Final Pre- Design Report
Durango Regional Conveyance Channel
75th Avenue to 107th Avenue

Contract FCD 2009C007

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Executive Summary

The conceptual design developed for the Durango Regional Conveyance Channel (DRCC) overlooked several constraints that needed to be mitigated prior to the Final Design. The constraining items included the following:

- Vertical alignment of 89th Avenue
- Detention/Retention Basin required east of 89th Avenue (with 5 ac "dry" per City)
- Vertical alignment of the 91st Avenue sanitary sewer
- Limited channel capacity downstream of 91st Avenue
- Limited culvert capacity downstream of 91st Avenue
- Vertical alignment of 92nd Avenue
- Storm water siphon at 103rd Avenue
- City of Phoenix roadway overtopping criteria

In order to mitigate these items, the DRCC conceptual design needed to be revised. The FCDMC performed a VA Study to develop design recommendations for the project. The J2 design team evaluated the VA recommendations and developed a preferred alternative. The preferred alternative is presented in the Final Pre-Design Report. The most significant change to the DRCC design was the addition of a detention/retention basin between 87th Avenue and 89th Avenue. The basin may be designed as either an offline basin or an online basin. The final configuration will be determined following the 30% submittal. The 30% submittal will reflect the offline basin configuration. This basin significantly reduces the peak discharge from 89th Avenue to 99th Avenue so that the existing north channel through this reach has the hydraulic capacity to pass the reduced peak discharge. Addendum No.1 provides an overview of the project and a discussion of the VA recommendations. The Final Pre-Design Report documents the engineering analyses conducted to date for the project. It is anticipated that the analyses will be modified during the final design process to optimize the design. A landscape site analysis is included in the report. A steady state and unsteady state HEC-RAS model is provided in the report. The unsteady state model was run from 75th Avenue to 103rd Avenue. The model verifies that the conceptual design will function for the 100-yer design event. The unsteady state model will be refined based on the final channel and basin geometries.

The Final Pre-Design Report defines a conceptual design that may be carried forward into final design. The preferred alternative will serve as the baseline condition for the final design.

Durango Regional Conveyance Channel
75th Avenue to 107th Avenue
Pre-Design Report
Addendum No. 1

1.0 Introduction

The Draft Pre-Design Report (PDR) was based on conceptual designs developed as part of the Durango Regional Conveyance Channel Candidate Assessment Report (CAR) developed by Aspen Engineering and the Addendum to the Durango Regional Conveyance Channel Candidate Assessment Report (ACAR) developed by Prestige Engineering, LLC. The goal of the project was to "connect" the previously constructed private development drainage facilities to form a regional conveyance channel. The regional conveyance channel originates at 75th Avenue and extends west to 107th Avenue. The detention/retention basin (originally located at 95th Avenue) was relocated to the northeast corner of 107th Avenue and Elwood Street. The preliminary regional drainage channel alignment minimized the need for additional right-of-way (locate the channel along the northern portion of the corridor).

During J2 Engineering & Environmental Design's (J2) Pre-Design work effort several design constraints and/or issues were identified. First, the vertical alignment of 89th Avenue and the vertical alignment of the 91st Avenue sanitary sewer severely restricted the hydraulic capacity of the regional channel (the 89th Avenue culvert is limited to a height of 1.5 feet). Second, the channel capacity between 91st Avenue and 95th Avenue was not adequate to convey the 100-year peak discharge. Third, an additional retention/detention basin is required at 89th Avenue. Fourth, construction of a large storm water siphon (at 103rd Avenue) would have significant operation and maintenance concerns. Therefore, the regional channel was shifted to the south from 103rd Avenue to 107th Avenue. Fifth, the reservoir routing operation of the retention/detention basin was modified to accommodate the channel revisions.

The Flood Control District of Maricopa County (FCDMC) conducted a Value Analysis Workshop (VA) to provide recommendations for value enhancement of the project. They reviewed/refined the project assumptions and design constraints in order to optimize the design. In addition, team members provided recommendations on possible solutions to mitigate the design constraints. A VA report was prepared that documented the recommendations discussed. The J2 design team reviewed the VA recommendations and developed a preferred design alternative for the project. The purpose of this Addendum is to document the VA recommendations and present the preferred design alternative to FCDMC staff. It is anticipated that the Final Design will be based on the preferred design discussed in the Addendum.

2.0 Design Alternatives

The VA Team developed several design alternatives for J2 to evaluate for the regional conveyance channel. J2 staff members evaluated the merits of each design alternative and developed a preferred design alternative. A brief description of each alternative (along with pros and cons) is provided in the following paragraphs. The recommendations included the following:

Recommendation No. 1: Divert flow south along 83rd Avenue. Begin new channel west of 83rd Avenue.

The Tuscano development constructed a large portion of the infrastructure (streets, utilities, earth channel, etc.) from 75th Avenue to 83rd Avenue. An earth lined channel was constructed from 75th Avenue to 83rd Avenue along the Elwood Street alignment. Another channel was constructed along the east side of 83rd Avenue from the Elwood Street alignment to Broadway Road. A small earth berm separates the two channels. The drainage report for Tuscano shows storm water runoff being conveyed in these channels to the northeast corner of Broadway Road and 83rd Avenue. The southern discharge concept is not in conformance with the Durango Regional Conveyance Channel. The future SR-801 freeway will be located approximately ½ mile south of Broadway Road at 83rd Avenue. The VA team requested that J2 consider routing storm water runoff east of 83rd Avenue to the south. The Durango Regional Conveyance Channel would start west of 83rd Avenue. The reduced peak discharge could flow through the constrained channel segments.

Pros

Cost effective way to reduce flows in the regional channel west of 83rd Avenue.

Utilizes previously constructed earthen channel.

Cons

Diverts flow to a location without an outlet (could adversely impact adjacent properties).

SR-801 is not funded at the current time.

Concept differs from the FCDMC regional plan.

Possible utility conflicts in Broadway Road

Summary: It appears that this option may be viable. Since the SR-801 is not funded at the current time it was abandoned.

Recommendation No. 2: Re-grade the channel east of 83rd Avenue into a detention/retention basin. Begin a new channel west of 83rd Avenue.

The City of Phoenix Park Department owns a parcel of land within the corridor (immediately east of 83rd Avenue). The VA Team requested that J2 determine the feasibility of widening the channel within the City property (online detention basin) to reduce the peak discharge west of 83rd Avenue. The proposed channel widening did not significantly reduce the peak discharge west of 83rd Avenue.

Pros

Reduced peak discharge downstream of 83rd Avenue

Cons

Required purchase of additional City property.

Did not significantly reduce the peak discharge west of 83rd Avenue.

Long term maintenance of shallow online detention basin.

Summary: This basin location was not in the optimum location. This alternative was abandoned.

Recommendation No. 3: Maintain the existing landscaped areas as retention/detention basins and construct a new conveyance channel on undeveloped land (acquire additional right-of-way/easements).

The City of Phoenix required developments to designate drainage easements within the future Durango Channel alignment. These developments constructed channels and retention basins in the drainage easement. Several of the developments installed significant irrigation and landscaping within the easement. The conceptual design was to connect the existing drainage facilities to form a regional conveyance channel. However, the individual designs did not integrate well into a regional facility. When the original concept was developed the project corridor was undergoing rapid development (i.e., land prices were escalating rapidly). Therefore, it was feasible to construct the regional channel within designated drainage easements. Following the economic downturn, the price of land fell significantly. It appears to be more feasible to purchase drainage easements from agricultural property owners than to modify the existing drainage facilities. The cost of re-grading, plant salvage and/or replacement, irrigation replacement, turf replacement, etc. and the impact to existing homeowners was greater than the cost of acquiring new drainage easements.

Specifically, additional right-of-way/easements were required in the area from 79th Avenue to 91st Avenue (a retention/detention basin is required in the City of Phoenix property between 87th Avenue and 89th Avenue). The proposed retention/detention basin will allow the existing channel to be utilized in the area from 91st Avenue to 103rd Avenue. The hydraulic capacity of the existing culverts will need to be expanded to match the hydraulic capacity of the channel.

Team members developed preliminary cost estimates for the two alternatives (north channel with improved culvert capacity and dual channels) for the 91st Avenue to 99th Avenue segment. It was determined that the north channel option was the most cost effective design. A copy of the cost estimate is included in the Addendum.

This recommendation appears to reduce the capital cost of the project.

Pros

Reduce capital cost

Minimize disturbance to existing property owners

Improve hydraulic performance of the facility

Cons

Impact agricultural properties

Cost for drainage easements (the drainage easements would be "donated" when the property develops in the future)

Summary: This alternative will be utilized for a portion of the corridor (79th Avenue to 91st Avenue). It will reduce capital cost, but will not resolve the design issue. This recommendation will be utilized with Recommendation #6 (basin at 89th Avenue). The southern channel

Recommendation No. 4: Maximize the online storage within the utility corridor to reduce peak discharge.

The VA Team recommended that J2 evaluate the impact of increase channel storage throughout the corridor by widening the channel in areas with excess right-of-way/easements. They felt that the additional channel storage may reduce peak discharge values within the corridor. J2 evaluated this alternative and found that it had a small impact on the peak discharge values. This alternative may be incorporated into other alternatives to optimize the system.

Pros

Slight reduction of peak discharge values

Cons

Creates additional waste material

Does not solve the problem (may supplement other alternatives)

Impacts a larger footprint (more mitigation required)

Summary: This alternative may be utilized to supplement Recommendation #6, the basin at 89th Avenue. It will allow for the basin storage volume to be reduced slightly.

Recommendation No. 5: Consider dual channel alternatives in undeveloped areas.

The VA Team suggested that a dual channel configuration be considered for areas that do not have adequate hydraulic conveyance. This concept would utilize the existing channels/basins and construct new channels as needed. J2 found this concept to provide a feasible design alternative. The hydraulic conveyance could be increased to accommodate the design flows. However, this concept required the conversion of existing retention basins into channels (loss of first flush water quality basins). It also significantly altered the maintenance road configuration for the APS and WAPA overhead power lines.

Pros

Provides increased hydraulic conveyance

Cons

Adversely impacts APS and WAPA access

Impacts the existing basins and channels (requires mitigation)

Requires purchase of drainage easements

Dual channel configuration more difficult to maintain than single channel

Summary: This alternative increased the capital cost and increased the maintenance concerns for APS/WAPA. This alternative was abandoned.

Recommendation No. 6: Construct detention/retention basins within corridor to limit peak discharge values to the hydraulic capacity of the channels.

The VA Team requested that J2 evaluate vacant parcels within the corridor that could be utilized for detention/retention basins to reduce the peak discharge in the critical design segment (89th Avenue to 95th Avenue). J2 evaluated a detention/retention basin on the City of Phoenix Park property located between 87th Avenue and 89th Avenue. J2 determined that the basin reduced the peak discharge enough to allow the critical segment to function within City of Phoenix guidelines.

The most feasible location for a regional retention/detention basin is in the City of Phoenix park site between 89th Avenue and 87th Avenue. Initially, J2 team members evaluated the option of utilizing the entire park site for flood control purposes. However, the City of Phoenix Park Department stated that they require 5 acres of the parcel to be "high and dry" during the 100-year storm event. In addition, that parcel would need access off of 89th Drive (adjacent to the school). Therefore, team members re-analyzed the basin and determined that the site would need to be expanded onto the Hurley property to the east. The basin geometry would conform to the preliminary site development prepared for the Hurley property.

J2 developed two design alternatives for the basin. First, the basin would function as an offline basin. The offline basin would require a lateral inflow weir, a culvert under the SRP irrigation line (in the basin), and would require the SRP irrigation line to be siphoned under the channel. The offline basin requires a smaller basin than the online basin. Second, the basin would function as an online basin. The online basin would require a culvert crossing under the SRP irrigation line and would eliminate the SRP siphon. However, the online basin would be larger than the offline basin. Both options preserve five acres for future City of Phoenix park facilities. The FCDMC has had preliminary discussions with the property owner (Hurley) regarding this alternative. Mr. Hurley was receptive to discussing design options that require acquisition of his property. The attached figure shows the preliminary basin configuration's (with Hurley's development plan overlaid).

This appears to be a viable design option.

Pros

Reduced peak discharge values

Located on City of Phoenix and Hurley property

Opportunity for multi-use park facility

Enables critical segment to function hydraulically

Potential to eliminate an SRP irrigation siphon (online option)

Cons

Conduit under SRP irrigation line required (between basins – both basin options)

Additional cost to project

Additional long term maintenance cost

Summary: This alternative optimized the hydraulic operation of the corridor. It was determined to be the preferred solution. This alternative will serve as the basis for the final design. It is anticipated that other recommendations will be utilized to optimize the design.

Recommendation No. 7: Connect grass lined basins between 83rd Avenue and 87th Avenue

The VA Team requested that J2 evaluate the opportunity to connect the existing retention basins located between 83rd Avenue and 87th Avenue to eliminate the need for new channel to the south. J2 determined that the basin inverts would need to be re-graded, irrigation replaced, turf replaced, vegetation replaced, etc. The cost of the basin mitigation exceeded the cost of obtaining a drainage easement for a channel to the south. This does not appear to be a viable option.

Pros

Reduces easements

Cons

More Expensive

Hydraulically inefficient

Requires additional culverts

Summary: This alternative was determined not to be cost effective. It was abandoned.

Recommendation No. 7: Route the 100-year storm event under the roadways rather than allowing 6 inch overtopping

Typically, the practice of allowing small depths of roadway overtopping during the 100-year storm event results in a capital cost savings for a project. The roadway vertical alignment of the majority of wash crossings is a defined vertical curve (sag at or near the wash). Therefore, the overtopping flows are contained and drop back into the wash immediately downstream of the crossing.

The DRCC is unique in that the roadway alignment at the cross roads have very slight vertical curves. Therefore, storm water overtopping the roadway may flow several hundred feet away from the channel and enter adjacent subdivisions via residential streets. The storm water will work its way west and back toward the DRCC. The residents may experience a lower level of service than they were expecting with a regional drainage channel adjacent to them.

In order to contain the overtopping flow in the channel, the roadway would need to be modified by creating a berm on either side of the channel. This would require significant street reconstruction and would create two "sag" locations on the outside of the berms. These sags would require catch basins and storm drain connections to the channel. This would be relatively expensive and provide minimal benefits to the project.

In addition, the City of Phoenix design criteria states the following "Culverts for major collectors and arterial streets are to be designed to convey, as a minimum, the 100-year discharge with no flow crossing over the roadway. Culverts for minor collectors and local streets shall be designed to convey the 100-year peak discharge with a maximum of 0.5 foot flow depth over the roadway. Dip sections without culverts are not allowed." Therefore, the 83rd, Avenue, 91st Avenue, 99th Avenue, and 107th Avenue crossings would not be allowed to overtop during the 100-year storm event. The 89th Avenue and 92nd Avenue culverts would be allowed to overtop a maximum of 0.5 feet. Review of the 92nd Avenue culvert crossing indicates that the overtopping flows would encroach into the adjacent neighborhood and exceed a depth of 0.5 feet. The J2 team evaluated the overtopping alternatives and determined that it would be more cost effective to route the entire 100-yer storm event under the roadways throughout the project limits.

Summary: Team members will design the roadway crossings to pass the 100-year storm event. This is required for arterials and major collectors. Two other local street crossings are immediately adjacent to schools where overtopping flow would not be preferred.

3.0 Description of the Preferred Alternative

J2 completed analyses of the recommendations developed during the VA process and developed a preferred alternative for the project. The construction plan for the preferred alternative is included in Appendix B of the report. The following paragraphs describe the preferred alternative. It is recommended that this alternative be carried forward into Final Design.

Initially, the project was required to pass the 10-year peak discharge under the roadways and pass the 100-year discharge over the roadways (with a maximum overtopping depth of 0.5 feet). Since the existing roadways are very flat, it was determined to be more cost effective to pass the entire 100-year discharge under the roadways. This change in the conceptual design eliminates the need to modify the vertical alignment of several roadways within the project corridor.

Reach 1 – 75th Avenue to 83rd Avenue

This reach consists of several independent linear retention basins with culverts at 76th Avenue and 79th Avenue. These facilities were constructed as part of the Tuscano development. The linear retention basins will be converted into a regional conveyance channel. This will require minimal grading within the basins and removal of small earthen berms between the basins. The longitudinal slope of the channel will be dictated by the invert of the existing culverts. The existing 76th Avenue culvert will be expanded from a 2 – 10' X 6' RCBC to a 3 – 10' X 6' RCBC. The existing culvert at 79th Avenue will be expanded from a 2 – 10' X 4' RCBC to a 4 – 10' X 4' RCBC. It is anticipated that minor grading will be required on the banks of the existing channel/basin to provide adequate freeboard for the regional system.

The inverts of the existing retention basins (Tuscano School site and the City of Phoenix Park Department property) will be re-graded. The proposed channel longitudinal slope in this reach is governed by the 91st Avenue crossing and the 79th Avenue culvert invert. The channel may be enlarged in these areas to provide inline storage volume (slight reduction in peak discharge) for the system and to minimize the impact to the school's playground and the future park site. The channel geometry will be optimized during the final design process. 83rd Avenue does not have a culvert crossing at the current time. A 3 – 12' X 5' RCBC will be constructed as part of this project.

The 83rd Avenue crossing will require coordination with several utilities. The most critical will be SRP irrigation, APS and WAPA (power poles west side of 83rd Avenue). The proposed channel will be located south of the APS/WAPA power poles.

Reach 2 – 83rd Avenue to 91st Avenue

This segment contains three of the most significant project design constraints. They are the SRP irrigation crossing at Riley Road (87th Avenue), 89th Avenue (vertical roadway alignment), and the 91st Avenue sanitary sewer (72 inch diameter pipe). A major goal was to minimize the number of SRP siphons required for the project. The SRP irrigation crossing at Riley Road will need to be siphoned under the conveyance channel. SRP would not review/comment on the proposed project features until construction plans had been prepared. SRP has not commented

on the siphon at the current time. The existing crossings at 89th Avenue and 91st Avenue have limited hydraulic conveyance. In order to convey the 100-year storm event through these constraints, the peak discharge will need to be significantly reduced. Therefore, a detention basin with the bottom 3' serving as retention is proposed within the City of Phoenix Parks Department parcel. This parcel is located between 87th Avenue and 89th Avenue on the south side of the conveyance corridor. In addition, the recommended alternative will leave the existing landscaped retention basins in place and will construct the conveyance channel south of the APS/WAPA overhead power lines (from 83rd Avenue to the basin and from the basin to 91st Avenue). The proposed alignment will require a private irrigation line to be siphoned under the conveyance channel.

The City Parks and Recreation Department requested that team members evaluate the opportunity to maintain a portion of the park site (5 acres) above the 100-year water surface elevation. Team members determined that the entire park area is required for the detention/retention basin. The District is investigating the opportunity to obtain property east of the park site for the detention/retention basin. Team members evaluated both offline and online detention/retention basins alternatives for this location. Both basins will achieve the required reduction in peak discharge. The offline basin will require a lateral inflow weir, a culvert under the SRP irrigation line, an SRP irrigation siphon, and additional right-of-way east of the Phoenix park site. The online basin will require a culvert under the SRP irrigation line, eliminate an SRP irrigation siphon, and require right-of-way east of the Phoenix park site. The online basin will require more right-of-way than the offline basin. The design team will determine the preferred basin alignment following the 30% plan submittal.

The existing 6 – 30" pipe culvert crossing at 91st Avenue will be replaced with a 4 - 12' X 4' RCBC. The existing vertical alignment of 89th Avenue allows a 1.5' high custom culvert. Team members will optimize the vertical alignment of 89th Avenue during final design. The alignment will be constrained by the Hurley Ranch School Parking Lot entrance and the intersection of 89th Drive and Forest Grove.

Reach 3 – 91st Avenue to 99th Avenue

This segment contains two of the most significant project design constraints. They are the existing channel and box culverts in this reach and the APS/WAPA power poles. Team members attempted to utilize the existing channel and maintain the existing linear retention basin within this segment (water quality basins). The hydraulic capacity of the channel is limited by the box culverts because several of the existing culverts are only 2 – 6' X 4' RCBC and therefore will need additional cells constructed to convey the 100-yr peak flow. The existing channel from 91st Avenue to 95th Avenue will require some minor grading of the channel bottom to maintain positive drainage and some grading around the culvert entrances and exits to accommodate the additional cells required to convey the 100-yr peak flow. The existing 2 – 12' X 4' RCBC's at 92nd Avenue and 95th Avenue will each be expanded to 3 – 12' X 4' RCBC's. Team members worked with WAPA representatives and verified the design criteria for construction adjacent to their power poles. Team members maximized the culvert and channel configuration at the power poles. The remaining channel segments remained in their existing condition. The peak flow reduction provided by the proposed basin at 89th Avenue in conjunction with the aforementioned culvert modifications enables the channel in this segment to pass the 100-year storm event.

The existing 2 – 10' X 4' RCBC at 99th Avenue will be expanded to a 4 – 10' X 4' RCBC.

The dual channel option from 91st Avenue to 99th Avenue was considered and determined to not be cost effective. Two of the culverts around the power poles between 95th Avenue and 99th

Avenue could be eliminated with the dual channel option in this segment, but the savings would be offset by the additional cost of right-of-way, excavation, and seeding. There will also be additional cost for relocation or compensation for the 4 existing barns that will be impacted, and the cost of grading the channel for positive drainage to a culvert under 95th Avenue and removing and replacing irrigation and landscaping upstream of 95th Avenue.

The following figure shows the cost estimate for the two design alternatives within the 91st Avenue to 99th Avenue segment. The cost of the northern channel alternative was substantially less than the dual channel option. Team members developed the attached profile along the southern channel alignment to show the lack of positive grade in the 91st Avenue to 95th Avenue corridor and to illustrate the vertical alignment of 95th Avenue and the necessary grading of the landscaped and irrigated channel bottom.

Reach 4 – 99th Avenue to 107th Avenue

This segment utilizes the existing channel from 99th Avenue to 103rd Avenue. The existing channel siphons under the SRP irrigation line near 103rd Avenue. Immediately west of 103rd Avenue a large channel outfalls into the regional channel. Team members realigned the conveyance channel to the south from 102nd Drive to 107th Avenue to eliminate the siphon. In order to pass under the SRP irrigation line and still be able to discharge into the conveyance channel a 2 – 12' X 5' RCBC designed with a change/break in longitudinal slope will be required to route storm water from the tributary channel that passes under Country Place Boulevard and along the west side of 103rd Avenue. The existing landscaped retention basin alignment (Lions Gate) will be utilized for the proposed channel from 103rd Avenue to 107th Avenue. The existing basin will be re-graded to conform to the future crossing of 107th Avenue.

A regional detention basin will be located at the northeast corner of 107th Avenue and the conveyance channel. It is anticipated that the basin may serve as a multi-use park in the future. The City of Phoenix may construct sports field within this park in the future. The basin will be graded to accommodate future sports fields and will be seeded for erosion control. A lateral weir/box culvert structure will route flow from the channel into the basin and a 30" – 36" RCP will be utilized to drain the basin in 36 hours. The regional drainage system will be constructed from 75th Avenue to 107th Avenue. The remaining section of the system (107th Avenue to Agua Fria River) will be constructed at a later date. The system will function as a retention basin until the downstream portion of the channel is constructed. The RCBC at 107th Avenue will be designed but not constructed with the rest of the project.

Reach 1 to 4 – 75th Avenue to 107th Avenue

All disturbed areas are to be hydroseeded, except where existing landscape is replaced and at operation and maintenance roads and ramps. Where a new channel is constructed, a drainage easement will be acquired.

4.0 Hydraulic Models

Team members have developed HEC-RAS models for the project. Initially, they developed steady-state models to evaluate the conceptual design. The models indicated that issues existed in the conceptual design. The models were revised to incorporate a detention basin at 89th Avenue.

After the steady state models were developed for the proposed system, team members developed unsteady state models to verify the feasibility of the design. Unsteady state models

have known stability issues as was the case with this model just upstream of 103rd Avenue at River Station 4891.53; therefore, the unsteady state model was run from 75th Avenue to 103rd Avenue to verify the feasibility of the proposed drainage facility. The model will be extended to 107th during final design or an additional model developed to address the model between 103rd and 107th. Results of the models are included in Appendix D.

5.0 Utilities

Team members will work with the City of Phoenix, APS, WAPA, SRP Power, SRP Irrigation and other private utility companies during final design. Team members have met with APS and WAPA representatives to discuss the proposed project. Preliminary discussions indicate that the proposed improvements will not adversely impact their operations. SRP irrigation has not reviewed the project. It is anticipated that team members and District staff will need to coordinate the design of the proposed siphoned crossings with them. Team members will invite all the utility companies to the stakeholder meetings and provide them with 30% plans when they have been completed. A complete list and description of the utilities within the corridor is provided in the Pre-Design Report.

6.0 Drainage Easements

The preferred alternative will require acquisition of additional drainage easements. The existing developments designated drainage easements within the proposed corridor. It appears that it may be several years before development may occur in the project area. Therefore, it appears that the District and City will be required to purchase drainage easements on these parcels. In addition, the District and City Streets Department will be required to purchase drainage easements from the City of Phoenix Parks Department. Team members have identified the easements required for the project. The drainage easements will be finalized prior to the 30% submittal. The total drainage easement area was estimated to be 30 acres.

7.0 Site Analysis Memorandum

The Updated Site Analysis Memorandum is contained in Appendix A.

ESTIMATE OF CONSTRUCTION COSTS
91ST AVENUE TO 99TH AVE
(DUAL CHANNEL OPTION)

	ITEM DESCRIPTION	QUANTITY	UNIT	PRICE	TOTAL
	CHANNEL				
1	Channel Excavation	CY	20000	$8.00	$160,000.00
2	Street Crossing - Small - Including Utilities (91st(1), 92nd & 95th)	EA	3	$20,000.00	$60,000.00
3	Street Crossing - Large - Including Utilities (91st(2) & 99th)	EA	2	$40,000.00	$80,000.00
4	Remove 6-30" RCP (91st Ave)	LF	1300	$10.00	$13,000.00
5	Relocate Irrigation Manhole	EA	1	$5,000.00	$5,000.00
6	Relocate 24" Irrigation Line	LF	210	$40.00	$8,400.00
7	Concrete Box Culvert (2-Barrel 12'x4') ADOT - 91st Ave (1) & (2)	LF	460	$1,476.06	$678,987.60
8	Concrete Box Culvert (1-Barrel 12'x4') ADOT - 92nd Ave & 95th Ave	LF	140	$866.20	$121,268.00
9	Concrete Box Culvert (1-Barrel 6'x5') ADOT - 2 PP's b/w 92nd & 95th	LF	244	$529.49	$129,195.56
10	Riprap	LS	1	$20,000.00	$20,000.00
11	Irrigation Canal	LF	2650	$25.00	$66,250.00
12	Drainage Easements	AC	5	$76,000.00	$380,000.00
	LANDSCAPE & IRRIGATION				
13	Minor Restoration Areas	AC	2.5	$17,424.00	$43,560.00
14	Major Restoration Areas	AC	1.0	$119,790.00	$119,790.00
15	Seeding	AC	5	$4,138.20	$20,691.00
				TOTAL	$1,906,142.16
				15% Contingency	$285,921.32
				EST TOTAL	$2,192,063.48
	Note: Cost for Concrete Box Culverts Includes Headwalls				
	Major Restoration includes removal and replacement of irrigation				

ESTIMATE OF CONSTRUCTION COSTS
91ST AVENUE TO 99TH AVE
(RECOMMENDED OPTION-SINGLE CHANNEL NORTH)

	ITEM DESCRIPTION	QUANTITY	UNIT	PRICE	TOTAL
	CHANNEL				
1	Channel Excavation	CY	3300	$8.00	$26,400.00
2	Street Crossing - Small - Including Utilities (92nd & 95th)	EA	2	$20,000.00	$40,000.00
3	Street Crossing - Large - Including Utilities (91st & 99th)	EA	2	$40,000.00	$80,000.00
4	Remove 6-30" RCP (91st Ave)	LF	1300	$10.00	$13,000.00
5	Relocate Irrigation Manhole	EA	1	$5,000.00	$5,000.00
6	Relocate 24" Irrigation Line	LF	210	$40.00	$8,400.00
7	Concrete Box Culvert (4-Barrel 12'x4') ADOT - 91st Ave	LF	213	$2,635.66	$561,395.58
8	Concrete Box Culvert (2-Barrel 12'x4') ADOT - PP W of 95th	LF	130	$1,474.06	$191,627.15
9	Concrete Box Culvert (1-Barrel 12'x4') ADOT - 92nd Ave & 95th Ave	LF	140	$866.20	$121,268.00
10	Concrete Box Culvert (1-Barrel 6'x5') ADOT - 2 PP's b/w 92nd & 95th	LF	244	$529.49	$129,195.56
11	Concrete Box Culvert (2-Barrel 10'x4') ADOT - PP E of 99th	LF	130	$1,220.29	$158,637.70
12	Riprap	LS	1	$20,000.00	$20,000.00
	LANDSCAPE & IRRIGATION				
13	Minor Restoration Areas	AC	2.00	$17,424.00	$34,848.00
				TOTAL	$1,389,771.99
				15% Contingency	$208,465.80
				EST TOTAL	$1,598,237.79
	Note: Cost for Concrete Box Culverts Includes Headwalls				

Matchline - See Sheet 2

Matchline - See Sheet 4

N

6685.61 6862.20 6924.11 7030.87 7095.15 7270.15 7445.15 7620.15 7795.15 7971.58 8028.60 8135.18 8195.40 8244.22 8395.49 8595.49 8797.05 8815.24 8897.16 8913.44 9015.90 9118.37 9130.95 9236.72 9249.24 9309.21

Exst ROW

Existing 2-12'x4' RCBC

Exst ROW

Existing 2-6'x4' RCBC

Hydraulic Control Line

Existing 2-6'x4' RCBC

Existing 2-10'x4' RCBC

95TH AVE

Q100 = 670 cfs

Won't need new 2-10'x4' RCBC.

Grading new channel will impact 4 barns

Won't need new 2-10'x4' RCBC.

Still need new RCBC here. 3' rise RCBC won't fit under road, therefore need to regrade/lower upstream channel bottom and remove and replace landscape irrigation.

Still need new RCBC here per power poles

50 0 50 100
Scale in Feet

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

DURANGO REGIONAL CONVEYANCE CHANNEL
PROJECT NUMBER
FCD2009C007-PRE-DESIGN

PRELIMINARY NOT FOR CONSTRUCTION

	BY	DATE
DESIGNED	J. LOUCKS	12/09
DRAWN	JL, JP, JW, MRT	12/09
CHECKED	J. HOLZMEISTER	12/09

J2 engineering and environmental design
4649 east cotton gin loop, suite B2
phoenix, arizona 85040
phone: 602.438.2221 www.j2design.us

DRAWING NO. | CROSS SECTION LOCATIONS | SHEET 3 OF 8

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Matchline - See Sheet 3

Matchline - See Sheet 5

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9476.21
9643.21
9810.21
9977.21
10142.23
10219.08
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10337.24
10349.47
10466.47
10583.46
10594.12
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10658.14
10842.14
11026.14
11209.18
11330.76
11559.85
11564.37
11693.45
11873.49
12027.39
12150.09
12282.22

92ND AVE

Exst ROW

Q100 = 513 cfs

Q100 = 320 cfs

Q100 = 672 cfs

Q100 = 690 cfs

Q100 = 722 cfs

Hydraulic Control Line

91ST AVE

Exst ROW

Existing
2-12'x4' RCBC

Existing
2-12'x4' RCBC

Existing
6-30" RCP

Still need new RCBC here per power poles

Still need new RCBC here. Still regrading channel bottom to fit RCBC and drain channel.

Still need new RCBC here per 50' radius flat zone around power poles.

50 0 50 100
Scale in Feet

NO.	REVISION	BY	DATE
3			
2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

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phoenix, arizona 85040
phone: 602.438.2221 www.j2design.us

DRAWING NO.

CROSS SECTION LOCATIONS

SHEET OF 4 8

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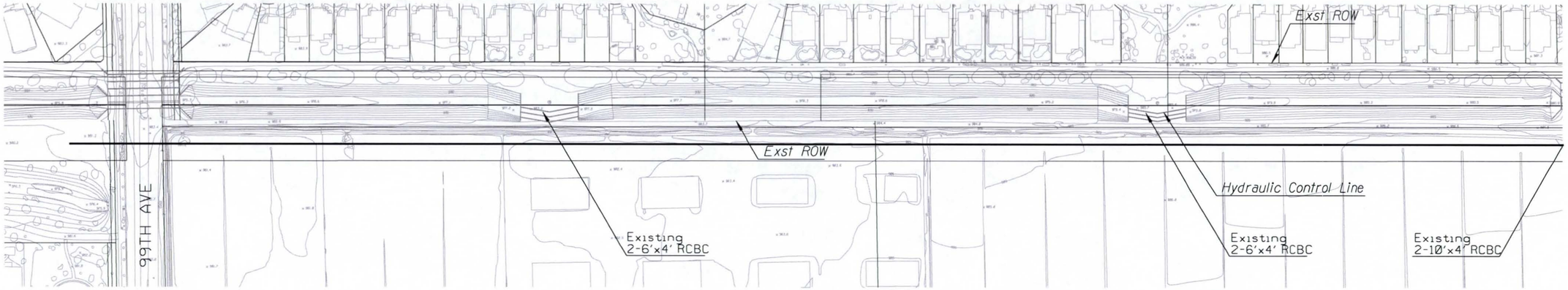

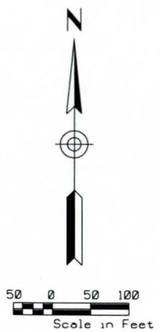

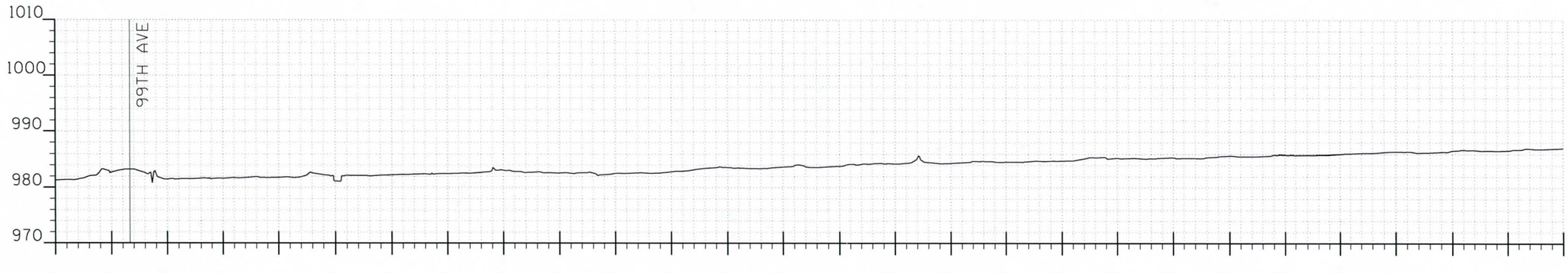

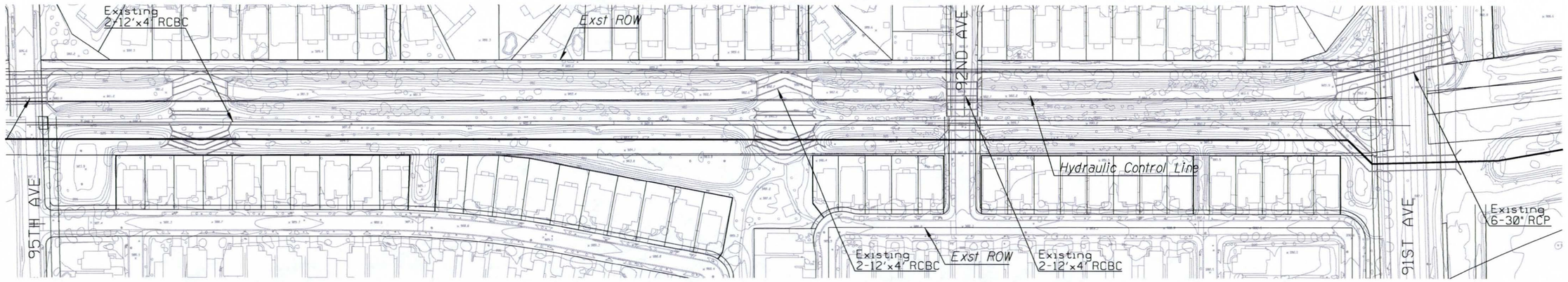

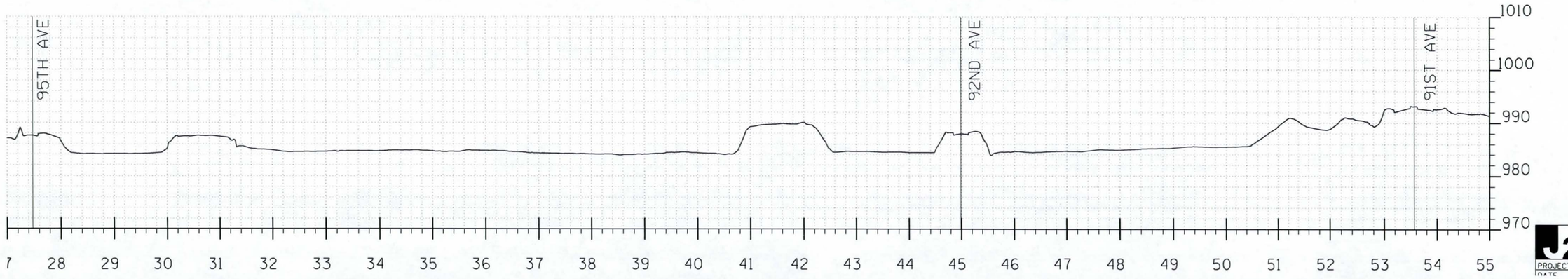

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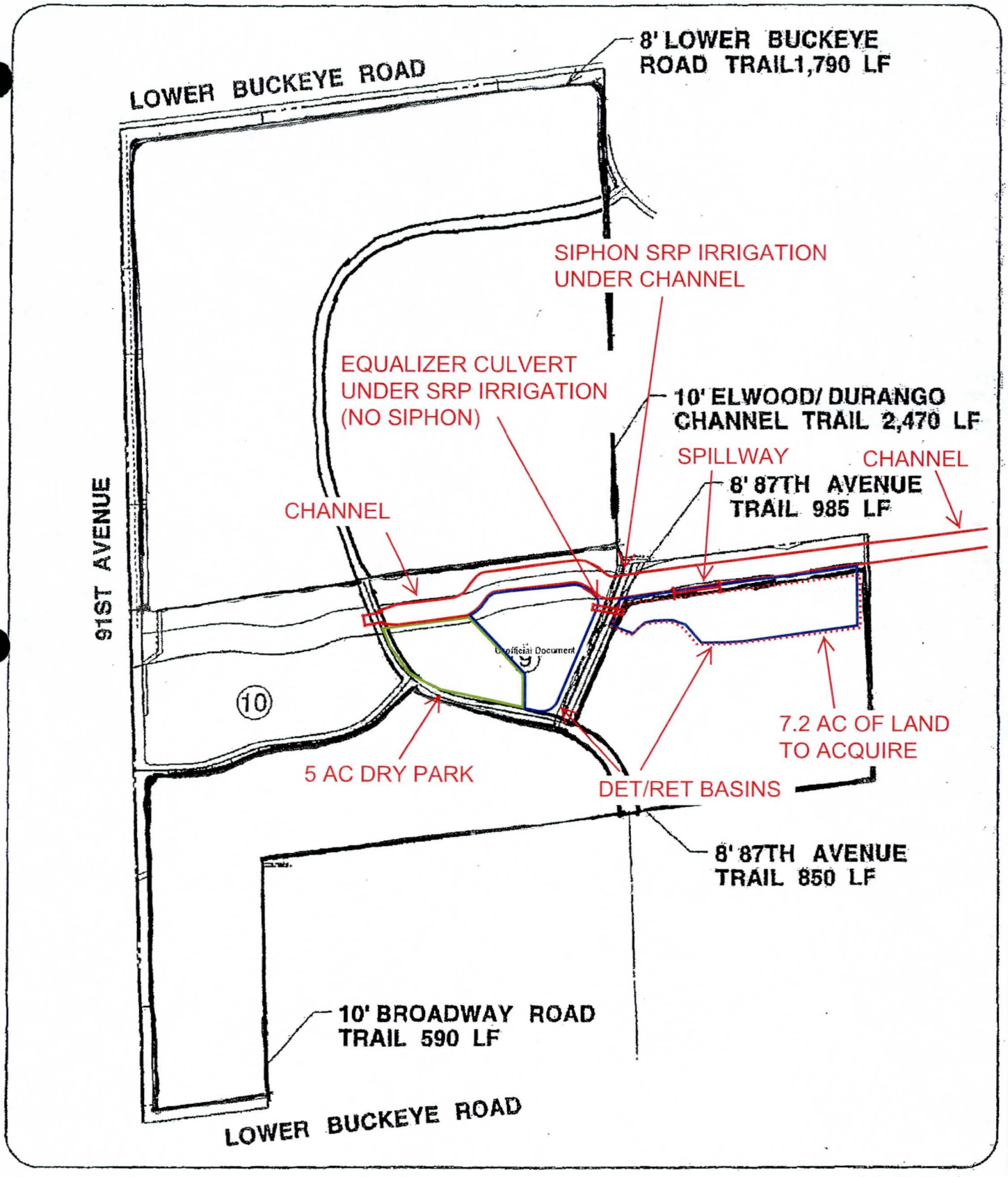
phone: 602.438.2221
www.j2design.us

PROJECT NO. 090388 | DRAWN BY JW
DATE 04-30-10 | CHECKED BY JW

Off-Line Basin Option Concept



HURLEY RANCH	COCEPETUAL SITE PLAN	JOB NO 027030
4550 NORTH 12TH STREET PHOENIX, ARIZONA 85014 TELEPHONE (602) 264-6831	COE & VAN LOO PLANNING • ENGINEERING • LANDSCAPE ARCHITECTURE	SHEET 1 OF 1

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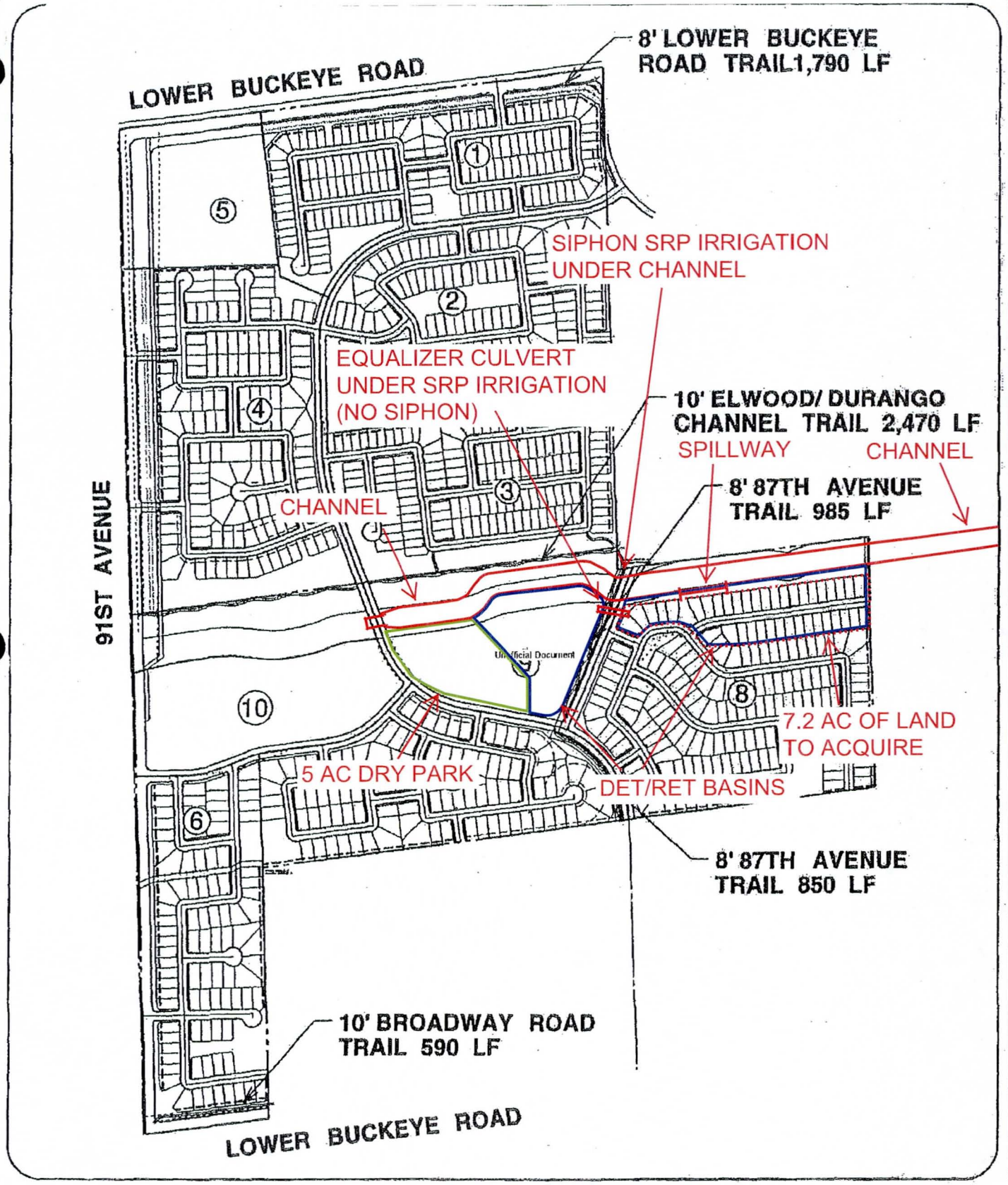
07 SEP 2006

Off-Line Basin Option Concept



Unofficial Document

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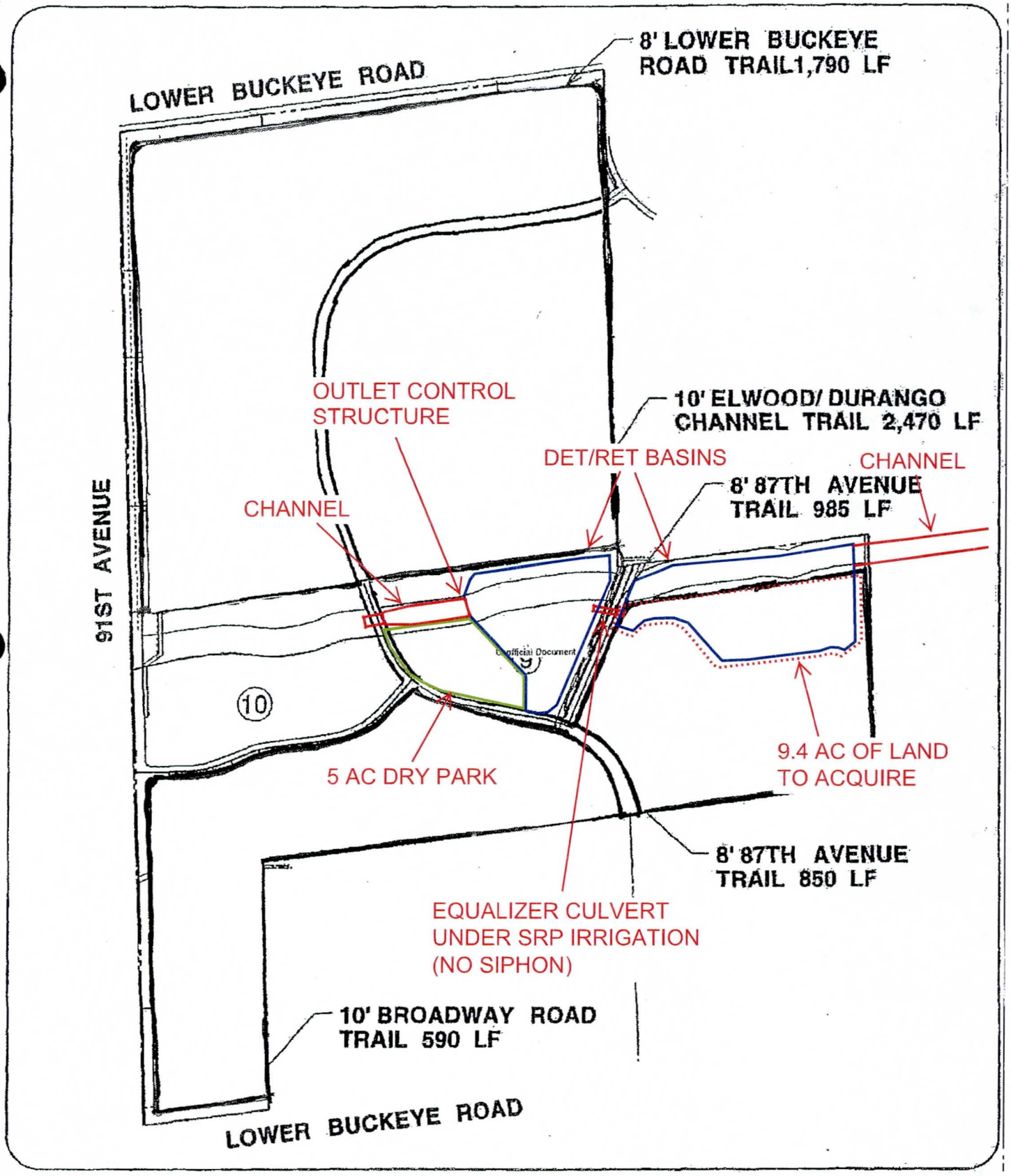
On-Line Basin Option Concept



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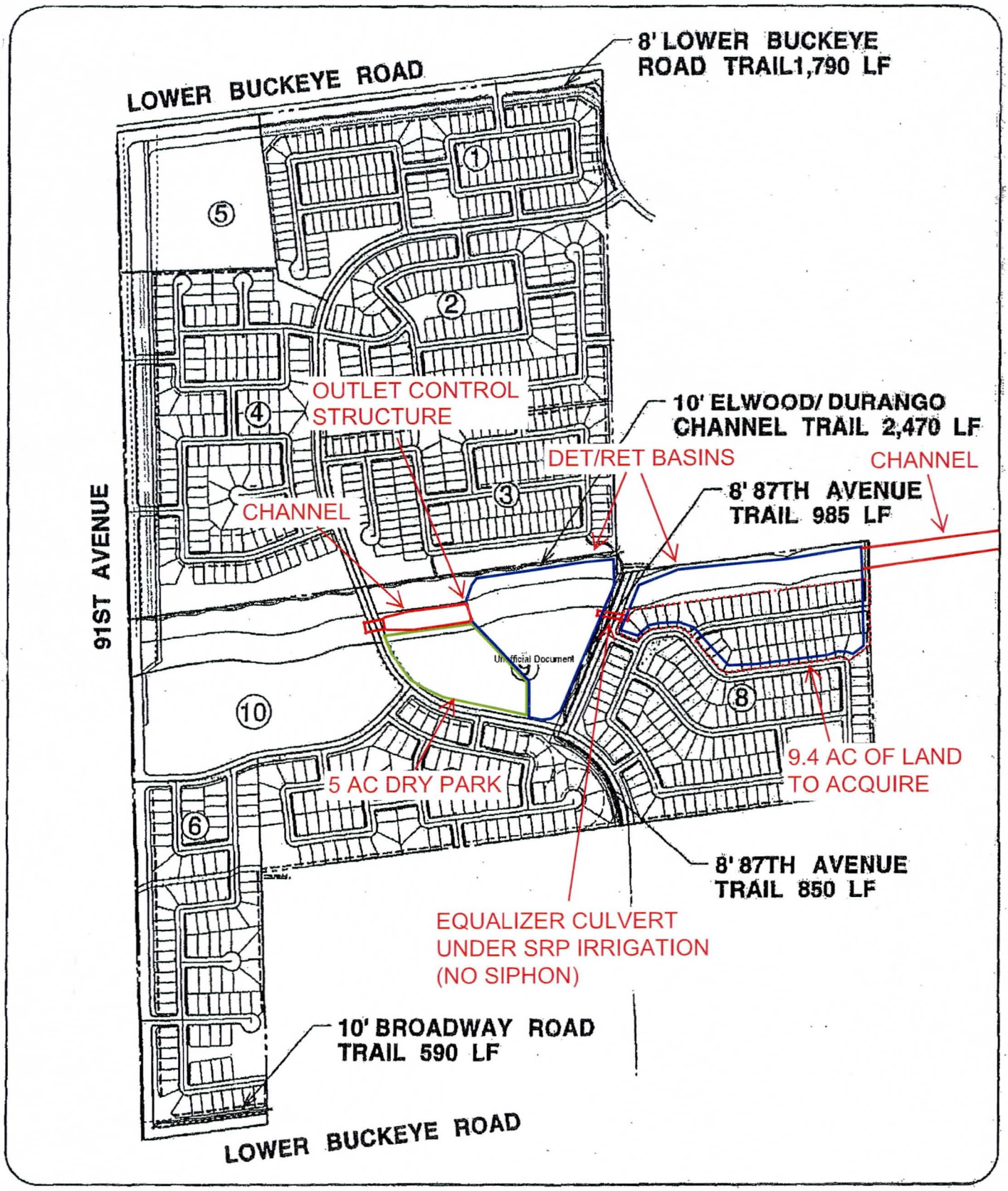
On-Line Basin Option Concept



HURLEY RANCH	COCEPETUAL SITE PLAN	JOB NO 027030
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07 SEP 2006

PRE-DESIGN REPORT

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APPENDIX B	PRE-DESIGN CONCEPTS
APPENDIX C	HEC-1 ANALYSES
APPENDIX D	HEC-RAS ANALYSES
APPENDIX E	QUANTITIES AND COSTS

1.0 Introduction

This Pre Design Report (PDR) was prepared for the Durango Regional Conveyance Channel - Elwood Street – 75th Avenue to 107th Avenue Project (DRCC). The project includes a four mile long drainage corridor, from 75th Avenue to 107th Avenue along the Elwood Street alignment, box culvert crossings at roadways and power poles, a multi-purpose detention/retention basin, maintenance roads adjacent to the drainage corridor, trails, and other associated features. Landscaping and irrigation design will be included for areas disturbed by the channel improvements.

Drainage facilities within the corridor were partially constructed by the adjacent developments. This project will enhance the existing facilities to provide a continuous segment of the regional drainage facility. The regional drainage facility west of 107th Avenue will be constructed at a later date. J2 Engineering and Environmental Design, LLC (J2) prepared this report in association with the Flood Control District of Maricopa County (FCDMC) and the City of Phoenix (COP) under contract FCD 2009C007.

1.1 Project Objectives

The goal of the overall Project is to intercept flood water from the north and south in the proposed drainage corridor and convey the water to the proposed detention basin at 107th Avenue. In the ultimate condition, a maximum of 1200 cubic feet per second (cfs) will be discharged west of the 107th Avenue detention basin. A future project will extend the flood control facilities from 107th Avenue to the Agua Fria River (convey storm water under 107th Avenue). The interim condition will maintain the existing sheet flow distribution over 107th Avenue. The project shall be designed to provide a 100-year level of protection. At a minimum, the 10-year flow shall pass through the project culverts and the 100-year flow shall weir over the roadways at a depth of less than six inches. The goals of the Project are consistent with that of the overall approach by the FCDMC to make their projects more design sensitive to the context and the environment in which they are placed.

The COP allowed private developers to construct a portion of the drainage facilities. Each development constructed the adjacent segment of the flood control facility. The drainage facilities constructed by the developments vary significantly. Drainage facilities include channels, culverts, retention basins, etc. The individual pieces of flood control facilities will be connected to form a regional drainage facility. Review of the existing flood control facilities indicates that they were not sized to accommodate the 100-year storm event. Team members will identify improvements required to provide protection for the 100-year storm event.

The majority of the project corridor is designated as a drainage easement within each development. It is the intent of this project that each development homeowners associations (HOA) continue maintaining their portion of the drainage corridor.

Arizona Public Service (APS), Salt River Project (SRP), and Western Area Power Administration (WAPA) have irrigation and power lines within the corridor. The COP has sewerlines and waterlines within the Project corridor. There are numerous other private utilities within the corridor. These utilities will have significant design constraints on the proposed improvements. Team members will work with the utilities to provide maintenance access.

1.2 Purpose of PDR

The Pre Design Report (PDR) shall provide a basis for final design of the Project. The purpose of the Project is to capture the 100-year flood within a series of linear channelized detention/retention basins along the Elwood Street alignment and convey the floodwater to the Project detention/retention basin at 107th Avenue. Landscaping and aesthetics will be integrated into the design plans where appropriate.

1.3 Project Vision

The J2 design team's vision for this project revolves around the creation of a regional flood control facility that optimizes multi-use opportunities (i.e., paths/trails between neighborhoods and schools, parks, aesthetics, etc.). The project area contains several recently constructed residential neighborhoods, schools, and future park sites. The project corridor may serve as a multi-modal feature to unite the neighborhoods.

1.4 Project Site

The project is located within the City of Phoenix (COP). The Project begins at 75th Avenue and ends at 107th Avenue, along the Elwood Street alignment. Elwood Street is located between Lower Buckeye Road and Broadway Road. Refer to Figures 1 and 2 for project location and vicinity maps respectively. The project is located within sections 20, 21, 22, and 23 of Township 1N Range 1E.

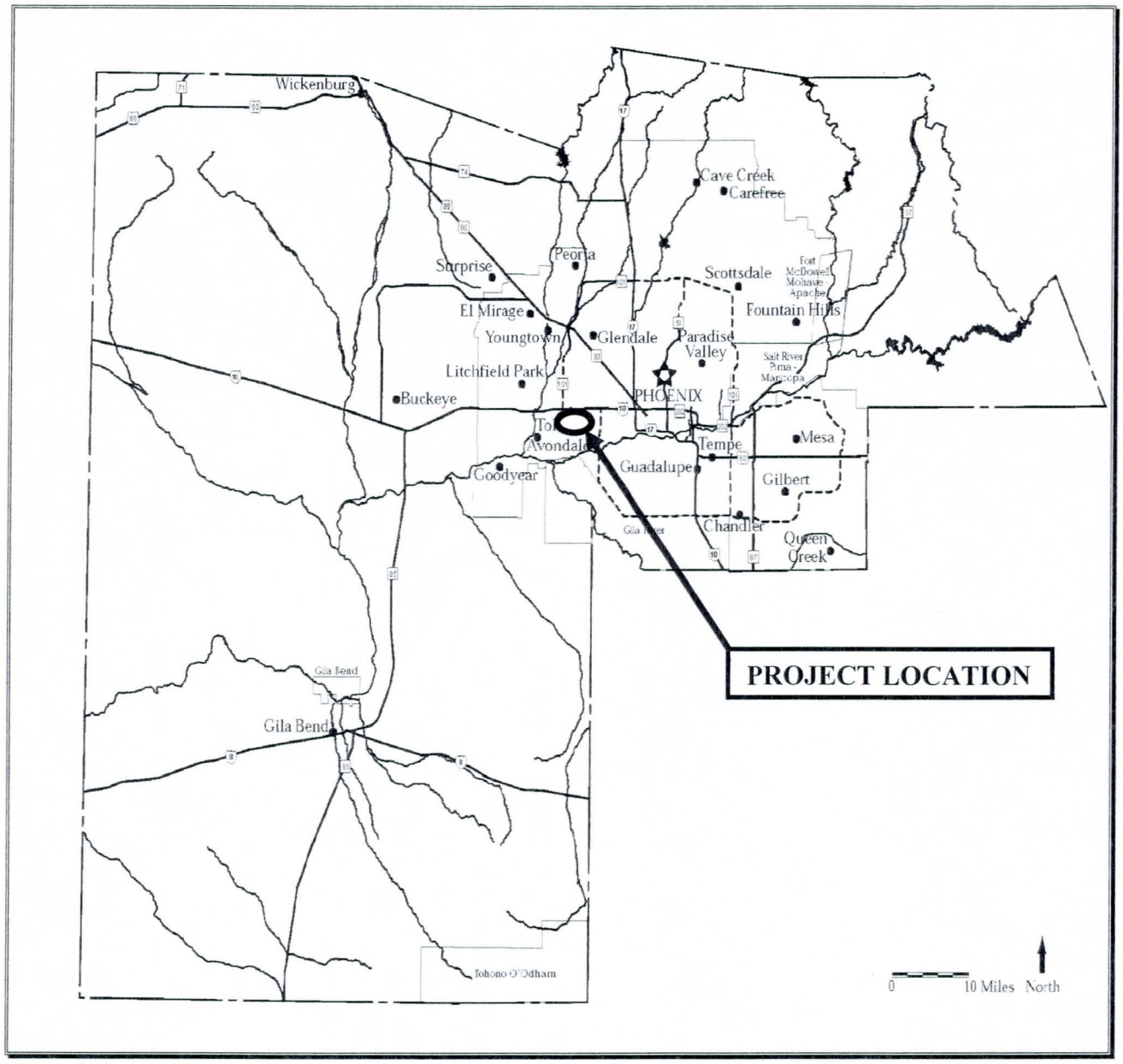


Figure 1 Project Location

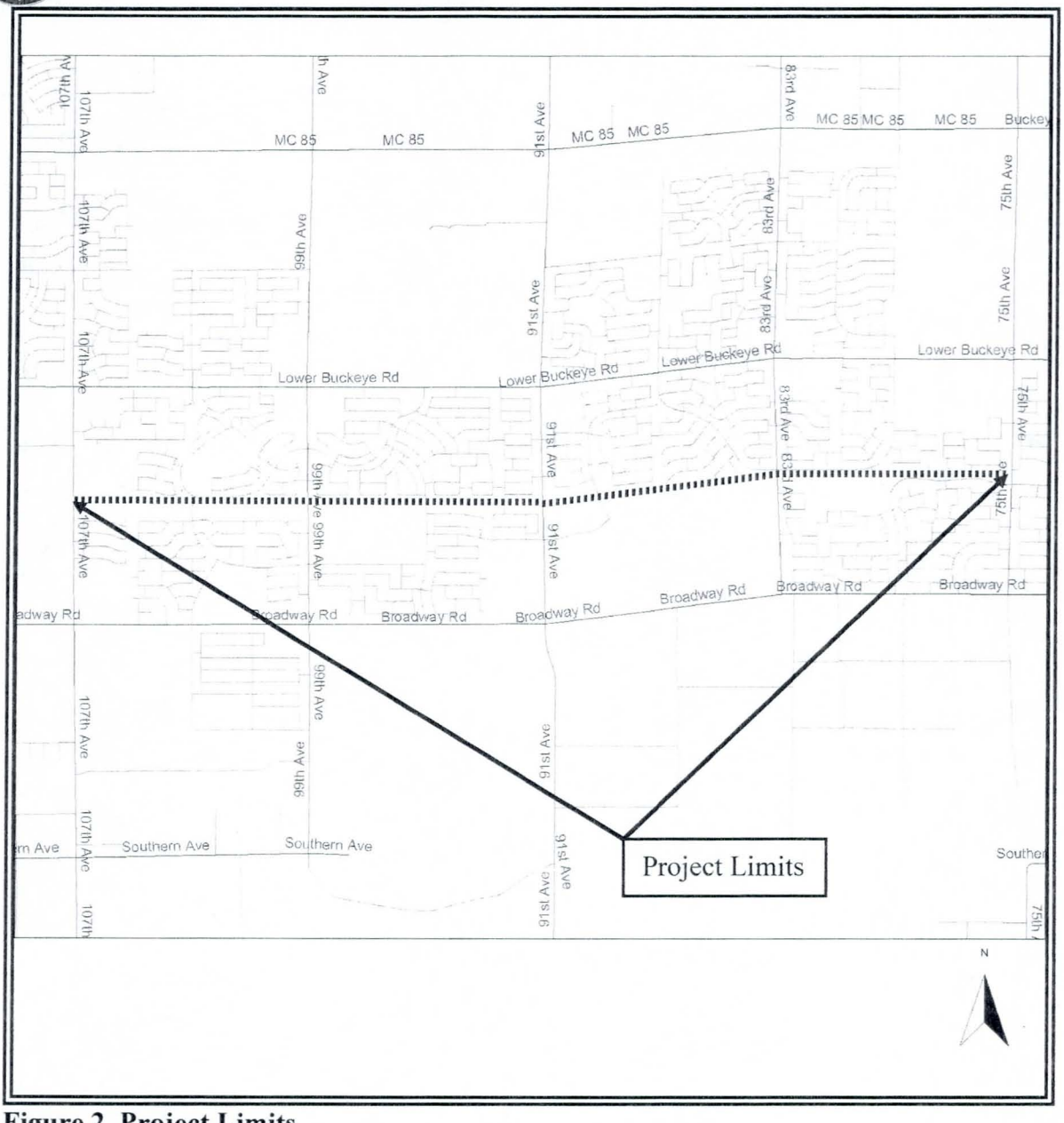


Figure 2 Project Limits

2.0 Data Collection

Data collection is the first step in understanding the complexities of any project. This process takes on an even greater role when the data collection will involve both hard engineering data and the softer landscape aesthetics data. The data collection begins with the gathering of reports and studies previously completed for the corridor and a physical assessment of the natural resources and constructed ("built") features within the corridor. The following is the process that J2's design team has undertaken in the data collection for this project. This process was undertaken to assist the team in understanding how all the physical elements of the project fit together to shape the channel project.

2.1 Objective and Process of Data Collection and Inventory

The objective of the data collection phase of the project is multi-faceted, however the focus of the process is to become knowledgeable of and involved in the corridor. This process has and will continue to include the collection of data, the study and analysis of this data and confirmation of this data through the use of site visits and computer modeling. The process of data collection that has been underway and continues on this project has included the following:

- Site Survey – Aztec Engineering Ground Control & Supplemental Survey; Cooper Aerial – Aerial Mapping
- Field Review of Existing Conditions
- Photo Documentation of Existing Conditions
- Review of Data from FCDMC and COP Relative to the Project
- Review of Engineering Reports
- Review of Plats
- Easement and Rights-of-Way documentation
- As-built Plans
- Utility Plans
- Homeowner Associations (HOA)
- Examining existing landscape aesthetics and multi-use elements within and adjacent to the project

The Data Collection phase of the project is vitally important to the ultimate success of this project. The data collection phase will assist the design team in developing an understanding of the existing site conditions and in the development of a basis of data to build upon during project development.

The following paragraph lists the engineering reports reviewed by project team members.

- Master Drainage Report for Country Place, Phoenix, Arizona, Coe & Van Loo Consultants, Inc., September 28, 1999
- Drainage Report for Country Place 2 & 3, Phoenix, Arizona, Coe & Van Loo Consultants, Inc., March 26, 2001.

- Master Drainage Report for Tuscano, Phoenix, Arizona, Coe & van Loo consultants, Inc. January 23, 2002.
- Durango Area Drainage Master Plan, Phoenix, Arizona, Dibble & Associates, Inc., October, 2002.
- Preliminary Drainage Report for Tivoli, Hoskin Ryan Consultants, Inc., March 14, 2003.
- Preliminary Offsite Drainage Report for Hurley Ranch, Phoenix, Arizona, Coe & Van Loo Consultants, Inc., May 23, 2003.
- Master Drainage Report for Hurley Ranch, Phoenix, Arizona, Coe & Van Loo Consultants, Inc., July 21, 2003.
- Final Drainage Report for The Palisades at Country Place, Phoenix, Arizona, M2 Group, Inc., December 2003.
- Drainage Report for Sunset Farms Unit 1, Phoenix, Arizona, Coe & Van Loo Consultants, Inc., December 10, 2003
- Drainage Report for Sunset Farms Unit 2, Phoenix, Arizona, Coe & Van Loo Consultants, Inc., January 23, 2004
- Final Drainage Report for Country Place Phase IV Infrastructure, Phoenix, Arizona WRG Design, Inc., July 1, 2004
- Final Drainage Report for Country Place, Phase IV Parcels 13, 16, & 17,Phoenix, Arizona, WRG Design, Inc., July 16, 2004
- Addendum to Master Drainage Report for Country Place Phase IV, Phoenix, Arizona WRG Design. Inc., August 4, 2004
- Tuscano Elementary School Final Drainage Report, Morrison-Maierle Inc., .August 13, 2004.
- Drainage Design Report for Lion's Gate, Hoskin Ryan Associates, Inc., October 14, 2005.
- Durango Regional Conveyance Chanel Candidate Assessment Report Aspen Consulting Engineers, Inc., February 2006.
- Addendum to the Durango Regional Conveyance Channel, Candidate Assessment Report, Prestige Engineering, Inc., June, 2009.

The following tables are lists of the Homeowners Associations and utility companies with their contact persons.

Durango Regional Conveyance Channel
Stakeholders

Name	Address	E-mail
Subdivision HOA		
Country Place Phase 1, 2, 3, 25, 26 ,27, 34 & 35		
Community Manager	Kevin Rust	krust@aamaz.com
	Associated Assets Management, LLC	
	7740 N 16th Street, Suite 300	
	Phoenix, AZ 85020	
	Phone: 602-674-4362	
Hurley Ranch Parcel 3 & 4		
Community Manager	Scott Ring	sring@aamaz.com
	Associated Assets Management, LLC	
	7740 N 16th Street, Suite 300	
	Phoenix, AZ 85020	
	Phone: 602-957-9191	
Lions Gate		
Community Manager	Barbara Evans	barbara@ecmaz.com
	Elite Community Management, LLC	
	21820 N 27th Avenue, Suite 200-210	
	Phoenix, AZ 85027	
	Phone: 623-322-8507	
Sunset Farms Unit 1 & 2		
Community Manager	Tamara Swanson	tswanson@aamaz.com
	Associated Assets Management, LLC	
	7740 N 16th Street, Suite 300	
	Phoenix, AZ 85020	
	Phone: 602-288-2658	
Tuscano Phase 1		
Tuscano PCD Phase 2 Parcels D & E		
Coronado West, Inc	John Winnard, Asset Manager	infi@coronadowest.com
	Coronado West, Inc	
	8655 S Priest dr	
	Tempe, AZ 85284	
	Phone: 480-820-0977	
Volterra		
Community Manager	Jerry Noffsinger	jnoffsinger@aamaz.com
	Associated Assets Management, LLC	
	7740 N 16th Street, Suite 300	
	Phoenix, AZ 85020	
	Phone: 602-957-9191	
School District		
Tuscano Elementry School	3850 S 79th Avenue	
	Phoenix, AZ 85043	
	Phone: 623-707-2300	
Fowler School District	1617 S 67th Avenue	
	Phoenix, AZ 85043	
	Phone: 623-707-4500	
Private Properties		
Appian Way, LLC	8219 W Forest Grove Avenue	
	Phoenix, AZ	
Metropolitian Investment Group	Paul Cardarelle	
	4500 N 32nd Street, Suite 200	
	Phoenix, AZ 85018	
	Phone: 602-912-9000	
PTH Properties, LLC	7110 N Wilder Rd	
	Phoenix, 85021	
CW Captial Fund Two Corp	7700 E Princess Drive, Suite 11	
,	Scottsdale, AZ 85255	

Durango Regional Conveyance Channel
Stakeholders

Name	Address	E-mail
Utilities		
APS	Robert Bott, Senior Land Agent	rbott@apsc.com
	PO Box 53933, MS 3016	
	Phoenix, AZ 85072-3933	
	Phone: 602-371-6586	
	John Rael, Government Liaision	john.rael@aps.com
	PO Box 53933, MS 3162	
	Phoenix, AZ 85072-3933	
	Phone: 602-371-6945	
SRP Power	Matt Streeper, Property Management Manager	
	Mail Station PAB 348, PO Box 52025	
	Phoenix, AZ 85072-2025	matt.streeper@srpnet.com
	Phone: 602-236-3105	
SRP Water	Harold Biever	hwbiever@srpnet.com
	Mail Station PAB 106, PO Box 52025	
	Phoenix, AZ 85072-2025	
	Phone: 602-236-2977	
El Paso Natural Gas		
	Ed Kemmerer	ed.kemmerer@elpaso.com
	4 S 84th Street	
	Tolleson, AZ 85353	
	Phone:	
Cox Communications		
	1550 W Deer Valley Road	
	Phoenix, AZ 85027	
	Phone: 623-594-1000	
Qwest, State and Local Government		
	Kimberlee Hagood	kimberlee.hadgo0d@qwest.com
	Phone: 800-777-9594	
Western Area Power Administration		
Desert Southwest regional Office	Don Holt	
	PO Box 6457	
615 S. 43rd Ave. Phoenix, AZ 85009	Phoenix, AZ 85005-6457	
	Phone: 602-605-2525	
Western Area Power Administration	Don Byron	byron@wapa.gov
Desert Southwest Regional Office		
	Phone: 602-605-2685	
	Jo Penunuri	penunuri@wapa.gov
	Carla Cristelli	cristelli@wapa.gov

2.3 Site Hydrology

The base hydrologic model for the proposed DRCC is the Durango DRCC hydrologic model, originally prepared in 2002 by Dibble & Associates, Inc. (Dibble). The original existing condition models were modified in 2005 by Aspen Engineering, Inc. (Aspen) to include the 75th Avenue storm drain, the DRC basin # 4 and the DRCC channel upstream of basin DRC # 4. The future condition models were also modified by Aspen to include first flush retention for properties adjacent to the DRCC alignment, and 100-year 2-hour retention for properties not adjacent to the DRCC.

The recent DRCC Candidate Assessment Report by Prestige modified the Aspen hydrologic models to remove the 95th Avenue multi-use basin and insert a new multi-use basin east of 107th Avenue and north of the DRCC.

J2 utilized the Aspen existing condition models EX75-6HR.DAT and EX75-24HR.DAT and the future condition models REC6.DAT AND REC24.DAT as the basis for this study. J2's goal was to modify the HEC-1 models to compute inflows into the proposed DRCC channel for use in both steady and unsteady flow HEC-RAS models.

J2 performed a cursory review of the Aspen HEC-1 models as part of the project. Many of the hydrographs generated in the models were extremely "peaky" (i.e., high peak discharge values with relatively small volumes). A 5 minute time step was utilized in the 6-hour models. Several hydrographs have a rising limb of less than 5 minutes. In addition, there appears to be abnormally large attenuations (several hundred cfs) in several routing sub-routines. It may be prudent to revise the Aspen HEC-1 models with a two minute time step and investigate the reason for the large routing attenuations during the final design. J2 modified the number of routing steps (HEC-1 NSTPS variable) to produce a more reasonable routed flow attenuations in the DRCC itself.

The HEC-1 models include routing subroutines along the DRCC that can be utilized in the steady flow model. The unsteady flow model requires hydrograph input at specific locations along the channel. To accomplish this, J2 inserted divert operations immediately following concentration points along the DRCC to divert all flow out of the model. In this way, the next downstream concentration point along the DRCC would identify new inflow into the channel. In addition, flow routing operations between concentration points along the DRCC were deactivated using asterisks since no flow remained in the channel to route to the next concentration point.

In addition, the models were modified to reflect recent development in the watershed since the preparation of the 2005 Aspen models. Those modifications are described in the following paragraphs. See Figure 3 for HEC-1 subbasin boundaries.

Description of J2 modifications to existing condition HEC-1 models

J2 examined aerial photographs and performed field visits to verify areas of the existing model that have been developed since the 2005 Aspen HEC-1 model modifications. J2 also reviewed as-built drawings, final plats, County Assessor's maps and existing subdivision drainage reports to determine existing retention volumes provided with those

new developments. Table 1 provides a summary of new existing retention provided since the 2005 Aspen models.

For subdivisions where a drainage report could be located, 80 percent of the retention volume provided was used directly in the HEC-1 models.

For some subdivisions only a final plat was available. Some of the final plats included the provided retention volume and others did not. For those that did not, J2 estimated the retention volume by using the total subdivision area, the 100-year 2-hour rainfall depth (2.72 inches) and an estimated composite C coefficient of 0.65. In these cases, only 80 percent of the calculated retention volume was used in the HEC-1 model.

Similarly, for some subdivisions only a County assessor's map was available. In those cases the total subdivision area was used to compute the estimate retention provided as above with the final plats.

J2 subdivided the existing Aspen model drainage subbasins JB, ED, and ID along the proposed DRCC corridor into JB1 and JB2, ED1 and ED2 and ID1 and ID2 to reflect the presence of the proposed channel. In cases where the recent development resulted in a subbasin changing from less than 50 percent developed to more than 50 percent developed, J2 changed the unit hydrograph method from agricultural to Phoenix Valley S-graph. MCUHP2 was used to develop the new HEC-1 input parameters (UI records).

Green-Ampt soil loss parameters were left unchanged except for RTIMP for subbasins that were split by the proposed DRCC alignment. The RTIMP values were modified using 50 percent of the new percent of the subbasin area that is now developed. Although more than 50 percent of a typical subdivision may be impervious, it is assumed that closer to only 50 percent of it is continuously impervious along the flow path.

Description of J2 modifications to future condition HEC-1 models

The original Aspen future condition models handled future development by diverting 80 percent of the first flush runoff volume out of the model for subbasins adjacent to the DRCC. For subbasins not adjacent to the DRCC, the Aspen model diverted 80 percent of the 100-year 2-hour retention out of the model.

J2 modified the Aspen future condition models by incorporating the same recently built subdivisions into the sub-basins adjacent to the DRCC as were included in the existing condition models. J2 recalculated the Aspen first flush volumes for the remaining undeveloped areas within those sub-basins. See Table 2 for future condition first flush and retention calculations.

J2 also divided subbasins JB, ED, and ID in the future condition models in the same manner as the modifications to the existing models to reflect the presence of the proposed DRCC.

J2 deactivated the previously proposed 95th Avenue detention basin along the DRCC. The 95th Avenue detention basin was moved to the east side of 107th Avenue. The basin may receive flow contributions from the following three sources 1) 103rd Avenue north channel (direct discharge into basin), 2) DRCC (lateral weir discharge into the basin),

and 107 Avenue (future flow from 107th Avenue). The flow routed south along 107th Avenue may be significantly impacted by adjacent development. The proposed basin will allow for one half of this flow.

The detention basin configuration has not been finalized at the current time. The recommended design requires the basin to be excavated to approximately 13 feet rather than the 3 – 6 feet specified in the CAR. It is anticipated that the basin will have a multi-use function (i.e., sports fields, etc.). It will be a two or three tier basin (sports fields in the lower basins). The basin geometry will be optimized to reduce the outlet peak discharge to less than 1200 cfs. The HEC-RAS unsteady flow analysis will be used to optimize the volume of flow that needs to be detained at that location to maintain the flow downstream of 107th Avenue to 1200 cfs or less per FCDMC.

HEC-1 Results

Table 3 summarizes the peak inflows into the proposed DRCC. The 100-year 6-hour storms produce higher peak flows and in general, the existing condition model produces higher peaks than the future condition model. However, those differences are relatively small and the watershed is expected to continue to develop in the near future. Therefore J2 recommends using the future condition 100-year 6-hour event for channel design.

J2 made several further modifications to the future condition 100-year 6-hour model. J2 subdivided the drainage subbasins JB, ED and ID along the proposed DRCC corridor as follows: JB1 was subdivided into JB1A, JB1B, and JB1C, and subbasin ID1 was subdivided into ID1A and ID1B. These modifications reflect the presence of major inflow points from adjacent residential developments.

J2 also observed that the TAREA variable (field 3 on the HC records) was either missing or not consistently applied throughout the HEC- models. This variable is especially important on multi-storm models (JD records) with divert operations, since HEC-1 does not automatically calculate the correct distribution of contributing drainage area at divert locations. As a result, the correct areal reduction factor may not be applied at combine operations.

J2 tabulated total contributing areas at each concentration point for the entire 100-year 6-hour future condition model and input the revised TAREA value in all of the HC records. At all divert operation locations, J2 examined the divert operation flows, estimated the average percentage of flow being diverted in each direction, and calculated the drainage area to be applied along each branch of the divert based on those flow split percentages. This resulted in increases in flow near 75th Avenue and decreases in flow near 107th Avenue compared to the previous HEC-1 models. See Appendix C for TAREA variable calculations.

J2 inserted several divert operations related to the proposed detention basin at 107th Avenue. Concentration point ~CPIB1 is the combined DRCC flow not including any from from the north at 107th Avenue. Divert operation DV107A diverts flow in excess of 1200 cfs into hydrograph 107L. The volume of this diverted flow is 29 acre-feet.

Two more divert operations were inserted in relation to flow approaching the DRCC from the north along 107th Avenue. Operation DIMBIB splits the flow along 107th Avenue at

Lower Buckeye Road (@CPMB) assuming that approximately 50 percent of this flow will follow the east side of 107th Avenue towards the proposed 107th Avenue Basin and the other 50 percent will be on the west side of 107th Avenue.

At the proposed basin, divert operation DV107B directs all of the east side 107th Avenue flow into the basin. This flow is not combined with the previous diverted flow at DV107A because the 107th Avenue Basin design actually includes two separate retention basins. The volume of this flow is 31 acre-feet.

At the beginning of the HEC-1 model, J2 inserted two additional JD records to better define the rainfall depth-area reduction relationship between areas of 2.80 and 16.0 square miles. Table 2.2 from the FCDMC *Drainage Design Manual* was used to calculate reduced rainfall depths corresponding to areas of 5.00 and 10.00 square miles. This was necessary because J2 observed in the original modeling efforts that the sum of the diverted flow and the non-diverted flow at operation DV107A did not equal the inflow into the divert operation at operation ~CPIB1. Further investigation revealed that inserting the additional JD records eliminates this problem.

In addition to the 100-year models, J2 prepared 10-year models for use in designing culvert crossings within the project limits. Depth-duration-frequency curves from the original Durango ADMP study were used in the 10-year HEC-1 models. The same areal reduction factors used for the precipitation depths in the JD records in the original 100-year models were used to derive JD precipitation depths in the 10-year HEC-1 models. Table 3 also includes 10-year flows.

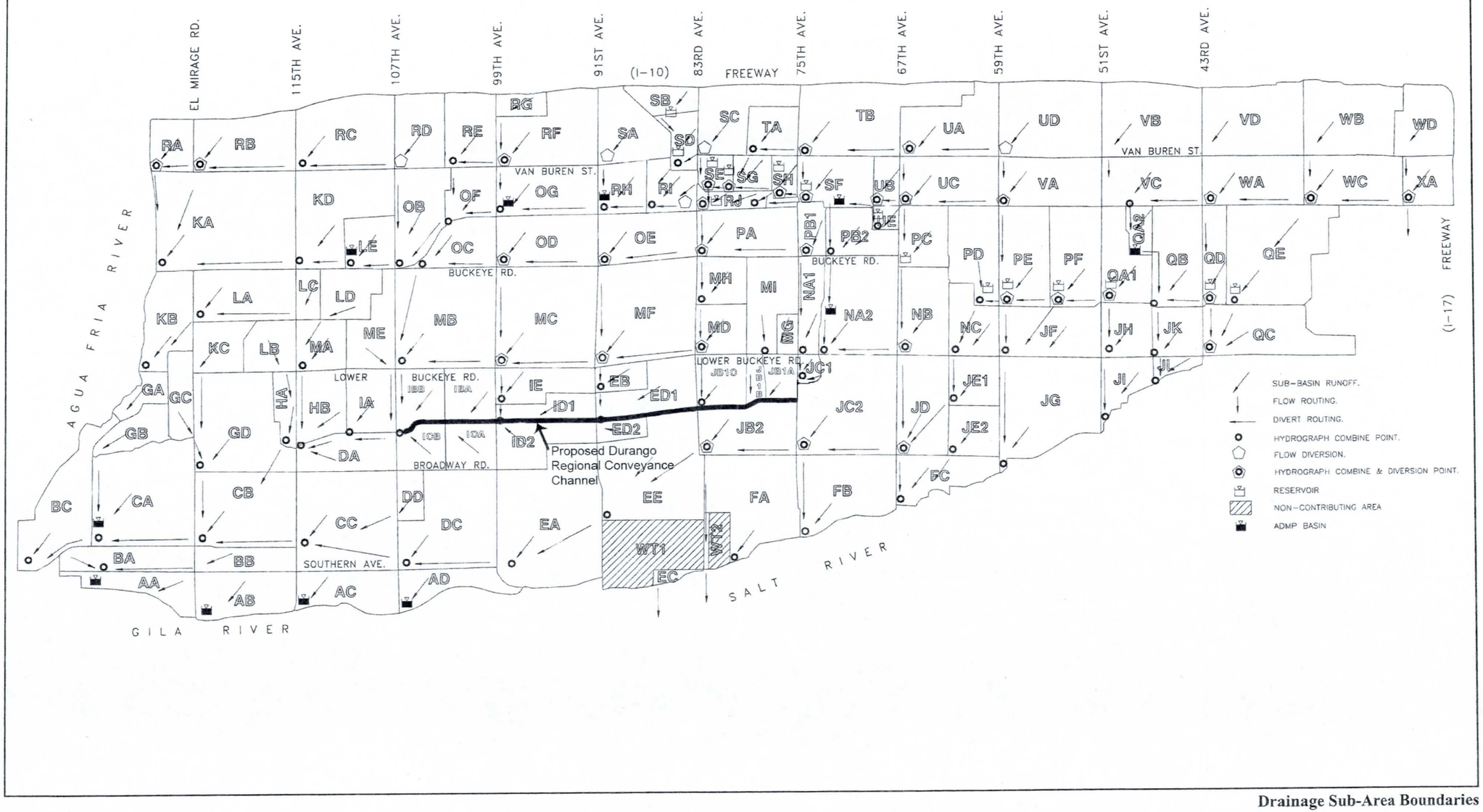
83RD Avenue Diversion Option

J2 performed a cursory HEC-1 trial in which all DRCC flow is diverted to the south at 83rd Avenue. There is an existing channel on the east side of 83rd Avenue that was constructed as part of the adjacent Tuscano development. This channel ends abruptly at Broadway Road and no information is available on what the intended outfall was for this channel.

There are two possible outfalls for this channel south of Broadway Road. The Salt River is located approximately 1 mile south of Broadway Road, and in addition, the proposed State Route 801 (SR801) will pass ¼ mile south of Broadway Road. Either the river or the SR801 offsite collector channel could serve as outfalls for the 83rd Avenue channel flow.

It is unknown when the SR801 will be constructed, but due to state funding issues, it is not likely to be built in the near future.

The HEC-1 trial revealed that DRCC flows east of 99th Avenue would be significantly reduced by the 83rd Avenue diversion. For example, immediately downstream of 83rd Avenue the DRCC flow would be near zero; at 91st Avenue, the DRCC flow would decrease from 1280 cfs to 700 cfs. At 99th Avenue, the flow would decrease from 1465 cfs to 1150 cfs. At 103rd Avenue, there would be no change in flow in the DRCC.



Drainage Sub-Area Boundaries

Table 1: Existing Retention Volumes

HEC-1 Subbasin ID	Subbasin Area, sq mi	Subbasin Area, ac	Development Name	Development Area, ac	Development Area, %	Retention Area Provided, ac	Retention Volume Provided, ac-ft	Data Source	Construction Status
JB1A	0.146	93.34	Tuscano Town Center	30.79	32.99		6.63	Assessors	constructed
JB1A	0.146	93.34	Tuscano Phase 2 Parcel E	47.55	50.94		7.01	Final Plat	constructed
				78.34	83.93		13.64		
JB1B	0.097	62.32	Tuscano Phase 2 Parcel D	36.02	57.80		5.31	Final Plat	constructed
				36.02	57.80		5.31		
JB1C	0.251	160.5	Sundance Ranch 2	24.56	15.30		3.62	Assessors	constructed
JB1C	0.251	160.5	Tuscano Phase 1	99.68	62.11	13.26	14.69	Final Plat	constructed
				124.24	77.41		18.30		
JB2	0.493	315.52	Tuscano Elementary School	20.09	6.37		2.96	Final Plat	constructed
EB	0.139	88.96	Hurley Ranch Parcel 4	19.28	21.67		2.84	Final Plat	graded
EB	0.139	88.96	Hurley Ranch Parcel 1 & 2	55.98	62.93		8.25	Assessors Map	mostly constructed
				75.26	84.60		11.09		
ED1	0.382	244.48	Volterra	13.43	5.49	3.38	1.98	Final Plat	constructed
ED1	0.382	244.48	Hurley Ranch Parcel 3	27.61	11.29		4.07	Final Plat	graded
ED1	0.382	244.48	Hurley Ranch Parcel 4	23.70	9.69		3.49	Final Plat	constructed
ED1	0.382	244.48	83rd Avenue & Lower Buckeye Rd	158.86	64.98	31.57	23.41	Final Plat	constructed
				223.60	91.46		32.94		
IE	0.302	193.28	Country Place	169.40	87.64		17.49	Drainage Report	constructed
ID1	0.204	130.56	Country Place	108.07	82.77		10.26	Drainage Report	constructed
ID2	0.360	230.4	Tivoli	63.72	27.66		15.36	Drainage Report	constructed
MB	0.995	636.8	Country Place	145.76	22.89		14.34	Drainage Report	constructed
IBA	0.240	153.6	Country Place	133.60	86.98		12.5	Drainage Report	constructed
IBB	0.239	152.96	Country Place	36.60	23.93		3.12	1/5TH OF IB(15.62 AC-FT)	constructed
ICA	0.230	147.2	Sunset Farms Unit 3	26.51	18.01		3.91		
ICA	0.230	147.2	Sunset Farms Unit 2	55.81	37.91		8.63	Drainage Report	graded
				82.32	55.92		12.54		
ICB	0.231	147.84	Sunset Farms Unit 1	71.08	48.08		12.02	Drainage Report	graded
ICB	0.231	147.84	Lion's Gate	39.57	26.76		3.26	Drainage Report	constructed
				110.65	74.84		15.28		

Table 2: HEC-1 Retention Worksheet

		Newly Developed Area Retention				Undeveloped Area First Flush			
HEC-1 Subbasin ID	Subbasin Area, ac	Existing Develop. Area, ac	100yr 2hr Retention ac-ft	0.8 x Retention ac-ft	Aspen HEC-1 retention	Undevel. Subbasin Area, ac	First Flush Undevel. Vol., ac-ft	0.8 x First Flush Vol., ac-ft	Comments
JB1A	93.34	78.34	13.64	10.91	10.5 *	15.00	0.63	0.50	HEC-1: use 0.8 x100yr 2hr retention + first flush
JB1B	62.32	36.02	5.31	4.25	10.5 *	26.30	1.10	0.88	HEC-1: use 0.8 x100yr 2hr retention + first flush
JB1C	160.50	124.24	18.30	14.64	10.5 *	36.26	1.51	1.21	HEC-1: use 0.8 x100yr 2hr retention + first flush
JB2	315.52	20.10	2.96	2.37	32.40	NA	NA	NA	Did not update future HEC-1 model retention **
EB	88.96	75.26	11.09	8.87	11.50	NA	NA	NA	Did not update future HEC-1 model retention **
ED1	244.48	223.60	32.94	26.35	8.1 *	20.88	0.87	0.70	HEC-1: use 0.8 x100yr 2hr retention + first flush
IE	193.28	169.40	17.49	13.99	25.00	NA	NA	NA	Did not update future HEC-1 model retention **
ID1	130.56	108.07	10.26	8.21	4.4 *	22.49	0.94	0.75	HEC-1: use 0.8 x100yr 2hr retention + first flush
ID2	230.40	63.72	15.36	12.29	7.7 *	166.68	6.94	5.56	HEC-1: use 0.8 x100yr 2hr retention + first flush
IB	636.80	145.76	14.34	11.47	88.40	NA	NA	NA	Did not update future HEC-1 model retention **
IBA	153.60	133.60	12.50	10.00	10.2 *	20.00	0.83	0.67	HEC-1: use 0.8 x100yr 2hr retention + first flush
IBB	152.96	36.60	3.12	12.50	10.2 *	116.36	4.85	3.88	HEC-1: use 0.8 x100yr 2hr retention + first flush
ICA	147.20	82.32	12.54	10.03	9.8 *	64.88	2.70	2.16	HEC-1: use 0.8 x100yr 2hr retention + first flush
ICB	147.84	110.65	15.28	12.22	9.8 *	37.19	1.55	1.24	HEC-1: use 0.8 x100yr 2hr retention + first flush

* Aspen HEC-1 model: 0.8 x first flush volume for basin: JB1, JB2, ED1, ID1, ID2, IB and IC

** did not update HEC-1 model retention for this subbasin because Aspen retention volume is greater than new development retention volume

Table 3: HEC-1 Peak Discharge Results (100-year 6-hour)

LOCATION	J2 FLOW		ASPEN FLOWS, 2005		DIBBLE FLOWS 2002	
	CONC. POINT	FLOW, CFS	CONC. POINT	FLOW, CFS	CONC. POINT	FLOW, CFS
75TH AVENUE	ADMP1	1098	ADMP1	705	~CPJC1	1173
83RD AVENUE	~CPJB1	1138	~CPJB1	617	~CPJB1	1393
91ST AVENUE	~CPED2	1279	~CPED2	1652	~CPED2	1967
99TH AVENUE	CPID2	1465	CPID2	976	CPID2	1697
103RD AVENUE	CP103	1626	CP103	NA	NA	NA
DRCC AT PROPOSED BASIN	~CPIB1	1633	~CPIB1	1113	~CPIB1	1849
107TH AVENUE N. OF DRCC	RTMBIB	559	RTMBIB	612	RTMBIB	749
DRCC AT 107TH AVENUE	@CPIB2	1200	@CPIB2	1565	@CPIB2	2552

City of Phoenix Future Storm Drains

The City of Phoenix plans to construct storm drains in the future along 83rd Avenue, 91st Avenue, and 99th Avenue that will discharge into the proposed DRCC. These storm drains will be designed to carry the 2-year runoff originating within the arterial right-of-way. Per conversations with City of Phoenix personnel, these storm drain projects are not currently programmed and little information is available about them at this time. J2 assumed that the storm drains will extend as far north as the existing Union Pacific Railroad tracks one half mile north of Buckeye Road.

Although the storm drains will be designed to carry the 2-year flow, the J2 HEC-1 models were developed for the 10-year event because the street gutters will carry flow in excess of the storm drain capacity, up to the 10-year event. J2 developed DRCC inflow hydrographs for these storm drains using separate HEC-1 models because the large-scale Durango ADMP-based HEC-1 models show zero flow at several concentration points in the 10-year future condition due to 100-year 2-hour retention within the upstream subbasins.

MC 85 (Buckeye Road)

The Maricopa County Department of Transportation (MCDOT) is planning to widen Buckeye Road between 75th Avenue and 107th Avenue in the near future. The design effort for this project is expected to begin this fiscal year. The project will include a 2-year storm drain system and the roadway will be turned over to the COP upon completion.

As of the present, discussions have not taken place between MCDOT and the COP regarding interconnections between the future COP storm drains in 83rd, 91st, and 99th Avenues with the proposed storm drains in Buckeye Road. However, coordination will be necessary since both storm drain systems would cross each other at the three major intersections.

As a conservative measure, J2 did not include divert operations representing the future Buckeye Road storm drain in the future condition HEC-1 models.

2.4 Hydraulics

Hydraulic models were prepared to evaluate both the existing and proposed conditions in the subject DRCC corridor. The analysis followed methods and procedures as outlined in the "Drainage Design Manual for Maricopa County – Volume 2". Updated topographic mapping was used to develop cross section data. The vertical datum used was NAVD 88. HEC-RAS 4.0.0 was used to compute the water surface profiles for the 100-year flow.

The proposed HEC-RAS model was prepared to aid in the evaluation of the existing DRCC corridor drainage features and to evaluate the proposed channel cross section configurations. The proposed DRCC HEC-RAS model was derived from new mapping, as-built plans, and new field survey data. The model represented the current condition of the drainage corridor.

The project criteria for the proposed improvements are as follows:

- Provide right of way containment for the 100-year flow.
- Pass the 10-year flow through culverts at all roadway crossings; in the 100-year event, roadway overtopping depth limited to 6 inches or less.
- Minimize area of disturbance within corridor

Figure 4 shows the location of HEC-RAS cross sections within the project limits.

2.4.1 Manning's n Values

The subject corridor is very compact. In order to maximize the hydraulic capacity, the vegetation density (particularly in the channel bottom) will be slight. A key design assumption was to maintain/reconstruct the existing vegetation pattern. The existing channel/basins are composed of earth lined channels, decomposed granite lined channels, grass lined basins, and decomposed granite/grass lined channels with vegetation along the side slopes. The existing channel roughness varies from 0.025 to

0.040. The existing and the preliminary HEC-RAS design models used the following n values:

- Earthen Channel: 0.020 – 0.035
- Decomposed Granite Channel: 0.025 - 0.035
- Decomposed Granite Channel (slight vegetation): 0.025 – 0.040
- Grass Lined Channel (with vegetation): 0.030 – 0.040

For the Draft Pre-Design submittal, it is assumed that the main channel roughness is based on surface with little to no vegetative cover; overbank n values are based on a low to moderate density of generally short vegetative cover. The Manning's n values in the proposed HEC-RAS plan are values that represent reasonable future vegetative condition that can be planned for (designed). It is anticipated that the Manning's n values will be further refined prior to the Final Pre-Design submittal as the design development continues.

It is anticipated that two independent Manning's "n" conditions will be modeled. The first, more conservative values will be utilized to establish the 100-year water surface elevations. The second, less conservative values will be utilized to verify channel stability.

2.4.2 Unsteady vs. Steady Flow Models

Ultimately J2 will use unsteady flow HEC-RAS models to simulate the performance of the existing channel and the proposed channel alternatives. However, for the first few design iterations, J2 is using steady flow models to evaluate the overall channel performance and to select alternatives to carry forward for further analysis. This approach is necessary because unsteady models tend to be unstable and require a large number of modeling iterations to resolve the instability issues causes by large changes in conveyance areas, etc.

Once team members have received review comments and input from WAPA, APS, and SRP regarding the location of the channel adjacent to irrigation (siphon) and power facilities the hydraulic models may be refined. These constraints will have a significant impact on the channel geometry (both horizontal and vertical).

SRP will not review/comment on the project until preliminary plans have been prepared. SRP has several irrigation crossings that may need to be siphoned under the proposed DRCC.

2.5 Hydraulic Analyses

The project corridor is broken into four distinct design reaches, each approximately one mile long. Preliminary hydraulic models (HEC-RAS) have been developed for the corridor.

Development of the design condition model is an iterative process that will continue through the Pre-Design submittal. Several key design assumptions will be utilized to develop the design condition model including:

- The project must provide flood protection for the 100-year flood event

- The 100-year flood may pass over the cross streets with a depth of no greater than 6 inches and the 10-year flood must pass through the culvert.

Each reach has specific hydraulic issues that will be addressed by the design team. The following paragraphs provide a brief description of each design reach.

2.5.1 Reach 1 – 75th Avenue to 83rd Avenue

Reach 1 is located from just west of 75th Avenue to just west of 83rd Avenue.

This reach consists of several independent linear retention basins with existing culverts at 76th Avenue (2 - 10' X 6') and 79th Avenue (2 - 10' X 4'). These facilities were constructed as part of the Tuscano development. The Tuscano development constructed the basic infrastructure (streets, water, sewer, storm drain, retention basins, etc.), but no homes were built. The linear retention basins are separated by small earthen berms that may be easily removed during construction to create a continuous channel. In general, the channel/retention basins have adequate hydraulic capacity to pass the 100-year storm event. The culvert capacities at 76th Avenue and 79th Avenue will need to be increased to pass the 100-year storm event. The longitudinal slope of the proposed channel will be set by the existing culverts. The channel will require minor excavation to provide positive drainage between culverts.

The existing linear retention basin within the future City of Phoenix Park site may need to be regraded to conform to future park facilities (see Subsection 3.2.1 constraint 2). Due to WAPA/APS and SRP design criteria, the 83rd Avenue culvert crossing was located south of the power poles. SRP has an existing irrigation line in 83rd Avenue. The irrigation line turns west immediately south of the DRCC and terminates (becomes a private irrigation line). Team members propose to extend the box culvert crossing west of 83rd Avenue to allow the private irrigation line to be siphoned. The siphon would not be located on the SRP line.

This concept requires siphoning the irrigation facility and requires some right-of-way acquisition in the southwest quadrant of the crossing. The existing agricultural field in this location is currently fallow.

The team investigated the possibility of using the proposed City of Phoenix park property east of 83rd Avenue as a detention basin. This could potentially provide a reduction in peak flows downstream, saving costs of expanding existing channel and culvert capacities downstream. City of Phoenix Parks staff member, Boyd Winfrey, stated that the Park Department does not prefer to have multi-use facilities (flood control/parks) and that the project would be required to purchase the park site from the City (if it were to be utilized for flood control). The 83rd Avenue detention basin alternative was not perused further.

In summary, the existing linear retention basins may be converted into a continuous channel within this segment with minimal effort. The required grading modifications are relatively minor (clean up side slopes and provide positive longitudinal slope). The existing culvert crossings will need to be expanded to accommodate the 100-year design event.

The proposed channel is uniform and probably will not have a significant reduction in peak discharge due to storage volume. One design alternative (single channel) was

prepared for this design segment. SRP review comments will not be received until the Pre-Design Report has been completed.

In addition, team members evaluated a design alternative that routes storm water south along 83rd Avenue to Broadway Road (Tuscano drainage master plan). The future SR 801 may be located approximately ¼ mile south of 83rd Avenue. Therefore, this channel could be connected to the ADOT system (or extended to the river) at a later date. Construction of the SR-801 is not in the ADOT 5-year plan. This alternative is outside of the DRCC Scope of Work (i.e., routing stormwater from 75th Avenue to 107th Avenue). This alternative does reduce peak discharge values in the 83rd Avenue to 99th Avenue section of the DRCC.

