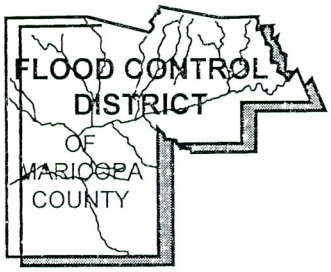
# DOUBLETREE RANCH ROAD REGIONAL DRAINAGE STUDY

## FCD 94-28

## STORMWATER MANAGEMENT REPORT VOLUME III

## PREFERRED ALTERNATIVE APPENDICES

DECEMBER 1996



Prepared For:
**FLOOD CONTROL DISTRICT OF MARICOPA COUNTY**
2801 West Durango Street
Phoenix, Arizona 85007
602-506-1501

**Hook Engineering, Inc.**

# 12.0 APPENDICES

12.1 PUBLIC INVOLVEMENT EXHIBITS

12.2 HYDRAULICS

12.3 DETENTION BASIN VOLUMES

12.4 COST

12.4.1 LAND ACQUISITION

12.4.2 UTILITY CONFLICT

12.4.3 ENERGY DISSIPATOR

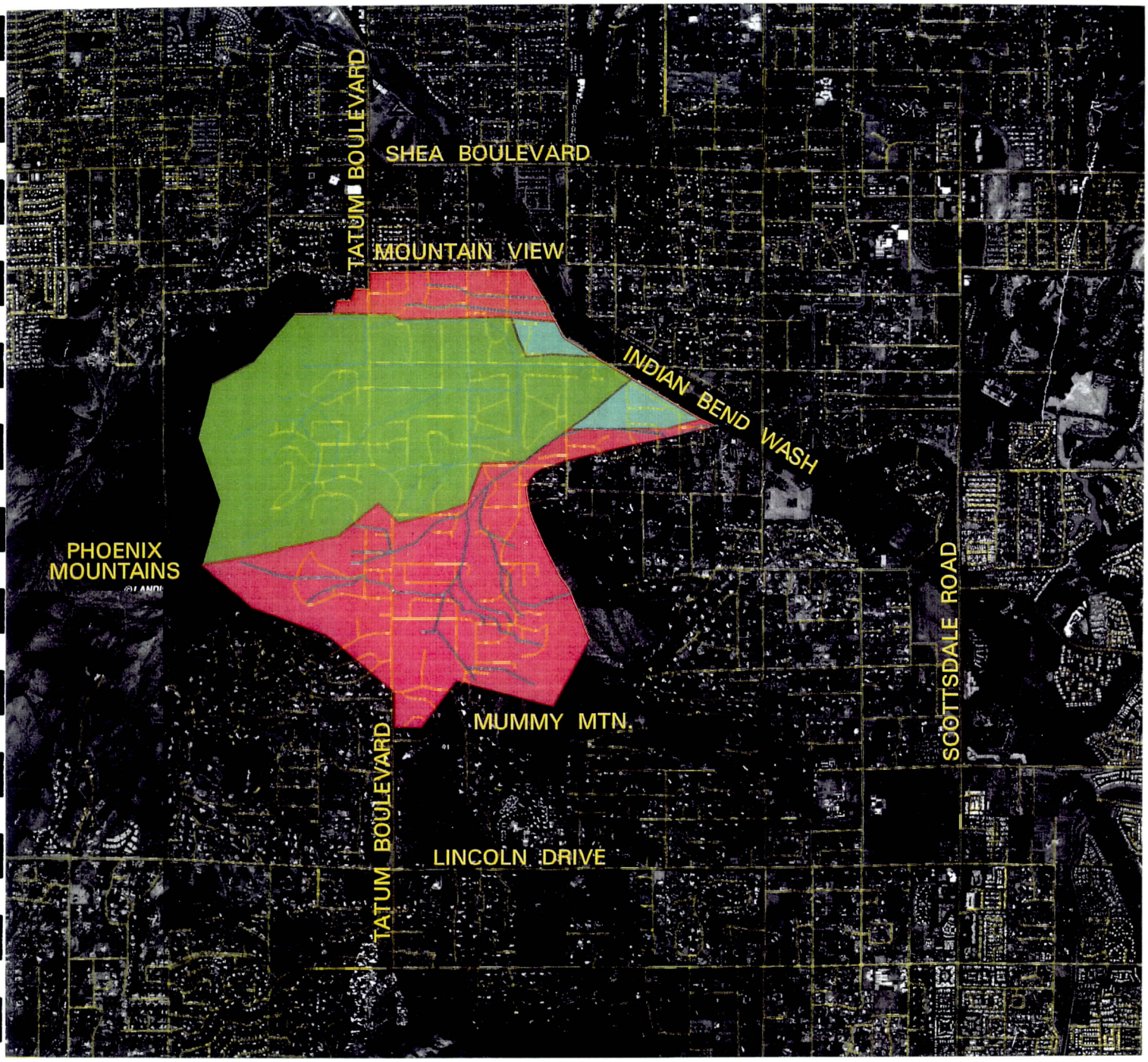
12.4.4 EXCAVATION, BACKFILL, PAVEMENT REMOVAL AND REPLACEMENT

12.4.5 DOUBLETREE RANCH ROAD PRELIMINARY COST ESTIMATE

12.4.6 CHEROKEE WASH PRELIMINARY COST ESTIMATE

12.1

# PUBLIC INVOLVEMENT EXHIBITS




N
W E
S

= Basin Boundaries
= Street Centerlines
= Flow Paths

**Doubletree Ranch Road Regional Drainage System**

**Basin Boundaries**

# DOUBLETREE RANCH DRAINAGE IMPROVEMENT PROJECT

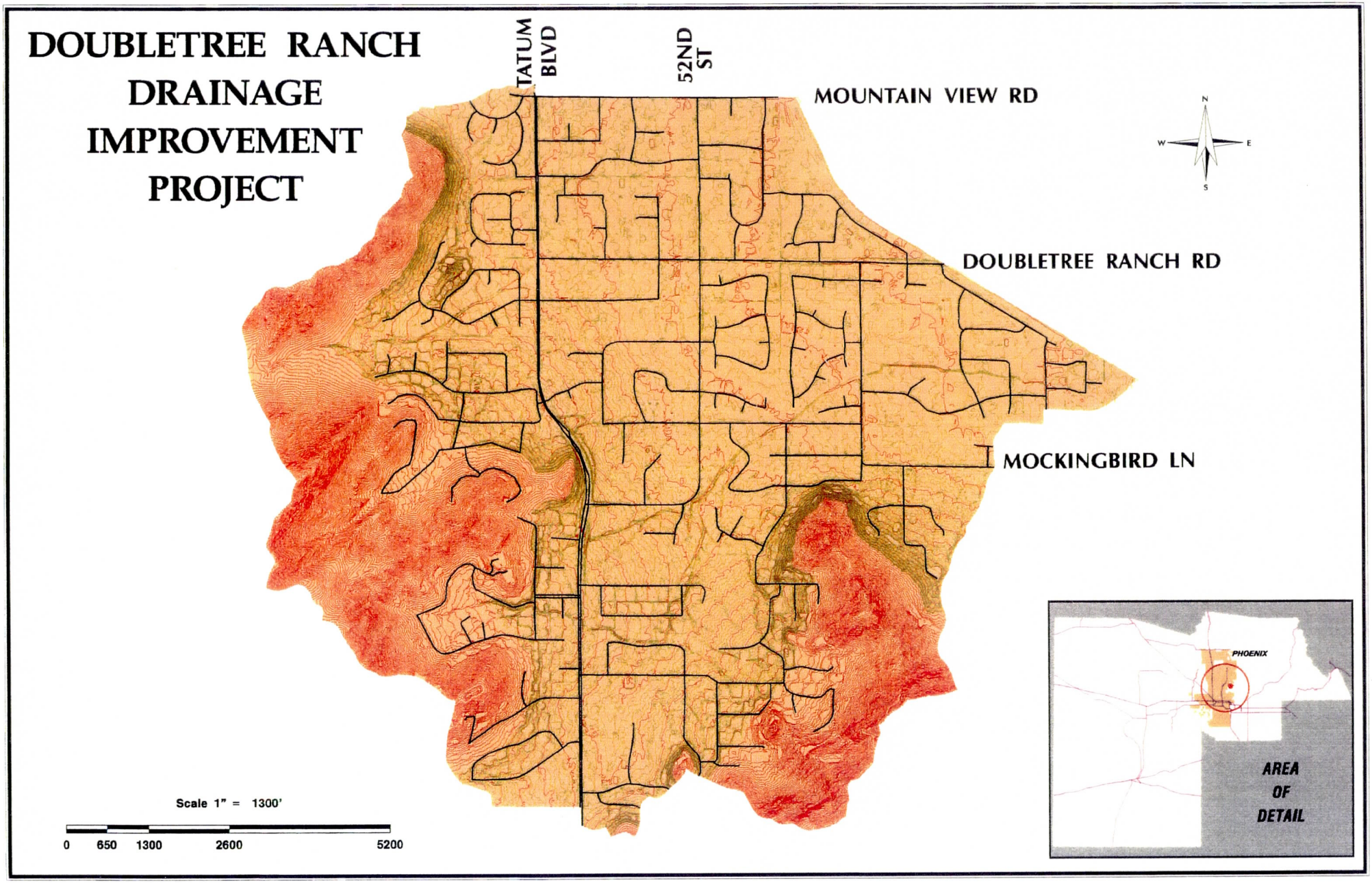
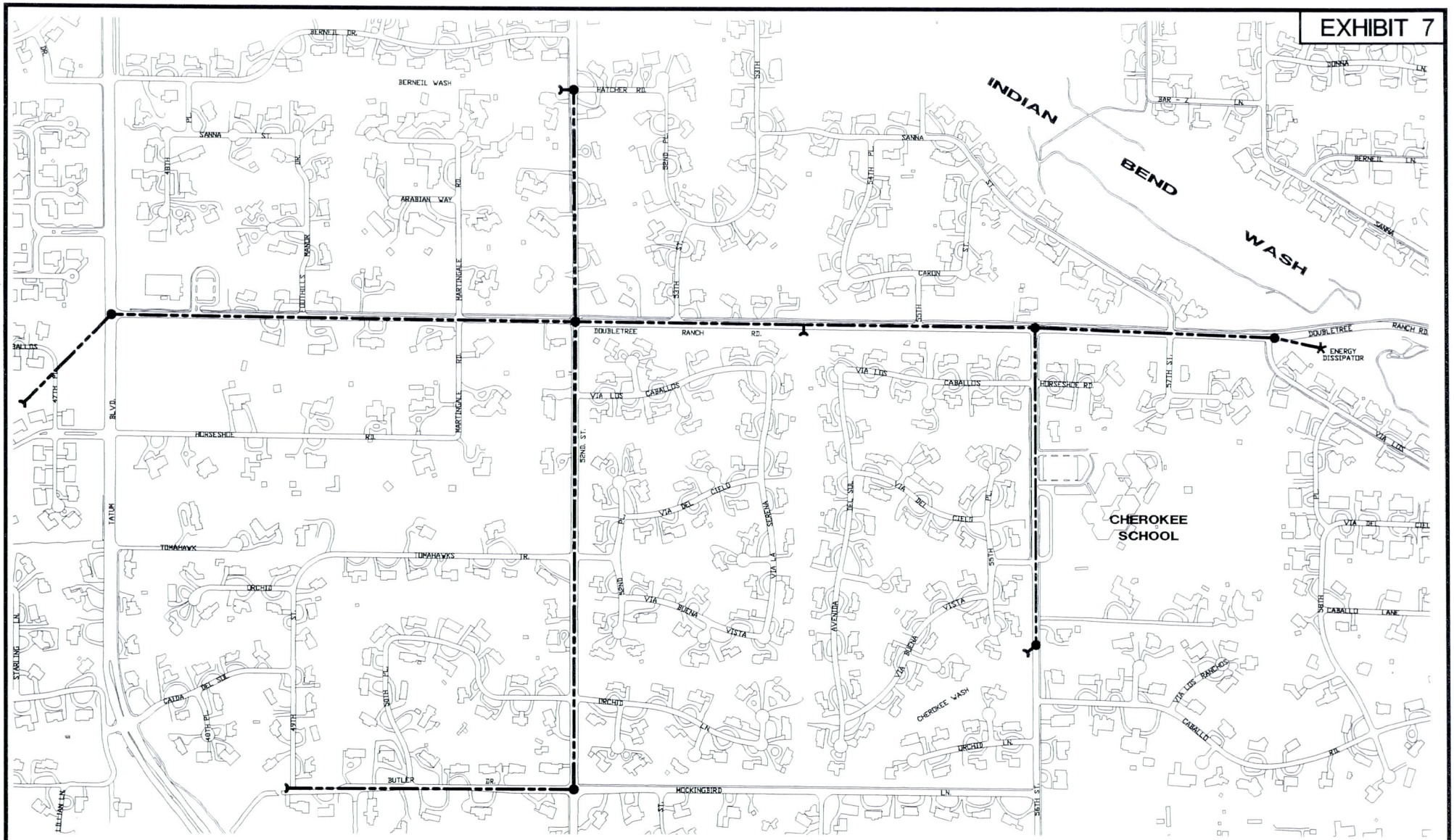


EXHIBIT 7




LEGEND

- STORM DRAIN PIPE
- MAJOR STORM DRAIN INLET
- JUNCTION BOX
- ENERGY DISSIPATOR

# PROPOSED STORM DRAIN NETWORK

## DOUBLETREE RANCH ROAD REGIONAL DRAINAGE STUDY

## FLOOD CONTROL DISTRICT OF MARICOPA COUNTY

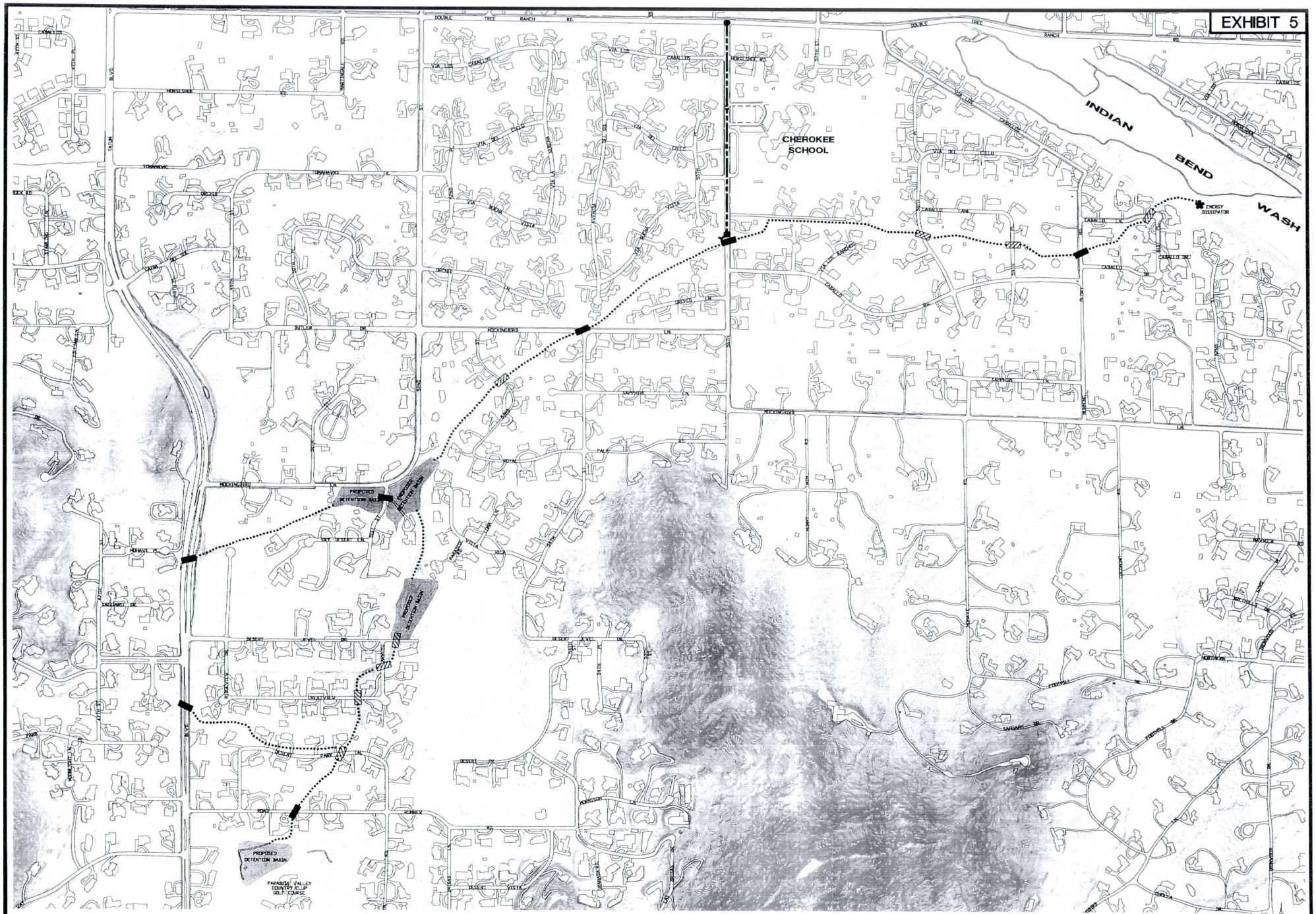
## PROJECT NO. FCD 94-28

240 120 0 240 480 720

SCALE 1" = 240 ft.

HOOK ENGINEERING, INC.

EXHIBIT 5




LEGEND

- PROPOSED CHEROKEE WASH IMPROVEMENTS
- CULVERT CROSSING
- CULVERT-DIP CROSSING
- STORM DRAIN PIPE

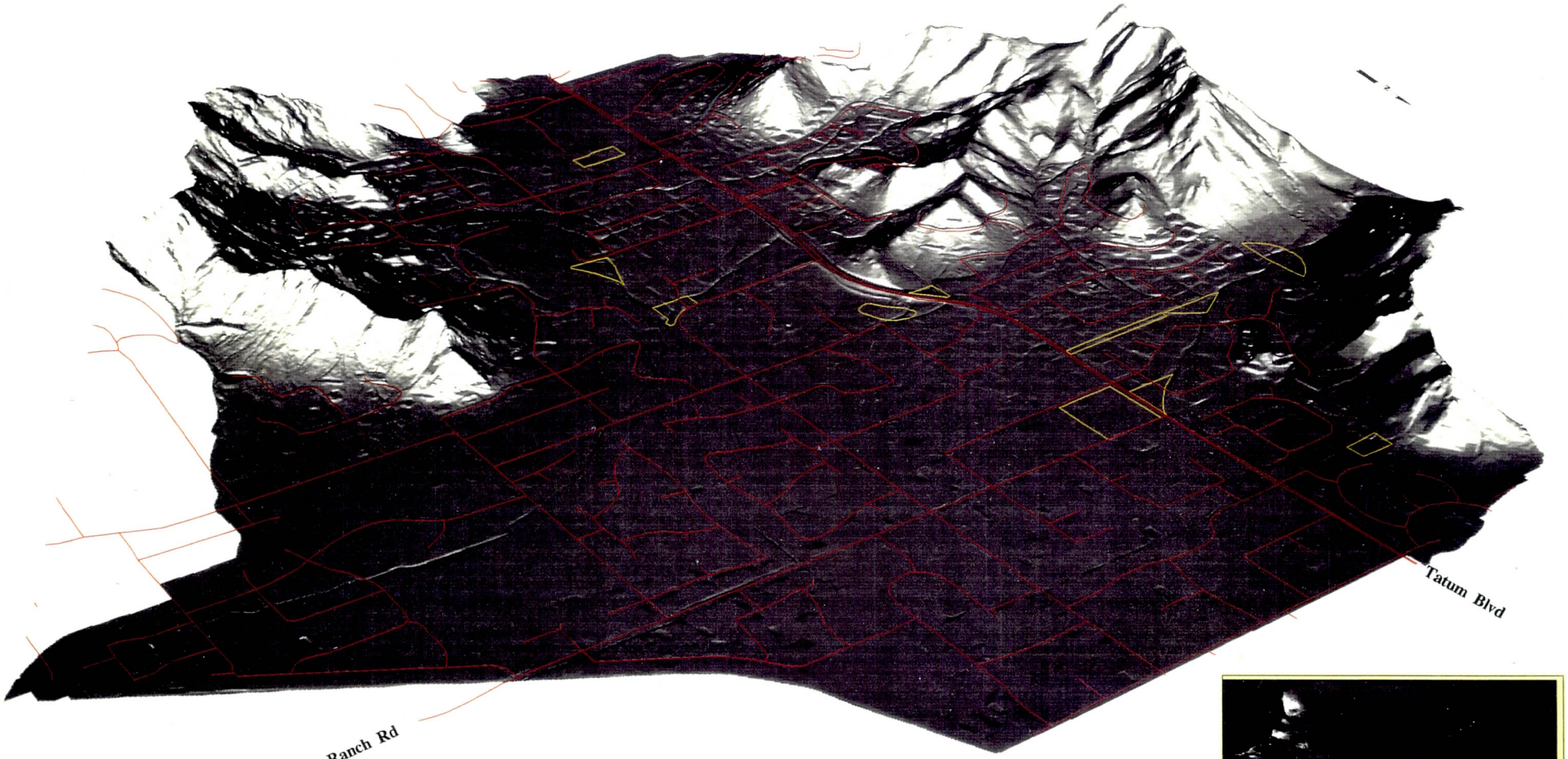
# PROPOSED CHEROKEE WASH IMPROVEMENTS

## DOUBLETREE RANCH ROAD REGIONAL DRAINAGE STUDY

## FLOOD CONTROL DISTRICT OF MARICOPA COUNTY PROJECT NO. FCD 94-28

HOOK ENGINEERING, INC.

# Doubletree Ranch Drainage Improvement Project




Legend

Proposed Drainage Basins

12.2

# HYDRAULICS

# DOUBLETREE RANCH ROAD

# STORM DRAIN

# SYSTEM

# 100-YEAR DISCHARGE

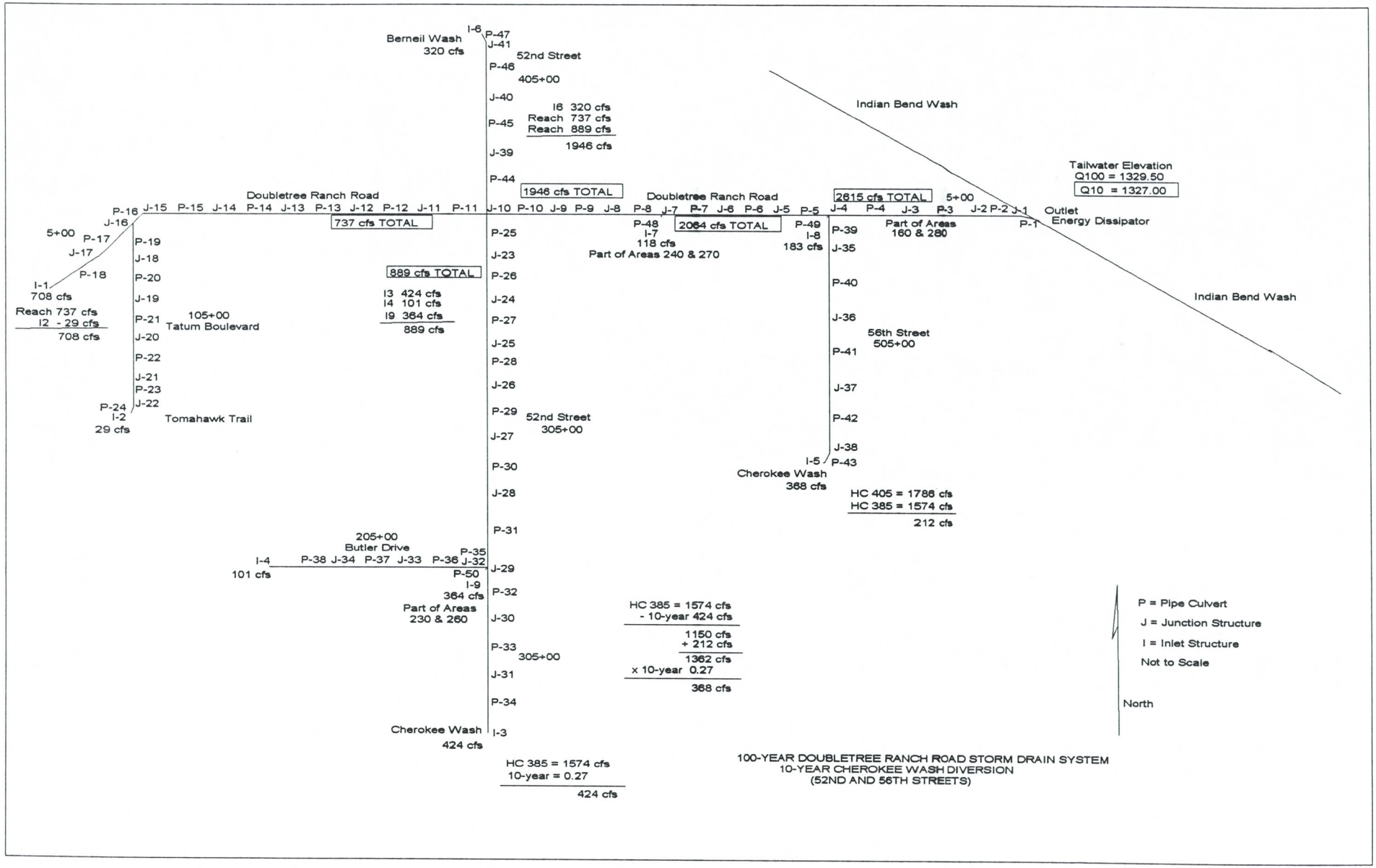
# 10-YEAR TAILWATER
# INDIAN BEND WASH

# HYDRAULIC GRADIENT

EXPLANATION OF HYDROLOGIC DISCHARGES

DOUBLETREE STORM DRAIN ADDITIONAL SUB BASIN DISCHARGES

CHEROKEE WASH DIVERSION DISCHARGES




100-YEAR DOUBLETREE RANCH ROAD STORM DRAIN SYSTEM
10-YEAR CHEROKEE WASH DIVERSION
(52ND AND 56TH STREETS)



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```
------------------- Beginning Calculation Cycle -------------------
Discharge: 708.00 cfs  at node I-1
Discharge: 708.00 cfs  at node J-17
Discharge: 29.00 cfs  at node I-2
Discharge: 29.00 cfs  at node J-22
Discharge: 29.00 cfs  at node J-21
Discharge: 29.00 cfs  at node J-20
Discharge: 29.00 cfs  at node J-19
Discharge: 29.00 cfs  at node J-18
Discharge: 737.00 cfs  at node J-16
Discharge: 737.00 cfs  at node J-15
Discharge: 737.00 cfs  at node J-14
Discharge: 737.00 cfs  at node J-13
Discharge: 737.00 cfs  at node J-12
Discharge: 737.00 cfs  at node J-11
Discharge: 320.00 cfs  at node I-6
Discharge: 320.00 cfs  at node J-41
Discharge: 320.00 cfs  at node J-40
Discharge: 320.00 cfs  at node J-39
Discharge: 424.00 cfs  at node I-3
Discharge: 424.00 cfs  at node J-31
Discharge: 424.00 cfs  at node J-30
Discharge: 101.00 cfs  at node I-4
Discharge: 101.00 cfs  at node J-34
Discharge: 101.00 cfs  at node J-33
Discharge: 101.00 cfs  at node J-32
Discharge: 364.00 cfs  at node I-9
Discharge: 889.00 cfs  at node J-29
Discharge: 889.00 cfs  at node J-28
Discharge: 889.00 cfs  at node J-27
Discharge: 889.00 cfs  at node J-26
Discharge: 889.00 cfs  at node J-25
Discharge: 889.00 cfs  at node J-24
Discharge: 889.00 cfs  at node J-23
Discharge: 1,946.00 cfs  at node J-10
Discharge: 1,946.00 cfs  at node J-9
Discharge: 1,946.00 cfs  at node J-8
Discharge: 118.00 cfs  at node I-7
Discharge: 2,064.00 cfs  at node J-7
Discharge: 2,064.00 cfs  at node J-6
Discharge: 2,064.00 cfs  at node J-5
Discharge: 368.00 cfs  at node I-5
Discharge: 368.00 cfs  at node J-38
Discharge: 368.00 cfs  at node J-37
Discharge: 368.00 cfs  at node J-36
Discharge: 368.00 cfs  at node J-35
Discharge: 183.00 cfs  at node I-8
Discharge: 2,615.00 cfs  at node J-4
Discharge: 2,615.00 cfs  at node J-3
Discharge: 2,615.00 cfs  at node J-2
Discharge: 2,615.00 cfs  at node J-1
Discharge: 2,615.00 cfs  at node Outlet
Beginning iteration 1
Discharge: 708.00 cfs  at node I-1
Discharge: 708.00 cfs  at node J-17
Discharge: 29.00 cfs  at node I-2
Discharge: 29.00 cfs  at node J-22
Discharge: 29.00 cfs  at node J-21
Discharge: 29.00 cfs  at node J-20
Discharge: 29.00 cfs  at node J-19
Discharge: 29.00 cfs  at node J-18
Discharge: 737.00 cfs  at node J-16
Discharge: 737.00 cfs  at node J-15
Discharge: 737.00 cfs  at node J-14
Discharge: 737.00 cfs  at node J-13
Discharge: 737.00 cfs  at node J-12
Discharge: 737.00 cfs  at node J-11
Discharge: 320.00 cfs  at node I-6
Discharge: 320.00 cfs  at node J-41
Discharge: 320.00 cfs  at node J-40
Discharge: 320.00 cfs  at node J-39
Discharge: 424.00 cfs  at node I-3
Discharge: 424.00 cfs  at node J-31
Discharge: 424.00 cfs  at node J-30
Discharge: 101.00 cfs  at node I-4
Discharge: 101.00 cfs  at node J-34
Discharge: 101.00 cfs  at node J-33
Discharge: 101.00 cfs  at node J-32
Discharge: 364.00 cfs  at node I-9
Discharge: 889.00 cfs  at node J-29
Discharge: 889.00 cfs  at node J-28
Discharge: 889.00 cfs  at node J-27
Discharge: 889.00 cfs  at node J-26
Discharge: 889.00 cfs  at node J-25
Discharge: 889.00 cfs  at node J-24
Discharge: 889.00 cfs  at node J-23
Discharge: 1,946.00 cfs  at node J-10
```


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```
Discharge: 1,946.00 cfs  at node J-9
Discharge: 1,946.00 cfs  at node J-8
Discharge: 118.00 cfs  at node I-7
Discharge: 2,064.00 cfs  at node J-7
Discharge: 2,064.00 cfs  at node J-6
Discharge: 2,064.00 cfs  at node J-5
Discharge: 368.00 cfs  at node I-5
Discharge: 368.00 cfs  at node J-38
Discharge: 368.00 cfs  at node J-37
Discharge: 368.00 cfs  at node J-36
Discharge: 368.00 cfs  at node J-35
Discharge: 183.00 cfs  at node I-8
Discharge: 2,615.00 cfs  at node J-4
Discharge: 2,615.00 cfs  at node J-3
Discharge: 2,615.00 cfs  at node J-2
Discharge: 2,615.00 cfs  at node J-1
Discharge: 2,615.00 cfs  at node Outlet
Discharge Convergence Achieved in 1 iterations: relative error:  0.0
Warning: No Duration data exists in IDF Table
Information: Outlet Known flow propagated from upstream junctions.
Information: J-1 Known flow propagated from upstream junctions.
Information: J-2 Known flow propagated from upstream junctions.
Information: P-3 Surcharged condition
Information: J-3 Known flow propagated from upstream junctions.
Information: P-4 Surcharged condition
Information: J-4 Known flow propagated from upstream junctions.
Information: P-5 Surcharged condition
Information: P-39 Surcharged condition
Information: J-35 Known flow propagated from upstream junctions.
Information: P-40 Surcharged condition
Information: J-36 Known flow propagated from upstream junctions.
Information: J-37 Known flow propagated from upstream junctions.
Information: J-38 Known flow propagated from upstream junctions.
Information: J-5 Known flow propagated from upstream junctions.
Information: P-6 Surcharged condition
Information: J-6 Known flow propagated from upstream junctions.
Information: P-7 Surcharged condition
Information: J-7 Known flow propagated from upstream junctions.
Information: P-8 Surcharged condition
Information: P-48 Surcharged condition
Information: J-8 Known flow propagated from upstream junctions.
Information: P-9 Surcharged condition
Information: J-9 Known flow propagated from upstream junctions.
Information: P-10 Surcharged condition
Information: J-10 Known flow propagated from upstream junctions.
Information: P-11 Surcharged condition
Information: P-44 Surcharged condition
Information: P-25 Surcharged condition
Information: J-39 Known flow propagated from upstream junctions.
Information: P-45 Surcharged condition
Information: J-23 Known flow propagated from upstream junctions.
Information: P-26 Surcharged condition
Information: J-11 Known flow propagated from upstream junctions.
Information: P-12 Surcharged condition
Information: J-40 Known flow propagated from upstream junctions.
Information: J-41 Known flow propagated from upstream junctions.
Information: J-24 Known flow propagated from upstream junctions.
Information: P-27 Surcharged condition
Information: J-25 Known flow propagated from upstream junctions.
Information: P-28 Surcharged condition
Information: J-26 Known flow propagated from upstream junctions.
Information: P-29 Surcharged condition
Information: J-27 Known flow propagated from upstream junctions.
Information: P-30 Surcharged condition
Information: J-28 Known flow propagated from upstream junctions.
Information: P-31 Surcharged condition
Information: J-29 Known flow propagated from upstream junctions.
Information: J-30 Known flow propagated from upstream junctions.
Information: J-31 Known flow propagated from upstream junctions.
Information: J-32 Known flow propagated from upstream junctions.
Information: J-33 Known flow propagated from upstream junctions.
Information: J-34 Known flow propagated from upstream junctions.
Information: J-12 Known flow propagated from upstream junctions.
Information: P-13 Surcharged condition
Information: J-13 Known flow propagated from upstream junctions.
Information: P-14 Surcharged condition
Information: J-14 Known flow propagated from upstream junctions.
Information: J-15 Known flow propagated from upstream junctions.
Information: J-16 Known flow propagated from upstream junctions.
Information: J-18 Known flow propagated from upstream junctions.
Information: J-19 Known flow propagated from upstream junctions.
Information: J-17 Known flow propagated from upstream junctions.
Information: J-20 Known flow propagated from upstream junctions.
Information: J-21 Known flow propagated from upstream junctions.
Information: J-22 Known flow propagated from upstream junctions.
---------- Calculations Complete ----------
```

** Analysis Options **
Friction method: Manning's Formula
HGL Convergence Test: 0.001000
Maximum Network Traversals: 5
Number of Flow Profile Steps: 5
Discharge Convergence Test: 0.001000
Maximum Design Passes: 3

---------- Network Quick View ----------

| Label | Length | Size | Discharge | Hydraulic Grade Upstream | Hydraulic Grade Downstream |
|---|---|---|---|---|---|
| P-1 | 145.00 | 10 x 6 ft | 2,615.00 | 1,329.63 | 1,329.57 |
| P-2 | 390.00 | 10 x 6 ft | 2,615.00 | 1,332.21 | 1,329.89 |
| P-3 | 535.00 | 10 x 6 ft | 2,615.00 | 1,334.41 | 1,332.30 |
| P-4 | 535.00 | 10 x 6 ft | 2,615.00 | 1,336.60 | 1,334.50 |
| P-5 | 425.00 | 10 x 6 ft | 2,064.00 | 1,339.74 | 1,337.89 |
| P-6 | 425.00 | 10 x 6 ft | 2,064.00 | 1,341.70 | 1,339.85 |
| P-7 | 425.00 | 10 x 6 ft | 2,064.00 | 1,343.65 | 1,341.80 |
| P-8 | 442.00 | 10 x 6 ft | 1,946.00 | 1,346.58 | 1,344.87 |
| P-9 | 441.00 | 10 x 6 ft | 1,946.00 | 1,348.38 | 1,346.67 |
| P-10 | 441.00 | 10 x 6 ft | 1,946.00 | 1,350.18 | 1,348.47 |
| P-11 | 516.00 | 8 x 6 ft | 737.00 | 1,356.53 | 1,351.99 |
| P-12 | 516.00 | 8 x 6 ft | 737.00 | 1,361.25 | 1,356.72 |
| P-13 | 516.00 | 8 x 6 ft | 737.00 | 1,365.98 | 1,361.44 |
| P-14 | 516.00 | 8 x 6 ft | 737.00 | 1,370.70 | 1,366.16 |
| P-15 | 516.00 | 8 x 6 ft | 737.00 | 1,375.50 | 1,370.88 |
| P-16 | 105.00 | 8 x 4 ft | 737.00 | 1,378.80 | 1,377.70 |
| P-17 | 348.00 | 8 x 4 ft | 708.00 | 1,385.93 | 1,380.04 |
| P-18 | 443.00 | 8 x 4 ft | 708.00 | 1,393.93 | 1,386.03 |
| P-20 | 296.00 | 30 inch | 29.00 | 1,382.84 | 1,380.70 |
| P-21 | 300.00 | 30 inch | 29.00 | 1,390.84 | 1,383.27 |

| Label | Length | Size | Discharge | Hydraulic Grade Upstream | Hydraulic Grade Downstream |
|---|---|---|---|---|---|
| P-22 | 292.00 | 30 inch | 29.00 | 1,398.84 | 1,391.27 |
| P-23 | 190.00 | 30 inch | 29.00 | 1,403.84 | 1,399.27 |
| P-24 | 60.00 | 30 inch | 29.00 | 1,405.84 | 1,404.27 |
| P-29 | 405.00 | 8 x 6 ft | 889.00 | 1,354.54 | 1,353.97 |
| P-30 | 405.00 | 8 x 5 ft | 889.00 | 1,356.76 | 1,354.60 |
| P-31 | 536.00 | 8 x 5 ft | 889.00 | 1,359.71 | 1,356.86 |
| P-32 | 415.00 | 8 x 5 ft | 424.00 | 1,364.11 | 1,361.05 |
| P-33 | 415.00 | 8 x 5 ft | 424.00 | 1,369.27 | 1,364.22 |
| P-34 | 415.00 | 8 x 5 ft | 424.00 | 1,374.44 | 1,369.38 |
| P-35 | 140.00 | 60 inch | 101.00 | 1,361.24 | 1,361.05 |
| P-36 | 545.00 | 48 inch | 101.00 | 1,366.54 | 1,361.46 |
| P-37 | 475.00 | 48 inch | 101.00 | 1,378.54 | 1,367.30 |
| P-38 | 475.00 | 48 inch | 101.00 | 1,393.04 | 1,379.30 |
| P-39 | 270.00 | 8 x 5 ft | 368.00 | 1,338.88 | 1,337.89 |
| P-40 | 525.00 | 8 x 5 ft | 368.00 | 1,340.86 | 1,338.94 |
| P-41 | 525.00 | 8 x 5 ft | 368.00 | 1,342.23 | 1,340.92 |
| P-42 | 460.00 | 8 x 5 ft | 368.00 | 1,344.56 | 1,342.32 |
| P-43 | 90.00 | 8 x 5 ft | 368.00 | 1,345.04 | 1,344.66 |
| P-44 | 428.00 | 10 x 6 ft | 320.00 | 1,352.40 | 1,351.99 |
| P-48 | 20.00 | 48 inch | 118.00 | 1,345.01 | 1,344.87 |

| Label | Length | Size | Discharge | Hydraulic Grade Upstream | Hydraulic Grade Downstream |
|---|---|---|---|---|---|
| P-49 | 30.00 | 48 inch | 183.00 | 1,338.29 | 1,337.89 |
| P-50 | 32.00 | 60 inch | 364.00 | 1,362.34 | 1,361.05 |
| P-45 | 428.00 | 10 x 6 ft | 320.00 | 1,352.82 | 1,352.42 |
| P-46 | 428.00 | 10 x 6 ft | 320.00 | 1,353.12 | 1,352.84 |
| P-47 | 67.00 | 10 x 6 ft | 320.00 | 1,353.14 | 1,353.15 |
| P-25 | 333.00 | 8 x 6 ft | 889.00 | 1,352.47 | 1,351.99 |
| P-26 | 332.00 | 8 x 6 ft | 889.00 | 1,352.97 | 1,352.50 |
| P-27 | 320.00 | 8 x 6 ft | 889.00 | 1,353.45 | 1,353.00 |
| P-28 | 320.00 | 8 x 6 ft | 889.00 | 1,353.94 | 1,353.48 |
| P-19 | 296.00 | 36 inch | 29.00 | 1,380.56 | 1,380.04 |

| Label | Discharge | Elevations Ground | Elevations Upstream HGL | Elevations Downstream HGL |
|---|---|---|---|---|
| Outlet | 2,615.00 | 1,331.00 | 1,327.00 | 1,327.00 |
| J-1 | 2,615.00 | 1,331.00 | 1,329.89 | 1,329.63 |
| J-2 | 2,615.00 | 1,336.00 | 1,332.30 | 1,332.21 |
| J-3 | 2,615.00 | 1,338.50 | 1,334.50 | 1,334.41 |
| J-4 | 2,615.00 | 1,340.00 | 1,337.89 | 1,336.60 |
| J-5 | 2,064.00 | 1,343.50 | 1,339.85 | 1,339.74 |
| J-6 | 2,064.00 | 1,344.00 | 1,341.80 | 1,341.70 |
| J-7 | 2,064.00 | 1,347.00 | 1,344.87 | 1,343.65 |
| J-8 | 1,946.00 | 1,349.00 | 1,346.67 | 1,346.58 |
| J-9 | 1,946.00 | 1,352.00 | 1,348.47 | 1,348.38 |
| J-10 | 1,946.00 | 1,356.00 | 1,351.99 | 1,350.18 |
| J-11 | 737.00 | 1,360.00 | 1,356.72 | 1,356.53 |
| J-12 | 737.00 | 1,365.00 | 1,361.44 | 1,361.25 |
| J-13 | 737.00 | 1,370.00 | 1,366.16 | 1,365.98 |
| J-14 | 737.00 | 1,375.00 | 1,370.88 | 1,370.70 |

| | | | | |
|---|---|---|---|---|
| J-15 | 737.00 | 1,380.00 | 1,377.70 | 1,375.50 |
| J-16 | 737.00 | 1,382.00 | 1,380.04 | 1,378.80 |
| J-17 | 708.00 | 1,388.00 | 1,386.03 | 1,385.93 |
| I-1 | 708.00 | 1,397.00 | 1,394.33 | 1,393.93 |
| J-18 | 29.00 | 1,383.50 | 1,380.70 | 1,380.56 |

| | | Elevations | | |
|---|---|---|---|---|
| Label | Discharge | Ground | Upstream HGL | Downstream HGL |
| J-19 | 29.00 | 1,386.00 | 1,383.27 | 1,382.84 |
| J-20 | 29.00 | 1,394.50 | 1,391.27 | 1,390.84 |
| J-21 | 29.00 | 1,402.00 | 1,399.27 | 1,398.84 |
| J-22 | 29.00 | 1,407.00 | 1,404.27 | 1,403.84 |
| I-2 | 29.00 | 1,409.00 | 1,406.01 | 1,405.84 |
| J-24 | 889.00 | 1,355.00 | 1,353.00 | 1,352.97 |
| J-26 | 889.00 | 1,357.00 | 1,353.97 | 1,353.94 |
| J-27 | 889.00 | 1,360.00 | 1,354.60 | 1,354.54 |
| J-28 | 889.00 | 1,362.50 | 1,356.86 | 1,356.76 |
| J-29 | 889.00 | 1,367.00 | 1,361.05 | 1,359.71 |
| J-30 | 424.00 | 1,370.00 | 1,364.22 | 1,364.11 |
| J-31 | 424.00 | 1,373.00 | 1,369.38 | 1,369.27 |
| I-3 | 424.00 | 1,378.00 | 1,374.88 | 1,374.44 |
| J-32 | 101.00 | 1,364.00 | 1,361.46 | 1,361.24 |
| J-33 | 101.00 | 1,372.50 | 1,367.30 | 1,366.54 |
| J-34 | 101.00 | 1,382.00 | 1,379.30 | 1,378.54 |
| I-4 | 101.00 | 1,396.00 | 1,393.35 | 1,393.04 |
| J-35 | 368.00 | 1,342.00 | 1,338.94 | 1,338.88 |
| J-36 | 368.00 | 1,343.00 | 1,340.92 | 1,340.86 |
| J-37 | 368.00 | 1,346.00 | 1,342.32 | 1,342.23 |

| | | Elevations | | |
|---|---|---|---|---|
| Label | Discharge | Ground | Upstream HGL | Downstream HGL |
| J-38 | 368.00 | 1,346.50 | 1,344.66 | 1,344.56 |
| I-5 | 368.00 | 1,347.00 | 1,345.44 | 1,345.04 |
| J-39 | 320.00 | 1,356.00 | 1,352.42 | 1,352.40 |
| J-40 | 320.00 | 1,356.00 | 1,352.84 | 1,352.82 |
| I-6 | 320.00 | 1,356.50 | 1,353.27 | 1,353.14 |
| I-7 | 118.00 | 1,347.00 | 1,345.28 | 1,345.01 |
| I-8 | 183.00 | 1,342.00 | 1,338.97 | 1,338.29 |
| I-9 | 364.00 | 1,367.00 | 1,363.43 | 1,362.34 |
| J-41 | 320.00 | 1,356.00 | 1,353.15 | 1,353.12 |
| J-23 | 889.00 | 1,356.50 | 1,352.50 | 1,352.47 |
| J-25 | 889.00 | 1,356.00 | 1,353.48 | 1,353.45 |

Elapsed: 0 minute(s) 18 second(s)

# Combined Pipe/Node Report

| Pipe | Upstream Node | Downstream Node | Length (ft) | Inlet Area (acres) | Weighted Roughness Coefficient | Inlet CA (acres) | Total CA (acres) | Inlet Discharge (cfs) | Section Size | Capacity (cfs) | Average Velocity (ft/s) | Upstream Invert Elevation (ft) | Downstream Invert Elevation (ft) | Constructed Slope (ft/ft) | Description |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P-49 | I-8 | J-4 | 30.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 48 inch | 426.90 | 14.71 | 1,334.50 | 1,331.85 | 0.088333 | |
| P-43 | I-5 | J-38 | 90.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 8 x 5 ft | 444.97 | 11.26 | 1,341.00 | 1,340.52 | 0.005333 | 56th Street□ |
| P-42 | J-38 | J-37 | 460.00 | N/A | N/A | N/A | 0.00 | N/A | 8 x 5 ft | 449.19 | 11.04 | 1,340.52 | 1,338.02 | 0.005435 | 56th Street□ |
| P-41 | J-37 | J-36 | 525.00 | N/A | N/A | N/A | 0.00 | N/A | 8 x 5 ft | 448.93 | 10.06 | 1,338.02 | 1,335.17 | 0.005429 | 56th Street□ |
| P-40 | J-36 | J-35 | 525.00 | N/A | N/A | N/A | 0.00 | N/A | 8 x 5 ft | 448.93 | 9.20 | 1,335.17 | 1,332.32 | 0.005429 | 56th Street□ |
| P-39 | J-35 | J-4 | 270.00 | N/A | N/A | N/A | 0.00 | N/A | 8 x 5 ft | 449.59 | 9.20 | 1,332.32 | 1,330.85 | 0.005444 | 56th Street□ |
| P-48 | I-7 | J-7 | 20.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 48 inch | 418.77 | 9.39 | 1,340.00 | 1,338.30 | 0.085000 | |
| P-50 | I-9 | J-29 | 32.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 60 inch | 651.07 | 18.63 | 1,357.50 | 1,355.50 | 0.062500 | |
| P-38 | I-4 | J-34 | 475.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 48 inch | 250.96 | 9.02 | 1,390.00 | 1,375.50 | 0.030526 | Butler Drive |
| P-37 | J-34 | J-33 | 475.00 | N/A | N/A | N/A | 0.00 | N/A | 48 inch | 228.30 | 9.02 | 1,375.50 | 1,363.50 | 0.025263 | Butler Drive |
| P-36 | J-33 | J-32 | 545.00 | N/A | N/A | N/A | 0.00 | N/A | 48 inch | 150.71 | 8.95 | 1,363.50 | 1,357.50 | 0.011009 | Butler Drive |
| P-35 | J-32 | J-29 | 140.00 | N/A | N/A | N/A | 0.00 | N/A | 60 inch | 311.27 | 5.19 | 1,356.50 | 1,354.50 | 0.014286 | Butler Drive |
| P-34 | I-3 | J-31 | 415.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 8 x 5 ft | 680.08 | 11.80 | 1,370.00 | 1,364.83 | 0.012458 | 52nd Street |
| P-33 | J-31 | J-30 | 415.00 | N/A | N/A | N/A | 0.00 | N/A | 8 x 5 ft | 679.42 | 11.80 | 1,364.83 | 1,359.67 | 0.012434 | 52nd Street |
| P-32 | J-30 | J-29 | 415.00 | N/A | N/A | N/A | 0.00 | N/A | 8 x 5 ft | 680.08 | 11.27 | 1,359.67 | 1,354.50 | 0.012458 | 52nd Street |
| P-31 | J-29 | J-28 | 536.00 | N/A | N/A | N/A | 0.00 | N/A | 8 x 5 ft | 888.60 | 11.11 | 1,354.50 | 1,351.65 | 0.005317 | 52nd Street |
| P-30 | J-28 | J-27 | 405.00 | N/A | N/A | N/A | 0.00 | N/A | 8 x 5 ft | 887.89 | 11.11 | 1,351.65 | 1,349.50 | 0.005309 | 52nd Street |
| P-29 | J-27 | J-26 | 405.00 | N/A | N/A | N/A | 0.00 | N/A | 8 x 6 ft | 1,852.30 | 6.17 | 1,348.50 | 1,346.00 | 0.006173 | 52nd Street |
| P-28 | J-26 | J-25 | 320.00 | N/A | N/A | N/A | 0.00 | N/A | 8 x 6 ft | 1,133.73 | 6.17 | 1,346.00 | 1,345.26 | 0.002313 | 52nd Street |
| P-27 | J-25 | J-24 | 320.00 | N/A | N/A | N/A | 0.00 | N/A | 8 x 6 ft | 1,126.05 | 6.17 | 1,345.26 | 1,344.53 | 0.002281 | 52nd Street |
| P-26 | J-24 | J-23 | 332.00 | N/A | N/A | N/A | 0.00 | N/A | 8 x 6 ft | 1,135.39 | 6.17 | 1,344.53 | 1,343.76 | 0.002319 | 52nd Street |
| P-25 | J-23 | J-10 | 333.00 | N/A | N/A | N/A | 0.00 | N/A | 8 x 6 ft | 1,126.30 | 6.17 | 1,343.76 | 1,343.00 | 0.002282 | 52nd Street |
| P-47 | I-6 | J-41 | 67.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 10 x 6 ft | 637.00 | 6.08 | 1,348.00 | 1,347.75 | 0.003731 | 52nd Street |
| P-46 | J-41 | J-40 | 428.00 | N/A | N/A | N/A | 0.00 | N/A | 10 x 6 ft | 633.59 | 5.65 | 1,347.75 | 1,346.17 | 0.003692 | 52nd Street |
| P-45 | J-40 | J-39 | 428.00 | N/A | N/A | N/A | 0.00 | N/A | 10 x 6 ft | 635.60 | 5.33 | 1,346.17 | 1,344.58 | 0.003715 | 52nd Street |
| P-44 | J-39 | J-10 | 428.00 | N/A | N/A | N/A | 0.00 | N/A | 10 x 6 ft | 633.59 | 5.33 | 1,344.58 | 1,343.00 | 0.003692 | 52nd Street |
| P-24 | I-2 | J-22 | 60.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 30 inch | 74.88 | 6.85 | 1,404.00 | 1,402.00 | 0.033333 | Tatum Boule |
| P-23 | J-22 | J-21 | 190.00 | N/A | N/A | N/A | 0.00 | N/A | 30 inch | 66.53 | 6.85 | 1,402.00 | 1,397.00 | 0.026316 | Tatum Boule |
| P-22 | J-21 | J-20 | 292.00 | N/A | N/A | N/A | 0.00 | N/A | 30 inch | 67.89 | 6.85 | 1,397.00 | 1,389.00 | 0.027397 | Tatum Boule |
| P-21 | J-20 | J-19 | 300.00 | N/A | N/A | N/A | 0.00 | N/A | 30 inch | 66.98 | 6.85 | 1,389.00 | 1,381.00 | 0.026667 | Tatum Boule |
| P-20 | J-19 | J-18 | 296.00 | N/A | N/A | N/A | 0.00 | N/A | 30 inch | 38.73 | 6.78 | 1,381.00 | 1,378.36 | 0.008919 | Tatum Boule |
| P-19 | J-18 | J-16 | 296.00 | N/A | N/A | N/A | 0.00 | N/A | 36 inch | 55.64 | 4.22 | 1,377.86 | 1,375.80 | 0.006959 | Tatum Boule |
| P-18 | I-1 | J-17 | 443.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 8 x 4 ft | 1,190.88 | 11.16 | 1,390.00 | 1,382.00 | 0.018059 | Doubletree |
| P-17 | J-17 | J-16 | 348.00 | N/A | N/A | N/A | 0.00 | N/A | 8 x 4 ft | 1,274.68 | 11.16 | 1,382.00 | 1,374.80 | 0.020690 | Doubletree |
| P-16 | J-16 | J-15 | 105.00 | N/A | N/A | N/A | 0.00 | N/A | 8 x 4 ft | 1,571.04 | 11.52 | 1,374.80 | 1,371.50 | 0.031429 | Doubletree |
| P-15 | J-15 | J-14 | 516.00 | N/A | N/A | N/A | 0.00 | N/A | 8 x 6 ft | 796.46 | 15.35 | 1,369.50 | 1,364.20 | 0.010271 | Doubletree |
| P-14 | J-14 | J-13 | 516.00 | N/A | N/A | N/A | 0.00 | N/A | 8 x 6 ft | 796.46 | 15.35 | 1,364.20 | 1,358.90 | 0.010271 | Doubletree |



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# Combined Pipe/Node Report

| Pipe | Upstream Node | Downstream Node | Length (ft) | Inlet Area (acres) | Weighted Roughness Coefficient | Inlet CA (acres) | Total CA (acres) | Inlet Discharge (cfs) | Section Size | Capacity (cfs) | Average Velocity (ft/s) | Upstream Invert Elevation (ft) | Downstream Invert Elevation (ft) | Constructed Slope (ft/ft) | Description |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P-13 | J-13 | J-12 | 516.00 | N/A | N/A | N/A | 0.00 | N/A | 8 x 6 ft | 796.46 | 15.35 | 1,358.90 | 1,353.60 | 0.010271 | Doubletree |
| P-12 | J-12 | J-11 | 516.00 | N/A | N/A | N/A | 0.00 | N/A | 8 x 6 ft | 796.46 | 15.35 | 1,353.60 | 1,348.30 | 0.010271 | Doubletree |
| P-11 | J-11 | J-10 | 516.00 | N/A | N/A | N/A | 0.00 | N/A | 8 x 6 ft | 796.46 | 15.35 | 1,348.30 | 1,343.00 | 0.010271 | Doubletree |
| P-10 | J-10 | J-9 | 441.00 | N/A | N/A | N/A | 0.00 | N/A | 10 x 6 ft | 2,224.63 | 10.81 | 1,343.00 | 1,340.77 | 0.005057 | Doubletree |
| P-9 | J-9 | J-8 | 441.00 | N/A | N/A | N/A | 0.00 | N/A | 10 x 6 ft | 2,229.61 | 10.81 | 1,340.77 | 1,338.53 | 0.005079 | Doubletree |
| P-8 | J-8 | J-7 | 442.00 | N/A | N/A | N/A | 0.00 | N/A | 10 x 6 ft | 2,222.11 | 10.81 | 1,338.53 | 1,336.30 | 0.005045 | Doubletree |
| P-7 | J-7 | J-6 | 425.00 | N/A | N/A | N/A | 0.00 | N/A | 10 x 6 ft | 2,225.10 | 11.47 | 1,336.30 | 1,334.15 | 0.005059 | Doubletree |
| P-6 | J-6 | J-5 | 425.00 | N/A | N/A | N/A | 0.00 | N/A | 10 x 6 ft | 2,225.10 | 11.47 | 1,334.15 | 1,332.00 | 0.005059 | Doubletree |
| P-5 | J-5 | J-4 | 425.00 | N/A | N/A | N/A | 0.00 | N/A | 10 x 6 ft | 2,225.10 | 11.47 | 1,332.00 | 1,329.85 | 0.005059 | Doubletree |
| P-4 | J-4 | J-3 | 535.00 | N/A | N/A | N/A | 0.00 | N/A | 10 x 6 ft | 2,518.28 | 10.90 | 1,329.85 | 1,327.90 | 0.003645 | Doubletree |
| P-3 | J-3 | J-2 | 535.00 | N/A | N/A | N/A | 0.00 | N/A | 10 x 6 ft | 2,518.28 | 10.90 | 1,327.90 | 1,325.95 | 0.003645 | Doubletree |
| P-2 | J-2 | J-1 | 390.00 | N/A | N/A | N/A | 0.00 | N/A | 10 x 6 ft | 2,472.25 | 11.55 | 1,325.90 | 1,324.53 | 0.003513 | Doubletree |
| P-1 | J-1 | Outlet | 145.00 | N/A | N/A | N/A | 0.00 | N/A | 10 x 6 ft | 2,521.84 | 12.27 | 1,324.53 | 1,324.00 | 0.003655 | Doubletree |

# DOT Report

| Pipe | -Node- Upstream Downstream | Inlet Area (acres) | Inlet CA (acres) | Total CA (acres) | -Ground- Upstream Downstream (ft) | -HGL- Upstream Downstream (ft) | -Slope- Energy Constructed (ft/ft) | -Section- Discharge Capacity (cfs) | -Section- Shape Size | Length (ft) | Average Velocity (ft/s) | Description |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P-49 | I-8 | 0.00 | 0.00 | 0.00 | 1,342.00 | 1,338.29 | 0.017770 | 183.00 | Circular | 30.00 | 14.71 | |
| | J-4 | | | | 1,340.00 | 1,337.89 | 0.088333 | 426.90 | 48 inch | | | |
| P-43 | I-5 | 0.00 | 0.00 | 0.00 | 1,347.00 | 1,345.04 | 0.005293 | 368.00 | Box | 90.00 | 11.26 | 56th Street□ |
| | J-38 | | | | 1,346.50 | 1,344.66 | 0.005333 | 444.97 | 8 x 5 ft | | | |
| P-42 | J-38 | N/A | N/A | 0.00 | 1,346.50 | 1,344.56 | 0.005382 | 368.00 | Box | 460.00 | 11.04 | 56th Street□ |
| | J-37 | | | | 1,346.00 | 1,342.32 | 0.005435 | 449.19 | 8 x 5 ft | | | |
| P-41 | J-37 | N/A | N/A | 0.00 | 1,346.00 | 1,342.23 | 0.003515 | 368.00 | Box | 525.00 | 10.06 | 56th Street□ |
| | J-36 | | | | 1,343.00 | 1,340.92 | 0.005429 | 448.93 | 8 x 5 ft | | | |
| P-40 | J-36 | N/A | N/A | 0.00 | 1,343.00 | 1,340.86 | 0.003648 | 368.00 | Box | 525.00 | 9.20 | 56th Street□ |
| | J-35 | | | | 1,342.00 | 1,338.94 | 0.005429 | 448.93 | 8 x 5 ft | | | |
| P-39 | J-35 | N/A | N/A | 0.00 | 1,342.00 | 1,338.88 | 0.003648 | 368.00 | Box | 270.00 | 9.20 | 56th Street□ |
| | J-4 | | | | 1,340.00 | 1,337.89 | 0.005444 | 449.59 | 8 x 5 ft | | | |
| P-48 | I-7 | 0.00 | 0.00 | 0.00 | 1,347.00 | 1,345.01 | 0.006749 | 118.00 | Circular | 20.00 | 9.39 | |
| | J-7 | | | | 1,347.00 | 1,344.87 | 0.085000 | 418.77 | 48 inch | | | |
| P-50 | I-9 | 0.00 | 0.00 | 0.00 | 1,367.00 | 1,362.34 | 0.043540 | 364.00 | Circular | 32.00 | 18.63 | |
| | J-29 | | | | 1,367.00 | 1,361.05 | 0.062500 | 651.07 | 60 inch | | | |
| P-38 | I-4 | 0.00 | 0.00 | 0.00 | 1,396.00 | 1,393.04 | 0.029914 | 101.00 | Circular | 475.00 | 9.02 | Butler Drive |
| | J-34 | | | | 1,382.00 | 1,379.30 | 0.030526 | 250.96 | 48 inch | | | |
| P-37 | J-34 | N/A | N/A | 0.00 | 1,382.00 | 1,378.54 | 0.024651 | 101.00 | Circular | 475.00 | 9.02 | Butler Drive |
| | J-33 | | | | 1,372.50 | 1,367.30 | 0.025263 | 228.30 | 48 inch | | | |
| P-36 | J-33 | N/A | N/A | 0.00 | 1,372.50 | 1,366.54 | 0.010248 | 101.00 | Circular | 545.00 | 8.95 | Butler Drive |
| | J-32 | | | | 1,364.00 | 1,361.46 | 0.011009 | 150.71 | 48 inch | | | |
| P-35 | J-32 | N/A | N/A | 0.00 | 1,364.00 | 1,361.24 | 0.001491 | 101.00 | Circular | 140.00 | 5.19 | Butler Drive |
| | J-29 | | | | 1,367.00 | 1,361.05 | 0.014286 | 311.27 | 60 inch | | | |
| P-34 | I-3 | 0.00 | 0.00 | 0.00 | 1,378.00 | 1,374.44 | 0.012448 | 424.00 | Box | 415.00 | 11.80 | 52nd Street |
| | J-31 | | | | 1,373.00 | 1,369.38 | 0.012458 | 680.08 | 8 x 5 ft | | | |
| P-33 | J-31 | N/A | N/A | 0.00 | 1,373.00 | 1,369.27 | 0.012424 | 424.00 | Box | 415.00 | 11.80 | 52nd Street |
| | J-30 | | | | 1,370.00 | 1,364.22 | 0.012434 | 679.42 | 8 x 5 ft | | | |
| P-32 | J-30 | N/A | N/A | 0.00 | 1,370.00 | 1,364.11 | 0.008499 | 424.00 | Box | 415.00 | 11.27 | 52nd Street |
| | J-29 | | | | 1,367.00 | 1,361.05 | 0.012458 | 680.08 | 8 x 5 ft | | | |
| P-31 | J-29 | N/A | N/A | 0.00 | 1,367.00 | 1,359.71 | 0.005322 | 889.00 | Box | 536.00 | 11.11 | 52nd Street |
| | J-28 | | | | 1,362.50 | 1,356.86 | 0.005317 | 888.60 | 8 x 5 ft | | | |
| P-30 | J-28 | N/A | N/A | 0.00 | 1,362.50 | 1,356.76 | 0.005322 | 889.00 | Box | 405.00 | 11.11 | 52nd Street |
| | J-27 | | | | 1,360.00 | 1,354.60 | 0.005309 | 887.89 | 8 x 5 ft | | | |
| P-29 | J-27 | N/A | N/A | 0.00 | 1,360.00 | 1,354.54 | 0.001422 | 889.00 | Box | 405.00 | 6.17 | 52nd Street |
| | J-26 | | | | 1,357.00 | 1,353.97 | 0.006173 | 1,852.30 | 8 x 6 ft | | | |
| P-28 | J-26 | N/A | N/A | 0.00 | 1,357.00 | 1,353.94 | 0.001422 | 889.00 | Box | 320.00 | 6.17 | 52nd Street |

# DOT Report

| Pipe | -Node- Upstream Downstream | Inlet Area (acres) | Inlet CA (acres) | Total CA (acres) | -Ground- Upstream Downstream (ft) | -HGL- Upstream Downstream (ft) | -Slope- Energy Constructed (ft/ft) | -Section- Discharge Capacity (cfs) | -Section- Shape Size | Length (ft) | Average Velocity (ft/s) | Description |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | J-25 | | | | 1,356.00 | 1,353.48 | 0.002313 | 1,133.73 | 8 x 6 ft | | | |
| P-27 | J-25 | N/A | N/A | 0.00 | 1,356.00 | 1,353.45 | 0.001422 | 889.00 | Box | 320.00 | 6.17 | 52nd Street |
| | J-24 | | | | 1,355.00 | 1,353.00 | 0.002281 | 1,126.05 | 8 x 6 ft | | | |
| P-26 | J-24 | N/A | N/A | 0.00 | 1,355.00 | 1,352.97 | 0.001422 | 889.00 | Box | 332.00 | 6.17 | 52nd Street |
| | J-23 | | | | 1,356.50 | 1,352.50 | 0.002319 | 1,135.39 | 8 x 6 ft | | | |
| P-25 | J-23 | N/A | N/A | 0.00 | 1,356.50 | 1,352.47 | 0.001422 | 889.00 | Box | 333.00 | 6.17 | 52nd Street |
| | J-10 | | | | 1,356.00 | 1,351.99 | 0.002282 | 1,126.30 | 8 x 6 ft | | | |
| P-47 | I-6 | 0.00 | 0.00 | 0.00 | 1,356.50 | 1,353.14 | 0.000805 | 320.00 | Box | 67.00 | 6.08 | 52nd Street |
| | J-41 | | | | 1,356.00 | 1,353.15 | 0.003731 | 637.00 | 10 x 6 ft | | | |
| P-46 | J-41 | N/A | N/A | 0.00 | 1,356.00 | 1,353.12 | 0.000895 | 320.00 | Box | 428.00 | 5.65 | 52nd Street |
| | J-40 | | | | 1,356.00 | 1,352.84 | 0.003692 | 633.59 | 10 x 6 ft | | | |
| P-45 | J-40 | N/A | N/A | 0.00 | 1,356.00 | 1,352.82 | 0.000942 | 320.00 | Box | 428.00 | 5.33 | 52nd Street |
| | J-39 | | | | 1,356.00 | 1,352.42 | 0.003715 | 635.60 | 10 x 6 ft | | | |
| P-44 | J-39 | N/A | N/A | 0.00 | 1,356.00 | 1,352.40 | 0.000942 | 320.00 | Box | 428.00 | 5.33 | 52nd Street |
| | J-10 | | | | 1,356.00 | 1,351.99 | 0.003692 | 633.59 | 10 x 6 ft | | | |
| P-24 | I-2 | 0.00 | 0.00 | 0.00 | 1,409.00 | 1,405.84 | 0.030717 | 29.00 | Circular | 60.00 | 6.85 | Tatum Boule |
| | J-22 | | | | 1,407.00 | 1,404.27 | 0.033333 | 74.88 | 30 inch | | | |
| P-23 | J-22 | N/A | N/A | 0.00 | 1,407.00 | 1,403.84 | 0.025490 | 29.00 | Circular | 190.00 | 6.85 | Tatum Boule |
| | J-21 | | | | 1,402.00 | 1,399.27 | 0.026316 | 66.53 | 30 inch | | | |
| P-22 | J-21 | N/A | N/A | 0.00 | 1,402.00 | 1,398.84 | 0.026860 | 29.00 | Circular | 292.00 | 6.85 | Tatum Boule |
| | J-20 | | | | 1,394.50 | 1,391.27 | 0.027397 | 67.89 | 30 inch | | | |
| P-21 | J-20 | N/A | N/A | 0.00 | 1,394.50 | 1,390.84 | 0.026143 | 29.00 | Circular | 300.00 | 6.85 | Tatum Boule |
| | J-19 | | | | 1,386.00 | 1,383.27 | 0.026667 | 66.98 | 30 inch | | | |
| P-20 | J-19 | N/A | N/A | 0.00 | 1,386.00 | 1,382.84 | 0.008227 | 29.00 | Circular | 296.00 | 6.78 | Tatum Boule |
| | J-18 | | | | 1,383.50 | 1,380.70 | 0.008919 | 38.73 | 30 inch | | | |
| P-19 | J-18 | N/A | N/A | 0.00 | 1,383.50 | 1,380.56 | 0.001866 | 29.00 | Circular | 296.00 | 4.22 | Tatum Boule |
| | J-16 | | | | 1,382.00 | 1,380.04 | 0.006959 | 55.64 | 36 inch | | | |
| P-18 | I-1 | 0.00 | 0.00 | 0.00 | 1,397.00 | 1,393.93 | 0.017983 | 708.00 | Box | 443.00 | 11.16 | Doubletree |
| | J-17 | | | | 1,388.00 | 1,386.03 | 0.018059 | 1,190.88 | 8 x 4 ft | | | |
| P-17 | J-17 | N/A | N/A | 0.00 | 1,388.00 | 1,385.93 | 0.017132 | 708.00 | Box | 348.00 | 11.16 | Doubletree |
| | J-16 | | | | 1,382.00 | 1,380.04 | 0.020690 | 1,274.68 | 8 x 4 ft | | | |
| P-16 | J-16 | N/A | N/A | 0.00 | 1,382.00 | 1,378.80 | 0.010493 | 737.00 | Box | 105.00 | 11.52 | Doubletree |
| | J-15 | | | | 1,380.00 | 1,377.70 | 0.031429 | 1,571.04 | 8 x 4 ft | | | |
| P-15 | J-15 | N/A | N/A | 0.00 | 1,380.00 | 1,375.50 | 0.008953 | 737.00 | Box | 516.00 | 15.35 | Doubletree |
| | J-14 | | | | 1,375.00 | 1,370.88 | 0.010271 | 796.46 | 8 x 6 ft | | | |
| P-14 | J-14 | N/A | N/A | 0.00 | 1,375.00 | 1,370.70 | 0.008795 | 737.00 | Box | 516.00 | 15.35 | Doubletree |
| | J-13 | | | | 1,370.00 | 1,366.16 | 0.010271 | 796.46 | 8 x 6 ft | | | |

# DOT Report

| Pipe | -Node- Upstream Downstream | Inlet Area (acres) | Inlet CA (acres) | Total CA (acres) | -Ground- Upstream Downstream (ft) | -HGL- Upstream Downstream (ft) | -Slope- Energy Constructed (ft/ft) | -Section- Discharge Capacity (cfs) | -Section- Shape Size | Length (ft) | Average Velocity (ft/s) | Description |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P-13 | J-13 | N/A | N/A | 0.00 | 1,370.00 | 1,365.98 | 0.008795 | 737.00 | Box | 516.00 | 15.35 | Doubletree |
| | J-12 | | | | 1,365.00 | 1,361.44 | 0.010271 | 796.46 | 8 x 6 ft | | | |
| P-12 | J-12 | N/A | N/A | 0.00 | 1,365.00 | 1,361.25 | 0.008795 | 737.00 | Box | 516.00 | 15.35 | Doubletree |
| | J-11 | | | | 1,360.00 | 1,356.72 | 0.010271 | 796.46 | 8 x 6 ft | | | |
| P-11 | J-11 | N/A | N/A | 0.00 | 1,360.00 | 1,356.53 | 0.008795 | 737.00 | Box | 516.00 | 15.35 | Doubletree |
| | J-10 | | | | 1,356.00 | 1,351.99 | 0.010271 | 796.46 | 8 x 6 ft | | | |
| P-10 | J-10 | N/A | N/A | 0.00 | 1,356.00 | 1,350.18 | 0.003869 | 1,946.00 | Box | 441.00 | 10.81 | Doubletree |
| | J-9 | | | | 1,352.00 | 1,348.47 | 0.005057 | 2,224.63 | 10 x 6 ft | | | |
| P-9 | J-9 | N/A | N/A | 0.00 | 1,352.00 | 1,348.38 | 0.003869 | 1,946.00 | Box | 441.00 | 10.81 | Doubletree |
| | J-8 | | | | 1,349.00 | 1,346.67 | 0.005079 | 2,229.61 | 10 x 6 ft | | | |
| P-8 | J-8 | N/A | N/A | 0.00 | 1,349.00 | 1,346.58 | 0.003869 | 1,946.00 | Box | 442.00 | 10.81 | Doubletree |
| | J-7 | | | | 1,347.00 | 1,344.87 | 0.005045 | 2,222.11 | 10 x 6 ft | | | |
| P-7 | J-7 | N/A | N/A | 0.00 | 1,347.00 | 1,343.65 | 0.004353 | 2,064.00 | Box | 425.00 | 11.47 | Doubletree |
| | J-6 | | | | 1,344.00 | 1,341.80 | 0.005059 | 2,225.10 | 10 x 6 ft | | | |
| P-6 | J-6 | N/A | N/A | 0.00 | 1,344.00 | 1,341.70 | 0.004353 | 2,064.00 | Box | 425.00 | 11.47 | Doubletree |
| | J-5 | | | | 1,343.50 | 1,339.85 | 0.005059 | 2,225.10 | 10 x 6 ft | | | |
| P-5 | J-5 | N/A | N/A | 0.00 | 1,343.50 | 1,339.74 | 0.004353 | 2,064.00 | Box | 425.00 | 11.47 | Doubletree |
| | J-4 | | | | 1,340.00 | 1,337.89 | 0.005059 | 2,225.10 | 10 x 6 ft | | | |
| P-4 | J-4 | N/A | N/A | 0.00 | 1,340.00 | 1,336.60 | 0.003930 | 2,615.00 | Box | 535.00 | 10.90 | Doubletree |
| | J-3 | | | | 1,338.50 | 1,334.50 | 0.003645 | 2,518.28 | 10 x 6 ft | | | |
| P-3 | J-3 | N/A | N/A | 0.00 | 1,338.50 | 1,334.41 | 0.003930 | 2,615.00 | Box | 535.00 | 10.90 | Doubletree |
| | J-2 | | | | 1,336.00 | 1,332.30 | 0.003645 | 2,518.28 | 10 x 6 ft | | | |
| P-2 | J-2 | N/A | N/A | 0.00 | 1,336.00 | 1,332.21 | 0.004758 | 2,615.00 | Box | 390.00 | 11.55 | Doubletree |
| | J-1 | | | | 1,331.00 | 1,329.89 | 0.003513 | 2,472.25 | 10 x 6 ft | | | |
| P-1 | J-1 | N/A | N/A | 0.00 | 1,331.00 | 1,329.63 | 0.003258 | 2,615.00 | Box | 145.00 | 12.27 | Doubletree |
| | Outlet | | | | 1,331.00 | 1,329.57 | 0.003655 | 2,521.84 | 10 x 6 ft | | | |

# Pipe Report

| Upstream Node | Downstream Node | Weighted Roughness Coefficient | Discharge (cfs) | Length (ft) | Constructed Slope (ft/ft) | Section Size | Roughness | Capacity (cfs) | Upstream Invert Elevation (ft) | Downstream Invert Elevation (ft) | Upstream Ground Elevation (ft) | Downstream Ground Elevation (ft) | Upstream Cover (ft) | Downstream Cover (ft) | Upstream HGL (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| I-8 | J-4 | 0.00 | 183.00 | 30.00 | 0.088333 | 48 inch | 0.013 | 426.90 | 1,334.50 | 1,331.85 | 1,342.00 | 1,340.00 | 3.50 | 4.15 | 1,338.29 |
| I-5 | J-38 | 0.00 | 368.00 | 90.00 | 0.005333 | 8 x 5 ft | 0.013 | 444.97 | 1,341.00 | 1,340.52 | 1,347.00 | 1,346.50 | 1.00 | 0.98 | 1,345.04 |
| J-38 | J-37 | N/A | 368.00 | 460.00 | 0.005435 | 8 x 5 ft | 0.013 | 449.19 | 1,340.52 | 1,338.02 | 1,346.50 | 1,346.00 | 0.98 | 2.98 | 1,344.56 |
| J-37 | J-36 | N/A | 368.00 | 525.00 | 0.005429 | 8 x 5 ft | 0.013 | 448.93 | 1,338.02 | 1,335.17 | 1,346.00 | 1,343.00 | 2.98 | 2.83 | 1,342.23 |
| J-36 | J-35 | N/A | 368.00 | 525.00 | 0.005429 | 8 x 5 ft | 0.013 | 448.93 | 1,335.17 | 1,332.32 | 1,343.00 | 1,342.00 | 2.83 | 4.68 | 1,340.86 |
| J-35 | J-4 | N/A | 368.00 | 270.00 | 0.005444 | 8 x 5 ft | 0.013 | 449.59 | 1,332.32 | 1,330.85 | 1,342.00 | 1,340.00 | 4.68 | 4.15 | 1,338.88 |
| I-7 | J-7 | 0.00 | 118.00 | 20.00 | 0.085000 | 48 inch | 0.013 | 418.77 | 1,340.00 | 1,338.30 | 1,347.00 | 1,347.00 | 3.00 | 4.70 | 1,345.01 |
| I-9 | J-29 | 0.00 | 364.00 | 32.00 | 0.062500 | 60 inch | 0.013 | 651.07 | 1,357.50 | 1,355.50 | 1,367.00 | 1,367.00 | 4.50 | 6.50 | 1,362.34 |
| I-4 | J-34 | 0.00 | 101.00 | 475.00 | 0.030526 | 48 inch | 0.013 | 250.96 | 1,390.00 | 1,375.50 | 1,396.00 | 1,382.00 | 2.00 | 2.50 | 1,393.04 |
| J-34 | J-33 | N/A | 101.00 | 475.00 | 0.025263 | 48 inch | 0.013 | 228.30 | 1,375.50 | 1,363.50 | 1,382.00 | 1,372.50 | 2.50 | 5.00 | 1,378.54 |
| J-33 | J-32 | N/A | 101.00 | 545.00 | 0.011009 | 48 inch | 0.013 | 150.71 | 1,363.50 | 1,357.50 | 1,372.50 | 1,364.00 | 5.00 | 2.50 | 1,366.54 |
| J-32 | J-29 | N/A | 101.00 | 140.00 | 0.014286 | 60 inch | 0.013 | 311.27 | 1,356.50 | 1,354.50 | 1,364.00 | 1,367.00 | 2.50 | 7.50 | 1,361.24 |
| I-3 | J-31 | 0.00 | 424.00 | 415.00 | 0.012458 | 8 x 5 ft | 0.013 | 680.08 | 1,370.00 | 1,364.83 | 1,378.00 | 1,373.00 | 3.00 | 3.17 | 1,374.44 |
| J-31 | J-30 | N/A | 424.00 | 415.00 | 0.012434 | 8 x 5 ft | 0.013 | 679.42 | 1,364.83 | 1,359.67 | 1,373.00 | 1,370.00 | 3.17 | 5.33 | 1,369.27 |
| J-30 | J-29 | N/A | 424.00 | 415.00 | 0.012458 | 8 x 5 ft | 0.013 | 680.08 | 1,359.67 | 1,354.50 | 1,370.00 | 1,367.00 | 5.33 | 7.50 | 1,364.11 |
| J-29 | J-28 | N/A | 889.00 | 536.00 | 0.005317 | 8 x 5 ft | 0.013 | 888.60 | 1,354.50 | 1,351.65 | 1,367.00 | 1,362.50 | 7.50 | 5.85 | 1,359.71 |
| J-28 | J-27 | N/A | 889.00 | 405.00 | 0.005309 | 8 x 5 ft | 0.013 | 887.89 | 1,351.65 | 1,349.50 | 1,362.50 | 1,360.00 | 5.85 | 5.50 | 1,356.76 |
| J-27 | J-26 | N/A | 889.00 | 405.00 | 0.006173 | 8 x 6 ft | 0.013 | 1,852.30 | 1,348.50 | 1,346.00 | 1,360.00 | 1,357.00 | 5.50 | 5.00 | 1,354.54 |
| J-26 | J-25 | N/A | 889.00 | 320.00 | 0.002313 | 8 x 6 ft | 0.013 | 1,133.73 | 1,346.00 | 1,345.26 | 1,357.00 | 1,356.00 | 5.00 | 4.74 | 1,353.94 |
| J-25 | J-24 | N/A | 889.00 | 320.00 | 0.002281 | 8 x 6 ft | 0.013 | 1,126.05 | 1,345.26 | 1,344.53 | 1,356.00 | 1,355.00 | 4.74 | 4.47 | 1,353.45 |
| J-24 | J-23 | N/A | 889.00 | 332.00 | 0.002319 | 8 x 6 ft | 0.013 | 1,135.39 | 1,344.53 | 1,343.76 | 1,355.00 | 1,356.50 | 4.47 | 6.74 | 1,352.97 |
| J-23 | J-10 | N/A | 889.00 | 333.00 | 0.002282 | 8 x 6 ft | 0.013 | 1,126.30 | 1,343.76 | 1,343.00 | 1,356.50 | 1,356.00 | 6.74 | 7.00 | 1,352.47 |
| I-6 | J-41 | 0.00 | 320.00 | 67.00 | 0.003731 | 10 x 6 ft | 0.013 | 637.00 | 1,348.00 | 1,347.75 | 1,356.50 | 1,356.00 | 2.50 | 2.25 | 1,353.14 |
| J-41 | J-40 | N/A | 320.00 | 428.00 | 0.003692 | 10 x 6 ft | 0.013 | 633.59 | 1,347.75 | 1,346.17 | 1,356.00 | 1,356.00 | 2.25 | 3.83 | 1,353.12 |
| J-40 | J-39 | N/A | 320.00 | 428.00 | 0.003715 | 10 x 6 ft | 0.013 | 635.60 | 1,346.17 | 1,344.58 | 1,356.00 | 1,356.00 | 3.83 | 5.42 | 1,352.82 |
| J-39 | J-10 | N/A | 320.00 | 428.00 | 0.003692 | 10 x 6 ft | 0.013 | 633.59 | 1,344.58 | 1,343.00 | 1,356.00 | 1,356.00 | 5.42 | 7.00 | 1,352.40 |
| I-2 | J-22 | 0.00 | 29.00 | 60.00 | 0.033333 | 30 inch | 0.013 | 74.88 | 1,404.00 | 1,402.00 | 1,409.00 | 1,407.00 | 2.50 | 2.50 | 1,405.84 |
| J-22 | J-21 | N/A | 29.00 | 190.00 | 0.026316 | 30 inch | 0.013 | 66.53 | 1,402.00 | 1,397.00 | 1,407.00 | 1,402.00 | 2.50 | 2.50 | 1,403.84 |
| J-21 | J-20 | N/A | 29.00 | 292.00 | 0.027397 | 30 inch | 0.013 | 67.89 | 1,397.00 | 1,389.00 | 1,402.00 | 1,394.50 | 2.50 | 3.00 | 1,398.84 |
| J-20 | J-19 | N/A | 29.00 | 300.00 | 0.026667 | 30 inch | 0.013 | 66.98 | 1,389.00 | 1,381.00 | 1,394.50 | 1,386.00 | 3.00 | 2.50 | 1,390.84 |
| J-19 | J-18 | N/A | 29.00 | 296.00 | 0.008919 | 30 inch | 0.013 | 38.73 | 1,381.00 | 1,378.36 | 1,386.00 | 1,383.50 | 2.50 | 2.64 | 1,382.84 |
| J-18 | J-16 | N/A | 29.00 | 296.00 | 0.006959 | 36 inch | 0.013 | 55.64 | 1,377.86 | 1,375.80 | 1,383.50 | 1,382.00 | 2.64 | 3.20 | 1,380.56 |
| I-1 | J-17 | 0.00 | 708.00 | 443.00 | 0.018059 | 8 x 4 ft | 0.013 | 1,190.88 | 1,390.00 | 1,382.00 | 1,397.00 | 1,388.00 | 3.00 | 2.00 | 1,393.93 |
| J-17 | J-16 | N/A | 708.00 | 348.00 | 0.020690 | 8 x 4 ft | 0.013 | 1,274.68 | 1,382.00 | 1,374.80 | 1,388.00 | 1,382.00 | 2.00 | 3.20 | 1,385.93 |
| J-16 | J-15 | N/A | 737.00 | 105.00 | 0.031429 | 8 x 4 ft | 0.013 | 1,571.04 | 1,374.80 | 1,371.50 | 1,382.00 | 1,380.00 | 3.20 | 4.50 | 1,378.80 |
| J-15 | J-14 | N/A | 737.00 | 516.00 | 0.010271 | 8 x 6 ft | 0.013 | 796.46 | 1,369.50 | 1,364.20 | 1,380.00 | 1,375.00 | 4.50 | 4.80 | 1,375.50 |
| J-14 | J-13 | N/A | 737.00 | 516.00 | 0.010271 | 8 x 6 ft | 0.013 | 796.46 | 1,364.20 | 1,358.90 | 1,375.00 | 1,370.00 | 4.80 | 5.10 | 1,370.70 |

# Pipe Report

| Upstream Node | Downstream Node | Weighted Roughness Coefficient | Discharge (cfs) | Length (ft) | Constructed Slope (ft/ft) | Section Size | Roughness | Capacity (cfs) | Upstream Invert Elevation (ft) | Downstream Invert Elevation (ft) | Upstream Ground Elevation (ft) | Downstream Ground Elevation (ft) | Upstream Cover (ft) | Downstream Cover (ft) | Upstream HGL (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| J-13 | J-12 | N/A | 737.00 | 516.00 | 0.010271 | 8 x 6 ft | 0.013 | 796.46 | 1,358.90 | 1,353.60 | 1,370.00 | 1,365.00 | 5.10 | 5.40 | 1,365.98 |
| J-12 | J-11 | N/A | 737.00 | 516.00 | 0.010271 | 8 x 6 ft | 0.013 | 796.46 | 1,353.60 | 1,348.30 | 1,365.00 | 1,360.00 | 5.40 | 5.70 | 1,361.25 |
| J-11 | J-10 | N/A | 737.00 | 516.00 | 0.010271 | 8 x 6 ft | 0.013 | 796.46 | 1,348.30 | 1,343.00 | 1,360.00 | 1,356.00 | 5.70 | 7.00 | 1,356.53 |
| J-10 | J-9 | N/A | 1,946.00 | 441.00 | 0.005057 | 10 x 6 ft | 0.013 | 2,224.63 | 1,343.00 | 1,340.77 | 1,356.00 | 1,352.00 | 7.00 | 5.23 | 1,350.18 |
| J-9 | J-8 | N/A | 1,946.00 | 441.00 | 0.005079 | 10 x 6 ft | 0.013 | 2,229.61 | 1,340.77 | 1,338.53 | 1,352.00 | 1,349.00 | 5.23 | 4.47 | 1,348.38 |
| J-8 | J-7 | N/A | 1,946.00 | 442.00 | 0.005045 | 10 x 6 ft | 0.013 | 2,222.11 | 1,338.53 | 1,336.30 | 1,349.00 | 1,347.00 | 4.47 | 4.70 | 1,346.58 |
| J-7 | J-6 | N/A | 2,064.00 | 425.00 | 0.005059 | 10 x 6 ft | 0.013 | 2,225.10 | 1,336.30 | 1,334.15 | 1,347.00 | 1,344.00 | 4.70 | 3.85 | 1,343.65 |
| J-6 | J-5 | N/A | 2,064.00 | 425.00 | 0.005059 | 10 x 6 ft | 0.013 | 2,225.10 | 1,334.15 | 1,332.00 | 1,344.00 | 1,343.50 | 3.85 | 5.50 | 1,341.70 |
| J-5 | J-4 | N/A | 2,064.00 | 425.00 | 0.005059 | 10 x 6 ft | 0.013 | 2,225.10 | 1,332.00 | 1,329.85 | 1,343.50 | 1,340.00 | 5.50 | 4.15 | 1,339.74 |
| J-4 | J-3 | N/A | 2,615.00 | 535.00 | 0.003645 | 10 x 6 ft | 0.013 | 2,518.28 | 1,329.85 | 1,327.90 | 1,340.00 | 1,338.50 | 4.15 | 4.60 | 1,336.60 |
| J-3 | J-2 | N/A | 2,615.00 | 535.00 | 0.003645 | 10 x 6 ft | 0.013 | 2,518.28 | 1,327.90 | 1,325.95 | 1,338.50 | 1,336.00 | 4.60 | 4.05 | 1,334.41 |
| J-2 | J-1 | N/A | 2,615.00 | 390.00 | 0.003513 | 10 x 6 ft | 0.013 | 2,472.25 | 1,325.90 | 1,324.53 | 1,336.00 | 1,331.00 | 4.10 | 0.47 | 1,332.21 |
| J-1 | Outlet | N/A | 2,615.00 | 145.00 | 0.003655 | 10 x 6 ft | 0.013 | 2,521.84 | 1,324.53 | 1,324.00 | 1,331.00 | 1,331.00 | 0.47 | 1.00 | 1,329.63 |

# Node Report

| HGL In (ft) | HGL Out (ft) | Ground Elevation (ft) | Known Flow (cfs) | Node | Structure Discharge (cfs) | System Flow Time (min) | Velocity (ft/s) |
|---|---|---|---|---|---|---|---|
| 1,338.97 | 1,338.29 | 1,342.00 | 183.00 | I-8 | 183.00 | 0.00 | 14.87 |
| 1,345.44 | 1,345.04 | 1,347.00 | 368.00 | I-5 | 368.00 | 0.00 | 11.40 |
| 1,344.66 | 1,344.56 | 1,346.50 | N/A | J-38 | 368.00 | 0.13 | 11.40 |
| 1,342.32 | 1,342.23 | 1,346.00 | N/A | J-37 | 368.00 | 0.83 | 10.92 |
| 1,340.92 | 1,340.86 | 1,343.00 | N/A | J-36 | 368.00 | 1.70 | 9.20 |
| 1,338.94 | 1,338.88 | 1,342.00 | N/A | J-35 | 368.00 | 2.65 | 9.20 |
| 1,345.28 | 1,345.01 | 1,347.00 | 118.00 | I-7 | 118.00 | 0.00 | 9.39 |
| 1,363.43 | 1,362.34 | 1,367.00 | 364.00 | I-9 | 364.00 | 0.00 | 18.73 |
| 1,393.35 | 1,393.04 | 1,396.00 | 101.00 | I-4 | 101.00 | 0.00 | 9.84 |
| 1,379.30 | 1,378.54 | 1,382.00 | N/A | J-34 | 101.00 | 0.88 | 9.84 |
| 1,367.30 | 1,366.54 | 1,372.50 | N/A | J-33 | 101.00 | 1.76 | 9.84 |
| 1,361.46 | 1,361.24 | 1,364.00 | N/A | J-32 | 101.00 | 2.77 | 5.25 |
| 1,374.88 | 1,374.44 | 1,378.00 | 424.00 | I-3 | 424.00 | 0.00 | 11.95 |
| 1,369.38 | 1,369.27 | 1,373.00 | N/A | J-31 | 424.00 | 0.59 | 11.95 |
| 1,364.22 | 1,364.11 | 1,370.00 | N/A | J-30 | 424.00 | 1.17 | 11.95 |
| 1,361.05 | 1,359.71 | 1,367.00 | N/A | J-29 | 889.00 | 3.22 | 11.11 |
| 1,356.86 | 1,356.76 | 1,362.50 | N/A | J-28 | 889.00 | 4.02 | 11.11 |
| 1,354.60 | 1,354.54 | 1,360.00 | N/A | J-27 | 889.00 | 4.63 | 6.17 |
| 1,353.97 | 1,353.94 | 1,357.00 | N/A | J-26 | 889.00 | 5.73 | 6.17 |
| 1,353.48 | 1,353.45 | 1,356.00 | N/A | J-25 | 889.00 | 6.59 | 6.17 |
| 1,353.00 | 1,352.97 | 1,355.00 | N/A | J-24 | 889.00 | 7.45 | 6.17 |
| 1,352.50 | 1,352.47 | 1,356.50 | N/A | J-23 | 889.00 | 8.35 | 6.17 |
| 1,353.27 | 1,353.14 | 1,356.50 | 320.00 | I-6 | 320.00 | 0.00 | 6.22 |
| 1,353.15 | 1,353.12 | 1,356.00 | N/A | J-41 | 320.00 | 0.18 | 5.96 |
| 1,352.84 | 1,352.82 | 1,356.00 | N/A | J-40 | 320.00 | 1.45 | 5.33 |
| 1,352.42 | 1,352.40 | 1,356.00 | N/A | J-39 | 320.00 | 2.78 | 5.33 |
| 1,406.01 | 1,405.84 | 1,409.00 | 29.00 | I-2 | 29.00 | 0.00 | 7.51 |
| 1,404.27 | 1,403.84 | 1,407.00 | N/A | J-22 | 29.00 | 0.15 | 7.51 |
| 1,399.27 | 1,398.84 | 1,402.00 | N/A | J-21 | 29.00 | 0.61 | 7.51 |
| 1,391.27 | 1,390.84 | 1,394.50 | N/A | J-20 | 29.00 | 1.32 | 7.51 |
| 1,383.27 | 1,382.84 | 1,386.00 | N/A | J-19 | 29.00 | 2.05 | 7.51 |
| 1,380.70 | 1,380.56 | 1,383.50 | N/A | J-18 | 29.00 | 2.78 | 4.33 |
| 1,394.33 | 1,393.93 | 1,397.00 | 708.00 | I-1 | 708.00 | 0.00 | 11.25 |
| 1,386.03 | 1,385.93 | 1,388.00 | N/A | J-17 | 708.00 | 0.66 | 11.25 |
| 1,380.04 | 1,378.80 | 1,382.00 | N/A | J-16 | 737.00 | 3.95 | 11.52 |
| 1,377.70 | 1,375.50 | 1,380.00 | N/A | J-15 | 737.00 | 4.10 | 15.35 |
| 1,370.88 | 1,370.70 | 1,375.00 | N/A | J-14 | 737.00 | 4.66 | 15.35 |
| 1,366.16 | 1,365.98 | 1,370.00 | N/A | J-13 | 737.00 | 5.22 | 15.35 |
| 1,361.44 | 1,361.25 | 1,365.00 | N/A | J-12 | 737.00 | 5.78 | 15.35 |
| 1,356.72 | 1,356.53 | 1,360.00 | N/A | J-11 | 737.00 | 6.34 | 15.35 |
| 1,351.99 | 1,350.18 | 1,356.00 | N/A | J-10 | 1,946.00 | 9.25 | 10.81 |
| 1,348.47 | 1,348.38 | 1,352.00 | N/A | J-9 | 1,946.00 | 9.93 | 10.81 |
| 1,346.67 | 1,346.58 | 1,349.00 | N/A | J-8 | 1,946.00 | 10.61 | 10.81 |
| 1,344.87 | 1,343.65 | 1,347.00 | N/A | J-7 | 2,064.00 | 11.29 | 11.47 |
| 1,341.80 | 1,341.70 | 1,344.00 | N/A | J-6 | 2,064.00 | 11.91 | 11.47 |
| 1,339.85 | 1,339.74 | 1,343.50 | N/A | J-5 | 2,064.00 | 12.52 | 11.47 |
| 1,337.89 | 1,336.60 | 1,340.00 | N/A | J-4 | 2,615.00 | 13.14 | 10.90 |
| 1,334.50 | 1,334.41 | 1,338.50 | N/A | J-3 | 2,615.00 | 13.96 | 10.90 |
| 1,332.30 | 1,332.21 | 1,336.00 | N/A | J-2 | 2,615.00 | 14.78 | 10.90 |
| 1,329.89 | 1,329.63 | 1,331.00 | N/A | J-1 | 2,615.00 | 15.34 | 12.81 |
| 1,327.00 | 1,327.00 | 1,331.00 | N/A | Outlet | 2,615.00 | 15.54 | 0.00 |

# Detailed Report for Outlet

## Flows

| Description | | Description | |
|---|---|---|---|
| Total Discharge | 2,615.00 cfs | Known Flow | 2,615.00 cfs |
| Upstream Additional + Carryover | 0.00 cfs | Total Watershed (CIA) | 0.00 cfs |

## Watershed Data

| Description | | Description | |
|---|---|---|---|
| System Intensity | 0.00 in/hr | Upstream CA | 0.00 acres |

## Flow Times

| Description | | Description | |
|---|---|---|---|
| System Flow Time | 15.54 min | Upstream Flow Time | 15.54 min |

## Elevations

| Description | | Description | |
|---|---|---|---|
| HGL In | 1,327.00 ft | HGL Out | 1,327.00 ft |
| Ground Elevation | 1,331.00 ft | Rim Elevation | 1,331.00 ft |

## Other Properties

| Description | | Description | |
|---|---|---|---|
| X | 2,000.23 ft | Y | -38.46 ft |
| Velocity | 0.00 ft/s | Headloss | 0.00 ft |
| Headloss Coefficient | 0.00 | Station | 0+00 ft |
| External Flow | 0.00 cfs | | |

Description:
Tailwater Indian Bend Wash Q=10
Outlet to Indian Bend Wash
At Doubletree Ranch Road

Status/Error Messages:
Information: Known flow propagated from upstream junctions.

# Detailed Report for Pipe P-1

Section Material: Concrete
Section Shape: Box
Section Size: 10 x 6 ft
Number Sections: 4

| Description | | Description | |
|---|---|---|---|
| Discharge | 2,615.00 cfs | Capacity | 2,521.84 cfs |
| Mannings Coefficient | 0.013 | Hydraulic Drop | 0.06 ft |
| Length | 145.00 ft | Energy Slope | 0.003258 ft/ft |
| Constructed Slope | 0.003655 ft/ft | Upstream Velocity | 12.81 ft/s |
| Upstream Flow Time | 15.35 min | Average Velocity | 12.27 ft/s |
| Pipe Flow Time | 0.20 min | Downstream Velocity | 11.73 ft/s |
| System Flow Time | 15.54 min | | |

Grade Elevations

| Location | Invert (ft) | Ground (ft) | Crown (ft) | Cover (ft) | Depth (ft) | HGL (ft) | EGL (ft) |
|---|---|---|---|---|---|---|---|
| Upstream | 1,324.53 | 1,331.00 | 1,330.53 | 0.47 | 5.10 | 1,329.63 | 1,332.18 |
| Downstream | 1,324.00 | 1,331.00 | 1,330.00 | 1.00 | 5.57 | 1,329.57 | 1,331.71 |

Description:
Doubletree Ranch Road
Station 80+49 to Outlet

Messages:
Profile: Steep supercritical frontwater profile (S2).
Profile: Critical depth assumed upstream.

# Detailed Report for J-1

## Flows

| Description | | Description | |
|---|---|---|---|
| Total Discharge | 2,615.00 cfs | Known Flow | 2,615.00 cfs |
| Upstream Additional + Carryover | 0.00 cfs | Total Watershed (CIA) | 0.00 cfs |

## Watershed Data

| Description | | Description | |
|---|---|---|---|
| System Intensity | 0.00 in/hr | Upstream CA | 0.00 acres |
| Total CA | 0.00 acres | | |

## Flow Times

| Description | | Description | |
|---|---|---|---|
| System Flow Time | 15.35 min | Upstream Flow Time | 15.35 min |

## Elevations

| Description | | Description | |
|---|---|---|---|
| HGL In | 1,329.89 ft | HGL Out | 1,329.63 ft |
| Ground Elevation | 1,331.00 ft | Rim Elevation | 1,331.00 ft |

## Other Properties

| Description | | Description | |
|---|---|---|---|
| X | 1,860.21 ft | Y | -0.31 ft |
| Velocity | 12.81 ft/s | Headloss | 0.26 ft |
| Headloss Coefficient | 0.10 | Station | 1+45 ft |
| External Flow | 0.00 cfs | | |

Description:
Doubletree Ranch Road
Station 80+49

Status/Error Messages:
Information: Known flow propagated from upstream junctions.


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# Detailed Report for Pipe P-2

Section Material: Concrete
Section Shape: Box
Section Size: 10 x 6 ft
Number Sections: 4

| Description | | Description | |
|---|---|---|---|
| Discharge | 2,615.00 cfs | Capacity | 2,472.25 cfs |
| Mannings Coefficient | 0.013 | Hydraulic Drop | 2.32 ft |
| Length | 390.00 ft | Energy Slope | 0.004758 ft/ft |
| Constructed Slope | 0.003513 ft/ft | Upstream Velocity | 10.90 ft/s |
| Upstream Flow Time | 14.78 min | Average Velocity | 11.55 ft/s |
| Pipe Flow Time | 0.56 min | Downstream Velocity | 12.20 ft/s |
| System Flow Time | 15.35 min | | |

Grade Elevations

| Location | Invert (ft) | Ground (ft) | Crown (ft) | Cover (ft) | Depth (ft) | HGL (ft) | EGL (ft) |
|---|---|---|---|---|---|---|---|
| Upstream | 1,325.90 | 1,336.00 | 1,331.90 | 4.10 | 6.31 | 1,332.21 | 1,334.06 |
| Downstream | 1,324.53 | 1,331.00 | 1,330.53 | 0.47 | 5.36 | 1,329.89 | 1,332.20 |

Description:
Doubletree Ranch Road
Station 76+59 to 80+49

Messages:
Profile: Mild subcritical drawdown profile (M2).
Profile: Pressure profile.
Profile: Composite profile.

# Detailed Report for J-2

## Flows

| Description | | Description | |
|---|---|---|---|
| Total Discharge | 2,615.00 cfs | Known Flow | 2,615.00 cfs |
| Upstream Additional + Carryover | 0.00 cfs | Total Watershed (CIA) | 0.00 cfs |

## Watershed Data

| Description | | Description | |
|---|---|---|---|
| System Intensity | 0.00 in/hr | Upstream CA | 0.00 acres |
| Total CA | 0.00 acres | | |

## Flow Times

| Description | | Description | |
|---|---|---|---|
| System Flow Time | 14.78 min | Upstream Flow Time | 14.78 min |

## Elevations

| Description | | Description | |
|---|---|---|---|
| HGL In | 1,332.30 ft | HGL Out | 1,332.21 ft |
| Ground Elevation | 1,336.00 ft | Rim Elevation | 1,336.00 ft |

## Other Properties

| Description | | Description | |
|---|---|---|---|
| X | 1,470.41 ft | Y | -0.55 ft |
| Velocity | 10.90 ft/s | Headloss | 0.09 ft |
| Headloss Coefficient | 0.05 | Station | 5+35 ft |
| External Flow | 0.00 cfs | | |

Description:
Doubletree Ranch Road
Station 76+59

Status/Error Messages:
Information: Known flow propagated from upstream junctions.


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# Detailed Report for Pipe P-3

Section Material: Concrete
Section Shape: Box
Section Size: 10 x 6 ft
Number Sections: 4

| Description | | Description | |
|---|---|---|---|
| Discharge | 2,615.00 cfs | Capacity | 2,518.28 cfs |
| Mannings Coefficient | 0.013 | Hydraulic Drop | 2.10 ft |
| Length | 535.00 ft | Energy Slope | 0.003930 ft/ft |
| Constructed Slope | 0.003645 ft/ft | Upstream Velocity | 10.90 ft/s |
| Upstream Flow Time | 13.97 min | Average Velocity | 10.90 ft/s |
| Pipe Flow Time | 0.82 min | Downstream Velocity | 10.90 ft/s |
| System Flow Time | 14.78 min | | |

Grade Elevations

| Location | Invert (ft) | Ground (ft) | Crown (ft) | Cover (ft) | Depth (ft) | HGL (ft) | EGL (ft) |
|---|---|---|---|---|---|---|---|
| Upstream | 1,327.90 | 1,338.50 | 1,333.90 | 4.60 | 6.51 | 1,334.41 | 1,336.25 |
| Downstream | 1,325.95 | 1,336.00 | 1,331.95 | 4.05 | 6.35 | 1,332.30 | 1,334.15 |

Description:
Doubletree Ranch Road
Stations 71+24 to 76+59

Messages:
Profile: Pressure profile.
Information: Surcharged condition

# Detailed Report for J-3

## Flows

| Description | | Description | |
|---|---|---|---|
| Total Discharge | 2,615.00 cfs | Known Flow | 2,615.00 cfs |
| Upstream Additional + Carryover | 0.00 cfs | Total Watershed (CIA) | 0.00 cfs |

## Watershed Data

| Description | | Description | |
|---|---|---|---|
| System Intensity | 0.00 in/hr | Upstream CA | 0.00 acres |
| Total CA | 0.00 acres | | |

## Flow Times

| Description | | Description | |
|---|---|---|---|
| System Flow Time | 13.97 min | Upstream Flow Time | 13.97 min |

## Elevations

| Description | | Description | |
|---|---|---|---|
| HGL In | 1,334.50 ft | HGL Out | 1,334.41 ft |
| Ground Elevation | 1,338.50 ft | Rim Elevation | 1,338.50 ft |

## Other Properties

| Description | | Description | |
|---|---|---|---|
| X | 935.32 ft | Y | -0.42 ft |
| Velocity | 10.90 ft/s | Headloss | 0.09 ft |
| Headloss Coefficient | 0.05 | Station | 10+70 ft |
| External Flow | 0.00 cfs | | |

Description:
Doubletree Ranch Road
Station 71+24

Status/Error Messages:
Information: Known flow propagated from upstream junctions.


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# Detailed Report for Pipe P-4

Section Material: Concrete
Section Shape: Box
Section Size: 10 x 6 ft
Number Sections: 4

| Description | | Description | |
|---|---|---|---|
| Discharge | 2,615.00 cfs | Capacity | 2,518.28 cfs |
| Mannings Coefficient | 0.013 | Hydraulic Drop | 2.10 ft |
| Length | 535.00 ft | Energy Slope | 0.003930 ft/ft |
| Constructed Slope | 0.003645 ft/ft | Upstream Velocity | 10.90 ft/s |
| Upstream Flow Time | 13.15 min | Average Velocity | 10.90 ft/s |
| Pipe Flow Time | 0.82 min | Downstream Velocity | 10.90 ft/s |
| System Flow Time | 13.97 min | | |

Grade Elevations

| Location | Invert (ft) | Ground (ft) | Crown (ft) | Cover (ft) | Depth (ft) | HGL (ft) | EGL (ft) |
|---|---|---|---|---|---|---|---|
| Upstream | 1,329.85 | 1,340.00 | 1,335.85 | 4.15 | 6.75 | 1,336.60 | 1,338.45 |
| Downstream | 1,327.90 | 1,338.50 | 1,333.90 | 4.60 | 6.60 | 1,334.50 | 1,336.34 |

Description:
Doubletree Ranch Road
Stations 65+89 to 71+24

Messages:
Profile: Pressure profile.
Information: Surcharged condition

# Detailed Report for J-4

## Flows

| Description | | Description | |
|---|---|---|---|
| Total Discharge | 2,615.00 cfs | Known Flow | 2,615.00 cfs |
| Upstream Additional + Carryover | 0.00 cfs | Total Watershed (CIA) | 0.00 cfs |

## Watershed Data

| Description | | Description | |
|---|---|---|---|
| System Intensity | 0.00 in/hr | Upstream CA | 0.00 acres |
| Total CA | 0.00 acres | | |

## Flow Times

| Description | | Description | |
|---|---|---|---|
| System Flow Time | 13.15 min | Upstream Flow Time | 13.15 min |

## Elevations

| Description | | Description | |
|---|---|---|---|
| HGL In | 1,337.89 ft | HGL Out | 1,336.60 ft |
| Ground Elevation | 1,340.00 ft | Rim Elevation | 1,340.00 ft |

## Other Properties

| Description | | Description | |
|---|---|---|---|
| X | 400.00 ft | Y | 0.12 ft |
| Velocity | 10.90 ft/s | Headloss | 1.29 ft |
| Headloss Coefficient | 0.70 | Station | 16+05 ft |
| External Flow | 0.00 cfs | | |

Description:
Intersection Doubletree Ranch Road and 56th Street
Station 65+89

Status/Error Messages:
Information: Known flow propagated from upstream junctions.


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# Detailed Report for Pipe P-5

Section Material: Concrete
Section Shape: Box
Section Size: 10 x 6 ft
Number Sections: 3

| Description | | Description | |
|---|---|---|---|
| Discharge | 2,064.00 cfs | Capacity | 2,225.10 cfs |
| Mannings Coefficient | 0.013 | Hydraulic Drop | 1.85 ft |
| Length | 425.00 ft | Energy Slope | 0.004353 ft/ft |
| Constructed Slope | 0.005059 ft/ft | Upstream Velocity | 11.47 ft/s |
| Upstream Flow Time | 12.53 min | Average Velocity | 11.47 ft/s |
| Pipe Flow Time | 0.62 min | Downstream Velocity | 11.47 ft/s |
| System Flow Time | 13.15 min | | |

Grade Elevations

| Location | Invert (ft) | Ground (ft) | Crown (ft) | Cover (ft) | Depth (ft) | HGL (ft) | EGL (ft) |
|---|---|---|---|---|---|---|---|
| Upstream | 1,332.00 | 1,343.50 | 1,338.00 | 5.50 | 7.74 | 1,339.74 | 1,341.79 |
| Downstream | 1,329.85 | 1,340.00 | 1,335.85 | 4.15 | 8.04 | 1,337.89 | 1,339.94 |

Description:
Doubletree Ranch Road
Stations 61+64 to 65+89

Messages:
Profile: Pressure profile.
Information: Surcharged condition

# Detailed Report for J-5

## Flows

| Description | | Description | |
|---|---|---|---|
| Total Discharge | 2,064.00 cfs | Known Flow | 2,064.00 cfs |
| Upstream Additional + Carryover | 0.00 cfs | Total Watershed (CIA) | 0.00 cfs |

## Watershed Data

| Description | | Description | |
|---|---|---|---|
| System Intensity | 0.00 in/hr | Upstream CA | 0.00 acres |
| Total CA | 0.00 acres | | |

## Flow Times

| Description | | Description | |
|---|---|---|---|
| System Flow Time | 12.53 min | Upstream Flow Time | 12.53 min |

## Elevations

| Description | | Description | |
|---|---|---|---|
| HGL In | 1,339.85 ft | HGL Out | 1,339.74 ft |
| Ground Elevation | 1,343.50 ft | Rim Elevation | 1,343.50 ft |

## Other Properties

| Description | | Description | |
|---|---|---|---|
| X | -24.86 ft | Y | -0.18 ft |
| Velocity | 11.47 ft/s | Headloss | 0.10 ft |
| Headloss Coefficient | 0.05 | Station | 20+30 ft |
| External Flow | 0.00 cfs | | |

Description:
Doubletree Ranch Road
Station 61+64

Status/Error Messages:
Information: Known flow propagated from upstream junctions.


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# Detailed Report for Pipe P-6

Section Material: Concrete
Section Shape: Box
Section Size: 10 x 6 ft
Number Sections: 3

| Description | | Description | |
|---|---|---|---|
| Discharge | 2,064.00 cfs | Capacity | 2,225.10 cfs |
| Mannings Coefficient | 0.013 | Hydraulic Drop | 1.85 ft |
| Length | 425.00 ft | Energy Slope | 0.004353 ft/ft |
| Constructed Slope | 0.005059 ft/ft | Upstream Velocity | 11.47 ft/s |
| Upstream Flow Time | 11.91 min | Average Velocity | 11.47 ft/s |
| Pipe Flow Time | 0.62 min | Downstream Velocity | 11.47 ft/s |
| System Flow Time | 12.53 min | | |

Grade Elevations

| Location | Invert (ft) | Ground (ft) | Crown (ft) | Cover (ft) | Depth (ft) | HGL (ft) | EGL (ft) |
|---|---|---|---|---|---|---|---|
| Upstream | 1,334.15 | 1,344.00 | 1,340.15 | 3.85 | 7.55 | 1,341.70 | 1,343.74 |
| Downstream | 1,332.00 | 1,343.50 | 1,338.00 | 5.50 | 7.85 | 1,339.85 | 1,341.89 |

Description:
Doubletree Ranch Road
Stations 57+39 to 61+64

Messages:
Profile: Pressure profile.
Information: Surcharged condition


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# Detailed Report for Pipe P-7

Section Material: Concrete
Section Shape: Box
Section Size: 10 x 6 ft
Number Sections: 3

| Description | | Description | |
|---|---|---|---|
| Discharge | 2,064.00 cfs | Capacity | 2,225.10 cfs |
| Mannings Coefficient | 0.013 | Hydraulic Drop | 1.85 ft |
| Length | 425.00 ft | Energy Slope | 0.004353 ft/ft |
| Constructed Slope | 0.005059 ft/ft | Upstream Velocity | 11.47 ft/s |
| Upstream Flow Time | 11.29 min | Average Velocity | 11.47 ft/s |
| Pipe Flow Time | 0.62 min | Downstream Velocity | 11.47 ft/s |
| System Flow Time | 11.91 min | | |

Grade Elevations

| Location | Invert (ft) | Ground (ft) | Crown (ft) | Cover (ft) | Depth (ft) | HGL (ft) | EGL (ft) |
|---|---|---|---|---|---|---|---|
| Upstream | 1,336.30 | 1,347.00 | 1,342.30 | 4.70 | 7.35 | 1,343.65 | 1,345.69 |
| Downstream | 1,334.15 | 1,344.00 | 1,340.15 | 3.85 | 7.65 | 1,341.80 | 1,343.84 |

Description:
Doubletree Ranch Road
Stations 53+14 to 57+39

Messages:
Profile: Pressure profile.
Information: Surcharged condition

# Detailed Report for J-7

## Flows

| Description | | Description | |
|---|---|---|---|
| Total Discharge | 2,064.00 cfs | Known Flow | 2,064.00 cfs |
| Upstream Additional + Carryover | 0.00 cfs | Total Watershed (CIA) | 0.00 cfs |

## Watershed Data

| Description | | Description | |
|---|---|---|---|
| System Intensity | 0.00 in/hr | Upstream CA | 0.00 acres |
| Total CA | 0.00 acres | | |

## Flow Times

| Description | | Description | |
|---|---|---|---|
| System Flow Time | 11.29 min | Upstream Flow Time | 11.29 min |

## Elevations

| Description | | Description | |
|---|---|---|---|
| HGL In | 1,344.87 ft | HGL Out | 1,343.65 ft |
| Ground Elevation | 1,347.00 ft | Rim Elevation | 1,347.00 ft |

## Other Properties

| Description | | Description | |
|---|---|---|---|
| X | -874.93 ft | Y | 0.03 ft |
| Velocity | 11.47 ft/s | Headloss | 1.23 ft |
| Headloss Coefficient | 0.60 | Station | 28+80 ft |
| External Flow | 0.00 cfs | | |

Description:
Doubletree Ranch Road
Station 53+14
Inlet from north and south to pick up washes

Status/Error Messages:
Information: Known flow propagated from upstream junctions.

# Detailed Report for Pipe P-8

Section Material: Concrete
Section Shape: Box
Section Size: 10 x 6 ft
Number Sections: 3

| Description | | Description | |
|---|---|---|---|
| Discharge | 1,946.00 cfs | Capacity | 2,222.11 cfs |
| Mannings Coefficient | 0.013 | Hydraulic Drop | 1.71 ft |
| Length | 442.00 ft | Energy Slope | 0.003869 ft/ft |
| Constructed Slope | 0.005045 ft/ft | Upstream Velocity | 10.81 ft/s |
| Upstream Flow Time | 10.61 min | Average Velocity | 10.81 ft/s |
| Pipe Flow Time | 0.68 min | Downstream Velocity | 10.81 ft/s |
| System Flow Time | 11.29 min | | |

Grade Elevations

| Location | Invert (ft) | Ground (ft) | Crown (ft) | Cover (ft) | Depth (ft) | HGL (ft) | EGL (ft) |
|---|---|---|---|---|---|---|---|
| Upstream | 1,338.53 | 1,349.00 | 1,344.53 | 4.47 | 8.05 | 1,346.58 | 1,348.40 |
| Downstream | 1,336.30 | 1,347.00 | 1,342.30 | 4.70 | 8.57 | 1,344.87 | 1,346.69 |

Description:
Doubletree Ranch Road
Stations 48+72 to 53+14

Messages:
Profile: Pressure profile.
Information: Surcharged condition

# Detailed Report for Pipe P-8

Section Material: Concrete
Section Shape: Box
Section Size: 10 x 6 ft
Number Sections: 3

| Description | | Description | |
|---|---|---|---|
| Discharge | 1,946.00 cfs | Capacity | 2,222.11 cfs |
| Mannings Coefficient | 0.013 | Hydraulic Drop | 1.71 ft |
| Length | 442.00 ft | Energy Slope | 0.003869 ft/ft |
| Constructed Slope | 0.005045 ft/ft | Upstream Velocity | 10.81 ft/s |
| Upstream Flow Time | 10.61 min | Average Velocity | 10.81 ft/s |
| Pipe Flow Time | 0.68 min | Downstream Velocity | 10.81 ft/s |
| System Flow Time | 11.29 min | | |

Grade Elevations

| Location | Invert (ft) | Ground (ft) | Crown (ft) | Cover (ft) | Depth (ft) | HGL (ft) | EGL (ft) |
|---|---|---|---|---|---|---|---|
| Upstream | 1,338.53 | 1,349.00 | 1,344.53 | 4.47 | 8.05 | 1,346.58 | 1,348.40 |
| Downstream | 1,336.30 | 1,347.00 | 1,342.30 | 4.70 | 8.57 | 1,344.87 | 1,346.69 |

Description:
Doubletree Ranch Road
Stations 48+72 to 53+14

Messages:
Profile: Pressure profile.
Information: Surcharged condition


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# Detailed Report for J-8

## Flows

| Description | | Description | |
|---|---|---|---|
| Total Discharge | 1,946.00 cfs | Known Flow | 1,946.00 cfs |
| Upstream Additional + Carryover | 0.00 cfs | Total Watershed (CIA) | 0.00 cfs |

## Watershed Data

| Description | | Description | |
|---|---|---|---|
| System Intensity | 0.00 in/hr | Upstream CA | 0.00 acres |
| Total CA | 0.00 acres | | |

## Flow Times

| Description | | Description | |
|---|---|---|---|
| System Flow Time | 10.61 min | Upstream Flow Time | 10.61 min |

## Elevations

| Description | | Description | |
|---|---|---|---|
| HGL In | 1,346.67 ft | HGL Out | 1,346.58 ft |
| Ground Elevation | 1,349.00 ft | Rim Elevation | 1,349.00 ft |

## Other Properties

| Description | | Description | |
|---|---|---|---|
| X | -1,317.04 ft | Y | -0.02 ft |
| Velocity | 10.81 ft/s | Headloss | 0.09 ft |
| Headloss Coefficient | 0.05 | Station | 33+22 ft |
| External Flow | 0.00 cfs | | |

Description:
Doubletree Ranch Road
Station 48+72

Status/Error Messages:
Information: Known flow propagated from upstream junctions.


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# Detailed Report for Pipe P-9

Section Material: Concrete
Section Shape: Box
Section Size: 10 x 6 ft
Number Sections: 3

| Description | | Description | |
|---|---|---|---|
| Discharge | 1,946.00 cfs | Capacity | 2,229.61 cfs |
| Mannings Coefficient | 0.013 | Hydraulic Drop | 1.71 ft |
| Length | 441.00 ft | Energy Slope | 0.003869 ft/ft |
| Constructed Slope | 0.005079 ft/ft | Upstream Velocity | 10.81 ft/s |
| Upstream Flow Time | 9.93 min | Average Velocity | 10.81 ft/s |
| Pipe Flow Time | 0.68 min | Downstream Velocity | 10.81 ft/s |
| System Flow Time | 10.61 min | | |

Grade Elevations

| Location | Invert (ft) | Ground (ft) | Crown (ft) | Cover (ft) | Depth (ft) | HGL (ft) | EGL (ft) |
|---|---|---|---|---|---|---|---|
| Upstream | 1,340.77 | 1,352.00 | 1,346.77 | 5.23 | 7.61 | 1,348.38 | 1,350.20 |
| Downstream | 1,338.53 | 1,349.00 | 1,344.53 | 4.47 | 8.14 | 1,346.67 | 1,348.49 |

Description:
Doubletree Ranch Road
Stations 44+32 to 48+72

Messages:
Profile: Pressure profile.
Information: Surcharged condition


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# Detailed Report for J-9

## Flows

| Description | | Description | |
|---|---|---|---|
| Total Discharge | 1,946.00 cfs | Known Flow | 1,946.00 cfs |
| Upstream Additional + Carryover | 0.00 cfs | Total Watershed (CIA) | 0.00 cfs |

## Watershed Data

| Description | | Description | |
|---|---|---|---|
| System Intensity | 0.00 in/hr | Upstream CA | 0.00 acres |
| Total CA | 0.00 acres | | |

## Flow Times

| Description | | Description | |
|---|---|---|---|
| System Flow Time | 9.93 min | Upstream Flow Time | 9.93 min |

## Elevations

| Description | | Description | |
|---|---|---|---|
| HGL In | 1,348.47 ft | HGL Out | 1,348.38 ft |
| Ground Elevation | 1,352.00 ft | Rim Elevation | 1,352.00 ft |

## Other Properties

| Description | | Description | |
|---|---|---|---|
| X | -1,758.06 ft | Y | -0.05 ft |
| Velocity | 10.81 ft/s | Headloss | 0.09 ft |
| Headloss Coefficient | 0.05 | Station | 37+63 ft |
| External Flow | 0.00 cfs | | |

Description:
Doubletree Ranch Road
Station 44+32

Status/Error Messages:
Information: Known flow propagated from upstream junctions.

# Detailed Report for Pipe P-10

Section Material: Concrete
Section Shape: Box
Section Size: 10 x 6 ft
Number Sections: 3

| Description | | Description | |
|---|---|---|---|
| Discharge | 1,946.00 cfs | Capacity | 2,224.63 cfs |
| Mannings Coefficient | 0.013 | Hydraulic Drop | 1.71 ft |
| Length | 441.00 ft | Energy Slope | 0.003869 ft/ft |
| Constructed Slope | 0.005057 ft/ft | Upstream Velocity | 10.81 ft/s |
| Upstream Flow Time | 9.25 min | Average Velocity | 10.81 ft/s |
| Pipe Flow Time | 0.68 min | Downstream Velocity | 10.81 ft/s |
| System Flow Time | 9.93 min | | |

Grade Elevations

| Location | Invert (ft) | Ground (ft) | Crown (ft) | Cover (ft) | Depth (ft) | HGL (ft) | EGL (ft) |
|---|---|---|---|---|---|---|---|
| Upstream | 1,343.00 | 1,356.00 | 1,349.00 | 7.00 | 7.18 | 1,350.18 | 1,351.99 |
| Downstream | 1,340.77 | 1,352.00 | 1,346.77 | 5.23 | 7.70 | 1,348.47 | 1,350.29 |

Description:
Doubletree Ranch Road
Stations 39+91 to 44+32

Messages:
Profile: Pressure profile.
Information: Surcharged condition

# Detailed Report for J-10

## Flows

| Description | | Description | |
|---|---|---|---|
| Total Discharge | 1,946.00 cfs | Known Flow | 1,946.00 cfs |
| Upstream Additional + Carryover | 0.00 cfs | Total Watershed (CIA) | 0.00 cfs |

## Watershed Data

| Description | | Description | |
|---|---|---|---|
| System Intensity | 0.00 in/hr | Upstream CA | 0.00 acres |
| Total CA | 0.00 acres | | |

## Flow Times

| Description | | Description | |
|---|---|---|---|
| System Flow Time | 9.25 min | Upstream Flow Time | 9.25 min |

## Elevations

| Description | | Description | |
|---|---|---|---|
| HGL In | 1,351.99 ft | HGL Out | 1,350.18 ft |
| Ground Elevation | 1,356.00 ft | Rim Elevation | 1,356.00 ft |

## Other Properties

| Description | | Description | |
|---|---|---|---|
| X | -2,199.01 ft | Y | 0.06 ft |
| Velocity | 10.81 ft/s | Headloss | 1.82 ft |
| Headloss Coefficient | 1.00 | Station | 42+04 ft |
| External Flow | 0.00 cfs | | |

Description:
Doubletree Ranch Road
Station 39+91
Intersection with 52nd Street north and south

Status/Error Messages:
Information: Known flow propagated from upstream junctions.

# Detailed Report for Pipe P-11

Section Material: Concrete
Section Shape: Box
Section Size: 8 x 6 ft
Number Sections: 1

| Description | | Description | |
|---|---|---|---|
| Discharge | 737.00 cfs | Capacity | 796.46 cfs |
| Mannings Coefficient | 0.013 | Hydraulic Drop | 4.54 ft |
| Length | 516.00 ft | Energy Slope | 0.008795 ft/ft |
| Constructed Slope | 0.010271 ft/ft | Upstream Velocity | 15.35 ft/s |
| Upstream Flow Time | 6.34 min | Average Velocity | 15.35 ft/s |
| Pipe Flow Time | 0.56 min | Downstream Velocity | 15.35 ft/s |
| System Flow Time | 6.90 min | | |

Grade Elevations

| Location | Invert (ft) | Ground (ft) | Crown (ft) | Cover (ft) | Depth (ft) | HGL (ft) | EGL (ft) |
|---|---|---|---|---|---|---|---|
| Upstream | 1,348.30 | 1,360.00 | 1,354.30 | 5.70 | 8.23 | 1,356.53 | 1,360.20 |
| Downstream | 1,343.00 | 1,356.00 | 1,349.00 | 7.00 | 8.99 | 1,351.99 | 1,355.66 |

Description:
Doubletree Ranch Road
Stations 34+75 to 39+91

Messages:
Profile: Pressure profile.
Information: Surcharged condition


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# Detailed Report for J-11

## Flows

| Description | | Description | |
|---|---|---|---|
| Total Discharge | 737.00 cfs | Known Flow | 737.00 cfs |
| Upstream Additional + Carryover | 0.00 cfs | Total Watershed (CIA) | 0.00 cfs |

## Watershed Data

| Description | | Description | |
|---|---|---|---|
| System Intensity | 0.00 in/hr | Upstream CA | 0.00 acres |
| Total CA | 0.00 acres | | |

## Flow Times

| Description | | Description | |
|---|---|---|---|
| System Flow Time | 6.34 min | Upstream Flow Time | 6.34 min |

## Elevations

| Description | | Description | |
|---|---|---|---|
| HGL In | 1,356.72 ft | HGL Out | 1,356.53 ft |
| Ground Elevation | 1,360.00 ft | Rim Elevation | 1,360.00 ft |

## Other Properties

| Description | | Description | |
|---|---|---|---|
| X | -2,715.04 ft | Y | -0.05 ft |
| Velocity | 15.35 ft/s | Headloss | 0.18 ft |
| Headloss Coefficient | 0.05 | Station | 47+20 ft |
| External Flow | 0.00 cfs | | |

Description:
**Doubletree Ranch Road**
Station 34+75

Status/Error Messages:
Information: Known flow propagated from upstream junctions.


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# Detailed Report for Pipe P-12

Section Material: Concrete
Section Shape: Box
Section Size: 8 x 6 ft
Number Sections: 1

| Description | | Description | |
|---|---|---|---|
| Discharge | 737.00 cfs | Capacity | 796.46 cfs |
| Mannings Coefficient | 0.013 | Hydraulic Drop | 4.54 ft |
| Length | 516.00 ft | Energy Slope | 0.008795 ft/ft |
| Constructed Slope | 0.010271 ft/ft | Upstream Velocity | 15.35 ft/s |
| Upstream Flow Time | 5.78 min | Average Velocity | 15.35 ft/s |
| Pipe Flow Time | 0.56 min | Downstream Velocity | 15.35 ft/s |
| System Flow Time | 6.34 min | | |

Grade Elevations

| Location | Invert (ft) | Ground (ft) | Crown (ft) | Cover (ft) | Depth (ft) | HGL (ft) | EGL (ft) |
|---|---|---|---|---|---|---|---|
| Upstream | 1,353.60 | 1,365.00 | 1,359.60 | 5.40 | 7.65 | 1,361.25 | 1,364.92 |
| Downstream | 1,348.30 | 1,360.00 | 1,354.30 | 5.70 | 8.42 | 1,356.72 | 1,360.38 |

Description:
Doubletree Ranch Road
Stations 29+59 to 34+75

Messages:
Profile: Pressure profile.
Information: Surcharged condition

# Detailed Report for J-12

## Flows

| Description | | Description | |
|---|---|---|---|
| Total Discharge | 737.00 cfs | Known Flow | 737.00 cfs |
| Upstream Additional + Carryover | 0.00 cfs | Total Watershed (CIA) | 0.00 cfs |

## Watershed Data

| Description | | Description | |
|---|---|---|---|
| System Intensity | 0.00 in/hr | Upstream CA | 0.00 acres |
| Total CA | 0.00 acres | | |

## Flow Times

| Description | | Description | |
|---|---|---|---|
| System Flow Time | 5.78 min | Upstream Flow Time | 5.78 min |

## Elevations

| Description | | Description | |
|---|---|---|---|
| HGL In | 1,361.44 ft | HGL Out | 1,361.25 ft |
| Ground Elevation | 1,365.00 ft | Rim Elevation | 1,365.00 ft |

## Other Properties

| Description | | Description | |
|---|---|---|---|
| X | -3,231.05 ft | Y | 0.08 ft |
| Velocity | 15.35 ft/s | Headloss | 0.18 ft |
| Headloss Coefficient | 0.05 | Station | 52+36 ft |
| External Flow | 0.00 cfs | | |

Description:
Doubletree Ranch Road
Station 29+59

Status/Error Messages:
Information: Known flow propagated from upstream junctions.


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# Detailed Report for Pipe P-13

Section Material: Concrete
Section Shape: Box
Section Size: 8 x 6 ft
Number Sections: 1

| Description | | Description | |
|---|---|---|---|
| Discharge | 737.00 cfs | Capacity | 796.46 cfs |
| Mannings Coefficient | 0.013 | Hydraulic Drop | 4.54 ft |
| Length | 516.00 ft | Energy Slope | 0.008795 ft/ft |
| Constructed Slope | 0.010271 ft/ft | Upstream Velocity | 15.35 ft/s |
| Upstream Flow Time | 5.22 min | Average Velocity | 15.35 ft/s |
| Pipe Flow Time | 0.56 min | Downstream Velocity | 15.35 ft/s |
| System Flow Time | 5.78 min | | |

Grade Elevations

| Location | Invert (ft) | Ground (ft) | Crown (ft) | Cover (ft) | Depth (ft) | HGL (ft) | EGL (ft) |
|---|---|---|---|---|---|---|---|
| Upstream | 1,358.90 | 1,370.00 | 1,364.90 | 5.10 | 7.08 | 1,365.98 | 1,369.64 |
| Downstream | 1,353.60 | 1,365.00 | 1,359.60 | 5.40 | 7.84 | 1,361.44 | 1,365.10 |

Description:
Doubletree Ranch Road
Stations 24+43 to 29+59

Messages:
Profile: Pressure profile.
Information: Surcharged condition

# Detailed Report for J-13

## Flows

| Description | | Description | |
|---|---|---|---|
| Total Discharge | 737.00 cfs | Known Flow | 737.00 cfs |
| Upstream Additional + Carryover | 0.00 cfs | Total Watershed (CIA) | 0.00 cfs |

## Watershed Data

| Description | | Description | |
|---|---|---|---|
| System Intensity | 0.00 in/hr | Upstream CA | 0.00 acres |
| Total CA | 0.00 acres | | |

## Flow Times

| Description | | Description | |
|---|---|---|---|
| System Flow Time | 5.22 min | Upstream Flow Time | 5.22 min |

## Elevations

| Description | | Description | |
|---|---|---|---|
| HGL In | 1,366.16 ft | HGL Out | 1,365.98 ft |
| Ground Elevation | 1,370.00 ft | Rim Elevation | 1,370.00 ft |

## Other Properties

| Description | | Description | |
|---|---|---|---|
| X | -3,747.01 ft | Y | 0.07 ft |
| Velocity | 15.35 ft/s | Headloss | 0.18 ft |
| Headloss Coefficient | 0.05 | Station | 57+52 ft |
| External Flow | 0.00 cfs | | |

Description:
Doubletree Ranch Road
Station 24+43

Status/Error Messages:
Information: Known flow propagated from upstream junctions.

# Detailed Report for Pipe P-14

Section Material: Concrete
Section Shape: Box
Section Size: 8 x 6 ft
Number Sections: 1

| Description | | Description | |
|---|---|---|---|
| Discharge | 737.00 cfs | Capacity | 796.46 cfs |
| Mannings Coefficient | 0.013 | Hydraulic Drop | 4.54 ft |
| Length | 516.00 ft | Energy Slope | 0.008795 ft/ft |
| Constructed Slope | 0.010271 ft/ft | Upstream Velocity | 15.35 ft/s |
| Upstream Flow Time | 4.66 min | Average Velocity | 15.35 ft/s |
| Pipe Flow Time | 0.56 min | Downstream Velocity | 15.35 ft/s |
| System Flow Time | 5.22 min | | |

Grade Elevations

| Location | Invert (ft) | Ground (ft) | Crown (ft) | Cover (ft) | Depth (ft) | HGL (ft) | EGL (ft) |
|---|---|---|---|---|---|---|---|
| Upstream | 1,364.20 | 1,375.00 | 1,370.20 | 4.80 | 6.50 | 1,370.70 | 1,374.36 |
| Downstream | 1,358.90 | 1,370.00 | 1,364.90 | 5.10 | 7.26 | 1,366.16 | 1,369.82 |

Description:
Doubletree Ranch Road
Stations 19+27 to 24+43

Messages:
Profile: Pressure profile.
Information: Surcharged condition

# Detailed Report for J-14

## Flows

| Description | | Description | |
|---|---|---|---|
| Total Discharge | 737.00 cfs | Known Flow | 737.00 cfs |
| Upstream Additional + Carryover | 0.00 cfs | Total Watershed (CIA) | 0.00 cfs |

## Watershed Data

| Description | | Description | |
|---|---|---|---|
| System Intensity | 0.00 in/hr | Upstream CA | 0.00 acres |
| Total CA | 0.00 acres | | |

## Flow Times

| Description | | Description | |
|---|---|---|---|
| System Flow Time | 4.66 min | Upstream Flow Time | 4.66 min |

## Elevations

| Description | | Description | |
|---|---|---|---|
| HGL In | 1,370.88 ft | HGL Out | 1,370.70 ft |
| Ground Elevation | 1,375.00 ft | Rim Elevation | 1,375.00 ft |

## Other Properties

| Description | | Description | |
|---|---|---|---|
| X | -4,262.96 ft | Y | -0.42e-2 ft |
| Velocity | 15.35 ft/s | Headloss | 0.18 ft |
| Headloss Coefficient | 0.05 | Station | 62+68 ft |
| External Flow | 0.00 cfs | | |

Description:
Doubletree Ranch Road
Station 19+27

Status/Error Messages:
Information: Known flow propagated from upstream junctions.


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# Detailed Report for Pipe P-15

Section Material: Concrete
Section Shape: Box
Section Size: 8 x 6 ft
Number Sections: 1

| Description | | Description | |
|---|---|---|---|
| Discharge | 737.00 cfs | Capacity | 796.46 cfs |
| Mannings Coefficient | 0.013 | Hydraulic Drop | 4.62 ft |
| Length | 516.00 ft | Energy Slope | 0.008953 ft/ft |
| Constructed Slope | 0.010271 ft/ft | Upstream Velocity | 15.35 ft/s |
| Upstream Flow Time | 4.10 min | Average Velocity | 15.35 ft/s |
| Pipe Flow Time | 0.56 min | Downstream Velocity | 15.35 ft/s |
| System Flow Time | 4.66 min | | |

Grade Elevations

| Location | Invert (ft) | Ground (ft) | Crown (ft) | Cover (ft) | Depth (ft) | HGL (ft) | EGL (ft) |
|---|---|---|---|---|---|---|---|
| Upstream | 1,369.50 | 1,380.00 | 1,375.50 | 4.50 | 6.00 | 1,375.50 | 1,379.16 |
| Downstream | 1,364.20 | 1,375.00 | 1,370.20 | 4.80 | 6.68 | 1,370.88 | 1,374.54 |

Description:
Doubletree Ranch Road
Stations 14+11 to 19+27

Messages:
Profile: Steep subcritical backwater profile (S1).
Profile: Composite profile.
Profile: Critical depth assumed upstream.
Profile: Pressure profile.
Profile: Hydraulic jump formed.

# Detailed Report for J-15

## Flows

| Description | | Description | |
|---|---|---|---|
| Total Discharge | 737.00 cfs | Known Flow | 737.00 cfs |
| Upstream Additional + Carryover | 0.00 cfs | Total Watershed (CIA) | 0.00 cfs |

## Watershed Data

| Description | | Description | |
|---|---|---|---|
| System Intensity | 0.00 in/hr | Upstream CA | 0.00 acres |
| Total CA | 0.00 acres | | |

## Flow Times

| Description | | Description | |
|---|---|---|---|
| System Flow Time | 4.10 min | Upstream Flow Time | 4.10 min |

## Elevations

| Description | | Description | |
|---|---|---|---|
| HGL In | 1,377.70 ft | HGL Out | 1,375.50 ft |
| Ground Elevation | 1,380.00 ft | Rim Elevation | 1,380.00 ft |

## Other Properties

| Description | | Description | |
|---|---|---|---|
| X | -4,779.01 ft | Y | 0.02 ft |
| Velocity | 15.35 ft/s | Headloss | 2.20 ft |
| Headloss Coefficient | 0.60 | Station | 67+84 ft |
| External Flow | 0.00 cfs | | |

Description:
Intersection of Doubletree Ranch Road and Tatum Boulevard
Station 14+11

Status/Error Messages:
Information: Known flow propagated from upstream junctions.


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# Detailed Report for Pipe P-16

Section Material: Concrete
Section Shape: Box
Section Size: 8 x 4 ft
Number Sections: 2

| Description | | Description | |
|---|---|---|---|
| Discharge | 737.00 cfs | Capacity | 1,571.04 cfs |
| Mannings Coefficient | 0.013 | Hydraulic Drop | 1.10 ft |
| Length | 105.00 ft | Energy Slope | 0.010493 ft/ft |
| Constructed Slope | 0.031429 ft/ft | Upstream Velocity | 11.52 ft/s |
| Upstream Flow Time | 3.95 min | Average Velocity | 11.52 ft/s |
| Pipe Flow Time | 0.15 min | Downstream Velocity | 11.52 ft/s |
| System Flow Time | 4.10 min | | |

Grade Elevations

| Location | Invert (ft) | Ground (ft) | Crown (ft) | Cover (ft) | Depth (ft) | HGL (ft) | EGL (ft) |
|---|---|---|---|---|---|---|---|
| Upstream | 1,374.80 | 1,382.00 | 1,378.80 | 3.20 | 4.00 | 1,378.80 | 1,380.86 |
| Downstream | 1,371.50 | 1,380.00 | 1,375.50 | 4.50 | 6.20 | 1,377.70 | 1,379.76 |

Description:
Doubletree Ranch Road Accross Tatum Boulevard
Station 13+06 to 14+11
West side of road towards south storm drain

Messages:
Profile: Steep subcritical backwater profile (S1).
Profile: Composite profile.
Profile: Critical depth assumed upstream.
Profile: Pressure profile.
Profile: Hydraulic jump formed.

# Detailed Report for J-16

## Flows

| Description | | Description | |
|---|---|---|---|
| Total Discharge | 737.00 cfs | Known Flow | 737.00 cfs |
| Upstream Additional + Carryover | 0.00 cfs | Total Watershed (CIA) | 0.00 cfs |

## Watershed Data

| Description | | Description | |
|---|---|---|---|
| System Intensity | 0.00 in/hr | Upstream CA | 0.00 acres |
| Total CA | 0.00 acres | | |

## Flow Times

| Description | | Description | |
|---|---|---|---|
| System Flow Time | 3.95 min | Upstream Flow Time | 3.95 min |

## Elevations

| Description | | Description | |
|---|---|---|---|
| HGL In | 1,380.04 ft | HGL Out | 1,378.80 ft |
| Ground Elevation | 1,382.00 ft | Rim Elevation | 1,382.00 ft |

## Other Properties

| Description | | Description | |
|---|---|---|---|
| X | -4,853.02 ft | Y | -74.08 ft |
| Velocity | 11.52 ft/s | Headloss | 1.24 ft |
| Headloss Coefficient | 0.60 | Station | 68+89 ft |
| External Flow | 0.00 cfs | | |

Description:
**West Side of Tatum Boulevard --- Doubletree Ranch Road**
Station 13+06

Status/Error Messages:
Information: Known flow propagated from upstream junctions.


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# Detailed Report for Pipe P-17

Section Material: Concrete
Section Shape: Box
Section Size: 8 x 4 ft
Number Sections: 2

| Description | | Description | |
|---|---|---|---|
| Discharge | 708.00 cfs | Capacity | 1,274.68 cfs |
| Mannings Coefficient | 0.013 | Hydraulic Drop | 5.90 ft |
| Length | 348.00 ft | Energy Slope | 0.017132 ft/ft |
| Constructed Slope | 0.020690 ft/ft | Upstream Velocity | 11.25 ft/s |
| Upstream Flow Time | 0.66 min | Average Velocity | 11.16 ft/s |
| Pipe Flow Time | 0.52 min | Downstream Velocity | 11.06 ft/s |
| System Flow Time | 1.18 min | | |

Grade Elevations

| Location | Invert (ft) | Ground (ft) | Crown (ft) | Cover (ft) | Depth (ft) | HGL (ft) | EGL (ft) |
|---|---|---|---|---|---|---|---|
| Upstream | 1,382.00 | 1,388.00 | 1,386.00 | 2.00 | 3.93 | 1,385.93 | 1,387.90 |
| Downstream | 1,374.80 | 1,382.00 | 1,378.80 | 3.20 | 5.24 | 1,380.04 | 1,381.94 |

Description:
Doubletree Ranch Road ---East of 47th Place
Stations 9+59 to 13+06

Messages:
Profile: Steep subcritical backwater profile (S1).
Profile: Composite profile.
Profile: Critical depth assumed upstream.
Profile: Pressure profile.
Profile: Hydraulic jump formed.

