FINAL
DRAINAGE REPORT

Greenfield and Ray Road Realignment

Prepared for The

Town of Gilbert, Arizona

Prepared By:

INCA ENGINEERS INC.

February 10, 2003

FINAL
DRAINAGE REPORT

Greenfield and Ray Road Realignment

ADDENDUM NUMBER 1

Prepared for The

Town of Gilbert, Arizona

Prepared By:

INCA
INCA ENGINEERS INC.

Registered Professional Engineer (Civil)
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February 10, 2003

Addendum April 21, 2003

e) On the south side of Ray Road, drainage on the private property from the Eastern Canal to 156th Street, and off-site drainage, is being retained in existing facilities. From 156th Street to East of the Future Santan Freeway the land is agricultural. The off-site flows are tail waters which enter the irrigation canals at present. There are new tail water facilities proposed to continue to accept the water until such time as the property is developed. There are currently plans to develop the property.

f) Ray Road east of the Santan will continue to drain to the south and west in existing ditches until the new Santan Freeway channel is constructed. The Agricultural land east of the relocated Greenfield Road and north of the UPRR will be drained to the new retention Basin B.

g) The existing retention basins along the existing Greenfield Road north of Camellia Road will be relieved by new catch basins and storm drains and the flow will be retained in retention Basin B.

h) The off-site flow along Knox Road will continue in the gutter line from east to west. A high point in the grade of the realigned Greenfield Road will provide for the flow to continue in its present course. The agricultural land west of the realigned Greenfield Road and north of the UPRR will continue to flow to the west to the Crossroads Park Lake.

Appendix 1, Section 2 (Retention Basin Capacities) is revised to add the following:

<u>RETENTION BASIN A</u>

The Town of Gilbert has elected to revise the design of Retention Basin A and the inlet storm drain structure to provide a bubble up structure and a shallow, larger Retention Basin sized per the volumes shown in the Final Drainage Report. Dry wells will be provided to provide positive drainage of the retention basin and storm drain in the required 36 hours.

TRANSMITTAL FORM

INCA 20th ANNIVERSARY 1983-2003

3800 N. Central Avenue
Suite 200
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Phone: (602) 277-8161
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To: Maricopa County Flood Control District
2801 West Durango
Phoenix, Arizona 85009

Date: April 22, 2003

Subject: Project No. ST065
Final Drainage Report
Addendum Number 1

Attn: Julie Cox

We Are Transmitting:

x Herewith
___ Under Separate Cover

Number of Copies:

1 Sets
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The Following:

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___ SF 254 / SF255
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x As Noted Above

For:

___ Review and Comment
___ Approval
___ Signature
___ Your Use and Files
___ Quotation
___ Payment
x As Requested
___ Action Noted Below

Remarks:

Per your request.

Sincerely Yours,

John A. Gleason

cc: Rick Allred, Town of Gilbert
File, 69446/3-6

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DRAINAGE REPORT

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Town of Gilbert, Arizona

February 10, 2003

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ARIZONA, U.S.A.

A Portion of Sections, 21, 22, 27, and 28 T1S, R6E, G&SRB&M
Town of Gilbert, Arizona

Greenfield and Ray Road Realignment
Final Drainage Report

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Greenfield and Ray Road Realignment
Final Drainage Report

I. Report Overview

This report describes the basis for design of stormwater management facilities for the proposed realignment of Greenfield and Ray Roads within the Town of Gilbert, Arizona. The scope of the report is based upon the Project Procedures Manual dated April 12, 2002. There are two major types of facilities described in the report: 1) conveyance and detention facilities, and 2) pump station facilities.

Sections III and IV describe the design criteria and data/assumptions underlying the design. Then each major facility type, size and location is described starting first with the conveyance and detention basins (Section V) and then the pump station facilities (Section VI). Facility designs have been completed to approximately 60% level of detail. Plan and profile drawings have been prepared to accompany the report.

The pump station design includes the following potential components: 1) inlet pipe and wet well transition apron, 2) pump station wet well (sump), 3) valve box, 4) pump discharge piping and outlet box, and 5) outlet box discharge pipe/culvert to the Crossroads Park flood conveyance channel. The pump size selection is based upon comparing the operation of different sizes of the wet well storage versus pump capacity. The storage obtained by utilizing the inlet pipe was considered in this analysis.

Appendices contain the calculations and computer simulation information. Appendix 1 contains information used for the HEC1 hydrologic and hydraulic analyses for conveyance and detention facilities. Appendix 2 contains information used to determine the type, size and location of pump station facilities. Appendix 3 contains hydrology and hydraulic calculations for the ADOT Rational design basis of the storm drains and catch basin inlets.

The project vertical datum is as follows: 1) Ray Road from the Eastern Canal to the Realigned Greenfield Road is on Town of Gilbert Datum. 2) The remainder of the Project is on ADOT datum. 3)The calculations herein for the new pumping station are Town of Gilbert datum. The conversion factor (number) from Town of Gilbert datum to ADOT datum is +1.55 feet.

II. Summary

Ray Road

Ray Road is a major arterial. It will be widened, re-aligned and re-graded. The proposed storm drain system between stations 23+89 to 16+17 is an enclosed underground system with approximately 5,030 lineal feet (LF) of 42-, 36-, 24- and 18-inch storm drain pipe, cross drain pipe between catch basins and manholes, manholes and catch basins, and headwalls with access barriers. The catch basin spacing is approximately 300-foot intervals. The outfall for the storm drain will be a new detention basin located on the north side of Ray Road east of the Eastern Canal. This will be an earthen basin with 3 H to 1 V side slopes. The detention basin will be approximately 10 feet deep and will require fencing. Dry wells will be provided as required to percolate accumulated stormwater from the design storm event within a 36-hour time period.

BASIN A

Greenfield Road

Greenfield Road is a major arterial that will be relocated in a depressed roadway to underpass the Union Pacific Railroad. The proposed storm drain system between stations 21+00 to 43+60 is an enclosed underground system. There will be a pumping station located at the north west intersection with the Union Pacific Railroad. The storm drainage system within the roadway will consist of approximately 2,834 LF of 36, 24 and 18-inch storm drain pipe, cross drain pipe between catch basins and manholes, manholes and catch basins, and headwalls with access barriers. The catch basin spacing is approximately 300-foot intervals.

In addition, to the depressed roadway portion of the realigned road, a segment that does not drain to the sag of the new road profile will be drained to a new temporary retention basin southeast of the new Greenfield Road and north of the Union Pacific Railroad. This basin is considered temporary since the development of the property may include moving it to another location. This will reduce the cost of the pumping station. Storm drainage will be collected between station 43+90 to 51+00. This storm drainage conveyance system will consist of approximately 2,043 L.F. of 30, 24- and 18-inch storm drain pipe, cross drain pipe between catch basins and manholes, manholes and catch basins, headwalls with access barriers and retention basin. The catch basin spacing is approximately 300-foot intervals. The retention basin design concept is an earthen basin with 4H to 1V side slopes excavated approximately 11 feet. Due to the depth, fencing will be provided. The basin plan is shown in Appendix 3.

Pumping Station

The pumping station will be located northeast of the new Greenfield Road alignment and the Union Pacific Railroad Bridge. The pumping station will be sized for the peak flow from a 50-year, 24-hour storm. The design capacity of the pump station is 13,440 gallons per minute (GPM). Three main stormwater pumps are proposed. Each has a design discharge capacity of 6,720 GPM. Two pumps provide the station capacity, and a third redundant pump is provided in the event of the failure of one of the main pumps.

The station will have a cast-in-place sub-structure and the superstructure will have a finished floor above the 100-year flood plain. The design proposed herein is based on installation of submersible pumps. Submersible pumps have been used extensively by ADOT for stormwater pumping stations in the Phoenix metropolitan area. There is a proven track record of performance for these pumps. Motor and ventilation controls will be located in a control panel on the slab. An A-frame gantry will be provided for equipment maintenance.

Stormwater disposal will be into the existing Crossroads Park stormwater detention basin. The pump discharge will first flow into an outlet discharge box west of the pump station and east of the detention basin. The discharge box will dissipate energy and transition flow from multiple pumps into a single 36-inch diameter outfall to the inlet channel of Crossroads Park detention basin. The outfall will pass beneath the existing access road. The outlet end of the outfall will include addition stone revetment for energy dissipation to protect the existing channel lining.

III. Design Criteria

The design criteria are provided in the Project Procedures Manual. Relevant design guidance documents include

- the drainage standards adopted by the Town of Gilbert
- Maricopa Association of Governments (MAG) Specification and Details
- Arizona Department of Transportation (ADOT) Chapter 600 Highway Drainage Design
- ADOT Highway Drainage Design Manual - Hydrology
- Federal Highway Administration (FHWA) Highway Stormwater Pump Station Design HEC-No. 24
- Federal Highway Administration (FHWA) Urban Drainage Design Manual HEC-No. 22, Chapter 4.4 Drainage Inlet Design
- Greenfield Road and Ray Road Railroad Crossing Study Report, INCA Engineers, Inc, July, 2001

Key design parameters include the following:

- retention basin capacity – storage for 50-year, 24-hour storm runoff with evacuation of storage within 36 hours
- cross culvert capacity – peak flow from 50-year, 24-hour storm
- storm drain capacity - 10-year, 1-hour storm
- pump station capacity – peak flow 50-year, 24-hour storm
- minimum pipe size 18 inches – per Town of Gilbert standards
- minimum flow velocity for design storm – 3 ft/s when flowing full
- hydraulic grade line in depressed roadways - 6 inches below the top of grate
- catch basin inlet capacity – flow capacity of inlets between 1.2 times design flow (0.8 capture ratio) for curb inlets and (0.5 capture ratio) for curb inlets in depressed areas.

IV. Data, Design Assumptions and Sources

The key data sources are as follows:

- surficial soil classification Group C (clay loam) – Soil Conservation Service soils map for Maricopa County
- average infiltration rate is 0.15 inches/hour – Soil Conservation Service soils map for Maricopa County
- rainfall intensity- frequency-duration relationships for design storms – ADOT Highway Drainage Design Manual – Hydrology
- 50-year, 24-hour storm depth of 3.0 inches - design directive Town of Gilbert
- 10-year, 1-hour storm depth of 1.50 inches - ADOT Highway Drainage Design Manual – Hydrology
- pump operating curve data – submersible pumps based on Flygt Pump Sizing Software (FLYPS 2.01)
- three primary stormwater pumps, any two providing the station capacity; third pump providing redundancy in event of failure of one pump
- a nuisance pump will be provided for seepage control and maintenance purposes

- Flygt submersible pump and motor control costs – James Hobson and Cook, Phoenix, AZ
- vault dimensions and capacities – Utility Vault Company, Chandler AZ
- stormwater management for the Greenfield Pump station will divert stormwater into the existing Crossroads Park stormwater detention basin
- stormwater management for the Ray Road system will consist of conveyance piping into a new stormwater detention basin adjacent to the RWCD Eastern canal — BASIN A
- stormwater management of the northern portion of the Greenfield Road re-alignment (between stations 43+60 to 51+00) will be provided by conveyance into a new stormwater detention basin southeast of the new Greenfield Road alignment near the intersection with the UPRR (this basin would also collect runoff across a large agricultural area between the new and existing Greenfield Roads) — BASIN B
- hourly rainfall data for Phoenix NWS weather station-Western Regional Climate Center Reno NV

V. Conveyance and Detention Facilities

Drainage Systems

This section covers the hydrologic and hydraulic analysis of proposed retention and conveyance facilities for Greenfield and Ray Road realignments. There are three major drainage systems:

1) the new Greenfield Road alignment from station 20+50 to station 43+60 that includes the drainage into the depressed highway section of the new road,
2) the new Greenfield Road alignment north from station 43+60 to the intersection with Knox Road (51+00), including a detention basin to collect runoff from the agricultural field between the new road alignment and the existing Greenfield Road alignment, and
3) the widened and realigned Ray Road from station 23+89 to 16+17 at the Union Pacific Railroad (UPRR) intersection.

The drainage areas are shown for each system in Table 1. Areas and percent impervious are based upon the 30% plan drawings. Subbasins were delineated for smaller areas of each system to obtain detailed peak flow estimates for pipe and catch basin inlet size calculations. The areas are thus delineated as the basis of HEC1 model analysis of the drainage areas and pumping station sizing. The HEC1 model was used for the basis of pumping station design. The ADOT Rational Formula used in the catch basin and storm drain design. The Rational Formula system design and drainage area maps are shown in Appendix 3.

Table 1: Drainage areas for major drainage systems

System/Subbasin	Area, acres	Area, sq.mi.	Percent impervious
Greenfield Rd 43+60 to 51+00			
1A	0.987	0.001541	77.3
1B	1.506	0.002352	80.5
Subtotal	2.492	0.003893	
Greenfield Rd 20+50 to 43+60			
1C	0.481	0.000752	75.23
2A	1.058	0.001652	84.9
2B	1.270	0.001984	85.0

System/Subbasin	Area, acres	Area, sq.mi.	Percent impervious
2C	0.886	0.001384	85.0
3A	0.415	0.000648	85.0
3B	1.223	0.001911	82.0
3C	1.105	0.001727	78.3
Subtotal	6.439	0.010061	
Ray Rd 23+89 to 16+17			
1A	0.58	0.000857	85.4
1B	1.165	0.001819	84.5
1C	1.644	0.002568	97.7
2A	1.797	0.002806	86.1
2B	1.778	0.002778	84.6
3A	1.801	0.002812	73.6
3B	2.181	0.003406	78.1
Subtotal	10.365	0.01619	

Drainage areas and percent impervious information were used in the input into the hydrologic model for runoff calculations.

Hydrologic Analysis Methods

The U.S. Army Corps of Engineers hydrologic program HEC-1 Flood Hydrograph Package (version 4.1, 1998) was used to calculate storm hydrographs and route flow through pipes into storage basins, and the pump station. This program was chosen because:

- it is frequently used in the Phoenix region for storm drainage and flood simulations
- it has ADOT documentation for selection of key hydrologic parameters and
- it allows integrated assessment of pump station operation with inflow hydrology.

The program also provides the capability to control operations of multiple pumps having different start/stop elevations in order to simulate the pump station operation more accurately.

Three models were created; one for each major drainage system described above. Ten-year (and 50-year at the pump station) storm events were simulated.

Electronic spreadsheets were used to calculate the stage-storage-infiltration relationships for storage basins proposed in the agricultural field adjacent to the new Greenfield Road alignment and the Ray Road improvements (near the RWCD canal). The saturated hydraulic conductivity of the retention basin was assumed equal to the average infiltration rate noted in Section IV. Darcy's equation was used to calculate the percolation rate flow rate over the basin at different stages. Discharge rates from the pervious retention basins were based upon the estimated total percolation rates. Shallow pit percolation tests were performed and final basin design and dry up calculations are presented in Appendix 3.

HEC-1 Input Data Development

Input for the HEC-1 program was prepared in accordance with modeling guidelines contained in ADOT's Highway Drainage Design Manual – Hydrology specifically for HEC-1 applications. This guidance recommends the use of the Green-Ampt equation for infiltration losses. Input Green-Ampt parameters were based on guidelines contained in the manual for clay loam soils.

The kinematic routing method was used for hydrologic routing flows computed for each subbasin in the model. The new Greenfield Road alignment from station 20+50 to station 43+60 was subdivided into seven subbasins. The new Greenfield Road alignment north from station 43+60 to the intersection with Knox Road, including a detention basin to collect runoff from the agricultural field was modeled as three subbasins. In addition to the basins shown in Table 1, the agricultural area that drains to this retention basin was included in the hydrologic model. The widened and realigned Ray Road from station 23+89 to 16+17 east of the UPRR was modeled as seven subbasins.

The hydraulic analysis of peak pipe flow depth was computed in HEC-1 using the kinematic routing method. This assumes that the stage is not affected by downstream flow control conditions. For the most part the steep slope in the pipes in the Greenfield Road system do not violate this assumption except for in the lowest section of the road. A separate analysis is provided for the inlet pipe to the pump station. The affect on retention basins is not significant.

The kinematic routing method does not consider the affect of energy losses on the hydraulic grade line due to form losses in manholes. However, these are considered to be less than 0.5 feet for most of the manholes in the system. The energy loss coefficient is about 0.2 for two-way storm sewer junctions. The peak flow velocities for the design storm are generally less than 10 ft/s and greater than 5 ft/s; therefore the maximum velocity head is approximately 1.5 feet; when this is multiplied by the loss coefficient, the energy form loss is estimated at about 0.3 feet at each manhole.

A rating curve was calculated for each pipe size (diameter) studied in the subbasin using the FLOWMASTER program by Haested Methods. The program calculates the normal depth-discharge relationship based on Manning's equation. The rating curves were input into the HEC-1 program to enable output of the peak flow depth obtained during each storm simulation. Pipe flow velocity is calculated during the HEC-1 simulation. Pipe size selection is based on design slopes over distances between subbasins.

Hydrologic/Hydraulic Results

Results of the analyses are summarized in the following subsections for each major drainage system. The input data development and the computer simulation output are provided in Appendix 1. The results of the analyses were used to prepare the final design plan and profile for each major system.

The pipe sizes determined with the model are equal to or greater than the minimum allowable diameter (18 inches). Partially full flow was computed in all of the pipes for peak design flow conditions. The minimum velocity of 3 ft/s flowing full was achieved in each pipe.

Greenfield Road

The new Greenfield Road alignment from station 20+50 to station 43+60 that includes the drainage into the depressed highway section of the new road was divided into two main sections, 2 and 3, that drain south and north respectively. Each of these sections was subdivided further into subbasins. Section 1 is the at grade portion of the new Greenfield Road which flows to retention basin B. The two sections in the Greenfield Road system were subdivided to evaluate peak flows at smaller road intervals. Average pipe slopes were designed that correspond approximately with the average road grades for each subbasin.

The proposed conveyance system is assumed to be a single main pipeline beneath the median strip in the center of the highway with connecting storm drains at catch basin locations. Catch basin spacing is approximately 300 feet. The adequacy of this spacing and the size of catch basin opening are evaluated in a subsequent section.

The results of the HEC-1 hydrograph simulations are summarized for this drainage system in Table 2. This system includes proposed in line storage of a portion of the stormwater during storm events in two segments of 36-inch pipe beneath the roadway and the 36-inch inlet pipe to the wet well. The size of the wet well and the inlet pipe storage studied in the pump storage analysis are described in Section VI of the drainage report.

Table 2: Summary of hydrology & pipe hydraulic capacity results for Greenfield Road stations 20+50 to station 43+60

Stations of Subbasin Limits (subbasin)	10-year peak flow, cfs	10-year peak flow depth, ft [1]	50-year peak flow, cfs	Design pipe diameter, in	Length of down-stream main pipe, ft	Design average pipe slope, percent
43+60:42+00 (1C)	2.47	0.43	3.57	18	410	1.5
42+00:37+90 (2A)	7.90	0.72	11.41	18	495	2.6
37+90:32+95 (2B)	14.21	1.06	20.59	18	310	2.0
32+95:29+90 (2C)	18.46	1.07	26.66	36	35	1.0
27+88:29+90 (3A)	13.93	0.91	20.25	36	145	1.0
23+40:27+88 (3B)	12.13	0.94	17.47	18	235	2.6
21+00:23+40 (3C)	5.82	0.61	8.32	18	235	2.5
29+59.61 to Wet Well	32.4	1.46	46	36	100	1.0

Notes: [1] depths based on normal depth calculation and do not consider backwater due to stormwater storage in downstream pipe

Based on the proposed 13,440 GPM (30 CFS) pump station capacity, the maximum pump station discharge during the 50-year storm event is 30 cfs.

Hydraulic analysis of the maximum stage at the inlet pipe manhole connecting the storm drainage conveyance to the wet well was based on culvert flow model (CULVERTMASTER). The storage in the inlet pipe during the 50-year design storm changes the flow in the inlet pipe from an inlet to outlet control condition due to the water surface allowed in the wet well.

The hydraulic analysis of the inlet pipe is shown in Appendix I in the pipe capacity calculation section. The results indicate that the maximum allowable wet well elevation is 1248.7 feet. At this level in the wet well, the maximum water surface elevation in the inlet manhole is 1250.18 feet for the peak inflow to the manhole estimated by HEC-1 at 46.0 cfs for the 50-year storm. The maximum allowable water surface in the manhole is estimated at 1250.2 feet; this is approximately the lowest finished grade in the sag section of the road. The analysis of the pump station operation (in Appendix II) indicated the maximum wet well elevation during the 50-year storm is expected to be 1,247.1 ft. The manhole inlet water elevation for this tailwater (1247.1 feet) is 1,248.37 feet, about 1.8 feet lower than the maximum allowable elevation. Considering other hydraulic losses will be less than 0.5 feet, the hydraulic grade line will be more than 0.5 feet below the top of the lowest inlet grate for the design storm.

Ray Road

The widened and realigned Ray Road from station 23+89 to 16+17, east of the Union Pacific Railroad (UPRR) intersection, was divided into three main sections: sections 1, section 2 and section 3 that drain west toward the East ern and RWCD canals. Average pipe slopes were assumed that correspond approximately with the average road grades for each subbasin. The three sections in the Ray Road system were subdivided further into subbasins to evaluate peak flows at smaller road intervals.

The proposed conveyance system is assumed to be a single main pipeline beneath the median strip in the center of the highway with connecting storm drains at catch basin locations. Catch basin spacing is approximately 300 feet.

The results of the HEC-1 hydrograph simulations are summarized for this drainage system in Table 3. This system includes a proposed retention basin for stormwater. The size of the basin selected for this simulation has dimensions of 100' w x 5.25' h x 100' l. The assumed invert elevation of the new detention basin was 1260.0 feet.

The outlet design for this basin includes a weir outlet structure at the west end. The actual design of this basin is presented in Appendix 3. The basin will infiltrate by percolation and by stormwater discharge into two dry wells to evacuate the basin during storm events within the required 36 hours. The basin is oversized for the Q_{50} 24hour storm event. Discharge is not expected; however, the proposed overflow weir will allow water to flow west to the existing Eastern Canal.

Table 3: Summary of hydrology & pipe hydraulic capacity results for Ray Road stations 23+89 to station 16+17

Stations of Subbasin Limits (subbasin)	10-year peak flow, cfs	10-year peak flow depth, ft [1]	50-year peak flow, cfs [2]	Design pipe diameter, in	Length of down-stream main pipe, ft	Design average pipe slope, percent
16+17:14+00 (1A)	2.84	0.53	n/a	18	450	0.8
14+00:9+50 (1B)	8.65	1.07	n/a	18	537	0.8
9+50:4+13 (1C)	16.82	1.56	n/a	24	592	0.5
4+13:41+98 (2A)	25.15	1.95	n/a	36	620	0.2
41+98:35+78 (2B)	32.16	2.08	n/a	40	609	0.2
35+78:29+69 (3A)	39.06	2.35	n/a	40	580	0.2
29+69:23+89 to Retention (3B)	47.37	2.79	n/a	40	100	0.2

Notes: [1] stages based on normal depth calculation and do not consider backwater due to stormwater storage in downstream retention basin
[2] n/a indicates not available

A second HEC-1 simulation was conducted for this system to determine the stage in the pond after 36 hours. The conclusion is that the pond will not be evacuated by shallow percolation alone, and therefore dry wells are recommended to achieve greater rate of percolation. Subsequent evaluation present in Appendix 3 after field percolation tests also show that this basin will not evacuate within 36 hours and two drywells will be required.

North Portion Greenfield Road and Agricultural Runoff

The new Greenfield Road alignment north from station 43+60 to the intersection with Knox Road, including a retention basin to collect runoff from the agricultural field between the new road alignment to the existing Greenfield Road alignment, was divided into three subbasins. These subbasins include the Greenfield road section 1 and the agricultural field that drains westerly toward the new Greenfield alignment. An average pipe slope for the road drainage system was assumed that corresponds approximately with the average road grade for section 1.

The proposed conveyance system for the new section of Greenfield Road is a single main pipeline beneath or adjacent to the median strip in the center of the roadway with connecting storm drains at catch basin locations. Catch basin spacing is approximately 300 feet.

The results of the HEC-1 hydrograph simulations are summarized for this drainage system in Table 4. This system includes a proposed retention basin for stormwater. The retention basin was originally a teardrop shape with the widest portion near the UPRR. At the northern end it terminated at a point. The size of the basin selected for this simulation has dimensions of 225' width x 10' height x 600' l. The assumed invert elevation of the new detention basin is 1264.40 feet. The peak stage for the design storm, was 1.0 feet and peak storage approximately 1.6 ac-ft.

BASIN B

Table 4: Summary of hydrology & pipe hydraulic capacity results for Greenfield Road stations 51+00 to station 43+60

Stations of Subbasin Limits (subbasin)	10-year peak flow, cfs	10-year peak flow depth, ft [1]	50-year peak flow, cfs [2]	Design pipe diameter, in	Length of down-stream main pipe, ft	Design average pipe slope, percent
51+00:48+50 (1A)	4.98	1.16	n/a	18 & 24	490	0.25
48+50:43+60 to SE Detention (1B)	12.12	1.77	n/a	24	865	0.25

Notes: [1] stages based on normal depth calculation and do not consider backwater due to stormwater storage in downstream retention basin

[2] n/a indicates not available

A second HEC-1 simulation was conducted for this system to determine the stage in the pond after 36 hours. The conclusion is that the pond will not be evacuated by shallow percolation alone, and therefore dry wells are recommended to achieve greater rate of percolation and positive dry up..

Catch Basin Inlet Capacity

The inlet capacity of the catch basins in each subbasin was determined using procedures in FHWA's Urban Drainage Design Manual (HEC-22). ADOT C-15.20 catch basin standard design was assumed. This design consists of a 6-inch high sweeping curb inlet. The curb inlet can have lengths varying between 3-, 6-, 10-, or 17-feet.Capture ratios of 0.8 and 0.5 were used for the curb inlets. Table 5 summarizes the results of the inlet capacity analysis requirements based on the Rational Formula. The detailed calculation results of the inlet capacity and selected curb inlet length are provided in Appendix 3.

Table 5: Catch Basin Inlet Capacity Summary

Subbasin	Start Stations	Peak inlet Flow, cfs	Curb Opening Capacity, cfs	Required Curb Inlet Length, ft	Provided Curb Inlet Length, ft	Bypass Flow cfs	Inlet Capture Ratio
Ray Road							
DA 1&2	25+42.78	5.45	7	15.47	20.58	0	0.80
DA 3	29+70	1.91	1.92	13.52	13.58	0	0.80
DA 4	32+76	1.57	1.82	9.63	13.58	0	0.80
DA 5	36+37	1.57	To existing	Catch basin	NA		
DA 6	35+85	1.9	1.94	13.03	13.58	0	0.80
DA 7	38+88	1.94	2.32	14.07	20.58	0	0.80
DA 8	38+88	1.96	2.34	14.16	20.58	0	0.80
DA 9	42+00	1.86	2.03	11.32	13.58	0	0.80
DA 10	42+00	1.86	2.03	11.32	13.58	0	0.80
DA 11	44+98	2.83	2.89	19.78	20.58	0	0.80
DA 12	44+98	1.49	1.53	13.01	13.58	0	0.80
Equation 46+57.81 LB = 2+80.60 LA							
DA 13	18+85.36 GF	0.87	0.90	9.10	9.58	0	0.80
DA 13A	4+22.33 Ray	0.61	0.62	6.38	6.58	0	0.80
DA 14	18+85.36 GF	0.47	0.49	6.26	6.58	0	0.80
DA 15 & 17	7+16.46	2.87	3.33	17.41	20.58	0	0.50
DA 16 & 18	7+16.46	3.21	3.33	19.77	20.58	0	0.50
DA 19	9+70	2.49	2.70	17.67	20.58	0	0.80
DA 20	9+70	1.78	1.86	12.57	13.58	0	0.80
DA 21	13+70	1.58	1.63	12.84	13.58	0	0.80
DA 22	13+70	1.32	1.44	11.72	13.58	0	0.80
DA 23	17+70	0.86	0.93	8.47	9.58	0	0.80
DA 24	17+75	1.22	1.35	7.78	9.58	0	0.80
Greenfield Road							
DA 25	21+00	0.53	0.54	6.48	6.58	0.00	0.80
DA 26	20+83.05	0.61	0.67	8.47	9.58	0.00	0.80
DA 27	23+40	2.20	2.44	17.04	20.58	0.00	0.80
DA 28	23+40	3.39	3.28	21.82	20.58	0.11	0.80
DA 29	26+40	2.75	2.77	20.35	20.58	0.00	0.80
DA 30	27+65	4.08	3.59	25.55	20.58	0.49	0.80
DA 31	27+70	1.25	1.35	11.97	13.58	0.00	0.80
DA 32	NOT USED						
DA 33 & 35	29+42	4.85	5.84	31.18	38.08	0.00	0.50
DA 34 & 36	29+42	6.28	7.68	30.68	38.08	0.00	0.50
DA 37	32+95	2.20	2.40	17.71	20.58	0.00	0.80
DA 38	32+95	2.20	2.50	16.11	20.58	0.00	0.80
DA 39	35+35	2.33	2.54	17.62	20.58	0.00	0.80
DA 40	35+35	2.33	2.54	17.62	20.58	0.00	0.80
DA 41	37+90	2.38	2.64	16.83	20.58	0.00	0.80

Table 5: Catch Basin Inlet Capacity Summary (Continued)

Subbasin	Start Stations	Peak inlet Flow, cfs	Curb Opening Capacity, cfs	Required Curb Inlet Length, ft	Provided Curb Inlet Length, ft	Bypass Flow cfs	Inlet Capture Ratio
DA 42	37+90	2.38	2.64	16.85	20.58	0.00	0.80
DA 43	40+50	1.41	1.46	9.24	9.58	0.00	0.80
DA 44	40+50	1.37	1.55	12.17	13.58	0.00	0.80
DA 45	42+00	1.69	1.63	10.25	9.58	0.06	0.80
DA 46	42+00	0.85	0.99	8.64	9.58	0.00	0.80
DA 47	44+45	2.56	2.85	16.41	20.58	0.00	0.80
DA 48	43+82.11	2.56	2.89	15.69	20.58	0.00	0.80
DA 49	46+65	1.08	1.10	9.34	9.58	0.00	0.80
DA 50	46+65	1.08	1.09	9.38	9.58	0.00	0.80
DA 51	50+34.15	2.31	2.60	16.34	20.58	0.00	0.80
DA 52	50+34.15	2.31	2.60	16.34	20.58	0.00	0.80
DA 53	To Knox Road						
DA 54	To Knox Road						
DA 55	1+50 Camelia	0.83	0.90	5.59	6.58	0.00	0.80
DA 56	1+50 Camelia	1.03	1.04	6.49	6.58	0.00	0.80
DA 57 & 58	Median Flush	2.93	4.11	Single			0.50
DA 59	Median Flush	1.27	4.11	Single			0.50

VI. Pump Station Facilities

Design Overview

Stormwater runoff along the new Greenfield Road alignment between station 20+50 to station 43+60 will be collected and conveyed to new pump station facilities. The stormwater will be diverted at an inlet manhole at approximate centerline stationing 29+53 through an inlet pipe to the pumping station. The new facilities include:

- an 36-inch diameter inlet pipe to convey stormwater flow onto a flow transition apron at the inlet of the pump station wet well
- a wet well to supply flow and provide submergence over the pump intakes, as well as storage to increase pump operation times
- discharge piping from the pumps to an outlet discharge box that recombines flow from each pump and directs it to the outfall culvert to Cross Road Park detention basin
- a valve box between the pump wet well and the discharge box to shelter air release/vacuum valves on each discharge pipeline and pipe couplings between horizontal and vertical pipe runs
- an outlet discharge box pipe outfall that acts as a culvert beneath the access road to the eastern border of Crossroads park; this pipe discharges to the riprap lined channel that enters the park detention basin.

The design of the pump station was prepared in accordance with the guidelines in Federal Highway Administration (FHWA) Highway Stormwater Pump Station Design HEC-No. 24. Detailed information used to prepare the pump station facility plan is contained in Appendix 2.

An important aspect of the design is the pump and storage facility size analysis. ADOT Chapter 600 Highway Drainage Design (Section 614 – Pump Stations) recommends, for depressed highway stations, providing storage to reduce peak discharge to be pumped and to reduce long-term operational costs of the station. The primary effect of storage is to attenuate the peak discharge rates and (as storage increases) increase the pump operating time. Longer operating time is preferred to insure the manufacturer's maximum number of operating cycles per hour is not exceeded. The minimum operation cycle times for the Flygt submersible pump sizes being considered for the Greenfield station is four (4) minutes, i.e. a maximum of 15 starts per hour.

The key steps in the design process were:

1. site planning and criteria identification
2. inflow hydrograph development
3. preliminary collection system layout and initial wet well dimensions determination
4. stage-storage curve development
5. optimization of pump size versus storage requirements for the design storm
6. selection of pump capacity and pump operating level determination
7. verification of pump and storage capacity by simulating pump station performance during historical storms

The site selected for the pump station is in close proximity to the lowest portion of the depressed road section on the northwest side of the right of way on the highest ground between the road and the proposed discharge disposal point, the Crossroads Park detention basin. The pump station site is approximately 55 feet northeast of the 100 foot UPRR right of way and 30 feet northwest of the proposed Greenfield Road right of way. The wet well is located approximately five feet from the closest point of the proposed natural gas pipeline 70-foot wide easement across the southern portion of the property.

The inflow design hydrograph was developed using HEC-1 assuming all drainage between Greenfield Road realignment stations 20+50 to 43+60 drains to the low point in the road profile. The contributing drainage area is 6.4 acres. The 50-year 24-hour peak inflow rate to the diversion manhole is 46 cfs. Drainage to the north along the realigned road is to be diverted to the southeast of the depressed road portion. This drainage design concept is consistent with the Greenfield Road and Ray Road Railroad Crossing Study Report (INCA Engineers, Inc, July 2001).

The conveyance collection system was developed as described in the previous section of the report. Detention storage for the pump station is achieved by over sizing the inlet pipe to the wet well and taking advantage of the shape of the inlet apron to provide storage volume in addition to the wet well itself.

The next subsection describes in greater detail the process and results used to study pump/storage capacity combinations. Plan and profile drawings of the overall pump station facilities, the wet well, and valve box are provided in the exhibits.

Pump and Storage Capacity Options

A preliminary evaluation of alternative pump and storage combinations presented in the 30 percent drainage design report indicated that total construction costs of pump capacity and storage capacity did not vary significantly in relation to the pump station capacity. For example, total cost differential between the 9,000-gpm and the 17,000-gpm capacity pump station is estimated at approximately $31,000; the smaller pump capacity station was estimated to cost slightly more for construction cost based on the estimating procedure used.

The component costs based on the 30 percent design concept are shown in Table 6. Construction costs were estimated for only the major components of the pump station facility that varied with pump capacity.

Table 6: Comparison of pump station facility component costs versus station capacity

Pumping Capacity [1]		Storm-water detention vault length, ft, [2]	Storm-water vault construction costs, $1000 [3]	Wet well construction costs, $1,000	Transition Chute construction costs, $1000	Pump construction costs, $1000 [4]	Total of vault, wet well, and pump costs, $1000 [5]
Station gpm (cfs)	**Single gpm (cfs)**						
4,480 (10)	**2240 (5)**	160	819	205	218	135	1,378
9,000 (20)	**4500 (10)**	88	476	233	296	224	1,229
13,440 (30)	**6720 (15)**	38	238	403	331	318	1,290
17,000 (38)	**8500 (19)**	0	0	481	348	369	1,198

Notes: [1] Total capacity equals single capacity times factor of 2.0; redundant third pump capacity provided but not included in capacity; nuisance pump capacity not included

[2] internal length dimension given; assumes 8-foot width and 8 foot height in median of roadway

[3] based on Utility Vault Company prefabricated vault

[4] based on Flygt submersible pump; three identical capacity pumps

[5] includes 25 % contingency; columns may not total due to rounding

In the 60% stage design, the roadway median storage vault concept has been eliminated from consideration. This avoids maintenance activities in the highway median. Storage is proposed by enlarging the wet well, providing an inlet apron (also desired for hydraulic flow transition reasons), and providing inline storage using the inlet pipe from the inlet manholes as well as small segments of the main conveyance system. However, higher storage cost for facilities constructed at the wet well site is expected to shift the optimum cost combination toward facilities with larger pump capacity.

Storage volume-elevation curves were computed for inlet pipes assumed to have a slope of 1 percent. The depth of storage in the pipes varied between 2.7 to 3.7 feet for 3.0 and 4.0-foot diameter inlet pipes, respectively. The depth was limited to insure that the length of pipe assumed for storage purposes at the design slope could be achieved when designing the main conveyance pipeline. For example, assuming a 36-inch diameter inlet pipe, the length of the pipe containing storage is approximately 270 feet. This length requires 100 feet of inlet pipe plus 175 feet of storage in 36-inch diameter pipes on either side of the inlet diversion manhole. The proposed design provides 200 feet of 36-inch pipe on either side of inlet manhole and therefore exceeds the assumed length.

A series of pump and storage size combinations were analyzed using HEC-1 to simulate 50-year, 24-hour storm event. The results are summarized in Appendix 2. Each combination meets or exceeds the minimum requirement of limiting the design water surface in the wet well to approximately 1248.0 feet. This elevation is two feet below the low point elevation (1250.0 feet) of the road grade in the depressed road section. Head losses for flow through the inlet pipe into the manhole are estimated at approximately 1.1 feet. Therefore the peak water surface at the lowest catch basin in the depressed road section is estimated to be not less than 6 inches below the roadway surface.

A preliminary set of start/stop elevations were assumed for the lead and lag pumps for these simulations. The assumed values were the same in each simulation. A refined evaluation of the start/stop elevations was prepared once final wet well size and pump selections were determined. The start between the lead and lag pump should be minimized as much as possible without allowing water waves in the wet well to trigger unnecessary starts. Another consideration is that if obstructions such as large pieces of gravel or wood occur in the lag pump intake, the third redundant pump should be brought on line relatively soon after the water level continues to rise in the wet well before the high water level alarm is reached.

Based on the results of the initial series of 50-year storm simulations, the capacity requirements of each major component (pump, wet well, and inlet pipe size) were determined. Table 7 provides the summary results of these simulation runs.

Table 7: Greenfield Road pump station capacity and detention storage combinations for design storm event

Pumping Capacity [1]		**Detention storage capacity, cu ft [3]**	**Peak water surface elevation, ft [2]**	**Minimum run time, minutes**	**Maximum number of cycles per hour**
Station	**Single gpm (cfs)**				
4,480 (10)	**2240 (5)**	24,670	1244.8	4	2
9,000 (20)	**4500 (10)**	16,435	1244.7	2	4
13,440 (30)	**6720 (15)**	10,050	1248.1	2	4
17,000 (38)	**8500 (19)**	9,550	1245.6	2	4

Notes: [1] Total capacity equals single capacity times factor of 2.0; redundant third pump capacity provided but not included in capacity; nuisance pump capacity not included

[2] For design 50-year, 24-hour storm event not including effect of nuisance pump

[3] includes inlet apron, wet well, and inlet pipe storage

The number of starts and stops during the 50-year design storm event is shown in Figures 1 through 4 for each pump station capacity. Note the time ordinate is two minutes for each point on the figure.

Figure 1: Pump station cycling and storage elevation for design storm event – 17,000 gpm capacity

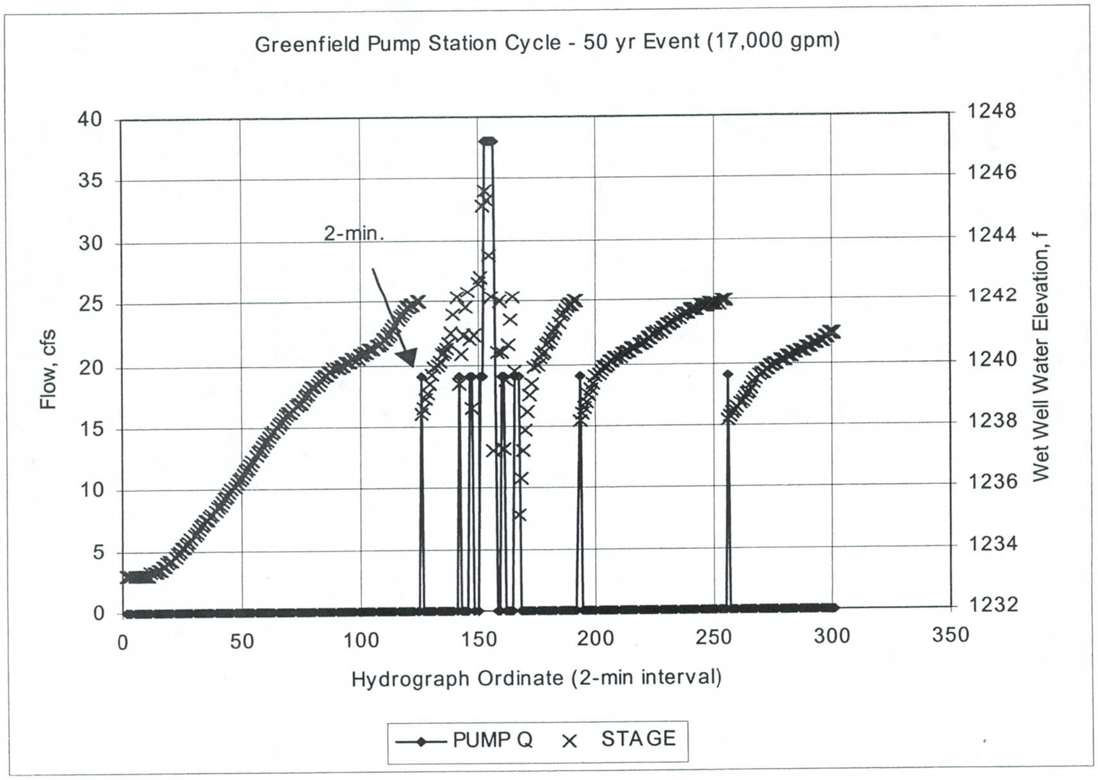


Figure 2: Pump station cycling and storage elevation for design storm event – 13,440 gpm capacity

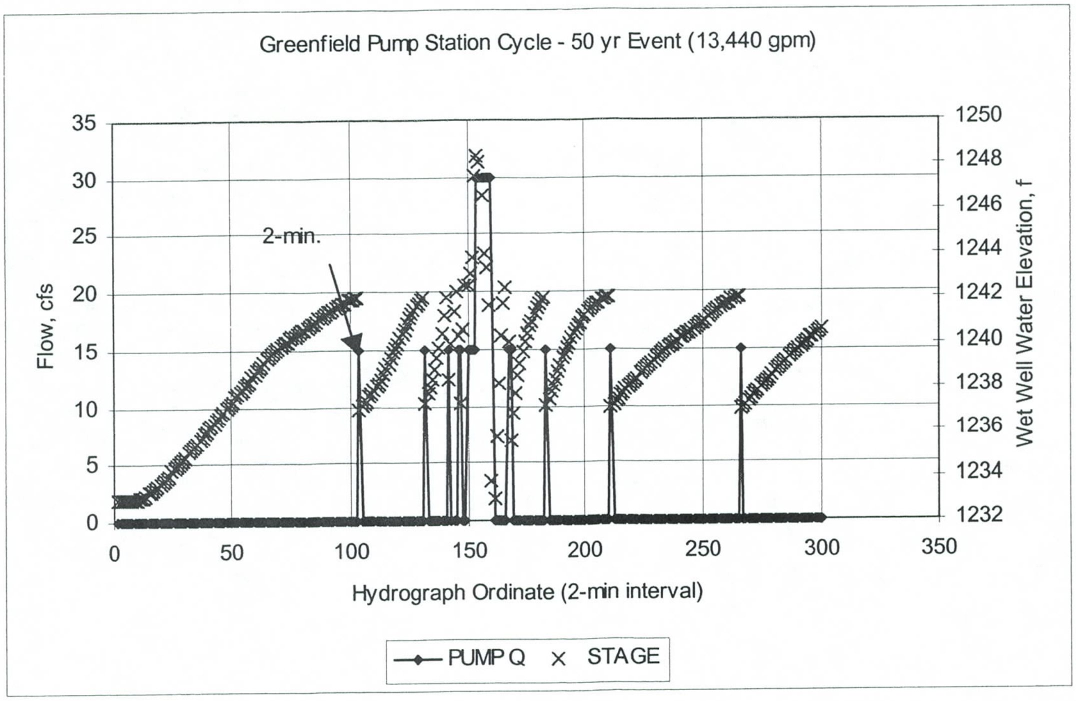


Figure 3: Pump station cycling and storage elevation for design storm event – 9,000 gpm capacity

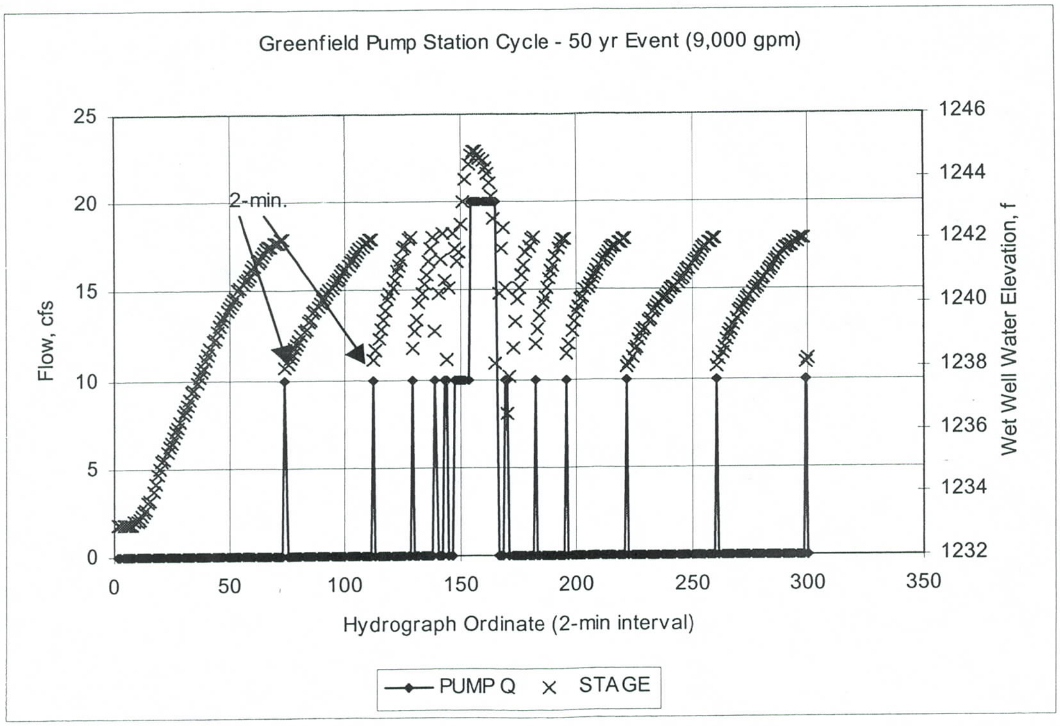
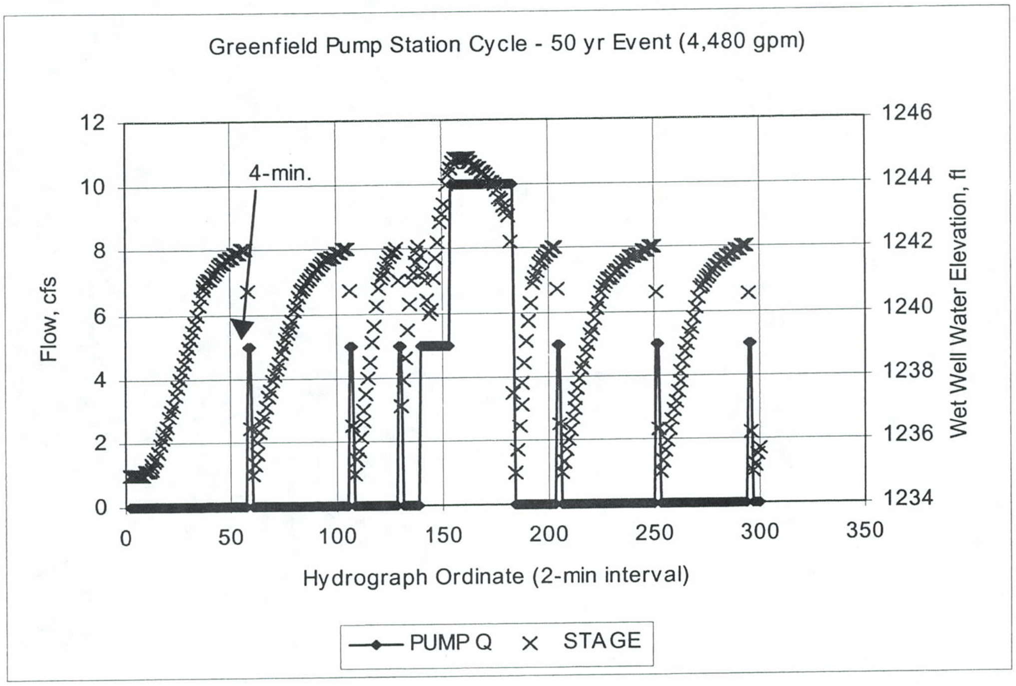


Figure 4: Pump station cycling and storage elevation for design storm event – 4,480 gpm capacity



The maximum number of start and stop increments in a one hour period is more in Figures 1 through 3 than in Figure 4 (approximately 4 versus 2). However, this number is not excessive and is less than the allowable maximum cycles.

Table 8 summarizes the size of the various components that provide storage volume in each combination evaluated. Note that the wet well invert elevations differ by a total range of approximately 2.4 feet. The selected site is shaded.

Table 8: Summary of wet well size and cycle volume calculations versus pump capacity

Pumping Capacity [1]		Inlet Apron Slope, degrees [2]	Wet Well Invert Elevation, ft [3]	Assumed Inlet Pipe Dia, inches	Wet Well Dimensions, ft (length x width) [4]
Station	**Single gpm (cfs)**				
4,480 (10)	**2240 (5)**	15	1234.83	48	20 x 15
9,000 (20)	**4500 (10)**	15	1233.65	40	23 x 17
13,440 (30)	**6720 (15)**	20	1232.82	36	23 x 20
17,000 (38)	**8500 (19)**	25	1232.24	36	23 x 23

Notes: [1] Total capacity equals single capacity times factor of 2.0; redundant third pump capacity provided but not included in capacity; nuisance pump capacity not included
[2] Angle from horizontal
[3] based on Hydraulic Institute criteria for pump submergence
[4] includes width needed for nuisance pump

The size of the wet well and submergence requirements were chosen after an evaluation of criteria from several sources:

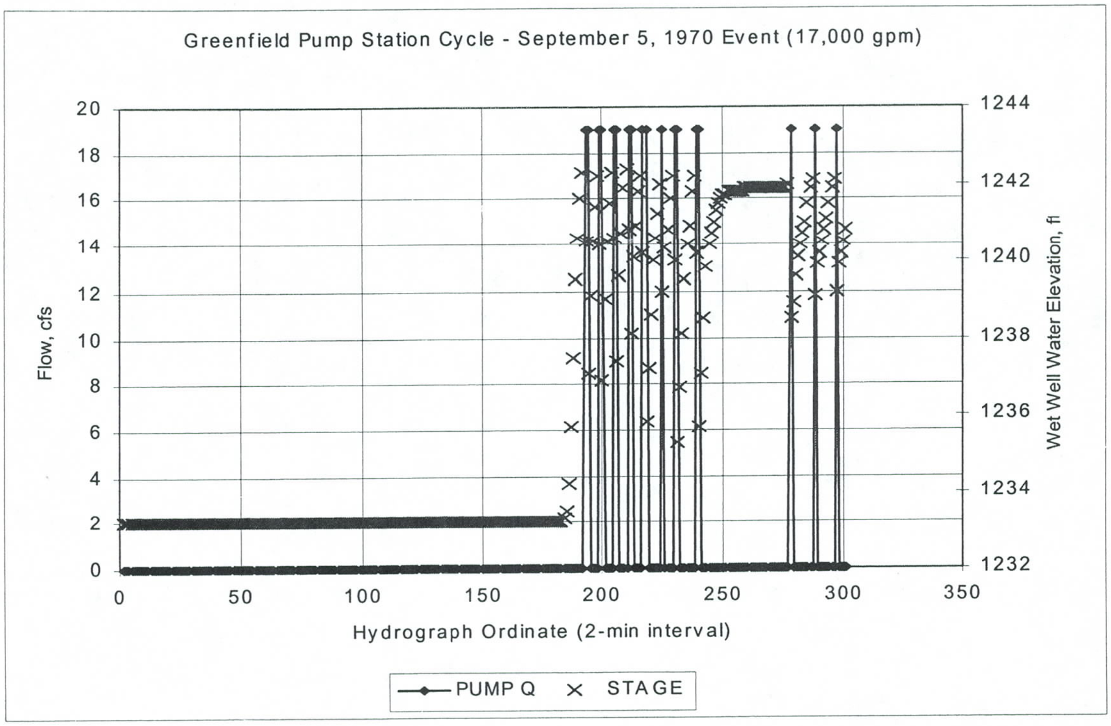
- Hydraulic Design Institute (as provided in FHWA Highway Stormwater Pump Station Design HEC-No. 24)
- Flygt Submersible Pump Catalogue (Sump Design from Nottingham Test Reports)
- Pumping Station Design (Robert L. Sanks, 1989, Butterworth Publishers)
- personal discussions with ADOT pump station maintenance supervisor and Flygt service representatives in Phoenix

Note that all of the wet well sizes are based on a rectangular geometry. The HDI criteria for wet well design indicates for individual pump capacities less than 5,000 gpm, circular wet wells are considered feasible, but for larger pump sizes (than 5,000 gpm) the Hydraulic Institute recommends modeling the performance of the circular wet well prior to adopting the design dimensions. Rectangular wet wells are preferred for large pump capacities. Circular wet wells were not considered in this study.

Although all of the simulation runs for the design storm do not exceed the maximum number of starts per hour, the prospect for a larger number of starts per hour occurs if the rainfall pattern varies significantly from the assumed peak alternating block rainfall distribution method used to generate a hypothetical rainfall pattern in the HEC-1 model. Therefore, a selected number of historical events were simulated based on the candidate pump capacity/storage combination. Hourly rainfall data obtained for the Phoenix weather station was used for storms that occurred on 9/5/70, 3/3/83, and 7/24/92. The total 24-hour rainfall for these events were 2.43, 1.98,and 1.66 inches, respectively.

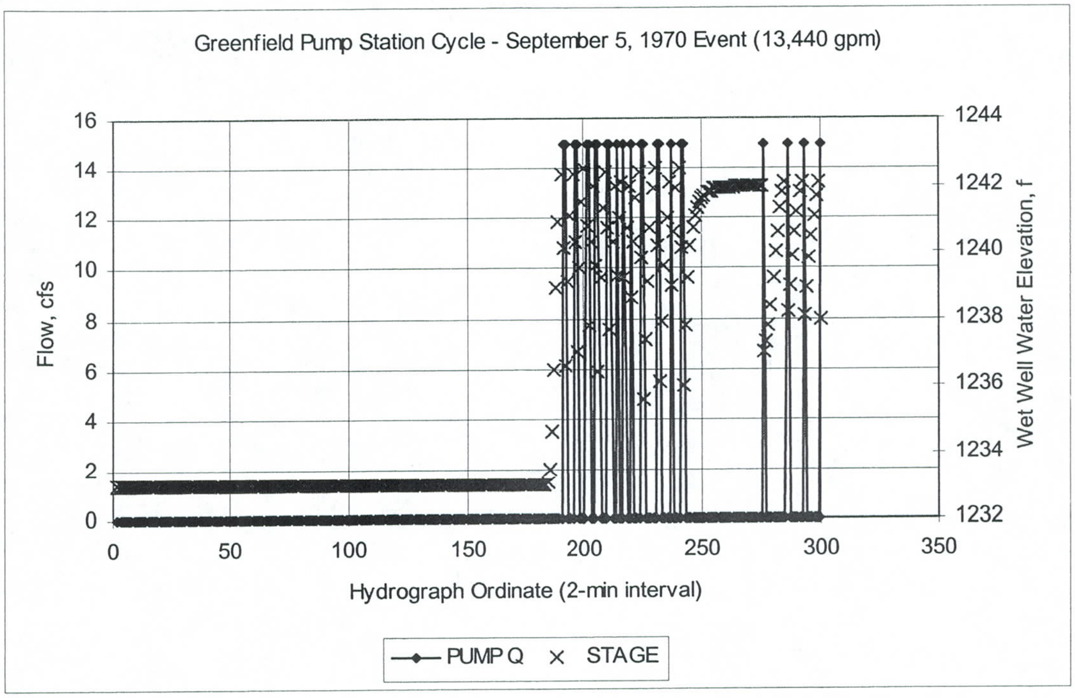
The 9/5/70 event imposes the most severe cycle time operation. Figure 5 shows the simulation results for the 17,000 GPM capacity pump station for this event.

Figure 5: 17,000 GPM Pump Station Operation Cycle for September 5, 1970 Event



In comparison Figure 6 shows the simulation results for the same event for the 13,440 gpm pump station capacity.

Figure 6: 13,440 GPM Pump Station Operation Cycle for September 5, 1970 Event



Note comparing Figures 5 and 6 that the peak wet well stage is similar (slightly higher than 1242 feet) and the maximum number of cycles per hour is 5 in Figure 5 versus 6 in Figure 6. There is no significant increase in cycles between the 17,000 compared to 13,440 gpm pump station capacities. Additional analyses contained in Appendix 2 indicate the decrease in cycles from the 13,440 to 9,000 gpm pump station is only one cycle per hour for the 9/5/70 event.

The 13,440 gpm station capacity (see highlighted row in Table 8) was adopted as the recommended pump capacity/storage combination. The reasons include:

- the maximum use of storage during the design event without exceeding the surcharge criteria for the roadway inundation
- the smallest acceptable pipe size considered for storage (36-inches) to meet hydrologic requirements for detention that has the shortest length of pipe at the assumed 1 percent pipe slope
- the smallest pipe size (36 inch) is technically feasible to use micro tunneling to construct whereas larger pipe sizes may become more difficult to install with this method
- a slightly smaller pump station size compared to the maximum pump station capacity has better performance during historical storm events in terms of pump cycle time
- the larger (8,500 gpm) pumps have greater weight and make the use of the proposed A-frame gantry for servicing system more problematic
- the 6,770 gpm pump has a lower motor horsepower (90 versus 110) compared to the 8,500 gpm pump and the motor speed (590 rpm) is less than 800 rpm

Speeds higher than 800 rpm have been found to result in excessive wear and maintenance costs.

System Head and Pump Performance Curves

Total dynamic head (TDH) estimates for each pump size were calculated based on the Bernoulli (energy) equation using an electronic spreadsheet shown in Appendix 2. The design procedure for multi pump installations normally calculates the system head curve based upon a common discharge pipe operations, however, the proposed discharge pipe installation is a single dedicated discharge line for each pump to the outlet box adjacent to the pump station. Therefore, the system curve is the curve for the individual pump.

Pump operating curves were obtained for Flygt submersible pumps from Flygt Pump Sizing Software (FLYPS 2.01). The operating range and efficiency for the pump operating on the system head curve is shown in the data provided in Appendix 2. The sensitivity of the recommended pump capacity (6,720 gpm) operation point to different wet well water elevations and different pipe roughness values is included in Appendix 2.

Additional Hydraulic Design Requirements

Additional hydraulic calculations are provided in Appendix 2 to estimate the hydraulic grade line from the wet well to the disposal point at the Crossroads Park detention basin channel. The key analyses are the design of the outlet discharge box and its outfall to Crossroads Park detention basin. The design of these features needs to establish the design water surface elevation in the outlet discharge box for pump capacity evaluation.

The final design report for the Crossroads Park detention storage and pump station facility does not contain information on the peak stages anticipated for 10- or 50-year storm events. The 100-year peak design water surface elevation is 1270.0 feet. A preliminary estimate of the 50-year stage can be made assuming the peak storage is in proportion to the peak 24-hour rainfall depths. The 50-year, 24-hour depth (based on the ADOT manual) is 3.3 inches. The 100-year, 24-hour rainfall depth is 3.6 inches. The ratio of the 50- to 100-year depths is 0.89. The Crossroads Park stage-storage volume relationship indicates the storage at 1266.0 feet is 305.6 acre-feet; at 1270.0 feet the storage is 451.81 acre-feet. The estimated elevation when the storage ratio is 0.89 (402.1/451.5 = 0.89) is approximately 1268.6 feet.

Based on a tailwater elevation of 1268.6 feet, the peak pump station discharge rate of 30 cfs produces a peak stage of approximately 1272.4 feet. If the 100-year water surface elevation (1270.0 feet) for the detention basin is used, the peak water surface elevation in the discharge box is also less than the planned invert elevations of the discharge pipes, 1273.10 feet.

A flap gate is proposed for covering the end of the discharge pipes into the outlet discharge box. The purposes of the flap gate include:

- closure of the discharge pipes when not in operation to reduce the inadvertent entry of foreign objects that could roll down the pipe into the pump
- prevent the emergency back flow of stormwater into the wet well if the pumps at the Crossroads park detention facility should fail, or the culvert into the detention basin (from the outlet discharge box) become blocked
- provide an alternative mechanism that could be used to allow stopping the stormwater pumps if the main sensors controlling the stop elevation should corrode and fail to signal shutoff to the control panel

The venting of air into and out of the pump discharge pipelines is another hydraulic design consideration. Each discharge pipe has approximately 40 feet of vertical rise followed by approximately 100 feet of nearly horizontal run to the discharge box. The flow velocity exceeds 10 feet/second at startup and standard design practice is to use a large capacity air release valve to vent the air just downstream of the vertical section of the discharge pipe. In addition, a smaller air release during operation will improve pump efficiency by releasing entrained air.

At pump shutoff, the pipeline water will be flow in reverse down the discharge pipe because the design for station does not include a check valve to prevent draining the pipe each time the pump stops. Discussions with the ADOT pump station supervisor and Flygt representatives indicate this is acceptable for the proposed pumps. However, at pump shutoff, the water column will drop into the wet well creating a vacuum in the discharge pipe. The vacuum will be created rapidly and the water column may surge up and down during the process of emptying the pipe. Experience with other stormwater pump stations in the metropolitan area has shown that the water column surging will result in alternation between air exhaust and intake into the pipe. This has resulted in severe opening and slamming of the flap gate on the outlet end of the pipe. To avoid this, a large capacity combination air release vacuum valve has been selected to facilitate ventilation of the discharge pipe. The valves are to be located in a valve box immediately outside the wet well. This vault also provides a location to construct a transition pipe coupling between the rise and run sections of the discharge pipes.

Pump Station Design Information

Design information for the electrical and mechanical design of the pump station is included in this section. The recommended pump size based on manufacturer's data is shown in Table 9. A proposed plan and hydraulic profile accompanies the design report submittal. The plan has been developed based on a pump station capacity of 13,440 gpm, i.e. 6,720 gpm single pump capacity.

Table 9: Design data for 13,440 gpm pump station capacity

Capacity [1]		**Single pump motor, horse-power**	**Pump motor speed (rpm) / voltage**	**Weight, lbs.**	**Starting current, amps [2]**	**Flygt Pump model/ impeller code**	**Discharge Pipe diameter, in**
Single gpm (cfs)	**Station**						
6720 (15)	**13,440 (30)**	90	590/460	5,940	565	CP 3400/735	16

Notes: [1] Total capacity equals single capacity times factor of 2.0; redundant third pump capacity provided but not included in capacity; nuisance pump capacity not included

[2] power supply should be designed assuming all three stormwater pumps operating simultaneously

The nuisance pump size has tentatively been selected at 450 gpm (1 cfs). An evaluation of the time required for this pump to dewater the wet well indicated this pump requires approximately two hours to pump from the lead pump off elevation to the minimum pumping water level for the nuisance pump.

A detail plan and elevation view of the wet well is provided. The wet well will be provided with an access ladder and ventilation. Both of the locations of these features must be chosen to minimize potential hydraulic effects in the wet well that could adversely affect pump performance. The access ladder can be located on the west (back) wall of the wet well behind the nuisance pump. This will reduce the potential for vortices to affect the main stormwater pumps during operation. The ventilation duct can be located in any corner provided that the bottom of the duct does not protrude beneath the highest water level in the wet well.

The instrumentation of the pump start/stop elevations needs to insure that the pumps will not inadvertently start within a couple of minutes of stopping. This is because the pump shafts will rotate in reverse as the water column drains from the discharge pipes through the pump impellers during draining after shutoff. The manufacturer recommends that the start elevation be sufficiently different so there is no possibility of the pump starting while the shaft is experiencing reverse rotation. Each 16-inch discharge pipe is filled with approximately 1,600 gallons of water. Assuming 10 feet per second discharge velocity, one should drain in less than 30 seconds if the pipe is completely vented. However, considering the forward momentum of the pump impellers, a couple of minutes should be allowed before restart.

The change in water surface elevation of the wet well will be about one foot assuming two main stormwater pumps shut off concurrently. This assumes shutoff at elevation 1240.0 feet and 428 cubic feet back flow into wet well. The proposed start/stop elevations are sufficiently different to prevent false starts.

Based on the considerations in the above paragraph and the evaluation of historical and design storm events using the hydrologic routing program (HEC-1), the following start/stop elevations are proposed in Table 10.

Table 10: Start and stop elevations for main storm water pumps

Action	Lead Pump #1	Lag Pump #2	Redundant Pump#3
Start	1242.0	1243.2	1244.0
Stop	1239.5	1240.5	1240.5

The redundant pump control should be set to initiate pumping relatively soon after the lag pump is started in the event that the lag pump's discharge rate is impaired (e.g. due to blockage of the impellers by a foreign object). This makes it apparent that the wet well is not drawing down. Note this requires the power supply provision for all three pumps operating simultaneously.

Minimum Wet Well Slab Elevation

The Federal Emergency Management Agency flood plain information maps were reviewed to determine if the proposed pump station is within a delineated flood plain area. A copy of the flood plain map for this portion of Maricopa County is contained in Appendix 1. The location of the proposed pump station site is outside the area delineated by Zone AE, the zone where the 100-year floodway has been determined. The site is within Zone X, the inundation area for 500-year flood or where the 100-year flood is less than one-foot depth.

The elevation of the 100-year flood near the intersection of the UPRR and the RWCD canal is 1271.4 feet based on the hydrologic/hydraulic analysis contained in the Flood Insurance Study, Gilbert-Chandler Area, Maricopa County, AZ for FEMA (1990). A copy of the page with this data taken from the report is provided in Appendix 1.

A minimum floor slab elevation of 1273.5 feet for the new pump station is proposed that will place all electrical equipment at least two feet above the estimated elevation of the 100-year flood and above more potentially severe flood events. The existing ground elevation at the proposed pump station site is approximately 1273.4.

The volume of stormwater pumped by the proposed pump station into the existing Crossroads detention basin is the same as the volume now existing from this area; however, with the change from the existing agricultural to roadway (impervious) soils the runoff rate is much greater. With the proposed pump station the flow will reach the detention basin faster with a faster rise in water surface within the basin; however, the increase in rate will not significantly impact the performance of that flood control facility. For example, the volume pumped by a 13,440-gpm capacity station during the design storm event will utilize approximately one acre-foot of storage capacity in the existing basin. The design water surface elevation for the Crossroads detention basin is 1270.0 feet. The basin is provided two feet of freeboard depth (making the top 1272.0 feet). The volume of additional storage provided in the basin between elevations 1270.0 and 1272.0 is approximately 108 acre-feet. Therefore, the increased volume pumped into the basin during the pump station design event represents about 1 percent of the volume in the freeboard zone above the basin's design water surface elevation.

The venting of air into and out of the pump discharge pipelines is another hydraulic design consideration. Each discharge pipe has approximately 40 feet of vertical rise followed by approximately 100 feet of nearly horizontal run to the discharge box. The flow velocity exceeds 10 feet/second at startup and standard design practice is to use a large capacity air release valve to vent the air just downstream of the vertical section of the discharge pipe. In addition, a smaller air release during operation will improve pump efficiency by releasing entrained air.

At pump shutoff, the pipeline water will be flow in reverse down the discharge pipe because the design for station does not include a check valve to prevent draining the pipe each time the pump stops. Discussions with the ADOT pump station supervisor and Flygt representatives indicate this is acceptable for the proposed pumps. However, at pump shutoff, the water column will drop into the wet well creating a vacuum in the discharge pipe. The vacuum will be created rapidly and the water column may surge up and down during the process of emptying the pipe. Experience with other stormwater pump stations in the metropolitan area has shown that the water column surging will result in alternation between air exhaust and intake into the pipe. This has resulted in severe opening and slamming of the flap gate on the outlet end of the pipe. To avoid this, a large capacity combination air release vacuum valve has been selected to facilitate ventilation of the discharge pipe. The valves are to be located in a valve box immediately outside the wet well. This vault also provides a location to construct a transition pipe coupling between the rise and run sections of the discharge pipes.

Pump Station Design Information

Design information for the electrical and mechanical design of the pump station is included in this section. The recommended pump size based on manufacturer's data is shown in Table 9. A proposed plan and hydraulic profile accompanies the design report submittal. The plan has been developed based on a pump station capacity of 13,440 gpm, i.e. 6,720 gpm single pump capacity.

Table 9: Design data for 13,440 gpm pump station capacity

Capacity [1]		**Single pump motor, horse-power**	**Pump motor speed (rpm) / voltage**	**Weight, lbs.**	**Starting current, amps** [2]	**Flygt Pump model/ impeller code**	**Discharge Pipe diameter, in**
Single gpm (cfs)	**Station**						
6720 (15)	**13,440 (30)**	90	590/460	5,940	565	CP 3400/735	16

Notes: [1] Total capacity equals single capacity times factor of 2.0; redundant third pump capacity provided but not included in capacity; nuisance pump capacity not included

[2] power supply should be designed assuming all three stormwater pumps operating simultaneously

The nuisance pump size has tentatively been selected at 450 gpm (1 cfs). An evaluation of the time required for this pump to dewater the wet well indicated this pump requires approximately two hours to pump from the lead pump off elevation to the minimum pumping water level for the nuisance pump.

A detail plan and elevation view of the wet well is provided. The wet well will be provided with an access ladder and ventilation. Both of the locations of these features must be chosen to minimize potential hydraulic effects in the wet well that could adversely affect pump performance. The access ladder can be located on the west (back) wall of the wet well behind the nuisance pump. This will reduce the potential for vortices to affect the main stormwater pumps during operation. The ventilation duct can be located in any corner provided that the bottom of the duct does not protrude beneath the highest water level in the wet well.

The instrumentation of the pump start/stop elevations needs to insure that the pumps will not inadvertently start within a couple of minutes of stopping. This is because the pump shafts will rotate in reverse as the water column drains from the discharge pipes through the pump impellers during draining after shutoff. The manufacturer recommends that the start elevation be sufficiently different so there is no possibility of the pump starting while the shaft is experiencing reverse rotation. Each 16-inch discharge pipe is filled with approximately 1,600 gallons of water. Assuming 10 feet per second discharge velocity, one should drain in less than 30 seconds if the pipe is completely vented. However, considering the forward momentum of the pump impellers, a couple of minutes should be allowed before restart.

The change in water surface elevation of the wet well will be about one foot assuming two main stormwater pumps shut off concurrently. This assumes shutoff at elevation 1240.0 feet and 428 cubic feet back flow into wet well. The proposed start/stop elevations are sufficiently different to prevent false starts.

Based on the considerations in the above paragraph and the evaluation of historical and design storm events using the hydrologic routing program (HEC-1), the following start/stop elevations are proposed in Table 10.

Table 10: Start and stop elevations for main storm water pumps

Action	Lead Pump #1	Lag Pump #2	Redundant Pump#3
Start	1242.0	1243.2	1244.0
Stop	1239.5	1240.5	1240.5

The redundant pump control should be set to initiate pumping relatively soon after the lag pump is started in the event that the lag pump's discharge rate is impaired (e.g. due to blockage of the impellers by a foreign object). This makes it apparent that the wet well is not drawing down. Note this requires the power supply provision for all three pumps operating simultaneously.

Minimum Wet Well Slab Elevation

The Federal Emergency Management Agency flood plain information maps were reviewed to determine if the proposed pump station is within a delineated flood plain area. A copy of the flood plain map for this portion of Maricopa County is contained in Appendix 1. The location of the proposed pump station site is outside the area delineated by Zone AE, the zone where the 100-year floodway has been determined. The site is within Zone X, the inundation area for 500-year flood or where the 100-year flood is less than one-foot depth.

The elevation of the 100-year flood near the intersection of the UPRR and the RWCD canal is 1271.4 feet based on the hydrologic/hydraulic analysis contained in the Flood Insurance Study, Gilbert-Chandler Area, Maricopa County, AZ for FEMA (1990). A copy of the page with this data taken from the report is provided in Appendix 1.

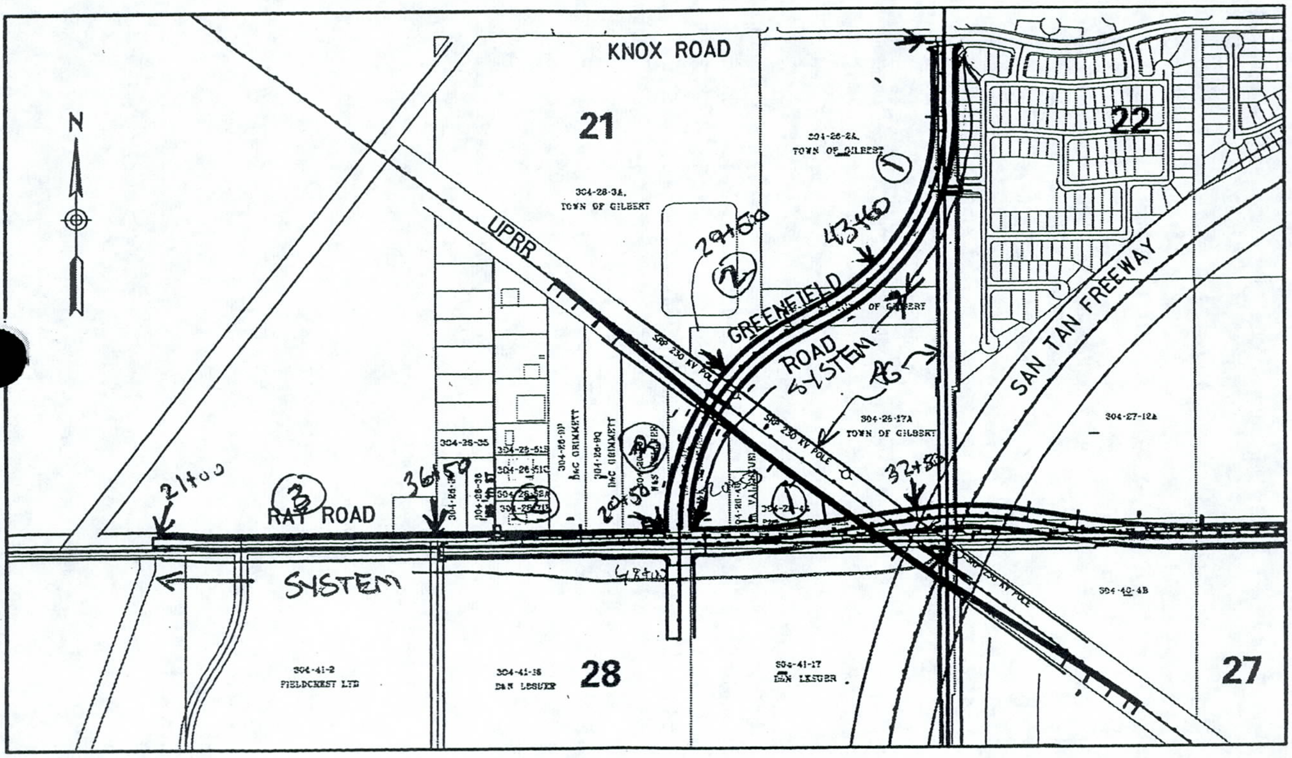
A minimum floor slab elevation of 1273.5 feet for the new pump station is proposed that will place all electrical equipment at least two feet above the estimated elevation of the 100-year flood and above more potentially severe flood events. The existing ground elevation at the proposed pump station site is approximately 1273.4.

The volume of stormwater pumped by the proposed pump station into the existing Crossroads detention basin is the same as the volume now existing from this area; however, with the change from the existing agricultural to roadway (impervious) soils the runoff rate is much greater. With the proposed pump station the flow will reach the detention basin faster with a faster rise in water surface within the basin; however, the increase in rate will not significantly impact the performance of that flood control facility. For example, the volume pumped by a 13,440-gpm capacity station during the design storm event will utilize approximately one acre-foot of storage capacity in the existing basin. The design water surface elevation for the Crossroads detention basin is 1270.0 feet. The basin is provided two feet of freeboard depth (making the top 1272.0 feet). The volume of additional storage provided in the basin between elevations 1270.0 and 1272.0 is approximately 108 acre-feet. Therefore, the increased volume pumped into the basin during the pump station design event represents about 1 percent of the volume in the freeboard zone above the basin's design water surface elevation.

ROADWAY IMPROVEMENT PLANS
FOR
GREENFIELD ROAD &
KNOX ROAD TO RAY ROAD
RAY ROAD
EASTERN CANAL TO GREENFEILD ROAD

T1S R6E

PROJEC
LOCATIO



INDEX MAP

NTS

1:160

IRRIGATION NOTES:

LOCATION OF DRAINAGE SYSTEM SECTIONS
USED IN HEC-1 MODELS

SHEET INI

G1.1-G1.2	*COV*
G2.1-G2.2	*TYF*
D1.1-D1.5	*DET*
C1.1-C1.25	*PAV*
C2.1-C2.25	*STO*
C3.1-C3.10	*WAT*

UTILITIES

SEWER --
WATER --
REFUSE --
PHONE --
ELECTRIC --
GAS --
CABLE --
IRRIGATION --

APPROVED

TOWN ENGINEER

FIRE DEPARTME

NOTE:

IN ACCORDANCE WITH AAC R18-4-119, ALL MATERIALS ADDED AFTER JANUARY 1, 1993 WHICH MAY COME INTO CONTACT WITH DRINKING WATER SHALL CONFORM TO NATI SANITAITION FOUNDATION STANDARDS 60 A

Drainage Area Summary by Subbasins

Greenfield Road 20+ 50 to 43+60

Subbasin	Impervious area, ft^2	Pervious area, ft^2	Impervious area, ac	Pervious area, ac	Total area, ac	Impervious area, mi^2	Pervious area,mi^2	Total area, mi^2	Percent Impervious
1A	33,223	9,756	0.763	0.224	0.987	1.191E-03	3.498E-04	1.541E-03	77.30%
1B	52,801	12,790	1.212	0.294	1.506	1.893E-03	4.586E-04	2.352E-03	80.50%
Totals	86,024	22,546	1.975	0.518	2.492	3.085E-03	8.085E-04	3.893E-03	

Greenfield Road 43+60 to 51+00

Subbasin	Impervious area, ft^2	Pervious area, ft^2	Impervious area, ac	Pervious area, ac	Total area, ac	Impervious area, mi^2	Pervious area,mi^2	Total area, mi^2	Percent Impervious
1C	15,774	5,193	0.362	0.119	0.481	5.656E-04	1.862E-04	7.518E-04	75.23%
2A	39,155	6,926	0.899	0.159	1.058	1.404E-03	2.484E-04	1.652E-03	84.97%
2B	47,012	8,316	1.079	0.191	1.270	1.686E-03	2.982E-04	1.984E-03	84.97%
2C	32,790	5,800	0.753	0.133	0.886	1.176E-03	2.080E-04	1.384E-03	84.97%
3A	15,348	2,715	0.352	0.062	0.415	5.504E-04	9.736E-05	6.477E-04	84.97%
3B	43,680	9,601	1.003	0.220	1.223	1.566E-03	3.443E-04	1.911E-03	81.98%
3C	37,691	10,461	0.865	0.240	1.105	1.352E-03	3.751E-04	1.727E-03	78.28%
Totals	231,450	49,012	5.313	1.125	6.439	8.299E-03	1.758E-03	1.006E-02	

Ray Road 23+89 to 16+17

Subbasin	Impervious area, ft^2	Pervious area, ft^2	Impervious area, ac	Pervious area, ac		Impervious area, mi^2	Pervious area,mi^2	Total area, mi^2	Percent Impervious
1A	20,411	3,480	0.469	0.080	0.548	7.319E-04	1.248E-04	8.567E-04	85.43%
1B	42,902	7,836	0.985	0.180	1.165	1.538E-03	2.810E-04	1.819E-03	84.56%
1C	69,973	1,650	1.606	0.038	1.644	2.509E-03	5.917E-05	2.568E-03	97.70%
2A	67,400	10,858	1.547	0.249	1.797	2.417E-03	3.894E-04	2.806E-03	86.13%
2B	65,542	11,903	1.505	0.273	1.778	2.350E-03	4.268E-04	2.777E-03	84.63%
3A	57,750	20,680	1.326	0.475	1.801	2.071E-03	7.416E-04	2.812E-03	73.63%
3B	74,176	20,816	1.703	0.478	2.181	2.660E-03	7.464E-04	3.406E-03	78.09%
Totals	398,154	77,223	9.140	1.773	10.913	1.428E-02	2.769E-03	1.619E-02	

69446/3-4

FILE COPY

RICKER • ATKINSON • McBEE & ASSOCIATES, INC
Geotechnical Engineering • Construction Materials Testing
2105 SOUTH HARDY DRIVE, SUITE 13
TEMPE, ARIZONA 85282-1924
PHONE: 480-921-8100 • FAX: 480-921-4081

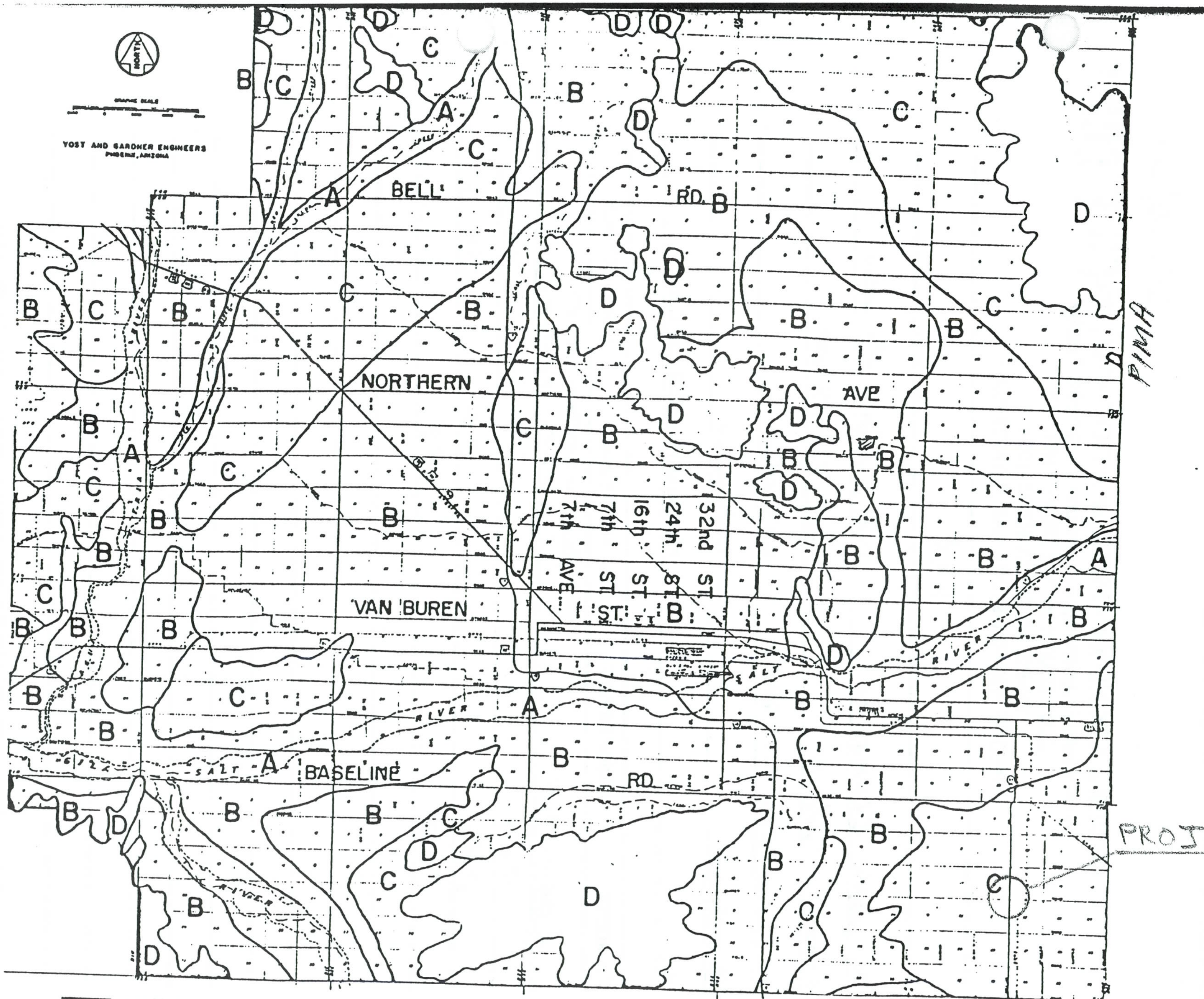
FAX

To: JOHN CLUASON
From: KON RICKER
Company: INCA
Date: 12-13-02
Fax Number: 602 277 8163
R.A.M. Reference:
Phone Number:
Your Reference:
Re:
Number of Pages Including Cover:

☐ URGENT ☐ FOR REVIEW ☐ PLEASE COMMENT ☐ PLEASE REPLY

LOCATION	PERCOLATION RATE (MINUTES/INCH)	
PH 1	39	BASIN A
PH 2	54	BASIN B
PH 3	49	BASIN C

If all pages have not been received or if received in error, please contact our office immediately.



GROUP "A" - 2" per hour & over
Undifferentiated sandy alluvial soils subject to overflow

Torrifluvents - recent alluvial soil
Calciorthids - high calcium soils
GROUP "B" 0.15" to 0.30" per hour & over

GROUP "C" - 0.05" to 0.15" per hour & over
Haplargids - stratified clay soils

GROUP "D" - Less than 0.05" per hour
Rock outcropings - stony mountainous soils on steep slopes

NOTE Minimum infiltration r... ...wn are from "WATER" - The Yearbook of Agriculture (1955) ...ment of Agriculture · pg 157

SOIL TYPES

FROM "GENERAL SOIL MAP OF MARICOPA COUNTY"
U S Department of Agriculture, Soil Conservation Service
Phoenix, Arizona · 1969

PLATE

Retention Basin A Volume Requirements

Drainage Area	Pavement Acres	Landscape Acres	Total Acres	Area S.F.	Pavement CA=0.9A	Landscape CA=0.7A	Total CA	CW
1	0.482576	0.184826	0.667	29,072.00	0.434	0.129	0.564	0.845
2	0.460882	0.176515	0.637	27,765.00	0.415	0.124	0.538	0.845
3	0.330165	0.126446	0.457	19,890.00	0.297	0.089	0.386	0.845
4	0.347865	0.113223	0.461	20,085.00	0.313	0.079	0.392	0.851
5	0.284435	0.088935	0.373	16,264.00	0.256	0.062	0.318	0.852
6	0.341391	0.110744	0.452	19,695.00	0.307	0.078	0.385	0.851
7	0.336639	0.128926	0.466	20,280.00	0.303	0.090	0.393	0.845
8	0.361616	0.109091	0.471	20,504.00	0.325	0.076	0.402	0.854
9	0.321534	0.123140	0.445	19,370.00	0.289	0.086	0.376	0.845
10	0.321534	0.123140	0.445	19,370.00	0.289	0.086	0.376	0.845
11	0.543365	0.120753	0.664	28,929.00	0.489	0.085	0.574	0.864
12	0.284894	0.066047	0.351	15,287.00	0.256	0.046	0.303	0.862
13	0.192332	0.006956	0.199	8,681.00	0.173	0.005	0.178	0.893
14	0.104178	0.008264	0.112	4,898.00	0.094	0.006	0.100	0.885
15	0.244238	0.055969	0.300	13,077.00	0.220	0.039	0.259	0.863
16	0.179729	0.068595	0.248	10,817.00	0.162	0.048	0.210	0.845
17	0.275000	0.104959	0.380	16,551.00	0.248	0.073	0.321	0.845
18	0.440266	0.180647	0.621	27,047.00	0.396	0.126	0.523	0.842
19	0.431589	0.165289	0.597	26,000.00	0.388	0.116	0.504	0.845
20	0.270661	0.165289	0.436	18,990.00	0.244	0.116	0.359	0.824
21	0.279775	0.096694	0.376	16,399.00	0.252	0.068	0.319	0.849
22	0.223393	0.093343	0.317	13,797.00	0.201	0.065	0.266	0.841
23	0.140266	0.048623	0.189	8,228.00	0.126	0.034	0.160	0.849
24	0.210399	0.083104	0.294	12,785.00	0.189	0.058	0.248	0.843
Ret. Basin A		O.6052	0.605	26,363.00	0.000	0.424	0.424	0.700
Total	2.247314	0.800689	3.048	460,144.00	2.023	0.560	2.583	0.847

Required Retention Volume
Town of Gilbert Requirements
V=DAC

Where V = volume cf
D = fifty-year, 24 hour rainfall depth - (3.2" =0.267')
A = area (square feet)
C = Weighted runoff coefficient

V = 0.267 x 460144 x 0.847 = 104,061 cf Required

Retention Provided Basin A

	Elev. (ft)	Area (sf)	Incremental Depth	Incremental Volume (cf)	Cumulative Volume (cf)
Top Elev	1268.00	21983			
			1	21,088	135,401
Stage	1267.00	20193			
			1	19,321	114,313
Stage	1266.00	18449			
			1	17,255	94,992
Stage	1265.00	16060			
			1	15,085	77,737
Stage	1264.00	14109			
			1	13,224	62,653
Stage	1263.00	12338			
			1	11,484	49,429
Stage	1262.00	10629			
			1	9,859	37,946
Stage	1261.00	9088			
			1	8,342	28,087
Stage	1260.00	7,596			
			1	6,896	19,745
Stage	1259.00	6,196			
			1	5,513	12,849
Stage	1258.00	4,829			
			1	4,238	7,337
Stage	1257.00	3,647			
			1.00	3,099	3,099
Bot. Elev.	1256.05	2,550			

Q_{50} 24hr High Water El = 1266.47

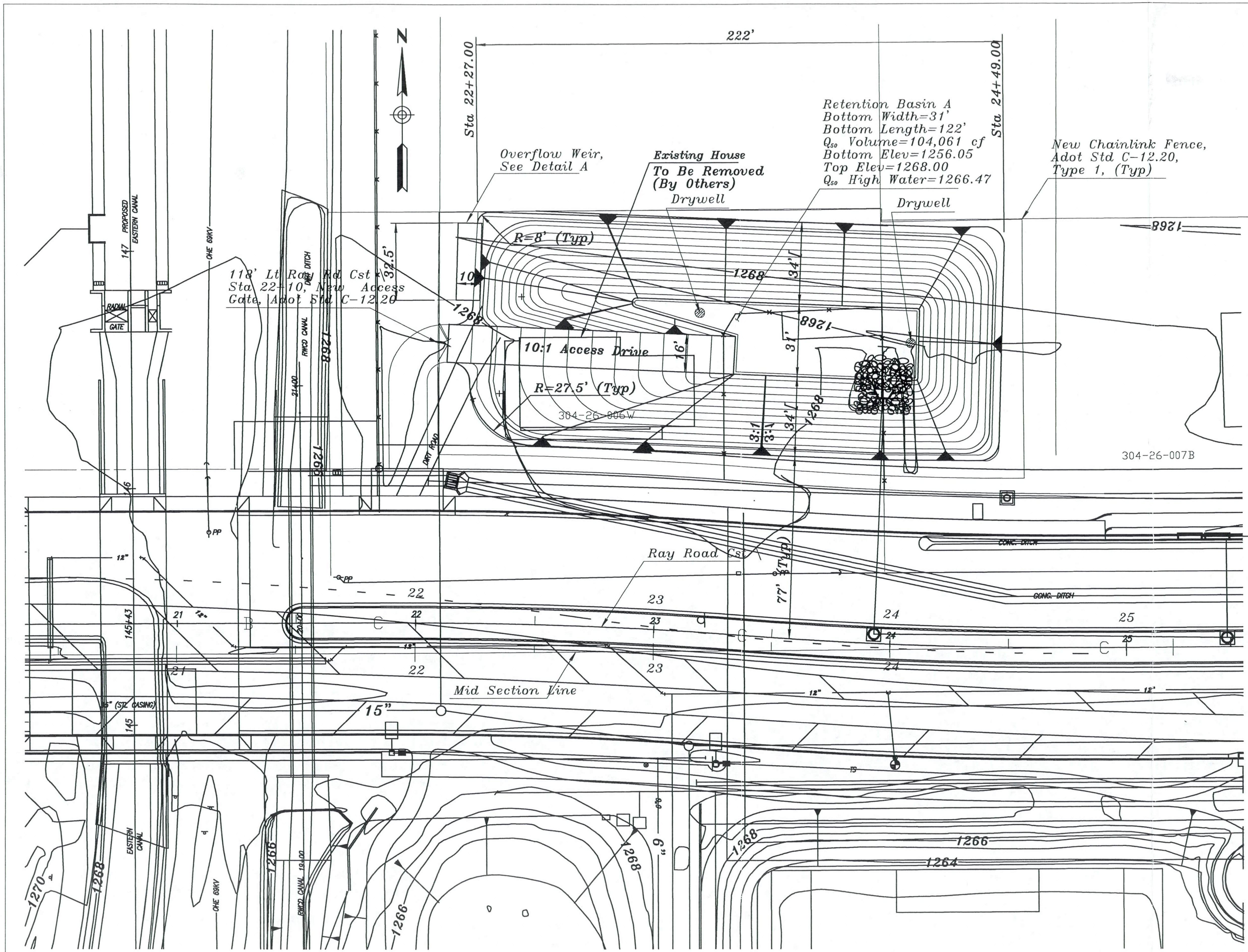
Percolation - Dry Up

Average percolation rate of the soil of the proiposed basin site is 39 minutes /inch/sf.
The wetted surface at the required volume is the percolation area. The area can also be considered the average of the bottom and top areas of the basin at the required retention high water level.
39 minutes per inch = 468 minutes for 1foot

Time to drain =	Top Area	Bottom Area	Average Area
	19,218	2,550	10,884

104,061 / 10,884 = 9.5609' average depth x 468minutes = 74.57 hours to drain

39 minutes per inch percolation rate from shallow pit field test is not considered totally indicative of the proposed basin depth. From borings performed for the Geotechnical Report we anticipate the infiltration time at the basin depth to be greater. A copy of the bore log is included in the Appendix.
The Town of Gilbert requires no less than one drywell per 43,500cf of volume.
In addition to the basin percolation, two Maxwell IV drywells will be installed and tested for performance.
Additional drywells may be required.



CONSTRUCTION NOTES

REV.	DATE	BY	DESCRIPTION

TOWN OF GILBERT

RAY ROAD
EASTERN CANAL TO GREENFIELD ROAD

DRAINAGE
STORM DRAIN
RETENTION BASIN-A
PLAN SHEET

INCA
INCA ENGINEERS INC.

PRELIMINARY 60% REVIEW NOT FOR CONSTRUCTION OR RECORDING

	NAME	DATE
DESIGN	P. COLE	01/03
DRAWN	R. STEELE/J. BLAIR	01/03
CHECKED	M. WAVERING	01/03

DWG. NO. D-2.1
SHEET OF

ccccсSYSTIMEccccc ccccсDGNcSPECIFICATIONccccc
$TIME$

Retention Basin B Volume Requirements

Drainage Area	Pavement Acres	Landscape Acres	Total Acres	Area S.F.	Pavement CA=0.9A	Landscape CA=0.7A	Total CA	CW
47	0.302112	0.115702	0.418	18,200.00	0.27	0.08	0.35	0.8446
48	0.302112	0.115702	0.418	18,200.00	0.27	0.08	0.35	0.8446
49	0.127319	0.048760	0.176	7,670.00	0.11	0.03	0.15	0.8446
50	0.127319	0.048760	0.176	7,670.00	0.11	0.03	0.15	0.8446
51	0.271901	0.104132	0.376	16,380.00	0.24	0.07	0.32	0.8446
52	0.271901	0.104132	0.376	16,380.00	0.24	0.07	0.32	0.8446
55	0.102433	0.071258	0.174	7,566.00	0.09	0.05	0.14	0.8179
56	0.102433	0.071258	0.174	7,566.00	0.09	0.05	0.14	0.8179
57	0.000000	0.367309	0.367	16,000.00	0.00	0.26	0.26	0.7000
58	0.000000	0.110193	0.110	4,800.00	0.00	0.08	0.08	0.7000
59	0.049587	0.207484	0.257	11,198.00	0.04	0.15	0.19	0.7386
Sub Total	1.657117	1.364692	3.022	131,630.00	1.49	0.96	2.45	0.8097
AG field	undev.	6.40243	6.402	278,889.85	0.00	4.48	4.48	0.7000
Total				410,519.85				

Required Retention Volume
Town of Gilbert Requirements

V=DAC

Where V = volume cf
D = fifty-year, 24 hour rainfall depth - (3.2" =0.267')
A = area (square feet)
C = Weighted runoff coefficient

V = 0.267 x 410,520 x 0.8097 = 88,751 cf Required

2 af

Retention Provided Basin B

	Elev. (ft)	Area (sf)	Incremental Depth	Incremental Volume (cf)	Cumulative Volume (cf)	
Top Elev	1274.00	48960				
			1	46,099	175,373	
Stage	1273.00	43237				
			1	40,524	129,274	
Stage	1272.00	37810				
			0.04622	1,528	88,751	Q_{50} 24hr High Water El = 1271.046
Stage	1271.00	28306				
			1	25,716	87,223	
Stage	1270.00	23125				
			1	20,744	61,507	
Stage	1269.00	18,363				
			1	16,113	40,763	
Stage	1268.00	13,863				
			1	12,005	24,650	
Stage	1267.00	10,146				
			1	8,535	12,646	
Stage	1266.00	6,924				
			0.70	4,111	4,111	
Bot. Elev.	1265.30	4,821		175,373		

Percolation - Dry Up

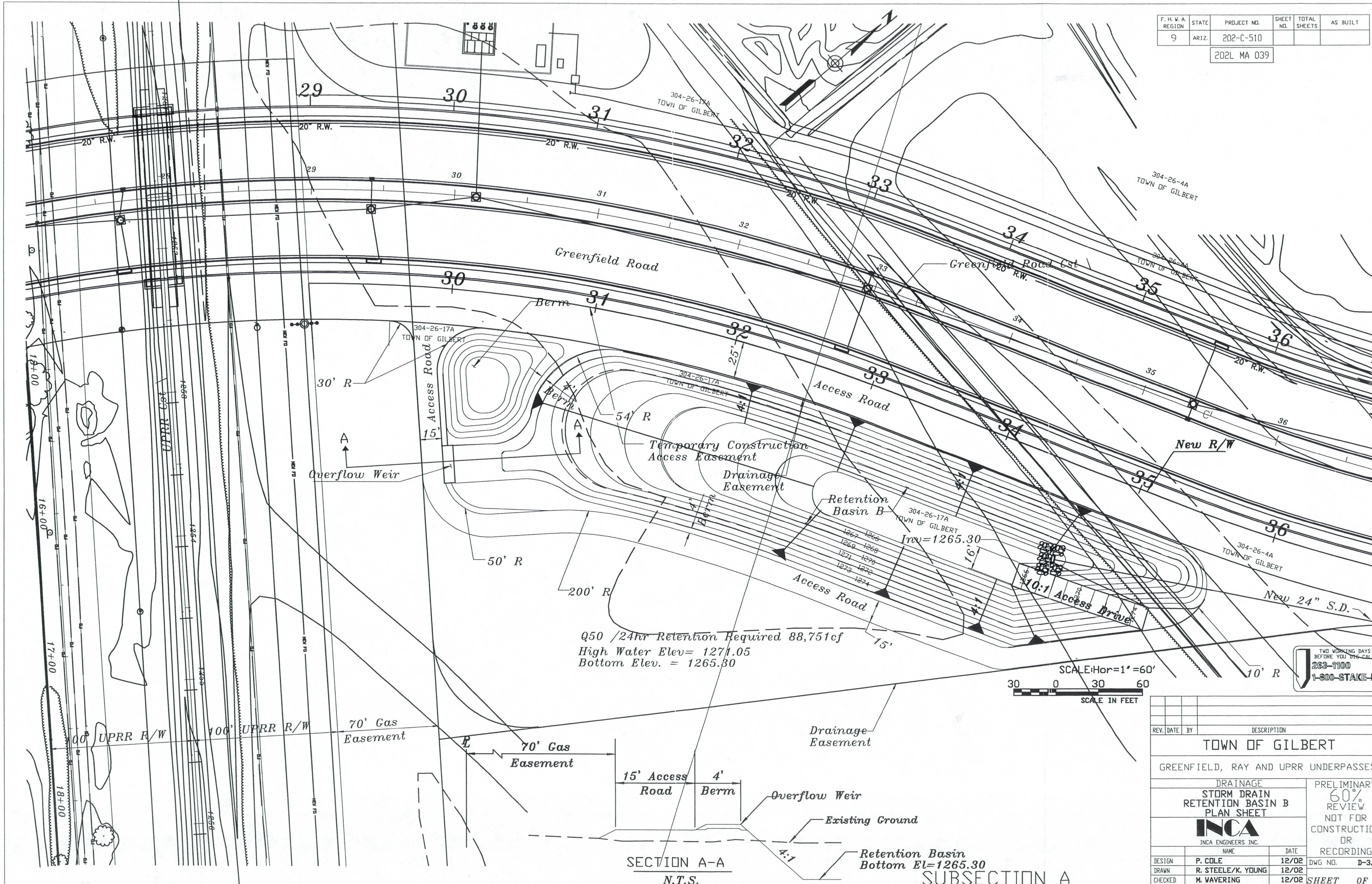
Average percolation rate of the soil of the proiposed basin site is 54 minutes /inch/sf.
The wetted surface at the required volume is the percolation area. The area can also be considered the average of the bottom and top areas of the basin at the required retention high water level.
54 minutes per inch = 648 minutes for 1foot

Time to drain	=	Top Area	Bottom Area	Average Area
		33,748	4,821	19,285

88,751 / 19285 =4.60274' average depth x 648minutes =49.70 hours to drain

The basin will not drain in the required 36 hours. The town of gilbert requires one drywell for each 43,500cf of volume.

Two Maxwell IV drywells will be installed.



F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-C-510			

202L MA 039

REV. | DATE | BY | DESCRIPTION

TOWN OF GILBERT

GREENFIELD, RAY AND UPRR UNDERPASSES

DRAINAGE
STORM DRAIN
RETENTION BASIN B
PLAN SHEET

INCA
INCA ENGINEERS INC.

PRELIMINARY 60% REVIEW NOT FOR CONSTRUCTION OR RECORDING

	NAME	DATE
DESIGN	P. COLE	12/02
DRAWN	R. STEELE/K. YOUNG	12/02
CHECKED	M. WAVERING	12/02

DWG NO. D-3.1
SHEET OF

cccccSYSTIMEccccc $TIME$ cccccDGNcSPECIFICATIONccccc

TRACS NO. H6338 01 C

202-C-510

INCA ENGINEERS INC.

Job No. 69446

Vol./Sheet No. ______ of ______

Contract/Client GREENFIELD & RAY RD

Phase/Subject 60 % DESIGN

Design Topic CONVEYANCE FACILITIES

Made By JRD Date 10/8/02 Checked By ______ Date ______ Page No. ______

SUMMARY OF PIPE VELOCITIES @ DESIGN FLOW

SUBBASIN	PIPE DIA. (IN)	VELOCITY (FT/S)	NORMAL DEPTH (FT)
GREENFIELD RD			
1A	18	5.06	1.16
1B	24	6.16	1.77
1C	18	9.04	0.43
2A	18	14.19	0.72
2B	18	16.47	1.06
2C	36	13.04	1.07
3C	18	13.94	0.91
3B	18	17.29	0.94
3A	36	11.49	0.61
WETWELL	36	32.40	1.46
RAY RD			
1A	18	7.31	0.53
1B	18	7.43	1.07
1C	24	8.70	1.56
2A	36	6.78	1.95
2B	42	7.26	2.08
3A	42	7.50	2.35
3B	42	7.86	2.79

Section 3 - 0.2%
Rating Table for Circular Channel

RAY ROAD FLOW
RATING TABLE

Project Description	
Project File	c:\haestad\fmw\rayroad.fm2
Worksheet	Ray Road Drainage
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Channel Depth

Constant Data		
Mannings Coefficient	0.012	
Channel Slope	0.002000	ft/ft
Diameter	42.00	in

Input Data	Minimum	Maximum	Increment
Discharge	2.00	56.00	2.00 cfs

Rating Table

Discharge (cfs)	Depth (ft)	Velocity (ft/s)
2.00	0.48	2.49
4.00	0.68	3.06
6.00	0.83	3.44
8.00	0.96	3.74
10.00	1.08	3.98
12.00	1.18	4.19
14.00	1.28	4.38
16.00	1.38	4.54
18.00	1.47	4.68
20.00	1.56	4.82
22.00	1.65	4.94
24.00	1.73	5.05
26.00	1.82	5.15
28.00	1.90	5.24
30.00	1.99	5.33
32.00	2.07	5.41
34.00	2.15	5.48
36.00	2.24	5.54
38.00	2.32	5.60
40.00	2.41	5.65
42.00	2.51	5.70
44.00	2.60	5.74
46.00	2.71	5.76
48.00	2.82	5.78
50.00	2.96	5.77

Section 3 - 0.2%
Rating Table for Circular Channel

Rating Table

Discharge (cfs)	Depth (ft)	Velocity (ft/s)
52.00	3.16	5.69
54.00	N/A	0.00
56.00	N/A	0.00

← 52.43 3.28 5.60

Section 3 - 0.2%

Rating Table for Circular Channel

Project Description	
Project File	c:\haestad\fmw\rayroad.fm2
Worksheet	Ray Road Drainage
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Channel Depth

Constant Data		
Mannings Coefficient	0.012	
Channel Slope	0.002000	ft/ft
Diameter	40.00	in

Input Data	Minimum	Maximum	Increment
Discharge	2.00	46.00	2.00 cfs

Rating Table

Discharge (cfs)	Depth (ft)	Velocity (ft/s)
2.00	0.49	2.50
4.00	0.69	3.07
6.00	0.84	3.46
8.00	0.98	3.76
10.00	1.10	4.00
12.00	1.21	4.21
14.00	1.31	4.39
16.00	1.41	4.55
18.00	1.51	4.69
20.00	1.60	4.82
22.00	1.69	4.94
24.00	1.79	5.04
26.00	1.88	5.14
28.00	1.97	5.23
30.00	2.06	5.31
32.00	2.15	5.38
34.00	2.24	5.44
36.00	2.34	5.50
38.00	2.44	5.54
40.00	2.56	5.57
42.00	2.68	5.59
44.00	2.83	5.58
46.00	3.09	5.45

Section 2 - 0.2%
Rating Table for Circular Channel

Project Description	
Project File	c:\haestad\fmw\rayroad.fm2
Worksheet	Ray Road Drainage
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Channel Depth

Constant Data		
Mannings Coefficient	0.012	
Channel Slope	0.002000	ft/ft
Diameter	36.00	in

Input Data	Minimum	Maximum	Increment
Discharge	2.00	38.00	2.00 cfs

Rating Table

Discharge (cfs)	Depth (ft)	Velocity (ft/s)
2.00	0.51	2.54
4.00	0.71	3.11
6.00	0.88	3.49
8.00	1.02	3.79
10.00	1.15	4.03
12.00	1.27	4.23
14.00	1.38	4.41
16.00	1.49	4.56
18.00	1.60	4.69
20.00	1.71	4.81
22.00	1.82	4.92
24.00	1.93	5.01
26.00	2.04	5.08
28.00	2.16	5.15
30.00	2.29	5.19
32.00	2.43	5.21
34.00	2.63	5.17
36.00	N/A	0.00
38.00	N/A	0.00

Section 2 - 0.5%
Rating Table for Circular Channel

Project Description	
Project File	c:\haestad\fmw\rayroad.fm2
Worksheet	Ray Road Drainage
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Channel Depth

Constant Data		
Mannings Coefficient	0.012	
Channel Slope	0.005000	ft/ft
Diameter	24.00	in

Input Data			
	Minimum	Maximum	Increment
Discharge	2.00	20.00	2.00 cfs

Rating Table

Discharge (cfs)	Depth (ft)	Velocity (ft/s)
2.00	0.46	3.68
4.00	0.65	4.48
6.00	0.81	5.01
8.00	0.95	5.41
10.00	1.09	5.71
12.00	1.22	5.95
14.00	1.36	6.14
16.00	1.52	6.26
18.00	1.72	6.27
20.00	N/A	0.00

Section 1 - 0.8%
Rating Table for Circular Channel

Project Description	
Project File	c:\haestad\fmw\rayroad.fm2
Worksheet	Ray Road Drainage
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Channel Depth

Constant Data		
Mannings Coefficient	0.012	
Channel Slope	0.008000	ft/ft
Diameter	18.00	in

Input Data

	Minimum	Maximum	Increment
Discharge	2.00	20.00	2.00 cfs

Rating Table

Discharge (cfs)	Depth (ft)	Velocity (ft/s)
2.00	0.45	4.47
4.00	0.65	5.41
6.00	0.83	6.00
8.00	1.00	6.38
10.00	1.21	6.57
12.00	N/A	0.00
14.00	N/A	0.00
16.00	N/A	0.00
18.00	N/A	0.00
20.00	N/A	0.00

GREENFIELD RD
FLOW RATING TABLES

18-inch
Rating Table for Circular Channel

Project Description	
Project File	c:\haestad\fmw\greenrd.fm2
Worksheet	Greenfiled Storm Drains
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Channel Depth

Constant Data		
Mannings Coefficient	0.013	
Diameter	18.00	in

Input Data	Minimum	Maximum	Increment	
Channel Slope	0.014000	0.034000	0.002000	ft/ft
Discharge	2.00	14.00	2.00	cfs

Rating Table

Discharge (cfs)	Channel Slope (ft/ft)	Depth (ft)	Velocity (ft/s)
2.00	0.014000	0.41	5.16
2.00	0.016000	0.39	5.41
2.00	0.018000	0.38	5.64
2.00	0.020000	0.37	5.86
2.00	0.022000	0.36	6.06
2.00	0.024000	0.36	6.25
2.00	0.026000	0.35	6.43
2.00	0.028000	0.34	6.60
2.00	0.030000	0.34	6.77
2.00	0.032000	0.33	6.92
2.00	0.034000	0.33	7.07
4.00	0.014000	0.59	6.27
4.00	0.016000	0.56	6.58
4.00	0.018000	0.55	6.87
4.00	0.020000	0.53	7.13
4.00	0.022000	0.52	7.38
4.00	0.024000	0.51	7.62
4.00	0.026000	0.50	7.84
4.00	0.028000	0.49	8.05
4.00	0.030000	0.48	8.26
4.00	0.032000	0.47	8.45
4.00	0.034000	0.46	8.64
6.00	0.014000	0.73	6.97
6.00	0.016000	0.71	7.33
6.00	0.018000	0.68	7.65

18-inch

Rating Table for Circular Channel

Rating Table

Discharge (cfs)	Channel Slope (ft/ft)	Depth (ft)	Velocity (ft/s)
6.00	0.020000	0.66	7.96
6.00	0.022000	0.65	8.24
6.00	0.024000	0.63	8.51
6.00	0.026000	0.62	8.76
6.00	0.028000	0.60	9.00
6.00	0.030000	0.59	9.23
6.00	0.032000	0.58	9.45
6.00	0.034000	0.57	9.66
8.00	0.014000	0.88	7.47
8.00	0.016000	0.84	7.87
8.00	0.018000	0.81	8.23
8.00	0.020000	0.78	8.56
8.00	0.022000	0.76	8.87
8.00	0.024000	0.74	9.17
8.00	0.026000	0.73	9.45
8.00	0.028000	0.71	9.71
8.00	0.030000	0.70	9.96
8.00	0.032000	0.68	10.21
8.00	0.034000	0.67	10.44
10.00	0.014000	1.02	7.82
10.00	0.016000	0.97	8.26
10.00	0.018000	0.93	8.65
10.00	0.020000	0.90	9.02
10.00	0.022000	0.87	9.36
10.00	0.024000	0.85	9.68
10.00	0.026000	0.83	9.98
10.00	0.028000	0.81	10.27
10.00	0.030000	0.79	10.54
10.00	0.032000	0.78	10.80
10.00	0.034000	0.76	11.05
12.00	0.014000	1.19	8.01
12.00	0.016000	1.12	8.51
12.00	0.018000	1.06	8.95
12.00	0.020000	1.02	9.36
12.00	0.022000	0.99	9.73
12.00	0.024000	0.96	10.07
12.00	0.026000	0.93	10.40
12.00	0.028000	0.91	10.70
12.00	0.030000	0.89	11.00
12.00	0.032000	0.87	11.27
12.00	0.034000	0.85	11.54
14.00	0.014000	N/A	0.00
14.00	0.016000	1.32	8.51
14.00	0.018000	1.22	9.09
14.00	0.020000	1.16	9.56

18-inch
Rating Table for Circular Channel

Rating Table

Discharge (cfs)	Channel Slope (ft/ft)	Depth (ft)	Velocity (ft/s)
14.00	0.022000	1.11	9.98
14.00	0.024000	1.07	10.36
14.00	0.026000	1.04	10.71
14.00	0.028000	1.01	11.04
14.00	0.030000	0.99	11.36
14.00	0.032000	0.96	11.65
14.00	0.034000	0.94	11.94

24-inch

Rating Table for Circular Channel

Project Description	
Project File	c:\haestad\fmw\greenrd.fm2
Worksheet	Greenfiled Storm Drains
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Channel Depth

Constant Data		
Mannings Coefficient	0.013	
Diameter	24.00	in

Input Data				
	Minimum	Maximum	Increment	
Channel Slope	0.010000	0.035000	0.005000	ft/ft
Discharge	2.00	18.00	2.00	cfs

Rating Table

Discharge (cfs)	Channel Slope (ft/ft)	Depth (ft)	Velocity (ft/s)
2.00	0.010000	0.40	4.44
2.00	0.015000	0.36	5.12
2.00	0.020000	0.34	5.67
2.00	0.025000	0.32	6.13
2.00	0.030000	0.31	6.54
2.00	0.035000	0.30	6.90
4.00	0.010000	0.57	5.43
4.00	0.015000	0.51	6.27
4.00	0.020000	0.48	6.95
4.00	0.025000	0.45	7.52
4.00	0.030000	0.43	8.02
4.00	0.035000	0.42	8.47
6.00	0.010000	0.70	6.08
6.00	0.015000	0.63	7.04
6.00	0.020000	0.59	7.81
6.00	0.025000	0.55	8.46
6.00	0.030000	0.53	9.02
6.00	0.035000	0.51	9.53
8.00	0.010000	0.82	6.58
8.00	0.015000	0.74	7.63
8.00	0.020000	0.68	8.47
8.00	0.025000	0.64	9.17
8.00	0.030000	0.61	9.79
8.00	0.035000	0.59	10.35
10.00	0.010000	0.93	6.98

24-inch
Rating Table for Circular Channel

Rating Table

Discharge (cfs)	Channel Slope (ft/ft)	Depth (ft)	Velocity (ft/s)
10.00	0.015000	0.83	8.10
10.00	0.020000	0.77	9.00
10.00	0.025000	0.72	9.76
10.00	0.030000	0.69	10.43
10.00	0.035000	0.66	11.02
12.00	0.010000	1.04	7.31
12.00	0.015000	0.92	8.50
12.00	0.020000	0.85	9.45
12.00	0.025000	0.80	10.26
12.00	0.030000	0.76	10.96
12.00	0.035000	0.73	11.59
14.00	0.010000	1.14	7.58
14.00	0.015000	1.01	8.84
14.00	0.020000	0.93	9.84
14.00	0.025000	0.87	10.69
14.00	0.030000	0.83	11.43
14.00	0.035000	0.79	12.09
16.00	0.010000	1.24	7.81
16.00	0.015000	1.09	9.13
16.00	0.020000	1.00	10.18
16.00	0.025000	0.94	11.07
16.00	0.030000	0.89	11.84
16.00	0.035000	0.85	12.53
18.00	0.010000	1.35	7.99
18.00	0.015000	1.17	9.39
18.00	0.020000	1.07	10.48
18.00	0.025000	1.00	11.40
18.00	0.030000	0.95	12.21
18.00	0.035000	0.91	12.93
20	0.01	1.46	8.13
20	0.02	1.15	10.75
22	0.02	1.22	10.98
24.2	0.01	1.82	8.97
26	0.02	1.37	11.35

30-inch
Rating Table for Circular Channel

Project Description	
Project File	c:\haestad\fmw\greenrd.fm2
Worksheet	Greenfiled Storm Drains
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Channel Depth

Constant Data		
Mannings Coefficient	0.013	
Diameter	30.00	in

Input Data	Minimum	Maximum	Increment	
Channel Slope	0.010000	0.035000	0.005000	ft/ft
Discharge	2.00	18.00	2.00	cfs

Rating Table

Discharge (cfs)	Channel Slope (ft/ft)	Depth (ft)	Velocity (ft/s)
2.00	0.010000	0.38	4.32
2.00	0.015000	0.34	4.98
2.00	0.020000	0.32	5.51
2.00	0.025000	0.30	5.96
2.00	0.030000	0.29	6.35
2.00	0.035000	0.28	6.70
4.00	0.010000	0.53	5.30
4.00	0.015000	0.48	6.12
4.00	0.020000	0.44	6.77
4.00	0.025000	0.42	7.33
4.00	0.030000	0.40	7.81
4.00	0.035000	0.39	8.25
6.00	0.010000	0.65	5.97
6.00	0.015000	0.58	6.89
6.00	0.020000	0.54	7.63
6.00	0.025000	0.51	8.26
6.00	0.030000	0.49	8.81
6.00	0.035000	0.47	9.30
8.00	0.010000	0.75	6.48
8.00	0.015000	0.67	7.49
8.00	0.020000	0.63	8.30
8.00	0.025000	0.59	8.98
8.00	0.030000	0.57	9.58
8.00	0.035000	0.55	10.12
10.00	0.010000	0.84	6.90

30-inch

Rating Table for Circular Channel

Rating Table

Discharge (cfs)	Channel Slope (ft/ft)	Depth (ft)	Velocity (ft/s)
10.00	0.015000	0.76	7.98
10.00	0.020000	0.70	8.84
10.00	0.025000	0.66	9.58
10.00	0.030000	0.63	10.22
10.00	0.035000	0.61	10.80
12.00	0.010000	0.93	7.25
12.00	0.015000	0.83	8.40
12.00	0.020000	0.77	9.31
12.00	0.025000	0.73	10.09
12.00	0.030000	0.70	10.77
12.00	0.035000	0.67	11.38
14.00	0.010000	1.01	7.56
14.00	0.015000	0.90	8.77
14.00	0.020000	0.84	9.73
14.00	0.025000	0.79	10.54
14.00	0.030000	0.75	11.25
14.00	0.035000	0.72	11.89
16.00	0.010000	1.08	7.84
16.00	0.015000	0.97	9.09
16.00	0.020000	0.90	10.09
16.00	0.025000	0.85	10.94
16.00	0.030000	0.81	11.68
16.00	0.035000	0.77	12.35
18.00	0.010000	1.16	8.08
18.00	0.015000	1.03	9.39
18.00	0.020000	0.96	10.42
18.00	0.025000	0.90	11.30
18.00	0.030000	0.86	12.07
18.00	0.035000	0.82	12.77

36-inch
Rating Table for Circular Channel

Project Description	
Project File	c:\haestad\fmw\greenrd.fm2
Worksheet	Greenfiled Storm Drains
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Channel Depth

Constant Data		
Mannings Coefficient	0.013	
Diameter	36.00	in

Input Data	Minimum	Maximum	Increment	
Channel Slope	0.010000	0.035000	0.005000	ft/ft
Discharge	2.00	18.00	2.00	cfs

Rating Table

Discharge (cfs)	Channel Slope (ft/ft)	Depth (ft)	Velocity (ft/s)
2.00	0.010000	0.36	4.22
2.00	0.015000	0.32	4.86
2.00	0.020000	0.30	5.38
2.00	0.025000	0.29	5.81
2.00	0.030000	0.27	6.20
2.00	0.035000	0.26	6.54
4.00	0.010000	0.50	5.19
4.00	0.015000	0.45	5.99
4.00	0.020000	0.42	6.62
4.00	0.025000	0.40	7.16
4.00	0.030000	0.38	7.63
4.00	0.035000	0.37	8.06
6.00	0.010000	0.61	5.85
6.00	0.015000	0.55	6.75
6.00	0.020000	0.51	7.47
6.00	0.025000	0.49	8.08
6.00	0.030000	0.46	8.61
6.00	0.035000	0.45	9.09
8.00	0.010000	0.70	6.36
8.00	0.015000	0.63	7.34
8.00	0.020000	0.59	8.13
8.00	0.025000	0.56	8.80
8.00	0.030000	0.53	9.38
8.00	0.035000	0.51	9.90
10.00	0.010000	0.79	6.79

36-inch
Rating Table for Circular Channel

Rating Table

Discharge (cfs)	Channel Slope (ft/ft)	Depth (ft)	Velocity (ft/s)
10.00	0.015000	0.71	7.84
10.00	0.020000	0.66	8.68
10.00	0.025000	0.62	9.39
10.00	0.030000	0.60	10.02
10.00	0.035000	0.57	10.58
12.00	0.010000	0.86	7.15
12.00	0.015000	0.78	8.26
12.00	0.020000	0.72	9.15
12.00	0.025000	0.68	9.91
12.00	0.030000	0.65	10.57
12.00	0.035000	0.63	11.16
14.00	0.010000	0.93	7.47
14.00	0.015000	0.84	8.64
14.00	0.020000	0.78	9.57
14.00	0.025000	0.74	10.36
14.00	0.030000	0.71	11.05
14.00	0.035000	0.68	11.67
16.00	0.010000	1.00	7.75
16.00	0.015000	0.90	8.97
16.00	0.020000	0.84	9.94
16.00	0.025000	0.79	10.77
16.00	0.030000	0.75	11.49
16.00	0.035000	0.73	12.13
18.00	0.010000	1.06	8.01
18.00	0.015000	0.96	9.27
18.00	0.020000	0.89	10.28
18.00	0.025000	0.84	11.13
18.00	0.030000	0.80	11.88
18.00	0.035000	0.77	12.55
20	0.01	1.13	8.25
24	0.01	1.24	8.66
26	0.01	1.30	8.85
30	0.01	1.41	9.19
32	0.01	1.46	9.34
40	0.01	1.67	9.86

30-inch
Rating Table for Circular Channel

Project Description	
Project File	c:\haestad\fmw\greenrd.fm2
Worksheet	Greenfiled Storm Drains
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Channel Depth

Constant Data		
Mannings Coefficient	0.013	
Diameter	18.00	in

Input Data	Minimum	Maximum	Increment	
Channel Slope	0.010000	0.035000	0.005000	ft/ft
Discharge	1.00	9.00	2.00	cfs

Rating Table

Discharge (cfs)	Channel Slope (ft/ft)	Depth (ft)	Velocity (ft/s)
1.00	0.010000	0.31	3.75
1.00	0.015000	0.28	4.32
1.00	0.020000	0.26	4.78
1.00	0.025000	0.25	5.18
1.00	0.030000	0.24	5.52
1.00	0.035000	0.23	5.83
3.00	0.010000	0.55	5.13
3.00	0.015000	0.49	5.93
3.00	0.020000	0.46	6.58
3.00	0.025000	0.43	7.13
3.00	0.030000	0.41	7.61
3.00	0.035000	0.40	8.04
5.00	0.010000	0.73	5.87
5.00	0.015000	0.65	6.82
5.00	0.020000	0.60	7.58
5.00	0.025000	0.56	8.22
5.00	0.030000	0.54	8.79
5.00	0.035000	0.52	9.29
7.00	0.010000	0.90	6.36
7.00	0.015000	0.79	7.43
7.00	0.020000	0.72	8.28
7.00	0.025000	0.68	9.00
7.00	0.030000	0.65	9.62
7.00	0.035000	0.62	10.18
9.00	0.010000	1.07	6.68

30-inch
Rating Table for Circular Channel

Rating Table

Discharge (cfs)	Channel Slope (ft/ft)	Depth (ft)	Velocity (ft/s)
9.00	0.015000	0.92	7.88
9.00	0.020000	0.84	8.81
9.00	0.025000	0.79	9.59
9.00	0.030000	0.75	10.27
9.00	0.035000	0.71	10.88

18-inch

Rating Table for Circular Channel

Project Description

Project File	c:\haestad\fmw\greenrd.fm2
Worksheet	Greenfiled Storm Drains
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Channel Depth

Constant Data

Mannings Coefficient	0.013	
Channel Slope	0.002500	ft/ft
Diameter	18.00	in

Input Data

	Minimum	Maximum	Increment
Discharge	0.50	9.00	0.50 cfs

Rating Table

Discharge (cfs)	Depth (ft)	Velocity (ft/s)
0.50	0.31	1.87
1.00	0.44	2.29
1.50	0.55	2.56
2.00	0.64	2.77
2.50	0.73	2.94
3.00	0.81	3.07
3.50	0.90	3.18
4.00	0.98	3.27
4.50	1.07	3.34
5.00	1.17	3.38
5.50	1.31	3.37
6.00	N/A	0.00
6.50	N/A	0.00
7.00	N/A	0.00
7.50	N/A	0.00
8.00	N/A	0.00
8.50	N/A	0.00
9.00	N/A	0.00

24
~~18~~-inch

Rating Table for Circular Channel

Project Description	
Project File	c:\haestad\fmw\greenrd.fm2
Worksheet	Greenfiled Storm Drains
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Channel Depth

Constant Data		
Mannings Coefficient	0.013	
Channel Slope	0.002500	ft/ft
Diameter	24.00	in

Input Data	Minimum	Maximum	Increment
Discharge	0.50	14.00	0.50 cfs

Rating Table

Discharge (cfs)	Depth (ft)	Velocity (ft/s)
0.50	0.29	1.81
1.00	0.40	2.22
1.50	0.49	2.50
2.00	0.57	2.71
2.50	0.64	2.89
3.00	0.70	3.04
3.50	0.76	3.17
4.00	0.82	3.29
4.50	0.88	3.39
5.00	0.93	3.49
5.50	0.98	3.58
6.00	1.04	3.65
6.50	1.09	3.72
7.00	1.14	3.79
7.50	1.19	3.85
8.00	1.24	3.90
8.50	1.29	3.95
9.00	1.35	4.00
9.50	1.40	4.03
10.00	1.46	4.06
10.50	1.52	4.09
11.00	1.59	4.10
11.50	1.67	4.10
12.00	1.78	4.06
12.50	N/A	0.00

24

~~18~~-inch

Rating Table for Circular Channel

Rating Table

Discharge (cfs)	Depth (ft)	Velocity (ft/s)
13.00	N/A	0.00
13.50	N/A	0.00
14.00	N/A	0.00

Greenfield - 0.5%
Rating Table for Circular Channel

Project Description	
Project File	c:\haestad\fmw\rayroad.fm2
Worksheet	Ray Road Drainage
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Channel Depth

Constant Data		
Mannings Coefficient	0.012	
Channel Slope	0.005000	ft/ft
Diameter	24.00	in

Input Data	Minimum	Maximum	Increment
Discharge	2.00	14.00	2.00 cfs

Rating Table

Discharge (cfs)	Depth (ft)	Velocity (ft/s)
2.00	0.46	3.68
4.00	0.65	4.48
6.00	0.81	5.01
8.00	0.95	5.41
10.00	1.09	5.71
12.00	1.22	5.95
14.00	1.36	6.14

Culvert Calculator Report
36-in dia RCP

INLET PIPE TO WET WELL

COMPUTED HW @ INLET MH

ESTIMATED TW ELEV FROM HEC-1

olve For: Headwater Elevation

Culvert Summary			
Allowable HW Elevation	1,250.20 ft	Headwater Depth/ Height	1.96
Computed Headwater Elevation	1,248.37 ft	Discharge	46.00 cfs
Inlet Control HW Elev	1,247.10 ft	Tailwater Elevation	1,247.10 ft
Outlet Control HW Elev	1,248.37 ft	Control Type	Outlet Control

Grades			
Upstream Invert	1,242.50 ft	Downstream Invert	1,241.50 ft
Length	100.00 ft	Constructed Slope	0.010000 ft/ft

Hydraulic Profile			
Profile	Pressure	Depth, Downstream	5.60 ft
Slope Type	N/A	Normal Depth	1.83 ft
Flow Regime	N/A	Critical Depth	2.21 ft
Velocity Downstream	6.51 ft/s	Critical Slope	0.005970 ft/ft

Section			
Section Shape	Circular	Mannings Coefficient	0.013
Section Material	Concrete	Span	3.00 ft
Section Size	36 inch	Rise	3.00 ft
Number Sections	1		

Outlet Control Properties			
Outlet Control HW Elev	1,248.37 ft	Upstream Velocity Head	0.66 ft
Ke	0.20	Entrance Loss	0.13 ft

Inlet Control Properties			
Inlet Control HW Elev	1,247.10 ft	Flow Control	N/A
Inlet Type	Groove end w/headwall	Area Full	7.1 ft²
K	0.00780	HDS 5 Chart	1
M	2.00000	HDS 5 Scale	2
C	0.02920	Equation Form	1
Y	0.74000		

Culvert Calculator Report
36-in dia RCP

MAXIMUM TW ELEV. ALLOWAB

ive For: Headwater Elevation

Culvert Summary

Allowable HW Elevation	1,250.20 ft	Headwater Depth/ Height	2.56
Computed Headwater Elevation	1,250.18 ft	Discharge	46.00 cfs
Inlet Control HW Elev	1,248.72 ft	Tailwater Elevation	1,248.72 ft
Outlet Control HW Elev	1,250.18 ft	Control Type	Outlet Control

Grades

Upstream Invert	1,242.50 ft	Downstream Invert	1,241.50 ft
Length	100.00 ft	Constructed Slope	0.010000 ft/ft

Hydraulic Profile

Profile	Pressure	Depth, Downstream	7.22 ft
Slope Type	N/A	Normal Depth	1.83 ft
Flow Regime	N/A	Critical Depth	2.21 ft
Velocity Downstream	6.51 ft/s	Critical Slope	0.005970 ft/ft

Section

Section Shape	Circular	Mannings Coefficient	0.013
Section Material	Concrete	Span	3.00 ft
Section Size	36 inch	Rise	3.00 ft
Number Sections	1		

utlet Control Properties

Outlet Control HW Elev	1,250.18 ft	Upstream Velocity Head	0.66 ft
Ke	0.50	Entrance Loss	0.33 ft

Inlet Control Properties

Inlet Control HW Elev	1,248.72 ft	Flow Control	Transition
Inlet Type	Square edge w/headwall	Area Full	7.1 ft²
K	0.00980	HDS 5 Chart	1
M	2.00000	HDS 5 Scale	1
C	0.03980	Equation Form	1
Y	0.67000		

ADOT RAINFALL DEPTH-DURATION-FREQUENCY TABLE CALCULATION
SOURCE: ADOT, HIGHWAY DRAINAGE DESIGN MANUAL, MARCH 1993.

Step 1 Depth for design storm/duration from USWB Maps

Frequency	6-hour depth, in	24-hour depth, in
2	1.1	1.3
10	1.9	2.25
50	2.6	3.0
100	3	3.6

Note : Use 24-hr storm duration

Step 2 Compute 2- and 100-year one hour depths

P2,1=-0.011+(0.942*P2,6^2)/P2,24
P100,1=0.494+(0.755*P100,6^2)/P100,24

P2,1	0.87
P100,1	2.38

Step 3 Compute 2-, 3-, and 12-hour storm depths

P2,2=0.341*P2,6+0.659*P2,1
P2,3=0.569*P2,6+0.431*P2,1
P2,12=0.500*P2,6+0.500*P2,24

P2,2	0.95
P2,3	1.00
P2,12	1.20

P100,2=0.341*P100,6+0.659*P100,1
P100,3=0.569*P100,6+0.431*P100,1
P100,12=0.500*P100,6+0.500*P100,24

P100,2	2.59
P100,3	2.73
P100,12	3.30

Step 4 Short Duration rainfall zone =8

Step 5 Short Duration Rainfall Ratios for Zone 8

	2-Year Storm Return Period				100-Year Storm Return Period			
	5-min	10-min	15-min	30-min	5-min	10-min	15-min	30-min
Ratios	0.34	0.51	0.62	0.82	0.3	0.46	0.59	0.8

Step 6 Short Duration Rainfall Stats for Zone 8

Event	Factor	Base Event	Depth,in
2-yr,5-min	0.34	0.87	0.29
2-yr,10-min	0.51	0.87	0.44
2-yr,15-min	0.62	0.87	0.54
2-yr,30-min	0.82	0.87	0.71
100-yr,5-min	0.3	2.38	0.71

100-yr,10-min	0.46	2.38	1.10
100-yr,15-min	0.59	2.38	1.41
100-yr,30-min	0.8	2.38	1.91

Step 7 Compute Rainfall Stats for other Frequencies

Event	Factor 1	Base Event	Factor 2	Base Event	Depth,in
10-yr,5-min	0.496	0.29	0.449	0.71	0.47
10-yr,10-min	0.496	0.44	0.449	1.10	0.71
10-yr,15-min	0.496	0.54	0.449	1.41	0.90
10-yr,30-min	0.496	0.71	0.449	1.91	1.21
10-yr,1hr	0.496	0.87	0.449	2.38	1.50
10-yr,2hr	0.496	0.95	0.449	2.59	1.63
10-yr,3hr	0.496	1.00	0.449	2.73	1.72
10-yr,12hr	0.496	1.20	0.496	3.30	2.23
10-yr,24hr					2.25
50-yr,5-min	0.146	0.29	0.835	0.71	0.64
50-yr,10-min	0.146	0.44	0.835	1.10	0.98
50-yr,15-min	0.146	0.54	0.835	1.41	1.25
50-yr,30-min	0.146	0.71	0.835	1.91	1.69
50-yr,1hr	0.146	0.87	0.835	2.38	2.11
50-yr,2hr	0.146	0.95	0.835	2.59	2.30
50-yr,3hr	0.146	1.00	0.835	2.73	2.43
50-yr,12hr	0.146	1.20	0.835	3.30	2.93
50-yr,24hr					3.00

Steps to be used to determine precipitation values for various durations and return periods.

STEP 1. From the precipitation maps in the manual "Hydrologic Design for Highway Drainage in Arizona", determine the precipitation values for the 6 and 24 hour duration storms for return periods of 2, 5, 10, 25, 50 and 100 years. Tabulate these values in Table 1 in the column headed 'Map Values'

TABLE 1

Return Period (Years)	Precipitation Values (inches)			
	6 hour duration		24 hour duration	
	Map Value	Corrected Value	Map Value	Corrected Value
2	1.1	1.1		1.3
5				
10	1.9	1.9		2.25
25				
50	2.7	2.6	3.2	
100	3.0	3.0	3.6	3.6

NOTE: There is a possibility of making an error while reading the maps because, (1) a site is not easy to locate precisely on a series of 12 maps, (2) there may be some slight registration differences in printing, and (3) precise interpolation between isolines is difficult. In order to minimize any errors in reading the maps, these values should be plotted on the diagram "Precipitation Depth versus Return Period" Fig. 1.

INCA ENGINEERS INC.

Job No. ______ Vol./Sheet No. ______ of ______

Contract/Client: GREENFIELD / RAY ROAD

Phase/Subject: DRAINAGE

Design Topic: DETERMINATION OF 10 Y 1 hour Precipitation Depth

Made By: PWC Date: 10/30/02 Checked By: ______ Date: ______ Page No. ______

$$Y_2 = -.011 + 0.942\,(x_1^2 / x_2) = -0.011 + 0.942\,(1.1^2 / 1.3) = 0.866$$

$$Y_{100} = 0.494 + 0.755\,(x_3^2 / x_4) = 0.494 + 0.755\,(3.00^2 / 3.6) = 2.382$$

ENGINEERS INC.

Job No.

Vol./Sheet No. of

Contract/Client GREENFIELD / RAY ROAD

Phase/Subject DRAINAGE / GREENFIELD ROAD DEPRESSED ROADWAY

Design Topic DETERMINATION OF 50Y 1 hour PRECIPITATION DEPTH

Made By PWC Date 12-13-02 Checked By Date Page No.

$Y_{50} = -.011 + 0.942(X_1^2/X_2) = -0.011 + 0.942(2.7^2/3.0) = 2.278$

Say 2.3

Project No. ______________ Station ______________

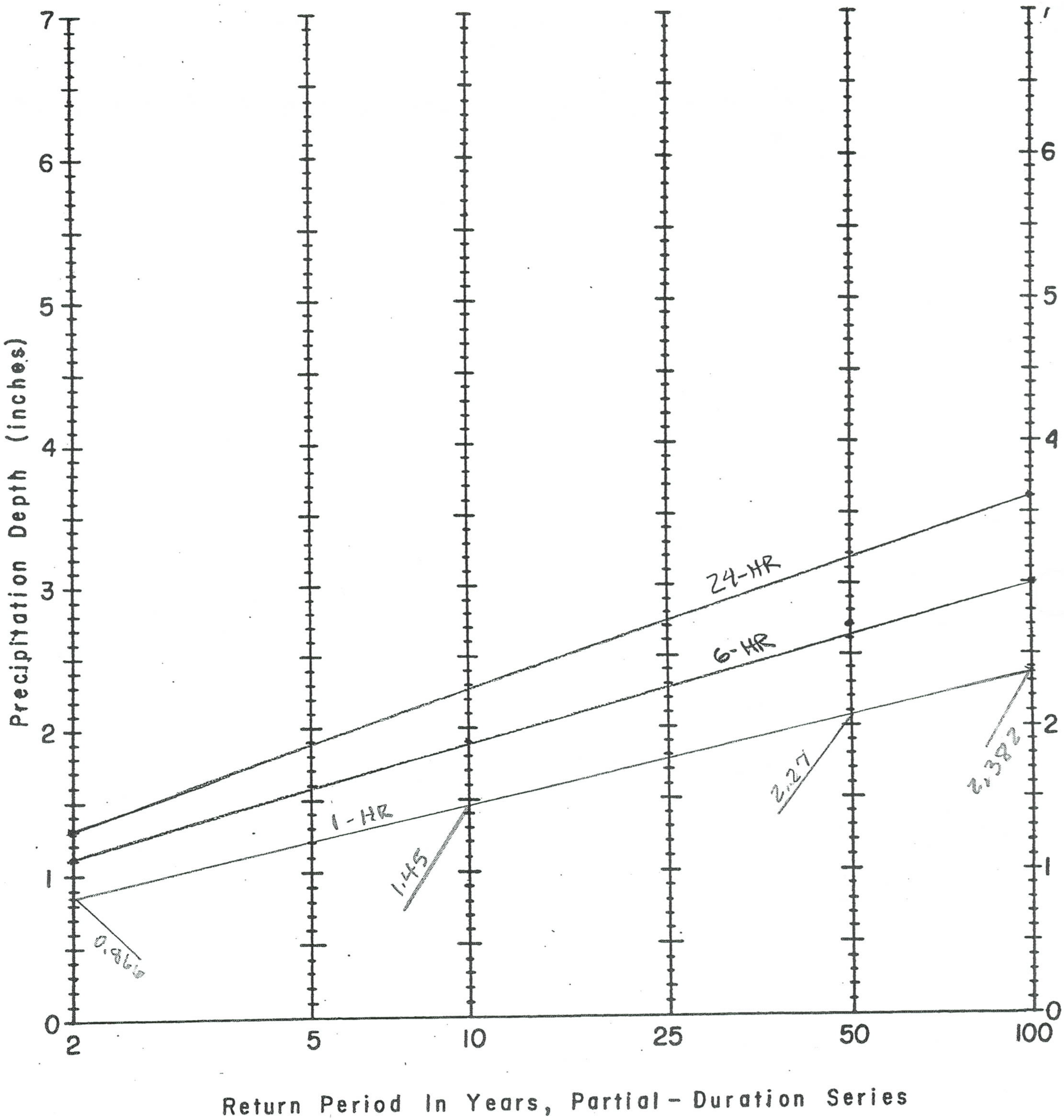


Figure 1 Precipitation Depth Versus Return Period for Partial - Duration Series

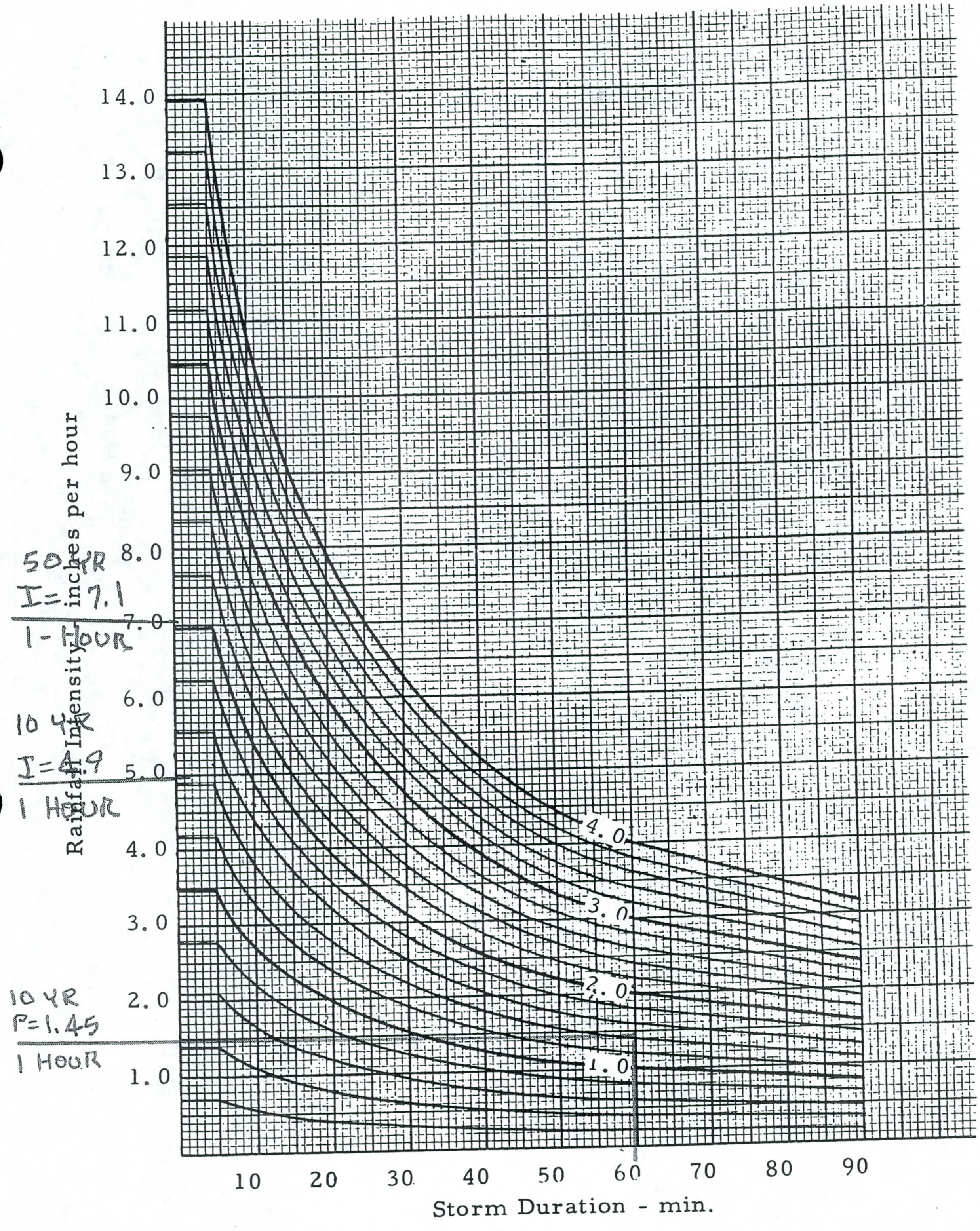
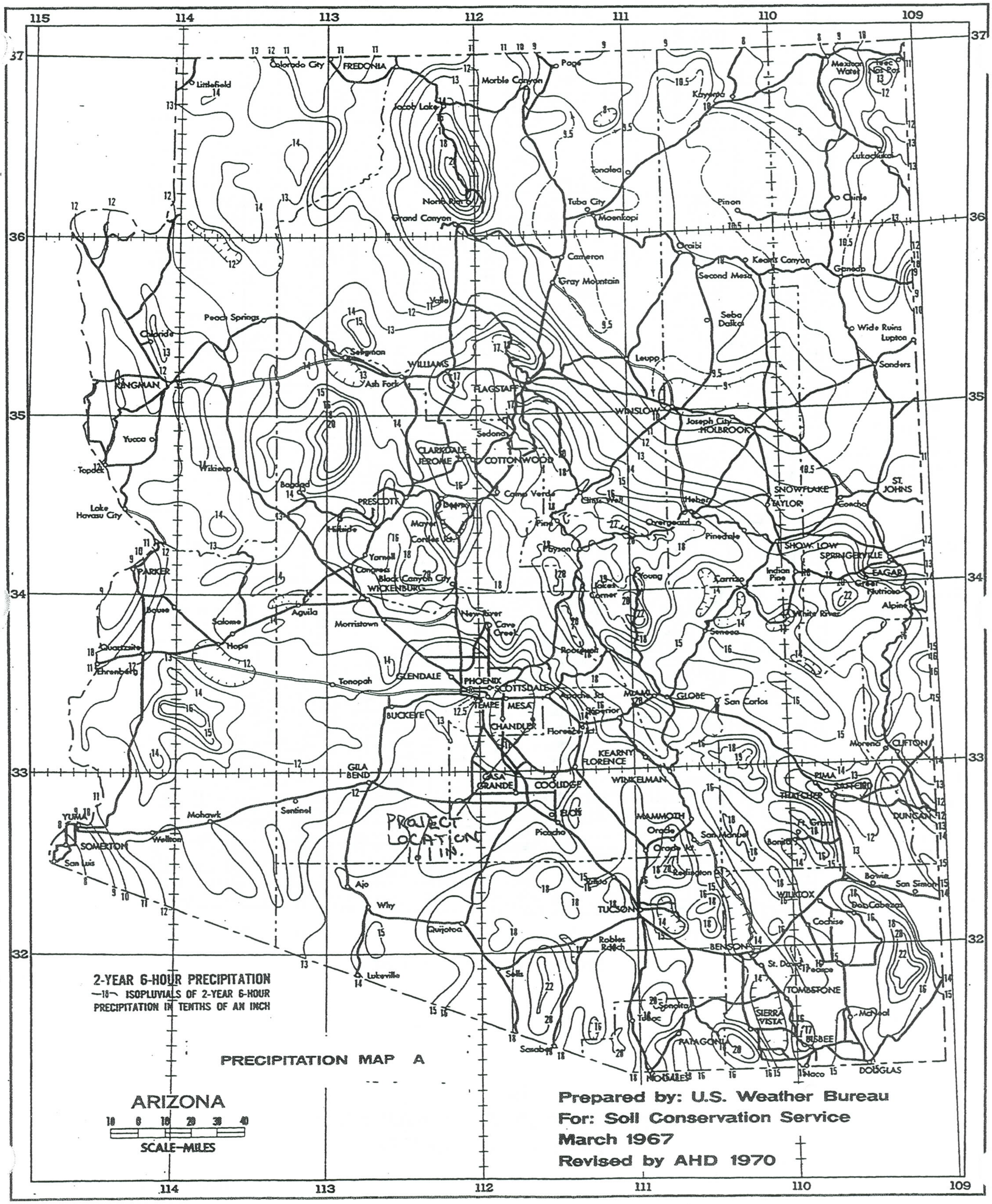
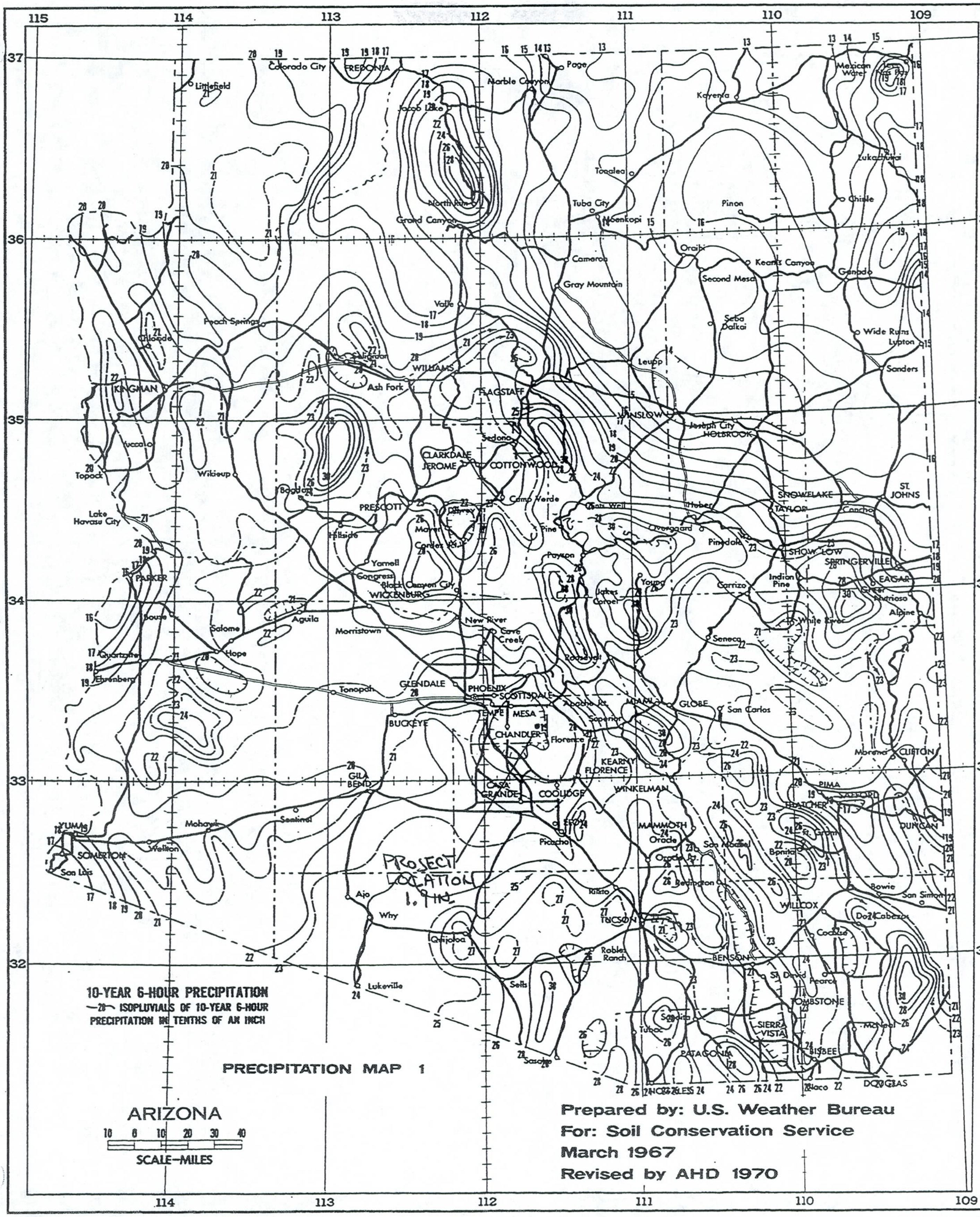


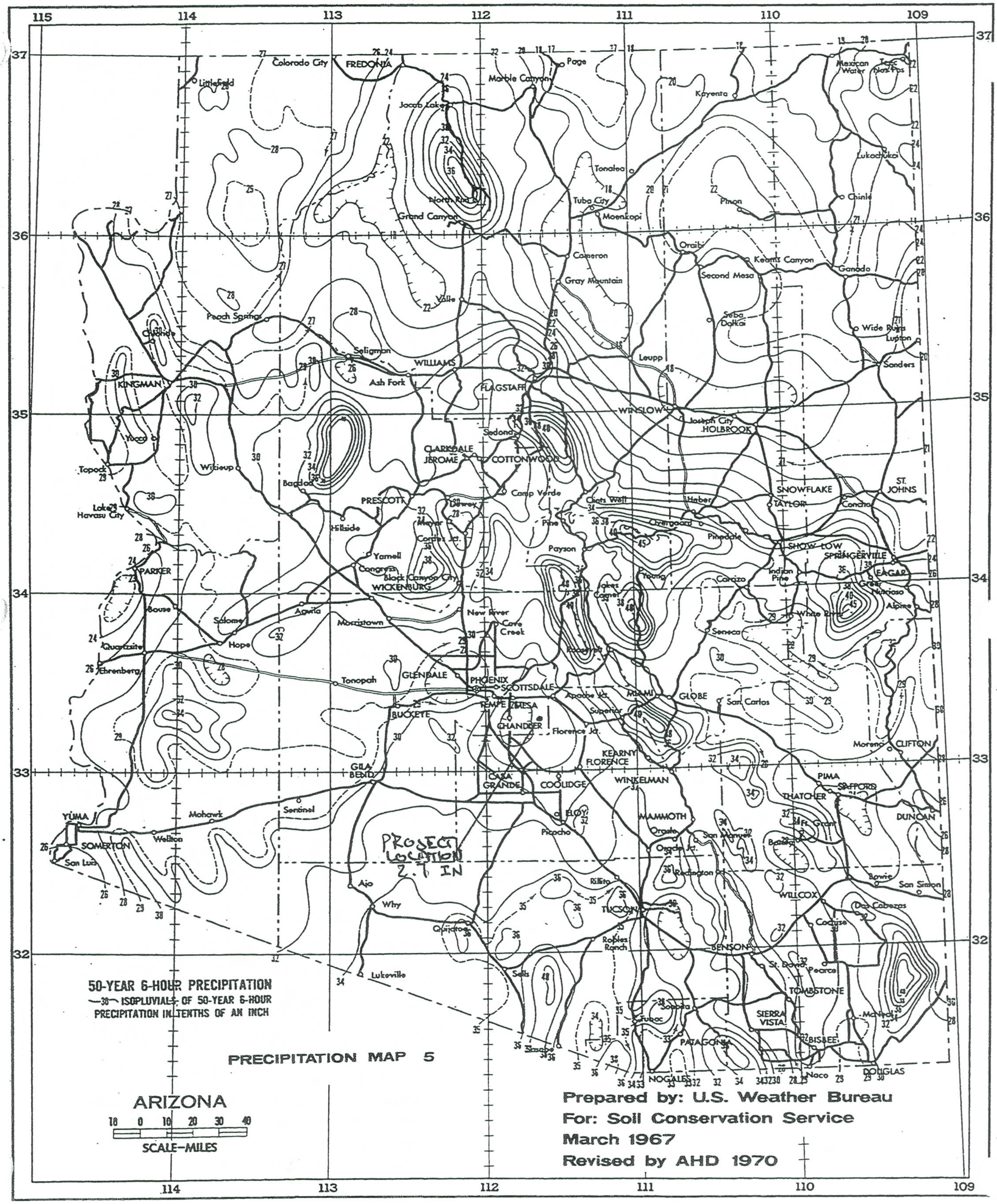
Fig. 3-2

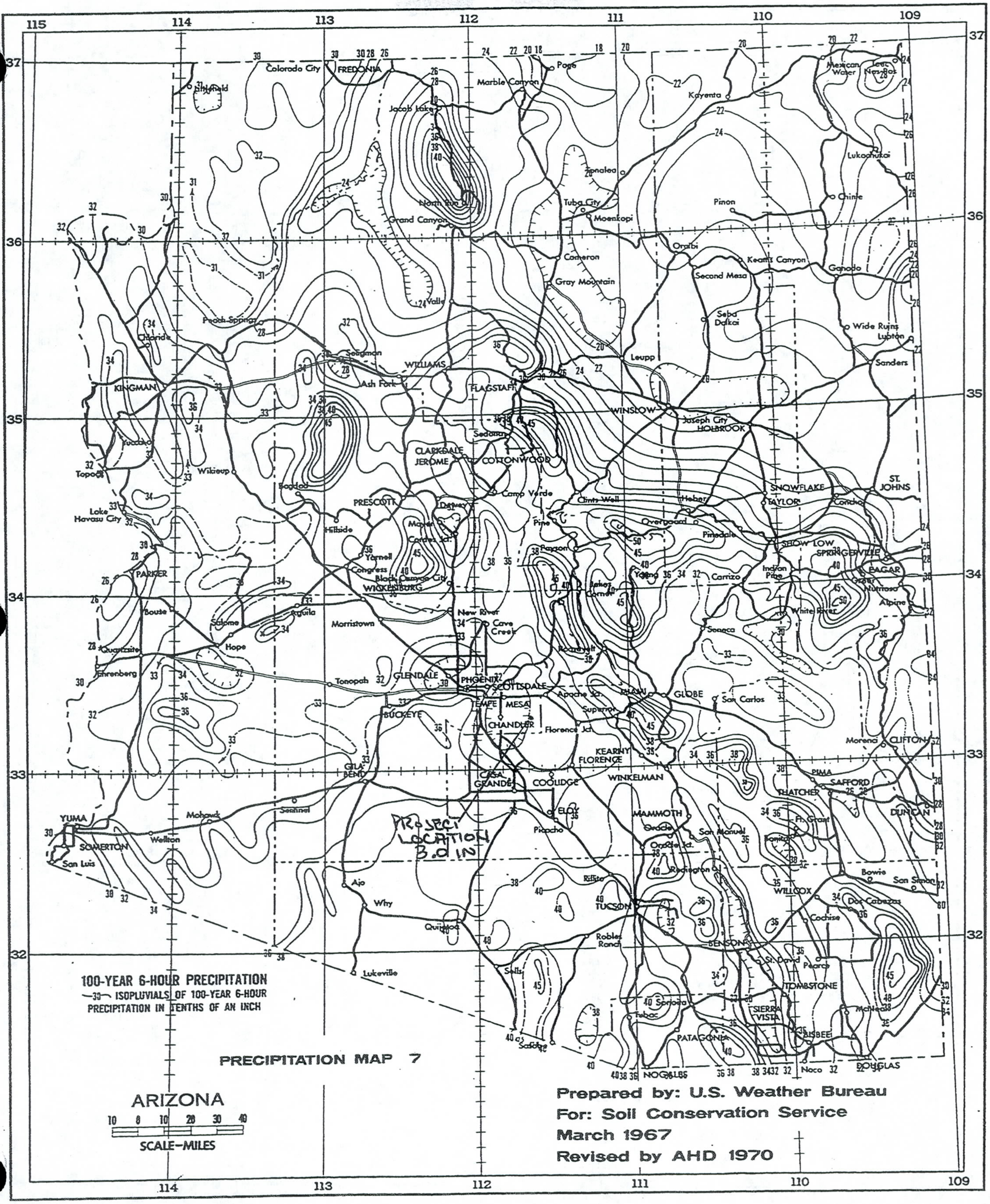
STANDARD DURATION RAINFALL - INTENSITY CURVES

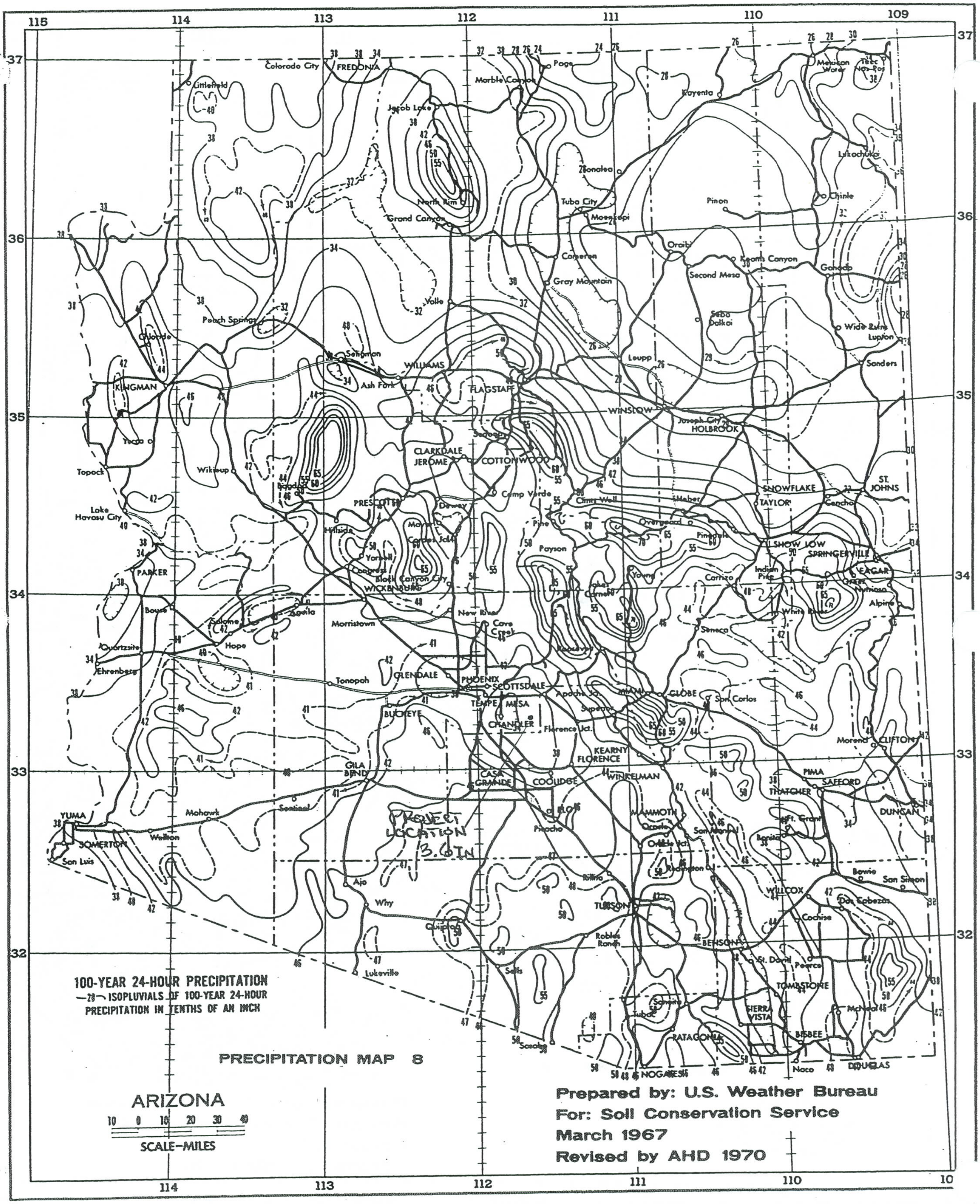
Based on:
Weather Bureau
Technical Paper No. 4(

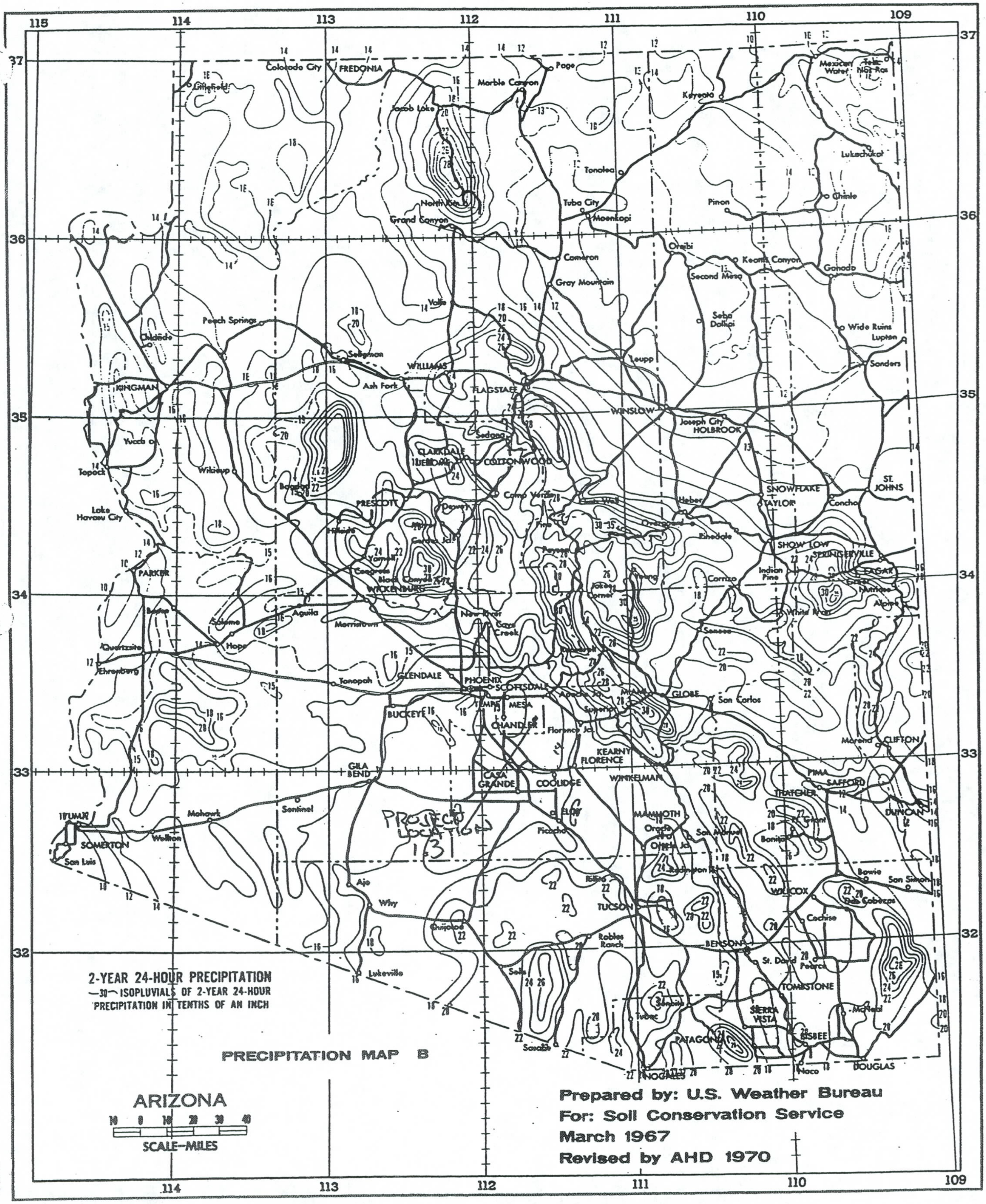

2-YEAR 6-HOUR PRECIPITATION
—18— ISOPLUVIALS OF 2-YEAR 6-HOUR PRECIPITATION IN TENTHS OF AN INCH
PRECIPITATION MAP A
ARIZONA
SCALE-MILES
PROJECT LOCATION 1.1 IN.
Prepared by: U.S. Weather Bureau
For: Soil Conservation Service
March 1967
Revised by AHD 1970


10-YEAR 6-HOUR PRECIPITATION
—20— ISOPLUVIALS OF 10-YEAR 6-HOUR PRECIPITATION IN TENTHS OF AN INCH
PRECIPITATION MAP 1
ARIZONA
SCALE-MILES
Prepared by: U.S. Weather Bureau
For: Soil Conservation Service
March 1967
Revised by AHD 1970
PROJECT LOCATION 1.9 IN.


50-YEAR 6-HOUR PRECIPITATION
—30— ISOPLUVIALS OF 50-YEAR 6-HOUR PRECIPITATION IN TENTHS OF AN INCH
PRECIPITATION MAP 5
ARIZONA
10 0 10 20 30 40
SCALE-MILES
Prepared by: U.S. Weather Bureau
For: Soil Conservation Service
March 1967
Revised by AHD 1970
PROJECT LOCATION
2.1 IN


100-YEAR 6-HOUR PRECIPITATION
—30— ISOPLUVIALS OF 100-YEAR 6-HOUR PRECIPITATION IN TENTHS OF AN INCH
PRECIPITATION MAP 7
ARIZONA
10 0 10 20 30 40
SCALE-MILES
Prepared by: U.S. Weather Bureau
For: Soil Conservation Service
March 1967
Revised by AHD 1970
PROJECT LOCATION 3.0 IN.


100-YEAR 24-HOUR PRECIPITATION
—28— ISOPLUVIALS OF 100-YEAR 24-HOUR PRECIPITATION IN TENTHS OF AN INCH
PRECIPITATION MAP 8
ARIZONA
10 0 10 20 30 40
SCALE–MILES
Prepared by: U.S. Weather Bureau
For: Soil Conservation Service
March 1967
Revised by AHD 1970
PROJECT LOCATION 3.0 IN


2-YEAR 24-HOUR PRECIPITATION
—30— ISOPLUVIALS OF 2-YEAR 24-HOUR PRECIPITATION IN TENTHS OF AN INCH
PRECIPITATION MAP B
ARIZONA
SCALE-MILES
Prepared by: U.S. Weather Bureau
For: Soil Conservation Service
March 1967
Revised by AHD 1970
PROJECT LOCATION 13

NCA ENGINEERS INC.

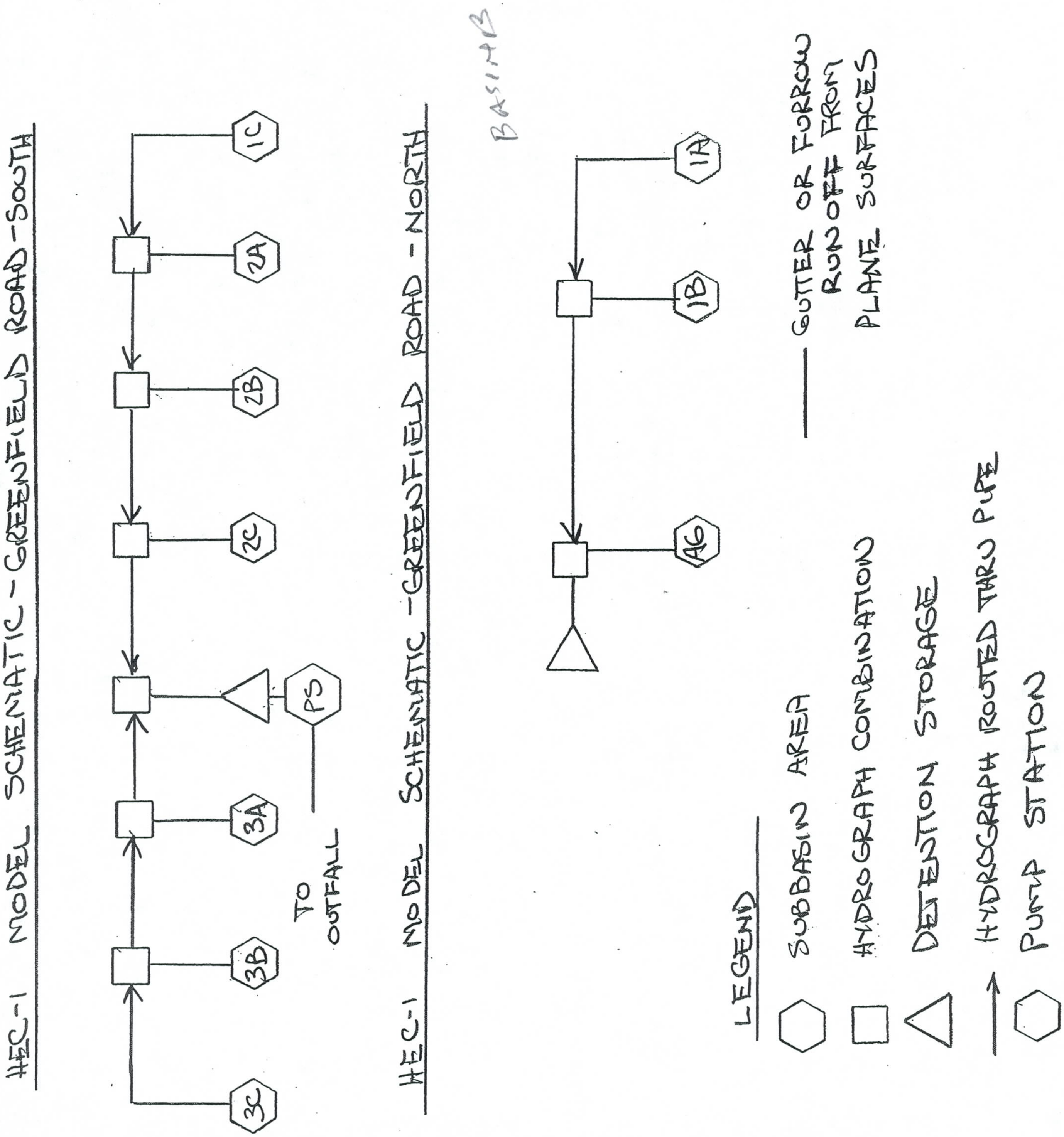
Job No. ______
Vol./Sheet No. ______ of ______

Contract/Client: GREENFIELD & RAY RD / TOWN OF GILBERT

Phase/Subject: 60% DESIGN

Design Topic: DRAINAGE – HYDROLOGIC MODEL SCHEMATIC

Made By: JRD Date: 10/02 Checked By: ______ Date: ______ Page No. ______



NCA ENGINEERS INC.