2.5.2 Reach 2 – 83rd Avenue to 91st Avenue

Reach 2 is located from just west of 83rd Avenue to just west of 91st Avenue.

This reach consists of several existing grass lined retention basins that will need to be connected to form a conveyance channel. In most locations the retention basins are wide enough to convey the 100-year storm event. However, the invert elevations of the retention basins will need to be regarded to provide a positive longitudinal slope in this reach. Channel crossings will be required at 85th Avenue, Riley Road (SRP irrigation), and 89th Avenue. The proposed channel is impacted by seven WAPA/APS 230 KV power poles. The largest design constraint in this reach is the shallow 72" sanitary sewer located in 91st Avenue (in conjunction with the vertical alignment of the 89th Avenue crossing).

Team members met with WAPA/APS representatives to determine design criteria for drainage facilities adjacent to 230KV power poles. WAPA/APS criteria are: 50-foot flat clear area around poles, measured from center of poles; 50-foot flat clear area at mid span, measured from center of lines; no excavations within 20 feet of the poles, measured from the outside of the poles; excavations shall not exceed 6 – 7 feet and will require a shoring plan approved by WAPA; All pipes, manholes, box culverts, or other proposed facilities to be located at or below grade in WAPA/APS/SRP easements must be designed to withstand a minimum of 320 lb/sq inch spread over a 27-inch diameter outrigger pad; maintenance road width requirements are 30-foot maximum (preferred) and 16-foot minimum; no trees in the easement shrubs that grow to less than 10 feet high are allowed. These criteria dictate box culvert crossings at some of the power poles.

Team members attempted to meet with SRP. SRP stated that they will not meet nor review the project until preliminary plans have been developed. They stated that their policy does not allow irrigation facilities to be siphoned. It is unlikely that the proposed channel may be feasibly constructed without the use of siphons for some of the SRP facilities. It is anticipated that SRP will provide input on the project after the Pre-Design Report has been completed.

The 91st Avenue crossing is one of the most critical design constraints in the entire project. 91st Avenue contains a 72-inch sanitary sewer and a WAPA/APS 230KV power pole (west side of 91st Avenue). The existing 72-inch sanitary sewer is located approximately seven (7) feet below 91st Avenue. The City of Phoenix's recommended cover (2 feet) and pavement thickness (13 - 16 inches) restrict the height of the proposed culvert. It is anticipated that team members will work with City staff to obtain a

design variance for this crossing (i.e., one foot clear between pipe and box and top of the box equal to top of road). In addition, the invert of the proposed culvert is significantly higher than the invert of the existing upstream retention basin.

Passing the channel under the sewer line is not feasible as this would require a channel approximately 20 feet deep. Therefore, the crossing will require multi barrel, 12-foot x 4-foot culvert. The proposed crossing will be located north of the WAPA/APS power poles and will require removal of the existing 6 – 30" pipe crossing. Due to the vertical alignment constraints of the existing 89th Avenue crossing, team members have attempted to minimize the water surface elevation at the 91st Avenue crossing.

The existing grass lined retention basin located between 91st Avenue and 89th Avenue is lower than the invert of the 91st Avenue crossing. Therefore, this section of the DRCC would function as a retention basin/sediment basin or would need to be filled to create a positive longitudinal channel slope. Team members modified the invert of the retention basin to provide positive drainage.

The existing 89th Avenue crossing is in a sag configuration. The low point of the sag is located at the DRCC. The water surface elevation in the DRCC is higher than 89th Avenue (flow will "breakout" into the neighborhood). In addition, the adjoining intersections (Forrest Grove and the school entrance) limit the ability to modify the vertical alignment of 89th Avenue. It is recommended that berming or short retaining walls be constructed to contain the water in the DRCC. The vertical alignment of 89th Avenue may need to be modified (increased). Storm water runoff from the neighborhood (contributing to the sag) would need to be collected and routed to a local retention basin. This may require acquisition of right-of-way west of 88th Lane.

It is recommended that the existing pedestrian DRCC crossing at 88th Lane be eliminated. It appears to be cost prohibitive to provide a multi cell box culvert pedestrian crossing a few hundred feet away from a roadway crossing. The pedestrian crossing could be maintained as an "at-grade" crossing. It could be utilized for the majority of the time (during non flood times).

A long box culvert would be required to cross SRP irrigation/Riley Road (87th Avenue alignment). It is anticipated that the SRP irrigation line would need to be siphoned under the proposed channel. Team members will discuss this concept with SRP following the Pre-Design Report submittal.

The invert of the grass lined retention basin located between Riley Road and 85th Avenue would need to be lowered to provide positive drainage in this reach. A 4 – 10' X 5' RCBC will be required to provide conveyance through the 85th Avenue crossing and a 4 – 10' X 5' RCBC will be required at the WAPA/APS power pole between 85th Avenue and 83rd Avenue.

In summary, this segment of the project requires conversion of grass lined retention basins into a channel. It will require re-grading of the basins to provide positive drainage. Team members will work with the District and HOA to develop the grading plans for the basin areas. There are three major utility constraints in this reach – 1) 91st Avenue sanitary sewer/89th Avenue roadway, 2) Riley Road SRP irrigation siphon, and 3) WAPA/APS power poles.

2.5.3 Reach 3 – 91st Avenue to 99th Avenue

Reach 3 is located from just west of 91st Avenue to just west of 99th Avenue.

This reach contains an existing channel system which is undersized and will require modification (widening). The existing box culverts in this reach do not have capacity to pass the design event. The corridor from 91st Avenue to 99th Avenue is especially narrow (approximately 175 feet from 91st Avenue to 95th Avenue and 130 feet from 95th Avenue to 99th Avenue).

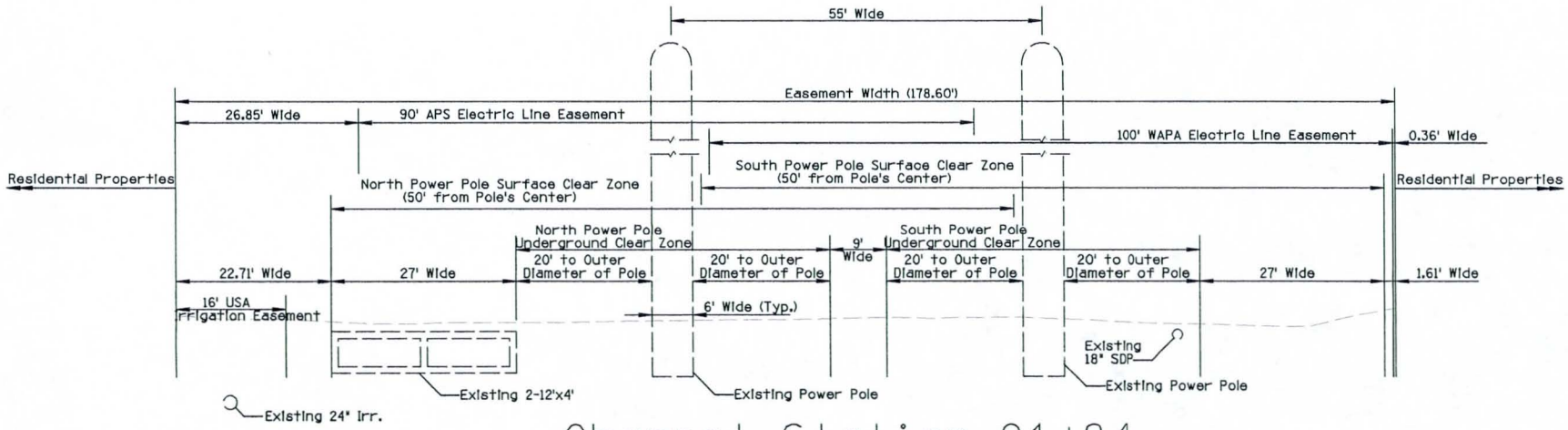
The primary constraint in this segment is the culvert crossings required at the WAPA/APS power poles. A 24" irrigation line is located along the northern edge of the corridor. The northern power pole (APS) is located 70 feet from the north fence line. The WAPA and APS power poles are 55 feet apart. Team members provided a 20 foot maintenance road over the irrigation pipe (pipe has a 16 feet easement associated with it). WAPA and APS do not allow structures to be constructed within 20 feet of their poles (23 feet from centerline). Therefore, a 2 - 12' X 4' RCBC is the largest culvert that can fit north of the APS power pole. The existing 2 – 12' X 4' RCBC is "kinked" around the pole. The power poles are 55 feet apart (centerline to centerline). WAPA and APS prohibit structures within 23 feet of their poles (46 feet total). This results in a usable opening of 9 feet between poles. Therefore, a 6' X 4' RCBC is the largest structure permitted between the poles. The southern pole (WAPA) is located approximately 50 feet from the south fence. The maximum allowable culvert would be a 3 – 8' X 4' RCBC. The hydraulic capacity of the three culvert crossing configuration through the WAPA/APS area serves as the constraint for this segment. The channel configuration in this reach was maximized. Figure 4 shows cross sections of the channel.

The existing 92nd Avenue crossing is overtopped by approximately 1.2 feet. The adjacent homes are two to three feet higher than the adjacent road (i.e., the finished floor elevation of the homes is above the DRCC 100-year WSEL). Since the overtopping depth is greater than 6 inches a design variance will be required at this location. The 92nd Avenue crossing is impacted by backwater from the culverts immediately downstream.

In order to maximize the channel area in this section, the Tivoli retention basins were eliminated and/or reduced. Therefore, the regional system will be required to accommodate their storm water runoff.

In order to accommodate the design discharge, the proposed channel from 95th Avenue to 99th Avenue will require additional right-of-way to the south (Accomazzo Trust). Team members will evaluate two design alternatives in this location. The first alternative will route all of the flow in an open channel south around the power poles (i.e., no structure cost, but more right-of-way cost). The second alternative will route the flow through the existing structures and through structures adjacent to the poles (i.e., higher structure cost, but less right-of-way cost). Team members will coordinate the design with District personnel to determine the preferred alignment.

Since the channel will be expanded to the south, the existing irrigation facilities will need to be relocated.



Channel Station 91+84
Representing Channel between 91st Ave. and 95th Ave

NTS

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FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY
ENGINEERING DIVISION

DURANGO REGIONAL CONVEYANCE CHANNEL
PROJECT NUMBER
FCD2009C007-PRE-DESIGN

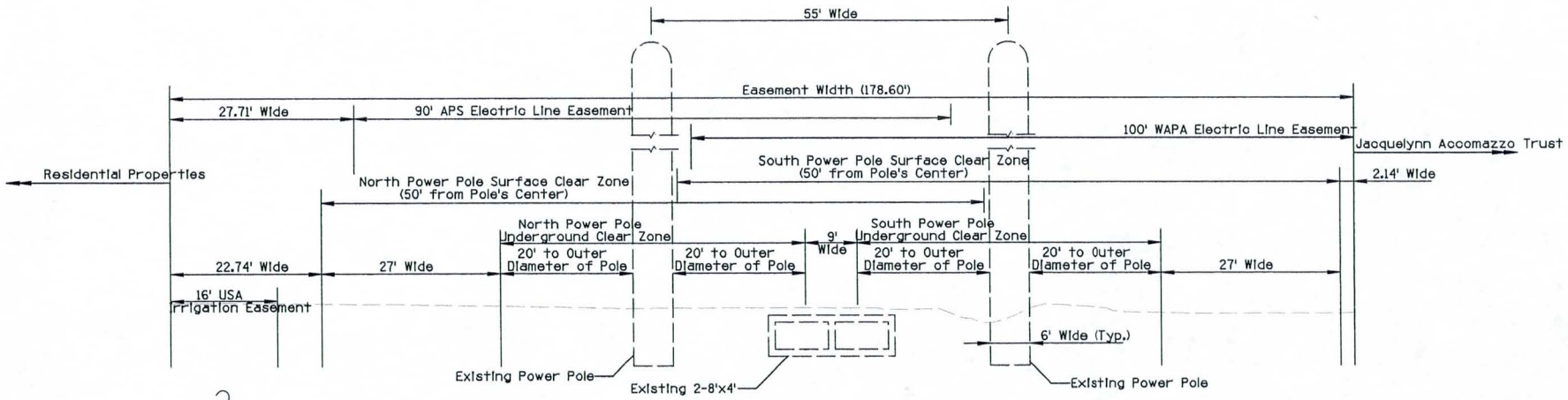
PRELIMINARY
NOT FOR
CONSTRUCTION

	BY	DATE
DESIGNED	J. LOUCKS	12/09
DRAWN	JL, JP, JW, MRT	12/09
CHECKED	J. HOLZMEISTER	12/09

J2 [illegible]

DRAWING NO. | CROSS SECTION INSIDE RESTRICTED CHANNEL AREA | SHEET OF 1 3

23



Channel Station 69+77
Representing Channel between 95th Ave. and 99th Ave

NTS

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FLOOD CONTROL DISTRICT
OF MARICOPA COUNTY
ENGINEERING DIVISION

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DRAWN	JL, JP, JW, MRT	12/09
CHECKED	J. HOLZMEISTER	12/09

J2 engineering and environmental design
4848 east cotton gin loop, suite 102
phoenix, arizona 85040
phone 602.438.2220 www.j2engineering.com

DRAWING NO. | CROSS SECTION INSIDE RESTRICTED CHANNEL AREA | SHEET OF 2 3

In summary, this reach of the project has a small existing channel that will need to be expanded to accommodate the design storm event. The channel/culvert hydraulic capacities were maximized in this reach in order to pass the design event. The 92nd Street crossing will require a design exception due to the overtopping water surface elevation. Right-of-way acquisition is required along the southern side for the project from 95th Avenue to 99th Avenue.

2.5.4 Reach 4 – 99th Avenue to 107th Avenue

Reach 4 is located from just west of 99th Avenue to just east of 107th Avenue. The major design constraints in this reach are the WAPA/APS power poles, SRP 36" irrigation line at 103rd Avenue, and power poles immediately west of 107th Avenue.

The proposed improvements in this area may include channel widening and expansion of existing culvert crossings. The propose channel widening will impact the existing retention basins along the south side of the alignment. Team members revised the channel configuration to eliminate the existing siphon condition at 103rd Avenue.

The existing corridor (including retention basins) is wide enough to accommodate the proposed channel. Structures will be required at the WAPA/APS power poles and at 103rd Avenue. The existing retention basins will need to be regarded to provide positive drainage for the corridor. Figure 4 shows cross sections of the channel.

The 36" irrigation line (that crosses the existing channel alignment immediately east of 103rd Avenue) presents a unique design constraint. The existing regional channel passes under the irrigation line in an inverted siphon configuration. This 15' x 3.5' culvert crossing does not have sufficient capacity for the design event. The sump area includes a "dry well" that appears to be filled with sediment. Team members feel strongly that storm water facilities should not be siphoned under irrigation facilities. The irrigation facility is easier to siphon for two reasons. Typically, it has relatively clean water and has uniform flow. Team members have developed a concept alternative that eliminates the siphon condition.

The recommended solution will shift the DRCC south around the 36" irrigation line. It will roughly match the alignment of the Lions Gate development retention basin. The basin will need to be re-graded (lowered a few feet). The 103rd Avenue channel will maintain the existing alignment north of the 36" irrigation line. The 103rd Avenue channel will be connected to the southern channel via a "broken back" box culvert under the 36" irrigation line. This configuration will eliminate the existing siphon configuration.

The "Addendum to the Durango Regional Conveyance Channel, Candidate Assessment Report, Prestige Engineering, Inc., June, 2009." recommended that a detention basin be constructed at 107th Avenue. The proposed basin provided for a multi-use facility that will limit peak discharge west of 107th Avenue to 1200 cfs. The hydrologic analyses contained in the CAR required several modifications that significantly impacted the peak discharge and volume at the basin. It is recommended that the regional hydrologic model be reviewed in detail prior to the final design.

Team members evaluated several detention basin design alternatives including 1) shallow (4 – 6 feet) surge basin, 2) shallow (4 – 6 feet) offline basin, and 3) deep (13

feet) offline basin. The deep basin was determined to be the preferred alternative. The deep basin would be required to construct a lateral weir from the southern channel to the basin. A box culvert would serve as the lateral weir to scalp the peak flows off of the hydrograph. The lateral weir would be required to pass approximately 300 cfs and the detention basin would be required to have a storage volume of approximately 30 ac-ft. In addition, the deep basin allows the DRCC to pass under 107th Avenue (between the irrigation line and the sanitary sewer).

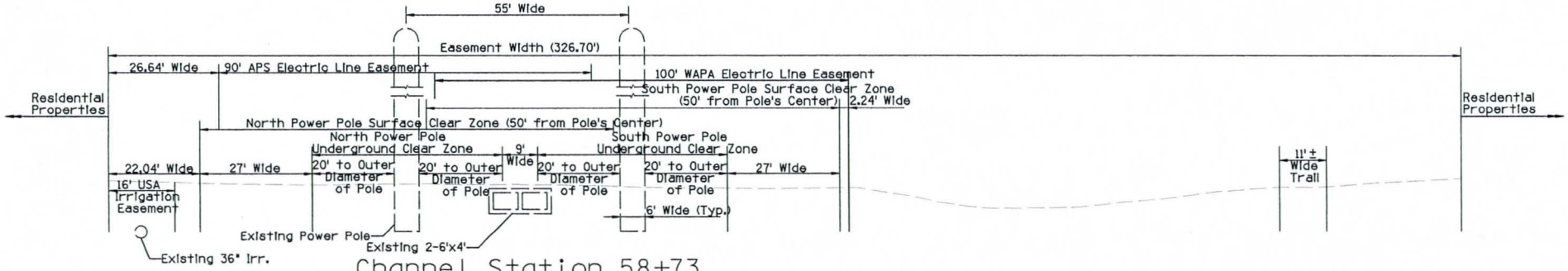
It is prudent for the design team to evaluate the DRCC downstream of 107th Avenue. There are numerous large power poles at 107th Avenue that may impact the future design. In addition, there are several large gravity utilities crossing the future DRCC corridor downstream of 107th Avenue.

2.5.5 Hydraulic Conclusions

Hydraulic design of the DRCC was an iterative process. Team members utilized the steady sate module of HEC-RAS to develop the conceptual alternatives. Once team members received input from the VA Team, WAPA/APS and (waiting for SRP irrigation and power input) unsteady state models were run to evaluate the hydraulic operation of system. The preferred alternative varied significantly from the original conceptual design described in the CAR. A second detention/retention basin was added to the system. The basin was located immediately upstream of the constrained segment between 87th Avenue and 89th Avenue.

The preferred alternative established the basic configuration of the channel system, during the final design process team members will refine the preferred alternative to improve the trail system alignment and elevation, provide vegetation, minimize the mitigation area, limit right-of-way acquisition, and work within the capital cost limitations and responsibilities of the project features. Team members will work to minimize the changes during final design, but do not want to limit the opportunity for discussion, creativity, and optimization of the design.

The recommended alignment is shown in Appendix B. The output files from the HEC-RAS models are shown is Appendix D. The HEC-RAS models are contained on the CD in the pocket of the report.



Channel Station 58+73
Representing Channel between 99th Ave. and 103rd Ave.

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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

DURANGO REGIONAL CONVEYANCE CHANNEL
PROJECT NUMBER
FCD2009C007-PRE-DESIGN

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CHECKED	J. HOLZMEISTER	12/09

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DRAWING NO. | CROSS SECTION INSIDE RESTRICTED CHANNEL AREA | SHEET OF 3 3

2.6 Right-of- Way/Easements

The project site right of way (ROW) and easements have been researched by team members. The following figures display the existing legal descriptions obtained by the project team. ROW/easement lines were identified through examination of Plat's, As-Built drawings, Maricopa County Assessor's records, etc. The legal descriptions have not been verified by title reports at the current time. They will be reviewed and verified prior to completing the 30 percent design.

Ownership of right of way varies throughout the project. Most ownership lies with private development. WAPA, APS, and SRP have extensive easements within the corridor. It is anticipated that they will have prior rights. Maricopa County Flood Control District and the City of Phoenix have extensive drainage easements within the corridor that will allow for construction of the regional channel.

Team members have developed a conceptual design for the project. The majority of the proposed drainage facility is located within existing drainage easements. It is the intent of the project to construct the regional drainage system within the existing drainage easements and allow the property owners (HOA) to maintain the facilities. Additional right-of-way/easements will need to be acquired in several locations. Team members have identified the following locations that may require the purchase of rights-of-way or drainage easements.

1) Southwest quadrant of 83rd Avenue and Elwood Street (Gerben Boschma Family Trust) – The northeast portion of this parcel will be required to construct a multi-cell box culvert across 83rd Avenue. The SRP owned irrigation facility appears to end at this location. The design concept constructs the proposed box culvert over the private irrigation supply. The private irrigation supply would be constructed as a siphon.

2) 89th Drive – the existing roadway sag crossing (entry to the Hurley Ranch Elementary School) is lower than the 100-year WSEL. The vertical alignment of the roadway may need to be modified and a retention basin constructed to accommodate runoff from this roadway. The retention basin may be located north of the regional channel and west of 88th Lane. Team members are evaluating additional design alternatives for this crossing.

3) 95th Avenue to 99th Avenue – Additional rights-of-way or drainage easements will be required along the southern side of the corridor (Jacquelynn Accomazzo Trust). Team members will work with the District to determine if routing the entire channel around the power poles will be more cost effective than constructing box culverts (decision will be based on the cost of rights-of-way).

4) 107th Avenue south of the drainage corridor – The existing retention basin along 107th Avenue (south of the corridor) is not designated as a drainage easement. The parcel may be filled and homes constructed in the future. Team members need to determine the optimum future crossing of 107th Avenue. future extension of the regional channel is planned to

It is anticipated Temporary Construction Easements may be required for the project. Team members will identify these locations during final design.

The following Figures show the right of way/easement parcels.

33'

107th Ave

2,657.32'
N0°42'06"W

33'

Exist R/W

Phoenix City Limits

FLOOD CONTROL DISTRICT MARICOPA COUNTY
38.585 Acres

Mon GDAC
54274
Fd BCHH MCDOT

Mid-Section Line

2,596.35'
N89°49'09"E

TRACT R
Common Area

TRACT 'C'
(Drainage Easement)
217,768 SF
4.999 Acres

LION'S GATE

Multiuse Trail Easement Line

1,326.77'
S0°37'43"E

Phoenix City Limits

104th Ln

Forest Grove Ave

103rd Dr

2,658.98'
N0°45'02"W

20' Sewer Access & Road Easement

COUNTRY PLACE PARCELS 2 & 3

TRACT G
(DE & MUTE)
234,453 SF
5.382 Acres

Mid-Section Line

TRACT G
(DE & MUTE)
234,453 SF
5.382 Acres

25' Sewer Easement

60'

TRACT A
(LE, DE, MUTE, PE)
277,842 SF
6.378 Acres

SUNSET FARMS UNIT 1

Fd Rebar

20

103rd Ave

2,655.93'
N0°45'02"W
103RD AVE

Matchline - See Sheet 2

N

50 0 50 100
Scale in Feet

NO.	REVISION	BY	DATE
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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

DURANGO REGIONAL CONVEYANCE CHANNEL
PROJECT NUMBER
FCD2009C007-PRE-DESIGN

PRELIMINARY NOT FOR CONSTRUCTION

	BY	DATE
DESIGNED	J. LOUCKS	12/09
DRAWN	JL, JP, JW, MRT	12/09
CHECKED	J. HOLZMEISTER	12/09

J2 engineering and environmental design
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DRAWING NO.

RIGHT-OF-WAY MAP

SHEET OF 1 8

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Matchline - See Sheet 1

102nd Dr

COUNTRY PLACE PHASE 1

Heber Road.

Country Place Blvd

TRACT T
(Drainage Easement)

TRACT F-F
(Drainage Easement)

COUNTRY PLACE PARCEL 4 SOUTH

2,660.18'
N0°52'34"W

98th Ln

Matchline - See Sheet 3

TRACT G-G
(DE & MUTE)
110,910 SF
2.546 Acres

Mid-Section Line

2,598.87'
N89°49'09"E

COUNTRY PLACE PHASE 1

TRACT J
(DE & MUTE)
102,999 SF
2.365 Acres

TRACT A
Drainage Easement

TRACT V
(DE & MUTE)
7,998 SF
0.184 Acres

TRACT A
(LE, DE, MUTE, PE)
541,256 SF
12.426 Acres

SUNSET FARMS UNIT 2

Mon GDAC
54275
Fd BC COP

99th Ave

2,658.12'
N0°49'22"W

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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
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RIGHT-OF-WAY MAP

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- See Sheet 2

Matchline - See Sheet 4

Heber Road

97th Ln

97th Dr

96th Ave

95th Dr

Windrow Blvd

94th Ln

UNTRY PLACE PHASE 2B
PARCEL 25

COUNTRY PLACE PHASE 2B
PARCEL 26

COUNTRY PLACE PHASE 2B
PARCEL 27

COUNTRY PLACE
DEVELOPMENT
UNIT 34

TRACT E
(LE, DE, & MUTE)
86,180 SF
1.978 Acres

TRACT E
(LE, DE, & MUTE)
75,510 SF
1.733 Acres

Mid-Section Line

TRACT D
(DE & Common Area)
65,082 SF
1.494 Acres

TRACT D
(DE, MUTE & C
123,389
2.833 Ac

2,604.90'
N89°58'40"E

Fd BC FL

2,659.88'
N1°12'44"W

95th Ave
95TH AVE

Elwood Street

101-28-002
Jacquelynn Accomazzo Trust

101-28-001N
Jacquelynn Accomazzo Trust

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Scale in Feet

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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
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RIGHT-OF-WAY MAP

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Matchline - See Sheet 3

Matchline - See Sheet 5

N

94th Ave

93rd Ln

93rd Ave

92ND AVE

92nd Dr

91st Dr

91st Ave

2,662.57'
N1°34'01"W

TRACT W
(Common Area)

TRACT X

Forest Grove Ave

HURLEY RANCH PARCEL 4

TRACT V
(Drainage Easement)
163,795 SF
3.760 Acres

Heber Road

COUNTRY PLACE DEVELOPMENT
UNIT 35

8' PUE
Exist R/W

20' MUTE

5' PUE
Exist R/W

50'

TRACT E

TRACT G
(DE,MUTE & Common Area)
30,565 SF
0.702 Acres

TRACT F
(DE,MUTE & Common Area)
68,388 SF
1.570 Acres

Mid-Section Line
2,605.84'
N89°58'40"E

TRACT U
(LE,DE,MUTE, & S/WE)
225,255 SF
5.171 Acres

TRACT G
(LE,DE & MUTE)
104,021 SF
2.388 Acres

TIVOLI

Elwood Street

93rd Dr

92nd Ln

91st Ln

91ST AVE

2,661.93'
N1°34'23"W

55'

1' VNAE

Exist R/W

10' PUE
8' PUE

Mon GDAC
54276
Calc per
Bk 686, Pg 43

101-30-714C
PTH Properties Ltd

101-30-879
101-30-712A
101-30-714C

PTH
Properties
Ltd

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RIGHT-OF-WAY MAP

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Matchline - See Sheet 4

Matchline - See Sheet 6

HURLEY RANCH PARCEL 3

Heber Road

88th Ln

87th Dr

89th Dr

60'

Riley Rd

60'

VOLTERRA

83rd AVE & LOWER BUCKEYE ROAD
FINAL PLAT

TRACT CC
(Drainage Easement)
66,158 SF
1.519 Acres

TRACT K
(DE,& Common Area)
256,817 SF
5.896 Acres

Exist Property Line

TRACT I
(Drainage Easement)
189,720 SF
4.355 Acres

Exist R/W

8' PUE

20' Multi-Use Trail Easement

16' Quit Claim

40' Sanitary Sewer Ease

20' Exception USA Fee Area

2,656.17'
N1°46'13"W

2,624.14'
N82°48'34"E

Mid-Section Line

101-30-881
City of Phoenix
803,107 SF
18.437 Acres

101-31-003A
PTH Properties Ltd

Mon Not Fd

2,652.80'
N1°46'13"W

HURLEY RANCH
ELEMENTARY SCHOOL

ILLINI ST

22

N

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Scale in Feet

NO.	REVISION	BY	DATE
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J2 engineering and environmental design
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RIGHT-OF-WAY MAP

SHEET OF 5 8

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Matchline - See Sheet 5

Matchline - See Sheet 7

83rd AVE & LOWER BUCKEYE ROAD
FINAL PLAT

Forest Grove Ave

84th Ln

85th Ave

83rd Ave

82nd Ln

81st Glen

81st Dr

Elwood St

TUSCANO PH 1

TRACT N
(DE,& MUTE)
237,811 SF
5.459 Acres

Note: 100' WAPA & 90' APS Easa Unknown

2,624.13'
N82°48'34"E

2,650.54'
N1°59'00"W

2,645.29'
N1°55'19"W

45'
55'
33'

Exist R/W

Mid-Section Line

101-31-004C
Jenny Boschma Trust

101-31-004B
Gerben Boschma
Family Trust

Mon GDAC
54277
Fd BC COP

101-53-755
City of Phoenix

101-53-745
City of Phoenix

TRACT V & L
(PARK SITE)
584,678 SF
13.422 Acres

TUSCANO PCD PH 2 PAR B

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Scale in Feet

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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
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RIGHT-OF-WAY MAP

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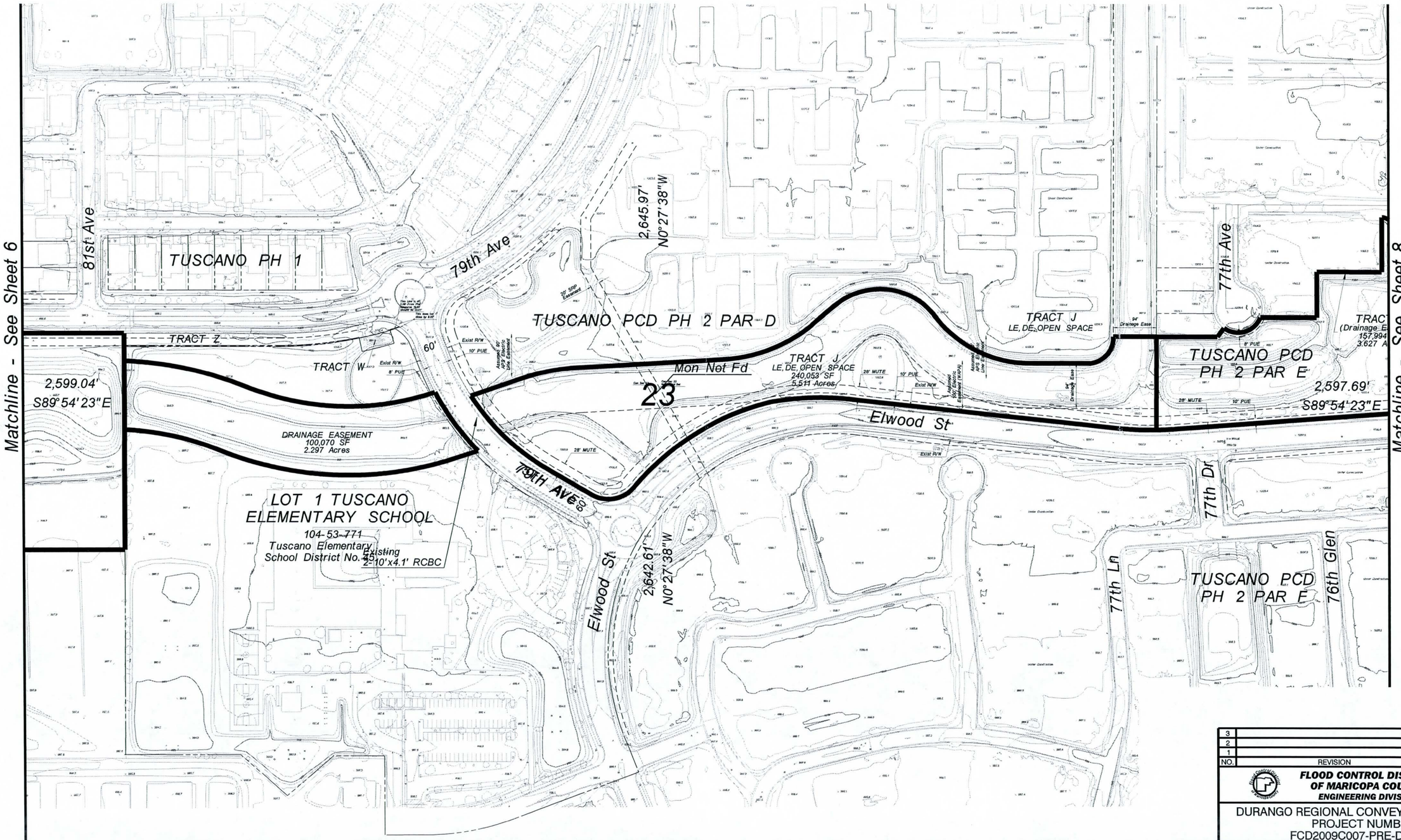

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RIGHT-OF-WAY MAP

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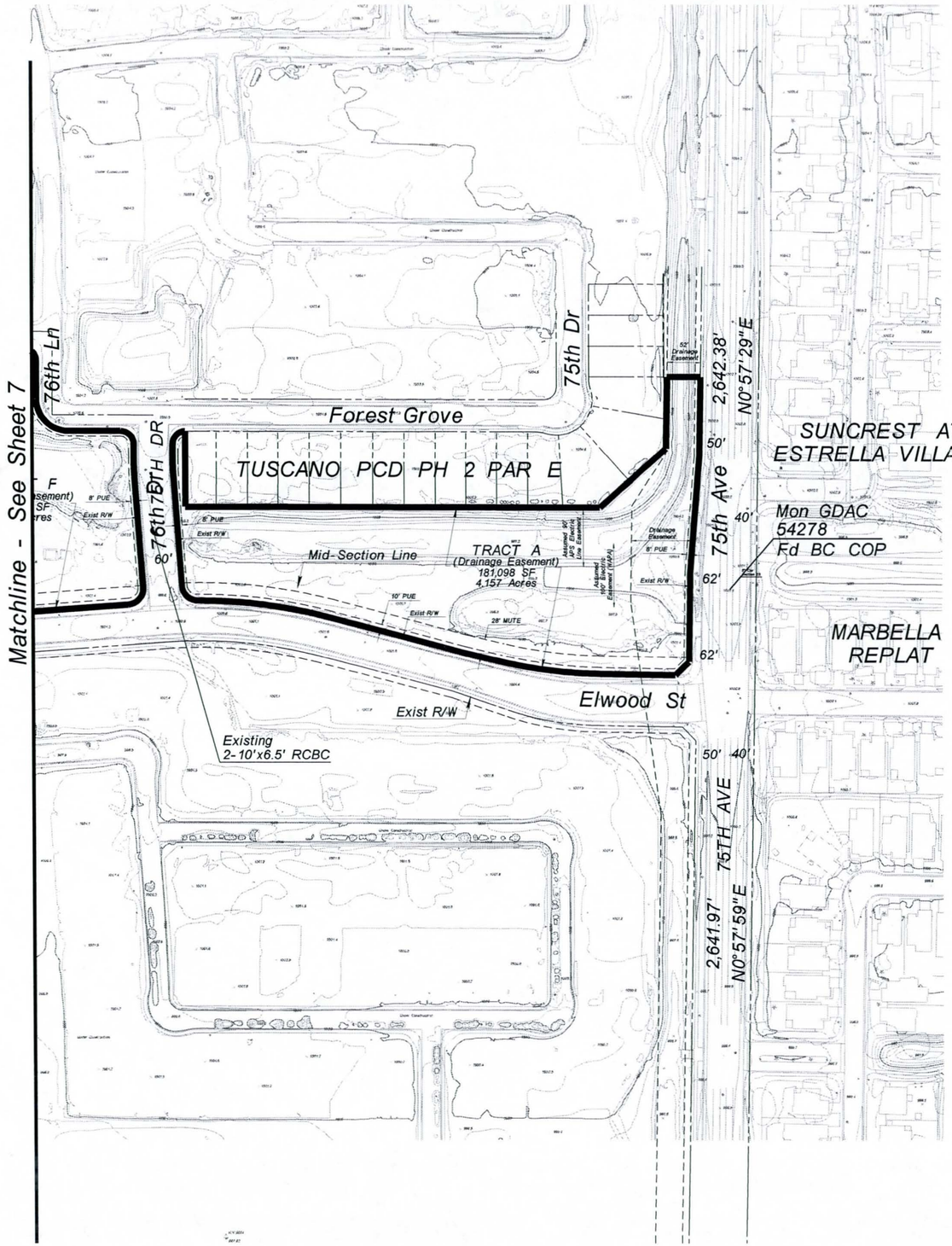

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Scale in Feet

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2.7 Site Utilities

The proposed project limits include the area from 75th Avenue to 107th Avenue. This project will not design any improvements for 75th Avenue or 107th Avenue. The project will cross three arterial streets – 83rd Avenue, 91st Avenue, and 99th Avenue. In addition, the project will cross the following residential streets 76th Drive, 79th Avenue, park entrance (future), 85th Avenue (future), Riley Road (future), 89th Drive, 92nd Drive, 95th Avenue, and 103rd Avenue.

Initial utility identification within the Durango Regional Conveyance Channel (proposed east/west corridor paralleling Elwood Street) has discovered the following overhead and underground facilities that may impact the channel location or require added protection or relocation due to the width, depth and routing of the proposed channel. At this time, prior rights will be assumed without verification through easement legal descriptions or title reports.

Western Area Power Administration (WAPA) 230 KV Power Line (South Line) – The WAPA power line extends throughout the entire project length. The proposed channel and culverts will need to accommodate WAPA's structural setback (20 feet adjacent to power poles with a maximum depth of 6 – 7 feet), and maintenance access requirements (minimum 20 access road throughout the entire corridor and 50 feet diameter flat clears zone adjacent to power poles and midspans). It should be noted that the existing condition does not meet these requirements. Team members met with WAPA and described the proposed improvements. WAPA does not currently have a 50 feet diameter set up area at several of their midspan locations. WAPA stated that if they do not currently have access to their line and the project does not modify the existing channel configuration, then they will not require the District to provide a set up area. WAPA will review the plans and provide a formal response at the next submittal.

Arizona Public Service (APS) 230 KV Power Line (North Line) - The APS power line extends throughout the entire project length (parallel to WAPA). The proposed channel and culverts will need to accommodate APS's structural setback (adjacent to power poles) and maintenance access requirements (throughout the entire corridor). Discussions with APS personnel indicated that they will defer to the WAPA design guidelines for this corridor. The WAPA criteria was discussed in the previous paragraph.

Salt River Project (SRP) Irrigation – SRP has several irrigation lines that cross the corridor. The irrigation crossings are at 103rd Avenue, 99th Avenue, Riley Road (future), 83rd Avenue, and 79th Avenue. Team members contacted Harold Biever to discuss the project design constraints. Mr. Biever stated that SRP will need to maintain all of the existing crossings and that they will not allow their facilities to be siphoned. He stated that he would not be attending any meetings until after he has received a preliminary set of construction documents (after the Final Pre-Design Report). Team members stated that there is a 72-inch sanitary sewer in the corridor (91st Avenue) that may force the SRP irrigation lines to be siphoned. He stated that SRP does not allow siphons in their system. Team members will coordinate the design of the crossings (siphon) with SRP personnel. In addition, SRP has several irrigation lines that flow parallel to the corridor. A 36-inch irrigation line extends from 107th Avenue to 103rd Avenue. A 24-inch irrigation line extends from 107th Avenue to 99th Avenue. In addition, they have several irrigation

supply channels along the corridor. These channels may need to be relocated as part of this project. The design and maintenance of these crossings will need to be coordinated with SRP. **This may be a critical design item – if SRP is not willing to attend meetings or assist in the development of design alternatives it may result in rework and or reanalysis during final design.**

City of Phoenix Sanitary Sewer – The 91st Avenue sanitary sewer is one of the main constraints of the project. The 72-inch sanitary sewer limits the depth of the channel. A 24-inch sanitary sewer extends from 107th Avenue to 103rd Avenue and a 12-inch sanitary sewer extends from 91st Avenue to Riley Road. The 12 and 24-inch sewer lines lay within the project alignment. The remaining sanitary sewers are relatively deep and do not appear to adversely impact the channel design.

City of Phoenix Water Lines – Water lines are designed as pressure systems and may be relocated to accommodate the channel design. There is one water line that runs parallel to the corridor. It is located between 107th Avenue and 103rd Avenue. It is not anticipated that water lines will be a project constraint.

Salt River Project (SRP) Power – SRP has power lines along 107th Avenue that should be incorporated into the design. These facilities will not impact this project, but may impact the next segment of the design.

In addition to utilities along the corridor there are numerous north/south utility crossings. The following Table 4 identifies utilities from their representative quarter section mapping.

Table 4: North/South Utility Crossing Locations

STREET	SEWER	WATER	GAS	COM	CABLE	OVERHEAD ELECTRIC	UNDERGROUND ELECTRIC
75th Ave	36"	12"	2"	X	X		X
76th Dr	10"	X			X		
79th Ave	X	8"	2"		X		X
83rd Ave	X	X			X		X
85th Ave		X			X		
Riley Rd		8"			X		X
89th Dr	12"	8"					
91st Ave	72" & 18"	12"		X	X	X	X
92nd Ave		8"					
95th Ave		8"			X		X
99th Ave		12"	6"	X	X	X	X
103rd Ave		8"	2"		X		
107th Ave	30"	8" & 12"	4"		X	X	X

X = existing size unknown

Due to the sequence of construction (upstream to downstream), team members conducted a preliminary utility review to identify potential conflicts west of 107th Avenue. The recommended DRCC alignment (Buckeye Feeder branch), identified in the 2002 *Durango Area Drainage Master Plan* (FCD 99-41) was utilized for the utility investigation.

The goal of the preliminary utility investigation was to identify major "fatal flaw" utilities that would adversely impact the proposed design. These were assumed to be gravity sanitary sewers, high pressure gas lines, major SRP irrigation lines, etc.

The recommended DRCC alignment west of 107th Avenue to the Agua Fria River falls entirely within Maricopa County jurisdiction except for a 25' strip annexed by the City of Avondale 33' west of the section line along 107th Avenue.

It was assumed that underground dry utilities (telephone, cable, etc.), buried wet utilities (potable water), and private irrigation pipes, irrigation canals and ditches could be relocated with reasonable effort.

Research started with the *Durango Area Drainage Master Plan* DRCC (Buckeye Feeder) recommended alignment and its respective 15% plan sheets 10 thru 15 of 38. These plan sheets identified proposed box culverts at street crossings and known underground conflicts. Additional research at the Cities of Phoenix and Avondale also identified the following utilities.

Street Crossing	DADMP Box Culvert Size	Utility Crossed	Depth	Ground Elevation
Dysart Road	9-10'x5'	None		925
Sect 26 N/S Mid-section line	9-10'x5'	None		930
El Mirage Road	10-10'x5'	None		934
Roeser Road	9-10'x5'	114" Effluent	8.5' *	937
235' N of Roeser Road	None	36" SS	14.6'	938
Broadway Road	9-10'x5'	None		940
Avondale Blvd *aka 115th Avenue*	8-10'x5'	20" El Paso Gas	9.7'	957
		42" SRP Irrigation	8.5' *	957
		30" SS	17.8'	957
Sect 19 N/S Mid-section line	8-10'x5'	None		958
107th Avenue	6-10'x5'	30" SS	18'	965

* Assumed from *Durango Area Drainage Master Plan* (FCD 99-41).
♦ COP as-built plans were not made available due to security issues.

Horizontal alignment was not questioned as to its relationship to the Buckeye Feeder Canal, section lines or mid-section lines. The route traverses large tracts of cultivated agricultural lands except for the power substation north of Broadway Road from ¼ to ½ mile east of El Mirage Road. Horizontal alignment may be subject to change as development precedes the extension of the DRCC and as right-of-way negotiations

begin. Two physical features that could influence the final horizontal alignment would be the transmission pole spacing for SRP's 500kV line north of Roeser, SRP's 230kV line along Broadway, and manholes on Avondale's 36" sewer north of Roeser.

Conclusions:

a) City of Phoenix and City of Avondale sanity sewer lines (north of Roeser, in 115th Ave, in 107th Ave) appear to be deep enough to avoid any disturbance.
b) Both private and SRP irrigation pipes, lined canals and dirt ditches that cross the DRCC are assumed to be replaced by inverted siphons.
c) El Paso Natural Gas 20" high pressure line in 115th Avenue appears to control the channel depth to the east. However, the 0.6' separation between top of pipe and flow line of channel will not be acceptable from either a construction or maintenance perspective. A critical factor for design will be providing more clearance, lower the pipeline, or lower the channel.
d) City of Phoenix 91st Ave Treatment Plant effluent discharge line needs additional verification for depth (at Roeser). One pothole taken in 91st Avenue, as part of the DADMP, placed the pipe only 5' deep. The approximate depth of 8.5' three and one-half miles west should not be considered accurate until verified. A pothole above the pipe on the Roeser Road alignment one-half mile west of 115th Avenue is recommended.

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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

DURANGO REGIONAL CONVEYANCE CHANNEL
PROJECT NUMBER
FCD2009C007-PRE-DESIGN

PRELIMINARY
NOT FOR
CONSTRUCTION

	BY	DATE
DESIGNED	J. LOUCKS	12/09
DRAWN	JL, JP, JW, MRT	12/09
CHECKED	J. HOLZMEISTER	12/09

J2 engineering and environmental design
4649 east cotton gin loop, suite B2
phoenix, arizona 85040
phone: 602.438.2221 www.j2design.us

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UTILITY MAP

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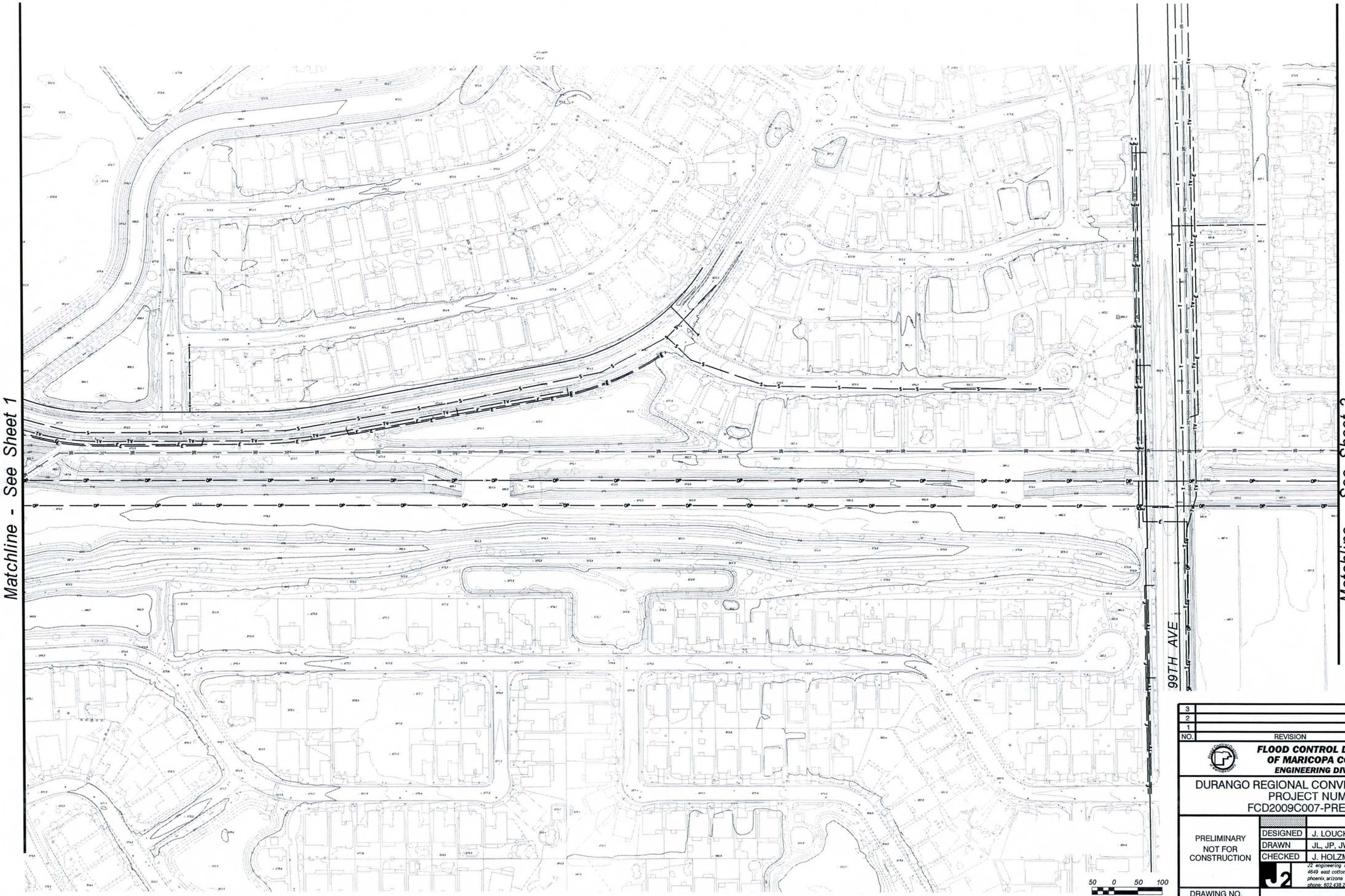

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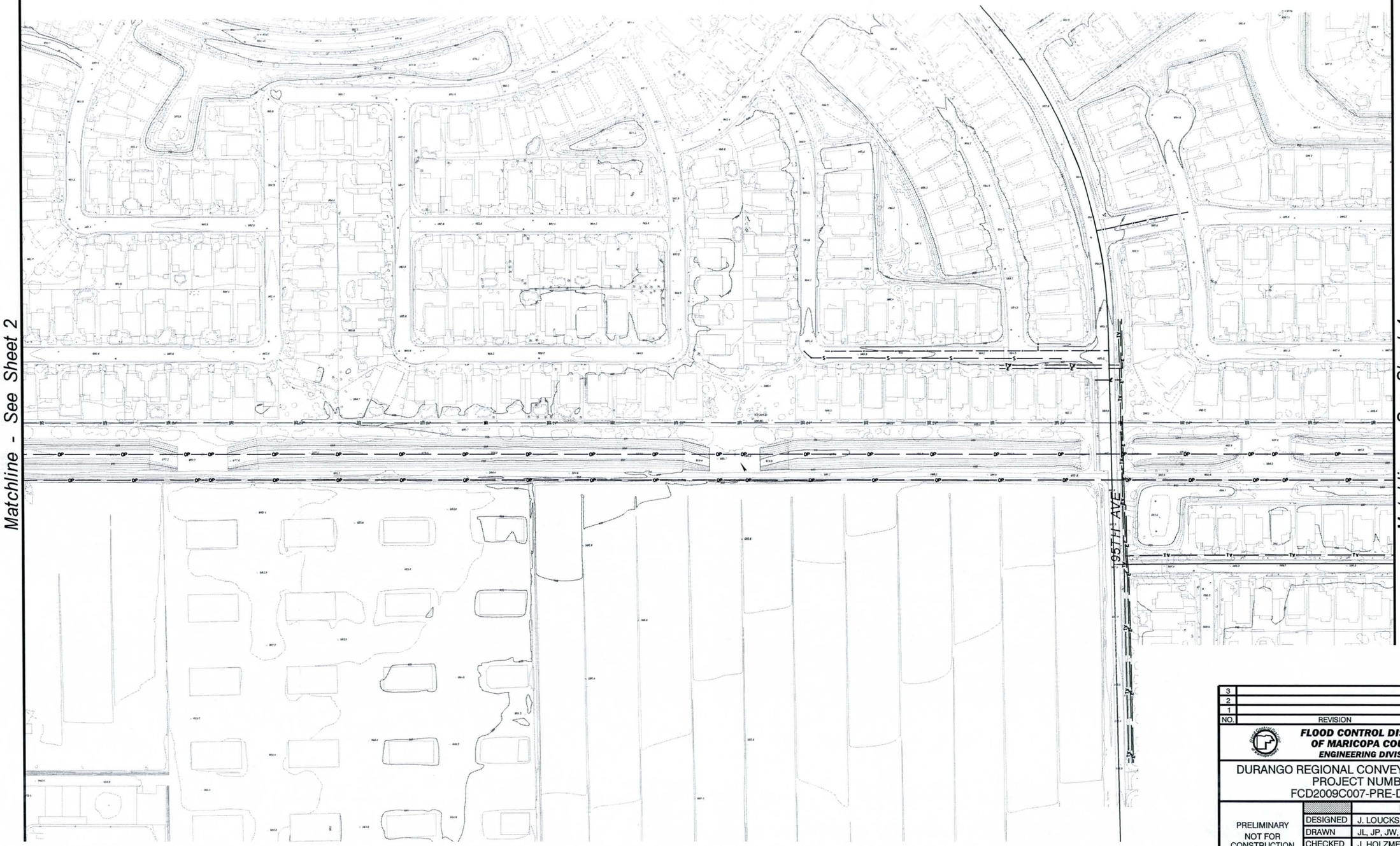

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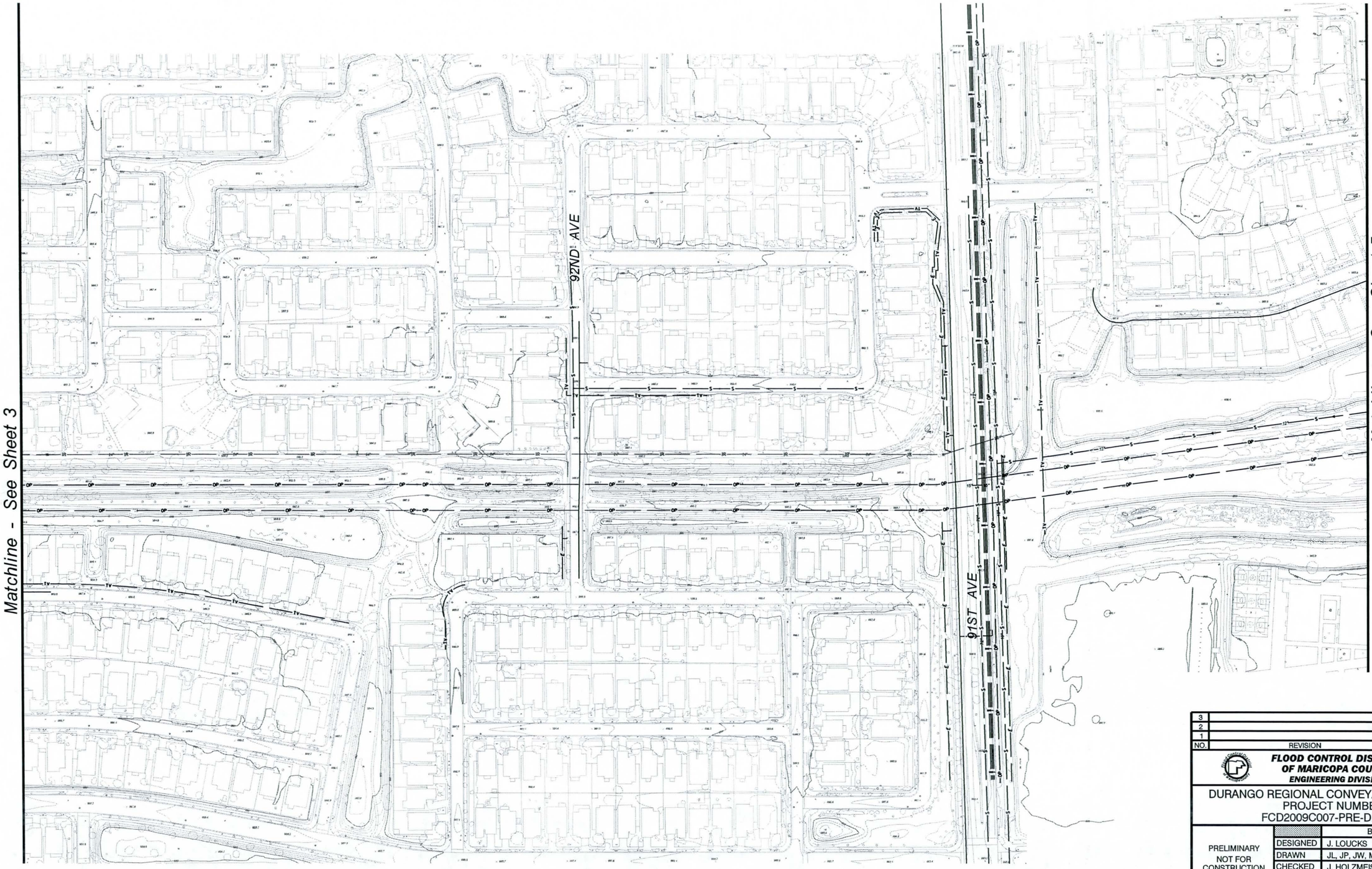

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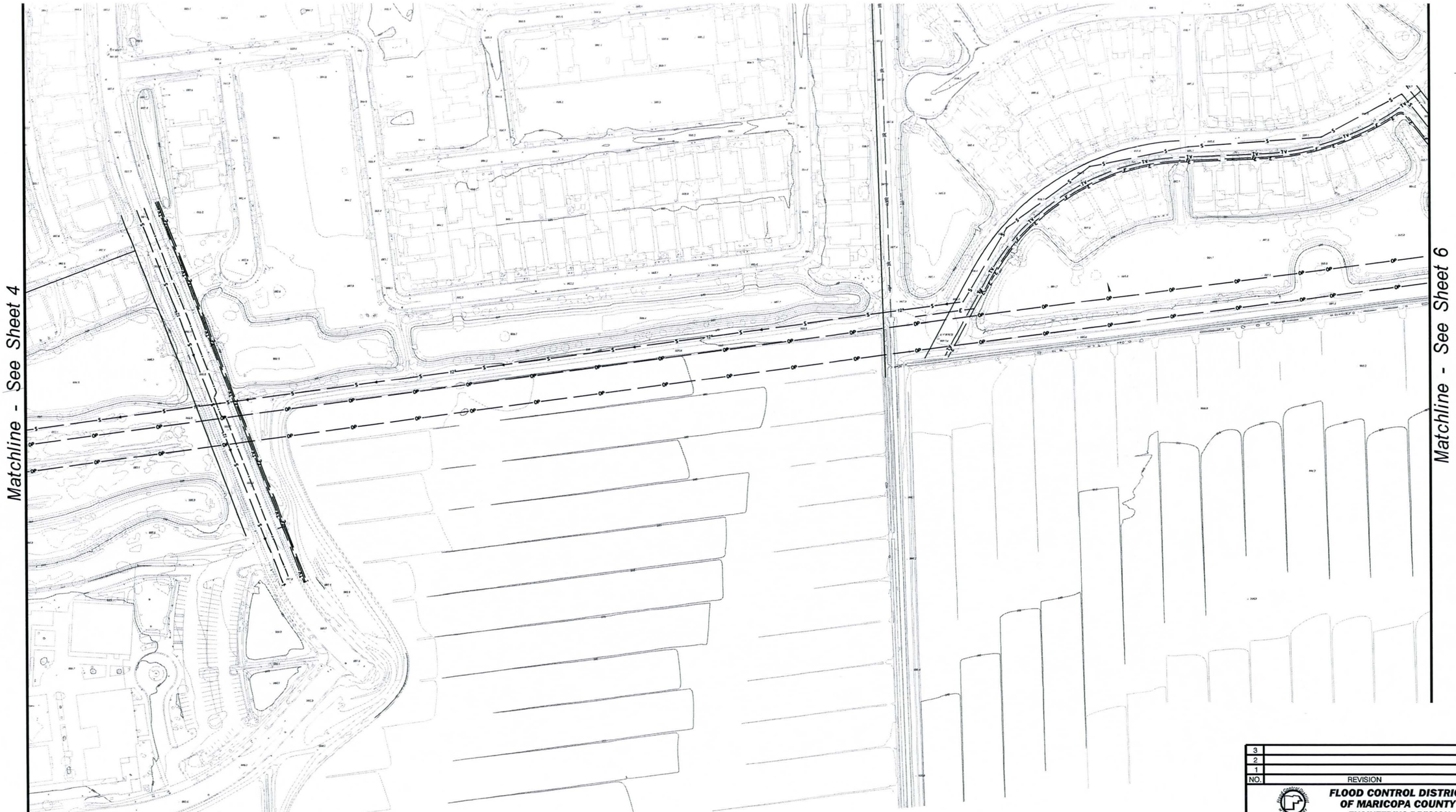

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Matchline - See Sheet 5

Matchline - See Sheet 7

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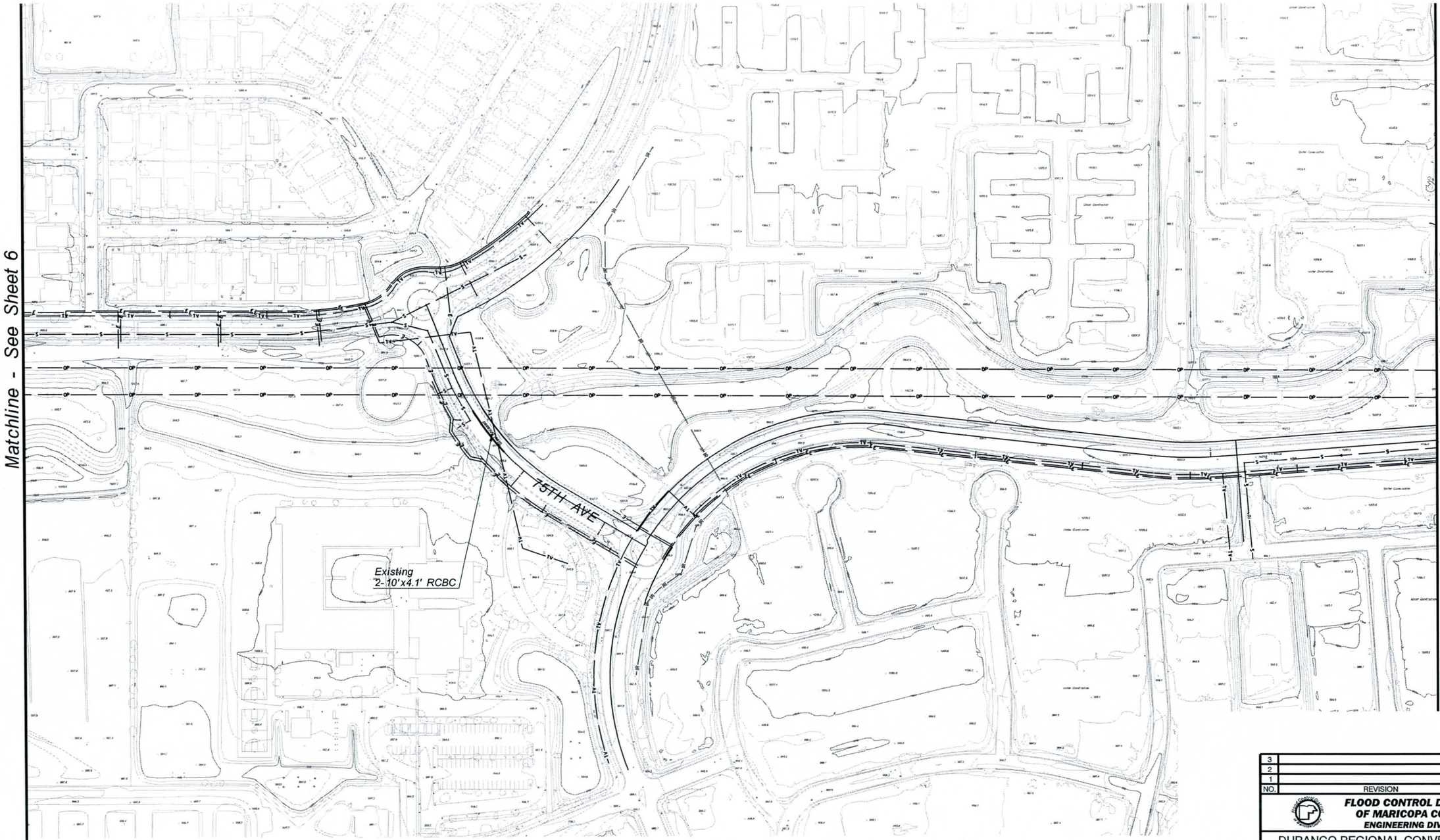

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UTILITY MAP

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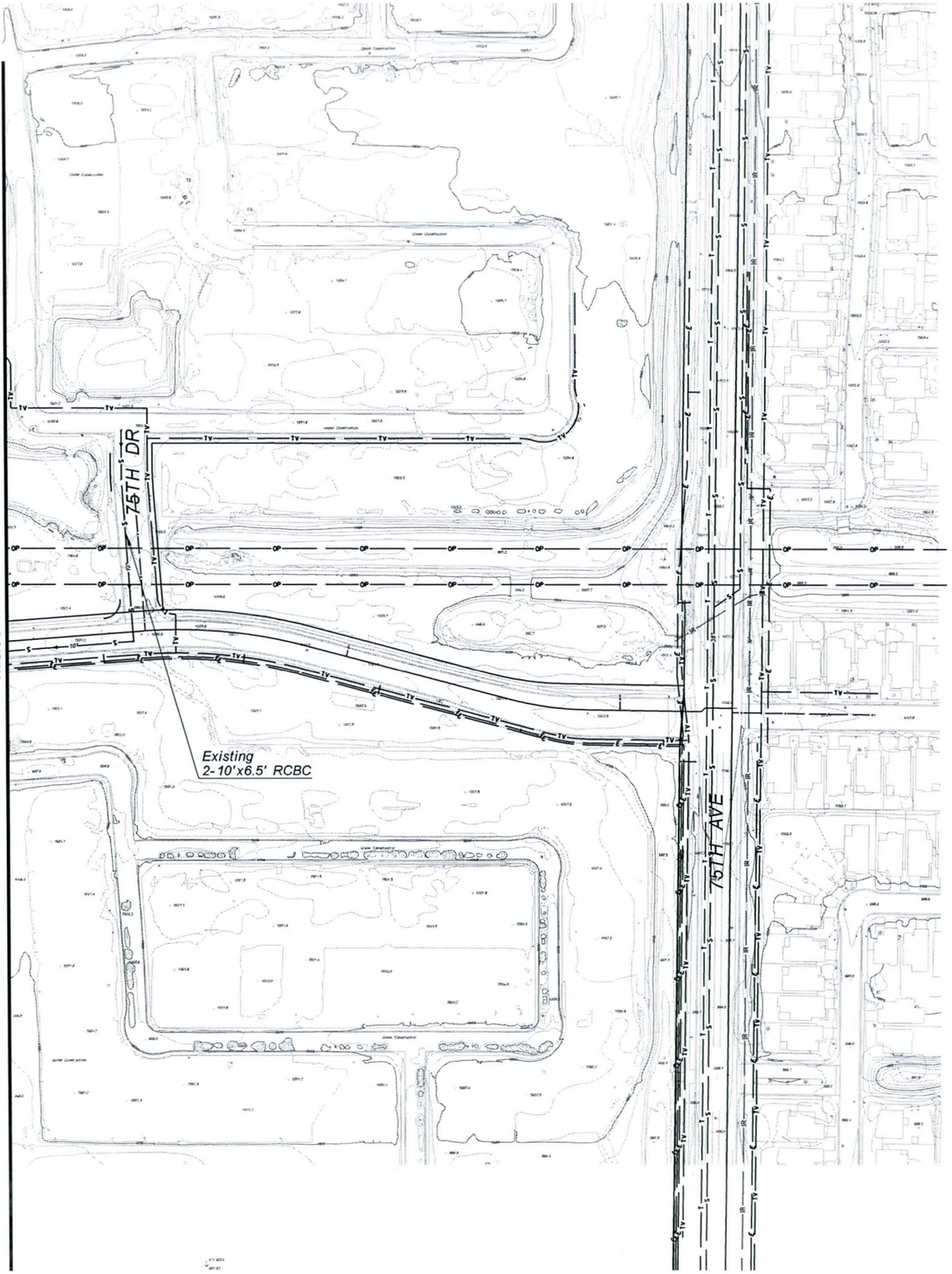

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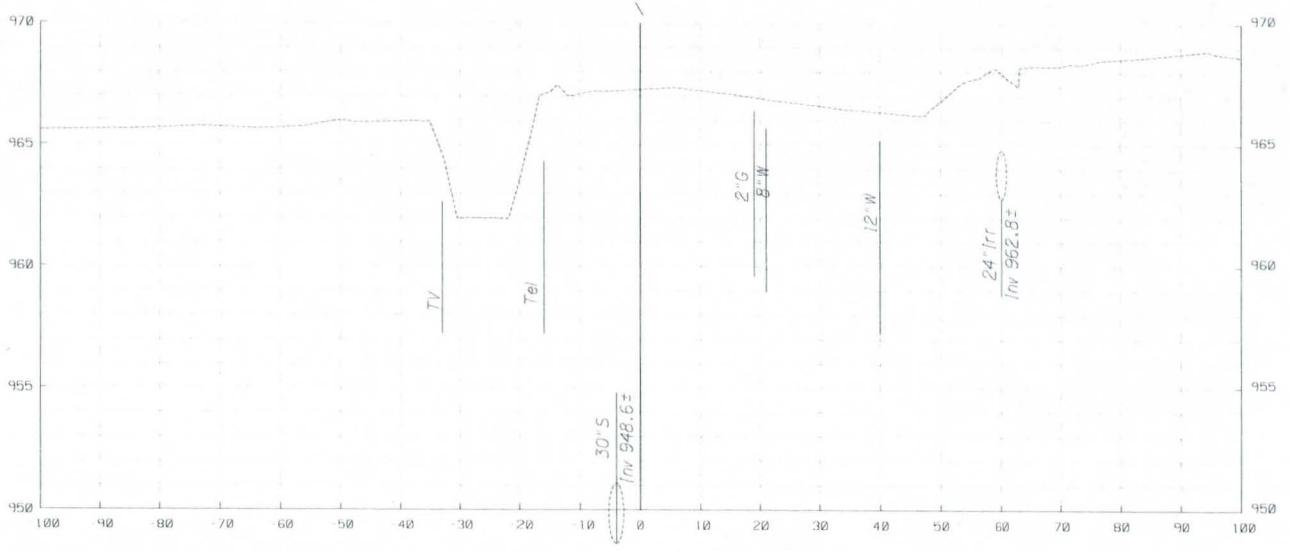

107TH AVE @ STA 30+00 MID SECTION LINE

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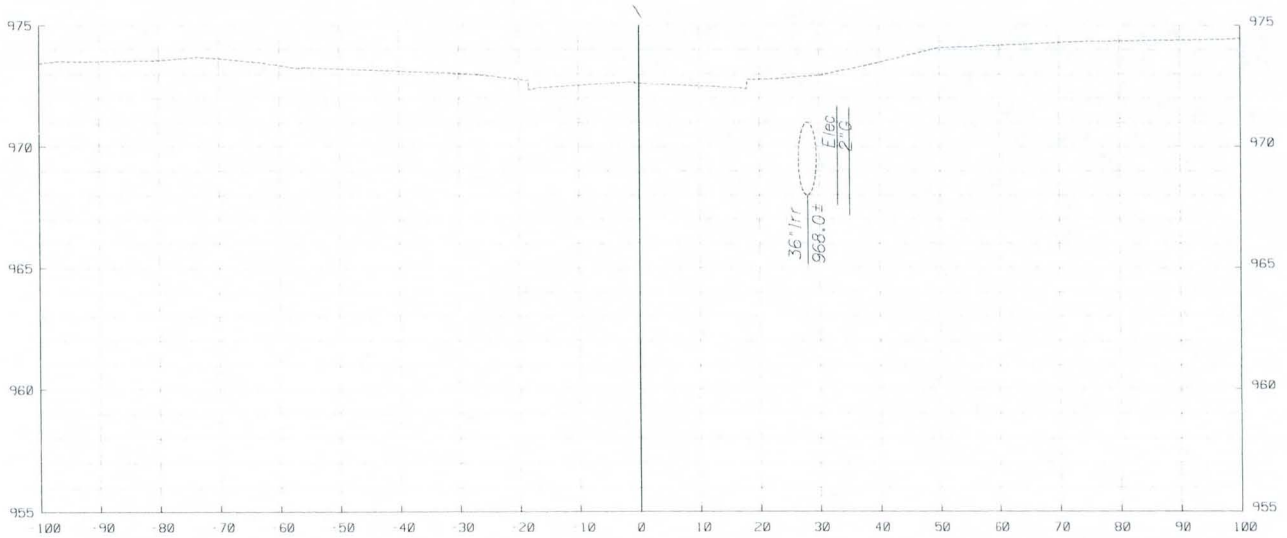

103RD AVE @ STA 30+00 MID-SECTION LINE

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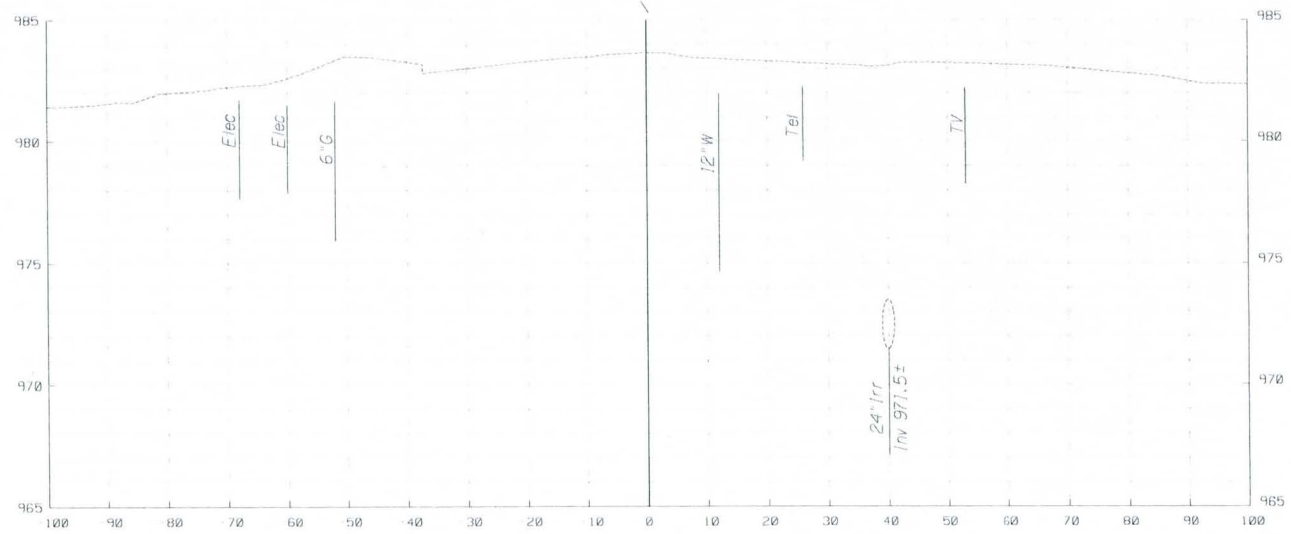

99TH AVE @ STA 30+00 MID-SECTION LINE

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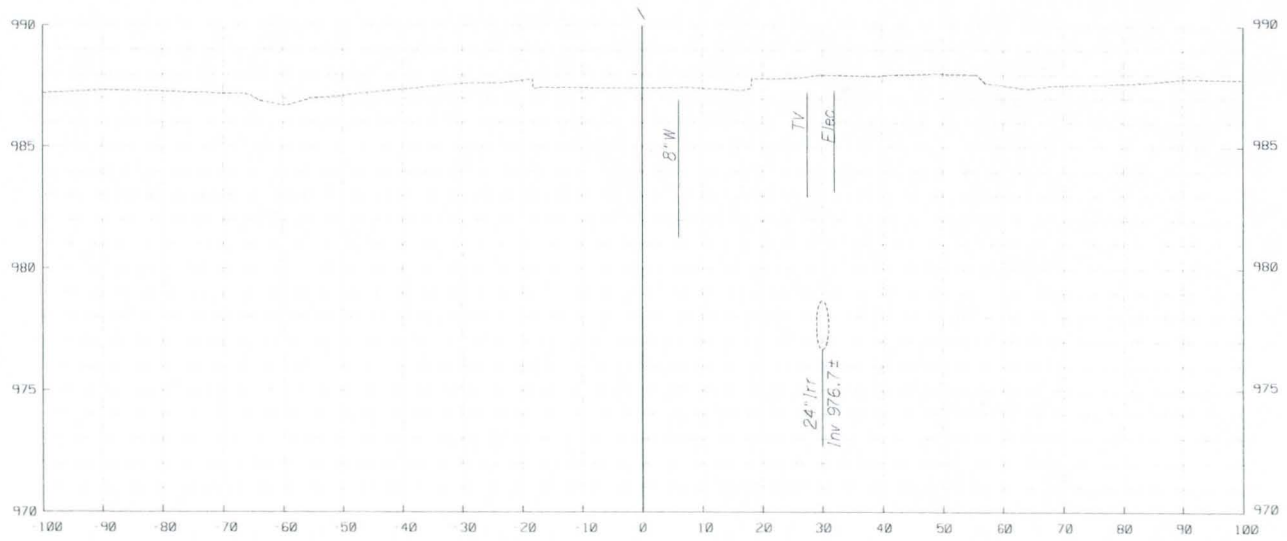

95TH AVE @ STA 30+00 MID-SECTION LINE

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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
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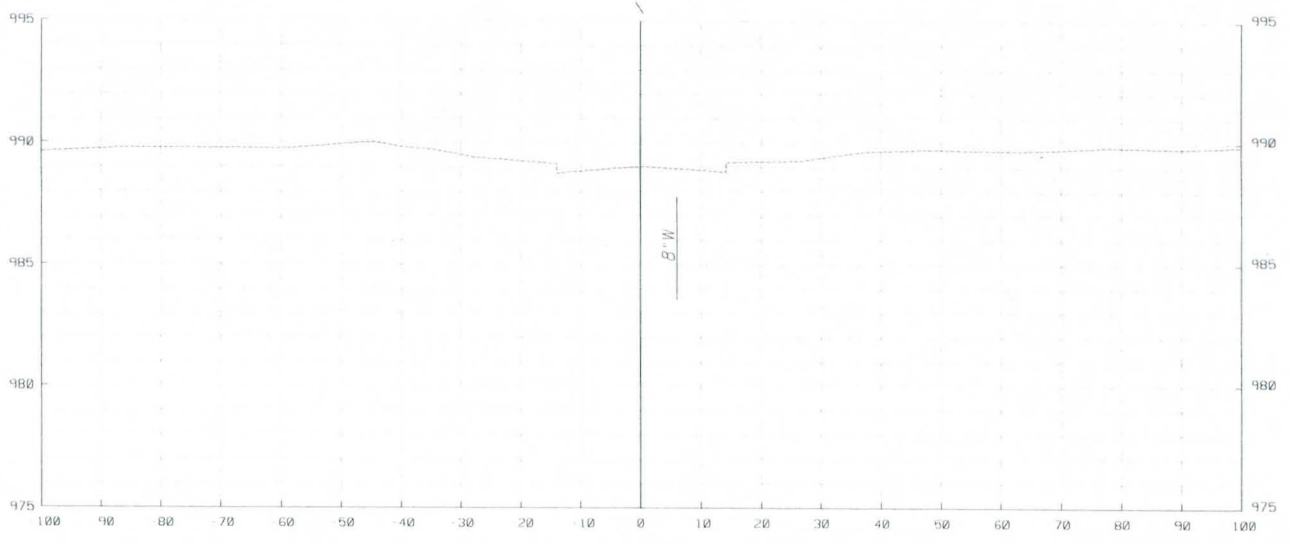

92ND DR @ STA 30+00 MID-SECTION LINE

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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
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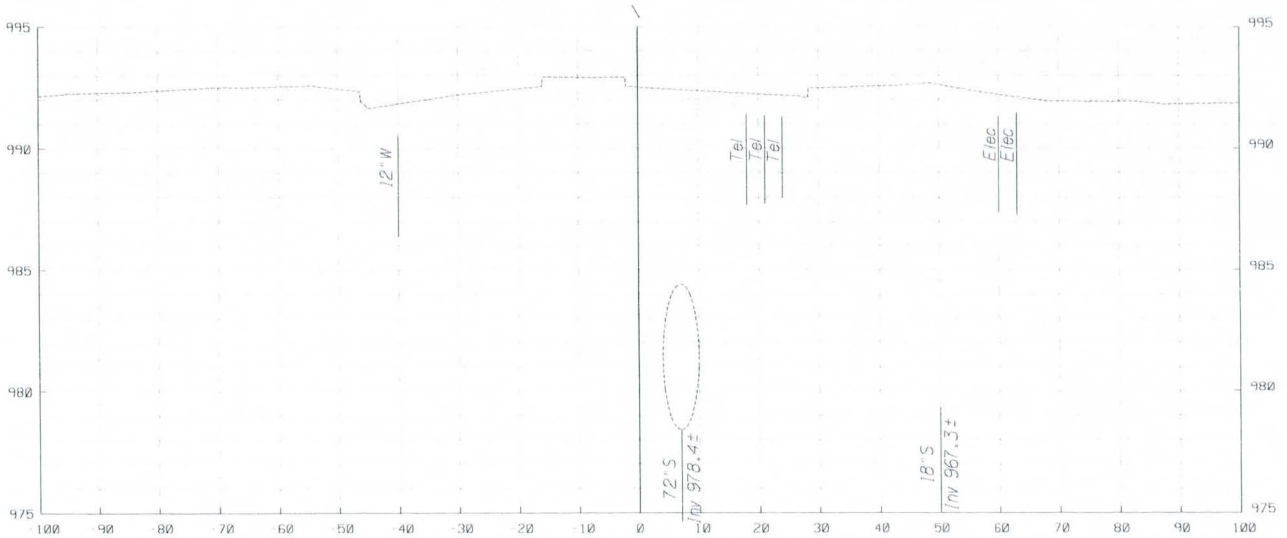

91ST AVE @ STA 30+00 MID-SECTION LINE

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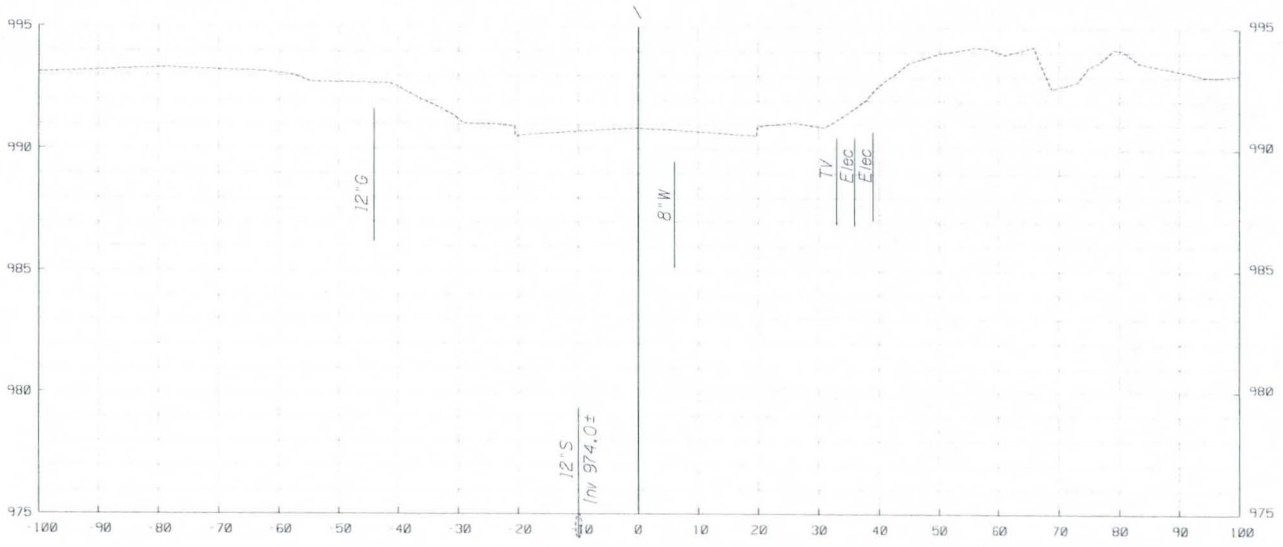

89TH DR @ STA 30+00 MID-SECTION LINE

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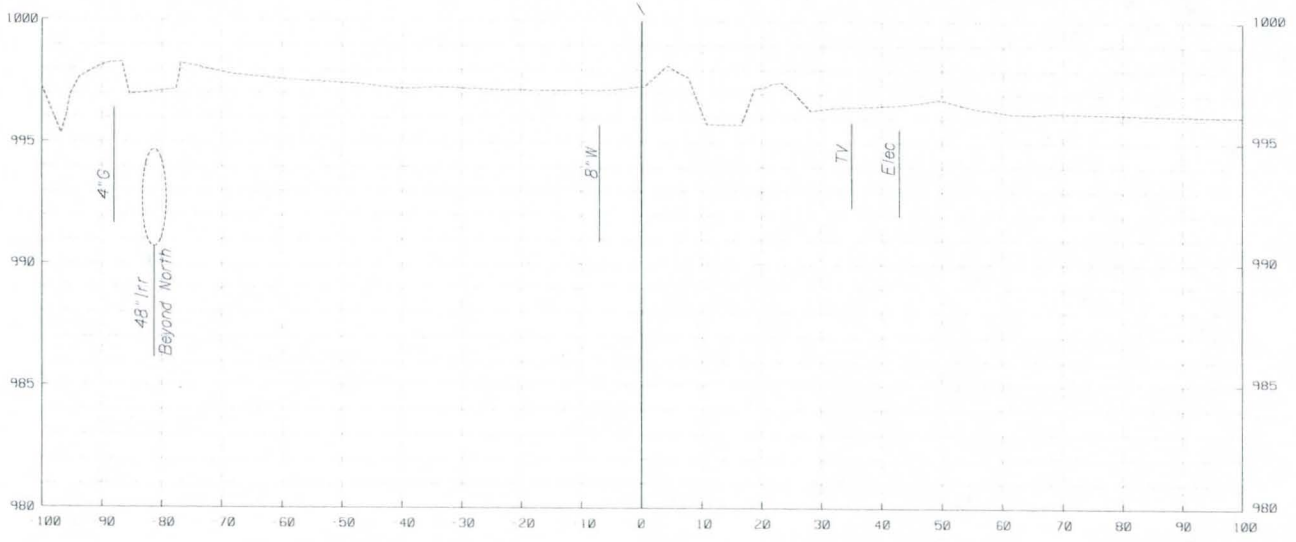

RILEY RD @ STA 30+00 MID-SECTION LINE

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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

DURANGO REGIONAL CONVEYANCE CHANNEL
PROJECT NUMBER
FCD2009C007-PRE-DESIGN

PRELIMINARY NOT FOR CONSTRUCTION

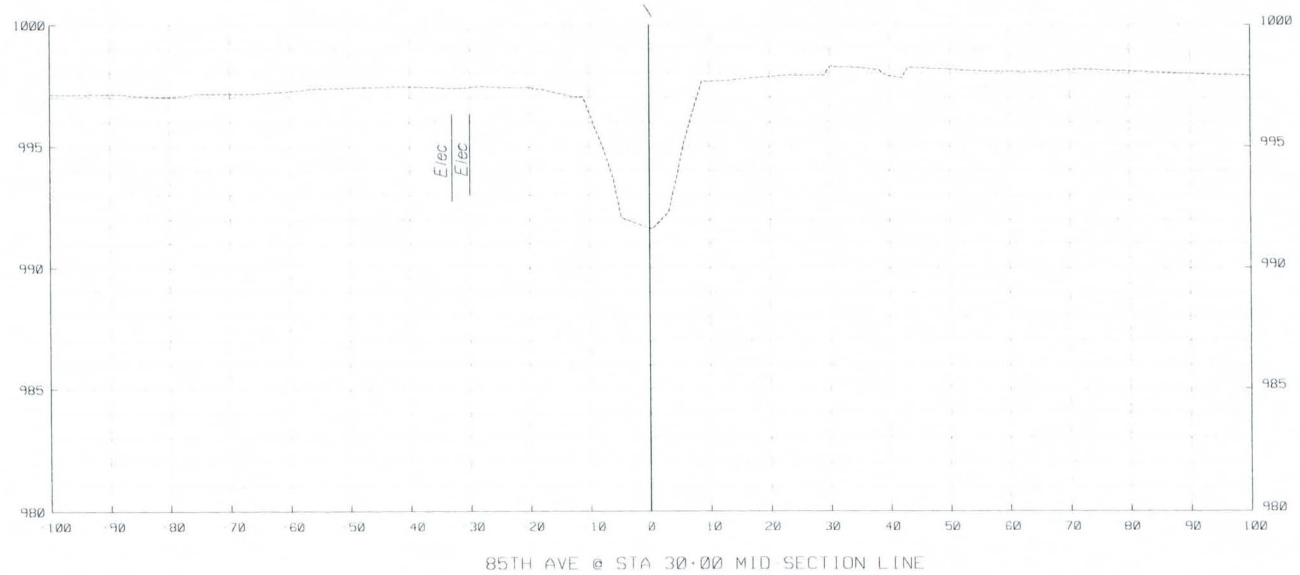
	BY	DATE
DESIGNED	J. LOUCKS	12/09
DRAWN	JL, JP, JW, MRT	12/09
CHECKED	J. HOLZMEISTER	12/09

j2 engineering and environmental design
4949 east cotton gin loop, suite 82
phoenix, arizona 85040
phone: 602.438.2221 www.j2design.us

DRAWING NO.

EXISTING UTILITIES CROSS SECTION @ ROADWAY CROSSING

SHEET 8 OF 13



85TH AVE @ STA 30+00 MID SECTION LINE

NO.	REVISION	BY	DATE
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2			
1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
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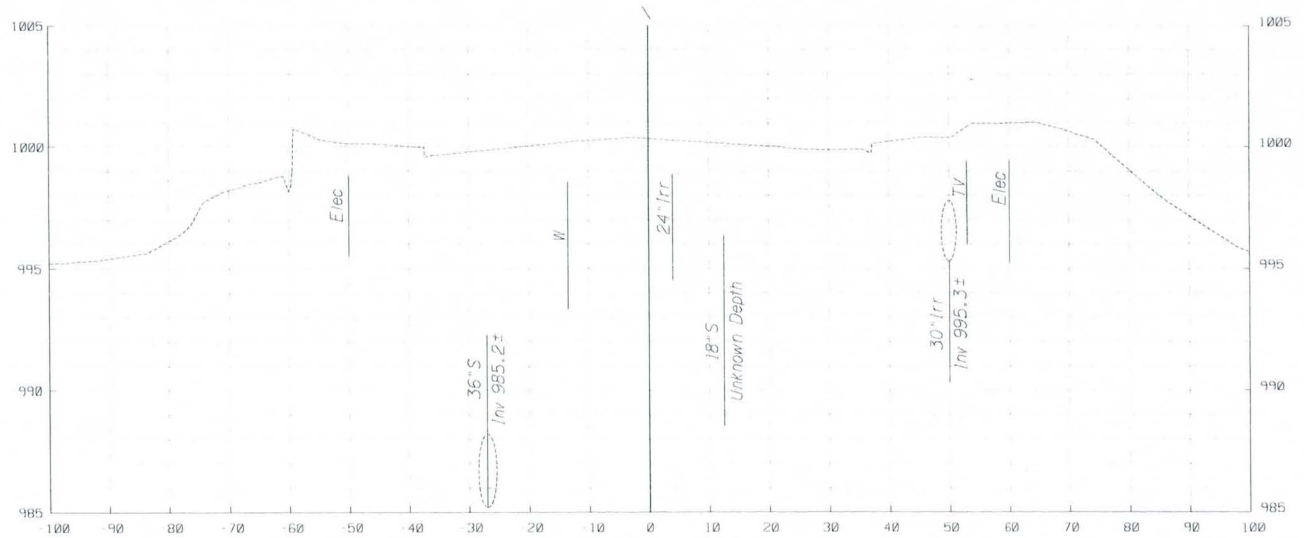

83RD AVE @ STA 30+00.00 MID-SECTION LINE

NO.	REVISION	BY	DATE
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1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
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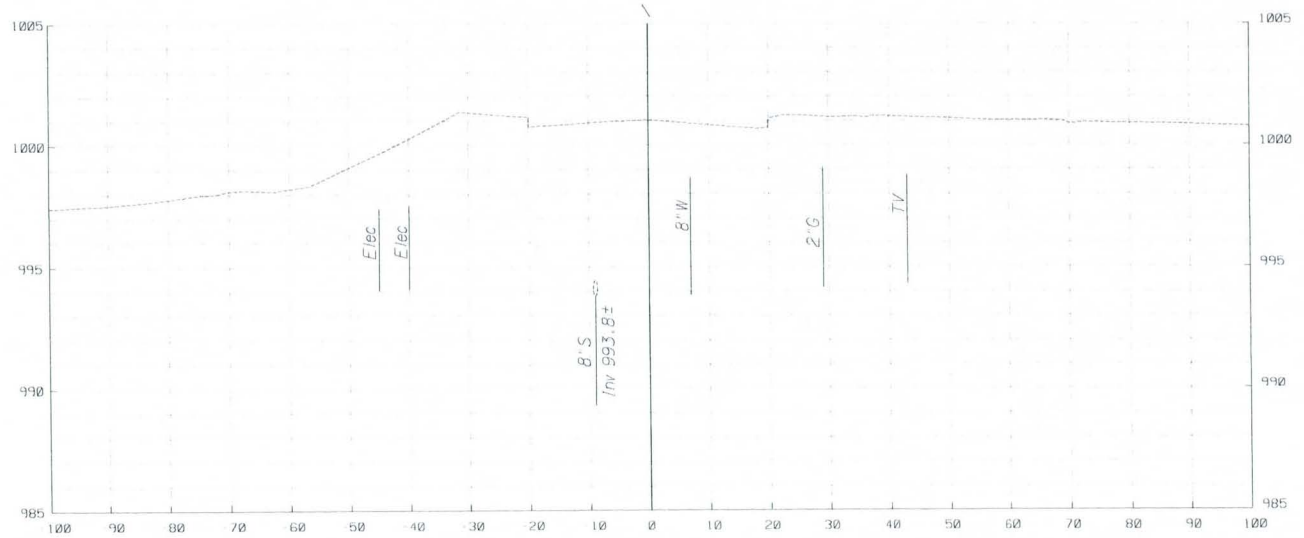
J2 engineering and environmental design
4649 east cotton gin loop, suite 82
phoenix, arizona 85040
phone: 602.438.2221 www.j2consultants

DRAWING NO.	EXISTING UTILITIES CROSS SECTION @ ROADWAY CROSSING	SHEET 10 OF 13



79TH AVE @ STA 30+00 MID-SECTION LINE

NO.	REVISION	BY	DATE
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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
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PROJECT NUMBER
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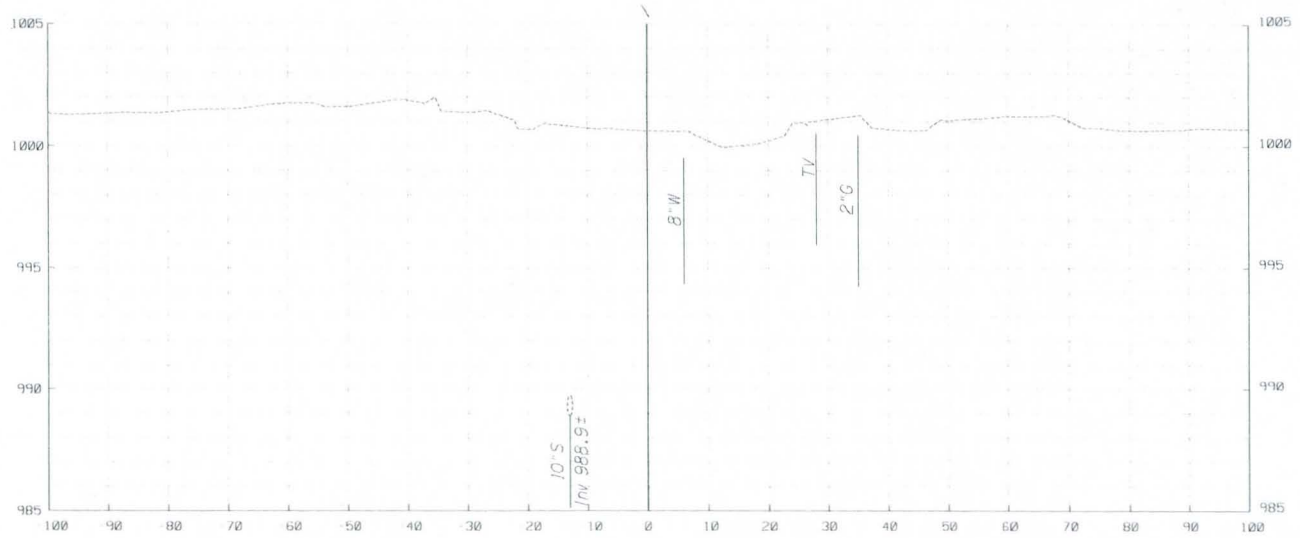
		BY	DATE
PRELIMINARY NOT FOR CONSTRUCTION	DESIGNED	J. LOUCKS	12/09
	DRAWN	JL, JP, JW, MRT	12/09
	CHECKED	J. HOLZMEISTER	12/09

J2 engineering and environmental design
4649 east cotton gin loop, suite 82
phoenix, arizona 85040
phone: 602.438.2221 www.j2design.us

DRAWING NO.	EXISTING UTILITIES CROSS SECTION @ ROADWAY CROSSING	SHEET 11 OF 13



76TH DR @ STA 30+00 MID-SECTION LINE

NO.	REVISION	BY	DATE
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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
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PROJECT NUMBER
FCD2009C007-PRE-DESIGN

PRELIMINARY
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4645 east cotton gin loop, suite 82
phoenix, arizona 85040
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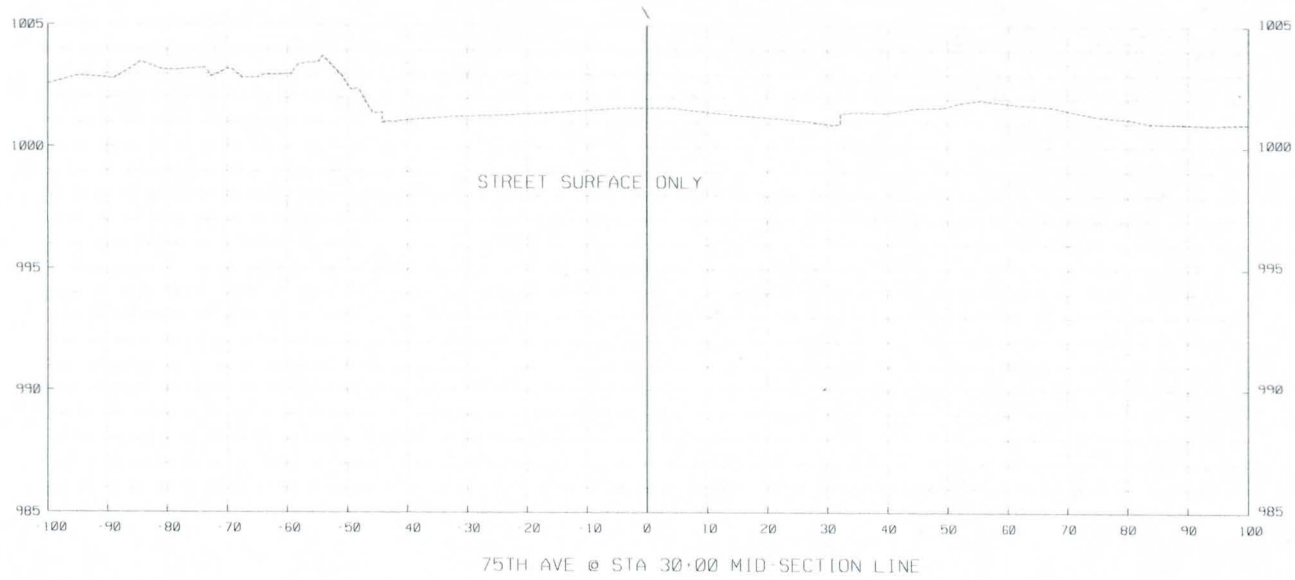
DRAWING NO. | EXISTING UTILITIES CROSS SECTION @ ROADWAY CROSSING | SHEET 12 OF 13



75TH AVE @ STA 30+00 MID-SECTION LINE

NO.	REVISION	BY	DATE
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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

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4649 east cotton gin loop, suite 82
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DRAWING NO.

EXISTING UTILITIES CROSS SECTION @ ROADWAY CROSSING

SHEET 13 OF 13

3.0 Opportunities and Constraints Analysis and Summary

3.1 Site Analysis Memorandum

The Draft Site Analysis Memorandum is contained in Appendix A. The memorandum provides a description of the existing conditions, project constraints and opportunities within the project. It is difficult to develop a detailed description of the landscape enhancements until the channel characteristics have been determined. The site analysis memorandum will be expanded prior to the Final Pre-Design Report.

3.2 Hydrology and Hydraulics Opportunities and Constraints

The existing drainage improvements within the DRCC were designed and constructed as part of private developments. The existing facilities are not interconnected and have variable hydraulic capacities. The key design constraints within the project corridor are coordination with WAPA, APS, SRP irrigation and power, City of Phoenix 91st Avenue sanitary sewer, and private developments.