# Detailed Report for J-17

## Flows

| Description | | Description | |
|---|---|---|---|
| Total Discharge | 708.00 cfs | Known Flow | 708.00 cfs |
| Upstream Additional + Carryover | 0.00 cfs | Total Watershed (CIA) | 0.00 cfs |

## Watershed Data

| Description | | Description | |
|---|---|---|---|
| System Intensity | 0.00 in/hr | Upstream CA | 0.00 acres |
| Total CA | 0.00 acres | | |

## Flow Times

| Description | | Description | |
|---|---|---|---|
| System Flow Time | 0.66 min | Upstream Flow Time | 0.66 min |

## Elevations

| Description | | Description | |
|---|---|---|---|
| HGL In | 1,386.03 ft | HGL Out | 1,385.93 ft |
| Ground Elevation | 1,388.00 ft | Rim Elevation | 1,388.00 ft |

## Other Properties

| Description | | Description | |
|---|---|---|---|
| X | -5,098.61 ft | Y | -320.56 ft |
| Velocity | 11.25 ft/s | Headloss | 0.10 ft |
| Headloss Coefficient | 0.05 | Station | 72+37 ft |
| External Flow | 0.00 cfs | | |

Description:
Doubletree Ranch Road---east of 47th Place
Station 9+59

Status/Error Messages:
Information: Known flow propagated from upstream junctions.


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# Detailed Report for Pipe P-18

Section Material: Concrete
Section Shape: Box
Section Size: 8 x 4 ft
Number Sections: 2

| Description | | Description | |
|---|---|---|---|
| Discharge | 708.00 cfs | Capacity | 1,190.88 cfs |
| Mannings Coefficient | 0.013 | Hydraulic Drop | 7.90 ft |
| Length | 443.00 ft | Energy Slope | 0.017983 ft/ft |
| Constructed Slope | 0.018059 ft/ft | Upstream Velocity | 11.25 ft/s |
| Upstream Flow Time | 0.00 min | Average Velocity | 11.16 ft/s |
| Pipe Flow Time | 0.66 min | Downstream Velocity | 11.06 ft/s |
| System Flow Time | 0.66 min | | |

Grade Elevations

| Location | Invert (ft) | Ground (ft) | Crown (ft) | Cover (ft) | Depth (ft) | HGL (ft) | EGL (ft) |
|---|---|---|---|---|---|---|---|
| Upstream | 1,390.00 | 1,397.00 | 1,394.00 | 3.00 | 3.93 | 1,393.93 | 1,395.90 |
| Downstream | 1,382.00 | 1,388.00 | 1,386.00 | 2.00 | 4.03 | 1,386.03 | 1,387.93 |

Description:
Doubletree Ranch Road
Stations 5+17 to 9+59

Messages:
Profile: Steep subcritical backwater profile (S1).
Profile: Composite profile.
Profile: Critical depth assumed upstream.
Profile: Pressure profile.
Profile: Hydraulic jump formed.

# Detailed Report for I-1

## Watershed Information

No watershed data entered for this inlet.

## Flows

| Description | | Description | |
|---|---|---|---|
| Total Discharge | 708.00 cfs | Known Flow | 708.00 cfs |
| Upstream Additional + Carryover | 0.00 cfs | Total Watershed (CIA) | 0.00 cfs |
| Carryover | 0.00 cfs | Additional Flow | 0.00 cfs |

## Watershed Data

| Description | | Description | |
|---|---|---|---|
| System Intensity | 0.00 in/hr | Upstream CA | 0.00 acres |
| Total CA | 0.00 acres | Inlet CA | 0.00 acres |
| External CA | 0.00 acres | | |

## Flow Times

| Description | | Description | |
|---|---|---|---|
| System Flow Time | 0.00 min | Upstream Flow Time | 0.00 min |
| Inlet TC | 0.00 min | External TC | 0.00 min |

## Elevations

| Description | | Description | |
|---|---|---|---|
| HGL In | 1,394.33 ft | HGL Out | 1,393.93 ft |
| Ground Elevation | 1,397.00 ft | Rim Elevation | 1,397.00 ft |

## Other Properties

| Description | | Description | |
|---|---|---|---|
| X | -5,462.01 ft | Y | -574.00 ft |
| Velocity | 11.25 ft/s | Headloss | 0.39 ft |
| Headloss Coefficient | 0.20 | Station | 76+80 ft |
| External Flow | 0.00 cfs | | |

Description:
Doubletree Ranch Road
Station 5+17
Inlet from concrete channel through subdivision on west side of 47th Place

# Detailed Report for Pipe P-19

Section Material: Concrete
Section Shape: Circular
Section Size: 36 inch
Number Sections: 1

| Description | | Description | |
|---|---|---|---|
| Discharge | 29.00 cfs | Capacity | 55.64 cfs |
| Mannings Coefficient | 0.013 | Hydraulic Drop | 0.52 ft |
| Length | 296.00 ft | Energy Slope | 0.001866 ft/ft |
| Constructed Slope | 0.006959 ft/ft | Upstream Velocity | 4.33 ft/s |
| Upstream Flow Time | 2.78 min | Average Velocity | 4.22 ft/s |
| Pipe Flow Time | 1.17 min | Downstream Velocity | 4.10 ft/s |
| System Flow Time | 3.95 min | | |

Grade Elevations

| Location | Invert (ft) | Ground (ft) | Crown (ft) | Cover (ft) | Depth (ft) | HGL (ft) | EGL (ft) |
|---|---|---|---|---|---|---|---|
| Upstream | 1,377.86 | 1,383.50 | 1,380.86 | 2.64 | 2.70 | 1,380.56 | 1,380.85 |
| Downstream | 1,375.80 | 1,382.00 | 1,378.80 | 3.20 | 4.24 | 1,380.04 | 1,380.30 |

Description:
Tatum Boulevard
Stations 117+04 to 120+00

Messages:
Profile: Steep subcritical backwater profile (S1).
Profile: Composite profile.
Profile: Pressure profile.
Profile: Hydraulic grade increases in downstream direction.


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# Detailed Report for J-18

## Flows

| Description | | Description | |
|---|---|---|---|
| Total Discharge | 29.00 cfs | Known Flow | 29.00 cfs |
| Upstream Additional + Carryover | 0.00 cfs | Total Watershed (CIA) | 0.00 cfs |

## Watershed Data

| Description | | Description | |
|---|---|---|---|
| System Intensity | 0.00 in/hr | Upstream CA | 0.00 acres |
| Total CA | 0.00 acres | | |

## Flow Times

| Description | | Description | |
|---|---|---|---|
| System Flow Time | 2.78 min | Upstream Flow Time | 2.78 min |

## Elevations

| Description | | Description | |
|---|---|---|---|
| HGL In | 1,380.70 ft | HGL Out | 1,380.56 ft |
| Ground Elevation | 1,383.50 ft | Rim Elevation | 1,383.50 ft |

## Other Properties

| Description | | Description | |
|---|---|---|---|
| X | -4,853.06 ft | Y | -370.13 ft |
| Velocity | 4.33 ft/s | Headloss | 0.15 ft |
| Headloss Coefficient | 0.50 | Station | 71+85 ft |
| External Flow | 0.00 cfs | | |

Description:
Tatum Boulevard
Station 117+04

Status/Error Messages:
Information: Known flow propagated from upstream junctions.

# Detailed Report for Pipe P-20

Section Material: Concrete
Section Shape: Circular
Section Size: 30 inch
Number Sections: 1

| Description | | Description | |
|---|---|---|---|
| Discharge | 29.00 cfs | Capacity | 38.73 cfs |
| Mannings Coefficient | 0.013 | Hydraulic Drop | 2.13 ft |
| Length | 296.00 ft | Energy Slope | 0.008227 ft/ft |
| Constructed Slope | 0.008919 ft/ft | Upstream Velocity | 7.51 ft/s |
| Upstream Flow Time | 2.05 min | Average Velocity | 6.78 ft/s |
| Pipe Flow Time | 0.73 min | Downstream Velocity | 6.06 ft/s |
| System Flow Time | 2.78 min | | |

Grade Elevations

| Location | Invert (ft) | Ground (ft) | Crown (ft) | Cover (ft) | Depth (ft) | HGL (ft) | EGL (ft) |
|---|---|---|---|---|---|---|---|
| Upstream | 1,381.00 | 1,386.00 | 1,383.50 | 2.50 | 1.84 | 1,382.84 | 1,383.71 |
| Downstream | 1,378.36 | 1,383.50 | 1,380.86 | 2.64 | 2.34 | 1,380.70 | 1,381.28 |

Description:
Tatum Boulevard
Stations 114+08 to 117+04

Messages:
Profile: Steep subcritical backwater profile (S1).
Profile: Critical depth assumed upstream.
Profile: Hydraulic jump formed.

# Detailed Report for J-19

## Flows

| Description | | Description | |
|---|---|---|---|
| Total Discharge | 29.00 cfs | Known Flow | 29.00 cfs |
| Upstream Additional + Carryover | 0.00 cfs | Total Watershed (CIA) | 0.00 cfs |

## Watershed Data

| Description | | Description | |
|---|---|---|---|
| System Intensity | 0.00 in/hr | Upstream CA | 0.00 acres |
| Total CA | 0.00 acres | | |

## Flow Times

| Description | | Description | |
|---|---|---|---|
| System Flow Time | 2.05 min | Upstream Flow Time | 2.05 min |

## Elevations

| Description | | Description | |
|---|---|---|---|
| HGL In | 1,383.27 ft | HGL Out | 1,382.84 ft |
| Ground Elevation | 1,386.00 ft | Rim Elevation | 1,386.00 ft |

## Other Properties

| Description | | Description | |
|---|---|---|---|
| X | -4,853.03 ft | Y | -665.95 ft |
| Velocity | 7.51 ft/s | Headloss | 0.44 ft |
| Headloss Coefficient | 0.50 | Station | 74+81 ft |
| External Flow | 0.00 cfs | | |

Description:
Tatum Boulevard
Station 117+04

Status/Error Messages:
Information: Known flow propagated from upstream junctions.


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# Detailed Report for Pipe P-21

Section Material: Concrete
Section Shape: Circular
Section Size: 30 inch
Number Sections: 1

| Description | | Description | |
|---|---|---|---|
| Discharge | 29.00 cfs | Capacity | 66.98 cfs |
| Mannings Coefficient | 0.013 | Hydraulic Drop | 7.56 ft |
| Length | 300.00 ft | Energy Slope | 0.026143 ft/ft |
| Constructed Slope | 0.026667 ft/ft | Upstream Velocity | 7.51 ft/s |
| Upstream Flow Time | 1.32 min | Average Velocity | 6.85 ft/s |
| Pipe Flow Time | 0.73 min | Downstream Velocity | 6.19 ft/s |
| System Flow Time | 2.05 min | | |

Grade Elevations

| Location | Invert (ft) | Ground (ft) | Crown (ft) | Cover (ft) | Depth (ft) | HGL (ft) | EGL (ft) |
|---|---|---|---|---|---|---|---|
| Upstream | 1,389.00 | 1,394.50 | 1,391.50 | 3.00 | 1.84 | 1,390.84 | 1,391.71 |
| Downstream | 1,381.00 | 1,386.00 | 1,383.50 | 2.50 | 2.27 | 1,383.27 | 1,383.87 |

Description:
Tatum Boulevard
Stations 111+12 to 114+08

Messages:
Profile: Steep subcritical backwater profile (S1).
Profile: Critical depth assumed upstream.
Profile: Hydraulic jump formed.

# Detailed Report for J-20

## Flows

| Description | | Description | |
|---|---|---|---|
| Total Discharge | 29.00 cfs | Known Flow | 29.00 cfs |
| Upstream Additional + Carryover | 0.00 cfs | Total Watershed (CIA) | 0.00 cfs |

## Watershed Data

| Description | | Description | |
|---|---|---|---|
| System Intensity | 0.00 in/hr | Upstream CA | 0.00 acres |
| Total CA | 0.00 acres | | |

## Flow Times

| Description | | Description | |
|---|---|---|---|
| System Flow Time | 1.32 min | Upstream Flow Time | 1.32 min |

## Elevations

| Description | | Description | |
|---|---|---|---|
| HGL In | 1,391.27 ft | HGL Out | 1,390.84 ft |
| Ground Elevation | 1,394.50 ft | Rim Elevation | 1,394.50 ft |

## Other Properties

| Description | | Description | |
|---|---|---|---|
| X | -4,853.08 ft | Y | -965.90 ft |
| Velocity | 7.51 ft/s | Headloss | 0.44 ft |
| Headloss Coefficient | 0.50 | Station | 77+81 ft |
| External Flow | 0.00 cfs | | |

Description:
Tatum Boulevard
Station 114+08

Status/Error Messages:
Information: Known flow propagated from upstream junctions.


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# Detailed Report for Pipe P-22

Section Material: Concrete
Section Shape: Circular
Section Size: 30 inch
Number Sections: 1

| Description | | Description | |
|---|---|---|---|
| Discharge | 29.00 cfs | Capacity | 67.89 cfs |
| Mannings Coefficient | 0.013 | Hydraulic Drop | 7.56 ft |
| Length | 292.00 ft | Energy Slope | 0.026860 ft/ft |
| Constructed Slope | 0.027397 ft/ft | Upstream Velocity | 7.51 ft/s |
| Upstream Flow Time | 0.61 min | Average Velocity | 6.85 ft/s |
| Pipe Flow Time | 0.71 min | Downstream Velocity | 6.19 ft/s |
| System Flow Time | 1.32 min | | |

Grade Elevations

| Location | Invert (ft) | Ground (ft) | Crown (ft) | Cover (ft) | Depth (ft) | HGL (ft) | EGL (ft) |
|---|---|---|---|---|---|---|---|
| Upstream | 1,397.00 | 1,402.00 | 1,399.50 | 2.50 | 1.84 | 1,398.84 | 1,399.71 |
| Downstream | 1,389.00 | 1,394.50 | 1,391.50 | 3.00 | 2.27 | 1,391.27 | 1,391.87 |

Description:
Tatum Boulevard
Stations 108+16 to 111+12

Messages:
Profile: Steep subcritical backwater profile (S1).
Profile: Critical depth assumed upstream.
Profile: Hydraulic jump formed.

# Detailed Report for J-21

## Flows

| Description | | Description | |
|---|---|---|---|
| Total Discharge | 29.00 cfs | Known Flow | 29.00 cfs |
| Upstream Additional + Carryover | 0.00 cfs | Total Watershed (CIA) | 0.00 cfs |

## Watershed Data

| Description | | Description | |
|---|---|---|---|
| System Intensity | 0.00 in/hr | Upstream CA | 0.00 acres |
| Total CA | 0.00 acres | | |

## Flow Times

| Description | | Description | |
|---|---|---|---|
| System Flow Time | 0.61 min | Upstream Flow Time | 0.61 min |

## Elevations

| Description | | Description | |
|---|---|---|---|
| HGL In | 1,399.27 ft | HGL Out | 1,398.84 ft |
| Ground Elevation | 1,402.00 ft | Rim Elevation | 1,402.00 ft |

## Other Properties

| Description | | Description | |
|---|---|---|---|
| X | -4,852.98 ft | Y | -1,258.04 ft |
| Velocity | 7.51 ft/s | Headloss | 0.44 ft |
| Headloss Coefficient | 0.50 | Station | 80+73 ft |
| External Flow | 0.00 cfs | | |

Description:
Tatum Boulevard
Station 111+12

Status/Error Messages:
Information: Known flow propagated from upstream junctions.


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# Detailed Report for Pipe P-23

Section Material: Concrete
Section Shape: Circular
Section Size: 30 inch
Number Sections: 1

| Description | | Description | |
|---|---|---|---|
| Discharge | 29.00 cfs | Capacity | 66.53 cfs |
| Mannings Coefficient | 0.013 | Hydraulic Drop | 4.56 ft |
| Length | 190.00 ft | Energy Slope | 0.025490 ft/ft |
| Constructed Slope | 0.026316 ft/ft | Upstream Velocity | 7.51 ft/s |
| Upstream Flow Time | 0.15 min | Average Velocity | 6.85 ft/s |
| Pipe Flow Time | 0.46 min | Downstream Velocity | 6.19 ft/s |
| System Flow Time | 0.61 min | | |

Grade Elevations

| Location | Invert (ft) | Ground (ft) | Crown (ft) | Cover (ft) | Depth (ft) | HGL (ft) | EGL (ft) |
|---|---|---|---|---|---|---|---|
| Upstream | 1,402.00 | 1,407.00 | 1,404.50 | 2.50 | 1.84 | 1,403.84 | 1,404.71 |
| Downstream | 1,397.00 | 1,402.00 | 1,399.50 | 2.50 | 2.27 | 1,399.27 | 1,399.87 |

Description:
Tatum Boulevard
Stations 106+25 to 108+16

Messages:
Profile: Steep subcritical backwater profile (S1).
Profile: Critical depth assumed upstream.
Profile: Hydraulic jump formed.

# Detailed Report for J-22

## Flows

| Description | | Description | |
|---|---|---|---|
| Total Discharge | 29.00 cfs | Known Flow | 29.00 cfs |
| Upstream Additional + Carryover | 0.00 cfs | Total Watershed (CIA) | 0.00 cfs |

## Watershed Data

| Description | | Description | |
|---|---|---|---|
| System Intensity | 0.00 in/hr | Upstream CA | 0.00 acres |
| Total CA | 0.00 acres | | |

## Flow Times

| Description | | Description | |
|---|---|---|---|
| System Flow Time | 0.15 min | Upstream Flow Time | 0.15 min |

## Elevations

| Description | | Description | |
|---|---|---|---|
| HGL In | 1,404.27 ft | HGL Out | 1,403.84 ft |
| Ground Elevation | 1,407.00 ft | Rim Elevation | 1,407.00 ft |

## Other Properties

| Description | | Description | |
|---|---|---|---|
| X | -4,853.07 ft | Y | -1,448.24 ft |
| Velocity | 7.51 ft/s | Headloss | 0.44 ft |
| Headloss Coefficient | 0.50 | Station | 82+63 ft |
| External Flow | 0.00 cfs | | |

Description:
Tatum Boulevard
Station 108+16

Status/Error Messages:
Information: Known flow propagated from upstream junctions.

# Detailed Report for Pipe P-24

Section Material: Concrete
Section Shape: Circular
Section Size: 30 inch
Number Sections: 1

| Description | | Description | |
|---|---|---|---|
| Discharge | 29.00 cfs | Capacity | 74.88 cfs |
| Mannings Coefficient | 0.013 | Hydraulic Drop | 1.56 ft |
| Length | 60.00 ft | Energy Slope | 0.030717 ft/ft |
| Constructed Slope | 0.033333 ft/ft | Upstream Velocity | 7.51 ft/s |
| Upstream Flow Time | 0.00 min | Average Velocity | 6.85 ft/s |
| Pipe Flow Time | 0.15 min | Downstream Velocity | 6.19 ft/s |
| System Flow Time | 0.15 min | | |

Grade Elevations

| Location | Invert (ft) | Ground (ft) | Crown (ft) | Cover (ft) | Depth (ft) | HGL (ft) | EGL (ft) |
|---|---|---|---|---|---|---|---|
| Upstream | 1,404.00 | 1,409.00 | 1,406.50 | 2.50 | 1.84 | 1,405.84 | 1,406.71 |
| Downstream | 1,402.00 | 1,407.00 | 1,404.50 | 2.50 | 2.27 | 1,404.27 | 1,404.87 |

Description:
Tatum Boulevard
Stations 105+65 to 106+25

Messages:
Profile: Steep subcritical backwater profile (S1).
Profile: Critical depth assumed upstream.
Profile: Hydraulic jump formed.

# Detailed Report for I-2

## Watershed Information

No watershed data entered for this inlet.

## Flows

| Description | | Description | |
|---|---|---|---|
| Total Discharge | 29.00 cfs | Known Flow | 29.00 cfs |
| Upstream Additional + Carryover | 0.00 cfs | Total Watershed (CIA) | 0.00 cfs |
| Carryover | 0.00 cfs | Additional Flow | 0.00 cfs |

## Watershed Data

| Description | | Description | |
|---|---|---|---|
| System Intensity | 0.00 in/hr | Upstream CA | 0.00 acres |
| Total CA | 0.00 acres | Inlet CA | 0.00 acres |
| External CA | 0.00 acres | | |

## Flow Times

| Description | | Description | |
|---|---|---|---|
| System Flow Time | 0.00 min | Upstream Flow Time | 0.00 min |
| Inlet TC | 0.00 min | External TC | 0.00 min |

## Elevations

| Description | | Description | |
|---|---|---|---|
| HGL In | 1,406.01 ft | HGL Out | 1,405.84 ft |
| Ground Elevation | 1,409.00 ft | Rim Elevation | 1,409.00 ft |

## Other Properties

| Description | | Description | |
|---|---|---|---|
| X | -4,868.01 ft | Y | -1,506.00 ft |
| Velocity | 7.51 ft/s | Headloss | 0.18 ft |
| Headloss Coefficient | 0.20 | Station | 83+23 ft |
| External Flow | 0.00 cfs | | |

Description:
Tatum Boulevard
Station 105+65
Inlet picking up wash at Tomahawk Drive

# Detailed Report for Pipe P-25

Section Material: Concrete
Section Shape: Box
Section Size: 8 x 6 ft
Number Sections: 3

| Description | | Description | |
|---|---|---|---|
| Discharge | 889.00 cfs | Capacity | 1,126.30 cfs |
| Mannings Coefficient | 0.013 | Hydraulic Drop | 0.47 ft |
| Length | 333.00 ft | Energy Slope | 0.001422 ft/ft |
| Constructed Slope | 0.002282 ft/ft | Upstream Velocity | 6.17 ft/s |
| Upstream Flow Time | 8.35 min | Average Velocity | 6.17 ft/s |
| Pipe Flow Time | 0.90 min | Downstream Velocity | 6.17 ft/s |
| System Flow Time | 9.25 min | | |

Grade Elevations

| Location | Invert (ft) | Ground (ft) | Crown (ft) | Cover (ft) | Depth (ft) | HGL (ft) | EGL (ft) |
|---|---|---|---|---|---|---|---|
| Upstream | 1,343.76 | 1,356.50 | 1,349.76 | 6.74 | 8.71 | 1,352.47 | 1,353.06 |
| Downstream | 1,343.00 | 1,356.00 | 1,349.00 | 7.00 | 8.99 | 1,351.99 | 1,352.59 |

Description:
52nd Street South
Stations 340+68 to 344+00

Messages:
Profile: Pressure profile.
Information: Surcharged condition

# Detailed Report for J-23

## Flows

| Description | | Description | |
|---|---|---|---|
| Total Discharge | 889.00 cfs | Known Flow | 889.00 cfs |
| Upstream Additional + Carryover | 0.00 cfs | Total Watershed (CIA) | 0.00 cfs |

## Watershed Data

| Description | | Description | |
|---|---|---|---|
| System Intensity | 0.00 in/hr | Upstream CA | 0.00 acres |
| Total CA | 0.00 acres | | |

## Flow Times

| Description | | Description | |
|---|---|---|---|
| System Flow Time | 8.35 min | Upstream Flow Time | 8.35 min |

## Elevations

| Description | | Description | |
|---|---|---|---|
| HGL In | 1,352.50 ft | HGL Out | 1,352.47 ft |
| Ground Elevation | 1,356.50 ft | Rim Elevation | 1,356.50 ft |

## Other Properties

| Description | | Description | |
|---|---|---|---|
| X | -2,199.03 ft | Y | -332.51 ft |
| Velocity | 6.17 ft/s | Headloss | 0.03 ft |
| Headloss Coefficient | 0.05 | Station | 45+37 ft |
| External Flow | 0.00 cfs | | |

Description:
52nd Street South
Station 340+68

Status/Error Messages:
Information: Known flow propagated from upstream junctions.


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# Detailed Report for Pipe P-26

Section Material: Concrete
Section Shape: Box
Section Size: 8 x 6 ft
Number Sections: 3

| Description | | Description | |
|---|---|---|---|
| Discharge | 889.00 cfs | Capacity | 1,135.39 cfs |
| Mannings Coefficient | 0.013 | Hydraulic Drop | 0.47 ft |
| Length | 332.00 ft | Energy Slope | 0.001422 ft/ft |
| Constructed Slope | 0.002319 ft/ft | Upstream Velocity | 6.17 ft/s |
| Upstream Flow Time | 7.46 min | Average Velocity | 6.17 ft/s |
| Pipe Flow Time | 0.90 min | Downstream Velocity | 6.17 ft/s |
| System Flow Time | 8.35 min | | |

Grade Elevations

| Location | Invert (ft) | Ground (ft) | Crown (ft) | Cover (ft) | Depth (ft) | HGL (ft) | EGL (ft) |
|---|---|---|---|---|---|---|---|
| Upstream | 1,344.53 | 1,355.00 | 1,350.53 | 4.47 | 8.44 | 1,352.97 | 1,353.56 |
| Downstream | 1,343.76 | 1,356.50 | 1,349.76 | 6.74 | 8.74 | 1,352.50 | 1,353.09 |

Description:
52nd Street South
Stations 337+35 to 340+68

Messages:
Profile: Pressure profile.
Information: Surcharged condition

# Detailed Report for J-24

## Flows

| Description | | Description | |
|---|---|---|---|
| Total Discharge | 889.00 cfs | Known Flow | 889.00 cfs |
| Upstream Additional + Carryover | 0.00 cfs | Total Watershed (CIA) | 0.00 cfs |

## Watershed Data

| Description | | Description | |
|---|---|---|---|
| System Intensity | 0.00 in/hr | Upstream CA | 0.00 acres |
| Total CA | 0.00 acres | | |

## Flow Times

| Description | | Description | |
|---|---|---|---|
| System Flow Time | 7.46 min | Upstream Flow Time | 7.46 min |

## Elevations

| Description | | Description | |
|---|---|---|---|
| HGL In | 1,353.00 ft | HGL Out | 1,352.97 ft |
| Ground Elevation | 1,355.00 ft | Rim Elevation | 1,355.00 ft |

## Other Properties

| Description | | Description | |
|---|---|---|---|
| X | -2,199.06 ft | Y | -665.00 ft |
| Velocity | 6.17 ft/s | Headloss | 0.03 ft |
| Headloss Coefficient | 0.05 | Station | 48+69 ft |
| External Flow | 0.00 cfs | | |

Description:
52nd Street
Station 337+35

Status/Error Messages:
Information: Known flow propagated from upstream junctions.

# Detailed Report for Pipe P-27

Section Material: Concrete
Section Shape: Box
Section Size: 8 x 6 ft
Number Sections: 3

| Description | | Description | |
|---|---|---|---|
| Discharge | 889.00 cfs | Capacity | 1,126.05 cfs |
| Mannings Coefficient | 0.013 | Hydraulic Drop | 0.46 ft |
| Length | 320.00 ft | Energy Slope | 0.001422 ft/ft |
| Constructed Slope | 0.002281 ft/ft | Upstream Velocity | 6.17 ft/s |
| Upstream Flow Time | 6.59 min | Average Velocity | 6.17 ft/s |
| Pipe Flow Time | 0.86 min | Downstream Velocity | 6.17 ft/s |
| System Flow Time | 7.46 min | | |

Grade Elevations

| Location | Invert (ft) | Ground (ft) | Crown (ft) | Cover (ft) | Depth (ft) | HGL (ft) | EGL (ft) |
|---|---|---|---|---|---|---|---|
| Upstream | 1,345.26 | 1,356.00 | 1,351.26 | 4.74 | 8.19 | 1,353.45 | 1,354.05 |
| Downstream | 1,344.53 | 1,355.00 | 1,350.53 | 4.47 | 8.47 | 1,353.00 | 1,353.59 |

Description:
52nd Street
Stations 334+10 to 337+35

Messages:
Profile: Pressure profile.
Information: Surcharged condition


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# Detailed Report for J-25

## Flows

| Description | | Description | |
|---|---|---|---|
| Total Discharge | 889.00 cfs | Known Flow | 889.00 cfs |
| Upstream Additional + Carryover | 0.00 cfs | Total Watershed (CIA) | 0.00 cfs |

## Watershed Data

| Description | | Description | |
|---|---|---|---|
| System Intensity | 0.00 in/hr | Upstream CA | 0.00 acres |
| Total CA | 0.00 acres | | |

## Flow Times

| Description | | Description | |
|---|---|---|---|
| System Flow Time | 6.59 min | Upstream Flow Time | 6.59 min |

## Elevations

| Description | | Description | |
|---|---|---|---|
| HGL In | 1,353.48 ft | HGL Out | 1,353.45 ft |
| Ground Elevation | 1,356.00 ft | Rim Elevation | 1,356.00 ft |

## Other Properties

| Description | | Description | |
|---|---|---|---|
| X | -2,199.02 ft | Y | -985.24 ft |
| Velocity | 6.17 ft/s | Headloss | 0.03 ft |
| Headloss Coefficient | 0.05 | Station | 51+89 ft |
| External Flow | 0.00 cfs | | |

Description:
52nd Street South
Station 334+10

Status/Error Messages:
Information: Known flow propagated from upstream junctions.


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# Detailed Report for Pipe P-28

Section Material: Concrete
Section Shape: Box
Section Size: 8 x 6 ft
Number Sections: 3

| Description | | Description | |
|---|---|---|---|
| Discharge | 889.00 cfs | Capacity | 1,133.73 cfs |
| Mannings Coefficient | 0.013 | Hydraulic Drop | 0.46 ft |
| Length | 320.00 ft | Energy Slope | 0.001422 ft/ft |
| Constructed Slope | 0.002313 ft/ft | Upstream Velocity | 6.17 ft/s |
| Upstream Flow Time | 5.73 min | Average Velocity | 6.17 ft/s |
| Pipe Flow Time | 0.86 min | Downstream Velocity | 6.17 ft/s |
| System Flow Time | 6.59 min | | |

Grade Elevations

| Location | Invert (ft) | Ground (ft) | Crown (ft) | Cover (ft) | Depth (ft) | HGL (ft) | EGL (ft) |
|---|---|---|---|---|---|---|---|
| Upstream | 1,346.00 | 1,357.00 | 1,352.00 | 5.00 | 7.94 | 1,353.94 | 1,354.53 |
| Downstream | 1,345.26 | 1,356.00 | 1,351.26 | 4.74 | 8.22 | 1,353.48 | 1,354.08 |

Description:
52nd Street South
Stations 330+90 to 334+10

Messages:
Profile: Pressure profile.
Information: Surcharged condition

# Detailed Report for J-26

## Flows

| Description | | Description | |
|---|---|---|---|
| Total Discharge | 889.00 cfs | Known Flow | 889.00 cfs |
| Upstream Additional + Carryover | 0.00 cfs | Total Watershed (CIA) | 0.00 cfs |

## Watershed Data

| Description | | Description | |
|---|---|---|---|
| System Intensity | 0.00 in/hr | Upstream CA | 0.00 acres |
| Total CA | 0.00 acres | | |

## Flow Times

| Description | | Description | |
|---|---|---|---|
| System Flow Time | 5.73 min | Upstream Flow Time | 5.73 min |

## Elevations

| Description | | Description | |
|---|---|---|---|
| HGL In | 1,353.97 ft | HGL Out | 1,353.94 ft |
| Ground Elevation | 1,357.00 ft | Rim Elevation | 1,357.00 ft |

## Other Properties

| Description | | Description | |
|---|---|---|---|
| X | -2,199.05 ft | Y | -1,305.08 ft |
| Velocity | 6.17 ft/s | Headloss | 0.03 ft |
| Headloss Coefficient | 0.05 | Station | 55+09 ft |
| External Flow | 0.00 cfs | | |

Description:
52nd Street South
Station 330+90

Status/Error Messages:
Information: Known flow propagated from upstream junctions.

# Detailed Report for Pipe P-29

Section Material: Concrete
Section Shape: Box
Section Size: 8 x 6 ft
Number Sections: 3

| Description | | Description | |
|---|---|---|---|
| Discharge | 889.00 cfs | Capacity | 1,852.30 cfs |
| Mannings Coefficient | 0.013 | Hydraulic Drop | 0.58 ft |
| Length | 405.00 ft | Energy Slope | 0.001422 ft/ft |
| Constructed Slope | 0.006173 ft/ft | Upstream Velocity | 6.17 ft/s |
| Upstream Flow Time | 4.64 min | Average Velocity | 6.17 ft/s |
| Pipe Flow Time | 1.09 min | Downstream Velocity | 6.17 ft/s |
| System Flow Time | 5.73 min | | |

Grade Elevations

| Location | Invert (ft) | Ground (ft) | Crown (ft) | Cover (ft) | Depth (ft) | HGL (ft) | EGL (ft) |
|---|---|---|---|---|---|---|---|
| Upstream | 1,348.50 | 1,360.00 | 1,354.50 | 5.50 | 6.04 | 1,354.54 | 1,355.14 |
| Downstream | 1,346.00 | 1,357.00 | 1,352.00 | 5.00 | 7.97 | 1,353.97 | 1,354.56 |

Description:
52nd Street South
Stations 326+85 to 330+90

Messages:
Profile: Pressure profile.
Information: Surcharged condition

# Detailed Report for J-27

## Flows

| Description | | Description | |
|---|---|---|---|
| Total Discharge | 889.00 cfs | Known Flow | 889.00 cfs |
| Upstream Additional + Carryover | 0.00 cfs | Total Watershed (CIA) | 0.00 cfs |

## Watershed Data

| Description | | Description | |
|---|---|---|---|
| System Intensity | 0.00 in/hr | Upstream CA | 0.00 acres |
| Total CA | 0.00 acres | | |

## Flow Times

| Description | | Description | |
|---|---|---|---|
| System Flow Time | 4.64 min | Upstream Flow Time | 4.64 min |

## Elevations

| Description | | Description | |
|---|---|---|---|
| HGL In | 1,354.60 ft | HGL Out | 1,354.54 ft |
| Ground Elevation | 1,360.00 ft | Rim Elevation | 1,360.00 ft |

## Other Properties

| Description | | Description | |
|---|---|---|---|
| X | -2,199.05 ft | Y | -1,709.97 ft |
| Velocity | 6.17 ft/s | Headloss | 0.06 ft |
| Headloss Coefficient | 0.10 | Station | 59+14 ft |
| External Flow | 0.00 cfs | | |

Description:
52nd Street South
Station 326+85

Status/Error Messages:
Information: Known flow propagated from upstream junctions.

# Detailed Report for Pipe P-30

Section Material: Concrete
Section Shape: Box
Section Size: 8 x 5 ft
Number Sections: 2

| Description | | Description | |
|---|---|---|---|
| Discharge | 889.00 cfs | Capacity | 887.89 cfs |
| Mannings Coefficient | 0.013 | Hydraulic Drop | 2.16 ft |
| Length | 405.00 ft | Energy Slope | 0.005322 ft/ft |
| Constructed Slope | 0.005309 ft/ft | Upstream Velocity | 11.11 ft/s |
| Upstream Flow Time | 4.03 min | Average Velocity | 11.11 ft/s |
| Pipe Flow Time | 0.61 min | Downstream Velocity | 11.11 ft/s |
| System Flow Time | 4.64 min | | |

Grade Elevations

| Location | Invert (ft) | Ground (ft) | Crown (ft) | Cover (ft) | Depth (ft) | HGL (ft) | EGL (ft) |
|---|---|---|---|---|---|---|---|
| Upstream | 1,351.65 | 1,362.50 | 1,356.65 | 5.85 | 5.11 | 1,356.76 | 1,358.68 |
| Downstream | 1,349.50 | 1,360.00 | 1,354.50 | 5.50 | 5.10 | 1,354.60 | 1,356.52 |

Description:
52nd Street South
Stations 322+81 to 326+85

Messages:
Profile: Pressure profile.
Information: Surcharged condition

# Detailed Report for J-28

## Flows

| Description | | Description | |
|---|---|---|---|
| Total Discharge | 889.00 cfs | Known Flow | 889.00 cfs |
| Upstream Additional + Carryover | 0.00 cfs | Total Watershed (CIA) | 0.00 cfs |

## Watershed Data

| Description | | Description | |
|---|---|---|---|
| System Intensity | 0.00 in/hr | Upstream CA | 0.00 acres |
| Total CA | 0.00 acres | | |

## Flow Times

| Description | | Description | |
|---|---|---|---|
| System Flow Time | 4.03 min | Upstream Flow Time | 4.03 min |

## Elevations

| Description | | Description | |
|---|---|---|---|
| HGL In | 1,356.86 ft | HGL Out | 1,356.76 ft |
| Ground Elevation | 1,362.50 ft | Rim Elevation | 1,362.50 ft |

## Other Properties

| Description | | Description | |
|---|---|---|---|
| X | -2,199.00 ft | Y | -2,114.94 ft |
| Velocity | 11.11 ft/s | Headloss | 0.10 ft |
| Headloss Coefficient | 0.05 | Station | 63+19 ft |
| External Flow | 0.00 cfs | | |

Description:
52nd Street South
Station 322+81

Status/Error Messages:
Information: Known flow propagated from upstream junctions.


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# Detailed Report for Pipe P-31

Section Material: Concrete
Section Shape: Box
Section Size: 8 x 5 ft
Number Sections: 2

| Description | | Description | |
|---|---|---|---|
| Discharge | 889.00 cfs | Capacity | 888.60 cfs |
| Mannings Coefficient | 0.013 | Hydraulic Drop | 2.85 ft |
| Length | 536.00 ft | Energy Slope | 0.005322 ft/ft |
| Constructed Slope | 0.005317 ft/ft | Upstream Velocity | 11.11 ft/s |
| Upstream Flow Time | 3.23 min | Average Velocity | 11.11 ft/s |
| Pipe Flow Time | 0.80 min | Downstream Velocity | 11.11 ft/s |
| System Flow Time | 4.03 min | | |

Grade Elevations

| Location | Invert (ft) | Ground (ft) | Crown (ft) | Cover (ft) | Depth (ft) | HGL (ft) | EGL (ft) |
|---|---|---|---|---|---|---|---|
| Upstream | 1,354.50 | 1,367.00 | 1,359.50 | 7.50 | 5.21 | 1,359.71 | 1,361.63 |
| Downstream | 1,351.65 | 1,362.50 | 1,356.65 | 5.85 | 5.21 | 1,356.86 | 1,358.77 |

Description:
52nd Street South
Stations 317+45 to 322+81

Messages:
Profile: Pressure profile.
Information: Surcharged condition

# Detailed Report for J-29

## Flows

| Description | | Description | |
|---|---|---|---|
| Total Discharge | 889.00 cfs | Known Flow | 889.00 cfs |
| Upstream Additional + Carryover | 0.00 cfs | Total Watershed (CIA) | 0.00 cfs |

## Watershed Data

| Description | | Description | |
|---|---|---|---|
| System Intensity | 0.00 in/hr | Upstream CA | 0.00 acres |
| Total CA | 0.00 acres | | |

## Flow Times

| Description | | Description | |
|---|---|---|---|
| System Flow Time | 3.23 min | Upstream Flow Time | 3.23 min |

## Elevations

| Description | | Description | |
|---|---|---|---|
| HGL In | 1,361.05 ft | HGL Out | 1,359.71 ft |
| Ground Elevation | 1,367.00 ft | Rim Elevation | 1,367.00 ft |

## Other Properties

| Description | | Description | |
|---|---|---|---|
| X | -2,198.59 ft | Y | -2,650.46 ft |
| Velocity | 11.11 ft/s | Headloss | 1.34 ft |
| Headloss Coefficient | 0.70 | Station | 68+55 ft |
| External Flow | 0.00 cfs | | |

Description:
52nd Street South
Intersection with Butler Drive
Station 317+45

Status/Error Messages:
Information: Known flow propagated from upstream junctions.

# Detailed Report for Pipe P-32

Section Material: Concrete
Section Shape: Box
Section Size: 8 x 5 ft
Number Sections: 1

| Description | | Description | |
|---|---|---|---|
| Discharge | 424.00 cfs | Capacity | 680.08 cfs |
| Mannings Coefficient | 0.013 | Hydraulic Drop | 3.06 ft |
| Length | 415.00 ft | Energy Slope | 0.008499 ft/ft |
| Constructed Slope | 0.012458 ft/ft | Upstream Velocity | 11.95 ft/s |
| Upstream Flow Time | 1.17 min | Average Velocity | 11.27 ft/s |
| Pipe Flow Time | 0.61 min | Downstream Velocity | 10.60 ft/s |
| System Flow Time | 1.79 min | | |

Grade Elevations

| Location | Invert (ft) | Ground (ft) | Crown (ft) | Cover (ft) | Depth (ft) | HGL (ft) | EGL (ft) |
|---|---|---|---|---|---|---|---|
| Upstream | 1,359.67 | 1,370.00 | 1,364.67 | 5.33 | 4.44 | 1,364.11 | 1,366.32 |
| Downstream | 1,354.50 | 1,367.00 | 1,359.50 | 7.50 | 6.55 | 1,361.05 | 1,362.80 |

Description:
52nd Street South
Stations 313+30 to 317+45

Messages:
Profile: Steep subcritical backwater profile (S1).
Profile: Composite profile.
Profile: Critical depth assumed upstream.
Profile: Pressure profile.
Profile: Hydraulic jump formed.

# Detailed Report for J-30

## Flows

| Description | | Description | |
|---|---|---|---|
| Total Discharge | 424.00 cfs | Known Flow | 424.00 cfs |
| Upstream Additional + Carryover | 0.00 cfs | Total Watershed (CIA) | 0.00 cfs |

## Watershed Data

| Description | | Description | |
|---|---|---|---|
| System Intensity | 0.00 in/hr | Upstream CA | 0.00 acres |
| Total CA | 0.00 acres | | |

## Flow Times

| Description | | Description | |
|---|---|---|---|
| System Flow Time | 1.17 min | Upstream Flow Time | 1.17 min |

## Elevations

| Description | | Description | |
|---|---|---|---|
| HGL In | 1,364.22 ft | HGL Out | 1,364.11 ft |
| Ground Elevation | 1,370.00 ft | Rim Elevation | 1,370.00 ft |

## Other Properties

| Description | | Description | |
|---|---|---|---|
| X | -2,199.06 ft | Y | -3,064.98 ft |
| Velocity | 11.95 ft/s | Headloss | 0.11 ft |
| Headloss Coefficient | 0.05 | Station | 72+70 ft |
| External Flow | 0.00 cfs | | |

Description:
52nd Street South
Station 313+30

Status/Error Messages:
Information: Known flow propagated from upstream junctions.

# Detailed Report for Pipe P-33

Section Material: Concrete
Section Shape: Box
Section Size: 8 x 5 ft
Number Sections: 1

| Description | | Description | |
|---|---|---|---|
| Discharge | 424.00 cfs | Capacity | 679.42 cfs |
| Mannings Coefficient | 0.013 | Hydraulic Drop | 5.05 ft |
| Length | 415.00 ft | Energy Slope | 0.012424 ft/ft |
| Constructed Slope | 0.012434 ft/ft | Upstream Velocity | 11.95 ft/s |
| Upstream Flow Time | 0.59 min | Average Velocity | 11.80 ft/s |
| Pipe Flow Time | 0.59 min | Downstream Velocity | 11.66 ft/s |
| System Flow Time | 1.17 min | | |

Grade Elevations

| Location | Invert (ft) | Ground (ft) | Crown (ft) | Cover (ft) | Depth (ft) | HGL (ft) | EGL (ft) |
|---|---|---|---|---|---|---|---|
| Upstream | 1,364.83 | 1,373.00 | 1,369.83 | 3.17 | 4.44 | 1,369.27 | 1,371.48 |
| Downstream | 1,359.67 | 1,370.00 | 1,364.67 | 5.33 | 4.55 | 1,364.22 | 1,366.33 |

Description:
52nd Street South
Stations 309+17 to 313+30

Messages:
Profile: Steep subcritical backwater profile (S1).
Profile: Critical depth assumed upstream.
Profile: Hydraulic jump formed.

# Detailed Report for J-31

## Flows

| Description | | Description | |
|---|---|---|---|
| Total Discharge | 424.00 cfs | Known Flow | 424.00 cfs |
| Upstream Additional + Carryover | 0.00 cfs | Total Watershed (CIA) | 0.00 cfs |

## Watershed Data

| Description | | Description | |
|---|---|---|---|
| System Intensity | 0.00 in/hr | Upstream CA | 0.00 acres |
| Total CA | 0.00 acres | | |

## Flow Times

| Description | | Description | |
|---|---|---|---|
| System Flow Time | 0.59 min | Upstream Flow Time | 0.59 min |

## Elevations

| Description | | Description | |
|---|---|---|---|
| HGL In | 1,369.38 ft | HGL Out | 1,369.27 ft |
| Ground Elevation | 1,373.00 ft | Rim Elevation | 1,373.00 ft |

## Other Properties

| Description | | Description | |
|---|---|---|---|
| X | -2,199.02 ft | Y | -3,480.05 ft |
| Velocity | 11.95 ft/s | Headloss | 0.11 ft |
| Headloss Coefficient | 0.05 | Station | 76+85 ft |
| External Flow | 0.00 cfs | | |

Description:
52nd Street South
Station 309+17

Status/Error Messages:
Information: Known flow propagated from upstream junctions.


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# Detailed Report for Pipe P-34

Section Material: Concrete
Section Shape: Box
Section Size: 8 x 5 ft
Number Sections: 1

| Description | | Description | |
|---|---|---|---|
| Discharge | 424.00 cfs | Capacity | 680.08 cfs |
| Mannings Coefficient | 0.013 | Hydraulic Drop | 5.06 ft |
| Length | 415.00 ft | Energy Slope | 0.012448 ft/ft |
| Constructed Slope | 0.012458 ft/ft | Upstream Velocity | 11.95 ft/s |
| Upstream Flow Time | 0.00 min | Average Velocity | 11.80 ft/s |
| Pipe Flow Time | 0.59 min | Downstream Velocity | 11.66 ft/s |
| System Flow Time | 0.59 min | | |

Grade Elevations

| Location | Invert (ft) | Ground (ft) | Crown (ft) | Cover (ft) | Depth (ft) | HGL (ft) | EGL (ft) |
|---|---|---|---|---|---|---|---|
| Upstream | 1,370.00 | 1,378.00 | 1,375.00 | 3.00 | 4.44 | 1,374.44 | 1,376.65 |
| Downstream | 1,364.83 | 1,373.00 | 1,369.83 | 3.17 | 4.55 | 1,369.38 | 1,371.49 |

Description:
52nd Street South
Cherokee Wash Inlet
Stations 305+00 to 309+17

Messages:
Profile: Steep subcritical backwater profile (S1).
Profile: Critical depth assumed upstream.
Profile: Hydraulic jump formed.


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# Detailed Report for I-3

## Watershed Information

No watershed data entered for this inlet.

## Flows

| Description | | Description | |
|---|---|---|---|
| Total Discharge | 424.00 cfs | Known Flow | 424.00 cfs |
| Upstream Additional + Carryover | 0.00 cfs | Total Watershed (CIA) | 0.00 cfs |
| Carryover | 0.00 cfs | Additional Flow | 0.00 cfs |

## Watershed Data

| Description | | Description | |
|---|---|---|---|
| System Intensity | 0.00 in/hr | Upstream CA | 0.00 acres |
| Total CA | 0.00 acres | Inlet CA | 0.00 acres |
| External CA | 0.00 acres | | |

## Flow Times

| Description | | Description | |
|---|---|---|---|
| System Flow Time | 0.00 min | Upstream Flow Time | 0.00 min |
| Inlet TC | 0.00 min | External TC | 0.00 min |

## Elevations

| Description | | Description | |
|---|---|---|---|
| HGL In | 1,374.88 ft | HGL Out | 1,374.44 ft |
| Ground Elevation | 1,378.00 ft | Rim Elevation | 1,378.00 ft |

## Other Properties

| Description | | Description | |
|---|---|---|---|
| X | -2,199.03 ft | Y | -3,895.28 ft |
| Velocity | 11.95 ft/s | Headloss | 0.44 ft |
| Headloss Coefficient | 0.20 | Station | 81+00 ft |
| External Flow | 0.00 cfs | | |

Description:
52nd Street at Cherokee Wash
Station 305+00

# Detailed Report for Pipe P-35

Section Material: Concrete
Section Shape: Circular
Section Size: 60 inch
Number Sections: 1

| Description | | Description | |
|---|---|---|---|
| Discharge | 101.00 cfs | Capacity | 311.27 cfs |
| Mannings Coefficient | 0.013 | Hydraulic Drop | 0.19 ft |
| Length | 140.00 ft | Energy Slope | 0.001491 ft/ft |
| Constructed Slope | 0.014286 ft/ft | Upstream Velocity | 5.25 ft/s |
| Upstream Flow Time | 2.77 min | Average Velocity | 5.19 ft/s |
| Pipe Flow Time | 0.45 min | Downstream Velocity | 5.14 ft/s |
| System Flow Time | 3.22 min | | |

Grade Elevations

| Location | Invert (ft) | Ground (ft) | Crown (ft) | Cover (ft) | Depth (ft) | HGL (ft) | EGL (ft) |
|---|---|---|---|---|---|---|---|
| Upstream | 1,356.50 | 1,364.00 | 1,361.50 | 2.50 | 4.74 | 1,361.24 | 1,361.67 |
| Downstream | 1,354.50 | 1,367.00 | 1,359.50 | 7.50 | 6.55 | 1,361.05 | 1,361.46 |

Description:
Butler Drive
Stations 220+60 to 222+00

Messages:
Profile: Steep subcritical backwater profile (S1).
Profile: Composite profile.
Profile: Pressure profile.
Profile: Hydraulic grade increases in downstream direction.

# Detailed Report for J-32

## Flows

| Description | | Description | |
|---|---|---|---|
| Total Discharge | 101.00 cfs | Known Flow | 101.00 cfs |
| Upstream Additional + Carryover | 0.00 cfs | Total Watershed (CIA) | 0.00 cfs |

## Watershed Data

| Description | | Description | |
|---|---|---|---|
| System Intensity | 0.00 in/hr | Upstream CA | 0.00 acres |
| Total CA | 0.00 acres | | |

## Flow Times

| Description | | Description | |
|---|---|---|---|
| System Flow Time | 2.77 min | Upstream Flow Time | 2.77 min |

## Elevations

| Description | | Description | |
|---|---|---|---|
| HGL In | 1,361.46 ft | HGL Out | 1,361.24 ft |
| Ground Elevation | 1,364.00 ft | Rim Elevation | 1,364.00 ft |

## Other Properties

| Description | | Description | |
|---|---|---|---|
| X | -2,338.96 ft | Y | -2,649.99 ft |
| Velocity | 5.25 ft/s | Headloss | 0.21 ft |
| Headloss Coefficient | 0.50 | Station | 69+95 ft |
| External Flow | 0.00 cfs | | |

Description:
Butler Drive
Station 220+60
Low spot

Status/Error Messages:
Information: Known flow propagated from upstream junctions.

# Detailed Report for Pipe P-36

Section Material: Concrete
Section Shape: Circular
Section Size: 48 inch
Number Sections: 1

| Description | | Description | |
|---|---|---|---|
| Discharge | 101.00 cfs | Capacity | 150.71 cfs |
| Mannings Coefficient | 0.013 | Hydraulic Drop | 5.09 ft |
| Length | 545.00 ft | Energy Slope | 0.010248 ft/ft |
| Constructed Slope | 0.011009 ft/ft | Upstream Velocity | 9.84 ft/s |
| Upstream Flow Time | 1.76 min | Average Velocity | 8.95 ft/s |
| Pipe Flow Time | 1.02 min | Downstream Velocity | 8.05 ft/s |
| System Flow Time | 2.77 min | | |

Grade Elevations

| Location | Invert (ft) | Ground (ft) | Crown (ft) | Cover (ft) | Depth (ft) | HGL (ft) | EGL (ft) |
|---|---|---|---|---|---|---|---|
| Upstream | 1,363.50 | 1,372.50 | 1,367.50 | 5.00 | 3.04 | 1,366.54 | 1,368.05 |
| Downstream | 1,357.50 | 1,364.00 | 1,361.50 | 2.50 | 3.96 | 1,361.46 | 1,362.46 |

Description:
Butler Drive
Stations 215+15 to 220+60

Messages:
Profile: Steep subcritical backwater profile (S1).
Profile: Critical depth assumed upstream.
Profile: Hydraulic jump formed.

# Detailed Report for J-33

## Flows

| Description | | Description | |
|---|---|---|---|
| Total Discharge | 101.00 cfs | Known Flow | 101.00 cfs |
| Upstream Additional + Carryover | 0.00 cfs | Total Watershed (CIA) | 0.00 cfs |

## Watershed Data

| Description | | Description | |
|---|---|---|---|
| System Intensity | 0.00 in/hr | Upstream CA | 0.00 acres |
| Total CA | 0.00 acres | | |

## Flow Times

| Description | | Description | |
|---|---|---|---|
| System Flow Time | 1.76 min | Upstream Flow Time | 1.76 min |

## Elevations

| Description | | Description | |
|---|---|---|---|
| HGL In | 1,367.30 ft | HGL Out | 1,366.54 ft |
| Ground Elevation | 1,372.50 ft | Rim Elevation | 1,372.50 ft |

## Other Properties

| Description | | Description | |
|---|---|---|---|
| X | -2,884.03 ft | Y | -2,649.97 ft |
| Velocity | 9.84 ft/s | Headloss | 0.75 ft |
| Headloss Coefficient | 0.50 | Station | 75+40 ft |
| External Flow | 0.00 cfs | | |

Description:
Butler Drive
Station 215+15

Status/Error Messages:
Information: Sump elevation must be at or below minimum pipe invert elevation (adjusted)
Information: Known flow propagated from upstream junctions.


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# Detailed Report for Pipe P-37

Section Material: Concrete
Section Shape: Circular
Section Size: 48 inch
Number Sections: 1

| Description | | Description | |
|---|---|---|---|
| Discharge | 101.00 cfs | Capacity | 228.30 cfs |
| Mannings Coefficient | 0.013 | Hydraulic Drop | 11.25 ft |
| Length | 475.00 ft | Energy Slope | 0.024651 ft/ft |
| Constructed Slope | 0.025263 ft/ft | Upstream Velocity | 9.84 ft/s |
| Upstream Flow Time | 0.88 min | Average Velocity | 9.02 ft/s |
| Pipe Flow Time | 0.88 min | Downstream Velocity | 8.19 ft/s |
| System Flow Time | 1.76 min | | |

Grade Elevations

| Location | Invert (ft) | Ground (ft) | Crown (ft) | Cover (ft) | Depth (ft) | HGL (ft) | EGL (ft) |
|---|---|---|---|---|---|---|---|
| Upstream | 1,375.50 | 1,382.00 | 1,379.50 | 2.50 | 3.04 | 1,378.54 | 1,380.05 |
| Downstream | 1,363.50 | 1,372.50 | 1,367.50 | 5.00 | 3.80 | 1,367.30 | 1,368.34 |

Description:
Butler Drive
Stations 210+40 to 215+15

Messages:
Profile: Steep subcritical backwater profile (S1).
Profile: Critical depth assumed upstream.
Profile: Hydraulic jump formed.

# Detailed Report for J-34

## Flows

| Description | | Description | |
|---|---|---|---|
| Total Discharge | 101.00 cfs | Known Flow | 101.00 cfs |
| Upstream Additional + Carryover | 0.00 cfs | Total Watershed (CIA) | 0.00 cfs |

## Watershed Data

| Description | | Description | |
|---|---|---|---|
| System Intensity | 0.00 in/hr | Upstream CA | 0.00 acres |
| Total CA | 0.00 acres | | |

## Flow Times

| Description | | Description | |
|---|---|---|---|
| System Flow Time | 0.88 min | Upstream Flow Time | 0.88 min |

## Elevations

| Description | | Description | |
|---|---|---|---|
| HGL In | 1,379.30 ft | HGL Out | 1,378.54 ft |
| Ground Elevation | 1,382.00 ft | Rim Elevation | 1,382.00 ft |

## Other Properties

| Description | | Description | |
|---|---|---|---|
| X | -3,358.90 ft | Y | -2,650.09 ft |
| Velocity | 9.84 ft/s | Headloss | 0.75 ft |
| Headloss Coefficient | 0.50 | Station | 80+15 ft |
| External Flow | 0.00 cfs | | |

Description:
Butler Drive
Station 210+40

Status/Error Messages:
Information: Known flow propagated from upstream junctions.

# Detailed Report for Pipe P-38

Section Material: Concrete
Section Shape: Circular
Section Size: 48 inch
Number Sections: 1

| Description | | Description | |
|---|---|---|---|
| Discharge | 101.00 cfs | Capacity | 250.96 cfs |
| Mannings Coefficient | 0.013 | Hydraulic Drop | 13.75 ft |
| Length | 475.00 ft | Energy Slope | 0.029914 ft/ft |
| Constructed Slope | 0.030526 ft/ft | Upstream Velocity | 9.84 ft/s |
| Upstream Flow Time | 0.00 min | Average Velocity | 9.02 ft/s |
| Pipe Flow Time | 0.88 min | Downstream Velocity | 8.19 ft/s |
| System Flow Time | 0.88 min | | |

Grade Elevations

| Location | Invert (ft) | Ground (ft) | Crown (ft) | Cover (ft) | Depth (ft) | HGL (ft) | EGL (ft) |
|---|---|---|---|---|---|---|---|
| Upstream | 1,390.00 | 1,396.00 | 1,394.00 | 2.00 | 3.04 | 1,393.04 | 1,394.55 |
| Downstream | 1,375.50 | 1,382.00 | 1,379.50 | 2.50 | 3.80 | 1,379.30 | 1,380.34 |

Description:
Butler Drive
Stations 205+65 to 210+40

Messages:
Profile: Steep subcritical backwater profile (S1).
Profile: Critical depth assumed upstream.
Profile: Hydraulic jump formed.

# Detailed Report for I-4

## Watershed Information

No watershed data entered for this inlet.

## Flows

| Description | | Description | |
|---|---|---|---|
| Total Discharge | 101.00 cfs | Known Flow | 101.00 cfs |
| Upstream Additional + Carryover | 0.00 cfs | Total Watershed (CIA) | 0.00 cfs |
| Carryover | 0.00 cfs | Additional Flow | 0.00 cfs |

## Watershed Data

| Description | | Description | |
|---|---|---|---|
| System Intensity | 0.00 in/hr | Upstream CA | 0.00 acres |
| Total CA | 0.00 acres | Inlet CA | 0.00 acres |
| External CA | 0.00 acres | | |

## Flow Times

| Description | | Description | |
|---|---|---|---|
| System Flow Time | 0.00 min | Upstream Flow Time | 0.00 min |
| Inlet TC | 0.00 min | External TC | 0.00 min |

## Elevations

| Description | | Description | |
|---|---|---|---|
| HGL In | 1,393.35 ft | HGL Out | 1,393.04 ft |
| Ground Elevation | 1,396.00 ft | Rim Elevation | 1,396.00 ft |

## Other Properties

| Description | | Description | |
|---|---|---|---|
| X | -3,834.06 ft | Y | -2,649.99 ft |
| Velocity | 9.84 ft/s | Headloss | 0.30 ft |
| Headloss Coefficient | 0.20 | Station | 84+90 ft |
| External Flow | 0.00 cfs | | |

Description:
Butler Drive at 49th Street
Station 205+65
Inlet for flows under Tatum Boulevard


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# Detailed Report for Pipe P-39

Section Material: Concrete
Section Shape: Box
Section Size: 8 x 5 ft
Number Sections: 1

| Description | | Description | |
|---|---|---|---|
| Discharge | 368.00 cfs | Capacity | 449.59 cfs |
| Mannings Coefficient | 0.013 | Hydraulic Drop | 0.98 ft |
| Length | 270.00 ft | Energy Slope | 0.003648 ft/ft |
| Constructed Slope | 0.005444 ft/ft | Upstream Velocity | 9.20 ft/s |
| Upstream Flow Time | 2.65 min | Average Velocity | 9.20 ft/s |
| Pipe Flow Time | 0.49 min | Downstream Velocity | 9.20 ft/s |
| System Flow Time | 3.14 min | | |

Grade Elevations

| Location | Invert (ft) | Ground (ft) | Crown (ft) | Cover (ft) | Depth (ft) | HGL (ft) | EGL (ft) |
|---|---|---|---|---|---|---|---|
| Upstream | 1,332.32 | 1,342.00 | 1,337.32 | 4.68 | 6.56 | 1,338.88 | 1,340.19 |
| Downstream | 1,330.85 | 1,340.00 | 1,335.85 | 4.15 | 7.04 | 1,337.89 | 1,339.21 |

Description:
56th Street
Stations 520+30 to 523+00

Messages:
Profile: Pressure profile.
Information: Surcharged condition

# Detailed Report for J-35

## Flows

| Description | | Description | |
|---|---|---|---|
| Total Discharge | 368.00 cfs | Known Flow | 368.00 cfs |
| Upstream Additional + Carryover | 0.00 cfs | Total Watershed (CIA) | 0.00 cfs |

## Watershed Data

| Description | | Description | |
|---|---|---|---|
| System Intensity | 0.00 in/hr | Upstream CA | 0.00 acres |
| Total CA | 0.00 acres | | |

## Flow Times

| Description | | Description | |
|---|---|---|---|
| System Flow Time | 2.65 min | Upstream Flow Time | 2.65 min |

## Elevations

| Description | | Description | |
|---|---|---|---|
| HGL In | 1,338.94 ft | HGL Out | 1,338.88 ft |
| Ground Elevation | 1,342.00 ft | Rim Elevation | 1,342.00 ft |

## Other Properties

| Description | | Description | |
|---|---|---|---|
| X | 399.99 ft | Y | -270.02 ft |
| Velocity | 9.20 ft/s | Headloss | 0.07 ft |
| Headloss Coefficient | 0.05 | Station | 18+75 ft |
| External Flow | 0.00 cfs | | |

Description:
56th Stree
Station 520+30

Status/Error Messages:
Information: Known flow propagated from upstream junctions.


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# Detailed Report for Pipe P-40

Section Material: Concrete
Section Shape: Box
Section Size: 8 x 5 ft
Number Sections: 1

| Description | | Description | |
|---|---|---|---|
| Discharge | 368.00 cfs | Capacity | 448.93 cfs |
| Mannings Coefficient | 0.013 | Hydraulic Drop | 1.92 ft |
| Length | 525.00 ft | Energy Slope | 0.003648 ft/ft |
| Constructed Slope | 0.005429 ft/ft | Upstream Velocity | 9.20 ft/s |
| Upstream Flow Time | 1.70 min | Average Velocity | 9.20 ft/s |
| Pipe Flow Time | 0.95 min | Downstream Velocity | 9.20 ft/s |
| System Flow Time | 2.65 min | | |

Grade Elevations

| Location | Invert (ft) | Ground (ft) | Crown (ft) | Cover (ft) | Depth (ft) | HGL (ft) | EGL (ft) |
|---|---|---|---|---|---|---|---|
| Upstream | 1,335.17 | 1,343.00 | 1,340.17 | 2.83 | 5.69 | 1,340.86 | 1,342.17 |
| Downstream | 1,332.32 | 1,342.00 | 1,337.32 | 4.68 | 6.62 | 1,338.94 | 1,340.26 |

Description:
56th Street
Stations 515+05 to 520+30

Messages:
Profile: Pressure profile.
Information: Surcharged condition

# Detailed Report for J-36

## Flows

| Description | | Description | |
|---|---|---|---|
| Total Discharge | 368.00 cfs | Known Flow | 368.00 cfs |
| Upstream Additional + Carryover | 0.00 cfs | Total Watershed (CIA) | 0.00 cfs |

## Watershed Data

| Description | | Description | |
|---|---|---|---|
| System Intensity | 0.00 in/hr | Upstream CA | 0.00 acres |
| Total CA | 0.00 acres | | |

## Flow Times

| Description | | Description | |
|---|---|---|---|
| System Flow Time | 1.70 min | Upstream Flow Time | 1.70 min |

## Elevations

| Description | | Description | |
|---|---|---|---|
| HGL In | 1,340.92 ft | HGL Out | 1,340.86 ft |
| Ground Elevation | 1,343.00 ft | Rim Elevation | 1,343.00 ft |

## Other Properties

| Description | | Description | |
|---|---|---|---|
| X | 399.98 ft | Y | -794.99 ft |
| Velocity | 9.20 ft/s | Headloss | 0.07 ft |
| Headloss Coefficient | 0.05 | Station | 24+00 ft |
| External Flow | 0.00 cfs | | |

Description:
56th Street
Station 515+05

Status/Error Messages:
Information: Known flow propagated from upstream junctions.


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# Detailed Report for Pipe P-41

Section Material: Concrete
Section Shape: Box
Section Size: 8 x 5 ft
Number Sections: 1

| Description | | Description | |
|---|---|---|---|
| Discharge | 368.00 cfs | Capacity | 448.93 cfs |
| Mannings Coefficient | 0.013 | Hydraulic Drop | 1.31 ft |
| Length | 525.00 ft | Energy Slope | 0.003515 ft/ft |
| Constructed Slope | 0.005429 ft/ft | Upstream Velocity | 10.92 ft/s |
| Upstream Flow Time | 0.83 min | Average Velocity | 10.06 ft/s |
| Pipe Flow Time | 0.87 min | Downstream Velocity | 9.20 ft/s |
| System Flow Time | 1.70 min | | |

Grade Elevations

| Location | Invert (ft) | Ground (ft) | Crown (ft) | Cover (ft) | Depth (ft) | HGL (ft) | EGL (ft) |
|---|---|---|---|---|---|---|---|
| Upstream | 1,338.02 | 1,346.00 | 1,343.02 | 2.98 | 4.21 | 1,342.23 | 1,344.09 |
| Downstream | 1,335.17 | 1,343.00 | 1,340.17 | 2.83 | 5.75 | 1,340.92 | 1,342.24 |

Description:
56th Street
Stations 509+80 to 515+05

Messages:
Profile: Steep subcritical backwater profile (S1).
Profile: Composite profile.
Profile: Pressure profile.
Profile: Hydraulic grade increases in downstream direction.


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# Detailed Report for Pipe P-42

Section Material: Concrete
Section Shape: Box
Section Size: 8 x 5 ft
Number Sections: 1

| Description | | Description | |
|---|---|---|---|
| Discharge | 368.00 cfs | Capacity | 449.19 cfs |
| Mannings Coefficient | 0.013 | Hydraulic Drop | 2.23 ft |
| Length | 460.00 ft | Energy Slope | 0.005382 ft/ft |
| Constructed Slope | 0.005435 ft/ft | Upstream Velocity | 11.40 ft/s |
| Upstream Flow Time | 0.13 min | Average Velocity | 11.04 ft/s |
| Pipe Flow Time | 0.69 min | Downstream Velocity | 10.69 ft/s |
| System Flow Time | 0.83 min | | |

Grade Elevations

| Location | Invert (ft) | Ground (ft) | Crown (ft) | Cover (ft) | Depth (ft) | HGL (ft) | EGL (ft) |
|---|---|---|---|---|---|---|---|
| Upstream | 1,340.52 | 1,346.50 | 1,345.52 | 0.98 | 4.04 | 1,344.56 | 1,346.57 |
| Downstream | 1,338.02 | 1,346.00 | 1,343.02 | 2.98 | 4.30 | 1,342.32 | 1,344.10 |

Description:
56th Street
Stations 505+20 to 509+80

Messages:
Profile: Steep subcritical backwater profile (S1).
Profile: Critical depth assumed upstream.
Profile: Hydraulic jump formed.

# Detailed Report for J-38

## Flows

| Description | | Description | |
|---|---|---|---|
| Total Discharge | 368.00 cfs | Known Flow | 368.00 cfs |
| Upstream Additional + Carryover | 0.00 cfs | Total Watershed (CIA) | 0.00 cfs |

## Watershed Data

| Description | | Description | |
|---|---|---|---|
| System Intensity | 0.00 in/hr | Upstream CA | 0.00 acres |
| Total CA | 0.00 acres | | |

## Flow Times

| Description | | Description | |
|---|---|---|---|
| System Flow Time | 0.13 min | Upstream Flow Time | 0.13 min |

## Elevations

| Description | | Description | |
|---|---|---|---|
| HGL In | 1,344.66 ft | HGL Out | 1,344.56 ft |
| Ground Elevation | 1,346.50 ft | Rim Elevation | 1,346.50 ft |

## Other Properties

| Description | | Description | |
|---|---|---|---|
| X | 399.98 ft | Y | -1,780.03 ft |
| Velocity | 11.40 ft/s | Headloss | 0.10 ft |
| Headloss Coefficient | 0.05 | Station | 33+85 ft |
| External Flow | 0.00 cfs | | |

Description:
56th Street
Station 505+20

Status/Error Messages:
Information: Known flow propagated from upstream junctions.


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# Detailed Report for Pipe P-43

Section Material: Concrete
Section Shape: Box
Section Size: 8 x 5 ft
Number Sections: 1

| Description | | Description | |
|---|---|---|---|
| Discharge | 368.00 cfs | Capacity | 444.97 cfs |
| Mannings Coefficient | 0.013 | Hydraulic Drop | 0.38 ft |
| Length | 90.00 ft | Energy Slope | 0.005293 ft/ft |
| Constructed Slope | 0.005333 ft/ft | Upstream Velocity | 11.40 ft/s |
| Upstream Flow Time | 0.00 min | Average Velocity | 11.26 ft/s |
| Pipe Flow Time | 0.13 min | Downstream Velocity | 11.12 ft/s |
| System Flow Time | 0.13 min | | |

Grade Elevations

| Location | Invert (ft) | Ground (ft) | Crown (ft) | Cover (ft) | Depth (ft) | HGL (ft) | EGL (ft) |
|---|---|---|---|---|---|---|---|
| Upstream | 1,341.00 | 1,347.00 | 1,346.00 | 1.00 | 4.04 | 1,345.04 | 1,347.05 |
| Downstream | 1,340.52 | 1,346.50 | 1,345.52 | 0.98 | 4.14 | 1,344.66 | 1,346.58 |

Description:
56th Street
Stations 504+30 to 505+20

Messages:
Profile: Steep subcritical backwater profile (S1).
Profile: Critical depth assumed upstream.
Profile: Hydraulic jump formed.

# Detailed Report for I-5

## Watershed Information

No watershed data entered for this inlet.

## Flows

| Description | | Description | |
|---|---|---|---|
| Total Discharge | 368.00 cfs | Known Flow | 368.00 cfs |
| Upstream Additional + Carryover | 0.00 cfs | Total Watershed (CIA) | 0.00 cfs |
| Carryover | 0.00 cfs | Additional Flow | 0.00 cfs |

## Watershed Data

| Description | | Description | |
|---|---|---|---|
| System Intensity | 0.00 in/hr | Upstream CA | 0.00 acres |
| Total CA | 0.00 acres | Inlet CA | 0.00 acres |
| External CA | 0.00 acres | | |

## Flow Times

| Description | | Description | |
|---|---|---|---|
| System Flow Time | 0.00 min | Upstream Flow Time | 0.00 min |
| Inlet TC | 0.00 min | External TC | 0.00 min |

## Elevations

| Description | | Description | |
|---|---|---|---|
| HGL In | 1,345.44 ft | HGL Out | 1,345.04 ft |
| Ground Elevation | 1,347.00 ft | Rim Elevation | 1,347.00 ft |

## Other Properties

| Description | | Description | |
|---|---|---|---|
| X | 355.00 ft | Y | -1,858.03 ft |
| Velocity | 11.40 ft/s | Headloss | 0.40 ft |
| Headloss Coefficient | 0.20 | Station | 34+75 ft |
| External Flow | 0.00 cfs | | |

Description:
56th Street
Station 504+30
Diversion from Cherokee Wash

# Detailed Report for Pipe P-44

Section Material: Concrete
Section Shape: Box
Section Size: 10 x 6 ft
Number Sections: 1

| Description | | Description | |
|---|---|---|---|
| Discharge | 320.00 cfs | Capacity | 633.59 cfs |
| Mannings Coefficient | 0.013 | Hydraulic Drop | 0.40 ft |
| Length | 428.00 ft | Energy Slope | 0.000942 ft/ft |
| Constructed Slope | 0.003692 ft/ft | Upstream Velocity | 5.33 ft/s |
| Upstream Flow Time | 2.78 min | Average Velocity | 5.33 ft/s |
| Pipe Flow Time | 1.34 min | Downstream Velocity | 5.33 ft/s |
| System Flow Time | 4.12 min | | |

Grade Elevations

| Location | Invert (ft) | Ground (ft) | Crown (ft) | Cover (ft) | Depth (ft) | HGL (ft) | EGL (ft) |
|---|---|---|---|---|---|---|---|
| Upstream | 1,344.58 | 1,356.00 | 1,350.58 | 5.42 | 7.82 | 1,352.40 | 1,352.84 |
| Downstream | 1,343.00 | 1,356.00 | 1,349.00 | 7.00 | 8.99 | 1,351.99 | 1,352.44 |

Description:
52nd Street North
Stations 418+00 to 413+72

Messages:
Profile: Pressure profile.
Information: Surcharged condition

# Detailed Report for J-39

## Flows

| Description | | Description | |
|---|---|---|---|
| Total Discharge | 320.00 cfs | Known Flow | 320.00 cfs |
| Upstream Additional + Carryover | 0.00 cfs | Total Watershed (CIA) | 0.00 cfs |

## Watershed Data

| Description | | Description | |
|---|---|---|---|
| System Intensity | 0.00 in/hr | Upstream CA | 0.00 acres |
| Total CA | 0.00 acres | | |

## Flow Times

| Description | | Description | |
|---|---|---|---|
| System Flow Time | 2.78 min | Upstream Flow Time | 2.78 min |

## Elevations

| Description | | Description | |
|---|---|---|---|
| HGL In | 1,352.42 ft | HGL Out | 1,352.40 ft |
| Ground Elevation | 1,356.00 ft | Rim Elevation | 1,356.00 ft |

## Other Properties

| Description | | Description | |
|---|---|---|---|
| X | -2,199.02 ft | Y | 428.04 ft |
| Velocity | 5.33 ft/s | Headloss | 0.02 ft |
| Headloss Coefficient | 0.05 | Station | 46+32 ft |
| External Flow | 0.00 cfs | | |

Description:
52nd Street
Station 413+72

Status/Error Messages:
Information: Known flow propagated from upstream junctions.


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# Detailed Report for Pipe P-45

Section Material: Concrete
Section Shape: Box
Section Size: 10 x 6 ft
Number Sections: 1

| Description | | Description | |
|---|---|---|---|
| Discharge | 320.00 cfs | Capacity | 635.60 cfs |
| Mannings Coefficient | 0.013 | Hydraulic Drop | 0.40 ft |
| Length | 428.00 ft | Energy Slope | 0.000942 ft/ft |
| Constructed Slope | 0.003715 ft/ft | Upstream Velocity | 5.33 ft/s |
| Upstream Flow Time | 1.45 min | Average Velocity | 5.33 ft/s |
| Pipe Flow Time | 1.34 min | Downstream Velocity | 5.33 ft/s |
| System Flow Time | 2.78 min | | |

Grade Elevations

| Location | Invert (ft) | Ground (ft) | Crown (ft) | Cover (ft) | Depth (ft) | HGL (ft) | EGL (ft) |
|---|---|---|---|---|---|---|---|
| Upstream | 1,346.17 | 1,356.00 | 1,352.17 | 3.83 | 6.65 | 1,352.82 | 1,353.26 |
| Downstream | 1,344.58 | 1,356.00 | 1,350.58 | 5.42 | 7.84 | 1,352.42 | 1,352.86 |

Description:
52nd Street North
Stations 413+72 to 409+44

Messages:
Profile: Pressure profile.
Information: Surcharged condition

# Detailed Report for J-40

## Flows

| Description | | Description | |
|---|---|---|---|
| Total Discharge | 320.00 cfs | Known Flow | 320.00 cfs |
| Upstream Additional + Carryover | 0.00 cfs | Total Watershed (CIA) | 0.00 cfs |

## Watershed Data

| Description | | Description | |
|---|---|---|---|
| System Intensity | 0.00 in/hr | Upstream CA | 0.00 acres |
| Total CA | 0.00 acres | | |

## Flow Times

| Description | | Description | |
|---|---|---|---|
| System Flow Time | 1.45 min | Upstream Flow Time | 1.45 min |

## Elevations

| Description | | Description | |
|---|---|---|---|
| HGL In | 1,352.84 ft | HGL Out | 1,352.82 ft |
| Ground Elevation | 1,356.00 ft | Rim Elevation | 1,356.00 ft |

## Other Properties

| Description | | Description | |
|---|---|---|---|
| X | -2,199.02 ft | Y | 856.01 ft |
| Velocity | 5.33 ft/s | Headloss | 0.02 ft |
| Headloss Coefficient | 0.05 | Station | 50+60 ft |
| External Flow | 0.00 cfs | | |

Description:
52nd Street North
Station 409+44

Status/Error Messages:
Information: Known flow propagated from upstream junctions.


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# Detailed Report for Pipe P-46

Section Material: Concrete
Section Shape: Box
Section Size: 10 x 6 ft
Number Sections: 1

| Description | | Description | |
|---|---|---|---|
| Discharge | 320.00 cfs | Capacity | 633.59 cfs |
| Mannings Coefficient | 0.013 | Hydraulic Drop | 0.27 ft |
| Length | 428.00 ft | Energy Slope | 0.000895 ft/ft |
| Constructed Slope | 0.003692 ft/ft | Upstream Velocity | 5.96 ft/s |
| Upstream Flow Time | 0.18 min | Average Velocity | 5.65 ft/s |
| Pipe Flow Time | 1.26 min | Downstream Velocity | 5.33 ft/s |
| System Flow Time | 1.45 min | | |

Grade Elevations

| Location | Invert (ft) | Ground (ft) | Crown (ft) | Cover (ft) | Depth (ft) | HGL (ft) | EGL (ft) |
|---|---|---|---|---|---|---|---|
| Upstream | 1,347.75 | 1,356.00 | 1,353.75 | 2.25 | 5.37 | 1,353.12 | 1,353.67 |
| Downstream | 1,346.17 | 1,356.00 | 1,352.17 | 3.83 | 6.67 | 1,352.84 | 1,353.29 |

Description:
52nd Street North
stations 409+44 to 405+16

Messages:
Profile: Steep subcritical backwater profile (S1).
Profile: Composite profile.
Profile: Pressure profile.
Profile: Hydraulic grade increases in downstream direction.

# Detailed Report for J-41

## Flows

| Description | | Description | |
|---|---|---|---|
| Total Discharge | 320.00 cfs | Known Flow | 320.00 cfs |
| Upstream Additional + Carryover | 0.00 cfs | Total Watershed (CIA) | 0.00 cfs |

## Watershed Data

| Description | | Description | |
|---|---|---|---|
| System Intensity | 0.00 in/hr | Upstream CA | 0.00 acres |
| Total CA | 0.00 acres | | |

## Flow Times

| Description | | Description | |
|---|---|---|---|
| System Flow Time | 0.18 min | Upstream Flow Time | 0.18 min |

## Elevations

| Description | | Description | |
|---|---|---|---|
| HGL In | 1,353.15 ft | HGL Out | 1,353.12 ft |
| Ground Elevation | 1,356.00 ft | Rim Elevation | 1,356.00 ft |

## Other Properties

| Description | | Description | |
|---|---|---|---|
| X | -2,198.74 ft | Y | 1,284.01 ft |
| Velocity | 5.96 ft/s | Headloss | 0.03 ft |
| Headloss Coefficient | 0.05 | Station | 54+88 ft |
| External Flow | 0.00 cfs | | |

Description:
52nd Street North
Station 405+16

Status/Error Messages:
Information: Known flow propagated from upstream junctions.

# Detailed Report for Pipe P-47

Section Material: Concrete
Section Shape: Box
Section Size: 10 x 6 ft
Number Sections: 1

| Description | | Description | |
|---|---|---|---|
| Discharge | 320.00 cfs | Capacity | 637.00 cfs |
| Mannings Coefficient | 0.013 | Hydraulic Drop | -0.58e-3 ft |
| Length | 67.00 ft | Energy Slope | 0.000805 ft/ft |
| Constructed Slope | 0.003731 ft/ft | Upstream Velocity | 6.22 ft/s |
| Upstream Flow Time | 0.00 min | Average Velocity | 6.08 ft/s |
| Pipe Flow Time | 0.18 min | Downstream Velocity | 5.93 ft/s |
| System Flow Time | 0.18 min | | |

Grade Elevations

| Location | Invert (ft) | Ground (ft) | Crown (ft) | Cover (ft) | Depth (ft) | HGL (ft) | EGL (ft) |
|---|---|---|---|---|---|---|---|
| Upstream | 1,348.00 | 1,356.50 | 1,354.00 | 2.50 | 5.14 | 1,353.14 | 1,353.75 |
| Downstream | 1,347.75 | 1,356.00 | 1,353.75 | 2.25 | 5.40 | 1,353.15 | 1,353.69 |

Description:
52nd Street North
Stations 405+16 to 404+51

Messages:
Profile: Steep subcritical backwater profile (S1).
Profile: Hydraulic grade increases in downstream direction.

# Detailed Report for I-6

## Watershed Information

No watershed data entered for this inlet.

## Flows

| Description | | Description | |
|---|---|---|---|
| Total Discharge | 320.00 cfs | Known Flow | 320.00 cfs |
| Upstream Additional + Carryover | 0.00 cfs | Total Watershed (CIA) | 0.00 cfs |
| Carryover | 0.00 cfs | Additional Flow | 0.00 cfs |

## Watershed Data

| Description | | Description | |
|---|---|---|---|
| System Intensity | 0.00 in/hr | Upstream CA | 0.00 acres |
| Total CA | 0.00 acres | Inlet CA | 0.00 acres |
| External CA | 0.00 acres | | |

## Flow Times

| Description | | Description | |
|---|---|---|---|
| System Flow Time | 0.00 min | Upstream Flow Time | 0.00 min |
| Inlet TC | 0.00 min | External TC | 0.00 min |

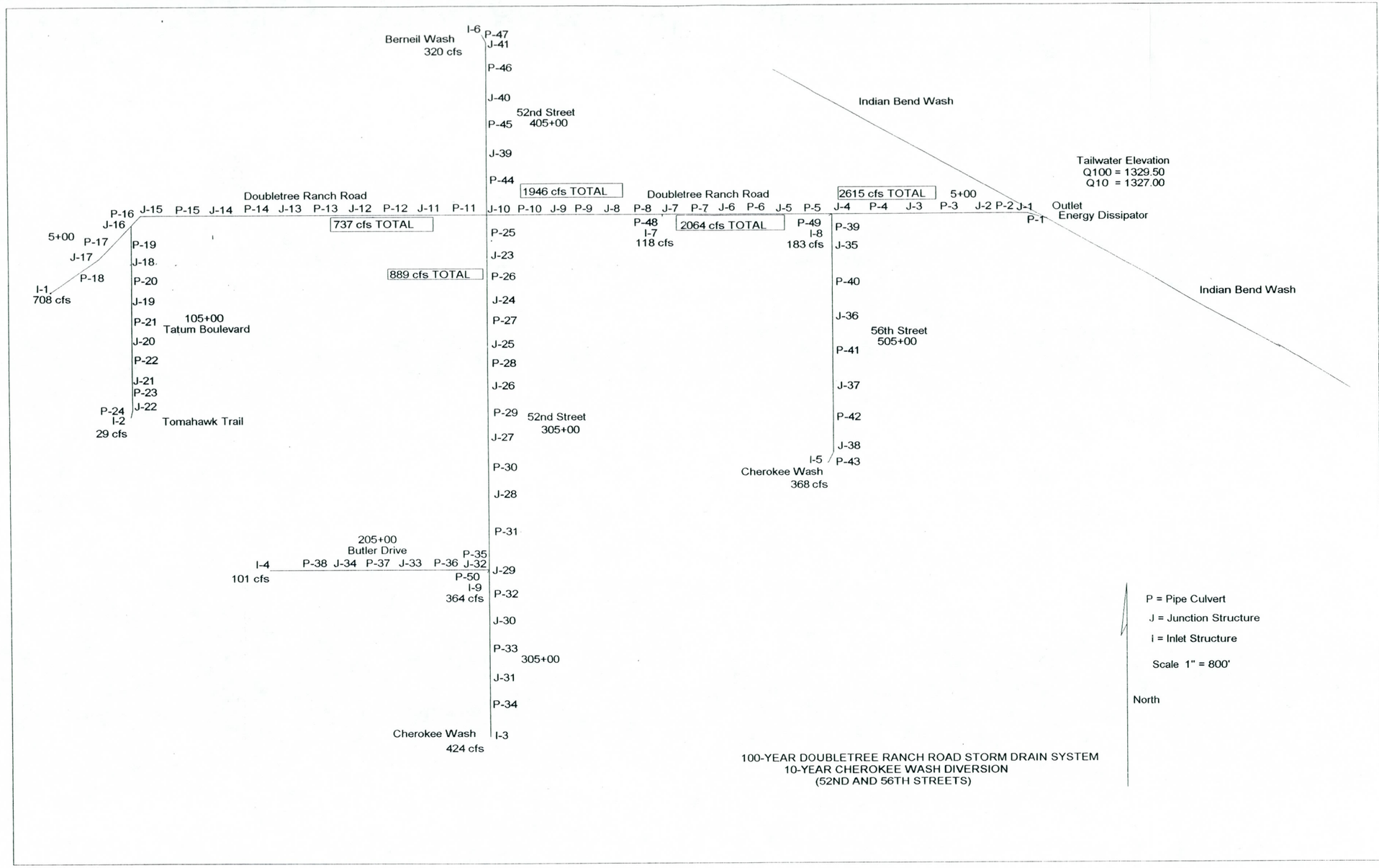
## Elevations

| Description | | Description | |
|---|---|---|---|
| HGL In | 1,353.27 ft | HGL Out | 1,353.14 ft |
| Ground Elevation | 1,356.50 ft | Rim Elevation | 1,356.50 ft |

## Other Properties

| Description | | Description | |
|---|---|---|---|
| X | -2,232.52 ft | Y | 1,342.33 ft |
| Velocity | 6.22 ft/s | Headloss | 0.12 ft |
| Headloss Coefficient | 0.20 | Station | 55+55 ft |
| External Flow | 0.00 cfs | | |

Description:
52nd Street North
Station 404+51
Inlet picks up Berneil Wash




100-YEAR DOUBLETREE RANCH ROAD STORM DRAIN SYSTEM
10-YEAR CHEROKEE WASH DIVERSION
(52ND AND 56TH STREETS)

Project Title: DOUBLETREE RANCH ROAD STORMWATER MANAGEMENT
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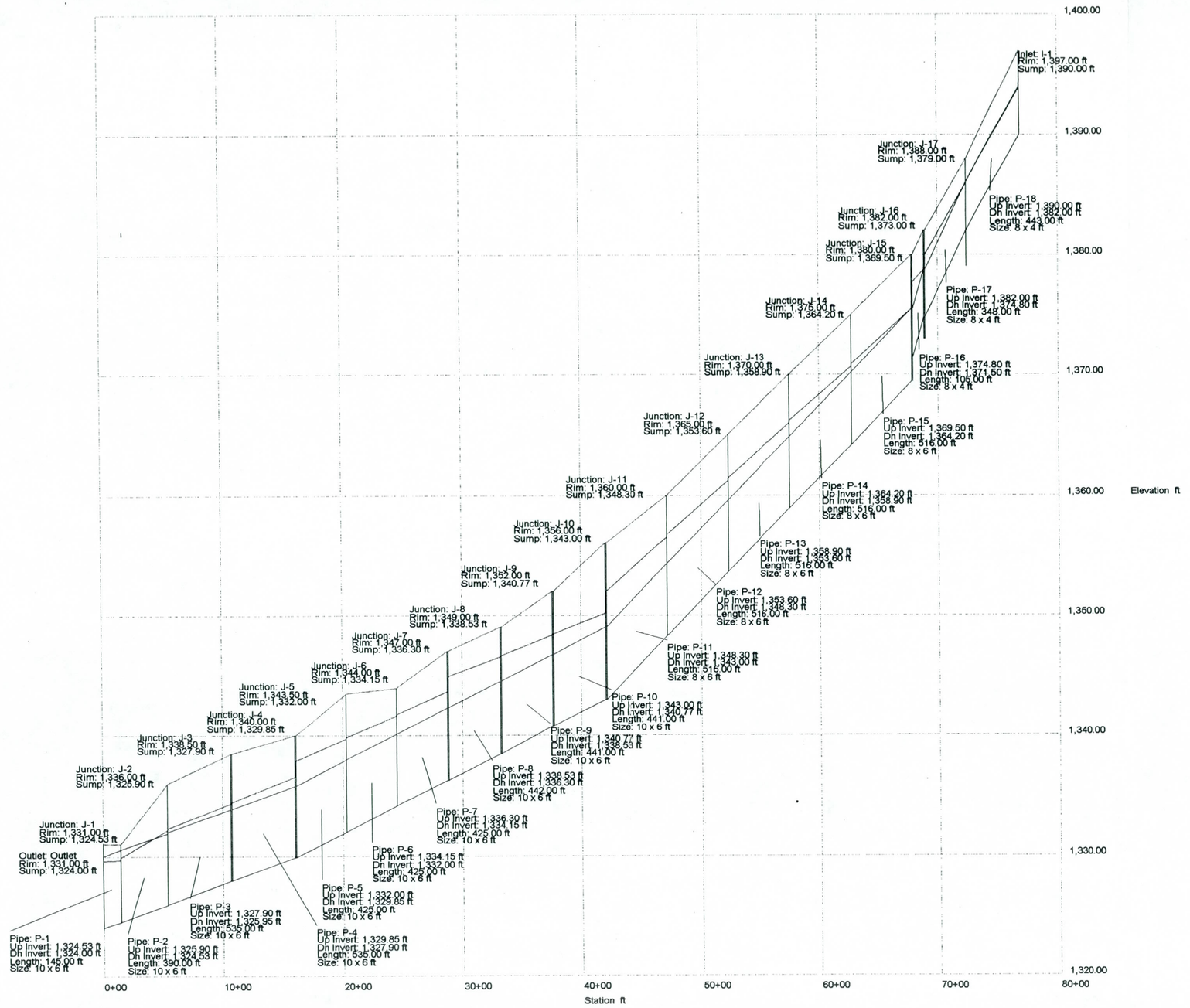
Project Engineer: Bill Snarr
StormCAD v1.0

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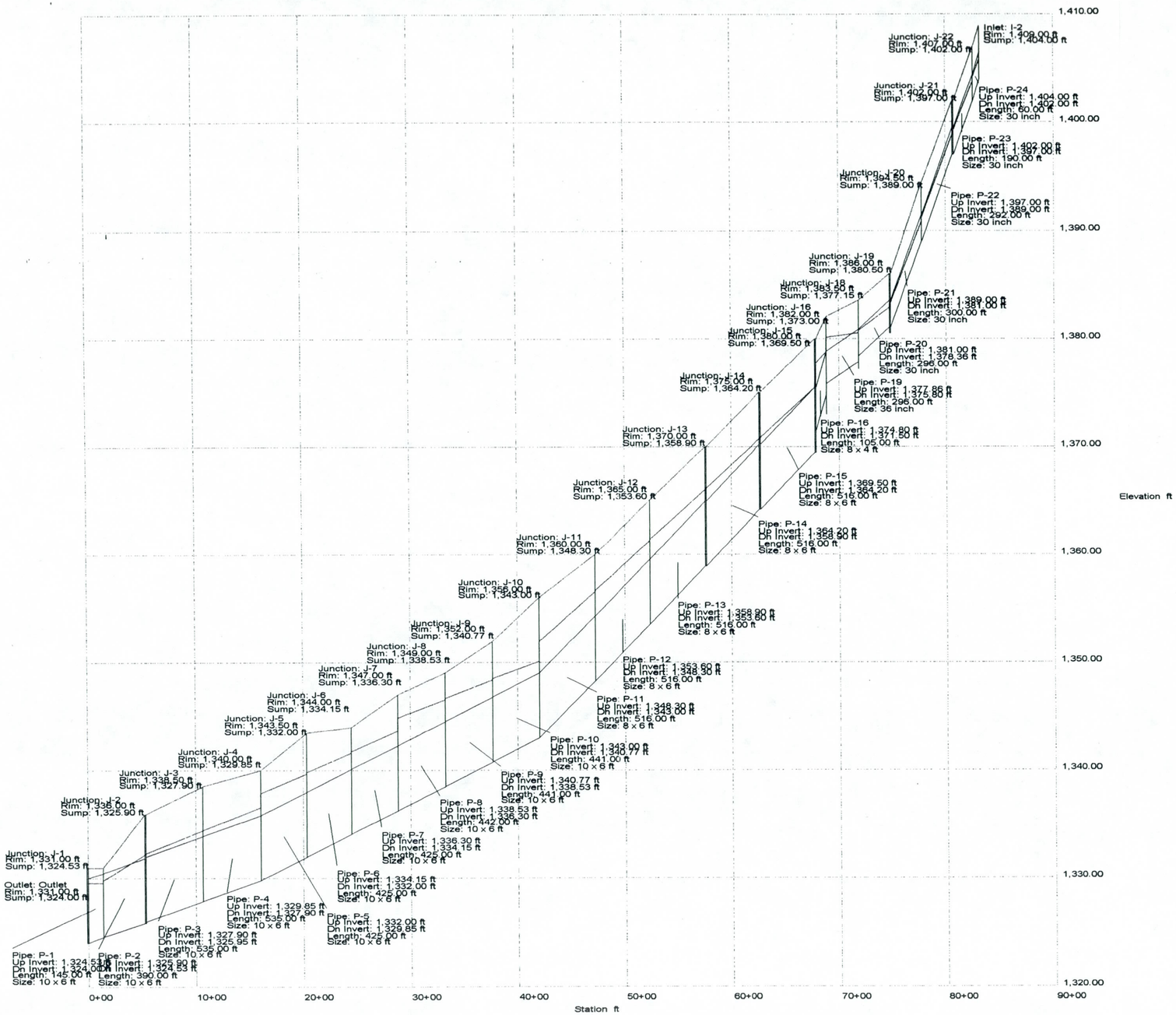


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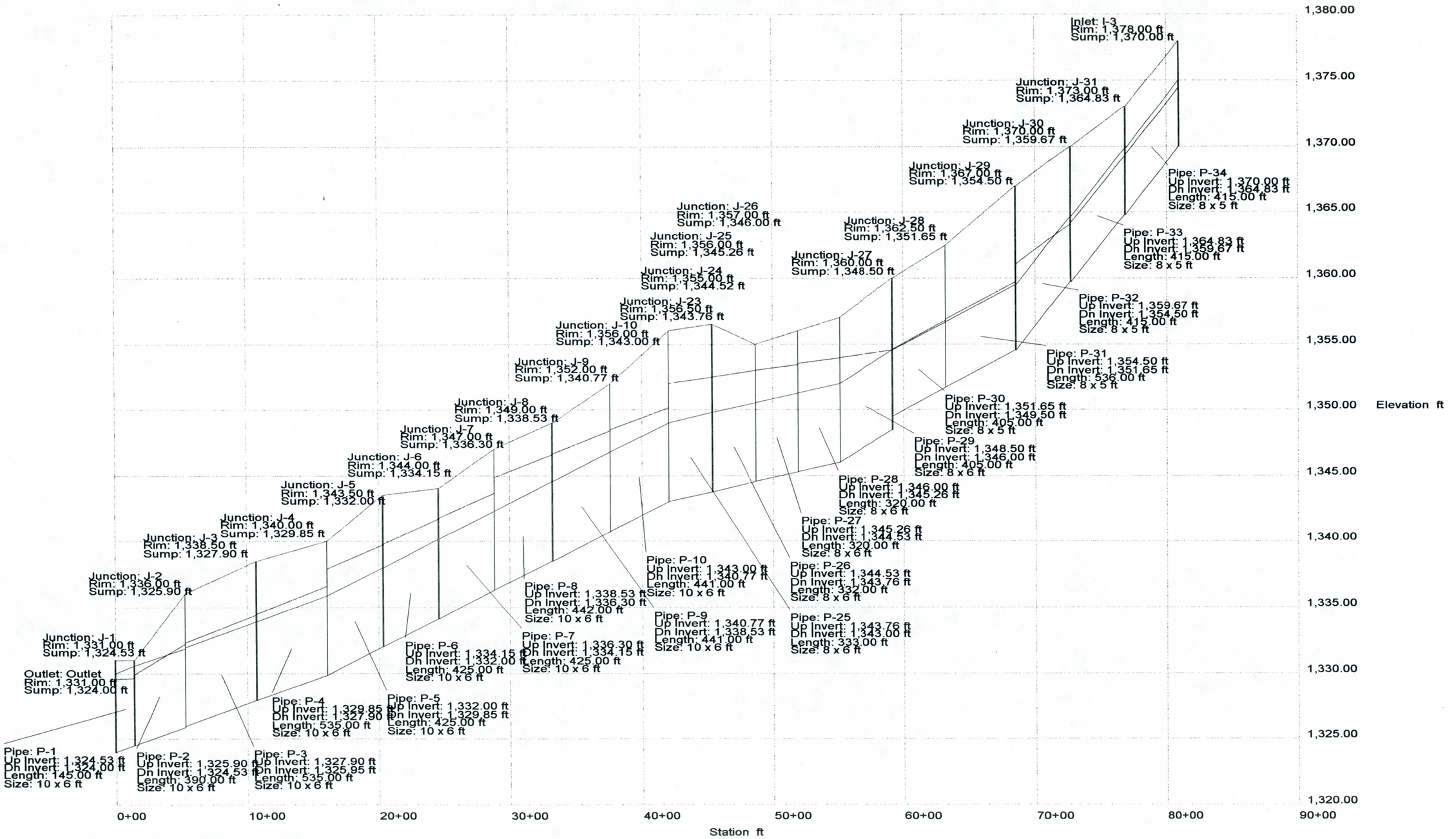


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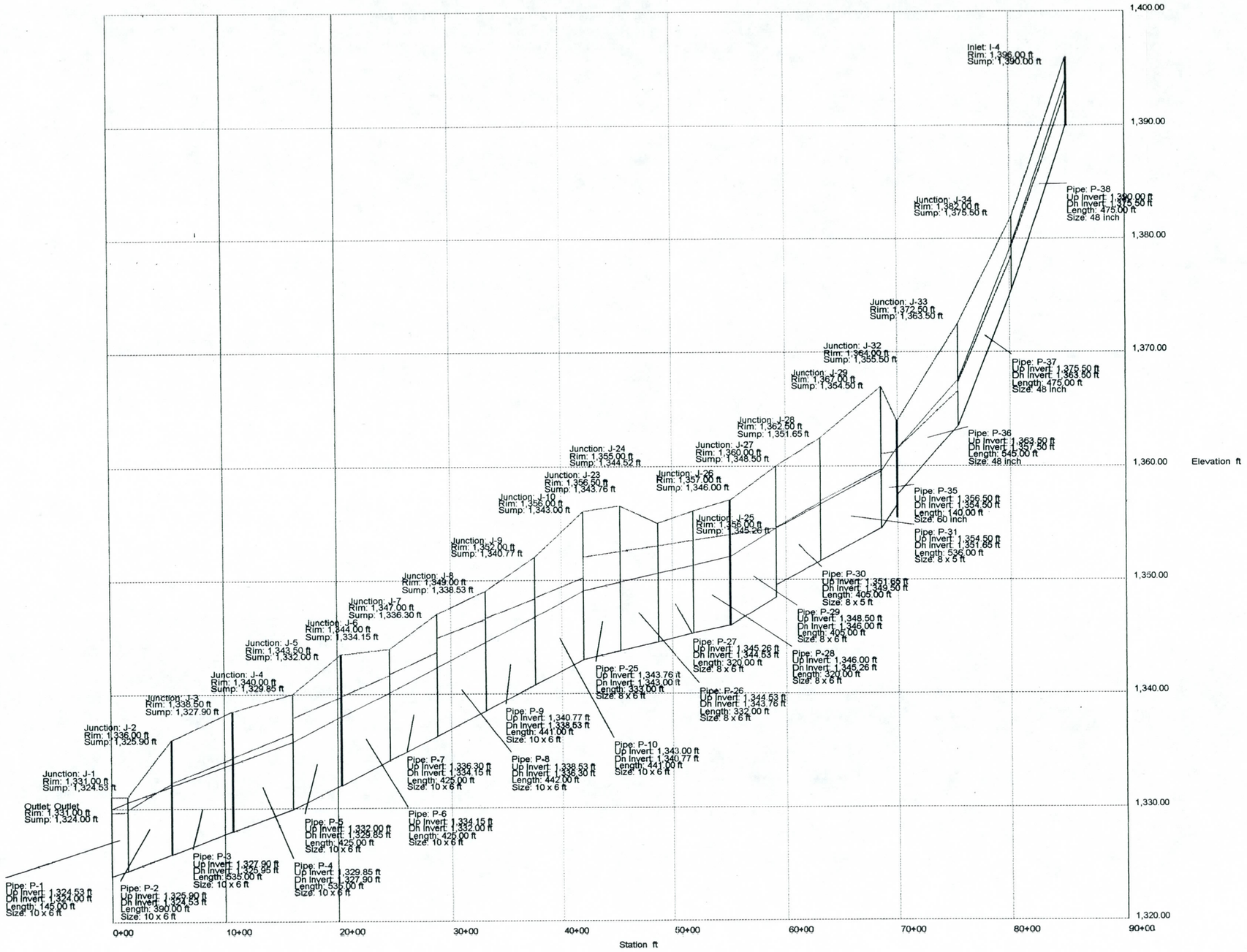


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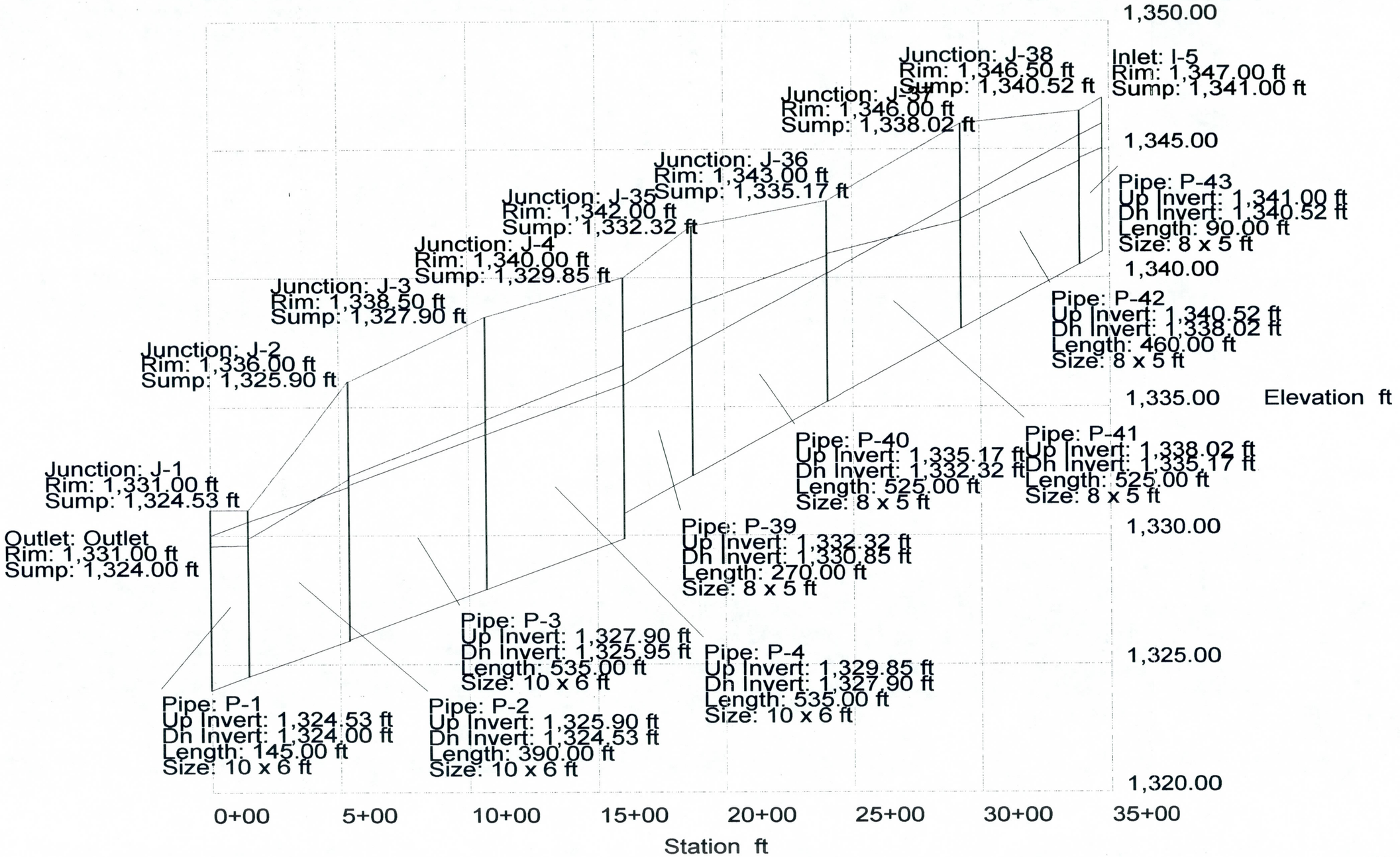
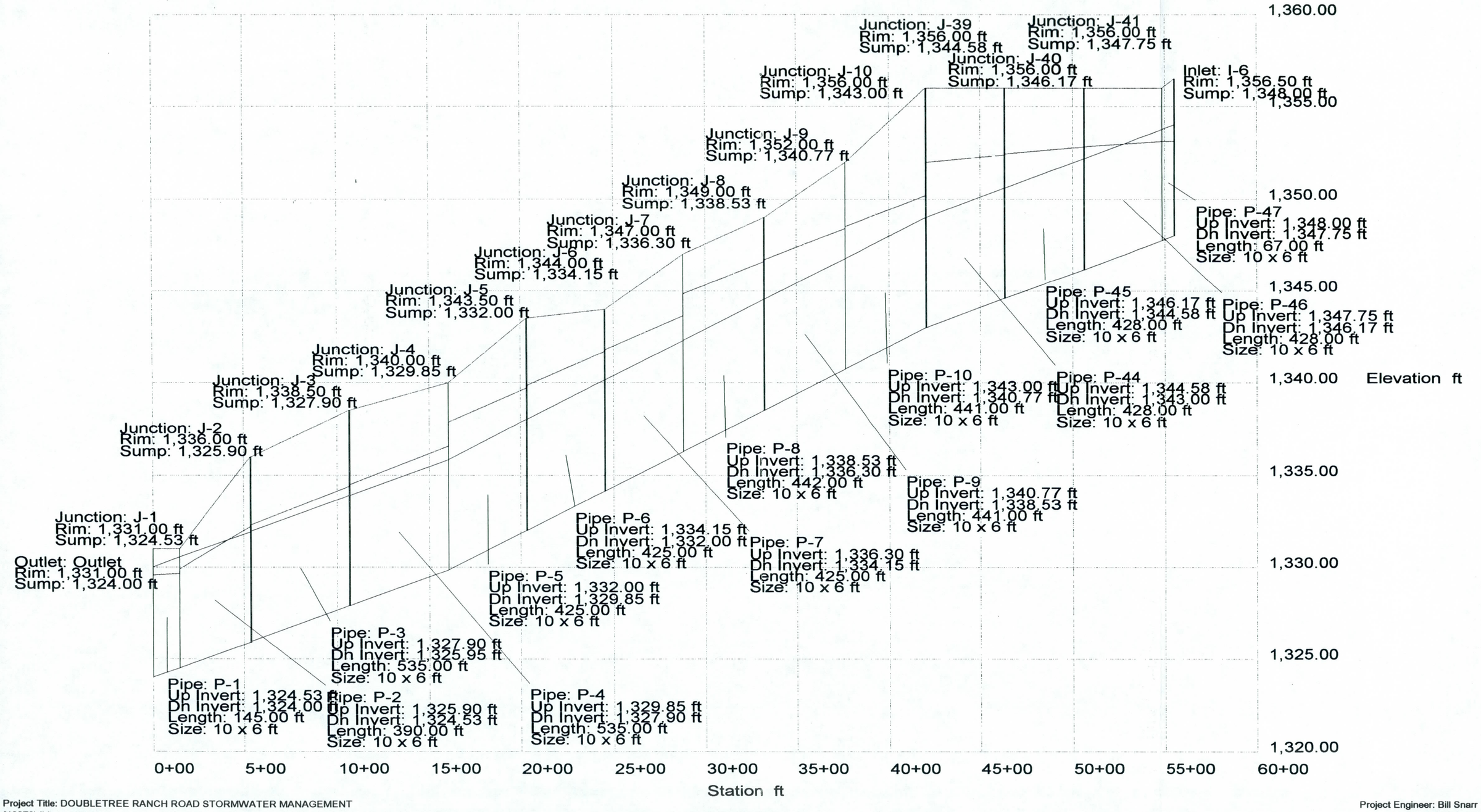
StormCAD v1.0

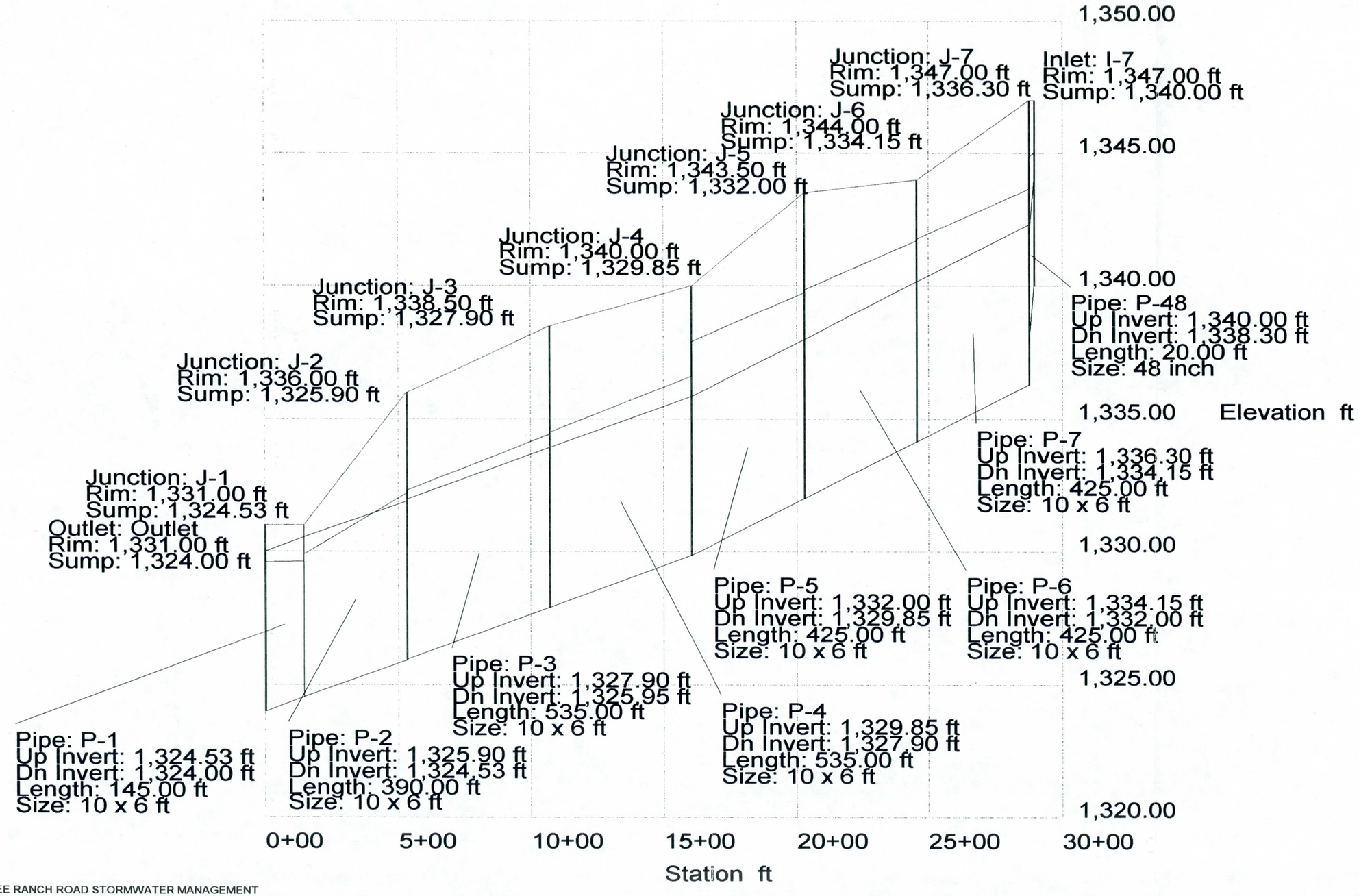

1,350.00
Junction: J-38
Rim: 1,346.50 ft
Sump: 1,340.52 ft
Inlet: I-5
Rim: 1,347.00 ft
Sump: 1,341.00 ft
Junction: J-37
Rim: 1,346.00 ft
Sump: 1,338.02 ft
1,345.00
Junction: J-36
Rim: 1,343.00 ft
Sump: 1,335.17 ft
Junction: J-35
Rim: 1,342.00 ft
Sump: 1,332.32 ft
Pipe: P-43
Up Invert: 1,341.00 ft
Dn Invert: 1,340.52 ft
Length: 90.00 ft
Size: 8 x 5 ft
Junction: J-4
Rim: 1,340.00 ft
Sump: 1,329.85 ft
1,340.00
Junction: J-3
Rim: 1,338.50 ft
Sump: 1,327.90 ft
Pipe: P-42
Up Invert: 1,340.52 ft
Dn Invert: 1,338.02 ft
Length: 460.00 ft
Size: 8 x 5 ft
Junction: J-2
Rim: 1,336.00 ft
Sump: 1,325.90 ft
1,335.00
Elevation ft
Pipe: P-40
Up Invert: 1,335.17 ft
Dn Invert: 1,332.32 ft
Length: 525.00 ft
Size: 8 x 5 ft
Pipe: P-41
Up Invert: 1,338.02 ft
Dn Invert: 1,335.17 ft
Length: 525.00 ft
Size: 8 x 5 ft
Junction: J-1
Rim: 1,331.00 ft
Sump: 1,324.53 ft
1,330.00
Outlet: Outlet
Rim: 1,331.00 ft
Sump: 1,324.00 ft
Pipe: P-39
Up Invert: 1,332.32 ft
Dn Invert: 1,330.85 ft
Length: 270.00 ft
Size: 8 x 5 ft
Pipe: P-3
Up Invert: 1,327.90 ft
Dn Invert: 1,325.95 ft
Length: 535.00 ft
Size: 10 x 6 ft
Pipe: P-4
Up Invert: 1,329.85 ft
Dn Invert: 1,327.90 ft
Length: 535.00 ft
Size: 10 x 6 ft
1,325.00
Pipe: P-1
Up Invert: 1,324.53 ft
Dn Invert: 1,324.00 ft
Length: 145.00 ft
Size: 10 x 6 ft
Pipe: P-2
Up Invert: 1,325.90 ft
Dn Invert: 1,324.53 ft
Length: 390.00 ft
Size: 10 x 6 ft
1,320.00
0+00
5+00
10+00
15+00
20+00
25+00
30+00
35+00
Station ft




Project Title: DOUBLETREE RANCH ROAD STORMWATER MANAGEMENT
f:\2878\dbltree.stm
11/11/96 02:18:59 PM

Hook Engineering Inc.
© Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA (203) 755-1666

Project Engineer: Bill Snarr
StormCAD v1.0


1,350.00
Junction: J-7
Rim: 1,347.00 ft
Sump: 1,336.30 ft
Inlet: I-7
Rim: 1,347.00 ft
Sump: 1,340.00 ft
Junction: J-6
Rim: 1,344.00 ft
Sump: 1,334.15 ft
1,345.00
Junction: J-5
Rim: 1,343.50 ft
Sump: 1,332.00 ft
Junction: J-4
Rim: 1,340.00 ft
Sump: 1,329.85 ft
1,340.00
Pipe: P-48
Up Invert: 1,340.00 ft
Dn Invert: 1,338.30 ft
Length: 20.00 ft
Size: 48 inch
Junction: J-3
Rim: 1,338.50 ft
Sump: 1,327.90 ft
Junction: J-2
Rim: 1,336.00 ft
Sump: 1,325.90 ft
1,335.00
Elevation ft
Pipe: P-7
Up Invert: 1,336.30 ft
Dn Invert: 1,334.15 ft
Length: 425.00 ft
Size: 10 x 6 ft
Junction: J-1
Rim: 1,331.00 ft
Sump: 1,324.53 ft
Outlet: Outlet
Rim: 1,331.00 ft
Sump: 1,324.00 ft
1,330.00
Pipe: P-5
Up Invert: 1,332.00 ft
Dn Invert: 1,329.85 ft
Length: 425.00 ft
Size: 10 x 6 ft
Pipe: P-6
Up Invert: 1,334.15 ft
Dn Invert: 1,332.00 ft
Length: 425.00 ft
Size: 10 x 6 ft
Pipe: P-3
Up Invert: 1,327.90 ft
Dn Invert: 1,325.95 ft
Length: 535.00 ft
Size: 10 x 6 ft
1,325.00
Pipe: P-4
Up Invert: 1,329.85 ft
Dn Invert: 1,327.90 ft
Length: 535.00 ft
Size: 10 x 6 ft
Pipe: P-1
Up Invert: 1,324.53 ft
Dn Invert: 1,324.00 ft
Length: 145.00 ft
Size: 10 x 6 ft
Pipe: P-2
Up Invert: 1,325.90 ft
Dn Invert: 1,324.53 ft
Length: 390.00 ft
Size: 10 x 6 ft
1,320.00
0+00
5+00
10+00
15+00
20+00
25+00
30+00
Station ft

# 10-YEAR DISCHARGE

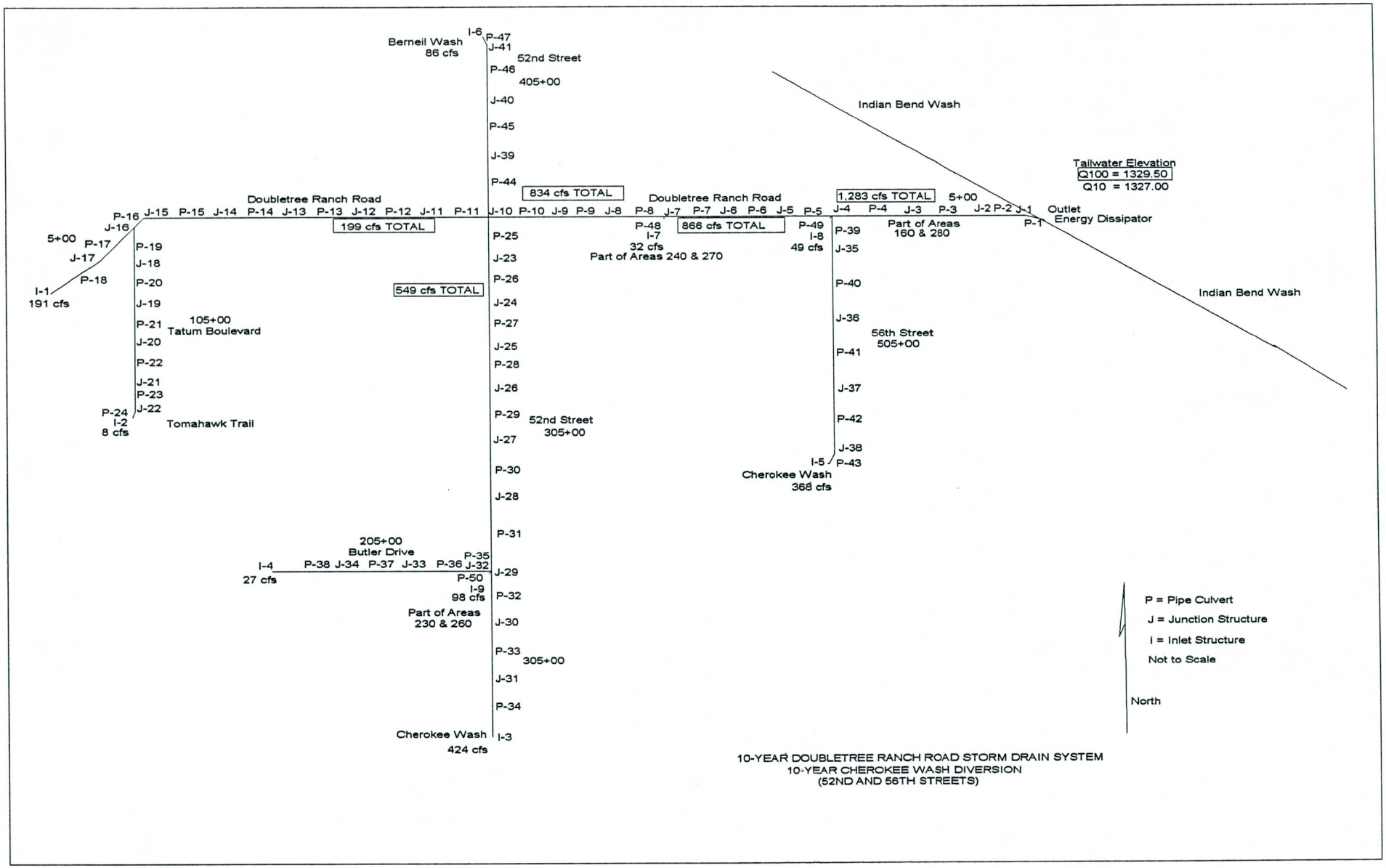
# 100-YEAR TAILWATER
# INDIAN BEND WASH

# HYDRAULIC GRADIENT

EXPLANATION OF HYDROLOGIC DISCHARGES

DOUBLETREE 10-YEAR STORM DRAIN DISCHARGES

CHEROKEE WASH DIVERSION DISCHARGES




10-YEAR DOUBLETREE RANCH ROAD STORM DRAIN SYSTEM
10-YEAR CHEROKEE WASH DIVERSION
(52ND AND 56TH STREETS)



© Haestad Methods, Inc.

```
------------------- Beginning Calculation Cycle --------------------
Discharge: 191.00 cfs  at node I-1
Discharge: 191.00 cfs  at node J-17
Discharge: 8.00 cfs  at node I-2
Discharge: 8.00 cfs  at node J-22
Discharge: 8.00 cfs  at node J-21
Discharge: 8.00 cfs  at node J-20
Discharge: 8.00 cfs  at node J-19
Discharge: 8.00 cfs  at node J-18
Discharge: 199.00 cfs  at node J-16
Discharge: 199.00 cfs  at node J-15
Discharge: 199.00 cfs  at node J-14
Discharge: 199.00 cfs  at node J-13
Discharge: 199.00 cfs  at node J-12
Discharge: 199.00 cfs  at node J-11
Discharge: 86.00 cfs  at node I-6
Discharge: 86.00 cfs  at node J-41
Discharge: 86.00 cfs  at node J-40
Discharge: 86.00 cfs  at node J-39
Discharge: 424.00 cfs  at node I-3
Discharge: 424.00 cfs  at node J-31
Discharge: 424.00 cfs  at node J-30
Discharge: 27.00 cfs  at node I-4
Discharge: 27.00 cfs  at node J-34
Discharge: 27.00 cfs  at node J-33
Discharge: 27.00 cfs  at node J-32
Discharge: 98.00 cfs  at node I-9
Discharge: 549.00 cfs  at node J-29
Discharge: 549.00 cfs  at node J-28
Discharge: 549.00 cfs  at node J-27
Discharge: 549.00 cfs  at node J-26
Discharge: 549.00 cfs  at node J-25
Discharge: 549.00 cfs  at node J-24
Discharge: 549.00 cfs  at node J-23
Discharge: 834.00 cfs  at node J-10
Discharge: 834.00 cfs  at node J-9
Discharge: 834.00 cfs  at node J-8
Discharge: 32.00 cfs  at node I-7
Discharge: 866.00 cfs  at node J-7
Discharge: 866.00 cfs  at node J-6
Discharge: 866.00 cfs  at node J-5
Discharge: 368.00 cfs  at node I-5
Discharge: 368.00 cfs  at node J-38
Discharge: 368.00 cfs  at node J-37
Discharge: 368.00 cfs  at node J-36
Discharge: 368.00 cfs  at node J-35
Discharge: 49.00 cfs  at node I-8
Discharge: 1,283.00 cfs  at node J-4
Discharge: 1,283.00 cfs  at node J-3
Discharge: 1,283.00 cfs  at node J-2
Discharge: 1,283.00 cfs  at node J-1
Discharge: 1,283.00 cfs  at node Outlet
Beginning iteration 1
Discharge: 191.00 cfs  at node I-1
Discharge: 191.00 cfs  at node J-17
Discharge: 8.00 cfs  at node I-2
Discharge: 8.00 cfs  at node J-22
Discharge: 8.00 cfs  at node J-21
Discharge: 8.00 cfs  at node J-20
Discharge: 8.00 cfs  at node J-19
Discharge: 8.00 cfs  at node J-18
Discharge: 199.00 cfs  at node J-16
Discharge: 199.00 cfs  at node J-15
Discharge: 199.00 cfs  at node J-14
Discharge: 199.00 cfs  at node J-13
Discharge: 199.00 cfs  at node J-12
Discharge: 199.00 cfs  at node J-11
Discharge: 86.00 cfs  at node I-6
Discharge: 86.00 cfs  at node J-41
Discharge: 86.00 cfs  at node J-40
Discharge: 86.00 cfs  at node J-39
Discharge: 424.00 cfs  at node I-3
Discharge: 424.00 cfs  at node J-31
Discharge: 424.00 cfs  at node J-30
Discharge: 27.00 cfs  at node I-4
Discharge: 27.00 cfs  at node J-34
Discharge: 27.00 cfs  at node J-33
Discharge: 27.00 cfs  at node J-32
Discharge: 98.00 cfs  at node I-9
Discharge: 549.00 cfs  at node J-29
Discharge: 549.00 cfs  at node J-28
Discharge: 549.00 cfs  at node J-27
Discharge: 549.00 cfs  at node J-26
Discharge: 549.00 cfs  at node J-25
Discharge: 549.00 cfs  at node J-24
Discharge: 549.00 cfs  at node J-23
Discharge: 834.00 cfs  at node J-10
```

```
Discharge: 834.00 cfs  at node J-9
Discharge: 834.00 cfs  at node J-8
Discharge: 32.00 cfs  at node I-7
Discharge: 866.00 cfs  at node J-7
Discharge: 866.00 cfs  at node J-6
Discharge: 866.00 cfs  at node J-5
Discharge: 368.00 cfs  at node I-5
Discharge: 368.00 cfs  at node J-38
Discharge: 368.00 cfs  at node J-37
Discharge: 368.00 cfs  at node J-36
Discharge: 368.00 cfs  at node J-35
Discharge: 49.00 cfs  at node I-8
Discharge: 1,283.00 cfs  at node J-4
Discharge: 1,283.00 cfs  at node J-3
Discharge: 1,283.00 cfs  at node J-2
Discharge: 1,283.00 cfs  at node J-1
Discharge: 1,283.00 cfs  at node Outlet
Discharge Convergence Achieved in 1 iterations: relative error:  0.0
Warning: No Duration data exists in IDF Table
Information: Outlet Known flow propagated from upstream junctions.
Information: J-1 Known flow propagated from upstream junctions.
Information: J-2 Known flow propagated from upstream junctions.
Information: J-3 Known flow propagated from upstream junctions.
Information: J-4 Known flow propagated from upstream junctions.
Information: J-35 Known flow propagated from upstream junctions.
Information: J-36 Known flow propagated from upstream junctions.
Information: J-5 Known flow propagated from upstream junctions.
Information: J-6 Known flow propagated from upstream junctions.
Information: J-7 Known flow propagated from upstream junctions.
Information: J-8 Known flow propagated from upstream junctions.
Information: J-9 Known flow propagated from upstream junctions.
Information: J-10 Known flow propagated from upstream junctions.
Information: J-39 Known flow propagated from upstream junctions.
Information: J-40 Known flow propagated from upstream junctions.
Information: J-41 Known flow propagated from upstream junctions.
Information: J-11 Known flow propagated from upstream junctions.
Information: J-12 Known flow propagated from upstream junctions.
Information: J-13 Known flow propagated from upstream junctions.
Information: J-14 Known flow propagated from upstream junctions.
Information: J-15 Known flow propagated from upstream junctions.
Information: J-16 Known flow propagated from upstream junctions.
Information: J-17 Known flow propagated from upstream junctions.
Information: J-18 Known flow propagated from upstream junctions.
Information: J-19 Known flow propagated from upstream junctions.
Information: J-20 Known flow propagated from upstream junctions.
Information: J-21 Known flow propagated from upstream junctions.
Information: J-22 Known flow propagated from upstream junctions.
Information: J-23 Known flow propagated from upstream junctions.
Information: J-24 Known flow propagated from upstream junctions.
Information: J-25 Known flow propagated from upstream junctions.
Information: J-26 Known flow propagated from upstream junctions.
Information: J-27 Known flow propagated from upstream junctions.
Information: J-28 Known flow propagated from upstream junctions.
Information: J-29 Known flow propagated from upstream junctions.
Information: J-32 Known flow propagated from upstream junctions.
Information: J-33 Known flow propagated from upstream junctions.
Information: J-34 Known flow propagated from upstream junctions.
Information: J-30 Known flow propagated from upstream junctions.
Information: J-31 Known flow propagated from upstream junctions.
Information: J-37 Known flow propagated from upstream junctions.
Information: J-38 Known flow propagated from upstream junctions.
---------- Calculations Complete ----------

** Analysis Options **
Friction method:  Manning's Formula
HGL Convergence Test:  0.001000
Maximum Network Traversals:  5
Number of Flow Profile Steps:  5
Discharge Convergence Test:  0.001000
Maximum Design Passes:  3
```

---------- Network Quick View ----------

| Label | Length | Size | Discharge | Hydraulic Grade Upstream | Hydraulic Grade Downstream |
|---|---|---|---|---|---|
| P-1 | 145.00 | 10 x 6 ft | 1,283.00 | 1,329.50 | 1,329.50 |
| P-2 | 390.00 | 10 x 6 ft | 1,283.00 | 1,329.55 | 1,329.57 |
| P-3 | 535.00 | 10 x 6 ft | 1,283.00 | 1,331.07 | 1,329.61 |
| P-4 | 535.00 | 10 x 6 ft | 1,283.00 | 1,333.02 | 1,331.15 |
| P-5 | 425.00 | 10 x 6 ft | 866.00 | 1,334.96 | 1,334.13 |
| P-6 | 425.00 | 10 x 6 ft | 866.00 | 1,337.11 | 1,335.03 |
| P-7 | 425.00 | 10 x 6 ft | 866.00 | 1,339.26 | 1,337.18 |
| P-8 | 442.00 | 10 x 6 ft | 834.00 | 1,341.42 | 1,340.15 |
| P-9 | 441.00 | 10 x 6 ft | 834.00 | 1,343.66 | 1,341.49 |
| P-10 | 441.00 | 10 x 6 ft | 834.00 | 1,345.89 | 1,343.73 |
| P-11 | 516.00 | 8 x 6 ft | 199.00 | 1,350.98 | 1,347.33 |

| | | | | | |
|---|---|---|---|---|---|
| P-12 | 516.00 | 8 x 6 ft | 199.00 | 1,356.28 | 1,351.05 |
| P-13 | 516.00 | 8 x 6 ft | 199.00 | 1,361.58 | 1,356.35 |
| P-14 | 516.00 | 8 x 6 ft | 199.00 | 1,366.88 | 1,361.65 |
| P-15 | 516.00 | 8 x 6 ft | 199.00 | 1,372.18 | 1,366.95 |
| P-16 | 105.00 | 8 x 4 ft | 199.00 | 1,376.49 | 1,372.36 |
| P-17 | 348.00 | 8 x 4 ft | 191.00 | 1,383.64 | 1,376.99 |
| P-18 | 443.00 | 8 x 4 ft | 191.00 | 1,391.64 | 1,383.68 |
| P-20 | 296.00 | 30 inch | 8.00 | 1,381.94 | 1,379.13 |
| P-21 | 300.00 | 30 inch | 8.00 | 1,389.94 | 1,382.11 |

| | | | | Hydraulic Grade | |
|---|---|---|---|---|---|
| Label | Length | Size | Discharge | Upstream | Downstream |
| P-22 | 292.00 | 30 inch | 8.00 | 1,397.94 | 1,390.11 |
| P-23 | 190.00 | 30 inch | 8.00 | 1,402.94 | 1,398.11 |
| P-24 | 60.00 | 30 inch | 8.00 | 1,404.94 | 1,403.11 |
| P-29 | 405.00 | 8 x 6 ft | 549.00 | 1,351.03 | 1,349.01 |
| P-30 | 405.00 | 8 x 5 ft | 549.00 | 1,354.97 | 1,352.41 |
| P-31 | 536.00 | 8 x 5 ft | 549.00 | 1,357.82 | 1,355.05 |
| P-32 | 415.00 | 8 x 5 ft | 424.00 | 1,364.11 | 1,358.98 |
| P-33 | 415.00 | 8 x 5 ft | 424.00 | 1,369.27 | 1,364.22 |
| P-34 | 415.00 | 8 x 5 ft | 424.00 | 1,374.44 | 1,369.38 |
| P-35 | 140.00 | 60 inch | 27.00 | 1,358.91 | 1,358.98 |
| P-36 | 545.00 | 48 inch | 27.00 | 1,365.04 | 1,358.65 |
| P-37 | 475.00 | 48 inch | 27.00 | 1,377.04 | 1,365.32 |
| P-38 | 475.00 | 48 inch | 27.00 | 1,391.54 | 1,377.32 |
| P-39 | 270.00 | 8 x 5 ft | 368.00 | 1,336.36 | 1,334.42 |
| P-40 | 525.00 | 8 x 5 ft | 368.00 | 1,339.21 | 1,336.46 |
| P-41 | 525.00 | 8 x 5 ft | 368.00 | 1,342.06 | 1,339.31 |
| P-42 | 460.00 | 8 x 5 ft | 368.00 | 1,344.56 | 1,342.16 |
| P-43 | 90.00 | 8 x 5 ft | 368.00 | 1,345.04 | 1,344.66 |
| P-44 | 428.00 | 10 x 6 ft | 86.00 | 1,347.32 | 1,347.33 |
| P-48 | 20.00 | 48 inch | 32.00 | 1,341.68 | 1,340.15 |

| | | | | Hydraulic Grade | |
|---|---|---|---|---|---|
| Label | Length | Size | Discharge | Upstream | Downstream |
| P-49 | 30.00 | 48 inch | 49.00 | 1,336.60 | 1,334.13 |
| P-50 | 32.00 | 60 inch | 98.00 | 1,360.32 | 1,358.98 |
| P-45 | 428.00 | 10 x 6 ft | 86.00 | 1,347.49 | 1,347.33 |
| P-46 | 428.00 | 10 x 6 ft | 86.00 | 1,349.07 | 1,347.52 |
| P-47 | 67.00 | 10 x 6 ft | 86.00 | 1,349.32 | 1,349.10 |
| P-25 | 333.00 | 8 x 6 ft | 549.00 | 1,347.51 | 1,347.33 |
| P-26 | 332.00 | 8 x 6 ft | 549.00 | 1,347.83 | 1,347.54 |
| P-27 | 320.00 | 8 x 6 ft | 549.00 | 1,348.32 | 1,347.87 |
| P-28 | 320.00 | 8 x 6 ft | 549.00 | 1,348.96 | 1,348.36 |
| P-19 | 296.00 | 36 inch | 8.00 | 1,378.75 | 1,376.99 |

| | | Elevations | | |
|---|---|---|---|---|
| Label | Discharge | Ground | Upstream HGL | Downstream HGL |
| Outlet | 1,283.00 | 1,331.00 | 1,329.50 | 1,329.50 |
| J-1 | 1,283.00 | 1,331.00 | 1,329.57 | 1,329.50 |
| J-2 | 1,283.00 | 1,336.00 | 1,329.61 | 1,329.55 |
| J-3 | 1,283.00 | 1,338.50 | 1,331.15 | 1,331.07 |
| J-4 | 1,283.00 | 1,340.00 | 1,334.13 | 1,333.02 |
| J-5 | 866.00 | 1,343.50 | 1,335.03 | 1,334.96 |
| J-6 | 866.00 | 1,344.00 | 1,337.18 | 1,337.11 |
| J-7 | 866.00 | 1,347.00 | 1,340.15 | 1,339.26 |
| J-8 | 834.00 | 1,349.00 | 1,341.49 | 1,341.42 |
| J-9 | 834.00 | 1,352.00 | 1,343.73 | 1,343.66 |
| J-10 | 834.00 | 1,356.00 | 1,347.33 | 1,345.89 |
| J-11 | 199.00 | 1,360.00 | 1,351.05 | 1,350.98 |
| J-12 | 199.00 | 1,365.00 | 1,356.35 | 1,356.28 |
| J-13 | 199.00 | 1,370.00 | 1,361.65 | 1,361.58 |
| J-14 | 199.00 | 1,375.00 | 1,366.95 | 1,366.88 |
| J-15 | 199.00 | 1,380.00 | 1,372.98 | 1,372.18 |
| J-16 | 199.00 | 1,382.00 | 1,376.99 | 1,376.49 |
| J-17 | 191.00 | 1,388.00 | 1,383.68 | 1,383.64 |
| I-1 | 191.00 | 1,397.00 | 1,391.81 | 1,391.64 |
| J-18 | 8.00 | 1,383.50 | 1,378.91 | 1,378.75 |

| | | Elevations | | |
|---|---|---|---|---|
| Label | Discharge | Ground | Upstream HGL | Downstream HGL |
| J-19 | 8.00 | 1,386.00 | 1,382.11 | 1,381.94 |
| J-20 | 8.00 | 1,394.50 | 1,390.11 | 1,389.94 |
| J-21 | 8.00 | 1,402.00 | 1,398.11 | 1,397.94 |
| J-22 | 8.00 | 1,407.00 | 1,403.11 | 1,402.94 |
| I-2 | 8.00 | 1,409.00 | 1,405.01 | 1,404.94 |
| J-24 | 549.00 | 1,355.00 | 1,347.87 | 1,347.83 |
| J-26 | 549.00 | 1,357.00 | 1,349.01 | 1,348.96 |
| J-27 | 549.00 | 1,360.00 | 1,351.16 | 1,351.03 |
| J-28 | 549.00 | 1,362.50 | 1,355.05 | 1,354.97 |
| J-29 | 549.00 | 1,367.00 | 1,358.98 | 1,357.82 |
| J-30 | 424.00 | 1,370.00 | 1,364.22 | 1,364.11 |
| J-31 | 424.00 | 1,373.00 | 1,369.38 | 1,369.27 |
| I-3 | 424.00 | 1,378.00 | 1,374.88 | 1,374.44 |
| J-32 | 27.00 | 1,364.00 | 1,358.98 | 1,358.91 |
| J-33 | 27.00 | 1,372.50 | 1,365.32 | 1,365.04 |
| J-34 | 27.00 | 1,382.00 | 1,377.32 | 1,377.04 |
| I-4 | 27.00 | 1,396.00 | 1,391.65 | 1,391.54 |

| | | | | |
|---|---|---|---|---|
| J-35 | 368.00 | 1,342.00 | 1,336.46 | 1,336.36 |
| J-36 | 368.00 | 1,343.00 | 1,339.31 | 1,339.21 |
| J-37 | 368.00 | 1,346.00 | 1,342.16 | 1,342.06 |

| | | Elevations | |
|---|---|---|---|
| Label | Discharge | Ground | Upstream HGL | Downstream HGL |
| J-38 | 368.00 | 1,346.50 | 1,344.66 | 1,344.56 |
| I-5 | 368.00 | 1,347.00 | 1,345.44 | 1,345.04 |
| J-39 | 86.00 | 1,356.00 | 1,347.33 | 1,347.32 |
| J-40 | 86.00 | 1,356.00 | 1,347.52 | 1,347.49 |
| I-6 | 86.00 | 1,356.50 | 1,349.45 | 1,349.32 |
| I-7 | 32.00 | 1,347.00 | 1,341.81 | 1,341.68 |
| I-8 | 49.00 | 1,342.00 | 1,336.77 | 1,336.60 |
| I-9 | 98.00 | 1,367.00 | 1,360.55 | 1,360.32 |
| J-41 | 86.00 | 1,356.00 | 1,349.10 | 1,349.07 |
| J-23 | 549.00 | 1,356.50 | 1,347.54 | 1,347.51 |
| J-25 | 549.00 | 1,356.00 | 1,348.36 | 1,348.32 |

Elapsed: 0 minute(s) 17 second(s)