Job No. ________
Vol./Sheet No. ____ of ____

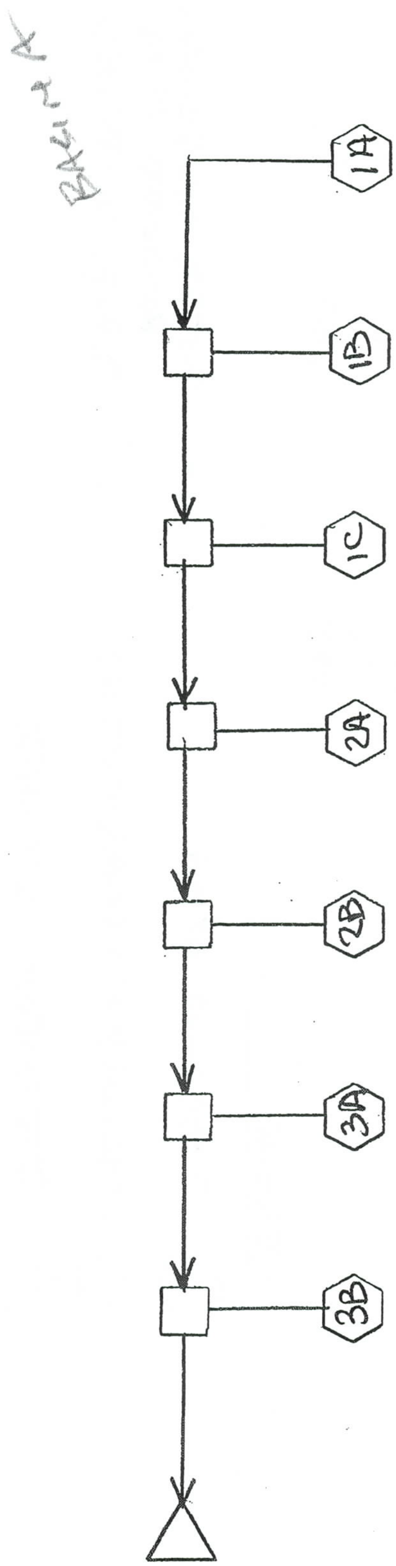
Contract/Client ________

Phase/Subject ________

Design Topic ________

Made By ____ Date ____ Checked By ____ Date ____ Page No. ____

HEC-1 MODEL SCHEMATIC- RAY RD



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 *                                       *                                                    *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                                                    *   U.S. ARMY CORPS OF ENGINEERS
 *                JUN   1998             *                                                    *   HYDROLOGIC ENGINEERING CENTER
 *            VERSION 4.1                *                                                    *        609 SECOND STREET
 *                                       *                                                    *     DAVIS, CALIFORNIA 95616
 *  RUN DATE   08OCT02  TIME  10:48:07   *                                                    *         (916) 756-1104
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                                   X     X  X        X     X         XX
                                   X     X  X        X                X
                                   XXXXXXX  XXXX     X       XXXXX    X
                                   X     X  X        X                X
                                   X     X  X        X     X          X
                                   X     X  XXXXXXX   XXXXX          XXX


              THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

              THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
              THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
              NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
              DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
              KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM


1                                        HEC-1 INPUT                                                       PAGE  1

          LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

            1           ID        TOWN OF GILBERT GREENFIELD ROAD SE DRAINAGE STORM DRAINAGE PN:96446-1
            2           ID        KINEMATIC WAVE WATERSHED MODEL 10 year storm Conveyance- Detention Basin
            3           IT       2 24SEP02    0000     300
            4           IO       3
                        *
                        *DIAGRAM
```

```
   5           KK       2
   6           KM         RUNOFF AGRICULTURAL AREA
   7           KO       1
   8           BA  0.0347
   9           PH      10             0.47    0.90    1.50
               *        BLANK FOR 50-YR & BA ADJUSTMENT
  10           LG     0.3    0.15     8.20    0.12     5.1
               *        ASSUME CLAY LOAM SOIL PARAMETERS
  11           UK      50   0.005      .06     100
  12           RK     750    .003     .012   .0347    TRAP       0       5
               *     FURROW FLOW
               *     ROUTE TO STORAGE

  13           KK      1A
  14           KM         RUNOFF SECTION 1A
  15           KO       0
  16           BA  .00154
               *        RATING FOR 18" DIA PIPE 0.25 %SLOPE
  17           HQ       0    0.50     1.00    1.50    2.00    2.50    3.00    4.00    5.00    5.50
  18           HE       0    0.31     0.44    0.55    0.64    0.73    0.81    0.98    1.17    1.31
  19           PH      10             0.47    0.90    1.50
               *        10-YR & BA ADJUSTMENT
  20           LG     0.3    0.15     8.20    0.12    77.3
               *        ASSUME CLAY LOAM SOIL PARAMETERS
  21           UK      52    0.04      .15     100
  22           RK     250  0.0040     .015 0.00063    TRAP       0       5
               *     GUTTER FLOW
  23           RK     490  0.0025     .012 0.00154    CIRC     1.5

  24           KK      1B
  25           KM         RUNOFF SECTION 1B
  26           KO       0
  27           BA  .00235
               *        RATING FOR 24" DIA PIPE 0.25%SLOPE
  28           HQ       0     1.5      3.0     4.5     6.0     7.5     9.0    11.0    12.0    12.5
  29           HE       0    0.49     0.70    0.88    1.04    1.19    1.35    1.59    1.78    1.78
  30           PH      10             0.47    0.90    1.50
               *        10-YR & BA ADJUSTMENT
  31           LG     0.3    0.15     8.20    0.12    80.5
               *        ASSUME CLAY LOAM SOIL PARAMETERS
  32           UK      52    0.04      .15     100
  33           RK     490  0.0040     .015 0.00063    TRAP       0       5
               *     GUTTER FLOW
  34           RK     865  0.0025     .012 0.00235    CIRC     2.0             YES
```


```
LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  35           KK       3
  36           KM         RUNOFF COMBINED
  37           HC       2

  38           KK       4
```

```
                39            KM        DETENTION FACILITY
                40            KO       1         2
                              *       STORAGE ROUTING THRU OPEN DETENTION POND
                41            RS       1      STOR      0.0
                42            SV       0     0.366     0.744     1.136     1.540     1.958     2.391     2.838     3.301     3.780
                43            SV   4.275     4.787     5.321     5.877
                44            SE       0      0.25       0.5      0.75       1.0      1.25      1.50      1.75      2.00      2.25
                45            SE    2.50      2.75      3.00      3.25
                46            SQ       0     0.181     0.187     0.194     0.200     0.207     0.214     0.222     0.229     0.237
                47            SQ   0.245     0.254     0.266     0.276
                48            ZZ
1
           SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

   NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

    5           2
                .
                .
   13           .          1A
                .           V
                .           V
   24           .          1B ***
                .           .
                .           .
   35           3............
                V
                V
   38           4

 (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1*****************************************
*****************************************
 *                                       *                                                 *
*
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                                                 *    U.S. ARMY CORPS OF ENGINEERS
*
 *               JUN   1998              *                                                 *    HYDROLOGIC ENGINEERING CENTER
*
 *            VERSION 4.1                *                                                 *          609 SECOND STREET
*
 *                                       *                                                 *       DAVIS, CALIFORNIA 95616
*
 *  RUN DATE   08OCT02  TIME  10:48:07   *                                                 *          (916) 756-1104
*
 *                                       *                                                 *
*
 *****************************************
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                         TOWN OF GILBERT GREENFIELD ROAD SE DRAINAGE STORM DRAINAGE PN:96446-1
                         KINEMATIC WAVE WATERSHED MODEL 10 year storm Conveyance- Detention Basin

 4 IO          OUTPUT CONTROL VARIABLES
                     IPRNT          3  PRINT CONTROL
                     IPLOT          0  PLOT CONTROL
                     QSCAL         0.  HYDROGRAPH PLOT SCALE

   IT          HYDROGRAPH TIME DATA
                      NMIN          2  MINUTES IN COMPUTATION INTERVAL
                     IDATE   24SEP 2  STARTING DATE
                     ITIME       0000  STARTING TIME
                        NQ        300  NUMBER OF HYDROGRAPH ORDINATES
                    NDDATE   24SEP 2  ENDING DATE
                    NDTIME       0958  ENDING TIME
                     ICENT         19  CENTURY MARK

                COMPUTATION INTERVAL      .03 HOURS
                     TOTAL TIME BASE     9.97 HOURS

          ENGLISH UNITS
               DRAINAGE AREA          SQUARE MILES
               PRECIPITATION DEPTH    INCHES
               LENGTH, ELEVATION      FEET
               FLOW                   CUBIC FEET PER SECOND
               STORAGE VOLUME         ACRE-FEET
               SURFACE AREA           ACRES
               TEMPERATURE            DEGREES FAHRENHEIT


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***
*** ***


            **************
            *            *
 5 KK       *          2 *
            *            *
            **************
                         RUNOFF AGRICULTURAL AREA

 7 KO          OUTPUT CONTROL VARIABLES
                     IPRNT          1  PRINT CONTROL
                     IPLOT          0  PLOT CONTROL
                     QSCAL         0.  HYDROGRAPH PLOT SCALE

             SUBBASIN RUNOFF DATA

 8 BA          SUBBASIN CHARACTERISTICS
                     TAREA        .03  SUBBASIN AREA
```

PRECIPITATION DATA

9 PH

DEPTHS FOR 10-PERCENT HYPOTHETICAL STORM

..... HYDRO-35			.... TP-40					.... TP-49			
5-MIN	15-MIN	60-MIN	2-HR	3-HR	6-HR	12-HR	24-HR	2-DAY	4-DAY	7-DAY	10-DAY
.47	.90	1.50	.00	.00	.00	.00	.00	.00	.00	.00	.00

STORM AREA = .03

10 LG

GREEN AND AMPT LOSS RATE

STRTL	.30	STARTING LOSS
DTH	.15	MOISTURE DEFICIT
PSIF	8.20	WETTING FRONT SUCTION
XKSAT	.12	HYDRAULIC CONDUCTIVITY
RTIMP	5.10	PERCENT IMPERVIOUS AREA

KINEMATIC WAVE

11 UK

OVERLAND-FLOW ELEMENT NO. 1

L	50.	OVERLAND FLOW LENGTH
S	.0050	SLOPE
N	.060	ROUGHNESS COEFFICIENT
PA	100.0	PERCENT OF SUBBASIN
DXMIN	5	MINIMUM NUMBER OF DX INTERVALS

KINEMATIC WAVE

12 RK

MAIN CHANNEL

L	750.	CHANNEL LENGTH
S	.0030	SLOPE
N	.012	CHANNEL ROUGHNESS COEFFICIENT
CA	.03	CONTRIBUTING AREA
SHAPE	TRAP	CHANNEL SHAPE
WD	.00	BOTTOM WIDTH OR DIAMETER
Z	5.00	SIDE SLOPE
NDXMIN	2	MINIMUM NUMBER OF DX INTERVALS
RUPSTQ	NO	ROUTE UPSTREAM HYDROGRAPH

***

COMPUTED KINEMATIC PARAMETERS
VARIABLE TIME STEP
(DT SHOWN IS A MINIMUM)

ELEMENT	ALPHA	M	DT (MIN)	DX (FT)	PEAK (CFS)	TIME TO PEAK (MIN)	VOLUME (IN)	MAXIMUM CELERITY (FPS)
PLANE1	1.76	1.67	.59	10.00	99.59	32.32	.75	.30
MAIN	2.48	1.33	.51	250.00	95.95	33.60	.75	8.86

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .1396E+01 OUTFLOW= .1389E+01 BASIN STORAGE= .1513E-03 PERCENT ERROR= .5

INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL

MAIN	2.48	1.33	2.00	95.15	34.00	.75

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****

HYDROGRAPH AT STATION 2

****
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DA	MON	HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q	*	DA	MON	HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q
24	SEP	0000	1	.00	.00	.00	0.	*	24	SEP	0500	151	.00	.00	.00	0.
24	SEP	0002	2	.02	.02	.00	0.	*	24	SEP	0502	152	.00	.00	.00	0.
24	SEP	0004	3	.02	.02	.00	0.	*	24	SEP	0504	153	.00	.00	.00	0.
24	SEP	0006	4	.02	.02	.00	0.	*	24	SEP	0506	154	.00	.00	.00	0.
24	SEP	0008	5	.02	.02	.00	0.	*	24	SEP	0508	155	.00	.00	.00	0.
24	SEP	0010	6	.02	.02	.00	0.	*	24	SEP	0510	156	.00	.00	.00	0.
24	SEP	0012	7	.02	.02	.00	0.	*	24	SEP	0512	157	.00	.00	.00	0.
24	SEP	0014	8	.02	.02	.00	0.	*	24	SEP	0514	158	.00	.00	.00	0.
24	SEP	0016	9	.03	.02	.00	0.	*	24	SEP	0516	159	.00	.00	.00	0.
24	SEP	0018	10	.03	.03	.00	0.	*	24	SEP	0518	160	.00	.00	.00	0.
24	SEP	0020	11	.04	.04	.00	0.	*	24	SEP	0520	161	.00	.00	.00	0.
24	SEP	0022	12	.04	.04	.00	0.	*	24	SEP	0522	162	.00	.00	.00	0.
24	SEP	0024	13	.06	.05	.00	0.	*	24	SEP	0524	163	.00	.00	.00	0.
24	SEP	0026	14	.07	.06	.01	1.	*	24	SEP	0526	164	.00	.00	.00	0.
24	SEP	0028	15	.10	.04	.06	3.	*	24	SEP	0528	165	.00	.00	.00	0.
24	SEP	0030	16	.19	.03	.15	23.	*	24	SEP	0530	166	.00	.00	.00	0.
24	SEP	0032	17	.19	.03	.16	75.	*	24	SEP	0532	167	.00	.00	.00	0.
24	SEP	0034	18	.15	.02	.12	95.	*	24	SEP	0534	168	.00	.00	.00	0.
24	SEP	0036	19	.09	.02	.07	75.	*	24	SEP	0536	169	.00	.00	.00	0.
24	SEP	0038	20	.07	.02	.05	54.	*	24	SEP	0538	170	.00	.00	.00	0.
24	SEP	0040	21	.04	.02	.03	38.	*	24	SEP	0540	171	.00	.00	.00	0.
24	SEP	0042	22	.04	.02	.02	27.	*	24	SEP	0542	172	.00	.00	.00	0.
24	SEP	0044	23	.04	.02	.02	20.	*	24	SEP	0544	173	.00	.00	.00	0.
24	SEP	0046	24	.03	.02	.02	16.	*	24	SEP	0546	174	.00	.00	.00	0.
24	SEP	0048	25	.02	.02	.01	13.	*	24	SEP	0548	175	.00	.00	.00	0.
24	SEP	0050	26	.02	.02	.01	10.	*	24	SEP	0550	176	.00	.00	.00	0.
24	SEP	0052	27	.02	.02	.01	8.	*	24	SEP	0552	177	.00	.00	.00	0.
24	SEP	0054	28	.02	.01	.00	7.	*	24	SEP	0554	178	.00	.00	.00	0.
24	SEP	0056	29	.02	.01	.00	6.	*	24	SEP	0556	179	.00	.00	.00	0.
24	SEP	0058	30	.02	.01	.00	5.	*	24	SEP	0558	180	.00	.00	.00	0.
24	SEP	0100	31	.02	.01	.00	4.	*	24	SEP	0600	181	.00	.00	.00	0.
24	SEP	0102	32	.00	.00	.00	3.	*	24	SEP	0602	182	.00	.00	.00	0.
24	SEP	0104	33	.00	.00	.00	3.	*	24	SEP	0604	183	.00	.00	.00	0.
24	SEP	0106	34	.00	.00	.00	2.	*	24	SEP	0606	184	.00	.00	.00	0.
24	SEP	0108	35	.00	.00	.00	2.	*	24	SEP	0608	185	.00	.00	.00	0.
24	SEP	0110	36	.00	.00	.00	2.	*	24	SEP	0610	186	.00	.00	.00	0.
24	SEP	0112	37	.00	.00	.00	1.	*	24	SEP	0612	187	.00	.00	.00	0.
24	SEP	0114	38	.00	.00	.00	1.	*	24	SEP	0614	188	.00	.00	.00	0.

24	SEP	0116	39	.00	.00	.00	1.	*
24	SEP	0118	40	.00	.00	.00	1.	*
24	SEP	0120	41	.00	.00	.00	1.	*
24	SEP	0122	42	.00	.00	.00	1.	*
24	SEP	0124	43	.00	.00	.00	0.	*
24	SEP	0126	44	.00	.00	.00	0.	*
24	SEP	0128	45	.00	.00	.00	0.	*
24	SEP	0130	46	.00	.00	.00	0.	*
24	SEP	0132	47	.00	.00	.00	0.	*
24	SEP	0134	48	.00	.00	.00	0.	*
24	SEP	0136	49	.00	.00	.00	0.	*
24	SEP	0138	50	.00	.00	.00	0.	*
24	SEP	0140	51	.00	.00	.00	0.	*
24	SEP	0142	52	.00	.00	.00	0.	*
24	SEP	0144	53	.00	.00	.00	0.	*
24	SEP	0146	54	.00	.00	.00	0.	*
24	SEP	0148	55	.00	.00	.00	0.	*
24	SEP	0150	56	.00	.00	.00	0.	*
24	SEP	0152	57	.00	.00	.00	0.	*
24	SEP	0154	58	.00	.00	.00	0.	*
24	SEP	0156	59	.00	.00	.00	0.	*
24	SEP	0158	60	.00	.00	.00	0.	*
24	SEP	0200	61	.00	.00	.00	0.	*
24	SEP	0202	62	.00	.00	.00	0.	*
24	SEP	0204	63	.00	.00	.00	0.	*
24	SEP	0206	64	.00	.00	.00	0.	*
24	SEP	0208	65	.00	.00	.00	0.	*
24	SEP	0210	66	.00	.00	.00	0.	*
24	SEP	0212	67	.00	.00	.00	0.	*
24	SEP	0214	68	.00	.00	.00	0.	*
24	SEP	0216	69	.00	.00	.00	0.	*
24	SEP	0218	70	.00	.00	.00	0.	*
24	SEP	0220	71	.00	.00	.00	0.	*
24	SEP	0222	72	.00	.00	.00	0.	*
24	SEP	0224	73	.00	.00	.00	0.	*
24	SEP	0226	74	.00	.00	.00	0.	*
24	SEP	0228	75	.00	.00	.00	0.	*
24	SEP	0230	76	.00	.00	.00	0.	*
24	SEP	0232	77	.00	.00	.00	0.	*
24	SEP	0234	78	.00	.00	.00	0.	*
24	SEP	0236	79	.00	.00	.00	0.	*
24	SEP	0238	80	.00	.00	.00	0.	*
24	SEP	0240	81	.00	.00	.00	0.	*
24	SEP	0242	82	.00	.00	.00	0.	*
24	SEP	0244	83	.00	.00	.00	0.	*
24	SEP	0246	84	.00	.00	.00	0.	*
24	SEP	0248	85	.00	.00	.00	0.	*
24	SEP	0250	86	.00	.00	.00	0.	*
24	SEP	0252	87	.00	.00	.00	0.	*
24	SEP	0254	88	.00	.00	.00	0.	*
24	SEP	0256	89	.00	.00	.00	0.	*
24	SEP	0258	90	.00	.00	.00	0.	*
24	SEP	0300	91	.00	.00	.00	0.	*
24	SEP	0302	92	.00	.00	.00	0.	*
24	SEP	0616	189	.00	.00	.00	0.	
24	SEP	0618	190	.00	.00	.00	0.	
24	SEP	0620	191	.00	.00	.00	0.	
24	SEP	0622	192	.00	.00	.00	0.	
24	SEP	0624	193	.00	.00	.00	0.	
24	SEP	0626	194	.00	.00	.00	0.	
24	SEP	0628	195	.00	.00	.00	0.	
24	SEP	0630	196	.00	.00	.00	0.	
24	SEP	0632	197	.00	.00	.00	0.	
24	SEP	0634	198	.00	.00	.00	0.	
24	SEP	0636	199	.00	.00	.00	0.	
24	SEP	0638	200	.00	.00	.00	0.	
24	SEP	0640	201	.00	.00	.00	0.	
24	SEP	0642	202	.00	.00	.00	0.	
24	SEP	0644	203	.00	.00	.00	0.	
24	SEP	0646	204	.00	.00	.00	0.	
24	SEP	0648	205	.00	.00	.00	0.	
24	SEP	0650	206	.00	.00	.00	0.	
24	SEP	0652	207	.00	.00	.00	0.	
24	SEP	0654	208	.00	.00	.00	0.	
24	SEP	0656	209	.00	.00	.00	0.	
24	SEP	0658	210	.00	.00	.00	0.	
24	SEP	0700	211	.00	.00	.00	0.	
24	SEP	0702	212	.00	.00	.00	0.	
24	SEP	0704	213	.00	.00	.00	0.	
24	SEP	0706	214	.00	.00	.00	0.	
24	SEP	0708	215	.00	.00	.00	0.	
24	SEP	0710	216	.00	.00	.00	0.	
24	SEP	0712	217	.00	.00	.00	0.	
24	SEP	0714	218	.00	.00	.00	0.	
24	SEP	0716	219	.00	.00	.00	0.	
24	SEP	0718	220	.00	.00	.00	0.	
24	SEP	0720	221	.00	.00	.00	0.	
24	SEP	0722	222	.00	.00	.00	0.	
24	SEP	0724	223	.00	.00	.00	0.	
24	SEP	0726	224	.00	.00	.00	0.	
24	SEP	0728	225	.00	.00	.00	0.	
24	SEP	0730	226	.00	.00	.00	0.	
24	SEP	0732	227	.00	.00	.00	0.	
24	SEP	0734	228	.00	.00	.00	0.	
24	SEP	0736	229	.00	.00	.00	0.	
24	SEP	0738	230	.00	.00	.00	0.	
24	SEP	0740	231	.00	.00	.00	0.	
24	SEP	0742	232	.00	.00	.00	0.	
24	SEP	0744	233	.00	.00	.00	0.	
24	SEP	0746	234	.00	.00	.00	0.	
24	SEP	0748	235	.00	.00	.00	0.	
24	SEP	0750	236	.00	.00	.00	0.	
24	SEP	0752	237	.00	.00	.00	0.	
24	SEP	0754	238	.00	.00	.00	0.	
24	SEP	0756	239	.00	.00	.00	0.	
24	SEP	0758	240	.00	.00	.00	0.	
24	SEP	0800	241	.00	.00	.00	0.	
24	SEP	0802	242	.00	.00	.00	0.	

24	SEP	0304	93	.00	.00	.00	0.	*
24	SEP	0306	94	.00	.00	.00	0.	*
24	SEP	0308	95	.00	.00	.00	0.	*
24	SEP	0310	96	.00	.00	.00	0.	*
24	SEP	0312	97	.00	.00	.00	0.	*
24	SEP	0314	98	.00	.00	.00	0.	*
24	SEP	0316	99	.00	.00	.00	0.	*
24	SEP	0318	100	.00	.00	.00	0.	*
24	SEP	0320	101	.00	.00	.00	0.	*
24	SEP	0322	102	.00	.00	.00	0.	*
24	SEP	0324	103	.00	.00	.00	0.	*
24	SEP	0326	104	.00	.00	.00	0.	*
24	SEP	0328	105	.00	.00	.00	0.	*
24	SEP	0330	106	.00	.00	.00	0.	*
24	SEP	0332	107	.00	.00	.00	0.	*
24	SEP	0334	108	.00	.00	.00	0.	*
24	SEP	0336	109	.00	.00	.00	0.	*
24	SEP	0338	110	.00	.00	.00	0.	*
24	SEP	0340	111	.00	.00	.00	0.	*
24	SEP	0342	112	.00	.00	.00	0.	*
24	SEP	0344	113	.00	.00	.00	0.	*
24	SEP	0346	114	.00	.00	.00	0.	*
24	SEP	0348	115	.00	.00	.00	0.	*
24	SEP	0350	116	.00	.00	.00	0.	*
24	SEP	0352	117	.00	.00	.00	0.	*
24	SEP	0354	118	.00	.00	.00	0.	*
24	SEP	0356	119	.00	.00	.00	0.	*
24	SEP	0358	120	.00	.00	.00	0.	*
24	SEP	0400	121	.00	.00	.00	0.	*
24	SEP	0402	122	.00	.00	.00	0.	*
24	SEP	0404	123	.00	.00	.00	0.	*
24	SEP	0406	124	.00	.00	.00	0.	*
24	SEP	0408	125	.00	.00	.00	0.	*
24	SEP	0410	126	.00	.00	.00	0.	*
24	SEP	0412	127	.00	.00	.00	0.	*
24	SEP	0414	128	.00	.00	.00	0.	*
24	SEP	0416	129	.00	.00	.00	0.	*
24	SEP	0418	130	.00	.00	.00	0.	*
24	SEP	0420	131	.00	.00	.00	0.	*
24	SEP	0422	132	.00	.00	.00	0.	*
24	SEP	0424	133	.00	.00	.00	0.	*
24	SEP	0426	134	.00	.00	.00	0.	*
24	SEP	0428	135	.00	.00	.00	0.	*
24	SEP	0430	136	.00	.00	.00	0.	*
24	SEP	0432	137	.00	.00	.00	0.	*
24	SEP	0434	138	.00	.00	.00	0.	*
24	SEP	0436	139	.00	.00	.00	0.	*
24	SEP	0438	140	.00	.00	.00	0.	*
24	SEP	0440	141	.00	.00	.00	0.	*
24	SEP	0442	142	.00	.00	.00	0.	*
24	SEP	0444	143	.00	.00	.00	0.	*
24	SEP	0446	144	.00	.00	.00	0.	*
24	SEP	0448	145	.00	.00	.00	0.	*
24	SEP	0450	146	.00	.00	.00	0.	*

24	SEP	0804	243	.00	.00	.00	0.
24	SEP	0806	244	.00	.00	.00	0.
24	SEP	0808	245	.00	.00	.00	0.
24	SEP	0810	246	.00	.00	.00	0.
24	SEP	0812	247	.00	.00	.00	0.
24	SEP	0814	248	.00	.00	.00	0.
24	SEP	0816	249	.00	.00	.00	0.
24	SEP	0818	250	.00	.00	.00	0.
24	SEP	0820	251	.00	.00	.00	0.
24	SEP	0822	252	.00	.00	.00	0.
24	SEP	0824	253	.00	.00	.00	0.
24	SEP	0826	254	.00	.00	.00	0.
24	SEP	0828	255	.00	.00	.00	0.
24	SEP	0830	256	.00	.00	.00	0.
24	SEP	0832	257	.00	.00	.00	0.
24	SEP	0834	258	.00	.00	.00	0.
24	SEP	0836	259	.00	.00	.00	0.
24	SEP	0838	260	.00	.00	.00	0.
24	SEP	0840	261	.00	.00	.00	0.
24	SEP	0842	262	.00	.00	.00	0.
24	SEP	0844	263	.00	.00	.00	0.
24	SEP	0846	264	.00	.00	.00	0.
24	SEP	0848	265	.00	.00	.00	0.
24	SEP	0850	266	.00	.00	.00	0.
24	SEP	0852	267	.00	.00	.00	0.
24	SEP	0854	268	.00	.00	.00	0.
24	SEP	0856	269	.00	.00	.00	0.
24	SEP	0858	270	.00	.00	.00	0.
24	SEP	0900	271	.00	.00	.00	0.
24	SEP	0902	272	.00	.00	.00	0.
24	SEP	0904	273	.00	.00	.00	0.
24	SEP	0906	274	.00	.00	.00	0.
24	SEP	0908	275	.00	.00	.00	0.
24	SEP	0910	276	.00	.00	.00	0.
24	SEP	0912	277	.00	.00	.00	0.
24	SEP	0914	278	.00	.00	.00	0.
24	SEP	0916	279	.00	.00	.00	0.
24	SEP	0918	280	.00	.00	.00	0.
24	SEP	0920	281	.00	.00	.00	0.
24	SEP	0922	282	.00	.00	.00	0.
24	SEP	0924	283	.00	.00	.00	0.
24	SEP	0926	284	.00	.00	.00	0.
24	SEP	0928	285	.00	.00	.00	0.
24	SEP	0930	286	.00	.00	.00	0.
24	SEP	0932	287	.00	.00	.00	0.
24	SEP	0934	288	.00	.00	.00	0.
24	SEP	0936	289	.00	.00	.00	0.
24	SEP	0938	290	.00	.00	.00	0.
24	SEP	0940	291	.00	.00	.00	0.
24	SEP	0942	292	.00	.00	.00	0.
24	SEP	0944	293	.00	.00	.00	0.
24	SEP	0946	294	.00	.00	.00	0.
24	SEP	0948	295	.00	.00	.00	0.
24	SEP	0950	296	.00	.00	.00	0.

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     24 SEP 0452  147      .00      .00      .00         0.       *      24 SEP 0952  297      .00      .00      .00         0.
     24 SEP 0454  148      .00      .00      .00         0.       *      24 SEP 0954  298      .00      .00      .00         0.
     24 SEP 0456  149      .00      .00      .00         0.       *      24 SEP 0956  299      .00      .00      .00         0.
     24 SEP 0458  150      .00      .00      .00         0.       *      24 SEP 0958  300      .00      .00      .00         0.
                                                                  *

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     TOTAL RAINFALL =    1.48, TOTAL LOSS =     .73, TOTAL EXCESS =     .75

  PEAK FLOW     TIME                                MAXIMUM AVERAGE FLOW
                                           6-HR         24-HR        72-HR       9.97-HR
+   (CFS)       (HR)
                                (CFS)
+      95.        .57                         3.           2.           2.           2.
                             (INCHES)       .750         .750         .750         .750
                              (AC-FT)         1.           1.           1.           1.

                             CUMULATIVE AREA =     .03 SQ MI


 *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***
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             **************
             *            *
   13 KK     *        1A  *
             *            *
             **************
                               RUNOFF SECTION 1A

   15 KO          OUTPUT CONTROL VARIABLES
                        IPRNT          3  PRINT CONTROL
                        IPLOT          0  PLOT CONTROL
                        QSCAL         0.  HYDROGRAPH PLOT SCALE

                SUBBASIN RUNOFF DATA

   16 BA          SUBBASIN CHARACTERISTICS
                        TAREA        .00  SUBBASIN AREA

                  PRECIPITATION DATA

   19 PH                              DEPTHS FOR  10-PERCENT HYPOTHETICAL STORM
                  ..... HYDRO-35 ......    ............... TP-40 ...............    ........... TP-49 ..........
                  5-MIN  15-MIN  60-MIN     2-HR     3-HR     6-HR    12-HR    24-HR    2-DAY    4-DAY    7-DAY   10-DAY
                    .47     .90    1.50      .00      .00      .00      .00      .00      .00      .00      .00      .00

                                                     STORM AREA =      .00
```

```
20 LG         GREEN AND AMPT LOSS RATE
                    STRTL          .30  STARTING LOSS
                      DTH          .15  MOISTURE DEFICIT
                     PSIF         8.20  WETTING FRONT SUCTION
                   XKSAT           .12  HYDRAULIC CONDUCTIVITY
                    RTIMP        77.30  PERCENT IMPERVIOUS AREA

              KINEMATIC WAVE
21 UK           OVERLAND-FLOW ELEMENT NO. 1
                        L          52.  OVERLAND FLOW LENGTH
                        S        .0400  SLOPE
                        N         .150  ROUGHNESS COEFFICIENT
                       PA        100.0  PERCENT OF SUBBASIN
                    DXMIN            5  MINIMUM NUMBER OF DX INTERVALS

              KINEMATIC WAVE
22 RK           COLLECTOR CHANNEL
                        L         250.  CHANNEL LENGTH
                        S        .0040  SLOPE
                        N         .015  CHANNEL ROUGHNESS COEFFICIENT
                       CA          .00  CONTRIBUTING AREA
                    SHAPE         TRAP  CHANNEL SHAPE
                       WD          .00  BOTTOM WIDTH OR DIAMETER
                        Z         5.00  SIDE SLOPE
                   NDXMIN            2  MINIMUM NUMBER OF DX INTERVALS
23 RK           MAIN CHANNEL
                        L         490.  CHANNEL LENGTH
                        S        .0025  SLOPE
                        N         .012  CHANNEL ROUGHNESS COEFFICIENT
                       CA          .00  CONTRIBUTING AREA
                    SHAPE         CIRC  CHANNEL SHAPE
                       WD         1.50  BOTTOM WIDTH OR DIAMETER
                        Z          .00  SIDE SLOPE
                   NDXMIN            2  MINIMUM NUMBER OF DX INTERVALS
                   RUPSTQ           NO  ROUTE UPSTREAM HYDROGRAPH
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COMPUTED KINEMATIC PARAMETERS
VARIABLE TIME STEP
(DT SHOWN IS A MINIMUM)

ELEMENT	ALPHA	M	DT (MIN)	DX (FT)	PEAK (CFS)	TIME TO PEAK (MIN)	VOLUME (IN)	MAXIMUM CELERITY (FPS)
PLANE1	1.99	1.67	.67	10.40	5.18	31.78	1.31	.36
COLLECTOR1	2.29	1.33	.46	83.33	5.06	32.93	1.31	3.20
MAIN	3.58	1.25	.56	163.33	4.98	33.90	1.31	5.06

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .1076E+00 OUTFLOW= .1074E+00 BASIN STORAGE= .3291E-05 PERCENT ERROR= .2

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                              INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL

              MAIN         3.58     1.25     2.00             4.97    34.00     1.31

     ***            ***            ***            ***            ***

                    HYDROGRAPH AT STATION       1A

     TOTAL RAINFALL =    1.48, TOTAL LOSS =     .17, TOTAL EXCESS =    1.31

   PEAK FLOW     TIME                    MAXIMUM AVERAGE FLOW
                                 6-HR       24-HR      72-HR     9.97-HR
+   (CFS)        (HR)
                           (CFS)
+       5.        .57                   0.         0.         0.         0.
                       (INCHES)      1.307      1.308      1.308      1.308
                        (AC-FT)         0.         0.         0.         0.

                    CUMULATIVE AREA =      .00 SQ MI

               COMPUTE STAGES FROM GIVEN RATING DATA

   16 HQ              FLOW        0.        1.        1.        2.        2.        3.        3.        4.        5.
6.
   18 HE              STAGE       .0        .3        .4        .6        .6        .7        .8       1.0       1.2
1.3

     ***            ***            ***            ***            ***

                    HYDROGRAPH AT STATION       1A

     MAXIMUM STAGE IS     1.16

 *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***
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              **************
              *            *
   24 KK      *       1B   *
              *            *
              **************
                          RUNOFF SECTION 1B

   26 KO         OUTPUT CONTROL VARIABLES
                      IPRNT           3  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE

               SUBBASIN RUNOFF DATA
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27 BA          SUBBASIN CHARACTERISTICS
                     TAREA          .00  SUBBASIN AREA

               PRECIPITATION DATA

30 PH                                  DEPTHS FOR  10-PERCENT HYPOTHETICAL STORM
               ..... HYDRO-35 ......    ............... TP-40 ...............    ........... TP-49 ...........
               5-MIN  15-MIN  60-MIN     2-HR     3-HR     6-HR    12-HR    24-HR    2-DAY    4-DAY    7-DAY  10-DAY
                 .47     .90    1.50      .00      .00      .00      .00      .00      .00      .00      .00     .00

                                                    STORM AREA =      .00

31 LG          GREEN AND AMPT LOSS RATE
                     STRTL          .30  STARTING LOSS
                       DTH          .15  MOISTURE DEFICIT
                      PSIF         8.20  WETTING FRONT SUCTION
                     XKSAT          .12  HYDRAULIC CONDUCTIVITY
                     RTIMP        80.50  PERCENT IMPERVIOUS AREA

               KINEMATIC WAVE
32 UK            OVERLAND-FLOW ELEMENT NO. 1
                         L          52.  OVERLAND FLOW LENGTH
                         S        .0400  SLOPE
                         N         .150  ROUGHNESS COEFFICIENT
                        PA        100.0  PERCENT OF SUBBASIN
                     DXMIN            5  MINIMUM NUMBER OF DX INTERVALS

               KINEMATIC WAVE
33 RK            COLLECTOR CHANNEL
                         L         490.  CHANNEL LENGTH
                         S        .0040  SLOPE
                         N         .015  CHANNEL ROUGHNESS COEFFICIENT
                        CA          .00  CONTRIBUTING AREA
                     SHAPE         TRAP  CHANNEL SHAPE
                        WD          .00  BOTTOM WIDTH OR DIAMETER
                         Z         5.00  SIDE SLOPE
                   NDXMIN             2  MINIMUM NUMBER OF DX INTERVALS
34 RK            MAIN CHANNEL
                         L         865.  CHANNEL LENGTH
                         S        .0025  SLOPE
                         N         .012  CHANNEL ROUGHNESS COEFFICIENT
                        CA          .00  CONTRIBUTING AREA
                     SHAPE         CIRC  CHANNEL SHAPE
                        WD         2.00  BOTTOM WIDTH OR DIAMETER
                         Z          .00  SIDE SLOPE
                   NDXMIN             2  MINIMUM NUMBER OF DX INTERVALS
                   RUPSTQ           YES  ROUTE UPSTREAM HYDROGRAPH

                                                         ***
                                    COMPUTED KINEMATIC PARAMETERS
                                          VARIABLE TIME STEP
                                        (DT SHOWN IS A MINIMUM)
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ELEMENT	ALPHA	M	DT (MIN)	DX (FT)	PEAK (CFS)	TIME TO PEAK (MIN)	VOLUME (IN)	MAXIMUM CELERITY (FPS)
PLANE1	1.99	1.67	.62	10.40	8.01	32.00	1.33	.36
COLLECTOR1	2.29	1.33	1.01	163.33	7.49	34.41	1.33	3.19
MAIN	3.76	1.25	.89	288.33	12.12	35.60	1.33	6.16

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1074E+00 EXCESS= .1673E+00 OUTFLOW= .2750E+00 BASIN STORAGE= .5438E-05 PERCENT ERROR= -.1

INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL

MAIN	3.76	1.25	2.00		11.94	36.00	1.32

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HYDROGRAPH AT STATION 1B

TOTAL RAINFALL = 1.48, TOTAL LOSS = .15, TOTAL EXCESS = 1.33

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	9.97-HR
+ (CFS)	(HR)					
		(CFS)				
+ 12.	.60		1.	0.	0.	0.
		(INCHES)	1.323	1.323	1.323	1.323
		(AC-FT)	0.	0.	0.	0.

CUMULATIVE AREA = .00 SQ MI

COMPUTE STAGES FROM GIVEN RATING DATA

27 HQ	FLOW	0.	2.	3.	5.	6.	8.	9.	11.	12.	13.
29 HE	STAGE	.0	.5	.7	.9	1.0	1.2	1.4	1.6	1.8	1.8

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HYDROGRAPH AT STATION 1B

MAXIMUM STAGE IS 1.77

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              **************
              *            *
   35 KK      *         3  *
              *            *
              **************
                                   RUNOFF COMBINED

   37 HC          HYDROGRAPH COMBINATION
                        ICOMP              2  NUMBER OF HYDROGRAPHS TO COMBINE
                                                                         ***

       ***             ***             ***             ***             ***

                             HYDROGRAPH AT STATION        3

  PEAK FLOW      TIME                           MAXIMUM AVERAGE FLOW
                                        6-HR        24-HR        72-HR       9.97-HR
+    (CFS)        (HR)
                              (CFS)
+      106.        .57                     3.           2.           2.           2.
                           (INCHES)      .807         .808         .808         .808
                            (AC-FT)        2.           2.           2.           2.

                             CUMULATIVE AREA =      .04 SQ MI


 *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***
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              **************
              *            *
   38 KK      *         4  *
              *            *
              **************
                                   DETENTION FACILITY

   40 KO          OUTPUT CONTROL VARIABLES
                        IPRNT              1  PRINT CONTROL
                        IPLOT              2  PLOT CONTROL
                        QSCAL             0.  HYDROGRAPH PLOT SCALE

                HYDROGRAPH ROUTING DATA

   41 RS          STORAGE ROUTING
                        NSTPS              1  NUMBER OF SUBREACHES
                         ITYP           STOR  TYPE OF INITIAL CONDITION
                       RSVRIC            .00  INITIAL CONDITION
                            X            .00 WORKING R AND D COEFFICIENT

   42 SV            STORAGE          .0         .4         .7        1.1        1.5        2.0        2.4        2.8        3.3
```

3.8

4.3 4.8 5.3 5.9

44 SE ELEVATION .00 .25 .50 .75 1.00 1.25 1.50 1.75 2.00
2.25
2.50 2.75 3.00 3.25

46 SQ DISCHARGE 0. 0. 0. 0. 0. 0. 0. 0. 0.
0.
0. 0. 0. 0.

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HYDROGRAPH AT STATION 4

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DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	*	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE	*	DA	MON	HRMN	ORD	OUTFLOW	STORAGE	STAGE
24	SEP	0000	1	0.	.0	.0	*	24	SEP	0320	101	0.	1.6	1.0	*	24	SEP	0640	201	0.	1.6	1.0
24	SEP	0002	2	0.	.0	.0	*	24	SEP	0322	102	0.	1.6	1.0	*	24	SEP	0642	202	0.	1.6	1.0
24	SEP	0004	3	0.	.0	.0	*	24	SEP	0324	103	0.	1.6	1.0	*	24	SEP	0644	203	0.	1.6	1.0
24	SEP	0006	4	0.	.0	.0	*	24	SEP	0326	104	0.	1.6	1.0	*	24	SEP	0646	204	0.	1.6	1.0
24	SEP	0008	5	0.	.0	.0	*	24	SEP	0328	105	0.	1.6	1.0	*	24	SEP	0648	205	0.	1.6	1.0
24	SEP	0010	6	0.	.0	.0	*	24	SEP	0330	106	0.	1.6	1.0	*	24	SEP	0650	206	0.	1.6	1.0
24	SEP	0012	7	0.	.0	.0	*	24	SEP	0332	107	0.	1.6	1.0	*	24	SEP	0652	207	0.	1.6	1.0
24	SEP	0014	8	0.	.0	.0	*	24	SEP	0334	108	0.	1.6	1.0	*	24	SEP	0654	208	0.	1.6	1.0
24	SEP	0016	9	0.	.0	.0	*	24	SEP	0336	109	0.	1.6	1.0	*	24	SEP	0656	209	0.	1.6	1.0
24	SEP	0018	10	0.	.0	.0	*	24	SEP	0338	110	0.	1.6	1.0	*	24	SEP	0658	210	0.	1.6	1.0
24	SEP	0020	11	0.	.0	.0	*	24	SEP	0340	111	0.	1.6	1.0	*	24	SEP	0700	211	0.	1.6	1.0
24	SEP	0022	12	0.	.0	.0	*	24	SEP	0342	112	0.	1.6	1.0	*	24	SEP	0702	212	0.	1.6	1.0
24	SEP	0024	13	0.	.0	.0	*	24	SEP	0344	113	0.	1.6	1.0	*	24	SEP	0704	213	0.	1.6	1.0
24	SEP	0026	14	0.	.0	.0	*	24	SEP	0346	114	0.	1.6	1.0	*	24	SEP	0706	214	0.	1.6	1.0

24	SEP	0028	15	0.	.0	.0	*	24	SEP	0348	115	0.	1.6	1.0	*	24	SEP	0708	215	0.	1.6	1.0
24	SEP	0030	16	0.	.1	.1	*	24	SEP	0350	116	0.	1.6	1.0	*	24	SEP	0710	216	0.	1.6	1.0
24	SEP	0032	17	0.	.2	.2	*	24	SEP	0352	117	0.	1.6	1.0	*	24	SEP	0712	217	0.	1.6	1.0
24	SEP	0034	18	0.	.5	.3	*	24	SEP	0354	118	0.	1.6	1.0	*	24	SEP	0714	218	0.	1.6	1.0
24	SEP	0036	19	0.	.8	.5	*	24	SEP	0356	119	0.	1.6	1.0	*	24	SEP	0716	219	0.	1.5	1.0
24	SEP	0038	20	0.	1.0	.6	*	24	SEP	0358	120	0.	1.6	1.0	*	24	SEP	0718	220	0.	1.5	1.0
24	SEP	0040	21	0.	1.1	.7	*	24	SEP	0400	121	0.	1.6	1.0	*	24	SEP	0720	221	0.	1.5	1.0
24	SEP	0042	22	0.	1.2	.8	*	24	SEP	0402	122	0.	1.6	1.0	*	24	SEP	0722	222	0.	1.5	1.0
24	SEP	0044	23	0.	1.3	.9	*	24	SEP	0404	123	0.	1.6	1.0	*	24	SEP	0724	223	0.	1.5	1.0
24	SEP	0046	24	0.	1.4	.9	*	24	SEP	0406	124	0.	1.6	1.0	*	24	SEP	0726	224	0.	1.5	1.0
24	SEP	0048	25	0.	1.4	.9	*	24	SEP	0408	125	0.	1.6	1.0	*	24	SEP	0728	225	0.	1.5	1.0
24	SEP	0050	26	0.	1.5	.9	*	24	SEP	0410	126	0.	1.6	1.0	*	24	SEP	0730	226	0.	1.5	1.0
24	SEP	0052	27	0.	1.5	1.0	*	24	SEP	0412	127	0.	1.6	1.0	*	24	SEP	0732	227	0.	1.5	1.0
24	SEP	0054	28	0.	1.5	1.0	*	24	SEP	0414	128	0.	1.6	1.0	*	24	SEP	0734	228	0.	1.5	1.0
24	SEP	0056	29	0.	1.5	1.0	*	24	SEP	0416	129	0.	1.6	1.0	*	24	SEP	0736	229	0.	1.5	1.0
24	SEP	0058	30	0.	1.5	1.0	*	24	SEP	0418	130	0.	1.6	1.0	*	24	SEP	0738	230	0.	1.5	1.0
24	SEP	0100	31	0.	1.6	1.0	*	24	SEP	0420	131	0.	1.6	1.0	*	24	SEP	0740	231	0.	1.5	1.0
24	SEP	0102	32	0.	1.6	1.0	*	24	SEP	0422	132	0.	1.6	1.0	*	24	SEP	0742	232	0.	1.5	1.0
24	SEP	0104	33	0.	1.6	1.0	*	24	SEP	0424	133	0.	1.6	1.0	*	24	SEP	0744	233	0.	1.5	1.0
24	SEP	0106	34	0.	1.6	1.0	*	24	SEP	0426	134	0.	1.6	1.0	*	24	SEP	0746	234	0.	1.5	1.0
24	SEP	0108	35	0.	1.6	1.0	*	24	SEP	0428	135	0.	1.6	1.0	*	24	SEP	0748	235	0.	1.5	1.0
24	SEP	0110	36	0.	1.6	1.0	*	24	SEP	0430	136	0.	1.6	1.0	*	24	SEP	0750	236	0.	1.5	1.0
24	SEP	0112	37	0.	1.6	1.0	*	24	SEP	0432	137	0.	1.6	1.0	*	24	SEP	0752	237	0.	1.5	1.0
24	SEP	0114	38	0.	1.6	1.0	*	24	SEP	0434	138	0.	1.6	1.0	*	24	SEP	0754	238	0.	1.5	1.0
24	SEP	0116	39	0.	1.6	1.1	*	24	SEP	0436	139	0.	1.6	1.0	*	24	SEP	0756	239	0.	1.5	1.0
24	SEP	0118	40	0.	1.6	1.1	*	24	SEP	0438	140	0.	1.6	1.0	*	24	SEP	0758	240	0.	1.5	1.0
24	SEP	0120	41	0.	1.6	1.1	*	24	SEP	0440	141	0.	1.6	1.0	*	24	SEP	0800	241	0.	1.5	1.0

24 SEP 0122	42	0.	1.6	1.1	*	24 SEP 0442	142	0.	1.6	1.0	*	24 SEP 0802	242	0.	1.5	1.0
24 SEP 0124	43	0.	1.6	1.1	*	24 SEP 0444	143	0.	1.6	1.0	*	24 SEP 0804	243	0.	1.5	1.0
24 SEP 0126	44	0.	1.6	1.1	*	24 SEP 0446	144	0.	1.6	1.0	*	24 SEP 0806	244	0.	1.5	1.0
24 SEP 0128	45	0.	1.6	1.1	*	24 SEP 0448	145	0.	1.6	1.0	*	24 SEP 0808	245	0.	1.5	1.0
24 SEP 0130	46	0.	1.6	1.1	*	24 SEP 0450	146	0.	1.6	1.0	*	24 SEP 0810	246	0.	1.5	1.0
24 SEP 0132	47	0.	1.6	1.1	*	24 SEP 0452	147	0.	1.6	1.0	*	24 SEP 0812	247	0.	1.5	1.0
24 SEP 0134	48	0.	1.6	1.1	*	24 SEP 0454	148	0.	1.6	1.0	*	24 SEP 0814	248	0.	1.5	1.0
24 SEP 0136	49	0.	1.6	1.1	*	24 SEP 0456	149	0.	1.6	1.0	*	24 SEP 0816	249	0.	1.5	1.0
24 SEP 0138	50	0.	1.6	1.1	*	24 SEP 0458	150	0.	1.6	1.0	*	24 SEP 0818	250	0.	1.5	1.0
24 SEP 0140	51	0.	1.6	1.1	*	24 SEP 0500	151	0.	1.6	1.0	*	24 SEP 0820	251	0.	1.5	1.0
24 SEP 0142	52	0.	1.6	1.1	*	24 SEP 0502	152	0.	1.6	1.0	*	24 SEP 0822	252	0.	1.5	1.0
24 SEP 0144	53	0.	1.6	1.1	*	24 SEP 0504	153	0.	1.6	1.0	*	24 SEP 0824	253	0.	1.5	1.0
24 SEP 0146	54	0.	1.6	1.1	*	24 SEP 0506	154	0.	1.6	1.0	*	24 SEP 0826	254	0.	1.5	1.0
24 SEP 0148	55	0.	1.6	1.1	*	24 SEP 0508	155	0.	1.6	1.0	*	24 SEP 0828	255	0.	1.5	1.0
24 SEP 0150	56	0.	1.6	1.1	*	24 SEP 0510	156	0.	1.6	1.0	*	24 SEP 0830	256	0.	1.5	1.0
24 SEP 0152	57	0.	1.6	1.1	*	24 SEP 0512	157	0.	1.6	1.0	*	24 SEP 0832	257	0.	1.5	1.0
24 SEP 0154	58	0.	1.6	1.1	*	24 SEP 0514	158	0.	1.6	1.0	*	24 SEP 0834	258	0.	1.5	1.0
24 SEP 0156	59	0.	1.6	1.1	*	24 SEP 0516	159	0.	1.6	1.0	*	24 SEP 0836	259	0.	1.5	1.0
24 SEP 0158	60	0.	1.6	1.1	*	24 SEP 0518	160	0.	1.6	1.0	*	24 SEP 0838	260	0.	1.5	1.0
24 SEP 0200	61	0.	1.6	1.1	*	24 SEP 0520	161	0.	1.6	1.0	*	24 SEP 0840	261	0.	1.5	1.0
24 SEP 0202	62	0.	1.6	1.1	*	24 SEP 0522	162	0.	1.6	1.0	*	24 SEP 0842	262	0.	1.5	1.0
24 SEP 0204	63	0.	1.6	1.1	*	24 SEP 0524	163	0.	1.6	1.0	*	24 SEP 0844	263	0.	1.5	1.0
24 SEP 0206	64	0.	1.6	1.1	*	24 SEP 0526	164	0.	1.6	1.0	*	24 SEP 0846	264	0.	1.5	1.0
24 SEP 0208	65	0.	1.6	1.1	*	24 SEP 0528	165	0.	1.6	1.0	*	24 SEP 0848	265	0.	1.5	1.0
24 SEP 0210	66	0.	1.6	1.1	*	24 SEP 0530	166	0.	1.6	1.0	*	24 SEP 0850	266	0.	1.5	1.0
24 SEP 0212	67	0.	1.6	1.1	*	24 SEP 0532	167	0.	1.6	1.0	*	24 SEP 0852	267	0.	1.5	1.0
24 SEP 0214	68	0.	1.6	1.1	*	24 SEP 0534	168	0.	1.6	1.0	*	24 SEP 0854	268	0.	1.5	1.0

24 SEP 0216	69	0.	1.6	1.1 *	24 SEP 0536	169	0.	1.6	1.0 *	24 SEP 0856	269	0.	1.5	1.0
24 SEP 0218	70	0.	1.6	1.1 *	24 SEP 0538	170	0.	1.6	1.0 *	24 SEP 0858	270	0.	1.5	1.0
24 SEP 0220	71	0.	1.6	1.1 *	24 SEP 0540	171	0.	1.6	1.0 *	24 SEP 0900	271	0.	1.5	1.0
24 SEP 0222	72	0.	1.6	1.1 *	24 SEP 0542	172	0.	1.6	1.0 *	24 SEP 0902	272	0.	1.5	1.0
24 SEP 0224	73	0.	1.6	1.1 *	24 SEP 0544	173	0.	1.6	1.0 *	24 SEP 0904	273	0.	1.5	1.0
24 SEP 0226	74	0.	1.6	1.1 *	24 SEP 0546	174	0.	1.6	1.0 *	24 SEP 0906	274	0.	1.5	1.0
24 SEP 0228	75	0.	1.6	1.1 *	24 SEP 0548	175	0.	1.6	1.0 *	24 SEP 0908	275	0.	1.5	1.0
24 SEP 0230	76	0.	1.6	1.1 *	24 SEP 0550	176	0.	1.6	1.0 *	24 SEP 0910	276	0.	1.5	1.0
24 SEP 0232	77	0.	1.6	1.1 *	24 SEP 0552	177	0.	1.6	1.0 *	24 SEP 0912	277	0.	1.5	1.0
24 SEP 0234	78	0.	1.6	1.1 *	24 SEP 0554	178	0.	1.6	1.0 *	24 SEP 0914	278	0.	1.5	1.0
24 SEP 0236	79	0.	1.6	1.1 *	24 SEP 0556	179	0.	1.6	1.0 *	24 SEP 0916	279	0.	1.5	1.0
24 SEP 0238	80	0.	1.6	1.1 *	24 SEP 0558	180	0.	1.6	1.0 *	24 SEP 0918	280	0.	1.5	1.0
24 SEP 0240	81	0.	1.6	1.1 *	24 SEP 0600	181	0.	1.6	1.0 *	24 SEP 0920	281	0.	1.5	1.0
24 SEP 0242	82	0.	1.6	1.0 *	24 SEP 0602	182	0.	1.6	1.0 *	24 SEP 0922	282	0.	1.5	1.0
24 SEP 0244	83	0.	1.6	1.0 *	24 SEP 0604	183	0.	1.6	1.0 *	24 SEP 0924	283	0.	1.5	1.0
24 SEP 0246	84	0.	1.6	1.0 *	24 SEP 0606	184	0.	1.6	1.0 *	24 SEP 0926	284	0.	1.5	1.0
24 SEP 0248	85	0.	1.6	1.0 *	24 SEP 0608	185	0.	1.6	1.0 *	24 SEP 0928	285	0.	1.5	1.0
24 SEP 0250	86	0.	1.6	1.0 *	24 SEP 0610	186	0.	1.6	1.0 *	24 SEP 0930	286	0.	1.5	1.0
24 SEP 0252	87	0.	1.6	1.0 *	24 SEP 0612	187	0.	1.6	1.0 *	24 SEP 0932	287	0.	1.5	1.0
24 SEP 0254	88	0.	1.6	1.0 *	24 SEP 0614	188	0.	1.6	1.0 *	24 SEP 0934	288	0.	1.5	1.0
24 SEP 0256	89	0.	1.6	1.0 *	24 SEP 0616	189	0.	1.6	1.0 *	24 SEP 0936	289	0.	1.5	1.0
24 SEP 0258	90	0.	1.6	1.0 *	24 SEP 0618	190	0.	1.6	1.0 *	24 SEP 0938	290	0.	1.5	1.0
24 SEP 0300	91	0.	1.6	1.0 *	24 SEP 0620	191	0.	1.6	1.0 *	24 SEP 0940	291	0.	1.5	1.0
24 SEP 0302	92	0.	1.6	1.0 *	24 SEP 0622	192	0.	1.6	1.0 *	24 SEP 0942	292	0.	1.5	1.0
24 SEP 0304	93	0.	1.6	1.0 *	24 SEP 0624	193	0.	1.6	1.0 *	24 SEP 0944	293	0.	1.5	1.0
24 SEP 0306	94	0.	1.6	1.0 *	24 SEP 0626	194	0.	1.6	1.0 *	24 SEP 0946	294	0.	1.5	1.0
24 SEP 0308	95	0.	1.6	1.0 *	24 SEP 0628	195	0.	1.6	1.0 *	24 SEP 0948	295	0.	1.5	1.0

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  24 SEP 0310  96       0.      1.6      1.0 * 24 SEP 0630 196       0.      1.6      1.0 * 24 SEP 0950 296       0.      1.5
1.0
  24 SEP 0312  97       0.      1.6      1.0 * 24 SEP 0632 197       0.      1.6      1.0 * 24 SEP 0952 297       0.      1.5
1.0
  24 SEP 0314  98       0.      1.6      1.0 * 24 SEP 0634 198       0.      1.6      1.0 * 24 SEP 0954 298       0.      1.5
1.0
  24 SEP 0316  99       0.      1.6      1.0 * 24 SEP 0636 199       0.      1.6      1.0 * 24 SEP 0956 299       0.      1.5
1.0
  24 SEP 0318 100       0.      1.6      1.0 * 24 SEP 0638 200       0.      1.6      1.0 * 24 SEP 0958 300       0.      1.5
1.0
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  PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
                                        6-HR       24-HR        72-HR       9.97-HR
+    (CFS)       (HR)
                                (CFS)
+       0.       1.30                    0.          0.          0.          0.
                              (INCHES)  .048        .076        .076        .076
                               (AC-FT)   0.          0.          0.          0.

 PEAK STORAGE   TIME                        MAXIMUM AVERAGE STORAGE
                                        6-HR       24-HR        72-HR       9.97-HR
+  (AC-FT)       (HR)
        2.       1.57                    2.          1.          1.          1.

  PEAK STAGE    TIME                          MAXIMUM AVERAGE STAGE
                                        6-HR       24-HR        72-HR       9.97-HR
+   (FEET)       (HR)
     1.06        1.67                   1.04         .96         .96         .96

                               CUMULATIVE AREA =      .04 SQ MI

1                                                        STATION        4

                                (I) INFLOW,   (O) OUTFLOW
          0.        20.        40.        60.        80.       100.       120.         0.         0.         0.         0.         0.
0.
                                                                                    (S) STORAGE
          .0         .0         .0         .0         .0         .0         .0         .5        1.0        1.5        2.0         .0
.0
 DAHRMN PER
 240000    1I---------.---------.---------.---------.---------.---------
S---------.---------.---------.---------.---------.---------.
 240002    2I         .          .          .          .          .          S          .          .          .          .          .
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 240004    3I         .          .          .          .          .          S          .          .          .          .          .
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 240006    4I         .          .          .          .          .          S          .          .          .          .          .
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 240008    5I         .          .          .          .          .          S          .          .          .          .          .
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240010   6I          .         .         .         .         .         S         .         .         .         .         .
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240012   7I          .         .         .         .         .         S         .         .         .         .         .
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240014   8I          .         .         .         .         .         S         .         .         .         .         .
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240016   9I          .         .         .         .         .         S         .         .         .         .         .
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240018  100I         .         .         .         .         .         S         .         .         .         .         .
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240020  110I. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . S . . . . . . . . . . . . . . . . . . . . . . . . . . .
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240022  120I         .         .         .         .         .         S         .         .         .         .         .
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240024  130I         .         .         .         .         .         S         .         .         .         .         .
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240026  140I         .         .         .         .         .         .S        .         .         .         .         .
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240028  150  I       .         .         .         .         .         .S        .         .         .         .         .
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240030  160          .   I     .         .         .         .         . S       .         .         .         .         .
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240032  170          .         .         .I        .         .    S    .         .         .         .         .
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240034  180          .         .         .         .         .  I      .         S         .         .         .         .
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240036  190          .         .         .         .   I     .         .         .    S    .         .         .         .
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240038  200          .         .         . I       .         .         .         .        S.         .         .         .
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240040  210 . . . . . . . . . . .I. . . . . . . . . . . . . . . . . . . . . . . . . . . . S . . . . . . . . . . . . . . . .
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240042  220          .     I   .         .         .         .         .         .         .   S     .         .         .
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240044  230          . I       .         .         .         .         .         .         .     S   .         .         .
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240046  240          I         .         .         .         .         .         .         .      S  .         .         .
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240048  250       I  .         .         .         .         .         .         .         .       S .         .         .
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240050  260     I    .         .         .         .         .         .         .         .        S.         .         .
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240052  270    I     .         .         .         .         .         .         .         .         S         .         .
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240054  280   I      .         .         .         .         .         .         .         .         S         .         .
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240056  290   I      .         .         .         .         .         .         .         .         .S        .         .
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240058  300  I       .         .         .         .         .         .         .         .         .S        .         .
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240100  310 .I. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .S. . . . . . . . . . .
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240102  320 I        .         .         .         .         .         .         .         .         . S       .         .
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240104 33O I . . . . S . .

240106 34O I . . . . S . .

240108 35OI . . . . S . .

240110 36OI . . . . S . .

240112 37OI . . . . S . .

240114 38OI . . . . S . .

240116 39OI . . . . S . .

240118 40I . . . . S . .

240120 41I . . . . .S. . . . .

240122 42I . . . . S . .

240124 43I . . . . S . .

240126 44I . . . . S . .

240128 45I . . . . S . .

240130 46I . . . . S . .

240132 47I . . . . S . .

240134 48I . . . . S . .

240136 49I . . . . S . .

240138 50I . . . . S . .

240140 51I . . . . .S. . . . .

240142 52I . . . . S . .

240144 53I . . . . S . .

240146 54I . . . . S . .

240148 55I . . . . S . .

240150 56I . . . . S . .

240152 57I . . . . S . .

240154 58I . . . . S . .

240156 59I . . . . S . .

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240158  60I          .       .       .       .       .       .       .       .       .  S     .       .
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240200  61I . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .S. . . . . . . . . . .
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240202  62I          .       .       .       .       .       .       .       .       .  S     .       .
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240204  63I          .       .       .       .       .       .       .       .       .  S     .       .
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240206  64I          .       .       .       .       .       .       .       .       .  S     .       .
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240208  65I          .       .       .       .       .       .       .       .       .  S     .       .
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240210  66I          .       .       .       .       .       .       .       .       .  S     .       .
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240212  67I          .       .       .       .       .       .       .       .       .  S     .       .
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240214  68I          .       .       .       .       .       .       .       .       .  S     .       .
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240216  69I          .       .       .       .       .       .       .       .       .  S     .       .
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240218  70I          .       .       .       .       .       .       .       .       .  S     .       .
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240220  71I . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .S. . . . . . . . . . .
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240222  72I          .       .       .       .       .       .       .       .       .  S     .       .
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240224  73I          .       .       .       .       .       .       .       .       .  S     .       .
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240226  74I          .       .       .       .       .       .       .       .       .  S     .       .
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240228  75I          .       .       .       .       .       .       .       .       .  S     .       .
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240230  76I          .       .       .       .       .       .       .       .       .  S     .       .
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240232  77I          .       .       .       .       .       .       .       .       .  S     .       .
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240234  78I          .       .       .       .       .       .       .       .       .  S     .       .
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240236  79I          .       .       .       .       .       .       .       .       . S      .       .
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240238  80I          .       .       .       .       .       .       .       .       . S      .       .
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240240  81I . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . S . . . . . . . . . . .
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240242  82I          .       .       .       .       .       .       .       .       . S      .       .
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240244  83I          .       .       .       .       .       .       .       .       . S      .       .
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240246  84I          .       .       .       .       .       .       .       .       . S      .       .
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240248  85I          .       .       .       .       .       .       .       .       . S      .       .
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240250  86I          .       .       .       .       .       .       .       .       . S      .       .
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240252	87I	.	.	.	.	.	.	.	.	. S	.	.
240254	88I	.	.	.	.	.	.	.	.	. S	.	.
240256	89I	.	.	.	.	.	.	.	.	. S	.	.
240258	90I	.	.	.	.	.	.	.	.	. S	.	.
240300	91I	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. S	. . . . .	. . . . .
240302	92I	.	.	.	.	.	.	.	.	. S	.	.
240304	93I	.	.	.	.	.	.	.	.	. S	.	.
240306	94I	.	.	.	.	.	.	.	.	. S	.	.
240308	95I	.	.	.	.	.	.	.	.	. S	.	.
240310	96I	.	.	.	.	.	.	.	.	. S	.	.
240312	97I	.	.	.	.	.	.	.	.	. S	.	.
240314	98I	.	.	.	.	.	.	.	.	. S	.	.
240316	99I	.	.	.	.	.	.	.	.	. S	.	.
240318	100I	.	.	.	.	.	.	.	.	. S	.	.
240320	101I	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. S	. . . . .	. . . . .
240322	102I	.	.	.	.	.	.	.	.	. S	.	.
240324	103I	.	.	.	.	.	.	.	.	. S	.	.
240326	104I	.	.	.	.	.	.	.	.	. S	.	.
240328	105I	.	.	.	.	.	.	.	.	. S	.	.
240330	106I	.	.	.	.	.	.	.	.	. S	.	.
240332	107I	.	.	.	.	.	.	.	.	. S	.	.
240334	108I	.	.	.	.	.	.	.	.	. S	.	.
240336	109I	.	.	.	.	.	.	.	.	. S	.	.
240338	110I	.	.	.	.	.	.	.	.	. S	.	.
240340	111I	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. S	. . . . .	. . . . .
240342	112I	.	.	.	.	.	.	.	.	. S	.	.
240344	113I	.	.	.	.	.	.	.	.	. S	.	.

240346 114I . . . . S . .
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240348 115I . . . . S . .
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240350 116I . . . . S . .
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240352 117I . . . . S . .
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240354 118I . . . . S . .
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240356 119I . . . . S . .
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240358 120I . . . . S . .
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240400 121I . . . . S . . . .
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240402 122I . . . . S . .
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240404 123I . . . . S . .
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240406 124I . . . . S . .
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240408 125I . . . . S . .
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240410 126I . . . . S . .
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240412 127I . . . . S . .
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240414 128I . . . . S . .
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240416 129I . . . . S . .
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240418 130I . . . . S . .
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240420 131I . . . . S . . . .
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240422 132I . . . . S . .
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240424 133I . . . . S . .
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240426 134I . . . . S . .
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240428 135I . . . . S . .
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240430 136I . . . . : S . .
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240432 137I . . . . S . .
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240434 138I . . . . S . .
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240436 139I . . . . S . .
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240438 140I . . . . S . .
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240440 141I . . . . S . . . .
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240442 142I . . . . S . .
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240444 143I . . . . S . .
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240446 144I . . . . S . .
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240448 145I . . . . S . .
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240450 146I . . . . S . .
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240452 147I . . . . S . .
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240454 148I . . . . S . .
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240456 149I . . . . S . .
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240458 150I . . . . S . .
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240500 151I . . . . S . . . .
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240502 152I . . . . S . .
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240504 153I . . . . S . .
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240506 154I . . . . S . .
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240508 155I . . . . S . .
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240510 156I . . . . S . .
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240512 157I . . . . S . .
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240514 158I . . . . S . .
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240516 159I . . . . S . .
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240518 160I . . . . S . .
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240520 161I . . . . S . . . .
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240522 162I . . . . S . .
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240524 163I . . . . S . .
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240526 164I . . . . S . .
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240528 165I . . . . S . .
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240530 166I . . . . S . .
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240532 167I . . . . S . .
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240534 168I          .         .         .         .         .         .         .         .         . S         .         .
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240536 169I          .         .         .         .         .         .         .         .         . S         .         .
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240538 170I          .         .         .         .         .         .         .         .         . S         .         .
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240540 171I . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . S . . . . . . . . . . .
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240542 172I          .         .         .         .         .         .         .         .         . S         .         .
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240544 173I          .         .         .         .         .         .         .         .         . S         .         .
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240546 174I          .         .         .         .         .         .         .         .         .S          .         .
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240548 175I          .         .         .         .         .         .         .         .         .S          .         .
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240550 176I          .         .         .         .         .         .         .         .         .S          .         .
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240552 177I          .         .         .         .         .         .         .         .         .S          .         .
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240554 178I          .         .         .         .         .         .         .         .         .S          .         .
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240556 179I          .         .         .         .         .         .         .         .         .S          .         .
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240558 180I          .         .         .         .         .         .         .         .         .S          .         .
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240600 181I . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .S. . . . . . . . . . . .
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240602 182I          .         .         .         .         .         .         .         .         .S          .         .
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240604 183I          .         .         .         .         .         .         .         .         .S          .         .
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240606 184I          .         .         .         .         .         .         .         .         .S          .         .
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240608 185I          .         .         .         .         .         .         .         .         .S          .         .
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240610 186I          .         .         .         .         .         .         .         .         .S          .         .
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240612 187I          .         .         .         .         .         .         .         .         .S          .         .
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240614 188I          .         .         .         .         .         .         .         .         .S          .         .
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240616 189I          .         .         .         .         .         .         .         .         .S          .         .
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240618 190I          .         .         .         .         .         .         .         .         .S          .         .
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240620 191I . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .S. . . . . . . . . . . .
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240622 192I          .         .         .         .         .         .         .         .         .S          .         .
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240624 193I          .         .         .         .         .         .         .         .         .S          .         .
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240626 194I          .         .         .         .         .         .         .         .         .S          .         .
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240628 195I          .         .         .         .         .         .         .         .         .S         .         .
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240630 196I          .         .         .         .         .         .         .         .         .S         .         .
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240632 197I          .         .         .         .         .         .         .         .         .S         .         .
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240634 198I          .         .         .         .         .         .         .         .         .S         .         .
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240636 199I          .         .         .         .         .         .         .         .         .S         .         .
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240638 200I          .         .         .         .         .         .         .         .         .S         .         .
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240640 201I . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .S. . . . . . . . . . . .
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240642 202I          .         .         .         .         .         .         .         .         .S         .         .
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240644 203I          .         .         .         .         .         .         .         .         .S         .         .
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240646 204I          .         .         .         .         .         .         .         .         .S         .         .
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240648 205I          .         .         .         .         .         .         .         .         .S         .         .
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240650 206I          .         .         .         .         .         .         .         .         .S         .         .
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240652 207I          .         .         .         .         .         .         .         .         .S         .         .
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240654 208I          .         .         .         .         .         .         .         .         .S         .         .
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240656 209I          .         .         .         .         .         .         .         .         .S         .         .
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240658 210I          .         .         .         .         .         .         .         .         .S         .         .
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240700 211I . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .S. . . . . . . . . . . .
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240702 212I          .         .         .         .         .         .         .         .         .S         .         .
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240704 213I          .         .         .         .         .         .         .         .         .S         .         .
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240706 214I          .         .         .         .         .         .         .         .         .S         .         .
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240708 215I          .         .         .         .         .         .         .         .         .S         .         .
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240710 216I          .         .         .         .         .         .         .         .         .S         .         .
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240712 217I          .         .         .         .         .         .         .         .         .S         .         .
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240714 218I          .         .         .         .         .         .         .         .         .S         .         .
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240716 219I          .         .         .         .         .         .         .         .         .S         .         .
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240718 220I          .         .         .         .         .         .         .         .         .S         .         .
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240720 221I . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .S. . . . . . . . . . . .
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 240722 222I          .         .         .         .         .         .         .         .        .S        .         .
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 240724 223I          .         .         .         .         .         .         .         .        .S        .         .
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 240726 224I          .         .         .         .         .         .         .         .        .S        .         .
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 240728 225I          .         .         .         .         .         .         .         .        .S        .         .
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 240730 226I          .         .         .         .         .         .         .         .        .S        .         .
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 240732 227I          .         .         .         .         .         .         .         .        .S        .         .
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 240734 228I          .         .         .         .         .         .         .         .        .S        .         .
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 240736 229I          .         .         .         .         .         .         .         .        .S        .         .
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 240738 230I          .         .         .         .         .         .         .         .        .S        .         .
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 240740 231I . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .S. . . . . . . . . . . .
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 240742 232I          .         .         .         .         .         .         .         .        .S        .         .
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 240744 233I          .         .         .         .         .         .         .         .        .S        .         .
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 240746 234I          .         .         .         .         .         .         .         .        .S        .         .
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 240748 235I          .         .         .         .         .         .         .         .        .S        .         .
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 240750 236I          .         .         .         .         .         .         .         .        .S        .         .
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 240752 237I          .         .         .         .         .         .         .         .        .S        .         .
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 240754 238I          .         .         .         .         .         .         .         .        .S        .         .
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 240756 239I          .         .         .         .         .         .         .         .        .S        .         .
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 240758 240I          .         .         .         .         .         .         .         .        .S        .         .
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 240800 241I . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .S. . . . . . . . . . . .
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 240802 242I          .         .         .         .         .         .         .         .        .S        .         .
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 240804 243I          .         .         .         .         .         .         .         .        .S        .         .
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 240806 244I          .         .         .         .         .         .         .         .        .S        .         .
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 240808 245I          .         .         .         .         .         .         .         .        .S        .         .
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 240810 246I          .         .         .         .         .         .         .         .        .S        .         .
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 240812 247I          .         .         .         .         .         .         .         .        .S        .         .
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 240814 248I          .         .         .         .         .         .         .         .        .S        .         .
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240816 249I    .    .    .    .    .    .    .    .   .S    .    .
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240818 250I    .    .    .    .    .    .    .    .   .S    .    .
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240820 251I . . . . . . . . . . . . . . . . . . . . . .S. . . . . . . .
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240822 252I    .    .    .    .    .    .    .    .   .S    .    .
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240824 253I    .    .    .    .    .    .    .    .   .S    .    .
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240826 254I    .    .    .    .    .    .    .    .   .S    .    .
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240828 255I    .    .    .    .    .    .    .    .   .S    .    .
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240830 256I    .    .    .    .    .    .    .    .   .S    .    .
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240832 257I    .    .    .    .    .    .    .    .   .S    .    .
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240834 258I    .    .    .    .    .    .    .    .   .S    .    .
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240836 259I    .    .    .    .    .    .    .    .   .S    .    .
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240838 260I    .    .    .    .    .    .    .    .   .S    .    .
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240840 261I . . . . . . . . . . . . . . . . . . . . . .S. . . . . . . .
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240842 262I    .    .    .    .    .    .    .    .   .S    .    .
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240844 263I    .    .    .    .    .    .    .    .   .S    .    .
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240846 264I    .    .    .    .    .    .    .    .   .S    .    .
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240848 265I    .    .    .    .    .    .    .    .   S     .    .
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240850 266I    .    .    .    .    .    .    .    .   S     .    .
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240852 267I    .    .    .    .    .    .    .    .   S     .    .
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240854 268I    .    .    .    .    .    .    .    .   S     .    .
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240856 269I    .    .    .    .    .    .    .    .   S     .    .
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240858 270I    .    .    .    .    .    .    .    .   S     .    .
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240900 271I . . . . . . . . . . . . . . . . . . . . . . S . . . . . . . .
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240902 272I    .    .    .    .    .    .    .    .   S     .    .
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240904 273I    .    .    .    .    .    .    .    .   S     .    .
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240906 274I    .    .    .    .    .    .    .    .   S     .    .
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240908 275I    .    .    .    .    .    .    .    .   S     .    .
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 240910 276I         .         .         .         .         .         .         .         .         S         .         .
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 240912 277I         .         .         .         .         .         .         .         .         S         .         .
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 240914 278I         .         .         .         .         .         .         .         .         S         .         .
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 240916 279I         .         .         .         .         .         .         .         .         S         .         .
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 240918 280I         .         .         .         .         .         .         .         .         S         .         .
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 240920 281I . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . S . . . . . . . . . . . .
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 240922 282I         .         .         .         .         .         .         .         .         S         .         .
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 240924 283I         .         .         .         .         .         .         .         .         S         .         .
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 240926 284I         .         .         .         .         .         .         .         .         S         .         .
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 240928 285I         .         .         .         .         .         .         .         .         S         .         .
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 240930 286I         .         .         .         .         .         .         .         .         S         .         .
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 240932 287I         .         .         .         .         .         .         .         .         S         .         .
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 240934 288I         .         .         .         .         .         .         .         .         S         .         .
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 240936 289I         .         .         .         .         .         .         .         .         S         .         .
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 240938 290I         .         .         .         .         .         .         .         .         S         .         .
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 240940 291I . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . S . . . . . . . . . . . .
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 240942 292I         .         .         .         .         .         .         .         .         S         .         .
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 240944 293I         .         .         .         .         .         .         .         .         S         .         .
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 240946 294I         .         .         .         .         .         .         .         .         S         .         .
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 240948 295I         .         .         .         .         .         .         .         .         S         .         .
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 240950 296I         .         .         .         .         .         .         .         .         S         .         .
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 240952 297I         .         .         .         .         .         .         .         .         S         .         .
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 240954 298I         .         .         .         .         .         .         .         .         S         .         .
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 240956 299I         .         .         .         .         .         .         .         .         S         .         .
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 240958 300I---------.---------.---------.---------.---------.---------.---------.---------.---------.---------
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RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND

TIME IN HOURS, AREA IN SQUARE MILES

+	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	2	95.	.57	3.	2.	2.	.03		
+	HYDROGRAPH AT	1A	5.	.57	0.	0.	0.	.00		
+	HYDROGRAPH AT	1B	12.	.60	1.	0.	0.	.00		
+	2 COMBINED AT	3	106.	.57	3.	2.	2.	.04		
+	ROUTED TO	4	0.	1.30	0.	0.	0.	.04		
+									1.06	1.67

1

SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
(FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)

ISTAQ	ELEMENT	DT (MIN)	PEAK (CFS)	TIME TO PEAK (MIN)	VOLUME (IN)	INTERPOLATED TO COMPUTATION INTERVAL DT (MIN)	PEAK (CFS)	TIME TO PEAK (MIN)	VOLUME (IN)
2	MANE	.51	95.95	33.60	.75	2.00	95.15	34.00	.75

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .1396E+01 OUTFLOW= .1389E+01 BASIN STORAGE= .1513E-03 PERCENT ERROR= .5

ISTAQ	ELEMENT	DT (MIN)	PEAK (CFS)	TIME TO PEAK (MIN)	VOLUME (IN)	DT (MIN)	PEAK (CFS)	TIME TO PEAK (MIN)	VOLUME (IN)
1A	MANE	.56	4.98	33.90	1.31	2.00	4.97	34.00	1.31

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .1076E+00 OUTFLOW= .1074E+00 BASIN STORAGE= .3291E-05 PERCENT ERROR= .2

ISTAQ	ELEMENT	DT (MIN)	PEAK (CFS)	TIME TO PEAK (MIN)	VOLUME (IN)	DT (MIN)	PEAK (CFS)	TIME TO PEAK (MIN)	VOLUME (IN)
1B	MANE	.89	12.12	35.60	1.33	2.00	11.94	36.00	1.32

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1074E+00 EXCESS= .1673E+00 OUTFLOW= .2750E+00 BASIN STORAGE= .5438E-05 PERCENT ERROR= -.1

*** NORMAL END OF HEC-1 ***

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1***************************************                   ***************************************
 *                                     *                   *                                     *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                   *     U.S. ARMY CORPS OF ENGINEERS    *
 *              JUN   1998              *                   *     HYDROLOGIC ENGINEERING CENTER   *
 *            VERSION 4.1               *                   *          609 SECOND STREET          *
 *                                     *                   *       DAVIS, CALIFORNIA 95616       *
 *  RUN DATE   03OCT02  TIME  10:07:54  *                   *          (916) 756-1104             *
 *                                     *                   *                                     *
 ***************************************                   ***************************************
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X     X  XXXXXXX   XXXXX           X
X     X  X        X     X         XX
X     X  X        X                X
XXXXXXX  XXXX     X        XXXXX   X
X     X  X        X                X
X     X  X        X     X          X
X     X  XXXXXXX   XXXXX          XXX
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THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM
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1                                        HEC-1 INPUT                                          PAGE  1

       LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

          1           ID        TOWN OF GILBERT GREENFIELD ROAD STORM DRAINAGE PN:96446-1
          2           ID        KINEMATIC WAVE WATERSHED MODEL 10 year storm 6720 gpm Conveyance Sizing
          3           IT        2 24SEP02    0000     300
          4           IO        3
                      *
                      *DIAGRAM

          5           KK       1C
          6           KM          RUNOFF SECTION 1C
          7           KO         0
          8           BA   .00075
                      *       RATING FOR 18" DIA PIPE 1.5% SLOPE
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  9     HQ      0      2.      4.      6.      8.     10.     12.     14.
 10     HE      0    0.40    0.57    0.72    0.86    1.00    1.15    1.16
 11     PH     10            0.47    0.90    1.50
        *      10-YR & BA ADJUSTMENT
 12     LG    0.3    0.15    8.20    0.12    75.0
        *      ASSUME CLAY LOAM SOIL PARAMETERS
 13     UK     52    0.04     .15     100
 14     RK    150  0.0040    .015 0.00063    TRAP       0       5
        *   GUTTER FLOW
 15     RK    410  0.0150    .012 0.00075    CIRC     1.5

 16     KK     2A
 17     KM        RUNOFF SECTION 2A
 18     KO      0
 19     BA  .00165
        *      RATING FOR 18" DIA PIPE 2.4% SLOPE
 20     HQ      0      2.      4.      6.      8.     10.     12.     14.
 21     HE      0    0.36    0.51    0.63    0.74    0.85    0.96    1.07
 22     PH     10            0.47    0.90    1.50
        *      10-YR & BA ADJUSTMENT
 23     LG    0.3    0.15    8.20    0.12    85.0
        *      ASSUME CLAY LOAM SOIL PARAMETERS
 24     UK     52    0.04     .15     100
 25     RK    260  0.0200    .015 0.00063    TRAP       0       5
        *   GUTTER FLOW
 26     RK    495  0.0260    .012 0.00165    CIRC     1.5             YES

 27     KK     2B
 28     KM        RUNOFF SECTION 2B
 29     KO      0
 30     BA  .00198
        *      RATING FOR 18" DIA PIPE  2.4% SLOPE
 31     HQ      0      2.      4.      6.      8.     10.     12.     14.
 32     HE      0    0.36    0.51    0.63    0.74    0.85    0.96    1.07
 33     PH     10            0.47    0.90    1.50
        *      10-YR & BA ADJUSTMENT
 34     LG    0.3    0.15    8.20    0.12    85.0
        *      ASSUME CLAY LOAM SOIL PARAMETERS
 35     UK     52    0.04     .15     100
 36     RK    250  0.0260    .015 0.00198    TRAP       0       5
        *   GUTTER FLOW
 37     RK    310   0.0200    .012 0.0025    CIRC     1.5             YES
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LINE    ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 38     KK     2C
 39     KM        RUNOFF SECTION 2C
 40     KO      0
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41     BA  .00138
       *       RATING FOR 36" DIA PIPE 1% SLOPE
42     HQ       0      2.      4.      6.      8.     10.     14.     16.    20.0    24.0
43     HQ      26.   30.0     32.    40.0
44     HE       0    0.36    0.50    0.61    0.70    0.79    0.93    1.00    1.13    1.24
45     HE    1.30    1.41    1.46    1.67
46     PH      10            0.47    0.90    1.50
       *        10-YR & BA ADJUSTMENT
47     LG     0.3    0.15    8.20    0.12    85.0
       *       ASSUME CLAY LOAM SOIL PARAMETERS
48     UK      52    0.04     .15     100
49     RK     310  0.0135    .015 0.00063    TRAP       0       5
       *   GUTTER FLOW
50     RK      35  0.0100    .012 0.00138    CIRC     3.0             YES
       *   ROUTE TO INLET MH IN 24-IN RCP

51     KK      3C
52     KM         RUNOFF SECTION 3C
53     KO       0
54     BA  .00173
       *       RATING FOR 18" DIA PIPE  2.5% SLOPE
55     HQ       0      2.      4.      6.      8.     10.     12.     14.
56     HE       0    0.36    0.51    0.63    0.74    0.85    0.96    1.07
57     LG     0.3    0.15    8.20    0.12    78.3
       *       ASSUME CLAY LOAM SOIL PARAMETERS
58     UK      52    0.04     .15     100
59     RK      60  0.0390    .015 0.00063    TRAP       0       5
       *   GUTTER FLOW
60     RK     235  0.0250    .012 0.00173    CIRC     1.5
       *   ROUTE TO INLET MH IN 18-IN RCP

61     KK      3B
62     KM         RUNOFF SECTION 3B
63     KO       0
64     BA  .00191
       *       RATING FOR 18" DIA PIPE 2.5% SLOPE
65     HQ       0      2.      4.      6.      8.     10.     12.     14.
66     HE       0    0.36    0.51    0.63    0.74    0.85    0.96    1.07
67     LG     0.3    0.15    8.20    0.12    82.0
       *       ASSUME CLAY LOAM SOIL PARAMETERS
68     UK      52    0.04     .15     100
69     RK     235  0.0390    .015 0.00063    TRAP       0       5
       *   GUTTER FLOW
70     RK     455  0.0350    .012 0.00191    CIRC     1.5             YES
       *   ROUTE TO INLET MH IN 18-IN RCP
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 71          KK      3A
 72          KM        RUNOFF SECTION 3A
 73          KO       0
 74          BA  .00065
             *       RATING FOR 36" DIA PIPE 1% SLOPE
 75          HQ       0       2.       4.       6.       8.      10.      12.      14.
 76          HE       0     0.36     0.50     0.61     0.70     0.79     0.86     0.93
 77          LG     0.3     0.15     8.20     0.12     85.0
             *       ASSUME CLAY LOAM SOIL PARAMETERS
 78          UK      52     0.04      .15      100
 79          RK     145   0.0135     .015  0.00063     TRAP        0        5
             *    GUTTER FLOW
 80          RK     165   0.0100     .012  0.00065     CIRC      3.0                YES
             *    ROUTE TO INLET MH IN 36-IN RCP

 81          KK       4
 82          KM        RUNOFF COMBINED
 83          HC       2

 84          KK       5
 85          KM        STORAGE FACILITY
 86          KO       0
             *       STORAGE FACILITY ROUTING THRU WET WELL - NO VAULT
 87          RS       1     STOR      0.0
 88          SV     0.0   0.0140   0.0280    0.043    0.051    0.060    0.071    0.095    0.173    0.187
 89          SV   0.203   0.2200   0.2380    0.258    0.280
 90          SE  1233.0   1235.0   1237.0   1239.0   1240.0   1241.0   1242.0   1243.0   1244.0   1245.0
 91          SE  1246.0   1247.0   1248.0   1249.0    1250.
 92          SQ       0        0        0        0        0        0        0        0        0        0
 93          SQ       0      0.0      0.0      0.0      0.1
             *    NUISANCE PUMP ON @ 1238.5  OFF @ 1235.50
 94          WP  1238.5      0.0   1235.5    PUMPS
             *    PUMP 1 ON @  1242.0 & OFF @ 1238.5
 95          WP  1242.0     15.0   1239.5    PUMPS
             *    PUMP 2 ON @  1243.2 & OFF @ 1240.5
 96          WP  1243.2     15.0   1240.5    PUMPS

 97          KK   PUMPS
 98          KM         PUMP STATION FLOW
 99          KO       0        2       10
100          WR   PUMPS
101          ZZ
1
                 SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

   NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

     5          1C
```

```
                    V
                    V
  16                2A ***
                    V
                    V
  27                2B ***
                    V
                    V
  38                2C ***
                    .
                    .
  51                .          3C
                    .          V
                    .          V
  61                .          3B ***
                    .          V
                    .          V
  71                .          3A ***
                    .          .
                    .          .
  81                4...........
                    V
                    V
  94                .------->   PUMPS
  84                5
                    .
                    .
 100                .          .<-------    PUMPS
  97                .       PUMPS

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1*****************************************
 *                                       *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
 *              JUN   1998               *
 *            VERSION 4.1                *
 *                                       *
 *  RUN DATE   03OCT02  TIME  10:07:54   *
 *                                       *
 *****************************************

 *****************************************
 *                                       *
 *   U.S. ARMY CORPS OF ENGINEERS        *
 *   HYDROLOGIC ENGINEERING CENTER       *
 *        609 SECOND STREET              *
 *     DAVIS, CALIFORNIA 95616           *
 *         (916) 756-1104                *
 *                                       *
 *****************************************

                    TOWN OF GILBERT GREENFIELD ROAD STORM DRAINAGE PN:96446-1
                    KINEMATIC WAVE WATERSHED MODEL 10 year storm 6720 gpm Conveyance Sizing

   4 IO          OUTPUT CONTROL VARIABLES
                      IPRNT          3  PRINT CONTROL
```

```
                  IPLOT            0  PLOT CONTROL
                  QSCAL           0.  HYDROGRAPH PLOT SCALE

  IT          HYDROGRAPH TIME DATA
                   NMIN            2  MINUTES IN COMPUTATION INTERVAL
                  IDATE     24SEP 2  STARTING DATE
                  ITIME         0000  STARTING TIME
                     NQ          300  NUMBER OF HYDROGRAPH ORDINATES
                 NDDATE     24SEP 2  ENDING DATE
                 NDTIME         0958  ENDING TIME
                  ICENT           19  CENTURY MARK

            COMPUTATION INTERVAL      .03 HOURS
                 TOTAL TIME BASE     9.97 HOURS

       ENGLISH UNITS
            DRAINAGE AREA          SQUARE MILES
            PRECIPITATION DEPTH    INCHES
            LENGTH, ELEVATION      FEET
            FLOW                   CUBIC FEET PER SECOND
            STORAGE VOLUME         ACRE-FEET
            SURFACE AREA           ACRES
            TEMPERATURE            DEGREES FAHRENHEIT


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

              **************
              *            *
   5 KK       *       1C   *
              *            *
              **************
                                RUNOFF SECTION 1C

   7 KO          OUTPUT CONTROL VARIABLES
                       IPRNT           3  PRINT CONTROL
                       IPLOT           0  PLOT CONTROL
                       QSCAL          0.  HYDROGRAPH PLOT SCALE

               SUBBASIN RUNOFF DATA

   8 BA          SUBBASIN CHARACTERISTICS
                       TAREA         .00  SUBBASIN AREA

                 PRECIPITATION DATA

  11 PH                                   DEPTHS FOR  10-PERCENT HYPOTHETICAL STORM
                 ..... HYDRO-35 ......   ............... TP-40 ...............   ........... TP-49 ...........
```

5-MIN	15-MIN	60-MIN	2-HR	3-HR	6-HR	12-HR	24-HR	2-DAY	4-DAY	7-DAY	10-DAY
.47	.90	1.50	.00	.00	.00	.00	.00	.00	.00	.00	.00

STORM AREA = .00

```
12 LG         GREEN AND AMPT LOSS RATE
                    STRTL          .30  STARTING LOSS
                      DTH          .15  MOISTURE DEFICIT
                     PSIF         8.20  WETTING FRONT SUCTION
                    XKSAT          .12  HYDRAULIC CONDUCTIVITY
                    RTIMP        75.00  PERCENT IMPERVIOUS AREA

              KINEMATIC WAVE
13 UK           OVERLAND-FLOW ELEMENT NO. 1
                        L          52.  OVERLAND FLOW LENGTH
                        S        .0400  SLOPE
                        N         .150  ROUGHNESS COEFFICIENT
                       PA        100.0  PERCENT OF SUBBASIN
                    DXMIN            5  MINIMUM NUMBER OF DX INTERVALS

              KINEMATIC WAVE
14 RK           COLLECTOR CHANNEL
                        L         150.  CHANNEL LENGTH
                        S        .0040  SLOPE
                        N         .015  CHANNEL ROUGHNESS COEFFICIENT
                       CA          .00  CONTRIBUTING AREA
                    SHAPE         TRAP  CHANNEL SHAPE
                       WD          .00  BOTTOM WIDTH OR DIAMETER
                        Z         5.00  SIDE SLOPE
                   NDXMIN            2  MINIMUM NUMBER OF DX INTERVALS
15 RK           MAIN CHANNEL
                        L         410.  CHANNEL LENGTH
                        S        .0150  SLOPE
                        N         .012  CHANNEL ROUGHNESS COEFFICIENT
                       CA          .00  CONTRIBUTING AREA
                    SHAPE         CIRC  CHANNEL SHAPE
                       WD         1.50  BOTTOM WIDTH OR DIAMETER
                        Z          .00  SIDE SLOPE
                   NDXMIN            2  MINIMUM NUMBER OF DX INTERVALS
                   RUPSTQ           NO  ROUTE UPSTREAM HYDROGRAPH
```

***

COMPUTED KINEMATIC PARAMETERS
VARIABLE TIME STEP
(DT SHOWN IS A MINIMUM)

ELEMENT	ALPHA	M	DT	DX	PEAK	TIME TO PEAK	VOLUME	MAXIMUM CELERITY
			(MIN)	(FT)	(CFS)	(MIN)	(IN)	(FPS)

```
              PLANE1        1.99      1.67        .66     10.40      2.53     31.90      1.29       .36
              COLLECTOR1    2.29      1.33        .39     50.00      2.49     32.50      1.29      3.29
              MAIN          8.78      1.25        .27    136.67      2.47     33.04      1.29      9.04

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00  EXCESS= .5170E-01 OUTFLOW= .5159E-01 BASIN STORAGE= .2599E-05 PERCENT ERROR=     .2

                                        INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL

              MAIN          8.78      1.25       2.00                2.39     34.00      1.29

      ***          ***          ***          ***          ***

                    HYDROGRAPH AT STATION       1C

    TOTAL RAINFALL =    1.48, TOTAL LOSS =     .19, TOTAL EXCESS =    1.29

  PEAK FLOW      TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR        24-HR       72-HR       9.97-HR
+    (CFS)       (HR)
                            (CFS)
+        2.        .57                  0.          0.          0.          0.
                         (INCHES)   1.289       1.289       1.289       1.289
                          (AC-FT)      0.          0.          0.          0.

                          CUMULATIVE AREA =       .00 SQ MI

                  COMPUTE STAGES FROM GIVEN RATING DATA

    8 HQ                    FLOW        0.        2.        4.        6.        8.       10.       12.       14.
   10 HE                   STAGE        .0        .4        .6        .7        .9       1.0       1.1       1.2

      ***          ***          ***          ***          ***

                    HYDROGRAPH AT STATION       1C

     MAXIMUM STAGE IS      .43

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

             **************
             *            *
   16 KK     *        2A  *
             *            *
```

```
              **************
                                  RUNOFF SECTION 2A

18 KO              OUTPUT CONTROL VARIABLES
                         IPRNT          3  PRINT CONTROL
                         IPLOT          0  PLOT CONTROL
                         QSCAL         0.  HYDROGRAPH PLOT SCALE

                SUBBASIN RUNOFF DATA

19 BA              SUBBASIN CHARACTERISTICS
                         TAREA        .00  SUBBASIN AREA

                   PRECIPITATION DATA

22 PH                                       DEPTHS FOR  10-PERCENT HYPOTHETICAL STORM
                   ..... HYDRO-35 ......    ............... TP-40 ...............    ........... TP-49 ...........
                   5-MIN  15-MIN  60-MIN     2-HR    3-HR    6-HR   12-HR   24-HR    2-DAY   4-DAY   7-DAY  10-DAY
                     .47     .90    1.50      .00     .00     .00     .00     .00      .00     .00     .00     .00

                                                    STORM AREA =      .00

23 LG              GREEN AND AMPT LOSS RATE
                         STRTL        .30  STARTING LOSS
                           DTH        .15  MOISTURE DEFICIT
                          PSIF       8.20  WETTING FRONT SUCTION
                         XKSAT        .12  HYDRAULIC CONDUCTIVITY
                         RTIMP      85.00  PERCENT IMPERVIOUS AREA

                   KINEMATIC WAVE
24 UK                OVERLAND-FLOW ELEMENT NO. 1
                             L        52.  OVERLAND FLOW LENGTH
                             S      .0400  SLOPE
                             N       .150  ROUGHNESS COEFFICIENT
                            PA      100.0  PERCENT OF SUBBASIN
                         DXMIN          5  MINIMUM NUMBER OF DX INTERVALS

                   KINEMATIC WAVE
25 RK                COLLECTOR CHANNEL
                             L       260.  CHANNEL LENGTH
                             S      .0200  SLOPE
                             N       .015  CHANNEL ROUGHNESS COEFFICIENT
                            CA        .00  CONTRIBUTING AREA
                         SHAPE       TRAP  CHANNEL SHAPE
                            WD        .00  BOTTOM WIDTH OR DIAMETER
                             Z       5.00  SIDE SLOPE
                        NDXMIN          2  MINIMUM NUMBER OF DX INTERVALS
26 RK                MAIN CHANNEL
                             L       495.  CHANNEL LENGTH
                             S      .0260  SLOPE
```

N	.012	CHANNEL ROUGHNESS COEFFICIENT
CA	.00	CONTRIBUTING AREA
SHAPE	CIRC	CHANNEL SHAPE
WD	1.50	BOTTOM WIDTH OR DIAMETER
Z	.00	SIDE SLOPE
NDXMIN	2	MINIMUM NUMBER OF DX INTERVALS
RUPSTQ	YES	ROUTE UPSTREAM HYDROGRAPH

***

COMPUTED KINEMATIC PARAMETERS
VARIABLE TIME STEP
(DT SHOWN IS A MINIMUM)

ELEMENT	ALPHA	M	DT (MIN)	DX (FT)	PEAK (CFS)	TIME TO PEAK (MIN)	VOLUME (IN)	MAXIMUM CELERITY (FPS)
PLANE1	1.99	1.67	.52	10.40	5.67	32.10	1.37	.36
COLLECTOR1	5.12	1.33	.36	86.67	5.60	32.50	1.37	6.04
MAIN	11.56	1.25	.29	165.00	7.90	32.87	1.34	14.19

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5157E-01 EXCESS= .1205E+00 OUTFLOW= .1719E+00 BASIN STORAGE= .2909E-05 PERCENT ERROR= .1

INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL

MAIN	11.56	1.25	2.00		7.68	34.00	1.34

*** *** *** *** ***

HYDROGRAPH AT STATION 2A

TOTAL RAINFALL = 1.48, TOTAL LOSS = .12, TOTAL EXCESS = 1.37

	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
				6-HR	24-HR	72-HR	9.97-HR
+	(CFS)	(HR)					
			(CFS)				
+	8.	.57		0.	0.	0.	0.
			(INCHES)	1.343	1.344	1.344	1.344
			(AC-FT)	0.	0.	0.	0.

CUMULATIVE AREA = .00 SQ MI

COMPUTE STAGES FROM GIVEN RATING DATA

19 HQ	FLOW	0.	2.	4.	6.	8.	10.	12.	14.

```
 21 HE                STAGE         .0         .4         .5         .6         .7         .9        1.0        1.1

     ***              ***              ***              ***              ***

                        HYDROGRAPH AT STATION       2A

    MAXIMUM STAGE IS      .72


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

              **************
              *            *
 27 KK        *       2B   *
              *            *
              **************
                                 RUNOFF SECTION 2B

 29 KO             OUTPUT CONTROL VARIABLES
                         IPRNT           3  PRINT CONTROL
                         IPLOT           0  PLOT CONTROL
                         QSCAL          0.  HYDROGRAPH PLOT SCALE

                 SUBBASIN RUNOFF DATA

 30 BA             SUBBASIN CHARACTERISTICS
                         TAREA         .00  SUBBASIN AREA

                   PRECIPITATION DATA

 33 PH                                     DEPTHS FOR  10-PERCENT HYPOTHETICAL STORM
                   ..... HYDRO-35 ......   ............... TP-40 ...............   ........... TP-49 ...........
                   5-MIN  15-MIN  60-MIN    2-HR    3-HR    6-HR   12-HR   24-HR   2-DAY   4-DAY   7-DAY  10-DAY
                     .47     .90    1.50     .00     .00     .00     .00     .00     .00     .00     .00     .00

                                                        STORM AREA =      .00

 34 LG             GREEN AND AMPT LOSS RATE
                         STRTL         .30  STARTING LOSS
                           DTH         .15  MOISTURE DEFICIT
                          PSIF        8.20  WETTING FRONT SUCTION
                         XKSAT         .12  HYDRAULIC CONDUCTIVITY
                         RTIMP       85.00  PERCENT IMPERVIOUS AREA

                   KINEMATIC WAVE
 35 UK               OVERLAND-FLOW ELEMENT NO. 1
                             L          52.  OVERLAND FLOW LENGTH
                             S        .0400  SLOPE
```

```
                    N         .150  ROUGHNESS COEFFICIENT
                   PA        100.0  PERCENT OF SUBBASIN
                DXMIN            5  MINIMUM NUMBER OF DX INTERVALS

          KINEMATIC WAVE
36 RK       COLLECTOR CHANNEL
                    L         250.  CHANNEL LENGTH
                    S        .0260  SLOPE
                    N         .015  CHANNEL ROUGHNESS COEFFICIENT
                   CA          .00  CONTRIBUTING AREA
                SHAPE         TRAP  CHANNEL SHAPE
                   WD          .00  BOTTOM WIDTH OR DIAMETER
                    Z         5.00  SIDE SLOPE
               NDXMIN            2  MINIMUM NUMBER OF DX INTERVALS
37 RK       MAIN CHANNEL
                    L         310.  CHANNEL LENGTH
                    S        .0200  SLOPE
                    N         .010  CHANNEL ROUGHNESS COEFFICIENT
                   CA          .00  CONTRIBUTING AREA
                SHAPE         CIRC  CHANNEL SHAPE
                   WD         1.50  BOTTOM WIDTH OR DIAMETER
                    Z          .00  SIDE SLOPE
               NDXMIN            2  MINIMUM NUMBER OF DX INTERVALS
               RUPSTQ          YES  ROUTE UPSTREAM HYDROGRAPH
```

***

COMPUTED KINEMATIC PARAMETERS
VARIABLE TIME STEP
(DT SHOWN IS A MINIMUM)

ELEMENT	ALPHA	M	DT (MIN)	DX (FT)	PEAK (CFS)	TIME TO PEAK (MIN)	VOLUME (IN)	MAXIMUM CELERITY (FPS)
PLANE1	1.99	1.67	.52	10.40	6.81	32.10	1.37	.36
COLLECTOR1	5.83	1.33	.23	83.33	6.75	32.22	1.37	8.86
MAIN	12.17	1.25	.19	103.33	14.21	32.55	1.35	16.47

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1720E+00 EXCESS= .1446E+00 OUTFLOW= .3163E+00 BASIN STORAGE= .8084E-05 PERCENT ERROR= .1

INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL

MAIN	12.17	1.25	2.00		13.87	34.00	1.36	

*** *** *** *** ***

HYDROGRAPH AT STATION 2B

```
     TOTAL RAINFALL =     1.48, TOTAL LOSS =      .12, TOTAL EXCESS =    1.37

   PEAK FLOW      TIME                          MAXIMUM AVERAGE FLOW
                                        6-HR       24-HR       72-HR       9.97-HR
+    (CFS)        (HR)
                              (CFS)
+       14.        .57                    1.          0.          0.           0.
                           (INCHES)     1.355       1.355       1.355        1.355
                            (AC-FT)        0.          0.          0.           0.

                         CUMULATIVE AREA =      .00 SQ MI


                  COMPUTE STAGES FROM GIVEN RATING DATA

  30 HQ                     FLOW        0.         2.         4.         6.         8.        10.        12.        14.
  32 HE                     STAGE       .0         .4         .5         .6         .7         .9        1.0        1.1

      ***             ***             ***             ***             ***

                          HYDROGRAPH AT STATION        2B

    MAXIMUM STAGE IS     1.06


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

            **************
            *            *
  38 KK     *        2C  *
            *            *
            **************
                              RUNOFF SECTION 2C

  40 KO           OUTPUT CONTROL VARIABLES
                        IPRNT           3  PRINT CONTROL
                        IPLOT           0  PLOT CONTROL
                        QSCAL          0.  HYDROGRAPH PLOT SCALE

                SUBBASIN RUNOFF DATA

  41 BA           SUBBASIN CHARACTERISTICS
                        TAREA         .00  SUBBASIN AREA

                  PRECIPITATION DATA

  46 PH                                 DEPTHS FOR  10-PERCENT HYPOTHETICAL STORM
```

```
                 ..... HYDRO-35 ......    ............... TP-40 ...............    ........... TP-49 ...........
                 5-MIN  15-MIN  60-MIN    2-HR    3-HR    6-HR   12-HR   24-HR    2-DAY   4-DAY   7-DAY  10-DAY
                  .47     .90    1.50     .00     .00     .00     .00     .00      .00     .00     .00     .00

                                                  STORM AREA =      .00

47 LG            GREEN AND AMPT LOSS RATE
                       STRTL          .30  STARTING LOSS
                         DTH          .15  MOISTURE DEFICIT
                        PSIF         8.20  WETTING FRONT SUCTION
                       XKSAT          .12  HYDRAULIC CONDUCTIVITY
                       RTIMP        85.00  PERCENT IMPERVIOUS AREA

                 KINEMATIC WAVE
48 UK              OVERLAND-FLOW ELEMENT NO. 1
                           L          52.  OVERLAND FLOW LENGTH
                           S        .0400  SLOPE
                           N         .150  ROUGHNESS COEFFICIENT
                          PA        100.0  PERCENT OF SUBBASIN
                       DXMIN            5  MINIMUM NUMBER OF DX INTERVALS

                 KINEMATIC WAVE
49 RK              COLLECTOR CHANNEL
                           L         310.  CHANNEL LENGTH
                           S        .0135  SLOPE
                           N         .015  CHANNEL ROUGHNESS COEFFICIENT
                          CA          .00  CONTRIBUTING AREA
                       SHAPE         TRAP  CHANNEL SHAPE
                          WD          .00  BOTTOM WIDTH OR DIAMETER
                           Z         5.00  SIDE SLOPE
                      NDXMIN            2  MINIMUM NUMBER OF DX INTERVALS
50 RK              MAIN CHANNEL
                           L          35.  CHANNEL LENGTH
                           S        .0100  SLOPE
                           N         .012  CHANNEL ROUGHNESS COEFFICIENT
                          CA          .00  CONTRIBUTING AREA
                       SHAPE         CIRC  CHANNEL SHAPE
                          WD         3.00  BOTTOM WIDTH OR DIAMETER
                           Z          .00  SIDE SLOPE
                      NDXMIN            2  MINIMUM NUMBER OF DX INTERVALS
                      RUPSTQ          YES  ROUTE UPSTREAM HYDROGRAPH

                                                        ***
                                          COMPUTED KINEMATIC PARAMETERS
                                                VARIABLE TIME STEP
                                             (DT SHOWN IS A MINIMUM)

                   ELEMENT     ALPHA        M         DT         DX        PEAK     TIME TO     VOLUME    MAXIMUM
                                                                                      PEAK                CELERITY
                                                     (MIN)      (FT)      (CFS)     (MIN)       (IN)      (FPS)
```

PLANE1	1.99	1.67	.52	10.40	4.74	32.10	1.37	.36
COLLECTOR1	4.20	1.33	.40	103.33	4.66	32.52	1.37	5.12
MAIN	8.05	1.25	.11	11.67	18.46	32.91	1.36	13.04

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3166E+00 EXCESS= .1008E+00 OUTFLOW= .4172E+00 BASIN STORAGE= .2833E-05 PERCENT ERROR= .0

INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL

MAIN	8.05	1.25	2.00		18.24	34.00	1.36

*** *** *** *** ***

HYDROGRAPH AT STATION 2C

TOTAL RAINFALL = 1.48, TOTAL LOSS = .12, TOTAL EXCESS = 1.37

	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
				6-HR	24-HR	72-HR	9.97-HR
+	(CFS)	(HR)					
			(CFS)				
+	18.	.57		1.	1.	1.	1.
			(INCHES)	1.359	1.359	1.359	1.359
			(AC-FT)	0.	0.	0.	0.

CUMULATIVE AREA = .01 SQ MI

COMPUTE STAGES FROM GIVEN RATING DATA

41 HQ	FLOW	0.	2.	4.	6.	8.	10.	14.	16.	20.	24.
44 HE	STAGE	.0	.4	.5	.6	.7	.8	.9	1.0	1.1	1.2
	FLOW	26.	30.	32.	40.						
	STAGE	1.3	1.4	1.5	1.7						

*** *** *** *** ***

HYDROGRAPH AT STATION 2C

MAXIMUM STAGE IS 1.07

*** ***

```
              **************
              *            *
51 KK         *       3C   *
              *            *
              **************
                           RUNOFF SECTION 3C

53 KO              OUTPUT CONTROL VARIABLES
                         IPRNT          3  PRINT CONTROL
                         IPLOT          0  PLOT CONTROL
                         QSCAL         0.  HYDROGRAPH PLOT SCALE

                 SUBBASIN RUNOFF DATA

54 BA              SUBBASIN CHARACTERISTICS
                         TAREA        .00  SUBBASIN AREA

                   PRECIPITATION DATA

46 PH                                  DEPTHS FOR  10-PERCENT HYPOTHETICAL STORM
                   ..... HYDRO-35 ......    ............... TP-40 ...............    ........... TP-49 ...........
                   5-MIN  15-MIN  60-MIN     2-HR     3-HR     6-HR    12-HR    24-HR    2-DAY    4-DAY    7-DAY   10-DAY
                     .47     .90    1.50      .00      .00      .00      .00      .00      .00      .00      .00      .00

                                                  STORM AREA =      .00

57 LG              GREEN AND AMPT LOSS RATE
                         STRTL        .30  STARTING LOSS
                           DTH        .15  MOISTURE DEFICIT
                          PSIF       8.20  WETTING FRONT SUCTION
                         XKSAT        .12  HYDRAULIC CONDUCTIVITY
                         RTIMP      78.30  PERCENT IMPERVIOUS AREA

                   KINEMATIC WAVE
58 UK                OVERLAND-FLOW ELEMENT NO. 1
                             L        52.  OVERLAND FLOW LENGTH
                             S      .0400  SLOPE
                             N       .150  ROUGHNESS COEFFICIENT
                            PA      100.0  PERCENT OF SUBBASIN
                         DXMIN          5  MINIMUM NUMBER OF DX INTERVALS

                   KINEMATIC WAVE
59 RK                COLLECTOR CHANNEL
                             L        60.  CHANNEL LENGTH
                             S      .0390  SLOPE
                             N       .015  CHANNEL ROUGHNESS COEFFICIENT
                            CA        .00  CONTRIBUTING AREA
                         SHAPE       TRAP  CHANNEL SHAPE
                            WD        .00  BOTTOM WIDTH OR DIAMETER
                             Z       5.00  SIDE SLOPE
```

```
                           NDXMIN          2  MINIMUM NUMBER OF DX INTERVALS
  60 RK               MAIN CHANNEL
                                 L       235.  CHANNEL LENGTH
                                 S      .0250  SLOPE
                                 N       .012  CHANNEL ROUGHNESS COEFFICIENT
                                CA        .00  CONTRIBUTING AREA
                             SHAPE       CIRC  CHANNEL SHAPE
                                WD       1.50  BOTTOM WIDTH OR DIAMETER
                                 Z        .00  SIDE SLOPE
                            NDXMIN          2  MINIMUM NUMBER OF DX INTERVALS
                            RUPSTQ         NO  ROUTE UPSTREAM HYDROGRAPH
```

***

COMPUTED KINEMATIC PARAMETERS
VARIABLE TIME STEP
(DT SHOWN IS A MINIMUM)

ELEMENT	ALPHA	M	DT (MIN)	DX (FT)	PEAK (CFS)	TIME TO PEAK (MIN)	VOLUME (IN)	MAXIMUM CELERITY (FPS)
PLANE1	1.99	1.67	.50	10.40	5.90	32.04	1.32	.35
COLLECTOR1	7.14	1.33	.14	20.00	5.82	32.04	1.32	8.47
MAIN	11.33	1.25	.24	78.33	5.81	32.34	1.32	13.94

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .1216E+00 OUTFLOW= .1214E+00 BASIN STORAGE= .2412E-05 PERCENT ERROR= .2

INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL

MAIN	11.33	1.25	2.00		5.74	32.00	1.32	

*** *** *** *** ***

HYDROGRAPH AT STATION 3C

TOTAL RAINFALL = 1.48, TOTAL LOSS = .17, TOTAL EXCESS = 1.32

	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
				6-HR	24-HR	72-HR	9.97-HR
+	(CFS)	(HR)					
			(CFS)				
+	6.	.53		0.	0.	0.	0.
			(INCHES)	1.315	1.315	1.315	1.315
			(AC-FT)	0.	0.	0.	0.

CUMULATIVE AREA = .00 SQ MI

```
                 COMPUTE STAGES FROM GIVEN RATING DATA

 54 HQ                  FLOW       0.        2.        4.        6.        8.       10.       12.       14.
 56 HE                 STAGE       .0        .4        .5        .6        .7        .9       1.0       1.1

    ***              ***              ***              ***              ***

                         HYDROGRAPH AT STATION       3C

   MAXIMUM STAGE IS      .61


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

            **************
            *            *
 61 KK      *       3B   *
            *            *
            **************
                              RUNOFF SECTION 3B

 63 KO           OUTPUT CONTROL VARIABLES
                       IPRNT          3  PRINT CONTROL
                       IPLOT          0  PLOT CONTROL
                       QSCAL         0.  HYDROGRAPH PLOT SCALE

               SUBBASIN RUNOFF DATA

 64 BA           SUBBASIN CHARACTERISTICS
                       TAREA        .00  SUBBASIN AREA

                 PRECIPITATION DATA

 46 PH                                DEPTHS FOR  10-PERCENT HYPOTHETICAL STORM
                 ..... HYDRO-35 ......    ............... TP-40 ...............   ........... TP-49 ...........
                 5-MIN  15-MIN  60-MIN     2-HR     3-HR     6-HR    12-HR    24-HR    2-DAY    4-DAY    7-DAY  10-DAY
                   .47     .90    1.50      .00      .00      .00      .00      .00      .00      .00      .00     .00

                                                 STORM AREA =      .00

 67 LG           GREEN AND AMPT LOSS RATE
                       STRTL        .30  STARTING LOSS
                         DTH        .15  MOISTURE DEFICIT
                        PSIF       8.20  WETTING FRONT SUCTION
                       XKSAT        .12  HYDRAULIC CONDUCTIVITY
                       RTIMP      82.00  PERCENT IMPERVIOUS AREA
```

```
                    KINEMATIC WAVE
68 UK                 OVERLAND-FLOW ELEMENT NO. 1
                              L         52.  OVERLAND FLOW LENGTH
                              S       .0400  SLOPE
                              N        .150  ROUGHNESS COEFFICIENT
                             PA       100.0  PERCENT OF SUBBASIN
                          DXMIN           5  MINIMUM NUMBER OF DX INTERVALS

                    KINEMATIC WAVE
69 RK                 COLLECTOR CHANNEL
                              L        235.  CHANNEL LENGTH
                              S       .0390  SLOPE
                              N        .015  CHANNEL ROUGHNESS COEFFICIENT
                             CA         .00  CONTRIBUTING AREA
                          SHAPE        TRAP  CHANNEL SHAPE
                             WD         .00  BOTTOM WIDTH OR DIAMETER
                              Z        5.00  SIDE SLOPE
                        NDXMIN            2  MINIMUM NUMBER OF DX INTERVALS
70 RK                 MAIN CHANNEL
                              L        455.  CHANNEL LENGTH
                              S       .0350  SLOPE
                              N        .012  CHANNEL ROUGHNESS COEFFICIENT
                             CA         .00  CONTRIBUTING AREA
                          SHAPE        CIRC  CHANNEL SHAPE
                             WD        1.50  BOTTOM WIDTH OR DIAMETER
                              Z         .00  SIDE SLOPE
                        NDXMIN            2  MINIMUM NUMBER OF DX INTERVALS
                        RUPSTQ          YES  ROUTE UPSTREAM HYDROGRAPH
```

***

COMPUTED KINEMATIC PARAMETERS
VARIABLE TIME STEP
(DT SHOWN IS A MINIMUM)

ELEMENT	ALPHA	M	DT (MIN)	DX (FT)	PEAK (CFS)	TIME TO PEAK (MIN)	VOLUME (IN)	MAXIMUM CELERITY (FPS)
PLANE1	1.99	1.67	.52	10.40	6.52	31.79	1.34	.36
COLLECTOR1	7.14	1.33	.18	78.33	6.47	32.29	1.34	7.57
MAIN	13.41	1.25	.25	151.67	12.13	32.45	1.33	17.29

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1214E+00 EXCESS= .1371E+00 OUTFLOW= .2581E+00 BASIN STORAGE= .3104E-05 PERCENT ERROR= .2

INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL

MAIN	13.41	1.25	2.00		11.78	32.00	1.33

```
     ***              ***              ***              ***              ***

                          HYDROGRAPH AT STATION        3B

   TOTAL RAINFALL =     1.48, TOTAL LOSS =      .14, TOTAL EXCESS =     1.35

  PEAK FLOW     TIME                              MAXIMUM AVERAGE FLOW
                                        6-HR        24-HR        72-HR       9.97-HR
+   (CFS)       (HR)
                              (CFS)
+      12.        .53                      1.          0.           0.            0.
                           (INCHES)     1.331       1.331        1.331         1.331
                            (AC-FT)        0.          0.           0.            0.

                          CUMULATIVE AREA =      .00 SQ MI

                  COMPUTE STAGES FROM GIVEN RATING DATA

  64 HQ                       FLOW        0.         2.         4.         6.         8.        10.        12.        14.
  66 HE                      STAGE        .0         .4         .5         .6         .7         .9        1.0        1.1

     ***              ***              ***              ***              ***

                          HYDROGRAPH AT STATION        3B

    MAXIMUM STAGE IS       .95

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

            **************
            *            *
  71 KK     *        3A  *
            *            *
            **************
                                   RUNOFF SECTION 3A

  73 KO           OUTPUT CONTROL VARIABLES
                        IPRNT           3  PRINT CONTROL
                        IPLOT           0  PLOT CONTROL
                        QSCAL          0.  HYDROGRAPH PLOT SCALE

                SUBBASIN RUNOFF DATA

  74 BA           SUBBASIN CHARACTERISTICS
                        TAREA         .00  SUBBASIN AREA
```

```
                PRECIPITATION DATA

46 PH                                DEPTHS FOR  10-PERCENT HYPOTHETICAL STORM
                ..... HYDRO-35 ......   ............... TP-40 ...............   ........... TP-49 ...........
                5-MIN  15-MIN  60-MIN    2-HR     3-HR     6-HR    12-HR    24-HR    2-DAY    4-DAY    7-DAY   10-DAY
                  .47     .90    1.50     .00      .00      .00      .00      .00      .00      .00      .00      .00

                                                   STORM AREA =      .00

77 LG           GREEN AND AMPT LOSS RATE
                      STRTL          .30  STARTING LOSS
                        DTH          .15  MOISTURE DEFICIT
                       PSIF         8.20  WETTING FRONT SUCTION
                      XKSAT          .12  HYDRAULIC CONDUCTIVITY
                      RTIMP        85.00  PERCENT IMPERVIOUS AREA

                KINEMATIC WAVE
78 UK             OVERLAND-FLOW ELEMENT NO. 1
                          L          52.  OVERLAND FLOW LENGTH
                          S        .0400  SLOPE
                          N         .150  ROUGHNESS COEFFICIENT
                         PA        100.0  PERCENT OF SUBBASIN
                      DXMIN            5  MINIMUM NUMBER OF DX INTERVALS

                KINEMATIC WAVE
79 RK             COLLECTOR CHANNEL
                          L         145.  CHANNEL LENGTH
                          S        .0135  SLOPE
                          N         .015  CHANNEL ROUGHNESS COEFFICIENT
                         CA          .00  CONTRIBUTING AREA
                      SHAPE         TRAP  CHANNEL SHAPE
                         WD          .00  BOTTOM WIDTH OR DIAMETER
                          Z         5.00  SIDE SLOPE
                    NDXMIN             2  MINIMUM NUMBER OF DX INTERVALS
80 RK             MAIN CHANNEL
                          L         165.  CHANNEL LENGTH
                          S        .0100  SLOPE
                          N         .012  CHANNEL ROUGHNESS COEFFICIENT
                         CA          .00  CONTRIBUTING AREA
                      SHAPE         CIRC  CHANNEL SHAPE
                         WD         3.00  BOTTOM WIDTH OR DIAMETER
                          Z          .00  SIDE SLOPE
                    NDXMIN             2  MINIMUM NUMBER OF DX INTERVALS
                     RUPSTQ          YES  ROUTE UPSTREAM HYDROGRAPH

                                                               ***
                                      COMPUTED KINEMATIC PARAMETERS
                                            VARIABLE TIME STEP
                                          (DT SHOWN IS A MINIMUM)
```

ELEMENT	ALPHA	M	DT (MIN)	DX (FT)	PEAK (CFS)	TIME TO PEAK (MIN)	VOLUME (IN)	MAXIMUM CELERITY (FPS)
PLANE1	1.99	1.67	.52	10.40	2.23	32.10	1.37	.36
COLLECTOR1	4.20	1.33	.17	48.33	2.21	32.21	1.37	5.13
MAIN	8.05	1.25	.19	55.00	13.93	32.29	1.34	11.49

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2583E+00 EXCESS= .4747E-01 OUTFLOW= .3057E+00 BASIN STORAGE= .2645E-05 PERCENT ERROR= .1

INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL

MAIN	8.05	1.25	2.00		13.63	32.00	1.34

*** *** *** *** ***

HYDROGRAPH AT STATION 3A

TOTAL RAINFALL = 1.48, TOTAL LOSS = .12, TOTAL EXCESS = 1.37

PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	9.97-HR
+ 14.	.53	(CFS)	1.	0.	0.	0.
		(INCHES)	1.337	1.337	1.337	1.337
		(AC-FT)	0.	0.	0.	0.

CUMULATIVE AREA = .00 SQ MI

COMPUTE STAGES FROM GIVEN RATING DATA

74 HQ	FLOW	0.	2.	4.	6.	8.	10.	12.	14.
76 HE	STAGE	.0	.4	.5	.6	.7	.8	.9	.9

*** *** *** *** ***

HYDROGRAPH AT STATION 3A

MAXIMUM STAGE IS .92

*** ***

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           **************
           *            *
 81 KK     *        4   *
           *            *
           **************
                             RUNOFF COMBINED

 83 HC          HYDROGRAPH COMBINATION
                      ICOMP           2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                                          ***

     ***             ***             ***             ***             ***

                        HYDROGRAPH AT STATION        4

 PEAK FLOW      TIME                          MAXIMUM AVERAGE FLOW
                                     6-HR        24-HR        72-HR       9.97-HR
+   (CFS)       (HR)
                         (CFS)
+      32.        .53                   1.           1.           1.            1.
                       (INCHES)     1.349        1.349        1.349         1.349
                        (AC-FT)        1.           1.           1.            1.

                       CUMULATIVE AREA =      .01 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

           **************
           *            *
 84 KK     *        5   *
           *            *
           **************
                             STORAGE FACILITY

 86 KO          OUTPUT CONTROL VARIABLES
                      IPRNT           3  PRINT CONTROL
                      IPLOT           0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE

              HYDROGRAPH ROUTING DATA

 87 RS          STORAGE ROUTING
                      NSTPS           1  NUMBER OF SUBREACHES
                       ITYP        STOR  TYPE OF INITIAL CONDITION
```

```
                    RSVRIC          .00  INITIAL CONDITION
                         X          .00 WORKING R AND D COEFFICIENT

  88 SV                STORAGE          .0         .0         .0         .0         .1         .1         .1         .1         .2         .2
                                        .2         .2         .2         .3         .3

  90 SE              ELEVATION     1233.00    1235.00    1237.00    1239.00    1240.00    1241.00    1242.00    1243.00    1244.00    1245.00
                                   1246.00    1247.00    1248.00    1249.00    1250.00

  92 SQ              DISCHARGE          0.         0.         0.         0.         0.         0.         0.         0.         0.         0.
                                        0.         0.         0.         0.         0.

  95 WP              PUMPING DATA

                        PUMP ON    PUMPING    PUMP OFF
                       ELEVATION     RATE     ELEVATION

                         1242.0       15.       1239.5
                         1243.2       15.       1240.5

                          ISTAD        PUMPS  PUMP FLOW HYDROGRAPH IDENTIFICATION

                                                                              ***

      ***             ***             ***             ***             ***

                            HYDROGRAPH AT STATION          5

 PEAK OUTFLOW IS          0. AT TIME     .00 HOURS

 ***** PUMP FLOW HYDROGRAPH *****

   PEAK FLOW      TIME                          MAXIMUM AVERAGE FLOW
                                          6-HR        24-HR       72-HR       9.97-HR
+    (CFS)        (HR)
                                  (CFS)
+       30.        .60                      1.          1.          1.            1.
                               (INCHES)  1.234       1.234       1.234         1.234
                                (AC-FT)     1.          1.          1.            1.

 ***** OUTFLOW HYDROGRAPH *****

   PEAK FLOW      TIME                          MAXIMUM AVERAGE FLOW
                                          6-HR        24-HR       72-HR       9.97-HR
+    (CFS)        (HR)
                                  (CFS)
+        0.        .00                      0.          0.          0.            0.
                               (INCHES)   .000        .000        .000          .000
```

```
                        (AC-FT)        0.          0.          0.            0.

PEAK STORAGE   TIME                              MAXIMUM AVERAGE STORAGE
                                         6-HR         24-HR       72-HR       9.97-HR
+  (AC-FT)      (HR)
      0.         .57                     0.          0.          0.            0.

 PEAK STAGE    TIME                               MAXIMUM AVERAGE STAGE
                                         6-HR         24-HR       72-HR       9.97-HR
+   (FEET)      (HR)
  1243.48        .57                  1241.39     1241.09     1241.09      1241.09

                        CUMULATIVE AREA =      .01 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


            **************
            *            *
  97 KK     *    PUMPS   *
            *            *
            **************
                            PUMP STATION FLOW

  99 KO          OUTPUT CONTROL VARIABLES
                       IPRNT          3  PRINT CONTROL
                       IPLOT          2  PLOT CONTROL
                       QSCAL         10.  HYDROGRAPH PLOT SCALE

                                                                     ***

     ***              ***              ***              ***              ***

                        HYDROGRAPH AT STATION    PUMPS

 PEAK FLOW     TIME                               MAXIMUM AVERAGE FLOW
                                         6-HR         24-HR       72-HR       9.97-HR
+   (CFS)       (HR)
                          (CFS)
+     30.        .60                       1.          1.          1.            1.
                        (INCHES)         1.234       1.234       1.234         1.234
                         (AC-FT)           1.          1.          1.            1.

                        CUMULATIVE AREA =      .00 SQ MI

1
                                                    RUNOFF SUMMARY
```

FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	1C	2.	.57	0.	0.	0.	.00		
+	HYDROGRAPH AT	2A	8.	.57	0.	0.	0.	.00		
+	HYDROGRAPH AT	2B	14.	.57	1.	0.	0.	.00		
+	HYDROGRAPH AT	2C	18.	.57	1.	1.	1.	.01		
+	HYDROGRAPH AT	3C	6.	.53	0.	0.	0.	.00		
+	HYDROGRAPH AT	3B	12.	.53	1.	0.	0.	.00		
+	HYDROGRAPH AT	3A	14.	.53	1.	0.	0.	.00		
+	2 COMBINED AT	4	32.	.53	1.	1.	1.	.01		
+	PUMP FLOW TO	PUMPS	30.	.60	1.	1.	1.	.01		
+	HYDROGRAPH AT	5	0.	.00	0.	0.	0.	.01		
+									1243.48	.57
+	HYDROGRAPH AT	PUMPS	30.	.60	1.	1.	1.	.00		

1

SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
(FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)

ISTAQ	ELEMENT	DT	PEAK	TIME TO PEAK	VOLUME	INTERPOLATED TO COMPUTATION INTERVAL DT	PEAK	TIME TO PEAK	VOLUME
		(MIN)	(CFS)	(MIN)	(IN)	(MIN)	(CFS)	(MIN)	(IN)

1C	MANE	.27	2.47	33.04	1.29	2.00	2.39	34.00	1.29

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .5170E-01 OUTFLOW= .5159E-01 BASIN STORAGE= .2599E-05 PERCENT ERROR= .2

2A	MANE	.29	7.90	32.87	1.34	2.00	7.68	34.00	1.34

CONTINUITY SUMMARY (AC-FT) - INFLOW= .5157E-01 EXCESS= .1205E+00 OUTFLOW= .1719E+00 BASIN STORAGE= .2909E-05 PERCENT ERROR= .1

2B	MANE	.19	14.21	32.55	1.35	2.00	13.87	34.00	1.36

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1720E+00 EXCESS= .1446E+00 OUTFLOW= .3163E+00 BASIN STORAGE= .8084E-05 PERCENT ERROR= .1

2C	MANE	.11	18.46	32.91	1.36	2.00	18.24	34.00	1.36

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3166E+00 EXCESS= .1008E+00 OUTFLOW= .4172E+00 BASIN STORAGE= .2833E-05 PERCENT ERROR= .0

3C	MANE	.24	5.81	32.34	1.32	2.00	5.74	32.00	1.32

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .1216E+00 OUTFLOW= .1214E+00 BASIN STORAGE= .2412E-05 PERCENT ERROR= .2

3B	MANE	.25	12.13	32.45	1.33	2.00	11.78	32.00	1.33

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1214E+00 EXCESS= .1371E+00 OUTFLOW= .2581E+00 BASIN STORAGE= .3104E-05 PERCENT ERROR= .2

3A	MANE	.19	13.93	32.29	1.34	2.00	13.63	32.00	1.34

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2583E+00 EXCESS= .4747E-01 OUTFLOW= .3057E+00 BASIN STORAGE= .2645E-05 PERCENT ERROR= .1

*** NORMAL END OF HEC-1 ***

```
1****************************************                                                    ****************************************
 *                                       *                                                    *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                                                    *   U.S. ARMY CORPS OF ENGINEERS       *
 *              JUN   1998               *                                                    *   HYDROLOGIC ENGINEERING CENTER      *
 *            VERSION 4.1                *                                                    *         609 SECOND STREET            *
 *                                       *                                                    *      DAVIS, CALIFORNIA 95616         *
 *  RUN DATE   03OCT02  TIME  10:09:09   *                                                    *          (916) 756-1104              *
 *                                       *                                                    *                                      *
 ****************************************                                                    ****************************************



                                                 X     X  XXXXXXX   XXXXX         X
                                                 X     X  X        X     X       XX
                                                 X     X  X        X              X
                                                 XXXXXXX  XXXX     X       XXXXX  X
                                                 X     X  X        X              X
                                                 X     X  X        X     X        X
                                                 X     X  XXXXXXX   XXXXX        XXX



                    THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

                    THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
                    THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
                    NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
                    DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
                    KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1                                                     HEC-1 INPUT                                                      PAGE  1

                   LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

                     1           ID        TOWN OF GILBERT GREENFIELD ROAD STORM DRAINAGE PN:96446-1
                     2           ID        KINEMATIC WAVE WATERSHED MODEL 50 year storm 6720 gpm Conveyance Sizing
                     3           IT       2 24SEP02     0000      300
                     4           IO       3
                                 *
                                 *DIAGRAM

                     5           KK      1C
                     6           KM        RUNOFF SECTION 1C
                     7           KO       0
                     8           BA   .00075
                                 *       RATING FOR 18" DIA PIPE 1.5% SLOPE
```

```
 9     HQ      0      2.      4.      6.      8.     10.     12.     14.
10     HE      0    0.40    0.57    0.72    0.86    1.00    1.15    1.16
11     PH                   0.64    1.25    2.11    2.30    2.43     2.6    2.93    3.00
       *      BLANK FOR 50-YR & BA ADJUSTMENT
12     LG    0.3    0.15    8.20    0.12    75.0
       *      ASSUME CLAY LOAM SOIL PARAMETERS
13     UK     52    0.04     .15     100
14     RK    150  0.0040    .015 0.00063    TRAP       0       5
       *    GUTTER FLOW
15     RK    410  0.0150    .012 0.00250    CIRC     1.5

16     KK     2A
17     KM        RUNOFF SECTION 2A
18     KO      0
19     BA .00165
       *      RATING FOR 18" DIA PIPE 2.6% SLOPE
20     HQ      0      2.      4.      6.      8.     10.     12.     14.
21     HE      0    0.35    0.50    0.62    0.73    0.83    0.93    1.04
22     PH                   0.64    1.25    2.11    2.30    2.43     2.6    2.93    3.00
       *      BLANK FOR 50-YR & BA ADJUSTMENT
23     LG    0.3    0.15    8.20    0.12    85.0
       *      ASSUME CLAY LOAM SOIL PARAMETERS
24     UK     52    0.04     .15     100
25     RK    260  0.0200    .015 0.00063    TRAP       0       5
       *    GUTTER FLOW
26     RK    495  0.0260    .012 0.00250    CIRC     1.5             YES

27     KK     2B
28     KM        RUNOFF SECTION 2B
29     KO      0
30     BA .00198
       *      RATING FOR 24" DIA PIPE  2.0% SLOPE
31     HQ      0      2.      4.      6.      8.     10.     12.     14.     16.     18.
32     HQ    20.    22.0    26.0
33     HE      0    0.34    0.48    0.59    0.68    0.77    0.85    0.93     1.0    1.07
34     HE   1.15    1.22    1.37
35     PH                   0.64    1.25    2.11    2.30    2.43     2.6    2.93    3.00
       *      BLANK FOR 50-YR & BA ADJUSTMENT
36     LG    0.3    0.15    8.20    0.12    85.0
       *      ASSUME CLAY LOAM SOIL PARAMETERS
37     UK     52    0.04     .15     100
38     RK    250  0.0260    .015 0.00063    TRAP       0       5
       *    GUTTER FLOW
```



```
LINE   ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

39     RK    310   0.020    .012  0.0025    CIRC     1.5             YES

40     KK     2C
```

```
41          KM       RUNOFF SECTION 2C
42          KO      0
43          BA  .00138
            *      RATING FOR 36" DIA PIPE 1% SLOPE
44          HQ      0      2.       4.       6.       8.      10.      14.      16.     20.0     24.0
45          HQ     26.    30.0     32.     40.0
46          HE      0     0.36     0.50     0.61     0.70     0.79     0.93     1.00     1.13     1.24
47          HE    1.30    1.41     1.46     1.67
48          PH                     0.64     1.25     2.11     2.30     2.43      2.6     2.93     3.00
            *      BLANK FOR 50-YR & BA ADJUSTMENT
49          LG     0.3    0.15     8.20     0.12     85.0
            *      ASSUME CLAY LOAM SOIL PARAMETERS
50          UK      52    0.04      .15      100
51          RK     310  0.0135     .015  0.00063     TRAP        0        5
            *    GUTTER FLOW
52          RK     135  0.0100     .012  0.00250     CIRC      3.0                 YES
            *    ROUTE TO INLET MH IN 36-IN RCP

53          KK      3C
54          KM       RUNOFF SECTION 3C
55          KO      0
56          BA  .00173
            *      RATING FOR 18" DIA PIPE  2.5% SLOPE
57          HQ      0      2.       4.       6.       8.      10.      12.      14.
58          HE      0     0.36     0.51     0.63     0.74     0.85     0.96     1.07
59          PH                     0.64     1.25     2.11     2.30     2.43      2.6     2.93     3.00
            *      BLANK FOR 50-YR & BA ADJUSTMENT
60          LG     0.3    0.15     8.20     0.12     78.3
            *      ASSUME CLAY LOAM SOIL PARAMETERS
61          UK      52    0.04      .15      100
62          RK      60  0.0390     .015  0.00063     TRAP        0        5
            *    GUTTER FLOW
63          RK     235  0.0250     .012  0.0019      CIRC      1.5
            *    ROUTE TO INLET MH IN 18-IN RCP

64          KK      3B
65          KM       RUNOFF SECTION 3B
66          KO      0
67          BA  .00191
            *      RATING FOR 18" DIA PIPE 2.5% SLOPE
68          HQ      0      2.       4.       6.       8.      10.      12.      14.
69          HE      0     0.36     0.51     0.63     0.74     0.85     0.96     1.07
70          LG     0.3    0.15     8.20     0.12     82.0
            *      ASSUME CLAY LOAM SOIL PARAMETERS
71          UK      52    0.04      .15      100
72          RK     235  0.0390     .015  0.00063     TRAP        0        5
            *    GUTTER FLOW
73          RK     455  0.0350     .012  0.00190     CIRC      1.5                 YES
            *    ROUTE TO INLET MH IN 18-IN RCP
```

```
LINE            ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10


 74             KK      3A
 75             KM        RUNOFF SECTION 3A
 76             KO       0
 77             BA  .00065
                *     RATING FOR 36" DIA PIPE 1% SLOPE
 78             HQ       0      2.      4.      6.      8.     10.     12.     14.
 79             HE       0    0.36    0.50    0.61    0.70    0.79    0.86    0.93
 80             LG     0.3    0.15    8.20    0.12    85.0
                *     ASSUME CLAY LOAM SOIL PARAMETERS
 81             UK      52    0.04     .15     100
 82             RK     145  0.0135    .015 0.00063    TRAP       0       5
                *    GUTTER FLOW
 83             RK     165  0.0100    .012 0.00190    CIRC     3.0             YES
                *    ROUTE TO INLET MH IN 36-IN RCP

 84             KK       4
 85             KM        RUNOFF COMBINED
 86             HC       2

 87             KK       5
 88             KM        STORAGE FACILITY
 89             KO       0
                *     STORAGE FACILITY ROUTING THRU WET WELL - NO VAULT
 90             RS       1    STOR     0.0
 91             SV     0.0  0.0140  0.0280   0.043   0.051   0.060   0.071   0.095   0.173   0.187
 92             SV   0.203  0.2200  0.2380   0.258   0.280
 93             SE  1233.0  1235.0  1237.0  1239.0  1240.0  1241.0  1242.0  1243.0  1244.0  1245.0
 94             SE  1246.0  1247.0  1248.0  1249.0   1250.
 95             SQ       0       0       0       0       0       0       0       0       0       0
 96             SQ       0     0.0     0.0     0.0     0.1
                *    NUISANCE PUMP ON @ 1238.5  OFF @ 1235.50
 97             WP  1238.5     0.0  1235.5   PUMPS
                *    PUMP 1 ON @  1242.0 & OFF @ 1239.5
 98             WP  1242.0    15.0  1239.5   PUMPS
                *    PUMP 2 ON @  1243.2 & OFF @ 1240.5
 99             WP  1243.2    15.0  1240.5   PUMPS

100             KK   PUMPS
101             KM        PUMP STATION FLOW
102             KO       0       2      10
103             WR   PUMPS
104             ZZ
1
                 SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING           (--->) DIVERSION OR PUMP FLOW
```

```
 NO.       (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

   5          1C
               V
               V
  16          2A ***
               V
               V
  27          2B ***
               V
               V
  40          2C ***
               .
               .
  53           .           3C
               .            V
               .            V
  64           .           3B ***
               .            V
               .            V
  74           .           3A ***
               .            .
               .            .
  84           4............
               V
               V
  97           .------->   PUMPS
  87           5
               .
               .
 103           .            .<-------    PUMPS
 100           .        PUMPS

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1*****************************************
 *                                        *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)    *
 *              JUN   1998                *
 *            VERSION 4.1                 *
 *                                        *
 *  RUN DATE   03OCT02  TIME  10:09:09    *
 *                                        *
 ******************************************

 ******************************************
 *                                        *
 *    U.S. ARMY CORPS OF ENGINEERERS      *
 *    HYDROLOGIC ENGINEERING CENTER       *
 *          609 SECOND STREET             *
 *       DAVIS, CALIFORNIA 95616          *
 *           (916) 756-1104               *
 *                                        *
 ******************************************


        TOWN OF GILBERT GREENFIELD ROAD STORM DRAINAGE PN:96446-1
```

```
                 KINEMATIC WAVE WATERSHED MODEL 50 year storm 6720 gpm Conveyance Sizing

   4 IO          OUTPUT CONTROL VARIABLES
                       IPRNT          3  PRINT CONTROL
                       IPLOT          0  PLOT CONTROL
                       QSCAL         0.  HYDROGRAPH PLOT SCALE

     IT          HYDROGRAPH TIME DATA
                        NMIN          2  MINUTES IN COMPUTATION INTERVAL
                       IDATE   24SEP 2  STARTING DATE
                       ITIME       0000  STARTING TIME
                          NQ        300  NUMBER OF HYDROGRAPH ORDINATES
                      NDDATE   24SEP 2  ENDING DATE
                      NDTIME       0958  ENDING TIME
                       ICENT         19  CENTURY MARK

                   COMPUTATION INTERVAL     .03 HOURS
                        TOTAL TIME BASE    9.97 HOURS

        ENGLISH UNITS
             DRAINAGE AREA           SQUARE MILES
             PRECIPITATION DEPTH     INCHES
             LENGTH, ELEVATION       FEET
             FLOW                    CUBIC FEET PER SECOND
             STORAGE VOLUME          ACRE-FEET
             SURFACE AREA            ACRES
             TEMPERATURE             DEGREES FAHRENHEIT


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

          **************
          *            *
   5 KK   *     1C     *
          *            *
          **************
                       RUNOFF SECTION 1C

   7 KO          OUTPUT CONTROL VARIABLES
                       IPRNT          3  PRINT CONTROL
                       IPLOT          0  PLOT CONTROL
                       QSCAL         0.  HYDROGRAPH PLOT SCALE

               SUBBASIN RUNOFF DATA

   8 BA          SUBBASIN CHARACTERISTICS
                       TAREA        .00  SUBBASIN AREA
```

```
                  PRECIPITATION DATA

 11 PH                                DEPTHS FOR   0-PERCENT HYPOTHETICAL STORM
                  ..... HYDRO-35 ......   ............... TP-40 ...............   ........... TP-49 ..........
                  5-MIN  15-MIN  60-MIN    2-HR    3-HR    6-HR   12-HR   24-HR    2-DAY   4-DAY   7-DAY  10-DAY
                    .64    1.25    2.11    2.30    2.43    2.60    2.93    3.00      .00     .00     .00     .00

                                                     STORM AREA =      .00

 12 LG            GREEN AND AMPT LOSS RATE
                        STRTL          .30  STARTING LOSS
                          DTH          .15  MOISTURE DEFICIT
                         PSIF         8.20  WETTING FRONT SUCTION
                        XKSAT          .12  HYDRAULIC CONDUCTIVITY
                        RTIMP        75.00  PERCENT IMPERVIOUS AREA

                  KINEMATIC WAVE
 13 UK              OVERLAND-FLOW ELEMENT NO. 1
                            L          52.  OVERLAND FLOW LENGTH
                            S        .0400  SLOPE
                            N         .150  ROUGHNESS COEFFICIENT
                           PA        100.0  PERCENT OF SUBBASIN
                        DXMIN            5  MINIMUM NUMBER OF DX INTERVALS

                  KINEMATIC WAVE
 14 RK              COLLECTOR CHANNEL
                            L         150.  CHANNEL LENGTH
                            S        .0040  SLOPE
                            N         .015  CHANNEL ROUGHNESS COEFFICIENT
                           CA          .00  CONTRIBUTING AREA
                        SHAPE         TRAP  CHANNEL SHAPE
                           WD          .00  BOTTOM WIDTH OR DIAMETER
                            Z         5.00  SIDE SLOPE
                       NDXMIN            2  MINIMUM NUMBER OF DX INTERVALS
 15 RK              MAIN CHANNEL
                            L         410.  CHANNEL LENGTH
                            S        .0150  SLOPE
                            N         .012  CHANNEL ROUGHNESS COEFFICIENT
                           CA          .00  CONTRIBUTING AREA
                        SHAPE         CIRC  CHANNEL SHAPE
                           WD         1.50  BOTTOM WIDTH OR DIAMETER
                            Z          .00  SIDE SLOPE
                       NDXMIN            2  MINIMUM NUMBER OF DX INTERVALS
                       RUPSTQ           NO  ROUTE UPSTREAM HYDROGRAPH

                                                                ***

          *** FDKRUT WARNING TIME STEP CALCULATION FAILED TO CONVERGE. STABILITY PROBLEMS MAY RESULT
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COMPUTED KINEMATIC PARAMETERS
VARIABLE TIME STEP
(DT SHOWN IS A MINIMUM)

ELEMENT	ALPHA	M	DT	DX	PEAK	TIME TO PEAK	VOLUME	MAXIMUM CELERITY

```
                                   (MIN)      (FT)      (CFS)     (MIN)       (IN)      (FPS)

     PLANE1        1.99      1.67       .54     10.40      3.61    299.66      2.51        .42
     COLLECTOR1    2.29      1.33       .24     50.00      3.59    300.17      2.50       3.54
     MAIN          8.78      1.25       .37    136.67      3.57    300.52      2.50       9.96

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00  EXCESS= .1008E+00 OUTFLOW= .1000E+00 BASIN STORAGE= .4882E-03 PERCENT ERROR=    .3

                              INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL

     MAIN          8.78      1.25      2.00                3.48    300.00      2.50

     ***              ***              ***              ***              ***

              HYDROGRAPH AT STATION       1C

   TOTAL RAINFALL =     2.84, TOTAL LOSS =      .32, TOTAL EXCESS =     2.52

  PEAK FLOW      TIME                         MAXIMUM AVERAGE FLOW
                                    6-HR         24-HR        72-HR       9.97-HR
+   (CFS)        (HR)
                          (CFS)
+       3.       5.00                 0.            0.           0.            0.
                        (INCHES)    2.349         2.500        2.500         2.500
                         (AC-FT)       0.            0.           0.            0.

                       CUMULATIVE AREA =      .00 SQ MI

              COMPUTE STAGES FROM GIVEN RATING DATA

   8 HQ             FLOW      0.        2.        4.        6.        8.       10.       12.       14.
  10 HE            STAGE      .0        .4        .6        .7        .9       1.0       1.1       1.2

     ***              ***              ***              ***              ***

              HYDROGRAPH AT STATION       1C

   MAXIMUM STAGE IS      .53

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

          **************
          *            *
```

```
16 KK      *        2A  *
           *            *
           **************
                          RUNOFF SECTION 2A

18 KO          OUTPUT CONTROL VARIABLES
                     IPRNT            3  PRINT CONTROL
                     IPLOT            0  PLOT CONTROL
                     QSCAL           0.  HYDROGRAPH PLOT SCALE

             SUBBASIN RUNOFF DATA

19 BA          SUBBASIN CHARACTERISTICS
                     TAREA          .00  SUBBASIN AREA

               PRECIPITATION DATA

22 PH                                  DEPTHS FOR   0-PERCENT HYPOTHETICAL STORM
               ..... HYDRO-35 ......    ............... TP-40 ...............   .......... TP-49 ..........
               5-MIN  15-MIN  60-MIN     2-HR    3-HR    6-HR   12-HR   24-HR   2-DAY   4-DAY   7-DAY  10-DAY
                 .64    1.25    2.11     2.30    2.43    2.60    2.93    3.00     .00     .00     .00     .00

                                                STORM AREA =      .00

23 LG          GREEN AND AMPT LOSS RATE
                     STRTL          .30  STARTING LOSS
                       DTH          .15  MOISTURE DEFICIT
                      PSIF         8.20  WETTING FRONT SUCTION
                     XKSAT          .12  HYDRAULIC CONDUCTIVITY
                     RTIMP        85.00  PERCENT IMPERVIOUS AREA

               KINEMATIC WAVE
24 UK            OVERLAND-FLOW ELEMENT NO. 1
                         L          52.  OVERLAND FLOW LENGTH
                         S        .0400  SLOPE
                         N         .150  ROUGHNESS COEFFICIENT
                        PA        100.0  PERCENT OF SUBBASIN
                     DXMIN            5  MINIMUM NUMBER OF DX INTERVALS

               KINEMATIC WAVE
25 RK            COLLECTOR CHANNEL
                         L         260.  CHANNEL LENGTH
                         S        .0200  SLOPE
                         N         .015  CHANNEL ROUGHNESS COEFFICIENT
                        CA          .00  CONTRIBUTING AREA
                     SHAPE         TRAP  CHANNEL SHAPE
                        WD          .00  BOTTOM WIDTH OR DIAMETER
                         Z         5.00  SIDE SLOPE
                   NDXMIN             2  MINIMUM NUMBER OF DX INTERVALS
26 RK            MAIN CHANNEL
```

L	495.	CHANNEL LENGTH
S	.0260	SLOPE
N	.012	CHANNEL ROUGHNESS COEFFICIENT
CA	.00	CONTRIBUTING AREA
SHAPE	CIRC	CHANNEL SHAPE
WD	1.50	BOTTOM WIDTH OR DIAMETER
Z	.00	SIDE SLOPE
NDXMIN	2	MINIMUM NUMBER OF DX INTERVALS
RUPSTQ	YES	ROUTE UPSTREAM HYDROGRAPH

***

COMPUTED KINEMATIC PARAMETERS
VARIABLE TIME STEP
(DT SHOWN IS A MINIMUM)

ELEMENT	ALPHA	M	DT (MIN)	DX (FT)	PEAK (CFS)	TIME TO PEAK (MIN)	VOLUME (IN)	MAXIMUM CELERITY (FPS)
PLANE1	1.99	1.67	.54	10.40	7.98	299.63	2.63	.42
COLLECTOR1	5.12	1.33	.34	86.67	7.92	300.03	2.63	6.61
MAIN	11.56	1.25	.20	165.00	11.37	300.48	2.59	15.04

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1000E+00 EXCESS= .2329E+00 OUTFLOW= .3310E+00 BASIN STORAGE= .6442E-03 PERCENT ERROR= .4

INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL

MAIN	11.56	1.25	2.00		11.06	300.00	2.58

*** *** *** *** ***

HYDROGRAPH AT STATION 2A

TOTAL RAINFALL = 2.84, TOTAL LOSS = .19, TOTAL EXCESS = 2.65

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	9.97-HR
+ (CFS)	(HR)					
		(CFS)				
+ 11.	5.00		1.	0.	0.	0.
		(INCHES)	2.418	2.585	2.585	2.585
		(AC-FT)	0.	0.	0.	0.

CUMULATIVE AREA = .00 SQ MI

COMPUTE STAGES FROM GIVEN RATING DATA

```
 19 HQ                FLOW      0.         2.         4.         6.         8.        10.        12.        14.
 21 HE               STAGE     .0         .3         .5         .6         .7         .8         .9        1.0

     ***              ***              ***              ***              ***

                     HYDROGRAPH AT STATION       2A

    MAXIMUM STAGE IS      .88


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


           **************
           *            *
 27 KK     *       2B   *
           *            *
           **************
                             RUNOFF SECTION 2B

 29 KO          OUTPUT CONTROL VARIABLES
                      IPRNT          3  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                      QSCAL         0.  HYDROGRAPH PLOT SCALE

              SUBBASIN RUNOFF DATA

 30 BA          SUBBASIN CHARACTERISTICS
                      TAREA        .00  SUBBASIN AREA

                PRECIPITATION DATA

 35 PH                              DEPTHS FOR   0-PERCENT HYPOTHETICAL STORM
                ..... HYDRO-35 ......   ............... TP-40 ...............   ........... TP-49 ..........
                5-MIN  15-MIN  60-MIN    2-HR    3-HR    6-HR   12-HR   24-HR    2-DAY   4-DAY   7-DAY  10-DAY
                  .64    1.25    2.11    2.30    2.43    2.60    2.93    3.00      .00     .00     .00     .00

                                                  STORM AREA =      .00

 36 LG          GREEN AND AMPT LOSS RATE
                      STRTL        .30  STARTING LOSS
                        DTH        .15  MOISTURE DEFICIT
                       PSIF       8.20  WETTING FRONT SUCTION
                      XKSAT        .12  HYDRAULIC CONDUCTIVITY
                      RTIMP      85.00  PERCENT IMPERVIOUS AREA

                KINEMATIC WAVE
 37 UK            OVERLAND-FLOW ELEMENT NO. 1
```

```
                    L        52.  OVERLAND FLOW LENGTH
                    S     .0400  SLOPE
                    N      .150  ROUGHNESS COEFFICIENT
                   PA     100.0  PERCENT OF SUBBASIN
                DXMIN         5  MINIMUM NUMBER OF DX INTERVALS

           KINEMATIC WAVE
38 RK       COLLECTOR CHANNEL
                    L      250.  CHANNEL LENGTH
                    S     .0260  SLOPE
                    N      .015  CHANNEL ROUGHNESS COEFFICIENT
                   CA       .00  CONTRIBUTING AREA
                SHAPE      TRAP  CHANNEL SHAPE
                   WD       .00  BOTTOM WIDTH OR DIAMETER
                    Z      5.00  SIDE SLOPE
              NDXMIN          2  MINIMUM NUMBER OF DX INTERVALS
39 RK       MAIN CHANNEL
                    L      310.  CHANNEL LENGTH
                    S     .0200  SLOPE
                    N      .012  CHANNEL ROUGHNESS COEFFICIENT
                   CA       .00  CONTRIBUTING AREA
                SHAPE      CIRC  CHANNEL SHAPE
                   WD      1.50  BOTTOM WIDTH OR DIAMETER
                    Z       .00  SIDE SLOPE
               NDXMIN         2  MINIMUM NUMBER OF DX INTERVALS
               RUPSTQ       YES  ROUTE UPSTREAM HYDROGRAPH

                                              ***

 *** FDKRUT WARNING TIME STEP CALCULATION FAILED TO CONVERGE. STABILITY PROBLEMS MAY RESULT


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*** FDKRUT - NEWTON RAPHSON FAILEDFIXED POINT ITERATION USED - ITERATION= 1

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COMPUTED KINEMATIC PARAMETERS
VARIABLE TIME STEP
(DT SHOWN IS A MINIMUM)

ELEMENT	ALPHA	M	DT (MIN)	DX (FT)	PEAK (CFS)	TIME TO PEAK (MIN)	VOLUME (IN)	MAXIMUM CELERITY (FPS)
PLANE1	1.99	1.67	.54	10.40	9.58	299.63	2.63	.42
COLLECTOR1	5.83	1.33	.30	83.33	9.52	300.00	2.63	7.30
MAIN	10.14	1.25	.13	103.33	20.56	300.31	2.60	15.06

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3308E+00 EXCESS= .2795E+00 OUTFLOW= .6080E+00 BASIN STORAGE= .6646E-03 PERCENT ERROR= .3

INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL

```
                 MAIN          10.14       1.25       2.00              20.11    300.00      2.60

     ***              ***              ***              ***              ***

                        HYDROGRAPH AT STATION        2B

   TOTAL RAINFALL =    2.84, TOTAL LOSS =      .19, TOTAL EXCESS =    2.65

  PEAK FLOW      TIME                          MAXIMUM AVERAGE FLOW
                                           6-HR       24-HR      72-HR      9.97-HR
+    (CFS)       (HR)
                               (CFS)
+      20.       5.00                        1.         1.         1.          1.
                            (INCHES)       2.435      2.604      2.604       2.604
                             (AC-FT)         1.         1.         1.          1.

                          CUMULATIVE AREA =      .00 SQ MI

                 COMPUTE STAGES FROM GIVEN RATING DATA

   30 HQ                  FLOW        0.        2.        4.        6.        8.       10.       12.       14.       16.       18.
   33 HE                  STAGE       .0        .3        .5        .6        .7        .8        .9        .9       1.0       1.1

                          FLOW       20.       22.       26.
                          STAGE      1.1       1.2       1.4

     ***              ***              ***              ***              ***

                        HYDROGRAPH AT STATION        2B

    MAXIMUM STAGE IS      1.15


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

             **************
             *            *
   40 KK     *       2C   *
             *            *
             **************
                              RUNOFF SECTION 2C

   42 KO          OUTPUT CONTROL VARIABLES
                       IPRNT           3  PRINT CONTROL
                       IPLOT           0  PLOT CONTROL
                       QSCAL          0.  HYDROGRAPH PLOT SCALE
```

SUBBASIN RUNOFF DATA

43 BA SUBBASIN CHARACTERISTICS

```
              TAREA         .00  SUBBASIN AREA
```

PRECIPITATION DATA

48 PH DEPTHS FOR 0-PERCENT HYPOTHETICAL STORM

..... HYDRO-35			.... TP-40					.... TP-49			
5-MIN	15-MIN	60-MIN	2-HR	3-HR	6-HR	12-HR	24-HR	2-DAY	4-DAY	7-DAY	10-DAY
.64	1.25	2.11	2.30	2.43	2.60	2.93	3.00	.00	.00	.00	.00

STORM AREA = .00

49 LG GREEN AND AMPT LOSS RATE

```
              STRTL         .30  STARTING LOSS
                DTH         .15  MOISTURE DEFICIT
               PSIF        8.20  WETTING FRONT SUCTION
              XKSAT         .12  HYDRAULIC CONDUCTIVITY
              RTIMP       85.00  PERCENT IMPERVIOUS AREA
```

KINEMATIC WAVE

50 UK OVERLAND-FLOW ELEMENT NO. 1

```
                  L         52.  OVERLAND FLOW LENGTH
                  S       .0400  SLOPE
                  N        .150  ROUGHNESS COEFFICIENT
                 PA       100.0  PERCENT OF SUBBASIN
              DXMIN           5  MINIMUM NUMBER OF DX INTERVALS
```

KINEMATIC WAVE

51 RK COLLECTOR CHANNEL

```
                  L        310.  CHANNEL LENGTH
                  S       .0135  SLOPE
                  N        .015  CHANNEL ROUGHNESS COEFFICIENT
                 CA         .00  CONTRIBUTING AREA
              SHAPE        TRAP  CHANNEL SHAPE
                 WD         .00  BOTTOM WIDTH OR DIAMETER
                  Z        5.00  SIDE SLOPE
            NDXMIN            2  MINIMUM NUMBER OF DX INTERVALS
```

52 RK MAIN CHANNEL

```
                  L        135.  CHANNEL LENGTH
                  S       .0100  SLOPE
                  N        .012  CHANNEL ROUGHNESS COEFFICIENT
                 CA         .00  CONTRIBUTING AREA
              SHAPE        CIRC  CHANNEL SHAPE
                 WD        3.00  BOTTOM WIDTH OR DIAMETER
                  Z         .00  SIDE SLOPE
            NDXMIN            2  MINIMUM NUMBER OF DX INTERVALS
             RUPSTQ         YES  ROUTE UPSTREAM HYDROGRAPH
```

***

COMPUTED KINEMATIC PARAMETERS
VARIABLE TIME STEP
(DT SHOWN IS A MINIMUM)

ELEMENT	ALPHA	M	DT (MIN)	DX (FT)	PEAK (CFS)	TIME TO PEAK (MIN)	VOLUME (IN)	MAXIMUM CELERITY (FPS)
PLANE1	1.99	1.67	.54	10.40	6.68	299.63	2.63	.42
COLLECTOR1	4.20	1.33	.37	103.33	6.61	300.31	2.63	5.59
MAIN	8.05	1.25	.19	45.00	26.61	300.28	2.61	13.40

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6083E+00 EXCESS= .1948E+00 OUTFLOW= .8016E+00 BASIN STORAGE= .6352E-03 PERCENT ERROR= .1

INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL

MAIN	8.05	1.25	2.00		26.23	300.00	2.61

*** *** *** *** ***

HYDROGRAPH AT STATION 2C

TOTAL RAINFALL = 2.84, TOTAL LOSS = .19, TOTAL EXCESS = 2.65

	PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	9.97-HR
+	26.	5.00	(CFS)	2.	1.	1.	1.
			(INCHES)	2.440	2.610	2.610	2.610
			(AC-FT)	1.	1.	1.	1.

CUMULATIVE AREA = .01 SQ MI

COMPUTE STAGES FROM GIVEN RATING DATA

43 HQ	FLOW	0.	2.	4.	6.	8.	10.	14.	16.	20.	24.
46 HE	STAGE	.0	.4	.5	.6	.7	.8	.9	1.0	1.1	1.2
	FLOW	26.	30.	32.	40.						
	STAGE	1.3	1.4	1.5	1.7						

*** *** *** *** ***

HYDROGRAPH AT STATION 2C

```
   MAXIMUM STAGE IS      1.31


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


              **************
              *            *
 53 KK        *        3C  *
              *            *
              **************
                                    RUNOFF SECTION 3C

 55 KO                OUTPUT CONTROL VARIABLES
                            IPRNT            3  PRINT CONTROL
                            IPLOT            0  PLOT CONTROL
                            QSCAL           0.  HYDROGRAPH PLOT SCALE

                  SUBBASIN RUNOFF DATA

 56 BA                SUBBASIN CHARACTERISTICS
                            TAREA          .00  SUBBASIN AREA

                      PRECIPITATION DATA

 59 PH                                  DEPTHS FOR   0-PERCENT HYPOTHETICAL STORM
                      ..... HYDRO-35 ......    ............... TP-40 ...............    ........... TP-49 ...........
                      5-MIN  15-MIN  60-MIN    2-HR     3-HR     6-HR    12-HR    24-HR    2-DAY    4-DAY    7-DAY  10-DAY
                        .64    1.25    2.11    2.30     2.43     2.60     2.93     3.00      .00      .00      .00     .00

                                                   STORM AREA =      .00

 60 LG                GREEN AND AMPT LOSS RATE
                            STRTL          .30  STARTING LOSS
                              DTH          .15  MOISTURE DEFICIT
                             PSIF         8.20  WETTING FRONT SUCTION
                            XKSAT          .12  HYDRAULIC CONDUCTIVITY
                            RTIMP        78.30  PERCENT IMPERVIOUS AREA

                      KINEMATIC WAVE
 61 UK                  OVERLAND-FLOW ELEMENT NO. 1
                                L          52.  OVERLAND FLOW LENGTH
                                S        .0400  SLOPE
                                N         .150  ROUGHNESS COEFFICIENT
                               PA        100.0  PERCENT OF SUBBASIN
                            DXMIN            5  MINIMUM NUMBER OF DX INTERVALS

                      KINEMATIC WAVE
```

```
62 RK            COLLECTOR CHANNEL
                         L        60.   CHANNEL LENGTH
                         S     .0390   SLOPE
                         N      .015   CHANNEL ROUGHNESS COEFFICIENT
                        CA       .00   CONTRIBUTING AREA
                     SHAPE      TRAP   CHANNEL SHAPE
                        WD       .00   BOTTOM WIDTH OR DIAMETER
                         Z      5.00   SIDE SLOPE
                    NDXMIN         2   MINIMUM NUMBER OF DX INTERVALS
63 RK            MAIN CHANNEL
                         L      235.   CHANNEL LENGTH
                         S     .0250   SLOPE
                         N      .012   CHANNEL ROUGHNESS COEFFICIENT
                        CA       .00   CONTRIBUTING AREA
                     SHAPE      CIRC   CHANNEL SHAPE
                        WD      1.50   BOTTOM WIDTH OR DIAMETER
                         Z       .00   SIDE SLOPE
                    NDXMIN         2   MINIMUM NUMBER OF DX INTERVALS
                    RUPSTQ        NO   ROUTE UPSTREAM HYDROGRAPH
```

***

COMPUTED KINEMATIC PARAMETERS
VARIABLE TIME STEP
(DT SHOWN IS A MINIMUM)

ELEMENT	ALPHA	M	DT (MIN)	DX (FT)	PEAK (CFS)	TIME TO PEAK (MIN)	VOLUME (IN)	MAXIMUM CELERITY (FPS)
PLANE1	1.99	1.67	.49	10.40	8.36	299.67	2.55	.41
COLLECTOR1	7.14	1.33	.19	20.00	8.33	300.04	2.55	9.85
MAIN	11.33	1.25	.19	78.33	8.31	300.15	2.55	14.78

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .2363E+00 OUTFLOW= .2350E+00 BASIN STORAGE= .4048E-03 PERCENT ERROR= .4

INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL

MAIN	11.33	1.25	2.00		8.30	300.00	2.55

*** *** *** *** ***

HYDROGRAPH AT STATION 3C

TOTAL RAINFALL = 2.84, TOTAL LOSS = .28, TOTAL EXCESS = 2.56

```
PEAK FLOW      TIME                    MAXIMUM AVERAGE FLOW
                          6-HR      24-HR      72-HR      9.97-HR
```

```
+    (CFS)        (HR)
                          (CFS)
+        8.       5.00                 0.          0.          0.          0.
                       (INCHES)    2.388       2.549       2.549       2.549
                        (AC-FT)       0.          0.          0.          0.

                       CUMULATIVE AREA =      .00 SQ MI


                   COMPUTE STAGES FROM GIVEN RATING DATA

   56 HQ                   FLOW      0.        2.        4.        6.        8.       10.       12.       14.
   58 HE                  STAGE      .0        .4        .5        .6        .7        .9       1.0       1.1

      ***             ***             ***             ***             ***

                      HYDROGRAPH AT STATION        3C

      MAXIMUM STAGE IS      .76


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


                **************
                *            *
   64 KK        *       3B   *
                *            *
                **************
                                RUNOFF SECTION 3B

   66 KO           OUTPUT CONTROL VARIABLES
                         IPRNT           3  PRINT CONTROL
                         IPLOT           0  PLOT CONTROL
                         QSCAL          0.  HYDROGRAPH PLOT SCALE

                 SUBBASIN RUNOFF DATA

   67 BA           SUBBASIN CHARACTERISTICS
                         TAREA         .00  SUBBASIN AREA

                   PRECIPITATION DATA

   59 PH                              DEPTHS FOR   0-PERCENT HYPOTHETICAL STORM
                   ..... HYDRO-35 ......   ............... TP-40 ...............   ........... TP-49 ...........
                   5-MIN  15-MIN  60-MIN    2-HR    3-HR    6-HR   12-HR   24-HR   2-DAY   4-DAY   7-DAY  10-DAY
                     .64    1.25    2.11    2.30    2.43    2.60    2.93    3.00     .00     .00     .00     .00

                                                  STORM AREA =      .00
```

```
70 LG          GREEN AND AMPT LOSS RATE
                     STRTL          .30  STARTING LOSS
                       DTH          .15  MOISTURE DEFICIT
                      PSIF         8.20  WETTING FRONT SUCTION
                     XKSAT          .12  HYDRAULIC CONDUCTIVITY
                     RTIMP        82.00  PERCENT IMPERVIOUS AREA

               KINEMATIC WAVE
71 UK            OVERLAND-FLOW ELEMENT NO. 1
                         L          52.  OVERLAND FLOW LENGTH
                         S        .0400  SLOPE
                         N         .150  ROUGHNESS COEFFICIENT
                        PA        100.0  PERCENT OF SUBBASIN
                     DXMIN            5  MINIMUM NUMBER OF DX INTERVALS

               KINEMATIC WAVE
72 RK            COLLECTOR CHANNEL
                         L         235.  CHANNEL LENGTH
                         S        .0390  SLOPE
                         N         .015  CHANNEL ROUGHNESS COEFFICIENT
                        CA          .00  CONTRIBUTING AREA
                     SHAPE         TRAP  CHANNEL SHAPE
                        WD          .00  BOTTOM WIDTH OR DIAMETER
                         Z         5.00  SIDE SLOPE
                    NDXMIN            2  MINIMUM NUMBER OF DX INTERVALS
73 RK            MAIN CHANNEL
                         L         455.  CHANNEL LENGTH
                         S        .0350  SLOPE
                         N         .012  CHANNEL ROUGHNESS COEFFICIENT
                        CA          .00  CONTRIBUTING AREA
                     SHAPE         CIRC  CHANNEL SHAPE
                        WD         1.50  BOTTOM WIDTH OR DIAMETER
                         Z          .00  SIDE SLOPE
                    NDXMIN            2  MINIMUM NUMBER OF DX INTERVALS
                    RUPSTQ          YES  ROUTE UPSTREAM HYDROGRAPH

                                                   ***

    *** FDKRUT WARNING TIME STEP CALCULATION FAILED TO CONVERGE. STABILITY PROBLEMS MAY RESULT


    *** FDKRUT WARNING TIME STEP CALCULATION FAILED TO CONVERGE. STABILITY PROBLEMS MAY RESULT

                              COMPUTED KINEMATIC PARAMETERS
                                  VARIABLE TIME STEP
                                 (DT SHOWN IS A MINIMUM)
```

ELEMENT	ALPHA	M	DT (MIN)	DX (FT)	PEAK (CFS)	TIME TO PEAK (MIN)	VOLUME (IN)	MAXIMUM CELERITY (FPS)
PLANE1	1.99	1.67	.56	10.40	9.27	300.04	2.60	.42
COLLECTOR1	7.14	1.33	.30	78.33	9.20	300.10	2.59	8.68
MAIN	13.41	1.25	.15	151.67	17.45	300.28	2.57	18.29

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2352E+00 EXCESS= .2657E+00 OUTFLOW= .4987E+00 BASIN STORAGE= .5574E-03 PERCENT ERROR= .3

INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL

MAIN	13.41	1.25	2.00		17.16	300.00	2.57

*** *** *** *** ***

HYDROGRAPH AT STATION 3B

TOTAL RAINFALL = 2.84, TOTAL LOSS = .23, TOTAL EXCESS = 2.61

	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
				6-HR	24-HR	72-HR	9.97-HR
+	(CFS)	(HR)					
			(CFS)				
+	17.	5.00		1.	1.	1.	1.
			(INCHES)	2.407	2.571	2.571	2.571
			(AC-FT)	0.	0.	0.	0.

CUMULATIVE AREA = .00 SQ MI

COMPUTE STAGES FROM GIVEN RATING DATA

67 HQ	FLOW	0.	2.	4.	6.	8.	10.	12.	14.
69 HE	STAGE	.0	.4	.5	.6	.7	.9	1.0	1.1

*** *** *** *** ***

HYDROGRAPH AT STATION 3B

MAXIMUM STAGE IS 1.07

*** ***

```
              **************
              *            *
 74 KK        *      3A    *
              *            *
              **************
                                   RUNOFF SECTION 3A

 76 KO             OUTPUT CONTROL VARIABLES
                         IPRNT          3  PRINT CONTROL
                         IPLOT          0  PLOT CONTROL
                         QSCAL         0.  HYDROGRAPH PLOT SCALE

                 SUBBASIN RUNOFF DATA

 77 BA             SUBBASIN CHARACTERISTICS
                         TAREA        .00  SUBBASIN AREA

                   PRECIPITATION DATA

 59 PH                                     DEPTHS FOR   0-PERCENT HYPOTHETICAL STORM
                   ..... HYDRO-35 ......   ............... TP-40 ...............   ........... TP-49 ...........
                   5-MIN  15-MIN  60-MIN    2-HR    3-HR    6-HR   12-HR   24-HR   2-DAY   4-DAY   7-DAY  10-DAY
                     .64    1.25    2.11    2.30    2.43    2.60    2.93    3.00     .00     .00     .00     .00

                                                        STORM AREA =      .00

 80 LG             GREEN AND AMPT LOSS RATE
                         STRTL        .30  STARTING LOSS
                           DTH        .15  MOISTURE DEFICIT
                          PSIF       8.20  WETTING FRONT SUCTION
                         XKSAT        .12  HYDRAULIC CONDUCTIVITY
                         RTIMP      85.00  PERCENT IMPERVIOUS AREA

                   KINEMATIC WAVE
 81 UK               OVERLAND-FLOW ELEMENT NO. 1
                             L        52.  OVERLAND FLOW LENGTH
                             S      .0400  SLOPE
                             N       .150  ROUGHNESS COEFFICIENT
                            PA      100.0  PERCENT OF SUBBASIN
                         DXMIN          5  MINIMUM NUMBER OF DX INTERVALS

                   KINEMATIC WAVE
 82 RK               COLLECTOR CHANNEL
                             L       145.  CHANNEL LENGTH
                             S      .0135  SLOPE
                             N       .015  CHANNEL ROUGHNESS COEFFICIENT
                            CA        .00  CONTRIBUTING AREA
                         SHAPE       TRAP  CHANNEL SHAPE
                            WD        .00  BOTTOM WIDTH OR DIAMETER
                             Z       5.00  SIDE SLOPE
```

	NDXMIN	2	MINIMUM NUMBER OF DX INTERVALS
83 RK	MAIN CHANNEL		
	L	165.	CHANNEL LENGTH
	S	.0100	SLOPE
	N	.012	CHANNEL ROUGHNESS COEFFICIENT
	CA	.00	CONTRIBUTING AREA
	SHAPE	CIRC	CHANNEL SHAPE
	WD	3.00	BOTTOM WIDTH OR DIAMETER
	Z	.00	SIDE SLOPE
	NDXMIN	2	MINIMUM NUMBER OF DX INTERVALS
	RUPSTQ	YES	ROUTE UPSTREAM HYDROGRAPH

***

*** FDKRUT WARNING TIME STEP CALCULATION FAILED TO CONVERGE. STABILITY PROBLEMS MAY RESULT

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COMPUTED KINEMATIC PARAMETERS
VARIABLE TIME STEP
(DT SHOWN IS A MINIMUM)

ELEMENT	ALPHA	M	DT (MIN)	DX (FT)	PEAK (CFS)	TIME TO PEAK (MIN)	VOLUME (IN)	MAXIMUM CELERITY (FPS)
PLANE1	1.99	1.67	.54	10.40	3.14	299.63	2.63	.42
COLLECTOR1	4.20	1.33	.26	48.33	3.13	299.97	2.63	5.79
MAIN	8.05	1.25	.08	55.00	20.26	300.21	2.58	12.22

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4991E+00 EXCESS= .9174E-01 OUTFLOW= .5900E+00 BASIN STORAGE= .5246E-03 PERCENT ERROR= .1

INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL

MAIN	8.05	1.25	2.00		19.98	300.00	2.58

*** *** *** *** ***

HYDROGRAPH AT STATION 3A

```
   TOTAL RAINFALL =     2.84, TOTAL LOSS =      .19, TOTAL EXCESS =     2.65

  PEAK FLOW      TIME                              MAXIMUM AVERAGE FLOW
                                           6-HR        24-HR        72-HR       9.97-HR
+    (CFS)       (HR)
                                 (CFS)
+       20.      5.00                         1.           1.           1.            1.
                               (INCHES)    2.415        2.580        2.580         2.580
                                (AC-FT)       1.           1.           1.            1.

                               CUMULATIVE AREA =       .00 SQ MI


                      COMPUTE STAGES FROM GIVEN RATING DATA

  77 HQ                         FLOW        0.          2.          4.          6.          8.         10.         12.         14.
  79 HE                        STAGE        .0          .4          .5          .6          .7          .8          .9          .9

      ***              ***              ***              ***              ***

                               HYDROGRAPH AT STATION        3A

     MAXIMUM STAGE IS      .93


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


            **************
            *            *
  84 KK     *         4  *
            *            *
            **************
                                        RUNOFF COMBINED

  86 HC          HYDROGRAPH COMBINATION
                       ICOMP            2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                                        ***

      ***              ***              ***              ***              ***

                               HYDROGRAPH AT STATION         4

  PEAK FLOW      TIME                              MAXIMUM AVERAGE FLOW
                                           6-HR        24-HR        72-HR       9.97-HR
+    (CFS)       (HR)
                                 (CFS)
+       46.      5.00                         3.           2.           2.            2.
```

```
            (INCHES)       2.430         2.597         2.597          2.597
             (AC-FT)          1.            1.            1.             1.

             CUMULATIVE AREA =       .01 SQ MI


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

               **************
               *            *
  87 KK        *        5   *
               *            *
               **************
                                 STORAGE FACILITY

  89 KO             OUTPUT CONTROL VARIABLES
                          IPRNT           3  PRINT CONTROL
                          IPLOT           0  PLOT CONTROL
                          QSCAL          0.  HYDROGRAPH PLOT SCALE

                  HYDROGRAPH ROUTING DATA

  90 RS             STORAGE ROUTING
                          NSTPS           1  NUMBER OF SUBREACHES
                           ITYP        STOR  TYPE OF INITIAL CONDITION
                         RSVRIC         .00  INITIAL CONDITION
                              X         .00 WORKING R AND D COEFFICIENT

  91 SV               STORAGE            .0          .0          .0          .0          .1          .1          .1          .1          .2          .2
                                         .2          .2          .2          .3          .3

  93 SE             ELEVATION       1233.00     1235.00     1237.00     1239.00     1240.00     1241.00     1242.00     1243.00     1244.00     1245.00
                                    1246.00     1247.00     1248.00     1249.00     1250.00

  95 SQ             DISCHARGE            0.          0.          0.          0.          0.          0.          0.          0.          0.          0.
                                         0.          0.          0.          0.          0.

  98 WP             PUMPING DATA

                       PUMP ON    PUMPING    PUMP OFF
                      ELEVATION     RATE    ELEVATION

                        1242.0       15.      1239.5
                        1243.2       15.      1240.5

                          ISTAD        PUMPS  PUMP FLOW HYDROGRAPH IDENTIFICATION
```

***

*** *** *** *** ***

HYDROGRAPH AT STATION 5

PEAK OUTFLOW IS 0. AT TIME .00 HOURS

***** PUMP FLOW HYDROGRAPH *****

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	9.97-HR
+ (CFS)	(HR)					
		(CFS)				
+ 30.	5.00		3.	2.	2.	2.
		(INCHES)	2.390	2.390	2.390	2.390
		(AC-FT)	1.	1.	1.	1.

***** OUTFLOW HYDROGRAPH *****

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	9.97-HR
+ (CFS)	(HR)					
		(CFS)				
+ 0.	.00		0.	0.	0.	0.
		(INCHES)	.000	.000	.000	.000
		(AC-FT)	0.	0.	0.	0.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	9.97-HR
+ (AC-FT)	(HR)				
0.	5.07	0.	0.	0.	0.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	9.97-HR
+ (FEET)	(HR)				
1247.15	5.10	1240.47	1239.36	1239.36	1239.36

CUMULATIVE AREA = .01 SQ MI

*** ***

****
*   *

```
100 KK      *     PUMPS  *
            *            *
            **************
                              PUMP STATION FLOW

102 KO            OUTPUT CONTROL VARIABLES
                        IPRNT           3  PRINT CONTROL
                        IPLOT           2  PLOT CONTROL
                        QSCAL          10.  HYDROGRAPH PLOT SCALE

                                                                  ***

        ***             ***             ***             ***             ***

                           HYDROGRAPH AT STATION     PUMPS

   PEAK FLOW      TIME                           MAXIMUM AVERAGE FLOW
                                          6-HR         24-HR        72-HR        9.97-HR
+    (CFS)        (HR)
                                (CFS)
+       30.       5.00                     3.           2.           2.            2.
                              (INCHES)   2.390        2.390        2.390         2.390
                               (AC-FT)     1.           1.           1.            1.

                             CUMULATIVE AREA =      .00 SQ MI

1
```

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	1C	3.	5.00	0.	0.	0.	.00		
+	HYDROGRAPH AT	2A	11.	5.00	1.	0.	0.	.00		
+	HYDROGRAPH AT	2B	20.	5.00	1.	1.	1.	.00		
+	HYDROGRAPH AT	2C	26.	5.00	2.	1.	1.	.01		
+	HYDROGRAPH AT	3C	8.	5.00	0.	0.	0.	.00		

	HYDROGRAPH AT								
+		3B	17.	5.00	1.	1.	1.	.00		
	HYDROGRAPH AT								
+		3A	20.	5.00	1.	1.	1.	.00		
	2 COMBINED AT								
+		4	46.	5.00	3.	2.	2.	.01		
	PUMP FLOW TO								
+		PUMPS	30.	5.00	3.	2.	2.	.01		
	HYDROGRAPH AT								
+		5	0.	.00	0.	0.	0.	.01		
+									1247.15	5.10
	HYDROGRAPH AT								
+		PUMPS	30.	5.00	3.	2.	2.	.00		
1										

SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
(FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)

ISTAQ	ELEMENT	DT	PEAK	TIME TO PEAK	VOLUME	INTERPOLATED TO COMPUTATION INTERVAL DT	PEAK	TIME TO PEAK	VOLUME
		(MIN)	(CFS)	(MIN)	(IN)	(MIN)	(CFS)	(MIN)	(IN)
1C	MANE	.37	3.57	300.52	2.50	2.00	3.48	300.00	2.50

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .1008E+00 OUTFLOW= .1000E+00 BASIN STORAGE= .4882E-03 PERCENT ERROR= .3

2A	MANE	.20	11.37	300.48	2.59	2.00	11.06	300.00	2.58

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1000E+00 EXCESS= .2329E+00 OUTFLOW= .3310E+00 BASIN STORAGE= .6442E-03 PERCENT ERROR= .4

2B	MANE	.13	20.56	300.31	2.60	2.00	20.11	300.00	2.60

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3308E+00 EXCESS= .2795E+00 OUTFLOW= .6080E+00 BASIN STORAGE= .6646E-03 PERCENT ERROR= .3

2C	MANE	.19	26.61	300.28	2.61	2.00	26.23	300.00	2.61

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6083E+00 EXCESS= .1948E+00 OUTFLOW= .8016E+00 BASIN STORAGE= .6352E-03 PERCENT ERROR= .1

```
              3C  MANE          .19      8.31    300.15       2.55       2.00      8.30    300.00        2.55

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .2363E+00 OUTFLOW= .2350E+00 BASIN STORAGE= .4048E-03 PERCENT ERROR=    .4

              3B  MANE          .15     17.45    300.28       2.57       2.00     17.16    300.00        2.57

CONTINUITY SUMMARY (AC-FT) - INFLOW= .2352E+00 EXCESS= .2657E+00 OUTFLOW= .4987E+00 BASIN STORAGE= .5574E-03 PERCENT ERROR=    .3

              3A  MANE          .08     20.26    300.21       2.58       2.00     19.98    300.00        2.58

CONTINUITY SUMMARY (AC-FT) - INFLOW= .4991E+00 EXCESS= .9174E-01 OUTFLOW= .5900E+00 BASIN STORAGE= .5246E-03 PERCENT ERROR=    .1


*** NORMAL END OF HEC-1 ***
```

```
1*****************************************                     ****************************************
 *                                       *                     *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                     *   U.S. ARMY CORPS OF ENGINEERS       *
 *             JUN   1998                *                     *   HYDROLOGIC ENGINEERING CENTER      *
 *          VERSION 4.1                  *                     *         609 SECOND STREET            *
 *                                       *                     *       DAVIS, CALIFORNIA 95616        *
 *  RUN DATE   03OCT02  TIME  10:43:45   *                     *           (916) 756-1104             *
 *                                       *                     *                                      *
 *****************************************                     ****************************************


                     X     X  XXXXXXX   XXXXX           X
                     X     X  X        X     X         XX
                     X     X  X        X                X
                     XXXXXXX  XXXX     X        XXXXX   X
                     X     X  X        X                X
                     X     X  X        X     X          X
                     X     X  XXXXXXX   XXXXX          XXX


          THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

          THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
          THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
          NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
          DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
          KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1                                      HEC-1 INPUT                                         PAGE  1

 LINE       ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

   1        ID        TOWN OF GILBERT GREENFIELD ROAD STORM DRAINAGE PN:96446-1
   2        ID        KINEMATIC WAVE WATERSHED MODEL 10 year storm Ray Rd Detention nr East Ca
   3        IT       2 15JUL02    1200     300
   4        IO       3
            *
            *DIAGRAM

   5        KK      1A
   6        KM        RUNOFF SECTION 1A
   7        KO       0       0
   8        BA  .00086
            *       RATING FOR 18" DIA PIPE
```

```
  9         HQ      0      2.      4.      6.      8.     10.
 10         HE      0    0.45    0.65    0.83    1.00    1.21
 11         PH     10            0.47    0.90    1.50
            *           FOR 10-YR & BA ADJUSTMENT
 12         LG    0.3    0.15    8.20    0.12    85.4
            *       ASSUME CLAY LOAM SOIL PARAMETERS
 13         UK     47   0.025     .15     100
 14         RK    200  0.0138    .015 0.00063    TRAP       0       5
            *    GUTTER FLOW
 15         RK    450  0.0080    .012 0.00086    CIRC     1.5
            *    ROUTE TO STORAGE IN 18-IN RCP

 16         KK     1B
 17         KM         RUNOFF SECTION 1B
 18         KO      0       0
 19         BA .00182
            *       RATING FOR 18" DIA PIPE
 20         HQ      0      2.      4.      6.      8.     10.
 21         HE      0    0.45    0.65    0.83    1.00    1.21
 22         PH     10            0.47    0.90    1.50
            *           FOR 10-YR & BA ADJUSTMENT
 23         LG    0.3    0.15    8.20    0.12    84.5
            *       ASSUME CLAY LOAM SOIL PARAMETERS
 24         UK     47   0.025     .15     100
 25         RK    450  0.0138    .015 0.00063    TRAP       0       5
            *    GUTTER FLOW
 26         RK    537  0.0050    .012 0.00182    CIRC     1.5             YES
            *    ROUTE TO STORAGE IN 18-IN RCP

 27         KK     1C
 28         KM         RUNOFF SECTION 1C
 29         KO      0       0
 30         BA .00257
            *       RATING FOR 24" DIA PIPE
 31         HQ      0      2.      4.      6.      8.     10.     12.     14.     16.     18.
 32         HE      0    0.46    0.65    0.81    0.95    1.09    1.22    1.36    1.52    1.72
 33         PH     10            0.47    0.90    1.50
            *           FOR 10-YR & BA ADJUSTMENT
 34         LG    0.3    0.15    8.20    0.12    97.7
            *       ASSUME CLAY LOAM SOIL PARAMETERS
 35         UK     47   0.025     .15     100
 36         RK    345  0.0030    .015 0.00063    TRAP       0       5
            *    GUTTER FLOW
1                                      HEC-1 INPUT                                          PAGE  2

LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 37         RK    592   0.005    .012 0.00257    CIRC     2.0             YES
            *    ROUTE TO STORAGE IN 18-IN RCP
```

```
38    KK      2A
39    KM        RUNOFF SECTION 2A
40    KO       0        0
41    BA   .00281
      *        RATING FOR 36" DIA PIPE
42    HQ       0       2.       4.       6.       8.      10.      12.      14.      16.      18.
43    HQ      20.     22.      24.      26.      28.     30.0      32.      34.
44    HE       0     0.51     0.71     0.88     1.02     1.15     1.27     1.38     1.49     1.60
45    HE    1.71     1.82     1.93     2.04     2.16     2.29     2.43     2.63
46    PH      10              0.47     0.90     1.50
      *               FOR 10-YR & BA ADJUSTMENT
47    LG     0.3     0.15     8.20     0.12     86.1
      *        ASSUME CLAY LOAM SOIL PARAMETERS
48    UK      47    0.025      .15      100
49    RK     292   0.0020     .015  0.00063     TRAP        0        5
      *   GUTTER FLOW
50    RK     620   0.0020     .012  0.00281     CIRC      3.0                YES
      *   ROUTE TO STORAGE IN 36-IN RCP

51    KK      2B
52    KM        RUNOFF SECTION 2B
53    KO       0        0
54    BA   .00278
      *        RATING FOR 42" DIA PIPE
55    HQ       0       2.       4.       6.       8.      10.      12.      14.      16.      18.
56    HQ      20.     24.      28.      32.      36.     40.0      44.      48.      52.      53.
57    HE       0     0.48     0.68     0.83     0.96     1.08     1.18     1.28     1.38     1.47
58    HE    1.56     1.73     1.90     2.07     2.24     2.41     2.60     2.82     3.16     3.17
59    PH      10              0.47     0.90     1.50
      *               FOR 10-YR & BA ADJUSTMENT
60    LG     0.3     0.15     8.20     0.12     84.6
      *        ASSUME CLAY LOAM SOIL PARAMETERS
61    UK      47    0.025      .15      100
62    RK     310   0.0010     .015  0.00063     TRAP        0        5
      *   GUTTER FLOW
63    RK     609   0.0020     .012  0.00278     CIRC      3.5                YES
      *   ROUTE TO STORAGE IN 42-IN RCP

64    KK      3A
65    KM        RUNOFF SECTION 3A
66    KO       0        0
67    BA   .00281
      *        RATING FOR 42" DIA PIPE
68    HQ       0       2.       4.       6.       8.      10.      12.      14.      16.      18.
69    HQ      20.     24.      28.      32.      36.     40.0      44.      48.      52.      53.
70    HE       0     0.48     0.68     0.83     0.96     1.08     1.18     1.28     1.38     1.47
71    HE    1.56     1.73     1.90     2.07     2.24     2.41     2.60     2.82     3.16     3.17
      *               FOR 10-YR & BA ADJUSTMENT
72    PH      10              0.47     0.90     1.50
73    LG     0.3     0.15     8.20     0.12     73.6
```

```
                  *       ASSUME CLAY LOAM SOIL PARAMETERS
     74           UK      47   0.025      .15      100
1                                                  HEC-1 INPUT                                                    PAGE  3

   LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

     75           RK     302  0.0020     .015 0.00063    TRAP       0       5
                  *    GUTTER FLOW
     76           RK     580  0.0020     .012 0.00281    CIRC     3.5              YES
                  *    ROUTE TO STORAGE IN 42-IN RCP

     77           KK      3B
     78           KM         RUNOFF SECTION 3B
     79           KO       0       0
     80           BA  .00341
                  *       RATING FOR 42" DIA PIPE
     81           HQ       0      2.       4.       6.       8.      10.      12.      14.      16.      18.
     82           HQ     20.     24.      28.      32.      36.     40.0      44.      48.      52.     52.4
     83           HE       0    0.48     0.68     0.83     0.96     1.08     1.18     1.28     1.38     1.47
     84           HE    1.56    1.73     1.90     2.07     2.24     2.41     2.60     2.82     3.16     3.28
     85           PH      10             0.47     0.90     1.50
                  *              FOR 10-YR & BA ADJUSTMENT
     86           LG     0.3    0.15     8.20     0.12     78.1
                  *       ASSUME CLAY LOAM SOIL PARAMETERS
     87           UK      47   0.025      .15      100
     88           RK     300  0.0020     .015 0.00063    TRAP       0       5
                  *    GUTTER FLOW
     89           RK     100  0.0020     .012 0.00341    CIRC     3.5              YES
                  *    ROUTE TO STORAGE IN 40-IN RCP

     90           KK       4
     91           KM         STORAGE FACILITY
     92           KO       0       0
                  *       STORAGE FACILITY ROUTING THRU OPEN DETENTION POND
     93           RS       1    STOR      0.0
     94           SV       0   0.303    0.614    0.935    1.266    1.607    1.957    2.319    2.691    3.075
     95           SV   3.470   3.878    4.296    4.726
     96           SE       0    0.25      0.5     0.75      1.0     1.25     1.50     1.75     2.00     2.25
     97           SE    2.50    2.75     3.00     3.25
     98           SQ       0   0.177    0.182    0.188    0.193    0.199    0.205    0.211    0.218    0.224
     99           SQ   0.231   0.238    0.244    0.251
    100           ZZ
1
                 SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE     (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

   NO.     (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

     5         1A
```

```
             V
             V
 16          1B ***
             V
             V
 27          1C ***
             V
             V
 38          2A ***
             V
             V
 51          2B ***
             V
             V
 64          3A ***
             V
             V
 77          3B ***
             V
             V
 90          4

(***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1****************************************
 *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
 *             JUN   1998               *
 *           VERSION 4.1                *
 *                                      *
 *  RUN DATE   03OCT02  TIME  10:43:45  *
 *                                      *
 ****************************************
```

```
****************************************
*                                      *
*    U.S. ARMY CORPS OF ENGINEERS      *
*    HYDROLOGIC ENGINEERING CENTER     *
*          609 SECOND STREET           *
*       DAVIS, CALIFORNIA 95616        *
*          (916) 756-1104              *
*                                      *
****************************************
```

```
                    TOWN OF GILBERT GREENFIELD ROAD STORM DRAINAGE PN:96446-1
                    KINEMATIC WAVE WATERSHED MODEL 10 year storm Ray Rd Detention nr East Ca

  4 IO         OUTPUT CONTROL VARIABLES
                     IPRNT          3  PRINT CONTROL
                     IPLOT          0  PLOT CONTROL
                     QSCAL         0.  HYDROGRAPH PLOT SCALE

    IT         HYDROGRAPH TIME DATA
                      NMIN          2  MINUTES IN COMPUTATION INTERVAL
                     IDATE    15JUL 2  STARTING DATE
                     ITIME       1200  STARTING TIME
                        NQ        300  NUMBER OF HYDROGRAPH ORDINATES
```

```
           NDDATE     15JUL 2  ENDING DATE
           NDTIME        2158  ENDING TIME
           ICENT           19  CENTURY MARK

        COMPUTATION INTERVAL      .03 HOURS
             TOTAL TIME BASE     9.97 HOURS

ENGLISH UNITS
     DRAINAGE AREA          SQUARE MILES
     PRECIPITATION DEPTH    INCHES
     LENGTH, ELEVATION      FEET
     FLOW                   CUBIC FEET PER SECOND
     STORAGE VOLUME         ACRE-FEET
     SURFACE AREA           ACRES
     TEMPERATURE            DEGREES FAHRENHEIT


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

               **************
               *            *
  5 KK         *       1A   *
               *            *
               **************
                                 RUNOFF SECTION 1A

  7 KO            OUTPUT CONTROL VARIABLES
                        IPRNT           3  PRINT CONTROL
                        IPLOT           0  PLOT CONTROL
                        QSCAL          0.  HYDROGRAPH PLOT SCALE

                SUBBASIN RUNOFF DATA

  8 BA            SUBBASIN CHARACTERISTICS
                        TAREA         .00  SUBBASIN AREA

                  PRECIPITATION DATA

 11 PH                                     DEPTHS FOR  10-PERCENT HYPOTHETICAL STORM
                  ..... HYDRO-35 ......   .............. TP-40 ...............   ........... TP-49 ...........
                  5-MIN  15-MIN  60-MIN     2-HR    3-HR    6-HR   12-HR   24-HR   2-DAY   4-DAY   7-DAY  10-DAY
                    .47     .90    1.50      .00     .00     .00     .00     .00     .00     .00     .00     .00

                                                        STORM AREA =      .00

 12 LG            GREEN AND AMPT LOSS RATE
                        STRTL         .30  STARTING LOSS
                          DTH         .15  MOISTURE DEFICIT
```

```
                 PSIF         8.20  WETTING FRONT SUCTION
                XKSAT          .12  HYDRAULIC CONDUCTIVITY
                RTIMP        85.40  PERCENT IMPERVIOUS AREA

          KINEMATIC WAVE
13 UK      OVERLAND-FLOW ELEMENT NO. 1
                    L          47.  OVERLAND FLOW LENGTH
                    S        .0250  SLOPE
                    N         .150  ROUGHNESS COEFFICIENT
                   PA        100.0  PERCENT OF SUBBASIN
                DXMIN            5  MINIMUM NUMBER OF DX INTERVALS

          KINEMATIC WAVE
14 RK      COLLECTOR CHANNEL
                    L         200.  CHANNEL LENGTH
                    S        .0138  SLOPE
                    N         .015  CHANNEL ROUGHNESS COEFFICIENT
                   CA          .00  CONTRIBUTING AREA
                SHAPE         TRAP  CHANNEL SHAPE
                   WD          .00  BOTTOM WIDTH OR DIAMETER
                    Z         5.00  SIDE SLOPE
               NDXMIN            2  MINIMUM NUMBER OF DX INTERVALS
15 RK      MAIN CHANNEL
                    L         450.  CHANNEL LENGTH
                    S        .0080  SLOPE
                    N         .012  CHANNEL ROUGHNESS COEFFICIENT
                   CA          .00  CONTRIBUTING AREA
                SHAPE         CIRC  CHANNEL SHAPE
                   WD         1.50  BOTTOM WIDTH OR DIAMETER
                    Z          .00  SIDE SLOPE
               NDXMIN            2  MINIMUM NUMBER OF DX INTERVALS
               RUPSTQ           NO  ROUTE UPSTREAM HYDROGRAPH
```

***

COMPUTED KINEMATIC PARAMETERS
VARIABLE TIME STEP
(DT SHOWN IS A MINIMUM)

ELEMENT	ALPHA	M	DT (MIN)	DX (FT)	PEAK (CFS)	TIME TO PEAK (MIN)	VOLUME (IN)	MAXIMUM CELERITY (FPS)
PLANE1	1.57	1.67	.54	9.40	2.90	31.93	1.37	.29
COLLECTOR1	4.25	1.33	.27	66.67	2.87	32.54	1.37	5.17
MAIN	6.41	1.25	.45	150.00	2.84	33.13	1.37	7.31

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .6295E-01 OUTFLOW= .6280E-01 BASIN STORAGE= .3054E-05 PERCENT ERROR= .2

INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL

```
                 MAIN           6.41       1.25        2.00                  2.79     34.00       1.37

      ***              ***              ***              ***              ***

                              HYDROGRAPH AT STATION       1A

      TOTAL RAINFALL =      1.48, TOTAL LOSS =      .11, TOTAL EXCESS =     1.37

   PEAK FLOW      TIME                              MAXIMUM AVERAGE FLOW
                                            6-HR          24-HR          72-HR         9.97-HR
 +    (CFS)        (HR)
                                (CFS)
 +        3.        .57                      0.             0.             0.              0.
                             (INCHES)      1.369          1.370          1.370           1.370
                              (AC-FT)         0.             0.             0.              0.

                             CUMULATIVE AREA =       .00 SQ MI

                      COMPUTE STAGES FROM GIVEN RATING DATA

   8 HQ                      FLOW        0.          2.          4.          6.          8.         10.
  10 HE                     STAGE        .0          .4          .6          .8         1.0         1.2

      ***              ***              ***              ***              ***

                              HYDROGRAPH AT STATION       1A

     MAXIMUM STAGE IS        .53


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

             **************
             *            *
  16 KK      *        1B  *
             *            *
             **************
                                RUNOFF SECTION 1B

  18 KO           OUTPUT CONTROL VARIABLES
                        IPRNT            3  PRINT CONTROL
                        IPLOT            0  PLOT CONTROL
                        QSCAL           0.  HYDROGRAPH PLOT SCALE
```

```
            SUBBASIN RUNOFF DATA

19 BA         SUBBASIN CHARACTERISTICS
                    TAREA           .00  SUBBASIN AREA

              PRECIPITATION DATA

22 PH                                   DEPTHS FOR  10-PERCENT HYPOTHETICAL STORM
              ..... HYDRO-35 ......   ............... TP-40 ...............   ........... TP-49 ...........
              5-MIN  15-MIN  60-MIN    2-HR    3-HR    6-HR   12-HR   24-HR   2-DAY   4-DAY   7-DAY  10-DAY
                .47     .90    1.50     .00     .00     .00     .00     .00     .00     .00     .00     .00

                                               STORM AREA =      .00

23 LG         GREEN AND AMPT LOSS RATE
                    STRTL           .30  STARTING LOSS
                      DTH           .15  MOISTURE DEFICIT
                     PSIF          8.20  WETTING FRONT SUCTION
                    XKSAT           .12  HYDRAULIC CONDUCTIVITY
                    RTIMP         84.50  PERCENT IMPERVIOUS AREA

              KINEMATIC WAVE
24 UK           OVERLAND-FLOW ELEMENT NO. 1
                        L           47.  OVERLAND FLOW LENGTH
                        S         .0250  SLOPE
                        N          .150  ROUGHNESS COEFFICIENT
                       PA         100.0  PERCENT OF SUBBASIN
                    DXMIN             5  MINIMUM NUMBER OF DX INTERVALS

              KINEMATIC WAVE
25 RK           COLLECTOR CHANNEL
                        L          450.  CHANNEL LENGTH
                        S         .0138  SLOPE
                        N          .015  CHANNEL ROUGHNESS COEFFICIENT
                       CA           .00  CONTRIBUTING AREA
                    SHAPE          TRAP  CHANNEL SHAPE
                       WD           .00  BOTTOM WIDTH OR DIAMETER
                        Z          5.00  SIDE SLOPE
                   NDXMIN             2  MINIMUM NUMBER OF DX INTERVALS
26 RK           MAIN CHANNEL
                        L          537.  CHANNEL LENGTH
                        S         .0050  SLOPE
                        N          .012  CHANNEL ROUGHNESS COEFFICIENT
                       CA           .00  CONTRIBUTING AREA
                    SHAPE          CIRC  CHANNEL SHAPE
                       WD          1.50  BOTTOM WIDTH OR DIAMETER
                        Z           .00  SIDE SLOPE
                   NDXMIN             2  MINIMUM NUMBER OF DX INTERVALS
                   RUPSTQ           YES  ROUTE UPSTREAM HYDROGRAPH
```

***

COMPUTED KINEMATIC PARAMETERS
VARIABLE TIME STEP
(DT SHOWN IS A MINIMUM)

ELEMENT	ALPHA	M	DT (MIN)	DX (FT)	PEAK (CFS)	TIME TO PEAK (MIN)	VOLUME (IN)	MAXIMUM CELERITY (FPS)
PLANE1	1.57	1.67	.64	9.40	6.17	31.94	1.36	.30
COLLECTOR1	4.25	1.33	.52	150.00	6.02	32.88	1.36	5.10
MAIN	5.07	1.25	.56	179.00	8.65	34.19	1.37	7.43

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6281E-01 EXCESS= .1326E+00 OUTFLOW= .1952E+00 BASIN STORAGE= .4492E-05 PERCENT ERROR= .1

INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL

MAIN	5.07	1.25	2.00		8.63	34.00	1.37

*** *** *** *** ***

HYDROGRAPH AT STATION 1B

TOTAL RAINFALL = 1.48, TOTAL LOSS = .12, TOTAL EXCESS = 1.37

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	9.97-HR
+ (CFS)	(HR)					
		(CFS)				
+ 9.	.57		0.	0.	0.	0.
		(INCHES)	1.365	1.365	1.365	1.365
		(AC-FT)	0.	0.	0.	0.