A constraint that affects all four reaches is the existing landscape and irrigation. Channel modifications may require replacement of the existing landscaping and irrigation systems. Because the HOAs maintain the landscaping and irrigation systems it is probable that many different irrigation systems exist. The replacement of the systems will be costly.

Additional Analysis:

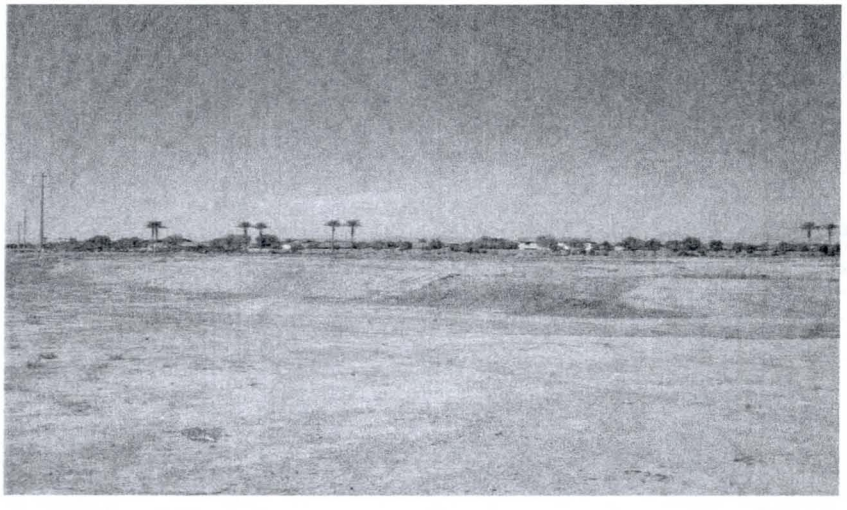
Do a plant inventory to document the existing landscaping within the corridor. This will assist in the proposed landscape plan for the corridor. Do an analysis of the existing irrigation systems to document the different types of systems. The proposed irrigation system will conform to the existing system.

The following paragraphs define the project opportunities and constraints for each of the four reaches (approximately one mile in length).

3.2.1 Reach 1 - 75th Avenue to 83rd Avenue

Constraint No. 1:

The primary constraint in this reach will be minimization of maintenance. Linear retention basins have been excavated and two box culverts constructed (76th Avenue and 79th Avenue). The ultimate condition channel may be created by removing small earthen berms, excavating the basin invert, and re-grading the basin side slopes within the alignment. The channel is earth lined and meanders around WAPA/APS power poles. Although the velocities within the channel are relatively slow, it is anticipated that some erosion protection will be required. The adjacent subdivision (Tuscano) constructed the infrastructure prior to the economic downturn. Homes have not been built at the current time. The development does not appear to be maintained. Large portions of the channel are filled with tumbleweeds. In addition, the "abandoned" look of the development raises safety concerns and encourages vandalism.



Opportunity:

Develop a channel with minimal short term maintenance that may be enhanced once the adjacent development is completed.

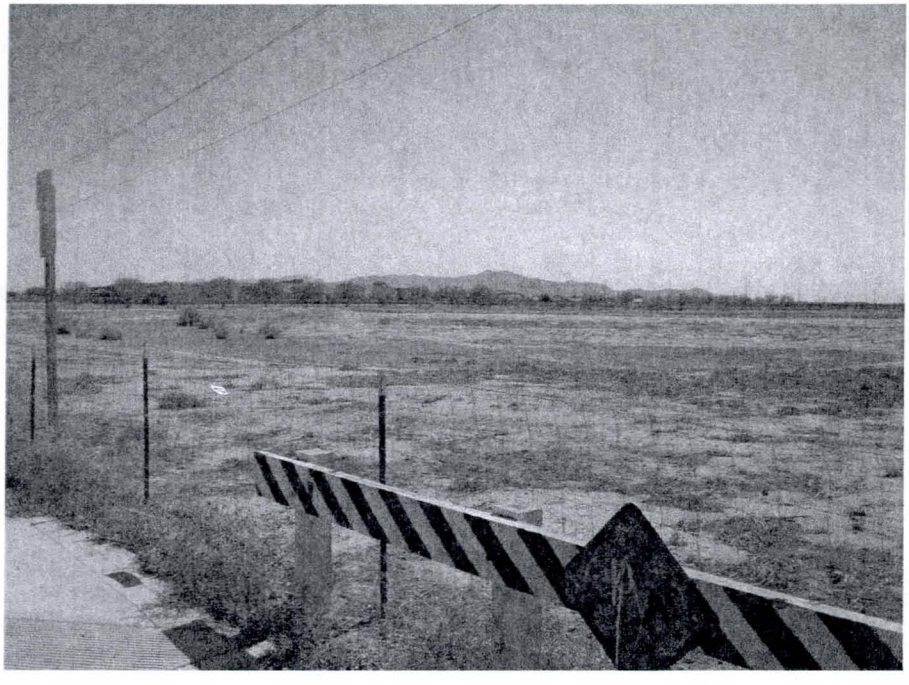
Additional Analysis:

Team members performed hydraulic analyses (HEC-RAS) to determine the required channel and culvert configuration within this reach. Team members have utilized steady state models to develop conceptual designs and will run the unsteady state models to optimize the system.

It appears that minimal channel modifications will be required to convert the linear retention basin into a regional channel.

Constraint No. 2:

A constraint in this reach will be coordination with the City of Phoenix Parks. A portion of the proposed channel (west of Tuscano Elementary School to 83rd Avenue) will be located within a future City of Phoenix Park. Park representatives stated that they would prefer not to have regional drainage facilities within the park. If drainage facilities are located within the park, then the right-of-way would need to be purchased from the City.



Opportunity:

Develop a multi-use channel that will blend with future park amenities.

Additional Analysis:

Team members performed hydraulic analysis (HEC-RAS) to optimize the channel (minimize right-of-way acquisition of park land) within this reach. Team members utilized the steady state models to develop conceptual designs and will run the unsteady state models to quantify the attenuation (storage losses) within the channel.

Constraint No. 3:

A constraint in this reach will be the extension of the future park entrance roadway across the channel as shown in the Park Master Plan (see Figure 2.3, Corridor Opportunities/Constraints). Team members need to determine if the future crossings should be constructed as part of this project or delayed until the adjacent property is developed.

Opportunity:

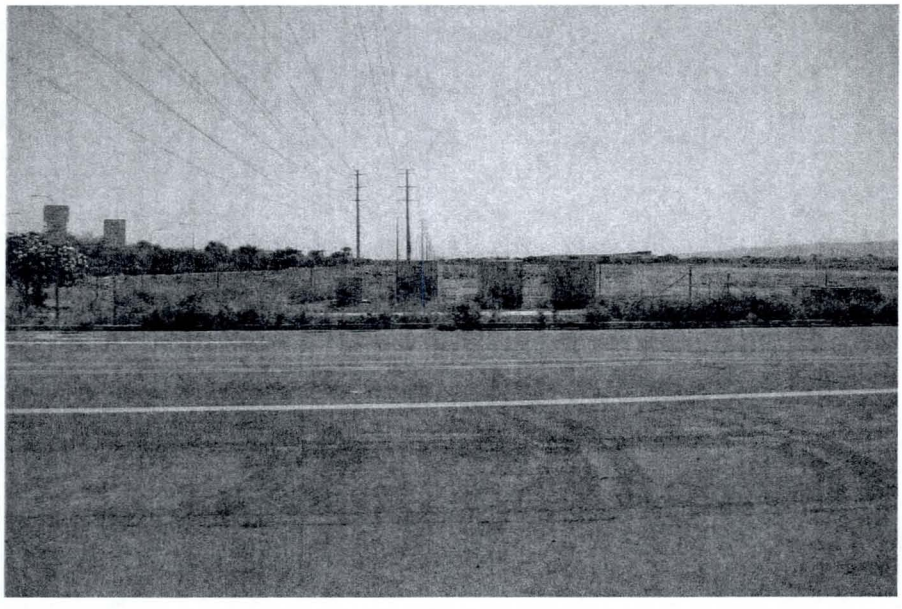
Minimize future disturbance to the channel.

Additional Analysis:

Need to perform quantity and cost estimates to determine project cost and compare with available funding.

Constraint No. 4:

There is not an existing crossing of 83rd Avenue. The proposed channel will require crossing a major arterial with numerous utilities. The major utility constraints are the SRP irrigation line and the WAPA/APS 230 KV power poles.



Opportunity:

Coordinate the crossing design with SRP irrigation personnel. It would be preferable to "siphon" the irrigation line under the regional channel. In addition, the WAPA/APS power poles may require the channel to be shifted to the south. Minimize project cost by identifying utility locations and minimizing construction issues.

Additional Analysis:

Need to meet with SRP irrigation personnel and determine their position on "siphons". Need to clarify the ownership of this irrigation line. It appears that the SRP irrigation line transitions to a private line at this location. It may be easier to siphon a private irrigation line under the DRCC rather than a SRP irrigation line. In addition, team members will determine the future need for the irrigation lines (i.e., are these lines going to be abandoned in the near future). **This is a critical design item**. It will determine if the regional channel will be siphoned under the irrigation line or if the SRP irrigation line is siphoned under the regional channel. Need to identify pothole locations and verify utility locations (horizontal and vertical).

Constraint No. 5:

A constraint in this reach is the WAPA/APS 230 KV power poles. Team members met with WAPA and APS representatives regarding the project. They stated that they require all-weather access to their facilities. In addition, they require a 50 feet diameter flat clear zone around their poles and at the midspan of their lines. The existing condition does not meet their design requirements

Opportunity:

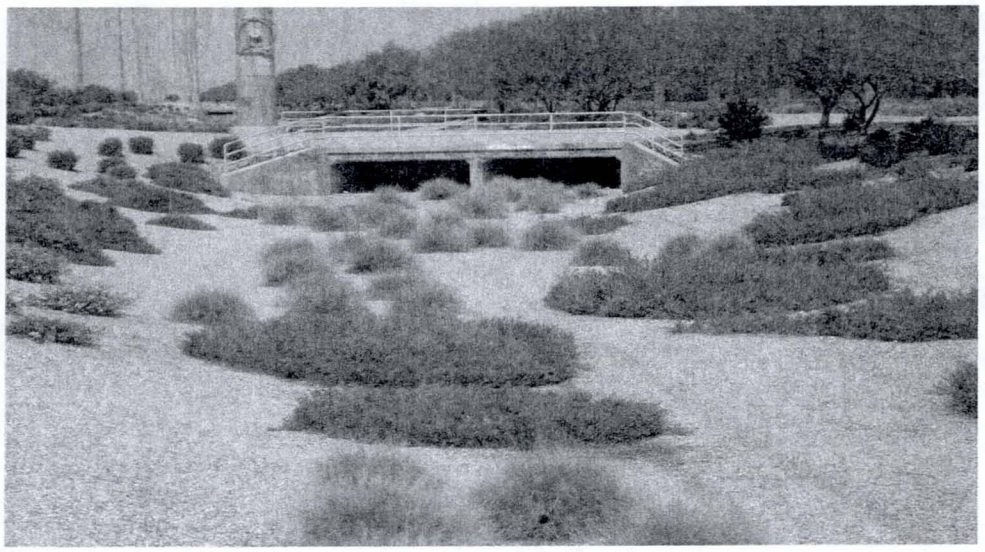
Coordinate the project with WAPA and APS. Attempt to minimize the hydraulic structures within the project limits.

Additional Analysis:

Submit WAPA a plan view of the corridor with the poles and midspan locations highlighted. Coordinate the design with WAPA to determine areas that require hydraulic structures. APS will utilize WAPA's design criteria for this project.

3.2.2 Reach 2 - 83rd Avenue to 91st Avenue

Constraint No. 1: The primary constraint in this reach is the WAPA/APS power poles. The existing channel/basin system narrows significantly adjacent to the poles.



Opportunity:

Provide wider channel and/or culvert crossings to maintain hydraulic continuity. Minimize project cost by minimizing utility conflicts. Look at utilizing the existing retention basins (both sides of power lines) to increase hydraulic capacity

Additional Analysis:

Widening the channel near the poles will require close coordination with WAPA and APS. Need to coordinate the design with WAPA representatives (APS representatives have stated that they will defer to WAPA design criteria).

Constraint No. 2:

A constraint in this reach will be extensions of 85th Avenue and Riley Road across the channel. Team members need to determine if the future crossings should be constructed as part of this project or delayed until the adjacent property is developed.

Opportunity:

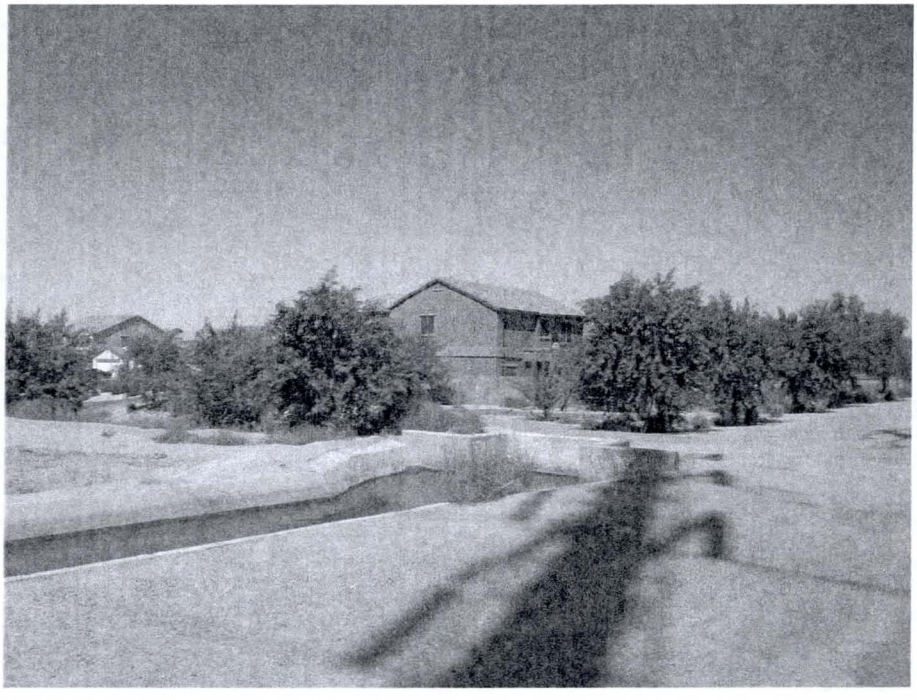
Minimize future disturbance to the channel.

Additional Analysis:

Need to perform quantity and cost estimates to determine project cost and compare with available funding. In addition, team members need to determine if the culvert will be sized for the 100-year storm event or for the 10-year storm event with the 100-year storm event overtopping the culvert at a depth of less than six inches.

Constraint No. 3:

There is a 48" SRP irrigation line crossing the drainage channel at 87th Avenue. The irrigation line will be in conflict with the proposed channel. A siphon will be required at this location.



Opportunity:

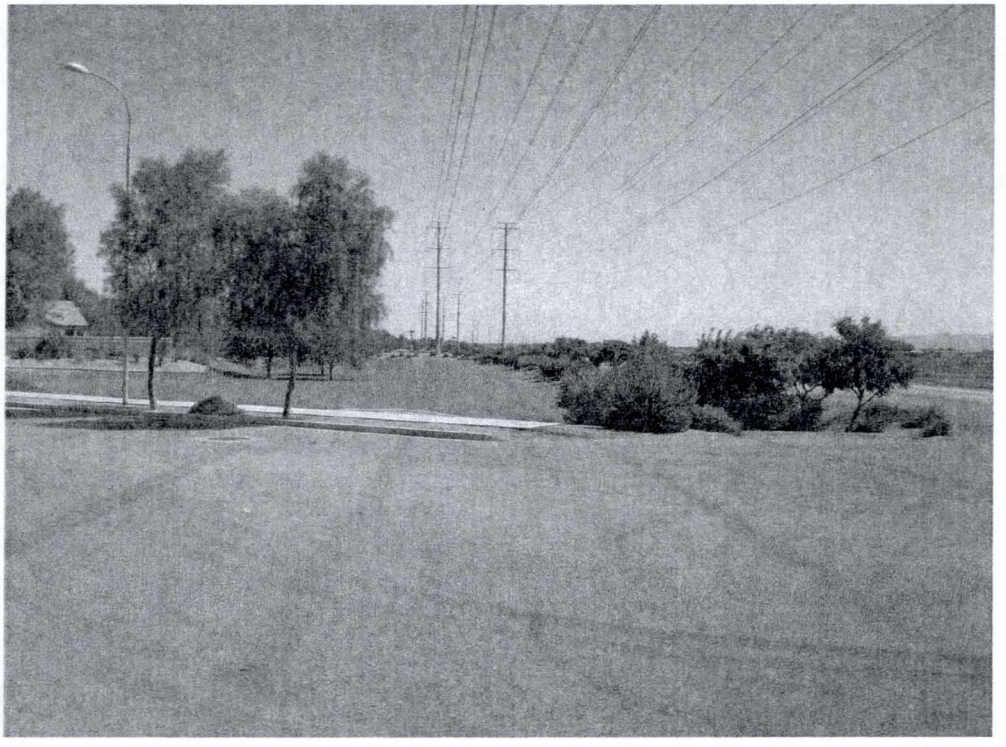
Coordinate the crossing design with SRP irrigation personnel. It would be preferable to "siphon" the SRP irrigation line under the regional channel. Need to clarify long term need for the irrigation line, long term maintenance costs, etc.

Additional Analysis:

Need to meet with SRP irrigation personnel and determine their position on "siphons". Need to determine the future need for the irrigation lines (i.e., are these lines going to be abandoned in the near future). **This is a critical design item**. It will determine if the regional channel will be siphoned under the SRP irrigation line or if the SRP irrigation line is siphoned under the regional channel. Need to identify pothole locations and verify utility locations (horizontal and vertical).

Constraint No. 4:

There is one 24-inch culvert crossing at 89th Drive. The proposed channel will require a larger box culvert crossing. The vertical alignment of 89th Drive is relatively low and does not contain the 100-year storm event. 91st Avenue constraints (sanitary sewer) have a major impact on 89th Drive (see constraint 5).



Opportunity:

Need to maximize the hydraulic capacity of the crossing without adversely impacting the surrounding properties. Optimize the vertical profile of 89th Drive between Hurley Elementary School and Forest Grove Avenue. Increase the height of the "bank" surrounding 89th Drive to provide additional hydraulic capacity. Explore feasibility of constructing a local retention basin north of the DRCC to accommodate street runoff. This will prevent DRCC flow from breaking out into the neighborhood.

Additional Analysis:

Explore feasibility of a full 100-year culvert crossing versus the 10-year under/100-year over culvert crossing to minimize street impacts. Optimize the HEC-RAS model once input from WAPA and SRP irrigation has been received. Determine the size of retention basin required to isolate storm water runoff generated north of the DRCC.

Constraint No. 5:

The primary constraint in this reach is a 72" sanitary sewer in 91st Avenue and the WAPA/APS 230 KV power poles. The existing culvert crossing has insufficient capacity to pass the required flow. The depth from the roadway to the top of the pipe is approximately 7 feet. In addition, the invert of the proposed culvert crossing will be higher than the invert of the upstream channel. This will place additional constraints on the 89th Drive crossing.

Opportunity:

Increase the hydraulic capacity of the 91st Avenue culvert crossing. Replace the existing 6 – 30" pipe culverts with a multi cell box culvert. .

Additional Analysis:

Explore feasibility of a full 100-year culvert crossing versus the 10-year under/100-year over culvert crossing to minimize street impacts.

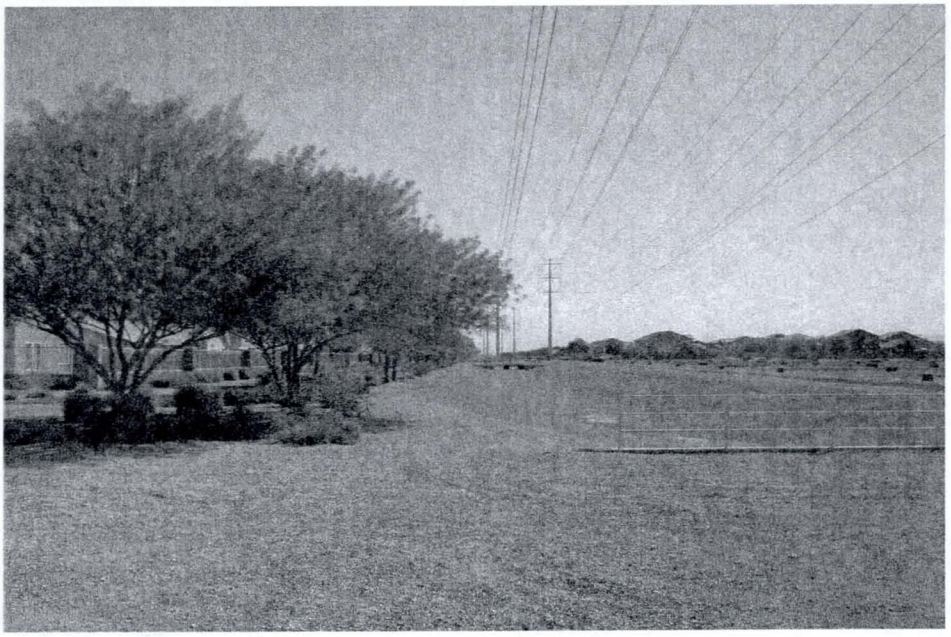
3.2.3 Reach 3 - 91st Avenue to 99th Avenue

Constraint No. 1:

The existing channel capacity is inadequate.

Opportunity:

Explore expanding the existing channel by utilizing adjacent Tivoli retention basins (landscaped) and vacant land to south. Alternatively, widen and/or deepen channel downstream of 91st Avenue.



Additional Analysis:

Team members performed hydraulic analyses (HEC-RAS) to evaluate the expanded channel configuration. They will perform unsteady state models once the conceptual design has been reviewed.

Constraint No. 2:

The existing culvert crossing at 92nd Drive is does not pass the 100-year storm event with an overtopping depth of less than 6 inches.

Opportunity:

Increase number of culvert barrels at each crossing to maintain continuity of channel system. The WAPA/APS culvert crossing creates a backwater that overtops the 92 Drive crossing.

Additional Analysis:

Explore feasibility of the 10-year under/100-year over culvert crossing to minimize street impacts. Team members may be required to request a design exception for this crossing. The adjacent homes are 2 – 3 feet above the roadway. It does not appear possible to limit the overtopping depth to 6 inches or less.

Constraint No. 3:

The culverts passing adjacent to the existing WAPA/APS power poles are undersized to pass the 100-year channel flow.

Opportunity:

Increase number of culvert barrels at each crossing to maintain continuity of channel system. This will require close coordination with WAPA/APS. Alternatively, supplement existing culverts with parallel channel system (dual channel) to the south.

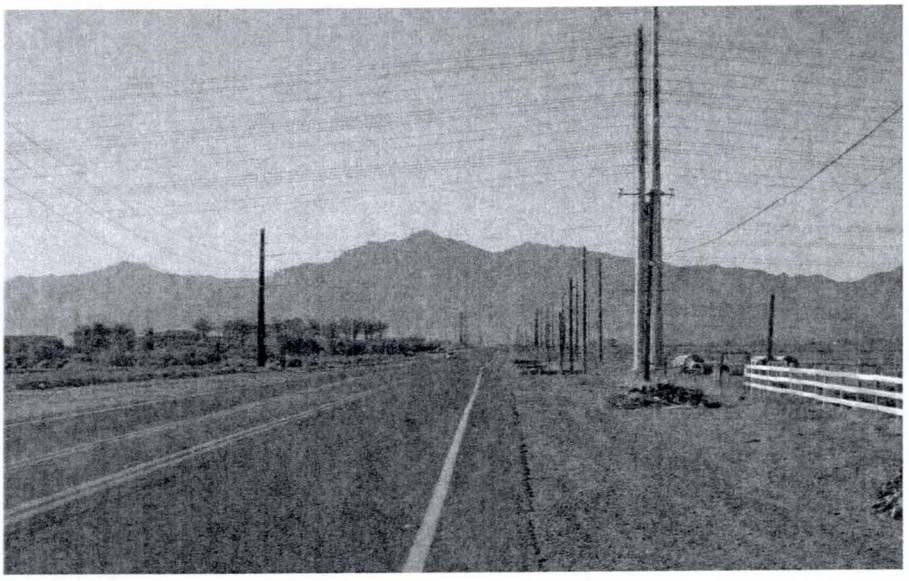
Additional Analysis:

Team members performed hydraulic analyses (HEC-RAS) to determine the hydraulic capacity of the channel. The proposed culvert crossing maximizes the hydraulic conveyance of the corridor. The culvert crossing includes box culverts north of the poles, through the poles, and south of the poles. Team members will coordinate the design with WAPA and APS.

3.2.4 Reach 4 - 99th Avenue to 107th Avenue

Constraint No. 1:

The primary constraint in this reach is ensuring that the maximum peak discharge crossing 107th Avenue is 1200 cfs.



Opportunity:

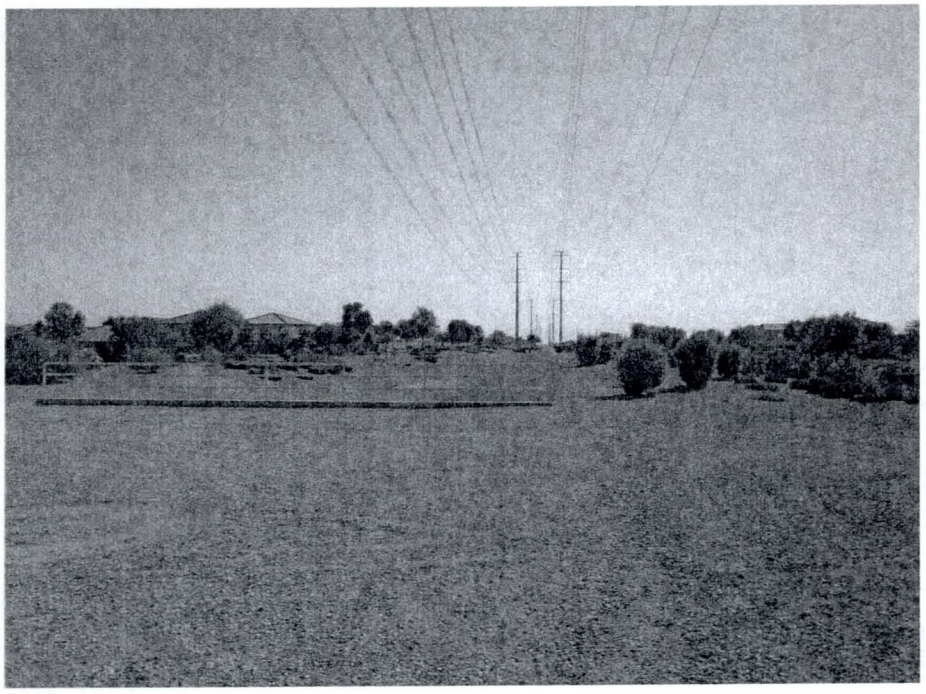
Develop a multi-use detention basin at 107th Avenue to limit the peak discharge to 1200 cfs (or less). *The basin may be converted into a park by the City of Phoenix in the future. In addition, 107th Avenue contains several utilities (sanitary sewer and irrigation) that constrain the 107th Avenue crossing. The Lions Gate retention basin (DRCC channel) invert elevation must be lowered in order to construct a box culvert between the sanitary sewer and irrigation line.*

Additional Analysis:

Due to time constraints the conceptual designs were developed with the steady state module of HEC-RAS. Team members will run the concepts with the unsteady state module to better quantify the attenuation (storage losses) within the channel.

Constraint No. 2:

The existing channel does not have the hydraulic capacity to convey the 100-year storm event.



Opportunity:

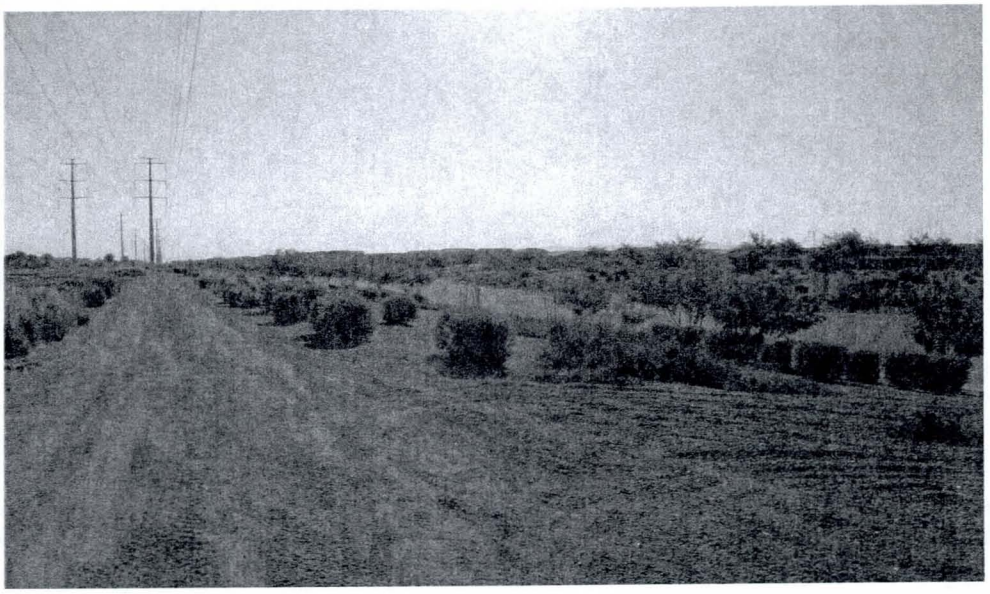
Increase the channel conveyance by utilizing the Lions Gate retention basin with the drainage easement south of the half section line. Increase the size of the existing channel to provide additional hydraulic conveyance.

Additional Analysis:

Need to perform analyses to determine the hydraulic operation of the channels (independent or single channel) and determine how the detention basin will function.

Constraint No. 3:

The existing irrigation line and overhead power line restrict the channel location.



Opportunity:

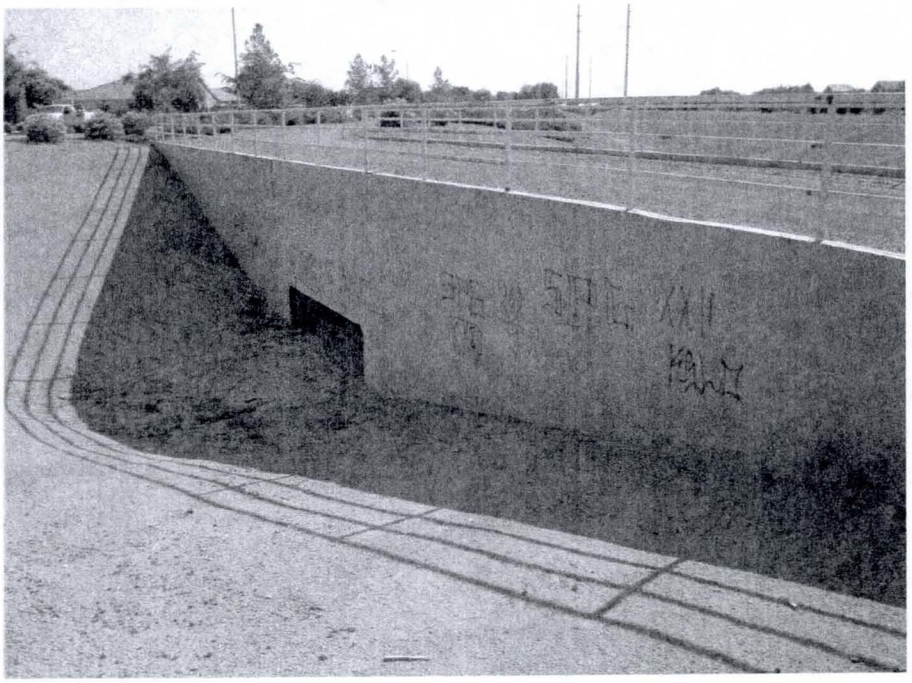
Increase the channel conveyance by utilizing the Lions Gate retention basin with the drainage easement south of the half section line.

Additional Analysis:

Need to perform analyses to determine the hydraulic operation of the channels (independent or single channel) and determine how the detention basin will function.

Constraint No. 4:

The existing 36" irrigation line crosses the channel under the pedestrian bridge east of 103rd Avenue. The existing 3.65' x 15' culvert is siphoned under the irrigation line.



Opportunity:

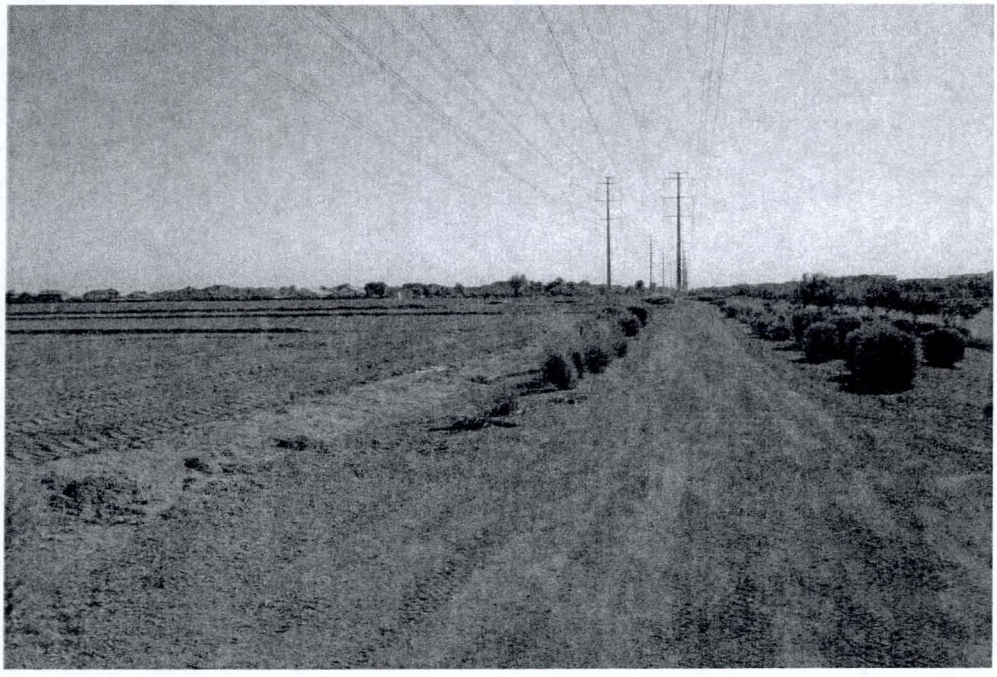
Eliminate the siphon condition by shifting the DRCC south of the 36" irrigation line (along the existing Lions Gate retention basin alignment). Route the 103rd Avenue flow into the existing retention basin north of the 36" irrigation line. Construct a "broken back" culvert to route flows from north of the 36" irrigation line to the southern channel. This configuration will eliminate the existing DRCC siphon.

Additional Analysis:

Team members performed hydraulic analyses (HEC-RAS) required to for the channel designl. Need to coordinate the design with SRP. Need to pothole utilities to determine potential conflicts.

Constraint No. 5:

Optimize the proposed detention/retention basin at 107th Avenue.



Opportunity:

Team members evaluated several detention basin alternatives including the following: 1) shallow detention basin (4 – 6 feet) that functions as a surge basin, 2) shallow detention basin (4 – 6 feet) that functions as an offline basin, and 3) deep detention basin (13 feet) that functions as an offline basin. The deep detention basin is required in order to route a lateral weir from the DRCC under the 36" irrigation storm water to the basin. The proposed weir will be sized to convey 300 cfs into the basin and the basin will be have a storage volume of approximately 30 ac-ft. The basin will be designed to maximize retention/detention in order to minimize the size of downstream structures. The COP requested the basin be graded to accommodate future soccer fields

Additional Analysis:

Team members will perform analyses to determine the hydraulic operation of the channels and the detention basin.

4.0 Recommendations

Team members need input from WAPA/APS and SRP irrigation before the design alternatives can be finalized and a preferred alternative selected. Team members have met with WAPA/APS and obtained their design criteria. SRP will not meet with team members or perform reviews until preliminary plans have been prepared. The design criteria may significantly impact the horizontal and vertical alignment of the proposed channel. Team members will meet with SRP during the final design process.

4.1 Cost & Quantities

Development of project quantities and costs are still in the conceptual stage. Once team members have received review comments the estimates will be refined. The quantity and cost tables are contained in Appendix E.

4.2 Issues to be addressed during design

The following issues need to be resolved prior to the development of the Final Pre-Design Report for this project:

SRP Irrigation design guidelines for irrigation crossings;
COP design guidelines (variances) for sanitary sewer and street crossings;
FCDMC design guidelines for detention basin design;
COP Park design criteria for multi-use drainage facilities;
COP/FCDMC criteria for future roadway crossings of the DRCC;
Design constraints for existing retention basin re-grading/re-vegetation;
Design constraints for roadway alignment modifications;
SRP life expectancy for existing irrigation facilities (assuming future development);
COP use of park facilities for detention basins;
Potential use of 83rd Avenue channel to the south (outlet into the Gila River);
Opportunity to coordinate regional drainage design with SR 801 Freeway (located ¼ south of Broadway Road at 83rd Avenue).

5.0 References

Drainage Design Manual – Hydrology, Volume I, Flood Control District of Maricopa County, January 1, 1995

Drainage Design Manual – Hydraulics, Volume II, Flood Control District of Maricopa County, January 28, 1996

Drainage Design Manual – Erosion Control, Volume III, Flood Control District of Maricopa County, January 1, 1993

Maricopa Association of Governments (MAG) Uniform Standard Specifications and Details for Public Construction Works, 1998 revised 2009

Durango Area Drainage Master Plan (ADMP), 2002, FCD 99-41

Durango Regional Conveyance Channel Candidate Assessment Report, 2006

Updated hydrology study

Basin and Hydrology Study, 91st Avenue to 107th Avenue, Prestige, 2009

Landscape Aesthetics and Multi-Use Consultant Handbook (Flood Control District – April 2003)

Scenery and Recreation Resource Assessment for Maricopa County (Flood Control District – ongoing)

Policy for the Aesthetic Treatment and Landscaping for Flood Control Projects (Flood Control District – Dec. 16, 1992)

Public Involvement and Public Information Guidelines (Flood Control District – July 1, 2004)

"City of Phoenix, Supplement to Maricopa Association of Governments, Uniform Standard Details", 2008, to be used to establish roadway section details per roadway classification, sidewalks, and ramps, pavement markings and signing, and other details for rights-of-way improvements

Arizona Department of Transportation Roadway and Bridge Standards, February, 2008

Maricopa County Department of Transportation Roadway Design Manual, November 3, 1993, revised April 2004

Various Drainage Reports and As-Builts from developers adjacent to the Project

Appendices

APPENDIX A

SITE ANALYSIS MEMORANDUM

Flood Control District of Maricopa County

Durango Regional Conveyance Channel

Elwood Street 75th Ave. to 107th Ave.

Final Site Analysis Memorandum

February 2010

Prepared by:

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Phoenix, Arizona 85040

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Introduction

The Flood Control District of Maricopa County (FCDMC) in the Durango Area Drainage Master Plan (DADMP) studied the flooding potentials of the area bounded by I-10 freeway to the north, the Salt River to the south, the I-17 freeway to the east, and the Agua Fria River to the west. This study identified that a portion of flooding re-mediation could be attained by the introduction of a regional conveyance channel. The channel alignment, starting from 63rd Avenue, heads west and parallels the Union Pacific Rail Road. The channel then turns south paralleling 71st Avenue, then it would turn west along the Elwood Street alignment until it turns south at 119th Avenue. It parallels 119th Avenue until it intersects the Buckeye Feeder Canal, following that alignment, and then discharges into the Aqua Fria River. This channel is deemed the Durango Regional Conveyance Channel (DRCC). The eastern portions of the DRCC from 75th Avenue to the east have been constructed via a combination of channel, storm drain, and basins that eventually outlets south to the Salt River. This particular project is focused on the middle reach of the DRCC along the Elwood Street alignment from 75th Avenue and heads west to 107th Avenue. The existing improvements of the DRCC are not conveying water to this section of the DRCC.

The goal of the project, as identified by the FCDMC, is to provide flood protection from the 100 year storm event. This will be accomplished by conveying water in a continuous channel from 75th Avenue to 107th Avenue. The engineering design criteria has been stated that the channel should be able to contain the 100 year storm event. Initially the intent, where the channel intersects with existing cross streets, the channel should strive to pass the 10 year storm event under the roadway through box culverts or other means, with the 100 year storm event overtopping the roadway for a maximum depth of six inches. Due to existing roadway constraints this approach has been revised to pass the entire 100 year event under the roadway.

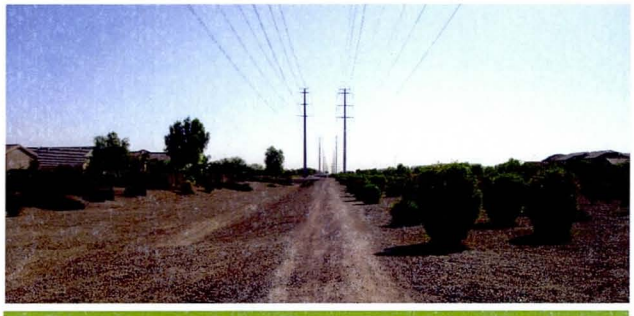
The terminus of this phase of the DRCC occurs at 107th Avenue where a large basin will be excavated. In the interim condition this basin will serve as a retention basin capable of storing the 100 year event. In the future condition of a fully completed DRCC the basin will serve as an offline detention basin that will meter out approximately 1200

Looking North At Proposed Basin Site

cfs back into the channel as it continues its route to the Agua Fria River. The *Addendum to the Durango Regional Conveyance Channel Candidate Assessment Report* provided a conceptual basin design, approximately 40+ acres, that encompassed the southwest quarter of the northwest quarter section bounded by 107th Avenue and 105th Avenue alignment on the east/west and by the Elwood Street alignment and the Miami Avenue alignment on the north/south. This concept basin was set back from 107th Avenue by 300 feet and was slated to hold six professional size soccer fields. This basin site will need to be analyzed and re-configured to work with the preferred alternative.

Existing Conditions

As stated above, the channel improvements for this segment are slated to follow the Elwood Street alignment. The channel area cuts through several existing single family residential subdivisions, school sites, future City of Phoenix park sites, and agricultural fields. The private development of the subdivisions has created several portions of channel and retention/detention basins through the corridor. The project team is tasked with evaluating these existing channels, basins, and culverts to see if any of the existing conditions will meet the design requirements as set forth by the FCDMC and/or what modifications will need to occur in order to convey the required flows.



Looking East Along Trail with Twin 230 kV Powerlines In Distance

In addition, the corridor also parallels twin 230 kV overhead power lines that are owned by Arizona Public Service (APS) and Western Area Power Association (WAPA). Currently, portions of the channel and basins meander around the existing power poles or have culverts running directly adjacent to the power poles. New improvements or modifications will need to be in conformance with all APS and WAPA development requirements.

Regional Attributes
(See Figure 1)

Existing and Future Character

The FCDMC has provided to the project team the *Landscape Inventory and Analysis* (LIA) document (July 1, 2009) for this specific reach of the DRCC. This document provides a comprehensive analysis of the region with respect to the specific project reach. The LIA has determined that the current Landscape Character Physical Setting is Sonoran Desert Valley Plains with an existing Cultural Setting that is mainly comprised of Rural and Suburban development. The LIA identifies that the Future Cultural Setting will be predominately Suburban. Additionally, the Existing Landscape Character Units are majority Rural Valley Plains but are identified to become majority Suburban Valley Plains.

Recreational Components

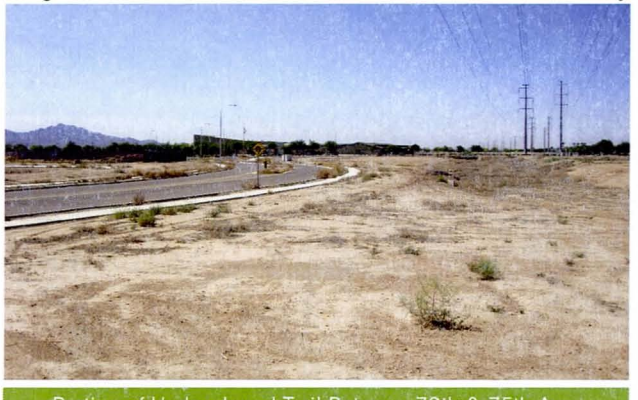
The study area is located approximately two miles north of the Salt River and approximately four miles from the Agua Fria River. Both of these rivers corridors are identified on the Maricopa County Regional Trails plan as linkages to regional destinations such as the South Mountain and Sierra Estrella Mountains.

In addition to these regional amenities, identified in the LIA, the project team has identified that the City of Phoenix has either existing or proposed trail systems that align with Lower Buckeye Road, Broadway Road, and directly through the heart of the project area along the Elwood Street alignment. In addition to these east/west trails the City has several north/south trail alignments along 101st Avenue, 95th Avenue, 87th Avenue, 79th Avenue, and 71st Avenue. The combination of these alignments would allow a trail user to complete a several mile loop trip or connect to the Salt River's regional trail network.

The City is currently developing the Tres Rios project along the Salt River from 91st Avenue to 111th Avenue. This series of constructed wetlands, trails and trail heads, outdoor classrooms, and environmental education center will become a regional destination for recreationist valley wide. The City of Phoenix is also in the preliminary stages of beginning the Oeste Project which will be a Salt River reclamation project, similar in scope to the Rio Salado project, that will extend from 91st Avenue east to 19th Avenue. In the near future trail users will be able to travel along the banks of the Salt River from Mesa, through Tempe, Phoenix, and Avondale.

Local Destinations

The project area specifically has four elementary schools within a 1/4 mile of the proposed channel alignment and existing trail system. Additionally, the City has four Neighborhood Parks and one District Park either directly adjacent to the channel alignment or within a half-mile.



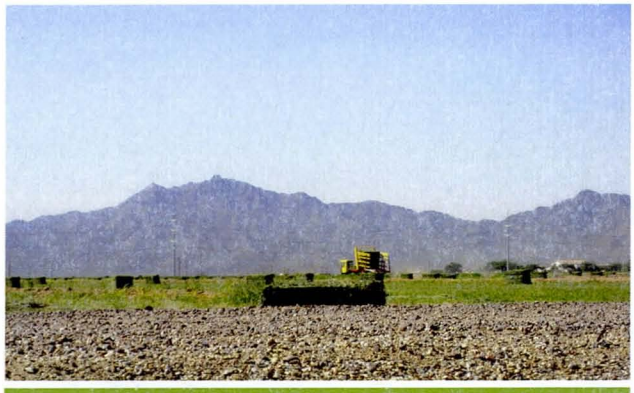
Portion of Undeveloped Trail Between 79th & 75th Ave.

The project area specifically has a soft surface trail that is almost contiguous for the entire stretch from 75th Avenue to 107th Avenue. Missing linkages are a half mile stretch east of 91st Avenue and a mile stretch from 79th Avenue to 75th Avenue. Completion of this trail system, as well as providing complementary access connections to the existing and future subdivisions, will create a complete network of alternative routes to these regional and site area destinations for non-motorized users.

Corridor Opportunities and Constraints
(See Figure 2)

Views

The corridor contains two types of views; views from within the corridor looking out and views looking into the corridor.



Unobstructed View Of Estrella Mountains Near 95th Ave.

The predominate scenic view from the corridor are the Estrella Mountains to south of the project area. Unfortunately for trail users, only glimpses of this scenic vista are afforded from the existing trail. The mountains can only be seen where there is active agricultural production or undeveloped subdivision lots. The existing single family residential development is a combination of single story and two story houses. The corridor is tightly lined by a majority of two story houses on the southern boundary which eclipses all but the slightest glimpse of the Estrella Mountains.

Views into the corridor could be classified into two categories, views from residential back yards and views from public access points. Residential back yard views are lots with existing open view fence. Public access points are considered cross streets, pedestrian connections through subdivisions to the corridor, and views from within the corridor. A large majority of the corridor is open to viewing from either these public access points or from residential back yards. It will be critical that improvements within the corridor, while serving a functional engineering purpose have an aesthetically pleasing appearance.

From a residential perspective, most home owners incur a premium lot charge when purchasing a home on an open space corridor. Paying this premium is meant to ensure a pleasant view and an enhanced and expanded backyard experience. These public access views into the corridor are important for several reasons. They will lend the public perspective and perception of the corridor. Views into the corridor from the intersecting cross streets can be a brief glimpse from a passing automobile, where framing of views, massing of shapes, and colors may be perceived. Or they can be from the perspective of a pedestrian, equestrian, or bicyclist where speeds are slower, textures of plant material and hardscape become apparent, and points of entry can be determined and should be inviting. Views from smaller pedestrian linkages to the corridor from the subdivisions should be clearly defined and open to the corridor. Users of these smaller access areas should have a sense of security, created through open views and clearly identifiable connections or landmarks.

The majority of the corridor does have view fence; while this allows the resident to look out, it also affords trail and corridor users views into residences. Careful consideration of corridor improvements such as trail placement, channel alignment, plant material, and lighting will need to be considered to balance and buffer both types of users and provide a sense of privacy and security for all.

Trail System

As stated previously, an existing soft surface (1/4" minus stabilized decomposed granite), ranging in width from ten to fourteen feet, occurs for the majority of the corridor. These trails have been installed as part of the private development along the corridor and are currently maintained by the various Home Owner's Associations

Portion of Trail Maintained by C.O.P Between 83rd & 79th Ave.

(HOA) with the exception of an approximately 1/4 mile frontage along Elwood Street, east of 83rd Avenue that is maintained by the City of Phoenix Parks Department. These trails, while mostly privately developed and maintained, are in public use easements.

The trail is generally a single linear trail as it moves along the corridor, the two exceptions to this are from 91st Avenue to 95th Avenue and then again from 99th Avenue west to the beginning of the Lions Gate subdivision. In these locations there is a parallel set of trails that follow the top of bank of existing channels or retention basins. While each of these dual trails offers connections to the trail from their respective subdivision on the north or south, the channels or retention areas create a barrier for any potential cross traffic except for at the existing street crossings. Barriers, such as this, effectively eliminate chance encounters by trail users. It is these chance encounters by the various user groups that help to give a sense of identity to a place, allow the formation of friendships, and help build a larger sense of community. These barriers could be reduced through the implementation of cross trail connections, pedestrian bridges, or culvert crossings.

Exercise Station Within Tivoli Subdivision

The Tivoli subdivision has installed exercise equipment stations and signage along their segment of trail. These amenities will need to be either protected in place or relocated as appropriate if any disturbance occurs in that reach.

The majority of the subdivisions have incorporated additional open space areas along the corridor in the form or parks, retention areas, or rest nodes. Some of the open space areas provide a connection to the existing trail system. Most of these existing connections occur through open turf/landscape areas with excellent visibility into the corridor. There are however several corridor entry

Narrow Trail Connection Near Heber Rd. & 93rd Ave.

points, particularly in the Country Place subdivision that are relatively narrow and do not offer the greatest sense of comfort. These openings occur between houses so the user has a one or two story structure on either side along with a six foot tall block wall. While little can be done to these houses and walls of these entry corridors, existing plant material should be evaluated for size and visibility. Smaller plant material should increase visibility and decrease potential hiding spots, thus allowing a greater sense of safety. Additionally, these small openings are difficult to discern from the trail user perspective trying to access the interior of adjacent subdivisions. The addition of monumentation, signage, pavement texture changes, or other cognitive way finding device, such as a specific grouping of plant materials, could be introduced to increase the visibility of the connection areas.

The potential does existing to provide additional connections through various open space retention areas along the corridor. Each potential connection point would need to be evaluated for accessibility, impacts to retention volumes, and impacts to existing landscaping. Each subdivision HOA would need to evaluate the cost-benefit of these potential connections.

Of this four mile corridor there does exist approximately a mile of undeveloped trail that disrupts the continuity of the system. The first portion of missing trail is at the Tuscano subdivision. This subdivision has all of its infrastructure, such as roads, utilities, walls, and drainage areas, but no houses. The intent was for the developer to install this piece of trail and would have been maintained by the HOA. Any improvements through this reach will need to ensure adequate space is left on the overbank for a future HOA trail as well as cross connections to the neighborhood.

Undeveloped Trail Connection at 89th Drive

The remaining missing trail segment is along the Hurley Ranch Subdivision. While there appears to be an existing maintenance road that has an application of aggregate base, a defined trail system has not been established. The subdivision has provided connections from the subdivision to the trail alignment but no trail improvements. It appears that the limits of the Hurley Ranch subdivision are just north of the trail corridor and therefore the developer did not install the trail. Development of this segment is quite critical as both Hurley Elementary and Union Elementary and a future City Neighborhood Park are directly adjacent to the trail corridor. Further investigation into who is responsible to develop and maintain this portion of trail will be required. The intersection of 89th Drive and the trail in this area results in a particular challenge due to a steep slope and elevation change of approximately three feet from top of street to the trail. This elevation change will not only affect the trail system and accessibility, but channel capacity and containment through this reach as well.

The last hindrance to connectivity of the trail system is the crossing of the various arterial and collector roadways. While the collector streets tend to have less traffic than the arterials and are at slower speeds, improvements could be made for safer crossings. Currently crossings are not signed, nor are there pavement markings to indicate a crosswalk. Simple additions of signage and enhanced pavement in a crosswalk increases the visibility of the crossing to passing drivers and can result in a safer crossing (See Appendix). This also decreases rogue crossing locations.

In addition to lack of signage or pavement markings indicating a crossing, some of the existing arterials that intersect the corridor have raised and planted medians that prevent cross flow. The introduction of pedestrian refuges would introduce a designated crossing point in addition to the creation of a sheltered area to address the crossing in stages if necessary. More substantial crossing enhancements such as pedestrian activated signals could be investigated for potential installation as well.

All trails should be developed or reestablished to be in accordance with the City of Phoenix's standard trail details P1130 and P1131 (See Appendix). Trails should also conform to The American Association of State Highway and Transportation Officials (AASHTO) guidelines for shared-use paths. This project specifically should try to adhere to the minimum five foot set back from the top of channel slopes.

Schools

Several elementary schools punctuate the corridor. The unification of this corridor can offer alternative means of transportation for these children to arrive safely at school. Separation from automobile traffic as well as a highly visible trail corridor provides ample opportunities for "eyes on the street" and an increasingly safer commute. Federal funding exists for developing "Safe Routes to Schools" and could be a potential funding source.

In addition, the close proximity of the schools to the corridor offers the opportunity to design improvements with the potential for education. Hydrologic functions could be observed and discussed by classrooms. Portions of the channel could be developed into various biomes of the desert wash system as an additional educational opportunity to study the various flora and fauna associations.

Parks

Neighborhood Park Located Adjacented To Trail in Country Place

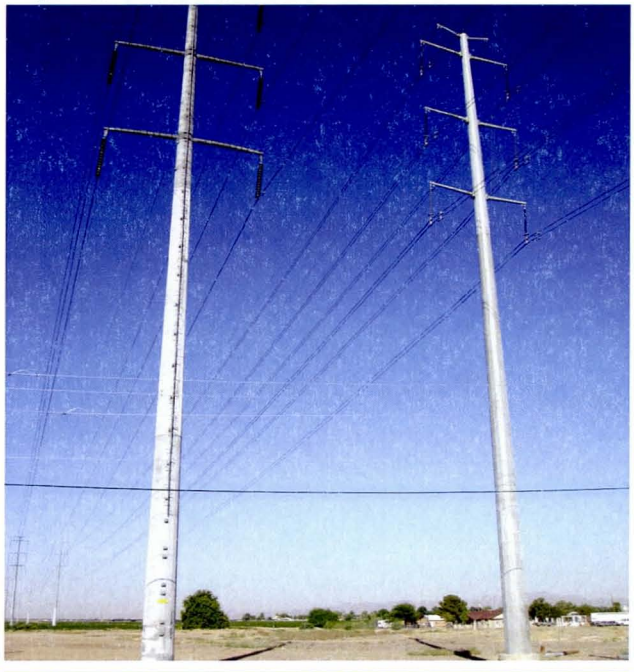
Several parks have been developed along the corridor by the various subdivisions. These parks all vary in the amenities that they offer, but range from a bench, within or adjacent to a park, to large play structures and ramadas. The majority of access to the corridor, through the subdivisions, occurs through these park areas. These facilities are all currently maintained by their respective HOAs.

The study corridor falls within the Estrella Village of the City of Phoenix General Plan. The City of Phoenix currently has four Neighborhood Parks in the study area and one District Park just north of the study area. The City of Phoenix's General Plan has a Recreation Element section that identifies potential programing for these types of facilities. "*Neighborhood parks are designed to serve an area within a radius of one-half mile or a population of 4,000 to 7,000 people . . . These parks are within walking or bicycling distance of residences and are typically 15 acres in size. Local or collector streets typically border them. Most neighborhood parks include children's playground and picnic areas, open play turf areas, parking, lighted volleyball and basketball courts, and restroom facility.*" (COP General Plan, pg. 294)

"*District parks draw from several communities and are 200 acres or larger, serving 100,000 to 200,000 people. They provide for active and passive recreation and serve a five-mile service radius. They may include specialized activities such as a golf course, festival area, or an amphitheater. In general, district parks are located on arterial streets, or in areas where the size and function will have minimum impact, i.e., commercial or industrial areas. They also serve the immediate local communities as neighborhood parks or community parks and contain these features: playgrounds and picnic areas, lighted basketball and volleyball courts, lighted racquetball courts, lighted softball and soccer facilities, restroom facilities, lighted tennis courts, and picnic ramadas.*" (COP General Plan, pg. 295)

Currently the City does not have the funding to maintain these future parks, so therefore there are not plans in the near future to develop them. The unnamed park at 83rd Avenue in the Tuscano subdivision is the only City park in the corridor that currently has an unofficial master plan that was provided with the subdivision design. This park along with the unnamed park at 89th Drive within the Hurley Ranch subdivision are currently in line with the drainage corridor and will potentially be impacted by the planned channel improvements. A clear understanding of the City's future programming of these sites will allow the project team to create a design alternative that will foster a "win-win" situation to provide both flood protection and a recreational amenity for the City.

Currently the unnamed park at 89th Drive within the Hurley Ranch subdivision is being developed as an off-line basin for the pre-design study. This basin is being added to take the peak flow down as the water heads to the west. By taking off the peak flow, the existing channels to the west can be left untouched and therefor the existing landscape, irrigation, and trail system can remain intact.



Dual Overhead 230 kV Power Lines Near 107th Ave.

Flood Plain

The west end of the project from 107th Avenue to the east, encompassing almost the entire Lions Gate subdivision, is identified as Flood Plain by the DADMP document, the LIA document, and the Maricopa County Assessor. However, the Federal Emergency Management Agency (FEMA) has not identified the area as Flood Plain on any of their maps or updates. The existing turf and landscape retention basins are only to store Lions Gate's on-site drainage and does not remove them from the Flood Plain designation. The drainage improvements for this project should eliminate the flood potential of that subdivision.

Power Poles

The dual overhead 230 kV power lines will play a significant role in all aspects of any improvements within the corridor. Both APS and WAPA have 50 foot, level, clear zone requirements around their poles in order to provide proper maintenance access to their poles. As well as access requirements at intervals along the spans of the lines as well. Maintenance roads, typically 20 feet wide, will also need to be incorporated into the design. There are currently areas along the corridor that appear to not meet these requirements. Due to these various restrictions the channel alignment may need to take significant shifts in order to traverse around the power poles and through the corridor. Any shifting of the existing channel or retention basins will impact existing trails, site amenities, and landscape and irrigation. A clear understanding of what existing facilities APS and WAPA will allow to be maintained in there current state, as well as what modifications or additions can occur around their poles will need to be solidified in order to produce design parameters for improvements.

Other additional design considerations for this corridor that will need to be addressed is the build up of static energy on site amenities. Any new metal objects such as signs, trash cans, benches, etc. will need to be grounded per National Electrical Safety Code (NESC) standards to reduce the potential for nuisance shocking to corridor users.

Corridor Utilities
(See Figure 3)

Overhead Power

In addition to the 230 kV overhead power paralleling the corridor, Salt River Project (SRP) has overhead 69 kV lines that intersect the project area running north/south along 107th Avenue and 91st Avenue. SRP will have similar restrictions (35 foot clear) and access requirements around their power poles and along their lines within their easements. The lines on 107th Avenue are on the west side of the street until just south of the corridor, where they transition under the 230 kV and then continue north on the east side of the street. The 69 kV lines along 91st Avenue occur on the east side of the street. Both of these lines will potentially be impacted by both roadway and drainage channel improvements. The goal would be to work with the existing pole locations as is and only relocate if completely necessary.

Water

Existing water lines run north/south at the following locations:

- 75th Avenue (12")
- 76th Drive (8") (has not been accepted by the City)
- 79th Avenue (8")
- 83rd Avenue (8")
- 85th Avenue (8")
- 87th Avenue (8")
- 89th Drive (8")
- 91st Avenue (12")
- 92nd Drive (8")
- 95th Avenue (8")
- 99th Avenue (12")
- 103rd Avenue (8")
- 105th Avenue (X")
- 107th Avenue (8")

Sewer Man Hole in Cooridor

Existing water lines run east/west paralleling the Elwood Street alignment at the following locations:

- 107th Avenue to 105th Avenue (X")
- 83rd Lane to 81st Glen (X")
- 79th Avenue to 75th Avenue (X")

Pot holing of these water lines will be critical during the final design phase to determine if realignment or lowering of any of the water lines will be required due to potential elevation conflicts or alignment conflicts with channel

and roadway configurations.

Sewer

Existing sewer lines run north/south at the following locations:

- 75th Avenue (36" and 15")
- 76th Drive (10") (has not been accepted by the City)
- 79th Avenue (8")
- 83rd Avenue (30" and 18"(has not been accepted by the City))
- 89th Drive (12")
- 91st Avenue (18" and 72")
- 107th Avenue (8")

Existing sewer lines run east/west paralleling the Elwood Street alignment at the following locations:

- 107th Avenue to 103rd Avenue (24")
- 91st Avenue to 87th Avenue (12")
- 83rd Avenue to 79th Avenue (X")
- 77th Drive to 76th Drive (10" has not been accepted by the City)

All man holes have been dipped to collect invert data of existing sewer lines as well as back checking as-built data as available. Roadway and channel improvements will need to be adjusted as required due to potential elevation conflicts or alignment conflicts with sewer line configurations, or sewer lines will have to be adjusted or siphoned. The 72" sewer in 91st Avenue is an excellent example where standard crossing conditions will not be able to be used due to the large diameter sewer line at a relatively shallow depth.

Irrigation Delivery Ditch at 87th Avenue

SRP Irrigation Delivery

Existing SRP Irrigation Delivery systems run north/south at the following locations:

- 83rd Avenue (30")
- 87th Avenue (48" and open ditch)
- 99th Avenue (24", 36", and open ditch)
- 107th Avenue (24" and open ditch)

Existing SRP Irrigation Delivery systems run east/west paralleling the Elwood Street alignment at the following locations:

- 107th Avenue to 91st Avenue (36" then transitions to 24" at 99th Avenue)
- 87th Avenue to 83rd Avenue (open ditch)

All man holes have been dipped to collect invert data of existing irrigation delivery lines as well as back checking as-built data where available. There is the potential that various open ditch head walls will have to be extended, pipe alignments shifted, or a siphon installed to avoid potential elevation conflicts or alignment conflicts with channel and roadway configurations. Currently the largest perceived conflict with the channel improvements and the irrigation delivery system is on the west end of the project

Irrigation POC at Lions Gate Subdivision

from 105th Avenue to 107th Avenue. Vertical adjustment of the irrigation delivery pipe that parallels the channel corridor is not preferable to the utility companies, so the channel and weir system to deliver water to the basin will have to be adjusted accordingly, or a siphon introduced to the irrigation line.

Dry Utilities

Various dry utilities such as telephone, gas, and fiber optic

are located through out the corridor and in the various cross streets. It is anticipated that these utilities will be relocated as necessary to accommodate the project improvements.

Landscape Irrigation Points of Connection

Existing irrigation points of connections (POC) have been identified through site visits and obtained as-built documents for each subdivision. Identification of these POCs will help establish the point of origin for the reestablishing of any disturbed irrigation system. It will be important to verify the limits of existing landscape areas served to ensure that each subdivision provides water to the reestablished plant material for their subdivision. Knowledge of these POCs will also help in determining alignments of channel improvements. If an existing landscape area is slated for disturbance but the existing POC is significantly removed from the site of the disturbance it is maybe in the best interest of the irrigation system to look at an alternative routing of the irrigation system within the disturbance area to a new or closer point of connection. A closer POC will typically mean less chance for inadvertently disturbing an existing lateral system. Additionally knowledge of available water sources will determine allowable densities and potential planting schemes. For example, if only a 3/4" water meter is available for a restored system then large amounts of turf should not be installed due to the high water demand and the inability to deliver the required amount of irrigation.

Corridor Photo Inventory
(See Figure 4)

The Corridor Photo Inventory exhibit has been created to give reviewers a glimpse into the existing conditions of the project corridor and identify key aspects and character of the project site. Additional photographs from the locations keyed on the Corridor Photo Inventory are located within the Photo Log Appendix.

Plant Material
(See Figure 5)

Existing

The existing subdivisions have a combined list of sixteen

Densely Planted Landscape at Volterra Subdivision

(16) different tree species and twenty-eight (28) different shrubs, ground covers, and accent planting. This is in addition to turf. The majority of the corridor is planted in a light to medium density of plant material. There are locations throughout the corridor where plant material that does not conform to APS's approved list have been planted in what appears to be the APS and WAPA easement. Exact limits of the APS and WAPA easements need to be confirmed prior to confirmation on what plant material might be in conflict. Upon an the approval of the preferred alternative a salvage and inventory identification and plan should be implemented to harvest mature, healthy plant material for relocation if viable and cost effective. To date, no state protected plant species were noted.

Overhead Power Restrictions

APS has an approved tree list for planting within their easements. This list is typically derived based on plant material mature canopy size so as to not interfere with the transmission lines. WAPA has an established policy of no trees are allowed within their easements and no shrubs over ten (10) feet in height. WAPA does not have an approved plant list. SRP has an approved tree and shrub list for planting within their easements. Any plant material proposed under SRP's 69 kV lines will need to be verified to be in conformance with this list.

Proposed Plant Palette

The proposed plant palette was reached by selecting similar species of plant material that are common through

out the corridor. This list was then cross examined with the APS list of approved plant material. The intent is to provide a plant palette that will be able lend a cohesive character to the corridor through providing a more uniform plant palette. This may be modified as levels of disturbance are more defined and a preferred concept begins to be generated. If the level of disturbance is great enough through the corridor, the design team might consider an alternative plant palette that lends more to the Suburban Valley Plain as identified in the LIA or that relates more to an identified project motif. Planting densities and design intent will need to be discussed with the various HOAs to gain concurrence for maintenance responsibilities.

Limits of Disturbance
(See Figure 6)

During the pre design study several different options for routing the water from point 'A' to point 'B' have been examined and evaluated. Everything from a single channel configuration, dual channel configuration, taking water to the south at 83rd Avenue, and adding detention basins along the system has been evaluated. All concepts took into account both WAPA and APS requirements around their facilities. The existing landscape, irrigation, and other subdivision amenities that were likely to be disturbed also gave direction on the final pre-design alternative. The final recommended alternative has the potential to be an combination of pieces from each of these concepts. Final determination will need to be based on the evaluation criteria as determined by the project team.

Upon further refinement of the drainage analysis, a single channel option, with an additional basin at 89th Drive, has evolved as the most suitable, functioning, alternative.

Culverts and Roadways

Preliminary investigation shows that only one existing box culvert at 76th Avenue is adequately sized to accept the required flows. The remaining box culverts or pipes will have to be modified or expanded in order to meet the design requirements. Addition of box culverts to roadways will require extensive roadway modifications in order to add the box. Looking at a worst case scenario roadway crossing, such as 91st Avenue, shows an approximate disturbance area of 1200 linear feet. Disturbances may include the existing roadway, various dry utilities, water lines, irrigation delivery, and existing roadway landscape improvements. Roadway construction does however, afford the opportunity to improve crossing conditions for trail users and maintenance access.

Pipe Crossing at 91st Avenue

Channels and Retention Areas

The recommended alternative is minimizing disturbance to the existing channels and retention basins along the corridor. Some locations the disturbance will be very minor regrading of the channel or removal of an earthen plug, such as between 75th Avenue and 79th Avenue. In areas further west the existing channels and retention areas that will be turned into channel, have well established plant material, irrigation, and trails and trail amenities that will be disturbed and then need to be replaced, such as from 103rd Avenue to 107th Avenue.

Fully Landscaped Retention Basin at Lions Gate

The majority of new channel will occur to the south of the existing improvements and will impact the existing agricultural fields to the south of the corridor. While the improvements through the agricultural fields will not require restoring any existing improvements such as trails and turf basins, it will require that additional right of way or drainage easements be acquired. There could also be additional impacts to the SRP Irrigation delivery system.

This channel concept, where needing to expand or deepen existing channel or retention areas, has tried to keep at least one existing side slope undisturbed. Keeping one slope will allow existing landscape, trails, and other amenities to be left intact, at least, for certain stretches of the alignment. Additionally, earthwork quantities should be reduced by minimizing cut and the cost associated with the hauling of the generated material.

Excavation Equipment

Earthwork

Preliminary earthwork numbers indicate approximately 512,000 Cubic Yards (CY) of cut and 101,000 CY of fill for the current channel configuration and basin concept. This leaves an approximate 411,000 CY of generated waste material. The cost with removing this amount of material off site will be extremely expensive and the final design should take every effort to minimize export and maximize places on site throughout the corridor that the material can spread. The addition of berms throughout the corridor, where space allows, can reduce the export and add an aesthetic value to the project.

Community Impacts

The impacts to the existing members of the community will be two fold. They will have the headache of dealing with a major construction project with its associated noise, dust, restricted traffic, and loss of access to recreational amenities occurring directly in their back yards. But in the end they will have gained an improved and aesthetically enhanced drainage system and multiuse corridor.

Public involvement during design and prior to construction can prepare residents for what to expect during construction. Public involvement can also help to build consensus on design approach. If the community is able to buy into the project and see it as a benefit, then they will find the construction to be not as great of a nuisance.

The project team, during construction document production, can set the ground work for a more community friendly construction operations. Stipulating hours of construction activity, phasing of construction, and traffic control plans can all contribute to a less intrusive construction project.

Basin Configurations
(See Figure 7)

Addendum to the DRCC Candidate Assessment Report (Original Basin) at 107th Avenue

The original basin concept set the parameters of a 300 foot setback from 107th Avenue. The intent is that this area will be sold off at a later point in time for future commercial development. There is an additional 50 foot perimeter buffer established from the setback and the other property lines. The basin consists of two terraces, one at four foot depth, and the other at a five foot depth. Lastly, this basin concept allowed for potentially six professional soccer fields. This basin could potentially serve as a future City of Phoenix park.

Addendum to the DRCC Candidate Assessment Report Modified Basin at 107th Avenue

A modified basin concept was developed to correspond with the drainage concepts that are being generated. This modified basin maintains the parameters that were established by the original basin concept for set backs, slopes, and future programming. Do to initial drainage investigations the depth of the basin is expected to increase significantly. Preliminary indications set a depth of thirteen feet. This increased depth has decreased the available area in the bottom of the basin due to the extension of the side slopes.

Additional impacts to the basin size and available area for future recreational uses is the interface of the basin to the new channel. Existing power poles at the southern edge of the basin force the basin to the north in order to accommodate the required clear zone as well as providing maintenance access.

While the MCFCD would not provide a parking lot for the basin site, the basin foot print has been modified to include room for parking. Typical parking counts for soccer facilities are 70 stalls per field. This accounts to 420 spaces required for a facility of this magnitude. An area count of 350 square feet per parking stall was used to estimate the total area required for parking. The 350 square feet is meant to capture the parking stall itself, drive isle, medians, etc.

Lastly, the basin site identifies a potential access road alignment at the northern edge of the site. Ideally, a signalized intersection at Miami Avenue would allow for the safest and most convenient access to the site in the future. Currently, the Maricopa County Assessor's web site shows a platted subdivision, Park Forest, backing directly up to the basin's northern property line with residential homes. This subdivision plat additionally shows 106th Drive roadway alignment terminating at the northern property line as well. Additional coordination with the City of Phoenix and this subdivision developer will need to occur to ensure that all access requirements by all parties are accommodated as best as possible.

As shown in the figure, the basin can still maintain the programmed six soccer fields, however, the fields have overlapping safety zones. While acceptable, this is not an ideal situation as there is not sufficient space for players along the sidelines or spectators. Additionally, there is not room to add any accessible routes or maintenance access to the bottom of the basin without impacting the safety zones. This configuration could be modified to accommodate these additional needs but the soccer fields would need to be sized to a collegiate/high school size field.

Basin Used for Recreation and Flood Control

Addendum to the DRCC Candidate Assessment Report Modified Basin (COP Community Park Guidelines) at 107th Avenue

This basin concept is a derivative of the first basin modification and has been based on the City of Phoenix's *General Plan Recreation Elements* description of a Community Park. This basin configuration is meant to capture how the City would typically develop a park site of this size. Additional recreation elements such as playgrounds for two age groups, restroom, small and large ramadas, volleyball, and basketball court have been added. These amenities have been kept on the top edge of the basin to remain out of any potential inundation. Addition of these other components has also reduced the number of soccer fields that are able to fit on the site from six to four. Using the same criteria for parking, the area required for parking has gone down by 25 spaces. The full 140 parking stall reduction from the elimination of two soccer fields was offset by the increased parking requirements for these additional recreational components.

This basin configuration does allow for shallower side slopes coming off of the upper recreation area to the lower soccer fields. In addition, there is room to incorporate both accessible routes and maintenance routes to the bottom of the basin without compromising the soccer field areas. The fields have overlapped safety zones in order to fit the width of the bottom of the basin, but again,

more room could be gained by the downsizing of the fields. Access to the site is the same as the prior basin, off Miami Avenue, and the same constraints will need to be addressed for this configuration as well.

89th Drive Basin

This basin has been added to the drainage concept to reduce the peak flow. The addition of this basin will reduce impacts to the existing channels to the west, by allowing those channels to function as they are and at their existing capacity. During final design this basin configuration will need to be reviewed by the COP to determine the most appropriate marriage between drainage function and the future park programming needs and amenities.

New Channel Configuration (See Figure 8)

A representative sampling of cross sections have been identified through Figure 8. These cross sections show impacts to the existing grade due to channel improvements as well as identify where existing site features are not impacted. These sections have been labeled as "restricted" or "non-restricted".

Restricted

Restricted sections are areas with limited right of way, utility conflicts, or other identified constraints that limit the new channel configuration. Restricted sections of channel will be developed with four to one (4:1) side slopes with an approximate 40 foot wide channel bottom and an approximate top of channel ranging from 120 feet to 150 feet in width. Since manipulation of grade to create visual interest will be extremely limited, plant material selection and placement will be extremely critical. Plant material can be placed in meandering masses to provide movement and splashes of color to the corridor. Placing plant material with varying heights can enhance the sense of vertical change, again adding visual interest throughout the corridor. Density of plant material will be coordinated with both the drainage component and the appropriate HOA. Coordination with the drainage component will ensure that channel capacity and N-values are compatible with the planting design and ground plane treatment. Coordination with the HOA's will ensure that the aesthetic treatments implemented are able to be maintained to each representative communities's standards.

Cross Section Restricted by Houses on Both Sides

Non-Restricted

Non-Restricted sections occur in areas with additional room within the right of way, areas not having extensive existing constraints, or new channel areas within the existing agricultural fields. Non-Restricted sections of channel will be developed with varying side slopes, terraces, and meandering of the channel alignment where possible. The introduction of low berms and swales can be facilitate water harvesting and provide visual interest along the trail system. The same planting design principals from the restricted sections should be used in the non-restricted sections to provide unity and engineering functionality throughout the corridor.

Future COP Park Site has Existing Wide Channel Area

Headwall and Guardrail Aesthetic Treatments
(See Figure 9)

The proposed channel improvements will utilize both existing box culverts and provide new box culverts to convey water through the system and provide the required access to the high voltage power poles. The vertical face of the walls of these boxes provides the opportunity to enhance the appearance of the corridor by providing a unifying motif. Several concepts have been formulated to enhance the aesthetic of the vertical faces and guardrails of these features.

Concept 1
Concept 1 derives its inspiration from the nearby Estrella Mountains. Heavy sandblast finish of the vertical surfaces will expose various colors, shapes, and sizes of aggregate that speak to the rugged terrain of the mountains. The walls can be painted, stained, or utilized integrally colored concrete to achieve a color that will speak of the desert and blend with the surrounding homes.

Concept 2
Concept 2 derives its inspiration from the near by confluence of the Salt River, Agua Fria River, and the Gila River know as Tres Rios. The symbol for water is in the forefront of this design to stress the importance of the this element. Form liners can be used to create the texture of river rock and the waves of water in cast concrete.

Concept 3
Concept 3 derives its inspiration from the ancient canals and waterways that traversed this area. The soft meandering flow of the river run pattern harkens to the crisscrossing of historic water ways. Form liners would be used to create the various textures and relief in the cast concrete.

Concept 4
Concept 4 derives its inspiration from the agricultural influence in the area. The strong horizontal rows are indicative of farm rows and crops. The accent bands in a natural rust patina evoke the idea of earth. Form liners would be used to create the various textures and relief in the cast concrete.

Concept 5
Concept 5 is not shown, but would entail a paint or stain treatment to both new and existing head walls to provide a consistent aesthetic and value engineered solution.

Typical Box Culvert, Headwall, and Guardrail

Evaluation Criteria for Recommended Alternative

The design team has identified the following items for use in evaluation of the various alternatives:

- Impact to overhead power lines
- Cost implications
- Impact to existing facilities
- Impacts to right of way
- Impact to existing irrigation systems
- Ease of maintenance
- Effectiveness
- Context sensitivity and in conformance with MCFCD's *Landscape Inventory & Analysis* as developed for this project
- Aesthetics in conformance with MCFCD's *Landscape Aesthetics & Multi-Use Design Guidelines* and *Policy for the Aesthetic Treatment of and Landscaping of Flood Control Projects*
- Final cohesiveness of the corridor

Each alternative will be questioned and tested against these criteria. The recommended alternative will be the concept with the greatest cost to benefit and value to enhancing the community.

Flood Control District of Maricopa County

Durango Regional Conveyance Channel
Elwood Street 75th Ave. to 107th Ave.

Final
Site Analysis Memorandum
Appendix

1a Looking south from 107th Ave.

3a Looking east just north of Lions Gate subdivision

5a Looking east within Lions Gate Subdivision retention basin

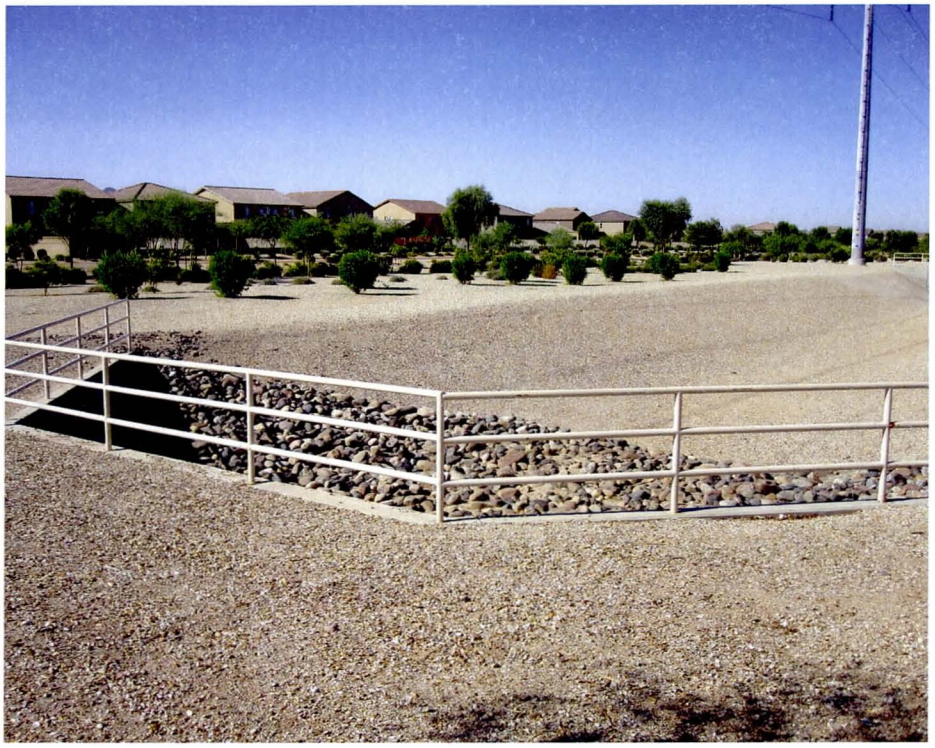
8a Catch basin south of Forest Grove Ave. & 104th Lane

10a Existing box culvert @ Country Place Blvd. & 103rd Ave.

10b Existing utility cabinets along Country Place Blvd.

12a Looking south from 99th Ln. & Heber Rd.

14a Looking SW across flood control channel from 99th Ave.



14b Looking NW @ box culvert from the east side of 99th Ave.

14c Looking east along trail with hay barns on the south side

16a Looking west along trail south of Country Place private open space

18a Looking south from trail towards active farming

19a Beginning of physical fitness course @ Tivoli subdivision

20a Looking east from trail towards landscaped flood control channel

21a Looking east from trail @ trail connection to Country Place subdivision

23a Vandalism at vacant house near trail connection to Country Place subdivision

24a Looking SE @ existing box culvert under 91st Ave.

24b Looking SW @ trail connection from 91st Ave.

24c Looking S-SW with view of 69KV power poles along 91st Ave.

25d Looking SE towards Hurley Ranch elementary school from 91st Ave.

26a Looking east along unfinished trail portion from 91st Ave. to Riley Rd.

26b Looking east @ unfinished trail with steep slopes from 89th Dr.

26c Existing storm water outlet just east of 98th Drive

26d "Wildcat" dumping along unfinished trail south of Hurley Ranch subdivision

28a Looking NE at intersection of Heber Rd. & 87th Dr. within Hurley Ranch

28b Looking east along unfinished trail

29a Looking south along irrigation canal near Riley Rd.

29b Looking NE from the End of Riley Rd.

29c Lush planting throughout Volterra subdivision

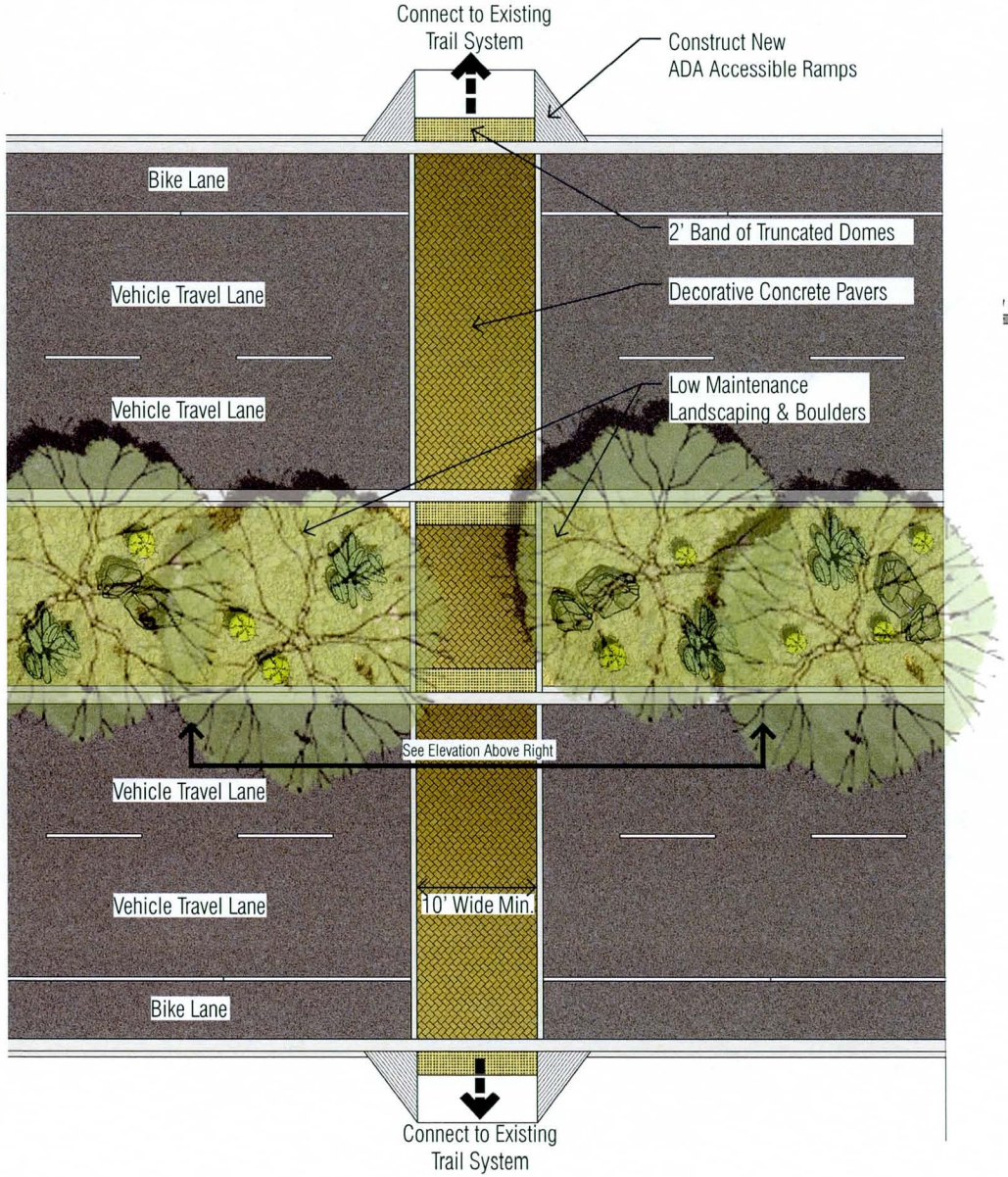
30a Looking south from end of 85th ave.

33a Looking north along 83rd Ave.

35a Looking SW from future COP park entrance

38a Looking NE across round-a-bout neat Elwood St. & 79th Ave.

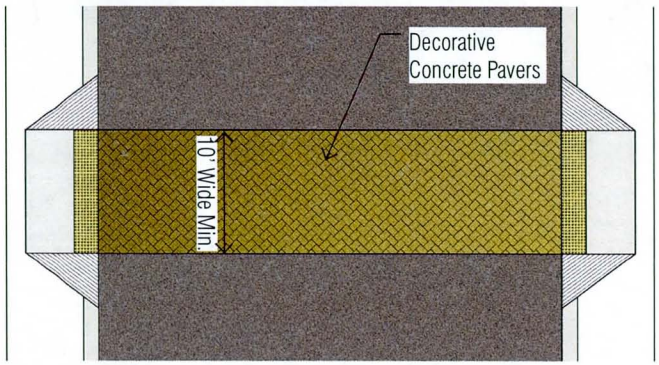
43a Looking west from unfinished trail within undeveloped Tuscano Subdivision



Pedestrian Refuge - Plan View
N.T.S

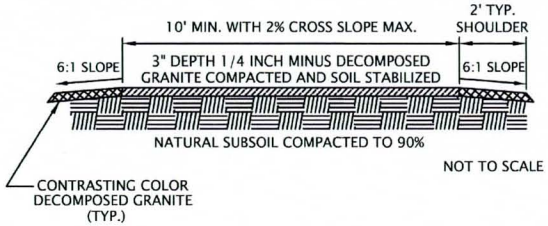
Pedestrian Refuge - Elevation View

Pedestrian Refuge - Built Example @ 5th St. & Mill In Tempe, Arizona

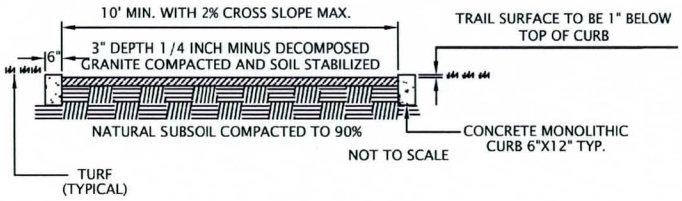


Enhanced Residential Crosswalk

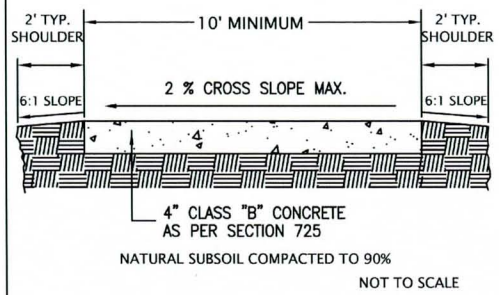
MULTI-USE TRAIL IN DECOMPOSED GRANITE



MULTI-USE TRAIL IN TURF

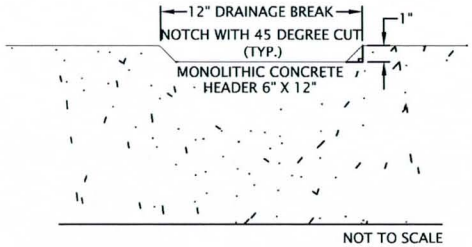


SHARED-USE PATH



DRAINAGE CUTS IN CONCRETE HEADER

(TO ACCOMPANY MULTI-USE TRAIL IN TURF DETAIL)



NOTES:

1) NO RUNNING SLOPE SHALL EXCEED 5%. IF RUNNING SLOPE EXCEEDS 5%, TRAIL MUST CONFORM TO AMERICANS WITH DISABILITIES ACT GUIDELINES.

2) TRAILS WILL NOT EXCEED 8% SLOPES, SLOPES 5-8% NOT TO EXCEED 30' DISTANCE WITHOUT 5' LANDING. REFER TO U.S. DEPT. OF JUSTICE WEBSITE FOR MORE INFO.

3) SHARED-USE TRAIL WILL FOLLOW P1230 SIDEWALK DETAILS & SPECIFICATIONS FOR CONCRETE SIDEWALK.

4) FOR APPROVED STABILIZATION PRODUCTS SEE SPECIFICATIONS IN SECTION 429.2 - SECTION 6.

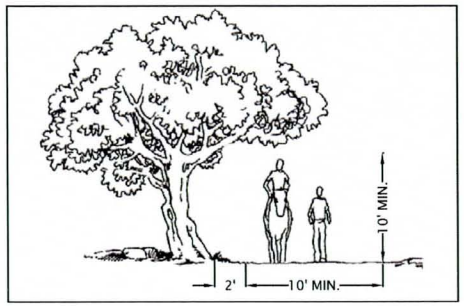
5) MULTI-USE TRAIL TO BE LOCATED WITH AN EXCLUSIVE MINIMUM 20' PUBLIC TRAIL EASEMENT OR A 28' PUBLIC TRAIL EASEMENT THAT INCLUDES A PUE.

6) SHARED-USE TRAIL TO BE LOCATED WITHIN A 20' PUBLIC TRAIL SIDEWALK EASEMENT.

7) MULTI-USE TRAILS AND SHARED-USE TRAILS LOCATED WITHIN OPEN SPACE OR WASH CORRIDOR WILL BE LOCATED WITHIN A MINIMUM 25' PUBLIC TRAIL EASEMENT.

DETAIL NO.	City of Phoenix STANDARD DETAIL	MULTI-USE TRAILS	APPROVED / CITY ENGINEER / DATE	DETAIL NO.
P1130			Mario Saldamando / 07-19-04	P1130

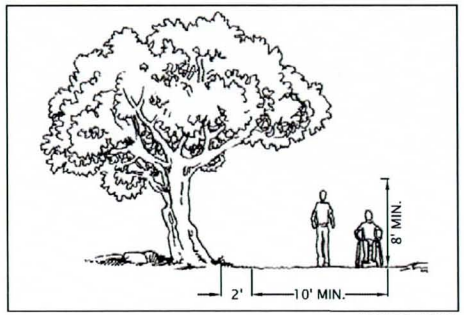
MULTI-USE REQUIRED VERTICAL CLEARANCES



NOT TO SCALE

MULTI-USE TRAILS REQUIRE VEGETATION CLEARED TO A HEIGHT OF 10 FEET, WITHIN 2' OF THE TRAIL EDGE.

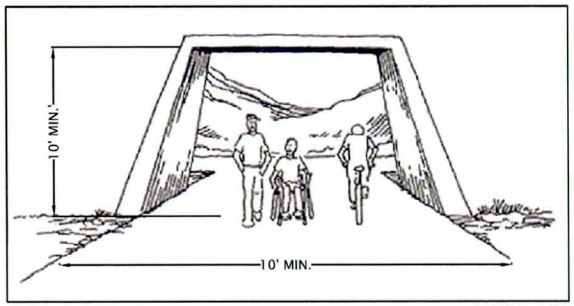
SHARED-USE REQUIRED VERTICAL CLEARANCES



NOT TO SCALE

SHARED USE TRAILS REQUIRE VEGETATION CLEARED TO A HEIGHT OF 8 FEET, WITHIN 2' OF THE TRAIL EDGE.

UNDERPASS CLEARANCES REQUIRED FOR TRAILS



NOT TO SCALE

UNOBSTRUCTED SIGHT LINES SHALL BE MAINTAINED. UNDERPASSES OR BRIDGES MORE THAN 50' IN LENGTH SHALL BE LIT TO AN AVERAGE OF 2 FOOT CANDLES. NATURAL LIGHT SOURCES ARE PREFERRED WHERE DESIGN CAN ACCOMODATE THIS.

DETAIL NO.	City of Phoenix STANDARD DETAIL	VERTICAL CLEARANCE MULTI-USE, SHARED-USE, AND UNDERPASS/BRIDGE CLEARANCE	APPROVED Mario Saldamando CITY ENGINEER 2-11-02 DATE	DETAIL NO.
P1131				P1131

Summary of Design Requirements

The *Landscape Inventory & Analysis* document for the Durango Regional Conveyance Channel -Elwood Street, 75th Avenue to 107th Avenue identifies the following design requirements:

Landscape Inventory

- Landscape Character Physical Settings- Sonoran Desert Valley Plains
- Existing Cultural Settings- Majority Rural followed by Suburban
- Future Cultural Settings- Majority Suburban
- Existing Landscape Character Units- Majority Rural Valley Plains follwed by Suburban Valley Plains
- Future Landscape Character Units- Majority Suburban Valley Plains
- Regional Parks & Recreation Resources- Project Site is within a few miles of regional trail systems and connections to the Salt River, Agua Fria River, and the Estrella Mountains
- Open Space Resources-Small area of Flood Plain identified at west end of project at 107th Avenue
- Regional Open Space Resources-Project Site is within a few miles of regional trail systems and connections to the Salt River, Agua Fria River, and the Estrella Mountains

Landscape Analysis

- Existing Landscape Character Units Structure Types Compatablity- Compatibility Class 6.3 is compatible with Non-Structural, Underground Pipe, Medium Channel Levee (6'-10' high 25'-100' wide), Medium Conveyance Channel (5'-8' deep 25'-100' wide), Medium Storage Basin (8' depth (60%) 15' depth (40%) 5-20 acres), and Medium Dam (10'-15' high 1-2 miles in length)
- Future Landscape Character Units Structure Types Compatability- Majority Compatibility Class 6.3
- Open Space Resources Structural Method Compatiblity- Compatablity Class 1 Non-Structural at 107th Ave. for Flood Plain area. This area is already constructed as subdivion lots and on-site retention
- Combined Existing Resources Structure Types Compatability- Majority Compatablity Class 6.3
- Combined Future Resources Structure Types Compatibility- Compatablity Class 6.3
- Existing Landscape Character Units Structural Method Compatibility- Compatablity Class 3 encompasses Non-Structural, Soft Structural, and Semi-Soft Structural
- Future Landscape Character Units Structual Method Compatibilty- Majority Compatibility Class 3
- Open Space Resources Structure Types Compatibility- Compatablity Class 1, Non-Structural at 107th Ave. for Flood Plain area. This area is already constructed as subdivion lots and on-site retention
- Combined Existing Resources Structual Method Compatibility- Majority Compatibility Class 3
- Combined Future Resources Structural Method Compatabilty- Compatibility Class 3
- Landscape Design Themes Compatible with Landscape Character Units- Suburban Valley Plains is compatible with Natural Lower Sonoran Dester, Natural Sonoran Desert Riparian, Natural Sonoran Desert Hydor Riparian, Semi-Natural Sonoran Desert, Enhanced Desert, Desert Park, and Desert Oasis. Existing corridor resembles Enhanced Desert Theme and Desert Park Theme

The corridor design will aslo need to be in accordance with FCDMC's *Policy for Aesthetic Treatment and Landscaping of Flood Control Projects*, *Landscape Aesthetics & Multi-use Design Guidelines for Flood Control Basins, Channels and Flood Retarding Structures*, *Context Sensitive Flood Hazard Mitigation Planning and Design Model*, and City of Phoenix standard details and supplements to MAG.

2-2010

Lower Buckeye Rd.

107th & Elwood Basin

Project Area

Elwood Alignment

89th Drive & Elwood Basin

Santa Maria Park

107th Ave.

99th Ave.

95th Ave. Alignment

91st Ave.

89th Ave. Alignment

83rd Ave.

79th Ave.

75th Ave.

67th Ave.

Broadway Rd.

103rd Ave.

71st Ave.

Roeser Rd.

Tres Rios
City of Phoenix
Project

Southern Ave.

Oeste Project

Salt River

Trailside Point Park

Baseline Rd.

Legend:

Regional Trail Connections Per C.O.P. & Maricopa County

Proposed Neighborhood Park City of Phoenix

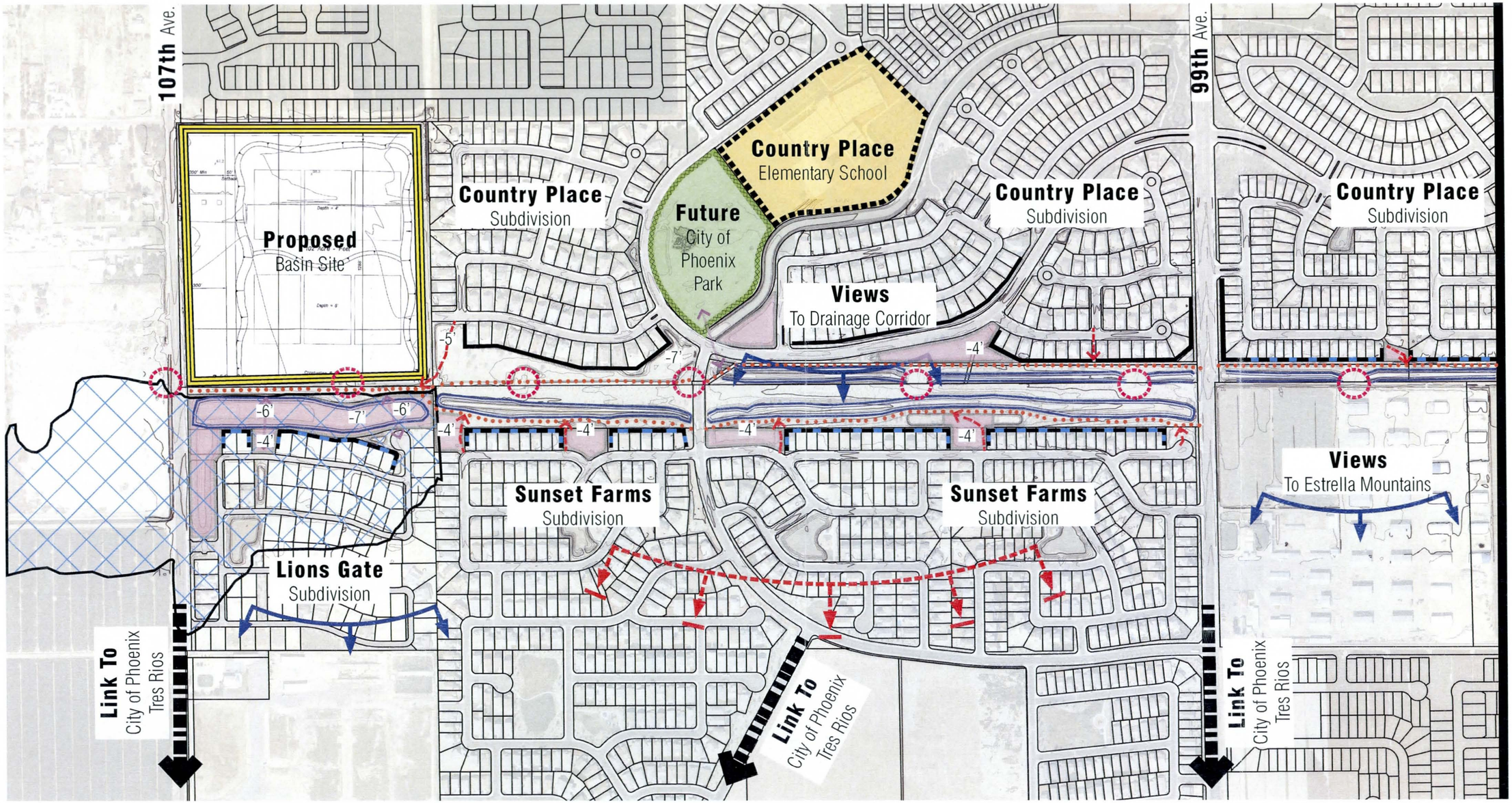
Proposed District Park City of Phoenix

Existing Parks City of Phoenix

NTS North

Durango Regional Conveyance Channel
Elwood Street (75th Ave to 107th Ave.)