# Combined Pipe/Node Report

| Pipe | Upstream Node | Downstream Node | Length (ft) | Inlet Area (acres) | Weighted Roughness Coefficient | Inlet CA (acres) | Total CA (acres) | Inlet Discharge (cfs) | Section Size | Capacity (cfs) | Average Velocity (ft/s) | Upstream Invert Elevation (ft) | Downstream Invert Elevation (ft) | Constructed Slope (ft/ft) | Description |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P-49 | I-8 | J-4 | 30.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 48 inch | 426.90 | 6.97 | 1,334.50 | 1,331.85 | 0.088333 | |
| P-43 | I-5 | J-38 | 90.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 8 x 5 ft | 444.97 | 11.26 | 1,341.00 | 1,340.52 | 0.005333 | 56th Street□ |
| P-42 | J-38 | J-37 | 460.00 | N/A | N/A | N/A | 0.00 | N/A | 8 x 5 ft | 449.19 | 11.26 | 1,340.52 | 1,338.02 | 0.005435 | 56th Street□ |
| P-41 | J-37 | J-36 | 525.00 | N/A | N/A | N/A | 0.00 | N/A | 8 x 5 ft | 448.93 | 11.26 | 1,338.02 | 1,335.17 | 0.005429 | 56th Street□ |
| P-40 | J-36 | J-35 | 525.00 | N/A | N/A | N/A | 0.00 | N/A | 8 x 5 ft | 448.93 | 11.26 | 1,335.17 | 1,332.32 | 0.005429 | 56th Street□ |
| P-39 | J-35 | J-4 | 270.00 | N/A | N/A | N/A | 0.00 | N/A | 8 x 5 ft | 449.59 | 12.13 | 1,332.32 | 1,330.85 | 0.005444 | 56th Street□ |
| P-48 | I-7 | J-7 | 20.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 48 inch | 418.77 | 6.02 | 1,340.00 | 1,338.30 | 0.085000 | |
| P-50 | I-9 | J-29 | 32.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 60 inch | 651.07 | 7.66 | 1,357.50 | 1,355.50 | 0.062500 | |
| P-38 | I-4 | J-34 | 475.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 48 inch | 250.96 | 5.45 | 1,390.00 | 1,375.50 | 0.030526 | Butler Drive |
| P-37 | J-34 | J-33 | 475.00 | N/A | N/A | N/A | 0.00 | N/A | 48 inch | 228.30 | 5.45 | 1,375.50 | 1,363.50 | 0.025263 | Butler Drive |
| P-36 | J-33 | J-32 | 545.00 | N/A | N/A | N/A | 0.00 | N/A | 48 inch | 150.71 | 7.57 | 1,363.50 | 1,357.50 | 0.011009 | Butler Drive |
| P-35 | J-32 | J-29 | 140.00 | N/A | N/A | N/A | 0.00 | N/A | 60 inch | 311.27 | 2.17 | 1,356.50 | 1,354.50 | 0.014286 | Butler Drive |
| P-34 | I-3 | J-31 | 415.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 8 x 5 ft | 680.08 | 11.80 | 1,370.00 | 1,364.83 | 0.012458 | 52nd Street |
| P-33 | J-31 | J-30 | 415.00 | N/A | N/A | N/A | 0.00 | N/A | 8 x 5 ft | 679.42 | 11.80 | 1,364.83 | 1,359.67 | 0.012434 | 52nd Street |
| P-32 | J-30 | J-29 | 415.00 | N/A | N/A | N/A | 0.00 | N/A | 8 x 5 ft | 680.08 | 11.89 | 1,359.67 | 1,354.50 | 0.012458 | 52nd Street |
| P-31 | J-29 | J-28 | 536.00 | N/A | N/A | N/A | 0.00 | N/A | 8 x 5 ft | 888.60 | 10.21 | 1,354.50 | 1,351.65 | 0.005317 | 52nd Street |
| P-30 | J-28 | J-27 | 405.00 | N/A | N/A | N/A | 0.00 | N/A | 8 x 5 ft | 887.89 | 11.06 | 1,351.65 | 1,349.50 | 0.005309 | 52nd Street |
| P-29 | J-27 | J-26 | 405.00 | N/A | N/A | N/A | 0.00 | N/A | 8 x 6 ft | 1,852.30 | 8.31 | 1,348.50 | 1,346.00 | 0.006173 | 52nd Street |
| P-28 | J-26 | J-25 | 320.00 | N/A | N/A | N/A | 0.00 | N/A | 8 x 6 ft | 1,133.73 | 7.54 | 1,346.00 | 1,345.26 | 0.002313 | 52nd Street |
| P-27 | J-25 | J-24 | 320.00 | N/A | N/A | N/A | 0.00 | N/A | 8 x 6 ft | 1,126.05 | 7.16 | 1,345.26 | 1,344.53 | 0.002281 | 52nd Street |
| P-26 | J-24 | J-23 | 332.00 | N/A | N/A | N/A | 0.00 | N/A | 8 x 6 ft | 1,135.39 | 6.49 | 1,344.53 | 1,343.76 | 0.002319 | 52nd Street |
| P-25 | J-23 | J-10 | 333.00 | N/A | N/A | N/A | 0.00 | N/A | 8 x 6 ft | 1,126.30 | 5.69 | 1,343.76 | 1,343.00 | 0.002282 | 52nd Street |
| P-47 | I-6 | J-41 | 67.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 10 x 6 ft | 637.00 | 6.44 | 1,348.00 | 1,347.75 | 0.003731 | 52nd Street |
| P-46 | J-41 | J-40 | 428.00 | N/A | N/A | N/A | 0.00 | N/A | 10 x 6 ft | 633.59 | 6.44 | 1,347.75 | 1,346.17 | 0.003692 | 52nd Street |
| P-45 | J-40 | J-39 | 428.00 | N/A | N/A | N/A | 0.00 | N/A | 10 x 6 ft | 635.60 | 4.82 | 1,346.17 | 1,344.58 | 0.003715 | 52nd Street |
| P-44 | J-39 | J-10 | 428.00 | N/A | N/A | N/A | 0.00 | N/A | 10 x 6 ft | 633.59 | 2.56 | 1,344.58 | 1,343.00 | 0.003692 | 52nd Street |
| P-24 | I-2 | J-22 | 60.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 30 inch | 74.88 | 4.26 | 1,404.00 | 1,402.00 | 0.033333 | Tatum Boule |
| P-23 | J-22 | J-21 | 190.00 | N/A | N/A | N/A | 0.00 | N/A | 30 inch | 66.53 | 4.26 | 1,402.00 | 1,397.00 | 0.026316 | Tatum Boule |
| P-22 | J-21 | J-20 | 292.00 | N/A | N/A | N/A | 0.00 | N/A | 30 inch | 67.89 | 4.26 | 1,397.00 | 1,389.00 | 0.027397 | Tatum Boule |
| P-21 | J-20 | J-19 | 300.00 | N/A | N/A | N/A | 0.00 | N/A | 30 inch | 66.98 | 4.26 | 1,389.00 | 1,381.00 | 0.026667 | Tatum Boule |
| P-20 | J-19 | J-18 | 296.00 | N/A | N/A | N/A | 0.00 | N/A | 30 inch | 38.73 | 5.48 | 1,381.00 | 1,378.36 | 0.008919 | Tatum Boule |
| P-19 | J-18 | J-16 | 296.00 | N/A | N/A | N/A | 0.00 | N/A | 36 inch | 55.64 | 3.80 | 1,377.86 | 1,375.80 | 0.006959 | Tatum Boule |
| P-18 | I-1 | J-17 | 443.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 8 x 4 ft | 1,190.88 | 7.18 | 1,390.00 | 1,382.00 | 0.018059 | Doubletree |
| P-17 | J-17 | J-16 | 348.00 | N/A | N/A | N/A | 0.00 | N/A | 8 x 4 ft | 1,274.68 | 6.35 | 1,382.00 | 1,374.80 | 0.020690 | Doubletree |
| P-16 | J-16 | J-15 | 105.00 | N/A | N/A | N/A | 0.00 | N/A | 8 x 4 ft | 1,571.04 | 10.88 | 1,374.80 | 1,371.50 | 0.031429 | Doubletree |
| P-15 | J-15 | J-14 | 516.00 | N/A | N/A | N/A | 0.00 | N/A | 8 x 6 ft | 796.46 | 9.17 | 1,369.50 | 1,364.20 | 0.010271 | Doubletree |
| P-14 | J-14 | J-13 | 516.00 | N/A | N/A | N/A | 0.00 | N/A | 8 x 6 ft | 796.46 | 9.17 | 1,364.20 | 1,358.90 | 0.010271 | Doubletree |

# Combined Pipe/Node Report

| Pipe | Upstream Node | Downstream Node | Length (ft) | Inlet Area (acres) | Weighted Roughness Coefficient | Inlet CA (acres) | Total CA (acres) | Inlet Discharge (cfs) | Section Size | Capacity (cfs) | Average Velocity (ft/s) | Upstream Invert Elevation (ft) | Downstream Invert Elevation (ft) | Constructed Slope (ft/ft) | Description |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P-13 | J-13 | J-12 | 516.00 | N/A | N/A | N/A | 0.00 | N/A | 8 x 6 ft | 796.46 | 9.17 | 1,358.90 | 1,353.60 | 0.010271 | Doubletree |
| P-12 | J-12 | J-11 | 516.00 | N/A | N/A | N/A | 0.00 | N/A | 8 x 6 ft | 796.46 | 9.17 | 1,353.60 | 1,348.30 | 0.010271 | Doubletree |
| P-11 | J-11 | J-10 | 516.00 | N/A | N/A | N/A | 0.00 | N/A | 8 x 6 ft | 796.46 | 7.52 | 1,348.30 | 1,343.00 | 0.010271 | Doubletree |
| P-10 | J-10 | J-9 | 441.00 | N/A | N/A | N/A | 0.00 | N/A | 10 x 6 ft | 2,224.63 | 9.52 | 1,343.00 | 1,340.77 | 0.005057 | Doubletree |
| P-9 | J-9 | J-8 | 441.00 | N/A | N/A | N/A | 0.00 | N/A | 10 x 6 ft | 2,229.61 | 9.52 | 1,340.77 | 1,338.53 | 0.005079 | Doubletree |
| P-8 | J-8 | J-7 | 442.00 | N/A | N/A | N/A | 0.00 | N/A | 10 x 6 ft | 2,222.11 | 8.43 | 1,338.53 | 1,336.30 | 0.005045 | Doubletree |
| P-7 | J-7 | J-6 | 425.00 | N/A | N/A | N/A | 0.00 | N/A | 10 x 6 ft | 2,225.10 | 9.64 | 1,336.30 | 1,334.15 | 0.005059 | Doubletree |
| P-6 | J-6 | J-5 | 425.00 | N/A | N/A | N/A | 0.00 | N/A | 10 x 6 ft | 2,225.10 | 9.64 | 1,334.15 | 1,332.00 | 0.005059 | Doubletree |
| P-5 | J-5 | J-4 | 425.00 | N/A | N/A | N/A | 0.00 | N/A | 10 x 6 ft | 2,225.10 | 8.25 | 1,332.00 | 1,329.85 | 0.005059 | Doubletree |
| P-4 | J-4 | J-3 | 535.00 | N/A | N/A | N/A | 0.00 | N/A | 10 x 6 ft | 2,518.28 | 9.98 | 1,329.85 | 1,327.90 | 0.003645 | Doubletree |
| P-3 | J-3 | J-2 | 535.00 | N/A | N/A | N/A | 0.00 | N/A | 10 x 6 ft | 2,518.28 | 9.43 | 1,327.90 | 1,325.95 | 0.003645 | Doubletree |
| P-2 | J-2 | J-1 | 390.00 | N/A | N/A | N/A | 0.00 | N/A | 10 x 6 ft | 2,472.25 | 7.58 | 1,325.90 | 1,324.53 | 0.003513 | Doubletree |
| P-1 | J-1 | Outlet | 145.00 | N/A | N/A | N/A | 0.00 | N/A | 10 x 6 ft | 2,521.84 | 6.14 | 1,324.53 | 1,324.00 | 0.003655 | Doubletree |

# DOT Report

| Pipe | -Node- Upstream Downstream | Inlet Area (acres) | Inlet CA (acres) | Total CA (acres) | -Ground- Upstream Downstream (ft) | -HGL- Upstream Downstream (ft) | -Slope- Energy Constructed (ft/ft) | -Section- Discharge Capacity (cfs) | -Section- Shape Size | Length (ft) | Average Velocity (ft/s) | Description |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P-49 | I-8 | 0.00 | 0.00 | 0.00 | 1,342.00 | 1,336.60 | 0.087420 | 49.00 | Circular | 30.00 | 6.97 | |
| | J-4 | | | | 1,340.00 | 1,334.13 | 0.088333 | 426.90 | 48 inch | | | |
| P-43 | I-5 | 0.00 | 0.00 | 0.00 | 1,347.00 | 1,345.04 | 0.005293 | 368.00 | Box | 90.00 | 11.26 | 56th Street□ |
| | J-38 | | | | 1,346.50 | 1,344.66 | 0.005333 | 444.97 | 8 x 5 ft | | | |
| P-42 | J-38 | N/A | N/A | 0.00 | 1,346.50 | 1,344.56 | 0.005427 | 368.00 | Box | 460.00 | 11.26 | 56th Street□ |
| | J-37 | | | | 1,346.00 | 1,342.16 | 0.005435 | 449.19 | 8 x 5 ft | | | |
| P-41 | J-37 | N/A | N/A | 0.00 | 1,346.00 | 1,342.06 | 0.005422 | 368.00 | Box | 525.00 | 11.26 | 56th Street□ |
| | J-36 | | | | 1,343.00 | 1,339.31 | 0.005429 | 448.93 | 8 x 5 ft | | | |
| P-40 | J-36 | N/A | N/A | 0.00 | 1,343.00 | 1,339.21 | 0.005422 | 368.00 | Box | 525.00 | 11.26 | 56th Street□ |
| | J-35 | | | | 1,342.00 | 1,336.46 | 0.005429 | 448.93 | 8 x 5 ft | | | |
| P-39 | J-35 | N/A | N/A | 0.00 | 1,342.00 | 1,336.36 | 0.005098 | 368.00 | Box | 270.00 | 12.13 | 56th Street□ |
| | J-4 | | | | 1,340.00 | 1,334.42 | 0.005444 | 449.59 | 8 x 5 ft | | | |
| P-48 | I-7 | 0.00 | 0.00 | 0.00 | 1,347.00 | 1,341.68 | 0.083644 | 32.00 | Circular | 20.00 | 6.02 | |
| | J-7 | | | | 1,347.00 | 1,340.15 | 0.085000 | 418.77 | 48 inch | | | |
| P-50 | I-9 | 0.00 | 0.00 | 0.00 | 1,367.00 | 1,360.32 | 0.055733 | 98.00 | Circular | 32.00 | 7.66 | |
| | J-29 | | | | 1,367.00 | 1,358.98 | 0.062500 | 651.07 | 60 inch | | | |
| P-38 | I-4 | 0.00 | 0.00 | 0.00 | 1,396.00 | 1,391.54 | 0.030362 | 27.00 | Circular | 475.00 | 5.45 | Butler Drive |
| | J-34 | | | | 1,382.00 | 1,377.32 | 0.030526 | 250.96 | 48 inch | | | |
| P-37 | J-34 | N/A | N/A | 0.00 | 1,382.00 | 1,377.04 | 0.025099 | 27.00 | Circular | 475.00 | 5.45 | Butler Drive |
| | J-33 | | | | 1,372.50 | 1,365.32 | 0.025263 | 228.30 | 48 inch | | | |
| P-36 | J-33 | N/A | N/A | 0.00 | 1,372.50 | 1,365.04 | 0.010428 | 27.00 | Circular | 545.00 | 7.57 | Butler Drive |
| | J-32 | | | | 1,364.00 | 1,358.65 | 0.011009 | 150.71 | 48 inch | | | |
| P-35 | J-32 | N/A | N/A | 0.00 | 1,364.00 | 1,358.91 | 0.000202 | 27.00 | Circular | 140.00 | 2.17 | Butler Drive |
| | J-29 | | | | 1,367.00 | 1,358.98 | 0.014286 | 311.27 | 60 inch | | | |
| P-34 | I-3 | 0.00 | 0.00 | 0.00 | 1,378.00 | 1,374.44 | 0.012448 | 424.00 | Box | 415.00 | 11.80 | 52nd Street |
| | J-31 | | | | 1,373.00 | 1,369.38 | 0.012458 | 680.08 | 8 x 5 ft | | | |
| P-33 | J-31 | N/A | N/A | 0.00 | 1,373.00 | 1,369.27 | 0.012424 | 424.00 | Box | 415.00 | 11.80 | 52nd Street |
| | J-30 | | | | 1,370.00 | 1,364.22 | 0.012434 | 679.42 | 8 x 5 ft | | | |
| P-32 | J-30 | N/A | N/A | 0.00 | 1,370.00 | 1,364.11 | 0.012456 | 424.00 | Box | 415.00 | 11.89 | 52nd Street |
| | J-29 | | | | 1,367.00 | 1,358.98 | 0.012458 | 680.08 | 8 x 5 ft | | | |
| P-31 | J-29 | N/A | N/A | 0.00 | 1,367.00 | 1,357.82 | 0.005312 | 549.00 | Box | 536.00 | 10.21 | 52nd Street |
| | J-28 | | | | 1,362.50 | 1,355.05 | 0.005317 | 888.60 | 8 x 5 ft | | | |
| P-30 | J-28 | N/A | N/A | 0.00 | 1,362.50 | 1,354.97 | 0.005085 | 549.00 | Box | 405.00 | 11.06 | 52nd Street |
| | J-27 | | | | 1,360.00 | 1,352.41 | 0.005309 | 887.89 | 8 x 5 ft | | | |
| P-29 | J-27 | N/A | N/A | 0.00 | 1,360.00 | 1,351.03 | 0.005908 | 549.00 | Box | 405.00 | 8.31 | 52nd Street |
| | J-26 | | | | 1,357.00 | 1,349.01 | 0.006173 | 1,852.30 | 8 x 6 ft | | | |
| P-28 | J-26 | N/A | N/A | 0.00 | 1,357.00 | 1,348.96 | 0.002130 | 549.00 | Box | 320.00 | 7.54 | 52nd Street |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# DOT Report

| Pipe | -Node- Upstream Downstream | Inlet Area (acres) | Inlet CA (acres) | Total CA (acres) | -Ground- Upstream Downstream (ft) | -HGL- Upstream Downstream (ft) | -Slope- Energy Constructed (ft/ft) | -Section- Discharge Capacity (cfs) | -Section- Shape Size | Length (ft) | Average Velocity (ft/s) | Description |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | J-25 | | | | 1,356.00 | 1,348.36 | 0.002313 | 1,133.73 | 8 x 6 ft | | | |
| P-27 | J-25 | N/A | N/A | 0.00 | 1,356.00 | 1,348.32 | 0.001850 | 549.00 | Box | 320.00 | 7.16 | 52nd Street |
| | J-24 | | | | 1,355.00 | 1,347.87 | 0.002281 | 1,126.05 | 8 x 6 ft | | | |
| P-26 | J-24 | N/A | N/A | 0.00 | 1,355.00 | 1,347.83 | 0.001406 | 549.00 | Box | 332.00 | 6.49 | 52nd Street |
| | J-23 | | | | 1,356.50 | 1,347.54 | 0.002319 | 1,135.39 | 8 x 6 ft | | | |
| P-25 | J-23 | N/A | N/A | 0.00 | 1,356.50 | 1,347.51 | 0.000983 | 549.00 | Box | 333.00 | 5.69 | 52nd Street |
| | J-10 | | | | 1,356.00 | 1,347.33 | 0.002282 | 1,126.30 | 8 x 6 ft | | | |
| P-47 | I-6 | 0.00 | 0.00 | 0.00 | 1,356.50 | 1,349.32 | 0.003713 | 86.00 | Box | 67.00 | 6.44 | 52nd Street |
| | J-41 | | | | 1,356.00 | 1,349.10 | 0.003731 | 637.00 | 10 x 6 ft | | | |
| P-46 | J-41 | N/A | N/A | 0.00 | 1,356.00 | 1,349.07 | 0.003689 | 86.00 | Box | 428.00 | 6.44 | 52nd Street |
| | J-40 | | | | 1,356.00 | 1,347.52 | 0.003692 | 633.59 | 10 x 6 ft | | | |
| P-45 | J-40 | N/A | N/A | 0.00 | 1,356.00 | 1,347.49 | 0.001568 | 86.00 | Box | 428.00 | 4.82 | 52nd Street |
| | J-39 | | | | 1,356.00 | 1,347.33 | 0.003715 | 635.60 | 10 x 6 ft | | | |
| P-44 | J-39 | N/A | N/A | 0.00 | 1,356.00 | 1,347.32 | 0.000193 | 86.00 | Box | 428.00 | 2.56 | 52nd Street |
| | J-10 | | | | 1,356.00 | 1,347.33 | 0.003692 | 633.59 | 10 x 6 ft | | | |
| P-24 | I-2 | 0.00 | 0.00 | 0.00 | 1,409.00 | 1,404.94 | 0.032542 | 8.00 | Circular | 60.00 | 4.26 | Tatum Boule |
| | J-22 | | | | 1,407.00 | 1,403.11 | 0.033333 | 74.88 | 30 inch | | | |
| P-23 | J-22 | N/A | N/A | 0.00 | 1,407.00 | 1,402.94 | 0.026066 | 8.00 | Circular | 190.00 | 4.26 | Tatum Boule |
| | J-21 | | | | 1,402.00 | 1,398.11 | 0.026316 | 66.53 | 30 inch | | | |
| P-22 | J-21 | N/A | N/A | 0.00 | 1,402.00 | 1,397.94 | 0.027235 | 8.00 | Circular | 292.00 | 4.26 | Tatum Boule |
| | J-20 | | | | 1,394.50 | 1,390.11 | 0.027397 | 67.89 | 30 inch | | | |
| P-21 | J-20 | N/A | N/A | 0.00 | 1,394.50 | 1,389.94 | 0.026508 | 8.00 | Circular | 300.00 | 4.26 | Tatum Boule |
| | J-19 | | | | 1,386.00 | 1,382.11 | 0.026667 | 66.98 | 30 inch | | | |
| P-20 | J-19 | N/A | N/A | 0.00 | 1,386.00 | 1,381.94 | 0.008641 | 8.00 | Circular | 296.00 | 5.48 | Tatum Boule |
| | J-18 | | | | 1,383.50 | 1,379.13 | 0.008919 | 38.73 | 30 inch | | | |
| P-19 | J-18 | N/A | N/A | 0.00 | 1,383.50 | 1,378.75 | 0.006533 | 8.00 | Circular | 296.00 | 3.80 | Tatum Boule |
| | J-16 | | | | 1,382.00 | 1,376.99 | 0.006959 | 55.64 | 36 inch | | | |
| P-18 | I-1 | 0.00 | 0.00 | 0.00 | 1,397.00 | 1,391.64 | 0.018055 | 191.00 | Box | 443.00 | 7.18 | Doubletree |
| | J-17 | | | | 1,388.00 | 1,383.68 | 0.018059 | 1,190.88 | 8 x 4 ft | | | |
| P-17 | J-17 | N/A | N/A | 0.00 | 1,388.00 | 1,383.64 | 0.020141 | 191.00 | Box | 348.00 | 6.35 | Doubletree |
| | J-16 | | | | 1,382.00 | 1,376.99 | 0.020690 | 1,274.68 | 8 x 4 ft | | | |
| P-16 | J-16 | N/A | N/A | 0.00 | 1,382.00 | 1,376.49 | 0.016630 | 199.00 | Box | 105.00 | 10.88 | Doubletree |
| | J-15 | | | | 1,380.00 | 1,372.36 | 0.031429 | 1,571.04 | 8 x 4 ft | | | |
| P-15 | J-15 | N/A | N/A | 0.00 | 1,380.00 | 1,372.18 | 0.010267 | 199.00 | Box | 516.00 | 9.17 | Doubletree |
| | J-14 | | | | 1,375.00 | 1,366.95 | 0.010271 | 796.46 | 8 x 6 ft | | | |
| P-14 | J-14 | N/A | N/A | 0.00 | 1,375.00 | 1,366.88 | 0.010267 | 199.00 | Box | 516.00 | 9.17 | Doubletree |
| | J-13 | | | | 1,370.00 | 1,361.65 | 0.010271 | 796.46 | 8 x 6 ft | | | |


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# DOT Report

| Pipe | -Node- Upstream Downstream | Inlet Area (acres) | Inlet CA (acres) | Total CA (acres) | -Ground- Upstream Downstream (ft) | -HGL- Upstream Downstream (ft) | -Slope- Energy Constructed (ft/ft) | -Section- Discharge Capacity (cfs) | -Section- Shape Size | Length (ft) | Average Velocity (ft/s) | Description |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P-13 | J-13 | N/A | N/A | 0.00 | 1,370.00 | 1,361.58 | 0.010267 | 199.00 | Box | 516.00 | 9.17 | Doubletree |
| | J-12 | | | | 1,365.00 | 1,356.35 | 0.010271 | 796.46 | 8 x 6 ft | | | |
| P-12 | J-12 | N/A | N/A | 0.00 | 1,365.00 | 1,356.28 | 0.010267 | 199.00 | Box | 516.00 | 9.17 | Doubletree |
| | J-11 | | | | 1,360.00 | 1,351.05 | 0.010271 | 796.46 | 8 x 6 ft | | | |
| P-11 | J-11 | N/A | N/A | 0.00 | 1,360.00 | 1,350.98 | 0.008677 | 199.00 | Box | 516.00 | 7.52 | Doubletree |
| | J-10 | | | | 1,356.00 | 1,347.33 | 0.010271 | 796.46 | 8 x 6 ft | | | |
| P-10 | J-10 | N/A | N/A | 0.00 | 1,356.00 | 1,345.89 | 0.005051 | 834.00 | Box | 441.00 | 9.52 | Doubletree |
| | J-9 | | | | 1,352.00 | 1,343.73 | 0.005057 | 2,224.63 | 10 x 6 ft | | | |
| P-9 | J-9 | N/A | N/A | 0.00 | 1,352.00 | 1,343.66 | 0.005073 | 834.00 | Box | 441.00 | 9.52 | Doubletree |
| | J-8 | | | | 1,349.00 | 1,341.49 | 0.005079 | 2,229.61 | 10 x 6 ft | | | |
| P-8 | J-8 | N/A | N/A | 0.00 | 1,349.00 | 1,341.42 | 0.004298 | 834.00 | Box | 442.00 | 8.43 | Doubletree |
| | J-7 | | | | 1,347.00 | 1,340.15 | 0.005045 | 2,222.11 | 10 x 6 ft | | | |
| P-7 | J-7 | N/A | N/A | 0.00 | 1,347.00 | 1,339.26 | 0.005053 | 866.00 | Box | 425.00 | 9.64 | Doubletree |
| | J-6 | | | | 1,344.00 | 1,337.18 | 0.005059 | 2,225.10 | 10 x 6 ft | | | |
| P-6 | J-6 | N/A | N/A | 0.00 | 1,344.00 | 1,337.11 | 0.005053 | 866.00 | Box | 425.00 | 9.64 | Doubletree |
| | J-5 | | | | 1,343.50 | 1,335.03 | 0.005059 | 2,225.10 | 10 x 6 ft | | | |
| P-5 | J-5 | N/A | N/A | 0.00 | 1,343.50 | 1,334.96 | 0.003759 | 866.00 | Box | 425.00 | 8.25 | Doubletree |
| | J-4 | | | | 1,340.00 | 1,334.13 | 0.005059 | 2,225.10 | 10 x 6 ft | | | |
| P-4 | J-4 | N/A | N/A | 0.00 | 1,340.00 | 1,333.02 | 0.003639 | 1,283.00 | Box | 535.00 | 9.98 | Doubletree |
| | J-3 | | | | 1,338.50 | 1,331.15 | 0.003645 | 2,518.28 | 10 x 6 ft | | | |
| P-3 | J-3 | N/A | N/A | 0.00 | 1,338.50 | 1,331.07 | 0.003472 | 1,283.00 | Box | 535.00 | 9.43 | Doubletree |
| | J-2 | | | | 1,336.00 | 1,329.61 | 0.003645 | 2,518.28 | 10 x 6 ft | | | |
| P-2 | J-2 | N/A | N/A | 0.00 | 1,336.00 | 1,329.55 | 0.001418 | 1,283.00 | Box | 390.00 | 7.58 | Doubletree |
| | J-1 | | | | 1,331.00 | 1,329.57 | 0.003513 | 2,472.25 | 10 x 6 ft | | | |
| P-1 | J-1 | N/A | N/A | 0.00 | 1,331.00 | 1,329.50 | 0.000829 | 1,283.00 | Box | 145.00 | 6.14 | Doubletree |
| | Outlet | | | | 1,331.00 | 1,329.50 | 0.003655 | 2,521.84 | 10 x 6 ft | | | |


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# Pipe Report

| Upstream Node | Downstream Node | Weighted Roughness Coefficient | Discharge (cfs) | Length (ft) | Constructed Slope (ft/ft) | Section Size | Roughness | Capacity (cfs) | Upstream Invert Elevation (ft) | Downstream Invert Elevation (ft) | Upstream Ground Elevation (ft) | Downstream Ground Elevation (ft) | Upstream Cover (ft) | Downstream Cover (ft) | Upstream HGL (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| I-8 | J-4 | 0.00 | 49.00 | 30.00 | 0.088333 | 48 inch | 0.013 | 426.90 | 1,334.50 | 1,331.85 | 1,342.00 | 1,340.00 | 3.50 | 4.15 | 1,336.60 |
| I-5 | J-38 | 0.00 | 368.00 | 90.00 | 0.005333 | 8 x 5 ft | 0.013 | 444.97 | 1,341.00 | 1,340.52 | 1,347.00 | 1,346.50 | 1.00 | 0.98 | 1,345.04 |
| J-38 | J-37 | N/A | 368.00 | 460.00 | 0.005435 | 8 x 5 ft | 0.013 | 449.19 | 1,340.52 | 1,338.02 | 1,346.50 | 1,346.00 | 0.98 | 2.98 | 1,344.56 |
| J-37 | J-36 | N/A | 368.00 | 525.00 | 0.005429 | 8 x 5 ft | 0.013 | 448.93 | 1,338.02 | 1,335.17 | 1,346.00 | 1,343.00 | 2.98 | 2.83 | 1,342.06 |
| J-36 | J-35 | N/A | 368.00 | 525.00 | 0.005429 | 8 x 5 ft | 0.013 | 448.93 | 1,335.17 | 1,332.32 | 1,343.00 | 1,342.00 | 2.83 | 4.68 | 1,339.21 |
| J-35 | J-4 | N/A | 368.00 | 270.00 | 0.005444 | 8 x 5 ft | 0.013 | 449.59 | 1,332.32 | 1,330.85 | 1,342.00 | 1,340.00 | 4.68 | 4.15 | 1,336.36 |
| I-7 | J-7 | 0.00 | 32.00 | 20.00 | 0.085000 | 48 inch | 0.013 | 418.77 | 1,340.00 | 1,338.30 | 1,347.00 | 1,347.00 | 3.00 | 4.70 | 1,341.68 |
| I-9 | J-29 | 0.00 | 98.00 | 32.00 | 0.062500 | 60 inch | 0.013 | 651.07 | 1,357.50 | 1,355.50 | 1,367.00 | 1,367.00 | 4.50 | 6.50 | 1,360.32 |
| I-4 | J-34 | 0.00 | 27.00 | 475.00 | 0.030526 | 48 inch | 0.013 | 250.96 | 1,390.00 | 1,375.50 | 1,396.00 | 1,382.00 | 2.00 | 2.50 | 1,391.54 |
| J-34 | J-33 | N/A | 27.00 | 475.00 | 0.025263 | 48 inch | 0.013 | 228.30 | 1,375.50 | 1,363.50 | 1,382.00 | 1,372.50 | 2.50 | 5.00 | 1,377.04 |
| J-33 | J-32 | N/A | 27.00 | 545.00 | 0.011009 | 48 inch | 0.013 | 150.71 | 1,363.50 | 1,357.50 | 1,372.50 | 1,364.00 | 5.00 | 2.50 | 1,365.04 |
| J-32 | J-29 | N/A | 27.00 | 140.00 | 0.014286 | 60 inch | 0.013 | 311.27 | 1,356.50 | 1,354.50 | 1,364.00 | 1,367.00 | 2.50 | 7.50 | 1,358.91 |
| I-3 | J-31 | 0.00 | 424.00 | 415.00 | 0.012458 | 8 x 5 ft | 0.013 | 680.08 | 1,370.00 | 1,364.83 | 1,378.00 | 1,373.00 | 3.00 | 3.17 | 1,374.44 |
| J-31 | J-30 | N/A | 424.00 | 415.00 | 0.012434 | 8 x 5 ft | 0.013 | 679.42 | 1,364.83 | 1,359.67 | 1,373.00 | 1,370.00 | 3.17 | 5.33 | 1,369.27 |
| J-30 | J-29 | N/A | 424.00 | 415.00 | 0.012458 | 8 x 5 ft | 0.013 | 680.08 | 1,359.67 | 1,354.50 | 1,370.00 | 1,367.00 | 5.33 | 7.50 | 1,364.11 |
| J-29 | J-28 | N/A | 549.00 | 536.00 | 0.005317 | 8 x 5 ft | 0.013 | 888.60 | 1,354.50 | 1,351.65 | 1,367.00 | 1,362.50 | 7.50 | 5.85 | 1,357.82 |
| J-28 | J-27 | N/A | 549.00 | 405.00 | 0.005309 | 8 x 5 ft | 0.013 | 887.89 | 1,351.65 | 1,349.50 | 1,362.50 | 1,360.00 | 5.85 | 5.50 | 1,354.97 |
| J-27 | J-26 | N/A | 549.00 | 405.00 | 0.006173 | 8 x 6 ft | 0.013 | 1,852.30 | 1,348.50 | 1,346.00 | 1,360.00 | 1,357.00 | 5.50 | 5.00 | 1,351.03 |
| J-26 | J-25 | N/A | 549.00 | 320.00 | 0.002313 | 8 x 6 ft | 0.013 | 1,133.73 | 1,346.00 | 1,345.26 | 1,357.00 | 1,356.00 | 5.00 | 4.74 | 1,348.96 |
| J-25 | J-24 | N/A | 549.00 | 320.00 | 0.002281 | 8 x 6 ft | 0.013 | 1,126.05 | 1,345.26 | 1,344.53 | 1,356.00 | 1,355.00 | 4.74 | 4.47 | 1,348.32 |
| J-24 | J-23 | N/A | 549.00 | 332.00 | 0.002319 | 8 x 6 ft | 0.013 | 1,135.39 | 1,344.53 | 1,343.76 | 1,355.00 | 1,356.50 | 4.47 | 6.74 | 1,347.83 |
| J-23 | J-10 | N/A | 549.00 | 333.00 | 0.002282 | 8 x 6 ft | 0.013 | 1,126.30 | 1,343.76 | 1,343.00 | 1,356.50 | 1,356.00 | 6.74 | 7.00 | 1,347.51 |
| I-6 | J-41 | 0.00 | 86.00 | 67.00 | 0.003731 | 10 x 6 ft | 0.013 | 637.00 | 1,348.00 | 1,347.75 | 1,356.50 | 1,356.00 | 2.50 | 2.25 | 1,349.32 |
| J-41 | J-40 | N/A | 86.00 | 428.00 | 0.003692 | 10 x 6 ft | 0.013 | 633.59 | 1,347.75 | 1,346.17 | 1,356.00 | 1,356.00 | 2.25 | 3.83 | 1,349.07 |
| J-40 | J-39 | N/A | 86.00 | 428.00 | 0.003715 | 10 x 6 ft | 0.013 | 635.60 | 1,346.17 | 1,344.58 | 1,356.00 | 1,356.00 | 3.83 | 5.42 | 1,347.49 |
| J-39 | J-10 | N/A | 86.00 | 428.00 | 0.003692 | 10 x 6 ft | 0.013 | 633.59 | 1,344.58 | 1,343.00 | 1,356.00 | 1,356.00 | 5.42 | 7.00 | 1,347.32 |
| I-2 | J-22 | 0.00 | 8.00 | 60.00 | 0.033333 | 30 inch | 0.013 | 74.88 | 1,404.00 | 1,402.00 | 1,409.00 | 1,407.00 | 2.50 | 2.50 | 1,404.94 |
| J-22 | J-21 | N/A | 8.00 | 190.00 | 0.026316 | 30 inch | 0.013 | 66.53 | 1,402.00 | 1,397.00 | 1,407.00 | 1,402.00 | 2.50 | 2.50 | 1,402.94 |
| J-21 | J-20 | N/A | 8.00 | 292.00 | 0.027397 | 30 inch | 0.013 | 67.89 | 1,397.00 | 1,389.00 | 1,402.00 | 1,394.50 | 2.50 | 3.00 | 1,397.94 |
| J-20 | J-19 | N/A | 8.00 | 300.00 | 0.026667 | 30 inch | 0.013 | 66.98 | 1,389.00 | 1,381.00 | 1,394.50 | 1,386.00 | 3.00 | 2.50 | 1,389.94 |
| J-19 | J-18 | N/A | 8.00 | 296.00 | 0.008919 | 30 inch | 0.013 | 38.73 | 1,381.00 | 1,378.36 | 1,386.00 | 1,383.50 | 2.50 | 2.64 | 1,381.94 |
| J-18 | J-16 | N/A | 8.00 | 296.00 | 0.006959 | 36 inch | 0.013 | 55.64 | 1,377.86 | 1,375.80 | 1,383.50 | 1,382.00 | 2.64 | 3.20 | 1,378.75 |
| I-1 | J-17 | 0.00 | 191.00 | 443.00 | 0.018059 | 8 x 4 ft | 0.013 | 1,190.88 | 1,390.00 | 1,382.00 | 1,397.00 | 1,388.00 | 3.00 | 2.00 | 1,391.64 |
| J-17 | J-16 | N/A | 191.00 | 348.00 | 0.020690 | 8 x 4 ft | 0.013 | 1,274.68 | 1,382.00 | 1,374.80 | 1,388.00 | 1,382.00 | 2.00 | 3.20 | 1,383.64 |
| J-16 | J-15 | N/A | 199.00 | 105.00 | 0.031429 | 8 x 4 ft | 0.013 | 1,571.04 | 1,374.80 | 1,371.50 | 1,382.00 | 1,380.00 | 3.20 | 4.50 | 1,376.49 |
| J-15 | J-14 | N/A | 199.00 | 516.00 | 0.010271 | 8 x 6 ft | 0.013 | 796.46 | 1,369.50 | 1,364.20 | 1,380.00 | 1,375.00 | 4.50 | 4.80 | 1,372.18 |
| J-14 | J-13 | N/A | 199.00 | 516.00 | 0.010271 | 8 x 6 ft | 0.013 | 796.46 | 1,364.20 | 1,358.90 | 1,375.00 | 1,370.00 | 4.80 | 5.10 | 1,366.88 |

# Pipe Report

| Upstream Node | Downstream Node | Weighted Roughness Coefficient | Discharge (cfs) | Length (ft) | Constructed Slope (ft/ft) | Section Size | Roughness | Capacity (cfs) | Upstream Invert Elevation (ft) | Downstream Invert Elevation (ft) | Upstream Ground Elevation (ft) | Downstream Ground Elevation (ft) | Upstream Cover (ft) | Downstream Cover (ft) | Upstream HGL (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| J-13 | J-12 | N/A | 199.00 | 516.00 | 0.010271 | 8 x 6 ft | 0.013 | 796.46 | 1,358.90 | 1,353.60 | 1,370.00 | 1,365.00 | 5.10 | 5.40 | 1,361.58 |
| J-12 | J-11 | N/A | 199.00 | 516.00 | 0.010271 | 8 x 6 ft | 0.013 | 796.46 | 1,353.60 | 1,348.30 | 1,365.00 | 1,360.00 | 5.40 | 5.70 | 1,356.28 |
| J-11 | J-10 | N/A | 199.00 | 516.00 | 0.010271 | 8 x 6 ft | 0.013 | 796.46 | 1,348.30 | 1,343.00 | 1,360.00 | 1,356.00 | 5.70 | 7.00 | 1,350.98 |
| J-10 | J-9 | N/A | 834.00 | 441.00 | 0.005057 | 10 x 6 ft | 0.013 | 2,224.63 | 1,343.00 | 1,340.77 | 1,356.00 | 1,352.00 | 7.00 | 5.23 | 1,345.89 |
| J-9 | J-8 | N/A | 834.00 | 441.00 | 0.005079 | 10 x 6 ft | 0.013 | 2,229.61 | 1,340.77 | 1,338.53 | 1,352.00 | 1,349.00 | 5.23 | 4.47 | 1,343.66 |
| J-8 | J-7 | N/A | 834.00 | 442.00 | 0.005045 | 10 x 6 ft | 0.013 | 2,222.11 | 1,338.53 | 1,336.30 | 1,349.00 | 1,347.00 | 4.47 | 4.70 | 1,341.42 |
| J-7 | J-6 | N/A | 866.00 | 425.00 | 0.005059 | 10 x 6 ft | 0.013 | 2,225.10 | 1,336.30 | 1,334.15 | 1,347.00 | 1,344.00 | 4.70 | 3.85 | 1,339.26 |
| J-6 | J-5 | N/A | 866.00 | 425.00 | 0.005059 | 10 x 6 ft | 0.013 | 2,225.10 | 1,334.15 | 1,332.00 | 1,344.00 | 1,343.50 | 3.85 | 5.50 | 1,337.11 |
| J-5 | J-4 | N/A | 866.00 | 425.00 | 0.005059 | 10 x 6 ft | 0.013 | 2,225.10 | 1,332.00 | 1,329.85 | 1,343.50 | 1,340.00 | 5.50 | 4.15 | 1,334.96 |
| J-4 | J-3 | N/A | 1,283.00 | 535.00 | 0.003645 | 10 x 6 ft | 0.013 | 2,518.28 | 1,329.85 | 1,327.90 | 1,340.00 | 1,338.50 | 4.15 | 4.60 | 1,333.02 |
| J-3 | J-2 | N/A | 1,283.00 | 535.00 | 0.003645 | 10 x 6 ft | 0.013 | 2,518.28 | 1,327.90 | 1,325.95 | 1,338.50 | 1,336.00 | 4.60 | 4.05 | 1,331.07 |
| J-2 | J-1 | N/A | 1,283.00 | 390.00 | 0.003513 | 10 x 6 ft | 0.013 | 2,472.25 | 1,325.90 | 1,324.53 | 1,336.00 | 1,331.00 | 4.10 | 0.47 | 1,329.55 |
| J-1 | Outlet | N/A | 1,283.00 | 145.00 | 0.003655 | 10 x 6 ft | 0.013 | 2,521.84 | 1,324.53 | 1,324.00 | 1,331.00 | 1,331.00 | 0.47 | 1.00 | 1,329.50 |


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# Node Report

| HGL In (ft) | HGL Out (ft) | Ground Elevation (ft) | Known Flow (cfs) | Node | Structure Discharge (cfs) | System Flow Time (min) | Velocity (ft/s) |
|---|---|---|---|---|---|---|---|
| 1,336.77 | 1,336.60 | 1,342.00 | 49.00 | I-8 | 49.00 | 0.00 | 7.33 |
| 1,345.44 | 1,345.04 | 1,347.00 | 368.00 | I-5 | 368.00 | 0.00 | 11.40 |
| 1,344.66 | 1,344.56 | 1,346.50 | N/A | J-38 | 368.00 | 0.13 | 11.40 |
| 1,342.16 | 1,342.06 | 1,346.00 | N/A | J-37 | 368.00 | 0.81 | 11.40 |
| 1,339.31 | 1,339.21 | 1,343.00 | N/A | J-36 | 368.00 | 1.59 | 11.40 |
| 1,336.46 | 1,336.36 | 1,342.00 | N/A | J-35 | 368.00 | 2.37 | 11.40 |
| 1,341.81 | 1,341.68 | 1,347.00 | 32.00 | I-7 | 32.00 | 0.00 | 6.39 |
| 1,360.55 | 1,360.32 | 1,367.00 | 98.00 | I-9 | 98.00 | 0.00 | 8.60 |
| 1,391.65 | 1,391.54 | 1,396.00 | 27.00 | I-4 | 27.00 | 0.00 | 6.07 |
| 1,377.32 | 1,377.04 | 1,382.00 | N/A | J-34 | 27.00 | 1.45 | 6.07 |
| 1,365.32 | 1,365.04 | 1,372.50 | N/A | J-33 | 27.00 | 2.90 | 6.07 |
| 1,358.98 | 1,358.91 | 1,364.00 | N/A | J-32 | 27.00 | 4.10 | 2.88 |
| 1,374.88 | 1,374.44 | 1,378.00 | 424.00 | I-3 | 424.00 | 0.00 | 11.95 |
| 1,369.38 | 1,369.27 | 1,373.00 | N/A | J-31 | 424.00 | 0.59 | 11.95 |
| 1,364.22 | 1,364.11 | 1,370.00 | N/A | J-30 | 424.00 | 1.17 | 11.95 |
| 1,358.98 | 1,357.82 | 1,367.00 | N/A | J-29 | 549.00 | 5.18 | 10.34 |
| 1,355.05 | 1,354.97 | 1,362.50 | N/A | J-28 | 549.00 | 6.06 | 10.34 |
| 1,351.16 | 1,351.03 | 1,360.00 | N/A | J-27 | 549.00 | 6.67 | 9.03 |
| 1,349.01 | 1,348.96 | 1,357.00 | N/A | J-26 | 549.00 | 7.48 | 7.72 |
| 1,348.36 | 1,348.32 | 1,356.00 | N/A | J-25 | 549.00 | 8.19 | 7.47 |
| 1,347.87 | 1,347.83 | 1,355.00 | N/A | J-24 | 549.00 | 8.93 | 6.93 |
| 1,347.54 | 1,347.51 | 1,356.50 | N/A | J-23 | 549.00 | 9.78 | 6.10 |
| 1,349.45 | 1,349.32 | 1,356.50 | 86.00 | I-6 | 86.00 | 0.00 | 6.52 |
| 1,349.10 | 1,349.07 | 1,356.00 | N/A | J-41 | 86.00 | 0.17 | 6.52 |
| 1,347.52 | 1,347.49 | 1,356.00 | N/A | J-40 | 86.00 | 1.28 | 6.52 |
| 1,347.33 | 1,347.32 | 1,356.00 | N/A | J-39 | 86.00 | 2.76 | 3.14 |
| 1,405.01 | 1,404.94 | 1,409.00 | 8.00 | I-2 | 8.00 | 0.00 | 4.74 |
| 1,403.11 | 1,402.94 | 1,407.00 | N/A | J-22 | 8.00 | 0.23 | 4.74 |
| 1,398.11 | 1,397.94 | 1,402.00 | N/A | J-21 | 8.00 | 0.98 | 4.74 |
| 1,390.11 | 1,389.94 | 1,394.50 | N/A | J-20 | 8.00 | 2.12 | 4.74 |
| 1,382.11 | 1,381.94 | 1,386.00 | N/A | J-19 | 8.00 | 3.30 | 4.74 |
| 1,378.91 | 1,378.75 | 1,383.50 | N/A | J-18 | 8.00 | 4.20 | 4.54 |
| 1,391.81 | 1,391.64 | 1,397.00 | 191.00 | I-1 | 191.00 | 0.00 | 7.27 |
| 1,383.68 | 1,383.64 | 1,388.00 | N/A | J-17 | 191.00 | 1.03 | 7.27 |
| 1,376.99 | 1,376.49 | 1,382.00 | N/A | J-16 | 199.00 | 5.50 | 7.37 |
| 1,372.98 | 1,372.18 | 1,380.00 | N/A | J-15 | 199.00 | 5.66 | 9.28 |
| 1,366.95 | 1,366.88 | 1,375.00 | N/A | J-14 | 199.00 | 6.59 | 9.28 |
| 1,361.65 | 1,361.58 | 1,370.00 | N/A | J-13 | 199.00 | 7.53 | 9.28 |
| 1,356.35 | 1,356.28 | 1,365.00 | N/A | J-12 | 199.00 | 8.47 | 9.28 |
| 1,351.05 | 1,350.98 | 1,360.00 | N/A | J-11 | 199.00 | 9.41 | 9.28 |
| 1,347.33 | 1,345.89 | 1,356.00 | N/A | J-10 | 834.00 | 10.76 | 9.63 |
| 1,343.73 | 1,343.66 | 1,352.00 | N/A | J-9 | 834.00 | 11.53 | 9.63 |
| 1,341.49 | 1,341.42 | 1,349.00 | N/A | J-8 | 834.00 | 12.30 | 9.63 |
| 1,340.15 | 1,339.26 | 1,347.00 | N/A | J-7 | 866.00 | 13.18 | 9.76 |
| 1,337.18 | 1,337.11 | 1,344.00 | N/A | J-6 | 866.00 | 13.91 | 9.76 |
| 1,335.03 | 1,334.96 | 1,343.50 | N/A | J-5 | 866.00 | 14.65 | 9.76 |
| 1,334.13 | 1,333.02 | 1,340.00 | N/A | J-4 | 1,283.00 | 15.50 | 10.11 |
| 1,331.15 | 1,331.07 | 1,338.50 | N/A | J-3 | 1,283.00 | 16.40 | 10.11 |
| 1,329.61 | 1,329.55 | 1,336.00 | N/A | J-2 | 1,283.00 | 17.34 | 8.79 |
| 1,329.57 | 1,329.50 | 1,331.00 | N/A | J-1 | 1,283.00 | 18.20 | 6.45 |
| 1,329.50 | 1,329.50 | 1,331.00 | N/A | Outlet | 1,283.00 | 18.59 | 0.00 |

# BACK-UP

# INFORMATION

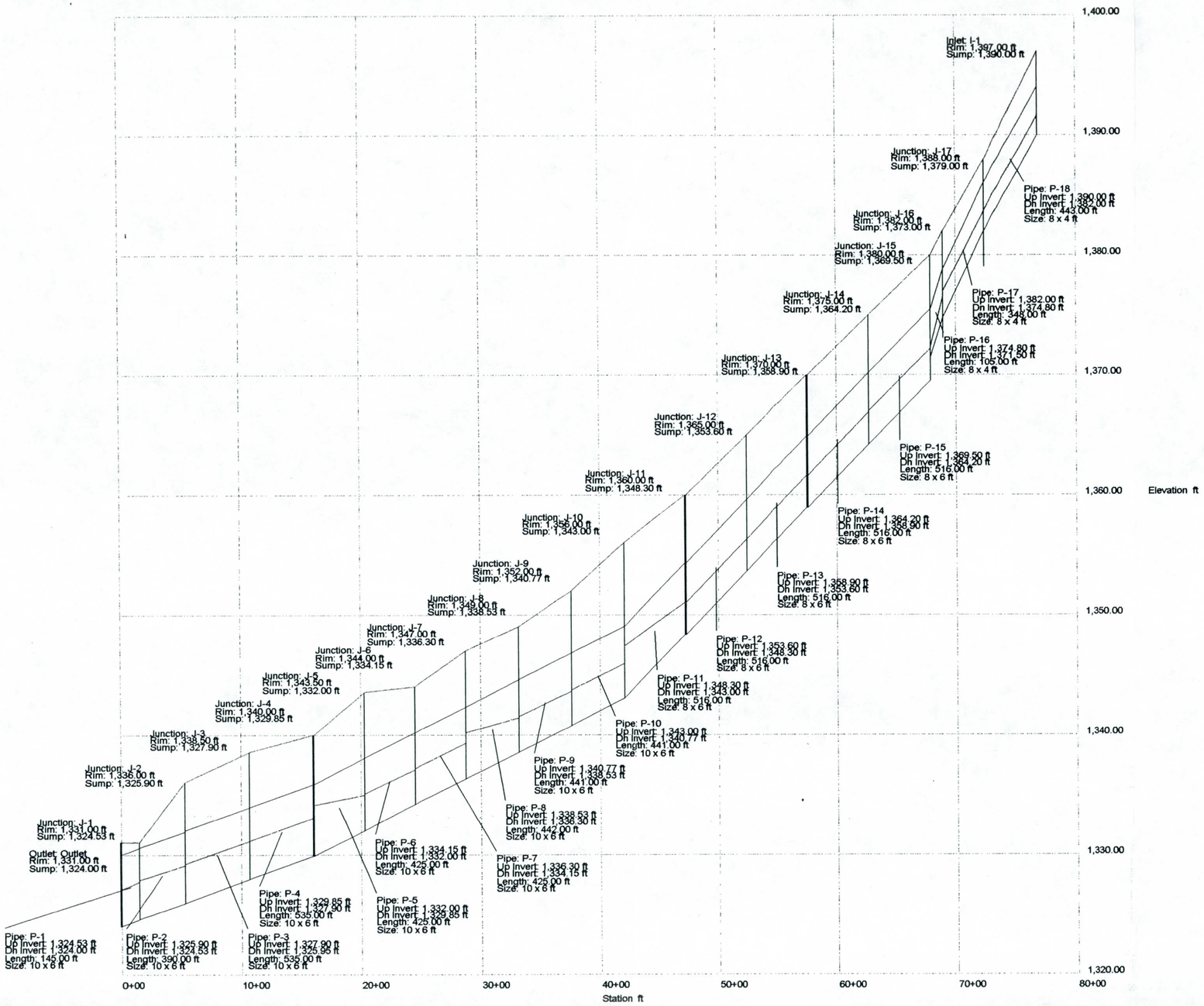
# FLOOD INSURANCE STUDY

# MARICOPA COUNTY, ARIZONA
## AND INCORPORATED AREAS
## VOLUME 5 OF 7

| COMMUNITY NAME | COMMUNITY NUMBER |
|---|---|
| AVONDALE, CITY OF | 040038 |
| BUCKEYE, TOWN OF | 040039 |
| CAREFREE, TOWN OF | 040126 |
| CAVE CREEK, TOWN OF | 040129 |
| CHANDLER, CITY OF | 040040 |
| EL MIRAGE, TOWN OF | 040041 |
| GILA BEND, TOWN OF | 040043 |
| GILBERT, TOWN OF | 040044 |
| GLENDALE, CITY OF | 040045 |
| GOODYEAR, TOWN OF | 040046 |
| GUADALUPE, TOWN OF | 040111 |
| LITCHFIELD PARK, CITY OF | 040128 |
| MARICOPA COUNTY UNINCORPORATED AREAS | 040037 |
| MESA, CITY OF | 040048 |
| PARADISE VALLEY, TOWN OF | 040049 |
| PEORIA, CITY OF | 040050 |
| PHOENIX, CITY OF | 040051 |
| QUEEN CREEK, TOWN OF | 040132 |
| SCOTTSDALE, CITY OF | 045012 |
| SURPRISE, TOWN OF | 045053 |
| TEMPE, CITY OF | 040054 |
| TOLLESON, CITY OF | 040055 |
| WICKENBURG, TOWN OF | 040056 |
| YOUNGSTOWN, TOWN OF | 040057 |

REVISED: SEPTEMBER 4, 1991

Federal Emergency Management Agency




Project Title: DOUBLETREE RANCH ROAD STORMWATER MANAGEMENT
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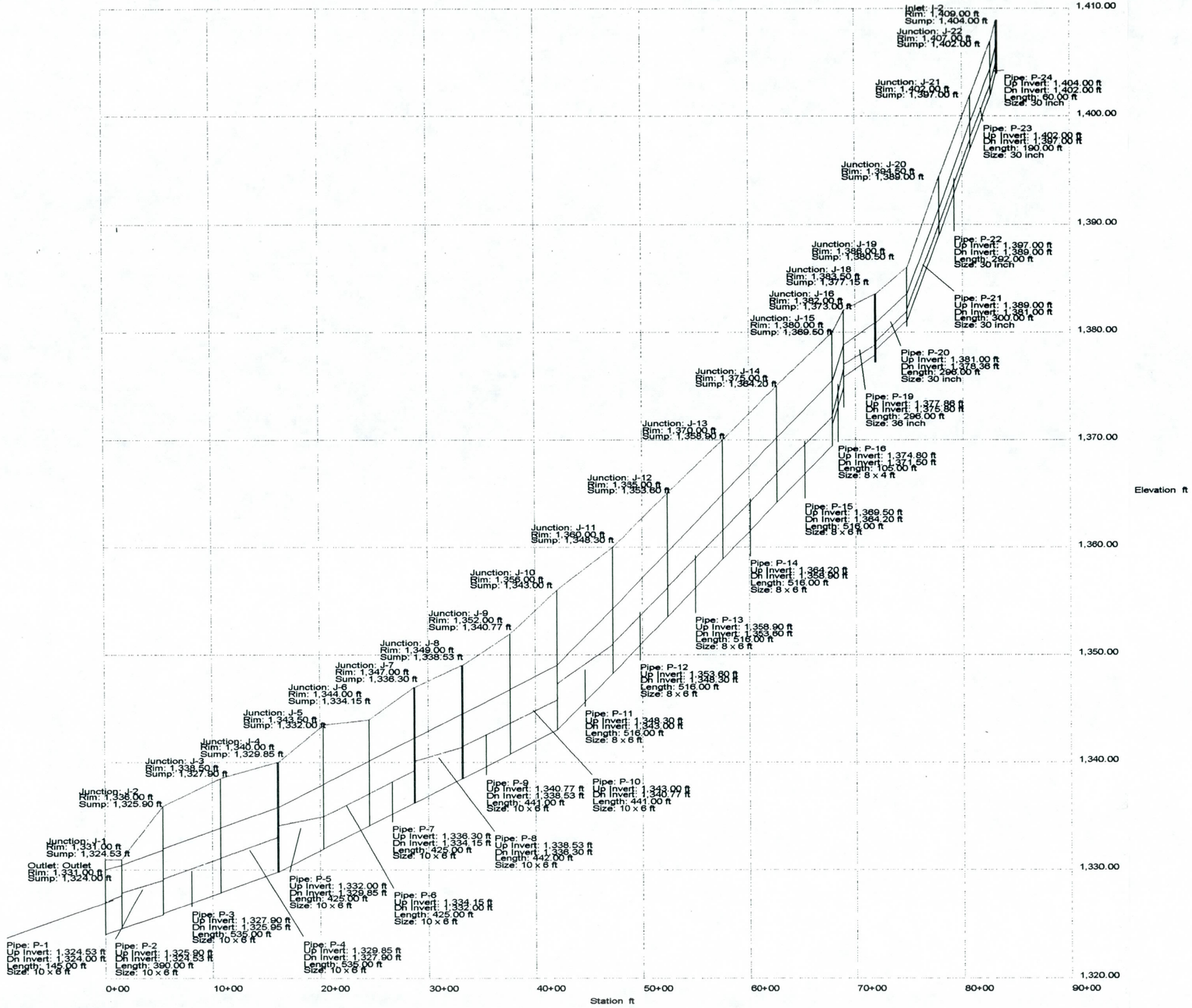
**Hook Engineering Inc.**

© Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA (203) 755-1666

Project Engineer: Bill Snarr
StormCAD v1.0

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**Hook Engineering Inc.**

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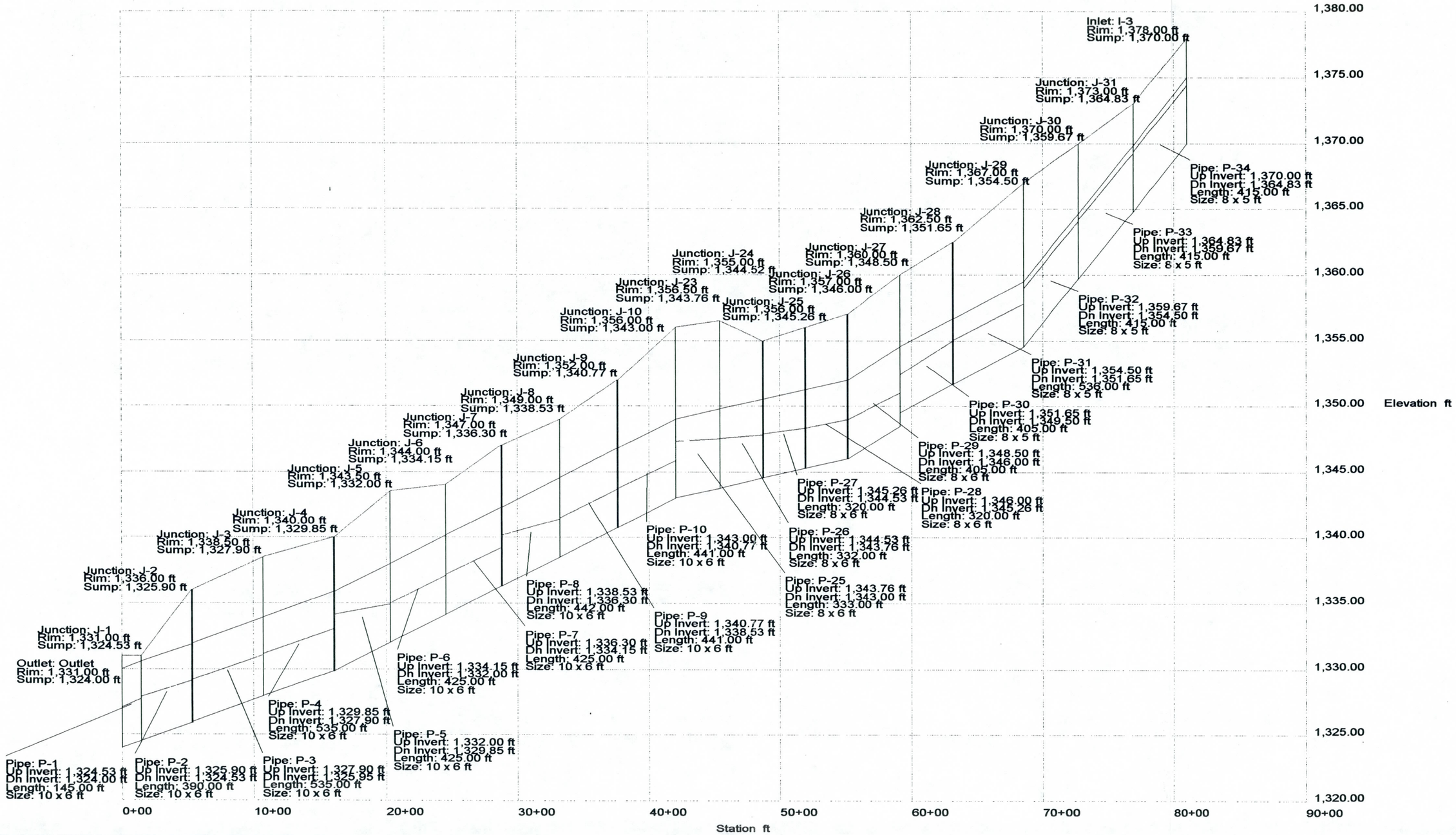
Project Engineer: Bill Snarr
StormCAD v1.0




Project Title: DOUBLETREE RANCH ROAD STORMWATER MANAGEMENT
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11/14/96 10:29:26 AM

Hook Engineering Inc.

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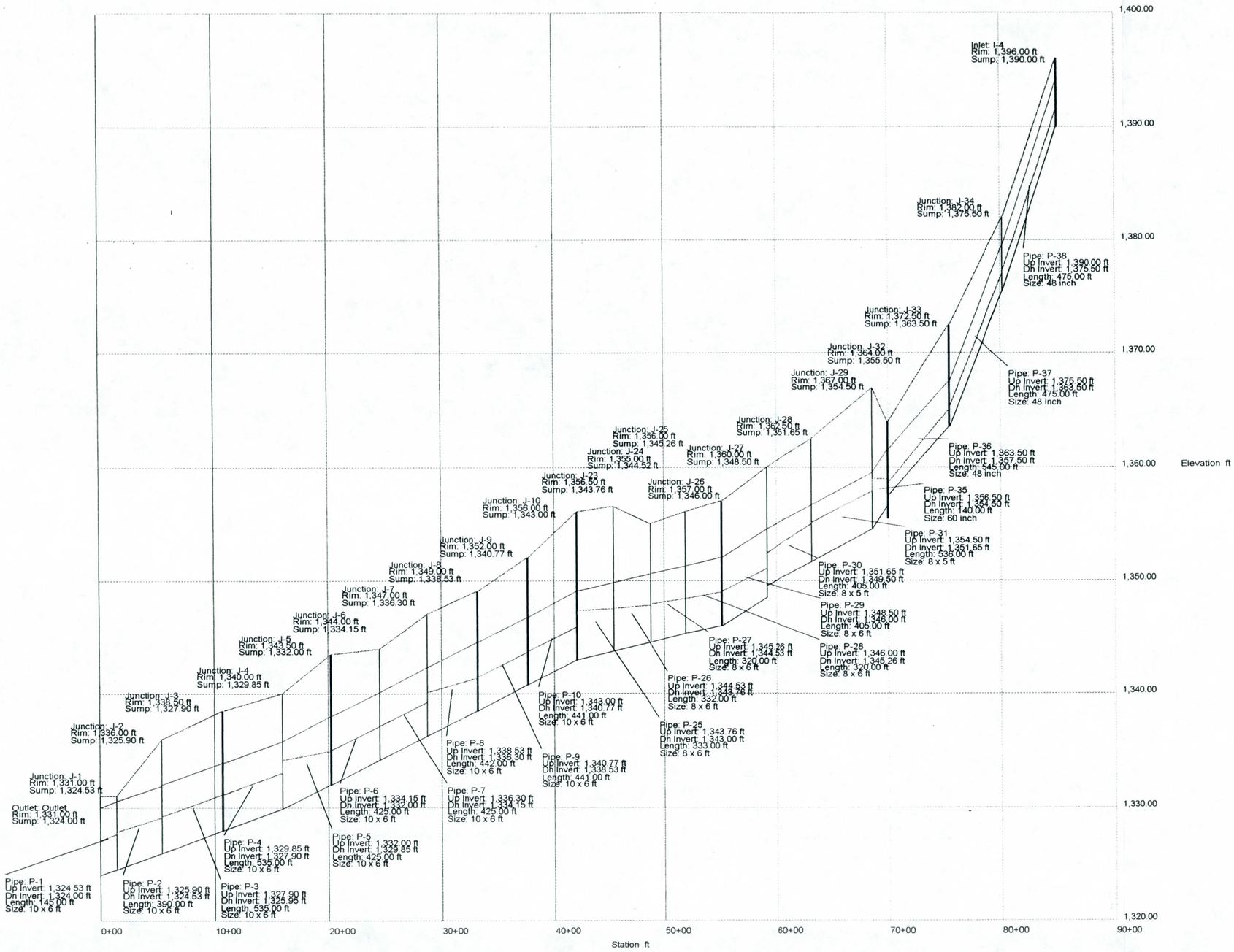
Project Engineer: Bill Snarr
StormCAD v1.0




Project Title: DOUBLETREE RANCH ROAD STORMWATER MANAGEMENT
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11/20/96 01:47:47 PM

**Hook Engineering Inc.**

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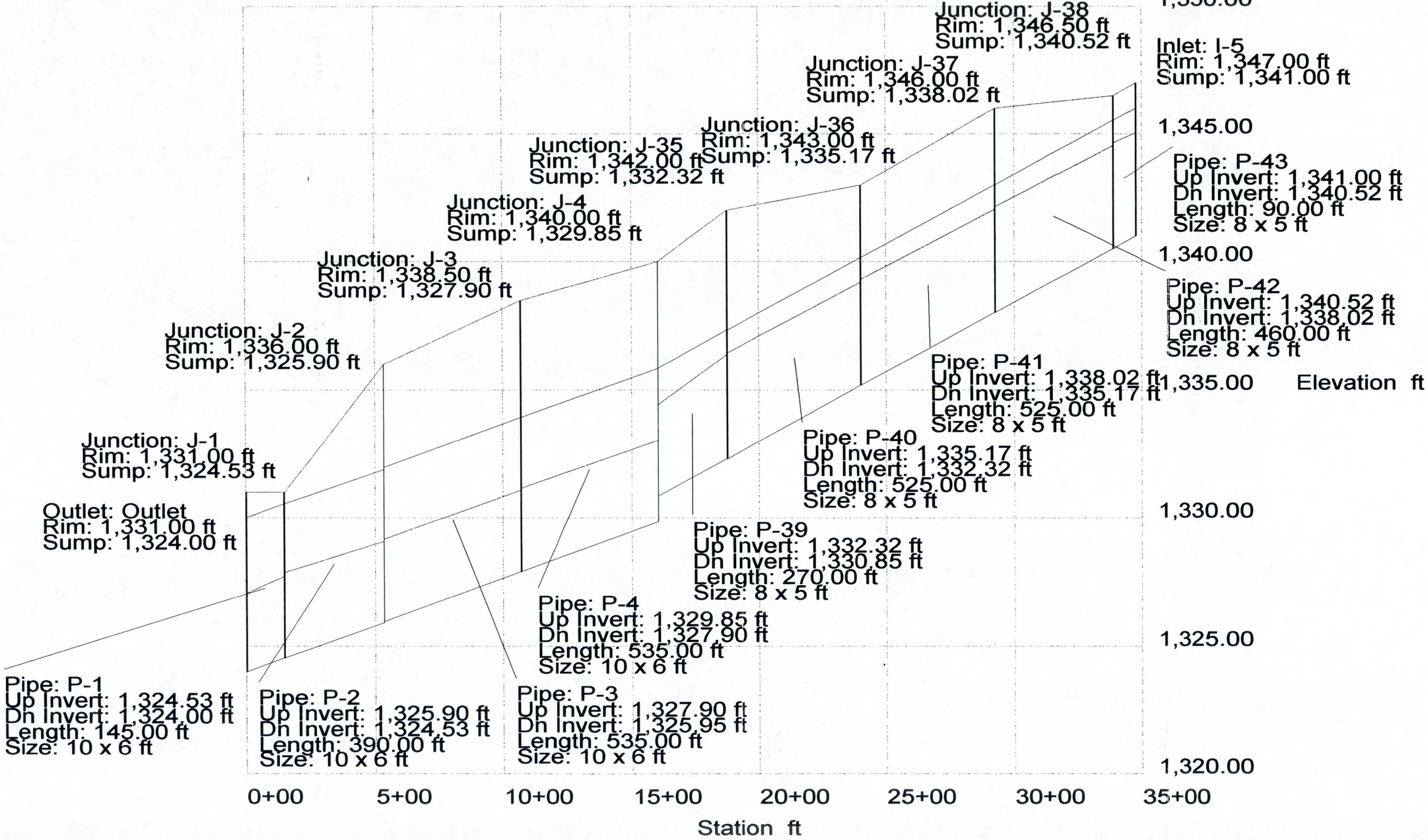
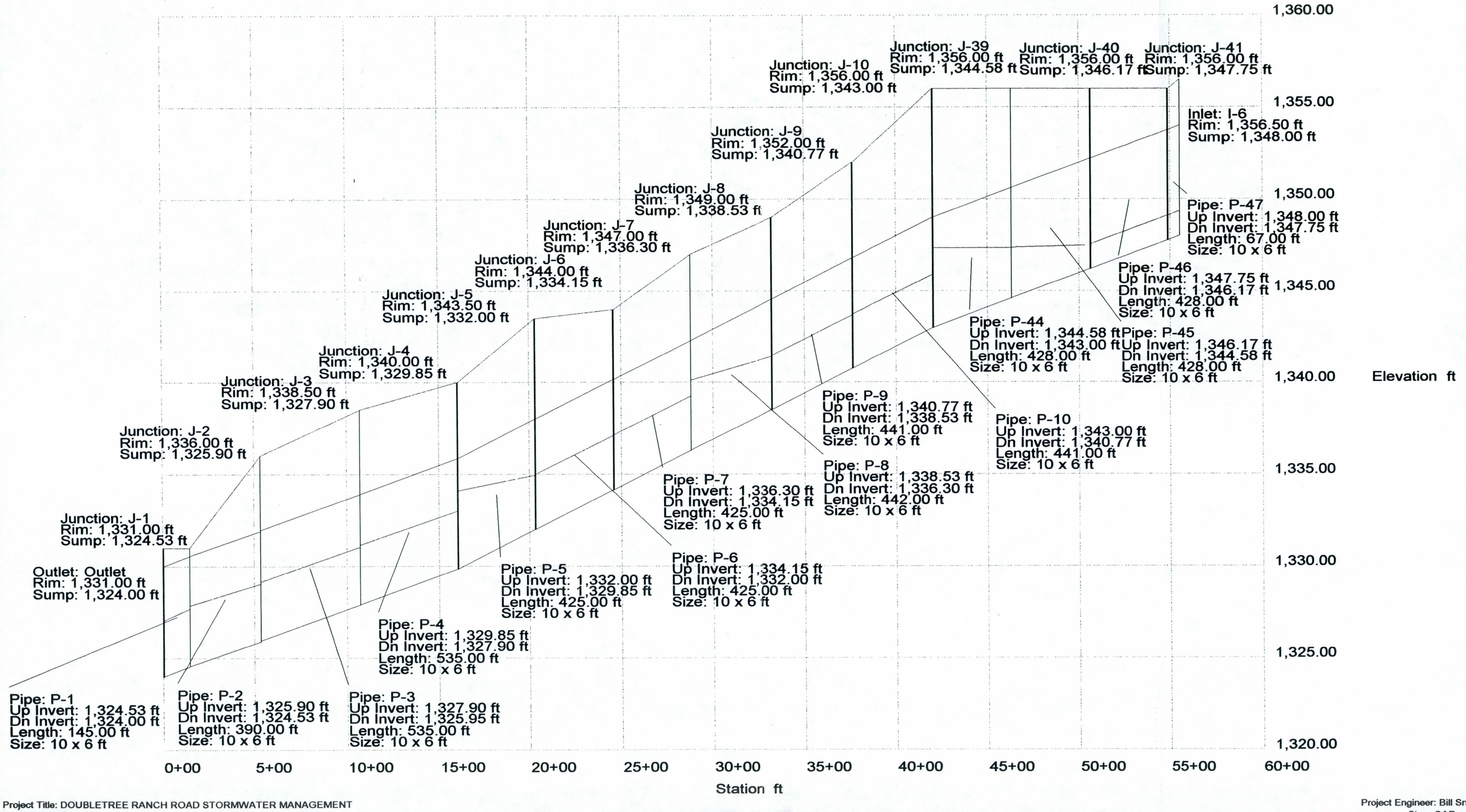
Project Engineer: Bill Snarr
StormCAD v1.0


Junction: J-38
Rim: 1,346.50 ft
Sump: 1,340.52 ft
Junction: J-37
Rim: 1,346.00 ft
Sump: 1,338.02 ft
Junction: J-36
Rim: 1,343.00 ft
Sump: 1,335.17 ft
Junction: J-35
Rim: 1,342.00 ft
Sump: 1,332.32 ft
Junction: J-4
Rim: 1,340.00 ft
Sump: 1,329.85 ft
Junction: J-3
Rim: 1,338.50 ft
Sump: 1,327.90 ft
Junction: J-2
Rim: 1,336.00 ft
Sump: 1,325.90 ft
Junction: J-1
Rim: 1,331.00 ft
Sump: 1,324.53 ft
Outlet: Outlet
Rim: 1,331.00 ft
Sump: 1,324.00 ft
Inlet: I-5
Rim: 1,347.00 ft
Sump: 1,341.00 ft
Pipe: P-43
Up Invert: 1,341.00 ft
Dn Invert: 1,340.52 ft
Length: 90.00 ft
Size: 8 x 5 ft
Pipe: P-42
Up Invert: 1,340.52 ft
Dn Invert: 1,338.02 ft
Length: 460.00 ft
Size: 8 x 5 ft
Pipe: P-41
Up Invert: 1,338.02 ft
Dn Invert: 1,335.17 ft
Length: 525.00 ft
Size: 8 x 5 ft
Pipe: P-40
Up Invert: 1,335.17 ft
Dn Invert: 1,332.32 ft
Length: 525.00 ft
Size: 8 x 5 ft
Pipe: P-39
Up Invert: 1,332.32 ft
Dn Invert: 1,330.85 ft
Length: 270.00 ft
Size: 8 x 5 ft
Pipe: P-4
Up Invert: 1,329.85 ft
Dn Invert: 1,327.90 ft
Length: 535.00 ft
Size: 10 x 6 ft
Pipe: P-3
Up Invert: 1,327.90 ft
Dn Invert: 1,325.95 ft
Length: 535.00 ft
Size: 10 x 6 ft
Pipe: P-2
Up Invert: 1,325.90 ft
Dn Invert: 1,324.53 ft
Length: 390.00 ft
Size: 10 x 6 ft
Pipe: P-1
Up Invert: 1,324.53 ft
Dn Invert: 1,324.00 ft
Length: 145.00 ft
Size: 10 x 6 ft
1,350.00
1,345.00
1,340.00
1,335.00
1,330.00
1,325.00
1,320.00
Elevation ft
0+00
5+00
10+00
15+00
20+00
25+00
30+00
35+00
Station ft




Project Title: DOUBLETREE RANCH ROAD STORMWATER MANAGEMENT
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11/14/96 10:45:11 AM

Hook Engineering Inc.

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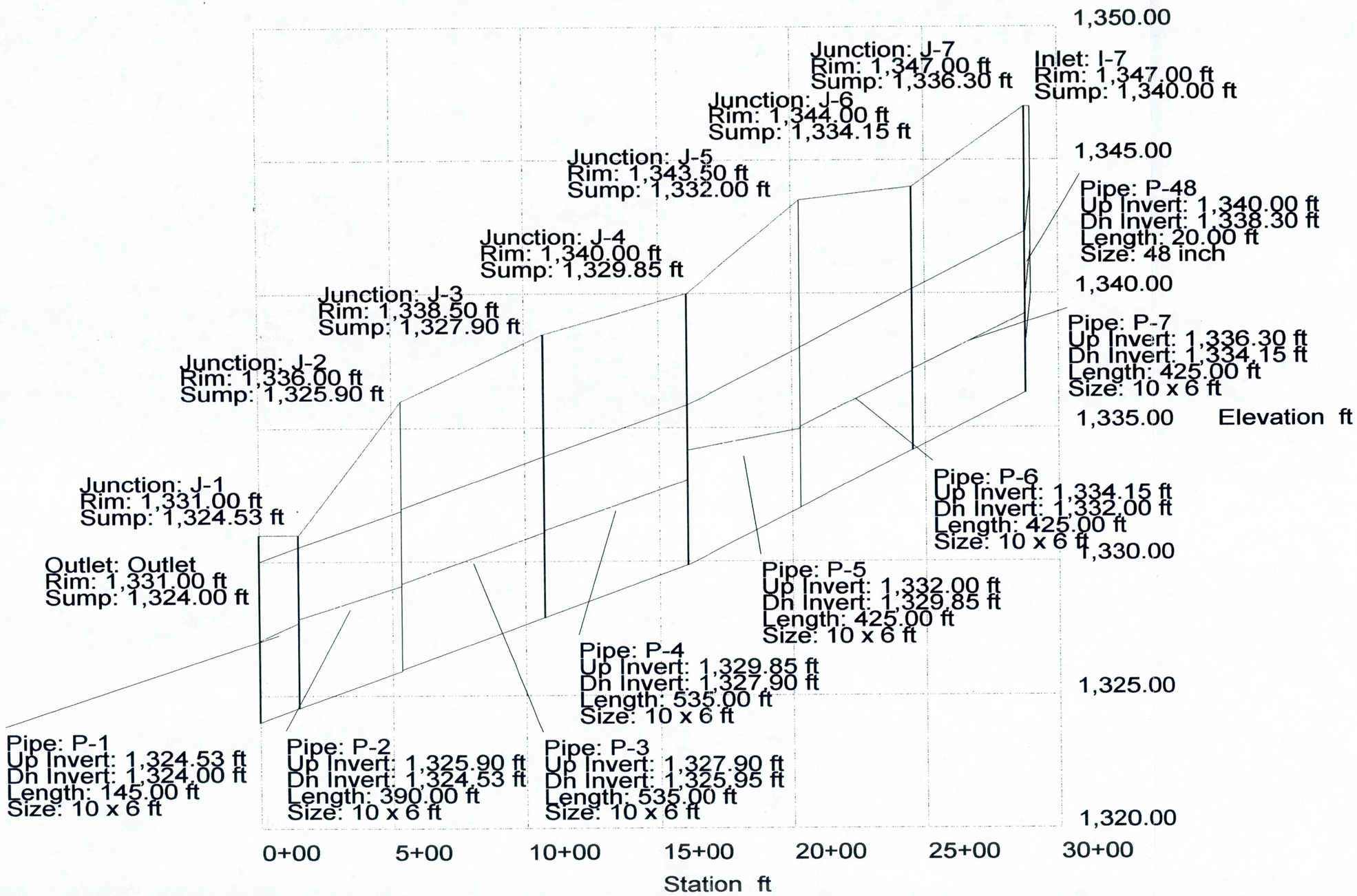
Project Engineer: Bill Snarr
StormCAD v1.0





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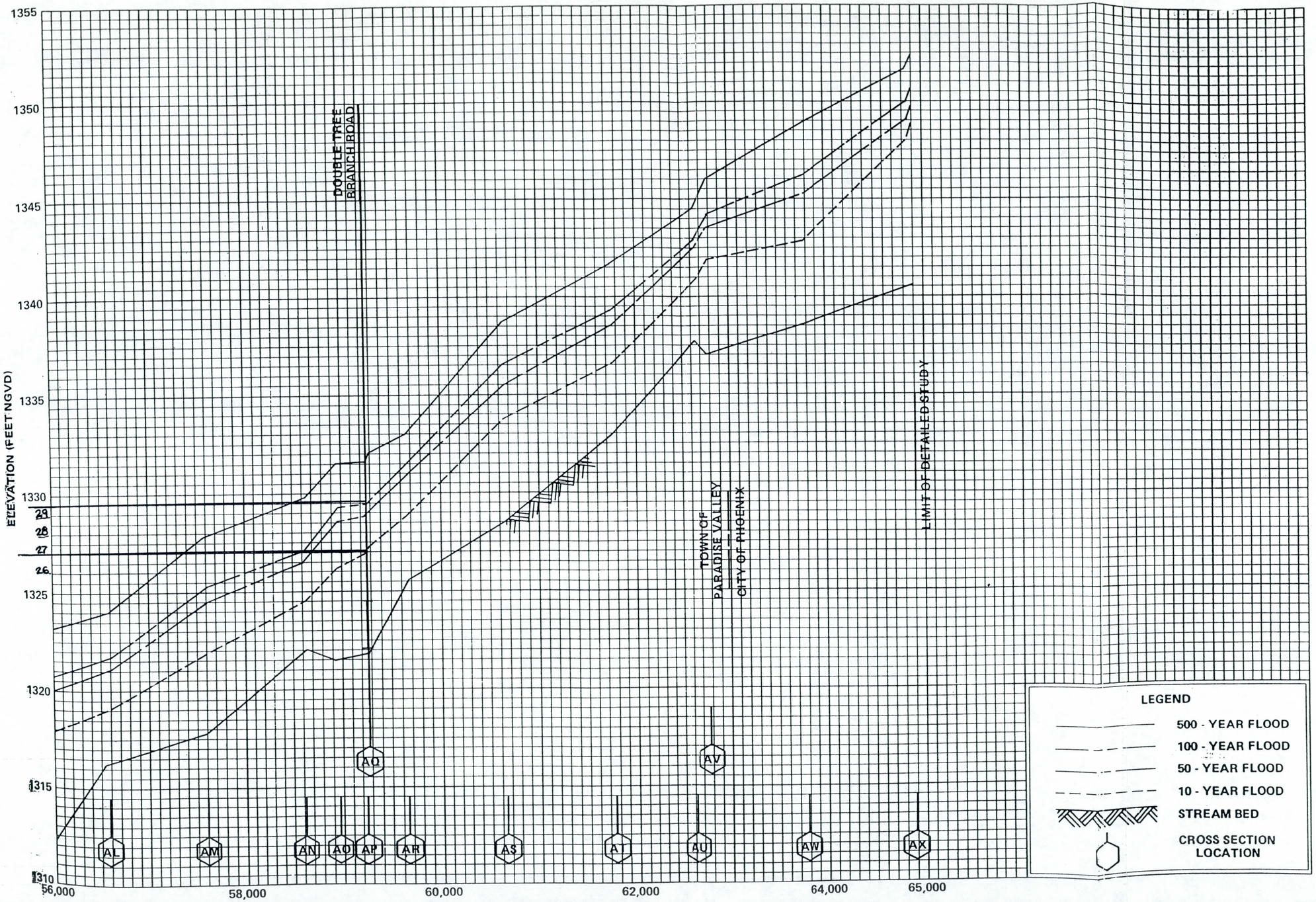



# FLOOD PROFILES

INDIAN BEND WASH

FEDERAL EMERGENCY MANAGEMENT AGENCY

MARICOPA COUNTY, AZ
AND INCORPORATED AREAS

# 100-YEAR DISCHARGE

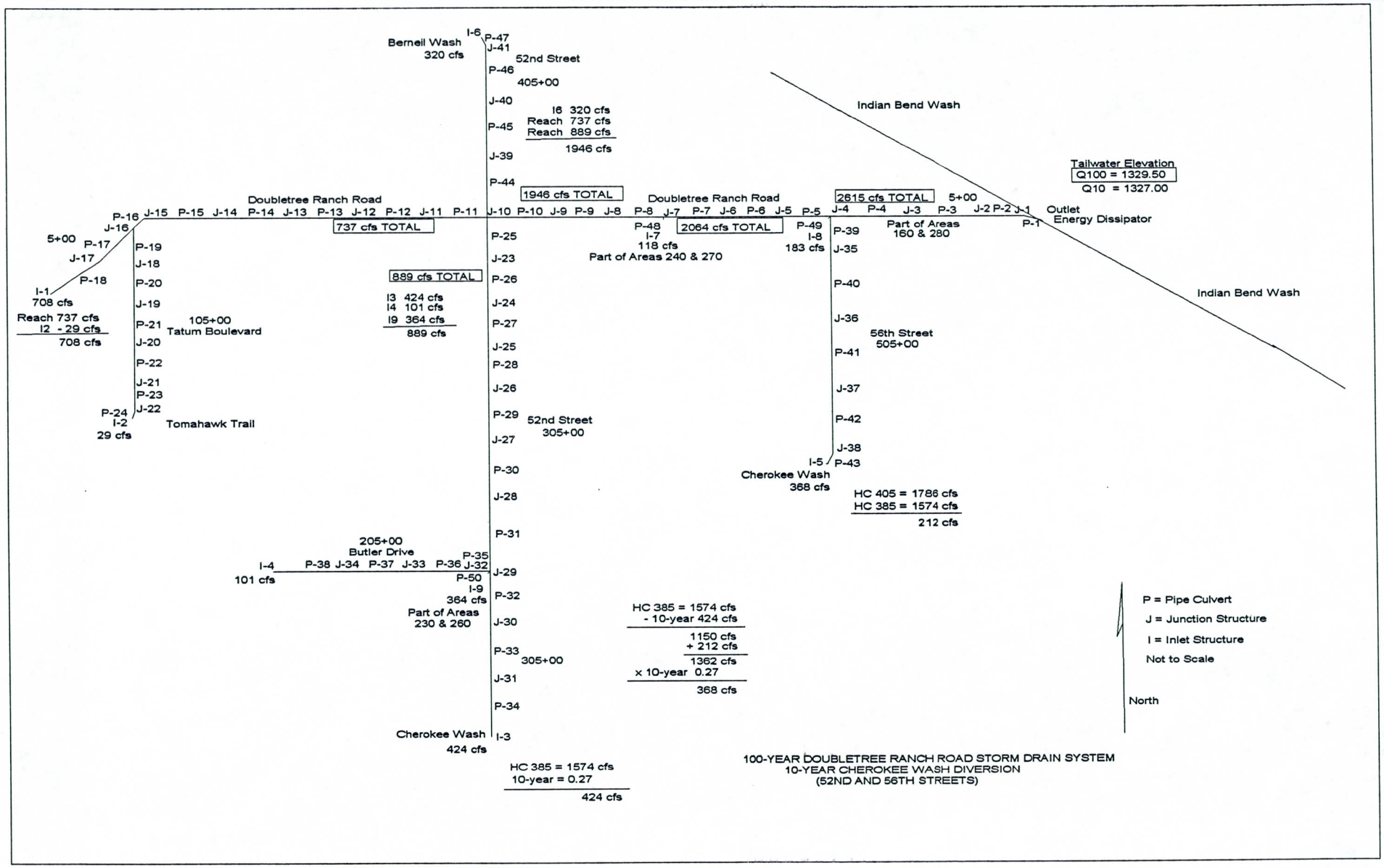
# 100-YEAR TAILWATER
# INDIAN BEND WASH

# HYDRAULIC GRADIENT

EXPLANATION OF HYDROLOGIC DISCHARGES

DOUBLETREE STORM DRAIN ADDITIONAL SUB BASIN DISCHARGES

CHEROKEE WASH DIVERSION DISCHARGES



```
------------------- Beginning Calculation Cycle --------------------
Discharge: 708.00 cfs  at node I-1
Discharge: 708.00 cfs  at node J-17
Discharge: 29.00 cfs  at node I-2
Discharge: 29.00 cfs  at node J-22
Discharge: 29.00 cfs  at node J-21
Discharge: 29.00 cfs  at node J-20
Discharge: 29.00 cfs  at node J-19
Discharge: 29.00 cfs  at node J-18
Discharge: 737.00 cfs  at node J-16
Discharge: 737.00 cfs  at node J-15
Discharge: 737.00 cfs  at node J-14
Discharge: 737.00 cfs  at node J-13
Discharge: 737.00 cfs  at node J-12
Discharge: 737.00 cfs  at node J-11
Discharge: 320.00 cfs  at node I-6
Discharge: 320.00 cfs  at node J-41
Discharge: 320.00 cfs  at node J-40
Discharge: 320.00 cfs  at node J-39
Discharge: 424.00 cfs  at node I-3
Discharge: 424.00 cfs  at node J-31
Discharge: 424.00 cfs  at node J-30
Discharge: 101.00 cfs  at node I-4
Discharge: 101.00 cfs  at node J-34
Discharge: 101.00 cfs  at node J-33
Discharge: 101.00 cfs  at node J-32
Discharge: 364.00 cfs  at node I-9
Discharge: 889.00 cfs  at node J-29
Discharge: 889.00 cfs  at node J-28
Discharge: 889.00 cfs  at node J-27
Discharge: 889.00 cfs  at node J-26
Discharge: 889.00 cfs  at node J-25
Discharge: 889.00 cfs  at node J-24
Discharge: 889.00 cfs  at node J-23
Discharge: 1,946.00 cfs  at node J-10
Discharge: 1,946.00 cfs  at node J-9
Discharge: 1,946.00 cfs  at node J-8
Discharge: 118.00 cfs  at node I-7
Discharge: 2,064.00 cfs  at node J-7
Discharge: 2,064.00 cfs  at node J-6
Discharge: 2,064.00 cfs  at node J-5
Discharge: 368.00 cfs  at node I-5
Discharge: 368.00 cfs  at node J-38
Discharge: 368.00 cfs  at node J-37
Discharge: 368.00 cfs  at node J-36
Discharge: 368.00 cfs  at node J-35
Discharge: 183.00 cfs  at node I-8
Discharge: 2,615.00 cfs  at node J-4
Discharge: 2,615.00 cfs  at node J-3
Discharge: 2,615.00 cfs  at node J-2
Discharge: 2,615.00 cfs  at node J-1
Discharge: 2,615.00 cfs  at node Outlet
Beginning iteration 1
Discharge: 708.00 cfs  at node I-1
Discharge: 708.00 cfs  at node J-17
Discharge: 29.00 cfs  at node I-2
Discharge: 29.00 cfs  at node J-22
Discharge: 29.00 cfs  at node J-21
Discharge: 29.00 cfs  at node J-20
Discharge: 29.00 cfs  at node J-19
Discharge: 29.00 cfs  at node J-18
Discharge: 737.00 cfs  at node J-16
Discharge: 737.00 cfs  at node J-15
Discharge: 737.00 cfs  at node J-14
Discharge: 737.00 cfs  at node J-13
Discharge: 737.00 cfs  at node J-12
Discharge: 737.00 cfs  at node J-11
Discharge: 320.00 cfs  at node I-6
Discharge: 320.00 cfs  at node J-41
Discharge: 320.00 cfs  at node J-40
Discharge: 320.00 cfs  at node J-39
Discharge: 424.00 cfs  at node I-3
Discharge: 424.00 cfs  at node J-31
Discharge: 424.00 cfs  at node J-30
Discharge: 101.00 cfs  at node I-4
Discharge: 101.00 cfs  at node J-34
Discharge: 101.00 cfs  at node J-33
Discharge: 101.00 cfs  at node J-32
Discharge: 364.00 cfs  at node I-9
Discharge: 889.00 cfs  at node J-29
Discharge: 889.00 cfs  at node J-28
Discharge: 889.00 cfs  at node J-27
Discharge: 889.00 cfs  at node J-26
Discharge: 889.00 cfs  at node J-25
Discharge: 889.00 cfs  at node J-24
Discharge: 889.00 cfs  at node J-23
Discharge: 1,946.00 cfs  at node J-10
```

```
Discharge: 1,946.00 cfs  at node J-9
Discharge: 1,946.00 cfs  at node J-8
Discharge: 118.00 cfs  at node I-7
Discharge: 2,064.00 cfs  at node J-7
Discharge: 2,064.00 cfs  at node J-6
Discharge: 2,064.00 cfs  at node J-5
Discharge: 368.00 cfs  at node I-5
Discharge: 368.00 cfs  at node J-38
Discharge: 368.00 cfs  at node J-37
Discharge: 368.00 cfs  at node J-36
Discharge: 368.00 cfs  at node J-35
Discharge: 183.00 cfs  at node I-8
Discharge: 2,615.00 cfs  at node J-4
Discharge: 2,615.00 cfs  at node J-3
Discharge: 2,615.00 cfs  at node J-2
Discharge: 2,615.00 cfs  at node J-1
Discharge: 2,615.00 cfs  at node Outlet
Discharge Convergence Achieved in 1 iterations: relative error:  0.0
Warning: No Duration data exists in IDF Table
Information: Outlet Known flow propagated from upstream junctions.
Information: J-1 Known flow propagated from upstream junctions.
Information: P-2 Surcharged condition
Information: J-2 Known flow propagated from upstream junctions.
Information: P-3 Surcharged condition
Information: J-3 Known flow propagated from upstream junctions.
Information: P-4 Surcharged condition
Information: J-4 Known flow propagated from upstream junctions.
Information: P-5 Surcharged condition
Information: P-39 Surcharged condition
Information: J-35 Known flow propagated from upstream junctions.
Information: P-40 Surcharged condition
Information: J-36 Known flow propagated from upstream junctions.
Information: J-37 Known flow propagated from upstream junctions.
Information: J-38 Known flow propagated from upstream junctions.
Information: J-5 Known flow propagated from upstream junctions.
Information: P-6 Surcharged condition
Information: J-6 Known flow propagated from upstream junctions.
Information: P-7 Surcharged condition
Information: J-7 Known flow propagated from upstream junctions.
Information: P-8 Surcharged condition
Information: P-48 Surcharged condition
Information: J-8 Known flow propagated from upstream junctions.
Information: P-9 Surcharged condition
Information: J-9 Known flow propagated from upstream junctions.
Information: P-10 Surcharged condition
Information: J-10 Known flow propagated from upstream junctions.
Information: P-11 Surcharged condition
Information: P-44 Surcharged condition
Information: P-25 Surcharged condition
Information: J-39 Known flow propagated from upstream junctions.
Information: P-45 Surcharged condition
Information: J-23 Known flow propagated from upstream junctions.
Information: P-26 Surcharged condition
Information: J-11 Known flow propagated from upstream junctions.
Information: P-12 Surcharged condition
Information: J-40 Known flow propagated from upstream junctions.
Information: J-41 Known flow propagated from upstream junctions.
Information: J-24 Known flow propagated from upstream junctions.
Information: P-27 Surcharged condition
Information: J-25 Known flow propagated from upstream junctions.
Information: P-28 Surcharged condition
Information: J-26 Known flow propagated from upstream junctions.
Information: J-27 Known flow propagated from upstream junctions.
Information: J-28 Known flow propagated from upstream junctions.
Information: J-29 Known flow propagated from upstream junctions.
Information: J-30 Known flow propagated from upstream junctions.
Information: J-31 Known flow propagated from upstream junctions.
Information: J-32 Known flow propagated from upstream junctions.
Information: J-33 Known flow propagated from upstream junctions.
Information: J-34 Known flow propagated from upstream junctions.
Information: J-12 Known flow propagated from upstream junctions.
Information: P-13 Surcharged condition
Information: J-13 Known flow propagated from upstream junctions.
Information: P-14 Surcharged condition
Information: J-14 Known flow propagated from upstream junctions.
Information: J-15 Known flow propagated from upstream junctions.
Information: J-16 Known flow propagated from upstream junctions.
Information: J-18 Known flow propagated from upstream junctions.
Information: J-19 Known flow propagated from upstream junctions.
Information: J-17 Known flow propagated from upstream junctions.
Information: J-20 Known flow propagated from upstream junctions.
Information: J-21 Known flow propagated from upstream junctions.
Information: J-22 Known flow propagated from upstream junctions.
---------- Calculations Complete ----------

** Analysis Options **
Friction method:  Manning's Formula
```

HGL Convergence Test: 0.001000
Maximum Network Traversals: 5
Number of Flow Profile Steps: 5
Discharge Convergence Test: 0.001000
Maximum Design Passes: 3

---------- Network Quick View ----------

| Label | Length | Size | Discharge | Hydraulic Grade Upstream | Hydraulic Grade Downstream |
|---|---|---|---|---|---|
| P-1 | 145.00 | 10 x 6 ft | 2,615.00 | 1,330.37 | 1,330.00 |
| P-2 | 390.00 | 10 x 6 ft | 2,615.00 | 1,332.09 | 1,330.56 |
| P-3 | 535.00 | 10 x 6 ft | 2,615.00 | 1,334.29 | 1,332.19 |
| P-4 | 535.00 | 10 x 6 ft | 2,615.00 | 1,336.48 | 1,334.38 |
| P-5 | 425.00 | 10 x 6 ft | 2,064.00 | 1,339.62 | 1,337.77 |
| P-6 | 425.00 | 10 x 6 ft | 2,064.00 | 1,341.58 | 1,339.73 |
| P-7 | 425.00 | 10 x 6 ft | 2,064.00 | 1,343.53 | 1,341.68 |
| P-8 | 442.00 | 10 x 6 ft | 1,946.00 | 1,346.46 | 1,344.75 |
| P-9 | 441.00 | 10 x 6 ft | 1,946.00 | 1,348.26 | 1,346.56 |
| P-10 | 441.00 | 10 x 6 ft | 1,946.00 | 1,350.06 | 1,348.35 |
| P-11 | 516.00 | 8 x 6 ft | 737.00 | 1,356.41 | 1,351.88 |
| P-12 | 516.00 | 8 x 6 ft | 737.00 | 1,361.14 | 1,356.60 |
| P-13 | 516.00 | 8 x 6 ft | 737.00 | 1,365.86 | 1,361.32 |
| P-14 | 516.00 | 8 x 6 ft | 737.00 | 1,370.58 | 1,366.04 |
| P-15 | 516.00 | 8 x 6 ft | 737.00 | 1,375.50 | 1,370.76 |
| P-16 | 105.00 | 8 x 4 ft | 737.00 | 1,378.80 | 1,377.70 |
| P-17 | 348.00 | 8 x 4 ft | 708.00 | 1,385.93 | 1,380.04 |
| P-18 | 443.00 | 8 x 4 ft | 708.00 | 1,393.93 | 1,386.03 |
| P-20 | 296.00 | 30 inch | 29.00 | 1,382.84 | 1,380.70 |
| P-21 | 300.00 | 30 inch | 29.00 | 1,390.84 | 1,383.27 |

| Label | Length | Size | Discharge | Hydraulic Grade Upstream | Hydraulic Grade Downstream |
|---|---|---|---|---|---|
| P-22 | 292.00 | 30 inch | 29.00 | 1,398.84 | 1,391.27 |
| P-23 | 190.00 | 30 inch | 29.00 | 1,403.84 | 1,399.27 |
| P-24 | 60.00 | 30 inch | 29.00 | 1,405.84 | 1,404.27 |
| P-29 | 405.00 | 8 x 6 ft | 889.00 | 1,354.40 | 1,353.85 |
| P-30 | 405.00 | 8 x 5 ft | 889.00 | 1,356.23 | 1,354.50 |
| P-31 | 536.00 | 8 x 5 ft | 889.00 | 1,359.08 | 1,356.65 |
| P-32 | 415.00 | 8 x 5 ft | 424.00 | 1,364.11 | 1,360.68 |
| P-33 | 415.00 | 8 x 5 ft | 424.00 | 1,369.27 | 1,364.22 |
| P-34 | 415.00 | 8 x 5 ft | 424.00 | 1,374.44 | 1,369.38 |
| P-35 | 140.00 | 60 inch | 101.00 | 1,360.81 | 1,360.68 |
| P-36 | 545.00 | 48 inch | 101.00 | 1,366.54 | 1,361.05 |
| P-37 | 475.00 | 48 inch | 101.00 | 1,378.54 | 1,367.30 |
| P-38 | 475.00 | 48 inch | 101.00 | 1,393.04 | 1,379.30 |
| P-39 | 270.00 | 8 x 5 ft | 368.00 | 1,338.76 | 1,337.77 |
| P-40 | 525.00 | 8 x 5 ft | 368.00 | 1,340.74 | 1,338.82 |
| P-41 | 525.00 | 8 x 5 ft | 368.00 | 1,342.06 | 1,340.81 |
| P-42 | 460.00 | 8 x 5 ft | 368.00 | 1,344.56 | 1,342.16 |
| P-43 | 90.00 | 8 x 5 ft | 368.00 | 1,345.04 | 1,344.66 |
| P-44 | 428.00 | 10 x 6 ft | 320.00 | 1,352.28 | 1,351.88 |
| P-48 | 20.00 | 48 inch | 118.00 | 1,344.89 | 1,344.75 |

| Label | Length | Size | Discharge | Hydraulic Grade Upstream | Hydraulic Grade Downstream |
|---|---|---|---|---|---|
| P-49 | 30.00 | 48 inch | 183.00 | 1,338.29 | 1,337.77 |
| P-50 | 32.00 | 60 inch | 364.00 | 1,362.34 | 1,360.68 |
| P-45 | 428.00 | 10 x 6 ft | 320.00 | 1,352.70 | 1,352.30 |
| P-46 | 428.00 | 10 x 6 ft | 320.00 | 1,352.96 | 1,352.73 |
| P-47 | 67.00 | 10 x 6 ft | 320.00 | 1,352.99 | 1,352.99 |
| P-25 | 333.00 | 8 x 6 ft | 889.00 | 1,352.35 | 1,351.88 |
| P-26 | 332.00 | 8 x 6 ft | 889.00 | 1,352.85 | 1,352.38 |
| P-27 | 320.00 | 8 x 6 ft | 889.00 | 1,353.34 | 1,352.88 |
| P-28 | 320.00 | 8 x 6 ft | 889.00 | 1,353.82 | 1,353.36 |
| P-19 | 296.00 | 36 inch | 29.00 | 1,380.56 | 1,380.04 |

| Label | Discharge | Elevations Ground | Upstream HGL | Downstream HGL |
|---|---|---|---|---|
| Outlet | 2,615.00 | 1,331.00 | 1,329.50 | 1,329.50 |
| J-1 | 2,615.00 | 1,331.00 | 1,330.56 | 1,330.37 |
| J-2 | 2,615.00 | 1,336.00 | 1,332.19 | 1,332.09 |
| J-3 | 2,615.00 | 1,338.50 | 1,334.38 | 1,334.29 |
| J-4 | 2,615.00 | 1,340.00 | 1,337.77 | 1,336.48 |
| J-5 | 2,064.00 | 1,343.50 | 1,339.73 | 1,339.62 |
| J-6 | 2,064.00 | 1,344.00 | 1,341.68 | 1,341.58 |
| J-7 | 2,064.00 | 1,347.00 | 1,344.75 | 1,343.53 |
| J-8 | 1,946.00 | 1,349.00 | 1,346.56 | 1,346.46 |
| J-9 | 1,946.00 | 1,352.00 | 1,348.35 | 1,348.26 |
| J-10 | 1,946.00 | 1,356.00 | 1,351.88 | 1,350.06 |
| J-11 | 737.00 | 1,360.00 | 1,356.60 | 1,356.41 |
| J-12 | 737.00 | 1,365.00 | 1,361.32 | 1,361.14 |
| J-13 | 737.00 | 1,370.00 | 1,366.04 | 1,365.86 |
| J-14 | 737.00 | 1,375.00 | 1,370.76 | 1,370.58 |
| J-15 | 737.00 | 1,380.00 | 1,377.70 | 1,375.50 |
| J-16 | 737.00 | 1,382.00 | 1,380.04 | 1,378.80 |

| | | | | |
|---|---|---|---|---|
| J-17 | 708.00 | 1,388.00 | 1,386.03 | 1,385.93 |
| I-1 | 708.00 | 1,397.00 | 1,394.33 | 1,393.93 |
| J-18 | 29.00 | 1,383.50 | 1,380.70 | 1,380.56 |

| | | Elevations | | |
|---|---|---|---|---|
| Label | Discharge | Ground | Upstream HGL | Downstream HGL |
| J-19 | 29.00 | 1,386.00 | 1,383.27 | 1,382.84 |
| J-20 | 29.00 | 1,394.50 | 1,391.27 | 1,390.84 |
| J-21 | 29.00 | 1,402.00 | 1,399.27 | 1,398.84 |
| J-22 | 29.00 | 1,407.00 | 1,404.27 | 1,403.84 |
| I-2 | 29.00 | 1,409.00 | 1,406.01 | 1,405.84 |
| J-24 | 889.00 | 1,355.00 | 1,352.88 | 1,352.85 |
| J-26 | 889.00 | 1,357.00 | 1,353.85 | 1,353.82 |
| J-27 | 889.00 | 1,360.00 | 1,354.46 | 1,354.40 |
| J-28 | 889.00 | 1,362.50 | 1,356.34 | 1,356.23 |
| J-29 | 889.00 | 1,367.00 | 1,360.68 | 1,359.08 |
| J-30 | 424.00 | 1,370.00 | 1,364.22 | 1,364.11 |
| J-31 | 424.00 | 1,373.00 | 1,369.38 | 1,369.27 |
| I-3 | 424.00 | 1,378.00 | 1,374.88 | 1,374.44 |
| J-32 | 101.00 | 1,364.00 | 1,361.05 | 1,360.81 |
| J-33 | 101.00 | 1,372.50 | 1,367.30 | 1,366.54 |
| J-34 | 101.00 | 1,382.00 | 1,379.30 | 1,378.54 |
| I-4 | 101.00 | 1,396.00 | 1,393.35 | 1,393.04 |
| J-35 | 368.00 | 1,342.00 | 1,338.82 | 1,338.76 |
| J-36 | 368.00 | 1,343.00 | 1,340.81 | 1,340.74 |
| J-37 | 368.00 | 1,346.00 | 1,342.16 | 1,342.06 |

| | | Elevations | | |
|---|---|---|---|---|
| Label | Discharge | Ground | Upstream HGL | Downstream HGL |
| J-38 | 368.00 | 1,346.50 | 1,344.66 | 1,344.56 |
| I-5 | 368.00 | 1,347.00 | 1,345.44 | 1,345.04 |
| J-39 | 320.00 | 1,356.00 | 1,352.30 | 1,352.28 |
| J-40 | 320.00 | 1,356.00 | 1,352.73 | 1,352.70 |
| I-6 | 320.00 | 1,356.50 | 1,353.11 | 1,352.99 |
| I-7 | 118.00 | 1,347.00 | 1,345.16 | 1,344.89 |
| I-8 | 183.00 | 1,342.00 | 1,338.97 | 1,338.29 |
| I-9 | 364.00 | 1,367.00 | 1,363.43 | 1,362.34 |
| J-41 | 320.00 | 1,356.00 | 1,352.99 | 1,352.96 |
| J-23 | 889.00 | 1,356.50 | 1,352.38 | 1,352.35 |
| J-25 | 889.00 | 1,356.00 | 1,353.36 | 1,353.34 |

Elapsed: 0 minute(s) 17 second(s)

# Combined Pipe/Node Report

| Pipe | Upstream Node | Downstream Node | Length (ft) | Inlet Area (acres) | Weighted Roughness Coefficient | Inlet CA (acres) | Total CA (acres) | Inlet Discharge (cfs) | Section Size | Capacity (cfs) | Average Velocity (ft/s) | Upstream Invert Elevation (ft) | Downstream Invert Elevation (ft) | Constructed Slope (ft/ft) | Description |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P-49 | I-8 | J-4 | 30.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 48 inch | 426.90 | 14.71 | 1,334.50 | 1,331.85 | 0.088333 | |
| P-43 | I-5 | J-38 | 90.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 8 x 5 ft | 444.97 | 11.26 | 1,341.00 | 1,340.52 | 0.005333 | 56th Street□ |
| P-42 | J-38 | J-37 | 460.00 | N/A | N/A | N/A | 0.00 | N/A | 8 x 5 ft | 449.19 | 11.26 | 1,340.52 | 1,338.02 | 0.005435 | 56th Street□ |
| P-41 | J-37 | J-36 | 525.00 | N/A | N/A | N/A | 0.00 | N/A | 8 x 5 ft | 448.93 | 10.30 | 1,338.02 | 1,335.17 | 0.005429 | 56th Street□ |
| P-40 | J-36 | J-35 | 525.00 | N/A | N/A | N/A | 0.00 | N/A | 8 x 5 ft | 448.93 | 9.20 | 1,335.17 | 1,332.32 | 0.005429 | 56th Street□ |
| P-39 | J-35 | J-4 | 270.00 | N/A | N/A | N/A | 0.00 | N/A | 8 x 5 ft | 449.59 | 9.20 | 1,332.32 | 1,330.85 | 0.005444 | 56th Street□ |
| P-48 | I-7 | J-7 | 20.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 48 inch | 418.77 | 9.39 | 1,340.00 | 1,338.30 | 0.085000 | |
| P-50 | I-9 | J-29 | 32.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 60 inch | 651.07 | 18.63 | 1,357.50 | 1,355.50 | 0.062500 | |
| P-38 | I-4 | J-34 | 475.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 48 inch | 250.96 | 9.02 | 1,390.00 | 1,375.50 | 0.030526 | Butler Drive |
| P-37 | J-34 | J-33 | 475.00 | N/A | N/A | N/A | 0.00 | N/A | 48 inch | 228.30 | 9.02 | 1,375.50 | 1,363.50 | 0.025263 | Butler Drive |
| P-36 | J-33 | J-32 | 545.00 | N/A | N/A | N/A | 0.00 | N/A | 48 inch | 150.71 | 9.20 | 1,363.50 | 1,357.50 | 0.011009 | Butler Drive |
| P-35 | J-32 | J-29 | 140.00 | N/A | N/A | N/A | 0.00 | N/A | 60 inch | 311.27 | 5.38 | 1,356.50 | 1,354.50 | 0.014286 | Butler Drive |
| P-34 | I-3 | J-31 | 415.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 8 x 5 ft | 680.08 | 11.80 | 1,370.00 | 1,364.83 | 0.012458 | 52nd Street |
| P-33 | J-31 | J-30 | 415.00 | N/A | N/A | N/A | 0.00 | N/A | 8 x 5 ft | 679.42 | 11.80 | 1,364.83 | 1,359.67 | 0.012434 | 52nd Street |
| P-32 | J-30 | J-29 | 415.00 | N/A | N/A | N/A | 0.00 | N/A | 8 x 5 ft | 680.08 | 11.27 | 1,359.67 | 1,354.50 | 0.012458 | 52nd Street |
| P-31 | J-29 | J-28 | 536.00 | N/A | N/A | N/A | 0.00 | N/A | 8 x 5 ft | 888.60 | 11.62 | 1,354.50 | 1,351.65 | 0.005317 | 52nd Street |
| P-30 | J-28 | J-27 | 405.00 | N/A | N/A | N/A | 0.00 | N/A | 8 x 5 ft | 887.89 | 11.62 | 1,351.65 | 1,349.50 | 0.005309 | 52nd Street |
| P-29 | J-27 | J-26 | 405.00 | N/A | N/A | N/A | 0.00 | N/A | 8 x 6 ft | 1,852.30 | 6.23 | 1,348.50 | 1,346.00 | 0.006173 | 52nd Street |
| P-28 | J-26 | J-25 | 320.00 | N/A | N/A | N/A | 0.00 | N/A | 8 x 6 ft | 1,133.73 | 6.17 | 1,346.00 | 1,345.26 | 0.002313 | 52nd Street |
| P-27 | J-25 | J-24 | 320.00 | N/A | N/A | N/A | 0.00 | N/A | 8 x 6 ft | 1,126.05 | 6.17 | 1,345.26 | 1,344.53 | 0.002281 | 52nd Street |
| P-26 | J-24 | J-23 | 332.00 | N/A | N/A | N/A | 0.00 | N/A | 8 x 6 ft | 1,135.39 | 6.17 | 1,344.53 | 1,343.76 | 0.002319 | 52nd Street |
| P-25 | J-23 | J-10 | 333.00 | N/A | N/A | N/A | 0.00 | N/A | 8 x 6 ft | 1,126.30 | 6.17 | 1,343.76 | 1,343.00 | 0.002282 | 52nd Street |
| P-47 | I-6 | J-41 | 67.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 10 x 6 ft | 637.00 | 6.26 | 1,348.00 | 1,347.75 | 0.003731 | 52nd Street |
| P-46 | J-41 | J-40 | 428.00 | N/A | N/A | N/A | 0.00 | N/A | 10 x 6 ft | 633.59 | 5.74 | 1,347.75 | 1,346.17 | 0.003692 | 52nd Street |
| P-45 | J-40 | J-39 | 428.00 | N/A | N/A | N/A | 0.00 | N/A | 10 x 6 ft | 635.60 | 5.33 | 1,346.17 | 1,344.58 | 0.003715 | 52nd Street |
| P-44 | J-39 | J-10 | 428.00 | N/A | N/A | N/A | 0.00 | N/A | 10 x 6 ft | 633.59 | 5.33 | 1,344.58 | 1,343.00 | 0.003692 | 52nd Street |
| P-24 | I-2 | J-22 | 60.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 30 inch | 74.88 | 6.85 | 1,404.00 | 1,402.00 | 0.033333 | Tatum Boule |
| P-23 | J-22 | J-21 | 190.00 | N/A | N/A | N/A | 0.00 | N/A | 30 inch | 66.53 | 6.85 | 1,402.00 | 1,397.00 | 0.026316 | Tatum Boule |
| P-22 | J-21 | J-20 | 292.00 | N/A | N/A | N/A | 0.00 | N/A | 30 inch | 67.89 | 6.85 | 1,397.00 | 1,389.00 | 0.027397 | Tatum Boule |
| P-21 | J-20 | J-19 | 300.00 | N/A | N/A | N/A | 0.00 | N/A | 30 inch | 66.98 | 6.85 | 1,389.00 | 1,381.00 | 0.026667 | Tatum Boule |
| P-20 | J-19 | J-18 | 296.00 | N/A | N/A | N/A | 0.00 | N/A | 30 inch | 38.73 | 6.78 | 1,381.00 | 1,378.36 | 0.008919 | Tatum Boule |
| P-19 | J-18 | J-16 | 296.00 | N/A | N/A | N/A | 0.00 | N/A | 36 inch | 55.64 | 4.22 | 1,377.86 | 1,375.80 | 0.006959 | Tatum Boule |
| P-18 | I-1 | J-17 | 443.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 8 x 4 ft | 1,190.88 | 11.16 | 1,390.00 | 1,382.00 | 0.018059 | Doubletree |
| P-17 | J-17 | J-16 | 348.00 | N/A | N/A | N/A | 0.00 | N/A | 8 x 4 ft | 1,274.68 | 11.16 | 1,382.00 | 1,374.80 | 0.020690 | Doubletree |
| P-16 | J-16 | J-15 | 105.00 | N/A | N/A | N/A | 0.00 | N/A | 8 x 4 ft | 1,571.04 | 11.52 | 1,374.80 | 1,371.50 | 0.031429 | Doubletree |
| P-15 | J-15 | J-14 | 516.00 | N/A | N/A | N/A | 0.00 | N/A | 8 x 6 ft | 796.46 | 15.35 | 1,369.50 | 1,364.20 | 0.010271 | Doubletree |
| P-14 | J-14 | J-13 | 516.00 | N/A | N/A | N/A | 0.00 | N/A | 8 x 6 ft | 796.46 | 15.35 | 1,364.20 | 1,358.90 | 0.010271 | Doubletree |



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# Combined Pipe/Node Report

| Pipe | Upstream Node | Downstream Node | Length (ft) | Inlet Area (acres) | Weighted Roughness Coefficient | Inlet CA (acres) | Total CA (acres) | Inlet Discharge (cfs) | Section Size | Capacity (cfs) | Average Velocity (ft/s) | Upstream Invert Elevation (ft) | Downstream Invert Elevation (ft) | Constructed Slope (ft/ft) | Description |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P-13 | J-13 | J-12 | 516.00 | N/A | N/A | N/A | 0.00 | N/A | 8 x 6 ft | 796.46 | 15.35 | 1,358.90 | 1,353.60 | 0.010271 | Doubletree |
| P-12 | J-12 | J-11 | 516.00 | N/A | N/A | N/A | 0.00 | N/A | 8 x 6 ft | 796.46 | 15.35 | 1,353.60 | 1,348.30 | 0.010271 | Doubletree |
| P-11 | J-11 | J-10 | 516.00 | N/A | N/A | N/A | 0.00 | N/A | 8 x 6 ft | 796.46 | 15.35 | 1,348.30 | 1,343.00 | 0.010271 | Doubletree |
| P-10 | J-10 | J-9 | 441.00 | N/A | N/A | N/A | 0.00 | N/A | 10 x 6 ft | 2,224.63 | 10.81 | 1,343.00 | 1,340.77 | 0.005057 | Doubletree |
| P-9 | J-9 | J-8 | 441.00 | N/A | N/A | N/A | 0.00 | N/A | 10 x 6 ft | 2,229.61 | 10.81 | 1,340.77 | 1,338.53 | 0.005079 | Doubletree |
| P-8 | J-8 | J-7 | 442.00 | N/A | N/A | N/A | 0.00 | N/A | 10 x 6 ft | 2,222.11 | 10.81 | 1,338.53 | 1,336.30 | 0.005045 | Doubletree |
| P-7 | J-7 | J-6 | 425.00 | N/A | N/A | N/A | 0.00 | N/A | 10 x 6 ft | 2,225.10 | 11.47 | 1,336.30 | 1,334.15 | 0.005059 | Doubletree |
| P-6 | J-6 | J-5 | 425.00 | N/A | N/A | N/A | 0.00 | N/A | 10 x 6 ft | 2,225.10 | 11.47 | 1,334.15 | 1,332.00 | 0.005059 | Doubletree |
| P-5 | J-5 | J-4 | 425.00 | N/A | N/A | N/A | 0.00 | N/A | 10 x 6 ft | 2,225.10 | 11.47 | 1,332.00 | 1,329.85 | 0.005059 | Doubletree |
| P-4 | J-4 | J-3 | 535.00 | N/A | N/A | N/A | 0.00 | N/A | 10 x 6 ft | 2,518.28 | 10.90 | 1,329.85 | 1,327.90 | 0.003645 | Doubletree |
| P-3 | J-3 | J-2 | 535.00 | N/A | N/A | N/A | 0.00 | N/A | 10 x 6 ft | 2,518.28 | 10.90 | 1,327.90 | 1,325.95 | 0.003645 | Doubletree |
| P-2 | J-2 | J-1 | 390.00 | N/A | N/A | N/A | 0.00 | N/A | 10 x 6 ft | 2,472.25 | 10.90 | 1,325.90 | 1,324.53 | 0.003513 | Doubletree |
| P-1 | J-1 | Outlet | 145.00 | N/A | N/A | N/A | 0.00 | N/A | 10 x 6 ft | 2,521.84 | 11.05 | 1,324.53 | 1,324.00 | 0.003655 | Doubletree |

# DOT Report

| Pipe | -Node- Upstream Downstream | Inlet Area (acres) | Inlet CA (acres) | Total CA (acres) | -Ground- Upstream Downstream (ft) | -HGL- Upstream Downstream (ft) | -Slope- Energy Constructed (ft/ft) | -Section- Discharge Capacity (cfs) | -Section- Shape Size | Length (ft) | Average Velocity (ft/s) | Description |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P-49 | I-8 | 0.00 | 0.00 | 0.00 | 1,342.00 | 1,338.29 | 0.021741 | 183.00 | Circular | 30.00 | 14.71 | |
| | J-4 | | | | 1,340.00 | 1,337.77 | 0.088333 | 426.90 | 48 inch | | | |
| P-43 | I-5 | 0.00 | 0.00 | 0.00 | 1,347.00 | 1,345.04 | 0.005293 | 368.00 | Box | 90.00 | 11.26 | 56th Street□ |
| | J-38 | | | | 1,346.50 | 1,344.66 | 0.005333 | 444.97 | 8 x 5 ft | | | |
| P-42 | J-38 | N/A | N/A | 0.00 | 1,346.50 | 1,344.56 | 0.005427 | 368.00 | Box | 460.00 | 11.26 | 56th Street□ |
| | J-37 | | | | 1,346.00 | 1,342.16 | 0.005435 | 449.19 | 8 x 5 ft | | | |
| P-41 | J-37 | N/A | N/A | 0.00 | 1,346.00 | 1,342.06 | 0.003721 | 368.00 | Box | 525.00 | 10.30 | 56th Street□ |
| | J-36 | | | | 1,343.00 | 1,340.81 | 0.005429 | 448.93 | 8 x 5 ft | | | |
| P-40 | J-36 | N/A | N/A | 0.00 | 1,343.00 | 1,340.74 | 0.003648 | 368.00 | Box | 525.00 | 9.20 | 56th Street□ |
| | J-35 | | | | 1,342.00 | 1,338.82 | 0.005429 | 448.93 | 8 x 5 ft | | | |
| P-39 | J-35 | N/A | N/A | 0.00 | 1,342.00 | 1,338.76 | 0.003648 | 368.00 | Box | 270.00 | 9.20 | 56th Street□ |
| | J-4 | | | | 1,340.00 | 1,337.77 | 0.005444 | 449.59 | 8 x 5 ft | | | |
| P-48 | I-7 | 0.00 | 0.00 | 0.00 | 1,347.00 | 1,344.89 | 0.006749 | 118.00 | Circular | 20.00 | 9.39 | |
| | J-7 | | | | 1,347.00 | 1,344.75 | 0.085000 | 418.77 | 48 inch | | | |
| P-50 | I-9 | 0.00 | 0.00 | 0.00 | 1,367.00 | 1,362.34 | 0.055120 | 364.00 | Circular | 32.00 | 18.63 | |
| | J-29 | | | | 1,367.00 | 1,360.68 | 0.062500 | 651.07 | 60 inch | | | |
| P-38 | I-4 | 0.00 | 0.00 | 0.00 | 1,396.00 | 1,393.04 | 0.029914 | 101.00 | Circular | 475.00 | 9.02 | Butler Drive |
| | J-34 | | | | 1,382.00 | 1,379.30 | 0.030526 | 250.96 | 48 inch | | | |
| P-37 | J-34 | N/A | N/A | 0.00 | 1,382.00 | 1,378.54 | 0.024651 | 101.00 | Circular | 475.00 | 9.02 | Butler Drive |
| | J-33 | | | | 1,372.50 | 1,367.30 | 0.025263 | 228.30 | 48 inch | | | |
| P-36 | J-33 | N/A | N/A | 0.00 | 1,372.50 | 1,366.54 | 0.010749 | 101.00 | Circular | 545.00 | 9.20 | Butler Drive |
| | J-32 | | | | 1,364.00 | 1,361.05 | 0.011009 | 150.71 | 48 inch | | | |
| P-35 | J-32 | N/A | N/A | 0.00 | 1,364.00 | 1,360.81 | 0.001464 | 101.00 | Circular | 140.00 | 5.38 | Butler Drive |
| | J-29 | | | | 1,367.00 | 1,360.68 | 0.014286 | 311.27 | 60 inch | | | |
| P-34 | I-3 | 0.00 | 0.00 | 0.00 | 1,378.00 | 1,374.44 | 0.012448 | 424.00 | Box | 415.00 | 11.80 | 52nd Street |
| | J-31 | | | | 1,373.00 | 1,369.38 | 0.012458 | 680.08 | 8 x 5 ft | | | |
| P-33 | J-31 | N/A | N/A | 0.00 | 1,373.00 | 1,369.27 | 0.012424 | 424.00 | Box | 415.00 | 11.80 | 52nd Street |
| | J-30 | | | | 1,370.00 | 1,364.22 | 0.012434 | 679.42 | 8 x 5 ft | | | |
| P-32 | J-30 | N/A | N/A | 0.00 | 1,370.00 | 1,364.11 | 0.009392 | 424.00 | Box | 415.00 | 11.27 | 52nd Street |
| | J-29 | | | | 1,367.00 | 1,360.68 | 0.012458 | 680.08 | 8 x 5 ft | | | |
| P-31 | J-29 | N/A | N/A | 0.00 | 1,367.00 | 1,359.08 | 0.005220 | 889.00 | Box | 536.00 | 11.62 | 52nd Street |
| | J-28 | | | | 1,362.50 | 1,356.65 | 0.005317 | 888.60 | 8 x 5 ft | | | |
| P-30 | J-28 | N/A | N/A | 0.00 | 1,362.50 | 1,356.23 | 0.005181 | 889.00 | Box | 405.00 | 11.62 | 52nd Street |
| | J-27 | | | | 1,360.00 | 1,354.50 | 0.005309 | 887.89 | 8 x 5 ft | | | |
| P-29 | J-27 | N/A | N/A | 0.00 | 1,360.00 | 1,354.40 | 0.001413 | 889.00 | Box | 405.00 | 6.23 | 52nd Street |
| | J-26 | | | | 1,357.00 | 1,353.85 | 0.006173 | 1,852.30 | 8 x 6 ft | | | |
| P-28 | J-26 | N/A | N/A | 0.00 | 1,357.00 | 1,353.82 | 0.001422 | 889.00 | Box | 320.00 | 6.17 | 52nd Street |


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37 Brookside Road Waterbury, CT 06708 USA (203) 755-1666

# DOT Report

| Pipe | -Node- Upstream Downstream | Inlet Area (acres) | Inlet CA (acres) | Total CA (acres) | -Ground- Upstream Downstream (ft) | -HGL- Upstream Downstream (ft) | -Slope- Energy Constructed (ft/ft) | -Section- Discharge Capacity (cfs) | -Section- Shape Size | Length (ft) | Average Velocity (ft/s) | Description |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | J-25 | | | | 1,356.00 | 1,353.36 | 0.002313 | 1,133.73 | 8 x 6 ft | | | |
| P-27 | J-25 | N/A | N/A | 0.00 | 1,356.00 | 1,353.34 | 0.001422 | 889.00 | Box | 320.00 | 6.17 | 52nd Street |
| | J-24 | | | | 1,355.00 | 1,352.88 | 0.002281 | 1,126.05 | 8 x 6 ft | | | |
| P-26 | J-24 | N/A | N/A | 0.00 | 1,355.00 | 1,352.85 | 0.001422 | 889.00 | Box | 332.00 | 6.17 | 52nd Street |
| | J-23 | | | | 1,356.50 | 1,352.38 | 0.002319 | 1,135.39 | 8 x 6 ft | | | |
| P-25 | J-23 | N/A | N/A | 0.00 | 1,356.50 | 1,352.35 | 0.001422 | 889.00 | Box | 333.00 | 6.17 | 52nd Street |
| | J-10 | | | | 1,356.00 | 1,351.88 | 0.002282 | 1,126.30 | 8 x 6 ft | | | |
| P-47 | I-6 | 0.00 | 0.00 | 0.00 | 1,356.50 | 1,352.99 | 0.000873 | 320.00 | Box | 67.00 | 6.26 | 52nd Street |
| | J-41 | | | | 1,356.00 | 1,352.99 | 0.003731 | 637.00 | 10 x 6 ft | | | |
| P-46 | J-41 | N/A | N/A | 0.00 | 1,356.00 | 1,352.96 | 0.000881 | 320.00 | Box | 428.00 | 5.74 | 52nd Street |
| | J-40 | | | | 1,356.00 | 1,352.73 | 0.003692 | 633.59 | 10 x 6 ft | | | |
| P-45 | J-40 | N/A | N/A | 0.00 | 1,356.00 | 1,352.70 | 0.000942 | 320.00 | Box | 428.00 | 5.33 | 52nd Street |
| | J-39 | | | | 1,356.00 | 1,352.30 | 0.003715 | 635.60 | 10 x 6 ft | | | |
| P-44 | J-39 | N/A | N/A | 0.00 | 1,356.00 | 1,352.28 | 0.000942 | 320.00 | Box | 428.00 | 5.33 | 52nd Street |
| | J-10 | | | | 1,356.00 | 1,351.88 | 0.003692 | 633.59 | 10 x 6 ft | | | |
| P-24 | I-2 | 0.00 | 0.00 | 0.00 | 1,409.00 | 1,405.84 | 0.030717 | 29.00 | Circular | 60.00 | 6.85 | Tatum Boule |
| | J-22 | | | | 1,407.00 | 1,404.27 | 0.033333 | 74.88 | 30 inch | | | |
| P-23 | J-22 | N/A | N/A | 0.00 | 1,407.00 | 1,403.84 | 0.025490 | 29.00 | Circular | 190.00 | 6.85 | Tatum Boule |
| | J-21 | | | | 1,402.00 | 1,399.27 | 0.026316 | 66.53 | 30 inch | | | |
| P-22 | J-21 | N/A | N/A | 0.00 | 1,402.00 | 1,398.84 | 0.026860 | 29.00 | Circular | 292.00 | 6.85 | Tatum Boule |
| | J-20 | | | | 1,394.50 | 1,391.27 | 0.027397 | 67.89 | 30 inch | | | |
| P-21 | J-20 | N/A | N/A | 0.00 | 1,394.50 | 1,390.84 | 0.026143 | 29.00 | Circular | 300.00 | 6.85 | Tatum Boule |
| | J-19 | | | | 1,386.00 | 1,383.27 | 0.026667 | 66.98 | 30 inch | | | |
| P-20 | J-19 | N/A | N/A | 0.00 | 1,386.00 | 1,382.84 | 0.008227 | 29.00 | Circular | 296.00 | 6.78 | Tatum Boule |
| | J-18 | | | | 1,383.50 | 1,380.70 | 0.008919 | 38.73 | 30 inch | | | |
| P-19 | J-18 | N/A | N/A | 0.00 | 1,383.50 | 1,380.56 | 0.001866 | 29.00 | Circular | 296.00 | 4.22 | Tatum Boule |
| | J-16 | | | | 1,382.00 | 1,380.04 | 0.006959 | 55.64 | 36 inch | | | |
| P-18 | I-1 | 0.00 | 0.00 | 0.00 | 1,397.00 | 1,393.93 | 0.017983 | 708.00 | Box | 443.00 | 11.16 | Doubletree |
| | J-17 | | | | 1,388.00 | 1,386.03 | 0.018059 | 1,190.88 | 8 x 4 ft | | | |
| P-17 | J-17 | N/A | N/A | 0.00 | 1,388.00 | 1,385.93 | 0.017132 | 708.00 | Box | 348.00 | 11.16 | Doubletree |
| | J-16 | | | | 1,382.00 | 1,380.04 | 0.020690 | 1,274.68 | 8 x 4 ft | | | |
| P-16 | J-16 | N/A | N/A | 0.00 | 1,382.00 | 1,378.80 | 0.010493 | 737.00 | Box | 105.00 | 11.52 | Doubletree |
| | J-15 | | | | 1,380.00 | 1,377.70 | 0.031429 | 1,571.04 | 8 x 4 ft | | | |
| P-15 | J-15 | N/A | N/A | 0.00 | 1,380.00 | 1,375.50 | 0.009184 | 737.00 | Box | 516.00 | 15.35 | Doubletree |
| | J-14 | | | | 1,375.00 | 1,370.76 | 0.010271 | 796.46 | 8 x 6 ft | | | |
| P-14 | J-14 | N/A | N/A | 0.00 | 1,375.00 | 1,370.58 | 0.008795 | 737.00 | Box | 516.00 | 15.35 | Doubletree |
| | J-13 | | | | 1,370.00 | 1,366.04 | 0.010271 | 796.46 | 8 x 6 ft | | | |

# DOT Report

| Pipe | -Node- Upstream Downstream | Inlet Area (acres) | Inlet CA (acres) | Total CA (acres) | -Ground- Upstream (ft) Downstream (ft) | -HGL- Upstream (ft) Downstream (ft) | -Slope- Energy Constructed (ft/ft) | -Section- Discharge Capacity (cfs) | -Section- Shape Size | Length (ft) | Average Velocity (ft/s) | Description |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P-13 | J-13 | N/A | N/A | 0.00 | 1,370.00 | 1,365.86 | 0.008795 | 737.00 | Box | 516.00 | 15.35 | Doubletree |
| | J-12 | | | | 1,365.00 | 1,361.32 | 0.010271 | 796.46 | 8 x 6 ft | | | |
| P-12 | J-12 | N/A | N/A | 0.00 | 1,365.00 | 1,361.14 | 0.008795 | 737.00 | Box | 516.00 | 15.35 | Doubletree |
| | J-11 | | | | 1,360.00 | 1,356.60 | 0.010271 | 796.46 | 8 x 6 ft | | | |
| P-11 | J-11 | N/A | N/A | 0.00 | 1,360.00 | 1,356.41 | 0.008795 | 737.00 | Box | 516.00 | 15.35 | Doubletree |
| | J-10 | | | | 1,356.00 | 1,351.88 | 0.010271 | 796.46 | 8 x 6 ft | | | |
| P-10 | J-10 | N/A | N/A | 0.00 | 1,356.00 | 1,350.06 | 0.003869 | 1,946.00 | Box | 441.00 | 10.81 | Doubletree |
| | J-9 | | | | 1,352.00 | 1,348.35 | 0.005057 | 2,224.63 | 10 x 6 ft | | | |
| P-9 | J-9 | N/A | N/A | 0.00 | 1,352.00 | 1,348.26 | 0.003869 | 1,946.00 | Box | 441.00 | 10.81 | Doubletree |
| | J-8 | | | | 1,349.00 | 1,346.56 | 0.005079 | 2,229.61 | 10 x 6 ft | | | |
| P-8 | J-8 | N/A | N/A | 0.00 | 1,349.00 | 1,346.46 | 0.003869 | 1,946.00 | Box | 442.00 | 10.81 | Doubletree |
| | J-7 | | | | 1,347.00 | 1,344.75 | 0.005045 | 2,222.11 | 10 x 6 ft | | | |
| P-7 | J-7 | N/A | N/A | 0.00 | 1,347.00 | 1,343.53 | 0.004353 | 2,064.00 | Box | 425.00 | 11.47 | Doubletree |
| | J-6 | | | | 1,344.00 | 1,341.68 | 0.005059 | 2,225.10 | 10 x 6 ft | | | |
| P-6 | J-6 | N/A | N/A | 0.00 | 1,344.00 | 1,341.58 | 0.004353 | 2,064.00 | Box | 425.00 | 11.47 | Doubletree |
| | J-5 | | | | 1,343.50 | 1,339.73 | 0.005059 | 2,225.10 | 10 x 6 ft | | | |
| P-5 | J-5 | N/A | N/A | 0.00 | 1,343.50 | 1,339.62 | 0.004353 | 2,064.00 | Box | 425.00 | 11.47 | Doubletree |
| | J-4 | | | | 1,340.00 | 1,337.77 | 0.005059 | 2,225.10 | 10 x 6 ft | | | |
| P-4 | J-4 | N/A | N/A | 0.00 | 1,340.00 | 1,336.48 | 0.003930 | 2,615.00 | Box | 535.00 | 10.90 | Doubletree |
| | J-3 | | | | 1,338.50 | 1,334.38 | 0.003645 | 2,518.28 | 10 x 6 ft | | | |
| P-3 | J-3 | N/A | N/A | 0.00 | 1,338.50 | 1,334.29 | 0.003930 | 2,615.00 | Box | 535.00 | 10.90 | Doubletree |
| | J-2 | | | | 1,336.00 | 1,332.19 | 0.003645 | 2,518.28 | 10 x 6 ft | | | |
| P-2 | J-2 | N/A | N/A | 0.00 | 1,336.00 | 1,332.09 | 0.003930 | 2,615.00 | Box | 390.00 | 10.90 | Doubletree |
| | J-1 | | | | 1,331.00 | 1,330.56 | 0.003513 | 2,472.25 | 10 x 6 ft | | | |
| P-1 | J-1 | N/A | N/A | 0.00 | 1,331.00 | 1,330.37 | 0.003247 | 2,615.00 | Box | 145.00 | 11.05 | Doubletree |
| | Outlet | | | | 1,331.00 | 1,330.00 | 0.003655 | 2,521.84 | 10 x 6 ft | | | |


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# Pipe Report

| Upstream Node | Downstream Node | Weighted Roughness Coefficient | Discharge (cfs) | Length (ft) | Constructed Slope (ft/ft) | Section Size | Roughness | Capacity (cfs) | Upstream Invert Elevation (ft) | Downstream Invert Elevation (ft) | Upstream Ground Elevation (ft) | Downstream Ground Elevation (ft) | Upstream Cover (ft) | Downstream Cover (ft) | Upstream HGL (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| I-8 | J-4 | 0.00 | 183.00 | 30.00 | 0.088333 | 48 inch | 0.013 | 426.90 | 1,334.50 | 1,331.85 | 1,342.00 | 1,340.00 | 3.50 | 4.15 | 1,338.29 |
| I-5 | J-38 | 0.00 | 368.00 | 90.00 | 0.005333 | 8 x 5 ft | 0.013 | 444.97 | 1,341.00 | 1,340.52 | 1,347.00 | 1,346.50 | 1.00 | 0.98 | 1,345.04 |
| J-38 | J-37 | N/A | 368.00 | 460.00 | 0.005435 | 8 x 5 ft | 0.013 | 449.19 | 1,340.52 | 1,338.02 | 1,346.50 | 1,346.00 | 0.98 | 2.98 | 1,344.56 |
| J-37 | J-36 | N/A | 368.00 | 525.00 | 0.005429 | 8 x 5 ft | 0.013 | 448.93 | 1,338.02 | 1,335.17 | 1,346.00 | 1,343.00 | 2.98 | 2.83 | 1,342.06 |
| J-36 | J-35 | N/A | 368.00 | 525.00 | 0.005429 | 8 x 5 ft | 0.013 | 448.93 | 1,335.17 | 1,332.32 | 1,343.00 | 1,342.00 | 2.83 | 4.68 | 1,340.74 |
| J-35 | J-4 | N/A | 368.00 | 270.00 | 0.005444 | 8 x 5 ft | 0.013 | 449.59 | 1,332.32 | 1,330.85 | 1,342.00 | 1,340.00 | 4.68 | 4.15 | 1,338.76 |
| I-7 | J-7 | 0.00 | 118.00 | 20.00 | 0.085000 | 48 inch | 0.013 | 418.77 | 1,340.00 | 1,338.30 | 1,347.00 | 1,347.00 | 3.00 | 4.70 | 1,344.89 |
| I-9 | J-29 | 0.00 | 364.00 | 32.00 | 0.062500 | 60 inch | 0.013 | 651.07 | 1,357.50 | 1,355.50 | 1,367.00 | 1,367.00 | 4.50 | 6.50 | 1,362.34 |
| I-4 | J-34 | 0.00 | 101.00 | 475.00 | 0.030526 | 48 inch | 0.013 | 250.96 | 1,390.00 | 1,375.50 | 1,396.00 | 1,382.00 | 2.00 | 2.50 | 1,393.04 |
| J-34 | J-33 | N/A | 101.00 | 475.00 | 0.025263 | 48 inch | 0.013 | 228.30 | 1,375.50 | 1,363.50 | 1,382.00 | 1,372.50 | 2.50 | 5.00 | 1,378.54 |
| J-33 | J-32 | N/A | 101.00 | 545.00 | 0.011009 | 48 inch | 0.013 | 150.71 | 1,363.50 | 1,357.50 | 1,372.50 | 1,364.00 | 5.00 | 2.50 | 1,366.54 |
| J-32 | J-29 | N/A | 101.00 | 140.00 | 0.014286 | 60 inch | 0.013 | 311.27 | 1,356.50 | 1,354.50 | 1,364.00 | 1,367.00 | 2.50 | 7.50 | 1,360.81 |
| I-3 | J-31 | 0.00 | 424.00 | 415.00 | 0.012458 | 8 x 5 ft | 0.013 | 680.08 | 1,370.00 | 1,364.83 | 1,378.00 | 1,373.00 | 3.00 | 3.17 | 1,374.44 |
| J-31 | J-30 | N/A | 424.00 | 415.00 | 0.012434 | 8 x 5 ft | 0.013 | 679.42 | 1,364.83 | 1,359.67 | 1,373.00 | 1,370.00 | 3.17 | 5.33 | 1,369.27 |
| J-30 | J-29 | N/A | 424.00 | 415.00 | 0.012458 | 8 x 5 ft | 0.013 | 680.08 | 1,359.67 | 1,354.50 | 1,370.00 | 1,367.00 | 5.33 | 7.50 | 1,364.11 |
| J-29 | J-28 | N/A | 889.00 | 536.00 | 0.005317 | 8 x 5 ft | 0.013 | 888.60 | 1,354.50 | 1,351.65 | 1,367.00 | 1,362.50 | 7.50 | 5.85 | 1,359.08 |
| J-28 | J-27 | N/A | 889.00 | 405.00 | 0.005309 | 8 x 5 ft | 0.013 | 887.89 | 1,351.65 | 1,349.50 | 1,362.50 | 1,360.00 | 5.85 | 5.50 | 1,356.23 |
| J-27 | J-26 | N/A | 889.00 | 405.00 | 0.006173 | 8 x 6 ft | 0.013 | 1,852.30 | 1,348.50 | 1,346.00 | 1,360.00 | 1,357.00 | 5.50 | 5.00 | 1,354.40 |
| J-26 | J-25 | N/A | 889.00 | 320.00 | 0.002313 | 8 x 6 ft | 0.013 | 1,133.73 | 1,346.00 | 1,345.26 | 1,357.00 | 1,356.00 | 5.00 | 4.74 | 1,353.82 |
| J-25 | J-24 | N/A | 889.00 | 320.00 | 0.002281 | 8 x 6 ft | 0.013 | 1,126.05 | 1,345.26 | 1,344.53 | 1,356.00 | 1,355.00 | 4.74 | 4.47 | 1,353.34 |
| J-24 | J-23 | N/A | 889.00 | 332.00 | 0.002319 | 8 x 6 ft | 0.013 | 1,135.39 | 1,344.53 | 1,343.76 | 1,355.00 | 1,356.50 | 4.47 | 6.74 | 1,352.85 |
| J-23 | J-10 | N/A | 889.00 | 333.00 | 0.002282 | 8 x 6 ft | 0.013 | 1,126.30 | 1,343.76 | 1,343.00 | 1,356.50 | 1,356.00 | 6.74 | 7.00 | 1,352.35 |
| I-6 | J-41 | 0.00 | 320.00 | 67.00 | 0.003731 | 10 x 6 ft | 0.013 | 637.00 | 1,348.00 | 1,347.75 | 1,356.50 | 1,356.00 | 2.50 | 2.25 | 1,352.99 |
| J-41 | J-40 | N/A | 320.00 | 428.00 | 0.003692 | 10 x 6 ft | 0.013 | 633.59 | 1,347.75 | 1,346.17 | 1,356.00 | 1,356.00 | 2.25 | 3.83 | 1,352.96 |
| J-40 | J-39 | N/A | 320.00 | 428.00 | 0.003715 | 10 x 6 ft | 0.013 | 635.60 | 1,346.17 | 1,344.58 | 1,356.00 | 1,356.00 | 3.83 | 5.42 | 1,352.70 |
| J-39 | J-10 | N/A | 320.00 | 428.00 | 0.003692 | 10 x 6 ft | 0.013 | 633.59 | 1,344.58 | 1,343.00 | 1,356.00 | 1,356.00 | 5.42 | 7.00 | 1,352.28 |
| I-2 | J-22 | 0.00 | 29.00 | 60.00 | 0.033333 | 30 inch | 0.013 | 74.88 | 1,404.00 | 1,402.00 | 1,409.00 | 1,407.00 | 2.50 | 2.50 | 1,405.84 |
| J-22 | J-21 | N/A | 29.00 | 190.00 | 0.026316 | 30 inch | 0.013 | 66.53 | 1,402.00 | 1,397.00 | 1,407.00 | 1,402.00 | 2.50 | 2.50 | 1,403.84 |
| J-21 | J-20 | N/A | 29.00 | 292.00 | 0.027397 | 30 inch | 0.013 | 67.89 | 1,397.00 | 1,389.00 | 1,402.00 | 1,394.50 | 2.50 | 3.00 | 1,398.84 |
| J-20 | J-19 | N/A | 29.00 | 300.00 | 0.026667 | 30 inch | 0.013 | 66.98 | 1,389.00 | 1,381.00 | 1,394.50 | 1,386.00 | 3.00 | 2.50 | 1,390.84 |
| J-19 | J-18 | N/A | 29.00 | 296.00 | 0.008919 | 30 inch | 0.013 | 38.73 | 1,381.00 | 1,378.36 | 1,386.00 | 1,383.50 | 2.50 | 2.64 | 1,382.84 |
| J-18 | J-16 | N/A | 29.00 | 296.00 | 0.006959 | 36 inch | 0.013 | 55.64 | 1,377.86 | 1,375.80 | 1,383.50 | 1,382.00 | 2.64 | 3.20 | 1,380.56 |
| I-1 | J-17 | 0.00 | 708.00 | 443.00 | 0.018059 | 8 x 4 ft | 0.013 | 1,190.88 | 1,390.00 | 1,382.00 | 1,397.00 | 1,388.00 | 3.00 | 2.00 | 1,393.93 |
| J-17 | J-16 | N/A | 708.00 | 348.00 | 0.020690 | 8 x 4 ft | 0.013 | 1,274.68 | 1,382.00 | 1,374.80 | 1,388.00 | 1,382.00 | 2.00 | 3.20 | 1,385.93 |
| J-16 | J-15 | N/A | 737.00 | 105.00 | 0.031429 | 8 x 4 ft | 0.013 | 1,571.04 | 1,374.80 | 1,371.50 | 1,382.00 | 1,380.00 | 3.20 | 4.50 | 1,378.80 |
| J-15 | J-14 | N/A | 737.00 | 516.00 | 0.010271 | 8 x 6 ft | 0.013 | 796.46 | 1,369.50 | 1,364.20 | 1,380.00 | 1,375.00 | 4.50 | 4.80 | 1,375.50 |
| J-14 | J-13 | N/A | 737.00 | 516.00 | 0.010271 | 8 x 6 ft | 0.013 | 796.46 | 1,364.20 | 1,358.90 | 1,375.00 | 1,370.00 | 4.80 | 5.10 | 1,370.58 |