CUMULATIVE AREA = .00 SQ MI

COMPUTE STAGES FROM GIVEN RATING DATA

19 HQ	FLOW	0.	2.	4.	6.	8.	10.
21 HE	STAGE	.0	.4	.6	.8	1.0	1.2

*** *** *** *** ***

HYDROGRAPH AT STATION 1B

MAXIMUM STAGE IS 1.07

```
*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

          **************
          *            *
 27 KK    *        1C  *
          *            *
          **************
                             RUNOFF SECTION 1C

 29 KO        OUTPUT CONTROL VARIABLES
                    IPRNT          3  PRINT CONTROL
                    IPLOT          0  PLOT CONTROL
                    QSCAL         0.  HYDROGRAPH PLOT SCALE

            SUBBASIN RUNOFF DATA

 30 BA        SUBBASIN CHARACTERISTICS
                    TAREA        .00  SUBBASIN AREA

              PRECIPITATION DATA

 33 PH                              DEPTHS FOR  10-PERCENT HYPOTHETICAL STORM
              ..... HYDRO-35 ......   ............... TP-40 ...............   ........... TP-49 ...........
              5-MIN  15-MIN  60-MIN    2-HR    3-HR    6-HR   12-HR   24-HR   2-DAY   4-DAY   7-DAY  10-DAY
                .47     .90    1.50     .00     .00     .00     .00     .00     .00     .00     .00     .00

                                           STORM AREA =      .00

 34 LG        GREEN AND AMPT LOSS RATE
                    STRTL        .30  STARTING LOSS
                      DTH        .15  MOISTURE DEFICIT
                     PSIF       8.20  WETTING FRONT SUCTION
                    XKSAT        .12  HYDRAULIC CONDUCTIVITY
                    RTIMP      97.70  PERCENT IMPERVIOUS AREA

              KINEMATIC WAVE
 35 UK          OVERLAND-FLOW ELEMENT NO. 1
                        L        47.  OVERLAND FLOW LENGTH
                        S      .0250  SLOPE
                        N       .150  ROUGHNESS COEFFICIENT
                       PA      100.0  PERCENT OF SUBBASIN
                    DXMIN          5  MINIMUM NUMBER OF DX INTERVALS

              KINEMATIC WAVE
 36 RK          COLLECTOR CHANNEL
                        L       345.  CHANNEL LENGTH
                        S      .0030  SLOPE
```

N	.015	CHANNEL ROUGHNESS COEFFICIENT
CA	.00	CONTRIBUTING AREA
SHAPE	TRAP	CHANNEL SHAPE
WD	.00	BOTTOM WIDTH OR DIAMETER
Z	5.00	SIDE SLOPE
NDXMIN	2	MINIMUM NUMBER OF DX INTERVALS

37 RK MAIN CHANNEL

L	592.	CHANNEL LENGTH
S	.0050	SLOPE
N	.012	CHANNEL ROUGHNESS COEFFICIENT
CA	.00	CONTRIBUTING AREA
SHAPE	CIRC	CHANNEL SHAPE
WD	2.00	BOTTOM WIDTH OR DIAMETER
Z	.00	SIDE SLOPE
NDXMIN	2	MINIMUM NUMBER OF DX INTERVALS
RUPSTQ	YES	ROUTE UPSTREAM HYDROGRAPH

***

COMPUTED KINEMATIC PARAMETERS
VARIABLE TIME STEP
(DT SHOWN IS A MINIMUM)

ELEMENT	ALPHA	M	DT (MIN)	DX (FT)	PEAK (CFS)	TIME TO PEAK (MIN)	VOLUME (IN)	MAXIMUM CELERITY (FPS)
PLANE1	1.57	1.67	.65	9.40	8.86	31.74	1.47	.30
COLLECTOR1	1.98	1.33	.69	115.00	8.58	33.63	1.47	2.87
MAIN	5.32	1.25	.52	197.33	16.82	34.58	1.41	8.70

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1952E+00 EXCESS= .2011E+00 OUTFLOW= .3961E+00 BASIN STORAGE= .5301E-05 PERCENT ERROR= .0

INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL

ELEMENT	ALPHA	M	DT (MIN)	DX (FT)	PEAK (CFS)	TIME TO PEAK (MIN)	VOLUME (IN)
MAIN	5.32	1.25	2.00		16.42	34.00	1.41

*** *** *** *** ***

HYDROGRAPH AT STATION 1C

TOTAL RAINFALL = 1.48, TOTAL LOSS = .02, TOTAL EXCESS = 1.47

	PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	9.97-HR
+			(CFS)				
+	16.	.57		1.	0.	0.	0.

```
                    (INCHES)     1.415        1.415        1.415         1.415
                     (AC-FT)        0.           0.           0.            0.

                     CUMULATIVE AREA =      .01 SQ MI


              COMPUTE STAGES FROM GIVEN RATING DATA

 30 HQ                 FLOW        0.         2.         4.         6.         8.        10.        12.        14.        16.        18.
 32 HE                STAGE        .0         .5         .6         .8         .9        1.1        1.2        1.4        1.5        1.7

     ***             ***             ***             ***             ***

                      HYDROGRAPH AT STATION       1C

   MAXIMUM STAGE IS     1.56



*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


          **************
          *            *
 38 KK    *        2A  *
          *            *
          **************
                           RUNOFF SECTION 2A

 40 KO        OUTPUT CONTROL VARIABLES
                    IPRNT          3  PRINT CONTROL
                    IPLOT          0  PLOT CONTROL
                    QSCAL         0.  HYDROGRAPH PLOT SCALE

            SUBBASIN RUNOFF DATA

 41 BA        SUBBASIN CHARACTERISTICS
                    TAREA        .00  SUBBASIN AREA

              PRECIPITATION DATA

 46 PH                              DEPTHS FOR  10-PERCENT HYPOTHETICAL STORM
              ..... HYDRO-35 ......   ............... TP-40 ...............   ........... TP-49 ...........
              5-MIN  15-MIN  60-MIN    2-HR    3-HR    6-HR   12-HR   24-HR   2-DAY   4-DAY   7-DAY  10-DAY
                .47     .90    1.50     .00     .00     .00     .00     .00     .00     .00     .00     .00

                                                  STORM AREA =      .00

 47 LG        GREEN AND AMPT LOSS RATE
                    STRTL        .30  STARTING LOSS
```

```
                    DTH          .15  MOISTURE DEFICIT
                   PSIF         8.20  WETTING FRONT SUCTION
                 XKSAT          .12  HYDRAULIC CONDUCTIVITY
                 RTIMP        86.10  PERCENT IMPERVIOUS AREA

                 KINEMATIC WAVE
 48 UK             OVERLAND-FLOW ELEMENT NO. 1
                      L          47.  OVERLAND FLOW LENGTH
                      S        .0250  SLOPE
                      N         .150  ROUGHNESS COEFFICIENT
                     PA        100.0  PERCENT OF SUBBASIN
                  DXMIN            5  MINIMUM NUMBER OF DX INTERVALS

                 KINEMATIC WAVE
 49 RK             COLLECTOR CHANNEL
                      L         292.  CHANNEL LENGTH
                      S        .0020  SLOPE
                      N         .015  CHANNEL ROUGHNESS COEFFICIENT
                     CA          .00  CONTRIBUTING AREA
                  SHAPE         TRAP  CHANNEL SHAPE
                     WD          .00  BOTTOM WIDTH OR DIAMETER
                      Z         5.00  SIDE SLOPE
                 NDXMIN            2  MINIMUM NUMBER OF DX INTERVALS
 50 RK             MAIN CHANNEL
                      L         620.  CHANNEL LENGTH
                      S        .0020  SLOPE
                      N         .012  CHANNEL ROUGHNESS COEFFICIENT
                     CA          .00  CONTRIBUTING AREA
                  SHAPE         CIRC  CHANNEL SHAPE
                     WD         3.00  BOTTOM WIDTH OR DIAMETER
                      Z          .00  SIDE SLOPE
                 NDXMIN            2  MINIMUM NUMBER OF DX INTERVALS
                 RUPSTQ          YES  ROUTE UPSTREAM HYDROGRAPH

                                            ***
                         COMPUTED KINEMATIC PARAMETERS
                              VARIABLE TIME STEP
                            (DT SHOWN IS A MINIMUM)
```

ELEMENT	ALPHA	M	DT (MIN)	DX (FT)	PEAK (CFS)	TIME TO PEAK (MIN)	VOLUME (IN)	MAXIMUM CELERITY (FPS)
PLANE1	1.57	1.67	.55	9.40	9.49	32.30	1.38	.30
COLLECTOR1	1.62	1.33	.77	97.33	9.14	33.32	1.38	2.47
MAIN	3.60	1.25	.52	206.67	25.15	35.25	1.40	6.78

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3961E+00 EXCESS= .2065E+00 OUTFLOW= .6026E+00 BASIN STORAGE= .6566E-05 PERCENT ERROR= .0

INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL

```
               MAIN         3.60      1.25      2.00              24.42     36.00      1.40

     ***             ***             ***             ***             ***

                     HYDROGRAPH AT STATION        2A

   TOTAL RAINFALL =    1.48, TOTAL LOSS =     .11, TOTAL EXCESS =    1.38

 PEAK FLOW     TIME                     MAXIMUM AVERAGE FLOW
                                  6-HR        24-HR       72-HR       9.97-HR
+   (CFS)      (HR)
                         (CFS)
+      24.       .60                  1.          1.          1.           1.
                       (INCHES)   1.401       1.401       1.401        1.401
                        (AC-FT)      1.          1.          1.           1.

                    CUMULATIVE AREA =       .01 SQ MI

               COMPUTE STAGES FROM GIVEN RATING DATA

  41 HQ                  FLOW        0.        2.        4.        6.        8.       10.       12.       14.       16.       18.
  44 HE                  STAGE       .0        .5        .7        .9       1.0       1.1       1.3       1.4       1.5       1.6

                         FLOW       20.       22.       24.       26.       28.       30.       32.       34.
                         STAGE      1.7       1.8       1.9       2.0       2.2       2.3       2.4       2.6

     ***             ***             ***             ***             ***

                     HYDROGRAPH AT STATION        2A

    MAXIMUM STAGE IS     1.95


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

              **************
              *            *
  51 KK       *        2B  *
              *            *
              **************
                          RUNOFF SECTION 2B

  53 KO          OUTPUT CONTROL VARIABLES
```

```
                  IPRNT           3  PRINT CONTROL
                  IPLOT           0  PLOT CONTROL
                  QSCAL          0.  HYDROGRAPH PLOT SCALE

          SUBBASIN RUNOFF DATA

 54 BA      SUBBASIN CHARACTERISTICS
                  TAREA         .00  SUBBASIN AREA

            PRECIPITATION DATA

 59 PH                        DEPTHS FOR  10-PERCENT HYPOTHETICAL STORM
            ..... HYDRO-35 ......   ............... TP-40 ...............   ........... TP-49 ...........
            5-MIN  15-MIN  60-MIN    2-HR    3-HR    6-HR   12-HR   24-HR   2-DAY   4-DAY   7-DAY  10-DAY
              .47     .90    1.50     .00     .00     .00     .00     .00     .00     .00     .00     .00

                                           STORM AREA =      .00

 60 LG      GREEN AND AMPT LOSS RATE
                  STRTL         .30  STARTING LOSS
                    DTH         .15  MOISTURE DEFICIT
                   PSIF        8.20  WETTING FRONT SUCTION
                  XKSAT         .12  HYDRAULIC CONDUCTIVITY
                 RTIMP        84.60  PERCENT IMPERVIOUS AREA

            KINEMATIC WAVE
 61 UK        OVERLAND-FLOW ELEMENT NO. 1
                      L         47.  OVERLAND FLOW LENGTH
                      S       .0250  SLOPE
                      N        .150  ROUGHNESS COEFFICIENT
                     PA       100.0  PERCENT OF SUBBASIN
                  DXMIN           5  MINIMUM NUMBER OF DX INTERVALS

            KINEMATIC WAVE
 62 RK        COLLECTOR CHANNEL
                      L        310.  CHANNEL LENGTH
                      S       .0010  SLOPE
                      N        .015  CHANNEL ROUGHNESS COEFFICIENT
                     CA         .00  CONTRIBUTING AREA
                  SHAPE        TRAP  CHANNEL SHAPE
                     WD         .00  BOTTOM WIDTH OR DIAMETER
                      Z        5.00  SIDE SLOPE
                 NDXMIN           2  MINIMUM NUMBER OF DX INTERVALS
 63 RK        MAIN CHANNEL
                      L        609.  CHANNEL LENGTH
                      S       .0020  SLOPE
                      N        .012  CHANNEL ROUGHNESS COEFFICIENT
                     CA         .00  CONTRIBUTING AREA
                  SHAPE        CIRC  CHANNEL SHAPE
                     WD        3.50  BOTTOM WIDTH OR DIAMETER
```

Z	.00	SIDE SLOPE
NDXMIN	2	MINIMUM NUMBER OF DX INTERVALS
RUPSTQ	YES	ROUTE UPSTREAM HYDROGRAPH

***

COMPUTED KINEMATIC PARAMETERS
VARIABLE TIME STEP
(DT SHOWN IS A MINIMUM)

ELEMENT	ALPHA	M	DT (MIN)	DX (FT)	PEAK (CFS)	TIME TO PEAK (MIN)	VOLUME (IN)	MAXIMUM CELERITY (FPS)
PLANE1	1.57	1.67	.64	9.40	9.43	31.93	1.36	.30
COLLECTOR1	1.14	1.33	1.01	103.33	8.77	34.58	1.37	1.88
MAIN	3.69	1.25	.61	203.00	32.16	36.01	1.39	7.26

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6023E+00 EXCESS= .2026E+00 OUTFLOW= .8050E+00 BASIN STORAGE= .7481E-05 PERCENT ERROR= .0

INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL

ELEMENT	ALPHA	M	DT (MIN)	DX (FT)	PEAK (CFS)	TIME TO PEAK (MIN)	VOLUME (IN)
MAIN	3.69	1.25	2.00		32.16	36.00	1.39

*** *** *** *** ***

HYDROGRAPH AT STATION 2B

TOTAL RAINFALL = 1.48, TOTAL LOSS = .12, TOTAL EXCESS = 1.37

	PEAK FLOW (CFS)	TIME (HR)		MAXIMUM AVERAGE FLOW 6-HR	24-HR	72-HR	9.97-HR
+	32.	.60	(CFS)	2.	1.	1.	1.
			(INCHES)	1.392	1.392	1.392	1.392
			(AC-FT)	1.	1.	1.	1.

CUMULATIVE AREA = .01 SQ MI

COMPUTE STAGES FROM GIVEN RATING DATA

54 HQ	FLOW	0.	2.	4.	6.	8.	10.	12.	14.	16.	18.
57 HE	STAGE	.0	.5	.7	.8	1.0	1.1	1.2	1.3	1.4	1.5
	FLOW	20.	24.	28.	32.	36.	40.	44.	48.	52.	53.
	STAGE	1.6	1.7	1.9	2.1	2.2	2.4	2.6	2.8	3.2	3.2

```
  ***                ***                ***                ***                ***

                       HYDROGRAPH AT STATION        2B

  MAXIMUM STAGE IS     2.08


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

               **************
               *            *
 64 KK         *       3A   *
               *            *
               **************
                                   RUNOFF SECTION 3A

 66 KO                OUTPUT CONTROL VARIABLES
                            IPRNT           3  PRINT CONTROL
                            IPLOT           0  PLOT CONTROL
                            QSCAL          0.  HYDROGRAPH PLOT SCALE

                    SUBBASIN RUNOFF DATA

 67 BA                SUBBASIN CHARACTERISTICS
                            TAREA         .00  SUBBASIN AREA

                      PRECIPITATION DATA

 72 PH                                       DEPTHS FOR  10-PERCENT HYPOTHETICAL STORM
                      ..... HYDRO-35 ......    ............... TP-40 ...............    ........... TP-49 ..........
                      5-MIN  15-MIN  60-MIN     2-HR     3-HR     6-HR    12-HR    24-HR    2-DAY    4-DAY    7-DAY  10-DAY
                        .47     .90    1.50      .00      .00      .00      .00      .00      .00      .00      .00     .00

                                                          STORM AREA =       .00

 73 LG                GREEN AND AMPT LOSS RATE
                            STRTL         .30  STARTING LOSS
                              DTH         .15  MOISTURE DEFICIT
                             PSIF        8.20  WETTING FRONT SUCTION
                            XKSAT         .12  HYDRAULIC CONDUCTIVITY
                            RTIMP       73.60  PERCENT IMPERVIOUS AREA

                      KINEMATIC WAVE
 74 UK                  OVERLAND-FLOW ELEMENT NO. 1
                                L         47.  OVERLAND FLOW LENGTH
                                S       .0250  SLOPE
                                N        .150  ROUGHNESS COEFFICIENT
```

```
                 PA        100.0  PERCENT OF SUBBASIN
              DXMIN            5  MINIMUM NUMBER OF DX INTERVALS

            KINEMATIC WAVE
75 RK         COLLECTOR CHANNEL
                  L         302.  CHANNEL LENGTH
                  S        .0020  SLOPE
                  N         .015  CHANNEL ROUGHNESS COEFFICIENT
                 CA          .00  CONTRIBUTING AREA
              SHAPE         TRAP  CHANNEL SHAPE
                 WD          .00  BOTTOM WIDTH OR DIAMETER
                  Z         5.00  SIDE SLOPE
             NDXMIN            2  MINIMUM NUMBER OF DX INTERVALS
76 RK         MAIN CHANNEL
                  L         580.  CHANNEL LENGTH
                  S        .0020  SLOPE
                  N         .012  CHANNEL ROUGHNESS COEFFICIENT
                 CA          .00  CONTRIBUTING AREA
              SHAPE         CIRC  CHANNEL SHAPE
                 WD         3.50  BOTTOM WIDTH OR DIAMETER
                  Z          .00  SIDE SLOPE
             NDXMIN            2  MINIMUM NUMBER OF DX INTERVALS
             RUPSTQ          YES  ROUTE UPSTREAM HYDROGRAPH
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COMPUTED KINEMATIC PARAMETERS
VARIABLE TIME STEP
(DT SHOWN IS A MINIMUM)

ELEMENT	ALPHA	M	DT (MIN)	DX (FT)	PEAK (CFS)	TIME TO PEAK (MIN)	VOLUME (IN)	MAXIMUM CELERITY (FPS)
PLANE1	1.57	1.67	.65	9.40	9.35	32.12	1.28	.30
COLLECTOR1	1.62	1.33	.83	100.67	8.94	33.38	1.28	2.46
MAIN	3.69	1.25	.56	193.33	39.06	36.76	1.37	7.50

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8050E+00 EXCESS= .1921E+00 OUTFLOW= .9970E+00 BASIN STORAGE= .7582E-05 PERCENT ERROR= .0

INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL

ELEMENT	ALPHA	M	DT (MIN)	DX (FT)	PEAK (CFS)	TIME TO PEAK (MIN)	VOLUME (IN)	MAXIMUM CELERITY (FPS)
MAIN	3.69	1.25	2.00		38.51	36.00	1.37	

*** *** *** *** ***

HYDROGRAPH AT STATION 3A

TOTAL RAINFALL = 1.48, TOTAL LOSS = .20, TOTAL EXCESS = 1.28

	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
				6-HR	24-HR	72-HR	9.97-HR
+	(CFS)	(HR)					
			(CFS)				
+	39.	.60		2.	1.	1.	1.
			(INCHES)	1.369	1.369	1.369	1.369
			(AC-FT)	1.	1.	1.	1.

CUMULATIVE AREA = .01 SQ MI

COMPUTE STAGES FROM GIVEN RATING DATA

67 HQ	FLOW	0.	2.	4.	6.	8.	10.	12.	14.	16.	18.
70 HE	STAGE	.0	.5	.7	.8	1.0	1.1	1.2	1.3	1.4	1.5
	FLOW	20.	24.	28.	32.	36.	40.	44.	48.	52.	53.
	STAGE	1.6	1.7	1.9	2.1	2.2	2.4	2.6	2.8	3.2	3.2

*** *** *** *** ***

HYDROGRAPH AT STATION 3A

MAXIMUM STAGE IS 2.35

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          **************
          *            *
77 KK     *       3B   *
          *            *
          **************
```

RUNOFF SECTION 3B

79 KO OUTPUT CONTROL VARIABLES

IPRNT	3	PRINT CONTROL
IPLOT	0	PLOT CONTROL
QSCAL	0.	HYDROGRAPH PLOT SCALE

SUBBASIN RUNOFF DATA

80 BA SUBBASIN CHARACTERISTICS

TAREA	.00	SUBBASIN AREA

PRECIPITATION DATA

```
85 PH                                   DEPTHS FOR  10-PERCENT HYPOTHETICAL STORM
              ..... HYDRO-35 ......    ............... TP-40 ...............    ........... TP-49 ...........
              5-MIN  15-MIN  60-MIN    2-HR    3-HR    6-HR   12-HR   24-HR   2-DAY   4-DAY   7-DAY  10-DAY
                .47     .90    1.50     .00     .00     .00     .00     .00     .00     .00     .00     .00

                                                STORM AREA =      .00

86 LG         GREEN AND AMPT LOSS RATE
                    STRTL          .30  STARTING LOSS
                      DTH          .15  MOISTURE DEFICIT
                     PSIF         8.20  WETTING FRONT SUCTION
                    XKSAT          .12  HYDRAULIC CONDUCTIVITY
                    RTIMP        78.10  PERCENT IMPERVIOUS AREA

              KINEMATIC WAVE
87 UK           OVERLAND-FLOW ELEMENT NO. 1
                        L          47.  OVERLAND FLOW LENGTH
                        S        .0250  SLOPE
                        N         .150  ROUGHNESS COEFFICIENT
                       PA        100.0  PERCENT OF SUBBASIN
                    DXMIN            5  MINIMUM NUMBER OF DX INTERVALS

              KINEMATIC WAVE
88 RK           COLLECTOR CHANNEL
                        L         300.  CHANNEL LENGTH
                        S        .0020  SLOPE
                        N         .015  CHANNEL ROUGHNESS COEFFICIENT
                       CA          .00  CONTRIBUTING AREA
                    SHAPE         TRAP  CHANNEL SHAPE
                       WD          .00  BOTTOM WIDTH OR DIAMETER
                        Z         5.00  SIDE SLOPE
                  NDXMIN             2  MINIMUM NUMBER OF DX INTERVALS
89 RK           MAIN CHANNEL
                        L         100.  CHANNEL LENGTH
                        S        .0020  SLOPE
                        N         .012  CHANNEL ROUGHNESS COEFFICIENT
                       CA          .00  CONTRIBUTING AREA
                    SHAPE         CIRC  CHANNEL SHAPE
                       WD         3.50  BOTTOM WIDTH OR DIAMETER
                        Z          .00  SIDE SLOPE
                  NDXMIN             2  MINIMUM NUMBER OF DX INTERVALS
                  RUPSTQ           YES  ROUTE UPSTREAM HYDROGRAPH

                                                          ***

     *** FDKRUT WARNING TIME STEP CALCULATION FAILED TO CONVERGE. STABILITY PROBLEMS MAY RESULT
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COMPUTED KINEMATIC PARAMETERS
VARIABLE TIME STEP
(DT SHOWN IS A MINIMUM)

ELEMENT	ALPHA	M	DT (MIN)	DX (FT)	PEAK (CFS)	TIME TO PEAK (MIN)	VOLUME (IN)	MAXIMUM CELERITY (FPS)
PLANE1	1.57	1.67	.62	9.40	11.35	32.29	1.31	.30
COLLECTOR1	1.62	1.33	.74	100.00	10.93	33.69	1.31	2.45
MAIN	3.69	1.25	.13	33.33	47.37	35.88	1.36	7.86

CONTINUITY SUMMARY (AC-FT) - INFLOW= .9969E+00 EXCESS= .2394E+00 OUTFLOW= .1236E+01 BASIN STORAGE= .5548E-05 PERCENT ERROR= .0

INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL

MAIN	3.69	1.25	2.00		47.37	36.00	1.36

*** *** *** *** ***

HYDROGRAPH AT STATION 3B

TOTAL RAINFALL = 1.48, TOTAL LOSS = .17, TOTAL EXCESS = 1.32

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	9.97-HR
+ (CFS)	(HR)					
		(CFS)				

```
+       47.        .60                        2.          2.          2.            2.
                          (INCHES)      1.360       1.360       1.360         1.360
                           (AC-FT)         1.          1.          1.            1.

                           CUMULATIVE AREA =      .02 SQ MI

                   COMPUTE STAGES FROM GIVEN RATING DATA

  80 HQ                      FLOW        0.         2.         4.         6.         8.        10.        12.        14.        16.        18.
  83 HE                     STAGE        .0         .5         .7         .8        1.0        1.1        1.2        1.3        1.4        1.5

                             FLOW       20.        24.        28.        32.        36.        40.        44.        48.        52.        52.
                            STAGE       1.6        1.7        1.9        2.1        2.2        2.4        2.6        2.8        3.2        3.3

     ***               ***               ***               ***               ***

                            HYDROGRAPH AT STATION       3B

    MAXIMUM STAGE IS       2.79


 *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


              **************
              *            *
  90 KK       *      4     *
              *            *
              **************
                                  STORAGE FACILITY

  92 KO            OUTPUT CONTROL VARIABLES
                         IPRNT           3  PRINT CONTROL
                         IPLOT           0  PLOT CONTROL
                         QSCAL          0.  HYDROGRAPH PLOT SCALE

                 HYDROGRAPH ROUTING DATA

  93 RS            STORAGE ROUTING
                         NSTPS           1  NUMBER OF SUBREACHES
                          ITYP        STOR  TYPE OF INITIAL CONDITION
                        RSVRIC         .00  INITIAL CONDITION
                             X         .00 WORKING R AND D COEFFICIENT

  94 SV              STORAGE         .0         .3         .6         .9        1.3        1.6        2.0        2.3        2.7        3.1
                                    3.5        3.9        4.3        4.7

  96 SE            ELEVATION        .00        .25        .50        .75       1.00       1.25       1.50       1.75       2.00       2.25
```

		2.50	2.75	3.00	3.25						
98 SQ	DISCHARGE	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
		0.	0.	0.	0.						

***

*** *** *** *** ***

HYDROGRAPH AT STATION 4

PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
			6-HR	24-HR	72-HR	9.97-HR
+ (CFS)	(HR)					
		(CFS)				
+ 0.	1.63		0.	0.	0.	0.
		(INCHES)	.104	.165	.165	.165
		(AC-FT)	0.	0.	0.	0.

PEAK STORAGE	TIME	MAXIMUM AVERAGE STORAGE			
		6-HR	24-HR	72-HR	9.97-HR
+ (AC-FT)	(HR)				
1.	1.60	1.	1.	1.	1.

PEAK STAGE	TIME	MAXIMUM AVERAGE STAGE			
		6-HR	24-HR	72-HR	9.97-HR
+ (FEET)	(HR)				
.96	1.70	.93	.86	.86	.86

CUMULATIVE AREA = .02 SQ MI

1

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

+	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
	HYDROGRAPH AT									
+		1A	3.	.57	0.	0.	0.	.00		
	HYDROGRAPH AT									
+		1B	9.	.57	0.	0.	0.	.00		
	HYDROGRAPH AT									
+		1C	16.	.57	1.	0.	0.	.01		
	HYDROGRAPH AT									

```
+                         2A      24.     .60        1.       1.       1.      .01

        HYDROGRAPH AT
+                         2B      32.     .60        2.       1.       1.      .01

        HYDROGRAPH AT
+                         3A      39.     .60        2.       1.       1.      .01

        HYDROGRAPH AT
+                         3B      47.     .60        2.       2.       2.      .02

        ROUTED TO
+                         4        0.    1.63        0.       0.       0.      .02
+                                                                                       .96      1.70
1
                          SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
                              (FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)
                                                                   INTERPOLATED TO
                                                                COMPUTATION INTERVAL
          ISTAQ   ELEMENT      DT      PEAK   TIME TO   VOLUME      DT     PEAK   TIME TO     VOLUME
                                                PEAK                                 PEAK

                              (MIN)    (CFS)    (MIN)     (IN)     (MIN)   (CFS)    (MIN)       (IN)

             1A   MANE          .45     2.84    33.13     1.37     2.00     2.79    34.00       1.37

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .6295E-01 OUTFLOW= .6280E-01 BASIN STORAGE= .3054E-05 PERCENT ERROR=    .2

             1B   MANE          .56     8.65    34.19     1.37     2.00     8.63    34.00       1.37

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6281E-01 EXCESS= .1326E+00 OUTFLOW= .1952E+00 BASIN STORAGE= .4492E-05 PERCENT ERROR=    .1

             1C   MANE          .52    16.82    34.58     1.41     2.00    16.42    34.00       1.41

CONTINUITY SUMMARY (AC-FT) - INFLOW= .1952E+00 EXCESS= .2011E+00 OUTFLOW= .3961E+00 BASIN STORAGE= .5301E-05 PERCENT ERROR=    .0

             2A   MANE          .52    25.15    35.25     1.40     2.00    24.42    36.00       1.40

CONTINUITY SUMMARY (AC-FT) - INFLOW= .3961E+00 EXCESS= .2065E+00 OUTFLOW= .6026E+00 BASIN STORAGE= .6566E-05 PERCENT ERROR=    .0

             2B   MANE          .61    32.16    36.01     1.39     2.00    32.16    36.00       1.39
```

CONTINUITY SUMMARY (AC-FT) - INFLOW= .6023E+00 EXCESS= .2026E+00 OUTFLOW= .8050E+00 BASIN STORAGE= .7481E-05 PERCENT ERROR= .0

3A	MANE	.56	39.06	36.76	1.37	2.00	38.51	36.00	1.37

CONTINUITY SUMMARY (AC-FT) - INFLOW= .8050E+00 EXCESS= .1921E+00 OUTFLOW= .9970E+00 BASIN STORAGE= .7582E-05 PERCENT ERROR= .0

3B	MANE	.13	47.37	35.88	1.36	2.00	47.37	36.00	1.36

CONTINUITY SUMMARY (AC-FT) - INFLOW= .9969E+00 EXCESS= .2394E+00 OUTFLOW= .1236E+01 BASIN STORAGE= .5548E-05 PERCENT ERROR= .0

*** NORMAL END OF HEC-1 ***

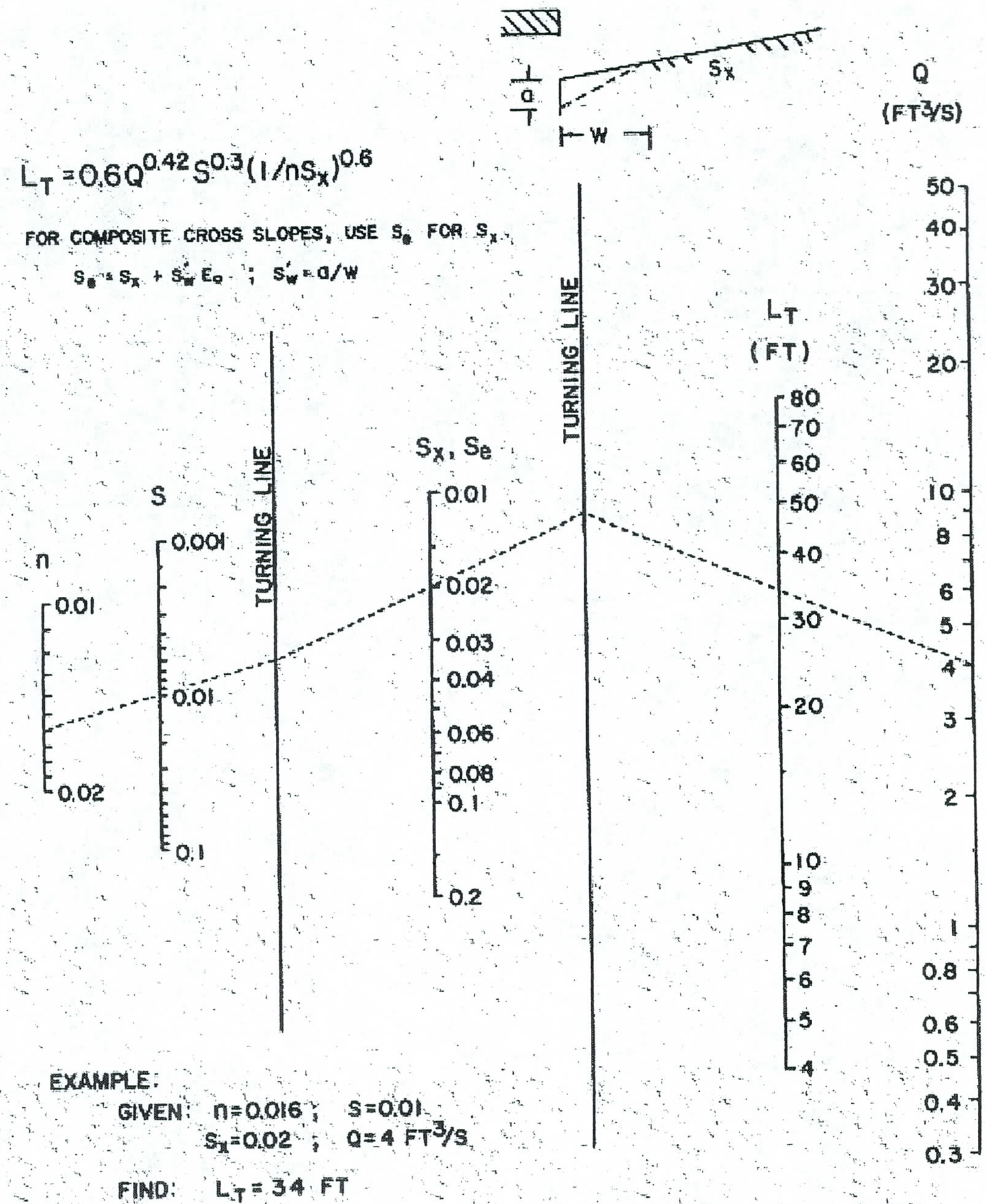


Chart 9. Curb-opening and slotted drain inlet length for total interception.

INCA ENGINEERS INC.

Job No. ______

Vol./Sheet No. ______ of ______

Contract/Client: GREEN FIELD / RAY ROADS – TOWN OF GILBERT

Phase/Subject: DESIGN

Design Topic: INLET GRATE & GUTTER CAPACITY

Made By: JRD Date: 10/02 Checked By: ______ Date: ______ Page No. ______

SUMMARY OF GUTTER PEAK FLOW 10-YEAR DESIGN STORM

SUBBASIN	STATIONS	SLOPE OF GUTTER %	LENGTH ft	VEL. fps	PEAK FLOW, cfs	# INLETS INCLUDED	PEAK Q INLET, cfs
GREENFIELD							
1A	51+00 : 48+50	0.4	250	3.2	5.06	3	1.69
1B	48+50 : 43+60	0.4	490	3.2	7.49	4	1.87
1C	43+60 : 42+00	0.4	150	3.3	2.47	2	1.24
2A	42+00 : 37+90	2.0	260	6.0	5.60	4	1.40
2B	37+90 : 32+95	2.6	250	8.8	6.75	4	1.69
2C	32+95 : 29+90	1.4	310	5.1	4.66	(2) *	3.44
3A	27+88 29+90	1.35	145	5.1	2.21	(2) *	
3B	23+40 : 27+88	3.9	235	7.6	6.47	3	2.16
3C	21+00 : 23+40	3.9	60	8.5	5.82	3	1.94

* THESE ARE SAME TWO CB'S

SUBBASIN	STATIONS	SLOPE OF GUTTER %	LENGTH ft	VEL. fps	PEAK FLOW, cfs	# INLETS INCLUDED	PEAK Q INLET, cfs
RAY							
1A	16+17 : 14+00	1.38	200	5.2	2.87	2	1.44
1B	14+00 : 9+50	1.38	450	5.1	6.02	2	3.01
1C	9+50 : 41+13	0.30	345	2.9	8.58	4	2.15
2A	41+13 : 41+98	0.20	292	2.5	9.14	4	2.29
2B	41+98 : 35+78	0.10	310	1.9	8.77	4	2.19
3A	35+78 : 29+69	0.2	302	2.5	8.94	4	2.24
3B	29+69 : 23+89	0.2	300	2.5	10.93	3	3.64

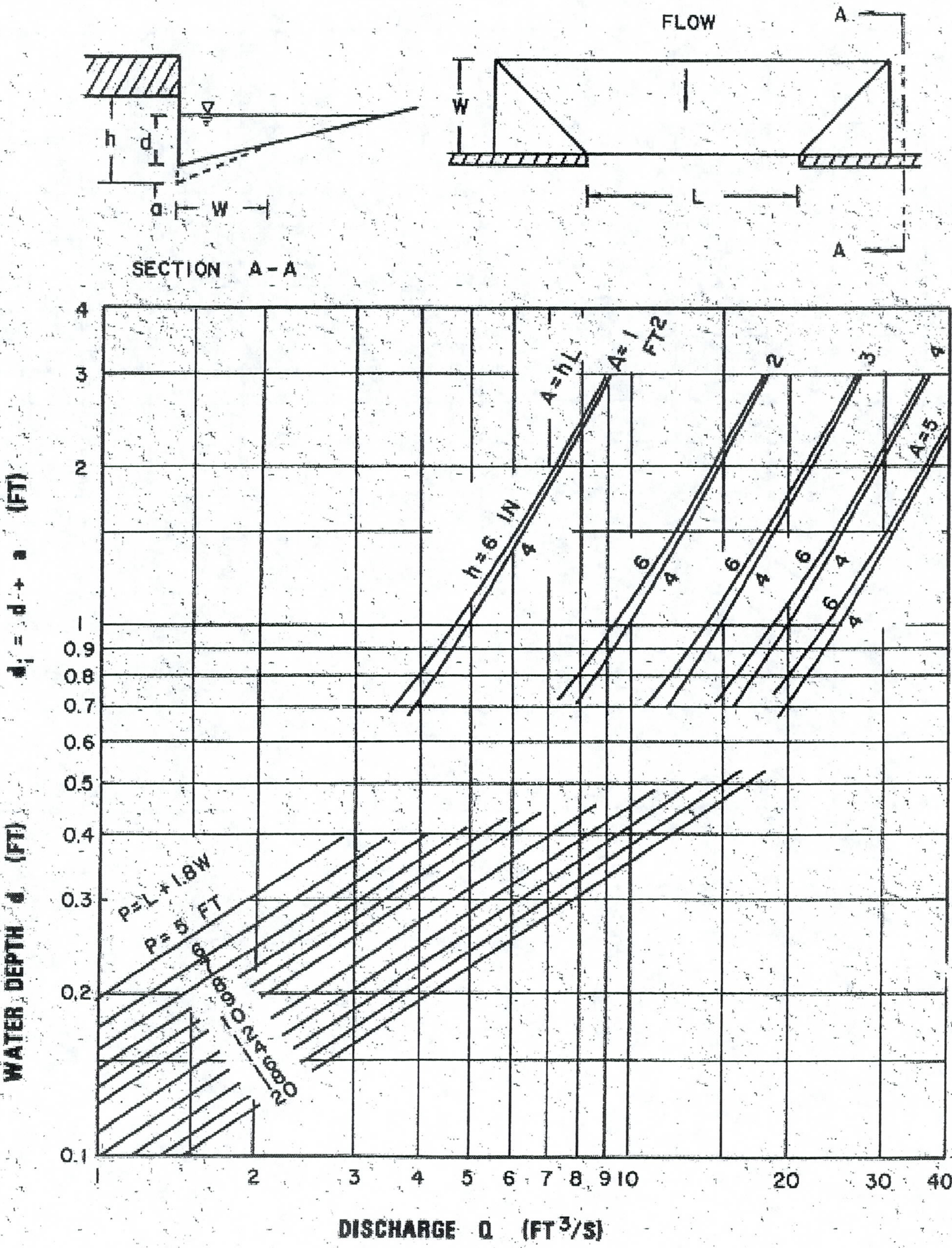


Chart 12. Depressed curb-opening inlet capacity in sump locations.

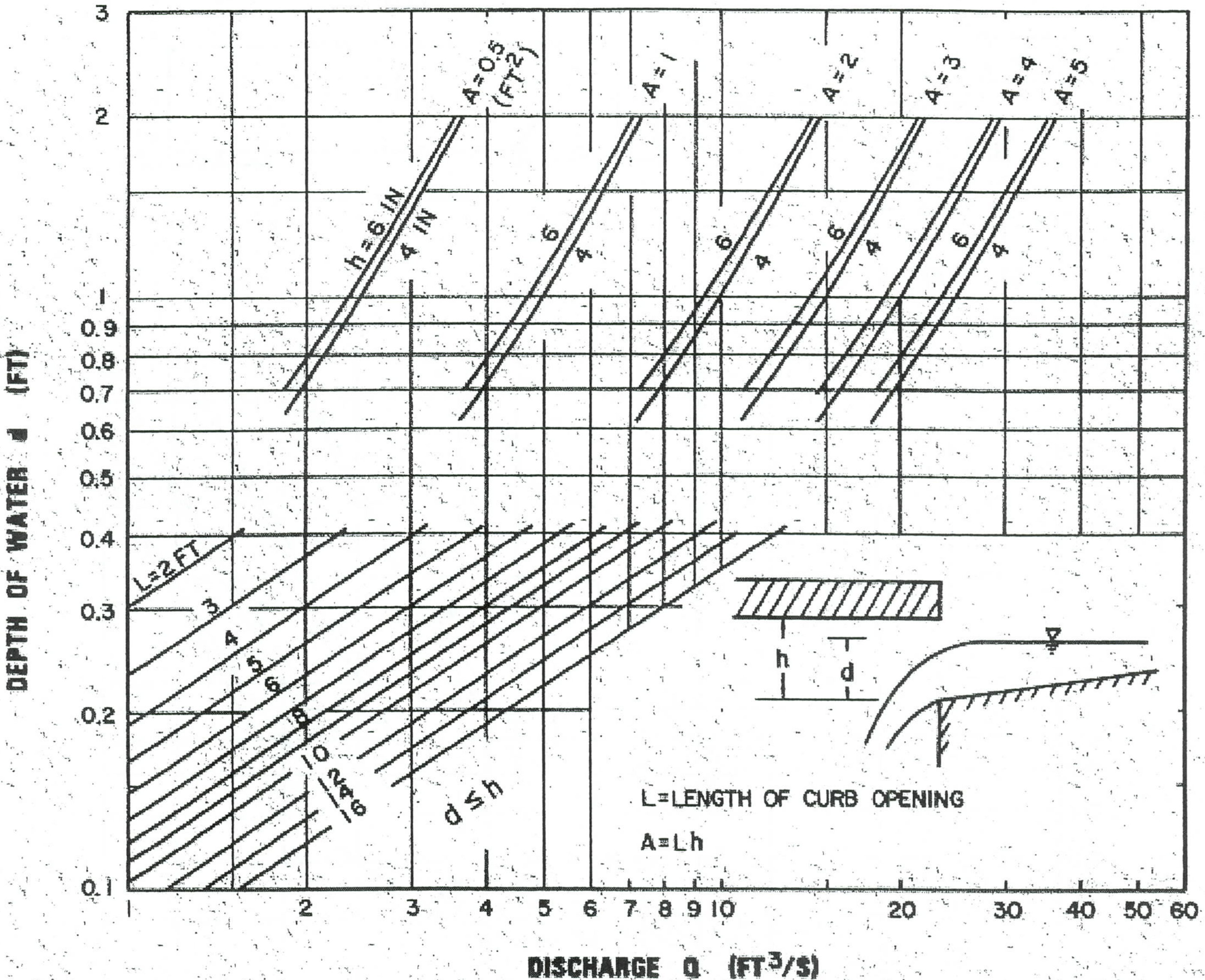
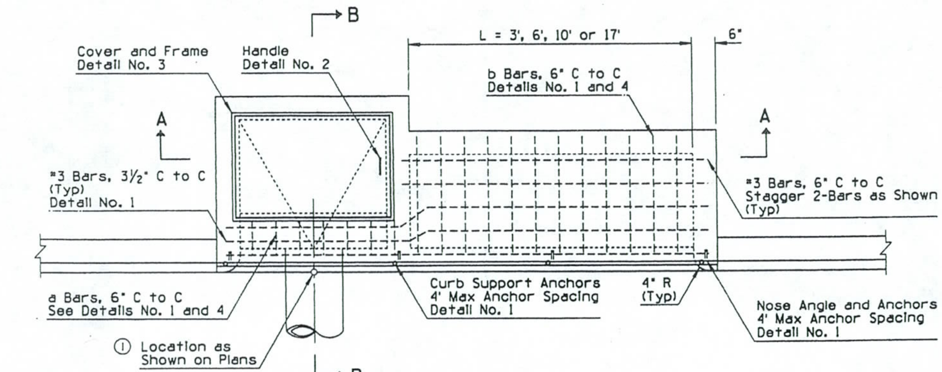


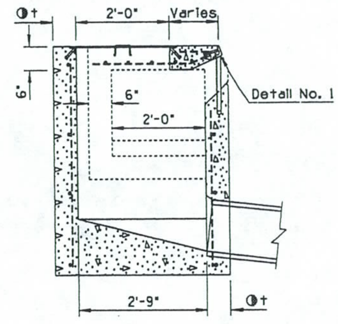
Chart 13. Curb-opening Inlet capacity in sump locations.

NO	DESCRIPTION OF REVISIONS	MADE BY	DATE
1	ADDED LOCATION REFERENCE	PHB	7/94
2			
3			
4			

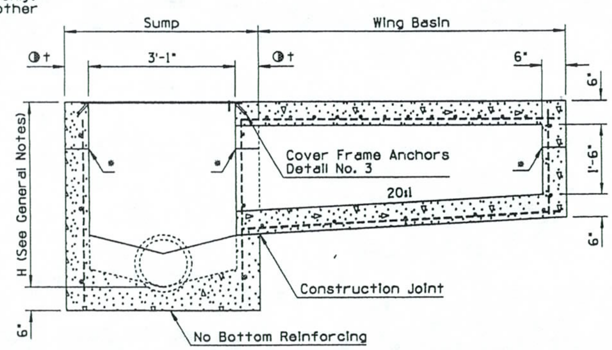


Note:
Reinforcing bars shown are for roof slab only. See Sections for other Reinforcing.

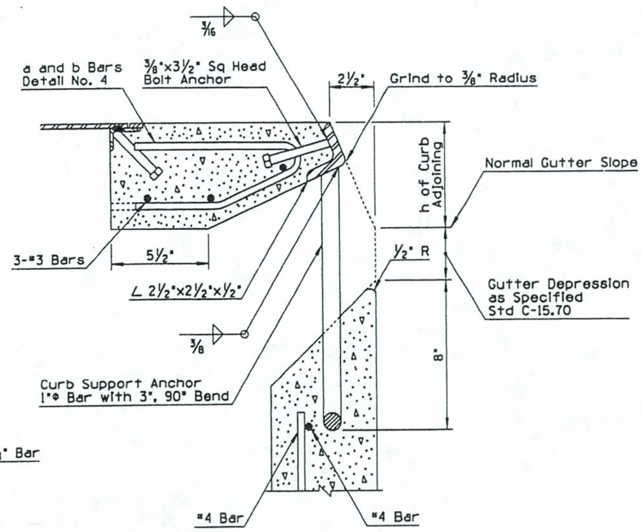
PLAN



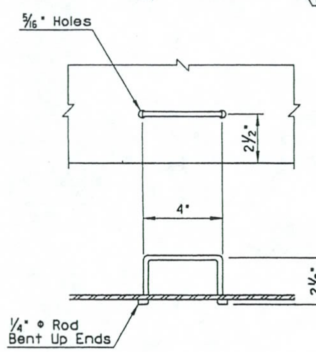
SECTION B-B



SECTION A-A



DETAIL NO. 1



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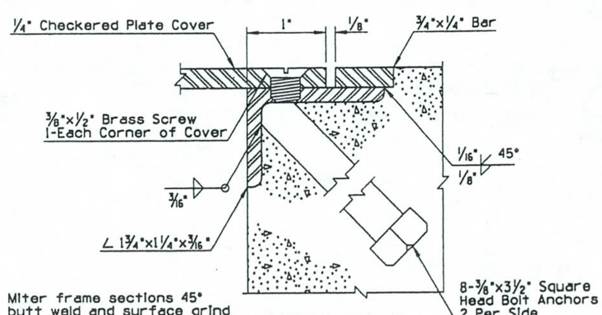
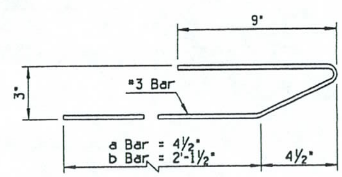


Miter frame sections 45° butt weld and surface grind

DETAIL NO. 3



DETAIL NO. 4

GENERAL NOTES

1. Type 3 - sump only.
2. Type 3-Wing (Illustrated), sump with wing basin upstream.
3. Type 3-Double wing, sump with symetrical wing basin each side.
4. Pipes can be placed in any wall except wall adjacent to wing basin.
5. Sump floor shall have a wood trowel finish and a minimum slope of 4:1 in all directions toward outlet pipe.
6. Gutter depression shall be warped to opening according to Std C-15.70.
7. All structural steel shall be ASTM A36.
8. Nose angle, frame and cover shall be given one shop coat of No. 1 paint.
9. All concrete shall be class B.
10. All reinforcing bars shall be #4, 1'-6" C to C both ways and 1½" clear to inside of walls and outside of wing basin floor except as shown.
11. Curb opening area (sq ft) per inch of curb "h" + gutter depression = curb opening length (ft) x 0.0833.
12. Welding shall be in accordance with Standard Welding Specifications.
13. * - Construction joints at or below bottom of curb line. Construction joints and drains shall be placed to meet field conditions. Std C-15.70.

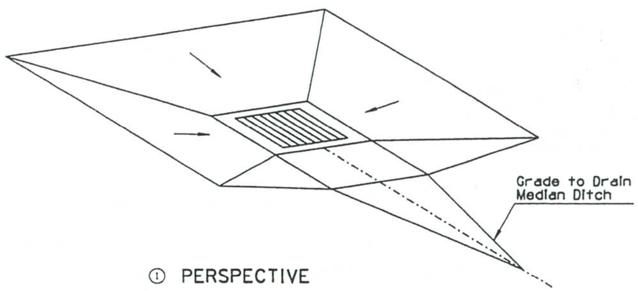
◐t = 6" when H is 8' or less.
8" when H is greater than 8'.
See Section B-B, Std C-15.10.

H = 2'-10" min when L = 3'
3'-0" min when L = 6'
3'-2" min when L = 10'
3'-7" min when L = 17'

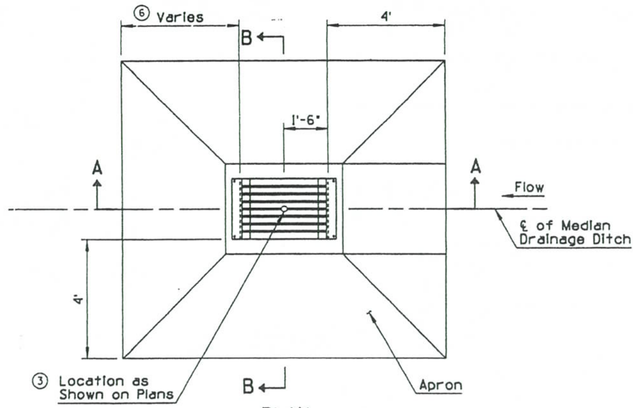
DESIGN APPROVED	STATE OF ARIZONA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS STANDARD DRAWINGS	REV. 7/94
APPROVED FOR DISTRIBUTION	CATCH BASIN, TYPE 3	DRAWING NO. C-15.20

NO	DESCRIPTION OF REVISIONS	MADE BY	DATE
1	REVISED PERSPECTIVE	PNB	7/94
2	REVISED SLOPE	PNB	7/94
3	ADDED NOTE	PNB	7/94
4	ADDED DETAIL	PNB	7/94

NO	DESCRIPTION OF REVISIONS	MADE BY	DATE
5	REVISED DIMENSION	PNB	7/94
6	ADDED DIMENSION	PNB	7/94
7			
8			



① PERSPECTIVE

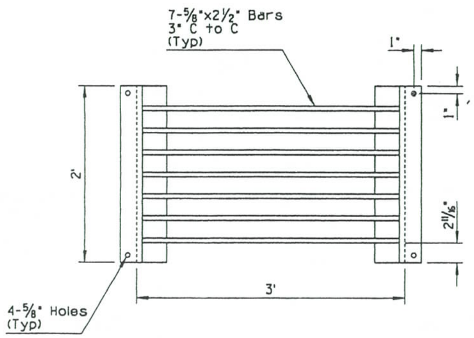


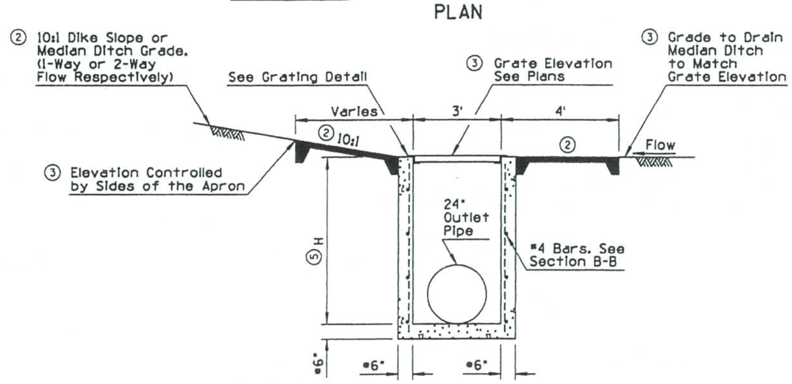
PLAN

GENERAL NOTES

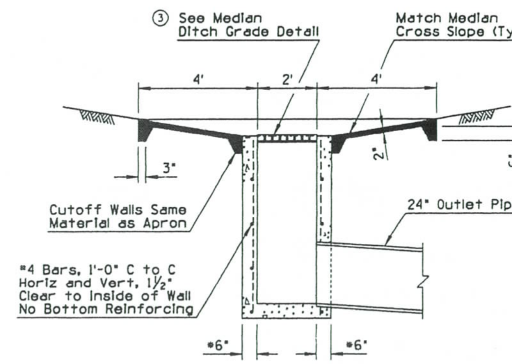
1. Apron shall be AC or portland cement concrete as specified on plans.
2. All concrete shall be Class B.
3. Grating shall be fabricated of structural steel.
4. Structural steel shall be in accordance with ASTM A36.
5. Welding shall be in accordance with Standard Welding Specifications.
6. Grating assembly shall be given one shop coat of No. 1 paint.
7. 'H' Indicated on plans.

* 8" When Wall Height Exceeds 8'

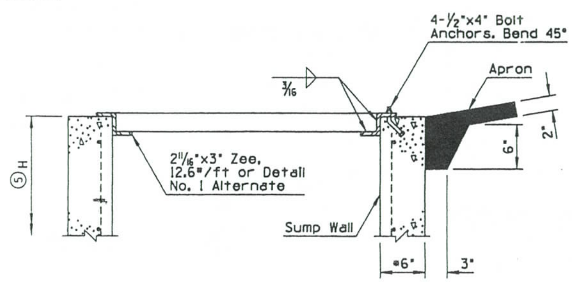




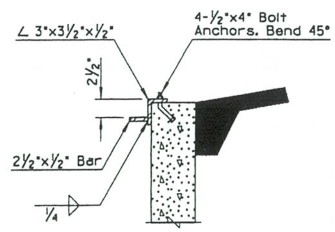
SECTION A-A



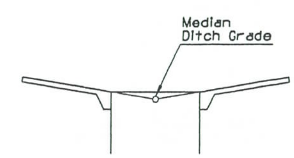
SECTION B-B



GRATING DETAIL



DETAIL NO. 1

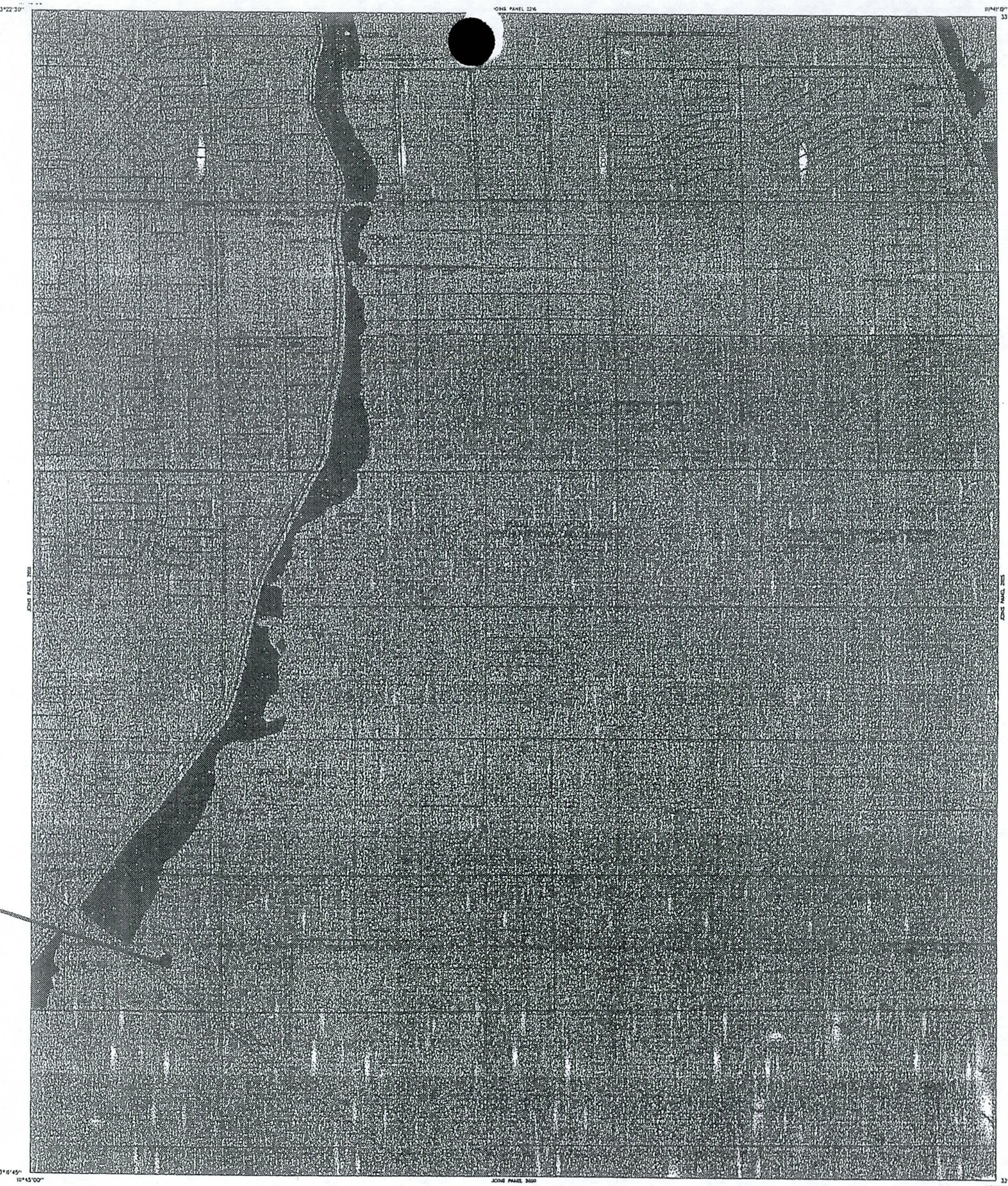


④ MEDIAN DITCH GRADE DETAIL

DESIGN APPROVED	STATE OF ARIZONA DEPARTMENT OF TRANSPORTATION DIVISION OF HIGHWAYS STANDARD DRAWINGS	REV. 7/94
APPROVED FOR DISTRIBUTION	CATCH BASIN, MEDIAN FLUSH	DRAWING NO. C-15.80

[redacted]

PROPOSED PUMP STATION SITE



LEGEND

[illegible]

MAP REPOSITORY
Refer to Repository Listing on Map Index

EFFECTIVE DATE OF
COUNTYWIDE FLOOD INSURANCE RATE MAP:

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

APPROXIMATE SCALE IN FEET
1000 0 1000

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

MARICOPA COUNTY,
ARIZONA AND
INCORPORATED AREAS

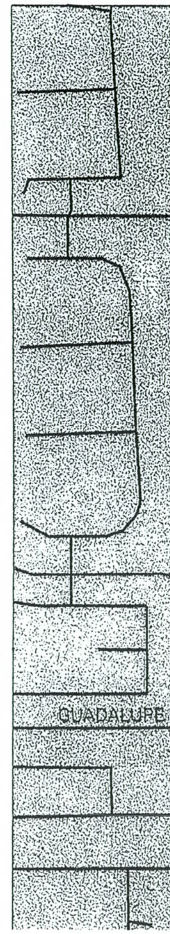
PANEL 2680 OF 4350
(SEE MAP INDEX FOR PANELS NOT PRINTED)

MAP NUMBER
04013C2680 G

MAP REVISED:
JULY 19, 2001

1

111°45′00″
33°22′30″



APPROXIMATE SCALE IN FEET

1000 0 1000

ELEVATION REFERENCE MARKS

REFERENCE MARK	ELEVATION (FEET NGVD)	DESCRIPTION OF LOCATION
RM1142	1286.45	Brass cap at the intersection of Tremaine Street and Higley Road.

FIRM

FLOOD INSURANCE RATE MAP

MARICOPA COUNTY, ARIZONA AND INCORPORATED AREAS

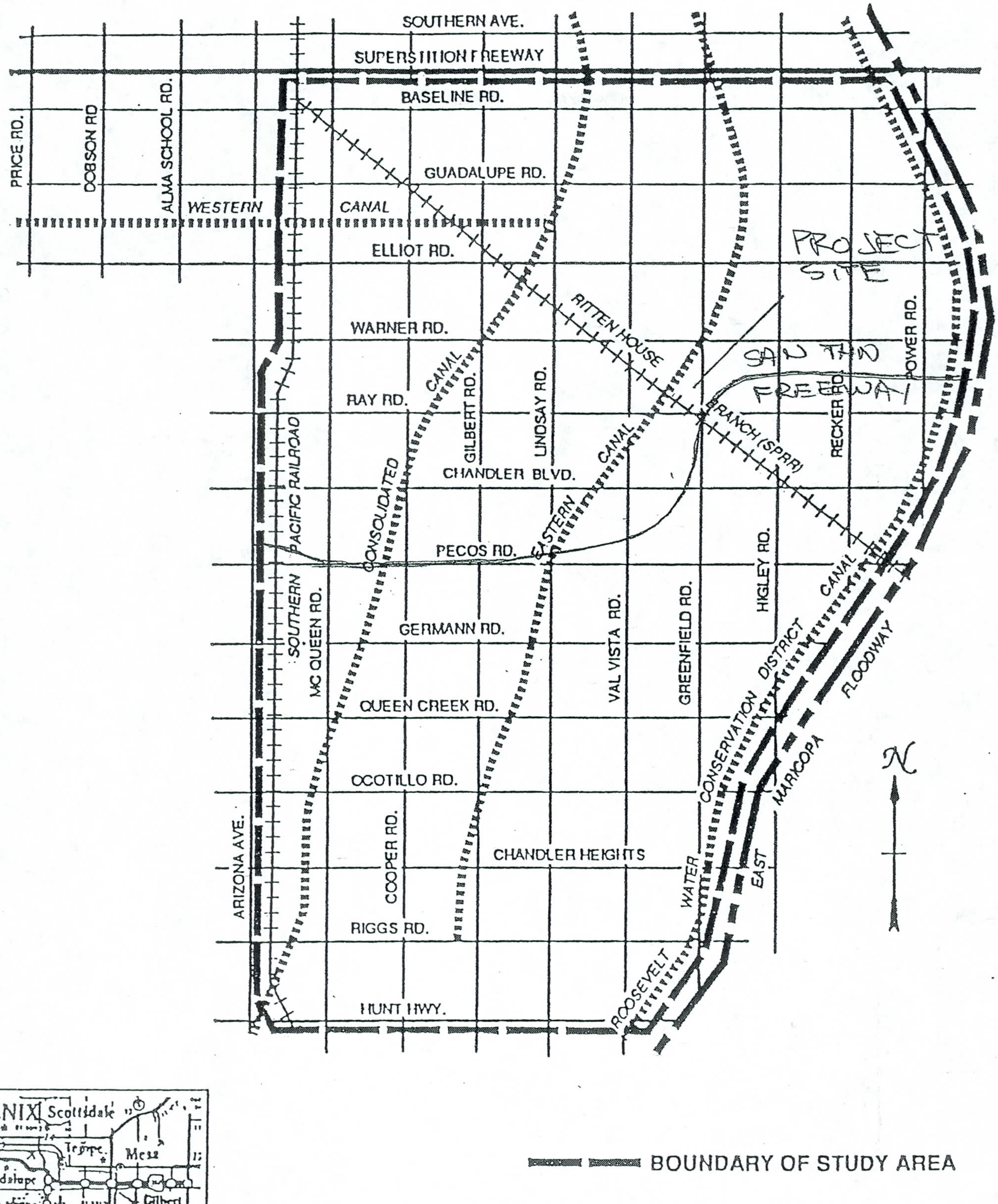
PANEL 2680 OF 4350

(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
GILBERT, TOWN OF	040044	2680	G
MARICOPA COUNTY UNINCORPORATED AREAS	040037	2680	G

MAP NUMBER
04013C2680 G



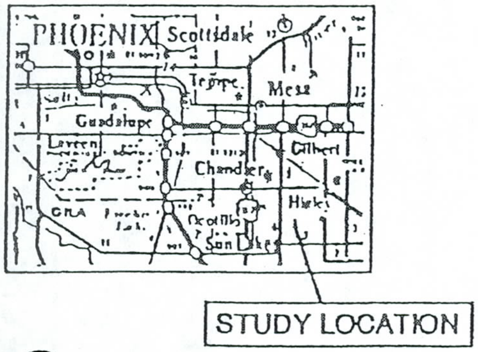


FIGURE 1
STUDY AREA SOUTH OF THE
SUPERSTITION FREEWAY
GILBERT-CHANDLER FLOODPLAIN DELINEATION STUDY

FC

TABLE 1 (Pag of 2)
Summary of W Surface Elevations
Eastern Cana
Gilbert-Chandler Flood Insurance Study
March 1991

Location	Approximate Station Location	Cross Section	Water Surface Elevation
Approximately one-half mile north of Queen Creek Road	212+10	5074	1261.2[1]
Approximately one-half mile north of Queen Creek Road	212+60 BK = 217+70 AHD	5073	1261.2[1]
Ryan Road north approximately one-half mile	218+40 - 245+50	5072 - 5070 (ponded)	1259.8
Germann Road north approximately one-half mile	253+10 - 279+20	5068 - 5065.2 (ponded)	1262.5
One-quarter mile south of Pecos Road to one-half mile north of Pecos Road	293+80 - 369+00	5064 - 5055 (ponded)	1264.9
Chandler Blvd north to Val Vista Road	389+60 - 403+50	5054 - 5051 (ponded)	1265.8
Val Vista Road north to Ray Road	404+00 - 433+50	5049 - 5042 (ponded)	1266.6
Ray Road north of the SPRR	433+80 - 467+40	5041 - 5038 (ponded)	1267.7
SPRR north to Warner Road	477+70 - 509+20	5037 - 5033 (ponded)	1271.4 ← FOR CROSSROAD PARK AREA
Warner Road north approximately one-half mile	509+40 - 538+25	5032 - 5027 (ponded)	1273.2
Approximately one-quarter mile south of Elliot Road	552+45 BK = 556+30 AHD	5026	1277.3
South side of Elliot Road	571+30	5025	1277.1[1]
Elliot Road north to Guadalupe Road	571+90 - 599+00	5024 - 5020 (ponded)	1277.1
Elliot Road north to Guadalupe Road	599+00 - 625+10	5020 - 5017 (ponded)	1277.7
Guadalupe Road north to Houston Road	625+60 - 652+90	5016 - 5012 (ponded)	1279.4
Houston Road north to Baseline Road	653+30 - 679+20	5011 - 5007.1 (ponded)	1280.8
Baseline Road north to Superstition Freeway	679+60 - 700+00	5007 - 5001 (ponded)	1282.4

[1]Flowing water overtops the canal bank. The elevation of the canal maintenance road plus 6 inches is used.

APPENDIX 2

TABLE OF CONTENTS

NCA ENGINEERS INC.

Job No. ______

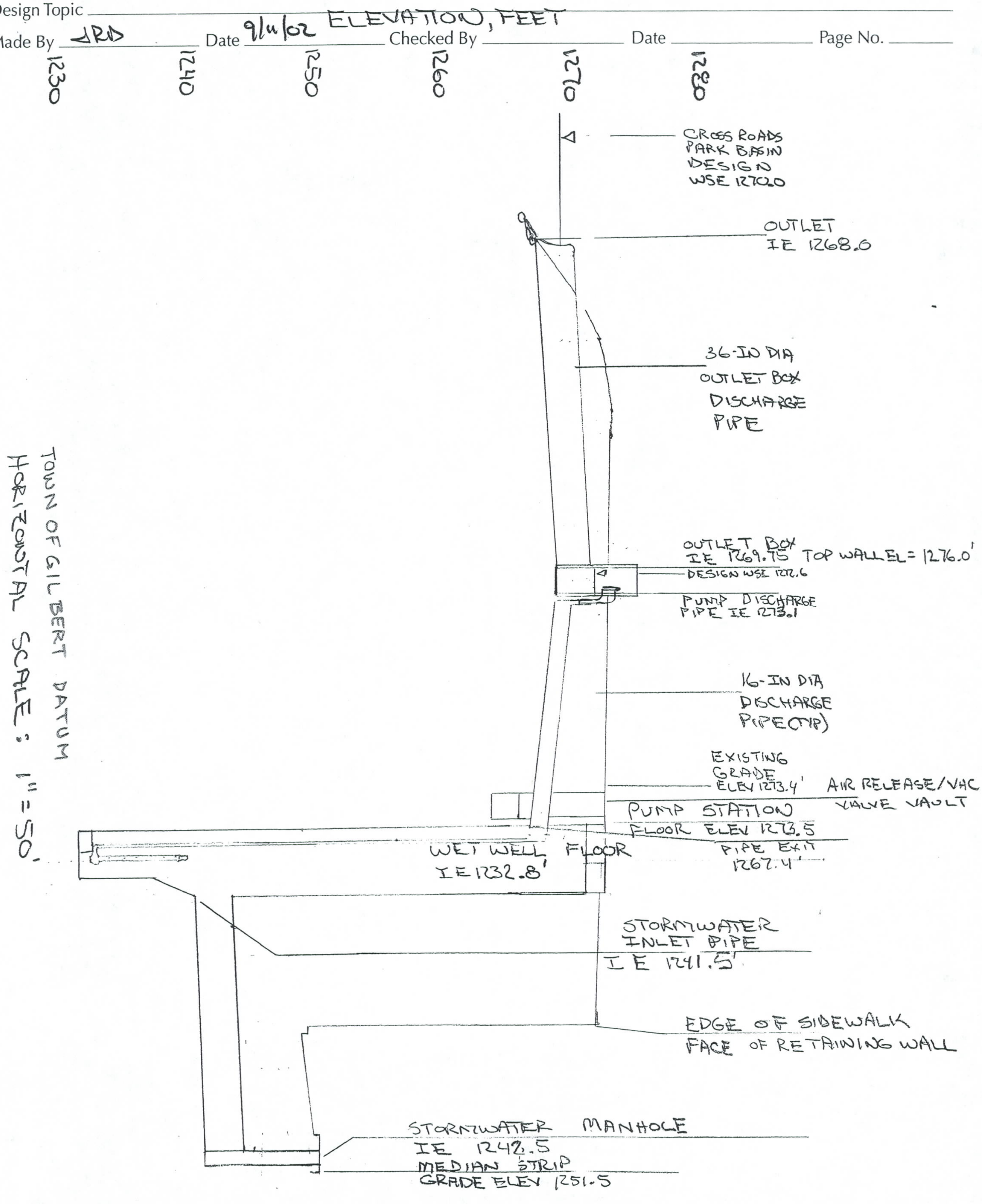
Vol./Sheet No. ______ of ______

Contract/Client ______

Phase/Subject ______

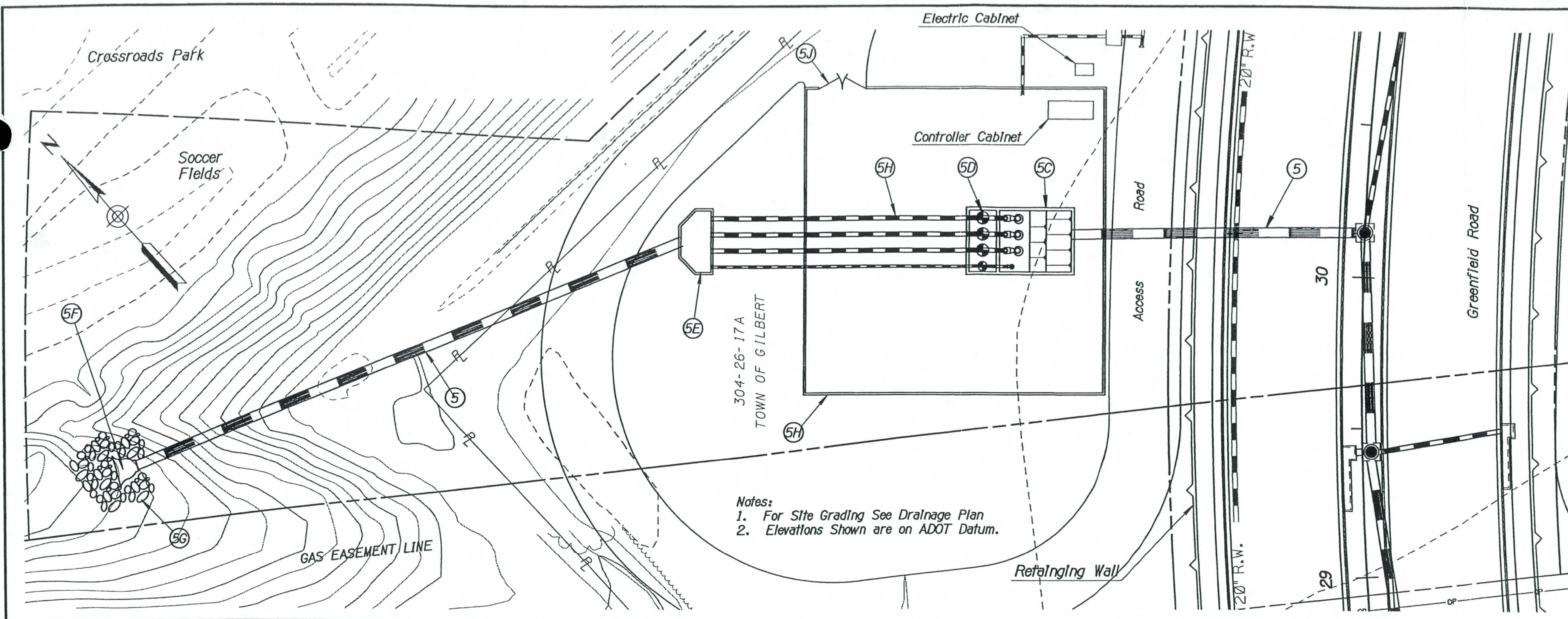
Design Topic ______

Made By JRD ______ Date 9/11/02 ______ Checked By ______ Date ______ Page No. ______



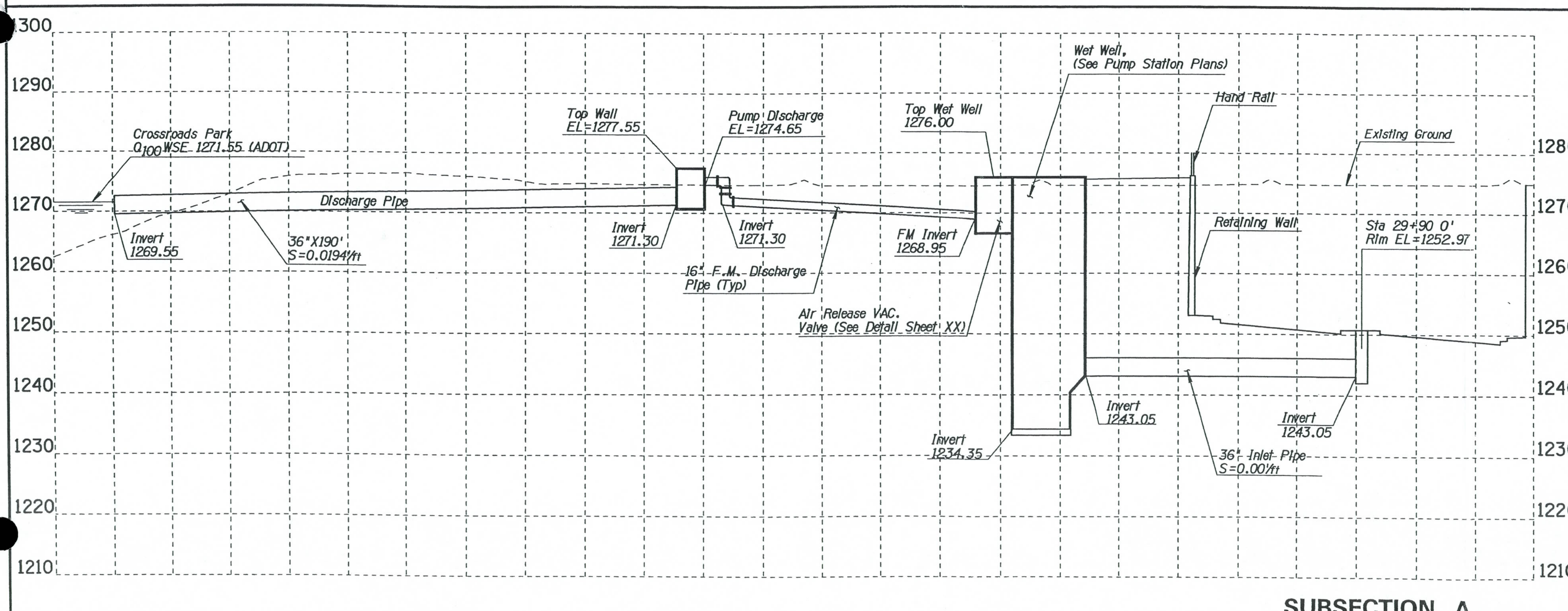
F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-C-508			

202L MA 040



CONSTRUCTION NOTES

(5)	Install 36" RGRCP Storm Drain Pipe	290 LF
(5A)	Install 16" DIP Force Main	272 SF
(5B)	Install 6" DIP Force Main	90 SF
(5C)	Install Pump Station	1 LS
(5D)	Install Valve Vault	1 LS
(5E)	Install Discharge Box Per Dtl	1 LS
(5F)	Install 36" End Section	1 EA
(5G)	Rip-Rap Per	90 CY
(5H)	7' Screen Wall Per Dtl .See Sheet	215 LF
(5J)	Access Gate Per Dtl ,See Sheet	1 EA



SUBSECTION A

NOTE: ADOT DATUM TOWN OF GILBERT DATUM 1.55' LOWER.

TWO WORKING DAYS BEFORE YOU DIG CALL: 263-1100 1-800-STAKE-IT

20 0 20 40 SCALE IN FEET

REV.	DATE	BY	DESCRIPTION

TOWN OF GILBERT

GREENFIELD, RAY AND UPRR UNDERPASSES

DRAINAGE

FORCE MAIN PLAN & PROFILE SHEET

INCA
INCA ENGINEERS INC.

	NAME	DATE
DESIGN	P.COLE	01/03
DRAWN	R.STEELE/K.YOUNG	01/03
CHECKED	M.WAVERING	01/03

PRELIMINARY 60% REVIEW NOT FOR CONSTRUCTION OR RECORDING

DWG NO. D-2.1

SHEET 62 OF 346

202-C-508

TRACS NO. H6259 01 C

01/30/03 08:13:47 AM O:\JOBS\69446 (Greenfield and Ray Road)\Cadd\Trans\69446fm01.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-C-508			

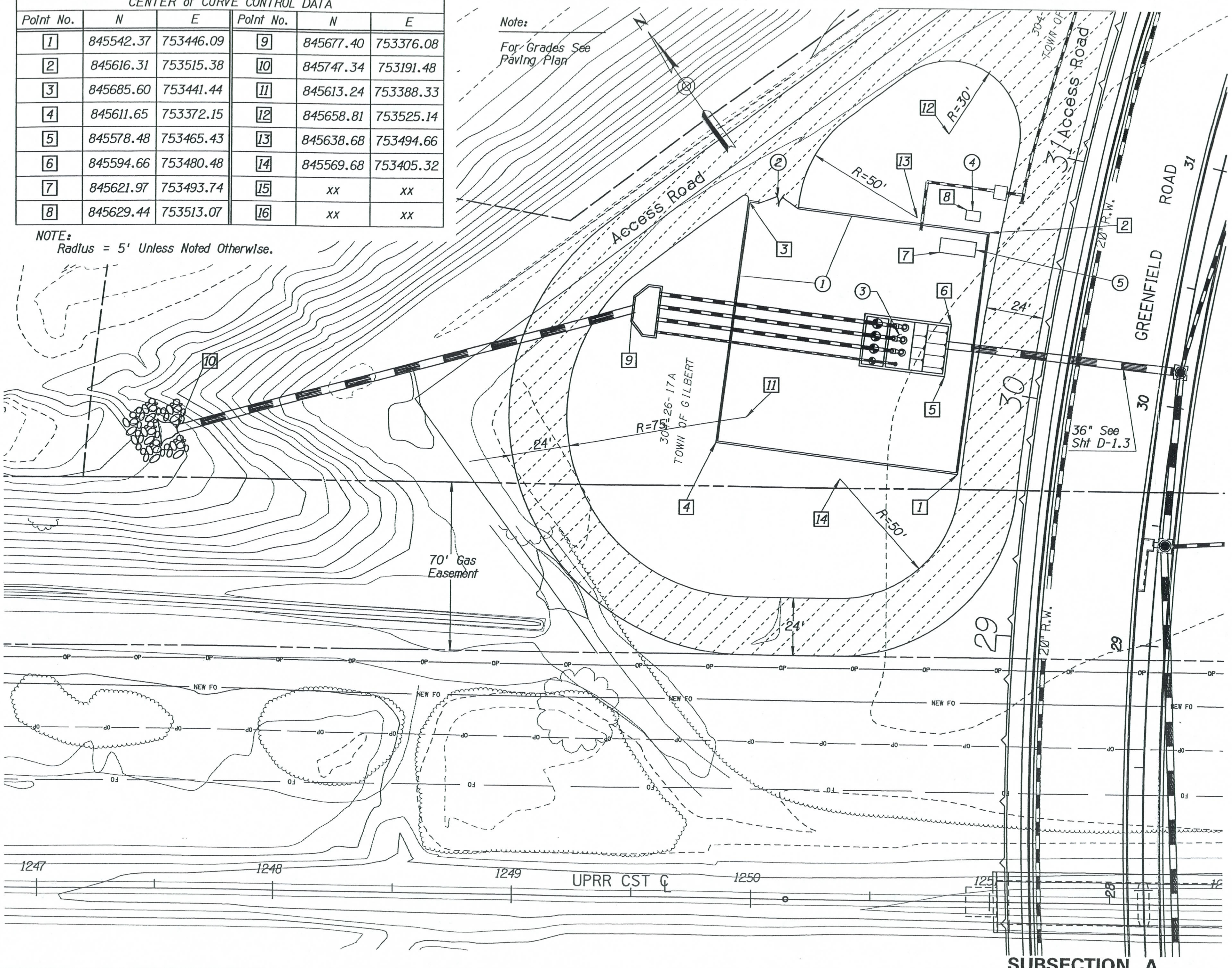
202L MA 040

CENTER of CURVE CONTROL DATA

Point No.	N	E	Point No.	N	E
1	845542.37	753446.09	9	845677.40	753376.08
2	845616.31	753515.38	10	845747.34	753191.48
3	845685.60	753441.44	11	845613.24	753388.33
4	845611.65	753372.15	12	845658.81	753525.14
5	845578.48	753465.43	13	845638.68	753494.66
6	845594.66	753480.48	14	845569.68	753405.32
7	845621.97	753493.74	15	xx	xx
8	845629.44	753513.07	16	xx	xx

NOTE:
Radius = 5' Unless Noted Otherwise.

Note:
For Grades See Paving Plan



CONSTRUCTION NOTES

No.	Note	Quantity
1	8'H Masonary Wall See Detail Sht xx	387 Lin Ft
2	16'X8' H Double Swing Gate per Detail. See Sht Xx	x Ea
3	Pumping Station See Struct. Mech. & Elec. Plans	1 LS
4	Electric Panel See Elec Plan	xx
5	Site Paving per MAG Std Det 200 Type F	1014 Sq Yds

TWO WORKING DAYS BEFORE YOU DIG CALL:
263-1100
1-800-STAKE-IT

20 0 20 40
SCALE IN FEET

REV.	DATE	BY	DESCRIPTION

TOWN OF GILBERT

GREENFIELD, RAY AND UPRR UNDERPASSES

DRAINAGE

PUMP STATION SITE PLAN

INCA ENGINEERS INC.

PRELIMINARY 60% REVIEW NOT FOR CONSTRUCTION OR RECORDING

	NAME	DATE
DESIGN	P.COLE	01/03
DRAWN	R.STEELE/K.YOUNG	01/03
CHECKED	M.WAVERING	01/03

DWG NO. PG-2

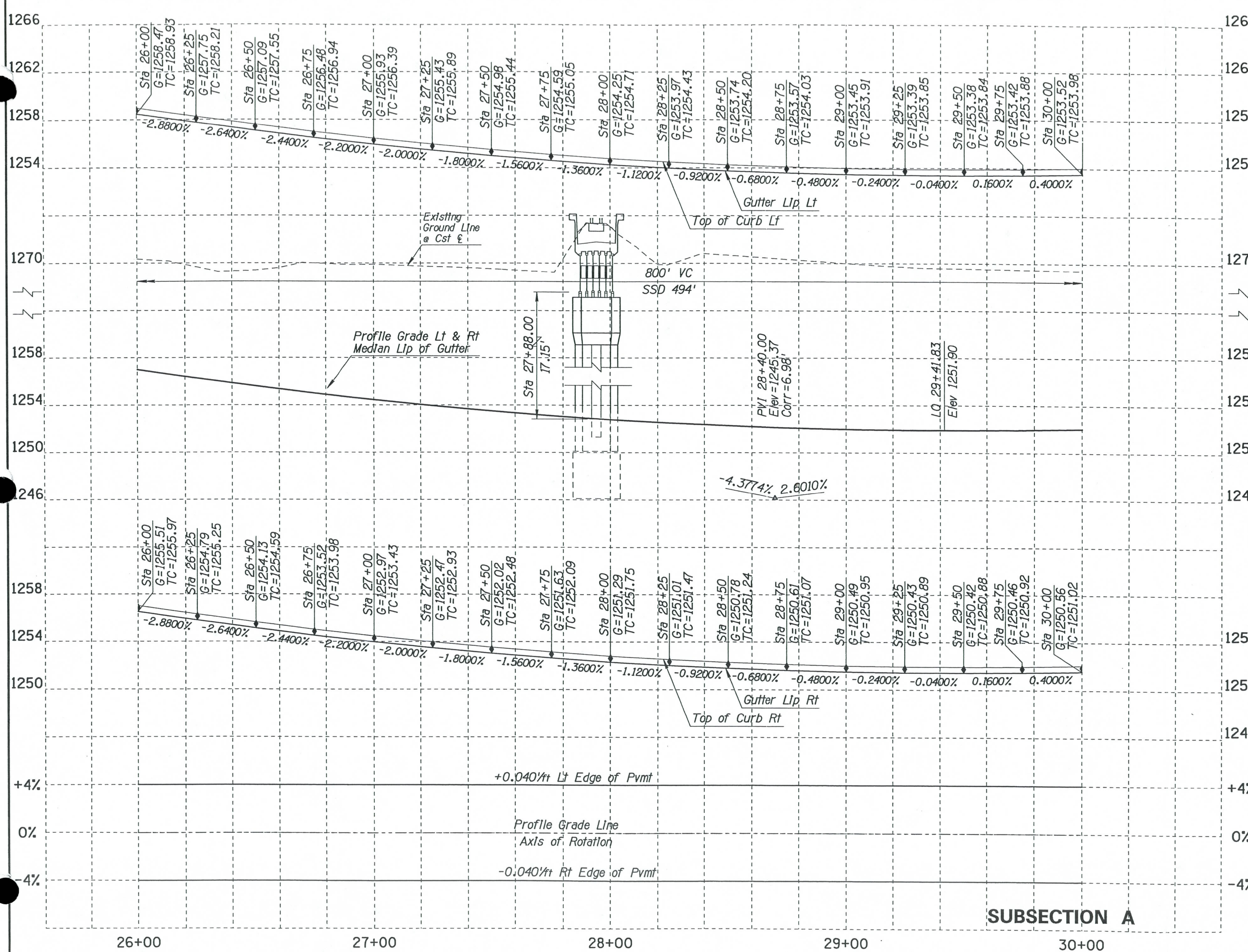
SHEET 86 OF 346

SUBSECTION A

TRACS NO. H6259 01 C

202-C-508

01/28/03 10:33:44 AM   o:\JOBS\69446 (Greenfield and Ray Road)\Cadd\Struct\60%submittal\Pump Station\PG-2.dgn



F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-C-508			

202L MA 040

CONSTRUCTION NOTES

Note: Existing Ground Lines Left and Right Not Shown.

TWO WORKING DAYS BEFORE YOU DIG CALL: 263-1100 1-800-STAKE-IT

REV.	DATE	BY	DESCRIPTION

TOWN OF GILBERT

GREENFIELD, RAY AND UPRR UNDERPASSES

UTLITIES
GREENFIELD ROAD
PROFILE SHEET
STA 26+00 to STA 30+00

INCA ENGINEERS INC.

PRELIMINARY 60% REVIEW NOT FOR CONSTRUCTION OR RECORDING

	NAME	DATE
DESIGN	P.COLE	01/03
DRAWN	R.STEELE/K.YOUNG	01/03
CHECKED	M.WAVERING	01/03

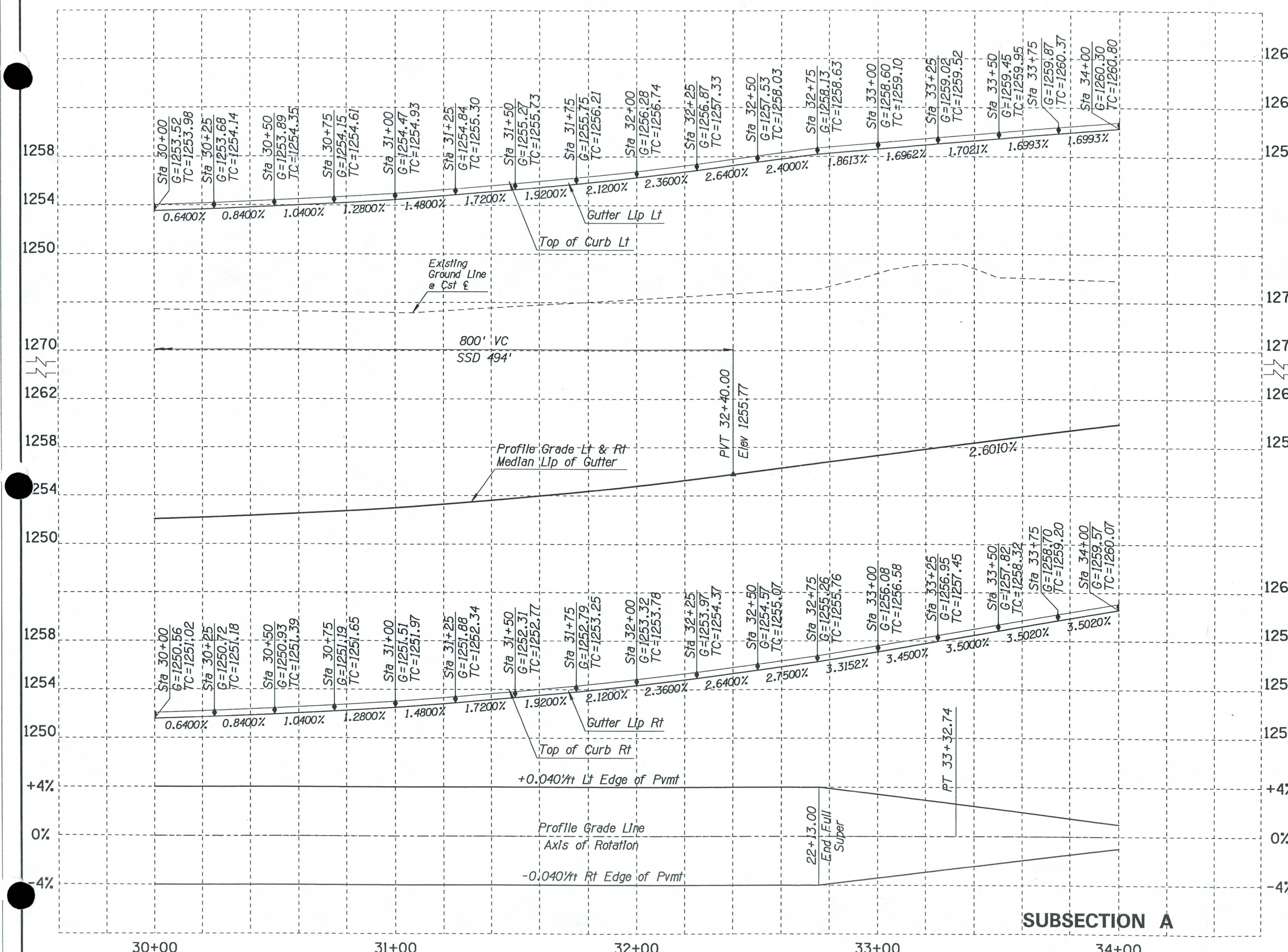
DWG NO. C-3.14

SHEET OF

01/30/03 07:18:40 AM O:\JOBS\69446 (Greenfield and Ray Road)\Cadd\Trans\69446pr15.dgn

TRACS NO. H6259 01 C

202-C-508



SUBSECTION A

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-C-508			

202L MA 040

CONSTRUCTION NOTES

Note:
Existing Ground Lines Left and Right Not Shown.

TWO WORKING DAYS BEFORE YOU DIG CALL:
263-1100
1-800-STAKE-IT

REV.	DATE	BY	DESCRIPTION

TOWN OF GILBERT

GREENFIELD, RAY AND UPRR UNDERPASSES

UTLITIES
GREENFIELD ROAD
PROFILE SHEET
STA 30+00 to STA 34+00

INCA
INCA ENGINEERS INC.

	NAME	DATE
DESIGN	P.COLE	01/03
DRAWN	R.STEELE/K.YOUNG	01/03
CHECKED	M.WAVERING	01/03

PRELIMINARY
60%
REVIEW
NOT FOR
CONSTRUCTION
OR
RECORDING

DWG NO. C-3.15
SHEET OF

01/30/03
07:19:18 AM
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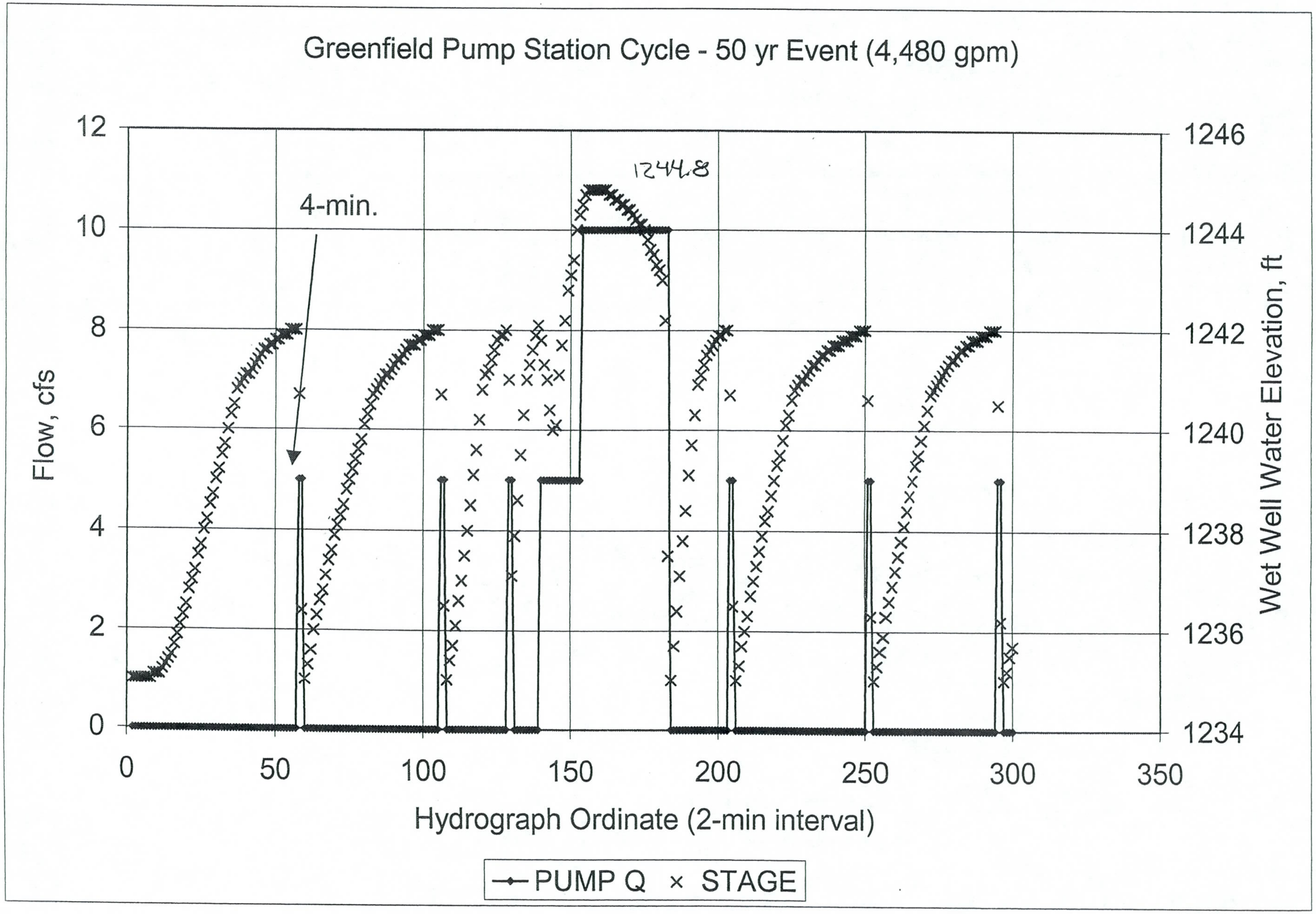
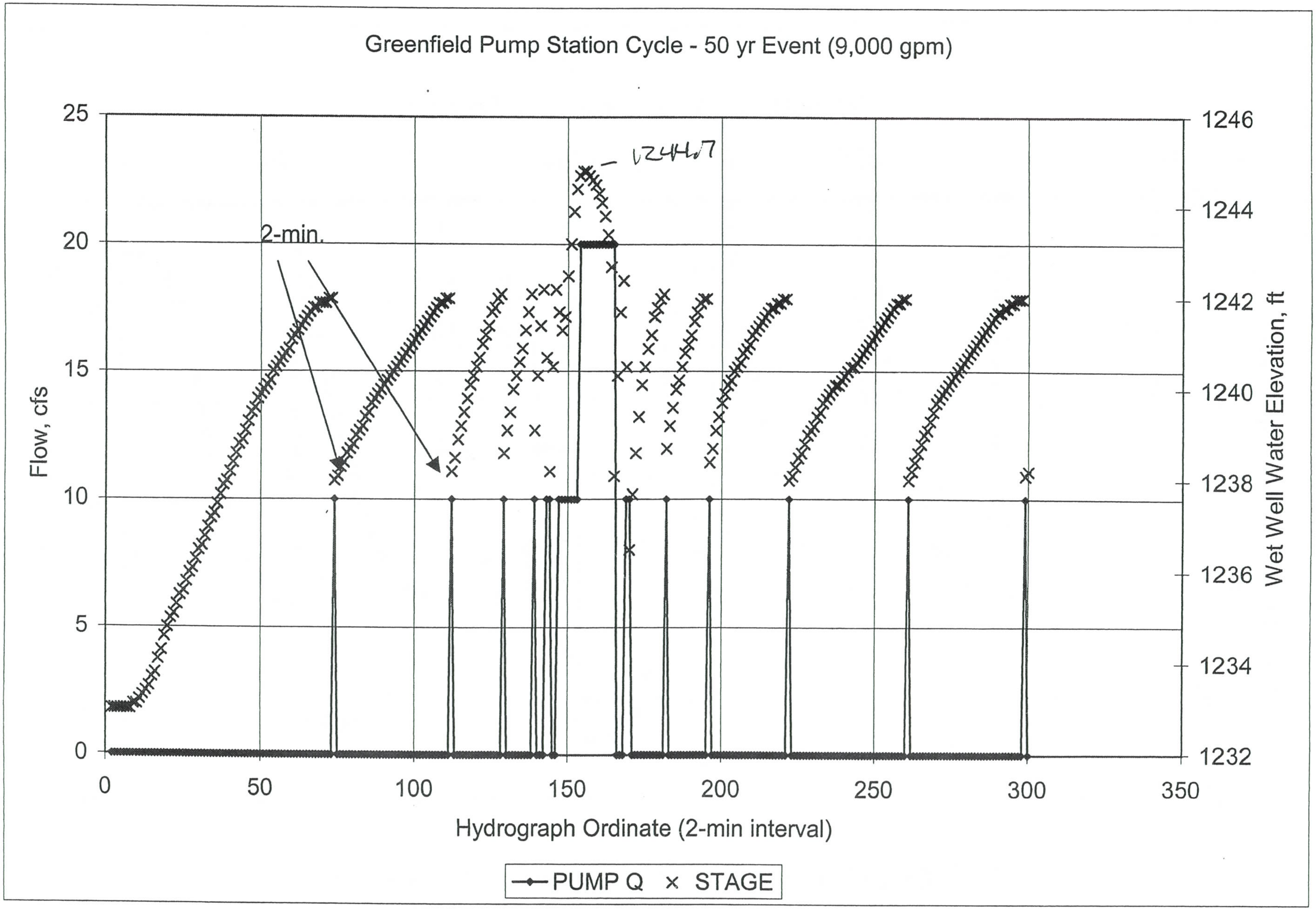
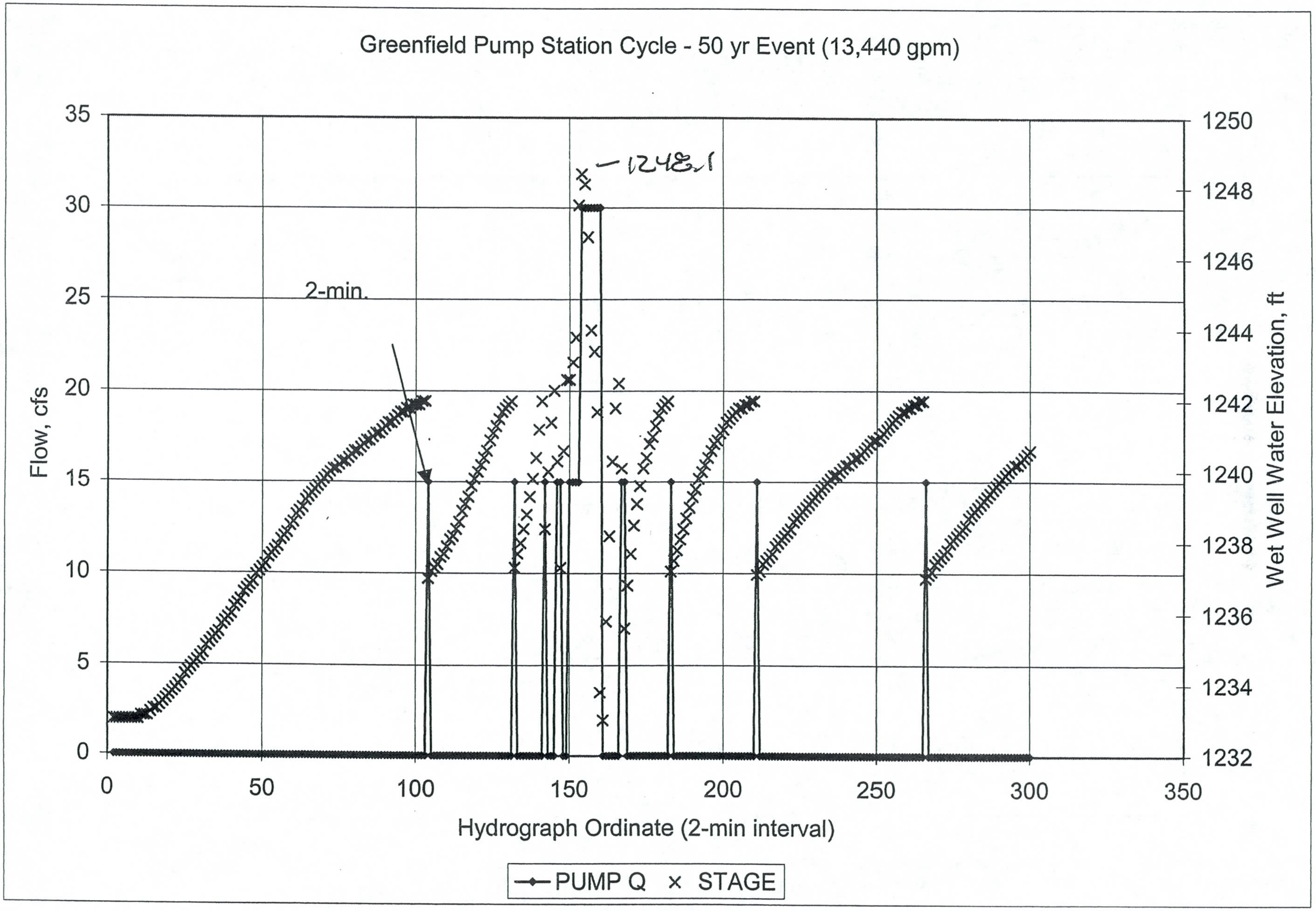
TRACS NO. H6259 01 C
202-C-508

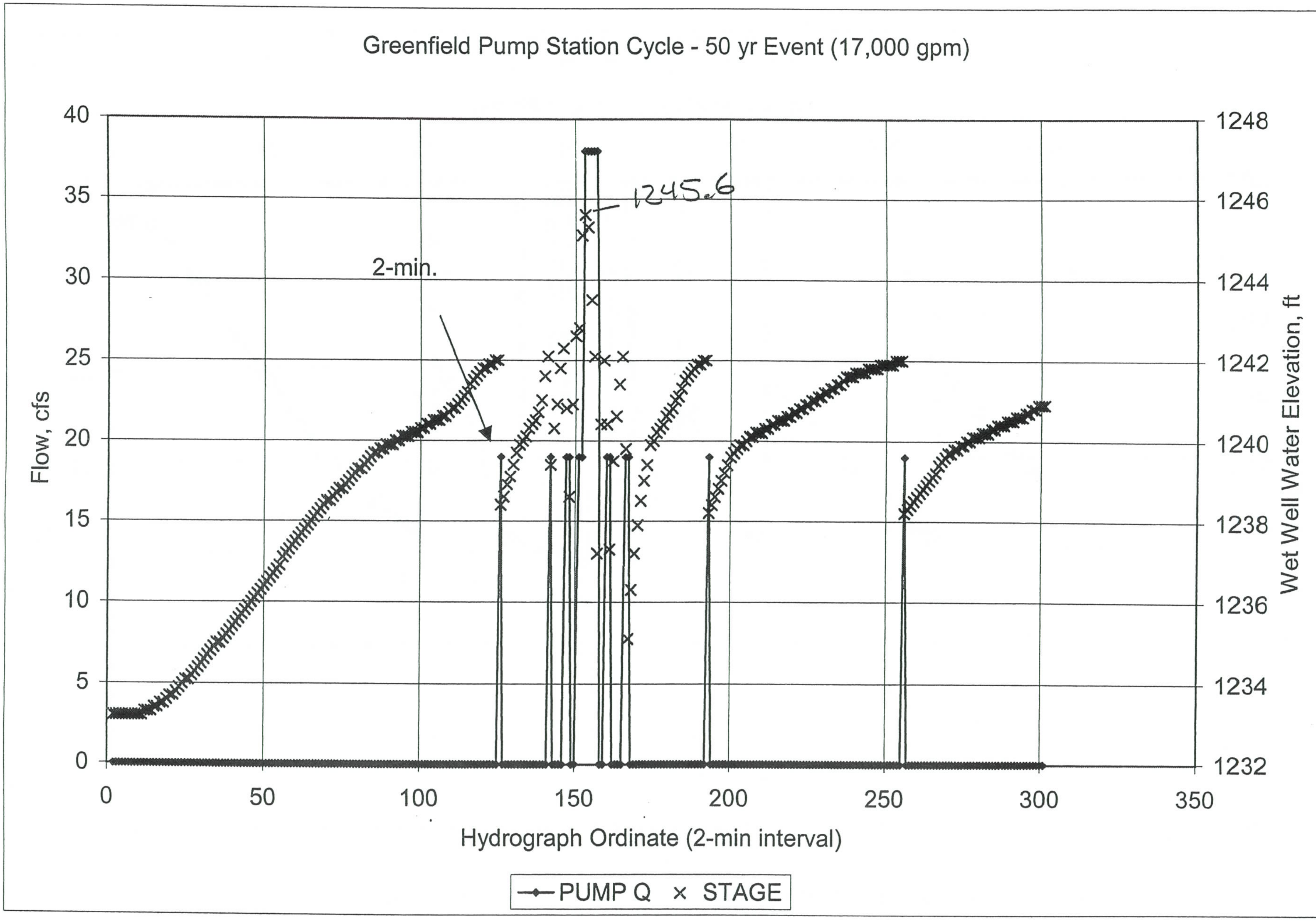

Greenfield Pump Station Cycle - 50 yr Event (4,480 gpm)
1244.8
4-min.
Flow, cfs
Wet Well Water Elevation, ft
Hydrograph Ordinate (2-min interval)
PUMP Q
STAGE
0
2
4
6
8
10
12
1234
1236
1238
1240
1242
1244
1246
0
50
100
150
200
250
300
350

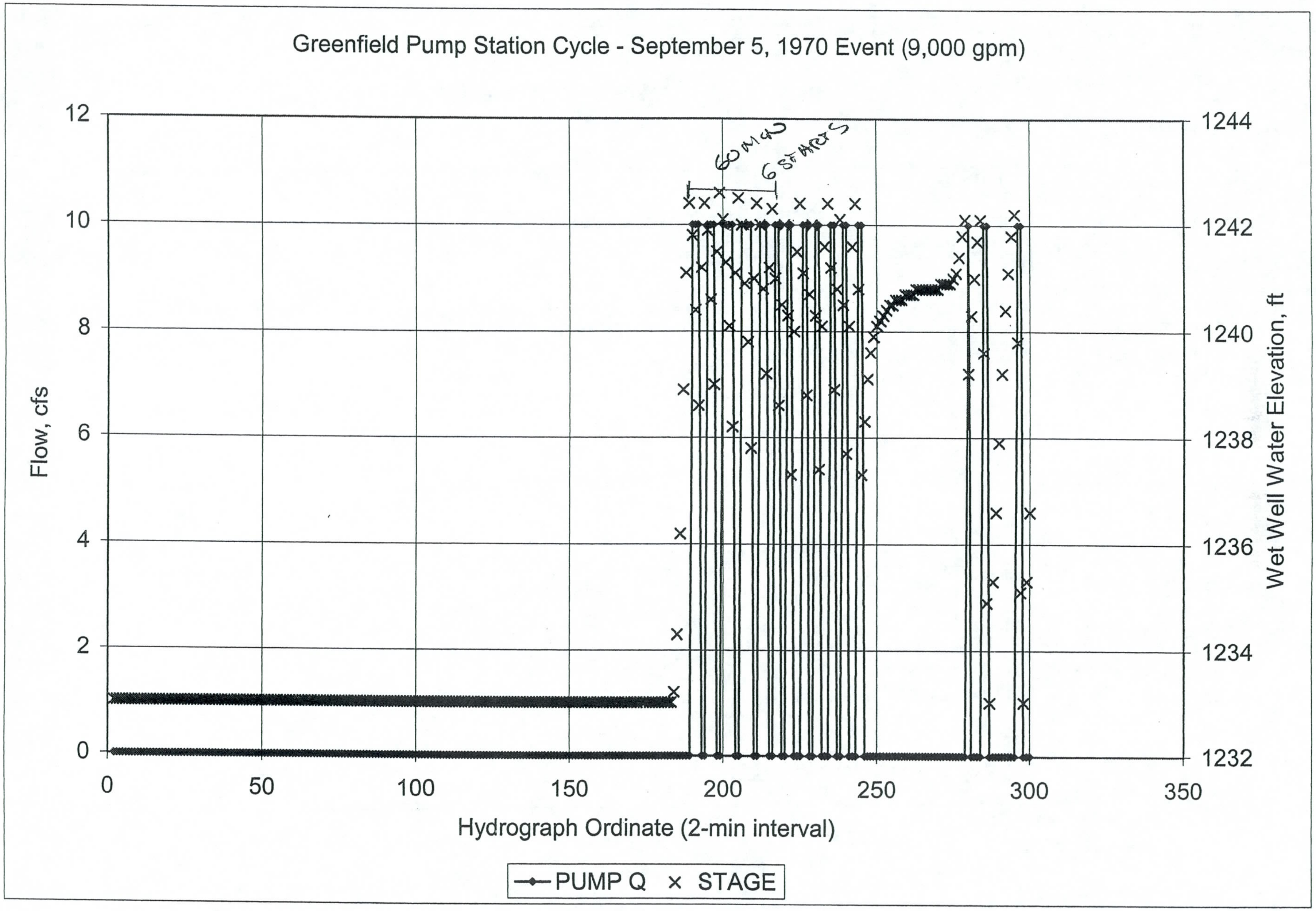


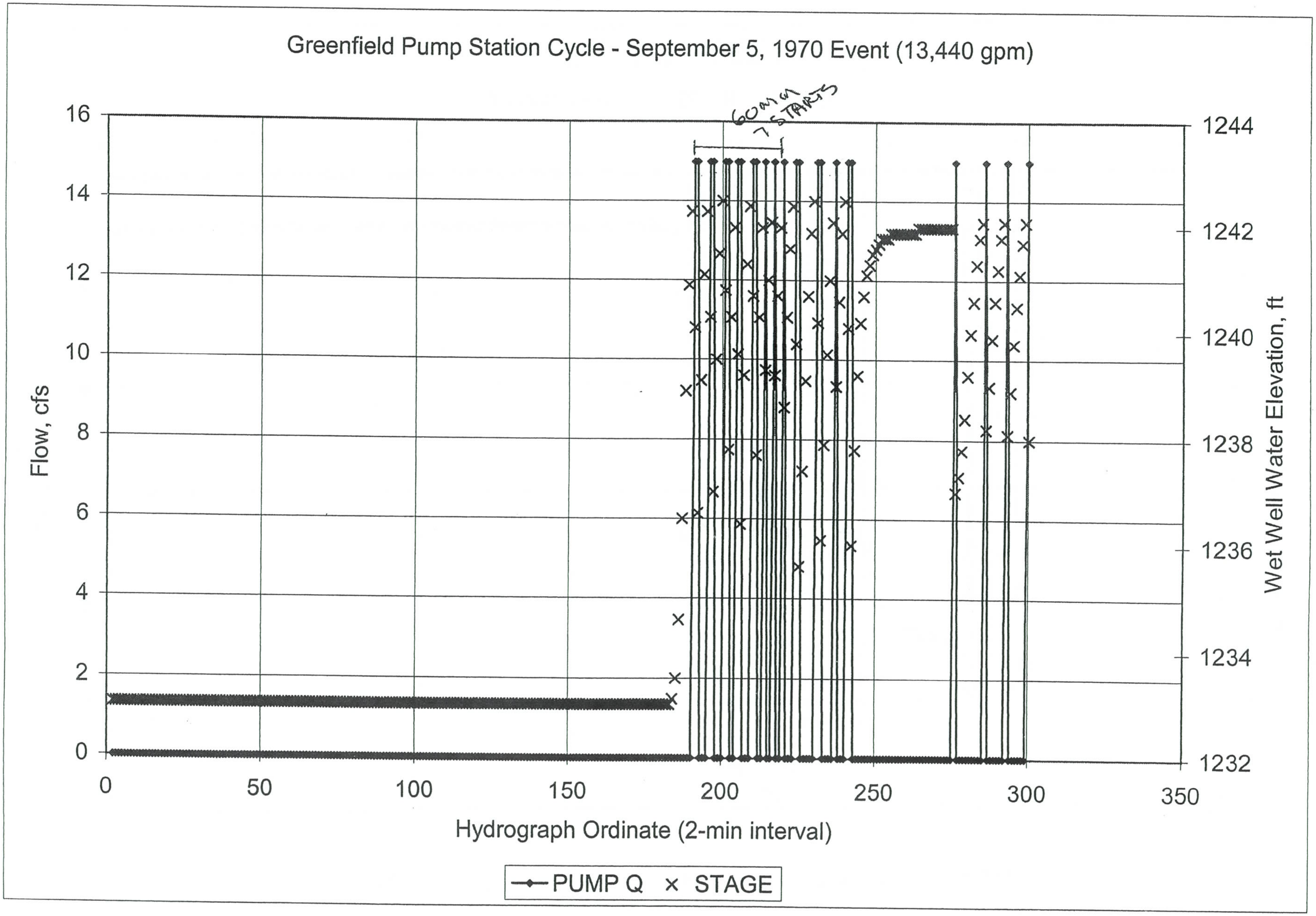
Greenfield Pump Station Cycle - 50 yr Event (9,000 gpm)
25
20
15
10
5
0
Flow, cfs
1246
1244
1242
1240
1238
1236
1234
1232
Wet Well Water Elevation, ft
0
50
100
150
200
250
300
350
Hydrograph Ordinate (2-min interval)
2-min.
PUMP Q
STAGE



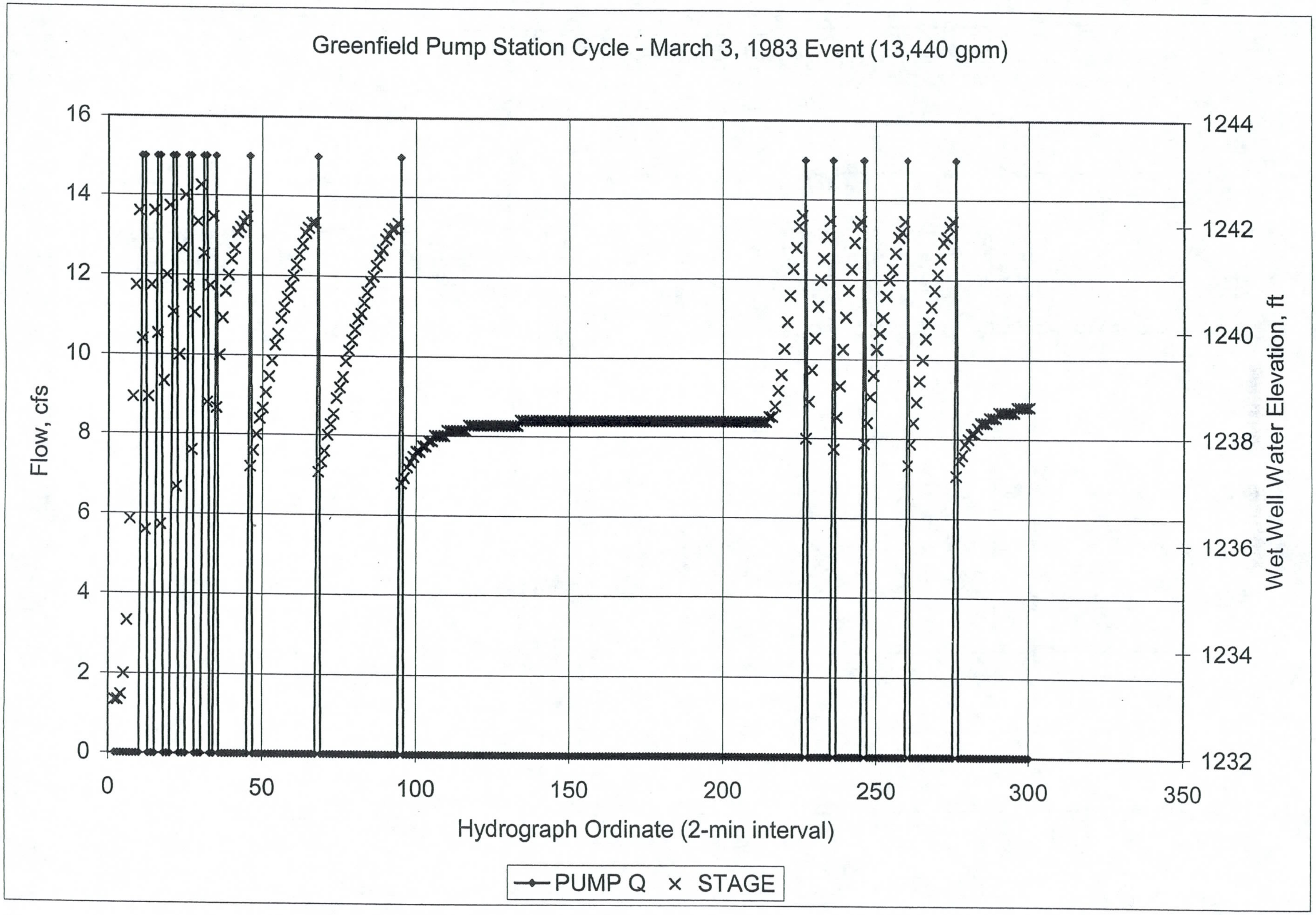
Greenfield Pump Station Cycle - 50 yr Event (13,440 gpm)
Flow, cfs
Wet Well Water Elevation, ft
Hydrograph Ordinate (2-min interval)
2-min.
-1248.1
PUMP Q
STAGE
0
5
10
15
20
25
30
35
50
100
150
200
250
300
350
1232
1234
1236
1238
1240
1242
1244
1246
1248
1250


Greenfield Pump Station Cycle - 50 yr Event (17,000 gpm)
Flow, cfs
Wet Well Water Elevation, ft
Hydrograph Ordinate (2-min interval)
2-min.
1245.6
PUMP Q
STAGE
0
5
10
15
20
25
30
35
40
1232
1234
1236
1238
1240
1242
1244
1246
1248
0
50
100
150
200
250
300
350

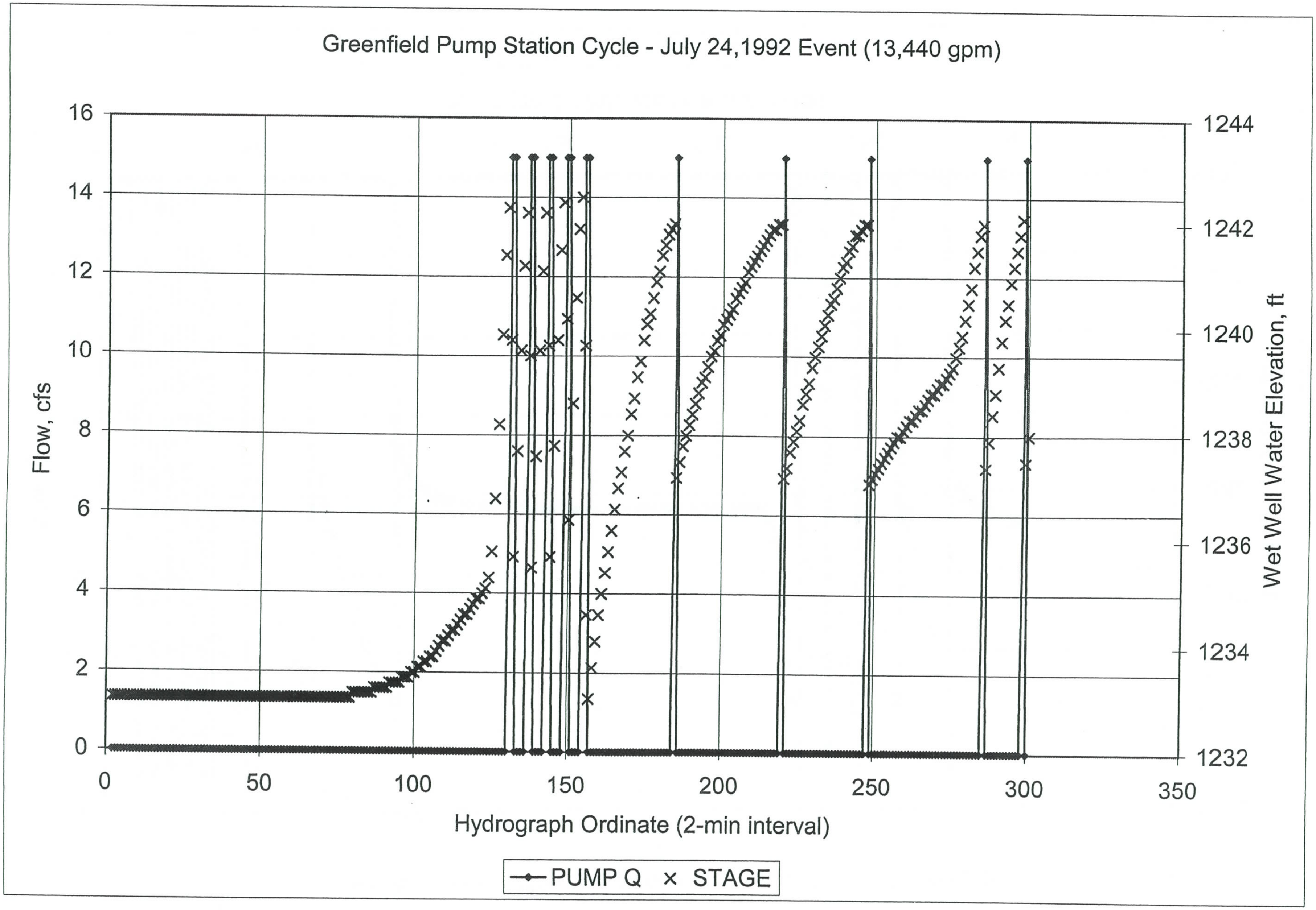

Greenfield Pump Station Cycle - September 5, 1970 Event (9,000 gpm)
60 MIN
6 STARTS
Flow, cfs
Wet Well Water Elevation, ft
Hydrograph Ordinate (2-min interval)
0
2
4
6
8
10
12
1232
1234
1236
1238
1240
1242
1244
0
50
100
150
200
250
300
350
PUMP Q
STAGE



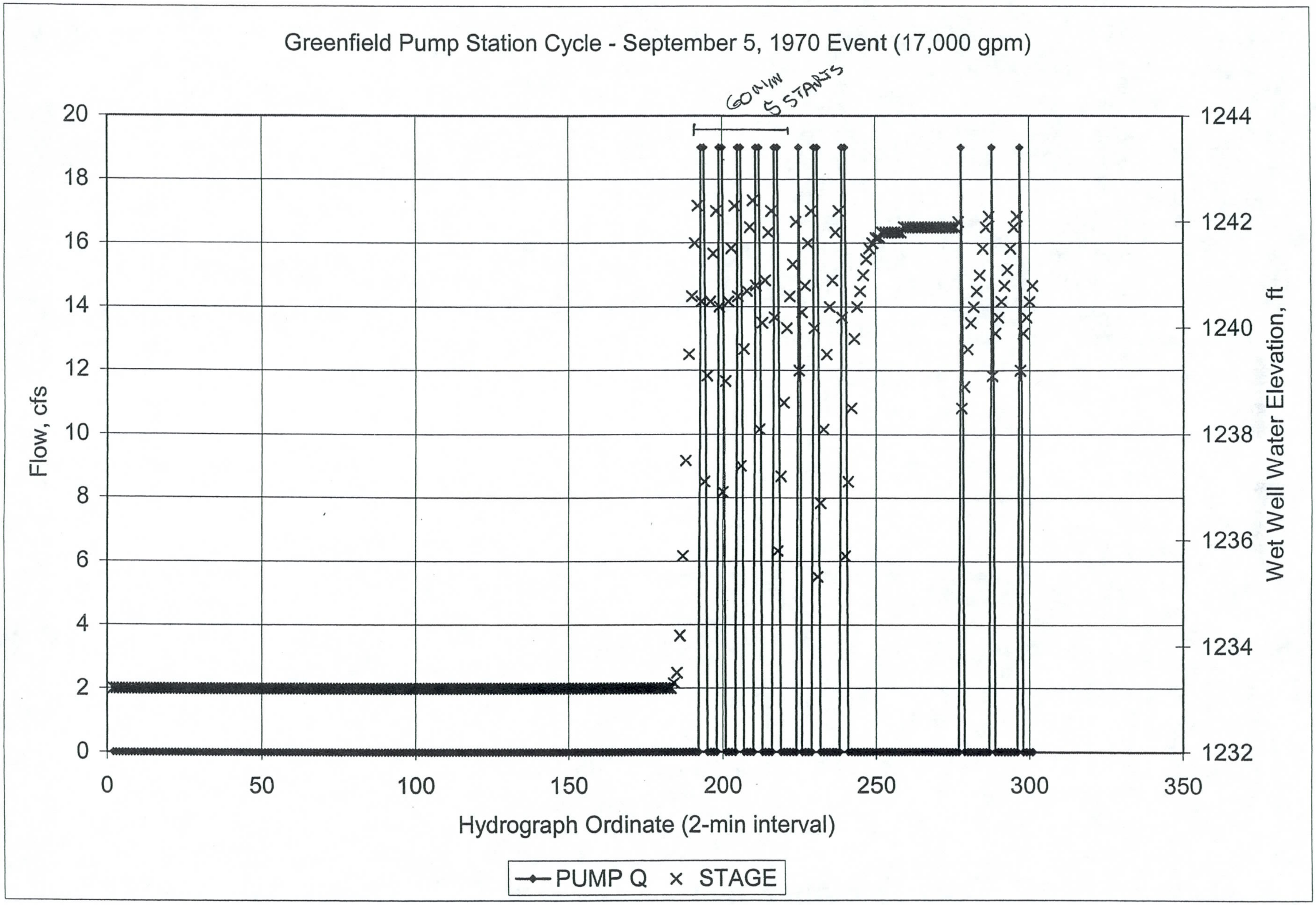
Greenfield Pump Station Cycle - September 5, 1970 Event (13,440 gpm)
60 min
7 STARTS
Flow, cfs
Wet Well Water Elevation, ft
Hydrograph Ordinate (2-min interval)
PUMP Q
STAGE
16
14
12
10
8
6
4
2
0
1244
1242
1240
1238
1236
1234
1232
0
50
100
150
200
250
300
350



Greenfield Pump Station Cycle - March 3, 1983 Event (13,440 gpm)
16
14
12
10
8
6
4
2
0
Flow, cfs
1244
1242
1240
1238
1236
1234
1232
Wet Well Water Elevation, ft
0
50
100
150
200
250
300
350
Hydrograph Ordinate (2-min interval)
PUMP Q
STAGE



Greenfield Pump Station Cycle - July 24,1992 Event (13,440 gpm)
Flow, cfs
Wet Well Water Elevation, ft
Hydrograph Ordinate (2-min interval)
0
2
4
6
8
10
12
14
16
1232
1234
1236
1238
1240
1242
1244
0
50
100
150
200
250
300
350
PUMP Q
STAGE

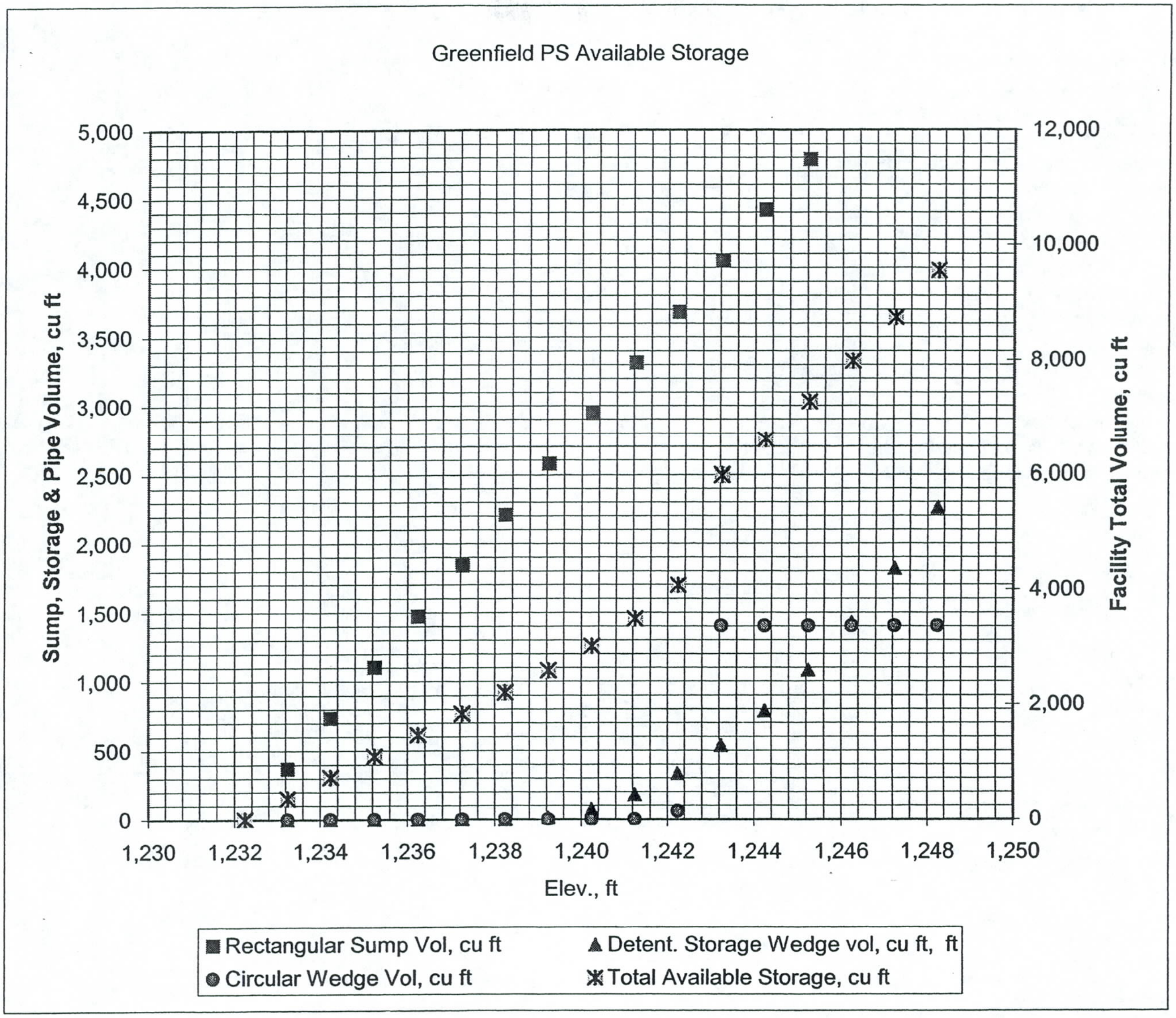


Greenfield Pump Station Cycle - September 5, 1970 Event (17,000 gpm)
60 min
5 STARTS
Flow, cfs
Wet Well Water Elevation, ft
Hydrograph Ordinate (2-min interval)
0
2
4
6
8
10
12
14
16
18
20
1232
1234
1236
1238
1240
1242
1244
50
100
150
200
250
300
350
PUMP Q
STAGE

Greenfield Road Stormwater Pump Station Stage Storage Table

Combined with Pump Capacity, !	**8,500**		Well IE	**1232.24**	Inlet Pipe IE		**1241.5**	Vent Duct &	0
Based on the following components:			Hmin=	6.26				Safety Ladder Clearance	
Rectangular wet well	368	Rectangular sump size, sq ft			TAN Apron slope		0.46604	25 degrees	
Detention storage	*6.44*	*length*	22.18	*wide*	3.00	*deep*	c_p varies		
Ungula pipe storage	Height to inlet ,ft		9.26	3 diameter	max depth	2.7	slope=	0.01 pipe	

Elevation,ft	Stage, feet	Rectangular Sump Vol, cu ft	Detent. Storage Wedge Depth, ft	Detent. Storage Wedge Length, ft	Detent. Storage Wedge vol, cu ft, ft	Circular Wedge Vol, cu ft	Total Available Storage, cu ft	Total Available Storage, ac ft	Area of Segment, sq ft	Length of element, ft	Depth of segment, ft	c_p
1,232	0	0	0	0	0	0	0	0	0.0	0.0		
1,233	1	368	0	0	0	0	368	0.008	0.0	0.0		
1,234	2	736	0	0	0	0	736	0.017	0.0	0.0		
1,235	3	1,104	0	0	0	0	1,104	0.025	0.0	0.0		
1,236	4	1,472	0	0	0	0	1,472	0.034	0.0	0.0		
1,237	5	1,840	0	0	0	0	1,840	0.042	0.0	0.0		
1,238	6	2,208	0	0	0	0	2,208	0.051	0.0	0.0		
1,239	7	2,576	0.7	1.6	13	0	2,589	0.059	0.0	0.0	0.0	0.0
1,240	8	2,944	1.7	3.7	72	0	3,017	0.069	0.0	0.0	0.0	0.0
1,241	9	3,312	2.7	5.9	179	0	3,491	0.080	0.0	0.0	0.0	0.0
1,242	10	3,680	3.7	8.0	333	59	4,073	0.093	1.4	74.1	0.7	-0.8
1,243	11	4,049	4.7	10.2	535	1,403	5,987	0.137	4.3	174.1	1.7	0.2
1,244	12	4,417	5.7	12.3	784	1,403	6,604	0.152	7.1	270.0	2.7	1.2
1,245	13	4,785	6.7	14.5	1,081	1,403	7,269	0.167	7.1	270.0	3.7	2.2
1,246	14	5,153	7.7	16.6	1,426	1,403	7,982	0.183	7.1	270.0	4.7	3.2
1,247	15	5,521	8.7	18.8	1,818	1,403	8,742	0.201	7.1	270.0	5.7	4.2
1,248	16	5,889	9.7	20.9	2,258	1,403	9,550	0.219	7.1	270.0	6.7	5.2



Greenfield PS Available Storage
Sump, Storage & Pipe Volume, cu ft
5,000
4,500
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
Facility Total Volume, cu ft
12,000
10,000
8,000
6,000
4,000
2,000
0
1,230
1,232
1,234
1,236
1,238
1,240
1,242
1,244
1,246
1,248
1,250
Elev., ft
Rectangular Sump Vol, cu ft
Detent. Storage Wedge vol, cu ft, ft
Circular Wedge Vol, cu ft
Total Available Storage, cu ft

Rectangular Sump Dimensions For individual pump capacities up to 40,000 gpm

Design Indivudual Pump Capacity,gpm **8,500**

Assume three pumps along sump centerline (3 main)

Qp=individual pump capacity, cfs	Cu= 0.52	18.9
C=clearance between pump inlet bell and sump floor,ft	C=0.5*D	1.33
Dr= outside diameter of pump inlet bell/volute,ft=Inlet size,D+0.5	D=manuf.dim	2.66 See chart below
Hmin=minimum water depth in sump,ft	Hmin=S+C	6.26
S=minimum pump inlet submergence,ft	S=Dr+(Cur*Qp)/Dr^1.5	4.93
W=pump inlet bay width, ft	W=2*D	5.31
B=clearance from back wall to pump centerline, ft	B=0.75*D	1.99
X=pump inlet bay length, ft	X=5.5*D	14.60
Z1=distance from centerline to diverging walls	Z1=5.5*D	14.60
Vs=pump bay velocity, f/s	Vs=Qp/W*Hmin	0.57
Ws= sump width, ft	Ws=3*W	15.93
L=Length, ft	L=B+Z1	16.59
Total width including nuisance pump=Ws+W1cfs pumpft	W=Ws+6.25	22.18

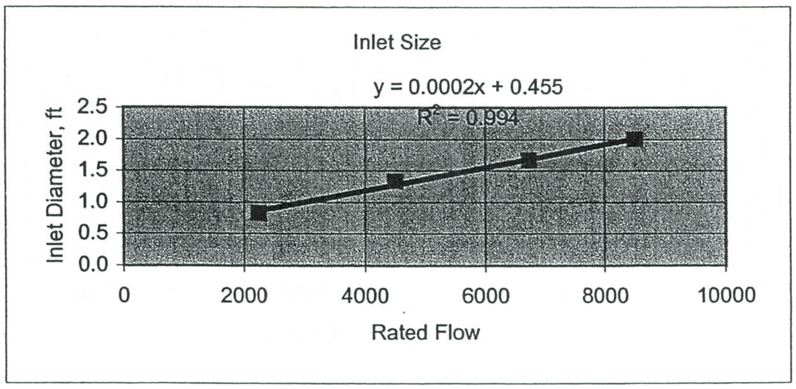
Cycle Time

minimum cycle time t=	10	
Minimum cycle volume V=15*Qp*t, ft^3		2841
Minimum depth from floor plan, L*Ws		10.75

Table for Inlet Diameter, in

Based on Flygt Submersible Pump CP Series

GPM	Inches	Feet
2240	10	0.8
4500	16	1.3
6720	20	1.7
8500	24	2.0



Apron Flare

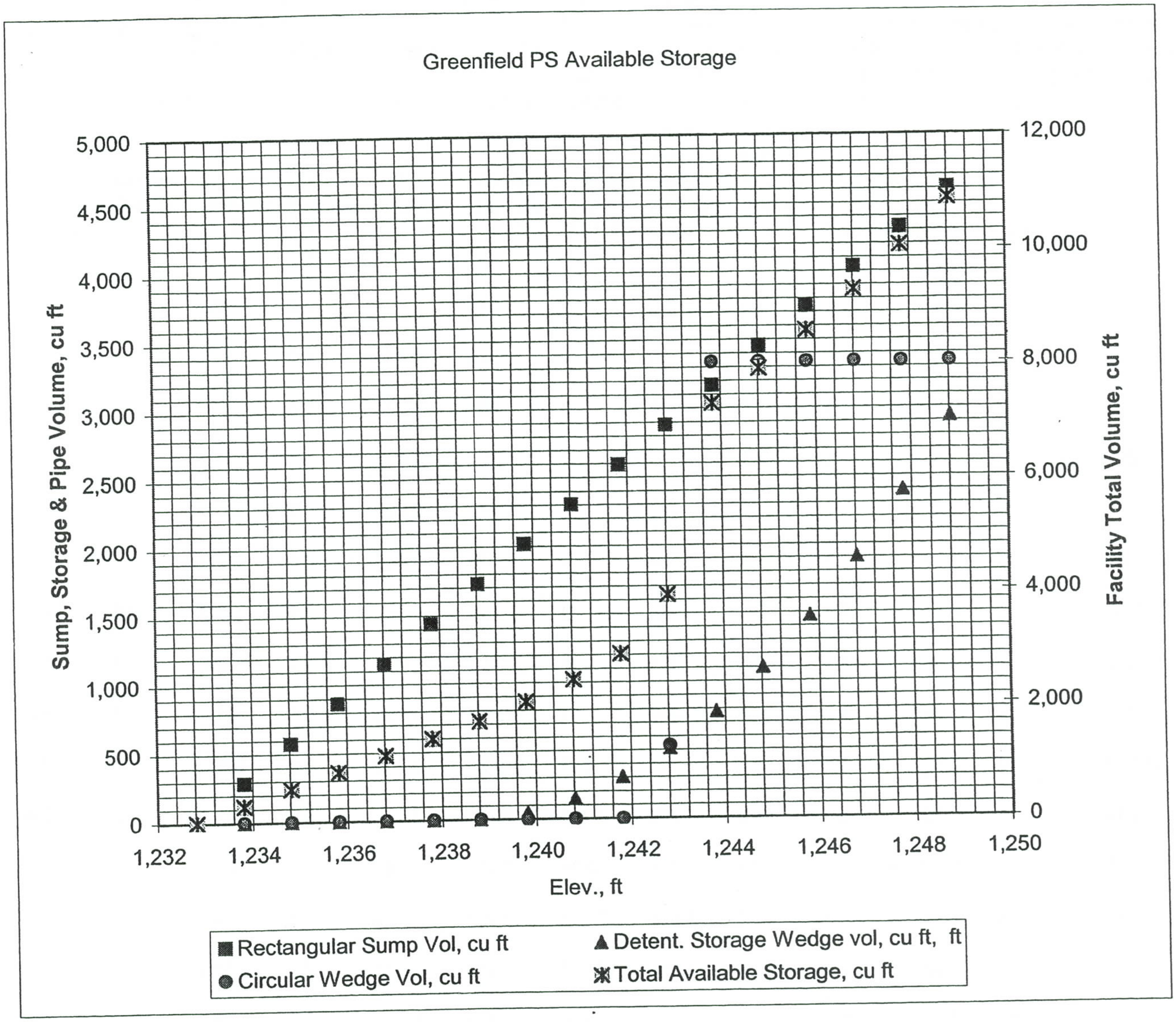
B=inletdepth*(1+((length)/(inletdepth*Fr))^1.5)

apron length= 6.44	Fr=	1.25	Based on 38 cfs in 30" pipe
Check w/ StorageRec!C5	inletdepth=	1.9	
apron width= 10.38			

Greenfield Road Stormwater Pump Station Stage Storage Table

Combined with Pump Capacity, !		**6,720**		Well IE	**1232.82**	Inlet Pipe IE		**1241.5**	Vent Duct & Safety Ladder Clearance		0
Based on the following components:				Hmin=	5.68						
Rectangular wet well	288	Rectangular sump size, sq ft				TAN Apron slope	0.36377		20	degrees	
Detention storage	*8.25*	*length*	20.04	*wide*	3.00	*deep*	c_p	varies			
Ungula pipe storage	Height to inlet ,ft		8.68	3	diameter	max depth	2.7	slope=	0.01	pipe	

Elevation,ft	Stage, feet	Rectangular Sump Vol, cu ft	Detent. Storage Wedge Depth, ft	Detent. Storage Wedge Length, ft	Detent. Storage Wedge vol, cu ft, ft	Circular Wedge Vol, cu ft	Total Available Storage, cu ft	Total Available Storage, ac ft	Area of Segment, sq ft	Length of element, ft	Depth of segment, ft	c_p
1,233	0	0	0	0	0	0	0	0	0.0	0.0		
1,234	1	288	0	0	0	0	288	0.007	0.0	0.0		
1,235	2	576	0	0	0	0	576	0.013	0.0	0.0		
1,236	3	864	0	0	0	0	864	0.020	0.0	0.0		
1,237	4	1,152	0	0	0	0	1,152	0.026	0.0	0.0		
1,238	5	1,440	0	0	0	0	1,440	0.033	0.0	0.0		
1,239	6	1,728	0	1	0	0	1,728	0.040	0.0	0.0		
1,240	7	2,016	1.3	3.6	48	0	2,064	0.047	0.0	0.0	0.0	0.0
1,241	8	2,304	2.3	6.4	148	0	2,452	0.056	0.0	0.0	0.0	0.0
1,242	9	2,592	3.3	9.1	303	1	2,896	0.066	0.4	31.8	0.3	-1.2
1,243	10	2,880	4.3	11.9	514	533	3,927	0.090	3.0	131.8	1.3	-0.2
1,244	11	3,168	5.3	14.6	779	3,338	7,286	0.167	5.9	231.8	2.3	0.8
1,245	12	3,456	6.3	17.4	1,100	3,338	7,894	0.181	7.1	270.0	3.3	1.8
1,246	13	3,744	7.3	20.1	1,475	3,338	8,558	0.196	7.1	270.0	4.3	2.8
1,247	14	4,032	8.3	22.9	1,906	3,338	9,277	0.213	7.1	270.0	5.3	3.8
1,248	15	4,320	9.3	25.6	2,392	3,338	10,050	0.231	7.1	270.0	6.3	4.8
1,249	16	4,608	10.3	28.4	2,933	3,338	10,879	0.250	7.1	270.0	7.3	5.8


Greenfield PS Available Storage
Sump, Storage & Pipe Volume, cu ft
5,000
4,500
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
Facility Total Volume, cu ft
12,000
10,000
8,000
6,000
4,000
2,000
0
1,232
1,234
1,236
1,238
1,240
1,242
1,244
1,246
1,248
1,250
Elev., ft
Rectangular Sump Vol, cu ft
Circular Wedge Vol, cu ft
Detent. Storage Wedge vol, cu ft, ft
Total Available Storage, cu ft

Rectangular Sump Dimensions For individual pump capacities up to 40,000 gpm
Design Indivudual Pump Capacity,gpm **6,720**
Assume three pumps along sump centerline (3 main)

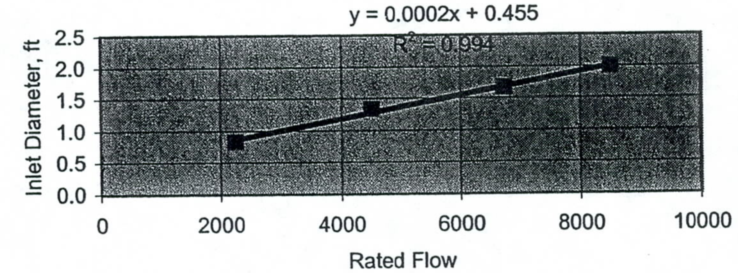
Qp=individual pump capacity, cfs	Cu= 0.52	15.0
C=clearance between pump inlet bell and sump floor,ft	C=0.5*D	1.15
Dr= outside diameter of pump inlet bell/volute,ft=Inlet size,D+0.5	D=manuf.dim	2.30 See chart below
Hmin=minimum water depth in sump,ft	Hmin=S+C	5.68
S=minimum pump inlet submergence,ft	S=Dr+(Cur*Qp)/Dr^1.5	4.53
W=pump inlet bay width, ft	W=2*D	4.60
B=clearance from back wall to pump centerline, ft	B=0.75*D	1.72
X=pump inlet bay length, ft	X=5.5*D	12.64
Z1=distance from centerline to diverging walls	Z1=5.5*D	12.64
Vs=pump bay velocity, f/s	Vs=Qp/W*Hmin	0.57
Ws= sump width, ft	Ws=3*W	13.79
L=Length, ft	L=B+Z1	14.37
Total width including nuisance pump=Ws+W1cfs pumpft	W=Ws+6.25	20.04

Cycle Time

minimum cycle time t=	10
Minimum cycle volume V=15*Qp*t, ft^3	2246
Minimum depth from floor plan, L*Ws	11.33

Table for Inlet Diameter, in
Based on Flygt Submersible Pump CP Series

GPM	Inches	Feet
2240	10	0.8
4500	16	1.3
6720	20	1.7
8500	24	2.0



Apron Flare

B=inletdepth*(1+((length)/(inletdepth*Fr))^1.5)

apron length=	8.25	Fr=	1.25 Based on 38 cfs in 30" pipe
Check w/ StorageRec!C5		inletdepth=	1.9
apron width=	14.19		

Greenfield Road Stormwater Pump Station Stage Storage Table

Combined with Pump Capacity, ! **4,500** Well IE **1233.65** Inlet Pipe IE **1241.5** | Vent Duct & Safety Ladder Clearance 0

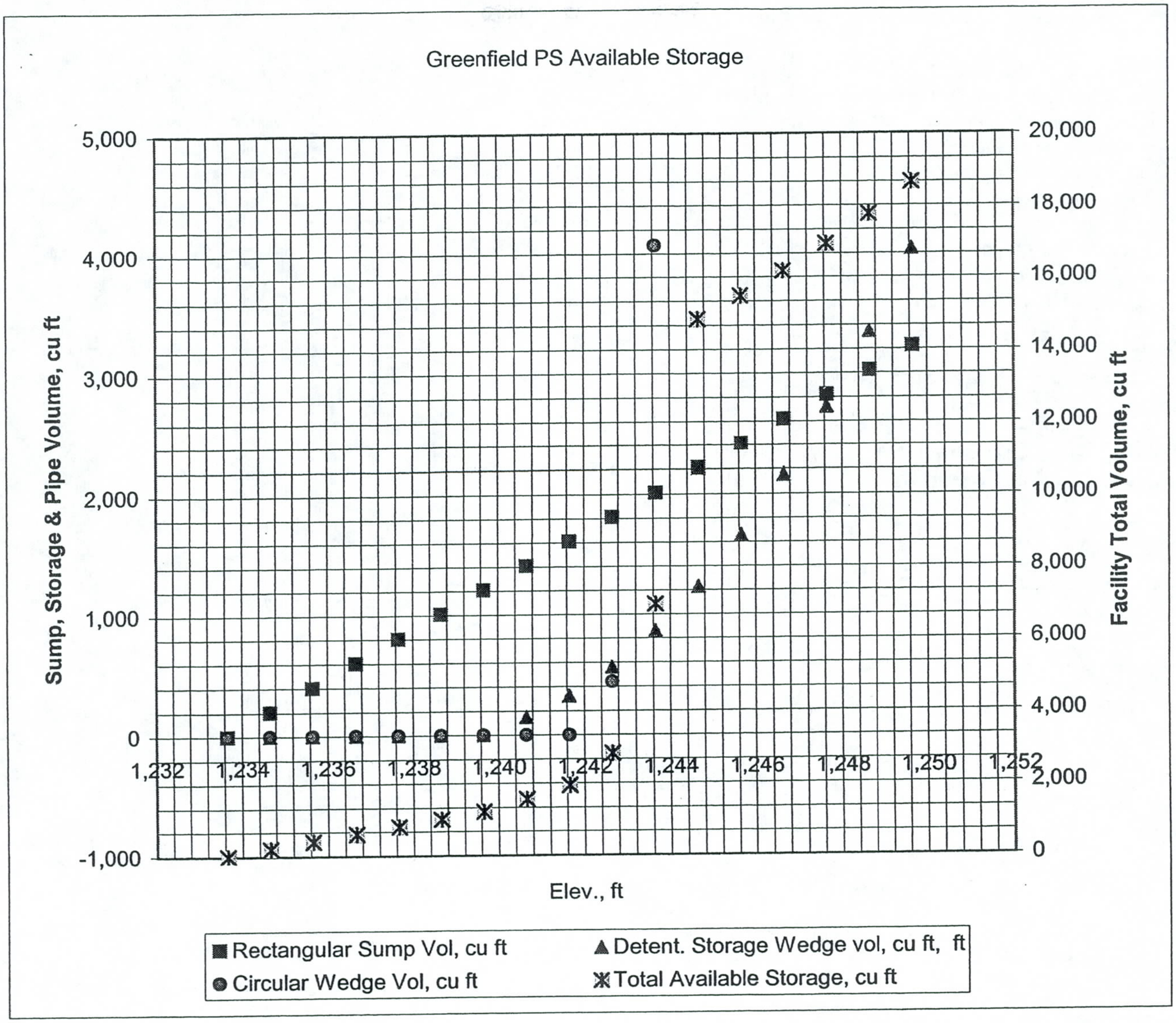
<u>Based on the following components:</u> Hmin= 4.85

Rectangular wet well 201 Rectangular sump size, sq ft TAN Apron slope 0.26781 15 degrees

Detention storage *11.20 length* 17.38 *wide* 3.00 *deep* c_p varies

Ungula pipe storage Height to inlet ,ft 7.85 3.5 diameter max depth 3.2 slope= 0.01 pipe

Elevation,ft	Stage, feet	Rectangular Sump Vol, cu ft	Detent. Storage Wedge Depth, ft	Detent. Storage Wedge Length, ft	Detent. Storage Wedge vol, cu ft, ft	Circular Wedge Vol, cu ft	Total Available Storage, cu ft	Total Available Storage, ac ft	Area of Segment, sq ft	Length of element, ft	Depth of segment, ft	c_p
1,234	0	0	0	0	0	0	0	0	0.0	0.0		
1,235	1	201	0	0	0	0	201	0.005	0.0	0.0		
1,236	2	403	0	0	0	0	403	0.009	0.0	0.0		
1,237	3	604	0	0	0	0	604	0.014	0.0	0.0		
1,238	4	806	0	0	0	0	806	0.019	0.0	0.0		
1,239	5	1,007	0	1	0	0	1,007	0.023	0.0	0.0		
1,240	6	1,209	1	4	0	0	1,209	0.028	0.0	0.0		
1,241	7	1,410	2.2	8.0	151	0	1,561	0.036	0.0	0.0	0.0	0.0
1,242	8	1,612	3.2	11.8	323	-1	1,933	0.044	0.1	15.4	0.2	-1.6
1,243	9	1,813	4.2	15.5	560	440	2,813	0.065	2.8	115.4	1.2	-0.6
1,244	10	2,015	5.2	19.2	862	4,071	6,948	0.160	6.2	215.4	2.2	0.4
1,245	11	2,216	6.2	23.0	1,229	11,395	14,840	0.341	9.1	315.4	3.2	1.4
1,246	12	2,418	7.2	26.7	1,661	11,395	15,474	0.355	9.6	320.0	4.2	2.4
1,247	13	2,619	8.2	30.4	2,157	11,395	16,172	0.371	9.6	320.0	5.2	3.4
1,248	14	2,821	9.2	34.2	2,719	11,395	16,935	0.389	9.6	320.0	6.2	4.4
1,249	15	3,022	10.2	37.9	3,345	11,395	17,763	0.408	9.6	320.0	7.2	5.4
1,250	16	3,224	11.2	41.6	4,037	11,395	18,656	0.428	9.6	320.0	8.2	6.4



Greenfield PS Available Storage
Sump, Storage & Pipe Volume, cu ft
5,000
4,000
3,000
2,000
1,000
0
-1,000
Facility Total Volume, cu ft
20,000
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
1,232
1,234
1,236
1,238
1,240
1,242
1,244
1,246
1,248
1,250
1,252
Elev., ft
Rectangular Sump Vol, cu ft
Detent. Storage Wedge vol, cu ft, ft
Circular Wedge Vol, cu ft
Total Available Storage, cu ft

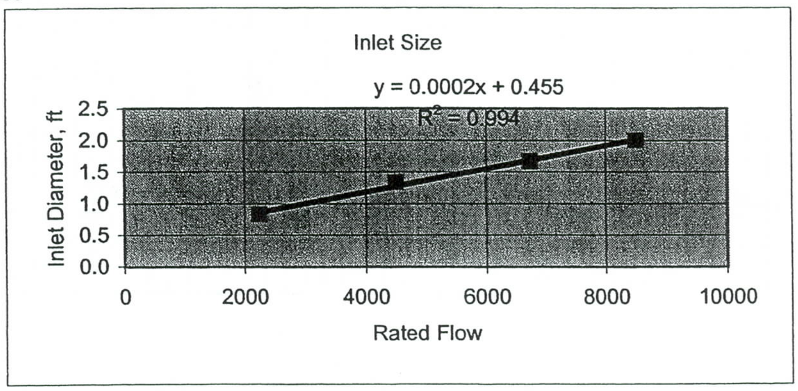
Rectangular Sump Dimensions	For individual pump capacities up to 40,000 gpm		
Design Indivudual Pump Capacity,gpm		**4,500**	
Assume three pumps along sump centerline (3 main)			
Qp=individual pump capacity, cfs	Cu= 0.52	10.0	
C=clearance between pump inlet bell and sump floor,ft	C=0.5*D	0.93	
Dr= outside diameter of pump inlet bell/volute,ft=Inlet size,D+0.5	D=manuf.dim	1.86	See chart below
Hmin=minimum water depth in sump,ft	Hmin=S+C	4.85	
S=minimum pump inlet submergence,ft	S=Dr+(Cur*Qp)/Dr^1.5	3.92	
W=pump inlet bay width, ft	W=2*D	3.71	
B=clearance from back wall to pump centerline, ft	B=0.75*D	1.39	
X=pump inlet bay length, ft	X=5.5*D	10.20	
Z1=distance from centerline to diverging walls	Z1=5.5*D	10.20	
Vs=pump bay velocity, f/s	Vs=Qp/W*Hmin	0.56	
Ws= sump width, ft	Ws=3*W	11.13	
L=Length, ft	L=B+Z1	11.59	
Total width including nuisance pump=Ws+W1cfs pumpft	W=Ws+6.25	17.38	

Cycle Time

minimum cycle time t=	10	
Minimum cycle volume V=15*Qp*t, ft^3		1504
Minimum depth from floor plan, L*Ws		11.66

Table for Inlet Diameter, in
Based on Flygt Submersible Pump CP Series

GPM	Inches	Feet
2240	10	0.8
4500	16	1.3
6720	20	1.7
8500	24	2.0



Apron Flare

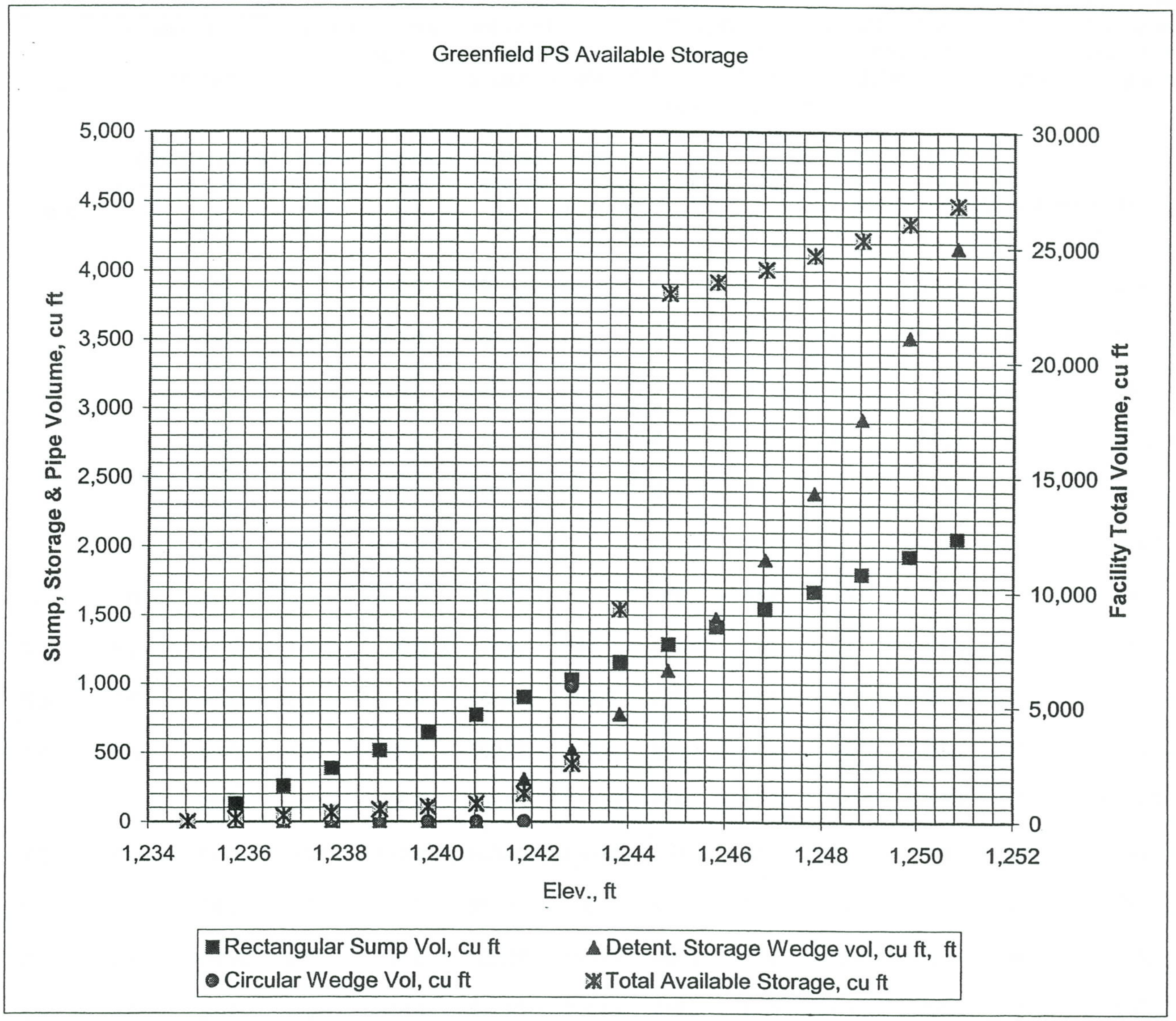
B=inletdepth*(1+((length)/(inletdepth*Fr))^1.5)

apron length=	11.20	Fr=	1.25	Based on 38 cfs in 30" pipe
Check w/ StorageRec!C5		inletdepth=	1.9	
apron width=	21.36			

Greenfield Road Stormwater Pump Station Stage Storage Table

Combined with Pump Capacity, !		**2,240**			Well IE	**1234.83**	Inlet Pipe IE			**1241.5**	Vent Duct & Safety Ladder Clearance	0
Based on the following components:					Hmin=	3.67						
Rectangular wet well		129	Rectangular sump size, sq ft				TAN Apron slope		0.26781		15 degrees	
Detention storage		*11.20*	*length*		14.67	*wide*	3.00	*deep*		c_p varies		
Ungula pipe storage	Height to inlet ,ft			6.67	4	diameter	max depth		3.7	slope=	0.01	pipe

Elevation,ft	Stage, feet	Rectangular Sump Vol, cu ft	Detent. Storage Wedge Depth, ft	Detent. Storage Wedge Length, ft	Detent. Storage Wedge vol, cu ft, ft	Circular Wedge Vol, cu ft	Total Available Storage, cu ft	Total Available Storage, ac ft	Area of Segment, sq ft	Length of element, ft	Depth of segment, ft	c_p
1,235	0	0	0	0	0	0	0	0	0.0	0.0		
1,236	1	129	0	0	0	0	129	0.003	0.0	0.0		
1,237	2	257	0	0	0	0	257	0.006	0.0	0.0		
1,238	3	386	0	0	0	0	386	0.009	0.0	0.0		
1,239	4	514	0	1	0	0	514	0.012	0.0	0.0		
1,240	5	643	1	5	0	0	643	0.015	0.0	0.0		
1,241	6	772	2	9	0	0	772	0.018	0.0	0.0		
1,242	7	900	3.3	12.4	304	1	1,206	0.028	0.5	33.4	0.3	-1.7
1,243	8	1,029	4.3	16.2	514	980	2,524	0.058	3.7	133.4	1.3	-0.7
1,244	9	1,158	5.3	19.9	779	7,296	9,233	0.212	7.6	233.4	2.3	0.3
1,245	10	1,286	6.3	23.7	1,099	20,612	22,997	0.528	11.2	333.4	3.3	1.3
1,246	11	1,415	7.3	27.4	1,473	20,612	23,500	0.539	12.6	370.0	4.3	2.3
1,247	12	1,543	8.3	31.1	1,902	20,612	24,058	0.552	12.6	370.0	5.3	3.3
1,248	13	1,672	9.3	34.9	2,386	20,612	24,670	0.566	12.6	370.0	6.3	4.3
1,249	14	1,801	10.3	38.6	2,924	20,612	25,337	0.582	12.6	370.0	7.3	5.3
1,250	15	1,929	11.3	42.3	3,518	20,612	26,059	0.598	12.6	370.0	8.3	6.3
1,251	16	2,058	12.3	46.1	4,166	20,612	26,836	0.616	12.6	370.0	9.3	7.3



Greenfield PS Available Storage
Sump, Storage & Pipe Volume, cu ft
5,000
4,500
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
Facility Total Volume, cu ft
30,000
25,000
20,000
15,000
10,000
5,000
0
1,234
1,236
1,238
1,240
1,242
1,244
1,246
1,248
1,250
1,252
Elev., ft
Rectangular Sump Vol, cu ft
Detent. Storage Wedge vol, cu ft, ft
Circular Wedge Vol, cu ft
Total Available Storage, cu ft

Rectangular Sump Dimensions For individual pump capacities up to 40,000 gpm

Design Indivudual Pump Capacity,gpm **2,240**

Assume three pumps along sump centerline (3 main)

Qp=individual pump capacity, cfs	Cu= 0.52	5.0
C=clearance between pump inlet bell and sump floor,ft	C=0.5*D	0.70
Dr= outside diameter of pump inlet bell/volute,ft=Inlet size,D+0.5	D=manuf.dim	1.40 See chart below
Hmin=minimum water depth in sump,ft	Hmin=S+C	3.67
S=minimum pump inlet submergence,ft	S=Dr+(Cur*Qp)/Dr^1.5	2.96
W=pump inlet bay width, ft	W=2*D	2.81
B=clearance from back wall to pump centerline, ft	B=0.75*D	1.05
X=pump inlet bay length, ft	X=5.5*D	7.72
Z1=distance from centerline to diverging walls	Z1=5.5*D	7.72
Vs=pump bay velocity, f/s	Vs=Qp/W*Hmin	0.49
Ws= sump width, ft	Ws=3*W	8.42
L=Length, ft	L=B+Z1	8.77
Total width including nuisance pump=Ws+W1cfs pumpft	W=Ws+6.25	14.67

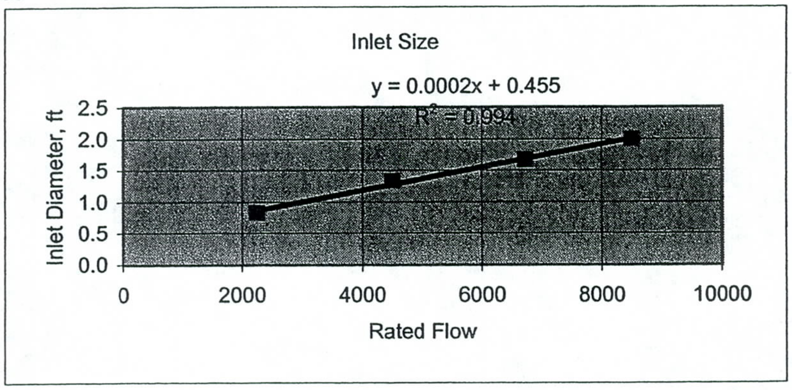
Cycle Time

minimum cycle time t=	10
Minimum cycle volume V=15*Qp*t, ft^3	749
Minimum depth from floor plan, L*Ws	10.14

Table for Inlet Diameter, in

Based on Flygt Submersible Pump CP Series

GPM	Inches	Feet
2240	10	0.8
4500	16	1.3
6720	20	1.7
8500	24	2.0



Apron Flare

B=inletdepth*(1+((length)/(inletdepth*Fr))^1.5)

apron length= 11.20	Fr=	1.25	Based on 38 cfs in 30" pipe
Check w/ StorageRec!C5	inletdepth=	1.9	
apron width= 21.36			

```
1*****************************************
***************************************
 *                                       *                    *
*
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *                    *    U.S. ARMY CORPS OF ENGINEERS
*
 *              JUN   1998               *                    *    HYDROLOGIC ENGINEERING CENTER
*
 *            VERSION 4.1                *                    *          609 SECOND STREET
*
 *                                       *                    *       DAVIS, CALIFORNIA 95616
*
 * RUN DATE   16SEP02  TIME  15:49:49    *                    *          (916) 756-1104
*
 *                                       *                    *
*
 *****************************************
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```
X     X  XXXXXXX   XXXXX          X
X     X  X        X     X        XX
X     X  X        X               X
XXXXXXX  XXXX     X       XXXXX   X
X     X  X        X               X
X     X  X        X     X         X
X     X  XXXXXXX   XXXXX         XXX
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THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

```
1                                HEC-1 INPUT                                          PAGE  1

     LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

       1           ID        TOWN OF GILBERT GREENFIELD ROAD STORM DRAINAGE PN:96446-1
       2           ID        KINEMATIC WAVE WATERSHED MODEL 50 year storm 2240 gpm
       3           IT       2 07SEP02    1200      300
       4           IO       4
                   *
                   *DIAGRAM
```

4480 GPM STATION

```
  5           KK       2
  6           KM        RUNOFF SECTION2
  7           KO       1
  8           BA  0.0050
              *      RATING FOR 30" DIA PIPE
  9           HQ       0      2.      4.      6.      8.     10.     12.     14.     16.     18.
 10           HQ     20.     22.     24.     26.
 11           HE       0    0.30    0.42    0.52    0.60    0.67    0.73    0.79    0.85    0.90
 12           HE    0.96    1.01    1.06    1.11
 13           PH                    0.64    1.25    2.11    2.30    2.43     2.6    2.93    3.00
              *      BLANK FOR 50-YR & BA ADJUSTMENT
 14           LG     0.3    0.15    8.20    0.12    85.1
              *      ASSUME CLAY LOAM SOIL PARAMETERS
 15           UK      52    0.04     .15     100
 16           RK     328  0.0210    .015 0.00063    TRAP       0       5
              *   GUTTER FLOW
 17           RK    1250  0.0210    .012            CIRC     2.5
              *   ROUTE TO STORAGE IN 24-IN RCP

 18           KK       3
 19           KM        RUNOFF SECTION3
 20           KO       0
 21           BA  0.0038
              *      RATING FOR 30" DIA PIPE
 22           HQ       0      2.      4.      6.      8.     10.     12.     14.     16.     18.
 23           HQ     20.     22.     24.     26.
 24           HE       0    0.29    0.40    0.49    0.56    0.63    0.69    0.75    0.80    0.85
 25           HE    0.90    0.95    1.00    1.04
 26           LG     0.3    0.15    8.20    0.12    90.3
              *      ASSUME CLAY LOAM SOIL PARAMETERS
 27           UK      52    0.04     .15     100
 28           RK     328  0.0250    .015 0.00063    TRAP       0       5
              *   GUTTER FLOW
 29           RK     900  0.0260    .012            CIRC     2.5
              *   ROUTE TO STORAGE IN 24-IN RCP

 30           KK       4
 31           KM        RUNOFF COMBINED
 32           HC       2

 33           KK       5
 34           KM        STORAGE FACILITY
 35           KO       0       2
              *      STORAGE FACILITY ROUTING THRU WET WELL - NO VAULT
 36           RS       1    STOR     0.0
 37           SV     0.0  0.0030  0.0060   0.012   0.015   0.018   0.028   0.058   0.212   0.528
 38           SV   0.539  0.5520  0.5660   0.582
 39           SE  1235.0  1236.0  1237.0  1239.0  1240.0  1241.0  1242.0  1243.0  1244.0  1245.0
1                                      HEC-1 INPUT                                         PAGE  2

LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 40           SE  1246.0  1247.0  1248.0  1249.0
 41           SQ       0       0       0       0       0       0       0       0       0       0
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             42           SQ       0      0.0      0.0      0.1
                          *    NUISANCE PUMP ON @ 1238.5  OFF @ 1235.50
             43           WP  1238.5      0.0  1235.5   PUMPS
                          *    PUMP 1 ON @  1242.0 & OFF @ 1238.5
             44           WP  1242.0      5.0  1239.5   PUMPS
                          *    PUMP 2 ON @  1244.2 & OFF @ 1240.0
             45           WP  1244.2      5.0  1241.0   PUMPS

             46           KK   PUMPS
             47           KM        PUMP STATION FLOW
             48           KO       0        2      10
             49           WR   PUMPS
             50           ZZ
1
                 SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

   NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

     5           2
                 .
                 .
    18           .           3
                 .           .
                 .           .
    30           4............
                 V
                 V
    43           .------->   PUMPS
    33           5
                 .
                 .
    49           .           .<-------   PUMPS
    46           .       PUMPS

 (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1*****************************************
****************************************
 *                                       *                                                      *
*
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)    *                                                      *   U.S. ARMY CORPS OF ENGINEERS
*
 *              JUN   1998                *                                                      *   HYDROLOGIC ENGINEERING CENTER
*
 *           VERSION 4.1                  *                                                      *         609 SECOND STREET
*
 *                                        *                                                      *      DAVIS, CALIFORNIA 95616
*
 *  RUN DATE   16SEP02  TIME  15:49:49    *                                                      *         (916) 756-1104
*
 *                                        *                                                      *
*
 *****************************************
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                            TOWN OF GILBERT GREENFIELD ROAD STORM DRAINAGE PN:96446-1
                            KINEMATIC WAVE WATERSHED MODEL 50 year storm 2240 gpm

  4 IO          OUTPUT CONTROL VARIABLES
                      IPRNT            4  PRINT CONTROL
                      IPLOT            0  PLOT CONTROL
                      QSCAL           0.  HYDROGRAPH PLOT SCALE

    IT          HYDROGRAPH TIME DATA
                       NMIN            2  MINUTES IN COMPUTATION INTERVAL
                      IDATE       7SEP 2  STARTING DATE
                      ITIME         1200  STARTING TIME
                         NQ          300  NUMBER OF HYDROGRAPH ORDINATES
                     NDDATE       7SEP 2  ENDING DATE
                     NDTIME         2158  ENDING TIME
                      ICENT           19  CENTURY MARK

                  COMPUTATION INTERVAL      .03 HOURS
                       TOTAL TIME BASE     9.97 HOURS

         ENGLISH UNITS
              DRAINAGE AREA          SQUARE MILES
              PRECIPITATION DEPTH    INCHES
              LENGTH, ELEVATION      FEET
              FLOW                   CUBIC FEET PER SECOND
              STORAGE VOLUME         ACRE-FEET
              SURFACE AREA           ACRES
              TEMPERATURE            DEGREES FAHRENHEIT


 *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***
*** ***

            **************
            *            *
  5 KK      *         2  *
            *            *
            **************
                            RUNOFF SECTION2

  7 KO          OUTPUT CONTROL VARIABLES
                      IPRNT            1  PRINT CONTROL
                      IPLOT            0  PLOT CONTROL
                      QSCAL           0.  HYDROGRAPH PLOT SCALE

              SUBBASIN RUNOFF DATA
```

```
  8 BA          SUBBASIN CHARACTERISTICS
                      TAREA          .00  SUBBASIN AREA

                PRECIPITATION DATA

 13 PH                                  DEPTHS FOR   0-PERCENT HYPOTHETICAL STORM
                ..... HYDRO-35 ......   ............... TP-40 ...............   ........... TP-49 ...........
                5-MIN  15-MIN  60-MIN    2-HR    3-HR    6-HR   12-HR   24-HR   2-DAY   4-DAY   7-DAY  10-DAY
                  .64    1.25    2.11    2.30    2.43    2.60    2.93    3.00     .00     .00     .00     .00

                                                   STORM AREA =      .00

 14 LG          GREEN AND AMPT LOSS RATE
                      STRTL          .30  STARTING LOSS
                        DTH          .15  MOISTURE DEFICIT
                       PSIF         8.20  WETTING FRONT SUCTION
                      XKSAT          .12  HYDRAULIC CONDUCTIVITY
                      RTIMP        85.10  PERCENT IMPERVIOUS AREA

                KINEMATIC WAVE
 15 UK            OVERLAND-FLOW ELEMENT NO. 1
                          L          52.  OVERLAND FLOW LENGTH
                          S        .0400  SLOPE
                          N         .150  ROUGHNESS COEFFICIENT
                         PA        100.0  PERCENT OF SUBBASIN
                      DXMIN            5  MINIMUM NUMBER OF DX INTERVALS

                KINEMATIC WAVE
 16 RK            COLLECTOR CHANNEL
                          L         328.  CHANNEL LENGTH
                          S        .0210  SLOPE
                          N         .015  CHANNEL ROUGHNESS COEFFICIENT
                         CA          .00  CONTRIBUTING AREA
                      SHAPE         TRAP  CHANNEL SHAPE
                         WD          .00  BOTTOM WIDTH OR DIAMETER
                          Z         5.00  SIDE SLOPE
                    NDXMIN             2  MINIMUM NUMBER OF DX INTERVALS
 17 RK            MAIN CHANNEL
                          L        1250.  CHANNEL LENGTH
                          S        .0210  SLOPE
                          N         .012  CHANNEL ROUGHNESS COEFFICIENT
                         CA          .00  CONTRIBUTING AREA
                      SHAPE         CIRC  CHANNEL SHAPE
                         WD         2.50  BOTTOM WIDTH OR DIAMETER
                          Z          .00  SIDE SLOPE
                    NDXMIN             2  MINIMUM NUMBER OF DX INTERVALS
                    RUPSTQ            NO  ROUTE UPSTREAM HYDROGRAPH

                                                        ***
                                         COMPUTED KINEMATIC PARAMETERS
                                               VARIABLE TIME STEP
                                             (DT SHOWN IS A MINIMUM)
```

ELEMENT	ALPHA	M	DT (MIN)	DX (FT)	PEAK (CFS)	TIME TO PEAK (MIN)	VOLUME (IN)	MAXIMUM CELERITY (FPS)
PLANE1	1.99	1.67	.55	10.40	24.19	300.11	2.63	.42
COLLECTOR1	5.24	1.33	.37	109.33	23.98	300.23	2.63	6.65
MAIN	11.31	1.25	.47	416.67	23.70	300.88	2.63	17.49

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .7060E+00 OUTFLOW= .7009E+00 BASIN STORAGE= .1241E-02 PERCENT ERROR= .5

INTERPOLATED TO SPECIFIED COMPUTATION INTERVAL

MAIN	11.31	1.25	2.00		23.03	302.00	2.63	

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HYDROGRAPH AT STATION 2

****
****

DA MON HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q	*	DA MON HRMN	ORD	RAIN	LOSS	EXCESS	COMP Q
7 SEP 1200	1	.00	.00	.00	0.	*	7 SEP 1700	151	.26	.00	.25	22.
7 SEP 1202	2	.00	.00	.00	0.	*	7 SEP 1702	152	.21	.00	.21	23.
7 SEP 1204	3	.00	.00	.00	0.	*	7 SEP 1704	153	.13	.00	.13	19.
7 SEP 1206	4	.00	.00	.00	0.	*	7 SEP 1706	154	.10	.00	.10	14.
7 SEP 1208	5	.00	.00	.00	0.	*	7 SEP 1708	155	.06	.00	.06	10.
7 SEP 1210	6	.00	.00	.00	0.	*	7 SEP 1710	156	.06	.00	.06	8.
7 SEP 1212	7	.00	.00	.00	0.	*	7 SEP 1712	157	.05	.00	.05	6.
7 SEP 1214	8	.00	.00	.00	0.	*	7 SEP 1714	158	.05	.00	.05	5.
7 SEP 1216	9	.00	.00	.00	0.	*	7 SEP 1716	159	.04	.00	.03	5.
7 SEP 1218	10	.00	.00	.00	0.	*	7 SEP 1718	160	.03	.00	.03	4.
7 SEP 1220	11	.00	.00	.00	0.	*	7 SEP 1720	161	.03	.00	.03	3.
7 SEP 1222	12	.00	.00	.00	0.	*	7 SEP 1722	162	.03	.00	.03	3.
7 SEP 1224	13	.00	.00	.00	0.	*	7 SEP 1724	163	.03	.00	.03	3.
7 SEP 1226	14	.00	.00	.00	0.	*	7 SEP 1726	164	.03	.00	.02	3.
7 SEP 1228	15	.00	.00	.00	0.	*	7 SEP 1728	165	.02	.00	.02	2.
7 SEP 1230	16	.00	.00	.00	0.	*	7 SEP 1730	166	.01	.00	.01	2.
7 SEP 1232	17	.00	.00	.00	0.	*	7 SEP 1732	167	.01	.00	.01	2.
7 SEP 1234	18	.00	.00	.00	0.	*	7 SEP 1734	168	.01	.00	.01	1.
7 SEP 1236	19	.00	.00	.00	0.	*	7 SEP 1736	169	.01	.00	.01	1.
7 SEP 1238	20	.00	.00	.00	0.	*	7 SEP 1738	170	.01	.00	.01	1.
7 SEP 1240	21	.00	.00	.00	0.	*	7 SEP 1740	171	.01	.00	.01	1.
7 SEP 1242	22	.00	.00	.00	0.	*	7 SEP 1742	172	.01	.00	.01	1.
7 SEP 1244	23	.00	.00	.00	0.	*	7 SEP 1744	173	.01	.00	.01	1.
7 SEP 1246	24	.00	.00	.00	0.	*	7 SEP 1746	174	.01	.00	.01	1.