FIGURE: 1 Regional Trail Connection
(Page 1 of 1)



Matchline See Figure 2.2

2-2010

Legend:

- Existing Trail Connections
- Potential Trail Connections
- Developed Trail
- Developed Trail (COP Maintained)
- Undeveloped Trail
- Tailwater Ditch
- Power Pole Location 230 Kv
- Potential Pedestrian Refuge
- View Fence
- Solid Wall
- Top of Existing Channel or Basin
- Steep Slope
- End of Road/ Barricade
- Proposed City of Phoenix Parks
- Elementary Schools
- Proposed Basin Site
- Floodplain Delineation
- Private Open Space/ Retention
- -X' Depth of Basin or Channel Below Trail or Road Grade
- Unobstructed Views
- Obstructed Views

0 250' 500' 1000' North

Durango Regional Conveyance Channel
Elwood Street (75th Ave to 107th Ave.)

FIGURE: 2.1 Corridor Opportunities / Constraints

engineering and environmental design

Matchline See Figure 2.1

Matchline See Figure 2.3

2-2010

Country Place
Subdivision

Country Place
Subdivision

91st Ave.

Hurley Ranch
Subdivision

Volterra
Subdivision

Open Views
To Drainage Corridor

Views
To Estrella Mountains

Future
City of
Phoenix Park &
Proposed
Basin Site

Hurley Ranch
Elementary School

Tivoli
Subdivision

Union
Elementary School

Link To
City of Phoenix
Tres Rios

Link To
City of Phoenix
Tres Rios

-4' -5' -5 -4' -2' -3 -6' -5' -6' -6' -4 -6' -5' -5' -5'

-5'

Legend:

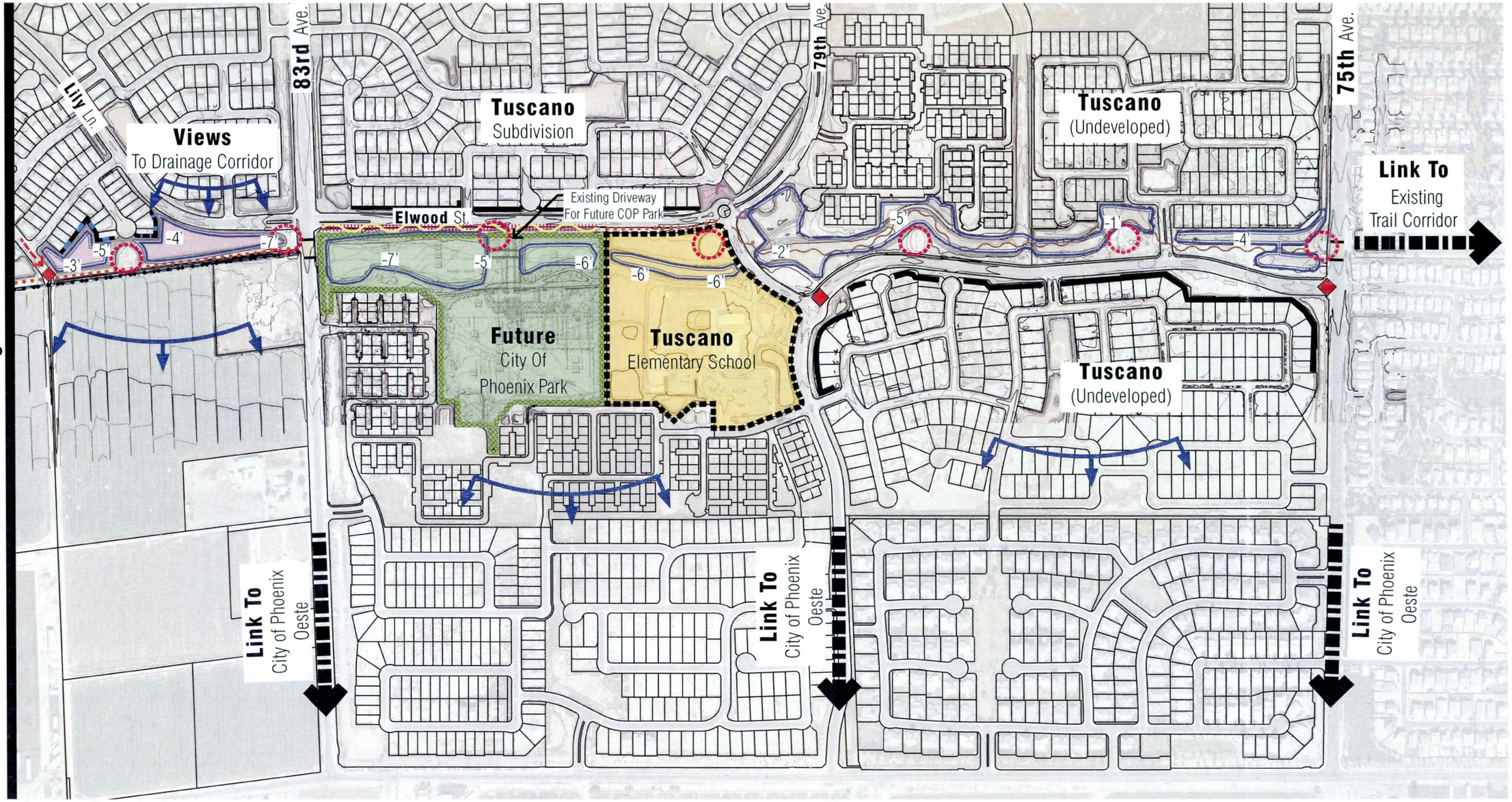
- Existing Trail Connections
- Potential Trail Connections
- Developed Trail
- Developed Trail (COP Maintained)
- Undeveloped Trail
- Tailwater Ditch
- Power Pole Location 230 Kv
- Potential Pedestrian Refuge
- View Fence
- Solid Wall
- Top of Existing Channel or Basin Steep Slope
- End of Road/ Barricade
- Proposed City of Phoenix Parks
- Elementary Schools
- Proposed Basin Site
- Floodplain Delineation
- Private Open Space/ Retention
- -X' Depth of Basin or Channel Below Trail or Road Grade
- Unobstructed Views
- Obstructed Views

0 250' 500' 1000' North

Durango Regional Conveyance Channel
Elwood Street (75th Ave to 107th Ave.)

FIGURE: 2.2 Corridor Opportunities / Constraints

Matchline See Figure 2.2



Legend:

- Existing Trail Connections
- Potential Trail Connections
- Developed Trail
- Developed Trail (COP Maintained)
- Undeveloped Trail
- Tailwater Ditch
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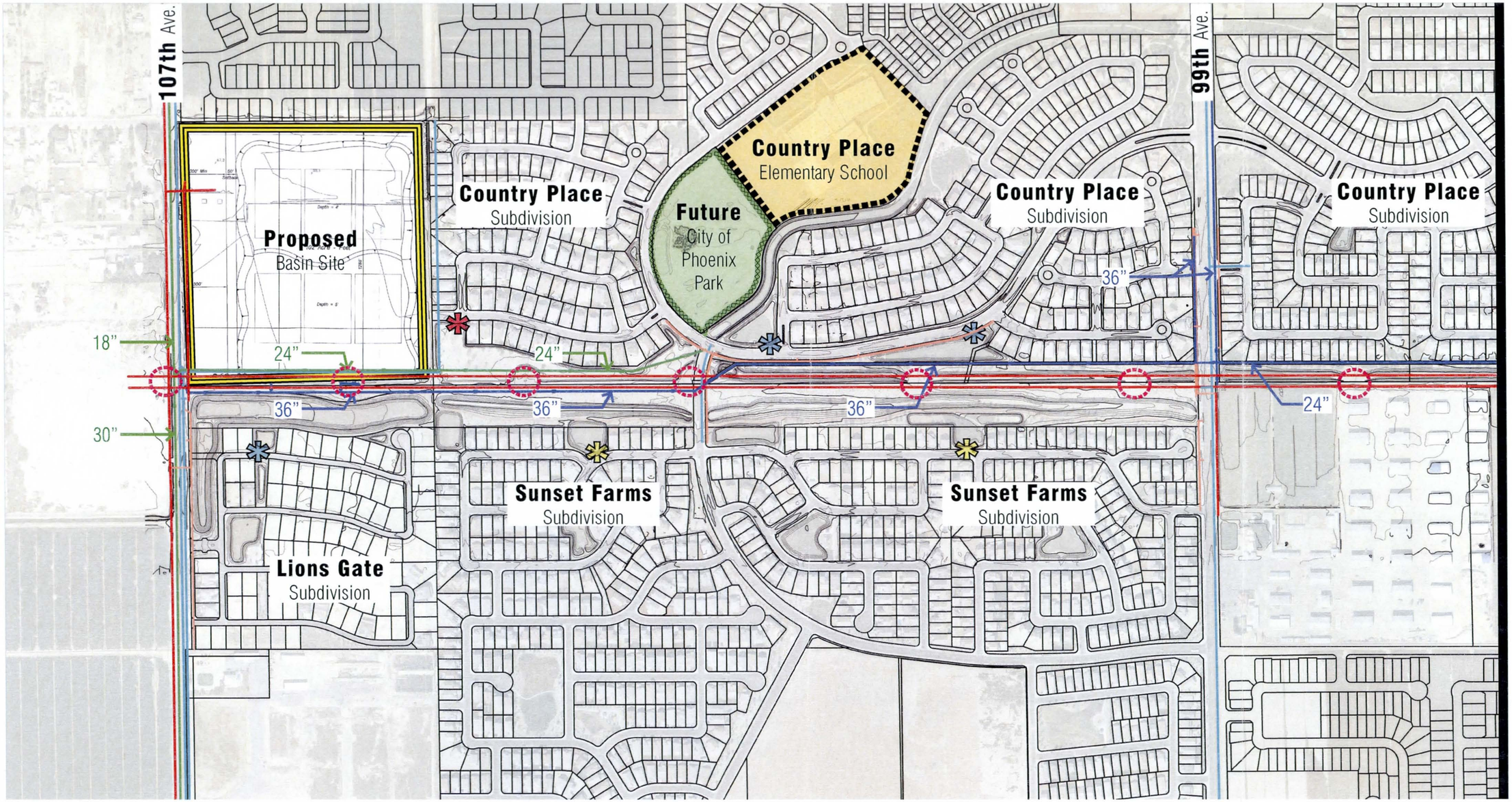
- Potential Pedestrian Refuge
- View Fence
- Solid Wall
- Top of Existing Channel or Basin
- Steep Slope
- End of Road/ Barricade
- Proposed City of Phoenix Parks
- Elementary Schools
- Proposed Basin Site
- Floodplain Delineation
- Private Open Space/ Retention
- -X' Depth of Basin or Channel Below Trail or Road Grade
- Unobstructed Views
- Obstructed Views

0 250' 500' 1000' North

Durango Regional Conveyance Channel
Elwood Street (75th Ave to 107th Ave.)

FIGURE: 2.3 Corridor Opportunities / Constraints



Legend:

- 2" Water Meter
- 1-1/2" Water Meter
- 1" Water Meter
- 3/4" Water Meter
- Overhead Power
- Underground Power
- Water
- Irrigation
- Sanitary Sewer
- Developed Trail
- Undeveloped Trail
- Power Pole Location 230 Kv

0 250' 500' 1000' North

Durango Regional Conveyance Channel
Elwood Street (75th Ave to 107th Ave.)

FIGURE: 3.1 Corridor Utilities/Irrigation Points of Connection

2-2010

Matchline See Figure 3.1

Matchline See Figure 3.3

2-2010

Country Place
Subdivision

Country Place
Subdivision

91st Ave.

Hurley Ranch
Subdivision

Volterra
Subdivision

18"
15"
12"
48"
12"
12"
24"
24"
18"
72"

Hurley Ranch
Elementary School

Future
City of
Phoenix Park &
Proposed
Basin Site

Tivoli
Subdivision

Union
Elementary School

Legend:

- 2" Water Meter
- 1-1/2" Water Meter
- 1" Water Meter
- 3/4" Water Meter
- Overhead Power
- Underground Power
- Water
- Irrigation
- Sanitary Sewer
- Developed Trail
- Undeveloped Trail
- Power Pole Location 230 Kv

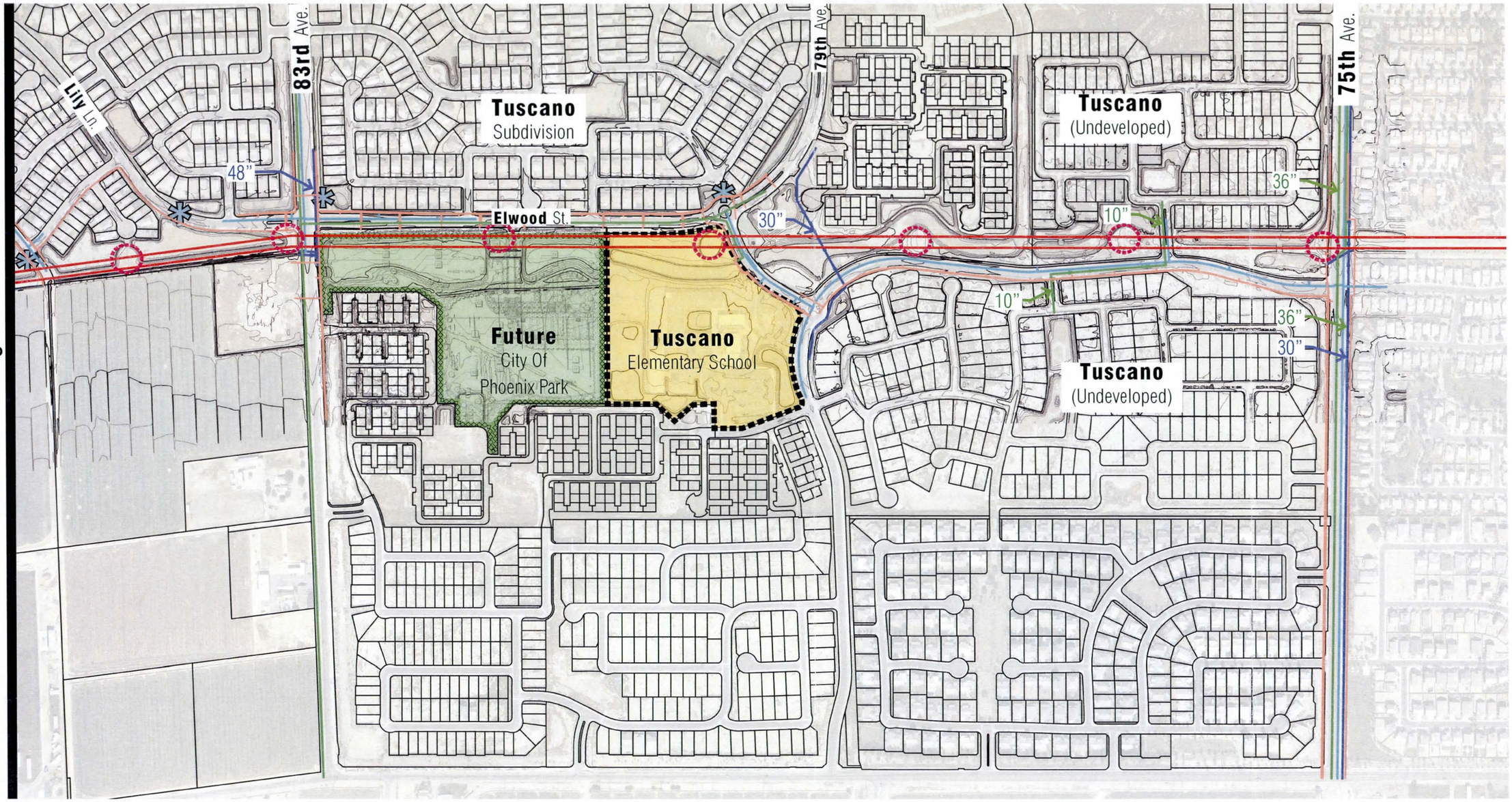
0 250' 500' 1000'

North

Durango Regional Conveyance Channel
Elwood Street (75th Ave to 107th Ave.)

FIGURE: 3.2 Corridor Utilities/Irrigation Points of Connection

engineering and environmental design



Legend:

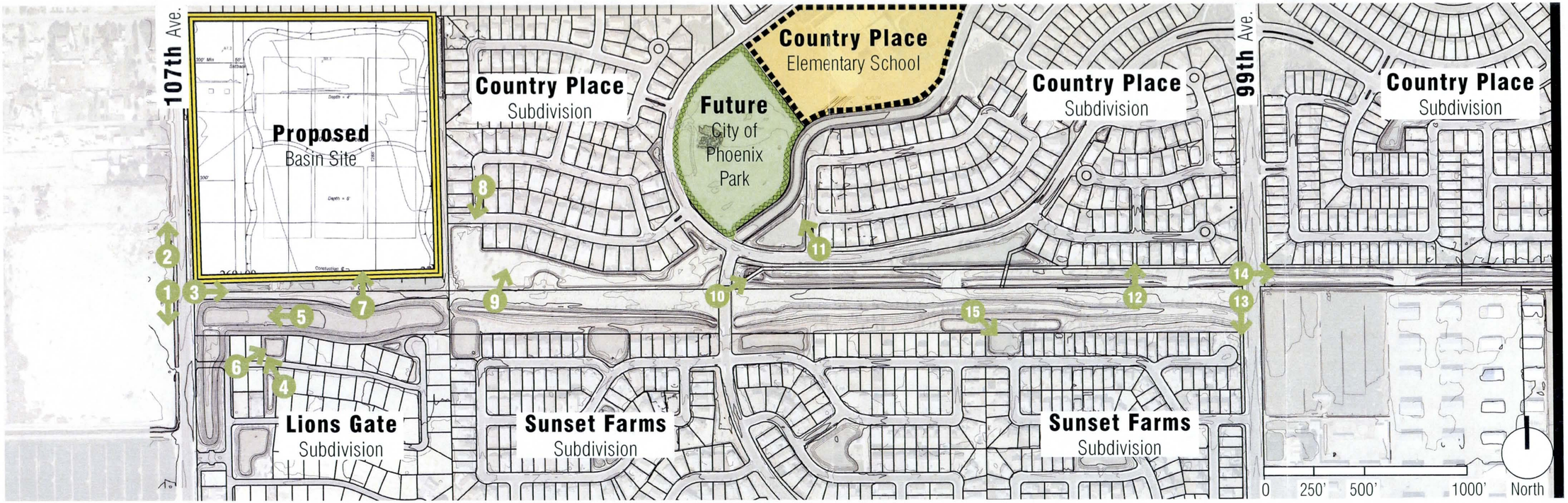
- 2" Water Meter
- 1-1/2" Water Meter
- 1" Water Meter
- 3/4" Water Meter
- Overhead Power
- Underground Power
- Water
- Irrigation
- Sanitary Sewer
- Developed Trail
- Undeveloped Trail
- Power Pole Location 230 Kv

0 250' 500' 1000' North

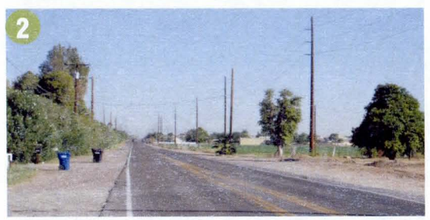
Durango Regional Conveyance Channel
Elwood Street (75th Ave to 107th Ave.)

FIGURE: 3.3 Corridor Utilities/Irrigation Points of Connection

2-2010



Matchline See Figure 4.2

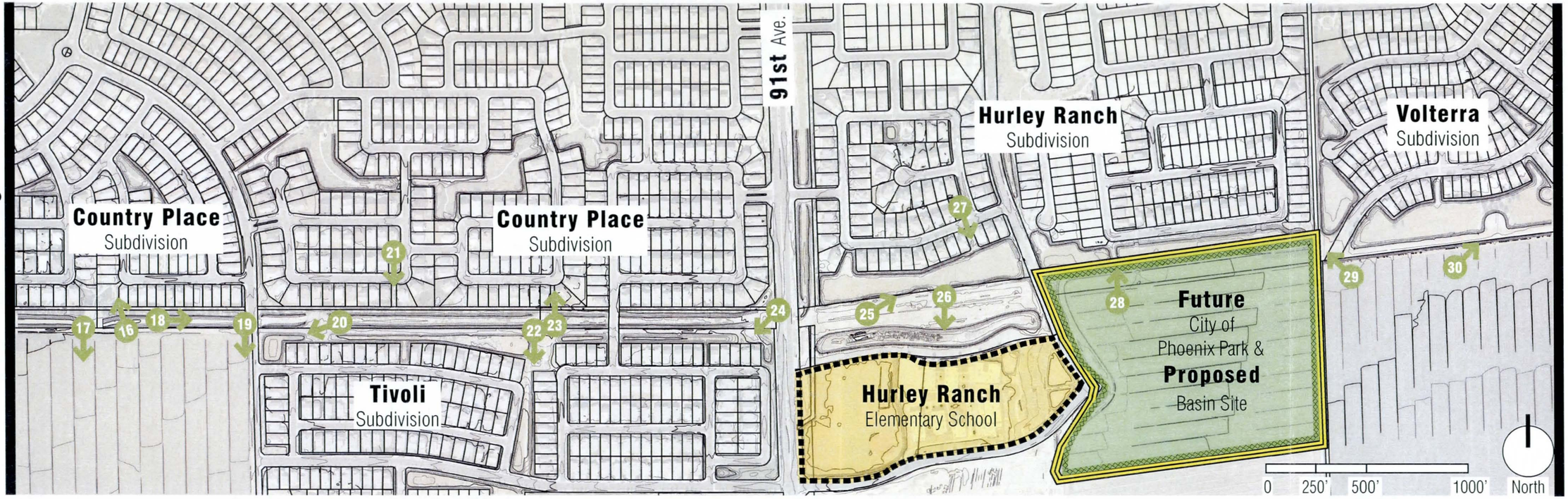


Durango Regional Conveyance Channel
Elwood Street (75th Ave to 107th Ave.)

FIGURE: 4.1 Corridor Photo Inventory

For Additional Imagery See Photo Log Appendix

Matchline See Figure 4.1



Matchline See Figure 4.3

2-2010

Flood Control District of Maricopa County

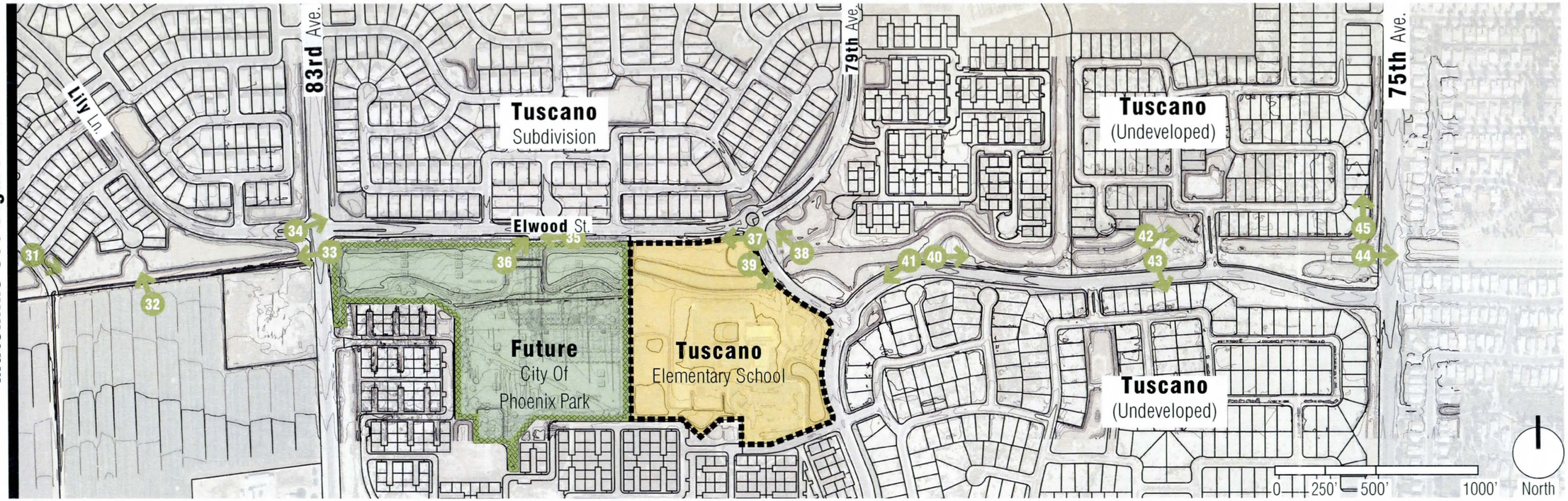
Durango Regional Conveyance Channel
Elwood Street (75th Ave to 107th Ave.)

FIGURE: 4.2 Corridor Photo Inventory

For Additional Imagery See Photo Log Appendix

J2 engineering and environmental design

Matchline See Figure 4.2



Durango Regional Conveyance Channel
Elwood Street (75th Ave to 107th Ave.)

FIGURE: 4.3 Corridor Photo Inventory

For Additional Imagery See Photo Log Appendix

2-2010

2-2010

Tuscano

Trees:
Chilopsis linearis - Desert Willow
Olea europea - Swan Hill Olive
Parkinsonia praecox - Palo Brea

Shrubs/Accents:
Agave vilmoriana - Octopus Agave
Cordia boissieri - Texas Olive
Hesperaloe parviflora - Red Yucca
Lantana montevidensis - Trailing Lantana
Lecuophyllum frutescens - Texas Sage

Turf

Country Place

Trees:
Dalbergia sissoo - Indian Rosewood
Olea europea - Swan Hill Olive
Parkinsonia x 'Desert Museum' - Palo Verde
Ulmus parvifolia - Evergreen Elm

Shrubs/Accents:
Acacia redolens - Desert Carpet
Bougainvillea -
Caesalpinia pulcherrima - Red Bird of Paradise
Convolvulus cneorum - Bush Morning Glory
Dasylirion wheeleri - Desert Spoon
Lantana species 'New Gold' - Lantana
Leucophyllum frutescens - Green Cloud
Muhlenbergia capillaris - Regal Mist
Ruellia peninsularis - Desert Ruellia
Tecoma x 'Orange Jubilee' - Orange Bells

Turf

Tivoli

Trees:
Acacia farnesiana - Sweet Acacia
Dalbergia sissoo - Indian Rosewood
Fraxinus Uhedi - Shamel Ash
Quercus virginiana - Southern Live Oak
Ulmus parvifolia - Evergreen Elm

Shrubs/Accents:
Acacia redolens - Desert Carpet
Baccharis sarothroides - Desert Broom
Caesalpinia pulcherrima - Red Bird of Paradise
Hesperaloe parviflora - Red Yucca
Lantana species 'New Gold' - Lantana
Leucophyllum frutescens - Green Cloud
Muhlenbergia capillaris - Regal Mist
Nerium oleander - Dwarf Pink Oleander
Rosmarinus officinalis - Rosemary

Turf

Volterra

Trees:
Dalbergia sissoo - Indian Rosewood
Eucalyptus papuana - Ghost Gum
Parkinsonia x 'Desert Museum' -
Desert Museum Palo Verde

Shrubs/Accents:
Acacia redolens - Desert Carpet
Bougainvillea
Caesalpinia mexicana -
Mexican Bird of Paradise
Leucophyllum frutescens - Green Cloud
Muhlenbergia rigens- Deer Grass
Nolina microcarpa - Bear Grass
Tecoma x 'Orange Jubilee' - Orange Bells

Turf

Hurley Ranch

Trees:
Acacia salicina - Willow Acacia
Dalbergia sissoo - Indian Rosewood
Fraxinus Uhedi - Shamel Ash
Parkinsonia x 'Desert Museum' - Palo Verde
Pistache chinesnsis - Chinese Pitstache
Prosopis chilensis - Chilean Mesquite

Shrubs/Accents:
Acacia redolens - Desert Carpet
Baccharis sarothroides - Desert Broom
Convolvulus cneorum - Bush Morning Glory
Dodonaea viscosa - Hop Bush
Lantana species 'New Gold' - Lantana
Leucophyllum frutescens - Green Cloud
Muhlenbergia rigens- Deer Grass
Tecoma stans - Yellow Bells

Turf

Sunset Farms

Trees:
Acacia salicina - Willow Acacia
Parkinsonia florida - Blue Palo Verde
Prosopis chilensis - Chilean Mesquite

Shrubs/Accents:
Agave vilmoriana - Octopus Agave
Calliandra californica - Red Fairy Duster
Convolvulus cneorum - Bush Morning Glory
Dalea greggii - Trailing Indigo Bush
Dasylirion wheeleri - Desert Spoon
Dodonaea viscosa - Hop Bush
Eremophila maculata - Valentine
Hesperaloe parviflora - Red Yucca
Lantana species 'New Gold' - Lantana
Ruellia peninsularis - Desert Ruellia
Tecoma stans - Yellow Bells
Tecoma x 'Orange Jubilee' - Orange Bells

Turf

Lions Gate

Trees:
Acacia farnesiana - Sweet Acacia
Bahinia congesta - Purple Orchid Tree
Caesalpinia cacalaco - Cascalote
Dalbergia sissoo - Indian Rosewood
Fraxinus Uhedi - Shamel Ash
Ulmus parvifolia - Evergreen Elm

Shrubs/Accents:
Acacia redolens - Desert Carpet
Aloe barbedensis - Medicinal Aloe
Eremophila maculata - Valentine
Hesperaloe parviflora - Red Yucca
Leucophyllum frutescens - Green Cloud
Ruellia peninsularis - Desert Ruellia
Senna artemisioides - Feathery Cassia

Turf

Acceptable Trees Allowed Within Arizona Public Service Company Transmission Line Rights of Way

Acacia aneura - Mulga
Acacia farnesiana - Sweet Acacia
Albizia julibrissin - Mimosa
Caesalpinia cacalaco - Cascalote
Cercidium microphyllum -Foothills Palo Verde
Cercidium praecox - Palo Brea
Chilopsis linearis - Desert Willow
Grapefruit & Orange
Phoenix roebelenii - Pygmy Date
Pithecellobium flexicaule - Texas Ebony
Prunus cerasifera 'Krauter Vesuvius'- Purple Leaf Plum
Pyrus kawakamii - Evergreen Pear
Vitex angus-castus - Chaste Tree
Washingtonia robusta - Mexican Fan Palm

Common Corridor Plant Species

Trees:
Acacia farnesiana - Sweet Acacia
Caesalpinia cacalaco - Cascalote
Chilopsis linearis - Desert Willow
Parkinsonia microphylla - Foothills Palo Verde
Parkinsonia praecox - Palo Brea

Shrubs/Accents:
Acacia redolens - Desert Carpet
Convolvulus cneorum - Bush Morning Glory
Hesperaloe parviflora - Red Yucca
Lantana species 'New Gold' - Lantana
Leucophyllum frutescens - Green Cloud
Ruellia peninsularis - Desert Ruellia
Senna artemisioides - Feathery Cassia
Tecoma x 'Orange Jubilee' - Orange Bells

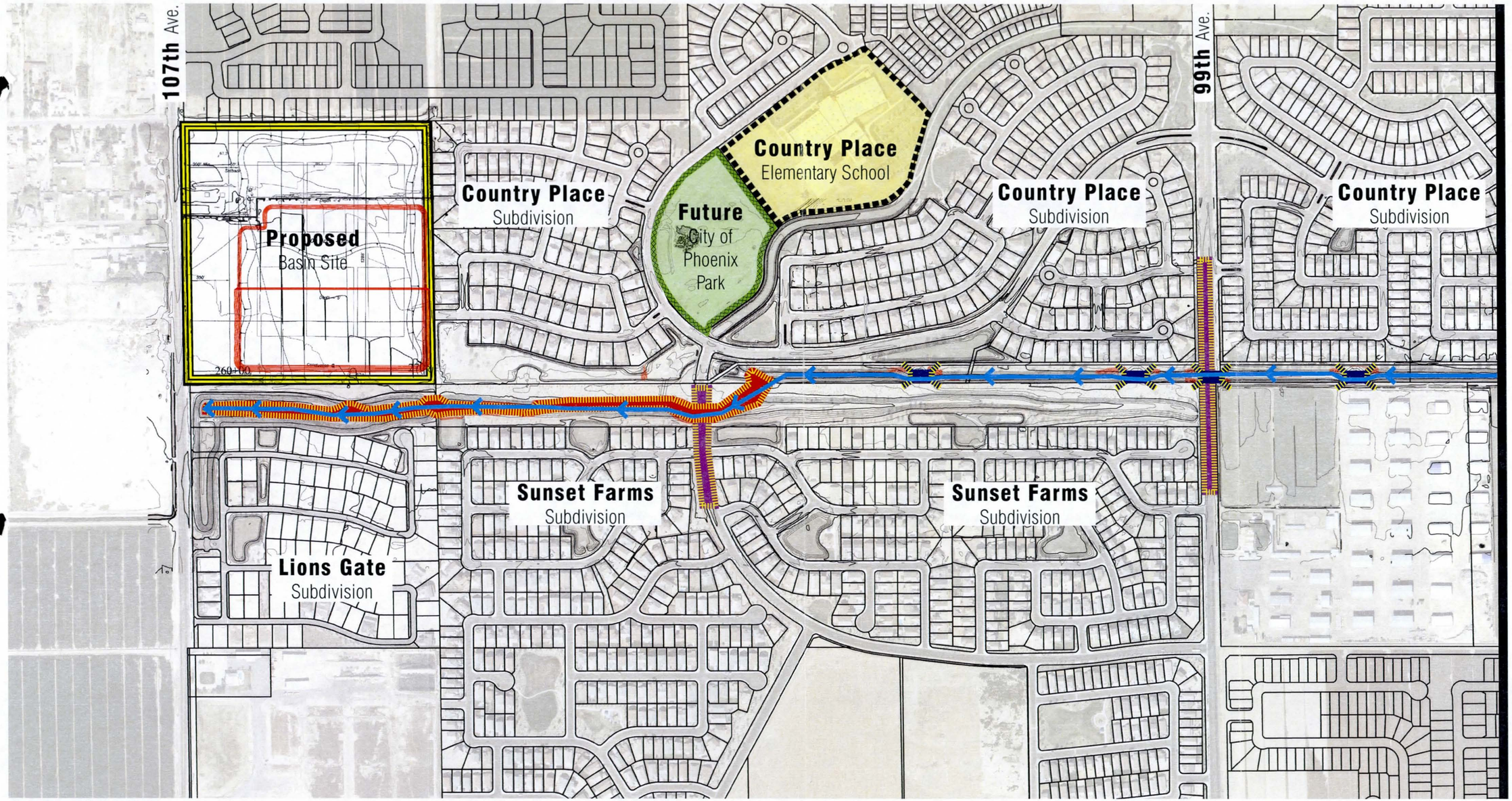
Turf

Flood Control District of Maricopa County

Durango Regional Conveyance Channel
Elwood Street (75th Ave to 107th Ave.)

FIGURE: 5.1 Plant Material

J2 engineering and environmental design



Legend:

- Channel Flow
- Existing Box Culvert Disturbance Area
- Channel Disturbance Area Major Impact
- Channel Disturbance Area Minor Impact
- Roadway Disturbance Area

0 250' 500' 1000' North

12-2009

Durango Regional Conveyance Channel
Elwood Street (75th Ave to 107th Ave.)

FIGURE: 6.1 Limits of Disturbance Concept A

J2 engineering and environmental design

Matchline See Figure 6.1

Matchline See Figure 6.3

12-2009

Country Place
Subdivision

Country Place
Subdivision

91st Ave.

Hurley Ranch
Subdivision

Volterra
Subdivision

Future
City of
Phoenix Park

Hurley Ranch
Elementary School

Union
Elementary School

Tivoli
Subdivision

Legend:

- Channel Flow
- Existing Box Culvert Disturbance Area
- Channel Disturbance Area Major Impact
- Channel Disturbance Area Minor Impact
- Roadway Disturbance Area

0 250' 500' 1000' North

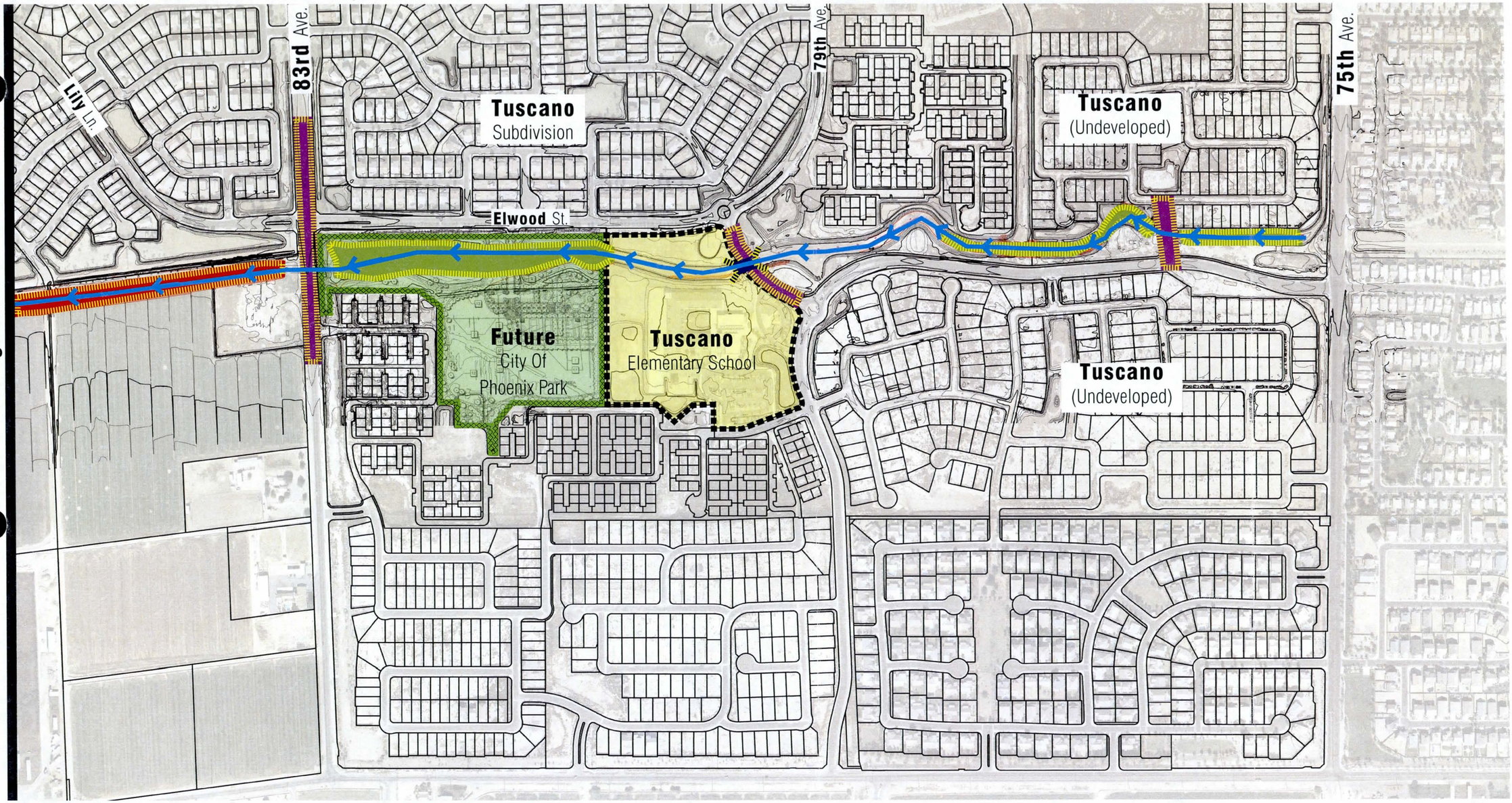
Flood Control District of Maricopa County

Durango Regional Conveyance Channel
Elwood Street (75th Ave to 107th Ave.)

FIGURE: 6.2 **Limits of Disturbance Concept A**

J2 engineering and environmental design

Match line See Figure 6.2



Legend:

- Channel Flow
- Existing Box Culvert Disturbance Area
- Channel Disturbance Area Major Impact
- Channel Disturbance Area Minor Impact
- Roadway Disturbance Area

0 250' 500' 1000' North

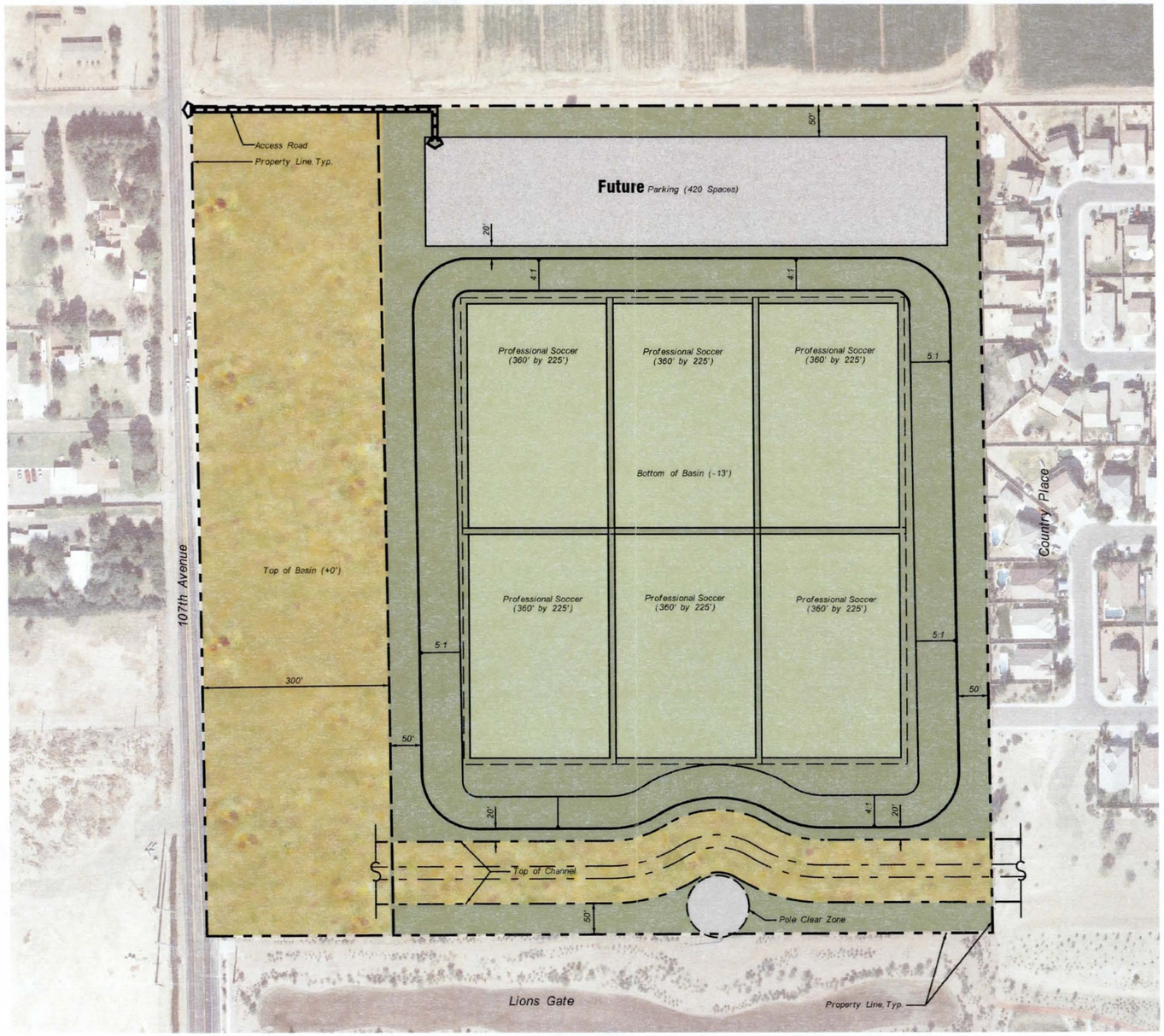
12-2009

Flood Control District of Maricopa County

Durango Regional Conveyance Channel
Elwood Street (75th Ave to 107th Ave.)

FIGURE: 6.3 Limits of Disturbance

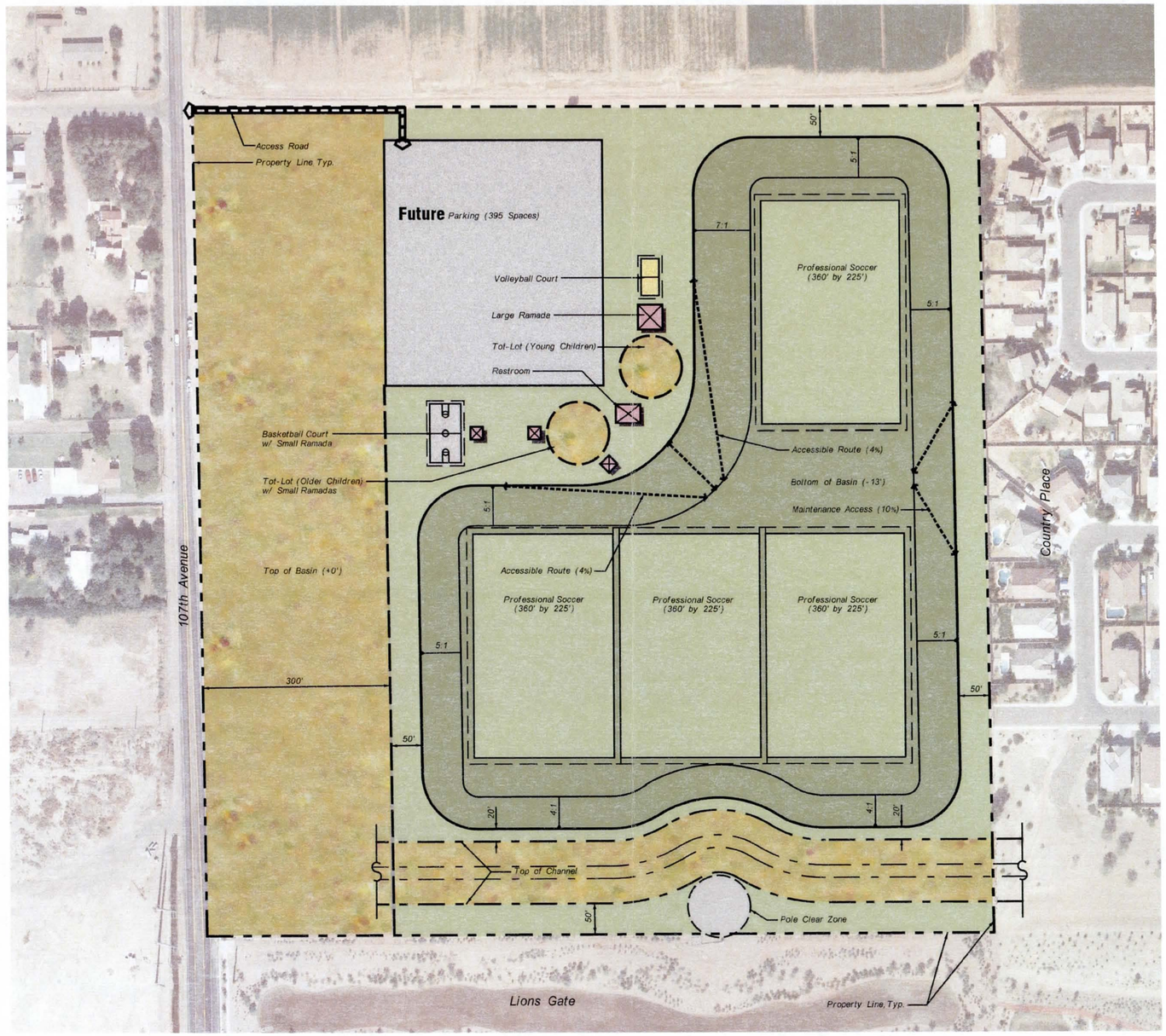
J2 engineering and environmental design



0 100' 200' 500' North

Durango Regional Conveyance Channel
Elwood Street (75th Ave to 107th Ave.)

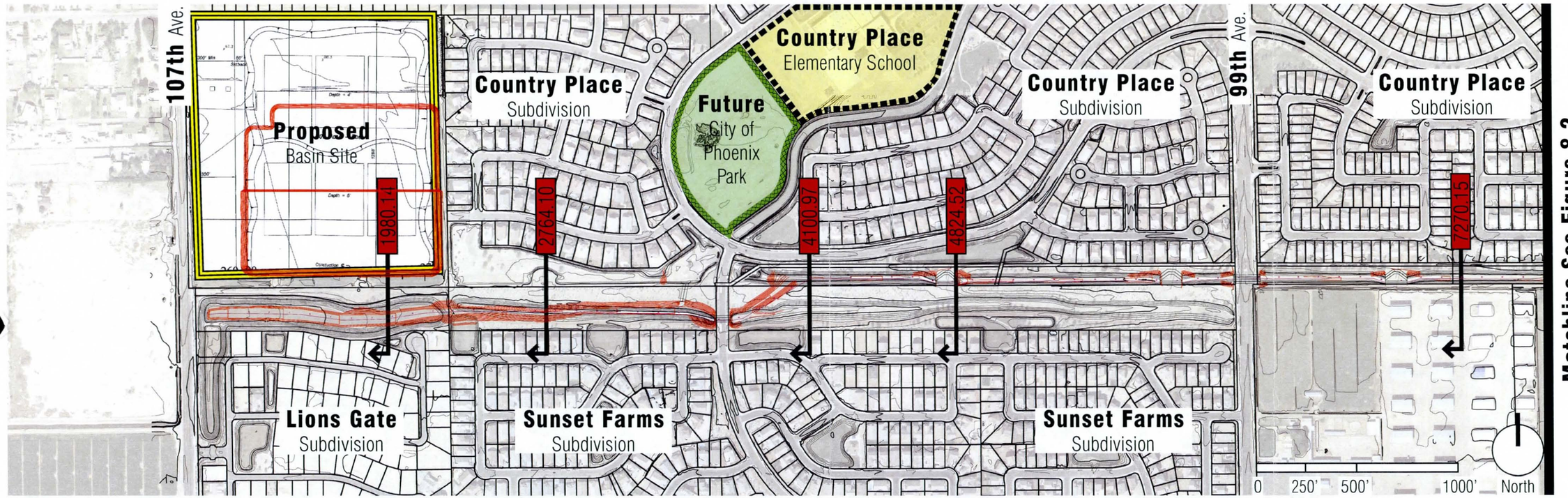
FIGURE: 7.1 Addendum to the DRCC Candidate Assessment Report Modified Basin



0 100' 200' 500' North

Durango Regional Conveyance Channel
Elwood Street (75th Ave to 107th Ave.)

FIGURE: 7.2 Addendum to the DRCC Candidate Assessment Report
Modified Basin (COP Community Park Guidelines)



Legend:

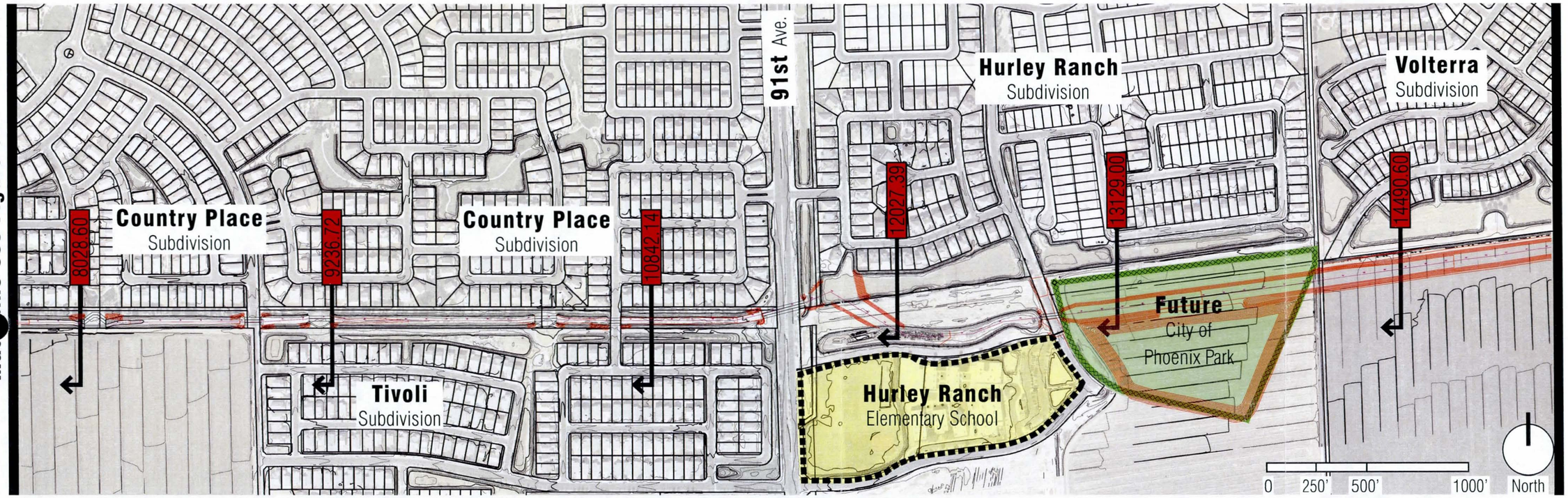
Proposed Channel Contours

See Figures 8.4- 8.11 For All Channel Sections

Durango Regional Conveyance Channel
Elwood Street (75th Ave to 107th Ave.)

FIGURE: 8.1 Channel Sections Plan View

Matchline See Figure 8.1



Matchline See Figure 8.3

Legend:

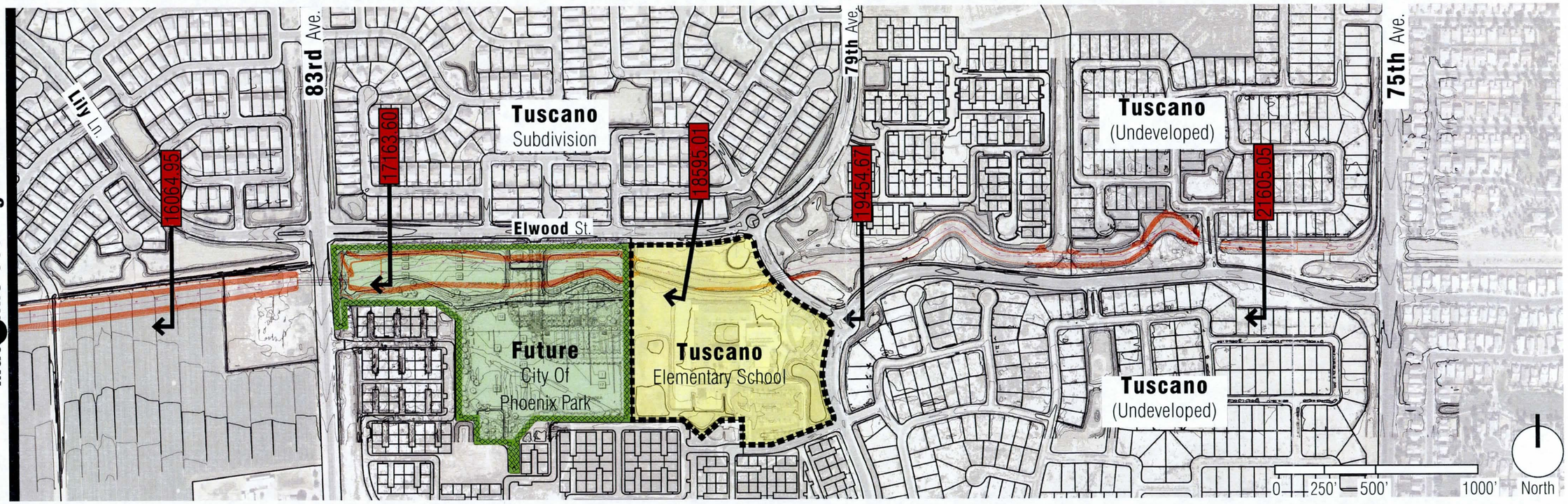
Proposed Channel Contours

See Figures 8.4- 8.11 For All Channel Sections

Durango Regional Conveyance Channel
Elwood Street (75th Ave to 107th Ave.)

FIGURE: 8.2 Channel Sections Plan View

Match line See Figure 8.2



Legend:

Proposed Channel Contours

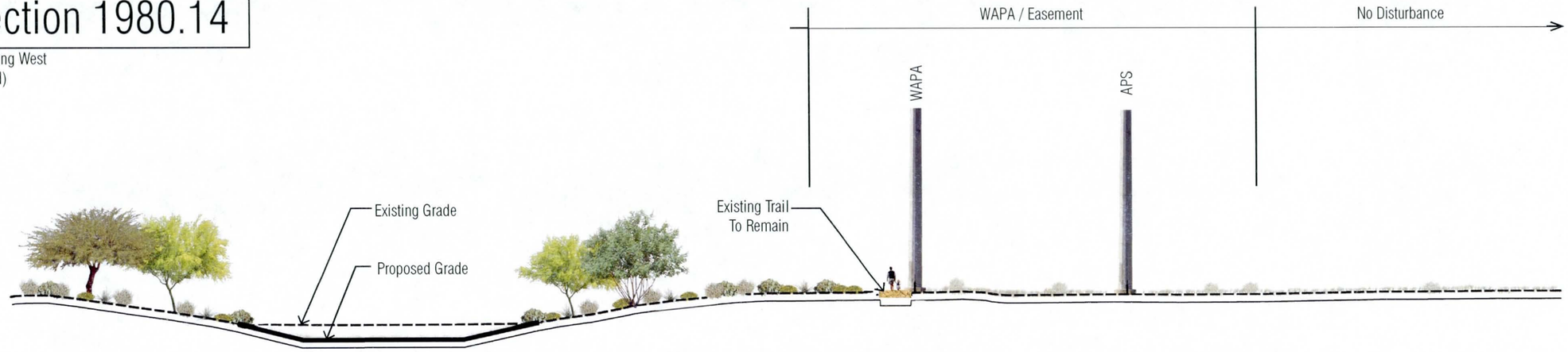
See Figures 8.4- 8.11 For All Channel Sections

Durango Regional Conveyance Channel
Elwood Street (75th Ave to 107th Ave.)

FIGURE: 8.3 Channel Sections Plan View

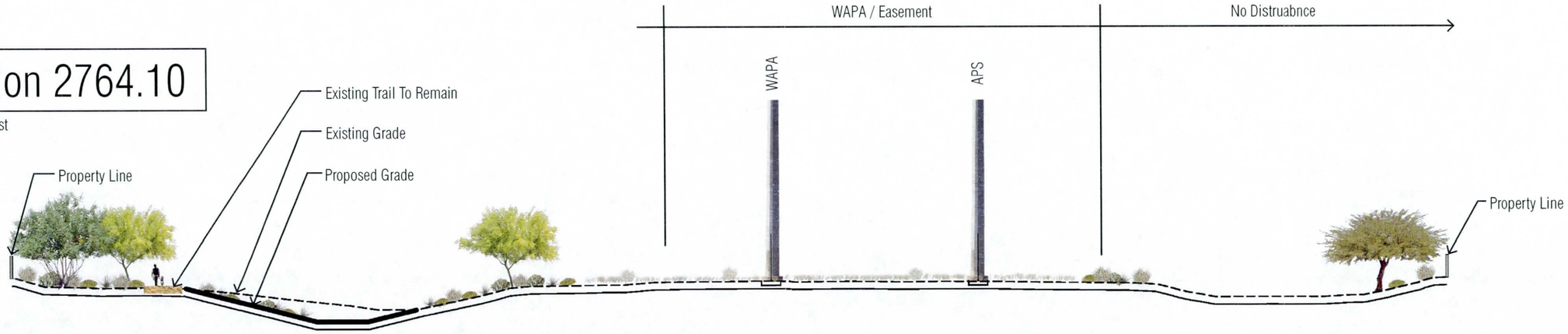
Section 1980.14

View Looking West
(Restricted)



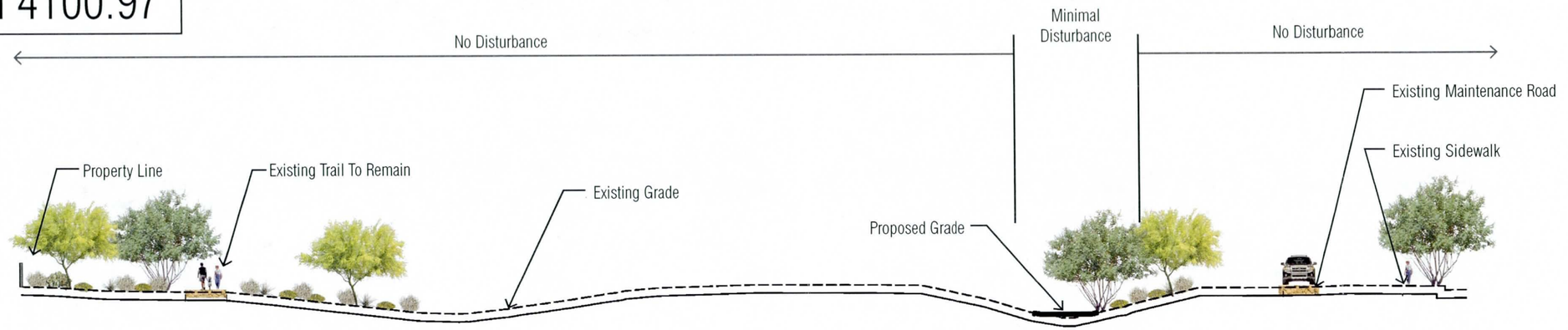
Section 2764.10

View Looking West
(Restricted)



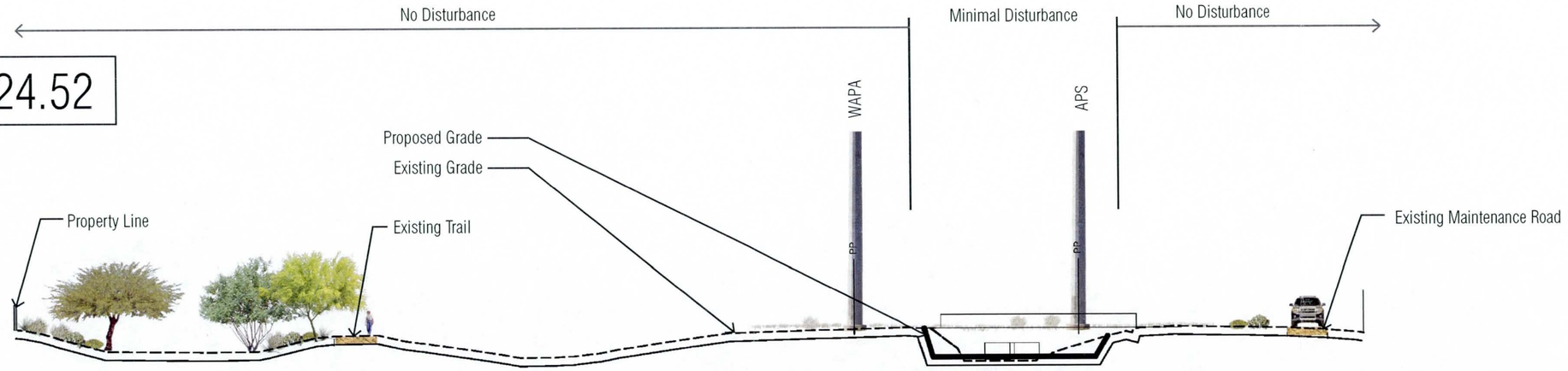
Section 4100.97

View Looking West
(Restricted)



Section 4824.52

View Looking West
(Restricted)

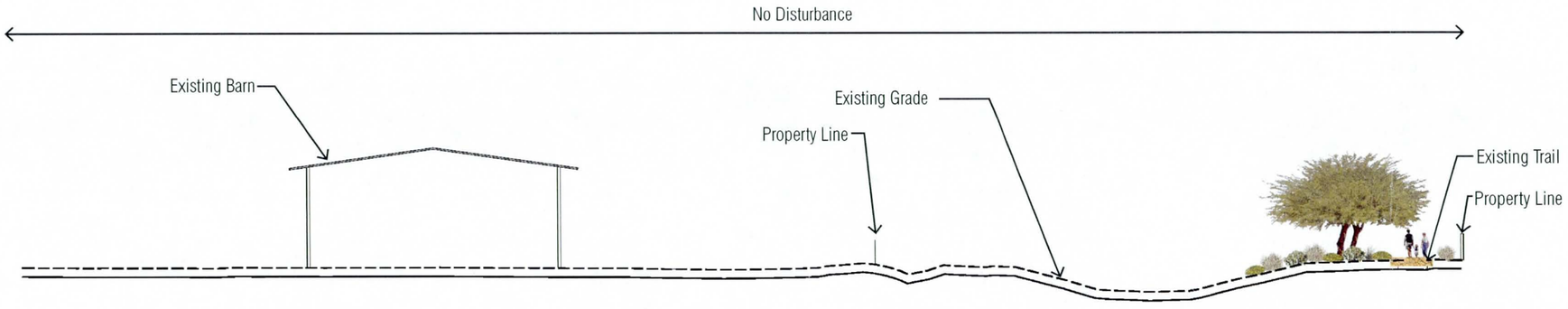


Durango Regional Conveyance Channel
Elwood Street (75th Ave to 107th Ave.)

FIGURE: 8.5 Channel Cross-Sections

Section 7270.15

View Looking West
(Restricted)



Section 8028.60

View Looking West
(Restricted)

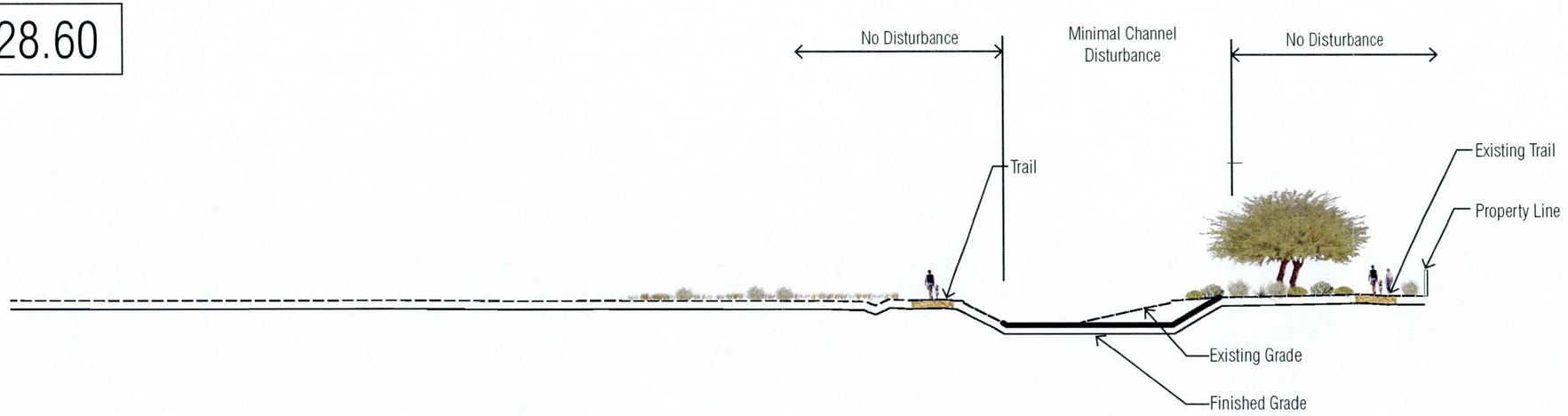
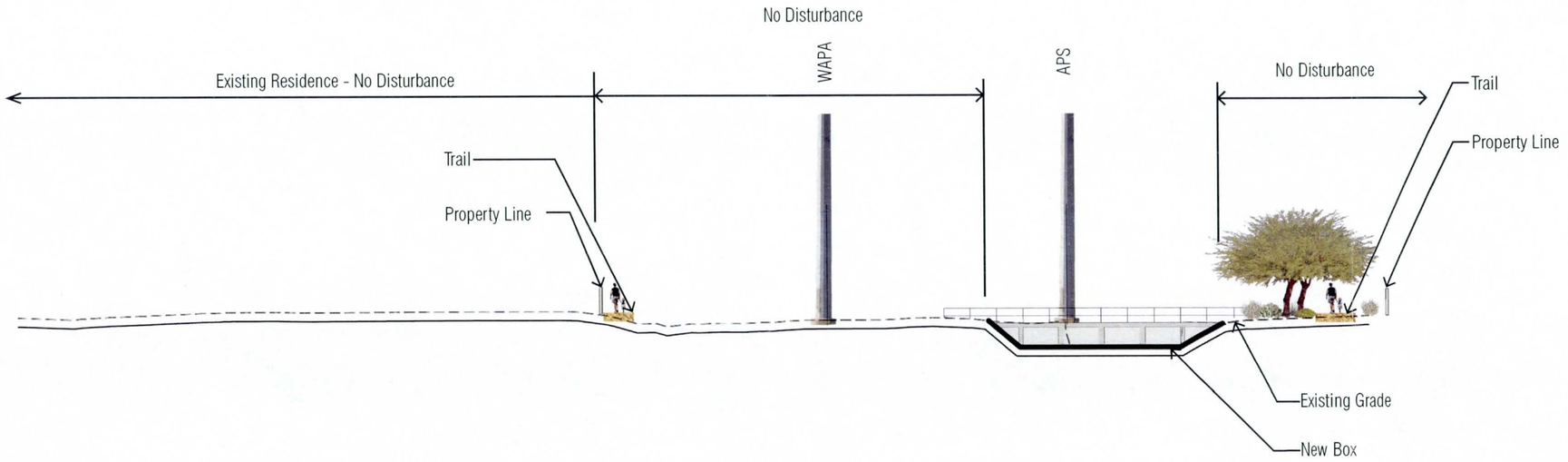


FIGURE: 8.6 Channel Cross-Sections

Section 9236.72

View Looking West
(Restricted)



Section 10824.14

View Looking West
(Restricted)

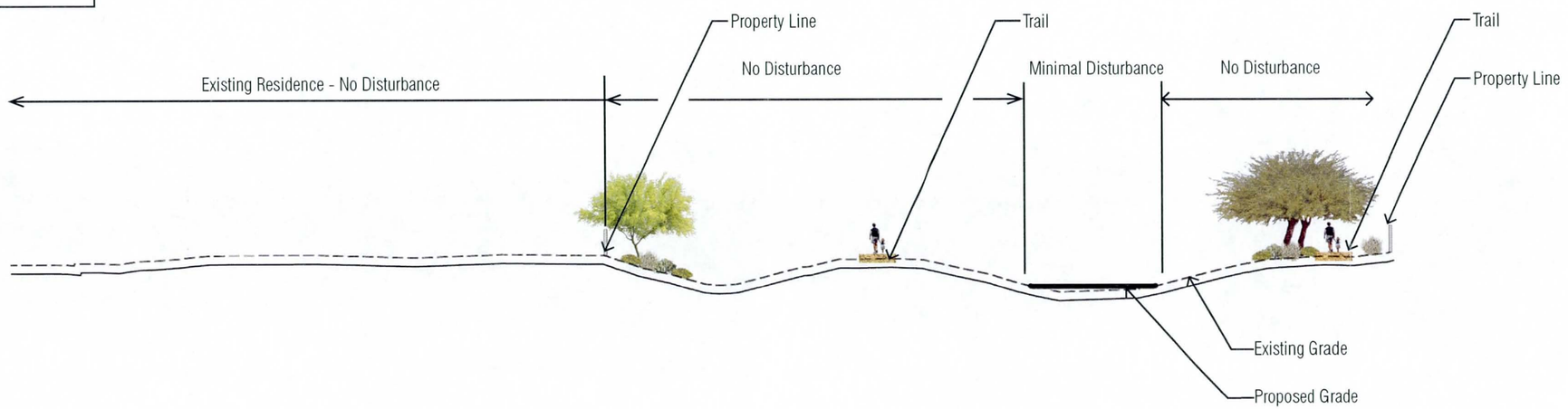
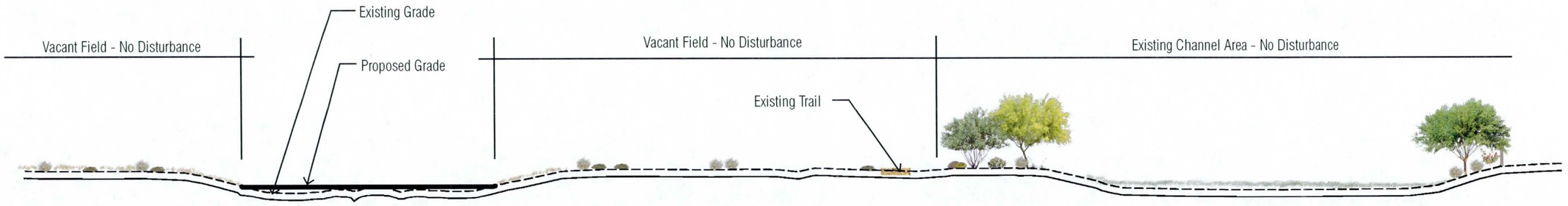


FIGURE: 8.7 Channel Cross-Sections

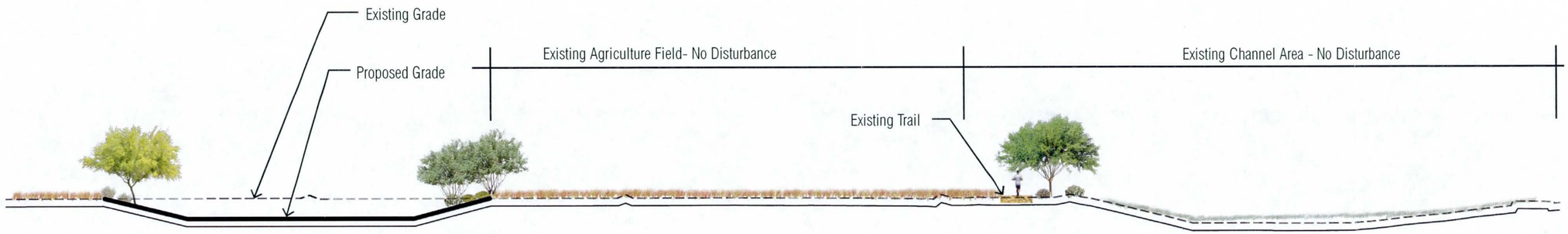
Section 12027.39

View Looking West
(Non-Restricted)



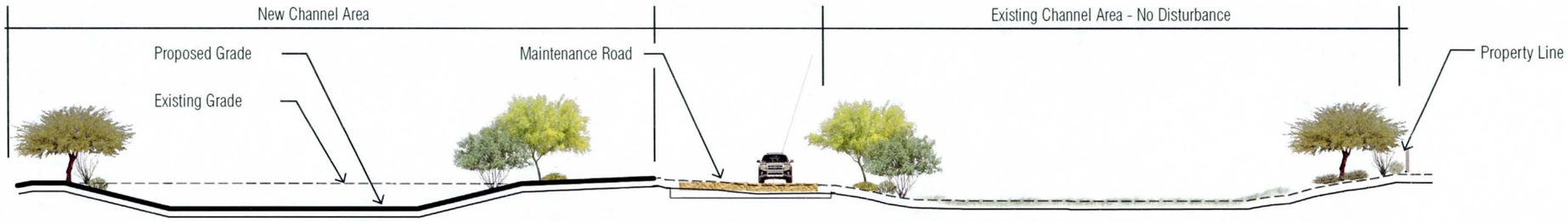
Section 13129.00

View Looking West
(Non-Restricted)



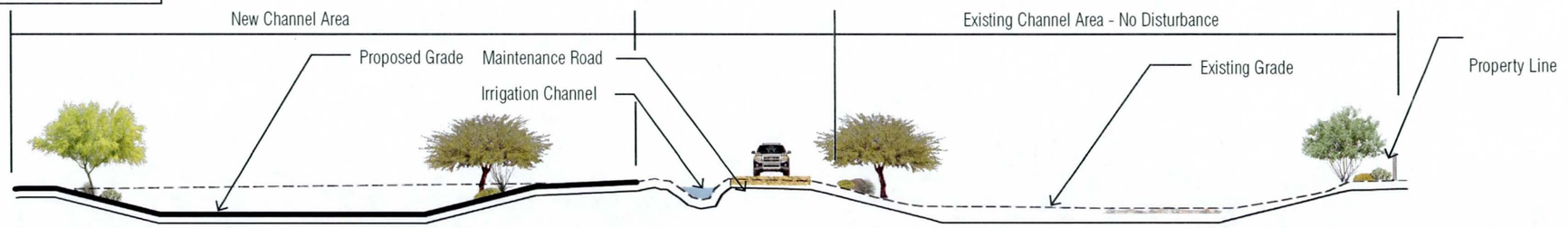
Section 14490.60

View Looking West
(Non-Restricted)



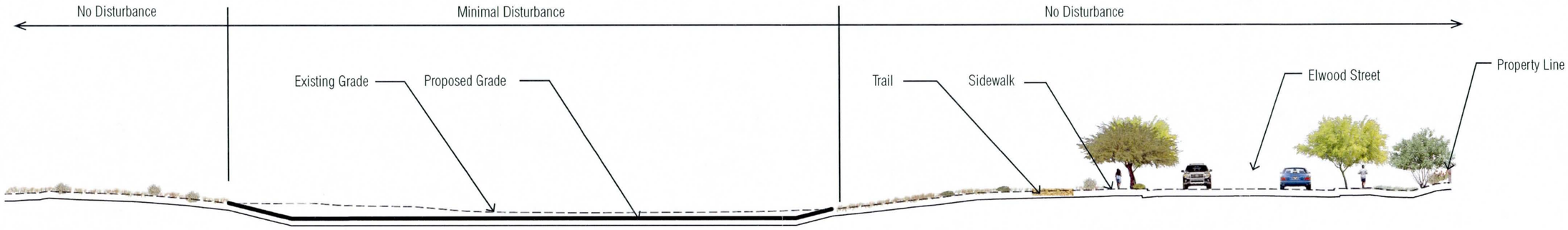
Section 16064.95

View Looking West
(Non-Restricted)



Section 17163.60

View Looking West
(Non-Restricted)



Section 18595.01

View Looking West
(Restricted)

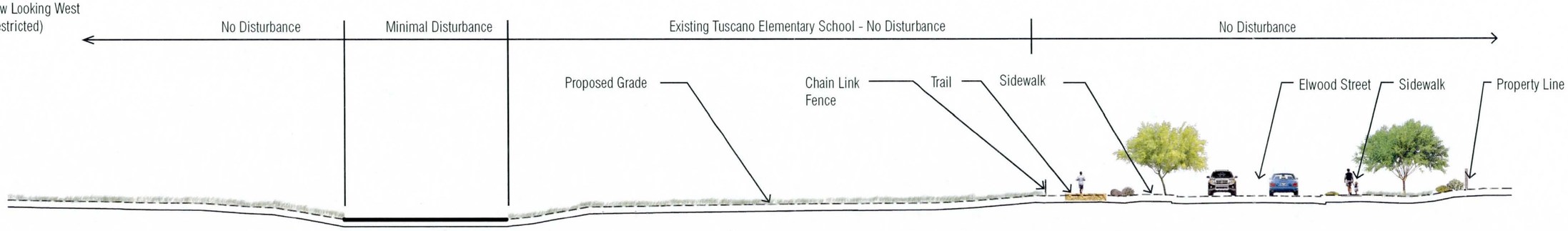
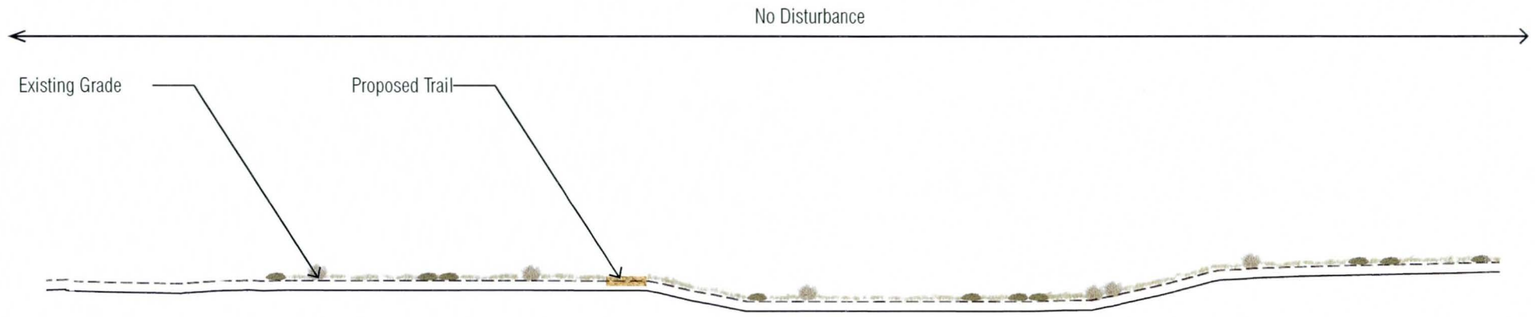


FIGURE: 8.10 Channel Cross-Sections

Section 19454.67

View Looking West
(Non-Restricted)



Section 21605.05

View Looking West
(Non-Restricted)

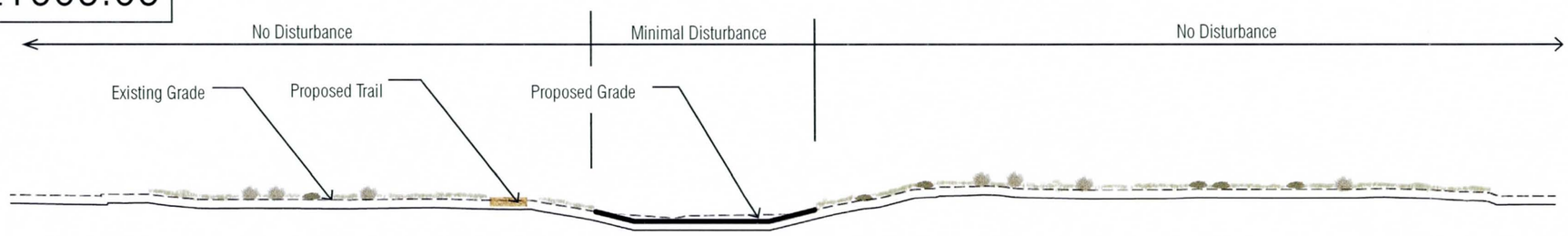
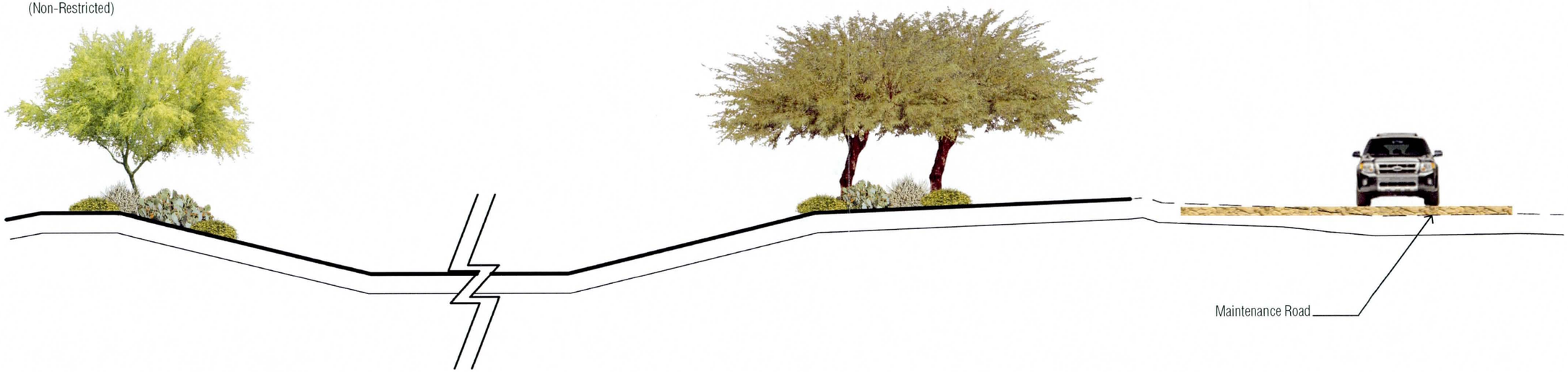


FIGURE: 8.11 Channel Cross-Sections

Section 14490.60

View Looking West
(Non-Restricted)



Plan

(Non-Restricted)

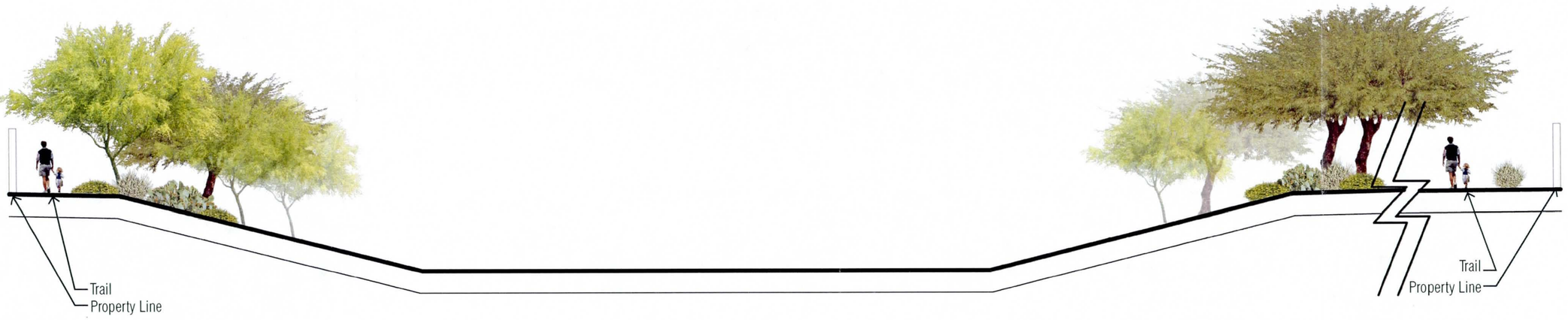
Durango Regional Conveyance Channel
Elwood Street (75th Ave to 107th Ave.)

FIGURE: 8.12 Channel Cross-Sections

J2 engineering and environmental design

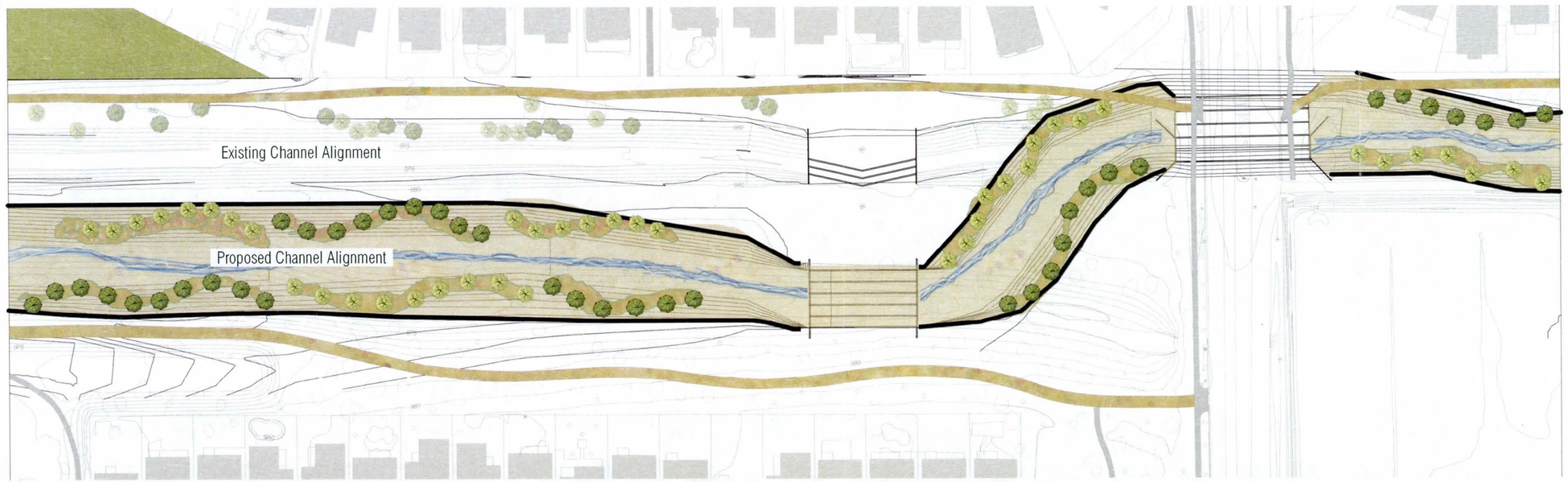
Section 5543.00

View Looking West
(Restricted)



Plan

View Looking West
(Restricted)



Durango Regional Conveyance Channel
Elwood Street (75th Ave to 107th Ave.)

FIGURE: 8.13 Channel Cross-Sections

2-2010

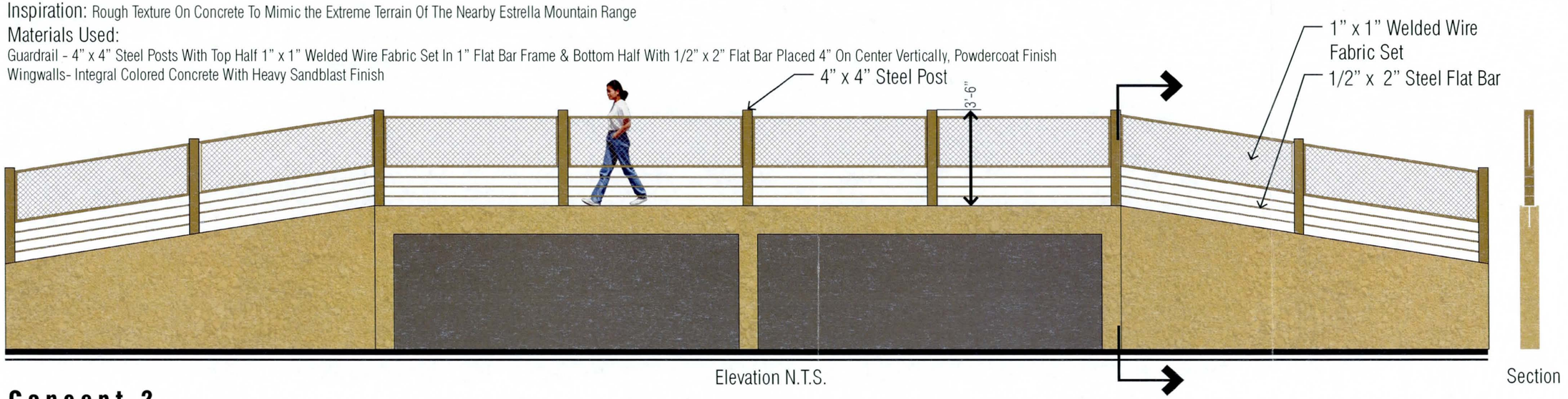
Concept 1

Inspiration: Rough Texture On Concrete To Mimic the Extreme Terrain Of The Nearby Estrella Mountain Range

Materials Used:

Guardrail - 4" x 4" Steel Posts With Top Half 1" x 1" Welded Wire Fabric Set In 1" Flat Bar Frame & Bottom Half With 1/2" x 2" Flat Bar Placed 4" On Center Vertically, Powdercoat Finish

Wingwalls- Integral Colored Concrete With Heavy Sandblast Finish



Elevation N.T.S.

Section

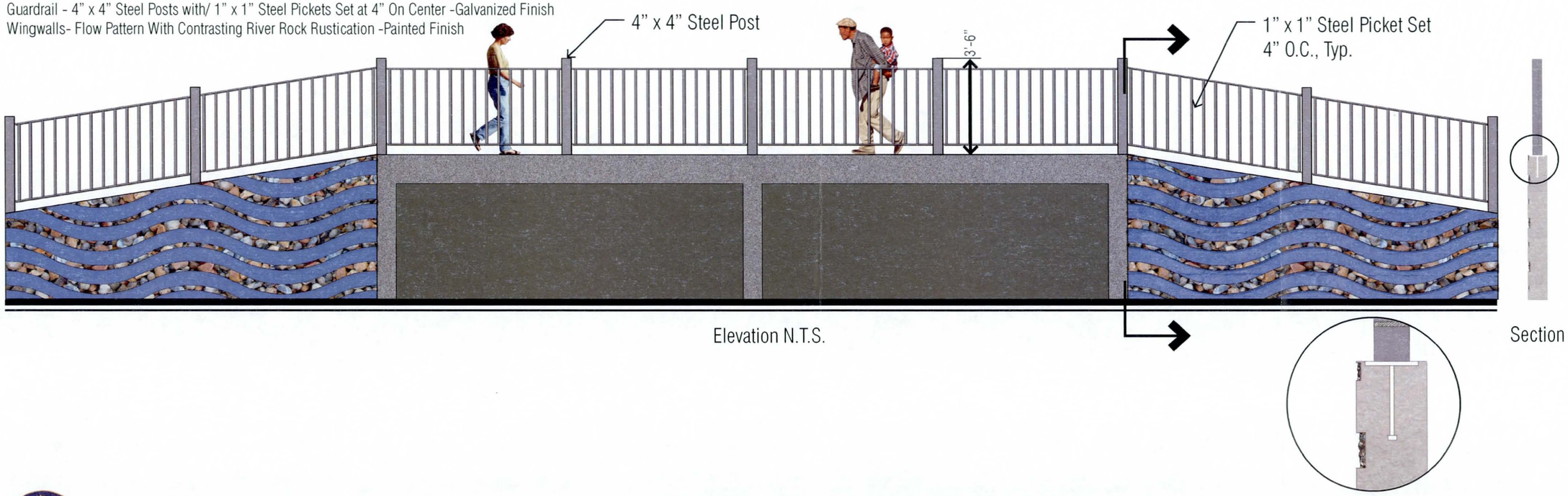
Concept 2

Inspiration: Repeating Arcs Painted Blue to Drawing Inspiration of the Natural Systems of the Nearby Tres Rios Wetlands

Materials Used:

Guardrail - 4" x 4" Steel Posts with/ 1" x 1" Steel Pickets Set at 4" On Center -Galvanized Finish

Wingwalls- Flow Pattern With Contrasting River Rock Rustication -Painted Finish



Elevation N.T.S.

Section

Durango Regional Conveyance Channel
Elwood Street (75th Ave to 107th Ave.)

FIGURE: 9.1 **Box Culvert Aesthetic Treatments**

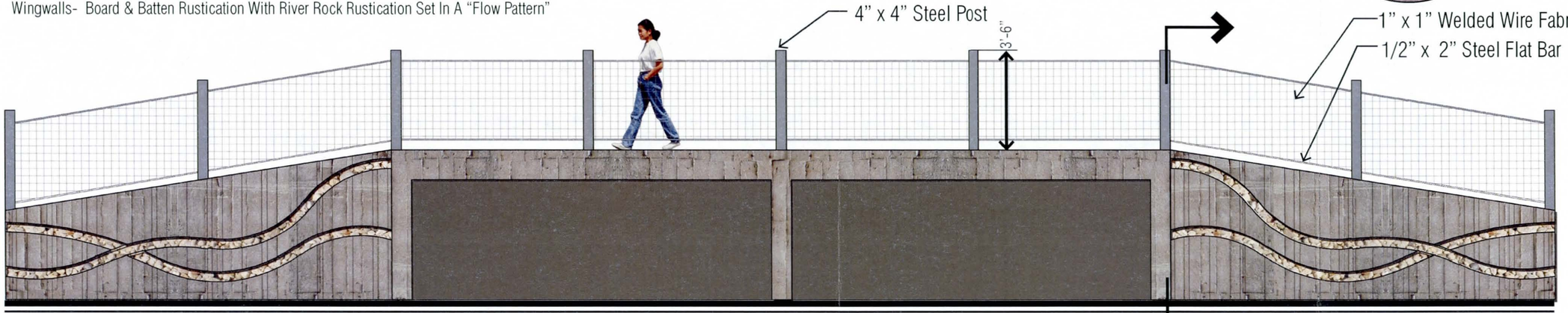
Concept 3

Inspiration: Rough Board Formed Concrete Walls Used As A Historical Connection to the Primitive Canals and Water Delivery Systems Once Used In The Area.

Materials Used:

Guardrail - 4" x 4" Steel Posts With 3" x 3" Welded Wire Fabric Infill Panels -Powdercoat Finish

Wingwalls- Board & Batten Rustication With River Rock Rustication Set In A "Flow Pattern"



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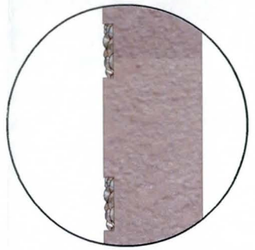


Section

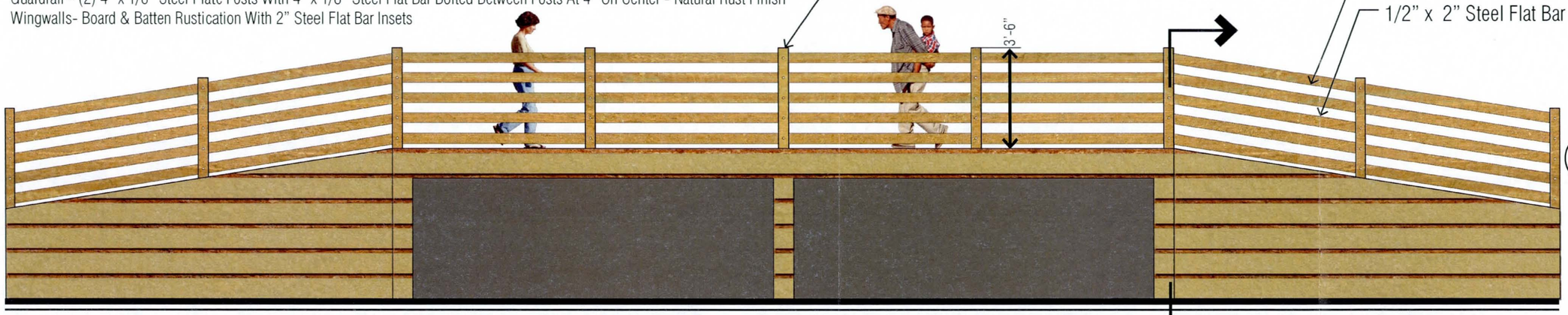
Concept 4

Inspiration: The Use of Repeating Horizontal Rows As A Connection To The Past & Present Farming Fields In The Community .

Materials Used:

Guardrail - (2) 4" x 1/8" Steel Plate Posts With 4" x 1/8" Steel Flat Bar Bolted Between Posts At 4" On Center - Natural Rust Finish

Wingwalls- Board & Batten Rustication With 2" Steel Flat Bar Insets



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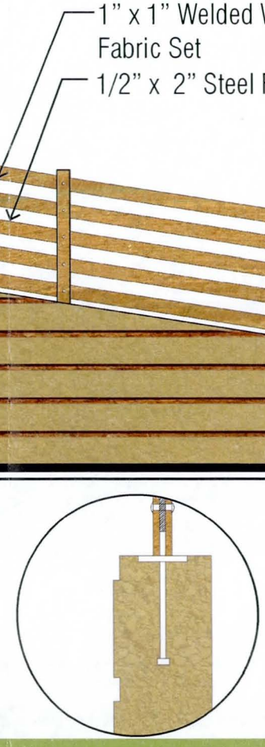


Section

2-2010

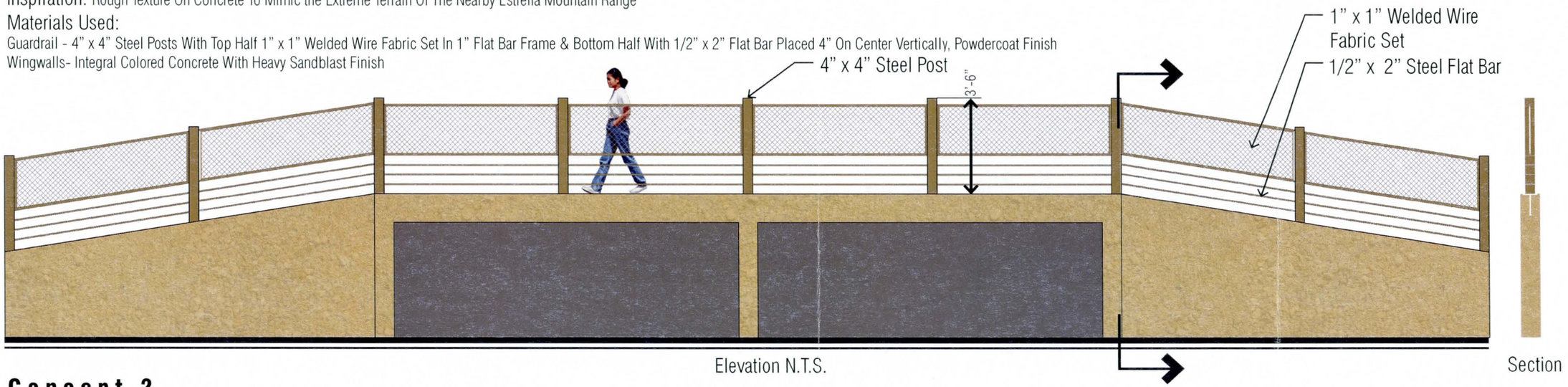
Concept 1

Inspiration: Rough Texture On Concrete To Mimic the Extreme Terrain Of The Nearby Estrella Mountain Range

Materials Used:

Guardrail - 4" x 4" Steel Posts With Top Half 1" x 1" Welded Wire Fabric Set In 1" Flat Bar Frame & Bottom Half With 1/2" x 2" Flat Bar Placed 4" On Center Vertically, Powdercoat Finish

Wingwalls- Integral Colored Concrete With Heavy Sandblast Finish



Elevation N.T.S.