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# Pipe Report

| Upstream Node | Downstream Node | Weighted Roughness Coefficient | Discharge (cfs) | Length (ft) | Constructed Slope (ft/ft) | Section Size | Roughness | Capacity (cfs) | Upstream Invert Elevation (ft) | Downstream Invert Elevation (ft) | Upstream Ground Elevation (ft) | Downstream Ground Elevation (ft) | Upstream Cover (ft) | Downstream Cover (ft) | Upstream HGL (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| J-13 | J-12 | N/A | 737.00 | 516.00 | 0.010271 | 8 x 6 ft | 0.013 | 796.46 | 1,358.90 | 1,353.60 | 1,370.00 | 1,365.00 | 5.10 | 5.40 | 1,365.86 |
| J-12 | J-11 | N/A | 737.00 | 516.00 | 0.010271 | 8 x 6 ft | 0.013 | 796.46 | 1,353.60 | 1,348.30 | 1,365.00 | 1,360.00 | 5.40 | 5.70 | 1,361.14 |
| J-11 | J-10 | N/A | 737.00 | 516.00 | 0.010271 | 8 x 6 ft | 0.013 | 796.46 | 1,348.30 | 1,343.00 | 1,360.00 | 1,356.00 | 5.70 | 7.00 | 1,356.41 |
| J-10 | J-9 | N/A | 1,946.00 | 441.00 | 0.005057 | 10 x 6 ft | 0.013 | 2,224.63 | 1,343.00 | 1,340.77 | 1,356.00 | 1,352.00 | 7.00 | 5.23 | 1,350.06 |
| J-9 | J-8 | N/A | 1,946.00 | 441.00 | 0.005079 | 10 x 6 ft | 0.013 | 2,229.61 | 1,340.77 | 1,338.53 | 1,352.00 | 1,349.00 | 5.23 | 4.47 | 1,348.26 |
| J-8 | J-7 | N/A | 1,946.00 | 442.00 | 0.005045 | 10 x 6 ft | 0.013 | 2,222.11 | 1,338.53 | 1,336.30 | 1,349.00 | 1,347.00 | 4.47 | 4.70 | 1,346.46 |
| J-7 | J-6 | N/A | 2,064.00 | 425.00 | 0.005059 | 10 x 6 ft | 0.013 | 2,225.10 | 1,336.30 | 1,334.15 | 1,347.00 | 1,344.00 | 4.70 | 3.85 | 1,343.53 |
| J-6 | J-5 | N/A | 2,064.00 | 425.00 | 0.005059 | 10 x 6 ft | 0.013 | 2,225.10 | 1,334.15 | 1,332.00 | 1,344.00 | 1,343.50 | 3.85 | 5.50 | 1,341.58 |
| J-5 | J-4 | N/A | 2,064.00 | 425.00 | 0.005059 | 10 x 6 ft | 0.013 | 2,225.10 | 1,332.00 | 1,329.85 | 1,343.50 | 1,340.00 | 5.50 | 4.15 | 1,339.62 |
| J-4 | J-3 | N/A | 2,615.00 | 535.00 | 0.003645 | 10 x 6 ft | 0.013 | 2,518.28 | 1,329.85 | 1,327.90 | 1,340.00 | 1,338.50 | 4.15 | 4.60 | 1,336.48 |
| J-3 | J-2 | N/A | 2,615.00 | 535.00 | 0.003645 | 10 x 6 ft | 0.013 | 2,518.28 | 1,327.90 | 1,325.95 | 1,338.50 | 1,336.00 | 4.60 | 4.05 | 1,334.29 |
| J-2 | J-1 | N/A | 2,615.00 | 390.00 | 0.003513 | 10 x 6 ft | 0.013 | 2,472.25 | 1,325.90 | 1,324.53 | 1,336.00 | 1,331.00 | 4.10 | 0.47 | 1,332.09 |
| J-1 | Outlet | N/A | 2,615.00 | 145.00 | 0.003655 | 10 x 6 ft | 0.013 | 2,521.84 | 1,324.53 | 1,324.00 | 1,331.00 | 1,331.00 | 0.47 | 1.00 | 1,330.37 |


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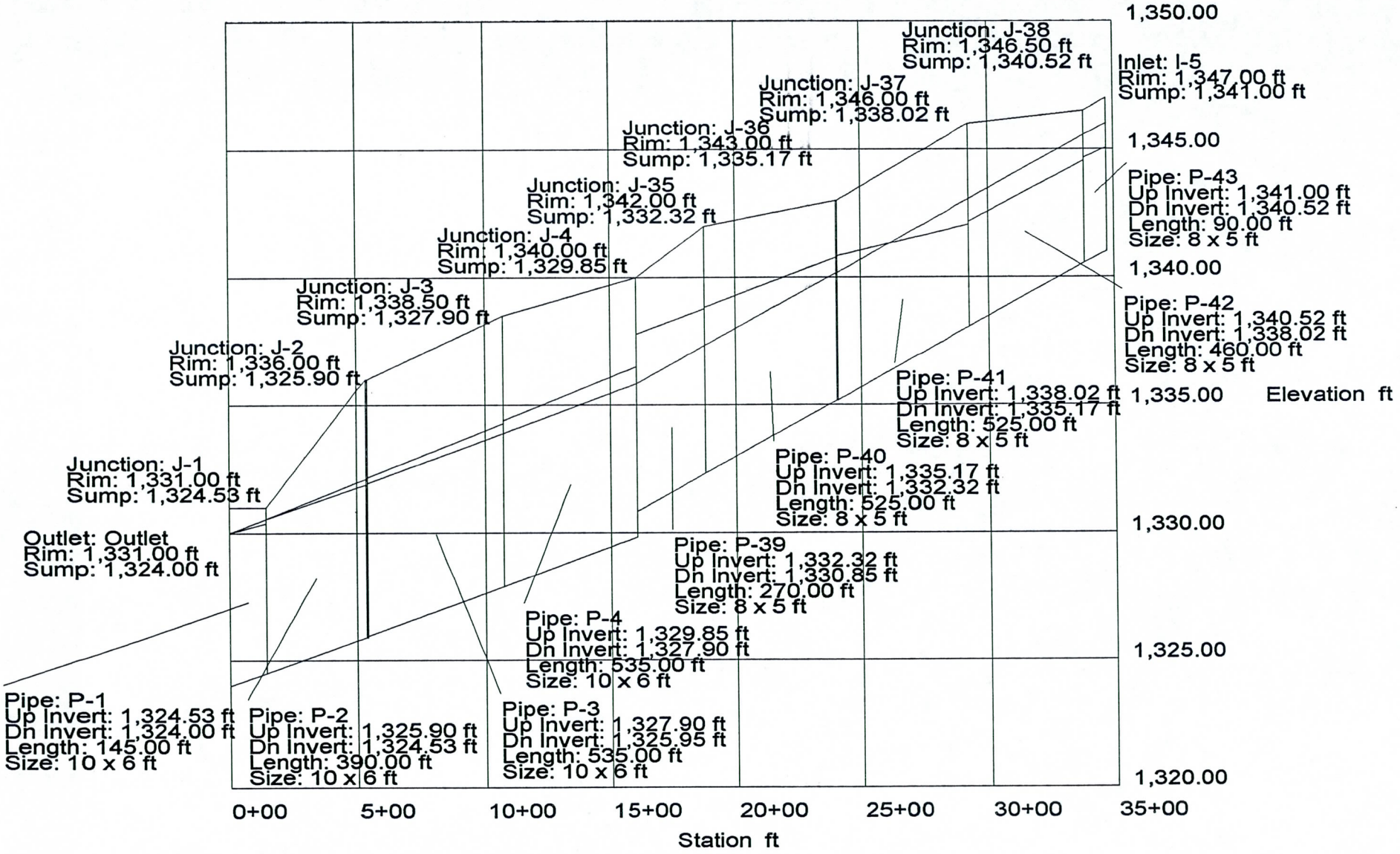
# Node Report

| HGL In (ft) | HGL Out (ft) | Ground Elevation (ft) | Known Flow (cfs) | Node | Structure Discharge (cfs) | System Flow Time (min) | Velocity (ft/s) |
|---|---|---|---|---|---|---|---|
| 1,338.97 | 1,338.29 | 1,342.00 | 183.00 | I-8 | 183.00 | 0.00 | 14.87 |
| 1,345.44 | 1,345.04 | 1,347.00 | 368.00 | I-5 | 368.00 | 0.00 | 11.40 |
| 1,344.66 | 1,344.56 | 1,346.50 | N/A | J-38 | 368.00 | 0.13 | 11.40 |
| 1,342.16 | 1,342.06 | 1,346.00 | N/A | J-37 | 368.00 | 0.81 | 11.40 |
| 1,340.81 | 1,340.74 | 1,343.00 | N/A | J-36 | 368.00 | 1.66 | 9.20 |
| 1,338.82 | 1,338.76 | 1,342.00 | N/A | J-35 | 368.00 | 2.62 | 9.20 |
| 1,345.16 | 1,344.89 | 1,347.00 | 118.00 | I-7 | 118.00 | 0.00 | 9.39 |
| 1,363.43 | 1,362.34 | 1,367.00 | 364.00 | I-9 | 364.00 | 0.00 | 18.73 |
| 1,393.35 | 1,393.04 | 1,396.00 | 101.00 | I-4 | 101.00 | 0.00 | 9.84 |
| 1,379.30 | 1,378.54 | 1,382.00 | N/A | J-34 | 101.00 | 0.88 | 9.84 |
| 1,367.30 | 1,366.54 | 1,372.50 | N/A | J-33 | 101.00 | 1.76 | 9.84 |
| 1,361.05 | 1,360.81 | 1,364.00 | N/A | J-32 | 101.00 | 2.74 | 5.62 |
| 1,374.88 | 1,374.44 | 1,378.00 | 424.00 | I-3 | 424.00 | 0.00 | 11.95 |
| 1,369.38 | 1,369.27 | 1,373.00 | N/A | J-31 | 424.00 | 0.59 | 11.95 |
| 1,364.22 | 1,364.11 | 1,370.00 | N/A | J-30 | 424.00 | 1.17 | 11.95 |
| 1,360.68 | 1,359.08 | 1,367.00 | N/A | J-29 | 889.00 | 3.18 | 12.14 |
| 1,356.34 | 1,356.23 | 1,362.50 | N/A | J-28 | 889.00 | 3.95 | 12.14 |
| 1,354.46 | 1,354.40 | 1,360.00 | N/A | J-27 | 889.00 | 4.53 | 6.28 |
| 1,353.85 | 1,353.82 | 1,357.00 | N/A | J-26 | 889.00 | 5.61 | 6.17 |
| 1,353.36 | 1,353.34 | 1,356.00 | N/A | J-25 | 889.00 | 6.47 | 6.17 |
| 1,352.88 | 1,352.85 | 1,355.00 | N/A | J-24 | 889.00 | 7.34 | 6.17 |
| 1,352.38 | 1,352.35 | 1,356.50 | N/A | J-23 | 889.00 | 8.23 | 6.17 |
| 1,353.11 | 1,352.99 | 1,356.50 | 320.00 | I-6 | 320.00 | 0.00 | 6.42 |
| 1,352.99 | 1,352.96 | 1,356.00 | N/A | J-41 | 320.00 | 0.18 | 6.14 |
| 1,352.73 | 1,352.70 | 1,356.00 | N/A | J-40 | 320.00 | 1.42 | 5.33 |
| 1,352.30 | 1,352.28 | 1,356.00 | N/A | J-39 | 320.00 | 2.76 | 5.33 |
| 1,406.01 | 1,405.84 | 1,409.00 | 29.00 | I-2 | 29.00 | 0.00 | 7.51 |
| 1,404.27 | 1,403.84 | 1,407.00 | N/A | J-22 | 29.00 | 0.15 | 7.51 |
| 1,399.27 | 1,398.84 | 1,402.00 | N/A | J-21 | 29.00 | 0.61 | 7.51 |
| 1,391.27 | 1,390.84 | 1,394.50 | N/A | J-20 | 29.00 | 1.32 | 7.51 |
| 1,383.27 | 1,382.84 | 1,386.00 | N/A | J-19 | 29.00 | 2.05 | 7.51 |
| 1,380.70 | 1,380.56 | 1,383.50 | N/A | J-18 | 29.00 | 2.78 | 4.33 |
| 1,394.33 | 1,393.93 | 1,397.00 | 708.00 | I-1 | 708.00 | 0.00 | 11.25 |
| 1,386.03 | 1,385.93 | 1,388.00 | N/A | J-17 | 708.00 | 0.66 | 11.25 |
| 1,380.04 | 1,378.80 | 1,382.00 | N/A | J-16 | 737.00 | 3.95 | 11.52 |
| 1,377.70 | 1,375.50 | 1,380.00 | N/A | J-15 | 737.00 | 4.10 | 15.35 |
| 1,370.76 | 1,370.58 | 1,375.00 | N/A | J-14 | 737.00 | 4.66 | 15.35 |
| 1,366.04 | 1,365.86 | 1,370.00 | N/A | J-13 | 737.00 | 5.22 | 15.35 |
| 1,361.32 | 1,361.14 | 1,365.00 | N/A | J-12 | 737.00 | 5.78 | 15.35 |
| 1,356.60 | 1,356.41 | 1,360.00 | N/A | J-11 | 737.00 | 6.34 | 15.35 |
| 1,351.88 | 1,350.06 | 1,356.00 | N/A | J-10 | 1,946.00 | 9.13 | 10.81 |
| 1,348.35 | 1,348.26 | 1,352.00 | N/A | J-9 | 1,946.00 | 9.81 | 10.81 |
| 1,346.56 | 1,346.46 | 1,349.00 | N/A | J-8 | 1,946.00 | 10.49 | 10.81 |
| 1,344.75 | 1,343.53 | 1,347.00 | N/A | J-7 | 2,064.00 | 11.17 | 11.47 |
| 1,341.68 | 1,341.58 | 1,344.00 | N/A | J-6 | 2,064.00 | 11.79 | 11.47 |
| 1,339.73 | 1,339.62 | 1,343.50 | N/A | J-5 | 2,064.00 | 12.41 | 11.47 |
| 1,337.77 | 1,336.48 | 1,340.00 | N/A | J-4 | 2,615.00 | 13.03 | 10.90 |
| 1,334.38 | 1,334.29 | 1,338.50 | N/A | J-3 | 2,615.00 | 13.85 | 10.90 |
| 1,332.19 | 1,332.09 | 1,336.00 | N/A | J-2 | 2,615.00 | 14.66 | 10.90 |
| 1,330.56 | 1,330.37 | 1,331.00 | N/A | J-1 | 2,615.00 | 15.26 | 11.20 |
| 1,329.50 | 1,329.50 | 1,331.00 | N/A | Outlet | 2,615.00 | 15.48 | 0.00 |



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# 10-YEAR DISCHARGE

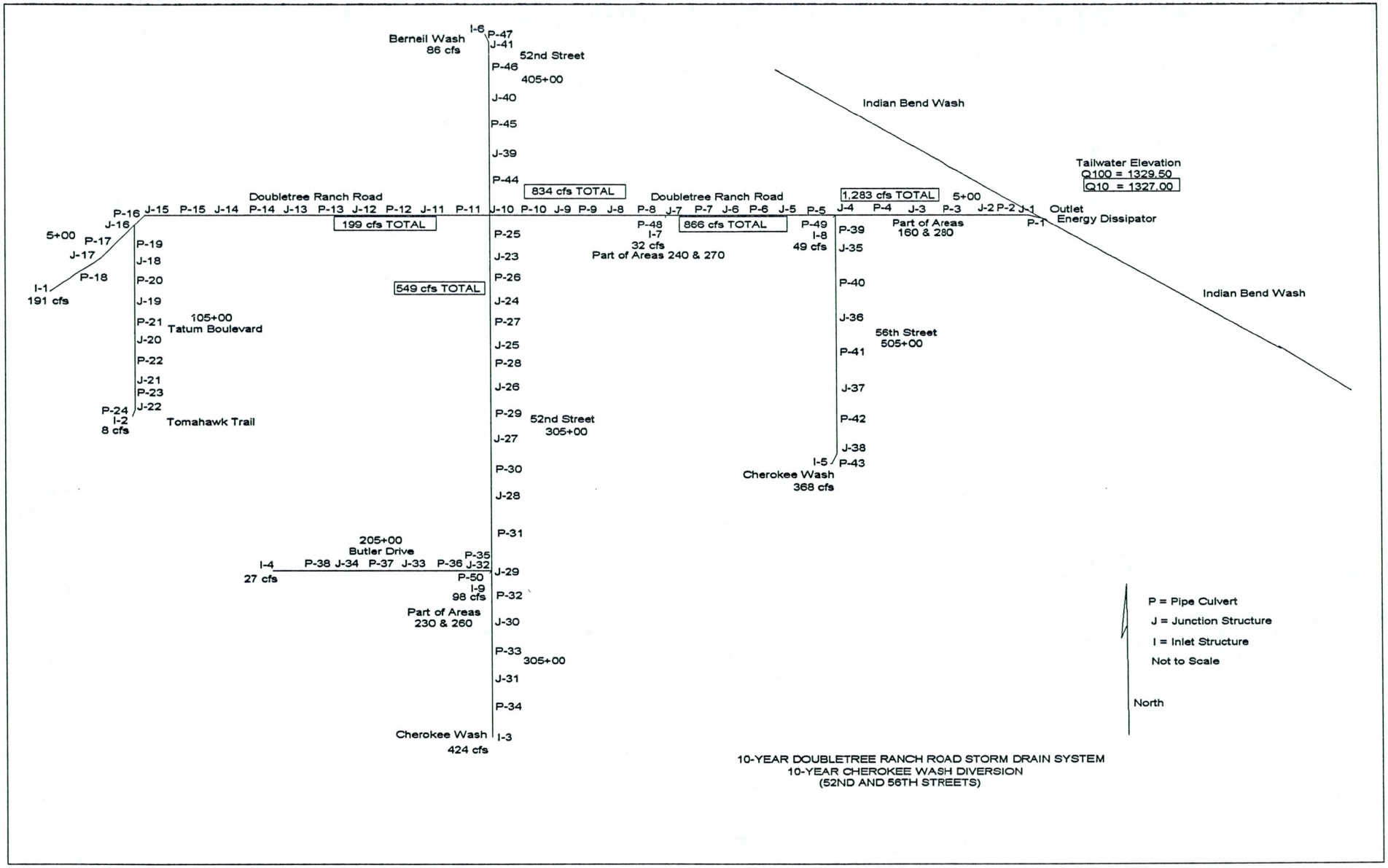
# 10-YEAR TAILWATER
# INDIAN BEND WASH

# HYDRAULIC GRADIENT

EXPLANATION OF HYDROLOGIC DISCHARGES

DOUBLETREE 10-YEAR STORM DRAIN DISCHARGES

CHEROKEE WASH DIVERSION DISCHARGES




10-YEAR DOUBLETREE RANCH ROAD STORM DRAIN SYSTEM
10-YEAR CHEROKEE WASH DIVERSION
(52ND AND 56TH STREETS)



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------------------- Beginning Calculation Cycle --------------------
Discharge: 191.00 cfs  at node I-1
Discharge: 191.00 cfs  at node J-17
Discharge: 8.00 cfs  at node I-2
Discharge: 8.00 cfs  at node J-22
Discharge: 8.00 cfs  at node J-21
Discharge: 8.00 cfs  at node J-20
Discharge: 8.00 cfs  at node J-19
Discharge: 8.00 cfs  at node J-18
Discharge: 199.00 cfs  at node J-16
Discharge: 199.00 cfs  at node J-15
Discharge: 199.00 cfs  at node J-14
Discharge: 199.00 cfs  at node J-13
Discharge: 199.00 cfs  at node J-12
Discharge: 199.00 cfs  at node J-11
Discharge: 86.00 cfs  at node I-6
Discharge: 86.00 cfs  at node J-41
Discharge: 86.00 cfs  at node J-40
Discharge: 86.00 cfs  at node J-39
Discharge: 424.00 cfs  at node I-3
Discharge: 424.00 cfs  at node J-31
Discharge: 424.00 cfs  at node J-30
Discharge: 27.00 cfs  at node I-4
Discharge: 27.00 cfs  at node J-34
Discharge: 27.00 cfs  at node J-33
Discharge: 27.00 cfs  at node J-32
Discharge: 98.00 cfs  at node I-9
Discharge: 549.00 cfs  at node J-29
Discharge: 549.00 cfs  at node J-28
Discharge: 549.00 cfs  at node J-27
Discharge: 549.00 cfs  at node J-26
Discharge: 549.00 cfs  at node J-25
Discharge: 549.00 cfs  at node J-24
Discharge: 549.00 cfs  at node J-23
Discharge: 834.00 cfs  at node J-10
Discharge: 834.00 cfs  at node J-9
Discharge: 834.00 cfs  at node J-8
Discharge: 32.00 cfs  at node I-7
Discharge: 866.00 cfs  at node J-7
Discharge: 866.00 cfs  at node J-6
Discharge: 866.00 cfs  at node J-5
Discharge: 368.00 cfs  at node I-5
Discharge: 368.00 cfs  at node J-38
Discharge: 368.00 cfs  at node J-37
Discharge: 368.00 cfs  at node J-36
Discharge: 368.00 cfs  at node J-35
Discharge: 49.00 cfs  at node I-8
Discharge: 1,283.00 cfs  at node J-4
Discharge: 1,283.00 cfs  at node J-3
Discharge: 1,283.00 cfs  at node J-2
Discharge: 1,283.00 cfs  at node J-1
Discharge: 1,283.00 cfs  at node Outlet
Beginning iteration 1
Discharge: 191.00 cfs  at node I-1
Discharge: 191.00 cfs  at node J-17
Discharge: 8.00 cfs  at node I-2
Discharge: 8.00 cfs  at node J-22
Discharge: 8.00 cfs  at node J-21
Discharge: 8.00 cfs  at node J-20
Discharge: 8.00 cfs  at node J-19
Discharge: 8.00 cfs  at node J-18
Discharge: 199.00 cfs  at node J-16
Discharge: 199.00 cfs  at node J-15
Discharge: 199.00 cfs  at node J-14
Discharge: 199.00 cfs  at node J-13
Discharge: 199.00 cfs  at node J-12
Discharge: 199.00 cfs  at node J-11
Discharge: 86.00 cfs  at node I-6
Discharge: 86.00 cfs  at node J-41
Discharge: 86.00 cfs  at node J-40
Discharge: 86.00 cfs  at node J-39
Discharge: 424.00 cfs  at node I-3
Discharge: 424.00 cfs  at node J-31
Discharge: 424.00 cfs  at node J-30
Discharge: 27.00 cfs  at node I-4
Discharge: 27.00 cfs  at node J-34
Discharge: 27.00 cfs  at node J-33
Discharge: 27.00 cfs  at node J-32
Discharge: 98.00 cfs  at node I-9
Discharge: 549.00 cfs  at node J-29
Discharge: 549.00 cfs  at node J-28
Discharge: 549.00 cfs  at node J-27
Discharge: 549.00 cfs  at node J-26
Discharge: 549.00 cfs  at node J-25
Discharge: 549.00 cfs  at node J-24
Discharge: 549.00 cfs  at node J-23
Discharge: 834.00 cfs  at node J-10
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Discharge: 834.00 cfs  at node J-9
Discharge: 834.00 cfs  at node J-8
Discharge: 32.00 cfs  at node I-7
Discharge: 866.00 cfs  at node J-7
Discharge: 866.00 cfs  at node J-6
Discharge: 866.00 cfs  at node J-5
Discharge: 368.00 cfs  at node I-5
Discharge: 368.00 cfs  at node J-38
Discharge: 368.00 cfs  at node J-37
Discharge: 368.00 cfs  at node J-36
Discharge: 368.00 cfs  at node J-35
Discharge: 49.00 cfs  at node I-8
Discharge: 1,283.00 cfs  at node J-4
Discharge: 1,283.00 cfs  at node J-3
Discharge: 1,283.00 cfs  at node J-2
Discharge: 1,283.00 cfs  at node J-1
Discharge: 1,283.00 cfs  at node Outlet
Discharge Convergence Achieved in 1 iterations: relative error:  0.0
Warning: No Duration data exists in IDF Table
Information: Outlet Known flow propagated from upstream junctions.
Information: J-1 Known flow propagated from upstream junctions.
Information: J-2 Known flow propagated from upstream junctions.
Information: J-3 Known flow propagated from upstream junctions.
Information: J-4 Known flow propagated from upstream junctions.
Information: J-35 Known flow propagated from upstream junctions.
Information: J-36 Known flow propagated from upstream junctions.
Information: J-5 Known flow propagated from upstream junctions.
Information: J-6 Known flow propagated from upstream junctions.
Information: J-7 Known flow propagated from upstream junctions.
Information: J-8 Known flow propagated from upstream junctions.
Information: J-9 Known flow propagated from upstream junctions.
Information: J-10 Known flow propagated from upstream junctions.
Information: J-39 Known flow propagated from upstream junctions.
Information: J-40 Known flow propagated from upstream junctions.
Information: J-41 Known flow propagated from upstream junctions.
Information: J-11 Known flow propagated from upstream junctions.
Information: J-12 Known flow propagated from upstream junctions.
Information: J-13 Known flow propagated from upstream junctions.
Information: J-14 Known flow propagated from upstream junctions.
Information: J-15 Known flow propagated from upstream junctions.
Information: J-16 Known flow propagated from upstream junctions.
Information: J-17 Known flow propagated from upstream junctions.
Information: J-18 Known flow propagated from upstream junctions.
Information: J-19 Known flow propagated from upstream junctions.
Information: J-20 Known flow propagated from upstream junctions.
Information: J-21 Known flow propagated from upstream junctions.
Information: J-22 Known flow propagated from upstream junctions.
Information: J-23 Known flow propagated from upstream junctions.
Information: J-24 Known flow propagated from upstream junctions.
Information: J-25 Known flow propagated from upstream junctions.
Information: J-26 Known flow propagated from upstream junctions.
Information: J-27 Known flow propagated from upstream junctions.
Information: J-28 Known flow propagated from upstream junctions.
Information: J-29 Known flow propagated from upstream junctions.
Information: J-32 Known flow propagated from upstream junctions.
Information: J-33 Sump elevation must be at or below minimum pipe invert elevation (adjusted)
Information: J-33 Known flow propagated from upstream junctions.
Information: J-34 Known flow propagated from upstream junctions.
Information: J-30 Known flow propagated from upstream junctions.
Information: J-31 Known flow propagated from upstream junctions.
Information: J-37 Known flow propagated from upstream junctions.
Information: J-38 Known flow propagated from upstream junctions.
---------- Calculations Complete ----------

** Analysis Options **
Friction method:  Manning's Formula
HGL Convergence Test:  0.001000
Maximum Network Traversals:  5
Number of Flow Profile Steps:  5
Discharge Convergence Test:  0.001000
Maximum Design Passes:  3
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---------- Network Quick View ----------

| Label | Length | Size | Discharge | Hydraulic Grade Upstream | Hydraulic Grade Downstream |
|---|---|---|---|---|---|
| P-1 | 145.00 | 10 x 6 ft | 1,283.00 | 1,327.70 | 1,327.04 |
| P-2 | 390.00 | 10 x 6 ft | 1,283.00 | 1,329.07 | 1,327.86 |
| P-3 | 535.00 | 10 x 6 ft | 1,283.00 | 1,331.07 | 1,329.15 |
| P-4 | 535.00 | 10 x 6 ft | 1,283.00 | 1,333.02 | 1,331.15 |
| P-5 | 425.00 | 10 x 6 ft | 866.00 | 1,334.96 | 1,334.13 |
| P-6 | 425.00 | 10 x 6 ft | 866.00 | 1,337.11 | 1,335.03 |
| P-7 | 425.00 | 10 x 6 ft | 866.00 | 1,339.26 | 1,337.18 |
| P-8 | 442.00 | 10 x 6 ft | 834.00 | 1,341.42 | 1,340.15 |
| P-9 | 441.00 | 10 x 6 ft | 834.00 | 1,343.66 | 1,341.49 |
| P-10 | 441.00 | 10 x 6 ft | 834.00 | 1,345.89 | 1,343.73 |

| | | | | | |
|---|---|---|---|---|---|
| P-11 | 516.00 | 8 x 6 ft | 199.00 | 1,350.98 | 1,347.33 |
| P-12 | 516.00 | 8 x 6 ft | 199.00 | 1,356.28 | 1,351.05 |
| P-13 | 516.00 | 8 x 6 ft | 199.00 | 1,361.58 | 1,356.35 |
| P-14 | 516.00 | 8 x 6 ft | 199.00 | 1,366.88 | 1,361.65 |
| P-15 | 516.00 | 8 x 6 ft | 199.00 | 1,372.18 | 1,366.95 |
| P-16 | 105.00 | 8 x 4 ft | 199.00 | 1,376.49 | 1,372.36 |
| P-17 | 348.00 | 8 x 4 ft | 191.00 | 1,383.64 | 1,376.99 |
| P-18 | 443.00 | 8 x 4 ft | 191.00 | 1,391.64 | 1,383.68 |
| P-20 | 296.00 | 30 inch | 8.00 | 1,381.94 | 1,379.13 |
| P-21 | 300.00 | 30 inch | 8.00 | 1,389.94 | 1,382.11 |

| | | | | Hydraulic Grade | |
|---|---|---|---|---|---|
| Label | Length | Size | Discharge | Upstream | Downstream |
| P-22 | 292.00 | 30 inch | 8.00 | 1,397.94 | 1,390.11 |
| P-23 | 190.00 | 30 inch | 8.00 | 1,402.94 | 1,398.11 |
| P-24 | 60.00 | 30 inch | 8.00 | 1,404.94 | 1,403.11 |
| P-29 | 405.00 | 8 x 6 ft | 549.00 | 1,351.03 | 1,349.01 |
| P-30 | 405.00 | 8 x 5 ft | 549.00 | 1,354.97 | 1,352.41 |
| P-31 | 536.00 | 8 x 5 ft | 549.00 | 1,357.82 | 1,355.05 |
| P-32 | 415.00 | 8 x 5 ft | 424.00 | 1,364.11 | 1,358.98 |
| P-33 | 415.00 | 8 x 5 ft | 424.00 | 1,369.27 | 1,364.22 |
| P-34 | 415.00 | 8 x 5 ft | 424.00 | 1,374.44 | 1,369.38 |
| P-35 | 140.00 | 60 inch | 27.00 | 1,358.91 | 1,358.98 |
| P-36 | 545.00 | 48 inch | 27.00 | 1,365.04 | 1,358.65 |
| P-37 | 475.00 | 48 inch | 27.00 | 1,377.04 | 1,365.32 |
| P-38 | 475.00 | 48 inch | 27.00 | 1,391.54 | 1,377.32 |
| P-39 | 270.00 | 8 x 5 ft | 368.00 | 1,336.36 | 1,334.42 |
| P-40 | 525.00 | 8 x 5 ft | 368.00 | 1,339.21 | 1,336.46 |
| P-41 | 525.00 | 8 x 5 ft | 368.00 | 1,342.06 | 1,339.31 |
| P-42 | 460.00 | 8 x 5 ft | 368.00 | 1,344.56 | 1,342.16 |
| P-43 | 90.00 | 8 x 5 ft | 368.00 | 1,345.04 | 1,344.66 |
| P-44 | 428.00 | 10 x 6 ft | 86.00 | 1,347.32 | 1,347.33 |
| P-48 | 20.00 | 48 inch | 32.00 | 1,341.68 | 1,340.15 |

| | | | | Hydraulic Grade | |
|---|---|---|---|---|---|
| Label | Length | Size | Discharge | Upstream | Downstream |
| P-49 | 30.00 | 48 inch | 49.00 | 1,336.60 | 1,334.13 |
| P-50 | 32.00 | 60 inch | 98.00 | 1,360.32 | 1,358.98 |
| P-45 | 428.00 | 10 x 6 ft | 86.00 | 1,347.49 | 1,347.33 |
| P-46 | 428.00 | 10 x 6 ft | 86.00 | 1,349.07 | 1,347.52 |
| P-47 | 67.00 | 10 x 6 ft | 86.00 | 1,349.32 | 1,349.10 |
| P-25 | 333.00 | 8 x 6 ft | 549.00 | 1,347.51 | 1,347.33 |
| P-26 | 332.00 | 8 x 6 ft | 549.00 | 1,347.83 | 1,347.54 |
| P-27 | 320.00 | 8 x 6 ft | 549.00 | 1,348.32 | 1,347.87 |
| P-28 | 320.00 | 8 x 6 ft | 549.00 | 1,348.96 | 1,348.36 |
| P-19 | 296.00 | 36 inch | 8.00 | 1,378.75 | 1,376.99 |

| | | Elevations | | |
|---|---|---|---|---|
| Label | Discharge | Ground | Upstream HGL | Downstream HGL |
| Outlet | 1,283.00 | 1,331.00 | 1,327.00 | 1,327.00 |
| J-1 | 1,283.00 | 1,331.00 | 1,327.86 | 1,327.70 |
| J-2 | 1,283.00 | 1,336.00 | 1,329.15 | 1,329.07 |
| J-3 | 1,283.00 | 1,338.50 | 1,331.15 | 1,331.07 |
| J-4 | 1,283.00 | 1,340.00 | 1,334.13 | 1,333.02 |
| J-5 | 866.00 | 1,343.50 | 1,335.03 | 1,334.96 |
| J-6 | 866.00 | 1,344.00 | 1,337.18 | 1,337.11 |
| J-7 | 866.00 | 1,347.00 | 1,340.15 | 1,339.26 |
| J-8 | 834.00 | 1,349.00 | 1,341.49 | 1,341.42 |
| J-9 | 834.00 | 1,352.00 | 1,343.73 | 1,343.66 |
| J-10 | 834.00 | 1,356.00 | 1,347.33 | 1,345.89 |
| J-11 | 199.00 | 1,360.00 | 1,351.05 | 1,350.98 |
| J-12 | 199.00 | 1,365.00 | 1,356.35 | 1,356.28 |
| J-13 | 199.00 | 1,370.00 | 1,361.65 | 1,361.58 |
| J-14 | 199.00 | 1,375.00 | 1,366.95 | 1,366.88 |
| J-15 | 199.00 | 1,380.00 | 1,372.98 | 1,372.18 |
| J-16 | 199.00 | 1,382.00 | 1,376.99 | 1,376.49 |
| J-17 | 191.00 | 1,388.00 | 1,383.68 | 1,383.64 |
| I-1 | 191.00 | 1,397.00 | 1,391.81 | 1,391.64 |
| J-18 | 8.00 | 1,383.50 | 1,378.91 | 1,378.75 |

| | | Elevations | | |
|---|---|---|---|---|
| Label | Discharge | Ground | Upstream HGL | Downstream HGL |
| J-19 | 8.00 | 1,386.00 | 1,382.11 | 1,381.94 |
| J-20 | 8.00 | 1,394.50 | 1,390.11 | 1,389.94 |
| J-21 | 8.00 | 1,402.00 | 1,398.11 | 1,397.94 |
| J-22 | 8.00 | 1,407.00 | 1,403.11 | 1,402.94 |
| I-2 | 8.00 | 1,409.00 | 1,405.01 | 1,404.94 |
| J-24 | 549.00 | 1,355.00 | 1,347.87 | 1,347.83 |
| J-26 | 549.00 | 1,357.00 | 1,349.01 | 1,348.96 |
| J-27 | 549.00 | 1,360.00 | 1,351.16 | 1,351.03 |
| J-28 | 549.00 | 1,362.50 | 1,355.05 | 1,354.97 |
| J-29 | 549.00 | 1,367.00 | 1,358.98 | 1,357.82 |
| J-30 | 424.00 | 1,370.00 | 1,364.22 | 1,364.11 |
| J-31 | 424.00 | 1,373.00 | 1,369.38 | 1,369.27 |
| I-3 | 424.00 | 1,378.00 | 1,374.88 | 1,374.44 |
| J-32 | 27.00 | 1,364.00 | 1,358.98 | 1,358.91 |
| J-33 | 27.00 | 1,372.50 | 1,365.32 | 1,365.04 |
| J-34 | 27.00 | 1,382.00 | 1,377.32 | 1,377.04 |


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| | | | | |
|---|---|---|---|---|
| I-4 | 27.00 | 1,396.00 | 1,391.65 | 1,391.54 |
| J-35 | 368.00 | 1,342.00 | 1,336.46 | 1,336.36 |
| J-36 | 368.00 | 1,343.00 | 1,339.31 | 1,339.21 |
| J-37 | 368.00 | 1,346.00 | 1,342.16 | 1,342.06 |

| | | Elevations | |
|---|---|---|---|
| Label | Discharge | Ground | Upstream HGL | Downstream HGL |
| J-38 | 368.00 | 1,346.50 | 1,344.66 | 1,344.56 |
| I-5 | 368.00 | 1,347.00 | 1,345.44 | 1,345.04 |
| J-39 | 86.00 | 1,356.00 | 1,347.33 | 1,347.32 |
| J-40 | 86.00 | 1,356.00 | 1,347.52 | 1,347.49 |
| I-6 | 86.00 | 1,356.50 | 1,349.45 | 1,349.32 |
| I-7 | 32.00 | 1,347.00 | 1,341.81 | 1,341.68 |
| I-8 | 49.00 | 1,342.00 | 1,336.77 | 1,336.60 |
| I-9 | 98.00 | 1,367.00 | 1,360.55 | 1,360.32 |
| J-41 | 86.00 | 1,356.00 | 1,349.10 | 1,349.07 |
| J-23 | 549.00 | 1,356.50 | 1,347.54 | 1,347.51 |
| J-25 | 549.00 | 1,356.00 | 1,348.36 | 1,348.32 |

Elapsed: 0 minute(s) 17 second(s)

# Combined Pipe/Node Report

| Pipe | Upstream Node | Downstream Node | Length (ft) | Inlet Area (acres) | Weighted Roughness Coefficient | Inlet CA (acres) | Total CA (acres) | Inlet Discharge (cfs) | Section Size | Capacity (cfs) | Average Velocity (ft/s) | Upstream Invert Elevation (ft) | Downstream Invert Elevation (ft) | Constructed Slope (ft/ft) | Description |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P-49 | I-8 | J-4 | 30.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 48 inch | 426.90 | 6.97 | 1,334.50 | 1,331.85 | 0.088333 | |
| P-43 | I-5 | J-38 | 90.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 8 x 5 ft | 444.97 | 11.26 | 1,341.00 | 1,340.52 | 0.005333 | 56th Street□ |
| P-42 | J-38 | J-37 | 460.00 | N/A | N/A | N/A | 0.00 | N/A | 8 x 5 ft | 449.19 | 11.26 | 1,340.52 | 1,338.02 | 0.005435 | 56th Street□ |
| P-41 | J-37 | J-36 | 525.00 | N/A | N/A | N/A | 0.00 | N/A | 8 x 5 ft | 448.93 | 11.26 | 1,338.02 | 1,335.17 | 0.005429 | 56th Street□ |
| P-40 | J-36 | J-35 | 525.00 | N/A | N/A | N/A | 0.00 | N/A | 8 x 5 ft | 448.93 | 11.26 | 1,335.17 | 1,332.32 | 0.005429 | 56th Street□ |
| P-39 | J-35 | J-4 | 270.00 | N/A | N/A | N/A | 0.00 | N/A | 8 x 5 ft | 449.59 | 12.13 | 1,332.32 | 1,330.85 | 0.005444 | 56th Street□ |
| P-48 | I-7 | J-7 | 20.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 48 inch | 418.77 | 6.02 | 1,340.00 | 1,338.30 | 0.085000 | |
| P-50 | I-9 | J-29 | 32.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 60 inch | 651.07 | 7.66 | 1,357.50 | 1,355.50 | 0.062500 | |
| P-38 | I-4 | J-34 | 475.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 48 inch | 250.96 | 5.45 | 1,390.00 | 1,375.50 | 0.030526 | Butler Drive |
| P-37 | J-34 | J-33 | 475.00 | N/A | N/A | N/A | 0.00 | N/A | 48 inch | 228.30 | 5.45 | 1,375.50 | 1,363.50 | 0.025263 | Butler Drive |
| P-36 | J-33 | J-32 | 545.00 | N/A | N/A | N/A | 0.00 | N/A | 48 inch | 150.71 | 7.57 | 1,363.50 | 1,357.50 | 0.011009 | Butler Drive |
| P-35 | J-32 | J-29 | 140.00 | N/A | N/A | N/A | 0.00 | N/A | 60 inch | 311.27 | 2.17 | 1,356.50 | 1,354.50 | 0.014286 | Butler Drive |
| P-34 | I-3 | J-31 | 415.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 8 x 5 ft | 680.08 | 11.80 | 1,370.00 | 1,364.83 | 0.012458 | 52nd Street |
| P-33 | J-31 | J-30 | 415.00 | N/A | N/A | N/A | 0.00 | N/A | 8 x 5 ft | 679.42 | 11.80 | 1,364.83 | 1,359.67 | 0.012434 | 52nd Street |
| P-32 | J-30 | J-29 | 415.00 | N/A | N/A | N/A | 0.00 | N/A | 8 x 5 ft | 680.08 | 11.89 | 1,359.67 | 1,354.50 | 0.012458 | 52nd Street |
| P-31 | J-29 | J-28 | 536.00 | N/A | N/A | N/A | 0.00 | N/A | 8 x 5 ft | 888.60 | 10.21 | 1,354.50 | 1,351.65 | 0.005317 | 52nd Street |
| P-30 | J-28 | J-27 | 405.00 | N/A | N/A | N/A | 0.00 | N/A | 8 x 5 ft | 887.89 | 11.06 | 1,351.65 | 1,349.50 | 0.005309 | 52nd Street |
| P-29 | J-27 | J-26 | 405.00 | N/A | N/A | N/A | 0.00 | N/A | 8 x 6 ft | 1,852.30 | 8.31 | 1,348.50 | 1,346.00 | 0.006173 | 52nd Street |
| P-28 | J-26 | J-25 | 320.00 | N/A | N/A | N/A | 0.00 | N/A | 8 x 6 ft | 1,133.73 | 7.54 | 1,346.00 | 1,345.26 | 0.002313 | 52nd Street |
| P-27 | J-25 | J-24 | 320.00 | N/A | N/A | N/A | 0.00 | N/A | 8 x 6 ft | 1,126.05 | 7.16 | 1,345.26 | 1,344.53 | 0.002281 | 52nd Street |
| P-26 | J-24 | J-23 | 332.00 | N/A | N/A | N/A | 0.00 | N/A | 8 x 6 ft | 1,135.39 | 6.49 | 1,344.53 | 1,343.76 | 0.002319 | 52nd Street |
| P-25 | J-23 | J-10 | 333.00 | N/A | N/A | N/A | 0.00 | N/A | 8 x 6 ft | 1,126.30 | 5.69 | 1,343.76 | 1,343.00 | 0.002282 | 52nd Street |
| P-47 | I-6 | J-41 | 67.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 10 x 6 ft | 637.00 | 6.44 | 1,348.00 | 1,347.75 | 0.003731 | 52nd Street |
| P-46 | J-41 | J-40 | 428.00 | N/A | N/A | N/A | 0.00 | N/A | 10 x 6 ft | 633.59 | 6.44 | 1,347.75 | 1,346.17 | 0.003692 | 52nd Street |
| P-45 | J-40 | J-39 | 428.00 | N/A | N/A | N/A | 0.00 | N/A | 10 x 6 ft | 635.60 | 4.82 | 1,346.17 | 1,344.58 | 0.003715 | 52nd Street |
| P-44 | J-39 | J-10 | 428.00 | N/A | N/A | N/A | 0.00 | N/A | 10 x 6 ft | 633.59 | 2.56 | 1,344.58 | 1,343.00 | 0.003692 | 52nd Street |
| P-24 | I-2 | J-22 | 60.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 30 inch | 74.88 | 4.26 | 1,404.00 | 1,402.00 | 0.033333 | Tatum Boule |
| P-23 | J-22 | J-21 | 190.00 | N/A | N/A | N/A | 0.00 | N/A | 30 inch | 66.53 | 4.26 | 1,402.00 | 1,397.00 | 0.026316 | Tatum Boule |
| P-22 | J-21 | J-20 | 292.00 | N/A | N/A | N/A | 0.00 | N/A | 30 inch | 67.89 | 4.26 | 1,397.00 | 1,389.00 | 0.027397 | Tatum Boule |
| P-21 | J-20 | J-19 | 300.00 | N/A | N/A | N/A | 0.00 | N/A | 30 inch | 66.98 | 4.26 | 1,389.00 | 1,381.00 | 0.026667 | Tatum Boule |
| P-20 | J-19 | J-18 | 296.00 | N/A | N/A | N/A | 0.00 | N/A | 30 inch | 38.73 | 5.48 | 1,381.00 | 1,378.36 | 0.008919 | Tatum Boule |
| P-19 | J-18 | J-16 | 296.00 | N/A | N/A | N/A | 0.00 | N/A | 36 inch | 55.64 | 3.80 | 1,377.86 | 1,375.80 | 0.006959 | Tatum Boule |
| P-18 | I-1 | J-17 | 443.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 8 x 4 ft | 1,190.88 | 7.18 | 1,390.00 | 1,382.00 | 0.018059 | Doubletree |
| P-17 | J-17 | J-16 | 348.00 | N/A | N/A | N/A | 0.00 | N/A | 8 x 4 ft | 1,274.68 | 6.35 | 1,382.00 | 1,374.80 | 0.020690 | Doubletree |
| P-16 | J-16 | J-15 | 105.00 | N/A | N/A | N/A | 0.00 | N/A | 8 x 4 ft | 1,571.04 | 10.88 | 1,374.80 | 1,371.50 | 0.031429 | Doubletree |
| P-15 | J-15 | J-14 | 516.00 | N/A | N/A | N/A | 0.00 | N/A | 8 x 6 ft | 796.46 | 9.17 | 1,369.50 | 1,364.20 | 0.010271 | Doubletree |
| P-14 | J-14 | J-13 | 516.00 | N/A | N/A | N/A | 0.00 | N/A | 8 x 6 ft | 796.46 | 9.17 | 1,364.20 | 1,358.90 | 0.010271 | Doubletree |


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# Combined Pipe/Node Report

| Pipe | Upstream Node | Downstream Node | Length (ft) | Inlet Area (acres) | Weighted Roughness Coefficient | Inlet CA (acres) | Total CA (acres) | Inlet Discharge (cfs) | Section Size | Capacity (cfs) | Average Velocity (ft/s) | Upstream Invert Elevation (ft) | Downstream Invert Elevation (ft) | Constructed Slope (ft/ft) | Description |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P-13 | J-13 | J-12 | 516.00 | N/A | N/A | N/A | 0.00 | N/A | 8 x 6 ft | 796.46 | 9.17 | 1,358.90 | 1,353.60 | 0.010271 | Doubletree |
| P-12 | J-12 | J-11 | 516.00 | N/A | N/A | N/A | 0.00 | N/A | 8 x 6 ft | 796.46 | 9.17 | 1,353.60 | 1,348.30 | 0.010271 | Doubletree |
| P-11 | J-11 | J-10 | 516.00 | N/A | N/A | N/A | 0.00 | N/A | 8 x 6 ft | 796.46 | 7.52 | 1,348.30 | 1,343.00 | 0.010271 | Doubletree |
| P-10 | J-10 | J-9 | 441.00 | N/A | N/A | N/A | 0.00 | N/A | 10 x 6 ft | 2,224.63 | 9.52 | 1,343.00 | 1,340.77 | 0.005057 | Doubletree |
| P-9 | J-9 | J-8 | 441.00 | N/A | N/A | N/A | 0.00 | N/A | 10 x 6 ft | 2,229.61 | 9.52 | 1,340.77 | 1,338.53 | 0.005079 | Doubletree |
| P-8 | J-8 | J-7 | 442.00 | N/A | N/A | N/A | 0.00 | N/A | 10 x 6 ft | 2,222.11 | 8.43 | 1,338.53 | 1,336.30 | 0.005045 | Doubletree |
| P-7 | J-7 | J-6 | 425.00 | N/A | N/A | N/A | 0.00 | N/A | 10 x 6 ft | 2,225.10 | 9.64 | 1,336.30 | 1,334.15 | 0.005059 | Doubletree |
| P-6 | J-6 | J-5 | 425.00 | N/A | N/A | N/A | 0.00 | N/A | 10 x 6 ft | 2,225.10 | 9.64 | 1,334.15 | 1,332.00 | 0.005059 | Doubletree |
| P-5 | J-5 | J-4 | 425.00 | N/A | N/A | N/A | 0.00 | N/A | 10 x 6 ft | 2,225.10 | 8.25 | 1,332.00 | 1,329.85 | 0.005059 | Doubletree |
| P-4 | J-4 | J-3 | 535.00 | N/A | N/A | N/A | 0.00 | N/A | 10 x 6 ft | 2,518.28 | 9.98 | 1,329.85 | 1,327.90 | 0.003645 | Doubletree |
| P-3 | J-3 | J-2 | 535.00 | N/A | N/A | N/A | 0.00 | N/A | 10 x 6 ft | 2,518.28 | 10.06 | 1,327.90 | 1,325.95 | 0.003645 | Doubletree |
| P-2 | J-2 | J-1 | 390.00 | N/A | N/A | N/A | 0.00 | N/A | 10 x 6 ft | 2,472.25 | 9.86 | 1,325.90 | 1,324.53 | 0.003513 | Doubletree |
| P-1 | J-1 | Outlet | 145.00 | N/A | N/A | N/A | 0.00 | N/A | 10 x 6 ft | 2,521.84 | 10.33 | 1,324.53 | 1,324.00 | 0.003655 | Doubletree |


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# DOT Report

| Pipe | -Node- Upstream Downstream | Inlet Area (acres) | Inlet CA (acres) | Total CA (acres) | -Ground- Upstream Downstream (ft) | -HGL- Upstream Downstream (ft) | -Slope- Energy Constructed (ft/ft) | -Section- Discharge Capacity (cfs) | -Section- Shape Size | Length (ft) | Average Velocity (ft/s) | Description |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P-49 | I-8 | 0.00 | 0.00 | 0.00 | 1,342.00 | 1,336.60 | 0.087420 | 49.00 | Circular | 30.00 | 6.97 | |
| | J-4 | | | | 1,340.00 | 1,334.13 | 0.088333 | 426.90 | 48 inch | | | |
| P-43 | I-5 | 0.00 | 0.00 | 0.00 | 1,347.00 | 1,345.04 | 0.005293 | 368.00 | Box | 90.00 | 11.26 | 56th Street□ |
| | J-38 | | | | 1,346.50 | 1,344.66 | 0.005333 | 444.97 | 8 x 5 ft | | | |
| P-42 | J-38 | N/A | N/A | 0.00 | 1,346.50 | 1,344.56 | 0.005427 | 368.00 | Box | 460.00 | 11.26 | 56th Street□ |
| | J-37 | | | | 1,346.00 | 1,342.16 | 0.005435 | 449.19 | 8 x 5 ft | | | |
| P-41 | J-37 | N/A | N/A | 0.00 | 1,346.00 | 1,342.06 | 0.005422 | 368.00 | Box | 525.00 | 11.26 | 56th Street□ |
| | J-36 | | | | 1,343.00 | 1,339.31 | 0.005429 | 448.93 | 8 x 5 ft | | | |
| P-40 | J-36 | N/A | N/A | 0.00 | 1,343.00 | 1,339.21 | 0.005422 | 368.00 | Box | 525.00 | 11.26 | 56th Street□ |
| | J-35 | | | | 1,342.00 | 1,336.46 | 0.005429 | 448.93 | 8 x 5 ft | | | |
| P-39 | J-35 | N/A | N/A | 0.00 | 1,342.00 | 1,336.36 | 0.005098 | 368.00 | Box | 270.00 | 12.13 | 56th Street□ |
| | J-4 | | | | 1,340.00 | 1,334.42 | 0.005444 | 449.59 | 8 x 5 ft | | | |
| P-48 | I-7 | 0.00 | 0.00 | 0.00 | 1,347.00 | 1,341.68 | 0.083644 | 32.00 | Circular | 20.00 | 6.02 | |
| | J-7 | | | | 1,347.00 | 1,340.15 | 0.085000 | 418.77 | 48 inch | | | |
| P-50 | I-9 | 0.00 | 0.00 | 0.00 | 1,367.00 | 1,360.32 | 0.055733 | 98.00 | Circular | 32.00 | 7.66 | |
| | J-29 | | | | 1,367.00 | 1,358.98 | 0.062500 | 651.07 | 60 inch | | | |
| P-38 | I-4 | 0.00 | 0.00 | 0.00 | 1,396.00 | 1,391.54 | 0.030362 | 27.00 | Circular | 475.00 | 5.45 | Butler Drive |
| | J-34 | | | | 1,382.00 | 1,377.32 | 0.030526 | 250.96 | 48 inch | | | |
| P-37 | J-34 | N/A | N/A | 0.00 | 1,382.00 | 1,377.04 | 0.025099 | 27.00 | Circular | 475.00 | 5.45 | Butler Drive |
| | J-33 | | | | 1,372.50 | 1,365.32 | 0.025263 | 228.30 | 48 inch | | | |
| P-36 | J-33 | N/A | N/A | 0.00 | 1,372.50 | 1,365.04 | 0.010428 | 27.00 | Circular | 545.00 | 7.57 | Butler Drive |
| | J-32 | | | | 1,364.00 | 1,358.65 | 0.011009 | 150.71 | 48 inch | | | |
| P-35 | J-32 | N/A | N/A | 0.00 | 1,364.00 | 1,358.91 | 0.000202 | 27.00 | Circular | 140.00 | 2.17 | Butler Drive |
| | J-29 | | | | 1,367.00 | 1,358.98 | 0.014286 | 311.27 | 60 inch | | | |
| P-34 | I-3 | 0.00 | 0.00 | 0.00 | 1,378.00 | 1,374.44 | 0.012448 | 424.00 | Box | 415.00 | 11.80 | 52nd Street |
| | J-31 | | | | 1,373.00 | 1,369.38 | 0.012458 | 680.08 | 8 x 5 ft | | | |
| P-33 | J-31 | N/A | N/A | 0.00 | 1,373.00 | 1,369.27 | 0.012424 | 424.00 | Box | 415.00 | 11.80 | 52nd Street |
| | J-30 | | | | 1,370.00 | 1,364.22 | 0.012434 | 679.42 | 8 x 5 ft | | | |
| P-32 | J-30 | N/A | N/A | 0.00 | 1,370.00 | 1,364.11 | 0.012456 | 424.00 | Box | 415.00 | 11.89 | 52nd Street |
| | J-29 | | | | 1,367.00 | 1,358.98 | 0.012458 | 680.08 | 8 x 5 ft | | | |
| P-31 | J-29 | N/A | N/A | 0.00 | 1,367.00 | 1,357.82 | 0.005312 | 549.00 | Box | 536.00 | 10.21 | 52nd Street |
| | J-28 | | | | 1,362.50 | 1,355.05 | 0.005317 | 888.60 | 8 x 5 ft | | | |
| P-30 | J-28 | N/A | N/A | 0.00 | 1,362.50 | 1,354.97 | 0.005085 | 549.00 | Box | 405.00 | 11.06 | 52nd Street |
| | J-27 | | | | 1,360.00 | 1,352.41 | 0.005309 | 887.89 | 8 x 5 ft | | | |
| P-29 | J-27 | N/A | N/A | 0.00 | 1,360.00 | 1,351.03 | 0.005908 | 549.00 | Box | 405.00 | 8.31 | 52nd Street |
| | J-26 | | | | 1,357.00 | 1,349.01 | 0.006173 | 1,852.30 | 8 x 6 ft | | | |
| P-28 | J-26 | N/A | N/A | 0.00 | 1,357.00 | 1,348.96 | 0.002130 | 549.00 | Box | 320.00 | 7.54 | 52nd Street |


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# DOT Report

| Pipe | -Node- Upstream Downstream | Inlet Area (acres) | Inlet CA (acres) | Total CA (acres) | -Ground- Upstream Downstream (ft) | -HGL- Upstream Downstream (ft) | -Slope- Energy Constructed (ft/ft) | -Section- Discharge Capacity (cfs) | -Section- Shape Size | Length (ft) | Average Velocity (ft/s) | Description |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | J-25 | | | | 1,356.00 | 1,348.36 | 0.002313 | 1,133.73 | 8 x 6 ft | | | |
| P-27 | J-25 | N/A | N/A | 0.00 | 1,356.00 | 1,348.32 | 0.001850 | 549.00 | Box | 320.00 | 7.16 | 52nd Street |
| | J-24 | | | | 1,355.00 | 1,347.87 | 0.002281 | 1,126.05 | 8 x 6 ft | | | |
| P-26 | J-24 | N/A | N/A | 0.00 | 1,355.00 | 1,347.83 | 0.001406 | 549.00 | Box | 332.00 | 6.49 | 52nd Street |
| | J-23 | | | | 1,356.50 | 1,347.54 | 0.002319 | 1,135.39 | 8 x 6 ft | | | |
| P-25 | J-23 | N/A | N/A | 0.00 | 1,356.50 | 1,347.51 | 0.000983 | 549.00 | Box | 333.00 | 5.69 | 52nd Street |
| | J-10 | | | | 1,356.00 | 1,347.33 | 0.002282 | 1,126.30 | 8 x 6 ft | | | |
| P-47 | I-6 | 0.00 | 0.00 | 0.00 | 1,356.50 | 1,349.32 | 0.003713 | 86.00 | Box | 67.00 | 6.44 | 52nd Street |
| | J-41 | | | | 1,356.00 | 1,349.10 | 0.003731 | 637.00 | 10 x 6 ft | | | |
| P-46 | J-41 | N/A | N/A | 0.00 | 1,356.00 | 1,349.07 | 0.003689 | 86.00 | Box | 428.00 | 6.44 | 52nd Street |
| | J-40 | | | | 1,356.00 | 1,347.52 | 0.003692 | 633.59 | 10 x 6 ft | | | |
| P-45 | J-40 | N/A | N/A | 0.00 | 1,356.00 | 1,347.49 | 0.001568 | 86.00 | Box | 428.00 | 4.82 | 52nd Street |
| | J-39 | | | | 1,356.00 | 1,347.33 | 0.003715 | 635.60 | 10 x 6 ft | | | |
| P-44 | J-39 | N/A | N/A | 0.00 | 1,356.00 | 1,347.32 | 0.000193 | 86.00 | Box | 428.00 | 2.56 | 52nd Street |
| | J-10 | | | | 1,356.00 | 1,347.33 | 0.003692 | 633.59 | 10 x 6 ft | | | |
| P-24 | I-2 | 0.00 | 0.00 | 0.00 | 1,409.00 | 1,404.94 | 0.032542 | 8.00 | Circular | 60.00 | 4.26 | Tatum Boule |
| | J-22 | | | | 1,407.00 | 1,403.11 | 0.033333 | 74.88 | 30 inch | | | |
| P-23 | J-22 | N/A | N/A | 0.00 | 1,407.00 | 1,402.94 | 0.026066 | 8.00 | Circular | 190.00 | 4.26 | Tatum Boule |
| | J-21 | | | | 1,402.00 | 1,398.11 | 0.026316 | 66.53 | 30 inch | | | |
| P-22 | J-21 | N/A | N/A | 0.00 | 1,402.00 | 1,397.94 | 0.027235 | 8.00 | Circular | 292.00 | 4.26 | Tatum Boule |
| | J-20 | | | | 1,394.50 | 1,390.11 | 0.027397 | 67.89 | 30 inch | | | |
| P-21 | J-20 | N/A | N/A | 0.00 | 1,394.50 | 1,389.94 | 0.026508 | 8.00 | Circular | 300.00 | 4.26 | Tatum Boule |
| | J-19 | | | | 1,386.00 | 1,382.11 | 0.026667 | 66.98 | 30 inch | | | |
| P-20 | J-19 | N/A | N/A | 0.00 | 1,386.00 | 1,381.94 | 0.008641 | 8.00 | Circular | 296.00 | 5.48 | Tatum Boule |
| | J-18 | | | | 1,383.50 | 1,379.13 | 0.008919 | 38.73 | 30 inch | | | |
| P-19 | J-18 | N/A | N/A | 0.00 | 1,383.50 | 1,378.75 | 0.006533 | 8.00 | Circular | 296.00 | 3.80 | Tatum Boule |
| | J-16 | | | | 1,382.00 | 1,376.99 | 0.006959 | 55.64 | 36 inch | | | |
| P-18 | I-1 | 0.00 | 0.00 | 0.00 | 1,397.00 | 1,391.64 | 0.018055 | 191.00 | Box | 443.00 | 7.18 | Doubletree |
| | J-17 | | | | 1,388.00 | 1,383.68 | 0.018059 | 1,190.88 | 8 x 4 ft | | | |
| P-17 | J-17 | N/A | N/A | 0.00 | 1,388.00 | 1,383.64 | 0.020141 | 191.00 | Box | 348.00 | 6.35 | Doubletree |
| | J-16 | | | | 1,382.00 | 1,376.99 | 0.020690 | 1,274.68 | 8 x 4 ft | | | |
| P-16 | J-16 | N/A | N/A | 0.00 | 1,382.00 | 1,376.49 | 0.016630 | 199.00 | Box | 105.00 | 10.88 | Doubletree |
| | J-15 | | | | 1,380.00 | 1,372.36 | 0.031429 | 1,571.04 | 8 x 4 ft | | | |
| P-15 | J-15 | N/A | N/A | 0.00 | 1,380.00 | 1,372.18 | 0.010267 | 199.00 | Box | 516.00 | 9.17 | Doubletree |
| | J-14 | | | | 1,375.00 | 1,366.95 | 0.010271 | 796.46 | 8 x 6 ft | | | |
| P-14 | J-14 | N/A | N/A | 0.00 | 1,375.00 | 1,366.88 | 0.010267 | 199.00 | Box | 516.00 | 9.17 | Doubletree |
| | J-13 | | | | 1,370.00 | 1,361.65 | 0.010271 | 796.46 | 8 x 6 ft | | | |


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# DOT Report

| Pipe | -Node- Upstream Downstream | Inlet Area (acres) | Inlet CA (acres) | Total CA (acres) | -Ground- Upstream Downstream (ft) | -HGL- Upstream Downstream (ft) | -Slope- Energy Constructed (ft/ft) | -Section- Discharge Capacity (cfs) | -Section- Shape Size | Length (ft) | Average Velocity (ft/s) | Description |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P-13 | J-13 | N/A | N/A | 0.00 | 1,370.00 | 1,361.58 | 0.010267 | 199.00 | Box | 516.00 | 9.17 | Doubletree |
| | J-12 | | | | 1,365.00 | 1,356.35 | 0.010271 | 796.46 | 8 x 6 ft | | | |
| P-12 | J-12 | N/A | N/A | 0.00 | 1,365.00 | 1,356.28 | 0.010267 | 199.00 | Box | 516.00 | 9.17 | Doubletree |
| | J-11 | | | | 1,360.00 | 1,351.05 | 0.010271 | 796.46 | 8 x 6 ft | | | |
| P-11 | J-11 | N/A | N/A | 0.00 | 1,360.00 | 1,350.98 | 0.008677 | 199.00 | Box | 516.00 | 7.52 | Doubletree |
| | J-10 | | | | 1,356.00 | 1,347.33 | 0.010271 | 796.46 | 8 x 6 ft | | | |
| P-10 | J-10 | N/A | N/A | 0.00 | 1,356.00 | 1,345.89 | 0.005051 | 834.00 | Box | 441.00 | 9.52 | Doubletree |
| | J-9 | | | | 1,352.00 | 1,343.73 | 0.005057 | 2,224.63 | 10 x 6 ft | | | |
| P-9 | J-9 | N/A | N/A | 0.00 | 1,352.00 | 1,343.66 | 0.005073 | 834.00 | Box | 441.00 | 9.52 | Doubletree |
| | J-8 | | | | 1,349.00 | 1,341.49 | 0.005079 | 2,229.61 | 10 x 6 ft | | | |
| P-8 | J-8 | N/A | N/A | 0.00 | 1,349.00 | 1,341.42 | 0.004298 | 834.00 | Box | 442.00 | 8.43 | Doubletree |
| | J-7 | | | | 1,347.00 | 1,340.15 | 0.005045 | 2,222.11 | 10 x 6 ft | | | |
| P-7 | J-7 | N/A | N/A | 0.00 | 1,347.00 | 1,339.26 | 0.005053 | 866.00 | Box | 425.00 | 9.64 | Doubletree |
| | J-6 | | | | 1,344.00 | 1,337.18 | 0.005059 | 2,225.10 | 10 x 6 ft | | | |
| P-6 | J-6 | N/A | N/A | 0.00 | 1,344.00 | 1,337.11 | 0.005053 | 866.00 | Box | 425.00 | 9.64 | Doubletree |
| | J-5 | | | | 1,343.50 | 1,335.03 | 0.005059 | 2,225.10 | 10 x 6 ft | | | |
| P-5 | J-5 | N/A | N/A | 0.00 | 1,343.50 | 1,334.96 | 0.003759 | 866.00 | Box | 425.00 | 8.25 | Doubletree |
| | J-4 | | | | 1,340.00 | 1,334.13 | 0.005059 | 2,225.10 | 10 x 6 ft | | | |
| P-4 | J-4 | N/A | N/A | 0.00 | 1,340.00 | 1,333.02 | 0.003639 | 1,283.00 | Box | 535.00 | 9.98 | Doubletree |
| | J-3 | | | | 1,338.50 | 1,331.15 | 0.003645 | 2,518.28 | 10 x 6 ft | | | |
| P-3 | J-3 | N/A | N/A | 0.00 | 1,338.50 | 1,331.07 | 0.003644 | 1,283.00 | Box | 535.00 | 10.06 | Doubletree |
| | J-2 | | | | 1,336.00 | 1,329.15 | 0.003645 | 2,518.28 | 10 x 6 ft | | | |
| P-2 | J-2 | N/A | N/A | 0.00 | 1,336.00 | 1,329.07 | 0.003484 | 1,283.00 | Box | 390.00 | 9.86 | Doubletree |
| | J-1 | | | | 1,331.00 | 1,327.86 | 0.003513 | 2,472.25 | 10 x 6 ft | | | |
| P-1 | J-1 | N/A | N/A | 0.00 | 1,331.00 | 1,327.70 | 0.003590 | 1,283.00 | Box | 145.00 | 10.33 | Doubletree |
| | Outlet | | | | 1,331.00 | 1,327.04 | 0.003655 | 2,521.84 | 10 x 6 ft | | | |

# Pipe Report

| Upstream Node | Downstream Node | Weighted Roughness Coefficient | Discharge (cfs) | Length (ft) | Constructed Slope (ft/ft) | Section Size | Roughness | Capacity (cfs) | Upstream Invert Elevation (ft) | Downstream Invert Elevation (ft) | Upstream Ground Elevation (ft) | Downstream Ground Elevation (ft) | Upstream Cover (ft) | Downstream Cover (ft) | Upstream HGL (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| I-8 | J-4 | 0.00 | 49.00 | 30.00 | 0.088333 | 48 inch | 0.013 | 426.90 | 1,334.50 | 1,331.85 | 1,342.00 | 1,340.00 | 3.50 | 4.15 | 1,336.60 |
| I-5 | J-38 | 0.00 | 368.00 | 90.00 | 0.005333 | 8 x 5 ft | 0.013 | 444.97 | 1,341.00 | 1,340.52 | 1,347.00 | 1,346.50 | 1.00 | 0.98 | 1,345.04 |
| J-38 | J-37 | N/A | 368.00 | 460.00 | 0.005435 | 8 x 5 ft | 0.013 | 449.19 | 1,340.52 | 1,338.02 | 1,346.50 | 1,346.00 | 0.98 | 2.98 | 1,344.56 |
| J-37 | J-36 | N/A | 368.00 | 525.00 | 0.005429 | 8 x 5 ft | 0.013 | 448.93 | 1,338.02 | 1,335.17 | 1,346.00 | 1,343.00 | 2.98 | 2.83 | 1,342.06 |
| J-36 | J-35 | N/A | 368.00 | 525.00 | 0.005429 | 8 x 5 ft | 0.013 | 448.93 | 1,335.17 | 1,332.32 | 1,343.00 | 1,342.00 | 2.83 | 4.68 | 1,339.21 |
| J-35 | J-4 | N/A | 368.00 | 270.00 | 0.005444 | 8 x 5 ft | 0.013 | 449.59 | 1,332.32 | 1,330.85 | 1,342.00 | 1,340.00 | 4.68 | 4.15 | 1,336.36 |
| I-7 | J-7 | 0.00 | 32.00 | 20.00 | 0.085000 | 48 inch | 0.013 | 418.77 | 1,340.00 | 1,338.30 | 1,347.00 | 1,347.00 | 3.00 | 4.70 | 1,341.68 |
| I-9 | J-29 | 0.00 | 98.00 | 32.00 | 0.062500 | 60 inch | 0.013 | 651.07 | 1,357.50 | 1,355.50 | 1,367.00 | 1,367.00 | 4.50 | 6.50 | 1,360.32 |
| I-4 | J-34 | 0.00 | 27.00 | 475.00 | 0.030526 | 48 inch | 0.013 | 250.96 | 1,390.00 | 1,375.50 | 1,396.00 | 1,382.00 | 2.00 | 2.50 | 1,391.54 |
| J-34 | J-33 | N/A | 27.00 | 475.00 | 0.025263 | 48 inch | 0.013 | 228.30 | 1,375.50 | 1,363.50 | 1,382.00 | 1,372.50 | 2.50 | 5.00 | 1,377.04 |
| J-33 | J-32 | N/A | 27.00 | 545.00 | 0.011009 | 48 inch | 0.013 | 150.71 | 1,363.50 | 1,357.50 | 1,372.50 | 1,364.00 | 5.00 | 2.50 | 1,365.04 |
| J-32 | J-29 | N/A | 27.00 | 140.00 | 0.014286 | 60 inch | 0.013 | 311.27 | 1,356.50 | 1,354.50 | 1,364.00 | 1,367.00 | 2.50 | 7.50 | 1,358.91 |
| I-3 | J-31 | 0.00 | 424.00 | 415.00 | 0.012458 | 8 x 5 ft | 0.013 | 680.08 | 1,370.00 | 1,364.83 | 1,378.00 | 1,373.00 | 3.00 | 3.17 | 1,374.44 |
| J-31 | J-30 | N/A | 424.00 | 415.00 | 0.012434 | 8 x 5 ft | 0.013 | 679.42 | 1,364.83 | 1,359.67 | 1,373.00 | 1,370.00 | 3.17 | 5.33 | 1,369.27 |
| J-30 | J-29 | N/A | 424.00 | 415.00 | 0.012458 | 8 x 5 ft | 0.013 | 680.08 | 1,359.67 | 1,354.50 | 1,370.00 | 1,367.00 | 5.33 | 7.50 | 1,364.11 |
| J-29 | J-28 | N/A | 549.00 | 536.00 | 0.005317 | 8 x 5 ft | 0.013 | 888.60 | 1,354.50 | 1,351.65 | 1,367.00 | 1,362.50 | 7.50 | 5.85 | 1,357.82 |
| J-28 | J-27 | N/A | 549.00 | 405.00 | 0.005309 | 8 x 5 ft | 0.013 | 887.89 | 1,351.65 | 1,349.50 | 1,362.50 | 1,360.00 | 5.85 | 5.50 | 1,354.97 |
| J-27 | J-26 | N/A | 549.00 | 405.00 | 0.006173 | 8 x 6 ft | 0.013 | 1,852.30 | 1,348.50 | 1,346.00 | 1,360.00 | 1,357.00 | 5.50 | 5.00 | 1,351.03 |
| J-26 | J-25 | N/A | 549.00 | 320.00 | 0.002313 | 8 x 6 ft | 0.013 | 1,133.73 | 1,346.00 | 1,345.26 | 1,357.00 | 1,356.00 | 5.00 | 4.74 | 1,348.96 |
| J-25 | J-24 | N/A | 549.00 | 320.00 | 0.002281 | 8 x 6 ft | 0.013 | 1,126.05 | 1,345.26 | 1,344.53 | 1,356.00 | 1,355.00 | 4.74 | 4.47 | 1,348.32 |
| J-24 | J-23 | N/A | 549.00 | 332.00 | 0.002319 | 8 x 6 ft | 0.013 | 1,135.39 | 1,344.53 | 1,343.76 | 1,355.00 | 1,356.50 | 4.47 | 6.74 | 1,347.83 |
| J-23 | J-10 | N/A | 549.00 | 333.00 | 0.002282 | 8 x 6 ft | 0.013 | 1,126.30 | 1,343.76 | 1,343.00 | 1,356.50 | 1,356.00 | 6.74 | 7.00 | 1,347.51 |
| I-6 | J-41 | 0.00 | 86.00 | 67.00 | 0.003731 | 10 x 6 ft | 0.013 | 637.00 | 1,348.00 | 1,347.75 | 1,356.50 | 1,356.00 | 2.50 | 2.25 | 1,349.32 |
| J-41 | J-40 | N/A | 86.00 | 428.00 | 0.003692 | 10 x 6 ft | 0.013 | 633.59 | 1,347.75 | 1,346.17 | 1,356.00 | 1,356.00 | 2.25 | 3.83 | 1,349.07 |
| J-40 | J-39 | N/A | 86.00 | 428.00 | 0.003715 | 10 x 6 ft | 0.013 | 635.60 | 1,346.17 | 1,344.58 | 1,356.00 | 1,356.00 | 3.83 | 5.42 | 1,347.49 |
| J-39 | J-10 | N/A | 86.00 | 428.00 | 0.003692 | 10 x 6 ft | 0.013 | 633.59 | 1,344.58 | 1,343.00 | 1,356.00 | 1,356.00 | 5.42 | 7.00 | 1,347.32 |
| I-2 | J-22 | 0.00 | 8.00 | 60.00 | 0.033333 | 30 inch | 0.013 | 74.88 | 1,404.00 | 1,402.00 | 1,409.00 | 1,407.00 | 2.50 | 2.50 | 1,404.94 |
| J-22 | J-21 | N/A | 8.00 | 190.00 | 0.026316 | 30 inch | 0.013 | 66.53 | 1,402.00 | 1,397.00 | 1,407.00 | 1,402.00 | 2.50 | 2.50 | 1,402.94 |
| J-21 | J-20 | N/A | 8.00 | 292.00 | 0.027397 | 30 inch | 0.013 | 67.89 | 1,397.00 | 1,389.00 | 1,402.00 | 1,394.50 | 2.50 | 3.00 | 1,397.94 |
| J-20 | J-19 | N/A | 8.00 | 300.00 | 0.026667 | 30 inch | 0.013 | 66.98 | 1,389.00 | 1,381.00 | 1,394.50 | 1,386.00 | 3.00 | 2.50 | 1,389.94 |
| J-19 | J-18 | N/A | 8.00 | 296.00 | 0.008919 | 30 inch | 0.013 | 38.73 | 1,381.00 | 1,378.36 | 1,386.00 | 1,383.50 | 2.50 | 2.64 | 1,381.94 |
| J-18 | J-16 | N/A | 8.00 | 296.00 | 0.006959 | 36 inch | 0.013 | 55.64 | 1,377.86 | 1,375.80 | 1,383.50 | 1,382.00 | 2.64 | 3.20 | 1,378.75 |
| I-1 | J-17 | 0.00 | 191.00 | 443.00 | 0.018059 | 8 x 4 ft | 0.013 | 1,190.88 | 1,390.00 | 1,382.00 | 1,397.00 | 1,388.00 | 3.00 | 2.00 | 1,391.64 |
| J-17 | J-16 | N/A | 191.00 | 348.00 | 0.020690 | 8 x 4 ft | 0.013 | 1,274.68 | 1,382.00 | 1,374.80 | 1,388.00 | 1,382.00 | 2.00 | 3.20 | 1,383.64 |
| J-16 | J-15 | N/A | 199.00 | 105.00 | 0.031429 | 8 x 4 ft | 0.013 | 1,571.04 | 1,374.80 | 1,371.50 | 1,382.00 | 1,380.00 | 3.20 | 4.50 | 1,376.49 |
| J-15 | J-14 | N/A | 199.00 | 516.00 | 0.010271 | 8 x 6 ft | 0.013 | 796.46 | 1,369.50 | 1,364.20 | 1,380.00 | 1,375.00 | 4.50 | 4.80 | 1,372.18 |
| J-14 | J-13 | N/A | 199.00 | 516.00 | 0.010271 | 8 x 6 ft | 0.013 | 796.46 | 1,364.20 | 1,358.90 | 1,375.00 | 1,370.00 | 4.80 | 5.10 | 1,366.88 |

# Pipe Report

| Upstream Node | Downstream Node | Weighted Roughness Coefficient | Discharge (cfs) | Length (ft) | Constructed Slope (ft/ft) | Section Size | Roughness | Capacity (cfs) | Upstream Invert Elevation (ft) | Downstream Invert Elevation (ft) | Upstream Ground Elevation (ft) | Downstream Ground Elevation (ft) | Upstream Cover (ft) | Downstream Cover (ft) | Upstream HGL (ft) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| J-13 | J-12 | N/A | 199.00 | 516.00 | 0.010271 | 8 x 6 ft | 0.013 | 796.46 | 1,358.90 | 1,353.60 | 1,370.00 | 1,365.00 | 5.10 | 5.40 | 1,361.58 |
| J-12 | J-11 | N/A | 199.00 | 516.00 | 0.010271 | 8 x 6 ft | 0.013 | 796.46 | 1,353.60 | 1,348.30 | 1,365.00 | 1,360.00 | 5.40 | 5.70 | 1,356.28 |
| J-11 | J-10 | N/A | 199.00 | 516.00 | 0.010271 | 8 x 6 ft | 0.013 | 796.46 | 1,348.30 | 1,343.00 | 1,360.00 | 1,356.00 | 5.70 | 7.00 | 1,350.98 |
| J-10 | J-9 | N/A | 834.00 | 441.00 | 0.005057 | 10 x 6 ft | 0.013 | 2,224.63 | 1,343.00 | 1,340.77 | 1,356.00 | 1,352.00 | 7.00 | 5.23 | 1,345.89 |
| J-9 | J-8 | N/A | 834.00 | 441.00 | 0.005079 | 10 x 6 ft | 0.013 | 2,229.61 | 1,340.77 | 1,338.53 | 1,352.00 | 1,349.00 | 5.23 | 4.47 | 1,343.66 |
| J-8 | J-7 | N/A | 834.00 | 442.00 | 0.005045 | 10 x 6 ft | 0.013 | 2,222.11 | 1,338.53 | 1,336.30 | 1,349.00 | 1,347.00 | 4.47 | 4.70 | 1,341.42 |
| J-7 | J-6 | N/A | 866.00 | 425.00 | 0.005059 | 10 x 6 ft | 0.013 | 2,225.10 | 1,336.30 | 1,334.15 | 1,347.00 | 1,344.00 | 4.70 | 3.85 | 1,339.26 |
| J-6 | J-5 | N/A | 866.00 | 425.00 | 0.005059 | 10 x 6 ft | 0.013 | 2,225.10 | 1,334.15 | 1,332.00 | 1,344.00 | 1,343.50 | 3.85 | 5.50 | 1,337.11 |
| J-5 | J-4 | N/A | 866.00 | 425.00 | 0.005059 | 10 x 6 ft | 0.013 | 2,225.10 | 1,332.00 | 1,329.85 | 1,343.50 | 1,340.00 | 5.50 | 4.15 | 1,334.96 |
| J-4 | J-3 | N/A | 1,283.00 | 535.00 | 0.003645 | 10 x 6 ft | 0.013 | 2,518.28 | 1,329.85 | 1,327.90 | 1,340.00 | 1,338.50 | 4.15 | 4.60 | 1,333.02 |
| J-3 | J-2 | N/A | 1,283.00 | 535.00 | 0.003645 | 10 x 6 ft | 0.013 | 2,518.28 | 1,327.90 | 1,325.95 | 1,338.50 | 1,336.00 | 4.60 | 4.05 | 1,331.07 |
| J-2 | J-1 | N/A | 1,283.00 | 390.00 | 0.003513 | 10 x 6 ft | 0.013 | 2,472.25 | 1,325.90 | 1,324.53 | 1,336.00 | 1,331.00 | 4.10 | 0.47 | 1,329.07 |
| J-1 | Outlet | N/A | 1,283.00 | 145.00 | 0.003655 | 10 x 6 ft | 0.013 | 2,521.84 | 1,324.53 | 1,324.00 | 1,331.00 | 1,331.00 | 0.47 | 1.00 | 1,327.70 |

# Node Report

| HGL In (ft) | HGL Out (ft) | Ground Elevation (ft) | Known Flow (cfs) | Node | Structure Discharge (cfs) | System Flow Time (min) | Velocity (ft/s) |
|---|---|---|---|---|---|---|---|
| 1,336.77 | 1,336.60 | 1,342.00 | 49.00 | I-8 | 49.00 | 0.00 | 7.33 |
| 1,345.44 | 1,345.04 | 1,347.00 | 368.00 | I-5 | 368.00 | 0.00 | 11.40 |
| 1,344.66 | 1,344.56 | 1,346.50 | N/A | J-38 | 368.00 | 0.13 | 11.40 |
| 1,342.16 | 1,342.06 | 1,346.00 | N/A | J-37 | 368.00 | 0.81 | 11.40 |
| 1,339.31 | 1,339.21 | 1,343.00 | N/A | J-36 | 368.00 | 1.59 | 11.40 |
| 1,336.46 | 1,336.36 | 1,342.00 | N/A | J-35 | 368.00 | 2.37 | 11.40 |
| 1,341.81 | 1,341.68 | 1,347.00 | 32.00 | I-7 | 32.00 | 0.00 | 6.39 |
| 1,360.55 | 1,360.32 | 1,367.00 | 98.00 | I-9 | 98.00 | 0.00 | 8.60 |
| 1,391.65 | 1,391.54 | 1,396.00 | 27.00 | I-4 | 27.00 | 0.00 | 6.07 |
| 1,377.32 | 1,377.04 | 1,382.00 | N/A | J-34 | 27.00 | 1.45 | 6.07 |
| 1,365.32 | 1,365.04 | 1,372.50 | N/A | J-33 | 27.00 | 2.90 | 6.07 |
| 1,358.98 | 1,358.91 | 1,364.00 | N/A | J-32 | 27.00 | 4.10 | 2.88 |
| 1,374.88 | 1,374.44 | 1,378.00 | 424.00 | I-3 | 424.00 | 0.00 | 11.95 |
| 1,369.38 | 1,369.27 | 1,373.00 | N/A | J-31 | 424.00 | 0.59 | 11.95 |
| 1,364.22 | 1,364.11 | 1,370.00 | N/A | J-30 | 424.00 | 1.17 | 11.95 |
| 1,358.98 | 1,357.82 | 1,367.00 | N/A | J-29 | 549.00 | 5.18 | 10.34 |
| 1,355.05 | 1,354.97 | 1,362.50 | N/A | J-28 | 549.00 | 6.06 | 10.34 |
| 1,351.16 | 1,351.03 | 1,360.00 | N/A | J-27 | 549.00 | 6.67 | 9.03 |
| 1,349.01 | 1,348.96 | 1,357.00 | N/A | J-26 | 549.00 | 7.48 | 7.72 |
| 1,348.36 | 1,348.32 | 1,356.00 | N/A | J-25 | 549.00 | 8.19 | 7.47 |
| 1,347.87 | 1,347.83 | 1,355.00 | N/A | J-24 | 549.00 | 8.93 | 6.93 |
| 1,347.54 | 1,347.51 | 1,356.50 | N/A | J-23 | 549.00 | 9.78 | 6.10 |
| 1,349.45 | 1,349.32 | 1,356.50 | 86.00 | I-6 | 86.00 | 0.00 | 6.52 |
| 1,349.10 | 1,349.07 | 1,356.00 | N/A | J-41 | 86.00 | 0.17 | 6.52 |
| 1,347.52 | 1,347.49 | 1,356.00 | N/A | J-40 | 86.00 | 1.28 | 6.52 |
| 1,347.33 | 1,347.32 | 1,356.00 | N/A | J-39 | 86.00 | 2.76 | 3.14 |
| 1,405.01 | 1,404.94 | 1,409.00 | 8.00 | I-2 | 8.00 | 0.00 | 4.74 |
| 1,403.11 | 1,402.94 | 1,407.00 | N/A | J-22 | 8.00 | 0.23 | 4.74 |
| 1,398.11 | 1,397.94 | 1,402.00 | N/A | J-21 | 8.00 | 0.98 | 4.74 |
| 1,390.11 | 1,389.94 | 1,394.50 | N/A | J-20 | 8.00 | 2.12 | 4.74 |
| 1,382.11 | 1,381.94 | 1,386.00 | N/A | J-19 | 8.00 | 3.30 | 4.74 |
| 1,378.91 | 1,378.75 | 1,383.50 | N/A | J-18 | 8.00 | 4.20 | 4.54 |
| 1,391.81 | 1,391.64 | 1,397.00 | 191.00 | I-1 | 191.00 | 0.00 | 7.27 |
| 1,383.68 | 1,383.64 | 1,388.00 | N/A | J-17 | 191.00 | 1.03 | 7.27 |
| 1,376.99 | 1,376.49 | 1,382.00 | N/A | J-16 | 199.00 | 5.50 | 7.37 |
| 1,372.98 | 1,372.18 | 1,380.00 | N/A | J-15 | 199.00 | 5.66 | 9.28 |
| 1,366.95 | 1,366.88 | 1,375.00 | N/A | J-14 | 199.00 | 6.59 | 9.28 |
| 1,361.65 | 1,361.58 | 1,370.00 | N/A | J-13 | 199.00 | 7.53 | 9.28 |
| 1,356.35 | 1,356.28 | 1,365.00 | N/A | J-12 | 199.00 | 8.47 | 9.28 |
| 1,351.05 | 1,350.98 | 1,360.00 | N/A | J-11 | 199.00 | 9.41 | 9.28 |
| 1,347.33 | 1,345.89 | 1,356.00 | N/A | J-10 | 834.00 | 10.76 | 9.63 |
| 1,343.73 | 1,343.66 | 1,352.00 | N/A | J-9 | 834.00 | 11.53 | 9.63 |
| 1,341.49 | 1,341.42 | 1,349.00 | N/A | J-8 | 834.00 | 12.30 | 9.63 |
| 1,340.15 | 1,339.26 | 1,347.00 | N/A | J-7 | 866.00 | 13.18 | 9.76 |
| 1,337.18 | 1,337.11 | 1,344.00 | N/A | J-6 | 866.00 | 13.91 | 9.76 |
| 1,335.03 | 1,334.96 | 1,343.50 | N/A | J-5 | 866.00 | 14.65 | 9.76 |
| 1,334.13 | 1,333.02 | 1,340.00 | N/A | J-4 | 1,283.00 | 15.50 | 10.11 |
| 1,331.15 | 1,331.07 | 1,338.50 | N/A | J-3 | 1,283.00 | 16.40 | 10.11 |
| 1,329.15 | 1,329.07 | 1,336.00 | N/A | J-2 | 1,283.00 | 17.28 | 10.11 |
| 1,327.86 | 1,327.70 | 1,331.00 | N/A | J-1 | 1,283.00 | 17.94 | 10.11 |
| 1,327.00 | 1,327.00 | 1,331.00 | N/A | Outlet | 1,283.00 | 18.18 | 0.00 |

STATE OF ARIZONA
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

STRUCTURES SECTION

# DRAINAGE MANUAL

## VOLUME I

## POLICY

BRIDGE DRAINAGE SERVICES

AUGUST 1987

31-061

# H. STORM DRAINS

## H.1 DESIGN CONSIDERATIONS

Storm drains are the conveyance system for flows from roadways and adjacent contributory drainage areas to a convenient outlet. The pipe material and construction methods shall be considered when determining the pipe roughness coefficients. The hydraulic grade line shall be computed at all junctions where pressure flow occurs in a storm drain system. At all inlet locations the hydraulic grade line shall be at least 0.5 feet below the bottom of the inlet or grate. The minimum size for a drain shall be 24", except that pipes connecting inlets to a trunk line may be 18". The "self-cleaning" velocity shall be a minimum of 3.0 fps.

## H.2 MANHOLE/CLEAN-OUT BOX SPACING

Manholes shall be provided at changes in pipe gradient, pipe size, alignment. The maximum spacing should be:

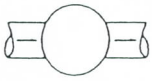
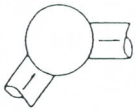
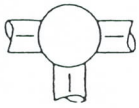
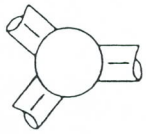
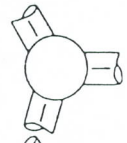
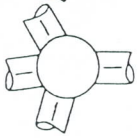
| Diameter, In. | Manhole Spacing |
|---|---|
| d less than 30" | 330 ft. |
| 30" to 45" | 440 ft. |
| d greater than 45" | 660 ft. |

## H.3 MATERIAL

The pipe material shall be selected in accordance with ADOT Highway Plans Services Office Memo regarding Pipe Conduit Alternates (Ref. 7).

## Headloss Coefficients for Manholes and Junctions

These are typical headloss coefficients used in the standard method for estimating headloss through manholes and junctions.

| Type of Manhole | Diagram | Headloss Coefficient |
|---|---|---|
| Trunkline only with no bend at the junction |  | 0.5 |
| Trunkline only with 45 degree bend at junction |  | 0.6 |
| Trunkline only with 90 degree bend at junction | | 0.8 |
| Trunkline with one lateral |  | Small 0.6<br>Large 0.7 |
| Two roughly equivalent entrance lines with angle of < 90 degrees between lines |  | 0.8 |
| Two roughly equivalent entrance lines with angle of > 90 degrees between lines |  | 0.9 |
| Three or more entrance lines |  | 1.0 |

# DOUBLETREE RANCH ROAD REGIONAL DRAINAGE STUDY

## FCD 94-28

## EXISTING HYDROLOGY REPORT

Prepared For:

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3511 East Indian School Road
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(602) 956-3200

Prepared By:

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November, 1995

## TABLE 1

**Existing 6-Hour Peak Discharges (cfs)**

| Location | HEC-1 I.D. | 2-Year | 10-Year | 50-Year | 100-Year |
|---|---|---|---|---|---|
| Berneil Dr. & Tatum Blvd. | HC145 | 24 | 87 | 165 | 199 |
| Channel at west property line of Doubletree Canyon Subdivision | 170S | 33 | 101 | 194 | 234 |
| Doubletree Canyon subdivision channel at Horseshoe Rd. | HC205 | 86 | 260 | 505 | 615 |
| Doubletree Ranch Rd. & Tatum Blvd. | HC211 | 96 | 299 | 577 | 701 |
| Tatum Blvd. & Mohave Pl. | 290S | 16 | 54 | 100 | 120 |
| Tatum Blvd. south of Foothill Dr. | 310S | 43 | 126 | 241 | 293 |
| Desert Park Ln. east of Tatum Blvd. | HC335 | 69 | 218 | 364 | 425 |
| Paradise Canyon east of Las Brisas Ln. | 340S | 17 | 51 | 85 | 99 |
| Roadrunner Rd. west of 54th St. | 350S | 23 | 61 | 98 | 114 |
| Desert Jewel Dr. east of Arroyo Dr. | HC365 | 161 | 517 | 967 | 1159 |
| 54th St. & Desert Jewel Dr. | 370S | 31 | 93 | 162 | 192 |
| Cherokee Wash east of 51st St. | HC385 | 214 | 691 | 1307 | 1574 |
| Cherokee Wash and 54th St. | HC395 | 217 | 713 | 1355 | 1634 |
| Cherokee Wash at Indian Bend Wash | HC435 | 219 | 775 | 1490 | 1790 |

# POINT DESCRIPTIONS

# GROUND CONTROL SURVEYS

# FOR PHOTOGRAMMETRY

# HORIZONTAL AND VERTICAL

# CONTROL DATA FOR MAPPING

FCD CONTRACT 93-51
AERIAL MAPPING SERVICES
PHOENIX MOUNTAIN PRESERVE/PARADISE VALLEY

POINT DESCRIPTIONS
GROUND CONTROL SURVEYS FOR PHOTOGRAMMETRY

| Point Number | Description |
|---|---|
| 100 | Set PK nail (flush) in the cul-de-sac on 63rd Place, North of Lincoln Drive. Marked with "circle" panel. |
| 101 | Set PK nail (flush) on East side of Smoke Tree Road (East side of loop) North of Lincoln Drive. Marked with "circle" panel. |
| 102 | Found cotton picker spindle, set in concrete (flush), at Joshua Tree Lane and 60th Street. Marked with "circle" panel. |
| 103 | Set PK nail (flush) at the intersection of Hummignbird Lane and Cholla Drive. Marked with "circle" panel. |
| 104 | Found ADOT ACP, on Mockingbird, +/- 150 West of Morning Glory. Found monumnet marked with a "Y" panel. Monument is 0.2' below pavement. |
| 105 | Found RR spike at the intersection of 54th Street and Sapphire. Monument is 0.2' below pavement. Marked with a "circle" panel. |
| 106 | Found Twon of Paradise Valley BC (flush) at Double Tree Raod and Via Los Caballos (on West side of Indian Bend Wash). Marked with a "circle" panel. |

| | |
|---|---|
| 107 | Set PK nail (flush) in asphalt sidewalk at the Northwest corner of Double Tree Road and Morning Glory. Marked with a "circle" panel. |
| 108 | Found City of Scottsdale BC on the East edge of Invergordon at Mountain View. Fouind monument marked with a "Y" panel. Monument is 0.1' below pavement. |
| 109 | Found BC (flush) at the intersection of 58th Street and Mountain View. Marked with a "circle" panel. |
| 110 | Found Maricopa County Highway Department BC at Caballo and an un-named cul-de-sac to the South. Point is approximately mid-way between Via Los Ranchos and 58th Place. Marked with a "circle" panel. |
| 111 | Found Maricopa County Highway Department BC (flush) at the intersection of Via Los Caballos and 52nd Place. Marked with a "circle" panel. |
| 112 | Found Maricopa County Highway Department BC (flush) at the intersection of Mountain View and 52nd Place Marked with a "T" panel. |
| 113 | Set 1/2" rebar (flush) on the East edge of Indian Bend Wash (on flat ground above East bank of channel rip-rap) and approximately 100' South of Shea Blvd. Marked with a paper "T" panel. |
| 114 | Set PK nail (flush) along the West side of 56th Street, North of where pavement narrows and South of Shea Blvd. Marked with a "circle" panel. |
| 115 | Found BC (flush) at the intersection of 56nd Street and Cholla. Marked with a "Y" panel. |
| 116 | Set PK nail (flsh) on the North side of Cholla, West of Tatum. Point is in front of residence address 4701 East Cholla. Marked with a "circle" panel. |

| | |
|---|---|
| 117 | Found BC (flush) at 44th Street and Yucca. Point is approximatley 150' South of Cholla. Marked with a "circle" panel. |
| 118 | Set PK nail (flush) on Yucca, 20' East of 38th Street. Marked with a "circle" panel. |
| 119 | Set PK nail (flush) at 36th Street and Hatcher. Marked with a "circle" panel. |
| 120 | Found BC (flush) at the intersection of Mountain View Road, 39th Street, Ocotillo Lane & Malapai Drive. Marked with a "circle" panel. |
| 121 | Found City of Phoenix BC at the East end of the cul-de-sac on Mission Lane East of 442nd Street. Marked with a "circle" panel. |
| 122 | Found City of Phoenix BC (in hand hole) on 44th Street approximately 100' South of Mountain View. Monument is 0.' below pavement. Marked with a "+" panel. |
| 123 | Found BC (flush) at the intersection of 47th Street and Gold Dust Lane. Marked with a "circle" panel. |
| 124 | Found City of Phoenix BC at the intersection of Sunset and Starling. Marked with a "circle" panel. |
| 125 | Found Maricopa County Highway Department BC (flush) at the West end of Charles Drive. Marked with a "circle" panel. |
| 126 | Found cotton picker spindle at the intersection of Sparkling Lane and Brookview Way. Marked with a "circle" panel. |
| 127 | Set PK nail (flush) at the intersection of Hillside Drive and Pepper Tree Lane. Marked with a "circle" panel. |

| | |
|---|---|
| 128 | Found BC (flush) at the intersection of Roadrunner Road and Las Brisas Lane. Marked with a "circle" panel. |
| 129 | Set PK nail (flush) on the East end of the pavement at the East end of Mummy Mountain Road, East of Arroyo Road and West of the gate to the residence at the end of Mummy Mountain Road. Marked with a "+" panel. |
| 130 | Set PK nail (flush) in the concrete median on Paradise Valley Parkway South of Cactus. Point is set in the median at the Southbound left turn bay into the shopping center on the East side of Paradise Valley Parkway and across from the entrance to the apartment complex on the West side of Paradise Valley Parkway. Marked with a "T" panel. |
| 131 | Set PK nail (flush) in driveway South of Paradise Valley Parkway approximatley 500' West of Tatum. Marked with a "T" panel. |
| 132 | Set PK nail (lfush) +/- 50' North of Sweetwater on 41st Place. Marked with a "T" panel. |
| 133 | Found USC&GS triangulation station "DALEY" (flush) in natural ground at the Northwest corner of the intersection of Sweetwater and 36th Street. Marked with a paper "+" panel. |
| 134 | Found BC (flush) at the intersection of Wetherfield and 38th Street. Marked with a "T" panel. |
| 135 | Set PK nail (flush) on the West side of 36th Street approximately 200' south of Cholla. Marked with a "T" panel. |
| 136 | Set PK nail (flush) on shangri-La at the first cul de sac Southeast of 40th Street. Marked with a "T" panel. |

| | |
|---|---|
| 137 | Set PK nail (flush) on the asphalt bike path on the North side of Lincoln Drive +/- 50' West of 52nd Place. Marked with a "circle" panel. |
| 138 | Set PK nail (flush) on sierra Vista approximately 350' West of 448th Street. Marked with a "circle" panel. |
| 139 | Set PK nail (flush) at the North end of the cul-de-sac being 41st Street North of Lincoln Drive. Marked with a "circle" panel. |
| 140 | Set PK nail (flush) at the North end of the cul-de-sac being 37th Place, North of Lincoln drive. Marked with a "circle" panel. |
| 141 | Set PK nail (flush) at the intersection of Prickly Pear Lane and Desert Fairways. Marked with a "circle" panel. |
| 142 | Set PK nail (flush) on the North edge of asphalt on Desert Jewel approximately 900' East of Tatum. Marked with a "circle" panel. |
| 143 | Found PK nail (flush) at the intersection of Butler and Poco Calle. Marked with a "+" panel. |
| 144 | Set PK nail (flush) on the asphalt bike path on the North side of Double Tree at Martingale. Marked with a "circle" panel. |
| 145 | Set PK nail (flush) at the intersection of 49th Place and Cheryl Drive. Marked with a "circle" panel. |
| 146 | Found City of Phoenix BC (flush) at the end of the cul-de-sac on Horseshoe Road West of Tatum. Marked with a "circle" panel. |

| | |
|---|---|
| 301 | Found City of Scottsdale monument in the intersection of Indian Bend Road and Mockingbird Lane. (City of Scottsdale number 327 (4101). Monument was used as GPS tie. |
| 302 | Found NGS Vertical Control Mark M474 (1981). 3" Brass disk epoxied to concrete sidewalk at the South end of the West bridge abutment over the Arizona Canal at 24th Street. Monument was not premarked. Monument was used as GPS tie. |

PHOENIX MOUNTAIN PRESERVE / PARADISE VALLEY

HORIZONTAL AND VERTICAL CONTROL DATA FOR MAPPING
**NAD83 AND NAVD88 - INTERNATIONAL FOOT**

| Point Number | North | East | Mon. Elev. | Ground |
|---|---|---|---|---|
| 100 | 921245.252 | 691585.199 | 1342.558 | |
| 101 | 921822.145 | 687757.980 | 1375.741 | |
| 102 | 922712.708 | 689294.824 | 1388.497 | |
| 103 | 926913.841 | 690063.953 | 1415.143 | |
| 104 | 930848.675 | 689313.017 | 1336.306 | |
| 105 | 931072.564 | 685409.934 | 1364.301 | 1364.500 |
| 106 | 934180.142 | 687960.855 | 1330.544 | |
| 107 | 934127.358 | 690237.582 | 1329.857 | |
| 108 | 936680.738 | 691866.440 | 1341.743 | |
| 109 | 936829.198 | 687936.977 | 1343.732 | |
| 110 | 931857.140 | 687646.867 | 1341.193 | |
| 111 | 933848.352 | 684374.410 | 1352.247 | |
| 112 | 936893.099 | 684560.232 | 1352.769 | |
| 113 | 939412.343 | 684434.954 | 1356.886 | |
| 114 | 939358.581 | 686605.949 | 1356.232 | |
| 115 | 942166.310 | 683992.081 | 1366.437 | |
| 116 | 942184.715 | 680758.903 | 1371.117 | |
| 117 | 941828.896 | 678725.997 | 1384.863 | |
| 118 | 941864.726 | 674613.954 | 1402.785 | |
| 119 | 935576.014 | 673299.930 | 1467.799 | |
| 120 | 936918.835 | 675281.647 | 1456.313 | |
| 121 | 935377.418 | 677234.977 | 1464.071 | |
| 122 | 936922.581 | 678730.574 | 1426.050 | |
| 123 | 938230.976 | 680848.748 | 1390.567 | |
| 124 | 932105.449 | 680869.170 | 1442.269 | |
| 125 | 930481.254 | 678842.227 | 1620.168 | |
| 126 | 925437.636 | 678660.527 | 1521.535 | |
| 127 | 923030.861 | 678982.653 | 1440.099 | |
| 128 | 927345.784 | 684258.375 | 1436.995 | |
| 129 | 923353.001 | 685608.199 | 1473.729 | |
| 130 | 945181.290 | 678531.134 | 1383.581 | |
| 131 | 947600.186 | 680699.806 | 1396.577 | |
| 132 | 947529.361 | 676938.372 | 1395.970 | |
| 133 | 947480.286 | 673177.321 | 1397.813 | |
| 134 | 944985.222 | 674578.867 | 1390.918 | |

| | | | |
|---|---|---|---|
| 135 | 941858.019 | 673247.870 | 1407.208 |
| 136 | 941671.825 | 676736.321 | 1397.162 |
| 137 | 920790.849 | 684318.659 | 1343.707 |
| 138 | 921226.802 | 680849.355 | 1367.245 |
| 139 | 921446.289 | 677154.147 | 1416.474 |
| 140 | 921285.930 | 673974.239 | 1421.253 |
| 141 | 925521.379 | 682309.089 | 1420.662 |
| 142 | 928956.139 | 682893.267 | 1417.350 |
| 143 | 931605.340 | 682775.375 | 1384.723 |
| 144 | 934300.954 | 683323.934 | 1362.100 |
| 145 | 937967.739 | 682313.593 | 1372.837 |
| 146 | 933272.769 | 678880.681 | 1444.604 |
| 301 | 923463.021 | 694587.762 | 1316.401 |
| 302 | 918236.159 | 665429.179 | 1249.572 |

# CHEROKEE WASH

# CHEROKEE WASH

# REACH LENGTHS

# DOUBLETREE RANCH ROAD

PROJECT NO. 2878

## CHEROKEE WASH
## REACH LENGTHS

| Reach | TO | Reach | Station | Station | Distance | Discharge (100/10) NO | Discharge (100/10) WITH | Elevation | Slope (ft/ft) | Channel Lengths Detention | Channel Lengths No Detention |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Indian Bend Wash | | Caballo Lane | 0 | 240 | 240 | 1790/483 | 793/214 | 1323 | | | |
| Caballo Lane | | Morning Glory | 240 | 950 | 710 | | | | | | |
| Morning Glory | | 59th Place | 950 | 1600 | 650 | | | | | 4134 | 4134 |
| 59th Place | | 58th Place | 1600 | 2345 | 745 | * | | | | | |
| 58th Place | | 56th Street | 2345 | 4134 | 1789 | 1786/481 | 596/161 | 1346 | 0.0056 | | |
| 56th Street | | Mockingbird | 4134 | 5557 | 1423 | | | | | | |
| Mockingbird | | 53rd Street | 5557 | 6463 | 906 | | | | | 2500 | 3200 |
| 53rd Street | | Detention 13 | 6463 | 7333 | 870 | 1634/441 | 551/149 | 1368 | 0.0069 | | |
| Detention 13 | | Detention 16 | 7333 | 8462 | 1129 | 1574/423 | 407/110 | 1378 | 0.0089 | 600 | 1130 |
| Detention 16 | | Desert Jewel | 8462 | 9210 | 748 | | | | | | |
| Arroyo | | | | | | | | | | | |
| Desert Jewel | | Crestview | 9210 | 9895 | 685 | | | | | | |
| Crestview | | Desert Park | 9895 | 10395 | 500 | | | | | 2260 | 3008 |
| Desert Park | | Road Runner | 10395 | 11070 | 675 | | | | | | |
| Road Runner | | Detention 15 | 11070 | 11470 | 400 | 425/115 | 82/22 | 1408 | 0.0100 | | |
| Detention 15 | | Tatum Boulevard | 11470 | 12315 | 845 | 283/64 | 238/64 | 1420 | 0.0142 | 845 | 845 |

* 422 cfs diverted to 56th Street

12-5-95 WSS

| Detention Basin | Length |
|---|---|
| 12 | 400 |
| 13 | 700 |
| 15 | 700 |
| 16 | 550 |

Culvert Lengths

| Street Name | Right-Of-Way (ft) | |
|---|---|---|
| Caballo Lane | 50 | |
| Morning Glory | 50 | |
| 59th Place | 50 | |
| 58th Street | 50 | |
| 56th Street | 80 | |
| Mockingbird Lane | 66-71 | 150 diagionally |
| 53rd Street | 50 | |
| Desert Jewel | 60 | |
| Arroyo | 50 | |
| Crestview | 50 | |
| Desert Park | 50 | |
| Raod Runner | 50 | |

Tatum Boulevard

| Basin | Q = 100 | Q = 10 |
|---|---|---|
| 290 | 120 | 32 |
| 310 | 293 | 79 |
| 320 | 238 | 64 |

Assume Slope = 0.01'/ft

# CHEROKEE WASH

# CULVERT CAPACITY SUMMARY

# LEVEL OF PROTECTION

# DOUBLETREE RANCH ROAD

**PROJECT NO.2878**

## CHEROKEE WASH
## CULVERT CAPACITIES SUMMARY

| STREET NAME | INVERT IN | INVERT OUT | LENGTH (ft) | SLOPE (ft/ft) | TYPE | NUMBER BARRELS | CAPACITY (Q = cfs) | INLET DEPTH | INLET ELEV. | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|
| Gaballo Lane | 1321.75 | 1321.00 | 30 | 0.0250 | 10x5 CBC | 2 | 675 | 5.31 | 1327.06 | 47-year Level of Protection |
| Morning Glory | 1324.00 | 1323.50 | 55 | 0.0091 | 10x5 CBC | 2 | 675 | 5.32 | 1329.32 | 47-year Level of Protection |
| 59th Place | 1327.50 | 1327.00 | 30 | 0.0167 | 10x5 CBC | 2 | 675 | 5.32 | 1332.82 | 47-year Level of Protection |
| 58th Place | 1332.50 | 1332.00 | 30 | 0.0167 | 10x5 CBC | 2 | 675 | 5.32 | 1337.82 | 47-year Level of Protection |
| 56th Street | 1341.00 | 1340.00 | 60 | 0.0167 | 10x5 CBC | 2 | 675 | 5.32 | 1346.32 | 47-year Level of Protection |
| Mockingbird Ln | 1354.50 | 1354.00 | 130 | 0.0038 | 10x3 CBC | 3 | 750 | 5.10 | 1359.60 | 41-year Level of Protection |
| 53rd Place | 1360.50 | 1360.00 | 30 | 0.0167 | 10x5 CBC | 2 | 750 | 5.72 | 1366.22 | 41-year Level of Protection |
| Desert Jewel | 1385.75 | 1385.00 | 40 | 0.0188 | 48" RCP | 3 | 313 | 5.41 | 1391.16 | 10-year Level of Protection |
| Arroyo Drive | 1388.00 | 1387.00 | 35 | 0.0286 | 48" RCP | 3 | 313 | 5.40 | 1393.40 | 10-year Level of Protection |
| Crestview Drive | 1392.50 | 1392.00 | 30 | 0.0167 | 48" RCP | 3 | 313 | 5.41 | 1397.91 | 10-year Level of Protection |
| Desert Park | 1399.50 | 1398.50 | 35 | 0.0286 | 48" RCP | 3 | 313 | 5.40 | 1404.90 | 10-year Level of Protection |
| Road Runner | 1405.00 | 1404.00 | 100 | 0.0100 | 36" CMP | 2 | 115 | 5.31 | 1410.31 | Existing-no change |

WSS 11/21/96

# DOUBLETREE RANCH ROAD

**PROJECT NO. 2878**

## CHEROKEE WASH
## CAPACITY OF CHANNEL
## LEVEL OF PROTECTION

| n-Year Flood | Percent of SPF for an Urbanized Watershed | Percent |
|---|---|---|
| SPF | 100 | % |
| 100 | 45 | 100 |
| 50 | 32 | 71 |
| 25 | 21 | 47 |
| 10 | 12 | 27 |
| 5 | 7 | 16 |
| 2 | 3 | 7 |

Trapezoidal Channel, 40 feet wide
Gabions or Wire Tied Rip Rap, 1 foot freeboard

**INDIAN BEND WASH TO 56TH STREET**

Slope = 0.0056 ft/ft
n = 0.035
Capacity of Channel (Q) = 675 cfs
Discharge (Q=100) = 1790cfs
Diversion 52nd Street = 424 cfs
Diversion 56th Street = 368 cfs
Percent of !00-year discharge = 675/(1790-424-368) = 0.676%

Level of Protection
(50-25)((68-47)/(71-47))+(50-25)= 46.875

**use 47 year level of protection**

**56TH STREET TO 52ND STREET**

Slope = 0.0069 ft/ft
n = 0.035
Capacity of Channel (Q) = 750 cfs
Discharge (Q=100) = 1634 cfs
Diversion 52nd Street = 424 cfs
Percent of 100-year discharge = 750/(1634-424 cfs) = 0.619%

Level of Protection
(50-25)((62-47)/71-47))+(50-25) = 40.625

**use 41 year level of protection**

PIPE CULVERT ANALYSIS
COMPUTATION OF CULVERT PERFORMANCE CURVE

November 21, 1996
CHEROKEE WASH
2-36" CMP TAPERED END
ROAD RUNNER ROAD

==========

PROGRAM INPUT DATA:

| DESCRIPTION | VALUE |
|---|---|
| Culvert Diameter (feet) | 3.00 |
| FHWA Chart Number (1,2 or 3) | 2 |
| Scale Number on Chart (Type of Culvert Entrance) | 2 |
| Manning`s Roughness Coefficient (n-value) | 0.0240 |
| Entrance Loss Coefficient of Culvert Opening | 0.70 |
| Culvert Length (feet) | 100.0 |
| Culvert Slope (feet per foot) | 0.0100 |

==========

PROGRAM RESULTS:

| Flow Rate (cfs) | Tailwater Depth (ft) | Headwater (ft) Inlet Control | Headwater (ft) Outlet Control | Normal Depth (ft) | Critical Depth (ft) | Depth at Outlet (ft) | Outlet Velocity (fps) |
|---|---|---|---|---|---|---|---|
| 57.5 | 3.00 | 5.31 | 6.27 | 3.00 | 2.46 | 3.00 | 8.13 |

==========

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PIPE CULVERT ANALYSIS
COMPUTATION OF CULVERT PERFORMANCE CURVE

November 21, 1996
CHEROKEE WASH
3-48" RCP HEADWALLS
DESERT PARK LANE

==========

PROGRAM INPUT DATA:

| DESCRIPTION | VALUE |
|---|---|
| Culvert Diameter (feet) | 4.00 |
| FHWA Chart Number (1,2 or 3) | 1 |
| Scale Number on Chart (Type of Culvert Entrance) | 1 |
| Manning`s Roughness Coefficient (n-value) | 0.0120 |
| Entrance Loss Coefficient of Culvert Opening | 0.20 |
| Culvert Length (feet) | 35.0 |
| Culvert Slope (feet per foot) | 0.0286 |

==========

PROGRAM RESULTS:

| Flow Rate (cfs) | Tailwater Depth (ft) | Headwater (ft) Inlet Control | Headwater (ft) Outlet Control | Normal Depth (ft) | Critical Depth (ft) | Depth at Outlet (ft) | Outlet Velocity (fps) |
|---|---|---|---|---|---|---|---|
| 104.0 | 4.00 | 5.40 | 4.43 | 1.75 | 3.09 | 1.75 | 19.72 |

==========

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PIPE CULVERT ANALYSIS
COMPUTATION OF CULVERT PERFORMANCE CURVE

November 21, 1996
CHEROKEE WASH
3-48" RCP HEADWALLS
CRESTVIEW DRIVE

==========

PROGRAM INPUT DATA:

| DESCRIPTION | VALUE |
|---|---|
| Culvert Diameter (feet) | 4.00 |
| FHWA Chart Number (1,2 or 3) | 1 |
| Scale Number on Chart (Type of Culvert Entrance) | 1 |
| Manning`s Roughness Coefficient (n-value) | 0.0120 |
| Entrance Loss Coefficient of Culvert Opening | 0.20 |
| Culvert Length (feet) | 30.0 |
| Culvert Slope (feet per foot) | 0.0167 |

==========

PROGRAM RESULTS:

| Flow Rate (cfs) | Tailwater Depth (ft) | Headwater (ft) Inlet Control | Headwater (ft) Outlet Control | Normal Depth (ft) | Critical Depth (ft) | Depth at Outlet (ft) | Outlet Velocity (fps) |
|---|---|---|---|---|---|---|---|
| 104.0 | 4.00 | 5.41 | 4.91 | 2.04 | 3.09 | 2.04 | 16.14 |

==========

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PIPE CULVERT ANALYSIS
COMPUTATION OF CULVERT PERFORMANCE CURVE

November 21, 1996
CHEROKEE WASH
3-48" RCP HEADWALLS
ARROYO DRIVE

==========

PROGRAM INPUT DATA:

| DESCRIPTION | VALUE |
|---|---|
| Culvert Diameter (feet)..... | 4.00 |
| FHWA Chart Number (1,2 or 3)..... | 1 |
| Scale Number on Chart (Type of Culvert Entrance)..... | 1 |
| Manning`s Roughness Coefficient (n-value)..... | 0.0120 |
| Entrance Loss Coefficient of Culvert Opening..... | 0.20 |
| Culvert Length (feet)..... | 35.0 |
| Culvert Slope (feet per foot)..... | 0.0286 |

==========

PROGRAM RESULTS:

| Flow Rate (cfs) | Tailwater Depth (ft) | Headwater (ft) Inlet Control | Headwater (ft) Outlet Control | Normal Depth (ft) | Critical Depth (ft) | Depth at Outlet (ft) | Outlet Velocity (fps) |
|---|---|---|---|---|---|---|---|
| 104.0 | 4.00 | 5.40 | 4.43 | 1.75 | 3.09 | 1.75 | 19.72 |

==========

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PIPE CULVERT ANALYSIS
COMPUTATION OF CULVERT PERFORMANCE CURVE

November 21, 1996
CHEROKEE WASH
3-48" RCP HEADWALLS
DESERT JEWEL DRIVE

==========

PROGRAM INPUT DATA:

| DESCRIPTION | VALUE |
|---|---|
| Culvert Diameter (feet) | 4.00 |
| FHWA Chart Number (1,2 or 3) | 1 |
| Scale Number on Chart (Type of Culvert Entrance) | 1 |
| Manning`s Roughness Coefficient (n-value) | 0.0120 |
| Entrance Loss Coefficient of Culvert Opening | 0.20 |
| Culvert Length (feet) | 40.0 |
| Culvert Slope (feet per foot) | 0.0188 |

==========

PROGRAM RESULTS:

| Flow Rate (cfs) | Tailwater Depth (ft) | Headwater (ft) Inlet Control | Headwater (ft) Outlet Control | Normal Depth (ft) | Critical Depth (ft) | Depth at Outlet (ft) | Outlet Velocity (fps) |
|---|---|---|---|---|---|---|---|
| 104.0 | 4.00 | 5.41 | 4.70 | 1.97 | 3.09 | 1.97 | 16.88 |

==========

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BOX CULVERT ANALYSIS
COMPUTATION OF CULVERT PERFORMANCE CURVE

November 21, 1996
CHEROKEE WASH
2-10' X 5" CBC
53RD PLACE

==========

PROGRAM INPUT DATA:

| DESCRIPTION | VALUE |
|---|---|
| Culvert Span (Width of Opening) (feet)..... | 10.00 |
| Culvert Rise (Height of Opening) (feet)..... | 5.00 |
| FHWA Chart Number (8,9,10,11,12 or 13)..... | 8 |
| Scale Number on Chart (Type of Culvert Entrance)..... | 1 |
| Manning`s Roughness Coefficient (n-value)..... | 0.0120 |
| Entrance Loss Coefficient of Culvert Opening..... | 0.50 |
| Culvert Length (feet)..... | 30.0 |
| Culvert Slope (feet per foot)..... | 0.0167 |

==========

PROGRAM RESULTS:

| Flow Rate (cfs) | Tailwater Depth (ft) | Headwater (ft) Inlet Control | Headwater (ft) Outlet Control | Normal Depth (ft) | Critical Depth (ft) | Depth at Outlet (ft) | Outlet Velocity (fps) |
|---|---|---|---|---|---|---|---|
| 375.0 | 5.00 | 5.72 | 5.86 | 1.90 | 3.52 | 5.00 | 7.50 |

==========

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BOX CULVERT ANALYSIS
COMPUTATION OF CULVERT PERFORMANCE CURVE

November 21, 1996
CHEROKEE WASH
3-10' X 3'
MOCKINGBIRD LANE

==========

PROGRAM INPUT DATA:

| DESCRIPTION | VALUE |
|---|---|
| Culvert Span (Width of Opening) (feet)..... | 10.00 |
| Culvert Rise (Height of Opening) (feet)..... | 3.00 |
| FHWA Chart Number (8,9,10,11,12 or 13)..... | 8 |
| Scale Number on Chart (Type of Culvert Entrance)..... | 1 |
| Manning`s Roughness Coefficient (n-value)..... | 0.0120 |
| Entrance Loss Coefficient of Culvert Opening..... | 0.50 |
| Culvert Length (feet)..... | 130.0 |
| Culvert Slope (feet per foot)..... | 0.0038 |

==========

PROGRAM RESULTS:

| Flow Rate (cfs) | Tailwater Depth (ft) | Headwater (ft) Inlet Control | Headwater (ft) Outlet Control | Normal Depth (ft) | Critical Depth (ft) | Depth at Outlet (ft) | Outlet Velocity (fps) |
|---|---|---|---|---|---|---|---|
| 250.0 | 3.00 | 5.10 | 4.61 | 2.38 | 2.69 | 2.38 | 10.50 |

==========

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BOX CULVERT ANALYSIS
COMPUTATION OF CULVERT PERFORMANCE CURVE

November 21, 1996
CHEROKEE WASH
2-10′ X 5′ CBC
56TH STREET

==========

PROGRAM INPUT DATA:

| DESCRIPTION | VALUE |
|---|---|
| Culvert Span (Width of Opening) (feet)..... | 10.00 |
| Culvert Rise (Height of Opening) (feet)..... | 5.00 |
| FHWA Chart Number (8,9,10,11,12 or 13)..... | 8 |
| Scale Number on Chart (Type of Culvert Entrance)..... | 1 |
| Manning`s Roughness Coefficient (n-value)..... | 0.0120 |
| Entrance Loss Coefficient of Culvert Opening..... | 0.50 |
| Culvert Length (feet)..... | 60.0 |
| Culvert Slope (feet per foot)..... | 0.0167 |

==========

PROGRAM RESULTS:

| Flow Rate (cfs) | Tailwater Depth (ft) | Headwater (ft) Inlet Control | Headwater (ft) Outlet Control | Normal Depth (ft) | Critical Depth (ft) | Depth at Outlet (ft) | Outlet Velocity (fps) |
|---|---|---|---|---|---|---|---|
| 337.5 | 5.00 | 5.32 | 5.15 | 1.77 | 3.28 | 1.77 | 19.11 |

==========

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BOX CULVERT ANALYSIS
COMPUTATION OF CULVERT PERFORMANCE CURVE

November 21, 1996
CHEROKEE WASH
2-10'X5' CBC
58TH PLACE

==========

PROGRAM INPUT DATA:

| DESCRIPTION | VALUE |
|---|---|
| Culvert Span (Width of Opening) (feet)..... | 10.00 |
| Culvert Rise (Height of Opening) (feet)..... | 5.00 |
| FHWA Chart Number (8,9,10,11,12 or 13)..... | 8 |
| Scale Number on Chart (Type of Culvert Entrance)..... | 1 |
| Manning`s Roughness Coefficient (n-value)..... | 0.0120 |
| Entrance Loss Coefficient of Culvert Opening..... | 0.50 |
| Culvert Length (feet)..... | 30.0 |
| Culvert Slope (feet per foot)..... | 0.0167 |

==========

PROGRAM RESULTS:

| Flow Rate (cfs) | Tailwater Depth (ft) | Headwater (ft) Inlet Control | Headwater (ft) Outlet Control | Normal Depth (ft) | Critical Depth (ft) | Depth at Outlet (ft) | Outlet Velocity (fps) |
|---|---|---|---|---|---|---|---|
| 337.5 | 5.00 | 5.32 | 5.61 | 1.77 | 3.28 | 5.00 | 6.75 |

==========

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BOX CULVERT ANALYSIS
COMPUTATION OF CULVERT PERFORMANCE CURVE

November 21, 1996
CHEROKEE WASH
2-10'X5' CBC
59TH PLACE

==========

PROGRAM INPUT DATA:

| DESCRIPTION | VALUE |
|---|---|
| Culvert Span (Width of Opening) (feet)..... | 10.00 |
| Culvert Rise (Height of Opening) (feet)..... | 5.00 |
| FHWA Chart Number (8,9,10,11,12 or 13)..... | 8 |
| Scale Number on Chart (Type of Culvert Entrance)..... | 1 |
| Manning`s Roughness Coefficient (n-value)..... | 0.0120 |
| Entrance Loss Coefficient of Culvert Opening..... | 0.50 |
| Culvert Length (feet)..... | 30.0 |
| Culvert Slope (feet per foot)..... | 0.0167 |

==========

PROGRAM RESULTS:

| Flow Rate (cfs) | Tailwater Depth (ft) | Headwater (ft) Inlet Control | Headwater (ft) Outlet Control | Normal Depth (ft) | Critical Depth (ft) | Depth at Outlet (ft) | Outlet Velocity (fps) |
|---|---|---|---|---|---|---|---|
| 337.5 | 5.00 | 5.32 | 5.61 | 1.77 | 3.28 | 5.00 | 6.75 |

==========

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BOX CULVERT ANALYSIS
COMPUTATION OF CULVERT PERFORMANCE CURVE

November 21, 1996
CHEROKEE WASH
2-10'X5' CBC
MORNING GLORY ROAD

==========

PROGRAM INPUT DATA:

| DESCRIPTION | VALUE |
|---|---|
| Culvert Span (Width of Opening) (feet)..... | 10.00 |
| Culvert Rise (Height of Opening) (feet)..... | 5.00 |
| FHWA Chart Number (8,9,10,11,12 or 13)..... | 8 |
| Scale Number on Chart (Type of Culvert Entrance)..... | 1 |
| Manning`s Roughness Coefficient (n-value)..... | 0.0120 |
| Entrance Loss Coefficient of Culvert Opening..... | 0.50 |
| Culvert Length (feet)..... | 55.0 |
| Culvert Slope (feet per foot)..... | 0.0091 |

==========

PROGRAM RESULTS:

| Flow Rate (cfs) | Tailwater Depth (ft) | Headwater (ft) Inlet Control | Headwater (ft) Outlet Control | Normal Depth (ft) | Critical Depth (ft) | Depth at Outlet (ft) | Outlet Velocity (fps) |
|---|---|---|---|---|---|---|---|
| 337.5 | 5.00 | 5.32 | 5.64 | 2.17 | 3.28 | 5.00 | 6.75 |

==========

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BOX CULVERT ANALYSIS
COMPUTATION OF CULVERT PERFORMANCE CURVE

November 21, 1996
CHEROKEE WASH
2-10'X5' CBC
GABALLO LANE

==========

PROGRAM INPUT DATA:

| DESCRIPTION | VALUE |
|---|---|
| Culvert Span (Width of Opening) (feet)..... | 10.00 |
| Culvert Rise (Height of Opening) (feet)..... | 5.00 |
| FHWA Chart Number (8,9,10,11,12 or 13)..... | 8 |
| Scale Number on Chart (Type of Culvert Entrance)..... | 1 |
| Manning`s Roughness Coefficient (n-value)..... | 0.0120 |
| Entrance Loss Coefficient of Culvert Opening..... | 0.50 |
| Culvert Length (feet)..... | 30.0 |
| Culvert Slope (feet per foot)..... | 0.0250 |

==========

PROGRAM RESULTS:

| Flow Rate (cfs) | Tailwater Depth (ft) | Headwater (ft) Inlet Control | Headwater (ft) Outlet Control | Normal Depth (ft) | Critical Depth (ft) | Depth at Outlet (ft) | Outlet Velocity (fps) |
|---|---|---|---|---|---|---|---|
| 337.5 | 5.00 | 5.31 | 5.36 | 1.54 | 3.28 | 5.00 | 6.75 |

==========

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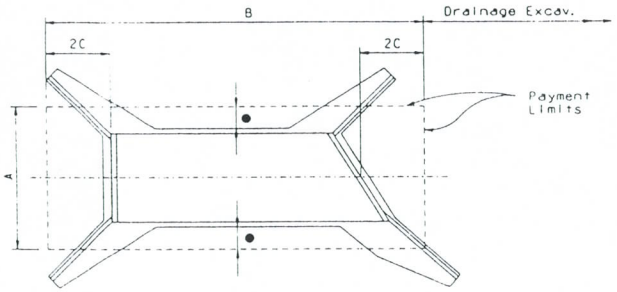
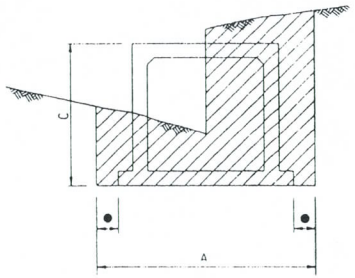


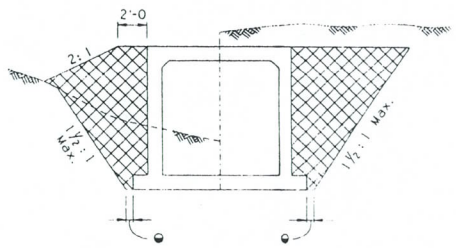

PLAN

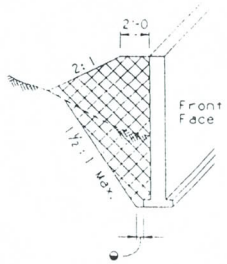


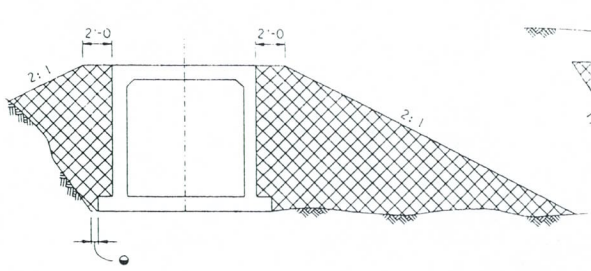

SECTION

## STRUCTURAL EXCAVATION - PAYMENT LIMITS

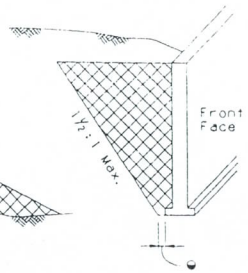
Note: Payment limits shown include structural excavation for headwalls, cutoffwalls, wingwalls, end sections, etc.



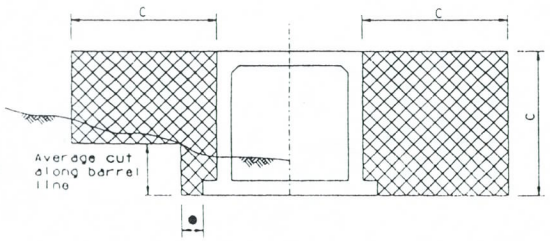

SECTION

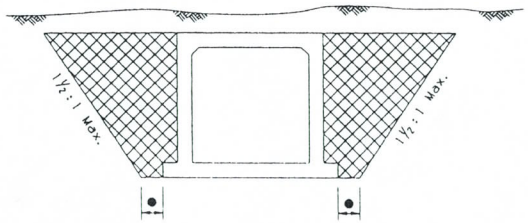



END VIEW WING OF BOX CULVERT

## STRUCTURE BACKFILL - PLACEMENT

Note: Placement of structure backfill behind headwalls and wingwalls shall be the same as around structures.




## LEGEND

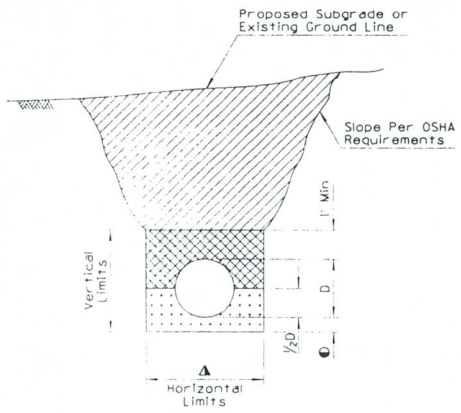
A : Width
B : Length
C : Height of barrel or headwall without cutoff wall.
● 6" Max. in rock and trench, 1'-6 max. all others
◒ 6" Min. in rock and trench, 1'-6 min. all others
Indicates Structural Excavation
Indicates Structure Backfill

## STRUCTURE BACKFILL - MEASUREMENT

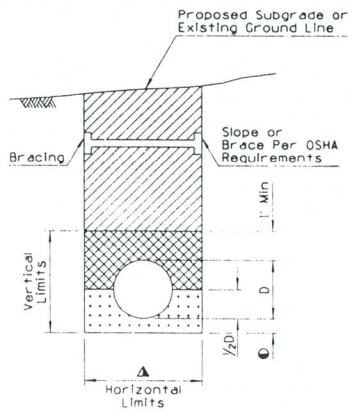
Note: Computation of structure backfill quantities is based on the area of a typical installation times (the total length of structure plus 2H). No measurment is necessary for wing arms. Use H for box extensions on each end extended.

| | | | |
|---|---|---|---|
| | DESIGN APPROVED | ARIZONA DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION STANDARD DRAWINGS | REVISION |
| | APPROVED FOR DISTRIBUTION | STRUCTURAL EXCAVATION & STRUCTURE BACKFILL FOR R.C.B. CULVERTS | STANDARD NO. B-19.50 |

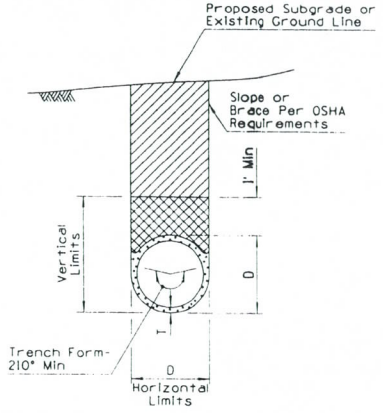
| NO. | DESCRIPTION OR REVISIONS | MADE BY | DATE |
|---|---|---|---|
| 1 | ADDED NOTE | PNB | 7/94 |
| 2 | REARRANGED STD | PNB | 7/94 |
| 3 | | | |
| 4 | | | |




TRENCH CONDITION
IN NATURAL GROUND OR IN EMBANKMENT
WITHOUT BRACING




TRENCH CONDITION
IN NATURAL GROUND OR IN EMBANKMENT
WITH BRACING SHOWN




TRENCH CONDITION
NRCIPCP IN NATURAL GROUND
OR IN EMBANKMENT

## GENERAL NOTES

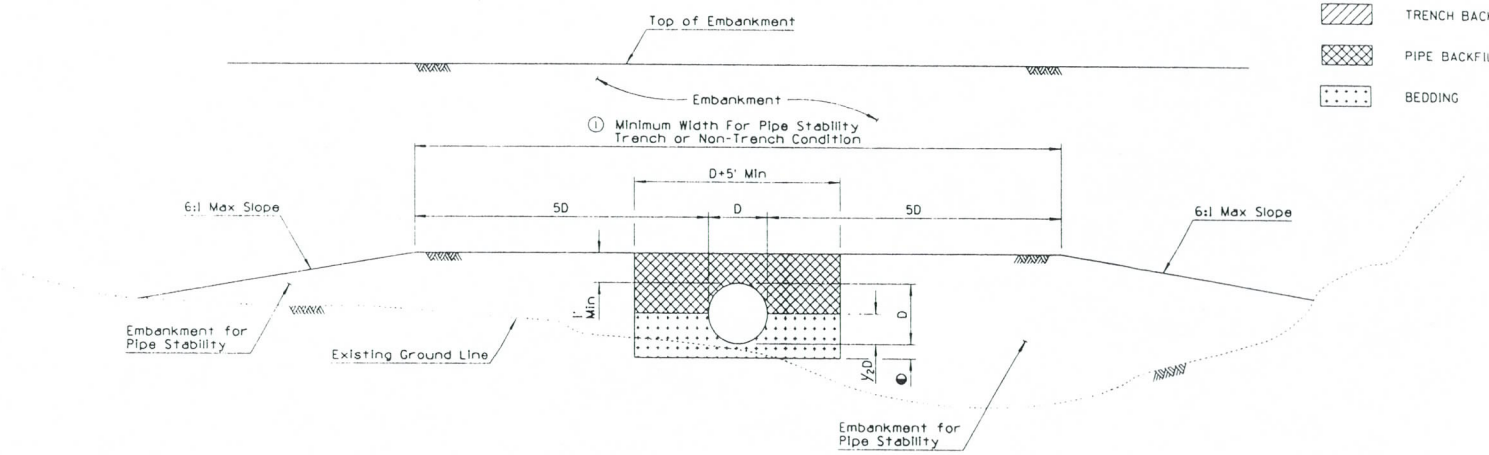
1. Pipes shall be installed either in a trench condition or in a non-trench condition in natural ground or in embankment.
2. In a trench condition, the vertical and horizontal limits shall be maintained. If horizontal limits are exceeded or the vertical limits are not maintained, a non-trench condition exists.
3. Bracing and sloping shall conform to OSHA requirements.
4. Pipe backfill may be bedding material.
(1) 5. In a non-trench condition, the embankment for pipe stability shall be constructed in lifts to the limits shown in the detail simultaneously with the bedding material and pipe backfill. If the contractor chooses to construct it as a trench condition, the embankment shall be constructed before excavating the trench.

D - Outside diameter of full circle pipe or outside dimension (span or rise) of arch, arch pipe, elliptical pipe.

T - Minimum wall thickness for NRCIPCP. See Plans.

▲ - D+2 feet maximum for diameters up to 4 feet and D+3 feet maximum for diameters 4 feet and over.

◐ - 6 inches except when on unyielding or unstable material. See standard specifications.




NON-TRENCH CONDITION

TRENCH BACKFILL
PIPE BACKFILL
BEDDING

| | | |
|---|---|---|
| DESIGN APPROVED | STATE OF ARIZONA<br>DEPARTMENT OF TRANSPORTATION<br>DIVISION OF HIGHWAYS<br>STANDARD DRAWINGS | REV.<br>7/94 |
| APPROVED FOR DISTRIBUTION | (2) TYPICAL PIPE INSTALLATION | DRAWING NO.<br>C-13.15 |

# CHEROKEE WASH

# EXCAVATION

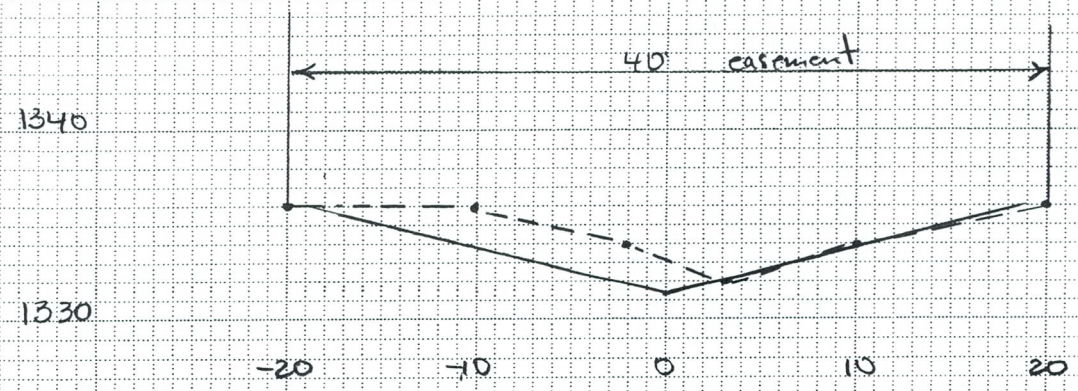
HOOK ENGINEERING, INC.

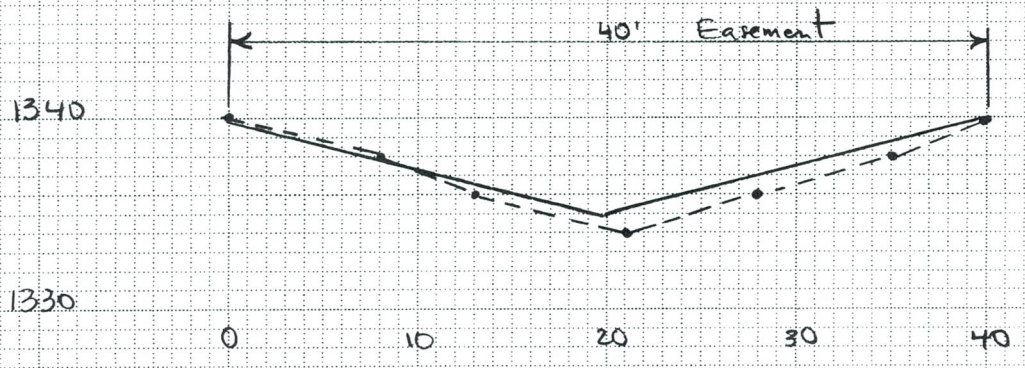
JOB Doubletree Ranch Road (2878)
COMPUTATION FOR Cherokee Wash
Dirt Channel Excavation

SHEET NO _____ OF _____
DATE 1-15-96
BY WSS CHKD _____

# Reach Indian Bend Wash to 56th Street

Channel lengths
with 4134 ft
without 4134 ft




| OFFSET | ELEV |
|---|---|
| 20 | 6 |
| 10 | 4 |
| 3 | 2 |
| -2 | 4 |
| -10 | 6 |
| -20 | 6 |
| 0 | 1 |
| 20 | 6 |

AREA = 46 ft²

VOL = 1.7 yd³

WITH = 1.7 x 4134 = 7,043 yd³

WITHOUT 1.7 x 4134 7,043 yd³

HOOK ENGINEERING, INC.