7 SEP 1248	25	.00	.00	.00	0.	*
7 SEP 1250	26	.00	.00	.00	0.	*
7 SEP 1252	27	.00	.00	.00	0.	*
7 SEP 1254	28	.00	.00	.00	0.	*
7 SEP 1256	29	.00	.00	.00	0.	*
7 SEP 1258	30	.00	.00	.00	0.	*
7 SEP 1300	31	.00	.00	.00	0.	*
7 SEP 1302	32	.00	.00	.00	0.	*
7 SEP 1304	33	.00	.00	.00	0.	*
7 SEP 1306	34	.00	.00	.00	0.	*
7 SEP 1308	35	.00	.00	.00	0.	*
7 SEP 1310	36	.00	.00	.00	0.	*
7 SEP 1312	37	.00	.00	.00	0.	*
7 SEP 1314	38	.00	.00	.00	0.	*
7 SEP 1316	39	.00	.00	.00	0.	*
7 SEP 1318	40	.00	.00	.00	0.	*
7 SEP 1320	41	.00	.00	.00	0.	*
7 SEP 1322	42	.00	.00	.00	0.	*
7 SEP 1324	43	.00	.00	.00	0.	*
7 SEP 1326	44	.00	.00	.00	0.	*
7 SEP 1328	45	.00	.00	.00	0.	*
7 SEP 1330	46	.00	.00	.00	0.	*
7 SEP 1332	47	.00	.00	.00	0.	*
7 SEP 1334	48	.00	.00	.00	0.	*
7 SEP 1336	49	.00	.00	.00	0.	*
7 SEP 1338	50	.00	.00	.00	0.	*
7 SEP 1340	51	.00	.00	.00	0.	*
7 SEP 1342	52	.00	.00	.00	0.	*
7 SEP 1344	53	.00	.00	.00	0.	*
7 SEP 1346	54	.00	.00	.00	0.	*
7 SEP 1348	55	.00	.00	.00	0.	*
7 SEP 1350	56	.00	.00	.00	0.	*
7 SEP 1352	57	.00	.00	.00	0.	*
7 SEP 1354	58	.00	.00	.00	0.	*
7 SEP 1356	59	.00	.00	.00	0.	*
7 SEP 1358	60	.00	.00	.00	0.	*
7 SEP 1400	61	.00	.00	.00	0.	*
7 SEP 1402	62	.00	.00	.00	0.	*
7 SEP 1404	63	.00	.00	.00	0.	*
7 SEP 1406	64	.00	.00	.00	0.	*
7 SEP 1408	65	.00	.00	.00	0.	*
7 SEP 1410	66	.00	.00	.00	0.	*
7 SEP 1412	67	.00	.00	.00	0.	*
7 SEP 1414	68	.00	.00	.00	0.	*
7 SEP 1416	69	.00	.00	.00	0.	*
7 SEP 1418	70	.00	.00	.00	0.	*
7 SEP 1420	71	.00	.00	.00	0.	*
7 SEP 1422	72	.00	.00	.00	0.	*
7 SEP 1424	73	.00	.00	.00	0.	*
7 SEP 1426	74	.00	.00	.00	0.	*
7 SEP 1428	75	.00	.00	.00	0.	*
7 SEP 1430	76	.00	.00	.00	0.	*
7 SEP 1432	77	.00	.00	.00	0.	*
7 SEP 1434	78	.00	.00	.00	0.	*
7 SEP 1748	175	.01	.00	.00	1.	
7 SEP 1750	176	.01	.00	.00	1.	
7 SEP 1752	177	.01	.00	.00	1.	
7 SEP 1754	178	.01	.00	.00	1.	
7 SEP 1756	179	.01	.00	.00	0.	
7 SEP 1758	180	.00	.00	.00	0.	
7 SEP 1800	181	.01	.00	.00	0.	
7 SEP 1802	182	.01	.00	.00	0.	
7 SEP 1804	183	.00	.00	.00	0.	
7 SEP 1806	184	.00	.00	.00	0.	
7 SEP 1808	185	.00	.00	.00	0.	
7 SEP 1810	186	.00	.00	.00	0.	
7 SEP 1812	187	.00	.00	.00	0.	
7 SEP 1814	188	.00	.00	.00	0.	
7 SEP 1816	189	.00	.00	.00	0.	
7 SEP 1818	190	.00	.00	.00	0.	
7 SEP 1820	191	.00	.00	.00	0.	
7 SEP 1822	192	.00	.00	.00	0.	
7 SEP 1824	193	.00	.00	.00	0.	
7 SEP 1826	194	.00	.00	.00	0.	
7 SEP 1828	195	.00	.00	.00	0.	
7 SEP 1830	196	.00	.00	.00	0.	
7 SEP 1832	197	.00	.00	.00	0.	
7 SEP 1834	198	.00	.00	.00	0.	
7 SEP 1836	199	.00	.00	.00	0.	
7 SEP 1838	200	.00	.00	.00	0.	
7 SEP 1840	201	.00	.00	.00	0.	
7 SEP 1842	202	.00	.00	.00	0.	
7 SEP 1844	203	.00	.00	.00	0.	
7 SEP 1846	204	.00	.00	.00	0.	
7 SEP 1848	205	.00	.00	.00	0.	
7 SEP 1850	206	.00	.00	.00	0.	
7 SEP 1852	207	.00	.00	.00	0.	
7 SEP 1854	208	.00	.00	.00	0.	
7 SEP 1856	209	.00	.00	.00	0.	
7 SEP 1858	210	.00	.00	.00	0.	
7 SEP 1900	211	.00	.00	.00	0.	
7 SEP 1902	212	.00	.00	.00	0.	
7 SEP 1904	213	.00	.00	.00	0.	
7 SEP 1906	214	.00	.00	.00	0.	
7 SEP 1908	215	.00	.00	.00	0.	
7 SEP 1910	216	.00	.00	.00	0.	
7 SEP 1912	217	.00	.00	.00	0.	
7 SEP 1914	218	.00	.00	.00	0.	
7 SEP 1916	219	.00	.00	.00	0.	
7 SEP 1918	220	.00	.00	.00	0.	
7 SEP 1920	221	.00	.00	.00	0.	
7 SEP 1922	222	.00	.00	.00	0.	
7 SEP 1924	223	.00	.00	.00	0.	
7 SEP 1926	224	.00	.00	.00	0.	
7 SEP 1928	225	.00	.00	.00	0.	
7 SEP 1930	226	.00	.00	.00	0.	
7 SEP 1932	227	.00	.00	.00	0.	
7 SEP 1934	228	.00	.00	.00	0.	

7	SEP	1436	79	.00	.00	.00	0.	*
7	SEP	1438	80	.00	.00	.00	0.	*
7	SEP	1440	81	.00	.00	.00	0.	*
7	SEP	1442	82	.00	.00	.00	0.	*
7	SEP	1444	83	.00	.00	.00	0.	*
7	SEP	1446	84	.00	.00	.00	0.	*
7	SEP	1448	85	.00	.00	.00	0.	*
7	SEP	1450	86	.00	.00	.00	0.	*
7	SEP	1452	87	.00	.00	.00	0.	*
7	SEP	1454	88	.00	.00	.00	0.	*
7	SEP	1456	89	.00	.00	.00	0.	*
7	SEP	1458	90	.00	.00	.00	0.	*
7	SEP	1500	91	.00	.00	.00	0.	*
7	SEP	1502	92	.00	.00	.00	0.	*
7	SEP	1504	93	.00	.00	.00	0.	*
7	SEP	1506	94	.00	.00	.00	0.	*
7	SEP	1508	95	.00	.00	.00	0.	*
7	SEP	1510	96	.00	.00	.00	0.	*
7	SEP	1512	97	.00	.00	.00	0.	*
7	SEP	1514	98	.00	.00	.00	0.	*
7	SEP	1516	99	.00	.00	.00	0.	*
7	SEP	1518	100	.00	.00	.00	0.	*
7	SEP	1520	101	.00	.00	.00	0.	*
7	SEP	1522	102	.00	.00	.00	0.	*
7	SEP	1524	103	.00	.00	.00	0.	*
7	SEP	1526	104	.00	.00	.00	0.	*
7	SEP	1528	105	.00	.00	.00	0.	*
7	SEP	1530	106	.00	.00	.00	0.	*
7	SEP	1532	107	.00	.00	.00	0.	*
7	SEP	1534	108	.00	.00	.00	0.	*
7	SEP	1536	109	.00	.00	.00	0.	*
7	SEP	1538	110	.00	.00	.00	0.	*
7	SEP	1540	111	.00	.00	.00	0.	*
7	SEP	1542	112	.00	.00	.00	0.	*
7	SEP	1544	113	.00	.00	.00	0.	*
7	SEP	1546	114	.00	.00	.00	0.	*
7	SEP	1548	115	.00	.00	.00	0.	*
7	SEP	1550	116	.00	.00	.00	0.	*
7	SEP	1552	117	.00	.00	.00	0.	*
7	SEP	1554	118	.00	.00	.00	0.	*
7	SEP	1556	119	.00	.00	.00	0.	*
7	SEP	1558	120	.01	.00	.00	0.	*
7	SEP	1600	121	.00	.00	.00	0.	*
7	SEP	1602	122	.00	.00	.00	0.	*
7	SEP	1604	123	.01	.00	.00	0.	*
7	SEP	1606	124	.01	.00	.00	0.	*
7	SEP	1608	125	.01	.00	.00	0.	*
7	SEP	1610	126	.01	.00	.00	0.	*
7	SEP	1612	127	.01	.00	.00	0.	*
7	SEP	1614	128	.01	.00	.01	0.	*
7	SEP	1616	129	.01	.00	.01	0.	*
7	SEP	1618	130	.01	.00	.01	0.	*
7	SEP	1620	131	.01	.00	.01	0.	*
7	SEP	1622	132	.01	.00	.01	0.	*
7	SEP	1936	229	.00	.00	.00	0.	
7	SEP	1938	230	.00	.00	.00	0.	
7	SEP	1940	231	.00	.00	.00	0.	
7	SEP	1942	232	.00	.00	.00	0.	
7	SEP	1944	233	.00	.00	.00	0.	
7	SEP	1946	234	.00	.00	.00	0.	
7	SEP	1948	235	.00	.00	.00	0.	
7	SEP	1950	236	.00	.00	.00	0.	
7	SEP	1952	237	.00	.00	.00	0.	
7	SEP	1954	238	.00	.00	.00	0.	
7	SEP	1956	239	.00	.00	.00	0.	
7	SEP	1958	240	.00	.00	.00	0.	
7	SEP	2000	241	.00	.00	.00	0.	
7	SEP	2002	242	.00	.00	.00	0.	
7	SEP	2004	243	.00	.00	.00	0.	
7	SEP	2006	244	.00	.00	.00	0.	
7	SEP	2008	245	.00	.00	.00	0.	
7	SEP	2010	246	.00	.00	.00	0.	
7	SEP	2012	247	.00	.00	.00	0.	
7	SEP	2014	248	.00	.00	.00	0.	
7	SEP	2016	249	.00	.00	.00	0.	
7	SEP	2018	250	.00	.00	.00	0.	
7	SEP	2020	251	.00	.00	.00	0.	
7	SEP	2022	252	.00	.00	.00	0.	
7	SEP	2024	253	.00	.00	.00	0.	
7	SEP	2026	254	.00	.00	.00	0.	
7	SEP	2028	255	.00	.00	.00	0.	
7	SEP	2030	256	.00	.00	.00	0.	
7	SEP	2032	257	.00	.00	.00	0.	
7	SEP	2034	258	.00	.00	.00	0.	
7	SEP	2036	259	.00	.00	.00	0.	
7	SEP	2038	260	.00	.00	.00	0.	
7	SEP	2040	261	.00	.00	.00	0.	
7	SEP	2042	262	.00	.00	.00	0.	
7	SEP	2044	263	.00	.00	.00	0.	
7	SEP	2046	264	.00	.00	.00	0.	
7	SEP	2048	265	.00	.00	.00	0.	
7	SEP	2050	266	.00	.00	.00	0.	
7	SEP	2052	267	.00	.00	.00	0.	
7	SEP	2054	268	.00	.00	.00	0.	
7	SEP	2056	269	.00	.00	.00	0.	
7	SEP	2058	270	.00	.00	.00	0.	
7	SEP	2100	271	.00	.00	.00	0.	
7	SEP	2102	272	.00	.00	.00	0.	
7	SEP	2104	273	.00	.00	.00	0.	
7	SEP	2106	274	.00	.00	.00	0.	
7	SEP	2108	275	.00	.00	.00	0.	
7	SEP	2110	276	.00	.00	.00	0.	
7	SEP	2112	277	.00	.00	.00	0.	
7	SEP	2114	278	.00	.00	.00	0.	
7	SEP	2116	279	.00	.00	.00	0.	
7	SEP	2118	280	.00	.00	.00	0.	
7	SEP	2120	281	.00	.00	.00	0.	
7	SEP	2122	282	.00	.00	.00	0.	

7 SEP 1624	133	.01	.00	.01	1.	*	7 SEP 2124	283	.00	.00	.00	0.
7 SEP 1626	134	.01	.00	.01	1.	*	7 SEP 2126	284	.00	.00	.00	0.
7 SEP 1628	135	.01	.00	.01	1.	*	7 SEP 2128	285	.00	.00	.00	0.
7 SEP 1630	136	.02	.00	.02	1.	*	7 SEP 2130	286	.00	.00	.00	0.
7 SEP 1632	137	.03	.00	.02	1.	*	7 SEP 2132	287	.00	.00	.00	0.
7 SEP 1634	138	.03	.00	.02	1.	*	7 SEP 2134	288	.00	.00	.00	0.
7 SEP 1636	139	.03	.00	.02	2.	*	7 SEP 2136	289	.00	.00	.00	0.
7 SEP 1638	140	.03	.00	.03	2.	*	7 SEP 2138	290	.00	.00	.00	0.
7 SEP 1640	141	.03	.00	.03	2.	*	7 SEP 2140	291	.00	.00	.00	0.
7 SEP 1642	142	.03	.00	.03	2.	*	7 SEP 2142	292	.00	.00	.00	0.
7 SEP 1644	143	.04	.00	.03	3.	*	7 SEP 2144	293	.00	.00	.00	0.
7 SEP 1646	144	.05	.00	.05	3.	*	7 SEP 2146	294	.00	.00	.00	0.
7 SEP 1648	145	.05	.00	.05	4.	*	7 SEP 2148	295	.00	.00	.00	0.
7 SEP 1650	146	.06	.00	.06	4.	*	7 SEP 2150	296	.00	.00	.00	0.
7 SEP 1652	147	.08	.00	.08	5.	*	7 SEP 2152	297	.00	.00	.00	0.
7 SEP 1654	148	.11	.00	.10	7.	*	7 SEP 2154	298	.00	.00	.00	0.
7 SEP 1656	149	.15	.00	.14	9.	*	7 SEP 2156	299	.00	.00	.00	0.
7 SEP 1658	150	.26	.00	.25	15.	*	7 SEP 2158	300	.00	.00	.00	0.
						*						

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TOTAL RAINFALL = 2.84, TOTAL LOSS = .19, TOTAL EXCESS = 2.65

	PEAK FLOW	TIME		MAXIMUM AVERAGE FLOW			
				6-HR	24-HR	72-HR	9.97-HR
+	(CFS)	(HR)					
			(CFS)				
+	23.	5.03		1.	1.	1.	1.
			(INCHES)	2.456	2.628	2.628	2.628
			(AC-FT)	1.	1.	1.	1.

CUMULATIVE AREA = .00 SQ MI

COMPUTE STAGES FROM GIVEN RATING DATA

8 HQ	FLOW	0.	2.	4.	6.	8.	10.	12.	14.	16.
18.										
11 HE	STAGE	.0	.3	.4	.5	.6	.7	.7	.8	.9
.9										
	FLOW	20.	22.	24.	26.					
	STAGE	1.0	1.0	1.1	1.1					

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HYDROGRAPH AT STATION 2

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DA MON HRMN	ORD	FLOW	STAGE	*	DA MON HRMN	ORD	FLOW	STAGE	*	DA MON HRMN	ORD	FLOW	STAGE
7 SEP 1200	1	0.	.0	*	7 SEP 1520	101	0.	.0	*	7 SEP 1840	201	0.	.0
7 SEP 1202	2	0.	.0	*	7 SEP 1522	102	0.	.0	*	7 SEP 1842	202	0.	.0
7 SEP 1204	3	0.	.0	*	7 SEP 1524	103	0.	.0	*	7 SEP 1844	203	0.	.0
7 SEP 1206	4	0.	.0	*	7 SEP 1526	104	0.	.0	*	7 SEP 1846	204	0.	.0
7 SEP 1208	5	0.	.0	*	7 SEP 1528	105	0.	.0	*	7 SEP 1848	205	0.	.0
7 SEP 1210	6	0.	.0	*	7 SEP 1530	106	0.	.0	*	7 SEP 1850	206	0.	.0
7 SEP 1212	7	0.	.0	*	7 SEP 1532	107	0.	.0	*	7 SEP 1852	207	0.	.0
7 SEP 1214	8	0.	.0	*	7 SEP 1534	108	0.	.0	*	7 SEP 1854	208	0.	.0
7 SEP 1216	9	0.	.0	*	7 SEP 1536	109	0.	.0	*	7 SEP 1856	209	0.	.0
7 SEP 1218	10	0.	.0	*	7 SEP 1538	110	0.	.0	*	7 SEP 1858	210	0.	.0
7 SEP 1220	11	0.	.0	*	7 SEP 1540	111	0.	.0	*	7 SEP 1900	211	0.	.0
7 SEP 1222	12	0.	.0	*	7 SEP 1542	112	0.	.0	*	7 SEP 1902	212	0.	.0
7 SEP 1224	13	0.	.0	*	7 SEP 1544	113	0.	.0	*	7 SEP 1904	213	0.	.0
7 SEP 1226	14	0.	.0	*	7 SEP 1546	114	0.	.0	*	7 SEP 1906	214	0.	.0
7 SEP 1228	15	0.	.0	*	7 SEP 1548	115	0.	.0	*	7 SEP 1908	215	0.	.0
7 SEP 1230	16	0.	.0	*	7 SEP 1550	116	0.	.0	*	7 SEP 1910	216	0.	.0
7 SEP 1232	17	0.	.0	*	7 SEP 1552	117	0.	.1	*	7 SEP 1912	217	0.	.0
7 SEP 1234	18	0.	.0	*	7 SEP 1554	118	0.	.1	*	7 SEP 1914	218	0.	.0
7 SEP 1236	19	0.	.0	*	7 SEP 1556	119	0.	.1	*	7 SEP 1916	219	0.	.0
7 SEP 1238	20	0.	.0	*	7 SEP 1558	120	0.	.1	*	7 SEP 1918	220	0.	.0
7 SEP 1240	21	0.	.0	*	7 SEP 1600	121	0.	.1	*	7 SEP 1920	221	0.	.0
7 SEP 1242	22	0.	.0	*	7 SEP 1602	122	0.	.1	*	7 SEP 1922	222	0.	.0
7 SEP 1244	23	0.	.0	*	7 SEP 1604	123	0.	.1	*	7 SEP 1924	223	0.	.0
7 SEP 1246	24	0.	.0	*	7 SEP 1606	124	0.	.1	*	7 SEP 1926	224	0.	.0
7 SEP 1248	25	0.	.0	*	7 SEP 1608	125	0.	.1	*	7 SEP 1928	225	0.	

.0	7 SEP 1250	26	0.	.0	*	7 SEP 1610	126	0.	.1	*	7 SEP 1930	226	0.
.0	7 SEP 1252	27	0.	.0	*	7 SEP 1612	127	0.	.1	*	7 SEP 1932	227	0.
.0	7 SEP 1254	28	0.	.0	*	7 SEP 1614	128	0.	.1	*	7 SEP 1934	228	0.
.0	7 SEP 1256	29	0.	.0	*	7 SEP 1616	129	0.	.1	*	7 SEP 1936	229	0.
.0	7 SEP 1258	30	0.	.0	*	7 SEP 1618	130	0.	.1	*	7 SEP 1938	230	0.
.0	7 SEP 1300	31	0.	.0	*	7 SEP 1620	131	0.	.1	*	7 SEP 1940	231	0.
.0	7 SEP 1302	32	0.	.0	*	7 SEP 1622	132	0.	.1	*	7 SEP 1942	232	0.
.0	7 SEP 1304	33	0.	.0	*	7 SEP 1624	133	1.	.1	*	7 SEP 1944	233	0.
.0	7 SEP 1306	34	0.	.0	*	7 SEP 1626	134	1.	.1	*	7 SEP 1946	234	0.
.0	7 SEP 1308	35	0.	.0	*	7 SEP 1628	135	1.	.1	*	7 SEP 1948	235	0.
.0	7 SEP 1310	36	0.	.0	*	7 SEP 1630	136	1.	.1	*	7 SEP 1950	236	0.
.0	7 SEP 1312	37	0.	.0	*	7 SEP 1632	137	1.	.1	*	7 SEP 1952	237	0.
.0	7 SEP 1314	38	0.	.0	*	7 SEP 1634	138	1.	.2	*	7 SEP 1954	238	0.
.0	7 SEP 1316	39	0.	.0	*	7 SEP 1636	139	2.	.2	*	7 SEP 1956	239	0.
.0	7 SEP 1318	40	0.	.0	*	7 SEP 1638	140	2.	.3	*	7 SEP 1958	240	0.
.0	7 SEP 1320	41	0.	.0	*	7 SEP 1640	141	2.	.3	*	7 SEP 2000	241	0.
.0	7 SEP 1322	42	0.	.0	*	7 SEP 1642	142	2.	.3	*	7 SEP 2002	242	0.
.0	7 SEP 1324	43	0.	.0	*	7 SEP 1644	143	3.	.3	*	7 SEP 2004	243	0.
.0	7 SEP 1326	44	0.	.0	*	7 SEP 1646	144	3.	.4	*	7 SEP 2006	244	0.
.0	7 SEP 1328	45	0.	.0	*	7 SEP 1648	145	4.	.4	*	7 SEP 2008	245	0.
.0	7 SEP 1330	46	0.	.0	*	7 SEP 1650	146	4.	.4	*	7 SEP 2010	246	0.
.0	7 SEP 1332	47	0.	.0	*	7 SEP 1652	147	5.	.5	*	7 SEP 2012	247	0.
.0	7 SEP 1334	48	0.	.0	*	7 SEP 1654	148	7.	.6	*	7 SEP 2014	248	0.
.0	7 SEP 1336	49	0.	.0	*	7 SEP 1656	149	9.	.6	*	7 SEP 2016	249	0.
.0	7 SEP 1338	50	0.	.0	*	7 SEP 1658	150	15.	.8	*	7 SEP 2018	250	0.
.0	7 SEP 1340	51	0.	.0	*	7 SEP 1700	151	22.	1.0	*	7 SEP 2020	251	0.
.0	7 SEP 1342	52	0.	.0	*	7 SEP 1702	152	23.	1.0	*	7 SEP 2022	252	0.

.0	7 SEP 1344	53	0.	.0	*	7 SEP 1704	153	19.	.9	*	7 SEP 2024	253	0.
.0	7 SEP 1346	54	0.	.0	*	7 SEP 1706	154	14.	.8	*	7 SEP 2026	254	0.
.0	7 SEP 1348	55	0.	.0	*	7 SEP 1708	155	10.	.7	*	7 SEP 2028	255	0.
.0	7 SEP 1350	56	0.	.0	*	7 SEP 1710	156	8.	.6	*	7 SEP 2030	256	0.
.0	7 SEP 1352	57	0.	.0	*	7 SEP 1712	157	6.	.5	*	7 SEP 2032	257	0.
.0	7 SEP 1354	58	0.	.0	*	7 SEP 1714	158	5.	.5	*	7 SEP 2034	258	0.
.0	7 SEP 1356	59	0.	.0	*	7 SEP 1716	159	5.	.5	*	7 SEP 2036	259	0.
.0	7 SEP 1358	60	0.	.0	*	7 SEP 1718	160	4.	.4	*	7 SEP 2038	260	0.
.0	7 SEP 1400	61	0.	.0	*	7 SEP 1720	161	3.	.4	*	7 SEP 2040	261	0.
.0	7 SEP 1402	62	0.	.0	*	7 SEP 1722	162	3.	.4	*	7 SEP 2042	262	0.
.0	7 SEP 1404	63	0.	.0	*	7 SEP 1724	163	3.	.4	*	7 SEP 2044	263	0.
.0	7 SEP 1406	64	0.	.0	*	7 SEP 1726	164	3.	.3	*	7 SEP 2046	264	0.
.0	7 SEP 1408	65	0.	.0	*	7 SEP 1728	165	2.	.3	*	7 SEP 2048	265	0.
.0	7 SEP 1410	66	0.	.0	*	7 SEP 1730	166	2.	.3	*	7 SEP 2050	266	0.
.0	7 SEP 1412	67	0.	.0	*	7 SEP 1732	167	2.	.3	*	7 SEP 2052	267	0.
.0	7 SEP 1414	68	0.	.0	*	7 SEP 1734	168	1.	.2	*	7 SEP 2054	268	0.
.0	7 SEP 1416	69	0.	.0	*	7 SEP 1736	169	1.	.2	*	7 SEP 2056	269	0.
.0	7 SEP 1418	70	0.	.0	*	7 SEP 1738	170	1.	.1	*	7 SEP 2058	270	0.
.0	7 SEP 1420	71	0.	.0	*	7 SEP 1740	171	1.	.1	*	7 SEP 2100	271	0.
.0	7 SEP 1422	72	0.	.0	*	7 SEP 1742	172	1.	.1	*	7 SEP 2102	272	0.
.0	7 SEP 1424	73	0.	.0	*	7 SEP 1744	173	1.	.1	*	7 SEP 2104	273	0.
.0	7 SEP 1426	74	0.	.0	*	7 SEP 1746	174	1.	.1	*	7 SEP 2106	274	0.
.0	7 SEP 1428	75	0.	.0	*	7 SEP 1748	175	1.	.1	*	7 SEP 2108	275	0.
.0	7 SEP 1430	76	0.	.0	*	7 SEP 1750	176	1.	.1	*	7 SEP 2110	276	0.
.0	7 SEP 1432	77	0.	.0	*	7 SEP 1752	177	1.	.1	*	7 SEP 2112	277	0.
.0	7 SEP 1434	78	0.	.0	*	7 SEP 1754	178	1.	.1	*	7 SEP 2114	278	0.
.0	7 SEP 1436	79	0.	.0	*	7 SEP 1756	179	0.	.1	*	7 SEP 2116	279	0.

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.0
     7 SEP 1438   80         0.         .0   *   7 SEP 1758  180         0.         .1   *   7 SEP 2118  280         0.
.0
     7 SEP 1440   81         0.         .0   *   7 SEP 1800  181         0.         .1   *   7 SEP 2120  281         0.
.0
     7 SEP 1442   82         0.         .0   *   7 SEP 1802  182         0.         .1   *   7 SEP 2122  282         0.
.0
     7 SEP 1444   83         0.         .0   *   7 SEP 1804  183         0.         .1   *   7 SEP 2124  283         0.
.0
     7 SEP 1446   84         0.         .0   *   7 SEP 1806  184         0.         .1   *   7 SEP 2126  284         0.
.0
     7 SEP 1448   85         0.         .0   *   7 SEP 1808  185         0.         .1   *   7 SEP 2128  285         0.
.0
     7 SEP 1450   86         0.         .0   *   7 SEP 1810  186         0.         .1   *   7 SEP 2130  286         0.
.0
     7 SEP 1452   87         0.         .0   *   7 SEP 1812  187         0.         .1   *   7 SEP 2132  287         0.
.0
     7 SEP 1454   88         0.         .0   *   7 SEP 1814  188         0.         .1   *   7 SEP 2134  288         0.
.0
     7 SEP 1456   89         0.         .0   *   7 SEP 1816  189         0.         .1   *   7 SEP 2136  289         0.
.0
     7 SEP 1458   90         0.         .0   *   7 SEP 1818  190         0.         .1   *   7 SEP 2138  290         0.
.0
     7 SEP 1500   91         0.         .0   *   7 SEP 1820  191         0.         .1   *   7 SEP 2140  291         0.
.0
     7 SEP 1502   92         0.         .0   *   7 SEP 1822  192         0.         .1   *   7 SEP 2142  292         0.
.0
     7 SEP 1504   93         0.         .0   *   7 SEP 1824  193         0.         .1   *   7 SEP 2144  293         0.
.0
     7 SEP 1506   94         0.         .0   *   7 SEP 1826  194         0.         .1   *   7 SEP 2146  294         0.
.0
     7 SEP 1508   95         0.         .0   *   7 SEP 1828  195         0.         .1   *   7 SEP 2148  295         0.
.0
     7 SEP 1510   96         0.         .0   *   7 SEP 1830  196         0.         .0   *   7 SEP 2150  296         0.
.0
     7 SEP 1512   97         0.         .0   *   7 SEP 1832  197         0.         .0   *   7 SEP 2152  297         0.
.0
     7 SEP 1514   98         0.         .0   *   7 SEP 1834  198         0.         .0   *   7 SEP 2154  298         0.
.0
     7 SEP 1516   99         0.         .0   *   7 SEP 1836  199         0.         .0   *   7 SEP 2156  299         0.
.0
     7 SEP 1518  100         0.         .0   *   7 SEP 1838  200         0.         .0   *   7 SEP 2158  300         0.
.0
                                             *                                           *
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      MAXIMUM STAGE IS    1.04


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                 *            *
  18 KK          *         3  *
                 *            *
                 **************
                                   RUNOFF SECTION3

  20 KO               OUTPUT CONTROL VARIABLES
                            IPRNT           4  PRINT CONTROL
                            IPLOT           0  PLOT CONTROL
                            QSCAL          0.  HYDROGRAPH PLOT SCALE

                    SUBBASIN RUNOFF DATA

  21 BA               SUBBASIN CHARACTERISTICS
                            TAREA         .00  SUBBASIN AREA

                      PRECIPITATION DATA

  13 PH                                     DEPTHS FOR   0-PERCENT HYPOTHETICAL STORM
                      ..... HYDRO-35 ......   ............... TP-40 ...............   ........... TP-49 ..........
                      5-MIN  15-MIN  60-MIN     2-HR     3-HR     6-HR    12-HR    24-HR    2-DAY   4-DAY   7-DAY  10-DAY
                        .64    1.25    2.11     2.30     2.43     2.60     2.93     3.00      .00     .00     .00     .00

                                                             STORM AREA =      .00

  26 LG               GREEN AND AMPT LOSS RATE
                            STRTL         .30  STARTING LOSS
                              DTH         .15  MOISTURE DEFICIT
                             PSIF        8.20  WETTING FRONT SUCTION
                           XKSAT          .12  HYDRAULIC CONDUCTIVITY
                            RTIMP       90.30  PERCENT IMPERVIOUS AREA

                      KINEMATIC WAVE
  27 UK                 OVERLAND-FLOW ELEMENT NO. 1
                                L         52.  OVERLAND FLOW LENGTH
                                S       .0400  SLOPE
                                N        .150  ROUGHNESS COEFFICIENT
                               PA       100.0  PERCENT OF SUBBASIN
                            DXMIN           5  MINIMUM NUMBER OF DX INTERVALS

                      KINEMATIC WAVE
  28 RK                 COLLECTOR CHANNEL
                                L        328.  CHANNEL LENGTH
                                S       .0250  SLOPE
                                N        .015  CHANNEL ROUGHNESS COEFFICIENT
                               CA         .00  CONTRIBUTING AREA
                            SHAPE        TRAP  CHANNEL SHAPE
                               WD         .00  BOTTOM WIDTH OR DIAMETER
                                Z        5.00  SIDE SLOPE
                           NDXMIN           2  MINIMUM NUMBER OF DX INTERVALS
  29 RK                 MAIN CHANNEL
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                             L        900.  CHANNEL LENGTH
                             S      .0260  SLOPE
                             N       .012  CHANNEL ROUGHNESS COEFFICIENT
                            CA        .00  CONTRIBUTING AREA
                         SHAPE       CIRC  CHANNEL SHAPE
                            WD       2.50  BOTTOM WIDTH OR DIAMETER
                             Z        .00  SIDE SLOPE
                        NDXMIN          2  MINIMUM NUMBER OF DX INTERVALS
                        RUPSTQ         NO  ROUTE UPSTREAM HYDROGRAPH

                                                                ***

                  COMPUTE STAGES FROM GIVEN RATING DATA

   21 HQ                  FLOW        0.       2.       4.       6.       8.      10.      12.      14.      16.
18.
   24 HE                 STAGE        .0       .3       .4       .5       .6       .6       .7       .8       .8
.9

                          FLOW       20.      22.      24.      26.
                         STAGE        .9       .9      1.0      1.0


 *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***
*** ***

              **************
              *            *
   30 KK      *       4    *
              *            *
              **************
                             RUNOFF COMBINED

   32 HC          HYDROGRAPH COMBINATION
                         ICOMP           2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                                ***


 *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***
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              **************
              *            *
   33 KK      *       5    *
              *            *
              **************
                             STORAGE FACILITY

   35 KO          OUTPUT CONTROL VARIABLES
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                    IPRNT           4  PRINT CONTROL
                    IPLOT           2  PLOT CONTROL
                    QSCAL          0.  HYDROGRAPH PLOT SCALE

             HYDROGRAPH ROUTING DATA

   36 RS       STORAGE ROUTING
                    NSTPS           1  NUMBER OF SUBREACHES
                     ITYP        STOR  TYPE OF INITIAL CONDITION
                   RSVRIC         .00  INITIAL CONDITION
                        X         .00 WORKING R AND D COEFFICIENT

   37 SV        STORAGE         .0       .0       .0       .0       .0       .0       .0       .1       .2
.5
                                .5       .6       .6       .6

   39 SE       ELEVATION   1235.00  1236.00  1237.00  1239.00  1240.00  1241.00  1242.00  1243.00  1244.00
1245.00
                           1246.00  1247.00  1248.00  1249.00

   41 SQ       DISCHARGE        0.       0.       0.       0.       0.       0.       0.       0.       0.
0.
                                0.       0.       0.       0.

   44 WP       PUMPING DATA

                  PUMP ON    PUMPING    PUMP OFF
                 ELEVATION     RATE    ELEVATION

                   1242.0       5.       1239.5
                   1244.2       5.       1241.0

                    ISTAD        PUMPS  PUMP FLOW HYDROGRAPH IDENTIFICATION

                                                                   ***
1                                                              STATION        5

                              (I) INFLOW,   (O) OUTFLOW
         0.         5.        10.       15.       20.       25.       30.       35.       40.       45.        0.        0.
0.
 DAHRMN PER
  71200
 1I---------.---------.---------.---------.---------.---------.---------.---------.---------.---------.---------.---------.
  71202   2I          .         .         .         .         .         .         .         .         .         .         .
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  71204   3I          .         .         .         .         .         .         .         .         .         .         .
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  71206   4I          .         .         .         .         .         .         .         .         .         .         .
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  71208   5I          .         .         .         .         .         .         .         .         .         .         .
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  71210   6I          .         .         .         .         .         .         .         .         .         .         .
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  71212   7I          .         .         .         .         .         .         .         .         .         .         .
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71214	8I	.	.	.	.	.	.	.	.	.	.	.
71216	9I	.	.	.	.	.	.	.	.	.	.	.
71218	10I	.	.	.	.	.	.	.	.	.	.	.
71220	11I	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .
71222	12I	.	.	.	.	.	.	.	.	.	.	.
71224	13I	.	.	.	.	.	.	.	.	.	.	.
71226	14I	.	.	.	.	.	.	.	.	.	.	.
71228	15I	.	.	.	.	.	.	.	.	.	.	.
71230	16I	.	.	.	.	.	.	.	.	.	.	.
71232	17I	.	.	.	.	.	.	.	.	.	.	.
71234	18I	.	.	.	.	.	.	.	.	.	.	.
71236	19I	.	.	.	.	.	.	.	.	.	.	.
71238	20OI	.	.	.	.	.	.	.	.	.	.	.
71240	21OI	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .
71242	22OI	.	.	.	.	.	.	.	.	.	.	.
71244	23OI	.	.	.	.	.	.	.	.	.	.	.
71246	24OI	.	.	.	.	.	.	.	.	.	.	.
71248	25OI	.	.	.	.	.	.	.	.	.	.	.
71250	26OI	.	.	.	.	.	.	.	.	.	.	.
71252	27OI	.	.	.	.	.	.	.	.	.	.	.
71254	28OI	.	.	.	.	.	.	.	.	.	.	.
71256	29OI	.	.	.	.	.	.	.	.	.	.	.
71258	30OI	.	.	.	.	.	.	.	.	.	.	.
71300	31OI	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .
71302	32OI	.	.	.	.	.	.	.	.	.	.	.
71304	33OI	.	.	.	.	.	.	.	.	.	.	.
71306	34OI	.	.	.	.	.	.	.	.	.	.	.

71308 35OI
71310 36OI
71312 37OI
71314 38OI
71316 39OI
71318 40OI
71320 41OI
71322 42OI
71324 43OI
71326 44OI
71328 45OI
71330 46OI
71332 47OI
71334 48OI
71336 49OI
71338 50OI
71340 51OI
71342 52OI
71344 53OI
71346 54OI
71348 55OI
71350 56OI
71352 57OI
71354 58OI
71356 59OI
71358 60OI
71400 61OI

71402	62OI	.	.	.	.	.	.	.	.	.	.	.
71404	63OI	.	.	.	.	.	.	.	.	.	.	.
71406	64OI	.	.	.	.	.	.	.	.	.	.	.
71408	65OI	.	.	.	.	.	.	.	.	.	.	.
71410	66OI	.	.	.	.	.	.	.	.	.	.	.
71412	67OI	.	.	.	.	.	.	.	.	.	.	.
71414	68OI	.	.	.	.	.	.	.	.	.	.	.
71416	69OI	.	.	.	.	.	.	.	.	.	.	.
71418	70I	.	.	.	.	.	.	.	.	.	.	.
71420	71I	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .
71422	72I	.	.	.	.	.	.	.	.	.	.	.
71424	73I	.	.	.	.	.	.	.	.	.	.	.
71426	74I	.	.	.	.	.	.	.	.	.	.	.
71428	75I	.	.	.	.	.	.	.	.	.	.	.
71430	76I	.	.	.	.	.	.	.	.	.	.	.
71432	77I	.	.	.	.	.	.	.	.	.	.	.
71434	78I	.	.	.	.	.	.	.	.	.	.	.
71436	79I	.	.	.	.	.	.	.	.	.	.	.
71438	80I	.	.	.	.	.	.	.	.	.	.	.
71440	81I	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .	. . . . .
71442	82I	.	.	.	.	.	.	.	.	.	.	.
71444	83I	.	.	.	.	.	.	.	.	.	.	.
71446	84OI	.	.	.	.	.	.	.	.	.	.	.
71448	85OI	.	.	.	.	.	.	.	.	.	.	.
71450	86OI	.	.	.	.	.	.	.	.	.	.	.
71452	87OI	.	.	.	.	.	.	.	.	.	.	.
71454	88OI	.	.	.	.	.	.	.	.	.	.	.

71456 89OI

71458 90OI

71500 91OI

71502 92OI

71504 93OI

71506 94OI

71508 95OI

71510 96OI

71512 97OI

71514 98OI

71516 99OI

71518 100OI

71520 101OI

71522 102OI

71524 103OI

71526 104OI

71528 105OI

71530 106OI

71532 107OI

71534 108OI

71536 109OI

71538 110OI

71540 111OI

71542 112OI

71544 113OI

71546 114OI

71548 115OI

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 71550 1160I       .       .       .       .       .       .       .       .       .       .       .
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 71552 1170I       .       .       .       .       .       .       .       .       .       .       .
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 71554 1180I       .       .       .       .       .       .       .       .       .       .       .
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 71556 1190I       .       .       .       .       .       .       .       .       .       .       .
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 71558 1200I       .       .       .       .       .       .       .       .       .       .       .
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 71600 1210I. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
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 71602 1220I       .       .       .       .       .       .       .       .       .       .       .
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 71604 1230I       .       .       .       .       .       .       .       .       .       .       .
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 71606 1240I       .       .       .       .       .       .       .       .       .       .       .
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 71608 1250I       .       .       .       .       .       .       .       .       .       .       .
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 71610 1260 I      .       .       .       .       .       .       .       .       .       .       .
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 71612 1270 I      .       .       .       .       .       .       .       .       .       .       .
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 71614 1280 I      .       .       .       .       .       .       .       .       .       .       .
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 71616 1290 I      .       .       .       .       .       .       .       .       .       .       .
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 71618 1300 I      .       .       .       .       .       .       .       .       .       .       .
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 71620 1310 I . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
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 71622 1320 I      .       .       .       .       .       .       .       .       .       .       .
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 71624 1330 I      .       .       .       .       .       .       .       .       .       .       .
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 71626 1340 I      .       .       .       .       .       .       .       .       .       .       .
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 71628 1350 I      .       .       .       .       .       .       .       .       .       .       .
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 71630 1360 I      .       .       .       .       .       .       .       .       .       .       .
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 71632 1370  I     .       .       .       .       .       .       .       .       .       .       .
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 71634 1380   I    .       .       .       .       .       .       .       .       .       .       .
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 71636 1390     I  .       .       .       .       .       .       .       .       .       .       .
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 71638 1400      I .       .       .       .       .       .       .       .       .       .       .
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 71640 1410 . . . I . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
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 71642 1420       I.       .       .       .       .       .       .       .       .       .       .
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71644 1430          I         .         .         .         .         .         .         .         .         .         .
71646 1440          .I        .         .         .         .         .         .         .         .         .         .
71648 1450          .  I      .         .         .         .         .         .         .         .         .         .
71650 1460          .     I   .         .         .         .         .         .         .         .         .         .
71652 1470          .        I.         .         .         .         .         .         .         .         .         .
71654 1480          .         .    I    .         .         .         .         .         .         .         .         .
71656 1490          .         .         .   I     .         .         .         .         .         .         .         .
71658 1500          .         .         .         .         .    I    .         .         .         .         .         .
71700 1510  . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .I. . . . . . . . . . . . . . . .
71702 1520          .         .         .         .         .         .         .         .I        .         .         .
71704 1530          .         .         .         .         .         .   I     .         .         .         .         .
71706 1540          .         .         .         .      I  .         .         .         .         .         .         .
71708 1550          .         .         .    I    .         .         .         .         .         .         .         .
71710 1560          .         .     I   .         .         .         .         .         .         .         .         .
71712 1570          .         .I        .         .         .         .         .         .         .         .         .
71714 1580          .        I.         .         .         .         .         .         .         .         .         .
71716 1590          .     I   .         .         .         .         .         .         .         .         .         .
71718 1600          .   I     .         .         .         .         .         .         .         .         .         .
71720 1610  . . . . . I . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
71722 1620          .I        .         .         .         .         .         .         .         .         .         .
71724 1630          I         .         .         .         .         .         .         .         .         .         .
71726 1640         I.         .         .         .         .         .         .         .         .         .         .
71728 1650         I.         .         .         .         .         .         .         .         .         .         .
71730 1660        I .         .         .         .         .         .         .         .         .         .         .
71732 1670      I   .         .         .         .         .         .         .         .         .         .         .
71734 1680     I    .         .         .         .         .         .         .         .         .         .         .
71736 1690    I     .         .         .         .         .         .         .         .         .         .         .
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71738 1700 I . . . .
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71740 1710 .I. . . . .
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71742 1720 I . . . .
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71744 1730 I . . . .
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71746 1740 I . . . .
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71748 1750 I . . . .
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71750 1760 I . . . .
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71752 1770 I . . . .
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71754 1780 I . . . .
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71756 1790 I . . . .
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71758 1800 I . . . .
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71800 1810 I . . . .
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71802 1820 I . . . .
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71804 1830 I . . . .
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71806 1840 I . . . .
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71808 1850 I . . . .
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71810 1860I . . . .
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71812 1870I . . . .
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71814 1880I . . . .
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71816 1890I . . . .
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71818 1900I . . . .
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71820 1910I. . . . .
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71822 1920I . . . .
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71824 1930I . . . .
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71826 1940I . . . .
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71828 1950I . . . .
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71830 1960I . . . .

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 71832 197OI      .     .     .     .     .     .     .     .     .     .     .
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 71834 198OI      .     .     .     .     .     .     .     .     .     .     .
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 71836 199OI      .     .     .     .     .     .     .     .     .     .     .
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 71838 200OI      .     .     .     .     .     .     .     .     .     .     .
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 71840 201OI. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
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 71842 202OI      .     .     .     .     .     .     .     .     .     .     .
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 71844 203OI      .     .     .     .     .     .     .     .     .     .     .
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 71846 204OI      .     .     .     .     .     .     .     .     .     .     .
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 71848 205OI      .     .     .     .     .     .     .     .     .     .     .
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 71850 206OI      .     .     .     .     .     .     .     .     .     .     .
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 71852 207OI      .     .     .     .     .     .     .     .     .     .     .
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 71854 208OI      .     .     .     .     .     .     .     .     .     .     .
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 71856 209OI      .     .     .     .     .     .     .     .     .     .     .
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 71858 210OI      .     .     .     .     .     .     .     .     .     .     .
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 71900 211OI. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
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 71902 212OI      .     .     .     .     .     .     .     .     .     .     .
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 71904 213OI      .     .     .     .     .     .     .     .     .     .     .
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 71906 214OI      .     .     .     .     .     .     .     .     .     .     .
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 71908 215OI      .     .     .     .     .     .     .     .     .     .     .
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 71910 216OI      .     .     .     .     .     .     .     .     .     .     .
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 71912 217OI      .     .     .     .     .     .     .     .     .     .     .
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 71914 218OI      .     .     .     .     .     .     .     .     .     .     .
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 71916 219OI      .     .     .     .     .     .     .     .     .     .     .
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 71918 220OI      .     .     .     .     .     .     .     .     .     .     .
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 71920 221OI. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
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 71922 222OI      .     .     .     .     .     .     .     .     .     .     .
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 71924 223OI      .     .     .     .     .     .     .     .     .     .     .
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71926 224OI . . . .

71928 225OI . . . .

71930 226OI . . . .

71932 227OI . . . .

71934 228OI . . . .

71936 229OI . . . .

71938 230OI . . . .

71940 231OI. . . . .

71942 232I . . . .

71944 233I . . . .

71946 234I . . . .

71948 235I . . . .

71950 236I . . . .

71952 237I . . . .

71954 238I . . . .

71956 239I . . . .

71958 240I . . . .

72000 241I . . . .

72002 242I . . . .

72004 243I . . . .

72006 244OI . . . .

72008 245OI . . . .

72010 246OI . . . .

72012 247OI . . . .

72014 248OI . . . .

72016 249OI . . . .

72018 250OI . . . .

72020 2510I. . . . .

72022 2520I . . . .

72024 2530I . . . .

72026 2540I . . . .

72028 2550I . . . .

72030 2560I . . . .

72032 2570I . . . .

72034 2580I . . . .

72036 2590I . . . .

72038 2600I . . . .

72040 2610I. . . . .

72042 2620I . . . .

72044 2630I . . . .

72046 2640I . . . .

72048 2650I . . . .

72050 2660I . . . .

72052 2670I . . . .

72054 2680I . . . .

72056 2690I . . . .

72058 2700I . . . .

72100 2710I. . . . .

72102 2720I . . . .

72104 2730I . . . .

72106 2740I . . . .

72108 2750I . . . .

72110 2760I . . . .

72112 2770I . . . .

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 72114 278OI          .         .         .         .         .         .         .         .         .         .         .
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 72116 279OI          .         .         .         .         .         .         .         .         .         .         .
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 72118 280OI          .         .         .         .         .         .         .         .         .         .         .
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 72120 281OI. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
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 72122 282OI          .         .         .         .         .         .         .         .         .         .         .
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 72124 283OI          .         .         .         .         .         .         .         .         .         .         .
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 72126 284OI          .         .         .         .         .         .         .         .         .         .         .
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 72128 285OI          .         .         .         .         .         .         .         .         .         .         .
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 72130 286OI          .         .         .         .         .         .         .         .         .         .         .
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 72132 287OI          .         .         .         .         .         .         .         .         .         .         .
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 72134 288OI          .         .         .         .         .         .         .         .         .         .         .
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 72136 289OI          .         .         .         .         .         .         .         .         .         .         .
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 72138 290OI          .         .         .         .         .         .         .         .         .         .         .
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 72140 291OI. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
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 72142 292OI          .         .         .         .         .         .         .         .         .         .         .
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 72144 293OI          .         .         .         .         .         .         .         .         .         .         .
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 72146 294OI          .         .         .         .         .         .         .         .         .         .         .
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 72148 295OI          .         .         .         .         .         .         .         .         .         .         .
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 72150 296OI          .         .         .         .         .         .         .         .         .         .         .
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 72152 297OI          .         .         .         .         .         .         .         .         .         .         .
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 72154 298OI          .         .         .         .         .         .         .         .         .         .         .
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 72156 299OI          .         .         .         .         .         .         .         .         .         .         .
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 72158
300I---------.---------.---------.---------.---------.---------.---------.---------.---------.---------.---------.---------.
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              **************
              *            *
  46 KK       *    PUMPS   *
              *            *
              **************
                             PUMP STATION FLOW

  48 KO          OUTPUT CONTROL VARIABLES
                       IPRNT          4  PRINT CONTROL
                       IPLOT          2  PLOT CONTROL
                       QSCAL        10.  HYDROGRAPH PLOT SCALE
```

***

1

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	2	23.	5.03	1.	1.	1.	.00		
+	HYDROGRAPH AT	3	18.	5.00	1.	1.	1.	.00		
+	2 COMBINED AT	4	40.	5.00	2.	2.	2.	.01		
+	PUMP FLOW TO	PUMPS	10.	5.07	2.	1.	1.	.01		
+	HYDROGRAPH AT	5	0.	.00	0.	0.	0.	.01		
+									1244.82	5.23
+	HYDROGRAPH AT	PUMPS	10.	5.07	2.	1.	1.	.00		

1

SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
(FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)

ISTAQ	ELEMENT	DT (MIN)	PEAK (CFS)	TIME TO PEAK (MIN)	VOLUME (IN)	INTERPOLATED TO COMPUTATION INTERVAL DT (MIN)	PEAK (CFS)	TIME TO PEAK (MIN)	VOLUME (IN)
2	MANE	.47	23.70	300.88	2.63	2.00	23.03	302.00	2.63

```
CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .7060E+00 OUTFLOW= .7009E+00 BASIN STORAGE= .1241E-02 PERCENT ERROR=
.5

                3  MANE          .29     18.28    300.79      2.69      2.00     17.90    300.00        2.69

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .5500E+00 OUTFLOW= .5456E+00 BASIN STORAGE= .1020E-02 PERCENT ERROR=
.6



*** NORMAL END OF HEC-1 ***
```

```
1****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*              JUN   1998               *
*              VERSION 4.1              *
*                                       *
*  RUN DATE   16SEP02  TIME  15:52:57   *
*                                       *
*****************************************
```

```
*****************************************
*                                       *
*     U.S. ARMY CORPS OF ENGINEERS      *
*     HYDROLOGIC ENGINEERING CENTER     *
*          609 SECOND STREET            *
*       DAVIS, CALIFORNIA 95616         *
*           (916) 756-1104              *
*                                       *
*****************************************
```

```
X     X  XXXXXXX   XXXXX           X
X     X  X        X     X         XX
X     X  X        X                X
XXXXXXX  XXXX     X        XXXXX   X
X     X  X        X                X
X     X  X        X     X          X
X     X  XXXXXXX   XXXXX          XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM


```
LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

   1        ID        TOWN OF GILBERT GREENFIELD ROAD STORM DRAINAGE PN:96446-1
   2        ID        KINEMATIC WAVE WATERSHED MODEL 50 year storm 4500 gpm
   3        IT       2 07SEP02    1200     300
   4        IO       4
            *
            *DIAGRAM

   5        KK       2
   6        KM        RUNOFF SECTION2
   7        KO       0
   8        BA   0.0050
            *       RATING FOR 30" DIA PIPE
```

9,000 GPM STATION

```
  9    HQ      0      2.      4.      6.      8.     10.     12.     14.     16.     18.
 10    HQ     20.     22.     24.     26.
 11    HE      0    0.30    0.42    0.52    0.60    0.67    0.73    0.79    0.85    0.90
 12    HE   0.96    1.01    1.06    1.11
 13    PH                   0.64    1.25    2.11    2.30    2.43     2.6    2.93    3.00
       *        BLANK FOR 50-YR & BA ADJUSTMENT
 14    LG    0.3    0.15    8.20    0.12    85.1
       *        ASSUME CLAY LOAM SOIL PARAMETERS
 15    UK     52    0.04     .15     100
 16    RK    328  0.0210    .015 0.00063    TRAP       0       5
       *    GUTTER FLOW
 17    RK   1250  0.0210    .012            CIRC     2.5
       *    ROUTE TO STORAGE IN 24-IN RCP

 18    KK      3
 19    KM         RUNOFF SECTION3
 20    KO      0
 21    BA 0.0038
       *        RATING FOR 30" DIA PIPE
 22    HQ      0      2.      4.      6.      8.     10.     12.     14.     16.     18.
 23    HQ     20.     22.     24.     26.
 24    HE      0    0.29    0.40    0.49    0.56    0.63    0.69    0.75    0.80    0.85
 25    HE   0.90    0.95    1.00    1.04
 26    LG    0.3    0.15    8.20    0.12    90.3
       *        ASSUME CLAY LOAM SOIL PARAMETERS
 27    UK     52    0.04     .15     100
 28    RK    328  0.0250    .015 0.00063    TRAP       0       5
       *    GUTTER FLOW
 29    RK    900  0.0250    .012            CIRC     2.5
       *    ROUTE TO STORAGE IN 24-IN RCP

 30    KK      4
 31    KM         RUNOFF COMBINED
 32    HC      2

 33    KK      5
 34    KM         STORAGE FACILITY
 35    KO      0       2
       *        STORAGE FACILITY ROUTING THRU WET WELL - NO VAULT
 36    RS      1    STOR     0.0
 37    SV    0.0  0.0050  0.0140   0.023   0.028   0.036   0.044   0.065   0.160   0.341
 38    SV  0.355  0.3710  0.3890   0.408
 39    SE 1233.0  1235.0  1237.0  1239.0  1240.0  1241.0  1242.0  1243.0  1244.0  1245.0
```



```
LINE   ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 40    SE 1246.0  1247.0  1248.0  1249.0
 41    SQ      0       0       0       0       0       0       0       0       0       0
 42    SQ      0     0.0     0.0     0.1
```

```
              *    NUISANCE PUMP ON @ 1238.5  OFF @ 1235.50
43            WP  1238.5     0.0  1235.5   PUMPS
              *    PUMP 1 ON @  1242.0 & OFF @ 1238.5
44            WP  1242.0    10.0  1239.5   PUMPS
              *    PUMP 2 ON @  1244.2 & OFF @ 1240.0
45            WP  1244.2    10.0  1241.0   PUMPS

46            KK   PUMPS
47            KM        PUMP STATION FLOW
48            KO       0       2       10
49            WR   PUMPS
50            ZZ
```

```
1
             SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE     (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

  NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

   5            2
                .
                .
  18            .           3
                .           .
                .           .
  30            4............
                V
                V
  43            .------->   PUMPS
  33            5
                .
                .
  49            .           .<-------    PUMPS
  46            .       PUMPS

 (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
```

```
1*****************************************
 *                                       *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
 *             JUN   1998                *
 *           VERSION 4.1                 *
 *                                       *
 *  RUN DATE   16SEP02  TIME  15:52:57   *
 *                                       *
 *****************************************
```

```
*****************************************
*                                       *
*    U.S. ARMY CORPS OF ENGINEERS       *
*    HYDROLOGIC ENGINEERING CENTER      *
*          609 SECOND STREET            *
*       DAVIS, CALIFORNIA 95616         *
*            (916) 756-1104             *
*                                       *
*****************************************
```

```
                      TOWN OF GILBERT GREENFIELD ROAD STORM DRAINAGE PN:96446-1
                      KINEMATIC WAVE WATERSHED MODEL 50 year storm 4500 gpm

  4 IO        OUTPUT CONTROL VARIABLES
                    IPRNT           4  PRINT CONTROL
                    IPLOT           0  PLOT CONTROL
                    QSCAL          0.  HYDROGRAPH PLOT SCALE

    IT        HYDROGRAPH TIME DATA
                     NMIN           2  MINUTES IN COMPUTATION INTERVAL
                    IDATE      7SEP 2  STARTING DATE
                    ITIME        1200  STARTING TIME
                       NQ         300  NUMBER OF HYDROGRAPH ORDINATES
                   NDDATE      7SEP 2  ENDING DATE
                   NDTIME        2158  ENDING TIME
                    ICENT          19  CENTURY MARK

                COMPUTATION INTERVAL     .03 HOURS
                     TOTAL TIME BASE    9.97 HOURS

       ENGLISH UNITS
            DRAINAGE AREA          SQUARE MILES
            PRECIPITATION DEPTH    INCHES
            LENGTH, ELEVATION      FEET
            FLOW                   CUBIC FEET PER SECOND
            STORAGE VOLUME         ACRE-FEET
            SURFACE AREA           ACRES
            TEMPERATURE            DEGREES FAHRENHEIT

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

         **************
         *            *
  5 KK   *          2 *
         *            *
         **************
                      RUNOFF SECTION2

  7 KO        OUTPUT CONTROL VARIABLES
                    IPRNT           4  PRINT CONTROL
                    IPLOT           0  PLOT CONTROL
                    QSCAL          0.  HYDROGRAPH PLOT SCALE

            SUBBASIN RUNOFF DATA

  8 BA        SUBBASIN CHARACTERISTICS
                    TAREA         .00  SUBBASIN AREA
```

PRECIPITATION DATA

```
13 PH                            DEPTHS FOR   0-PERCENT HYPOTHETICAL STORM
          ..... HYDRO-35 ......   ............... TP-40 ...............   ........... TP-49 ...........
          5-MIN  15-MIN  60-MIN    2-HR    3-HR    6-HR   12-HR   24-HR   2-DAY   4-DAY   7-DAY  10-DAY
            .64    1.25    2.11    2.30    2.43    2.60    2.93    3.00     .00     .00     .00     .00

                                           STORM AREA =      .00

14 LG     GREEN AND AMPT LOSS RATE
                STRTL         .30  STARTING LOSS
                  DTH         .15  MOISTURE DEFICIT
                 PSIF        8.20  WETTING FRONT SUCTION
                XKSAT         .12  HYDRAULIC CONDUCTIVITY
                RTIMP       85.10  PERCENT IMPERVIOUS AREA

          KINEMATIC WAVE
15 UK       OVERLAND-FLOW ELEMENT NO. 1
                    L         52.  OVERLAND FLOW LENGTH
                    S       .0400  SLOPE
                    N        .150  ROUGHNESS COEFFICIENT
                   PA       100.0  PERCENT OF SUBBASIN
                DXMIN           5  MINIMUM NUMBER OF DX INTERVALS

          KINEMATIC WAVE
16 RK       COLLECTOR CHANNEL
                    L        328.  CHANNEL LENGTH
                    S       .0210  SLOPE
                    N        .015  CHANNEL ROUGHNESS COEFFICIENT
                   CA         .00  CONTRIBUTING AREA
                SHAPE        TRAP  CHANNEL SHAPE
                   WD         .00  BOTTOM WIDTH OR DIAMETER
                    Z        5.00  SIDE SLOPE
               NDXMIN           2  MINIMUM NUMBER OF DX INTERVALS
17 RK       MAIN CHANNEL
                    L       1250.  CHANNEL LENGTH
                    S       .0210  SLOPE
                    N        .012  CHANNEL ROUGHNESS COEFFICIENT
                   CA         .00  CONTRIBUTING AREA
                SHAPE        CIRC  CHANNEL SHAPE
                   WD        2.50  BOTTOM WIDTH OR DIAMETER
                    Z         .00  SIDE SLOPE
               NDXMIN           2  MINIMUM NUMBER OF DX INTERVALS
               RUPSTQ          NO  ROUTE UPSTREAM HYDROGRAPH

                                                   ***
```

COMPUTE STAGES FROM GIVEN RATING DATA

```
  8 HQ                FLOW       0.        2.        4.        6.        8.       10.       12.       14.       16.       18.
 11 HE               STAGE       .0        .3        .4        .5        .6        .7        .7        .8        .9        .9

                      FLOW      20.       22.       24.       26.
                     STAGE      1.0       1.0       1.1       1.1


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

           **************
           *            *
 18 KK     *         3  *
           *            *
           **************
                            RUNOFF SECTION3

 20 KO          OUTPUT CONTROL VARIABLES
                      IPRNT          4  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                      QSCAL         0.  HYDROGRAPH PLOT SCALE

              SUBBASIN RUNOFF DATA

 21 BA          SUBBASIN CHARACTERISTICS
                      TAREA        .00  SUBBASIN AREA

                PRECIPITATION DATA

 13 PH                               DEPTHS FOR   0-PERCENT HYPOTHETICAL STORM
                ..... HYDRO-35 ......   ............... TP-40 ...............   ........... TP-49 ...........
                5-MIN  15-MIN  60-MIN    2-HR    3-HR    6-HR   12-HR   24-HR    2-DAY   4-DAY   7-DAY  10-DAY
                  .64    1.25    2.11    2.30    2.43    2.60    2.93    3.00      .00     .00     .00     .00

                                                   STORM AREA =      .00

 26 LG          GREEN AND AMPT LOSS RATE
                      STRTL        .30  STARTING LOSS
                        DTH        .15  MOISTURE DEFICIT
                       PSIF       8.20  WETTING FRONT SUCTION
                      XKSAT        .12  HYDRAULIC CONDUCTIVITY
                      RTIMP      90.30  PERCENT IMPERVIOUS AREA

                KINEMATIC WAVE
 27 UK            OVERLAND-FLOW ELEMENT NO. 1
                          L         52.  OVERLAND FLOW LENGTH
                          S       .0400  SLOPE
                          N        .150  ROUGHNESS COEFFICIENT
                         PA       100.0  PERCENT OF SUBBASIN
```

```
                 DXMIN          5  MINIMUM NUMBER OF DX INTERVALS

              KINEMATIC WAVE
 28 RK          COLLECTOR CHANNEL
                     L       328.  CHANNEL LENGTH
                     S      .0250  SLOPE
                     N       .015  CHANNEL ROUGHNESS COEFFICIENT
                    CA        .00  CONTRIBUTING AREA
                 SHAPE       TRAP  CHANNEL SHAPE
                    WD        .00  BOTTOM WIDTH OR DIAMETER
                     Z       5.00  SIDE SLOPE
                NDXMIN          2  MINIMUM NUMBER OF DX INTERVALS
 29 RK          MAIN CHANNEL
                     L       900.  CHANNEL LENGTH
                     S      .0250  SLOPE
                     N       .012  CHANNEL ROUGHNESS COEFFICIENT
                    CA        .00  CONTRIBUTING AREA
                 SHAPE       CIRC  CHANNEL SHAPE
                    WD       2.50  BOTTOM WIDTH OR DIAMETER
                     Z        .00  SIDE SLOPE
                NDXMIN          2  MINIMUM NUMBER OF DX INTERVALS
                RUPSTQ         NO  ROUTE UPSTREAM HYDROGRAPH

                                                        ***

              COMPUTE STAGES FROM GIVEN RATING DATA

 21 HQ                FLOW      0.        2.        4.        6.        8.       10.       12.       14.       16.       18.
 24 HE               STAGE      .0        .3        .4        .5        .6        .6        .7        .8        .8        .9

                      FLOW     20.       22.       24.       26.
                     STAGE      .9        .9       1.0       1.0


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

           **************
           *            *
 30 KK     *       4    *
           *            *
           **************
                             RUNOFF COMBINED

 32 HC        HYDROGRAPH COMBINATION
                 ICOMP          2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                        ***
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*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

              **************
              *            *
 33 KK        *         5  *
              *            *
              **************
                              STORAGE FACILITY

 35 KO             OUTPUT CONTROL VARIABLES
                         IPRNT          4  PRINT CONTROL
                         IPLOT          2  PLOT CONTROL
                         QSCAL         0.  HYDROGRAPH PLOT SCALE

                 HYDROGRAPH ROUTING DATA

 36 RS             STORAGE ROUTING
                         NSTPS          1  NUMBER OF SUBREACHES
                          ITYP       STOR  TYPE OF INITIAL CONDITION
                        RSVRIC        .00  INITIAL CONDITION
                             X        .00 WORKING R AND D COEFFICIENT

 37 SV               STORAGE         .0        .0        .0        .0        .0        .0        .0        .1        .2        .3
                                     .4        .4        .4        .4

 39 SE             ELEVATION    1233.00   1235.00   1237.00   1239.00   1240.00   1241.00   1242.00   1243.00   1244.00   1245.00
                                1246.00   1247.00   1248.00   1249.00

 41 SQ             DISCHARGE         0.        0.        0.        0.        0.        0.        0.        0.        0.        0.
                                     0.        0.        0.        0.

 44 WP             PUMPING DATA

                      PUMP ON    PUMPING    PUMP OFF
                     ELEVATION     RATE     ELEVATION

                       1242.0       10.       1239.5
                       1244.2       10.       1241.0

                         ISTAD        PUMPS  PUMP FLOW HYDROGRAPH IDENTIFICATION

                                                                             ***
1                                                                    STATION        5

                             (I) INFLOW,    (O) OUTFLOW
          0.         5.        10.        15.        20.        25.        30.        35.        40.        45.        0.        0.        0.
 DAHRMN PER
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71200    1I
71202    2I
71204    3I
71206    4I
71208    5I
71210    6I
71212    7I
71214    8I
71216    9I
71218   10I
71220   11I
71222   12I
71224   13I
71226   14I
71228   15I
71230   16I
71232   17I
71234   18I
71236   19I
71238   200I
71240   210I
71242   220I
71244   230I
71246   240I
71248   250I
71250   260I
71252   270I
71254   280I
71256   290I
71258   300I
71300   310I
71302   320I
71304   330I
71306   340I
71308   350I
71310   360I
71312   370I
71314   380I
71316   390I
71318   400I
71320   410I
71322   420I
71324   430I
71326   440I
71328   450I
71330   460I
71332   470I
71334   480I
71336   490I
71338   500I
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71340  51OI
71342  52OI
71344  53OI
71346  54OI
71348  55OI
71350  56OI
71352  57OI
71354  58OI
71356  59OI
71358  60OI
71400  61OI
71402  62OI
71404  63OI
71406  64OI
71408  65OI
71410  66OI
71412  67OI
71414  68OI
71416  69OI
71418  70I
71420  71I
71422  72I
71424  73I
71426  74I
71428  75I
71430  76I
71432  77I
71434  78I
71436  79I
71438  80I
71440  81I
71442  82I
71444  83I
71446  84OI
71448  85OI
71450  86OI
71452  87OI
71454  88OI
71456  89OI
71458  90OI
71500  91OI
71502  92OI
71504  93OI
71506  94OI
71508  95OI
71510  96OI
71512  97OI
71514  98OI
71516  99OI
71518 100OI
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71520 1010I. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
71522 1020I        .         .         .         .         .         .         .         .         .         .         .         .
71524 1030I        .         .         .         .         .         .         .         .         .         .         .         .
71526 1040I        .         .         .         .         .         .         .         .         .         .         .         .
71528 1050I        .         .         .         .         .         .         .         .         .         .         .         .
71530 1060I        .         .         .         .         .         .         .         .         .         .         .         .
71532 1070I        .         .         .         .         .         .         .         .         .         .         .         .
71534 1080I        .         .         .         .         .         .         .         .         .         .         .         .
71536 1090I        .         .         .         .         .         .         .         .         .         .         .         .
71538 1100I        .         .         .         .         .         .         .         .         .         .         .         .
71540 1110I. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
71542 1120I        .         .         .         .         .         .         .         .         .         .         .         .
71544 1130I        .         .         .         .         .         .         .         .         .         .         .         .
71546 1140I        .         .         .         .         .         .         .         .         .         .         .         .
71548 1150I        .         .         .         .         .         .         .         .         .         .         .         .
71550 1160I        .         .         .         .         .         .         .         .         .         .         .         .
71552 1170I        .         .         .         .         .         .         .         .         .         .         .         .
71554 1180I        .         .         .         .         .         .         .         .         .         .         .         .
71556 1190I        .         .         .         .         .         .         .         .         .         .         .         .
71558 1200I        .         .         .         .         .         .         .         .         .         .         .         .
71600 1210I. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
71602 1220I        .         .         .         .         .         .         .         .         .         .         .         .
71604 1230I        .         .         .         .         .         .         .         .         .         .         .         .
71606 1240I        .         .         .         .         .         .         .         .         .         .         .         .
71608 1250I        .         .         .         .         .         .         .         .         .         .         .         .
71610 1260 I       .         .         .         .         .         .         .         .         .         .         .         .
71612 1270 I       .         .         .         .         .         .         .         .         .         .         .         .
71614 1280 I       .         .         .         .         .         .         .         .         .         .         .         .
71616 1290 I       .         .         .         .         .         .         .         .         .         .         .         .
71618 1300 I       .         .         .         .         .         .         .         .         .         .         .         .
71620 1310 I . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
71622 1320 I       .         .         .         .         .         .         .         .         .         .         .         .
71624 1330 I       .         .         .         .         .         .         .         .         .         .         .         .
71626 1340 I       .         .         .         .         .         .         .         .         .         .         .         .
71628 1350 I       .         .         .         .         .         .         .         .         .         .         .         .
71630 1360 I       .         .         .         .         .         .         .         .         .         .         .         .
71632 1370  I      .         .         .         .         .         .         .         .         .         .         .         .
71634 1380   I     .         .         .         .         .         .         .         .         .         .         .         .
71636 1390     I   .         .         .         .         .         .         .         .         .         .         .         .
71638 1400      I  .         .         .         .         .         .         .         .         .         .         .         .
71640 1410 . . . I . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
71642 1420        I.         .         .         .         .         .         .         .         .         .         .         .
71644 1430         I         .         .         .         .         .         .         .         .         .         .         .
71646 1440         .I        .         .         .         .         .         .         .         .         .         .         .
71648 1450         .  I      .         .         .         .         .         .         .         .         .         .         .
71650 1460         .     I   .         .         .         .         .         .         .         .         .         .         .
71652 1470         .        I.         .         .         .         .         .         .         .         .         .         .
71654 1480         .         .    I    .         .         .         .         .         .         .         .         .         .
71656 1490         .         .         .   I     .         .         .         .         .         .         .         .         .
71658 1500         .         .         .         .         .    I    .         .         .         .         .         .         .
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71700 1510 . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . I . . . . . . . . . . . . . . . . . . . .
71702 1520         .         .         .         .         .         .         .         .I        .         .         .         .
71704 1530         .         .         .         .         .         .    I    .         .         .         .         .         .
71706 1540         .         .         .         .      I  .         .         .         .         .         .         .         .
71708 1550         .         .         .    I    .         .         .         .         .         .         .         .         .
71710 1560         .         .     I   .         .         .         .         .         .         .         .         .         .
71712 1570         .         .I        .         .         .         .         .         .         .         .         .         .
71714 1580         .        I.         .         .         .         .         .         .         .         .         .         .
71716 1590         .     I   .         .         .         .         .         .         .         .         .         .         .
71718 1600         .   I     .         .         .         .         .         .         .         .         .         .         .
71720 1610 . . . . . I . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
71722 1620         .I        .         .         .         .         .         .         .         .         .         .         .
71724 1630         I         .         .         .         .         .         .         .         .         .         .         .
71726 1640        I.         .         .         .         .         .         .         .         .         .         .         .
71728 1650        I.         .         .         .         .         .         .         .         .         .         .         .
71730 1660       I .         .         .         .         .         .         .         .         .         .         .         .
71732 1670     I   .         .         .         .         .         .         .         .         .         .         .         .
71734 1680    I    .         .         .         .         .         .         .         .         .         .         .         .
71736 1690   I     .         .         .         .         .         .         .         .         .         .         .         .
71738 1700  I      .         .         .         .         .         .         .         .         .         .         .         .
71740 1710 .I. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
71742 1720  I      .         .         .         .         .         .         .         .         .         .         .         .
71744 1730 I       .         .         .         .         .         .         .         .         .         .         .         .
71746 1740 I       .         .         .         .         .         .         .         .         .         .         .         .
71748 1750 I       .         .         .         .         .         .         .         .         .         .         .         .
71750 1760 I       .         .         .         .         .         .         .         .         .         .         .         .
71752 1770 I       .         .         .         .         .         .         .         .         .         .         .         .
71754 1780 I       .         .         .         .         .         .         .         .         .         .         .         .
71756 1790 I       .         .         .         .         .         .         .         .         .         .         .         .
71758 1800 I       .         .         .         .         .         .         .         .         .         .         .         .
71800 1810 I . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
71802 1820 I       .         .         .         .         .         .         .         .         .         .         .         .
71804 1830 I       .         .         .         .         .         .         .         .         .         .         .         .
71806 1840 I       .         .         .         .         .         .         .         .         .         .         .         .
71808 1850 I       .         .         .         .         .         .         .         .         .         .         .         .
71810 1860I        .         .         .         .         .         .         .         .         .         .         .         .
71812 1870I        .         .         .         .         .         .         .         .         .         .         .         .
71814 1880I        .         .         .         .         .         .         .         .         .         .         .         .
71816 1890I        .         .         .         .         .         .         .         .         .         .         .         .
71818 1900I        .         .         .         .         .         .         .         .         .         .         .         .
71820 1910I. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
71822 1920I        .         .         .         .         .         .         .         .         .         .         .         .
71824 1930I        .         .         .         .         .         .         .         .         .         .         .         .
71826 1940I        .         .         .         .         .         .         .         .         .         .         .         .
71828 1950I        .         .         .         .         .         .         .         .         .         .         .         .
71830 1960I        .         .         .         .         .         .         .         .         .         .         .         .
71832 1970I        .         .         .         .         .         .         .         .         .         .         .         .
71834 1980I        .         .         .         .         .         .         .         .         .         .         .         .
71836 1990I        .         .         .         .         .         .         .         .         .         .         .         .
71838 2000I        .         .         .         .         .         .         .         .         .         .         .         .
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71840 201OI
71842 202OI
71844 203OI
71846 204OI
71848 205OI
71850 206OI
71852 207OI
71854 208OI
71856 209OI
71858 210OI
71900 211OI
71902 212OI
71904 213OI
71906 214OI
71908 215OI
71910 216OI
71912 217OI
71914 218OI
71916 219OI
71918 220OI
71920 221OI
71922 222OI
71924 223OI
71926 224OI
71928 225OI
71930 226OI
71932 227OI
71934 228OI
71936 229OI
71938 230OI
71940 231OI
71942 232I
71944 233I
71946 234I
71948 235I
71950 236I
71952 237I
71954 238I
71956 239I
71958 240I
72000 241I
72002 242I
72004 243I
72006 244OI
72008 245OI
72010 246OI
72012 247OI
72014 248OI
72016 249OI
72018 250OI

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72020 2510I. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
72022 2520I         .         .         .         .         .         .         .         .         .         .         .         .
72024 2530I         .         .         .         .         .         .         .         .         .         .         .         .
72026 2540I         .         .         .         .         .         .         .         .         .         .         .         .
72028 2550I         .         .         .         .         .         .         .         .         .         .         .         .
72030 2560I         .         .         .         .         .         .         .         .         .         .         .         .
72032 2570I         .         .         .         .         .         .         .         .         .         .         .         .
72034 2580I         .         .         .         .         .         .         .         .         .         .         .         .
72036 2590I         .         .         .         .         .         .         .         .         .         .         .         .
72038 2600I         .         .         .         .         .         .         .         .         .         .         .         .
72040 2610I. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
72042 2620I         .         .         .         .         .         .         .         .         .         .         .         .
72044 2630I         .         .         .         .         .         .         .         .         .         .         .         .
72046 2640I         .         .         .         .         .         .         .         .         .         .         .         .
72048 2650I         .         .         .         .         .         .         .         .         .         .         .         .
72050 2660I         .         .         .         .         .         .         .         .         .         .         .         .
72052 2670I         .         .         .         .         .         .         .         .         .         .         .         .
72054 2680I         .         .         .         .         .         .         .         .         .         .         .         .
72056 2690I         .         .         .         .         .         .         .         .         .         .         .         .
72058 2700I         .         .         .         .         .         .         .         .         .         .         .         .
72100 2710I. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
72102 2720I         .         .         .         .         .         .         .         .         .         .         .         .
72104 2730I         .         .         .         .         .         .         .         .         .         .         .         .
72106 2740I         .         .         .         .         .         .         .         .         .         .         .         .
72108 2750I         .         .         .         .         .         .         .         .         .         .         .         .
72110 2760I         .         .         .         .         .         .         .         .         .         .         .         .
72112 2770I         .         .         .         .         .         .         .         .         .         .         .         .
72114 2780I         .         .         .         .         .         .         .         .         .         .         .         .
72116 2790I         .         .         .         .         .         .         .         .         .         .         .         .
72118 2800I         .         .         .         .         .         .         .         .         .         .         .         .
72120 2810I. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
72122 2820I         .         .         .         .         .         .         .         .         .         .         .         .
72124 2830I         .         .         .         .         .         .         .         .         .         .         .         .
72126 2840I         .         .         .         .         .         .         .         .         .         .         .         .
72128 2850I         .         .         .         .         .         .         .         .         .         .         .         .
72130 2860I         .         .         .         .         .         .         .         .         .         .         .         .
72132 2870I         .         .         .         .         .         .         .         .         .         .         .         .
72134 2880I         .         .         .         .         .         .         .         .         .         .         .         .
72136 2890I         .         .         .         .         .         .         .         .         .         .         .         .
72138 2900I         .         .         .         .         .         .         .         .         .         .         .         .
72140 2910I. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
72142 2920I         .         .         .         .         .         .         .         .         .         .         .         .
72144 2930I         .         .         .         .         .         .         .         .         .         .         .         .
72146 2940I         .         .         .         .         .         .         .         .         .         .         .         .
72148 2950I         .         .         .         .         .         .         .         .         .         .         .         .
72150 2960I         .         .         .         .         .         .         .         .         .         .         .         .
72152 2970I         .         .         .         .         .         .         .         .         .         .         .         .
72154 2980I         .         .         .         .         .         .         .         .         .         .         .         .
72156 2990I         .         .         .         .         .         .         .         .         .         .         .         .
72158 300I---------.---------.---------.---------.---------.---------.---------.---------.---------.---------.---------.---------.
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1

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              **************
              *            *
 46 KK        *   PUMPS    *
              *            *
              **************
                                     PUMP STATION FLOW

 48 KO          OUTPUT CONTROL VARIABLES
                       IPRNT           4  PRINT CONTROL
                       IPLOT           2  PLOT CONTROL
                       QSCAL          10.  HYDROGRAPH PLOT SCALE
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1

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

+	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	2	23.	5.03	1.	1.	1.	.00		
+	HYDROGRAPH AT	3	18.	5.00	1.	1.	1.	.00		
+	2 COMBINED AT	4	40.	5.03	2.	2.	2.	.01		
+	PUMP FLOW TO	PUMPS	20.	5.07	2.	1.	1.	.01		
+	HYDROGRAPH AT	5	0.	.00	0.	0.	0.	.01		
+									1244.80	5.13
+	HYDROGRAPH AT	PUMPS	20.	5.07	2.	1.	1.	.00		

1

SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
(FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)

ISTAQ	ELEMENT	DT	PEAK	TIME TO PEAK	VOLUME	DT	INTERPOLATED TO COMPUTATION INTERVAL PEAK	TIME TO PEAK	VOLUME
		(MIN)	(CFS)	(MIN)	(IN)	(MIN)	(CFS)	(MIN)	(IN)
2	MANE	.47	23.70	300.88	2.63	2.00	23.03	302.00	2.63

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .7060E+00 OUTFLOW= .7009E+00 BASIN STORAGE= .1241E-02 PERCENT ERROR= .5

3	MANE	.44	18.27	300.89	2.69	2.00	17.75	300.00	2.69

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .5500E+00 OUTFLOW= .5460E+00 BASIN STORAGE= .1024E-02 PERCENT ERROR= .5

*** NORMAL END OF HEC-1 ***

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1***************************************                                        ***************************************
 *                                      *                                        *                                     *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                                        *    U.S. ARMY CORPS OF ENGINEERS     *
 *              JUN   1998              *                                        *    HYDROLOGIC ENGINEERING CENTER    *
 *           VERSION 4.1                *                                        *          609 SECOND STREET          *
 *                                      *                                        *       DAVIS, CALIFORNIA 95616       *
 *  RUN DATE   16SEP02  TIME  15:57:06  *                                        *          (916) 756-1104             *
 *                                      *                                        *                                     *
 ***************************************                                        ***************************************


                   X     X  XXXXXXX   XXXXX         X
                   X     X  X        X     X       XX
                   X     X  X        X              X
                   XXXXXXX  XXXX     X       XXXXX  X
                   X     X  X        X              X
                   X     X  X        X     X        X
                   X     X  XXXXXXX   XXXXX        XXX
```

THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM


```
LINE           ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  1            ID        TOWN OF GILBERT GREENFIELD ROAD STORM DRAINAGE PN:96446-1
  2            ID        KINEMATIC WAVE WATERSHED MODEL 50 year storm 6720 gpm
  3            IT       2 07DEP02    1200     300
  4            IO       4
               *
               *DIAGRAM
```

13,440 GPM STATION

```
   5          KK        2
   6          KM          RUNOFF SECTION2
   7          KO        0
   8          BA   0.0050
              *         RATING FOR 30" DIA PIPE
   9          HQ        0        2.        4.        6.        8.       10.       12.       14.       16.       18.
  10          HQ      20.       22.       24.       26.
  11          HE        0      0.30      0.42      0.52      0.60      0.67      0.73      0.79      0.85      0.90
  12          HE     0.96      1.01      1.06      1.11
  13          PH                         0.64      1.25      2.11      2.30      2.43       2.6      2.93      3.00
              *         BLANK FOR 50-YR & BA ADJUSTMENT
  14          LG      0.3      0.15      8.20      0.12      85.1
              *         ASSUME CLAY LOAM SOIL PARAMETERS
  15          UK       52      0.04       .15       100
  16          RK      328    0.0210      .015   0.00063      TRAP         0         5
              *     GUTTER FLOW
  17          RK     1250    0.0210      .012                CIRC       2.5
              *     ROUTE TO STORAGE IN 24-IN RCP

  18          KK        3
  19          KM          RUNOFF SECTION3
  20          KO        0
  21          BA   0.0038
              *         RATING FOR 30" DIA PIPE
  22          HQ        0        2.        4.        6.        8.       10.       12.       14.       16.       18.
  23          HQ      20.       22.       24.       26.
  24          HE        0      0.29      0.40      0.49      0.56      0.63      0.69      0.75      0.80      0.85
  25          HE     0.90      0.95      1.00      1.04
  26          LG      0.3      0.15      8.20      0.12      90.3
              *         ASSUME CLAY LOAM SOIL PARAMETERS
  27          UK       52      0.04       .15       100
  28          RK      328    0.0250      .015   0.00063      TRAP         0         5
              *     GUTTER FLOW
  29          RK      900    0.0260      .012                CIRC       2.5
              *     ROUTE TO STORAGE IN 24-IN RCP

  30          KK        4
  31          KM          RUNOFF COMBINED
  32          HC        2

  33          KK        5
  34          KM          STORAGE FACILITY
  35          KO        0         2
              *         STORAGE FACILITY ROUTING THRU WET WELL - NO VAULT
  36          RS        1      STOR       0.0
  37          SV      0.0    0.0130    0.0260     0.040     0.047     0.056     0.066     0.090     0.167     0.181
  38          SV    0.196    0.2130    0.2310     0.250
  39          SE   1233.0    1235.0    1237.0    1239.0    1240.0    1241.0    1242.0    1243.0    1244.0    1245.0
```



```
LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  40          SE   1246.0    1247.0    1248.0    1249.0
  41          SQ        0         0         0         0         0         0         0         0         0         0
```

```
          42           SQ        0      0.0      0.0      0.1
                       *    NUISANCE PUMP ON @ 1238.5  OFF @ 1235.50
          43           WP  1238.5      0.0  1235.5   PUMPS
                       *    PUMP 1 ON @  1242.0 & OFF @ 1238.5
          44           WP  1242.0     15.0  1239.5   PUMPS
                       *    PUMP 2 ON @  1244.2 & OFF @ 1240.0
          45           WP  1244.2     15.0  1241.0   PUMPS

          46           KK   PUMPS
          47           KM        PUMP STATION FLOW
          48           KO       0        2      10
          49           WR   PUMPS
          50           ZZ
1
              SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

   NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

     5          2
                .
                .
    18          .           3
                .           .
                .           .
    30          4............
                V
                V
    43          .------->   PUMPS
    33          5
                .
                .
    49          .           .<-------   PUMPS
    46          .       PUMPS

 (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1*****************************************
****************************************
 *                                        *                                                   *
*
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)    *                                                   *    U.S. ARMY CORPS OF ENGINEERS
*
 *             JUN   1998                 *                                                   *    HYDROLOGIC ENGINEERING CENTER
*
 *           VERSION 4.1                  *                                                   *          609 SECOND STREET
*
 *                                        *                                                   *       DAVIS, CALIFORNIA 95616
*
 *  RUN DATE   16SEP02  TIME  15:57:06    *                                                   *           (916) 756-1104
*
 *                                        *                                                   *
*
 *****************************************
```

```
****************************************

                                 TOWN OF GILBERT GREENFIELD ROAD STORM DRAINAGE PN:96446-1
                                 KINEMATIC WAVE WATERSHED MODEL 50 year storm 6720 gpm

    4 IO          OUTPUT CONTROL VARIABLES
                        IPRNT            4  PRINT CONTROL
                        IPLOT            0  PLOT CONTROL
                        QSCAL           0.  HYDROGRAPH PLOT SCALE

      IT          HYDROGRAPH TIME DATA
                         NMIN            2  MINUTES IN COMPUTATION INTERVAL
                        IDATE       7DEP 2  STARTING DATE
                        ITIME         1200  STARTING TIME
                           NQ          300  NUMBER OF HYDROGRAPH ORDINATES
                       NDDATE       7    2  ENDING DATE
                       NDTIME         2158  ENDING TIME
                       ICENT            19  CENTURY MARK

                    COMPUTATION INTERVAL      .03 HOURS
                         TOTAL TIME BASE     9.97 HOURS

           ENGLISH UNITS
                DRAINAGE AREA          SQUARE MILES
                PRECIPITATION DEPTH    INCHES
                LENGTH, ELEVATION      FEET
                FLOW                   CUBIC FEET PER SECOND
                STORAGE VOLUME         ACRE-FEET
                SURFACE AREA           ACRES
                TEMPERATURE            DEGREES FAHRENHEIT

 *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***
*** ***

            **************
            *            *
    5 KK    *         2  *
            *            *
            **************
                                 RUNOFF SECTION2

    7 KO          OUTPUT CONTROL VARIABLES
                        IPRNT            4  PRINT CONTROL
                        IPLOT            0  PLOT CONTROL
                        QSCAL           0.  HYDROGRAPH PLOT SCALE

                SUBBASIN RUNOFF DATA
```

```
 8 BA          SUBBASIN CHARACTERISTICS
                     TAREA          .00  SUBBASIN AREA

               PRECIPITATION DATA

13 PH                                  DEPTHS FOR   0-PERCENT HYPOTHETICAL STORM
               ..... HYDRO-35 ......      ............... TP-40 ..............     .......... TP-49 ..........
               5-MIN  15-MIN  60-MIN     2-HR     3-HR     6-HR    12-HR    24-HR    2-DAY    4-DAY    7-DAY   10-DAY
                 .64    1.25    2.11     2.30     2.43     2.60     2.93     3.00      .00      .00      .00      .00

                                                     STORM AREA =      .00

14 LG          GREEN AND AMPT LOSS RATE
                     STRTL          .30  STARTING LOSS
                       DTH          .15  MOISTURE DEFICIT
                      PSIF         8.20  WETTING FRONT SUCTION
                     XKSAT          .12  HYDRAULIC CONDUCTIVITY
                     RTIMP        85.10  PERCENT IMPERVIOUS AREA

               KINEMATIC WAVE
15 UK            OVERLAND-FLOW ELEMENT NO. 1
                         L          52.  OVERLAND FLOW LENGTH
                         S        .0400  SLOPE
                         N         .150  ROUGHNESS COEFFICIENT
                        PA        100.0  PERCENT OF SUBBASIN
                     DXMIN            5  MINIMUM NUMBER OF DX INTERVALS

               KINEMATIC WAVE
16 RK            COLLECTOR CHANNEL
                         L         328.  CHANNEL LENGTH
                         S        .0210  SLOPE
                         N         .015  CHANNEL ROUGHNESS COEFFICIENT
                        CA          .00  CONTRIBUTING AREA
                     SHAPE         TRAP  CHANNEL SHAPE
                        WD          .00  BOTTOM WIDTH OR DIAMETER
                         Z         5.00  SIDE SLOPE
                    NDXMIN            2  MINIMUM NUMBER OF DX INTERVALS
17 RK            MAIN CHANNEL
                         L        1250.  CHANNEL LENGTH
                         S        .0210  SLOPE
                         N         .012  CHANNEL ROUGHNESS COEFFICIENT
                        CA          .00  CONTRIBUTING AREA
                     SHAPE         CIRC  CHANNEL SHAPE
                        WD         2.50  BOTTOM WIDTH OR DIAMETER
                         Z          .00  SIDE SLOPE
                    NDXMIN            2  MINIMUM NUMBER OF DX INTERVALS
                    RUPSTQ           NO  ROUTE UPSTREAM HYDROGRAPH

                                                        ***

               COMPUTE STAGES FROM GIVEN RATING DATA

 8 HQ                 FLOW         0.         2.         4.         6.         8.        10.        12.        14.        16.
```

```
18.
  11 HE                STAGE        .0        .3        .4        .5        .6        .7        .7        .8        .9
.9

                        FLOW       20.       22.       24.       26.
                       STAGE       1.0       1.0       1.1       1.1


 *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***
*** ***


             **************
             *            *
  18 KK      *        3   *
             *            *
             **************
                              RUNOFF SECTION3

  20 KO           OUTPUT CONTROL VARIABLES
                        IPRNT           4  PRINT CONTROL
                        IPLOT           0  PLOT CONTROL
                        QSCAL          0.  HYDROGRAPH PLOT SCALE

                SUBBASIN RUNOFF DATA

  21 BA           SUBBASIN CHARACTERISTICS
                        TAREA         .00  SUBBASIN AREA

                  PRECIPITATION DATA

  13 PH                                DEPTHS FOR   0-PERCENT HYPOTHETICAL STORM
                  ..... HYDRO-35 ......   ............... TP-40 ...............   ........... TP-49 ...........
                  5-MIN  15-MIN  60-MIN    2-HR    3-HR    6-HR   12-HR   24-HR    2-DAY   4-DAY   7-DAY  10-DAY
                    .64    1.25    2.11    2.30    2.43    2.60    2.93    3.00      .00     .00     .00     .00

                                                    STORM AREA =      .00

  26 LG           GREEN AND AMPT LOSS RATE
                        STRTL         .30  STARTING LOSS
                          DTH         .15  MOISTURE DEFICIT
                         PSIF        8.20  WETTING FRONT SUCTION
                        XKSAT         .12  HYDRAULIC CONDUCTIVITY
                        RTIMP       90.30  PERCENT IMPERVIOUS AREA

                  KINEMATIC WAVE
  27 UK             OVERLAND-FLOW ELEMENT NO. 1
                            L         52.  OVERLAND FLOW LENGTH
                            S       .0400  SLOPE
                            N        .150  ROUGHNESS COEFFICIENT
                           PA       100.0  PERCENT OF SUBBASIN
                        DXMIN           5  MINIMUM NUMBER OF DX INTERVALS
```

```
                  KINEMATIC WAVE
   28 RK            COLLECTOR CHANNEL
                              L        328.  CHANNEL LENGTH
                              S       .0250  SLOPE
                              N        .015  CHANNEL ROUGHNESS COEFFICIENT
                             CA         .00  CONTRIBUTING AREA
                          SHAPE        TRAP  CHANNEL SHAPE
                             WD         .00  BOTTOM WIDTH OR DIAMETER
                              Z        5.00  SIDE SLOPE
                         NDXMIN           2  MINIMUM NUMBER OF DX INTERVALS
   29 RK            MAIN CHANNEL
                              L        900.  CHANNEL LENGTH
                              S       .0260  SLOPE
                              N        .012  CHANNEL ROUGHNESS COEFFICIENT
                             CA         .00  CONTRIBUTING AREA
                          SHAPE        CIRC  CHANNEL SHAPE
                             WD        2.50  BOTTOM WIDTH OR DIAMETER
                              Z         .00  SIDE SLOPE
                         NDXMIN           2  MINIMUM NUMBER OF DX INTERVALS
                         RUPSTQ          NO  ROUTE UPSTREAM HYDROGRAPH

                                                         ***

                  COMPUTE STAGES FROM GIVEN RATING DATA

   21 HQ                   FLOW        0.        2.        4.        6.        8.       10.       12.       14.       16.
18.
   24 HE                  STAGE        .0        .3        .4        .5        .6        .6        .7        .8        .8
.9

                           FLOW       20.       22.       24.       26.
                          STAGE        .9        .9       1.0       1.0


 *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***
*** ***


                ***************
                *             *
   30 KK        *      4      *
                *             *
                ***************
                                RUNOFF COMBINED

   32 HC          HYDROGRAPH COMBINATION
                          ICOMP           2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                         ***


 *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** **  *** *** ***
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*** ***

                 **************
                 *            *
   33 KK         *         5  *
                 *            *
                 **************
                                    STORAGE FACILITY

   35 KO              OUTPUT CONTROL VARIABLES
                            IPRNT          4  PRINT CONTROL
                            IPLOT          2  PLOT CONTROL
                            QSCAL         0.  HYDROGRAPH PLOT SCALE

                    HYDROGRAPH ROUTING DATA

   36 RS              STORAGE ROUTING
                            NSTPS          1  NUMBER OF SUBREACHES
                             ITYP       STOR  TYPE OF INITIAL CONDITION
                           RSVRIC        .00  INITIAL CONDITION
                                X        .00 WORKING R AND D COEFFICIENT

   37 SV                STORAGE         .0         .0         .0         .0         .0         .1         .1         .1         .2
.2
                                        .2         .2         .2         .3

   39 SE              ELEVATION    1233.00    1235.00    1237.00    1239.00    1240.00    1241.00    1242.00    1243.00    1244.00
1245.00
                                   1246.00    1247.00    1248.00    1249.00

   41 SQ              DISCHARGE         0.         0.         0.         0.         0.         0.         0.         0.         0.
0.
                                        0.         0.         0.         0.

   44 WP              PUMPING DATA

                         PUMP ON    PUMPING    PUMP OFF
                        ELEVATION     RATE     ELEVATION

                          1242.0       15.       1239.5
                          1244.2       15.       1241.0

                            ISTAD      PUMPS  PUMP FLOW HYDROGRAPH IDENTIFICATION

                                                                ***
1                                                            STATION        5

                            (I) INFLOW,   (O) OUTFLOW
          0.         5.        10.        15.        20.        25.        30.        35.        40.        45.         0.         0.
0.
 DAHRMN PER
  71200
1I---------.---------.---------.---------.---------.---------.---------.---------.---------.---------.---------.---------.
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71202 2I

71204 3I

71206 4I

71208 5I

71210 6I

71212 7I

71214 8I

71216 9I

71218 10I

71220 11I

71222 12I

71224 13I

71226 14I

71228 15I

71230 16I

71232 17I

71234 18I

71236 19I

71238 20OI

71240 21OI

71242 22OI

71244 23OI

71246 24OI

71248 25OI

71250 26OI

71252 27OI

71254 28OI

71256 29OI . . . .
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71258 30OI . . . .
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71300 31OI. . . . .
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71302 32OI . . . .
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71304 33OI . . . .
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71306 34OI . . . .
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71308 35OI . . . .
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71310 36OI . . . .
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71312 37OI . . . .
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71314 38OI . . . .
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71316 39OI . . . .
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71318 40OI . . . .
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71320 41OI. . . . .
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71322 42OI . . . .
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71324 43OI . . . .
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71326 44OI . . . .
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71328 45OI . . . .
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71330 46OI . . . .
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71332 47OI . . . .
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71334 48OI . . . .
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71336 49OI . . . .
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71338 50OI . . . .
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71340 51OI. . . . .
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71342 52OI . . . .
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71344 53OI . . . .
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71346 54OI . . . .
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71348 55OI . . . .
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71350 56OI . . . .
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71352 57OI . . . .
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71354 58OI . . . .
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71356 59OI . . . .
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71358 60OI . . . .
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71400 61OI. . . . .
. . .
71402 62OI . . . .
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71404 63OI . . . .
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71406 64OI . . . .
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71408 65OI . . . .
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71410 66OI . . . .
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71412 67OI . . . .
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71414 68OI . . . .
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71416 69OI . . . .
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71418 70I . . . .
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71420 71I . . . .
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71422 72I . . . .
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71424 73I . . . .
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71426 74I . . . .
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71428 75I . . . .
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71430 76I . . . .
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71432 77I . . . .
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71434 78I . . . .
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71436 79I . . . .
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71438 80I . . . .
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71440 81I . . . .
. . .
71442 82I . . . .
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71444  83I     .    .    .    .    .    .    .    .    .    .    .
71446  84OI    .    .    .    .    .    .    .    .    .    .    .
71448  85OI    .    .    .    .    .    .    .    .    .    .    .
71450  86OI    .    .    .    .    .    .    .    .    .    .    .
71452  87OI    .    .    .    .    .    .    .    .    .    .    .
71454  88OI    .    .    .    .    .    .    .    .    .    .    .
71456  89OI    .    .    .    .    .    .    .    .    .    .    .
71458  90OI    .    .    .    .    .    .    .    .    .    .    .
71500  91OI. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
71502  92OI    .    .    .    .    .    .    .    .    .    .    .
71504  93OI    .    .    .    .    .    .    .    .    .    .    .
71506  94OI    .    .    .    .    .    .    .    .    .    .    .
71508  95OI    .    .    .    .    .    .    .    .    .    .    .
71510  96OI    .    .    .    .    .    .    .    .    .    .    .
71512  97OI    .    .    .    .    .    .    .    .    .    .    .
71514  98OI    .    .    .    .    .    .    .    .    .    .    .
71516  99OI    .    .    .    .    .    .    .    .    .    .    .
71518 100OI    .    .    .    .    .    .    .    .    .    .    .
71520 101OI. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
71522 102OI    .    .    .    .    .    .    .    .    .    .    .
71524 103OI    .    .    .    .    .    .    .    .    .    .    .
71526 104OI    .    .    .    .    .    .    .    .    .    .    .
71528 105OI    .    .    .    .    .    .    .    .    .    .    .
71530 106OI    .    .    .    .    .    .    .    .    .    .    .
71532 107OI    .    .    .    .    .    .    .    .    .    .    .
71534 108OI    .    .    .    .    .    .    .    .    .    .    .
71536 109OI    .    .    .    .    .    .    .    .    .    .    .
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71538 1100I . . . .

71540 1110I. . . . .

71542 1120I . . . .

71544 1130I . . . .

71546 1140I . . . .

71548 1150I . . . .

71550 1160I . . . .

71552 1170I . . . .

71554 1180I . . . .

71556 1190I . . . .

71558 1200I . . . .

71600 1210I. . . . .

71602 1220I . . . .

71604 1230I . . . .

71606 1240I . . . .

71608 1250I . . . .

71610 1260 I . . . .

71612 1270 I . . . .

71614 1280 I . . . .

71616 1290 I . . . .

71618 1300 I . . . .

71620 1310 I . . . .

71622 1320 I . . . .

71624 1330 I . . . .

71626 1340 I . . . .

71628 1350 I . . . .

71630 1360 I . . . .

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  71632 1370  I      .         .         .         .         .         .         .         .         .         .         .
.
  71634 1380   I     .         .         .         .         .         .         .         .         .         .         .
.
  71636 1390     I   .         .         .         .         .         .         .         .         .         .         .
.
  71638 1400      I  .         .         .         .         .         .         .         .         .         .         .
.
  71640 1410 . . . I . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
. . .
  71642 1420        I.         .         .         .         .         .         .         .         .         .         .
.
  71644 1430         I         .         .         .         .         .         .         .         .         .         .
.
  71646 1440         .I        .         .         .         .         .         .         .         .         .         .
.
  71648 1450         .  I      .         .         .         .         .         .         .         .         .         .
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  71650 1460         .     I   .         .         .         .         .         .         .         .         .         .
.
  71652 1470         .        I.         .         .         .         .         .         .         .         .         .
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  71654 1480         .         .    I    .         .         .         .         .         .         .         .         .
.
  71656 1490         .         .         .   I     .         .         .         .         .         .         .         .
.
  71658 1500         .         .         .         .         .    I    .         .         .         .         .         .
.
  71700 1510 . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .I. . . . . . . . . . . . . . . . .
. . .
  71702 1520         .         .         .         .         .         .         .I        .         .         .
.
  71704 1530         .         .         .         .         .         .   I     .         .         .         .         .
.
  71706 1540         .         .         .         .      I  .         .         .         .         .         .         .
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  71708 1550         .         .         .    I    .         .         .         .         .         .         .         .
.
  71710 1560         .         .     I   .         .         .         .         .         .         .         .         .
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  71712 1570         .         .I        .         .         .         .         .         .         .         .         .
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  71714 1580         .        I.         .         .         .         .         .         .         .         .         .
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  71716 1590         .     I   .         .         .         .         .         .         .         .         .         .
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  71718 1600         .   I     .         .         .         .         .         .         .         .         .         .
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  71720 1610 . . . . .I . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
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  71722 1620         .I        .         .         .         .         .         .         .         .         .         .
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  71724 1630         I         .         .         .         .         .         .         .         .         .         .
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  71726 1640        I.         .         .         .         .         .         .         .         .         .         .
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  71728 1650        I.         .         .         .         .         .         .         .         .         .         .
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  71730 1660       I .         .         .         .         .         .         .         .         .         .         .
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  71732 1670     I   .         .         .         .         .         .         .         .         .         .         .
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  71734 1680    I    .         .         .         .         .         .         .         .         .         .         .
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  71736 1690   I     .         .         .         .         .         .         .         .         .         .         .
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  71738 1700  I      .         .         .         .         .         .         .         .         .         .         .
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  71740 1710 .I. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
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  71742 1720  I      .         .         .         .         .         .         .         .         .         .         .
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  71744 1730 I       .         .         .         .         .         .         .         .         .         .         .
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  71746 1740 I       .         .         .         .         .         .         .         .         .         .         .
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  71748 1750 I       .         .         .         .         .         .         .         .         .         .         .
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  71750 1760 I       .         .         .         .         .         .         .         .         .         .         .
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  71752 1770 I       .         .         .         .         .         .         .         .         .         .         .
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  71754 1780 I       .         .         .         .         .         .         .         .         .         .         .
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  71756 1790 I       .         .         .         .         .         .         .         .         .         .         .
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  71758 1800 I       .         .         .         .         .         .         .         .         .         .         .
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  71800 1810 I . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
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  71802 1820 I       .         .         .         .         .         .         .         .         .         .         .
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  71804 1830 I       .         .         .         .         .         .         .         .         .         .         .
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  71806 1840 I       .         .         .         .         .         .         .         .         .         .         .
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  71808 1850 I       .         .         .         .         .         .         .         .         .         .         .
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  71810 1860I        .         .         .         .         .         .         .         .         .         .         .
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  71812 1870I        .         .         .         .         .         .         .         .         .         .         .
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  71814 1880I        .         .         .         .         .         .         .         .         .         .         .
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  71816 1890I        .         .         .         .         .         .         .         .         .         .         .
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  71818 1900I        .         .         .         .         .         .         .         .         .         .         .
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71820 1910I. . . . .
71822 1920I . . . .
71824 1930I . . . .
71826 1940I . . . .
71828 1950I . . . .
71830 1960I . . . .
71832 1970I . . . .
71834 1980I . . . .
71836 1990I . . . .
71838 2000I . . . .
71840 2010I. . . . .
71842 2020I . . . .
71844 2030I . . . .
71846 2040I . . . .
71848 2050I . . . .
71850 2060I . . . .
71852 2070I . . . .
71854 2080I . . . .
71856 2090I . . . .
71858 2100I . . . .
71900 2110I. . . . .
71902 2120I . . . .
71904 2130I . . . .
71906 2140I . . . .
71908 2150I . . . .
71910 2160I . . . .
71912 2170I . . . .

71914 218OI . . . .
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71916 219OI . . . .
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71918 220OI . . . .
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71920 221OI. . . . .
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71922 222OI . . . .
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71924 223OI . . . .
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71926 224OI . . . .
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71928 225OI . . . .
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71930 226OI . . . .
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71932 227OI . . . .
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71934 228OI . . . .
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71936 229OI . . . .
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71938 230OI . . . .
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71940 231OI. . . . .
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71942 232I . . . .
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71944 233I . . . .
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71946 234I . . . .
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71948 235I . . . .
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71950 236I . . . .
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71952 237I . . . .
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71954 238I . . . .
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71956 239I . . . .
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71958 240I . . . .
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72000 241I . . . .
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72002 242I . . . .
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72004 243I . . . .
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72006 244OI . . . .
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72008 2450I . . . .
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72010 2460I . . . .
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72012 2470I . . . .
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72014 2480I . . . .
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72016 2490I . . . .
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72018 2500I . . . .
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72020 2510I. . . . .
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72022 2520I . . . .
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72024 2530I . . . .
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72026 2540I . . . .
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72028 2550I . . . .
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72030 2560I . . . .
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72032 2570I . . . .
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72034 2580I . . . .
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72036 2590I . . . .
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72038 2600I . . . .
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72042 2620I . . . .
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72044 2630I . . . .
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72046 2640I . . . .
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72048 2650I . . . .
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72050 2660I . . . .
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72052 2670I . . . .
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72054 2680I . . . .
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72056 2690I . . . .
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72058 2700I . . . .
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72100 2710I. . . . .
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72102 2720I . . . .
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72104 2730I . . . .
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72106 2740I . . . .
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72108 2750I . . . .
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72110 2760I . . . .
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72112 2770I . . . .
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72114 2780I . . . .
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72116 2790I . . . .
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72118 2800I . . . .
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72120 2810I. . . . .
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72122 2820I . . . .
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72124 2830I . . . .
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72126 2840I . . . .
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72128 2850I . . . .
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72130 2860I . . . .
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72132 2870I . . . .
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72134 2880I . . . .
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72136 2890I . . . .
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72138 2900I . . . .
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72140 2910I. . . . .
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72142 2920I . . . .
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72144 2930I . . . .
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72146 2940I . . . .
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72148 2950I . . . .
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72150 2960I . . . .
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72152 2970I . . . .
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72154 2980I . . . .
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  72156 299OI        .         .         .         .         .         .         .         .         .         .         .
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  72158
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             *            *
   46 KK     *    PUMPS   *
             *            *
             **************
                               PUMP STATION FLOW

   48 KO          OUTPUT CONTROL VARIABLES
                        IPRNT           4  PRINT CONTROL
                        IPLOT           2  PLOT CONTROL
                        QSCAL         10.  HYDROGRAPH PLOT SCALE
                                                                               ***
1
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RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD			BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+					6-HOUR	24-HOUR	72-HOUR			
	HYDROGRAPH AT									
+		2	23.	5.03	1.	1.	1.	.00		
	HYDROGRAPH AT									
+		3	18.	5.00	1.	1.	1.	.00		
	2 COMBINED AT									
+		4	40.	5.00	2.	2.	2.	.01		
	PUMP FLOW TO									
+		PUMPS	30.	5.07	2.	1.	1.	.01		
	HYDROGRAPH AT									
+		5	0.	5.07	0.	0.	0.	.01		
+									1248.45	5.07
	HYDROGRAPH AT									
+		PUMPS	30.	5.07	2.	1.	1.	.00		

1

SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING

(FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)

ISTAQ	ELEMENT	DT (MIN)	PEAK (CFS)	TIME TO PEAK (MIN)	VOLUME (IN)	INTERPOLATED TO COMPUTATION INTERVAL DT (MIN)	PEAK (CFS)	TIME TO PEAK (MIN)	VOLUME (IN)
2	MANE	.47	23.70	300.88	2.63	2.00	23.03	302.00	2.63

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .7060E+00 OUTFLOW= .7009E+00 BASIN STORAGE= .1241E-02 PERCENT ERROR= .5

ISTAQ	ELEMENT	DT (MIN)	PEAK (CFS)	TIME TO PEAK (MIN)	VOLUME (IN)	DT (MIN)	PEAK (CFS)	TIME TO PEAK (MIN)	VOLUME (IN)
3	MANE	.29	18.28	300.79	2.69	2.00	17.90	300.00	2.69

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .5500E+00 OUTFLOW= .5456E+00 BASIN STORAGE= .1020E-02 PERCENT ERROR= .6

*** NORMAL END OF HEC-1 ***

```
1***************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*             JUN   1998               *
*           VERSION 4.1                *
*                                      *
*  RUN DATE   16SEP02  TIME  15:58:11  *
*                                      *
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***************************************
*                                     *
*    U.S. ARMY CORPS OF ENGINEERS     *
*    HYDROLOGIC ENGINEERING CENTER    *
*          609 SECOND STREET          *
*       DAVIS, CALIFORNIA 95616       *
*          (916) 756-1104             *
*                                     *
***************************************
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X     X  XXXXXXX   XXXXX          X
X     X  X        X     X        XX
X     X  X        X               X
XXXXXXX  XXXX     X        XXXXX  X
X     X  X        X               X
X     X  X        X     X         X
X     X  XXXXXXX   XXXXX         XXX
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THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM


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LINE        ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  1         ID        TOWN OF GILBERT GREENFIELD ROAD STORM DRAINAGE PN:96446-1
  2         ID        KINEMATIC WAVE WATERSHED MODEL 50 year storm 8500 gpm
  3         IT       2 07SEP02    1200      300
  4         IO       4
            *
            *DIAGRAM

  5         KK       2
  6         KM        RUNOFF SECTION2
  7         KO       0
  8         BA  0.0050
            *       RATING FOR 30" DIA PIPE
```

17,000 GPM STATION

```
   9          HQ       0      2.      4.      6.      8.     10.     12.     14.     16.     18.
  10          HQ     20.     22.     24.     26.
  11          HE       0    0.30    0.42    0.52    0.60    0.67    0.73    0.79    0.85    0.90
  12          HE    0.96    1.01    1.06    1.11
  13          PH                    0.64    1.25    2.11    2.30    2.43     2.6    2.93    3.00
              *        BLANK FOR 50-YR & BA ADJUSTMENT
  14          LG     0.3    0.15    8.20    0.12    85.1
              *        ASSUME CLAY LOAM SOIL PARAMETERS
  15          UK      52    0.04     .15     100
  16          RK     328  0.0210    .015 0.00063    TRAP       0       5
              *    GUTTER FLOW
  17          RK    1250  0.0210    .012 0.00500    CIRC     2.5
              *    ROUTE TO STORAGE IN 24-IN RCP

  18          KK       3
  19          KM         RUNOFF SECTION3
  20          KO       0       2
  21          BA  0.0038
              *        RATING FOR 30" DIA PIPE
  22          HQ       0      2.      4.      6.      8.     10.     12.     14.     16.     18.
  23          HQ     20.     22.     24.     26.
  24          HE       0    0.29    0.40    0.49    0.56    0.63    0.69    0.75    0.80    0.85
  25          HE    0.90    0.95    1.00    1.04
  26          LG     0.3    0.15    8.20    0.12    90.3
              *        ASSUME CLAY LOAM SOIL PARAMETERS
  27          UK      52    0.04     .15     100
  28          RK     328  0.0250    .015 0.00063    TRAP       0       5
              *    GUTTER FLOW
  29          RK     900  0.0260    .012            CIRC     2.5
              *    ROUTE TO STORAGE IN 24-IN RCP

  30          KK       4
  31          KM         RUNOFF COMBINED
  32          HC       2

  33          KK       5
  34          KM         STORAGE FACILITY
  35          KO       0       2
              *        STORAGE FACILITY ROUTING THRU WET WELL - NO VAULT
  36          RS       1    STOR     0.0
  37          SV       0  0.0080  0.0250   0.042   0.051   0.059   0.080   0.093   0.137   0.152
  38          SV   0.167   0.183   0.201   0.219
  39          SE  1233.2  1234.0  1236.0  1238.0  1239.0  1240.0  1241.0  1242.0  1243.0  1244.0
1                                         HEC-1 INPUT                                               PAGE  2

      LINE    ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

  40          SE  1245.0  1246.0  1247.0  1248.0
  41          SQ       0       0       0       0       0       0       0       0       0       0
  42          SQ     0.0       0    0.00     0.1
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```
                 *    NUISANCE PUMP ON @ 1238.5  OFF @ 1235.50
      43         WP  1238.5     0.0  1235.5   PUMPS
                 *    PUMP 1 ON @  1242.0 & OFF @ 1239.5
      44         WP  1242.0    18.9  1239.5   PUMPS
                 *    PUMP 2 ON @  1244.2 & OFF @ 1241.0
      45         WP  1244.2    18.9  1241.0   PUMPS

      46         KK   PUMPS
      47         KM        PUMP STATION FLOW
      48         KO       0        2      10
      49         WR   PUMPS
      50         ZZ
1
                SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

   NO.      (.) CONNECTOR        (<---) RETURN OF DIVERTED OR PUMPED FLOW

     5          2
                .
                .
    18          .           3
                .           .
                .           .
    30          4............
                V
                V
    43          .------->   PUMPS
    33          5
                .
                .
    49          .           .<-------   PUMPS
    46          .       PUMPS

 (***) RUNOFF ALSO COMPUTED AT THIS LOCATION
1*****************************************
 *                                       *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
 *              JUN  1998                *
 *             VERSION 4.1               *
 *                                       *
 *  RUN DATE   16SEP02  TIME  15:58:11   *
 *                                       *
 *****************************************

 *****************************************
 *                                       *
 *   U.S. ARMY CORPS OF ENGINEERS        *
 *   HYDROLOGIC ENGINEERING CENTER       *
 *         609 SECOND STREET             *
 *      DAVIS, CALIFORNIA 95616          *
 *          (916) 756-1104               *
 *                                       *
 *****************************************
```

```
                              TOWN OF GILBERT GREENFIELD ROAD STORM DRAINAGE PN:96446-1
                              KINEMATIC WAVE WATERSHED MODEL 50 year storm 8500 gpm

   4 IO        OUTPUT CONTROL VARIABLES
                     IPRNT          4  PRINT CONTROL
                     IPLOT          0  PLOT CONTROL
                     QSCAL         0.  HYDROGRAPH PLOT SCALE

     IT        HYDROGRAPH TIME DATA
                      NMIN          2  MINUTES IN COMPUTATION INTERVAL
                     IDATE     7SEP 2  STARTING DATE
                     ITIME       1200  STARTING TIME
                        NQ        300  NUMBER OF HYDROGRAPH ORDINATES
                    NDDATE     7SEP 2  ENDING DATE
                    NDTIME       2158  ENDING TIME
                     ICENT         19  CENTURY MARK

                 COMPUTATION INTERVAL      .03 HOURS
                      TOTAL TIME BASE     9.97 HOURS

        ENGLISH UNITS
             DRAINAGE AREA          SQUARE MILES
             PRECIPITATION DEPTH    INCHES
             LENGTH, ELEVATION      FEET
             FLOW                   CUBIC FEET PER SECOND
             STORAGE VOLUME         ACRE-FEET
             SURFACE AREA           ACRES
             TEMPERATURE            DEGREES FAHRENHEIT


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

              **************
              *            *
   5 KK       *       2    *
              *            *
              **************
                              RUNOFF SECTION2

   7 KO        OUTPUT CONTROL VARIABLES
                     IPRNT          4  PRINT CONTROL
                     IPLOT          0  PLOT CONTROL
                     QSCAL         0.  HYDROGRAPH PLOT SCALE

             SUBBASIN RUNOFF DATA

   8 BA        SUBBASIN CHARACTERISTICS
                     TAREA        .00  SUBBASIN AREA
```

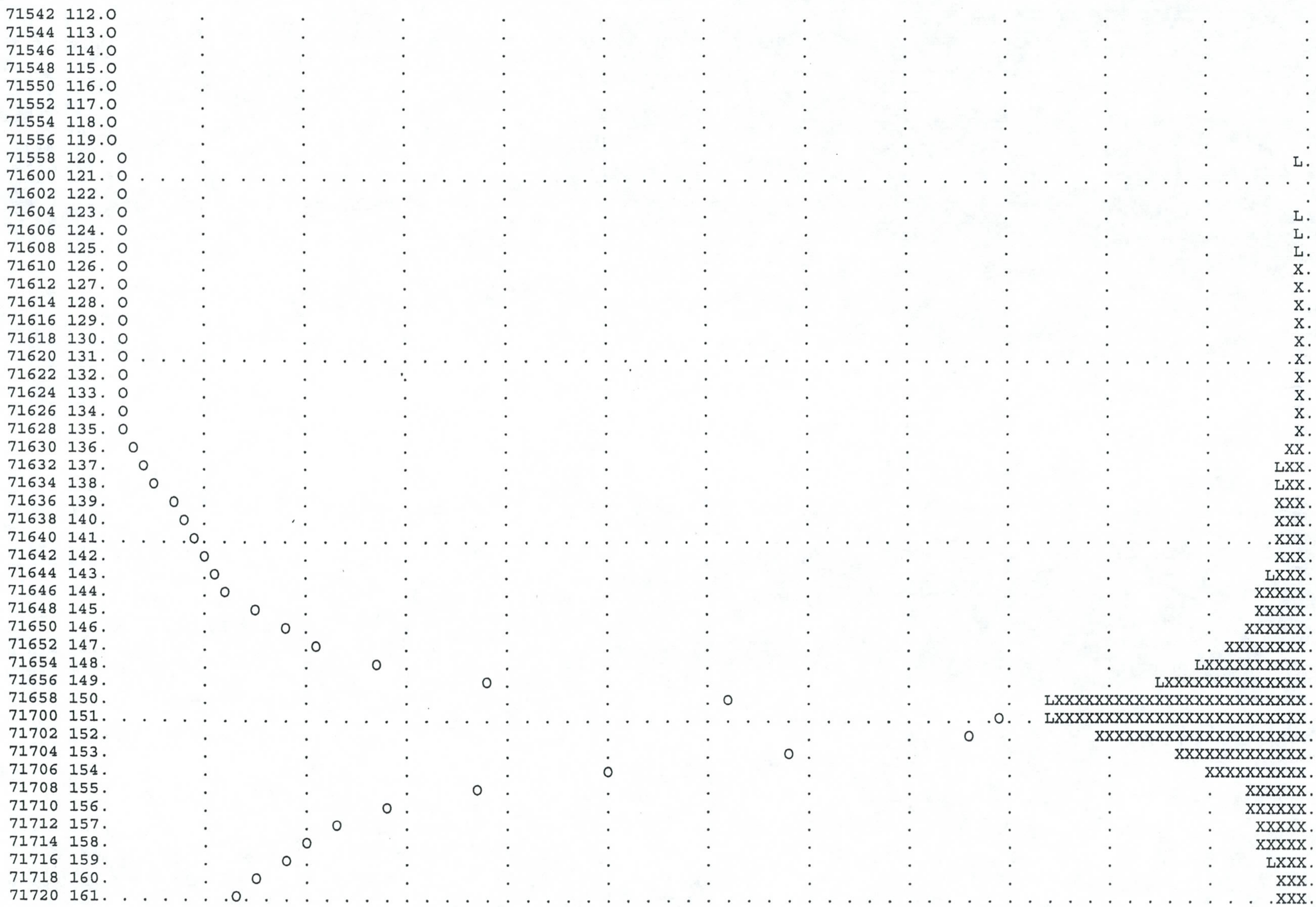
```
                PRECIPITATION DATA

13 PH                                DEPTHS FOR   0-PERCENT HYPOTHETICAL STORM
                ..... HYDRO-35 ......    ............... TP-40 ..............    ........... TP-49 ..........
                5-MIN  15-MIN  60-MIN     2-HR     3-HR     6-HR    12-HR    24-HR    2-DAY    4-DAY    7-DAY   10-DAY
                  .64    1.25    2.11     2.30     2.43     2.60     2.93     3.00      .00      .00      .00      .00

                                                  STORM AREA =      .00

14 LG           GREEN AND AMPT LOSS RATE
                      STRTL          .30  STARTING LOSS
                        DTH          .15  MOISTURE DEFICIT
                       PSIF         8.20  WETTING FRONT SUCTION
                      XKSAT          .12  HYDRAULIC CONDUCTIVITY
                      RTIMP        85.10  PERCENT IMPERVIOUS AREA

                KINEMATIC WAVE
15 UK             OVERLAND-FLOW ELEMENT NO. 1
                          L          52.  OVERLAND FLOW LENGTH
                          S        .0400  SLOPE
                          N         .150  ROUGHNESS COEFFICIENT
                         PA        100.0  PERCENT OF SUBBASIN
                      DXMIN            5  MINIMUM NUMBER OF DX INTERVALS

                KINEMATIC WAVE
16 RK             COLLECTOR CHANNEL
                          L         328.  CHANNEL LENGTH
                          S        .0210  SLOPE
                          N         .015  CHANNEL ROUGHNESS COEFFICIENT
                         CA          .00  CONTRIBUTING AREA
                      SHAPE         TRAP  CHANNEL SHAPE
                         WD          .00  BOTTOM WIDTH OR DIAMETER
                          Z         5.00  SIDE SLOPE
                     NDXMIN            2  MINIMUM NUMBER OF DX INTERVALS
17 RK             MAIN CHANNEL
                          L        1250.  CHANNEL LENGTH
                          S        .0210  SLOPE
                          N         .012  CHANNEL ROUGHNESS COEFFICIENT
                         CA          .00  CONTRIBUTING AREA
                      SHAPE         CIRC  CHANNEL SHAPE
                         WD         2.50  BOTTOM WIDTH OR DIAMETER
                          Z          .00  SIDE SLOPE
                     NDXMIN            2  MINIMUM NUMBER OF DX INTERVALS
                     RUPSTQ           NO  ROUTE UPSTREAM HYDROGRAPH

                                                           ***

                COMPUTE STAGES FROM GIVEN RATING DATA
```

```
  8 HQ               FLOW       0.        2.        4.        6.        8.       10.       12.       14.       16.       18.
 11 HE              STAGE       .0        .3        .4        .5        .6        .7        .7        .8        .9        .9

                     FLOW      20.       22.       24.       26.
                    STAGE      1.0       1.0       1.1       1.1


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

            **************
            *            *
 18 KK      *      3     *
            *            *
            **************
                         RUNOFF SECTION3

 20 KO           OUTPUT CONTROL VARIABLES
                       IPRNT          4  PRINT CONTROL
                       IPLOT          2  PLOT CONTROL
                       QSCAL         0.  HYDROGRAPH PLOT SCALE

               SUBBASIN RUNOFF DATA

 21 BA           SUBBASIN CHARACTERISTICS
                       TAREA        .00  SUBBASIN AREA

                 PRECIPITATION DATA

 13 PH                                DEPTHS FOR   0-PERCENT HYPOTHETICAL STORM
                 ..... HYDRO-35 ......  ............... TP-40 ...............    ........... TP-49 ...........
                 5-MIN  15-MIN  60-MIN    2-HR    3-HR    6-HR   12-HR   24-HR   2-DAY   4-DAY   7-DAY  10-DAY
                   .64    1.25    2.11    2.30    2.43    2.60    2.93    3.00     .00     .00     .00     .00

                                                   STORM AREA =       .00

 26 LG           GREEN AND AMPT LOSS RATE
                       STRTL        .30  STARTING LOSS
                         DTH        .15  MOISTURE DEFICIT
                        PSIF       8.20  WETTING FRONT SUCTION
                       XKSAT        .12  HYDRAULIC CONDUCTIVITY
                       RTIMP      90.30  PERCENT IMPERVIOUS AREA

                 KINEMATIC WAVE
 27 UK             OVERLAND-FLOW ELEMENT NO. 1
                           L        52.  OVERLAND FLOW LENGTH
                           S      .0400  SLOPE
                           N       .150  ROUGHNESS COEFFICIENT
                          PA      100.0  PERCENT OF SUBBASIN
```

```
                      DXMIN           5  MINIMUM NUMBER OF DX INTERVALS

                 KINEMATIC WAVE
  28 RK            COLLECTOR CHANNEL
                          L        328.  CHANNEL LENGTH
                          S       .0250  SLOPE
                          N        .015  CHANNEL ROUGHNESS COEFFICIENT
                         CA         .00  CONTRIBUTING AREA
                      SHAPE        TRAP  CHANNEL SHAPE
                         WD         .00  BOTTOM WIDTH OR DIAMETER
                          Z        5.00  SIDE SLOPE
                    NDXMIN            2  MINIMUM NUMBER OF DX INTERVALS
  29 RK            MAIN CHANNEL
                          L        900.  CHANNEL LENGTH
                          S       .0260  SLOPE
                          N        .012  CHANNEL ROUGHNESS COEFFICIENT
                         CA         .00  CONTRIBUTING AREA
                      SHAPE        CIRC  CHANNEL SHAPE
                         WD        2.50  BOTTOM WIDTH OR DIAMETER
                          Z         .00  SIDE SLOPE
                    NDXMIN            2  MINIMUM NUMBER OF DX INTERVALS
                    RUPSTQ           NO  ROUTE UPSTREAM HYDROGRAPH

                                                        ***

                 COMPUTE STAGES FROM GIVEN RATING DATA

  21 HQ                FLOW       0.        2.        4.        6.        8.       10.       12.       14.       16.       18.
  24 HE               STAGE       .0        .3        .4        .5        .6        .6        .7        .8        .8        .9

                       FLOW      20.       22.       24.       26.
                      STAGE       .9        .9       1.0       1.0
1                                                 STATION        3

                      (O) OUTFLOW
         0.        2.        4.        6.        8.       10.       12.       14.       16.       18.        0.        0.        0.
                                                                                                (L) PRECIP,   (X) EXCESS
         .0        .0        .0        .0        .0        .0        .0        .0        .0        .3        .2        .1        .0
DAHRMN PER
 71200  10---------.---------.---------.---------.---------.---------.---------.---------.---------.---------.---------.---------.
 71202  20         .         .         .         .         .         .         .         .         .         .         .         .
 71204  30         .         .         .         .         .         .         .         .         .         .         .         .
 71206  40         .         .         .         .         .         .         .         .         .         .         .         .
 71208  50         .         .         .         .         .         .         .         .         .         .         .         .
 71210  60         .         .         .         .         .         .         .         .         .         .         .         .
 71212  70         .         .         .         .         .         .         .         .         .         .         .         .
 71214  80         .         .         .         .         .         .         .         .         .         .         .         .
 71216  90         .         .         .         .         .         .         .         .         .         .         .         .
 71218 100         .         .         .         .         .         .         .         .         .         .         .         .
 71220 110 . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
```

71222	120
71224	130
71226	140
71228	150
71230	160
71232	17.0
71234	18.0
71236	19.0
71238	20.0
71240	21.0
71242	22.0
71244	23.0
71246	24.0
71248	25.0
71250	26.0
71252	27.0
71254	28.0
71256	29.0
71258	30.0
71300	31.0
71302	32.0
71304	33.0
71306	34.0
71308	35.0
71310	36.0
71312	37.0
71314	38.0
71316	39.0
71318	40.0
71320	41.0
71322	42.0
71324	43.0
71326	44.0
71328	45.0
71330	46.0
71332	47.0
71334	48.0
71336	49.0
71338	50.0
71340	51.0
71342	52.0
71344	53.0
71346	54.0
71348	55.0
71350	56.0
71352	57.0
71354	58.0
71356	59.0
71358	60.0
71400	61.0

71402	62.0
71404	63.0
71406	64.0
71408	65.0
71410	66.0
71412	67.0
71414	68.0
71416	69.0
71418	70.0
71420	71.0
71422	72.0
71424	73.0
71426	74.0
71428	75.0
71430	76.0
71432	77.0
71434	78.0
71436	79.0
71438	80.0
71440	81.0
71442	82.0
71444	83.0
71446	84.0
71448	85.0
71450	86.0
71452	87.0
71454	88.0
71456	89.0
71458	90.0
71500	91.0
71502	92.0
71504	93.0
71506	94.0
71508	95.0
71510	96.0
71512	97.0
71514	98.0
71516	99.0
71518	100.0
71520	101.0
71522	102.0
71524	103.0
71526	104.0
71528	105.0
71530	106.0
71532	107.0
71534	108.0
71536	109.0
71538	110.0
71540	111.0


71542 112.0
71544 113.0
71546 114.0
71548 115.0
71550 116.0
71552 117.0
71554 118.0
71556 119.0
71558 120.
71600 121.
71602 122.
71604 123.
71606 124.
71608 125.
71610 126.
71612 127.
71614 128.
71616 129.
71618 130.
71620 131.
71622 132.
71624 133.
71626 134.
71628 135.
71630 136.
71632 137.
71634 138.
71636 139.
71638 140.
71640 141.
71642 142.
71644 143.
71646 144.
71648 145.
71650 146.
71652 147.
71654 148.
71656 149.
71658 150.
71700 151.
71702 152.
71704 153.
71706 154.
71708 155.
71710 156.
71712 157.
71714 158.
71716 159.
71718 160.
71720 161.

```
71722 162.         . O       .         .         .         .         .         .         .         .         .         .      XXX.
71724 163.         .O        .         .         .         .         .         .         .         .         .         .      XXX.
71726 164.         O         .         .         .         .         .         .         .         .         .         .      LXX.
71728 165.         O         .         .         .         .         .         .         .         .         .         .       XX.
71730 166.        O.         .         .         .         .         .         .         .         .         .         .        X.
71732 167.      O  .         .         .         .         .         .         .         .         .         .         .        X.
71734 168.    O    .         .         .         .         .         .         .         .         .         .         .        X.
71736 169.   O     .         .         .         .         .         .         .         .         .         .         .        X.
71738 170.   O     .         .         .         .         .         .         .         .         .         .         .        X.
71740 171. .O. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .X.
71742 172.  O      .         .         .         .         .         .         .         .         .         .         .        X.
71744 173.  O      .         .         .         .         .         .         .         .         .         .         .        X.
71746 174. O       .         .         .         .         .         .         .         .         .         .         .        X.
71748 175. O       .         .         .         .         .         .         .         .         .         .         .        X.
71750 176. O       .         .         .         .         .         .         .         .         .         .         .        X.
71752 177. O       .         .         .         .         .         .         .         .         .         .         .        L.
71754 178. O       .         .         .         .         .         .         .         .         .         .         .        L.
71756 179. O       .         .         .         .         .         .         .         .         .         .         .        L.
71758 180. O       .         .         .         .         .         .         .         .         .         .         .         .
71800 181. O . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .L.
71802 182. O       .         .         .         .         .         .         .         .         .         .         .        L.
71804 183. O       .         .         .         .         .         .         .         .         .         .         .         .
71806 184. O       .         .         .         .         .         .         .         .         .         .         .         .
71808 185. O       .         .         .         .         .         .         .         .         .         .         .         .
71810 186. O       .         .         .         .         .         .         .         .         .         .         .         .
71812 187. O       .         .         .         .         .         .         .         .         .         .         .         .
71814 188. O       .         .         .         .         .         .         .         .         .         .         .         .
71816 189. O       .         .         .         .         .         .         .         .         .         .         .         .
71818 190. O       .         .         .         .         .         .         .         .         .         .         .         .
71820 191.O. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
71822 192.O        .         .         .         .         .         .         .         .         .         .         .         .
71824 193.O        .         .         .         .         .         .         .         .         .         .         .         .
71826 194.O        .         .         .         .         .         .         .         .         .         .         .         .
71828 195.O        .         .         .         .         .         .         .         .         .         .         .         .
71830 196.O        .         .         .         .         .         .         .         .         .         .         .         .
71832 197.O        .         .         .         .         .         .         .         .         .         .         .         .
71834 198.O        .         .         .         .         .         .         .         .         .         .         .         .
71836 199.O        .         .         .         .         .         .         .         .         .         .         .         .
71838 200.O        .         .         .         .         .         .         .         .         .         .         .         .
71840 201.O. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
71842 202.O        .         .         .         .         .         .         .         .         .         .         .         .
71844 203.O        .         .         .         .         .         .         .         .         .         .         .         .
71846 204.O        .         .         .         .         .         .         .         .         .         .         .         .
71848 205.O        .         .         .         .         .         .         .         .         .         .         .         .
71850 206.O        .         .         .         .         .         .         .         .         .         .         .         .
71852 207.O        .         .         .         .         .         .         .         .         .         .         .         .
71854 208.O        .         .         .         .         .         .         .         .         .         .         .         .
71856 209.O        .         .         .         .         .         .         .         .         .         .         .         .
71858 210.O        .         .         .         .         .         .         .         .         .         .         .         .
71900 211.O. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
```

71902	212.0
71904	213.0
71906	214.0
71908	215.0
71910	216.0
71912	217.0
71914	218.0
71916	219.0
71918	220.0
71920	221.0
71922	222.0
71924	223.0
71926	224.0
71928	225.0
71930	226.0
71932	227.0
71934	228.0
71936	229.0
71938	230.0
71940	231.0
71942	232.0
71944	233.0
71946	234.0
71948	235.0
71950	236.0
71952	237.0
71954	238.0
71956	239.0
71958	240.0
72000	241.0
72002	242.0
72004	243.0
72006	244.0
72008	245.0
72010	246.0
72012	247.0
72014	248.0
72016	249.0
72018	250.0
72020	251.0
72022	252.0
72024	253.0
72026	254.0
72028	255.0
72030	256.0
72032	257.0
72034	258.0
72036	259.0
72038	260.0
72040	261.0

```
 72042 262.0         .         .         .         .         .         .         .         .         .         .         .         .
 72044 263.0         .         .         .         .         .         .         .         .         .         .         .         .
 72046 264.0         .         .         .         .         .         .         .         .         .         .         .         .
 72048 265.0         .         .         .         .         .         .         .         .         .         .         .         .
 72050 266.0         .         .         .         .         .         .         .         .         .         .         .         .
 72052 267.0         .         .         .         .         .         .         .         .         .         .         .         .
 72054 268.0         .         .         .         .         .         .         .         .         .         .         .         .
 72056 269.0         .         .         .         .         .         .         .         .         .         .         .         .
 72058 270.0         .         .         .         .         .         .         .         .         .         .         .         .
 72100 271.0. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
 72102 272.0         .         .         .         .         .         .         .         .         .         .         .         .
 72104 273.0         .         .         .         .         .         .         .         .         .         .         .         .
 72106 274.0         .         .         .         .         .         .         .         .         .         .         .         .
 72108 275.0         .         .         .         .         .         .         .         .         .         .         .         .
 72110 276.0         .         .         .         .         .         .         .         .         .         .         .         .
 72112 277.0         .         .         .         .         .         .         .         .         .         .         .         .
 72114 278.0         .         .         .         .         .         .         .         .         .         .         .         .
 72116 279.0         .         .         .         .         .         .         .         .         .         .         .         .
 72118 280.0         .         .         .         .         .         .         .         .         .         .         .         .
 72120 281.0. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
 72122 282.0         .         .         .         .         .         .         .         .         .         .         .         .
 72124 283.0         .         .         .         .         .         .         .         .         .         .         .         .
 72126 284.0         .         .         .         .         .         .         .         .         .         .         .         .
 72128 285.0         .         .         .         .         .         .         .         .         .         .         .         .
 72130 286.0         .         .         .         .         .         .         .         .         .         .         .         .
 72132 287.0         .         .         .         .         .         .         .         .         .         .         .         .
 72134 288.0         .         .         .         .         .         .         .         .         .         .         .         .
 72136 289.0         .         .         .         .         .         .         .         .         .         .         .         .
 72138 290.0         .         .         .         .         .         .         .         .         .         .         .         .
 72140 291.0. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
 72142 292.0         .         .         .         .         .         .         .         .         .         .         .         .
 72144 293.0         .         .         .         .         .         .         .         .         .         .         .         .
 72146 294.0         .         .         .         .         .         .         .         .         .         .         .         .
 72148 295.0         .         .         .         .         .         .         .         .         .         .         .         .
 72150 296.0         .         .         .         .         .         .         .         .         .         .         .         .
 72152 297.0         .         .         .         .         .         .         .         .         .         .         .         .
 72154 298.0         .         .         .         .         .         .         .         .         .         .         .         .
 72156 299.0         .         .         .         .         .         .         .         .         .         .         .         .
 72158 300.0--------.---------.---------.---------.---------.---------.---------.---------.---------.---------.---------.---------.
1


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

             **************
             *            *
  30 KK      *         4  *
             *            *
```

```
              **************
                                  RUNOFF COMBINED

 32 HC              HYDROGRAPH COMBINATION
                          ICOMP             2  NUMBER OF HYDROGRAPHS TO COMBINE

                                                                           ***

*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***

              **************
              *            *
 33 KK        *        5   *
              *            *
              **************
                                  STORAGE FACILITY

 35 KO              OUTPUT CONTROL VARIABLES
                          IPRNT             4  PRINT CONTROL
                          IPLOT             2  PLOT CONTROL
                          QSCAL            0.  HYDROGRAPH PLOT SCALE

                  HYDROGRAPH ROUTING DATA

 36 RS              STORAGE ROUTING
                          NSTPS             1  NUMBER OF SUBREACHES
                           ITYP          STOR  TYPE OF INITIAL CONDITION
                         RSVRIC           .00  INITIAL CONDITION
                              X           .00 WORKING R AND D COEFFICIENT

 37 SV                STORAGE            .0         .0         .0         .0         .1         .1         .1         .1         .1         .2
                                         .2         .2         .2         .2

 39 SE              ELEVATION       1233.20    1234.00    1236.00    1238.00    1239.00    1240.00    1241.00    1242.00    1243.00    1244.00
                                    1245.00    1246.00    1247.00    1248.00

 41 SQ              DISCHARGE            0.         0.         0.         0.         0.         0.         0.         0.         0.         0.
                                         0.         0.         0.         0.

 44 WP              PUMPING DATA

                      PUMP ON    PUMPING   PUMP OFF
                     ELEVATION     RATE    ELEVATION

                       1242.0       19.      1239.5
                       1244.2       19.      1241.0
```

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                         ISTAD       PUMPS  PUMP FLOW HYDROGRAPH IDENTIFICATION

                                                                      ***
1                                                              STATION        5

                              (I) INFLOW,    (O) OUTFLOW
              0.         5.        10.        15.        20.        25.        30.        35.        40.        45.         0.         0.         0.
DAHRMN PER
 71200   1I---------.---------.---------.---------.---------.---------.---------.---------.---------.---------.---------.---------.
 71202   2I         .         .         .         .         .         .         .         .         .         .         .         .
 71204   3I         .         .         .         .         .         .         .         .         .         .         .         .
 71206   4I         .         .         .         .         .         .         .         .         .         .         .         .
 71208   5I         .         .         .         .         .         .         .         .         .         .         .         .
 71210   6I         .         .         .         .         .         .         .         .         .         .         .         .
 71212   7I         .         .         .         .         .         .         .         .         .         .         .         .
 71214   8I         .         .         .         .         .         .         .         .         .         .         .         .
 71216   9I         .         .         .         .         .         .         .         .         .         .         .         .
 71218  10I         .         .         .         .         .         .         .         .         .         .         .         .
 71220  11I . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
 71222  12I         .         .         .         .         .         .         .         .         .         .         .         .
 71224  13I         .         .         .         .         .         .         .         .         .         .         .         .
 71226  14I         .         .         .         .         .         .         .         .         .         .         .         .
 71228  15I         .         .         .         .         .         .         .         .         .         .         .         .
 71230  16I         .         .         .         .         .         .         .         .         .         .         .         .
 71232  17I         .         .         .         .         .         .         .         .         .         .         .         .
 71234  18I         .         .         .         .         .         .         .         .         .         .         .         .
 71236  19I         .         .         .         .         .         .         .         .         .         .         .         .
 71238  20OI        .         .         .         .         .         .         .         .         .         .         .         .
 71240  21OI. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
 71242  22OI        .         .         .         .         .         .         .         .         .         .         .         .
 71244  23OI        .         .         .         .         .         .         .         .         .         .         .         .
 71246  24OI        .         .         .         .         .         .         .         .         .         .         .         .
 71248  25OI        .         .         .         .         .         .         .         .         .         .         .         .
 71250  26OI        .         .         .         .         .         .         .         .         .         .         .         .
 71252  27OI        .         .         .         .         .         .         .         .         .         .         .         .
 71254  28OI        .         .         .         .         .         .         .         .         .         .         .         .
 71256  29OI        .         .         .         .         .         .         .         .         .         .         .         .
 71258  30OI        .         .         .         .         .         .         .         .         .         .         .         .
 71300  31OI. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
 71302  32OI        .         .         .         .         .         .         .         .         .         .         .         .
 71304  33OI        .         .         .         .         .         .         .         .         .         .         .         .
 71306  34OI        .         .         .         .         .         .         .         .         .         .         .         .
 71308  35OI        .         .         .         .         .         .         .         .         .         .         .         .
 71310  36OI        .         .         .         .         .         .         .         .         .         .         .         .
 71312  37OI        .         .         .         .         .         .         .         .         .         .         .         .
 71314  38OI        .         .         .         .         .         .         .         .         .         .         .         .
 71316  39OI        .         .         .         .         .         .         .         .         .         .         .         .
 71318  40OI        .         .         .         .         .         .         .         .         .         .         .         .
 71320  41OI. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
 71322  42OI        .         .         .         .         .         .         .         .         .         .         .         .
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71324	430I
71326	440I
71328	450I
71330	460I
71332	470I
71334	480I
71336	490I
71338	500I
71340	510I
71342	520I
71344	530I
71346	540I
71348	550I
71350	560I
71352	570I
71354	580I
71356	590I
71358	600I
71400	610I
71402	620I
71404	630I
71406	640I
71408	650I
71410	660I
71412	670I
71414	680I
71416	690I
71418	70I
71420	71I
71422	72I
71424	73I
71426	74I
71428	75I
71430	76I
71432	77I
71434	78I
71436	79I
71438	80I
71440	81I
71442	82I
71444	83I
71446	840I
71448	850I
71450	860I
71452	870I
71454	880I
71456	890I
71458	900I
71500	910I
71502	920I

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71504  93OI         .         .         .         .         .         .         .         .         .         .         .         .
71506  94OI         .         .         .         .         .         .         .         .         .         .         .         .
71508  95OI         .         .         .         .         .         .         .         .         .         .         .         .
71510  96OI         .         .         .         .         .         .         .         .         .         .         .         .
71512  97OI         .         .         .         .         .         .         .         .         .         .         .         .
71514  98OI         .         .         .         .         .         .         .         .         .         .         .         .
71516  99OI         .         .         .         .         .         .         .         .         .         .         .         .
71518 100OI         .         .         .         .         .         .         .         .         .         .         .         .
71520 101OI. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
71522 102OI         .         .         .         .         .         .         .         .         .         .         .         .
71524 103OI         .         .         .         .         .         .         .         .         .         .         .         .
71526 104OI         .         .         .         .         .         .         .         .         .         .         .         .
71528 105OI         .         .         .         .         .         .         .         .         .         .         .         .
71530 106OI         .         .         .         .         .         .         .         .         .         .         .         .
71532 107OI         .         .         .         .         .         .         .         .         .         .         .         .
71534 108OI         .         .         .         .         .         .         .         .         .         .         .         .
71536 109OI         .         .         .         .         .         .         .         .         .         .         .         .
71538 110OI         .         .         .         .         .         .         .         .         .         .         .         .
71540 111OI. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
71542 112OI         .         .         .         .         .         .         .         .         .         .         .         .
71544 113OI         .         .         .         .         .         .         .         .         .         .         .         .
71546 114OI         .         .         .         .         .         .         .         .         .         .         .         .
71548 115OI         .         .         .         .         .         .         .         .         .         .         .         .
71550 116OI         .         .         .         .         .         .         .         .         .         .         .         .
71552 117OI         .         .         .         .         .         .         .         .         .         .         .         .
71554 118OI         .         .         .         .         .         .         .         .         .         .         .         .
71556 119OI         .         .         .         .         .         .         .         .         .         .         .         .
71558 120OI         .         .         .         .         .         .         .         .         .         .         .         .
71600 121OI. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
71602 122OI         .         .         .         .         .         .         .         .         .         .         .         .
71604 123OI         .         .         .         .         .         .         .         .         .         .         .         .
71606 124OI         .         .         .         .         .         .         .         .         .         .         .         .
71608 125OI         .         .         .         .         .         .         .         .         .         .         .         .
71610 126O I        .         .         .         .         .         .         .         .         .         .         .         .
71612 127O I        .         .         .         .         .         .         .         .         .         .         .         .
71614 128O I        .         .         .         .         .         .         .         .         .         .         .         .
71616 129O I        .         .         .         .         .         .         .         .         .         .         .         .
71618 130O I        .         .         .         .         .         .         .         .         .         .         .         .
71620 131O I . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
71622 132O I        .         .         .         .         .         .         .         .         .         .         .         .
71624 133O I        .         .         .         .         .         .         .         .         .         .         .         .
71626 134O I        .         .         .         .         .         .         .         .         .         .         .         .
71628 135O I        .         .         .         .         .         .         .         .         .         .         .         .
71630 136O I        .         .         .         .         .         .         .         .         .         .         .         .
71632 137O  I       .         .         .         .         .         .         .         .         .         .         .         .
71634 138O   I      .         .         .         .         .         .         .         .         .         .         .         .
71636 139O     I    .         .         .         .         .         .         .         .         .         .         .         .
71638 140O      I   .         .         .         .         .         .         .         .         .         .         .         .
71640 141O . . . I . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
71642 142O         I.         .         .         .         .         .         .         .         .         .         .         .
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71644 1430         I         .         .         .         .         .         .         .         .         .         .         .
71646 1440         .I        .         .         .         .         .         .         .         .         .         .         .
71648 1450         .  I      .         .         .         .         .         .         .         .         .         .         .
71650 1460         .     I   .         .         .         .         .         .         .         .         .         .         .
71652 1470         .        I.         .         .         .         .         .         .         .         .         .         .
71654 1480         .         .    I    .         .         .         .         .         .         .         .         .         .
71656 1490         .         .         .   I     .         .         .         .         .         .         .         .         .
71658 1500         .         .         .         .         .    I    .         .         .         .         .         .         .
71700 1510 . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .I. . . . . . . . . . . . . . . . . . .
71702 1520         .         .         .         .         .         .         .         .I        .         .         .         .
71704 1530         .         .         .         .         .         .   I     .         .         .         .         .         .
71706 1540         .         .         .         .      I  .         .         .         .         .         .         .         .
71708 1550         .         .         .    I    .         .         .         .         .         .         .         .         .
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71714 1580         .        I.         .         .         .         .         .         .         .         .         .         .
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71718 1600         .   I     .         .         .         .         .         .         .         .         .         .         .
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71722 1620         .I        .         .         .         .         .         .         .         .         .         .         .
71724 1630         I         .         .         .         .         .         .         .         .         .         .         .
71726 1640        I.         .         .         .         .         .         .         .         .         .         .         .
71728 1650        I.         .         .         .         .         .         .         .         .         .         .         .
71730 1660       I .         .         .         .         .         .         .         .         .         .         .         .
71732 1670     I   .         .         .         .         .         .         .         .         .         .         .         .
71734 1680    I    .         .         .         .         .         .         .         .         .         .         .         .
71736 1690   I     .         .         .         .         .         .         .         .         .         .         .         .
71738 1700  I      .         .         .         .         .         .         .         .         .         .         .         .
71740 1710 .I. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
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71802 1820 I       .         .         .         .         .         .         .         .         .         .         .         .
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71814 1880I        .         .         .         .         .         .         .         .         .         .         .         .
71816 1890I        .         .         .         .         .         .         .         .         .         .         .         .
71818 1900I        .         .         .         .         .         .         .         .         .         .         .         .
71820 1910I. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
71822 1920I        .         .         .         .         .         .         .         .         .         .         .         .
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71912 217OI
71914 218OI
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71946 234I
71948 235I
71950 236I
71952 237I
71954 238I
71956 239I
71958 240I
72000 241I
72002 242I

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72008 245OI
72010 246OI
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72014 248OI
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72018 250OI
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72124 283OI
72126 284OI
72128 285OI
72130 286OI
72132 287OI
72134 288OI
72136 289OI
72138 290OI
72140 291OI.
72142 292OI

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  72144 293OI       .         .         .         .         .         .         .         .         .         .         .         .
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  72156 299OI       .         .         .         .         .         .         .         .         .         .         .         .
  72158 300I---------.---------.---------.---------.---------.---------.---------.---------.---------.---------.---------.---------.
1


 *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


           **************
           *            *
  46 KK    *     PUMPS  *
           *            *
           **************
                                   PUMP STATION FLOW

  48 KO          OUTPUT CONTROL VARIABLES
                       IPRNT           4  PRINT CONTROL
                       IPLOT           2  PLOT CONTROL
                       QSCAL         10.  HYDROGRAPH PLOT SCALE

                                                                     ***
1
```

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+										
	HYDROGRAPH AT									
+		2	23.	5.03	1.	1.	1.	.00		
	HYDROGRAPH AT									
+		3	18.	5.00	1.	1.	1.	.00		
	2 COMBINED AT									
+		4	40.	5.00	2.	2.	2.	.01		
	PUMP FLOW TO									
+		PUMPS	38.	5.03	2.	1.	1.	.01		
	HYDROGRAPH AT									

```
+                        5       0.    .00          0.        0.        0.      .01
+                                                                                      1245.57      5.03

        HYDROGRAPH AT
+                    PUMPS      38.   5.03          2.        1.        1.      .00
1
                                SUMMARY OF KINEMATIC WAVE - MUSKINGUM-CUNGE ROUTING
                                   (FLOW IS DIRECT RUNOFF WITHOUT BASE FLOW)
                                                                  INTERPOLATED TO
                                                              COMPUTATION INTERVAL
          ISTAQ    ELEMENT       DT       PEAK    TIME TO     VOLUME      DT      PEAK    TIME TO      VOLUME
                                                   PEAK                                     PEAK

                               (MIN)     (CFS)     (MIN)       (IN)     (MIN)    (CFS)     (MIN)        (IN)

              2    MANE          .47     23.70    300.88       2.63     2.00     23.03    302.00        2.63

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .7060E+00 OUTFLOW= .7009E+00 BASIN STORAGE= .1241E-02 PERCENT ERROR=    .5

              3    MANE          .29     18.28    300.79       2.69     2.00     17.90    300.00        2.69

CONTINUITY SUMMARY (AC-FT) - INFLOW= .0000E+00 EXCESS= .5500E+00 OUTFLOW= .5456E+00 BASIN STORAGE= .1020E-02 PERCENT ERROR=    .6


*** NORMAL END OF HEC-1 ***
```

NCA ENGINEERS INC.

Job No. ______

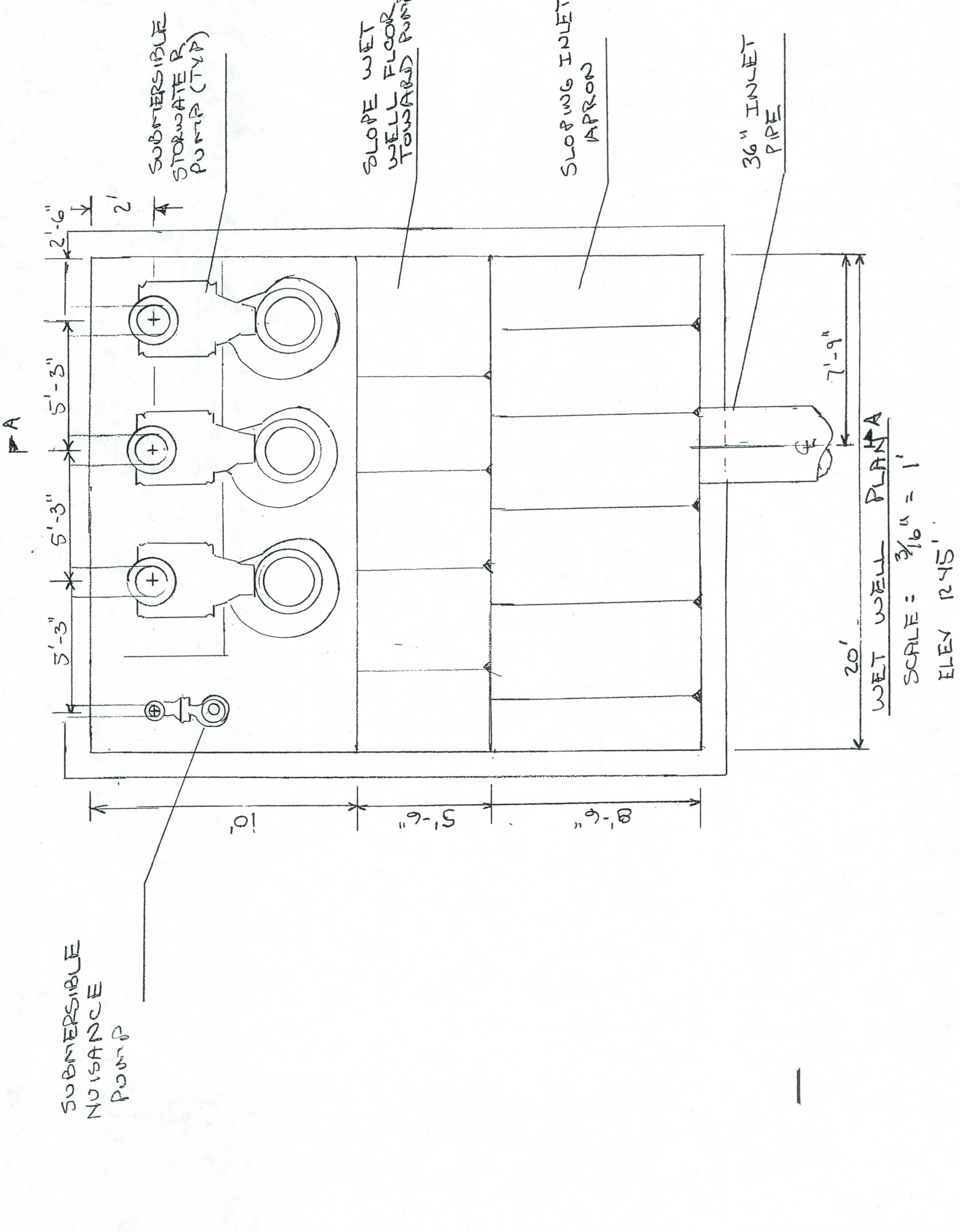
Vol./Sheet No. ______ of ______

Contract/Client: GREENFIELD RD / TOWN of GILBERT

Phase/Subject: DRAINAGE

Design Topic: PUMP STATION WET WELL SIZE

Made By: JRD Date: 9/11/02 Checked By ______ Date ______ Page No. 1



NCA ENGINEERS INC.

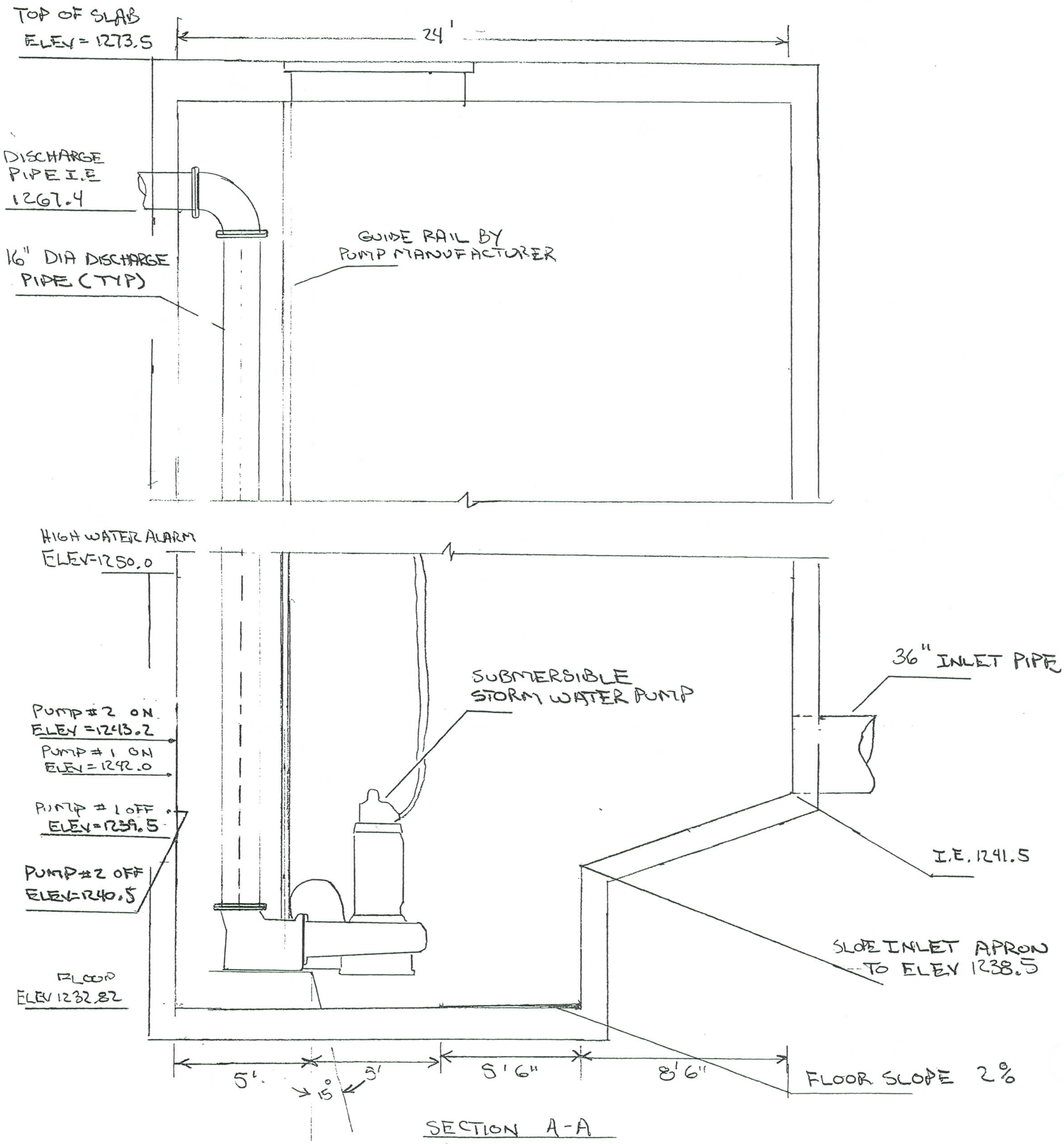
Job No. ______ Vol./Sheet No. ______ of ______

Contract/Client ______

Phase/Subject ______

Design Topic ______

Made By JRD Date 9/11/02 Checked By ______ Date ______ Page No. 2



SECTION A-A

SCALE: 3/16" = 1'

INCA ENGINEERS INC.

Job No. ____ Vol./Sheet No. ____ of ____

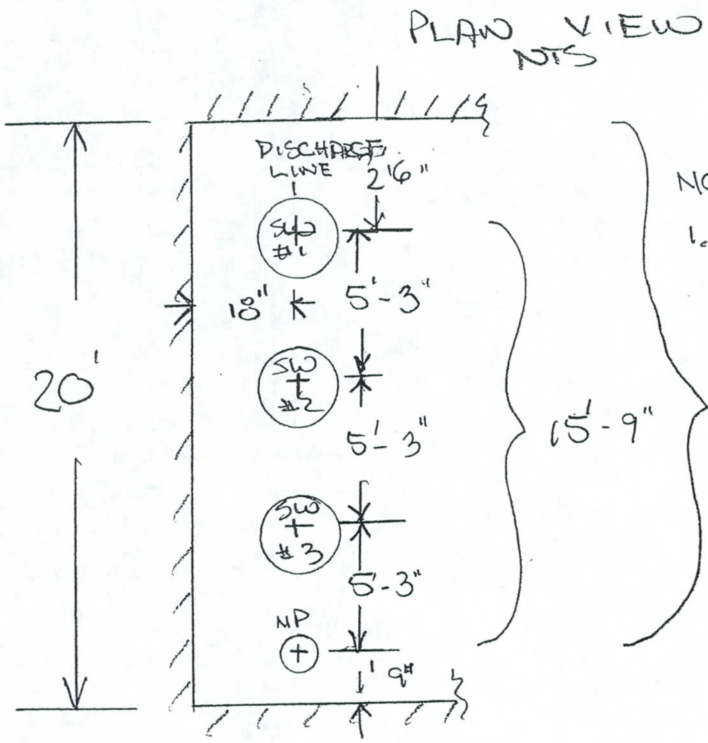
Contract/Client ____

Phase/Subject ____

Design Topic ____

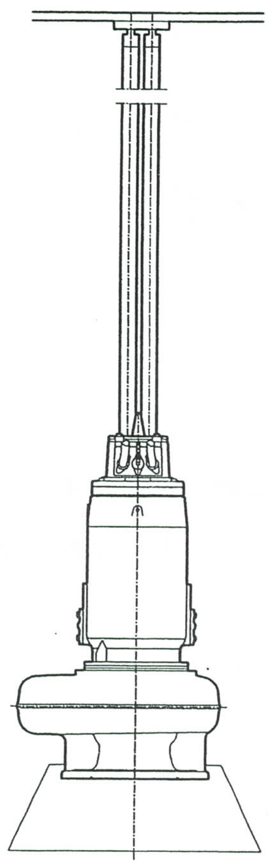
Made By ____ Date ____ Checked By ____ Date ____ Page No. 3

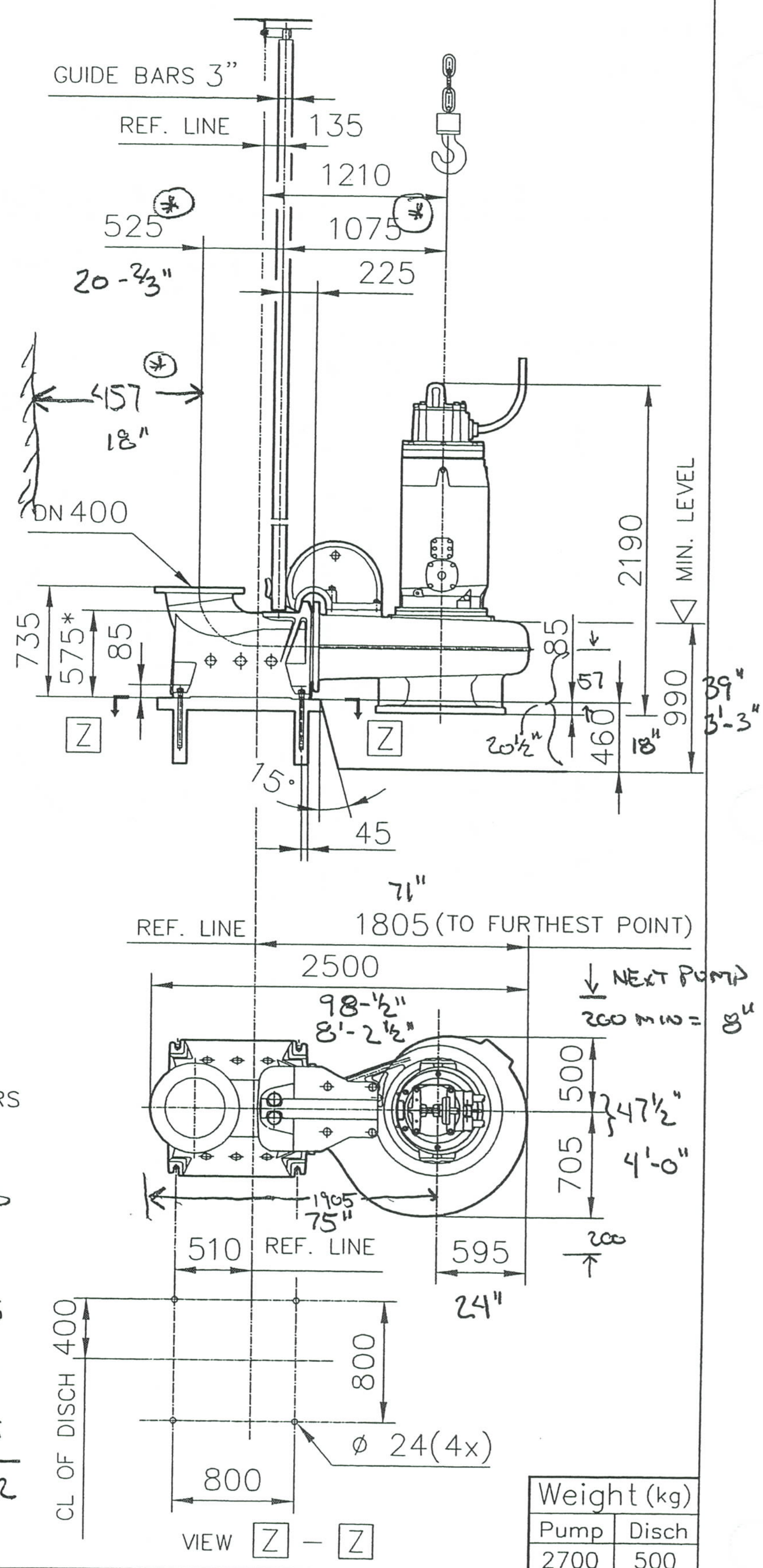
WET WELL PUMP/WALL SPACING:



NOTES:

1. BASED ON 6,720 gpm, FLYGT CP 3400 735/745





* DIMENSION TO ENDS OF GUIDE BARS

SUM OF (*) DIMENSIONS

WALL - ℄ DISCHARGE	457
℄ DISCHARGE - RAIL	525
RAIL - ℄ MOTOR	1075
℄ MOTOR - FORWARD EDGE PMP	595
	2,652

= 104½ in

= 8'-8"

Weight (kg)	
Pump	Disch
2700	500

FLYGT AUTOCAD DRAWING	Denomination: Dimensional drwg CP 3400 735/745	Drawn by OHn	Checked by Sors	Date 980703
		Scale 1:40	Reg no 5399
		644 17 00	A

ALTERNATIVE BASIC DESIGNS:

Sump designs for compact sewage and stormwater pumping stations are also shown. They are based on extensive model testing programs and on stations in practice. The dimensions, which depend on pump flow rate, are given in Fig. 3. To avoid sedimentation problems due to lower velocities, these dimensions should not be increased.

Fig. 1

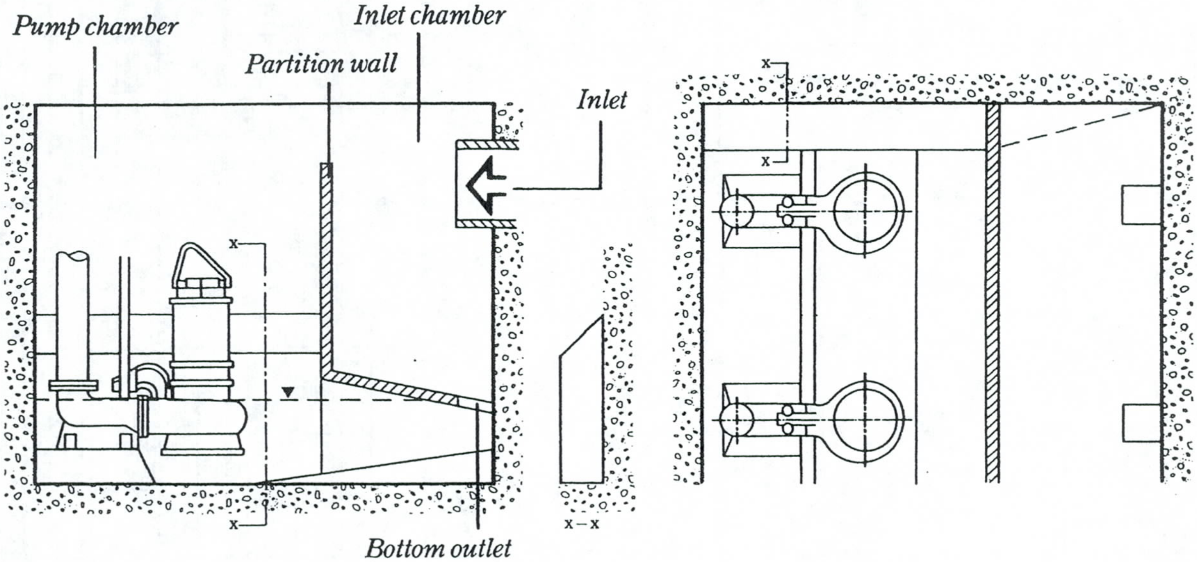
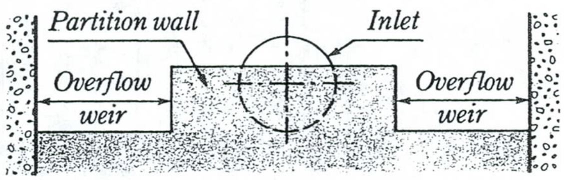
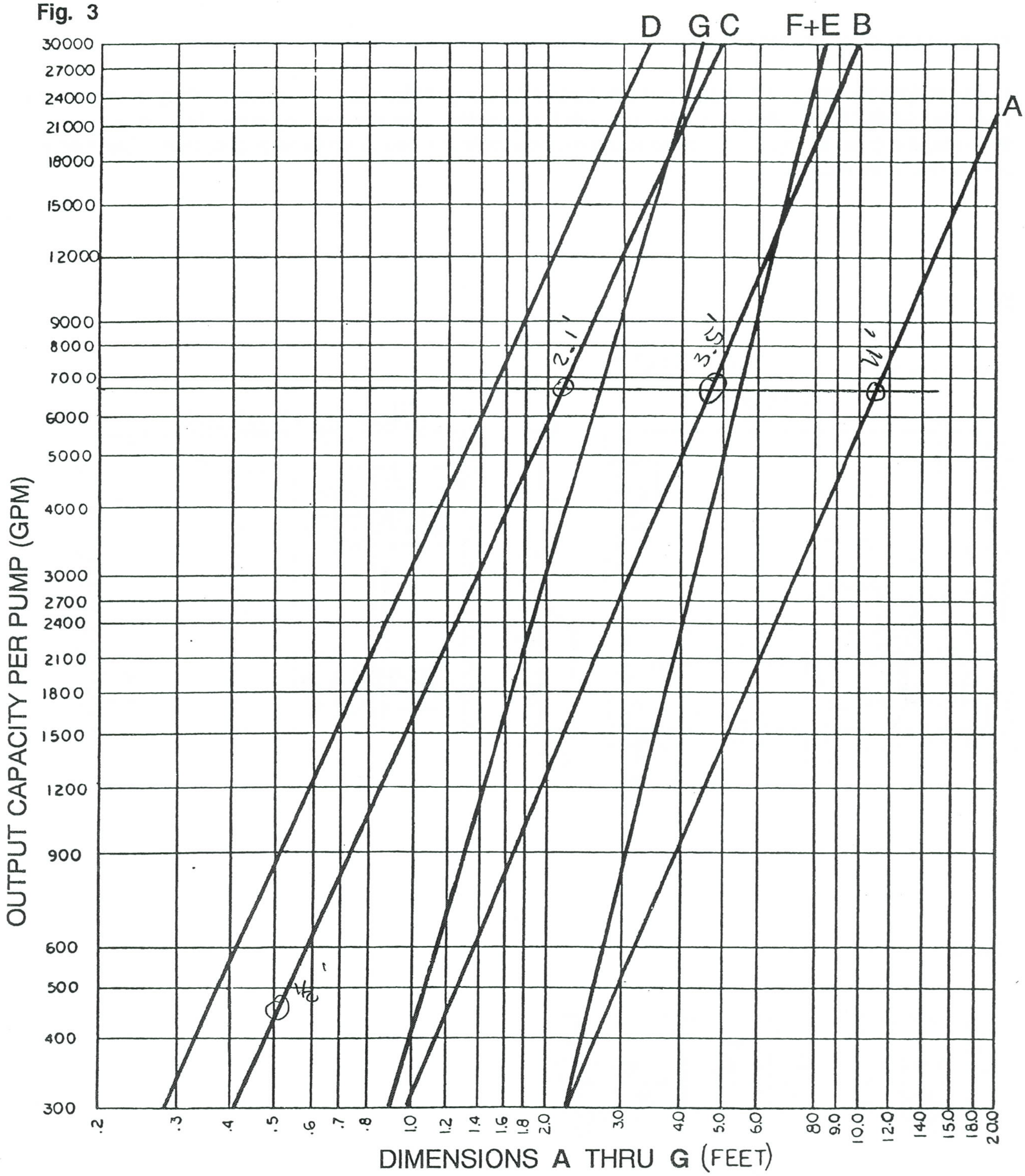


Fig. 2



Partition wall with overflow weirs

Fig. 3

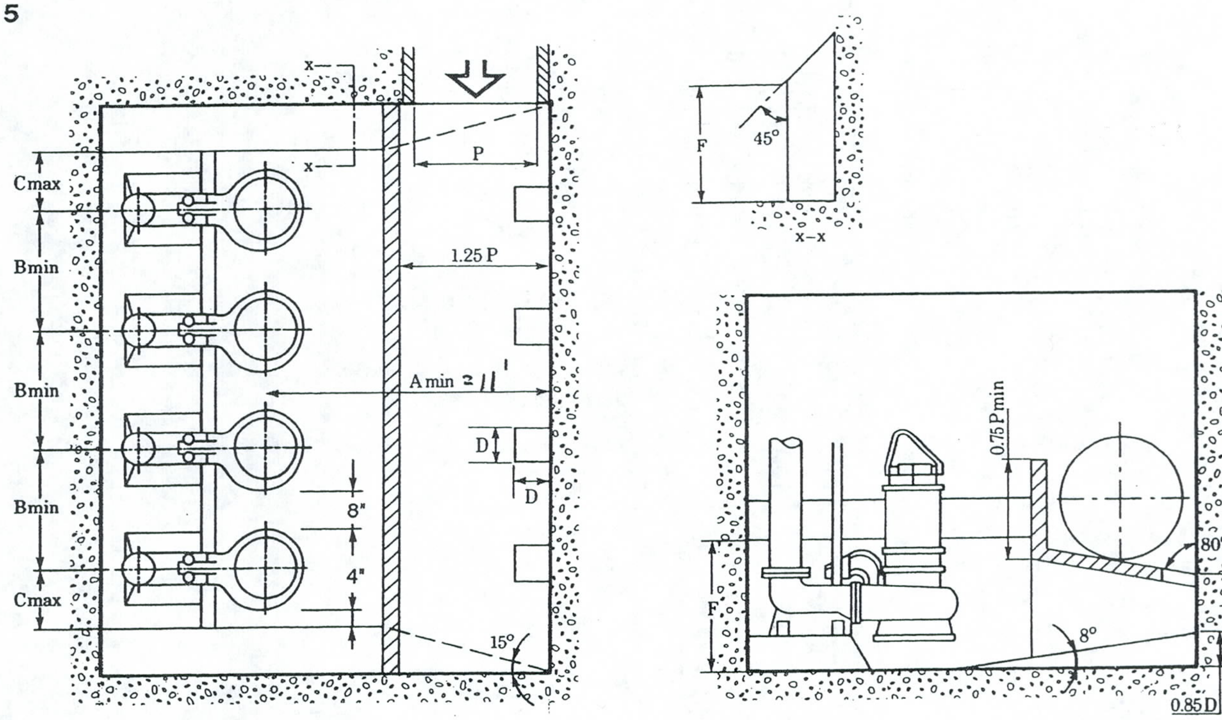


Note: 1) On dimension B: The clearance between the two pump casings must never be less than 8 inches.