Section

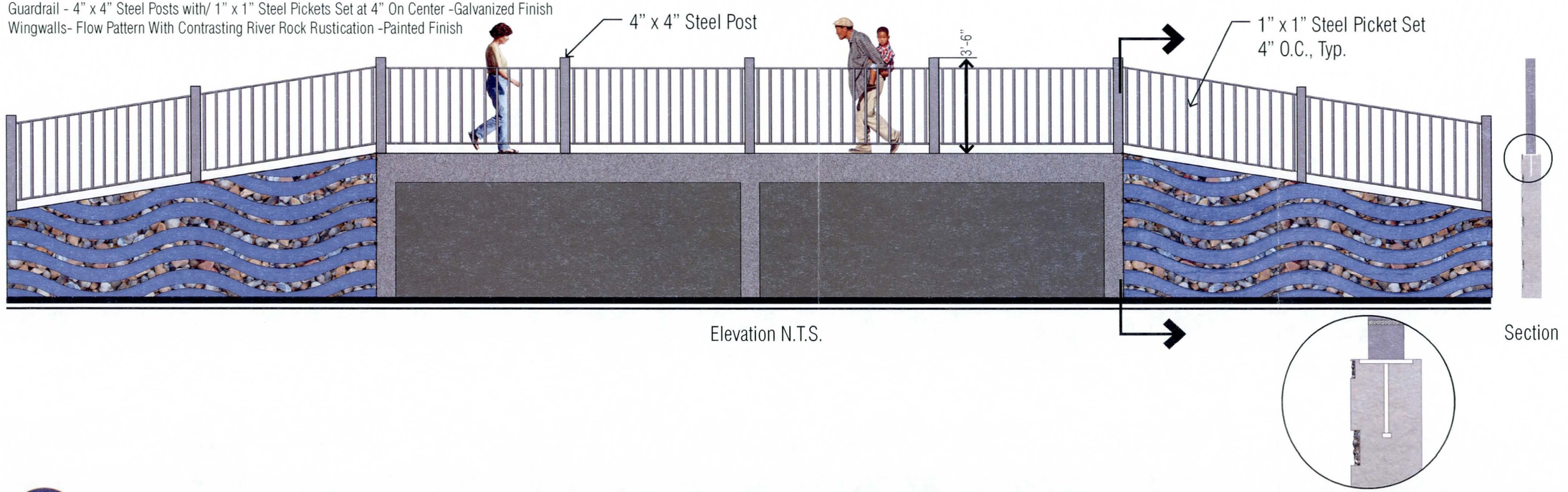
Concept 2

Inspiration: Repeating Arcs Painted Blue to Drawing Inspiration of the Natural Systems of the Nearby Tres Rios Wetlands

Materials Used:

Guardrail - 4" x 4" Steel Posts with/ 1" x 1" Steel Pickets Set at 4" On Center -Galvanized Finish

Wingwalls- Flow Pattern With Contrasting River Rock Rustication -Painted Finish



Elevation N.T.S.

Section

FIGURE: 9.1 Box Culvert Aesthetic Treatments

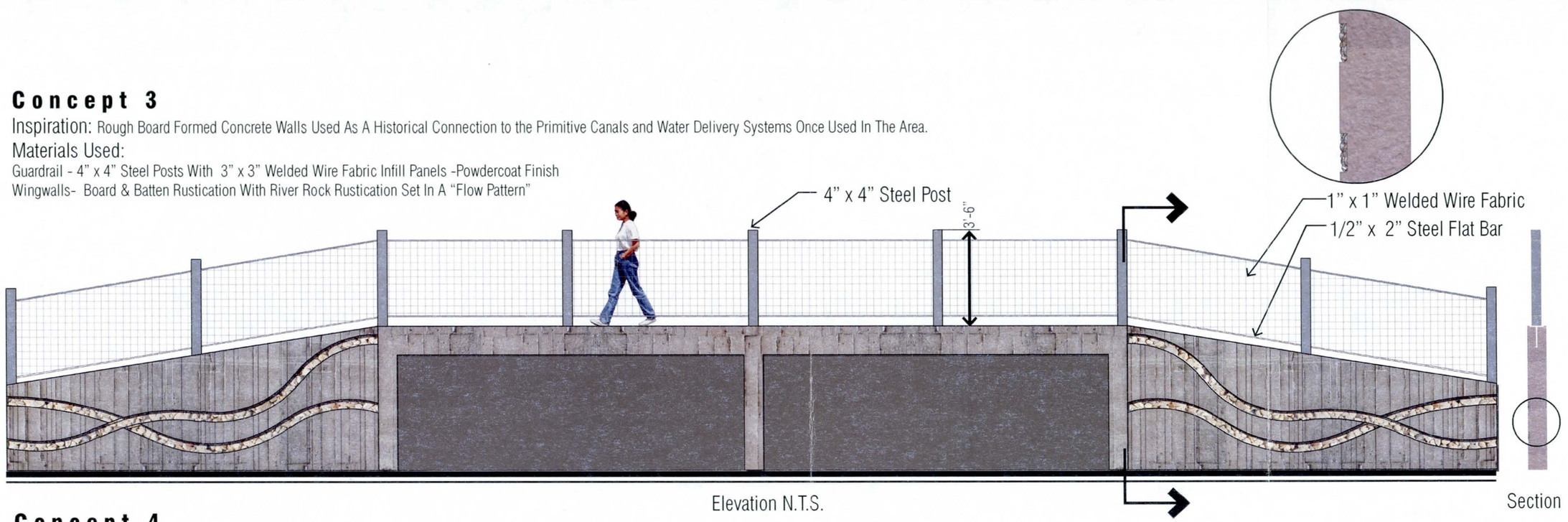
Concept 3

Inspiration: Rough Board Formed Concrete Walls Used As A Historical Connection to the Primitive Canals and Water Delivery Systems Once Used In The Area.

Materials Used:

Guardrail - 4" x 4" Steel Posts With 3" x 3" Welded Wire Fabric Infill Panels -Powdercoat Finish

Wingwalls- Board & Batten Rustication With River Rock Rustication Set In A "Flow Pattern"



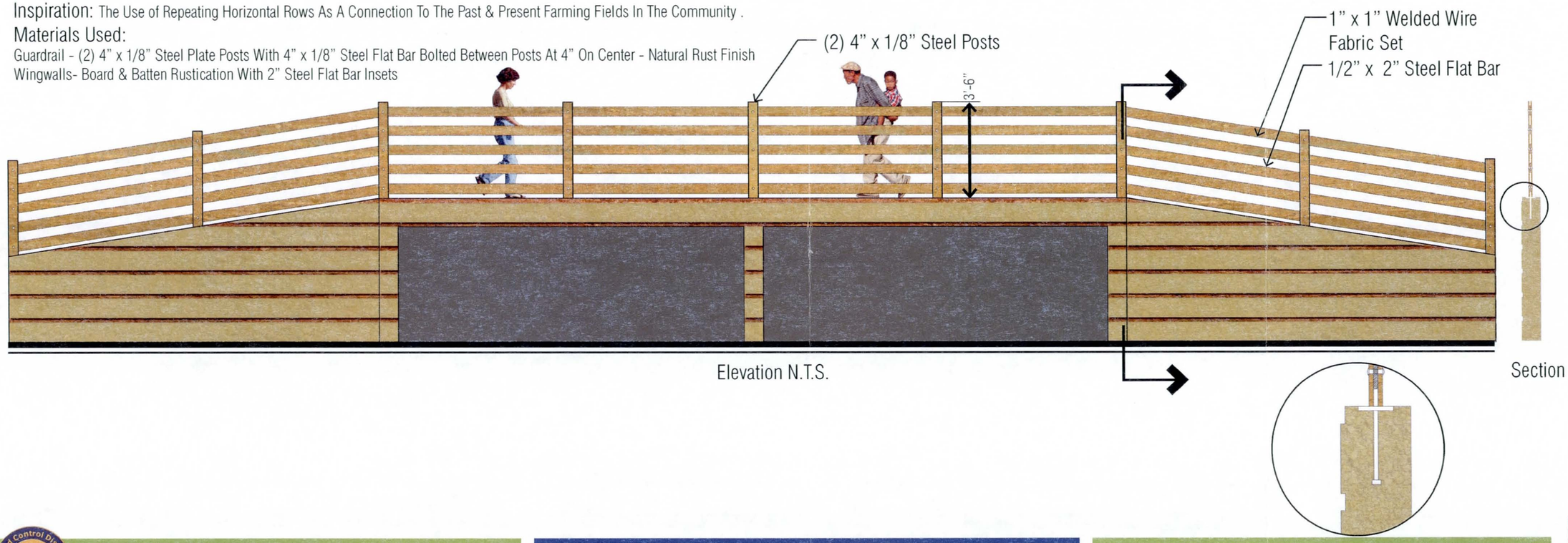
Concept 4

Inspiration: The Use of Repeating Horizontal Rows As A Connection To The Past & Present Farming Fields In The Community .

Materials Used:

Guardrail - (2) 4" x 1/8" Steel Plate Posts With 4" x 1/8" Steel Flat Bar Bolted Between Posts At 4" On Center - Natural Rust Finish

Wingwalls- Board & Batten Rustication With 2" Steel Flat Bar Insets



2-2010

Durango Regional Conveyance Channel
Elwood Street (75th Ave to 107th Ave.)

FIGURE: 9.2 **Box Culvert Aesthetic Treatments**

APPENDIX B

PRE-DESIGN CONCEPTS

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Scale in Feet

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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

DURANGO REGIONAL CONVEYANCE CHANNEL
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	DRAWN	JL, JP, JW, MRT	12/09
	CHECKED	J. HOLZMEISTER	12/09

J2 engineering and environmental design
4649 east cotton gin loop, suite B2
phoenix, arizona 85040
phone: 602.438.2221 www.j2design.us

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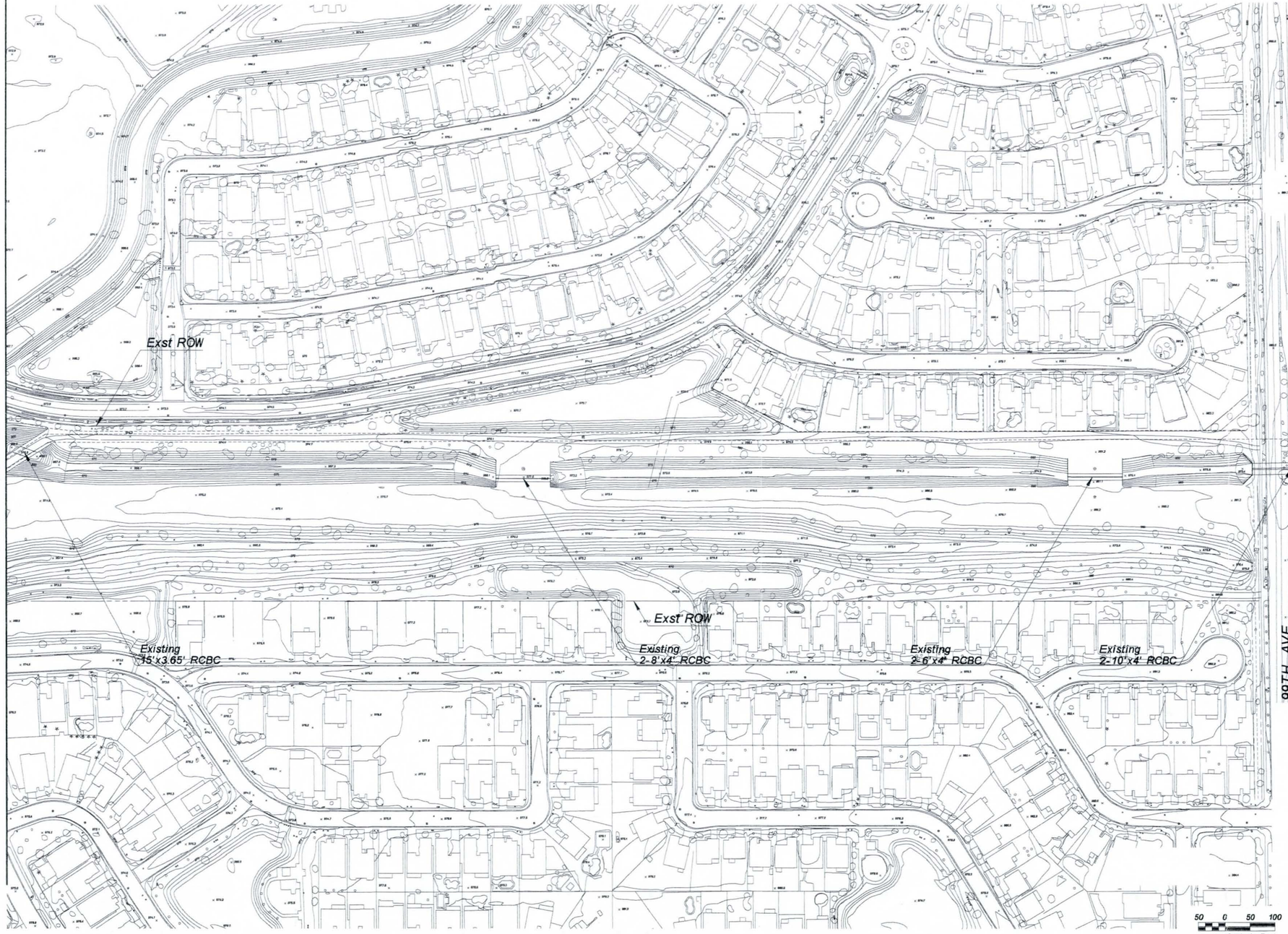

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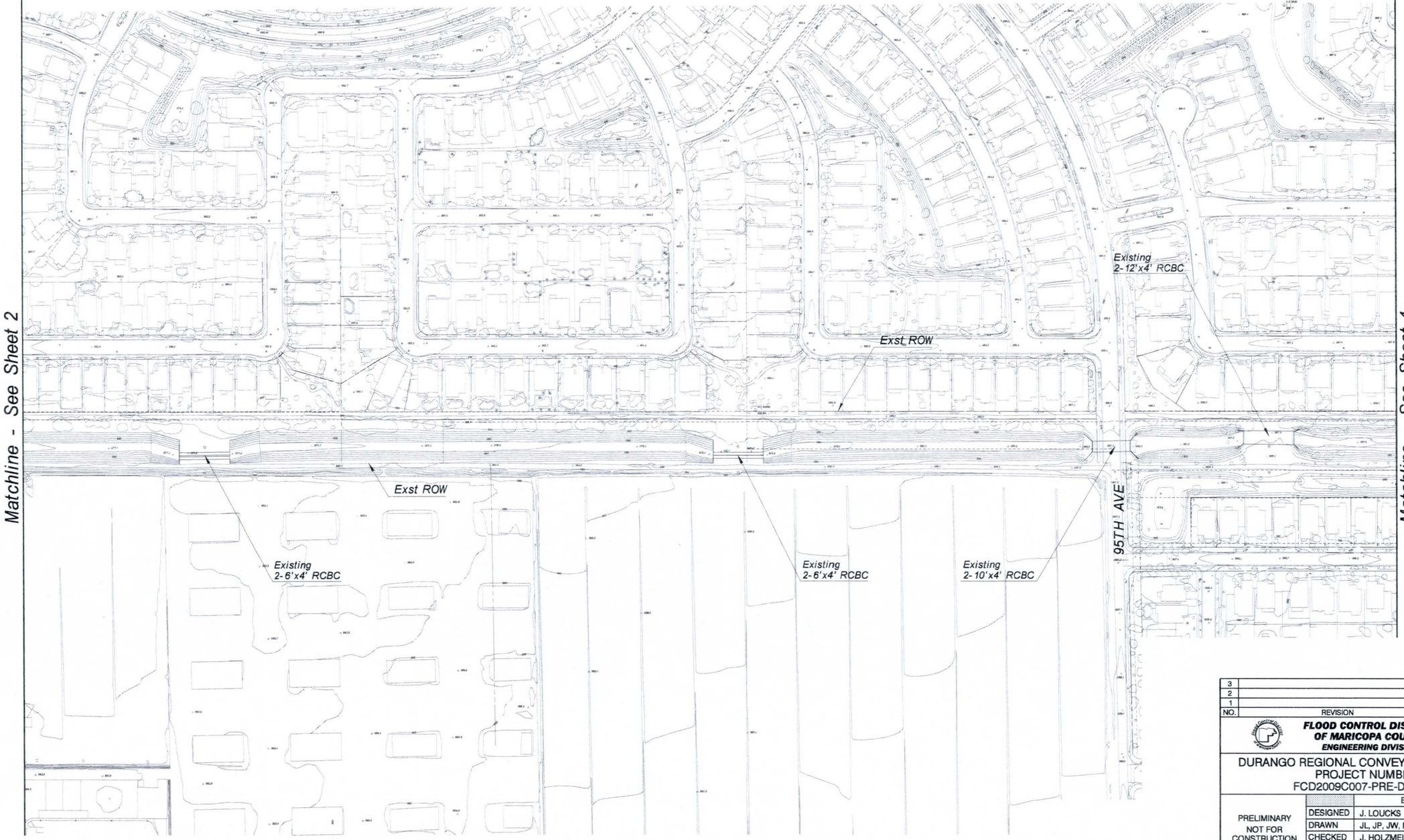

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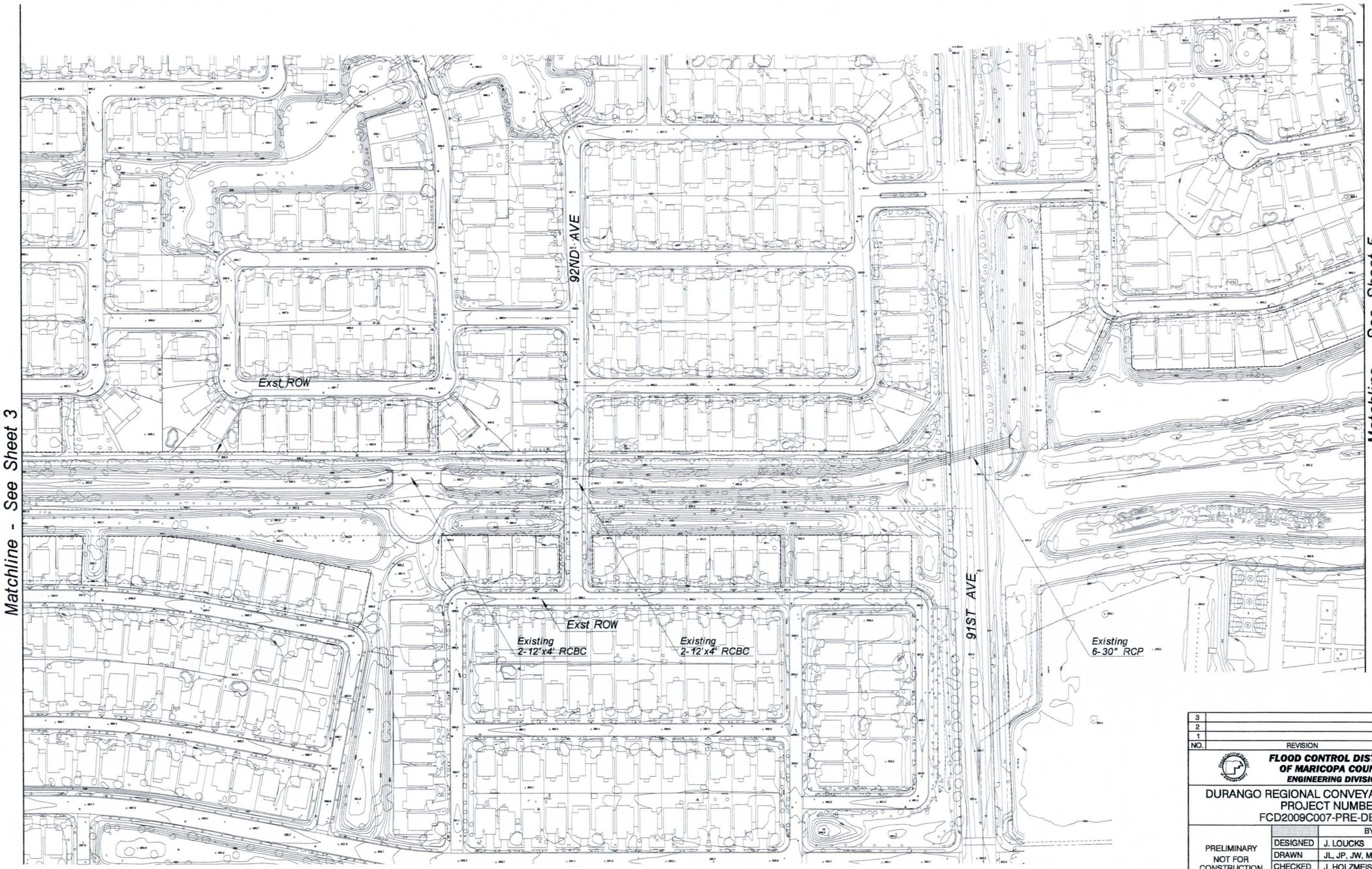

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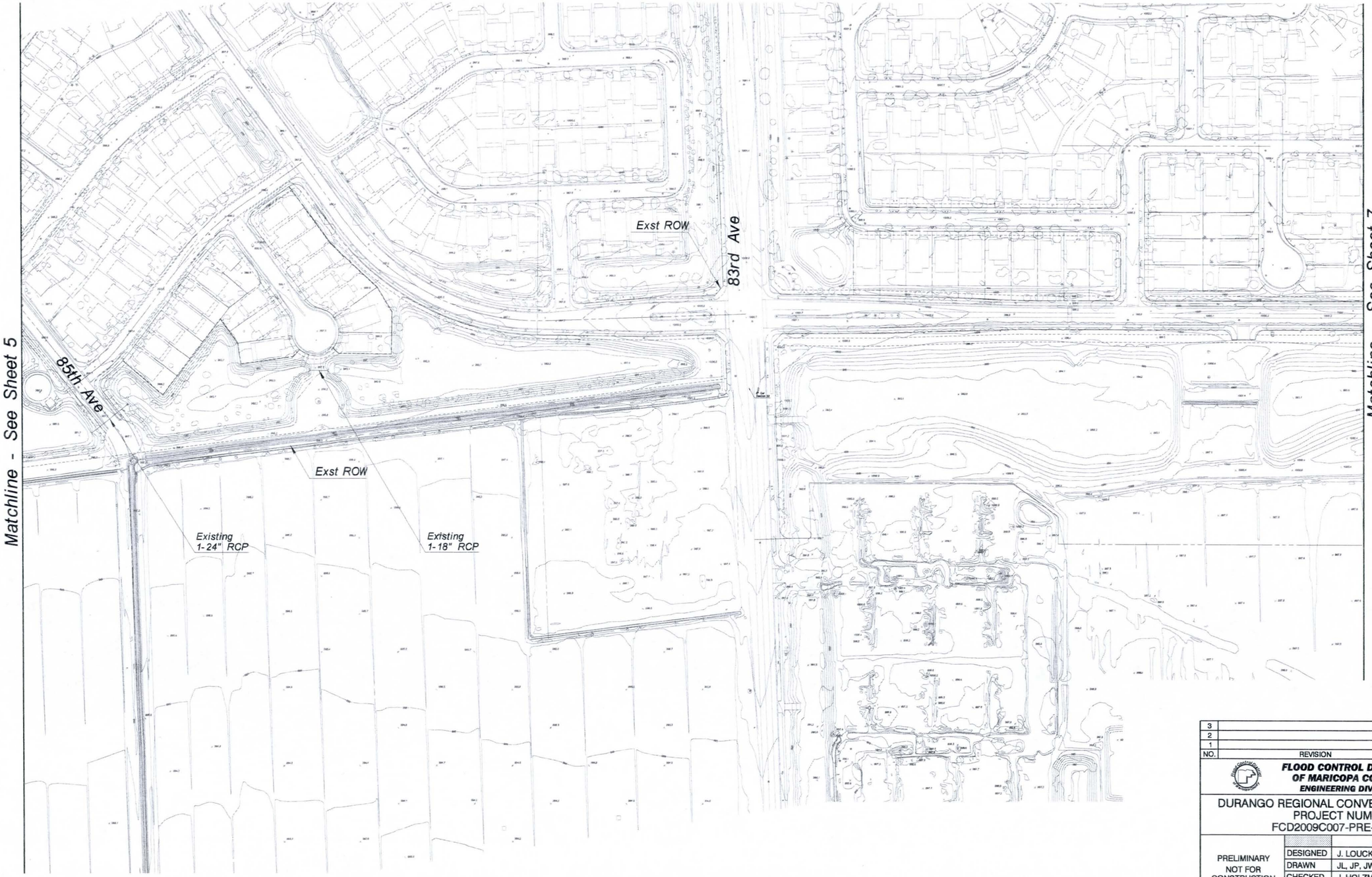

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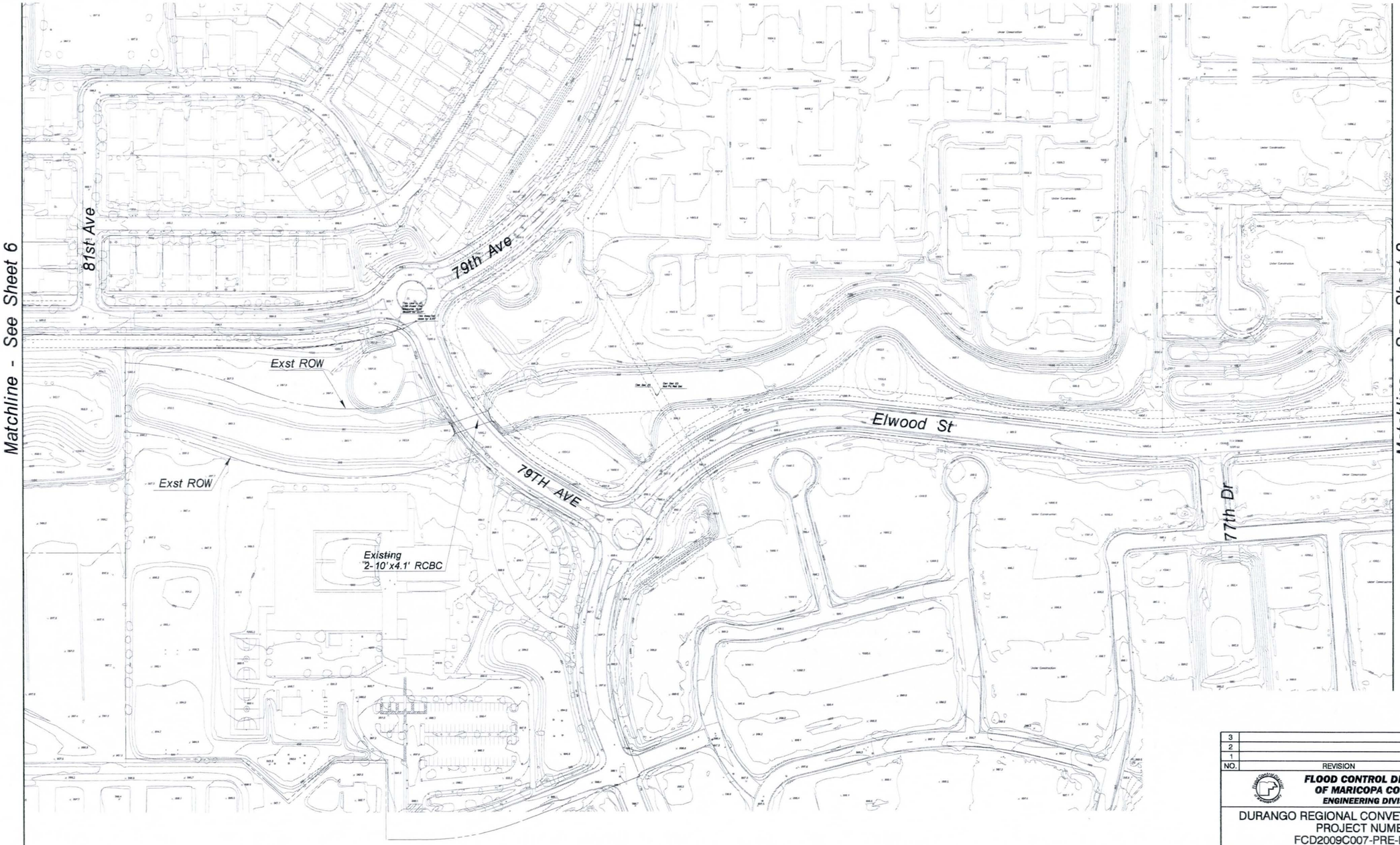

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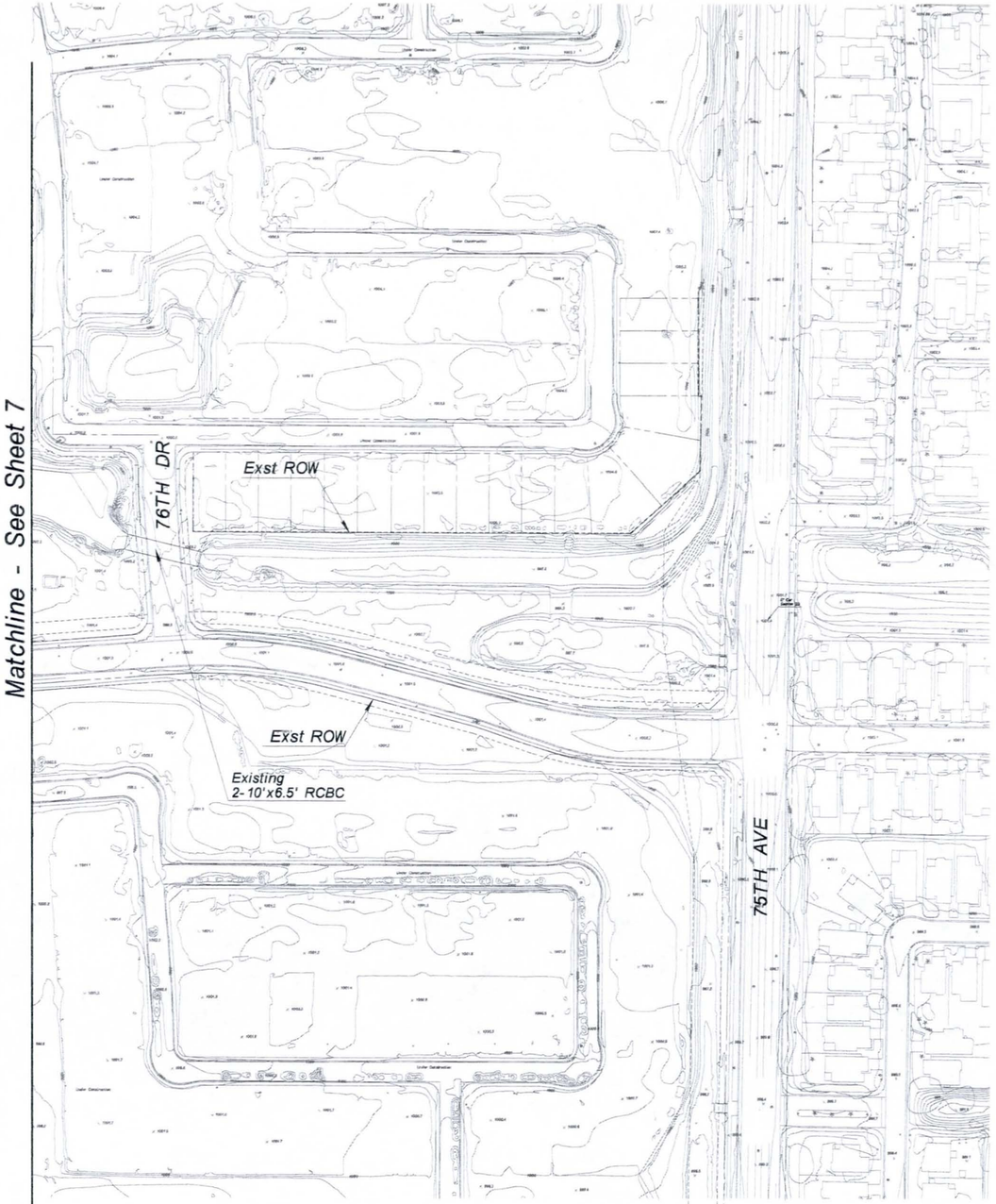

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New 36" RCP
(Drain in 36 hrs)

New 12'x5' RCBC

Exst ROW

FOREST GROVE AVE

Existing
2-10'x4' RCBC

Matchline - See Sheet 2

New 2-12'x5' RCBC

Hydraulic Control Line

Exst ROW

Existing
2-6'x4' RCBC

New 3-10'x5' RCBC

103RD AVE

LIONS GATE

107TH AVE

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Matchline - See Sheet 1

Matchline - See Sheet 3

99TH AVE

Existing
15'x3.65' RCBC

Exst ROW

New 2-10'x4' RCBC

New 2-12'x4' RCBC

New 2-10'x4' RCBC

Exst ROW

Existing
2-6'x4' RCBC

Existing
2-6'x4' RCBC

Existing
2-10'x4' RCBC

Hydraulic Control Line

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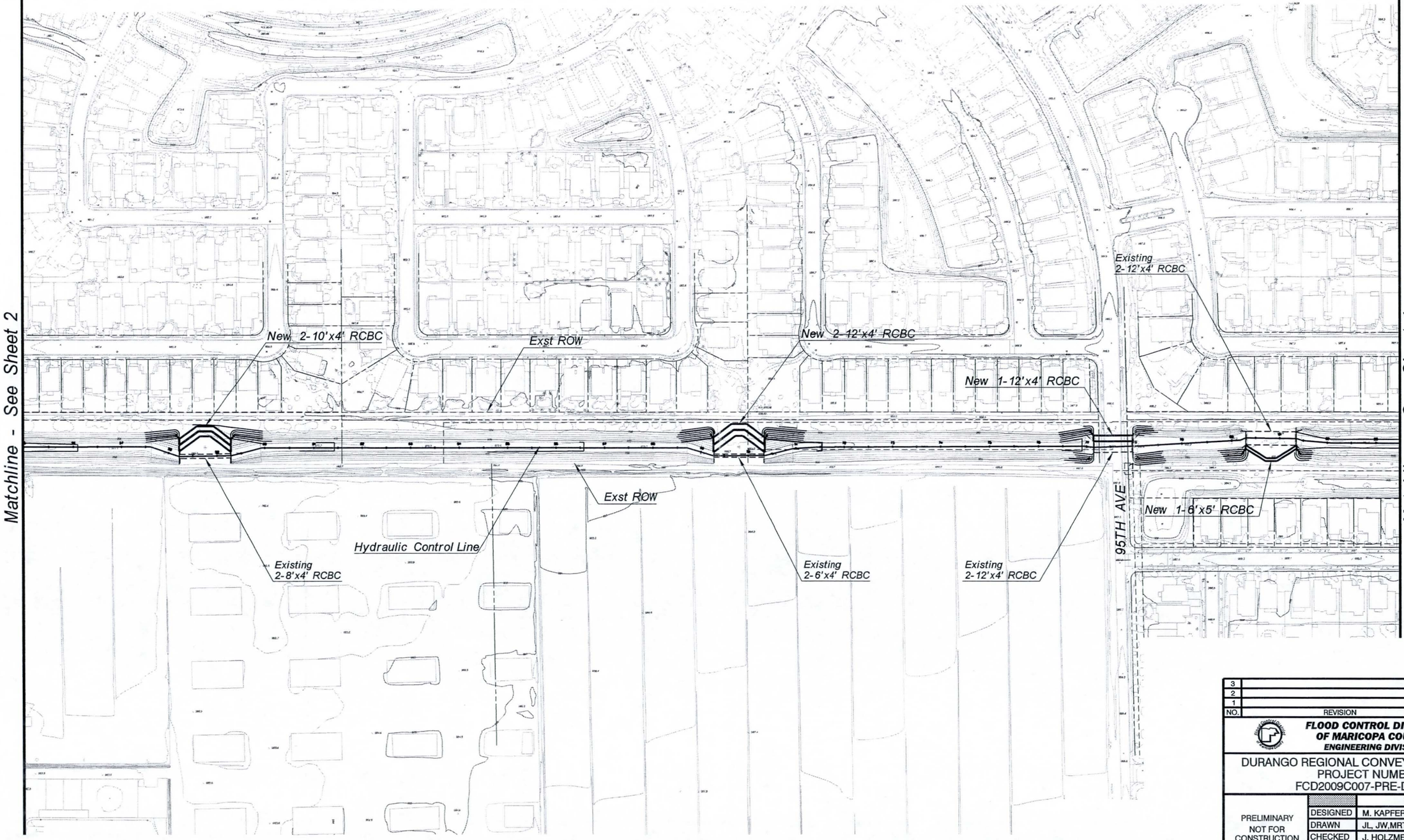

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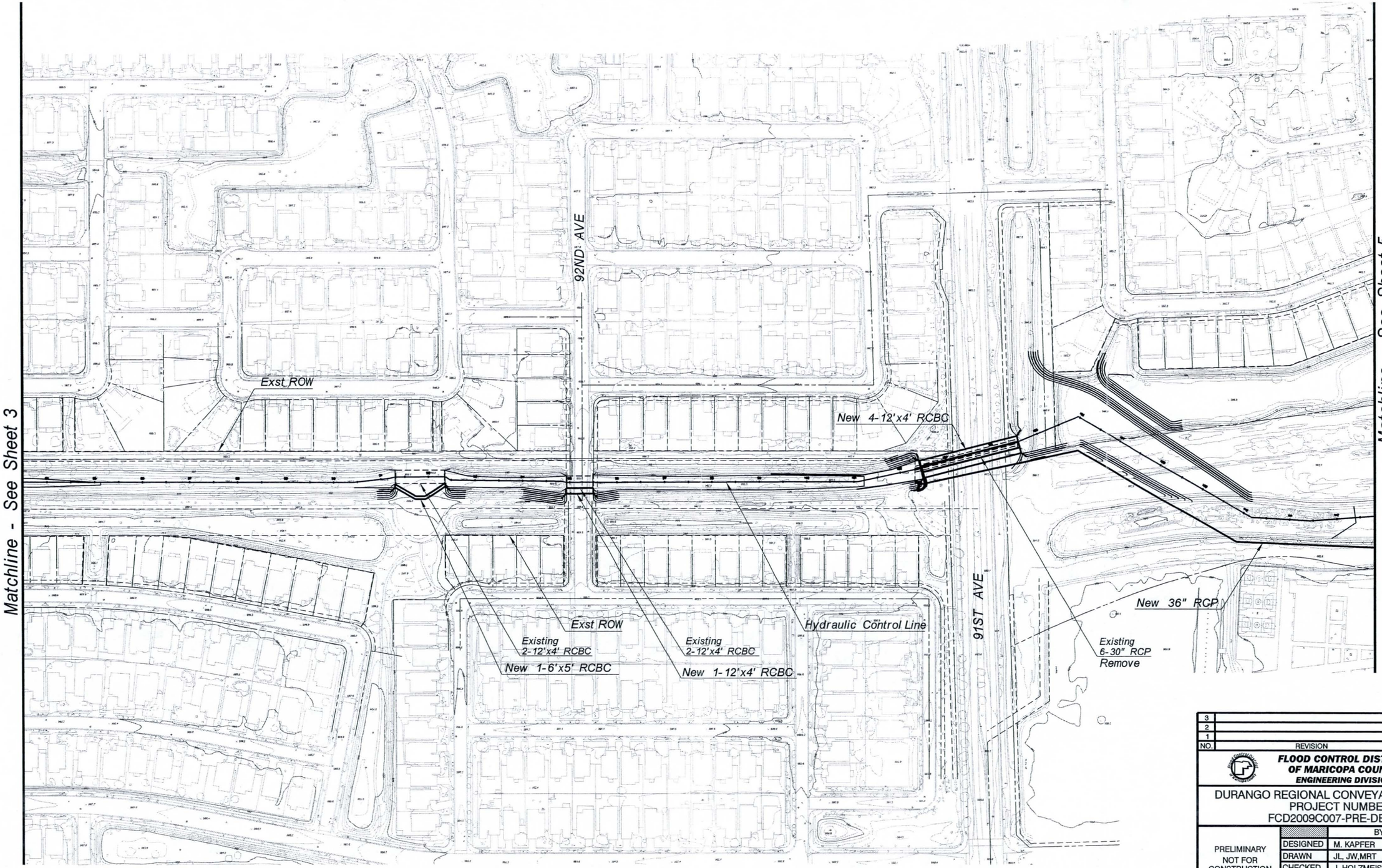

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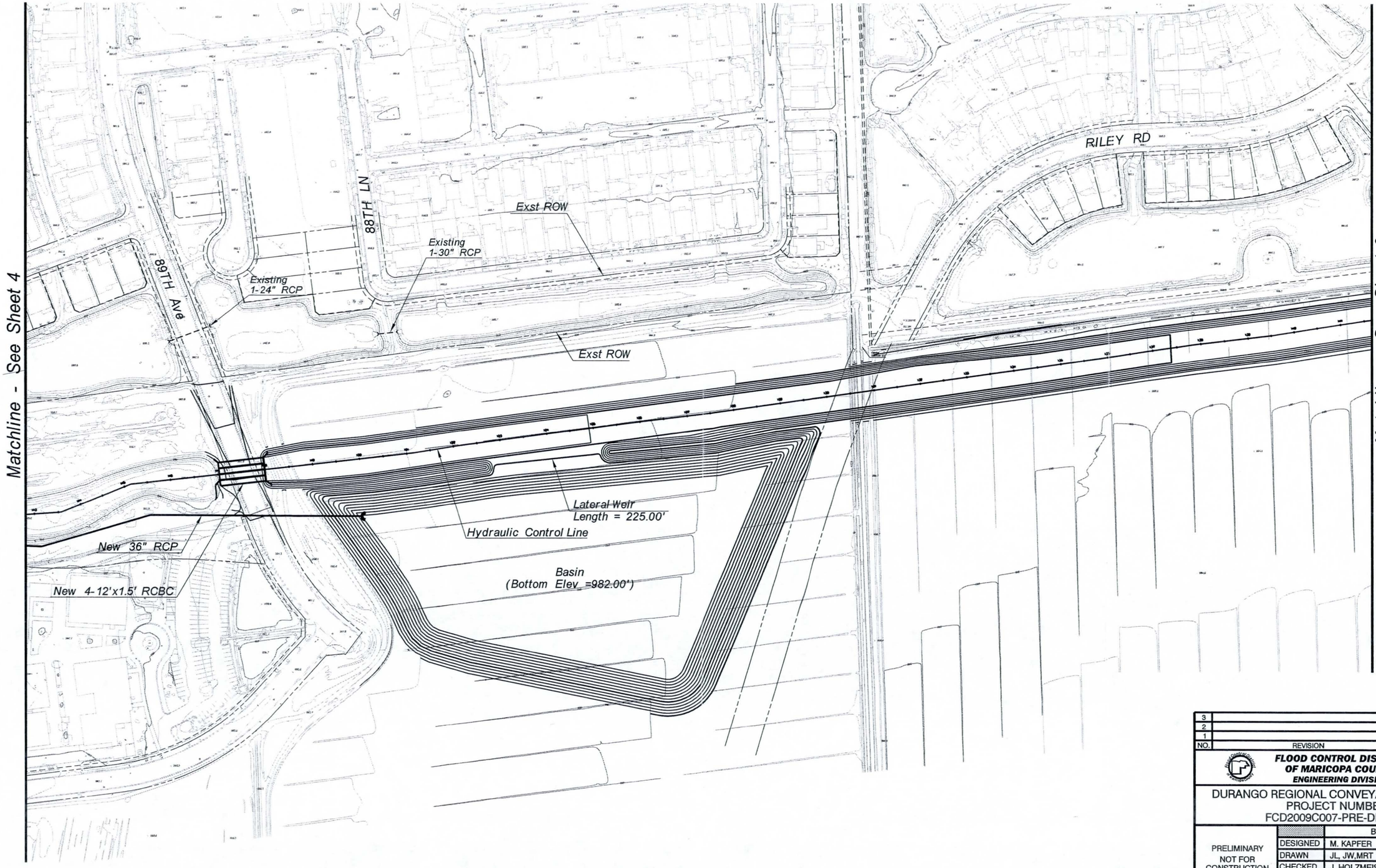

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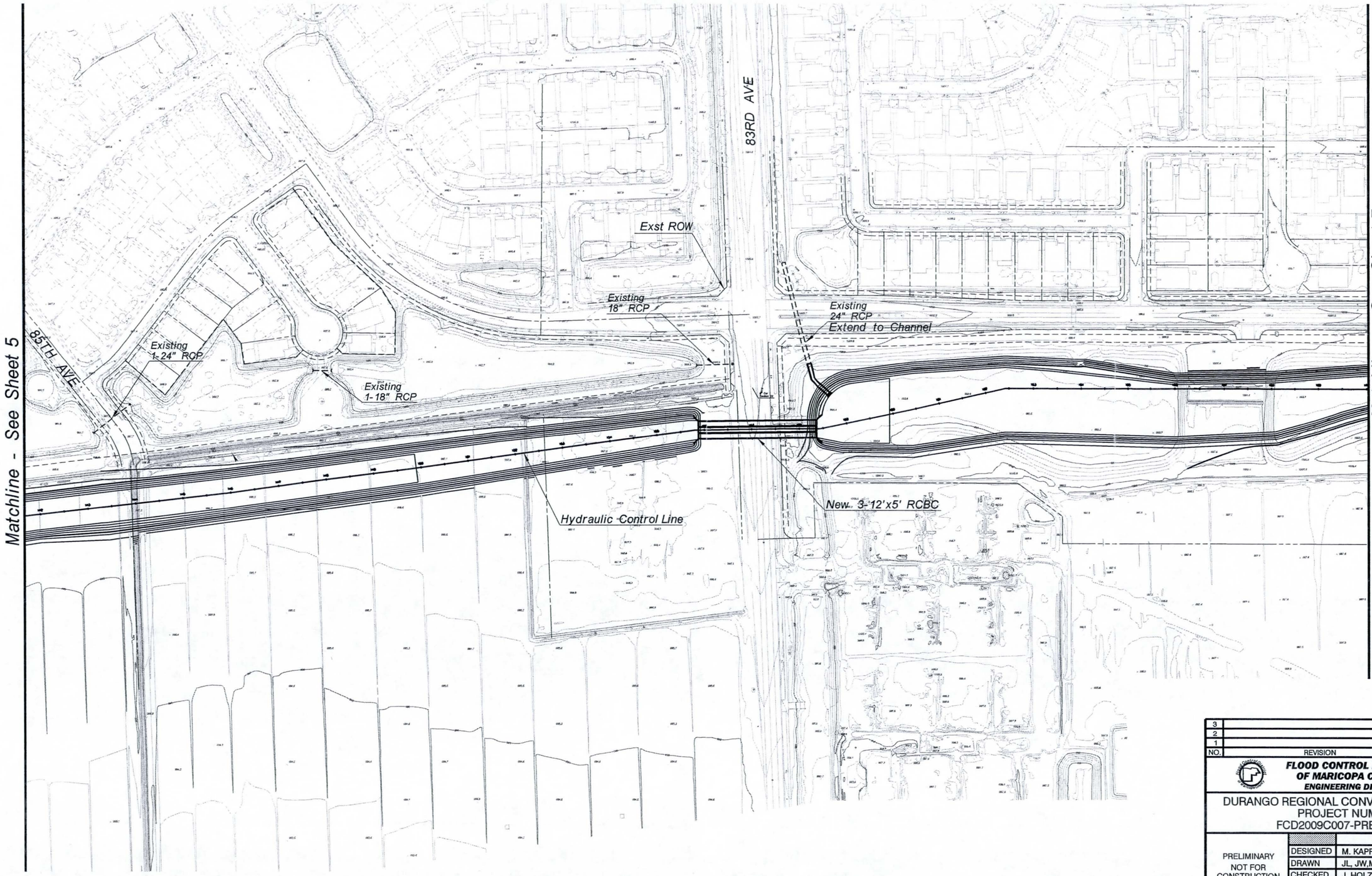

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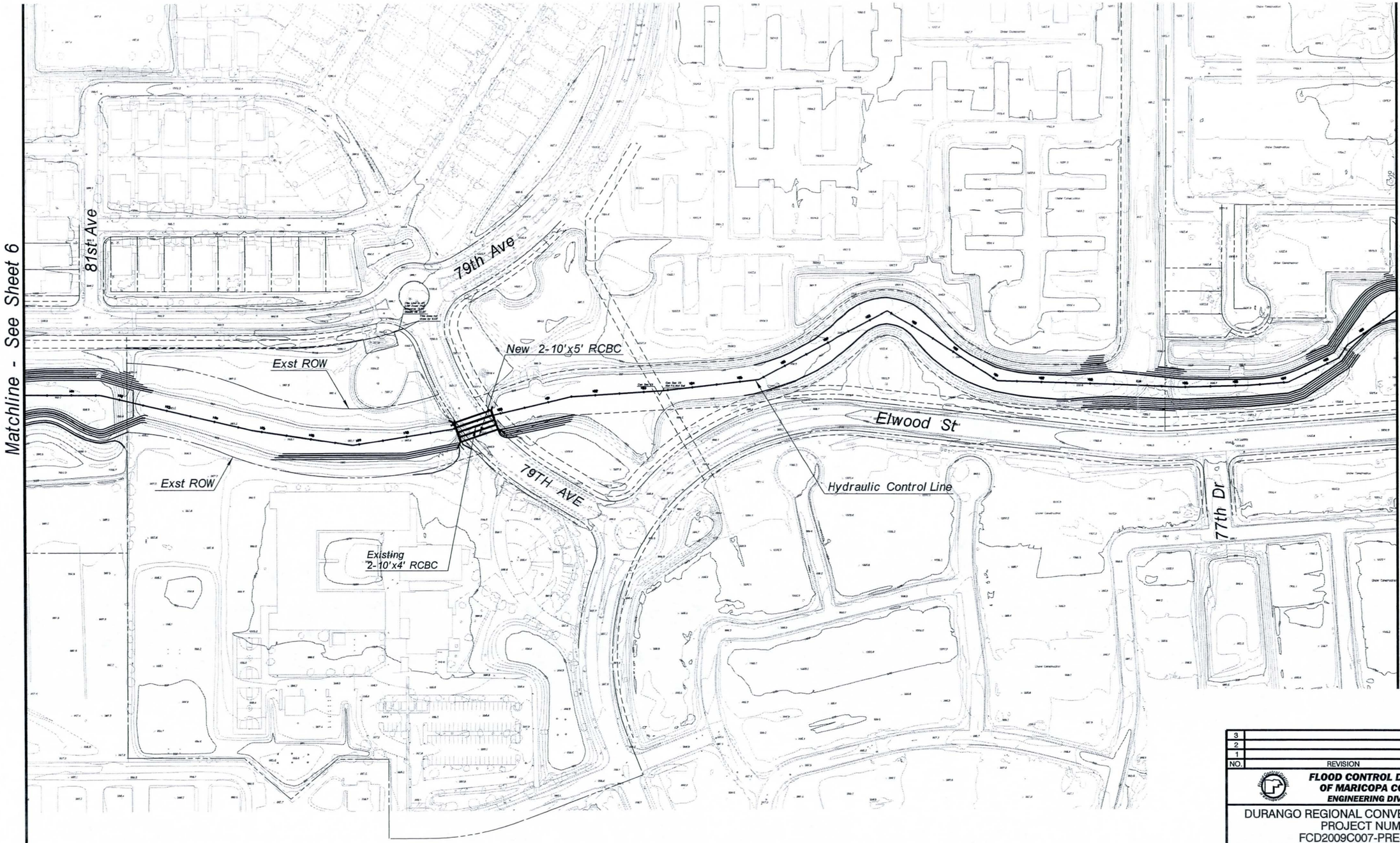

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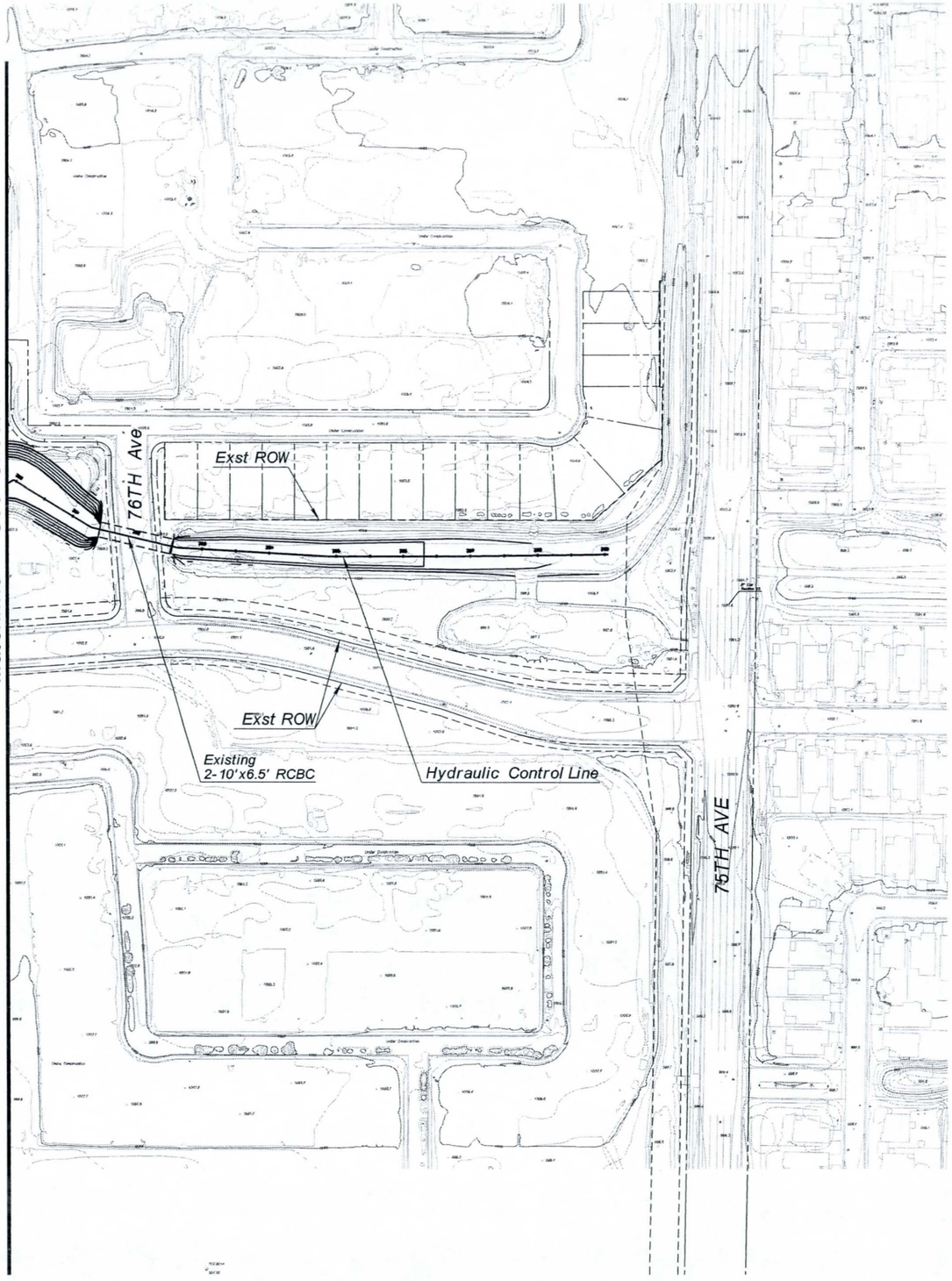

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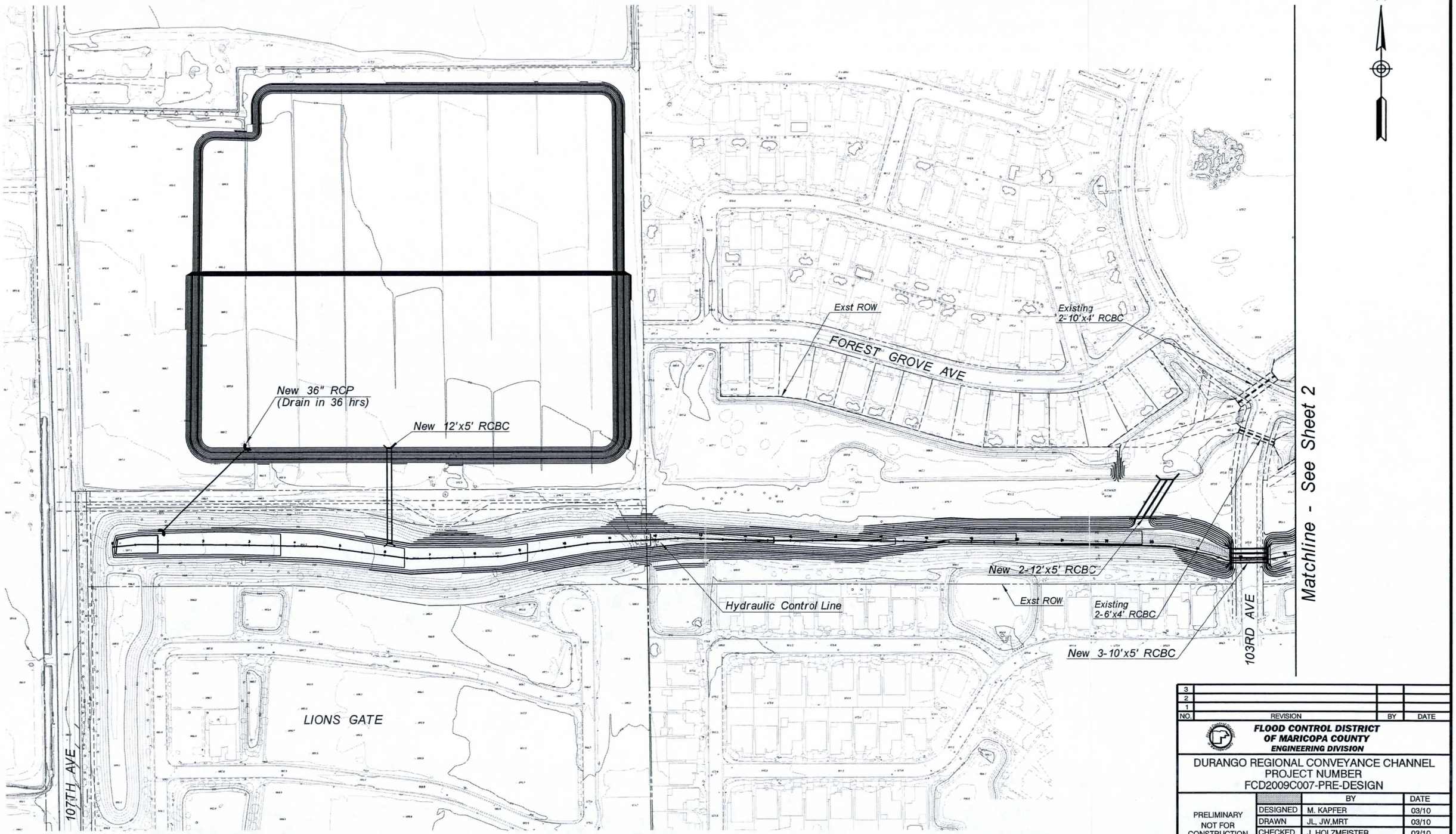

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PROJECT NUMBER
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		BY	DATE
PRELIMINARY NOT FOR CONSTRUCTION	DESIGNED	M. KAPFER	03/10
	DRAWN	JL, JW,MRT	03/10
	CHECKED	J. HOLZMEISTER	03/10

J2 engineering and environmental design
4649 east cotton gin loop, suite B2
phoenix, arizona 85040
phone: 602.438.2221 www.j2design.us

DRAWING NO. | RECOMMENDED ALTERNATIVE | SHEET OF 1 8

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Scale in Feet

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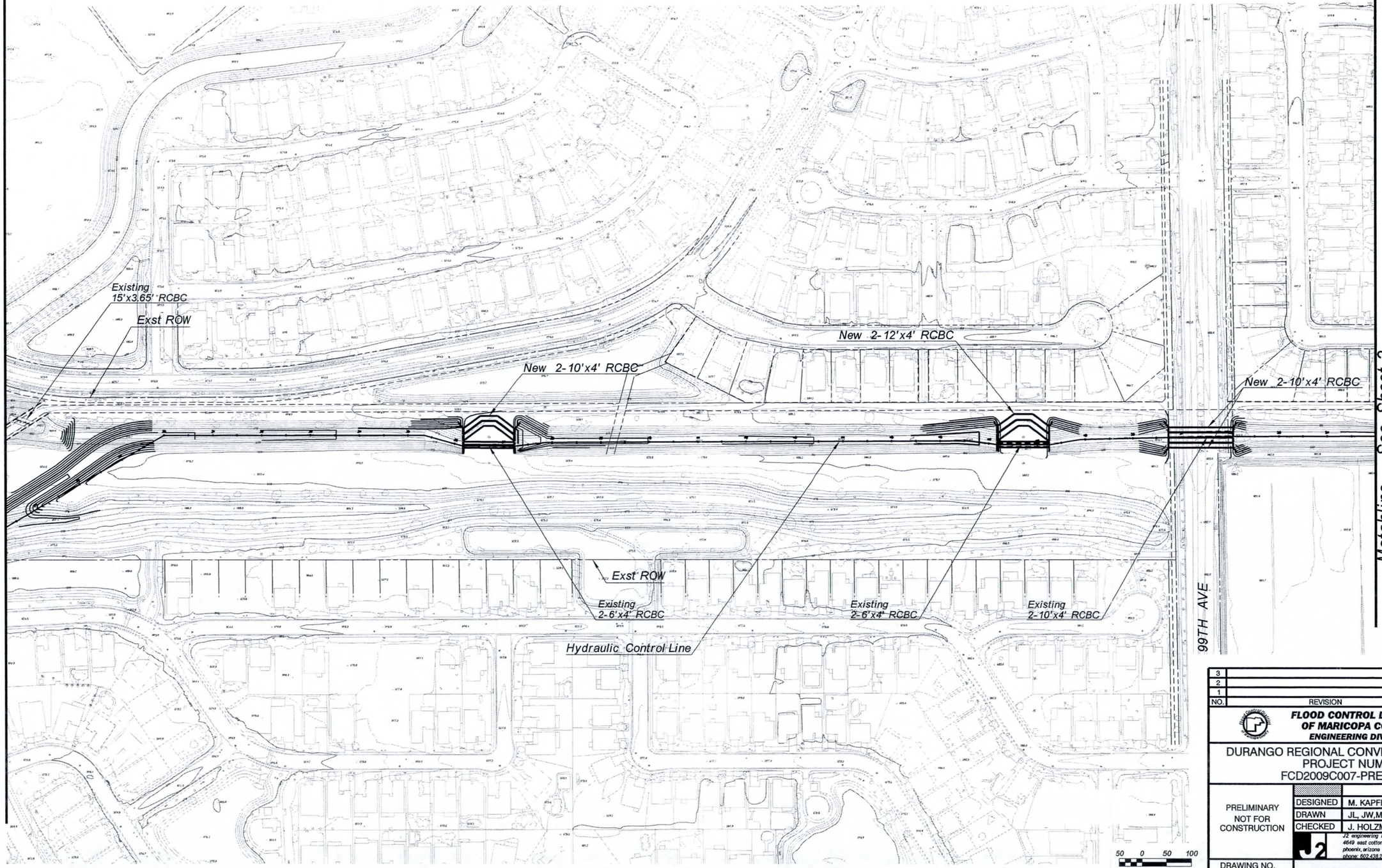

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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

DURANGO REGIONAL CONVEYANCE CHANNEL
PROJECT NUMBER
FCD2009C007-PRE-DESIGN

PRELIMINARY
NOT FOR
CONSTRUCTION

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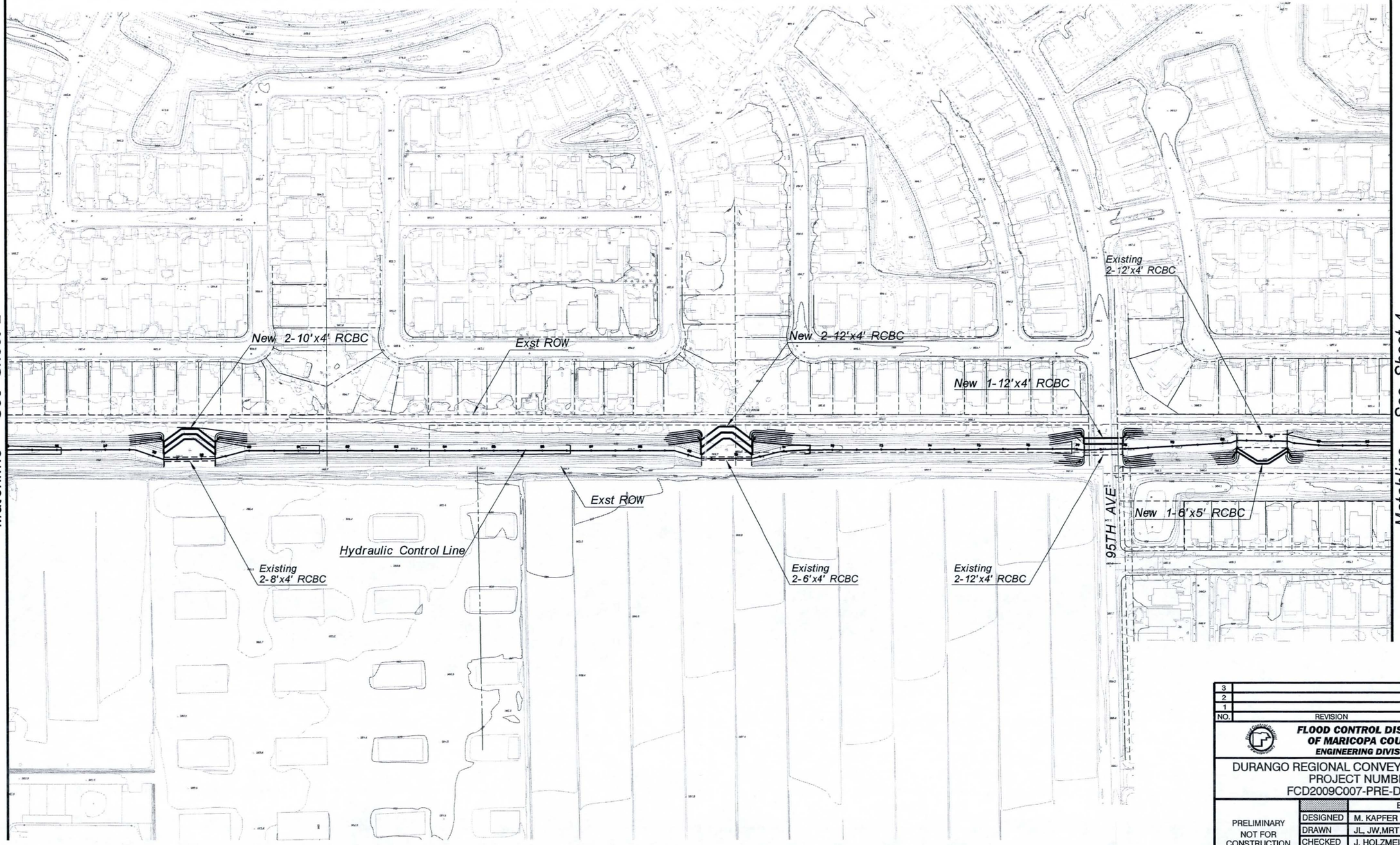

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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

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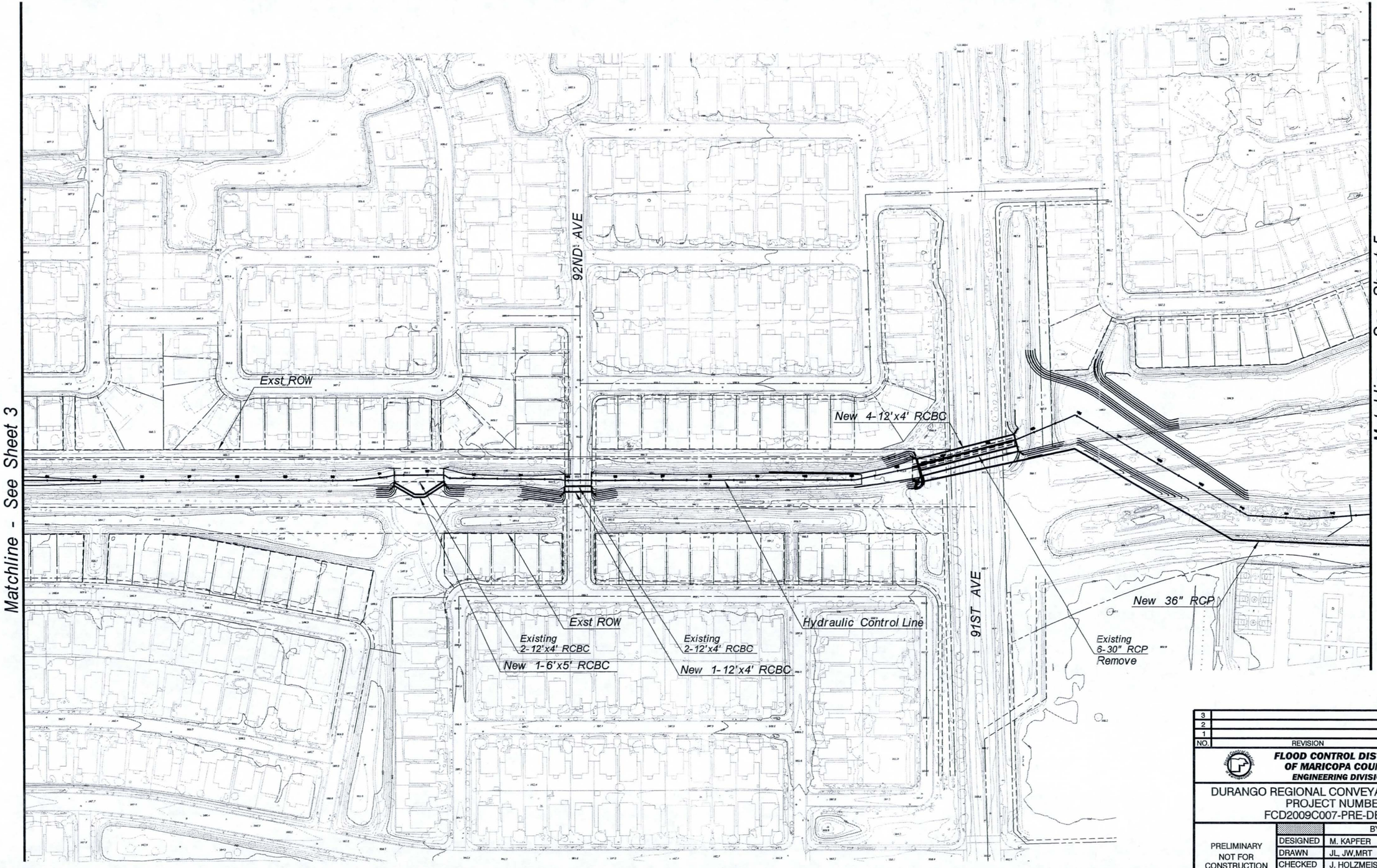

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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
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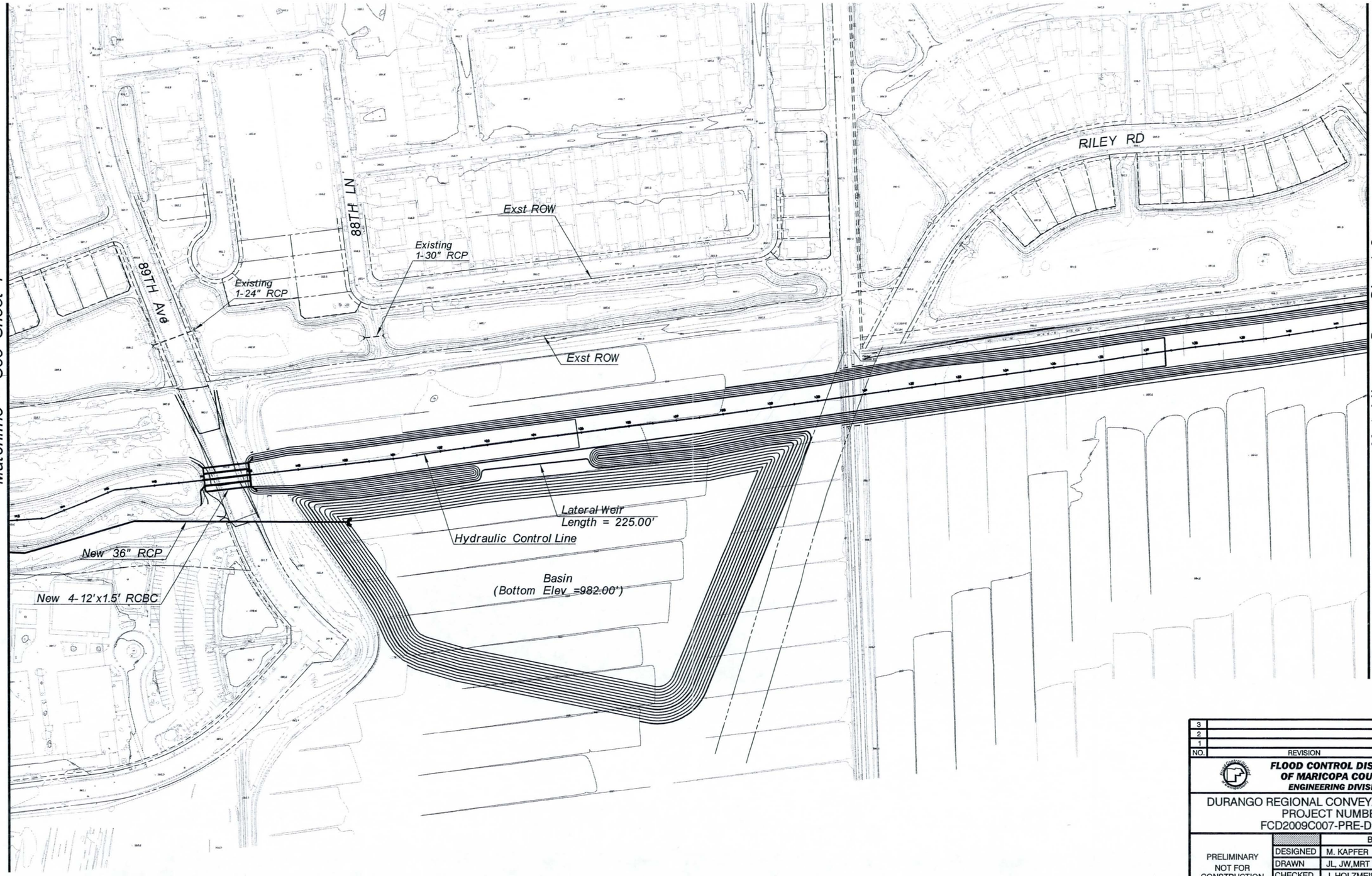

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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

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PROJECT NUMBER
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Matchline - See Sheet 5

85TH AVE

Existing
1-24" RCP

Existing
1-18" RCP

Exst ROW

83RD AVE

Existing
18" RCP

Existing
24" RCP
Extend to Channel

Hydraulic Control Line

New 3-12'x5' RCBC

Matchline - See Sheet 7

N

50 0 50 100
Scale in Feet

NO.	REVISION	BY	DATE
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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
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SHEET 6 OF 8

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Matchline - See Sheet 6

Matchline - See Sheet 8

81st Ave

79th Ave

New 2-10'x5' RCBC

Exst ROW

Exst ROW

79TH AVE

Existing
2-10'x4' RCBC

Elwood St

Hydraulic Control Line

77th Dr

N

50 0 50 100
Scale in Feet

NO.	REVISION	BY	DATE
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1			

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

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DRAWN	JL, JW,MRT	03/10
CHECKED	J. HOLZMEISTER	03/10

J2 engineering and environmental design
4649 east cotton gin loop, suite 82
phoenix, arizona 85040
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DRAWING NO. | RECOMMENDED ALTERNATIVE | SHEET OF 7 8

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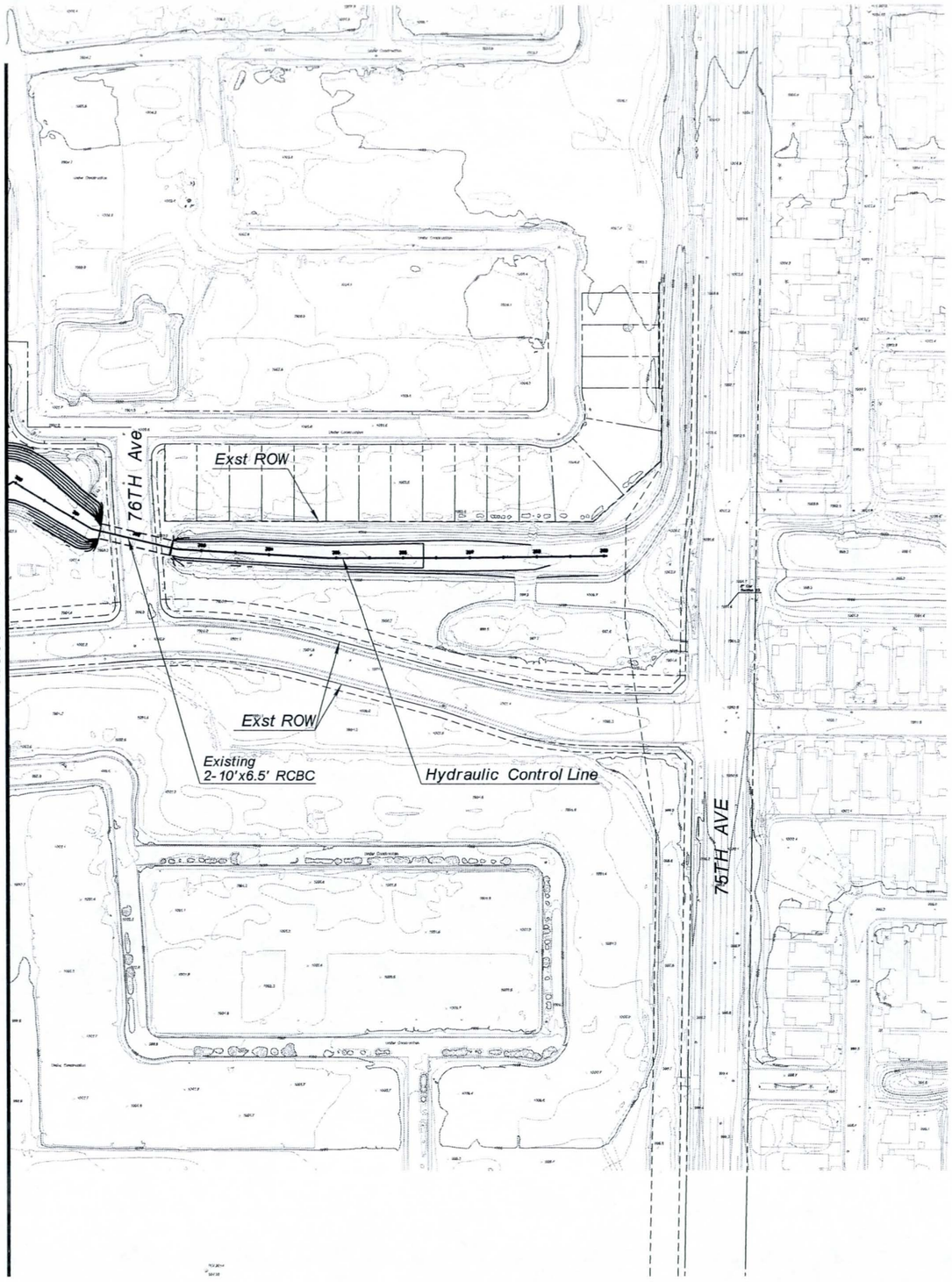

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Scale in Feet
50 0 50 100

NO.	REVISION	BY	DATE
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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

DURANGO REGIONAL CONVEYANCE CHANNEL
PROJECT NUMBER
FCD2009C007-PRE-DESIGN

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phoenix, arizona 85040
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DRAWING NO.

RECOMMENDED ALTERNATIVE

SHEET OF
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APPENDIX C

HEC-1 ANALYSES

```
1*****************************************
*                                       *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)   *
*              JUN  1998                *
*            VERSION 4.1                *
*                                       *
*  RUN DATE   17MAR10  TIME  15:09:49   *
*                                       *
*****************************************
```

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

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

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

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


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

    1         ID   FILE NAME: UFUT6J2S.DAT
    2         ID   100-YEAR 6-HOUR MODEL
    3         ID   J2 ENGINEERING AND ENVIRONMENTAL DESIGN, LLC
    4         ID   THIS FILE IS A MODIFICATION OF ASPEN ENGINEERING FILE REC6.DAT
    5         ID   ADDED EXISTING 100YR-2HOUR RETENTION & MODIFIED FIRST FLUSH RETENTION
    6         ID   TO BASINS JB1, ED1, ID1, ID2, IB & IC
    7         ID
    8         ID   J2 SUBDIVIDED BASINS JB, ED, ID, IC, AND IB ALONG THE PROPOSED DRCC
    9         ID   CORRIDOR INTO BASINS JB1A, JB1B, JB1C, ED1, ED2, ID1, ID2, ICA, ICB,
   10         ID   IBA, & IBB.
   11         ID   GREEN-AMPT SOIL LOSS PARAMETERS LEFT UNCHANGED EXCEPT FOR IA AND RTIMP
   12         ID   FOR SUBBASINS THAT WERE SPLIT.
   13         ID
   14         ID   J2 MODIFIED THE FOLLOWING CHANNEL ROUTES: RTMGJB, MCJCJB, RTMFMC,
   15         ID   RTMCIE, MCJBED, MCED95, MC95ID, MCIDIB, RTDIMB, & MCIBIB
   16         ID
   17         ID   BASINS ADDED AT 107TH AVENUE (OPERATIONS 107U AND 107L)
   18         ID   ROUTED BASINS ID1 & IE THROUGH COUNTRY PLACE TO 103RD AVENUE OUTFALL
   19         ID
   20         ID   ************************************************************************
   21         ID
   22         ID   REC6.DAT
   23         ID   ASPEN CONSULTING ENGINEERS, JCS and POL, NOV. 9, 2005
   24         ID   6-HOUR RAINFALL
   25         ID   THIS IS THE SOUTH ALIGNMENT DRCC FROM 75TH AVE TO THE AF.
   26         ID   CHANGES MADE TO TOTDUR6.DAT MODEL ARE AS FOLLOWS:
   27         ID
   28         ID   THIS IS THE DRCC IN AVONDALE WITH CULVERTS IN PHOENIX MODEL WITH FIRST
   29         ID   FLUSH RETENTION IN AVONDALE.
   30         ID
   31         ID   SUNLAND CHANNEL INCLUDED AS PART OF PROJECT IMPROVEMENTS.  FIRST FLUSH
   32         ID   RETENTION INCLUDED WHERE AVAILABLE.
   33         ID
   34         ID   MODIFIED TO REFLECT "SOUTH" DRCC ALIGNMENT.  FUTURE ARTERIAL ROADWAY
   35         ID   ROUTING MODIFIED TO FUTURE CONDITIONS.
   36         ID
   37         ID   1/2 INCH "FIRST FLUSH" RETENTION WAS USED FOR SUBBASINS DIRECTLY
   38         ID   ADJACENT TO THE DRCC IN AVONDALE.
   39         ID
   40         ID   INSERTED 99BASIN TO REMODEL THE MULTIUSE BASIN BETWEEN 91ST AND 99TH AVE.
   41         ID
   42         ID   RETENTION BASINS ADJACENT TO THE DRCC AND ROUTING FOR THE DRCC IN
   43         ID   PHOENIX WERE REPLACED BY MODIFIED PULS ROUTING IN ORDER TO MODEL THE
   44         ID   EFFECT OF PLACING 10-YR CULVERTS BETWEEN RETENTION BASINS.  THE CULVERTS
   45         ID   WOULD BE PLACED AT 83RD AVE, 91ST AVE, 99TH AVE AND 107TH AVE.
   46         ID   CHANNEL ROUTING IN THIS SAME REACH REMOVED 75TH AVENUE TO 107TH
   47         ID
   48         ID   ADDED/CHANGED SUBJB2 TO CPEE IN ORDER TO REINSERT SUBJB2 AND DIVERT
   49         ID   RETURNS.
   50         ID
   51         ID   INSERTED DIBBLE MODEL 1084F6-IMP-R.DAT AFTER CPHA TO CHANGE MODEL TO THE
   52         ID   SOUTH DRCC ALIGNMENT.  CHANGED DIBBLE SUBBASINS AND RETENTION TO ASPEN
   53         ID   FUTURE LAND USE SUBBASINS AND RETENTION.  CHANGED SUNLAND CHANNEL ROUTING.
   54         ID
   55         ID   CHANGED SUBBASINS AND RETENTION TO ACCOUNT FOR EXISTING DEVELOPMENT
```



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

   56         ID   WITHOUT RETENTION.  ACRES WITHOUT RETENTION: GB 67.5, GC 94.4, HB 83.1,
   57         ID   IA 90.8, DA 72.9, CC 19.3, CA1 18.8
   58         ID
   59         ID   THE LG AND UI CARDS WERE CHANGED FOR SUBBASINS IDENTIFIED AS
   60         ID   CONTRIBUTING TO THE DRCC IN ORDER TO REFLECT FUTURE CONDITIONS LAND USE.
   61         ID   VALLEY S-GRAPH WAS USED INSTED OF AGRICULTURAL S-GRAPH.
   62         ID
   63         ID   FUTURE LANDUSE 100-YEAR 2-HOUR RETENTION INSERTED AFTER SUBBASINS
   64         ID   IDENTIFIED AS CONTRIBUTING TO THE DRCC.  80% OF REQUIRED RETENTION USED.
   65         ID
```

```
ID   CHANGED SUBGD2 BA CARD FROM 0.739 TO 0.211.
* ************************************************************************
* The following is from the original model provided to Aspen by FCDMC     *
* ************************************************************************
ID   TOTDUR6.DAT
ID   75th Avenue Storm Drain 100-Year/6-Hour Model, PJE
ID   Future Condtion Model
ID   DRC #4 Basin Alternative 2, modeled in this run along with
ID   16.6 arce foot retention basin in SUBJC2.
ID   The base hydrologic model used for this study is the model that was
ID   developed for the Durango ADMP recommended design.
ID
ID   Regional detention basins that are subject to the project area are sized and
ID   analyzed to optimize storage function in order to reduce outfall storm drain
ID   and potential channel size.
ID
ID   Modifications are made to the original model to reflect changes in watershed
ID   characterictics.  Changes in sub-basin boundaries, land use and routing reaches
ID   that have occurred since the completion of the Durango ADMP have been
ID   incorporated into the model.
ID   Changes made to the oringal model inclued:
ID   1)       The area defined by the panhandle of Sub-Basin TB is revised to drain to
ID   concentration point CPUA.
ID   2)       Sub-basin SF is re-delineated to be consistent with drainage improvements
ID   constructed as partof the Target Southwest Distribution Center.
ID   3)       The 75th Avenue storm drain is evaluated to drain proposed Durango ADMP
ID   regional detention facilities thus eliminating the conveyance channel between
ID   Basin DRC #4 and Basin DRC #3 and downstream of Basin DRC #3.
ID   4)       Street drainage that would be directly intercepted by the 75th Avenue
ID   Storm Drain and laterals to the storm drain is modeled.
ID   5)       Sub Basin JC is subdevied into Sub-Basin JC1 and Sub-Basin JC2.
ID   6) Lag times and s-graphs are developed for future condtions for watersheds
ID   that were not alrerady built out.
ID   7)       The storm drain flow capacity of the 59th Avenue and the 67th Avenue
ID   Storm Drains up stream of the Union Pacific Railroad are diverted from their
ID   subject watersheds.
*DIAGRAM
* MODIFIED IT CARD FOR DSS RUN  SLT
* IT     5              1200    2000
* IT     5 09MAR95      1200    2000
IT       2 09MAR95      1200    2000
IO       5
IN      15
*
JD    3.23    0.01
```

1 HEC-1 INPUT PAGE 3

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

PC   0.000   0.008   0.016   0.025   0.033   0.041   0.050   0.058   0.066   0.074
PC   0.087   0.099   0.118   0.138   0.216   0.377   0.834   0.911   0.931   0.950
PC   0.962   0.972   0.983   0.991   1.000
JD   3.209    0.50
JD   3.149    2.80
PC   0.000   0.009   0.016   0.025   0.034   0.042   0.051   0.059   0.067   0.076
PC   0.087   0.100   0.120   0.163   0.252   0.451   0.694   0.837   0.900   0.938
PC   0.950   0.963   0.975   0.988   1.000
JD   3.100     5.0
JD   3.036    10.0
JD   2.978    16.0
PC   0.000   0.009   0.020   0.030   0.048   0.063   0.076   0.090   0.105   0.119
PC   0.135   0.152   0.175   0.222   0.304   0.472   0.670   0.796   0.868   0.912
PC   0.946   0.960   0.973   0.987   1.000
JD   2.623    90.0
PC   0.000   0.021   0.035   0.051   0.071   0.087   0.105   0.125   0.143   0.160
PC   0.179   0.201   0.232   0.281   0.364   0.500   0.658   0.773   0.841   0.888
PC   0.927   0.945   0.964   0.982   1.000
JD   1.841   500.0
PC   0.000   0.024   0.043   0.059   0.078   0.098   0.119   0.141   0.162   0.186
PC   0.212   0.239   0.271   0.321   0.408   0.515   0.627   0.735   0.814   0.864
PC   0.907   0.930   0.954   0.977   1.000
*

KK   SUBWD   BASIN
KM    VALLEY S-GRAPH WAS USED FOR THIS BASIN
BA   0.393
LG    0.20    0.19    7.00    0.17      12
UI      32      42     116     157     189     226     281     403     348     281
UI     240     193     156     115      65      54      42      32      17      10
UI      10      10      10       9       0       0       0       0       0       0
UI       0       0       0       0       0       0       0       0       0       0
*

KK  RTWDXA   ROUTE   REACH
KM        ROUTE FLOW FROM WD TO XA (ALONG 27TH AVENUE).
KM        TYPE C CHANNEL
RS       4              -1       0
RC   0.025   0.025   0.025    2500  0.0016    0.00
RX     0.0   100.0   400.0   500.0   500.1   600.0   900.0  1000.0
RY     5.0     4.0     1.0     0.0     0.0     1.0     4.0     5.0
*

KK   SUBXA   BASIN
KM    VALLEY S-GRAPH WAS USED FOR THIS BASIN
BA   0.247
LG    0.13    0.15    9.70    0.06      44
UI      34     125     193     268     417     308     225     157      74      48
UI      29      10      11      11       0       0       0       0       0       0
UI       0       0       0       0       0       0       0       0       0       0
*
```

1 HEC-1 INPUT PAGE 4

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

KK   CPXA1
KM   ADD HYDROGRAPHS AT XA
```

```
149          HC       2    0.64
             *
             * KK  RSXA
             * KM MODIFIED PULS ROUTING THROUGH PONDING BEHIND SPRR.
             * RS      1     STOR        0        0
             * SV    .01      .07      1.0      5.1     14.0     28.5     50.0     79.1    117.4    165
             * SE1063.3   1063.5   1063.6   1064.1   1064.6   1065.1   1065.6   1066.1   1066.6   1067
             * SQ      0       15       43      455     1751     3879     6999    11192    17236    253
             *

150          KK   DIXAO
151          KM   DIVERT FLOW FROM XA SOUTHWARD OVER SPRR AND OUT OF MODEL
152          DT   DIZZ1
153          DI       0        0       43      455     1751     3879     6999    11192    17236    25382
154          DQ       0        0        0        0        0        0        0       44      960     3141
             *

155          KK  RTXAWC   ROUTE   REACH
156          KM        ROUTE FLOW FROM XA TO WC (ALONG SPRR).
157          KM         TYPE C CHANNEL
158          RS       12             -1        0
159          RC   0.035    0.035    0.035     5100  0.0016     0.00
160          RX     0.0     20.0     35.0     50.0     50.1    250.0    450.0    550.0
161          RY     5.0      5.0      2.5      0.0      0.0      2.0      4.0      5.0
             *

162          KK   SUBWB   BASIN
163          KM    VALLEY S-GRAPH WAS USED FOR THIS BASIN
164          BA   0.667
165          LG    0.16     0.15     9.70     0.06       36
166          UI      60      103      240      316      391      474      689      701      538      442
167          UI     358      278      177      107       94       61       41       19       18       19
168          UI      19       18        0        0        0        0        0        0        0        0
169          UI       0        0        0        0        0        0        0        0        0        0
             *

170          KK  RTWBWC   ROUTE   REACH
171          KM        ROUTE FLOW FROM WB TO WC (ALONG 35TH AVENUE).
172          KM         TYPE C CHANNEL
173          RS       3             -1        0
174          RC   0.025    0.025    0.025     2500  0.0020     0.00
175          RX     0.0     100.0    400.0    500.0    500.1    600.0    900.0   1000.0
176          RY     5.0      4.0      1.0      0.0      0.0      1.0      4.0      5.0
             *

177          KK   SUBWC   BASIN
178          KM    VALLEY S-GRAPH WAS USED FOR THIS BASIN
179          BA   0.487
180          LG    0.16     0.16     9.70     0.06       43
181          UI      46       90      195      255      315      404      581      477      377      302
182          UI     240      167       90       78       48       36       14       15       14       14
183          UI       0        0        0        0        0        0        0        0        0        0
             *
```



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

184          KK    CPWC
185          KM    ADD HYDROGRAPHS AT WC.
186          HC       3    1.76
             *
             * KK  RSWC
             * KM MODIFIED PULS ROUTING THROUGH PONDING BEHIND SPRR.
             * KM Revised SV-SQ records to reflect new weir analysis based on survey. 03.15.0
             * KO      1
             * RS      1     STOR        0        0
             * SV   16.1     27.6     44.0     65.2     90.7    121.5    159.6    206.8    263.7    329
             * SE1057.1   1057.6   1058.1   1058.6   1059.1   1059.6   1060.1   1060.6   1061.1   1061
             * SQ      0       34      456     1381     2859     4933     7982    12958    19919    288
             *

187          KK  DIWCWA
188          KM   DIVERT FLOW FROM WC TO QE
189          KM   Revised DQ records to reflect new weir analysis based on survey. 05.4.00 JEP
190          DT    DIQE
191          DI       0       34      456     1381     2859     4933     7982    12958    19919    28835
192          DQ       0        0        0        0        0        0      141     1221     3463     6954
             *
             * KKDIWCQE
             * KM DIVERT FLOW FROM WC TO QE
             * DT  DIQE
             * DI       0      115      608     1579     3086     5253     8972    15024    23745    350
             * DQ       0        0        0        0        0       40      951     3350     7104    121
             *

193          KK  RTWCWA
194          KM   HEC-RAS REACH
195          KM        ROUTE FLOW FROM WC TO WA (ALONG SPRR).
196          KM        Channel geometry changed to match natural conditions 04.11.00  JEP
197          KM        Manning's N values changed to match approved values 04.11.00  JEP
198          KM        Method changed from Normal Depth Storage to Modified Puls 05.25.00 JEP
199          KM        Stage-storage values are based on HEC-2 analysis results 06.19.00 JEP
200          KM        Values transferred directly from HEC-2 file: Tape7_1 09.29.00 JEP
201          RS      15     STOR        0        0
202          SV       0      103      168      242      267      296      317      332      338      354
203          SV     375
204          SQ       0      200      400      800     1000     1200     1400     1600     1700     1900
205          SQ    2200
             * RC  .129     .129     .129     4850    .0010
             * RX     0       40      200      410      870     1240     1700     2160
             * RY   4.4      3.8        0      1.6        0      1.8      2.8      4.4
             *
             *

206          KK   SUBWA   BASIN
207          KM    VALLEY S-GRAPH WAS USED FOR THIS BASIN
```

```
 208          BA   0.492
 209          LG    0.15    0.15   10.10    0.05      43
 210          UI      75     302     455     683     855     573     402     209     117      67
 211          UI      23      23      23       0       0       0       0       0       0       0
 212          UI       0       0       0       0       0       0       0       0       0       0
              *
1                                        HEC-1 INPUT                                        PAGE  6

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

 213          KK   CPWA1
 214          KM    ADD HYDROGRAPH SUBWA TO RTWCWA
 215          HC       2    2.04
              *

 216          KK   SUBVD   BASIN
 217          KM    VALLEY S-GRAPH WAS USED FOR THIS BASIN
 218          BA   0.697
 219          LG    0.16    0.16    9.70    0.06      36
 220          UI      63     108     251     330     408     495     720     733     562     461
 221          UI     375     291     185     112      98      63      44      19      20      19
 222          UI      20      19       0       0       0       0       0       0       0       0
 223          UI       0       0       0       0       0       0       0       0       0       0
              *

 224          KK  RTVDWA   ROUTE   REACH
 225          KM        ROUTE FLOW FROM VD TO WA (ALONG 43RD AVENUE).
 226          KM        FUTURE ARTERIAL SECTION
 227          RS       1              -1       0
 228          RC   0.100   0.023   0.100    2500  0.0030    0.00
 229          RX     0.0     440     445   445.1   575.1   575.2     900  1000.0
 230          RY     105     105     105   99.75   99.75     105     105     105
              *

 231          KK   CPWA2
 232          KM    ADD HYDROGRAPHS FROM SUBWA AND RTWCWA TO RTVDWA.
 233          HC       2    2.73
              *
              * KK  RSWA
              * KM MODIFIED PULS ROUTING THROUGH PONDING BEHIND SPRR.
              * KM Revised SV-SQ records to reflect new weir analysis based on survey. 03.15.0
              * KO      1
              * RS      1    STOR       0       0
              * SV    1.3     1.9     2.4     3.1     4.0     8.5    16.7    29.9    48.5      74
              * SE1050.7  1050.9  1051.1  1051.3  1051.4  1051.9  1052.4  1052.9  1053.4  1053
              * SQ      0       0       0       0       0      77     562    1532    3131      53
              *

 234          KK  DIWAVC
 235          KM        DIVERT FLOW FROM WA TO QD OVER SPRR
 236          KM   Revised DQ records to reflect new weir analysis based on survey. 05.4.00 JEP
 237          KM   Revised DQ records based on HEC-2 analysis results.  06.28.00 JEP
 238          DT    DIQD
 239          DI       0     200     400     800    1000    1200    1400    1600    1700    1900
 240          DQ       0       0      42     369     555     746     942    1140    1174    1370
              *
              * KKDIVCQD
              * KM DIVERT FLOW FROM VC TO QD OVER SPRR
              * DT  DIQD
              * DI      0     810    9237   10710
              * DQ      0       0       0      63
              *
1                                        HEC-1 INPUT                                        PAGE  7

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

 241          KK  RTWAVC
 242          KM   HEC-RAS REACH
 243          KM        MODIFIED PULS ROUTE FLOW FROM WA TO VC (ALONG SPRR).
              * KM      Channel geometry changed to match natural conditions 04.11.00  JEP
 244          KM        Manning's N values changed to match approved values 04.11.00  JEP
 245          KM        Method changed from Normal Depth Storage to Modified Puls 05.22.00 JEP
 246          KM        Stage-Storage values based on HEC-2 analysis results.  06.19.00 JEP
 247          KM        Values transferred directly from HEC-2 file:  Tape7_2  9.29.00 JEP
 248          RS      15    STOR       0       0
 249          SV       0     146     178     193     201     208     212
 250          SQ       0     400     600     800     989    1247    1487
              * RC   .317    .317    .317    5270   .0005
              * RX      0      50     120     390     810     950    1400    1700
              * RY    6.8       0       0     1.8     2.8     3.8     5.1     6.8
              *

 251          KK   SUBVC   BASIN
 252          KM    VALLEY S-GRAPH WAS USED FOR THIS BASIN
 253          BA   0.490
 254          LG    0.12    0.16    8.40    0.10      50
 255          UI      75     300     454     680     852     570     400     209     116      67
 256          UI      23      23      23       0       0       0       0       0       0       0
 257          UI       0       0       0       0       0       0       0       0       0       0
              *

 258          KK   CPVC1
 259          KM    ADD HYDROGRAPH SUBVC TO RTWAVC.
 260          HC       2    2.24
              *

 261          KK   SUBVB   BASIN
 262          KM    VALLEY S-GRAPH WAS USED FOR THIS BASIN
 263          BA   0.720
 264          LG    0.15    0.17    9.70    0.06      45
 265          UI     121     489     718    1162    1201     810     529     243     146      66
 266          UI      36      36       0       0       0       0       0       0       0       0
 267          UI       0       0       0       0       0       0       0       0       0       0
              *
```

```
 268          KK  RTVBVC   ROUTE   REACH
 269          KM        ROUTE FLOW FROM VB TO VC (ALONG 51ST AVENUE).
 270          KM         FUTURE ARTERIAL SECTION
 271          RS       1              -1       0
 272          RC   0.100   0.023   0.100    2500  0.0017    0.00
 273          RX     0.0     440     445   445.1   575.1   575.2     900  1000.0
 274          RY     105     105     105   99.75   99.75     105     105     105
              *