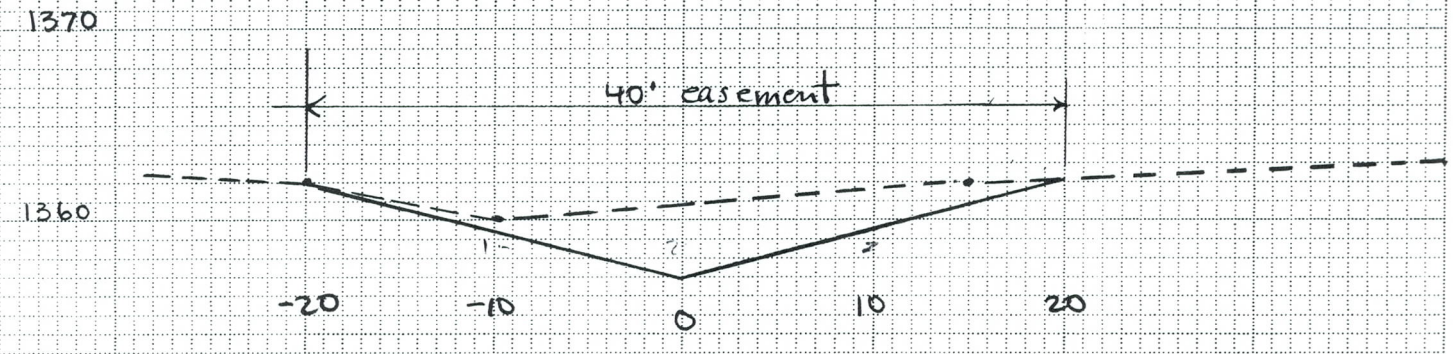
JOB Doubletree Ranch Road (2878)
COMPUTATION FOR Cherokee Wash
Dirt Channel Excavation

SHEET NO _____ OF _____
DATE 1-15-96
BY WSS CHKD _____

# Reach 56th Street to Detention Basin 13

CHANNEL LENGTHS

| | |
|---|---|
| WITH | 2500 |
| WITHOUT | 3200 |




| OFFSET | ELEV |
|---|---|
| 20 | 2 |
| -10 | 0 |
| -20 | 2 |
| 0 | -3 |
| 20 | 2 |

AREA 60 ft²
VOL 2.22 yd³

WITH = 2.22 X 2500 = 5,550 yd³
WITHOUT = 2.22 X 3200 = 7,104 yd³

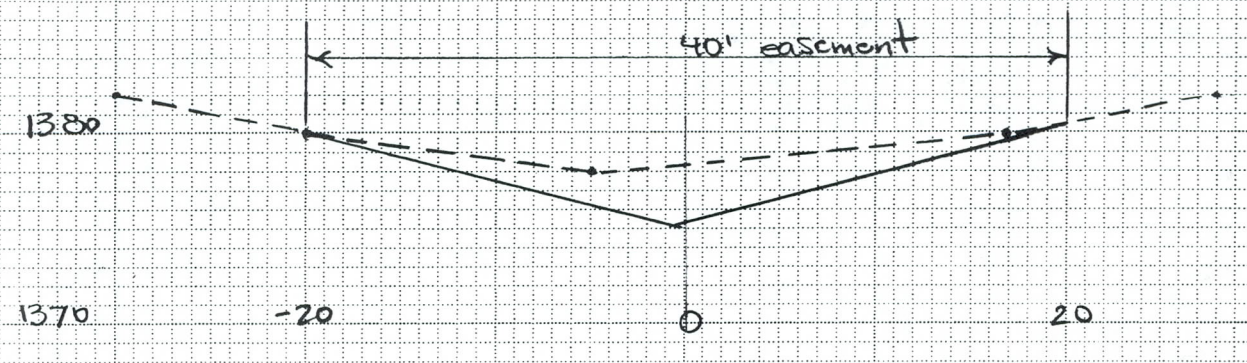
HOOK ENGINEERING, INC.

JOB Double Tree Ranch Road (2878)
COMPUTATION FOR Cherokee Wash
Dirt Channel Excavation

SHEET NO _____ OF _____
DATE 1-15-96
BY WSS CHKD _____

# Reach Detention Basin 13 to Detention Basin 16

| CHANNEL LENGTH | |
|---|---|
| WITH | 600 |
| WITHOUT | 1130 |




| OFFSET | ELEV |
|---|---|
| 20 | 10 |
| -5 | 8 |
| -20 | 10 |
| 0 | 5 |
| 20 | 10 |

AREA 60 ft²
VOL 2.22 yd³

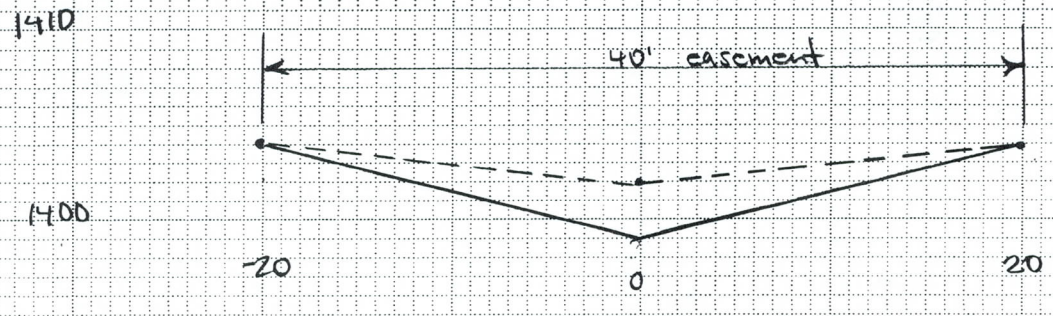
WITH 600 x 2.22 = 1333 yd³
WITHOU 1130 x 2.22 = 2509 yd³

# REACH DETENTION BASIN 16 TO DETENTION BASIN 15 (4)

CHANNEL LENGTH

WITH 2260

WITHOUT 3008




Average end area (cuyd)

| OFFSET | ELEV |
|---|---|
| 20 | 4 |
| 0 | 2 |
| -20 | 4 |
| 0 | -1 |
| 20 | 4 |

AREA = 60.00 ft²
VOL = 2.22 yds³

WITH = 2.22 X 2260 = 5,017 yd³

WITHOUT = 2.22 X 3008 6,678 yd³

# CHEROKEE WASH

# SUPERELEVATION

# DOUBLETREE RANCH ROAD

**PROJECT NO. 2878**

## CHEROKEE WASH
## SUPER ELEVATION AT BENDS

| STREET NAME | STATION | SLOPE (ft/ft) | FLOWRATE (cfs) | FROUDE NUMBER | AREA ($ft^2$) | TOP WIDTH (ft) | VELOCITY (fps) | DEPTH (Y) | $r_c'$ | Δy (ft) | FREE BOARD | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Road Runner | 607+00 | 0.0100 | 425 | 0.83 | 57.78 | 23.71 | 7.36 | 3.43 | 46.5 | 0.86 | 1.07 | Typical trapezodial channel |
| Crestview | 623+00 | 0.0113 | 1159 | 0.93 | 115.12 | 31.95 | 10.07 | 5.49 | 73.3 | 1.37 | 1.77 | Q = 100-year |
| Arroyo | 626+00 | 0.0140 | 1159 | 1.03 | 106.37 | 30.84 | 10.90 | 5.21 | 87.4 | 1.30 | 1.76 | 2:1 Side Slopes |
| Mockingbird | 641+00 | 0.0083 | 1159 | 0.81 | 129.03 | 33.65 | 8.98 | 5.91 | 57.0 | 1.48 | 1.79 | 10' Bottom Width |
| 56th Street | 680+00 | 0.0093 | 1786 | 0.88 | 170.36 | 38.25 | 10.48 | 4.65 | 112.2 | 1.16 | 1.59 | |
| 56th Street | 681+00 | 0.0093 | 1786 | 0.88 | 170.36 | 38.25 | 10.48 | 4.65 | 112.2 | 1.16 | 1.59 | |
| 59th Place | 703+00 | 0.0035 | 1790 | 0.55 | 245.40 | 45.42 | 7.29 | 5.90 | 50.8 | 1.48 | 1.68 | |
| 59th Place | 705+00 | 0.0035 | 1790 | 0.55 | 245.40 | 45.42 | 7.29 | 5.90 | 50.8 | 1.48 | 1.68 | |
| Gaballo | 715+00 | 0.0067 | 1790 | 0.75 | 192.73 | 40.52 | 9.29 | 5.04 | 86.2 | 1.26 | 1.60 | |
| Gaballo | 716+00 | 0.0067 | 1790 | 0.75 | 192.73 | 40.52 | 9.29 | 5.04 | 86.2 | 1.26 | 1.60 | |
| | | | | | | | | | | | | Conceptual --Alternative No. 6 |
| Gabions | | 0.0056 | 675 | 0.65 | 100.00 | 30.00 | 6.75 | 5.00 | 34.0 | 1.25 | 1.43 | 56th Street to Indian Bend Wash |
| | | 0.0069 | 750 | 0.72 | 100.00 | 30.00 | 7.50 | 5.00 | 41.9 | 1.25 | 1.47 | 52nd Street to 56th Street |

11/15/96 WSS

**SUPER ELEVATION** (rise in water surface at bends)

$\Delta y = V^2T/gr_c'$ — equation 5.9 page 5-19

$r_c = 4V^2T/gy$ Froude > 0.85 — equation 5.8 page 5-18

Δy = depth caused by water around bend (ft)
V = velocity (fps)
T = channel width top of water surface (ft)
g = 32.2 $ft/sec^2$
$r_c$ = radius of channel centerline curvature (ft)
y = depth of flow

**FREEBOARD**

$FB = 0.25(y+v^2/2g)$ — equation 5.1 page 5-19
Minimum freeboard = one foot subcritical
two feet supercritical

**FROUDE NUMBER**

$F = V/(gD)^{.5}$ — equation 5.4 page 5-15

D = hydraulic Depth = A/T (ft)
A = Cross sectional area of flow ($ft^2$)
T = see superelevation

| Constants | Quantity | Units |
|---|---|---|
| g | 32.2 | $ft/sec^2$ |
| "n" | 0.035 | |
| SS | 2:1 | horz/vert |

TRAPEZOIDAL CHANNEL ANALYSIS
RATING CURVE COMPUTATION

November 21, 1996
CHEROKEE WASH
GABIONS SUPERELEVATION
52ND STREET TO 56TH STREET

==========

PROGRAM INPUT DATA:

| DESCRIPTION | VALUE |
|---|---|
| Channel Bottom Slope (feet per foot)..... | 0.0069 |
| Manning`s Roughness Coefficient (n-value)..... | 0.0350 |
| Channel Side Slope - Left Side (horizontal/vertical).... | 2.00 |
| Channel Side Slope - Right Side (horizontal/vertical)... | 2.00 |
| Channel Bottom Width (feet)..... | 10.0 |

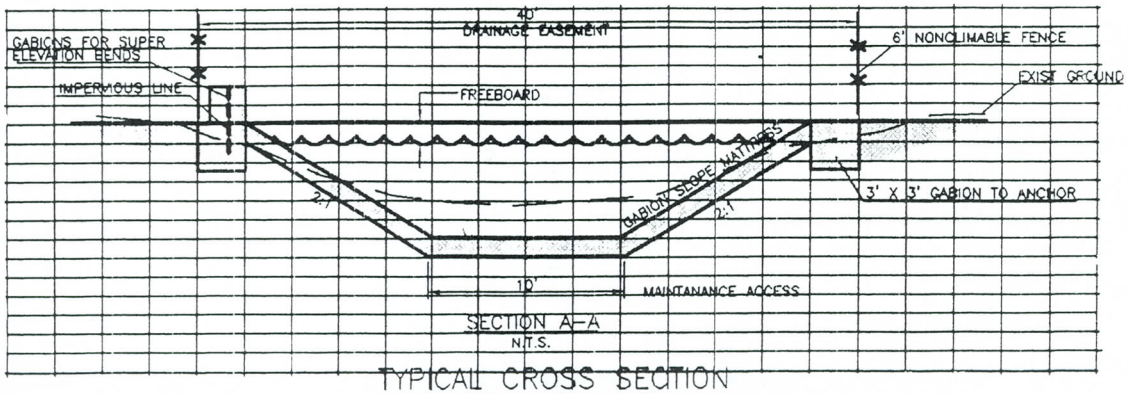
==========

PROGRAM RESULTS:

| Depth (ft) | Flow Rate (cfs) | Velocity (fps) | Froude Number | Velocity Head(ft) | Energy Head(ft) | Flow Area (sq ft) | Top Width (ft) |
|---|---|---|---|---|---|---|---|
| 5.0 | 748.2 | 7.48 | 0.722 | 0.869 | 5.869 | 100.0 | 30.0 |
| 4.0 | 477.9 | 6.64 | 0.703 | 0.684 | 4.684 | 72.0 | 26.0 |
| 3.0 | 273.2 | 5.69 | 0.679 | 0.503 | 3.503 | 48.0 | 22.0 |
| 2.0 | 128.1 | 4.58 | 0.647 | 0.325 | 2.325 | 28.0 | 18.0 |
| 1.0 | 37.4 | 3.11 | 0.592 | 0.150 | 1.150 | 12.0 | 14.0 |

==========

TRAPEZOIDAL CHANNEL ANALYSIS COMPUTER PROGRAM, Version 1.3 (c) 1986 Dodson & Associates, Inc., 5629 FM 1960 W., #314, Houston, TX 77069 (713) 440-3787. A manual with equations & flow chart is available.



TYPICAL CROSS SECTION

TRAPEZOIDAL CHANNEL ANALYSIS
RATING CURVE COMPUTATION

November 21, 1996
CHEROKEE WASH
GABIONS SUPERELEVATION
56TH STREET TO INDIAN BEND WASH

==========

PROGRAM INPUT DATA:

| DESCRIPTION | VALUE |
|---|---|
| Channel Bottom Slope (feet per foot)..... | 0.0056 |
| Manning`s Roughness Coefficient (n-value)..... | 0.0350 |
| Channel Side Slope - Left Side (horizontal/vertical).... | 2.00 |
| Channel Side Slope - Right Side (horizontal/vertical)... | 2.00 |
| Channel Bottom Width (feet)..... | 10.0 |

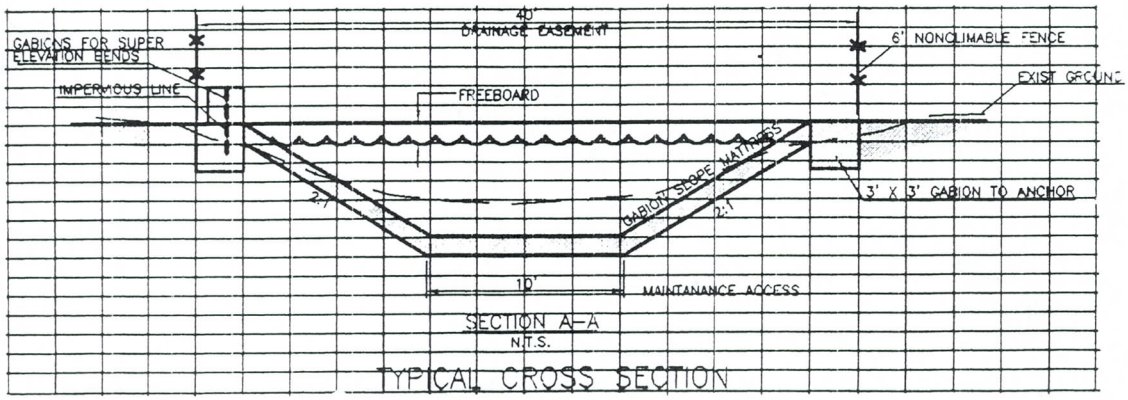
==========

PROGRAM RESULTS:

| Depth (ft) | Flow Rate (cfs) | Velocity (fps) | Froude Number | Velocity Head(ft) | Energy Head(ft) | Flow Area (sq ft) | Top Width (ft) |
|---|---|---|---|---|---|---|---|
| 5.0 | 674.1 | 6.74 | 0.651 | 0.706 | 5.706 | 100.0 | 30.0 |
| 4.0 | 430.5 | 5.98 | 0.633 | 0.555 | 4.555 | 72.0 | 26.0 |
| 3.0 | 246.1 | 5.13 | 0.612 | 0.408 | 3.408 | 48.0 | 22.0 |
| 2.0 | 115.4 | 4.12 | 0.582 | 0.264 | 2.264 | 28.0 | 18.0 |
| 1.0 | 33.7 | 2.80 | 0.534 | 0.122 | 1.122 | 12.0 | 14.0 |

==========

TRAPEZOIDAL CHANNEL ANALYSIS COMPUTER PROGRAM, Version 1.3 (c) 1986 Dodson & Associates, Inc., 5629 FM 1960 W., #314, Houston, TX 77069 (713) 440-3787. A manual with equations & flow chart is available.

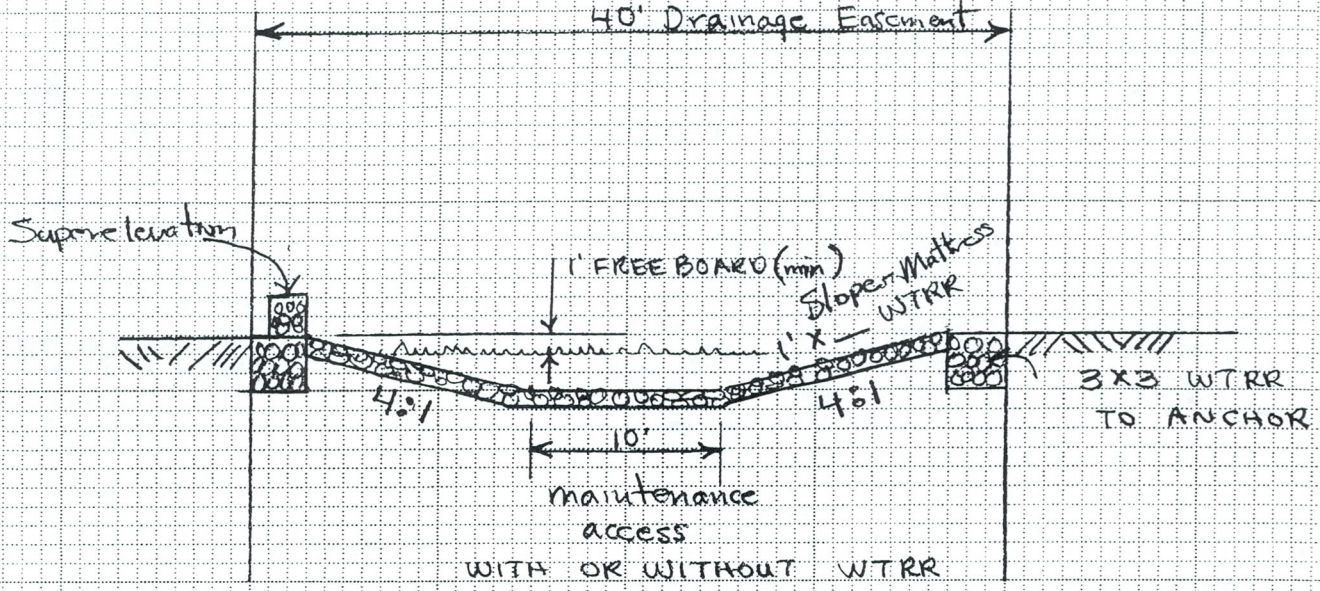


TYPICAL CROSS SECTION

HOOK ENGINEERING, INC.

JOB DOUBLETREE RANCH ROAD
COMPUTATION FOR CHEROKEE WASH
GABIONS (WIRE TIED RIP-RAP) WTRR

SHEET NO ____ OF ____
DATE 8-14-96
BY WSS CHKD ____




WITH OR WITHOUT WTRR
ACCESS FROM DIP SECTIONS ON CROSS ROADS

CAPACITY

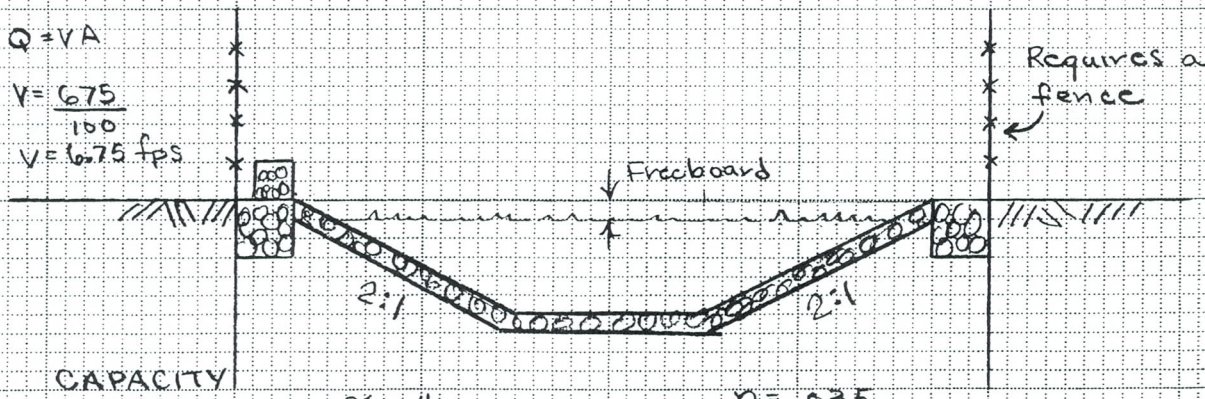
$$Q = \frac{1.49}{n} A R^{2/3} S^{1/2}$$

$n = .035$
$S = .0056$ ft/ft (conservatively)
$A = (2 \times 10) + (8 \times 2) = 36$ ft²
$WP = (8.2462)2 + 10 = 26.4924$ ft
$R = A/WP = 36/26.4924 = 1.3588$
$R^{2/3} = 1.2269$

$$Q = \frac{1.49}{.035}(36)(1.2269)(.0748) = 141 \text{ cfs}$$

---

GABION BASKETS 2:1 pg 5-14 VOL II HYDRAULICS, MARICOPA COUNTY




CAPACITY

$$Q = \frac{1.49}{n} A R^{2/3} S^{1/2}$$

$$Q = \frac{1.49}{.035}(100)(2.1216)(.07483)$$

$Q = 675$ cfs

$n = .035$
$S = .0056$ ft/ft
$A = (5 \times 10) + (10 \times 5) = 100$ ft²
$WP = (\sqrt{5^2 + 10^2})2 + 10' = 32.36068$
$R = 100/32.36068 = 3.09017 = R^{2/3} = 2.146$

TRAPEZOIDAL CHANNEL ANALYSIS
NORMAL DEPTH COMPUTATION

November 15, 1996
CHEROKEE WASH
STATION 607+00
ROAD RUNNER ROAD

==========

PROGRAM INPUT DATA:

| DESCRIPTION | VALUE |
|---|---|
| Flow Rate (cubic feet per second) | 425.0 |
| Channel Bottom Slope (feet per foot) | 0.0100 |
| Manning`s Roughness Coefficient (n-value) | 0.0350 |
| Channel Side Slope - Left Side (horizontal/vertical) | 2.00 |
| Channel Side Slope - Right Side (horizontal/vertical) | 2.00 |
| Channel Bottom Width (feet) | 10.0 |

==========

PROGRAM RESULTS:

| DESCRIPTION | VALUE |
|---|---|
| Normal Depth (feet) | 3.43 |
| Flow Velocity (feet per second) | 7.36 |
| Froude Number (Flow is Sub-Critical) | 0.830 |
| Velocity Head (feet) | 0.84 |
| Energy Head (feet) | 4.27 |
| Cross-Sectional Area of Flow (square feet) | 57.78 |
| Top Width of Flow (feet) | 23.71 |

==========

TRAPEZOIDAL CHANNEL ANALYSIS COMPUTER PROGRAM, Version 1.3 (c) 1986 Dodson & Associates, Inc., 5629 FM 1960 W., #314, Houston, TX 77069 (713) 440-3787. A manual with equations & flow chart is available.

TRAPEZOIDAL CHANNEL ANALYSIS
NORMAL DEPTH COMPUTATION

November 15, 1996
CHEROKEE WASH
STATION 623+00
CRESTVIEW DRIVE

==========

PROGRAM INPUT DATA:

| DESCRIPTION | VALUE |
|---|---|
| Flow Rate (cubic feet per second) | 1159.0 |
| Channel Bottom Slope (feet per foot) | 0.0113 |
| Manning`s Roughness Coefficient (n-value) | 0.0350 |
| Channel Side Slope - Left Side (horizontal/vertical) | 2.00 |
| Channel Side Slope - Right Side (horizontal/vertical) | 2.00 |
| Channel Bottom Width (feet) | 10.0 |

==========

PROGRAM RESULTS:

| DESCRIPTION | VALUE |
|---|---|
| Normal Depth (feet) | 5.49 |
| Flow Velocity (feet per second) | 10.07 |
| Froude Number (Flow is Sub-Critical) | 0.935 |
| Velocity Head (feet) | 1.57 |
| Energy Head (feet) | 7.06 |
| Cross-Sectional Area of Flow (square feet) | 115.12 |
| Top Width of Flow (feet) | 31.95 |

==========

TRAPEZOIDAL CHANNEL ANALYSIS COMPUTER PROGRAM, Version 1.3 (c) 1986
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(713) 440-3787. A manual with equations & flow chart is available.

TRAPEZOIDAL CHANNEL ANALYSIS
NORMAL DEPTH COMPUTATION

November 15, 1996
CHEROKEE WASH
STATION 626+00
ARROYO

==========

PROGRAM INPUT DATA:

| DESCRIPTION | VALUE |
|---|---|
| Flow Rate (cubic feet per second) | 1159.0 |
| Channel Bottom Slope (feet per foot) | 0.0140 |
| Manning`s Roughness Coefficient (n-value) | 0.0350 |
| Channel Side Slope - Left Side (horizontal/vertical) | 2.00 |
| Channel Side Slope - Right Side (horizontal/vertical) | 2.00 |
| Channel Bottom Width (feet) | 10.0 |

==========

PROGRAM RESULTS:

| DESCRIPTION | VALUE |
|---|---|
| Normal Depth (feet) | 5.21 |
| Flow Velocity (feet per second) | 10.90 |
| Froude Number (Flow is Super-Critical) | 1.034 |
| Velocity Head (feet) | 1.84 |
| Energy Head (feet) | 7.05 |
| Cross-Sectional Area of Flow (square feet) | 106.37 |
| Top Width of Flow (feet) | 30.84 |

==========

TRAPEZOIDAL CHANNEL ANALYSIS COMPUTER PROGRAM, Version 1.3 (c) 1986
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(713) 440-3787. A manual with equations & flow chart is available.

TRAPEZOIDAL CHANNEL ANALYSIS
NORMAL DEPTH COMPUTATION

November 15, 1996
CHEROKEE WASH
STATION 641+00
MOCKINGBIRD LANE

==========

PROGRAM INPUT DATA:

| DESCRIPTION | VALUE |
|---|---|
| Flow Rate (cubic feet per second) | 1159.0 |
| Channel Bottom Slope (feet per foot) | 0.0083 |
| Manning`s Roughness Coefficient (n-value) | 0.0350 |
| Channel Side Slope - Left Side (horizontal/vertical) | 2.00 |
| Channel Side Slope - Right Side (horizontal/vertical) | 2.00 |
| Channel Bottom Width (feet) | 10.0 |

==========

PROGRAM RESULTS:

| DESCRIPTION | VALUE |
|---|---|
| Normal Depth (feet) | 5.91 |
| Flow Velocity (feet per second) | 8.98 |
| Froude Number (Flow is Sub-Critical) | 0.808 |
| Velocity Head (feet) | 1.25 |
| Energy Head (feet) | 7.17 |
| Cross-Sectional Area of Flow (square feet) | 129.03 |
| Top Width of Flow (feet) | 33.65 |

==========

TRAPEZOIDAL CHANNEL ANALYSIS COMPUTER PROGRAM, Version 1.3 (c) 1986
Dodson & Associates, Inc., 5629 FM 1960 W., #314, Houston, TX 77069
(713) 440-3787. A manual with equations & flow chart is available.

TRAPEZOIDAL CHANNEL ANALYSIS
NORMAL DEPTH COMPUTATION

November 21, 1996
CHEROKEE WASH
STATION 680+000
56TH STREET

==========

PROGRAM INPUT DATA:

| DESCRIPTION | VALUE |
|---|---|
| Flow Rate (cubic feet per second) | 1786.0 |
| Channel Bottom Slope (feet per foot) | 0.0093 |
| Manning`s Roughness Coefficient (n-value) | 0.0350 |
| Channel Side Slope - Left Side (horizontal/vertical) | 2.00 |
| Channel Side Slope - Right Side (horizontal/vertical) | 2.00 |
| Channel Bottom Width (feet) | 10.0 |

==========

PROGRAM RESULTS:

| DESCRIPTION | VALUE |
|---|---|
| Normal Depth (feet) | 7.06 |
| Flow Velocity (feet per second) | 10.48 |
| Froude Number (Flow is Sub-Critical) | 0.875 |
| Velocity Head (feet) | 1.71 |
| Energy Head (feet) | 8.77 |
| Cross-Sectional Area of Flow (square feet) | 170.36 |
| Top Width of Flow (feet) | 38.25 |

==========

TRAPEZOIDAL CHANNEL ANALYSIS COMPUTER PROGRAM, Version 1.3 (c) 1986
Dodson & Associates, Inc., 5629 FM 1960 W., #314, Houston, TX 77069
(713) 440-3787. A manual with equations & flow chart is available.

TRAPEZOIDAL CHANNEL ANALYSIS
NORMAL DEPTH COMPUTATION

November 21, 1996
CHEROKEE WASH
STATION 681+00
56TH STREET

==========

PROGRAM INPUT DATA:

| DESCRIPTION | VALUE |
|---|---|
| Flow Rate (cubic feet per second) | 1786.0 |
| Channel Bottom Slope (feet per foot) | 0.0093 |
| Manning`s Roughness Coefficient (n-value) | 0.0350 |
| Channel Side Slope - Left Side (horizontal/vertical) | 2.00 |
| Channel Side Slope - Right Side (horizontal/vertical) | 2.00 |
| Channel Bottom Width (feet) | 10.0 |

==========

PROGRAM RESULTS:

| DESCRIPTION | VALUE |
|---|---|
| Normal Depth (feet) | 7.06 |
| Flow Velocity (feet per second) | 10.48 |
| Froude Number (Flow is Sub-Critical) | 0.875 |
| Velocity Head (feet) | 1.71 |
| Energy Head (feet) | 8.77 |
| Cross-Sectional Area of Flow (square feet) | 170.36 |
| Top Width of Flow (feet) | 38.25 |

==========

TRAPEZOIDAL CHANNEL ANALYSIS COMPUTER PROGRAM, Version 1.3 (c) 1986 Dodson & Associates, Inc., 5629 FM 1960 W., #314, Houston, TX 77069 (713) 440-3787. A manual with equations & flow chart is available.

TRAPEZOIDAL CHANNEL ANALYSIS
NORMAL DEPTH COMPUTATION

November 21, 1996
CHEROKEE WASH
STATION 703+00
59TH PLACE

==========

PROGRAM INPUT DATA:

| DESCRIPTION | VALUE |
|---|---|
| Flow Rate (cubic feet per second) | 1790.0 |
| Channel Bottom Slope (feet per foot) | 0.0035 |
| Manning`s Roughness Coefficient (n-value) | 0.0350 |
| Channel Side Slope - Left Side (horizontal/vertical) | 2.00 |
| Channel Side Slope - Right Side (horizontal/vertical) | 2.00 |
| Channel Bottom Width (feet) | 10.0 |

==========

PROGRAM RESULTS:

| DESCRIPTION | VALUE |
|---|---|
| Normal Depth (feet) | 8.86 |
| Flow Velocity (feet per second) | 7.29 |
| Froude Number (Flow is Sub-Critical) | 0.553 |
| Velocity Head (feet) | 0.83 |
| Energy Head (feet) | 9.68 |
| Cross-Sectional Area of Flow (square feet) | 245.40 |
| Top Width of Flow (feet) | 45.42 |

==========

TRAPEZOIDAL CHANNEL ANALYSIS COMPUTER PROGRAM, Version 1.3 (c) 1986 Dodson & Associates, Inc., 5629 FM 1960 W., #314, Houston, TX 77069 (713) 440-3787. A manual with equations & flow chart is available.

TRAPEZOIDAL CHANNEL ANALYSIS
NORMAL DEPTH COMPUTATION

November 21, 1996
CHEROKEE WASH
STATION 705+00
59TH PLACE

==========

PROGRAM INPUT DATA:

| DESCRIPTION | VALUE |
|---|---|
| Flow Rate (cubic feet per second) | 1790.0 |
| Channel Bottom Slope (feet per foot) | 0.0035 |
| Manning`s Roughness Coefficient (n-value) | 0.0350 |
| Channel Side Slope - Left Side (horizontal/vertical) | 2.00 |
| Channel Side Slope - Right Side (horizontal/vertical) | 2.00 |
| Channel Bottom Width (feet) | 10.0 |

==========

PROGRAM RESULTS:

| DESCRIPTION | VALUE |
|---|---|
| Normal Depth (feet) | 8.86 |
| Flow Velocity (feet per second) | 7.29 |
| Froude Number (Flow is Sub-Critical) | 0.553 |
| Velocity Head (feet) | 0.83 |
| Energy Head (feet) | 9.68 |
| Cross-Sectional Area of Flow (square feet) | 245.40 |
| Top Width of Flow (feet) | 45.42 |

==========

TRAPEZOIDAL CHANNEL ANALYSIS COMPUTER PROGRAM, Version 1.3 (c) 1986
Dodson & Associates, Inc., 5629 FM 1960 W., #314, Houston, TX 77069
(713) 440-3787. A manual with equations & flow chart is available.

TRAPEZOIDAL CHANNEL ANALYSIS
NORMAL DEPTH COMPUTATION

November 21, 1996
CHEROKEE WASH
STATION 715+00
GABALLO LANE

==========

PROGRAM INPUT DATA:

| DESCRIPTION | VALUE |
|---|---|
| Flow Rate (cubic feet per second) | 1790.0 |
| Channel Bottom Slope (feet per foot) | 0.0067 |
| Manning`s Roughness Coefficient (n-value) | 0.0350 |
| Channel Side Slope - Left Side (horizontal/vertical) | 2.00 |
| Channel Side Slope - Right Side (horizontal/vertical) | 2.00 |
| Channel Bottom Width (feet) | 10.0 |

==========

PROGRAM RESULTS:

| DESCRIPTION | VALUE |
|---|---|
| Normal Depth (feet) | 7.63 |
| Flow Velocity (feet per second) | 9.29 |
| Froude Number (Flow is Sub-Critical) | 0.750 |
| Velocity Head (feet) | 1.34 |
| Energy Head (feet) | 8.97 |
| Cross-Sectional Area of Flow (square feet) | 192.73 |
| Top Width of Flow (feet) | 40.52 |

==========

TRAPEZOIDAL CHANNEL ANALYSIS COMPUTER PROGRAM, Version 1.3 (c) 1986
Dodson & Associates, Inc., 5629 FM 1960 W., #314, Houston, TX 77069
(713) 440-3787. A manual with equations & flow chart is available.

TRAPEZOIDAL CHANNEL ANALYSIS
NORMAL DEPTH COMPUTATION

November 21, 1996
CHEROKEE WASH
STATION 716+00
GABALLO LANE

==========

PROGRAM INPUT DATA:

| DESCRIPTION | VALUE |
|---|---|
| Flow Rate (cubic feet per second) | 1790.0 |
| Channel Bottom Slope (feet per foot) | 0.0067 |
| Manning`s Roughness Coefficient (n-value) | 0.0350 |
| Channel Side Slope - Left Side (horizontal/vertical) | 2.00 |
| Channel Side Slope - Right Side (horizontal/vertical) | 2.00 |
| Channel Bottom Width (feet) | 10.0 |

==========

PROGRAM RESULTS:

| DESCRIPTION | VALUE |
|---|---|
| Normal Depth (feet) | 7.63 |
| Flow Velocity (feet per second) | 9.29 |
| Froude Number (Flow is Sub-Critical) | 0.750 |
| Velocity Head (feet) | 1.34 |
| Energy Head (feet) | 8.97 |
| Cross-Sectional Area of Flow (square feet) | 192.73 |
| Top Width of Flow (feet) | 40.52 |

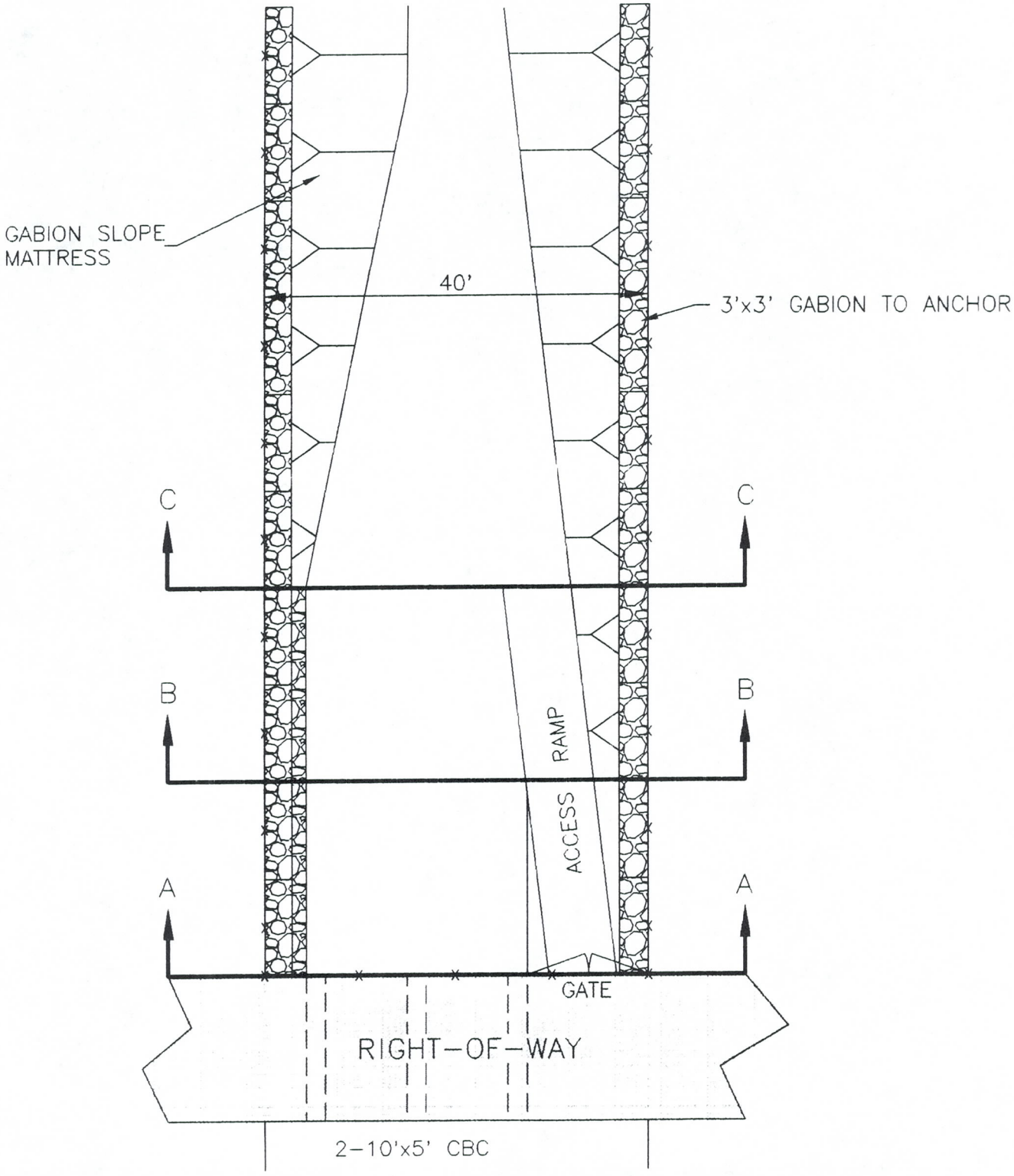
==========

TRAPEZOIDAL CHANNEL ANALYSIS COMPUTER PROGRAM, Version 1.3 (c) 1986
Dodson & Associates, Inc., 5629 FM 1960 W., #314, Houston, TX 77069
(713) 440-3787. A manual with equations & flow chart is available.

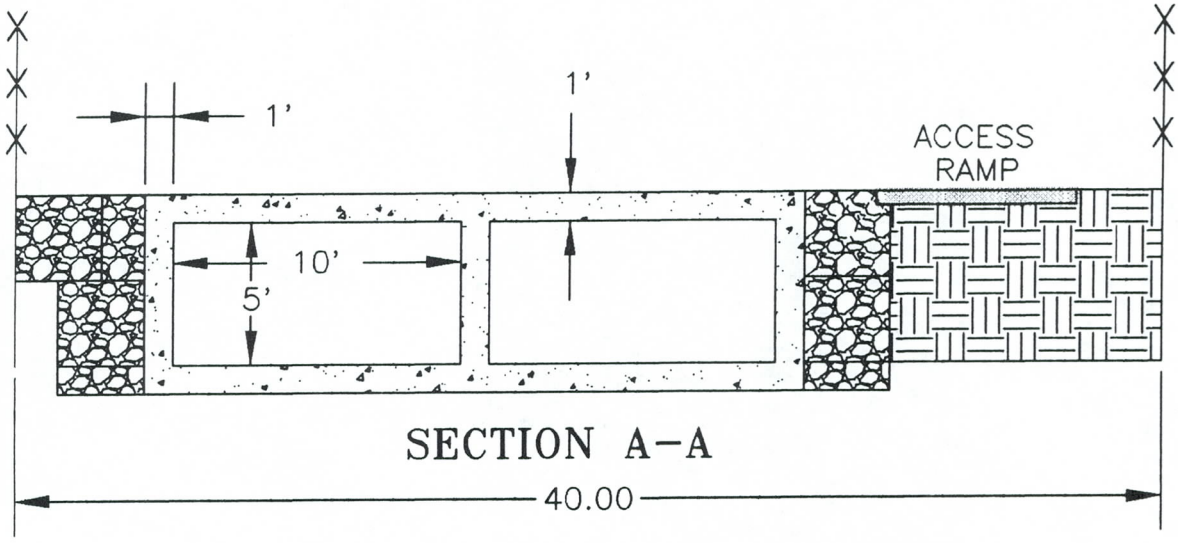
# CHEROKEE WASH

# ACCESS RAMP

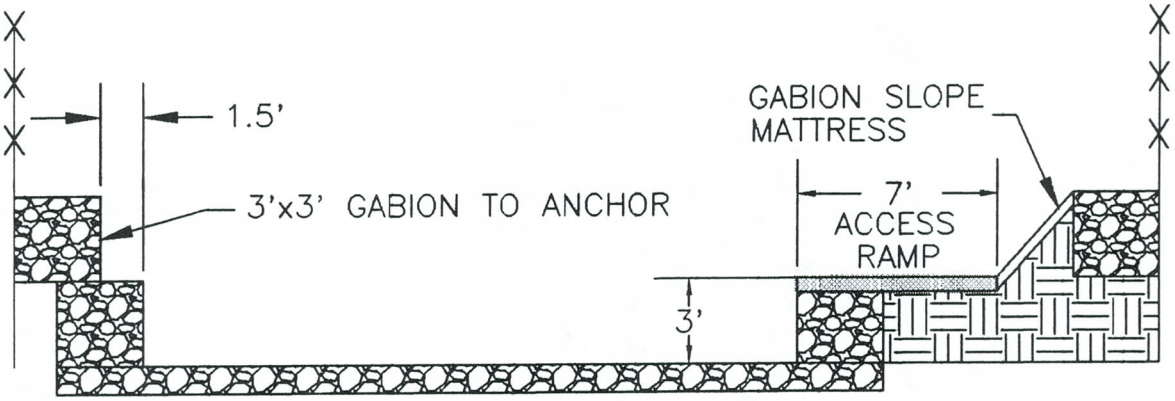
# CHEROKEE WASH
# ACCESS RAMP



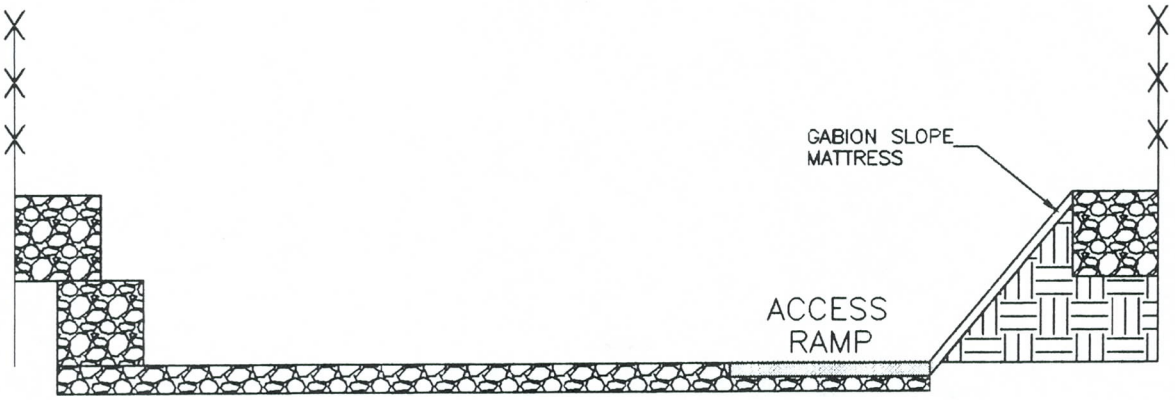
# CHEROKEE WASH
# ACCESS RAMP




SECTION A–A




SECTION B–B

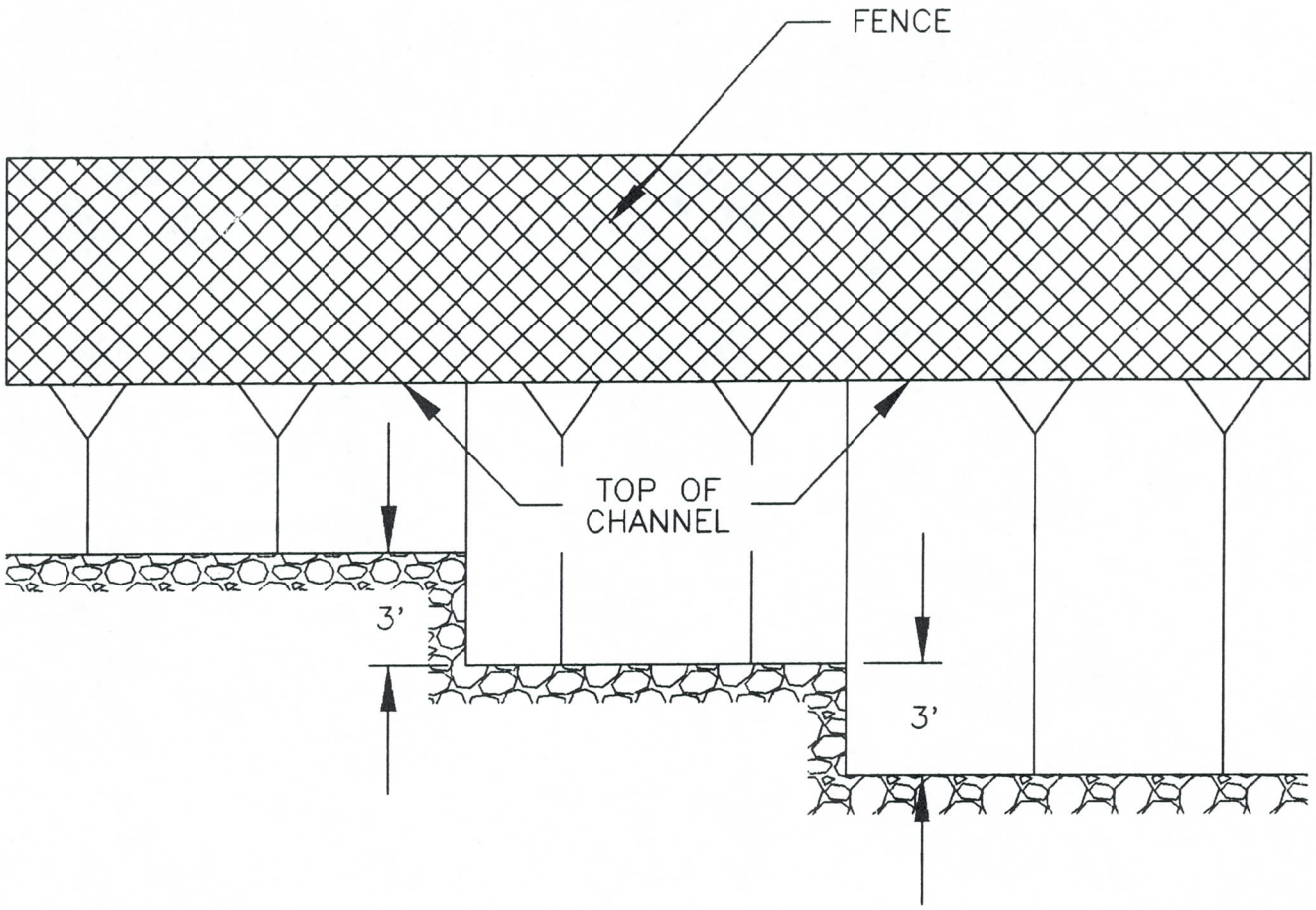



SECTION C–C

# CHEROKEE WASH

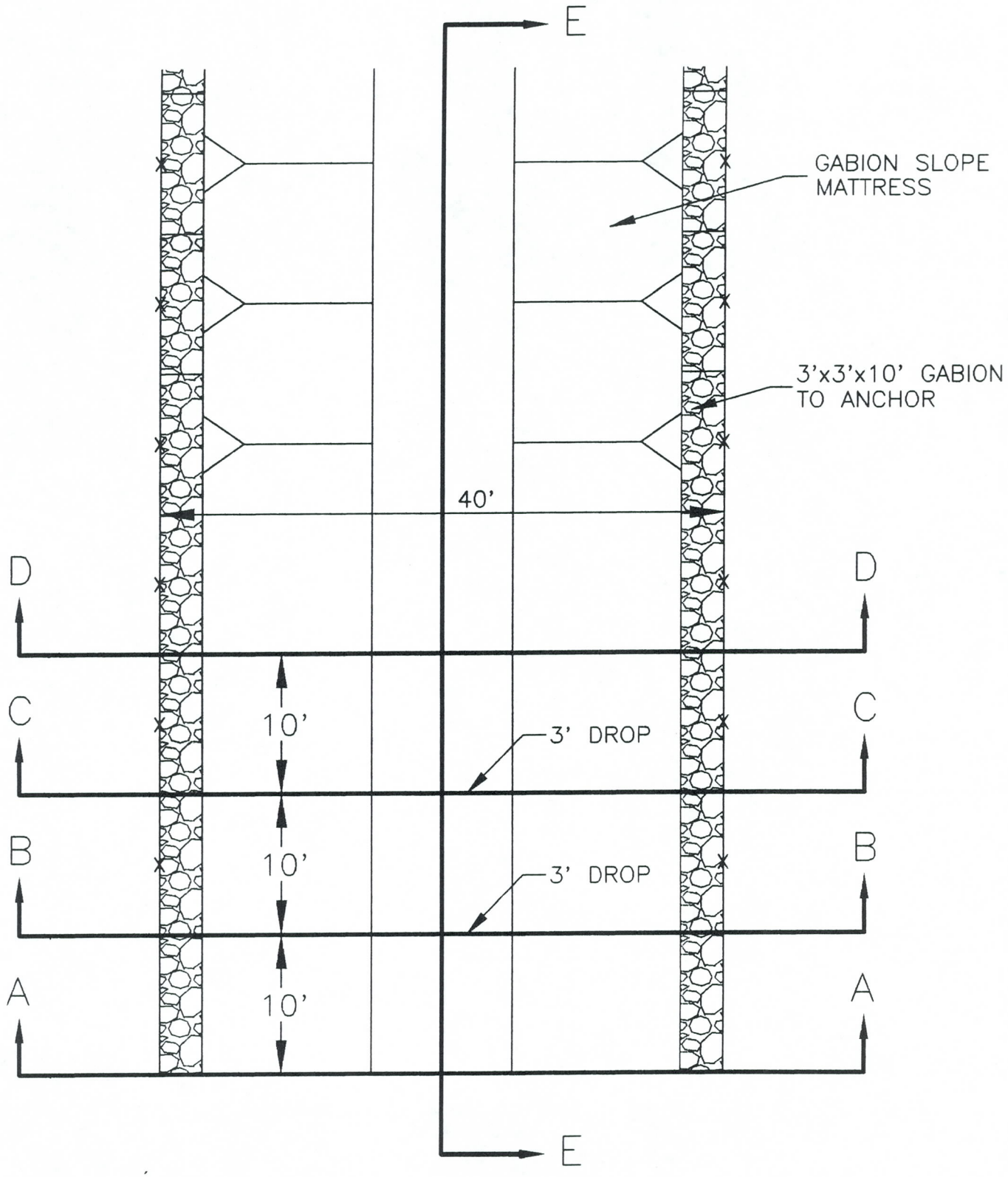
# CONTROL DROP STRUCTURE

# CHEROKEE WASH
# GRADE CONTROL DROP STRUCTURE

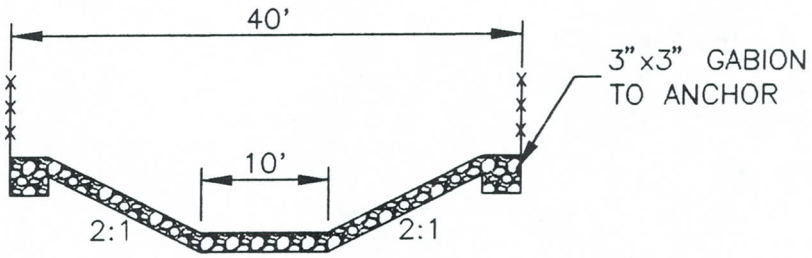



## SECTION E–E

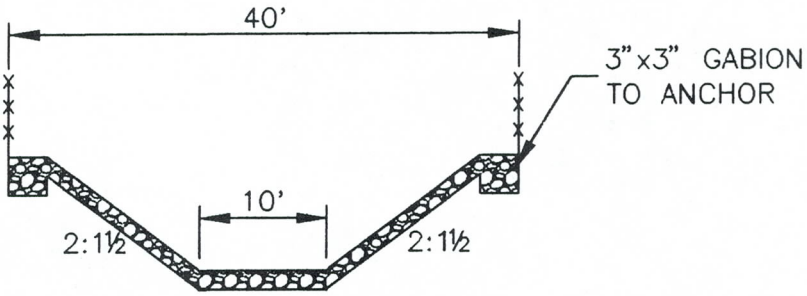
# CHEROKEE WASH
# GRADE CONTROL DROP STRUCTURE



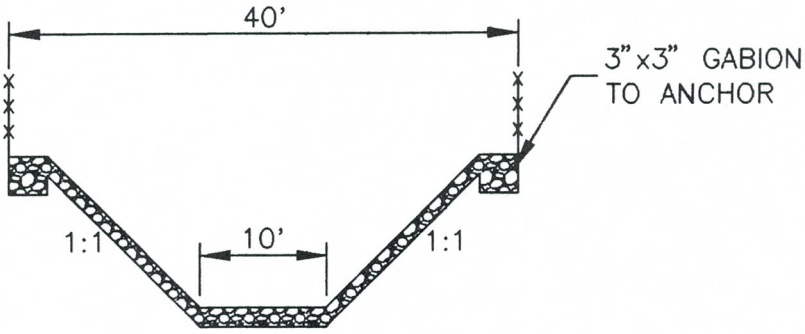
# CHEROKEE WASH
# GRADE CONTROL DROP STRUCTURE



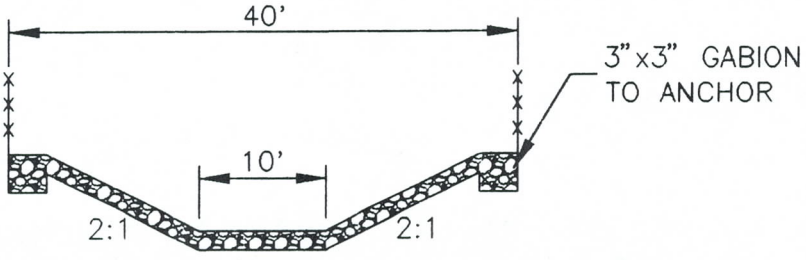

SECTION A–A




SECTION B–B




SECTION C–C




SECTION D–D

12.3

# DETENTION BASIN VOLUMES

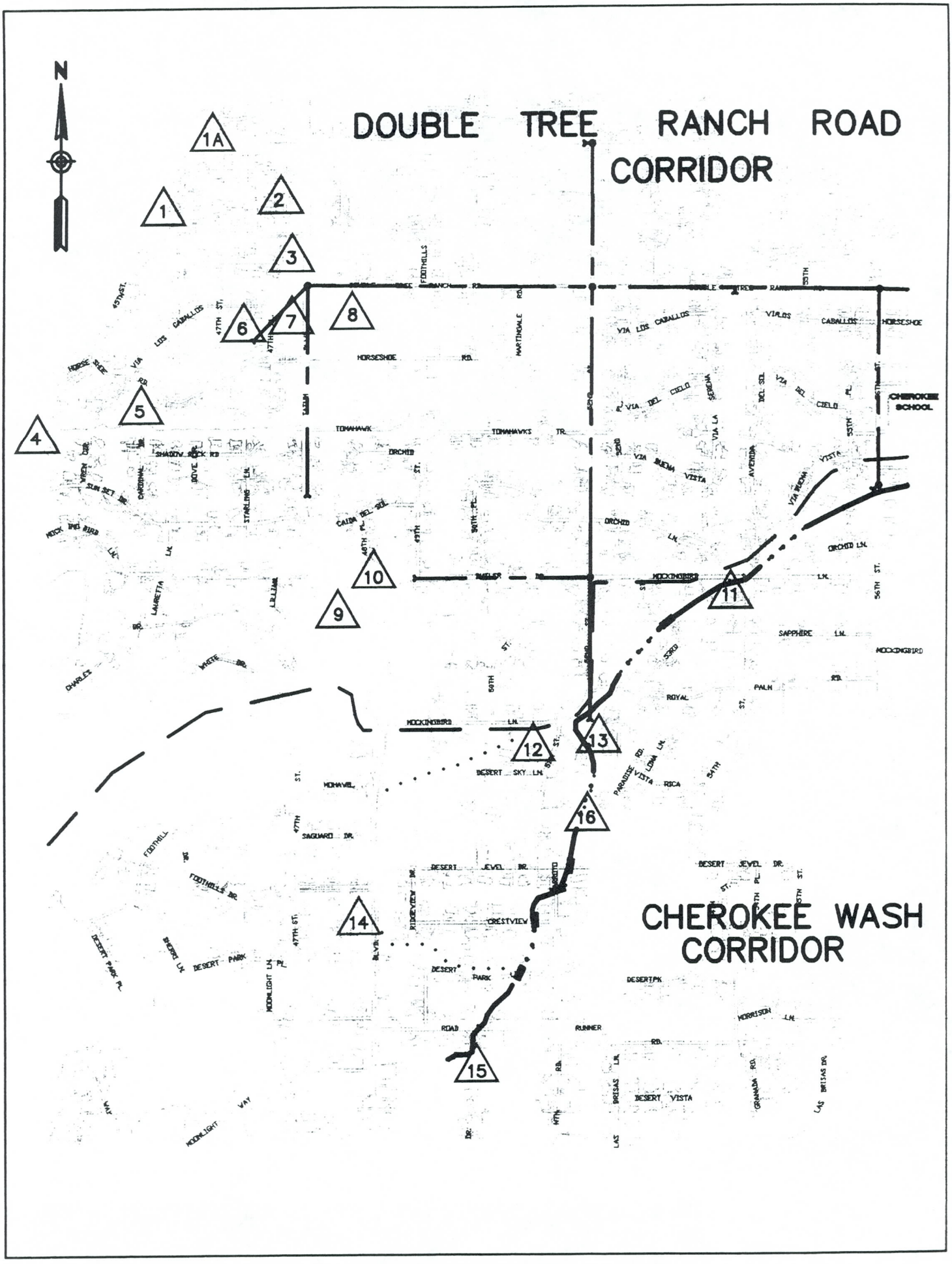
# DOUBLETREE RANCH ROAD
# DETENTION BASIN
PROJECT NO. 2878

| DETENTION BASIN NO. | ADVANTAGE | DISADVANTAGE | COMMENTS |
|---|---|---|---|
| DOUBLETREE RANCH ROAD BASIN | | | |
| 1 | Reduce Flooding | Steep Hillside<br>No Volume<br>Private Property (cost)<br>Outlet Private Street | Eliminated |
| 1A | Reduce Flooding (Berneil Drain) | Along Pedestrian Trail<br>Phoenix Mountain Preserve<br>Outlet-Pedestrian<br>Access Easement | |
| 2 | Existing Retention Basin | No Volume<br>Private Subdivision<br>Overflow Tatum Boulevard | Eliminated |
| 3 | Existing Retention Basin | No Volume<br>Private Subdivision<br>Overflow Tatum Boulevard | Eliminated |
| 4 | Reduce Flooding<br>Existing Outlet Channel | Pedestrian Trail<br>Phoenix Mountain Preserve | Eliminated |
| 5 | Reduce Flooding<br>Existing Concrete Outlet<br>Existing Drainage Easement | Confined Area<br>Need Berm for Volume<br>Phoenix Mountain Preserve | Eliminated |
| 6 & 7 | Green Area- Home Owners Association-City of Phoenix<br>Equestrian Trail across Tatum Boulevard<br>Existing Box Culvert under 47th Place | Deep and Confined Area<br>Need Berm for Volume | |
| 8 | Reduce Flooding<br>Equestrian Trail<br>Big Area, Vacant<br>Good Volume | Private Property<br>Could be Multi Use | |
| 9 | Vacant Property<br>Tatum Boulevard Natural Dam<br>Reduce Flooding Butler Dr. | Need Regrading<br>Private Property | |
| 10 | Reduce Flooding Butler Dr. | Hillside- High Berm | |

| | | | |
|---|---|---|---|
| | Vacant Land | | |

CHEROKEE WASH BASIN

| | | | |
|---|---|---|---|
| 11 | Vacant Land | Confined Area<br>No Volume<br>Private Ownership | Eliminated |
| 12 | Vacant Land<br>Reduce Flooding<br>Mockingbird Lane | Private Ownership<br>Confined Area | |
| 13 | Vacant Land | Private Ownership<br>Confined Area | |
| 14 | Vacant Land | Private Ownership<br>Confined Area<br>No Volume | Eliminated |
| 15 | Existing Golf Course<br>Good Volume | Private Property<br>Berm Along Golf Course | |
| 16 | Vacant Land | Private Property | |




**DETENTION BASIN LOCATIONS**

# DOUBLETREE RANCH ROAD

**PROJECT NO. 2878**

## DETENTION BASINS
## CONSTRUCTION COST SUMMARIES

| Detention Basin No. | Acre-feet (acft) | Dam Height (ft) | Dam Definition | Land Area (acres) | Land Cost ($) | Clearing/ Grubbing ($) | Excavation Volume (cuyd) | Excavation Cost ($) | Structural Backfill Volume (cuyd) | Structural Backfill Cost ($) | Erosion Control (sqft) | Erosion Control ($) | Fence (linft) | Fence ($) | Outlet Weir (Lump Sum) | Construction Cost ($) | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.21 | 2.5 | | | | | | | | | | | | | | | Eliminated-Small Volume |
| 1A | 2.75 | 6 | Non | 1.5 | 187,500 | 2,775 | 7,900 | 47,400 | 1,600 | 92,800 | 65,340 | 19,602 | 1,025 | 9,225 | 30,000 | 201,802 | City of Phoenix- Mountain Preserve |
| 2 | 1.15 | Exist. | | | | | | | | | | | | | | | Eliminated-Small Volume |
| 3 | 0.69 | Exist. | | | | | | | | | | | | | | | Eliminated-Small Volume |
| 4 | 14.59 | 12 | Non | 4 | 500,000 | 7,400 | 15,500 | 93,000 | 10,300 | 597,400 | 175,000 | 52,500 | | | 50,000 | 800,300 | City of Phoenix- Mountain Preserve |
| 5 | 6.12 | 10 | Non | 2 | 250,000 | 3,700 | 12,200 | 73,200 | 4,400 | 255,200 | 87,120 | 26,136 | | | 20,000 | 378,236 | City of Phoenix- Mountain Preserve |
| 6 | 1.65 | 5 | Non | 1 | 125,000 | 1,850 | 7,000 | 42,000 | 1,000 | 58,000 | 43,560 | 13,068 | 850 | 7,650 | 20,000 | 142,568 | Doubletree Canyon HOA |
| 7 | 15.39 | 6 | Non | 2 | 250,000 | 3,700 | 13,000 | 78,000 | 2,300 | 133,400 | 87,120 | 26,136 | 1,200 | 10,800 | 40,000 | 292,036 | Doubletree Canyon HOA |
| 8 | 67.8 | 8 | Jur | 10 | 1,250,000 | 18,500 | 39,100 | 234,600 | 7,360 | 426,880 | 392,300 | 117,690 | 2,400 | 21,600 | 50,000 | 869,270 | |
| 9 | 6.79 | Exist. | Non | 2.5 | 312,500 | 4,625 | 15,000 | 90,000 | 0 | 0 | 108,900 | 32,670 | 1,320 | 11,880 | 30,000 | 169,175 | |
| 10 | 15.58 | 14 | Non | 4 | 500,000 | 7,400 | 26,500 | 159,000 | 6,200 | 359,600 | 174,240 | 52,272 | 1,700 | 15,300 | 30,000 | 623,572 | |
| Sub-Total | | | | | $3,375,000 | $49,950 | | $817,200 | | $1,923,280 | | $340,074 | | $76,455 | $270,000 | $3,476,959 | Doubletree Ranch Road Basin |
| 11 | 1.01 | 2 | | | | | | | | | | | | | | | Eliminated-Small Volume |
| 12 | 6.82 | 6 | Non | 2 | 250000 | 3,700 | 13,800 | 82,800 | 4,150 | 240,700 | 87,120 | 26,136 | 1,200 | 10,800 | 20,000 | 384,136 | |
| 13 | 18.06 | 12 | Non | 5 | 625000 | 9,250 | 11,300 | 67,800 | 5,200 | 301,600 | 217,800 | 65,340 | 1,900 | 17,100 | 40,000 | 501,090 | |
| 14 | 1.89 | 6 | | | | | | | | | | | | | | | Eliminated-Small Volume |
| 15 | 33.73 | 6 | Non | 11 | 1375000 | 20,350 | 80,000 | 480,000 | 2,890 | 167,620 | 479,160 | 143,748 | | | 40,000 | 851,718 | Paradise Valley Gof Course |
| 16 | 23.57 | 12 | Non | 5 | 625000 | 9,250 | 40,700 | 244,200 | 4,100 | 237,800 | 217,800 | 65,340 | 1,900 | 17,100 | 50,000 | 623,690 | |
| Sub-Total | | | | | $2,875,000 | $42,550 | | $874,800 | | $947,720 | | $300,564 | | $45,000 | $150,000 | $2,360,634 | Cherokee Wash Basin |
| Total | | | | | $6,250,000 | $92,500 | | $1,692,000 | | $2,871,000 | | $640,638 | | $121,455 | $420,000 | $5,837,593 | GRAND TOTAL |

| Quantities | Cost | Unit |
|---|---|---|
| Land Cost | 125,000 | Acre |
| Clearing | 1,850 | Acre |
| Excavation | 6 | cuyd |
| Backfill | 18 | cuyd |
| Erosion | 0.30 | sqft |
| Fence | 9 | linft |

Note: HOA = Home Owners Association
Non = Nonjurisdictional Size
Jur = Jurisdictional Size

11/13/96
WSS
Ckd:

## TABLE 1
## DETENTION BASINS WITH DIVERSION CHANNELS
## 50-YEAR, 6-HOUR RUNOFF SUMMARY

| HOOK I.D. | KHE HEC-1 I.D. | Q (CFS) | RUNOFF VOL. (AC-FT) | MAX. WS (FT) | OUTLET PIPE (IN.) |
|---|---|---|---|---|---|
| 12 | HC305<br>305RR | 144<br>62 | 9 | 1386.99 | 30 |
| 14 | 310S<br>310D<br>310RE<br>310RR<br>HC310 | 241<br>175<br>66<br>39<br>214 | 20 | 1442.67 | 30 |
| 15 | HC335<br>335RR | 364<br>78 | 26 | 1411.20 | 36 |
| 16 | HC365A<br>365D<br>365RE<br>365RR<br>HC365B | 654<br>250<br>404<br>89<br>339 | 105 | 1386.90 | 36 |
| 13 | HC385A<br>385D<br>385RE<br>385RR<br>HC385B | 588<br>300<br>288<br>94<br>394 | 101 | 1377.72 | 36 |
| 4 | 170S<br>170RR | 194<br>62 | 15 | 1455.94 | 30 |
| 5 | HC195A<br>195D<br>195RE<br>195RR<br>HC195B | 325<br>100<br>225<br>87<br>187 | 38 | 1417.43 | 30 |
| 6 & 7 | HC211<br>211RR1 | 304<br>181 | 43 | 1386.70 | 2-30 |
| 8 | 211RR2 | 41 | | 1375.51 | 24 |
| 9<br>10 | 250S<br>250RR1<br>250RR2 | 84<br>79<br>26 | 6 | 1414.19<br>1403.88 | 48<br>24 |
| 1A | 100S<br>100RR | 88<br>46 | 5 | 1397.48 | 24 |

**TABLE 2**
**DETENTION BASINS WITH DIVERSION CHANNELS**
**100-YEAR, 6-HOUR RUNOFF SUMMARY**

| HOOK I.D. | KHE HEC-1 I.D. | Q (CFS) | RUNOFF VOL. (AC-FT) | MAX. WS (FT) | OUTLET PIPE (IN.) |
|---|---|---|---|---|---|
| 12 | HC305<br>305RR | 175<br>68 | 11 | 1388.42 | 30 |
| 14 | 310S<br>310D<br>310RE<br>310RR<br>HC310 | 293<br>175<br>118<br>57<br>232 | 24 | 1445.76 | 30 |
| 15 | HC335<br>335RR | 424<br>82 | 30 | 1411.83 | 36 |
| 16 | HC365A<br>365D<br>365RE<br>365RR<br>HC365B | 766<br>250<br>516<br>102<br>352 | 125 | 1388.97 | 36 |
| 13 | HC385A<br>385D<br>385RE<br>385RR<br>HC385B | 645<br>300<br>345<br>105<br>405 | 120 | 1379.49 | 36 |
| 4 | 170S<br>170RR | 234<br>67 | 17 | 1457.10 | 30 |
| 5 | HC195A<br>195D<br>195RE<br>195RR<br>HC195B | 390<br>100<br>290<br>94<br>194 | 44 | 1419.79 | 30 |
| 6 & 7 | HC211<br>211RR1 | 338<br>189 | 50 | 1387.95 | 2-30 |
| 8 | 211RR2 | 44 | 58 | 1376.60 | 24 |
| 9<br>10 | 250S<br>250RR1<br>250RR2 | 101<br>90<br>28 | 7 | 1414.70<br>1404.37 | 48<br>24 |
| 1A | 100S<br>100RR | 108<br>50 | 6 | 1399.13 | 24 |

**TABLE 3**
**50-YEAR DETENTION BASIN DESIGN**
**WITHOUT DIVERSION CHANNELS**
**50-YEAR, 6-HOUR RUNOFF SUMMARY**

| HOOK I.D. | KHE HEC-1 I.D. | Q (CFS) | RUNOFF VOL. (AC-FT) | MAX. WS (FT) | OUTLET PIPE (IN.) |
|---|---|---|---|---|---|
| 12 | HC305<br>305RR | 144<br>62 | 9 | 1386.99 | 30 |
| 14 | 310S<br>310RR | 241<br>213 | 20 | 1445.28 | 2-42 |
| 15 | HC335<br>335RR | 364<br>78 | 26 | 1411.20 | 36 |
| 16 | HC365<br>365RR | 630<br>292 | 105 | 1389.95 | 2-42 |
| 13 | HC385<br>385RR | 515<br>361 | 101 | 1378.93 | 2-48 |
| 4 | 170S<br>170RR | 194<br>62 | 15 | 1455.94 | 30 |
| 5 | HC195<br>195RR | 325<br>181 | 38 | 1418.67 | 2-30 |
| 6 & 7 | HC211<br>211RR1 | 278<br>177 | 43 | 1385.98 | 2-30 |
| 8 | 211RR2 | 41 | | 1375.50 | 24 |
| 9<br>10 | 250S<br>250RR1<br>250RR2 | 84<br>79<br>26 | 6 | 1414.19<br>1403.88 | 48<br>24 |
| 1A | 100S<br>100RR | 88<br>46 | 5 | 1397.48 | 24 |

**TABLE 4**
**50-YEAR DETENTION BASIN DESIGN**
**WITHOUT DIVERSION CHANNELS**
**100-YEAR, 6-HOUR RUNOFF SUMMARY**

| HOOK I.D. | KHE HEC-1 I.D. | Q (CFS) | RUNOFF VOL. (AC-FT) | MAX. WS (FT) | OUTLET PIPE (IN.) |
|---|---|---|---|---|---|
| 12 | HC305<br>305RR | 175<br>68 | 11 | 1388.42 | 30 |
| 14 | 310S<br>310RR | 293<br>286 | 24 | 1446.34 | 2-42 |
| 15 | HC335<br>335RR | 424<br>82 | 30 | 1411.83 | 36 |
| 16 | HC365<br>365RR | 747<br>495 | 125 | 1390.80 | 2-42 |
| 13 | HC385<br>385RR | 713<br>572 | 120 | 1380.76 | 2-48 |
| 4 | 170S<br>170RR | 234<br>67 | 17 | 1457.10 | 30 |
| 5 | HC195<br>195RR | 390<br>247 | 44 | 1420.35 | 2-30 |
| 6 & 7 | HC211<br>211RR1 | 319<br>188 | 50 | 1387.86 | 2-30 |
| 8 | 211RR2 | 44 | 58 | 1376.60 | 24 |
| 9<br>10 | 250S<br>250RR1<br>250RR2 | 101<br>90<br>28 | 7 | 1414.70<br>1404.37 | 48<br>24 |
| 1A | 100S<br>100RR | 108<br>50 | 6 | 1399.13 | 24 |

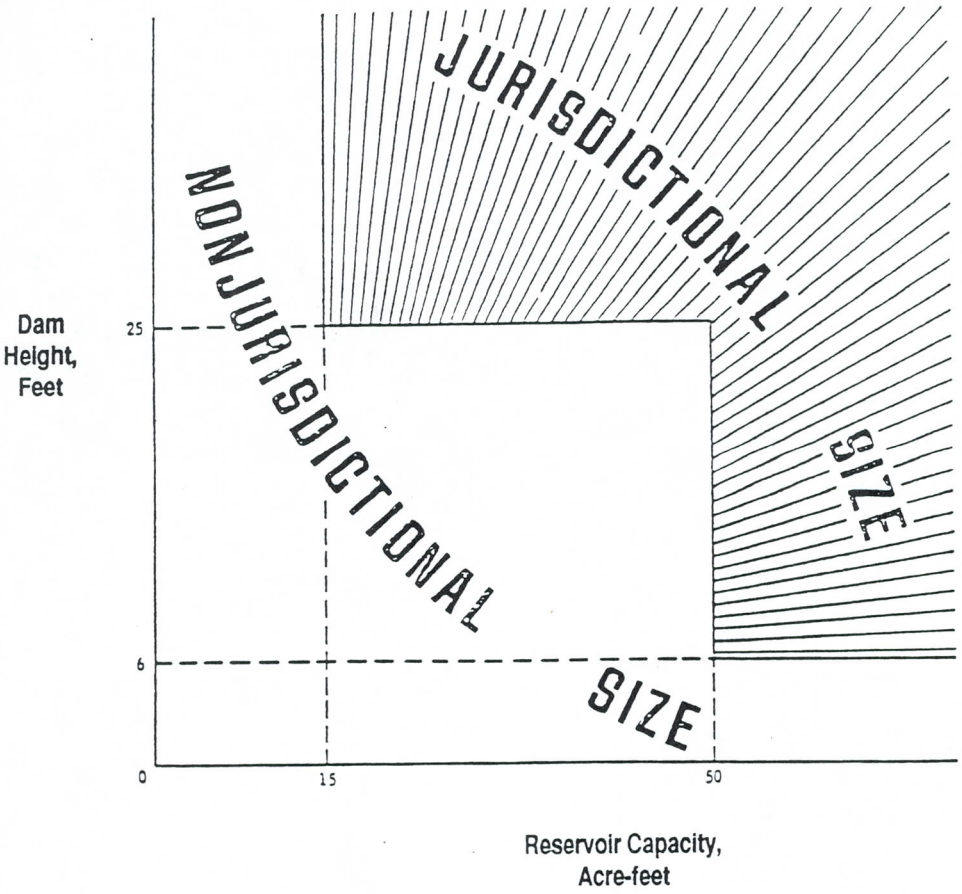
**TABLE 5**
**100-YEAR DETENTION BASIN DESIGN**
**WITHOUT DIVERSION CHANNELS**
**100-YEAR, 6-HOUR RUNOFF SUMMARY**

| HOOK I.D. | KHE HEC-1 I.D. | Q (CFS) | RUNOFF VOL. (AC-FT) | MAX. WS (FT) | OUTLET PIPE (IN.) |
|---|---|---|---|---|---|
| 12 | HC305<br>305RR | 175<br>68 | 11 | 1388.42 | 30 |
| 14 | 310S<br>310RR | 293<br>286 | 24 | 1446.34 | 2-42 |
| 15 | HC335<br>335RR | 424<br>82 | 30 | 1411.83 | 36 |
| 16 | HC365<br>365RR | 747<br>407 | 125 | 1390.19 | 2-48 |
| 13 | HC385<br>385RR | 651<br>551 | 120 | 1380.70 | 2-48 |
| 4 | 170S<br>170RR | 234<br>67 | 17 | 1457.10 | 30 |
| 5 | HC195<br>195RR | 390<br>247 | 44 | 1420.35 | 2-30 |
| 6 & 7 | HC211<br>211RR1 | 319<br>188 | 50 | 1387.86 | 2-30 |
| 8 | 211RR2 | 44 | 58 | 1376.60 | 24 |
| 9<br>10 | 250S<br>250RR1<br>250RR2 | 101<br>90<br>28 | 7 | 1414.70<br>1404.37 | 48<br>24 |
| 1A | 100S<br>100RR | 108<br>50 | 6 | 1399.13 | 24 |
| | | | | | |

Figure 8.8

**State of Arizona Jurisdictional Dam Definition**

(Adapted from: State of Arizona Department of Water Resources, Safety of Dams Section.)




**A JURISDICTIONAL DAM** is either twenty-five feet or more in height or stores more than fifty acre-feet. If it is less than six feet in height regardless of storage capacity or does not store more than fifteen acre-feet regardless of height, it is not in jurisdiction.

**THE HEIGHT** is the vertical distance from the lowest elevation of the outside limit of the dam at its intersection with the natural ground surface to the spillway crest elevation.

**THE CAPACITY** is the maximum storage, in acre-feet, which can be impounded by the dam when there is no discharge of water.

Table 8.1

**Emergency Spillway Design Capacity Requirements for an Embankment Dam that is not regulated by ADWR**

| Dam Height | Spillway Design Capacity |
|---|---|
| $H \leq 6$ ft | Unattenuated 100-year inflow |
| 6 ft $< H <$ 25 ft | 1/2 Probable Maximum Flood |

# DOUBLETREE RANCH ROAD
# STAGE STORAGE CALCULATIONS
# DETENTION POND #1
## 4:1 SLOPES 10' BOTTOM

| 1 Contour Elev (ft) | 2 Plainmeter Reading | 3 Area (ft^2) | 4 A1+A2 (ft^2) | 5 (A1*A2)^.5 (ft^2) | 6 4 + 5 (ft^2) | 7 h (ft) | 8 h/3 (ft) | 9 = 8 * 6 Volume (ft^3) | 10 Sum Volume (ft^3) | 11 Sum Volume (Acft) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| 1409.5 | 0.0 | 0 | 0 | | | | | | | |
| 1410.0 | 0.0 | 0 | 0 | 0 | 0 | 0.5 | 0.1667 | 0 | 0 | 0.00 |
| 1412.0 | 0.0 | 9,000 | 9,000 | 0 | 9,000 | 2.0 | 0.6667 | 6,000 | 6,000 | 0.14 |
| 0.0 | 0.0 | 0 | 0 | 0 | 0 | 0.0 | 0.0000 | 0 | 0 | 0.00 |

# DETENTION POND #1
## 4:1 SLOPES 15' BOTTOM

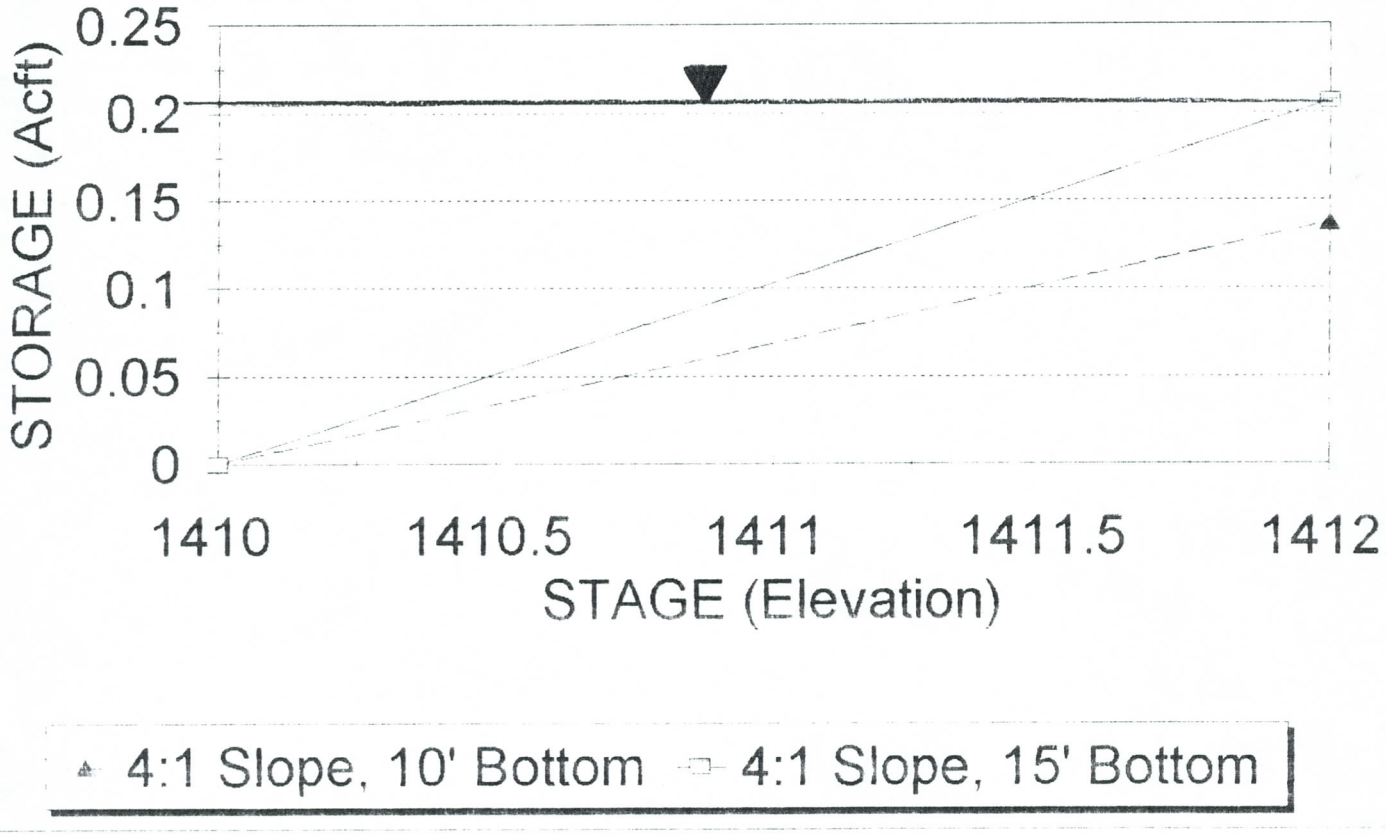
| 1 Contour Elev (ft) | 2 Plainmeter Reading | 3 Area (ft^2) | 4 A1+A2 (ft^2) | 5 (A1*A2)^.5 (ft^2) | 6 4 + 5 (ft^2) | 7 h (ft) | 8 h/3 (ft) | 9 = 8 * 6 Volume (ft^3) | 10 Sum Volume (ft^3) | 11 Sum Volume (Acft) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| 1409.5 | 0.0 | 0 | 0 | | | | | | | |
| 1410.0 | 0.0 | 0 | 0 | 0 | 0 | 0.5 | 0.1667 | 0 | 0 | 0.00 |
| 1412.0 | 0.0 | 13,500 | 13,500 | 0 | 13,500 | 2.0 | 0.6667 | 9,000 | 9,000 | 0.21 |
| 0.0 | 0.0 | 0 | 0 | 0 | 0 | 0.0 | 0.0000 | 0 | 0 | 0.00 |

# DETENTION POND #1A
## 4:1 SLOPES

| 1 Contour Elev (ft) | 2 Plainmeter Reading | 3 Area (ft^2) | 4 A1+A2 (ft^2) | 5 (A1*A2)^.5 (ft^2) | 6 4 + 5 (ft^2) | 7 h (ft) | 8 h/3 (ft) | 9 = 8 * 6 Volume (ft^3) | 10 Sum Volume (ft^3) | 11 Sum Volume (Acft) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| 1392.0 | 1.0 | 990 | 0 | | | | | | | |
| 1394.0 | 3.8 | 3,762 | 4,752 | 1,930 | 8,683 | 2.0 | 0.6667 | 4,455 | 4,455 | 0.10 |
| 1396.0 | 7.4 | 13,500 | 17,262 | 7,127 | 24,389 | 2.0 | 0.6667 | 16,259 | 20,715 | 0.48 |
| 1398.0 | 12.0 | 11,881 | 25,381 | 12,665 | 38,046 | 2.0 | 0.6667 | 25,364 | 46,078 | 1.06 |
| 1400 | 16.8 | 16,934 | 28,815 | 14,059 | 42,573 | 2.0 | 0.6667 | 28,382 | 74,460 | 1.71 |

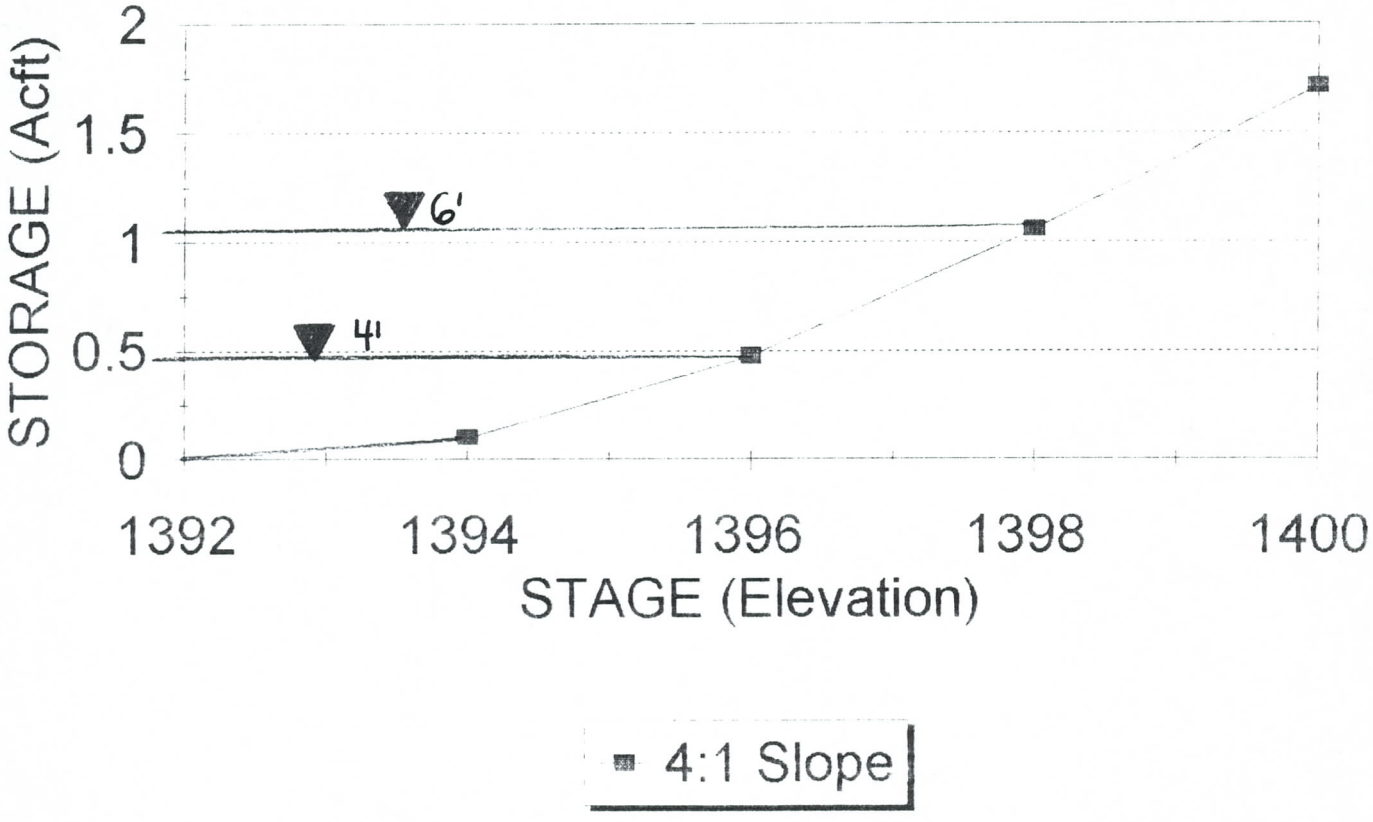
# Doubletree Ranch Road

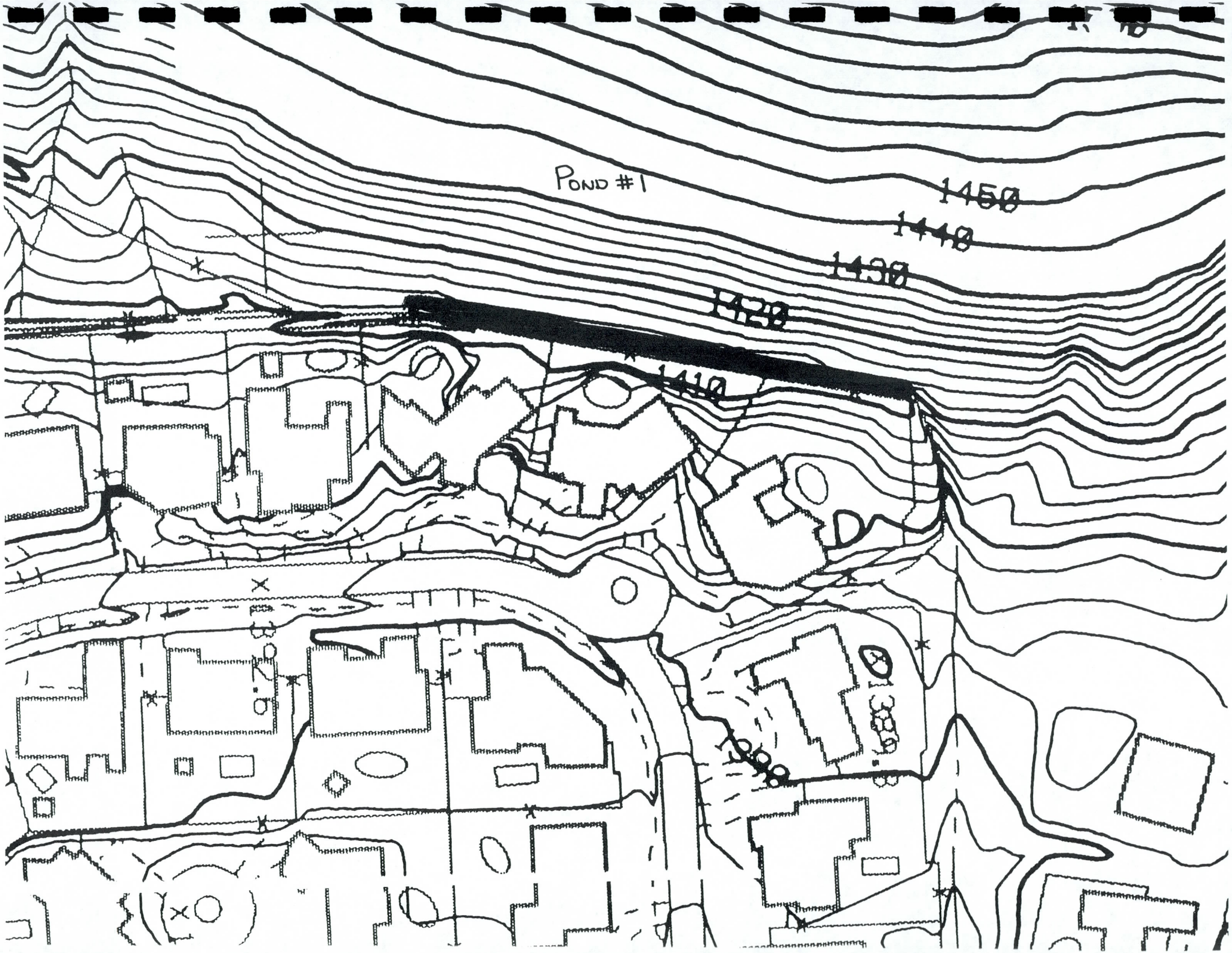
## Stage Storage Pond #1

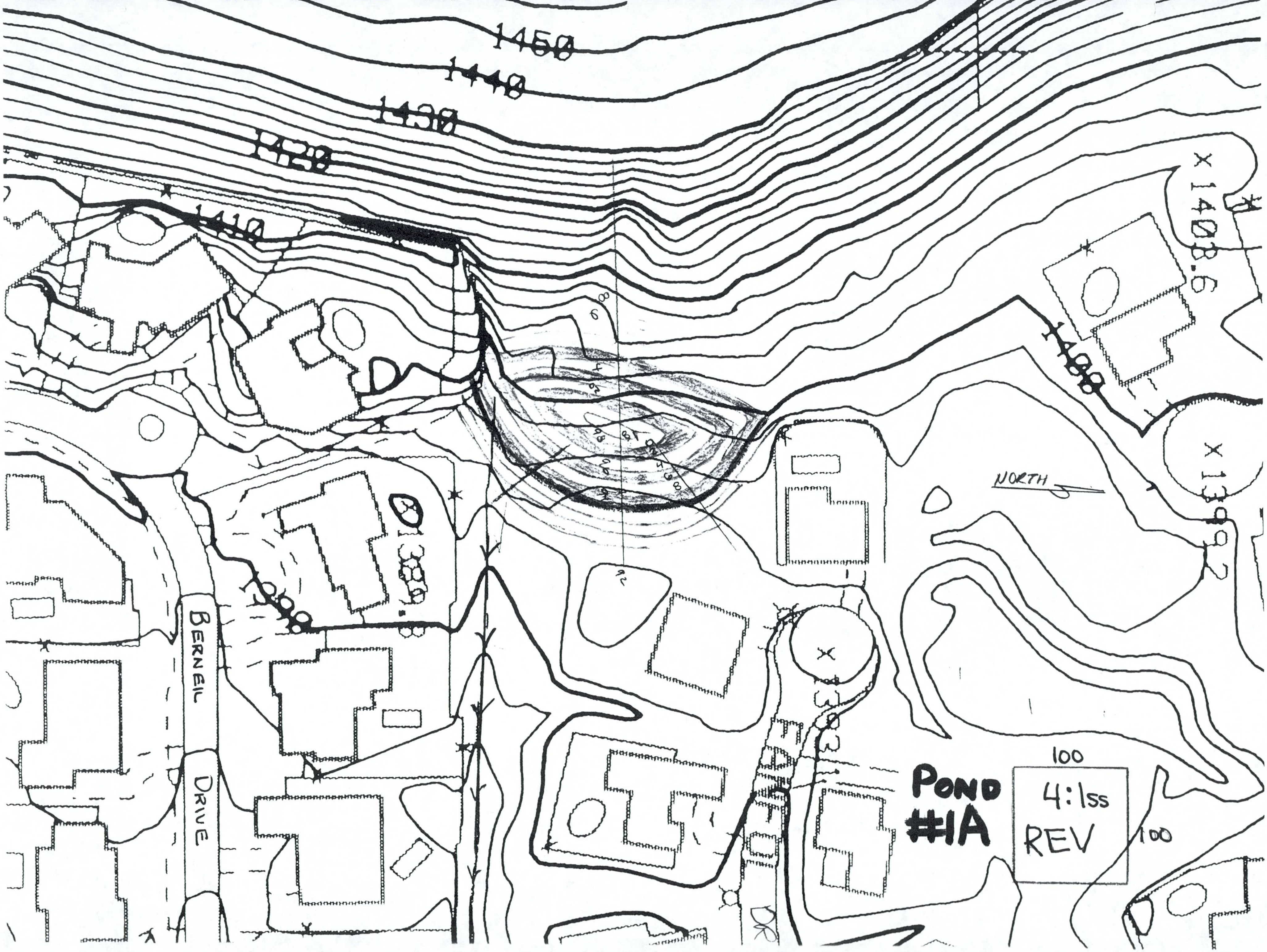


# Doubletree Ranch Road

## Stage Storage Pond # 1A




POND #1
1450
1440
1430
1420
1410


1450
1440
1430
1420
1410
1400
1390
1408.6
NORTH
BERNEIL
DRIVE
POND #1A
100
4:1ss
REV
100

# DOUBLETREE RANCH ROAD
# STAGE STORAGE CALCULATIONS
# DETENTION POND #2
## 4:1 SLOPES

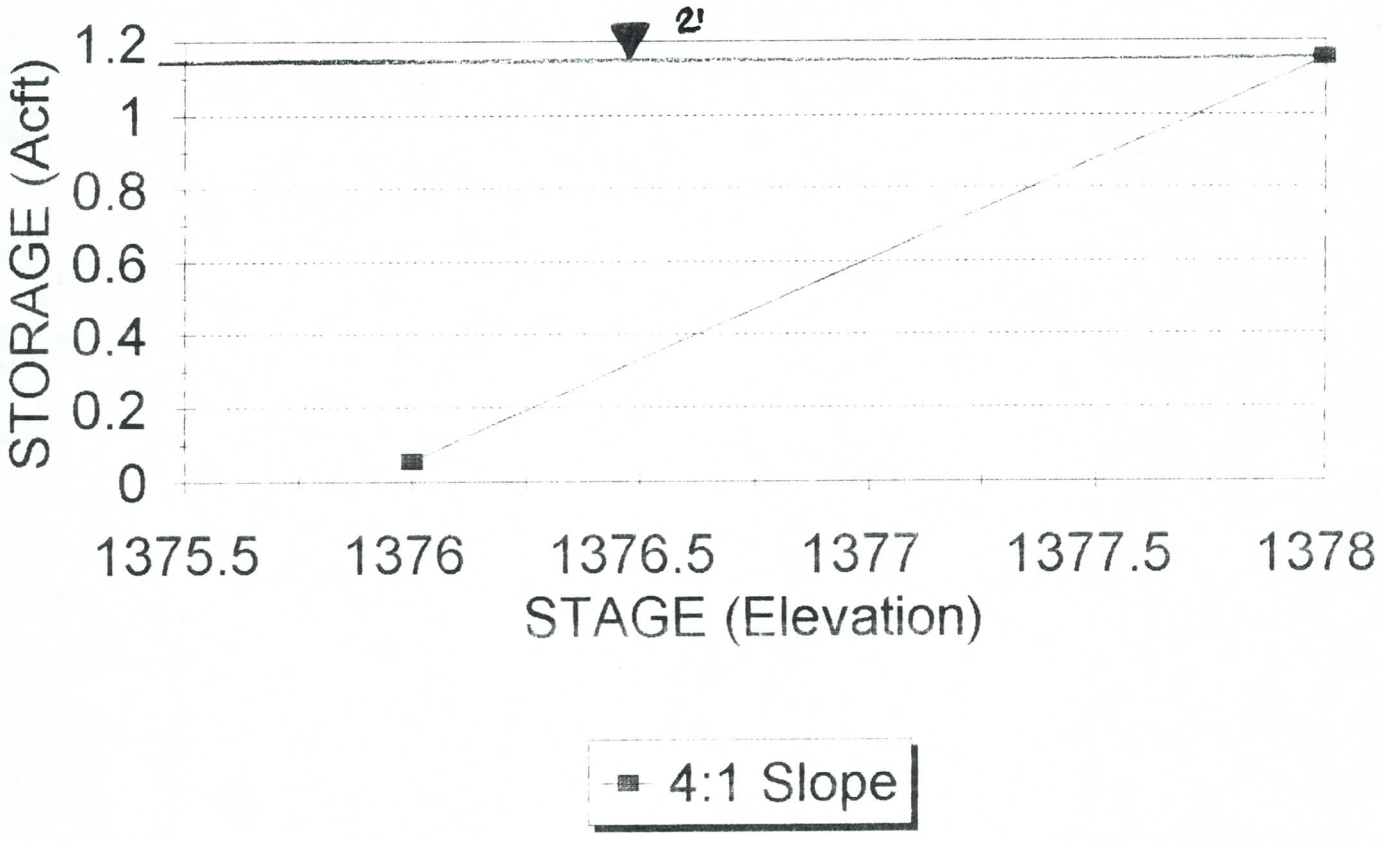
| 1 Contour Elev (ft) | 2 Plainmeter Reading | 3 Area (ft^2) | 4 A1+A2 (ft^2) | 5 (A1*A2)^.5 (ft^2) | 6 4 + 5 (ft^2) | 7 h (ft) | 8 h/3 (ft) | 9 = 8 * 6 Volume (ft^3) | 10 Sum Volume (ft^3) | 11 Sum Volume (Acft) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| 1375.5 | 0.0 | 0 | 0 | | | | | | | |
| 1376.0 | 15.2 | 15,050 | 15,050 | 0 | 15,050 | 0.5 | 0.1667 | 2,508 | 2,508 | 0.06 |
| 1378.0 | 34.3 | 33,960 | 49,010 | 22,607 | 71,617 | 2.0 | 0.6667 | 47,745 | 50,253 | 1.15 |
| 0.0 | 0.0 | 0 | 0 | 0 | 0 | 0.0 | 0.0000 | 0 | 0 | 0.00 |

# DOUBLETREE RANCH ROAD
# STAGE STORAGE CALCULATIONS
# DETENTION POND #3
## 4:1 SLOPES

| 1 Contour Elev (ft) | 2 Plainmeter Reading | 3 Area (ft^2) | 4 A1+A2 (ft^2) | 5 (A1*A2)^.5 (ft^2) | 6 4 + 5 (ft^2) | 7 h (ft) | 8 h/3 (ft) | 9 = 8 * 6 Volume (ft^3) | 10 Sum Volume (ft^3) | 11 Sum Volume (Acft) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| 1375.5 | 0.0 | 0 | 0 | | | | | | | |
| 1376.0 | 11.0 | 10,891 | 10,891 | 0 | 10,891 | 0.5 | 0.1667 | 1,815 | 1,815 | 0.04 |
| 1378.0 | 18.0 | 17,822 | 28,713 | 13,932 | 42,645 | 2.0 | 0.6667 | 28,430 | 30,245 | 0.69 |
| 0.0 | 0.0 | 0 | 0 | 0 | 0 | 0.0 | 0.0000 | 0 | 0 | 0.00 |

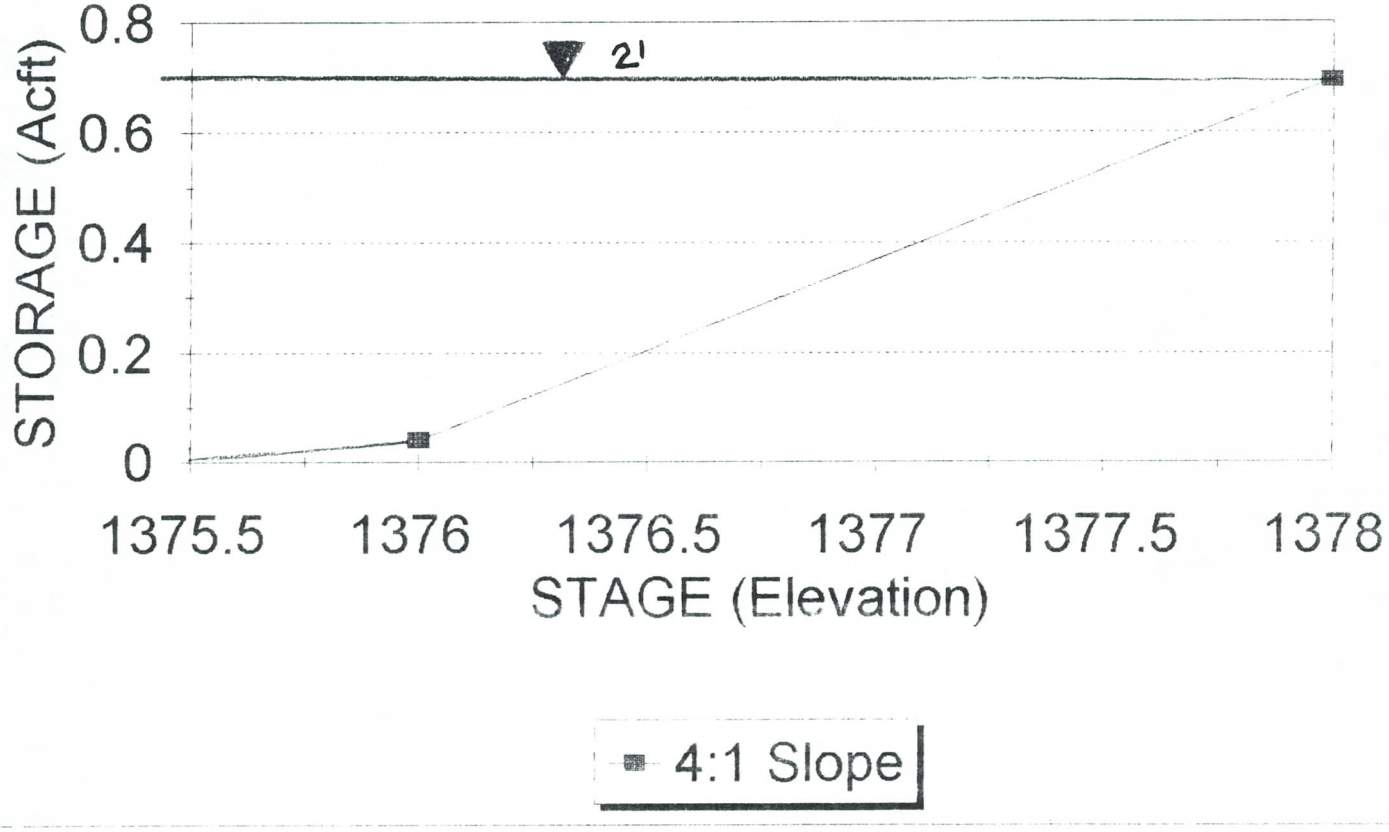
# Doubletree Ranch Road

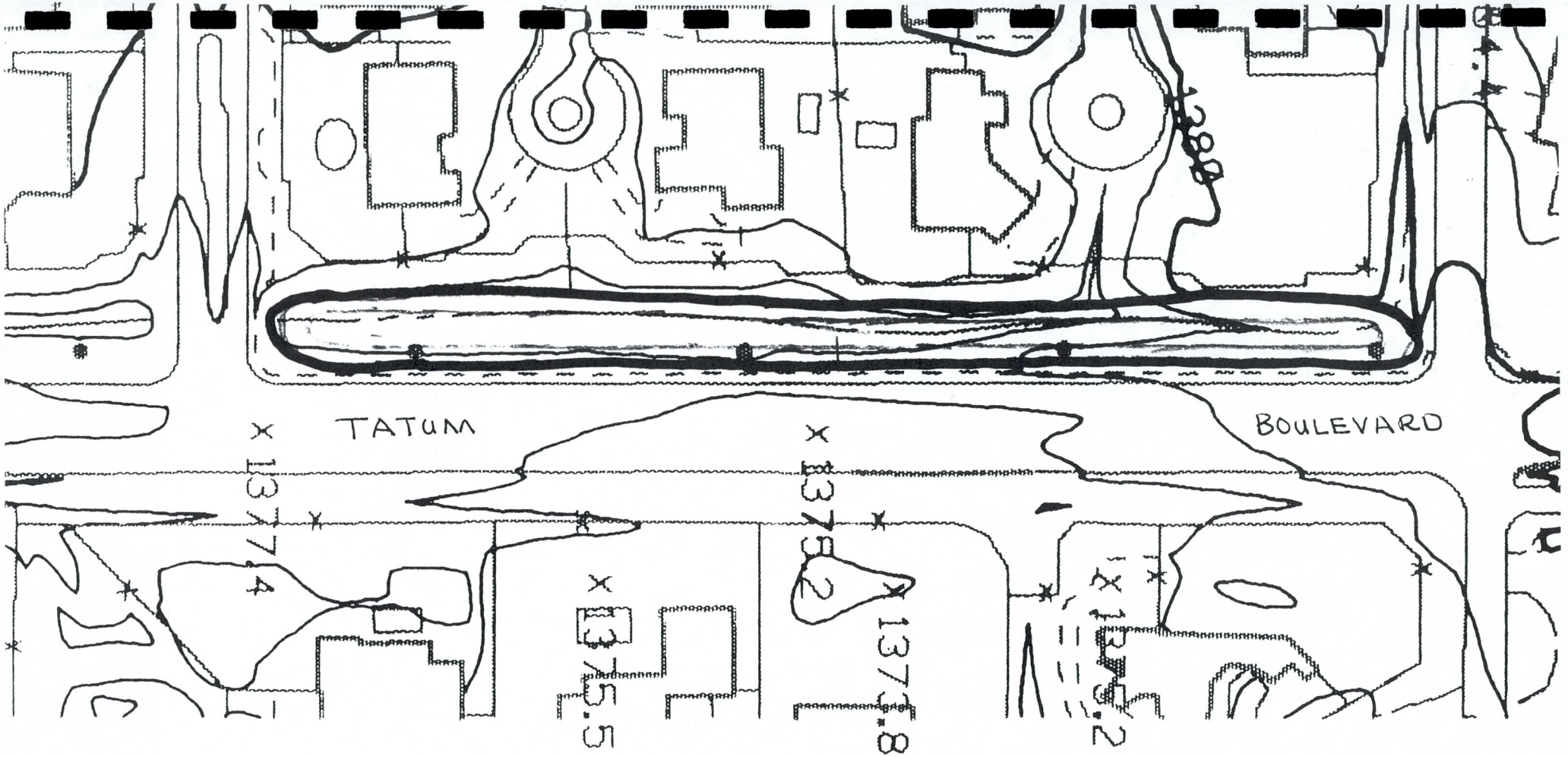
## Stage Storage Pond #2

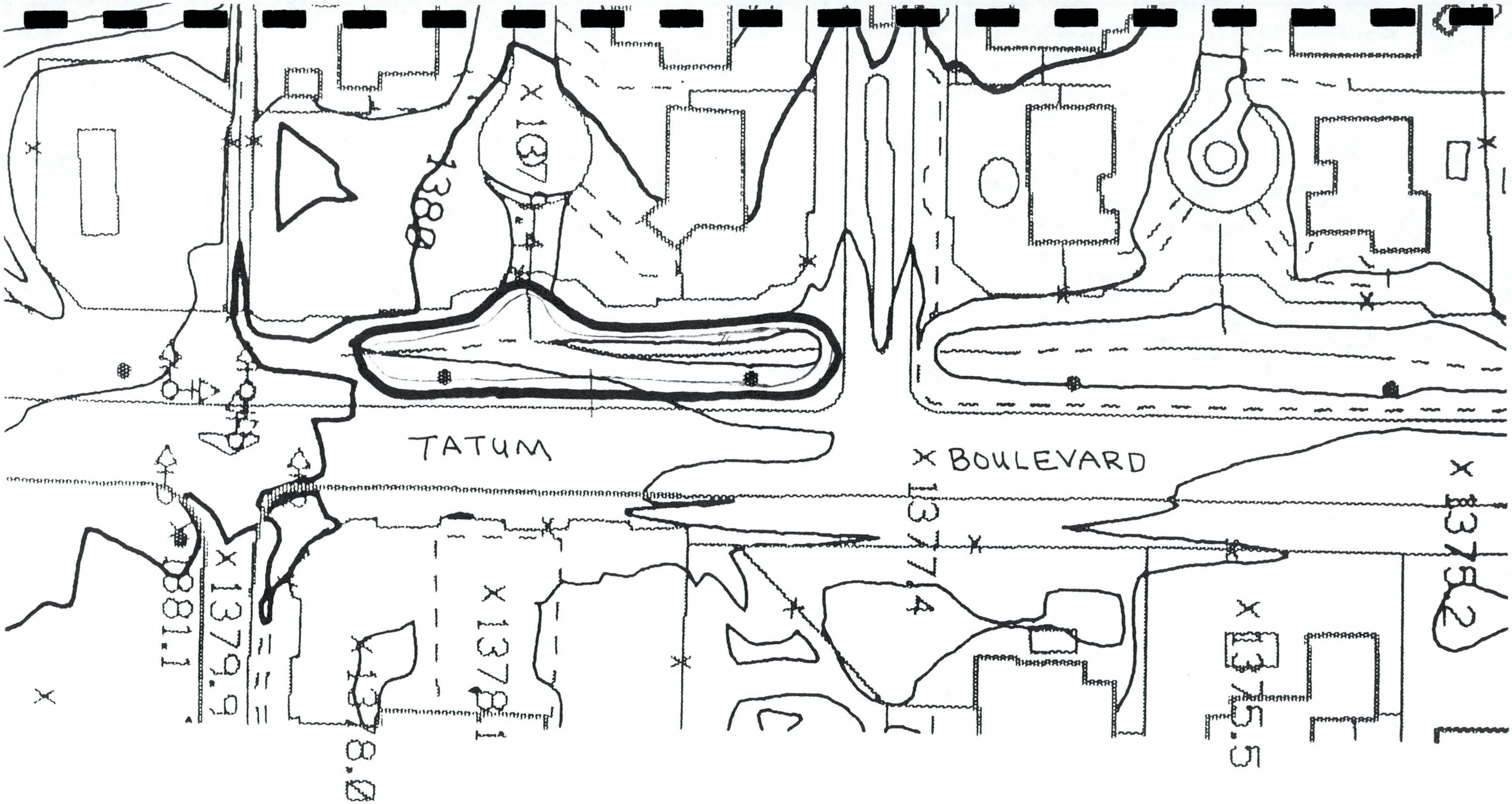


# Doubletree Ranch Road

## Stage Storage Pond #3




TATUM
BOULEVARD
1374.77
1374.53
1374.32
1374.08
1373.87
1373.63
1373.42
1373.18
1372.97
1372.73
1372.52
1372.28
1372.07
1371.83
1371.62
1371.38
1371.17
1370.93
1370.72
1370.48
1370.27
1370.03
1369.82
1369.58
1369.37
1369.13
1368.92
1368.68
1368.47
1368.23
1368.02
1367.78
1367.57
1367.33
1367.12
1366.88
1366.67
1366.43
1366.22
1365.98



TATUM
BOULEVARD
1375.2
1375.5
1377.4
1378.1
1378.0
1379.9
1381.1
1388


Pond #3

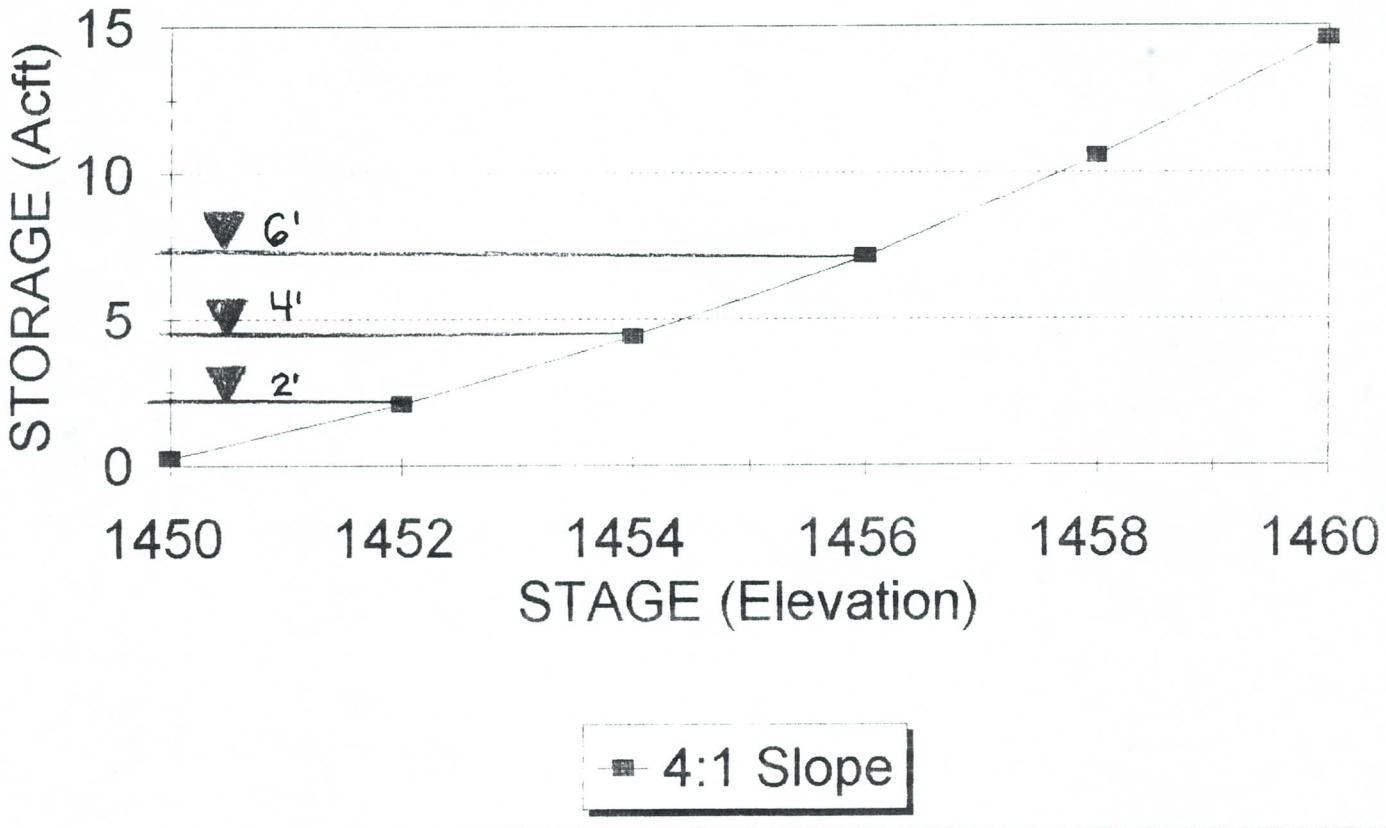
1" = 100'

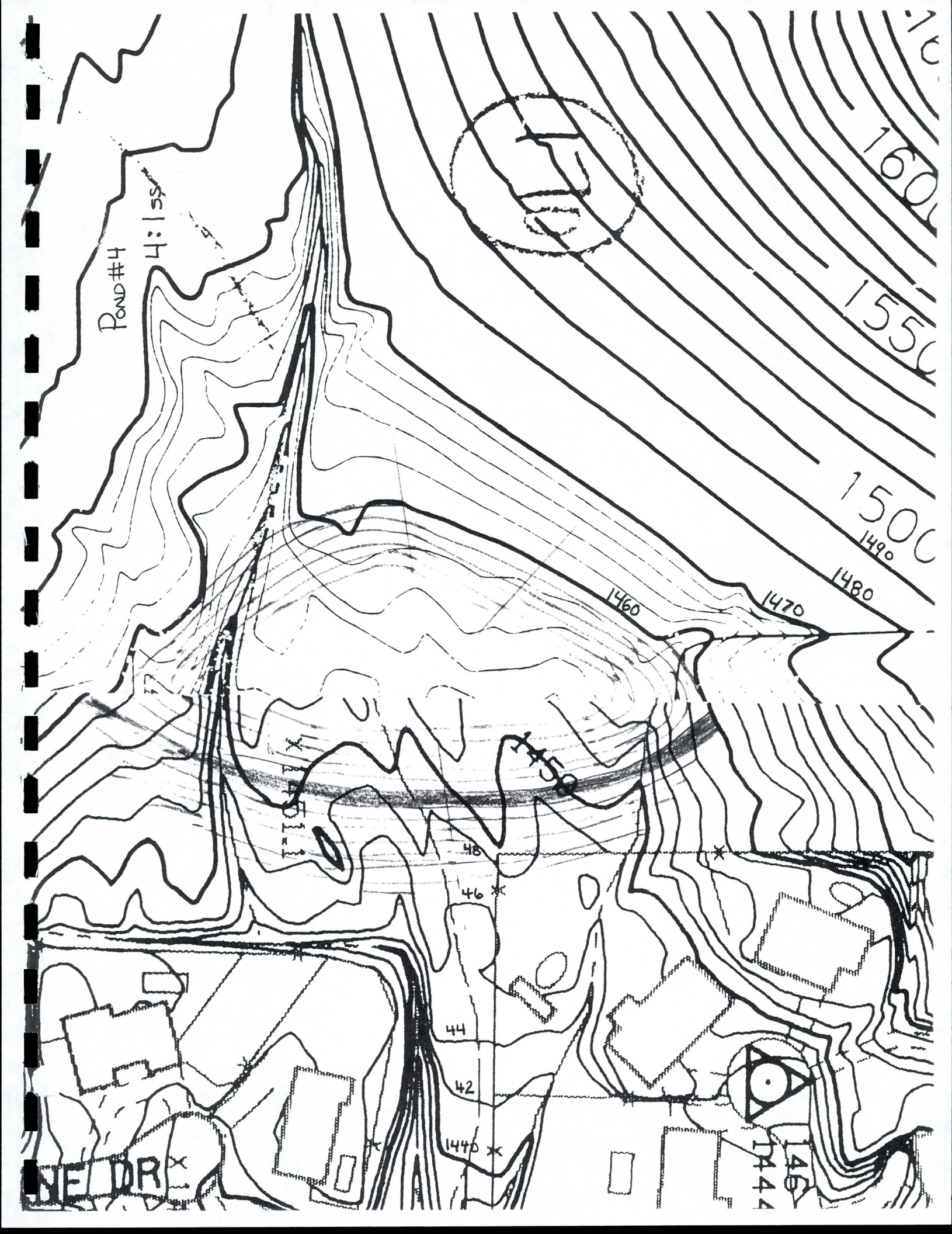
# DOUBLETREE RANCH ROAD
# STAGE STORAGE CALCULATIONS
# DETENTION POND #4
## 4:1 SLOPES

| 1<br>Contour Elev<br>(ft) | 2<br>Plainmeter Reading | 3<br>Area<br>(ft^2) | 4<br>A1+A2<br>(ft^2) | 5<br>(A1*A2)^.5<br>(ft^2) | 6<br>4 + 5<br>(ft^2) | 7<br>h<br>(ft) | 8<br>h/3<br>(ft) | 9<br>= 8 * 6<br>Volume<br>(ft^3) | 10<br>Sum Volume<br>(ft^3) | 11<br>Sum Volume<br>(Acft) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| 1449.0 | 0.0 | 0 | 0 | | | | | | | |
| 1450.0 | 36.0 | 35,644 | 35,644 | 0 | 35,644 | 1.0 | 0.3333 | 11,881 | 11,881 | 0.27 |
| 1452.0 | 45.0 | 44,554 | 80,198 | 39,851 | 120,049 | 2.0 | 0.6667 | 80,032 | 91,914 | 2.11 |
| 1454.0 | 55.4 | 54,851 | 99,406 | 49,436 | 148,842 | 2.0 | 0.6667 | 99,228 | 191,141 | 4.39 |
| 1456.0 | 68.1 | 67,426 | 122,277 | 60,814 | 183,092 | 2.0 | 0.6667 | 122,061 | 313,203 | 7.19 |
| 1458.0 | 80.7 | 79,901 | 147,327 | 73,399 | 220,726 | 2.0 | 0.6667 | 147,150 | 460,353 | 10.57 |
| 1460.0 | 96.3 | 95,347 | 175,248 | 87,283 | 262,530 | 2.0 | 0.6667 | 175,020 | 635,373 | 14.59 |

# Doubletree Ranch Road

## Stage Storage Pond #4




Pond #4
4:1 ss
1600
1550
1500
1490
1480
1470
1460
48
46
44
42
1440
NE DR

# DOUBLETREE RANCH ROAD
# STAGE STORAGE CALCULATIONS
# DETENTION POND #5

## 4:1 SLOPES

| 1 Contour Elev (ft) | 2 Plainmeter Reading | 3 Area (ft^2) | 4 A1+A2 (ft^2) | 5 (A1*A2)^.5 (ft^2) | 6 4 + 5 (ft^2) | 7 h (ft) | 8 h/3 (ft) | 9 = 8 * 6 Volume (ft^3) | 10 Sum Volume (ft^3) | 11 Sum Volume (Acft) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| 1413.5 | 0.0 | 0 | 0 | | | | | | | |
| 1414.0 | 26.5 | 26,238 | 26,238 | 0 | 26,238 | 0.5 | 0.1667 | 4,373 | 4,373 | 0.10 |
| 1416.0 | 37.6 | 37,228 | 63,465 | 31,253 | 94,719 | 2.0 | 0.6667 | 63,146 | 67,519 | 1.55 |
| 1418.0 | 47.9 | 47,426 | 84,653 | 42,018 | 126,672 | 2.0 | 0.6667 | 84,448 | 151,967 | 3.49 |
| 1420.0 | 68.4 | 67,723 | 115,149 | 56,673 | 171,821 | 2.0 | 0.6667 | 114,548 | 266,514 | 6.12 |
| | | | | | | | | | | |

## 6:1 SLOPES

| 1 Contour Elev (ft) | 2 Plainmeter Reading | 3 Area (ft^2) | 4 A1+A2 (ft^2) | 5 (A1*A2)^.5 (ft^2) | 6 4 + 5 (ft^2) | 7 h (ft) | 8 h/3 (ft) | 9 =8*6 Volume (ft^3) | 10 Sum Volume (ft^3) | 11 Sum Volume (Acft) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| 1413.5 | 0.0 | 0 | 0 | | | | | | | |
| 1414.0 | 26.2 | 25,941 | 25,941 | 0 | 25,941 | 0.5 | 0.1667 | 4,323 | 4,323 | 0.10 |
| 1416.0 | 37.1 | 36,733 | 62,673 | 30,869 | 93,542 | 2.0 | 0.6667 | 62,361 | 66,685 | 1.53 |
| 1418.0 | 48.7 | 48,218 | 84,950 | 42,085 | 127,036 | 2.0 | 0.6667 | 84,691 | 151,375 | 3.48 |
| 1420.0 | 65.2 | 64,554 | 112,772 | 55,791 | 168,564 | 2.0 | 0.6667 | 112,376 | 263,751 | 6.05 |
| | | | | | | | | | | |

## 8:1 SLOPES

| 1 Contour Elev (ft) | 2 Plainmeter Reading | 3 Area (ft^2) | 4 A1+A2 (ft^2) | 5 (A1*A2)^.5 (ft^2) | 6 4 + 5 (ft^2) | 7 h (ft) | 8 h/3 (ft) | 9 =8*6 Volume (ft^3) | 10 Sum Volume (ft^3) | 11 Sum Volume (Acft) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| 1413.5 | 0.0 | 0 | 0 | | | | | | | |
| 1414.0 | 20.0 | 19,802 | 19,802 | 0 | 19,802 | 0.5 | 0.1667 | 3,300 | 3,300 | 0.08 |
| 1416.0 | 31.7 | 31,386 | 51,188 | 24,930 | 76,118 | 2.0 | 0.6667 | 50,745 | 54,046 | 1.24 |
| 1418.0 | 48.5 | 48,020 | 79,406 | 38,822 | 118,228 | 2.0 | 0.6667 | 78,819 | 132,864 | 3.05 |
| 1420.0 | 65.9 | 65,248 | 113,267 | 55,975 | 169,242 | 2.0 | 0.6667 | 112,828 | 245,693 | 5.64 |
| | | | | | | | | | | |

# DOUBLETREE RANCH ROAD
# STAGE STORAGE CALCULATIONS
## DETENTION POND #5A revision

Existing top of concrete berm

| 1 Contour Elev (ft) | 2 Plainmeter Reading | 3 Area (ft^2) | 4 A1+A2 (ft^2) | 5 (A1*A2)^. (ft^2) | 6 4 + 5 (ft^2) | 7 h (ft) | 8 h/3 (ft) | 9 =8*6 Volume (ft^3) | 10 Sum Volume (ft^3) | 11 Sum Volume (Acft) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| 1399.5 | 0.0 | 0 | | | | | | | | |
| 1400.0 | 0.9 | 900 | 900 | 0 | 900 | 0.5 | 0.1667 | 150 | 150 | 0.00 |
| 1402.0 | 3.0 | 3,000 | 3,900 | 1,643 | 5,543 | 2.0 | 0.6667 | 3,695 | 3,845 | 0.09 |
| 1404.0 | 7.0 | 7,000 | 10,000 | 4,583 | 14,583 | 2.0 | 0.6667 | 9,722 | 13,567 | 0.31 |
| 1406.0 | 13.8 | 13,800 | 20,800 | 9,829 | 30,629 | 2.0 | 0.6667 | 20,419 | 33,986 | 0.78 |
| 1408.0 | 21.0 | 21,000 | 34,800 | 17,024 | 51,824 | 2.0 | 0.6667 | 34,549 | 68,535 | 1.57 |
| 1410.0 | 30.7 | 30,700 | 51,700 | 25,391 | 77,091 | 2.0 | 0.6667 | 51,394 | 119,929 | 2.75 |
| 1412.0 | 41.0 | 41,000 | 71,700 | 35,478 | 107,178 | 2.0 | 0.6667 | 71,452 | 191,381 | 4.39 |

Sub-basin
Q (100yr, 6 hr) = cfs (Kaminski-Hubbard)

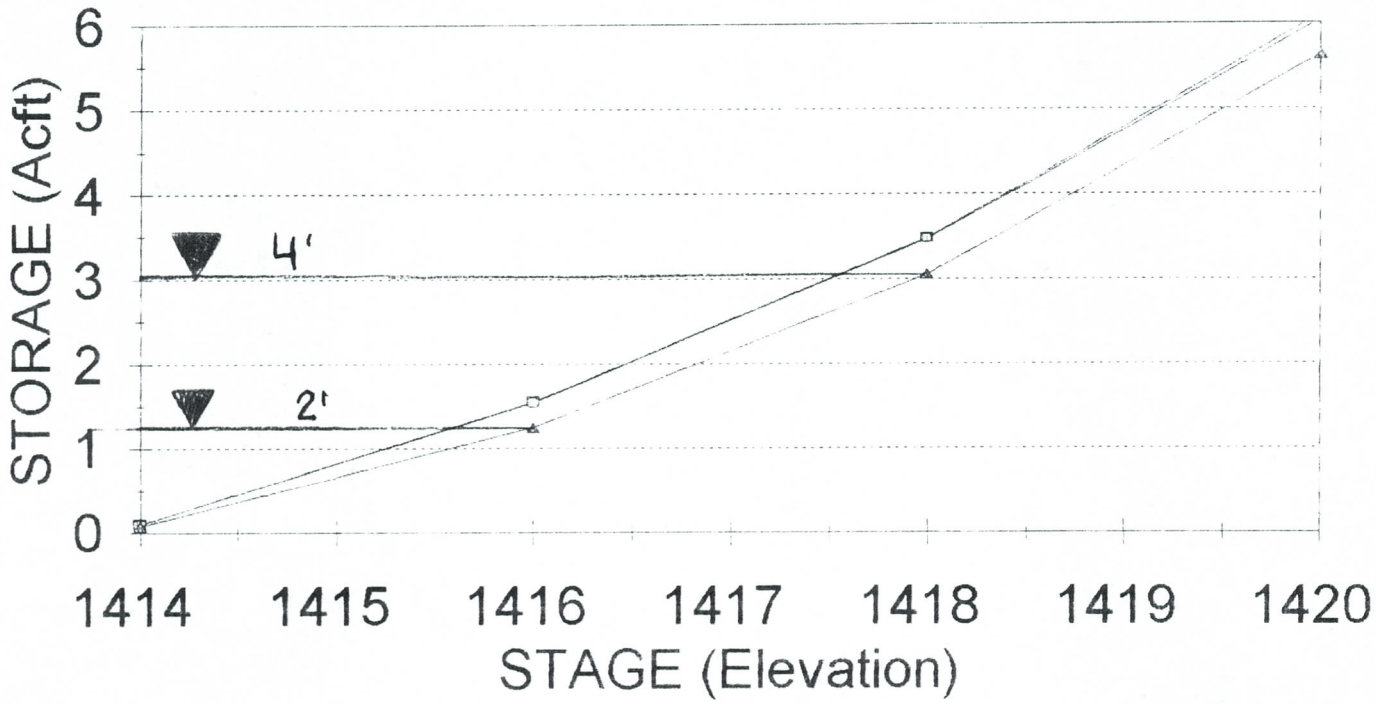
## DETENTION POND #5B revision

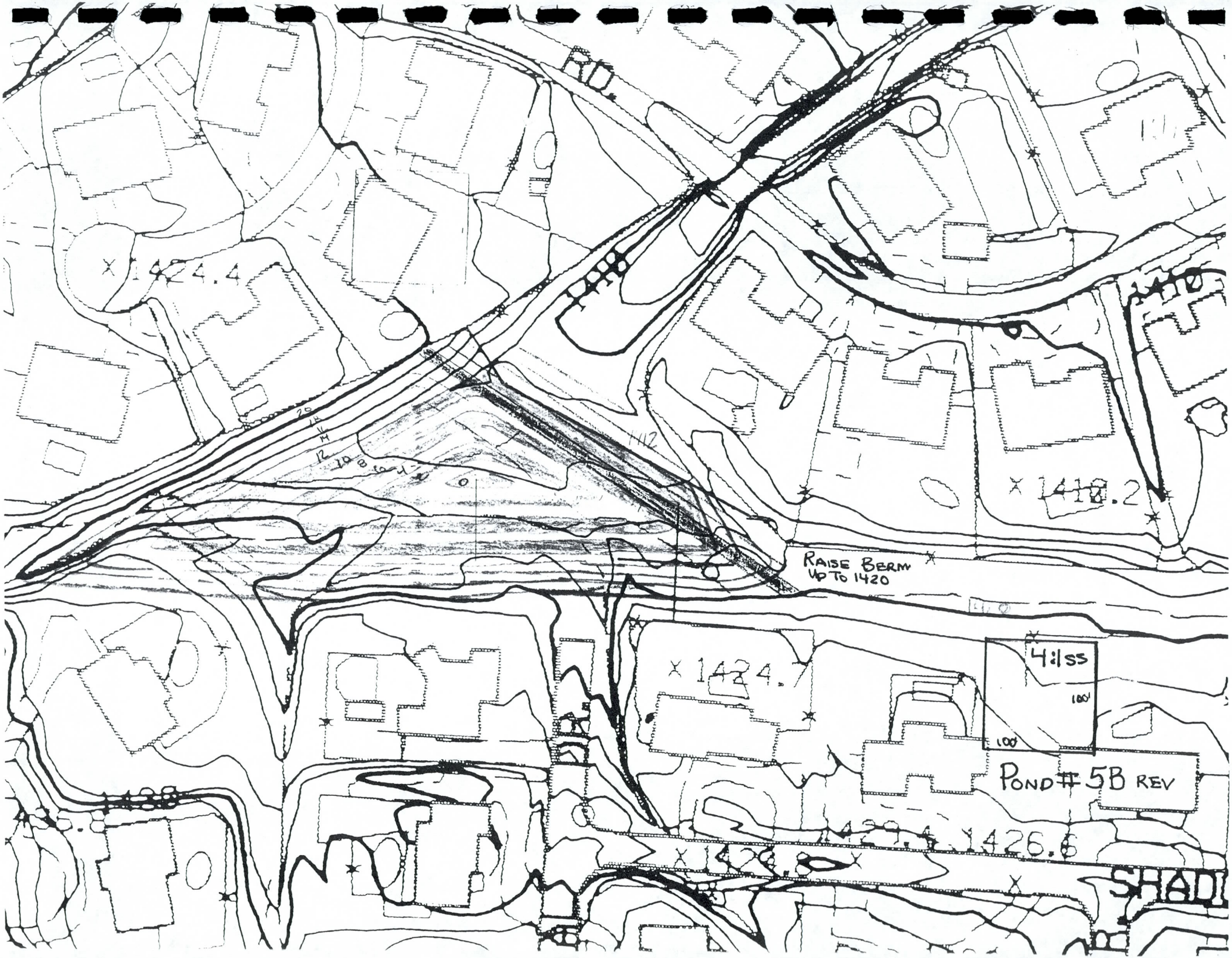
Build berm up to Elev. 1420

| 1 Contour Elev (ft) | 2 Plainmeter Reading | 3 Area (ft^2) | 4 A1+A2 (ft^2) | 5 (A1*A2)^. (ft^2) | 6 4 + 5 (ft^2) | 7 h (ft) | 8 h/3 (ft) | 9 =8*6 Volume (ft^3) | 10 Sum Volume (ft^3) | 11 Sum Volume (Acft) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| 1403.5 | 0.0 | 0 | 0 | | | | | | | |
| 1404.0 | 1.4 | 1,400 | 1,400 | 0 | 1,400 | 0.5 | 0.1667 | 233 | 233 | 0.01 |
| 1406.0 | 5.0 | 5,000 | 6,400 | 2,646 | 9,046 | 2.0 | 0.6667 | 6,031 | 6,264 | 0.14 |
| 1408.0 | 10.4 | 10,400 | 15,400 | 7,211 | 22,611 | 2.0 | 0.6667 | 15,074 | 21,338 | 0.49 |
| 1410.0 | 16.4 | 16,400 | 26,800 | 13,060 | 39,860 | 2.0 | 0.6667 | 26,573 | 47,911 | 1.10 |
| 1412.0 | 24.5 | 24,500 | 40,900 | 20,045 | 60,945 | 2.0 | 0.6667 | 40,630 | 88,541 | 2.03 |
| 1414 | 33.6 | 33,600 | 58,100 | 28,691 | 86,791 | 2.0 | 0.6667 | 57,861 | 146,402 | 3.36 |
| 1416 | 44.2 | 44,200 | 77,800 | 38,537 | 116,337 | 2.0 | 0.6667 | 77,558 | 223,960 | 5.14 |
| 1418 | 56.4 | 56,400 | 100,600 | 49,929 | 150,529 | 2.0 | 0.6667 | 100,352 | 324,313 | 7.45 |
| 1420 | 69.0 | 69,000 | 125,400 | 62,383 | 187,783 | 2.0 | 0.6667 | 125,188 | 449,501 | 10.32 |

# Doubletree Ranch Road

## Stage Storage Pond #5




RD.
1424.4
1418.2
RAISE BERM
UP TO 1420
1424.
4:1 SS
100
100
POND # 5B REV
1426.6
1426.6
SHAD

# DOUBLETREE RANCH ROAD
# STAGE STORAGE CALCULATIONS
# DETENTION POND #6

## 4:1 SLOPES

| 1 Contour Elev (ft) | 2 Plainmeter Reading | 3 Area (ft^2) | 4 A1+A2 (ft^2) | 5 (A1*A2)^.5 (ft^2) | 6 4 + 5 (ft^2) | 7 h (ft) | 8 h/3 (ft) | 9 =8*6 Volume (ft^3) | 10 Sum Volume (ft^3) | 11 Sum Volume (Acft) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1383.0 | 0.0 | 0 | 0 | | | | | | | |
| 1384.0 | 5.0 | 4,950 | 4,950 | 0 | 4,950 | 1.0 | 0.3333 | 1,650 | 1,650 | 0.04 |
| 1386.0 | 9.1 | 9,010 | 13,960 | 6,679 | 20,639 | 2.0 | 0.6667 | 13,759 | 15,409 | 0.35 |
| 1388.0 | 14.2 | 14,059 | 23,069 | 11,255 | 34,324 | 2.0 | 0.6667 | 22,883 | 38,292 | 0.88 |
| 1390.0 | 19.8 | 19,604 | 33,663 | 16,602 | 50,265 | 2.0 | 0.6667 | 33,510 | 71,802 | 1.65 |

## 6:1 SLOPES

| 1 Contour Elev (ft) | 2 Plainmeter Reading | 3 Area (ft^2) | 4 A1+A2 (ft^2) | 5 (A1*A2)^.5 (ft^2) | 6 4 + 5 (ft^2) | 7 h (ft) | 8 h/3 (ft) | 9 =8*6 Volume (ft^3) | 10 Sum Volume (ft^3) | 11 Sum Volume (Acft) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1383.0 | 0.0 | 0 | 0 | | | | | | | |
| 1384.0 | 2.0 | 1,980 | 1,980 | 0 | 1,980 | 1.0 | 0.3333 | 660 | 660 | 0.02 |
| 1386.0 | 6.1 | 6,040 | 8,020 | 3,458 | 11,478 | 2.0 | 0.6667 | 7,652 | 8,312 | 0.19 |
| 1388.0 | 10.9 | 10,792 | 16,832 | 8,073 | 24,905 | 2.0 | 0.6667 | 16,603 | 24,916 | 0.57 |
| 1390.0 | 19.8 | 19,604 | 30,396 | 14,545 | 44,941 | 2.0 | 0.6667 | 29,961 | 54,876 | 1.26 |