Note: 2) On dimension C: The clearance between the side wall and the pump casing must never be less than 4 inches.

If dimensions other than those recommended here are desired, contact your FLYGT representative. He will help you arrive at a satisfactory solution.

Fig. 5

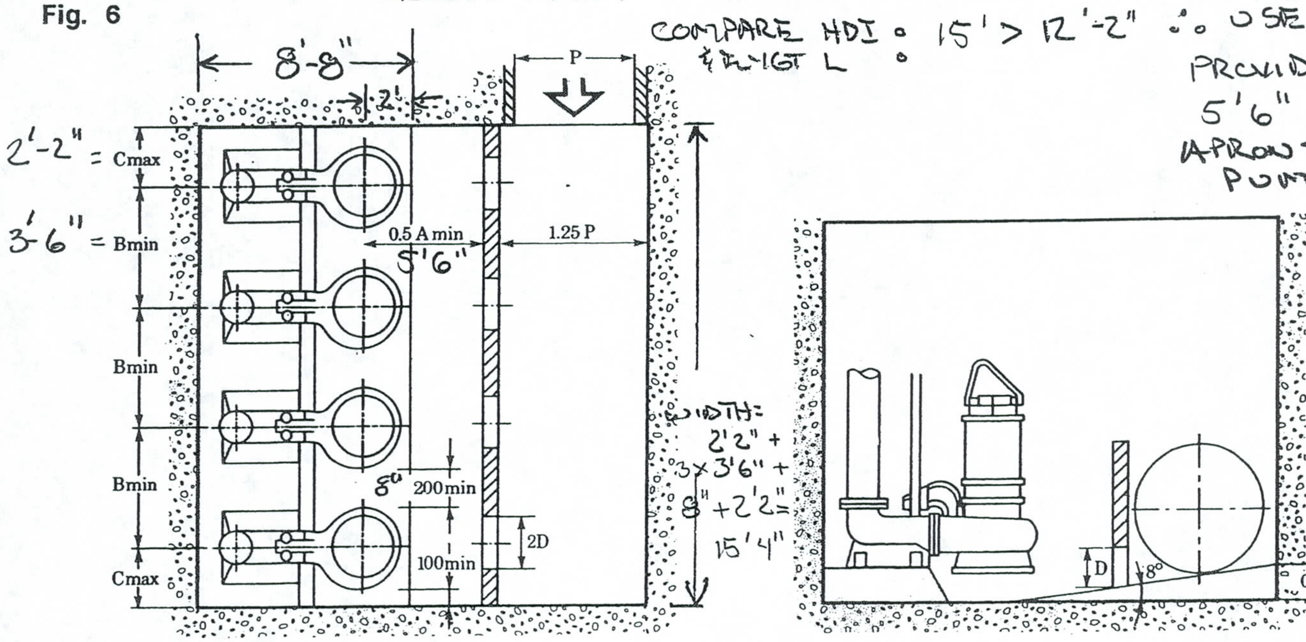


Sump with side entry (Medium Elevation)

LENGTH= 6'-8" + 11' = 27'-8" W/ SIDE ENTERING PIPE
LENGTH FROM WEIR TO WALL ((8'8"-2')+5'6") = 12'2"
COMPARE HDI : 15' > 12'-2" ∴ USE 15'
& ELYGT L :

PROVIDE 5'6" BETWEEN APRON & PUMP

Fig. 6



Sump with side entry (Low Elevation)

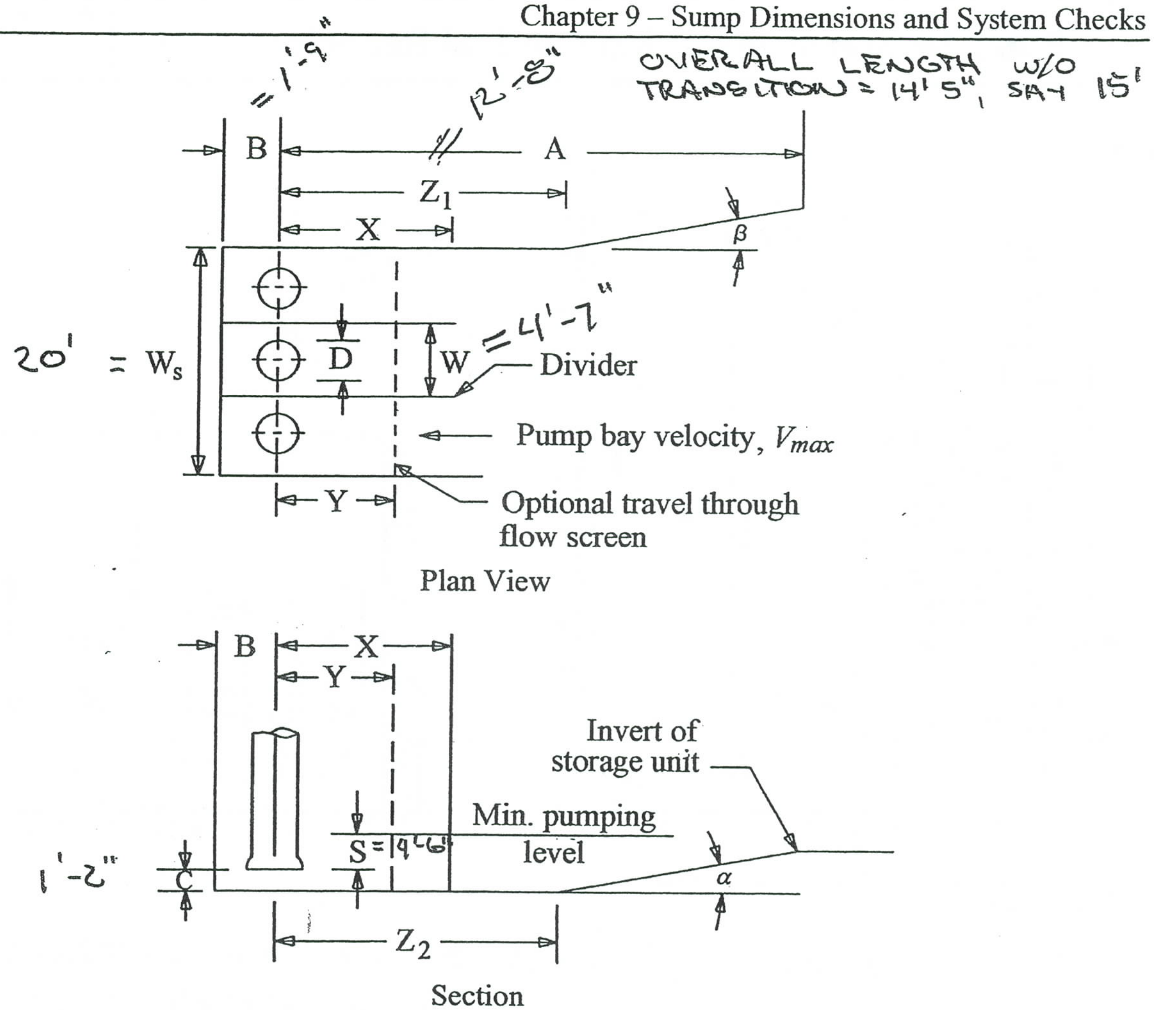


Figure 9-1. Recommended rectangular sump

Adapted from reference 15

DIMENSIONS PROVIDED IN ATTACHED SPREADSHEET CALCS FOR PUMP SIZE SECTION

Rectangular Sump Dimensions	For individual pump capacities up to 40,000 gpm	
Design Indivudual Pump Capacity,gpm		**6,720**
Assume three pumps along sump centerline (3 main)		

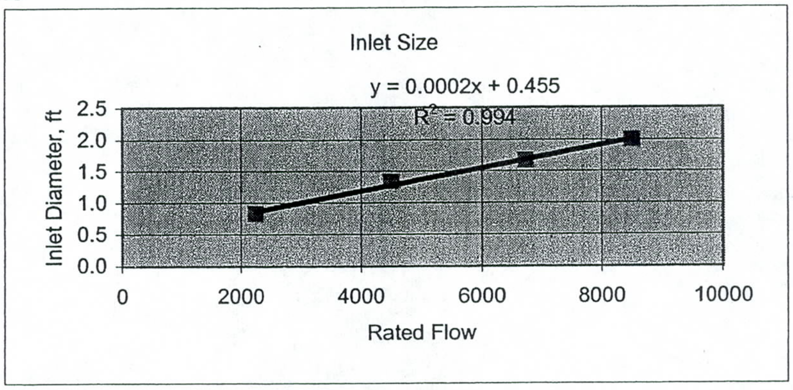
Qp=individual pump capacity, cfs	Cu= 0.52	15.0	
C=clearance between pump inlet bell and sump floor,ft	C=0.5*D	1.15	
Dr= outside diameter of pump inlet bell/volute,ft=Inlet size,D+0.5	D=manuf.dim	2.30	See chart below
Hmin=minimum water depth in sump,ft	Hmin=S+C	5.68	
S=minimum pump inlet submergence,ft	S=Dr+(Cur*Qp)/Dr^1.5	4.53	
W=pump inlet bay width, ft	W=2*D	4.60	
B=clearance from back wall to pump centerline, ft	B=0.75*D	1.72	
X=pump inlet bay length, ft	X=5.5*D	12.64	
Z1=distance from centerline to diverging walls	Z1=5.5*D	12.64	
Vs=pump bay velocity, f/s	Vs=Qp/W*Hmin	0.57	
Ws= sump width, ft	Ws=3*W	13.79	
L=Length, ft	L=B+Z1	14.37	
Total width including nuisance pump=Ws+W1cfs pumpft	W=Ws+6.25	20.04	

Cycle Time

minimum cycle time t=	10	
Minimum cycle volume V=15*Qp*t, ft^3		2246
Minimum depth from floor plan, L*Ws		11.33

Table for Inlet Diameter, in
Based on Flygt Submersible Pump CP Series

GPM	Inches	Feet
2240	10	0.8
4500	16	1.3
6720	20	1.7
8500	24	2.0



Apron Flare

B=inletdepth*(1+((length)/(inletdepth*Fr))^1.5)

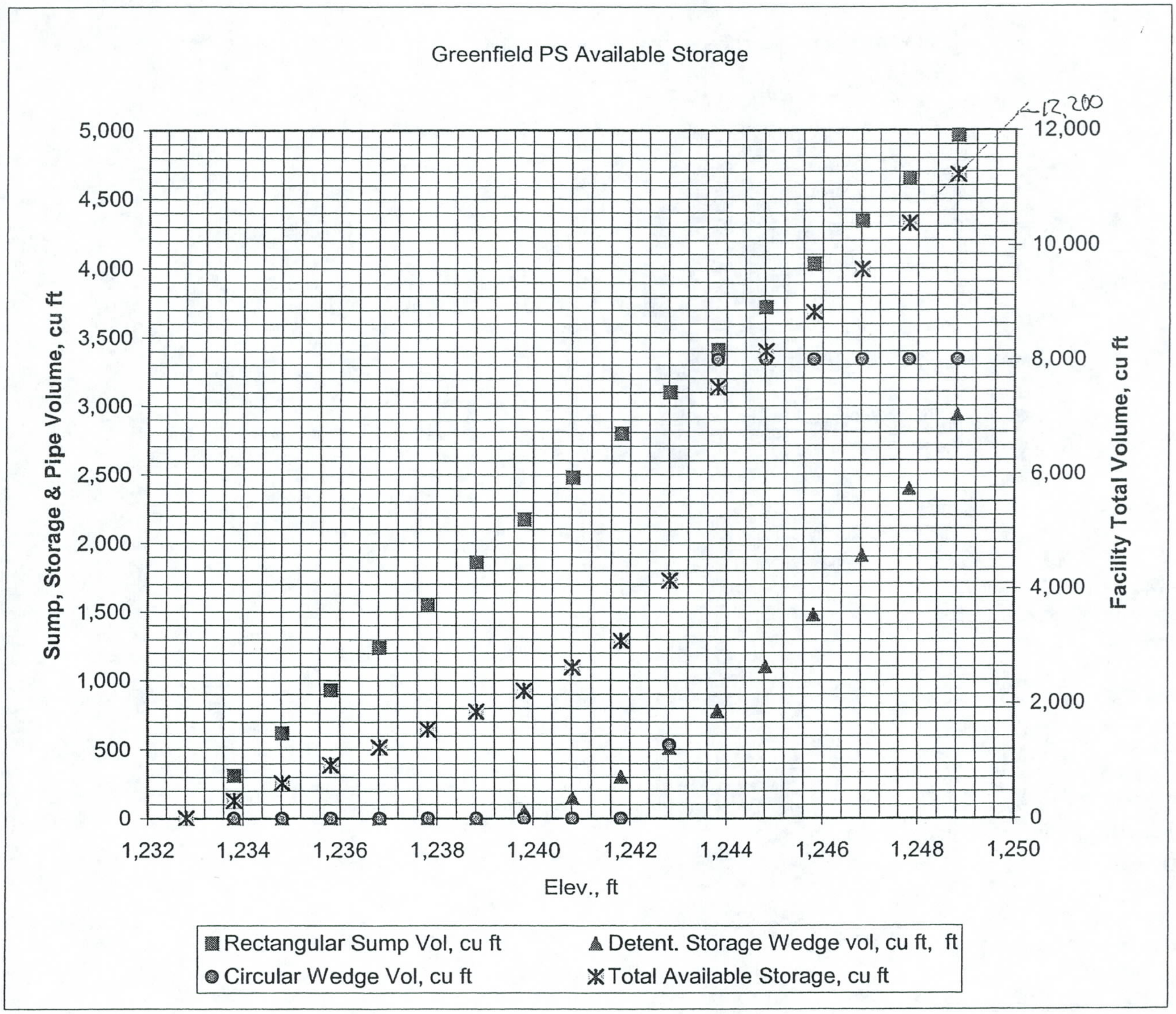
apron length=	8.25	Fr=	1.25	Based on 38 cfs in 30" pipe
Check w/ StorageRec!C5		inletdepth=	1.9	
apron width=	14.19			

BASED ON PROPOSED 20'x 15½'

Greenfield Road Stormwater Pump Station Stage Storage Table

Combined with Pump Capacity,	**6,720**	Well IE	**1232.82**	Inlet Pipe IE	**1241.5**	Vent Duct & Safety Ladder Clearance	0			
<u>Based on the following components:</u>		Hmin=	5.68							
Rectangular wet well	310	Rectangular sump size, sq ft		TAN Apron slope	0.36377	20 degrees				
Detention storage	*8.25*	*length*	20.04	*wide*	3.00	*deep*	c_p	varies		
Ungula pipe storage	Height to inlet ,ft	8.68	3	diameter	max depth	3	slope=	0.01	pipe	

Elevation,ft	Stage, feet	Rectangular Sump Vol, cu ft	Detent. Storage Wedge Depth, ft	Detent. Storage Wedge Length, ft	Detent. Storage Wedge vol, cu ft, ft	Circular Wedge Vol, cu ft	Total Available Storage, cu ft	Total Available Storage, ac ft	Area of Segment, sq ft	Length of element, ft	Depth of segment, ft	c_p
1,233	0	0	0	0	0	0	0	0	0.0	0.0		
1,234	1	310	0	0	0	0	310	0.007	0.0	0.0		
1,235	2	620	0	0	0	0	620	0.014	0.0	0.0		
1,236	3	930	0	0	0	0	930	0.021	0.0	0.0		
1,237	4	1,240	0	0	0	0	1,240	0.028	0.0	0.0		
1,238	5	1,550	0	0	0	0	1,550	0.036	0.0	0.0		
1,239	6	1,860	0	1	0	0	1,860	0.043	0.0	0.0		
1,240	7	2,170	1.3	3.6	48	0	2,218	0.051	0.0	0.0	0.0	0.0
1,241	8	2,480	2.3	6.4	148	0	2,628	0.060	0.0	0.0	0.0	0.0
1,242	9	2,790	3.3	9.1	303	1	3,094	0.071	0.4	31.8	0.3	-1.2
1,243	10	3,100	4.3	11.9	514	533	4,147	0.095	3.0	131.8	1.3	-0.2
1,244	11	3,410	5.3	14.6	779	3,338	7,527	0.173	5.9	231.8	2.3	0.8
1,245	12	3,720	6.3	17.4	1,100	3,338	8,158	0.187	7.1	300.0	3.3	1.8
1,246	13	4,030	7.3	20.1	1,475	3,338	8,844	0.203	7.1	300.0	4.3	2.8
1,247	14	4,340	8.3	22.9	1,906	3,338	9,584	0.220	7.1	300.0	5.3	3.8
1,248	15	4,650	9.3	25.6	2,392	3,338	10,380	0.238	7.1	300.0	6.3	4.8
1,249	16	4,960	10.3	28.4	2,933	3,338	11,231	0.258	7.1	300.0	7.3	5.8



Greenfield PS Available Storage
Sump, Storage & Pipe Volume, cu ft
Facility Total Volume, cu ft
Elev., ft
5,000
4,500
4,000
3,500
3,000
2,500
2,000
1,500
1,000
500
0
12,000
10,000
8,000
6,000
4,000
2,000
0
1,232
1,234
1,236
1,238
1,240
1,242
1,244
1,246
1,248
1,250
12,200
Rectangular Sump Vol, cu ft
Detent. Storage Wedge vol, cu ft, ft
Circular Wedge Vol, cu ft
Total Available Storage, cu ft

Greenfield Road SWPS

SYSTEM HEAD-DISCHARGE CURVE

10/8/02

Basis of Calculation: Ht = Hstat + Hent + Hfs + Hfd + Sum Hfvs + Sum Hfvd + Vd^2/(2*g) **(TDH)**

Where:
Hstat = High point elev. - Wet well elev.
Hent = Kent*V^2/(2*g)
Hfs = ((149*Q)/(C*D^2.63))^1.85*(Lent/1000)
Sum Hfvs = Kfvs*Vent^2/(2*g)
Sum Hfvd = Kfvd*Vext^2/(2*g)
Hfd = ((149*Q)/(C*D^2.63))^1.85*(Ldis/1000)

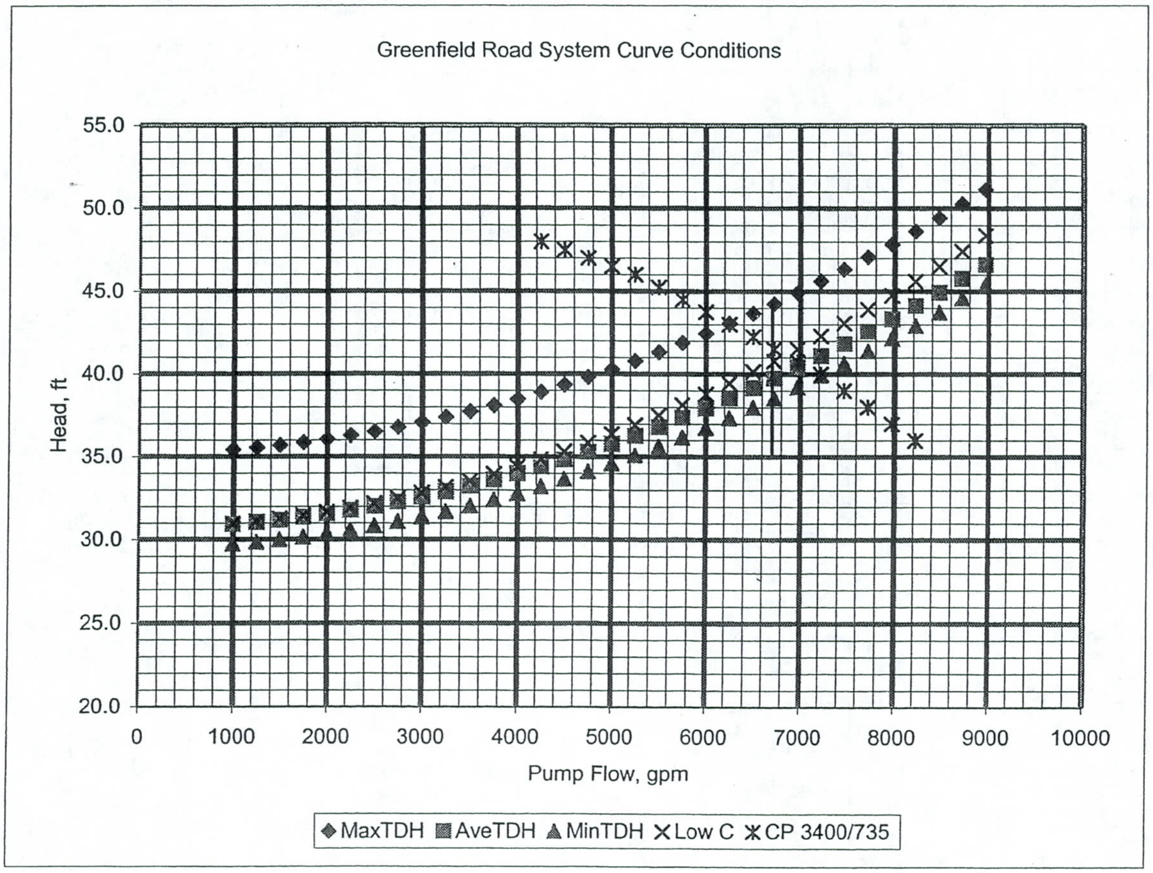
								K form Coefficients		
Constants	Kent=	0.1	g=	32.16	Qcfs=	15.0	6,732	Fitting/ Valve	Suction	Discharge
	Lent=	0.2	D=	1.33	**wet well floor=**	**1232.82**		Restrictor	0.5	
	Ldis=	139.18	A =	1.40	PS_loss=	0		90°ell		0.08
	SumKfvs=	0.50	V=Q/A	Flap gate headloss,ft		0.02		Check Valve		2.00
	SumKfvd=	2.18	d=	16	Pump Centerline , ft		1.7	90°ell		0.08
	Ductile Iron	**C=**	**145**					Flap Gate		0.02
		LowC=	**120**	Additional discharge distance			100	Sum	0.5	2.18

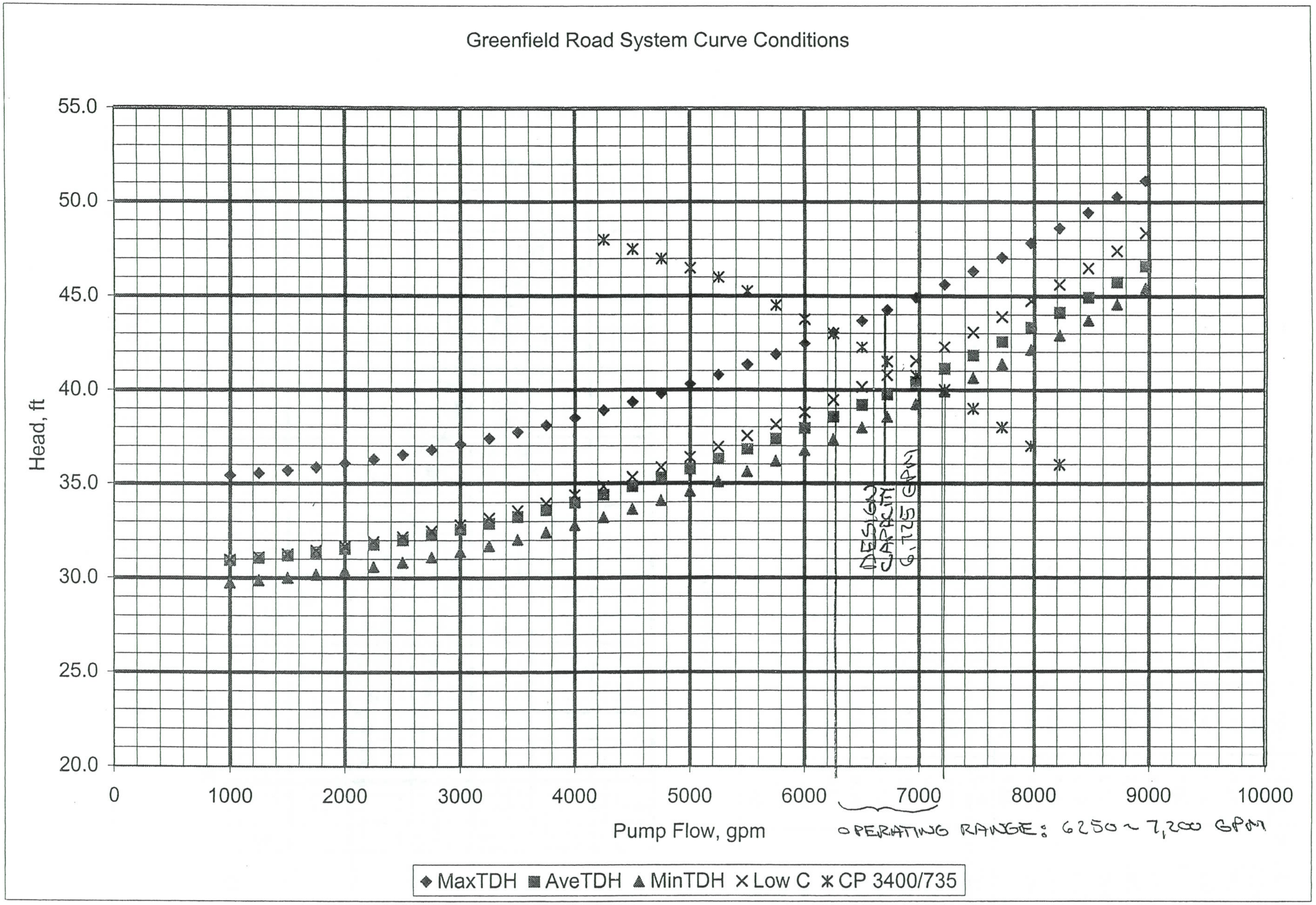
	Case #1	Case #2	Case #3	Case #4
Pumps On/Off Stage, ft.	1238.5	1242	1244.2	1242
Description	Min Pos Suction	Ave Pos Suction	Max Pos Suction	More pipe rough.
Wet Well Water Elev., ft	1238.5	1243	1244.2	1243
High Point in FM, Elev. ft	1273.7	1273.7	1273.7	1273.7
Static Head, ft	35.2	30.7	29.5	30.7
Datum - Centerline Pump, ft.	1234.52	1234.52	1234.52	1234.52
Discharge Head -Suction Head, ft	35.2	30.7	29.5	30.7

System Curve Based on Discharge Pipe Dia= 16

	Single Pump System Head Curves				CP 3400/735
Flow, Q, gpm	MaxTDH	AveTDH	MinTDH	Low C	Pump Head
1000	35.4	30.9	29.7	31.0	
1250	35.6	31.1	29.9	31.1	
1500	35.7	31.2	30.0	31.3	
1750	35.9	31.4	30.2	31.5	
2000	36.1	31.6	30.4	31.7	
2250	36.3	31.8	30.6	31.9	
2500	36.5	32.0	30.8	32.2	
2750	36.8	32.3	31.1	32.5	
3000	37.1	32.6	31.4	32.8	
3250	37.4	32.9	31.7	33.2	
3500	37.7	33.2	32.0	33.5	
3750	38.1	33.6	32.4	33.9	

Flow, Q, gpm	MaxTDH	AveTDH	MinTDH	Low C	Pump Head
4000	38.5	34.0	32.8	34.4	48.0
4250	38.9	34.4	33.2	34.8	47.5
4500	39.3	34.8	33.6	35.3	47.0
4750	39.8	35.3	34.1	35.8	46.5
5000	40.3	35.8	34.6	36.4	46.0
5250	40.8	36.3	35.1	36.9	45.3
5500	41.3	36.8	35.6	37.5	44.5
5750	41.9	37.4	36.2	38.1	43.8
6000	42.5	38.0	36.8	38.8	43.0
6250	43.1	38.6	37.4	39.5	42.3
6500	43.7	39.2	38.0	40.1	41.5
6720	44.3	39.8	38.6	40.8	40.8 **Pump Design Capacity**
6970	44.9	40.4	39.2	41.5	40.0
7220	45.6	41.1	39.9	42.3	39.0
7470	46.3	41.8	40.6	43.1	38.0
7720	47.1	42.6	41.4	43.9	37.0
7970	47.8	43.3	42.1	44.7	36.0
8220	48.6	44.1	42.9	45.6	
8470	49.4	44.9	43.7	46.5	
8720	50.3	45.8	44.6	47.4	
8970	51.1	46.6	45.4	48.4	




Greenfield Road System Curve Conditions
Head, ft
55.0
50.0
45.0
40.0
35.0
30.0
25.0
20.0
0
1000
2000
3000
4000
5000
6000
7000
8000
9000
10000
Pump Flow, gpm
DESIGN CAPACITY 6,725 GPM
OPERATING RANGE: 6250 ~ 7,200 GPM
MaxTDH
AveTDH
MinTDH
Low C
CP 3400/735

Greenfield Road SWPS

SYSTEM HEAD-DISCHARGE CURVE 10/8/02

Basis of Calculation: $Ht = Hstat + Hent + Hfs + Hfd + Sum\ Hfvs + Sum\ Hfvd + Vd^2/(2*g)$ (TDH)

Where:
$Hstat$ = High point elev. - Wet well elev.
$Hent = Kent*V^2/(2*g)$
$Hfs = ((149*Q)/(C*D^{2.63}))^{1.85}*(Lent/1000)$
$Sum\ Hfvs = Kfvs*Vent^2/(2*g)$
$Sum\ Hfvd = Kfvd*Vext^2/(2*g)$
$Hfd = ((149*Q)/(C*D^{2.63}))^{1.85}*(Ldis/1000)$

Constants							
Kent=	0.1	g=	32.16	Qcfs=	1.0	449	
Lent=	0.2	D=	0.50	**wet well floor=**	**1232.8**		
Ldis=	140.07	A =	0.20	PS_loss=	0		
SumKfvs=	0.50	V=Q/A		Flap gate headloss,ft	0.02		
SumKfvd=	2.31	d=	6	Pump Centerline , ft		0.83	
Ductile Iron	**C=**	**145**					
	LowC=	**120**		Additional discharge distance		100	

K form Coefficients

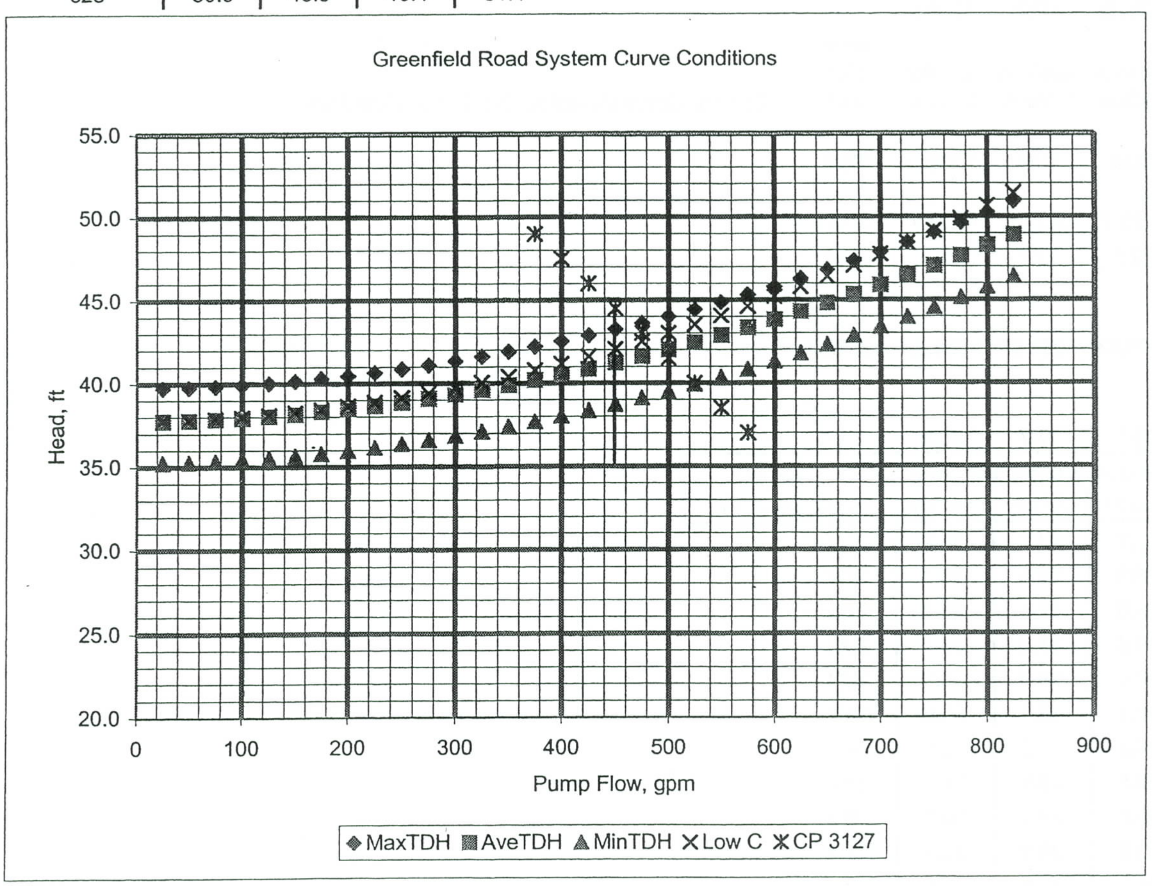
Fitting/ Valve	Suction	Discharge
Restrictor	0.5	
90°ell		0.15
Check Valve		2.00
90°ell		0.15
Flap Gate		0.02
Sum	0.5	2.31

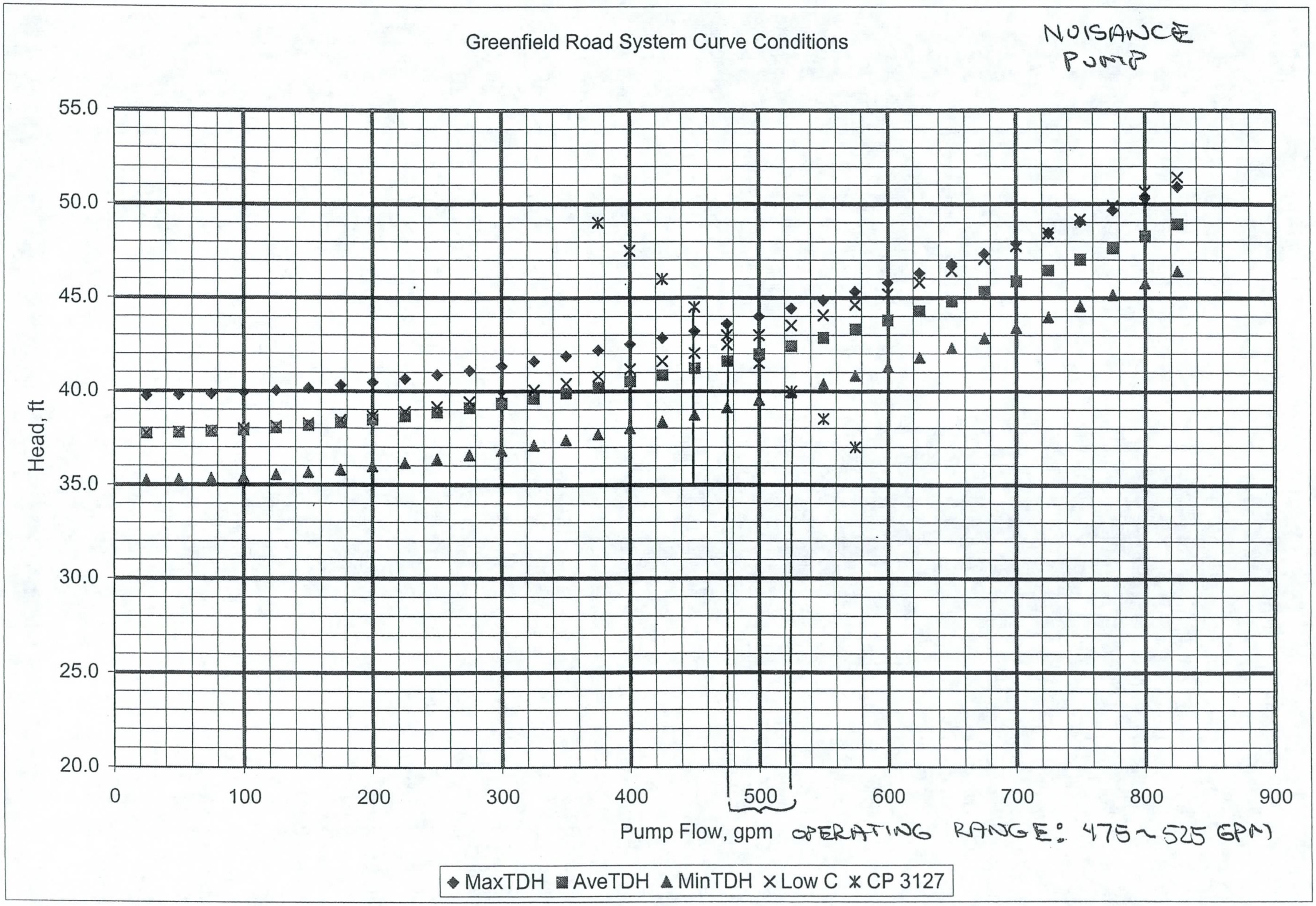
	Case #1	Case #2	Case #3	Case #4
Pumps On/Off Stage, ft.	1234.3	1236	1238.5	1242
Description	Min Pos Suction	Ave Pos Suction	Max Pos Suction	More pipe rough.
Wet Well Water Elev., ft	1234	1236	1238.5	1236
High Point in FM, Elev. ft	1273.7	1273.7	1273.7	1273.7
Static Head, ft	39.7	37.7	35.2	37.7
Datum - Centerline Pump, ft.	1233.63	1233.63	1233.63	1233.63
Discharge Head -Suction Head, ft	. 39.7	37.7	35.2	37.7

System Curve Based on Discharge Pipe Dia= 6

	Single Pump System Head Curves				CP 3127
Flow, Q, gpm	MaxTDH	AveTDH	MinTDH	Low C	Pump Head
25	39.7	37.7	35.2	37.7	
50	39.8	37.8	35.3	37.8	
75	39.8	37.8	35.3	37.9	
100	39.9	37.9	35.4	38.0	
125	40.0	38.0	35.5	38.1	
150	40.1	38.1	35.6	38.3	
175	40.3	38.3	35.8	38.4	
200	40.5	38.5	36.0	38.6	
225	40.6	38.6	36.1	38.9	
250	40.9	38.9	36.4	39.1	
275	41.1	39.1	36.6	39.4	
300	41.3	39.3	36.8	39.7	

Flow, Q, gpm	MaxTDH	AveTDH	MinTDH	Low C	Pump Head	
325	41.6	39.6	37.1	40.0		
350	41.9	39.9	37.4	40.4	49.0	
375	42.2	40.2	37.7	40.8	47.5	
400	42.5	40.5	38.0	41.2	46.0	
425	42.9	40.9	38.4	41.6	44.5	
450	43.2	41.2	38.7	42.0	43.0	**Pump Design Capacity**
475	43.6	41.6	39.1	42.5	41.5	
500	44.0	42.0	39.5	43.0	40.0	
525	44.4	42.4	39.9	43.5	38.5	
550	44.9	42.9	40.4	44.1	37.0	
575	45.3	43.3	40.8	44.6		
600	45.8	43.8	41.3	45.2		
625	46.3	44.3	41.8	45.8		
650	46.8	44.8	42.3	46.4		
675	47.3	45.3	42.8	47.1		
700	47.9	45.9	43.4	47.7		
725	48.5	46.5	44.0	48.4		
750	49.0	47.0	44.5	49.2		
775	49.7	47.7	45.2	49.9		
800	50.3	48.3	45.8	50.7		
825	50.9	48.9	46.4	51.4		





Greenfield Road System Curve Conditions
NUISANCE PUMP
Head, ft
55.0
50.0
45.0
40.0
35.0
30.0
25.0
20.0
0
100
200
300
400
500
600
700
800
900
Pump Flow, gpm
OPERATING RANGE: 475 ~ 525 GPM
MaxTDH
AveTDH
MinTDH
Low C
CP 3127

Loss of Head Through Flap Gates

Tests conducted on flap gates show that the loss of head due to the flap riding on the water is very small compared with other losses in the hydraulic structure. Of these, the entrance loss is usually considerably more critical than loss at the flap gate on the outlet end of the conduit.

The Hydraulic Laboratory of the State University of Iowa conducted a series of tests some years ago to determine the amount of head lost by water discharging through Armco Flap Gates (Model 10C). The gates—18, 24 and 30 inches in diameter—were supplied from commercial stock.

The following passage is excerpted from the report of Professor Floyd A. Nagler, Associate Professor of Mechanics and Hydraulics, who supervised the investigation.

"Based on these experiments the following empirical formula was derived to express the loss in head through Calco Gates of varying sizes and with different velocities of flow:

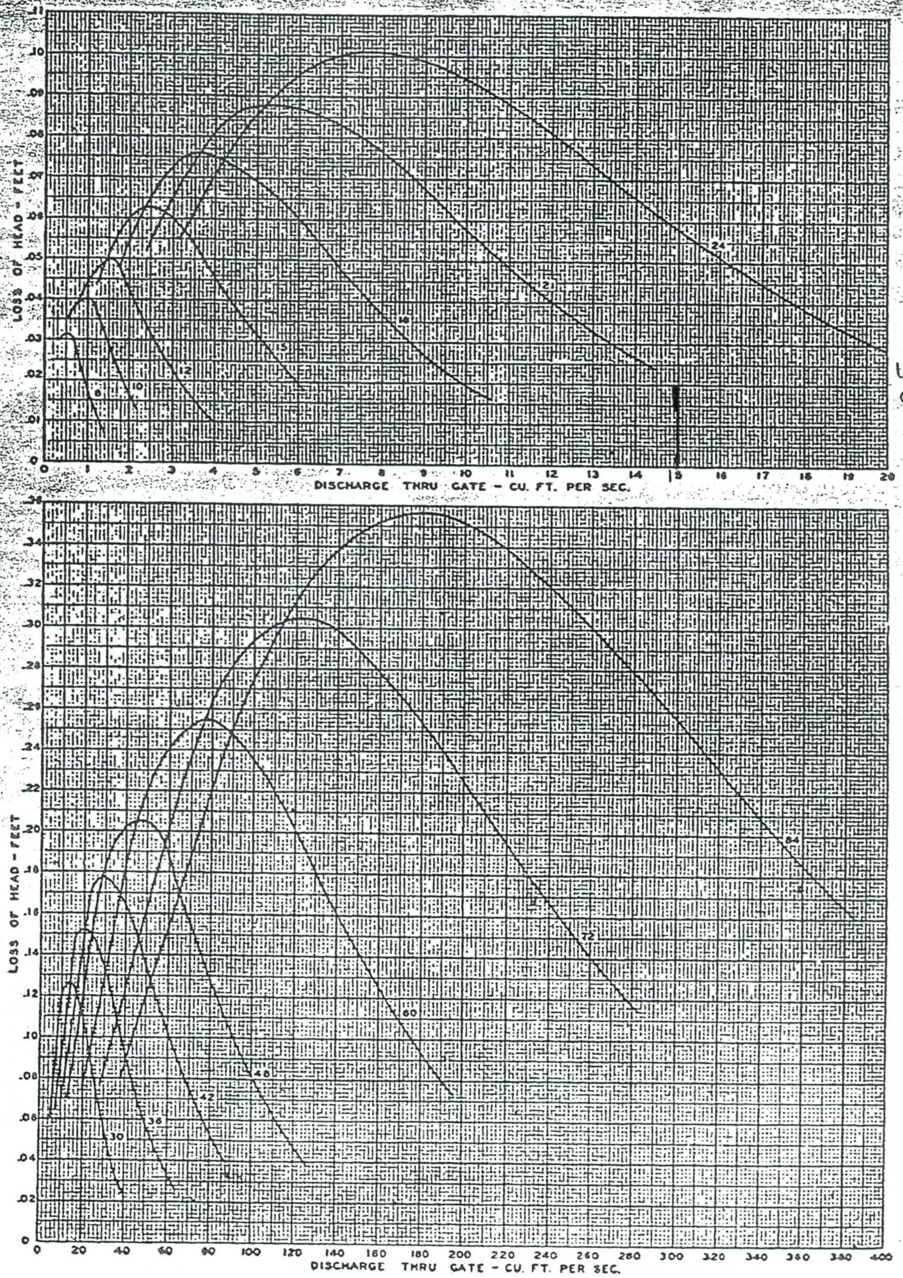
L—Loss of head in feet
v—Velocity of flow through gate in feet per second
d—Diameter of outlet in feet
e—Base of natural logarithms

$$L = \frac{4v^2}{g} \times e^{\left(\frac{-1.15v}{\sqrt{d}}\right)}$$

"It may be concluded from these experiments that the Calco Gate in its hydraulic characteristics is all that the manufacturers have claimed for it. The small loss in head obtained through these gates demonstrates that their installation has but little effect on the discharged capacity of drainage outlets."

Medium and heavy duty flap gates have heavier flaps or covers than the gate model tested. As a result, head losses through these gates may be slightly more than those indicated by the test.

LOSS OF HEAD THROUGH FLAP GATES



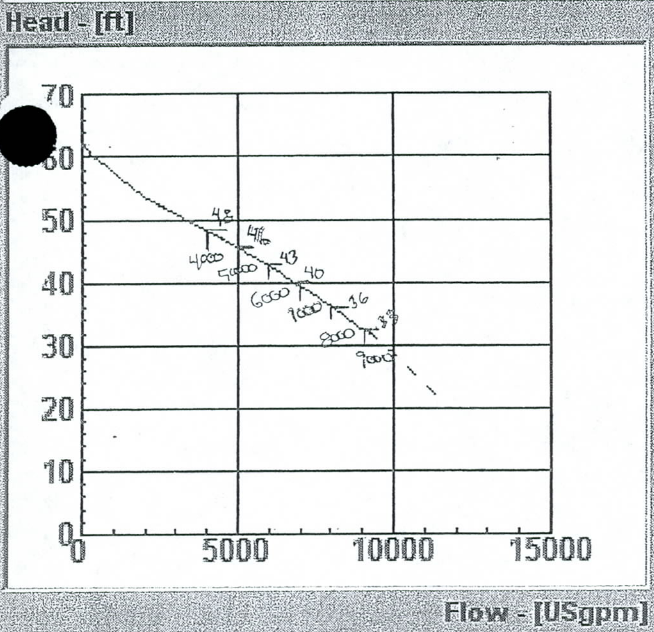
Revised 10/71

F7: Product data

Overview | Rating | Curves

Close | Print | Export | Help

Pump:	CP 3400/735	**Curve:**	C3400-63-1230	Weight: -- lbs	
		FUS ID:			
Motor		**Impeller**		**Volute**	
Frequency:	60 Hz	# of vanes/blades:	3	Inlet:	19.5 inch
Voltage:	460 V	Throughlet:	4.5 inch	Outlet:	15.5 inch
Phases:	3	Diameter:	560 mm	PL/LL:	-- inch
Poles:	12				
Rated power:	90.0 hp				



F7: Product data

Overview | Rating | Curves

Close | Print | Export | Help

Frequency	60 Hz	Product	3400 .000	Issue	2
Phases	3	Motor #	43-44-12AA	# of Starts/Hr	15
Poles	12	Rated power	90.0 hp	Issue date	9/8/92
Approval		Installations	LPSTZ	Valid from	
-	N	Type of duty	S1	Status	APPR

Rtd. amb. temp. 40 °C / 104 °F

Select Stator

	Alternative 1	Alternative 2		
Voltage	460 V	V	Stator variant	01
Connection	D		Speed	590 r/min
Rtd. Curr.	148.0 A	A	Power factor	0.62
Starting current	565.0 A	A	Module	130
NEMA code letter	F		Motor issue	13

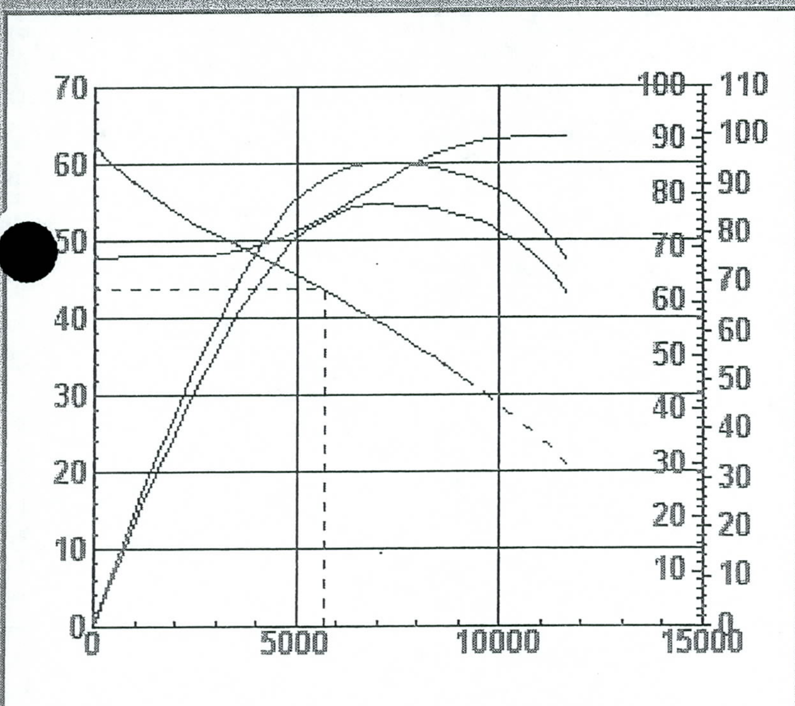
Warm liquid data	Note! Reduced rated power	
Rtd. amb. temp.	°C / °F	°C / °F
Rtd. Curr. (1)	A	A
Rtd. Curr. (2)	A	A
Max input power	kW	kW

F7: Product data

Overview | Rating | **Curves**

Close | Print | Export | Help

CP 3400 C3400-63-1230



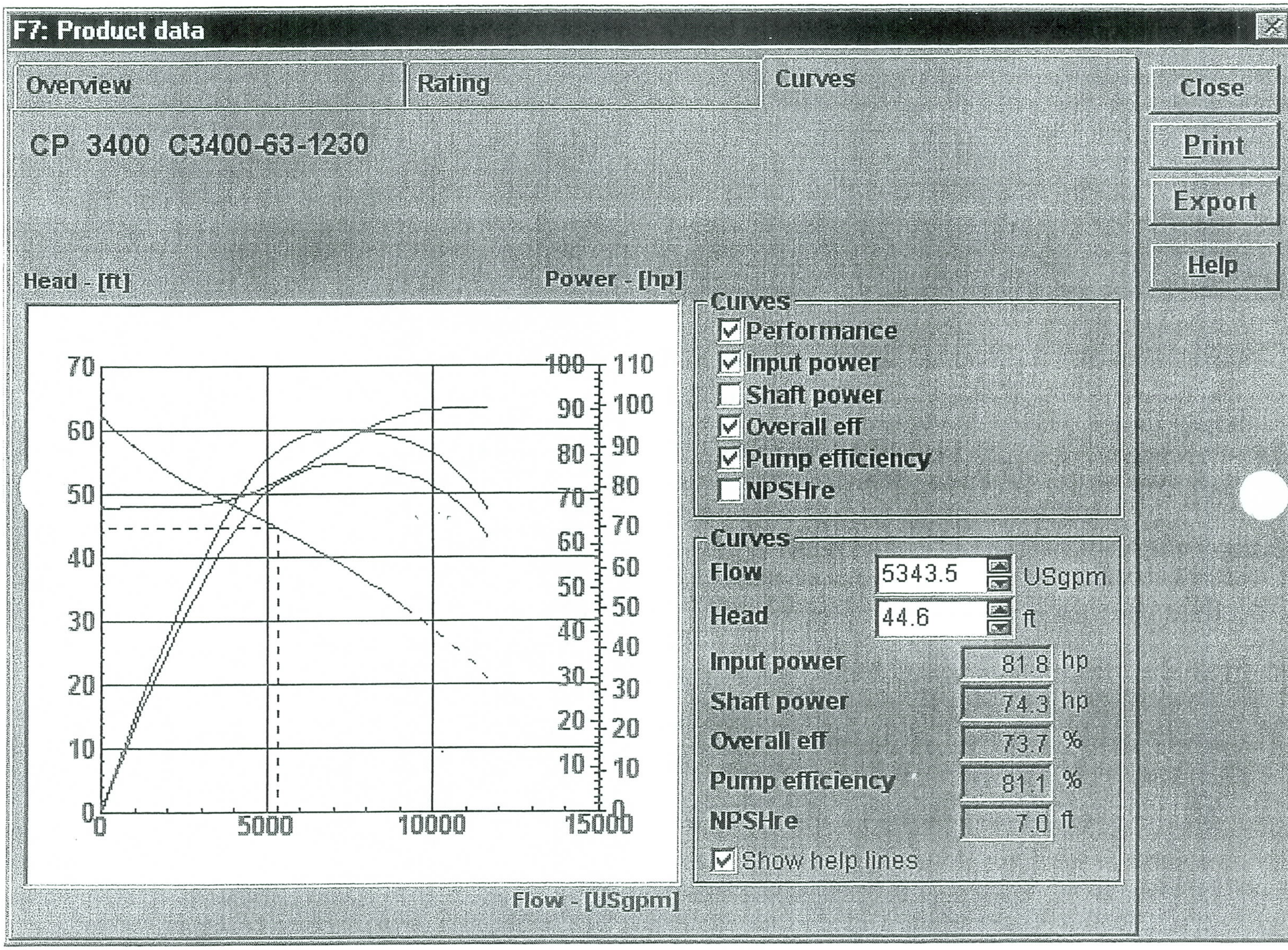
Curves

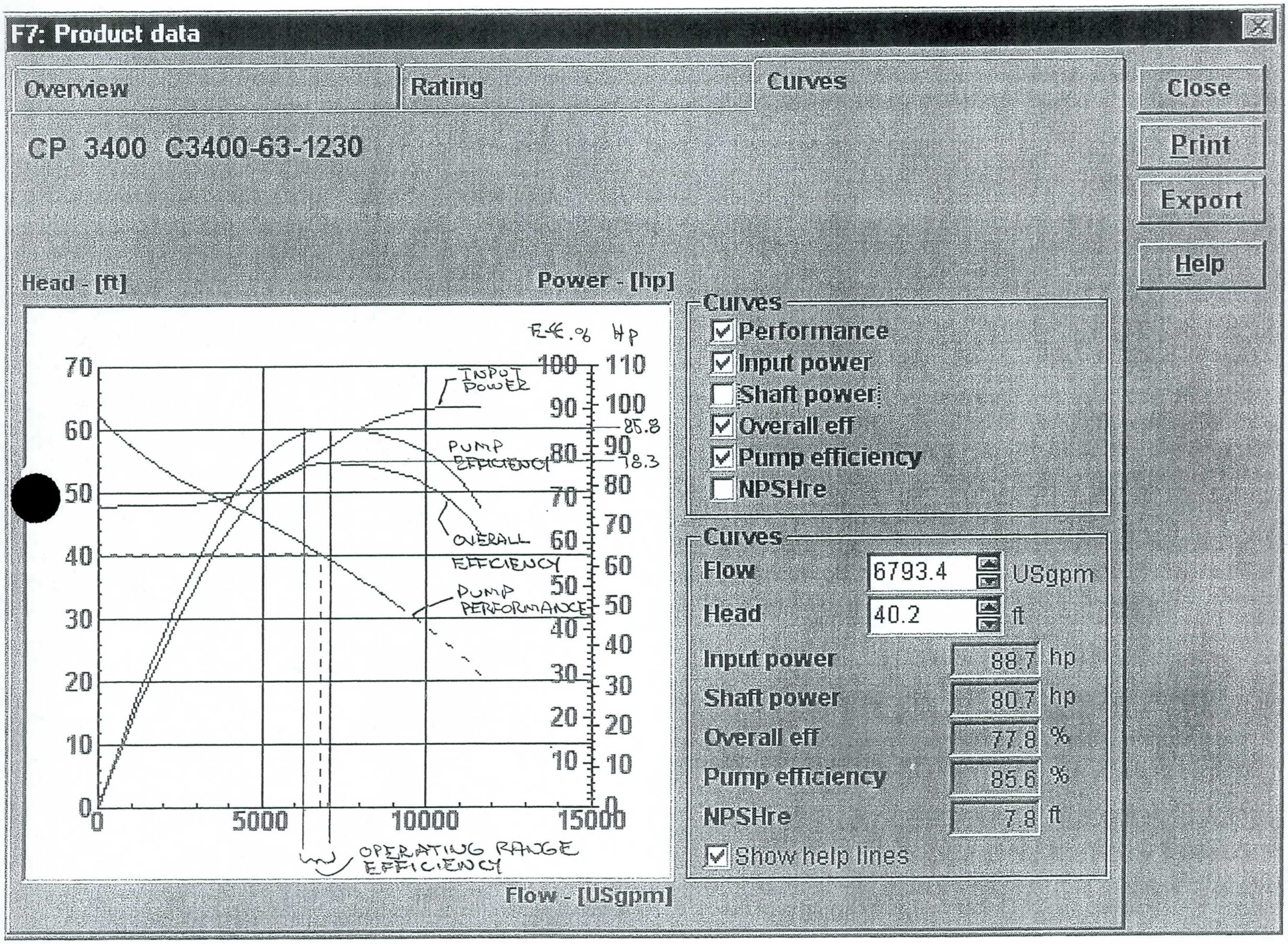
- [x] Performance
- [x] Input power
- [ ] Shaft power
- [x] Overall eff
- [x] Pump efficiency
- [ ] NPSHre

Curves

Flow	5688.0	USgpm
Head	43.6	ft
Input power	83.3	hp
Shaft power	75.7	hp
Overall eff	75.3	%
Pump efficiency	82.9	%
NPSHre	7.1	ft

- [x] Show help lines


F7: Product data
Overview
Rating
Curves
Close
Print
Export
Help
CP 3400 C3400-63-1230
Head - [ft]
Power - [hp]
Flow - [USgpm]
70
60
50
40
30
20
10
0
100
90
80
70
60
50
40
30
20
10
0
110
100
90
80
70
60
50
40
30
20
10
0
5000
10000
15000
Curves
Performance
Input power
Shaft power
Overall eff
Pump efficiency
NPSHre
Curves
Flow 5343.5 USgpm
Head 44.6 ft
Input power 81.8 hp
Shaft power 74.3 hp
Overall eff 73.7 %
Pump efficiency 81.1 %
NPSHre 7.0 ft
Show help lines



OVERALL EFFICIENCY 78.3 %

PUMP EFFICIENCY 85.8 %

F7: Product data

Overview | Rating | Curves

Close

Print

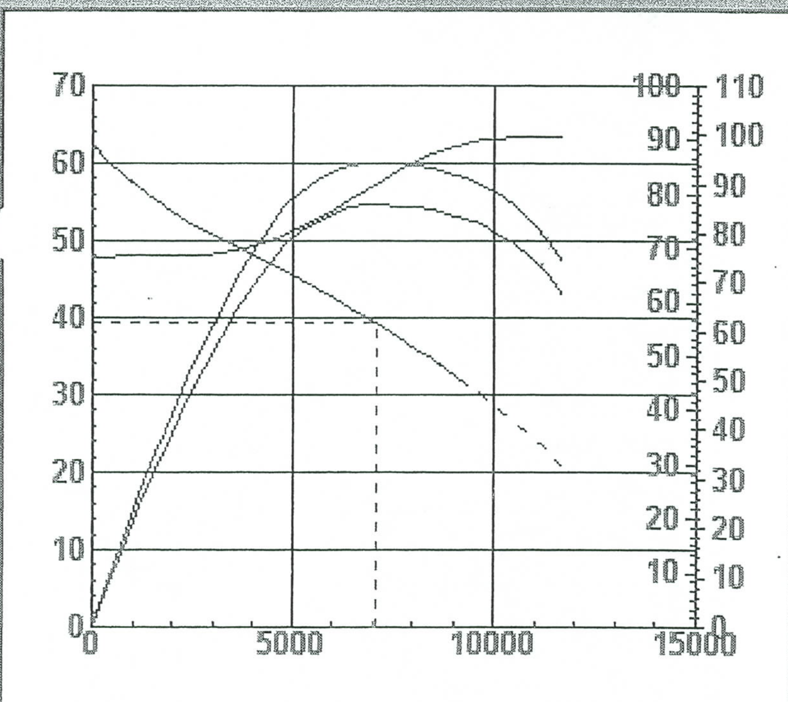
Export

Help

CP 3400 C3400-63-1230

Head - [ft]

Power - [hp]



Flow - [USgpm]

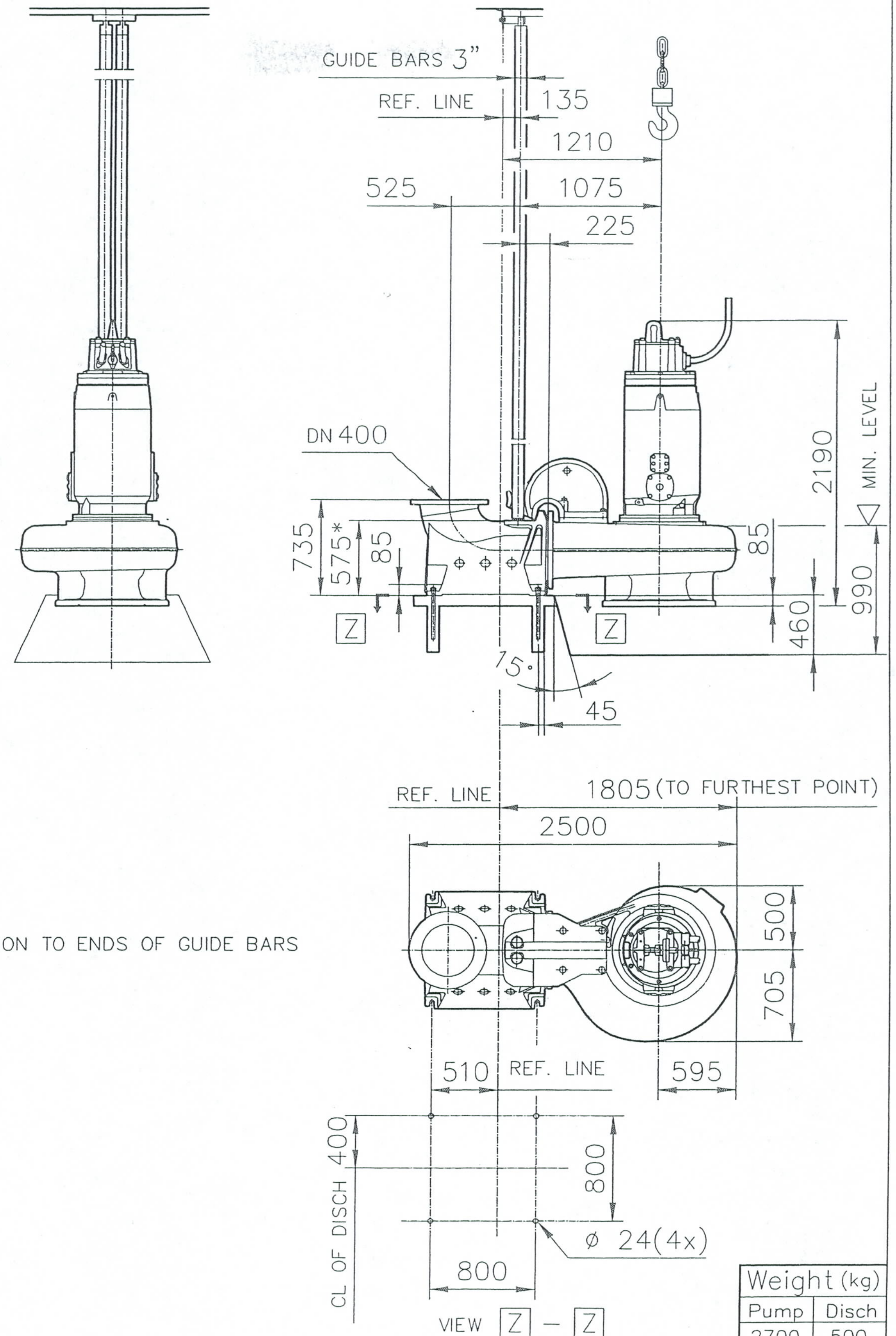
Curves

- [x] Performance
- [x] Input power
- [ ] Shaft power
- [x] Overall eff
- [x] Pump efficiency
- [ ] NPSHre

Curves

Flow	7053.3	USgpm
Head	39.3	ft
Input power	90.0	hp
Shaft power	81.8	hp
Overall eff	77.9	%
Pump efficiency	85.7	%
NPSHre	8.0	ft

- [x] Show help lines



* DIMENSION TO ENDS OF GUIDE BARS

Weight (kg)	
Pump	Disch
2700	500

FLYGT AUTOCAD DRAWING	Denomination: Dimensional drwg CP 3400 735/745	Drawn by OHn	Checked by Sors	Date 980703
		Scale 1:40		Reg no 5399
		644 17 00		A

JCH James, Cooke, & Hobson, Inc.

Sales Engineers

Date: July 31, 2002

To: JIM DEXTER

Company: INCA ENGINEERS

Fax: 425-635-1150

Re:

Sender: Mark Lux

YOU SHOULD RECEIVE 7 PAGE(S) INCLUDING THIS COVER SHEET. IF YOU DO NOT RECEIVE ALL THE PAGES, PLEASE CALL 602-243-0585.

JIM:

ATTACHED IS A COPY OF THE FLYGT CATALOG SHEET THAT EXPLAINS THE CONNECTION SIZES. SHOULD YOU NEED MORE DETAILED DIMENSION PRINTS I WILL BE GLAD TO SEND TO YOU.
THANKS AGAIN.

Mark Lux

Phone 602-243-0585 4632 South 36th Street Phoenix,AZ 85040 Fax 602-276-5402

C-3400

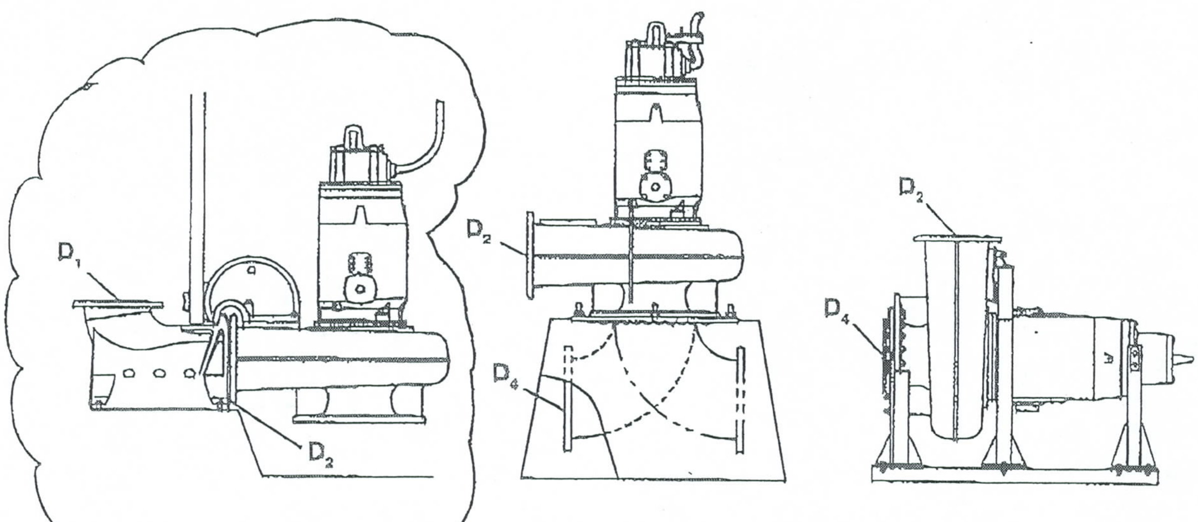
6-720
6-20

Section 3 | **Impeller/Motor/Nominal Sizes** | Issued: 8/00 | Supersedes: 2/96

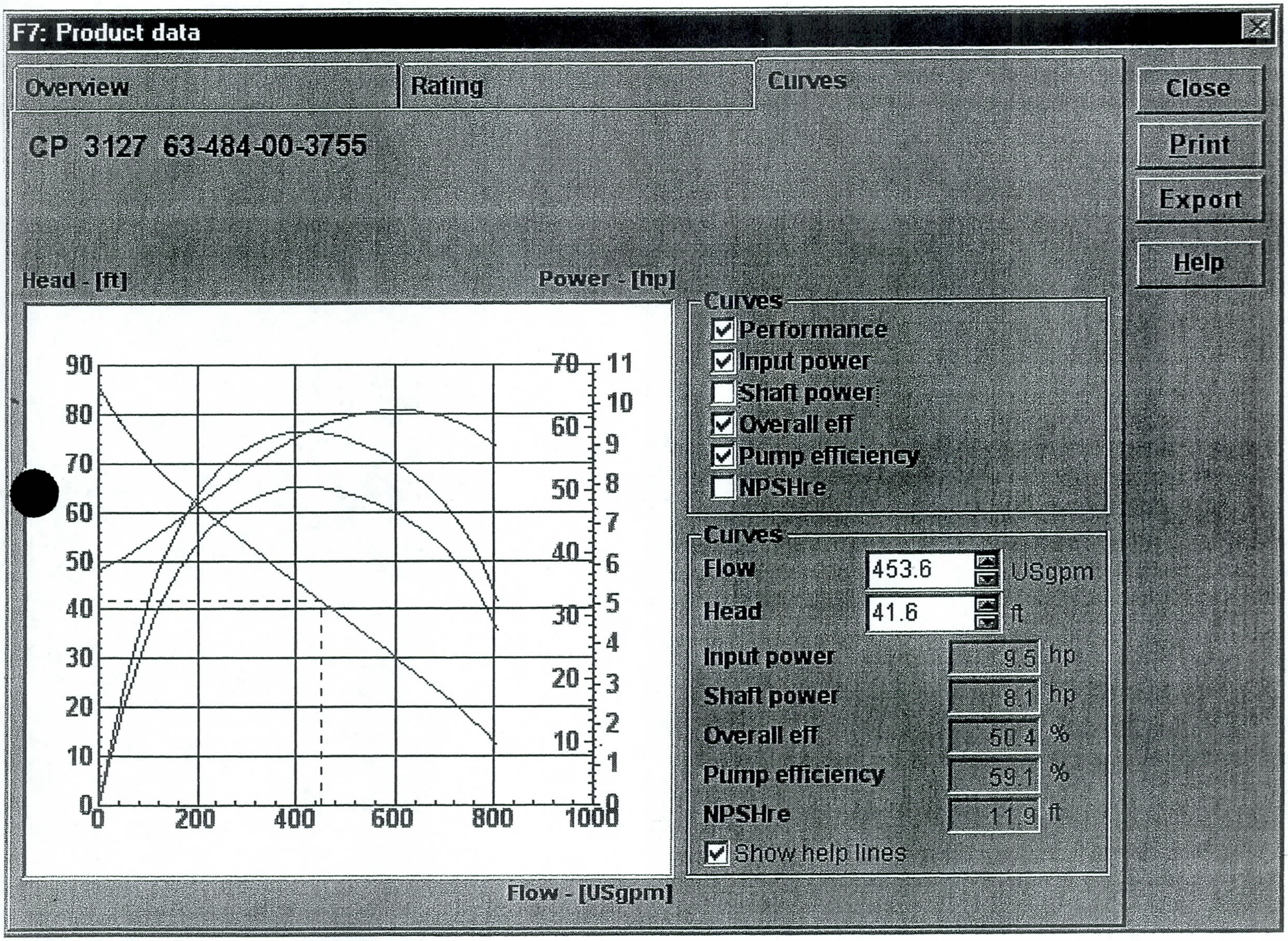
PUMP MODEL	IMPELLER CODE	HP RATING CP, CT, CZ	VAC	D1	D2	D3	D4
3400 3Ø	630 MT	385, 470	460, 575	16"	16"	--	20"
	830 MT	185, 230, 240, 335, 415	460, 575				
	1030 MT	90	230, 460, 575				
		135, 170, 185	460, 575				
	1230 MT	60, 90	230, 460, 575				
		120	460, 575				
	1430 MT	60	230, 460, 575				

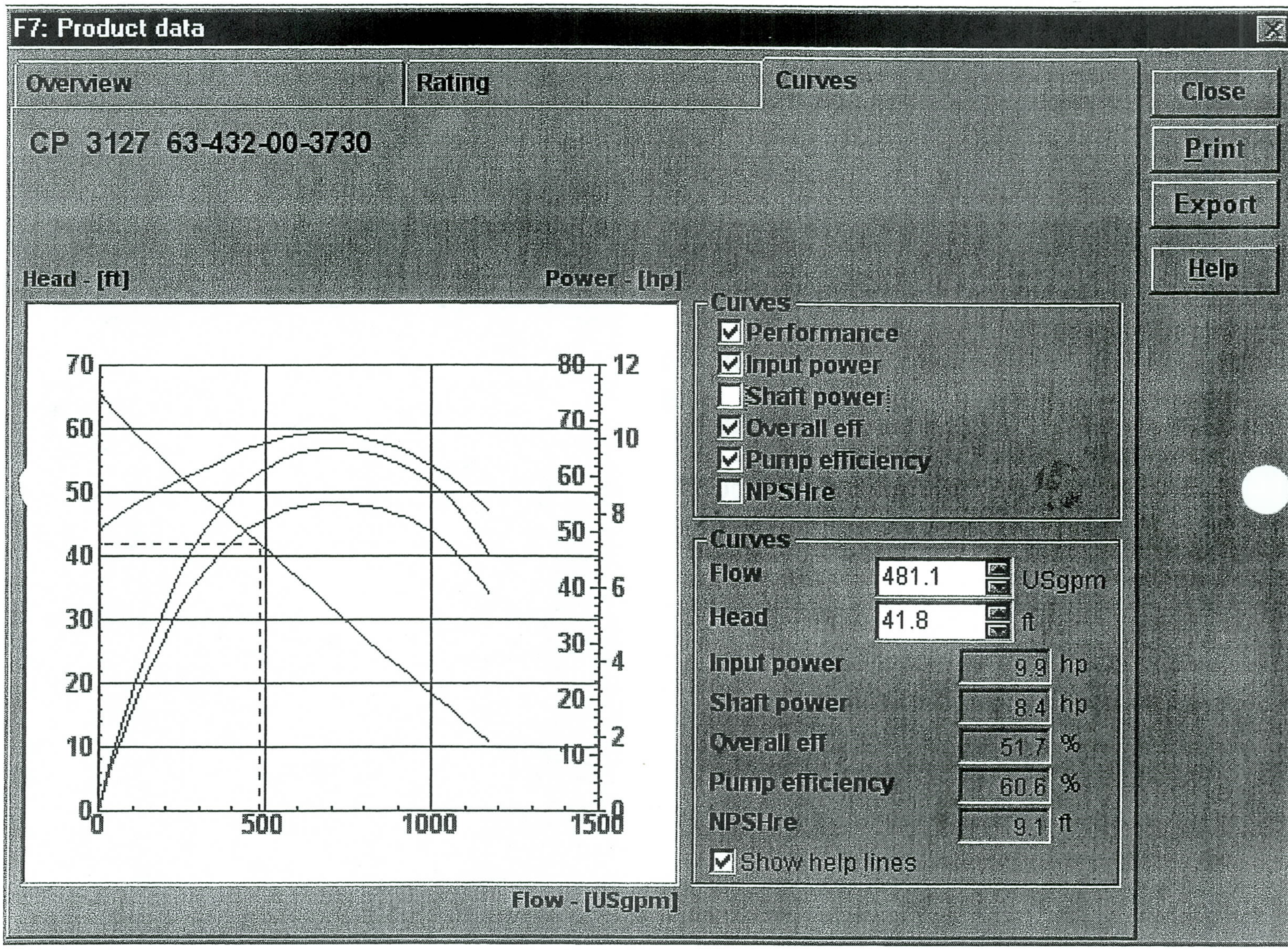
MT= Standard

NOTE: Pump available in CS by special order only.



CP CT CZ


F7: Product data
Overview
Rating
Curves
Close
Print
Export
Help
CP 3127 63-484-00-3755
Head - [ft]
Power - [hp]
Flow - [USgpm]
Curves
Performance
Input power
Shaft power
Overall eff
Pump efficiency
NPSHre
Curves
Flow 453.6 USgpm
Head 41.6 ft
Input power 9.5 hp
Shaft power 8.1 hp
Overall eff 50.4 %
Pump efficiency 59.1 %
NPSHre 11.9 ft
Show help lines



F7: Product data
Overview
Rating
Curves
Close
Print
Export
Help
CP 3127 63-432-00-3730
Head - [ft]
Power - [hp]
Flow - [USgpm]
Curves
Performance
Input power
Shaft power
Overall eff
Pump efficiency
NPSHre
Curves
Flow 481.1 USgpm
Head 41.8 ft
Input power 9.9 hp
Shaft power 8.4 hp
Overall eff 51.7 %
Pump efficiency 60.6 %
NPSHre 9.1 ft
Show help lines

F7: Product data

Overview | Rating | Curves

Close

Print

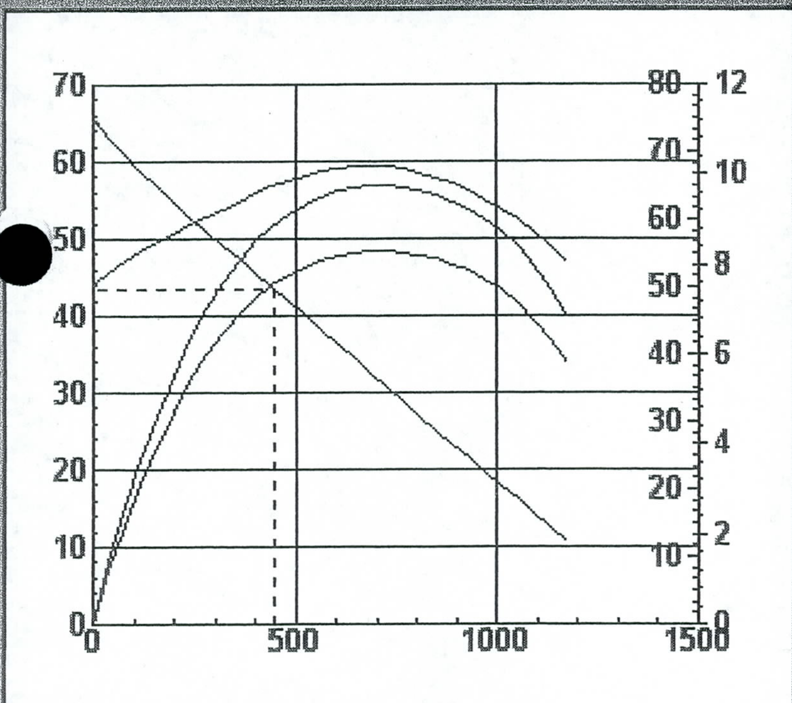
Export

Help

CP 3127 63-432-00-3730

Head - [ft]

Power - [hp]



Flow - [USgpm]

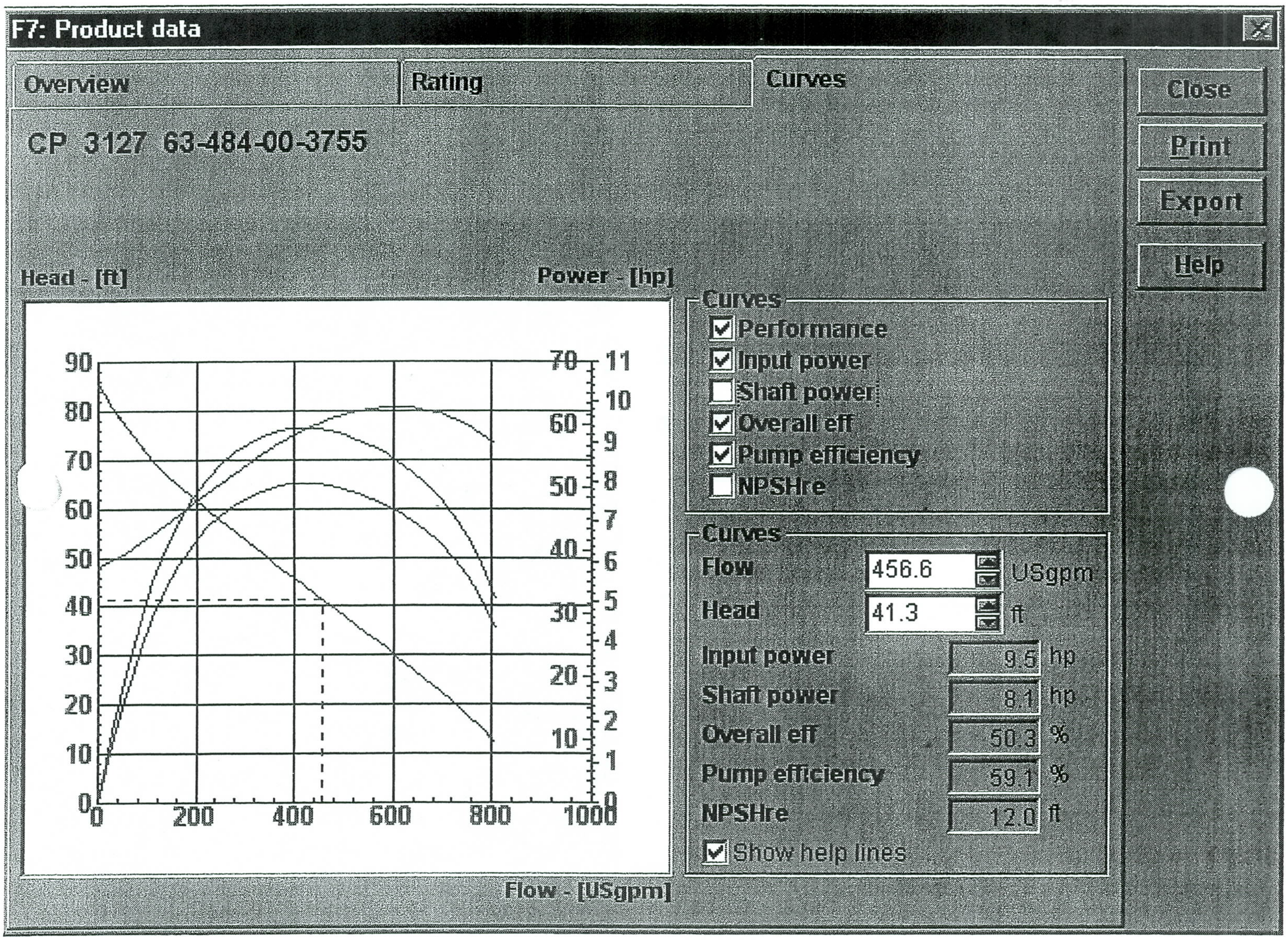
Curves

- [x] Performance
- [x] Input power
- [ ] Shaft power
- [x] Overall eff
- [x] Pump efficiency
- [ ] NPSHre

Curves

Flow	444.6	USgpm
Head	43.5	ft
Input power	9.7	hp
Shaft power	8.3	hp
Overall eff.	50.3	%
Pump efficiency	59.0	%
NPSHre	9.2	ft

- [x] Show help lines



F7: Product data
Overview
Rating
Curves
CP 3127 63-484-00-3755
Head - [ft]
Power - [hp]
Flow - [USgpm]
Close
Print
Export
Help
Curves
Performance
Input power
Shaft power
Overall eff
Pump efficiency
NPSHre
Curves
Flow 456.6 USgpm
Head 41.3 ft
Input power 9.5 hp
Shaft power 8.1 hp
Overall eff 50.3 %
Pump efficiency 59.1 %
NPSHre 12.0 ft
Show help lines

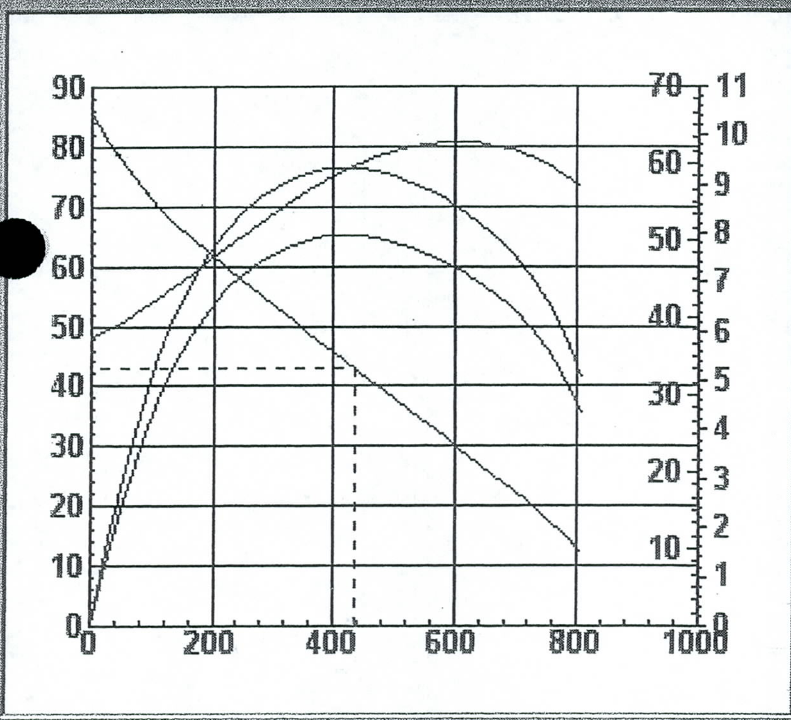
F7: Product data

Overview | Rating | Curves

Close | Print | Export | Help

CP 3127 63-484-00-3755

Head - [ft] Power - [hp]



Flow - [USgpm]

Curves

- [x] Performance
- [x] Input power
- [ ] Shaft power
- [x] Overall eff
- [x] Pump efficiency
- [ ] NPSHre

Curves

Flow	433.9	USgpm
Head	43.1	ft
Input power	9.4	hp
Shaft power	8.0	hp
Overall eff	50.5	%
Pump efficiency	59.3	%
NPSHre	11.3	ft

- [x] Show help lines

F7: Product data

Overview | Rating | **Curves**

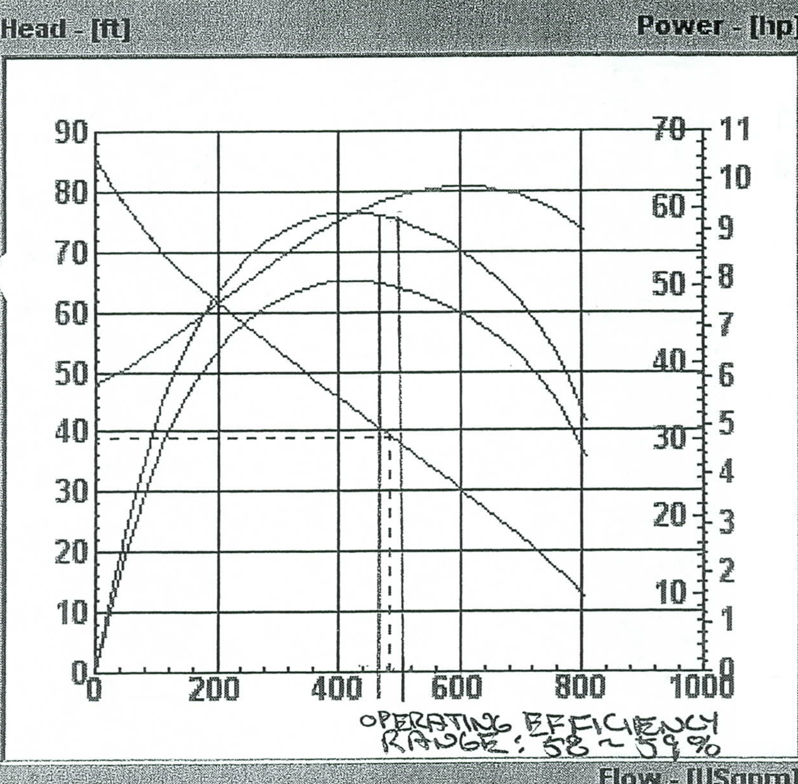
CP 3127 63-484-00-3755

Close

Print

Export

Help



Curves

- [x] Performance
- [x] Input power
- [ ] Shaft power
- [x] Overall eff
- [x] Pump efficiency
- [ ] NPSHre

Curves

Flow	485.6	USgpm
Head	39.1	ft
Input power	9.6	hp
Shaft power	8.2	hp
Overall eff	49.9	%
Pump efficiency	58.6	%
NPSHre	13.2	ft

- [x] Show help lines

F7: Product data

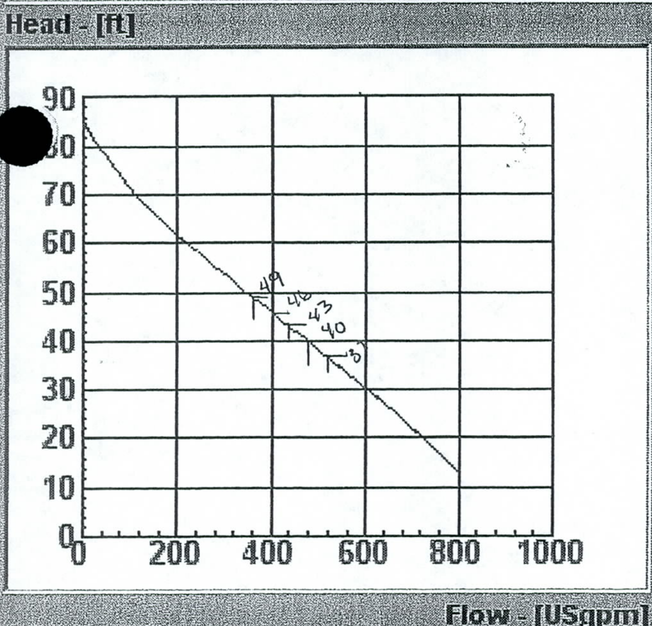
Overview | Rating | Curves

Close | Print | Export | Help

Pump: CP 3127 HT **Curve:** 63-484-00-3755 **Weight:** 324 lbs

FUS ID:

Motor		Impeller		Volute	
Frequency:	60 Hz	# of vanes/blades:	1	Inlet:	4.0 inch
Voltage:	460 V	Throughlet:	3.0 inch	Outlet:	4.0 inch
Phases:	3	Diameter:	217 mm	PL/LL:	-- inch
Poles:	4				
Rated power:	10.0 hp				



F7: Product data

Overview | Rating | Curves

Close | Print | Export | Help

Frequency	60 Hz	Product	3127 . 180	Issue	5
Phases	3	Motor #	21-12-4AL	# of Starts/Hr	15
Poles	4	Rated power	10.0 hp	Issue date	5/14/85
Approval		Installations	PSJL	Valid from	
-	N	Type of duty	S1	Status	APPR

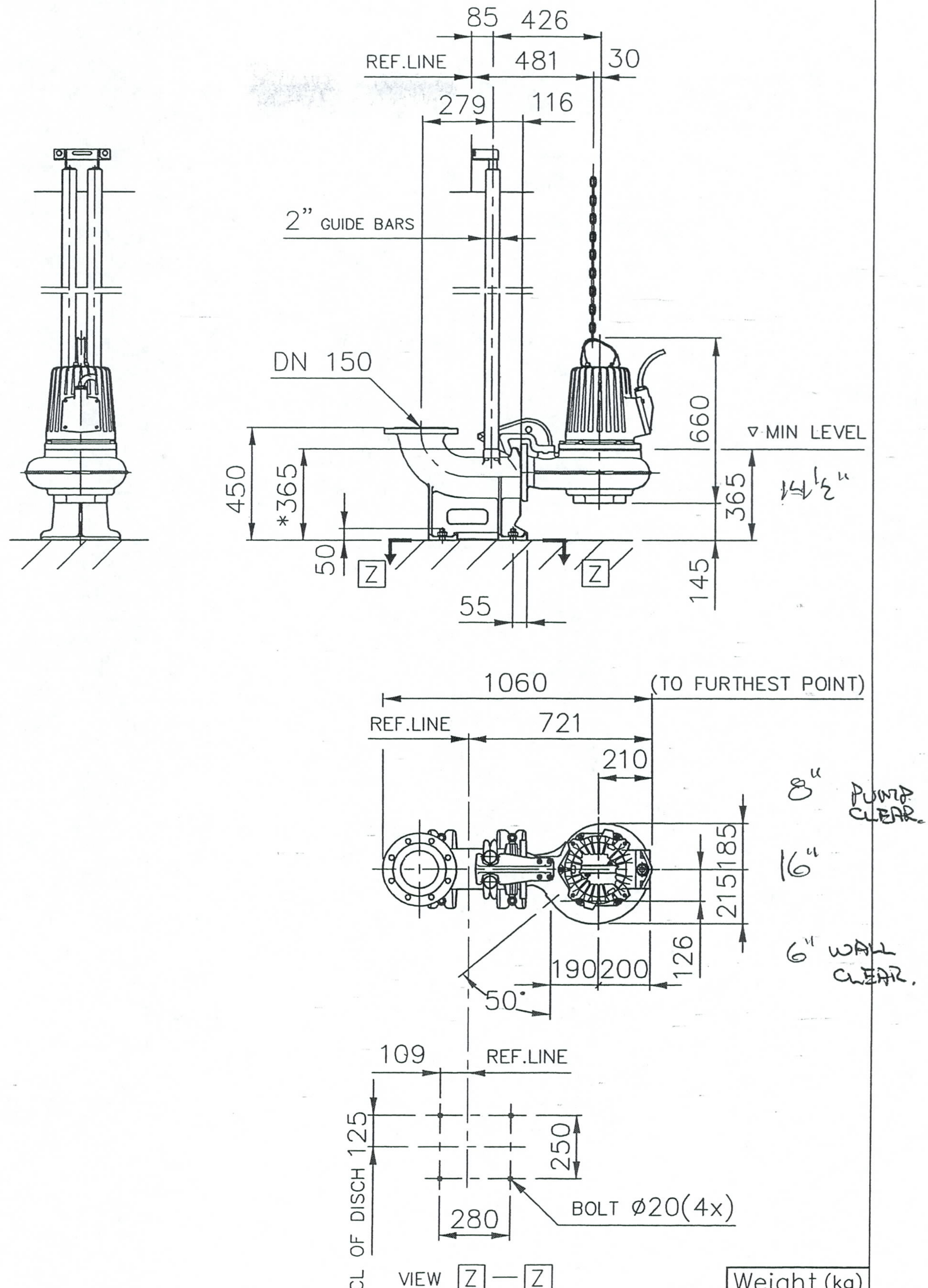
Rtd. amb. temp. 40 ° C / 104 ° F

Select Stator

	Alternative 1	Alternative 2		
Voltage	460 V	230 V	Stator variant	12
Connection	YSER	Y//	Speed	1735 r/min
Rtd. Curr.	13.0 A	25.0 A	Power factor	0.89
Starting current	64.0 A	128.0 A	Module	130
NEMA code letter	F	F	Motor issue	10

Warm liquid data — Note! Reduced rated power

Rtd. amb. temp.	70 ° C / 158 ° F	90 ° C / 194 ° F
Rtd. Curr. (1)	9.9 A	7.4 A
Rtd. Curr. (2)	20.0 A	15.0 A
Max input power	6.9 kW	4.8 kW



* DIMENSION TO ENDS OF GUIDE BARS

Weight (kg)	
Pump	Disch
147	53

FLYGT AUTOCAD DRAWING	Denomination: Dimensional drwg CP 3127 MT DN 100/DN 150	Drawn by Klas	Checked by EGC	Date 880310
		Scale 1:20		Reg no 5399
		538 86 00		C

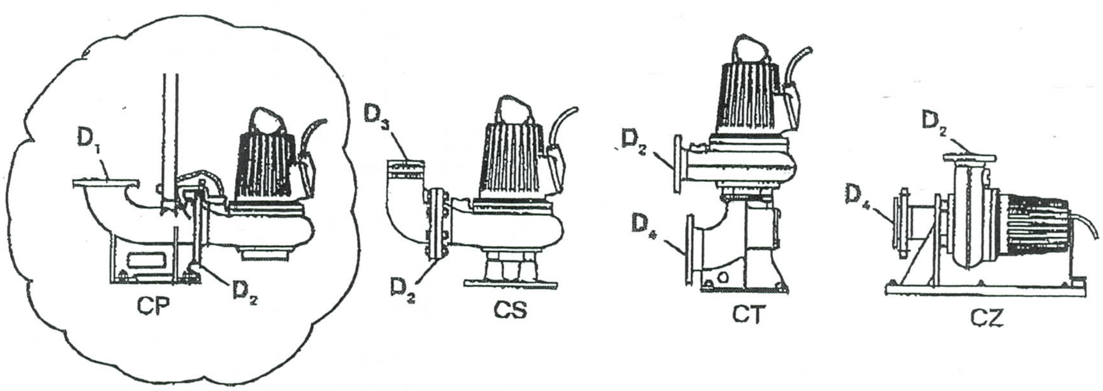
C-3127

Section 3 FLYGT **Impeller/Motor/Nominal Sizes** Issued: 8/00 Supersedes: 7/96

PUMP MODEL	IMPELLER CODE	HP RATING				VAC	D1	D2	D3	D4
		CP	CS	CT	CZ					
3127 3Ø	411 LT	10.0	10.0	--	--	200 230/460 575	8"	6"	6"	--
	412 LT	7.5	7.5	7.4	7.4		8"	6"	8"	8"
	432 MT	10.0	10.0	--	--					--
	433 MT	7.5,10	7.5,10	7.4	7.4		4"	4"	4"	
	434 MT	7.5,10	7.5,10	6.4	6.4		6"	6"	6"	6"
	436 MT	7.5,10	7.5,10	6.4	6.4		8"			
	442 LT	10.0	10.0	--	--		8"	6"	6,8"	--
	481 HT	10.0	10.0	--	--		4"	4"	4"	
	483 HT	10.0	10.0	--	--					--
	484 HT	10.0	10.0	--	--		4"	4"	4"	
	485 HT	7.5	7.5	7.4	7.4					4"

PUMP MODEL	IMPELLER CODE	HP RATING		VAC	D1	D2	D3	D4
		CP	CS					
3127 1Ø	412 LT	7.4	7.4	230	8"	6"	6,8"	--
	433 MT 434 MT	7.4	7.4		4" 6" 8"	4" 6"	4" 6"	--
	462 HT 463 HT 484 HT 485 HT	7.4	7.4		4"	4"	4"	--

LT= High Volume MT= Standard HT= High Head



Wet Well Inlet Velocity - No Tailwater
Worksheet for Circular Channel

Project Description	
Project File	c:\haestad\fmw\wetwelli.fm2
Worksheet	Inlet Pipe Velocity
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coefficient	0.013	
Channel Slope	0.010000	ft/ft
Diameter	36.00	in
Discharge	40.00	cfs

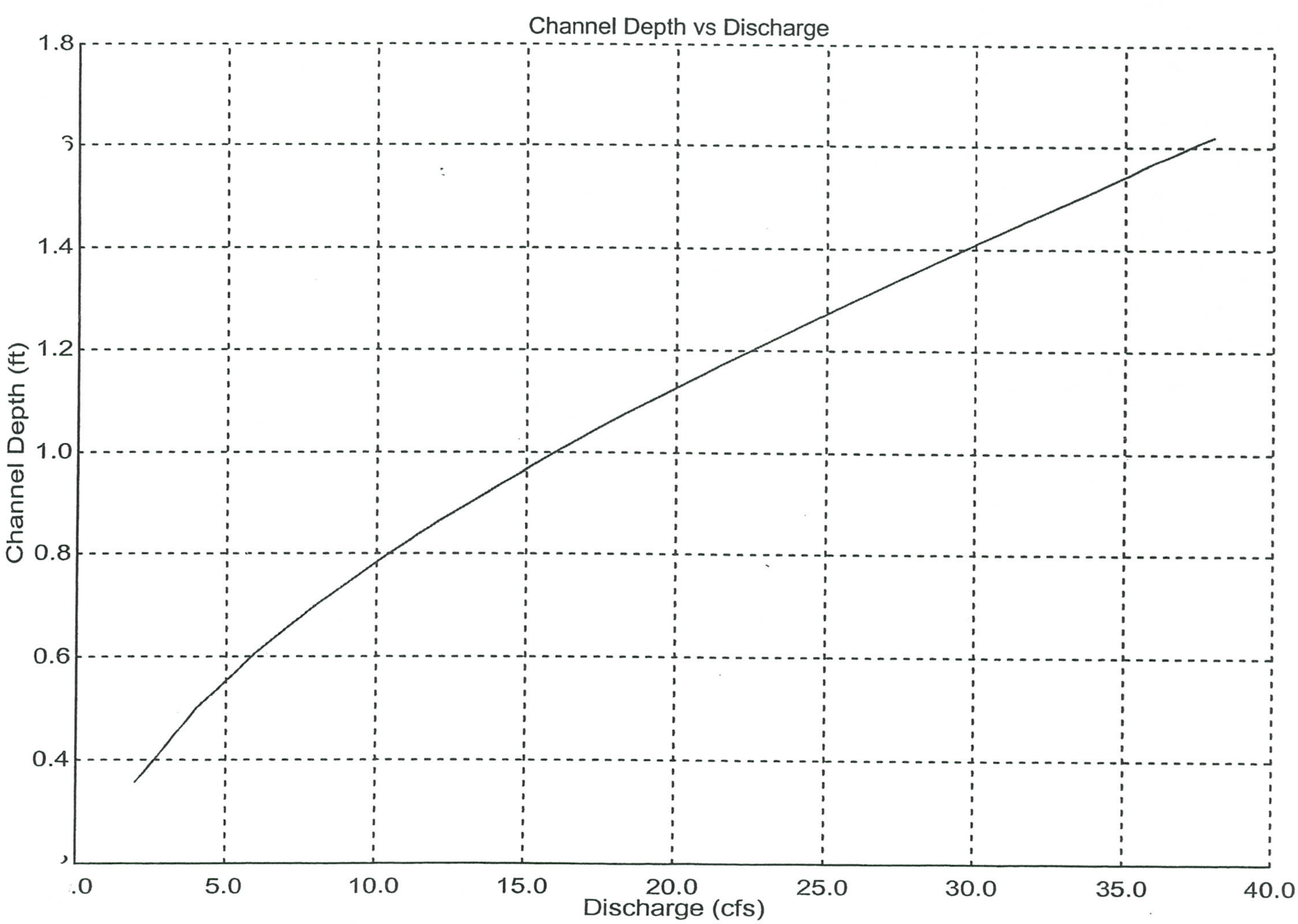
Results		
Depth	1.67	ft
Flow Area	4.06	ft^2
Wetted Perimeter	5.06	ft
Top Width	2.98	ft
Critical Depth	2.06	ft
Percent Full	55.81	
Critical Slope	0.005403	ft/ft
Velocity	9.86	ft/s
Velocity Head	1.51	ft
Specific Energy	3.19	ft
Froude Number	1.49	
Maximum Discharge	71.74	cfs
Full Flow Capacity	66.69	cfs
Full Flow Slope	0.003597	ft/ft
Flow is supercritical.		

No Tailwater AT Apron
Plotted Curves for Circular Channel

Project Description	
Project File	c:\haestad\fmw\wetwelli.fm2
Worksheet	Inlet Pipe Velocity
Flow Element	Circular Channel
Method	Manning's Formula
Solve For	Channel Depth

Constant Data		
Mannings Coefficient	0.013	
Channel Slope	0.010000	ft/ft
Diameter	36.00	in

Input Data	Minimum	Maximum	Increment
Discharge	2.00	38.00	2.00 cfs



INCA ENGINEERS INC.

Job No. ______ Vol./Sheet No. ______ of ______

Contract/Client: GREENFIELD PUMP STA / TOWN OF GILBERT

Phase/Subject: 60 % DESIGN

Design Topic: DISCHARGE BOX WEIR

Made By: JRD Date: 9/02 Checked By: ______ Date: ______ Page No. ______

1. DESIGN DISCHARGE - 7053 GPM = 15.7 CFS (1 PMP)

2. WEIR EQ = $Q = CLH^{3/2} \Rightarrow H = (Q/CL)^{2/3}$

C = 2.95	C = 3.20
L = 18 ft	L = 18 ft
1-PUMP H = 0.44 ft	2-PUMPS H = 0.67 ft

3. OUTLET BOX ELEVATIONS

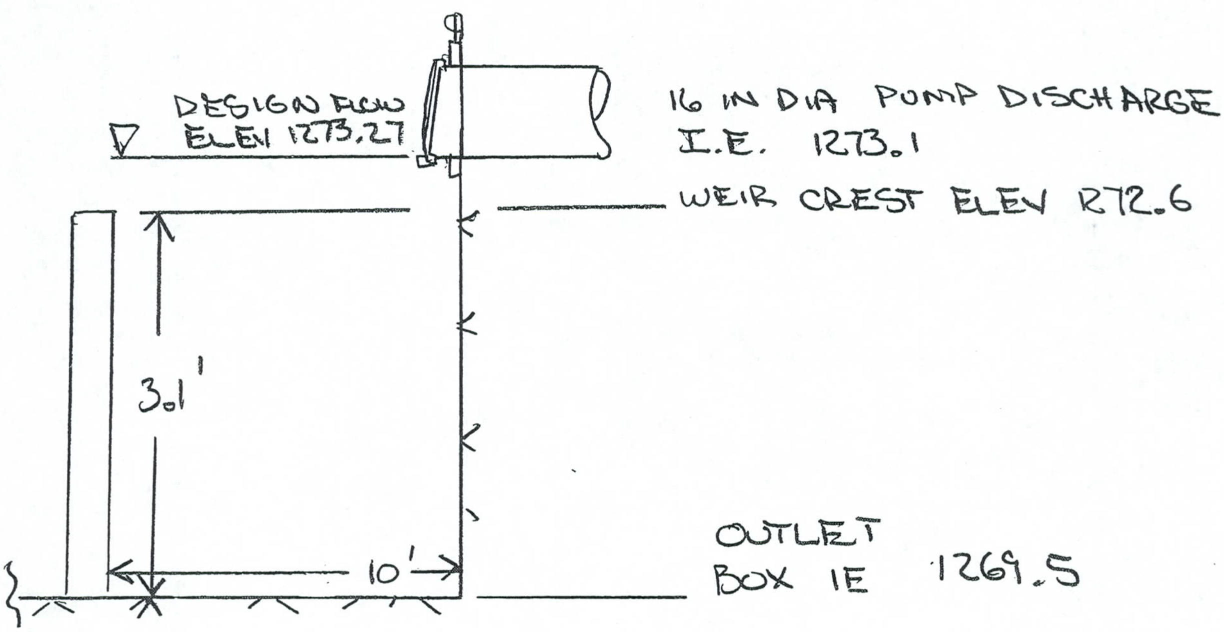


Table 5-3. Values of C in the Formula $Q = CLH^{3/2}$ for Broad-crested Weirs

Measured head in feet, H	Breadth of crest of weir in feet 0.50	0.75	1.00	1.50	2.00	2.50	3.00	4.00	5.00	10.00	15.00
0.2	2.80	2.75	2.69	2.62	2.54	2.48	2.44	2.38	2.34	2.49	2.68
0.4	2.92	2.80	2.72	2.64	2.61	2.60	2.58	2.54	2.50	2.56	2.70
0.6	3.08	2.89	2.75	2.64	2.61	2.60	2.68	2.69	2.70	2.70	2.70
0.8	3.30	3.04	2.85	2.68	2.60	2.60	2.67	2.68	2.68	2.69	2.64
1.0	3.32	3.14	2.98	2.75	2.66	2.64	2.65	2.67	2.68	2.68	2.63
1.2	3.32	3.20	3.08	2.86	2.70	2.65	2.64	2.67	2.66	2.69	2.64
1.4	3.32	3.26	3.20	2.92	2.77	2.68	2.64	2.65	2.65	2.67	2.64
1.6	3.32	3.29	3.28	3.07	2.89	2.75	2.68	2.66	2.65	2.64	2.63
1.8	3.32	3.32	3.31	3.07	2.88	2.74	2.68	2.66	2.65	2.64	2.63
2.0	3.32	3.31	3.30	3.03	2.85	2.76	2.72	2.68	2.65	2.64	2.63
2.5	3.32	3.32	3.31	3.28	3.07	2.89	2.81	2.72	2.67	2.64	2.63
3.0	3.32	3.32	3.32	3.32	3.20	3.05	2.92	2.73	2.66	2.64	2.63
3.5	3.32	3.32	3.32	3.32	3.32	3.19	2.97	2.76	2.68	2.64	2.63
4.0	3.32	3.32	3.32	3.32	3.32	3.32	3.07	2.79	2.70	2.64	2.63
4.5	3.32	3.32	3.32	3.32	3.32	3.32	3.32	2.88	2.74	2.64	2.63
5.0	3.32	3.32	3.32	3.32	3.32	3.32	3.32	3.07	2.79	2.64	2.63
5.5	3.32	3.32	3.32	3.32	3.32	3.32	3.32	3.32	2.88	2.64	2.63

Table 5-4. Values of C in the Formula $Q = CLH^{3/2}$ for Models of Broad-crested Weirs with Rounded Upstream Corner

Name of experimenter	Radius of curve in feet	Breadth of weir in feet, B	Height of weir in feet, P	Head in feet, H 0.4	0.6	0.8	1.0	1.5	2.0	2.5	3.0	4.0	5.0
Bazin	0.33	2.62	2.46	2.93	2.97	2.98	3.01	3.04					
Bazin	0.33	6.56	2.46	2.70	2.82	2.87	2.89	2.92					
U. S. Deep Waterways	0.33	2.62	4.57	....	2.77	2.80	2.83	2.92	3.00	3.08	3.17	3.34	3.50
U. S. Deep Waterways	0.33	6.56	4.56	....	....	2.83	2.83	2.83	2.82	2.82	2.82	2.82	2.81

Table 5-5. Values of C in the Formula $Q = CLH^{3/2}$ for Broad-crested Weirs with Crests Inclined Slightly Downward

(a)

Crest	Energy head = H_e 0.5	0.6	0.7	0.8	0.9	1.0	1.2	1.4	1.5
Level	2.78	2.79	2.80	2.81	2.82	2.83	2.85	2.85	2.85
Slope = 0.004	2.95	2.94	2.93	2.92	2.91	2.90	2.88	2.87	2.87
Slope = 0.026	3.07	3.06	3.05	3.04	3.03	3.02	3.00	2.99	

(b)

Slope of crest	Length of weir in feet	Head in feet, H 0.1	0.2	0.3	0.4	0.5	0.6	0.7
12 to 1	3.0	2.58	2.87	2.57	2.60	2.84	2.81	2.70
18 to 1	3.0	2.91	2.92	2.53	2.60	2.80	2.74	2.62
18 to 1	10.0	2.52	2.68	2.73	2.80	2.90	2.80	2.68

Table 5-6. Values of C in the Formula $Q = CLH^{3/2}$ for Weirs of Triangular Cross Section with Vertical Upstream Face and Sloping Downstream Face

Slope of downstream face	Height of weir in feet, P	Head in feet, H 0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.2	1.5
Hor. Vert.												
1 to 1	2.46	3.88	3.85	3.85	3.85	3.85	3.85	3.85	3.85	3.85	3.85	3.85
2 to 1	2.46	3.48	3.48	3.49	3.49	3.50	3.50	3.50	3.50	3.50	3.51	3.51
2 to 1	1.64	3.56	3.47	3.47	3.51	3.54	3.57	3.58	3.58	3.58	3.59	3.57
3 to 1	1.64	....	2.90	3.11	3.22	3.26	3.33	3.37	3.40	3.40	3.41	3.41
5 to 1	2.46	....	3.08	3.06	3.05	3.05	3.07	3.09	3.12	3.13	3.13	3.13
10 to 1	2.46	....	2.82	2.83	2.84	2.86	2.89	2.90	2.91	2.91	2.92	2.93

ENGINEERS INC.

Job No.

Vol./Sheet No. of

Contract/Client

Phase/Subject

Design Topic

Made By Date Checked By Date Page No.

4. JET TRAJECTORY INTO BOX

$V_x = 11.2$ FPS

$$V_x = x\sqrt{\frac{g}{2z}}$$

WHEN $z = 3.1$ ft

$$11.2 = x\sqrt{\frac{32.2}{2 \times 3.1}} \Rightarrow x = 4.9 \text{ SAY } 5 \text{ ft}$$

WHEN $z = 1$ ft

$$11.2 = x\sqrt{\frac{32.2}{2 \times 1}} \Rightarrow x = 1.9 \text{ SAY } 2 \text{ ft}$$

∴ 10 ft TO WEIR WALL ADEQUATE FOR JET IMPACT & ENERGY DISSIPATION

Culvert Calculator Report
Outlet Pipe

FROM DISCHARGE BOX
TO CROSS ROADS PARK BASIN

ɔlve For: Headwater Elevation

Culvert Summary

Allowable HW Elevation	1,273.10 ft	Headwater Depth/ Height	0.89
Computed Headwater Elevation	1,272.41 ft	Discharge	30.00 cfs
Inlet Control HW Elev	1,272.29 ft	Tailwater Elevation	1,268.60 ft
Outlet Control HW Elev	1,272.41 ft	Control Type	Entrance Control

Grades

Upstream Invert	1,269.75 ft	Downstream Invert	1,268.00 ft
Length	130.00 ft	Constructed Slope	0.013462 ft/ft

Hydraulic Profile

Profile	S2	Depth, Downstream	1.31 ft
Slope Type	Steep	Normal Depth	1.30 ft
Flow Regime	Supercritical	Critical Depth	1.77 ft
Velocity Downstream	10.09 ft/s	Critical Slope	0.004683 ft/ft

Section

Section Shape	Circular	Mannings Coefficient	0.013
Section Material	Concrete	Span	3.00 ft
Section Size	36 inch	Rise	3.00 ft
Number Sections	1		

ɔutlet Control Properties

Outlet Control HW Elev	1,272.41 ft	Upstream Velocity Head	0.74 ft
Ke	0.20	Entrance Loss	0.15 ft

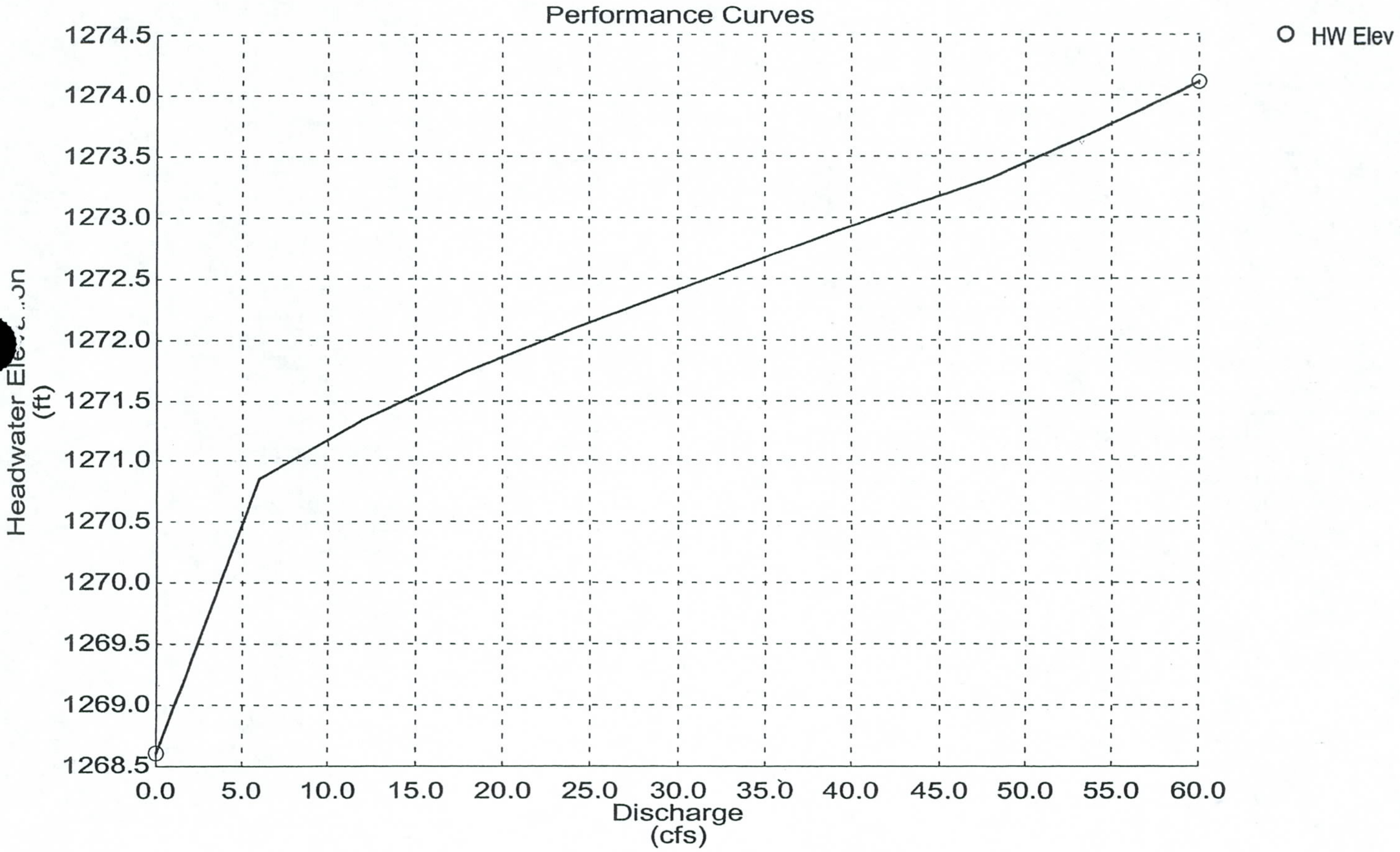
Inlet Control Properties

Inlet Control HW Elev	1,272.29 ft	Flow Control	Unsubmerged
Inlet Type	Beveled ring, 45 ° bevels	Area Full	7.1 ft²
K	0.00180	HDS 5 Chart	3
M	2.50000	HDS 5 Scale	1
C	0.03000	Equation Form	1
Y	0.74000		

Performance Curves Report
Outlet Pipe

Range Data:

	Minimum	Maximum	Increment
Discharge	0.00	60.00	6.00 cfs



Culvert Calculator Report
Outlet Pipe

›lve For: Headwater Elevation

Culvert Summary			
Allowable HW Elevation	1,273.10 ft	Headwater Depth/ Height	0.89
Computed Headwater Elevation	1,272.41 ft	Discharge	30.00 cfs
Inlet Control HW Elev	1,272.29 ft	Tailwater Elevation	1,270.00 ft
Outlet Control HW Elev	1,272.41 ft	Control Type	Entrance Control

Grades			
Upstream Invert	1,269.75 ft	Downstream Invert	1,268.00 ft
Length	130.00 ft	Constructed Slope	0.013462 ft/ft

Hydraulic Profile			
Profile	CompositeS1S2	Depth, Downstream	2.00 ft
Slope Type	Steep	Normal Depth	1.30 ft
Flow Regime	N/A	Critical Depth	1.77 ft
Velocity Downstream	5.99 ft/s	Critical Slope	0.004683 ft/ft

Section			
Section Shape	Circular	Mannings Coefficient	0.013
Section Material	Concrete	Span	3.00 ft
Section Size	36 inch	Rise	3.00 ft
Number Sections	1		

›utlet Control Properties			
Outlet Control HW Elev	1,272.41 ft	Upstream Velocity Head	0.74 ft
Ke	0.20	Entrance Loss	0.15 ft

Inlet Control Properties			
Inlet Control HW Elev	1,272.29 ft	Flow Control	Unsubmerged
Inlet Type	Beveled ring, 45 ° bevels	Area Full	7.1 ft²
K	0.00180	HDS 5 Chart	3
M	2.50000	HDS 5 Scale	1
C	0.03000	Equation Form	1
Y	0.74000		

INCA ENGINEERS INC.

Job No. 69446

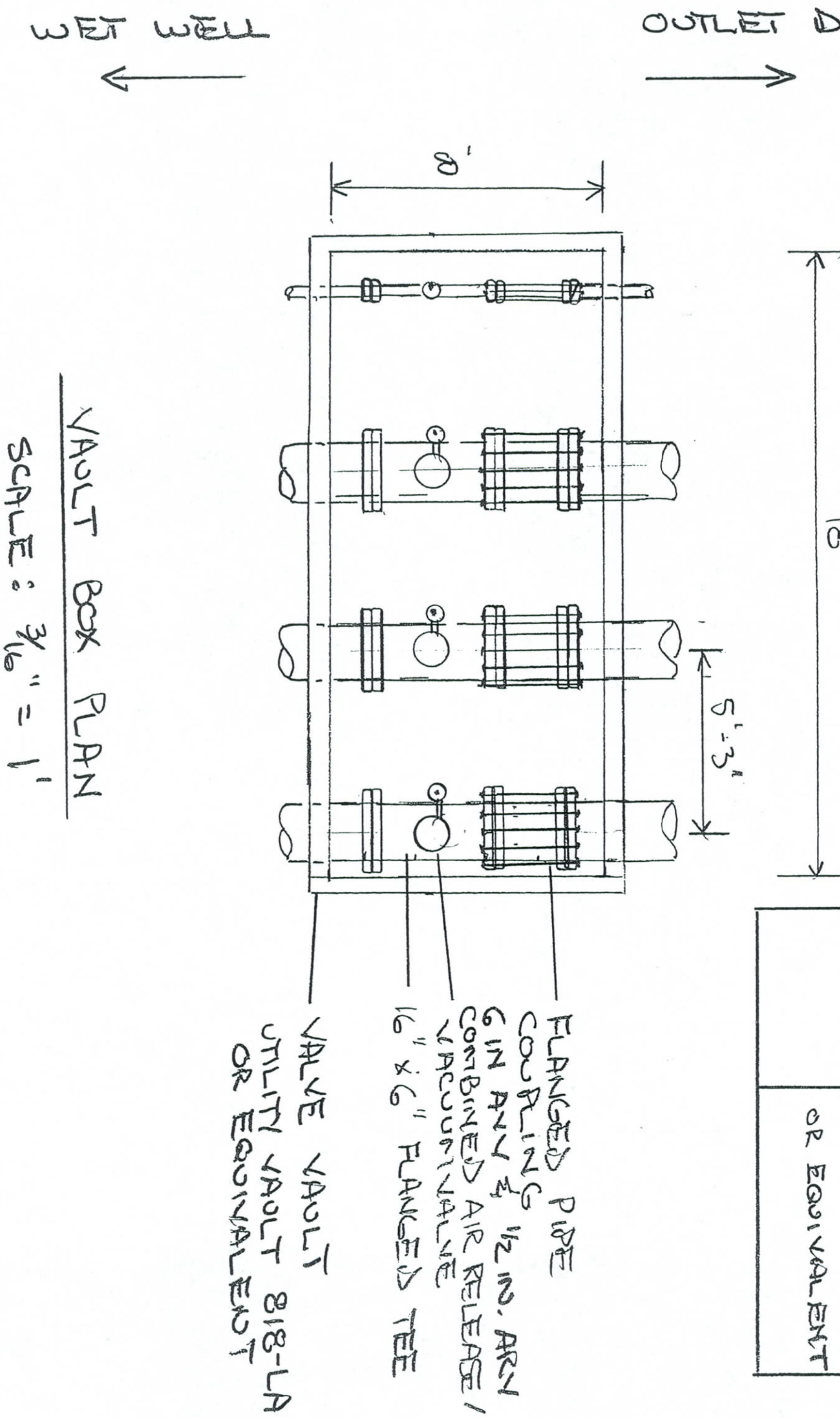
Vol./Sheet No. ______ of ______

Contract/Client GREENFIELD & RAY RD / TOWN OF GILBERT

Phase/Subject 60% DESIGN

Design Topic VALVE VAULT BOX PLAN

Made By JRD Date 10/9/02 Checked By ______ Date ______ Page No. ______



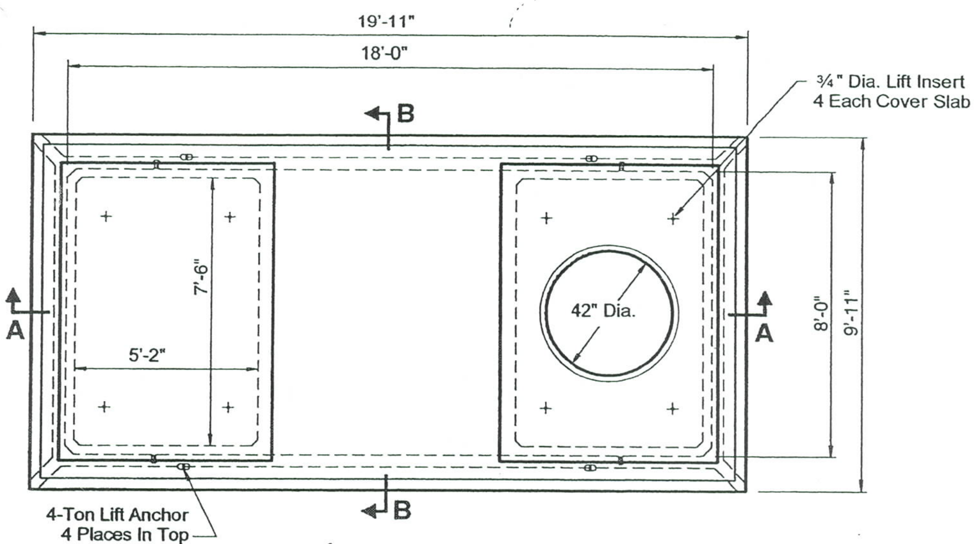
AIR RELEASE/VACUUM VALVE SCHEDULE

PIPE DIA.	VALVES
16 IN.	APCO SERIES 150 MODEL 1166 OR EQUIVALENT APCO SERIES 400 MODEL 50 OR EQUIVALENT
6 IN	APCO SERIES 140C MODEL 145C OR EQUIVALENT

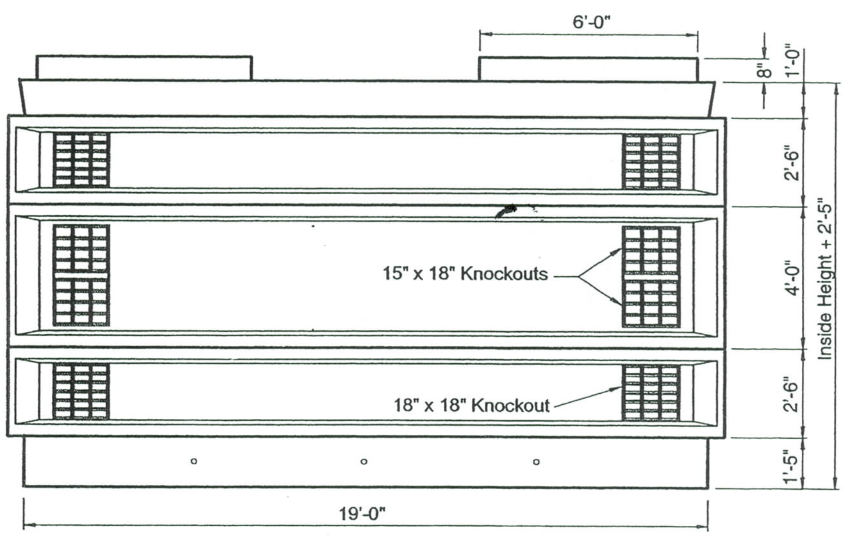
818-LA

VALVE VAULT

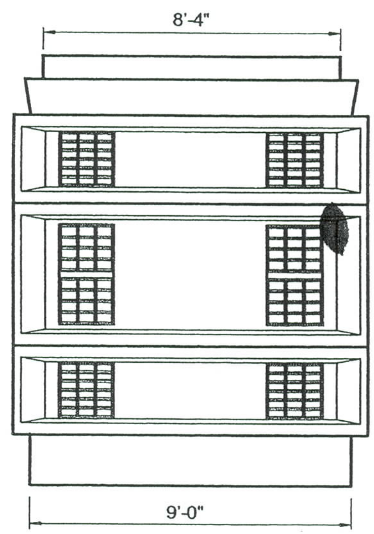
SCALE: 3/16" =1'-0"



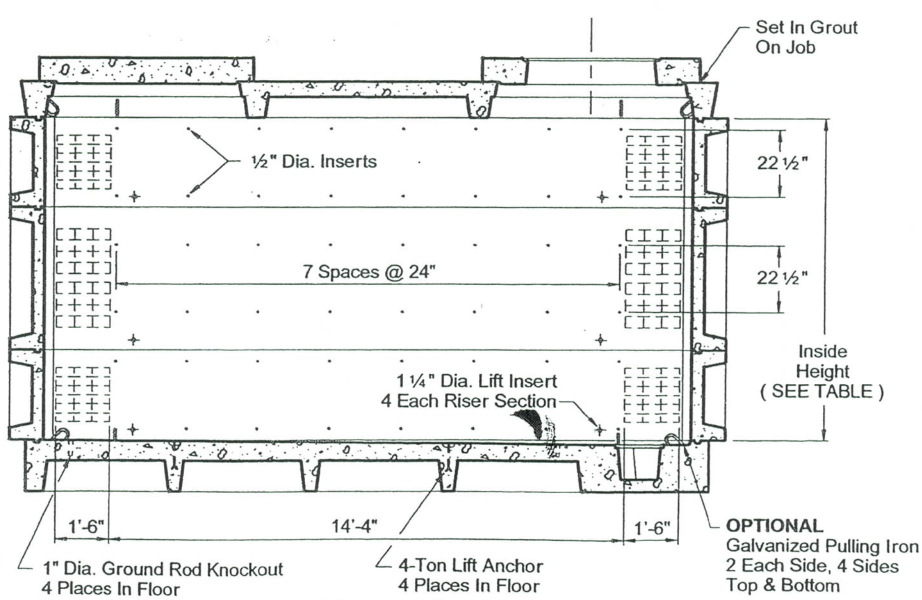
PLAN VIEW



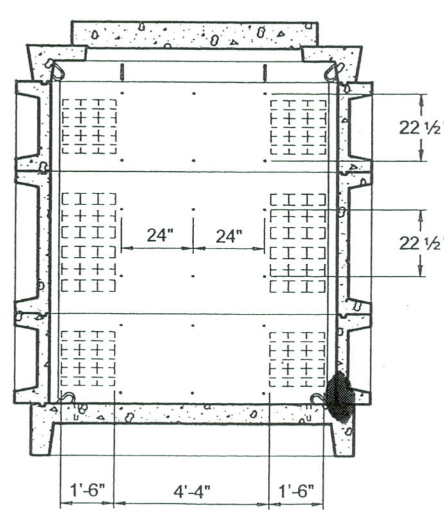
SIDE VIEW



END VIEW

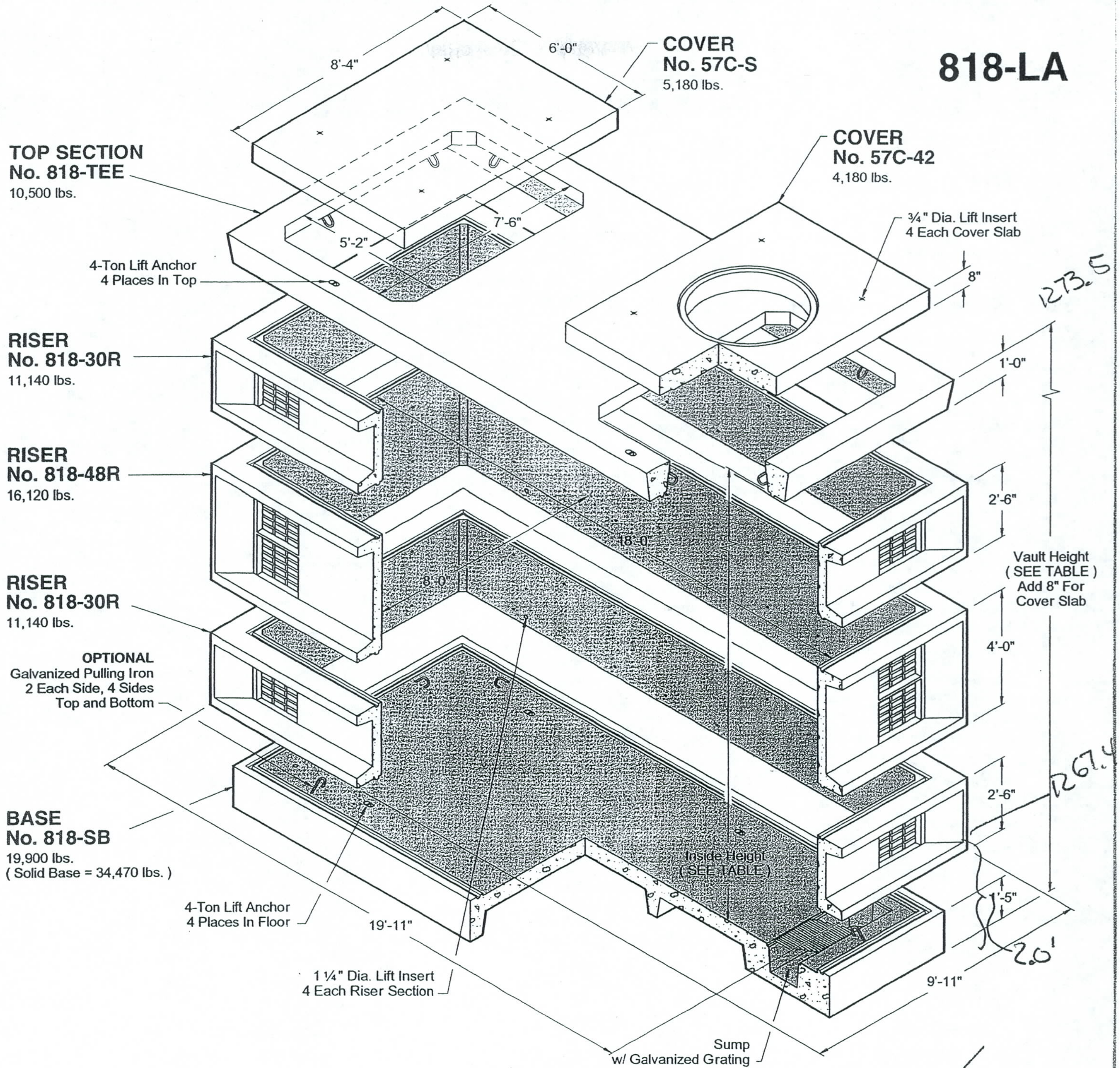


SECTION AA

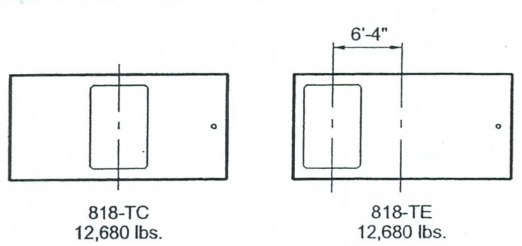


SECTION BB

818-LA



OPTIONAL TOP SECTION - ALSO ON PAGE 44-45



VAULT No.	INSIDE HEIGHT	818-30R RISERS	818-48R RISERS	*OUTSIDE HEIGHT	*VAULT WEIGHT
818-66-LA	6'-6"	1	1	8'-11"	57,660 lbs.
818-76-LA	7'-6"	3		9'-11"	63,820 lbs.
818-8-LA	8'-0"		2	10'-5"	62,640 lbs.
818-9-LA	9'-0"	2	1	11'-5"	68,800 lbs.
818-10-LA	10'-0"	4		12'-5"	74,960 lbs.
818-11-LA	11'-0"		3	14'-5"	78,760 lbs.

*** HEIGHT and WEIGHT DO NOT INCLUDE 8" 57C COVER SLAB**

Any Combination Of 30" Risers Or 48" Risers May Be Used To Achieve Desired Height.

For Details Of Access Covers, See COVER Section.

*** ITEMS SHOWN ARE SUBJECT TO CHANGE WITHOUT NOTICE.**

FOR DETAILS SEE REVERSE SIDE.

UTILITY VAULT COMPANY®
P.O. BOX 588
Auburn, Washington 98071-0588
Phone (206) 839-3500
Fax (206) 735-4201

APCO Gives Guaranteed Protection

1. Protection for pipelines
2. Eliminating risk of collapsing the line due to vacuum
3. Exhausts air when the line is filled
4. Allows air to re-enter immediately when the line drains

Plus these exclusive features at no extra cost!

5. Stainless steel floats - Guaranteed individually tested
6. ASTM quality materials guaranteed throughout
7. Every valve hydrostatically factory tested.

Why and Where to Use Air/Vacuum Valves

An Air/Vacuum Valve has a large venting orifice and is used to exhaust large quantities of air from a pipeline when being filled or a deep well pump column when the pump is started*. Once the line is filled, the Air/Vacuum Valve closes and remains closed until the liquid is drained and pressure returns to atmospheric. The Air/ Vacuum Valve will then immediately open to allow air to re-enter the line and prevent a vacuum from developing.

Air/Vacuum Valves do not open to exhaust the small pockets of air which collect in the line while it is operating under pressure. We highly recommend for **maximum** pipeline flow and pump efficiency Automatic Air Release Valves be used in conjunction with Air/Vacuum Valves. The AARV will eliminate constricting air pockets from forming at the high points of the pipeline.

The minimal cost for the Automatic Air Release Valves will quickly pay for itself in minimizing head loss through the pipeline. The result: energy cost savings!

AVAILABLE FOR HIGH PRESSURE SERVICE

SPECIFY OPERATING PRESSURE IF BELOW 50 PSI

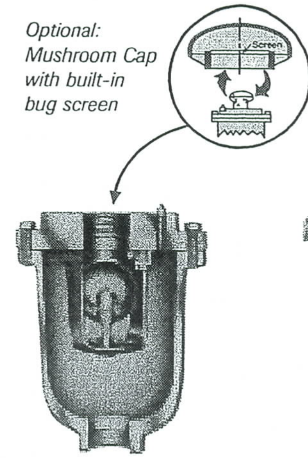
**SEE BULLETIN 586 - AIR VALVES FOR VERTICAL TURBINE PUMPS*

PHYSICAL DIMENSIONS

MODEL	SIZE	HEIGHT	MAXIMUM DIAMETER	INLET	OUTLET	WEIGHT LBS.
141	1/2"	7 1/16	5 1/8	1/2" NPT	1/2" NPT	10
142	1"	9	7	1" NPT	1" NPT	22
144	2"	12	9	2" NPT	2" NPT	55
146	3"	13 5/8	9 7/16	3" NPT OR FLANGED	3" NPT	60
152	4"	18 7/8	12	4" NPT OR FLANGED	4" PLAIN	100
153	6"	21 3/4	16	6" FLANGED	6" PLAIN	150
154	8"	25	18	8" FLANGED	8" PLAIN	200
155	10"	27 5/8	20	10" FLANGED	10" PLAIN	350
156	12"	30 3/8	25	12" FLANGED	12" PLAIN	500
157	14"	30 3/4	29	14" FLANGED	14" PLAIN	625
158	16"	31 3/4	32	16" FLANGED	16" PLAIN	830
159	18"	43 1/2	34	18" FLANGED	18" PLAIN	1100
160	20"	48	40	20" FLANGED	20" PLAIN	1650
162	24"	58	48	24" FLANGED	24" PLAIN	2600

[illegible]

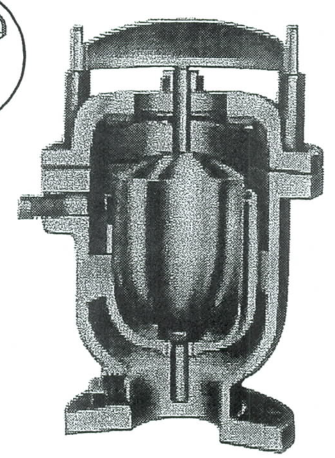
Optional: Mushroom Cap with built-in bug screen



SERIES 140

1/2 INCH THROUGH 3 INCH

OUTLETS ARE NPT THREAD. IT IS GOOD PRACTICE TO INSTALL A MUSHROOM CAP INTO THE THREADED OUTLET FOR DISCHARGE PROTECTION.



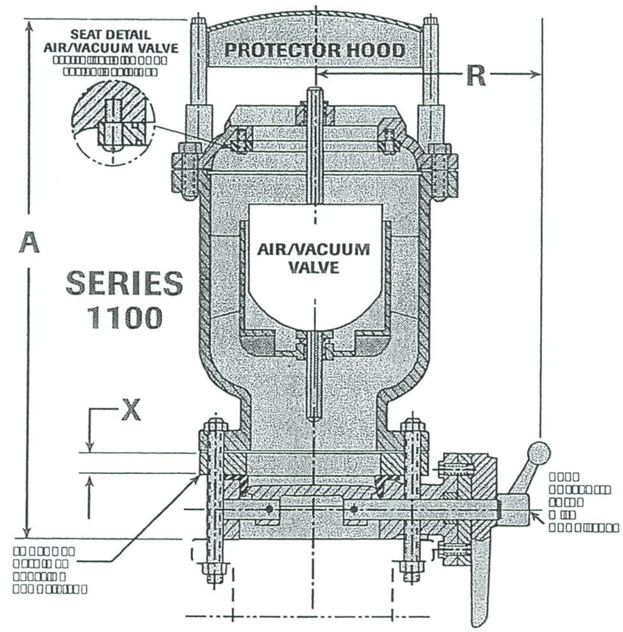
SERIES 150

4 INCH THROUGH 30 INCH

STANDARD OUTLETS ARE PLAIN WITH A STEEL PROTECTOR HOOD. OPTIONAL THREADED OR FLANGED OUTLETS AVAILABLE.

Replace Shut-Off Valves with APCO Butterfly Valves

[illegible]



VALVE SIZE	MODEL NO.	COMBINATION	A	R	X	NO. REQUIRED & SIZE: STUDS	NO. REQUIRED & SIZE: NUTS
4"	1104	152 / 904	21½	9½	15/16	(8) 5/8-11x6-1/2 LG.	(16) 5/8-11
6"	1106	153 / 906	25¼	10¾	1	(8) 3/4-10x8 LG.	(16) 3/4-10
8"	1108	154 / 908	29	14¼	1.5	(8) 3/4-10x9 LG.	(16) 3/4-10
10"	1110	155 / 910	32	14½	2	(12) 7/8-9x10 LG.	(24) 7/8-9
*12"	1112	156 / 912	39¾	15	5	(12) 7/8-9x8-1/2 LG.	(24) 7/8-9
*14"	1114	157 / 914	40	16¾	5	(12) 1-8x9 LG.	(24) 1-8
16"	1116	158 / 916	42¾	17¾	1-7/16	(16) 1-8x11 LG.	(32) 1-8

* USES SPOOL PIECE

ADDITIONAL AIR VALVE INFORMATION	BULLETIN
WHICH AIR VALVE SHOULD I USE?	610
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SLOW CLOSING AIR AND VACUUM VALVES	613
HYDRAULICALLY CONTROLLED AIR/VACUUM VALVES	7000

INCA ENGINEERS INC.

Job No. ______
Vol./Sheet No. ______ of ______
Contract/Client GREENFIELD PUMP STATION / TOWN OF GILBERT
Phase/Subject 60% DESIGN
Design Topic AIR EXHAUST / VACUUM VALVE SIZING
Made By JRD Date 9/02 Checked By ______ Date ______ Page No. ______

16-INCH DISCHARGE LINES - MAIN PUMPS

1. MAXIMUM FILL RATE = USE 7,053 GPM = 15.7 CFS
   $V_f = 15.7/((3.14 \times 16/12)^2/4) = 15.7/1.4 = 11.2$ FPS
2. MAXIMUM DRAIN RATE -

   $CFS = 0.08666(SD^5)^{1/2}$

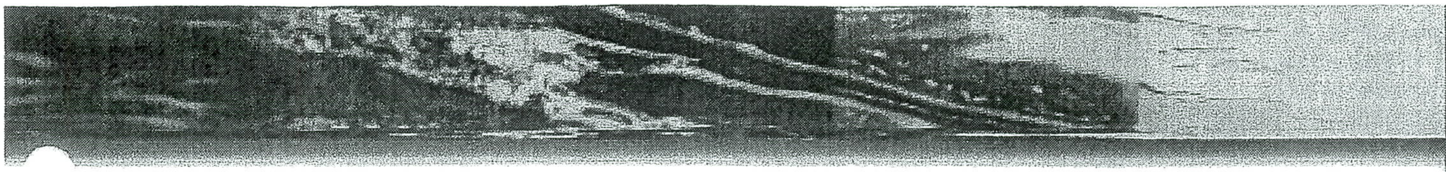
   $S = SLOPE = \frac{1273.1 - 1232.8}{145} = 0.278$

   $D = 16$ IN

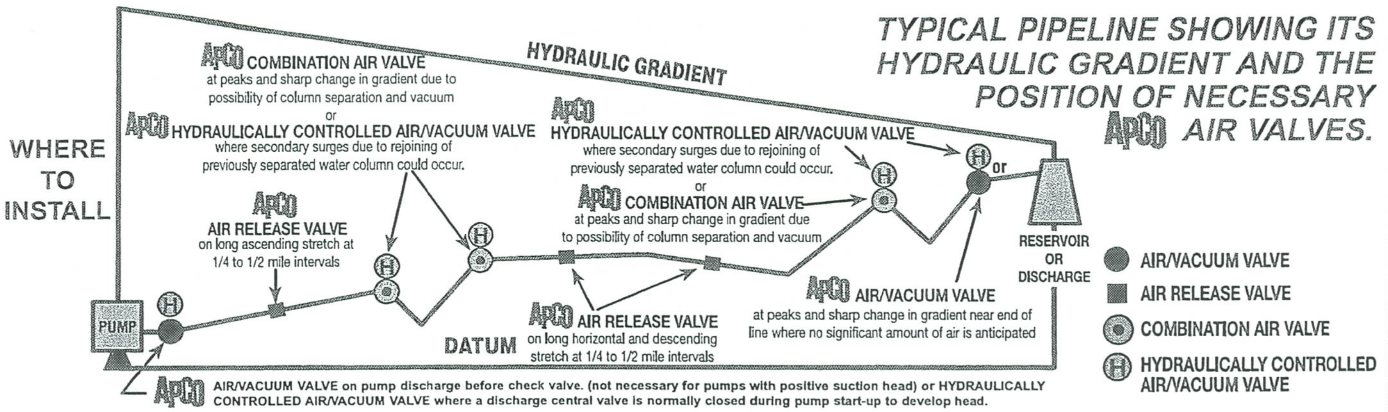
   $CFS = 0.08666(0.278 \times 16^5)^{1/2} = 46.8$ CFS

   $V_d = 46.8/1.4 = 33.4$ FPS
3. USE ATTACHED PERFORMANCE GRAPHS FOR APCO VALVES FOR SIZING
4. CHECK RESULTS FROM GRAPHS AGAINST APCO COMPUTER SIZING (ATTACHED)
5. SELECT MORE CONSERVATIVE RESULTS:

   APCO 6 IN AVV SERIES 150 MODEL 1106
   OR EQUAL



TYPICAL PIPELINE SHOWING ITS HYDRAULIC GRADIENT AND THE POSITION OF NECESSARY APCO AIR VALVES.



SIZING AIR/VACUUM VALVES FOR PIPELINES

GENERAL EXPLANATION OF CRITERIA USED

1. Calculate necessary valves independently for each high point on the line.
2. Consider the more severe of the two gradients adjacent to each high point.
3. Determine maximum rate of flow in cubic feet per second which can occur in this gradient during both the filling and draining of the line. Always be sure to take the highest possible rate of flow under either circumstance, draining or filling the pipeline.

To calculate rate of flow:

If line is being filled by pump

$$\text{Rate of flow C.F.S.} = \frac{\text{GPM of pump}}{449}$$

If the line is being drained by gravity

$$\text{Rate of flow in C.F.S.} = 0.08666\,(SD^5)^{1/2}$$

Where S = Slope (in feet per foot of length)
D = Diameter of pipe (inches)

4. Valve to be installed at this high point must release or re-enter the amount of air in C.F.S. equal to the maximum possible flow of water in C.F.S. immediately adjacent to this high point.
5. To economize in size of valves selected, final step is to determine the maximum pressure differential which can be tolerated across the orifice consistent with the required flow of air in C.F.S. already determined.
6. To determine this maximum tolerable differential pressure, it is necessary to calculate if there is risk of line collapse from vacuum. This condition usually is present in thin-walled steel lines above 24". To calculate collapsing pressure for thin-walled-cylindrical pipe:

$$P = 12{,}500{,}000 \left(\frac{T}{D}\right)^3$$

Where P = Collapsing pressure (PSI)
T = Thickness of pipe (inches)
D = Diameter of pipe (inches)

This includes a Safety Factor of 4

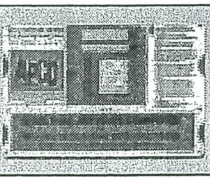
7. For air flow in, use the maximum pressure differential thus calculated or 5 psi whichever is lower. Enter the graph with this differential (never greater than 5 psi) and the flow found **during draining** to select the appropriate valve to protect your line from collapse and water column separation due to vacuum.
8. Next enter the graph with the **maximum rate at which the line can be filled** and use a 2 psi differential pressure. This valve size is sufficient to vent all air from the line before valve closure. This ensures maximum performance from the line.
9. Compare the sizes calculated in steps 7 & 8 - whichever is larger is correct for the protection of your system.
10. These valves should be installed on the high point with a shut-off valve below them.
11. The same procedure should be followed for each individual high point.
12. If the line lacks clearly defined high points or they are separated by long stretches of uniform gradient, it is recommended that the proper valves be selected as explained above and duplicate installations be made at regular intervals of ¼ to ½ mile at the engineer's discretion.

TO ENSURE MAXIMUM CAPACITY FROM THE PIPELINE

When a line is in operation, Air Pockets collect both at the high point and for a distance down stream from the high point. To release the Air, install the APCO Air/Vacuum Valves along with a 2" APCO No. 200 Air Release Valve at the high point and a second Air Release Valve a short distance down stream.

SIZING

USE APCO SLIDE RULE AIR VALVE COMPUTER OR APCO APSLIDE SOFTWARE



PERFORMANCE GRAPHS FOR AIR/VACUUM VALVE

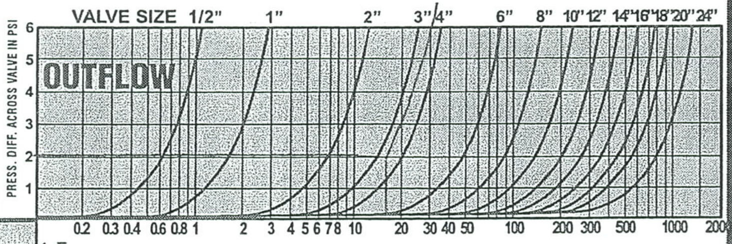
AIR INFLOW/OUTFLOW THRU VALVE IN STANDARD CUBIC FEET OF FREE AIR PER SECOND, (SCFS)

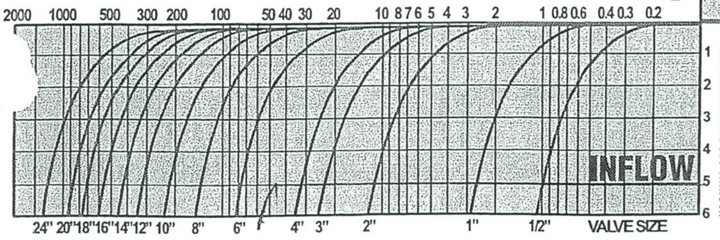
4 IN EXHAUST VALVE

CURVES SHOWN ARE ACTUAL FLOW CAPACITIES AT 14.7 PSI BAROMETRIC PRESSURE AND 70°F TEMPERATURE BASE ON ACTUAL TEST.

THESE FIGURES ARE NOT MERELY FLOW CAPACITIES ACROSS THE ORIFICE, BUT FLOW CAPACITIES ACROSS THE ENTIRE VALVE.

IN THE TEST SET-UP, AIR APPROACH VELOCITY IS NEGLIGIBLE, THEREFORE ACTUAL FLOW CAPACITY EXCEEDS THE VALUES SHOWN ON CHART.





6 IN VACUUM VALVE

TEST CONDUCTED BY:

PHILLIP PETROLEUM COMPANY
ENGINEERING DEPARTMENT - TEST DIVISION
EDMOND PLANT FEBRUARY 2, 1961

SOUTHERN RESEARCH INSTITUTE
BIRMINGHAM, ALABAMA MAY 8, 1959

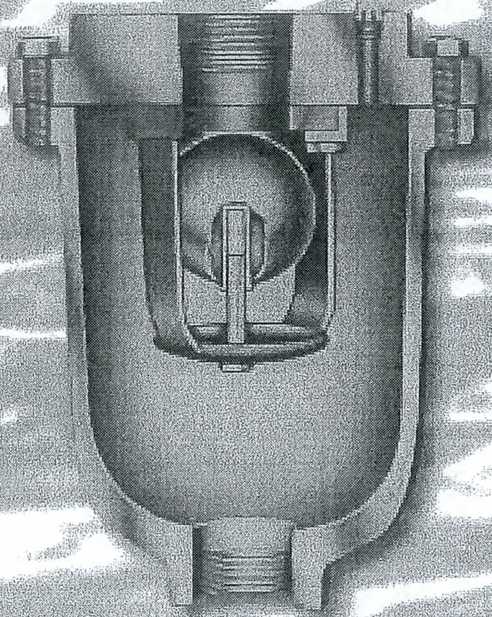
6 IN VALVE GOVERNS

2000
Millennium
Edition

BULLETIN 601

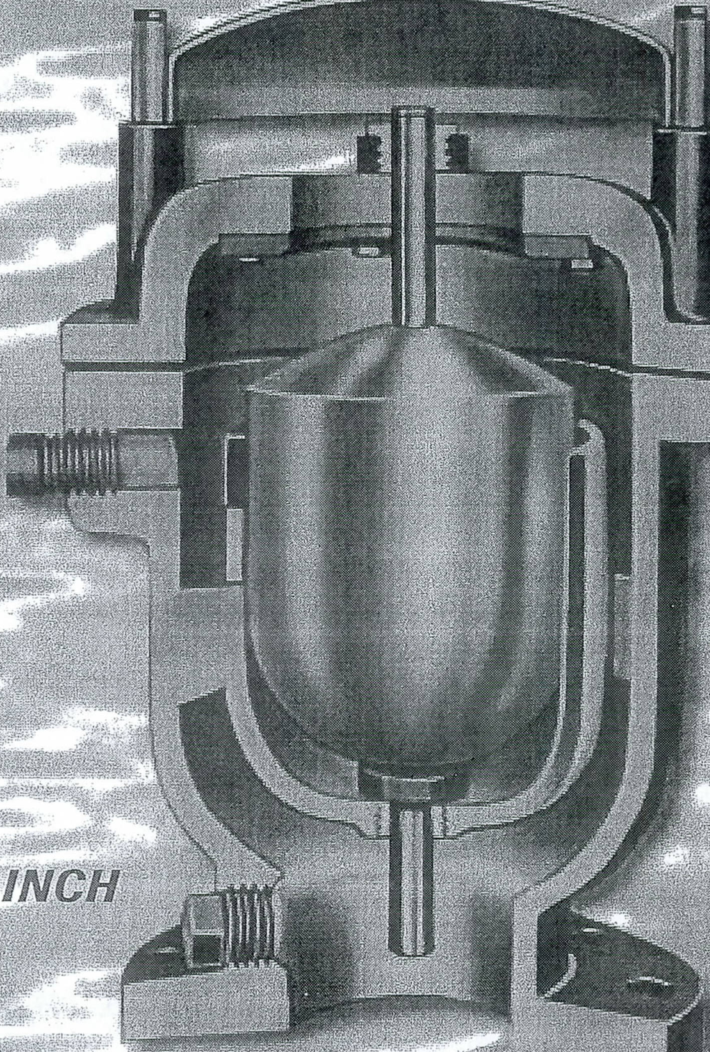
APCO®

AIR/VACUUM VALVES



SERIES 140

1/2 INCH THROUGH 3 INCH



ISO FLANGE CONNECTIONS AVAILABLE

BUILT TO AWWA C-512 STANDARDS

SERIES 150

4 INCH THROUGH 30 INCH

AIR/VACUUM VALVES

VALVE & PRIMER CORPORATION
1420 S. WRIGHT BLVD. • SCHAUMBURG, IL 60193-4599
847.524.9000 • FAX:847.524.9007 • 800.323.6969
website: www.apcovalves.com • e-mail: factory@apcovalves.com

APCO AIR/VACUUM VALVES

APCO Gives Guaranteed Protection

1. Protection for pipelines
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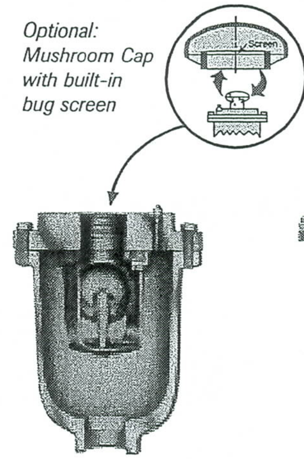
**SEE BULLETIN 586 - AIR VALVES FOR VERTICAL TURBINE PUMPS*



SERIES 140

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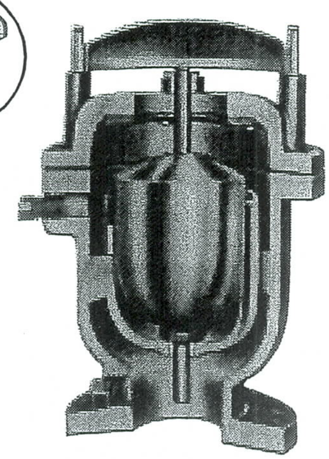

SERIES 150

4 INCH THROUGH 30 INCH

STANDARD OUTLETS ARE PLAIN WITH A STEEL PROTECTOR HOOD. OPTIONAL THREADED OR FLANGED OUTLETS AVAILABLE.

Replace Shut-Off Valves with APCO Butterfly Valves

Costs to excavate pipeline trenches can be greatly reduced by using APCO Butterfly Valves for isolation instead of gate valves. APCO Butterfly Valves are economical, reliable and much shorter, permitting a reduction in depth of trench. See Below.

PHYSICAL DIMENSIONS

MODEL	SIZE	HEIGHT	MAXIMUM DIAMETER	INLET	OUTLET	WEIGHT LBS.
141	1/2"	7 1/16	5 1/8	1/2" NPT	1/2" NPT	10
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146	3"	13 5/8	9 7/16	3" NPT OR FLANGED	3" NPT	60
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155	10"	27 3/8	20	10" FLANGED	10" PLAIN	350
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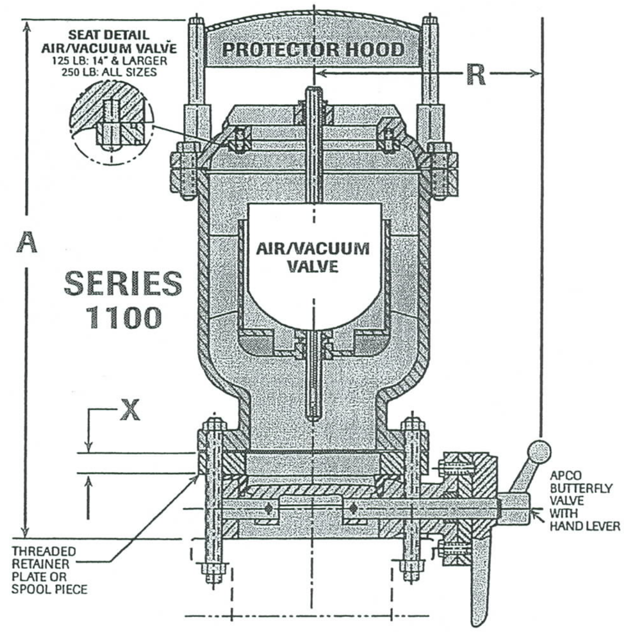
159	18"	43 1/2	34	18" FLANGED	18" PLAIN	1100
160	20"	48	40	20" FLANGED	20" PLAIN	1650
162	24"	58	48	24" FLANGED	24" PLAIN	2600

ON SIZES 4" AND LARGER, THE PLAIN OUTLET COMES WITH A PROTECTOR HOOD, AS ILLUSTRATED. HOWEVER, THREADED OR FLANGED OUTLETS ARE AVAILABLE AND RECOMMENDED WHEN VALVES ARE USED INSIDE THE PUMP HOUSE.



VALVE SIZE	MODEL NO.	COMBINATION	A	R	X	NO. REQUIRED & SIZE: STUDS	NO. REQUIRED & SIZE: NUTS
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16"	1116	158 / 916	42¾	17¾	1-7/16	(16) 1-8x11 LG.	(32) 1-8

* USES SPOOL PIECE

ADDITIONAL AIR VALVE INFORMATION	BULLETIN
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HYDRAULICALLY CONTROLLED AIR/VACUUM VALVES	7000

INCA ENGINEERS INC.

Job No. ____________

Vol./Sheet No. ______ of ______

Contract/Client ____________

Phase/Subject ____________

Design Topic AIR RELEASE VALVE SIZING

Made By JRD Date 9/02 Checked By ______ Date ______ Page No. ______

16 - INCH DISCHARGE LINE - MAIN PUMPS

1. BASE AIR RELEASE ON FILL RATE - 15.7 CFS

2. ASSUME 5% AIR BY VOLUME

3. AIR RELEASE REQUIRED -

$$15.7 \times 0.5 \times 60 \frac{\text{min}}{\text{sec}} = 47.1 \quad \text{SAY } 50 \text{ SCFM}$$

4. ESTIMATED OPERATING PRESSURE

   45 FT STATIC HEAD
   2 FT DYNAMIC HEAD
   ______
   47 FT TOTAL HEAD
   20.3 PSI

5. ATMOSPHERIC PRESSURE = 14.7 PSI

6. ESTIMATED DIFFERENTIAL PRESSURE

   20.3 - 14.7 = 5.6 PSI SAY 6 PSI

7. SELECT 1/2" ORIFICE FROM ATTACHED APCO AIR RELEASE VENT CAPACITY CHART

8. SELECT GREATER OF CHART OR COMPUTER RESULT

   APCO 1/2" ARV MODEL 50
   OR EQUAL

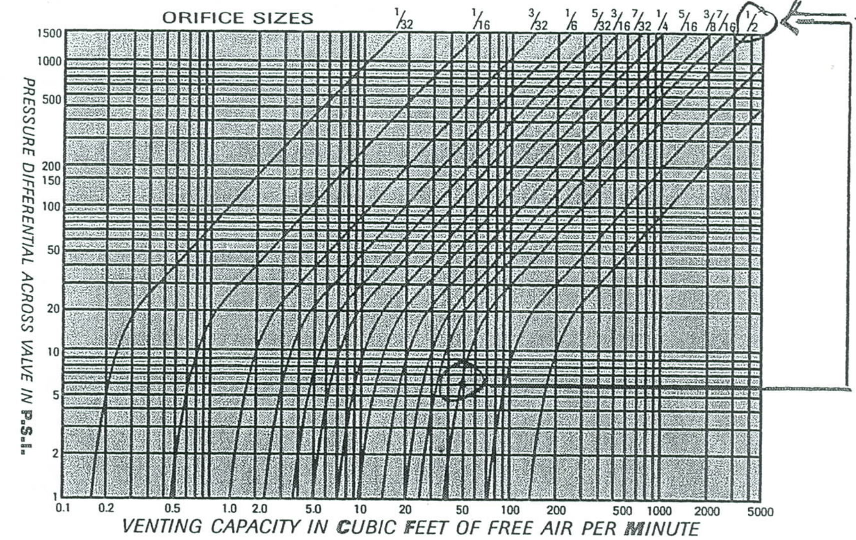
. . . AND SIZE AN AIR RELEASE VALVE WHEN A SPECIFIC VENTING CAPACITY IS REQUIRED.

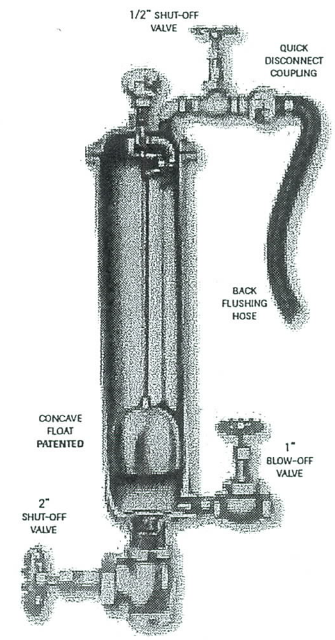
A. Enter GRAPH with pressure in system and venting capacity required.

B. Read off nearest orifice diameter to intersection of pressure and capacity lines on GRAPH.

C. Enter TABLE BELOW with orifice diameter and select valve which can use this orifice diameter at the pressure involved.

VENTING CAPACITY GRAPH FOR AIR RELEASE VALVES





SEWAGE AIR RELEASE

STANDARD OPERATING PRESSURE 175 PSI.
HIGHER PRESSURES AVAILABLE.

#400

2, 3, 4"

PHYSICAL DIMENSIONS
Height . . . . 17 ½"
Max. Diameter . . . 7 ½"
Weight . . . . 41 lbs.

VALVE WITH ACCESSORIES
Height . . . . 24"
Weight . . . . 55 lbs.
Inlet– 2", 3" or 4" pipe thread

#450

2, 3, 4"

PHYSICAL DIMENSIONS
Height . . . . 20"
Max. Diameter . . . 9 ½"
Weight . . . . 85 lbs.

VALVE WITH ACCESSORIES
Height . . . . 27"
Weight . . . . 118 lbs.
Inlet– 2", 3" or 4" pipe thread

MODEL	INLET SIZE	MAXIMUM ORIFICE SIZES WHICH CAN BE USED WITH THE FOLLOWING PRESSURES												
		10	25	50	75	100	125	150	200	250	300	500	800	1500
50	½,¾,1"	3/32	3/32	3/32	3/32	3/32	3/32	3/32	1/16	1/16	1/16	x	x	x
55	1/2"	3/32	3/32	3/32	3/32	3/32	3/32	3/32	x	x	x	x	x	x
65	3/4"	7/32	7/32	7/32	7/32	1/8	1/8	1/8	x	x	x	x	x	x
200A	1",2"	5/16	5/16	5/16	1/4	3/16	3/16	3/16	5/32	5/32	5/32	x	x	x
200	2"	1/2	1/2	1/2	1/2	3/8	3/8	3/8	7/32	7/32	7/32	x	x	x
205	2"	x	x	x	x	1/2	3/8	3/8	7/32	7/32	7/32	7/32	1/8	x
206	2"	x	x	x	x	x	x	x	x	x	x	x	x	3/32
207	6"	1	1	1	1	1	1	1	3/4	3/4	3/4	x	x	x
400	2",3",4"	5/16	5/16	5/16	1/4	1/4	1/4	1/4	3/16	5/32	5/32	x	x	x
450	2",3",4"	1/2	1/2	1/2	1/2	1/2	1/2	1/2	7/16	7/16	7/16	x	x	x

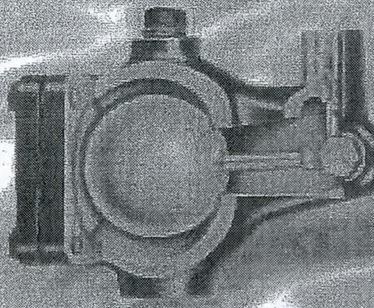
STANDARD ORIFICES ON CHART ARE SHADED IN BLUE

APCO VALVE & PRIMER CORPORATION
1420 S. WRIGHT BLVD. • SCHAUMBURG, IL 60193-4599
847.524.9000 • FAX:847.524.9007 • 800.323.6969
website: www.apcovalves.com • e-mail: factory@apcovalves.com

APCO®

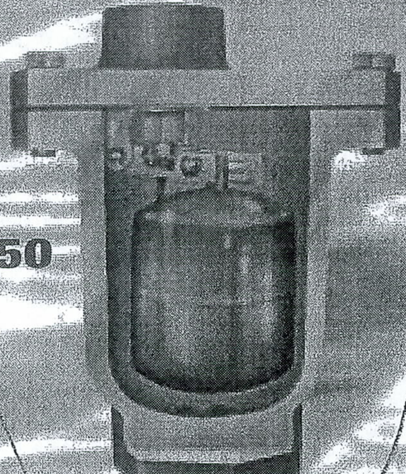
AIR RELEASE VALVES

Manufactured to AWWA C-512 standards
ISO connections available



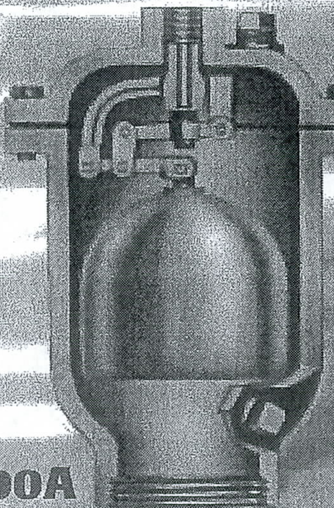
#55

Factory Mutual System ★APPROVED UL LISTED



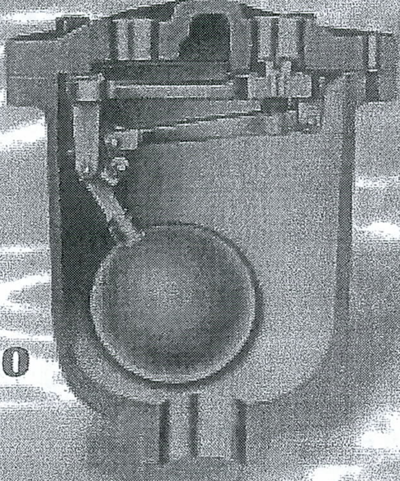
#50

Factory Mutual System ★APPROVED UL LISTED

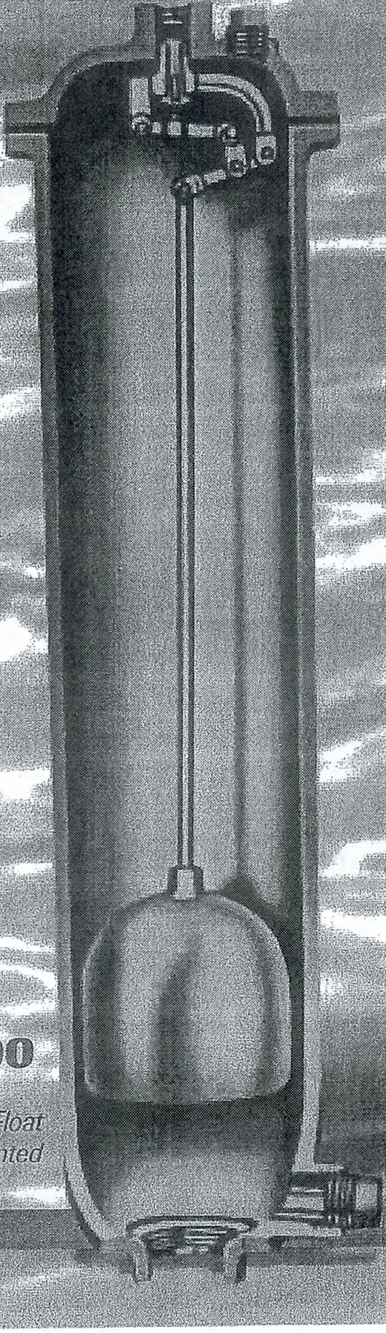


#200A

Concave Float Patented



#200



#400

Concave Float Patented

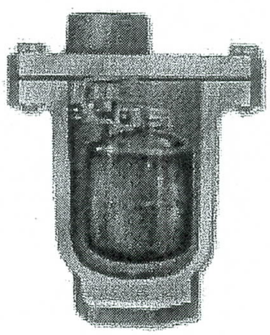
VALVE & PRIMER CORPORATION
1420 S. WRIGHT BLVD. • SCHAUMBURG, IL 60193-4599
847.524.9000 • FAX:847.524.9007 • 800.323.6969
website: www.apcovalves.com • e-mail: factory@apcovalves.com

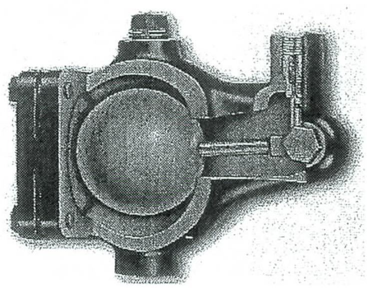
AIR RELEASE VALVES

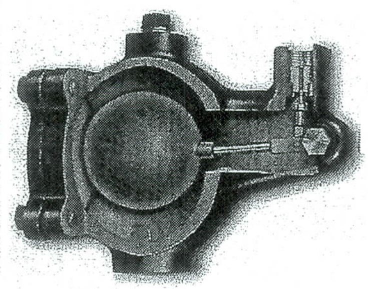
WHY and WHERE to use An Air Release Valve has a small venting orifice and is used wherever air is entrained in water under pressure. These pockets of air increase the resistance to the flow of water. In critical installations, air can reduce the capacity of a line down to zero. More common is an increased resistance of 10 to 15%. The increased resistance must be overcome by the pump using more power than necessary to move the required amount of water. Such a loss can continue unnoticed for years creating excessive power consumption costs. This is a major reason why all points where air can collect should be equipped with an APCO Air Release Valve.

HOW TO OPERATE These valves have much smaller orifices than the Air/Vacuum Valves. Their function is to release small pockets of air which gather at the high points of a system after it is filled and under pressure. The Air Release Valve has the ability to open against internal pressure because it has a small orifice and a leverage mechanism which multiplies the force of the float. This force must be greater than the internal pressure across the orifice in order to open the orifice when a pocket of air needs to be vented. This explains why, as the internal pressure **increases,** the orifice **decreases** in size to facilitate the valve opening.

SIMPLE LEVER







All APCO Air Release Valves are 100% Hydrostatically factory tested for ANSI/AWWA C512 standards.

#50

1/2, 3/4, 1" Inlet

PHYSICAL DIMENSIONS

Height	5⅞"
Width	3¾"
Weight	6 lbs.

Factory Mutual System ✱APPROVED — UL LISTED

Standard pressures up to 175 psi and up to 300 psi with special orifice.
Specify if operating pressure is below 20 psi.

#55

1/2" Inlet

PHYSICAL DIMENSIONS

Height	5"
Length	6⅜"
Width	3 5/16"
Weight	5½ lbs.

Factory Mutual System ✱APPROVED — UL LISTED

Standard pressures up to 150 psi.

#65

3/4" Inlet

PHYSICAL DIMENSIONS

Height	7"
Length	8½"
Width	4½"
Weight	9 lbs.

Standard pressures up to 150 psi

MATERIALS OF CONSTRUCTION

Body and Cover
Cast Iron

Float
Stainless Steel

Seat
Brass-Stainless or Buna-N

Needle
Brass or Stainless Steel

Linkage
Delrin, Bronze or Stainless Steel

Other internal parts – Lever Pins, Retaining Rings, Screws are **Stainless Steel, Bronze or Brass.**

NOTE:
Great care is taken in the choice of materials to avoid galvanic action!

APCO Uses Stainless Steel Floats Exclusively!

Examine these QUALITY features provided at no extra cost!

1. ASTM QUALITY materials guaranteed throughout
2. Stainless Steel Floats
3. Conserve pumping power – eliminate restricted high points
4. Create maximum pipeline efficiency

Use APCO Air Release Valves.

APCO COMPUTER SPREADSHEET CHECK ON GRAPHICAL SOLUTION 16-IN. DIA DISCHARGE PIPE STORMWATER PUMP

Microsoft Excel - Apslide.xls

File Tools Window

FUNCTION #8

APCO

Air and Vaccuum Valve Selection

High Point #	1	
Maximum Filling Flow Rate	7100	gpm
Maximum Draining Flow Rate	21179.2	gpm
Maximum Design Discharge	6720.0	gpm
Sizing for air exhaust	4	inches
AVV Differential Pressure	1.84	psi
Sizing for air vacuum	6	inches
AVV Differential Pressure	2.54	psi

Available AVV or CAV Sizes

1,2,3,4,6,8,10,12,14,16,18,20,24, & 30-inch

Size Air Exhaust | Size Air Vacuum | Save Current Design | Design Another

View Summary (Function 9) | Main Menu | Back Up | Help

SPREADSHEET
SOLUTION - 16 IN DIA.
DISCHARGE PIPES

FUNCTION #9

Air and Vacuum Valve Design Summary

High Point #	Pipe Size inches	Filling Velocity fps	Draining Velocity fps	Design Velocity fps	Air Exhaust Orifice Size inches	Air Exhaust DP psi	Air Vacuum Orifice Size inches	Air Vacuum DP psi	Air Release Orifice Size inches	Air Release DP psi	*Surge Check Needed
1	16	11.33	406.94	10.72	4	1.84	16	4.97	0.1563	80	yes

* [A surge check valve is needed when
the design velocity is greater than 10 fps (3.05m/s)]

City of:

Project Engineer:

Disclaimer: The sizing data is based solely on testing performed on APCO valves as demonstrated on the APCO slide rule and is not intended for use in sizing other air valves. This program will compute slopes and size air valves for individual high points in a pipe line or force main. It does not take into consideration that a valve at one high point may serve the need of an adjacent high point.

SPEC FOR
6-IN COMB. VALVE

APCO SPECIFICATIONS

SERIES 1800 CUSTOM COMBINATION AIR VALVE

January 22, 2001

Custom Combination Air Valves (double body, double orifice) allow large volumes of air to escape out the large diameter air & vacuum orifice when filling a pipeline, then close water tight when the liquid enters the valve. The small orifice Air Release Valve shall be an independent valve body, side connected to the large orifice air vacuum valve body with piping, including 1" all brass gate valve for isolation. While the large orifice is closed, the small 3/16" or 5/32" air release orifice will open to allow small pockets of air to escape automatically and independently of the large orifice. The small orifice air release valve shall be an independently operated compound lever mechanism of precision cast stainless steel.

The large air & vacuum orifice shall also open and allow large volumes of air to enter the pipeline during pipeline drainage to break the vacuum. The large orifice float must be surrounded by a baffle for protection against direct contact of the rushing air and water to prevent premature valve shutoff. The baffle must be a heavy integral cast part of the main valve body not a loose piece.

The Buna-N seat shall be compression molded a minimum 1/2" thick and fastened to the valve cover with shoulder screws to lock the seat in place without seat distortion, for drop tight shutoff. Both floats shall be heavy stainless steel, hermetically sealed. The large orifice float shall have a one piece hex rod through its center, for center guiding through stainless steel bushings into positive shut-off against the Buna-N seat.

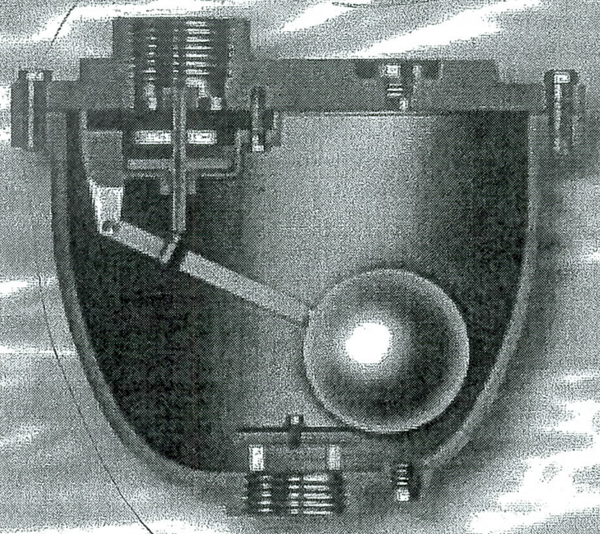
The Custom Combination Air Valve shall be rated 125 lb. or 250 lb. Class. The 3/16" small orifice shall operate (open) up to 150 psi. The 5/32" small orifice shall operate (open) up to 300 psi. (Engineer to select one small orifice and flange class rating).

Body & Cover	Cast iron	ASTM A126 Gr. B
Floats (ARV Concave Float)	Stainless steel	ASTM A240 T304
Needle & seat	Buna-N	
Leverage frame	Stainless steel	ASTM A351 T316
Exterior paint	Universal Metal Primer	FDA Approved for Potable Water Contact

Valve to be APCO Series 1800 Custom Combination Air Valve, as manufactured by Valve & Primer Corporation, Schaumburg, Illinois, U.S.A.

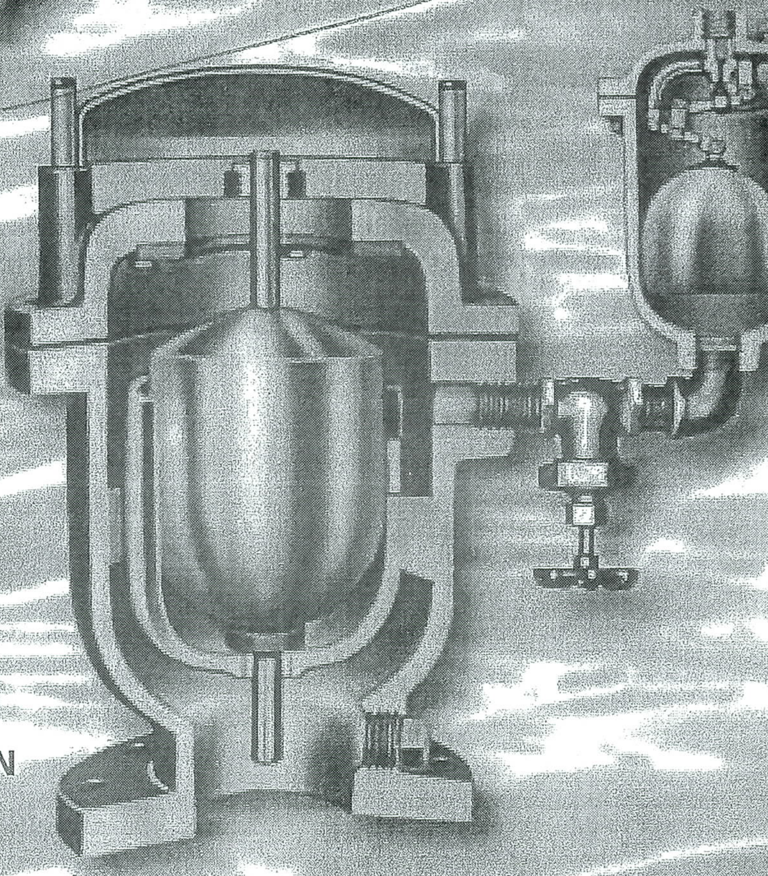
APCO

COMBINATION AIR VALVES



SERIES 140C

STANDARD COMBINATION
SINGLE BODY



MANUFACTURED TO AWWA C-512 STANDARDS

ISO FLANGE CONNECTIONS AVAILABLE

SERIES 1800

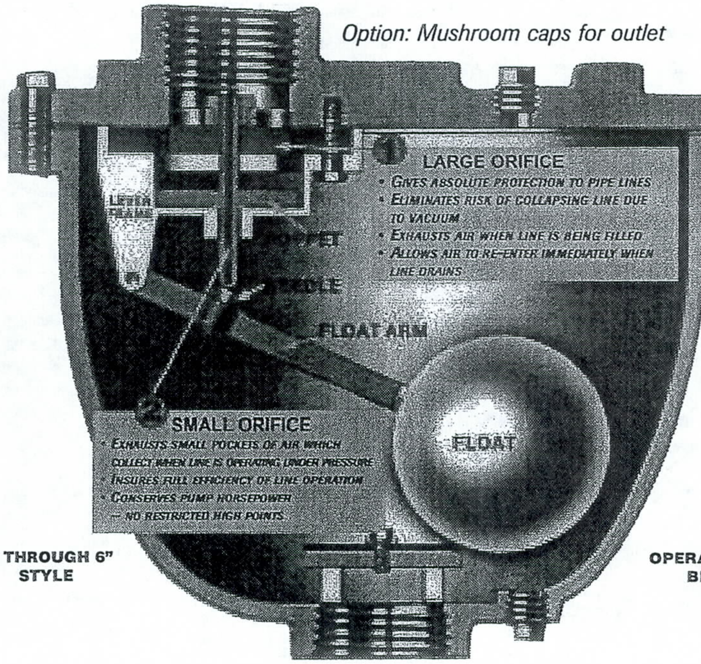
CUSTOM COMBINATION
DUPLEX BODY

VALVE & PRIMER CORPORATION
1420 S. WRIGHT BLVD. • SCHAUMBURG, IL 60193-4599
847.524.9000 • FAX:847.524.9007 • 800.323.6969
website: www.apcovalves.com • e-mail: factory@apcovalves.com

APCO COMBINATION AIR VALVES

SINGLE BODY *Double Orifice*

Option: Mushroom caps for outlet



1" THROUGH 6" STYLE

BUILT FOR 300 PSI SERVICE

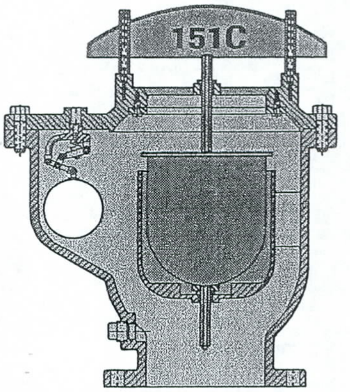
SPECIFY IF OPERATING PRESSURES BELOW 50 P.S.I.