 275          KK   CPVC2
 276          KM    ADD HYDROGRAPHS FROM SUBVC AND RTWAVC TO RTVBVC.
 277          HC       2    2.96
              *
              * KK  RSVC
              * KM MODIFIED PULS ROUTING THROUGH PONDING BEHIND SPRR.
              * KM Revised SV-SQ records to reflect new weir analysis based on survey. 03.15.0
              * KO      1
              * RS      1    STOR       0       0
              * SV     70      83      97     113     121     170     192     216     284       3
              * SE1051.4  1051.6  1051.8  1052.0  1052.1  1052.6  1052.8  1053.0  1053.3  1053
              * SQ     16     246     746    1537    2048    5354    7033    8943   12315   147
              *
1                                          HEC-1 INPUT                                        PAGE  8

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

 278          KK  DIVCQA
 279          KM   DIVERT FLOW FROM VC TO VA OVER 51st AVE.
 280          KM   Revised DQ records to reflect new weir analysis based on survey. 05.4.00 JEP
 281          KM   Revised DQ records based on HEC-2 analysis results.  06.19.00 JEP
 282          DT    DIVA
 283          DI       0     100     400     600     800     989    1247    1487
 284          DQ       0       1      27      32      30      32      32      32
              *
              * KKDIVCVA
              * KM DIVERT FLOW FROM VC TO VA OVER 51st AVE.
              * DT  DIVA
              * DI     0       9     654    2822    7159
              * DQ     0       4     214     753    1814
              *

 285          KK  RTVCQA   ROUTE   REACH
 286          KM   ROUTE FLOW FROM VC TO QA (ALONG 51ST AVENUE).
 287          KM   FUTURE ARTERIAL SECTION
 288          RS       2              -1       0
 289          RC   0.100   0.023   0.100    5000  0.0030    0.00
 290          RX     0.0     440     445   445.1   575.1   575.2     900  1000.0
 291          RY     105     105     105   99.75   99.75     105     105     105
              *

 292          KK   SUBQA   BASIN
 293          KM    VALLEY S-GRAPH WAS USED FOR THIS BASIN
 294          BA   0.485
 295          LG    0.34    0.14   10.10    0.05      20
 296          UI      38      40     133     178     215     253     303     423     464     361
 297          UI     306     252     209     170     115      67      63      44      38      18
 298          UI      12      11      12      11      12       0       0       0       0       0
 299          UI       0       0       0       0       0       0       0       0       0       0
              *

 300          KK   CPQA2
 301          KM   ADD HYDROGRAPHS AT QA
 302          HC       2    3.41
              *

 303          KK    RSQA
 304          KM       MODIFIED PLUS ROUTING THROUGH PONDING BEHIND RID
 305          RS       1    STOR      -1       0
 306          SV     6.6     9.4    13.0    17.4    22.4    28.1    34.6    42.1    50.4
 307          SE  1032.2  1032.4  1032.6  1032.8  1033.0  1033.2  1033.4  1033.6  1033.8
 308          SQ       0      69    1129    6033   11213
 309          SE  1031.9  1032.4  1032.9  1033.4  1033.9
              *

 310          KK  DIQAPF
 311          KM   DIVERT FLOW FROM QA TO PF
 312          DT    DIPF
 313          DI       0      69    1129    6033   11213
 314          DQ       0      39     462    1272    2210
              *
1                                          HEC-1 INPUT                                        PAGE  9

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

 315          KK  RTQAJH   ROUTE   REACH
 316          KM        ROUTE FLOW FROM QA TO JH (SHEET FLOW).
 317          KM         TYPE A CHANNEL
 318          RS      11              -1       0
 319          RC   0.100   0.100   0.100    2800  0.0031    0.00
 320          RX     0.0   100.0   400.0   500.0   500.1   600.0   900.0  1000.0
 321          RY     5.0     4.0     1.0     0.0     0.0     1.0     4.0     5.0
              *

 322          KK   SUBQE   BASIN
 323          KM    VALLEY S-GRAPH WAS USED FOR THIS BASIN
 324          BA   0.913
 325          LG    0.15    0.13   10.10    0.04      56
 326          UI      92     200     409     529     670     915    1121     854     673     525
 327          UI     394     212     156     109      77      28      29      28      29       0
 328          UI       0       0       0       0       0       0       0       0       0       0
              *

 329          KK    DRQE
 330          KM    RETURN DIVERT FROM WC
 331          DR    DIQE
```

```
                *
  332           KK  RTDIQE   ROUTE   REACH
  333           KM        ROUTE DIVERT FROM WC TO QE
  334           KM        TYPE A CHANNEL
  335           RS       8              -1       0
  336           RC   0.025   0.025   0.025    6600  0.0030    0.00
  337           RX     0.0   100.0   400.0   500.0   500.1   600.0   900.0  1000.0
  338           RY     5.0     4.0     1.0     0.0     0.0     1.0     4.0     5.0
                *
  339           KK    CPQE
  340           KM       ADD HYDROGRAPHS AT QE
  341           HC       2    1.12
                *
  342           KK    RSQE
  343           KM        MODIFIED PULS ROUTING BEHIND RID CANAL
  344           RS       1    STOR       0       0
  345           SV     9.5    11.0    14.9    20.2    26.5    33.8   55.23    82.5    95.6   159.9
  346           SE  1040.1  1040.2  1040.4  1040.6  1040.8  1041.0  1041.5  1042.0  1042.2  1043.0
  347           SQ       0     1.8    62.8   242.3   581.9    1158    4169    9977   13108   31180
                *
  348           KK  RTQEQC   ROUTE   REACH
  349           KM        ROUTE FLOW FROM QE TO QC (SHEET FLOW).
  350           KM        TYPE A CHANNEL
  351           RS       3              -1       0
  352           RC   0.025   0.025   0.025    3000  0.0027    0.00
  353           RX     0.0   100.0   400.0   500.0   500.1   600.0   900.0  1000.0
  354           RY     5.0     4.0     1.0     0.0     0.0     1.0     4.0     5.0
                *
1                                        HEC-1 INPUT                                        PAGE 10

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

  355           KK   SUBQD   BASIN
  356           KM    VALLEY S-GRAPH WAS USED FOR THIS BASIN
  357           BA   0.249
  358           LG    0.17    0.06   12.40    0.02      51
  359           UI      35     125     195     271     419     311     227     158      75      48
  360           UI      29      10      11      11       0       0       0       0       0       0
  361           UI       0       0       0       0       0       0       0       0       0       0
                *
  362           KK    DRQD
  363           KM   RETURN DIVERT FROM WA
  364           DR    DIQD
                *
  365           KK  RTDIQD   ROUTE   REACH
  366           KM        ROUTE DIVERT FROM WA TO QD
  367           KM        TYPE C CHANNEL
  368           RS       5              -1       0
  369           RC   0.100   0.023   0.100    5000  0.0030    0.00
  370           RX     0.0     440     445   445.1   575.1   575.2     900  1000.0
  371           RY     105     105     105   99.75   99.75     105     105     105
                *
  372           KK    CPQD
  373           KM    ADD HYDROGRAPHS AT QD
  374           HC       2    1.23
                *
  375           KK    RSQD
  376           KM        MODIFIED PULS ROUTING BEHIND RID CANAL.
  377           RS       1    STOR       0       0
  378           SV     2.8     4.8     8.6    14.6    22.5    31.9    42.6    54.8    65.5
  379           SE  1038.1  1038.5  1039.0  1039.5  1040.0  1040.5  1041.0  1041.5  1042.0
  380           SQ       0    30.5   388.4  1580.9  4070.0  7936.6 13214.2 19810.4 26117.2
                *
  381           KK  DIQDQB
  382           KM        DIVERT FLOW FROM QD TO QB
  383           DT    DIQB
  384           DI       0      31     388    1580    4070    7937   13214   19810   26117
  385           DQ       0       0      71     591    1899    3883    6624   10067   13292
                *
  386           KK  RTQDQC   ROUTE REACH
  387           KM        ROUTE FLOW FROM QD TO QC.
  388           KM        FUTURE ARTERIAL SECTION
  389           RS       1              -1       0
  390           RC   0.100   0.023   0.100    2600  0.0040    0.00
  391           RX     0.0     440     445   445.1   575.1   575.2     900  1000.0
  392           RY     105     105     105   99.75   99.75     105     105     105
                *
1                                        HEC-1 INPUT                                        PAGE 11

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

  393           KK   SUBQC   BASIN
  394           KM    VALLEY S-GRAPH WAS USED FOR THIS BASIN
  395           BA   0.606
  396           LG    0.23    0.16   10.10    0.04      32
  397           UI      63     146     285     371     474     679     733     552     429     333
  398           UI     233     119      98      64      33      20      20      19      20       0
  399           UI       0       0       0       0       0       0       0       0       0       0
                *
  400           KK    CPQC
  401           KM       ADD HYDROGRAPHS AT QC
  402           HC       3    2.65
                *
```

```
403          KK   DIQCR
404          KM   DIVERT 80% OF FLOW FROM QC TO RIVER
405          DT    DISR
406          DI       0      25      50      75     100     150     200
407          DQ       0      20      40      60      80     120     160
             *

408          KK  RTQCJI   ROUTE   REACH
409          KM        ROUTE FLOW FROM QC TO JF
410          KM         TYPE A CHANNEL
411          RS      15              -1       0
412          RC  0.100   0.100   0.100    6500  0.0028    0.00
413          RX    0.0   100.0   400.0   500.0   500.1   600.0   900.0  1000.0
414          RY    5.0     4.0     1.0     0.0     0.0     1.0     4.0     5.0
             *

415          KK   SUBQB   BASIN
416          KM    VALLEY S-GRAPH WAS USED FOR THIS BASIN
417          BA   0.505
418          LG    0.30    0.11   11.20    0.03      27
419          UI      40      48     143     194     234     276     336     483     465     366
420          UI     316     253     211     166      97      69      63      41      34      12
421          UI      13      12      13      12      13       0       0       0       0       0
422          UI       0       0       0       0       0       0       0       0       0       0
             *

423          KK    DRQB
424          KM         RETURN DIVERT FROM QD
425          DR    DIQB
             *

426          KK  RTDIQB   ROUTE   REACH
427          KM        TYPE C CHANNEL
428          RS      12              -1       0
429          RC  0.100   0.100   0.100    2500  0.0028    0.00
430          RX    0.0    20.0    35.0    50.0    50.1   250.0   450.0   550.0
431          RY    5.0     5.0     2.5     0.0     0.0     2.0     4.0     5.0
             *
```



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

432          KK    CPQB
433          KM   ADD HYDROGRAPHS AT QB
434          HC       2    0.82
             *

435          KK    RSQB
436          KM         MODIFIED PULS ROUTING THROUGH PONDING BEHIND RID.
437          KM   THROUGH THE 43RD AVENUE.
438          RS       1    STOR       0       0
439          SV     9.4    13.9    19.2    25.5    33.1    41.8    51.7    62.9    75.3    89.1
440          SE  1033.3  1033.6  1033.9  1034.2  1034.5  1034.8  1035.1  1035.4  1035.7  1036.0
441          SQ       0    19.3   123.0   423.5   958.2  1718.8  2775.9  4426.7  6845.4  9954.3
             *

442          KK  RTQBJH   ROUTE REACH
443          KM   ROUTE FLOW FROM QB TO JH (SHEET FLOW).
444          KM         TYPE A CHANNEL
445          RS      15              -1       0
446          RC  0.100   0.100   0.100    3500  0.0028    0.00
447          RX    0.0   100.0   400.0   500.0   500.1   600.0   900.0  1000.0
448          RY    5.0     4.0     1.0     0.0     0.0     1.0     4.0     5.0
             *

449          KK   SUBJH   BASIN
450          KM    VALLEY S-GRAPH WAS USED FOR THIS BASIN
451          BA   0.516
452          LG    0.37    0.11   11.20    0.03      17
453          UI      62     175     314     402     581     733     541     418     304     176
454          UI     107      71      41      19      19      19       0       0       0       0
455          UI       0       0       0       0       0       0       0       0       0       0
             *

456          KK    CPJH
457          HC       4    3.98
             *

458          KK  RTJHJI   ROUTE REACH
459          KM   ROUTE FLOW FROM JH TO JI (SHEET FLOW).
460          KM         TYPE A CHANNEL
461          RS      14              -1       0
462          RC  0.100   0.100   0.100    4000  0.0031    0.00
463          RX    0.0   100.0   400.0   500.0   500.1   600.0   900.0  1000.0
464          RY    5.0     4.0     1.0     0.0     0.0     1.0     4.0     5.0
             *

465          KK   SUBJI   BASIN
466          KM    VALLEY S-GRAPH WAS USED FOR THIS BASIN
467          BA   0.308
468          LG    0.39    0.11   11.20    0.03      21
469          UI      52     209     307     497     514     346     227     104      62      28
470          UI      16      15       0       0       0       0       0       0       0       0
471          UI       0       0       0       0       0       0       0       0       0       0
             *
```



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

472          KK    CPJI
473          KM   COMBINE FLOWS AT JI
474          HC       2    4.29
             *

475          KK   DISRX
```

```
476          KM    DUMMY DIVERT TO SALT RIVER (NOT RETURNED)
477          DT   DISR1
478          DI       0   10000
479          DQ       0   10000
             *

480          KK   SUBPF   BASIN
481          KM    VALLEY S-GRAPH WAS USED FOR THIS BASIN
482          BA   0.502
483          LG    0.17    0.20    7.30    0.12      52
484          UI     113     407     611    1001     766     497     244     127      58      26
485          UI      28       0       0       0       0       0       0       0       0       0
486          UI       0       0       0       0       0       0       0       0       0       0
             *

487          KK   RETPF
488          KM   DIVERT RETENTION OUT OF MODEL DUE TO KNIGHT TRANSPORTATION
489          KM   PARKING LOT EXPANSION. -DCF
490          KM   TOTAL RETENTION IS 3.9 AF. 80% OF THAT IS USED HERE. -DCF
491          DT   RETPF     3.1
492          DI       0   10000
493          DQ       0   10000
             *

494          KK    DRPF
495          KM        RETURN DIVERT FROM QA.
496          DR    DIPF
             *

497          KK  RTDIPF   ROUTE   REACH
498          KM         ROUTE DIVERT FROM QA TO PF.
499          KM         TYPE C CHANNEL
500          RS      11              -1       0
501          RC   0.035   0.035   0.035    2600  0.0005    0.00
502          RX     0.0    20.0    35.0    50.0    50.1   250.0   450.0   550.0
503          RY     5.0     5.0     2.5     0.0     0.0     2.0     4.0     5.0
             *

504          KK   @CPPF
505          KM        ADD HYDROGRAPHS AT PF
506          HC       2    1.80
             *
1                                        HEC-1 INPUT                                        PAGE 14

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

507          KK    RSPF
508          KM        MODIFIED PULS ROUTING BEHIND RID
             * KO     1
509          RS       1    STOR       0       0
510          SV    28.2    33.4    39.2    48.8    55.7    67.3    76.0    85.3   100.7   111.8
511          SE  1032.2  1032.4  1032.6  1032.8  1033.0  1033.2  1033.4  1033.6  1033.8  1034.0
512          SQ       0    19.4   124.9   457.5  1050.9  1875.2  2964.8  4437.1  6362.7  8725.9
             *

513          KK  DIPFPE
514          KM        DIVERT FLOW FROM PF TO PE
515          DT    DIPE
516          DI       0     255    1875    5340   11513
517          DQ       0       0       0     160    1143
             *

518          KK  RTPFJF   ROUTE   REACH
519          KM         ROUTE FLOW FROM PF TO JF.
520          KM         TYPE A CHANNEL
521          RS       6              -1       0
522          RC   0.035   0.035   0.035    4000  0.0040    0.00
523          RX     0.0    20.0    35.0    50.0    50.1   250.0   450.0   550.0
524          RY     5.0     5.0     2.5     0.0     0.0     2.0     4.0     5.0
             *

525          KK   SUBUD   BASIN
526          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
527          KM    L=      1.3  Lca=       .6   S=   20.0  Kn= .020  LAG=  14.9
528          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
529          BA     .759
530          LG     .15     .15    9.70     .05   55.00
531          UI    306.    941.   1739.   1494.    851.    324.    131.     53.      0.      0.
532          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *

533          KK    RETUD
534          KM   DIVERT REQUIRED DEVELPMENT RETENTION OUT OF MODEL
535          KM   80% OF REQUIRED MODELED
536          DT   RETB1    38.7
537          DI       0   10000
538          DQ       0   10000
             *

539          KK  SDDRUD
540          KM   DIVERT STORM DRAIN FLOW
541          DT  59SD1D
542          DI       0     102   10000
543          DQ       0     102     102
             *
1                                        HEC-1 INPUT                                        PAGE 15

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

544          KK  DIUDUA
545          KM   DIVERT 25% OF FLOW FROM UD TO UA.
546          DT    DIUA
547          DI       0      25      50      75     100     150     200
548          DQ       0       6      13      19      25      38      50
             *
```

```
549          KK  RTUDVA   ROUTE   REACH
550          KM        ROUTE FLOW FROM UD TO VA (ALONG 59TH AVENUE).
551          KM        FUTURE ARTERIAL SECTION
552          RS       1          -1        0
553          RC   0.100   0.023   0.100    2600  0.0019    0.00
554          RX     0.0     440     445   445.1   575.1   575.2     900  1000.0
555          RY     105     105     105   99.75   99.75     105     105     105
             *

556          KK   SUBVA   BASIN
557          KM    VALLEY S-GRAPH WAS USED FOR THIS BASIN
558          BA   0.493
559          LG    0.10    0.15    8.40    0.10      58
560          UI      75     303     456     684     857     574     402     210     117      67
561          UI      23      23      24       0       0       0       0       0       0       0
562          UI       0       0       0       0       0       0       0       0       0       0
             *
             * THE FOLLOWING DIVERT RETURN IS REMOVED TO MODEL THE ADMP CONDITION

563          KK    DRVA
564          KM        RETURN DIVERT FROM VC
565          DR    DIVA
             *
             * KKRTDIVA
             * KM HEC-RAS REACH
             * KO      1
             * KM       ROUTE FLOW FROM VC TO VA (ALONG SPRR).
             * KM       Method changed from Normal Depth Storage to Modified Puls 06.19.00 JEP
             * KM       Stage-Storage values are based on HEC-2 analysis results. 06.19.00 JEP
             * KM       Values transferred directly from HEC-2 file:  Tape7_3  09.29.00  JEP
             * RS    15     STOR       0       0
             * SV     0       56       87      130      163      191      205      218      227
             * SQ     0      100      200      400      600      800     1000     1200     1500
             *

566          KK   CPVA1
567          KM        ADD HYDROGRAPH SUBVA TO RTDIVA
568          HC       3    1.10
             *
             *

569          KK  SDDRVA
570          KM   DIVERT STORM DRAIN FLOW
571          DT  59SD2D
572          DI       0       59   10000
573          DQ       0       59      59
             *
             * KK CPVA2
             * KM       ADD HYDROGRAPHS SUBVA AND RTDIVA TO RTUDVA
             * HC      2
             *
             * KK  RSVA
             * KM MODIFIED PULS ROUTING THROUGH PONDING BEHIND SPRR.
             * KM Revised SV-SQ records to reflect new weir analysis based on survey. 03.15.0
             * KO      1
             * RS      1    STOR       0       0
             * SV   10.3    13.3    15.6    23.9    34.6    48.9    67.7    90.8   118.6
             * SE1044.2  1044.3  1044.5  1045.0  1045.5  1046.0  1046.5  1047.0  1047.5
             * SQ      0       2      39     397    1279    2904    5363    8613   13175
             *
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LINE         ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

574          KK  DIVAPE
575          KM   DIVERT FLOW FROM VA TO UC OVER 59TH AVE.
576          KM   Revised DQ records to reflect new weir analysis based on survey. 05.04.00 JEP
577          KM   REVISED DIVERSION RECORDS TO REROUTE DIVERSION AROUND CODE SEQUENCE.
578          KM   INSTEAD OF DIVERTING FLOW OVER THE WEIR TO THE SOUTH, FLOW IS BEING
579          KM   DIVERTED TO THE WEST. 06.02.00 -DCF
580          KM   Revised DQ records based on HEC-2 analysis results.  06.19.00 JEP
581          DT    DIUC
582          DI       0     200     400     600     800    1000    1200    1500
583          DQ       0     200     398     548     656     715     738     756
             * DI     0       2      39     397    1279
             * DQ     0       0       0       0       0
             *

584          KK  RTVAPE   ROUTE   REACH
585          KM   ROUTE FLOW FROM VA TO PE (ALONG 59TH AVENUE).
586          KM   FUTURE ARTERIAL SECTION
587          RS       2          -1        0
588          RC   0.100   0.023   0.100    3000  0.0038    0.00
589          RX     0.0     440     445   445.1   575.1   575.2     900  1000.0
590          RY     105     105     105   99.75   99.75     105     105     105
             *

591          KK   SUBPE   BASIN
592          KM    VALLEY S-GRAPH WAS USED FOR THIS BASIN
593          BA   0.504
594          LG    0.13    0.26    6.20    0.22      56
595          UI     130     449     692    1071     728     453     189     108      32      29
596          UI       0       0       0       0       0       0       0       0       0       0
             *

597          KK    DRPE
598          KM    RETURN DIVERT FROM PF
599          DR    DIPE
             *

600          KK  RTDIPE
601          KM        ROUTE DIVERT FROM PF TO PE.
602          KM        TYPE C CHANNEL
603          RS       3          -1        0
604          RC    .035    .035    .035    2000   .0005
```

```
605          RX       0      20      35      50    50.1     250     450     550
606          RY       5       5     2.5       0       0       2       4       5
             *

607          KK    CPPE
608          KM       ADD HYDROGRAPHS AT PE
609          HC       3    0.73
             *
1                                        HEC-1 INPUT                                                    PAGE 17

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

610          KK    RSPE
611          KM          RESERVOIR ROUTING BEHIND 59TH AVE AND RID CANAL
612          RS       1    STOR       0       0
613          SV    15.6    16.9    21.0    24.0    29.5    33.7    38.3    43.2
614          SE  1032.5  1032.6  1032.8  1033.0  1033.2  1033.4  1033.6  1033.7
615          SQ       0    1.44      23     194     637    1420    2516    3177
             *

616          KK  DIPEPD
617          KM         DIVERT FLOW FROM PE TO PD
618          DT    DIPD
619          DI       0     8.2     636    3177
620          DQ       0       0       0     8.1
             *

621          KK  RTPEJF   ROUTE   REACH
622          KM        ROUTE FLOW FROM PE TO JF (ALONG 59TH AVE).
623          KM        FUTURE ARTERIAL SECTION
624          RS       1              -1       0
625          RC   0.100   0.023   0.100    2600  0.0036    0.00
626          RX     0.0     440     445   445.1   575.1   575.2     900  1000.0
627          RY     105     105     105   99.75   99.75     105     105     105
             *

628          KK   SUBJF   BASIN
629          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
630          KM    L=        .7  Lca=        .4   S=    11.1  Kn= .027  LAG=  22.9
631          KM    AGRICULTURAL S-GRAPH WAS USED FOR THIS BASIN
632          BA   0.501
633          LG    0.10    0.15    7.60    0.14      55
634          UI     320    1108    1172     675     319     146      67      20      19      19
635          UI       0       0       0       0       0       0       0       0       0       0
             *

636          KK    CPJF
637          KM   COMBINE FLOWS AT JF.
638          HC       3    2.95
             *

639          KK  RTJFJG   ROUTE   REACH
640          KM        ROUTE FLOW FROM JF TO JE (ALONG 59TH AVE).
641          KM        FUTURE ARTERIAL SECTION
642          RS       3              -1       0
643          RC   0.100   0.023   0.100    6000  0.0036    0.00
644          RX     0.0     440     445   445.1   575.1   575.2     900  1000.0
645          RY     105     105     105   99.75   99.75     105     105     105
             *

646          KK   SUBJG   BASIN
647          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
648          KM    L=        .7  Lca=        .4   S=    11.1  Kn= .027  LAG=  22.9
649          KM    AGRICULTURAL S-GRAPH WAS USED FOR THIS BASIN
650          BA   0.901
651          LG    0.12    0.16    8.40    0.10      51
1                                        HEC-1 INPUT                                                    PAGE 18

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

652          UI     195     717    1181    1396    1191     840     531     336     203     134
653          UI      96      35      20      21      21      20      21       0       0       0
654          UI       0       0       0       0       0       0       0       0       0       0
             *

655          KK    CPJG
656          KM   COMBINE FLOWS AT SALT RIVER.
657          HC       2    3.85
             *

658          KK  CPJGSR
659          KM   COMBINE FLOWS AT SALT RIVER
660          HC       2    3.85
             *
             * ***************************************************************************
             *

661          KK    DRUC
662          KM    RETURN DIVERT FROM VA
663          DR    DIUC
             *
             *
             * KKRTVAUC   ROUTE   REACH
             * KM       ROUTE FLOW FROM VA TO UC
             * KM       Channel geometry changed to match natural conditions 04.11.00  JEP
             * KM       Manning's N values changed to match approved values 04.11.00  JEP
             * RS     9              -1       0
             * RC 0.035   0.035   0.035    5200  0.0012    0.00
             * RX   0.0    20.0    35.0    50.0    50.1   250.0   450.0   550.0
             * RY   5.0     5.0     2.5     0.0     0.0     2.0     4.0     5.0
             *

664          KK  RTVAUC
665          KM   HEC-RAS REACH
666          KM        ROUTE FLOW FROM VA TO A POINT IN UC (ALONG SPRR).
667          KM        Channel geometry changed to match natural conditions 04.11.00  JEP
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```
668          KM        Manning's N values changed to match approved values 04.11.00  JEP
669          KM        Method changed from Normal Depth Storage to Modified Puls 05.25.00 JEP
670          KM        Stage-storage values are from HEC-2 results 06.19.00 JEP
671          KM        Values transferred directly from HEC-2 file: Tape7_4  09.29.00 JEP
672          KM        Values modified to reflect channelization downstream  06.11.01 JEP
673          RS      9    STOR       0       0
674          SV      0      46      62      76      90     102     114     125     137
675          SQ      0     200     400     600     800    1000    1200    1400    1600
             *
             * KKSUBUC    BASIN
             * KM  VALLEY S-GRAPH WAS USED FOR THIS BASIN
             * BA 0.483
             * LG  0.23    0.15    9.70    0.06      28
             * UI    49     105     217     280     354     484     594     451     356     2
             * UI   208     113      83      57      41      15      15      14      15
             * UI     0       0       0       0       0       0       0       0       0
             *
             * KK@CPUC1
             * KM       ADD HYDROGRAPHS SUBUC1 TO RTVAUC
             * HC     2    1.73
             *
1                                                HEC-1 INPUT                                                PAGE 19

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

676          KK  MCUCUC   ROUTE   REACH
677          KM   ADMP CHANNEL
678          KM   MASTER CHANNEL ROUTE FROM UC1 TO UC2
679          KM   ROUTING RECORD ADDED, JEP 6/11/01
680          RS       1    FLOW      -1
681          RC   0.014   0.014   0.014    2493  0.0014    0.00
682          RX     0.0    16.0    16.0    16.0    46.0    46.0    46.0    62.0
683          RY     4.8     5.1     2.6     0.0     0.0     2.6     5.1     4.8
             *
684          KK  SUBUC    BASIN
685          KM    VALLEY S-GRAPH WAS USED FOR THIS BASIN
686          BA   0.483
687          LG    0.23    0.15    9.70    0.06      28
688          UI      49     105     217     280     354     484     594     451     356     278
689          UI     208     113      83      57      41      15      15      14      15       0
690          UI       0       0       0       0       0       0       0       0       0       0
             *
691          KK   @CPUC
692          KM        ADD HYDROGRAPHS SUBUC TO MCUCUC
693          HC       2    0.89

694          KK  SUBTB1
695          KM   BASIN TB1
696          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
697          KM    L=        .9  Lca=        .3   S=    9.4  Kn= .020  LAG=  10.4
698          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
699          BA     .14
700          LG     .25     .15    9.70     .05   30.00
701          UI    118.    367.    381.    146.     40.     14.      0.      0.      0.      0.
702          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *
703          KK   RETB1
704          KM   DIVERT REQUIRED DEVELPMENT RETENTION OUT OF MODEL
705          KM   80% OF REQUIRED MODELED
706          DT   RETB1    11.2
707          DI       0   10000
708          DQ       0   10000
             *
709          KK  SDDTB1
710          KM   DIVERT STORM DRAIN FLOW
711          DT  67SD1D
712          DI       0      17   10000
713          DQ       0      17      17
             *
1                                                HEC-1 INPUT                                                PAGE 20

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

714          KK  RTUAUC   ROUTE   REACH
715          KM        ROUTE FLOW FROM TB1 TO UA (ALONG 67TH AVENUE).
716          KM        FUTURE ARTERIAL SECTION
717          RS       2              -1       0
718          RC   0.100   0.023   0.100    2450  0.0015    0.00
719          RX     0.0     440     445   445.1   575.1   575.2     900  1000.0
720          RY     105     105     105   99.75   99.75     105     105     105
             *
721          KK   SUBUA   BASIN
722          KM    VALLEY S-GRAPH WAS USED FOR THIS BASIN
723          BA   0.561
724          LG    0.23    0.16    9.70    0.06      22
725          UI      44      46     155     204     249     294     350     490     536     417
726          UI     354     291     242     198     133      77      73      51      43      21
727          UI      13      13      14      13      14       0       0       0       0       0
728          UI       0       0       0       0       0       0       0       0       0       0
             *
729          KK    DRUA
730          KM    RETURN DIVERT FROM UD
731          DR    DIUA
             *
732          KK  RTDIUA   ROUTE   REACH
733          KM        ROUTE DIVERT TO UA
734          KM        FUTURE ARTERIAL SECTION
735          RS       4              -1       0
```

```
736          RC   0.100   0.023   0.100    5000  0.0014    0.00
737          RX     0.0     440     445   445.1   575.1   575.2     900  1000.0
738          RY     105     105     105   99.75   99.75     105     105     105
             *

739          KK   @CPUA
740          KM        ADD HYDROGRAPHS AT UA
741          HC        3    0.89
             *

742          KK  SDDRUA
743          KM   DIVERT STORM DRAIN FLOW
744          DT  67SD1D
745          DI        0      96   10000
746          DQ        0      96      96
             *

747          KK  DIUAUC
748          KM        DIVERT 20% OF FLOW FROM UA TO TB
749          DT    DITB
750          DI        0      25      50      75     100     150     200
751          DQ        0       5      10      15      20      30      40
             *
1                                        HEC-1 INPUT                                        PAGE 21

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

752          KK  RTUAUC   ROUTE   REACH
753          KM        ROUTE FLOW FROM UA TO UC (ALONG 67TH AVENUE).
754          KM        FUTURE ARTERIAL SECTION
755          RS        2              -1       0
756          RC   0.100   0.023   0.100    2400  0.0017    0.00
757          RX     0.0     440     445   445.1   575.1   575.2     900  1000.0
758          RY     105     105     105   99.75   99.75     105     105     105
             *

759          KK  ~CPUC2
760          KM        ADD HYDROGRAPHS SUBUC AND MCUCUC TO RTUAUC
761          HC        2    1.25
             *
             * KK  RSUC
             * KM       ROUTE FLOW FROM UC TO UB OVER 67th AVE.
             * KM Revised SV-SQ records to reflect new weir analysis based on survey. 03.15.0
             * KO     1
             * RS     1    STOR       0       0
             * SV   4.8     6.9     9.9    19.0    33.0    52.6    77.4   108.7   148.6
             * SE1036.2  1036.3  1036.5  1037.0  1037.5  1038.0  1038.5  1039.0  1039.5
             * SQ     0       0      76     811    2294    4562    7715   11722   16588
             *

762          KK  DIUCPC
763          KM   DIVERT FLOW FROM UC TO PC OVER SPRR
764          KM   Revised DQ records to reflect new weir analysis based on survey. 05.04.00 JEP
765          KM   Revised DQ records based on HEC-2 results.  06.19.00 JEP
766          KM   REVERSE DIVERT TO ROUTE AROUND CODE SEQUENCE. 06.21.00 -DCF
767          KM   DIVERT EFFECTIVELY REMOVED DUE TO ADMP CHANNELIZATION.  06.11.01 -JEP
768          DT    DIUB
769          DI        0     100     400     800    1000    1200    1400    1600
770          DQ        0     100     400     800    1000    1200    1400    1600
             * DI      0     100     400     800    1000    1200    1400    1600
             * DQ      0     100     400     674     825     854     914     945
             * DI      0     100     400     800    1000    1200    1400    1600
             * DQ      0       0       0     126     175     346     486     655
             *

771          KK  RTUCPC   ROUTE   REACH
772          KM   ROUTE FLOW FROM UC TO PC (ALONG 67TH AVE).
773          KM   FUTURE ARTERIAL SECTION
774          RS        3              -1       0
775          RC   0.100   0.023   0.100    3000  0.0038    0.00
776          RX     0.0     440     445   445.1   575.1   575.2     900  1000.0
777          RY     105     105     105   99.75   99.75     105     105     105
             *

778          KK   SUBPC   BASIN
779          KM    VALLEY S-GRAPH WAS USED FOR THIS BASIN
780          BA   0.300
781          LG    0.18    0.19    8.80    0.06      42
782          UI     160     482     829     518     214      79      23       0       0       0
783          UI       0       0       0       0       0       0       0       0       0       0
             *
1                                        HEC-1 INPUT                                        PAGE 22

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

784          KK    CPPC
785          KM   COMBINE POSSIBLE FLOWS FROM UC WITH FLOWS FROM PC
786          HC        2    0.30
             *

787          KK    RSPC
788          KM   MODIFIED PULS ROUTING FROM PC TO NB.
789          RS        1    STOR       0       0
790          SV     29.1    31.8    34.8    38.2      42      46    50.2    78.8   107.9   135.6
791          SE   1029.8  1029.9  1030.0  1030.1  1030.2  1030.3  1030.4  1031.0  1031.5  1032.0
792          SQ        5      27      70     134     225     357     545    3654    9263   17876
             *

793          KK  RTPCNB   ROUTE   REACH
794          KM        ROUTE FLOW FROM PC TO NB (ALONG 67TH AVE).
795          KM        FUTURE ARTERIAL SECTION
796          RS        7              -1       0
797          RC   0.100   0.023   0.100    4800  0.0038    0.00
798          RX     0.0     440     445   445.1   575.1   575.2     900  1000.0
799          RY     105     105     105   99.75   99.75     105     105     105
```

```
                *
  800           KK   SUBNB   BASIN
  801           KM   BASIN NB
  802           KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
  803           KM    L=      1.4  Lca=       .7   S=   16.8  Kn= .020  LAG=  16.4
  804           KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
  805           BA     .44
  806           LG     .25     .15    6.80     .16   12.00
  807           UI    144.    464.    790.    956.    577.    284.    126.     48.     28.      0.
  808           UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                *
  809           KK   RETNB
  810           KM   DIVERT REQUIRED DEVELPMENT RETENTION OUT OF MODEL
  811           KM   80% OF REQUIRED MODELED
  812           DT   RETNB    33.5
  813           DI       0   10000
  814           DQ       0   10000
                *
  815           KK   CPNB1
  816           KM        ADD HYDROGRAPHS AT NB
  817           HC       2    0.74
                *
                * KKDINBNA
                * KM       DIVERT 65% OF FLOW FROM NB TO NA
                * DT  DINA
                * DI      0      25      50      75     100     150     200
                * DQ      0      16      33      49      65      98     130
                *
1                                        HEC-1 INPUT                                        PAGE 23

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

  818           KK  RTNBJD   ROUTE   REACH
  819           KM         ROUTE FLOW FROM NB TO JD (ALONG 67TH AVENUE).
  820           KM        FUTURE ARTERIAL SECTION
  821           RS       3              -1       0
  822           RC   0.100   0.023   0.100    5200  0.0054    0.00
  823           RX     0.0     440     445   445.1   575.1   575.2     900  1000.0
  824           RY     105     105     105   99.75   99.75     105     105     105
                *
  825           KK   SUBPD   BASIN
  826           KM    VALLEY S-GRAPH WAS USED FOR THIS BASIN
  827           BA   0.443
  828           LG    0.14    0.17    8.00    0.11      24
  829           UI     130     438     708     954     610     331     138      64      27      27
  830           UI       0       0       0       0       0       0       0       0       0       0
                *
  831           KK    DRPD
  832           KM    RETURN DIVERT FROM PE
  833           DR    DIPD
                *
  834           KK   CPPD2
  835           KM        ADD HYDROGRAPH AT PD
  836           HC       2    0.44
                *
  837           KK    RSPD
  838           KM         MODIFIED PULS ROUTING FROM PD TO NC.
                * KO      1
  839           RS       1    STOR       0       0
  840           SV    25.6    37.6    42.4    51.8    53.9    56.1    58.2
  841           SE  1030.6  1030.7  1030.8  1030.9  1031.0  1031.1  1031.2
  842           SQ       0       4      28     101     246     487     820
                *
  843           KK  RTPDNC   ROUTE   REACH
  844           KM         ROUTE FLOW FROM PD TO NC (SHEET FLOW).
  845           KM        TYPE A CHANNEL
  846           RS       5              -1       0
  847           RC   0.035   0.035   0.035    3000  0.0027    0.00
  848           RX     0.0   100.0   400.0   500.0   500.1   600.0   900.0  1000.0
  849           RY     5.0     4.0     1.0     0.0     0.0     1.0     4.0     5.0
                *
  850           KK   SUBNC   BASIN
  851           KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
  852           KM    L=       .7  Lca=       .3   S=   14.7  Kn= .092  LAG=  43.5
  853           KM    AGRICULTURAL S-GRAPH WAS USED FOR THIS BASIN
  854           BA   0.306
  855           LG    0.47    0.25    5.30    0.35      51
  856           UI      86     341     534     508     379     219     121      71      44      23
  857           UI       9       8       8       9       8       0       0       0       0       0
  858           UI       0       0       0       0       0       0       0       0       0       0
                *
1                                        HEC-1 INPUT                                        PAGE 24

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

  859           KK    CPNC
  860           KM        ADD HYDROGRAPHS AT NC.
  861           HC       2    0.75
                *
  862           KK  RTNCJE   ROUTE   REACH
  863           KM         ROUTE FLOW FROM NC TO JE (SHEET FLOW).
  864           KM        TYPE A CHANNEL
  865           RS      12              -1       0
  866           RC   0.035   0.035   0.035    5000  0.0014    0.00
  867           RX     0.0   100.0   400.0   500.0   500.1   600.0   900.0  1000.0
```

```
868          RY     5.0     4.0     1.0     0.0     0.0     1.0     4.0     5.0
             *

869          KK  SUBJE1   BASIN
870          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
871          KM     L=      1.1  Lca=       .6   S=    12.7  Kn= .090  LAG=  66.1
872          KM     AGRICULTURAL S-GRAPH WAS USED FOR THIS BASIN
873          BA   0.248
874          LG    0.10    0.25    5.40    0.32      55
875          UI     192     630     574     304     118      57      16      11      10       0
876          UI       0       0       0       0       0       0       0       0       0       0
             *

877          KK   CPJE1
878          KM   COMBINE FLOWS FROM NC AND JE1
879          HC       2    1.00
             *

880          KK  RTJEJD   ROUTE   REACH
881          KM        ROUTE FLOW FROM JE TO JD.
882          KM        FUTURE ARTERIAL SECTION
883          RS       3              -1       0
884          RC   0.100   0.023   0.100    2500  0.0080    0.00
885          RX     0.0     440     445   445.1   575.1   575.2     900  1000.0
886          RY     105     105     105   99.75   99.75     105     105     105
             *

887          KK   SUBJD   BASIN
888          KM   BASIN JD
889          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
890          KM     L=       1.1  Lca=       .6   S=    12.7  Kn= .020  LAG=  14.7
891          KM     PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
892          BA      .51
893          LG     .25     .17    8.00     .10   22.50
894          UI    211.    648.   1201.    988.    552.    203.     82.     36.      0.      0.
895          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *
1                                        HEC-1 INPUT                                        PAGE 25

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

896          KK   RETJD
897          KM   DIVERT REQUIRED DEVELPMENT RETENTION OUT OF MODEL
898          KM   80% OF REQUIRED MODELED
             * KO     3                                21
899          DT   RETJD    35.0
900          DI       0   10000
901          DQ       0   10000
             *

902          KK    CPJD
903          KM        ADD HYDROGRAPHS AT JD
904          HC       3    2.25
             *
             * KKSDDRJD
             * KM DIVERT STORM DRAIN FLOW
             * DT59SDJD
             * DI     0     207   10000
             * DQ     0     207     207
             *

905          KK  DIJDJC
906          KM        DIVERT 37% OF FLOW AT JD TO JC2.
907          DT   DIJC2
908          DI       0      25      50     100     150     200
909          DQ       0       9      19      37      56      74
             *

910          KK  RTJDFC   ROUTE   REACH
911          KM        ROUTE FLOW FROM JD TO FC.
912          KM        FUTURE ARTERIAL SECTION
913          RS       1              -1       0
914          RC   0.100   0.023   0.100    3000  0.0053    0.00
915          RX     0.0     440     445   445.1   575.1   575.2     900  1000.0
916          RY     105     105     105   99.75   99.75     105     105     105
             *

917          KK  SUBJE2   BASIN
918          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
919          KM     L=       1.1  Lca=       .5   S=    19.8  Kn= .097  LAG=  63.6
920          KM     AGRICULTURAL S-GRAPH WAS USED FOR THIS BASIN
921          BA   0.253
922          LG    0.12    0.13   10.10    0.05      44
923          UI     109     427     539     421     225     108      59      33       9       8
924          UI       8       9       0       0       0       0       0       0       0       0
925          UI       0       0       0       0       0       0       0       0       0       0
             *

926          KK  RETJE2
927          KM   DIVERT RETENTION OUT OF MODEL DUE TO RIO DEL REY DEVELOPMENT. -DCF
928          KM   TOTAL RETENTION IS 5.9 AF. 80% OF THAT IS USED HERE. -DCF
929          DT   RETJE     4.7
930          DI       0   10000
931          DQ       0   10000
             *
1                                        HEC-1 INPUT                                        PAGE 26

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

932          KK  RTJEFC   ROUTE   REACH
933          KM        ROUTE FLOW FROM JE TO FC (SHEET FLOW).
934          KM        TYPE A CHANNEL
935          RS       4              -1       0
936          RC   0.035   0.035   0.035    4000  0.0080    0.00
937          RX     0.0   100.0   400.0   500.0   500.1   600.0   900.0  1000.0
```

```
 938          RY     5.0     4.0     1.0     0.0     0.0     1.0     4.0     5.0
              *
 939          KK   SUBFC   BASIN
 940          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 941          KM    L=       1.0  Lca=       .4   S=   18.6  Kn= .097  LAG=  55.3
 942          KM    AGRICULTURAL S-GRAPH WAS USED FOR THIS BASIN
 943          BA   0.357
 944          LG    0.12    0.16    7.60    0.13      51
 945          UI     101     397     624     592     442     256     140      84      50      28
 946          UI      10       9      10      10      10       0       0       0       0       0
 947          UI       0       0       0       0       0       0       0       0       0       0
              *
 948          KK    CPFC
 949          KM         ADD HYDROGRAPHS AT FC
 950          HC       3    2.03
              *
 951          KK  CPFCSR
 952          KM   COMBINE HYDROGRAPHS INTO SALT RIVER AT FC
 953          HC       2    5.88
              *
              * ****************************************************************************
              *
              *
              * ****************************************************************************
              *
              *
 954          KK  DRUCUB
 955          KM   RETURN DIVERT FROM UC
 956          DR    DIUB
              *
 957          KK  MCUCUB   ROUTE   REACH
 958          KM   ADMP CHANNEL
 959          KM   MASTER CHANNEL ROUTE FROM UC2 TO UB
 960          KM   ROUTING RECORD ADDED, JEP 6/11/01
 961          RS       1    FLOW      -1
 962          RC   0.014   0.014   0.014    1287  0.0010    0.00
 963          RX     0.0    16.0    16.0    16.0    51.0    51.0    51.0    67.0
 964          RY     4.8     5.1     2.5     0.0     0.0     2.5     5.1     4.8
              *
              * KKRTUCUB
              * KM HEC-RAS REACH
              * KM      ROUTE FLOW FROM UC TO UB
              * KM      Channel geometry changed to match natural conditions 04.11.00  JEP
              * KM      Manning's N values changed to match approved values 04.11.00  JEP
              * RS      4              -1       0
              * RC 0.035   0.035   0.035    1400  0.0043    0.00
              * RX   0.0    20.0    35.0    50.0    50.1   250.0   450.0   550.0
              * RY   5.0     5.0     2.5     0.0     0.0     2.0     4.0     5.0
              *
              *
```



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

 965          KK   SUBUB
 966          KM   BASIN UB
 967          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 968          KM    L=       .8  Lca=       .4   S=   16.2  Kn= .048  LAG=  26.9
 969          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
 970          BA     .14
 971          LG     .25     .14    8.80     .08   30.00
 972          UI     18.     53.     91.    119.    176.    199.    143.    106.     76.     38.
 973          UI     27.     18.      6.      5.      5.      5.      0.      0.      0.      0.
 974          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *
 975          KK  ~@CPUB
 976          KM        ADD HYDROGRAPHS AT UB
 977          HC       2    1.39
              *
              * KK71PASS
              * KM DIVERT LOW FLOW AROUND BASIN
              * DT71PASS
              * DI     0       0   10000
              * DQ     0       0       0
              *
 978          KK  SUBSF1
 979          KM   BASIN SF1
 980          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
 981          KM    L=       .5  Lca=       .3   S=    9.2  Kn= .100  LAG=  45.9
 982          KM    AGRICULTURAL S-GRAPH WAS USED FOR THIS BASIN
 983          BA     .13
 984          LG     .50     .15    9.70     .07     .00
 985          UI     10.     11.     24.     46.     58.     74.     81.     86.     86.     74.
 986          UI     75.     62.     58.     42.     35.     30.     25.     18.     15.     13.
 987          UI     10.      9.      7.      6.      6.      5.      1.      1.      1.      1.
 988          UI      1.      1.      1.      1.      1.      1.      1.      1.      1.      1.
 989          UI      1.      0.      0.      0.      0.      0.      0.      0.      0.      0.
 990          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *
 991          KK    DRTB
 992          KM        RETURN DIVERT FROM UA
 993          DR    DITB
              *
 994          KK  RTDITB   ROUTE   REACH
 995          KM        ROUTE DIVERT TO SF1 (REACH LENGTH SUBJECT TO CHANGED
 996          KM        BASED ON BASIN 3 LOCATION)
 997          KM        TYPE A CHANNEL
```

```
 998          RS       8              -1       0
 999          RC   0.025   0.025   0.025    1400  0.0019    0.00
1000          RX     0.0   100.0   400.0   500.0   500.1   600.0   900.0  1000.0
1001          RY     5.0     4.0     1.0     0.0     0.0     1.0     4.0     5.0
              *
```



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

1002          KK   CPBA3
1003          KM   COMBINE CPUB, SF1, DITB
1004          HC       3    1.61
              *

1005          KK  SUBTB2
1006          KM   BASIN TB2
1007          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1008          KM    L=      1.8  Lca=       .9   S=    10.3  Kn= .046  LAG=  50.5
1009          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1010          BA     .75
1011          LG     .15      .15    8.80     .06   55.00
1012          UI     50.      50.    127.    204.    251.    289.    334.    391.    512.    630.
1013          UI    541.    450.    392.    333.    284.    242.    184.    119.     88.     82.
1014          UI     59.      50.     36.     15.     15.     15.     15.     15.     15.     15.
1015          UI      0.       0.      0.      0.      0.      0.      0.      0.      0.      0.
              *

1016          KK  RETTB
1017          KM   DIVERT REQUIRED DEVELPMENT RETENTION OUT OF MODEL
1018          KM   80% OF REQUIRED MODELED
1019          DT   RETTB    19.6
1020          DI       0   10000
1021          DQ       0   10000
              *

1022          KK  DITBTA
1023          KM        DIVERT 25% OF FLOW TO TA
1024          DT    DITA
1025          DI       0      25      50      75     100     150     200
1026          DQ       0       6      13      19      25      38      50
              *

1027          KK  RTTBSF   ROUTE   REACH
1028          KM   ROUTE FLOW FROM TB TO SF (ALONG 75TH AVENUE).
1029          KM   TARGET CHANNEL
1030          RS       4    ELEV   27.35       0
1031          RC   0.030   0.030   0.030    2160  0.0010    0.00
1032          RX     100   107.0   127.0   133.0   151.0   157.0   179.0   193.0
1033          RY    32.5    32.0   27.35   27.35   27.35   27.35    32.0    32.5
              *

1034          KK  SUSFB2
1035          KM   BASIN SFB2
1036          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1037          KM    L=       .5  Lca=       .3   S=     2.9  Kn= .020  LAG=  11.4
1038          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1039          BA     .11
1040          LG     .15      .15    9.70     .07   50.00
1041          UI     78.     231.    324.    153.     46.     13.      0.      0.      0.      0.
1042          UI      0.       0.      0.      0.      0.      0.      0.      0.      0.      0.
              *
```



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

1043          KK  SUSF2A
1044          KM   BASIN SF2A
1045          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1046          KM    L=       .6  Lca=       .2   S=     5.9  Kn= .020  LAG=   9.2
1047          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1048          BA     .14
1049          LG     .15      .15    9.70     .07   80.00
1050          UI    154.     478.    336.     89.     19.      0.      0.      0.      0.      0.
1051          UI      0.       0.      0.      0.      0.      0.      0.      0.      0.      0.
              *

1052          KK  RSSF2A
1053          KM   TARGET NORTH BASIN
1054          KM   28.51 Acre Feet of Sorage Provided per Target Drainage Report
1055          DT  RETSF2   28.51
1056          DI       0   10000
1057          DQ       0   10000
              *
              * KKRSSF2A
              * KM  TARGET NORTH RETENTION BASIN
              * RS     1    STOR       0       0
              * SA  5.57    6.03    6.50    6.98    6.56    8.03   12.56   20.42   28.51   37.
              * SE     0       1       2       3       4       5       6       7       8
              * SQ     0       0       0       0       0       0       0       0       0    3
              *

1058          KK  CPSF2B
1059          KM    COMBINE FLOW FROM TB1, SF2A AMD SF2B
1060          HC       3    0.81
              *

1061          KK   CPBA3
1062          KM   Combine Target with regional basin
1063          HC       2    2.42
              *

1064          KK  BSN71
1065          KM   PROPOSED DETENTION BASIN DRC #4
1066          KM   INCLUDES TARGET SOUTH RETETNION BASIN AREA
1067          RS       1    ELEV    1010
```

```
1068          SV       0   0.001   0.001   10.40   15.34   53.24   74.82  118.92  163.57  349.40
1069          SQ       0   18.38   45.77   52.41   55.24   73.97   78.64   86.98   90.38   96.00
1070          SE    1010 1012.12    1015    1016 1016.47 1020.00    1021 1023.00    1024    1028
              *

1071          KK  DBSN71
1072          KM   DIVERT FLOWS FROM DETENTION BASIN DCR4 TO STORM DRAIN
1073          DT   BSN71
1074          DI       0   10000
1075          DQ       0   10000
              *
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1076          KK  SUBPB
              * KO     3                              21
1077          KM   BASIN PB
              * KM  THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
              * KM  L=       1.1  Lca=       .5   S=     5.3  Kn= .020  LAG=  16.9
              * KM  PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
              * BA   .41
              * LG   .25     .15    8.80     .06   55.00
              * UI  123.    405.    671.    887.    553.    301.    126.     56.     25.      2
              * UI    0.      0.      0.      0.      0.      0.      0.      0.      0.
1078          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1079          KM    L=       1.1  Lca=       .5   S=     5.3  Kn= .020  LAG=  16.7
1080          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1081          BA     .41
1082          LG     .25     .15    8.80     .06   55.00
1083          UI     83.     97.    294.    400.    475.    566.    697.    983.    944.    747.
1084          UI    630.    516.    424.    326.    193.    142.    123.     83.     65.     25.
1085          UI     25.     25.     25.     25.      0.      0.      0.      0.      0.      0.
1086          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *

1087          KK   RETPB
1088          KM   DIVERT REQUIRED DEVELPMENT RETENTION OUT OF MODEL
1089          KM   80% OF REQUIRED MODELED
              * KO     3                              21
1090          DT   RETPB    42.9
1091          DI       0   10000
1092          DQ       0   10000
              *

1093          KK   PB75
1094          KM   BASIN PB75 (ROADWAY DRAINAGE)
              * KM  THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
              * KM  L=        .5  Lca=       .3   S=    12.0  Kn= .020  LAG=   8.1
              * KM  PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
              * BA   .01
              * LG   .15     .15    9.70     .04   80.00
              * UI   14.     39.     19.      4.      0.      0.      0.      0.      0.
              * UI    0.      0.      0.      0.      0.      0.      0.      0.      0.
1095          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1096          KM    L=        .5  Lca=       .3   S=    12.0  Kn= .020  LAG=   8.7
1097          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1098          BA     .01
1099          LG     .15     .15    9.70     .04   80.00
1100          UI      4.     16.     23.     36.     43.     29.     20.     10.      6.      3.
1101          UI      1.      1.      1.      0.      0.      0.      0.      0.      0.      0.
1102          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1103          KK    PBBU
1104          KM   BASIN PBBU   (ROADWAY DRAINAGE)
              * KM  THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
              * KM  L=       1.0  Lca=       .5   S=     6.0  Kn= .020  LAG=  15.8
              * KM  PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
              * BA   .02
              * LG   .15     .15    8.00     .07   80.00
              * UI    7.     23.     42.     44.     26.     11.      5.      2.      1.
              * UI    0.      0.      0.      0.      0.      0.      0.      0.      0.
1105          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1106          KM    L=       1.0  Lca=       .5   S=     6.0  Kn= .020  LAG=  15.8
1107          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1108          BA     .02
1109          LG     .15     .15    8.00     .07   80.00
1110          UI      4.      6.     16.     21.     26.     31.     42.     53.     43.     35.
1111          UI     29.     23.     18.     11.      7.      6.      4.      3.      1.      1.
1112          UI      1.      1.      1.      0.      0.      0.      0.      0.      0.      0.
1113          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *

1114          KK  CPBSD
              * KO     3                              21
1115          KM           COMBINE STREET DRAINAGE
1116          HC       2    0.03
              *

1117          KK  DPBSD1
1118          KM   DIVERT STORM DRAIN FLOW (75TH AVENUE)
1119          DT  SD75PB
1120          DI       0      23   10000
1121          DQ       0      23      23
              *
              *

1122          KK  DPBSD2
1123          KM   DIVERT STORM DRAIN FLOW (BUCKEYE ROAD DRAINAGE)
1124          DT  SDBRPB
1125          DI       0      39   10000
```

```
1126          DQ       0      39      39
              *

1127          KK    CPPB
              * KO     3                                21
1128          KM        ADD HYDROGRAPHS AT PB
1129          HC       2    0.42
              *

1130          KK  DIPBPA
1131          KM        DIVERT 19% OF FLOW FROM PB TO PA(ADMP DIVERSION)
1132          DT   DIPA1
1133          DI       0      25      50      75     100     150     200     400     800   10000
1134          DQ       0       5      10      14      19      29      38      76     152    1900
              *
1                                        HEC-1 INPUT                                        PAGE 32

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

1135          KK   CPPB1
              * KO     3                                21
1136          KM        ADD HYDROGRAPHS AT PB
1137          HC       2    0.34
              *

1138          KK  RTPBNA   ROUTE   REACH
1139          KM        ROUTE FLOW FROM PB TO NA ALONG 75th AVE.
1140          KM        FUTURE ARTERIAL SECTION
              * KO     3                                21
              * RS     4    ELEV      -1       0
1141          RS      10    ELEV      -1       0
1142          RC   0.100   0.023   0.100    5280  0.0032    0.00
1143          RX     0.0     440     445   445.1   575.1   575.2     900  1000.0
1144          RY     105     105     105   99.75   99.75     105     105     105
              *

1145          KK  SUBNA
1146          KM   BASIN NA
              * KM  THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
              * KM  L=      2.0  Lca=      1.0   S=   10.5  Kn= .020  LAG=  24.0
              * KM  PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
              * BA   .94
              * LG   .25     .15    8.00     .08   51.00
              * UI  132.    473.    742.   1029.   1568.   1184.    859.    588.    280.    18
              * UI  106.     40.     40.     40.      0.      0.      0.      0.      0.
              * UI    0.      0.      0.      0.      0.      0.      0.      0.      0.
1147          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1148          KM    L=      2.0  Lca=      1.0   S=   10.5  Kn= .020  LAG=  24.0
1149          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1150          BA     .94
1151          LG    .25     .15    8.00     .08   51.00
1152          UI   132.    132.    206.    463.    579.    678.    762.    859.    983.   1147.
1153          UI  1477.   1705.   1412.   1209.   1075.    948.    823.    719.    628.    500.
1154          UI   351.    234.    223.    217.    136.    132.    114.     40.     40.     40.
1155          UI    40.     40.     40.     40.     40.      0.      0.      0.      0.      0.
1156          UI     0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *

1157          KK   RETNA
1158          KM   DIVERT REQUIRED DEVELPMENT RETENTION OUT OF MODEL
1159          KM   80% OF REQUIRED MODELED
1160          DT   RETNA    89.6
1161          DI       0   10000
1162          DQ       0   10000
              *

1163          KK    NA75
              * KM BASIN NA75  (75 AVENUE ROADWAY DRAINAGE)
              * KM  THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
              * KM  L=      1.0  Lca=       .5   S=   15.2  Kn= .020  LAG=  13.1
              * KM  PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
              * BA   .02
              * LG   .15     .15    7.60     .08   80.00
              * UI   11.     32.     55.     35.     14.      5.      2.      0.      0.
              * UI    0.      0.      0.      0.      0.      0.      0.      0.      0.
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1164          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1165          KM    L=      1.0  Lca=       .5   S=   15.2  Kn= .020  LAG=  13.2
1166          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1167          BA     .02
1168          LG    .15     .15    7.60     .08   80.00
1169          UI     5.     11.     22.     29.     36.     50.     62.     46.     37.     29.
1170          UI    22.     12.      9.      6.      4.      2.      2.      2.      2.      0.
1171          UI     0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
1172          UI     0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *

1173          KK    NALB
1174          KM   BASIN NALB  (LOWER BUCKEYE ROADWAY DRAINAGE)
              * KM  THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
              * KM  L=      1.0  Lca=       .5   S=    6.0  Kn= .020  LAG=  15.8
              * KM  PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
              * BA   .02
              * LG   .15     .19    6.60     .12   80.00
              * UI    7.     23.     42.     44.     26.     11.      5.      2.      1.
              * UI    0.      0.      0.      0.      0.      0.      0.      0.      0.
1175          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1176          KM    L=      1.0  Lca=       .5   S=    6.0  Kn= .020  LAG=  15.8
1177          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1178          BA     .02
1179          LG    .15     .19    6.60     .12   80.00
1180          UI     4.      6.     16.     21.     26.     31.     42.     53.     43.     35.
1181          UI    29.     23.     18.     11.      7.      6.      4.      3.      1.      1.
```

```
1182          UI      1.      1.      1.      0.      0.      0.      0.      0.      0.      0.
1183          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *

1184          KK   CNASD
              * KO     3                                  21
1185          KM    COMBINE STREET DRAINAGE
1186          HC       2    0.04
              *

1187          KK  CPNA1
1188          KM    COMBINE ROUTED FLOW FROM PB
1189          HC       3    1.32
              *
              *

1190          KK  DNASD1
1191          KM   DIVERT STORM DRAIN FLOW (75TH AVENUE)
1192          DT  SD75NA
1193          DI       0      40   10000
1194          DQ       0      40      40
              *
1                                        HEC-1 INPUT                                        PAGE 34

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

1195          KK  DNASD2
1196          KM   DIVERT STORM DRAIN FLOW (LOWER BUCKEYE)
1197          DT  SDLBNA
1198          DI       0      38   10000
1199          DQ       0      38      38
              *

1200          KK  DADMP1
              * KM DIVERT STREET FLOW TO ADMP CHANNEL
1201          KM   DIVERT ALL BUT 73 CFS INTO DRCC (73 CFS CONTINUES SOUTH ON 75TH AVE.)
1202          DT   ADMP1
              * DI     0     220   10000
              * DQ     0     220   10000
1203          DI       0      73    4000
1204          DQ       0       0    3927
              *

1205          KK  SUBJC1
1206          KM   BASIN JC1
1207          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1208          KM    L=      1.5  Lca=      1.0   S=   10.7  Kn= .020  LAG=  21.4
1209          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1210          BA     .47
1211          LG     .25     .15    7.00     .13   30.00
1212          UI     76.    304.    456.    712.    797.    538.    365.    173.    102.     52.
1213          UI     23.     23.      0.      0.      0.      0.      0.      0.      0.      0.
1214          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *

1215          KK  RETJC1
              * KO     3                                  21
1216          KM   DIVERT REQUIRED DEVELPMENT RETENTION OUT OF MODEL
1217          KM   80% OF REQUIRED MODELED
1218          DT  RETJC1    35.5
1219          DI       0   10000
1220          DQ       0   10000
              *

1221          KK    JC75
1222          KM   BASIN JC75  (ROADWAY DRAINAGE)
1223          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1224          KM    L=      1.0  Lca=       .5   S=   13.0  Kn= .020  LAG=  13.6
1225          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1226          BA     .02
1227          LG     .15     .15    7.00     .10   80.00
1228          UI     10.     31.     56.     38.     18.      7.      2.      2.      0.      0.
1229          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *
1                                        HEC-1 INPUT                                        PAGE 35

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

1230          KK  CJCSD1
              * KO     3                                  21
1231          KM       COMBINE STREET DRAINAGE AND RETETION OVERFLOW
1232          HC       2    0.49
              *

1233          KK  SUBJC2
1234          KM   BASIN JC2
1235          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1236          KM    L=      1.5  Lca=      1.0   S=   11.3  Kn= .020  LAG=  21.2
1237          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1238          BA     .48
1239          LG     .25     .15    7.00     .13     .24
1240          UI     81.    317.    475.    753.    805.    544.    365.    165.    101.     49.
1241          UI     23.     23.      0.      0.      0.      0.      0.      0.      0.      0.
1242          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *

1243          KK  RETJC2
              * KO     3                                  21
1244          KM   DIVERT REQUIRED DEVELPMENT RETENTION OUT OF MODEL
1245          KM    140 ACRES OF EXISITING DEVELOPMENT NOT INCLUDED IN CALCULATIONS
1246          KM   80% OF REQUIRED MODELED
1247          DT  RETJC2    19.6
1248          DI       0   10000
1249          DQ       0   10000
              *
```

```
1250          KK  DETJC2
1251          KM   DIVERT PROPOSED RETENTION OUT OF MODEL FOR APPROXIMATELY 140 ACRES
1252          KM   OF EXISITING DEVELOPMENT THAT DOES NOT HAVE RETENTION
1253          KM   80% OF REQUIRED MODELED
1254          DT  DETJC2    16.6
1255          DI       0   10000
1256          DQ       0   10000
              *

1257          KK  RTJCJC   ROUTE   REACH
1258          KM        ROUTE FLOW FROM JC2 TO JC1 ALONG 75th AVE.
1259          KM        FUTURE ARTERIAL SECTION
              * KO     3                                21
1260          RS       2    ELEV      -1       0
1261          RC   0.100   0.023   0.100    2640  0.0021    0.00
1262          RX     0.0     440     445   445.1   575.1   575.2     900  1000.0
1263          RY     105     105     105   99.75   99.75     105     105     105
              *

1264          KK  CPJC1A
1265          KM    COMBINE FLOW FROM JC2 WITH FLOW FROM JC3
1266          HC       2    0.97
              *
1                                        HEC-1 INPUT                                                    PAGE 36

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

1267          KK    JCBR
1268          KM   BASIN JCBR  (ROADWAY DRAINAGE)
1269          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1270          KM    L=      1.0  Lca=      .5   S=    11.0  Kn= .020  LAG=  14.0
1271          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1272          BA     .02
1273          LG     .15     .17    6.90     .11   80.00
1274          UI     10.     29.     53.     39.     20.      7.      3.      2.      0.      0.
1275          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *

1276          KK  CJCSD2
              * KO     3                                21
1277          KM        COMBINE STREET DRAINAGE AND RETETION OVERFLOW
1278          HC       2    0.99
              *

1279          KK  CPJC1B
              * KO     3                                21
1280          KM        COMBINE JC1, JC2 AND STREET DRAINAGE
1281          HC       2    0.99
              *

1282          KK  DJC2SD
1283          KM   DIVERT OFFSITE TO STORM DRAIN FLOW (BROADWAY STORM DRAIN FLOW)
1284          DT  SDOSBR
1285          DI       0      41   10000
1286          DQ       0      41      41
              *

1287          KK  DJCSD1
1288          KM   DIVERT STORM DRAIN FLOW (75TH AVE. STORM DRAIN FLOW)
1289          DT  SD75JC
1290          DI       0      42   10000
1291          DQ       0      42      42
              *

1292          KK   DIJD
1293          KM   RETURN DIVERTED FLOW FROM BASIN SUBJD
1294          DR   DIJC2
              *

1295          KK  RTJCJC   ROUTE   REACH
1296          KM        ROUTE FLOW FROM JD TO JC1 ALONG 75th AVE.
1297          KM        FUTURE ARTERIAL SECTION
              * KO     3                                21
1298          RS       5    ELEV      -1       0
1299          RC   0.100   0.023   0.100    5280  0.0021    0.00
1300          RX     0.0     440     445   445.1   575.1   575.2     900  1000.0
1301          RY     105     105     105   99.75   99.75     105     105     105
              *
1                                        HEC-1 INPUT                                                    PAGE 37

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

1302          KK   CPJC2
              * KO     3                                21
1303          KM         COMBINE SPLIT FLOW FROM SUBJD WITH FLOW AT CPCJ1
1304          HC       2    1.08
              *

1305          KK  DIJCJB
1306          KM        DIVERT 46% OF FLOW AT JC TO JB.  (ADMP DIVERSION)
              * KO     3                                21
1307          DT   DIJB2
1308          DI       0      25      50      75     100     150     200    1346    2000
1309          DQ       0      12      23      35      46      69      92   605.7     920
              *

1310          KK  RTJCFB   ROUTE   REACH
1311          KM        ROUTE FLOW FROM JC1 TO FB ALONG 75th AVE.
1312          KM        FUTURE ARTERIAL SECTION
              * KO     3                                21
1313          RS       3    ELEV      -1       0
1314          RC   0.100   0.023   0.100    4200  0.0032    0.00
1315          RX     0.0     440     445   445.1   575.1   575.2     900  1000.0
1316          RY     105     105     105   99.75   99.75     105     105     105
```

```
                *
1317            KK   DRB71
1318            KM   RETURN DIVERTED FLOW FROM BASIN DRC #4
1319            DR   BSN71
                *
1320            KK  RT71PB   ROUTE   REACH
1321            KM        ROUTE FLOW FROM BASIN TO PB ALONG 71th AVE AND
1322            KM        BUCKEYE RD.
1323            KM
1324            RT                        2
                *
1325            KK  RSDPB1
1326            KM   RETURN STORM DRAIN FLOW FROM PB
1327            DR  SD75PB
                *
1328            KK  CPPBS1
                * KO     3                                  21
1329            KM    COMBINE STORM DRAIN FLOWS
1330            HC       2    2.44
                *
1331            KK  RSDPB2
1332            KM   RETURN STORM DRAIN FLOW FROM PB
1333            DR  SDBRPB
                *
1                                       HEC-1 INPUT                                    PAGE 38

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

1334            KK  CPPBS2
                * KO     3                                  21
1335            KM    COMBINE STORM DRAIN FLOWS
1336            HC       2    2.44
                *
1337            KK  RTPBNA   ROUTE   REACH
1338            KM        ROUTE FLOW FROM PB TO NA IN STORM DRAIN
1339            KM
1340            RT                        2
                *
1341            KK  RSDNA1
1342            KM   RETURN DIVERTED STORM DRAIN FLOW FROM NA
1343            DR  SD75NA
                *
1344            KK  CPNAS1
                * KO     3                                  21
1345            KM    COMBINE STORM DRAIN FLOWS
1346            HC       2    3.10
                *
1347            KK  RSDNA2
1348            KM   RETURN DIVERTED STORM DRAIN FLOW FROM NA
1349            DR  SDLBNA
                *
1350            KK  CPNAS2
                * KO     3                                  21
1351            KM    COMBINE STORM DRAIN FLOWS
1352            HC       2    3.43
                *
1353            KK  RTNAJC   ROUTE   REACH
1354            KM        ROUTE FLOW FROM NA TO JC IN STORM DRAIN
1355            KM
1356            RT                        2
                *
1357            KK  RSDJC1
1358            KM   RETURN DIVERTED STORM DRAIN FLOW FROM JC (75TH AVENUE)
1359            DR  SD75JC
                *
1360            KK  CPJCS1
                * KO     3                                  21
1361            KM    COMBINE STORM DRAIN FLOWS
1362            HC       2    3.67
                *
                * KKRSDJC2
                * KM RETURN DIVERTED STORM DRAIN FLOW FROM JC (BROADWAY ROAD)
                * DRSDBRJC
                *
1                                       HEC-1 INPUT                                    PAGE 39

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

1363            KK  RSDJC3
1364            KM   RETURN DIVERTED STORM DRAIN FLOW FROM JC1 and JC2
1365            DR  SDOSBR
                *
                * KKCPJCS2
                * KO     3                                  21
                * KM  COMBINE STORM DRAIN FLOWS
                * HC     2    0.50
                *
1366            KK  CPJCS3
                * KO     3                                  21
1367            KM    COMBINE STORM DRAIN FLOWS
1368            HC       2    4.17
```

```
                *
1369            KK  RTJCFB   ROUTE   REACH
1370            KM        ROUTE FLOW FROM JC TO FB ALONG 75th AVE.
1371            KM
1372            RT                     2
                *
1373            KK    FB75
1374            KM   BASIN FB75(ROADWAY DRAINAGE)
1375            KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1376            KM    L=       .8  Lca=       .4   S=   10.7  Kn= .020  LAG=  12.4
1377            KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1378            BA     .02
1379            LG     .15     .25    4.70     .25   80.00
1380            UI     11.     32.     52.     29.     10.      3.      2.      0.      0.      0.
1381            UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                *
1382            KK    CPFB
                * KO     3                                  21
1383            KM        ADD HYDROGRAPHS AT FB
1384            HC       2    4.19
                *
                * ADDED BY SLT MAR16,2005 TO ELIMINATE ERROR
1385            KK    DUMM
1386            KM        ELIMINATE UNNECESSARY HYDROGRAPHS
1387            HC       3   10.65
                *
                *
                * ADDED RETURNS TO ADD TO DDS FOR NEW STUDY  -  SLT  3/03/05
                *
                * KK  SLT1
                * KM       RETURN DIVERT FROM TB
                * DR  DITA
                * ZW A=DURANGO B=SLT1  C=FLOW  E=5MIN F=6-HR
                *
                * KK  SLT2
                * KM       RETURN DIVERT FROM ADMP1
                * DR ADMP1
                * ZW A=DURANGO B=SLT2  C=FLOW  E=5MIN  F=6-HR
                *
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LINE            ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1388            KK   SUBSH   BASIN
1389            KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1390            KM    L=       .4  Lca=       .2   S=   11.1  Kn= .030  LAG=  11.5
1391            KM    VALLEY S-GRAPH WAS USED FOR THIS BASIN - JCS
1392            BA   0.103
1393            LG    0.15    0.16    9.70    0.07      55
1394            UI      72     211     303     147      44      13       8       0       0       0
1395            UI       0       0       0       0       0       0       0       0       0       0
                *
1396            KK   RETSH
1397            KM   DIVERT 80% REQUIRED DEVELPMENT RETENTION OUT OF MODEL - JCS
1398            DT   RETSH    10.3
1399            DI       0   10000
1400            DQ       0   10000
                *
1401            KK    RSSH
1402            KM        MODIFIED PULS ROUTING BEHIND RID.
                * KO     1
1403            RS       1    STOR       0       0
1404            SV      19      21      24      30      37      44    46.4
1405            SE  1027.0  1027.1  1027.2  1027.5  1027.7  1028.0  1028.2
1406            SQ       0   138.6   475.2  1277.3
1407            SE  1027.0  1027.6  1027.8  1028.1
                *
                *
1408            KK  DISHRJ
1409            KM   DIVERT FLOW FROM SH TO RJ2
1410            DT   DIRJ2
1411            DI       0   138.6   475.2  1277.3
1412            DQ       0    88.6   375.2  1077.3
                *
                *
1413            KK  RTSHSG   ROUTE   REACH
1414            KM        ROUTE FLOW FROM SH TO SG
1415            KM        TYPE C CHANNEL
1416            RS       8              -1       0
1417            RC   0.035   0.035   0.035    2600  0.0008    0.00
1418            RX     0.0    20.0    35.0    50.0    50.1   250.0   450.0   550.0
1419            RY     5.0     5.0     2.5     0.0     0.0     2.0     4.0     5.0
                *
1420            KK   SUBTA   BASIN
1421            KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1422            KM    L=       .8  Lca=       .4   S=   10.5  Kn= .03  LAG=  17.1
1423            KM    VALLEY S-GRAPH WAS USED FOR THIS BASIN - JCS
1424            BA   0.241
1425            LG    0.15    0.15    7.00    0.18      55
1426            UI      71     234     382     523     328     186      76      35      15      14
1427            UI       3       0       0       0       0       0       0       0       0       0
1428            UI       0       0       0       0       0       0       0       0       0       0
                *
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LINE            ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
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1429          KK   RETTA
1430          KM   DIVERT 80% REQUIRED DEVELPMENT RETENTION OUT OF MODEL - JCS
1431          DT   RETTA    24.1
1432          DI       0   10000
1433          DQ       0   10000
              *

1434          KK    DRTA
1435          KM        RETURN DIVERT FROM TB
1436          KM        RETURN DIVERT FROM TB
1437          DR    DITA
              * BA      0
              * ZR  =QI A=DURANGO B=SLT1  C=FLOW  E=5MIN  F=6-HR
              *

1438          KK  RTDITA   ROUTE   REACH
1439          KM        ROUTE DIVERT TO TA
1440          KM        TYPE A CHANNEL
1441          RS        8              -1        0
1442          RC   0.025   0.025   0.024    2600  0.0004    0.00
1443          RX     0.0   100.0   400.0   500.0   500.1   600.0   900.0  1000.0
1444          RY     5.0     4.0     1.0     0.0     0.0     1.0     4.0     5.0
              *

1445          KK   @CPTA
1446          KM        ADD HYDROGRAPHS AT TA
1447          HC        2    0.43
              *

1448          KK  RTTASG   ROUTE   REACH
1449          KM        ROUTE FLOW FROM TA TO SG (SHEET FLOW).
1450          KM        TYPE A CHANNEL
1451          RS        2              -1        0
1452          RC   0.025   0.025   0.025    2200  0.0050    0.00
1453          RX     0.0   100.0   400.0   500.0   500.1   600.0   900.0  1000.0
1454          RY     5.0     4.0     1.0     0.0     0.0     1.0     4.0     5.0
              *

1455          KK   SUBSG   BASIN
1456          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1457          KM    L=        .6  Lca=        .3   S=     5.0  Kn= .03  LAG=  16.6
1458          KM    VALLEY S-GRAPH WAS USED FOR THIS BASIN - JCS
1459          BA   0.136
1460          LG    0.15    0.15    8.80    0.09      55
1461          UI      43     139     233     294     180      92      40      16       8       8
1462          UI       0       0       0       0       0       0       0       0       0       0
              *

1463          KK   RETSG
1464          KM   DIVERT 80% REQUIRED DEVELPMENT RETENTION OUT OF MODEL - JCS
1465          DT   RETSG    13.6
1466          DI       0   10000
1467          DQ       0   10000
              *
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

1468          KK    CPSG
1469          KM        ADD HYDROGRAPHS AT SG
1470          HC        3    0.59
              *

1471          KK    RSSG
1472          KM        MODIFIED PULS ROUTING BEHIND RID AND 81ST AVENUE
              * KO      1
1473          RS        1    STOR       0       0
1474          SV     12.3    13.3    14.9    16.5    18.4    22.4    25.9    35.2
1475          SE   1026.4  1026.6  1026.8  1027.0  1027.2  1027.4  1027.6  1027.9
1476          SQ        0       9     114     525    1221    2143    3276    5343
              *

1477          KK  DISGRJ
1478          KM        DIVERT FLOW FROM SG TO RJ
1479          DT   DIRJ4
1480          DI        0       9     114     525    1221
1481          DQ        0       1      70     400     964
              *

1482          KK  RTSGSE   ROUTE   REACH
1483          KM        ROUTE FLOW FROM SG TO SE
1484          KM        TYPE C CHANNEL
1485          RS        2              -1        0
1486          RC   0.035   0.035   0.035    1200  0.0030    0.00
1487          RX     0.0    20.0    35.0    50.0    50.1   250.0   450.0   550.0
1488          RY     5.0     5.0     2.5     0.0     0.0     2.0     4.0     5.0
              *

1489          KK   SUBSC   BASIN
1490          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1491          KM    L=       1.3  Lca=        .7   S=    15.2  Kn= .029  LAG=  23.9
1492          KM    VALLEY S-GRAPH WAS USED FOR THIS BASIN - JCS
1493          BA   0.453
1494          LG    0.14    0.26    5.00    0.39      58
1495          UI      64     229     360     500     758     569     409     284     133      88
1496          UI      50      19      20      20       6       0       0       0       0       0
1497          UI       0       0       0       0       0       0       0       0       0       0
              *

1498          KK   RETSC
1499          KM   DIVERT 80% REQUIRED DEVELPMENT RETENTION OUT OF MODEL - JCS
1500          DT   RETSC    45.4
1501          DI       0   10000
1502          DQ       0   10000
              *
```

```
1503          KK  DISCSD
1504          KM        DIVERT 54% OF FLOW AT SC TO SD.
1505          DT    DISD
1506          DI       0      25      50     100     150     200
1507          DQ       0      14      27      54      81     108
              *
1                                        HEC-1 INPUT                                                    PAGE 43

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

1508          KK  RTSCSE   ROUTE   REACH
1509          KM        ROUTE FLOW FROM SC TO SE (ALONG 83RD AVENUE).
1510          KM        FUTURE ARTERIAL SECTION
1511          RS        1              -1       0
1512          RC   0.100   0.023   0.100    1000  0.0022    0.00
1513          RX     0.0     440     445   445.1   575.1   575.2     900  1000.0
1514          RY     105     105     105   99.75   99.75     105     105     105
              *

1515          KK   SUBSE   BASIN
1516          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1517          KM    L=        .3  Lca=       .2   S=   26.5  Kn= .03  LAG=  7.8
1518          KM    VALLEY S-GRAPH WAS USED FOR THIS BASIN - JCS
1519          BA   0.125
1520          LG    0.15    0.25    4.80    0.39      55
1521          UI     185     511     220      40      11       0       0       0       0       0
1522          UI       0       0       0       0       0       0       0       0       0       0
              *

1523          KK   RETSE
1524          KM   DIVERT 80% REQUIRED DEVELPMENT RETENTION OUT OF MODEL - JCS
1525          DT   RETSE    12.5
1526          DI       0   10000
1527          DQ       0   10000
              *

1528          KK    CPSE
1529          KM        ADD HYDROGRAPHS AT SE
1530          HC       3    0.65
              *

1531          KK    RSSE
1532          KM        MODIFIED PULS ROUTING AT SE BEHIND THE RID CANAL
              * KO     1
1533          RS       1    STOR       0       0
1534          SV    13.5    14.8    17.6    20.5
1535          SE  1025.9  1026.0  1026.5  1026.9
1536          SQ    3.14    14.3  479.44 2013.01
              *

1537          KK  DISERJ
1538          KM   DIVERT FLOW FROM SE TO RJ
1539          DT   DIRJ5
1540          DI       0       3     142    1100
1541          DQ       0       3     142    1100
              *

1542          KK  RTSERI   ROUTE   REACH
1543          KM        ROUTE FLOW FROM SE TO RI
1544          KM        TYPE A CHANNEL
1545          RS       4              -1       0
1546          RC   0.035   0.035   0.035    2000  0.0019    0.00
1547          RX     0.0   100.0   400.0   500.0   500.1   600.0   900.0  1000.0
1548          RY     5.0     4.0     1.0     0.0     0.0     1.0     4.0     5.0
              *
1                                        HEC-1 INPUT                                                    PAGE 44

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

1549          KK   SUBRJ   BASIN
1550          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1551          KM    L=        .7  Lca=       .4   S=    5.6  Kn= .03  LAG=  19.8
1552          KM    VALLEY S-GRAPH WAS USED FOR THIS BASIN - JCS
1553          BA   0.163
1554          LG    0.15    0.15    7.00    0.18      55
1555          UI      33     122     184     307     254     170      98      46      25       8
1556          UI       9       7       0       0       0       0       0       0       0       0
1557          UI       0       0       0       0       0       0       0       0       0       0
              *

1558          KK   RETRJ
1559          KM   DIVERT 80% REQUIRED DEVELPMENT RETENTION OUT OF MODEL - JCS
1560          DT   RETRJ    16.3
1561          DI       0   10000
1562          DQ       0   10000
              *

1563          KK   CPRJ2
1564          KM        RETURN DIVERSION FROM SH
1565          DR   DIRJ2
              *

1566          KK  RTSHRJ   ROUTE   REACH
1567          KM        ROUTE HYDROGRAPH FROM SH TO RJ2
1568          KM        TYPE C CHANNEL
1569          RS       7              -1       0
1570          RC   0.050   0.050   0.050    2000  0.0015    0.00
1571          RX     0.0    20.0    35.0    50.0    50.1   250.0   450.0   550.0
1572          RY     5.0     5.0     2.5     0.0     0.0     2.0     4.0     5.0
              *

1573          KK  RTRJ3    ROUTE   REACH
1574          KM        ROUTE HYDROGRAPH FROM RJ3 TO RJ
1575          KM        TYPE C CHANNEL
```

```
1576          RS       8              -1       0
1577          RC   0.035   0.035   0.035    3900  0.0015    0.00
1578          RX     0.0    20.0    35.0    50.0    50.1   250.0   450.0   550.0
1579          RY     5.0     5.0     2.5     0.0     0.0     2.0     4.0     5.0
              *
1580          KK  CPRJ4A
1581          KM         RETURN DIVERT FROM SG
1582          DR   DIRJ4
              *
1583          KK  CPRJ4B
1584          KM        COMBINE HYDROGRAPHS AT RJ4
1585          HC       2    0.35
              *
              *
1                                        HEC-1 INPUT                                        PAGE 45

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

1586          KK  RTSGRJ   ROUTE   REACH
1587          KM        ROUTE DIVERT FROM SG TO RJ
1588          KM        TYPE C CHANNEL
1589          RS       3              -1       0
1590          RC   0.035   0.035   0.035    1400  0.0019    0.00
1591          RX     0.0    20.0    35.0    50.0    50.1   250.0   450.0   550.0
1592          RY     5.0     5.0     2.5     0.0     0.0     2.0     4.0     5.0
              *
1593          KK   CPRJ5
1594          KM        RETURN DIVERT FROM SE
1595          DR   DIRJ5
              *
1596          KK  RTSERJ   ROUTE   REACH
1597          KM        ROUTE DIVERT FROM SE TO RJ
1598          KM        TYPE C CHANNEL
1599          RS       9              -1       0
1600          RC   0.035   0.035   0.035    1000  0.0001    0.00
1601          RX     0.0    20.0    35.0    50.0    50.1   250.0   450.0   550.0
1602          RY     5.0     5.0     2.5     0.0     0.0     2.0     4.0     5.0
              *
1603          KK  @CPRJ6
1604          KM        ADD HYDROGRAPHS AT RJ
1605          HC       3    1.16
              *
1606          KK    RSRJ
1607          KM        RESERVOIR ROUTING AT RJ BEHIND 83RD AVE AND THE SPRR
              * KO     1
1608          RS       1    STOR       0       0
1609          SV     3.5     6.2    11.0    18.4    30.9    52.2    76.3
1610          SE  1022.1  1022.5  1023.0  1023.5  1024.0  1024.5  1024.9
1611          SQ       0      50     100     506     899    1369
1612          SE  1022.1  1022.7  1022.9  1023.7  1024.0  1024.2
              *
1613          KK  DIRJPA
1614          KM   DIVERT FLOW OVER SPRR FROM RJ TO PA
1615          DT   DIPA2
1616          DI       0      50     100     506     899    1369
1617          DQ       0       0       0       6     149     369
              *
1618          KK  RTRJRI   ROUTE   REACH
1619          KM        ROUTE FLOW FROM RJ TO RI1
1620          KM        TYPE C CHANNEL
1621          RS       5              -1       0
1622          RC   0.035   0.035   0.035    2600  0.0019    0.00
1623          RX     0.0    20.0    35.0    50.0    50.1   250.0   450.0   550.0
1624          RY     5.0     5.0     2.5     0.0     0.0     2.0     4.0     5.0
              *
              * THE FOLLOWING DIVERT REMOVED TO MODEL THE ADMP CONDITION
              * KKDIRIOE
              * KM DIVERT FLOW FROM RI TO OE OVER SPRR.
              * KM 1/4 MILE WEST OF 83RD AVE.
              * DT DIOE3
              * DI   100     400    1392    1300    1400
              * DQ     0      55     370     680     730
              *
1                                        HEC-1 INPUT                                        PAGE 46

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

1625          KK  RTRIRI
1626          KM   TYPE C CHANNEL
1627          RS       4              -1       0
1628          RC    .035    .035    .035    1550   .0019
1629          RX       0      20      35      50    50.1     250     450     550
1630          RY       5       5     2.5       0       0       2       4       5
              *
1631          KK   SUBRI   BASIN
1632          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1633          KM    L=       .6  Lca=       .2   S=   19.3  Kn= .03  LAG=  10.6
1634          KM    VALLEY S-GRAPH WAS USED FOR THIS BASIN - JCS
1635          BA   0.232
1636          LG    0.15    0.15    7.60    0.14      55
1637          UI     193     596     651     255      72      23       7       0       0       0
1638          UI       0       0       0       0       0       0       0       0       0       0
              *
1639          KK   RETRI
1640          KM   DIVERT 80% REQUIRED DEVELPMENT RETENTION OUT OF MODEL - JCS
```

```
1641          DT   RETRI    23.2
1642          DI       0   10000
1643          DQ       0   10000
              *

1644          KK   SUBSB   BASIN
1645          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1646          KM    L=      .5  Lca=       .3   S=    15.1  Kn= .03   LAG=  12.3
1647          KM    VALLEY S-GRAPH WAS USED FOR THIS BASIN - JCS
1648          BA   0.168
1649          LG    0.15    0.15    9.70    0.07      55
1650          UI     102     299     486     271      95      30      14       5       0       0
1651          UI       0       0       0       0       0       0       0       0       0       0
              *

1652          KK   RETSB
1653          KM   DIVERT 80% REQUIRED DEVELPMENT RETENTION OUT OF MODEL - JCS
1654          DT   RETSB    16.8
1655          DI       0   10000
1656          DQ       0   10000
              *

1657          KK    RSSB
1658          KM         MODIFIED PULS ROUTING THROUGH PONDING  BEHIND RID CANAL.
              * KO     1
1659          RS       1    STOR       0       0
1660          SV     2.2     5.6    11.9    21.4    33.8
1661          SE  1024.0  1024.5  1025.0  1025.5  1025.9
1662          SQ       0      94     581    2114    4864
              *
1                                        HEC-1 INPUT                                        PAGE 47

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

1663          KK   SUBSD   BASIN
1664          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1665          KM    L=       .6  Lca=       .3   S=    12.3  Kn= .03  LAG=  14.4
1666          KM    VALLEY S-GRAPH WAS USED FOR THIS BASIN - JCS
1667          BA   0.168
1668          LG    0.15    0.28    6.60    0.18      55
1669          UI      73     222     410     319     173      61      24      12       7       0
1670          UI       0       0       0       0       0       0       0       0       0       0
              *

1671          KK   RETSD
1672          KM   DIVERT 80% REQUIRED DEVELPMENT RETENTION OUT OF MODEL - JCS
1673          DT   RETSD    16.8
1674          DI       0   10000
1675          DQ       0   10000
              *

1676          KK    DRSD
1677          KM    RETURN DIVERT FROM SC.
1678          DR    DISD
              *

1679          KK   @CPSD
1680          KM        ADD HYDROGRAPHS AT SD.
1681          KM        ROUTING STEP NOT INCLUDED DUE TO SHORT ROUTING LENGTH
1682          HC       3    0.58
              *

1683          KK    RSSD
1684          KM         MODIFIED PULS ROUTING BEHIND CANAL, NORTH OF VAN BUREN.
              * KO     1
1685          RS       1    STOR       0       0
1686          SV       0     .01      .1      .6     1.8       5       9      14      23
1687          SE  1021.4  1022.8    1023  1023.3  1023.6    1024  1024.3  1024.6    1025
1688          SQ       0     .16      46     534     939    1427    1993    2767
1689          SE  1021.4  1021.5    1022    1023  1023.5    1024  1024.5    1025
              *

1690          KK  RTSDRI   ROUTE   REACH
1691          KM        ROUTE FLOW FROM SD TO RI
1692          KM        TYPE A CHANNEL
1693          RS       3              -1       0
1694          RC   0.035   0.035   0.035    2400  0.0046    0.00
1695          RX     0.0   100.0   400.0   500.0   500.1   600.0   900.0  1000.0
1696          RY     5.0     4.0     1.0     0.0     0.0     1.0     4.0     5.0
              *

1697          KK  ~@CPRI
1698          KM   ADD HYDROGRAPHS AT RI (1/2 MILE WEST OF 83RD AVE)
1699          HC       4    1.81
              *
              * THE FOLLWOING PONDING REMOVED TO MODEL THE ADMP CONDITION
              * KK  RSRI
              * KM       MODIFIED PULS ROUTING BEHIND SPRR.
              * KO     1
              * RS     1    STOR      -1       0
              * SV     0       0      .1      .3     1.2     3.0     6.5   13.76    21.8    35
              * SE1014.0  1014.1  1014.5  1015.0  1015.5  1016.0  1016.5  1017.0  1017.5  1018
              * SQ     0       4     142     573    1333    3217    5957    9319   13343   182
              *
1                                        HEC-1 INPUT                                        PAGE 48

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

1700          KK  MCRIRH   ROUTE   REACH
1701          KM   ADMP CHANNEL
1702          KM   ROUTE FLOW FROM RI TO RH
1703          RS       3    FLOW      -1
1704          RC   0.040   0.040   0.040    2482  0.0015    0.00
1705          RX     0.0    16.0    33.7    51.3    71.3    89.0   106.7   122.7
1706          RY     5.6     5.9     3.0     0.0     0.0     3.0     5.9     5.6
```

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                *
                * ************************************************************************
1707            KK  ~DUMMY
1708            KM   COMBINE HYDROGRAPHS SO STACK DOES NOT EXCEED 5
1709            HC       2
                *
1710            KK   SUBPA   BASIN
                * KM  THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
                * KM  L=      1.1  Lca=      .6   S=   16.7  Kn= .03   LAG=  21.5
                * KM  VALLEY S-GRAPH WAS USED FOR THIS BASIN - JCS
                * BA 0.477
                * LG  0.15    0.17    7.30    0.14      55
                * UI    76     307     461     716     812     547     372     178     105
                * UI    23      23      19       0       0       0       0       0       0
                * UI     0       0       0       0       0       0       0       0       0
1711            KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1712            KM    L=      1.1  Lca=      .6   S=   16.7  Kn= .030  LAG=  21.6
1713            KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1714            BA    .477
1715            LG     .15     .17    7.30     .14   55.00
1716            UI     74.     74.    162.    281.    356.    412.    464.    542.    636.    840.
1717            UI    941.    761.    650.    574.    489.    423.    362.    291.    194.    131.
1718            UI    124.    107.     74.     74.     31.     23.     23.     23.     23.     23.
1719            UI     23.     23.      0.      0.      0.      0.      0.      0.      0.      0.
1720            UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                *
1721            KK   RETPA
1722            KM   DIVERT 80% REQUIRED DEVELPMENT RETENTION OUT OF MODEL - JCS
1723            DT   RETPA    47.8
1724            DI       0   10000
1725            DQ       0   10000
                *
1726            KK   DRPA2
1727            KM   RETURN DIVERT FROM RJ.
1728            DR   DIPA2
                *
1729            KK  RTRJPA   ROUTE   REACH
1730            KM        ROUTE DIVERT FROM RJ TO PA
1731            KM        FUTURE ARTERIAL SECTION
                * RS      2              -1       0
1732            RS        5              -1       0
1733            RC   0.100   0.023   0.100    2400  0.0054    0.00

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

1734            RX     0.0     440     445   445.1   575.1   575.2     900  1000.0
1735            RY     105     105     105   99.75   99.75     105     105     105
                *
1736            KK    CPPA
1737            KM   ADD HYDROGRAPHS AT PA
1738            HC       2    0.64
                *
1739            KK  DIPAOE
1740            KM        DIVERT 18% OF FLOW AT PA TO OE.
1741            DT    DIOE
1742            DI       0      25      50      75     100     150     200
1743            DQ       0       5       9      14      18      27      36
                *
1744            KK  RTPAMH   ROUTE   REACH
1745            KM        ROUTE FLOW FROM PA TO MH (ALONG 83RD AVENUE).
1746            KM        FUTURE ARTERIAL SECTION
                * RS      2              -1       0
1747            RS        5              -1       0
1748            RC   0.100   0.023   0.100    2640  0.0012    0.00
1749            RX     0.0     440     445   445.1   575.1   575.2     900  1000.0
1750            RY     105     105     105   99.75   99.75     105     105     105
                *
1751            KK   SUBMH   BASIN
                * KM  THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
                * KM  L=       .7  Lca=       .3   S=    8.8  Kn= .05  LAG=  19.7
                * KM  VALLEY S-GRAPH WAS USED FOR THIS BASIN - JCS
                * BA 0.239
                * LG  0.25    0.15    8.80    0.09      30
                * UI    49     179     272     452     372     249     141      66      36
                * UI    12      10       0       0       0       0       0       0       0
1752            KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1753            KM    L=       .7  Lca=       .3   S=    8.8  Kn= .050  LAG=  26.3
1754            KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1755            BA    .239
1756            LG     .25     .15    8.80     .09   30.00
1757            UI     31.     31.    31.      99.    123.    146.    167.    183.    205.    232.
1758            UI    269.    339.    399.    340.    291.    260.    234.    205.    183.    159.
1759            UI    144.    111.     83.     54.     52.     50.     38.     31.     31.     18.
1760            UI      9.      9.      9.      9.      9.      9.      9.      9.      9.      0.
1761            UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
1762            UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                *
1763            KK   RETMH
1764            KM   DIVERT 80% REQUIRED DEVELPMENT RETENTION OUT OF MODEL - JCS
1765            DT   RETMH    19.8
1766            DI       0   10000
1767            DQ       0   10000
                *
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LINE            ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10
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1768          KK    CPMH
1769          KM    ADD HYDROGRAPHS AT MH
1770          HC       2    0.77
              *

1771          KK  RTMHMD   ROUTE   REACH
1772          KM        ROUTE FLOW FROM PA TO MD (ALONG 83RD AVENUE).
1773          KM        FUTURE ARTERIAL SECTION
              * RS     2              -1       0
1774          RS       5              -1       0
1775          RC   0.100   0.023   0.100    2640  0.0012    0.00
1776          RX     0.0     440     445   445.1   575.1   575.2     900  1000.0
1777          RY     105     105     105   99.75   99.75     105     105     105
              *

1778          KK   SUBMD   BASIN
              * KM  THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
              * KM  L=      1.4  Lca=       .6   S=   14.3  Kn= .05  LAG=  41.7
              * KM  VALLEY S-GRAPH WAS USED FOR THIS BASIN - JCS
              * BA 0.255
              * LG  0.25    0.08    7.60    0.11      30
              * UI    21      24      73     100     119     142     175     247     234     1
              * UI   156     127     106      80      47      35      30      21      15
              * UI     6       6       6       6       6       0       0       0       0
1779          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1780          KM    L=      1.4  Lca=       .6   S=   14.3  Kn= .050  LAG=  40.7
1781          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1782          BA    .255
1783          LG     .25     .08    7.60     .11   30.00
1784          UI     21.     21.     21.     21.     37.     69.     80.     92.    101.    110.
1785          UI    118.    126.    135.    146.    159.    170.    193.    232.    255.    278.
1786          UI    244.    219.    199.    185.    173.    163.    148.    137.    126.    117.
1787          UI    107.    100.     88.     74.     61.     44.     37.     37.     35.     35.
1788          UI     32.     21.     21.     21.     21.     13.      6.      6.      6.      6.
1789          UI      6.      6.      6.      6.      6.      6.      6.      6.      6.      6.
1790          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
1791          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *

1792          KK   RETMD
1793          KM   DIVERT 80% REQUIRED DEVELPMENT RETENTION OUT OF MODEL - JCS
1794          DT   RETMD    21.1
1795          DI       0   10000
1796          DQ       0   10000
              *

1797          KK    CPMD
1798          KM       ADD HYDROGRAPHS AT MD
1799          HC       2    1.02
              *
1                                        HEC-1 INPUT                                        PAGE 51

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

1800          KK  DIMDJB
1801          KM       DIVERT 21% OF FLOW FROM MD TO JB.
1802          DT   DIJB1
1803          DI       0      25      50      75     100     150     200
1804          DQ       0       5      10      16      21      32      42
              *

1805          KK  DIMDMF
1806          KM   DIVERT FLOW FROM MD TO MF
1807          KM   DUMMY DIVERT TO ROUTE FLOW AROUND CODE SEQUENCE.
1808          DT   DIMFX
1809          DI       0   10000
1810          DQ       0   10000
              *

1811          KK   SUBMI   BASIN
              * KM  THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
              * KM  L=       .7  Lca=       .3   S=    8.8  Kn= .043  LAG=  16.9
              * KM  VALLEY S-GRAPH WAS USED FOR THIS BASIN - JCS
              * BA 0.409
              * LG  0.21    0.15    8.40    0.11      38
              * UI   122     402     662     886     553     306     126      57      25
              * UI     3       0       0       0       0       0       0       0       0
1812          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1813          KM    L=       .7  Lca=       .3   S=    8.8  Kn= .043  LAG=  22.6
1814          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1815          BA    .409
1816          LG     .21     .15    8.40     .11   38.00
1817          UI     61.     61.    116.    220.    283.    326.    365.    421.    482.    616.
1818          UI    768.    694.    578.    507.    446.    384.    333.    289.    221.    151.
1819          UI    108.    101.     89.     61.     61.     32.     19.     19.     19.     19.
1820          UI     19.     19.     19.      0.      0.      0.      0.      0.      0.      0.
1821          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *

1822          KK   RETMI
1823          KM   DIVERT 80% REQUIRED DEVELPMENT RETENTION OUT OF MODEL - JCS
1824          DT   RETMI    35.3
1825          DI       0   10000
1826          DQ       0   10000
              *

1827          KK   SUBMG   BASIN
              * KM  THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
              * KM  L=       .7  Lca=       .3   S=    8.8  Kn= .04   LAG=  11.7
              * KM  VALLEY S-GRAPH WAS USED FOR THIS BASIN - JCS
              * BA 0.082
              * LG  0.20    0.15    7.00    0.17      43
              * UI    55     162     241     120      37      11       7       0       0
1828          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
```

```
1829          KM    L=       .7  Lca=       .3   S=    8.8  Kn= .040  LAG=  21.1
1830          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1831          BA    .082
1832          LG     .20     .15    7.00     .17   43.00
1                                      HEC-1 INPUT                                    PAGE 52

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

1833          UI     13.     13.     30.     51.     64.     74.     84.     98.    119.    159.
1834          UI    157.    127.    110.     96.     82.     70.     59.     43.     27.     23.
1835          UI     22.     14.     13.      9.      4.      4.      4.      4.      4.      4.
1836          UI      4.      0.      0.      0.      0.      0.      0.      0.      0.      0.
1837          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *

1838          KK   RETMG
1839          KM   DIVERT 80% REQUIRED DEVELPMENT RETENTION OUT OF MODEL - JCS
1840          DT   RETMG     7.3
1841          DI       0   10000
1842          DQ       0   10000
              *

1843          KK    CPMG
1844          KM   COMBINE FLOWS FROM MI AND MG.
1845          HC       2    0.49
              *