## 8:1 SLOPES

| 1 Contour Elev (ft) | 2 Plainmeter Reading | 3 Area (ft^2) | 4 A1+A2 (ft^2) | 5 (A1*A2)^.5 (ft^2) | 6 4 + 5 (ft^2) | 7 h (ft) | 8 h/3 (ft) | 9 =8*6 Volume (ft^3) | 10 Sum Volume (ft^3) | 11 Sum Volume (Acft) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1383.0 | 0.0 | 0 | 0 | | | | | | | |
| 1384.0 | 0.6 | 594 | 594 | 0 | 594 | 1.0 | 0.3333 | 198 | 198 | 0.00 |
| 1386.0 | 2.9 | 2,871 | 3,465 | 1,306 | 4,771 | 2.0 | 0.6667 | 3,181 | 3,379 | 0.08 |
| 1388.0 | 10.5 | 10,396 | 13,267 | 5,464 | 18,731 | 2.0 | 0.6667 | 12,487 | 15,866 | 0.36 |
| 1390.0 | 19.8 | 19,604 | 30,000 | 14,276 | 44,276 | 2.0 | 0.6667 | 29,517 | 45,383 | 1.04 |

# DOUBLETREE RANCH ROAD
# STAGE STORAGE CALCULATIONS
# DETENTION POND #7

## 4:1 SLOPES

| 1 Contour Elev (ft) | 2 Plainmeter Reading | 3 Area (ft^2) | 4 A1+A2 (ft^2) | 5 (A1*A2)^.5 (ft^2) | 6 4 + 5 (ft^2) | 7 h (ft) | 8 h/3 (ft) | 9 =8*6 Volume (ft^3) | 10 Sum Volume (ft^3) | 11 Sum Volume (Acft) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1383.0 | 0 | 0 | 0 | | | | | | | |
| 1384.0 | 21.9 | 21,683 | 21,683 | 0 | 21,683 | 1.0 | 0.3333 | 7,228 | 7,228 | 0.17 |
| 1386.0 | 29.6 | 29,307 | 50,990 | 25,208 | 76,199 | 2.0 | 0.6667 | 50,799 | 58,027 | 1.33 |
| 1388.0 | 38.5 | 38,119 | 67,426 | 33,424 | 100,849 | 2.0 | 0.6667 | 67,233 | 125,260 | 2.88 |
| 1390.0 | 45.4 | 44,950 | 83,069 | 41,394 | 124,463 | 2.0 | 0.6667 | 82,976 | 208,235 | 4.78 |

## 6:1 SLOPES

| 1 Contour Elev (ft) | 2 Plainmeter Reading | 3 Area (ft^2) | 4 A1+A2 (ft^2) | 5 (A1*A2)^.5 (ft^2) | 6 4 + 5 (ft^2) | 7 h (ft) | 8 h/3 (ft) | 9 =8*6 Volume (ft^3) | 10 Sum Volume (ft^3) | 11 Sum Volume (Acft) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1383.0 | 0 | 0 | 0 | | | | | | | |
| 1384.0 | 16.9 | 16,733 | 16,733 | 0 | 16,733 | 1.0 | 0.3333 | 5,578 | 5,578 | 0.13 |
| 1386.0 | 25.1 | 24,851 | 41,584 | 20,392 | 61,976 | 2.0 | 0.6667 | 41,317 | 46,895 | 1.08 |
| 1388.0 | 34 | 33,663 | 58,515 | 28,924 | 87,439 | 2.0 | 0.6667 | 58,292 | 105,187 | 2.41 |
| 1390.0 | 45.8 | 45,347 | 79,010 | 39,071 | 118,081 | 2.0 | 0.6667 | 78,720 | 183,908 | 4.22 |

## 8:1 SLOPES

| 1 Contour Elev (ft) | 2 Plainmeter Reading | 3 Area (ft^2) | 4 A1+A2 (ft^2) | 5 (A1*A2)^.5 (ft^2) | 6 4 + 5 (ft^2) | 7 h (ft) | 8 h/3 (ft) | 9 =8*6 Volume (ft^3) | 10 Sum Volume (ft^3) | 11 Sum Volume (Acft) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1383.0 | 0 | 0 | 0 | | | | | | | |
| 1384.0 | 9.2 | 9,109 | 9,109 | 0 | 9,109 | 1.0 | 0.3333 | 3,036 | 3,036 | 0.07 |
| 1386.0 | 18.2 | 18,020 | 27,129 | 12,812 | 39,940 | 2.0 | 0.6667 | 26,627 | 29,663 | 0.68 |
| 1388.0 | 29.2 | 28,911 | 46,931 | 22,825 | 69,755 | 2.0 | 0.6667 | 46,504 | 76,167 | 1.75 |
| 1390.0 | 39.6 | 39,208 | 68,119 | 33,668 | 101,787 | 2.0 | 0.6667 | 67,858 | 144,025 | 3.31 |

# DOUBLETREE RANCH ROAD
# STAGE STORAGE CALCULATIONS
## DETENTION POND #7A revision

Existing Contour from Tatum Blvd.

| 1 Contour Elev (ft) | 2 Plainmete Reading | 3 Area (ft^2) | 4 A1+A2 (ft^2) | 5 (A1*A2)^. (ft^2) | 6 4 + 5 (ft^2) | 7 h (ft) | 8 h/3 (ft) | 9 =8*6 Volume (ft^3) | 10 Sum Volume (ft^3) | 11 Sum Volume (Acft) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| | | | | | | | | | | |
| 1372.0 | 11.6 | 11,600 | 11,600 | 0 | 11,600 | 0.0 | 0.0000 | 0 | 0 | 0.00 |
| 1374.0 | 22.6 | 22,600 | 34,200 | 16,191 | 50,391 | 2.0 | 0.6667 | 33,594 | 33,594 | 0.77 |
| 1376.0 | 29.2 | 29,200 | 51,800 | 25,689 | 77,489 | 2.0 | 0.6667 | 51,659 | 85,254 | 1.96 |
| 1378.0 | 35.7 | 35,700 | 64,900 | 32,287 | 97,187 | 2.0 | 0.6667 | 64,791 | 150,045 | 3.44 |
| 1380.0 | 44.3 | 44,300 | 80,000 | 39,768 | 119,768 | 2.0 | 0.6667 | 79,845 | 229,890 | 5.28 |
| 1382.0 | 52.3 | 52,300 | 96,600 | 48,134 | 144,734 | 2.0 | 0.6667 | 96,489 | 326,380 | 7.49 |
| 1384.0 | 60.7 | 60,700 | 113,000 | 56,344 | 169,344 | 2.0 | 0.6667 | 112,896 | 439,275 | 10.08 |

Sub-basin
Q (100yr, 6 hr) = cfs (Kaminski-Hubbard)

## DETENTION POND #7B revision

Berm up to elevation 1390

| 1 Contour Elev (ft) | 2 Plainmete Reading | 3 Area (ft^2) | 4 A1+A2 (ft^2) | 5 (A1*A2)^. (ft^2) | 6 4 + 5 (ft^2) | 7 h (ft) | 8 h/3 (ft) | 9 =8*6 Volume (ft^3) | 10 Sum Volume (ft^3) | 11 Sum Volume (Acft) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| | | | | | | | | | | |
| 1372.0 | 5.7 | 5,700 | 5,700 | 0 | 5,700 | 0.0 | 0.0000 | 0 | 0 | 0.00 |
| 1374.0 | 8.3 | 8,300 | 14,000 | 6,878 | 20,878 | 2.0 | 0.6667 | 13,919 | 13,919 | 0.32 |
| 1376.0 | 12.4 | 12,400 | 20,700 | 10,145 | 30,845 | 2.0 | 0.6667 | 20,563 | 34,482 | 0.79 |
| 1378.0 | 16.8 | 16,800 | 29,200 | 14,433 | 43,633 | 2.0 | 0.6667 | 29,089 | 63,571 | 1.46 |
| 1380.0 | 21.5 | 21,500 | 38,300 | 19,005 | 57,305 | 2.0 | 0.6667 | 38,204 | 101,774 | 2.34 |
| 1382.0 | 27.8 | 27,800 | 49,300 | 24,448 | 73,748 | 2.0 | 0.6667 | 49,165 | 150,940 | 3.47 |
| 1384.0 | 34.2 | 34,200 | 62,000 | 30,834 | 92,834 | 2.0 | 0.6667 | 61,890 | 212,829 | 4.89 |
| 1386.0 | 40.3 | 40,300 | 74,500 | 37,125 | 111,625 | 2.0 | 0.6667 | 74,417 | 287,246 | 6.59 |
| 1388.0 | 47.0 | 47,000 | 87,300 | 43,521 | 130,821 | 2.0 | 0.6667 | 87,214 | 374,460 | 8.60 |
| 1390.0 | 55.2 | 55,200 | 102,200 | 50,935 | 153,135 | 2.0 | 0.6667 | 102,090 | 476,550 | 10.94 |

Sub-basin
Q (100yr, 6 hr) = cfs (Kaminski-Hubbard)

# DOUBLETREE RANCH ROAD
# STAGE STORAGE CALCULATIONS
## DETENTION POND #7C revision

Combined 6& 7, no berm

| 1 Contour Elev (ft) | 2 Plainmete Reading | 3 Area (ft^2) | 4 A1+A2 (ft^2) | 5 (A1*A2)^. (ft^2) | 6 4 + 5 (ft^2) | 7 h (ft) | 8 h/3 (ft) | 9 =8*6 Volume (ft^3) | 10 Sum Volume (ft^3) | 11 Sum Volume (Acft) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| | | | | | | | | | | |
| 1372.0 | 17.0 | 17,000 | 17,000 | 0 | 17,000 | 0.0 | 0.0000 | 0 | 0 | 0.00 |
| 1374.0 | 24.0 | 24,000 | 41,000 | 20,199 | 61,199 | 2.0 | 0.6667 | 40,799 | 40,799 | 0.94 |
| 1376.0 | 32.5 | 32,500 | 56,500 | 27,928 | 84,428 | 2.0 | 0.6667 | 56,286 | 97,085 | 2.23 |
| 1378.0 | 42.4 | 42,400 | 74,900 | 37,121 | 112,021 | 2.0 | 0.6667 | 74,681 | 171,766 | 3.94 |
| 1380.0 | 53.8 | 53,800 | 96,200 | 47,761 | 143,961 | 2.0 | 0.6667 | 95,974 | 267,740 | 6.15 |
| 1382.0 | 67.1 | 67,100 | 120,900 | 60,083 | 180,983 | 2.0 | 0.6667 | 120,655 | 388,395 | 8.92 |
| 1384.0 | 79.0 | 79,000 | 146,100 | 72,807 | 218,907 | 2.0 | 0.6667 | 145,938 | 534,334 | 12.27 |

Sub-basin
Q (100yr, 6 hr) = cfs (Kaminski-Hubbard)

## DETENTION POND #7D revision

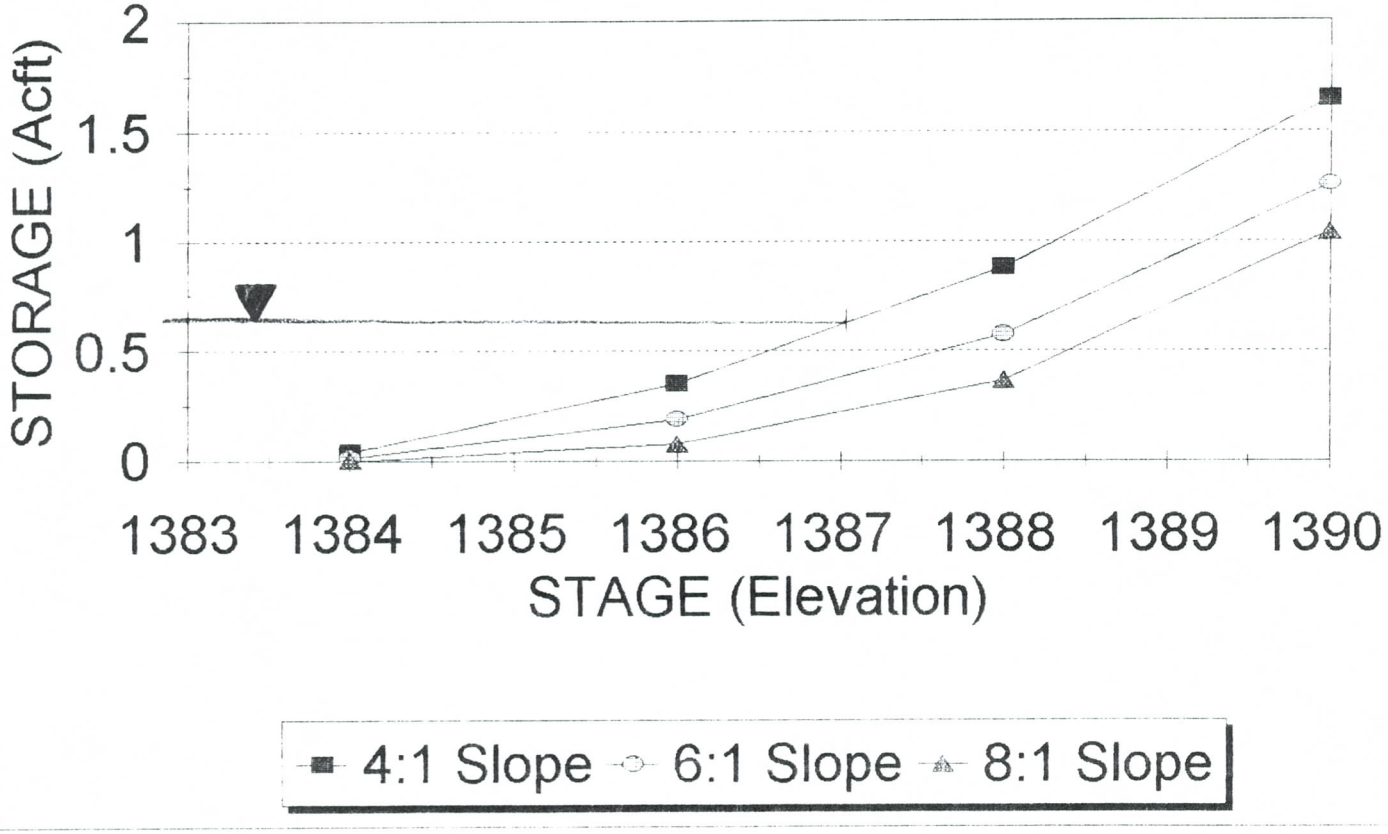
Combined 6&7,Berm up to elevation 1390

| 1 Contour Elev (ft) | 2 Plainmete Reading | 3 Area (ft^2) | 4 A1+A2 (ft^2) | 5 (A1*A2)^. (ft^2) | 6 4 + 5 (ft^2) | 7 h (ft) | 8 h/3 (ft) | 9 =8*6 Volume (ft^3) | 10 Sum Volume (ft^3) | 11 Sum Volume (Acft) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| | | | | | | | | | | |
| 1372.0 | 6.4 | 6,400 | 6,400 | 0 | 6,400 | 0.0 | 0.0000 | 0 | 0 | 0.00 |
| 1374.0 | 10.0 | 10,000 | 16,400 | 8,000 | 24,400 | 2.0 | 0.6667 | 16,267 | 16,267 | 0.37 |
| 1376.0 | 14.7 | 14,700 | 24,700 | 12,124 | 36,824 | 2.0 | 0.6667 | 24,550 | 40,816 | 0.94 |
| 1378.0 | 22.5 | 22,500 | 37,200 | 18,187 | 55,387 | 2.0 | 0.6667 | 36,924 | 77,741 | 1.78 |
| 1380.0 | 29.1 | 29,100 | 51,600 | 25,588 | 77,188 | 2.0 | 0.6667 | 51,459 | 129,199 | 2.97 |
| 1382.0 | 36.9 | 36,900 | 66,000 | 32,769 | 98,769 | 2.0 | 0.6667 | 65,846 | 195,045 | 4.48 |
| 1384.0 | 47.4 | 47,400 | 84,300 | 41,822 | 126,122 | 2.0 | 0.6667 | 84,081 | 279,126 | 6.41 |
| 1386.0 | 58.8 | 58,800 | 106,200 | 52,793 | 158,993 | 2.0 | 0.6667 | 105,995 | 385,122 | 8.84 |
| 1388.0 | 71.0 | 71,000 | 129,800 | 64,613 | 194,413 | 2.0 | 0.6667 | 129,608 | 514,730 | 11.82 |
| 1390.0 | 84.7 | 84,700 | 155,700 | 77,548 | 233,248 | 2.0 | 0.6667 | 155,499 | 670,229 | 15.39 |

Sub-basin
Q (100yr, 6 hr) = cfs (Kaminski-Hubbard)

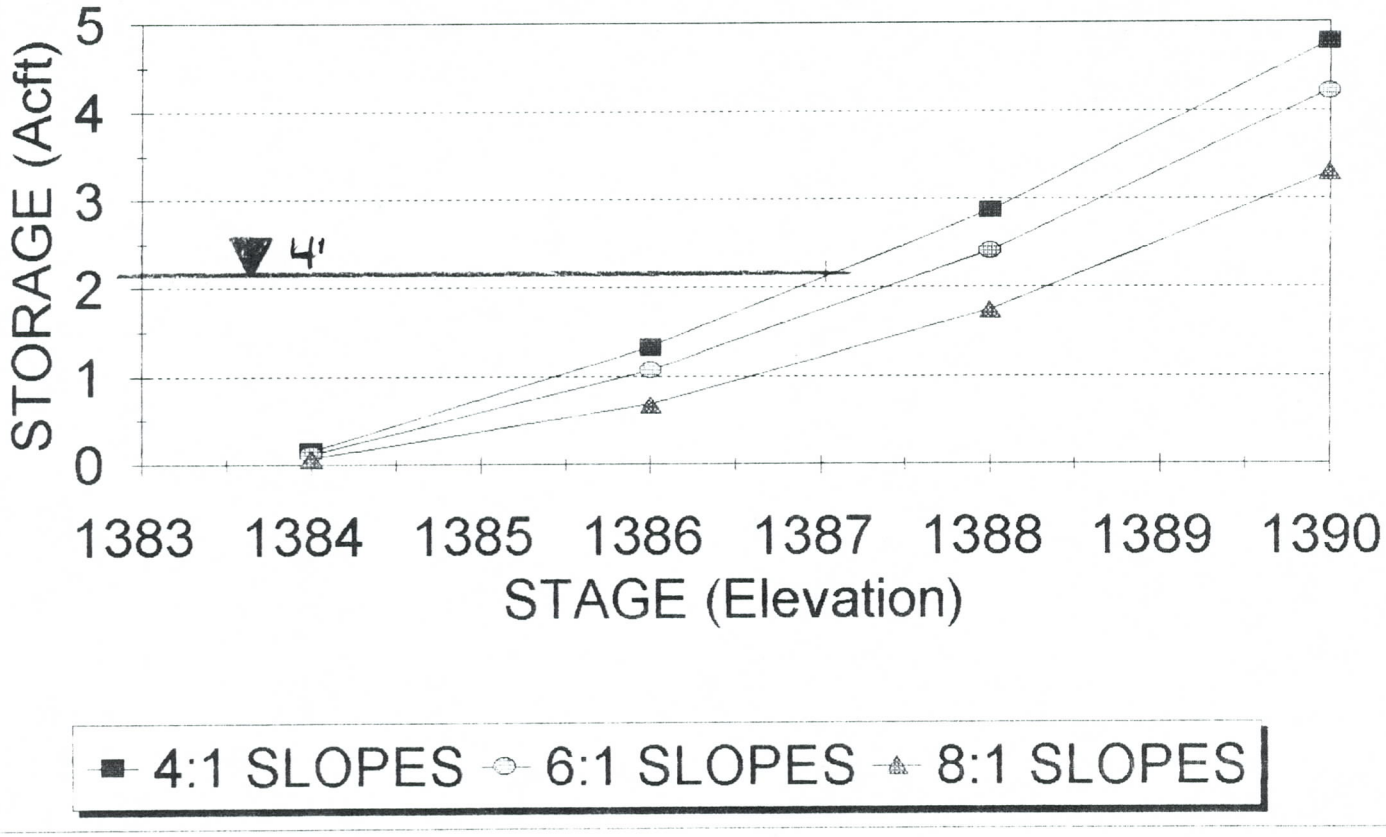
# Doubletree Ranch Road

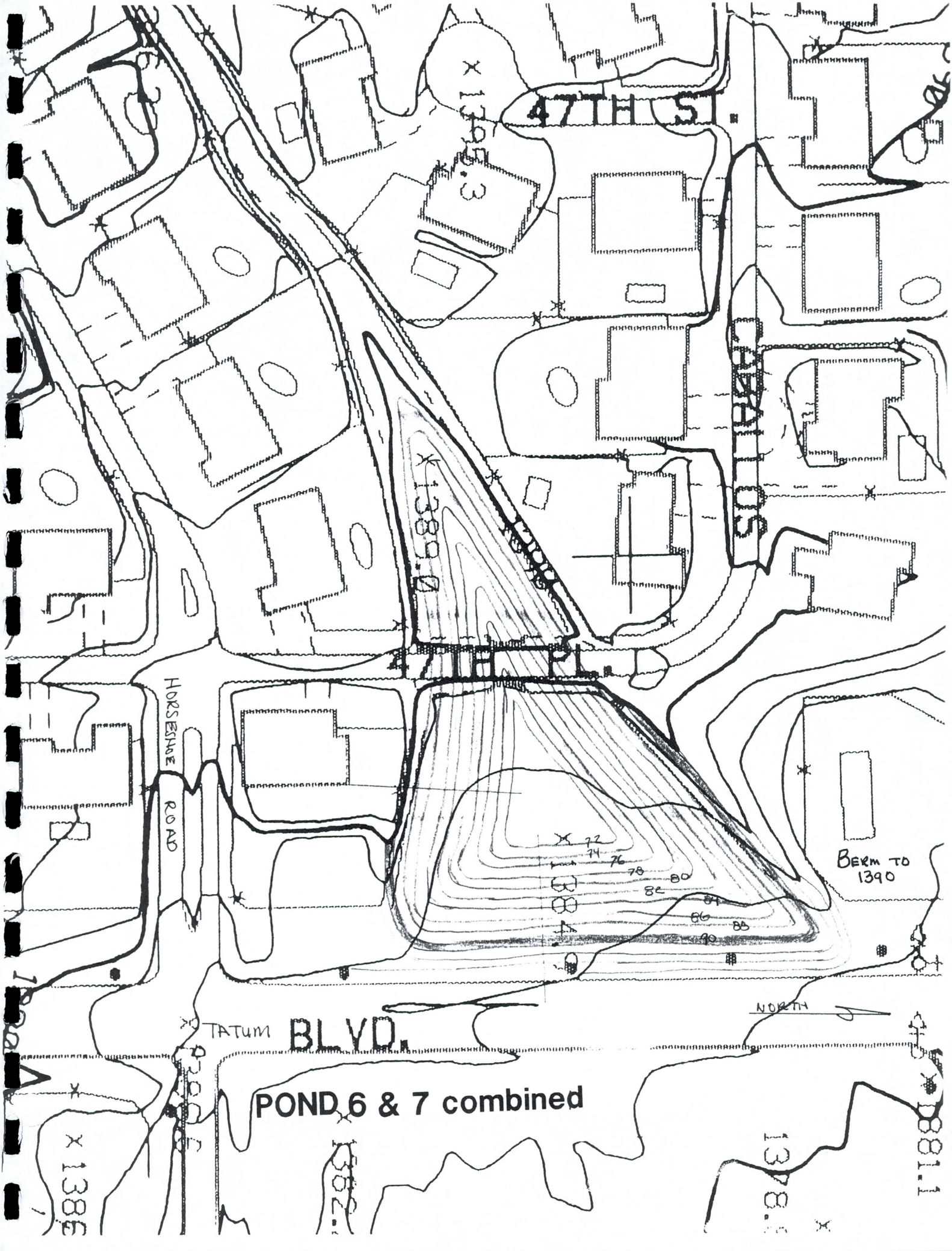
## Stage Storage Pond #6



# Doubletree Ranch Road

## Stage Storage Pond #7




47TH ST.
47TH PL.
HORSESHOE ROAD
TATUM BLVD.
BERM TO 1390
NORTH
POND 6 & 7 combined

# DOUBLETREE RANCH ROAD
# STAGE STORAGE CALCULATIONS
# DETENTION POND #8
## 4:1 SLOPES

| 1<br>Contour Elev (ft) | 2<br>Plainmeter Reading | 3<br>Area (ft^2) | 4<br>A1+A2 (ft^2) | 5<br>(A1*A2)^.5 (ft^2) | 6<br>4 + 5 (ft^2) | 7<br>h (ft) | 8<br>h/3 (ft) | 9<br>= 8 * 6 Volume (ft^3) | 10<br>Sum Volume (ft^3) | 11<br>Sum Volume (Acft) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1373.5 | 0.0 | 0 | 0 | | | | | | | |
| 1374.0 | 179.7 | 177,921 | 177,921 | 0 | 177,921 | 0.5 | 0.1667 | 29,653 | 29,653 | 0.68 |
| 1376.0 | 197.3 | 195,347 | 373,267 | 186,430 | 559,697 | 2.0 | 0.6667 | 373,132 | 402,785 | 9.25 |
| 1378.0 | 211.0 | 208,911 | 404,257 | 202,015 | 606,272 | 2.0 | 0.6667 | 404,182 | 806,967 | 18.53 |
| 1380.0 | 226.0 | 223,762 | 432,673 | 216,209 | 648,882 | 2.0 | 0.6667 | 432,588 | 1,239,555 | 28.46 |

# DETENTION POND #8
## 6:1 SLOPES

| 1<br>Contour Elev (ft) | 2<br>Plainmeter Reading | 3<br>Area (ft^2) | 4<br>A1+A2 (ft^2) | 5<br>(A1*A2)^.5 (ft^2) | 6<br>4 + 5 (ft^2) | 7<br>h (ft) | 8<br>h/3 (ft) | 9<br>= 8 * 6 Volume (ft^3) | 10<br>Sum Volume (ft^3) | 11<br>Sum Volume (Acft) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1373.5 | 0.0 | 0 | 0 | | | | | | | |
| 1374.0 | 151.9 | 150,396 | 150,396 | 0 | 150,396 | 0.5 | 0.1667 | 25,066 | 25,066 | 0.58 |
| 1376.0 | 172.1 | 170,396 | 320,792 | 160,084 | 480,876 | 2.0 | 0.6667 | 320,584 | 345,650 | 7.94 |
| 1378.0 | 193.0 | 191,089 | 361,485 | 180,446 | 541,931 | 2.0 | 0.6667 | 361,288 | 706,938 | 16.23 |
| 1380.0 | 219.5 | 217,327 | 408,416 | 203,786 | 612,202 | 2.0 | 0.6667 | 408,135 | 1,115,072 | 25.60 |

# DETENTION POND #8
## 8:1 SLOPES

| 1<br>Contour Elev (ft) | 2<br>Plainmeter 0 | 3<br>Area (ft^2) | 4<br>A1+A2 (ft^2) | 5<br>(A1*A2)^.5 (ft^2) | 6<br>4 + 5 (ft^2) | 7<br>h (ft) | 8<br>h/3 (ft) | 9<br>= 8 * 6 Volume (ft^3) | 10<br>Sum Volume (ft^3) | 11<br>Sum Volume (Acft) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1373.5 | 0.0 | 0 | 0 | | | | | | | |
| 1374.0 | 133.5 | 122,673 | 122,673 | 0 | 122,673 | 0.5 | 0.1667 | 20,446 | 20,446 | 0.47 |
| 1376.0 | 151.1 | 148,804 | 271,477 | 135,471 | 407,748 | 2.0 | 0.6667 | 271,832 | 292,278 | 6.71 |
| 1378.0 | 180.6 | 178,010 | 326,814 | 163,046 | 489,262 | 2.0 | 0.6667 | 326,174 | 618,452 | 14.24 |
| 1380.0 | 214.5 | 213,326 | 391,336 | 194,981 | 586,317 | 2.0 | 0.6667 | 390,911 | 1,011,363 | 23.22 |

# DOUBLETREE RANCH ROAD
# STAGE STORAGE CALCULATIONS
## DETENTION POND #8 revision

| 1 Contour Elev (ft) | 2 Plainmeter Reading | 3 Area (ft^2) | 4 A1+A2 (ft^2) | 5 (A1*A2)^. (ft^2) | 6 4 + 5 (ft^2) | 7 h (ft) | 8 h/3 (ft) | 9 =8*6 Volume (ft^3) | 10 Sum Volume (ft^3) | 11 Sum Volume (Acft) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| | | | | | | | | | | |
| 1368.0 | 102.1 | 102,100 | 102,100 | 0 | 102,100 | 0.0 | 0.0000 | 0 | 0 | 0.00 |
| 1370.0 | 219.6 | 219,600 | 321,700 | 149,737 | 471,437 | 2.0 | 0.6667 | 314,291 | 314,291 | 7.22 |
| 1372.0 | 238.2 | 238,200 | 457,800 | 228,711 | 686,511 | 2.0 | 0.6667 | 457,674 | 771,965 | 17.72 |
| 1374.0 | 253.5 | 253,500 | 491,700 | 245,731 | 737,431 | 2.0 | 0.6667 | 491,621 | 1,263,586 | 29.01 |
| 1376.0 | 272.2 | 272,200 | 525,700 | 262,684 | 788,384 | 2.0 | 0.6667 | 525,589 | 1,789,175 | 41.07 |
| 1378.0 | 291.1 | 291,100 | 563,300 | 281,491 | 844,791 | 2.0 | 0.6667 | 563,194 | 2,352,369 | 54.00 |
| 1380.0 | 310.0 | 310,000 | 601,100 | 300,401 | 901,501 | 2.0 | 0.6667 | 601,001 | 2,953,370 | 67.80 |

Sub-basin
Q (100yr, 6 hr) = cfs (Kaminski-Hubbard)

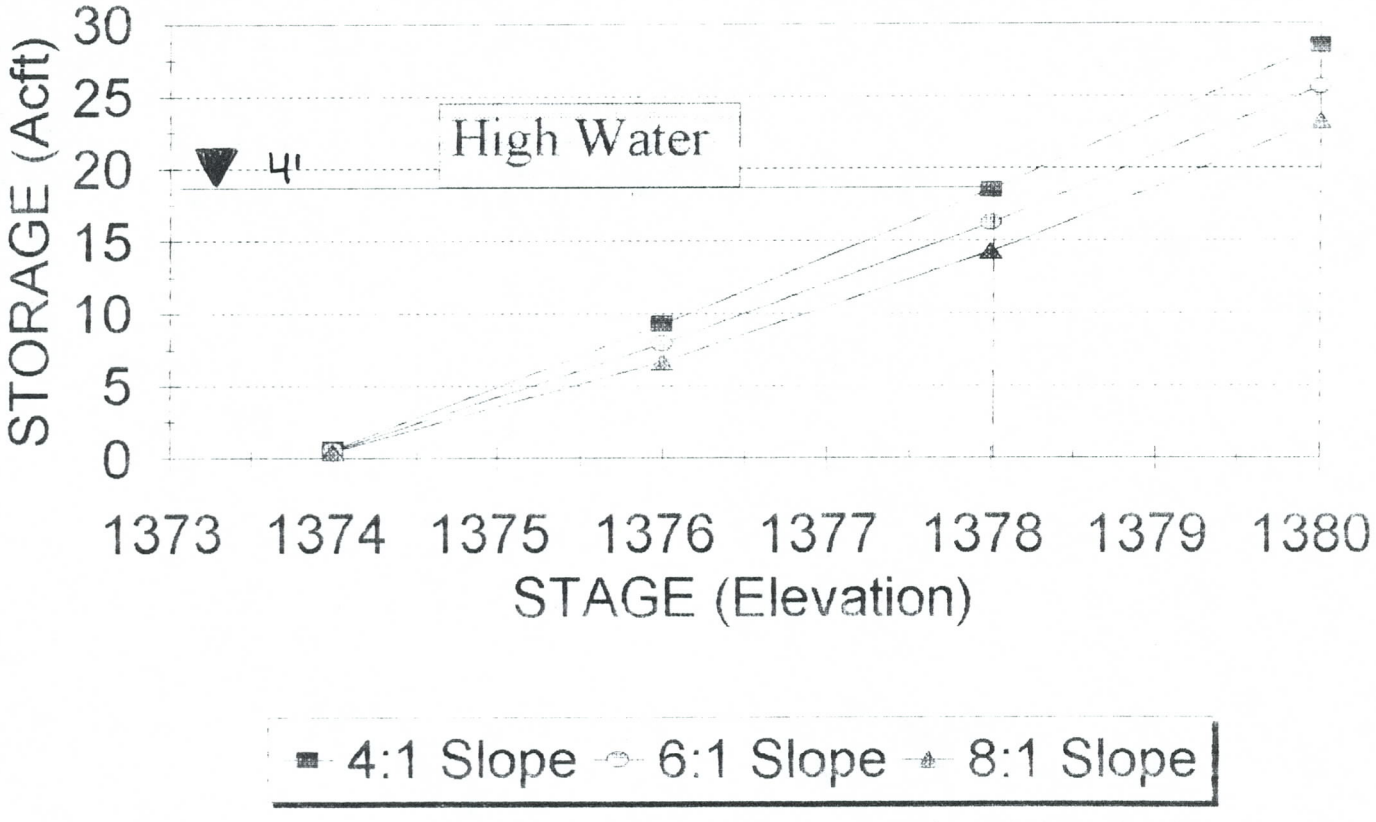
## DETENTION POND #1A revision

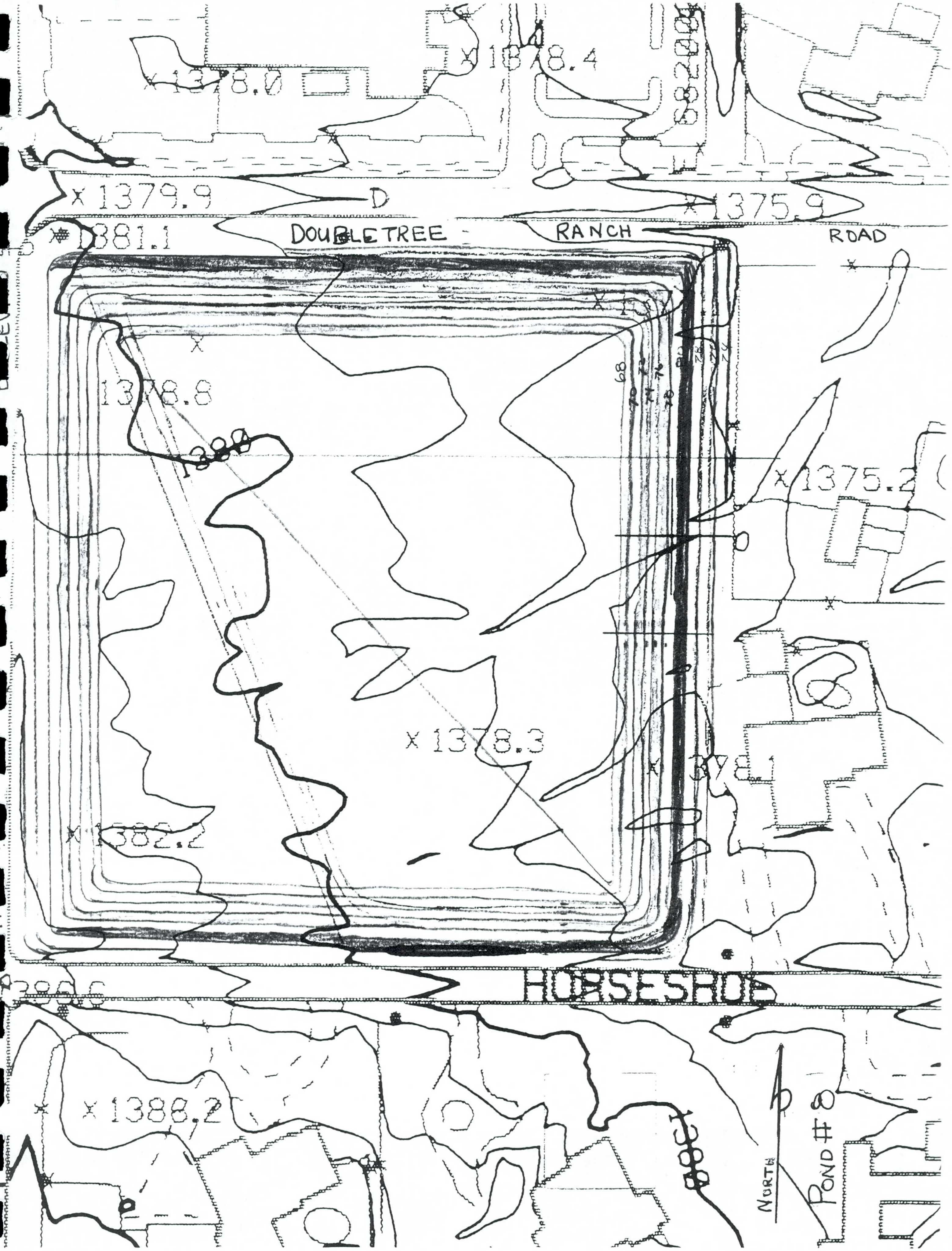
| 1 Contour Elev (ft) | 2 Plainmeter Reading | 3 Area (ft^2) | 4 A1+A2 (ft^2) | 5 (A1*A2)^. (ft^2) | 6 4 + 5 (ft^2) | 7 h (ft) | 8 h/3 (ft) | 9 =8*6 Volume (ft^3) | 10 Sum Volume (ft^3) | 11 Sum Volume (Acft) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| | | | | | | | | | | |
| 1478.0 | 0.8 | 800 | 800 | 0 | 800 | 0.0 | 0.0000 | 0 | 0 | 0.00 |
| 1480.0 | 2.5 | 2,500 | 3,300 | 1,414 | 4,714 | 2.0 | 0.6667 | 3,143 | 3,143 | 0.07 |
| 1482.0 | 5.2 | 5,200 | 7,700 | 3,606 | 11,306 | 2.0 | 0.6667 | 7,537 | 10,680 | 0.25 |
| 1484.0 | 9.0 | 9,000 | 14,200 | 6,841 | 21,041 | 2.0 | 0.6667 | 14,027 | 24,707 | 0.57 |
| 1486.0 | 13.0 | 13,000 | 22,000 | 10,817 | 32,817 | 2.0 | 0.6667 | 21,878 | 46,585 | 1.07 |
| 1488.0 | 18.4 | 18,400 | 31,400 | 15,466 | 46,866 | 2.0 | 0.6667 | 31,244 | 77,829 | 1.79 |
| 1490.0 | 23.8 | 23,800 | 42,200 | 20,927 | 63,127 | 2.0 | 0.6667 | 42,084 | 119,913 | 2.75 |

Sub-basin
Q (100yr, 6 hr) = cfs (Kaminski-Hubbard)

# Doubletree Ranch Road

## Stage Storage Pond #8




x 1379.9
D
x 1375.9
DOUBLETREE
RANCH
ROAD
x 1375.2
x 1378.3
HORSESHOE
x 1388.2
NORTH
POND #8

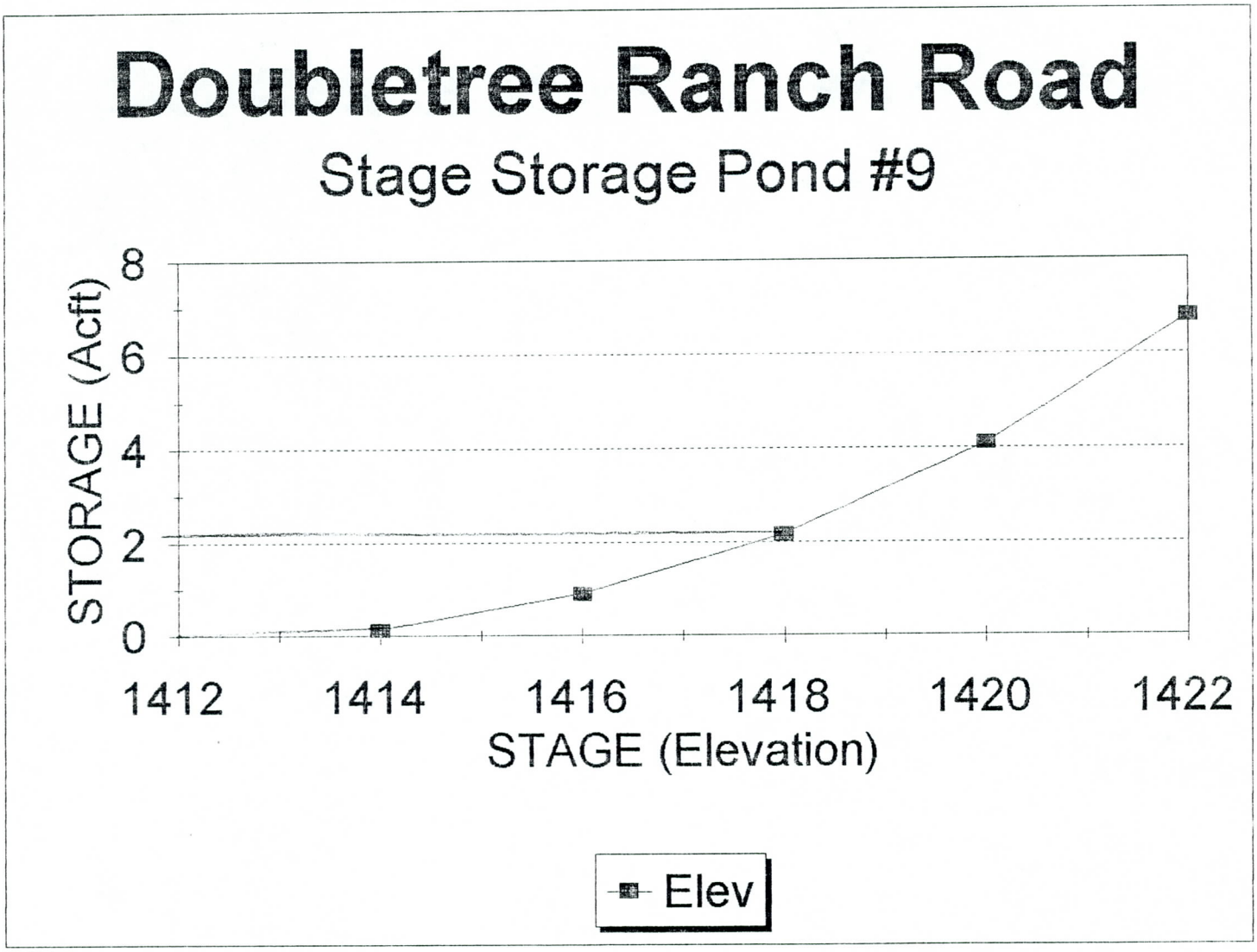
# DOUBLETREE RANCH ROAD
# STAGE STORAGE CALCULATIONS
## DETENTION POND #9

| 1 Contour Elev (ft) | 2 Plainmeter Reading | 3 Area (ft^2) | 4 A1+A2 (ft^2) | 5 (A1*A2)^.5 (ft^2) | 6 4 + 5 (ft^2) | 7 h (ft) | 8 h/3 (ft) | 9 =8*6 Volume (ft^3) | 10 Sum Volume (ft^3) | 11 Sum Volume (Acft) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| 1412.5 | 0 | 0 | | | | | | | | |
| 1414.0 | 11.6 | 11,485 | 11,485 | 0 | 11,485 | 1.5 | 0.5000 | 5,743 | 5,743 | 0.13 |
| 1416.0 | 22.8 | 22,574 | 34,059 | 16,102 | 50,161 | 2.0 | 0.6667 | 33,441 | 39,183 | 0.90 |
| 1418.0 | 33.2 | 32,871 | 55,446 | 27,241 | 82,686 | 2.0 | 0.6667 | 55,124 | 94,307 | 2.17 |
| 1420.0 | 52.8 | 52,277 | 85,149 | 41,454 | 126,602 | 2.0 | 0.6667 | 84,402 | 178,709 | 4.10 |
| 1422.0 | 65.7 | 65,050 | 117,327 | 58,315 | 175,641 | 2.0 | 0.6667 | 117,094 | 295,803 | 6.79 |

Sub-basin 250
Q (100yr, 6 hr) = 105 cfs (Kaminski-Hubbard)

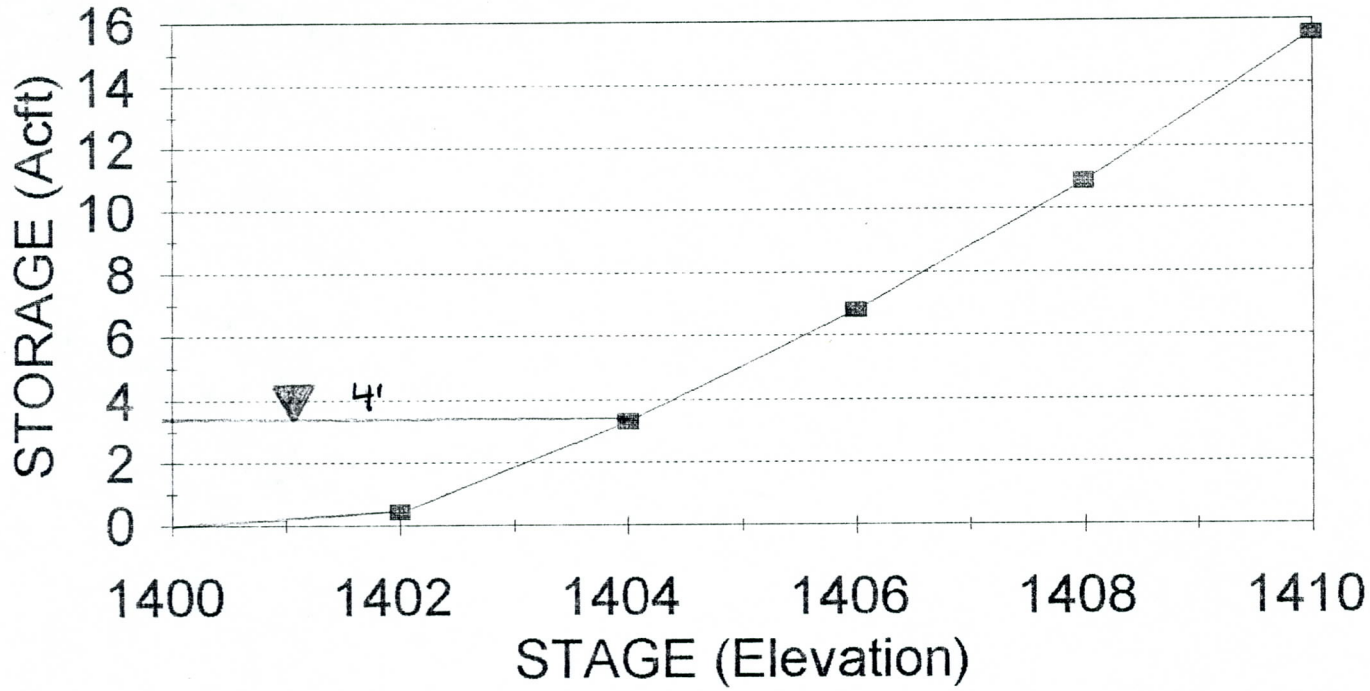
## DETENTION POND #10

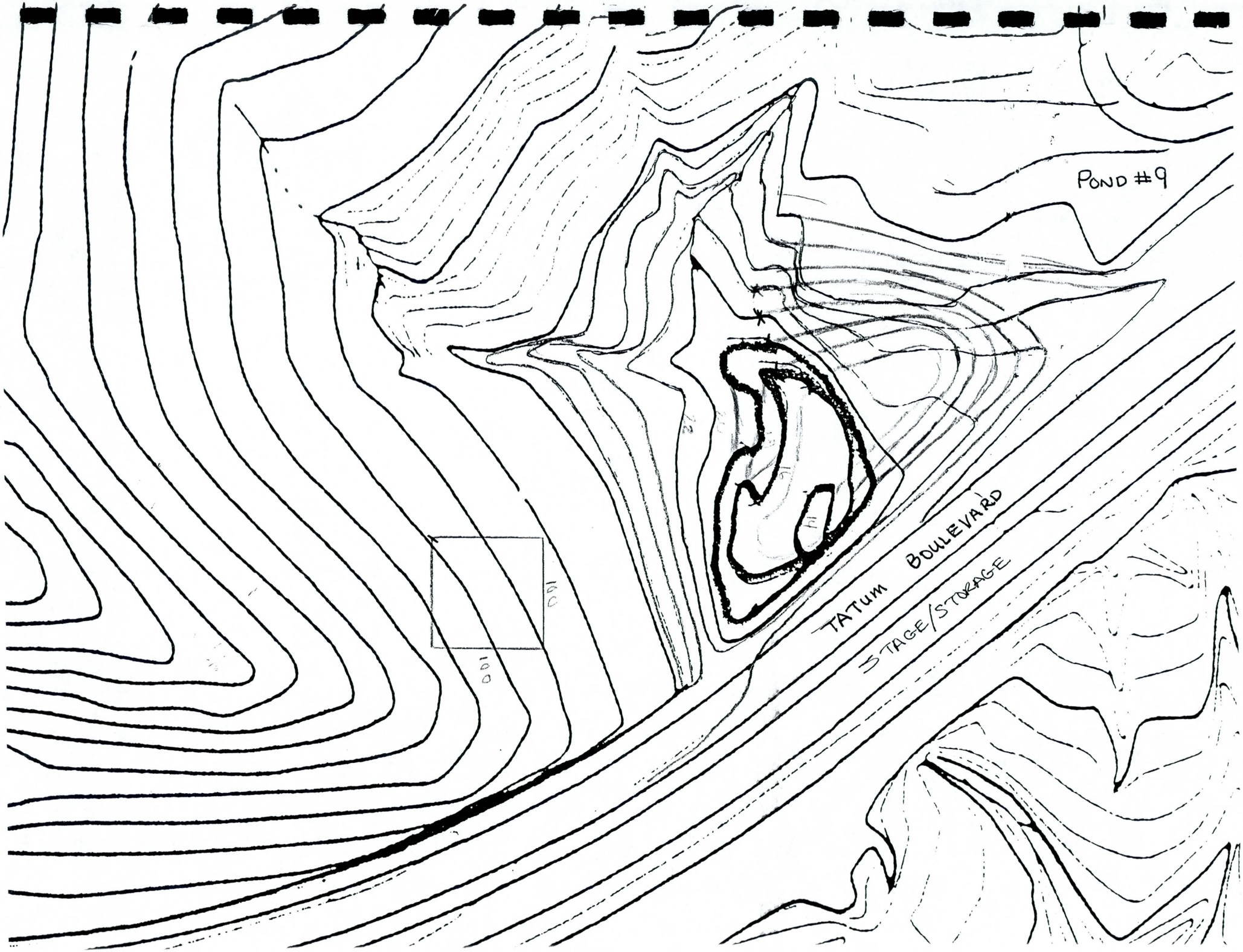
| 1 Contour Elev (ft) | 2 Plainmeter Reading | 3 Area (ft^2) | 4 A1+A2 (ft^2) | 5 (A1*A2)^.5 (ft^2) | 6 4 + 5 (ft^2) | 7 h (ft) | 8 h/3 (ft) | 9 =8*6 Volume (ft^3) | 10 Sum Volume (ft^3) | 11 Sum Volume (Acft) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| 1401.0 | 0 | 0 | 0 | | | | | | | |
| 1402.0 | 56.1 | 55,545 | 55,545 | 0 | 55,545 | 1.0 | 0.3333 | 18,515 | 18,515 | 0.43 |
| 1404.0 | 70.2 | 69,505 | 125,050 | 62,134 | 187,183 | 2.0 | 0.6667 | 124,789 | 143,304 | 3.29 |
| 1406.0 | 84.4 | 83,564 | 153,069 | 76,211 | 229,280 | 2.0 | 0.6667 | 152,854 | 296,157 | 6.80 |
| 1408.0 | 95 | 94,059 | 177,624 | 88,657 | 266,280 | 2.0 | 0.6667 | 177,520 | 473,678 | 10.87 |
| 1410.0 | 112.5 | 111,386 | 205,446 | 102,357 | 307,802 | 2.0 | 0.6667 | 205,202 | 678,879 | 15.58 |

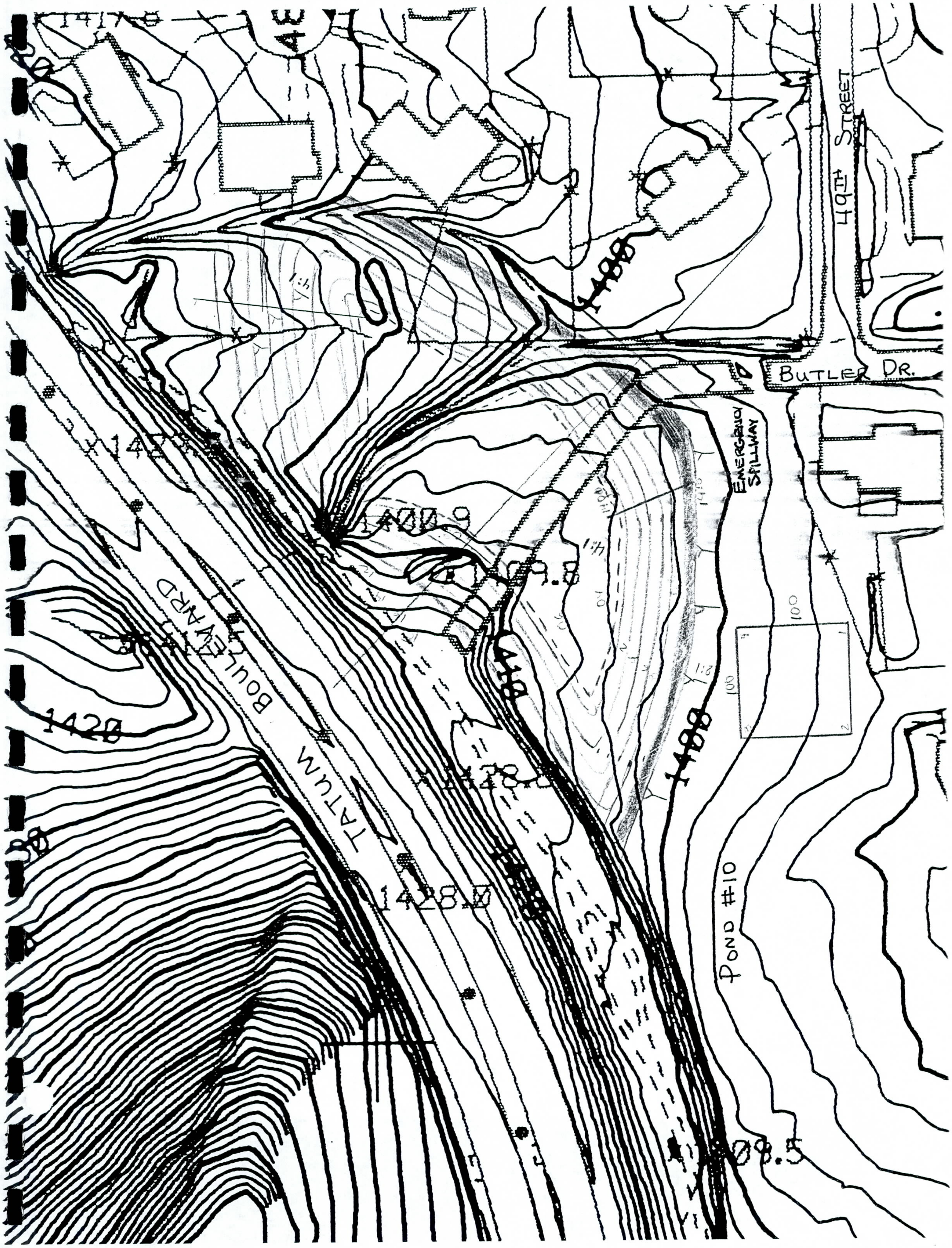

Doubletree Ranch Road
Stage Storage Pond #9
STORAGE (Acft)
0
2
4
6
8
1412
1414
1416
1418
1420
1422
STAGE (Elevation)
Elev

# Doubletree Ranch Road

## Stage Storage Pond #10




POND #9
TATUM BOULEVARD
STAGE/STORAGE

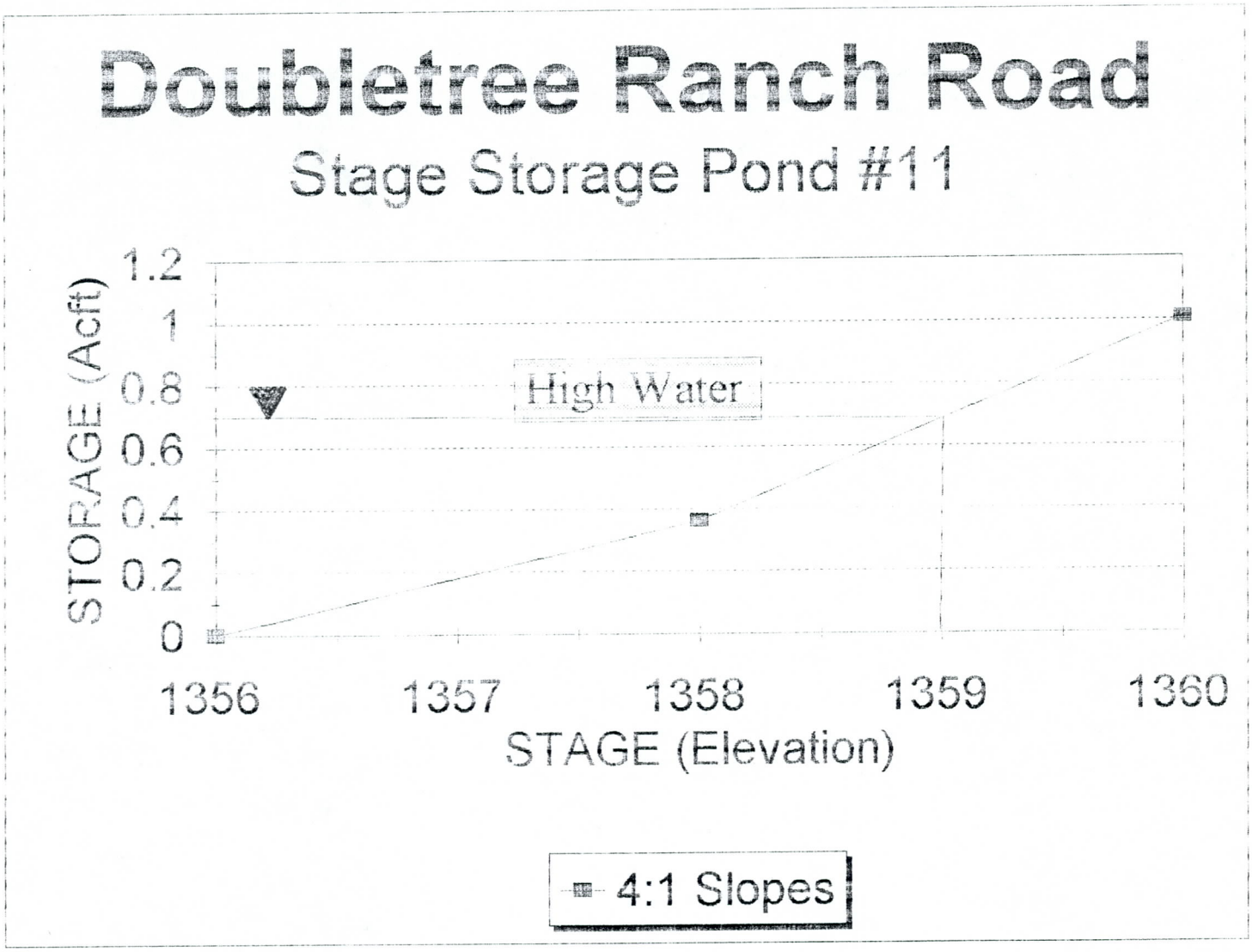

49th STREET
BUTLER DR.
EMERGENCY SPILLWAY
TATUM BOULEVARD
POND #10
1400.9
1428.0
1420
1400

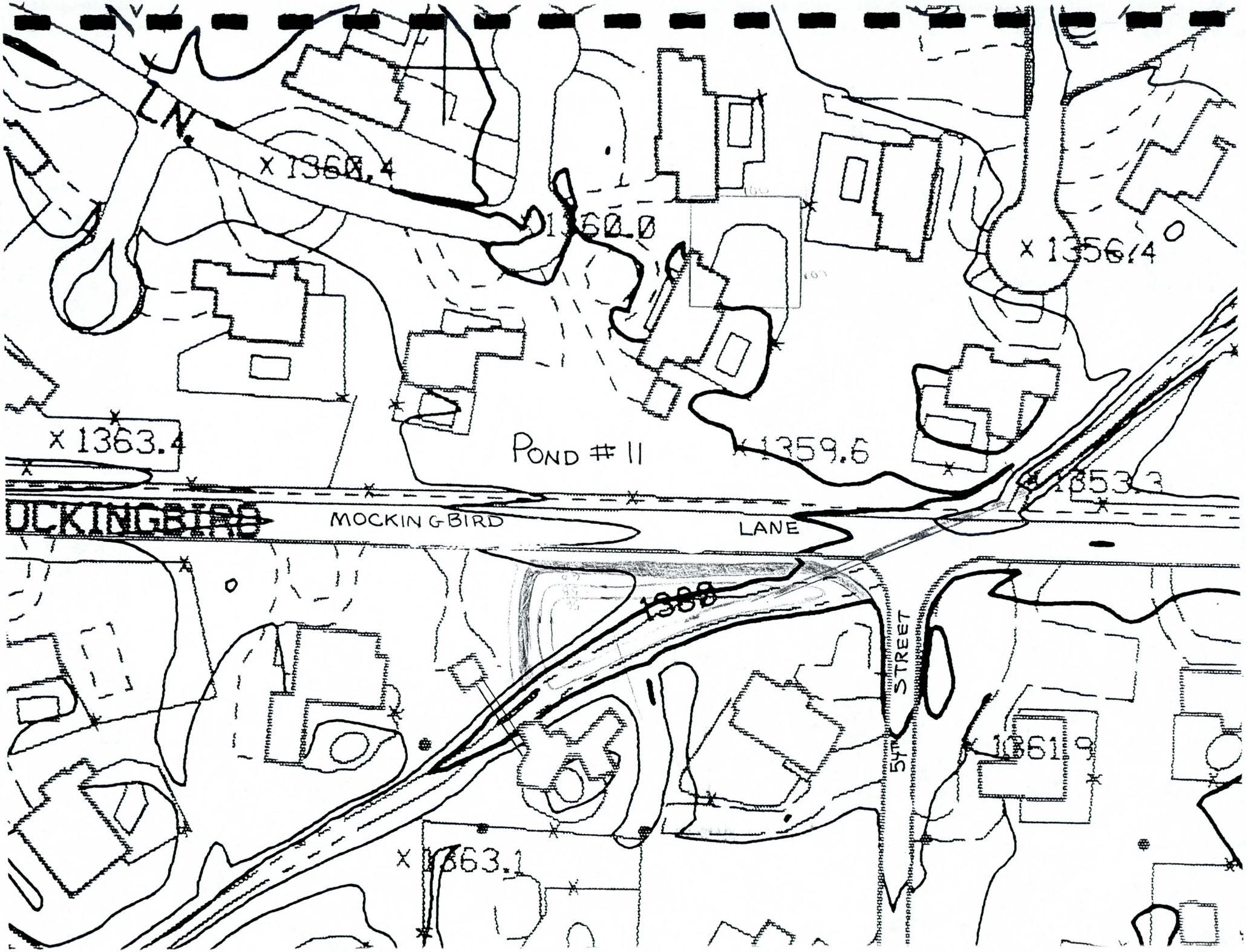
# DOUBLETREE RANCH ROAD
# STAGE STORAGE CALCULATIONS
# DETENTION POND #11
## 4:1 SLOPES

| 1<br>Contour Elev<br>(ft) | 2<br>Plainmeter Reading | 3<br>Area<br>(ft^2) | 4<br>A1+A2<br>(ft^2) | 5<br>(A1*A2)^.5<br>(ft^2) | 6<br>4 + 5<br>(ft^2) | 7<br>h<br>(ft) | 8<br>h/3<br>(ft) | 9<br>= 8 * 6<br>Volume<br>(ft^3) | 10<br>Sum Volume<br>(ft^3) | 11<br>Sum Volume<br>(Acft) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| 1356.0 | 5.5 | 5,446 | 0 | | | | | | | |
| 1358.0 | 10.8 | 10,693 | 16,139 | 7,631 | 23,769 | 2.0 | 0.6667 | 15,846 | 15,846 | 0.36 |
| 1360.0 | 17.8 | 17,624 | 28,317 | 13,728 | 42,045 | 2.0 | 0.6667 | 28,030 | 43,876 | 1.01 |
| 0.0 | 0.0 | 0 | 0 | 0 | 0 | 0.0 | 0.0000 | 0 | 0 | 0.00 |
| 0.0 | 0.0 | 0 | 0 | 0 | 0 | 0.0 | 0.0000 | 0 | 0 | 0.00 |

# Doubletree Ranch Road

## Stage Storage Pond #11




N.
x 1360.4
1360.0
x 1356.4
x 1363.4
POND #11
x 1359.6
MOCKINGBIRD LANE
1360
54th STREET
1361
x 1363.1

# DOUBLETREE RANCH ROAD
# STAGE STORAGE CALCULATIONS
# DETENTION POND #12
## 4:1 SLOPES

| 1<br>Contour Elev<br>(ft) | 2<br>Plainmeter Reading | 3<br>Area<br>(ft^2) | 4<br>A1+A2<br>(ft^2) | 5<br>(A1*A2)^.5<br>(ft^2) | 6<br>4 + 5<br>(ft^2) | 7<br>h<br>(ft) | 8<br>h/3<br>(ft) | 9<br>= 8 * 6<br>Volume<br>(ft^3) | 10<br>Sum Volume<br>(ft^3) | 11<br>Sum Volume<br>(Acft) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| 1380.0 | 0.0 | 0 | 0 | | | | | | | 0 |
| 1382.0 | 12.2 | 12,079 | 12,079 | 0 | 12,079 | 2.0 | 0.6667 | 8,053 | 8,053 | 0.18 |
| 1384.0 | 18.1 | 17,921 | 30,000 | 14,713 | 44,713 | 2.0 | 0.6667 | 29,809 | 37,861 | 0.87 |
| 1386.0 | 26.0 | 25,743 | 43,663 | 21,479 | 65,142 | 2.0 | 0.6667 | 43,428 | 81,289 | 1.87 |
| 1388.0 | 35.2 | 34,851 | 60,594 | 29,953 | 90,547 | 2.0 | 0.6667 | 60,365 | 141,654 | 3.25 |

# DOUBLETREE RANCH ROAD
# STAGE STORAGE CALCULATIONS
# DETENTION POND #13
## 4:1 SLOPES

| 1<br>Contour Elev<br>(ft) | 2<br>Plainmeter Reading | 3<br>Area<br>(ft^2) | 4<br>A1+A2<br>(ft^2) | 5<br>(A1*A2)^.5<br>(ft^2) | 6<br>4 + 5<br>(ft^2) | 7<br>h<br>(ft) | 8<br>h/3<br>(ft) | 9<br>= 8 * 6<br>Volume<br>(ft^3) | 10<br>Sum Volume<br>(ft^3) | 11<br>Sum Volume<br>(Acft) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| 1370.0 | 0.0 | 0 | 0 | | | | | | | 0 |
| 1372.0 | 29.9 | 29,604 | 29,604 | 0 | 29,604 | 2.0 | 0.6667 | 19,736 | 19,736 | 0.45 |
| 1374.0 | 36.9 | 36,535 | 66,139 | 32,887 | 99,026 | 2.0 | 0.6667 | 66,017 | 85,753 | 1.97 |
| 1376.0 | 45.4 | 44,950 | 81,485 | 40,525 | 122,010 | 2.0 | 0.6667 | 81,340 | 167,093 | 3.84 |
| 1378.0 | 52.9 | 52,376 | 97,327 | 48,522 | 145,848 | 2.0 | 0.6667 | 97,232 | 264,325 | 6.07 |
| 1380.0 | 61.9 | 61,287 | 113,663 | 56,657 | 170,320 | 2.0 | 0.6667 | 113,547 | 377,872 | 8.67 |

# DOUBLETREE RANCH ROAD
# STAGE STORAGE CALCULATIONS
## DETENTION POND #12 revision

| 1 Contour Elev (ft) | 2 Plainmete Reading | 3 Area (ft^2) | 4 A1+A2 (ft^2) | 5 (A1*A2)^. (ft^2) | 6 4 + 5 (ft^2) | 7 h (ft) | 8 h/3 (ft) | 9 =8*6 Volume (ft^3) | 10 Sum Volume (ft^3) | 11 Sum Volume (Acft) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| | | | | | | | | | | |
| 1380.0 | 13.6 | 13,600 | 13,600 | 0 | 13,600 | 0.0 | 0.0000 | 0 | 0 | 0.00 |
| 1382.0 | 19.6 | 19,600 | 33,200 | 16,327 | 49,527 | 2.0 | 0.6667 | 33,018 | 33,018 | 0.76 |
| 1384.0 | 25.3 | 25,300 | 44,900 | 22,268 | 67,168 | 2.0 | 0.6667 | 44,779 | 77,797 | 1.79 |
| 1386.0 | 32.9 | 32,900 | 58,200 | 28,851 | 87,051 | 2.0 | 0.6667 | 58,034 | 135,831 | 3.12 |
| 1388.0 | 40.3 | 40,300 | 73,200 | 36,412 | 109,612 | 2.0 | 0.6667 | 73,075 | 208,906 | 4.80 |
| 1390.0 | 48.0 | 48,000 | 88,300 | 43,982 | 132,282 | 2.0 | 0.6667 | 88,188 | 297,093 | 6.82 |

Sub-basin
Q (100yr, 6 hr) = cfs (Kaminski-Hubbard)

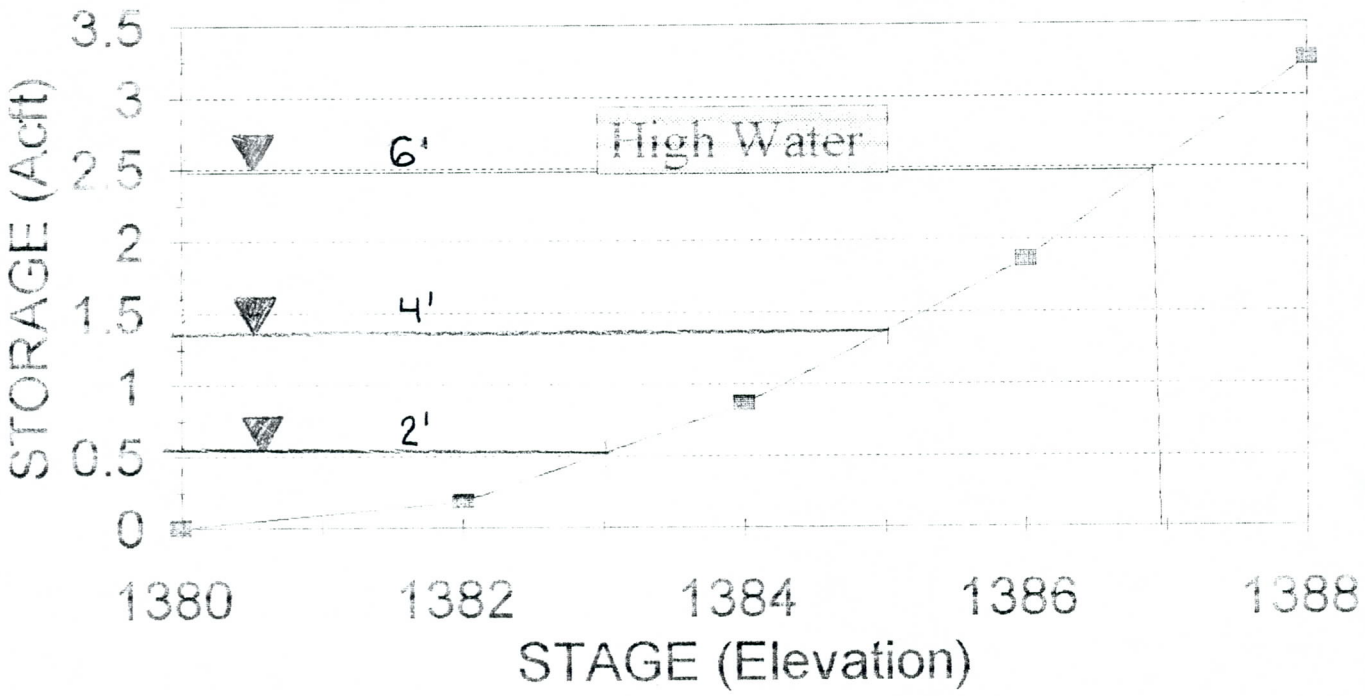
## DETENTION POND #13 revision

| 1 Contour Elev (ft) | 2 Plainmete Reading | 3 Area (ft^2) | 4 A1+A2 (ft^2) | 5 (A1*A2)^. (ft^2) | 6 4 + 5 (ft^2) | 7 h (ft) | 8 h/3 (ft) | 9 =8*6 Volume (ft^3) | 10 Sum Volume (ft^3) | 11 Sum Volume (Acft) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| | | | | | | | | | | |
| 1370.0 | 49.4 | 49,400 | 49,400 | 0 | 49,400 | 0.0 | 0.0000 | 0 | 0 | 0.00 |
| 1372.0 | 61.5 | 61,500 | 110,900 | 55,119 | 166,019 | 2.0 | 0.6667 | 110,679 | 110,679 | 2.54 |
| 1374.0 | 73.0 | 73,000 | 134,500 | 67,004 | 201,504 | 2.0 | 0.6667 | 134,336 | 245,015 | 5.62 |
| 1376.0 | 86.2 | 86,200 | 159,200 | 79,326 | 238,526 | 2.0 | 0.6667 | 159,017 | 404,032 | 9.28 |
| 1378.0 | 97.7 | 97,700 | 183,900 | 91,770 | 275,670 | 2.0 | 0.6667 | 183,780 | 587,812 | 13.49 |
| 1380.0 | 101.0 | 101,000 | 198,700 | 99,336 | 298,036 | 2.0 | 0.6667 | 198,691 | 786,503 | 18.06 |

Sub-basin
Q (100yr, 6 hr) = cfs (Kaminski-Hubbard)

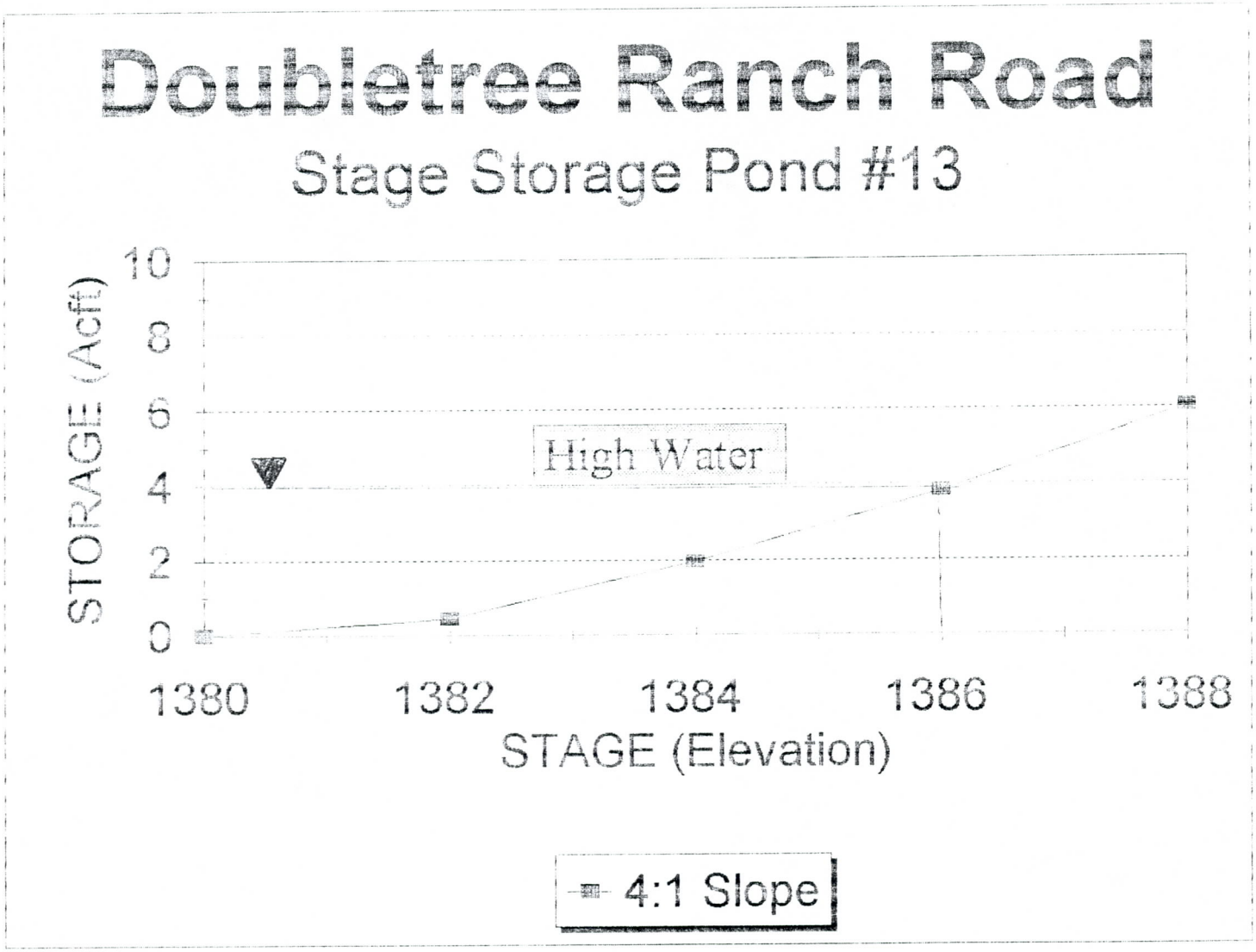
# Doubletree Ranch Road

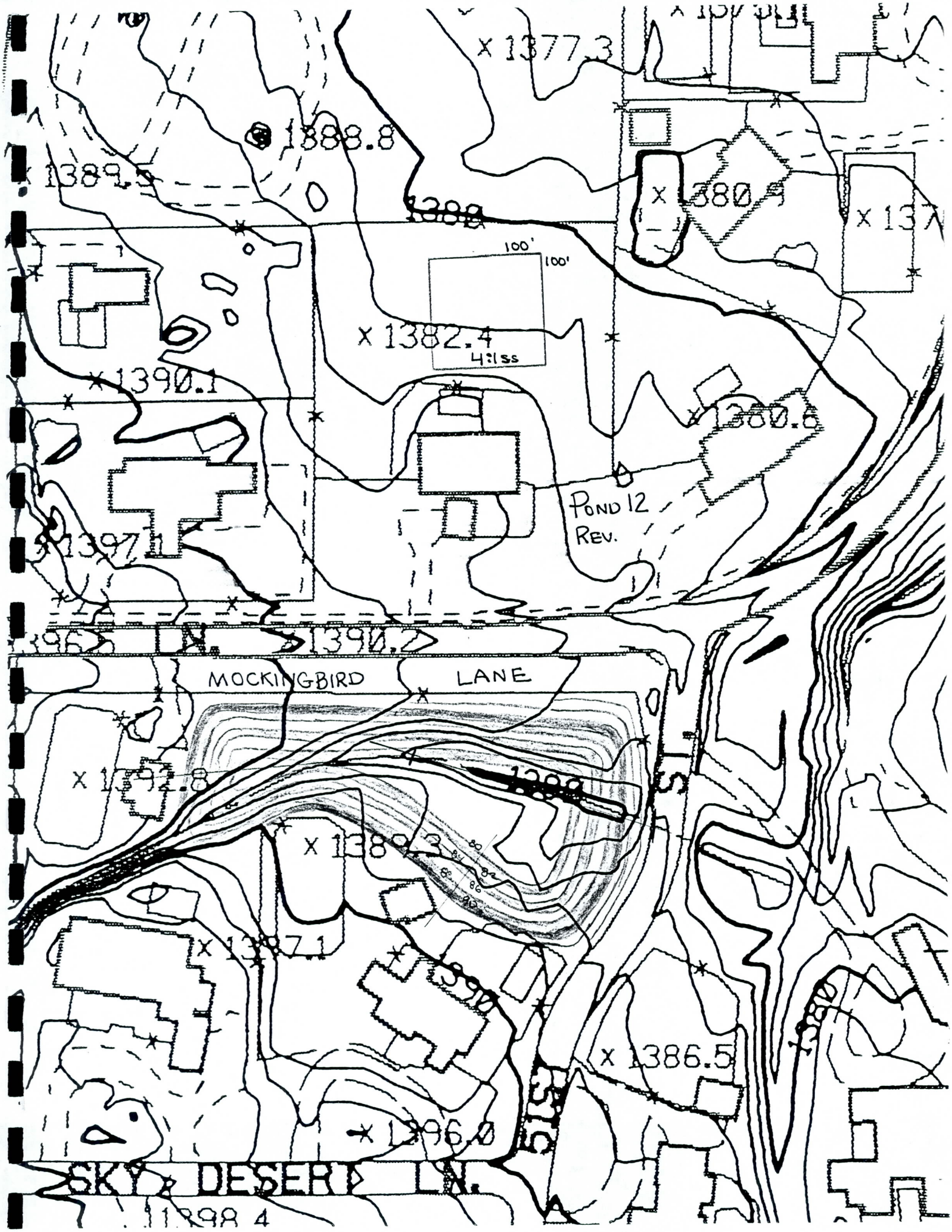
## Stage Storage Pond 12

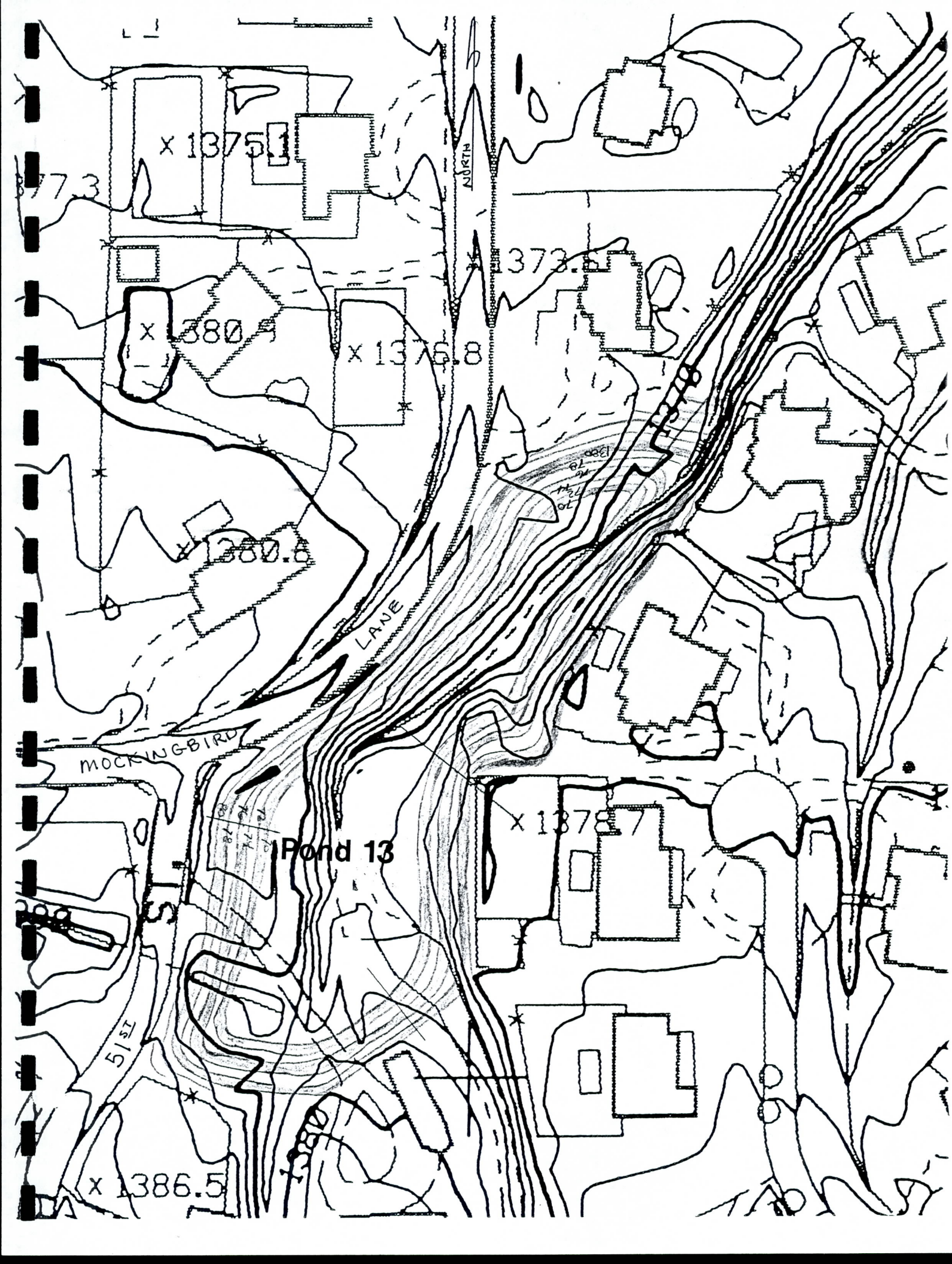


# Doubletree Ranch Road

## Stage Storage Pond #13




x 1377.3
1388.8
x 1389.5
x 1380.9
100'
100'
x 1382.4
4:1 ss
x 1390.1
x 1380.6
POND 12
REV.
x 1397.1
1390.2
MOCKINGBIRD LANE
x 1392.8
1390
x 1380.3
x 1387.1
1390
x 1386.5
x 1396.0
SKY DESERT LN.
1398.4


X 1375.1
NORTH
X 1373.6
X 1380.9
X 1376.8
X 1380.6
LANE
MOCKINGBIRD
Pond 13
X 1387.7
51ST
X 1386.5

# DOUBLETREE RANCH ROAD
# STAGE STORAGE CALCULATIONS
# DETENTION POND #14
## 4:1 SLOPES

| 1<br>Contour Elev.<br>(ft) | 2<br>Plainmeter Reading | 3<br>Area<br>(ft^2) | 4<br>A1+A2<br>(ft^2) | 5<br>(A1*A2)^.5<br>(ft^2) | 6<br>4 + 5<br>(ft^2) | 7<br>h<br>(ft) | 8<br>h/3<br>(ft) | 9<br>= 8 * 6<br>Volume<br>(ft^3) | 10<br>Sum Volume<br>(ft^3) | 11<br>Sum Volume<br>(Acft) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| 1440.0 | 7.9 | 7,822 | 0 | | | | | | | 0 |
| 1442.0 | 11.9 | 11,782 | 19,604 | 9,800 | 29,204 | 2.0 | 0.6667 | 19,469 | 19,469 | 0.45 |
| 1444.0 | 15.9 | 15,743 | 27,525 | 13,619 | 41,144 | 2.0 | 0.6667 | 27,429 | 46,899 | 1.08 |
| 1446.0 | 19.9 | 19,703 | 35,446 | 17,612 | 53,057 | 2.0 | 0.6667 | 35,372 | 82,270 | 1.89 |
| 0.0 | 0.0 | 0 | 0 | 0 | 0 | 0.0 | 0.0000 | 0 | 0 | 0.00 |

# DOUBLETREE RANCH ROAD
# STAGE STORAGE CALCULATIONS
# DETENTION POND #15
## 4:1 SLOPES

| 1<br>Contour Elev.<br>(ft) | 2<br>Plainmeter Reading | 3<br>Area<br>(ft^2) | 4<br>A1+A2<br>(ft^2) | 5<br>(A1*A2)^.5<br>(ft^2) | 6<br>4 + 5<br>(ft^2) | 7<br>h<br>(ft) | 8<br>h/3<br>(ft) | 9<br>= 8 * 6<br>Volume<br>(ft^3) | 10<br>Sum Volume<br>(ft^3) | 11<br>Sum Volume<br>(Acft) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| 1410.0 | 57.8 | 57,228 | 0 | | | | | | | 0 |
| 1412.0 | 82.3 | 81,485 | 138,713 | 68,288 | 207,001 | 2.0 | 0.6667 | 138,000 | 138,000 | 3.17 |
| 1414.0 | 97.1 | 96,139 | 177,624 | 88,509 | 266,133 | 2.0 | 0.6667 | 177,422 | 315,422 | 7.24 |
| 0.0 | 0.0 | 0 | 0 | 0 | 0 | 0.0 | 0.0000 | 0 | 0 | 0.00 |
| 0.0 | 0.0 | 0 | 0 | 0 | 0 | 0.0 | 0.0000 | 0 | 0 | 0.00 |
| 0.0 | 0 | 0 | 0 | 0 | 0 | 0.0 | 0.0000 | 0 | 0 | 0.00 |

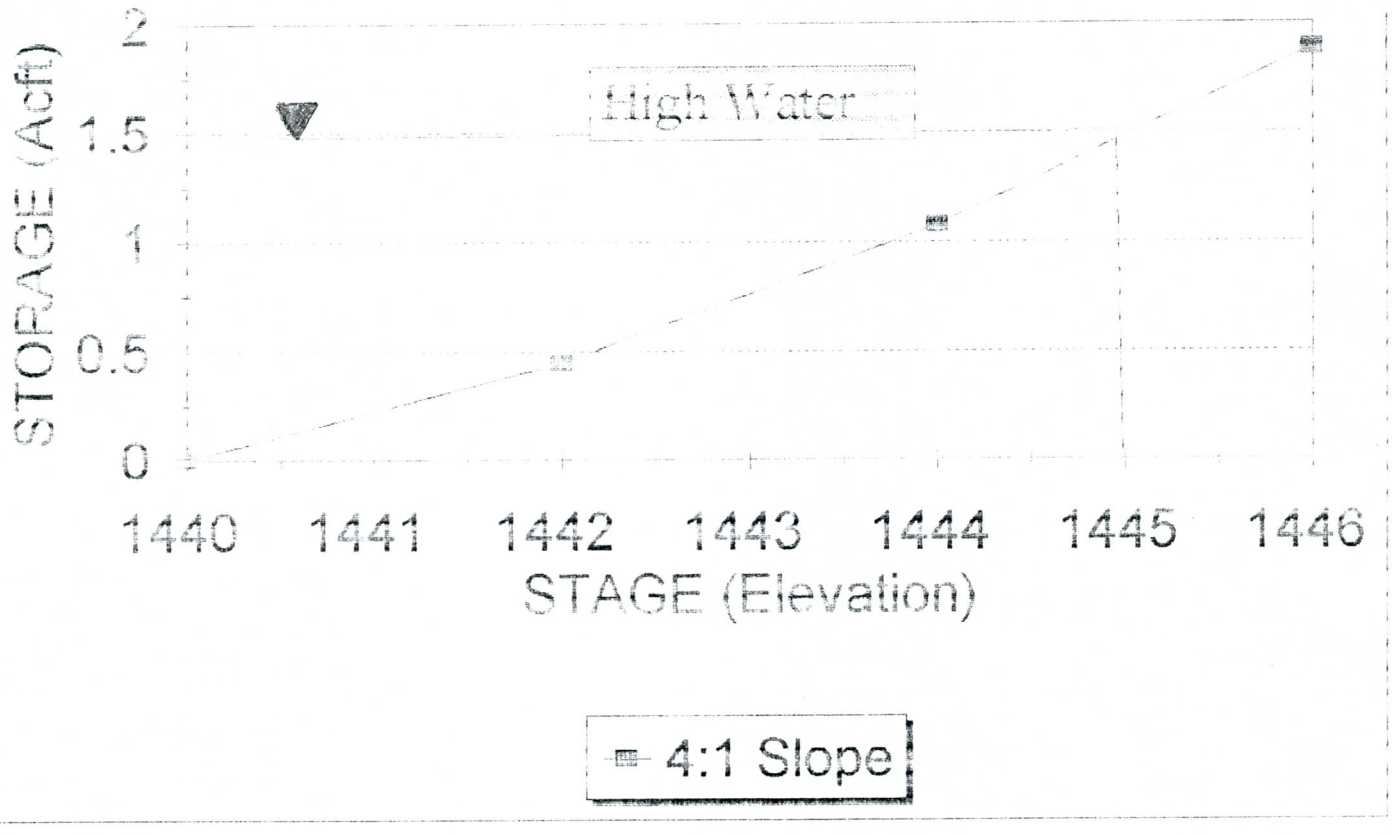
# DOUBLETREE RANCH ROAD
# STAGE STORAGE CALCULATIONS
## DETENTION POND #15 revision

| 1<br>Contour Elev (ft) | 2<br>Plainmete Reading | 3<br>Area (ft^2) | 4<br>A1+A2 (ft^2) | 5<br>(A1*A2)^. (ft^2) | 6<br>4 + 5 (ft^2) | 7<br>h (ft) | 8<br>h/3 (ft) | 9<br>=8*6 Volume (ft^3) | 10<br>Sum Volume (ft^3) | 11<br>Sum Volume (Acft) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| | | | | | | | | | | |
| 1406.0 | 42.5 | 42,500 | 42,500 | 0 | 42,500 | 0.0 | 0.0000 | 0 | 0 | 0.00 |
| 1408.0 | 68.5 | 68,500 | 111,000 | 53,956 | 164,956 | 2.0 | 0.6667 | 109,971 | 109,971 | 2.52 |
| 1410.0 | 238.7 | 238,700 | 307,200 | 127,871 | 435,071 | 2.0 | 0.6667 | 290,047 | 400,018 | 9.18 |
| 1412.0 | 268.0 | 268,000 | 506,700 | 252,926 | 759,626 | 2.0 | 0.6667 | 506,417 | 906,435 | 20.81 |
| 1414.0 | 294.9 | 294,900 | 562,900 | 281,128 | 844,028 | 2.0 | 0.6667 | 562,686 | 1,469,121 | 33.73 |

Sub-basin
Q (100yr, 6 hr) = cfs (Kaminski-Hubbard)

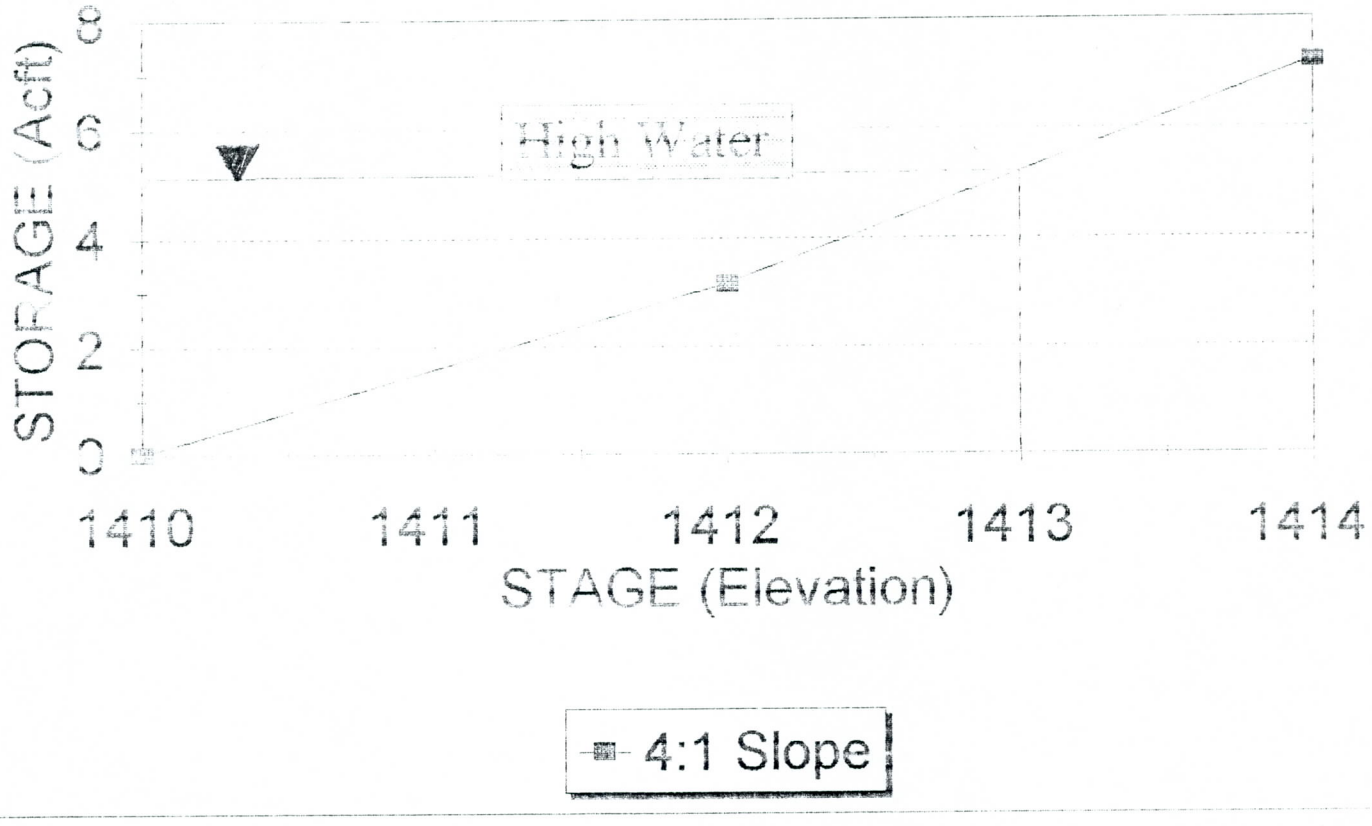
# Doubletree Ranch Road

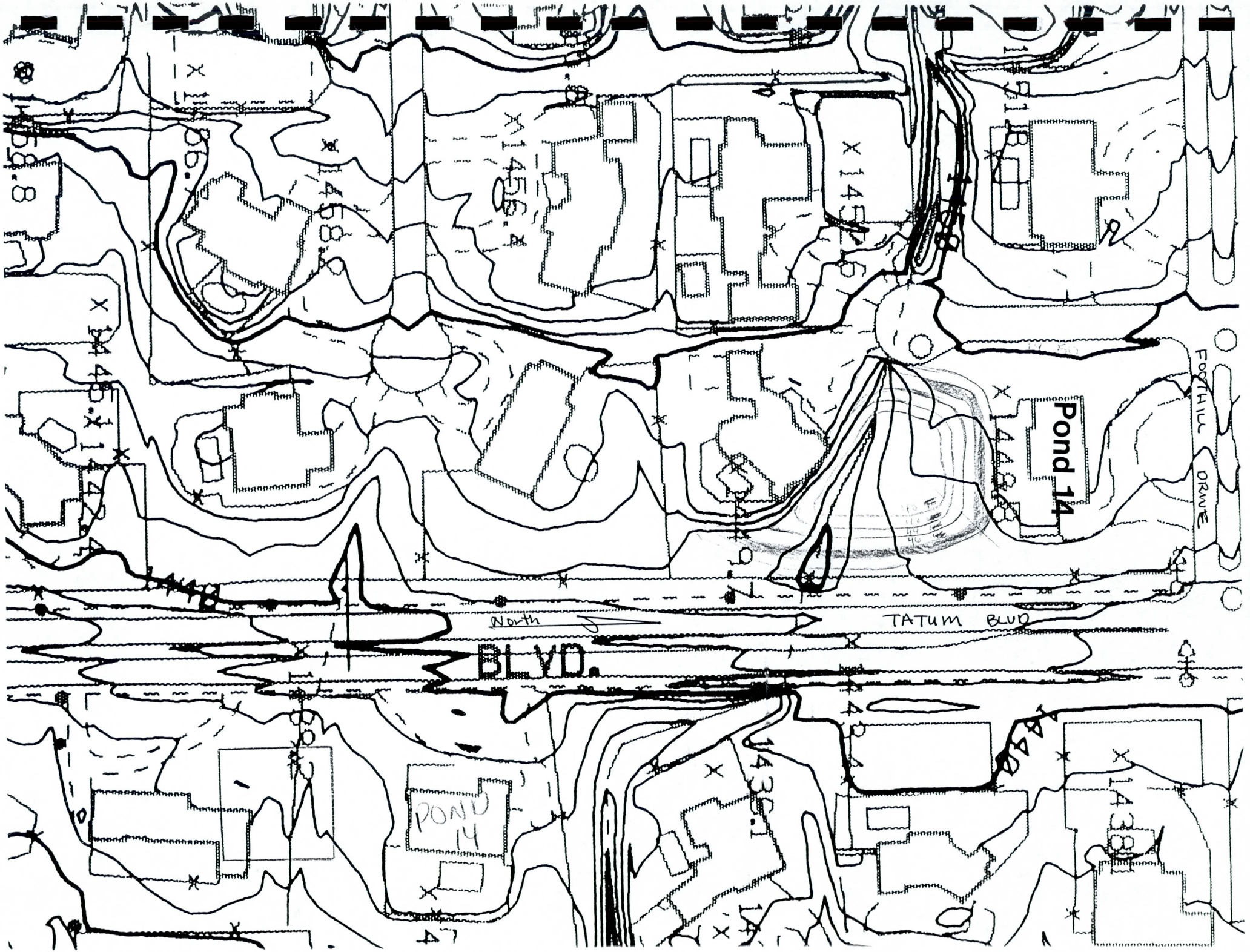
## Stage Storage Pond #14

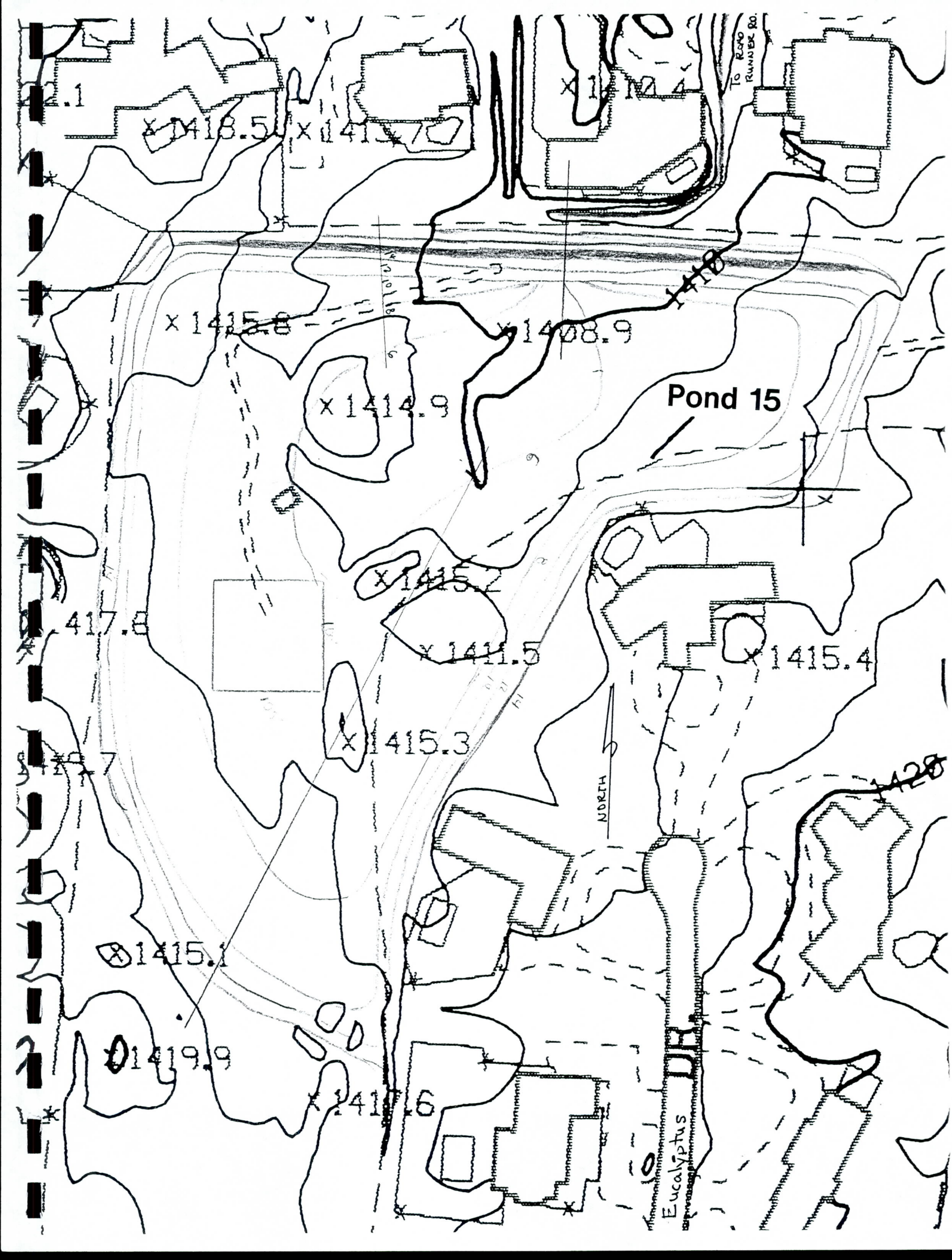


# Doubletree Ranch Road

## Stage Storage Pond #15




Pond 14
FOOTHILL DRIVE
North
TATUM BLVD
BLVD.
POND 14


Pond 15
NORTH
Eucalyptus

# DOUBLETREE RANCH ROAD
# STAGE STORAGE CALCULATIONS
# DETENTION POND #16

## 4:1 Slope, slope start behind property line, natural contour

| 1 Contour Elev (ft) | 2 Plainmete Reading | 3 Area (ft^2) | 4 A1+A2 (ft^2) | 5 (A1*A2)^. (ft^2) | 6 4 + 5 (ft^2) | 7 h (ft) | 8 h/3 (ft) | 9 = 8 * 6 Volume (ft^3) | 10 Sum Volume (ft^3) | 11 Sum Volume (Acft) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| 1380.0 | 44.8 | 44,356 | 0 | | | | | | | 0 |
| 1382.0 | 50.9 | 50,396 | 94,752 | 47,280 | 142,032 | 2.0 | 0.6667 | 94,688 | 94,688 | 2.17 |
| 1384.0 | 59.6 | 59,010 | 109,406 | 54,533 | 163,939 | 2.0 | 0.6667 | 109,293 | 203,981 | 4.68 |
| 1386.0 | 71.8 | 71,089 | 130,099 | 64,769 | 194,868 | 2.0 | 0.6667 | 129,912 | 333,893 | 7.67 |
| 1388.0 | 83.1 | 82,277 | 153,366 | 76,479 | 229,845 | 2.0 | 0.6667 | 153,230 | 487,123 | 11.18 |
| 1390.0 | 95.2 | 94,257 | 176,535 | 88,064 | 264,598 | 2.0 | 0.6667 | 176,399 | 663,522 | 15.23 |

## 4:1 Slope, top of berm, property line to Desert Jewel

| 1 Contour Elev (ft) | 2 Plainmete Reading | 3 Area (ft^2) | 4 A1+A2 (ft^2) | 5 (A1*A2)^. (ft^2) | 6 4 + 5 (ft^2) | 7 h (ft) | 8 h/3 (ft) | 9 = 8 * 6 Volume (ft^3) | 10 Sum Volume (ft^3) | 11 Sum Volume (Acft) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| 1380.0 | 71.2 | 70,495 | 0 | | | | | | | 0 |
| 1382.0 | 87.0 | 86,139 | 156,634 | 77,925 | 234,559 | 2.0 | 0.6667 | 156,373 | 156,373 | 3.59 |
| 1384.0 | 97.7 | 96,733 | 182,871 | 91,282 | 274,153 | 2.0 | 0.6667 | 182,769 | 339,142 | 7.79 |
| 1386.0 | 109.0 | 107,921 | 204,653 | 102,174 | 306,827 | 2.0 | 0.6667 | 204,551 | 543,693 | 12.48 |
| 1388.0 | 121.9 | 120,693 | 228,614 | 114,128 | 342,742 | 2.0 | 0.6667 | 228,495 | 772,188 | 17.73 |
| 1390.0 | 135.5 | 134,158 | 254,851 | 127,248 | 382,099 | 2.0 | 0.6667 | 254,733 | 1,026,921 | 23.57 |

## 4:1 Slope. start behind property line, Bk to Desert Jewel

| 1 Contour Elev (ft) | 2 Plainmete Reading | 3 Area (ft^2) | 4 A1+A2 (ft^2) | 5 (A1*A2)^. (ft^2) | 6 4 + 5 (ft^2) | 7 h (ft) | 8 h/3 (ft) | 9 = 8 * 6 Volume (ft^3) | 10 Sum Volume (ft^3) | 11 Sum Volume (Acft) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| 1380.0 | 57.6 | 57,030 | 0 | | | | | | | 0 |
| 1382.0 | 66.4 | 65,743 | 122,772 | 61,231 | 184,004 | 2.0 | 0.6667 | 122,669 | 122,669 | 2.82 |
| 1384.0 | 75.3 | 74,554 | 140,297 | 70,010 | 210,307 | 2.0 | 0.6667 | 140,205 | 262,874 | 6.03 |
| 1386.0 | 85.0 | 84,158 | 158,713 | 79,211 | 237,924 | 2.0 | 0.6667 | 158,616 | 421,490 | 9.68 |
| 1388.0 | 94.7 | 93,762 | 177,921 | 88,831 | 266,751 | 2.0 | 0.6667 | 177,834 | 599,324 | 13.76 |
| 1390.0 | 108.2 | 107,129 | 200,891 | 100,223 | 301,114 | 2.0 | 0.6667 | 200,743 | 800,067 | 18.37 |

# DOUBLETREE RANCH ROAD
# STAGE STORAGE CALCULATIONS
# DETENTION POND #16

## 4:1 Slope, slope start behind property line, natural contour

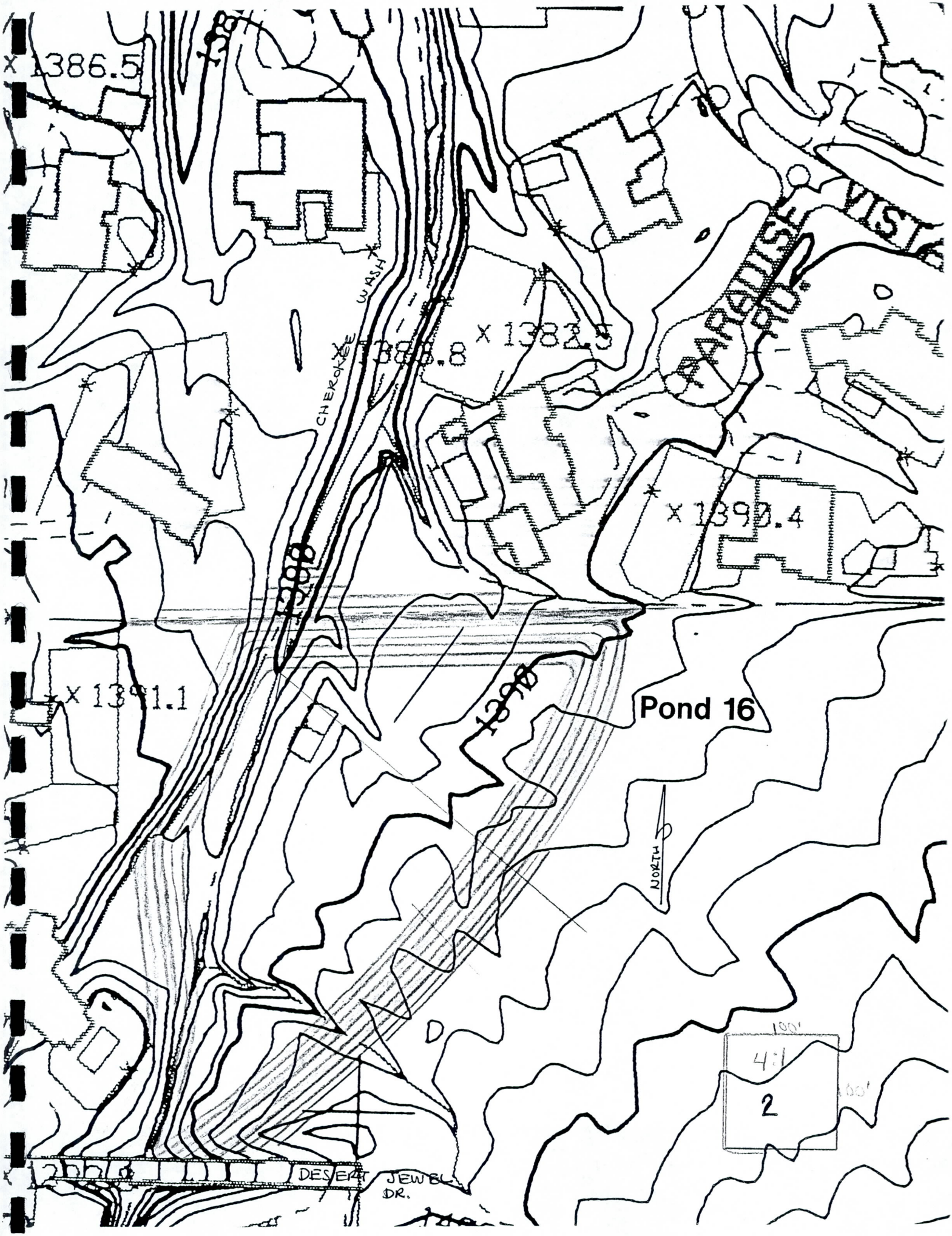
| 1 Contour Elev (ft) | 2 Plainmete Reading | 3 Area (ft^2) | 4 A1+A2 (ft^2) | 5 (A1*A2)^. (ft^2) | 6 4 + 5 (ft^2) | 7 h (ft) | 8 h/3 (ft) | 9 = 8 * 6 Volume (ft^3) | 10 Sum Volume (ft^3) | 11 Sum Volume (Acft) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| 1380.0 | 44.8 | 44,356 | 0 | | | | | | | 0 |
| 1382.0 | 50.9 | 50,396 | 94,752 | 47,280 | 142,032 | 2.0 | 0.6667 | 94,688 | 94,688 | 2.17 |
| 1384.0 | 59.6 | 59,010 | 109,406 | 54,533 | 163,939 | 2.0 | 0.6667 | 109,293 | 203,981 | 4.68 |
| 1386.0 | 71.8 | 71,089 | 130,099 | 64,769 | 194,868 | 2.0 | 0.6667 | 129,912 | 333,893 | 7.67 |
| 1388.0 | 83.1 | 82,277 | 153,366 | 76,479 | 229,845 | 2.0 | 0.6667 | 153,230 | 487,123 | 11.18 |
| 1390.0 | 95.2 | 94,257 | 176,535 | 88,064 | 264,598 | 2.0 | 0.6667 | 176,399 | 663,522 | 15.23 |

## 4:1 Slope, top of berm, property line to Desert Jewel

| 1 Contour Elev (ft) | 2 Plainmete Reading | 3 Area (ft^2) | 4 A1+A2 (ft^2) | 5 (A1*A2)^ (ft^2) | 6 4 + 5 (ft^2) | 7 h (ft) | 8 h/3 (ft) | 9 = 8 * 6 Volume (ft^3) | 10 Sum Volume (ft^3) | 11 Sum Volume (Acft) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| 1380.0 | 71.2 | 70,495 | 0 | | | | | | | 0 |
| 1382.0 | 87.0 | 86,139 | 156,634 | 77,925 | 234,559 | 2.0 | 0.6667 | 156,373 | 156,373 | 3.59 |
| 1384.0 | 97.7 | 96,733 | 182,871 | 91,282 | 274,153 | 2.0 | 0.6667 | 182,769 | 339,142 | 7.79 |
| 1386.0 | 109.0 | 107,921 | 204,653 | 102,174 | 306,827 | 2.0 | 0.6667 | 204,551 | 543,693 | 12.48 |
| 1388.0 | 121.9 | 120,693 | 228,614 | 114,128 | 342,742 | 2.0 | 0.6667 | 228,495 | 772,188 | 17.73 |
| 1390.0 | 135.5 | 134,158 | 254,851 | 127,248 | 382,099 | 2.0 | 0.6667 | 254,733 | 1,026,921 | 23.57 |

## 4:1 Slope. start behind property line, Bk to Desert Jewel

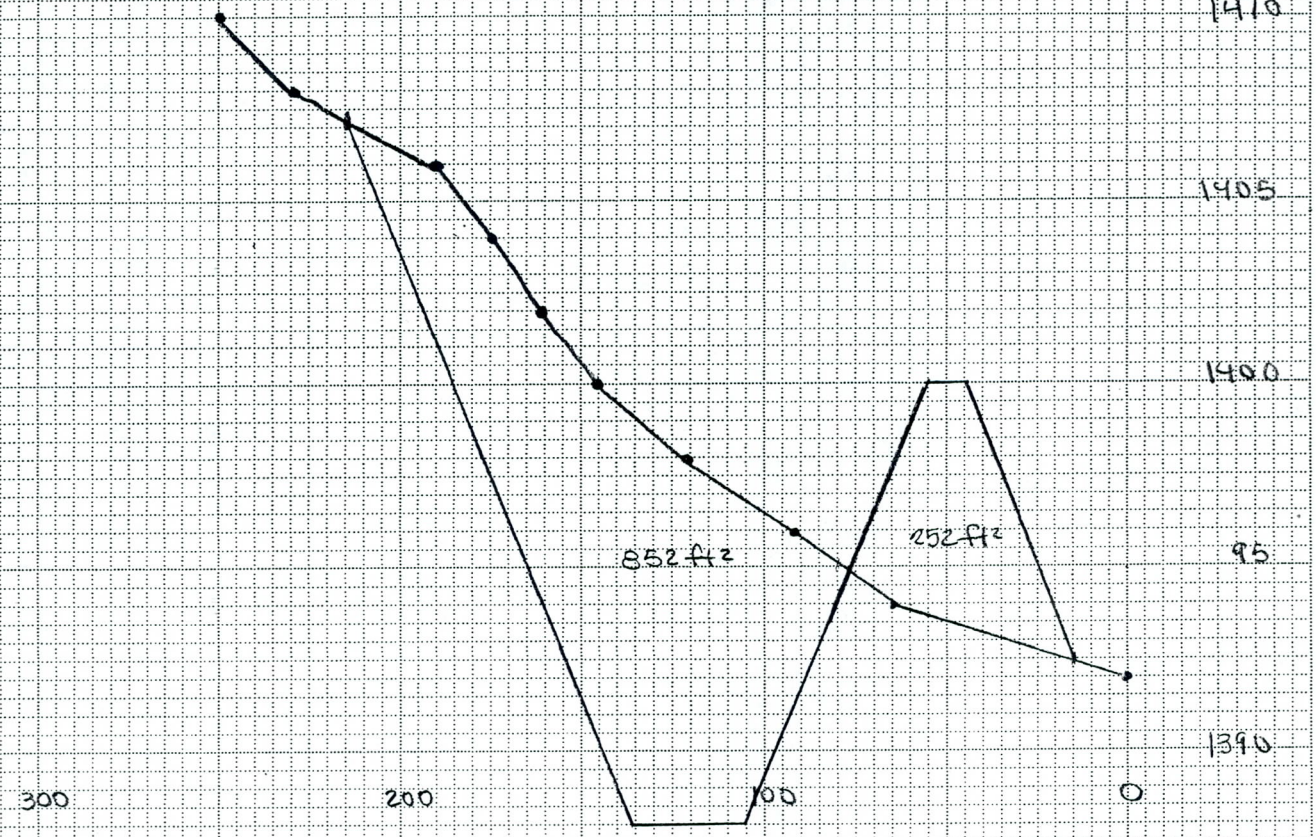
| 1 Contour Elev (ft) | 2 Plainmete Reading | 3 Area (ft^2) | 4 A1+A2 (ft^2) | 5 (A1*A2)^. (ft^2) | 6 4 + 5 (ft^2) | 7 h (ft) | 8 h/3 (ft) | 9 = 8 * 6 Volume (ft^3) | 10 Sum Volume (ft^3) | 11 Sum Volume (Acft) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| 1380.0 | 57.6 | 57,030 | 0 | | | | | | | 0 |
| 1382.0 | 66.4 | 65,743 | 122,772 | 61,231 | 184,004 | 2.0 | 0.6667 | 122,669 | 122,669 | 2.82 |
| 1384.0 | 75.3 | 74,554 | 140,297 | 70,010 | 210,307 | 2.0 | 0.6667 | 140,205 | 262,874 | 6.03 |
| 1386.0 | 85.0 | 84,158 | 158,713 | 79,211 | 237,924 | 2.0 | 0.6667 | 158,616 | 421,490 | 9.68 |
| 1388.0 | 94.7 | 93,762 | 177,921 | 88,831 | 266,751 | 2.0 | 0.6667 | 177,834 | 599,324 | 13.76 |
| 1390.0 | 108.2 | 107,129 | 200,891 | 100,223 | 301,114 | 2.0 | 0.6667 | 200,743 | 800,067 | 18.37 |


x 1386.5
CHEROKEE WASH
x 1388.8
x 1382.5
PARADISE RD.
VISTA
x 1390.4
1390
x 1391.1
Pond 16
NORTH
100'
4:1
2
100'
DESERT JEWEL DR.

HOOK ENGINEERING, INC.

JOB Doubletree Ranch Road (2878)
COMPUTATION FOR Detention Basin # 1A
Excavation, Structural Fill

SHEET NO _____ OF _____
DATE 12-1-95
BY WSS CHKD _____




EXCAVATION ≈ 250'

852 X 250 = 213,000 ft³/27 = 7,889 yd³

USE 7,900 yd³

STRUCTURAL FILL

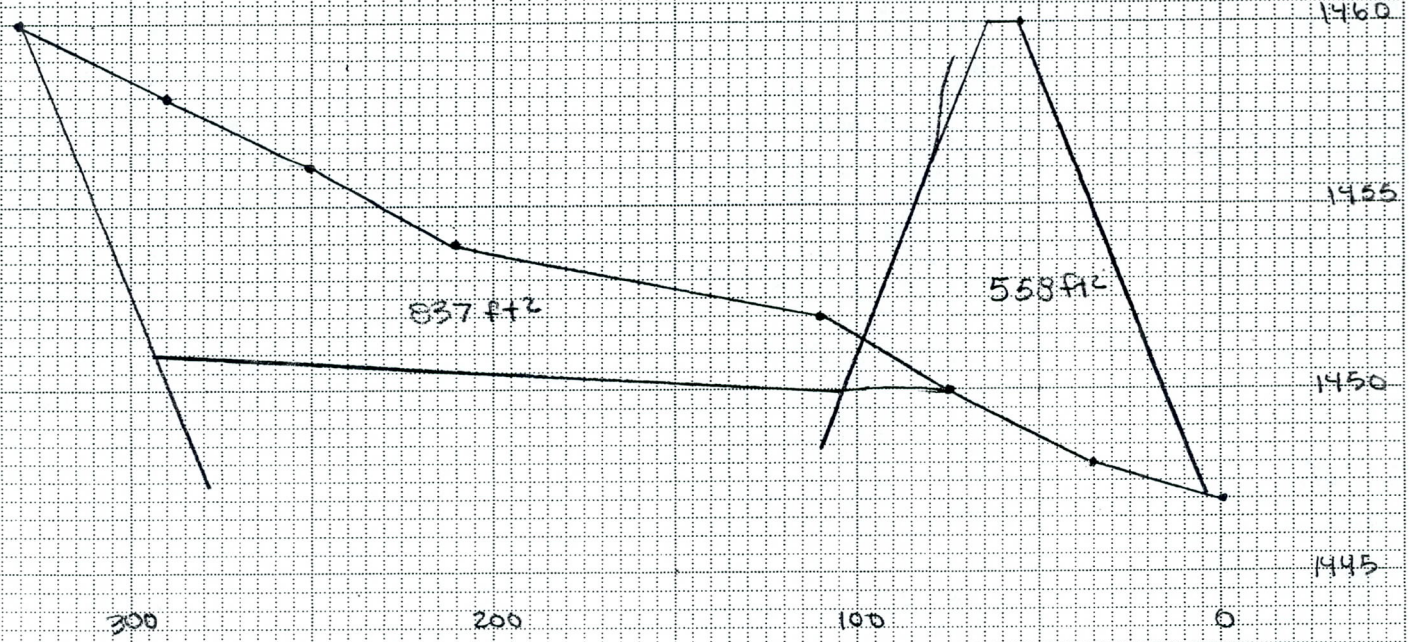
252 X 175 = 44,100 ft³/27

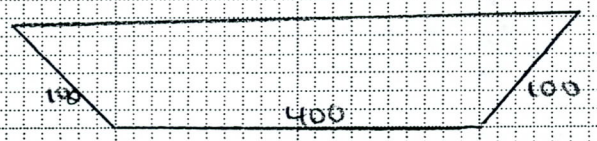
1,633 yd³

USE 1600 yd³

HOOK ENGINEERING, INC.

JOB DOUBLETREE RANCH ROAD (2878) SHEET NO _____ OF _____
COMPUTATION FOR DETENTION BASIN # 4 DATE 12-1-95
EXCAVATION, STRUCTURAL FILL BY WSS CHKD _____




STRUCTURAL FILL

$558 \times 400$
$558 \times 100$ $= 279,000 / 27 = 10,333 yd^3$

USE $10,300 yd^3$

EXCAVATION $\approx 500$ ft

$837 \times 500 = 418,500 / 27 = 15,500 yd^3$

HOOK ENGINEERING, INC.

JOB DOUBLETREE RANCH ROAD
COMPUTATION FOR DETENTION BASIN #5
EXCAVATION, STRUCTURAL FILL

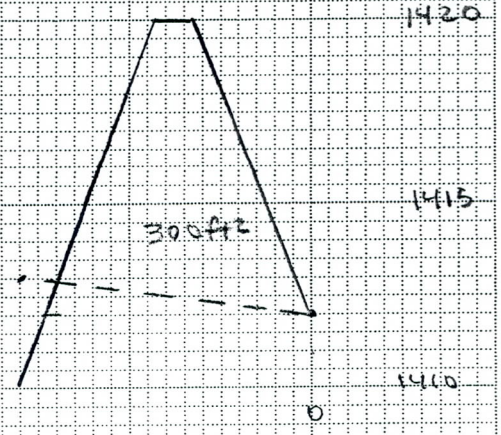
SHEET NO _____ OF _____
DATE 12-1-95
BY WSS CHKD _____

STRUCTURAL FILL ≈ 400'

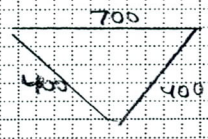
$300 ft^2 \times 400 ft = 120,000 ft^3/27$

$4,444 yd^3$

use $4,400 yd^3$




EXCAVATION




$80,000 ft^2 \times 3$

$240,000 ft^3/27$

$8888 yd^3$

$58,541 ft^3/27$ elev 1412

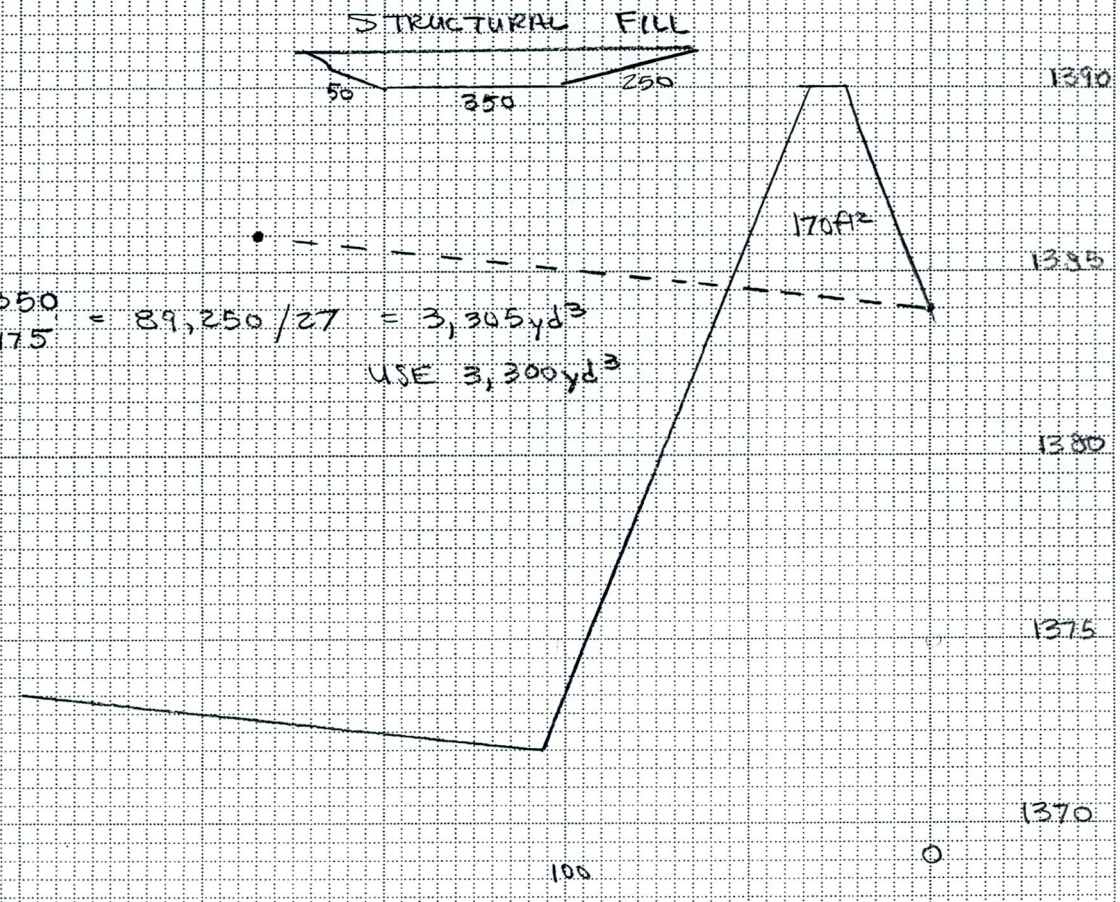
$3,279 yd^3$

TOTAL $12,167 yd^3$

USE $12,200 yd^3$

HOOK ENGINEERING, INC.

JOB DOUBLETREE RANCH ROAD (2878) SHEET NO. ____ OF ____
COMPUTATION FOR DETENTION BASIN #7 & 6 DATE 12-1-95
EXCAVATION, STRUCTURAL FILL BY WSS CHKD ____

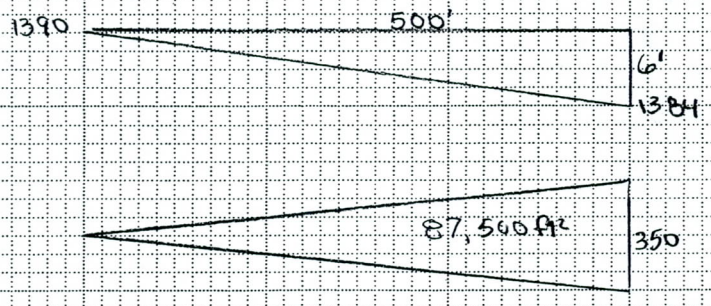



170 x 350
170 x 175 = 89,250 / 27 = 3,305 yd³

USE 3,300 yd³

EXCAVATION VOLUME ELEVATION 1984

279,126 ft³ = 10,338 yd³







87,500 x 3 = 262,500 ft³ / 27 = 9,722 yd³

20,060 yd³

USE 20,000 yd³

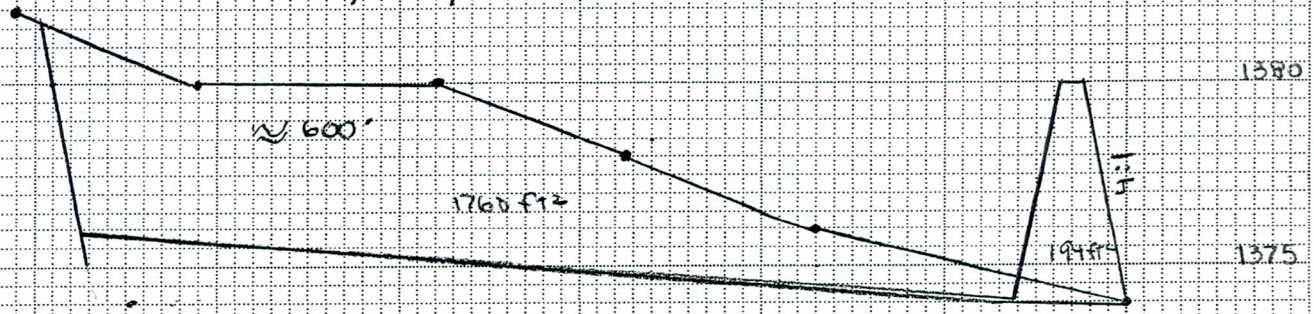
HOOK ENGINEERING, INC.

JOB DOUBLE TREE RANCH ROAD (2878) SHEET NO _____ OF _____
COMPUTATION FOR DETENTION BASIN #8 DATE 12-1-95
EXCAVATION, STRUCTURAL FILL BY WSS CHKD _____

STRUCTURAL FILL

4,311
1,975
1,077
7,364

use 7,360 yd³




EXCAVATION

1760 ft² x 600 ft = 1,056,000 ft³ / 27 = 39,111 yd³

39,100 yd³

HOOK ENGINEERING, INC.

JOB

COMPUTATION FOR DETENTION BASIN #9
EXCAVATION, STRUCTURAL FILL

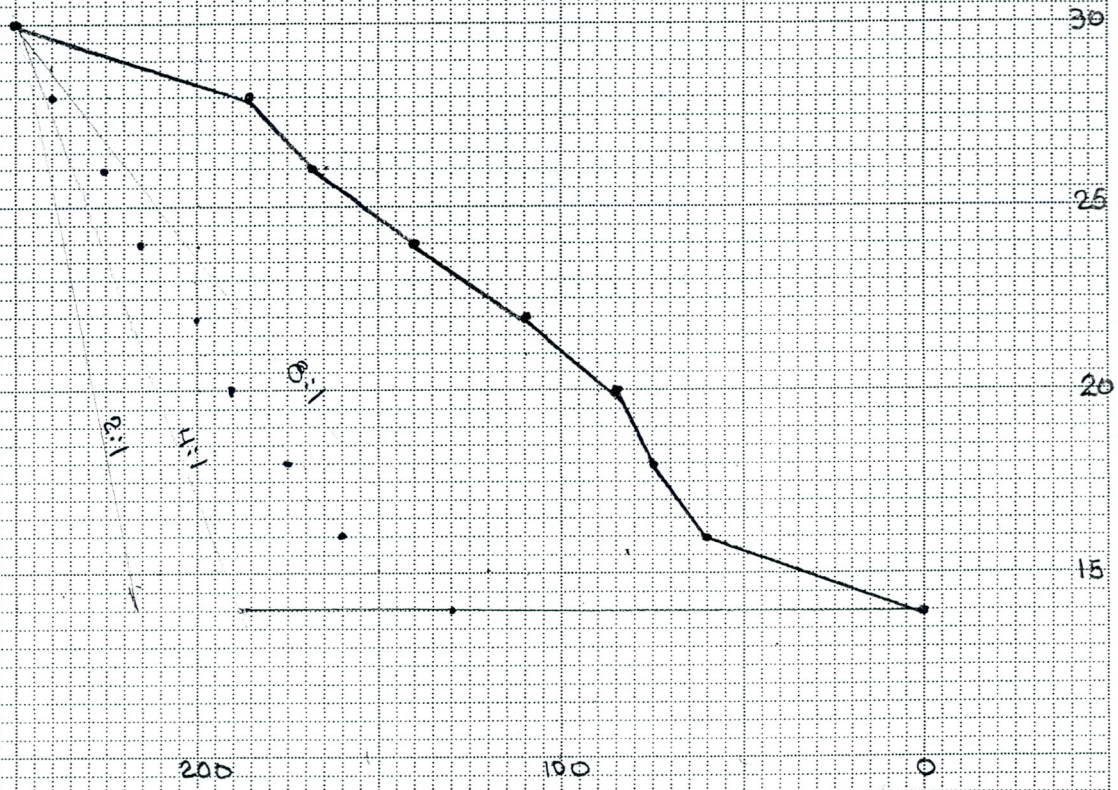
SHEET NO ____ OF ____
DATE 11-30-95
BY WSS CHKD ____

WEST OF TATUM

TATUM ACTS AS A DAM

VERT 1" = 5'
HORZ 1" = 50'

EXCAVATION 4:1 Slope ≈ 250'




300 200 100 0

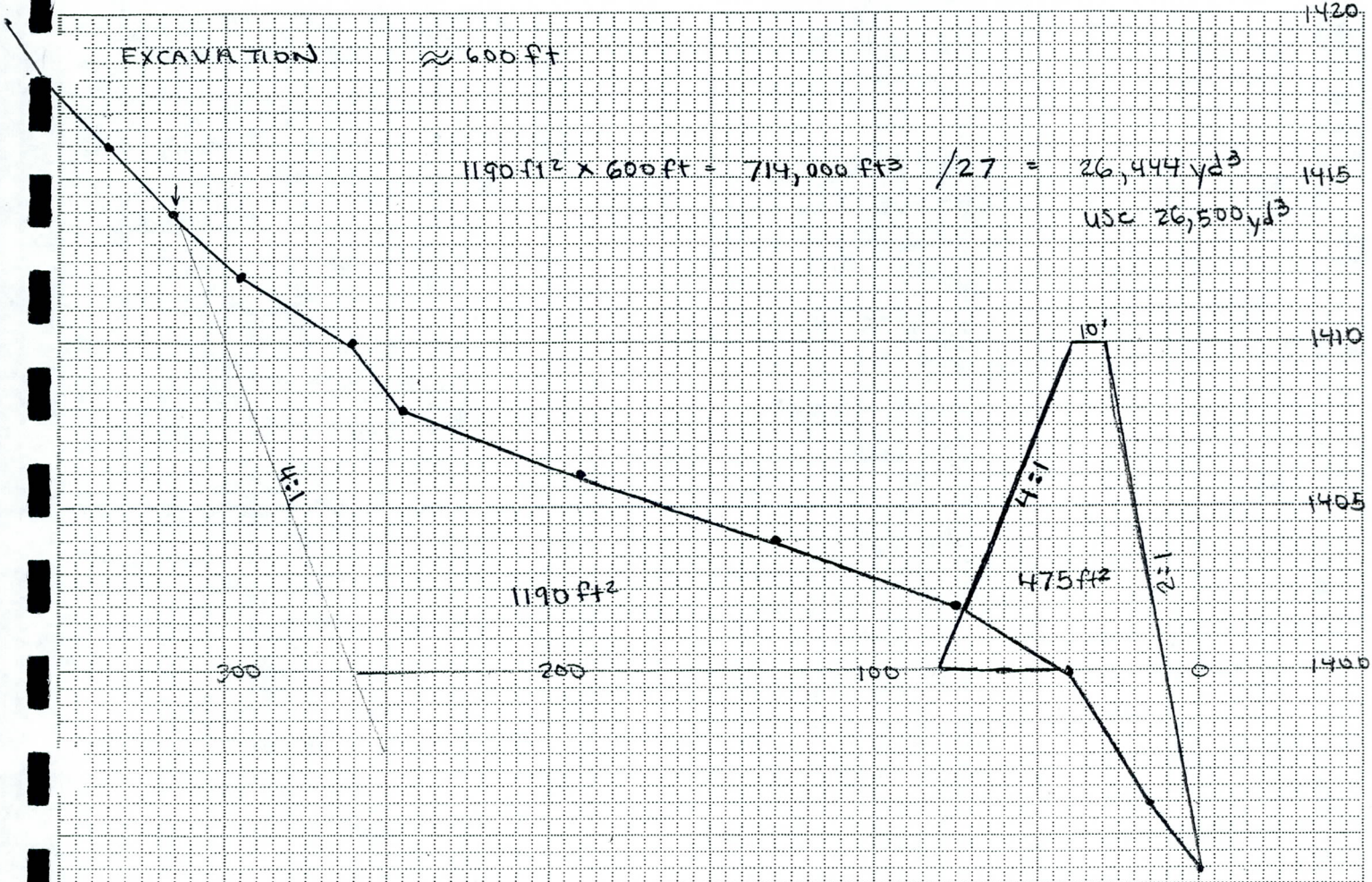
AREA = 1577 ft² / 27 58 ft³/LIN FT X 250' = 14,602 yd³

USE 15,000 yd³

HOOK ENGINEERING, INC.

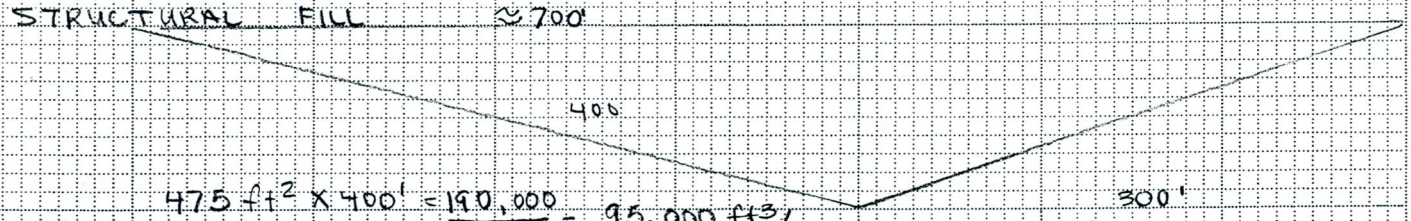
JOB DOUBLETREE RANCH RD (2878)
COMPUTATION FOR DETENTION BASIN #10
EXCAVATION, STRUCTURAL FILL

SHEET NO _____ OF _____
DATE 11-30-95
BY WSS CHKD _____




$1190\ ft^2 \times 600\ ft = 714{,}000\ ft^3 \;/27 = 26{,}444\ yd^3$

use $26{,}500\ yd^3$




$475\ ft^2 \times 400' = \frac{190{,}000}{2} = 95{,}000\ ft^3 /27 = 3{,}519\ yd^3$

$475\ ft^2 \times 300 = \frac{142{,}500}{2} = 71{,}250 /27 = 2639\ yd^3$

$6158\ yd^3$

use $6{,}200\ yd^3$

HOOK ENGINEERING, INC.