MATERIALS USED IN BOTH STYLE COMBINATION AIR VALVES

Body, Cover, Lever Frame	Cast Iron
Float	Stainless Steel
Seat	Buna-N
Lever Frame (1" & 2" size)	Delrin
Leverage Mechanism (8" size)	Stainless Steel

ALL OTHER INTERNAL PARTS STAINLESS STEEL OR BRONZE

8" STYLE



TO SIZE AIR VALVES FOR PIPELINE SERVICE USE APCO AIR VALVE COMPUTER *or* APSLIDE COMPUTER SOFTWARE

1"	2"	3"	4"	6"	8"
143C	145C	147C	149C	150C	151C
ILLUSTRATED ABOVE*	ILLUSTRATED ABOVE	ILLUSTRATED ABOVE	ILLUSTRATED ABOVE	ILLUSTRATED ABOVE	SEE ABOVE DRAWING
PHYSICAL DIMENSIONS	**PHYSICAL DIMENSIONS**	**PHYSICAL DIMENSIONS**	**PHYSICAL DIMENSIONS**	**PHYSICAL DIMENSIONS**	**PHYSICAL DIMENSIONS**
· Height 10"	· Height 12 1/4"	· Height 15 1/2"	· Height 17 1/8"	· Height 27 1/4"	· Height 25 3/4"
· Width 7"	· Width 8"	· Width 10"	· Width 11"	· Width 13"	· Width 17 1/2"
· Length 11"	· Length 14"	· Length 16"	· Length 18"	· Length 18 3/8"	· Length 22 1/4"
· Weight 35 lbs.	· Weight 75 lbs.	· Weight 100 lbs.	· Weight 170 lbs.	· Weight 205 lbs.	· Weight 300 lbs.
INLET / OUTLET 1" PIPE THREAD * EXCEPT POPPET	INLET / OUTLET 2" PIPE THREAD	INLET / OUTLET 3" PIPE THREAD 125 & 250 LB. FLANGES ALSO AVAILABLE HEIGHT FLANGED 161/2"	INLET / OUTLET 4" PIPE THREAD 125 & 250 LB. FLANGES ALSO AVAILABLE HEIGHT FLANGED 19"	INLET 125 & 250 LB. FLANGE OUTLET OPTIONS • PLAIN WITH HOOD • THREADED • FLANGED	INLET 125 & 250 LB. FLANGE OUTLET OPTIONS • PLAIN WITH HOOD (AS SHOWN) • FLANGED

SINGLE BODY SPECIFICATIONS

Combination Air Valve sizes 1" through 8", (single body, double orifice) allows large volumes of air to escape out the large orifice when filling a pipeline and closes when liquid enters the valve. When the valve is closed and pressurized, the small air release orifice will open to allow small pockets of air to escape automatically and independently of the large orifice.

The large orifice shall also allow large volumes of air to enter during pipeline drainage to break the vacuum. The body inlet must be baffled to protect the float from direct forces of rushing air and water to prevent premature valve shut-off.

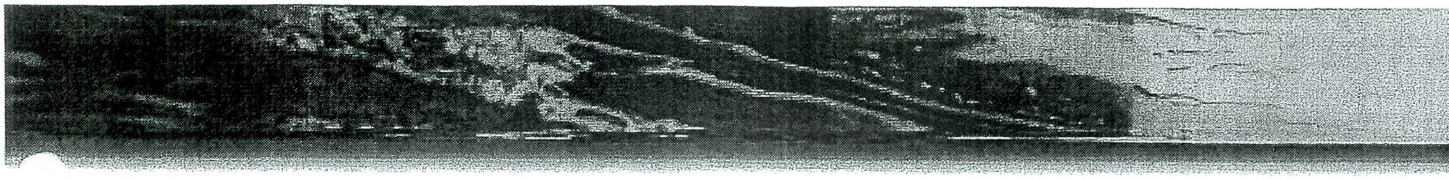
The Buna-N seat must be fastened to the valve cover without distortion for drop tight shut-off. The floats shall be heavy stainless steel. The plug or float shall be center guided through hex bushings for positive shut-off.

Valve exterior to be painted with Universal Metal Primer Paint as accepted by the FDA for use in Potable Water.

All materials of construction shall be certified in writing to conform to A.S.T.M. specifications as follows:

Body & Cover	Cast iron	ASTM A126 GR.B
Float	Stainless steel	ASTM A240
Needle & seat	Buna-N	
Plug	Bronze	ASTM B124
Leverage frame	Delrin/Cast iron	ASTM D2133/ASTM A126 GR.B

Valve to be APCO Model (Engineer to Name) Combination Air Valve as manufactured by Valve & Primer Corporation, Schaumburg, Illinois, U.S.A.



THERE ARE BASICALLY TWO TYPES OF AIR VALVES:

TYPE 1. AIR/VACUUM VALVES with ① LARGE ORIFICE to vent large volumes of air for efficient filling and draining of pipelines. This protects against vacuum and water column separation or pipeline collapse.

TYPE 2. AIR RELEASE VALVES with ② SMALL ORIFICE for continuous venting of air pockets as they accumulate in a pressurized pipeline.

When the above types are combined, the result is a COMBINATION AIR VALVE.

The Combination Air Valve is available in a SINGLE BODY DOUBLE ORIFICE shown here, or in a DUPLEX arrangement (see Back Page).

The single body is most popular due to its smaller overall size and resulting space saving inside a valve vault. It is available in 1" to 8" sizes.

HOW IT WORKS: Sizes 1" through 6" incorporate a poppet (or plug) which rests freely inside the lever frame. The center stem of the poppet has a SMALL ORIFICE through it. When water enters the main valve body it raises the float and float arm which puts the needle, attached to the arm, in contact with the poppet stem while lifting the poppet to the shut-off position against the LARGE ORIFICE.

As air accumulates inside the main valve body the water is displaced. The float arm falls away from the poppet stem to expose the small orifice and the pocket of air is vented. Water re-enters the main valve body lifting the float arm back to the shut-off position and the cycle repeats as air accumulates. As long as the main valve body is under pressure, the poppet stays closed because the pressure differential across the large orifice is more than the poppet can overcome.

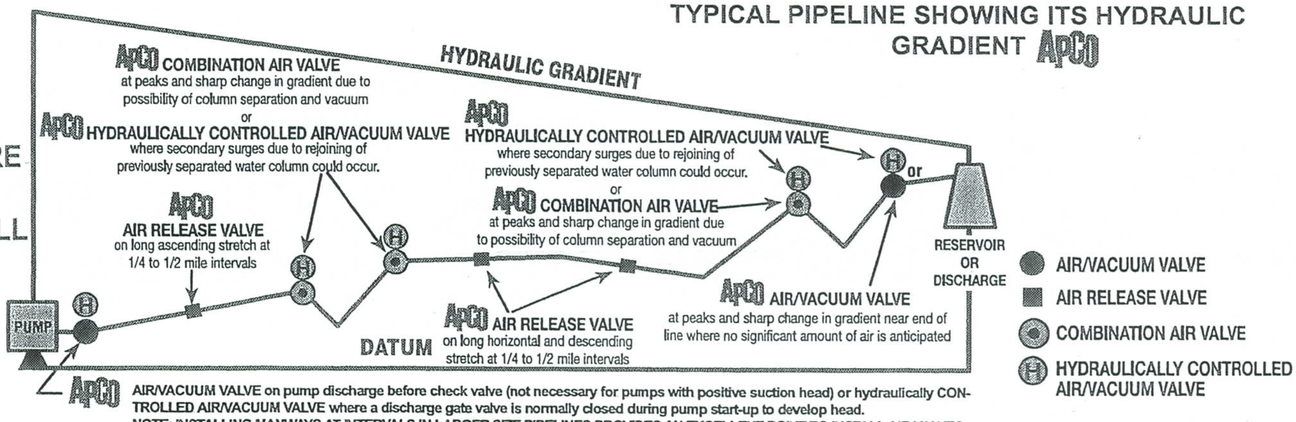
If, however, a negative pressure occurs inside the main valve body, the poppet will drop open to allow air in and prevent a vacuum from forming in the pipeline.

Size 8" functions in the same manner, but, instead of a poppet, a float is used for shutting off the large orifice and a separate internal float operated lever mechanism is incorporated with a small orifice for venting smaller pockets of air when the system is pressurized.

Every Combination Air Valve is hydrostatically seat and shell tested before it leaves our factory to insure quality performance in the field.

TYPICAL PIPELINE SHOWING ITS HYDRAULIC GRADIENT APCO

WHERE TO INSTALL



NOTE: INSTALLING MANWAYS AT INTERVALS IN LARGER SIZE PIPELINES PROVIDES AN EXCELLENT POINT TO INSTALL AIR VALVES.

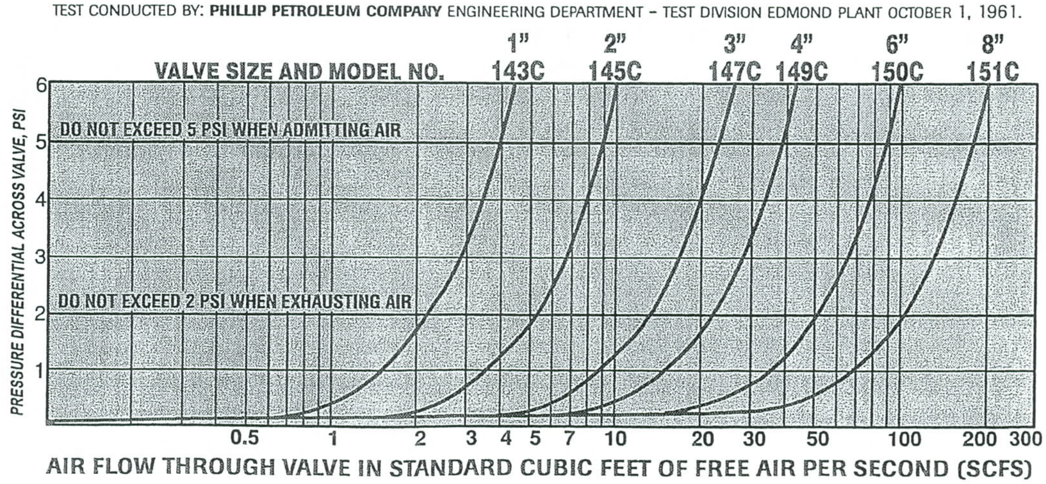
ORIFICE SIZES
for 300 psi working pressure

MODEL	① LARGE ORIFICE	② SMALL ORIFICE
143C	1"	5/64"
145C	2"	3/32"
147C	3"	3/32"
149C	4"	3/32"
150C	6"	1/8"
151C	8"	5/32"

DISCHARGE CAPACITIES FOR COMBINATION AIR VALVE

CURVES SHOWN ARE ACTUAL FLOW CAPACITIES AT 14.7 PSI BAROMETRIC PRESSURE AND 70° F TEMPERATURE BASED ON ACTUAL TEST. **THESE FIGURES ARE NOT ONLY THE FLOW CAPACITIES ACROSS THE ORIFICE BUT FLOW ACROSS THE ENTIRE VALVE.** IN THE TEST SET-UP, APPROACH VELOCITY TO THE VALVE IS NEGLIGIBLE THEREFORE ACTUAL CAPACITY EXCEEDS THE VALUES SHOWN ON CHART.

TEST CONDUCTED BY: **PHILLIP PETROLEUM COMPANY** ENGINEERING DEPARTMENT - TEST DIVISION EDMOND PLANT OCTOBER 1, 1961.



APCO COMPUTER SPREADSHEET SOLUTION FOR 6-IN DIA PIPE AIRVALVES

Microsoft Excel - 2_in_valve.xls

File Tools Window

FUNCTION #8

APCO

Air and Vaccuum Valve Selection

High Point #	1	
Maximum Filling Flow Rate	500	gpm
Maximum Draining Flow Rate	3245.8	gpm
Maximum Design Discharge	500.0	gpm
Sizing for air exhaust	1	inches
AVV Differential Pressure	1.33	psi
Sizing for air vacuum	3	inches
AVV Differential Pressure	1.83	psi

Available AVV or CAV Sizes

1,2,3,4,6,8,10,12,14,16,18,20,24, & 30-inch

Size Air Exhaust | Size Air Vacuum | Save Current Design | Design Another

View Summary (Function 9) | Main Menu | Back Up | Help

SPREADSHEET SOLUTION -
6 IN DIA DISCHARGE
NUISANCE PUMP

FUNCTION #9

APCO®

Air and Vacuum Valve Design Summary

High Point #	Pipe Size inches	Filling Velocity fps	Draining Velocity fps	Design Velocity fps	Air Exhaust Orifice Size inches	Air Exhaust DP psi	Air Vacuum Orifice Size inches	Air Vacuum DP psi	Air Release Orifice Size inches	Air Release DP psi	*Surge Check Needed
1	6	5.67	36.83	5.67	1	1.33	3	1.83	0.0625	20	no

* [A surge check valve is needed when
the design velocity is greater than 10 fps (3.05m/s)]

City of:

Project Engineer:

Disclaimer: The sizing data is based solely on testing performed on APCO valves as demonstrated on the APCO slide rule and is not intended for use in sizing other air valves. This program will compute slopes and size air valves for individual high points in a pipe line or force main. It does not take into consideration that a valve at one high point may serve the need of an adjacent high point.

INCA ENGINEERS INC.

Job No.

Vol./Sheet No. of

Contract/Client GREENFIELD PUMP STA / TOWN OF GILBERT

Phase/Subject 60% DESIGN

Design Topic PUMP DISCHARGE PIPING

Made By RD Date 9/02 Checked By Date Page No.

PIPE SELECTION / APPURTENANCES

1. SELECT FLANGED DI PIPING FOR WET WELL TO VALVE VAULT BOX

2. SELECT TRANSITION PIECE FROM VAULT BOX TO FIRST PIPE LENGTH – FLANGE TO MJ OR FASTITE

3. SELECT MJ OR FASTITE DI PIPE TO OUTLET DISCHARGE BOX

4. USE RESTRAINED JOINT AND/OR THRUST BLOCKING BELOW GRADE AT DISCHARGE BOX

5. USE FLANGED JOINT AND PIPE ANCHORS TO DISCHARGE BOX ABOVE GRADE

6. USE FLAP GATE FOR PIPE CLOSURE IN DISCHARGE BOX WITH RESISTANCE TO SLAMMING DAMAGE

American Ductile Iron Pipe

MENU CATEGORIES

Standard Pressure Classes

American Ductile Iron Pipe
ANSI/AWWA C150/A21.50
and
ANSI/AWWA C151/A21.51
Standard Pressure Classes - Wall Thickness and Nominal Wall Thicknesses

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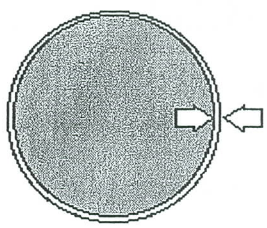

Table No. 3-8

NUISANCE PUMP DISCHARGE → 6
STORMWATER PUMP DISCHARGE → 16

Size in.	Outside Diameter in.	Pressure Class				
		150	200	250	300	350
		Nominal Thickness in inches				
4	4.8	-	-	-	-	0.25
6	6.9	-	-	-	-	0.25
8	9.05	-	-	-	-	0.25
10	11.1	-	-	-	-	0.26
12	13.2	-	-	-	-	0.28
14	15.3	-	-	0.28	0.3	0.31
16	17.4	-	-	0.3	0.32	0.34
18	19.5	-	-	0.31	0.34	0.36
20	21.6	-	-	0.33	0.36	0.38
24	25.8	-	0.33	0.37	0.4	0.43
30	32	0.34	0.38	0.42	0.45	0.49
36	38.3	0.38	0.42	0.47	0.51	0.56
42	44.5	0.41	0.47	0.52	0.57	0.63
48	50.8	0.46	0.52	0.58	0.64	0.7
54	57.56	0.51	0.58	0.65	0.72	0.79
60	61.61	0.54	0.61	0.68	0.76	0.83
64	65.67	0.56	0.64	0.72	0.8	0.87

> Standard Pressure Classes-Wall Thickness
> Weights for Pressure Classes
> Working Pressures & Depths of Cover Min. Pressure Classes
> Working Pressures & Depths of Cover Pressure Classes
> Gravity Service Pipe Depths of Cover

Notes:
Pressure classes are defined as the rated water working pressure of the pipe in psi. The thicknesses shown are adequate for the rated working pressure plus a surge

AMERICAN Flanged Pipe AMERICAN Ductile Iron Flanged Pipe
ANSI/AWWA C115/A21.15

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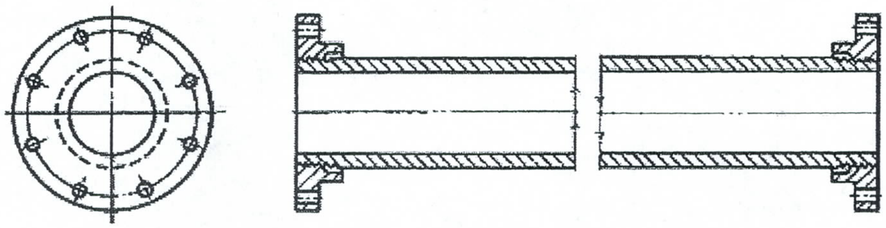

Flange and Flange

Table No. 8-5

Size in.	Pressure* Rating psi	Nominal Wall Thickness in.	Pipe O.D. in.	Minimum Length** in.	Maximum Length** ft.-in.	Weight in Pounds		
						Per Foot Plain End	One Flange	Per Maximum Length with Two Flanges
4	350+	0.32	4.8	4 1/2	20'-0"	13.8	13	300
6	350+	0.34	6.9	4 1/2	20'-0"	21.4	17	460
8	350+	0.36	9.05	4 1/2	20'-0"	30.1	27	655
10	350+	0.38	11.1	6	20'-0"	39.2	38	860
12	350+	0.4	13.2	6	20'-0"	49.2	59	1100
14	350+	0.42	15.3	7	20'-0"	60.1	70	1340
16	350+	0.43	17.4	7	20'-0"	70.1	90	1580
18	350+	0.44	19.5	7	19'-6"	80.6	88	1750
20	350+	0.45	21.6	7	19'-6"	91.5	112	2010
24	350+	0.47	25.8	8	19'-6"	114.4	155	2540
30	250	0.51	32	12	19'-6"	154.4	245	3500
36	250	0.58	38.3	14	19'-6"	210.3	354	4810
42	250	0.65	44.5	18	19'-6"	274	512	6370
48	250	0.72	50.8	18	19'-6"	346.6	632	8020
54	250	0.81	57.56	20	19'-6"	441.9	716	10050
60	250	0.83	61.61	20	19'-6"	485	1113	11680
64	250	0.87	65.67	21	19'-0"	542	1824	13950

FOR WETWELL 6-IN DIA DISCHARGE (NUISANCE) PUMP

FOR WETWELL 16-IN DIA DISCHARGE PIPE (STORMWATER PUMP

Notes:
*Pressure rating designated is maximum water working pressure. Contact AMERICAN on higher pressure requirements.
**Check AMERICAN if longer or shorter lengths required.
+This rating is applicable to flanged joints utilizing AMERICAN Toruseal® gaskets only as per Flanged Pipe description.
Pipe is available with greater wall thickness than shown. Thicknesses above correspond to

Details, Dimensions & Weights

**AMERICAN Flanged Pipe Companion Flanges for Use On Ductile Iron Pipe
ANSI/AWWA C115/A21.15**

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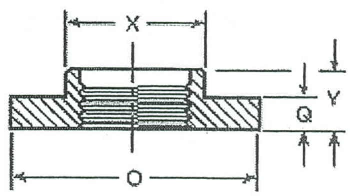

Ductile Companion Flange

Table No. 8-4

Size in.	Pipe O.D. in.	AWWA C115			
		O Dia. Of Flange in.	Q Thickness in.	X Dia. Hub in.	Y Length Incl. Hub in.
4	4.8	9	0.94	6.00	1.88
6	6.9	11	1.00	7.78	2.06
8	9.05	13.5	1.12	10.01	2.25
10	11.1	16	1.19	12.31	2.44
12	13.2	19	1.25	14.75	2.68
14	15.3	21	1.38	16.59	2.87
16	17.4	23.5	1.44	18.94	3.06
18	19.5	25	1.56	20.38	3.31
20	21.6	27.5	1.69	22.62	3.50
24	25.8	32	1.88	26.91	3.93
30	32	38.75	2.12	33.31	4.50
36	38.3	46	2.38	39.62	5.12
42	44.5	53	2.62	46.00	5.75
48	50.8	59.5	2.75	52.31	6.38
54	57.56	66.25	3.00	58.75	7.00
60	61.61	73	3.12	63.76	7.00
64	65.67	80	3.38	70.32	7.00

Notes:
Hub diameter and length are AMERICAN Design. See Table No. 8-3 for data on bolt holes and bolt circle.
When ordering Companion Flanges for Ductile Iron Pipe specify the outside diameter of the pipe.
"X" and "Y" dimensions may vary depending on foundry equipment.

> Com
Flange
On Duc
Pipe
ANSI/A
C115/A
> Flang
Flange
> Flang
Plain E
> Flang
MJ
> Flang
Fastite
> Com
Flanges
On Duc
Pipe Fa
Drilled
B16.1 C
250
> Flang
Faced a
Drilled
B16.1 C
250

54	250	0.81	57.56	12	19'-6"	441.9	716	9330
60	250	0.83	61.61	12	19'-6"	485	1113	10570
64	250	0.87	65.67	12	19'-0"	542	1824	12120

Notes:
*Pressure rating designated is maximum water working pressure. Contact AMERICAN on higher pressure requirements.
**Check AMERICAN if longer or shorter lengths required. All minimum lengths assume a "no-gauge" plain end (no joint will be made at the plain end).
+This rating is applicable to flanged joints utilizing AMERICAN Toruseal® gaskets only as per Flanged Pipe description.
¤Plain Ends to be assembled in a joint (MJ, Fastite, coupling, etc.) must be ordered gauged for the specific joint.
Pipe is available with greater wall thickness than shown. Thicknesses above correspond to Special Class 53 for 4"-54" diameters, and Pressure Class 350 for 60" and 64" diameters as shown in AWWA C151.
Any length between minimum and maximum shown can be furnished.
Tolerance on length is ±0.25 in.
Where required, specify flanges "Tap for Studs."
The bolt circle and bolt holes of AWWA C115 flanges, AWWA C110 flanges and ANSI B16.1 Class 125 flanges are identical, and these flanges can be joined. AWWA C115 and AWWA C110 flanges are rated for 250-350 psi water working pressure depending on size and specified gasketing system.

AMERICAN Flanged Pipe AMERICAN Ductile Iron Flanged Pipe
ANSI/AWWA C115/A21.15 and AMERICAN Standard

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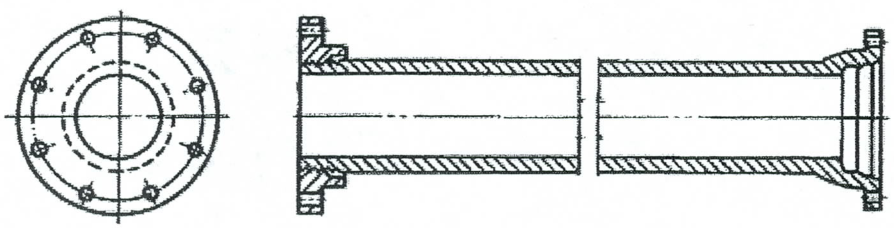

Flange and MJ

Table No. 8-7

Size in.	Pressure* Rating psi	Nominal Wall Thickness in.	Pipe O.D. in.	Minimum Laying Length** in.	Maximum Laying Length** ft.-in.	Weight in Pounds			
						Per Foot Plain End	Flange	MJ Bell	19'-6" Length
4	350+	0.32	4.8	3 1/2	19'-6"	13.8	13	14	295
6	350+	0.34	6.9	3 1/2	19'-6"	21.4	17	19	455
8	350+	0.36	9.05	3 1/2	19'-6"	30.1	27	25	640
10	350+	0.38	11.1	6	19'-6"	39.2	38	31	835
12	350+	0.4	13.2	6	19'-6"	49.2	59	38	1055
14	250	0.42	15.3	6 1/2	19'-6"	60.1	70	58	1300
16	250	0.43	17.4	6 1/2	19'-6"	70.1	90	67	1525

OPTION ① FROM VALVE BOX TO DISCHARGE BOX

18	250	0.44	19.5	7 1/2	19'-6"	80.6	88	79	1740
20	250	0.45	21.6	7 1/2	19'-6"	91.5	112	93	1990
24	250	0.47	25.8	8	19'-6"	114.4	155	122	2510

Notes:
*Pressure rating designated is maximum water working pressure. Contact AMERICAN on higher pressure requirements.
**Check AMERICAN if longer or shorter lengths required.
+This rating is applicable to flanged joints utilizing AMERICAN Toruseal® gaskets only as per Flanged Pipe description.
30"-64"pipe is not available with integrally cast MJ Bell. See Table 8-8 (below) for Flange and Fastite Pipe.
Pipe is available with greater wall thickness than shown. Thicknesses above correspond to Special Class 53.
Any length between minimum and maximum shown can be furnished.
Tolerance on length is ±0.25 in.
If specified, bolt holes both ends can be drilled straddle a common centerline.
Where required, specify flanges or MJ Bells "Tap for Studs."
The bolt circle and bolt holes of AWWA C115 flanges, AWWA C110 flanges and ANSI B16.1 Class 125 flanges are identical, and these flanges can be joined. AWWA C115 and AWWA C110 flanges are rated for 250-350 psi water working pressure depending on size and specified gasketing system.

AMERICAN Flanged Pipe AMERICAN Ductile Iron Flanged Pipe ANSI/AWWA C115/A21.15 and AMERICAN Standard

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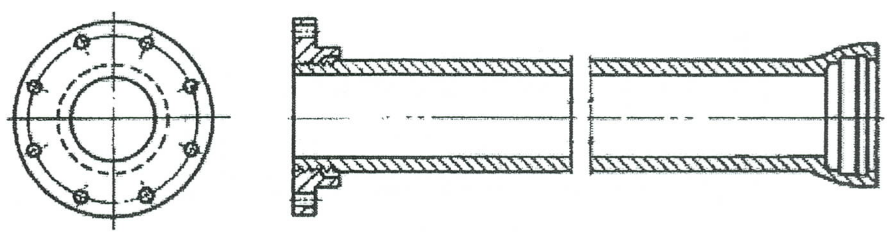

Flange and Fastite

Table No. 8-8

Size in.	Pressure* Rating psi	Nominal Wall Thickness in.	Pipe O.D. in.	Minimum Laying Length** in.	Maximum Laying Length** ft.-in.	Weight in Pounds			
						Per Foot Plain End	Flange	Fastite Bell	19'-6" Length
4	350+	0.32	4.8	2 1/2	19'-6"	13.8	13	10	290
6	350+	0.34	6.9	2 1/2	19'-6"	21.4	17	15	450
8	350+	0.36	9.05	3	19'-6"	30.1	27	21	635
10	350+	0.38	11.1	2	19'-6"	39.2	38	27	830
12	350+	0.4	13.2	2	19'-6"	49.2	59	32	1050
14	250	0.42	15.3	2 3/4	19'-6"	60.1	70	57	1300
16	250	0.43	17.4	2 3/4	19'-6"	70.1	90	64	1520

OPTION ②
FROM VALVE VAULT TO DISCHARGE BOX

18	250	0.44	19.5	3	19'-6"	80.6	88	73	1735
20	250	0.45	21.6	3	19'-6"	91.5	112	81	1980
24	250	0.47	25.8	2 3/4	19'-6"	114.4	155	96	2480
30	250	0.51	32	12	19'-6"	154.4	245	164	3420
36	250	0.58	38.3	14	19'-6"	210.3	354	214	4670
42	250	0.65	44.5	14	19'-6"	274	512	289	6140
48	250	0.72	50.8	16	19'-6"	346.6	632	354	7745
54	250	0.81	57.56	16	19'-6"	441.9	716	439	9770
60	250	0.83	61.61	16	19'-6"	485	1113	819	11390
64	250	0.87	65.67	16	19'-6"	542	1824	932	13320

Notes:
*Pressure rating designated is maximum water working pressure. Contact AMERICAN on higher pressure requirements.
**Check AMERICAN if longer or shorter lengths required.
+This rating is applicable to flanged joints utilizing AMERICAN Toruseal® gaskets only as per Flanged Pipe description.
Pipe is available with greater wall thickness than shown. Thicknesses above correspond to Special Class 53 for 4"-54" diameters, and Pressure Class 350 for 60" and 64" diameters as shown in AWWA C151.
Any length between minimum and maximum shown can be furnished.
Tolerance on length is ±0.25 in.
Where required, specify flanges "Tap for Studs."
The bolt circle and bolt holes of AWWA C115 flanges, AWWA C110 flanges and ANSI B16.1 Class 125 flanges are identical, and these flanges can be joined. AWWA C115 and AWWA C110 flanges are rated for 250-350 psi water working pressure depending on size and specified gasketing system.

AMERICAN Flanged Pipe Companion Flanges for Use On Ductile Iron Pipe Faced and Drilled Per ANSI B16.1 Class 250

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DI FLANGES

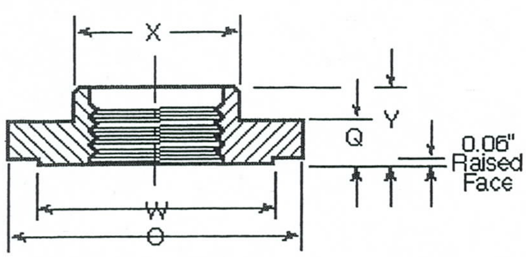

Table No. 8-12

Size in.	Pipe O.D. in.	Flanges Faced and Drilled Per ANSI B16.1 Class 250				
		O Dia. of Flange in.	Q Thickness in.	W Dia. Of Raised Face in.	X Dia. of Hub in.	Y Length incl. Hub in.
4	4.8	10	1.25	6.94	6	2.12

6	6.9	12.5	1.44	9.69	8.5	2.31
8	9.05	15	1.62	11.94	10.78	2.5
10	11.1	17.5	1.88	14.06	12.81	2.68
12	13.2	20.5	2	16.44	15.13	2.93
14	15.3	23	2.12	18.94	17.5	3.12
16	17.4	25.5	2.25	21.06	19.56	3.31
18	19.5	28	2.38	23.31	21.75	3.56
20	21.6	30.5	2.5	25.56	24	3.75
24	25.8	36	2.75	30.31	28.5	4.18
30	32	43	3	37.19	35	4.75
36	38.3	50	3.38	43.69	41.25	5.37
42	44.5	57	3.69	50.44	48.5	6
48	50.8	65	4	58.44	56.55	6.63

Notes:
Flanges faced and drilled per ANSI B16.1 Class 250 have a 0.06" raised face; they do not match AWWA C110 or C115 flanges.
Flanges may be furnished with a flat face upon special request.
Hub diameter and length are AMERICAN Design. See Table No. 8-11 (short lengths) for data on bolt holes and bolt circle.
When ordering Companion Flanges for Ductile Iron Pipe specify the outside diameter of the pipe.

AMERICAN Flanged Pipe
AMERICAN Ductile Iron Flanged Pipe
Flanges Faced and Drilled
ANSI/AWWA C115/A21.15 & ANSI B16.1 Class 250

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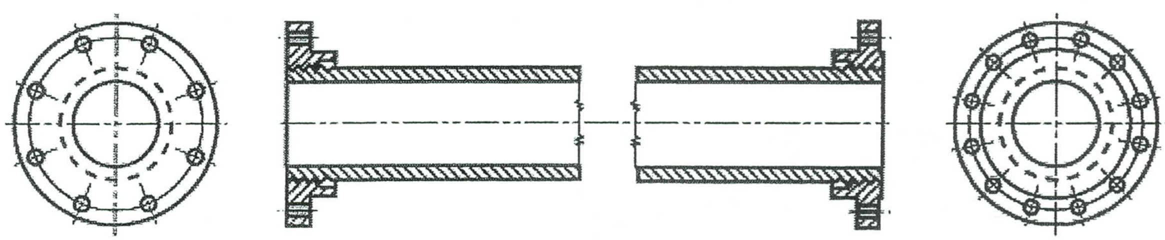


Flange and Flange
C115 to B16.1 Class 250 Transition Pipe

Table No. 8-13

Size in.	Pressure Class psi	Nominal Wall Thickness in.	Pipe O.D. in.	Minimum Laying Length in.*	Maximum Laying Length ft.-in.	Weight in Pounds			
						Per Foot Plain End	C115 Flange	B16.1 250 Flange	Min. Length Total Wt.
4	250**	0.32	4.8	6	20'-0"	13.8	13	20	40
6	250	0.34	6.9	6	20'-0"	21.4	17	32	60

8	250	0.36	9.05	6	20'-0"	30.1	27	49	91
10	250	0.38	11.1	8	20'-0"	39.2	38	68	132
12	250	0.4	13.2	8	20'-0"	49.2	59	99	191
14	250	0.42	15.3	10	20'-0"	60.1	70	127	247
16	250	0.43	17.4	10	20'-0"	70.1	90	157	305
18	250	0.44	19.5	10	19'-6"	80.6	88	194	349
20	250	0.45	21.6	10	19'-6"	91.5	112	239	427
24	250	0.47	25.8	10	19'-6"	114.4	155	358	608
30	250	0.51	32	12	19'-6"	154.4	245	508	907
36	250	0.58	38.3	14	19'-6"	210.3	354	697	1296
42	250	0.65	44.5	18	19'-6"	274	512	1010	1933
48	250	0.72	50.8	18	19'-6"	346.6	632	1545	2697

Notes:
*The minimum lengths shown may not allow clearance in all cases for installation of bolts between flanges requiring bolt clearance from the other direction. Very short (shorter than the minimums as per above table) fabricated steel adapters are also available for connecting AWWA C115 flanged pipe or AWWA C110 fittings to ANSI B16.1 Class 250 flanged items. Contact AMERICAN for details.
**4"-12" C115 flanges rate 350 psi when Toruseal® gaskets are employed.
Flanges faced and drilled per ANSI B16.1 Class 250 have 0.06" raised face; they do not match AWWA C110 or C115 flanges. Flanges may be furnished with a flat face upon special request.
Pressure rating designated is maximum water working pressure.
Pipe is available with greater wall thickness than shown.
Tolerance on length for Flange and Flange pipe is ±0.12 in.
Standard drilling is with bolt holes aligned, straddle a common centerline. Class 250 is special drilling and all connecting equipment must have flanges faced and drilled per ANSI B16.1 Class 250.
Where required, specify flanges "Tap for Studs."

Flanged 90° Bends

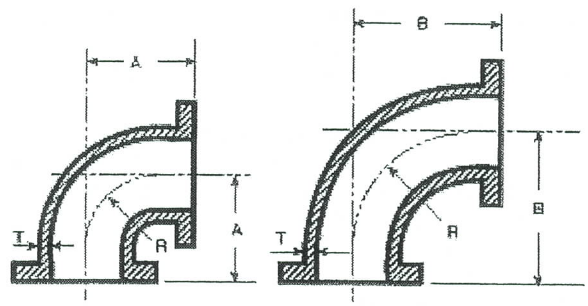
American Ductile Iron Flange Fittings
Flanged 90° Bends (Reducing, Base, Side Outlet)

> Flanged 90° Bends
> Flanged 90° Reducing Bends
> Flanged Base 90° Bends
> Flanged Side Outlet 90° Bends

> Link to Base Flange Detail

AMERICAN Ductile Iron Flanged Fittings
ANSI/AWWA C110/A21.10, C153/A21.53, or AMERICAN Standard
Flanged 90° Bends

Flanged 90° Bends | Flanged 90° Reducing Bends | Flanged Base 90° Bends
Flanged Side Outlet 90° Bends | To Top of Page



Short Radius   Long Radius AMERICAN Standard

DI 90° ELL FOR 16-IN DIA DISCHARGE @ WET WELL SLAB

Table No. 6-3

Size in.	Pressure Rating psi	T in.	Short Radius			Long Radius		
			A in.	R in.	Weight lb	B in.	R in.	Weight lb
4	250	0.52	6.5	4.5	40	9	7	50
6	250	0.55	8	6	65	11.5	9.5	80
8	250	0.6	9	7	105	14	12	140
10	250	0.68	11	9	165	16.5	14.5	215
12	250	0.75	12	10	240	19	17	325
14	250	0.66	14	11.5	290	21.5	19	385
16	250	0.7	15	12.5	370	24	21.5	505
18	250	0.75	16.5	14	450	26.5	24	630
20	250	0.8	18	15.5	575	29	26.5	810
24	250	0.89	22	18.5	900	34	30.5	1240
30	250	1.03	25	21.5	1430	41.5	38	2105
36	250	1.15	28	24.5	2135	49	45.5	3285
42	250	1.28	31	27.5	3055	56.5	53	4865
48	250	1.42	34	30.5	4090	64	60.5	6790

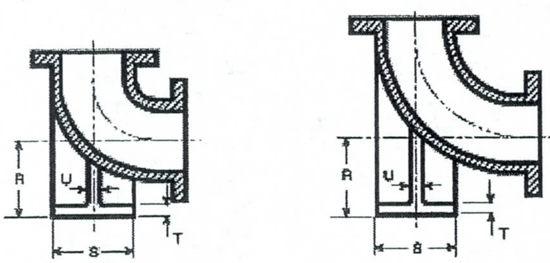
48 x 36	250	1.96	1.58	-	-	-	64	60.5	7145
48 x 36	250	1.42	1.15	34	30.5	3255	-	-	-
48 x 42	250	1.96	1.78	34	30.5	4685	64	60.5	8065

Notes:
30" and 36" short radius reducing bends can be furnished with any combination of Flanged, MJ, Fastite, or Flex-Ring joints.
42" and 48" short radius reducing bends can be furnished with any combination of Flanged, MJ, Fastite or Lok-Ring joints.
30" and 36" reducing bends can be furnished with any combination of Flanged, MJ, Fastite, or Flex-Ring joints.
42" and 48" reducing bends can be furnished with any combination of Flanged, MJ, Fastite or Lok-Ring joints.
The short radius reducing bends have center-to-face and radius dimensions according to AWWA C110 (same as ANSI B16.1 Class 125) based on a standard 90° bend of the larger opening. The dimensions for the long radius reducing bends are per B16.1 Class 125 based on a standard long radius 90° bend of the larger opening.

See General Notes.

AMERICAN Ductile Iron Flanged Fittings
ANSI/AWWA C110/A21.10 and AMERICAN Standard
Flanged Base 90° Bends

Flanged 90° Bends | Flanged 90° Reducing Bends | Flanged Base 90° Bends
Flanged Side Outlet 90° Bends | To Top of Page



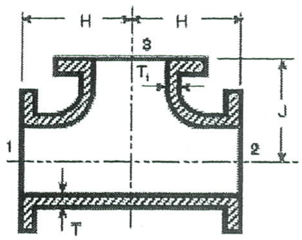
Short Radius AWWA C110 — Long Radius AMERICAN Standard

Table No. 6-19

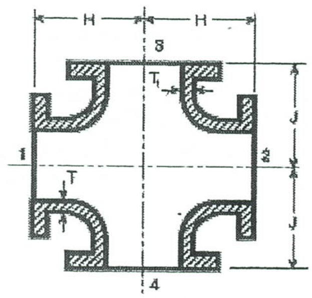
Size in.	Pressure Rating psi	Dimensions in Inches				Weight in Pounds			
		R	S Dia.	T	U	Short Radius Base Bend	Short Radius Base Only	Long Radius Base Bend	Long Radius Base Only
4	250	5.5	6	0.62	0.5	55	10	65	15
6	250	7	7	0.69	0.62	85	20	110	30
8	250	8.38	9	0.94	0.88	145	40	195	55
10	250	9.75	9	0.94	0.88	210	45	280	65
12	250	11.25	11	1	1	300	65	420	95
14	250	12.5	11	1	1	360	70	490	105
16	250	13.75	11	1	1	445	75	615	110

Flanged Tees and Crosses

AMERICAN Ductile Iron Flanged Fittings ANSI/AWWA C110/A21.10 or C153/A21.53 Flanged Tees and Crosses



Tee



Cross

DI TEE FOR 16-IN VALVE CONNECTION (NEXT PAGE)

Table No. 6-7

Size in.		Pressure Rating psi	Dimensions in Inches				Weight in Pounds	
Run	Branch		T	T1	H	J	Tee	Cross
4	4	250	0.52	0.52	6.5	6.5	65	85
6	4	250	0.55	0.52	8	8	100	115
6	6	250	0.55	0.55	8	8	105	130
8	4	250	0.6	0.52	9	9	145	165
8	6	250	0.6	0.55	9	9	150	175
8	8	250	0.6	0.6	9	9	165	205
10	4	250	0.68	0.52	11	11	220	240
10	6	250	0.68	0.55	11	11	230	255
10	8	250	0.68	0.6	11	11	240	280
10	10	250	0.8	0.8	11	11	285	345
12	4	250	0.75	0.52	12	12	315	335
12	6	250	0.75	0.55	12	12	320	345
12	8	250	0.75	0.6	12	12	335	370
12	10	250	0.87	0.8	12	12	380	435
12	12	250	0.87	0.87	12	12	405	490
*14	4	250	0.66	0.52	14	14	375	-
14	6	250	0.66	0.55	14	14	385	415
14	8	250	0.66	0.6	14	14	400	445
14	10	250	0.66	0.68	14	14	415	480
14	12	250	0.66	0.75	14	14	445	535
14	14	250	0.66	0.66	14	14	455	550

H

*16	4	250	0.7	0.52	15	15	475	-
16	6	250	0.7	0.55	15	15	485	515
16	8	250	0.7	0.6	15	15	500	540
16	10	250	0.7	0.68	15	15	515	575
16	12	250	0.7	0.75	15	15	540	630
16	14	250	0.7	0.66	15	15	550	645
16	16	250	0.7	0.7	15	15	575	690
*18	4	250	0.75	0.52	13	15.5	495	515
18	6	250	0.75	0.55	13	15.5	500	530
18	8	250	0.75	0.6	13	15.5	515	555
18	10	250	0.75	0.68	13	15.5	530	585
18	12	250	0.75	0.75	13	15.5	555	630
18	14	250	0.75	0.66	16.5	16.5	655	750
18	16	250	0.75	0.7	16.5	16.5	675	795
18	18	250	0.75	0.75	16.5	16.5	695	825
*20	4	250	0.8	0.52	14	17	625	645
20	6	250	0.8	0.55	14	17	630	660
20	8	250	0.8	0.6	14	17	645	685
20	10	250	0.8	0.68	14	17	660	715
20	12	250	0.8	0.75	14	17	685	765
20	14	250	0.8	0.66	14	17	690	775
20	16	250	0.8	0.7	18	18	840	955
20	18	250	0.8	0.75	18	18	850	980
20	20	250	0.8	0.8	18	18	885	1055
*24	4	250	0.89	0.52	15	19	875	895
24	6	250	0.89	0.55	15	19	880	905
24	8	250	0.89	0.6	15	19	890	930
24	10	250	0.89	0.68	15	19	905	960
24	12	250	0.89	0.75	15	19	930	1005
24	14	250	0.89	0.66	15	19	930	1010
24	16	250	0.89	0.7	15	19	950	1050
24	18	250	0.89	0.75	22	22	1270	1415
24	20	250	0.89	0.8	22	22	1305	1485
24	24	250	0.89	0.89	22	22	1380	1630
*30	8	250	1.03	0.6	18	23	1450	1490
*30	10	250	1.03	0.68	18	23	1465	1520
30	12	250	1.03	0.75	18	23	1485	1565
30	14	250	1.03	0.66	18	23	1490	1570
30	16	250	1.03	0.7	18	23	1505	1605
30	18	250	1.03	0.75	18	23	1515	1615
30	20	250	1.03	0.8	18	23	1540	1670
30	24	250	1.03	0.89	25	25	2025	2245
30	30	250	1.03	1.03	25	25	2150	2500

CAST STEEL • AUTOMATIC

DRAINAGE GATE

Model F-50 Gates are designed for use in drainage, flood control, and similar projects with seating heads up to 50 feet and where slamming, tidal action, ice or debris may necessitate a gate with high resistance to damage from impact. A minimum 2½° seating angle assures that gates will not "hang open" even if pipe sags slightly or mounting is not on a perfectly vertical plane. This gate opens with minimum differential head, but ensures positive closing. Spigotback and flatback models are available.

The frame and cover are commercial quality cast steel. Links are fabricated from heavy duty angle or steel flat bar with bronze hinge bushings. Hinge pins, washers and keepers are stainless steel.

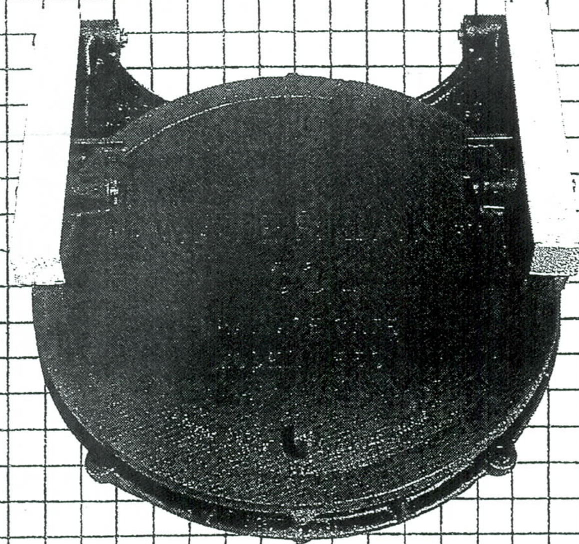
The non-jamming design eliminates the need for additional bars or lugs. The lifting eye is cast as an integral part of the cover (flap).

Seating surfaces are machined steel, with bronze or stainless steel seat faces available as options. A neoprene dovetail seat face, recessed in the cover to minimize damage from debris, is an additional option.

Optional Items

- **Special paint, coatings, and galvanizing per ASTM A-123**
- **Bronze, stainless steel and neoprene cushion seat faces**
- **Galvanized or stainless steel anchor bolts**

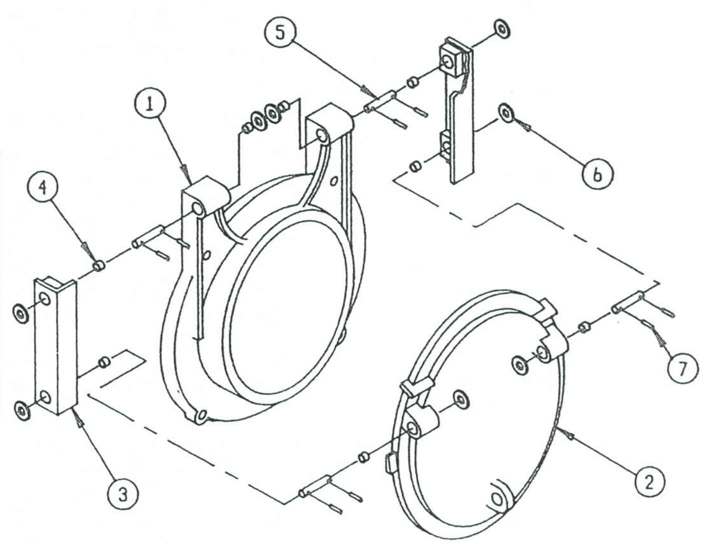
MODEL F-50



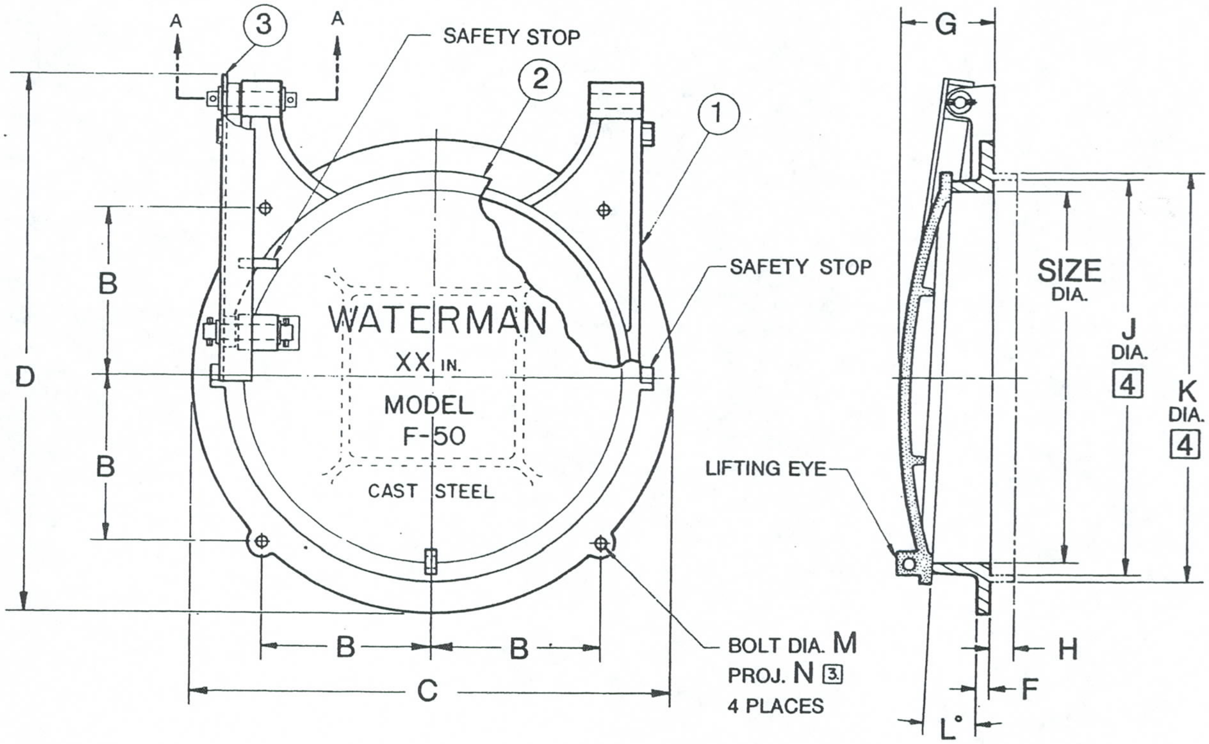
50 FOOT SEATING HEAD
Cast Steel Design

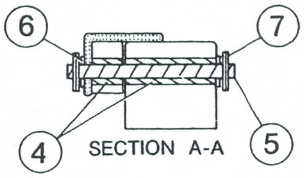
Model F-50f - Flatback
Model F-50sb - Spigotback

PARTS LIST	
No.	**Name**
1	FRAME
2	COVER
3	HINGE LINKS (HEAVY DUTY)
4	HINGE BUSHINGS
5	PIVOT PIN
6	WASHER
7	SPRING PIN



Waterman® INDUSTRIES, INC.

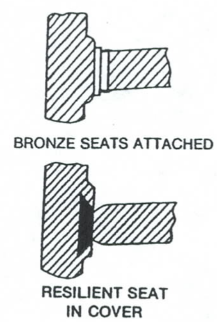




GATE DIMENSIONS ARE IN INCHES

SIZE DIA.	B	C	D	F	G	H	J	K	L°	M	N
4	2¼	6 5/16	8½	⅜	4⅛	2¼	5⅛	5⅝	5	⅝	1⅜
6	2 13/16	8 1/16	10	⅜	4⅛	2¼	7⅛	7 9/16	5	⅝	1⅜
8	3½	10	12	⅜	4¼	2⅜	9⅛	9⅝	5	⅝	1⅜
10	4¾	12¼	14½	⅜	4½	2¼	11 3/16	11⅝	5	⅝	1⅜
12	5⅛	15	17⅛	⅜	4½	2⅛	13⅛	13⅝	5	⅝	1⅜
14	5 15/16	16⅞	19⅝	⅜	4¾	2⅛	15 1/16	15⅝	5	⅝	1⅜
15	6¼	18⅛	20	⅜	5	2¼	16	16¾	5	⅝	1⅜
16	6⅝	18 11/16	21⅝	7/16	5	2⅜	17	17¾	5	⅝	1⅜
18	7 7/16	21	24⅜	7/16	5⅜	2⅛	19	19¾	5	⅝	1⅜
20	8¼	23 9/16	26½	½	6	2¼	21⅛	21¾	5	¾	1⅝
21	8 9/16	24	27½	½	7	2¼	22	22¾	5	¾	1⅝
24	9 11/16	27½	32	½	7⅝	2¼	25	26½	5	¾	1⅝
30	12	34	39⅝	¾	6½	2 3/16	31	32	2½	⅞	2
36	14⅜	40⅝	46	¾	8	2⅛	37	38	2½	⅞	2
42	16 11/16	47⅜	55¾	¾	8	2½	43⅛	44⅛	2½	⅞	2
48	19 5/16	54½	63⅜	¾	9⅛	3	49⅞	51 1/16	2½	⅞	2
54	22⅛	60¼	71	⅞	9¾	3	55¼	57	2½	1⅛	2¾
60	24 13/16	72	80⅝	1	10¾	3	61¼	62¾	2½	1⅛	2¾
72	29	83	95½	1⅛	11½	3⅛	74¾	76½	2½	1⅛	2¾

PARTS LIST	
No.	**Name**
1	FRAME
2	COVER
3	HINGE LINK
4	HINGE BUSHING
5	HINGE PIN
6	WASHER
7	SPRING PIN



ALTERNATE SEAT DETAILS

NOTE:

1. FOR USE WITH SEATING HEADS TO 50 FEET.
2. SUITABLE FOR PUMP DISCHARGE USE.
3. ADD GROUT PAD THICKNESS TO ANCHOR BOLT PROJECTION.
4. APPLIES TO SPIGOT BACK GATE ONLY. SPIGOT, SHOWN IN PHANTOM, IS OPTIONAL.

MODEL	F-50f & F-50sb DRAINAGE GATE	
SCALE	CATALOG DWG. NO.	REVISION NO.
NONE	D-7	

Waterman® INDUSTRIES, INC.

NOTE: FOR PRELIMINARY DESIGN PURPOSES ONLY
DO NOT USE FOR INSTALLATION
UNLESS PART OF CERTIFIED & APPROVED SUBMITTAL

JCH James, Cooke, & Hobson, Inc.

Sales Engineers

QUOTATION #072902-1MPL

July 29, 2002

To: INCA ENGINEERS

Job Name: ADOT - RAY RD & GREENFIELD

Attn: JIM DEXTER
Fax: 425-635-1150

Location: GILBERT, AZ.
Quotation By: Mark Lux
Bid Date:

Unless otherwise stated: Prices are firm for 30 days from bid date, payment terms are NET 30 DAYS from shipment. Prices do not include any sales and/or use taxes. Applicable taxes will be added to the invoice at rate in effect at time of shipment. Interest shall accrue on past due amounts at 1.5% per month. Freight terms are F.O.B. factory full freight allowed.

Qty	Description	Each	Total

OPTIONS BELOW INCLUDE THE FOLLOWING BILL OF MATERIALS:

- 3 EA. SUBMERSIBLE PUMPS WITH 3/60/460V MOTOR AND 40FT. OF POWER CABLE. EACH UNIT SHALL BE RATED FOR OPERATION IN CLASS 1, DIVISION 1, GROUPS C & D HAZARDOUS AREAS (EXPLOSION-PROOF)
- 3 EA. FLYGT LEAKAGE SENSOR TO BE CONNECTED IN EACH PUMP
- 3 EA. FLYGT DISCHARGE CONNECTION
- 3 EA. GUIDE PIPE - 304 STAINLESS STEEL
- 3 EA. UPPER GUIDE RAIL BRACKET - 304 STAINLESS STEEL
- 3 EA. INTERMEDIATE GUIDE RAIL BRACKET - 304 ST. STL.
- 3 EA. LIFTING CABLE - 304 STAINLESS STEEL

MODEL	GPM	TDH	HP	DISC SIZE	Each	Total
CP-3531-1440	8500	39FT	110	20"	$89,330.00	$267,990.00
CP-3400-1230	6720	37FT	90	16"	$75,500.00	$226,500.00
CP-3306-810	4500	35FT	70	14"	$50,875.00	$152,625.00
CP-3201-637	2240	34FT	35	10"	$28,900.00	$86,700.00

OPTIONS BELOW INCLUDE THE SAME BILL OF MATERIAL AS LISTED ABOVE EXCEPT IN QUANTITIES OF ONE (1):

MODEL	GPM	TDH	HP	DISC SIZE	Each	Total
CP-3127-433	448	33FT	7.5	6"	$7,535.00	$7,535.00
CP-3102-434	224	33FT	5	4"	$6,400.00	$6,400.00

QUADRAPLEX CONTROL PANEL RATED TO OPERATE THE PUMPS ABOVE TO INCLUDE: BRUSHED ALUMINUM DEADFRONT DOOR, PUMP CIRCUIT BREAKERS, MOTOR STARTERS, CONTROL CIRCUIT TRANSFORMER, RUN PILOT LIGHTS, HAND-OFF-AUTO SELECTOR SWITCHES, ALTERNATOR (FOR THREE MAIN PUMPS), ELAPSE TIME METERS, SEAL LEAKAGE ALARM CIRCUIT, MOTOR TEMPERATURE ALARM CIRCUIT, HIGH WATER ALARM CIRCUIT, "INTRINSICALLY SAFE" FLOAT CIRCUIT

110HP/110HP/110HP/7.5HP	$20,000.00	$20,000.00
90HP/90HP/90HP/7.5HP	$20,000.00	$20,000.00
70HP/70HP/70HP/7.5HP	$20,000.00	$20,000.00
35HP/35HP/35HP/7.5HP	$18,000.00	$18,000.00

NOT INCLUDING: CONNECTING PIPING, VALVES, FITTINGS, ANCHOR BOLTS, CONCRETE, GROUT, CONDUIT, WIRING HOOK-UP, JUNCTION BOXES, INSTALLATION, OR ANY OTHER ITEMS NOT SPECIFICALLY LISTED ABOVE.

APPENDIX 3

TABLE OF CONTENTS

INCA ENGINEERS INC.

Job No. 69446
Sheet No. 1 of
Contact/Client Town of Gilbert
Phase/Subject Ray Road
Design Topic Drainage Area Calculations
Made By PWC Date 11/26/02 Checked By Date Page No.

Drainage Area	***1***	Sta	STA 2095.61 To	STA 2542.86	Lt
Surface	area sf	C	CA	CW	CW-Total DA
Impervious					
Pavement	16548.25	0.9	14,893		
Curb & Gutter	1789.00	0.95	1,700		
Sidewalk	2683.50	0.95	2,549		
Total	21,021		19,142	0.911	
Pervious					
Median	2907.13	0.7	2,035		
Landscape	5143.38	0.7	3,600		
Total	8,051		5,635	0.700	0.852

Drainage Area	***2***	Sta	2542.86 To	2970.00	Lt
Surface	area sf	C	CA	CW	
Impervious					
Pavement	15804.18	0.9	14,224		
Curb & Gutter	1708.56	0.95	1,623		
Sidewalk	2562.84	0.95	2,435		
Total	20,076		18,282	0.911	
Pervious					
Median	2776.41	0.7	1,943		
Landscape	4912.11	0.7	3,438		
Total	7,689		5,382	0.700	0.852

Drainage Area	***3***	Sta	2970.00 To	3276.00	Lt
Surface	area sf	C	CA	CW	
Impervious					
Pavement	11322.00	0.9	10,190		
Curb & Gutter	1224.00	0.95	1,163		
Sidewalk	1836.00	0.95	1,744		
Total	14,382		13,097	0.911	
Pervious					
Median	1989.00	0.7	1,392		
Landscape	3519.00	0.7	2,463		
Total	5,508		3,856	0.700	0.852

INCA ENGINEERS INC.

Job No.	69446						
Sheet No.	2	of					
Contact/Client	Town of Gilbert						
Phase/Subject	Ray Road						
Design Topic	Drainage Area Calculations						
Made By	PWC	Date	11/26/02	Checked By		Date	Page No.

			STA		STA		
Drainage Area	*4*	Sta	3276.00	To	3585.00	Lt	
Surface	area sf	C	CA		CW	CW-Total DA	
Impervious							
Pavement	12063.00	0.9	10,857				
Curb & Gutter	1236.00	0.95	1,174				
Sidewalk	1854.00	0.95	1,761				
Total	15,153		13,792		0.910		
Pervious							
Median	2008.50	0.7	1,406				
Landscape	2923.50	0.7	2,046				
Total	4,932		3,452		0.700	0.859	

Drainage Area	*5*	Sta	3637.78	To	3888.00	Lt	
Surface	area sf	C	CA		CW		
Impervious							
Pavement	9888.14	0.9	8,899				
Curb & Gutter	1000.88	0.95	951				
Sidewalk	1501.32	0.95	1,426				
Total	12,390		11,276		0.910		
Pervious							
Median	1626.43	0.7	1,139				
Landscape	2247.53	0.7	1,573				
Total	3,874		2,712		0.700	0.860	

Drainage Area	*6*	Sta	3585.00	To	3888.00	Lt	
Surface	area sf	C	CA		CW		
Impervious							
Pavement	11841.00	0.9	10,657				
Curb & Gutter	1212.00	0.95	1,151				
Sidewalk	1818.00	0.95	1,727				
Total	14,871		13,535		0.910		
Pervious							
Median	1969.50	0.7	1,379				
Landscape	2854.50	0.7	1,998				
Total	4,824		3,377		0.700	0.859	

INCA ENGINEERS INC.

Job No.	69446							
Sheet No.	3	of						
Contact/Client	Town of Gilbert							
Phase/Subject	Ray Road							
Design Topic	Drainage Area Calculations							
Made By	PWC	Date	11/26/02	Checked By		Date		Page No.

Drainage Area	7	Sta	STA 3888.00 To	STA 4200.00	Lt
Surface	area sf	C	CA	CW	CW-Total DA
Impervious					
Pavement	11544.00	0.9	10,390		
Curb & Gutter	1248.00	0.95	1,186		
Sidewalk	1872.00	0.95	1,778		
Total	14,664		13,354	0.911	
Pervious					
Median	2028.00	0.7	1,420		
Landscape	3588.00	0.7	2,512		
Total	5,616		3,931	0.700	0.852

Drainage Area	8	Sta	3888.00 To	4200.00	Lt
Surface	area sf	C	CA	CW	
Impervious					
Pavement	12408.00	0.9	11,167		
Curb & Gutter	1248.00	0.95	1,186		
Sidewalk	1872.00	0.95	1,778		
Total	15,528		14,131	0.910	
Pervious					
Median	2028.00	0.7	1,420		
Landscape	2724.00	0.7	1,907		
Total	4,752		3,326	0.700	0.861

Drainage Area	9	Sta	4200.00 To	4498.00	Lt
Surface	area sf	C	CA	CW	
Impervious					
Pavement	11026.00	0.9	9,923		
Curb & Gutter	1192.00	0.95	1,132		
Sidewalk	1788.00	0.95	1,699		
Total	14,006		12,754	0.911	
Pervious					
Median	1937.00	0.7	1,356		
Landscape	3427.00	0.7	2,399		
Total	5,364		3,755	0.700	0.852

INCA ENGINEERS INC

Job No. 69446
Sheet No. 4 of
Contact/Client Town of Gilbert
Phase/Subject Ray Road
Design Topic Drainage Area Calculations
Made By PWC Date 11/5/02 Checked By Date Page No.

			STA		STA		
Drainage Area	***10***	Sta	4200.00	To	4498.00	Lt	
Surface	area sf	C	CA		CW	CW-Total DA	
Impervious							
Pavement	11026.00	0.9	9,923				
Curb & Gutter	1192.00	0.95	1,132				
Sidewalk	1788.00	0.95	1,699				
Total	14,006		12,754		0.911		
Pervious							
Median	1937.00	0.7	1,356				
Landscape	3427.00	0.7	2,399				
Total	5,364		3,755		0.700	0.852	

Drainage Area	***11***	Sta	4498.00	To	4657.81	+413-280.60=	132.4 EQUATION
Surface	area sf	C	CA		CW	Lt	
Impervious							
Pavement	20746.91	0.9	18,672				
Curb & Gutter	1168.84	0.95	1,110				
Sidewalk	1753.26	0.95	1,666				
Total	23,669		21,448		0.906		
Pervious							
Median	1899.37	0.7	1,330				
Landscape	3360.42	0.7	2,352				
Total	5,260		3,682		0.700	0.869	

Drainage Area	***12***	Sta	4498.00	To	4657.81	+413-280.60=	132.4 EQUATION
Surface	area sf	C	CA		CW	Lt	
Impervious							
Pavement	10811.77	0.9	9,731				
Curb & Gutter	639.24	0.95	607				
Sidewalk	958.86	0.95	911				
Total	12,410		11,249		0.906		
Pervious							
Median	1038.77	0.7	727				
Landscape	1837.82	0.7	1,286				
Total	2,877		2,014		0.700	0.868	

INCA ENGINEERS INC.

Job No. 69446
Sheet No. 5 of
Contact/Client Town of Gilbert
Phase/Subject Ray Road
Design Topic Drainage Area Calculations
Made By PWC Date 11/5/02 Checked By Date Page No.

			STA	STA	
Drainage Area	***13***	Sta	413.00 To	509.00	Lt
Surface	area sf	C	CA	CW	CW-Total DA
Impervious					
Pavement	7968.00	0.9	7,171		
Curb & Gutter	200.00	0.95	190		
Sidewalk	210.00	0.95	200		
Total	8,378		7,561	0.902	
Pervious					
Median	130.00	0.7	91		
Landscape	172.50	0.7	121		
Total	303		212	0.700	0.895

Drainage Area	***14***	Sta	413.00 To	509.00	Lt
Surface	area sf	C	CA	CW	
Impervious					
Pavement	4128.00	0.9	3,715		
Curb & Gutter	200.00	0.95	190		
Sidewalk	210.00	0.95	200		
Total	4,538		4,105	0.905	
Pervious					
Median	130.00	0.7	91		
Landscape	230.00	0.7	161		
Total	360		252	0.700	0.889

Drainage Area	***15***	Sta	509.00 To	716.00	Lt
Surface	area sf	C	CA	CW	
Impervious					
Pavement	9089.00	0.9	8,180		
Curb & Gutter	620.00	0.95	589		
Sidewalk	930.00	0.95	884		
Total	10,639		9,653	0.907	
Pervious					
Median	828.00	0.7	580		
Landscape	1610.00	0.7	1,127		
Total	2,438		1,707	0.700	0.869

INCA ENGINEERS INC.

Job No. 69446
Sheet No. 6 of
Contact/Client Town of Gilbert
Phase/Subject Ray Road
Design Topic Drainage Area Calculations
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			STA	STA		
Drainage Area	***16***	Sta	550.00 To	716.00	Lt	
Surface	area sf	C	CA	CW	CW-Total DA	
Impervious						
Pavement	6168.56	0.9	5,552			
Curb & Gutter	664.00	0.95	631			
Sidewalk	996.00	0.95	946			
Total	7,829		7,129	0.911		
Pervious						
Median	1079.00	0.7	755			
Landscape	1909.00	0.7	1,336			
Total	2,988		2,092	0.700	0.852	

Drainage Area	***17***	Sta	716.00 To	970.00	Lt	
Surface	area sf	C	CA	CW		
Impervious						
Pavement	9438.64	0.9	8,495			
Curb & Gutter	1016.00	0.95	965			
Sidewalk	1524.00	0.95	1,448			
Total	11,979		10,908	0.911		
Pervious						
Median	1651.00	0.7	1,156			
Landscape	2921.00	0.7	2,045			
Total	4,572		3,200	0.700	0.852	

Drainage Area	***18***	Sta	2542.86 To	2980.00	Lt	
Surface	area sf	C	CA	CW		
Impervious						
Pavement	14807.00	0.9	13,326			
Curb & Gutter	1748.56	0.95	1,661			
Sidewalk	2622.84	0.95	2,492			
Total	19,178		17,479	0.911		
Pervious						
Median	2841.41	0.7	1,989			
Landscape	5027.11	0.7	3,519			
Total	7,869		5,508	0.700	0.850	

INCA ENGINEERS INC.

Job No. 69446
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Design Topic Drainage Area Calculations
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			STA		STA		
Drainage Area	***19***	Sta	970.00	To	1370.00	Lt	
Surface	area sf	C	CA		CW	CW-Total DA	
Impervious							
Pavement	14800.00	0.9	13,320				
Curb & Gutter	1600.00	0.95	1,520				
Sidewalk	2400.00	0.95	2,280				
Total	18,800		17,120		0.911		
Pervious							
Median	2600.00	0.7	1,820				
Landscape	4600.00	0.7	3,220				
Total	7,200		5,040		0.700	0.852	

Drainage Area	***20***	Sta	970.00	To	1370.00	Lt	
Surface	area sf	C	CA		CW		
Impervious							
Pavement	7790.00	0.9	7,011				
Curb & Gutter	1600.00	0.95	1,520				
Sidewalk	2400.00	0.95	2,280				
Total	11,790		10,811		0.917		
Pervious							
Median	2600.00	0.7	1,820				
Landscape	4600.00	0.7	3,220				
Total	7,200		5,040		0.700	0.835	

Drainage Area	***21***	Sta	1370.00	To	1604.00	Lt	
Surface	area sf	C	CA		CW		
Impervious							
Pavement	9847.40	0.9	8,863				
Curb & Gutter	936.00	0.95	889				
Sidewalk	1404.00	0.95	1,334				
Total	12,187		11,086		0.910		
Pervious							
Median	1521.00	0.7	1,065				
Landscape	2691.00	0.7	1,884				
Total	4,212		2,948		0.700	0.856	

INCA ENGINEERS INC.

Job No. 69446
Sheet No. of
Contact/Client Town of Gilbert
Phase/Subject Ray Road
Design Topic Drainage Area Calculations
Made By PWC Date 11/5/02 Checked By Date Page No.

			STA		STA	
Drainage Area	***22***	Sta	1370.00	To	1606.00	Lt
Surface	area sf	C	CA		CW	CW-Total DA
Impervious	8					
Pavement	7770.00	0.9	6,993			
Curb & Gutter	544.00	0.95	517			
Sidewalk	1416.00	0.95	1,345			
Total	9,730		8,855		0.910	
Pervious						
Median	1352.00	0.7	946			
Landscape	2714.00	0.7	1,900			
Total	4,066		2,846		0.700	0.848

Drainage Area	***23***	Sta	1606.00	To	1770.00	Lt
Surface	area sf	C	CA		CW	
Impervious						
Pavement	4810.00	0.9	4,329			
Curb & Gutter	520.00	0.95	494			
Sidewalk	780.00	0.95	741			
Total	6,110		5,564		0.911	
Pervious						
Median	910.00	0.7	637			
Landscape	1207.50	0.7	845			
Total	2,118		1,482		0.700	0.856

Drainage Area	***24***	Sta	1606.00	To	1775.00	Lt
Surface	area sf	C	CA		CW	
Impervious						
Pavement	7215.00	0.9	6,494			
Curb & Gutter	780.00	0.95	741			
Sidewalk	1170.00	0.95	1,112			
Total	9,165		8,346		0.911	
Pervious						
Median	975.00	0.7	683			
Landscape	2645.00	0.7	1,852			
Total	3,620		2,534		0.700	0.851

INCA ENGINEERS INC.

Job No. 69446
Sheet No. 9 of
Contact/Client Town of Gilbert
Phase/Subject Greenfield Road
Design Topic Drainage Area Calculations
Made By PWC Date 11/26/02 Checked By Date Page No.

			STA		STA		
Drainage Area	***25***	Sta	2000.00	To	2100.00	Lt	
Surface	area sf	C	CA		CW	CW-Total DA	
Impervious							
Pavement	3000.00	0.9	2,700				
Curb & Gutter	120.00	0.95	114				
Sidewalk	150.00	0.95	143				
Total	3,270		2,957		0.904		
Pervious							
Median	34.00	0.7	24				
Landscape	345.00	0.7	242				
Total	379		265		0.700	0.883	

Drainage Area	***26***	Sta	2000.00	To	2090.00	Lt	
Surface	area sf	C	CA		CW		
Impervious							
Pavement	3600.00	0.9	3,240				
Curb & Gutter	100.00	0.95	95				
Sidewalk	150.00	0.95	143				
Total	3,850		3,478		0.903		
Pervious							
Median	34.00	0.7	24				
Landscape	287.50	0.7	201				
Total	322		225		0.700	0.888	

Drainage Area	***27***	Sta	2100.00	To	2340.00	Lt	
Surface	area sf	C	CA		CW		
Impervious							
Pavement	8880.00	0.9	7,992				
Curb & Gutter	960.00	0.95	912				
Sidewalk	1440.00	0.95	1,368				
Total	11,280		10,272		0.911		
Pervious							
Median	1560.00	0.7	1,092				
Landscape	2760.00	0.7	1,932				
Total	4,320		3,024		0.700	0.852	

INCA ENGINEERS INC.

Job No. 69446
Sheet No. 10 of
Contact/Client Town of Gilbert
Phase/Subject Greenfield Road
Design Topic Drainage Area Calculations
Made By PWC Date 11/26/02 Checked By Date Page No.

			STA	STA		
Drainage Area	**28**	Sta	2090.00 To	2340.00	Lt	
Surface	area sf	C	CA	CW	CW-Total DA	
Impervious						
Pavement	18000.00	0.9	16,200			
Curb & Gutter	1000.00	0.95	950			
Sidewalk	1500.00	0.95	1,425			
Total	20,500		18,575	0.906		
Pervious						
Median	1625.00	0.7	1,138			
Landscape	2875.00	0.7	2,013			
Total	4,500		3,150	0.700		0.869

Drainage Area	**29**	Sta	2340.00 To	2640.00	Lt	
Surface	area sf	C	CA	CW		
Impervious						
Pavement	11100.00	0.9	9,990			
Curb & Gutter	1200.00	0.95	1,140			
Sidewalk	1800.00	0.95	1,710			
Total	14,100		12,840	0.911		
Pervious						
Median	1950.00	0.7	1,365			
Landscape	3450.00	0.7	2,415			
Total	5,400		3,780	0.700		0.852

Drainage Area	**30**	Sta	2340.00 To	2765.00	Lt	
Surface	area sf	C	CA	CW		
Impervious						
Pavement	15725.00	0.9	14,153			
Curb & Gutter	1700.00	0.95	1,615			
Sidewalk	2550.00	0.95	2,423			
Total	19,975		18,190	0.911		
Pervious						
Median	2762.50	0.7	1,934			
Landscape	5537.50	0.7	3,876			
Total	8,300		5,810	0.700		0.849

INCA ENGINEERS INC.

Job No. 69446
Sheet No. 11 of
Contact/Client Town of Gilbert
Phase/Subject Greenfield Road
Design Topic Drainage Area Calculations
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Drainage Area	***31***	Sta	STA 2640.00 To	STA 2765.00	Lt
Surface	area sf	C	CA	CW	CW-Total DA
Impervious					
Pavement	4625.00	0.9	4,163		
Curb & Gutter	500.00	0.95	475		
Sidewalk	750.00	0.95	713		
Total	5,875		5,350	0.911	
Pervious					
Median	812.50	0.7	569		
Landscape	1437.50	0.7	1,006		
Total	2,250		1,575	0.700	0.852

NOT USED

Drainage Area	***32***	Sta	To		Lt
Surface	area sf	C	CA	CW	
Impervious					
Pavement	#VALUE!	0.9	#VALUE!		
Curb & Gutter	#VALUE!	0.95	#VALUE!		
Sidewalk	#VALUE!	0.95	#VALUE!		
Total	#VALUE!		#VALUE!	#VALUE!	
Pervious					
Median	#VALUE!	0.7	#VALUE!		
Landscape	#VALUE!	0.7	#VALUE!		
Total	#VALUE!		#VALUE!	#VALUE!	#VALUE!

Drainage Area	***33***	Sta	2765.00 To	2990.00	Lt
Surface	area sf	C	CA	CW	
Impervious					
Pavement	8325.00	0.9	7,493		
Curb & Gutter	900.00	0.95	855		
Sidewalk	1350.00	0.95	1,283		
Total	10,575		9,630	0.911	
Pervious					
Median	1462.50	0.7	1,024		
Landscape	2587.50	0.7	1,811		
Total	4,050		2,835	0.700	0.852

INCA ENGINEERS INC.

Job No.	69446		
Sheet No.	12	of	
Contact/Client	Town of Gilbert		
Phase/Subject	Greenfield Road		
Design Topic	Drainage Area Calculations		
Made By	PWC	Date 11/26/02	Checked By	Date

Drainage Area	***34***	Sta	STA 2765.00 To	STA 2990.00	Lt
Surface	area sf	C	CA	CW	CW-Total DA
Impervious					
Pavement	8325.00	0.9	7,493		
Curb & Gutter	900.00	0.95	855		
Sidewalk	1350.00	0.95	1,283		
Total	10,575		9,630	0.911	
Pervious					
Median	1462.50	0.7	1,024		
Landscape	5712.50	0.7	3,999		
Total	7,175		5,023	0.700	0.825

Drainage Area	***35***	Sta	2990.00 To	3295.00	Lt
Surface	area sf	C	CA	CW	
Impervious					
Pavement	11285.00	0.9	10,157		
Curb & Gutter	1220.00	0.95	1,159		
Sidewalk	1830.00	0.95	1,739		
Total	14,335		13,054	0.911	
Pervious					
Median	1982.50	0.7	1,388		
Landscape	3507.50	0.7	2,455		
Total	5,490		3,843	0.700	0.852

Drainage Area	***36***	Sta	2990.00 To	3295.00	Lt
Surface	area sf	C	CA	CW	
Impervious					
Pavement	11285.00	0.9	10,157		
Curb & Gutter	1220.00	0.95	1,159		
Sidewalk	1830.00	0.95	1,739		
Total	14,335		13,054	0.911	
Pervious					
Median	1982.50	0.7	1,388		
Landscape	3507.50	0.7	2,455		
Total	5,490		3,843	0.700	0.852

INCA ENGINEERS INC.

Job No.	69446				
Sheet No.	13	of			
Contact/Client	Town of Gilbert				
Phase/Subject	Greenfield Road				
Design Topic	Drainage Area Calculations				
Made By	PWC	Date 11/26/02	Checked By	Date	Page No.

Drainage Area	***37***	Sta	STA 3295.00 To	STA 3535.00	Lt
Surface	area sf	C	CA	CW	CW-Total DA
Impervious					
Pavement	8880.00	0.9	7,992		
Curb & Gutter	960.00	0.95	912		
Sidewalk	1440.00	0.95	1,368		
Total	11,280		10,272	0.911	
Pervious					
Median	1560.00	0.7	1,092		
Landscape	2760.00	0.7	1,932		
Total	4,320		3,024	0.700	0.852

Drainage Area	***38***	Sta	3295.00 To	3535.00	Lt
Surface	area sf	C	CA	CW	
Impervious					
Pavement	8918.40	0.9	8,027		
Curb & Gutter	960.00	0.95	912		
Sidewalk	1440.00	0.95	1,368		
Total	11,318		10,307	0.911	
Pervious					
Median	1560.00	0.7	1,092		
Landscape	2760.00	0.7	1,932		
Total	4,320		3,024	0.700	0.852

Drainage Area	***39***	Sta	3535.00 To	3790.00	Lt
Surface	area sf	C	CA	CW	
Impervious					
Pavement	9435.00	0.9	8,492		
Curb & Gutter	1020.00	0.95	969		
Sidewalk	1530.00	0.95	1,454		
Total	11,985		10,914	0.911	
Pervious					
Median	1657.50	0.7	1,160		
Landscape	2932.50	0.7	2,053		
Total	4,590		3,213	0.700	0.852

INCA ENGINEERS INC.

Job No. 69446
Sheet No. 14 of
Contact/Client Town of Gilbert
Phase/Subject Greenfield Road
Design Topic Drainage Area Calculations
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Drainage Area	***40***	Sta	STA 3535.00 To	STA 3790.00	Lt
Surface	area sf	C	CA	CW	CW-Total DA
Impervious					
Pavement	9435.00	0.9	8,492		
Curb & Gutter	1020.00	0.95	969		
Sidewalk	1530.00	0.95	1,454		
Total	11,985		10,914	0.911	
Pervious					
Median	1657.50	0.7	1,160		
Landscape	2932.50	0.7	2,053		
Total	4,590		3,213	0.700	0.852

Drainage Area	***41***	Sta	3790.00 To	4050.00	Lt
Surface	area sf	C	CA	CW	
Impervious					
Pavement	9620.00	0.9	8,658		
Curb & Gutter	1040.00	0.95	988		
Sidewalk	1560.00	0.95	1,482		
Total	12,220		11,128	0.911	
Pervious					
Median	1690.00	0.7	1,183		
Landscape	2990.00	0.7	2,093		
Total	4,680		3,276	0.700	0.852

Drainage Area	***42***	Sta	3790.00 To	4050.00	Lt
Surface	area sf	C	CA	CW	
Impervious					
Pavement	9620.00	0.9	8,658		
Curb & Gutter	1040.00	0.95	988		
Sidewalk	1560.00	0.95	1,482		
Total	12,220		11,128	0.911	
Pervious					
Median	1690.00	0.7	1,183		
Landscape	2990.00	0.7	2,093		
Total	4,680		3,276	0.700	0.852

INCA ENGINEERS INC.

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Phase/Subject	Greenfield Road
Design Topic	Drainage Area Calculations
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Drainage Area	***43***	Sta	STA 4050.00 To	STA 4200.00	Lt
Surface	area sf	C	CA	CW	CW-Total DA
Impervious					
Pavement	5550.00	0.9	4,995		
Curb & Gutter	600.00	0.95	570		
Sidewalk	900.00	0.95	855		
Total	7,050		6,420	0.911	
Pervious					
Median	975.00	0.7	683		
Landscape	1725.00	0.7	1,208		
Total	2,700		1,890	0.700	0.852

Drainage Area	***44***	Sta	4050.00 To	4200.00	Lt
Surface	area sf	C	CA	CW	
Impervious					
Pavement	5550.00	0.9	4,995		
Curb & Gutter	600.00	0.95	570		
Sidewalk	900.00	0.95	855		
Total	7,050		6,420	0.911	
Pervious					
Median	975.00	0.7	683		
Landscape	1725.00	0.7	1,208		
Total	2,700		1,890	0.700	0.852

Drainage Area	***45***	Sta	4200.00 To	4385.00	Lt
Surface	area sf	C	CA	CW	
Impervious					
Pavement	6845.00	0.9	6,161		
Curb & Gutter	740.00	0.95	703		
Sidewalk	1110.00	0.95	1,055		
Total	8,695		7,918	0.911	
Pervious					
Median	1202.50	0.7	842		
Landscape	2127.50	0.7	1,489		
Total	3,330		2,331	0.700	0.852

INCA ENGINEERS INC.

Job No. 69446
Sheet No. 16 of
Contact/Client Town of Gilbert
Phase/Subject Greenfield Road
Design Topic Drainage Area Calculations
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			STA	STA		
Drainage Area	***46***	Sta	4200.00 To	4385.00	Lt	
Surface	area sf	C	CA	CW	CW-Total DA	
Impervious						
Pavement	6845.00	0.9	6,161			
Curb & Gutter	740.00	0.95	703			
Sidewalk	1110.00	0.95	1,055			
Total	8,695		7,918	0.911		
Pervious						
Median	1202.50	0.7	842			
Landscape	2127.50	0.7	1,489			
Total	3,330		2,331	0.700	0.852	

Drainage Area	***47***	Sta	4385.00 To	4665.00	Lt	
Surface	area sf	C	CA	CW		
Impervious						
Pavement	10360.00	0.9	9,324			
Curb & Gutter	1120.00	0.95	1,064			
Sidewalk	1680.00	0.95	1,596			
Total	13,160		11,984	0.911		
Pervious						
Median	1820.00	0.7	1,274			
Landscape	3220.00	0.7	2,254			
Total	5,040		3,528	0.700	0.852	

Drainage Area	***48***	Sta	4385.00 To	4665.00	Lt	
Surface	area sf	C	CA	CW		
Impervious						
Pavement	10360.00	0.9	9,324			
Curb & Gutter	1120.00	0.95	1,064			
Sidewalk	1680.00	0.95	1,596			
Total	13,160		11,984	0.911		
Pervious						
Median	1820.00	0.7	1,274			
Landscape	3220.00	0.7	2,254			
Total	5,040		3,528	0.700	0.852	

INCA ENGINEERS INC.

Job No.	69446
Sheet No.	17 of
Contact/Client	Town of Gilbert
Phase/Subject	Greenfield Road
Design Topic	Drainage Area Calculations
Made By	PWC Date 11/26/02 Checked By Date Page No.

			STA		STA	
Drainage Area	**49**	Sta	4665.00	To	4783.00	Lt
Surface	area sf	C	CA		CW	CW-Total DA
Impervious						
Pavement	4366.00	0.9	3,929			
Curb & Gutter	472.00	0.95	448			
Sidewalk	708.00	0.95	673			
Total	5,546		5,050		0.911	
Pervious						
Median	767.00	0.7	537			
Landscape	1357.00	0.7	950			
Total	2,124		1,487		0.700	0.852

Drainage Area	**50**	Sta	4665.00	To	4783.00	Lt
Surface	area sf	C	CA		CW	
Impervious						
Pavement	4366.00	0.9	3,929			
Curb & Gutter	472.00	0.95	448			
Sidewalk	708.00	0.95	673			
Total	5,546		5,050		0.911	
Pervious						
Median	767.00	0.7	537			
Landscape	1357.00	0.7	950			
Total	2,124		1,487		0.700	0.852

Drainage Area	**51**	Sta	4783.00	To	5035.00	Lt
Surface	area sf	C	CA		CW	
Impervious						
Pavement	9324.00	0.9	8,392			
Curb & Gutter	1008.00	0.95	958			
Sidewalk	1512.00	0.95	1,436			
Total	11,844		10,786		0.911	
Pervious						
Median	1638.00	0.7	1,147			
Landscape	2898.00	0.7	2,029			
Total	4,536		3,175		0.700	0.852

INCA ENGINEERS INC.

Job No.	69446				
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Contact/Client	Town of Gilbert				
Phase/Subject	Ray Road				
Design Topic	Drainage Area Calculations				
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			STA	STA	
Drainage Area	**52**	Sta	4783.00 To	5035.00	Lt
Surface	area sf	C	CA	CW	CW-Total DA
Impervious					
Pavement	9324.00	0.9	8,392		
Curb & Gutter	1008.00	0.95	958		
Sidewalk	1512.00	0.95	1,436		
Total	11,844		10,786	0.911	
Pervious					
Median	1638.00	0.7	1,147		
Landscape	2898.00	0.7	2,029		
Total	4,536		3,175	0.700	0.852

Drainage Area	**53**	Sta	5035.00 To	5138.00	Lt
Surface	area sf	C	CA	CW	
Impervious					
Pavement	3827.48	0.9	3,445		
Curb & Gutter	412.00	0.95	391		
Sidewalk	618.00	0.95	587		
Total	4,857		4,423	0.911	
Pervious					
Median	669.50	0.7	469		
Landscape	1184.50	0.7	829		
Total	1,854		1,298	0.700	0.852

Drainage Area	**54**	Sta	5035.00 To	5135.00	Lt
Surface	area sf	C	CA	CW	
Impervious					
Pavement	3716.00	0.9	3,344		
Curb & Gutter	400.00	0.95	380		
Sidewalk	600.00	0.95	570		
Total	4,716		4,294	0.911	
Pervious					
Median	650.00	0.7	455		
Landscape	1150.00	0.7	805		
Total	1,800		1,260	0.700	0.852

INCA ENGINEERS INC

Job No. 69446
Sheet No. 19 of
Contact/Client Town of Gilbert
Phase/Subject Greenfield Road
Design Topic Drainage Area Calculations
Made By PWC Date 11/26/02 Checked By Date Page No.

			STA	STA	
Drainage Area	***55***	Sta	66.00 To	260.00	Lt
Surface	area sf	C	CA	CW	CW-Total DA
Impervious					
Pavement	3104.00	0.9	2,794		
Curb & Gutter	388.00	0.95	369		
Sidewalk	970.00	0.95	922		
Total	4,462		4,084	0.915	
Pervious					
Median	0.00	0.7	0		
Landscape	3104.00	0.7	2,173		
Total	3,104		2,173	0.700	0.827

Drainage Area	***56***	Sta	66.00 To	260.00	Lt
Surface	area sf	C	CA	CW	
Impervious					
Pavement	3104.00	0.9	2,794		
Curb & Gutter	388.00	0.95	369		
Sidewalk	970.00	0.95	922		
Total	4,462		4,084	0.915	
Pervious					
Median	0.00	0.7	0		
Landscape	3104.00	0.7	2,173		
Total	3,104		2,173	0.700	0.827

Drainage Area	***57***	Sta	0.00 To	0.00	Lt
Surface	area sf	C	CA	CW	
Impervious					
Pavement	0.00	0.9	0		
Curb & Gutter	0.00	0.95	0		
Sidewalk	0.00	0.95	0		
Total	0		0	0.000	
Pervious					
Median	0.00	0.7	0		
Landscape	16000.00	0.7	11,200		
Total	16,000		11,200	0.700	0.700

INCA ENGINEERS INC.

Job No.	69446		
Sheet No.	20	of	
Contact/Client	Town of Gilbert		
Phase/Subject	Gilbert Road		
Design Topic	Drainage Area Calculations		
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			STA		STA		
Drainage Area	**58**	Sta	0.00	To	0.00	Lt	
Surface	area sf	C	CA		CW	CW-Total DA	
Impervious							
Pavement	0.00	0.9	0				
Curb & Gutter	0.00	0.95	0				
Sidewalk	0.00	0.95	0				
Total	0		0		0.000		
Pervious							
Median	0.00	0.7	0				
Landscape	4800.00	0.7	3,360				
Total	4,800		3,360		0.700	0.700	

Drainage Area	**59**	Sta	0.00	To	90.00	Lt
Surface	area sf	C	CA		CW	
Impervious						
Pavement	1440.00	0.9	1,296			
Curb & Gutter	180.00	0.95	171			
Sidewalk	540.00	0.95	513			
Total	2,160		1,980		0.917	
Pervious						
Median	0.00	0.7	0			
Landscape	9037.50	0.7	6,326			
Total	9,038		6,326		0.700	0.742

ARIZONA DEPARTMENT OF TRANSPORTATION

HYDROLOGIC DESIGN DATA RECORD

RATIONAL METHOD

LOCATION DATA

Highway Ray Road County Maricopa

Location Ray Road east of the Eastern Canal

Project No. Town of Gilbert- Station 25+42.78

Name of Stream DA-1 Profile low point

DESIGN DATA

Design Frequency		10	years
Drainage Area	A_1	0.483	acres
	A_2	0.185	acres
	A_3		acres
Drainage Length		447.17	feet
Elevation			
Top of Drainage Area		1271.25	feet
At Structure		1267.97	feet
Drainage Area Slope		0.7335	%
Precipitation			
P = 6-hour		1.9	inches
P = 24-hour		2.25	inches

DESIGN COMPUTATIONS

Precipation P_1 = 1-hour		1.45	inches
Time of Concentration	TC	5.69	minutes
Rainfall Intensity Fig. 3-2	I	4.9	inches / hour
Runoff Coefficient	C_1	0.911	
	C_2	0.7	
	C_3		
Weighted Runoff Coefficient	C	0.852	
Peak Discharge $Q_p = C_{iA}$ =		2.79	cfs

Computed by P.W.C. Date 12/12/02

20-2903 12/74

ARIZONA DEPARTMENT OF TRANSPORTATION

HYDROLOGIC DESIGN DATA RECORD

RATIONAL METHOD

LOCATION DATA

Highway Ray Road County Maricopa

Location Ray Road east of the Eastern Canal

Project No. Town of Gilbert- Station 25+42.78

Name of Stream DA-2 Low point profile

DESIGN DATA

Design Frequency		10	years
Drainage Area	A_1	0.461	acres
	A_2	0.177	acres
	A_3		acres
Drainage Length		427.22	feet
Elevation			
Top of Drainage Area		1270.93	feet
At Structure		1268.91	feet
Drainage Area Slope		0.4728	%
Precipitation			
P = 6-hour		1.9	inches
P = 24-hour		2.25	inches

DESIGN COMPUTATIONS

Precipation P_1 = 1-hour		1.45	inches
Time of Concentration	TC	6.50	minutes
Rainfall Intensity Fig. 3-2	I	4.9	inches / hour
Runoff Coefficient	C_1	0.911	
	C_2	0.7	
	C_3		
Weighted Runoff Coefficient	C	0.85	
Peak Discharge $Q_p = C_{iA}$ =		2.66	cfs

Computed by P.W.C. Date 12/12/02

20-2903 12/74

ARIZONA DEPARTMENT OF TRANSPORTATION

HYDROLOGIC DESIGN DATA RECORD

RATIONAL METHOD

LOCATION DATA

Highway Ray Road County Maricopa

Location Ray Road east of the Eastern Canal

Project No. Town of Gilbert- Station 25+42.78

Name of Stream DA-1&2 Combined CP at catch basin Sta 25+42.78

DESIGN DATA

Design Frequency		10	years
Drainage Area	A_1	0.943	acres
	A_2	0.361	acres
	A_3		acres
Drainage Length		447.17	feet
Elevation			
Top of Drainage Area		1269.98	feet
At Structure		1267.89	feet
Drainage Area Slope		0.4674	%
Precipitation			
P = 6-hour		1.9	inches
P = 24-hour		2.25	inches

DESIGN COMPUTATIONS

Precipation P_1 = 1-hour		1.45	inches
Time of Concentration	TC	6.76	minutes
Rainfall Intensity Fig. 3-2	I	4.9	inches / hour
Runoff Coefficient	C_1	0.911	
	C_2	0.7	
	C_3		
Weighted Runoff Coefficient	C	0.85	
Peak Discharge $Q_p = C_{iA}$ =		5.45	cfs

Computed by P.W.C. Date 12/12/02

20-2903 12/74

ARIZONA DEPARTMENT OF TRANSPORTATION

HYDROLOGIC DESIGN DATA RECORD

RATIONAL METHOD

LOCATION DATA

Highway	Ray Road	County	Maricopa
Location	Ray Road east of the Eastern Canal		
Project No.	Town of Gilbert-	Station	29+70
Name of Stream	DA-3		

DESIGN DATA

Design Frequency		10	years
Drainage Area	A_1	0.330	acres
	A_2	0.126	acres
	A_3		acres
Drainage Length		306	feet
Elevation			
Top of Drainage Area		1270.64	feet
At Structure		1268.91	feet
Drainage Area Slope		0.5654	%
Precipitation			
P = 6-hour		1.9	inches
P = 24-hour		2.25	inches

DESIGN COMPUTATIONS

Precipation P_1 = 1-hour		1.45	inches
Time of Concentration	TC	4.69	minutes
Rainfall Intensity Fig. 3-2	I	4.9	inches / hour
Runoff Coefficient	C_1	0.911	
	C_2	0.7	
	C_3		
Weighted Runoff Coefficient	C	0.85	
Peak Discharge $Q_p = C_{iA}$ =		1.91	cfs

Computed by P.W.C. Date 12/12/02

20-2903 12/74

ARIZONA DEPARTMENT OF TRANSPORTATION

HYDROLOGIC DESIGN DATA RECORD

RATIONAL METHOD

LOCATION DATA

Highway: Ray Road — County: Maricopa

Location: Ray Road east of the Eastern Canal

Project No.: Town of Gilbert- — Station: 32+76

Name of Stream: DA-4

DESIGN DATA

Design Frequency		10	years
Drainage Area	A_1	0.348	acres
	A_2	0.113	acres
	A_3		acres
Drainage Length		299	feet
Elevation			
Top of Drainage Area		1271.31	feet
At Structure		1269.59	feet
Drainage Area Slope		0.5753	%
Precipitation			
P = 6-hour		1.9	inches
P = 24-hour		2.25	inches

DESIGN COMPUTATIONS

Precipation P_1 = 1-hour		1.45	inches
Time of Concentration	TC	4.58	minutes
Rainfall Intensity Fig. 3-2	I	4.9	inches / hour
Runoff Coefficient	C_1	0.91	
	C_2	0.70	
	C_3		
Weighted Runoff Coefficient	C	0.86	
Peak Discharge $Q_p = C_{iA}$ =		1.94	cfs

Computed by: P.W.C. — Date: 12/12/02

20-2903 12/74

ARIZONA DEPARTMENT OF TRANSPORTATION

HYDROLOGIC DESIGN DATA RECORD

RATIONAL METHOD

LOCATION DATA

Highway Ray Road County Maricopa

Location Ray Road east of the Eastern Canal

Project No. Town of Gilbert- Station 35+85

Name of Stream DA-5 To existing catch basin

DESIGN DATA

Design Frequency		10	years
Drainage Area	A_1	0.284	acres
	A_2	0.089	acres
	A_3		acres
Drainage Length		250.22	feet
Elevation			
Top of Drainage Area		1271.07	feet
At Structure		1270.62	feet
Drainage Area Slope		0.1798	%
Precipitation			
P = 6-hour		1.9	inches
P = 24-hour		2.25	inches

DESIGN COMPUTATIONS

Precipation P_1 = 1-hour		1.45	inches
Time of Concentration	TC	6.25	minutes
Rainfall Intensity Fig. 3-2	I	4.9	inches / hour
Runoff Coefficient	C_1	0.91	
	C_2	0.70	
	C_3		
Weighted Runoff Coefficient	C	0.86	
Peak Discharge $Q_p = C_{iA}$ =		1.57	cfs

Computed by P.W.C. Date 12/12/02

20-2903 12/74

ARIZONA DEPARTMENT OF TRANSPORTATION

HYDROLOGIC DESIGN DATA RECORD

RATIONAL METHOD

LOCATION DATA

Highway: Ray Road — County: Maricopa

Location: Ray Road east of the Eastern Canal

Project No. Town of Gilbert- — Station: 35+85

Name of Stream: DA-6

DESIGN DATA

Design Frequency		10	years
Drainage Area	A_1	0.341	acres
	A_2	0.111	acres
	A_3		acres
Drainage Length		303	feet
Elevation			
Top of Drainage Area		1271.67	feet
At Structure		1270.24	feet
Drainage Area Slope		0.4719	%
Precipitation			
P = 6-hour		1.9	inches
P = 24-hour		2.25	inches

DESIGN COMPUTATIONS

Precipation P_1 = 1-hour		1.45	inches
Time of Concentration	TC	4.99	minutes
Rainfall Intensity Fig. 3-2	I	4.9	inches / hour
Runoff Coefficient	C_1	0.911	
	C_2	0.7	
	C_3		
Weighted Runoff Coefficient	C	0.86	
Peak Discharge $Q_p = C_{iA}$ =		1.90	cfs

Computed by: P.W.C. — Date: 12/12/02

20-2903 12/74

ARIZONA DEPARTMENT OF TRANSPORTATION

HYDROLOGIC DESIGN DATA RECORD

RATIONAL METHOD

LOCATION DATA

Highway	Ray Road	County	Maricopa
Location	Ray Road east of the Eastern Canal		
Project No.	Town of Gilbert-	Station	38+88
Name of Stream	DA-7		

DESIGN DATA

Design Frequency		10	years
Drainage Area	A_1	0.337	acres
	A_2	0.129	acres
	A_3		acres
Drainage Length		312	feet
Elevation			
Top of Drainage Area		1272.69	feet
At Structure		1270.62	feet
Drainage Area Slope		0.6635	%
Precipitation			
P = 6-hour		1.9	inches
P = 24-hour		2.25	inches

DESIGN COMPUTATIONS

Precipation P_1 = 1-hour		1.45	inches
Time of Concentration	TC	4.48	minutes
Rainfall Intensity Fig. 3-2	I	4.9	inches / hour
Runoff Coefficient	C_1	0.911	
	C_2	0.7	
	C_3		
Weighted Runoff Coefficient	C	0.85	
Peak Discharge $Q_p = C_{iA}$ =		1.94	cfs

Computed by P.W.C. Date 12/12/02

20-2903 12/74

ARIZONA DEPARTMENT OF TRANSPORTATION

HYDROLOGIC DESIGN DATA RECORD

RATIONAL METHOD

LOCATION DATA

Highway: Ray Road — County: Maricopa

Location: Ray Road east of the Eastern Canal

Project No.: Town of Gilbert- — Station: 38+_88

Name of Stream: DA-8

DESIGN DATA

Design Frequency		10	years
Drainage Area	A_1	0.356	acres
	A_2	0.109	acres
	A_3		acres
Drainage Length		312	feet
Elevation			
Top of Drainage Area		1272.69	feet
At Structure		1270.62	feet
Drainage Area Slope		0.6635	%
Precipitation			
P = 6-hour		1.9	inches
P = 24-hour		2.25	inches

DESIGN COMPUTATIONS

Precipation P_1 = 1-hour		1.45	inches
Time of Concentration	TC	4.48	minutes
Rainfall Intensity Fig. 3-2	I	4.9	inches / hour
Runoff Coefficient	C_1	0.91	
	C_2	0.7	
	C_3		
Weighted Runoff Coefficient	C	0.86	
Peak Discharge $Q_p = C_{iA}$ =		1.96	cfs

Computed by P.W.C. — Date 12/12/02

20-2903 12/74

ARIZONA DEPARTMENT OF TRANSPORTATION

HYDROLOGIC DESIGN DATA RECORD

RATIONAL METHOD

LOCATION DATA

Highway	Ray Road	County	Maricopa
Location	Ray Road east of the Eastern Canal		
Project No.	Town of Gilbert-	Station	42+00
Name of Stream	DA-9		

DESIGN DATA

Design Frequency		10	years
Drainage Area	A_1	0.322	acres
	A_2	0.123	acres
	A_3		acres
Drainage Length		298	feet
Elevation			
Top of Drainage Area		1272.36	feet
At Structure		1271.64	feet
Drainage Area Slope		0.2416	%
Precipitation			
P = 6-hour		1.9	inches
P = 24-hour		2.25	inches

DESIGN COMPUTATIONS

Precipation P_1 = 1-hour		1.45	inches
Time of Concentration	TC	6.38	minutes
Rainfall Intensity Fig. 3-2	I	4.9	inches / hour
Runoff Coefficient	C_1	0.911	
	C_2	0.7	
	C_3		
Weighted Runoff Coefficient	C	0.852	
Peak Discharge $Q_p = C_{iA}$ =		1.86	cfs

Computed by P.W.C. Date 12/12/02

20-2903 12/74

ARIZONA DEPARTMENT OF TRANSPORTATION

HYDROLOGIC DESIGN DATA RECORD

RATIONAL METHOD

LOCATION DATA

Highway	Ray Road	County	Maricopa
Location	Ray Road east of the Eastern Canal		
Project No.	Town of Gilbert-	Station	42+00
Name of Stream	DA-10		

DESIGN DATA

Design Frequency		10	years
Drainage Area	A_1	0.322	acres
	A_2	0.123	acres
	A_3		acres
Drainage Length		298	feet
Elevation			
Top of Drainage Area		1272.36	feet
At Structure		1271.64	feet
Drainage Area Slope		0.2416	%
Precipitation			
P = 6-hour		1.9	inches
P = 24-hour		2.25	inches

DESIGN COMPUTATIONS

Precipation P_1 = 1-hour		1.45	inches
Time of Concentration	TC	6.38	minutes
Rainfall Intensity Fig. 3-2	I	4.9	inches / hour
Runoff Coefficient	C_1	0.911	
	C_2	0.7	
	C_3		
Weighted Runoff Coefficient	C	0.852	
Peak Discharge $Q_p = C_{iA}$ =		1.86	cfs

Computed by P.W.C. Date 12/12/02

20-2903 12/74

ARIZONA DEPARTMENT OF TRANSPORTATION

HYDROLOGIC DESIGN DATA RECORD

RATIONAL METHOD

LOCATION DATA

Highway: Ray Road — County: Maricopa

Location: Ray Road east of the Eastern Canal

Project No.: Town of Gilbert- — Station: 44+98

Name of Stream: DA-11

DESIGN DATA

Design Frequency		10	years
Drainage Area	A_1	0.543	acres
	A_2	0.121	acres
	A_3		acres
Drainage Length		292.21	feet
Elevation			
Top of Drainage Area		1274.4	feet
At Structure		1271.01	feet
Drainage Area Slope		1.1601	%
Precipitation			
P = 6-hour		1.9	inches
P = 24-hour		2.25	inches

DESIGN COMPUTATIONS

Precipation P_1 = 1-hour		1.45	inches
Time of Concentration	TC	3.43	minutes
Rainfall Intensity Fig. 3-2	I	4.9	inches / hour
Runoff Coefficient	C_1	0.906	
	C_2	0.7	
	C_3		
Weighted Runoff Coefficient	C	0.869	
Peak Discharge $Q_p = C_{iA}$ =		2.83	cfs

Computed by: P.W.C. — Date: 12/12/02

20-2903 12/74

ARIZONA DEPARTMENT OF TRANSPORTATION

HYDROLOGIC DESIGN DATA RECORD

RATIONAL METHOD

LOCATION DATA

Highway Ray Road County Maricopa

Location Ray Road east of the Eastern Canal

Project No. Town of Gilbert- Station 44+98

Name of Stream DA-12

DESIGN DATA

Design Frequency		10	years
Drainage Area	A_1	0.285	acres
	A_2	0.066	acres
	A_3		acres
Drainage Length		292.21	feet
Elevation			
Top of Drainage Area		1274.40	feet
At Structure		1271.31	feet
Drainage Area Slope		1.0575	%
Precipitation			
P = 6-hour		1.9	inches
P = 24-hour		2.25	inches

DESIGN COMPUTATIONS

Precipation P_1 = 1-hour		1.45	inches
Time of Concentration	TC	3.56	minutes
Rainfall Intensity Fig. 3-2	I	4.9	inches / hour
Runoff Coefficient	C_1	0.906	
	C_2	0.7	
	C_3		
Weighted Runoff Coefficient	C	0.87	
Peak Discharge $Q_p = C_{iA}$ =		1.49	cfs

Computed by P.W.C. Date 12/12/02

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ARIZONA DEPARTMENT OF TRANSPORTATION

HYDROLOGIC DESIGN DATA RECORD

RATIONAL METHOD

LOCATION DATA

Highway: Ray Road — County: Maricopa

Location: Ray Road east of the Eastern Canal

Project No. Town of Gilbert- — Station: 18+90 Greenfield Rd. S. of Ray

Name of Stream: DA-13

DESIGN DATA

Design Frequency		10	years
Drainage Area	A_1	0.192	acres
	A_2	0.007	acres
	A_3		acres
Drainage Length		124	feet
Elevation			
Top of Drainage Area		1273.13	feet
At Structure		1271.94	feet
Drainage Area Slope		0.9597	%
Precipitation			
P = 6-hour		1.9	inches
P = 24-hour		2.25	inches

DESIGN COMPUTATIONS

Precipation P_1 = 1-hour		1.45	inches
Time of Concentration	TC	1.91	minutes
Rainfall Intensity Fig. 3-2	I	4.9	inches / hour
Runoff Coefficient	C_1	0.902	
	C_2	0.7	
	C_3		
Weighted Runoff Coefficient	C	0.895	
Peak Discharge $Q_p = C_{iA}$ =		0.87	cfs

Computed by P.W.C. — Date 12/12/02

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ARIZONA DEPARTMENT OF TRANSPORTATION

HYDROLOGIC DESIGN DATA RECORD

RATIONAL METHOD

LOCATION DATA

Highway: Ray Road — County: Maricopa

Location: Ray Road east of the Eastern Canal

Project No.: Town of Gilbert- — Station: 4+22

Name of Stream: DA-13A

DESIGN DATA

Design Frequency		10	years
Drainage Area	A_1	0.138	acres
	A_2	0.000	acres
	A_3		acres
Drainage Length		100	feet
Elevation			
Top of Drainage Area		1273.13	feet
At Structure		1272.66	feet
Drainage Area Slope		0.4700	%
Precipitation			
P = 6-hour		1.9	inches
P = 24-hour		2.25	inches

DESIGN COMPUTATIONS

Precipation P_1 = 1-hour		1.45	inches
Time of Concentration	TC	2.13	minutes
Rainfall Intensity Fig. 3-2	I	4.9	inches / hour
Runoff Coefficient	C_1	0.9	
	C_2		
	C_3		
Weighted Runoff Coefficient	C	0.900	
Peak Discharge $Q_p = C_{iA}$ =		0.61	cfs

Computed by P.W.C. Date 12/12/02

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ARIZONA DEPARTMENT OF TRANSPORTATION

HYDROLOGIC DESIGN DATA RECORD

RATIONAL METHOD

LOCATION DATA

Highway	Ray Road	County	Maricopa
Location	Ray Road east of the Eastern Canal		
Project No.	Town of Gilbert-	Station	18+90 Greenfield Rd S. of Ray
Name of Stream	DA14		

DESIGN DATA

Design Frequency		10	years
Drainage Area	A_1	0.100	acres
	A_2	0.008	acres
	A_3		acres
Drainage Length		125	feet
Elevation			
Top of Drainage Area		1273.13	feet
At Structure		1271.82	feet
Drainage Area Slope		1.0480	%
Precipitation			
P = 6-hour		1.9	inches
P = 24-hour		2.25	inches

DESIGN COMPUTATIONS

Precipation P_1 = 1-hour		1.45	inches
Time of Concentration	TC	1.86	minutes
Rainfall Intensity Fig. 3-2	I	4.9	inches / hour
Runoff Coefficient	C_1	0.905	
	C_2	0.70	
	C_3		
Weighted Runoff Coefficient	C	0.89	
Peak Discharge $Q_p = C_{iA}$ =		0.47	cfs

Computed by P.W.C. Date 12/12/02

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ARIZONA DEPARTMENT OF TRANSPORTATION

HYDROLOGIC DESIGN DATA RECORD

RATIONAL METHOD

LOCATION DATA

Highway	Ray Road	County	Maricopa
Location	Ray Road east of the Eastern Canal		
Project No.	Town of Gilbert-	Station	7+11.20 Low Point
Name of Stream	DA-15		

DESIGN DATA

Design Frequency		10	years
Drainage Area	A_1	0.244	acres
	A_2	0.056	acres
	A_3		acres
Drainage Length		208	feet
Elevation			
Top of Drainage Area		1275.05	feet
At Structure		1274.51	feet
Drainage Area Slope		0.2596	%
Precipitation			
P = 6-hour		1.9	inches
P = 24-hour		2:25	inches

DESIGN COMPUTATIONS

Precipation P_1 = 1-hour		1.45	inches
Time of Concentration	TC	4.70	minutes
Rainfall Intensity Fig. 3-2	I	4.9	inches / hour
Runoff Coefficient	C_1	0.907	
	C_2	0.7	
	C_3		
Weighted Runoff Coefficient	C	0.869	
Peak Discharge $Q_p = C_{iA}$ =		1.28	cfs

Computed by P.W.C. Date 1/24/03

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ARIZONA DEPARTMENT OF TRANSPORTATION

HYDROLOGIC DESIGN DATA RECORD

RATIONAL METHOD

LOCATION DATA

Highway: Ray Road — County: Maricopa

Location: Ray Road east of the Eastern Canal

Project No.: Town of Gilbert- — Station: 7+11.20 Low Point

Name of Stream: DA-16

DESIGN DATA

Design Frequency		10	years
Drainage Area	A_1	0.180	acres
	A_2	0.069	acres
	A_3		acres
Drainage Length		208	feet
Elevation			
Top of Drainage Area		1272.8	feet
At Structure		1272.56	feet
Drainage Area Slope		0.1154	%
Precipitation			
P = 6-hour		1.9	inches
P = 24-hour		2.25	inches

DESIGN COMPUTATIONS

Precipation P_1 = 1-hour		1.45	inches
Time of Concentration	TC	6.43	minutes
Rainfall Intensity Fig. 3-2	I	4.9	inches / hour
Runoff Coefficient	C_1	0.911	
	C_2	0.7	
	C_3		
Weighted Runoff Coefficient	C	0.85	
Peak Discharge $Q_p = C_{iA}$ =		1.04	cfs

Computed by: P.W.C. — Date: 1/24/03

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ARIZONA DEPARTMENT OF TRANSPORTATION

HYDROLOGIC DESIGN DATA RECORD

RATIONAL METHOD

LOCATION DATA

Highway Ray Road — County Maricopa

Location Ray Road east of the Eastern Canal

Project No. Town of Gilbert- — Station 7+11.20 Low Point

Name of Stream DA-17

DESIGN DATA

Design Frequency		10	years
Drainage Area	A_1	0.275	acres
	A_2	0.105	acres
	A_3		acres
Drainage Length		253.57	feet
Elevation			
Top of Drainage Area		1276.7	feet
At Structure		1272.56	feet
Drainage Area Slope		1.6327	%
Precipitation			
P = 6-hour		1.9	inches
P = 24-hour		2.25	inches

DESIGN COMPUTATIONS

Precipation P_1 = 1-hour		1.45	inches
Time of Concentration	TC	2.70	minutes
Rainfall Intensity Fig. 3-2	I	4.9	inches / hour
Runoff Coefficient	C_1	0.911	
	C_2	0.7	
	C_3		
Weighted Runoff Coefficient	C	0.85	
Peak Discharge $Q_p = C_{iA}$ =		1.59	cfs

Computed by P.W.C. — Date 1/24/03

20-2903 12/74

ARIZONA DEPARTMENT OF TRANSPORTATION

HYDROLOGIC DESIGN DATA RECORD

RATIONAL METHOD

LOCATION DATA

Highway	Ray Road	County	Maricopa
Location	Ray Road east of the Eastern Canal		
Project No.	Town of Gilbert-	Station	7+11.20 Low Point
Name of Stream	DA-18		

DESIGN DATA

Design Frequency		10	years
Drainage Area	A_1	0.340	acres
	A_2	0.181	acres
	A_3		acres
Drainage Length		208	feet
Elevation			
Top of Drainage Area		1274.6	feet
At Structure		1272.56	feet
Drainage Area Slope		0.9808	%
Precipitation			
P = 6-hour		1.9	inches
P = 24-hour		2.25	inches

DESIGN COMPUTATIONS

Precipation P_1 = 1-hour		1.45	inches
Time of Concentration	TC	2.82	minutes
Rainfall Intensity Fig. 3-2	I	4.9	inches / hour
Runoff Coefficient	C_1	0.911	
	C_2	0.7	
	C_3		
Weighted Runoff Coefficient	C	0.85	
Peak Discharge $Q_p = C_{iA}$ =		2.17	cfs

Computed by P.W.C. Date 1/24/03

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ARIZONA DEPARTMENT OF TRANSPORTATION

HYDROLOGIC DESIGN DATA RECORD

RATIONAL METHOD

LOCATION DATA

Highway: Ray Road — County: Maricopa

Location: Ray Road east of the Eastern Canal

Project No.: Town of Gilbert- — Station: 9+70

Name of Stream: DA-19

DESIGN DATA

Design Frequency		10	years
Drainage Area	A_1	0.432	acres
	A_2	0.165	acres
	A_3		acres
Drainage Length		400	feet
Elevation			
Top of Drainage Area		1279.87	feet
At Structure		1274.99	feet
Drainage Area Slope		1.2200	%
Precipitation			
P = 6-hour		1.9	inches
P = 24-hour		2.25	inches

DESIGN COMPUTATIONS

Precipation P_1 = 1-hour		1.45	inches
Time of Concentration	TC	4.29	minutes
Rainfall Intensity Fig. 3-2	I	4.9	inches / hour
Runoff Coefficient	C_1	0.911	
	C_2	0.70	
	C_3		
Weighted Runoff Coefficient	C	0.852	
Peak Discharge $Q_p = C_{iA}$ =		2.49	cfs

Computed by: P.W.C. — Date: 12/13/02

20-2903 12/74

ARIZONA DEPARTMENT OF TRANSPORTATION

HYDROLOGIC DESIGN DATA RECORD

RATIONAL METHOD

LOCATION DATA

Highway	Ray Road	County	Maricopa
Location	Ray Road east of the Eastern Canal		
Project No.	Town of Gilbert-	Station	9+70
Name of Stream	DA-20		

DESIGN DATA

Design Frequency		10	years
Drainage Area	A_1	0.271	acres
	A_2	0.165	acres
	A_3		acres
Drainage Length		400	feet
Elevation			
Top of Drainage Area		1279.87	feet
At Structure		1274.90	feet
Drainage Area Slope		1.2425	%
Precipitation			
P = 6-hour		1.9	inches
P = 24-hour		2.25	inches

DESIGN COMPUTATIONS

Precipation P_1 = 1-hour		1.45	inches
Time of Concentration	TC	4.26	minutes
Rainfall Intensity Fig. 3-2	I	4.9	inches / hour
Runoff Coefficient	C_1	0.917	
	C_2	0.70	
	C_3		
Weighted Runoff Coefficient	C	0.835	
Peak Discharge $Q_p = C_{iA}$ =		1.78	cfs

Computed by P.W.C. Date 12/13/02

20-2903 12/74

ARIZONA DEPARTMENT OF TRANSPORTATION

HYDROLOGIC DESIGN DATA RECORD

RATIONAL METHOD

LOCATION DATA

Highway: Ray Road — County: Maricopa
Location: Ray Road east of the Eastern Canal
Project No.: Town of Gilbert- — Station: 13+70
Name of Stream: DA-21

DESIGN DATA

Design Frequency		10	years
Drainage Area	A_1	0.280	acres
	A_2	0.097	acres
	A_3		acres
Drainage Length		270	feet
Elevation			
Top of Drainage Area		1281.00	feet
At Structure		1278.82	feet
Drainage Area Slope		0.8074	%
Precipitation			
P = 6-hour		1.9	inches
P = 24-hour		2.25	inches

DESIGN COMPUTATIONS

Precipation P_1 = 1-hour		1.45	inches
Time of Concentration	TC	3.72	minutes
Rainfall Intensity Fig. 3-2	I	4.9	inches / hour
Runoff Coefficient	C_1	0.91	
	C_2	0.7	
	C_3		
Weighted Runoff Coefficient	C	0.856	
Peak Discharge $Q_p = C_{iA}$ =		1.58	cfs

Computed by P.W.C. — Date 12/13/02

20-2903 12/74

ARIZONA DEPARTMENT OF TRANSPORTATION

HYDROLOGIC DESIGN DATA RECORD

RATIONAL METHOD

LOCATION DATA

Highway Ray Road County Maricopa

Location Ray Road east of the Eastern Canal

Project No. Town of Gilbert- Station 13+70

Name of Stream DA-22

DESIGN DATA

Design Frequency		10	years
Drainage Area	A_1	0.223	acres
	A_2	0.093	acres
	A_3		acres
Drainage Length		240	feet
Elevation			
Top of Drainage Area		1281.00	feet
At Structure		1278.82	feet
Drainage Area Slope		0.9083	%
Precipitation			
P = 6-hour		1.9	inches
P = 24-hour		2.25	inches

DESIGN COMPUTATIONS

Precipation P_1 = 1-hour		1.45	inches
Time of Concentration	TC	3.24	minutes
Rainfall Intensity Fig. 3-2	I	4.9	inches / hour
Runoff Coefficient	C_1	0.91	
	C_2	0.7	
	C_3		
Weighted Runoff Coefficient	C	0.848	
Peak Discharge $Q_p = C_{iA}$ =		1.32	cfs

Computed by P.W.C. Date 12/13/02

20-2903 12/74

ARIZONA DEPARTMENT OF TRANSPORTATION

HYDROLOGIC DESIGN DATA RECORD

RATIONAL METHOD

LOCATION DATA

Highway: Ray Road — County: Maricopa

Location: Ray Road east of the Eastern Canal

Project No. Town of Gilbert- — Station: 17+70

Name of Stream: DA-23

DESIGN DATA

Design Frequency		10	years
Drainage Area	A_1	0.140	acres
	A_2	0.049	acres
	A_3		acres
Drainage Length		140	feet
Elevation			
Top of Drainage Area		1281.00	feet
At Structure		1279.33	feet
Drainage Area Slope		1.1929	%
Precipitation			
P = 6-hour		1.9	inches
P = 24-hour		2.25	inches

DESIGN COMPUTATIONS

Precipitation P_1 = 1-hour		1.45	inches
Time of Concentration	TC	1.93	minutes
Rainfall Intensity Fig. 3-2	I	4.9	inches / hour
Runoff Coefficient	C_1	0.911	
	C_2	0.7	
	C_3		
Weighted Runoff Coefficient	C	0.86	
Peak Discharge $Q_p = C_{iA}$ =		0.856	cfs

Computed by P.W.C. — Date 12/13/02

20-2903 12/74

ARIZONA DEPARTMENT OF TRANSPORTATION

HYDROLOGIC DESIGN DATA RECORD

RATIONAL METHOD

LOCATION DATA

Highway Ray Road County Maricopa

Location Ray Road east of the Eastern Canal

Project No. Town of Gilbert- Station 17+75

Name of Stream DA-24

DESIGN DATA

Design Frequency		10	years
Drainage Area	A_1	0.210	acres
	A_2	0.083	acres
	A_3		acres
Drainage Length		195	feet
Elevation			
Top of Drainage Area		1281.00	feet
At Structure		1280.55	feet
Drainage Area Slope		0.2308	%
Precipitation			
P = 6-hour		1.9	inches
P = 24-hour		2.25	inches

DESIGN COMPUTATIONS

Precipation P_1 = 1-hour		1.45	inches
Time of Concentration	TC	4.68	minutes
Rainfall Intensity Fig. 3-2	I	4.9	inches / hour
Runoff Coefficient	C_1	0.911	
	C_2	0.7	
	C_3		
Weighted Runoff Coefficient	C	0.85	
Peak Discharge $Q_p = C_{iA}$ =		1.22	cfs

Computed by P.W.C. Date 12/13/02

20-2903 12/74

ARIZONA DEPARTMENT OF TRANSPORTATION

HYDROLOGIC DESIGN DATA RECORD

RATIONAL METHOD

LOCATION DATA

Highway Ray Road County Maricopa

Location Relocated Greenfield Road North of Ray Road

Project No. Town of Gilbert- Station 21+00

Name of Stream DA-25

DESIGN DATA

Design Frequency		50	years
Drainage Area	A_1	0.075	acres
	A_2	0.009	acres
	A_3		acres
Drainage Length		110	feet
Elevation			
Top of Drainage Area		1273.70	feet
At Structure		1272.79	feet
Drainage Area Slope		0.8273	%
Precipitation			
P = 6-hour		2.6	inches
P = 24-hour		3.2	inches

DESIGN COMPUTATIONS

Precipation P_1 = 1-hour		2.3	inches
Time of Concentration	TC	1.84	minutes
Rainfall Intensity Fig. 3-2	I	7.20	inches / hour
Runoff Coefficient	C_1	0.904	
	C_2	0.7	
	C_3		
Weighted Runoff Coefficient	C	0.883	
Peak Discharge $Q_p = C_{iA}$ =		0.53	cfs

Computed by P.W.C. Date 12/13/02

20-2903 12/74

INCA ENGINEERS INC

SUMP CURB OPENING INLET CAPACITY

Site:	GILBERT ROAD
Location:	GILBERT, ARIZONA
Description:	Calculation of ADOT Std. Det. C-15.20 Catch Basin in a sump - Depressed Inlet
References:	Town of Gilbert Standard Details MAG Supplement Article XII, ADOT Roadway Design Guidelines Chapter 600
Concentration Point:	**DA-26**
Date:	1/23/03

Known Values:

Longitudinal Slope (S)	**0.0080**	ft/ft	
Flow from Catchment (Q)	**0.61**	cfs	
Carryover from Previous Inlet (Qc)	**0.00**	cfs	**From DA-30**
Sump (ds)	**0.25**	ft	
Clogging Factor (Fr)	**0.80**		
Width of Depression (W)	**1.42**	ft	
Manning's Coefficient (n)	**0.015**		
Cross-Slope of Street (Sx)	**0.005**	ft/ft	

Calculated Values:

Referenced Equations:

$L_T = ((Q+Qc / (C_w d^{1.5} Fr))-1.8W)$

$Q_i = C_w(L+1.8W)d^{1.5} x Fr$

where L_T = Length of Curb Opening to Intercept Entire Flow (ft) Based on the Greater of d or ds.

d = Depth Approaching Catch Basin at Normal Slope (ft)

ds = Depth of Sump (ft)

L = Design Length of Curb Opening (ft)

Fr = Clogging Factor

C_w = 2.3 (Weir Coefficient)

W = Width of Depression (ft)

Q_i = Interception Capacity of Inlet (cfs)

Total Flow Approaching Catch Basin (Q+Qc):	0.61	cfs	
Depth of Flow in Approaching Gutter (d):	0.16	ft	**Flowmaster**
Greater of d or ds:	0.25		
Length of Curb Opening to Intercept Entire Flow (L_T):	0.10	ft	
Design Length of Curb Opening (L):	3.00	ft	
Interception Capacity of Inlet (Qi):	1.28	cfs	
Bypassed by Current Inlet (Q+Qc-Qi):	0.00	cfs	

ARIZONA DEPARTMENT OF TRANSPORTATION

HYDROLOGIC DESIGN DATA RECORD

RATIONAL METHOD

LOCATION DATA

Highway Ray Road County Maricopa

Location Relocated Greenfield Road North of Ray Road

Project No. Town of Gilbert- Station 23+40

Name of Stream DA-27

DESIGN DATA

Design Frequency		50	years
Drainage Area	A_1	0.259	acres
	A_2	0.099	acres
	A_3		acres
Drainage Length		240	feet
Elevation			
Top of Drainage Area		1273.72	feet
At Structure		1266.29	feet
Drainage Area Slope		3.0958	%
Precipitation			
P = 6-hour		2.6	inches
P = 24-hour		3.2	inches

DESIGN COMPUTATIONS

Precipation P_1 = 1-hour		2.3	inches
Time of Concentration	TC	2.02	minutes
Rainfall Intensity Fig. 3-2	I	7.2	inches / hour
Runoff Coefficient	C_1	0.911	
	C_2	0.7	
	C_3		
Weighted Runoff Coefficient	C	0.852	
Peak Discharge $Q_p = C_{iA}$ =		2.20	cfs

Computed by P.W.C. Date 12/13/02

20-2903 12/74

ARIZONA DEPARTMENT OF TRANSPORTATION

HYDROLOGIC DESIGN DATA RECORD

RATIONAL METHOD

LOCATION DATA

Highway: Ray Road   County: Maricopa

Location: Relocated Greenfield Road North of Ray Road

Project No. Town of Gilbert-   Station: 23+40

Name of Stream: DA-28

DESIGN DATA

Design Frequency		50	years
Drainage Area	A_1	0.471	acres
	A_2	0.103	acres
	A_3		acres
Drainage Length		240	feet
Elevation			
Top of Drainage Area		1273.41	feet
At Structure		1266.79	feet
Drainage Area Slope		2.7583	%
Precipitation			
P = 6-hour		2.6	inches
P = 24-hour		3.2	inches

DESIGN COMPUTATIONS

Precipation P_1 = 1-hour		2.3	inches
Time of Concentration	TC	2.11	minutes
Rainfall Intensity Fig. 3-2	I	7.2	inches / hour
Runoff Coefficient	C_1	0.906	
	C_2	0.7	
	C_3		
Weighted Runoff Coefficient	C	0.87	
Peak Discharge $Q_p = C_{iA}$ =		3.59	cfs

Computed by: P.W.C.   Date: 12/13/02

20-2903 12/74

ARIZONA DEPARTMENT OF TRANSPORTATION

HYDROLOGIC DESIGN DATA RECORD

RATIONAL METHOD

LOCATION DATA

Highway Ray Road County Maricopa

Location Relocated Greenfield Road North of Ray Road

Project No. Town of Gilbert- Station 26+40

Name of Stream DA-29

DESIGN DATA

Design Frequency		50	years
Drainage Area	A_1	0.324	acres
	A_2	0.124	acres
	A_3		acres
Drainage Length		300	feet
Elevation			
Top of Drainage Area		1266.99	feet
At Structure		1255.59	feet
Drainage Area Slope		3.8000	%
Precipitation			
P = 6-hour		2.6	inches
P = 24-hour		3.2	inches

DESIGN COMPUTATIONS

Precipation P_1 = 1-hour		2.3	inches
Time of Concentration	TC	2.22	minutes
Rainfall Intensity Fig. 3-2	I	7.2	inches / hour
Runoff Coefficient	C_1	0.911	
	C_2	0.7	
	C_3		
Weighted Runoff Coefficient	C	0.85	
Peak Discharge $Q_p = C_{iA}$ =		2.75	cfs

Computed by P.W.C. Date 12/13/02

20-2903 12/74

ARIZONA DEPARTMENT OF TRANSPORTATION

HYDROLOGIC DESIGN DATA RECORD

RATIONAL METHOD

LOCATION DATA

Highway Ray Road County Maricopa

Location Relocated Greenfield Road North of Ray Road

Project No. Town of Gilbert- Station 27+65

Name of Stream DA-30

DESIGN DATA

Design Frequency		50	years
Drainage Area	A_1	0.459	acres
	A_2	0.191	acres
	A_3		acres
Drainage Length		425	feet
Elevation			
Top of Drainage Area		1268.93	feet
At Structure		1254.24	feet
Drainage Area Slope		3.4565	%
Precipitation			
P = 6-hour		2.6	inches
P = 24-hour		3.2	inches

DESIGN COMPUTATIONS

Precipation P_1 = 1-hour		2.3	inches
Time of Concentration	TC	3.01	minutes
Rainfall Intensity Fig. 3-2	I	7.2	inches / hour
Runoff Coefficient	C_1	0.911	
	C_2	0.700	
	C_3		
Weighted Runoff Coefficient	C	0.85	
Peak Discharge $Q_p = C_{iA}$ =		3.97	cfs

Computed by P.W.C. Date 12/13/02

20-2903 12/74

ARIZONA DEPARTMENT OF TRANSPORTATION

HYDROLOGIC DESIGN DATA RECORD

RATIONAL METHOD

LOCATION DATA

Highway: Ray Road — County: Maricopa

Location: Relocated Greenfield Road North of Ray Road

Project No.: Town of Gilbert- — Station: 27+70

Name of Stream: DA-31

DESIGN DATA

Design Frequency		50	years
Drainage Area	A_1	0.135	acres
	A_2	0.052	acres
	A_3		acres
Drainage Length		130	feet
Elevation			
Top of Drainage Area		1256.83	feet
At Structure		1252.76	feet
Drainage Area Slope		3.1308	%
Precipitation			
P = 6-hour		2.6	inches
P = 24-hour		3.2	inches

DESIGN COMPUTATIONS

Precipation P_1 = 1-hour		2.3	inches
Time of Concentration	TC	1.26	minutes
Rainfall Intensity Fig. 3-2	I	7.2	inches / hour
Runoff Coefficient	C_1	0.911	
	C_2	0.7	
	C_3		
Weighted Runoff Coefficient	C	0.93	
Peak Discharge $Q_p = C_{iA}$ =		1.25	cfs

Computed by: P.W.C. — Date: 12/13/02

20-2903 12/74

ARIZONA DEPARTMENT OF TRANSPORTATION

HYDROLOGIC DESIGN DATA RECORD

RATIONAL METHOD

LOCATION DATA

Highway	Ray Road	County	Maricopa
Location	Relocated Greenfield Road North of Ray Road		
Project No.	Town of Gilbert-	Station	29+59.61
Name of Stream	DA-33	Low Point	

DESIGN DATA

Design Frequency		50	years
Drainage Area	A_1	0.243	acres
	A_2	0.093	acres
	A_3		acres
Drainage Length		194.61	feet
Elevation			
Top of Drainage Area		1256.19	feet
At Structure		1251.42	feet
Drainage Area Slope		2.4511	%
Precipitation			
P = 6-hour		2.6	inches
P = 24-hour		3.2	inches

DESIGN COMPUTATIONS

Precipation P_1 = 1-hour		2.3	inches
Time of Concentration	TC	1.88	minutes
Rainfall Intensity Fig. 3-2	I	7.2	inches / hour
Runoff Coefficient	C_1	0.911	
	C_2	0.7	
	C_3		
Weighted Runoff Coefficient	C	0.85	
Peak Discharge $Q_p = C_{iA}$ =		2.06	cfs

Computed by P.W.C. Date 12/13/02

20-2903 12/74

ARIZONA DEPARTMENT OF TRANSPORTATION

HYDROLOGIC DESIGN DATA RECORD

RATIONAL METHOD

LOCATION DATA

Highway Ray Road County Maricopa

Location Relocated Greenfield Road North of Ray Road

Project No. Town of Gilbert- Station 25+52.86

Name of Stream DA-34

DESIGN DATA

Design Frequency		50	years
Drainage Area	A_1	0.243	acres
	A_2	0.165	acres
	A_3		acres
Drainage Length		194.61	feet
Elevation			
Top of Drainage Area		1255.6	feet
At Structure		1252.91	feet
Drainage Area Slope		1.3823	%
Precipitation			
P = 6-hour		2.6	inches
P = 24-hour		3.2	inches

DESIGN COMPUTATIONS

Precipation P_1 = 1-hour		2.3	inches
Time of Concentration	TC	2.35	minutes
Rainfall Intensity Fig. 3-2	I	7.2	inches / hour
Runoff Coefficient	C_1	0.911	
	C_2	0.7	
	C_3		
Weighted Runoff Coefficient	C	0.83	
Peak Discharge $Q_p = C_{iA}$ =		2.42	cfs

Computed by P.W.C. Date 12/13/02

20-2903 12/74

ARIZONA DEPARTMENT OF TRANSPORTATION

HYDROLOGIC DESIGN DATA RECORD

RATIONAL METHOD

LOCATION DATA

Highway	Ray Road	County	Maricopa
Location	Relocated Greenfield Road North of Ray Road		
Project No.	Town of Gilbert-	Station	25+52.86
Name of Stream	DA-35		

DESIGN DATA

Design Frequency		50	years
Drainage Area	A_1	0.329	acres
	A_2	0.126	acres
	A_3		acres
Drainage Length		335.39	feet
Elevation			
Top of Drainage Area		1257.34	feet
At Structure		1251.42	feet
Drainage Area Slope		1.7651	%
Precipitation			
P = 6-hour		2.6	inches
P = 24-hour		3.2	inches

DESIGN COMPUTATIONS

Precipation P_1 = 1-hour		2.3	inches
Time of Concentration	TC	3.25	minutes
Rainfall Intensity Fig. 3-2	I	7.2	inches / hour
Runoff Coefficient	C_1	0.911	
	C_2	0.7	
	C_3		
Weighted Runoff Coefficient	C	0.85	
Peak Discharge $Q_p = C_{iA}$ =		2.79	cfs

Computed by P.W.C. Date 12/13/02

20-2903 12/74

ARIZONA DEPARTMENT OF TRANSPORTATION

HYDROLOGIC DESIGN DATA RECORD

RATIONAL METHOD

LOCATION DATA

Highway: Ray Road — County: Maricopa

Location: Relocated Greenfield Road North of Ray Road

Project No. Town of Gilbert- — Station: 29+59.61

Name of Stream: DA-36

DESIGN DATA

Design Frequency		50	years
Drainage Area	A_1	0.452	acres
	A_2	0.177	acres
	A_3		acres
Drainage Length		335.39	feet
Elevation			
Top of Drainage Area		1258.64	feet
At Structure		1252.91	feet
Drainage Area Slope		1.7085	%
Precipitation			
P = 6-hour		2.6	inches
P = 24-hour		3.2	inches

DESIGN COMPUTATIONS

Precipation P_1 = 1-hour		2.3	inches
Time of Concentration	TC	3.29	minutes
Rainfall Intensity Fig. 3-2	I	7.2	inches / hour
Runoff Coefficient	C_1	0.911	
	C_2	0.7	
	C_3		
Weighted Runoff Coefficient	C	0.85	
Peak Discharge $Q_p = C_{iA}$ =		3.86	cfs

Computed by: P.W.C. — Date: 12/13/02

20-2903 12/74

ARIZONA DEPARTMENT OF TRANSPORTATION

HYDROLOGIC DESIGN DATA RECORD

RATIONAL METHOD

LOCATION DATA

Highway	Ray Road	County	Maricopa
Location	Relocated Greenfield Road North of Ray Road		
Project No.	Town of Gilbert-	Station	32+95
Name of Stream	DA-37		

DESIGN DATA

Design Frequency		50	years
Drainage Area	A_1	0.259	acres
	A_2	0.099	acres
	A_3		acres
Drainage Length		240	feet
Elevation			
Top of Drainage Area		1264.75	feet
At Structure		1255.6	feet
Drainage Area Slope		3.8125	%
Precipitation			
P = 6-hour		2.6	inches
P = 24-hour		3.2	inches

DESIGN COMPUTATIONS

Precipation P_1 = 1-hour		2.3	inches
Time of Concentration	TC	1.87	minutes
Rainfall Intensity Fig. 3-2	I	7.2	inches / hour
Runoff Coefficient	C_1	0.911	
	C_2	0.7	
	C_3		
Weighted Runoff Coefficient	C	0.85	
Peak Discharge $Q_p = C_{iA}$ =		2.20	cfs

Computed by P.W.C. Date 12/13/02

20-2903 12/74

ARIZONA DEPARTMENT OF TRANSPORTATION

HYDROLOGIC DESIGN DATA RECORD

RATIONAL METHOD

LOCATION DATA

Highway Ray Road County Maricopa

Location Relocated Greenfield Road North of Ray Road

Project No. Town of Gilbert- Station 32+95

Name of Stream DA-38

DESIGN DATA

Design Frequency		50	years
Drainage Area	A_1	0.260	acres
	A_2	0.099	acres
	A_3		acres
Drainage Length		240	feet
Elevation			
Top of Drainage Area		1262.6	feet
At Structure		1257.09	feet
Drainage Area Slope		2.2958	%
Precipitation			
P = 6-hour		2.6	inches
P = 24-hour		3.2	inches

DESIGN COMPUTATIONS

Precipation P_1 = 1-hour		2.3	inches
Time of Concentration	TC	2.27	minutes
Rainfall Intensity Fig. 3-2	I	7.2	inches / hour
Runoff Coefficient	C_1	0.911	
	C_2	0.7	
	C_3		
Weighted Runoff Coefficient	C	0.85	
Peak Discharge $Q_p = C_{iA}$ =		2.20	cfs

Computed by P.W.C. Date 12/13/02

20-2903 12/74

ARIZONA DEPARTMENT OF TRANSPORTATION

HYDROLOGIC DESIGN DATA RECORD

RATIONAL METHOD

LOCATION DATA

Highway Ray Road County Maricopa

Location Relocated Greenfield Road North of Ray Road

Project No. Town of Gilbert- Station 35+35

Name of Stream DA-39

DESIGN DATA

Design Frequency		50	years
Drainage Area	A_1	0.275	acres
	A_2	0.105	acres
	A_3		acres
Drainage Length		255	feet
Elevation			
Top of Drainage Area		1271.13	feet
At Structure		1263.33	feet
Drainage Area Slope		3.0588	%
Precipitation			
P = 6-hour		2.6	inches
P = 24-hour		3.2	inches

DESIGN COMPUTATIONS

Precipation P_1 = 1-hour		2.3	inches
Time of Concentration	TC	2.13	minutes
Rainfall Intensity Fig. 3-2	I	7.2	inches / hour
Runoff Coefficient	C_1	0.911	
	C_2	0.7	
	C_3		
Weighted Runoff Coefficient	C	0.85	
Peak Discharge $Q_p = C_{iA}$ =		2.33	cfs

Computed by P.W.C. Date 12/13/02

20-2903 12/74

ARIZONA DEPARTMENT OF TRANSPORTATION

HYDROLOGIC DESIGN DATA RECORD

RATIONAL METHOD

LOCATION DATA

Highway: Ray Road — County: Maricopa

Location: Relocated Greenfield Road North of Ray Road

Project No. Town of Gilbert- — Station: 35+35

Name of Stream: DA-40

DESIGN DATA

Design Frequency		50	years
Drainage Area	A_1	0.275	acres
	A_2	0.105	acres
	A_3		acres
Drainage Length		255	feet
Elevation			
Top of Drainage Area		1269.64	feet
At Structure		1262.45	feet
Drainage Area Slope		2.8196	%
Precipitation			
P = 6-hour		2.6	inches
P = 24-hour		3.2	inches

DESIGN COMPUTATIONS

Precipation P_1 = 1-hour		2.3	inches
Time of Concentration	TC	2.20	minutes
Rainfall Intensity Fig. 3-2	I	7.2	inches / hour
Runoff Coefficient	C_1	0.911	
	C_2	0.7	
	C_3		
Weighted Runoff Coefficient	C	0.85	
Peak Discharge $Q_p = C_{iA}$ =		2.33	cfs

Computed by P.W.C. — Date 12/13/02

20-2903 12/74

ARIZONA DEPARTMENT OF TRANSPORTATION

HYDROLOGIC DESIGN DATA RECORD

RATIONAL METHOD

LOCATION DATA

Highway: Ray Road — County: Maricopa

Location: Relocated Greenfield Road North of Ray Road

Project No.: Town of Gilbert- — Station: 37+90

Name of Stream: DA-41

DESIGN DATA

Design Frequency		50	years
Drainage Area	A_1	0.281	acres
	A_2	0.107	acres
	A_3		acres
Drainage Length		260	feet
Elevation			
Top of Drainage Area		1275.13	feet
At Structure		1269.32	feet
Drainage Area Slope		2.2346	%
Precipitation			
P = 6-hour		2.6	inches
P = 24-hour		3.2	inches

DESIGN COMPUTATIONS

Precipation P_1 = 1-hour		2.3	inches
Time of Concentration	TC	2.44	minutes
Rainfall Intensity Fig. 3-2	I	7.2	inches / hour
Runoff Coefficient	C_1	0.911	
	C_2	0.7	
	C_3		
Weighted Runoff Coefficient	C	0.85	
Peak Discharge $Q_p = C_{iA}$ =		2.38	cfs

Computed by: P.W.C. — Date: 12/13/02

20-2903 12/74

ARIZONA DEPARTMENT OF TRANSPORTATION

HYDROLOGIC DESIGN DATA RECORD

RATIONAL METHOD

LOCATION DATA

Highway: Ray Road — County: Maricopa

Location: Relocated Greenfield Road North of Ray Road

Project No. Town of Gilbert- — Station: 37+90

Name of Stream: DA-42

DESIGN DATA

Design Frequency		50	years
Drainage Area	A_1	0.281	acres
	A_2	0.107	acres
	A_3		acres
Drainage Length		260	feet
Elevation			
Top of Drainage Area		1273.64	feet
At Structure		1267.8	feet
Drainage Area Slope		2.2462	%
Precipitation			
P = 6-hour		2.6	inches
P = 24-hour		3.2	inches

DESIGN COMPUTATIONS

Precipation P_1 = 1-hour		2.3	inches
Time of Concentration	TC	2.43	minutes
Rainfall Intensity Fig. 3-2	I	7.2	inches / hour
Runoff Coefficient	C_1	0.911	
	C_2	0.7	
	C_3		
Weighted Runoff Coefficient	C	0.85	
Peak Discharge $Q_p = C_{iA}$ =		2.38	cfs

Computed by P.W.C. — Date 12/13/02

20-2903 12/74

ARIZONA DEPARTMENT OF TRANSPORTATION

HYDROLOGIC DESIGN DATA RECORD

RATIONAL METHOD

LOCATION DATA

Highway	Ray Road	County	Maricopa
Location	Relocated Greenfield Road North of Ray Road		
Project No.	Town of Gilbert-	Station	40+50
Name of Stream	DA-43		

DESIGN DATA

Design Frequency		50	years
Drainage Area	A_1	0.162	acres
	A_2	0.062	acres
	A_3		acres
Drainage Length		150	feet
Elevation			
Top of Drainage Area		1276.66	feet
At Structure		1273.64	feet
Drainage Area Slope		2.0133	%
Precipitation			
P = 6-hour		2.6	inches
P = 24-hour		3.2	inches

DESIGN COMPUTATIONS

Precipation P_1 = 1-hour		2.3	inches
Time of Concentration	TC	1.66	minutes
Rainfall Intensity Fig. 3-2	I	7.2	inches / hour
Runoff Coefficient	C_1	0.911	
	C_2	0.7	
	C_3		
Weighted Runoff Coefficient	C	0.85	
Peak Discharge $Q_p = C_{iA}$ =		1.37	cfs

Computed by P.W.C. Date 12/13/02

20-2903 12/74

ARIZONA DEPARTMENT OF TRANSPORTATION

HYDROLOGIC DESIGN DATA RECORD

RATIONAL METHOD

LOCATION DATA

Highway: Ray Road — County: Maricopa

Location: Relocated Greenfield Road North of Ray Road

Project No.: Town of Gilbert- — Station: 25+52.86

Name of Stream: DA-44

DESIGN DATA

Design Frequency		50	years
Drainage Area	A_1	0.162	acres
	A_2	0.062	acres
	A_3		acres
Drainage Length		150	feet
Elevation			
Top of Drainage Area		1275.18	feet
At Structure		1272.07	feet
Drainage Area Slope		2.0733	%
Precipitation			
P = 6-hour		2.6	inches
P = 24-hour		3.2	inches

DESIGN COMPUTATIONS

Precipation P_1 = 1-hour		2.3	inches
Time of Concentration	TC	1.64	minutes
Rainfall Intensity Fig. 3-2	I	7.2	inches / hour
Runoff Coefficient	C_1	0.911	
	C_2	0.7	
	C_3		
Weighted Runoff Coefficient	C	0.85	
Peak Discharge $Q_p = C_{iA}$ =		1.37	cfs

Computed by P.W.C. — Date 12/13/02

20-2903 12/74

ARIZONA DEPARTMENT OF TRANSPORTATION

HYDROLOGIC DESIGN DATA RECORD

RATIONAL METHOD

LOCATION DATA

Highway	Ray Road	County	Maricopa
Location	Relocated Greenfield Road North of Ray Road		
Project No.	Town of Gilbert-	Station	25+52.86
Name of Stream	DA-45		

DESIGN DATA

Design Frequency		50	years
Drainage Area	A_1	0.200	acres
	A_2	0.076	acres
	A_3		acres
Drainage Length		417.14	feet
Elevation			
Top of Drainage Area		1269.98	feet
At Structure		1267.89	feet
Drainage Area Slope		0.5010	%
Precipitation			
P = 6-hour		2.6	inches
P = 24-hour		3.2	inches

DESIGN COMPUTATIONS

Precipation P_1 = 1-hour		2.3	inches
Time of Concentration	TC	6.24	minutes
Rainfall Intensity Fig. 3-2	I	7.2	inches / hour
Runoff Coefficient	C_1	0.911	
	C_2	0.7	
	C_3		
Weighted Runoff Coefficient	C	0.85	
Peak Discharge $Q_p = C_{iA}$ =		1.69	cfs

Computed by P.W.C. Date 12/13/02

20-2903 12/74

ARIZONA DEPARTMENT OF TRANSPORTATION

HYDROLOGIC DESIGN DATA RECORD

RATIONAL METHOD

LOCATION DATA

Highway: Ray Road County: Maricopa

Location: Relocated Greenfield Road North of Ray Road

Project No.: Town of Gilbert- Station: 42+00

Name of Stream: DA-46

DESIGN DATA

Design Frequency		50	years
Drainage Area	A_1	0.200	acres
	A_2	0.076	acres
	A_3		acres
Drainage Length		185	feet
Elevation			
Top of Drainage Area		1276.26	feet
At Structure		1273.54	feet
Drainage Area Slope		1.4703	%
Precipitation			
P = 6-hour		2.6	inches
P = 24-hour		3.2	inches

DESIGN COMPUTATIONS

Precipation P_1 = 1-hour		2.3	inches
Time of Concentration	TC	2.20	minutes
Rainfall Intensity Fig. 3-2	I	7.2	inches / hour
Runoff Coefficient	C_1	0.911	
	C_2	0.7	
	C_3		
Weighted Runoff Coefficient	C	0.85	
Peak Discharge $Q_p = C_{iA}$ =		1.69	cfs

Computed by P.W.C. Date 12/13/02

20-2903 12/74

ARIZONA DEPARTMENT OF TRANSPORTATION

HYDROLOGIC DESIGN DATA RECORD

RATIONAL METHOD

LOCATION DATA

Highway	Ray Road	County	Maricopa
Location	Relocated Greenfield Road North of Ray Road		
Project No.	Town of Gilbert-	Station	44+50
Name of Stream	DA-47		

DESIGN DATA

Design Frequency		50	years
Drainage Area	A_1	0.302	acres
	A_2	0.116	acres
	A_3		acres
Drainage Length		220	feet
Elevation			
Top of Drainage Area		1277.95	feet
At Structure		1274.56	feet
Drainage Area Slope		1.5409	%
Precipitation			
P = 6-hour		2.6	inches
P = 24-hour		3.2	inches

DESIGN COMPUTATIONS

Precipation P_1 = 1-hour		2.3	inches
Time of Concentration	TC	2.47	minutes
Rainfall Intensity Fig. 3-2	I	7.2	inches / hour
Runoff Coefficient	C_1	0.911	
	C_2	0.7	
	C_3		
Weighted Runoff Coefficient	C	0.85	
Peak Discharge $Q_p = C_{iA}$ =		2.56	cfs

Computed by P.W.C. Date 12/13/02

20-2903 12/74

ARIZONA DEPARTMENT OF TRANSPORTATION

HYDROLOGIC DESIGN DATA RECORD

RATIONAL METHOD

LOCATION DATA

Highway: Ray Road   County: Maricopa

Location: Relocated Greenfield Road North of Ray Road

Project No.: Town of Gilbert-   Station: 43+85

Name of Stream: DA-48

DESIGN DATA

Design Frequency		50	years
Drainage Area	A_1	0.302	acres
	A_2	0.116	acres
	A_3		acres
Drainage Length		225	feet
Elevation			
Top of Drainage Area		1277.3	feet
At Structure		1274.56	feet
Drainage Area Slope		1.2178	%
Precipitation			
P = 6-hour		2.6	inches
P = 24-hour		3.2	inches

DESIGN COMPUTATIONS

Precipation P_1 = 1-hour		2.3	inches
Time of Concentration	TC	2.76	minutes
Rainfall Intensity Fig. 3-2	I	7.2	inches / hour
Runoff Coefficient	C_1	0.911	
	C_2	0.7	
	C_3		
Weighted Runoff Coefficient	C	0.85	
Peak Discharge $Q_p = C_{iA}$ =		2.56	cfs

Computed by: P.W.C.   Date: 12/13/02

20-2903 12/74

ARIZONA DEPARTMENT OF TRANSPORTATION

HYDROLOGIC DESIGN DATA RECORD

RATIONAL METHOD

LOCATION DATA

Highway	Ray Road	County	Maricopa
Location	Relocated Greenfield Road North of Ray Road		
Project No.	Town of Gilbert-	Station	46+65
Name of Stream	DA-49		

DESIGN DATA

Design Frequency		50	years
Drainage Area	A_1	0.127	acres
	A_2	0.049	acres
	A_3		acres
Drainage Length		118	feet
Elevation			
Top of Drainage Area		1278.95	feet
At Structure		1277.36	feet
Drainage Area Slope		1.3475	%
Precipitation			
P = 6-hour		2.6	inches
P = 24-hour		3.2	inches

DESIGN COMPUTATIONS

Precipation P_1 = 1-hour		2.3	inches
Time of Concentration	TC	1.61	minutes
Rainfall Intensity Fig. 3-2	I	7.2	inches / hour
Runoff Coefficient	C_1	0.911	
	C_2	0.7	
	C_3		
Weighted Runoff Coefficient	C	0.85	
Peak Discharge $Q_p = C_{iA}$ =		1.08	cfs

Computed by P.W.C. Date 12/13/02

20-2903 12/74

ARIZONA DEPARTMENT OF TRANSPORTATION

HYDROLOGIC DESIGN DATA RECORD

RATIONAL METHOD

LOCATION DATA

Highway	Ray Road	County	Maricopa
Location	Relocated Greenfield Road North of Ray Road		
Project No.	Town of Gilbert-	Station	46+65
Name of Stream	DA-50		

DESIGN DATA

Design Frequency		50	years
Drainage Area	A_1	0.127	acres
	A_2	0.049	acres
	A_3		acres
Drainage Length		118	feet
Elevation			
Top of Drainage Area		1277.47	feet
At Structure		1275.84	feet
Drainage Area Slope		1.3814	%
Precipitation			
P = 6-hour		2.6	inches
P = 24-hour		3.2	inches

DESIGN COMPUTATIONS

Precipation P_1 = 1-hour		2.3	inches
Time of Concentration	TC	1.60	minutes
Rainfall Intensity Fig. 3-2	I	7.2	inches / hour
Runoff Coefficient	C_1	0.911	
	C_2	0.7	
	C_3		
Weighted Runoff Coefficient	C	0.85	
Peak Discharge $Q_p = C_{iA}$ =		1.08	cfs

Computed by P.W.C. Date 12/13/02

20-2903 12/74

ARIZONA DEPARTMENT OF TRANSPORTATION

HYDROLOGIC DESIGN DATA RECORD

RATIONAL METHOD

LOCATION DATA

Highway	Ray Road	County	Maricopa
Location	Relocated Greenfield Road North of Ray Road		
Project No.	Town of Gilbert-	Station	50+34.14
Name of Stream	DA-51		

DESIGN DATA

Design Frequency		50	years
Drainage Area	A_1	0.272	acres
	A_2	0.104	acres
	A_3		acres
Drainage Length		255	feet
Elevation			
Top of Drainage Area		1277.47	feet
At Structure		1275.37	feet
Drainage Area Slope		0.8235	%
Precipitation			
P = 6-hour		2.6	inches
P = 24-hour		3.2	inches

DESIGN COMPUTATIONS

Precipation P_1 = 1-hour		2.3	inches
Time of Concentration	TC	3.53	minutes
Rainfall Intensity Fig. 3-2	I	7.2	inches / hour
Runoff Coefficient	C_1	0.911	
	C_2	0.7	
	C_3		
Weighted Runoff Coefficient	C	0.85	
Peak Discharge $Q_p = C_{iA}$ =		2.31	cfs

Computed by P.W.C. Date 12/13/02

20-2903 12/74

ARIZONA DEPARTMENT OF TRANSPORTATION

HYDROLOGIC DESIGN DATA RECORD

RATIONAL METHOD

LOCATION DATA

Highway: Ray Road — County: Maricopa

Location: Relocated Greenfield Road North of Ray Road

Project No.: Town of Gilbert- — Station: 50+34.14

Name of Stream: DA-52

DESIGN DATA

Design Frequency		50	years
Drainage Area	A_1	0.272	acres
	A_2	0.104	acres
	A_3		acres
Drainage Length		255	feet
Elevation			
Top of Drainage Area		1277.47	feet
At Structure		1275.37	feet
Drainage Area Slope		0.8235	%
Precipitation			
P = 6-hour		2.6	inches
P = 24-hour		3.2	inches

DESIGN COMPUTATIONS

Precipation P_1 = 1-hour		2.3	inches
Time of Concentration	TC	3.53	minutes
Rainfall Intensity Fig. 3-2	I	7.2	inches / hour
Runoff Coefficient	C_1	0.911	
	C_2	0.7	
	C_3		
Weighted Runoff Coefficient	C	0.85	
Peak Discharge $Q_p = C_{iA}$ =		2.31	cfs

Computed by P.W.C. — Date 12/13/02

20-2903 12/74

ARIZONA DEPARTMENT OF TRANSPORTATION

HYDROLOGIC DESIGN DATA RECORD

RATIONAL METHOD

LOCATION DATA

Highway	Ray Road	County	Maricopa
Location	Relocated Greenfield Road North of Ray Road		
Project No.	Town of Gilbert-	Station	51+40
Name of Stream	DA53		

DESIGN DATA

Design Frequency		50	years
Drainage Area	A_1	0.112	acres
	A_2	0.043	acres
	A_3		acres
Drainage Length		120	feet
Elevation			
Top of Drainage Area		1275.53	feet
At Structure		1275.28	feet
Drainage Area Slope		0.2083	%
Precipitation			
P = 6-hour		2.6	inches
P = 24-hour		3.2	inches

DESIGN COMPUTATIONS

Precipation P_1 = 1-hour		2.3	inches
Time of Concentration	TC	3.35	minutes
Rainfall Intensity Fig. 3-2	I	7.2	inches / hour
Runoff Coefficient	C_1	0.911	
	C_2	0.7	
	C_3		
Weighted Runoff Coefficient	C	0.85	
Peak Discharge $Q_p = C_{iA}$ =		0.95	cfs

Computed by P.W.C. Date 12/13/02

20-2903 12/74

ARIZONA DEPARTMENT OF TRANSPORTATION

HYDROLOGIC DESIGN DATA RECORD

RATIONAL METHOD

LOCATION DATA

Highway Ray Road County Maricopa

Location Relocated Greenfield Road North of Ray Road

Project No. Town of Gilbert- Station 51+40

Name of Stream DA-54

DESIGN DATA

Design Frequency		50	years
Drainage Area	A_1	0.108	acres
	A_2	0.041	acres
	A_3		acres
Drainage Length		110	feet
Elevation			
Top of Drainage Area		1276.51	feet
At Structure		1275.3	feet
Drainage Area Slope		1.1000	%
Precipitation			
P = 6-hour		2.6	inches
P = 24-hour		3.2	inches

DESIGN COMPUTATIONS

Precipation P_1 = 1-hour		2.3	inches
Time of Concentration	TC	1.65	minutes
Rainfall Intensity Fig. 3-2	I	7.2	inches / hour
Runoff Coefficient	C_1	0.911	
	C_2	0.7	
	C_3		
Weighted Runoff Coefficient	C	0.85	
Peak Discharge $Q_p = C_{iA}$ =		0.92	cfs

Computed by P.W.C. Date 12/13/02

20-2903 12/74

ARIZONA DEPARTMENT OF TRANSPORTATION

HYDROLOGIC DESIGN DATA RECORD

RATIONAL METHOD

LOCATION DATA

Highway: Ray Road — County: Maricopa

Location: Relocated Camellia Road

Project No.: Town of Gilbert- — Station: 2+58

Name of Stream: DA-55

DESIGN DATA

Design Frequency		50	years
Drainage Area	A_1	0.102	acres
	A_2	0.071	acres
	A_3		acres
Drainage Length		195	feet
Elevation			
Top of Drainage Area		1274.46	feet
At Structure		1274.3	feet
Drainage Area Slope		0.0821	%
Precipitation			
P = 6-hour		2.6	inches
P = 24-hour		3.2	inches

DESIGN COMPUTATIONS

Precipation P_1 = 1-hour		2.3	inches
Time of Concentration	TC	6.97	minutes
Rainfall Intensity Fig. 3-2	I	7.2	inches / hour
Runoff Coefficient	C_1	0.915	
	C_2	0.7	
	C_3		
Weighted Runoff Coefficient	C	0.83	
Peak Discharge $Q_p = C_{iA}$ =		1.03	cfs

Computed by: P.W.C. — Date: 12/13/02

20-2903 12/74

ARIZONA DEPARTMENT OF TRANSPORTATION

HYDROLOGIC DESIGN DATA RECORD

RATIONAL METHOD

LOCATION DATA

Highway Ray Road County Maricopa

Location Relocated Greenfield Road North of Ray Road

Project No. Town of Gilbert- Station 2+58

Name of Stream DA-56

DESIGN DATA

Design Frequency		50	years
Drainage Area	A_1	0.102	acres
	A_2	0.071	acres
	A_3		acres
Drainage Length		180	feet
Elevation			
Top of Drainage Area		1274.46	feet
At Structure		1274.3	feet
Drainage Area Slope		0.0889	%
Precipitation			
P = 6-hour		2.6	inches
P = 24-hour		3.2	inches

DESIGN COMPUTATIONS

Precipation P_1 = 1-hour		2.3	inches
Time of Concentration	TC	6.36	minutes
Rainfall Intensity Fig. 3-2	I	7.2	inches / hour
Runoff Coefficient	C_1	0.915	
	C_2	0.7	
	C_3		
Weighted Runoff Coefficient	C	0.83	
Peak Discharge $Q_p = C_{iA}$ =		1.03	cfs

Computed by P.W.C. Date 12/13/02

20-2903 12/74

ARIZONA DEPARTMENT OF TRANSPORTATION

HYDROLOGIC DESIGN DATA RECORD

RATIONAL METHOD

LOCATION DATA

Highway: Ray Road — County: Maricopa

Location: Relocated Greenfield Road North of Ray Road

Project No. Town of Gilbert- — Station: Retention Landscape Area

Name of Stream: DA-57 Sump

DESIGN DATA

Design Frequency		50	years
Drainage Area	A_1	0.367	acres
	A_2	0.000	acres
	A_3		acres
Drainage Length		320	feet
Elevation			
Top of Drainage Area		1276.05	feet
At Structure		1274.05	feet
Drainage Area Slope		0.6250	%
Precipitation			
P = 6-hour		2.6	inches
P = 24-hour		3.2	inches

DESIGN COMPUTATIONS

Precipation P_1 = 1-hour		2.3	inches
Time of Concentration	TC	4.67	minutes
Rainfall Intensity Fig. 3-2	I	7.2	inches / hour
Runoff Coefficient	C_1	0.7	
	C_2	0	
	C_3		
Weighted Runoff Coefficient	C	0.85	
Peak Discharge $Q_p = C_{iA}$ =		2.25	cfs

Computed by P.W.C. Date 12/13/02

20-2903 12/74

ARIZONA DEPARTMENT OF TRANSPORTATION

HYDROLOGIC DESIGN DATA RECORD

RATIONAL METHOD

LOCATION DATA

Highway Ray Road County Maricopa

Location Relocated Greenfield Road North of Ray Road

Project No. Town of Gilbert- Station Retention Landscaped area

Name of Stream DA-58 Sump

DESIGN DATA

Design Frequency		50	years
Drainage Area	A_1	0.110	acres
	A_2	0.000	acres
	A_3		acres
Drainage Length		160	feet
Elevation			
Top of Drainage Area		1273.14	feet
At Structure		1272.75	feet
Drainage Area Slope		0.2438	%
Precipitation			
P = 6-hour		2.6	inches
P = 24-hour		3.2	inches

DESIGN COMPUTATIONS

Precipation P_1 = 1-hour		2.3	inches
Time of Concentration	TC	3.94	minutes
Rainfall Intensity Fig. 3-2	I	7.2	inches / hour
Runoff Coefficient	C_1	0.7	
	C_2	0	
	C_3		
Weighted Runoff Coefficient	C	0.85	
Peak Discharge $Q_p = C_{iA}$ =		0.68	cfs

Computed by P.W.C. Date 12/13/02

20-2903 12/74

ARIZONA DEPARTMENT OF TRANSPORTATION

HYDROLOGIC DESIGN DATA RECORD

RATIONAL METHOD

LOCATION DATA

Highway Ray Road County Maricopa

Location Relocated Greenfield Road North of Ray Road

Project No. Town of Gilbert- Station Retention Laandscape Area

Name of Stream DA-59 Sump

DESIGN DATA

Design Frequency		50	years
Drainage Area	A_1	0.207	acres
	A_2	0.000	acres
	A_3		acres
Drainage Length		240	feet
Elevation			
Top of Drainage Area		1278.9	feet
At Structure		1275.53	feet
Drainage Area Slope		1.4042	%
Precipitation			
P = 6-hour		2.6	inches
P = 24-hour		3.2	inches

DESIGN COMPUTATIONS

Precipation P_1 = 1-hour		2.3	inches
Time of Concentration	TC	2.74	minutes
Rainfall Intensity Fig. 3-2	I	7.2	inches / hour
Runoff Coefficient	C_1	0.911	
	C_2	0.7	
	C_3		
Weighted Runoff Coefficient	C	0.85	
Peak Discharge $Q_p = C_{iA}$ =		1.27	cfs

Computed by P.W.C. Date 12/13/02

20-2903 12/74

INCA ENGINEERS INC

SUMP CURB OPENING INLET CAPACITY

Site:	RAY ROAD
Location:	GILBERT, ARIZONA
Description:	Calculation of ADOT Std. Det. C-15.20 Catch Basin in a sump - Depressed Inlet
References:	Town of Gilbert Standard Details MAG Supplement Article XII, ADOT Roadway Design Guidelines Chapter 600
Concentration Point:	**DA-1&2** **CP-1**
Date:	12/19/02

Known Values:

Longitudinal Slope (S)	**0.0073** ft/ft	
Flow from Catchment (Q)	**5.45** cfs	
Carryover from Previous Inlet (Qc)	**0.00** cfs	**From**
Sump (ds)	**0.25** ft	
Clogging Factor (Fr)	**0.80**	
Width of Depression (W)	**1.42** ft	
Manning's Coefficient (n)	**0.015**	
Cross-Slope of Street (Sx)	**0.025** ft/ft	

Calculated Values:

Referenced Equations:

$L_T = ((Q+Qc / (C_w d^{1.5} Fr))-1.8W)$

$Q_i = C_w(L+1.8W)d^{1.5} x Fr$

where L_T = Length of Curb Opening to Intercept Entire Flow (ft) Based on the Greater of d or ds.

d = Depth Approaching Catch Basin at Normal Slope (ft)

ds = Depth of Sump (ft)

L = Design Length of Curb Opening (ft)

Fr = Clogging Factor

C_w = 2.3 (Weir Coefficient)

W = Width of Depression (ft)

Q_i = Interception Capacity of Inlet (cfs)

Total Flow Approaching Catch Basin (Q+Qc):	5.45	cfs	
Depth of Flow in Approaching Gutter (d):	0.30	ft	Flowmaster
Greater of d or ds:	0.30		
Length of Curb Opening to Intercept Entire Flow (L_T):	15.47	ft	
Design Length of Curb Opening (L):	20.58	ft	
Interception Capacity of Inlet (Qi):	7.00	cfs	
Bypassed by Current Inlet (Q+Qc-Qi):	0.00	cfs	

CB C-15.20
L=17
d=3"

INCA ENGINEERS INC

ON-GRADE CURB OPENING INLET CAPACITY

Site:	**RAY ROAD**
Location:	**GILBERT ARIZONA**
Description:	Calculation of ADOT C-15.2' Catch Basin Opening on grade -depressed inlet
References:	Town of Gilbert Standard Details MAG Supplement Article XII, ADOT Roadway Design Guidelines Chapter 600, Drainage Design Manual for Maricopa County.
Concentration Point:	**DA-3**
Date:	12/19/02

Known Values:

Depth of Inlet Depression	0.25 ft
Flow from Catchment	1.91 cfs
Carryover from Previous Inlet	0.00 cfs
Length of Curb Opening	13.58 ft
Clogging Factor	0.80
Manning's Coefficient	0.015
Slope of Street	0.0057 ft/ft
Cross-Slope of Street	0.025 ft/ft

Calculated Values:

Referenced Equations:

$y = [Qn/(.56ZS^{1/2})]^{3/8}$

$L = Q / .7F_r(a+y)^{3/2}\{1-[1-y/(a+y)]^{5/2}\}$

$Q_i = Q\,[(a/y+1)^{5/2}-(a/y+1-L_i/L)^{5/2}] / [(a/y+1)^{5/2}-(a/y)^{5/2}]$

where
L = Length of Curb Opening to Intercept Entire Flow (ft)
Q = Flow Approaching Gutter (cfs)
L_i = Length of Curb Opening (ft)
Q_i = Interception Capacity (cfs)
y = Depth Flow in Approaching Gutter (ft)
a = Depth of Inlet Depression (ft)
F_r = Clogging Factor
n = Manning's Coefficient for Asphalt
S = Cross-Slope of Street
Z = Reciprocal of Cross-Slope

Depth of Flow in Approaching Gutter:

y =	**0.22**	**ft**

Length of Curb Opening to Intercept Entire Flow:

L =	**13.52**	**ft**

Interception Capacity of Inlet:

Q_i =	**1.92**	**cfs**

Bypassed by Current Inlet:

$Q - Q_i$ =	**-0.01**	**cfs**

Recommend ADOT C-15.20, L=10'

INCA ENGINEERS INC

ON-GRADE CURB OPENING INLET CAPACITY

Site:	**RAY ROAD**
Location:	**GILBERT ARIZONA**
Description:	Calculation of ADOT C-15.2' Catch Basin Opening on grade -depressed inlet
References:	Town of Gilbert Standard Details MAG Supplement Article XII, ADOT Roadway Design Guidelines Chapter 600, Drainage Design Manual for Maricopa County.
Concentration Point:	**DA-4**
Date:	12/19/02

Known Values:

Depth of Inlet Depression	0.25 ft
Flow from Catchment	1.57 cfs
Carryover from Previous Inlet	0.00 cfs
Length of Curb Opening	13.58 ft
Clogging Factor	0.80
Manning's Coefficient	0.015
Slope of Street	0.0018 ft/ft
Cross-Slope of Street	0.025 ft/ft

Calculated Values:

Referenced Equations:

$y = [Qn/(.56ZS^{1/2})]^{3/8}$

$L = Q / .7F_r(a+y)^{3/2}\{1-[1-y/(a+y)]^{5/2}\}$

$Q_i = Q\,[(a/y+1)^{5/2}-(a/y+1-L_i/L)^{5/2}] / [(a/y+1)^{5/2}-(a/y)^{5/2}]$

where
- L = Length of Curb Opening to Intercept Entire Flow (ft)
- Q = Flow Approaching Gutter (cfs)
- L_i = Length of Curb Opening (ft)
- Q_i = Interception Capacity (cfs)
- y = Depth Flow in Approaching Gutter (ft)
- a = Depth of Inlet Depression (ft)
- F_r = Clogging Factor
- n = Manning's Coefficient for Asphalt
- S = Cross-Slope of Street
- Z = Reciprocal of Cross-Slope

Depth of Flow in Approaching Gutter:

y = 0.25 ft

Length of Curb Opening to Intercept Entire Flow:

L = 9.63 ft

Interception Capacity of Inlet:

Q_i = 1.82 cfs

Bypassed by Current Inlet:

$Q - Q_i$ = -0.25 cfs

Recommend ADOT C-15.20, L=10'

INCA ENGINEERS INC

ON-GRADE CURB OPENING INLET CAPACITY

Site:	**RAY ROAD**
Location:	**GILBERT ARIZONA**
Description:	Calculation of ADOT C-15.2' Catch Basin Opening on grade -depressed inlet
References:	Town of Gilbert Standard Details MAG Supplement Article XII, ADOT Roadway Design Guidelines Chapter 600, Drainage Design Manual for Maricopa County.
Concentration Point:	**DA-6**
Date:	12/19/02

Known Values:

Depth of Inlet Depression	0.25 ft
Flow from Catchment	1.90 cfs
Carryover from Previous Inlet	0.00 cfs
Length of Curb Opening	13.58 ft
Clogging Factor	0.80
Manning's Coefficient	0.015
Slope of Street	0.0047 ft/ft
Cross-Slope of Street	0.025 ft/ft

Calculated Values:

Referenced Equations:

$y = [Qn/(.56ZS^{1/2})]^{3/8}$

$L = Q / .7F_r(a+y)^{3/2}\{1-[1-y/(a+y)]^{5/2}\}$

$Q_i = Q\,[(a/y+1)^{5/2}-(a/y+1-L_i/L)^{5/2}] / [(a/y+1)^{5/2}-(a/y)^{5/2}]$

where
L = Length of Curb Opening to Intercept Entire Flow (ft)
Q = Flow Approaching Gutter (cfs)
L_i = Length of Curb Opening (ft)
Q_i = Interception Capacity (cfs)
y = Depth Flow in Approaching Gutter (ft)
a = Depth of Inlet Depression (ft)
F_r = Clogging Factor
n = Manning's Coefficient for Asphalt
S = Cross-Slope of Street
Z = Reciprocal of Cross-Slope

Depth of Flow in Approaching Gutter:

y = 0.22 ft

Length of Curb Opening to Intercept Entire Flow:

L = 13.03 ft

Interception Capacity of Inlet:

Q_i = 1.94 cfs

Bypassed by Current Inlet:

$Q - Q_i$ = -0.04 cfs

Recommend ADOT C-15.20, L=10'

INCA ENGINEERS INC.

ON-GRADE CURB OPENING INLET CAPACITY

Site:	**RAY ROAD**
Location:	**GILBERT ARIZONA**
Description:	Calculation of ADOT C-15.2' Catch Basin Opening on grade -depressed inlet
References:	Town of Gilbert Standard Details MAG Supplement Article XII, ADOT Roadway Design Guidelines Chapter 600, Drainage Design Manual for Maricopa County.
Concentration Point:	**DA-7**
Date:	12/19/02

Known Values:

Depth of Inlet Depression	0.25	ft
Flow from Catchment	1.94	cfs
Carryover from Previous Inlet	0.00	cfs
Length of Curb Opening	20.58	ft
Clogging Factor	0.80	
Manning's Coefficient	0.015	
Slope of Street	0.0066	ft/ft
Cross-Slope of Street	0.025	ft/ft

Calculated Values:

Referenced Equations:

$y = [Qn/(.56ZS^{1/2})]^{3/8}$

$L = Q / .7F_r(a+y)^{3/2}\{1-[1-y/(a+y)]^{5/2}\}$

$Q_i = Q\ [(a/y+1)^{5/2}-(a/y+1-L_i/L)^{5/2}] / [(a/y+1)^{5/2}-(a/y)^{5/2}]$

where
- L = Length of Curb Opening to Intercept Entire Flow (ft)
- Q = Flow Approaching Gutter (cfs)
- L_i = Length of Curb Opening (ft)
- Q_i = Interception Capacity (cfs)
- y = Depth Flow in Approaching Gutter (ft)
- a = Depth of Inlet Depression (ft)
- F_r = Clogging Factor
- n = Manning's Coefficient for Asphalt
- S = Cross-Slope of Street
- Z = Reciprocal of Cross-Slope

Depth of Flow in Approaching Gutter:

y = 0.21 ft

Length of Curb Opening to Intercept Entire Flow:

L = 14.07 ft

Interception Capacity of Inlet:

Q_i = 2.32 cfs

Bypassed by Current Inlet:

$Q - Q_i$ = -0.38 cfs

Recommend ADOT C-15.20, L=17'

INCA ENGINEERS INC

ON-GRADE CURB OPENING INLET CAPACITY

Site:	**RAY ROAD**
Location:	**GILBERT ARIZONA**
Description:	Calculation of ADOT C-15.2' Catch Basin Opening on grade -depressed inlet
References:	Town of Gilbert Standard Details MAG Supplement Article XII, ADOT Roadway Design Guidelines Chapter 600, Drainage Design Manual for Maricopa County.
Concentration Point:	**DA-8**
Date:	12/19/02

Known Values:

Depth of Inlet Depression	0.25 ft
Flow from Catchment	1.96 cfs
Carryover from Previous Inlet	0.00 cfs
Length of Curb Opening	20.58 ft
Clogging Factor	0.80
Manning's Coefficient	0.015
Slope of Street	0.0066 ft/ft
Cross-Slope of Street	0.025 ft/ft

Calculated Values:

Referenced Equations:

$y = [Qn/(.56ZS^{1/2})]^{3/8}$

$L = Q / .7F_r(a+y)^{3/2}\{1-[1-y/(a+y)]^{5/2}\}$

$Q_i = Q\ [(a/y+1)^{5/2}-(a/y+1-L_i/L)^{5/2}] / [(a/y+1)^{5/2}-(a/y)^{5/2}]$

where
- L = Length of Curb Opening to Intercept Entire Flow (ft)
- Q = Flow Approaching Gutter (cfs)
- L_i = Length of Curb Opening (ft)
- Q_i = Interception Capacity (cfs)
- y = Depth Flow in Approaching Gutter (ft)
- a = Depth of Inlet Depression (ft)
- F_r = Clogging Factor
- n = Manning's Coefficient for Asphalt
- S = Cross-Slope of Street
- Z = Reciprocal of Cross-Slope

Depth of Flow in Approaching Gutter:

y = 0.21 ft

Length of Curb Opening to Intercept Entire Flow:

L = 14.16 ft

Interception Capacity of Inlet:

Q_i = 2.34 cfs

Bypassed by Current Inlet:

$Q - Q_i$ = -0.38 cfs

Recommend ADOT C-15.20, L=17'

INCA ENGINEERS INC

ON-GRADE CURB OPENING INLET CAPACITY

Site:	**RAY ROAD**
Location:	**GILBERT ARIZONA**
Description:	Calculation of ADOT C-15.2' Catch Basin Opening on grade -depressed inlet
References:	Town of Gilbert Standard Details MAG Supplement Article XII, ADOT Roadway Design Guidelines Chapter 600, Drainage Design Manual for Maricopa County.
Concentration Point:	**DA-9**
Date:	12/19/02

Known Values:

Depth of Inlet Depression	0.25	ft
Flow from Catchment	1.86	cfs
Carryover from Previous Inlet	0.00	cfs
Length of Curb Opening	13.58	ft
Clogging Factor	0.80	
Manning's Coefficient	0.015	
Slope of Street	0.0024	ft/ft
Cross-Slope of Street	0.025	ft/ft

Calculated Values:

Referenced Equations:

$$y = [Qn/(.56ZS^{1/2})]^{3/8}$$

$$L = Q / .7F_r(a+y)^{3/2}\{1-[1-y/(a+y)]^{5/2}\}$$

$$Q_i = Q\,[(a/y+1)^{5/2}-(a/y+1-L_i/L)^{5/2}] / [(a/y+1)^{5/2}-(a/y)^{5/2}]$$

where
- L = Length of Curb Opening to Intercept Entire Flow (ft)
- Q = Flow Approaching Gutter (cfs)
- L_i = Length of Curb Opening (ft)
- Q_i = Interception Capacity (cfs)
- y = Depth Flow in Approaching Gutter (ft)
- a = Depth of Inlet Depression (ft)
- F_r = Clogging Factor
- n = Manning's Coefficient for Asphalt
- S = Cross-Slope of Street
- Z = Reciprocal of Cross-Slope

Depth of Flow in Approaching Gutter:

y = 0.25 ft

Length of Curb Opening to Intercept Entire Flow:

L = 11.32 ft

Interception Capacity of Inlet:

Q_i = 2.03 cfs

Bypassed by Current Inlet:

$Q - Q_i$ = -0.17 cfs

Recommend ADOT C-15.20, L=10'

INCA ENGINEERS INC

ON-GRADE CURB OPENING INLET CAPACITY

Site:	**RAY ROAD**
Location:	**GILBERT ARIZONA**
Description:	Calculation of ADOT C-15.2' Catch Basin Opening on grade -depressed inlet
References:	Town of Gilbert Standard Details MAG Supplement Article XII, ADOT Roadway Design Guidelines Chapter 600, Drainage Design Manual for Maricopa County.
Concentration Point:	**DA-10**
Date:	12/19/02

Known Values:

Depth of Inlet Depression	0.25 ft
Flow from Catchment	1.86 cfs
Carryover from Previous Inlet	0.00 cfs
Length of Curb Opening	13.58 ft
Clogging Factor	0.80
Manning's Coefficient	0.015
Slope of Street	0.0024 ft/ft
Cross-Slope of Street	0.025 ft/ft

Calculated Values:

Referenced Equations:

$y = [Qn/(.56ZS^{1/2})]^{3/8}$

$L = Q / .7F_r(a+y)^{3/2}\{1-[1-y/(a+y)]^{5/2}\}$

$Q_i = Q\,[(a/y+1)^{5/2}-(a/y+1-L_i/L)^{5/2}] / [(a/y+1)^{5/2}-(a/y)^{5/2}]$

where
- L = Length of Curb Opening to Intercept Entire Flow (ft)
- Q = Flow Approaching Gutter (cfs)
- L_i = Length of Curb Opening (ft)
- Q_i = Interception Capacity (cfs)
- y = Depth Flow in Approaching Gutter (ft)
- a = Depth of Inlet Depression (ft)
- F_r = Clogging Factor
- n = Manning's Coefficient for Asphalt
- S = Cross-Slope of Street
- Z = Reciprocal of Cross-Slope

Depth of Flow in Approaching Gutter:

y = 0.25 ft

Length of Curb Opening to Intercept Entire Flow:

L = 11.32 ft

Interception Capacity of Inlet:

Q_i = 2.03 cfs

Bypassed by Current Inlet:

$Q - Q_i$ = -0.17 cfs

Recommend ADOT C-15.20, L=10'

INCA ENGINEERS INC

ON-GRADE CURB OPENING INLET CAPACITY

Site:	**RAY ROAD**
Location:	**GILBERT ARIZONA**
Description:	Calculation of ADOT C-15.2' Catch Basin Opening on grade -depressed inlet
References:	Town of Gilbert Standard Details MAG Supplement Article XII, ADOT Roadway Design Guidelines Chapter 600, Drainage Design Manual for Maricopa County.
Concentration Point:	**DA-11**
Date:	12/19/02

Known Values:

Depth of Inlet Depression	0.25 ft
Flow from Catchment	2.83 cfs
Carryover from Previous Inlet	0.00 cfs
Length of Curb Opening	20.58 ft
Clogging Factor	0.80
Manning's Coefficient	0.015
Slope of Street	0.0116 ft/ft
Cross-Slope of Street	0.025 ft/ft

Calculated Values:

Referenced Equations:

$y = [Qn/(.56ZS^{1/2})]^{3/8}$

$L = Q / .7F_r(a+y)^{3/2}\{1-[1-y/(a+y)]^{5/2}\}$

$Q_i = Q [(a/y+1)^{5/2}-(a/y+1-L_i/L)^{5/2}] / [(a/y+1)^{5/2}-(a/y)^{5/2}]$

where
L = Length of Curb Opening to Intercept Entire Flow (ft)
Q = Flow Approaching Gutter (cfs)
L_i = Length of Curb Opening (ft)
Q_i = Interception Capacity (cfs)
y = Depth Flow in Approaching Gutter (ft)
a = Depth of Inlet Depression (ft)
F_r = Clogging Factor
n = Manning's Coefficient for Asphalt
S = Cross-Slope of Street
Z = Reciprocal of Cross-Slope

Depth of Flow in Approaching Gutter:

y = 0.22 ft

Length of Curb Opening to Intercept Entire Flow:

L = 19.78 ft

Interception Capacity of Inlet:

Q_i = 2.89 cfs

Bypassed by Current Inlet:

$Q - Q_i$ = -0.06 cfs

Recommend ADOT C-15.20, L=17'

INCA ENGINEERS INC.