1846          KK  RTMGJB   ROUTE   REACH
1847          KM   ROUTE FLOW ALONG 48FT BW CHANNEL TO DRCC
              * RS      4     FLOW       -1        0
1848          RS      10     FLOW       -1        0
1849          RC   0.035   0.035   0.035    2692  0.0015    0.00
              * RC 0.035   0.035   0.035    5050  0.0024    0.00
1850          RX       0      34      46      50      98     102     122     150
1851          RY     5.0     4.0     1.0     0.0     0.0     1.0     4.0     5.0
              *
              * KK~CNAMG
              * KM COMBINE FLOWS FROM NA AND MG INTO ADMP CHANNEL
              * HC      3
              *
              * KKMCMGJB   ROUTE   REACH
              * KM ADMP CHANNEL
              * RS      3     FLOW       -1
              * RC 0.040   0.040   0.040    4374  0.0029    0.00
              * RX   0.0    16.0    33.9    51.9    86.9   104.8   122.8   138.8
              * RY   5.7     6.0     3.0     0.0     0.0     3.0     6.0     5.7
              *
              * KKSUBJB1   BASIN
              * KM  THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
              * KM  L=      1.3  Lca=       .7   S=   17.4  Kn= .050  LAG=  39.7
              * KM  VALLEY S-GRAPH WAS USED FOR THIS BASIN - JCS
              * BA 0.494
              * LG  0.25    0.25    5.00    0.41      30
              * UI    42      58     157     209     250     303     397     524     425     3
              * UI   286     233     186     117      73      67      42      35      13
              * UI    13      13      13       9       0       0       0       0       0
              *
1                                      HEC-1 INPUT                                    PAGE 53

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

1852          KK  SBJB1A
1853          KM   BASIN SUBJB1A
              * KM  THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
              * KM  L=       .9  Lca=       .4   S=   11.1  Kn= .050  LAG=  30.9
              * KM  PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
              * BA   .15
              * LG   .16     .25    5.70     .31   65.00
              * UI   16.     38.     74.     95.    122.    184.    169.    129.    100.     7
              * UI   45.     27.     20.     14.      5.      5.      5.      5.      0.
              * UI    0.      0.      0.      0.      0.      0.      0.      0.      0.
1854          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1855          KM    L=       .9  Lca=       .4   S=   11.1  Kn= .050  LAG=  30.9
1856          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1857          BA     .15
1858          LG     .16     .25    5.70     .31   65.00
1859          UI     16.     16.     16.     33.     57.     68.     78.     88.     95.    104.
1860          UI    116.    127.    149.    182.    213.    192.    166.    148.    135.    124.
1861          UI    110.    100.     90.     80.     71.     56.     44.     29.     29.     27.
1862          UI     27.     16.     16.     16.     11.      5.      5.      5.      5.      5.
1863          UI      5.      5.      5.      5.      5.      5.      0.      0.      0.      0.
1864          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *

1865          KK  RTJB1A
1866          KM   RETENTION MODIFIED FROM 80% REQUIRED TO FIRST FLUSH FOR DETENTION BASIN ROUTI
1867          KM   DIVERT 80% OF FIRST FLUSH 1/2" RETENTION OUT OF MODEL
1868          KM   FF for 15.00 acres; FF V= 0.63ac-ft
1869          DT  RTJB1A    0.50
1870          DI       0   10000
1871          DQ       0   10000
              *

1872          KK  RTJB1A
1873          KM   EXISTING
1874          KM   DIVERT RETENTION OUT OF MODEL DUE TO DEVELOPMENT: SUNDANCE RANCH 2;
1875          KM   TUSCANO TOWN CENTER; TUSCANO (PHASE1, PHASE 2 & PARCEL D & E)
1876          KM   TOTAL RETENTION IS 13.64ac-ft. 80% OF THAT IS USED HERE.
1877          DT  RTJB1A   10.91
1878          DI       0   10000
1879          DQ       0   10000
              *

1880          KK   ADMP1
              * KO      1       2
1881          KM   RETURN DIVERT FROM 75TH SD MODEL  - SLT 3/9/2005
```

```
1882          KM        RETURN DIVERT FROM ADMP1
1883          DR   ADMP1
              * BA      0
              * ZR  =QI A=DURANGO B=SLT2  C=FLOW  E=5MIN
              *
1                                        HEC-1 INPUT                                                    PAGE 54

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

1884          KK  MCJCJB
1885          KM   ROUTE REACH FROM 75TH AVE TO DRCC
1886          KM   ADMP CHANNEL
              * KM MASTER CHANNEL ROUTE FROM JC1 TO JB1
              * KM POL AUGUST 26 2005
              * RS      2    FLOW      -1
1887          RS        5    FLOW      -1
1888          RC   0.035   0.035   0.035    2650  0.0030
1889          RX        0     0.1      10      42      54      86      96    96.1
1890          RY        9       8       8       0       0       8       8       9
              *

1891          KK  MCJCJB
1892          KM   ROUTE REACH ALONG DRCC FROM 75TH AVE TO CPJB1C
1893          KM   ADMP CHANNEL
1894          KM   MASTER CHANNEL ROUTE FROM JC1 TO JB1
              * RS      2    FLOW      -1
1895          RS        5    FLOW      -1
1896          RC   0.035   0.035   0.035    1550  0.0015
1897          RX        0     0.1      10      42      82     114     124   124.1
1898          RY        9       8       8       0       0       8       8       9
              *

1899          KK  CPJB1A
1900          KM   COMBINE FLOWS FROM JC1A, MG, MI AND ADMP1
1901          HC        3    0.97
              *
              *

1902          KK   RJB1A
1903          KM   ROUTE REACH FROM CPJB1A TO CPJB1B
              * RS      2    FLOW      -1
1904          RS        5    FLOW      -1
1905          RC   0.035   0.035   0.035    1350  0.0015    0.00
1906          RX        0     0.1      10      42      82     114     124   124.1
1907          RY        9       8       8       0       0       8       8       9
              *
              *

1908          KK  SBJB1B
1909          KM   BASIN SUBJB1B
              * KM  THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
              * KM  L=       .5  Lca=       .3   S=   16.4  Kn= .050  LAG=  20.6
              * KM  PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
              * BA   .10
              * LG   .16     .25    5.70     .31   50.00
              * UI   18.     67.    102.    166.    157.    107.     68.     30.     18.
              * UI    5.      5.      0.      0.      0.      0.      0.      0.      0.
              * UI    0.      0.      0.      0.      0.      0.      0.      0.      0.
1910          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1911          KM    L=       .5  Lca=       .3   S=   16.4  Kn= .050  LAG=  20.6
1912          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1913          BA     .10
1914          LG     .16     .25    5.70     .31   50.00
1                                        HEC-1 INPUT                                                    PAGE 55

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

1915          UI     16.     16.     40.     66.     81.     93.    107.    125.    157.    207.
1916          UI    185.    152.    132.    113.     98.     82.     68.     45.     29.     27.
1917          UI     23.     16.     16.      5.      5.      5.      5.      5.      5.      5.
1918          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
1919          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *

1920          KK  RTJB1B
1921          KM   RETENTION MODIFIED FROM 80% REQUIRED TO FIRST FLUSH FOR DETENTION BASIN ROUTI
1922          KM   DIVERT 80% OF FIRST FLUSH 1/2" RETENTION OUT OF MODEL
1923          KM   FF for 36.26 acres; FF V= 1.51ac-ft
1924          DT  RTJB1B    0.88
1925          DI        0   10000
1926          DQ        0   10000
              *

1927          KK  RTJB1B
1928          KM   EXISTING
1929          KM   DIVERT RETENTION OUT OF MODEL DUE TO DEVELOPMENT: SUNDANCE RANCH 2;
1930          KM   TUSCANO TOWN CENTER; TUSCANO (PHASE1, PHASE 2 & PARCEL D & E)
1931          KM   TOTAL RETENTION IS 5.31ac-ft. 80% OF THAT IS USED HERE.
1932          DT  RTJB1B    4.25
1933          DI        0   10000
1934          DQ        0   10000
              *

1935          KK  CPJB1B
1936          KM   COMBINE FLOWS FROM JC1A, MG, MI AND ADMP1
1937          HC        2    1.07
              *

1938          KK   RJB1B
1939          KM   ROUTE REACH FROM CPJB1B TO 83RD AVE
1940          KM   ADMP CHANNEL
              * RS      2    FLOW      -1
1941          RS        5    FLOW      -1
1942          RC   0.035   0.035   0.035    2200  0.0015    0.00
1943          RX        0     0.1      10      42      82     114     124   124.1
1944          RY        9       8       8       0       0       8       8       9
```

```
                *
                *
1945            KK  SBJB1C
1946            KM   BASIN SUBJB1C
                * KM  THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
                * KM  L=       .7  Lca=       .4   S=   16.7  Kn= .050  LAG=  26.0
                * KM  PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
                * BA   .25
                * LG   .27     .25    5.70     .31   39.00
                * UI   33.    103.    172.    229.    354.    343.    250.    183.    120.     5
                * UI   42.     24.     10.     10.     10.      0.      0.      0.      0.
                * UI    0.      0.      0.      0.      0.      0.      0.      0.      0.
1947            KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1948            KM    L=       .7  Lca=       .4   S=   16.7  Kn= .050  LAG=  26.0
1949            KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1                                       HEC-1 INPUT                                          PAGE 56

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

1950            BA     .25
1951            LG     .27     .25    5.70     .31   39.00
1952            UI     32.     32.     33.    108.    132.    156.    177.    195.    221.    248.
1953            UI    293.    372.    419.    349.    302.    270.    243.    211.    189.    164.
1954            UI    144.    109.     78.     57.     54.     53.     34.     32.     32.     11.
1955            UI     10.     10.     10.     10.     10.     10.     10.     10.      0.      0.
1956            UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                *

1957            KK  RTJB1C
1958            KM   RETENTION MODIFIED FROM 80% REQUIRED TO FIRST FLUSH FOR DETENTION BASIN ROUTI
1959            KM   DIVERT 80% OF FIRST FLUSH 1/2" RETENTION OUT OF MODEL
1960            KM   FF for 36.26 acres; FF V= 1.51ac-ft
1961            DT  RTJB1C    1.21
1962            DI       0   10000
1963            DQ       0   10000
                *

1964            KK   RTJB1
1965            KM   EXISTING
1966            KM   DIVERT RETENTION OUT OF MODEL DUE TO DEVELOPMENT: SUNDANCE RANCH 2;
1967            KM   TUSCANO TOWN CENTER; TUSCANO (PHASE1, PHASE 2 & PARCEL D & E)
1968            KM   TOTAL RETENTION IS 18.30ac-ft. 80% OF THAT IS USED HERE.
1969            DT  RTJB1C   14.64
1970            DI       0   10000
1971            DQ       0   10000
                *

1972            KK    DRJB
1973            KM   RETURN DIVERT FROM MD
1974            DR   DIJB1
                *

1975            KK  RDIJB1
1976            KM   ROUTE DIVERT FROM MD TO JB
1977            KM   FUTURE ARTERIAL SECTION
                * RS     4              -1       0
1978            RS      10              -1       0
1979            RC      .1   0.023      .1    2640   .0030
1980            RX     0.0     440     445   445.1  575.1  575.2     900  1000.0
1981            RY     105     105     105   99.75  99.75    105     105     105
                *
                *

1982            KK  ~CPJB1
1983            KM   COMBINE FLOWS FROM MD, JC1, MG AND JB1 INTO ADMP CHANNEL
1984            KM   COMBINE ADDED, JEP 5/10/01
1985            HC       4    1.54
                *
                * KKDCPJB1
                * KM DIVERT FLOW IN EXCESS OF 300 CFS OUT OF MODEL (POSSIBLE OFFLINE BASIN)
                * KO     1
                * DT DBAS1
                * DI     0     300    2000
                * DQ     0       0    1700
                *
                * J2 MODIFICATION:  DEACTIVATE RRJB1
                *
                * KK RRJB1
                * KM MODIFIED PULS ROUTING
                * KM DETENTION IN DRCC RIGHT OF WAY AT JB1 (83RD AVENUE) POL
                * RS     1    STOR      0       0
                * SV     0      29      35      41
                * SQ     0     294     559    1044
                *
1                                       HEC-1 INPUT                                          PAGE 57

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

1986            KK    DIED
1987            KM   DIVERT FLOWS AT JB TO ED.  THIS IS DONE TO ROUTE FLOW AS NEEDED
1988            KM   FOR THE ADMP
1989            DT    DIED
1990            DI       0   10000
1991            DQ       0   10000
                *
                *
                *

1992            KK   SUBOE   BASIN
1993            KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
                * KM  L=      1.1  Lca=       .6   S=   17.3  Kn= .03  LAG=  20.8
                * KM  VALLEY S-GRAPH WAS USED FOR THIS BASIN - JCS
                * BA 0.469
                * LG  0.15    0.23    6.20    0.24      55
                * UI    84     321     482     784     767     519     338     150      92
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                * UI    23      23      10       0       0       0       0       0       0
                * UI     0       0       0       0       0       0       0       0       0
1994            KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
1995            KM    L=      1.1  Lca=       .6   S=   17.3  Kn= .030  LAG=  21.5
1996            KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
1997            BA    .469
1998            LG     .15     .23    6.20     .24   55.00
1999            UI     74.     74.    163.    281.    355.    410.    462.    540.    640.    847.
2000            UI    921.    742.    637.    561.    476.    412.    353.    273.    181.    130.
2001            UI    121.     98.     74.     73.     23.     23.     23.     23.     23.     23.
2002            UI     23.     23.      0.      0.      0.      0.      0.      0.      0.      0.
2003            UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                *

2004            KK   RETOE
2005            KM   DIVERT 80% REQUIRED DEVELPMENT RETENTION OUT OF MODEL - JCS
2006            DT   RETOE    47.0
2007            DI       0   10000
2008            DQ       0   10000
                *
                * REMOVED BY JCS
                * KK RETOE
                * KM DIVERT RETENTION OUT OF MODEL DUE TO WILLAMETTE IND. DEVELOPMENT. -DCF
                * KM TOTAL RETENTION IS 5.3 AF. 80% OF THAT IS USED HERE. -DCF
                * DT RETOE     4.2
                * DI      0   10000
                * DQ      0   10000
                *

2009            KK   CPOE1
2010            KM   RETURN DIVERT FROM PA.
2011            DR    DIOE
                *
1                                       HEC-1 INPUT                                         PAGE 58

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

2012            KK  RTDIOE   ROUTE   REACH
2013            KM   ROUTE DIVERT FROM PA TO OE
2014            KM   FUTURE ARTERIAL SECTION
                * RS     7              -1       0
2015            RS      18              -1       0
2016            RC   0.100   0.023   0.100    5000  0.0013    0.00
2017            RX     0.0     440     445   445.1   575.1   575.2     900  1000.0
2018            RY     105     105     105   99.75   99.75     105     105     105
                *
                * THE FOLLOWING RETURNS REMOVED TO MODEL THE ADMP CONDITION.
                * KK CPOE2
                * KM RETURN DIVERT FROM RH
                * DR DIOE2
                *
                * KK CPOE3
                * KM RETURN DIVERT FROM RI
                * DR DIOE3
                *

2019            KK   @CPOE
2020            KM        ADD HYDROGRAPHS AT OE
2021            HC       2    0.58
                *

2022            KK  DIOEOD
2023            KM   DIVERT 17% OF FLOW FROM OE2 TO OD
2024            DT    DIOD
2025            DI       0      25      50      75     100     150     200
2026            DQ       0       4       9      12      17      26      34
                *

2027            KK  RTOEMF   ROUTE   REACH
2028            KM   ROUTE FLOW FROM OE TO MF.
2029            KM   FUTURE ARTERIAL SECTION
                * RS     4              -1       0
2030            RS      10              -1       0
2031            RC   0.100   0.023   0.100    5200  0.0021    0.00
2032            RX     0.0     440     445   445.1   575.1   575.2     900  1000.0
2033            RY     105     105     105   99.75   99.75     105     105     105
                *

2034            KK   SUBMF   BASIN
2035            KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
                * KM  L=      1.4  Lca=       .7   S=   12.9  Kn= .050  LAG=  44.0
                * KM  VALLEY S-GRAPH WAS USED FOR THIS BASIN - JCS
                * BA 0.971
                * LG  0.25    0.15    8.40    0.10      30
                * UI    74      74     256     341     414     483     581     777     936     7
                * UI   619     520     429     362     256     153     125     105      74
                * UI    23      23      23      22      22      22       6       0       0
2036            KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
2037            KM    L=      1.4  Lca=       .7   S=   12.9  Kn= .050  LAG=  44.0
2038            KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
2039            BA    .971
1                                       HEC-1 INPUT                                         PAGE 59

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

2040            LG     .25     .15    8.40     .10   30.00
2041            UI     74.     74.     74.     74.     74.    235.    261.    290.    342.    364.
2042            UI    397.    420.    445.    474.    509.    555.    582.    651.    744.    862.
2043            UI    981.    936.    827.    752.    694.    646.    608.    577.    527.    488.
2044            UI    457.    429.    387.    363.    342.    289.    242.    214.    144.    132.
2045            UI    132.    122.    122.    122.     78.     74.     74.     74.     74.     30.
2046            UI     23.     23.     23.     23.     23.     23.     23.     23.     23.     23.
2047            UI     23.     23.     23.     23.     23.      0.      0.      0.      0.      0.
2048            UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                *
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```
2049          KK   RETMF
2050          KM   DIVERT 80% REQUIRED DEVELPMENT RETENTION OUT OF MODEL - JCS
2051          DT   RETMF    80.3
2052          DI       0   10000
2053          DQ       0   10000
              *

2054          KK    CPMF
2055          KM        RETURN ROUTING DIVERT FROM MD (DIMFX).
2056          DR   DIMFX
              *
              *

2057          KK  RTMDMF   ROUTE   REACH
2058          KM        ROUTE FLOW FROM MD TO MF (ALONG LOWER BUCKEYE ROAD).
2059          KM        FUTURE ARTERIAL SECTION
              * RS     6              -1       0
2060          RS      15              -1       0
2061          RC   0.100   0.023   0.100    5200  0.0015    0.00
2062          RX     0.0     440     445   445.1   575.1   575.2     900  1000.0
2063          RY     105     105     105   99.75   99.75     105     105     105
              *
              *

2064          KK   CPMF1
2065          KM        ADD HYDROGRAPHS AT MF
2066          HC       3    2.25
              *

2067          KK  DIMFEB
2068          KM        DIVERT 47% OF FLOW AT MF TO EB.
2069          DT    DIEB
2070          DI       0      25      50      75     100     150     200
2071          DQ       0      12      23      35      47      71      94
              *

2072          KK  RTMFMC   ROUTE   REACH
2073          KM        ROUTE FLOW FROM MF TO MC (ALONG LOWER BUCKEYE ROAD).
2074          KM        FLOWS INTERCEPTED BY TRAP DITCH FOR COUNTRY PLACE
2075          KM        FUTURE ARTERIAL SECTION
              * RS     4              -1       0
2076          RS      10              -1       0
2077          RC   0.100   0.023   0.100    4530  0.0015    0.00
2078          RX     0.0     440     445   445.1   575.1   575.2     900  1000.0
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

2079          RY     105     105     105   99.75   99.75     105     105     105
              *

2080          KK   SUBOD   BASIN
              * KM  THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
              * KM  L=      1.1  Lca=      .6    S=   18.2  Kn= .030  LAG=  20.6
              * KM  VALLEY S-GRAPH WAS USED FOR THIS BASIN - JCS
              * BA 0.509
              * LG  0.15    0.15    9.70    0.07      55
              * UI    94     354     533     874     825     556     357     157      97
              * UI    25      26       7       0       0       0       0       0       0
              * UI     0       0       0       0       0       0       0       0       0
2081          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
2082          KM    L=      1.1  Lca=      .6    S=   18.2  Kn= .030  LAG=  21.3
2083          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
2084          BA     .51
2085          LG    .15     .15    9.70     .07   55.00
2086          UI    81.     81.    183.    311.    391.    451.    512.    597.    715.    953.
2087          UI   988.    798.    687.    602.    513.    440.    379.    278.    183.    141.
2088          UI   132.     97.     81.     68.     25.     25.     25.     25.     25.     25.
2089          UI    25.      0.      0.      0.      0.      0.      0.      0.      0.      0.
2090          UI     0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *

2091          KK   RETOD
2092          KM   DIVERT 80% REQUIRED DEVELPMENT RETENTION OUT OF MODEL - JCS
2093          DT   RETOD    63.7
2094          DI       0   10000
2095          DQ       0   10000
              *

2096          KK    DROD
2097          KM    RETURN DIVERT FROM OE.
2098          DR    DIOD
              *

2099          KK  RTDIOD  ROUTE   REACH
2100          KM   FUTURE ARTERIAL SECTION
              * RS     4              -1       0
2101          RS      10              -1       0
2102          RC   0.100   0.023   0.100    2700  0.0013    0.00
2103          RX     0.0     440     445   445.1   575.1   575.2     900  1000.0
2104          RY     105     105     105   99.75   99.75     105     105     105
              *
              * THE FOLLOWING RETURNS REMOVED TO MODEL THE ADMP CONDITION
              * KK DROD2
              * KM  RETURN DIVERT FROM OG1
              * DR DIOD1
              *
              * KK DROD3
              * KM       RETURN DIVERT FROM OG2.
              * DR DIOD2
              *
```



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

2105          KK    CPOD
```

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2106          KM   ADD HYDROGRAPHS AT OD.
2107          HC       2    0.61
              *

2108          KK  DIODOC
2109          KM        DIVERT 18% OF FLOW FROM OD TO OC.
2110          DT    DIOC
2111          DI       0      25      50      75     100     150     200
2112          DQ       0       5       9      14      18      27      36
              *

2113          KK  RTODMC   ROUTE   REACH
2114          KM   ROUTE FLOW FROM OD TO MC.
2115          KM   FUTURE ARTERIAL SECTION
              * RS     5               -1       0
2116          RS      13               -1       0
2117          RC   0.100   0.023   0.100    5200  0.0023    0.00
2118          RX     0.0     440     445   445.1   575.1   575.2     900  1000.0
2119          RY     105     105     105   99.75   99.75     105     105     105
              *

2120          KK   SUBMC   BASIN
              * KM  THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
              * KM  L=      1.4  Lca=       .7   S=   13.6  Kn= .035  LAG=  30.5
              * KM  VALLEY S-GRAPH WAS USED FOR THIS BASIN - JCS
              * BA 0.999
              * LG  0.18    0.15    8.80    0.09      59
              * UI   110     271     519     667     869    1308    1136     873     663     5
              * UI   275     187     126      81      34      34      34      34       7
2121          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
2122          KM    L=      1.4  Lca=       .7   S=   13.6  Kn= .035  LAG=  30.5
2123          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
2124          BA    .999
2125          LG     .18     .15    8.80     .09   59.00
2126          UI    110.    110.    110.    236.    389.    467.    534.    602.    649.    713.
2127          UI    800.    878.   1038.   1275.   1450.   1249.   1089.    977.    894.    811.
2128          UI    722.    653.    580.    526.    449.    341.    249.    195.    187.    181.
2129          UI    150.    110.    110.    110.     38.     34.     34.     34.     34.     34.
2130          UI     34.     34.     34.     34.     34.      0.      0.      0.      0.      0.
2131          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *

2132          KK   RETMC
2133          KM   DIVERT 80% REQUIRED DEVELPMENT RETENTION OUT OF MODEL - JCS
2134          DT   RETMC    95.4
2135          DI       0   10000
2136          DQ       0   10000
              *
1                                        HEC-1 INPUT                                        PAGE 62

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

2137          KK   CPMC1
2138          KM        ADD HYDROGRAPHS AT MC
2139          HC       3    2.69
              *

2140          KK  DIMCMB
2141          KM        DIVERT 44% OF FLOW AT MC WEST TO MB.
2142          DT    DIMB
2143          DI       0      25      50      75     100     150     200
2144          DQ       0      11      22      33      44      66      88
              *

2145          KK  DIMCMB
2146          KM    J2 MODIFICATION.
2147          KM       FLOW BEING DIVERTED SOUTH WEST THROUGH COUNTRY PLACE
2148          KM       DIVERT 100% OF THE REMAINDER OF THE FLOW AT 99TH AVE & JUST SOUTH OF
2149          KM       LOWER BUCKEY
2150          DT   SW103
2151          DI       0   10000
2152          DQ       0   10000
              *

2153          KK  RTMCIE   ROUTE   REACH
2154          KM        ROUTE FLOW FROM MC TO IE (ALONG 99TH AVENUE).
2155          KM        FUTURE ARTERIAL SECTION
2156          KM     J2 MODIFICATION UPDATED CROSS SECTION
              * RS     3    FLOW      -1
2157          RS       8    FLOW      -1
2158          RC    0.03    0.03    0.03    2000  0.0030
2159          RX     0.0     0.1      10      34      64      88      98    98.1
2160          RY       7       6       6       0       0       6       6       7
              * RC 0.100   0.023   0.100    2000  0.0030    0.00
              * RX   0.0     440     445   445.1   575.1   575.2     900  1000.0
              * RY   105     105     105   99.75   99.75     105     105     105
              *

2161          KK    DREB
2162          KM   RETURN DIVERT FROM MF TO EB
2163          DR    DIEB
              *

2164          KK   SUBEB   BASIN
              * KM  THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
              * KM  L=       .5  Lca=       .3   S=   11.3  Kn= .050  LAG=  22.1
              * KM  VALLEY S-GRAPH WAS USED FOR THIS BASIN - JCS
              * BA 0.139
              * LG  0.25    0.21    6.40    0.23      30
              * UI    21      85     127     192     240     164     114      60      34
              * UI     6       6       6       1       0       0       0       0       0
2165          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
2166          KM    L=       .5  Lca=       .3   S=   11.3  Kn= .050  LAG=  22.1
2167          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
2168          BA    .139
2169          LG     .25     .21    6.40     .23   30.00
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LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
2170      UI     21.    21.    43.    78.   100.   116.   130.   151.   174.   227.
2171      UI    272.   228.   192.   170.   147.   127.   108.    92.    67.    42.
2172      UI     36.    35.    23.    21.    17.     6.     6.     6.     6.     6.
2173      UI      6.     6.     0.     0.     0.     0.     0.     0.     0.     0.
2174      UI      0.     0.     0.     0.     0.     0.     0.     0.     0.     0.
          *
2175      KK   RETEB
2176      KM   DIVERT 80% REQUIRED DEVELPMENT RETENTION OUT OF MODEL - JCS
2177      DT   RETEB    11.5
2178      DI       0   10000
2179      DQ       0   10000
          *
          *
2180      KK    CPEB
2181      HC       2    1.20
          *
2182      KK   RDIED
2183      KM   RETURN DIVERT FROM JB1 TO ED1
2184      DR    DIED
          *
          *  REACTIVATE MCJBED
          *
          * ROUTING BELOW REMOVED BY POL FOR DETENTION BASIN ROUTING
2185      KK  MCJBED   ROUTE   REACH
2186      KM   ADMP CHANNEL
2187      KM   ROUTE FLOW FROM JB1 TO ED1
2188      RS       7    FLOW      -1
2189      RS      18    FLOW      -1
2190      RC   0.040   0.040   0.040    5128  0.0007    0.00
2191      RX       0     0.1      10      42      54      86      96    96.1
2192      RY       9       8       8       0       0       8       8       9
          *
2193      KK  SUBED1   BASIN
          * KM  THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
          * KM  L=      1.2  Lca=       .6   S=    9.4  Kn= .050  LAG=  42.1
          * KM  VALLEY S-GRAPH WAS USED FOR THIS BASIN - JCS
          * BA 0.382
          * LG  0.25    0.25    5.70    0.31      30
          * UI    30      35     108     147     174     208     254     357     356     2
          * UI   237     193     161     127      75      53      49      30      27
          * UI     9       9       9       9       9       2       0       0       0
2194      KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
2195      KM    L=      1.2  Lca=       .6   S=    9.4  Kn= .050  LAG=  41.5
2196      KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
2197      BA    .382
2198      LG     .25     .25    5.70     .31   30.00
2199      UI     31.     31.     31.     31.     47.    102.    115.    131.    147.    159.
2200      UI    171.    181.    194.    209.    228.    242.    270.    311.    364.    412.
2201      UI    378.    336.    305.    281.    262.    247.    230.    209.    194.    182.
2202      UI    165.    153.    143.    122.    100.     89.     56.     55.     54.     51.
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LINE      ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10
2203      UI     51.     44.     31.     31.     31.     31.     19.      9.      9.      9.
2204      UI      9.      9.      9.      9.      9.      9.      9.      9.      9.      9.
2205      UI      9.      0.      0.      0.      0.      0.      0.      0.      0.      0.
2206      UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
          *
2207      KK  RETED1
2208      KM   RETENTION MODIFIED FROM 80% REQUIRED TO FIRST FLUSH FOR DETENTION BASIN ROUTI
2209      KM   DIVERT 80% OF FIRST FLUSH 1/2" RETENTION OUT OF MODEL - JCS
2210      KM   FF for 20.88 acres; FF V= 0.87ac-ft
          * DTRETED1     8.1
2211      DT  RETED1    0.70
2212      DI       0   10000
2213      DQ       0   10000
          *
2214      KK  RETED1
2215      KM   EXISTING
2216      KM   DIVERT RETENTION OUT OF MODEL DUE TO DEVELOPMENT: HURLEY RANCH PARCEL 3 & 4
2217      KM   VOLTERRA; 83RD AVENUE & LOWER BUCKEYE RD
2218      KM   TOTAL RETENTION IS 32.94 AF. 80% OF THAT IS USED HERE.
2219      DT  RETED1   26.35
2220      DI       0   10000
2221      DQ       0   10000
          *
2222      KK  SUBED2   BASIN
          * KM  THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
          * KM  L= 0.6    Lca=  .3     S=    9.4      Kn= .050     LAG=  24.5
          * KM  VALLEY S-GRAPH WAS USED FOR THIS BASIN - JCS
          * BA 0.114
          * LG  0.30    0.25    5.70    0.31      15
          * UI    16      54      87     118     184     146     107      76      38
          * UI    15       5       5       5       3       0       0       0       0
2223      KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
2224      KM    L=       .6  Lca=       .3   S=    9.4  Kn= .050  LAG=  24.5
2225      KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
2226      BA    .114
2227      LG     .30     .25    5.70     .31   15.00
2228      UI     16.     16.     22.     54.     67.     79.     89.     99.    114.    130.
2229      UI    168.    200.    177.    149.    132.    118.    102.     90.     78.     67.
2230      UI     50.     33.     27.     26.     22.     16.     16.      9.      5.      5.
2231      UI      5.      5.      5.      5.      5.      5.      0.      0.      0.      0.
2232      UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
```

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                *
2233            KK  RETED2
2234            KM   RETENTION MODIFIED FROM 80% REQUIRED TO FIRST FLUSH FOR DETENTION BASIN ROUTI
2235            KM   DIVERT 80% OF FIRST FLUSH 1/2" RETENTION OUT OF MODEL - JCS
2236            DT  RETED2      2.4
2237            DI       0   10000
2238            DQ       0   10000
                *
1                                                HEC-1 INPUT                                                PAGE 65

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

2239            KK  ~CPED1
2240            KM   ADD HYDROGRAPHS AT ED1
2241            HC       3    2.06
                *

2242            KK   89BSN
2243            KM   DIVERTING FLOW TO BASIN AT 89TH AVE
                * KO     1       2
2244            DT   89BSN
2245            DI       0     147    1131
2246            DQ       0       0     851
                *

2247            KK  ~CPED2
2248            KM   COMBINE FLOW FROM EB & ED WITH FLOW FROM MF DIVERSION
                * KO     1
2249            HC       2    3.26
                *

2250            KK  R89BSN
2251            KM   RETRIEVE 89BSN
2252            DR   89BSN
                *

2253            KK   D89BN
2254            KM   ROUTE 89BSN THROUGH PROPOSED DETENTION BASIN
2255            KM   OUTLET PIPE = 24" X 1455 LF RCP
2256            RS       1    STOR       0
2257            SV       0      24      50   77.95   107.8
2258            SQ       0       0     4.2     8.7    11.6
2259            SE     986     988     990     992     994
                *

2260            KK  CPED2A
2261            KM   COMBINE ~CPED2 WITH ROUTED FLOW FROM D89BN
2262            HC       2    3.26
                *
                * J2 MODIFICATION:  DEACTIVATE RRED, REACTIVATE MCED95 AND MC95ID
                *
                * KKRRED
                * KM MODIFIED PULS ROUTING
                * KM DETENTION IN DRCC RIGHT OF WAY AT ED1 (91ST AVENUE)  POL
                * RS     1    STOR       0       0
                * SV     0      28      33      39
                * SQ     0     643     908    1393
                *
                * THE FOLLOWING ROUTING REMOVED BY POL FOR DETENTION BASIN ROUTING IN DRCC RIGHT

2263            KK  MCED95   ROUTE   REACH
                * KO     3       2
2264            KM   ADMP CHANNEL
2265            KM   ROUTE FLOW FROM ED TO BASIN 95
                * RS     2    FLOW      -1
2266            RS       5   FLOW      -1
1                                                HEC-1 INPUT                                                PAGE 66

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

2267            RC   0.040   0.040   0.040    2278  0.0010    0.00
2268            RX       0     0.1      10      42      82     114     124   124.1
2269            RY       9       8       8       0       0       8       8       9
                *
                *
                * THE FOLLOWING DIVERSION REMOVED BY POL FOR DETENTION BASIN ROUTING
                * KK95PASS
                * KO     3
                * KM DIVERT OVERFLOW INTO BASIN - JLM 5/21/01
                * DT D-B95
                * DI     0    1050    1051    2000
                * DQ     0       0       1     950
                *
                * THE FOLLOWING ROUTING REMOVED BY POL FOR DETENTION BASIN ROUTING IN DRCC RIGHT

2270            KK  MC95ID   ROUTE   REACH
2271            KM   ADMP CHANNEL
2272            KM   ROUTE FLOW FROM BASIN 95 TO ID
                * RS     2    FLOW      -1
2273            RS       5    FLOW      -1
2274            RC   0.040   0.040   0.040    2778  0.0027    0.00
2275            RX       0     0.1      10      42      82     114     124   124.1
2276            RY       9       8       8       0       0       8       8       9
                *
                * KM HEC-RAS REACH
                * KM BFC
                * KM ROUTE FLOW FROM EB TO IE.
                * KM ROUTING FOR THIS REACH USES DISCHARGE-STORAGE VALUES DEVELOPED FROM THE
                * KM HEC-RAS MODEL. 06.07.00 -DCF
                * RS     8    STOR       0
                * SV     0      82   138.4   188.1     233   277.3   316.8     355   389.7   406
                * SQ     0     400     800    1200    1600    2000    2400    2800    3200    34
                *
                * KKSUBID1   BASIN
                * * KM  THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
```

```
* * KM  L=  1.0     Lca=  .4      S= 7.1      Kn= .05     LAG=  35.0
* * KM  VALLEY S-GRAPH WAS USED FOR THIS BASIN - JCS
* * BA 0.204
* * LG  0.25    0.15    8.00    0.11      30
* * UI    20      37      82     107     131     170     242     199     159
* * UI   101      71      38      32      20      15       6       6       6
* * UI     6       0       0       0       0       0       0       0       0
* * UI     0       0       0       0       0       0       0       0       0
* KM  THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
* KM  L=      1.0  Lca=       .4   S=    7.1  Kn= .050  LAG=  35.0
* KM  PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
* BA  .204
* LG   .25     .15    8.00     .11   30.00
* UI   20.     20.     20.     20.     63.     72.     86.     95.    106.    11
* UI  122.    133.    148.    160.    189.    225.    259.    232.    204.    18
* UI  168.    156.    143.    129.    118.    107.     98.     90.     75.     5
* UI   43.     35.     34.     32.     32.     21.     20.     20.     20.
* UI    6.      6.      6.      6.      6.      6.      6.      6.      6.
* UI    6.      6.      0.      0.      0.      0.      0.      0.      0.
* UI    0.      0.      0.      0.      0.      0.      0.      0.      0.
*
* KKRETID1
* KM RETENTION MODIFIED FROM 80% REQUIRED TO FIRST FLUSH FOR DETENTION BASIN ROU
* KM DIVERT 80% OF FIRST FLUSH 1/2" RETENTION OUT OF MODEL - JCS
* KM FF for 22.49 acres; FF V= 0.94ac-ft
* *  DTRETID1     4.4
* DTRETID1    0.75
* DI      0   10000
* DQ      0   10000
*
* KKRETID1
* KM EXISTING
* KM DIVERT RETENTION OUT OF MODEL DUE TO DEVELOPMENT: COUNTRY PLACE
* KM TOTAL RETENTION IS 10.26ac-ft. 80% OF THAT IS USED HERE.
* DTRETID1     8.2
* DI      0   10000
* DQ      0   10000
*
*
```



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

2277      KK  SUBID2   BASIN
          * KM  THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
          * KM  L=   1.0     Lca=  .4       S=  7.1      Kn= .05     LAG=  35.0
          * KM  VALLEY S-GRAPH WAS USED FOR THIS BASIN - JCS
          * BA 0.360
          * LG  0.25    0.25    4.90    0.40      30
          * UI    34      65     145     188     231     298     426     351     280     2
          * UI   177     124      67      57      36      26      11      10      11
          * UI    10       0       0       0       0       0       0       0       0
          * UI     0       0       0       0       0       0       0       0       0
2278      KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
2279      KM    L=      1.0  Lca=       .4   S=    7.1  Kn= .050  LAG=  35.0
2280      KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
2281      BA     .36
2282      LG    .25     .25    4.90     .40   30.00
2283      UI    35.     35.     35.     35.    112.    128.    151.    168.    187.    199.
2284      UI   216.    236.    261.    283.    334.    397.    458.    410.    360.    323.
2285      UI   296.    276.    252.    227.    208.    190.    172.    158.    133.    100.
2286      UI    76.     61.     60.     57.     57.     37.     35.     35.     35.     14.
2287      UI    11.     11.     11.     11.     11.     11.     11.     11.     11.     11.
2288      UI    11.     11.      0.      0.      0.      0.      0.      0.      0.      0.
2289      UI     0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
          *

2290      KK  RETID2
2291      KM   RETENTION MODIFIED FROM 80% REQUIRED TO FIRST FLUSH FOR DETENTION BASIN ROUTI
2292      KM   DIVERT 80% OF FIRST FLUSH 1/2" RETENTION OUT OF MODEL - JCS
2293      KM   FF for 166.68 acres; FF V= 6.94ac-ft
          * DTRETID2     7.7
2294      DT  RETID2    5.56
2295      DI       0   10000
2296      DQ       0   10000
          *

2297      KK  RETID2
2298      KM   DIVERT RETENTION OUT OF MODEL DUE TO DEVELOPMENT: TIVOLI
2299      KM   TOTAL RETENTION IS 15.36ac-ft . 80% OF THAT IS USED HERE.
2300      DT  RETID2   12.29
2301      DI       0   10000
2302      DQ       0   10000
          *

2303      KK  ~CPID1
2304      HC       2    3.62
          *
          * J2:  DISABLE RRID1 ROUTING OPERATION IN DRCC
          *
          * KK RRID1
          * KM MODIFIED PULS ROUTING
          * KM DETENTION IN DRCC RIGHT OF WAY AT ID1 (99TH AVENUE)  POL
          * RS      1    STOR       0       0
          * SV      0      23      33      39
          * SQ      0     188     700    1342
          *
          * J2:  DISABLE 99BASIN OPERATION IN DRCC
          *
          * KK99BASIN
          * KO      3                        21
          * KM DIVERT TO MULTIUSE BASIN BEFORE 99TH AVE - JCS
          * KM GENERAL BASIN DIMENTIONS
          * KM 15.7 AC = TOP, 14.3 AC = BOTTOM, TOP SIDE = 826 FT, BOTTOM SIDE = 790 FT,
          * KM 6:1 SIDES, 3 FT = ACTIVE DEPTH, 6 FT= TOTAL DEPTH, 45 AF = VOLUME
          * KM SIDE WEIR DIMENSIONS
```

```
* KM L = 150FT, MAX DEPTH = 1.5 FT, DESIGN DEPTH = 1.0 FT, C = 3.0
* DT 99BSN       45
* DI     0     188     700    1342
* DQ     0       0     450     827
*
* KK SUBIE   BASIN
* KM  THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
* KM  L=       .8  Lca=       .4   S=    6.0  Kn= .05   LAG=  34.3
* KM  VALLEY S-GRAPH WAS USED FOR THIS BASIN - JCS
* BA 0.302
* LG  0.25    0.15    8.80    0.09      30
* UI    30      58     126     164     203     267     368     289     232     1
* UI   137     135     135     132     113     115     126      84      88
* UI   146      93      51      44      30      16       9       9       9
* UI     5       0       0       0       0       0       0       0       0
*
* KK RETIE
* KM DIVERT 80% REQUIRED DEVELPMENT RETENTION OUT OF MODEL - JCS
* DT RETIE    25.0
* DI     0   10000
* DQ     0   10000
*
1                                   HEC-1 INPUT                                 PAGE 68

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

2305          KK   CPID2
2306          HC       2    3.62
              *
              * J2 MODIFICATION:  REACTIVATE MCIDIB
              *
              * THE FOLLOWING ROUTING REMOVED BY POL FOR DETENTION BASIN ROUTING IN DRCC RIGHT

2307          KK  MCIDIB   ROUTE   REACH
2308          KM   ADMP CHANNEL
2309          KM   ROUTE FLOW FROM BASIN ID TO IBA @ 103RD AVE
              * RS     2    FLOW      -1
2310          RS       5    FLOW      -1
2311          RC   0.040   0.040   0.040    2600  0.0032    0.00
2312          RX       0     0.1      10      42      82     114     124   124.1
2313          RY       9       8       8       0       0       8       8       9
              *
              * KM HEC-RAS REACH
              * KM BFC
              * KM ROUTE FLOW FROM ID TO IB.
              * KM ROUTING FOR THIS REACH USES DISCHARGE-STORAGE VALUES DEVELOPED FROM THE
              * KM HEC-RAS MODEL. 06.07.00 -DCF
              * RS     5    STOR       0
              * SV     0    58.3   100.7   135.4     164   190.3     214   236.2   258.3   269
              * SQ     0     400     800    1200    1600    2000    2400    2800    3200    34
              *

2314          KK  SUBIBA   BASIN
              * KM BASIN SUBIBA
              * KM  THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
              * KM  L=       .7  Lca=       .3   S=   14.2  Kn= .050  LAG=  25.5
              * KM  PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
              * BA   .24
              * LG   .28     .15    8.40     .11   43.00
              * UI   32.    104.    170.    228.    358.    320.    234.    170.    102.     5
              * UI   36.     18.     10.     10.     10.      0.      0.      0.      0.
              * UI    0.      0.      0.      0.      0.      0.      0.      0.      0.
2315          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
2316          KM    L=       .7  Lca=       .3   S=   14.2  Kn= .050  LAG=  24.0
2317          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
2318          BA     .24
2319          LG     .28     .15    8.40     .11   43.00
2320          UI     34.     34.     52.    118.    147.    172.    194.    218.    250.    290.
2321          UI    374.    435.    362.    310.    275.    243.    211.    184.    160.    130.
2322          UI     91.     59.     57.     55.     36.     34.     30.     10.     10.     10.
2323          UI     10.     10.     10.     10.     10.      0.      0.      0.      0.      0.
2324          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *

2325          KK  RETIBA
2326          KM   RETENTION MODIFIED FROM REQUIRED TO FIRST FLUSH FOR DETENTION BASIN ROUTING -
2327          KM   DIVERT 80% OF FIRST FLUSH 1/2" RETENTION OUT OF MODEL
2328          KM   FF for 20.00 acres; FF V= 0.83ac-ft
2329          DT  ETIBBA    0.67
2330          DI       0   10000
1                                   HEC-1 INPUT                                 PAGE 69

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

2331          DQ       0   10000
              *

2332          KK  RETIBA
2333          KM   EXISTING
2334          KM   DIVERT RETENTION OUT OF MODEL DUE TO DEVELOPMENT: COUNTRY PLACE
2335          KM   TOTAL RETENTION IS 15.62ac-ft. MINUS 3.12ac-ft FOR COUNTRY PLACE PARCELS 2&3
2336          KM   TOTAL 12.5 ac-ft 80% OF THAT IS USED HERE.
2337          DT  RETIBA   10.00
2338          DI       0   10000
2339          DQ       0   10000
              *

2340          KK  SUBICA   BASIN
2341          KM   BASIN SUBICA
              * KM  THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
              * KM  L=       .7  Lca=       .3   S=    4.7  Kn= .050  LAG=  31.4
              * KM  PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
              * BA   .23
              * LG   .36     .25    5.30     .34   28.00
              * UI   25.     57.    113.    145.    185.    276.    272.    206.    160.    12
              * UI   79.     43.     34.     25.      9.      8.      8.      8.      0.
```

```
                * UI    0.      0.      0.      0.      0.      0.      0.      0.      0.
2342            KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
2343            KM    L=      .7  Lca=      .3   S=     4.7  Kn= .050  LAG=  29.6
2344            KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
2345            BA     .23
2346            LG     .36     .25    5.30     .34   28.00
2347            UI     26.     26.     26.     61.     94.    113.    130.    144.    157.    174.
2348            UI    194.    217.    265.    323.    328.    278.    244.    221.    202.    180.
2349            UI    162.    144.    129.    113.     89.     67.     46.     45.     43.     39.
2350            UI     26.     26.     26.     11.      8.      8.      8.      8.      8.      8.
2351            UI      8.      8.      8.      8.      0.      0.      0.      0.      0.      0.
2352            UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                *
2353            KK  RETICA
2354            KM   RETENTION MODIFIED FROM 80% REQUIRED TO FIRST FLUSH FOR DETENTION BASIN ROUTI
2355            KM   DIVERT 80% OF FIRST FLUSH 1/2" RETENTION OUT OF MODEL
2356            KM   FF for 64.88 acres; FF V= 2.70ac-ft
2357            DT  RETICA    2.16
2358            DI       0   10000
2359            DQ       0   10000
                *
2360            KK  RETICA
2361            KM   EXISTING
2362            KM   DIVERT RETENTION OUT OF MODEL DUE TO DEVELOPMENT: SUNSET FARMS UNIT 2&3
2363            KM   TOTAL RETENTION IS 12.54ac-ft. 80% OF THAT IS USED HERE.
2364            DT  RETICA   10.03
2365            DI       0   10000
2366            DQ       0   10000
                *
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LINE            ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

2367            KK   DR103
2368            KM    RETURN DIVERT FROM MC.
2369            DR   SW103
                *
2370            KK   SUBIE   BASIN
                * KM  THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
                * KM  L=       .8  Lca=       .4   S=     6.0  Kn= .05   LAG=  34.3
                * KM  VALLEY S-GRAPH WAS USED FOR THIS BASIN - JCS
                * BA 0.302
                * LG  0.25    0.15    8.80    0.09      30
                * UI    30      58     126     164     203     267     368     289     232     1
                * UI   137     135     135     132     113     115     126      84      88
                * UI   146      93      51      44      30      16       9       9       9
                * UI     5       0       0       0       0       0       0       0       0
2371            KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
2372            KM    L=      .8  Lca=      .4   S=     6.0  Kn= .050  LAG=  33.2
2373            KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
2374            BA    .302
2375            LG     .25     .15    8.80     .09   30.00
2376            UI     31.     31.     31.     43.    101.    118.    143.    155.    169.    184.
2377            UI    201.    223.    242.    281.    343.    397.    368.    320.    286.    261.
2378            UI    242.    219.    197.    181.    162.    147.    129.    103.     82.     54.
2379            UI     54.     50.     50.     37.     31.     31.     31.     12.      9.      9.
2380            UI      9.      9.      9.      9.      9.      9.      9.      9.      9.      0.
2381            UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
2382            UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                *
2383            KK   RETIE
2384            KM   DIVERT 80% REQUIRED DEVELPMENT RETENTION OUT OF MODEL - JCS
2385            DT   RETIE    25.0
2386            DI       0   10000
2387            DQ       0   10000
                *
2388            KK  SUBID1   BASIN
                * KM  THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
                * KM  L=  1.0     Lca=  .4       S= 7.1     Kn= .05     LAG=  35.0
                * KM  VALLEY S-GRAPH WAS USED FOR THIS BASIN - JCS
                * BA 0.204
                * LG  0.25    0.15    8.00    0.11      30
                * UI    20      37      82     107     131     170     242     199     159     1
                * UI   101      71      38      32      20      15       6       6       6
                * UI     6       0       0       0       0       0       0       0       0
                * UI     0       0       0       0       0       0       0       0       0
2389            KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
2390            KM    L=      1.0  Lca=      .4   S=     7.1  Kn= .050  LAG=  35.0
2391            KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
2392            BA    .204
2393            LG     .25     .15    8.00     .11   30.00
2394            UI     20.     20.     20.     20.     63.     72.     86.     95.    106.    113.
2395            UI    122.    133.    148.    160.    189.    225.    259.    232.    204.    183.
2396            UI    168.    156.    143.    129.    118.    107.     98.     90.     75.     56.
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LINE            ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

2397            UI     43.     35.     34.     32.     32.     21.     20.     20.     20.      8.
2398            UI      6.      6.      6.      6.      6.      6.      6.      6.      6.      6.
2399            UI      6.      6.      0.      0.      0.      0.      0.      0.      0.      0.
2400            UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                *
2401            KK  RETID1
2402            KM   RETENTION MODIFIED FROM 80% REQUIRED TO FIRST FLUSH FOR DETENTION BASIN ROUTI
2403            KM   DIVERT 80% OF FIRST FLUSH 1/2" RETENTION OUT OF MODEL - JCS
2404            KM   FF for 22.49 acres; FF V= 0.94ac-ft
                *  DTRETID1     4.4
2405            DT  RETID1    0.75
2406            DI       0   10000
```

```
2407          DQ       0   10000
              *

2408          KK  RETID1
2409          KM   EXISTING
2410          KM   DIVERT RETENTION OUT OF MODEL DUE TO DEVELOPMENT: COUNTRY PLACE
2411          KM   TOTAL RETENTION IS 10.26ac-ft. 80% OF THAT IS USED HERE.
2412          DT  RETID1     8.2
2413          DI       0   10000
2414          DQ       0   10000
              *
              *

2415          KK    CPIE
2416          KM   ADD HYDROGRAPHS AT FROM BASIN ID1 & IE AND DIVERTED FLOW FROM MC
2417          HC       3    2.02
              *

2418          KK  RTDIIE   ROUTE   REACH
2419          KM        ROUTE DIVERT FROM MC TO IBA VIA CHANNEL THROUGH COUNTRY PLACE
2420          KM   OUTLET AT 103RD AVE  & DRCC CHANNEL
              * RS      8    FLOW      -1       0
2421          RS       20    FLOW      -1       0
2422          RC   0.030   0.030   0.030    4930  0.0026    0.00
2423          RX     0.0     0.1      10      30      62      82      92    92.1
2424          RY       6       5       5       0       0       5       5       6
              *

2425          KK   CP103
2426          KM   ADD HYDROGRAPHS AT IBA. OUTLET @103RD AVE
2427          HC       4    6.10
              *
              * J2 MODIFICATION:
              *

2428          KK  MCIBIB   ROUTE   REACH
2429          KM   ADMP CHANNEL
2430          KM   ROUTE FLOW FROM CP103 @103RD AVE TO IBB @107TH AVE
              * RS       2   FLOW      -1
2431          RS       5   FLOW      -1
2432          RC   0.040   0.040   0.040    2665  0.0032    0.00
2433          RX       0     0.1      10      42      82     114     124   124.1
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

2434          RY       9       8       8       0       0       8       8       9
              *

2435          KK  SUBIBB   BASIN
2436          KM   BASIN SUBIBB
              * KM  THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
              * KM  L=       .7  Lca=       .3   S=   14.2  Kn= .050  LAG=  25.5
              * KM  PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
              * BA   .24
              * LG   .44     .15    8.40     .11   12.00
              * UI   32.    104.    170.    227.    357.    318.    233.    169.    102.     5
              * UI   36.     18.     10.     10.     10.      0.      0.      0.      0.
              * UI    0.      0.      0.      0.      0.      0.      0.      0.      0.
2437          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
2438          KM    L=       .7  Lca=       .3   S=   14.2  Kn= .050  LAG=  24.0
2439          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
2440          BA     .24
2441          LG     .44     .15    8.40     .11   12.00
2442          UI     34.     34.     52.    118.    147.    172.    194.    218.    250.    290.
2443          UI    374.    435.    362.    310.    275.    243.    211.    184.    160.    130.
2444          UI     91.     59.     57.     55.     36.     34.     30.     10.     10.     10.
2445          UI     10.     10.     10.     10.     10.      0.      0.      0.      0.      0.
2446          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *

2447          KK  RETIBB
2448          KM   RETENTION MODIFIED FROM REQUIRED TO FIRST FLUSH FOR DETENTION BASIN ROUTING -
2449          KM   DIVERT 80% OF FIRST FLUSH 1/2" RETENTION OUT OF MODEL
2450          KM   FF for 116.36 acres; FF V= 4.85ac-ft
2451          DT  RETIBB    3.88
2452          DI       0   10000
2453          DQ       0   10000
              *

2454          KK  RETIBB
2455          KM   EXISTING
2456          KM   DIVERT RETENTION OUT OF MODEL DUE TO DEVELOPMENT: COUNTRY PLACE PARCEL 2&3
2457          KM   TOTAL RETENTION IS 3.12ac-ft. 80% OF THAT IS USED HERE.
2458          DT  RETIBB    2.50
2459          DI       0   10000
2460          DQ       0   10000
              *

2461          KK  SUBICB   BASIN
              * KM BASIN SUBICB
              * KM  THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
              * KM  L=       .7  Lca=       .3   S=    4.7  Kn= .050  LAG=  31.4
              * KM  PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
              * BA   .23
              * LG   .31     .25    5.30     .34   37.00
              * UI   25.     58.    113.    146.    186.    277.    274.    207.    161.    12
              * UI   79.     43.     34.     25.      9.      8.      8.      8.      0.
              * UI    0.      0.      0.      0.      0.      0.      0.      0.      0.
2462          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
2463          KM    L=       .7  Lca=       .3   S=    4.7  Kn= .050  LAG=  29.6
1                                      HEC-1 INPUT                                                    PAGE 73

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

2464          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
2465          BA     .23
```

```
2466          LG     .31     .25    5.30     .34   37.00
2467          UI     26.     26.     26.     61.     94.    113.    130.    144.    157.    174.
2468          UI    194.    217.    265.    323.    328.    278.    244.    221.    202.    180.
2469          UI    162.    144.    129.    113.     89.     67.     46.     45.     43.     39.
2470          UI     26.     26.     26.     11.      8.      8.      8.      8.      8.      8.
2471          UI      8.      8.      8.      8.      0.      0.      0.      0.      0.      0.
2472          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *

2473          KK  RETICB
2474          KM   RETENTION MODIFIED FROM 80% REQUIRED TO FIRST FLUSH FOR DETENTION BASIN ROUTI
2475          KM   DIVERT 80% OF FIRST FLUSH 1/2" RETENTION OUT OF MODEL
2476          KM   FF for 37.19 acres; FF V= 1.55ac-ft
2477          DT  RETICB    1.24
2478          DI       0   10000
2479          DQ       0   10000
              *

2480          KK  RETICB
2481          KM   EXISTING
2482          KM   DIVERT RETENTION OUT OF MODEL DUE TO DEVELOPMENT: SUNSET FARMS UNIT 1 AND
2483          KM   LION'S GATE
2484          KM   TOTAL RETENTION IS 15.28ac-ft. 80% OF THAT IS USED HERE.
2485          DT  RETICB   12.22
2486          DI       0   10000
2487          DQ       0   10000
              *

2488          KK  ~CPIB1
2489          KM   ADD HYDROGRAPHS AT IB.
2490          HC       3    6.57
              *

2491          KK  DV107A
2492          KM   DIVERT FLOW ABOVE 1200 CFS INTO LOWER 107TH AVE BASIN
2493          DT    107L
2494          DI       0    1200    1250    1300    1350    1400    1450   10000
2495          DQ       0       0      50     100     150     200     250    8800
              *

2496          KK   SUBOC   BASIN
              * KM  THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
              * KM  L=       .8  Lca=       .4   S=   13.2    Kn= .03   LAG=  17.6
              * KM  VALLEY S-GRAPH WAS USED FOR THIS BASIN - JCS
              * BA 0.310
              * LG  0.15    0.15    9.70    0.07      59
              * UI    85     285     452     670     436     263     109      56      18
              * UI    10       0       0       0       0       0       0       0       0
              * UI     0       0       0       0       0       0       0       0       0
2497          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
2498          KM    L=       .8  Lca=       .4   S=   13.2  Kn= .030  LAG=  17.2
2499          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
2500          BA     .31
1                                        HEC-1 INPUT                                        PAGE 74

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

2501          LG     .15     .15    9.70     .07   59.00
2502          UI     61.     65.    214.    286.    343.    407.    491.    678.    740.    577.
2503          UI    487.    402.    333.    270.    180.    108.    100.     69.     61.     26.
2504          UI     19.     19.     19.     19.     19.      0.      0.      0.      0.      0.
2505          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
              *

2506          KK   RETOC
2507          KM   DIVERT 80% REQUIRED DEVELPMENT RETENTION OUT OF MODEL - JCS
2508          DT   RETOC    31.1
2509          DI       0   10000
2510          DQ       0   10000
              *

2511          KK    DROC
2512          KM    RETURN DIVERT FROM OD.
2513          DR    DIOC
              *

2514          KK  RTDIOC   ROUTE   REACH
2515          KM        ROUTE DIVERT FROM OD TO OC
2516          KM        FUTURE ARTERIAL SECTION
              * RS     7              -1       0
2517          RS      18              -1       0
2518          RC   0.100   0.023   0.100    4000  0.0010    0.00
2519          RX     0.0     440     445   445.1   575.1   575.2     900  1000.0
2520          RY     105     105     105   99.75   99.75     105     105     105
              *

2521          KK    CPOC
2522          KM   ADD HYDROGRAPHS AT OC
2523          HC       2    0.42
              *

2524          KK  RTOCMB   ROUTE   REACH
2525          KM        ROUTE FLOW FROM OC TO MB.
2526          KM        FUTURE ARTERIAL SECTION
              * RS     3              -1       0
2527          RS       8              -1       0
2528          RC   0.100   0.023   0.100    5200  0.0038    0.00
2529          RX     0.0     440     445   445.1   575.1   575.2     900  1000.0
2530          RY     105     105     105   99.75   99.75     105     105     105
              *

2531          KK   SUBMB   BASIN
              * KM  THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
              * KM  L=  1.4     Lca= .7     S= 17.6     Kn= .0425     LAG=  34.5
              * KM  VALLEY S-GRAPH WAS USED FOR THIS BASIN - JCS
              * BA 0.995
              * LG  0.21    0.15    8.40    0.10      46
```

```
                * UI    97     190     413     535     664     866    1210     956     766     5
                * UI   486     313     171     148      98      58      30      30      30
                * UI    17       0       0       0       0       0       0       0       0
                * UI     0       0       0       0       0       0       0       0       0
          2532  KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
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          LINE  ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

          2533  KM    L=      1.4  Lca=       .7   S=   17.6  Kn= .0425  LAG=  35.2
          2534  KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
          2535  BA    .995
          2536  LG     .21     .15    8.40     .10   46.00
          2537  UI    95.     95.     95.     95.    302.    350.    413.    459.    512.    547.
          2538  UI   589.    645.    712.    771.    902.   1080.   1251.   1145.    998.    900.
          2539  UI   822.    764.    704.    630.    581.    528.    478.    444.    372.    288.
          2540  UI   228.    168.    167.    156.    156.    115.     95.     95.     95.     54.
          2541  UI    29.     29.     29.     29.     29.     29.     29.     29.     29.     29.
          2542  UI    29.     29.      0.      0.      0.      0.      0.      0.      0.      0.
          2543  UI     0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                *

          2544  KK   RETMB
          2545  KM   DIVERT 80% REQUIRED DEVELPMENT RETENTION OUT OF MODEL - JCS
          2546  DT   RETMB    88.4
          2547  DI       0   10000
          2548  DQ       0   10000
                *

          2549  KK    DRMB
          2550  KM    RETURN DIVERT FROM MC.
          2551  DR    DIMB
                *

          2552  KK  RTDIMB   ROUTE   REACH
          2553  KM        ROUTE DIVERT FROM MC TO MB
          2554  KM        FUTURE ARTERIAL SECTION
                * RS     4              -1       0
          2555  RS      10              -1       0
          2556  RC   0.100   0.023   0.100    5200  0.0023    0.00
          2557  RX     0.0     440     445   445.1   575.1   575.2     900  1000.0
          2558  RY     105     105     105   99.75   99.75     105     105     105
                *

          2559  KK   @CPMB
          2560  KM   ADD HYDROGRAPHS AT MB.
          2561  HC       3    1.42
                *

          2562  KK  DIMBIB
          2563  KM        DIVERT 50% OF FLOW AT MB TO IBB ALONG WEST SIDE OF 107TH AVE
          2564  DT   DIIBW
          2565  DI       0      50     100    1000   10000
          2566  DQ       0      25      50     500    5000
                *

          2567  KK  RTMBIB   ROUTE   REACH
          2568  KM        ROUTE FLOW FROM MB TO IB (ALONG 107TH AVENUE).
          2569  KM        FUTURE ARTERIAL SECTION
                * RS     8              -1
          2570  RS      20    FLOW      -1
          2571  RC   0.100   0.030   0.100    2600  0.0015
          2572  RX       0     0.1      10      42      82     114     124   124.1
          2573  RY       9       8       8       0       0       8       8       9
                *
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          LINE  ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

          2574  KK  DV107B
          2575  KM   DIVERT 100% OF FLOW INTO UPPER 107TH AVE BASIN
          2576  DT    107U
          2577  DI       0   10000
          2578  DQ       0   10000
                *

          2579  KK  @CPIB2
          2580  KM   COMBINE FLOW FROM IB & IC WITH FLOWS FROM MB
          2581  HC       2    6.57
                *

          2582  KK    RRIB
          2583  KM   MODIFIED PULS ROUTING
          2584  KM   DETENTION IN DRCC RIGHT OF WAY AT IB (107TH AVENUE)  POL
          2585  RS       1    STOR       0       0
          2586  SV       0      57      66      85
          2587  SQ       0     546     811    1924
                *

          2588  KK  MCIBIA   ROUTE   REACH
          2589  KM   ADMP CHANNEL
          2590  KM   ROUTE FLOW FROM IB TO IA
                * RS     4    FLOW      -1
          2591  RS      10    FLOW      -1
          2592  RC   0.040   0.040   0.040    2493  0.0005    0.00
          2593  RX     1.0    17.0    35.2    53.3   263.3   281.5   299.7   315.7
          2594  RY     5.7     6.1     3.0     0.0     0.0     3.0     6.1     5.7
                *
                * KM HEC-RAS REACH
                * KM BFC
                * KM ROUTE FLOW FROM IB TO IA (ALONG 107TH AVENUE).
                * KM ROUTING FOR THIS REACH USES DISCHARGE-STORAGE VALUES DEVELOPED FROM THE
                * KM HEC-RAS MODEL. 06.07.00 -DCF
                * RS     3    STOR       0
                * SV     0      17    45.4      77     106   135.9   167.9   199.8   228.7     2
                * SQ     0     400     800    1200    1600    2000    2400    2800    3200    34
```

```
                *
                * KM FUTURE ARTERIAL SECTION
                * RS     1              -1       0
                * RC 0.100   0.023   0.100     500  0.0120    0.00
                * RX   0.0     440     445   445.1   575.1   575.2     900  1000.0
                * RY   105     105     105   99.75   99.75     105     105     105
                *

2595            KK   SUBME    BASIN
                * KM  THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
                * KM  L=   1.0     Lca= .4     S=  20.6     Kn= .050     LAG=  30.1
                * KM  VALLEY S-GRAPH WAS USED FOR THIS BASIN - JCS
                * BA 0.326
                * LG  0.29    0.26    4.70    0.44      18
                * UI    36      91     172     222     290     437     366     282     215     1
                * UI    83      61      39      23      11      11      11      11       0
                * UI     0       0       0       0       0       0       0       0       0
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LINE            ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

2596            KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
2597            KM    L=      1.0  Lca=       .4   S=   20.6  Kn= .050  LAG=  28.6
2598            KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
2599            BA    .326
2600            LG     .29     .26    4.70     .44   18.00
2601            UI     38.     38.     38.    101.    141.    174.    196.    217.    237.    266.
2602            UI    295.    344.    426.    502.    438.    378.    338.    307.    275.    244.
2603            UI    220.    193.    173.    136.    103.     68.     66.     63.     56.     38.
2604            UI     38.     38.     12.     12.     12.     12.     12.     12.     12.     12.
2605            UI     12.     12.      0.      0.      0.      0.      0.      0.      0.      0.
2606            UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                *

2607            KK   RETME
2608            KM   DIVERT 80% REQUIRED DEVELPMENT RETENTION OUT OF MODEL - JCS
2609            DT   RETME    22.8
2610            DI       0   10000
2611            DQ       0   10000
                *

2612            KK  RDIIBW
2613            KM   RETURN DIVERT FROM MB COMBINE 1/2 MB FLOW WITH ME
2614            DR   DIIBW
                *

2615            KK    CPME
2616            KM        ADD HYDROGRAPHS AT ME.
2617            HC       2    1.04
                *

2618            KK  RTMEIA   ROUTE   REACH
2619            KM        ROUTE FLOW FROM ME TO IA (ALONG 107TH AVENUE).
2620            KM        FUTURE ARTERIAL SECTION
                * RS     3              -1       0
2621            RS       8              -1       0
2622            RC   0.100   0.023   0.100    3400  0.0034    0.00
2623            RX     0.0     440     445   445.1   575.1   575.2     900  1000.0
2624            RY     105     105     105   99.75   99.75     105     105     105
                *

2625            KK   SUBIA   BASIN
                * KM  THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
                * KM  L=  .8      Lca=  .4     S= 17.1      Kn= .05     LAG=  26.2
                * KM  VALLEY S-GRAPH WAS USED FOR THIS BASIN - JCS
                * KM THIS SUBBASIN HAS BE MODIFIED TO ACCOUNT FOR EXISTING DEVELOPMENT
                * KM WITHOUT RETENTION. - JCS
                * BA 0.309
                * LG  0.27    0.25    6.00    0.25    23.1
                * UI    40     125     210     277     426     426     309     227     152
                * UI    53      32      12      12      12       8       0       0       0
                * UI     0       0       0       0       0       0       0       0       0
2626            KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
2627            KM    L=       .8  Lca=       .4   S=   17.1  Kn= .050  LAG=  27.2
2628            KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
2629            BA    .309
1                                          HEC-1 INPUT                                          PAGE 78

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

2630            LG     .27     .25    6.00     .25   23.10
2631            UI     38.     38.     38.    114.    148.    180.    202.    223.    248.    280.
2632            UI    314.    393.    478.    464.    390.    343.    311.    278.    245.    219.
2633            UI    192.    168.    130.     94.     68.     65.     63.     46.     38.     38.
2634            UI     23.     12.     12.     12.     12.     12.     12.     12.     12.     12.
2635            UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
2636            UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                *

2637            KK   RETIA
2638            KM   DIVERT 80% OF FIRST FLUSH 1/2" RETENTION OUT OF MODEL - JCS
2639            KM   THIS DIVERSION HAS BE MODIFIED TO ACCOUNT FOR EXISTING DEVELOPMENT
2640            KM   WITHOUT RETENTION. - JCS
2641            DT   RETIA     3.6
2642            DI       0   10000
2643            DQ       0   10000
                *

2644            KK   ~CPIA
2645            KM        ADD HYDROGRAPHS AT IA.
2646            HC       3    9.81
                *

2647            KK  MCIAHB   ROUTE   REACH
2648            KM   ADMP CHANNEL
2649            KM   ROUTE FLOW FROM BASIN IA TO HB
                * RS     4    FLOW      -1
```

```
2650          RS      10    FLOW      -1
2651          RC   0.040   0.040   0.040    2646  0.0005    0.00
2652          RX     0.0    16.0    34.1    52.2   262.2   280.3   298.4   314.4
2653          RY     5.7     6.0     3.0     0.0     0.0     3.0     6.0     5.7
              * KM HEC-RAS REACH
              * KM BFC
              * KM ROUTE FLOW FROM IA TO HB.
              * KM ROUTING FOR THIS REACH USES DISCHARGE-STORAGE VALUES DEVELOPED FROM THE
              * KM HEC-RAS MODEL. 06.07.00 -DCF
              * RS      2    STOR       0
              * SV      0    23.3    45.2      73   102.7   132.9   160.6   189.4   212.1   222
              * SQ      0     400     800    1200    1600    2000    2400    2800    3200    34
              *

2654          KK   SUBHB   BASIN
2655          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
2656          KM    L=  .8    Lca=   .4     S=  25.0     Kn= .050     LAG=  25.1
2657          KM    VALLEY S-GRAPH WAS USED FOR THIS BASIN - JCS
2658          KM   THIS SUBBASIN HAS BE MODIFIED TO ACCOUNT FOR EXISTING DEVELOPMENT
2659          KM   WITHOUT RETENTION. - JCS
2660          BA   0.343
2661          LG    0.27    0.25    4.80    0.41    24.3
2662          UI      46     154     250     336     531     450     329     239     132      78
2663          UI      48      21      14      14      14       0       0       0       0       0
2664          UI       0       0       0       0       0       0       0       0       0       0
              *
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

2665          KK   RETHB
2666          KM   DIVERT 80% OF FIRST FLUSH 1/2" RETENTION OUT OF MODEL - JCS
2667          KM   THIS DIVERSION HAS BE MODIFIED TO ACCOUNT FOR EXISTING DEVELOPMENT
2668          KM   WITHOUT RETENTION. - JCS
2669          DT   RETHB     4.5
2670          DI       0   10000
2671          DQ       0   10000
              *

2672          KK   CPHB1
2673          KM   ADD HYDROGRAPHS AT HB.
2674          HC       2   10.15
              *

2675          KK   SUBDA   BASIN
2676          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
2677          KM    L=  1.0    Lca= .6      S= 17.6     Kn= .05     LAG=  34.0
2678          KM    VALLEY S-GRAPH WAS USED FOR THIS BASIN - JCS
2679          KM   THIS SUBBASIN HAS BE MODIFIED TO ACCOUNT FOR EXISTING DEVELOPMENT
2680          KM   WITHOUT RETENTION. - JCS
2681          BA   0.328
2682          LG    0.30    0.17    6.80    0.18      15
2683          UI      32      65     140     181     225     302     400     311     249     195
2684          UI     154      94      56      46      33      14      10      10      10      10
2685          UI       3       0       0       0       0       0       0       0       0       0
2686          UI       0       0       0       0       0       0       0       0       0       0
              *

2687          KK   RETDA
2688          KM   DIVERT 80% OF FIRST FLUSH 1/2" RETENTION OUT OF MODEL - JCS
2689          KM   THIS DIVERSION HAS BE MODIFIED TO ACCOUNT FOR EXISTING DEVELOPMENT
2690          KM   WITHOUT RETENTION. - JCS
2691          DT   RETDA     4.6
2692          DI       0   10000
2693          DQ       0   10000
              *

2694          KK   ~CPDA
2695          KM   ADD HYDROGRAPHS AT DA.
2696          HC       2   10.48
              *

2697          KK   SUBLD   BASIN
2698          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
2699          KM    L=       .8  Lca=       .4   S=   13.3    Kn= .05    LAG=  30
2700          KM    VALLEY S-GRAPH WAS USED FOR THIS BASIN - JCS
2701          BA   0.278
2702          LG    0.28    0.26    4.80    0.37      29
2703          UI      32      82     153     197     263     386     305     236     179     126
2704          UI      65      49      32      14      10      10       9       6       0       0
2705          UI       0       0       0       0       0       0       0       0       0       0
              *
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

2706          KK   RETLD
2707          KM   DIVERT 80% REQUIRED DEVELPMENT RETENTION OUT OF MODEL - JCS
2708          DT   RETLD    20.7
2709          DI       0   10000
2710          DQ       0   10000
              *
              * THE FOLLOWING RETURN AND ROUTE REMOVED TO MODEL THE ADMP CONDITION
              * KK  DRLD
              * KM RETURN DIVERT FROM LE TO LD
              * DR  DILD
              *
              * KKRTDILD   ROUTE   REACH
              * KM ROUTE DIVERT FROM LE TO LD
              * KM TYPE A CHANNEL
              * RS     4              -1       0
              * RC 0.025   0.025   0.025    2500  0.0016    0.00
              * RX   0.0   100.0   400.0   500.0   500.1   600.0   900.0  1000.0
              * RY   5.0     4.0     1.0     0.0     0.0     1.0     4.0     5.0
              *
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```
2711          KK  RTLDMA    ROUTE    REACH
2712          KM         ROUTE FLOW FROM LD TO MA
2713          KM         TYPE A CHANNEL
2714          RS       3              -1        0
2715          RC   0.025   0.025   0.025    2600  0.0035    0.00
2716          RX     0.0   100.0   400.0   500.0   500.1   600.0   900.0  1000.0
2717          RY     5.0     4.0     1.0     0.0     0.0     1.0     4.0     5.0
              *

2718          KK   SUBMA    BASIN
2719          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
2720          KM    L=  .7       Lca= .3       S=  14.7      Kn= .050     LAG=  24.8
2721          KM    VALLEY S-GRAPH WAS USED FOR THIS BASIN - JCS
2722          BA   0.247
2723          LG    0.30    0.25    4.55    0.52      15
2724          UI      33     115     184     250     392     320     234     167      88      55
2725          UI      34      12      10      10       8       0       0       0       0       0
2726          UI       0       0       0       0       0       0       0       0       0       0
              *

2727          KK   RETMA
2728          KM   DIVERT 80% REQUIRED DEVELPMENT RETENTION OUT OF MODEL - JCS
2729          DT   RETMA    16.3
2730          DI       0   10000
2731          DQ       0   10000
              *

2732          KK    CPMA
2733          KM         ADD HYDROGRAPHS AT MA
2734          HC       2    0.53
              *
1                                        HEC-1 INPUT                                        PAGE 81

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

2735          KK  RTMAHB    ROUTE    REACH
2736          KM         ROUTE FLOW FROM MA TO HB (ALONG 115TH AVENUE).
2737          KM         FUTURE ARTERIAL SECTION
2738          RS       3              -1        0
2739          RC   0.100   0.023   0.100    4000  0.0071    0.00
2740          RX     0.0     440     445   445.1   575.1   575.2     900  1000.0
2741          RY     105     105     105   99.75   99.75     105     105     105
              *

2742          KK   CPHB2
2743          KM         ADD HYDROGRAPHS AT HB.
2744          HC       2   11.00
              *
              * THE FOLLOWING ROUTES REMOVED TO MODEL THE ADMP CONDITION
              * ROUTING TO DA NO LONGER OCCURS BUT IS COMBINED INTO CHANNEL AT HB
              * KKRTHBDA
              * KM HEC-RAS REACH
              * KM BFC
              * KM ROUTE FLOW FROM HB TO DA (ALONG 115TH AVENUE).
              * KM ROUTING FOR THIS REACH USES DISCHARGE-STORAGE VALUES DEVELOPED FROM THE
              * KM HEC-RAS MODEL. 06.07.00 -DCF
              * RS      2    STOR       0
              * SV      0    11.3    18.3    26.4    34.3    40.3    46.2    51.7    56.5    59
              * SQ      0     400     800    1200    1600    2000    2400    2800    3200    34
              *
              * KKRTDACC
              * KM HEC-RAS REACH
              * KM BFC
              * KM ROUTE FLOW FROM DA TO CC.
              * KM ROUTING FOR THIS REACH USES DISCHARGE-STORAGE VALUES DEVELOPED FROM THE
              * KM HEC-RAS MODEL. 06.07.00 -DCF
              * RS      6    STOR       0
              * SV      0    49.6    80.6   107.1   129.8   149.2     167   184.1   200.2   207
              * SQ      0     400     800    1200    1600    2000    2400    2800    3200    34
              *

2745          KK   SUBLB    BASIN
2746          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
2747          KM    L=       .7  Lca=       .3   S=    8.8  Kn= .050  LAG=  27
2748          KM    VALLEY S-GRAPH WAS USED FOR THIS BASIN - JCS
2749          BA   0.249
2750          LG    0.30    0.25    4.60    0.49      15
2751          UI      31      90     158     206     297     358     258     192     142      72
2752          UI      50      31      14      10      10       9       3       0       0       0
2753          UI       0       0       0       0       0       0       0       0       0       0
              *

2754          KK   RETLB
2755          KM   DIVERT 80% REQUIRED DEVELPMENT RETENTION OUT OF MODEL - JCS
2756          DT   RETLB    16.4
2757          DI       0   10000
2758          DQ       0   10000
              *
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

2759          KK  RTLBHA    ROUTE    REACH
2760          KM         ROUTE FLOW FROM LB TO HA (SHEET FLOW).
2761          KM         TYPE A CHANNEL
2762          RS      13              -1        0
2763          RC   0.100   0.100   0.100    4000  0.0065    0.00
2764          RX     0.0   100.0   400.0   500.0   500.1   600.0   900.0  1000.0
2765          RY     5.0     4.0     1.0     0.0     0.0     1.0     4.0     5.0
              *

2766          KK   SUBHA    BASIN
2767          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
2768          KM    L=  .8      Lca=  .4       S= 33.8       Kn= .05      LAG=  23.5
```

```
2769          KM    VALLEY S-GRAPH WAS USED FOR THIS BASIN - JCS
2770          BA   0.150
2771          LG    0.25    0.25    4.70    0.44      30
2772          UI      21      79     122     172     255     186     133     089      42      27
2773          UI      14       7       7       7       0       0       0       0       0       0
2774          UI       0       0       0       0       0       0       0       0       0       0
              *

2775          KK   RETHA
2776          KM   DIVERT 80% OF FIRST FLUSH 1/2" RETENTION OUT OF MODEL - JCS
2777          DT   RETHA     3.2
2778          DI       0   10000
2779          DQ       0   10000
              *

2780          KK    CPHA
2781          KM        ADD HYDROGRAPHS AT HA
2782          HC        3   11.40
              * ******************************************************************************
              * INSERTED SOUTH ALIGNMENT FROM 1084F6-IMP-R.DAT - JCS
              * ADDED/CHANGED SUBJB2 TO CPEE IN ORDER TO REINSERT SUBJB2 - JCS
              *

2783          KK  MCHACB    ROUTE      REACH
2784          KM   ADMP CHANNEL
2785          KM   ROUTE FLOW FROM HA TO CB.
2786          RS       8     FLOW       -1
2787          RC   0.040   0.040   0.040    9163  0.0017    0.00
2788          RX     0.0    16.0    33.7    51.4   201.4   219.4   228.1   244.1
2789          RY     5.6     5.9     3.0     0.0     0.0     3.0     5.9     5.6
              *

2790          KK  SUBJB2
2791          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
2792          KM    L=      1.3  Lca=       .7   S=    17.4  Kn= .050  LAG=  40
2793          KM    VALLEY S-GRAPH WAS USED FOR THIS BASIN - JCS
2794          BA   0.493
2795          LG    0.30    0.21    6.40    0.18      15
2796          UI      41      54     151     203     242     293     372     515     433     350
2797          UI     292     237     194     133      73      68      46      41      14      13
2798          UI      12      13      13      13       2       0       0       0       0       0
              *
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              LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

2799          KK  RETJB2
2800          KM   DIVERT 80% REQUIRED DEVELPMENT RETENTION OUT OF MODEL - JCS
2801          DT  RETJB2    32.4
2802          DI       0   10000
2803          DQ       0   10000
              *

2804          KK   DRJB2
2805          KM    RETURN DIVERT FROM JC2
2806          DR   DIJB2
              *

2807          KK   RTJCJB   ROUTE      REACH
2808          KM   ROUTE DIVERT FROM JC2 TO JB2
2809          KM   FUTURE ARTERIAL SECTION
2810          RS       4       -1        0
2811          RC   0.100   0.023   0.100    5000  0.0015    0.00
2812          RX     0.0     440     445   445.1   575.1   575.2     900  1000.0
2813          RY     105     105     105   99.75   99.75     105     105     105
              *

2814          KK  @CPJB2
2815          KM   ADD HYDROGRAPHS AT JB2
2816          HC       2    0.99
              *

2817          KK  DIJBEE
2818          KM   DIVERT 64% OF FLOW AT JB2 TO FA AND THE SALT RIVER. - JCS
2819          DT    DIFA
2820          DI       0      25      50      75     100     150    2000
2821          DQ       0      16      32      48      64      96    1280
              *

2822          KK  RTJBEE  ROUTE      REACH
2823          KM        ROUTE DIVERT FROM JB TO EE
2824          KM        TYPE A CHANNEL
2825          RS      10              -1        0
2826          RC   0.100   0.023   0.100    7500  0.0015    0.00
2827          RX     0.0   100.0   400.0   500.0   500.1   600.0   900.0  1000.0
2828          RY     5.0     4.0     1.0     0.0     0.0     1.0     4.0     5.0
              *

2829          KK   SUBEE
2830          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
2831          KM    L=      1.6  Lca=       1.0   S=    16.0  Kn= .05  LAG=  50.8
2832          KM    VALLEY S-GRAPH WAS USED FOR THIS BASIN - JCS
2833          BA   0.958
2834          LG    0.20    0.25    4.90    0.34      15
2835          UI      63      63     159     258     318     366     421     494     637     802
2836          UI     695     577     504     428     362     314     244     157     113     104
2837          UI      79      64      51      19      20      20      19      20      20      20
2838          UI       7       0       0       0       0       0       0       0       0       0
2839          UI       0       0       0       0       0       0       0       0       0       0
              *
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              LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

2840          KK  RETEE
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2841          KM   DIVERT 80% REQUIRED DEVELPMENT RETENTION OUT OF MODEL - JCS
2842          DT  RETEE     63.0
2843          DI        0   10000
2844          DQ        0   10000
              *

2845          KK   CPEE
2846          KM         ADD HYDROGRAPHS AT EE
2847          HC        2    1.31
              *

2848          KK  RTEEEA
2849          KM   HEC-RAS REACH
2850          KM   ROUTE FLOW FROM EE TO EA.
2851          KM   ROUTING FOR THIS REACH USES DISCHARGE-STORAGE VALUES OBTAINED FROM THE
2852          KM   DIBBLE MODEL DUR-6im.DAT.    POL 9-6-2005
2853          RS        9    STOR        0
2854          SV        0    63.2    84.9     119    148.6   174.2   197.9   220.2   241.2   263.1
2855          SQ        0     100     200     400      600     800    1000    1200    1400    1600
              *
              * KKRTEEEA   ROUTE   REACH
              * KM       ROUTE FLOW FROM EE TO EA
              * KM       TYPE A CHANNEL
              * RS      9              -1        0
              * RC 0.035   0.035   0.035    5300  0.0030    0.00
              * RX   0.0   100.0   400.0   500.0   500.1   600.0   900.0  1000.0
              * RY   5.0     4.0     1.0     0.0     0.0     1.0     4.0     5.0
              *

2856          KK   SUBEA   BASIN
2857          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
2858          KM    L=      1.5  Lca=      .8     S=    21.3    Kn= .05    LAG=  44.3
2859          KM    VALLEY S-GRAPH WAS USED FOR THIS BASIN - JCS
2860          BA   1.321
2861          LG    0.29    0.25    5.30    0.34      16
2862          UI     100     101     340     457     556     647     776    1034    1263    1015
2863          UI     846     715     587     501     364     221     170     151     100      89
2864          UI      31      31      31      30      30      30      15       0       0       0
2865          UI       0       0       0       0       0       0       0       0       0       0
              *

2866          KK   RETEA
2867          KM   DIVERT 80% REQUIRED DEVELPMENT RETENTION OUT OF MODEL - JCS
2868          DT   RETEA    89.2
2869          DI        0   10000
2870          DQ        0   10000
              *
1                                        HEC-1 INPUT                                        PAGE 85

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

2871          KK    CPEA
2872          KM         ADD HYDROGRAPHS AT EA
2873          HC        2    2.63
              *
              * KKP-99SO
              * KO      1       2
              * KM DIVERT OVERFLOW INTO BASIN - JLM 6/17/02
              * DTB-99SO
              * DI      0     260     260    2000    5000
              * DQ      0       0       1    1740    4740
              *

2874          KK  RTEADC   ROUTE   REACH
2875          KM    ROUTE FLOW FROM EA TO DC
2876          KM    SUNLAND CHANNEL
2877          RS        7              -1        0
2878          RC   0.040   0.040   0.040    4951  0.0018    0.00
2879          RX     0.0   100.0   101.0   137.0   157.0   193.0   194.0   294.0
2880          RY     6.0     6.0     6.0     0.0     0.0     6.0     6.0     6.0
              *

2881          KK   SUBDC   BASIN
2882          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
2883          KM    L=      1.4  Lca=      .4    S=    22.1    Kn= .05    LAG=  33.5
2884          KM    VALLEY S-GRAPH WAS USED FOR THIS BASIN - JCS
2885          KM   THIS SUBBASIN HAS BE MODIFIED TO ACCOUNT FOR EXISTING DEVELOPMENT
2886          KM   WITHOUT RETENTION. - JCS
2887          BA   0.830
2888          LG    0.29    0.25    6.00    0.27      16
2889          UI      83     170     363     469     584     800    1016     778     624     486
2890          UI     377     216     142     108      83      26      26      26      26      25
2891          UI       2       0       0       0       0       0       0       0       0       0
2892          UI       0       0       0       0       0       0       0       0       0       0
              *

2893          KK   RETDC
2894          KM   DIVERT 80% REQUIRED DEVELPMENT RETENTION OUT OF MODEL (43%) - JCS
2895          KM   DIVERT 80% OF FIRST FLUSH 1/2" RETENTION OUT OF MODEL (12%) - JCS
2896          KM   THIS DIVERSION HAS BE MODIFIED TO ACCOUNT FOR EXISTING DEVELOPMENT
2897          KM   WITHOUT RETENTION. (45%) - JCS
2898          DT   RETDC    25.9
2899          DI        0   10000
2900          DQ        0   10000
              *

2901          KK   ~CPDC
2902          KM         ADD HYDROGRAPHS AT DC
2903          HC        2    3.46
              *
1                                        HEC-1 INPUT                                        PAGE 86

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

2904          KK  RTDCCC   ROUTE   REACH
```

```
2905          KM        ROUTE FLOW FROM DC TO CC.
2906          KM   SUNLAND CHANNEL
2907          RS       5              -1        0
2908          RC   0.040   0.040   0.040    5103  0.0022    0.00
2909          RX     0.0   100.0   101.0   137.0   167.0   203.0   204.0   304.0
2910          RY     6.0     6.0     6.0     0.0     0.0     6.0     6.0     6.0
              *

2911          KK   SUBDD   BASIN
2912          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
2913          KM    L=       .5  Lca=       .3   S=   28.3  Kn= .050  LAG=  18.2
2914          KM    VALLEY S-GRAPH WAS USED FOR THIS BASIN - JCS
2915          BA   0.133
2916          LG    0.25    0.25    4.65    0.43      30
2917          UI      34     115     178     281     193     123      53      30      10       8
2918          UI       7       0       0       0       0       0       0       0       0       0
2919          UI       0       0       0       0       0       0       0       0       0       0
              *

2920          KK   RETDD
2921          KM   DIVERT 80% REQUIRED DEVELPMENT RETENTION OUT OF MODEL - JCS
2922          DT   RETDD    11.0
2923          DI       0   10000
2924          DQ       0   10000
              *

2925          KK  RTDDCCROUTE      REACH
2926          KM        ROUTE FLOW FROM DD TO CC.
2927          KM        TYPE A CHANNEL
2928          RS       7              -1        0
2929          RC   0.035   0.035   0.035    5000  0.0040    0.00
2930          RX     0.0   100.0   400.0   500.0   500.1   600.0   900.0  1000.0
2931          RY     5.0     4.0     1.0     0.0     0.0     1.0     4.0     5.0
              *

2932          KK   SUBCC   BASIN
2933          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
2934          KM    L=  1.4    Lca= .7     S=   22.8      Kn= .05      LAG=  38.6
2935          KM    VALLEY S-GRAPH WAS USED FOR THIS BASIN - JCS
2936          KM   THIS SUBBASIN HAS BE MODIFIED TO ACCOUNT FOR EXISTING DEVELOPMENT
2937          KM   WITHOUT RETENTION. - JCS
2938          BA   0.981
2939          LG    0.30    0.24    6.20    0.21      15
2940          UI      85     130     328     437     522     639     869    1062     820     677
2941          UI     546     446     331     189     145     111      86      42      26      26
2942          UI      26      25      26       2       0       0       0       0       0       0
2943          UI       0       0       0       0       0       0       0       0       0       0
              *
1                                        HEC-1 INPUT                                        PAGE 87

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

2944          KK   RETCC
2945          KM   DIVERT 80% REQUIRED DEVELPMENT RETENTION OUT OF MODEL (54%) - JCS
2946          KM   DIVERT 80% OF FIRST FLUSH 1/2" RETENTION OUT OF MODEL (24%) - JCS
2947          KM   THIS DIVERSION HAS BE MODIFIED TO ACCOUNT FOR EXISTING DEVELOPMENT
2948          KM   WITHOUT RETENTION. (40%) - JCS
2949          DT   RETCC    34.2
2950          DI       0   10000
2951          DQ       0   10000
              *

2952          KK   ~CPCC
2953          HC       3    4.57
              *

2954          KK  RTCCSC
2955          KM   ROUTE FLOW FROM CC TO DRCC
2956          KM   SUNLAND CHANNEL
2957          RS       4              -1        0
2958          RC   0.040   0.040   0.040    3027  0.0008    0.00
2959          RX     0.0   100.0   101.0   137.0   167.0   203.0   204.0   304.0
2960          RY     6.0     6.0     6.0     0.0     0.0     6.0     6.0     6.0
              *

2961          KK  RTCCSC
2962          KM   HEC-RAS REACH
2963          KM   BFC
2964          KM   ROUTE SUNLAND IN DRCC
2965          KM   DRCC CHANNEL
2966          RS       2              -1        0
2967          RC   0.040   0.040   0.040    2256  0.0017    0.00
2968          RX     0.0   100.0   101.0   137.0   287.0   353.0   354.0   454.0
2969          RY     6.0     6.0     6.0     0.0     0.0     6.0     6.0     6.0
              *

2970          KK   SUBCB   BASIN
2971          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
2972          KM    L=  1.2    Lca=  .5     S= 11.1     Kn= .05     LAG=  36.9
2973          KM    VALLEY S-GRAPH WAS USED FOR THIS BASIN - JCS
2974          BA   0.739
2975          LG    0.30    0.15    9.70    0.07      15
2976          UI      67     114     268     355     429     535     768     774     596     488
2977          UI     390     310     194     117     102      68      43      21      21      21
2978          UI      21      21       1       0       0       0       0       0       0       0
2979          UI       0       0       0       0       0       0       0       0       0       0
              *

2980          KK   RETCB
2981          KM   DIVERT 80% OF FIRST FLUSH 1/2" RETENTION OUT OF MODEL - JCS
2982          DT   RETCB    15.8
2983          DI       0   10000
2984          DQ       0   10000
              *
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LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

2985          KK  ~CPCB1
2986          HC       3   16.71
              *

2987          KK  SUBGD1   BASIN
2988          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
2989          KM    L=  1.1     Lca= .6      S= 33.3      Kn= .05      LAG=  31.6
2990          KM    VALLEY S-GRAPH WAS USED FOR THIS BASIN - JCS
2991          BA   0.629
2992          LG    0.25    0.25    5.30    0.33      30
2993          UI      67     155     306     394     501     742     750     564     440     342
2994          UI     225     116      96      68      26      21      21      20      18       0
2995          UI       0       0       0       0       0       0       0       0       0       0
              *

2996          KK  RETGD1
2997          KM   DIVERT 80% OF FIRST FLUSH 1/2" RETENTION OUT OF MODEL - JCS
2998          DT  RETGD1    13.4
2999          DI       0   10000
3000          DQ       0   10000
              *

3001          KK  SUBGD2
3002          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
3003          KM    L=  1.2     Lca=  .5     S= 11.1      Kn= .05      LAG=  37.5
3004          KM    VALLEY S-GRAPH WAS USED FOR THIS BASIN - JCS
3005          BA   0.211
3006          LG    0.25    0.15    9.70    0.07      30
3007          UI      66     108     259     345     414     512     722     791     604     498
3008          UI     395     327     218     119     109      69      56      21      21      20
3009          UI      21      20       9       0       0       0       0       0       0       0
3010          UI       0       0       0       0       0       0       0       0       0       0
              *

3011          KK  RETGD2
3012          KM   DIVERT 80% OF FIRST FLUSH 1/2" RETENTION OUT OF MODEL - JCS
3013          DT  RETGD2    15.8
3014          DI       0   10000
3015          DQ       0   10000
              *

3016          KK   CPGD
3017          KM   RECOMBINE SUBBASIN GD - JCS
3018          HC       2    0.84
              *

3019          KK   SUBKC   BASIN
3020          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
3021          KM    L=      .8  Lca=      .4    S=    26.3  Kn= .050  LAG=  25
3022          KM    VALLEY S-GRAPH WAS USED FOR THIS BASIN - JCS
3023          BA   0.264
3024          LG    0.25    0.25    4.60    0.50      30
3025          UI      35     119     193     260     409     346     253     183     101      60
3026          UI      37      16      11      11      11       0       0       0       0       0
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LINE          ID.....1.....2.....3.....4.....5.....6.....7.....8.....9.....10

3027          UI       0       0       0       0       0       0       0       0       0       0
              *

3028          KK   RETKC
3029          KM   DIVERT 80% REQUIRED DEVELPMENT RETENTION OUT OF MODEL - JCS
3030          DT   RETKC     21.8
3031          DI       0   10000
3032          DQ       0   10000
              *

3033          KK  RTKCGDROUTE      REACH
3034          KM        ROUTE FLOW FROM KC TO GD1 (ALONG EL MIRAGE RD).
3035          KM        ASSUME NEGLIGIBLE CHANNEL TRANSMISSION LOSS.
3036          KM        FUTURE ARTERIAL SECTION
3037          RS       3              -1       0
3038          RC   0.100   0.023   0.100    4090  0.0049    0.00
3039          RX     0.0     440     445   445.1   575.1   575.2     900  1000.0
3040          RY     105     105     105   99.75   99.75     105     105     105
              *

3041          KK   SUBGC   BASIN
3042          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
3043          KM    L= .8     Lca=  .4      S=   26.5     Kn= .045     LAG=  23.3
3044          KM    VALLEY S-GRAPH WAS USED FOR THIS BASIN - JCS
3045          KM   THIS SUBBASIN HAS BE MODIFIED TO ACCOUNT FOR EXISTING DEVELOPMENT
3046          KM   WITHOUT RETENTION. - JCS
3047          BA   0.215
3048          LG    0.28    0.26    4.70    0.34    19.7
3049          UI      31     116     178     254     368     265     189     123      57      38
3050          UI      19      10       9       9       0       0       0       0       0       0
3051          UI       0       0       0       0       0       0       0       0       0       0
              *

3052          KK   RETGC
3053          KM   DIVERT 80% REQUIRED DEVELPMENT RETENTION OUT OF MODEL - JCS
3054          KM   THIS DIVERSION HAS BE MODIFIED TO ACCOUNT FOR EXISTING DEVELOPMENT
3055          KM   WITHOUT RETENTION. - JCS
3056          DT   RETGC      5.0
3057          DI       0   10000
3058          DQ       0   10000
              *

3059          KK  RTGCGD     ROUTE      REACH
3060          KM        ROUTE FLOW FROM GC TO GD1 (ALONG EL MIRAGE ROAD).
3061          KM        FUTURE ARTERIAL SECTION
3062          RS       1              -1       0
```

```
3063          RC   0.100   0.023   0.100     820  0.0049    0.00
3064          RX     0.0     440     445   445.1   575.1   575.2     900  1000.0
3065          RY     105     105     105   99.75   99.75     105     105     105
              *
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

3066          KK   CPGD1
3067          KM        ADD ALL HYDROGRAPHS AT GD1.
3068          HC        3    1.32
              *

3069          KK  RTGDCB    ROUTE      REACH
3070          KM   ROUTE FLOW FROM GD1 TO CB
3071          RS        6    FLOW       -1
3072          RC   0.100   0.023   0.100    3880  0.0010    0.00
3073          RX     0.0     440     445   445.1   575.1   575.2     900  1000.0
3074          RY     105     105     105   99.75   99.75     105     105     105
              *

3075          KK  ~CPCB2
3076          KM   COMBINE FLOWS FROM CB TO CHANNEL
3077          HC        2   18.03
              *

3078          KK  MCCBCA
3079          KM   ADMP CHANNEL
3080          KM   ROUTE FLOW FROM CB TO CA.
3081          RS        8    FLOW       -1
3082          RC   0.040   0.040   0.040    5026  0.0014    0.00
3083          RX     0.0    16.0    33.7    51.4   201.4   219.4   228.1   244.1
3084          RY     5.6     5.9     3.0     0.0     0.0     3.0     5.9     5.6
              *

3085          KK  SUBCA1   BASIN
3086          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
3087          KM    L=      1.0  Lca=       .5   S=    6.4  Kn= .05  LAG=  38.9
3088          KM    VALLEY S-GRAPH WAS USED FOR THIS BASIN - JCS
3089          KM   THIS SUBBASIN HAS BE MODIFIED TO ACCOUNT FOR EXISTING DEVELOPMENT
3090          KM   WITHOUT RETENTION. - JCS
3091          BA   0.143
3092          LG    0.26    0.15    7.60    0.14    26.9
3093          UI      12      18      47      63      75      92     124     154     120      99
3094          UI      81      65      50      29      21      17      12       7       4       4
3095          UI       4       4       4       1       0       0       0       0       0       0
3096          UI       0       0       0       0       0       0       0       0       0       0
              *

3097          KK  RETCA1
3098          KM   DIVERT 80% OF FIRST FLUSH 1/2" RETENTION OUT OF MODEL - JCS
3099          KM   THIS DIVERSION HAS BE MODIFIED TO ACCOUNT FOR EXISTING DEVELOPMENT
3100          KM   WITHOUT RETENTION. - JCS
3101          DT  RETCA1     2.4
3102          DI        0   10000
3103          DQ        0   10000
              *
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

3104          KK  SUBCA2   BASIN
3105          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
3106          KM    L=      1.0  Lca=       .5   S=    7.8    Kn= .05    LAG=  37.4
3107          KM    VALLEY S-GRAPH WAS USED FOR THIS BASIN - JCS
3108          BA   0.841
3109          LG    0.30    0.15    8.80    0.09      15
3110          UI      76     123     297     297     393     474     585     829     898     566
3111          UI     448     369     247     134     124      76      63      23      23      23
3112          UI      23      23       9       0       0       0       0       0       0       0
3113          UI       0       0       0       0       0       0       0       0       0       0
              *

3114          KK  RETCA2
3115          KM   DIVERT 80% OF FIRST FLUSH 1/2" RETENTION OUT OF MODEL - JCS
3116          DT  RETCA2    17.9
3117          DI        0   10000
3118          DQ        0   10000
              *

3119          KK  ~CPCA1
3120          KM   COMBINE FLOWS AT CA
3121          KM   RECOMBINE SUBBASIN CA - JCS
3122          HC        3   19.01
              *

3123          KK   SUBGB   BASIN
3124          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
3125          KM    L= .8     Lca= .6   S=   36.1    Kn= .05     LAG=  27.4
3126          KM    VALLEY S-GRAPH WAS USED FOR THIS BASIN - JCS
3127          KM   THIS SUBBASIN HAS BE MODIFIED TO ACCOUNT FOR EXISTING DEVELOPMENT
3128          KM   WITHOUT RETENTION. - JCS
3129          BA   0.221
3130          LG    0.30    0.25    4.55    0.42      15
3131          UI      27      79     139     181     260     318     230     171     127      65
3132          UI      45      27      13       8       8       8       3       0       0       0
3133          UI       0       0       0       0       0       0       0       0       0       0
              *

3134          KK   RETGB
3135          KM   DIVERT 80% REQUIRED DEVELPMENT RETENTION OUT OF MODEL - JCS
3136          KM   THIS DIVERSION HAS BE MODIFIED TO ACCOUNT FOR EXISTING DEVELOPMENT
3137          KM   WITHOUT RETENTION. - JCS
3138          DT   RETGB     8.3
3139          DI        0   10000
```

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3140          DQ       0   10000
              *

3141          KK  RTGBCA    ROUTE       REACH
3142          KM         ROUTE FLOW FROM GB TO CA1.
3143          KM          FUTURE ARTERIAL SECTION
3144          RS        5              -1        0
3145          RC   0.040   0.040   0.040    5136  0.0014    0.00
3146          RX     0.0    16.0    33.8    51.6   166.6   184.4   202.3   218.3
3147          RY     5.6     5.9     3.0     0.0     0.0     3.0     5.9     5.6
              *
1                                        HEC-1 INPUT                                        PAGE 92

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

3148          KK  ~CPCA2
3149          KM         ADD HYDROGRAPHS AT CA
3150          HC        2   19.24
              *

3151          KK  P-DRCCDIVERT
3152          KM   DIVERT OVERFLOW INTO BASIN - JLM 6/18/02
3153          DT  B-DRCC
3154          DI        0       34       34    5000    9000
3155          DQ        0        0        1    4966    8966
              *

3156          KK  MCCABC    ROUTE       REACH
3157          KM   ROUTE ADMP CHANNEL FROM CA1 TO BC1
3158          RS        5     FLOW        -1
3159          RC   0.014   0.014   0.014    3914  0.0005    0.00
3160          RX     0.0    16.0    16.0    16.0    20.0    20.0    20.0    36.0
3161          RY     3.8     4.1     2.1     0.0     0.0     2.1     4.1     3.8
              *
              * KM HEC-RAS REACH
              * KM BFC
              * KM ROUTE FLOW FROM CA TO BC.
              * KM ROUTING FOR THIS REACH USES DISCHARGE-STORAGE VALUES DEVELOPED FROM THE
              * KM HEC-RAS MODEL. 06.07.00 -DCF
              * RS     11     STOR        0
              * SV      0     52.4   113.5   174.4   227.6   278.6   321.5     363   401.7     4
              * SQ      0      400     800    1200    1600    2000    2400    2800    3200    34
              *

3162          KK  SUBBC1    BASIN
3163          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
3164          KM    L=  0.22x1.7   Lca=  0.22x0.8    S=  11.5    Kn= .02    LAG=  6.3
3165          KM    VALLEY S-GRAPH WAS USED FOR THIS BASIN - JCS
3166          BA   0.137
3167          LG    0.15    0.28    4.80    0.38      55
3168          UI     309     618     117     117      18       0       0       0       0       0
3169          UI       0       0       0       0       0       0       0       0       0       0
              *

3170          KK  RETBC1
3171          KM   DIVERT 80% OF FIRST FLUSH 1/2" RETENTION OUT OF MODEL - JCS
3172          DT  RETBC1     2.9
3173          DI        0   10000
3174          DQ        0   10000
              *

3175          KK  SUBBC2    BASIN
3176          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
3177          KM    L=      1.7  Lca=      .8    S=   11.5  Kn= .038  LAG=  38.3
3178          KM    VALLEY S-GRAPH WAS USED FOR THIS BASIN - JCS
3179          BA   0.493
3180          LG    0.24    0.25    5.10    0.39      31
3181          UI      55      86     214     284     340     419     573     682     523     433
3182          UI     345     284     204     116      93      68      55      21      17      17
1                                        HEC-1 INPUT                                        PAGE 93

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

3183          UI       17      17      15       0       0       0       0       0       0       0
3184          UI        0       0       0       0       0       0       0       0       0       0
              *

3185          KK  RETBC2
3186          KM   DIVERT 80% OF FIRST FLUSH 1/2" RETENTION OUT OF MODEL - JCS
3187          DT  RETBC2    10.5
3188          DI        0   10000
3189          DQ        0   10000
              *

3190          KK   ~CPBC
3191          KM   ADD HYDROGRAPHS AT BC1
3192          KM   RECOMBINE SUBBASIN BC - JCS
3193          HC        3   10.25
              *

3194          KK  CPAFBC
3195          KM   COMBINE FLOWS INTO AGUA FRIA RIVER AT BC
3196          HC        2   10.25
              *
              * KM       FUTURE ARTERIAL SECTION
              * RS     10              -1        0
              * RC 0.100   0.023   0.100    5700  0.0018    0.00
              * RX   0.0     440     445   445.1   575.1   575.2     900  1000.0
              * RY   105     105     105   99.75   99.75     105     105     105
              *
              *
              *
              * ********************************************************************************
              * NOTES REFERING TO CHANGES MADE TO DIBBLE MODEL HAVE BEEN OMITTED.
              * SEE 1084F6-IMP-R.DAT FOR NOTES. - JCS
3197          ZZ
```

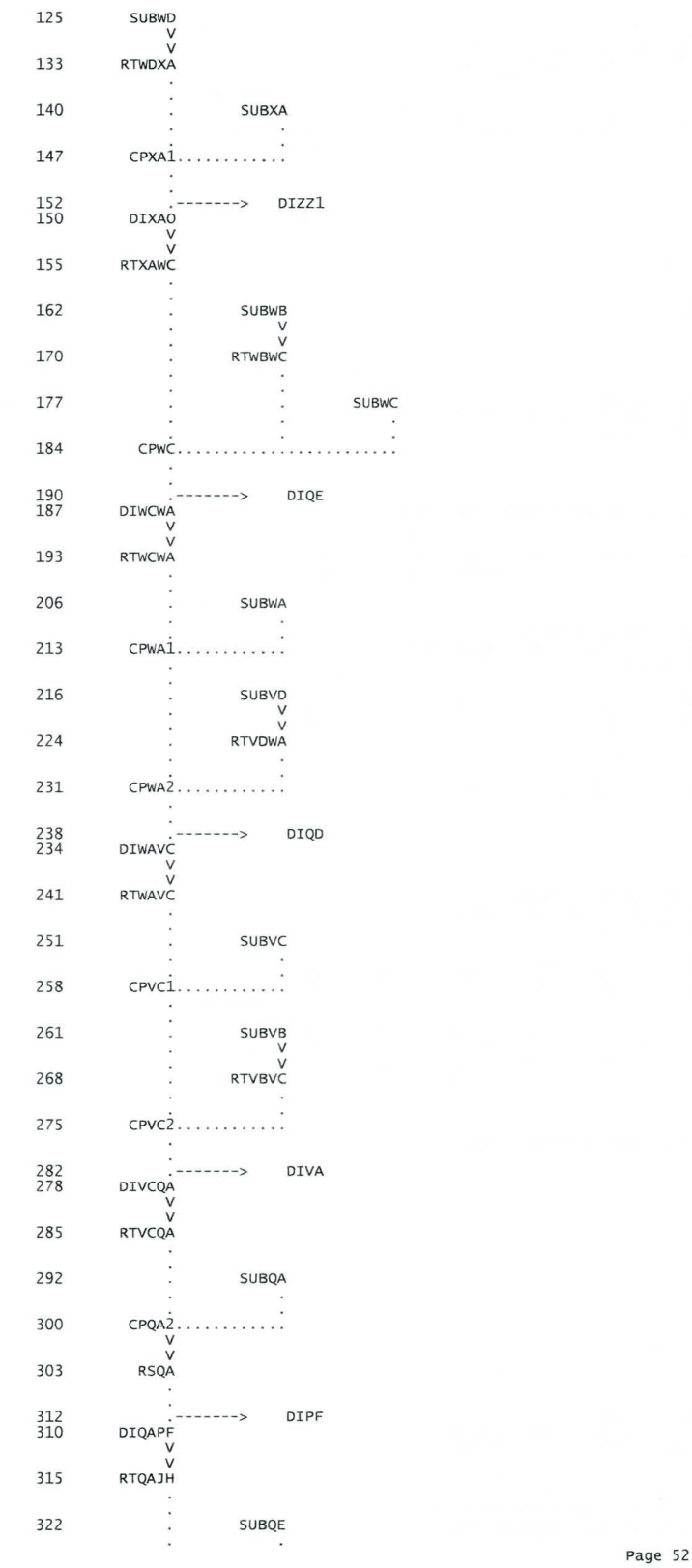
1

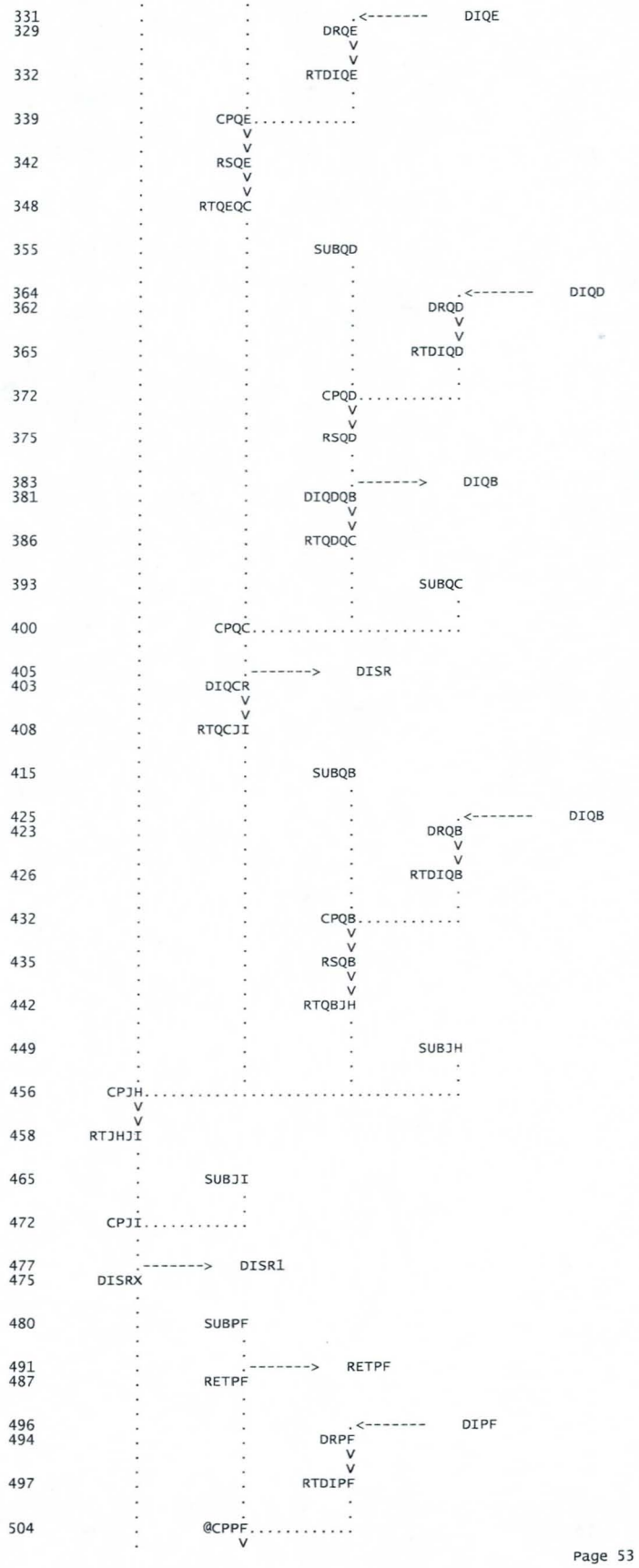
SCHEMATIC DIAGRAM OF STREAM NETWORK

INPUT LINE NO.