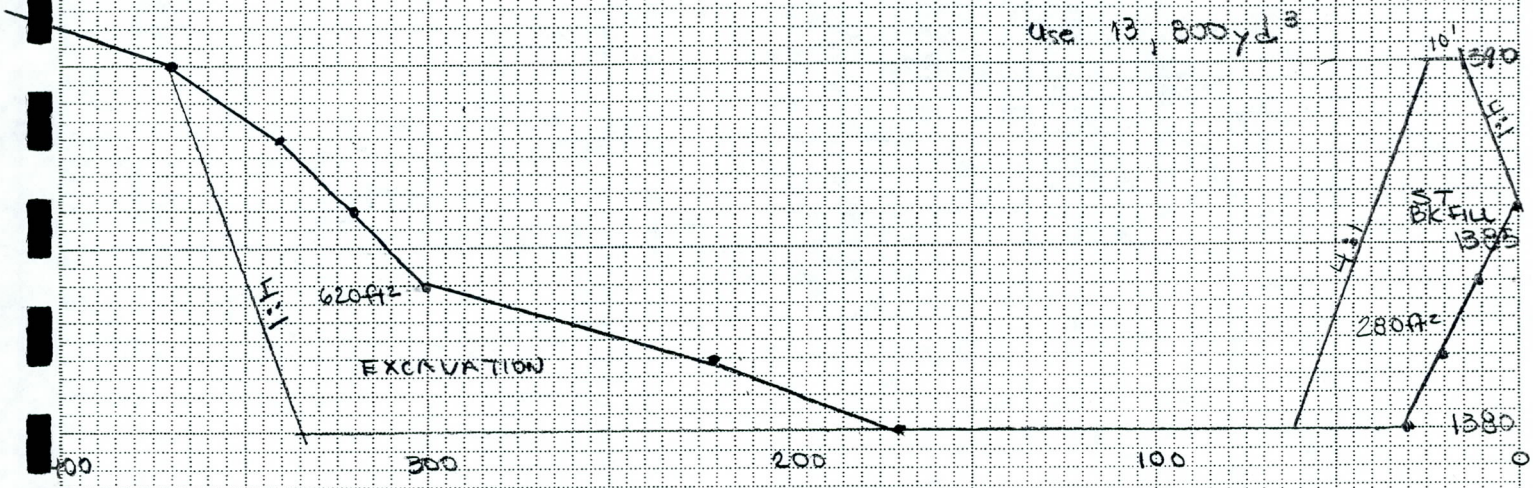
JOB DOUBLETREE RANCH RD (2878)
COMPUTATION FOR DENTENTION BASIN #12
EXCAVATION, STRUCTURAL FILL

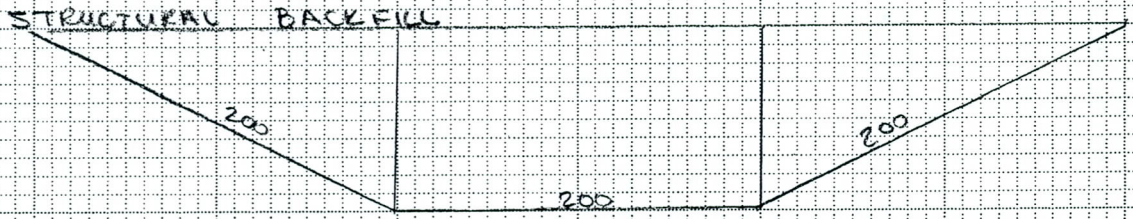
SHEET NO _____ OF _____
DATE 11-30-95
BY WSS CHKD _____

EXCAVATION ≈ 600'

620 ft² x 600' = 372,000 ft³/27 = 13,778 yd³

Use 13,800 yd³



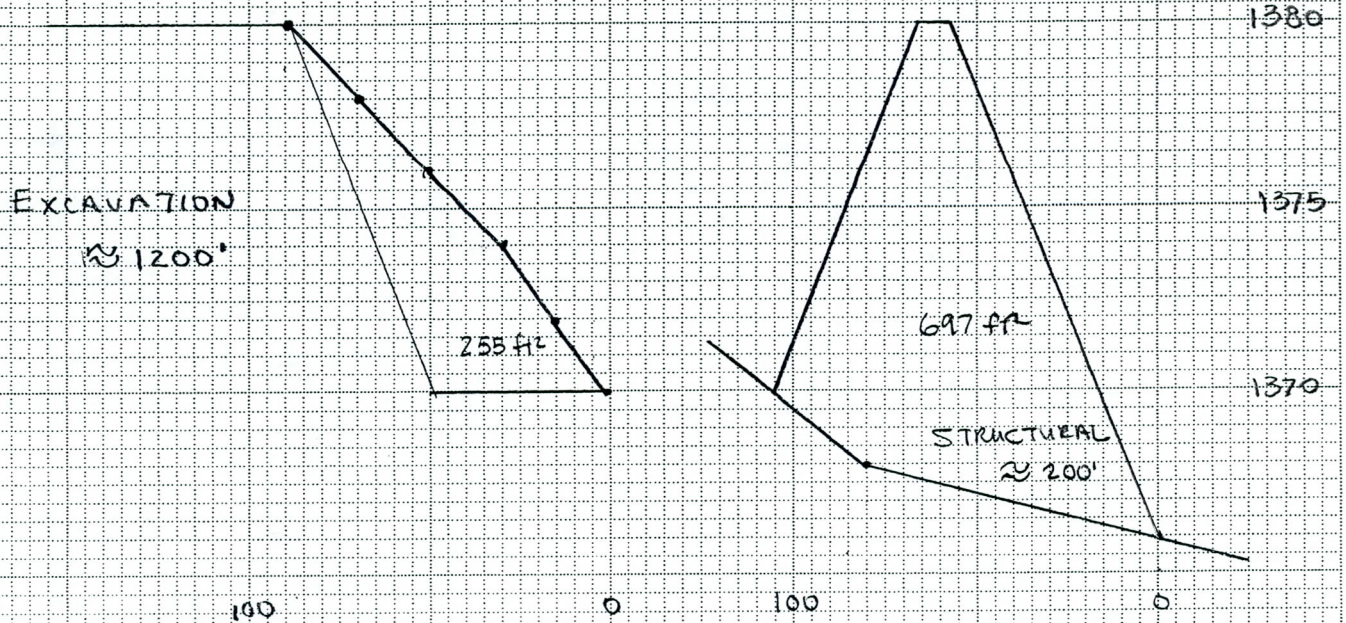

280 X 400 = 112,000 ft3 /27 = 4,148 yd³

USE 4,150 yd³

HOOK ENGINEERING, INC.

JOB Doubletree Ranch Road
COMPUTATION FOR Detention Basin #13
Excavation, Structural Fill

SHEET NO _____ OF _____
DATE 12-1-95
BY WSS CHKD _____




255 x 1200 = 306,000 / 27

11,333 yd³

use 11,300 yd³

697 x 200 = 139,400 / 27

5,162 yd³

use 5,200 yd³

HOOK ENGINEERING, INC.

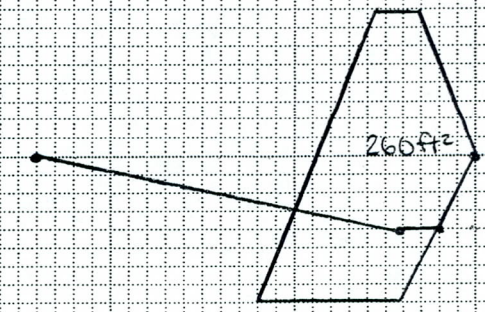
JOB DOUBLETREE RANCH ROAD (2878) SHEET NO _____ OF _____
COMPUTATION FOR DETENTION BASIN #15 DATE 12-1-95
EXCAVATION, STRUCTURAL FILL BY WSS CHKD _____

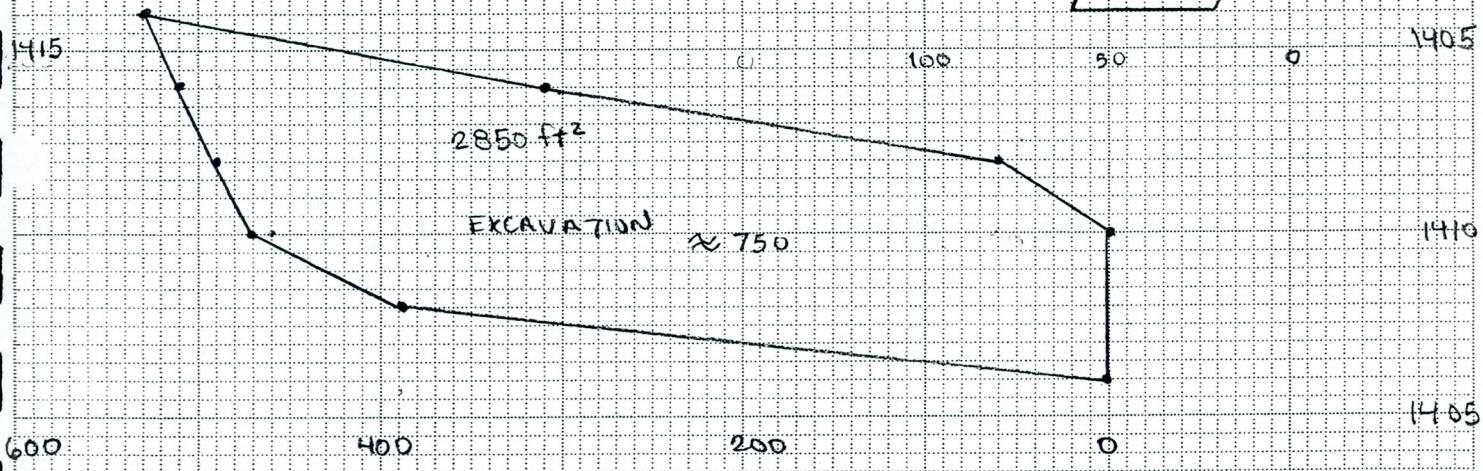
$260\,ft^2 \times 300\,ft = 78,000\,ft^3 / 27$

$2,889\,yd^3$

USE $2890\,yd^3$

STRUCTURAL FILL




EXCAVATION

$750\,ft \times 2850\,ft^2 = 2,137,500\,ft^3 / 27 = 79,167\,yd^3$

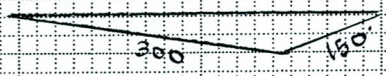
USE $80,000\,yd^3$

HOOK ENGINEERING, INC.

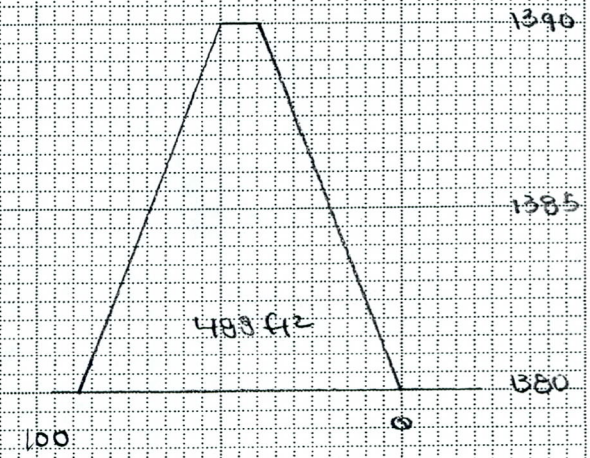
JOB Doubletree Ranch Road (2878)
COMPUTATION FOR Detention Basin #16
Excavation, Structural Fill

SHEET NO _____ OF _____
DATE 12-1-95
BY WSS CHKD _____

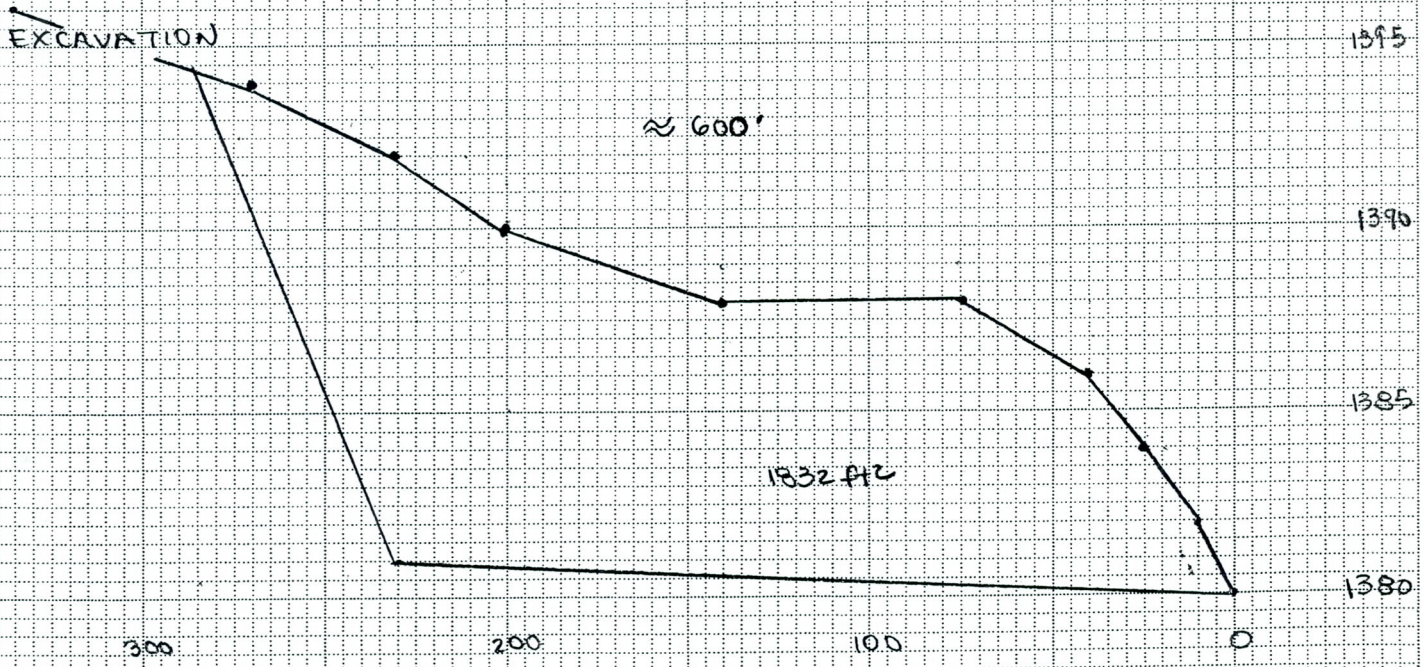
STRUCTURAL




488 x 150 = 109,800 / 27
488 x 75 = 4,067 yd³
USE 4,100 yd³




EXCAVATION




600 x 1832 = 1,099,200 ft³ / 27
40,711 yd³
USE 40,700 yd³

12.4

# COST

12.4.1

# LAND ACQUISITION

# DOUBLETREE RANCH ROAD

**PROJECT NO.2878**

## LAND ACQUISITION COST

| SECTION | | AREA | | COST |
|---|---|---|---|---|
| FROM | TO | (sqft) | (acres) | ($) |
| **DOUBLETREE RANCH ROAD BASIN** | | | | |
| Concrete Channel 5+17 | 47th Place 9+00 | 13,788 | 0.32 | 39,566 |
| 47th Place 9+50 | Tatum Blvd. 13+00 | 12,600 | 0.29 | 36,157 |
| Doubletree Ranch Road 79+00 | Energy Dissipator 82+00 | 35,200 | 0.81 | 101,010 |
| Tatum Boulevard | 106+00 | 4,500 | 0.10 | 12,913 |
| **Temporary Construction Easement** | | | | |
| Concrete Channel 5+17 | 47th Place 9+00 | 11,490 | 0.26 | 3,297 |
| 47th Place 9+50 | Tatum Blvd. 13+00 | 10,500 | 0.24 | 3,013 |
| Outlet Energy Dissipator | | 126,324 | 2.90 | 36,250 |
| Land Cost for Damages Indian Bend Wash | | 33,555 | 0.77 | 96,290 |
| SUB-TOTAL | | 247,957 | 5.69 | $328,496 |
| **CHEROKEE WASH BASIN** | | | | |
| Paradise Valley Country Club 605+40 | Road Runner Road 608+85 | 12,450 | 0.29 | 35,727 |
| Road Runner Road 610+00 | Desert Park Lane 615+40 | 21,600 | 0.50 | 61,983 |
| Desert Park Lane 616+00 | Crestview Drive 620+65 | 18,600 | 0.43 | 53,375 |
| Crestview Drive 621+15 | Arroyo Drive 624+75 | 14,400 | 0.33 | 41,322 |
| Arroyo Drive 625+35 | Desert Jewel Drive 627+25 | 7,600 | 0.17 | 21,809 |
| Desert Jewel Drive 627+75 | Mockingbird Lane 635+00 | 29,000 | 0.67 | 83,219 |
| 637+00 | 643+50 | 28,000 | 0.64 | 80,349 |
| 59th Place 704+75 | Mockingbird Lane 707+95 | 12,800 | 0.29 | 36,731 |
| SUB-TOTAL | | 144,450 | 3.32 | $414,514 |
| TOTAL | | 392,407 | 9.01 | 743,011 |

Note: Land Cost figured at: $ 125,000
Temporary Construction Easement: $ 12,500
(10% of Land Cost-minimum $500)

11/12/96
WSS

# DOUBLETREE RANCH ROAD

**PROJECT NO. 2878**

## LAND ACQUISITION DAMAGES
## INDIAN BEND WASH

**INCREASE FLOW FROM DIVERSION FROM CHEROKEE WASH**

| SECTION | DISCHARGE (Q) | BOTTOM WIDTH (ft) | LEFT SIDE SLOPE | RIGHT SIDE SLOPE | MANNINGS "n" | CHANNEL SLOPE (ft/ft) | DEPTH * (ft) | DIFFERENCE DEPTH (ft) | SLOPE WATER ELEV. | LAND DAMAGED WIDTH (ft) | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A-A | 13,253 | 375 | 27 | 27 | 0.025 | 0.0035 | 3.74 | | | | |
| | 14,045 | 375 | 27 | 27 | 0.025 | 0.0035 | 3.86 | 0.12 | 0.018 | 6.67 | Increase Flow From Cherokee |
| C-C | 13,670 | 425 | 18 | 18 | 0.025 | 0.0025 | 4.01 | | | | |
| | 14,462 | 425 | 18 | 18 | 0.025 | 0.0025 | 4.14 | 0.13 | 0.04 | 3.25 | Increase Flow From Cherokee |
| | | | | | | | | | | | * Flowmaster Computer Program |

| SECTION | LENGTH (ft) | WIDTH (ft) | AREA (sqft) | AREA (acres) | COST ($) | COMMENTS |
|---|---|---|---|---|---|---|
| Top to A-A | 2,000 | 6.67 | 13,333 | 0.31 | 38,261 | Both Sides of Indian Bend Wash |
| A-A to C-C | 1,578 | 4.96 | 15,649 | 0.36 | 44,905 | |
| C-C to Bot. | 1,407 | 3.25 | 4,573 | 0.10 | 13,122 | |
| | | | TOTAL | 0.77 | $96,288 | |

| QUANTITIES | COST | UNIT |
|---|---|---|
| LAND | 125,000 | acre |

11-7-96 WSS

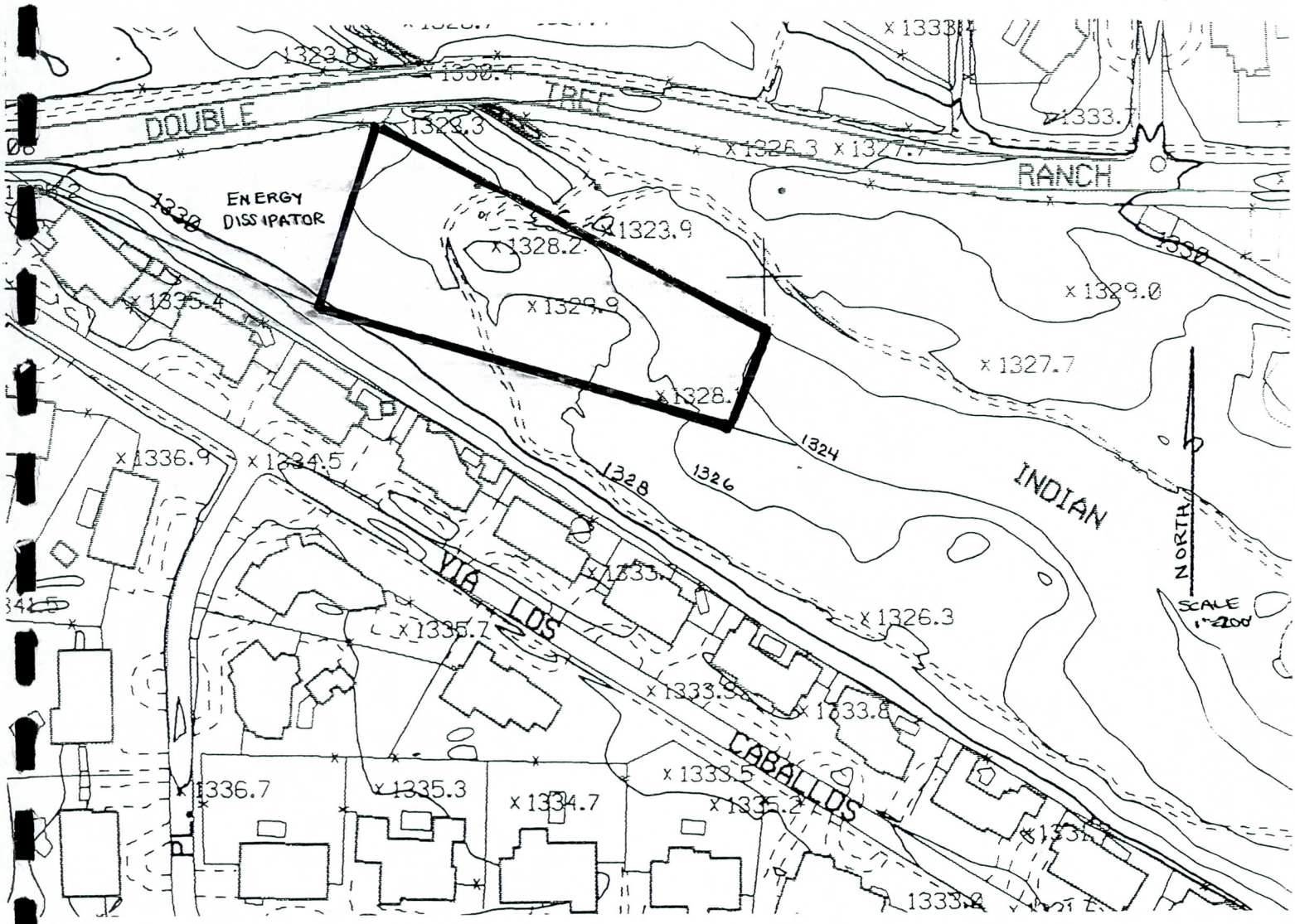
EXISTING CONCRETE CHANNEL TO REMAIN
5+17
6+00
7+00
9+00
10+00
11+00
12+00
13+00
14+00
35' LAND ACQUISITION
TCE
S.M.H. RIM= 90.65 INV.= 79.06
S 47TH PL
W 8"
NORTH
TRACT "I"
SEE SHEET 19 FOR TATUM BLVD PLAN & PROFILE
117+00
118+00
119+00
120+00
S 10" VCP
W 12" ACP
W 6" ACP
6" ACP WATER REMOVE
S 12" VCP
TATUM BOULEVARD
26'
23'
16'
31'
54'
19'

77+00
155'
PROPERTY LINE
78+00
RANCH
VIA LOS CABALLOS
79+00
TELEPHONE LINE RELOCATE
ROAD
80+00
DRAINAGE EASEMENT LINE
FLOODPLAIN LIMIT
Q100 = 1329.50
INDIAN BEND WASH
81+00
LAND AQUISITION
1328
1330'
TCE
1326
50'
LAND AQUISITION
82+00
LAND AQUISITION
2
83+00
PROPERTY LINE
10'
GOLF CART UNDERPASS
84+00
TCE
12" DIP
85+00

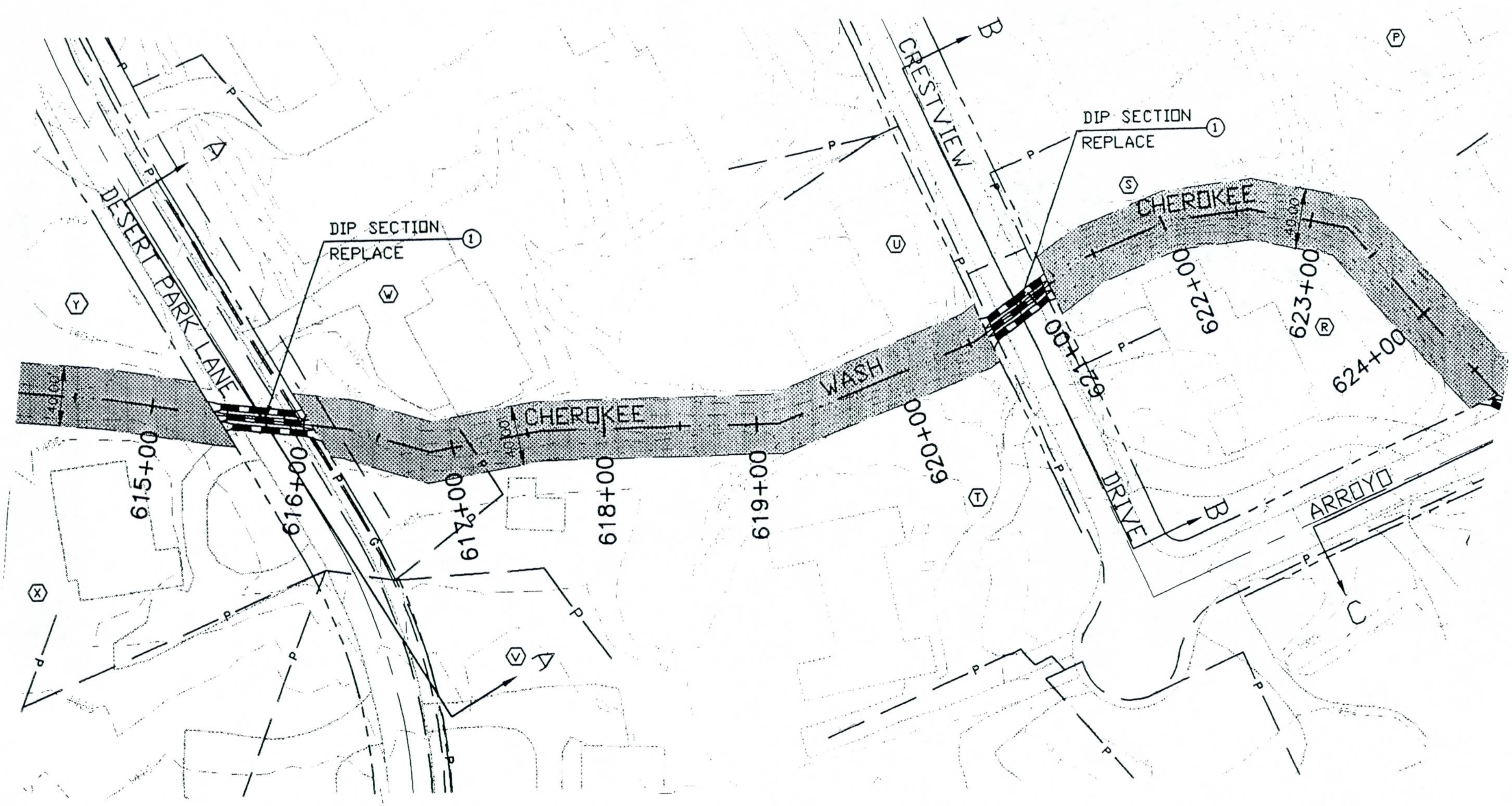
**TEMPORARY CONSTRUCTION EASEMENT**

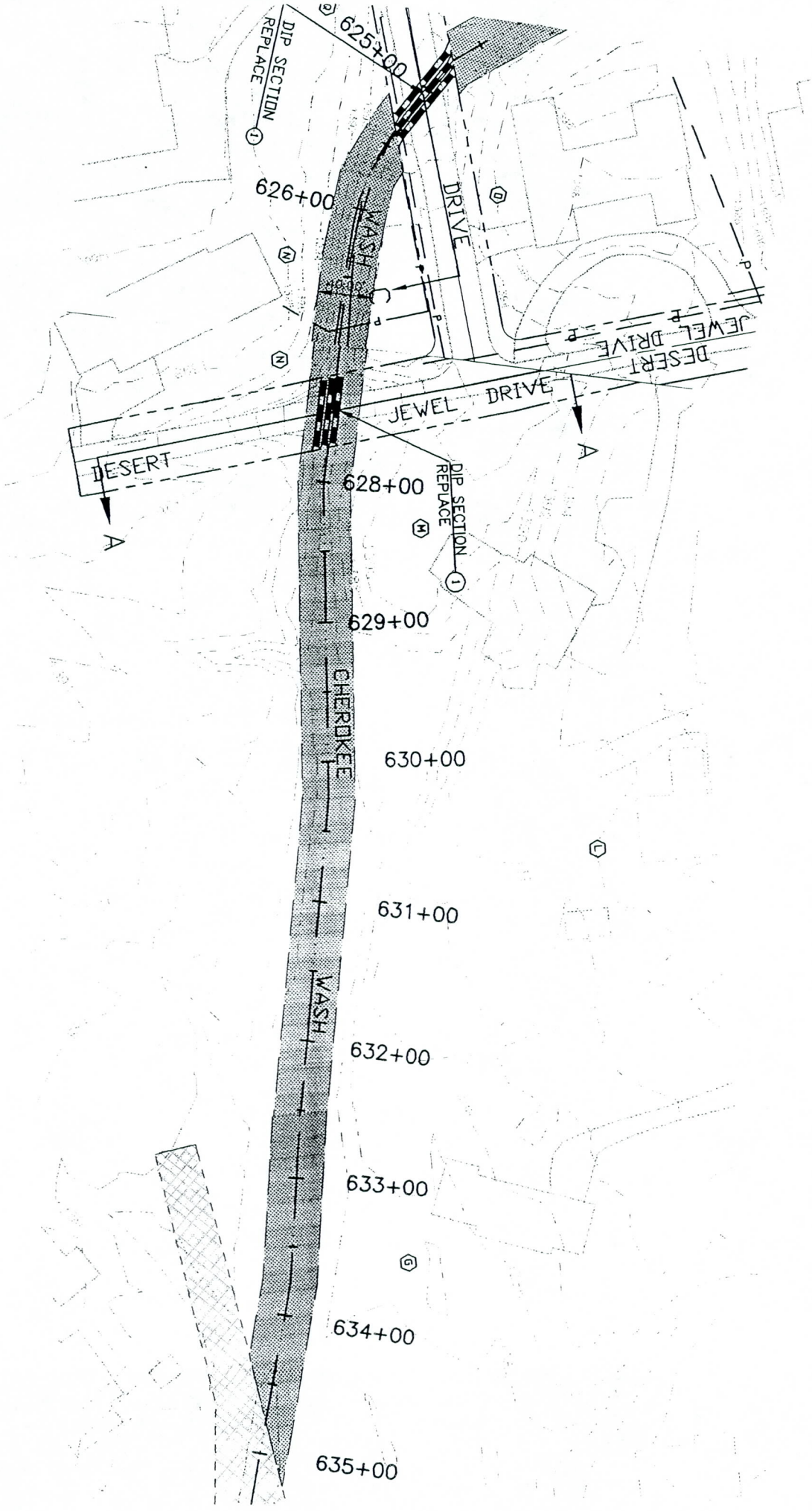
**OUTLET**

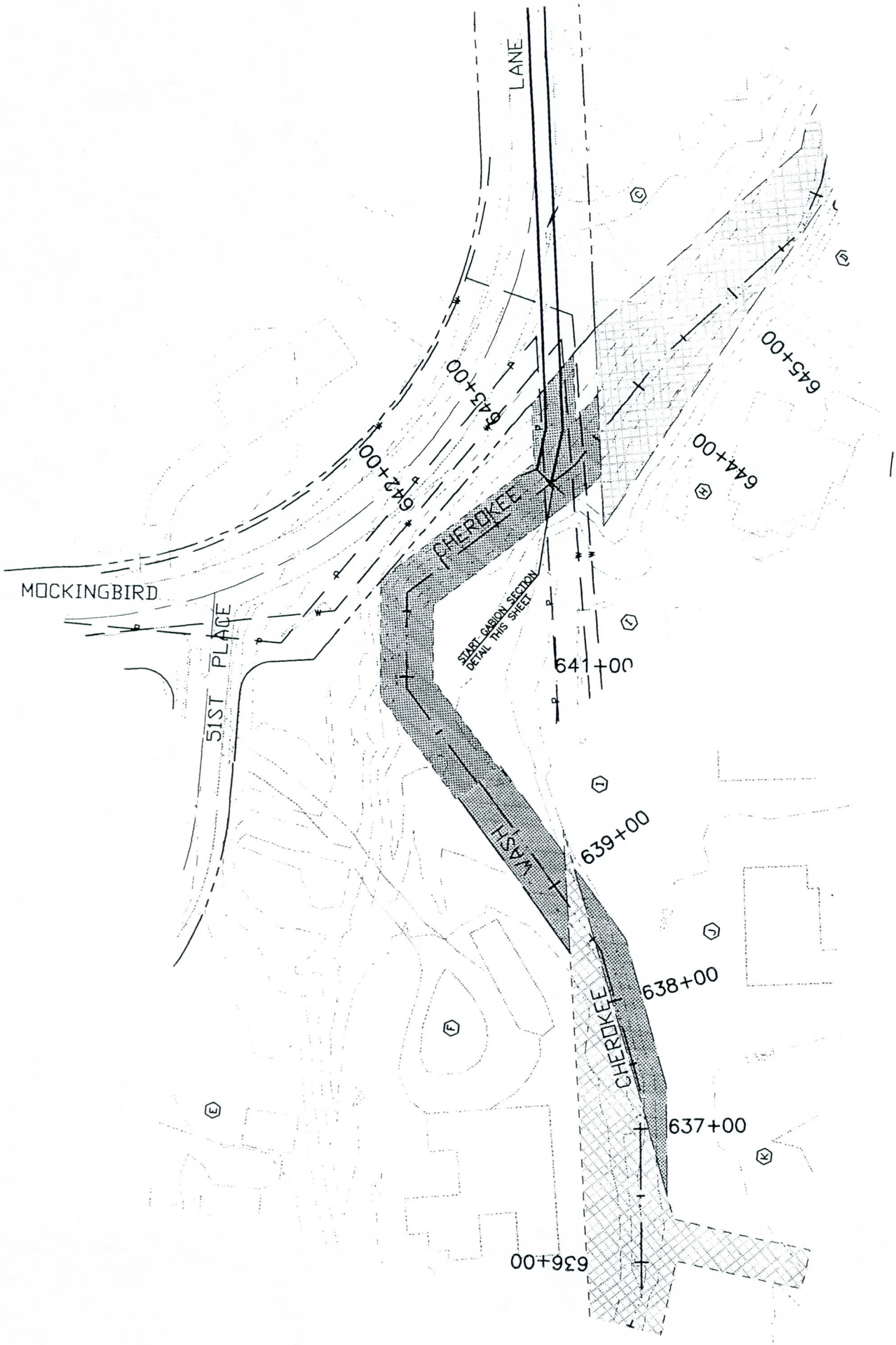
**INDIAN BEND WASH**

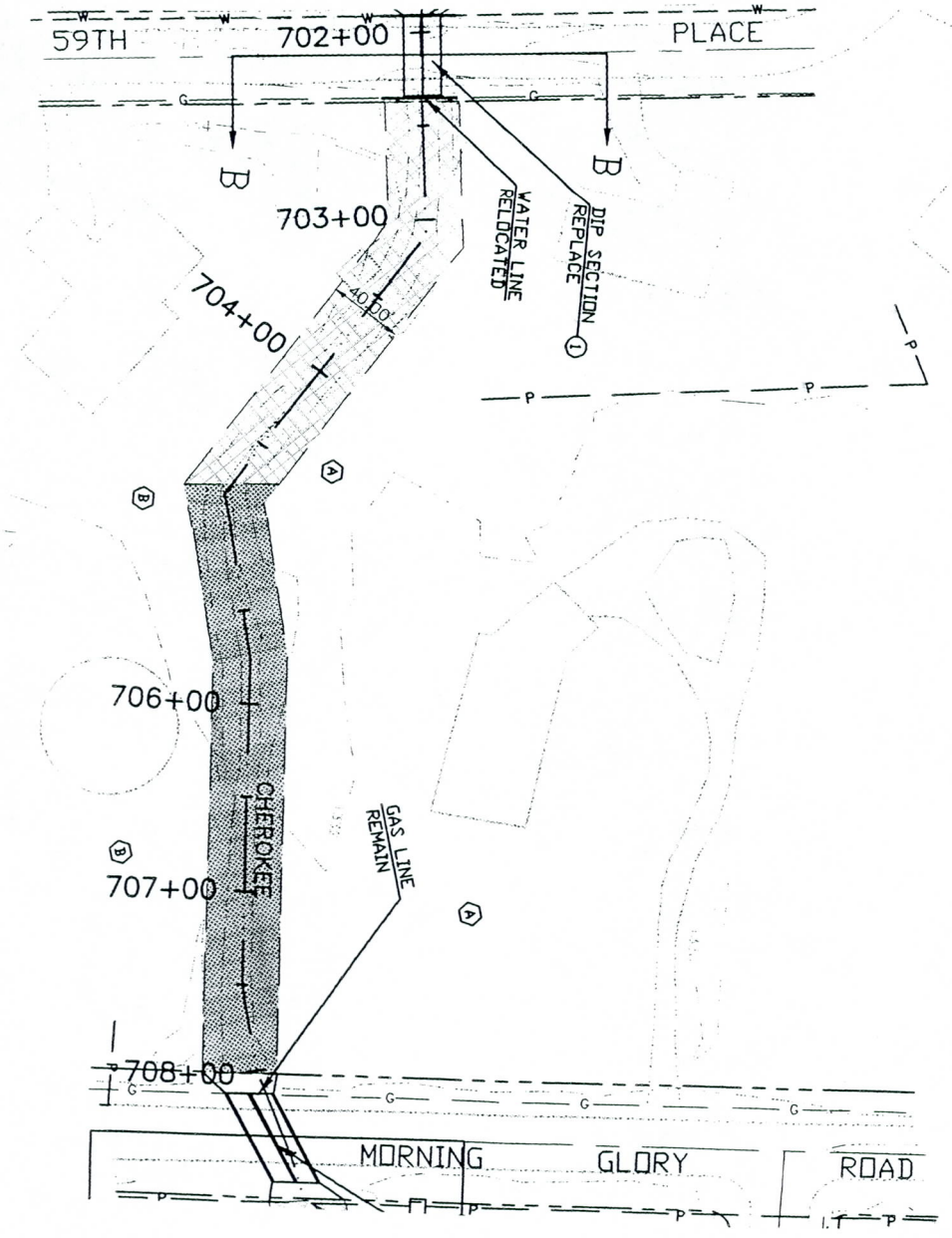


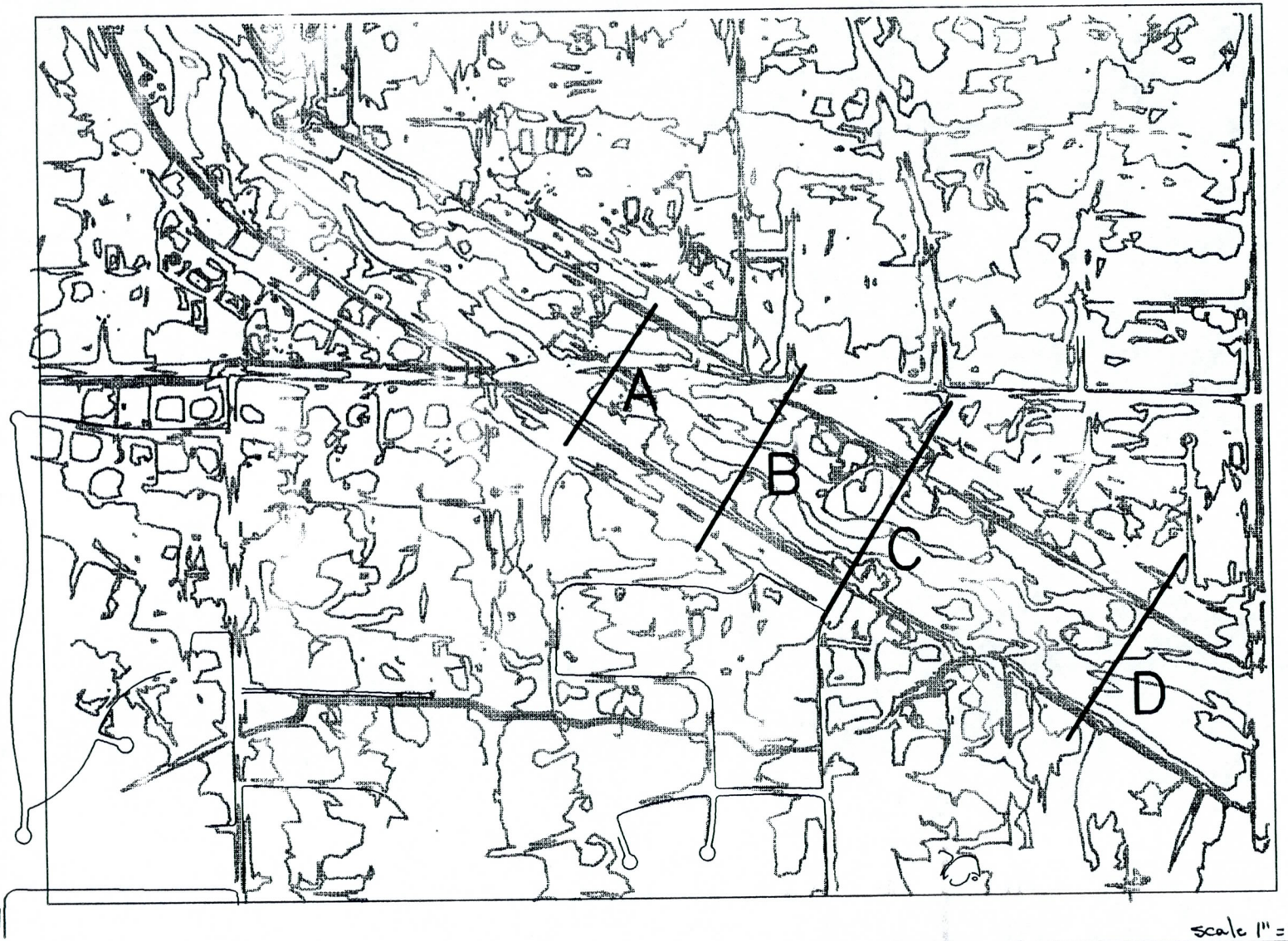
PROPERTY LINE
605+00
606+00
607+00
CHEROKEE
PROPERTY LINE
608+00
609+00
RUNNER
ROAD
610+00
2-36"CMP
ASPH. COATED
MITERED ENDS w/
REMAIN
ROAD
611+00
612+00
WASH
613+00


DESERT PARK LANE
DIP SECTION
REPLACE
615+00
616+00
617+00
618+00
619+00
620+00
621+00
622+00
623+00
624+00
CHEROKEE
WASH
CHEROKEE
CRESTVIEW
DRIVE
ARROYO
DIP SECTION
REPLACE
40.00
40.00
40.00
A
A
B
B
C


625+00
DIP SECTION REPLACE
626+00
WASH
DRIVE
JEWEL DRIVE
DESERT
A
628+00
DIP SECTION REPLACE
629+00
CHEROKEE
630+00
631+00
WASH
632+00
633+00
634+00
635+00


LANE
645+00
644+00
643+00
642+00
CHEROKEE
MOCKINGBIRD
51ST PLACE
START GABION SECTION
DETAIL THIS SHEET
641+00
WASH
639+00
638+00
CHEROKEE
637+00
636+00


59TH
PLACE
702+00
703+00
704+00
40.00'
WATER LINE RELOCATED
DIP SECTION REPLACE
706+00
CHEROKEE
707+00
GAS LINE REMAIN
708+00
MORNING
GLORY
ROAD




scale 1" = 800'

HOOK ENGINEERING, INC.
3511 E. INDIAN SCHOOL ROAD PHOENIX, ARIZONA 85018
Tel: (602) 956-3200 Fax (602) 955-5443

Trapezoidal Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: INDIAN BEND WASH

Comment: LAND ACQUISITON FOR DAMAGES SECTION C-C

Solve For Depth

Given Input Data:

| | |
|---|---|
| Bottom Width..... | 425.00 ft |
| Left Side Slope.. | 18.00:1 (H:V) |
| Right Side Slope. | 18.00:1 (H:V) |
| Manning's n..... | 0.025 |
| Channel Slope.... | 0.0025 ft/ft |
| Discharge..... | 13670.00 cfs |

Computed Results:

| | |
|---|---|
| Depth..... | 4.01 ft |
| Velocity..... | 6.85 fps |
| Flow Area..... | 1994.68 sf |
| Flow Top Width... | 569.42 ft |
| Wetted Perimeter. | 569.65 ft |
| Critical Depth... | 3.04 ft |
| Critical Slope... | 0.0065 ft/ft |
| Froude Number.... | 0.65 (flow is Subcritical) |

Open Channel Flow Module, Version 3.3 (c) 1991
Haestad Methods, Inc. * 37 Brookside Rd * Waterbury, Ct 06708

Trapezoidal Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: INDIAN BEND WASH

Comment: LAND ACQUISITON FOR DAMAGES SECTION C-C

Solve For Depth

Given Input Data:

| | |
|---|---|
| Bottom Width..... | 425.00 ft |
| Left Side Slope.. | 18.00:1 (H:V) |
| Right Side Slope. | 18.00:1 (H:V) |
| Manning's n..... | 0.025 |
| Channel Slope.... | 0.0025 ft/ft |
| Discharge..... | 14462.00 cfs |

Computed Results:

| | |
|---|---|
| Depth..... | 4.14 ft |
| Velocity..... | 6.99 fps |
| Flow Area..... | 2070.11 sf |
| Flow Top Width... | 574.17 ft |
| Wetted Perimeter. | 574.40 ft |
| Critical Depth... | 3.15 ft |
| Critical Slope... | 0.0065 ft/ft |
| Froude Number.... | 0.65 (flow is Subcritical) |

Open Channel Flow Module, Version 3.3 (c) 1991
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Trapezoidal Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: INDIAN BEND WASH

Comment: LAND ACQUISITION FOR DAMAGES SECTION A-A

Solve For Depth

Given Input Data:

| | |
|---|---|
| Bottom Width..... | 375.00 ft |
| Left Side Slope.. | 27.00:1 (H:V) |
| Right Side Slope. | 27.00:1 (H:V) |
| Manning's n..... | 0.025 |
| Channel Slope.... | 0.0035 ft/ft |
| Discharge..... | 13253.00 cfs |

Computed Results:

| | |
|---|---|
| Depth..... | 3.74 ft |
| Velocity..... | 7.45 fps |
| Flow Area..... | 1779.06 sf |
| Flow Top Width... | 576.86 ft |
| Wetted Perimeter. | 576.99 ft |
| Critical Depth... | 3.13 ft |
| Critical Slope... | 0.0066 ft/ft |
| Froude Number.... | 0.75 (flow is Subcritical) |

Open Channel Flow Module, Version 3.3 (c) 1991
Haestad Methods, Inc. * 37 Brookside Rd * Waterbury, Ct 06708

Trapezoidal Channel Analysis & Design
Open Channel - Uniform flow

Worksheet Name: INDIAN BEND WASH

Comment: LAND ACQUISITION FOR DAMAGES SECTION A-A

Solve For Depth

Given Input Data:

| | |
|---|---|
| Bottom Width..... | 375.00 ft |
| Left Side Slope.. | 27.00:1 (H:V) |
| Right Side Slope. | 27.00:1 (H:V) |
| Manning's n..... | 0.025 |
| Channel Slope.... | 0.0035 ft/ft |
| Discharge..... | 14045.00 cfs |

Computed Results:

| | |
|---|---|
| Depth..... | 3.86 ft |
| Velocity..... | 7.59 fps |
| Flow Area..... | 1850.58 sf |
| Flow Top Width... | 583.51 ft |
| Wetted Perimeter. | 583.66 ft |
| Critical Depth... | 3.24 ft |
| Critical Slope... | 0.0065 ft/ft |
| Froude Number.... | 0.75 (flow is Subcritical) |

Open Channel Flow Module, Version 3.3 (c) 1991
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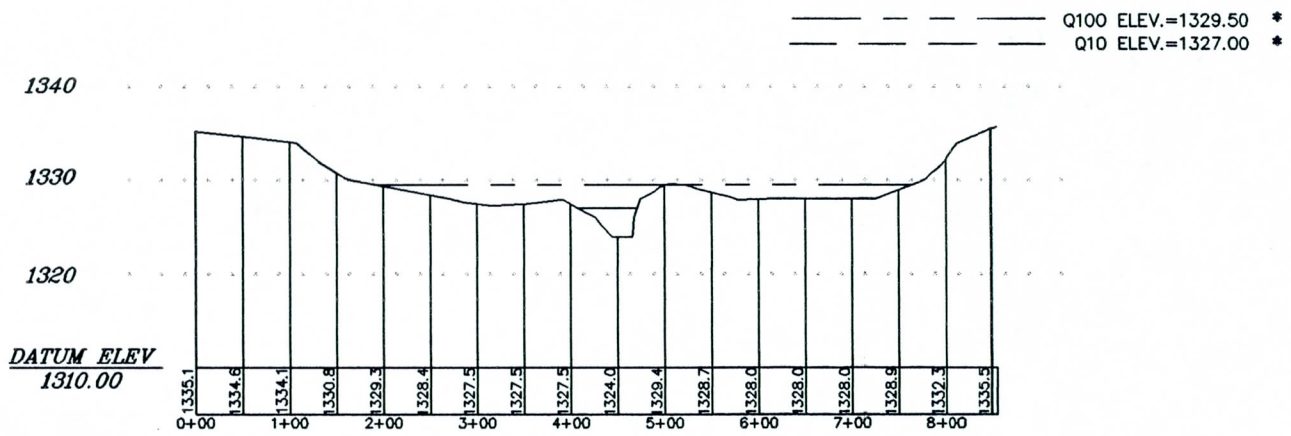



# CROSS SECTION–A

GRAPHIC SCALE

200 0 100 200

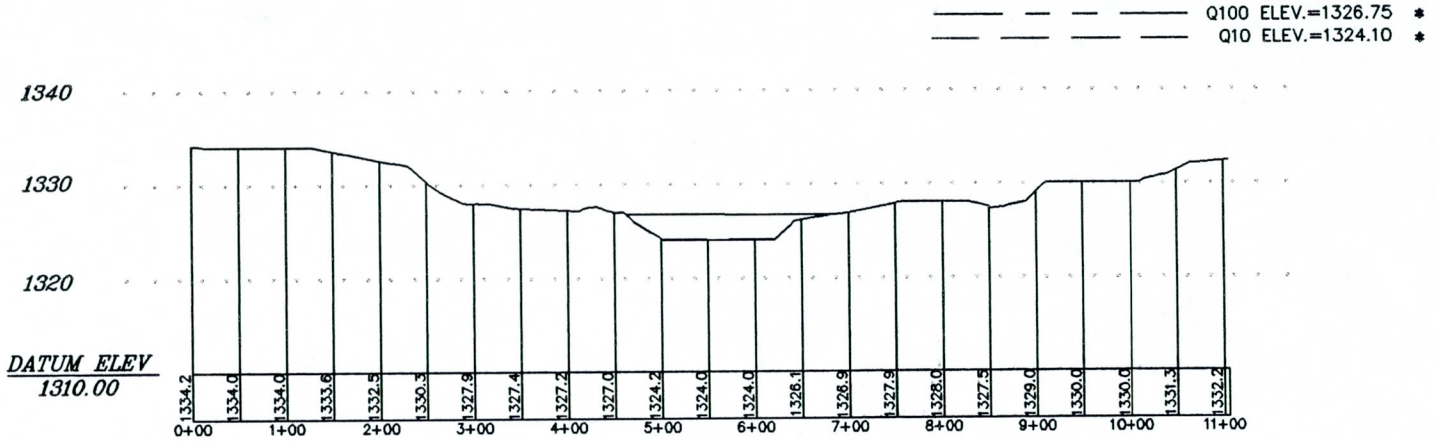
( IN FEET )

1 inch = 200 ft.

| | AREA | PERIMETER | TOP WIDTH |
|---|---|---|---|
| Q100 | 9288.02 SQFT | 633.48 SQFT | 575.27 |
| Q10 | 1166.95 SQFT | 100.33 SQFT | 63.18 |

* NOTE: FEMA INDIAN BEND WASH FLOOD PROFILE

HOOK ENGINEERING, INC.
3511 E. INDIAN SCHOOL ROAD PHOENIX, ARIZONA 85018
Tel: (602) 956–3200 Fax (602) 955–5443




# CROSS SECTION-B

| | AREA | PERIMETER | TOP WIDTH |
|---|---|---|---|
| *Q100* | 4375.97 SQFT | 245.80 SQFT | 228.30 |
| *Q10* | 119.26 SQFT | 121.75 SQFT | 120.99 |

GRAPHIC SCALE

200 0 100 200

( IN FEET )

1 inch = 200 ft.

* NOTE: FEMA INDIAN BEND WASH FLOOD PROFILE

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3511 E. INDIAN SCHOOL ROAD PHOENIX, ARIZONA 85018
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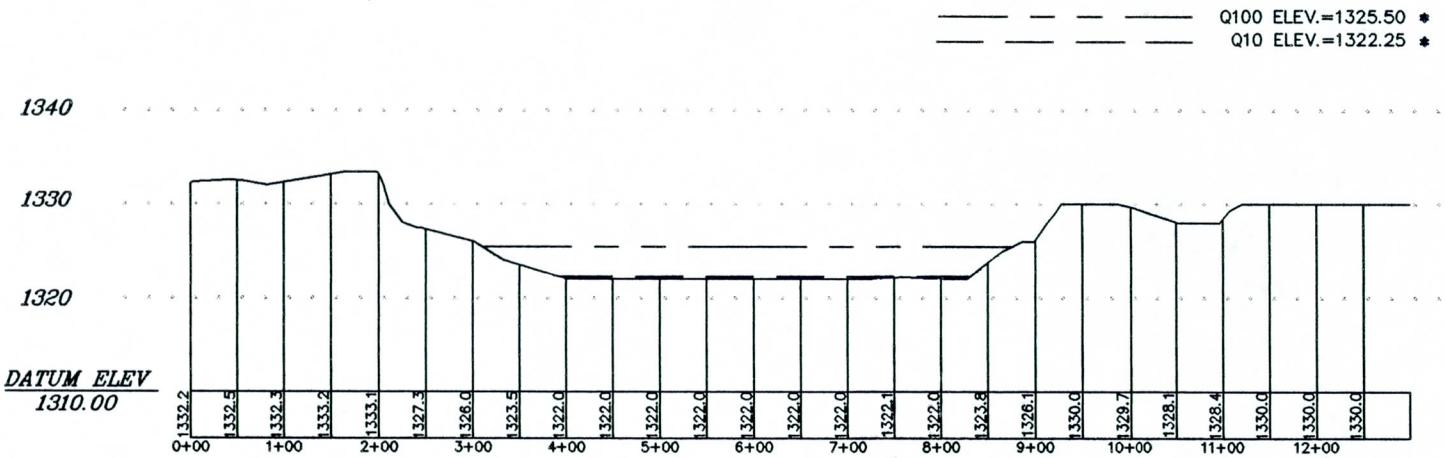


# CROSS SECTION-C

| | AREA | PERIMETER | TOP WIDTH |
|---|---|---|---|
| *Q100* | 17491.24 SQFT | 585.52 SQFT | 566.64 |
| *Q10* | 990.59 SQFT | 438.57 SQFT | 437.10 |

GRAPHIC SCALE

200 0 100 200

( IN FEET )

1 inch = 200 ft.

* NOTE: FEMA INDIAN BEND WASH FLOOD PROFILE

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3511 E. INDIAN SCHOOL ROAD PHOENIX, ARIZONA 85018
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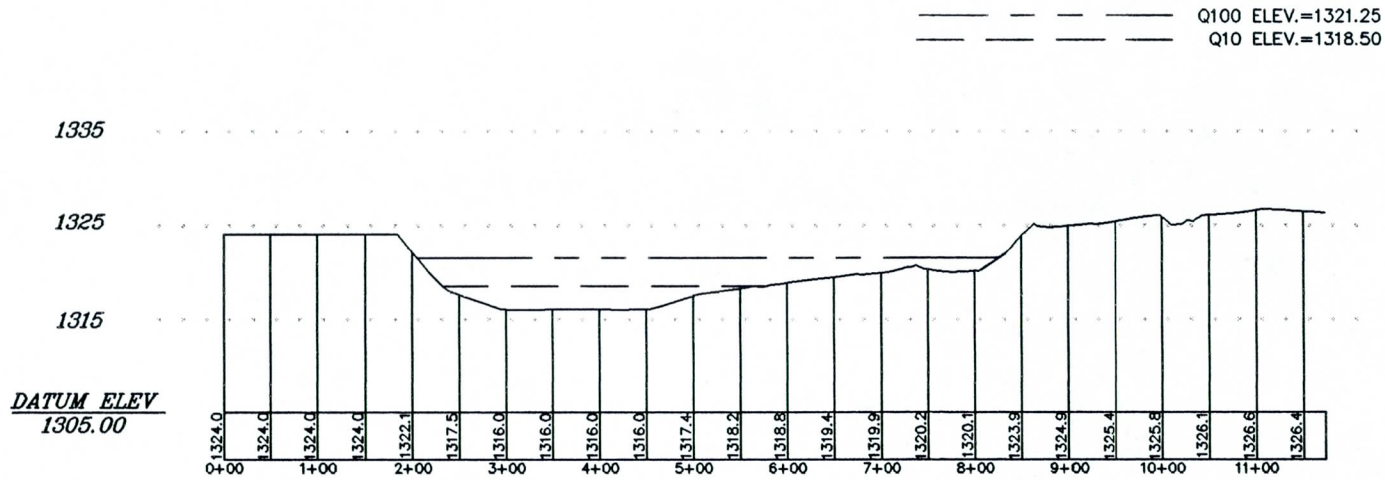



# CROSS SECTION–D

| | AREA | PERIMETER | TOP WIDTH |
|---|---|---|---|
| *Q100* | 21146.82 SQFT | 650.01 SQFT | 621.03 |
| *Q10* | 1271.04 SQFT | 355.45 SQFT | 346.80 |

GRAPHIC SCALE

200 0 100 200

( IN FEET )
1 inch = 200 ft.

* NOTE: FEMA INDIAN BEND WASH FLOOD PROFILE

HOOK ENGINEERING, INC.
3511 E. INDIAN SCHOOL ROAD PHOENIX, ARIZONA 85018
Tel: (602) 956–3200 Fax (602) 955–5443

12.4.2

# UTILITY CONFLICTS

# DOUBLETREE RANCH ROAD

**PROJECT NO. 2878**

## UTILITY RELOCATIONS
## ESTIMATE OF QUANTITIES

### DOUBLETREE RANCH ROAD CORRIDOR

| ITEM NO. | DESCRIPTION | QTY. | UNIT | UNIT COST | AMOUNT ($) | SHEET NO. |
|---|---|---|---|---|---|---|
| 1 | NEW 5' DIA. SMH D = 10'+/- | 2 | EA. | 5,500 | 11,000 | SHT 3 |
| 2 | NEW 8" VCP SEWER D=10'+/- | 380 | LF | 32 | 12,160 | SHT 3 |
| 3 | NEW 6" WATERLINE D=5'+/- NEW | 190 | LF | 26 | 4,940 | SHT 3 |
| 4 | LOWER 8" DIP WATERLINE | 40 | LF | 30 | 1,200 | SHT 4 |
| 5 | LOWER 12" DIP WATERLINE | 50 | LF | 40 | 2,000 | SHT 4 |
| 6 | NEW 6" WATERLINE | 100 | LF | 26 | 2,600 | SHT 4 |
| 7 | LOWER CABLE LINE | 50 | LF | 30 | 1,500 | SHT 4 |
| 8 | LOWER GAS LINE | 50 | LF | 30 | 1,500 | SHT 4 |
| 9 | LOWER U/G POWER LINE | 50 | LF | 30 | 1,500 | SHT 4 |
| 10 | LOWER 12" WATERLINE | 55 | LF | 40 | 2,200 | SHT 7 |
| 11 | NEW 5' DIA SMH D=9' +/- | 3 | EA | 5,500 | 16,500 | SHT 8 |
| 12 | CONVERT EXIST SMH INTO A DROP MANHOLE D = 11' +/- | 1 | EA. | 5,500 | 5,500 | SHT 8 |
| 13 | NEW SEWER DROP MANHOLE D=11' +/- | 2 | EA. | 5,500 | 11,000 | SHT 8 |
| 14 | RELOCATE CABLE TV | 600 | LF | 30 | 18,000 | SHT 8 |
| 15 | NEW 8" VCP SEWER LINE | 900 | LF | 32 | 28,800 | SHT 8 |
| 16 | RAISE 6" WATERLINE (2 LOCAT) | 110 | LF | 26 | 2,860 | SHT 8 |
| 17 | RAISE GAS LINE | 75 | LF | 30 | 2,250 | SHT 8 |
| 18 | LOWER U/G POWER LINE | 50 | LF | 30 | 1,500 | SHT 8 |
| | **SUB-TOTAL** | | | | **$127,010** | |

## DOUBLETREE RANCH ROAD CORRIDOR

| ITEM NO. | DESCRIPTION | QTY. | UNIT | UNIT COST | AMOUNT ($) | SHEET NO. |
|---|---|---|---|---|---|---|
| 19 | RELOCATE 12" WATERLINE | 940 | LF | 40 | 37,600 | SHT 9 |
| 20 | LOWER TEL LINE | 75 | LF | 30 | 2,250 | SHT 9 |
| 21 | RELOCATE CABLE TV | 900 | LF | 30 | 27,000 | SHT 9 |
| 22 | LOWER U/G POWER | 250 | LF | 30 | 7,500 | SHT 9 |
| 23 | LOWER GAS LINE | 110 | LF | 30 | 3,300 | SHT 9 |
| | SEE CHEROKEE WASH SHEET 25 | | | | | SHT 10 |
| 24 | LOWER TEL LINE | 30 | LF | 30 | 900 | SHT 11 |
| 25 | LOWER GAS LINE 2 LOCATIONS D=9'+/- | 60 | LF | 30 | 1,800 | SHT 11 |
| 26 | LOWER 6" WATERLINE D=11' +/- | 60 | LF | 26 | 1,560 | SHT 11 |
| 27 | NEW 5' DIA SMH D=8'+/- | 3 | EA | 5,500 | 16,500 | SHT 11 |
| 28 | LOWER 12" WATER LINE | 30 | LF | 40 | 1,200 | SHT 11 |
| 29 | NEW 8" VCP SEWER LINE D=8'+/- | 1200 | EA | 32 | 38,400 | SHT 11 |
| 30 | LOWER U/G POWER LINE (4 LOCATIONS) | 120 | LF | 30 | 3,600 | SHT 11 |
| 31 | NEW 5' DIA SMH D=8'+/- | 2 | EA | 5,500 | 11,000 | SHT 12 |
| 32 | NEW 8" VCP SANITARY SEWER d=10*/- | 690 | LF | 32 | 22,080 | SHT 12 |
| 33 | NEW 4" WATERLINE | 530 | LF | 26 | 13,780 | SHT 12 |
| 34 | NEW 4" SEWER FORCE MAIN D = 6' =/- | 100 | LF | 26 | 2,600 | SHT 12 |
| 35 | NEW LIFT STATION | 1 | EA | 50,000 | 50,000 | SHT 12 |
| | **SUB-TOTAL** | | | | **$241,070** | |

## DOUBLETREE RANCH ROAD

| ITEM NO. | DESCRIPTION | QTY. | UNIT | UNIT COST | AMOUNT ($) | SHEET NO. |
|---|---|---|---|---|---|---|
| 36 | LOWER 6" WATERLINE D=11'+/- (3 LOCAT. | 150 | LF | 26 | 3,900 | SHT 13 |
| 37 | LOWER GAS LINE | 50 | LF | 30 | 1,500 | SHT 13 |
| 38 | LOWER GAS LINE (2 LOCATIONS) D=11'+/- | 80 | LF | 30 | 2,400 | SHT 15 |
| 39 | LOWER 6" WATERLINE | 80 | LF | 40 | 3,200 | SHT 15 |
| 40 | LOWER U/G POWER LINE (2 LOCAT.) | 80 | LF | 30 | 2,400 | SHT 15 |
| 41 | LOWER TELEPHONE LINE | 50 | LF | 30 | 1,500 | SHT 15 |
| 42 | LOWER CABLE (2 LOCATIONS) | 50 | LF | 30 | 1,500 | SHT 16 |
| 43 | LOWER GAS LINE D=10'+/- | 25 | LF | 30 | 750 | SHT 16 |
| 44 | LOWER TEL. LINE | 25 | LF | 30 | 750 | SHT 16 |
| 45 | LOWER GAS LINE D=10'+/- (4 LOCAT.) | 100 | LF | 30 | 3,000 | SHT 17 |
| 46 | LOWER WATER LINE | 25 | LF | 30 | 750 | SHT 17 |
| 47 | LOWER TEL. LINE | 25 | LF | 30 | 750 | SHT 17 |
| 48 | REMOVE 30" CMP | 100 | LF | 20 | 2,000 | SHT 18 |
| 49 | LOWER 12" WATERLINE D=8'+/- | 20 | LF | 40 | 800 | SHT 19 |
| | **SUB-TOTAL** | | | | **$25,200** | |
| | **TOTAL** | | | | **$393,280** | |

## CHEROKEE WASH CORRIDOR

| ITEM NO. | DESCRIPTION | QTY. | UNIT | UNIT COST | AMOUNT ($) | SHEET NO. |
|---|---|---|---|---|---|---|
| 1 | REMOVE S.S. MANHOLE | 1 | EA | 2,500 | 2,500 | SHT 24 |
| 2 | NEW 5' DIA SMH D=8'+/- | 2 | EA | 5,500 | 11,000 | SHT 24 |
| 3 | NEW 8" VCP S.S. | 70 | LF | 32 | 2,240 | SHT 24 |
| 4 | LOWER 12" WATERLINE D = 9' +/- | 60 | LF | 40 | 2,400 | SHT 25 |
| 5 | REMOVE 36" X 24" CMPA (4) | 280 | LF | 20 | 5,600 | SHT 25 |
| 6 | LOWER GAS LINE D= 11' +/- | 60 | LF | 30 | 1,800 | SHT 25 |
| 7 | LOWER TEL LINE (2 LOCAT.) | 120 | LF | 30 | 3,600 | SHT 25 |
| 8 | NEW 5' DIA SMH D=8'+/- | 1 | EA | 5,500 | 5,500 | SHT 25 |
| 9 | NEW 8" VCP SEWER LINE D=8'+/- | 300 | LF | 32 | 9,600 | SHT 25 |
| 10 | U/G POWER LINE | 60 | LF | 30 | 1,800 | SHT 25 |
| 11 | RELOCATE GAS LINE | 350 | LF | 30 | 10,500 | SHT 26 |
| 12 | LOWER GAS LINE (2 LOCATIONS) | 100 | LF | 30 | 3,000 | SHT 27 |
| 13 | RELOCATE WATERLINE (2 LOCATIONS) | 100 | LF | 32 | 3,200 | SHT 27 |
| | **SUB-TOTAL** | | | | **$62,740** | |

**GRAND TOTAL** **$456,020**

LC 12/10/96
CKD:

12.4.3

# ENERGY DISSIPATOR

HOOK ENGINEERING, INC.

JOB DOUBLE TREE RANCH ROAD
COMPUTATION FOR COST ESTIMATE
ENERGY DISSIPATOR

SHEET NO _____ OF _____
DATE 10-1-96
BY WSS CHKD _____

OUTLET 4-10 x 6

TAILWATER

$Q_{100}$ = 55
$Q_{10}$ = 3

| | |
|---|---|
| VELOCITY | 12.82 fps |
| DISCHARGE | 2615 cfs |
| DEPTH | 5.10 ft |
| SLOPE | 0.002627 ft/ft |

FROUDE NUMBER

$F_r^2 = V^2/gd$

$F_r = V/\sqrt{gd}$

$F_r = 12.82/32.2(5.11)$

$F_r = .99$

SINCE $F_r \leq 1$ TRY CSU RIGID BOUNDARY BASIN HEC 14 CHPT ~~VII~~ A
~~VIII~~ C
VIII B
~~XI~~

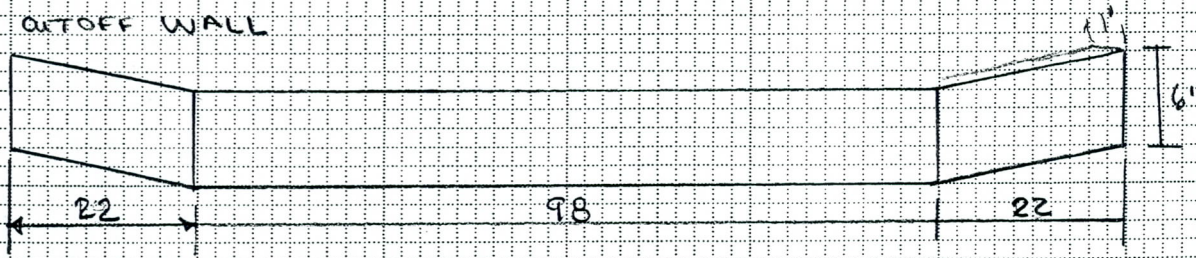
USBR TYBE VI
HOOK TYPE
RIP RAP BASIN

CSU ENERGY DISSIPATOR COST

HEAD WALL

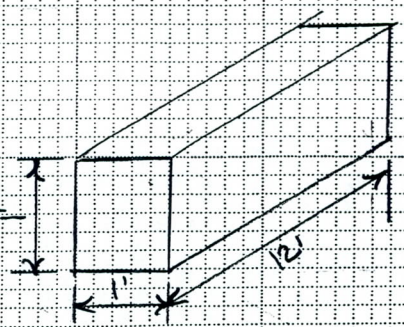
| | | |
|---|---|---|
| FOOTING | 24" x 18" x 98 = | 294 ft³ |
| HEAD | (1 x 1 x 43) 2 = | 86 ft³ |
| WING | (1 x 10 x 24) 2 = | 480 ft³ |
| | | 860 ft³ /27 = 31.85 yd³ |

CUTOFF WALL




(142 x 6 x 1) = 852 ft³ / 27 = 31.56 yd³

BAFFLE BLOCK




$\frac{Y_a}{Y_o} = (.25)$

$Y_a = (.25)5.11$

$Y_a = 1.28$

$h/y_a = .71$ $h = (.71)(1.28)$

$L/h = 6$ $h = .91 \nearrow 1'$

$W_B/W_b = 2$

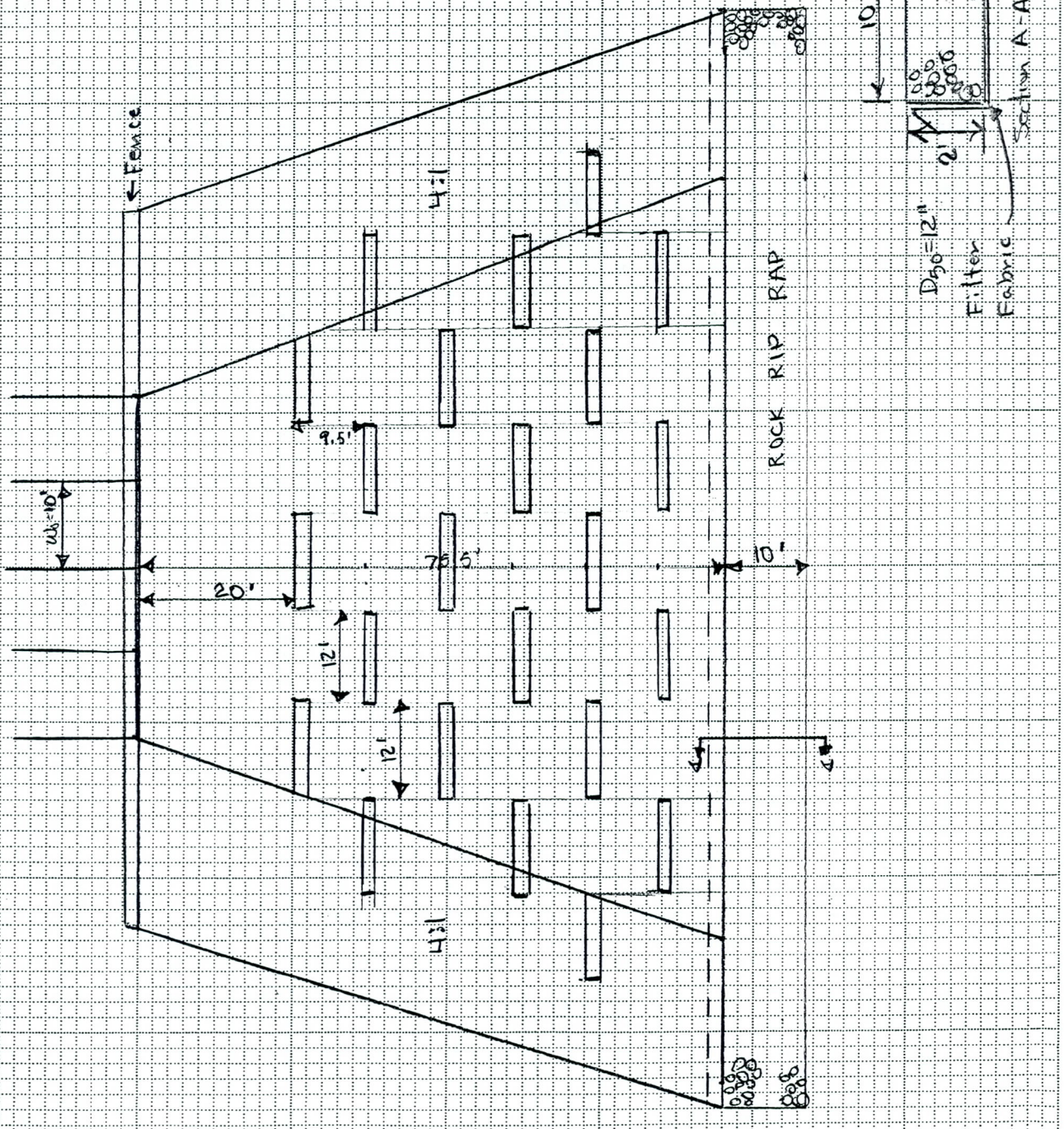
$W_1/W_b = .57$

(1 x 1 x 12) 23 = 276 ft³ / 27 = 10.22 yd³

HOOK ENGINEERING, INC.

JOB DOUBLETREE RANCH ROAD
COMPUTATION FOR COST ESTIMATE
ENERGY DISSIPATOR

SHEET NO. _____ OF _____
DATE 10-1-96
BY WSS CHKD _____

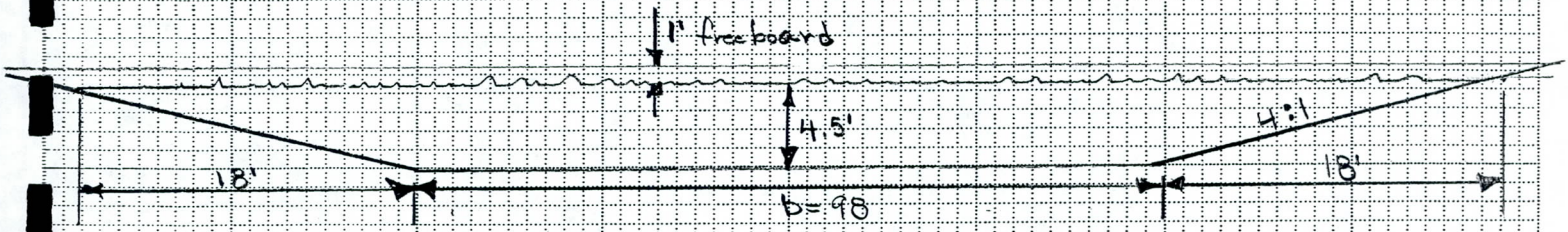



NUMBER BAFFLE BLOCKS = 23

HOOK ENGINEERING, INC.

JOB Doubletree Ranch Road
COMPUTATION FOR Cost Estimate
Energy Dissipator

SHEET NO _____ OF _____
DATE 10-1-96
BY WSS CHKD _____




$Q = VA$

$Q = 2619$

$V = 5 fps$

$A = \frac{2619}{5} = 523.8 \nearrow 524$

$A = (b + zy)y$ $\quad y = 4.5'$ $\quad z = 4$

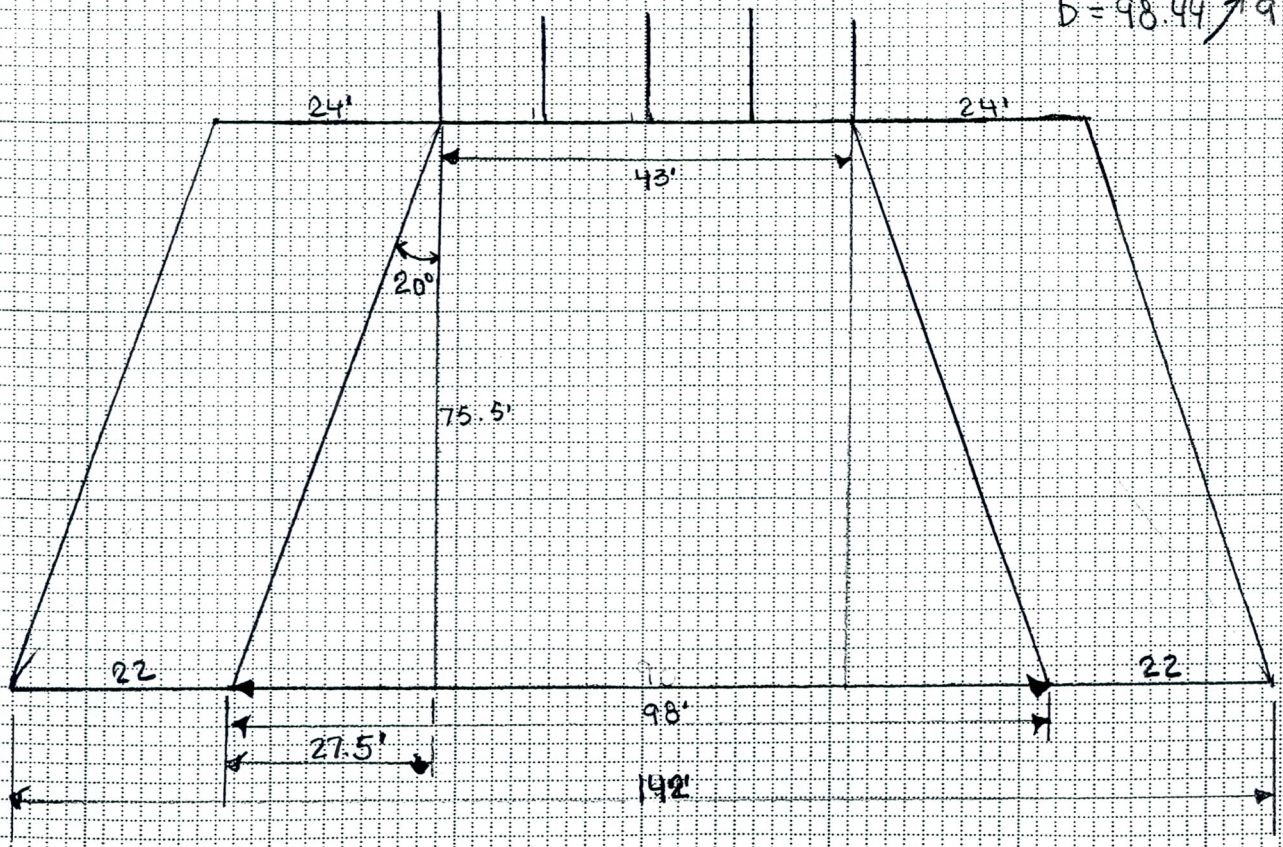
$A = by + zy^2$

$A - zy^2 = by$

$\frac{A - zy^2}{y} = b$

$\frac{524 - (4)(4.5)^2}{4.5} = b$

$b = 98.44 \nearrow 98'$

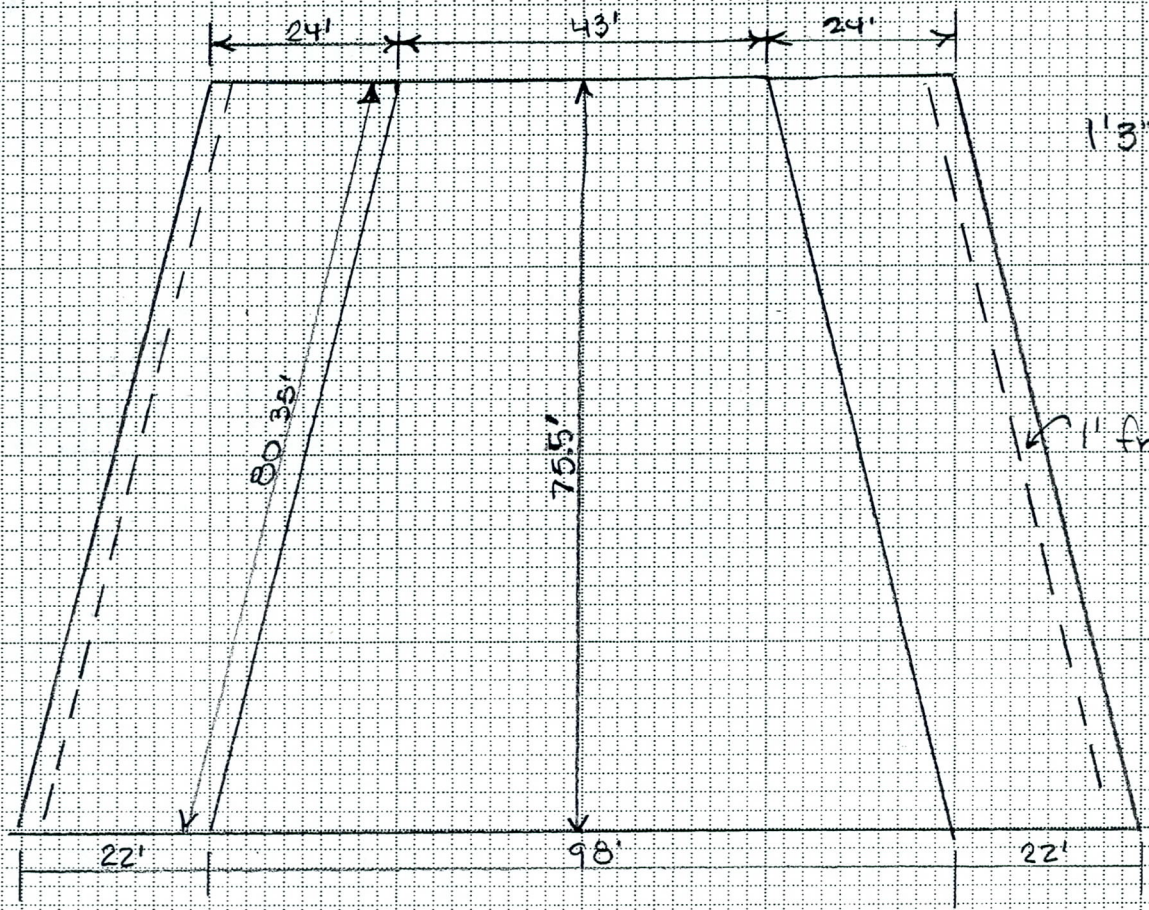


HOOK ENGINEERING, INC.

JOB DOUBLETREE RANCH ROAD
COMPUTATION FOR COST ESTIMATE
ENERGY DISSIPATOR

SHEET NO. _____ OF _____
DATE 10-2-96
BY WSS CHKD _____

CONTINUOUS SPAN SLAB




MAIN SLAB

$(43+98)/2 \times 75.5 \times 1.25 = 6,653\ ft^3 = 246.4\ yd^3$

SIDE SLOPES

$\left[(24+22)/2 \times 80.35 \times 1.25\right]2 = 4,620\ ft^3 = 171.11\ yd^3$

| TOTAL CONCRETE | $yd^3$ |
|---|---|
| HEAD WALL | 31.85 |
| CUT OFF WALL | 31.56 |
| BAFFLE BLOCKS | 10.22 |
| SLAB | 246.40 |
| SIDE SLOPE | 171.11 |
| TOTAL | 491.14 |

$491.14 \times \$300 = \$147,342$

HOOK ENGINEERING, INC.

JOB DOUBLETREE RANCH ROAD
COMPUTATION FOR COST ESTIMATE
ENERGY DISSIPATOR

SHEET NO _____ OF _____
DATE 10-2-96
BY WSS CHKD _____

STEEL (% of Concrete cubic yards)

| Box | CONC | STEEL | steel/conc |
|---|---|---|---|
| 1-10 X6 | 1.262 | 173.4 | 137.40 |
| 2-10 X6 | 2.270 | 330.7 | 145.68 |
| 3-10 X6 | 3.258 | 474.9 | 145.76 |
| 4-10 X6 | 4.246 | 597.7 | 140.77 |
| 5-10 X6 | 5.234 | 752.6 | 143.79 |
| 6-10 X6 | 6.222 | 894.7 | 143.79 |
| TOTAL | 22.492 | 3,224 | 143.34 lbs |
| HEADWALL | | | |
| 10X6 INLET | 11.53 | 876 | 75.97 |
| 10X6 OUTLET | 19.14 | 1396 | 72.94 |
| APRONS (OUTLET) | | | |
| 6 X6 | .57 | 54 | 95.74 |
| 8 X6 | 1.13 | 96 | 85.96 |
| 10 X6 | 1.76 | 143 | 81.25 |
| 12 X12 | 4.42 | 337 | 76.24 |
| | | | 84.79 |

USE 100 lbs / $yd^3$

CONCRETE STEEL #
491.14 X 100 X 0.50 = #24,557

FENCE (HEADWALL)
91 Lm ft X #9.00 /ft = #819 ↗ #1,000

GABIONS
2 X 10 X 142 = 2840 $ft^3$ /27 = 105 $yd^3$ X #100.00 = #10,500

TOTAL ENERGY DISSIPATOR COST.

| | |
|---|---|
| CONCRETE | 147,342 |
| STEEL | 24,557 |
| FENCE | 1,000 |
| GABIONS | 10,500 |
| GRATE | 10,000 |
| | 193,399 ↗ #195,000 |

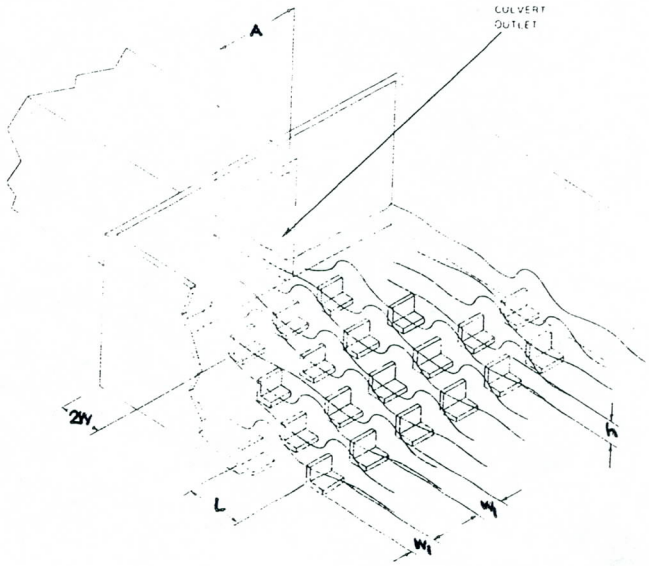



FIGURE VII-A-1. SKETCH OF C.S.U. RIGID BOUNDARY BASIN

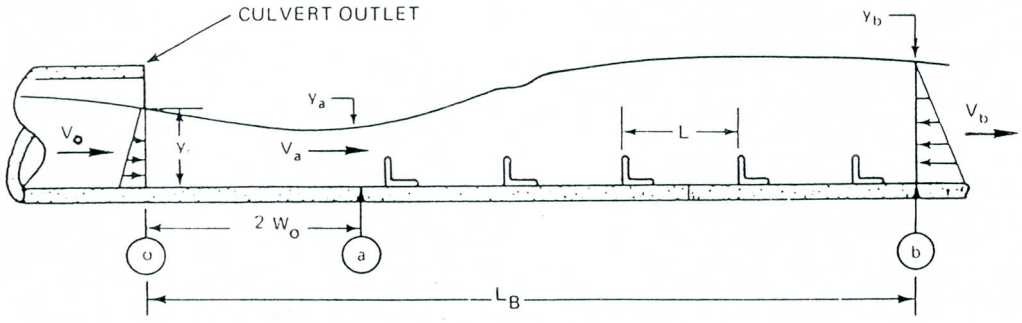
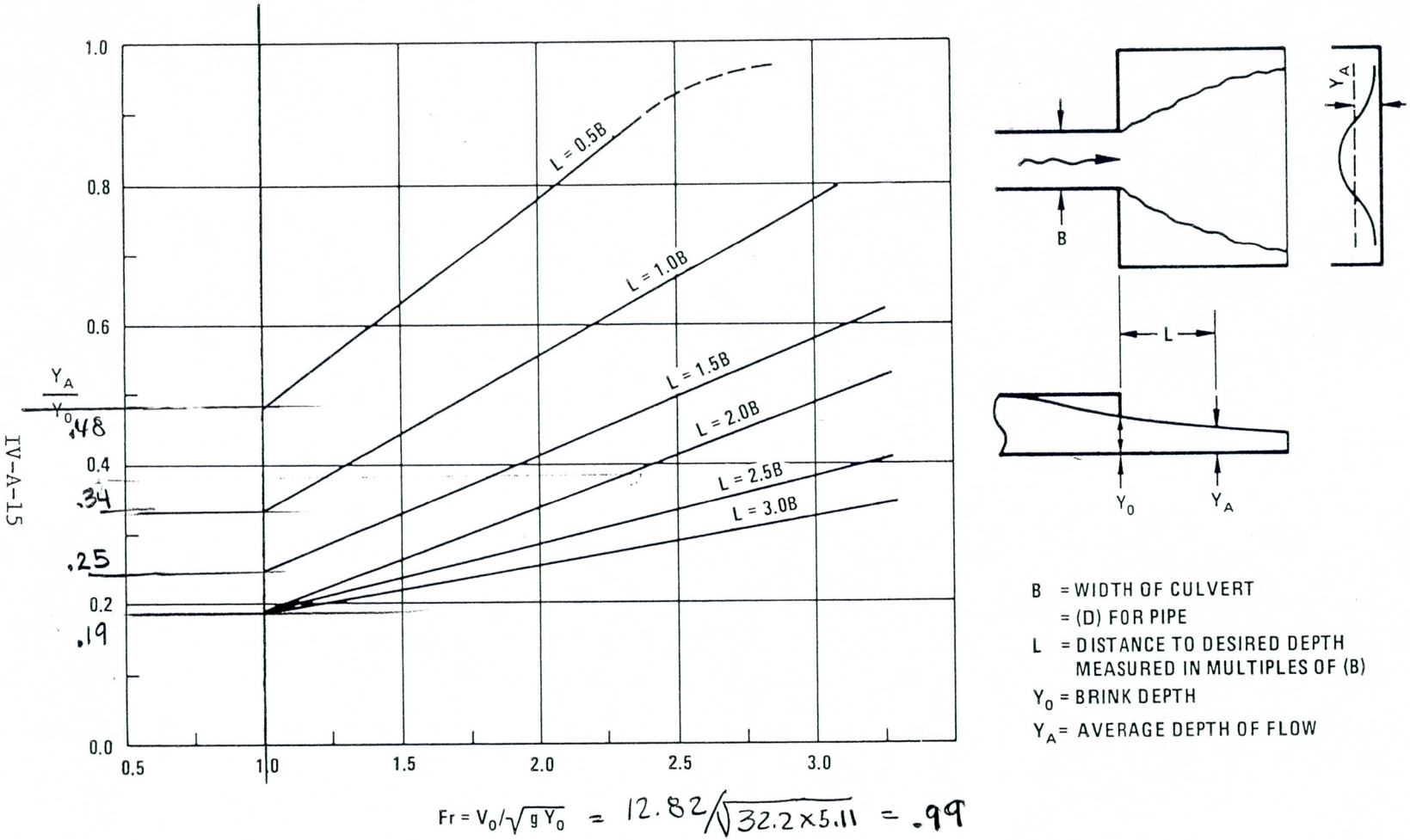



FIGURE VII-A-2. DEFINITIVE SKETCH FOR THE MOMENTUM EQUATION




B = WIDTH OF CULVERT
= (D) FOR PIPE

L = DISTANCE TO DESIRED DEPTH MEASURED IN MULTIPLES OF (B)

$Y_0$ = BRINK DEPTH

$Y_A$ = AVERAGE DEPTH OF FLOW

$Fr = V_0/\sqrt{g\,Y_0} = 12.82/\sqrt{32.2 \times 5.11} = .99$

IV-A-15

## FIGURE IV-A-4. AVERAGE DEPTH FOR ABRUPT EXPANSION BELOW RECTANGULAR CULVERT OUTLET

$\frac{Y_a}{Y_0} = .19 \quad = Y_a = .19(5.11) = .97'$

$.25(5.11) = 1.27'$

$.34(5.11) = 1.74'$

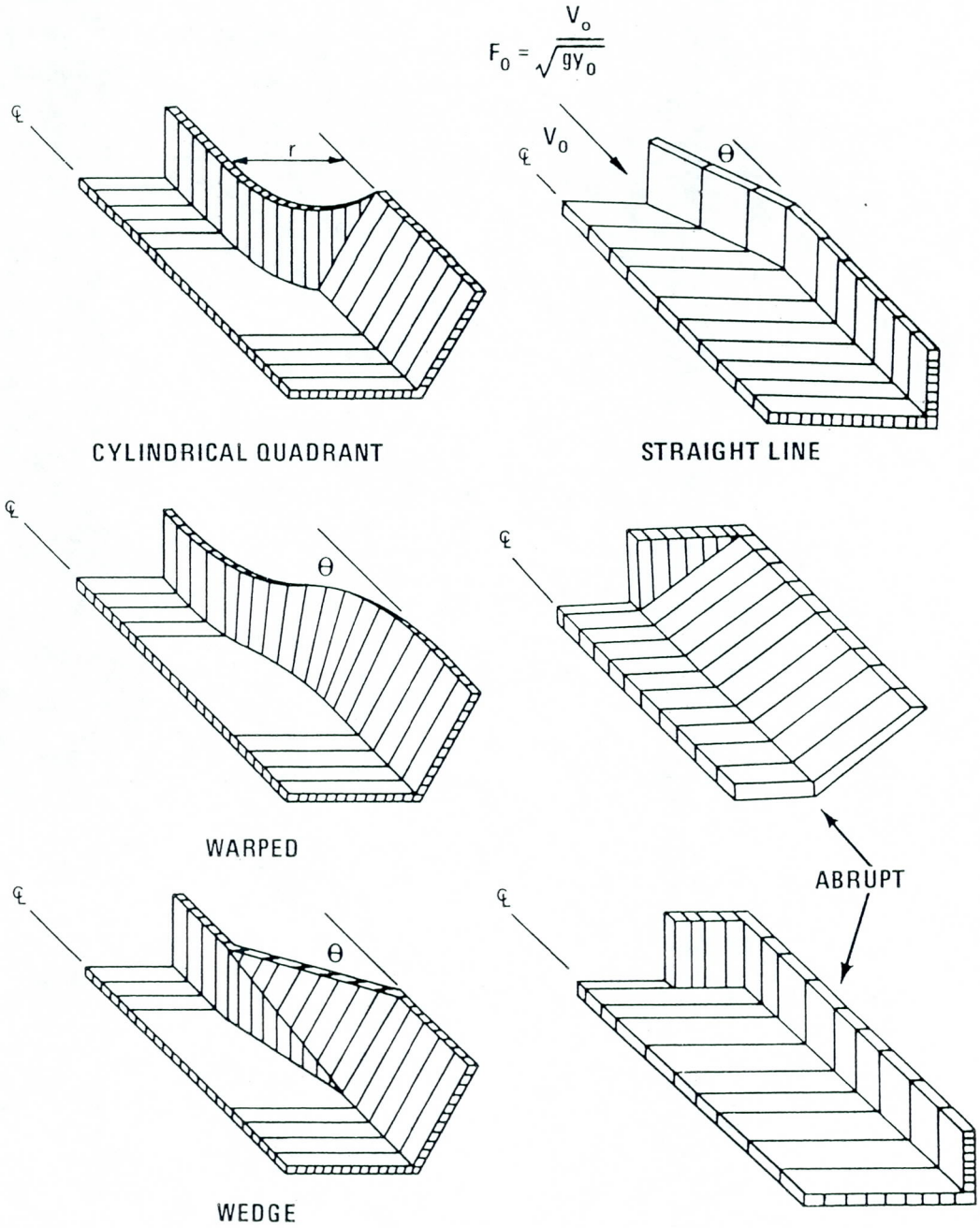



FIGURE IV-1. TRANSITION TYPES

# Detailed Report for Pipe P-1

Section Material: Concrete
Section Shape: Box
Section Size: 10 x 6 ft
Number Sections: 4

| Description | | | Description | | |
|---|---|---|---|---|---|
| Discharge | 2,615.00 | cfs | Capacity | 2,521.84 | cfs |
| Mannings Coefficient | 0.013 | | Hydraulic Drop | 0.06 | ft |
| Length | 145.00 | ft | Energy Slope | 0.003258 | ft/ft |
| Constructed Slope | 0.003655 | ft/ft | Upstream Velocity | 12.81 | ft/s |
| Upstream Flow Time | 15.35 | min | Average Velocity | 12.27 | ft/s |
| Pipe Flow Time | 0.20 | min | Downstream Velocity | 11.73 | ft/s |
| System Flow Time | 15.54 | min | | | |

Grade Elevations

| Location | Invert (ft) | Ground (ft) | Crown (ft) | Cover (ft) | Depth (ft) | HGL (ft) | EGL (ft) |
|---|---|---|---|---|---|---|---|
| Upstream | 1,324.53 | 1,331.00 | 1,330.53 | 0.47 | 5.10 | 1,329.63 | 1,332.18 |
| Downstream | 1,324.00 | 1,331.00 | 1,330.00 | 1.00 | 5.57 | 1,329.57 | 1,331.71 |

Description:
Doubletree Ranch Road
Station 80+49 to Outlet

Messages:
Profile: Steep supercritical frontwater profile (S2).
Profile: Critical depth assumed upstream.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Hook Engineering Inc. 37 Brookside Road Waterbury, CT 06708 USA (203) 755-1666

HOOK ENGINEERING, INC.

JOB DOUBLETREE RANCH ROAD
COMPUTATION FOR COST ESTIMATE
ENERGY DISSIPATOR

SHEET NO _____ OF _____
DATE 10-2-96
BY WSJ CHKD _____

CONSIDER RIP RAP BASIN (HEC 14 CHPT XI)

Tailwater 5.5 $Q_{100}$ 3 $Q_{10}$

$Y_o$ = 5.11

Q = 2619

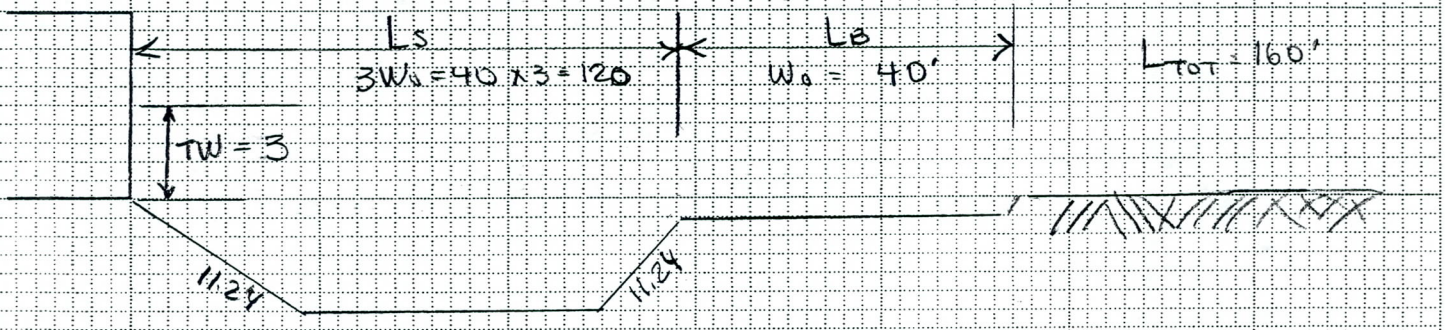
$V_o$ = 12.82

$F_r = V_o / \sqrt{g Y_o}$

$F_r = 12.82 / \sqrt{32.2 \times 5.11}$

$F_r = .99$

$\frac{TW}{Y_o} = Q_{10} = \frac{3}{5.11} = .59 < 0.75$ OK




$d_{50}/Y_o = .25$ $d_{50} = (.25)(5.11) = 1.27$

$d_{50}/Y_o = .35 = (.35)(5.11) = 1.79$

$h_s/Y_c = .3$ $h_s = (.3)(5.11) = 1.53'$

$h_s/Y_c$ 1.1 $= (1.1)(5.11) = 5.62$

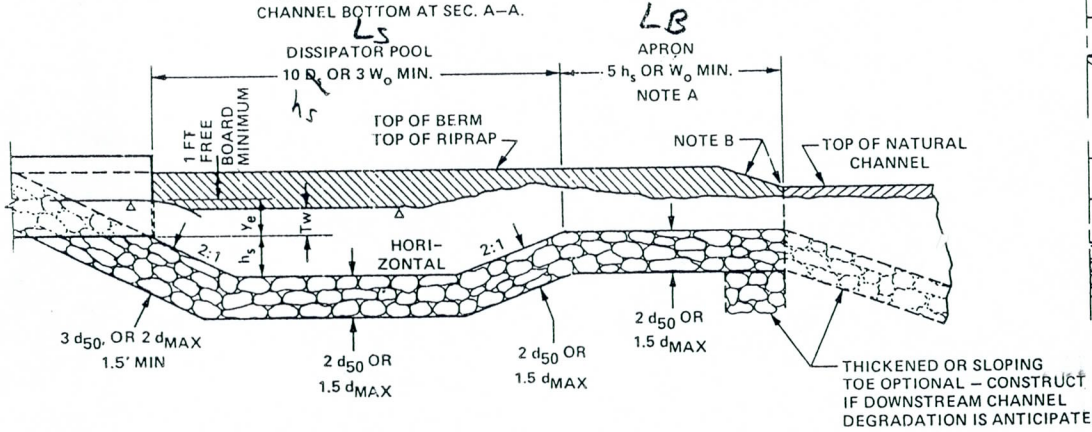
$h_s/d_{50} = \frac{1.53}{1.27} = 1.21$

$h_s/d_{50} = \frac{5.62}{1.79} = 3.14$

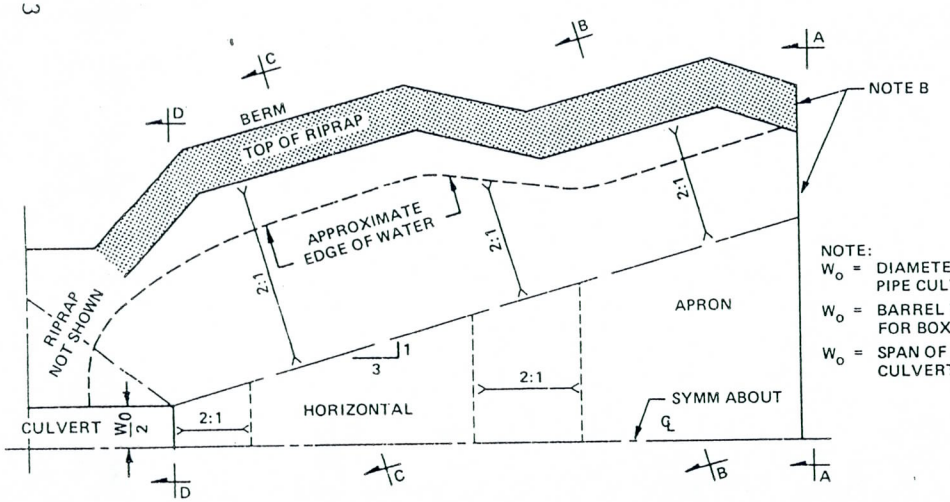
| | | |
|---|---|---|
| Base | 40 X 160 X 3.5 | 22,400 |
| | 54 X 160 X 3.5 | 30,240 |
| Side Slope | (14 X 170 X 3.5) 2 | 16,660 |
| | | 69,300 = 2,566 = 256,666 |

NOTE A -- IF EXIT VELOCITY OF BASIN IS SPECIFIED, EXTEND BASIN AS REQUIRED TO OBTAIN SUFFICIENT CROSS-SECTIONAL AREA AT SECTION A–A SUCH THAT $Q_{des}$/(CROSS SECTION AREA AT SEC. A–A) = SPECIFIED EXIT VELOCITY.

NOTE B -- WARP BASIN TO CONFORM TO NATURAL STREAM CHANNEL. TOP OF RIPRAP IN FLOOR OF BASIN SHOULD BE AT THE SAME ELEVATION OR LOWER THAN NATURAL CHANNEL BOTTOM AT SEC. A–A.

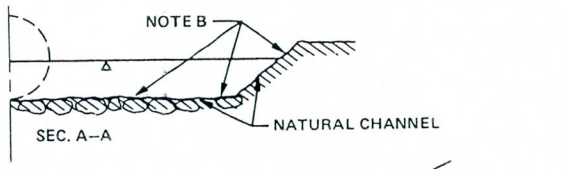


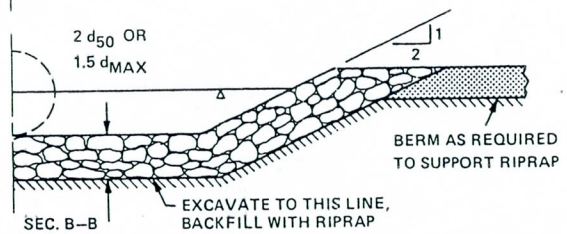

℄ SECTION

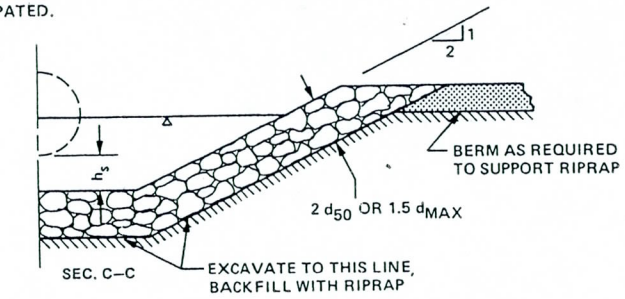



HALF PLAN

NOTE:
$W_o$ = DIAMETER FOR PIPE CULVERT
$W_o$ = BARREL WIDTH FOR BOX CULVERT
$W_o$ = SPAN OF PIPE–ARCH CULVERT



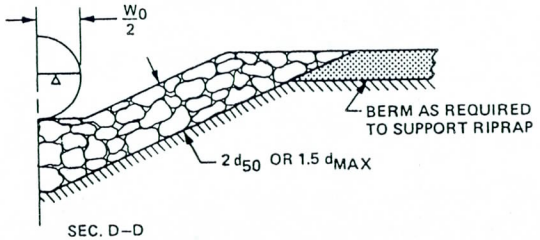




FIGURE X1–1. DETAILS OF RIPRAPPED CULVERT ENERGY BASIN

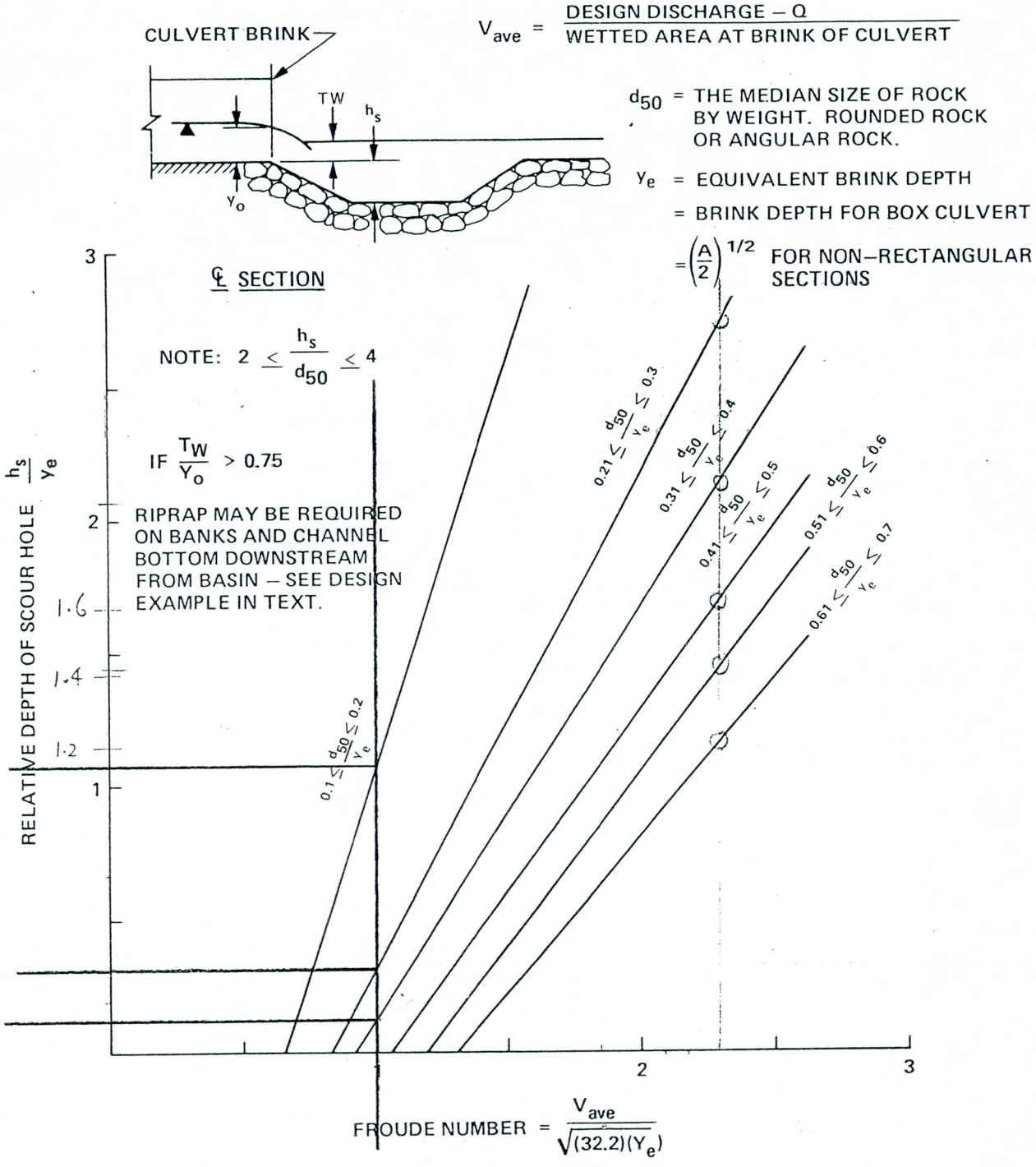



FIGURE X1–2. RELATIVE DEPTH OF SCOUR HOLE VERSUS FROUDE NUMBER AT BRINK OF CULVERT WITH RELATIVE SIZE OF RIPRAP AS A THIRD VARIABLE

TABLE XII-I DISSIPATOR LIMITATIONS

| DISSIPATOR TYPE | Froude number Fr | Allowable Debris | | | Tailwater TW | Special Consideration |
|---|---|---|---|---|---|---|
| | | Silt Sand | Boulders | Floating | | |
| Free Hydraulic Jump | >1 | H | H | H | Required | |
| + CSU Rigid Boundary | <3 | M | L | M | - | |
| Tumbling Flow | >1 | M | L | L | - | $4<S_o<25$ |
| Increased Resistance | - | M | L | L | - | Check Outlet Control HW |
| USBR Type II | 4 to 14 | M | L | M | Required | |
| USBR Type III | 4.5 to 17 | M | L | M | Required | |
| USBR Type IV | 2.5 to 4.5 | M | L | M | Required | |
| + SAF | 1.7 to 17 | M | L | M | Required | |
| Contra Costa | <3 | H | M | M | <0.5D | |
| + Hook | 1.8 to 3 | H | M | M | - | |
| + USBR Type VI | - | M | L | L | Desirable | Q<400 cfs, V<50 fps |
| Forest Service | - | M | L | L | Desirable | D<36 inch |
| Drop Structure | <1 | H | L | M | Required | Drop< 15ft. |
| Manifold | - | M | N | N | Desirable | Note: |
| Corps Stilling Well | - | M | L | N | Desirable | N=none L=low |
| + Riprap | <3 | H | H | H | - | M=moderate H=heavy |

HEC 14

12.4.4

# EXCAVATION, BACKFILL, PAVEMENT REMOVAL AND REPLACEMENT

# DOUBLETREE RANCH ROAD

**PROJECT NO. 2878**

## DOUBLETREE RANCH ROAD STORM DRAIN
## STRUCTURAL EXCAVATION MEASUREMENT

100-year Discharge Doubletree Ranch Road
10-year Discharge Diversion from Cherokee Wash (52nd and 56th Streets)

| PIPE NO. | LENGTH | SIZE | | | | | | | EXCAVATION QUANTITIES | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | NO. BARRELS | SPAN | HEIGHT | TOP/BOTTOM SLAB | TOTAL HEIGHT | WALL THICKNESS | TOTAL WIDTH | INVERT ELEVATION | | GROUND ELEVATION | | AVERAGE END AREA | VOLUME | |
| | | | | | | | | | Upstream | Downstream | Upstream | Downstream | | | |
| | (ft) | | (ft) | (ft) | (ft) | (ft) | (ft) | (FT) | | | | | (sqft) | (cuft) | (cuyd) |
| | | | | | 0 | | | | | | | | | | |
| P1 | 145 | 4 | 10 | 6 | 1.92 | 7.92 | 0.92 | 44.58 | 1324.53 | 1324.00 | 1331.00 | 1331.00 | 375.25 | 54,411 | 2,015 |
| P2 | 390 | 4 | 10 | 6 | 1.92 | 7.92 | 0.92 | 44.58 | 1325.90 | 1324.53 | 1336.00 | 1331.00 | 450.04 | 175,517 | 6,501 |
| P3 | 535 | 4 | 10 | 6 | 1.92 | 7.92 | 0.92 | 44.58 | 1327.90 | 1325.90 | 1338.50 | 1336.00 | 549.69 | 294,082 | 10,892 |
| P4 | 535 | 4 | 10 | 6 | 1.92 | 7.92 | 0.92 | 44.58 | 1329.85 | 1327.90 | 1340.00 | 1338.50 | 550.89 | 294,727 | 10,916 |
| P5 | 425 | 3 | 10 | 6 | 1.92 | 7.92 | 0.92 | 33.67 | 1332.00 | 1329.85 | 1343.50 | 1340.00 | 443.06 | 188,301 | 6,974 |
| P6 | 425 | 3 | 10 | 6 | 1.92 | 7.92 | 0.92 | 33.67 | 1334.15 | 1332.00 | 1344.00 | 1343.50 | 437.46 | 185,921 | 6,886 |
| P7 | 425 | 3 | 10 | 6 | 1.92 | 7.92 | 0.92 | 33.67 | 1336.30 | 1334.15 | 1347.00 | 1344.00 | 422.53 | 179,574 | 6,651 |
| P8 | 442 | 3 | 10 | 6 | 1.92 | 7.92 | 0.92 | 33.67 | 1338.53 | 1336.30 | 1349.00 | 1347.00 | 434.10 | 191,873 | 7,106 |
| P9 | 441 | 3 | 10 | 6 | 1.92 | 7.92 | 0.92 | 33.67 | 1340.77 | 1338.53 | 1352.00 | 1349.00 | 444.00 | 195,802 | 7,252 |
| P10 | 441 | 3 | 10 | 6 | 1.92 | 7.92 | 0.92 | 33.67 | 1343.00 | 1340.77 | 1356.00 | 1352.00 | 491.23 | 216,631 | 8,023 |
| P11 | 516 | 1 | 8 | 6 | 1.67 | 7.67 | 0.92 | 9.83 | 1348.30 | 1343.00 | 1360.00 | 1356.00 | 178.02 | 91,858 | 3,402 |
| P12 | 516 | 1 | 8 | 6 | 1.67 | 7.67 | 0.92 | 9.83 | 1353.60 | 1348.30 | 1365.00 | 1360.00 | 167.22 | 86,284 | 3,196 |
| P13 | 516 | 1 | 8 | 6 | 1.67 | 7.67 | 0.92 | 9.83 | 1358.90 | 1353.60 | 1370.00 | 1365.00 | 163.17 | 84,193 | 3,118 |
| P14 | 516 | 1 | 8 | 6 | 1.67 | 7.67 | 0.92 | 9.83 | 1364.20 | 1358.90 | 1375.00 | 1370.00 | 159.11 | 82,103 | 3,041 |
| P15 | 516 | 1 | 8 | 6 | 1.67 | 7.67 | 0.92 | 9.83 | 1369.50 | 1364.20 | 1380.00 | 1375.00 | 155.06 | 80,013 | 2,963 |
| P16 | 105 | 2 | 8 | 4 | 1.75 | 5.75 | 0.75 | 18.25 | 1374.80 | 1369.50 | 1382.00 | 1380.00 | 215.00 | 22,575 | 836 |
| P17 | 348 | 2 | 8 | 4 | 1.75 | 5.75 | 0.75 | 18.25 | 1382.00 | 1374.80 | 1388.00 | 1382.00 | 165.68 | 57,656 | 2,135 |
| P18 | 443 | 2 | 8 | 4 | 1.75 | 5.75 | 0.75 | 18.25 | 1390.00 | 1382.00 | 1397.00 | 1388.00 | 163.49 | 72,425 | 2,682 |
| P29 | 405 | 3 | 8 | 6 | 1.75 | 7.75 | 0.75 | 27.00 | 1348.50 | 1346.00 | 1360.00 | 1357.00 | 374.43 | 151,644 | 5,616 |
| P30 | 405 | 2 | 8 | 5 | 1.75 | 6.75 | 0.75 | 18.25 | 1351.65 | 1349.50 | 1362.50 | 1360.00 | 255.00 | 103,276 | 3,825 |
| P31 | 536 | 2 | 8 | 5 | 1.75 | 6.75 | 0.75 | 18.25 | 1354.50 | 1351.65 | 1367.00 | 1362.50 | 276.92 | 148,431 | 5,497 |
| P32 | 415 | 1 | 8 | 5 | 1.75 | 6.75 | 0.92 | 9.83 | 1359.67 | 1354.50 | 1370.00 | 1367.00 | 165.39 | 68,638 | 2,542 |
| P33 | 415 | 1 | 8 | 5 | 1.75 | 6.75 | 0.92 | 9.83 | 1364.83 | 1359.67 | 1373.00 | 1370.00 | 136.16 | 56,506 | 2,093 |
| P34 | 415 | 1 | 8 | 5 | 1.75 | 6.75 | 0.92 | 9.83 | 1370.00 | 1364.83 | 1378.00 | 1373.00 | 120.43 | 49,977 | 1,851 |
| P39 | 270 | 1 | 8 | 5 | 1.75 | 6.75 | 0.92 | 9.83 | 1332.32 | 1330.85 | 1342.00 | 1340.00 | 138.39 | 37,364 | 1,384 |
| P40 | 525 | 1 | 8 | 5 | 1.67 | 6.67 | 0.92 | 9.83 | 1335.17 | 1332.32 | 1343.00 | 1342.00 | 129.47 | 67,974 | 2,518 |
| P41 | 525 | 1 | 8 | 5 | 1.67 | 6.67 | 0.92 | 9.83 | 1338.02 | 1335.17 | 1346.00 | 1343.00 | 118.00 | 61,948 | 2,294 |
| P42 | 460 | 1 | 8 | 5 | 1.67 | 6.67 | 0.92 | 9.83 | 1340.52 | 1338.02 | 1346.50 | 1346.00 | 105.51 | 48,533 | 1,798 |
| P43 | 90 | 1 | 8 | 5 | 1.67 | 6.67 | 0.92 | 9.83 | 1341.00 | 1340.52 | 1347.00 | 1346.50 | 92.14 | 8,292 | 307 |
| P44 | 428 | 1 | 10 | 6 | 1.67 | 7.67 | 1.08 | 12.17 | 1344.58 | 1343.00 | 1356.00 | 1356.00 | 206.56 | 88,409 | 3,274 |
| P45 | 428 | 1 | 10 | 6 | 1.67 | 7.67 | 1.08 | 12.17 | 1346.17 | 1344.58 | 1356.00 | 1356.00 | 181.46 | 77,666 | 2,877 |
| P46 | 428 | 1 | 10 | 6 | 1.67 | 7.67 | 1.08 | 12.17 | 1347.75 | 1346.17 | 1356.00 | 1356.00 | 156.36 | 66,922 | 2,479 |
| P47 | 67 | 1 | 10 | 6 | 1.67 | 7.67 | 1.08 | 12.17 | 1348.00 | 1347.75 | 1356.50 | 1356.00 | 145.83 | 9,771 | 362 |
| P25 | 333 | 3 | 8 | 6 | 1.67 | 7.67 | 0.92 | 27.67 | 1343.76 | 1343.00 | 1356.50 | 1356.00 | 433.33 | 144,300 | 5,344 |
| P26 | 332 | 3 | 8 | 6 | 1.67 | 7.67 | 0.92 | 27.67 | 1344.53 | 1343.76 | 1355.00 | 1356.50 | 393.69 | 130,706 | 4,841 |
| P27 | 320 | 3 | 8 | 6 | 1.67 | 7.67 | 0.92 | 27.67 | 1345.26 | 1344.53 | 1356.00 | 1355.00 | 362.36 | 115,954 | 4,295 |
| P28 | 320 | 3 | 8 | 6 | 1.67 | 7.67 | 0.92 | 27.67 | 1346.00 | 1345.26 | 1357.00 | 1356.00 | 370.66 | 118,611 | 4,393 |
| | | | | | | | | | | | | | | TOTAL | 152,180 |

| WALL THICKNESS | | | SLAB THICKNESS | | | | |
|---|---|---|---|---|---|---|---|
| | | | TOP | | BOTTOM | | TOTAL |
| SIZE | INCHES | FEET | (inches) | (feet) | (inches) | (feet) | THICKNESS |
| 4-10X6 | 11 | 0.92 | 10.50 | 0.88 | 12.50 | 1.04 | 1.92 |
| 3-10X6 | 11 | 0.92 | 10.50 | 0.88 | 12.50 | 1.04 | 1.92 |
| 3-8X6 | 9 | 0.75 | 9.50 | 0.79 | 11.50 | 0.96 | 1.75 |
| 2-8X5 | 9 | 0.75 | 9.50 | 0.79 | 11.50 | 0.96 | 1.75 |
| 2-8X4 | 9 | 0.75 | 9.50 | 0.79 | 11.50 | 0.96 | 1.75 |
| 10X6 | 13 | 1.08 | 10.00 | 0.83 | 10.00 | 0.83 | 1.67 |
| 8X6 | 11 | 0.92 | 10.00 | 0.83 | 10.00 | 0.83 | 1.67 |
| 8X5 | 11 | 0.92 | 10.00 | 0.83 | 10.00 | 0.83 | 1.67 |

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# DOUBLETREE RANCH ROAD

**PROJECT NO. 2878**

## DOUBLETREE RANCH ROAD STORM DRAIN
## STRUCTURAL BACKFILL MEASUREMENT

100-year Discharge Doubletree Ranch Road
10-year Discharge Diversion from Cherokee Wash (52nd and 56th Streets)

| PIPE NO. | LENGTH | SIZE | | | | | BACKFILL QUANTITIES | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | NO. BARRELS | SPAN | HEIGHT | TOP/BOTTOM SLAB | TOTAL HEIGHT | 1'10"Bottom(2X) X Tot. Height | Side Slope 1.5 x Tot. Height | Tot. Height x Side Slope | Area/foot | Volume | |
| | (ft) | | (ft) | (ft) | (ft) | (ft) | (sqft) | (ft) | (sqft) | (sqft) | (cuft) | (cuyd) |
| P1 | 145 | 4 | 10 | 6 | 1.92 | 7.92 | 28.98 | 11.88 | 94.01 | 122.99 | 17,833 | 660 |
| P2 | 390 | 4 | 10 | 6 | 1.92 | 7.92 | 28.98 | 11.88 | 94.01 | 122.99 | 47,964 | 1,776 |
| P3 | 535 | 4 | 10 | 6 | 1.92 | 7.92 | 28.98 | 11.88 | 94.01 | 122.99 | 65,797 | 2,437 |
| P4 | 535 | 4 | 10 | 6 | 1.92 | 7.92 | 28.98 | 11.88 | 94.01 | 122.99 | 65,797 | 2,437 |
| P5 | 425 | 3 | 10 | 6 | 1.92 | 7.92 | 28.98 | 11.88 | 94.01 | 122.99 | 52,269 | 1,936 |
| P6 | 425 | 3 | 10 | 6 | 1.92 | 7.92 | 28.98 | 11.88 | 94.01 | 122.99 | 52,269 | 1,936 |
| P7 | 425 | 3 | 10 | 6 | 1.92 | 7.92 | 28.98 | 11.88 | 94.01 | 122.99 | 52,269 | 1,936 |
| P8 | 442 | 3 | 10 | 6 | 1.92 | 7.92 | 28.98 | 11.88 | 94.01 | 122.99 | 54,360 | 2,013 |
| P9 | 441 | 3 | 10 | 6 | 1.92 | 7.92 | 28.98 | 11.88 | 94.01 | 122.99 | 54,237 | 2,009 |
| P10 | 441 | 3 | 10 | 6 | 1.92 | 7.92 | 28.98 | 11.88 | 94.01 | 122.99 | 54,237 | 2,009 |
| P11 | 516 | 1 | 8 | 6 | 1.67 | 7.67 | 28.06 | 11.50 | 88.17 | 116.23 | 59,973 | 2,221 |
| P12 | 516 | 1 | 8 | 6 | 1.67 | 7.67 | 28.06 | 11.50 | 88.17 | 116.23 | 59,973 | 2,221 |
| P13 | 516 | 1 | 8 | 6 | 1.67 | 7.67 | 28.06 | 11.50 | 88.17 | 116.23 | 59,973 | 2,221 |
| P14 | 516 | 1 | 8 | 6 | 1.67 | 7.67 | 28.06 | 11.50 | 88.17 | 116.23 | 59,973 | 2,221 |
| P15 | 516 | 1 | 8 | 6 | 1.67 | 7.67 | 28.06 | 11.50 | 88.17 | 116.23 | 59,973 | 2,221 |
| P16 | 105 | 2 | 8 | 4 | 1.75 | 5.75 | 21.05 | 8.63 | 49.59 | 70.64 | 7,417 | 275 |
| P17 | 348 | 2 | 8 | 4 | 1.75 | 5.75 | 21.05 | 8.63 | 49.59 | 70.64 | 24,582 | 910 |
| P18 | 443 | 2 | 8 | 4 | 1.75 | 5.75 | 21.05 | 8.63 | 49.59 | 70.64 | 31,293 | 1,159 |
| P25 | 333 | 3 | 8 | 6 | 1.75 | 7.75 | 28.37 | 11.63 | 90.09 | 118.46 | 39,447 | 1,461 |
| P26 | 332 | 3 | 8 | 6 | 1.75 | 7.75 | 28.37 | 11.63 | 90.09 | 118.46 | 39,328 | 1,457 |
| P27 | 320 | 3 | 8 | 6 | 1.75 | 7.75 | 28.37 | 11.63 | 90.09 | 118.46 | 37,907 | 1,404 |
| P28 | 320 | 3 | 8 | 6 | 1.75 | 7.75 | 28.37 | 11.63 | 90.09 | 118.46 | 37,907 | 1,404 |
| P29 | 405 | 3 | 8 | 6 | 1.75 | 7.75 | 28.37 | 11.63 | 90.09 | 118.46 | 47,976 | 1,777 |
| P30 | 405 | 2 | 8 | 5 | 1.75 | 6.75 | 24.71 | 10.13 | 68.34 | 93.05 | 37,685 | 1,396 |
| P31 | 536 | 2 | 8 | 5 | 1.75 | 6.75 | 24.71 | 10.13 | 68.34 | 93.05 | 49,874 | 1,847 |
| P32 | 415 | 1 | 8 | 5 | 1.67 | 6.67 | 24.40 | 10.00 | 66.67 | 91.07 | 37,793 | 1,400 |
| P33 | 415 | 1 | 8 | 5 | 1.67 | 6.67 | 24.40 | 10.00 | 66.67 | 91.07 | 37,793 | 1,400 |
| P34 | 415 | 1 | 8 | 5 | 1.67 | 6.67 | 24.40 | 10.00 | 66.67 | 91.07 | 37,793 | 1,400 |
| P39 | 270 | 1 | 8 | 5 | 1.67 | 6.67 | 24.40 | 10.00 | 66.67 | 91.07 | 24,588 | 911 |
| P40 | 525 | 1 | 8 | 5 | 1.67 | 6.67 | 24.40 | 10.00 | 66.67 | 91.07 | 47,810 | 1,771 |
| P41 | 525 | 1 | 8 | 5 | 1.67 | 6.67 | 24.40 | 10.00 | 66.67 | 91.07 | 47,810 | 1,771 |
| P42 | 460 | 1 | 8 | 5 | 1.67 | 6.67 | 24.40 | 10.00 | 66.67 | 91.07 | 41,891 | 1,552 |
| P43 | 90 | 1 | 8 | 5 | 1.67 | 6.67 | 24.40 | 10.00 | 66.67 | 91.07 | 8,196 | 304 |
| P44 | 428 | 1 | 10 | 6 | 1.67 | 7.67 | 28.06 | 11.50 | 88.17 | 116.23 | 49,745 | 1,842 |
| P45 | 428 | 1 | 10 | 6 | 1.67 | 7.67 | 28.06 | 11.50 | 88.17 | 116.23 | 49,745 | 1,842 |
| P46 | 428 | 1 | 10 | 6 | 1.67 | 7.67 | 28.06 | 11.50 | 88.17 | 116.23 | 49,745 | 1,842 |
| P47 | 67 | 1 | 10 | 6 | 1.67 | 7.67 | 28.06 | 11.50 | 88.17 | 116.23 | 7,787 | 288 |

TOTAL 59,667

| SLAB THICKNESS | | | | | |
|---|---|---|---|---|---|
| BARREL | TOP | | BOTTOM | | TOTAL |
| SIZE | (inches) | (feet) | (inches) | (feet) | THICKNESS |
| 4-10X6 | 10.5 | 0.88 | 12.50 | 1.04 | 1.92 |
| 3-10X6 | 10.5 | 0.88 | 12.50 | 1.04 | 1.92 |
| 3-8X6 | 9.5 | 0.79 | 11.50 | 0.96 | 1.75 |
| 2-8X5 | 9.5 | 0.79 | 11.50 | 0.96 | 1.75 |
| 2-8X4 | 9.5 | 0.79 | 11.50 | 0.96 | 1.75 |
| 10X6 | 10 | 0.83 | 10.00 | 0.83 | 1.67 |
| 8X6 | 10 | 0.83 | 10.00 | 0.83 | 1.67 |
| 8X5 | 10 | 0.83 | 10.00 | 0.83 | 1.67 |

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# DOUBLETREE RANCH ROAD

**PROJECT NO. 2878**

## DOUBLETREE RANCH ROAD STORM DRAIN
## PAVEMENT REMOVAL AND REPLACEMENT

100-year Discharge Doubletree Ranch Road
10-year Discharge Diversion from Cherokee Wash (52nd and 56th Streets)

| PIPE NO. | LENGTH | SIZE | | | | | | | ROAD REMOVAL AND REPLACEMENT | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | NO. BARRELS | SPAN | HEIGHT | TOP/BOTTOM SLAB | TOTAL HEIGHT | WALL THICKNESS | TOTAL WIDTH | INVERT ELEVATION | | GROUND ELEVATION | | AVERAGE DEPTH | SIDE SLOPE | BOTTOM WIDTH CUT | CUT TOP WIDTH | AREA |
| | | | | | | | | | Upstream | Downstream | Upstream | Downstream | | 1.5:1 | | | |
| | (ft) | | (ft) | (ft) | (ft) | (ft) | (ft) | (FT) | | | | | (ft) | | (ft) | (ft) | (sqyd) |
| P1 | 145 | 4 | 10 | 6 | 1.92 | 7.92 | 0.92 | 44.58 | 1324.53 | 1324.00 | 1331.00 | 1331.00 | 7.78 | 11.67 | 48.25 | 71.58 | 1,153 |
| P2 | 390 | 4 | 10 | 6 | 1.92 | 7.92 | 0.92 | 44.58 | 1325.90 | 1324.53 | 1336.00 | 1331.00 | 9.33 | 13.99 | 48.25 | 76.23 | 3,303 |
| P3 | 535 | 4 | 10 | 6 | 1.92 | 7.92 | 0.92 | 44.58 | 1327.90 | 1325.90 | 1338.50 | 1336.00 | 11.39 | 17.09 | 48.25 | 82.43 | 4,900 |
| P4 | 535 | 4 | 10 | 6 | 1.92 | 7.92 | 0.92 | 44.58 | 1329.85 | 1327.90 | 1340.00 | 1338.50 | 11.42 | 17.13 | 48.25 | 82.50 | 4,904 |
| P5 | 425 | 3 | 10 | 6 | 1.92 | 7.92 | 0.92 | 33.67 | 1332.00 | 1329.85 | 1343.50 | 1340.00 | 11.87 | 17.80 | 37.34 | 72.94 | 3,444 |
| P6 | 425 | 3 | 10 | 6 | 1.92 | 7.92 | 0.92 | 33.67 | 1334.15 | 1332.00 | 1344.00 | 1343.50 | 11.72 | 17.58 | 37.34 | 72.49 | 3,423 |
| P7 | 425 | 3 | 10 | 6 | 1.92 | 7.92 | 0.92 | 33.67 | 1336.30 | 1334.15 | 1347.00 | 1344.00 | 11.32 | 16.98 | 37.34 | 71.29 | 3,366 |
| P8 | 442 | 3 | 10 | 6 | 1.92 | 7.92 | 0.92 | 33.67 | 1338.53 | 1336.30 | 1349.00 | 1347.00 | 11.63 | 17.44 | 37.34 | 72.22 | 3,547 |
| P9 | 441 | 3 | 10 | 6 | 1.92 | 7.92 | 0.92 | 33.67 | 1340.77 | 1338.53 | 1352.00 | 1349.00 | 11.89 | 17.84 | 37.34 | 73.01 | 3,578 |
| P10 | 441 | 3 | 10 | 6 | 1.92 | 7.92 | 0.92 | 33.67 | 1343.00 | 1340.77 | 1356.00 | 1352.00 | 13.16 | 19.74 | 37.34 | 76.81 | 3,764 |
| P11 | 516 | 1 | 8 | 6 | 1.67 | 7.67 | 0.92 | 9.83 | 1348.30 | 1343.00 | 1360.00 | 1356.00 | 13.18 | 19.77 | 13.50 | 53.05 | 3,042 |
| P12 | 516 | 1 | 8 | 6 | 1.67 | 7.67 | 0.92 | 9.83 | 1353.60 | 1348.30 | 1365.00 | 1360.00 | 12.38 | 18.58 | 13.50 | 50.65 | 2,904 |
| P13 | 516 | 1 | 8 | 6 | 1.67 | 7.67 | 0.92 | 9.83 | 1358.90 | 1353.60 | 1370.00 | 1365.00 | 12.08 | 18.12 | 13.50 | 49.75 | 2,853 |
| P14 | 516 | 1 | 8 | 6 | 1.67 | 7.67 | 0.92 | 9.83 | 1364.20 | 1358.90 | 1375.00 | 1370.00 | 11.78 | 17.67 | 13.50 | 48.85 | 2,801 |
| P15 | 516 | 1 | 8 | 6 | 1.67 | 7.67 | 0.92 | 9.83 | 1369.50 | 1364.20 | 1380.00 | 1375.00 | 11.48 | 17.23 | 13.50 | 47.95 | 2,749 |
| P16 | 105 | 2 | 8 | 4 | 1.75 | 5.75 | 0.75 | 18.25 | 1374.80 | 1369.50 | 1382.00 | 1380.00 | 9.81 | 14.71 | 21.92 | 51.34 | 599 |
| P17 | 348 | 2 | 8 | 4 | 1.75 | 5.75 | 0.75 | 18.25 | 1382.00 | 1374.80 | 1388.00 | 1382.00 | 7.56 | 11.34 | 21.92 | 44.59 | 1,724 |
| P18 | 443 | 2 | 8 | 4 | 1.75 | 5.75 | 0.75 | 18.25 | 1390.00 | 1382.00 | 1397.00 | 1388.00 | 7.46 | 11.19 | 21.92 | 44.29 | 2,180 |
| P29 | 405 | 3 | 8 | 6 | 1.75 | 7.75 | 0.75 | 27.00 | 1348.50 | 1346.00 | 1360.00 | 1357.00 | 12.08 | 18.12 | 30.67 | 66.92 | 3,011 |
| P30 | 405 | 2 | 8 | 5 | 1.75 | 6.75 | 0.75 | 18.25 | 1351.65 | 1349.50 | 1362.50 | 1360.00 | 11.63 | 17.45 | 21.92 | 56.82 | 2,557 |
| P31 | 536 | 2 | 8 | 5 | 1.75 | 6.75 | 0.75 | 18.25 | 1354.50 | 1351.65 | 1367.00 | 1362.50 | 12.63 | 18.95 | 21.92 | 59.82 | 3,563 |
| P32 | 415 | 1 | 8 | 5 | 1.75 | 6.75 | 0.92 | 9.83 | 1359.67 | 1354.50 | 1370.00 | 1367.00 | 12.25 | 18.37 | 13.50 | 50.25 | 2,317 |
| P33 | 415 | 1 | 8 | 5 | 1.75 | 6.75 | 0.92 | 9.83 | 1364.83 | 1359.67 | 1373.00 | 1370.00 | 10.08 | 15.12 | 13.50 | 43.75 | 2,018 |
| P34 | 415 | 1 | 8 | 5 | 1.75 | 6.75 | 0.92 | 9.83 | 1370.00 | 1364.83 | 1378.00 | 1373.00 | 8.92 | 13.38 | 13.50 | 40.26 | 1,856 |
| P39 | 270 | 1 | 8 | 5 | 1.75 | 6.75 | 0.92 | 9.83 | 1332.32 | 1330.85 | 1342.00 | 1340.00 | 10.25 | 15.37 | 13.50 | 44.25 | 1,327 |
| P40 | 525 | 1 | 8 | 5 | 1.67 | 6.67 | 0.92 | 9.83 | 1335.17 | 1332.32 | 1343.00 | 1342.00 | 9.59 | 14.38 | 13.50 | 42.27 | 2,466 |
| P41 | 525 | 1 | 8 | 5 | 1.67 | 6.67 | 0.92 | 9.83 | 1338.02 | 1335.17 | 1346.00 | 1343.00 | 8.74 | 13.11 | 13.50 | 39.72 | 2,317 |
| P42 | 460 | 1 | 8 | 5 | 1.67 | 6.67 | 0.92 | 9.83 | 1340.52 | 1338.02 | 1346.50 | 1346.00 | 7.81 | 11.72 | 13.50 | 36.94 | 1,888 |
| P43 | 90 | 1 | 8 | 5 | 1.67 | 6.67 | 0.92 | 9.83 | 1341.00 | 1340.52 | 1347.00 | 1346.50 | 6.82 | 10.23 | 13.50 | 33.97 | 340 |
| P44 | 428 | 1 | 10 | 6 | 1.67 | 7.67 | 1.08 | 12.17 | 1344.58 | 1343.00 | 1356.00 | 1356.00 | 13.04 | 19.56 | 15.84 | 54.97 | 2,614 |
| P45 | 428 | 1 | 10 | 6 | 1.67 | 7.67 | 1.08 | 12.17 | 1346.17 | 1344.58 | 1356.00 | 1356.00 | 11.46 | 17.19 | 15.84 | 50.21 | 2,388 |
| P46 | 428 | 1 | 10 | 6 | 1.67 | 7.67 | 1.08 | 12.17 | 1347.75 | 1346.17 | 1356.00 | 1356.00 | 9.87 | 14.81 | 15.84 | 45.46 | 2,162 |
| P47 | 67 | 1 | 10 | 6 | 1.67 | 7.67 | 1.08 | 12.17 | 1348.00 | 1347.75 | 1356.50 | 1356.00 | 9.21 | 13.81 | 15.84 | 43.46 | 324 |
| P25 | 333 | 3 | 8 | 6 | 1.67 | 7.67 | 0.92 | 27.67 | 1343.76 | 1343.00 | 1356.50 | 1356.00 | 13.83 | 20.74 | 31.34 | 72.82 | 2,694 |
| P26 | 332 | 3 | 8 | 6 | 1.67 | 7.67 | 0.92 | 27.67 | 1344.53 | 1343.76 | 1355.00 | 1356.50 | 12.56 | 18.84 | 31.34 | 69.03 | 2,546 |
| P27 | 320 | 3 | 8 | 6 | 1.67 | 7.67 | 0.92 | 27.67 | 1345.26 | 1344.53 | 1356.00 | 1355.00 | 11.56 | 17.34 | 31.34 | 66.03 | 2,348 |
| P28 | 320 | 3 | 8 | 6 | 1.67 | 7.67 | 0.92 | 27.67 | 1346.00 | 1345.26 | 1357.00 | 1356.00 | 11.83 | 17.74 | 31.34 | 66.82 | 2,376 |
| P19 | 296 | 1 | 3 | 3 | | | 0.33 | 3.67 | 1377.86 | 1375.80 | 1383.50 | 1382.00 | 5.92 | 2.88 | 5.00 | 10.76 | 354 |
| P20 | 296 | 1 | 2.5 | 2.5 | | | 0.29 | 3.08 | 1381.00 | 1378.36 | 1386.00 | 1383.50 | 5.07 | 2.36 | 4.50 | 9.21 | 303 |
| P21 | 296 | 1 | 2.5 | 2.5 | | | 0.29 | 3.08 | 1389.00 | 1381.00 | 1394.50 | 1386.00 | 5.25 | 2.63 | 4.50 | 9.75 | 321 |
| P22 | 296 | 1 | 2.5 | 2.5 | | | 0.29 | 3.08 | 1397.00 | 1389.00 | 1402.00 | 1394.50 | 6.08 | 3.87 | 4.50 | 12.25 | 403 |
| P23 | 190 | 1 | 2.5 | 2.5 | | | 0.29 | 3.08 | 1402.00 | 1397.00 | 1407.00 | 1402.00 | 5.00 | 2.25 | 4.50 | 9.00 | 190 |
| P24 | 60 | 1 | 2.5 | 2.5 | | | 0.29 | 3.08 | 1404.00 | 1402.00 | 1409.00 | 1407.00 | 5.00 | 2.25 | 4.50 | 9.00 | 60 |
| P35 | 140 | 1 | 5 | 5 | | | 0.50 | 6.00 | 1355.50 | 1354.50 | 1364.00 | 1367.00 | 10.50 | 6.75 | 8.00 | 21.50 | 334 |
| P36 | 545 | 1 | 4 | 4 | | | 0.42 | 4.83 | 1361.00 | 1356.50 | 1372.50 | 1364.00 | 9.50 | 6.75 | 7.00 | 20.50 | 1,241 |
| P37 | 475 | 1 | 4 | 4 | | | 0.42 | 4.83 | 1375.50 | 1361.00 | 1382.00 | 1372.50 | 9.00 | 6.00 | 7.00 | 19.00 | 1,003 |
| P38 | 475 | 1 | 4 | 4 | | | 0.42 | 4.83 | 1390.00 | 1375.50 | 1396.00 | 1382.00 | 6.25 | 1.88 | 7.00 | 10.75 | 567 |
| | | | | | | | | | | | | | | | | TOTAL | 100,122 |

| WALL THICKNESS | | | SLAB THICKNESS | | | | |
|---|---|---|---|---|---|---|---|
| | | | TOP | | BOTTOM | | TOTAL |
| SIZE | INCHES | FEET | (inches) | (feet) | (inches) | (feet) | THICKNESS |
| 4-10X6 | 11 | 0.92 | 10.50 | 0.88 | 12.50 | 1.04 | 1.92 |
| 3-10X6 | 11 | 0.92 | 10.50 | 0.88 | 12.50 | 1.04 | 1.92 |
| 3-8X5 | 9 | 0.75 | 9.50 | 0.79 | 11.50 | 0.96 | 1.75 |
| 2-8X5 | 9 | 0.75 | 9.50 | 0.79 | 11.50 | 0.96 | 1.75 |
| 2-8X4 | 9 | 0.75 | 9.50 | 0.79 | 11.50 | 0.96 | 1.75 |
| 10X6 | 13 | 1.08 | 10.00 | 0.83 | 10.00 | 0.83 | 1.67 |
| 8X6 | 11 | 0.92 | 10.00 | 0.83 | 10.00 | 0.83 | 1.67 |
| 8X5 | 11 | 0.92 | 10.00 | 0.83 | 10.00 | 0.83 | 1.67 |
| 30" | 3.5 | 0.29 | | | | | |
| 36" | 4 | 0.33 | | | | | |
| 48" | 5 | 0.42 | | | | | |
| 60" | 6 | 0.50 | | | | | |

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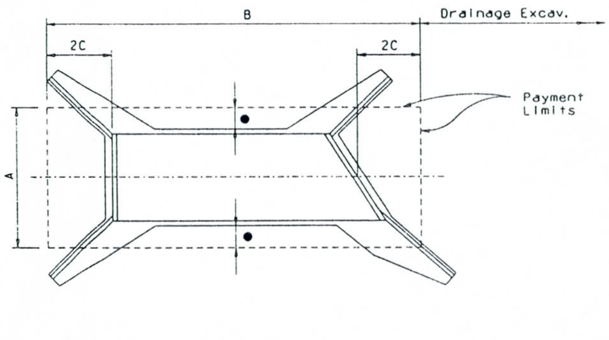
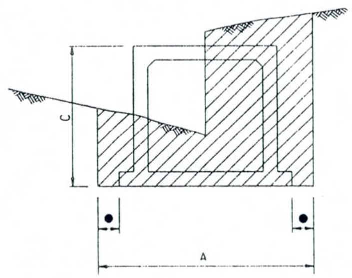


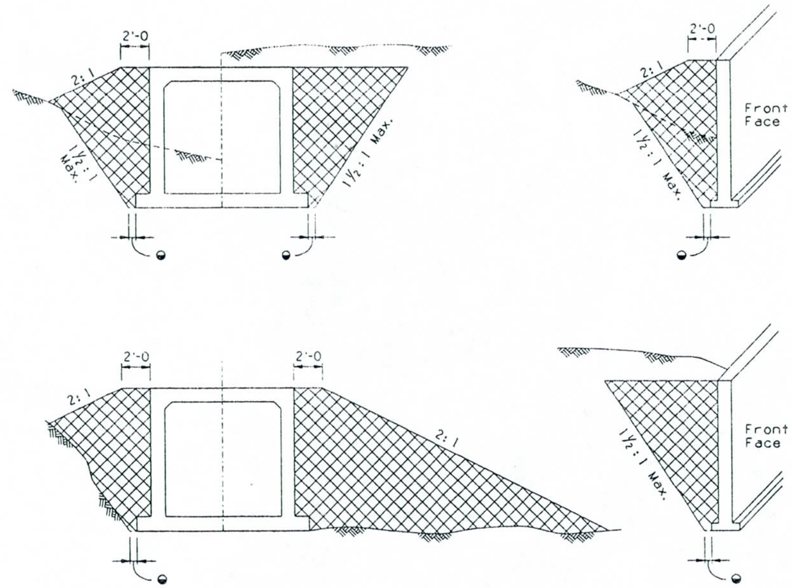

PLAN




SECTION

## STRUCTURAL EXCAVATION - PAYMENT LIMITS

Note: Payment limits shown include structural excavation for headwalls, cutoffwalls, wingwalls, end sections, etc.