ON-GRADE CURB OPENING INLET CAPACITY

Site:	**RAY ROAD**
Location:	**GILBERT ARIZONA**
Description:	Calculation of ADOT C-15.2' Catch Basin Opening on grade -depressed inlet
References:	Town of Gilbert Standard Details MAG Supplement Article XII, ADOT Roadway Design Guidelines Chapter 600, Drainage Design Manual for Maricopa County.
Concentration Point:	**DA-12**
Date:	12/19/02

Known Values:

Depth of Inlet Depression	0.25 ft
Flow from Catchment	1.49 cfs
Carryover from Previous Inlet	0.00 cfs
Length of Curb Opening	13.58 ft
Clogging Factor	0.80
Manning's Coefficient	0.015
Slope of Street	0.0106 ft/ft
Cross-Slope of Street	0.025 ft/ft

Calculated Values:

Referenced Equations:

$y = [Qn/(.56ZS^{1/2})]^{3/8}$

$L = Q / .7F_r(a+y)^{3/2}\{1-[1-y/(a+y)]^{5/2}\}$

$Q_i = Q [(a/y+1)^{5/2}-(a/y+1-L_i/L)^{5/2}] / [(a/y+1)^{5/2}-(a/y)^{5/2}]$

where
- L = Length of Curb Opening to Intercept Entire Flow (ft)
- Q = Flow Approaching Gutter (cfs)
- L_i = Length of Curb Opening (ft)
- Q_i = Interception Capacity (cfs)
- y = Depth Flow in Approaching Gutter (ft)
- a = Depth of Inlet Depression (ft)
- F_r = Clogging Factor
- n = Manning's Coefficient for Asphalt
- S = Cross-Slope of Street
- Z = Reciprocal of Cross-Slope

Depth of Flow in Approaching Gutter:

y = 0.18 ft

Length of Curb Opening to Intercept Entire Flow:

L = 13.01 ft

Interception Capacity of Inlet:

Q_i = 1.53 cfs

Bypassed by Current Inlet:

$Q - Q_i$ = -0.04 cfs

Recommend ADOT C-15.20, L=10'

INCA ENGINEERS INC.

ON-GRADE CURB OPENING INLET CAPACITY

Site:	**RAY ROAD**
Location:	**GILBERT ARIZONA**
Description:	Calculation of ADOT C-15.2' Catch Basin Opening on grade -depressed inlet
References:	Town of Gilbert Standard Details MAG Supplement Article XII, ADOT Roadway Design Guidelines Chapter 600, Drainage Design Manual for Maricopa County.
Concentration Point:	**DA-13**
Date:	12/23/02

Known Values:

Depth of Inlet Depression	0.25 ft
Flow from Catchment	0.87 cfs
Carryover from Previous Inlet	0.00 cfs
Length of Curb Opening	9.58 ft
Clogging Factor	0.80
Manning's Coefficient	0.015
Slope of Street	0.0096 ft/ft
Cross-Slope of Street	0.025 ft/ft

Calculated Values:

Referenced Equations:

$y = [Qn/(.56ZS^{1/2})]^{3/8}$

$L = Q / .7F_r(a+y)^{3/2}\{1-[1-y/(a+y)]^{5/2}\}$

$Q_i = Q\,[(a/y+1)^{5/2}-(a/y+1-L_i/L)^{5/2}] / [(a/y+1)^{5/2}-(a/y)^{5/2}]$

where
- L = Length of Curb Opening to Intercept Entire Flow (ft)
- Q = Flow Approaching Gutter (cfs)
- L_i = Length of Curb Opening (ft)
- Q_i = Interception Capacity (cfs)
- y = Depth Flow in Approaching Gutter (ft)
- a = Depth of Inlet Depression (ft)
- F_r = Clogging Factor
- n = Manning's Coefficient for Asphalt
- S = Cross-Slope of Street
- Z = Reciprocal of Cross-Slope

Depth of Flow in Approaching Gutter:

y = 0.15 ft

Length of Curb Opening to Intercept Entire Flow:

L = 9.10 ft

Interception Capacity of Inlet:

Q_i = 0.90 cfs

Bypassed by Current Inlet:

$Q - Q_i$ = -0.03 cfs

Recommend ADOT C-15.20, L=6'

INCA ENGINEERS INC

ON-GRADE CURB OPENING INLET CAPACITY

Site:	**RAY ROAD**
Location:	**GILBERT ARIZONA**
Description:	Calculation of ADOT C-15.2' Catch Basin Opening on grade -depressed inlet
References:	Town of Gilbert Standard Details MAG Supplement Article XII, ADOT Roadway Design Guidelines Chapter 600, Drainage Design Manual for Maricopa County.
Concentration Point:	**DA-13A**
Date:	12/20/02

Known Values:

Depth of Inlet Depression	0.25 ft
Flow from Catchment	0.61 cfs
Carryover from Previous Inlet	0.00 cfs
Length of Curb Opening	6.58 ft
Clogging Factor	0.80
Manning's Coefficient	0.015
Slope of Street	0.0047 ft/ft
Cross-Slope of Street	0.025 ft/ft

Calculated Values:

Referenced Equations:

$y = [Qn/(.56ZS^{1/2})]^{3/8}$

$L = Q / .7F_r(a+y)^{3/2}\{1-[1-y/(a+y)]^{5/2}\}$

$Q_i = Q\,[(a/y+1)^{5/2}-(a/y+1-L_i/L)^{5/2}] / [(a/y+1)^{5/2}-(a/y)^{5/2}]$

where
L = Length of Curb Opening to Intercept Entire Flow (ft)
Q = Flow Approaching Gutter (cfs)
L_i = Length of Curb Opening (ft)
Q_i = Interception Capacity (cfs)
y = Depth Flow in Approaching Gutter (ft)
a = Depth of Inlet Depression (ft)
F_r = Clogging Factor
n = Manning's Coefficient for Asphalt
S = Cross-Slope of Street
Z = Reciprocal of Cross-Slope

Depth of Flow in Approaching Gutter:

y = 0.15 ft

Length of Curb Opening to Intercept Entire Flow:

L = 6.38 ft

Interception Capacity of Inlet:

Q_i = 0.62 cfs

Bypassed by Current Inlet:

$Q - Q_i$ = -0.01 cfs

Recommend ADOT C-15.20, L=3'

INCA ENGINEERS INC

ON-GRADE CURB OPENING INLET CAPACITY

Site:	**RAY ROAD**
Location:	**GILBERT ARIZONA**
Description:	Calculation of ADOT C-15.2' Catch Basin Opening on grade -depressed inlet
References:	Town of Gilbert Standard Details MAG Supplement Article XII, ADOT Roadway Design Guidelines Chapter 600, Drainage Design Manual for Maricopa County.
Concentration Point:	**DA-14**
Date:	12/20/02

Known Values:

Depth of Inlet Depression	0.25	ft
Flow from Catchment	0.47	cfs
Carryover from Previous Inlet	0.00	cfs
Length of Curb Opening	6.58	ft
Clogging Factor	0.80	
Manning's Coefficient	0.015	
Slope of Street	0.0105	ft/ft
Cross-Slope of Street	0.025	ft/ft

Calculated Values:

Referenced Equations:

$y = [Qn/(.56ZS^{1/2})]^{3/8}$

$L = Q / .7F_r(a+y)^{3/2}\{1-[1-y/(a+y)]^{5/2}\}$

$Q_i = Q\,[(a/y+1)^{5/2}-(a/y+1-L_i/L)^{5/2}] / [(a/y+1)^{5/2}-(a/y)^{5/2}]$

where
- L = Length of Curb Opening to Intercept Entire Flow (ft)
- Q = Flow Approaching Gutter (cfs)
- L_i = Length of Curb Opening (ft)
- Q_i = Interception Capacity (cfs)
- y = Depth Flow in Approaching Gutter (ft)
- a = Depth of Inlet Depression (ft)
- F_r = Clogging Factor
- n = Manning's Coefficient for Asphalt
- S = Cross-Slope of Street
- Z = Reciprocal of Cross-Slope

Depth of Flow in Approaching Gutter:

y = 0.11 ft

Length of Curb Opening to Intercept Entire Flow:

L = 6.26 ft

Interception Capacity of Inlet:

Q_i = 0.49 cfs

Bypassed by Current Inlet:

$Q - Q_i$ = -0.02 cfs

Recommend ADOT C-15.20, L=3'

INCA ENGINEERS INC

SUMP CURB OPENING INLET CAPACITY

Site:	GILBERT ROAD
Location:	GILBERT, ARIZONA
Description:	Calculation of ADOT Std. Det. C-15.20 Catch Basin in a sump - Depressed Inlet
References:	Town of Gilbert Standard Details MAG Supplement Article XII, ADOT Roadway Design Guidelines Chapter 600
Concentration Point:	**DA-15 & 17**
Date:	1/30/03

Known Values:

Longitudinal Slope (S)	**0.0165**	ft/ft
Flow from Catchment (Q)	**2.87**	cfs
Carryover from Previous Inlet (Qc)	**0.00**	cfs
Sump (ds)	**0.25**	ft
Clogging Factor (Fr)	**0.50**	
Width of Depression (W)	**1.42**	ft
Manning's Coefficient (n)	**0.015**	
Cross-Slope of Street (Sx)	**0.022**	ft/ft

Calculated Values:

Referenced Equations:

$L_T = ((Q+Qc / (C_w d^{1.5} Fr))-1.8W)$

$Q_i = C_w(L+1.8W)d^{1.5} x Fr$

where
L_T = Length of Curb Opening to Intercept Entire Flow (ft) Based on the Greater of d or ds.
d = Depth Approaching Catch Basin at Normal Slope (ft)
ds = Depth of Sump (ft)
L = Design Length of Curb Opening (ft)
Fr = Clogging Factor
C_w = 2.3 (Weir Coefficient)
W = Width of Depression (ft)
Q_i = Interception Capacity of Inlet (cfs)

Total Flow Approaching Catch Basin (Q+Qc):	2.87	cfs	
Depth of Flow in Approaching Gutter (d):	0.23	ft	Flowmaster
Greater of d or ds:	0.25		
Length of Curb Opening to Intercept Entire Flow (L_T):	17.41	ft	
Design Length of Curb Opening (L):	20.58	ft	
Interception Capacity of Inlet (Qi):	3.33	cfs	
Bypassed by Current Inlet (Q+Qc-Qi):	0.00	cfs	

INCA ENGINEERS INC

SUMP CURB OPENING INLET CAPACITY

Site:	GILBERT ROAD
Location:	GILBERT, ARIZONA
Description:	Calculation of ADOT Std. Det. C-15.20 Catch Basin in a sump - Depressed Inlet
References:	Town of Gilbert Standard Details MAG Supplement Article XII, ADOT Roadway Design Guidelines Chapter 600
Concentration Point:	**DA-16 & 18**
Date:	1/30/03

Known Values:

Longitudinal Slope (S)	**0.0165**	ft/ft
Flow from Catchment (Q)	**3.21**	cfs
Carryover from Previous Inlet (Qc)	**0.00**	cfs
Sump (ds)	**0.25**	ft
Clogging Factor (Fr)	**0.50**	
Width of Depression (W)	**1.42**	ft
Manning's Coefficient (n)	**0.015**	
Cross-Slope of Street (Sx)	**0.022**	ft/ft

Calculated Values:

Referenced Equations:

$L_T = ((Q+Qc / (C_w d^{1.5} Fr))-1.8W)$

$Q_i = C_w(L+1.8W)d^{1.5} x Fr$

where
L_T = Length of Curb Opening to Intercept Entire Flow (ft) Based on the Greater of d or ds.
d = Depth Approaching Catch Basin at Normal Slope (ft)
ds = Depth of Sump (ft)
L = Design Length of Curb Opening (ft)
Fr = Clogging Factor
C_w = 2.3 (Weir Coefficient)
W = Width of Depression (ft)
Q_i = Interception Capacity of Inlet (cfs)

Total Flow Approaching Catch Basin (Q+Qc):	**3.21**	**cfs**	
Depth of Flow in Approaching Gutter (d):	**0.23**	**ft**	**Flowmaster**
Greater of d or ds:	**0.25**		
Length of Curb Opening to Intercept Entire Flow (L_T):	**19.77**	**ft**	
Design Length of Curb Opening (L):	**20.58**	**ft**	
Interception Capacity of Inlet (Qi):	**3.33**	**cfs**	
Bypassed by Current Inlet (Q+Qc-Qi):	**0.00**	**cfs**	

INCA ENGINEERS INC

ON-GRADE CURB OPENING INLET CAPACITY

Site:	**RAY ROAD**
Location:	**GILBERT ARIZONA**
Description:	Calculation of ADOT C-15.2' Catch Basin Opening on grade -depressed inlet
References:	Town of Gilbert Standard Details MAG Supplement Article XII, ADOT Roadway Design Guidelines Chapter 600, Drainage Design Manual for Maricopa County.
Concentration Point:	**DA-19**
Date:	12/23/02

Known Values:

Depth of Inlet Depression	0.25	ft
Flow from Catchment	2.49	cfs
Carryover from Previous Inlet	0.00	cfs
Length of Curb Opening	20.58	ft
Clogging Factor	0.80	
Manning's Coefficient	0.015	
Slope of Street	0.0122	ft/ft
Cross-Slope of Street	0.028	ft/ft

Calculated Values:

Referenced Equations:

$y = [Qn/(.56ZS^{1/2})]^{3/8}$

$L = Q / .7F_r(a+y)^{3/2}\{1-[1-y/(a+y)]^{5/2}\}$

$Q_i = Q\,[(a/y+1)^{5/2}-(a/y+1-L_i/L)^{5/2}] / [(a/y+1)^{5/2}-(a/y)^{5/2}]$

where
- L = Length of Curb Opening to Intercept Entire Flow (ft)
- Q = Flow Approaching Gutter (cfs)
- L_i = Length of Curb Opening (ft)
- Q_i = Interception Capacity (cfs)
- y = Depth Flow in Approaching Gutter (ft)
- a = Depth of Inlet Depression (ft)
- F_r = Clogging Factor
- n = Manning's Coefficient for Asphalt
- S = Cross-Slope of Street
- Z = Reciprocal of Cross-Slope

Depth of Flow in Approaching Gutter:

y = 0.22 ft

Length of Curb Opening to Intercept Entire Flow:

L = 17.67 ft

Interception Capacity of Inlet:

Q_i = 2.70 cfs

Bypassed by Current Inlet:

$Q - Q_i$ = -0.21 cfs

Recommend ADOT C-15.20, L=17'

INCA ENGINEERS INC

ON-GRADE CURB OPENING INLET CAPACITY

Site:	**RAY ROAD**
Location:	**GILBERT ARIZONA**
Description:	Calculation of ADOT C-15.2' Catch Basin Opening on grade -depressed inlet
References:	Town of Gilbert Standard Details MAG Supplement Article XII, ADOT Roadway Design Guidelines Chapter 600, Drainage Design Manual for Maricopa County.
Concentration Point:	**DA-20**
Date:	1/30/03

Known Values:

Depth of Inlet Depression	0.25 ft
Flow from Catchment	1.78 cfs
Carryover from Previous Inlet	0.00 cfs
Length of Curb Opening	13.58 ft
Clogging Factor	0.80
Manning's Coefficient	0.015
Slope of Street	0.0124 ft/ft
Cross-Slope of Street	0.040 ft/ft

Calculated Values:

Referenced Equations:

$y = [Qn/(.56ZS^{1/2})]^{3/8}$

$L = Q / .7F_r(a+y)^{3/2}\{1-[1-y/(a+y)]^{5/2}\}$

$Q_i = Q\ [(a/y+1)^{5/2}-(a/y+1-L_i/L)^{5/2}] / [(a/y+1)^{5/2}-(a/y)^{5/2}]$

where
- L = Length of Curb Opening to Intercept Entire Flow (ft)
- Q = Flow Approaching Gutter (cfs)
- L_i = Length of Curb Opening (ft)
- Q_i = Interception Capacity (cfs)
- y = Depth Flow in Approaching Gutter (ft)
- a = Depth of Inlet Depression (ft)
- F_r = Clogging Factor
- n = Manning's Coefficient for Asphalt
- S = Cross-Slope of Street
- Z = Reciprocal of Cross-Slope

Depth of Flow in Approaching Gutter:

y = 0.22 ft

Length of Curb Opening to Intercept Entire Flow:

L = 12.57 ft

Interception Capacity of Inlet:

Q_i = 1.86 cfs

Bypassed by Current Inlet:

$Q - Q_i$ = -0.08 cfs

Recommend ADOT C-15.20, L=17'

INCA ENGINEERS INC

ON-GRADE CURB OPENING INLET CAPACITY

Site:	**RAY ROAD**
Location:	**GILBERT ARIZONA**
Description:	Calculation of ADOT C-15.2' Catch Basin Opening on grade -depressed inlet
References:	Town of Gilbert Standard Details MAG Supplement Article XII, ADOT Roadway Design Guidelines Chapter 600, Drainage Design Manual for Maricopa County.
Concentration Point:	**DA-21**
Date:	12/23/02

Known Values:

Depth of Inlet Depression	0.25 ft
Flow from Catchment	1.58 cfs
Carryover from Previous Inlet	0.00 cfs
Length of Curb Opening	13.58 ft
Clogging Factor	0.80
Manning's Coefficient	0.015
Slope of Street	0.0081 ft/ft
Cross-Slope of Street	0.025 ft/ft

Calculated Values:

Referenced Equations:

$y = [Qn/(.56ZS^{1/2})]^{3/8}$

$L = Q / .7F_r(a+y)^{3/2}\{1-[1-y/(a+y)]^{5/2}\}$

$Q_i = Q\ [(a/y+1)^{5/2}-(a/y+1-L_i/L)^{5/2}] / [(a/y+1)^{5/2}-(a/y)^{5/2}]$

where
- L = Length of Curb Opening to Intercept Entire Flow (ft)
- Q = Flow Approaching Gutter (cfs)
- L_i = Length of Curb Opening (ft)
- Q_i = Interception Capacity (cfs)
- y = Depth Flow in Approaching Gutter (ft)
- a = Depth of Inlet Depression (ft)
- F_r = Clogging Factor
- n = Manning's Coefficient for Asphalt
- S = Cross-Slope of Street
- Z = Reciprocal of Cross-Slope

Depth of Flow in Approaching Gutter:

y = 0.19 ft

Length of Curb Opening to Intercept Entire Flow:

L = 12.84 ft

Interception Capacity of Inlet:

Q_i = 1.63 cfs

Bypassed by Current Inlet:

$Q - Q_i$ = -0.05 cfs

Recommend ADOT C-15.20, L=10'

INCA ENGINEERS INC

ON-GRADE CURB OPENING INLET CAPACITY

Site:	**RAY ROAD**
Location:	**GILBERT ARIZONA**
Description:	Calculation of ADOT C-15.2' Catch Basin Opening on grade -depressed inlet
References:	Town of Gilbert Standard Details MAG Supplement Article XII, ADOT Roadway Design Guidelines Chapter 600, Drainage Design Manual for Maricopa County.
Concentration Point:	**DA-22**
Date:	12/23/02

Known Values:

Depth of Inlet Depression	0.25 ft
Flow from Catchment	1.32 cfs
Carryover from Previous Inlet	0.00 cfs
Length of Curb Opening	13.58 ft
Clogging Factor	0.80
Manning's Coefficient	0.015
Slope of Street	0.0091 ft/ft
Cross-Slope of Street	0.025 ft/ft

Calculated Values:

Referenced Equations:

$y = [Qn/(.56ZS^{1/2})]^{3/8}$

$L = Q / .7F_r(a+y)^{3/2}\{1-[1-y/(a+y)]^{5/2}\}$

$Q_i = Q\,[(a/y+1)^{5/2}-(a/y+1-L_i/L)^{5/2}] / [(a/y+1)^{5/2}-(a/y)^{5/2}]$

where
- L = Length of Curb Opening to Intercept Entire Flow (ft)
- Q = Flow Approaching Gutter (cfs)
- L_i = Length of Curb Opening (ft)
- Q_i = Interception Capacity (cfs)
- y = Depth Flow in Approaching Gutter (ft)
- a = Depth of Inlet Depression (ft)
- F_r = Clogging Factor
- n = Manning's Coefficient for Asphalt
- S = Cross-Slope of Street
- Z = Reciprocal of Cross-Slope

Depth of Flow in Approaching Gutter:

y = 0.17 ft

Length of Curb Opening to Intercept Entire Flow:

L = 11.72 ft

Interception Capacity of Inlet:

Q_i = 1.44 cfs

Bypassed by Current Inlet:

$Q - Q_i$ = -0.12 cfs

Recommend ADOT C-15.20, L=10'

INCA ENGINEERS INC

ON-GRADE CURB OPENING INLET CAPACITY

Site:	**RAY ROAD**
Location:	**GILBERT ARIZONA**
Description:	Calculation of ADOT C-15.2' Catch Basin Opening on grade -depressed inlet
References:	Town of Gilbert Standard Details MAG Supplement Article XII, ADOT Roadway Design Guidelines Chapter 600, Drainage Design Manual for Maricopa County.
Concentration Point:	**DA-23**
Date:	12/23/02

Known Values:

Depth of Inlet Depression	0.25 ft
Flow from Catchment	0.86 cfs
Carryover from Previous Inlet	0.00 cfs
Length of Curb Opening	9.58 ft
Clogging Factor	0.80
Manning's Coefficient	0.015
Slope of Street	0.0119 ft/ft
Cross-Slope of Street	0.033 ft/ft

Calculated Values:

Referenced Equations:

$$y = [Qn/(.56ZS^{1/2})]^{3/8}$$

$$L = Q / .7F_r(a+y)^{3/2}\{1-[1-y/(a+y)]^{5/2}\}$$

$$Q_i = Q\,[(a/y+1)^{5/2}-(a/y+1-L_i/L)^{5/2}] / [(a/y+1)^{5/2}-(a/y)^{5/2}]$$

where
- L = Length of Curb Opening to Intercept Entire Flow (ft)
- Q = Flow Approaching Gutter (cfs)
- L_i = Length of Curb Opening (ft)
- Q_i = Interception Capacity (cfs)
- y = Depth Flow in Approaching Gutter (ft)
- a = Depth of Inlet Depression (ft)
- F_r = Clogging Factor
- n = Manning's Coefficient for Asphalt
- S = Cross-Slope of Street
- Z = Reciprocal of Cross-Slope

Depth of Flow in Approaching Gutter:

y = 0.15 ft

Length of Curb Opening to Intercept Entire Flow:

L = 8.47 ft

Interception Capacity of Inlet:

Q_i = 0.93 cfs

Bypassed by Current Inlet:

$Q - Q_i$ = -0.07 cfs

Recommend ADOT C-15.20, L=6'

INCA ENGINEERS INC

ON-GRADE CURB OPENING INLET CAPACITY

Site:	**RAY ROAD**
Location:	**GILBERT ARIZONA**
Description:	Calculation of ADOT C-15.2' Catch Basin Opening on grade -depressed inlet
References:	Town of Gilbert Standard Details MAG Supplement Article XII, ADOT Roadway Design Guidelines Chapter 600, Drainage Design Manual for Maricopa County.
Concentration Point:	**DA-24**
Date:	12/23/02

Known Values:

Depth of Inlet Depression	0.25 ft
Flow from Catchment	1.22 cfs
Carryover from Previous Inlet	0.00 cfs
Length of Curb Opening	9.58 ft
Clogging Factor	0.80
Manning's Coefficient	0.015
Slope of Street	0.0023 ft/ft
Cross-Slope of Street	0.033 ft/ft

Calculated Values:

Referenced Equations:

$y = [Qn/(.56ZS^{1/2})]^{3/8}$

$L = Q / .7F_r(a+y)^{3/2}\{1-[1-y/(a+y)]^{5/2}\}$

$Q_i = Q\ [(a/y+1)^{5/2}-(a/y+1-L_i/L)^{5/2}] / [(a/y+1)^{5/2}-(a/y)^{5/2}]$

where
- L = Length of Curb Opening to Intercept Entire Flow (ft)
- Q = Flow Approaching Gutter (cfs)
- L_i = Length of Curb Opening (ft)
- Q_i = Interception Capacity (cfs)
- y = Depth Flow in Approaching Gutter (ft)
- a = Depth of Inlet Depression (ft)
- F_r = Clogging Factor
- n = Manning's Coefficient for Asphalt
- S = Cross-Slope of Street
- Z = Reciprocal of Cross-Slope

Depth of Flow in Approaching Gutter:

y = 0.24 ft

Length of Curb Opening to Intercept Entire Flow:

L = 7.78 ft

Interception Capacity of Inlet:

Q_i = 1.35 cfs

Bypassed by Current Inlet:

Q - Q_i = -0.13 cfs

Recommend ADOT C-15.20, L=6'

INCA ENGINEERS INC.

ON-GRADE CURB OPENING INLET CAPACITY

Site:	**GILBERT ROAD**
Location:	**GILBERT ARIZONA**
Description:	Calculation of ADOT C-15.2' Catch Basin Opening on grade -depressed inlet
References:	Town of Gilbert Standard Details MAG Supplement Article XII, ADOT Roadway Design Guidelines Chapter 600, Drainage Design Manual for Maricopa County.
Concentration Point:	**DA-25**
Date:	12/23/02

Known Values:

Depth of Inlet Depression	0.25	ft
Flow from Catchment	0.53	cfs
Carryover from Previous Inlet	0.00	cfs
Length of Curb Opening	6.58	ft
Clogging Factor	0.80	
Manning's Coefficient	0.015	
Slope of Street	0.0083	ft/ft
Cross-Slope of Street	0.025	ft/ft

Calculated Values:

Referenced Equations:

$y = [Qn/(.56ZS^{1/2})]^{3/8}$

$L = Q / .7F_r(a+y)^{3/2}\{1-[1-y/(a+y)]^{5/2}\}$

$Q_i = Q\,[(a/y+1)^{5/2}-(a/y+1-L_i/L)^{5/2}] / [(a/y+1)^{5/2}-(a/y)^{5/2}]$

where
L = Length of Curb Opening to Intercept Entire Flow (ft)
Q = Flow Approaching Gutter (cfs)
L_i = Length of Curb Opening (ft)
Q_i = Interception Capacity (cfs)
y = Depth Flow in Approaching Gutter (ft)
a = Depth of Inlet Depression (ft)
F_r = Clogging Factor
n = Manning's Coefficient for Asphalt
S = Cross-Slope of Street
Z = Reciprocal of Cross-Slope

Depth of Flow in Approaching Gutter:

y = 0.12 ft

Length of Curb Opening to Intercept Entire Flow:

L = 6.48 ft

Interception Capacity of Inlet:

Q_i = 0.54 cfs

Bypassed by Current Inlet:

$Q - Q_i$ = -0.01 cfs

Recommend ADOT C-15.20, L=3'

INCA ENGINEERS INC

ON-GRADE CURB OPENING INLET CAPACITY

Site:	**GILBERT ROAD**
Location:	**GILBERT ARIZONA**
Description:	Calculation of ADOT C-15.2' Catch Basin Opening on grade -depressed inlet
References:	Town of Gilbert Standard Details MAG Supplement Article XII, ADOT Roadway Design Guidelines Chapter 600, Drainage Design Manual for Maricopa County.
Concentration Point:	**DA-26**
Date:	12/23/02

Known Values:

Depth of Inlet Depression	0.25 ft
Flow from Catchment	0.61 cfs
Carryover from Previous Inlet	0.00 cfs
Length of Curb Opening	9.58 ft
Clogging Factor	0.80
Manning's Coefficient	0.015
Slope of Street	0.0080 ft/ft
Cross-Slope of Street	0.015 ft/ft

Calculated Values:

Referenced Equations:

$y = [Qn/(.56ZS^{1/2})]^{3/8}$

$L = Q / .7F_r(a+y)^{3/2}\{1-[1-y/(a+y)]^{5/2}\}$

$Q_i = Q\ [(a/y+1)^{5/2}-(a/y+1-L_i/L)^{5/2}]\ /\ [(a/y+1)^{5/2}-(a/y)^{5/2}]$

where
- L = Length of Curb Opening to Intercept Entire Flow (ft)
- Q = Flow Approaching Gutter (cfs)
- L_i = Length of Curb Opening (ft)
- Q_i = Interception Capacity (cfs)
- y = Depth Flow in Approaching Gutter (ft)
- a = Depth of Inlet Depression (ft)
- F_r = Clogging Factor
- n = Manning's Coefficient for Asphalt
- S = Cross-Slope of Street
- Z = Reciprocal of Cross-Slope

Depth of Flow in Approaching Gutter:

y = 0.11 ft

Length of Curb Opening to Intercept Entire Flow:

L = 8.47 ft

Interception Capacity of Inlet:

Q_i = 0.67 cfs

Bypassed by Current Inlet:

$Q - Q_i$ = -0.06 cfs

Recommend ADOT C-15.20, L=6'

INCA ENGINEERS INC

ON-GRADE CURB OPENING INLET CAPACITY

Site:	**GILBERT ROAD**
Location:	**GILBERT ARIZONA**
Description:	Calculation of ADOT C-15.2' Catch Basin Opening on grade -depressed inlet
References:	Town of Gilbert Standard Details MAG Supplement Article XII, ADOT Roadway Design Guidelines Chapter 600, Drainage Design Manual for Maricopa County.
Concentration Point:	**DA-27**
Date:	12/23/02

Known Values:

Depth of Inlet Depression	0.25 ft
Flow from Catchment	2.20 cfs
Carryover from Previous Inlet	0.00 cfs
Length of Curb Opening	20.58 ft
Clogging Factor	0.80
Manning's Coefficient	0.015
Slope of Street	0.0310 ft/ft
Cross-Slope of Street	0.040 ft/ft

Calculated Values:

Referenced Equations:

$y = [Qn/(.56ZS^{1/2})]^{3/8}$

$L = Q / .7F_r(a+y)^{3/2}\{1-[1-y/(a+y)]^{5/2}\}$

$Q_i = Q [(a/y+1)^{5/2}-(a/y+1-L_i/L)^{5/2}] / [(a/y+1)^{5/2}-(a/y)^{5/2}]$

where
- L = Length of Curb Opening to Intercept Entire Flow (ft)
- Q = Flow Approaching Gutter (cfs)
- L_i = Length of Curb Opening (ft)
- Q_i = Interception Capacity (cfs)
- y = Depth Flow in Approaching Gutter (ft)
- a = Depth of Inlet Depression (ft)
- F_r = Clogging Factor
- n = Manning's Coefficient for Asphalt
- S = Cross-Slope of Street
- Z = Reciprocal of Cross-Slope

Depth of Flow in Approaching Gutter:

y = 0.20 ft

Length of Curb Opening to Intercept Entire Flow:

L = 17.04 ft

Interception Capacity of Inlet:

Q_i = 2.44 cfs

Bypassed by Current Inlet:

$Q - Q_i$ = -0.24 cfs

Recommend ADOT C-15.20, L=17'

INCA ENGINEERS INC

ON-GRADE CURB OPENING INLET CAPACITY

Site:	**GILBERT ROAD**
Location:	**GILBERT ARIZONA**
Description:	Calculation of ADOT C-15.2 Catch Basin Opening on grade -depressed inlet
References:	Town of Gilbert Standard Details MAG Supplement Article XII, ADOT Roadway Design Guidelines Chapter 600, Drainage Design Manual for Maricopa County.
Concentration Point:	**DA-28**
Date:	12/23/02

Known Values:

Depth of Inlet Depression	0.25 ft
Flow from Catchment	3.39 cfs
Carryover from Previous Inlet	0.00 cfs
Length of Curb Opening	20.58 ft
Clogging Factor	0.80
Manning's Coefficient	0.015
Slope of Street	0.0276 ft/ft
Cross-Slope of Street	0.040 ft/ft

Calculated Values:

Referenced Equations:

$y = [Qn/(.56ZS^{1/2})]^{3/8}$

$L = Q / .7F_r(a+y)^{3/2}\{1-[1-y/(a+y)]^{5/2}\}$

$Q_i = Q [(a/y+1)^{5/2}-(a/y+1-L_i/L)^{5/2}] / [(a/y+1)^{5/2}-(a/y)^{5/2}]$

where
L = Length of Curb Opening to Intercept Entire Flow (ft)
Q = Flow Approaching Gutter (cfs)
L_i = Length of Curb Opening (ft)
Q_i = Interception Capacity (cfs)
y = Depth Flow in Approaching Gutter (ft)
a = Depth of Inlet Depression (ft)
F_r = Clogging Factor
n = Manning's Coefficient for Asphalt
S = Cross-Slope of Street
Z = Reciprocal of Cross-Slope

Depth of Flow in Approaching Gutter:

y = 0.24 ft

Length of Curb Opening to Intercept Entire Flow:

L = 21.82 ft

Interception Capacity of Inlet:

Q_i = 3.28 cfs

Bypassed by Current Inlet:

$Q - Q_i$ = 0.11 cfs TO DA-30

Recommend ADOT C-15.20, L=17'

INCA ENGINEERS INC.

ON-GRADE CURB OPENING INLET CAPACITY

Site:	**GILBERT ROAD**
Location:	**GILBERT ARIZONA**
Description:	Calculation of ADOT C-15.2 Catch Basin Opening on grade -depressed inlet
References:	Town of Gilbert Standard Details MAG Supplement Article XII, ADOT Roadway Design Guidelines Chapter 600, Drainage Design Manual for Maricopa County.
Concentration Point:	**DA-29**
Date:	12/23/02

Known Values:

Depth of Inlet Depression	0.25 ft
Flow from Catchment	2.75 cfs
Carryover from Previous Inlet	0.00 cfs
Length of Curb Opening	20.58 ft
Clogging Factor	0.80
Manning's Coefficient	0.015
Slope of Street	0.0380 ft/ft
Cross-Slope of Street	0.040 ft/ft

Calculated Values:

Referenced Equations:

$y = [Qn/(.56ZS^{1/2})]^{3/8}$

$L = Q / .7F_r(a+y)^{3/2}\{1-[1-y/(a+y)]^{5/2}\}$

$Q_i = Q [(a/y+1)^{5/2}-(a/y+1-L_i/L)^{5/2}] / [(a/y+1)^{5/2}-(a/y)^{5/2}]$

where
L = Length of Curb Opening to Intercept Entire Flow (ft)
Q = Flow Approaching Gutter (cfs)
L_i = Length of Curb Opening (ft)
Q_i = Interception Capacity (cfs)
y = Depth Flow in Approaching Gutter (ft)
a = Depth of Inlet Depression (ft)
F_r = Clogging Factor
n = Manning's Coefficient for Asphalt
S = Cross-Slope of Street
Z = Reciprocal of Cross-Slope

Depth of Flow in Approaching Gutter:

y = 0.21 ft

Length of Curb Opening to Intercept Entire Flow:

L = 20.35 ft

Interception Capacity of Inlet:

Q_i = 2.77 cfs

Bypassed by Current Inlet:

$Q - Q_i$ = -0.02 cfs

Recommend ADOT C-15.20, L=17'

INCA ENGINEERS INC

ON-GRADE CURB OPENING INLET CAPACITY

Site:	**GILBERT ROAD**
Location:	**GILBERT ARIZONA**
Description:	Calculation of ADOT C-15.2 Catch Basin Opening on grade -depressed inlet
References:	Town of Gilbert Standard Details MAG Supplement Article XII, ADOT Roadway Design Guidelines Chapter 600, Drainage Design Manual for Maricopa County.
Concentration Point:	**DA-30**
Date:	1/30/03

Known Values:

Depth of Inlet Depression	**0.25** ft	
Flow from Catchment	**3.97** cfs	
Carryover from Previous Inlet	**0.43** cfs	**FROM DA- 28**
Length of Curb Opening	**31.08** ft	
Clogging Factor	**0.80**	
Manning's Coefficient	**0.015**	
Slope of Street	**0.0346** ft/ft	
Cross-Slope of Street	**0.040** ft/ft	

Calculated Values:

Referenced Equations:

$y = [Qn/(.56ZS^{1/2})]^{3/8}$

$L = Q / .7F_r(a+y)^{3/2}\{1-[1-y/(a+y)]^{5/2}\}$

$Q_i = Q\ [(a/y+1)^{5/2}-(a/y+1-L_i/L)^{5/2}] / [(a/y+1)^{5/2}-(a/y)^{5/2}]$

where
- L = Length of Curb Opening to Intercept Entire Flow (ft)
- Q = Flow Approaching Gutter (cfs)
- L_i = Length of Curb Opening (ft)
- Q_i = Interception Capacity (cfs)
- y = Depth Flow in Approaching Gutter (ft)
- a = Depth of Inlet Depression (ft)
- F_r = Clogging Factor
- n = Manning's Coefficient for Asphalt
- S = Cross-Slope of Street
- Z = Reciprocal of Cross-Slope

Depth of Flow in Approaching Gutter:

y = 0.25 ft

Length of Curb Opening to Intercept Entire Flow:

L = 26.77 ft

Interception Capacity of Inlet:

Q_i = 4.73 cfs

Bypassed by Current Inlet:

$Q - Q_i$ = -0.33 cfs

Recommend ADOT C-15.20, L=17'

INCA ENGINEERS INC

ON-GRADE CURB OPENING INLET CAPACITY

Site:	**GILBERT ROAD**
Location:	**GILBERT ARIZONA**
Description:	Calculation of ADOT C-15.2 Catch Basin Opening on grade -depressed inlet
References:	Town of Gilbert Standard Details MAG Supplement Article XII, ADOT Roadway Design Guidelines Chapter 600, Drainage Design Manual for Maricopa County.
Concentration Point:	**DA-31**
Date:	12/23/02

Known Values:

Depth of Inlet Depression	**0.25**	ft
Flow from Catchment	**1.25**	cfs
Carryover from Previous Inlet	**0.00**	cfs
Length of Curb Opening	**13.58**	ft
Clogging Factor	**0.80**	
Manning's Coefficient	**0.015**	
Slope of Street	**0.0313**	ft/ft
Cross-Slope of Street	**0.040**	ft/ft

Calculated Values:

Referenced Equations:

$y = [Qn/(.56ZS^{1/2})]^{3/8}$

$L = Q / .7F_r(a+y)^{3/2}\{1-[1-y/(a+y)]^{5/2}\}$

$Q_i = Q\ [(a/y+1)^{5/2}-(a/y+1-L_i/L)^{5/2}] / [(a/y+1)^{5/2}-(a/y)^{5/2}]$

where
- L = Length of Curb Opening to Intercept Entire Flow (ft)
- Q = Flow Approaching Gutter (cfs)
- L_i = Length of Curb Opening (ft)
- Q_i = Interception Capacity (cfs)
- y = Depth Flow in Approaching Gutter (ft)
- a = Depth of Inlet Depression (ft)
- F_r = Clogging Factor
- n = Manning's Coefficient for Asphalt
- S = Cross-Slope of Street
- Z = Reciprocal of Cross-Slope

Depth of Flow in Approaching Gutter:

y = 0.16 ft

Length of Curb Opening to Intercept Entire Flow:

L = 11.97 ft

Interception Capacity of Inlet:

Q_i = 1.35 cfs

Bypassed by Current Inlet:

$Q - Q_i$ = -0.10 cfs

Recommend ADOT C-15.20, L=10'

INCA ENGINEERS INC

SUMP CURB OPENING INLET CAPACITY

Site:	GILBERT ROAD
Location:	GILBERT, ARIZONA
Description:	Calculation of ADOT Std. Det. C-15.20 Catch Basin in a sump - Depressed Inlet
References:	Town of Gilbert Standard Details MAG Supplement Article XII, ADOT Roadway Design Guidelines Chapter 600
Concentration Point:	**DA-33 & 35**
Date:	1/30/03

Known Values:

Longitudinal Slope (S)	**0.0200**	ft/ft
Flow from Catchment (Q)	**4.85**	cfs
Carryover from Previous Inlet (Qc)	**0.00**	cfs
Sump (ds)	**0.25**	ft
Clogging Factor (Fr)	**0.50**	
Width of Depression (W)	**1.42**	ft
Manning's Coefficient (n)	**0.015**	
Cross-Slope of Street (Sx)	**0.040**	ft/ft

Calculated Values:

Referenced Equations:

$L_T = ((Q+Qc / (C_w d^{1.5} Fr))-1.8W)$

$Q_i = C_w(L+1.8W)d^{1.5} x Fr$

where
- L_T = Length of Curb Opening to Intercept Entire Flow (ft) Based on the Greater of d or ds.
- d = Depth Approaching Catch Basin at Normal Slope (ft)
- ds = Depth of Sump (ft)
- L = Design Length of Curb Opening (ft)
- Fr = Clogging Factor
- C_w = 2.3 (Weir Coefficient)
- W = Width of Depression (ft)
- Q_i = Interception Capacity of Inlet (cfs)

Total Flow Approaching Catch Basin (Q+Qc):	**4.85**	**cfs**
Depth of Flow in Approaching Gutter (d):	**0.23**	**ft**
Greater of d or ds:	**0.25**	
Length of Curb Opening to Intercept Entire Flow (L_T):	**31.18**	**ft**
Design Length of Curb Opening (L):	**38.08**	**ft**
Interception Capacity of Inlet (Qi):	**5.84**	**cfs**
Bypassed by Current Inlet (Q+Qc-Qi):	**0.00**	**cfs**

INCA ENGINEERS INC

SUMP CURB OPENING INLET CAPACITY

Site:	GILBERT ROAD
Location:	GILBERT, ARIZONA
Description:	Calculation of ADOT Std. Det. C-15.20 Catch Basin in a sump - Depressed Inlet
References:	Town of Gilbert Standard Details MAG Supplement Article XII, ADOT Roadway Design Guidelines Chapter 600
Concentration Point:	**DA-34 & 36**
Date:	1/30/03

Known Values:

Longitudinal Slope (S)	**0.0070**	ft/ft
Flow from Catchment (Q)	**6.28**	cfs
Carryover from Previous Inlet (Qc)	**0.00**	cfs
Sump (ds)	**0.25**	ft
Clogging Factor (Fr)	**0.50**	
Width of Depression (W)	**1.42**	ft
Manning's Coefficient (n)	**0.015**	
Cross-Slope of Street (Sx)	**0.040**	ft/ft

Calculated Values:

Referenced Equations:

$L_T = ((Q+Qc / (C_w d^{1.5} Fr))-1.8W)$

$Q_i = C_w(L+1.8W)d^{1.5} x Fr$

where
L_T = Length of Curb Opening to Intercept Entire Flow (ft) Based on the Greater of d or ds.
d = Depth Approaching Catch Basin at Normal Slope (ft)
ds = Depth of Sump (ft)
L = Design Length of Curb Opening (ft)
Fr = Clogging Factor
C_w = 2.3 (Weir Coefficient)
W = Width of Depression (ft)
Q_i = Interception Capacity of Inlet (cfs)

Total Flow Approaching Catch Basin (Q+Qc):	**6.28**	**cfs**	
Depth of Flow in Approaching Gutter (d):	**0.30**	**ft**	**Flowmaster**
Greater of d or ds:	**0.30**		
Length of Curb Opening to Intercept Entire Flow (L_T):	**30.68**	**ft**	
Design Length of Curb Opening (L):	**38.08**	**ft**	
Interception Capacity of Inlet (Qi):	**7.68**	**cfs**	
Bypassed by Current Inlet (Q+Qc-Qi):	**0.00**	**cfs**	

INCA ENGINEERS INC.

ON-GRADE CURB OPENING INLET CAPACITY

Site:	**GILBERT ROAD**
Location:	**GILBERT ARIZONA**
Description:	Calculation of ADOT C-15.2 Catch Basin Opening on grade -depressed inlet
References:	Town of Gilbert Standard Details MAG Supplement Article XII, ADOT Roadway Design Guidelines Chapter 600, Drainage Design Manual for Maricopa County.
Concentration Point:	**DA-37**
Date:	12/23/02

Known Values:

Depth of Inlet Depression	**0.25**	ft
Flow from Catchment	**2.20**	cfs
Carryover from Previous Inlet	**0.00**	cfs
Length of Curb Opening	**20.58**	ft
Clogging Factor	**0.80**	
Manning's Coefficient	**0.015**	
Slope of Street	**0.0381**	ft/ft
Cross-Slope of Street	**0.040**	ft/ft

Calculated Values:

Referenced Equations:

$y = [Qn/(.56ZS^{1/2})]^{3/8}$

$L = Q / .7F_r(a+y)^{3/2}\{1-[1-y/(a+y)]^{5/2}\}$

$Q_i = Q\ [(a/y+1)^{5/2}-(a/y+1-L_i/L)^{5/2}] / [(a/y+1)^{5/2}-(a/y)^{5/2}]$

where
- L = Length of Curb Opening to Intercept Entire Flow (ft)
- Q = Flow Approaching Gutter (cfs)
- L_i = Length of Curb Opening (ft)
- Q_i = Interception Capacity (cfs)
- y = Depth Flow in Approaching Gutter (ft)
- a = Depth of Inlet Depression (ft)
- F_r = Clogging Factor
- n = Manning's Coefficient for Asphalt
- S = Cross-Slope of Street
- Z = Reciprocal of Cross-Slope

Depth of Flow in Approaching Gutter:

y =	**0.19**	**ft**

Length of Curb Opening to Intercept Entire Flow:

L =	**17.71**	**ft**

Interception Capacity of Inlet:

Q_i =	**2.40**	**cfs**

Bypassed by Current Inlet:

$Q - Q_i$ =	**-0.20**	**cfs**

Recommend ADOT C-15.20, L=17'

INCA ENGINEERS INC.

ON-GRADE CURB OPENING INLET CAPACITY

Site:	**GILBERT ROAD**
Location:	**GILBERT ARIZONA**
Description:	Calculation of ADOT C-15.2 Catch Basin Opening on grade -depressed inlet
References:	Town of Gilbert Standard Details MAG Supplement Article XII, ADOT Roadway Design Guidelines Chapter 600, Drainage Design Manual for Maricopa County.
Concentration Point:	**DA-38**
Date:	12/23/02

Known Values:

Depth of Inlet Depression	**0.25**	ft
Flow from Catchment	**2.20**	cfs
Carryover from Previous Inlet	**0.00**	cfs
Length of Curb Opening	**20.58**	ft
Clogging Factor	**0.80**	
Manning's Coefficient	**0.015**	
Slope of Street	**0.0230**	ft/ft
Cross-Slope of Street	**0.040**	ft/ft

Calculated Values:

Referenced Equations:

$y = [Qn/(.56ZS^{1/2})]^{3/8}$

$L = Q / .7F_r(a+y)^{3/2}\{1-[1-y/(a+y)]^{5/2}\}$

$Q_i = Q\ [(a/y+1)^{5/2}-(a/y+1-L_i/L)^{5/2}]\ /\ [(a/y+1)^{5/2}-(a/y)^{5/2}]$

where
- L = Length of Curb Opening to Intercept Entire Flow (ft)
- Q = Flow Approaching Gutter (cfs)
- L_i = Length of Curb Opening (ft)
- Q_i = Interception Capacity (cfs)
- y = Depth Flow in Approaching Gutter (ft)
- a = Depth of Inlet Depression (ft)
- F_r = Clogging Factor
- n = Manning's Coefficient for Asphalt
- S = Cross-Slope of Street
- Z = Reciprocal of Cross-Slope

Depth of Flow in Approaching Gutter:

y =	0.21	ft

Length of Curb Opening to Intercept Entire Flow:

L =	16.11	ft

Interception Capacity of Inlet:

Q_i =	2.50	cfs

Bypassed by Current Inlet:

$Q - Q_i$ =	-0.30	cfs

Recommend ADOT C-15.20, L=17'

INCA ENGINEERS INC

ON-GRADE CURB OPENING INLET CAPACITY

Site:	**GILBERT ROAD**
Location:	**GILBERT ARIZONA**
Description:	Calculation of ADOT C-15.2 Catch Basin Opening on grade -depressed inlet
References:	Town of Gilbert Standard Details MAG Supplement Article XII, ADOT Roadway Design Guidelines Chapter 600, Drainage Design Manual for Maricopa County.
Concentration Point:	**DA-39**
Date:	12/23/02

Known Values:

Depth of Inlet Depression	**0.25**	ft
Flow from Catchment	**2.33**	cfs
Carryover from Previous Inlet	**0.00**	cfs
Length of Curb Opening	**20.58**	ft
Clogging Factor	**0.80**	
Manning's Coefficient	**0.015**	
Slope of Street	**0.0306**	ft/ft
Cross-Slope of Street	**0.040**	ft/ft

Calculated Values:

Referenced Equations:

$y = [Qn/(.56ZS^{1/2})]^{3/8}$

$L = Q / .7F_r(a+y)^{3/2}\{1-[1-y/(a+y)]^{5/2}\}$

$Q_i = Q\,[(a/y+1)^{5/2}-(a/y+1-L_i/L)^{5/2}] / [(a/y+1)^{5/2}-(a/y)^{5/2}]$

where
- L = Length of Curb Opening to Intercept Entire Flow (ft)
- Q = Flow Approaching Gutter (cfs)
- L_i = Length of Curb Opening (ft)
- Q_i = Interception Capacity (cfs)
- y = Depth Flow in Approaching Gutter (ft)
- a = Depth of Inlet Depression (ft)
- F_r = Clogging Factor
- n = Manning's Coefficient for Asphalt
- S = Cross-Slope of Street
- Z = Reciprocal of Cross-Slope

Depth of Flow in Approaching Gutter:

y = **0.20** **ft**

Length of Curb Opening to Intercept Entire Flow:

L = **17.62** **ft**

Interception Capacity of Inlet:

Q_i = **2.54** **cfs**

Bypassed by Current Inlet:

$Q - Q_i$ = **-0.21** **cfs**

Recommend ADOT C-15.20, L=17'

INCA ENGINEERS INC

ON-GRADE CURB OPENING INLET CAPACITY

Site:	**GILBERT ROAD**
Location:	**GILBERT ARIZONA**
Description:	Calculation of ADOT C-15.2 Catch Basin Opening on grade -depressed inlet
References:	Town of Gilbert Standard Details MAG Supplement Article XII, ADOT Roadway Design Guidelines Chapter 600, Drainage Design Manual for Maricopa County.
Concentration Point:	**DA-40**
Date:	12/23/02

Known Values:

Depth of Inlet Depression	**0.25**	ft
Flow from Catchment	**2.33**	cfs
Carryover from Previous Inlet	**0.00**	cfs
Length of Curb Opening	**20.58**	ft
Clogging Factor	**0.80**	
Manning's Coefficient	**0.015**	
Slope of Street	**0.0306**	ft/ft
Cross-Slope of Street	**0.040**	ft/ft

Calculated Values:

Referenced Equations:

$$y = [Qn/(.56ZS^{1/2})]^{3/8}$$

$$L = Q / .7F_r(a+y)^{3/2}\{1-[1-y/(a+y)]^{5/2}\}$$

$$Q_i = Q\,[(a/y+1)^{5/2}-(a/y+1-L_i/L)^{5/2}] / [(a/y+1)^{5/2}-(a/y)^{5/2}]$$

where
- L = Length of Curb Opening to Intercept Entire Flow (ft)
- Q = Flow Approaching Gutter (cfs)
- L_i = Length of Curb Opening (ft)
- Q_i = Interception Capacity (cfs)
- y = Depth Flow in Approaching Gutter (ft)
- a = Depth of Inlet Depression (ft)
- F_r = Clogging Factor
- n = Manning's Coefficient for Asphalt
- S = Cross-Slope of Street
- Z = Reciprocal of Cross-Slope

Depth of Flow in Approaching Gutter:

y = 0.20 ft

Length of Curb Opening to Intercept Entire Flow:

L = 17.62 ft

Interception Capacity of Inlet:

Q_i = 2.54 cfs

Bypassed by Current Inlet:

$Q - Q_i$ = -0.21 cfs

Recommend ADOT C-15.20, L=17'

INCA ENGINEERS INC

ON-GRADE CURB OPENING INLET CAPACITY

Site:	**GILBERT ROAD**
Location:	**GILBERT ARIZONA**
Description:	Calculation of ADOT C-15.2 Catch Basin Opening on grade -depressed inlet
References:	Town of Gilbert Standard Details MAG Supplement Article XII, ADOT Roadway Design Guidelines Chapter 600, Drainage Design Manual for Maricopa County.
Concentration Point:	**DA-41**
Date:	12/23/02

Known Values:

Depth of Inlet Depression	**0.25** ft
Flow from Catchment	**2.38** cfs
Carryover from Previous Inlet	**0.00** cfs
Length of Curb Opening	**20.58** ft
Clogging Factor	**0.80**
Manning's Coefficient	**0.015**
Slope of Street	**0.0223** ft/ft
Cross-Slope of Street	**0.040** ft/ft

Calculated Values:

Referenced Equations:

$y = [Qn/(.56ZS^{1/2})]^{3/8}$

$L = Q / .7F_r(a+y)^{3/2}\{1-[1-y/(a+y)]^{5/2}\}$

$Q_i = Q\,[(a/y+1)^{5/2}-(a/y+1-L_i/L)^{5/2}] / [(a/y+1)^{5/2}-(a/y)^{5/2}]$

where
L = Length of Curb Opening to Intercept Entire Flow (ft)
Q = Flow Approaching Gutter (cfs)
L_i = Length of Curb Opening (ft)
Q_i = Interception Capacity (cfs)
y = Depth Flow in Approaching Gutter (ft)
a = Depth of Inlet Depression (ft)
F_r = Clogging Factor
n = Manning's Coefficient for Asphalt
S = Cross-Slope of Street
Z = Reciprocal of Cross-Slope

Depth of Flow in Approaching Gutter:

y = 0.22 ft

Length of Curb Opening to Intercept Entire Flow:

L = 16.83 ft

Interception Capacity of Inlet:

Q_i = 2.64 cfs

Bypassed by Current Inlet:

$Q - Q_i$ = -0.26 cfs

Recommend ADOT C-15.20, L=17'

INCA ENGINEERS INC

ON-GRADE CURB OPENING INLET CAPACITY

Site:	**GILBERT ROAD**
Location:	**GILBERT ARIZONA**
Description:	Calculation of ADOT C-15.2 Catch Basin Opening on grade -depressed inlet
References:	Town of Gilbert Standard Details MAG Supplement Article XII, ADOT Roadway Design Guidelines Chapter 600, Drainage Design Manual for Maricopa County.
Concentration Point:	**DA-42**
Date:	12/23/02

Known Values:

Depth of Inlet Depression	**0.25** ft
Flow from Catchment	**2.38** cfs
Carryover from Previous Inlet	**0.00** cfs
Length of Curb Opening	**20.58** ft
Clogging Factor	**0.80**
Manning's Coefficient	**0.015**
Slope of Street	**0.0225** ft/ft
Cross-Slope of Street	**0.040** ft/ft

Calculated Values:

Referenced Equations:

$y = [Qn/(.56ZS^{1/2})]^{3/8}$

$L = Q / .7F_r(a+y)^{3/2}\{1-[1-y/(a+y)]^{5/2}\}$

$Q_i = Q\,[(a/y+1)^{5/2}-(a/y+1-L_i/L)^{5/2}] / [(a/y+1)^{5/2}-(a/y)^{5/2}]$

where
- L = Length of Curb Opening to Intercept Entire Flow (ft)
- Q = Flow Approaching Gutter (cfs)
- L_i = Length of Curb Opening (ft)
- Q_i = Interception Capacity (cfs)
- y = Depth Flow in Approaching Gutter (ft)
- a = Depth of Inlet Depression (ft)
- F_r = Clogging Factor
- n = Manning's Coefficient for Asphalt
- S = Cross-Slope of Street
- Z = Reciprocal of Cross-Slope

Depth of Flow in Approaching Gutter:

y = 0.22 ft

Length of Curb Opening to Intercept Entire Flow:

L = 16.85 ft

Interception Capacity of Inlet:

Q_i = 2.64 cfs

Bypassed by Current Inlet:

$Q - Q_i$ = -0.26 cfs

Recommend ADOT C-15.20, L=17'

INCA ENGINEERS INC

ON-GRADE CURB OPENING INLET CAPACITY

Site:	**GILBERT ROAD**
Location:	**GILBERT ARIZONA**
Description:	Calculation of ADOT C-15.2 Catch Basin Opening on grade -depressed inlet
References:	Town of Gilbert Standard Details MAG Supplement Article XII, ADOT Roadway Design Guidelines Chapter 600, Drainage Design Manual for Maricopa County.
Concentration Point:	**DA-43**
Date:	12/23/02

Known Values:

Depth of Inlet Depression	**0.25** ft	
Flow from Catchment	**1.37** cfs	
Carryover from Previous Inlet	**0.06** cfs	**FROM DA-45**
Length of Curb Opening	**9.58** ft	
Clogging Factor	**0.80**	
Manning's Coefficient	**0.015**	
Slope of Street	**0.0050** ft/ft	
Cross-Slope of Street	**0.040** ft/ft	

Calculated Values:

Referenced Equations:

$y = [Qn/(.56ZS^{1/2})]^{3/8}$

$L = Q / .7F_r(a+y)^{3/2}\{1-[1-y/(a+y)]^{5/2}\}$

$Q_i = Q\,[(a/y+1)^{5/2}-(a/y+1-L_i/L)^{5/2}] / [(a/y+1)^{5/2}-(a/y)^{5/2}]$

where
- L = Length of Curb Opening to Intercept Entire Flow (ft)
- Q = Flow Approaching Gutter (cfs)
- L_i = Length of Curb Opening (ft)
- Q_i = Interception Capacity (cfs)
- y = Depth Flow in Approaching Gutter (ft)
- a = Depth of Inlet Depression (ft)
- F_r = Clogging Factor
- n = Manning's Coefficient for Asphalt
- S = Cross-Slope of Street
- Z = Reciprocal of Cross-Slope

Depth of Flow in Approaching Gutter:

y = 0.24 ft

Length of Curb Opening to Intercept Entire Flow:

L = 9.24 ft

Interception Capacity of Inlet:

Q_i = 1.46 cfs

Bypassed by Current Inlet:

$Q - Q_i$ = -0.03 cfs

Recommend ADOT C-15.20, L=6'

INCA ENGINEERS INC

ON-GRADE CURB OPENING INLET CAPACITY

Site:	**GILBERT ROAD**
Location:	**GILBERT ARIZONA**
Description:	Calculation of ADOT C-15.2 Catch Basin Opening on grade -depressed inlet
References:	Town of Gilbert Standard Details MAG Supplement Article XII, ADOT Roadway Design Guidelines Chapter 600, Drainage Design Manual for Maricopa County.
Concentration Point:	**DA-44**
Date:	12/23/02

Known Values:

Depth of Inlet Depression	**0.25**	ft
Flow from Catchment	**1.37**	cfs
Carryover from Previous Inlet	**0.08**	cfs
Length of Curb Opening	**13.58**	ft
Clogging Factor	**0.80**	
Manning's Coefficient	**0.015**	
Slope of Street	**0.0207**	ft/ft
Cross-Slope of Street	**0.040**	ft/ft

Calculated Values:

Referenced Equations:

$$y = [Qn/(.56ZS^{1/2})]^{3/8}$$

$$L = Q / .7F_r(a+y)^{3/2}\{1-[1-y/(a+y)]^{5/2}\}$$

$$Q_i = Q\,[(a/y+1)^{5/2}-(a/y+1-L_i/L)^{5/2}] / [(a/y+1)^{5/2}-(a/y)^{5/2}]$$

where
- L = Length of Curb Opening to Intercept Entire Flow (ft)
- Q = Flow Approaching Gutter (cfs)
- L_i = Length of Curb Opening (ft)
- Q_i = Interception Capacity (cfs)
- y = Depth Flow in Approaching Gutter (ft)
- a = Depth of Inlet Depression (ft)
- F_r = Clogging Factor
- n = Manning's Coefficient for Asphalt
- S = Cross-Slope of Street
- Z = Reciprocal of Cross-Slope

Depth of Flow in Approaching Gutter:

y = **0.18** ft

Length of Curb Opening to Intercept Entire Flow:

L = **12.17** ft

Interception Capacity of Inlet:

Q_i = **1.55** cfs

Bypassed by Current Inlet:

$Q - Q_i$ = **-0.10** cfs

Recommend ADOT C-15.20, L=10'

INCA ENGINEERS INC

ON-GRADE CURB OPENING INLET CAPACITY

Site:	**GILBERT ROAD**
Location:	**GILBERT ARIZONA**
Description:	Calculation of ADOT C-15.2 Catch Basin Opening on grade -depressed inlet
References:	Town of Gilbert Standard Details MAG Supplement Article XII, ADOT Roadway Design Guidelines Chapter 600, Drainage Design Manual for Maricopa County.
Concentration Point:	**DA-45**
Date:	12/23/02

Known Values:

Depth of Inlet Depression	**0.25** ft
Flow from Catchment	**1.69** cfs
Carryover from Previous Inlet	**0.00** cfs
Length of Curb Opening	**9.58** ft
Clogging Factor	**0.80**
Manning's Coefficient	**0.015**
Slope of Street	**0.0050** ft/ft
Cross-Slope of Street	**0.040** ft/ft

Calculated Values:

Referenced Equations:

$y = [Qn/(.56ZS^{1/2})]^{3/8}$

$L = Q / .7F_r(a+y)^{3/2}\{1-[1-y/(a+y)]^{5/2}\}$

$Q_i = Q\ [(a/y+1)^{5/2}-(a/y+1-L_i/L)^{5/2}] / [(a/y+1)^{5/2}-(a/y)^{5/2}]$

where
- L = Length of Curb Opening to Intercept Entire Flow (ft)
- Q = Flow Approaching Gutter (cfs)
- L_i = Length of Curb Opening (ft)
- Q_i = Interception Capacity (cfs)
- y = Depth Flow in Approaching Gutter (ft)
- a = Depth of Inlet Depression (ft)
- F_r = Clogging Factor
- n = Manning's Coefficient for Asphalt
- S = Cross-Slope of Street
- Z = Reciprocal of Cross-Slope

Depth of Flow in Approaching Gutter:

y = 0.25 ft

Length of Curb Opening to Intercept Entire Flow:

L = 10.25 ft

Interception Capacity of Inlet:

Q_i = 1.63 cfs

Bypassed by Current Inlet:

$Q - Q_i$ = 0.06 cfs TO DA-43

Recommend ADOT C-15.20, L=6'

INCA ENGINEERS INC

ON-GRADE CURB OPENING INLET CAPACITY

Site:	**GILBERT ROAD**
Location:	**GILBERT ARIZONA**
Description:	Calculation of ADOT C-15.2 Catch Basin Opening on grade -depressed inlet
References:	Town of Gilbert Standard Details MAG Supplement Article XII, ADOT Roadway Design Guidelines Chapter 600, Drainage Design Manual for Maricopa County.
Concentration Point:	**DA-46**
Date:	12/23/02

Known Values:

Depth of Inlet Depression	**0.25**	ft
Flow from Catchment	**0.85**	cfs
Carryover from Previous Inlet	**0.08**	cfs
Length of Curb Opening	**9.58**	ft
Clogging Factor	**0.80**	
Manning's Coefficient	**0.015**	
Slope of Street	**0.0147**	ft/ft
Cross-Slope of Street	**0.040**	ft/ft

Calculated Values:

Referenced Equations:

$y = [Qn/(.56ZS^{1/2})]^{3/8}$

$L = Q / .7F_r(a+y)^{3/2}\{1-[1-y/(a+y)]^{5/2}\}$

$Q_i = Q [(a/y+1)^{5/2}-(a/y+1-L_i/L)^{5/2}] / [(a/y+1)^{5/2}-(a/y)^{5/2}]$

where
- L = Length of Curb Opening to Intercept Entire Flow (ft)
- Q = Flow Approaching Gutter (cfs)
- L_i = Length of Curb Opening (ft)
- Q_i = Interception Capacity (cfs)
- y = Depth Flow in Approaching Gutter (ft)
- a = Depth of Inlet Depression (ft)
- F_r = Clogging Factor
- n = Manning's Coefficient for Asphalt
- S = Cross-Slope of Street
- Z = Reciprocal of Cross-Slope

Depth of Flow in Approaching Gutter:

y = 0.17 ft

Length of Curb Opening to Intercept Entire Flow:

L = 8.64 ft

Interception Capacity of Inlet:

Q_i = 0.99 cfs

Bypassed by Current Inlet:

$Q - Q_i$ = -0.06 cfs

Recommend ADOT C-15.20, L=3'

INCA ENGINEERS INC

ON-GRADE CURB OPENING INLET CAPACITY

Site:	**GILBERT ROAD**
Location:	**GILBERT ARIZONA**
Description:	Calculation of ADOT C-15.2 Catch Basin Opening on grade -depressed inlet
References:	Town of Gilbert Standard Details MAG Supplement Article XII, ADOT Roadway Design Guidelines Chapter 600, Drainage Design Manual for Maricopa County.
Concentration Point:	**DA-47**
Date:	12/23/02

Known Values:

Depth of Inlet Depression	**0.25**	ft
Flow from Catchment	**2.56**	cfs
Carryover from Previous Inlet	**0.00**	cfs
Length of Curb Opening	**20.58**	ft
Clogging Factor	**0.80**	
Manning's Coefficient	**0.015**	
Slope of Street	**0.0154**	ft/ft
Cross-Slope of Street	**0.040**	ft/ft

Calculated Values:

Referenced Equations:

$$y = [Qn/(.56ZS^{1/2})]^{3/8}$$

$$L = Q / .7F_r(a+y)^{3/2}\{1-[1-y/(a+y)]^{5/2}\}$$

$$Q_i = Q\,[(a/y+1)^{5/2}-(a/y+1-L_i/L)^{5/2}] / [(a/y+1)^{5/2}-(a/y)^{5/2}]$$

where
- L = Length of Curb Opening to Intercept Entire Flow (ft)
- Q = Flow Approaching Gutter (cfs)
- L_i = Length of Curb Opening (ft)
- Q_i = Interception Capacity (cfs)
- y = Depth Flow in Approaching Gutter (ft)
- a = Depth of Inlet Depression (ft)
- F_r = Clogging Factor
- n = Manning's Coefficient for Asphalt
- S = Cross-Slope of Street
- Z = Reciprocal of Cross-Slope

Depth of Flow in Approaching Gutter:

y = **0.24** ft

Length of Curb Opening to Intercept Entire Flow:

L = **16.41** ft

Interception Capacity of Inlet:

Q_i = **2.85** cfs

Bypassed by Current Inlet:

$Q - Q_i$ = **-0.29** cfs

Recommend ADOT C-15.20, L=17'

INCA ENGINEERS INC

ON-GRADE CURB OPENING INLET CAPACITY

Site:	**GILBERT ROAD**
Location:	**GILBERT ARIZONA**
Description:	Calculation of ADOT C-15.2 Catch Basin Opening on grade -depressed inlet
References:	Town of Gilbert Standard Details MAG Supplement Article XII, ADOT Roadway Design Guidelines Chapter 600, Drainage Design Manual for Maricopa County.
Concentration Point:	**DA-48**
Date:	12/23/02

Known Values:

Depth of Inlet Depression	**0.25**	ft
Flow from Catchment	**2.56**	cfs
Carryover from Previous Inlet	**0.00**	cfs
Length of Curb Opening	**20.58**	ft
Clogging Factor	**0.80**	
Manning's Coefficient	**0.015**	
Slope of Street	**0.0122**	ft/ft
Cross-Slope of Street	**0.040**	ft/ft

Calculated Values:

Referenced Equations:

$y = [Qn/(.56ZS^{1/2})]^{3/8}$

$L = Q / .7F_r(a+y)^{3/2}\{1-[1-y/(a+y)]^{5/2}\}$

$Q_i = Q\ [(a/y+1)^{5/2}-(a/y+1-L_i/L)^{5/2}] / [(a/y+1)^{5/2}-(a/y)^{5/2}]$

where
- L = Length of Curb Opening to Intercept Entire Flow (ft)
- Q = Flow Approaching Gutter (cfs)
- L_i = Length of Curb Opening (ft)
- Q_i = Interception Capacity (cfs)
- y = Depth Flow in Approaching Gutter (ft)
- a = Depth of Inlet Depression (ft)
- F_r = Clogging Factor
- n = Manning's Coefficient for Asphalt
- S = Cross-Slope of Street
- Z = Reciprocal of Cross-Slope

Depth of Flow in Approaching Gutter:

y = 0.25 ft

Length of Curb Opening to Intercept Entire Flow:

L = 15.69 ft

Interception Capacity of Inlet:

Q_i = 2.89 cfs

Bypassed by Current Inlet:

$Q - Q_i$ = -0.33 cfs

Recommend ADOT C-15.20, L=17'

INCA ENGINEERS INC

ON-GRADE CURB OPENING INLET CAPACITY

Site:	**GILBERT ROAD**
Location:	**GILBERT ARIZONA**
Description:	Calculation of ADOT C-15.2 Catch Basin Opening on grade -depressed inlet
References:	Town of Gilbert Standard Details MAG Supplement Article XII, ADOT Roadway Design Guidelines Chapter 600, Drainage Design Manual for Maricopa County.
Concentration Point:	**DA-49**
Date:	12/23/02

Known Values:

Depth of Inlet Depression	**0.25**	ft
Flow from Catchment	**1.08**	cfs
Carryover from Previous Inlet	**0.00**	cfs
Length of Curb Opening	**9.58**	ft
Clogging Factor	**0.80**	
Manning's Coefficient	**0.015**	
Slope of Street	**0.0135**	ft/ft
Cross-Slope of Street	**0.040**	ft/ft

Calculated Values:

Referenced Equations:

$y = [Qn/(.56ZS^{1/2})]^{3/8}$

$L = Q / .7F_r(a+y)^{3/2}\{1-[1-y/(a+y)]^{5/2}\}$

$Q_i = Q\ [(a/y+1)^{5/2}-(a/y+1-L_i/L)^{5/2}] / [(a/y+1)^{5/2}-(a/y)^{5/2}]$

where
- L = Length of Curb Opening to Intercept Entire Flow (ft)
- Q = Flow Approaching Gutter (cfs)
- L_i = Length of Curb Opening (ft)
- Q_i = Interception Capacity (cfs)
- y = Depth Flow in Approaching Gutter (ft)
- a = Depth of Inlet Depression (ft)
- F_r = Clogging Factor
- n = Manning's Coefficient for Asphalt
- S = Cross-Slope of Street
- Z = Reciprocal of Cross-Slope

Depth of Flow in Approaching Gutter:

y = 0.18 ft

Length of Curb Opening to Intercept Entire Flow:

L = 9.34 ft

Interception Capacity of Inlet:

Q_i = 1.10 cfs

Bypassed by Current Inlet:

$Q - Q_i$ = -0.02 cfs

Recommend ADOT C-15.20, L=6'

INCA ENGINEERS INC

ON-GRADE CURB OPENING INLET CAPACITY

Site:	**GILBERT ROAD**
Location:	**GILBERT ARIZONA**
Description:	Calculation of ADOT C-15.2 Catch Basin Opening on grade -depressed inlet
References:	Town of Gilbert Standard Details MAG Supplement Article XII, ADOT Roadway Design Guidelines Chapter 600, Drainage Design Manual for Maricopa County.
Concentration Point:	**DA-50**
Date:	12/23/02

Known Values:

Depth of Inlet Depression	**0.25**	ft
Flow from Catchment	**1.08**	cfs
Carryover from Previous Inlet	**0.00**	cfs
Length of Curb Opening	**9.58**	ft
Clogging Factor	**0.80**	
Manning's Coefficient	**0.015**	
Slope of Street	**0.0138**	ft/ft
Cross-Slope of Street	**0.040**	ft/ft

Calculated Values:

Referenced Equations:

$y = [Qn/(.56ZS^{1/2})]^{3/8}$

$L = Q / .7F_r(a+y)^{3/2}\{1-[1-y/(a+y)]^{5/2}\}$

$Q_i = Q\,[(a/y+1)^{5/2}-(a/y+1-L_i/L)^{5/2}] / [(a/y+1)^{5/2}-(a/y)^{5/2}]$

where
- L = Length of Curb Opening to Intercept Entire Flow (ft)
- Q = Flow Approaching Gutter (cfs)
- L_i = Length of Curb Opening (ft)
- Q_i = Interception Capacity (cfs)
- y = Depth Flow in Approaching Gutter (ft)
- a = Depth of Inlet Depression (ft)
- F_r = Clogging Factor
- n = Manning's Coefficient for Asphalt
- S = Cross-Slope of Street
- Z = Reciprocal of Cross-Slope

Depth of Flow in Approaching Gutter:

y = 0.18 ft

Length of Curb Opening to Intercept Entire Flow:

L = 9.38 ft

Interception Capacity of Inlet:

Q_i = 1.09 cfs

Bypassed by Current Inlet:

$Q - Q_i$ = -0.01 cfs

Recommend ADOT C-15.20, L=6'

INCA ENGINEERS INC

ON-GRADE CURB OPENING INLET CAPACITY

Site:	**GILBERT ROAD**
Location:	**GILBERT ARIZONA**
Description:	Calculation of ADOT C-15.2 Catch Basin Opening on grade -depressed inlet
References:	Town of Gilbert Standard Details MAG Supplement Article XII, ADOT Roadway Design Guidelines Chapter 600, Drainage Design Manual for Maricopa County.
Concentration Point:	**DA-51**
Date:	12/23/02

Known Values:

Depth of Inlet Depression	**0.25** ft
Flow from Catchment	**2.31** cfs
Carryover from Previous Inlet	**0.00** cfs
Length of Curb Opening	**20.58** ft
Clogging Factor	**0.80**
Manning's Coefficient	**0.015**
Slope of Street	**0.0082** ft/ft
Cross-Slope of Street	**0.025** ft/ft

Calculated Values:

Referenced Equations:

$y = [Qn/(.56ZS^{1/2})]^{3/8}$

$L = Q / .7F_r(a+y)^{3/2}\{1-[1-y/(a+y)]^{5/2}\}$

$Q_i = Q [(a/y+1)^{5/2}-(a/y+1-L_i/L)^{5/2}] / [(a/y+1)^{5/2}-(a/y)^{5/2}]$

where
- L = Length of Curb Opening to Intercept Entire Flow (ft)
- Q = Flow Approaching Gutter (cfs)
- L_i = Length of Curb Opening (ft)
- Q_i = Interception Capacity (cfs)
- y = Depth Flow in Approaching Gutter (ft)
- a = Depth of Inlet Depression (ft)
- F_r = Clogging Factor
- n = Manning's Coefficient for Asphalt
- S = Cross-Slope of Street
- Z = Reciprocal of Cross-Slope

Depth of Flow in Approaching Gutter:

y = 0.22 ft

Length of Curb Opening to Intercept Entire Flow:

L = 16.34 ft

Interception Capacity of Inlet:

Q_i = 2.60 cfs

Bypassed by Current Inlet:

$Q - Q_i$ = -0.29 cfs

Recommend ADOT C-15.20, L=17'

INCA ENGINEERS INC

ON-GRADE CURB OPENING INLET CAPACITY

Site:	**GILBERT ROAD**
Location:	**GILBERT ARIZONA**
Description:	Calculation of ADOT C-15.2 Catch Basin Opening on grade -depressed inlet
References:	Town of Gilbert Standard Details MAG Supplement Article XII, ADOT Roadway Design Guidelines Chapter 600, Drainage Design Manual for Maricopa County.
Concentration Point:	**DA-52**
Date:	12/23/02

Known Values:

Depth of Inlet Depression	**0.25**	ft
Flow from Catchment	**2.31**	cfs
Carryover from Previous Inlet	**0.00**	cfs
Length of Curb Opening	**20.58**	ft
Clogging Factor	**0.80**	
Manning's Coefficient	**0.015**	
Slope of Street	**0.0082**	ft/ft
Cross-Slope of Street	**0.025**	ft/ft

Calculated Values:

Referenced Equations:

$y = [Qn/(.56ZS^{1/2})]^{3/8}$

$L = Q / .7F_r(a+y)^{3/2}\{1-[1-y/(a+y)]^{5/2}\}$

$Q_i = Q\ [(a/y+1)^{5/2}-(a/y+1-L_i/L)^{5/2}] / [(a/y+1)^{5/2}-(a/y)^{5/2}]$

where
- L = Length of Curb Opening to Intercept Entire Flow (ft)
- Q = Flow Approaching Gutter (cfs)
- L_i = Length of Curb Opening (ft)
- Q_i = Interception Capacity (cfs)
- y = Depth Flow in Approaching Gutter (ft)
- a = Depth of Inlet Depression (ft)
- F_r = Clogging Factor
- n = Manning's Coefficient for Asphalt
- S = Cross-Slope of Street
- Z = Reciprocal of Cross-Slope

Depth of Flow in Approaching Gutter:

y = **0.22** **ft**

Length of Curb Opening to Intercept Entire Flow:

L = **16.34** **ft**

Interception Capacity of Inlet:

Q_i = **2.60** **cfs**

Bypassed by Current Inlet:

$Q - Q_i$ = **-0.29** **cfs**

Recommend ADOT C-15.20, L=17'

INCA ENGINEERS INC

ON-GRADE CURB OPENING INLET CAPACITY

Site:	**CAMELLIA ROAD**
Location:	**GILBERT ARIZONA**
Description:	Calculation of ADOT C-15.2 Catch Basin Opening on grade -depressed inlet
References:	Town of Gilbert Standard Details MAG Supplement Article XII, ADOT Roadway Design Guidelines Chapter 600, Drainage Design Manual for Maricopa County.
Concentration Point:	**DA-55**
Date:	12/23/02

Known Values:

Depth of Inlet Depression	**0.25** ft
Flow from Catchment	**0.83** cfs
Carryover from Previous Inlet	**0.00** cfs
Length of Curb Opening	**6.58** ft
Clogging Factor	**0.80**
Manning's Coefficient	**0.015**
Slope of Street	**0.0008** ft/ft
Cross-Slope of Street	**0.025** ft/ft

Calculated Values:

Referenced Equations:

$y = [Qn/(.56ZS^{1/2})]^{3/8}$

$L = Q / .7F_r(a+y)^{3/2}\{1-[1-y/(a+y)]^{5/2}\}$

$Q_i = Q\ [(a/y+1)^{5/2}-(a/y+1-L_i/L)^{5/2}] / [(a/y+1)^{5/2}-(a/y)^{5/2}]$

where
- L = Length of Curb Opening to Intercept Entire Flow (ft)
- Q = Flow Approaching Gutter (cfs)
- L_i = Length of Curb Opening (ft)
- Q_i = Interception Capacity (cfs)
- y = Depth Flow in Approaching Gutter (ft)
- a = Depth of Inlet Depression (ft)
- F_r = Clogging Factor
- n = Manning's Coefficient for Asphalt
- S = Cross-Slope of Street
- Z = Reciprocal of Cross-Slope

Depth of Flow in Approaching Gutter:

$y =$ 0.23 ft

Length of Curb Opening to Intercept Entire Flow:

$L =$ 5.59 ft

Interception Capacity of Inlet:

$Q_i =$ 0.90 cfs

Bypassed by Current Inlet:

$Q - Q_i =$ -0.07 cfs

Recommend ADOT C-15.20, L=3'

INCA ENGINEERS INC

ON-GRADE CURB OPENING INLET CAPACITY

Site:	**CAMELLIA ROAD**
Location:	**GILBERT ARIZONA**
Description:	Calculation of ADOT C-15.2 Catch Basin Opening on grade -depressed inlet
References:	Town of Gilbert Standard Details MAG Supplement Article XII, ADOT Roadway Design Guidelines Chapter 600, Drainage Design Manual for Maricopa County.
Concentration Point:	**DA-56**
Date:	12/23/02

Known Values:

Depth of Inlet Depression	**0.25** ft
Flow from Catchment	**1.03** cfs
Carryover from Previous Inlet	**0.00** cfs
Length of Curb Opening	**6.58** ft
Clogging Factor	**0.80**
Manning's Coefficient	**0.015**
Slope of Street	**0.0009** ft/ft
Cross-Slope of Street	**0.025** ft/ft

Calculated Values:

Referenced Equations:

$y = [Qn/(.56ZS^{1/2})]^{3/8}$

$L = Q / .7F_r(a+y)^{3/2}\{1-[1-y/(a+y)]^{5/2}\}$

$Q_i = Q\ [(a/y+1)^{5/2}-(a/y+1-L_i/L)^{5/2}] / [(a/y+1)^{5/2}-(a/y)^{5/2}]$

where
- L = Length of Curb Opening to Intercept Entire Flow (ft)
- Q = Flow Approaching Gutter (cfs)
- L_i = Length of Curb Opening (ft)
- Q_i = Interception Capacity (cfs)
- y = Depth Flow in Approaching Gutter (ft)
- a = Depth of Inlet Depression (ft)
- F_r = Clogging Factor
- n = Manning's Coefficient for Asphalt
- S = Cross-Slope of Street
- Z = Reciprocal of Cross-Slope

Depth of Flow in Approaching Gutter:

y = 0.24 ft

Length of Curb Opening to Intercept Entire Flow:

L = 6.49 ft

Interception Capacity of Inlet:

Q_i = 1.04 cfs

Bypassed by Current Inlet:

$Q - Q_i$ = -0.01 cfs

Recommend ADOT C-15.20, L=3'

INCA ENGINEERS INC.

SUMP INLET CAPACITY

Site:	**GREENFIELD ROAD**
Location:	TOWN OF GILBERT, ARIZONA
Description:	Calculation of Depressed Inlets In A Sump Condition ADOT C-15.80 C.B.
References:	Town of Gilbert Standard Details MAG Supplement Article XII, ADOT Roadway Design Guidelines Chapter 600, Drainage Design Manual for Maricopa County.
Concentration Point:	**DA-57 & 58**
Date:	1/30/03

Known Values:

Depth at CB		**0.20**	ft
Flow from catchment, 50-yr		**2.93**	cfs
Carryover from previous inlet		**0.00**	cfs
Clogging factor		**2.00**	
Grate Perimeter	For ADOT C-15.80	**10.00**	ft

* Grate acts as a weir to a depth of 0.4 feet of depth then as orfice flow condition

Calculated Values:

Referenced Equations:

Weir Flow $Q_i = C_w P d^{1.5}$

where P = Grate Perimeter - - - P For ADOT C-15.80 =
Q_i = interception capacity per inlet (cfs)
y = depth flow in approaching gutter (ft)
d = depth at curb (ft)
F_r = clogging factor
C_w = 2.3 (weir coefficient)
W = width of depression (ft)

Perimeter Of Grate opening to intercept entire flow:

Q_i = **4.11** ft

Design Perimeter Of Grate opening:

P = 10.00 ft

USE SINGLE ADOT C-15.80 CB

INCA ENGINEERS INC.

SUMP INLET CAPACITY

Site:	**GREENFIELD ROAD**
Location:	TOWN OF GILBERT, ARIZONA
Description:	Calculation of Depressed Inlets In A Sump Condition ADOT C-15.80 C.B.
References:	Town of Gilbert Standard Details MAG Supplement Article XII, ADOT Roadway Design Guidelines Chapter 600, Drainage Design Manual for Maricopa County.
Concentration Point:	**DA-59**
Date:	12/23/02

Known Values:

Depth at CB		**0.20**	ft
Flow from catchment, 50-yr		**1.27**	cfs
Carryover from previous inlet		**0.00**	cfs
Clogging factor		**2.00**	
Grate Perimeter	For ADOT C-15.80	**10.00**	ft

* Grate acts as a weir to a depth of 0.4 feet of depth then as orfice flow condition

Calculated Values:

Referenced Equations:

Weir Flow $Q_i = C_w P d^{1.5}$

where
P = Grate Perimeter - - - P For ADOT C-15.80 =
Q_i = interception capacity per inlet (cfs)
y = depth flow in approaching gutter (ft)
d = depth at curb (ft)
F_r = clogging factor
C_w = 2.3 (weir coefficient)
W = width of depression (ft)

Perimeter Of Grate opening to intercept entire flow:

Q_i = **4.11** ft

Design Perimeter Of Grate opening:

P = 10.00 ft

USE SINGLE ADOT C-15.80 CB

Ray Road - Gutter flow in DA-1
Worksheet for Gutter Section

Project Description	
Worksheet	Gutter Section - DA-1
Type	Gutter Section
Solve For	Spread

Input Data		
Slope	0.007335	ft/ft
Discharge	2.79	cfs
Gutter Width	1.42	ft
Gutter Cross Slope	0.058685	ft/ft
Road Cross Slope	0.025000	ft/ft
Mannings Coefficient	0.015	

Results		
Spread	9.31	ft
Flow Area	1.1	ft^2
Depth	0.28	ft
Gutter Depression	0.6	in
Velocity	2.50	ft/s

Ray Road - Gutter flow in DA-2
Worksheet for Gutter Section

Project Description	
Worksheet	Ray Road - Gutter flow in DA-2
Type	Gutter Section
Solve For	Spread

Input Data		
Slope	0.004728	ft/ft
Discharge	2.66	cfs
Gutter Width	1.42	ft
Gutter Cross Slope	0.058685	ft/ft
Road Cross Slope	0.025000	ft/ft
Mannings Coefficient	0.015	

Results		
Spread	9.96	ft
Flow Area	1.3	ft²
Depth	0.30	ft
Gutter Depression	0.6	in
Velocity	2.09	ft/s

Ray Road - Gutter flow in Da-3
Worksheet for Gutter Section

Project Description	
Worksheet	Ray Road - Gutter flow in DA-3
Type	Gutter Section
Solve For	Spread

Input Data		
Slope	0.005654	ft/ft
Discharge	1.91	cfs
Gutter Width	1.42	ft
Gutter Cross Slope	0.058685	ft/ft
Road Cross Slope	0.025000	ft/ft
Mannings Coefficient	0.015	

Results		
Spread	8.43	ft
Flow Area	0.9	ft²
Depth	0.26	ft
Gutter Depression	0.6	in
Velocity	2.07	ft/s

Ray Road - Gutter flow in DA-4
Worksheet for Gutter Section

Project Description	
Worksheet	Ray Road - Gutter flow in DA-4
Type	Gutter Section
Solve For	Spread

Input Data		
Slope	0.005753	ft/ft
Discharge	1.94	cfs
Gutter Width	1.42	ft
Gutter Cross Slope	0.058685	ft/ft
Road Cross Slope	0.025000	ft/ft
Mannings Coefficient	0.015	

Results		
Spread	8.46	ft
Flow Area	0.9	ft^2
Depth	0.26	ft
Gutter Depression	0.6	in
Velocity	2.09	ft/s

Ray Road - Gutter flow in DA-5
Worksheet for Gutter Section

Project Description	
Worksheet	Ray Road - Gutter flow in DA-5
Type	Gutter Section
Solve For	Spread

Input Data		
Slope	0.001798	ft/ft
Discharge	1.57	cfs
Gutter Width	1.42	ft
Gutter Cross Slope	0.056869	ft/ft
Road Cross Slope	0.025000	ft/ft
Mannings Coefficient	0.015	

Results		
Spread	9.80	ft
Flow Area	1.2	ft^2
Depth	0.29	ft
Gutter Depression	0.5	in
Velocity	1.27	ft/s

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Ray Road - Gutter flow in DA-6
Worksheet for Gutter Section

Project Description	
Worksheet	Ray Road - Gutter flow in DA-6
Type	Gutter Section
Solve For	Spread

Input Data		
Slope	0.004719	ft/ft
Discharge	1.90	cfs
Gutter Width	1.42	ft
Gutter Cross Slope	0.058685	ft/ft
Road Cross Slope	0.025000	ft/ft
Mannings Coefficient	0.015	

Results		
Spread	8.72	ft
Flow Area	1.0	ft^2
Depth	0.27	ft
Gutter Depression	0.6	in
Velocity	1.93	ft/s

Ray Road - Gutter flow in DA-7
Worksheet for Gutter Section

Project Description	
Worksheet	Ray Road - Gutter flow in DA-7
Type	Gutter Section
Solve For	Spread

Input Data		
Slope	0.006635	ft/ft
Discharge	1.94	cfs
Gutter Width	1.42	ft
Gutter Cross Slope	0.058685	ft/ft
Road Cross Slope	0.025000	ft/ft
Mannings Coefficient	0.015	

Results		
Spread	8.22	ft
Flow Area	0.9	ft^2
Depth	0.25	ft
Gutter Depression	0.6	in
Velocity	2.21	ft/s

Ray Road - Gutter flow in DA-8
Worksheet for Gutter Section

Project Description	
Worksheet	Ray Road - Gutter flow in Da-8
Type	Gutter Section
Solve For	Spread

Input Data		
Slope	0.006635	ft/ft
Discharge	1.96	cfs
Gutter Width	1.42	ft
Gutter Cross Slope	0.058685	ft/ft
Road Cross Slope	0.025000	ft/ft
Mannings Coefficient	0.015	

Results		
Spread	8.25	ft
Flow Area	0.9	ft^2
Depth	0.25	ft
Gutter Depression	0.6	in
Velocity	2.21	ft/s

Ray Road - gutter flow in DA-9
Worksheet for Gutter Section

Project Description	
Worksheet	Ray Road - Gutter flow in DA-9
Type	Gutter Section
Solve For	Spread

Input Data		
Slope	0.002416	ft/ft
Discharge	1.86	cfs
Gutter Width	1.42	ft
Gutter Cross Slope	0.058685	ft/ft
Road Cross Slope	0.025000	ft/ft
Mannings Coefficient	0.015	

Results		
Spread	9.87	ft
Flow Area	1.3	ft^2
Depth	0.29	ft
Gutter Depression	0.6	in
Velocity	1.49	ft/s

Ray Road - gutter flow in DA-10
Worksheet for Gutter Section

Project Description	
Worksheet	Ray Road - Gutter flow in DA-10
Type	Gutter Section
Solve For	Spread

Input Data		
Slope	0.002416	ft/ft
Discharge	1.86	cfs
Gutter Width	1.42	ft
Gutter Cross Slope	0.058685	ft/ft
Road Cross Slope	0.025000	ft/ft
Mannings Coefficient	0.015	

Results		
Spread	9.87	ft
Flow Area	1.3	ft^2
Depth	0.29	ft
Gutter Depression	0.6	in
Velocity	1.49	ft/s

Ray Road - Gutter flow in DA-11
Worksheet for Gutter Section

Project Description	
Worksheet	Ray Road - Gutter flow in DA-11
Type	Gutter Section
Solve For	Spread

Input Data		
Slope	0.011601	ft/ft
Discharge	2.83	cfs
Gutter Width	1.42	ft
Gutter Cross Slope	0.058685	ft/ft
Road Cross Slope	0.025000	ft/ft
Mannings Coefficient	0.015	

Results		
Spread	8.55	ft
Flow Area	0.9	ft^2
Depth	0.26	ft
Gutter Depression	0.6	in
Velocity	2.99	ft/s

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Ray Road - Gutter flow in DA-12
Worksheet for Gutter Section

Project Description	
Worksheet	Ray Road - Gutter flow in DA-12
Type	Gutter Section
Solve For	Spread

Input Data		
Slope	0.010575	ft/ft
Discharge	1.49	cfs
Gutter Width	1.42	ft
Gutter Cross Slope	0.058685	ft/ft
Road Cross Slope	0.025000	ft/ft
Mannings Coefficient	0.015	

Results		
Spread	6.72	ft
Flow Area	0.6	ft²
Depth	0.22	ft
Gutter Depression	0.6	in
Velocity	2.49	ft/s

Ray Road - Gutter flow in DA-13
Worksheet for Gutter Section

Project Description	
Worksheet	Ray Road - Gutter flow in DA-13
Type	Gutter Section
Solve For	Spread

Input Data		
Slope	0.009597	ft/ft
Discharge	0.87	cfs
Gutter Width	1.42	ft
Gutter Cross Slope	0.058685	ft/ft
Road Cross Slope	0.025000	ft/ft
Mannings Coefficient	0.015	

Results		
Spread	5.47	ft
Flow Area	0.4	ft^2
Depth	0.18	ft
Gutter Depression	0.6	in
Velocity	2.13	ft/s

Ray Road - Gutter flow in DA-13A
Worksheet for Gutter Section

Project Description	
Worksheet	Ray Road - Gutter flow in DA-13
Type	Gutter Section
Solve For	Spread

Input Data		
Slope	0.004700	ft/ft
Discharge	0.61	cfs
Gutter Width	1.42	ft
Gutter Cross Slope	0.058685	ft/ft
Road Cross Slope	0.025000	ft/ft
Mannings Coefficient	0.015	

Results		
Spread	5.47	ft
Flow Area	0.4	ft²
Depth	0.18	ft
Gutter Depression	0.6	in
Velocity	1.49	ft/s

Ray Road - Gutter flow in DA-14
Worksheet for Gutter Section

Project Description	
Worksheet	Ray Road - Gutter flow in DA-14
Type	Gutter Section
Solve For	Spread

Input Data		
Slope	0.010480	ft/ft
Discharge	0.47	cfs
Gutter Width	1.42	ft
Gutter Cross Slope	0.058685	ft/ft
Road Cross Slope	0.025000	ft/ft
Mannings Coefficient	0.015	

Results		
Spread	4.07	ft
Flow Area	0.2	ft^2
Depth	0.15	ft
Gutter Depression	0.6	in
Velocity	1.95	ft/s

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Ray Road - Gutter flow in DA-15
Worksheet for Gutter Section

Project Description	
Worksheet	Ray Road - Gutter flow in DA-15
Type	Gutter Section
Solve For	Spread

Input Data		
Slope	0.002548	ft/ft
Discharge	1.28	cfs
Gutter Width	1.42	ft
Gutter Cross Slope	0.058685	ft/ft
Road Cross Slope	0.025000	ft/ft
Mannings Coefficient	0.015	

Results		
Spread	8.43	ft
Flow Area	0.9	ft²
Depth	0.26	ft
Gutter Depression	0.6	in
Velocity	1.39	ft/s

Ray Road - Gutter flow in DA-16
Worksheet for Gutter Section

Project Description	
Worksheet	Ray Road - Gutter flow in DA-16
Type	Gutter Section
Solve For	Spread

Input Data		
Slope	0.002480	ft/ft
Discharge	1.04	cfs
Gutter Width	1.42	ft
Gutter Cross Slope	0.058685	ft/ft
Road Cross Slope	0.025000	ft/ft
Mannings Coefficient	0.015	

Results		
Spread	7.80	ft
Flow Area	0.8	ft^2
Depth	0.24	ft
Gutter Depression	0.6	in
Velocity	1.31	ft/s

Ray Road - Gutter flow in DA-17
Worksheet for Gutter Section

Project Description	
Worksheet	Ray Road - Gutter flow in DA-17
Type	Gutter Section
Solve For	Spread

Input Data		
Slope	0.013566	ft/ft
Discharge	1.59	cfs
Gutter Width	1.42	ft
Gutter Cross Slope	0.058685	ft/ft
Road Cross Slope	0.025000	ft/ft
Mannings Coefficient	0.015	

Results		
Spread	6.56	ft
Flow Area	0.6	ft^2
Depth	0.21	ft
Gutter Depression	0.6	in
Velocity	2.78	ft/s

Ray Road - Gutter flow in DA-18
Worksheet for Gutter Section

Project Description	
Worksheet	Ray Road - Gutter flow in DA-18
Type	Gutter Section
Solve For	Spread

Input Data		
Slope	0.016538	ft/ft
Discharge	2.17	cfs
Gutter Width	1.42	ft
Gutter Cross Slope	0.058685	ft/ft
Road Cross Slope	0.025000	ft/ft
Mannings Coefficient	0.015	

Results		
Spread	7.15	ft
Flow Area	0.7	ft^2
Depth	0.23	ft
Gutter Depression	0.6	in
Velocity	3.22	ft/s

Ray Road - Gutter flow in DA-19
Worksheet for Gutter Section

Project Description	
Worksheet	Ray Road - Gutter flow in DA-19
Type	Gutter Section
Solve For	Spread

Input Data		
Slope	0.012200	ft/ft
Discharge	2.49	cfs
Gutter Width	1.42	ft
Gutter Cross Slope	0.058685	ft/ft
Road Cross Slope	0.025000	ft/ft
Mannings Coefficient	0.015	

Results		
Spread	8.04	ft
Flow Area	0.8	ft²
Depth	0.25	ft
Gutter Depression	0.6	in
Velocity	2.96	ft/s

Ray Road - Gutter flow in DA-20
Worksheet for Gutter Section

Project Description	
Worksheet	Ray Road - Gutter flow in DA-20
Type	Gutter Section
Solve For	Spread

Input Data		
Slope	0.012425	ft/ft
Discharge	1.78	cfs
Gutter Width	1.42	ft
Gutter Cross Slope	0.058685	ft/ft
Road Cross Slope	0.025000	ft/ft
Mannings Coefficient	0.015	

Results		
Spread	6.99	ft
Flow Area	0.6	ft^2
Depth	0.22	ft
Gutter Depression	0.6	in
Velocity	2.76	ft/s

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Ray Road - Gutter flow in DA-21
Worksheet for Gutter Section

Project Description	
Worksheet	Ray Road - Gutter flow in DA-21
Type	Gutter Section
Solve For	Spread

Input Data		
Slope	0.008074	ft/ft
Discharge	1.58	cfs
Gutter Width	1.42	ft
Gutter Cross Slope	0.058685	ft/ft
Road Cross Slope	0.025000	ft/ft
Mannings Coefficient	0.015	

Results		
Spread	7.27	ft
Flow Area	0.7	ft^2
Depth	0.23	ft
Gutter Depression	0.6	in
Velocity	2.27	ft/s

Ray Road - Gutter flow in DA-22
Worksheet for Gutter Section

Project Description	
Worksheet	Ray Road - Gutter flow in DA-22
Type	Gutter Section
Solve For	Spread

Input Data		
Slope	0.009083	ft/ft
Discharge	1.32	cfs
Gutter Width	1.42	ft
Gutter Cross Slope	0.058685	ft/ft
Road Cross Slope	0.025000	ft/ft
Mannings Coefficient	0.015	

Results		
Spread	6.60	ft
Flow Area	0.6	ft^2
Depth	0.21	ft
Gutter Depression	0.6	in
Velocity	2.28	ft/s

Ray Road - Gutter flow in DA-23
Worksheet for Gutter Section

Project Description	
Worksheet	Ray Road - Gutter flow in DA-23
Type	Gutter Section
Solve For	Spread

Input Data		
Slope	0.011929	ft/ft
Discharge	0.86	cfs
Gutter Width	1.42	ft
Gutter Cross Slope	0.058685	ft/ft
Road Cross Slope	0.025000	ft/ft
Mannings Coefficient	0.015	

Results		
Spread	5.19	ft
Flow Area	0.4	ft^2
Depth	0.18	ft
Gutter Depression	0.6	in
Velocity	2.32	ft/s

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Ray Road - Gutter flow in DA-24
Worksheet for Gutter Section

Project Description	
Worksheet	Ray Road - Gutter flow in DA-24
Type	Gutter Section
Solve For	Spread

Input Data		
Slope	0.002308	ft/ft
Discharge	1.22	cfs
Gutter Width	1.42	ft
Gutter Cross Slope	0.058685	ft/ft
Road Cross Slope	0.025000	ft/ft
Mannings Coefficient	0.015	

Results		
Spread	8.43	ft
Flow Area	0.9	ft^2
Depth	0.26	ft
Gutter Depression	0.6	in
Velocity	1.32	ft/s

Ray Road - Gutter flow in DA-25
Worksheet for Gutter Section

Project Description	
Worksheet	Ray Road - Gutter flow in DA-25
Type	Gutter Section
Solve For	Spread

Input Data		
Slope	0.008273	ft/ft
Discharge	0.53	cfs
Gutter Width	1.42	ft
Gutter Cross Slope	0.058685	ft/ft
Road Cross Slope	0.025000	ft/ft
Mannings Coefficient	0.015	

Results		
Spread	4.54	ft
Flow Area	0.3	ft^2
Depth	0.16	ft
Gutter Depression	0.6	in
Velocity	1.82	ft/s

Relocated Greenfield Road DA-26
Worksheet for Gutter Section

Project Description	
Worksheet	Relocated Greenfield Road DA-2
Type	Gutter Section
Solve For	Spread

Input Data		
Slope	0.008000	ft/ft
Discharge	0.61	cfs
Gutter Width	1.42	ft
Gutter Cross Slope	0.058685	ft/ft
Road Cross Slope	0.025000	ft/ft
Mannings Coefficient	0.013	

Results		
Spread	4.57	ft
Flow Area	0.3	ft²
Depth	0.16	ft
Gutter Depression	0.6	in
Velocity	2.07	ft/s

Relocated Greenfield Road DA-27
Worksheet for Gutter Section

Project Description	
Worksheet	Relocated Greenfield Road DA-2
Type	Gutter Section
Solve For	Spread

Input Data		
Slope	0.030958	ft/ft
Discharge	2.20	cfs
Gutter Width	1.42	ft
Gutter Cross Slope	0.058685	ft/ft
Road Cross Slope	0.040000	ft/ft
Mannings Coefficient	0.015	

Results		
Spread	4.82	ft
Flow Area	0.5	ft²
Depth	0.22	ft
Gutter Depression	0.3	in
Velocity	4.55	ft/s

Relocated Greenfield Road DA-28
Worksheet for Gutter Section

Project Description	
Worksheet	Relocated Greenfield Road DA-2
Type	Gutter Section
Solve For	Spread

Input Data		
Slope	0.027583	ft/ft
Discharge	3.59	cfs
Gutter Width	1.42	ft
Gutter Cross Slope	0.058685	ft/ft
Road Cross Slope	0.040000	ft/ft
Mannings Coefficient	0.015	

Results		
Spread	5.98	ft
Flow Area	0.7	ft^2
Depth	0.27	ft
Gutter Depression	0.3	in
Velocity	4.90	ft/s

Relocated Greenfield Road DA-29
Worksheet for Gutter Section

Project Description	
Worksheet	Relocated Greenfield Road DA-2
Type	Gutter Section
Solve For	Spread

Input Data		
Slope	0.038000	ft/ft
Discharge	2.75	cfs
Gutter Width	1.42	ft
Gutter Cross Slope	0.058685	ft/ft
Road Cross Slope	0.040000	ft/ft
Mannings Coefficient	0.015	

Results		
Spread	5.05	ft
Flow Area	0.5	ft²
Depth	0.23	ft
Gutter Depression	0.3	in
Velocity	5.19	ft/s

Relocated Greenfield Road DA-30
Worksheet for Gutter Section

Project Description	
Worksheet	Relocated Greenfield Road DA-3
Type	Gutter Section
Solve For	Spread

Input Data		
Slope	0.034565	ft/ft
Discharge	3.97	cfs
Gutter Width	1.42	ft
Gutter Cross Slope	0.058685	ft/ft
Road Cross Slope	0.040000	ft/ft
Mannings Coefficient	0.015	

Results		
Spread	5.95	ft
Flow Area	0.7	ft^2
Depth	0.26	ft
Gutter Depression	0.3	in
Velocity	5.46	ft/s

Relocated Greenfield Road DA-31
Worksheet for Gutter Section

Project Description	
Worksheet	Relocated Greenfield Road DA-3
Type	Gutter Section
Solve For	Spread

Input Data		
Slope	0.031308	ft/ft
Discharge	1.25	cfs
Gutter Width	1.42	ft
Gutter Cross Slope	0.058685	ft/ft
Road Cross Slope	0.040000	ft/ft
Mannings Coefficient	0.015	

Results		
Spread	3.83	ft
Flow Area	0.3	ft²
Depth	0.18	ft
Gutter Depression	0.3	in
Velocity	4.01	ft/s

Relocated Greenfield Road DA-33
Worksheet for Gutter Section

Project Description	
Worksheet	Relocated Greenfield Road DA-3
Type	Gutter Section
Solve For	Spread

Input Data		
Slope	0.024511	ft/ft
Discharge	2.06	cfs
Gutter Width	1.42	ft
Gutter Cross Slope	0.058685	ft/ft
Road Cross Slope	0.040000	ft/ft
Mannings Coefficient	0.015	

Results		
Spread	4.92	ft
Flow Area	0.5	ft²
Depth	0.22	ft
Gutter Depression	0.3	in
Velocity	4.10	ft/s

Relocated Greenfield Road DA-34
Worksheet for Gutter Section

Project Description	
Worksheet	Relocated Greenfield Road DA-3
Type	Gutter Section
Solve For	Spread

Input Data		
Slope	0.013823	ft/ft
Discharge	2.42	cfs
Gutter Width	1.42	ft
Gutter Cross Slope	0.058685	ft/ft
Road Cross Slope	0.040000	ft/ft
Mannings Coefficient	0.015	

Results		
Spread	5.86	ft
Flow Area	0.7	ft^2
Depth	0.26	ft
Gutter Depression	0.3	in
Velocity	3.43	ft/s

Relocated Greenfield Road DA-35
Worksheet for Gutter Section

Project Description	
Worksheet	Relocated Greenfield Road DA-3
Type	Gutter Section
Solve For	Spread

Input Data		
Slope	0.017651	ft/ft
Discharge	2.79	cfs
Gutter Width	1.42	ft
Gutter Cross Slope	0.058685	ft/ft
Road Cross Slope	0.040000	ft/ft
Mannings Coefficient	0.015	

Results		
Spread	5.91	ft
Flow Area	0.7	ft^2
Depth	0.26	ft
Gutter Depression	0.3	in
Velocity	3.89	ft/s

Relocated Greenfield Road DA-36
Worksheet for Gutter Section

Project Description	
Worksheet	Relocated Greenfield Road DA-3
Type	Gutter Section
Solve For	Spread

Input Data		
Slope	0.017085	ft/ft
Discharge	3.86	cfs
Gutter Width	1.42	ft
Gutter Cross Slope	0.058685	ft/ft
Road Cross Slope	0.040000	ft/ft
Mannings Coefficient	0.015	

Results		
Spread	6.75	ft
Flow Area	0.9	ft^2
Depth	0.30	ft
Gutter Depression	0.3	in
Velocity	4.15	ft/s

Relocated Greenfield Road DA-37
Worksheet for Gutter Section

Project Description	
Worksheet	Relocated Greenfield Road DA-3
Type	Gutter Section
Solve For	Spread

Input Data		
Slope	0.038125	ft/ft
Discharge	2.20	cfs
Gutter Width	1.42	ft
Gutter Cross Slope	0.058685	ft/ft
Road Cross Slope	0.040000	ft/ft
Mannings Coefficient	0.015	

Results		
Spread	4.62	ft
Flow Area	0.4	ft²
Depth	0.21	ft
Gutter Depression	0.3	in
Velocity	4.93	ft/s

Relocated Greenfield Road DA-38
Worksheet for Gutter Section

Project Description	
Worksheet	Relocated Greenfield Road DA-3
Type	Gutter Section
Solve For	Spread

Input Data		
Slope	0.022958	ft/ft
Discharge	2.20	cfs
Gutter Width	1.42	ft
Gutter Cross Slope	0.058685	ft/ft
Road Cross Slope	0.040000	ft/ft
Mannings Coefficient	0.015	

Results		
Spread	5.11	ft
Flow Area	0.5	ft^2
Depth	0.23	ft
Gutter Depression	0.3	in
Velocity	4.06	ft/s

Relocated Greenfield Road DA-39
Worksheet for Gutter Section

Project Description	
Worksheet	Relocated Greenfield Road DA-3
Type	Gutter Section
Solve For	Spread

Input Data		
Slope	0.030588	ft/ft
Discharge	2.33	cfs
Gutter Width	1.42	ft
Gutter Cross Slope	0.058685	ft/ft
Road Cross Slope	0.040000	ft/ft
Mannings Coefficient	0.015	

Results		
Spread	4.94	ft
Flow Area	0.5	ft^2
Depth	0.22	ft
Gutter Depression	0.3	in
Velocity	4.60	ft/s

Relocated Greenfield Road DA-40
Worksheet for Gutter Section

Project Description	
Worksheet	Relocated Greenfield Road DA-4
Type	Gutter Section
Solve For	Spread

Input Data		
Slope	0.028196	ft/ft
Discharge	2.33	cfs
Gutter Width	1.42	ft
Gutter Cross Slope	0.058685	ft/ft
Road Cross Slope	0.040000	ft/ft
Mannings Coefficient	0.015	

Results		
Spread	5.02	ft
Flow Area	0.5	ft^2
Depth	0.23	ft
Gutter Depression	0.3	in
Velocity	4.45	ft/s

Relocated Greenfield Road DA-41
Worksheet for Gutter Section

Project Description	
Worksheet	Relocated Greenfield Road DA-4
Type	Gutter Section
Solve For	Spread

Input Data		
Slope	0.022346	ft/ft
Discharge	2.38	cfs
Gutter Width	1.42	ft
Gutter Cross Slope	0.058685	ft/ft
Road Cross Slope	0.040000	ft/ft
Mannings Coefficient	0.015	

Results		
Spread	5.30	ft
Flow Area	0.6	ft^2
Depth	0.24	ft
Gutter Depression	0.3	in
Velocity	4.10	ft/s

Relocated Greenfield Road DA-42
Worksheet for Gutter Section

Project Description	
Worksheet	Relocated Greenfield Road DA-4
Type	Gutter Section
Solve For	Spread

Input Data		
Slope	0.022462	ft/ft
Discharge	2.38	cfs
Gutter Width	1.42	ft
Gutter Cross Slope	0.058685	ft/ft
Road Cross Slope	0.040000	ft/ft
Mannings Coefficient	0.015	

Results		
Spread	5.30	ft
Flow Area	0.6	ft^2
Depth	0.24	ft
Gutter Depression	0.3	in
Velocity	4.10	ft/s

Relocated Greenfield Road DA-43
Worksheet for Gutter Section

Project Description	
Worksheet	Relocated Greenfield Road DA-4
Type	Gutter Section
Solve For	Spread

Input Data		
Slope	0.020133	ft/ft
Discharge	1.37	cfs
Gutter Width	1.42	ft
Gutter Cross Slope	0.058685	ft/ft
Road Cross Slope	0.040000	ft/ft
Mannings Coefficient	0.015	

Results		
Spread	4.34	ft
Flow Area	0.4	ft²
Depth	0.20	ft
Gutter Depression	0.3	in
Velocity	3.46	ft/s

Relocated Greenfield Road DA-44
Worksheet for Gutter Section

Project Description	
Worksheet	Relocated Greenfield Road DA-4
Type	Gutter Section
Solve For	Spread

Input Data		
Slope	0.020733	ft/ft
Discharge	1.37	cfs
Gutter Width	1.42	ft
Gutter Cross Slope	0.058685	ft/ft
Road Cross Slope	0.040000	ft/ft
Mannings Coefficient	0.015	

Results		
Spread	4.32	ft
Flow Area	0.4	ft^2
Depth	0.20	ft
Gutter Depression	0.3	in
Velocity	3.50	ft/s

Relocated Greenfield Road DA-45
Worksheet for Gutter Section

Project Description	
Worksheet	Relocated Greenfield Road DA-4
Type	Gutter Section
Solve For	Spread

Input Data		
Slope	0.005010	ft/ft
Discharge	3.86	cfs
Gutter Width	1.42	ft
Gutter Cross Slope	0.058685	ft/ft
Road Cross Slope	0.040000	ft/ft
Mannings Coefficient	0.015	

Results		
Spread	8.54	ft
Flow Area	1.5	ft^2
Depth	0.37	ft
Gutter Depression	0.3	in
Velocity	2.61	ft/s

Relocated Greenfield Road DA-46
Worksheet for Gutter Section

Project Description	
Worksheet	Relocated Greenfield Road DA-4
Type	Gutter Section
Solve For	Spread

Input Data		
Slope	0.014703	ft/ft
Discharge	1.69	cfs
Gutter Width	1.42	ft
Gutter Cross Slope	0.058685	ft/ft
Road Cross Slope	0.040000	ft/ft
Mannings Coefficient	0.015	

Results		
Spread	5.03	ft
Flow Area	0.5	ft²
Depth	0.23	ft
Gutter Depression	0.3	in
Velocity	3.22	ft/s

Relocated Greenfield Road DA-47
Worksheet for Gutter Section

Project Description	
Worksheet	Relocated Greenfield Road DA-4
Type	Gutter Section
Solve For	Spread

Input Data		
Slope	0.015409	ft/ft
Discharge	2.56	cfs
Gutter Width	1.42	ft
Gutter Cross Slope	0.058685	ft/ft
Road Cross Slope	0.040000	ft/ft
Mannings Coefficient	0.015	

Results		
Spread	5.87	ft
Flow Area	0.7	ft²
Depth	0.26	ft
Gutter Depression	0.3	in
Velocity	3.62	ft/s

Relocated Greenfield Road DA-48
Worksheet for Gutter Section

Project Description	
Worksheet	Relocated Greenfield Road DA-4
Type	Gutter Section
Solve For	Spread

Input Data		
Slope	0.012178	ft/ft
Discharge	2.56	cfs
Gutter Width	1.42	ft
Gutter Cross Slope	0.058685	ft/ft
Road Cross Slope	0.040000	ft/ft
Mannings Coefficient	0.015	

Results		
Spread	6.14	ft
Flow Area	0.8	ft²
Depth	0.27	ft
Gutter Depression	0.3	in
Velocity	3.31	ft/s

Relocated Greenfield Road DA-49
Worksheet for Gutter Section

Project Description	
Worksheet	Relocated Greenfield Road DA-4
Type	Gutter Section
Solve For	Spread

Input Data		
Slope	0.013475	ft/ft
Discharge	1.08	cfs
Gutter Width	1.42	ft
Gutter Cross Slope	0.058685	ft/ft
Road Cross Slope	0.040000	ft/ft
Mannings Coefficient	0.015	

Results		
Spread	4.28	ft
Flow Area	0.4	ft^2
Depth	0.20	ft
Gutter Depression	0.3	in
Velocity	2.80	ft/s

Relocated Greenfield Road DA-50
Worksheet for Gutter Section

Project Description	
Worksheet	Relocated Greenfield Road DA-5
Type	Gutter Section
Solve For	Spread

Input Data		
Slope	0.013814	ft/ft
Discharge	1.08	cfs
Gutter Width	1.42	ft
Gutter Cross Slope	0.058685	ft/ft
Road Cross Slope	0.040000	ft/ft
Mannings Coefficient	0.015	

Results		
Spread	4.26	ft
Flow Area	0.4	ft²
Depth	0.20	ft
Gutter Depression	0.3	in
Velocity	2.83	ft/s

Relocated Greenfield Road DA-51
Worksheet for Gutter Section

Project Description	
Worksheet	Relocated Greenfield Road DA-5
Type	Gutter Section
Solve For	Spread

Input Data		
Slope	0.008235	ft/ft
Discharge	2.31	cfs
Gutter Width	1.42	ft
Gutter Cross Slope	0.058685	ft/ft
Road Cross Slope	0.025000	ft/ft
Mannings Coefficient	0.015	

Results		
Spread	8.44	ft
Flow Area	0.9	ft^2
Depth	0.26	ft
Gutter Depression	0.6	in
Velocity	2.50	ft/s

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Relocated Greenfield Road DA-52
Worksheet for Gutter Section

Project Description	
Worksheet	Relocated Greenfield Road DA-5
Type	Gutter Section
Solve For	Spread

Input Data		
Slope	0.013216	ft/ft
Discharge	2.31	cfs
Gutter Width	1.42	ft
Gutter Cross Slope	0.058685	ft/ft
Road Cross Slope	0.025000	ft/ft
Mannings Coefficient	0.015	

Results		
Spread	7.68	ft
Flow Area	0.8	ft^2
Depth	0.24	ft
Gutter Depression	0.6	in
Velocity	3.00	ft/s

Relocated Greenfield Road DA-53
Worksheet for Gutter Section

Project Description	
Worksheet	Relocated Greenfield Road DA-5
Type	Gutter Section
Solve For	Spread

Input Data		
Slope	0.002083	ft/ft
Discharge	0.95	cfs
Gutter Width	1.42	ft
Gutter Cross Slope	0.058685	ft/ft
Road Cross Slope	0.025000	ft/ft
Mannings Coefficient	0.015	

Results		
Spread	7.79	ft
Flow Area	0.8	ft^2
Depth	0.24	ft
Gutter Depression	0.6	in
Velocity	1.20	ft/s

Relocated Greenfield Road DA-54
Worksheet for Gutter Section

Project Description	
Worksheet	Relocated Greenfield Road DA-!
Type	Gutter Section
Solve For	Spread

Input Data		
Slope	0.002083	ft/ft
Discharge	0.95	cfs
Gutter Width	1.42	ft
Gutter Cross Slope	0.058685	ft/ft
Road Cross Slope	0.025000	ft/ft
Mannings Coefficient	0.015	

Results		
Spread	7.79	ft
Flow Area	0.8	ft²
Depth	0.24	ft
Gutter Depression	0.6	in
Velocity	1.20	ft/s

Relocated Greenfield Road DA-55
Worksheet for Gutter Section

Project Description	
Worksheet	Relocated Greenfield Road DA-5
Type	Gutter Section
Solve For	Spread

Input Data		
Slope	0.000821	ft/ft
Discharge	1.03	cfs
Gutter Width	1.42	ft
Gutter Cross Slope	0.058685	ft/ft
Road Cross Slope	0.025000	ft/ft
Mannings Coefficient	0.015	

Results		
Spread	9.67	ft
Flow Area	1.2	ft²
Depth	0.29	ft
Gutter Depression	0.6	in
Velocity	0.86	ft/s

Relocated Greenfield Road DA-56
Worksheet for Gutter Section

Project Description	
Worksheet	Relocated Greenfield Road DA-5
Type	Gutter Section
Solve For	Spread

Input Data		
Slope	0.000889	ft/ft
Discharge	1.03	cfs
Gutter Width	1.42	ft
Gutter Cross Slope	0.058685	ft/ft
Road Cross Slope	0.040000	ft/ft
Mannings Coefficient	0.015	

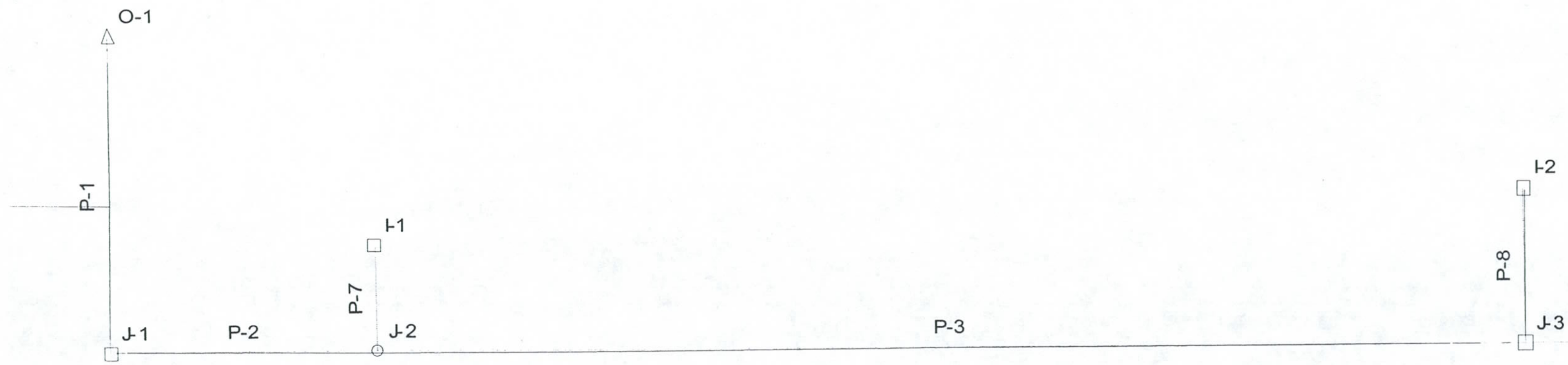
Results		
Spread	7.17	ft
Flow Area	1.0	ft²
Depth	0.31	ft
Gutter Depression	0.3	in
Velocity	0.98	ft/s

Scenario: Base -A

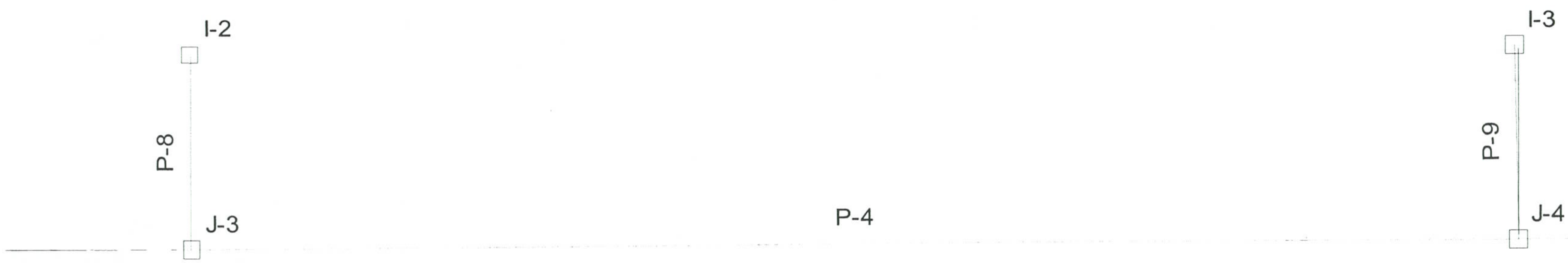
RAY ROAD FROM
RETENTION BASIN A
EAST

WORSE CASE Q_{50} RETENTION

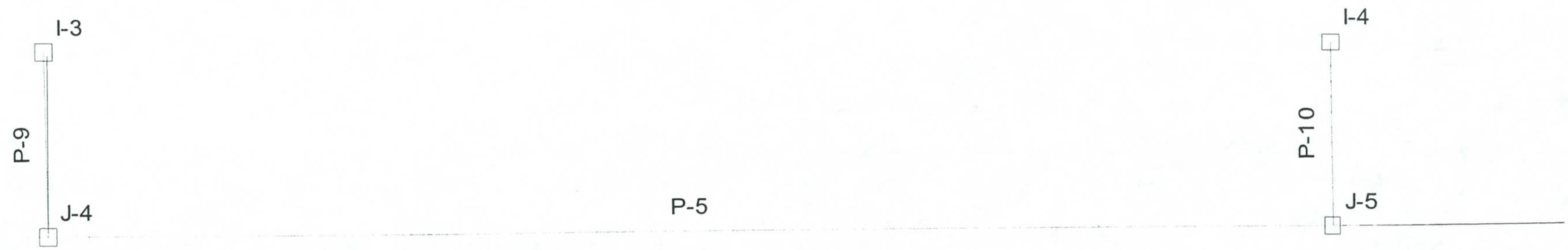
SUBMERGED OUTLET
RETENTION BASIN A
Q_{50} HIGH WATER 1266.18



Scenario: Base A



Scenario: Base A



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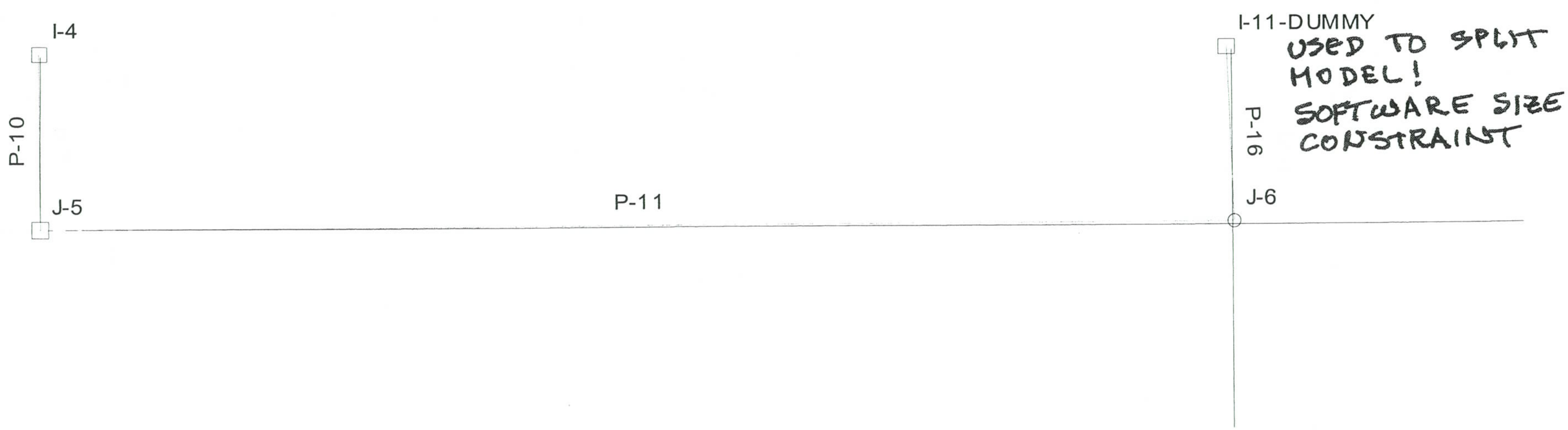
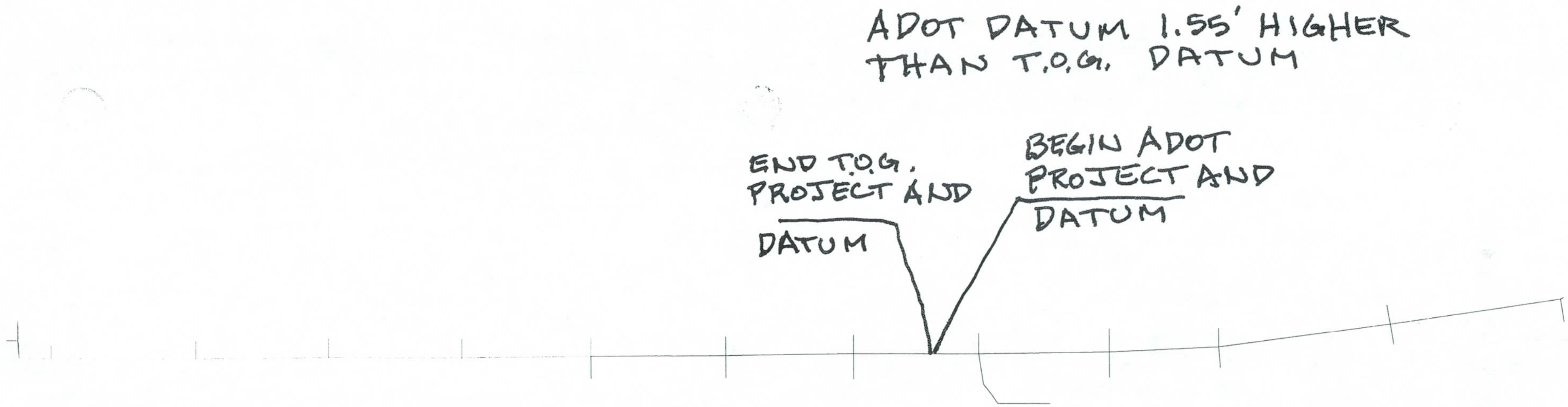
01/20/03 06:34:06 PM

Scenario: Base A



Scenario: Base



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Scenario: Base

>>>> Info: I-11-DUMMY No bypass target specified. Bypass is assumed to travel to O-1.
>>>> Info: I-4 No bypass target specified. Bypass is assumed to travel to O-1.
>>>> Info: I-3 No bypass target specified. Bypass is assumed to travel to O-1.
>>>> Info: I-2 No bypass target specified. Bypass is assumed to travel to O-1.
>>>> Info: J-1 No bypass target specified. Bypass is assumed to travel to O-1.
>>>> Info: J-5 No bypass target specified. Bypass is assumed to travel to O-1.
>>>> Info: J-4 No bypass target specified. Bypass is assumed to travel to O-1.
>>>> Info: J-3 No bypass target specified. Bypass is assumed to travel to O-1.

>>>> Info: Subsurface Analysis iterations: 1
>>>> Info: Convergence was achieved.

===

Gravity subnetwork discharging at: O-1

>>>> Info: Loading and hydraulic computations completed successfully.

CALCULATION SUMMARY FOR SURFACE NETWORKS

Label	Inlet Type	Inlet	Total Intercepted Flow (cfs)	Total Bypassed Flow (cfs)	Capture Efficiency (%)	Gutter Spread (ft)	Gutter Depth (ft)
I-1	Curb Inlet	Curb DI-3B	0.00	0.00	100.0	0.00	0.00
I-11-DUMMY	Curb Inlet	Curb DI-4E	0.00	0.00	100.0	0.00	0.00
I-4	Curb Inlet	Curb DI-4E	0.00	0.00	100.0	0.00	0.00
I-3	Curb Inlet	Curb DI-4E	0.00	0.00	100.0	0.00	0.00
I-2	Curb Inlet	Curb DI-4E	0.00	0.00	100.0	0.00	0.00
J-1	Curb Inlet	Curb DI-4E	0.00	0.00	100.0	0.00	0.00
J-5	Curb Inlet	Curb DI-4E	0.00	0.00	100.0	0.00	0.00
J-4	Curb Inlet	Curb DI-4E	0.00	0.00	100.0	0.00	0.00
J-3	Curb Inlet	Curb DI-4E	0.00	0.00	100.0	0.00	0.00

CALCULATION SUMMARY FOR SUBSURFACE NETWORK WITH ROOT: O-1

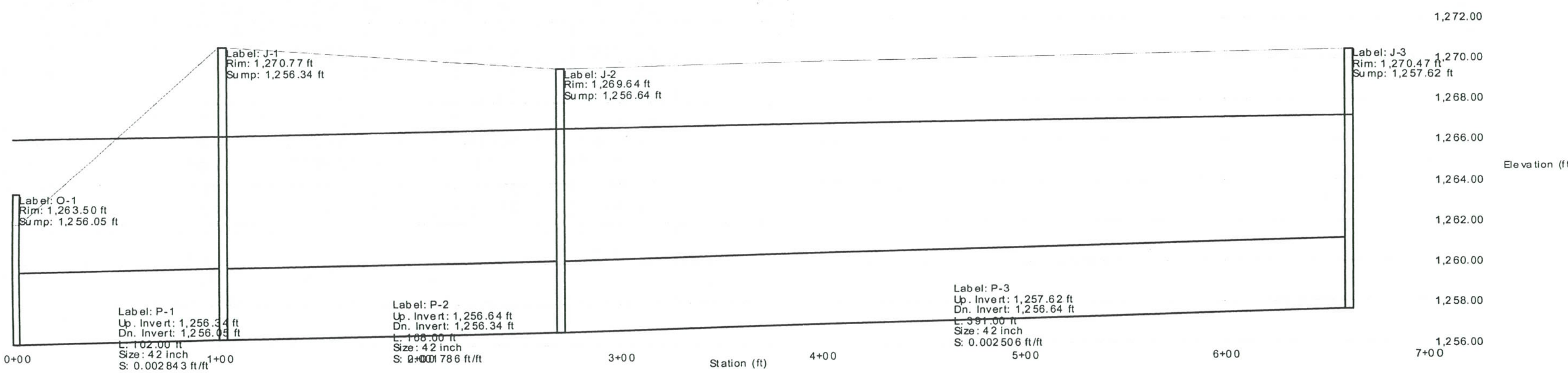
Label	Number of Sections	Section Size	Section Shape	Length (ft)	Total System Flow (cfs)	Average Velocity (ft/s)	Hydraulic Grade Upstream (ft)	Hydraulic Grade Downstream (ft)
P-1	1	42 inch	Circular	102.00	40.42	4.20	1,266.34	1,266.18
P-2	1	42 inch	Circular	168.00	40.42	4.20	1,266.66	1,266.39
P-3	1	42 inch	Circular	391.00	34.97	3.63	1,267.16	1,266.69
P-7	1	18 inch	Circular	45.00	5.45	3.08	1,267.15	1,267.03
P-8	1	18 inch	Circular	48.00	1.91	1.08	1,267.46	1,267.44
P-4	1	42 inch	Circular	306.00	33.06	3.44	1,267.52	1,267.19
P-9	1	18 inch	Circular	48.00	1.94	1.10	1,267.78	1,267.77
P-5	1	42 inch	Circular	310.00	31.12	3.23	1,267.84	1,267.55
P-10	1	18 inch	Circular	48.00	1.90	1.08	1,268.07	1,268.06
P-11	1	42 inch	Circular	302.50	29.22	3.04	1,268.12	1,267.87
P-16	1	42 inch	Circular	1.00	29.22	3.04	1,268.14	1,268.14

Label	Total System Flow (cfs)	Ground Elevation (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)
O-1	40.42	1,262.00	1,266.18	1,266.18
J-1	40.42	1,270.77	1,266.39	1,266.34
J-2	40.42	1,269.64	1,266.69	1,266.66
J-3	34.97	1,270.47	1,267.19	1,267.16
I-1	5.45	1,268.20	1,267.15	1,267.15
I-2	1.91	1,269.10	1,267.46	1,267.46
J-4	33.06	1,271.15	1,267.55	1,267.52
I-3	1.94	1,269.70	1,267.78	1,267.78
J-5	31.12	1,271.81	1,267.87	1,267.84
I-4	1.90	1,270.40	1,268.07	1,268.07
J-6	29.22	1,271.75	1,268.14	1,268.12
I-11-DUMMY	29.22	1,271.75	1,268.14	1,268.14

==

Completed: 01/21/2003 07:47:29 AM

Profile
Scenario: Base

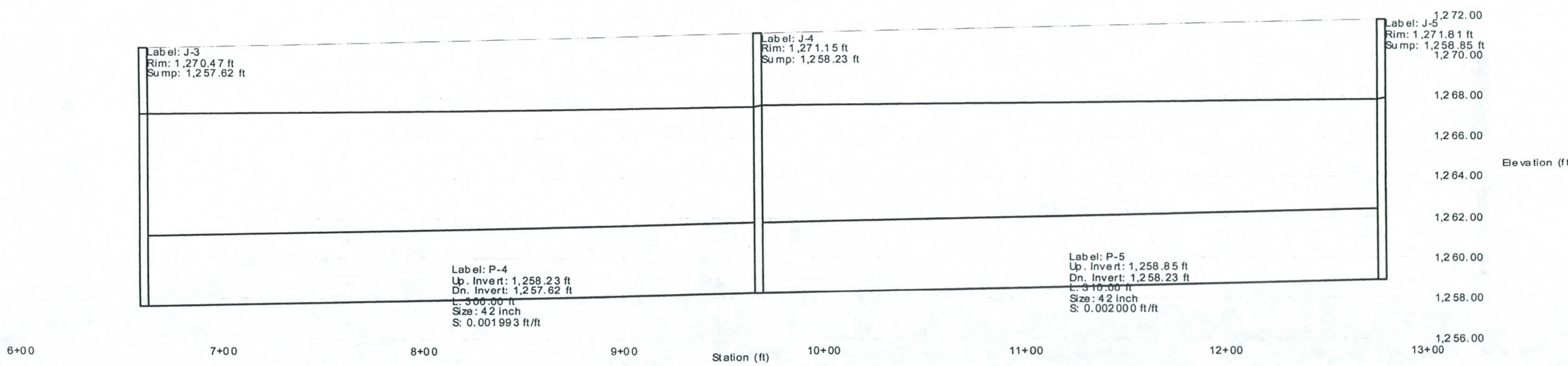


Title: RAY ROAD EASTERN CANAL TO UPRR
o:\...\drainage\storm-cad\ray-seg-1.stm
01/21/03 9:44 AM

Inca Engineers Inc

Project Engineer: INCA Engineers, Inc
StormCAD v4.1.1 [4.2014a]

Profile
Scenario: Base



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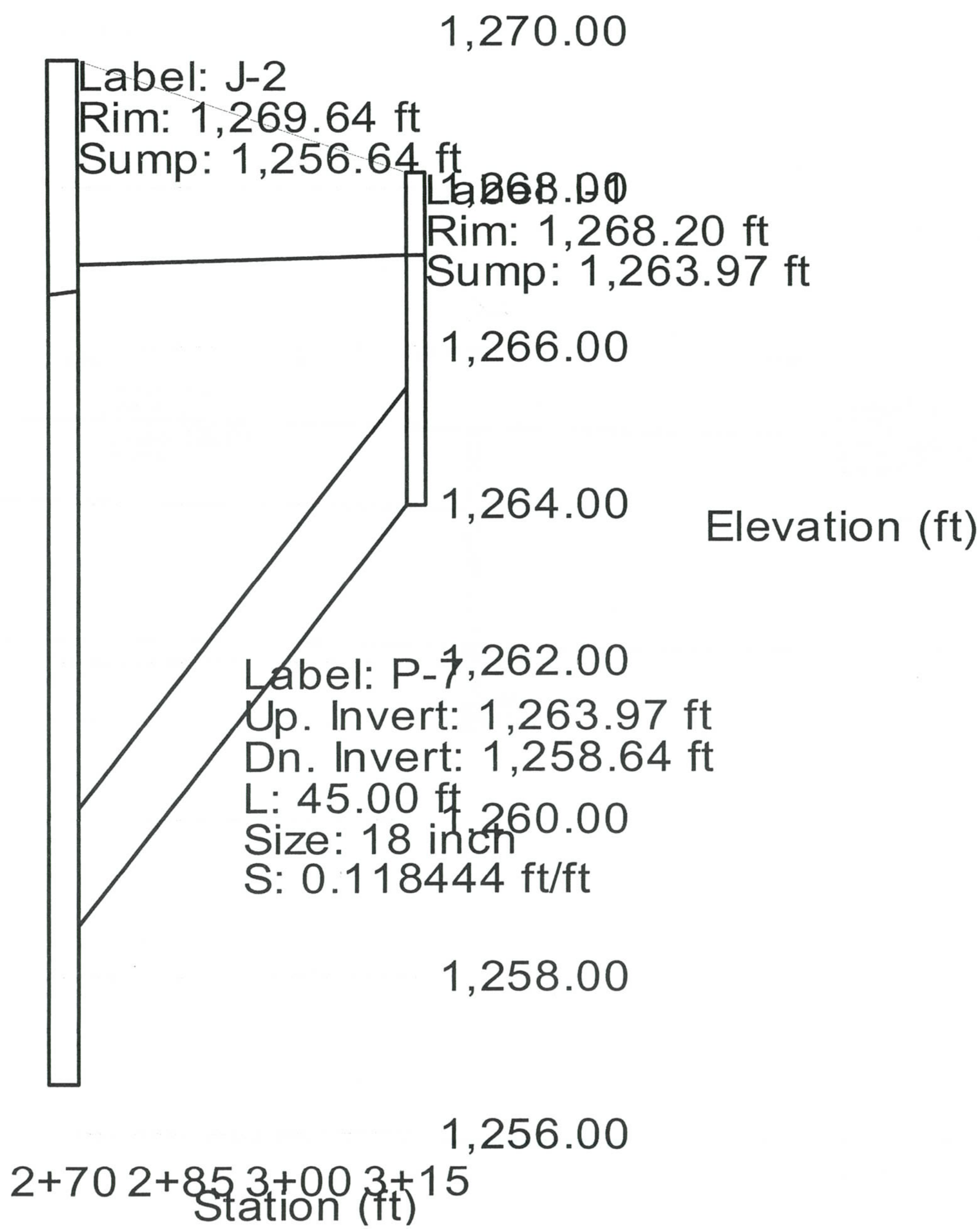

Profile
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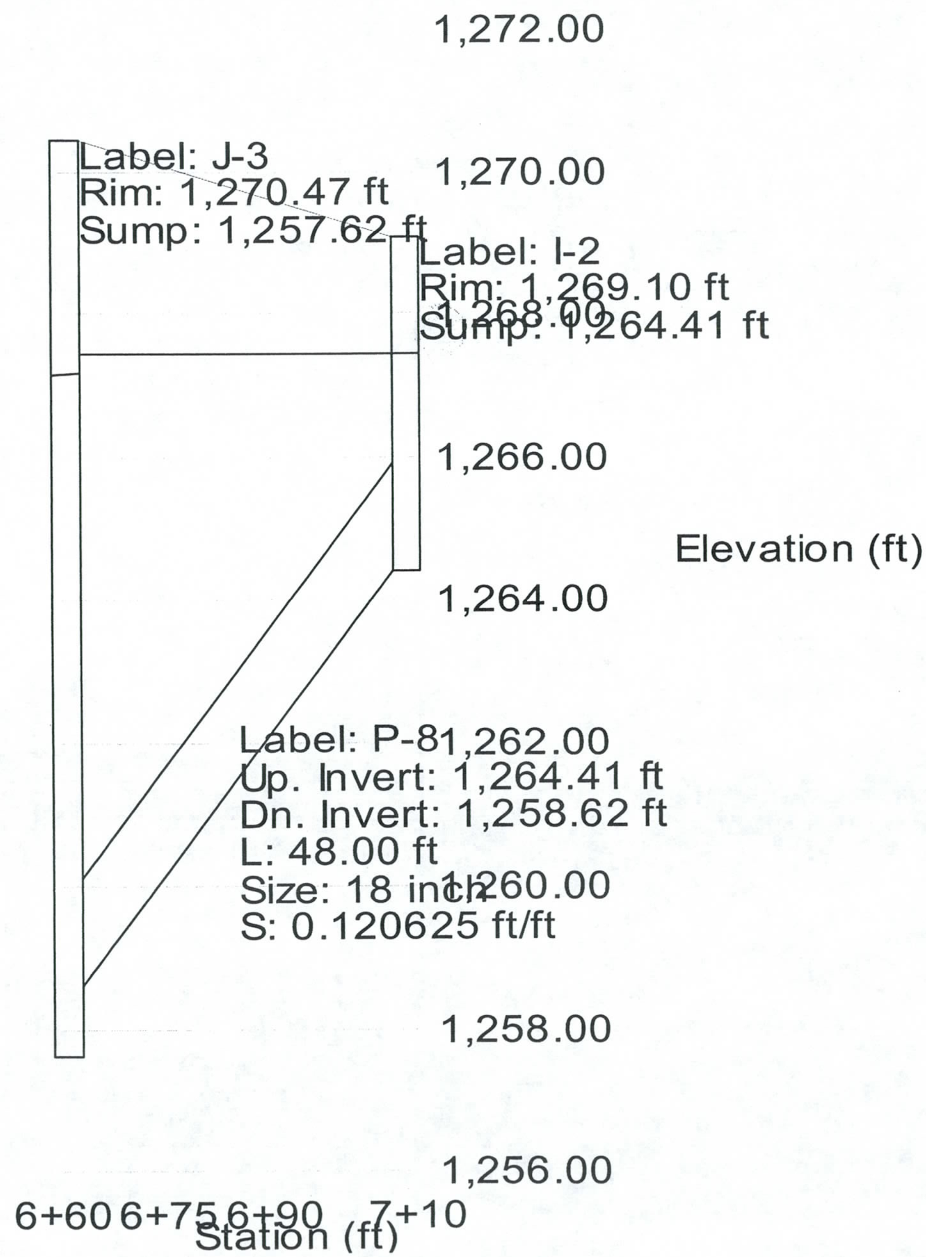

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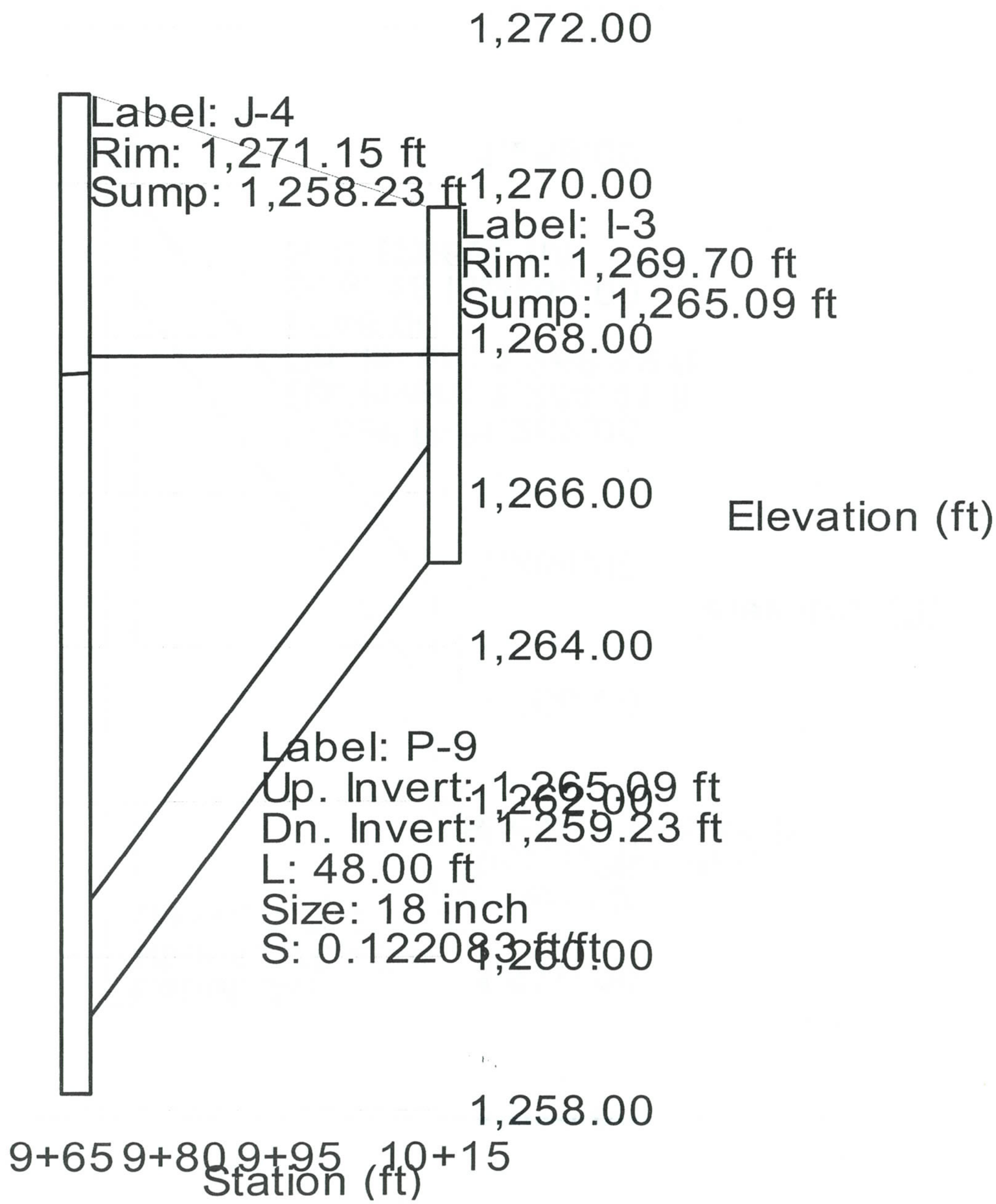
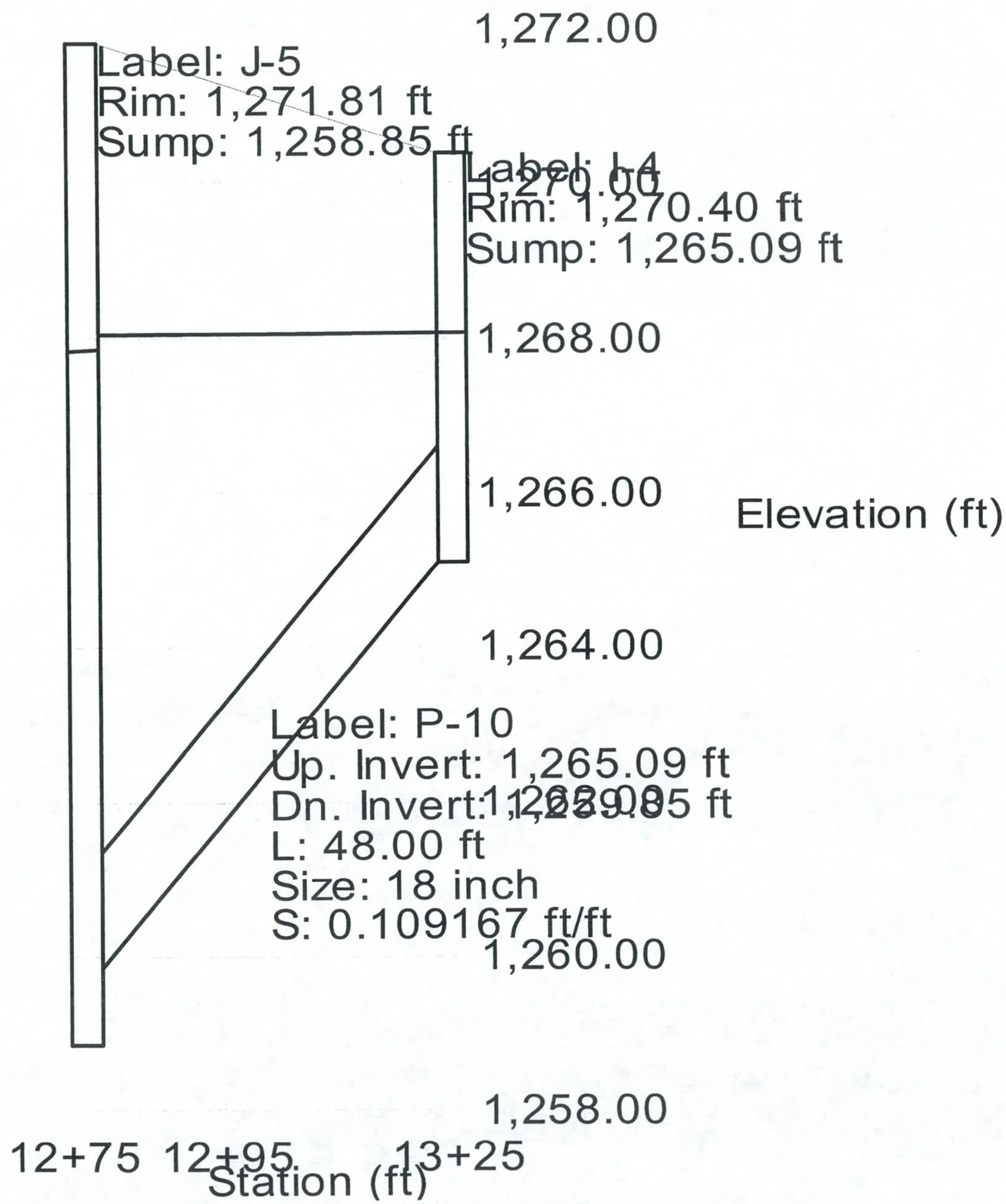


Profile
Scenario: Base



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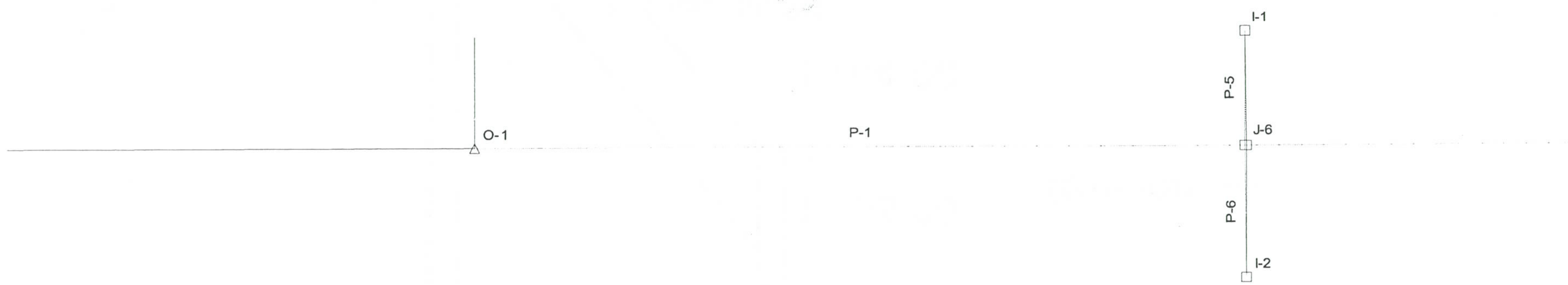
01/21/03 07:54:28 AM

Inca Engineers Inc

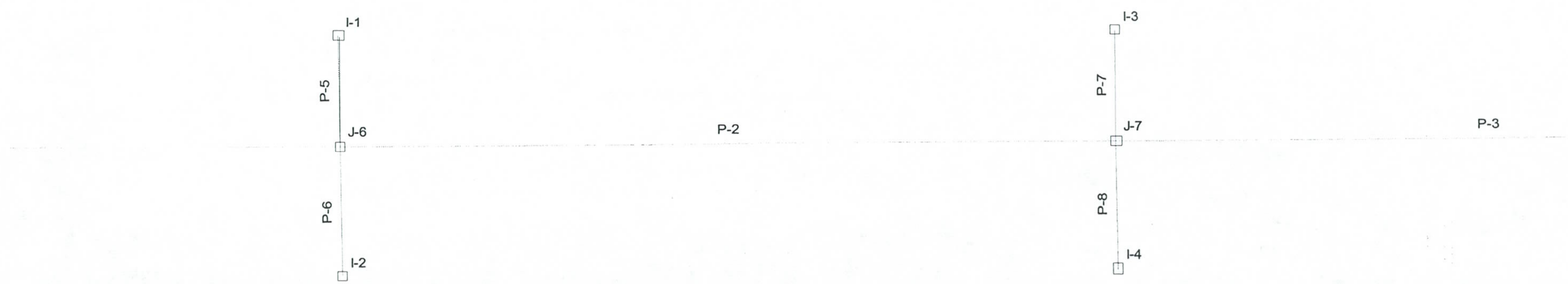
Project Engineer: INCA Engineers, Inc
StormCAD v4.1.1 [4.2014a]

Scenario: Base -B

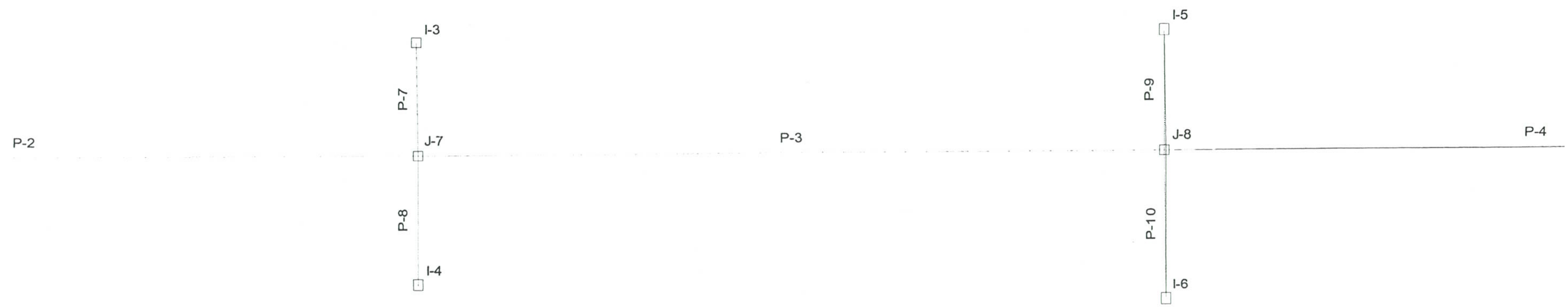
RAY ROAD FROM
STA 38+88 EAST
WORSE CASE Q_{50} RETENTION



Scenario: Base



Scenario: Base



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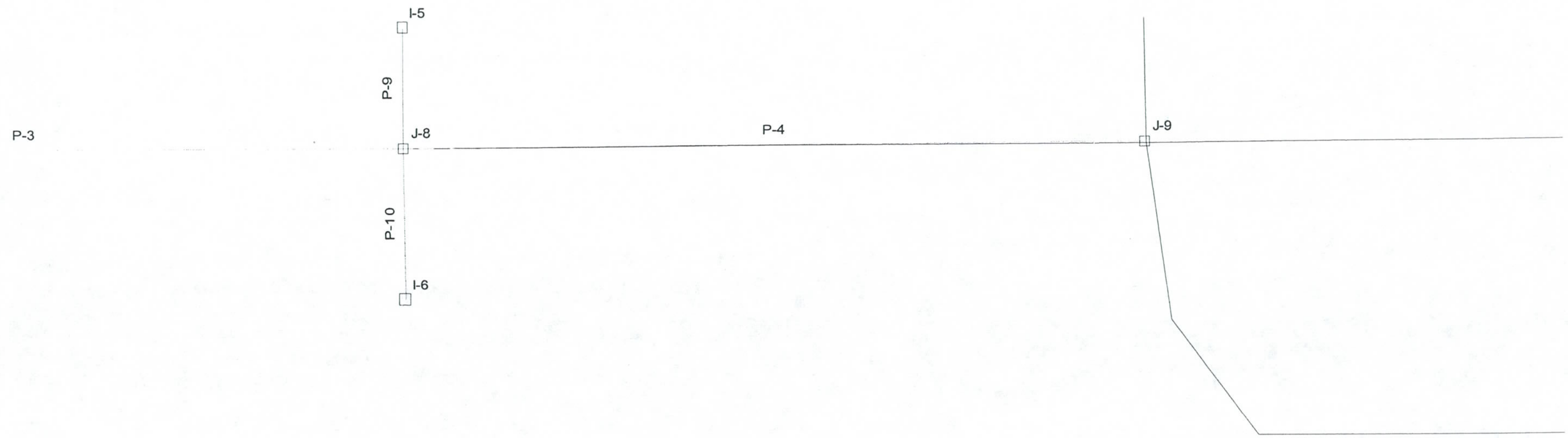

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==================================================================
Scenario: Base

>>>> Info: I-6 No bypass target specified. Bypass is assumed to
     travel to O-1.
>>>> Info: I-5 No bypass target specified. Bypass is assumed to
     travel to O-1.
>>>> Info: I-4 No bypass target specified. Bypass is assumed to
     travel to O-1.
>>>> Info: I-3 No bypass target specified. Bypass is assumed to
     travel to O-1.
>>>> Info: I-2 No bypass target specified. Bypass is assumed to
     travel to O-1.
>>>> Info: I-1 No bypass target specified. Bypass is assumed to
     travel to O-1.
>>>> Info: J-9 No bypass target specified. Bypass is assumed to
     travel to O-1.
>>>> Info: J-8 No bypass target specified. Bypass is assumed to
     travel to O-1.
>>>> Info: J-7 No bypass target specified. Bypass is assumed to
     travel to O-1.
>>>> Info: J-6 No bypass target specified. Bypass is assumed to
     travel to O-1.

>>>> Info: Subsurface Analysis iterations: 1
>>>> Info: Convergence was achieved.


==================================================================
Gravity subnetwork discharging at: O-1
------------------------------------------------------------------
>>>> Info: Loading and hydraulic computations completed
     successfully.
```

CALCULATION SUMMARY FOR SURFACE NETWORKS

Label	Inlet Type	Inlet	Total Intercepted Flow (cfs)	Total Bypassed Flow (cfs)	Capture Efficiency (%)	Gutter Spread (ft)	Gutter Depth (ft)
I-6	Curb Inlet	Curb DI-4E	0.00	0.00	100.0	0.00	0.00
I-5	Curb Inlet	Curb DI-4E	0.00	0.00	100.0	0.00	0.00
I-4	Curb Inlet	Curb DI-4E	0.00	0.00	100.0	0.00	0.00
I-3	Curb Inlet	Curb DI-4E	0.00	0.00	100.0	0.00	0.00
I-2	Curb Inlet	Curb DI-4E	0.00	0.00	100.0	0.00	0.00
I-1	Curb Inlet	Curb DI-4E	0.00	0.00	100.0	0.00	0.00
J-9	Curb Inlet	Curb DI-4E	0.00	0.00	100.0	0.00	0.00
J-8	Curb Inlet	Curb DI-4E	0.00	0.00	100.0	0.00	0.00
J-7	Curb Inlet	Curb DI-4E	0.00	0.00	100.0	0.00	0.00
J-6	Curb Inlet	Curb DI-4E	0.00	0.00	100.0	0.00	0.00

CALCULATION SUMMARY FOR SUBSURFACE NETWORK WITH ROOT: O-1

Label	Number of Sections	Section Size	Section Shape	Length (ft)	Total System Flow (cfs)	Average Velocity (ft/s)	Hydraulic Grade Upstream (ft)	Hydraulic Grade Downstream (ft)
P-1	1	36 inch	Circular	302.00	29.22	4.13	1,268.70	1,268.12
P-5	1	18 inch	Circular	48.00	1.96	1.11	1,269.10	1,269.09
P-2	1	36 inch	Circular	312.00	25.32	3.58	1,269.21	1,268.76
P-6	1	18 inch	Circular	50.00	1.94	1.10	1,268.74	1,268.72
P-7	1	18 inch	Circular	48.00	1.86	1.05	1,269.24	1,269.22
P-8	1	18 inch	Circular	50.00	1.86	1.05	1,269.24	1,269.22
P-3	1	30 inch	Circular	298.00	21.60	4.40	1,270.08	1,269.25
P-4	1	30 inch	Circular	292.21	17.28	3.52	1,270.68	1,270.16
P-10	1	18 inch	Circular	59.00	2.83	1.60	1,270.34	1,270.30
P-9	1	18 inch	Circular	50.00	1.49	0.84	1,270.20	1,270.19

Label	Total System Flow (cfs)	Ground Elevation (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)
O-1	29.22	1,271.81	1,268.12	1,268.12
J-6	29.22	1,271.75	1,268.72	1,268.70
I-1	1.96	1,270.70	1,269.10	1,269.10
J-7	25.32	1,272.50	1,269.22	1,269.21
I-2	1.94	1,270.75	1,268.74	1,268.74
I-3	1.86	1,271.04	1,269.24	1,269.24
I-4	1.86	1,271.08	1,269.24	1,269.24
J-8	21.60	1,272.86	1,270.16	1,270.08
J-9	17.28	1,274.30	1,270.68	1,270.68
I-6	2.83	1,271.30	1,270.34	1,270.34
I-5	1.49	1,271.48	1,270.20	1,270.20

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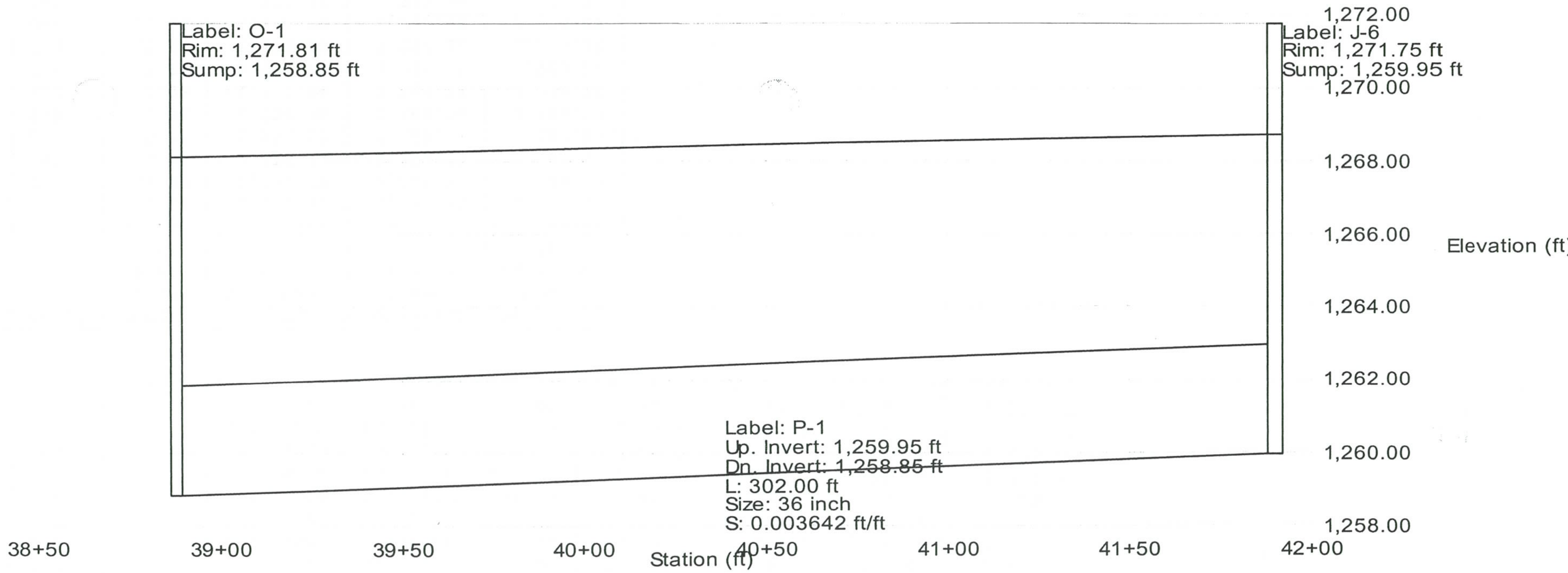
Profile
Scenario: Base



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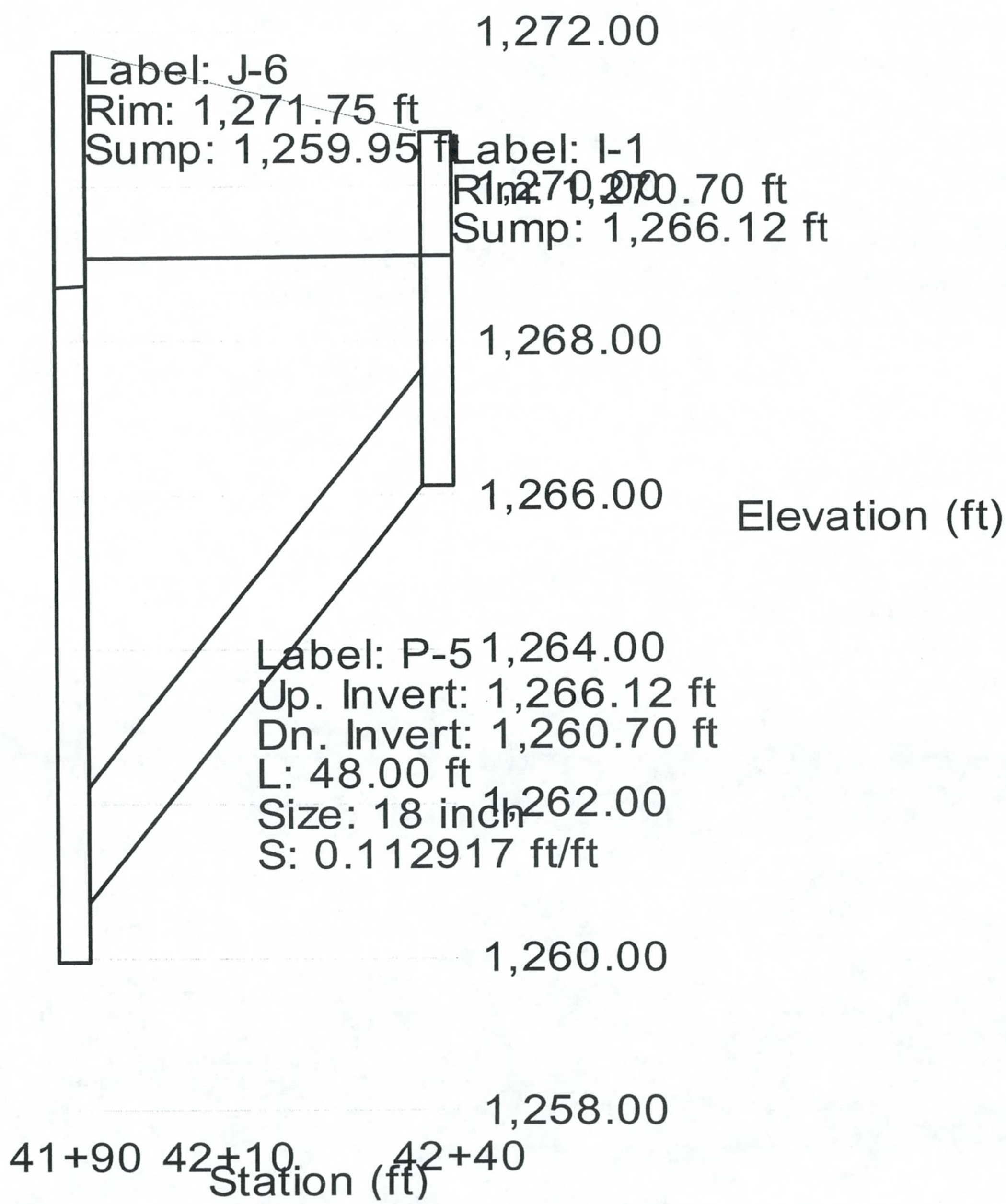
01/21/03 54:40 AM

Inca Engineers Inc

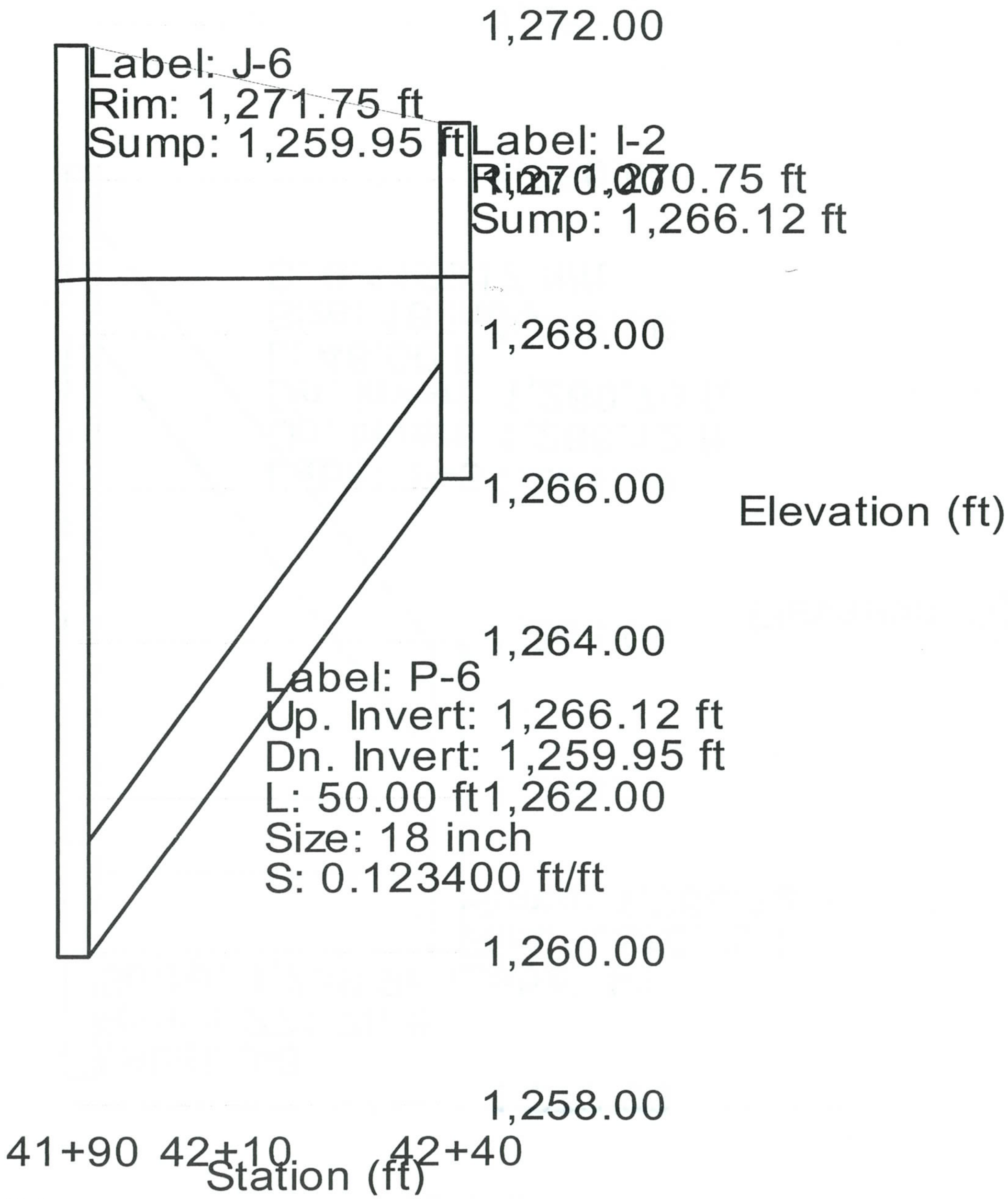
Project Engineer: INCA Engineers, Inc
StormCAD v4.1.1 [4.2014a]

Profile

Scenario: Base



Profile
Scenario: Base



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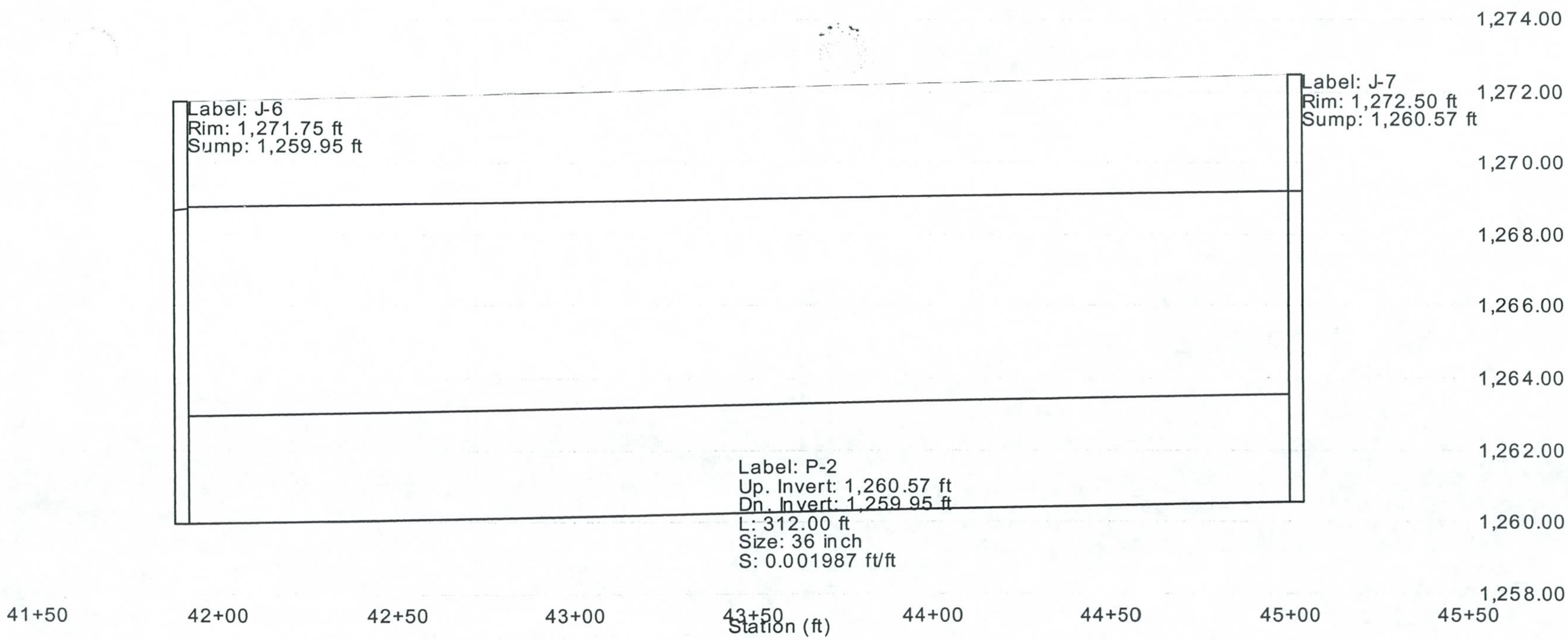
Project Engineer: INCA Engineers, Inc
StormCAD v4.1.1 [4.2014a]

Inca Engineers Inc

Profile
Scenario: Base



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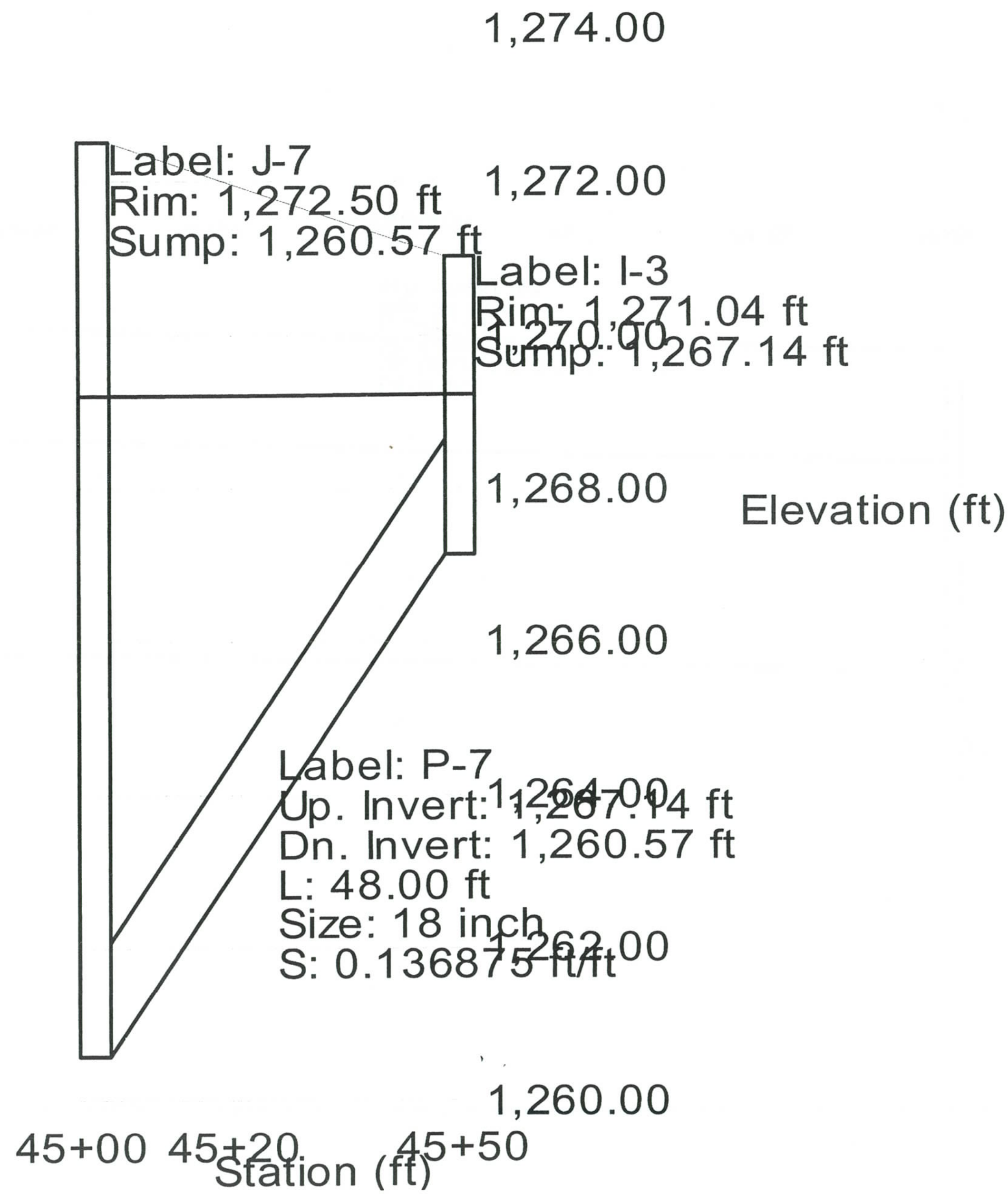
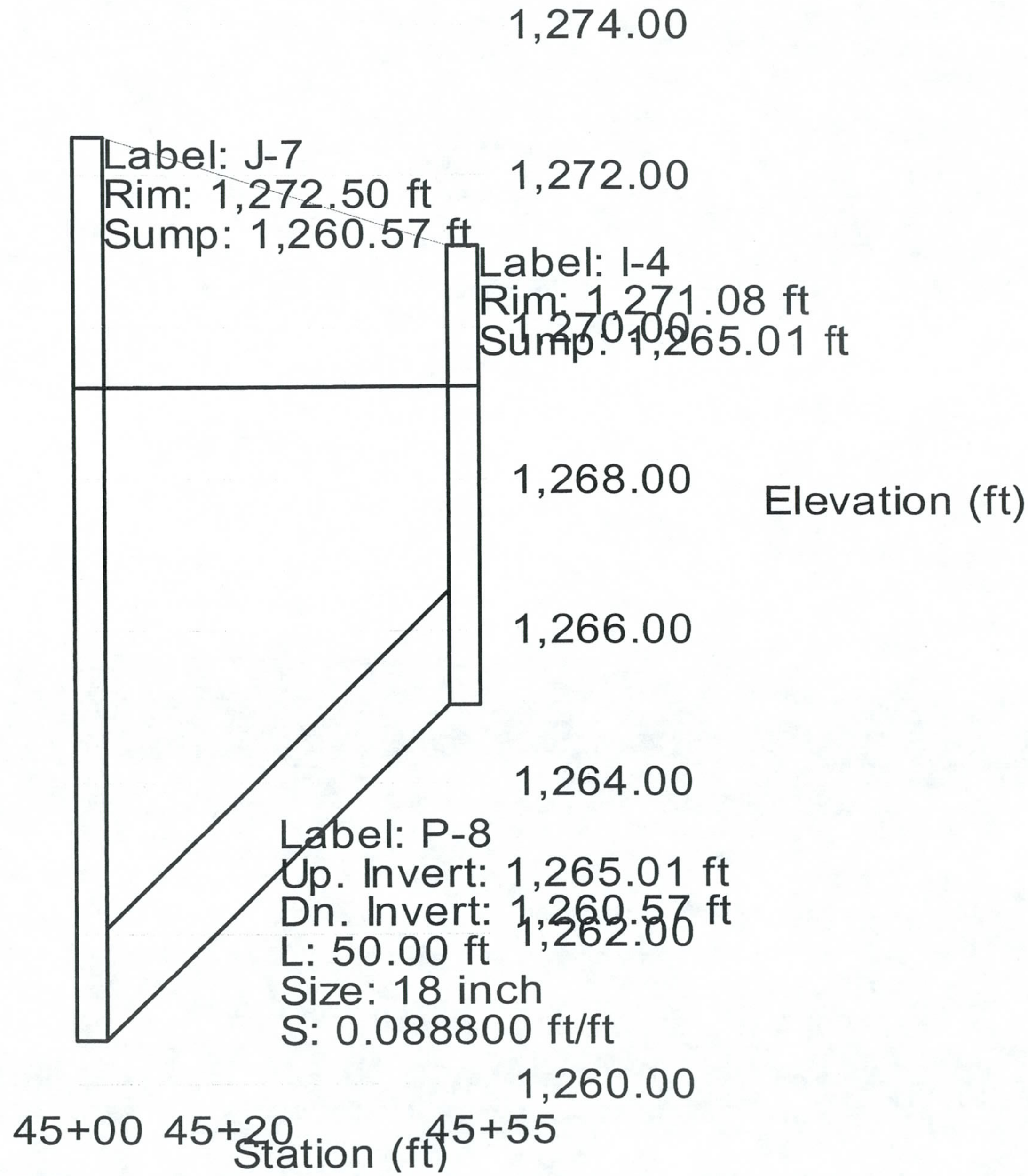
Project Engineer: INCA Engineers, Inc
StormCAD v4.1.1 [4.2014a]

Inca Engineers Inc

Profile
Scenario: Base

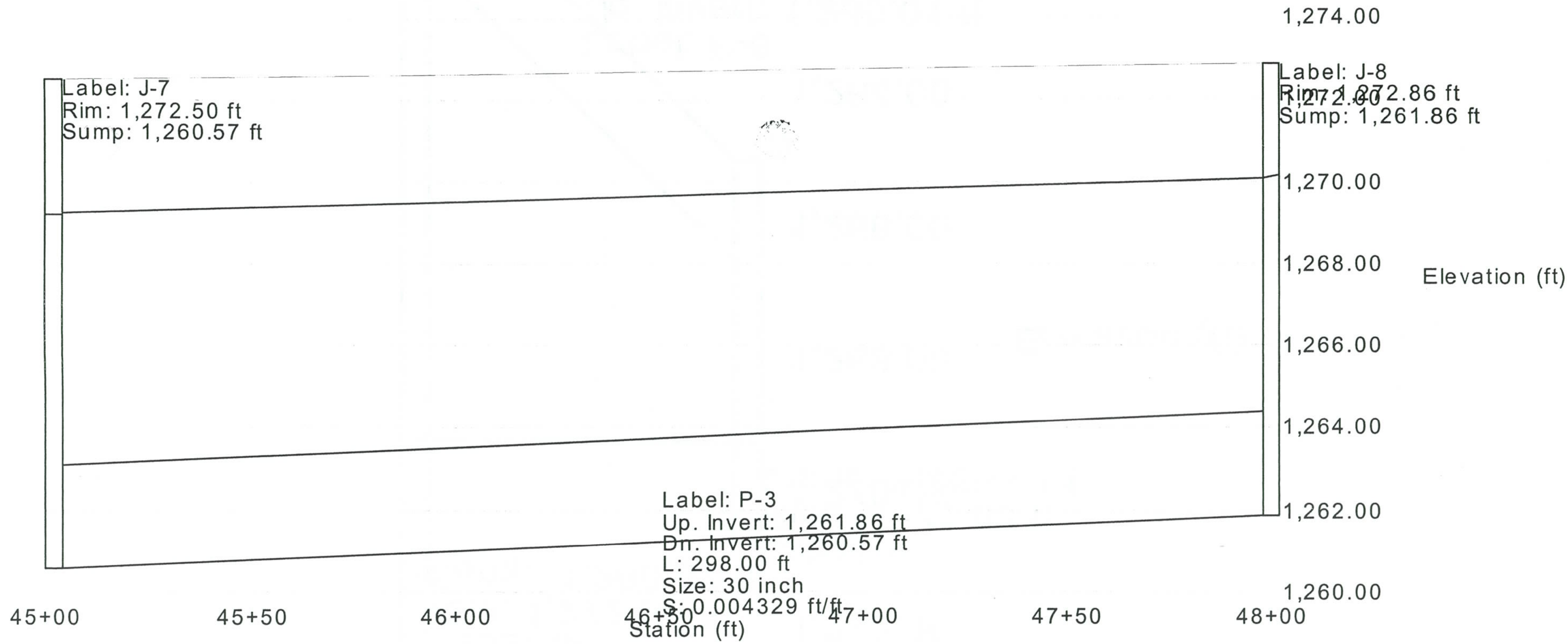


Profile
Scenario: Base

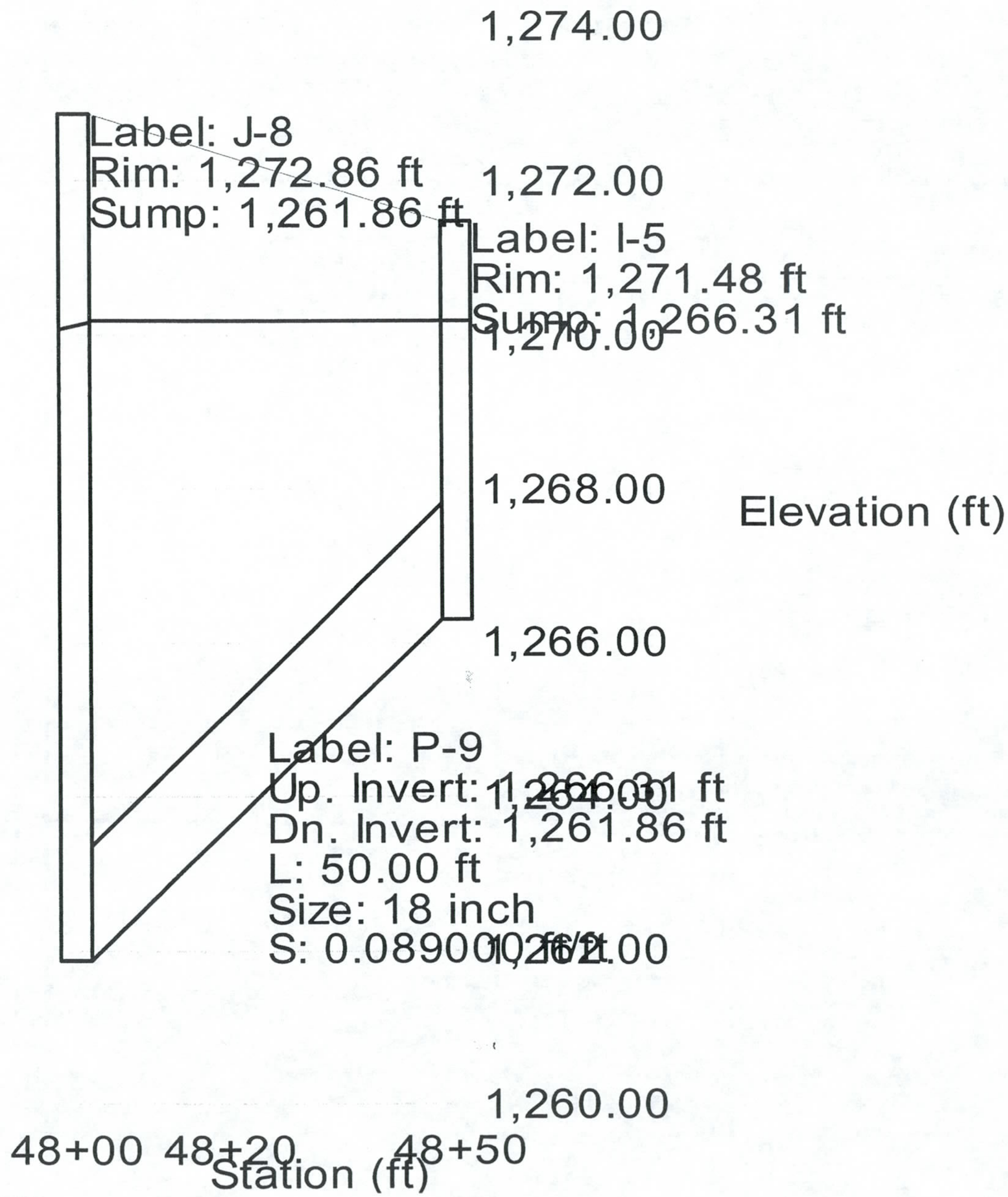


Profile

Scenario: Base



Profile
Scenario: Base



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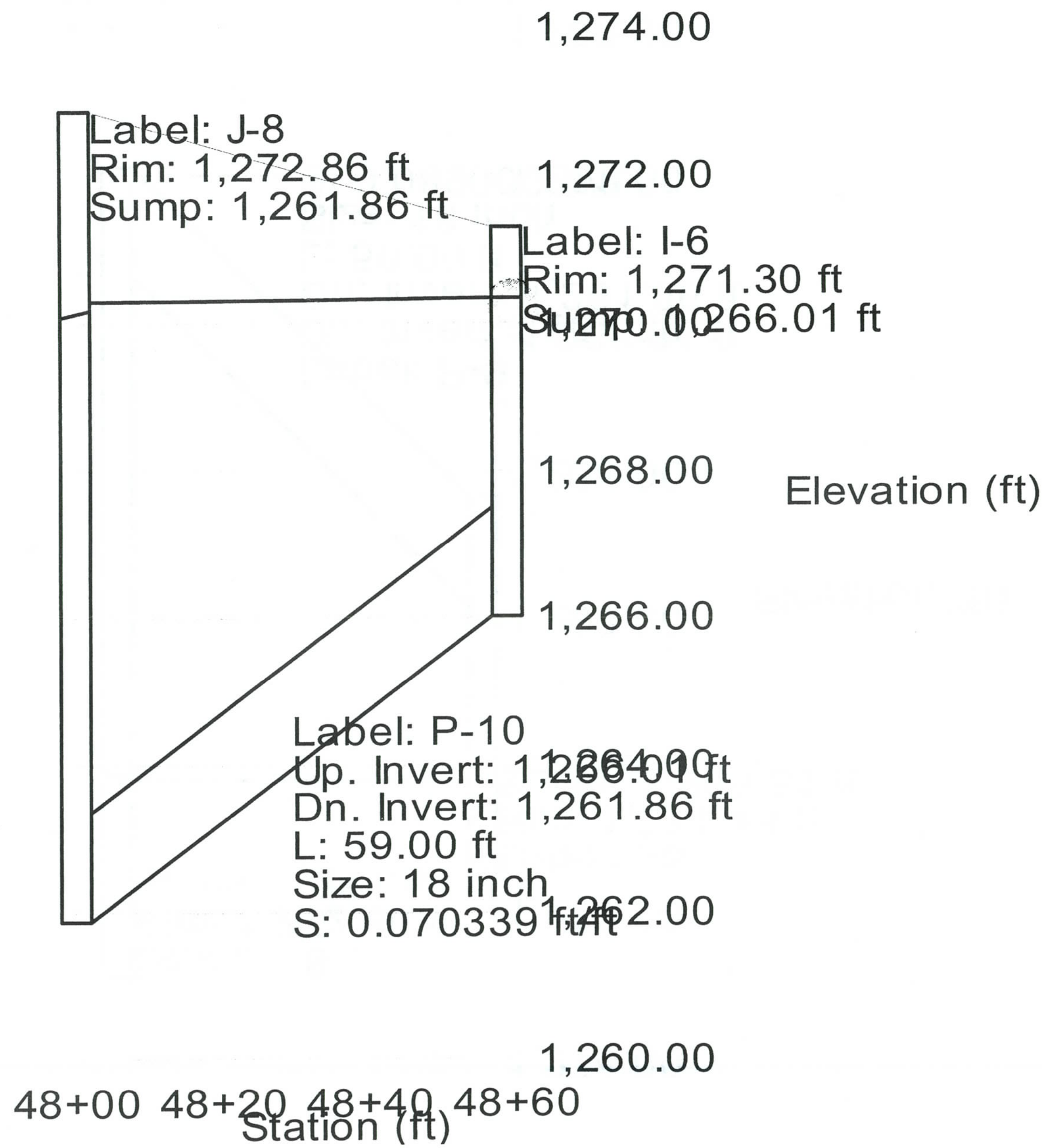
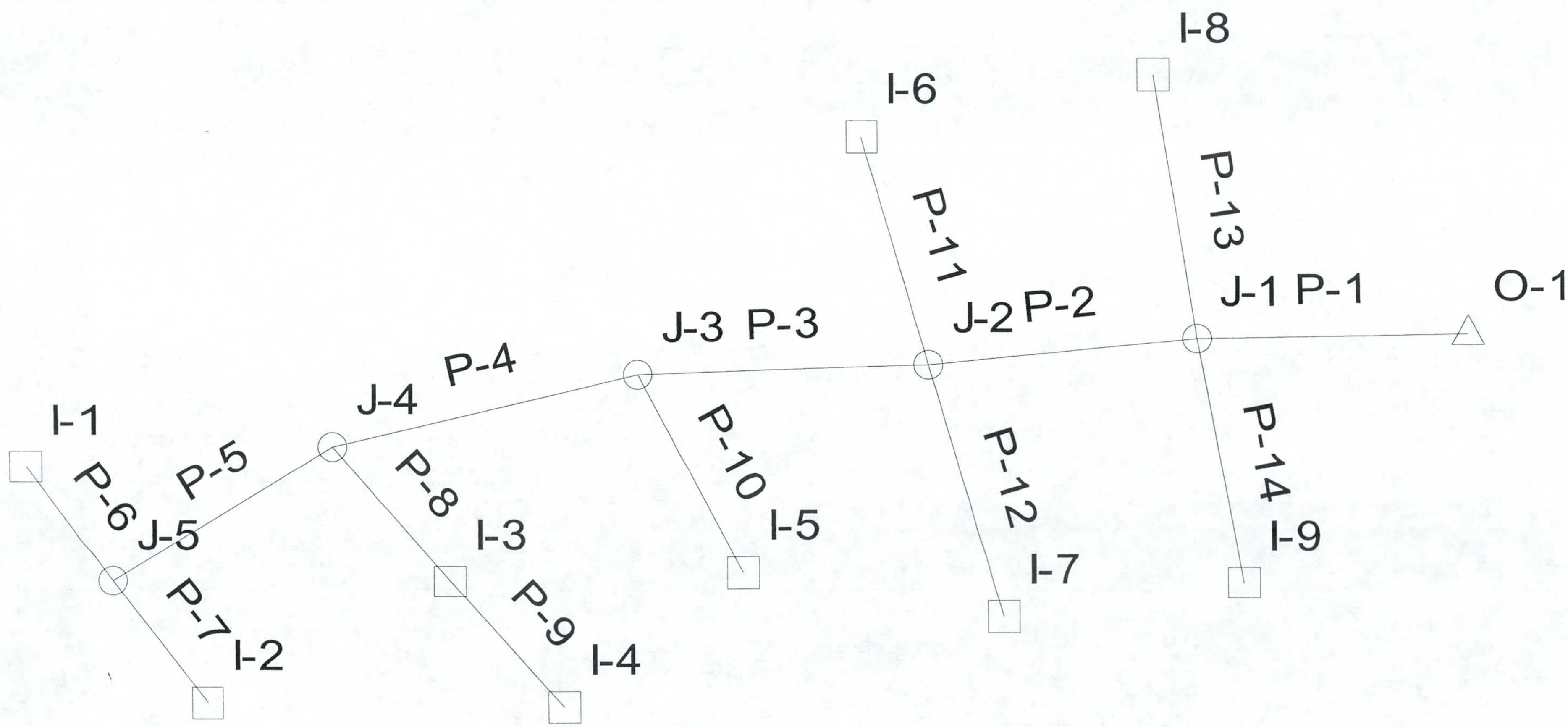


Scenario: Base

GREENFIELD ROAD
SOUTH OF P.S.



Title: Greenfield Road S of PS
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01/20/03 03:54:52 PM

Inca Engineers Inc
© Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Project Engineer: INCA Engineers, Inc
StormCAD v4.1.1 [4.2014a]

==

Scenario: Base

>>>> Info: Subsurface Analysis iterations: 1
>>>> Info: Convergence was achieved.

==

Gravity subnetwork discharging at: O-1

>>>> Info: Loading and hydraulic computations completed successfully.
>>>> Info: P-2 Hydraulic jump formed.
>>>> Info: P-2 Critical depth assumed upstream.
>>>> Info: P-4 Hydraulic jump formed.
>>>> Info: P-4 Critical depth assumed upstream.
>>>> Info: P-5 Hydraulic jump formed.
>>>> Info: P-5 Critical depth assumed upstream.
>>>> Info: P-6 Hydraulic jump formed.
>>>> Info: P-6 Critical depth assumed upstream.
>>>> Info: P-7 Hydraulic jump formed.
>>>> Info: P-7 Critical depth assumed upstream.
>>>> Info: P-8 Hydraulic jump formed.
>>>> Info: P-8 Critical depth assumed upstream.
>>>> Info: P-9 Hydraulic jump formed.
>>>> Info: P-9 Critical depth assumed upstream.
>>>> Info: P-10 Hydraulic jump formed.
>>>> Info: P-10 Critical depth assumed upstream.
>>>> Info: P-12 Hydraulic jump formed.
>>>> Info: P-12 Critical depth assumed upstream.
>>>> Info: P-13 Hydraulic jump formed.
>>>> Info: P-13 Critical depth assumed upstream.
>>>> Info: P-14 Hydraulic jump formed.
>>>> Info: P-14 Critical depth assumed upstream.

CALCULATION SUMMARY FOR SURFACE NETWORKS

Label	Inlet Type	Inlet	Total Intercepted Flow (cfs)	Total Bypassed Flow (cfs)	Capture Efficiency (%)	Gutter Spread (ft)	Gutter Depth (ft)
I-9	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
I-8	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
I-7	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
I-6	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
I-5	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
I-4	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
I-3	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
I-2	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
I-1	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00

CALCULATION SUMMARY FOR SUBSURFACE NETWORK WITH ROOT: O-1

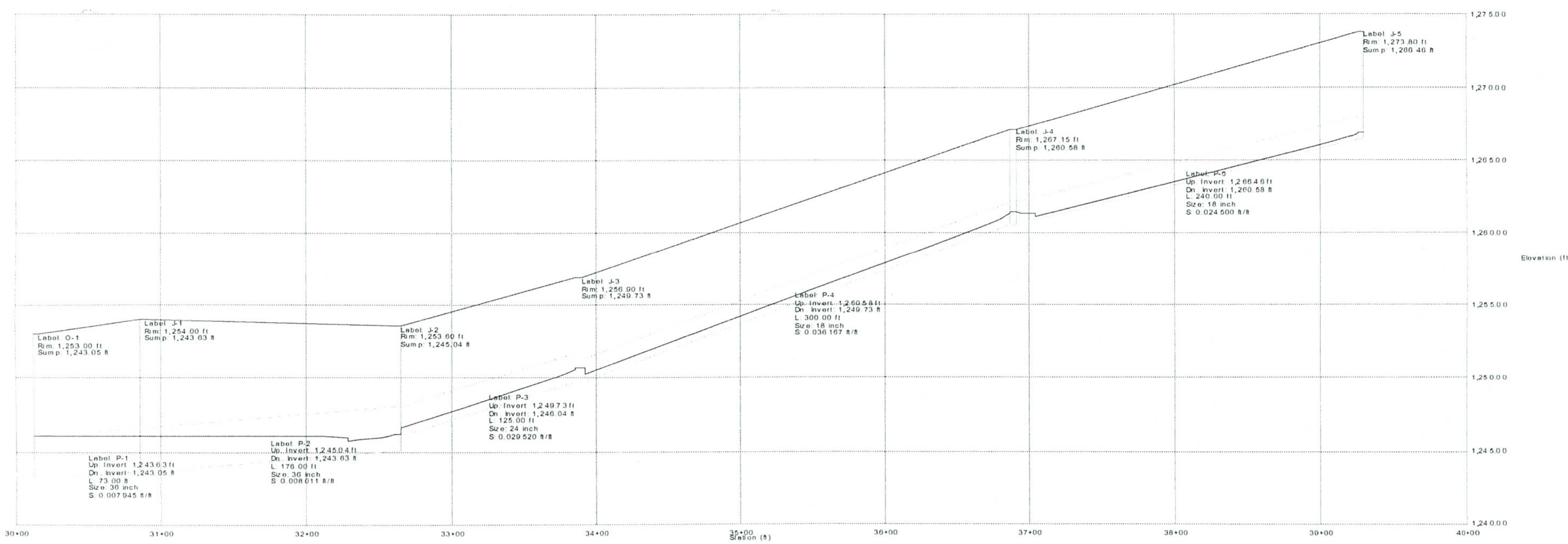
Label	Number of Sections	Section Size	Section Shape	Length (ft)	Total System Flow (cfs)	Average Velocity (ft/s)	Hydraulic Grade Upstream (ft)	Hydraulic Grade Downstream (ft)
P-1	1	36 inch	Circular	73.00	23.83	3.61	1,246.08	1,246.05
P-14	1	18 inch	Circular	46.00	4.85	3.77	1,248.39	1,246.23
P-2	1	36 inch	Circular	176.00	12.70	3.61	1,246.17	1,246.11
P-13	1	18 inch	Circular	8.00	6.28	4.43	1,250.00	1,246.23
P-3	1	24 inch	Circular	125.00	7.48	7.25	1,250.70	1,246.63
P-11	1	18 inch	Circular	18.00	3.97	9.81	1,250.90	1,245.92

P-12	1	18 inch	Circular	33.00	1.25	2.28	1,248.42	1,246.34
P-10	1	18 inch	Circular	45.00	2.75	3.02	1,251.85	1,250.76
P-4	1	18 inch	Circular	300.00	4.73	4.17	1,261.42	1,250.76
P-5	1	18 inch	Circular	240.00	1.14	2.08	1,266.86	1,261.42
P-8	1	18 inch	Circular	5.00	3.59	3.90	1,261.38	1,261.42
P-6	1	18 inch	Circular	66.00	0.61	2.08	1,269.00	1,266.86
P-7	1	18 inch	Circular	48.00	0.53	1.93	1,268.92	1,266.86
P-9	1	18 inch	Circular	47.00	2.20	3.13	1,261.97	1,261.38

Label	Total System Flow (cfs)	Ground Elevation (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)
O-1	23.83	1,253.00	1,246.05	1,246.05
J-1	23.83	1,254.00	1,246.11	1,246.08
I-9	4.85	1,252.00	1,248.39	1,248.39
J-2	12.70	1,253.60	1,246.20	1,246.17
I-8	6.28	1,253.00	1,250.00	1,250.00
J-3	7.48	1,256.90	1,250.76	1,250.70
I-6	3.97	1,254.14	1,250.90	1,250.90
I-7	1.25	1,252.53	1,248.42	1,248.42
I-5	2.75	1,255.60	1,251.85	1,251.85
J-4	4.73	1,267.15	1,261.42	1,261.42
J-5	1.14	1,273.80	1,266.86	1,266.86
I-3	3.59	1,266.90	1,261.38	1,261.38
I-1	0.61	1,272.70	1,269.00	1,269.00
I-2	0.53	1,273.40	1,268.92	1,268.92
I-4	2.20	1,265.70	1,261.97	1,261.97

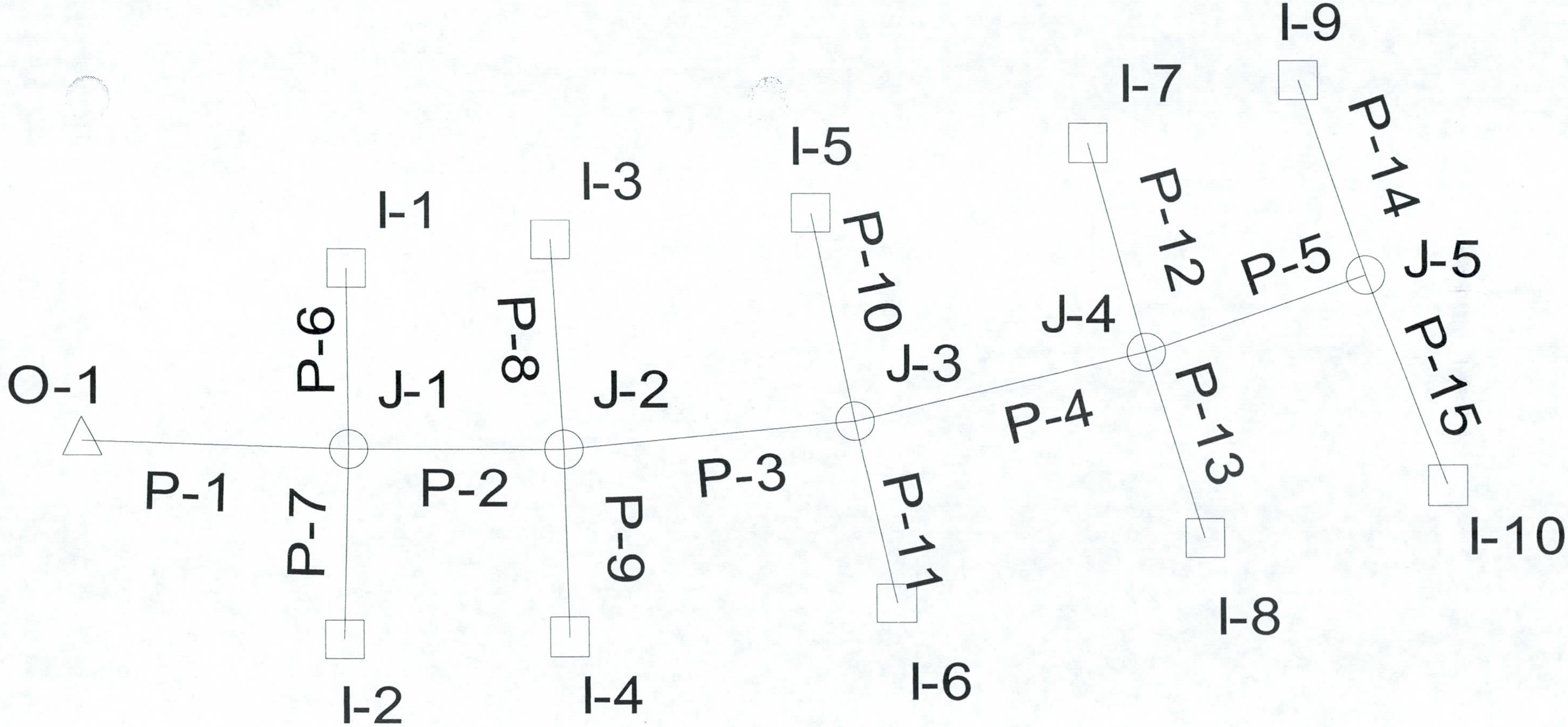
Completed: 01/20/2003 12:53:34 PM

Profile
Scenario: Base



Scenario: Base

GREENFIELD RD.
NORTH OF P.S.



Title: GREENFIELD ROAD NORTH OF PUNM STATION
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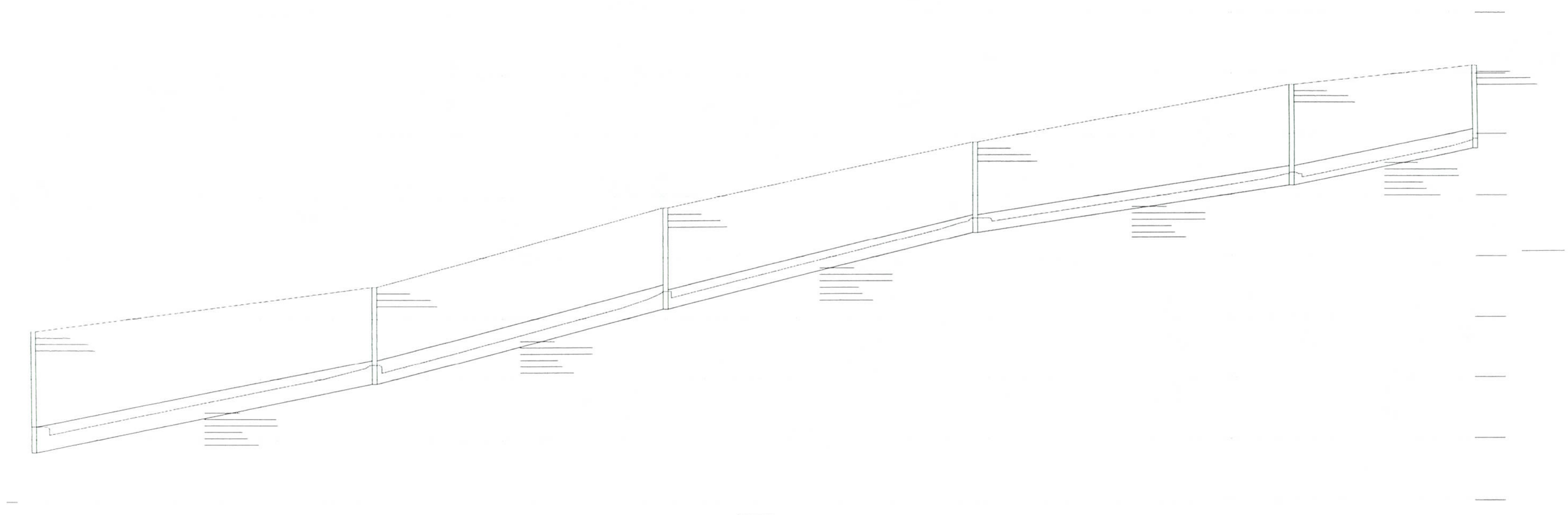
01/20/03 03:34:12 PM

Inca Engineers Inc
© Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Project Engineer: INCA Engineers, Inc
StormCAD v4.1.1 [4.2014a]

Profile
Scenario: Base



Title: GREENFIELD ROAD NORTH OF PUNM STATION
o:\...\drainage\storm-cad\greenfield-n.stm
01/20/03 ˆ 37:38 PM

Project Engineer: INCA Engineers, Inc
StormCAD v4.1.1 [4.2014a]

```
==============================================================
Scenario: Base


>>>> Info: Subsurface Analysis iterations: 1
>>>> Info: Convergence was achieved.


==============================================================
Gravity subnetwork discharging at: O-1
--------------------------------------------------------------
>>>> Info: Loading and hydraulic computations completed
     successfully.
>>>> Info: P-1 Hydraulic jump formed.
>>>> Info: P-1 Critical depth assumed upstream.
>>>> Info: P-2 Hydraulic jump formed.
>>>> Info: P-2 Critical depth assumed upstream.
>>>> Info: P-3 Hydraulic jump formed.
>>>> Info: P-3 Critical depth assumed upstream.
>>>> Info: P-4 Hydraulic jump formed.
>>>> Info: P-4 Critical depth assumed upstream.
>>>> Info: P-5 Hydraulic jump formed.
>>>> Info: P-5 Critical depth assumed upstream.
>>>> Info: P-6 Hydraulic jump formed.
>>>> Info: P-6 Critical depth assumed upstream.
>>>> Info: P-7 Hydraulic jump formed.
>>>> Info: P-7 Critical depth assumed upstream.
>>>> Info: P-8 Hydraulic jump formed.
>>>> Info: P-8 Critical depth assumed upstream.
>>>> Info: P-9 Hydraulic jump formed.
>>>> Info: P-9 Critical depth assumed upstream.
>>>> Info: P-10 Hydraulic jump formed.
>>>> Info: P-10 Critical depth assumed upstream.
>>>> Info: P-11 Hydraulic jump formed.
>>>> Info: P-11 Critical depth assumed upstream.
>>>> Info: P-12 Hydraulic jump formed.
>>>> Info: P-12 Critical depth assumed upstream.
>>>> Info: P-13 Hydraulic jump formed.
>>>> Info: P-13 Critical depth assumed upstream.
>>>> Info: P-14 Hydraulic jump formed.
>>>> Info: P-14 Critical depth assumed upstream.
>>>> Info: P-15 Hydraulic jump formed.
>>>> Info: P-15 Critical depth assumed upstream.
```

CALCULATION SUMMARY FOR SURFACE NETWORKS

Label	Inlet Type	Inlet	Total Intercepted Flow (cfs)	Total Bypassed Flow (cfs)	Capture Efficiency (%)	Gutter Spread (ft)	Gutter Depth (ft)
I-10	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
I-9	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
I-8	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
I-7	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
I-6	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
I-5	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
I-4	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
I-3	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
I-2	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00
I-1	Generic Inlet	Generic Default 100%	0.00	0.00	100.0	0.00	0.00

CALCULATION SUMMARY FOR SUBSURFACE NETWORK WITH ROOT: O-1

Label	Number	Section	Section	Length	Total	Average	Hydraulic	Hydraulic

	of Sections	Size	Shape	(ft)	System Flow (cfs)	Velocity (ft/s)	Grade Upstream (ft)	Grade Downstream (ft)
P-1	1	24 inch	Circular	280.00	22.19	7.47	1,251.28	1,246.05
P-6	1	18 inch	Circular	9.00	3.86	3.85	1,253.96	1,251.28
P-2	1	24 inch	Circular	240.00	15.54	6.01	1,257.26	1,251.28
P-7	1	18 inch	Circular	42.00	2.79	3.17	1,252.35	1,251.28
P-3	1	18 inch	Circular	255.00	10.88	6.56	1,263.22	1,257.26
P-9	1	18 inch	Circular	9.00	2.33	2.53	1,260.03	1,257.26
P-8	1	18 inch	Circular	43.00	2.33	2.53	1,259.15	1,257.26
P-11	1	18 inch	Circular	16.00	2.38	2.62	1,266.02	1,263.22
P-4	1	18 inch	Circular	260.00	6.12	4.50	1,266.82	1,263.22
P-10	1	18 inch	Circular	35.00	2.38	2.62	1,264.50	1,263.22
P-5	1	18 inch	Circular	150.00	3.38	3.51	1,269.56	1,266.82
P-13	1	18 inch	Circular	9.00	1.37	2.17	1,270.08	1,266.82
P-12	1	18 inch	Circular	41.00	1.37	2.17	1,268.56	1,266.82
P-15	1	18 inch	Circular	9.00	1.69	2.73	1,269.99	1,269.56
P-14	1	18 inch	Circular	41.00	1.69	2.73	1,270.15	1,269.56

Label	Total System Flow (cfs)	Ground Elevation (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)
O-1	22.19	1,254.00	1,246.05	1,246.05
J-1	22.19	1,257.70	1,251.28	1,251.28
I-1	3.86	1,257.21	1,253.96	1,253.96
J-2	15.54	1,264.09	1,257.26	1,257.26
I-2	2.79	1,256.00	1,252.35	1,252.35
J-3	10.88	1,269.30	1,263.22	1,263.22
I-4	2.33	1,263.00	1,260.03	1,260.03
I-3	2.33	1,262.55	1,259.15	1,259.15
I-6	2.38	1,269.40	1,266.02	1,266.02
J-4	6.12	1,274.14	1,266.82	1,266.82
I-5	2.38	1,267.90	1,264.50	1,264.50
J-5	3.38	1,275.67	1,269.56	1,269.56
I-8	1.37	1,273.50	1,270.08	1,270.08
I-7	1.37	1,272.12	1,268.56	1,268.56
I-10	1.69	1,273.50	1,269.99	1,269.99
I-9	1.69	1,273.68	1,270.15	1,270.15

==

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Scenario: Base

Combined Pipe\Node Report

Label	Upstream Node	Downstream Node	Length (ft)	Upstream Inlet Area (acres)	Upstream Inlet CA (acres)	Upstream Inlet Rational Coefficient	Upstream Calculated System CA (acres)	Upstream Inlet Rational Flow (cfs)	Section Size	Full Capacity (cfs)
P-1	J-1	O-1	280.00	N/A	N/A	N/A	0.00	N/A	24 inch	31.85
P-2	J-2	J-1	240.00	N/A	N/A	N/A	0.00	N/A	24 inch	36.48
P-3	J-3	J-2	255.00	N/A	N/A	N/A	0.00	N/A	18 inch	16.27
P-4	J-4	J-3	260.00	N/A	N/A	N/A	0.00	N/A	18 inch	12.86
P-5	J-5	J-4	150.00	N/A	N/A	N/A	0.00	N/A	18 inch	14.85
P-6	I-1	J-1	9.00	0.00	0.00	0.00	0.00	0.00	18 inch	59.21
P-7	I-2	J-1	42.00	0.00	0.00	0.00	0.00	0.00	18 inch	18.97
P-8	I-3	J-2	43.00	0.00	0.00	0.00	0.00	0.00	18 inch	26.47
P-9	I-4	J-2	9.00	0.00	0.00	0.00	0.00	0.00	18 inch	66.52
P-10	I-5	J-3	35.00	0.00	0.00	0.00	0.00	0.00	18 inch	24.86
P-11	I-6	J-3	16.00	0.00	0.00	0.00	0.00	0.00	18 inch	48.99
P-12	I-7	J-4	41.00	0.00	0.00	0.00	0.00	0.00	18 inch	24.66
P-13	I-8	J-4	9.00	0.00	0.00	0.00	0.00	0.00	18 inch	68.07
P-14	I-9	J-5	41.00	0.00	0.00	0.00	0.00	0.00	18 inch	14.67
P-15	I-10	J-5	9.00	0.00	0.00	0.00	0.00	0.00	18 inch	28.01

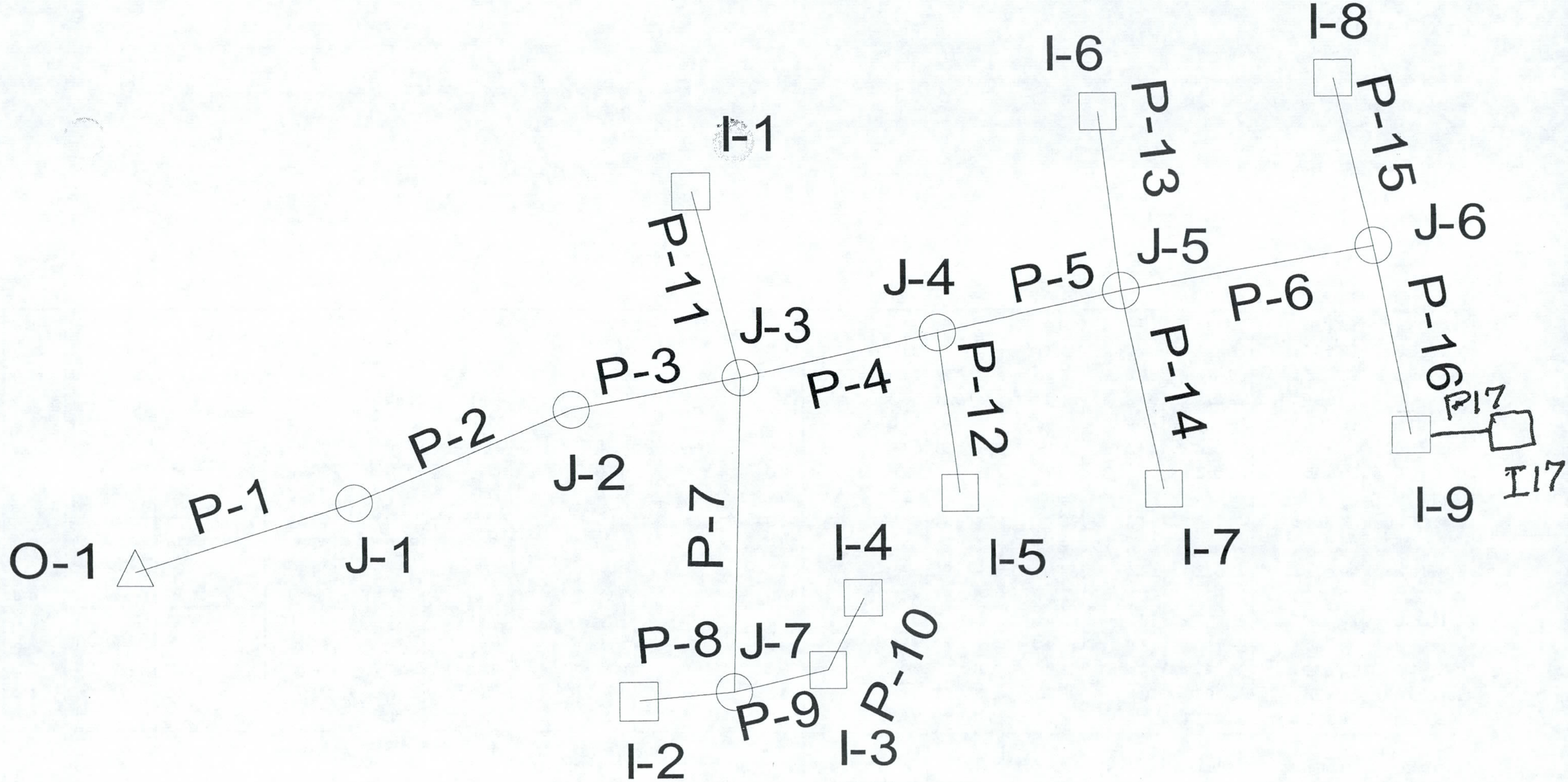
Scenario: Base

Combined Pipe\Node Report

Average Velocity (ft/s)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Constructed Slope (ft/ft)	Description
7.47	1,249.60	1,244.05	0.019821	
6.01	1,255.84	1,249.60	0.026000	
6.56	1,261.96	1,255.84	0.024000	
4.50	1,265.86	1,261.96	0.015000	
3.51	1,268.86	1,265.86	0.020000	
3.85	1,253.21	1,250.35	0.317778	
3.17	1,251.72	1,250.35	0.032619	
2.53	1,258.57	1,255.84	0.063488	
2.53	1,259.45	1,255.84	0.401111	
2.62	1,263.92	1,261.96	0.056000	
2.62	1,265.44	1,261.96	0.217500	
2.17	1,268.12	1,265.86	0.055122	
2.17	1,269.64	1,265.86	0.420000	
2.73	1,269.66	1,268.86	0.019512	
2.73	1,269.50	1,268.86	0.071111	

Scenario: Base

GREENFIELD ROAD
FROM KNOX RD,
SOUTH TO RET.
BASIN B



Title: GREENFIELD ROAD TO RETENTION BASIN B
untitled.stm
01/20/03 04:33:02 PM

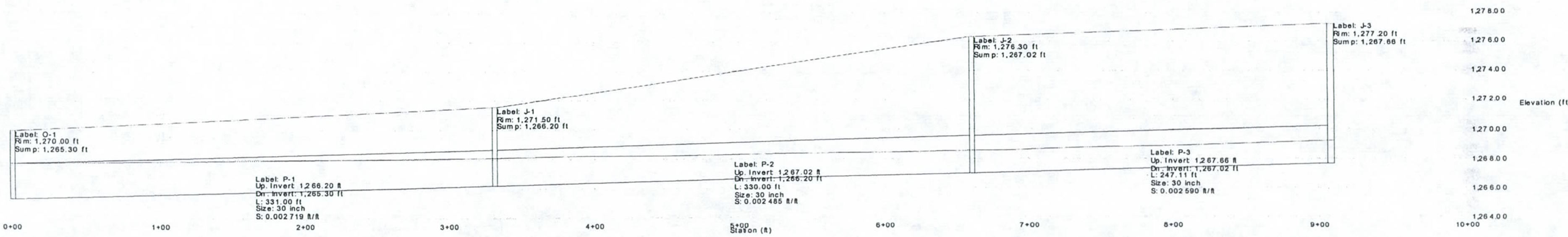
Inca Engineers Inc

Project Engineer: INCA Engineers, Inc
StormCAD v4.1.1 [4.2014a]

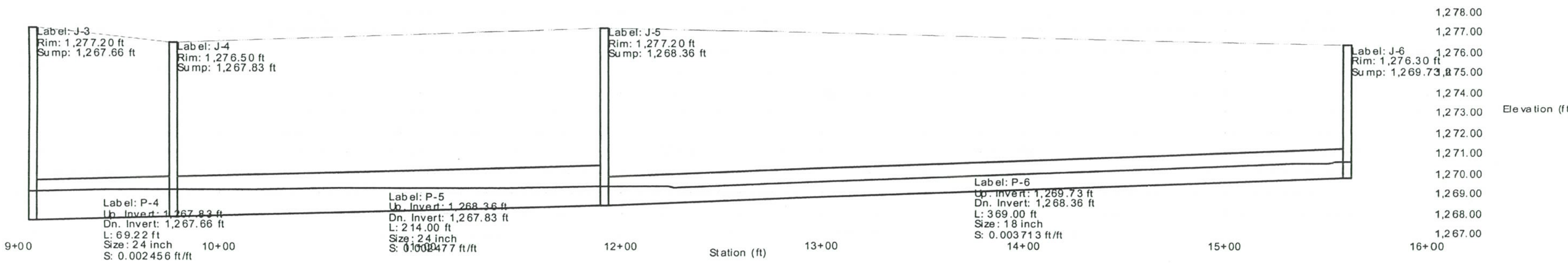
Combined Pipe\Node Report

Label	Upstream Node	Downstream Node	Length (ft)	Upstream Inlet Area (acres)	Upstream Inlet CA (acres)	Upstream Inlet Rational Coefficient	Upstream Calculated System CA (acres)	Upstream Inlet Rational Flow (cfs)	Section Size	Full Capacity (cfs)	Average Velocity (ft/s)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Constructed Slope (ft/ft)
P-1	J-1	O-1	331.00	N/A	N/A	N/A	0.00	N/A	30 inch	21.39	3.16	1,266.20	1,265.30	0.002719
P-2	J-2	J-1	330.00	N/A	N/A	N/A	0.00	N/A	30 inch	22.15	4.01	1,267.02	1,266.20	0.002485
P-3	J-3	J-2	247.11	N/A	N/A	N/A	0.00	N/A	30 inch	20.87	4.55	1,267.66	1,267.02	0.002590
P-4	J-4	J-3	69.22	N/A	N/A	N/A	0.00	N/A	24 inch	14.57	3.88	1,267.83	1,267.66	0.002456
P-5	J-5	J-4	214.00	N/A	N/A	N/A	0.00	N/A	24 inch	14.63	3.69	1,268.36	1,267.83	0.002477
P-6	J-6	J-5	369.00	N/A	N/A	N/A	0.00	N/A	18 inch	8.32	4.21	1,269.73	1,268.36	0.003713
P-7	J-7	J-3	155.00	N/A	N/A	N/A	0.00	N/A	18 inch	13.39	2.37	1,270.18	1,267.66	0.016258
P-8	I-2	J-7	20.00	0.00	0.00	0.00	0.00	0.00	18 inch	28.38	2.66	1,271.74	1,270.28	0.073000
P-9	I-3	J-7	9.00	0.00	0.00	0.00	0.00	0.00	18 inch	7.00	2.50	1,270.32	1,270.28	0.004444
P-10	I-4	I-3	50.00	0.00	0.00	0.00	0.00	0.00	18 inch	6.64	3.83	1,270.52	1,270.32	0.004000
P-11	I-1	J-3	40.00	0.00	0.00	0.00	0.00	0.00	18 inch	28.86	2.64	1,270.68	1,267.66	0.075500
P-12	I-5	J-4	19.00	0.00	0.00	0.00	0.00	0.00	18 inch	51.17	2.67	1,272.34	1,267.83	0.237368
P-13	I-6	J-5	40.00	0.00	0.00	0.00	0.00	0.00	18 inch	28.57	5.37	1,271.96	1,269.00	0.074000
P-14	I-7	J-5	11.00	0.00	0.00	0.00	0.00	0.00	18 inch	66.13	8.10	1,273.36	1,269.00	0.396364
P-15	I-8	J-6	31.00	0.00	0.00	0.00	0.00	0.00	18 inch	24.67	3.19	1,271.53	1,269.82	0.055161
P-16	I-9	J-6	58.00	0.00	0.00	0.00	0.00	0.00	18 inch	17.17	3.19	1,271.37	1,269.82	0.026724
P-17	I-10	I-9	40.00	0.00	0.00	0.00	0.00	0.00	18 inch	6.64	2.41	1,271.53	1,271.37	0.004000

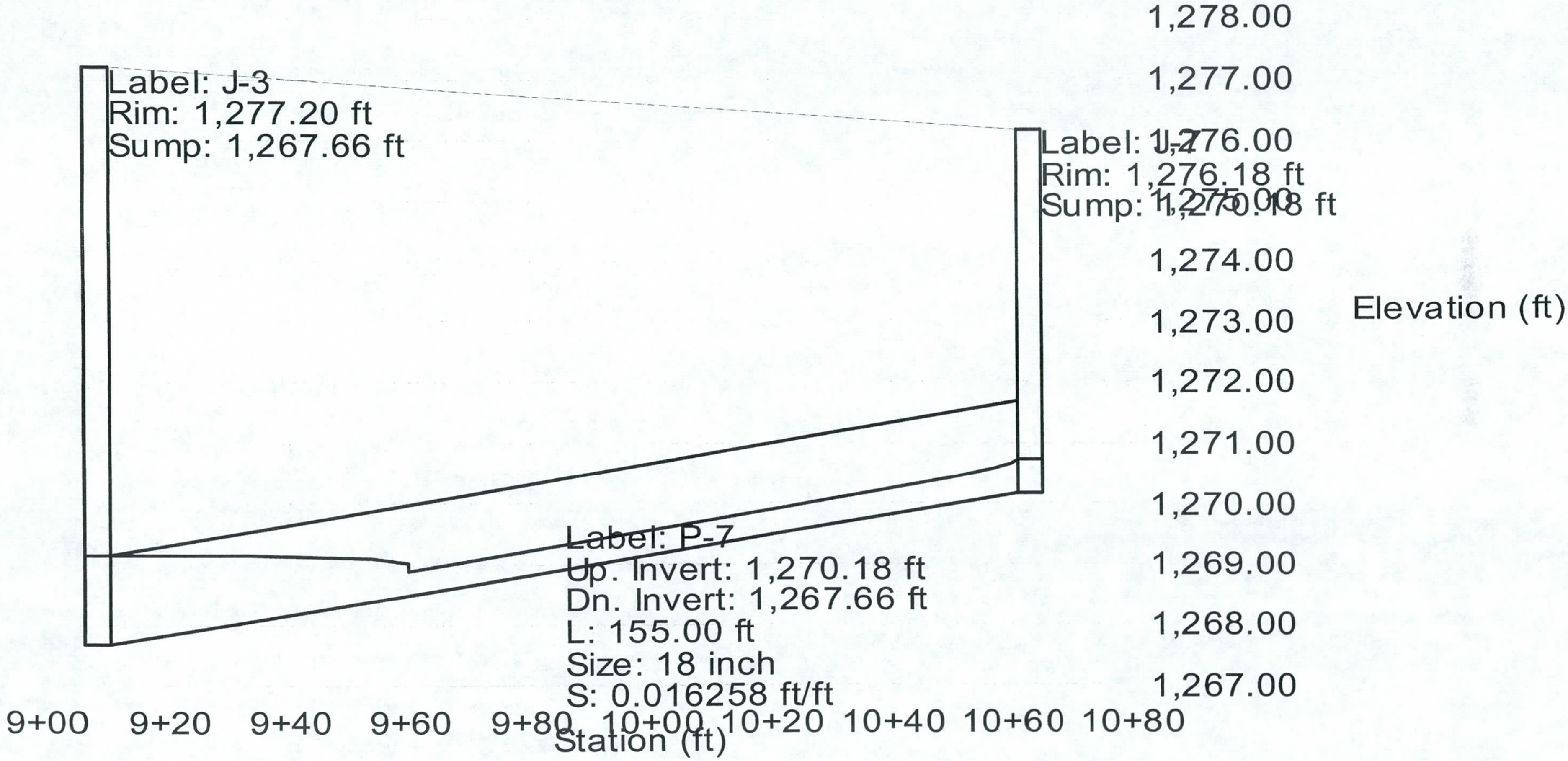
Profile
Scenario: Base



Profile
Scenario: Base



Profile
Scenario: Base



```
==================================================================
Scenario: Base

>>>> Info: I-7 No bypass target specified. Bypass is assumed to
     travel to O-1.
>>>> Info: I-6 No bypass target specified. Bypass is assumed to
     travel to O-1.
>>>> Info: I-5 No bypass target specified. Bypass is assumed to
     travel to O-1.
>>>> Info: I-4 No bypass target specified. Bypass is assumed to
     travel to O-1.
>>>> Info: I-3 No bypass target specified. Bypass is assumed to
     travel to O-1.
>>>> Info: I-2 No bypass target specified. Bypass is assumed to
     travel to O-1.
>>>> Info: I-1 No bypass target specified. Bypass is assumed to
     travel to O-1.
>>>> Info: J-2 No bypass target specified. Bypass is assumed to
     travel to O-1.
>>>> Info: J-1 No bypass target specified. Bypass is assumed to
     travel to O-1.
>>>> Info: I-12-DUMMY No bypass target specified. Bypass is
     assumed to travel to O-1.

>>>> Info: Subsurface Analysis iterations: 1
>>>> Info: Convergence was achieved.


==================================================================
Gravity subnetwork discharging at: O-1
------------------------------------------------------------------
>>>> Info: Loading and hydraulic computations completed
     successfully.
>>>> Warning: I-7 Pipe and structure elevations do not agree
     with selected benching type.
     Calculations are performed with specified benching type.
>>>> Warning: I-6 Pipe invert is below structure.
>>>> Warning: I-6 Pipe and structure elevations do not agree
     with selected benching type.
     Calculations are performed with specified benching type.
>>>> Warning: I-5 Flooding is occurring. Calculations continue
     with hydraulic grade reset.
>>>> Warning: I-4 Flooding is occurring. Calculations continue
     with hydraulic grade reset.
>>>> Warning: I-3 Flooding is occurring. Calculations continue
     with hydraulic grade reset.
>>>> Warning: I-2 Flooding is occurring. Calculations continue
     with hydraulic grade reset.
>>>> Warning: I-1 Flooding is occurring. Calculations continue
     with hydraulic grade reset.
>>>> Warning: J-1 Pipe invert is below structure.
>>>> Warning: J-3 Pipe invert is below structure.
```

```
>>>> Info: P-2 Pipe slope is adverse (negative).
>>>> Warning: P-2 Pipe fails minimum slope constraint.
>>>> Warning: P-2 Pipe discharge is above full flow capacity.
>>>> Warning: P-6 Pipe fails minimum velocity constraint.
>>>> Warning: P-7 Pipe fails minimum velocity constraint.
>>>> Warning: P-8 Pipe fails minimum velocity constraint.
>>>> Warning: P-16 Pipe fails maximum slope constraint.
```

CALCULATION SUMMARY FOR SURFACE NETWORKS

Label	Inlet Type	Inlet	Total Intercepted Flow (cfs)	Total Bypassed Flow (cfs)	Capture Efficiency (%)	Gutter Spread (ft)	Gutter Depth (ft)
I-7	Curb Inlet	Curb DI-4E	0.00	0.00	100.0	0.00	0.00
I-6	Curb Inlet	Curb DI-4E	0.00	0.00	100.0	0.00	0.00
I-5	Curb Inlet	Curb DI-4E	0.00	0.00	100.0	0.00	0.00
I-4	Curb Inlet	Curb DI-4E	0.00	0.00	100.0	0.00	0.00
I-3	Curb Inlet	Curb DI-4E	0.00	0.00	100.0	0.00	0.00
I-2	Curb Inlet	Curb DI-4E	0.00	0.00	100.0	0.00	0.00
I-1	Curb Inlet	Curb DI-4E	0.00	0.00	100.0	0.00	0.00
J-2	Curb Inlet	Curb DI-4E	0.00	0.00	100.0	0.00	0.00
J-1	Curb Inlet	Curb DI-4E	0.00	0.00	100.0	0.00	0.00
I-12-DUMMY	Curb Inlet	Curb DI-4E	0.00	0.00	100.0	0.00	0.00

CALCULATION SUMMARY FOR SUBSURFACE NETWORK WITH ROOT: O-1

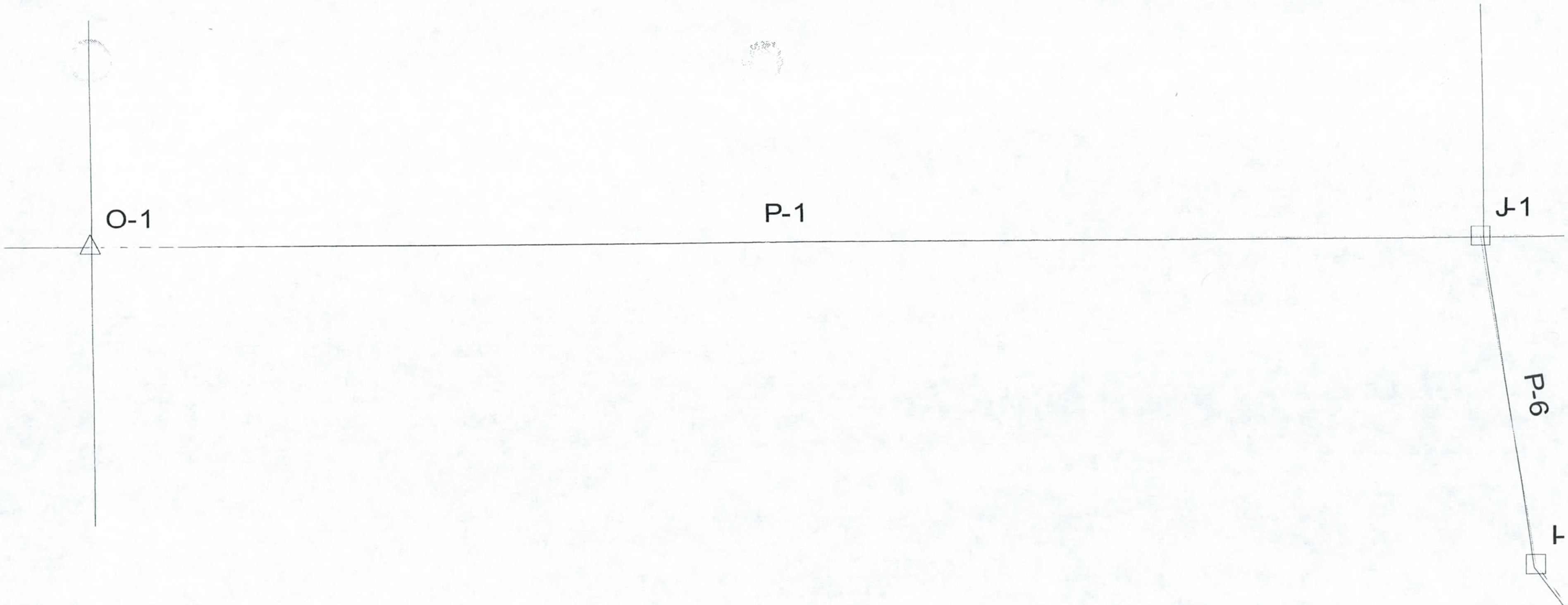
Label	Number of Sections	Section Size	Section Shape	Length (ft)	Total System Flow (cfs)	Average Velocity (ft/s)	Hydraulic Grade Upstream (ft)	Hydraulic Grade Downstream (ft)
P-1	1	24 inch	Circular	312.00	17.28	5.50	1,272.16	1,270.34
P-6	1	18 inch	Circular	67.00	0.16	0.09	1,272.83	1,272.83
P-2	1	24 inch	Circular	303.00	13.34	4.24	1,273.33	1,272.28
P-7	1	18 inch	Circular	54.00	0.87	0.49	1,272.82	1,272.82
P-3	1	24 inch	Circular	254.00	9.25	2.94	1,273.88	1,273.46
P-9	1	18 inch	Circular	58.13	2.17	1.23	1,273.49	1,273.46
P-10	1	18 inch	Circular	10.00	1.92	1.09	1,273.45	1,273.45
P-8	1	18 inch	Circular	116.00	1.11	0.63	1,271.85	1,271.84
P-16	1	24 inch	Circular	1.00	4.98	1.58	1,273.91	1,273.91
P-12	1	18 inch	Circular	10.00	2.49	1.41	1,274.38	1,274.38
P-11	1	18 inch	Circular	50.46	1.78	1.01	1,274.39	1,274.38

Label	Total	Ground	Hydraulic	Hydraulic

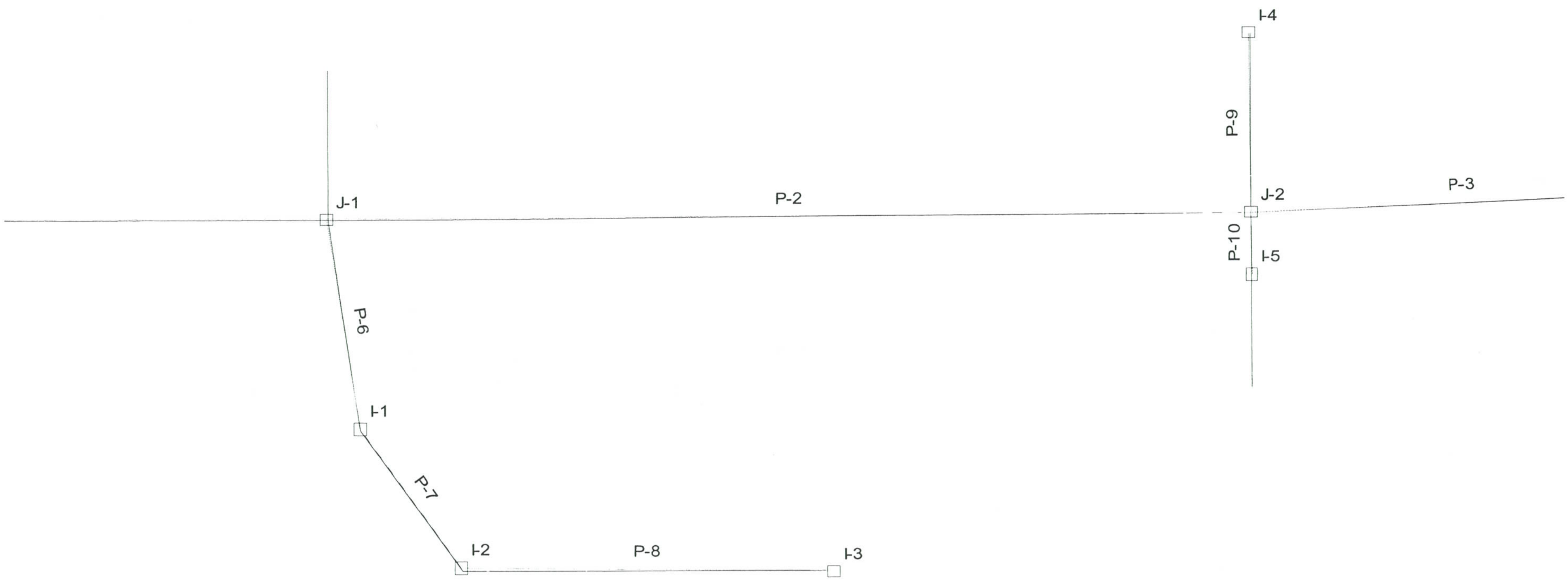
	System Flow (cfs)	Elevation (ft)	Grade Line In (ft)	Grade Line Out (ft)
O-1	17.28	1,273.30	1,270.34	1,270.34
J-1	17.28	1,274.05	1,272.28	1,272.16
I-1	0.16	1,272.82	1,272.82	1,272.82
J-2	13.34	1,275.30	1,273.45	1,273.33
I-2	0.87	1,271.84	1,271.84	1,271.84
J-3	9.25	1,276.70	1,273.91	1,273.88
I-4	2.17	1,272.60	1,272.60	1,272.60
I-5	1.92	1,273.14	1,273.14	1,273.14
I-3	1.11	1,271.84	1,271.84	1,271.84
I-12-DUMMY	4.98	1,281.50	1,273.91	1,273.91
I-7	2.49	1,274.80	1,274.38	1,274.38
I-6	1.78	1,275.05	1,274.39	1,274.39

Completed: 01/21/2003 01:39:26 PM

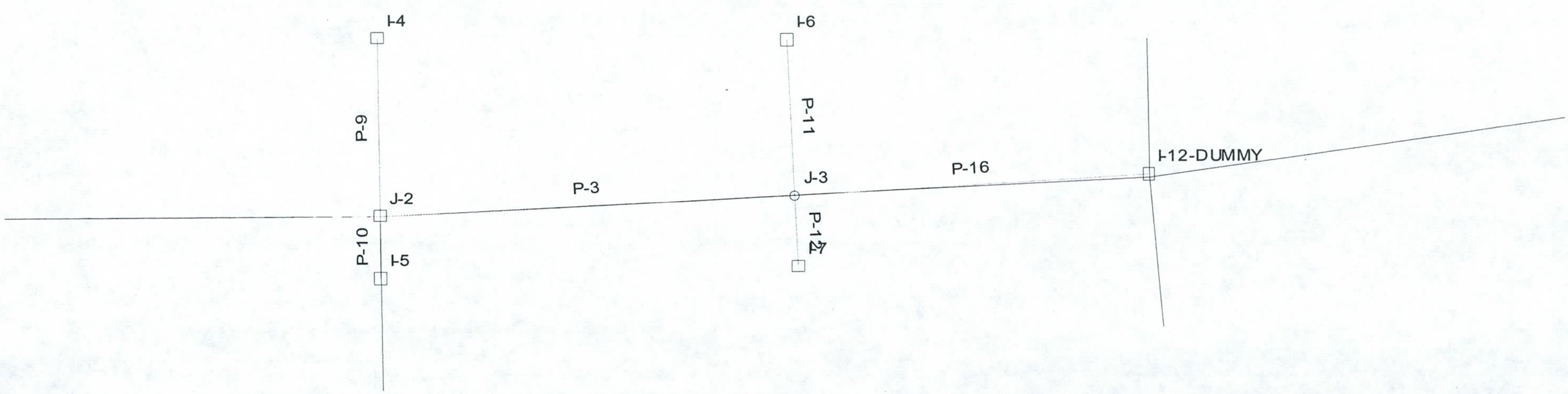
Scenario: Base



Scenario: Base



Scenario: Base



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01/21/03 03:42:28 PM

Project Engineer: INCA Engineers, Inc
StormCAD v4.1.1 [4.2014a]

```
=================================================================
Scenario: Base

>>>> Info: I-7 No bypass target specified. Bypass is assumed to
     travel to O-1.
>>>> Info: I-6 No bypass target specified. Bypass is assumed to
     travel to O-1.
>>>> Info: I-5 No bypass target specified. Bypass is assumed to
     travel to O-1.
>>>> Info: I-4 No bypass target specified. Bypass is assumed to
     travel to O-1.
>>>> Info: I-3 No bypass target specified. Bypass is assumed to
     travel to O-1.
>>>> Info: I-2 No bypass target specified. Bypass is assumed to
     travel to O-1.
>>>> Info: I-1 No bypass target specified. Bypass is assumed to
     travel to O-1.
>>>> Info: J-2 No bypass target specified. Bypass is assumed to
     travel to O-1.
>>>> Info: J-1 No bypass target specified. Bypass is assumed to
     travel to O-1.
>>>> Info: I-12-DUMMY No bypass target specified. Bypass is
     assumed to travel to O-1.

>>>> Info: Subsurface Analysis iterations: 1
>>>> Info: Convergence was achieved.


=================================================================
Gravity subnetwork discharging at: O-1
-----------------------------------------------------------------
>>>> Info: Loading and hydraulic computations completed
     successfully.
```

CALCULATION SUMMARY FOR SURFACE NETWORKS

Label	Inlet Type	Inlet	Total Intercepted Flow (cfs)	Total Bypassed Flow (cfs)	Capture Efficiency (%)	Gutter Spread (ft)	Gutter Depth (ft)
I-7	Curb Inlet	Curb DI-4E	0.00	0.00	100.0	0.00	0.00
I-6	Curb Inlet	Curb DI-4E	0.00	0.00	100.0	0.00	0.00
I-5	Curb Inlet	Curb DI-4E	0.00	0.00	100.0	0.00	0.00
I-4	Curb Inlet	Curb DI-4E	0.00	0.00	100.0	0.00	0.00
I-3	Curb Inlet	Curb DI-4E	0.00	0.00	100.0	0.00	0.00
I-2	Curb Inlet	Curb DI-4E	0.00	0.00	100.0	0.00	0.00
I-1	Curb Inlet	Curb DI-4E	0.00	0.00	100.0	0.00	0.00
J-2	Curb Inlet	Curb DI-4E	0.00	0.00	100.0	0.00	0.00
J-1	Curb Inlet	Curb DI-4E	0.00	0.00	100.0	0.00	0.00
I-12-DUMMY	Curb Inlet	Curb DI-4E	0.00	0.00	100.0	0.00	0.00

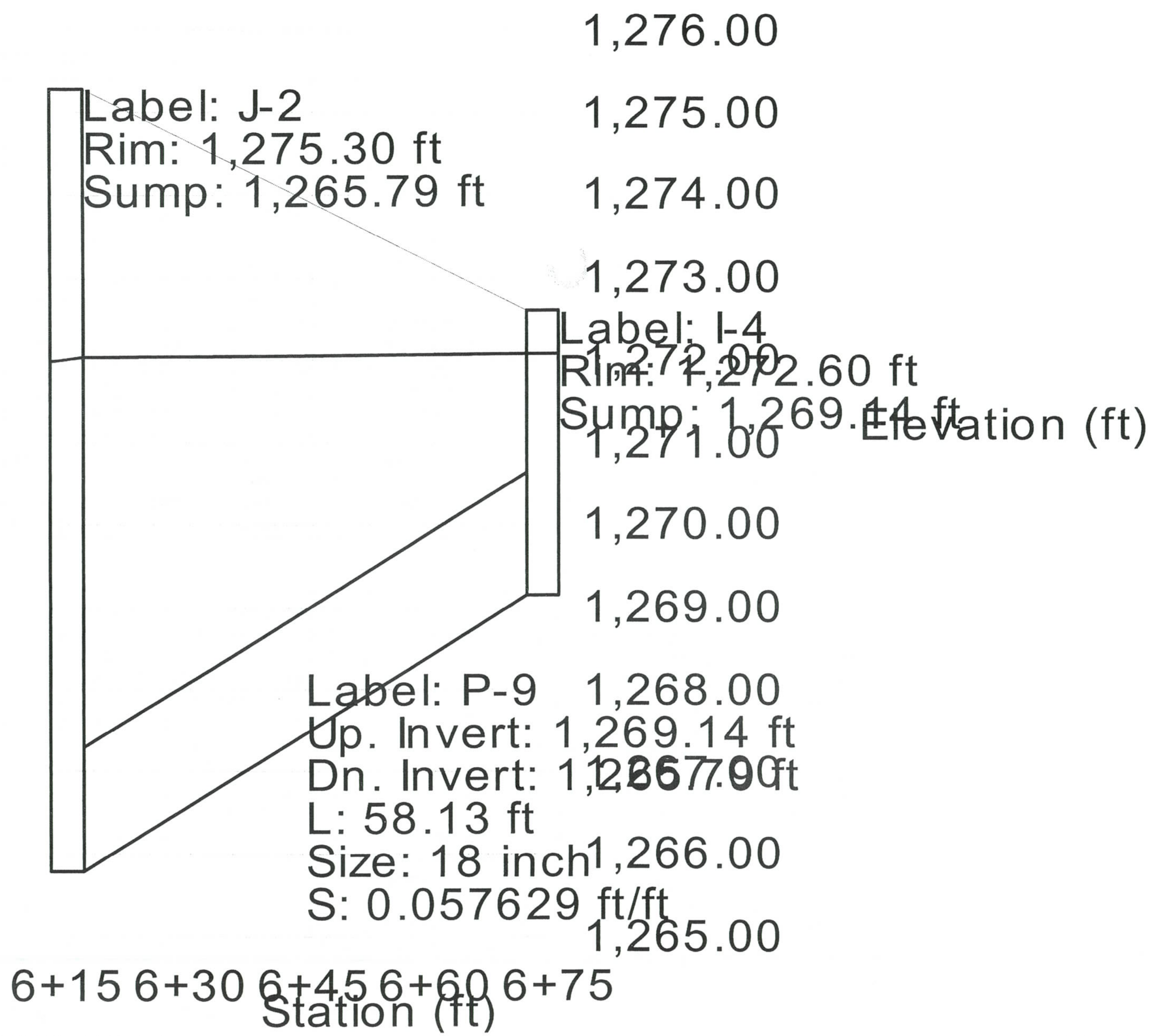
CALCULATION SUMMARY FOR SUBSURFACE NETWORK WITH ROOT: O-1

Label	Number of Sections	Section Size	Section Shape	Length (ft)	Total System Flow (cfs)	Average Velocity (ft/s)	Hydraulic Grade Upstream (ft)	Hydraulic Grade Downstream (ft)
P-1	1	30 inch	Circular	312.00	17.28	3.52	1,270.89	1,270.34
P-6	1	24 inch	Circular	67.00	0.61	0.19	1,270.91	1,270.91
P-2	1	24 inch	Circular	303.00	13.34	4.24	1,272.00	1,270.94
P-7	1	18 inch	Circular	54.00	0.87	0.49	1,270.91	1,270.91
P-3	1	24 inch	Circular	254.00	9.25	2.94	1,272.55	1,272.12
P-9	1	18 inch	Circular	58.13	2.17	1.23	1,272.08	1,272.05
P-10	1	18 inch	Circular	10.00	1.92	1.09	1,272.05	1,272.05
P-8	1	18 inch	Circular	116.00	1.75	0.99	1,270.95	1,270.92
P-16	1	24 inch	Circular	1.00	4.98	1.58	1,272.59	1,272.59
P-12	1	18 inch	Circular	10.00	2.49	1.41	1,272.59	1,272.59
P-11	1	18 inch	Circular	50.46	1.78	1.01	1,272.59	1,272.58

Label	Total System Flow (cfs)	Ground Elevation (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)
O-1	17.28	1,274.30	1,270.34	1,270.34
J-1	17.28	1,274.63	1,270.91	1,270.89
I-1	0.61	1,273.00	1,270.91	1,270.91
J-2	13.34	1,275.30	1,272.05	1,272.00
I-2	0.87	1,273.72	1,270.92	1,270.91
J-3	9.25	1,276.70	1,272.58	1,272.55
I-4	2.17	1,272.60	1,272.08	1,272.08
I-5	1.92	1,273.14	1,272.05	1,272.05
I-3	1.75	1,273.57	1,270.95	1,270.95
I-12-DUMMY	4.98	1,281.50	1,272.59	1,272.59
I-7	2.49	1,274.80	1,272.59	1,272.59
I-6	1.78	1,275.05	1,272.59	1,272.59

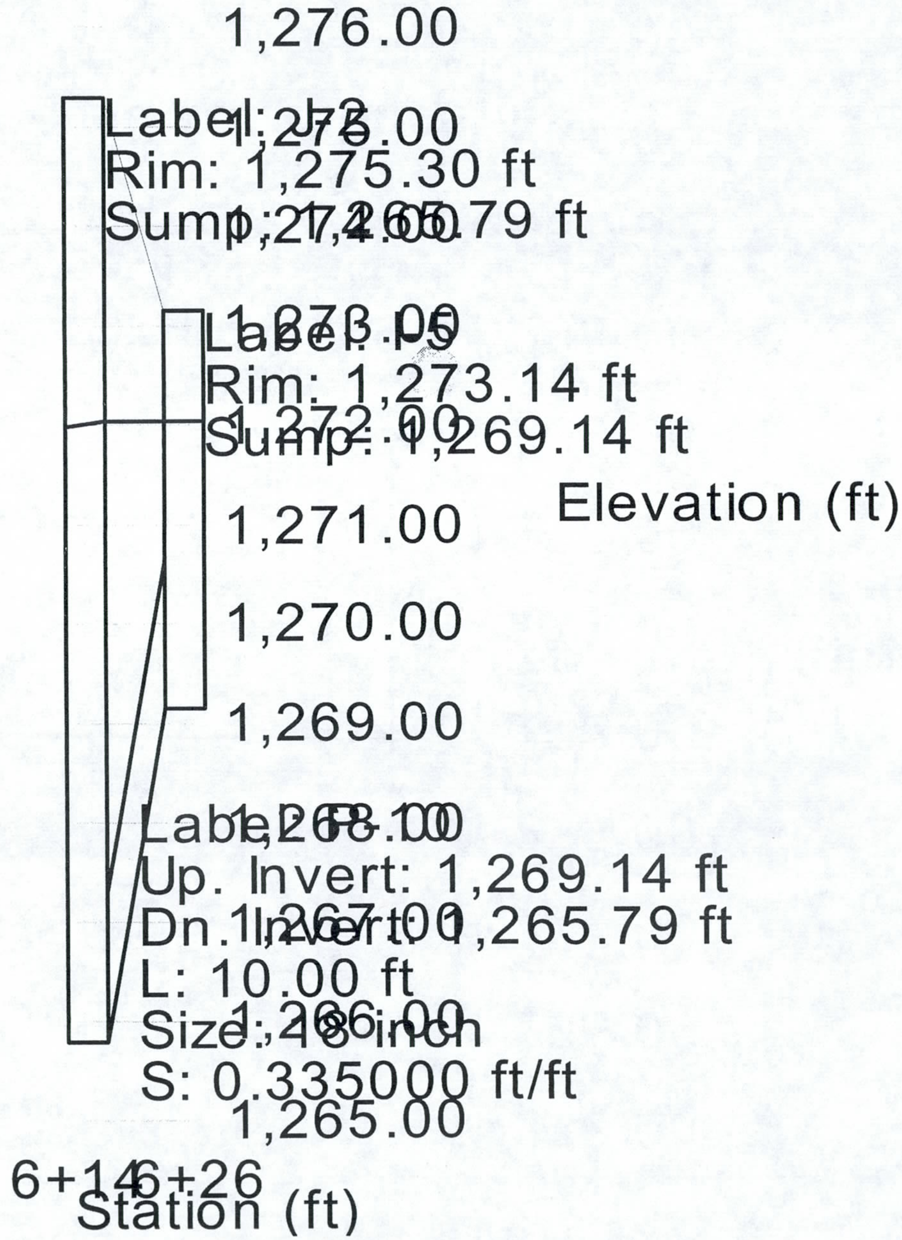
Completed: 01/21/2003 02:30:57 PM

Profile
Scenario: Base

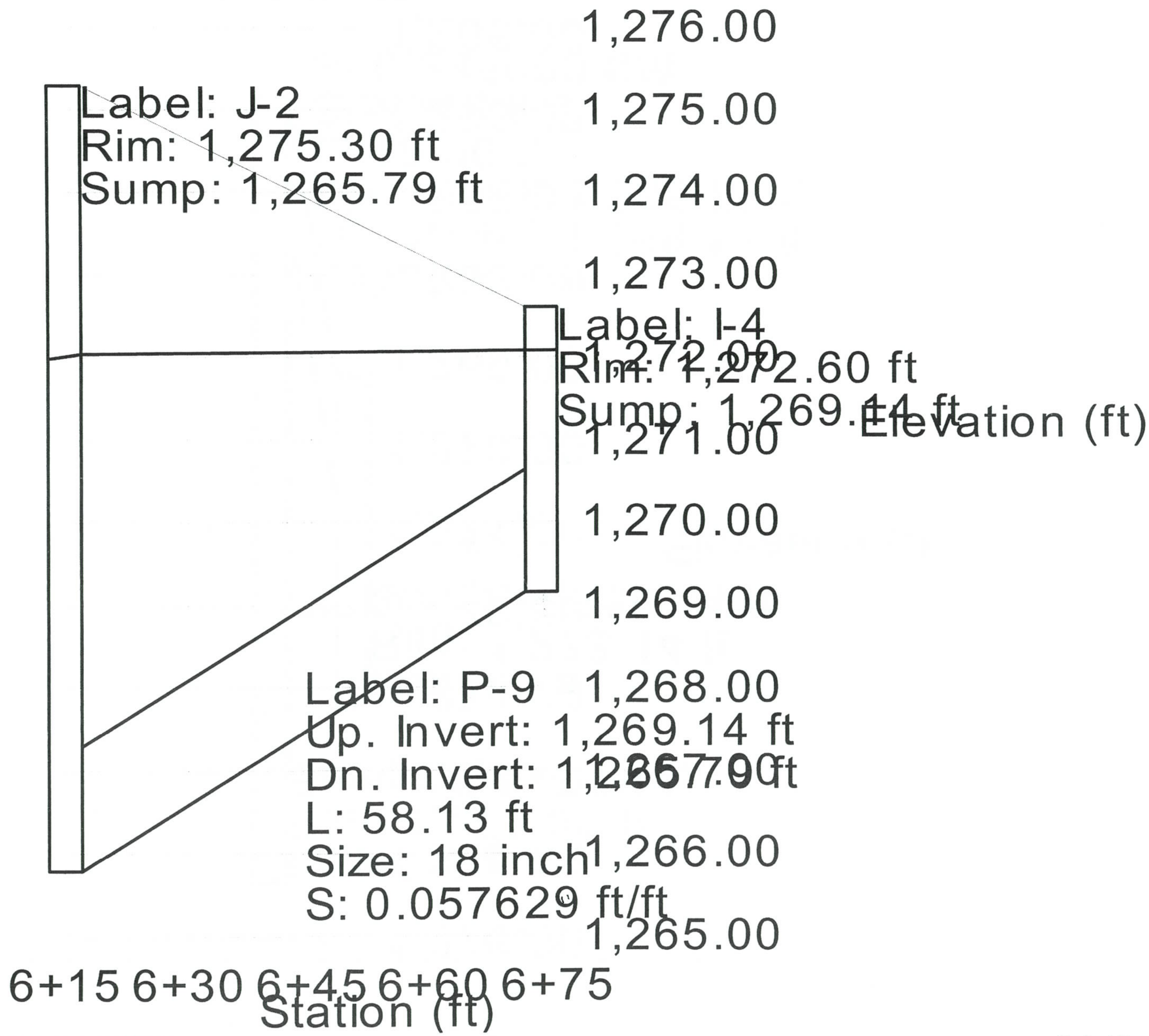


Profile

Scenario: Base



Profile
Scenario: Base



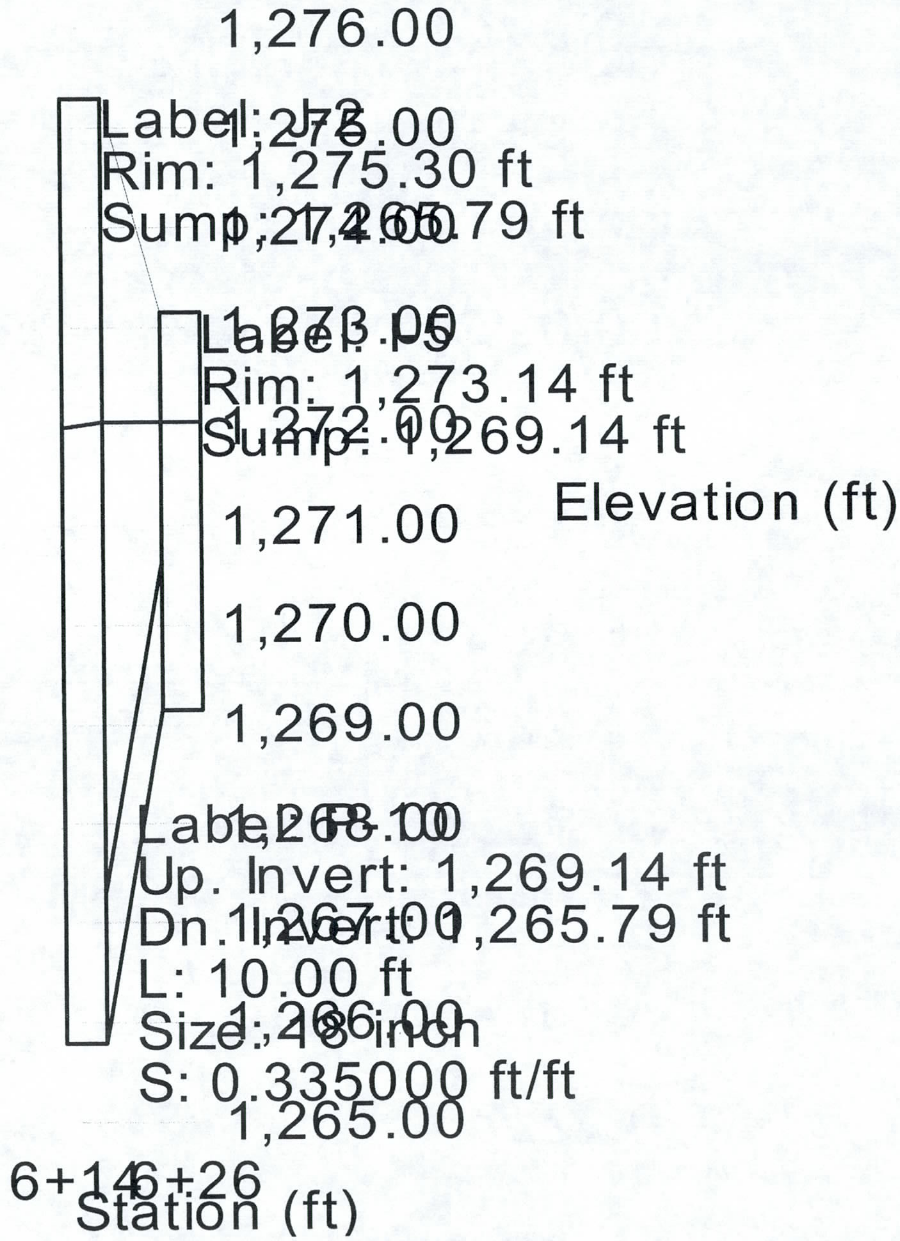
Title: RAY ROAD EASTERN CANAL TO UPRR
o:\...\drainage\storm-cad\ray-seg-3a-adot.stm
01/21/0[illegible] [illegible]:59:19 PM

Inca Engineers Inc

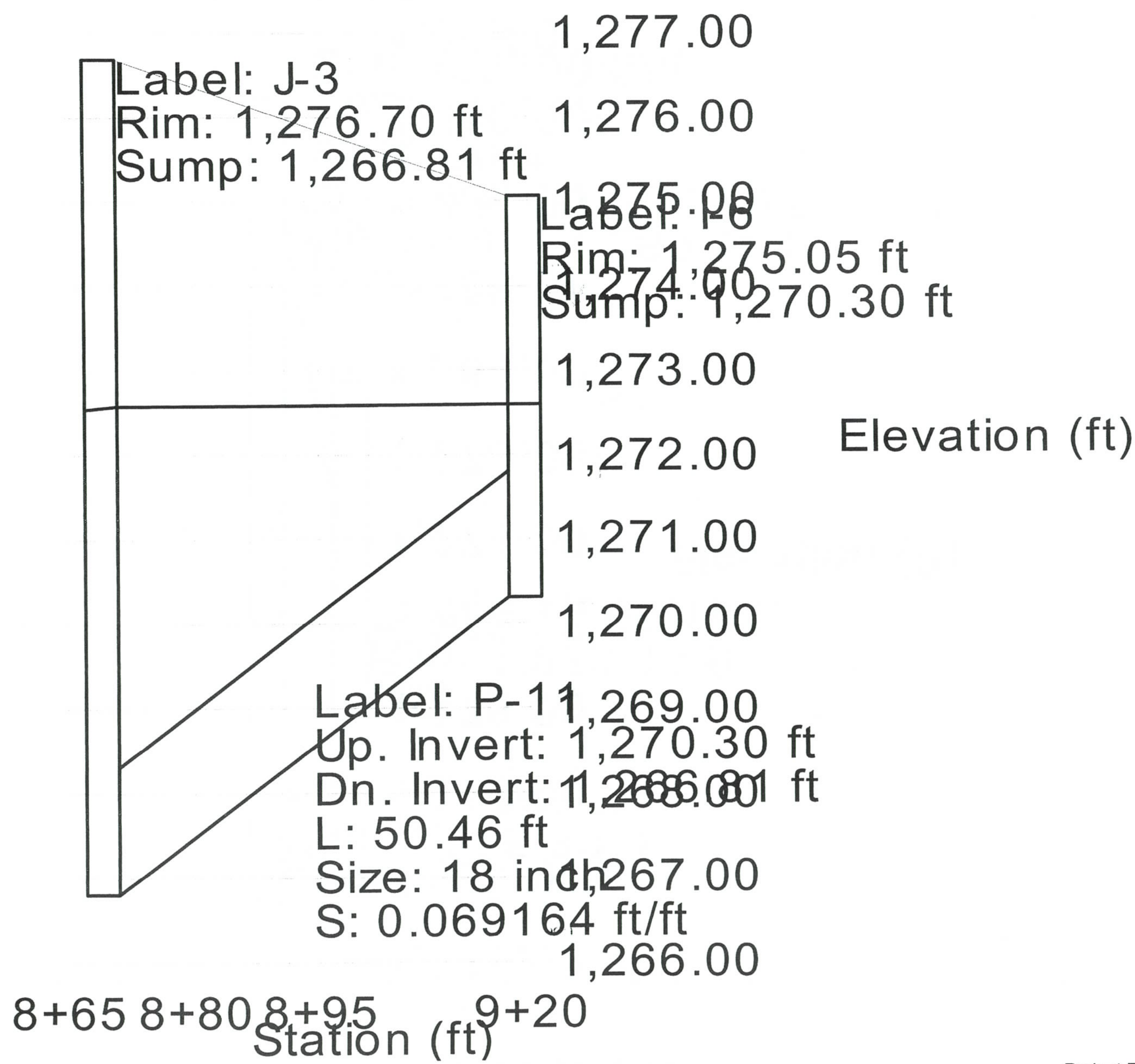
Project Engineer: INCA Engineers, Inc
StormCAD v4.1.1 [4.2014a]

Profile

Scenario: Base

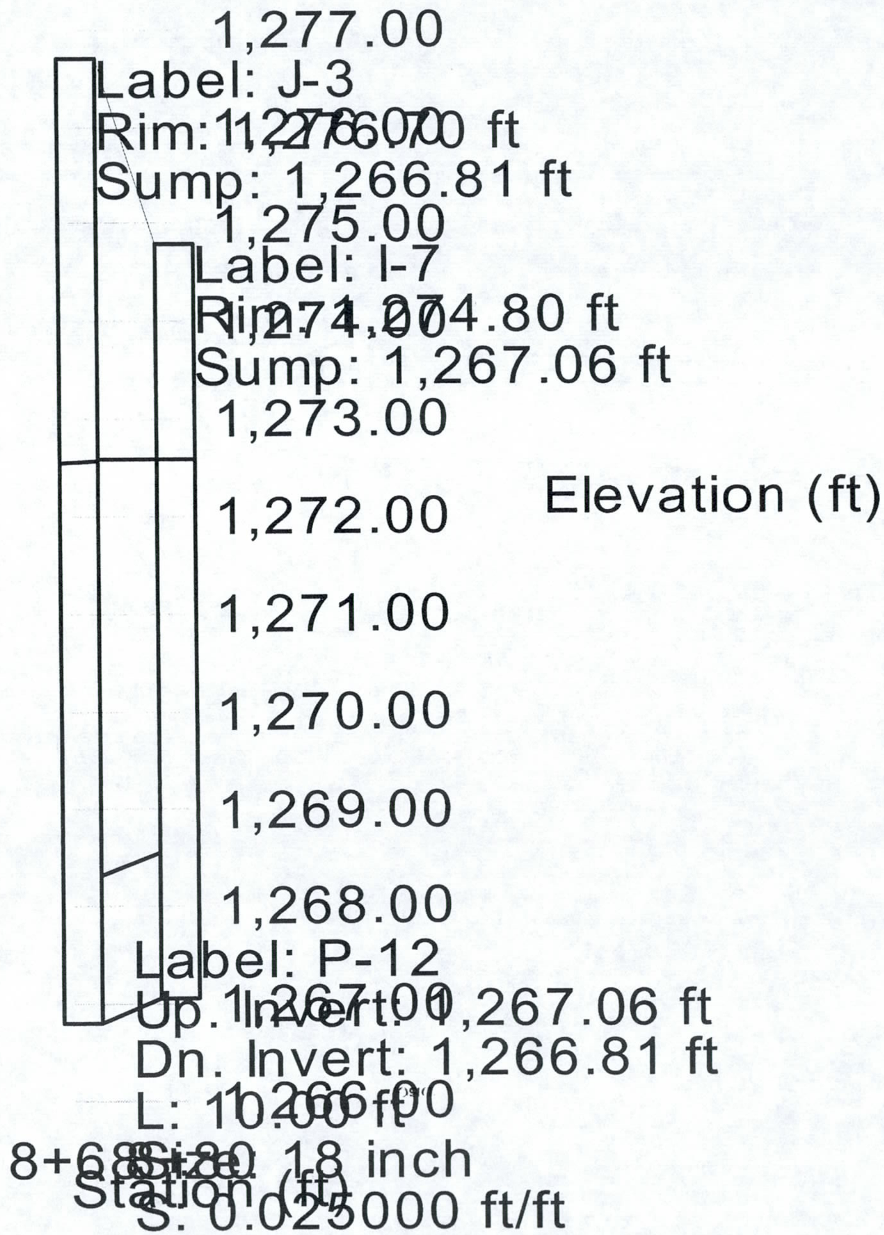


Profile
Scenario: Base

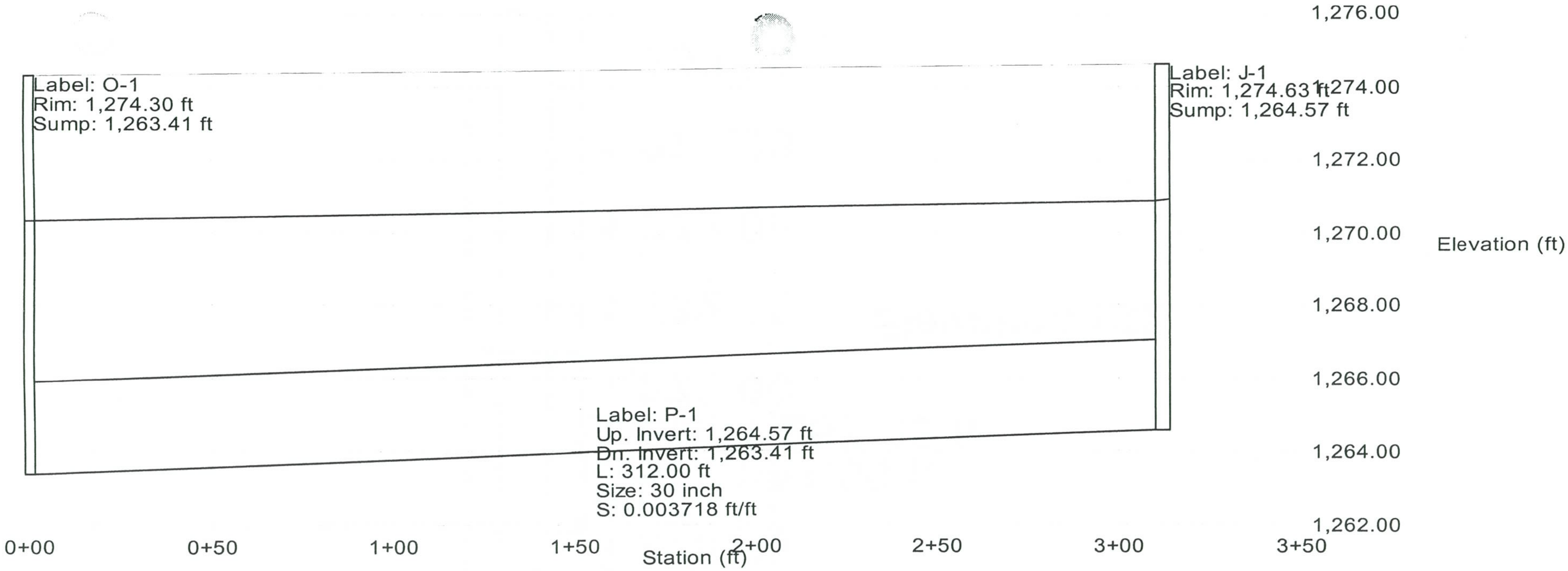


Profile

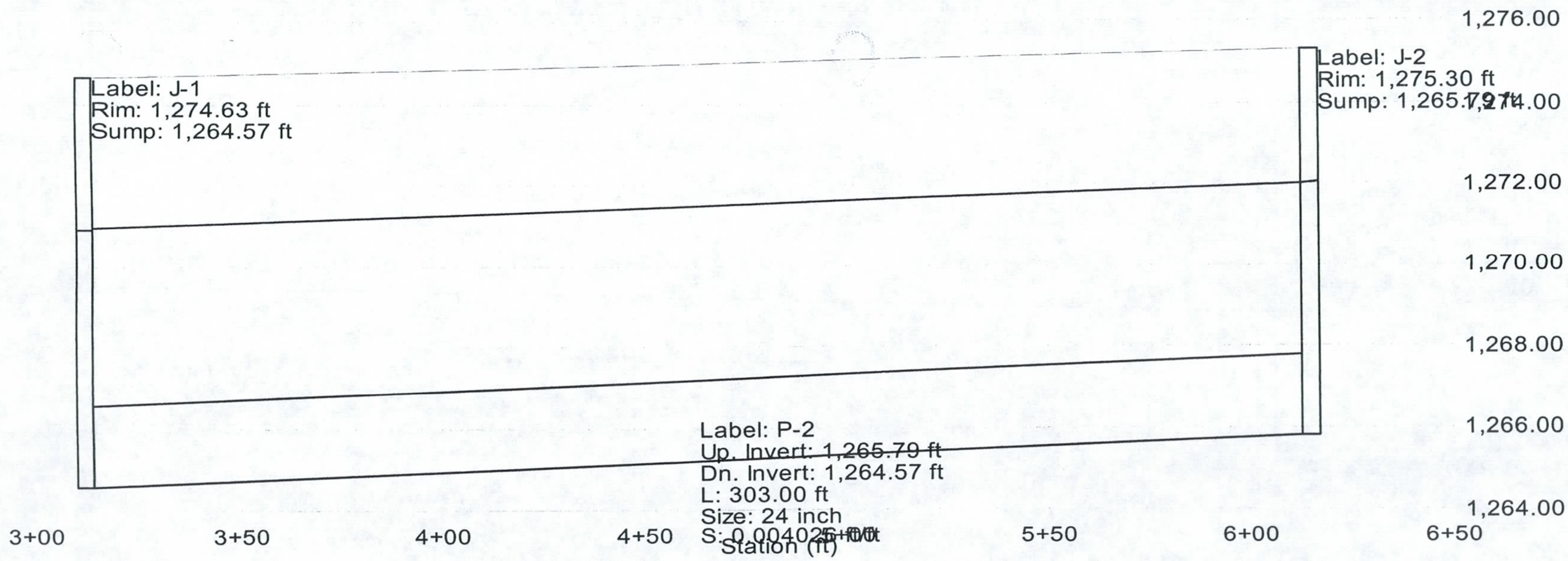
Scenario: Base



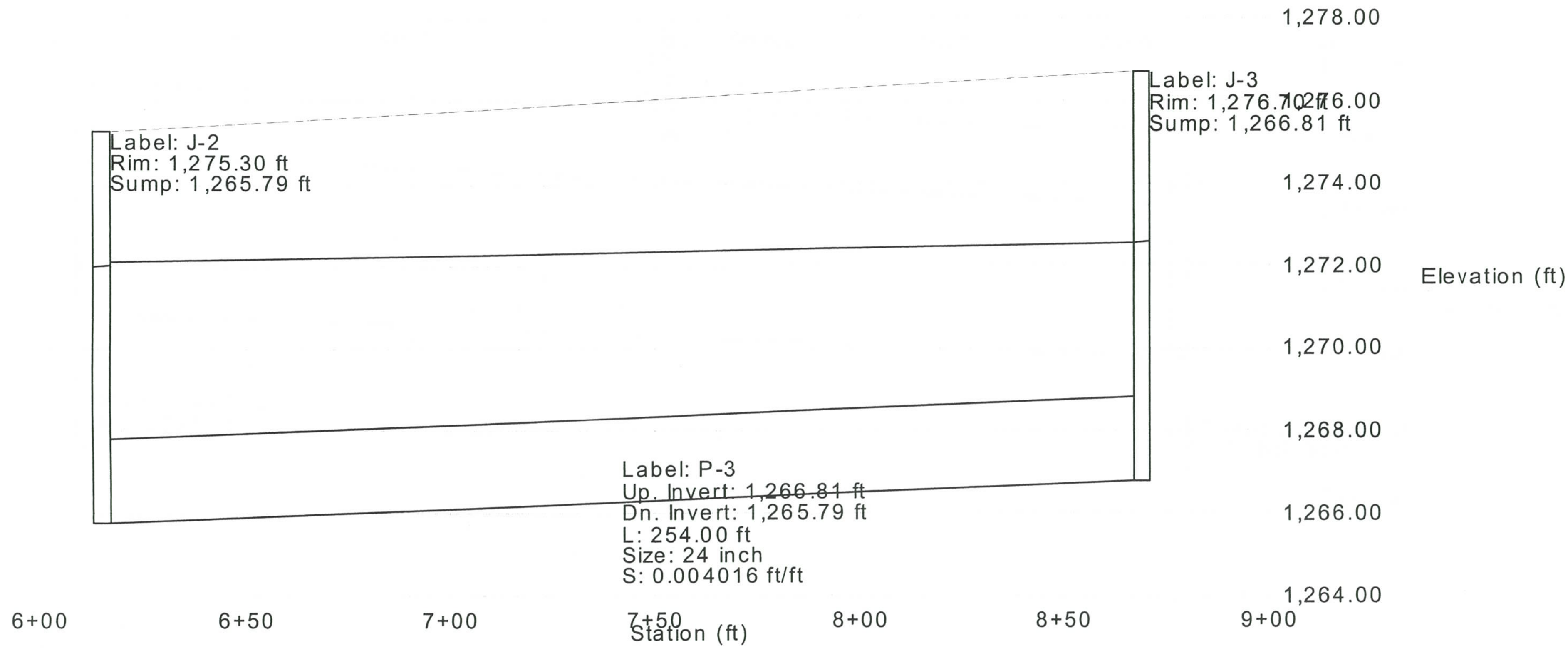
Profile
Scenario: Base



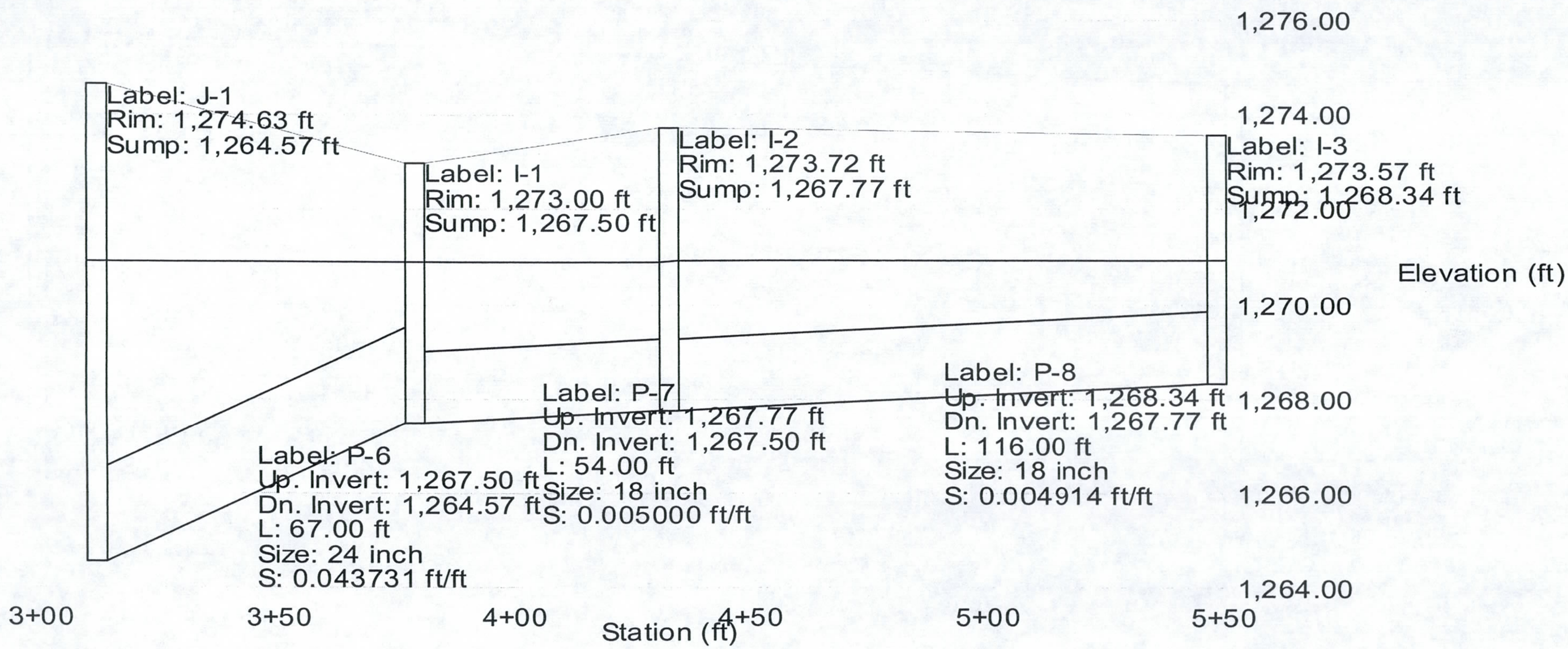
Profile
Scenario: Base



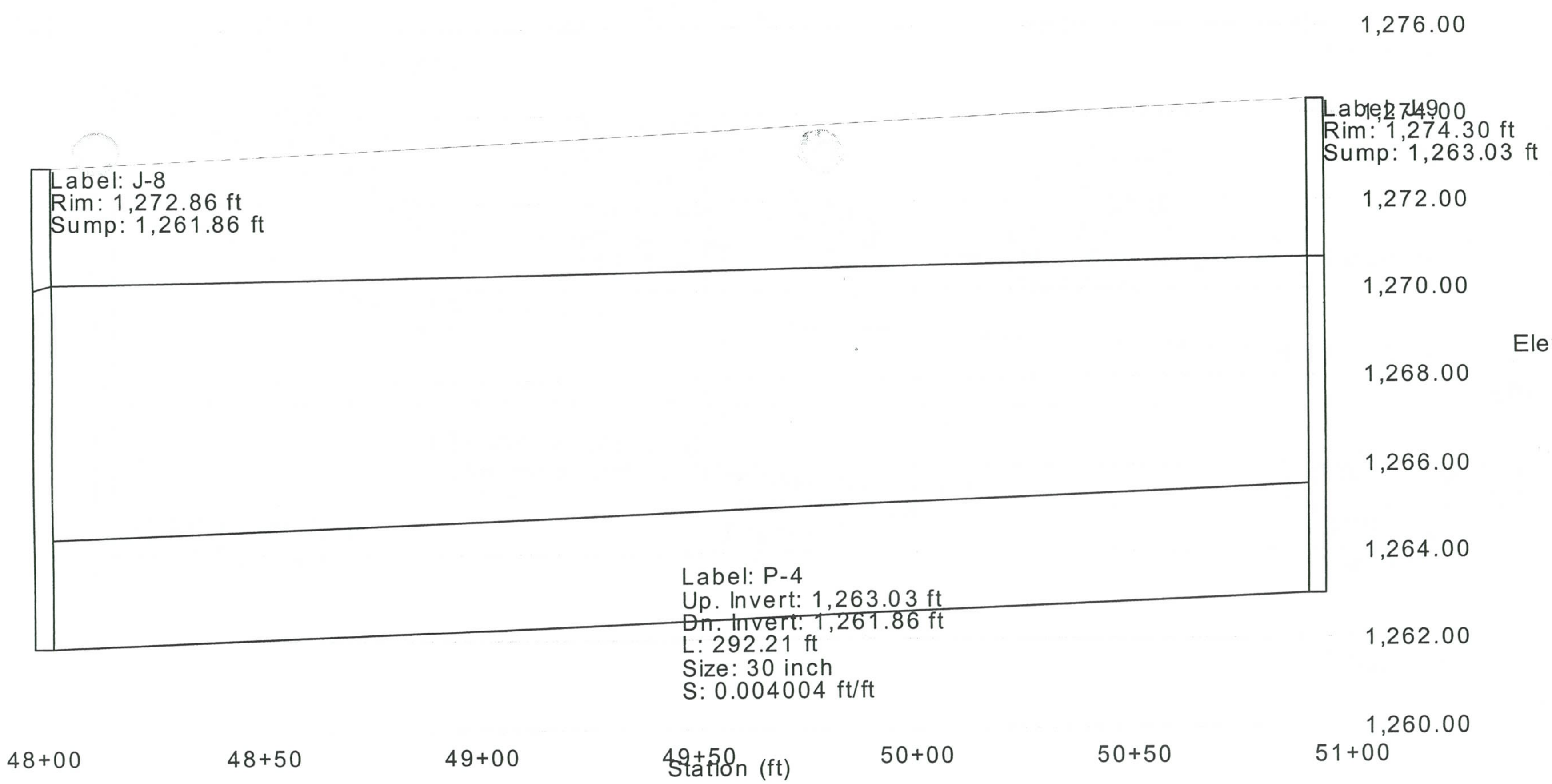
Profile
Scenario: Base



Profile
Scenario: Base



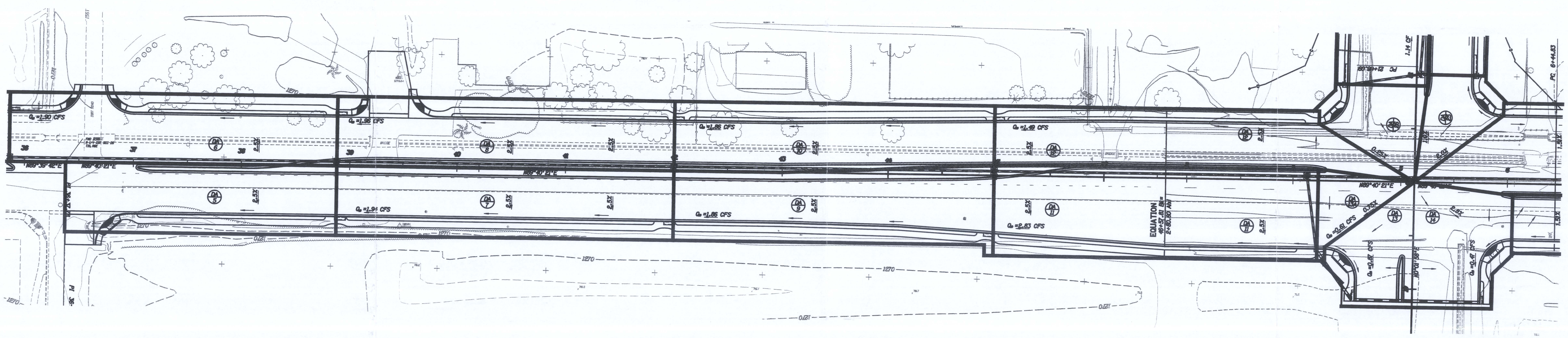
Profile
Scenario: Base



F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-C-508			
		202L MA 040			

CONSTRUCTION NOTES

RAY ROAD (WEST)
T.O.G. Sta. 21+00 to T.O.G. Sta. 36+00



RAY ROAD (WEST)
T.O.G. Sta. 36+00 to ADOT Sta. 6+50

50 0 50 100
SCALE IN FEET

SCALE: 1"=50'

TOWN OF GILBERT

GREENFIELD, RAY AND UPRR UNDERPASSES

DRAINAGE

DRAINAGE EXHIBIT MAP
RAY ROAD (WEST)

INCA
INCA ENGINEERS INC.

	NAME	DATE
DESIGN	P.COLE	01/03
DRAWN	R.STEELE/K.YOUNG	01/03
CHECKED	M.WAVERING	01/03

DWG NO. 1

SHEET 1 OF 4

202-C-508

TRACS NO. H6259 01 C

02/12/03
02:39:05 PM

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F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-C-508			

202L MA 040

CONSTRUCTION NOTES

N

RAY ROAD (EAST)
ADOT Sta. 6+00 to ADOT Sta. 22+00

50 0 50 100
SCALE IN FEET

SCALE: 1"=50'

TOWN OF GILBERT

GREENFIELD, RAY AND UPRR UNDERPASSES

DRAINAGE

DRAINAGE EXHIBIT MAP
RAY ROAD (EAST)

INCA
INCA ENGINEERS INC.

	NAME	DATE
DESIGN	P.COLE	01/03
DRAWN	R.STEELE/K.YOUNG	01/03
CHECKED	M.WAVERING	01/03

DWG NO.

SHEET 2 OF 4

02/12/03
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TRACS NO. H6259 01 C

202-C-508

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-C-508			
		202L MA 040			

CONSTRUCTION NOTES

GREENFIELD ROAD (SOUTH)
ADOT Sta. 21+00 to ADOT Sta. 36+50

50 0 50 100
SCALE IN FEET

SCALE: 1"=50'

TOWN OF GILBERT

GREENFIELD, RAY AND UPRR UNDERPASSES

DRAINAGE

DRAINAGE EXHIBIT MAP
GREENFIELD ROAD (SOUTH)

INCA
INCA ENGINEERS INC.

	NAME	DATE
DESIGN	P.COLE	01/03
DRAWN	R.STEELE/K.YOUNG	01/03
CHECKED	M.WAVERING	01/03

DWG NO.

SHEET 3 OF 4

02/12/03
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TRACS NO. H6259 01 C

202-C-508

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-C-508			
		202L MA 040			

CONSTRUCTION NOTES

50 0 50 100
SCALE IN FEET

SCALE: 1"=50'

GREENFIELD ROAD (NORTH)
ADOT Sta. 36+50 to ADOT Sta. 51+62

TOWN OF GILBERT

GREENFIELD, RAY AND UPRR UNDERPASSES

DRAINAGE

DRAINAGE EXHIBIT MAP
GREENFIELD ROAD (NORTH)

INCA ENGINEERS INC.

	NAME	DATE
DESIGN	P.COLE	01/03
DRAWN	R.STEELE/K.YOUNG	01/03
CHECKED	M.WAVERING	01/03

DWG NO.

SHEET 4 OF 4

TRACS NO. H6259 01 C

202-C-508

02/12/03
02:31:13 PM

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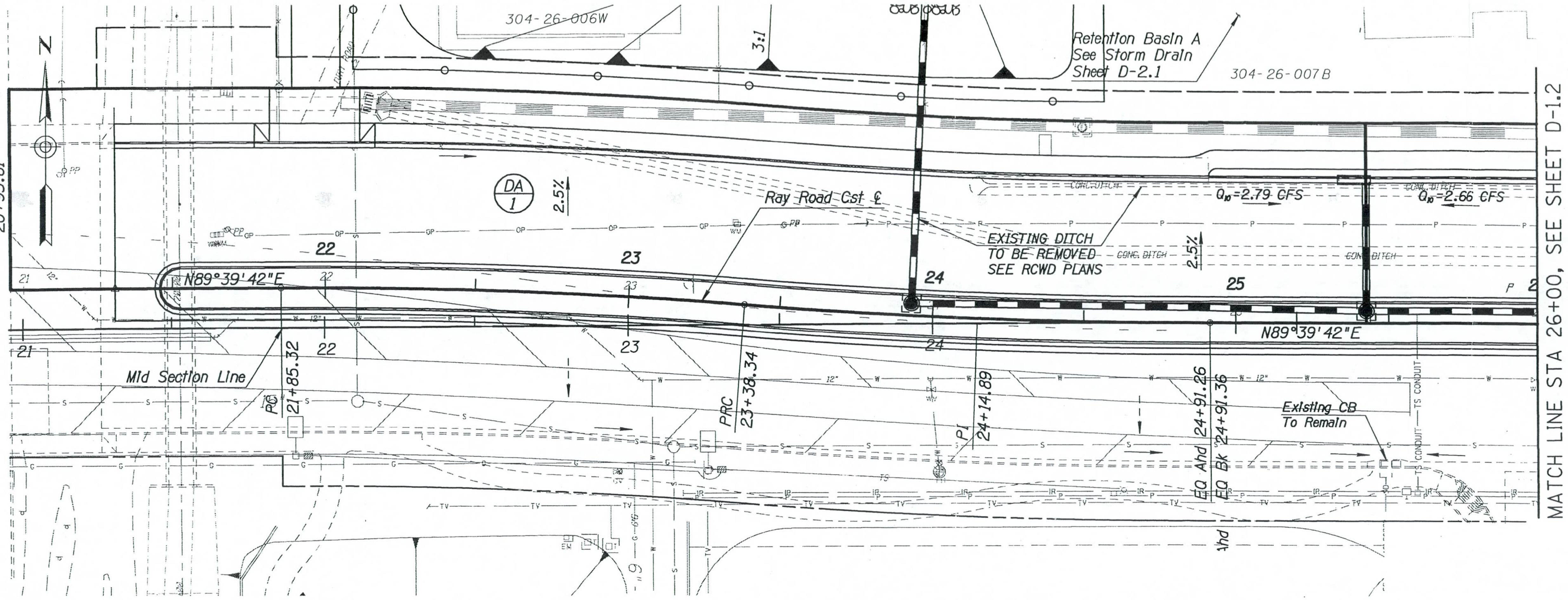
F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-C-510			

202L MA 039

CONSTRUCTION NOTES



TWO WORKING DAYS BEFORE YOU DIG CALL:
263–1100
1-800-STAKE-IT

SCALE: Hor=1"=20'
Vert=1"=4'

20 0 20 40
SCALE IN FEET

REV.	DATE	BY	DESCRIPTION

TOWN OF GILBERT

GREENFIELD, RAY AND UPRR UNDERPASSES

DRAINAGE

DRAINAGE EXHIBIT MAP
STA. 21+00 TO STA. 26+00

PRELIMINARY
60%
REVIEW
NOT FOR
CONSTRUCTION
OR
RECORDING

INCA
INCA ENGINEERS INC.

	NAME	DATE
DESIGN	P.COLE	12/02
DRAWN	R.STEELE/K.YOUNG	12/02
CHECKED	M.WAVERING	12/02

DWG NO. DE-1.1

SHEET OF

01/15/03
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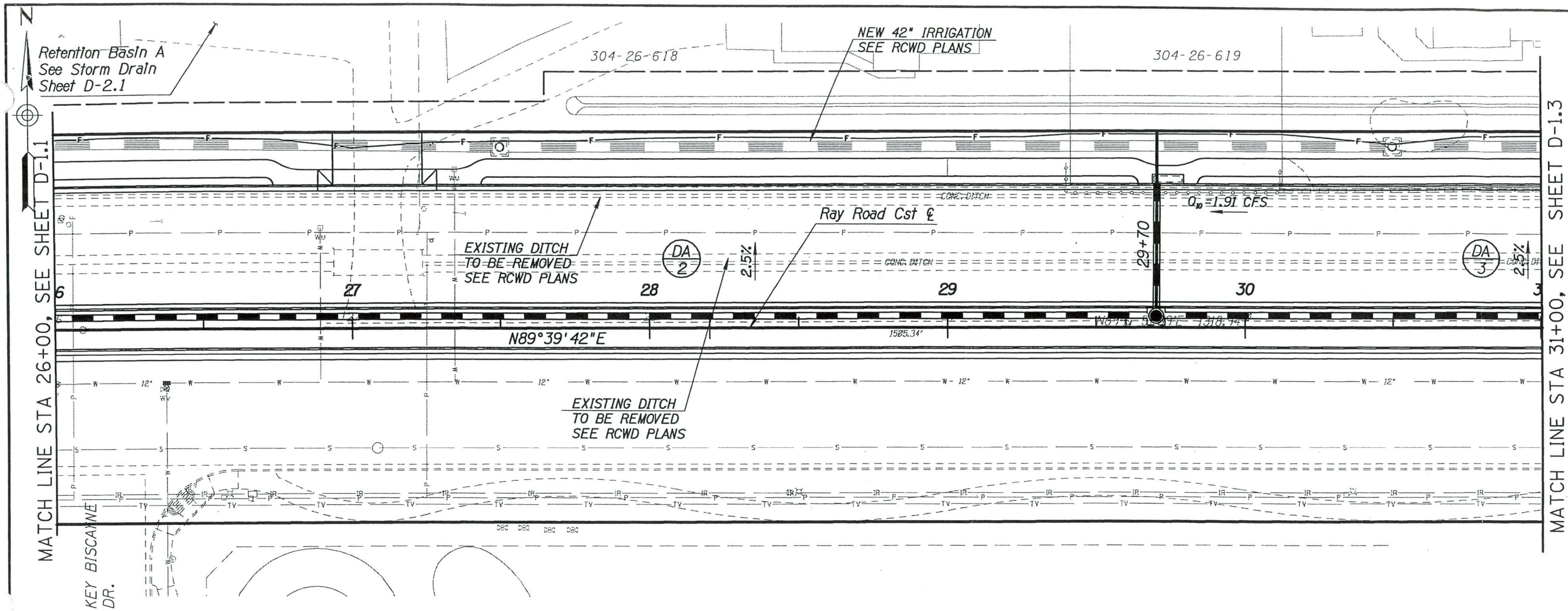
TRACS NO. H6338 01 C

202-C-510



F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-C-510			

202L MA 039

CONSTRUCTION NOTES

TWO WORKING DAYS BEFORE YOU DIG CALL:
263-1100
1-800-STAKE-IT

SCALE: Hor=1"=20'
Vert=1"=4'

20 0 20 40
SCALE IN FEET

REV.	DATE	BY	DESCRIPTION

TOWN OF GILBERT

GREENFIELD, RAY AND UPRR UNDERPASSES

DRAINAGE

DRAINAGE EXHIBIT MAP
STA. 26+00 TO STA. 31+00

PRELIMINARY **60%** REVIEW
NOT FOR CONSTRUCTION OR RECORDING

INCA
INCA ENGINEERS INC.

	NAME	DATE
DESIGN	P.COLE	12/02
DRAWN	R.STEELE/K.YOUNG	12/02
CHECKED	M.WAVERING	12/02

DWG NO. DE-1.2

SHEET OF

01/15/03
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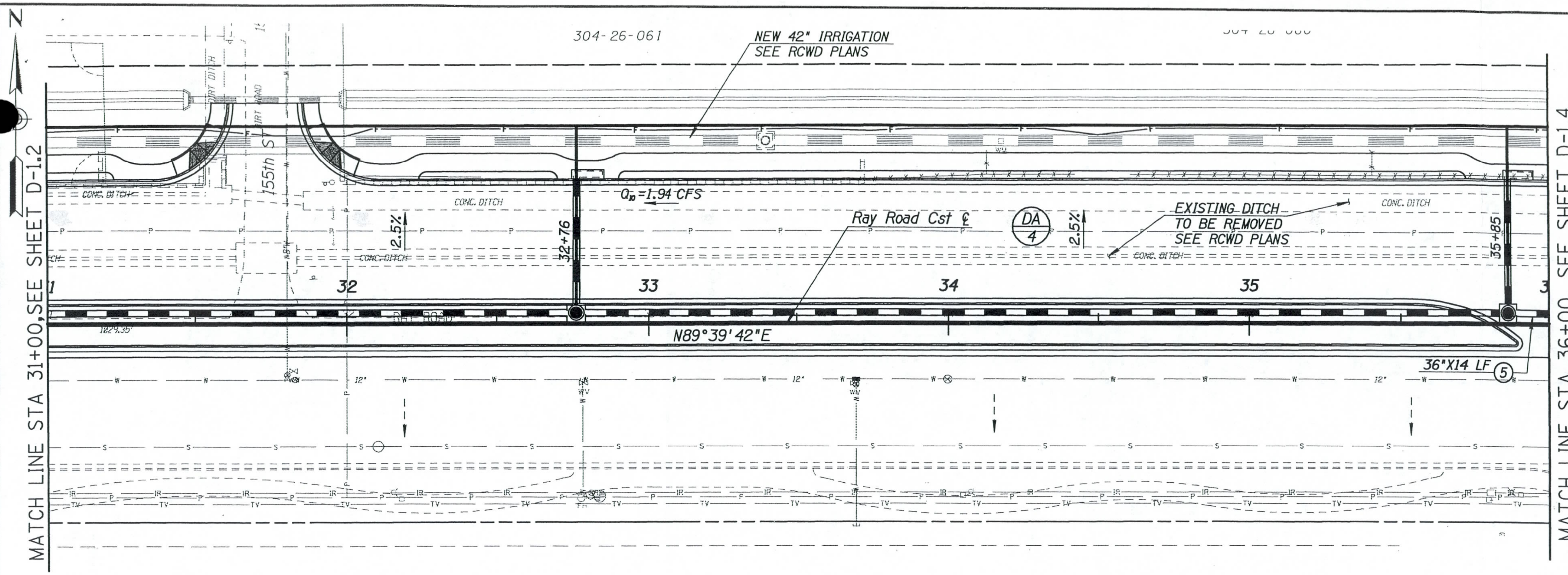
TRACS NO. H6338 01 C

202-C-510



F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-C-510			

202L MA 039

CONSTRUCTION NOTES

TWO WORKING DAYS BEFORE YOU DIG CALL:
263-1100
1-800-STAKE-IT

SCALE: Hor=1"=20'
Vert=1"=4'

20 0 20 40
SCALE IN FEET

REV.	DATE	BY	DESCRIPTION

TOWN OF GILBERT

GREENFIELD, RAY AND UPRR UNDERPASSES

DRAINAGE

DRAINAGE EXHIBIT MAP
STA. 31+00 TO STA. 36+00

PRELIMINARY
60%
REVIEW
NOT FOR
CONSTRUCTION
OR
RECORDING

INCA
INCA ENGINEERS INC.

	NAME	DATE
DESIGN	P.COLE	12/02
DRAWN	R.STEELE/K.YOUNG	12/02
CHECKED	M.WAVERING	12/02

DWG NO. DE-1.3

SHEET OF

01/15/03
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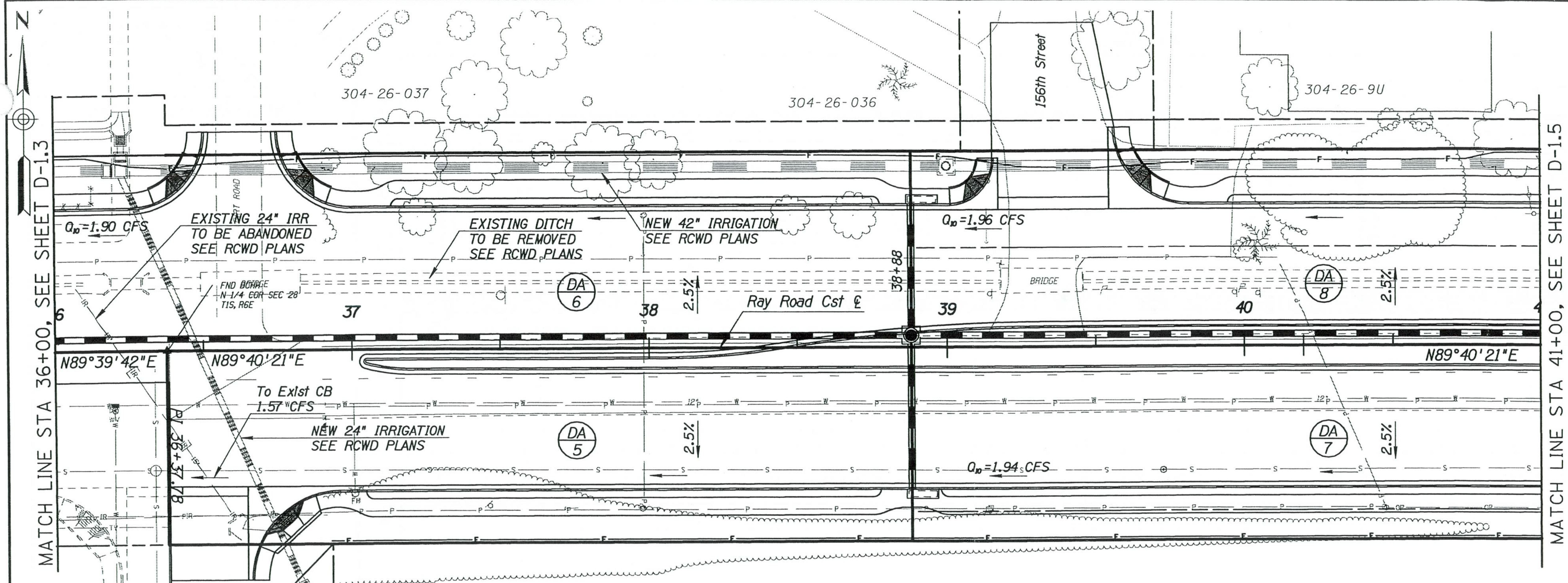
TRACS NO. H6338 01 C

202-C-510

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-C-510			
		202L MA 039			

CONSTRUCTION NOTES



TWO WORKING DAYS BEFORE YOU DIG CALL:
263-1100
1-800-STAKE-IT

SCALE: Hor=1"=20'
Vert=1"=4'

20 0 20 40
SCALE IN FEET

REV.	DATE	BY	DESCRIPTION

TOWN OF GILBERT

GREENFIELD, RAY AND UPRR UNDERPASSES

DRAINAGE

DRAINAGE EXHIBIT MAP
STA. 36+00 TO STA. 41+00

INCA
INCA ENGINEERS INC.

PRELIMINARY
60%
REVIEW
NOT FOR
CONSTRUCTION
OR
RECORDING

	NAME	DATE
DESIGN	P.COLE	12/02
DRAWN	R.STEELE/K.YOUNG	12/02
CHECKED	M.WAVERING	12/02

DWG NO. DE-1.4
SHEET OF

01/15/03
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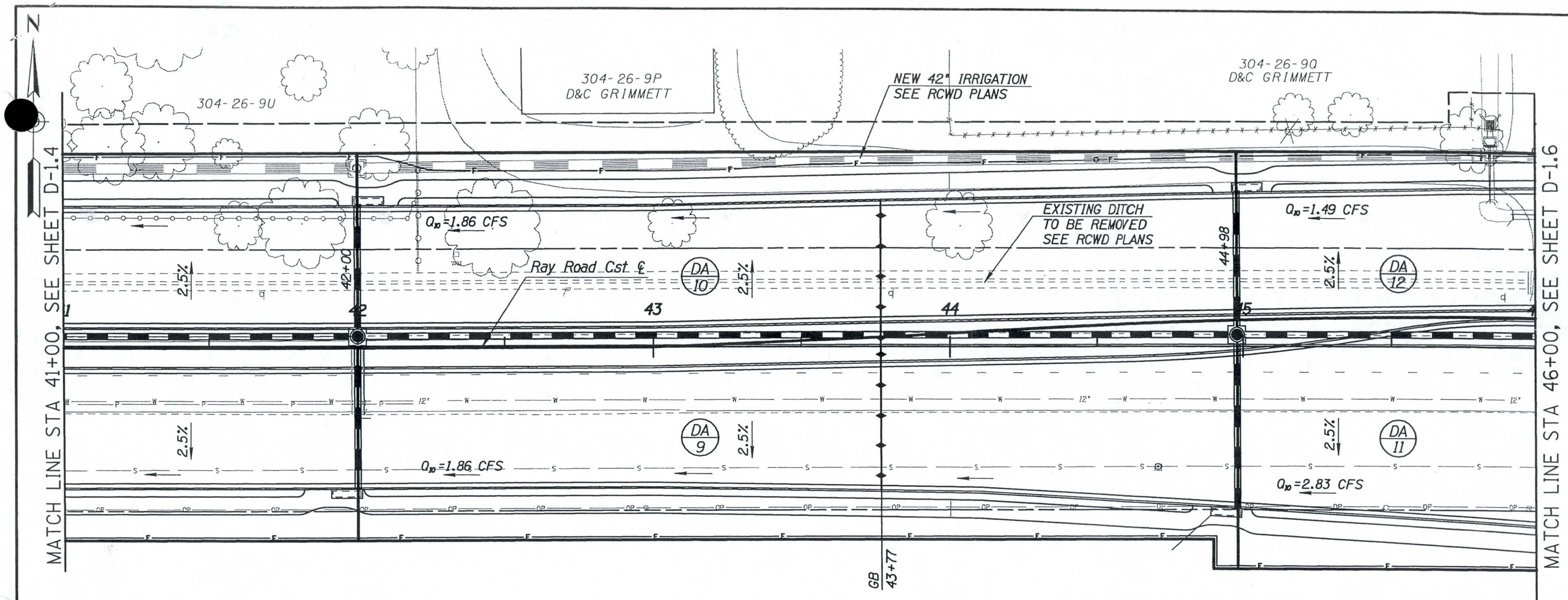
TRACS NO. H6338 01 C

202-C-510



F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-C-510			
		202L MA 039			

CONSTRUCTION NOTES

TWO WORKING DAYS BEFORE YOU DIG CALL:
263-1100
1-800-STAKE-IT

SCALE: Hor=1"=20'
Vert=1"=4'

20 0 20 40
SCALE IN FEET

REV.	DATE	BY	DESCRIPTION

TOWN OF GILBERT

GREENFIELD, RAY AND UPRR UNDERPASSES

DRAINAGE

DRAINAGE EXHIBIT MAP
STA. 41+00 TO STA. 46+00

INCA
INCA ENGINEERS INC.

PRELIMINARY
60%
REVIEW
NOT FOR
CONSTRUCTION
OR
RECORDING

	NAME	DATE
DESIGN	P.COLE	12/02
DRAWN	R.STEELE/K.YOUNG	12/02
CHECKED	M.WAVERING	12/02

DWG NO. DE-1.5

SHEET OF

202-C-510

TRACS NO. H6338 01 C

01/15/03
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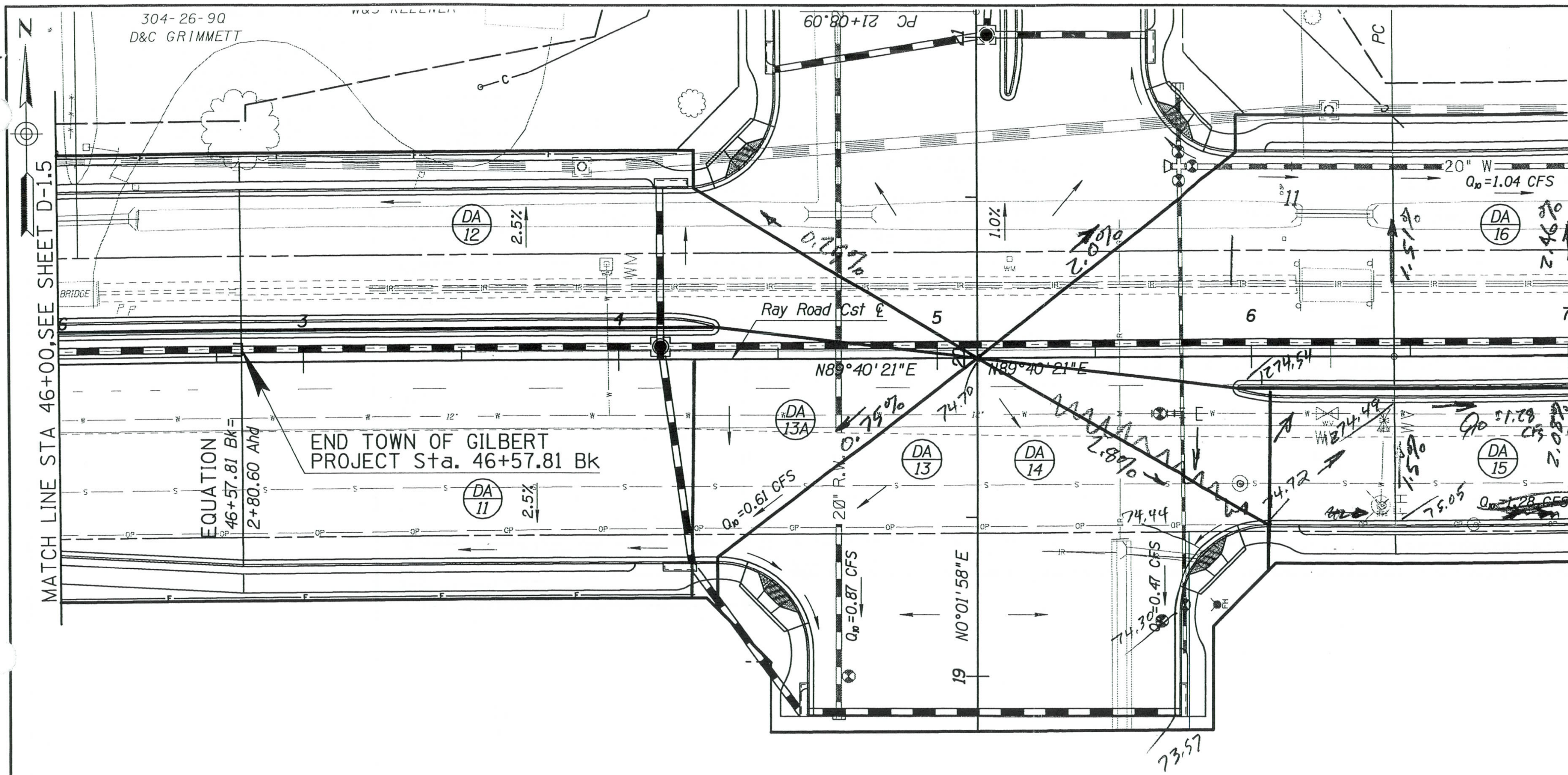

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-C-510			

202L MA 039

CONSTRUCTION NOTES

TWO WORKING DAYS BEFORE YOU DIG CALL:
263-1100
1-800-STAKE-IT

SCALE: Hor=1"=20'
Vert=1"=2'

20 0 20 40
SCALE IN FEET

REV.	DATE	BY	DESCRIPTION

TOWN OF GILBERT

GREENFIELD, RAY AND UPRR UNDERPASSES

DRAINAGE

DRAINAGE EXHIBIT MAP
STA. 41+00 TO STA. 46+57.81

PRELIMINARY
60%
REVIEW
NOT FOR CONSTRUCTION OR RECORDING

INCA
INCA ENGINEERS INC.

	NAME	DATE
DESIGN	P.COLE	12/02
DRAWN	R.STEELE/K.YOUNG	12/02
CHECKED	M.WAVERING	12/02

DWG NO. DE-1.6
SHEET OF

01/15/03
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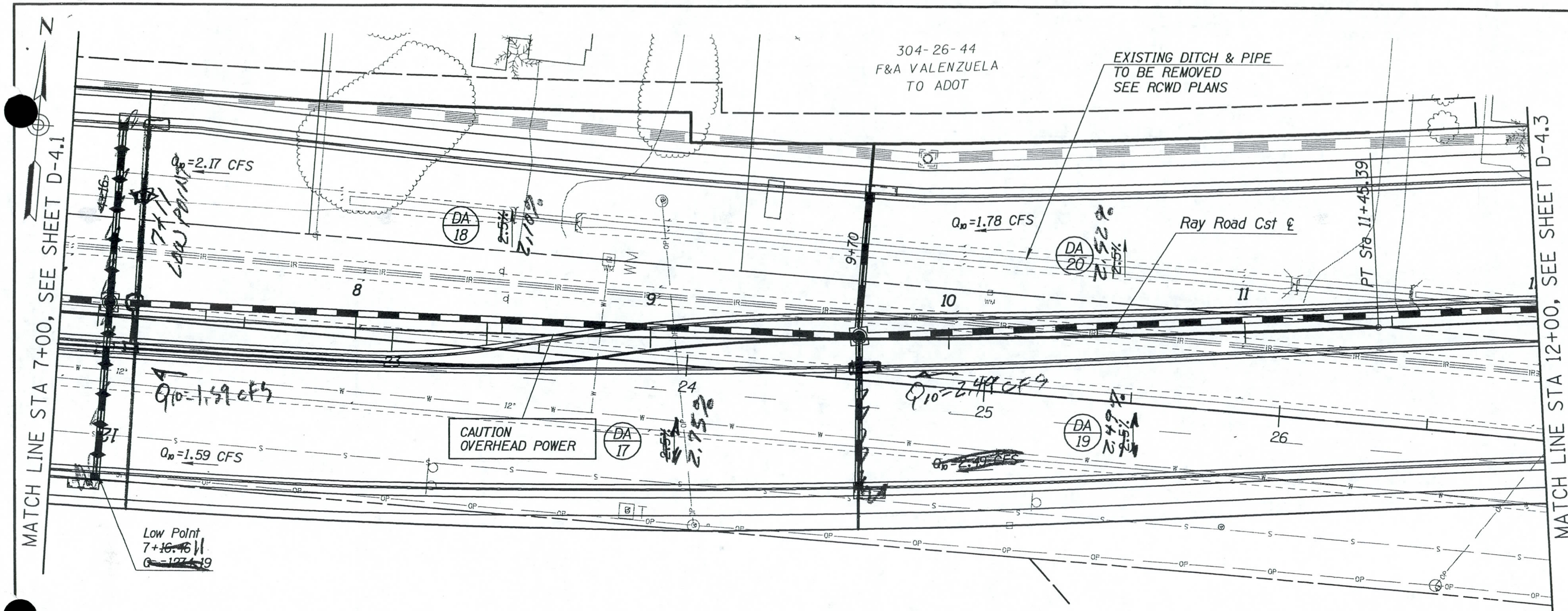
TRACS NO. H6338 01 C

202-C-510



F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-C-510			

202L MA 039

CONSTRUCTION NOTES

TWO WORKING DAYS BEFORE YOU DIG CALL:
263-1100
1-800-STAKE-IT

SCALE: Hor=1"=20'
Vert=1"=4'

20 0 20 40
SCALE IN FEET

REV.	DATE	BY	DESCRIPTION

TOWN OF GILBERT

GREENFIELD, RAY AND UPRR UNDERPASSES

DRAINAGE

DRAINAGE EXHIBIT MAP
STA. 7+00 TO STA. 12+00

PRELIMINARY 60% REVIEW NOT FOR CONSTRUCTION OR RECORDING

INCA ENGINEERS INC.

	NAME	DATE
DESIGN	P.COLE	12/02
DRAWN	R.STEELE/K.YOUNG	12/02
CHECKED	M.WAVERING	12/02

DWG NO. DE-1.7

SHEET OF

01/15/03
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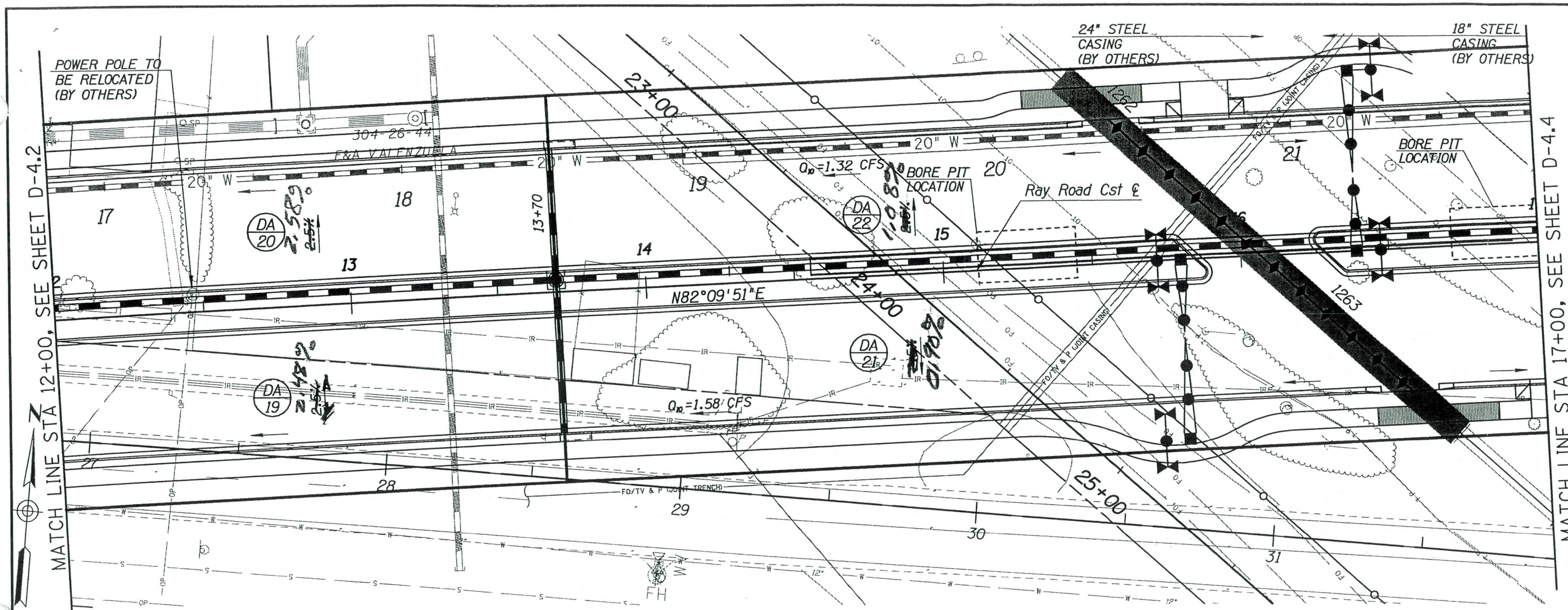
TRACS NO. H6338 01 C

202-C-510



F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-C-510			

202L MA 039

CONSTRUCTION NOTES

TWO WORKING DAYS BEFORE YOU DIG CALL:
263-1100
1-800-STAKE-IT

SCALE: Hor=1"=20'
Vert=1"=4'

20 0 20 40
SCALE IN FEET

REV.	DATE	BY	DESCRIPTION

TOWN OF GILBERT

GREENFIELD, RAY AND UPRR UNDERPASSES

UTILITIES

DRAINAGE EXHIBIT MAP
STA. 12+00 TO STA. 17+00

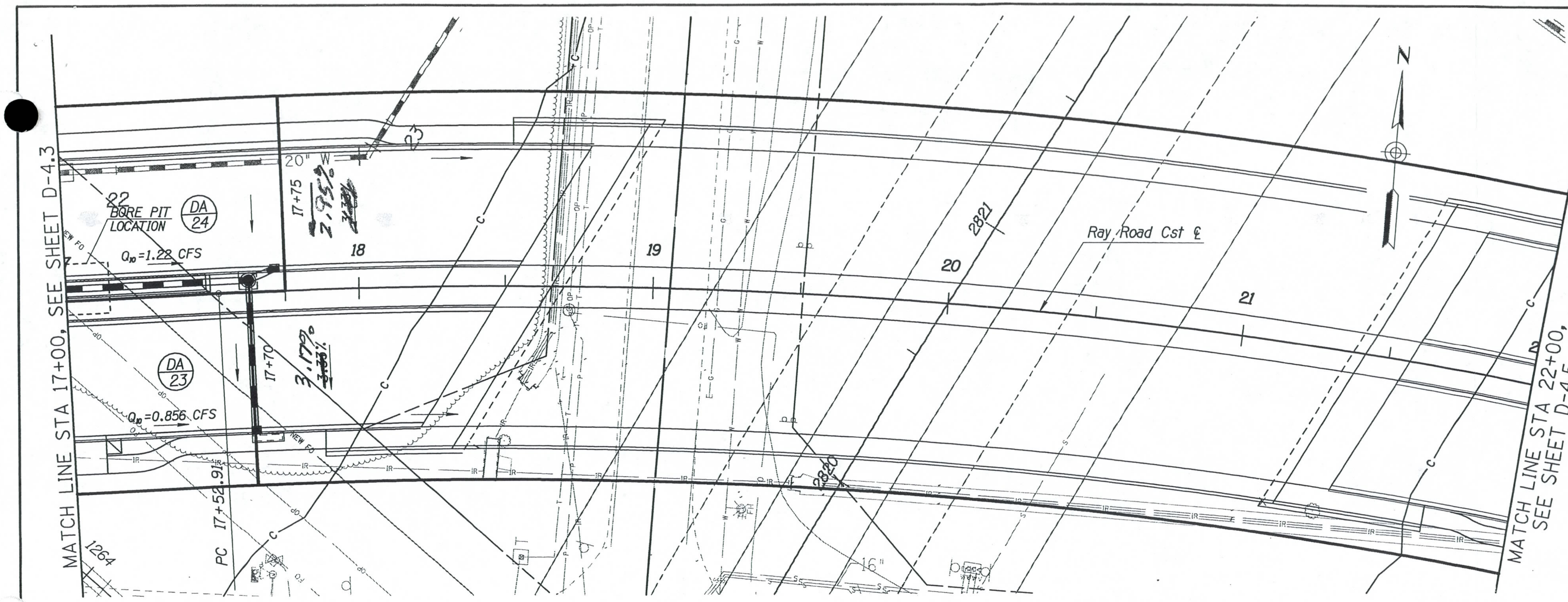
INCA
INCA ENGINEERS INC.

PRELIMINARY
60%
REVIEW
NOT FOR
CONSTRUCTION
OR
RECORDING

	NAME	DATE
DESIGN	P.COLE	12/02
DRAWN	R.STEELE/K.YOUNG	12/02
CHECKED	M.WAVERING	12/02

DWG NO. DE-1.8

SHEET OF



F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-C-510			

202L MA 039

CONSTRUCTION NOTES

TWO WORKING DAYS BEFORE YOU DIG CALL:
263-1100
1-800-STAKE-IT

SCALE: Hor=1"=20'
Vert=1"=4'

20 0 20 40
SCALE IN FEET

REV.	DATE	BY	DESCRIPTION

TOWN OF GILBERT

GREENFIELD, RAY AND UPRR UNDERPASSES

DRAINAGE

DRAINAGE EXHIBIT MAP
STA. 17+00 TO STA. 22+00

PRELIMINARY 60% REVIEW
NOT FOR CONSTRUCTION OR RECORDING

INCA
INCA ENGINEERS INC.

	NAME	DATE
DESIGN	P.COLE	12/02
DRAWN	R.STEELE/K.YOUNG	12/02
CHECKED	M.WAVERING	12/02

DWG NO. DE-1.9

SHEET OF

01/15/03
12:12:32 PM

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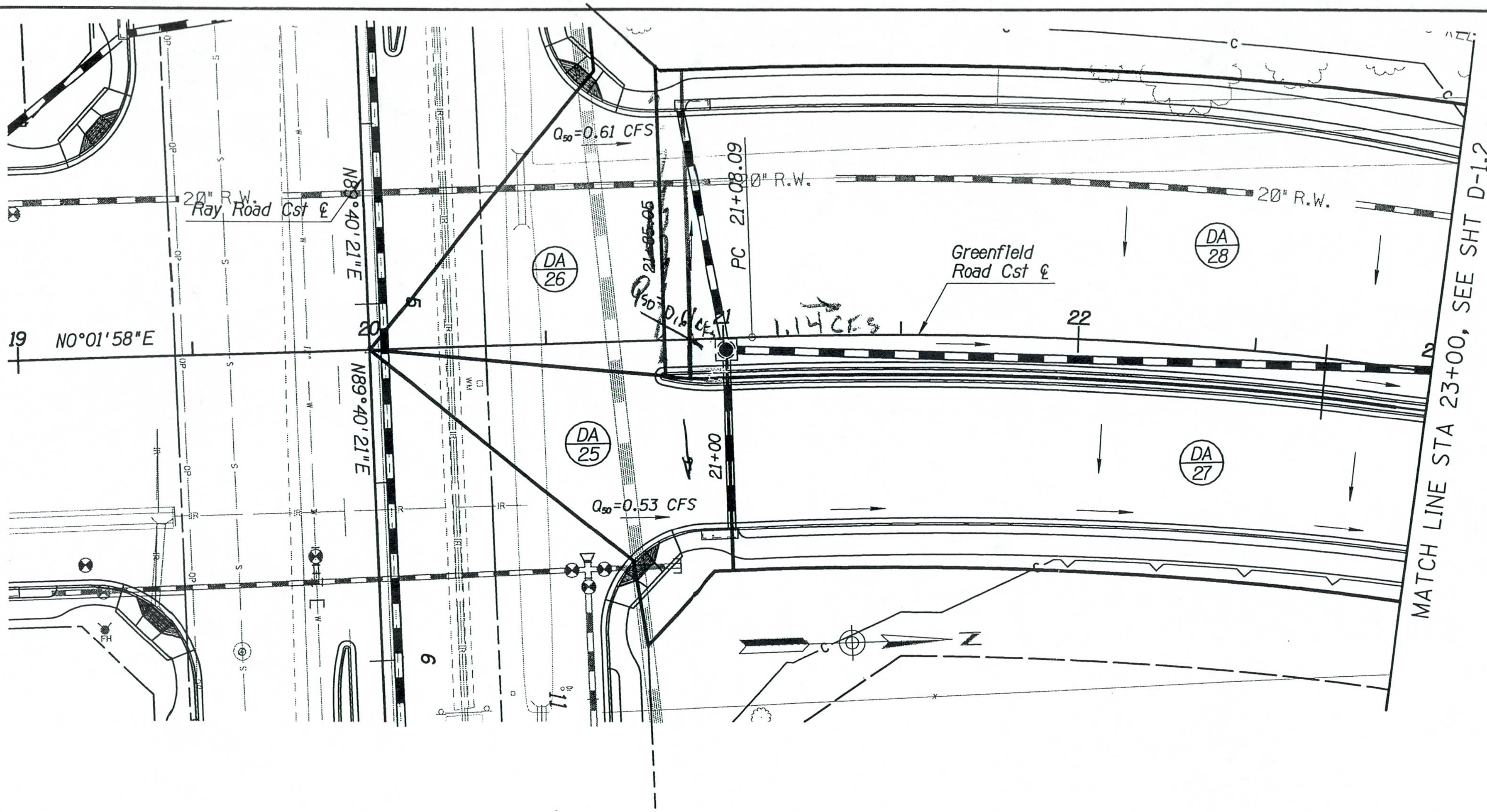
TRACS NO. H6338 01 C

202-C-510



F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-C-510			

202L MA 039

CONSTRUCTION NOTES

TWO WORKING DAYS BEFORE YOU DIG CALL:
263-1100
1-800-STAKE-IT

SCALE: Hor=1"=20'
Vert=1"=4'

20 0 20 40
SCALE IN FEET

REV.	DATE	BY	DESCRIPTION

TOWN OF GILBERT

GREENFIELD, RAY AND UPRR UNDERPASSES

DRAINAGE

DRAINAGE EXHIBIT MAP
STA. 19+00 TO STA. 23+00

INCA
INCA ENGINEERS INC.

PRELIMINARY
60%
REVIEW
NOT FOR CONSTRUCTION OR RECORDING

	NAME	DATE
DESIGN	P.COLE	12/02
DRAWN	R.STEELE/K.YOUNG	12/02
CHECKED	M.WAVERING	12/02

DWG NO. DE-1.10

SHEET OF

01/15/03
12:06:13 PM

O:\JOBS\69446 (Greenfield and Ray Road)\cadd\drainage Figs\dxm10.dgn

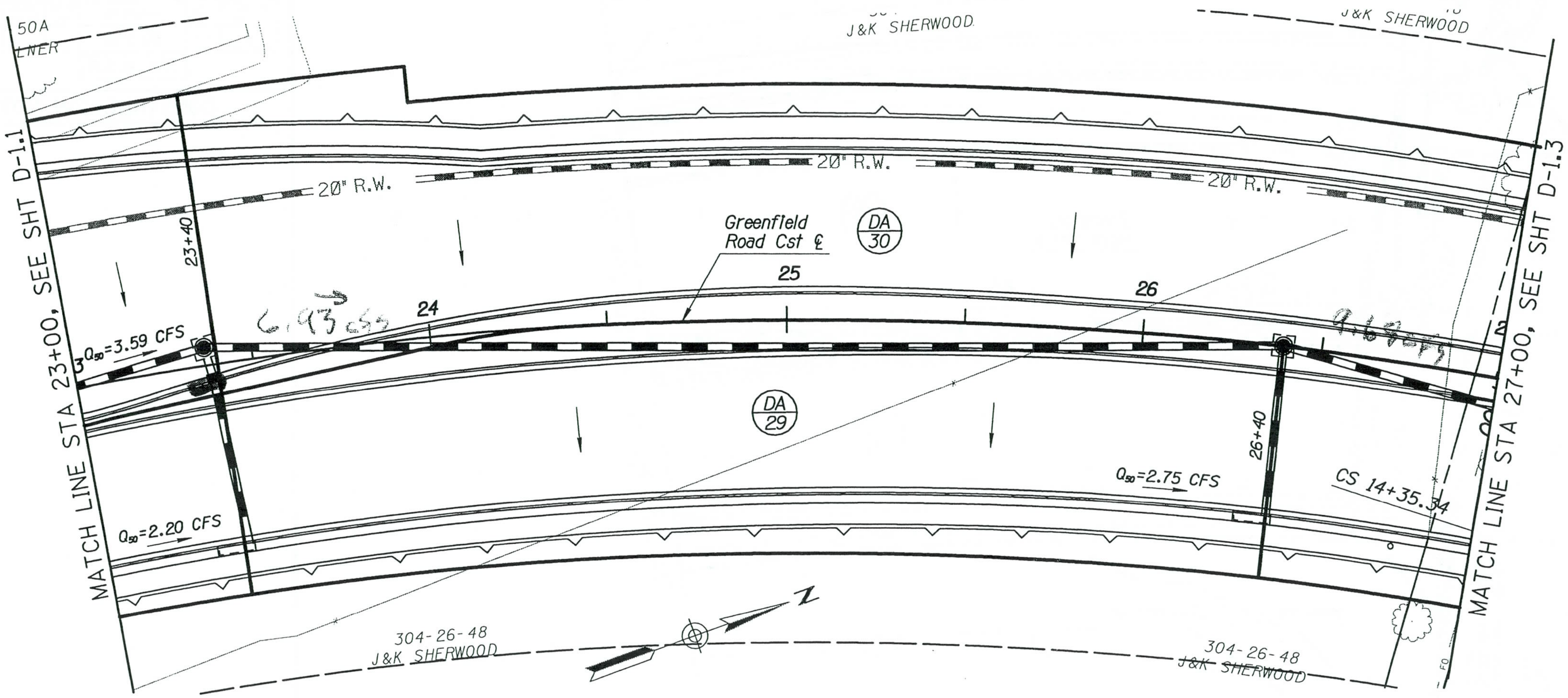
TRACS NO. H6338 01 C

202-C-510

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-C-510			

202L MA 039

CONSTRUCTION NOTES



TWO WORKING DAYS BEFORE YOU DIG CALL:
263-1100
1-800-STAKE-IT

SCALE: Hor=1"=20'
Vert=1"=4'

20 0 20 40
SCALE IN FEET

REV.	DATE	BY	DESCRIPTION

TOWN OF GILBERT

GREENFIELD, RAY AND UPRR UNDERPASSES

DRAINAGE

DRAINAGE EXHIBIT MAP
STA. 23+00 TO STA. 27+00

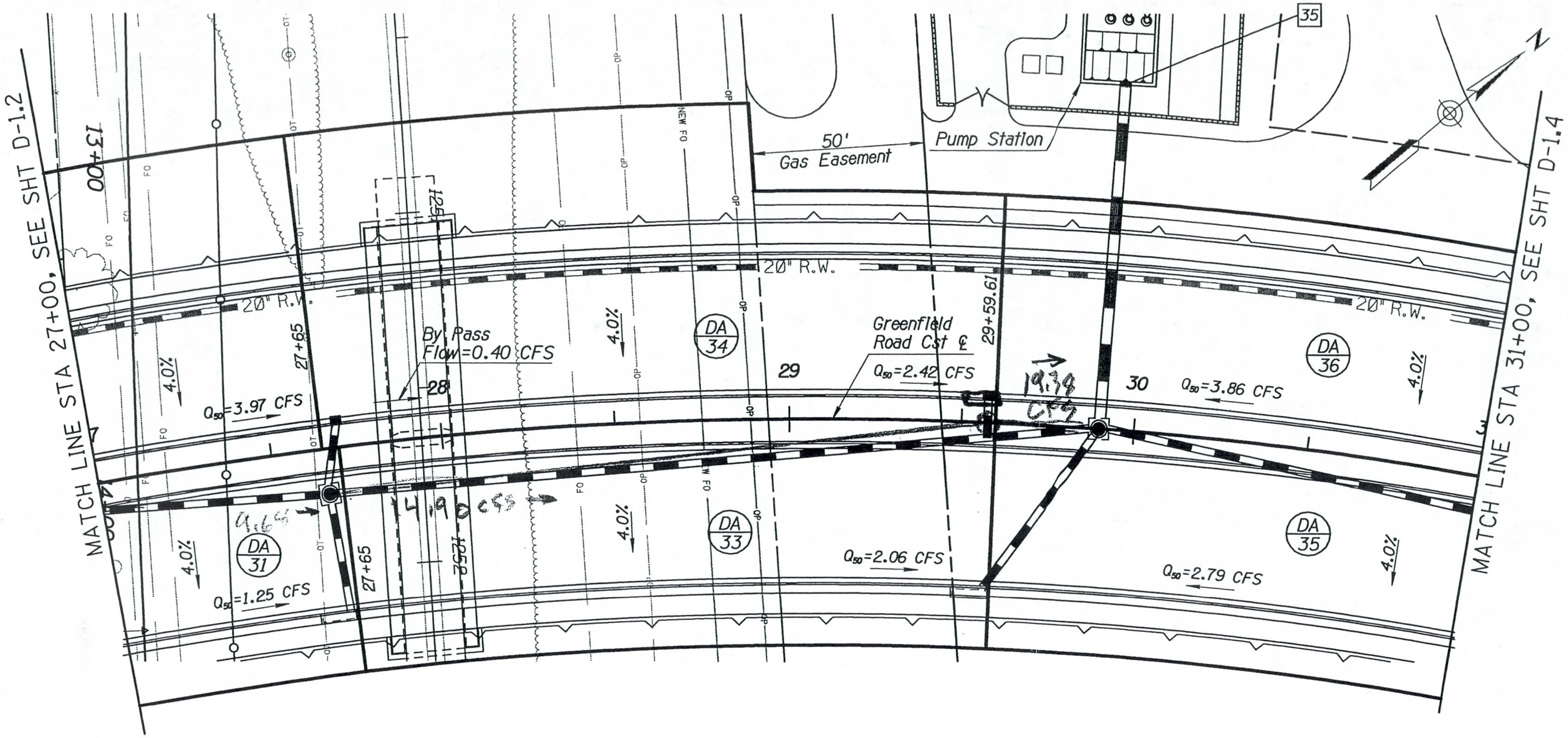
PRELIMINARY 60% REVIEW
NOT FOR CONSTRUCTION OR RECORDING

INCA
INCA ENGINEERS INC.

	NAME	DATE
DESIGN	P.COLE	12/02
DRAWN	R.STEELE/K.YOUNG	12/02
CHECKED	M.WAVERING	12/02

DWG NO. DE-1.11

SHEET OF



F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-C-510			

202L MA 039

CONSTRUCTION NOTES

TWO WORKING DAYS BEFORE YOU DIG CALL:
263-1100
1-800-STAKE-IT

SCALE: Hor=1"=20'
Vert=1"=4'

20 0 20 40
SCALE IN FEET

REV.	DATE	BY	DESCRIPTION

TOWN OF GILBERT

GREENFIELD, RAY AND UPRR UNDERPASSES

DRAINAGE

DRAINAGE EXHIBIT MAP
STA. 27+00 TO STA. 31+00

PRELIMINARY 60% REVIEW NOT FOR CONSTRUCTION OR RECORDING

INCA ENGINEERS INC.

	NAME	DATE
DESIGN	P.COLE	12/02
DRAWN	R.STEELE/K.YOUNG	12/02
CHECKED	M.WAVERING	12/02

DWG NO. DE-1.12

SHEET OF

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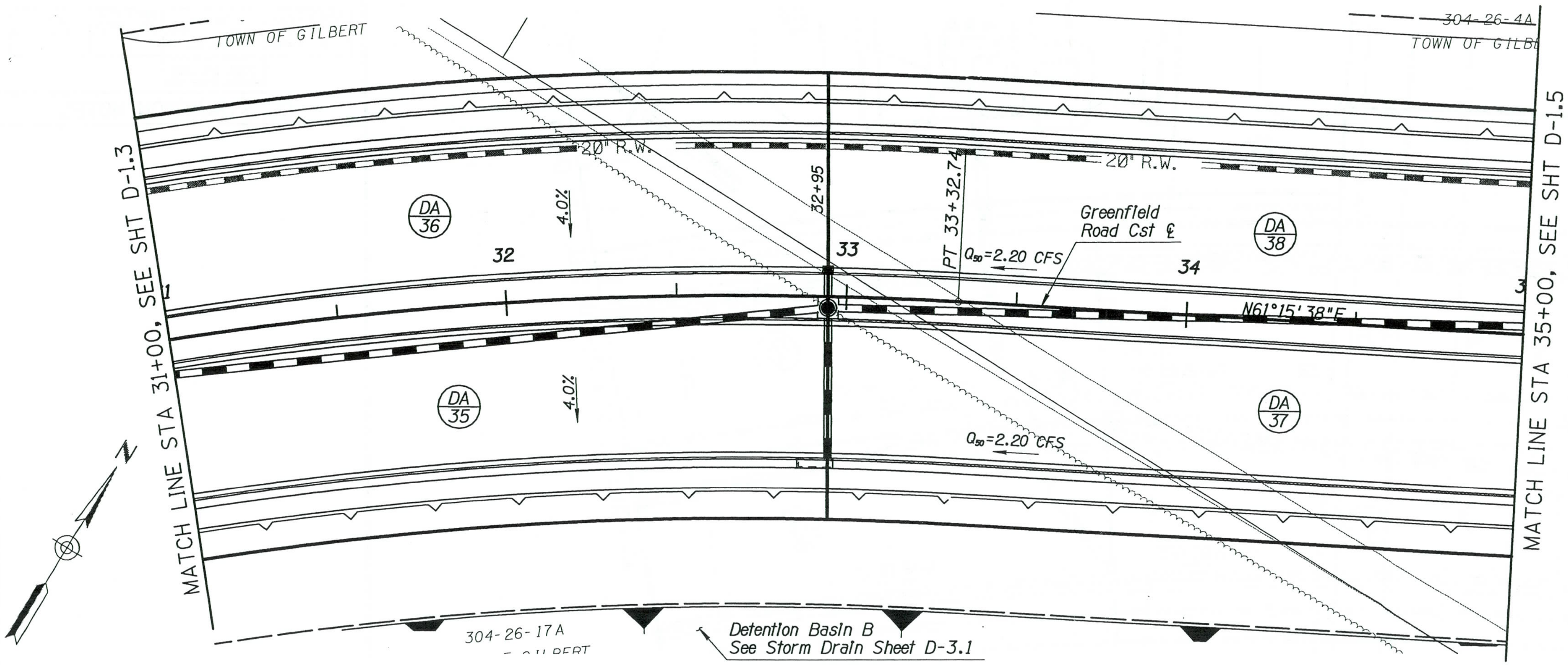
TRACS NO. H6338 01 C

202-C-510



F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-C-510			

202L MA 039

CONSTRUCTION NOTES

TWO WORKING DAYS BEFORE YOU DIG CALL:
263-1100
1-800-STAKE-IT

SCALE: Hor=1"=20'
Vert=1"=4'

20 0 20 40
SCALE IN FEET

REV.	DATE	BY	DESCRIPTION

TOWN OF GILBERT

GREENFIELD, RAY AND UPRR UNDERPASSES

DRAINAGE

DRAINAGE EXHIBIT MAP
STA. 31+00 TO STA. 35+00

PRELIMINARY
60%
REVIEW
NOT FOR
CONSTRUCTION
OR
RECORDING

INCA
INCA ENGINEERS INC.

	NAME	DATE
DESIGN	P.COLE	12/02
DRAWN	R.STEELE/K.YOUNG	12/02
CHECKED	M.WAVERING	12/02

DWG NO. DE-1.13

SHEET OF

01/15/03
11:47:53 AM

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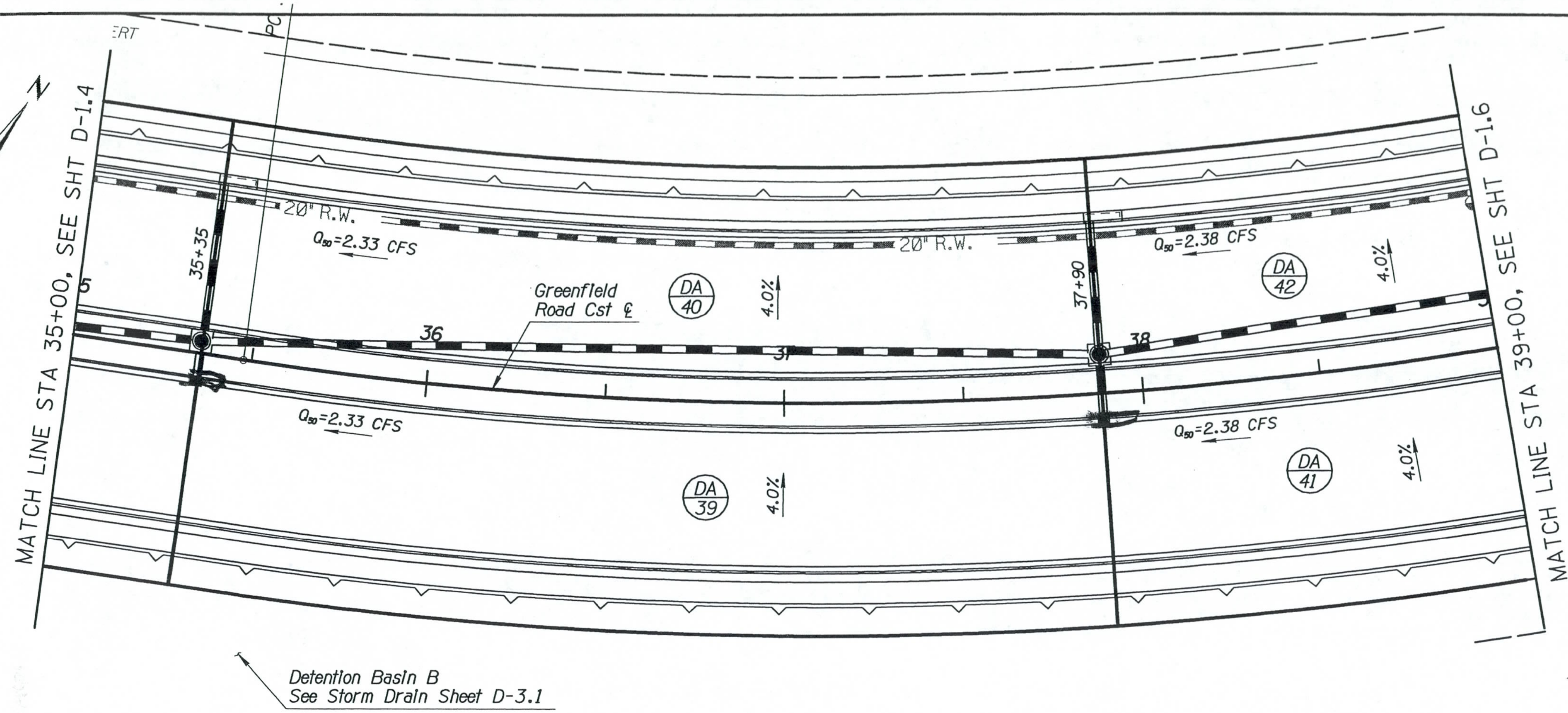
TRACS NO. H6338 01 C

202-C-510



1276

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-C-510			

202L MA 039

CONSTRUCTION NOTES

TWO WORKING DAYS BEFORE YOU DIG CALL:
263-1100
1-800-STAKE-IT

SCALE: Hor=1"=20'
Vert=1"=4'
20 0 20 40
SCALE IN FEET

REV.	DATE	BY	DESCRIPTION

TOWN OF GILBERT

GREENFIELD, RAY AND UPRR UNDERPASSES

DRAINAGE

DRAINAGE EXHIBIT MAP
STA. 35+00 TO STA. 39+00

PRELIMINARY 60% REVIEW NOT FOR CONSTRUCTION OR RECORDING

INCA ENGINEERS INC.

	NAME	DATE
DESIGN	P.COLE	12/02
DRAWN	R.STEELE/K.YOUNG	12/02
CHECKED	M.WAVERING	12/02

DWG NO. DE-1.14
SHEET OF

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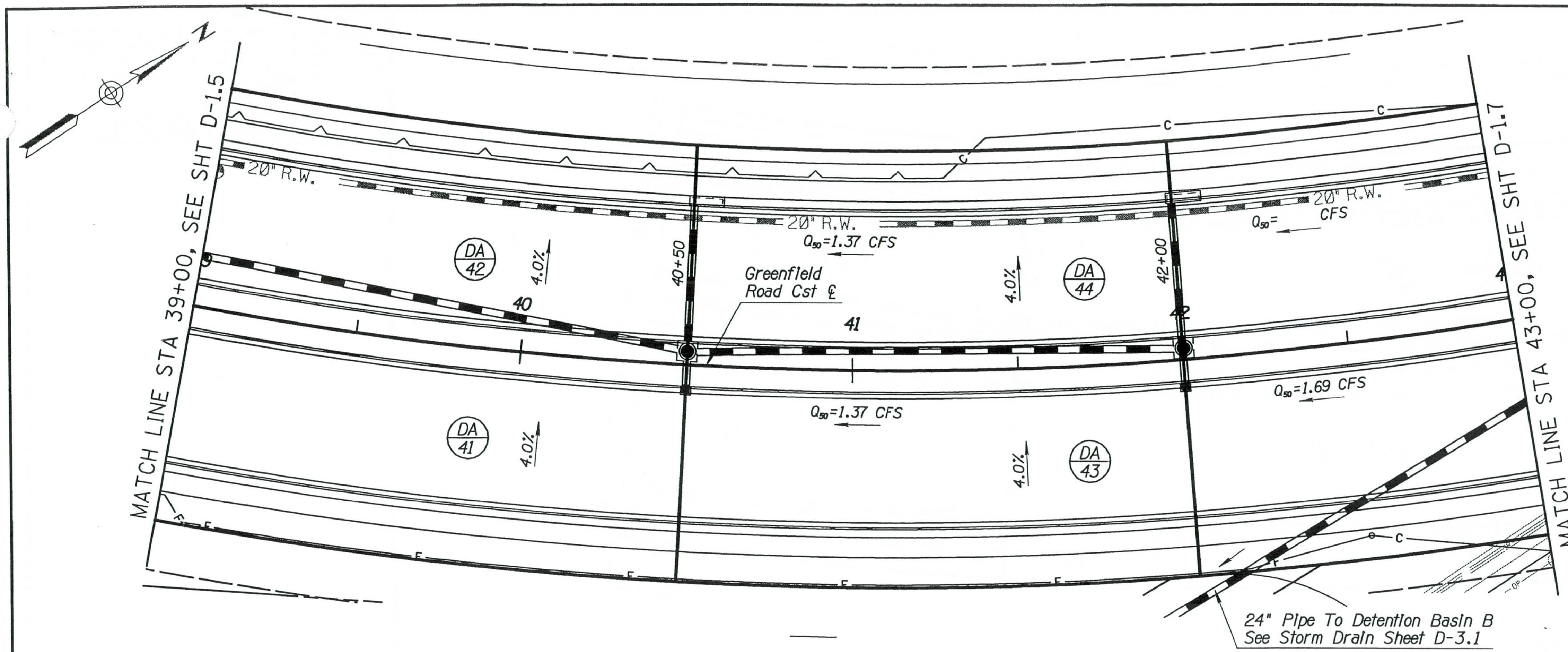
TRACS NO. H6338 01 C

202-C-510



F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-C-510			

202L MA 039

CONSTRUCTION NOTES

TWO WORKING DAYS BEFORE YOU DIG CALL:
263-1100
1-800-STAKE-IT

SCALE: Hor=1"=20'
Vert=1"=4'

20 0 20 40
SCALE IN FEET

REV.	DATE	BY	DESCRIPTION

TOWN OF GILBERT

GREENFIELD, RAY AND UPRR UNDERPASSES

DRAINAGE

DRAINAGE EXHIBIT MAP
STA. 39+00 TO STA. 43+00

INCA
INCA ENGINEERS INC.

	NAME	DATE
DESIGN	P.COLE	12/02
DRAWN	R.STEELE/K.YOUNG	12/02
CHECKED	M.WAVERING	12/02

PRELIMINARY
60%
REVIEW
NOT FOR
CONSTRUCTION
OR
RECORDING

DWG NO. DE-1.15

SHEET OF

01/15/03
11:37:56 AM

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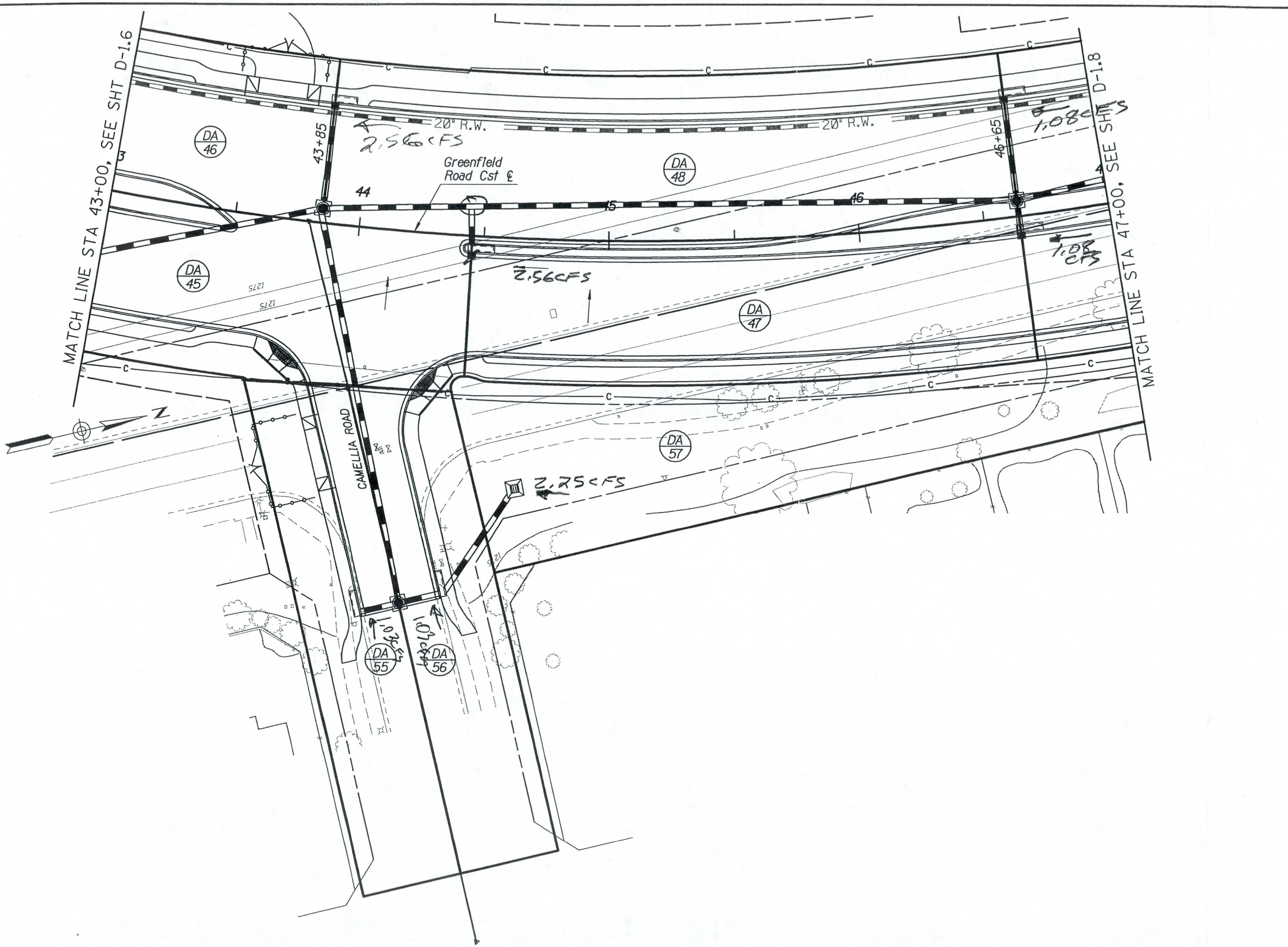
TRACS NO. H6338 01 C

202-C-510



F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-C-510			

202L MA 039

CONSTRUCTION NOTES

TWO WORKING DAYS BEFORE YOU DIG CALL:
263-1100
1-800-STAKE-IT

SCALE: Hor=1"=20'
Vert=1"=4'

20 0 20 40
SCALE IN FEET

REV.	DATE	BY	DESCRIPTION

TOWN OF GILBERT

GREENFIELD, RAY AND UPRR UNDERPASSES

DRAINAGE

DRAINAGE EXHIBIT MAP
STA. 43+00 TO STA. 47+00

PRELIMINARY 60% REVIEW NOT FOR CONSTRUCTION OR RECORDING

INCA
INCA ENGINEERS INC.

	NAME	DATE
DESIGN	P.COLE	12/02
DRAWN	R.STEELE/K.YOUNG	12/02
CHECKED	M.WAVERING	12/02

DWG NO. DE-1.16

SHEET OF

01/15/03
11:33:36 AM

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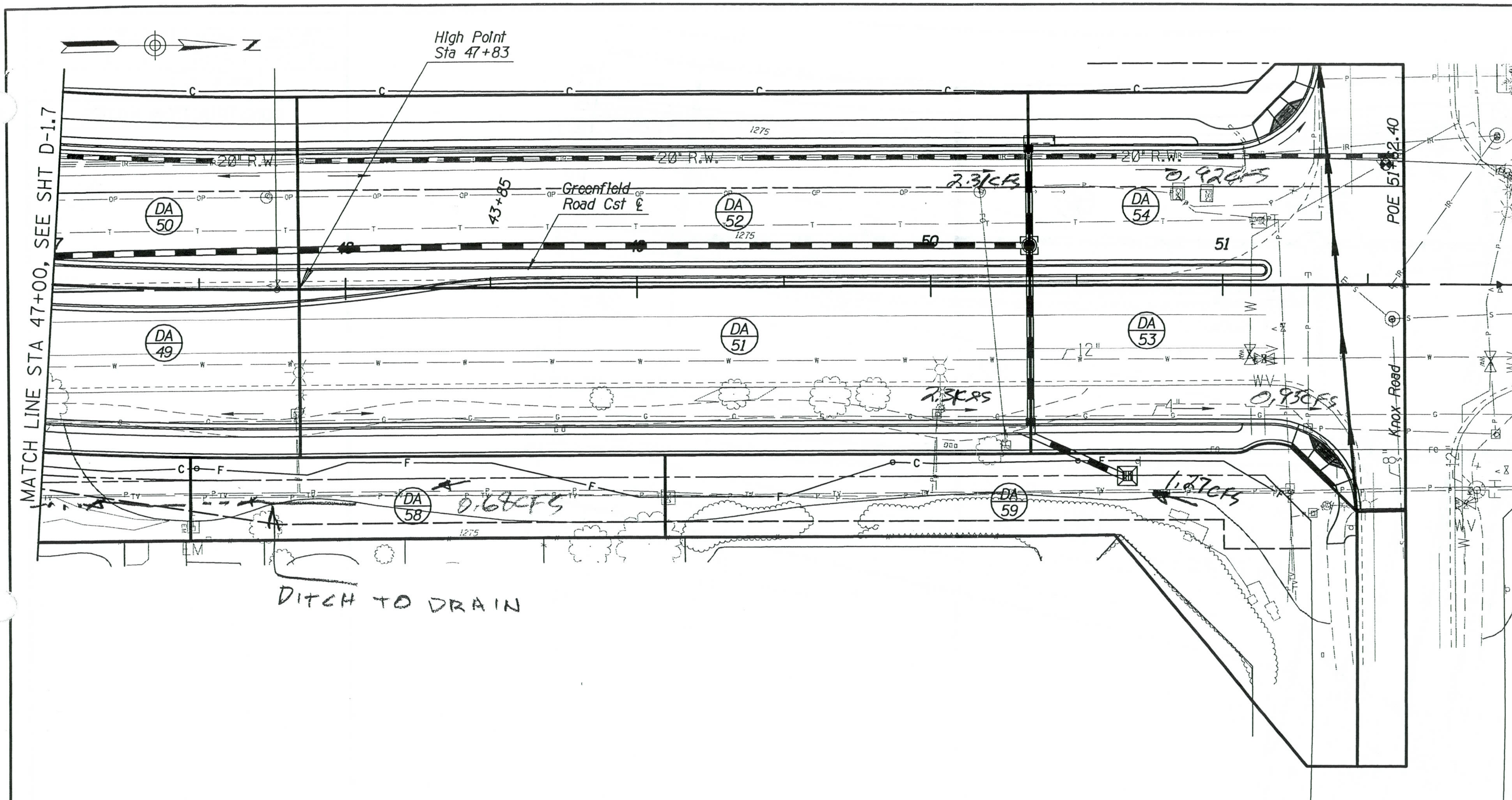
TRACS NO. H6338 01 C

202-C-510



F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-C-510			

202L MA 039

CONSTRUCTION NOTES

TWO WORKING DAYS BEFORE YOU DIG CALL:
263-1100
1-800-STAKE-IT

SCALE: Hor=1"=20'
Vert=1"=2'

20 0 20 40
SCALE IN FEET

REV.	DATE	BY	DESCRIPTION

TOWN OF GILBERT

GREENFIELD, RAY AND UPRR UNDERPASSES

DRAINAGE

DRAINAGE EXHIBIT MAP
STA. 47+00 TO STA. 51+62.40

PRELIMINARY 60% REVIEW NOT FOR CONSTRUCTION OR RECORDING

INCA
INCA ENGINEERS INC.

	NAME	DATE
DESIGN	P.COLE	12/02
DRAWN	R.STEELE/K.YOUNG	12/02
CHECKED	M.WAVERING	12/02

DWG NO. DE-1.17

SHEET OF