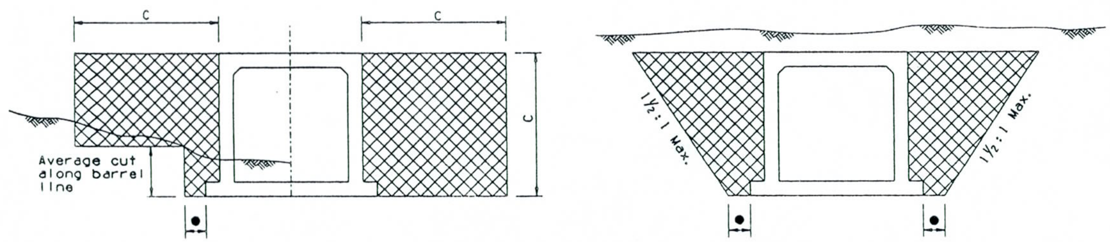



SECTION

END VIEW WING OF BOX CULVERT

## STRUCTURE BACKFILL - PLACEMENT

Note: Placement of structure backfill behind headwalls and wingwalls shall be the same as around structures.




## STRUCTURE BACKFILL - MEASUREMENT

Note: Computation of structure backfill quantities is based on the area of a typical installation times (the total length of structure plus 2H). No measurment is necessary for wing arms. Use H for box extensions on each end extended.

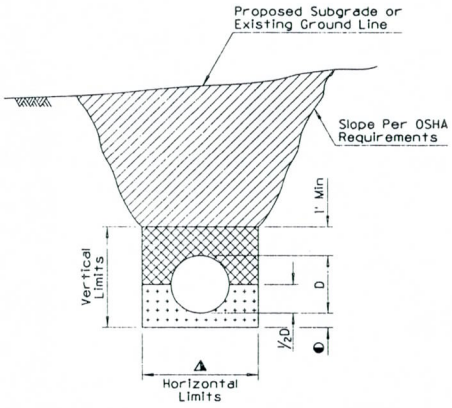
## LEGEND

A = Width
B = Length
C = Height of barrel or headwall without cutoff wall.
● 6" Max. in rock and trench, 1'-6 max. all others
◒ 6" Min. in rock and trench, 1'-6 min. all others
▨ Indicates Structural Excavation
▩ Indicates Structure Backfill

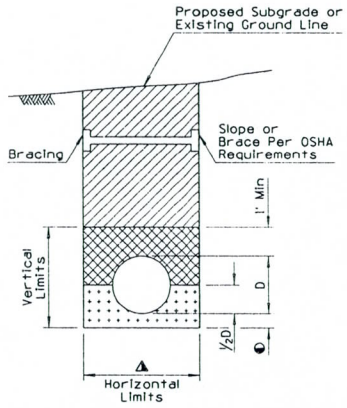
| DESIGN APPROVED | ARIZONA DEPARTMENT OF TRANSPORTATION HIGHWAYS DIVISION STANDARD DRAWINGS | REVISION |
|---|---|---|
| APPROVED FOR DISTRIBUTION | STRUCTURAL EXCAVATION & STRUCTURE BACKFILL FOR R.C.B. CULVERTS | STANDARD NO. B-19.50 |

08-MAY-1992 15:40

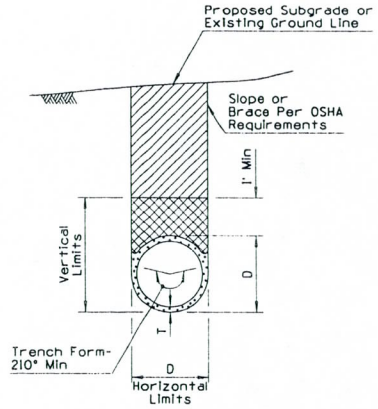
| NO. | DESCRIPTION OF REVISIONS | MADE BY | DATE |
|---|---|---|---|
| 1 | ADDED NOTE | PNB | 7/94 |
| 2 | REARRANGED STD | PNB | 7/94 |
| 3 | | | |
| 4 | | | |




TRENCH CONDITION
IN NATURAL GROUND OR IN EMBANKMENT
WITHOUT BRACING




TRENCH CONDITION
IN NATURAL GROUND OR IN EMBANKMENT
WITH BRACING SHOWN




TRENCH CONDITION
NRCIPCP IN NATURAL GROUND
OR IN EMBANKMENT

## GENERAL NOTES

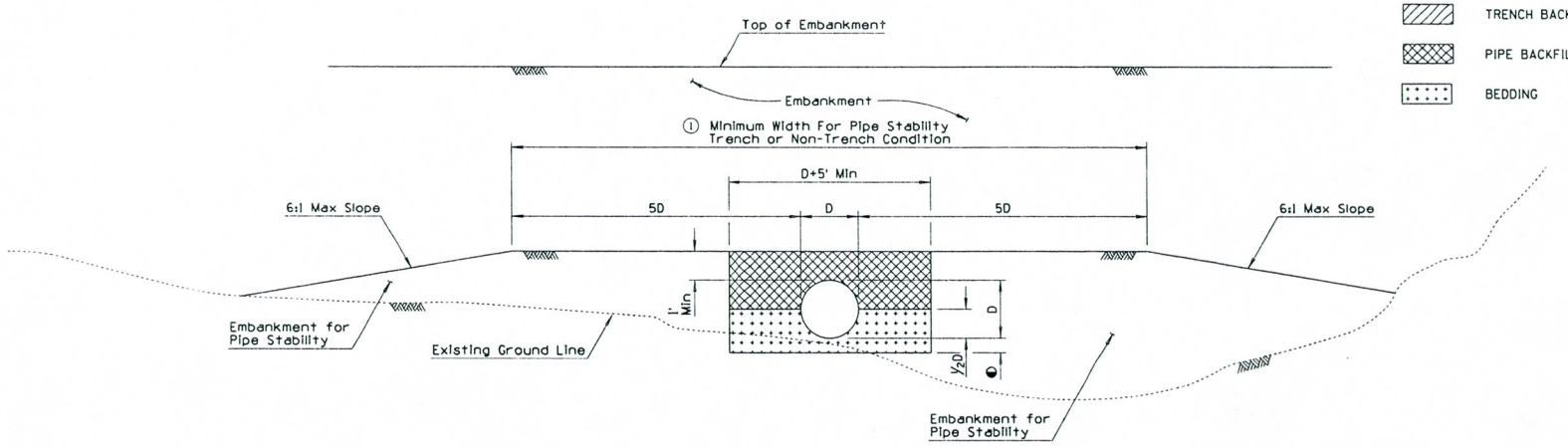
1. Pipes shall be installed either in a trench condition or in a non-trench condition in natural ground or in embankment.
2. In a trench condition, the vertical and horizontal limits shall be maintained. If horizontal limits are exceeded or the vertical limits are not maintained, a non-trench condition exists.
3. Bracing and sloping shall conform to OSHA requirements.
4. Pipe backfill may be bedding material.
5. (1) In a non-trench condition, the embankment for pipe stability shall be constructed in lifts to the limits shown in the detail simultaneously with the bedding material and pipe backfill. If the contractor chooses to construct it as a trench condition, the embankment shall be constructed before excavating the trench.

D - Outside diameter of full circle pipe or outside dimension (span or rise) of arch, arch pipe, elliptical pipe.

T - Minimum wall thickness for NRCIPCP. See Plans.

▲ - D+2 feet maximum for diameters up to 4 feet and D+3 feet maximum for diameters 4 feet and over.

◐ - 6 inches except when on unyielding or unstable material. See standard specifications.




NON-TRENCH CONDITION

TRENCH BACKFILL

PIPE BACKFILL

BEDDING

| | | |
|---|---|---|
| DESIGN APPROVED | STATE OF ARIZONA<br>DEPARTMENT OF TRANSPORTATION<br>DIVISION OF HIGHWAYS<br>STANDARD DRAWINGS | REV. 7/94 |
| APPROVED FOR DISTRIBUTION | (2) TYPICAL PIPE INSTALLATION | DRAWING NO. C-13.15 |

COST ESTIMATES

Doubletree Ranch Road

FOLDER # 2878

DATE June 15, 1996

***** LINEAR MEASUREMENT *****

LOCAL FULL WIDTH _____ COLLECTOR FULL WIDTH _____ MAJOR FULL WIDTH _____

1/2 WIDTH _____ 1/2 WIDTH _____ 1/2 WIDTH _____

NOTE: Any new curb on either side of street (excepting driveway cuts) constitutes 1/2 street improvement.

***** PAVEMENT RELATED COSTS *****

| | | | | | |
|---|---|---|---|---|---|
| ASPHALTIC CONCRETE | 4" / 10 | 2" / 6" (St AC) | _____ 2" / 6" (dwy AC) @ $8.00/SY | | 8.00 |
| | 2 | ADDITIONAL 1" of AC beyond 2" @ $2.00/SY | | | 4.00 |
| | 4 | ADDITIONAL 1" of ABC beyond 6" @ $ 0.50/SY | | | 2.00 |
| MANHOLE ADJUSTMENTS | _____ | @ $360.00/EA | | TOTAL | 14.00 |
| VALVE & CLEANOUT ADJUSTMENTS | _____ | @ $90.00/EA | | | |
| SURVEY MON. | _____ | TY-A @ $150.00/EA | _____ TY-B @ $75.00/EA | _____ TY-C @ $50.00/EA | |
| TEMPORARY DRIVEWAYS (AC) | _____ | @ $500.00/EA | | | |
| ALLEY SURFACING | _____ | 4" ABC @ $4.00/SY | _____ 6" ABC @ $6.00/SY | | |
| THICKENED EDGE | _____ | TYPE A @ $2.00/LF | _____ TYPE B @ $1.20/LF | | |
| GRADER DITCH | _____ | @ $1.00/LF | | | |
| BARRICADE | _____ | INSTALL @ $24.00/LF | _____ RELOC @ $12.00/LF | _____ REM @ $4.80/LF | |
| DUST PALLATIVE | _____ | @ $1.00/SY | | | |
| AC SIDEWALK RAMPS | _____ | @ $8.00/EA | | | |
| TRAFFIC CONTROL | _____ | BUTTONS @ $1.50/EA | _____ PVMT REFLECTORS @ $4.00/EA | | |
| AC SAWCUT | _____ | REMOVE @ $4.80/SY | _____ REM & REPL @ $20.00 SY | | |
| MISC. _____ | _____ | @ _____ | _____ | | |
| | (DESC) | (QTY) | (UNIT COST) | (TOTAL) | |
| | | | | TOTAL - | |

***** CONCRETE RELATED COSTS *****

| | | | | |
|---|---|---|---|---|
| CURB/GUTTER | _____ | 6" VERT @ $8.00/LF | _____ 4" VERT @ $7.00/LF | |
| | _____ | ROLL @ $7.00/LF | _____ TRANSITION @ $9.00/LF | |
| CURB-ONLY | _____ | RIBBON @ $4.50/LF | _____ SINGLE 18" @ $8.00/LF | |
| | _____ | 6" RET @ 8.50/LF | _____ 4" RETURN @ $6.50/LF | |
| CONCRETE VALLEY GUTTER & APRON | _____ | | @ $40.50/SY | |
| SIDEWALK | _____ | 4" CONC. @ $1.50/SF | _____ PED. RAMP @ $200.00/EA | |
| DRIVEWAY | _____ | COMM. @ $1,800.00/EA | _____ NON-COMM. @ $800.00/EA | |
| CUTOFF WALL | _____ | @ $2.50/LF | | |
| SIDEWALK SCUPPER | _____ | @ $480.00/EA | | |
| REMOVALS | _____ | S/W OR DWY @ $1.00/SF | _____ C&G @ $2.40/LF | |
| MISC. _____ | _____ | @ _____ | _____ | |
| | (DESC) | (QTY) | (UNIT COST) | (TOTAL) |
| | | | | TOTAL - |

12.4.5

# DOUBLETREE RANCH ROAD
# PRELIMINARY COST ESTIMATE

# TABLE 2

## DOUBLETREE RANCH ROAD

PROJECT NO. 2878

## DOUBLETREE RANCH ROAD STORM DRAIN
## PRELIMINARY COST ESTIMATE SUMMARY
## ALTERNATIVE NO. 5

DOUBLETREE STORM DRAIN SYSTEM Including CHEROKEE WASH DIVERSION at 52nd and 56th Streets

| ALTERNATIVES | LAND/ EASEMENT ACQUISITION | STORM DRAIN CONST. | DETENTION BASIN CONST. | SUB TOTAL CONST. | UTILITY RELOCATION | ENGINEERING DESIGN | CONSTRUCTION ADMIN. | CONTINGENCY | TOTAL PROJECT COST |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Includes: Civil Geotechnical Landscape Structural Survey<br>10% of Construction | Includes: Inspection Survey Testing<br>10% of Construction | 12% of Land Acquisition & Construction | |
| | ($) | ($) | ($) | ($) | ($) | ($) | ($) | ($) | ($) |
| NO DETENTION BASINS<br>100-Year | 328,496 | 15,583,269 | -0- | 15,583,269 | 393,280 | 1,558,327 | 1,558,327 | 1,909,412 | $21,331,111 |

WSS12/17/96

# DOUBLETREE RANCH ROAD

**PROJECT NO. 2878**

## STORM DRAIN ANALYSIS
## CHEROKEE WASH DIVERSION
## ALTERNATIVE NO. 5

Doubletree Ranch Road System
100-Year No Detention
Cherokee Wash Diversion @ 52nd & 56th Street (10-year Storm)

| CULVERT NO. | SIZE (FT) | LENGTH (FT) | QUANTITIES/PRICE (Per Linear Ft.) | | | | | | | | ROAD REMOVAL & REPLACEMENT | | | TOTAL COST | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Concrete (cuyd) | Sub Cost | Steel (lbs) | Sub Cost | Excavation (cuyd) | Excavation ($) | Backfill (cuyd) | Backfill ($) | (Width) | (sqyd) | Sub Cost | | |
| Outlet | | | | | | | | | | | | | | | |
| Drainage Excavation | 118 | 500 | | | | | 1093 | 6,556 | | | 118 | 6556 | 17,700 | 24,256 | Grass and Sprinkler System |
| P1 | 4-10x6 | 145 | 4.2460 | 184,701 | 597.7 | 43,333 | 19.96 | 17,365 | 4.74 | 12,371 | 67 | 1,079 | 17,811 | 275,582 | Grass and Sprinkler System |
| P2 | 4-10x6 | 390 | 4.2460 | 496,782 | 597.7 | 116,552 | 19.96 | 46,706 | 4.74 | 33,275 | 67 | 2,903 | 47,905 | 741,220 | |
| P3 | 4-10x6 | 535 | 4.2460 | 681,483 | 597.7 | 159,885 | 19.96 | 64,072 | 4.74 | 45,646 | 67 | 3,983 | 65,716 | 1,016,801 | |
| P4 | 4-10x6 | 535 | 4.2460 | 681,483 | 597.7 | 159,885 | 19.96 | 64,072 | 4.74 | 45,646 | 67 | 3,983 | 65,716 | 1,016,801 | |
| P5 | 3-10x6 | 425 | 3.2580 | 415,395 | 474.9 | 100,916 | 13.96 | 35,598 | 4.74 | 36,261 | 56 | 2,644 | 43,633 | 631,804 | |
| P6 | 3-10x6 | 425 | 3.2580 | 415,395 | 474.9 | 100,916 | 13.96 | 35,598 | 4.74 | 36,261 | 56 | 2,644 | 43,633 | 631,804 | |
| P7 | 3-10x6 | 425 | 3.2580 | 415,395 | 474.9 | 100,916 | 13.96 | 35,598 | 4.74 | 36,261 | 56 | 2,644 | 43,633 | 631,804 | |
| P8 | 3-10x6 | 442 | 3.2580 | 432,011 | 474.9 | 104,953 | 13.96 | 37,022 | 4.74 | 37,711 | 56 | 2,750 | 45,379 | 657,076 | |
| P9 | 3-10x6 | 441 | 3.2580 | 431,033 | 474.9 | 104,715 | 13.96 | 36,938 | 4.74 | 37,626 | 56 | 2,744 | 45,276 | 655,589 | |
| P10 | 3-10x6 | 441 | 3.2580 | 431,033 | 474.9 | 104,715 | 13.96 | 36,938 | 4.74 | 37,626 | 56 | 2,744 | 45,276 | 655,589 | |
| P11 | 8x6 | 516 | 1.0440 | 161,611 | 153.3 | 39,551 | 5.70 | 17,647 | 4.74 | 44,025 | 34 | 1,949 | 32,164 | 294,999 | |
| P12 | 8x6 | 516 | 1.0440 | 161,611 | 153.3 | 39,551 | 5.70 | 17,647 | 4.74 | 44,025 | 34 | 1,949 | 32,164 | 294,999 | |
| P13 | 8x6 | 516 | 1.0440 | 161,611 | 153.3 | 39,551 | 5.70 | 17,647 | 4.74 | 44,025 | 34 | 1,949 | 32,164 | 294,999 | |
| P14 | 8x6 | 516 | 1.0440 | 161,611 | 153.3 | 39,551 | 5.70 | 17,647 | 4.74 | 44,025 | 34 | 1,949 | 32,164 | 294,999 | |
| P15 | 8x6 | 516 | 1.0440 | 161,611 | 153.3 | 39,551 | 5.70 | 17,647 | 4.74 | 44,025 | 34 | 1,949 | 32,164 | 294,999 | |
| P16 | 12x4 | 105 | 1.8030 | 56,795 | 313.2 | 16,443 | 6.00 | 3,780 | 2.89 | 5,462 | 32 | 373 | 6,160 | 88,640 | |
| P17 | 12x4 | 348 | 1.8030 | 188,233 | 313.2 | 54,497 | 6.00 | 12,528 | 2.89 | 18,103 | 32 | 1,237 | 3,341 | 276,702 | Grass and Sprinkler System-not |
| P18 | 12x4 | 443 | 1.8030 | 239,619 | 313.2 | 69,374 | 6.00 | 15,948 | 2.89 | 23,045 | 32 | 1,575 | 4,253 | 352,238 | Road Removal/ Replacement |
| P19 | 36" | 296 | | 25,160 | | | | | | | 15 | 493 | 8,140 | 33,300 | |
| P20 | 30" | 296 | | 19,240 | | | | | | | 15 | 493 | 8,140 | 27,380 | |
| P21 | 30" | 296 | | 19,240 | | | | | | | 15 | 493 | 8,140 | 27,380 | |
| P22 | 30" | 296 | | 19,240 | | | | | | | 15 | 493 | 8,140 | 27,380 | |
| P23 | 30" | 190 | | 12,350 | | | | | | | 15 | 317 | 5,225 | 17,575 | |
| P24 | 30" | 60 | | 3,900 | | | | | | | 15 | 100 | 1,650 | 5,550 | |
| P25 | 3-8x6 | 665 | 2.4680 | 492,366 | 403.0 | 133,998 | 13.03 | 51,990 | 4.74 | 56,738 | 49 | 3,621 | 59,739 | 794,830 | |
| P26 | 3-8x6 | | | | | | | | | | | | | | |
| P27 | 3-8x6 | | | | | | | | | | | | | | |
| P28 | 3-8x6 | 640 | 2.4680 | 473,856 | 403.0 | 128,960 | 13.03 | 50,035 | 4.74 | 54,605 | 49 | 3,484 | 57,493 | 764,949 | |
| P29 | 3-8x6 | 405 | 2.4680 | 299,862 | 403.0 | 81,608 | 13.03 | 31,663 | 4.74 | 34,555 | 49 | 2,205 | 36,383 | 484,070 | |
| P30 | 2-8x5 | 405 | 1.6420 | 199,503 | 284.3 | 57,571 | 8.52 | 20,704 | 3.76 | 27,410 | 39 | 1,755 | 28,958 | 334,145 | |
| P31 | 2-8x5 | 536 | 1.6420 | 264,034 | 284.3 | 76,192 | 8.52 | 27,400 | 3.76 | 36,276 | 39 | 2,323 | 38,324 | 442,227 | |
| P32 | 8X5 | 415 | .9760 | 121,512 | 144.3 | 29,942 | 5.19 | 12,923 | 3.76 | 28,087 | 30 | 1,383 | 22,825 | 215,290 | |
| P33 | 8X5 | 415 | .9760 | 121,512 | 144.3 | 29,942 | 5.19 | 12,923 | 3.76 | 28,087 | 30 | 1,383 | 22,825 | 215,290 | |
| P34 | 8X5 | 415 | .9760 | 121,512 | 144.3 | 29,942 | 5.19 | 12,923 | 3.76 | 28,087 | 30 | 1,383 | 22,825 | 215,290 | |
| P35 | 60" | 140 | | 19,600 | | | | | | | 22 | 342 | 5,647 | 25,247 | |
| P36 | 48" | 545 | | 59,950 | | | | | | | 18 | 1,090 | 17,985 | 77,935 | |
| P37 | 48" | 475 | | 52,250 | | | | | | | 18 | 950 | 15,675 | 67,925 | |
| P38 | 48" | 475 | | 52,250 | | | | | | | 18 | 950 | 15,675 | 67,925 | |
| P39 | 8x5 | 270 | 0.976 | 79,056 | 144.3 | 19,481 | 5.19 | 8,408 | 3.76 | 18,274 | 30 | 900 | 14,850 | 140,068 | |
| P40 | 8x5 | 525 | 0.976 | 153,720 | 144.3 | 37,879 | 5.19 | 16,349 | 3.76 | 35,532 | 30 | 1,750 | 28,875 | 272,354 | |
| P41 | 8x5 | 525 | 0.976 | 153,720 | 144.3 | 37,879 | 5.19 | 16,349 | 3.76 | 35,532 | 30 | 1,750 | 28,875 | 272,354 | |
| P42 | 8x5 | 460 | 0.976 | 134,688 | 144.3 | 33,189 | 5.19 | 14,324 | 3.76 | 31,133 | 30 | 1,533 | 25,300 | 238,634 | |
| P43 | 8X5 | 90 | 0.976 | 26,352 | 144.3 | 6,494 | 5.19 | 2,803 | 3.76 | 6,091 | 30 | 300 | 4,950 | 46,689 | |
| P44 | 10x6 | 428 | 1.262 | 162,041 | 173.4 | 37,108 | 6.52 | 16,743 | 4.74 | 36,517 | 34 | 1,617 | 26,679 | 279,087 | |
| P45 | 10x6 | 428 | 1.262 | 162,041 | 173.4 | 37,108 | 6.52 | 16,743 | 4.74 | 36,517 | 34 | 1,617 | 26,679 | 279,087 | |
| P46 | 10x6 | 428 | 1.262 | 162,041 | 173.4 | 37,108 | 6.52 | 16,743 | 4.74 | 36,517 | 34 | 1,617 | 26,679 | 279,087 | |
| P47 | 10x6 | 67 | 1.262 | 25,366 | 173.4 | 5,809 | 6.52 | 2,621 | 4.74 | 5,716 | 34 | 253 | 4,176 | 43,689 | |
| P48 | 48" | 20 | | 1,300 | | | | | | | 18 | 40 | 660 | 1,960 | |
| P49 | 48" | 30 | | 3,300 | | | | | | | 18 | 60 | 990 | 4,290 | |
| P50 | 60" | 32 | | 4,480 | | | | | | | 22 | 78 | 1,291 | 5,771 | |
| I1 | 12x4 | | 11.220 | 3,366 | 824.0 | 412 | | | | | | | | 3,778 | Inlet Wingwalls |
| I2 | 30" | | 2.70 | 810 | 111.0 | 56 | | | | | | | | 866 | 4:1 Slope |
| I3 | 8x5 | | 8.740 | 2,622 | 618.0 | 309 | | | | | | | | 2,931 | 0 Degree Skew |
| I4 | 48" | | 9.40 | 2,820 | 570.0 | 285 | | | | | | | | 3,105 | |
| I5 | 8X5 | | 8.740 | 2,622 | 618.0 | 309 | | | | | | | | 2,931 | |
| I6 | 10x6 | | 11.530 | 3,459 | 876.0 | 438 | | | | | | | | 3,897 | |
| Drop Structure | 1 | | | 15,000 | | | | | | | | | | 15,000 | |
| I7 | 48" | | 9.40 | 2,820 | 570.0 | 285 | | | | | | | | 3,105 | |
| I8 | 48" | | 9.40 | 2,820 | 570.0 | 285 | | | | | | | | | Picked up in Catchbasins |
| I9 | 60" | | 12.20 | 3,660 | 725.0 | 363 | | | | | | | | | Picked up in Catchbasins |
| | | | | | | | | | | | | | 1,230,043 | | |
| TOTAL | | 17948 | | | | | | | | | | | Sub Total | 14,873,269 | |

| Quantities | Cost | Unit | |
|---|---|---|---|
| Concrete | 300.00 | cuyd | * |
| Steel | 0.50 | lbs | |
| Road Removal | 2.50 | sqyd | |
| Road Replacement | 14.00 | sqyd | |
| 30" Pipe | 65.00 | Linft | * |
| 36" Pipe | 85.00 | Linft | |
| 48" Pipe | 110.00 | Linft | * |
| 60" Pipe | 140.00 | Linft | |
| Excavation | 6.00 | cuyd | * |
| Structural Backfill | 18.00 | cuyd | * |
| Landscape | 0.30 | sqft | |

| Miscellaneous | Quantity | Units | Unit Cost | Total Cost | |
|---|---|---|---|---|---|
| Junction Box | 2 | each | 25,000 | 50,000 | * |
| Access Holes | 51 | each | 2,000 | 102,000 | * |
| Manholes | 8 | each | 5,500 | 44,000 | * |
| Catchbasins | 60 | each | 2,000 | 120,000 | |
| CB Laterials (24"x20') | 60 | each | 1,000 | 60,000 | |
| Channels | 5000 | cuyds | 5 | 25,000 | |
| Energy Dissipator | 1 | Lump Sum | 195,000 | 195,000 | |
| Tatum Crossing | 1 | Lump Sum | 100,000 | 100,000 | |
| Trash Racks/ Barrel | 7 | each | 2,000 | 14,000 | |
| | | | Sub Total | 710,000 | |

*Revised to Flood Control Cost 9/10/96

**TOTAL** **$ 15,583,269**

WSS 11/12/96

12.4.6

# CHEROKEE WASH
# PRELIMINARY COST ESTIMATE

# TABLE 3

## DOUBLETREE RANCH ROAD

PROJECT NO. 2878

## CHEROKEE WASH DRAINAGE CORRIDOR
## PRELIMINARY COST ESTIMATE SUMMARY
## ALTERNATIVE NO. 6

TRAPEZOIDAL CHANNEL GABIONS from Indian Bend Wash to Paradise Valley Country Club
CULVERT DESIGN to CHANNEL CAPACITY

| ALTERNATIVES | LAND/ EASEMENT ACQUISITION | CHANNEL CONSTRUCTION | CULVERT CONST. | UTILITY RELOCATION | ENGINEERING DESIGN | CONSTRUCTION ADMIN. | CONTINGENCY | TOTAL PROJECT COST |
|---|---|---|---|---|---|---|---|---|
| | | | | | Includes: Civil Geotechnical Landscape Structural Survey<br>10% of Construction | Includes: Inspection Survey Testing<br>10% of Construction | 12% of Land Acquisition & Construction | |
| | ($) | ($) | ($) | ($) | ($) | ($) | ($) | ($) |
| NO DETENTION BASINS | 414,514 | 1,842,742 | 624,328 | 62,740 | 246,707 | 246,707 | 345,790 | $ 3,783,528 |

WSS 12/17/96
Ckd:

# DOUBLETREE RANCH ROAD

**PROJECT NO. 2878**

## CHEROKEE WASH
## CULVERT CONSTRUCTION
## ALTERNATIVE NO. 6

**DISCHARGE AS SPECIFIED (LEVEL OF PROTECTION)**
**NO DETENTION**
**10-YEAR DIVERSION TO DOUBLETREE RANCH ROAD**
**(52nd and 56th STREETS)**

| STREET NAME | DISCHARGE | SIZE | LENGTH | CULVERT QUANTITIES/COST | | | | | | | ROAD REMOVAL & REPLACEMENT | | | HEADWALLS | | | | | GUARD RAIL | | TOTAL COST | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Concrete | Sub Cost | Steel | Sub Cost | Excavation | Backfill | Sub Cost | | | | INLET | | OUTLET | | Sub Cost | Length x2 | Sub Cost | | |
| | | (ft) | (ft) | (cuyd) | ($) | (lbs) | ($) | | ($) | ($) | (Width) | (sqyd) | (Sub Cost) | Concrete | Steel | Concrete | Steel | ($) | (ft) | ($) | ($) | |
| Caballo Lane | 675 | 2-10X5 | 30 | 2.168 | 19,512 | 318.4 | 4,776 | 1,800 | 2,030 | 28,118 | 43 | 143 | 2,365 | 10.45 | 797 | 18.16 | 1380 | 9,672 | 240 | 3,120 | 43,275 | 45-year Level of Protection<br>Headwalls 4:1 slope, 0 Skew |
| Morning Glory | 675 | 2-10X5 | 30 | 2.168 | 19,512 | 318.4 | 4,776 | 1,800 | 2,030 | 28,118 | 43 | 143 | 2,365 | 10.45 | 797 | 18.16 | 1380 | 9,672 | 260 | 3,380 | 43,535 | |
| 59th Place | 675 | 2-10X5 | 30 | 2.168 | 19,512 | 318.4 | 4,776 | 1,800 | 2,030 | 28,118 | 43 | 143 | 2,365 | 10.45 | 797 | 18.16 | 1380 | 9,672 | 100 | 1,300 | 41,455 | |
| 58th Place | 675 | 2-10X5 | 30 | 2.168 | 19,512 | 318.4 | 4,776 | 1,800 | 2,030 | 28,118 | 43 | 143 | 2,365 | 10.45 | 797 | 18.16 | 1380 | 9,672 | 300 | 3,900 | 44,055 | |
| 56th Street | 675 | 2-10X5 | 60 | 2.168 | 39,024 | 318.4 | 9,552 | 3,600 | 4,061 | 56,237 | 43 | 287 | 4,730 | 10.45 | 797 | 18.16 | 1380 | 9,672 | 100 | 1,300 | 71,938 | |
| Mockingbird Ln | 750 | 3-10X3 | 130 | 2.851 | 111,189 | 430.6 | 27,989 | 9,360 | 4,984 | 153,522 | 50 | 722 | 11,917 | 8.2 | 692 | 14.71 | 1215 | 7,827 | 100 | 1,300 | 174,565 | 42-year Level of Protection<br>40 Skew |
| 53rd Place | 750 | 2-10X5 | 30 | 2.168 | 19,512 | 318.4 | 4,776 | 1,800 | 2,030 | 28,118 | 43 | 143 | 2,365 | 10.45 | 797 | 18.16 | 1380 | 9,672 | 200 | 2,600 | 42,755 | |
| Desert Jewel | 313 | 3-48" | 40 | | 13,200 | | | | | 13,200 | 30 | 133 | 2,200 | 16.4 | 980 | 20.2 | 1185 | 12,063 | 200 | 2,600 | 30,063 | 10-year Level of Protection |
| Arroyo Dr | 313 | 3-48" | 35 | | 11,550 | | | | | 11,550 | 30 | 117 | 1,925 | 16.4 | 980 | 20.2 | 1185 | 12,063 | 300 | 3,900 | 29,438 | |
| Crestview Drive | 313 | 3-48" | 30 | | 9,900 | | | | | 9,900 | 30 | 100 | 1,650 | 16.4 | 980 | 20.2 | 1185 | 12,063 | 300 | 3,900 | 27,513 | |
| Desert Park | 313 | 3-48" | 35 | | 11,550 | | | | | 11,550 | 30 | 117 | 1,925 | 16.4 | 980 | 20.2 | 1185 | 12,063 | 400 | 5,200 | 30,738 | |
| Road Runner | 115 | "2-36"(Ex) | 100 | | | | | | | | | | | | | | | | | | | |
| Grade Control Structures | | 3 | 15,000 | | 45,000 | | | | | | | | | | | | | | | | 45,000 | |

| QUANTITIES | COST | UNIT |
|---|---|---|
| Concrete | 300.00 | cuyd |
| Steel | 0.50 | lbs |
| Excavation | 6.00 | cuyd |
| Backfill | 18.00 | cuyd |
| Road Removal | 2.50 | sqyd |
| Road Replace | 14.00 | sqyd |
| 30" End Section | 325.00 | each |
| 42" End Section | 585.00 | each |
| 30" Pipe | 65.00 | Linft |
| 42" Pipe | 90.00 | Linft |
| 48" Pipe | 110.00 | Linft |
| 54" Pipe | 120.00 | Linft |
| 60" Pipe | 140.00 | Linft |
| 66" Pipe | 170.00 | Linft |
| 72" Pipe | 200.00 | Linft |
| Guard Rail | 13.00 | Linft |

$624,328 Grand Total

WSS 10/15/96

# DOUBLETREE RANCH ROAD

**PROJECT NO. 2878**

## CHEROKEE WASH DRAINAGE CORRIDOR
## ALTERNATIVE NO. 6
## CHANNEL CONSTRUCTION

**CHANNEL IMPROVEMENTS FROM 52ND STREET TO INDIAN BEND WASH**

| REACH | LENGTH (FT) | GABIONS | FENCE | CLEARING/ CRUBBING | EXCAVATION/ GRADING | TOTAL COST ($) |
|---|---|---|---|---|---|---|
| 52nd Street to 56th Street | 3200 | 704,000 | 57,600 | 5,436 | 42,624 | 809,660 |
| 56th Street to Indian Bend Wash | 4134 | 909,480 | 74,412 | 7,023 | 42,167 | 1,033,082 |
| | | | | | TOTAL | $1,842,742 |

WSS 10/14/96

| Quantities | Cost ($) | Unit |
|---|---|---|
| Gabions | 100.00 | Linft |
| Fence | 9.00 | Linft |
| Clearing/ Grubbing | 1850.00 | acre |
| Excavation/ Grading | 6.00 | cuyd |

# DOUBLETREE RANCH ROAD

PROJECT NO. 2878

## SEGMENT COST

| SEGMENT | ACCESS BOX | CATCH BASIN | TRASH RACK | MANHOLE | JUNCTION BOX | SUB COST | LAND ACQUISITION | COST ($) | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|
| Outlet to J4 | 9 | 2 | | | 1 | 47,000 | 233,550 | | |
| P1 | | | | | | 275,582 | | | |
| P2 | | | | | | 741,220 | | | |
| P3 | | | | | | 1,016,801 | | | |
| P4 | | | | | | 1,016,801 | | | |
| Energy Dissipator | | | | | | 195,000 | | | |
| | | | | | | 2,000 | | | Laterials |
| | | | | | | 24,253 | | | Drainage Ex. |
| | | | | | | 3,318,657 | | | Sub-Total Const. |
| | | | | | | | | 99,330 | Utilities |
| | | | | | | | | 663,731 | 20% Const & Eng. |
| | | | | | | | | 426,265 | 12% Land and Const |
| | | | | | | | | $4,741,533 | TOTAL |
| J4 to J10 | 15 | 10 | 1 | | 1 | 77,000 | | | |
| P5 | | | | | | 631,804 | | | |
| P6 | | | | | | 631,804 | | | |
| P7 | | | | | | 631,804 | | | |
| P8 | | | | | | 657,076 | | | |
| P9 | | | | | | 655,589 | | | |
| P10 | | | | | | 655,589 | | | |
| Inlet 7 | | | | | | 3,105 | | | |
| P48 | | | | | | 1,960 | | | |
| | | | | | | 10,000 | | | Laterials |
| | | | | | | 3,955,731 | | | Sub-Total Const. |
| | | | | | | | | 66,930 | Utilities |
| | | | | | | | | 1,265,834 | 32% Const, Eng, Cont |
| | | | | | | | | $5,288,495 | TOTAL |
| J10 to J15 | 5 | 10 | | | | 30,000 | | | |
| P11 | | | | | | 294,999 | | | |
| P12 | | | | | | 294,999 | | | |
| P13 | | | | | | 294,999 | | | |
| P14 | | | | | | 294,999 | | | |
| P15 | | | | | | 294,999 | | | |
| | | | | | | 10,000 | | | Laterials |
| | | | | | | 1,514,995 | | | Sub-Total Const. |
| | | | | | | | | 484,798 | 32%Const, Eng, Cont |
| | | | | | | | | $1,999,793 | TOTAL |

| SEGMENT | ACCESS BOX | CATCH BASIN | TRASH RACK | MANHOLE | JUNCTION BOX | SUB COST | LAND ACQUISITION | COST ($) | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|
| J15 to I1 | 2 | | 1 | | | 6,000 | 94,946 | | |
| P16 | | | | | | 88,640 | | | |
| P17 | | | | | | 276,702 | | | |
| P18 | | | | | | 352,238 | | | |
| Inlet I1 | | | | | | 3,778 | | | |
| tatum crossing | | | | | | 100,000 | | | |
| | | | | | | 827,358 | | | Sub-Total Const. |
| | | | | | | | | 10,300 | Utilities |
| | | | | | | | | 165,472 | 20% Const, Eng |
| | | | | | | | | 110,676 | 12% const + land |
| | | | | | | | | $1,208,752 | TOTAL |
| J15 to I2 | | 6 | 1 | 5 | | 41,500 | | | |
| P19 | | | | | | 33,300 | | | |
| P20 | | | | | | 27,380 | | | |
| P21 | | | | | | 27,380 | | | |
| P22 | | | | | | 27,380 | | | |
| P23 | | | | | | 17,575 | | | |
| P24 | | | | | | 5,550 | | | |
| Inlet I2 | | | | | | 866 | | | |
| | | | | | | 6,000 | | | Laterials |
| | | | | | | 186,931 | | | Sub-Total Cosnt. |
| | | | | | | | | 2,800 | Utilities |
| | | | | | | | | 59,818 | 32% Const, Eng, Cont. |
| | | | | | | | | $249,549 | TOTAL |
| J10 to J29 | 13 | 10 | | | | 46,000 | | | |
| P25 | | | | | | 794,830 | | | |
| P26 | | | | | | 764,949 | | | |
| P27 | | | | | | 484,070 | | | |
| P28 | | | | | | 334,145 | | | |
| P29 | | | | | | 442,227 | | | |
| P30 | | | | | | 5,771 | | | |
| P31 | | | | | | | | | |
| channel | | | | | | 12,500 | | | |
| | | | | | | 10,000 | | | Laterials |
| | | | | | | 2,894,492 | | | Sub-Total Const. |
| | | | | | | | | 19,180 | Utilities |
| | | | | | | | | 926,237 | 32% Const, Eng, Cont |
| | | | | | | | | $3,839,909 | TOTAL |

| SEGMENT | ACCESS BOX | CATCH BASIN | TRASH RACK | MANHOLE | JUNCTION BOX | SUB COST | LAND ACQUISITION | COST ($) | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|
| J29 to I3 | 2 | 4 | 1 | | | 14,000 | | | |
| P32 | | | | | | 215,290 | | | |
| P33 | | | | | | 215,290 | | | |
| P34 | | | | | | 215,290 | | | |
| Inlet I3 | | | | | | 2,931 | | | |
| channel | | | | | | 6,250 | | | |
| | | | | | | 4,000 | | | Laterials |
| | | | | | | 673,051 | | | Sub-Total Const. |
| | | | | | | | | 113,780 | Utilities |
| | | | | | | | | 215,376 | 32% const |
| | | | | | | | | $1,002,207 | TOTAL |
| J29 to I4 | | 6 | 1 | 3 | | 30,500 | | | |
| P35 | | | | | | 25,247 | | | |
| P36 | | | | | | 77,935 | | | |
| P37 | | | | | | 67,925 | | | |
| P38 | | | | | | 67,925 | | | |
| Inlet I4 | | | | | | 3,105 | | | |
| | | | | | | 6,000 | | | Laterials |
| | | | | | | 278,637 | | | Sub-Total Const. |
| | | | | | | | | 7,500 | Utilities |
| | | | | | | | | 89,164 | 32%Const, Eng, Cont |
| | | | | | | | | $375,301 | TOTAL |
| J4 to I5 | 3 | 8 | 1 | | | 24,000 | | | |
| P39 | | | | | | 140,068 | | | |
| P40 | | | | | | 272,354 | | | |
| P41 | | | | | | 272,354 | | | |
| P42 | | | | | | 238,634 | | | |
| P43 | | | | | | 46,689 | | | |
| Inlet I5 | | | | | | 2,931 | | | |
| P49 | | | | | | 4,290 | | | |
| Channel | | | | | | 6,250 | | | |
| | | | | | | 8,000 | | | Laterials |
| | | | | | | 1,015,570 | | | Sub-Total Const. |
| | | | | | | | | 63,960 | Utilities |
| | | | | | | | | 324,982 | 32%Const, Eng, Cont |
| | | | | | | | | $1,404,512 | TOTAL |

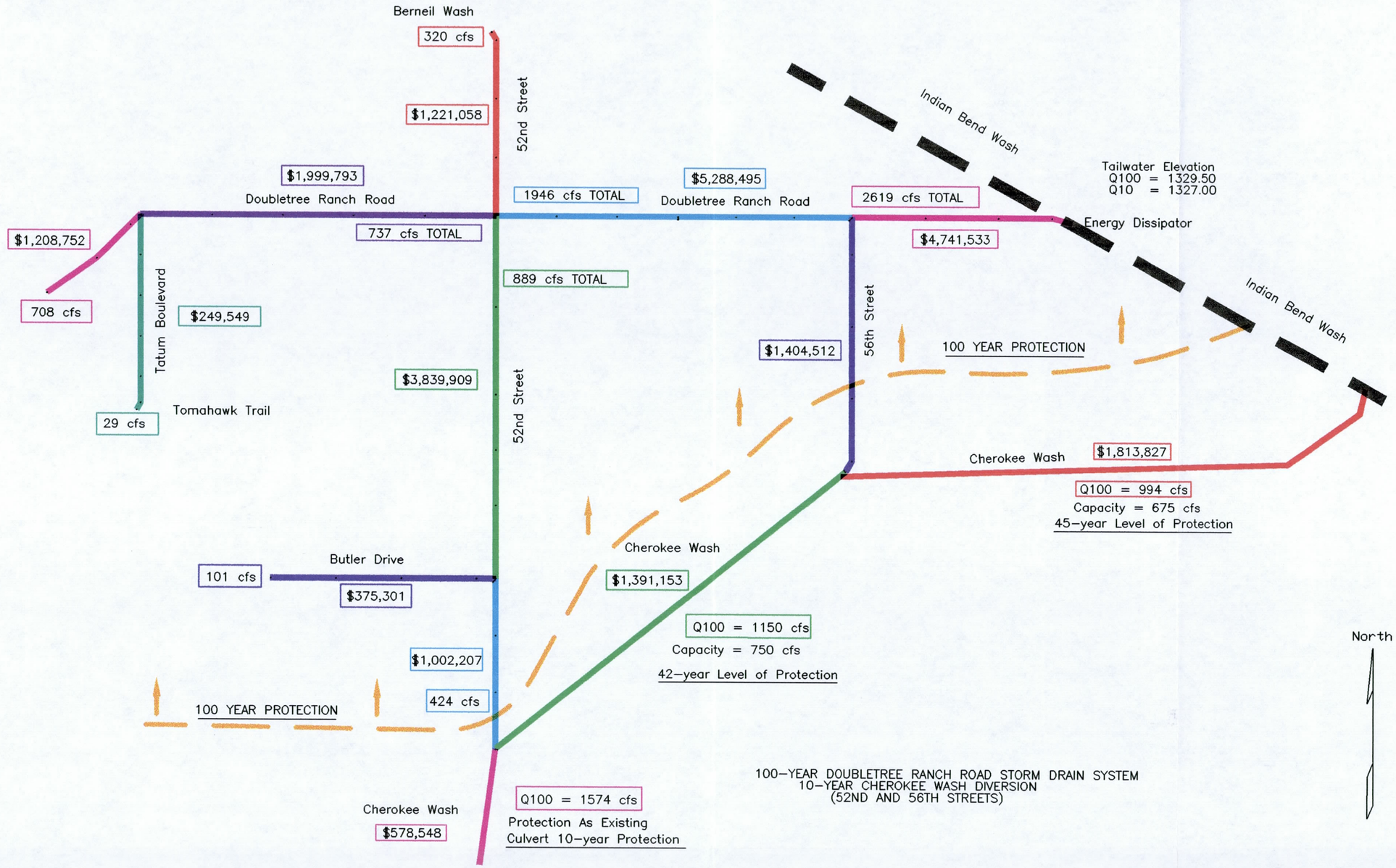
| SEGMENT | ACCESS BOX | CATCH BASIN | TRASH RACK | MANHOLE | JUNCTION BOX | SUB COST | LAND ACQUISITION | COST ($) | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|
| J10 to I6 | 2 | 4 | 1 | | | 14,000 | | | |
| P44 | | | | | | 279,087 | | | |
| P45 | | | | | | 279,087 | | | |
| P46 | | | | | | 279,087 | | | |
| P47 | | | | | | 43,689 | | | |
| Inlet I6 | | | | | | 3,897 | | | |
| | | | | | | 15,000 | | | Drop Structure |
| | | | | | | 4,000 | | | Laterials |
| | | | | | | 917,847 | | | Sub-Total Const. |
| | | | | | | | | 9,500 | Utilities |
| | | | | | | | | 293,711 | 32%Const, Eng, Cont |
| | | | | | | | | $1,221,058 | |

| Quantity | Cost | Unit |
|---|---|---|
| Junction | 25000 | Each |
| Access | 2000 | Each |
| Manhole | 5500 | Each |
| Catch | 2000 | Each |
| Trash | 2000 | Each |

328,496 Total Land Cost

$21,331,111 GRAND TOTAL

# DOUBLETREE STORM DRAIN AND CHEROKEE WASH PHASING DIAGRAM




100-YEAR DOUBLETREE RANCH ROAD STORM DRAIN SYSTEM
10-YEAR CHEROKEE WASH DIVERSION
(52ND AND 56TH STREETS)


HOOK ENGINEERING, INC.
3511 E. INDIAN SCHOOL ROAD PHOENIX, ARIZONA 85018
Tel: (602) 956-3200 Fax (602) 955-5443

# DOUBLETREE RANCH ROAD

**PROJECT NO. 2878**

## DOUBLETREE RANCH ROAD STORM DRAIN SYSTEM COST COMPARISON

A **Base Cost** was determined for the Doubletree Storm Drain System for a 100-year storm with no detention basins and no DIVERSIONS from Cherokee Wash.

A comparison was then determined for DIVERSIONS of the 100-year, 50-year and 10-year storm from Cherokee Wash to the Doubletree Storm Drain System with the **original unit price** summary. The Summaries were then updated to the **revised unit prices** recommended from Flood Control District.

# DOUBLETREE RANCH ROAD
**PROJECT NO. 2878**

## DOUBLETREE RANCH ROAD STORM DRAIN
## PRELIMINARY COST ESTIMATE SUMMARY

### Base Cost

| ALTERNATIVES | LAND ACQUISITION ($) | STORM DRAIN CONST. ($) | DETENTION BASIN CONST. ($) | SUB TOTAL CONST. ($) | UTILITY RELOCATION'S 5% of Construction ($) | ENGINEERING DESIGN Includes: Civil Geotechnical Landscape Structural Survey 10% of Construction ($) | CONSTRUCTION ADMIN. Includes: Inspection Survey Testing 10% of Construction ($) | CONTINGENCY 10% of Land Acquisition & Construction ($) | TOTAL PROJECT COST ($) |
|---|---|---|---|---|---|---|---|---|---|
| NO DETENTION BASINS 100-Year | 175,000 | 13,053,098 | -0- | 13,053,098 | 652,655 | 1,305,310 | 1,305,310 | 1,322,810 | $17,639,182 |

WSS 7/24/96

# DOUBLETREE RANCH ROAD

**PROJECT NO. 2878**

## STORM DRAIN ANALYSIS
## BASE FLOW

Doubletree Ranch Road System
100-Year No Detention

| CULVERT NO. | SIZE (FT) | LENGTH (FT) | QUANTITIES/PRICE (Per Linear Ft.) | | | | | | | | ROAD REMOVAL & REPLACEMENT | | | TOTAL COST | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Concrete | Sub Cost | Steel | Sub Cost | Trench | | Backfill | | | | | | |
| | | | (cuyd) | | (lbs) | | (cuyd) | ($) | (cuyd) | ($) | (Width) | (sqyd) | Sub Cost | | |
| Drainage Excavation | 351 | 190 | | | | | 1235 | 4,323 | | | | | | 4,323 | |
| P1 | 5-10X5 | 571 | 5.030 | 861,639 | 730.0 | 208,415 | 22.00 | 43,967 | 3.76 | 27,910 | 75.5 | 4,790 | 79,036 | 1,220,967 | |
| P2 | 5-10X5 | 571 | 5.030 | 861,639 | 730.0 | 208,415 | 22.00 | 43,967 | 3.76 | 27,910 | 75.5 | 4,790 | 79,036 | 1,220,967 | |
| P3 | 5-10X5 | 571 | 5.030 | 861,639 | 730.0 | 208,415 | 22.00 | 43,967 | 3.76 | 27,910 | 75.5 | 4,790 | 79,036 | 1,220,967 | |
| P4 | 3-10X5 | 431 | 3.1220 | 403,675 | 459.1 | 98,936 | 13.96 | 21,059 | 3.76 | 21,067 | 54 | 2,586 | 42,669 | 587,406 | |
| P5 | 3-10X5 | 431 | 3.1220 | 403,675 | 459.1 | 98,936 | 13.96 | 21,059 | 3.76 | 21,067 | 54 | 2,586 | 42,669 | 587,406 | |
| P6 | 3-10X5 | 431 | 3.1220 | 403,675 | 459.1 | 98,936 | 13.96 | 21,059 | 3.76 | 21,067 | 54 | 2,586 | 42,669 | 587,406 | |
| P7 | 3-10X6 | 433 | 3.2580 | 423,214 | 474.9 | 102,816 | 15.40 | 23,339 | 4.74 | 26,681 | 56 | 2,694 | 44,455 | 620,505 | |
| P8 | 3-10X6 | 433 | 3.2580 | 423,214 | 474.9 | 102,816 | 15.40 | 23,339 | 4.74 | 26,681 | 56 | 2,694 | 44,455 | 620,505 | |
| P9 | 3-10X6 | 433 | 3.2580 | 423,214 | 474.9 | 102,816 | 15.40 | 23,339 | 4.74 | 26,681 | 56 | 2,694 | 44,455 | 620,505 | |
| P10 | 10X5 | 536 | 1.1820 | 190,066 | 165.0 | 44,220 | 5.86 | 10,993 | 3.76 | 26,200 | 32 | 1,906 | 31,445 | 302,924 | |
| P11 | 10X6 | 537 | 1.2620 | 203,308 | 173.4 | 46,558 | 6.52 | 12,254 | 4.74 | 33,090 | 34 | 2,029 | 33,473 | 328,683 | |
| P12 | 10X6 | 536 | 1.2620 | 202,930 | 173.4 | 46,471 | 6.52 | 12,232 | 4.74 | 33,028 | 34 | 2,025 | 33,411 | 328,071 | |
| P13 | 10X6 | 536 | 1.2620 | 202,930 | 173.4 | 46,471 | 6.52 | 12,232 | 4.74 | 33,028 | 34 | 2,025 | 33,411 | 328,071 | |
| P14 | 10X6 | 536 | 1.2620 | 202,930 | 173.4 | 46,471 | 6.52 | 12,232 | 4.74 | 33,028 | 34 | 2,025 | 33,411 | 328,071 | |
| P15 | 10X6 | 105 | 1.2620 | 39,753 | 173.4 | 9,104 | 6.52 | 2,396 | 4.74 | 6,470 | 34 | 397 | 6,545 | 64,268 | |
| P16 | 10X6 | 347 | 1.2620 | 131,374 | 173.4 | 30,085 | 6.52 | 7,919 | 4.74 | 21,382 | 34 | 1,311 | 21,630 | 212,389 | |
| P17 | 10X6 | 347 | 1.2620 | 131,374 | 173.4 | 30,085 | 6.52 | 7,919 | 4.74 | 21,382 | 34 | 1,311 | 21,630 | 212,389 | |
| P18 | 30" | 330 | | 18,150 | | | | | | | 15 | 550 | 9,075 | 27,225 | |
| P19 | 30" | 330 | | 18,150 | | | | | | | 15 | 550 | 9,075 | 27,225 | |
| P22 | 30" | 330 | | 18,150 | | | | | | | 15 | 550 | 9,075 | 27,225 | |
| P23 | 30" | 330 | | 18,150 | | | | | | | 15 | 550 | 9,075 | 27,225 | |
| P26 | 30" | 110 | | 6,050 | | | | | | | 15 | 183 | 3,025 | 9,075 | |
| P27 | 8X5 | 320 | 0.9760 | 93,696 | 144.3 | 23,088 | 5.19 | 5,813 | 3.76 | 15,642 | 30 | 1,067 | 17,600 | 155,838 | |
| P28 | 8X5 | 320 | 0.9760 | 93,696 | 144.3 | 23,088 | 5.19 | 5,813 | 3.76 | 15,642 | 30 | 1,067 | 17,600 | 155,838 | |
| P29 | 8X5 | 320 | 0.9760 | 93,696 | 144.3 | 23,088 | 5.19 | 5,813 | 3.76 | 15,642 | 30 | 1,067 | 17,600 | 155,838 | |
| P30 | 10X5 | 507 | 1.1820 | 179,782 | 165.0 | 41,828 | 5.86 | 10,399 | 3.76 | 24,782 | 32 | 1,803 | 29,744 | 286,534 | |
| P31 | 10X5 | 507 | 1.1820 | 179,782 | 165.0 | 41,828 | 5.86 | 10,399 | 3.76 | 24,782 | 32 | 1,803 | 29,744 | 286,534 | |
| P32 | 10X5 | 507 | 1.1820 | 179,782 | 165.0 | 41,828 | 5.86 | 10,399 | 3.76 | 24,782 | 32 | 1,803 | 29,744 | 286,534 | |
| P33 | 10X5 | 507 | 1.1820 | 179,782 | 165.0 | 41,828 | 5.86 | 10,399 | 3.76 | 24,782 | 32 | 1,803 | 29,744 | 286,534 | |
| P40 | 48" | 135 | | 12,825 | | | | | | | 18 | 270 | 4,455 | 17,280 | |
| P41 | 48" | 545 | | 51,775 | | | | | | | 18 | 1,090 | 17,985 | 69,760 | |
| P44 | 48" | 475 | | 45,125 | | | | | | | 18 | 950 | 15,675 | 60,800 | |
| P45 | 48" | 475 | | 45,125 | | | | | | | 18 | 950 | 15,675 | 60,800 | |
| P46 | 10X5 | 507 | 1.1820 | 179,782 | 165.0 | 41,828 | 5.86 | 10,399 | 3.76 | 24,782 | 32 | 1,803 | 29,744 | 286,534 | |
| P48 | 10X5 | 600 | 1.1820 | 212,760 | 165.0 | 49,500 | 5.86 | 12,306 | 3.76 | 29,328 | 32 | 2,133 | 35,200 | 339,094 | |
| P49 | 10X5 | 600 | 1.1820 | 212,760 | 165.0 | 49,500 | 5.86 | 12,306 | 3.76 | 29,328 | 32 | 2,133 | 35,200 | 339,094 | |
| P50 | 10X5 | 600 | 1.1820 | 212,760 | 165.0 | 0 | 5.86 | 12,306 | 3.76 | 29,328 | 32 | 2,133 | 35,200 | 289,594 | |
| P51 | 10X5 | 100 | 1.1820 | 35,460 | 165.0 | 8,250 | 5.86 | 2,051 | 3.76 | 4,888 | 32 | 356 | 5,867 | 56,516 | |
| P52 | 48" | 20 | | 1,900 | | | | | | | 18 | 40 | 660 | 2,560 | |
| I1 | 10x7 | | 14.430 | 4,329 | 1128.0 | 564 | | | | | | | | 4,893 | Wingwalls |
| I2 | 30" | | 2.70 | 810 | 111.0 | 56 | | | | | | | | 866 | 4:1 Slope |
| I5 | 8x5 | | 8.740 | 2,622 | 618.0 | 309 | | | | | | | | 2,931 | 0 Degree Skew |
| I9 | 48" | | 9.40 | 2,820 | 570.0 | 285 | | | | | | | | 3,105 | |
| I14 | 10x5 | | 9.050 | 2,715 | 667.0 | 334 | | | | | | | | 3,049 | |
| I15 | 48" | | 9.40 | 2,820 | 570.0 | 285 | | | | | | | | 3,105 | |
| OUTLET | 5-10x5 | | 14.650 | 4,395 | 1187.0 | 594 | | | | | | | | 4,989 | |
| TOTAL | | 16260 | | | | | | | | | | | Sub Total | 12,668,098 | |

| Quantities | Cost | Unit |
|---|---|---|
| Concrete | 300.00 | cuyd |
| Steel | 0.50 | lbs |
| Road Removal | 2.50 | sqyd |
| Road Replacement | 14.00 | sqyd |
| 30" Pipe | 55.00 | Linft |
| 48" Pipe | 95.00 | Linft |
| Trench | 3.50 | cuyd |
| Structural Backfill | 13.00 | cuyd |

| Miscellaneous | Quantity | Units | Unit Cos | Total Cost |
|---|---|---|---|---|
| Junction Box | 2 | each | 10,000 | 20,000 |
| Access Holes | 46 | each | 1,000 | 46,000 |
| Manholes | 7 | each | 2,000 | 14,000 |
| Catchbasins | 54 | each | 2,000 | 108,000 |
| Channels | 5000 | cuyds | 5 | 25,000 |
| Energy Dissipator | 1 | Lump Sum | 50,000 | 50,000 |
| Tatum Crossing | 1 | Lump Sum | 100,000 | 100,000 |
| Trash Racks/ Barrel | 11 | each | 2,000 | 22,000 |
| | | | Sub Tota | 385,000 |

**TOTAL** **13,053,098**

WSS 7/24/96

# DOUBLETREE RANCH ROAD
PROJECT NO. 2878

## DOUBLETREE RANCH ROAD STORM DRAIN
## PRELIMINARY COST ESTIMATE SUMMARY

### Cherokee Wash Diversion (100-year Storm)

### ORIGINAL UNIT PRICES

| ALTERNATIVES | LAND ACQUISITION ($) | STORM DRAIN CONST. ($) | DETENTION BASIN CONST. ($) | SUB TOTAL CONST. ($) | UTILITY RELOCATIONS 5% of Construction ($) | ENGINEERING DESIGN Includes: Civil Geotechnical Landscape Structural Survey 10% of Construction ($) | CONSTRUCTION ADMIN. Includes: Inspection Survey Testing 10% of Construction ($) | CONTINGENCY 10% of Land Acquisition & Construction ($) | TOTAL PROJECT COST ($) |
|---|---|---|---|---|---|---|---|---|---|
| NO DETENTION BASINS 100-Year | 175,000 | 16,135,548 | -0- | 16,135,548 | 806,777 | 1,613,555 | 1,613,555 | 1,631,055 | $21,800,490 |

WSS 9/23/96

# DOUBLETREE RANCH ROAD

**PROJECT NO. 2878**

## STORM DRAIN ANALYSIS
## CHEROKEE WASH DIVERSION

Doubletree Ranch Road System
100-Year No Detention
Cherokee Wash Diversion @ 52nd & 56th Street (100-year Storm)

**ORIGINAL UNIT PRICES**

| CULVERT NO. | SIZE (FT) | LENGTH (FT) | QUANTITIES/PRICE (Per Linear Ft.) | | | | | | | | ROAD REMOVAL & REPLACEMENT | | | TOTAL COST | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Concrete (cuyd) | Sub Cost | Steel (lbs) | Sub Cost | Trench (cuyd) | Trench ($) | Backfill (cuyd) | Backfill ($) | (Width) | (sqyd) | Sub Cost | | |
| Outlet | | | | | | | | | | | | | | | |
| Drainage Excavation | 351 | 190 | | | | | 1235 | 4,323 | | | | | | 4,323 | |
| P1 | 6-10X6 | 571 | 6.2220 | 710,552 | 894.7 | 255,437 | 28.69 | 57,337 | 4.74 | 35,185 | 88.5 | 5,615 | 92,645 | 1,151,156 | |
| P2 | 6-10X6 | 571 | 6.2220 | 710,552 | 894.7 | 255,437 | 28.69 | 57,337 | 4.74 | 35,185 | 88.5 | 5,615 | 92,645 | 1,151,156 | |
| P3 | 6-10X6 | 571 | 6.2220 | 710,552 | 894.7 | 255,437 | 28.69 | 57,337 | 4.74 | 35,185 | 88.5 | 5,615 | 92,645 | 1,151,156 | |
| P4 | 5-10X6 | 431 | 5.2340 | 451,171 | 752.6 | 162,185 | 24.24 | 36,566 | 4.74 | 26,558 | 77.6 | 3,716 | 61,317 | 737,797 | |
| P5 | 5-10X6 | 431 | 5.2340 | 451,171 | 752.6 | 162,185 | 24.24 | 36,566 | 4.74 | 26,558 | 77.6 | 3,716 | 61,317 | 737,797 | |
| P6 | 5-10X6 | 431 | 5.2340 | 451,171 | 752.6 | 162,185 | 24.24 | 36,566 | 4.74 | 26,558 | 77.6 | 3,716 | 61,317 | 737,797 | |
| P7 | 5-10X6 | 433 | 5.2340 | 453,264 | 752.6 | 162,938 | 24.24 | 36,736 | 4.74 | 26,681 | 77.6 | 3,733 | 61,601 | 741,221 | |
| P8 | 5-10X6 | 433 | 5.2340 | 453,264 | 752.6 | 162,938 | 24.24 | 36,736 | 4.74 | 26,681 | 77.6 | 3,733 | 61,601 | 741,221 | |
| P9 | 5-10X6 | 433 | 5.2340 | 453,264 | 752.6 | 162,938 | 24.24 | 36,736 | 4.74 | 26,681 | 77.6 | 3,733 | 61,601 | 741,221 | |
| P10 | 10X5 | 536 | 1.1820 | 126,710 | 165.0 | 44,220 | 5.86 | 10,993 | 3.76 | 26,200 | 32 | 1,906 | 31,445 | 239,569 | |
| P11 | 10X6 | 537 | 1.2620 | 135,539 | 173.4 | 46,558 | 6.52 | 12,254 | 4.74 | 33,090 | 34 | 2,029 | 33,473 | 260,914 | |
| P12 | 10X6 | 536 | 1.2620 | 135,286 | 173.4 | 46,471 | 6.52 | 12,232 | 4.74 | 33,028 | 34 | 2,025 | 33,411 | 260,428 | |
| P13 | 10X6 | 536 | 1.2620 | 135,286 | 173.4 | 46,471 | 6.52 | 12,232 | 4.74 | 33,028 | 34 | 2,025 | 33,411 | 260,428 | |
| P14 | 10X6 | 536 | 1.2620 | 135,286 | 173.4 | 46,471 | 6.52 | 12,232 | 4.74 | 33,028 | 34 | 2,025 | 33,411 | 260,428 | |
| P15 | 10X6 | 105 | 1.2620 | 26,502 | 173.4 | 9,104 | 6.52 | 2,396 | 4.74 | 6,470 | 34 | 397 | 6,545 | 51,017 | |
| P16 | 10X6 | 347 | 1.2620 | 87,583 | 173.4 | 30,085 | 6.52 | 7,919 | 4.74 | 21,382 | 34 | 1,311 | 21,630 | 168,598 | |
| P17 | 10X6 | 347 | 1.2620 | 87,583 | 173.4 | 30,085 | 6.52 | 7,919 | 4.74 | 21,382 | 34 | 1,311 | 21,630 | 168,598 | |
| P18 | 30" | 330 | | 18,150 | | | | | | | 15 | 550 | 9,075 | 27,225 | |
| P19 | 30" | 330 | | 18,150 | | | | | | | 15 | 550 | 9,075 | 27,225 | |
| P22 | 30" | 110 | | 6,050 | | | | | | | 15 | 183 | 3,025 | 9,075 | |
| P23 | 30" | 330 | | 18,150 | | | | | | | 15 | 550 | 9,075 | 27,225 | |
| P26 | 30" | 330 | | 18,150 | | | | | | | 15 | 550 | 9,075 | 27,225 | |
| P27 | 8X5 | 450 | .9760 | 87,840 | 144.3 | 32,468 | 5.19 | 8,174 | 3.76 | 21,996 | 30 | 1,500 | 24,750 | 175,228 | |
| P28 | 8X5 | 450 | .9760 | 87,840 | 144.3 | 32,468 | 5.19 | 8,174 | 3.76 | 21,996 | 30 | 1,500 | 24,750 | 175,228 | |
| P29 | 8X5 | 450 | .9760 | 87,840 | 144.3 | 32,468 | 5.19 | 8,174 | 3.76 | 21,996 | 30 | 1,500 | 24,750 | 175,228 | |
| P30 | 4-10X6 | 530 | 4.2460 | 450,076 | 597.7 | 158,391 | 19.96 | 37,026 | 4.74 | 32,659 | 66.6 | 3,922 | 64,713 | 742,864 | |
| P31 | 4-10X6 | 530 | 4.2460 | 450,076 | 597.7 | 158,391 | 19.96 | 37,026 | 4.74 | 32,659 | 66.6 | 3,922 | 64,713 | 742,864 | |
| P32 | 4-10X6 | 530 | 4.2460 | 450,076 | 597.7 | 158,391 | 19.96 | 37,026 | 4.74 | 32,659 | 66.6 | 3,922 | 64,713 | 742,864 | |
| P33 | 3-10X6 | 529 | 3.2580 | 344,696 | 474.9 | 125,611 | 15.48 | 28,661 | 4.74 | 32,597 | 55.7 | 3,274 | 54,020 | 585,585 | |
| P40 | 48" | 475 | | 45,125 | | | | | | | 18 | 950 | 15,675 | 60,800 | |
| P41 | 48" | 475 | | 45,125 | | | | | | | 18 | 950 | 15,675 | 60,800 | |
| P44 | 48" | 545 | | 51,775 | | | | | | | 18 | 1,090 | 17,985 | 69,760 | |
| P45 | 60" | 135 | | 18,900 | | | | | | | 22 | 330 | 5,445 | 24,345 | |
| P46 | 3-10X6 | 531 | 3.2580 | 346,000 | 474.9 | 126,086 | 15.48 | 28,770 | 4.74 | 32,720 | 55.7 | 3,286 | 54,224 | 587,799 | |
| P48 | 8X4 | 601 | .0908 | 10,914 | 138.8 | 41,709 | 4.67 | 9,823 | 2.89 | 22,580 | 28 | 1,870 | 30,851 | 115,878 | |
| P49 | 8X4 | 600 | .0908 | 10,896 | 138.8 | 41,640 | 4.67 | 9,807 | 2.89 | 22,542 | 28 | 1,867 | 30,800 | 115,685 | |
| P50 | 8X4 | 600 | .0908 | 10,896 | 138.8 | 41,640 | 4.67 | 9,807 | 2.89 | 22,542 | 28 | 1,867 | 30,800 | 115,685 | |
| P51 | 8X4 | 100 | .0908 | 1,816 | 138.8 | 6,940 | 4.67 | 1,635 | 2.89 | 3,757 | 28 | 311 | 5,133 | 19,281 | |
| P52 | 48" | 20 | | 1,900 | | | | | | | 18 | 40 | 660 | 2,560 | |
| P53 | 60" | 38 | | 5,320 | | | | | | | 22 | 93 | 1,533 | 6,853 | |
| P54 | 3-10X5 | 417 | 3.1220 | 260,375 | 459.1 | 95,722 | 13.96 | 75,677 | 3.76 | 20,383 | 53.7 | 2,488 | 41,054 | 493,211 | |
| P55 | 3-10X5 | 418 | 3.1220 | 260,999 | 459.1 | 95,952 | 13.96 | 75,859 | 3.76 | 20,432 | 53.7 | 2,494 | 41,152 | 494,394 | |
| P56 | 3-10X5 | 416 | 3.1220 | 259,750 | 459.1 | 95,493 | 13.96 | 75,496 | 3.76 | 20,334 | 53.7 | 2,482 | 40,955 | 492,028 | |
| P57 | 60" | 30 | | 4,200 | | | | | | | 22 | 73 | 1,210 | 5,410 | |
| INLETS | | | | | | | | | | | | | | | |
| I1 | 10x6 | | 11.530 | 2,306 | 876.0 | 438 | | | | | | | | 2,744 | Wingwalls |
| I2 | 30" | | 2.70 | 540 | 111.0 | 56 | | | | | | | | 596 | 4:1 Slope |
| I5 | 8x5 | | 8.740 | 1,748 | 618.0 | 309 | | | | | | | | 2,057 | 0 Degree Skew |
| I9 | 48" | | 9.40 | 1,880 | 570.0 | 285 | | | | | | | | 2,165 | |
| I14 | 8X4 | | 6.680 | 1,336 | 480.0 | 240 | | | | | | | | 1,576 | |
| I15 | 48" | | 9.40 | 1,880 | 570.0 | 285 | | | | | | | | 2,165 | |
| I16 | 60" | | 12.20 | 2,440 | 725.0 | 363 | | | | | | | | | Picked up in Catchbasins |
| I17 | 3-10X5 | | 11.850 | 2,370 | 927.0 | 464 | | | | | | | | 2,834 | |
| I18 | 60" | | 12.20 | 2,440 | 725.0 | 363 | | | | | | | | | Picked up in Catchbasins |
| OUTLET | 6-10x6 | | 31.690 | 6,338 | 2496.0 | 1,248 | | | | | | | | 7,586 | |
| TOTAL | | 18085 | | | | | | | | | | | Sub Total | 15,704,548 | |

| Quantities | Cost | Unit |
|---|---|---|
| Concrete | 200.00 | cuyd |
| Steel | 0.50 | lbs |
| Road Removal | 2.50 | sqyd |
| Road Replacement | 14.00 | sqyd |
| 30" Pipe | 55.00 | Linft |
| 48" Pipe | 95.00 | Linft |
| 60" Pipe | 140.00 | Linft |
| Trench | 3.50 | cuyd |
| Structural Backfill | 13.00 | cuyd |

| Miscellaneous | Quantity | Units | Unit Cost | Total Cost |
|---|---|---|---|---|
| Junction Box | 2 | each | 10,000 | 20,000 |
| Access Holes | 63 | each | 1,000 | 63,000 |
| Manholes | 7 | each | 3,000 | 21,000 |
| Catchbasins | 60 | each | 2,000 | 120,000 |
| Channels | 5000 | cuyds | 5 | 25,000 |
| Energy Dissipator | 1 | Lump Sum | 60,000 | 60,000 |
| Tatum Crossing | 1 | Lump Sum | 100,000 | 100,000 |
| Trash Racks/ Barrel | 11 | each | 2,000 | 22,000 |
| | | | Sub Total | 431,000 |

**TOTAL $ 16,135,548**

WSS 7/31/96
Rev WSS 9/10/96
Rev WSS 9/18/96

# DOUBLETREE RANCH ROAD

**PROJECT NO. 2878**

## DOUBLETREE RANCH ROAD STORM DRAIN
## PRELIMINARY COST ESTIMATE SUMMARY

### Cherokee Wash Diversion (100-year Storm)

### REVISED UNIT PRICES

| ALTERNATIVES | LAND ACQUISITION ($) | STORM DRAIN CONST. ($) | DETENTION BASIN CONST. ($) | SUB TOTAL CONST. ($) | UTILITY RELOCATION 5% of Construction ($) | ENGINEERING DESIGN Includes: Civil Geotechnical Landscape Structural Survey 10% of Construction ($) | CONSTRUCTION ADMIN. Includes: Inspection Survey Testing 10% of Construction ($) | CONTINGENCY 10% of Land Acquisition & Construction ($) | TOTAL PROJECT COST ($) |
|---|---|---|---|---|---|---|---|---|---|
| NO DETENTION BASINS 100-Year | 175,000 | 21,613,911 | -0- | 21,613,911 | 1,080,696 | 2,161,391 | 2,161,391 | 2,178,891 | $29,196,280 |

WSS 7/31/96
Rev. WSS 9/10/96
Rev. WSS 9/18/96

# DOUBLETREE RANCH ROAD

**PROJECT NO. 2878**

## STORM DRAIN ANALYSIS
## CHEROKEE WASH DIVERSION

Doubletree Ranch Road System
100-Year No Detention
Cherokee Wash Diversion @ 52nd & 56th Street (100-year Storm)

**REVISED UNIT PRICES**

| CULVERT NO. | SIZE (FT) | LENGTH (FT) | QUANTITIES/PRICE (Per Linear Ft.) | | | | | | | | ROAD REMOVAL & REPLACEMENT | | | TOTAL COST | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Concrete (cuyd) | Sub Cost | Steel (lbs) | Sub Cost | Trench (cuyd) | Trench ($) | Backfill (cuyd) | Backfill ($) | (Width) | (sqyd) | Sub Cost | | |
| Outlet | | | | | | | | | | | | | | | |
| Drainage Excavation | 351 | 190 | | | | | 1235 | 7,410 | | | | | | 7,410 | |
| P1 | 6-10X6 | 571 | 6.2220 | 1,065,829 | 894.7 | 255,437 | 28.69 | 98,292 | 4.74 | 48,718 | 88.5 | 5,615 | 92,645 | 1,560,920 | |
| P2 | 6-10X6 | 571 | 6.2220 | 1,065,829 | 894.7 | 255,437 | 28.69 | 98,292 | 4.74 | 48,718 | 88.5 | 5,615 | 92,645 | 1,560,920 | |
| P3 | 6-10X6 | 571 | 6.2220 | 1,065,829 | 894.7 | 255,437 | 28.69 | 98,292 | 4.74 | 48,718 | 88.5 | 5,615 | 92,645 | 1,560,920 | |
| P4 | 5-10X6 | 431 | 5.2340 | 676,756 | 752.6 | 162,185 | 24.24 | 62,685 | 4.74 | 36,773 | 77.6 | 3,716 | 61,317 | 999,716 | |
| P5 | 5-10X6 | 431 | 5.2340 | 676,756 | 752.6 | 162,185 | 24.24 | 62,685 | 4.74 | 36,773 | 77.6 | 3,716 | 61,317 | 999,716 | |
| P6 | 5-10X6 | 431 | 5.2340 | 676,756 | 752.6 | 162,185 | 24.24 | 62,685 | 4.74 | 36,773 | 77.6 | 3,716 | 61,317 | 999,716 | |
| P7 | 5-10X6 | 433 | 5.2340 | 679,897 | 752.6 | 162,938 | 24.24 | 62,976 | 4.74 | 36,944 | 77.6 | 3,733 | 61,601 | 1,004,355 | |
| P8 | 5-10X6 | 433 | 5.2340 | 679,897 | 752.6 | 162,938 | 24.24 | 62,976 | 4.74 | 36,944 | 77.6 | 3,733 | 61,601 | 1,004,355 | |
| P9 | 5-10X6 | 433 | 5.2340 | 679,897 | 752.6 | 162,938 | 24.24 | 62,976 | 4.74 | 36,944 | 77.6 | 3,733 | 61,601 | 1,004,355 | |
| P10 | 10X5 | 536 | 1.1820 | 190,066 | 165.0 | 44,220 | 5.86 | 18,846 | 3.76 | 36,276 | 32 | 1,906 | 31,445 | 320,853 | |
| P11 | 10X6 | 537 | 1.2620 | 203,308 | 173.4 | 46,558 | 6.52 | 21,007 | 4.74 | 45,817 | 34 | 2,029 | 33,473 | 350,163 | |
| P12 | 10X6 | 536 | 1.2620 | 202,930 | 173.4 | 46,471 | 6.52 | 20,968 | 4.74 | 45,732 | 34 | 2,025 | 33,411 | 349,511 | |
| P13 | 10X6 | 536 | 1.2620 | 202,930 | 173.4 | 46,471 | 6.52 | 20,968 | 4.74 | 45,732 | 34 | 2,025 | 33,411 | 349,511 | |
| P14 | 10X6 | 536 | 1.2620 | 202,930 | 173.4 | 46,471 | 6.52 | 20,968 | 4.74 | 45,732 | 34 | 2,025 | 33,411 | 349,511 | |
| P15 | 10X6 | 105 | 1.2620 | 39,753 | 173.4 | 9,104 | 6.52 | 4,108 | 4.74 | 8,959 | 34 | 397 | 6,545 | 68,468 | |
| P16 | 10X6 | 347 | 1.2620 | 131,374 | 173.4 | 30,085 | 6.52 | 13,575 | 4.74 | 29,606 | 34 | 1,311 | 21,630 | 226,269 | |
| P17 | 10X6 | 347 | 1.2620 | 131,374 | 173.4 | 30,085 | 6.52 | 13,575 | 4.74 | 29,606 | 34 | 1,311 | 21,630 | 226,269 | |
| P18 | 30" | 330 | | 21,450 | | | | | | | 15 | 550 | 9,075 | 30,525 | |
| P19 | 30" | 330 | | 21,450 | | | | | | | 15 | 550 | 9,075 | 30,525 | |
| P22 | 30" | 110 | | 7,150 | | | | | | | 15 | 183 | 3,025 | 10,175 | |
| P23 | 30" | 330 | | 21,450 | | | | | | | 15 | 550 | 9,075 | 30,525 | |
| P26 | 30" | 330 | | 21,450 | | | | | | | 15 | 550 | 9,075 | 30,525 | |
| P27 | 8X5 | 450 | .9760 | 131,760 | 144.3 | 32,468 | 5.19 | 14,013 | 3.76 | 30,456 | 30 | 1,500 | 24,750 | 233,447 | |
| P28 | 8X5 | 450 | .9760 | 131,760 | 144.3 | 32,468 | 5.19 | 14,013 | 3.76 | 30,456 | 30 | 1,500 | 24,750 | 233,447 | |
| P29 | 8X5 | 450 | .9760 | 131,760 | 144.3 | 32,468 | 5.19 | 14,013 | 3.76 | 30,456 | 30 | 1,500 | 24,750 | 233,447 | |
| P30 | 4-10X6 | 530 | 4.2460 | 675,114 | 597.7 | 158,391 | 19.96 | 63,473 | 4.74 | 45,220 | 66.6 | 3,922 | 64,713 | 1,006,910 | |
| P31 | 4-10X6 | 530 | 4.2460 | 675,114 | 597.7 | 158,391 | 19.96 | 63,473 | 4.74 | 45,220 | 66.6 | 3,922 | 64,713 | 1,006,910 | |
| P32 | 4-10X6 | 530 | 4.2460 | 675,114 | 597.7 | 158,391 | 19.96 | 63,473 | 4.74 | 45,220 | 66.6 | 3,922 | 64,713 | 1,006,910 | |
| P33 | 3-10X6 | 529 | 3.2580 | 517,045 | 474.9 | 125,611 | 15.48 | 49,134 | 4.74 | 45,134 | 55.7 | 3,274 | 54,020 | 790,943 | |
| P40 | 48" | 475 | | 52,250 | | | | | | | 18 | 950 | 15,675 | 67,925 | |
| P41 | 48" | 475 | | 52,250 | | | | | | | 18 | 950 | 15,675 | 67,925 | |
| P44 | 48" | 545 | | 59,950 | | | | | | | 18 | 1,090 | 17,985 | 77,935 | |
| P45 | 60" | 135 | | 18,900 | | | | | | | 22 | 330 | 5,445 | 24,345 | |
| P46 | 3-10X6 | 531 | 3.2580 | 518,999 | 474.9 | 126,086 | 15.48 | 49,319 | 4.74 | 45,305 | 55.7 | 3,286 | 54,224 | 793,934 | |
| P48 | 8X4 | 601 | .0908 | 16,371 | 138.8 | 41,709 | 4.67 | 16,840 | 2.89 | 31,264 | 28 | 1,870 | 30,851 | 137,036 | |
| P49 | 8X4 | 600 | .0908 | 16,344 | 138.8 | 41,640 | 4.67 | 16,812 | 2.89 | 31,212 | 28 | 1,867 | 30,800 | 136,808 | |
| P50 | 8X4 | 600 | .0908 | 16,344 | 138.8 | 41,640 | 4.67 | 16,812 | 2.89 | 31,212 | 28 | 1,867 | 30,800 | 136,808 | |
| P51 | 8X4 | 100 | .0908 | 2,724 | 138.8 | 6,940 | 4.67 | 2,802 | 2.89 | 5,202 | 28 | 311 | 5,133 | 22,801 | |
| P52 | 48" | 20 | | 2,200 | | | | | | | 18 | 40 | 660 | 2,860 | |
| P53 | 60" | 38 | | 5,320 | | | | | | | 22 | 93 | 1,533 | 6,853 | |
| P54 | 3-10X5 | 417 | 3.1220 | 390,562 | 459.1 | 95,722 | 13.96 | 104,784 | 3.76 | 28,223 | 53.7 | 2,488 | 41,054 | 660,345 | |
| P55 | 3-10X5 | 418 | 3.1220 | 391,499 | 459.1 | 95,952 | 13.96 | 105,035 | 3.76 | 28,290 | 53.7 | 2,494 | 41,152 | 661,928 | |
| P56 | 3-10X5 | 416 | 3.1220 | 389,626 | 459.1 | 95,493 | 13.96 | 104,532 | 3.76 | 28,155 | 53.7 | 2,482 | 40,955 | 658,761 | |
| P57 | 60" | 30 | | 4,200 | | | | | | | 22 | 73 | 1,210 | 5,410 | |
| INLETS | | | | | | | | | | | | | | | |
| I1 | 10x6 | | 11.530 | 3,459 | 876.0 | 438 | | | | | | | | 3,897 | Wingwalls |
| I2 | 30" | | 2.70 | 810 | 111.0 | 56 | | | | | | | | 866 | 4:1 Slope |
| I5 | 8x5 | | 8.740 | 2,622 | 618.0 | 309 | | | | | | | | 2,931 | 0 Degree Skew |
| I9 | 48" | | 9.40 | 2,820 | 570.0 | 285 | | | | | | | | 3,105 | |
| I14 | 8X4 | | 6.680 | 2,004 | 480.0 | 240 | | | | | | | | 2,244 | |
| I15 | 48" | | 9.40 | 2,820 | 570.0 | 285 | | | | | | | | 3,105 | |
| I16 | 60" | | 12.20 | 3,660 | 725.0 | 363 | | | | | | | | | Picked up in Catchbasins |
| I17 | 3-10X5 | | 11.850 | 3,555 | 927.0 | 464 | | | | | | | | 4,019 | |
| I18 | 60" | | 12.20 | 3,660 | 725.0 | 363 | | | | | | | | | Picked up in Catchbasins |
| OUTLET | 6-10x6 | | 31.690 | 9,507 | 2496.0 | 1,248 | | | | | | | | 10,755 | |
| TOTAL | | 18085 | | | | | | | | | | | Sub Total | 21,072,411 | |

| Quantities | Cost | Unit | |
|---|---|---|---|
| Concrete | 300.00 | cuyd | * |
| Steel | 0.50 | lbs | |
| Road Removal | 2.50 | sqyd | |
| Road Replacement | 14.00 | sqyd | |
| 30" Pipe | 65.00 | Linft | * |
| 48" Pipe | 110.00 | Linft | * |
| 60" Pipe | 140.00 | Linft | |
| Trench | 6.00 | cuyd | * |
| Structural Backfill | 18.00 | cuyd | * |

| Miscellaneous | Quantity | Units | Unit Cost | Total Cost | |
|---|---|---|---|---|---|
| Junction Box | 2 | each | 25,000 | 50,000 | * |
| Access Holes | 63 | each | 2,000 | 126,000 | * |
| Manholes | 7 | each | 5,500 | 38,500 | * |
| Catchbasins | 60 | each | 2,000 | 120,000 | |
| Channels | 5000 | cuyds | 5 | 25,000 | |
| Energy Dissipator | 1 | Lump Sum | 60,000 | 60,000 | |
| Tatum Crossing | 1 | Lump Sum | 100,000 | 100,000 | |
| Trash Racks/ Barrel | 11 | each | 2,000 | 22,000 | |
| | | | Sub Total | 541,500 | |

*Revised to Flood Control Cost 9/10/96

**TOTAL $21,613,911**

WSS 7/31/96
Rev WSS 9/10/96
Rev WSS 9/18/96

# DOUBLETREE RANCH ROAD

**PROJECT NO. 2878**

## DOUBLETREE RANCH ROAD STORM DRAIN
## PRELIMINARY COST ESTIMATE SUMMARY

### Cherokee Wash Diversion (50-year Storm)

### ORIGINAL COST

| ALTERNATIVES | LAND ACQUISITION ($) | STORM DRAIN CONST. ($) | DETENTION BASIN CONST. ($) | SUB TOTAL CONST. ($) | UTILITY RELOCATIONS 5% of Construction ($) | ENGINEERING DESIGN Includes: Civil Geotechnical Landscape Structural Survey 10% of Construction ($) | CONSTRUCTION ADMIN. Includes: Inspection Survey Testing 10% of Construction ($) | CONTINGENCY 10% of Land Acquisition & Construction ($) | TOTAL PROJECT COST ($) |
|---|---|---|---|---|---|---|---|---|---|
| NO DETENTION BASINS 100-Year | 175,000 | 15,717,730 | -0- | 15,717,730 | 785,886 | 1,571,773 | 1,571,773 | 1,589,273 | $21,236,435 |

WSS 9/19/96

# DOUBLETREE RANCH ROAD

PROJECT NO. 2878

## STORM DRAIN ANALYSIS
## CHEROKEE WASH DIVERSION

Doubletree Ranch Road System
100-Year No Detention
Cherokee Wash Diversion @ 52nd & 56th Street (50-year Storm)

**ORIGINAL COST**

| CULVERT NO | SIZE (FT) | LENGTH (FT) | QUANTITIES/PRICE (Per Linear Ft.) | | | | | | | | ROAD REMOVAL & REPLACEMENT | | | TOTAL COST | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Concrete (cuyd) | Sub Cost | Steel (lbs) | Sub Cost | Trench (cuyd) | Trench ($) | Backfill (cuyd) | Backfill ($) | (Width) | (sqyd) | Sub Cost | | |
| Outlet | | | | | | | | | | | | | | | |
| Drainage Excavation | 351 | 190 | | | | | 1235 | 4,323 | | | | | | 4,323 | |
| P1 | 6-10x6 | 571 | 6.2220 | 710,552 | 894.7 | 255,437 | 28.70 | 57,357 | 4.74 | 35,185 | 88.5 | 5,615 | 92,645 | 1,151,176 | |
| P2 | 6-10x6 | 571 | 6.2220 | 710,552 | 894.7 | 255,437 | 28.70 | 57,357 | 4.74 | 35,185 | 88.5 | 5,615 | 92,645 | 1,151,176 | |
| P3 | 6-10x6 | 571 | 6.2220 | 710,552 | 894.7 | 255,437 | 28.70 | 57,357 | 4.74 | 35,185 | 88.5 | 5,615 | 92,645 | 1,151,176 | |
| P4 | 5-10x6 | 431 | 5.2340 | 451,171 | 752.6 | 162,185 | 24.40 | 36,807 | 4.74 | 26,558 | 78 | 3,735 | 61,633 | 738,355 | |
| P5 | 5-10x6 | 431 | 5.2340 | 451,171 | 752.6 | 162,185 | 24.40 | 36,807 | 4.74 | 26,558 | 78 | 3,735 | 61,633 | 738,355 | |
| P6 | 5-10x6 | 431 | 5.2340 | 451,171 | 752.6 | 162,185 | 24.40 | 36,807 | 4.74 | 26,558 | 78 | 3,735 | 61,633 | 738,355 | |
| P7 | 5-10x6 | 433 | 5.2340 | 453,264 | 752.6 | 162,938 | 24.40 | 36,978 | 4.74 | 26,681 | 78 | 3,753 | 61,919 | 741,781 | |
| P8 | 5-10x6 | 433 | 5.2340 | 453,264 | 752.6 | 162,938 | 24.40 | 36,978 | 4.74 | 26,681 | 78 | 3,753 | 61,919 | 741,781 | |
| P9 | 5-10x6 | 433 | 5.2340 | 453,264 | 752.6 | 162,938 | 24.40 | 36,978 | 4.74 | 26,681 | 78 | 3,753 | 61,919 | 741,781 | |
| P10 | 8x6 | 536 | 1.0440 | 111,917 | 153.3 | 41,084 | 5.70 | 10,693 | 4.74 | 33,028 | 32 | 1,906 | 31,445 | 228,168 | |
| P11 | 8x6 | 537 | 1.0440 | 112,126 | 153.3 | 41,161 | 5.70 | 10,713 | 4.74 | 33,090 | 32 | 1,909 | 31,504 | 228,594 | |
| P12 | 8x6 | 536 | 1.0440 | 111,917 | 153.3 | 41,084 | 5.70 | 10,693 | 4.74 | 33,028 | 32 | 1,906 | 31,445 | 228,168 | |
| P13 | 8x6 | 536 | 1.0440 | 111,917 | 153.3 | 41,084 | 5.70 | 10,693 | 4.74 | 33,028 | 32 | 1,906 | 31,445 | 228,168 | |
| P14 | 8x6 | 536 | 1.0440 | 111,917 | 153.3 | 41,084 | 5.70 | 10,693 | 4.74 | 33,028 | 32 | 1,906 | 31,445 | 228,168 | |
| P15 | 8x6 | 105 | 1.0440 | 21,924 | 153.3 | 8,048 | 5.70 | 2,095 | 4.74 | 6,470 | 32 | 373 | 6,160 | 44,697 | |
| P16 | 8x6 | 347 | 1.0440 | 72,454 | 153.3 | 26,598 | 5.70 | 6,923 | 4.74 | 21,382 | 32 | 1,234 | 20,357 | 147,713 | |
| P17 | 8x6 | 347 | 1.0440 | 72,454 | 153.3 | 26,598 | 5.70 | 6,923 | 4.74 | 21,382 | 32 | 1,234 | 20,357 | 147,713 | |
| P18 | 30" | 330 | | 18,150 | | | | | | | 15 | 550 | 9,075 | 27,225 | |
| P19 | 30" | 330 | | 18,150 | | | | | | | 15 | 550 | 9,075 | 27,225 | |
| P22 | 30" | 110 | | 6,050 | | | | | | | 15 | 183 | 3,025 | 9,075 | |
| P23 | 30" | 330 | | 18,150 | | | | | | | 15 | 550 | 9,075 | 27,225 | |
| P26 | 30" | 330 | | 18,150 | | | | | | | 15 | 550 | 9,075 | 27,225 | |
| P27 | 8X5 | 450 | .9760 | 87,840 | 144.3 | 32,468 | 5.19 | 8,174 | 3.76 | 21,996 | 30 | 1,500 | 24,750 | 175,228 | |
| P28 | 8X5 | 450 | .9760 | 87,840 | 144.3 | 32,468 | 5.19 | 8,174 | 3.76 | 21,996 | 30 | 1,500 | 24,750 | 175,228 | |
| P29 | 8X5 | 450 | .9760 | 87,840 | 144.3 | 32,468 | 5.19 | 8,174 | 3.76 | 21,996 | 30 | 1,500 | 24,750 | 175,228 | |
| P30 | 4-10x6 | 530 | 4.2460 | 450,076 | 597.7 | 158,391 | 19.96 | 37,026 | 4.74 | 32,659 | 67 | 3,946 | 65,102 | 743,253 | |
| P31 | 4-10x6 | 530 | 4.2460 | 450,076 | 597.7 | 158,391 | 19.96 | 37,026 | 4.74 | 32,659 | 67 | 3,946 | 65,102 | 743,253 | |
| P32 | 3-10x6 | 530 | 3.2580 | 345,348 | 474.9 | 125,849 | 15.48 | 28,715 | 4.74 | 32,659 | 56 | 3,298 | 54,413 | 586,984 | |
| P33 | 3-10x6 | 529 | 3.2580 | 344,696 | 474.9 | 125,611 | 15.48 | 28,661 | 4.74 | 32,597 | 56 | 3,292 | 54,311 | 585,876 | |
| P40 | 48" | 475 | | 45,125 | | | | | | | 18 | 950 | 15,675 | 60,800 | |
| P41 | 48" | 475 | | 45,125 | | | | | | | 18 | 950 | 15,675 | 60,800 | |
| P44 | 48" | 545 | | 51,775 | | | | | | | 18 | 1,090 | 17,985 | 69,760 | |
| P45 | 60" | 135 | | 18,900 | | | | | | | 22 | 330 | 5,445 | 24,345 | |
| P46 | 3-10x6 | 531 | 3.2580 | 346,000 | 474.9 | 126,086 | 15.48 | 28,770 | 4.74 | 32,720 | 56 | 3,304 | 54,516 | 588,091 | |
| P48 | 6x5 | 601 | 0.746 | 89,669 | 123.0 | 36,962 | 4.44 | 9,340 | 3.76 | 29,377 | 28 | 1,870 | 30,851 | 196,198 | |
| P49 | 6x5 | 600 | 0.746 | 89,520 | 123.0 | 36,900 | 4.44 | 9,324 | 3.76 | 29,328 | 28 | 1,867 | 30,800 | 195,872 | |
| P50 | 6x5 | 600 | 0.746 | 89,520 | 123.0 | 36,900 | 4.44 | 9,324 | 3.76 | 29,328 | 28 | 1,867 | 30,800 | 195,872 | |
| P51 | 6x5 | 100 | 0.746 | 14,920 | 123.0 | 6,150 | 4.44 | 1,554 | 3.76 | 4,888 | 28 | 311 | 5,133 | 32,645 | |
| P52 | 48" | 20 | | 1,900 | | | | | | | 18 | 40 | 660 | 2,560 | |
| P53 | 60" | 38 | | 5,320 | | | | | | | 22 | 93 | 1,533 | 6,853 | |
| P54 | 2-10x6 | 417 | 2.270 | 189,318 | 330.7 | 68,951 | 11.00 | 59,631 | 4.74 | 25,696 | 45 | 2,085 | 34,403 | 377,998 | |
| P55 | 2-10x6 | 418 | 2.270 | 189,772 | 330.7 | 69,116 | 11.00 | 59,774 | 4.74 | 25,757 | 45 | 2,090 | 34,485 | 378,904 | |
| P56 | 2-10x6 | 416 | 2.270 | 188,864 | 330.7 | 68,786 | 11.00 | 59,488 | 4.74 | 25,634 | 45 | 2,080 | 34,320 | 377,092 | |
| P57 | 60" | 30 | | 4,200 | | | | | | | 22 | 73 | 1,210 | 5,410 | |
| INLETS | | | | | | | | | | | | | | | |
| I1 | 8x6 | | 11.220 | 2,244 | 824.0 | 412 | | | | | | | | 2,656 | Wingwalls |
| I2 | 30" | | 2.70 | 540 | 111.0 | 56 | | | | | | | | 596 | 4:1 Slope |
| I5 | 8x5 | | 8.740 | 1,748 | 618.0 | 309 | | | | | | | | 2,057 | 0 Degree Skew |
| I9 | 48" | | 9.40 | 1,880 | 570.0 | 285 | | | | | | | | 2,165 | |
| I14 | 6x5 | | 8.440 | 1,688 | 593.0 | 297 | | | | | | | | 1,985 | |
| I15 | 48" | | 9.40 | 1,880 | 570.0 | 285 | | | | | | | | 2,165 | |
| I16 | 60" | | 12.20 | 2,440 | 725.0 | 363 | | | | | | | | | Picked up in Catchbasins |
| I17 | 2-10x6 | | 12.930 | 2,586 | 1006.0 | 503 | | | | | | | | 3,089 | |
| I18 | 60" | | 12.20 | 2,440 | 725.0 | 363 | | | | | | | | | Picked up in Catchbasins |
| OUTLET | 6-10x6 | | 18.530 | 3,706 | 1526.0 | 763 | | | | | | | | 4,469 | |
| TOTAL | | 18085 | | | | | | | | | | | Sub Total | 15,270,730 | |

| Quantities | Cost | Unit |
|---|---|---|
| Concrete | 200.00 | cuyd |
| Steel | 0.50 | lbs |
| Road Removal | 2.50 | sqyd |
| Road Replacement | 14.00 | sqyd |
| 30" Pipe | 55.00 | Linft |
| 48" Pipe | 95.00 | Linft |
| 60" Pipe | 140.00 | Linft |
| Trench | 3.50 | cuyd |
| Structural Backfill | 13.00 | cuyd |

| Miscellaneous | Quantity | Units | Unit Cost | Total Cost |
|---|---|---|---|---|
| Junction Box | 2 | each | 10,000 | 20,000 |
| Access Holes | 79 | each | 1,000 | 79,000 |
| Manholes | 7 | each | 3,000 | 21,000 |
| Catchbasins | 60 | each | 2,000 | 120,000 |
| Channels | 5000 | cuyds | 5 | 25,000 |
| Energy Dissipator | 1 | Lump Sum | 60,000 | 60,000 |
| Tatum Crossing | 1 | Lump Sum | 100,000 | 100,000 |
| Trash Racks/ Barrel | 11 | each | 2,000 | 22,000 |
| | | | Sub Total | 447,000 |

**TOTAL $ 15,717,730**

WSS 9/19/96

# DOUBLETREE RANCH ROAD

**PROJECT NO. 2878**

## DOUBLETREE RANCH ROAD STORM DRAIN
## PRELIMINARY COST ESTIMATE SUMMARY

### Cherokee Wash Diversion (50-year Storm)

### REVISED UNIT PRICES

| ALTERNATIVES | LAND ACQUISITION ($) | STORM DRAIN CONST. ($) | DETENTION BASIN CONST. ($) | SUB TOTAL CONST. ($) | UTILITY RELOCATIONS 5% of Construction ($) | ENGINEERING DESIGN Includes: Civil Geotechnical Landscape Structural Survey 10% of Construction ($) | CONSTRUCTION ADMIN. Includes: Inspection Survey Testing 10% of Construction ($) | CONTINGENCY 10% of Land Acquisition & Construction ($) | TOTAL PROJECT COST ($) |
|---|---|---|---|---|---|---|---|---|---|
| NO DETENTION BASINS 100-Year | 175,000 | 21,091,370 | -0- | 21,091,370 | 1,054,568 | 2,109,137 | 2,109,137 | 2,126,637 | $28,665,849 |

WSS 9/19/96

# DOUBLETREE RANCH ROAD

**PROJECT NO. 2878**

## STORM DRAIN ANALYSIS
## CHEROKEE WASH DIVERSION

Doubletree Ranch Road System
100-Year No Detention
Cherokee Wash Diversion @ 52nd & 56th Street (50-year Storm)

**REVISED UNIT PRICES**

| CULVERT NO. | SIZE (FT) | LENGTH (FT) | QUANTITIES/PRICE (Per Linear Ft.) | | | | | | | | ROAD REMOVAL & REPLACEMENT | | | TOTAL COST | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Concrete (cuyd) | Sub Cost | Steel (lbs) | Sub Cost | Trench (cuyd) | Trench ($) | Backfill (cuyd) | Backfill ($) | (Width) | (sqyd) | Sub Cost | | |
| Outlet | | | | | | | | | | | | | | | |
| Drainage Excavation | 351 | 190 | | | | | 1235 | 7,410 | | | | | | 7,410 | |
| P1 | 6-10x6 | 571 | 6.2220 | 1,065,829 | 894.7 | 255,437 | 28.70 | 98,326 | 4.74 | 48,718 | 88.5 | 5,615 | 92,645 | 1,560,954 | |
| P2 | 6-10x6 | 571 | 6.2220 | 1,065,829 | 894.7 | 255,437 | 28.70 | 98,326 | 4.74 | 48,718 | 88.5 | 5,615 | 92,645 | 1,560,954 | |
| P3 | 6-10x6 | 571 | 6.2220 | 1,065,829 | 894.7 | 255,437 | 28.70 | 98,326 | 4.74 | 48,718 | 88.5 | 5,615 | 92,645 | 1,560,954 | |
| P4 | 5-10x6 | 431 | 5.2340 | 676,756 | 752.6 | 162,185 | 24.40 | 63,098 | 4.74 | 36,773 | 78 | 3,735 | 61,633 | 1,000,446 | |
| P5 | 5-10x6 | 431 | 5.2340 | 676,756 | 752.6 | 162,185 | 24.40 | 63,098 | 4.74 | 36,773 | 78 | 3,735 | 61,633 | 1,000,446 | |
| P6 | 5-10x6 | 431 | 5.2340 | 676,756 | 752.6 | 162,185 | 24.40 | 63,098 | 4.74 | 36,773 | 78 | 3,735 | 61,633 | 1,000,446 | |
| P7 | 5-10x6 | 433 | 5.2340 | 679,897 | 752.6 | 162,938 | 24.40 | 63,391 | 4.74 | 36,944 | 78 | 3,753 | 61,919 | 1,005,088 | |
| P8 | 5-10x6 | 433 | 5.2340 | 679,897 | 752.6 | 162,938 | 24.40 | 63,391 | 4.74 | 36,944 | 78 | 3,753 | 61,919 | 1,005,088 | |
| P9 | 5-10x6 | 433 | 5.2340 | 679,897 | 752.6 | 162,938 | 24.40 | 63,391 | 4.74 | 36,944 | 78 | 3,753 | 61,919 | 1,005,088 | |
| P10 | 8x6 | 536 | 1.0440 | 167,875 | 153.3 | 41,084 | 5.70 | 18,331 | 4.74 | 45,732 | 32 | 1,906 | 31,445 | 304,468 | |
| P11 | 8x6 | 537 | 1.0440 | 168,188 | 153.3 | 41,161 | 5.70 | 18,365 | 4.74 | 45,817 | 32 | 1,909 | 31,504 | 305,036 | |
| P12 | 8x6 | 536 | 1.0440 | 167,875 | 153.3 | 41,084 | 5.70 | 18,331 | 4.74 | 45,732 | 32 | 1,906 | 31,445 | 304,468 | |
| P13 | 8x6 | 536 | 1.0440 | 167,875 | 153.3 | 41,084 | 5.70 | 18,331 | 4.74 | 45,732 | 32 | 1,906 | 31,445 | 304,468 | |
| P14 | 8x6 | 536 | 1.0440 | 167,875 | 153.3 | 41,084 | 5.70 | 18,331 | 4.74 | 45,732 | 32 | 1,906 | 31,445 | 304,468 | |
| P15 | 8x6 | 105 | 1.0440 | 32,886 | 153.3 | 8,048 | 5.70 | 3,591 | 4.74 | 8,959 | 32 | 373 | 6,160 | 59,644 | |
| P16 | 8x6 | 347 | 1.0440 | 108,680 | 153.3 | 26,598 | 5.70 | 11,867 | 4.74 | 29,606 | 32 | 1,234 | 20,357 | 197,109 | |
| P17 | 8x6 | 347 | 1.0440 | 108,680 | 153.3 | 26,598 | 5.70 | 11,867 | 4.74 | 29,606 | 32 | 1,234 | 20,357 | 197,109 | |
| P18 | 30" | 330 | | 21,450 | | | | | | | 15 | 550 | 9,075 | 30,525 | |
| P19 | 30" | 330 | | 21,450 | | | | | | | 15 | 550 | 9,075 | 30,525 | |
| P22 | 30" | 110 | | 7,150 | | | | | | | 15 | 183 | 3,025 | 10,175 | |
| P23 | 30" | 330 | | 21,450 | | | | | | | 15 | 550 | 9,075 | 30,525 | |
| P26 | 30" | 330 | | 21,450 | | | | | | | 15 | 550 | 9,075 | 30,525 | |
| P27 | 8X5 | 450 | .9760 | 131,760 | 144.3 | 32,468 | 5.19 | 14,013 | 3.76 | 30,456 | 30 | 1,500 | 24,750 | 233,447 | |
| P28 | 8X5 | 450 | .9760 | 131,760 | 144.3 | 32,468 | 5.19 | 14,013 | 3.76 | 30,456 | 30 | 1,500 | 24,750 | 233,447 | |
| P29 | 8X5 | 450 | .9760 | 131,760 | 144.3 | 32,468 | 5.19 | 14,013 | 3.76 | 30,456 | 30 | 1,500 | 24,750 | 233,447 | |
| P30 | 4-10x6 | 530 | 4.2460 | 675,114 | 597.7 | 158,391 | 19.96 | 63,473 | 4.74 | 45,220 | 67 | 3,946 | 65,102 | 1,007,299 | |
| P31 | 4-10x6 | 530 | 4.2460 | 675,114 | 597.7 | 158,391 | 19.96 | 63,473 | 4.74 | 45,220 | 67 | 3,946 | 65,102 | 1,007,299 | |
| P32 | 3-10x6 | 530 | 3.2580 | 518,022 | 474.9 | 125,849 | 15.48 | 49,226 | 4.74 | 45,220 | 56 | 3,298 | 54,413 | 792,730 | |
| P33 | 3-10x6 | 529 | 3.2580 | 517,045 | 474.9 | 125,611 | 15.48 | 49,134 | 4.74 | 45,134 | 56 | 3,292 | 54,311 | 791,234 | |
| P40 | 48" | 475 | | 52,250 | | | | | | | 18 | 950 | 15,675 | 67,925 | |
| P41 | 48" | 475 | | 52,250 | | | | | | | 18 | 950 | 15,675 | 67,925 | |
| P44 | 48" | 545 | | 59,950 | | | | | | | 18 | 1,090 | 17,985 | 77,935 | |
| P45 | 60" | 135 | | 18,900 | | | | | | | 22 | 330 | 5,445 | 24,345 | |
| P46 | 3-10x6 | 531 | 3.2580 | 518,999 | 474.9 | 126,086 | 15.48 | 49,319 | 4.74 | 45,305 | 56 | 3,304 | 54,516 | 794,226 | |
| P48 | 6x5 | 601 | 0.746 | 134,504 | 123.0 | 36,962 | 4.44 | 16,011 | 3.76 | 40,676 | 28 | 1,870 | 30,851 | 259,003 | |
| P49 | 6x5 | 600 | 0.746 | 134,280 | 123.0 | 36,900 | 4.44 | 15,984 | 3.76 | 40,608 | 28 | 1,867 | 30,800 | 258,572 | |
| P50 | 6x5 | 600 | 0.746 | 134,280 | 123.0 | 36,900 | 4.44 | 15,984 | 3.76 | 40,608 | 28 | 1,867 | 30,800 | 258,572 | |
| P51 | 6x5 | 100 | 0.746 | 22,380 | 123.0 | 6,150 | 4.44 | 2,664 | 3.76 | 6,768 | 28 | 311 | 5,133 | 43,095 | |
| P52 | 48" | 20 | | 2,200 | | | | | | | 18 | 40 | 660 | 2,860 | |
| P53 | 60" | 38 | | 5,320 | | | | | | | 22 | 93 | 1,533 | 6,853 | |
| P54 | 2-10x6 | 417 | 2.270 | 283,977 | 330.7 | 68,951 | 11.00 | 82,566 | 4.74 | 35,578 | 45 | 2,085 | 34,403 | 505,475 | |
| P55 | 2-10x6 | 418 | 2.270 | 284,658 | 330.7 | 69,116 | 11.00 | 82,764 | 4.74 | 35,664 | 45 | 2,090 | 34,485 | 506,687 | |
| P56 | 2-10x6 | 416 | 2.270 | 283,296 | 330.7 | 68,786 | 11.00 | 82,368 | 4.74 | 35,493 | 45 | 2,080 | 34,320 | 504,263 | |
| P57 | 60" | 30 | | 4,200 | | | | | | | 22 | 73 | 1,210 | 5,410 | |
| INLETS | | | | | | | | | | | | | | | |
| I1 | 8x6 | | 11.220 | 3,366 | 824.0 | 412 | | | | | | | | 3,778 | Wingwalls |
| I2 | 30" | | 2.70 | 810 | 111.0 | 56 | | | | | | | | 866 | 4:1 Slope |
| I5 | 8x5 | | 8.740 | 2,622 | 618.0 | 309 | | | | | | | | 2,931 | 0 Degree Skew |
| I9 | 48" | | 9.40 | 2,820 | 570.0 | 285 | | | | | | | | 3,105 | |
| I14 | 6x5 | | 8.440 | 2,532 | 593.0 | 297 | | | | | | | | 2,829 | |
| I15 | 48" | | 9.40 | 2,820 | 570.0 | 285 | | | | | | | | 3,105 | |
| I16 | 60" | | 12.20 | 3,660 | 725.0 | 363 | | | | | | | | | Picked up in Catchbasins |
| I17 | 2-10x6 | | 12.930 | 3,879 | 1006.0 | 503 | | | | | | | | 4,382 | |
| I18 | 60" | | 12.20 | 3,660 | 725.0 | 363 | | | | | | | | | Picked up in Catchbasins |
| OUTLET | 6-10x6 | | 18.530 | 5,559 | 1526.0 | 763 | | | | | | | | 6,322 | |
| TOTAL | | 18085 | | | | | | | | | | | Sub Total | 20,517,870 | |

| Quantities | Cost | Unit | |
|---|---|---|---|
| Concrete | 300.00 | cuyd | * |
| Steel | 0.50 | lbs | |
| Road Removal | 2.50 | sqyd | |
| Road Replacement | 14.00 | sqyd | |
| 30" Pipe | 65.00 | Linft | * |
| 48" Pipe | 110.00 | Linft | * |
| 60" Pipe | 140.00 | Linft | |
| Trench | 6.00 | cuyd | * |
| Structural Backfill | 18.00 | cuyd | * |

| Miscellaneous | Quantity | Units | Unit Cost | Total Cost | |
|---|---|---|---|---|---|
| Junction Box | 2 | each | 25,000 | 50,000 | * |
| Access Holes | 79 | each | 2,000 | 158,000 | * |
| Manholes | 7 | each | 5,500 | 38,500 | * |
| Catchbasins | 60 | each | 2,000 | 120,000 | |
| Channels | 5000 | cuyds | 5 | 25,000 | |
| Energy Dissipator | 1 | Lump Sum | 60,000 | 60,000 | |
| Tatum Crossing | 1 | Lump Sum | 100,000 | 100,000 | |
| Trash Racks/ Barrel | 11 | each | 2,000 | 22,000 | |
| | | | Sub Total | 573,500 | |

*Revised to Flood Control Cost 9/10/96

**TOTAL $ 21,091,370**

WSS 9/19/96

# DOUBLETREE RANCH ROAD

**PROJECT NO. 2878**

## DOUBLETREE RANCH ROAD STORM DRAIN
## PRELIMINARY COST ESTIMATE SUMMARY

### Cherokee Wash Diversion (10-year Storm)

### ORIGINAL COST

| ALTERNATIVES | LAND ACQUISITION ($) | STORM DRAIN CONST. ($) | DETENTION BASIN CONST. ($) | SUB TOTAL CONST. ($) | UTILITY RELOCATIONS 5% of Construction ($) | ENGINEERING DESIGN Includes: Civil Geotechnical Landscape Structural Survey 10% of Construction ($) | CONSTRUCTION ADMIN. Includes: Inspection Survey Testing 10% of Construction ($) | CONTINGENCY 10% of Land Acquisition & Construction ($) | TOTAL PROJECT COST ($) |
|---|---|---|---|---|---|---|---|---|---|
| NO DETENTION BASINS 100-Year | 175,000 | 10,763,957 | -0- | 10,763,957 | 538,198 | 1,076,396 | 1,076,396 | 1,093,896 | $14,548,842 |

WSS 9/19/96

# DOUBLETREE RANCH ROAD

PROJECT NO. 2878

## STORM DRAIN ANALYSIS
## CHEROKEE WASH DIVERSION

Doubletree Ranch Road System
100-Year No Detention
Cherokee Wash Diversion @ 52nd & 56th Street (10-year Storm)

**ORIGINAL UNIT PRICES**

| CULVERT NO. | SIZE (FT) | LENGTH (FT) | QUANTITIES/PRICE (Per Linear Ft.) | | | | | | | | ROAD REMOVAL & REPLACEMENT | | | TOTAL COST | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Concrete (cuyd) | Sub Cost | Steel (lbs) | Sub Cost | Trench (cuyd) | Trench ($) | Backfill (cuyd) | Backfill ($) | (Width) | (sqyd) | Sub Cost | | |
| Outlet | | | | | | | | | | | | | | | |
| Drainage Excavation | 351 | 190 | | | | | 1235 | 4,323 | | | | | | 4,323 | |
| P1 | 4-10x6 | 571 | 4.2460 | 484,893 | 597.7 | 170,643 | 19.96 | 39,890 | 4.74 | 35,185 | 67 | 4,251 | 70,138 | 800,749 | |
| P2 | 4-10x6 | 571 | 4.2460 | 484,893 | 597.7 | 170,643 | 19.96 | 39,890 | 4.74 | 35,185 | 67 | 4,251 | 70,138 | 800,749 | |
| P3 | 4-10x6 | 571 | 4.2460 | 484,893 | 597.7 | 170,643 | 19.96 | 39,890 | 4.74 | 35,185 | 67 | 4,251 | 70,138 | 800,749 | |
| P4 | 3-10x6 | 431 | 3.2580 | 280,840 | 474.9 | 102,341 | 13.96 | 21,059 | 4.74 | 26,558 | 56 | 2,682 | 44,249 | 475,047 | |
| P5 | 3-10x6 | 431 | 3.2580 | 280,840 | 474.9 | 102,341 | 13.96 | 21,059 | 4.74 | 26,558 | 56 | 2,682 | 44,249 | 475,047 | |
| P6 | 3-10x6 | 431 | 3.2580 | 280,840 | 474.9 | 102,341 | 13.96 | 21,059 | 4.74 | 26,558 | 56 | 2,682 | 44,249 | 475,047 | |
| P7 | 3-10x6 | 433 | 3.2580 | 282,143 | 474.9 | 102,816 | 13.96 | 21,156 | 4.74 | 26,681 | 56 | 2,694 | 44,455 | 477,251 | |
| P8 | 3-10x6 | 433 | 3.2580 | 282,143 | 474.9 | 102,816 | 13.96 | 21,156 | 4.74 | 26,681 | 56 | 2,694 | 44,455 | 477,251 | |
| P9 | 3-10x6 | 433 | 3.2580 | 282,143 | 474.9 | 102,816 | 13.96 | 21,156 | 4.74 | 26,681 | 56 | 2,694 | 44,455 | 477,251 | |
| P10 | 8x6 | 536 | 1.0440 | 111,917 | 153.3 | 41,084 | 5.70 | 10,693 | 4.74 | 33,028 | 32 | 1,906 | 31,445 | 228,168 | |
| P11 | 8x6 | 537 | 1.0440 | 112,126 | 153.3 | 41,161 | 5.70 | 10,713 | 4.74 | 33,090 | 34 | 2,029 | 33,473 | 230,563 | |
| P12 | 8x6 | 536 | 1.0440 | 111,917 | 153.3 | 41,084 | 5.70 | 10,693 | 4.74 | 33,028 | 34 | 2,025 | 33,411 | 230,133 | |
| P13 | 8x6 | 536 | 1.0440 | 111,917 | 153.3 | 41,084 | 5.70 | 10,693 | 4.74 | 33,028 | 34 | 2,025 | 33,411 | 230,133 | |
| P14 | 8x6 | 536 | 1.0440 | 111,917 | 153.3 | 41,084 | 5.70 | 10,693 | 4.74 | 33,028 | 34 | 2,025 | 33,411 | 230,133 | |
| P15 | 8x6 | 105 | 1.0440 | 21,924 | 153.3 | 8,048 | 5.70 | 2,095 | 4.74 | 6,470 | 34 | 397 | 6,545 | 45,082 | |
| P16 | 8x6 | 347 | 1.0440 | 72,454 | 153.3 | 26,598 | 5.70 | 6,923 | 4.74 | 21,382 | 34 | 1,311 | 21,630 | 148,986 | |
| P17 | 8x6 | 347 | 1.0440 | 72,454 | 153.3 | 26,598 | 5.70 | 6,923 | 4.74 | 21,382 | 34 | 1,311 | 21,630 | 148,986 | |
| P18 | 30" | 330 | | 18,150 | | | | | | | 15 | 550 | 9,075 | 27,225 | |
| P19 | 30" | 330 | | 18,150 | | | | | | | 15 | 550 | 9,075 | 27,225 | |
| P22 | 30" | 110 | | 6,050 | | | | | | | 15 | 183 | 3,025 | 9,075 | |
| P23 | 30" | 330 | | 18,150 | | | | | | | 15 | 550 | 9,075 | 27,225 | |
| P26 | 30" | 330 | | 18,150 | | | | | | | 15 | 550 | 9,075 | 27,225 | |
| P27 | 8X5 | 450 | .9760 | 87,840 | 144.3 | 32,468 | 5.19 | 8,174 | 3.76 | 21,996 | 30 | 1,500 | 24,750 | 175,228 | |
| P28 | 8X5 | 450 | .9760 | 87,840 | 144.3 | 32,468 | 5.19 | 8,174 | 3.76 | 21,996 | 30 | 1,500 | 24,750 | 175,228 | |
| P29 | 8X5 | 450 | .9760 | 87,840 | 144.3 | 32,468 | 5.19 | 8,174 | 3.76 | 21,996 | 30 | 1,500 | 24,750 | 175,228 | |
| P30 | 3-8x6 | 530 | 2.4680 | 261,608 | 403.0 | 106,795 | 13.03 | 24,171 | 4.74 | 32,659 | 49 | 2,886 | 47,612 | 472,844 | |
| P31 | 3-8x6 | 530 | 2.4680 | 261,608 | 403.0 | 106,795 | 13.03 | 24,171 | 4.74 | 32,659 | 49 | 2,886 | 47,612 | 472,844 | |
| P32 | 2-8x5 | 530 | 1.6420 | 174,052 | 284.3 | 75,340 | 8.52 | 15,805 | 3.76 | 25,906 | 39 | 2,297 | 37,895 | 328,998 | |
| P33 | 2-8x5 | 529 | 1.6420 | 173,724 | 284.3 | 75,197 | 8.52 | 15,775 | 3.76 | 25,858 | 39 | 2,292 | 37,824 | 328,377 | |
| P40 | 48" | 475 | | 45,125 | | | | | | | 18 | 950 | 15,675 | 60,800 | |
| P41 | 48" | 475 | | 45,125 | | | | | | | 18 | 950 | 15,675 | 60,800 | |
| P44 | 48" | 545 | | 51,775 | | | | | | | 18 | 1,090 | 17,985 | 69,760 | |
| P45 | 60" | 135 | | 18,900 | | | | | | | 22 | 330 | 5,445 | 24,345 | |
| P46 | 2-8x5 | 531 | 1.6420 | 174,380 | 284.3 | 75,482 | 8.52 | 15,834 | 3.76 | 25,955 | 39 | 2,301 | 37,967 | 329,618 | |
| P48 | 48" | 601 | | 57,095 | | | | | | | 18 | 1,202 | 19,833 | 76,928 | |
| P49 | 48" | 600 | | 57,000 | | | | | | | 18 | 1,200 | 19,800 | 76,800 | |
| P50 | 48" | 600 | | 57,000 | | | | | | | 18 | 1,200 | 19,800 | 76,800 | |
| P51 | 48" | 100 | | 9,500 | | | | | | | 18 | 200 | 3,300 | 12,800 | |
| P52 | 48" | 20 | | 1,900 | | | | | | | 18 | 40 | 660 | 2,560 | |
| P53 | 60" | 38 | | 5,320 | | | | | | | 22 | 93 | 1,533 | 6,853 | |
| P54 | 10x4 | 417 | 1.1020 | 91,907 | 160.4 | 33,443 | 5.33 | 7,779 | 2.89 | 15,667 | 30 | 1,390 | 22,935 | 171,731 | |
| P55 | 10x4 | 418 | 1.1020 | 92,127 | 160.4 | 33,524 | 5.33 | 7,798 | 2.89 | 15,704 | 30 | 1,393 | 22,990 | 172,143 | |
| P56 | 10x4 | 416 | 1.1020 | 91,686 | 160.4 | 33,363 | 5.33 | 7,760 | 2.89 | 15,629 | 30 | 1,387 | 22,880 | 171,319 | |
| P57 | 60" | 30 | | 4,200 | | | | | | | 22 | 73 | 1,210 | 5,410 | |
| INLETS | | | | | | | | | | | | | | | |
| I1 | 8x6 | | 11.220 | 2,244 | 824.0 | 412 | | | | | | | | 2,656 | Wingwalls |
| I2 | 30" | | 2.70 | 540 | 111.0 | 56 | | | | | | | | 596 | 4:1 Slope |
| I5 | 8x5 | | 8.740 | 1,748 | 618.0 | 309 | | | | | | | | 2,057 | 0 Degree Skew |
| I9 | 48" | | 9.40 | 1,880 | 570.0 | 285 | | | | | | | | 2,165 | |
| I14 | 48" | | 9.40 | 1,880 | 570.0 | 285 | | | | | | | | 2,165 | |
| I15 | 48" | | 9.40 | 1,880 | 570.0 | 285 | | | | | | | | 2,165 | |
| I16 | 60" | | 12.20 | 2,440 | 725.0 | 363 | | | | | | | | | Picked up in Catchbasins |
| I17 | 10x4 | | 6.990 | 1,398 | 526.0 | 263 | | | | | | | | 1,661 | |
| I18 | 60" | | 12.20 | 2,440 | 725.0 | 363 | | | | | | | | | Picked up in Catchbasins |
| OUTLET | 4-10x6 | | 15.730 | 3,146 | 1266.0 | 633 | | | | | | | | 3,779 | |
| TOTAL | | 18085 | | | | | | | | | | | Sub Total | 10,333,957 | |

| Quantities | Cost | Unit |
|---|---|---|
| Concrete | 200.00 | cuyd |
| Steel | 0.50 | lbs |
| Road Removal | 2.50 | sqyd |
| Road Replacement | 14.00 | sqyd |
| 30" Pipe | 55.00 | Linft |
| 48" Pipe | 95.00 | Linft |
| 60" Pipe | 140.00 | Linft |
| Trench | 3.50 | cuyd |
| Structural Backfill | 13.00 | cuyd |

| Miscellaneous | Quantity | Units | Unit Cost | Total Cost |
|---|---|---|---|---|
| Junction Box | 2 | each | 10,000 | 20,000 |
| Access Holes | 53 | each | 1,000 | 53,000 |
| Manholes | 10 | each | 3,000 | 30,000 |
| Catchbasins | 60 | each | 2,000 | 120,000 |
| Channels | 5000 | cuyds | 5 | 25,000 |
| Energy Dissipator | 1 | Lump Sum | 60,000 | 60,000 |
| Tatum Crossing | 1 | Lump Sum | 100,000 | 100,000 |
| Trash Racks/ Barrel | 11 | each | 2,000 | 22,000 |
| | | | Sub Total | 430,000 |

**TOTAL $ 10,763,957**

WSS 9/19/96

# DOUBLETREE RANCH ROAD

**PROJECT NO. 2878**

## DOUBLETREE RANCH ROAD STORM DRAIN
## PRELIMINARY COST ESTIMATE SUMMARY

### Cherokee Wash Diversion (10-year Storm)

### REVISED UNIT PRICES

| ALTERNATIVES | LAND ACQUISITION ($) | STORM DRAIN CONST. ($) | DETENTION BASIN CONST. ($) | SUB TOTAL CONST. ($) | UTILITY RELOCATIONS 5% of Construction ($) | ENGINEERING DESIGN Includes: Civil Geotechnical Landscape Structural Survey 10% of Construction ($) | CONSTRUCTION ADMIN. Includes: Inspection Survey Testing 10% of Construction ($) | CONTINGENCY 10% of Land Acquisition & Construction ($) | TOTAL PROJECT COST ($) |
|---|---|---|---|---|---|---|---|---|---|
| NO DETENTION BASINS 100-Year | 175,000 | 14,283,374 | -0- | 14,283,374 | 714,169 | 1,428,337 | 1,428,337 | 1,445,837 | $19,300,055 |

WSS 9/19/96

# DOUBLETREE RANCH ROAD

**PROJECT NO. 2878**

## STORM DRAIN ANALYSIS
## CHEROKEE WASH DIVERSION

Doubletree Ranch Road System
100-Year No Detention
Cherokee Wash Diversion @ 52nd & 56th Street (10-year Storm)

**REVISED UNIT PRICES**

| CULVERT NO. | SIZE (FT) | LENGTH (FT) | QUANTITIES/PRICE (Per Linear Ft.) | | | | | | | | ROAD REMOVAL & REPLACEMENT | | | TOTAL COST | COMMENTS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Concrete (cuyd) | Sub Cost | Steel (lbs) | Sub Cost | Trench (cuyd) | Trench ($) | Backfill (cuyd) | Backfill ($) | (Width) | (sqyd) | Sub Cost | | |
| Outlet Drainage S | 351 | 190 | | | | | 1235 | 7,410 | | | | | | 7,410 | |
| P1 | 4-10x6 | 571 | 4.2460 | 727,340 | 597.7 | 170,643 | 19.96 | 68,383 | 4.74 | 48,718 | 67 | 4,251 | 70,138 | 1,085,222 | |
| P2 | 4-10x6 | 571 | 4.2460 | 727,340 | 597.7 | 170,643 | 19.96 | 68,383 | 4.74 | 48,718 | 67 | 4,251 | 70,138 | 1,085,222 | |
| P3 | 4-10x6 | 571 | 4.2460 | 727,340 | 597.7 | 170,643 | 19.96 | 68,383 | 4.74 | 48,718 | 67 | 4,251 | 70,138 | 1,085,222 | |
| P4 | 3-10x6 | 431 | 3.2580 | 421,259 | 474.9 | 102,341 | 13.96 | 36,101 | 4.74 | 36,773 | 56 | 2,682 | 44,249 | 640,723 | |
| P5 | 3-10x6 | 431 | 3.2580 | 421,259 | 474.9 | 102,341 | 13.96 | 36,101 | 4.74 | 36,773 | 56 | 2,682 | 44,249 | 640,723 | |
| P6 | 3-10x6 | 431 | 3.2580 | 421,259 | 474.9 | 102,341 | 13.96 | 36,101 | 4.74 | 36,773 | 56 | 2,682 | 44,249 | 640,723 | |
| P7 | 3-10x6 | 433 | 3.2580 | 423,214 | 474.9 | 102,816 | 13.96 | 36,268 | 4.74 | 36,944 | 56 | 2,694 | 44,455 | 643,696 | |
| P8 | 3-10x6 | 433 | 3.2580 | 423,214 | 474.9 | 102,816 | 13.96 | 36,268 | 4.74 | 36,944 | 56 | 2,694 | 44,455 | 643,696 | |
| P9 | 3-10x6 | 433 | 3.2580 | 423,214 | 474.9 | 102,816 | 13.96 | 36,268 | 4.74 | 36,944 | 56 | 2,694 | 44,455 | 643,696 | |
| P10 | 6x6 | 536 | 1.0440 | 167,875 | 153.3 | 41,084 | 5.70 | 18,331 | 4.74 | 45,732 | 32 | 1,906 | 31,445 | 304,468 | |
| P11 | 8x6 | 537 | 1.0440 | 168,188 | 153.3 | 41,161 | 5.70 | 18,365 | 4.74 | 45,817 | 34 | 2,029 | 33,473 | 307,005 | |
| P12 | 8x6 | 536 | 1.0440 | 167,875 | 153.3 | 41,084 | 5.70 | 18,331 | 4.74 | 45,732 | 34 | 2,025 | 33,411 | 306,433 | |
| P13 | 8x6 | 536 | 1.0440 | 167,875 | 153.3 | 41,084 | 5.70 | 18,331 | 4.74 | 45,732 | 34 | 2,025 | 33,411 | 306,433 | |
| P14 | 8x6 | 536 | 1.0440 | 167,875 | 153.3 | 41,084 | 5.70 | 18,331 | 4.74 | 45,732 | 34 | 2,025 | 33,411 | 306,433 | |
| P15 | 8x6 | 105 | 1.0440 | 32,886 | 153.3 | 8,048 | 5.70 | 3,591 | 4.74 | 8,959 | 34 | 397 | 6,545 | 60,029 | |
| P16 | 8x6 | 347 | 1.0440 | 108,680 | 153.3 | 26,598 | 5.70 | 11,867 | 4.74 | 29,606 | 34 | 1,311 | 21,630 | 198,381 | |
| P17 | 8x6 | 347 | 1.0440 | 108,680 | 153.3 | 26,598 | 5.70 | 11,867 | 4.74 | 29,606 | 34 | 1,311 | 21,630 | 198,381 | |
| P18 | 30" | 330 | | 21,450 | | | | | | | 15 | 550 | 9,075 | 30,525 | |
| P19 | 30" | 330 | | 21,450 | | | | | | | 15 | 550 | 9,075 | 30,525 | |
| P22 | 30" | 110 | | 7,150 | | | | | | | 15 | 183 | 3,025 | 10,175 | |
| P23 | 30" | 330 | | 21,450 | | | | | | | 15 | 550 | 9,075 | 30,525 | |
| P26 | 30" | 330 | | 21,450 | | | | | | | 15 | 550 | 9,075 | 30,525 | |
| P27 | 8X5 | 450 | .9760 | 131,760 | 144.3 | 32,468 | 5.19 | 14,013 | 3.76 | 30,456 | 30 | 1,500 | 24,750 | 233,447 | |
| P28 | 8X5 | 450 | .9760 | 131,760 | 144.3 | 32,468 | 5.19 | 14,013 | 3.76 | 30,456 | 30 | 1,500 | 24,750 | 233,447 | |
| P29 | 8X5 | 450 | .9760 | 131,760 | 144.3 | 32,468 | 5.19 | 14,013 | 3.76 | 30,456 | 30 | 1,500 | 24,750 | 233,447 | |
| P30 | 3-8x6 | 530 | 2.4680 | 392,412 | 403.0 | 106,795 | 13.03 | 41,435 | 4.74 | 45,220 | 49 | 2,886 | 47,612 | 633,474 | |
| P31 | 3-8x6 | 530 | 2.4680 | 392,412 | 403.0 | 106,795 | 13.03 | 41,435 | 4.74 | 45,220 | 49 | 2,886 | 47,612 | 633,474 | |
| P32 | 2-8x5 | 530 | 1.6420 | 261,078 | 284.3 | 75,340 | 8.52 | 27,094 | 3.76 | 35,870 | 39 | 2,297 | 37,895 | 437,277 | |
| P33 | 2-8x5 | 529 | 1.6420 | 260,585 | 284.3 | 75,197 | 8.52 | 27,042 | 3.76 | 35,803 | 39 | 2,292 | 37,824 | 436,451 | |
| P40 | 48" | 475 | | 52,250 | | | | | | | 18 | 950 | 15,675 | 67,925 | |
| P41 | 48" | 475 | | 52,250 | | | | | | | 18 | 950 | 15,675 | 67,925 | |
| P44 | 48" | 545 | | 59,950 | | | | | | | 18 | 1,090 | 17,985 | 77,935 | |
| P45 | 60" | 135 | | 18,900 | | | | | | | 22 | 330 | 5,445 | 24,345 | |
| P46 | 2-8x5 | 531 | 1.6420 | 261,571 | 284.3 | 75,482 | 8.52 | 27,145 | 3.76 | 35,938 | 39 | 2,301 | 37,967 | 438,102 | |
| P48 | 48" | 601 | | 66,110 | | | | | | | 18 | 1,202 | 19,833 | 85,943 | |
| P49 | 48" | 600 | | 66,000 | | | | | | | 18 | 1,200 | 19,800 | 85,800 | |
| P50 | 48" | 600 | | 66,000 | | | | | | | 18 | 1,200 | 19,800 | 85,800 | |
| P51 | 48" | 100 | | 11,000 | | | | | | | 18 | 200 | 3,300 | 14,300 | |
| P52 | 48" | 20 | | 2,200 | | | | | | | 18 | 40 | 660 | 2,860 | |
| P53 | 60" | 38 | | 5,320 | | | | | | | 22 | 93 | 1,533 | 6,853 | |
| P54 | 10x4 | 417 | 1.1020 | 137,860 | 160.4 | 33,443 | 5.33 | 13,336 | 2.89 | 21,692 | 30 | 1,390 | 22,935 | 229,267 | |
| P55 | 10x4 | 418 | 1.1020 | 138,191 | 160.4 | 33,524 | 5.33 | 13,368 | 2.89 | 21,744 | 30 | 1,393 | 22,990 | 229,816 | |
| P56 | 10x4 | 416 | 1.1020 | 137,530 | 160.4 | 33,363 | 5.33 | 13,304 | 2.89 | 21,640 | 30 | 1,387 | 22,880 | 228,717 | |
| P57 | 60" | 30 | | 4,200 | | | | | | | 22 | 73 | 1,210 | 5,410 | |
| INLETS | | | | | | | | | | | | | | | |
| I1 | 8x6 | | 11.220 | 3,366 | 824.0 | 412 | | | | | | | | 3,778 | Wingwalls |
| I2 | 30" | | 2.70 | 810 | 111.0 | 56 | | | | | | | | 866 | 4:1 Slope |
| I5 | 8x5 | | 8.740 | 2,622 | 618.0 | 309 | | | | | | | | 2,931 | 0 Degree Skew |
| I9 | 48" | | 9.40 | 2,820 | 570.0 | 285 | | | | | | | | 3,105 | |
| I14 | 48" | | 9.40 | 2,820 | 570.0 | 285 | | | | | | | | 3,105 | |
| I15 | 48" | | 9.40 | 2,820 | 570.0 | 285 | | | | | | | | 3,105 | |
| I16 | 60" | | 12.20 | 3,660 | 725.0 | 363 | | | | | | | | | Picked up in Catchbasins |
| I17 | 10x4 | | 6.990 | 2,097 | 526.0 | 263 | | | | | | | | 2,360 | |
| I18 | 60" | | 12.20 | 3,660 | 725.0 | 363 | | | | | | | | | Picked up in Catchbasins |
| OUTLET | 4-10x6 | | 15.730 | 4,719 | 1266.0 | 633 | | | | | | | | 5,352 | |
| TOTAL | | 18085 | | | | | | | | | | | Sub Total | 13,745,374 | |

| Quantities | Cost | Unit | |
|---|---|---|---|
| Concrete | 300.00 | cuyd | * |
| Steel | 0.50 | lbs | |
| Road Rem | 2.50 | sqyd | |
| Road Rep | 14.00 | sqyd | |
| 30" Pipe | 65.00 | Linft | * |
| 48" Pipe | 110.00 | Linft | * |
| 60" Pipe | 140.00 | Linft | |
| Trench | 6.00 | cuyd | * |
| Structural | 18.00 | cuyd | * |

| Miscellaneo | Quantity | Units | Unit Cost | Total Cost | |
|---|---|---|---|---|---|
| Junction B | 2 | each | 25,000 | 50,000 | * |
| Access Ho | 53 | each | 2,000 | 106,000 | * |
| Manholes | 10 | each | 5,500 | 55,000 | * |
| Catchbasi | 60 | each | 2,000 | 120,000 | |
| Channels | 5000 | cuyds | 5 | 25,000 | |
| Energy Dis | 1 | Lump Sum | 60,000 | 60,000 | |
| Tatum Cro | 1 | Lump Sum | 100,000 | 100,000 | |
| Trash Rac | 11 | each | 2,000 | 22,000 | |
| | | | Sub Total | 538,000 | |

*Revised to Flood Control Cost 9/10/96

**TOTAL $ 14,283,374**

WSS 9/19/96