(V) ROUTING (---->) DIVERSION OR PUMP FLOW

(.) CONNECTOR (<----) RETURN OF DIVERTED OR PUMPED FLOW




331
329
DIQE
DRQE
332
RTDIQE
339
CPQE
342
RSQE
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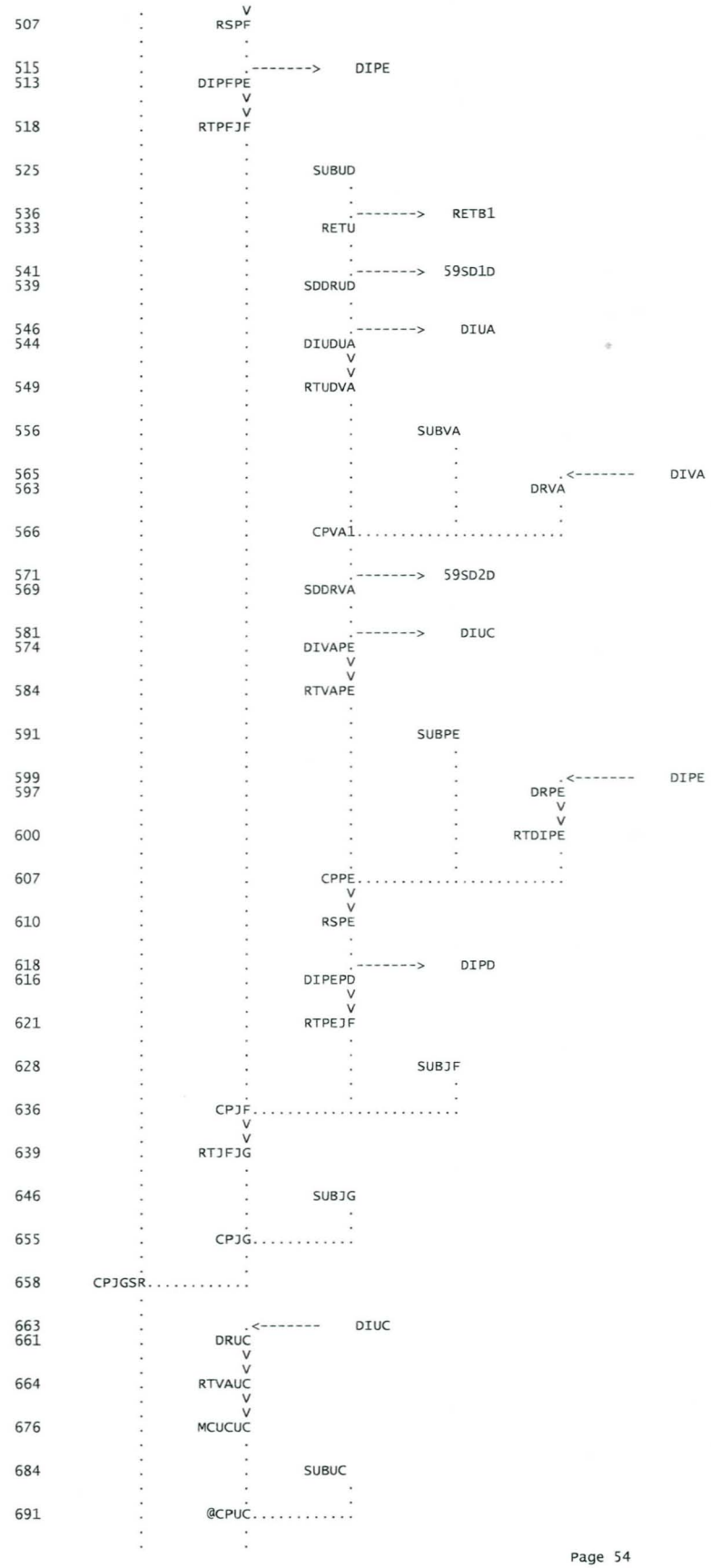
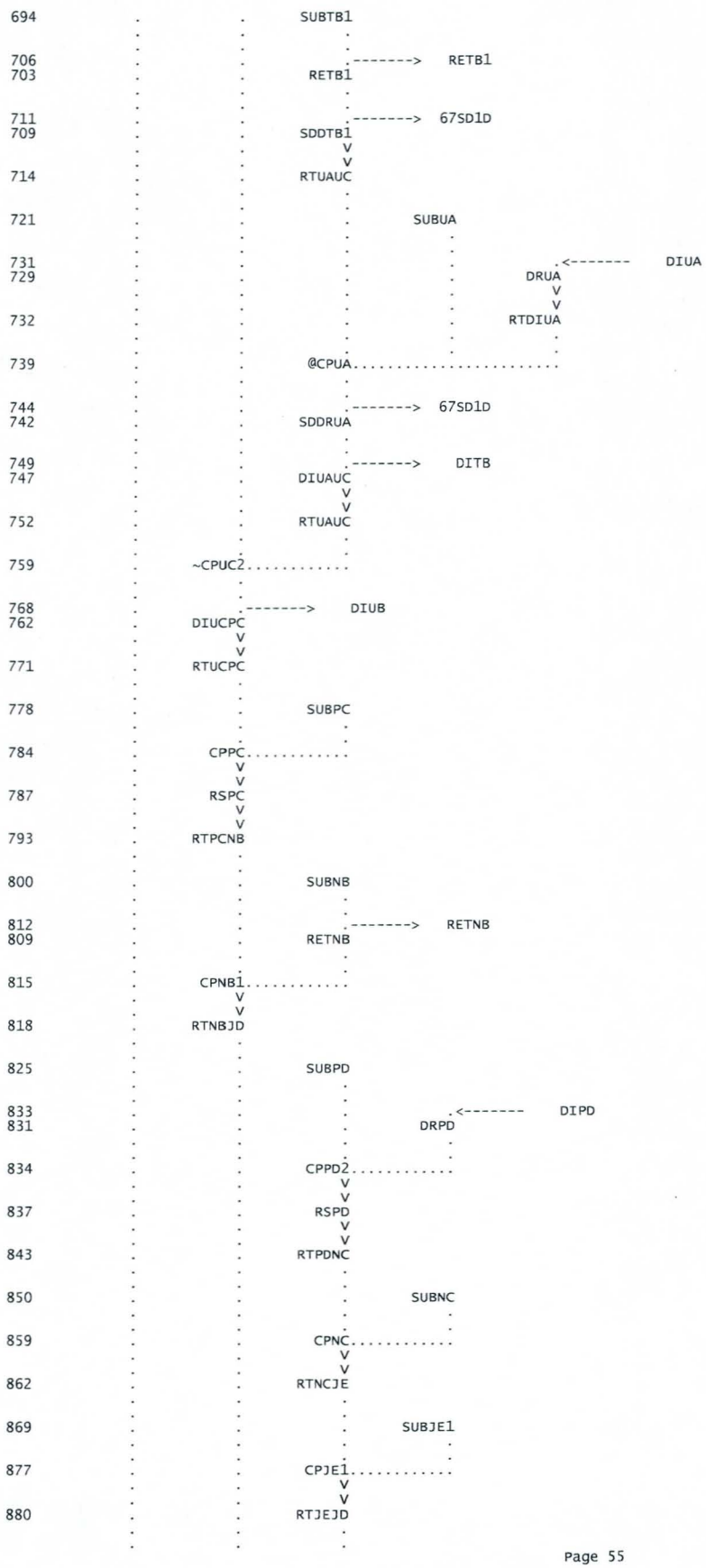
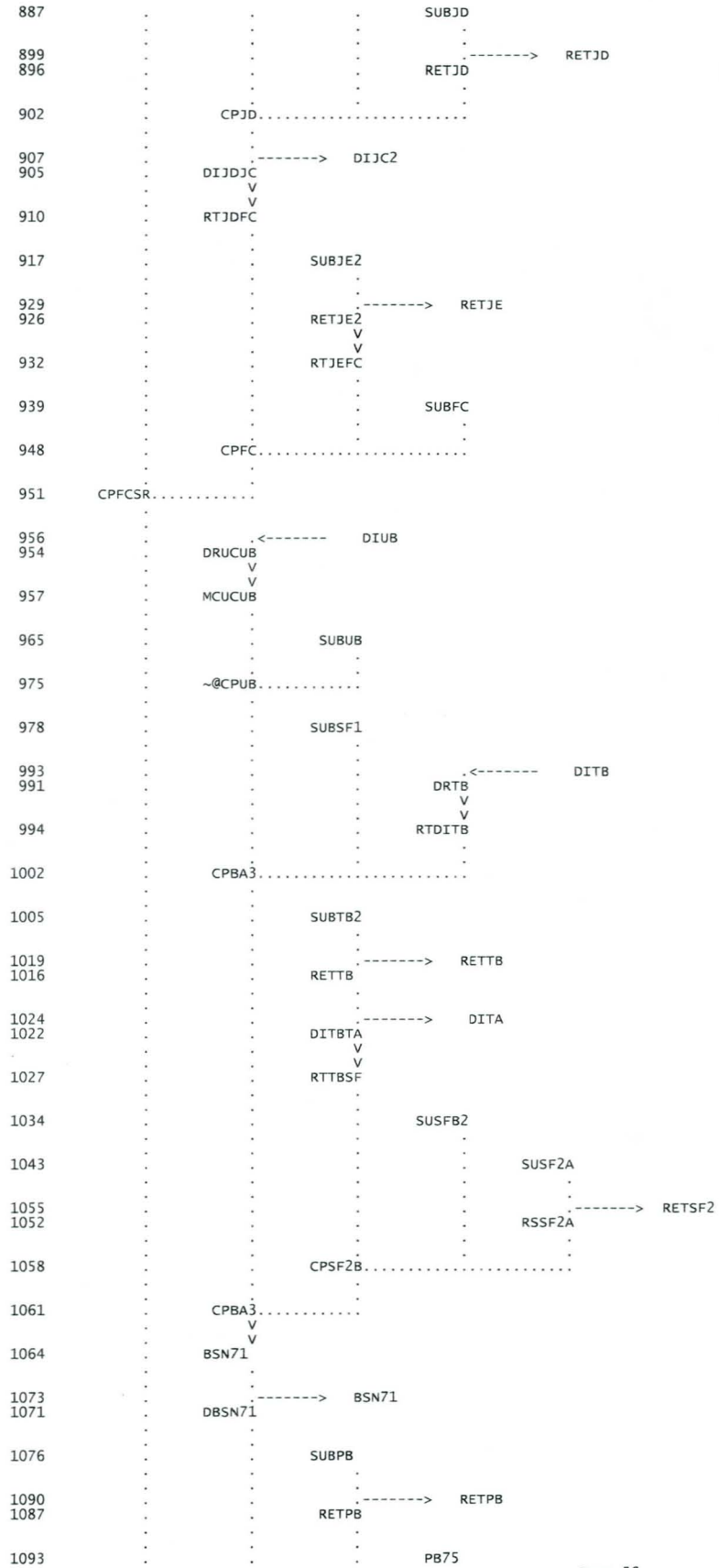
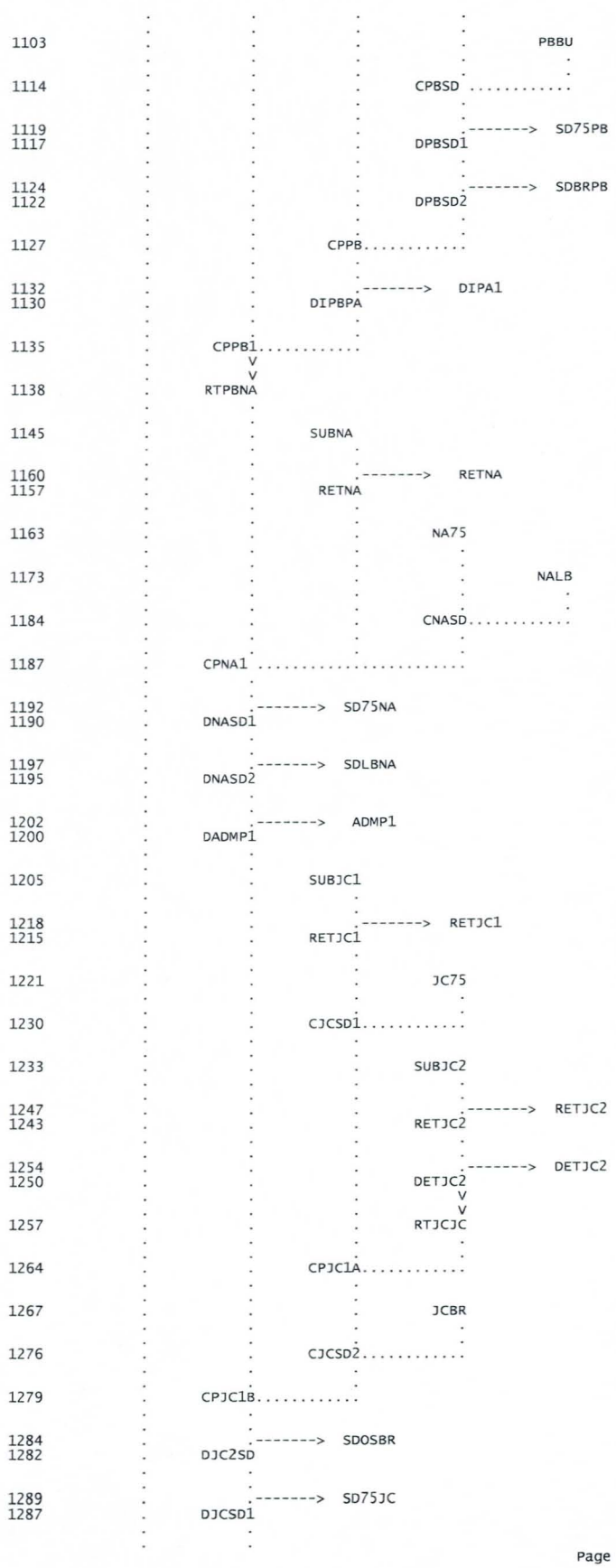
RTQEQC
355
SUBQD
364
362
DIQD
DRQD
365
RTDIQD
372
CPQD
375
RSQD
383
381
DIQB
DIQDQB
386
RTQDQC
393
SUBQC
400
CPQC
405
403
DISR
DIQCR
408
RTQCJI
415
SUBQB
425
423
DIQB
DRQB
426
RTDIQB
432
CPQB
435
RSQB
442
RTQBJH
449
SUBJH
456
CPJH
458
RTJHJI
465
SUBJI
472
CPJI
477
475
DISR1
DISRX
480
SUBPF
491
487
RETPF
RETPF
496
494
DIPF
DRPF
497
RTDIPF
504
@CPPF


507 RSPF
515 DIPE
513 DIPFPE
518 RTPFJF
525 SUBUD
536 RETB1
533 RETU
541 59SD1D
539 SDDRUD
546 DIUA
544 DIUDUA
549 RTUDVA
556 SUBVA
565 DIVA
563 DRVA
566 CPVA1
571 59SD2D
569 SDDRVA
581 DIUC
574 DIVAPE
584 RTVAPE
591 SUBPE
599 DIPE
597 DRPE
600 RTDIPE
607 CPPE
610 RSPE
618 DIPD
616 DIPEPD
621 RTPEJF
628 SUBJF
636 CPJF
639 RTJFJG
646 SUBJG
655 CPJG
658 CPJGSR
663 DIUC
661 DRUC
664 RTVAUC
676 MCUCUC
684 SUBUC
691 @CPUC


694 SUBTB1
706
703 RETB1
711
709 SDDTB1
714 RTUAUC
721 SUBUA
731
729 DRUA
732 RTDIUA
739 @CPUA
744
742 SDDRUA
749
747 DIUAUC
752 RTUAUC
759 ~CPUC2
768
762 DIUCPC
771 RTUCPC
778 SUBPC
784 CPPC
787 RSPC
793 RTPCNB
800 SUBNB
812
809 RETNB
815 CPNB1
818 RTNBJD
825 SUBPD
833
831 DRPD
834 CPPD2
837 RSPD
843 RTPDNC
850 SUBNC
859 CPNC
862 RTNCJE
869 SUBJE1
877 CPJE1
880 RTJEJD
RETB1
67SD1D
DIUA
67SD1D
DITB
DIUB
DIPD


887 SUBJD
899 RETJD
896 RETJD
902 CPJD
907 DIJC2
905 DIJDJC
910 RTJDFC
917 SUBJE2
929 RETJE
926 RETJE2
932 RTJEFC
939 SUBFC
948 CPFC
951 CPFCSR
956 DIUB
954 DRUCUB
957 MCUCUB
965 SUBUB
975 ~@CPUB
978 SUBSF1
993 DITB
991 DRTB
994 RTDITB
1002 CPBA3
1005 SUBTB2
1019 RETTB
1016 RETTB
1024 DITA
1022 DITBTA
1027 RTTBSF
1034 SUSFB2
1043 SUSF2A
1055 RETSF2
1052 RSSF2A
1058 CPSF2B
1061 CPBA3
1064 BSN71
1073 BSN71
1071 DBSN71
1076 SUBPB
1090 RETPB
1087 RETPB
1093 PB75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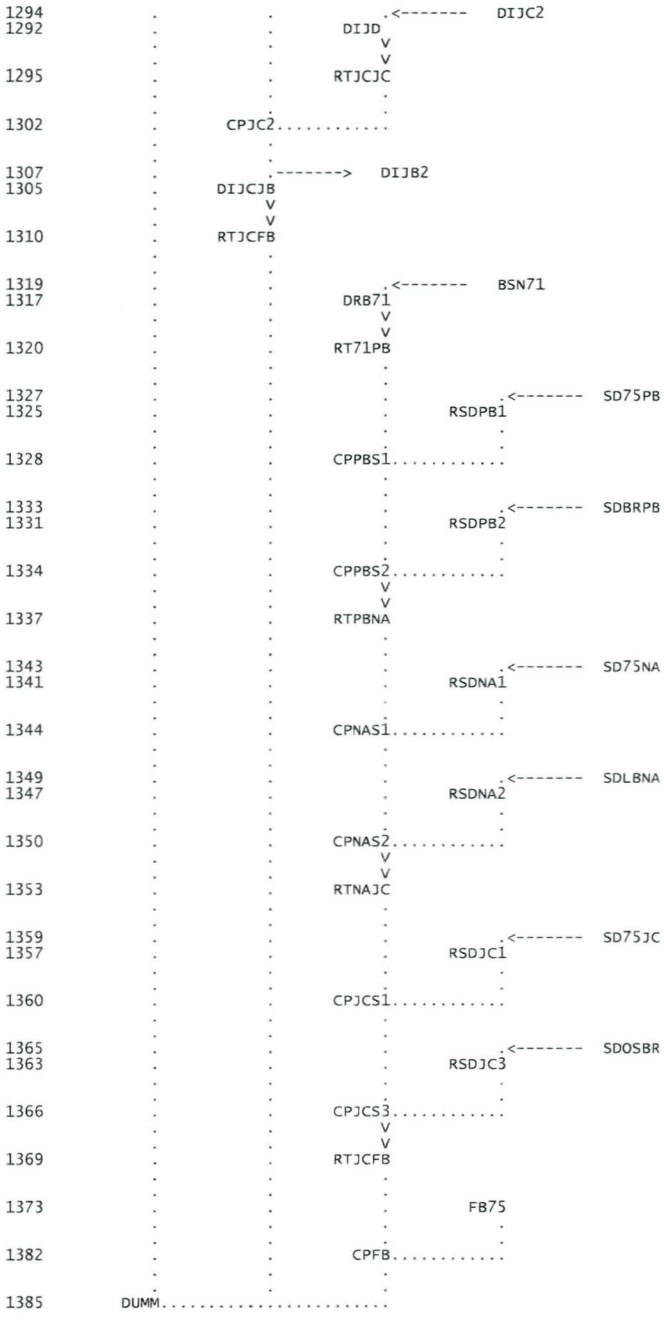
1119 SD75PB
1117 DPBSD1
1124 SDBRPB
1122 DPBSD2
1127 CPPB
1132 DIPA1
1130 DIPBPA
1135 CPPB1
1138 RTPBNA
1145 SUBNA
1160 RETNA
1157
1163 NA75
1173 NALB
1184 CNASD
1187 CPNA1
1192 SD75NA
1190 DNASD1
1197 SDLBNA
1195 DNASD2
1202 ADMP1
1200 DADMP1
1205 SUBJC1
1218 RETJC1
1215
1221 JC75
1230 CJCSD1
1233 SUBJC2
1247 RETJC2
1243 RETJC2
1254 DETJC2
1250 DETJC2
1257 RTJCJC
1264 CPJC1A
1267 JCBR
1276 CJCSD2
1279 CPJC1B
1284 SDOSBR
1282 DJC2SD
1289 SD75JC
1287 DJCSD1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1292
DIJD
1295
RTJCJC
1302
CPJC2
1307
DIJB2
1305
DIJCJB
1310
RTJCFB
1319
BSN71
1317
DRB71
1320
RT71PB
1327
SD75PB
1325
RSDPB1
1328
CPPBS1
1333
SDBRPB
1331
RSDPB2
1334
CPPBS2
1337
RTPBNA
1343
SD75NA
1341
RSDNA1
1344
CPNAS1
1349
SDLBNA
1347
RSDNA2
1350
CPNAS2
1353
RTNAJC
1359
SD75JC
1357
RSDJC1
1360
CPJCS1
1365
SDOSBR
1363
RSDJC3
1366
CPJCS3
1369
RTJCFB
1373
FB75
1382
CPFB
1385
DUMM
1388
SUBSH
1398
RETSH
1396
RETSH
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RSSH
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DIRJ2
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SUBTA
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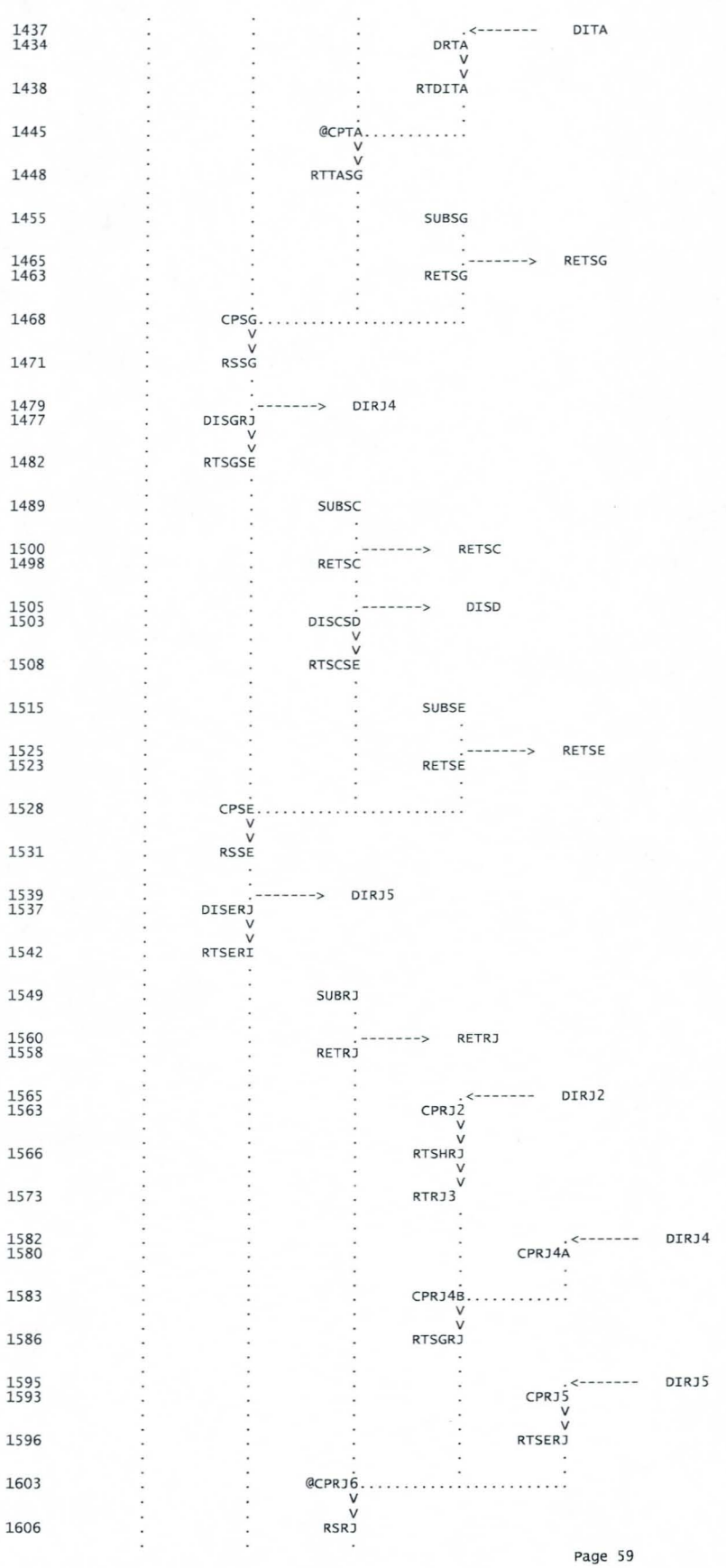
RETTA
1429
RETTA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1434
DITA
DRTA
1438
RTDITA
1445
@CPTA
1448
RTTASG
1455
SUBSG
1465
1463
RETSG
RETSG
1468
CPSG
1471
RSSG
1479
1477
DIRJ4
DISGRJ
1482
RTSGSE
1489
SUBSC
1500
1498
RETSC
RETSC
1505
1503
DISD
DISCSD
1508
RTSCSE
1515
SUBSE
1525
1523
RETSE
RETSE
1528
CPSE
1531
RSSE
1539
1537
DIRJ5
DISERJ
1542
RTSERI
1549
SUBRJ
1560
1558
RETRJ
RETRJ
1565
1563
DIRJ2
CPRJ2
1566
RTSHRJ
1573
RTRJ3
1582
1580
DIRJ4
CPRJ4A
1583
CPRJ4B
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1595
1593
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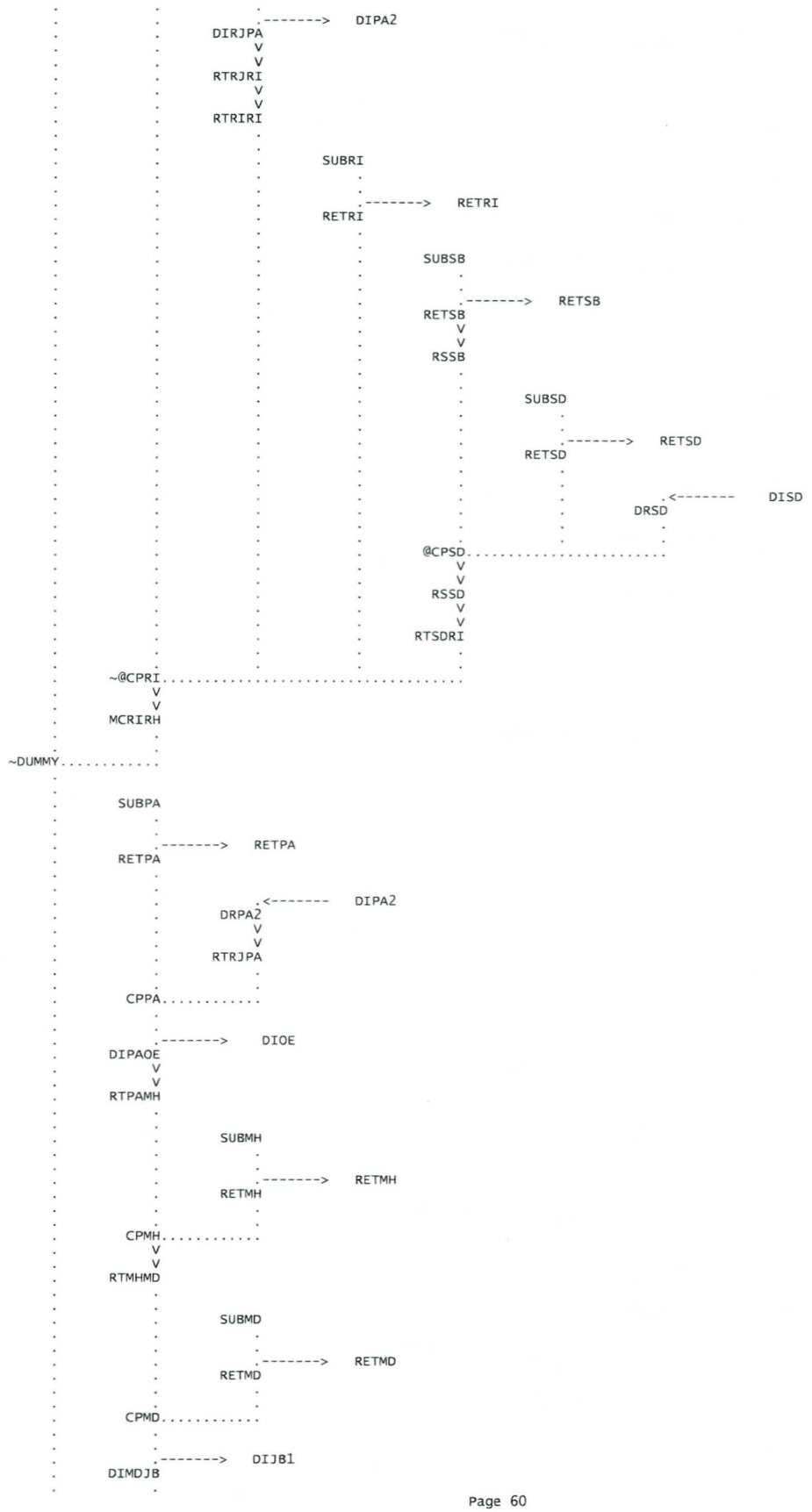
1596
RTSERJ
1603
@CPRJ6
1606
RSRJ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1613 DIRJPA
1618 RTRJRI
1625 RTRIRI
1631 SUBRI
1641
1639 RETRI
1644 SUBSB
1654
1652 RETSB
1657 RSSB
1663 SUBSD
1673
1671 RETSD
1678
1676 DRSD
1679 @CPSD
1683 RSSD
1690 RTSDRI
1697 ~@CPRI
1700 MCRIRH
1707 ~DUMMY
1710 SUBPA
1723
1721 RETPA
1728
1726 DRPA2
1729 RTRJPA
1736 CPPA
1741
1739 DIPAOE
1744 RTPAMH
1751 SUBMH
1765
1763 RETMH
1768 CPMH
1771 RTMHMD
1778 SUBMD
1794
1792 RETMD
1797 CPMD
1802
1800 DIMDJB
DIPA2
RETRI
RETSB
RETSD
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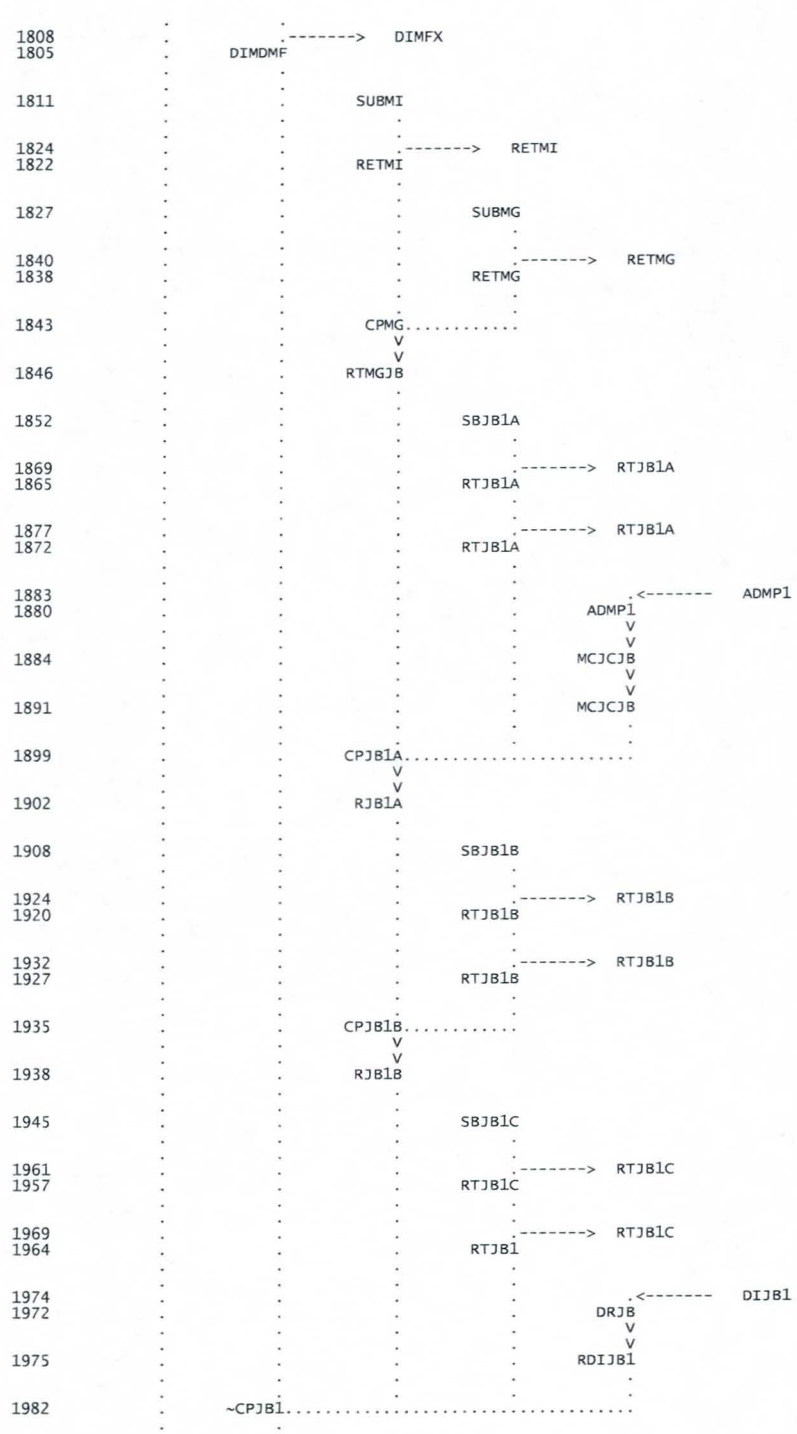
DIPA2
RETPA
RETMH
RETMD
DIJB1
DIOE


1808
1805
DIMDMF
DIMFX
1811
SUBMI
1824
1822
RETMI
RETMI
1827
SUBMG
1840
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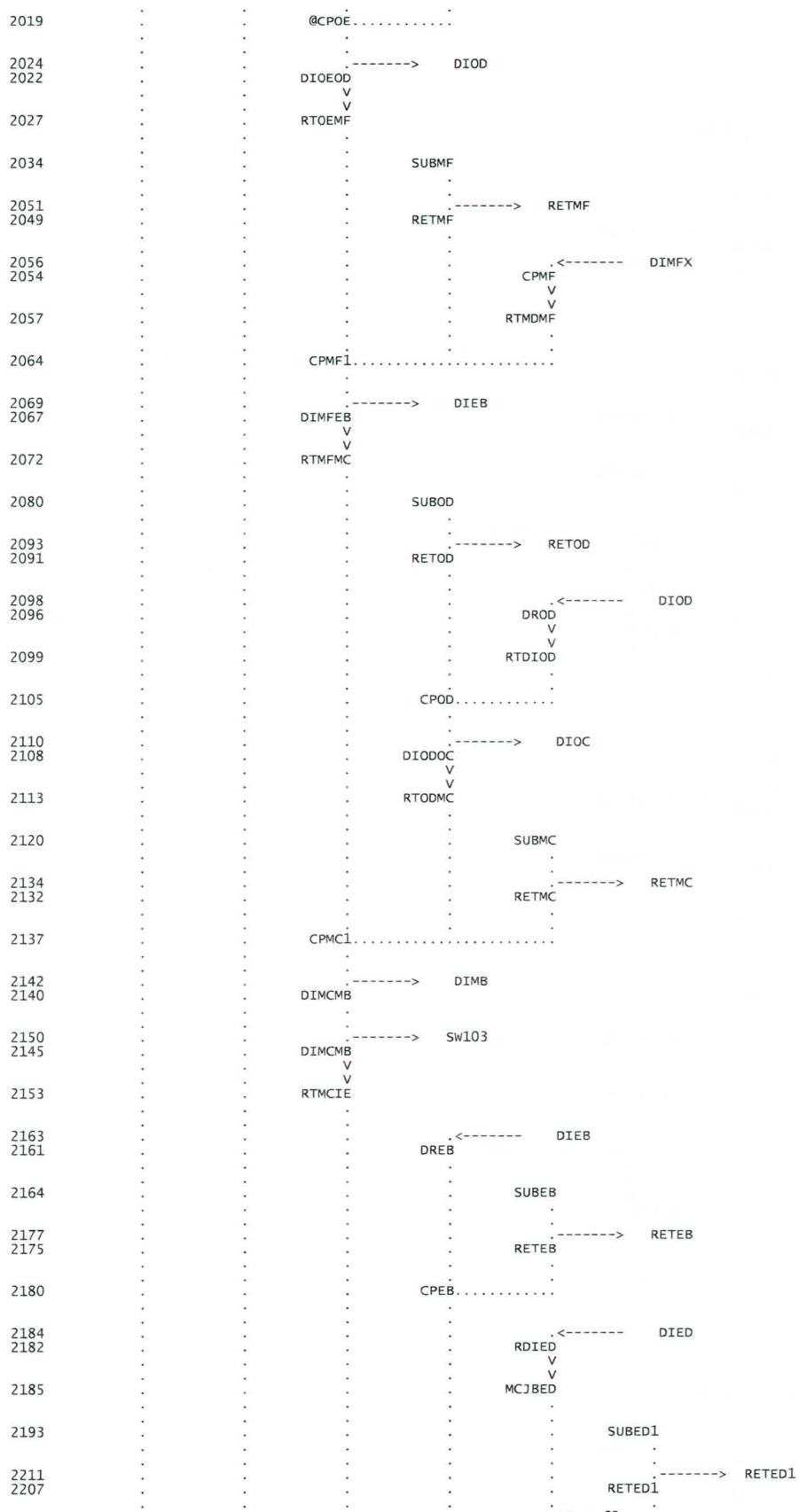
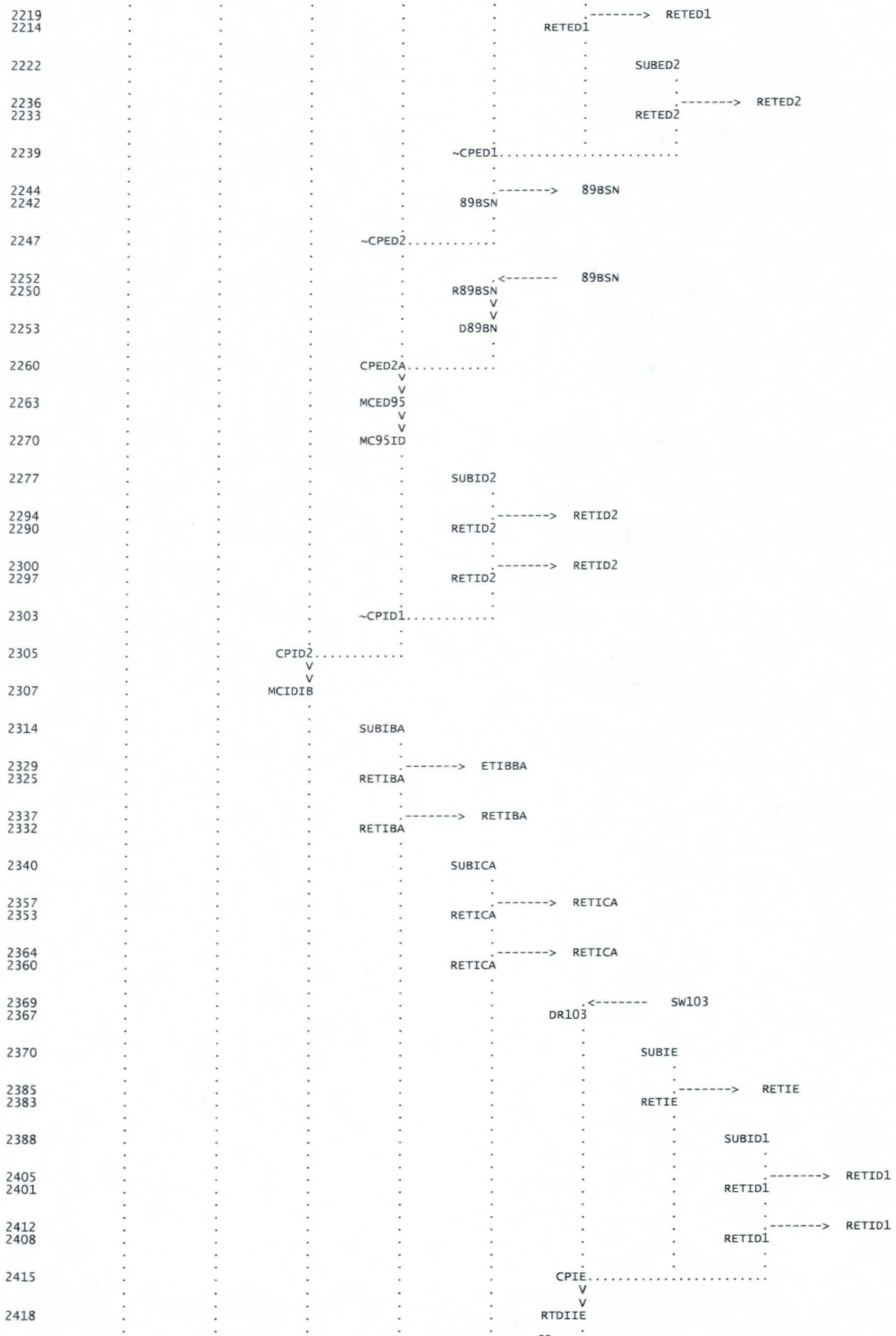
RETMG
1843
CPMG
1846
RTMGJB
1852
SBJB1A
1869
1865
RTJB1A
RTJB1A
1877
1872
RTJB1A
RTJB1A
1883
1880
ADMP1
ADMP1
1884
MCJCJB
1891
MCJCJB
1899
CPJB1A
1902
RJB1A
1908
SBJB1B
1924
1920
RTJB1B
RTJB1B
1932
1927
RTJB1B
RTJB1B
1935
CPJB1B
1938
RJB1B
1945
SBJB1C
1961
1957
RTJB1C
RTJB1C
1969
1964
RTJB1
1974
1972
DRJB
DIJB1
1975
RDIJB1
1982
~CPJB1
1989
1986
DIED
DIED
1992
SUBOE
2006
2004
RETOE
RETOE
2011
2009
CPOE1
DIOE
2012
RTDIOE


2019 @CPOE
2024
2022 DIOEOD
2027 RTOEMF
2034 SUBMF
2051
2049 RETMF
2056
2054 CPMF
2057 RTMDMF
2064 CPMF1
2069
2067 DIMFEB
2072 RTMFMC
2080 SUBOD
2093
2091 RETOD
2098
2096 DROD
2099 RTDIOD
2105 CPOD
2110
2108 DIODOC
2113 RTODMC
2120 SUBMC
2134
2132 RETMC
2137 CPMC1
2142
2140 DIMCMB
2150
2145 DIMCMB
2153 RTMCIE
2163
2161 DREB
2164 SUBEB
2177
2175 RETEB
2180 CPEB
2184
2182 RDIED
2185 MCJBED
2193 SUBED1
2211
2207 RETED1
DIOD
RETMF
DIMFX
DIEB
RETOD
DIOD
DIOC
SW103
DIMB
DIEB
RETMC
RETEB
DIED
RETED1


2219
2214
RETED1
RETED1
2222
SUBED2
2236
2233
RETED2
RETED2
2239
~CPED1
2244
2242
89BSN
89BSN
2247
~CPED2
2252
2250
89BSN
R89BSN
2253
D89BN
2260
CPED2A
2263
MCED95
2270
MC95ID
2277
SUBID2
2294
2290
RETID2
RETID2
2300
2297
RETID2
RETID2
2303
~CPID1
2305
CPID2
2307
MCIDIB
2314
SUBIBA
2329
2325
ETIBBA
RETIBA
2337
2332
RETIBA
RETIBA
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SUBICA
2357
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RETICA
RETICA
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SW103
DR103
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SUBIE
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RETIE
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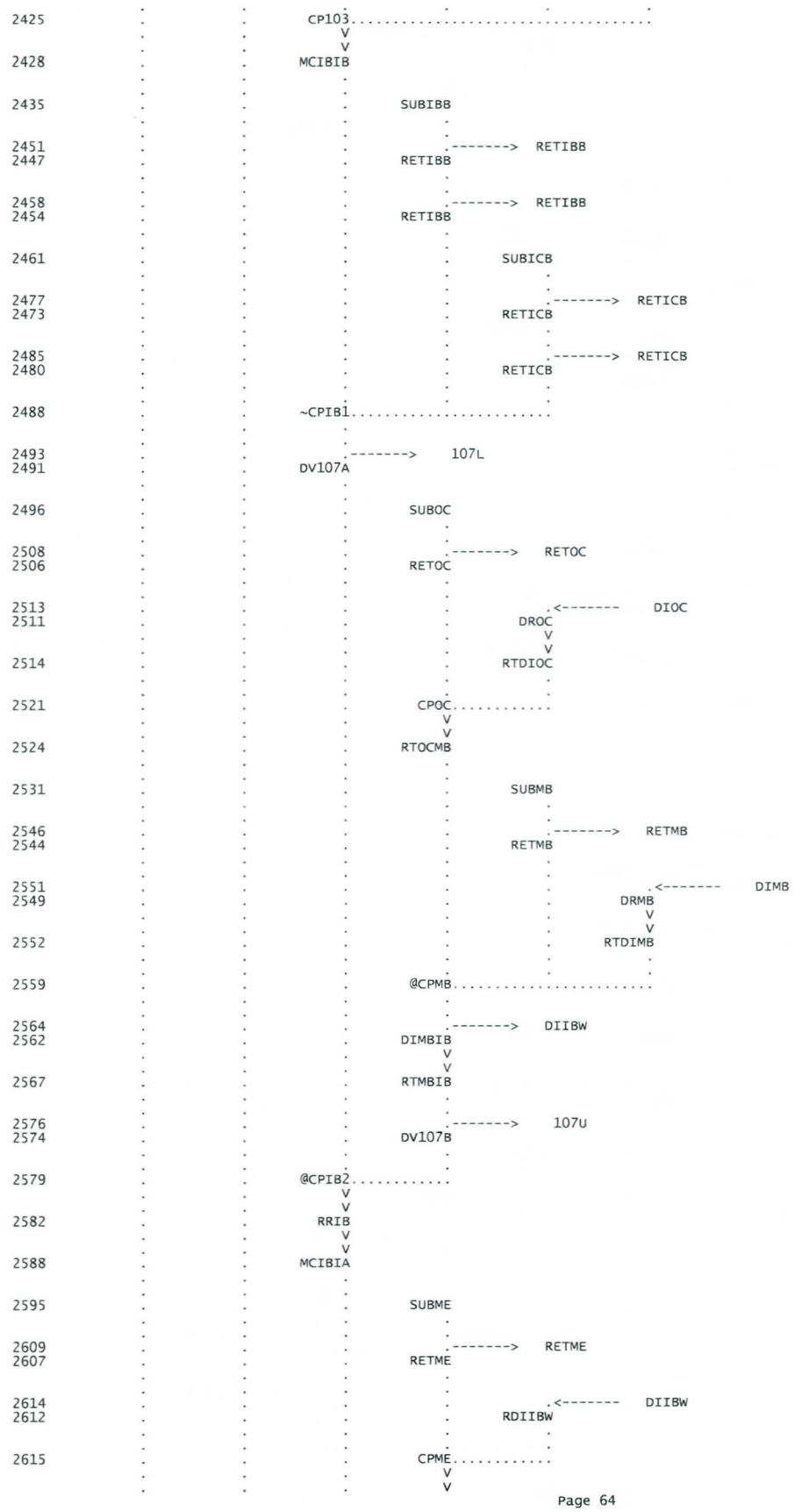
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CP103
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MCIBIB
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2447
RETIBB
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2454
RETIBB
2461
SUBICB
2477
2473
RETICB
2485
2480
RETICB
2488
~CPIB1
2493
2491
DV107A
107L
2496
SUBOC
2508
2506
RETOC
2513
2511
DROC
DIOC
2514
RTDIOC
2521
CPOC
2524
RTOCMB
2531
SUBMB
2546
2544
RETMB
2551
2549
DRMB
DIMB
2552
RTDIMB
2559
@CPMB
2564
2562
DIMBIB
DIIBW
2567
RTMBIB
2576
2574
DV107B
107U
2579
@CPIB2
2582
RRIB
2588
MCIBIA
2595
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2609
2607
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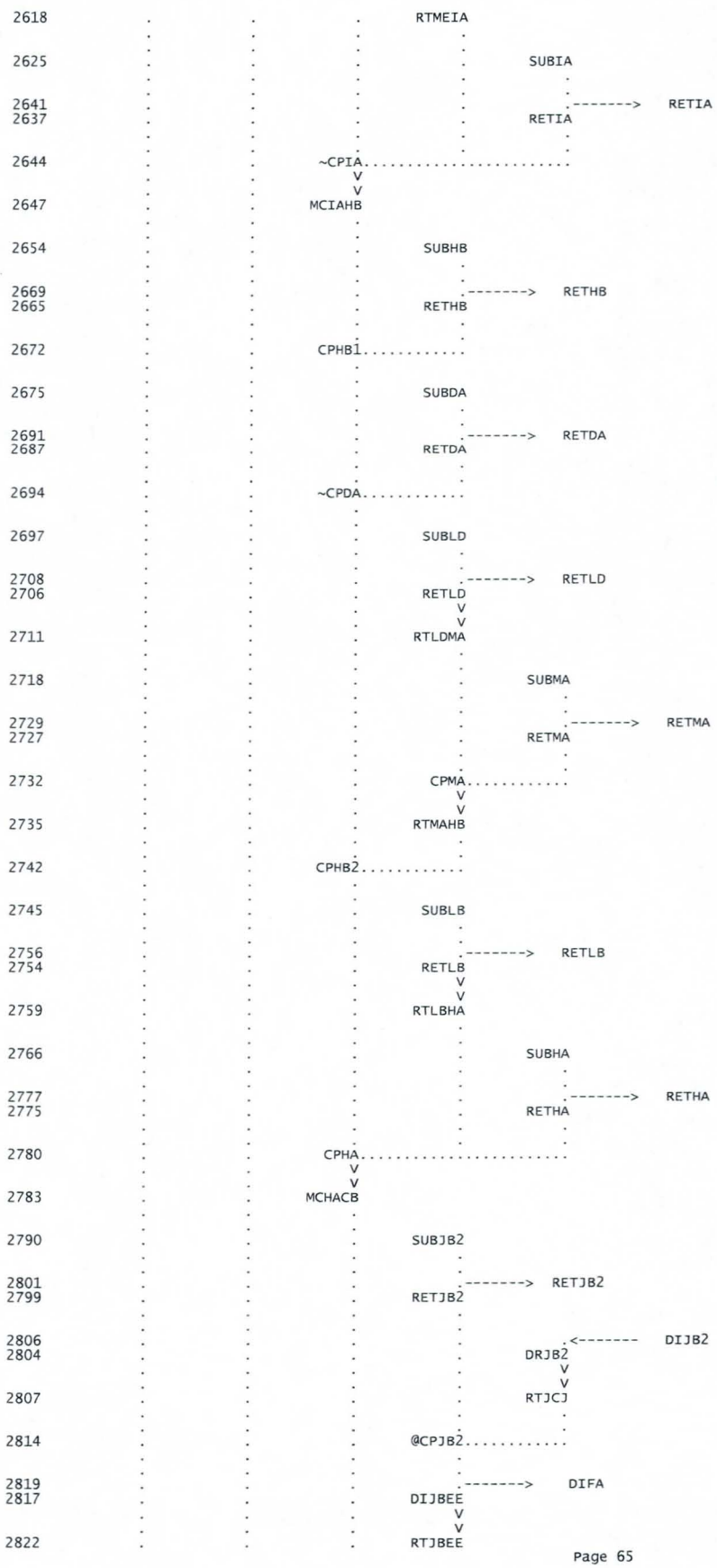
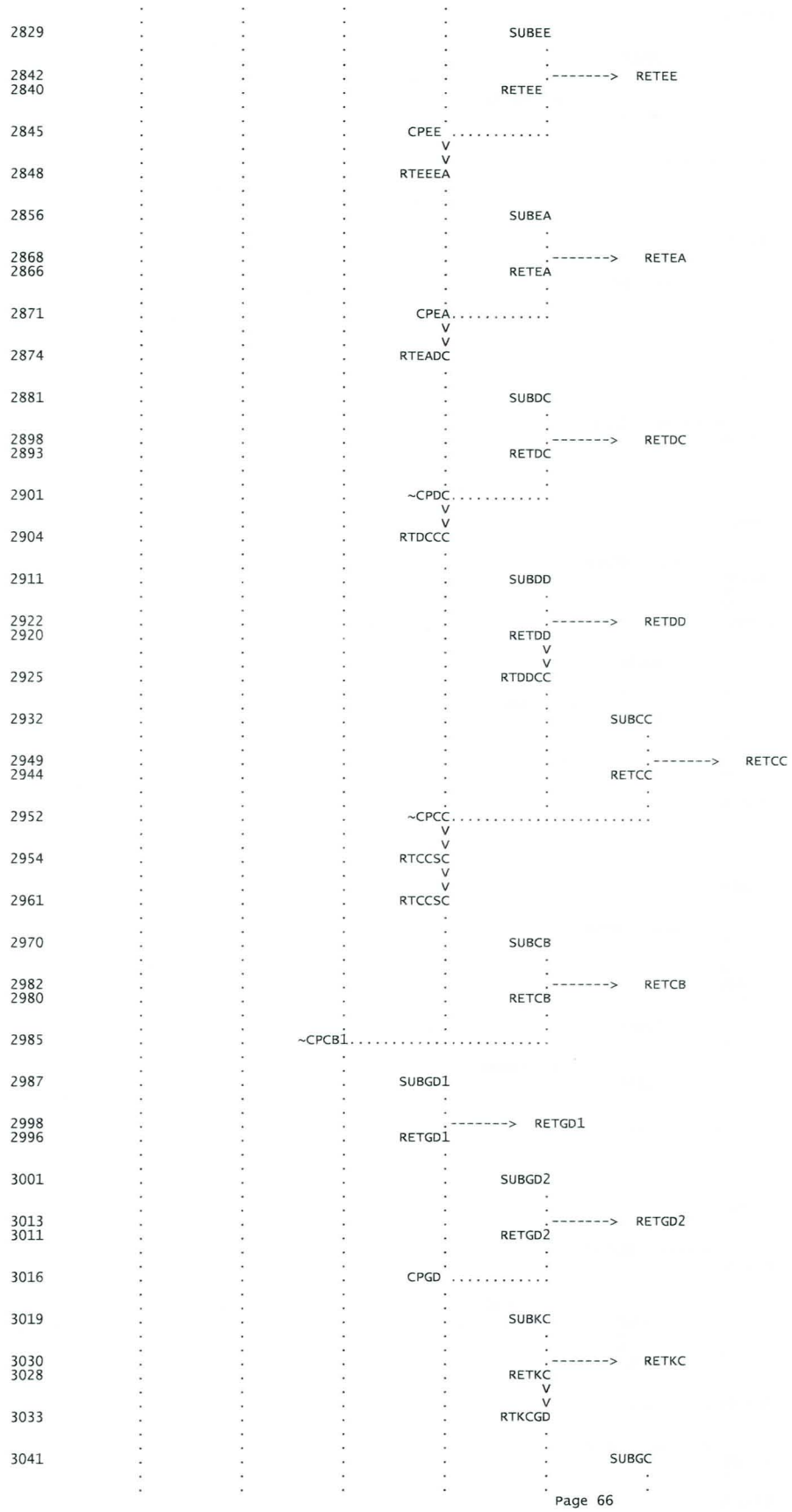
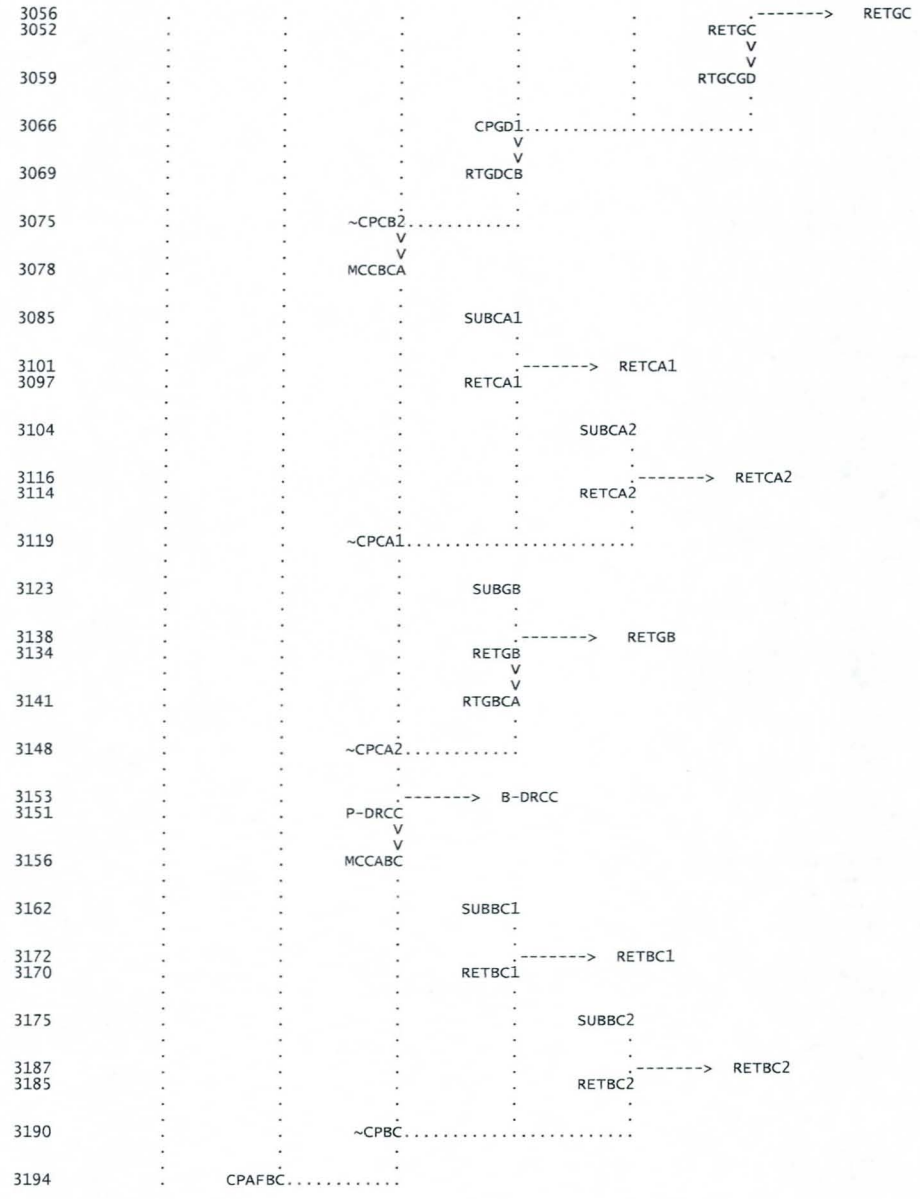
2614
2612
RDIIBW
DIIBW
2615
CPME


2618 RTMEIA
2625 SUBIA
2641 RETIA
2637 RETIA
2644 ~CPIA
2647 MCIAHB
2654 SUBHB
2669 RETHB
2665 RETHB
2672 CPHB1
2675 SUBDA
2691 RETDA
2687 RETDA
2694 ~CPDA
2697 SUBLD
2708 RETLD
2706 RETLD
2711 RTLDMA
2718 SUBMA
2729 RETMA
2727 RETMA
2732 CPMA
2735 RTMAHB
2742 CPHB2
2745 SUBLB
2756 RETLB
2754 RETLB
2759 RTLBHA
2766 SUBHA
2777 RETHA
2775 RETHA
2780 CPHA
2783 MCHACB
2790 SUBJB2
2801 RETJB2
2799 RETJB2
2806 DIJB2
2804 DRJB2
2807 RTJCJ
2814 @CPJB2
2819 DIFA
2817 DIJBEE
2822 RTJBEE


2829 SUBEE
2842
2840 RETEE
RETEE
2845 CPEE
2848 RTEEEA
2856 SUBEA
2868
2866 RETEA
RETEA
2871 CPEA
2874 RTEADC
2881 SUBDC
2898
2893 RETDC
RETDC
2901 ~CPDC
2904 RTDCCC
2911 SUBDD
2922
2920 RETDD
RETDD
2925 RTDDCC
2932 SUBCC
2949
2944 RETCC
RETCC
2952 ~CPCC
2954 RTCCSC
2961 RTCCSC
2970 SUBCB
2982
2980 RETCB
RETCB
2985 ~CPCB1
2987 SUBGD1
2998
2996 RETGD1
RETGD1
3001 SUBGD2
3013
3011 RETGD2
RETGD2
3016 CPGD
3019 SUBKC
3030
3028 RETKC
RETKC
3033 RTKCGD
3041 SUBGC



(***) RUNOFF ALSO COMPUTED AT THIS LOCATION

1**********

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* FLOOD HYDROGRAPH PACKAGE (HEC-1) *

* JUN 1998 *

* VERSION 4.1 *

*

* RUN DATE 17MAR10 TIME 15:09:49 *

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*

* U.S. ARMY CORPS OF ENGINEERS *

* HYDROLOGIC ENGINEERING CENTER *

* 609 SECOND STREET *

* DAVIS, CALIFORNIA 95616 *

* (916) 756-1104 *

*

****

FILE NAME: UFUT6J2S.DAT
100-YEAR 6-HOUR MODEL
J2 ENGINEERING AND ENVIRONMENTAL DESIGN, LLC
THIS FILE IS A MODIFICATION OF ASPEN ENGINEERING FILE REC6.DAT
ADDED EXISTING 100YR-2HOUR RETENTION & MODIFIED FIRST FLUSH RETENTION
TO BASINS JB1, ED1, ID1, ID2, IB & IC

J2 SUBDIVIDED BASINS JB, ED, ID, IC, AND IB ALONG THE PROPOSED DRCC
CORRIDOR INTO BASINS JB1A, JB1B, JB1C, ED1, ED2, ID1, ID2, ICA, ICB,
IBA, & IBB.
GREEN-AMPT SOIL LOSS PARAMETERS LEFT UNCHANGED EXCEPT FOR IA AND RTIMP
FOR SUBBASINS THAT WERE SPLIT.

J2 MODIFIED THE FOLLOWING CHANNEL ROUTES: RTMGJB, MCJCJB, RTMFMC,
RTMCIE, MCJBED, MCED95, MC95ID, MCIDIB, RTDIMB, & MCIBIB

BASINS ADDED AT 107TH AVENUE (OPERATIONS 107U AND 107L)

```
                    ROUTED BASINS ID1 & IE THROUGH COUNTRY PLACE TO 103RD AVENUE OUTFALL
                    **********************************************************************

                    REC6.DAT
                    ASPEN CONSULTING ENGINEERS, JCS and POL, NOV. 9, 2005
                    6-HOUR RAINFALL
                    THIS IS THE SOUTH ALIGNMENT DRCC FROM 75TH AVE TO THE AF.
                    CHANGES MADE TO TOTDUR6.DAT MODEL ARE AS FOLLOWS:

                    THIS IS THE DRCC IN AVONDALE WITH CULVERTS IN PHOENIX MODEL WITH FIRST
                    FLUSH RETENTION IN AVONDALE.

                    SUNLAND CHANNEL INCLUDED AS PART OF PROJECT IMPROVEMENTS.  FIRST FLUSH
                    RETENTION INCLUDED WHERE AVAILABLE.

                    MODIFIED TO REFLECT "SOUTH" DRCC ALIGNMENT.  FUTURE ARTERIAL ROADWAY
                    ROUTING MODIFIED TO FUTURE CONDITIONS.

                    1/2 INCH "FIRST FLUSH" RETENTION WAS USED FOR SUBBASINS DIRECTLY
                    ADJACENT TO THE DRCC IN AVONDALE.

                    INSERTED 99BASIN TO REMODEL THE MULTIUSE BASIN BETWEEN 91ST AND 99TH AVE.

                    RETENTION BASINS ADJACENT TO THE DRCC AND ROUTING FOR THE DRCC IN
                    PHOENIX WERE REPLACED BY MODIFIED PULS ROUTING IN ORDER TO MODEL THE
                    EFFECT OF PLACING 10-YR CULVERTS BETWEEN RETENTION BASINS.  THE CULVERTS
                    WOULD BE PLACED AT 83RD AVE, 91ST AVE, 99TH AVE AND 107TH AVE.
                    CHANNEL ROUTING IN THIS SAME REACH REMOVED 75TH AVENUE TO 107TH

                    ADDED/CHANGED SUBJB2 TO CPEE IN ORDER TO REINSERT SUBJB2 AND DIVERT
                    RETURNS.

                    INSERTED DIBBLE MODEL 1084F6-IMP-R.DAT AFTER CPHA TO CHANGE MODEL TO THE
                    SOUTH DRCC ALIGNMENT.  CHANGED DIBBLE SUBBASINS AND RETENTION TO ASPEN
                    FUTURE LAND USE SUBBASINS AND RETENTION.  CHANGED SUNLAND CHANNEL ROUTING.

                    CHANGED SUBBASINS AND RETENTION TO ACCOUNT FOR EXISTING DEVELOPMENT
                    WITHOUT RETENTION.  ACRES WITHOUT RETENTION: GB 67.5, GC 94.4, HB 83.1,
                    IA 90.8, DA 72.9, CC 19.3, CA1 18.8

                    THE LG AND UI CARDS WERE CHANGED FOR SUBBASINS IDENTIFIED AS
                    CONTRIBUTING TO THE DRCC IN ORDER TO REFLECT FUTURE CONDITIONS LAND USE.
                    VALLEY S-GRAPH WAS USED INSTED OF AGRICULTURAL S-GRAPH.

                    FUTURE LANDUSE 100-YEAR 2-HOUR RETENTION INSERTED AFTER SUBBASINS
                    IDENTIFIED AS CONTRIBUTING TO THE DRCC.  80% OF REQUIRED RETENTION USED.

                    CHANGED SUBGD2 BA CARD FROM 0.739 TO 0.211.
                    TOTDUR6.DAT
                    75th Avenue Storm Drain 100-Year/6-Hour Model, PJE
                    Future Condtion Model
                    DRC #4 Basin Alternative 2, modeled in this run along with
                    16.6 arce foot retention basin in SUBJC2.
                    The base hydrologic model used for this study is the model that was
                    developed for the Durango ADMP recommended design.

                    Regional detention basins that are subject to the project area are sized and
                    analyzed to optimize storage function in order to reduce outfall storm drain
                    and potential channel size.

                    Modifications are made to the original model to reflect changes in watershed
                    charactericts.  Changes in sub-basin boundaries, land use and routing reaches
                    that have occurred since the completion of the Durango ADMP have been
                    incorporated into the model.
                    Changes made to the oringal model inclued:
                    1)  The area defined by the panhandle of Sub-Basin TB is revised to drain to
                    concentration point CPUA.
                    2)  Sub-basin SF is re-delineated to be consistent with drainage improvements
                    constructed as partof the Target Southwest Distribution Center.
                    3)  The 75th Avenue storm drain is evaluated to drain proposed Durango ADMP
                    regional detention facilities thus eliminating the conveyance channel between
                    Basin DRC #4 and Basin DRC #3 and downstream of Basin DRC #3.
                    4)  Street drainage that would be directly intercepted by the 75th Avenue
                    Storm Drain and laterals to the storm drain is modeled.
                    5)  Sub Basin JC is subdevied into Sub-Basin JC1 and Sub-Basin JC2.
                    6) Lag times and s-graphs are developed for future condtions for watersheds
                    that were not alrready built out.
                    7)  The storm drain flow capacity of the 59th Avenue and the 67th Avenue
                    Storm Drains up stream of the Union Pacific Railroad are diverted from their
                    subject watersheds.

100 IO          OUTPUT CONTROL VARIABLES
                      IPRNT          5  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                      QSCAL          0.  HYDROGRAPH PLOT SCALE

    IT          HYDROGRAPH TIME DATA
                       NMIN          2  MINUTES IN COMPUTATION INTERVAL
                      IDATE      9MAR95  STARTING DATE
                      ITIME        1200  STARTING TIME
                         NQ        2000  NUMBER OF HYDROGRAPH ORDINATES
                     NDDATE     12MAR95  ENDING DATE
                     NDTIME        0638  ENDING TIME
                     ICENT           19  CENTURY MARK

                  COMPUTATION INTERVAL      .03 HOURS
                       TOTAL TIME BASE   66.63 HOURS

        ENGLISH UNITS
             DRAINAGE AREA          SQUARE MILES
             PRECIPITATION DEPTH    INCHES
             LENGTH, ELEVATION      FEET
             FLOW                   CUBIC FEET PER SECOND
             STORAGE VOLUME         ACRE-FEET
             SURFACE AREA           ACRES
             TEMPERATURE            DEGREES FAHRENHEIT
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102 JD          INDEX STORM NO. 1
                      STRM        3.23  PRECIPITATION DEPTH
                      TRDA         .01  TRANSPOSITION DRAINAGE AREA

103 PI            PRECIPITATION PATTERN
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
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                .00       .00       .00       .00       .00       .00       .00       .01       .01       .01
                .01       .01       .01       .01       .01       .02       .02       .02       .02       .02
                .02       .02       .04       .06       .06       .06       .06       .06       .06       .06
                .01       .01       .01       .01       .01       .01       .01       .01       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00

106 JD          INDEX STORM NO. 2
                      STRM        3.21  PRECIPITATION DEPTH
                      TRDA         .50  TRANSPOSITION DRAINAGE AREA

  0 PI            PRECIPITATION PATTERN
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
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                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .01       .01       .01
                .01       .01       .01       .01       .01       .02       .02       .02       .02       .02
                .02       .02       .04       .06       .06       .06       .06       .06       .06       .06
                .01       .01       .01       .01       .01       .01       .01       .01       .00       .00
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                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00

107 JD          INDEX STORM NO. 3
                      STRM        3.15  PRECIPITATION DEPTH
                      TRDA        2.80  TRANSPOSITION DRAINAGE AREA

108 PI            PRECIPITATION PATTERN
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
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                .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
                .01       .01       .01       .01       .01       .03       .03       .03       .03       .03
                .03       .03       .03       .03       .03       .03       .03       .03       .03       .03
                .02       .02       .02       .02       .02       .02       .02       .01       .01       .01
                .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
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                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00

111 JD          INDEX STORM NO. 4
                      STRM        3.10  PRECIPITATION DEPTH
                      TRDA        5.00  TRANSPOSITION DRAINAGE AREA

  0 PI            PRECIPITATION PATTERN
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
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                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00

112 JD          INDEX STORM NO. 5
                      STRM        3.04  PRECIPITATION DEPTH
                      TRDA       10.00  TRANSPOSITION DRAINAGE AREA

  0 PI            PRECIPITATION PATTERN
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
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                .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
                .01       .01       .01       .01       .01       .03       .03       .03       .03       .03
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                .02       .02       .02       .02       .02       .02       .02       .01       .01       .01
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113 JD          INDEX STORM NO. 6
                      STRM        2.98  PRECIPITATION DEPTH
                      TRDA       16.00  TRANSPOSITION DRAINAGE AREA

114 PI            PRECIPITATION PATTERN
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
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117 JD          INDEX STORM NO. 7
                      STRM        2.62  PRECIPITATION DEPTH
                      TRDA       90.00  TRANSPOSITION DRAINAGE AREA

118 PI            PRECIPITATION PATTERN
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
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                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00

121 JD          INDEX STORM NO. 8
                      STRM        1.84  PRECIPITATION DEPTH
                      TRDA      500.00  TRANSPOSITION DRAINAGE AREA

122 PI            PRECIPITATION PATTERN
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
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                .00       .00       .00       .00       .00       .00       .00       .00       .00       .00
                .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
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                .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
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                .01       .01       .01       .01       .01       .01       .01       .01       .01       .01
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        WARNING EXCESS AT PONDING LESS THAN ZERO FOR PERIOD. EXCESS SET TO ZERO
        WARNING EXCESS AT PONDING LESS THAN ZERO FOR PERIOD. EXCESS SET TO ZERO
        WARNING EXCESS AT PONDING LESS THAN ZERO FOR PERIOD. EXCESS SET TO ZERO

WARNING --- ROUTED OUTFLOW (   1619.) IS GREATER THAN MAXIMUM OUTFLOW (   1331.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (   1832.) IS GREATER THAN MAXIMUM OUTFLOW (   1331.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (   1853.) IS GREATER THAN MAXIMUM OUTFLOW (   1331.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (   1762.) IS GREATER THAN MAXIMUM OUTFLOW (   1331.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (   1638.) IS GREATER THAN MAXIMUM OUTFLOW (   1331.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (   1530.) IS GREATER THAN MAXIMUM OUTFLOW (   1331.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (   1449.) IS GREATER THAN MAXIMUM OUTFLOW (   1331.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (   1372.) IS GREATER THAN MAXIMUM OUTFLOW (   1331.) IN STORAGE-OUTFLOW TABLE

WARNING --- ROUTED OUTFLOW (   1371.) IS GREATER THAN MAXIMUM OUTFLOW (   1331.) IN STORAGE-OUTFLOW TABLE
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WARNING --- ROUTED OUTFLOW (1704.) IS GREATER THAN MAXIMUM OUTFLOW (1331.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (1834.) IS GREATER THAN MAXIMUM OUTFLOW (1331.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (1809.) IS GREATER THAN MAXIMUM OUTFLOW (1331.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (1707.) IS GREATER THAN MAXIMUM OUTFLOW (1331.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (1592.) IS GREATER THAN MAXIMUM OUTFLOW (1331.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (1496.) IS GREATER THAN MAXIMUM OUTFLOW (1331.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (1415.) IS GREATER THAN MAXIMUM OUTFLOW (1331.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (1331.) IS GREATER THAN MAXIMUM OUTFLOW (1331.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (1508.) IS GREATER THAN MAXIMUM OUTFLOW (1331.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (1752.) IS GREATER THAN MAXIMUM OUTFLOW (1331.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (1817.) IS GREATER THAN MAXIMUM OUTFLOW (1331.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (1761.) IS GREATER THAN MAXIMUM OUTFLOW (1331.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (1656.) IS GREATER THAN MAXIMUM OUTFLOW (1331.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (1551.) IS GREATER THAN MAXIMUM OUTFLOW (1331.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (1461.) IS GREATER THAN MAXIMUM OUTFLOW (1331.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (1379.) IS GREATER THAN MAXIMUM OUTFLOW (1331.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (1607.) IS GREATER THAN MAXIMUM OUTFLOW (1331.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (1774.) IS GREATER THAN MAXIMUM OUTFLOW (1331.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (1788.) IS GREATER THAN MAXIMUM OUTFLOW (1331.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (1714.) IS GREATER THAN MAXIMUM OUTFLOW (1331.) IN STORAGE-OUTFLOW TABLE
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WARNING --- ROUTED OUTFLOW (1573.) IS GREATER THAN MAXIMUM OUTFLOW (1331.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (1531.) IS GREATER THAN MAXIMUM OUTFLOW (1331.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (1461.) IS GREATER THAN MAXIMUM OUTFLOW (1331.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (1380.) IS GREATER THAN MAXIMUM OUTFLOW (1331.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (1499.) IS GREATER THAN MAXIMUM OUTFLOW (1331.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (1562.) IS GREATER THAN MAXIMUM OUTFLOW (1331.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (1553.) IS GREATER THAN MAXIMUM OUTFLOW (1331.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (1500.) IS GREATER THAN MAXIMUM OUTFLOW (1331.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (1425.) IS GREATER THAN MAXIMUM OUTFLOW (1331.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (1344.) IS GREATER THAN MAXIMUM OUTFLOW (1331.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (1398.) IS GREATER THAN MAXIMUM OUTFLOW (1331.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (1522.) IS GREATER THAN MAXIMUM OUTFLOW (1331.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (1555.) IS GREATER THAN MAXIMUM OUTFLOW (1331.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (1528.) IS GREATER THAN MAXIMUM OUTFLOW (1331.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (1467.) IS GREATER THAN MAXIMUM OUTFLOW (1331.) IN STORAGE-OUTFLOW TABLE
WARNING --- ROUTED OUTFLOW (1390.) IS GREATER THAN MAXIMUM OUTFLOW (1331.) IN STORAGE-OUTFLOW TABLE
WARNING EXCESS AT PONDING LESS THAN ZERO FOR PERIOD. EXCESS SET TO ZERO

1

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

	OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
+	HYDROGRAPH AT	SUBWD	410.	4.13	34.	9.	3.	.39		
+	ROUTED TO	RTWDXA	332.	4.37	34.	9.	3.	.39		
+	HYDROGRAPH AT	SUBXA	341.	4.03	28.	7.	3.	.25		
+	2 COMBINED AT	CPXA1	374.	4.33	62.	16.	6.	.64		
+	DIVERSION TO	DIZZ1	0.	.00	0.	0.	0.	.64		
+	HYDROGRAPH AT	DIXAO	374.	4.33	62.	16.	6.	.64		
+	ROUTED TO	RTXAWC	331.	4.87	61.	16.	6.	.64		
+	HYDROGRAPH AT	SUBWB	729.	4.10	74.	18.	7.	.67		
+	ROUTED TO	RTWBWC	622.	4.30	73.	18.	7.	.67		

+	HYDROGRAPH AT	SUBWC	586.	4.10	55.	14.	5.	.49
+	3 COMBINED AT	CPWC	828.	4.20	182.	46.	17.	1.76
+	DIVERSION TO	DIQE	0.	.00	0.	0.	0.	1.76
+	HYDROGRAPH AT	DIWCWA	828.	4.20	182.	46.	17.	1.76
+	ROUTED TO	RTWCWA	262.	8.87	167.	46.	17.	1.76
+	HYDROGRAPH AT	SUBWA	692.	4.03	57.	14.	5.	.49
+	2 COMBINED AT	CPWA1	452.	4.03	167.	60.	22.	2.04
+	HYDROGRAPH AT	SUBVD	752.	4.10	77.	19.	7.	.70
+	ROUTED TO	RTVDWA	665.	4.20	76.	19.	7.	.70
+	2 COMBINED AT	CPWA2	770.	4.07	191.	78.	28.	2.73
+	DIVERSION TO	DIQD	345.	4.07	31.	8.	3.	2.73
+	HYDROGRAPH AT	DIWAVC	425.	4.07	163.	70.	25.	2.73
+	ROUTED TO	RTWAVC	196.	13.97	153.	70.	25.	2.73
+	HYDROGRAPH AT	SUBVC	684.	4.03	56.	14.	5.	.49
+	2 COMBINED AT	CPVC1	405.	4.03	153.	84.	30.	2.24
+	HYDROGRAPH AT	SUBVB	912.	4.03	81.	20.	7.	.72
+	ROUTED TO	RTVBVC	752.	4.10	81.	20.	7.	.72
+	2 COMBINED AT	CPVC2	825.	4.07	197.	103.	37.	2.96
+	DIVERSION TO	DIVA	32.	4.30	8.	4.	1.	2.96
+	HYDROGRAPH AT	DIVCQA	795.	4.07	189.	100.	36.	2.96
+	ROUTED TO	RTVCQA	687.	4.23	184.	100.	36.	2.96
+	HYDROGRAPH AT	SUBQA	525.	4.13	50.	12.	4.	.49
+	2 COMBINED AT	CPQA2	984.	4.20	225.	111.	40.	3.41
+	ROUTED TO	RSQA	914.	4.33	222.	111.	40.	3.41
+	DIVERSION TO	DIPF	376.	4.33	100.	53.	19.	3.41
+	HYDROGRAPH AT	DIQAPF	538.	4.33	122.	58.	21.	3.41
+	ROUTED TO	RTQAJH	468.	4.97	118.	58.	21.	3.41
+	HYDROGRAPH AT	SUBQE	975.	4.07	110.	28.	10.	.91
+	HYDROGRAPH AT	DRQE	0.	.00	0.	0.	0.	1.76
+	ROUTED TO	RTDIQE	0.	.00	0.	0.	0.	1.76
+	2 COMBINED AT	CPQE	975.	4.07	110.	28.	10.	1.12
+	ROUTED TO	RSQE	664.	4.23	88.	23.	8.	1.12
+	ROUTED TO	RTQEQC	555.	4.47	88.	23.	8.	1.12
+	HYDROGRAPH AT	SUBQD	350.	4.03	31.	8.	3.	.25
+	HYDROGRAPH AT	DRQD	345.	4.07	31.	8.	3.	2.73
+	ROUTED TO	RTDIQD	266.	4.43	31.	8.	3.	2.73

+	2 COMBINED AT	CPQD	470.	4.33	68.	18.	6.	1.23
+	ROUTED TO	RSQD	421.	4.43	63.	16.	6.	1.23
+	DIVERSION TO	DIQB	99.	4.40	10.	3.	1.	1.23
+	HYDROGRAPH AT	DIQDQB	324.	4.43	53.	14.	5.	1.23
+	ROUTED TO	RTQDQC	281.	4.57	53.	14.	5.	1.23
+	HYDROGRAPH AT	SUBQC	722.	4.07	67.	17.	6.	.61
+	3 COMBINED AT	CPQC	831.	4.43	196.	51.	18.	2.65
+	DIVERSION TO	DISR	665.	4.43	157.	41.	15.	2.65
+	HYDROGRAPH AT	DIQCR	166.	4.43	39.	10.	4.	2.65
+	ROUTED TO	RTQCJI	96.	6.67	37.	10.	4.	2.65
+	HYDROGRAPH AT	SUBQB	564.	4.13	56.	14.	5.	.50
+	HYDROGRAPH AT	DRQB	99.	4.40	10.	3.	1.	1.23
+	ROUTED TO	RTDIQB	54.	5.37	10.	3.	1.	1.23
+	2 COMBINED AT	CPQB	564.	4.13	68.	17.	6.	.82
+	ROUTED TO	RSQB	181.	4.43	45.	12.	4.	.82
+	ROUTED TO	RTQBJH	109.	5.80	42.	12.	4.	.82
+	HYDROGRAPH AT	SUBJH	668.	4.07	55.	14.	5.	.52
+	4 COMBINED AT	CPJH	491.	4.93	217.	92.	33.	3.98
+	ROUTED TO	RTJHJI	415.	5.90	211.	92.	33.	3.98
+	HYDROGRAPH AT	SUBJI	434.	4.03	33.	8.	3.	.31
+	2 COMBINED AT	CPJI	420.	5.90	219.	99.	36.	4.29
+	DIVERSION TO	DISR1	420.	5.90	219.	99.	36.	4.29
+	HYDROGRAPH AT	DISRX	0.	.00	0.	0.	0.	4.29
+	HYDROGRAPH AT	SUBPF	710.	4.00	57.	14.	5.	.50
+	DIVERSION TO	RETPF	74.	3.43	6.	2.	1.	.50
+	HYDROGRAPH AT	RETPF	710.	4.00	50.	13.	5.	.50
+	HYDROGRAPH AT	DRPF	376.	4.33	100.	53.	19.	3.41
+	ROUTED TO	RTDIPF	350.	4.80	98.	53.	19.	3.41
+	2 COMBINED AT	@CPPF	709.	4.00	139.	65.	24.	1.80
+	ROUTED TO	RSPF	189.	5.40	82.	50.	18.	1.80
+	DIVERSION TO	DIPE	0.	.00	0.	0.	0.	1.80
+	HYDROGRAPH AT	DIPFPE	189.	5.40	82.	50.	18.	1.80
+	ROUTED TO	RTPFJF	176.	5.93	80.	50.	18.	1.80
+	HYDROGRAPH AT	SUBUD	992.	4.00	90.	23.	8.	.75
+	DIVERSION TO	RETB1	992.	4.00	78.	20.	7.	.75
	HYDROGRAPH AT							

+		RETU	197.	4.17	12.	3.	1.	.75
+	DIVERSION TO	59SD1D	78.	4.17	10.	2.	1.	.75
+	HYDROGRAPH AT	SDDRUD	119.	4.17	2.	1.	0.	.75
+	DIVERSION TO	DIUA	30.	4.17	1.	0.	0.	.75
+	HYDROGRAPH AT	DIUDUA	89.	4.17	2.	0.	0.	.75
+	ROUTED TO	RTUDVA	12.	4.33	2.	0.	0.	.75
+	HYDROGRAPH AT	SUBVA	692.	4.03	58.	15.	5.	.49
+	HYDROGRAPH AT	DRVA	32.	4.30	8.	4.	1.	2.96
+	3 COMBINED AT	CPVA1	692.	4.03	65.	18.	7.	1.10
+	DIVERSION TO	59SD2D	59.	3.40	23.	8.	3.	1.10
+	HYDROGRAPH AT	SDDRVA	515.	4.03	41.	10.	4.	1.10
+	DIVERSION TO	DIUC	470.	4.03	40.	10.	4.	1.10
+	HYDROGRAPH AT	DIVAPE	45.	4.03	1.	0.	0.	1.10
+	ROUTED TO	RTVAPE	11.	4.27	1.	0.	0.	1.10
+	HYDROGRAPH AT	SUBPE	706.	4.00	55.	14.	5.	.50
+	HYDROGRAPH AT	DRPE	0.	.00	0.	0.	0.	1.80
+	ROUTED TO	RTDIPE	0.	.00	0.	0.	0.	1.80
+	3 COMBINED AT	CPPE	706.	4.00	57.	14.	5.	.73
+	ROUTED TO	RSPE	120.	4.23	21.	6.	2.	.73
+	DIVERSION TO	DIPD	0.	.00	0.	0.	0.	.73
+	HYDROGRAPH AT	DIPEPD	120.	4.23	21.	6.	2.	.73
+	ROUTED TO	RTPEJF	75.	4.53	21.	6.	2.	.73
+	HYDROGRAPH AT	SUBJF	727.	4.00	58.	14.	5.	.50
+	3 COMBINED AT	CPJF	371.	4.00	123.	67.	25.	2.95
+	ROUTED TO	RTJFJG	296.	4.23	119.	67.	25.	2.95
+	HYDROGRAPH AT	SUBJG	1034.	4.03	102.	25.	9.	.90
+	2 COMBINED AT	CPJG	861.	4.03	204.	90.	34.	3.85
+	2 COMBINED AT	CPJGSR	861.	4.03	204.	90.	34.	3.85
+	HYDROGRAPH AT	DRUC	470.	4.03	40.	10.	4.	1.10
+	ROUTED TO	RTVAUC	105.	6.40	40.	10.	4.	1.10
+	ROUTED TO	MCUCUC	104.	6.53	40.	10.	4.	1.10
+	HYDROGRAPH AT	SUBUC	590.	4.07	51.	13.	5.	.48
+	2 COMBINED AT	@CPUC	505.	4.07	87.	23.	8.	.89
+	HYDROGRAPH AT	SUBTB1	203.	4.00	15.	4.	1.	.14
+	DIVERSION TO	RETB1	203.	4.00	15.	4.	1.	.14
+	HYDROGRAPH AT	RETB1	0.	.00	0.	0.	0.	.14

+	DIVERSION TO	67SD1D	0.	.00	0.	0.	0.	.14
+	HYDROGRAPH AT	SDDTB1	0.	.00	0.	0.	0.	.14
+	ROUTED TO	RTUAUC	0.	.00	0.	0.	0.	.14
+	HYDROGRAPH AT	SUBUA	591.	4.13	58.	14.	5.	.56
+	HYDROGRAPH AT	DRUA	30.	4.17	1.	0.	0.	.75
+	ROUTED TO	RTDIUA	2.	5.27	1.	0.	0.	.75
+	3 COMBINED AT	@CPUA	591.	4.13	58.	15.	5.	.89
+	DIVERSION TO	67SD1D	96.	3.67	24.	6.	2.	.89
+	HYDROGRAPH AT	SDDRUA	431.	4.13	33.	8.	3.	.89
+	DIVERSION TO	DITB	86.	4.13	7.	2.	1.	.89
+	HYDROGRAPH AT	DIUAUC	345.	4.13	27.	7.	2.	.89
+	ROUTED TO	RTUAUC	286.	4.30	27.	7.	2.	.89
+	2 COMBINED AT	~CPUC2	595.	4.17	112.	29.	10.	1.25
+	DIVERSION TO	DIUB	595.	4.17	112.	29.	10.	1.25
+	HYDROGRAPH AT	DIUCPC	0.	.00	0.	0.	0.	1.25
+	ROUTED TO	RTUCPC	0.	.00	0.	0.	0.	1.25
+	HYDROGRAPH AT	SUBPC	439.	4.00	34.	8.	3.	.30
+	2 COMBINED AT	CPPC	439.	4.00	34.	8.	3.	.30
+	ROUTED TO	RSPC	5.	.00	5.	5.	5.	.30
+	ROUTED TO	RTPCNB	5.	.00	5.	5.	5.	.30
+	HYDROGRAPH AT	SUBNB	617.	4.00	40.	10.	4.	.44
+	DIVERSION TO	RETNB	617.	4.00	40.	10.	4.	.44
+	HYDROGRAPH AT	RETNB	0.	.00	0.	0.	0.	.44
+	2 COMBINED AT	CPNB1	5.	.00	5.	5.	5.	.74
+	ROUTED TO	RTNBJD	5.	.00	5.	5.	5.	.74
+	HYDROGRAPH AT	SUBPD	628.	4.00	45.	11.	4.	.44
+	HYDROGRAPH AT	DRPD	0.	.00	0.	0.	0.	.73
+	2 COMBINED AT	CPPD2	628.	4.00	45.	11.	4.	.44
+	ROUTED TO	RSPD	0.	.00	0.	0.	0.	.44
+	ROUTED TO	RTPDNC	0.	.00	0.	0.	0.	.44
+	HYDROGRAPH AT	SUBNC	406.	4.00	31.	8.	3.	.31
+	2 COMBINED AT	CPNC	358.	4.00	30.	7.	3.	.75
+	ROUTED TO	RTNCJE	176.	4.77	29.	7.	3.	.75
+	HYDROGRAPH AT	SUBJE1	350.	4.00	26.	7.	2.	.25
+	2 COMBINED AT	CPJE1	284.	4.00	53.	14.	5.	1.00
+	ROUTED TO	RTJEJD	268.	4.07	53.	14.	5.	1.00

+	HYDROGRAPH AT	SUBJD	723.	4.00	50.	13.	5.	.51
+	DIVERSION TO	RETJD	723.	4.00	50.	13.	5.	.51
+	HYDROGRAPH AT	RETJD	0.	.00	0.	0.	0.	.51
+	3 COMBINED AT	CPJD	268.	4.07	58.	19.	10.	2.25
+	DIVERSION TO	DIJC2	73.	4.07	21.	7.	4.	2.25
+	HYDROGRAPH AT	DIJDJC	124.	4.07	35.	12.	6.	2.25
+	ROUTED TO	RTJDFC	81.	5.20	35.	12.	6.	2.25
+	HYDROGRAPH AT	SUBJE2	369.	4.00	29.	7.	3.	.25
+	DIVERSION TO	RETJE	167.	3.80	9.	2.	1.	.25
+	HYDROGRAPH AT	RETJE2	369.	4.00	20.	5.	2.	.25
+	ROUTED TO	RTJEFC	184.	4.33	20.	5.	2.	.25
+	HYDROGRAPH AT	SUBFC	502.	4.00	40.	10.	4.	.36
+	3 COMBINED AT	CPFC	372.	4.03	92.	26.	11.	2.03
+	2 COMBINED AT	CPFCSR	1164.	4.03	288.	114.	44.	5.88
+	HYDROGRAPH AT	DRUCUB	595.	4.17	112.	29.	10.	1.25
+	ROUTED TO	MCUCUB	585.	4.20	112.	29.	10.	1.25
+	HYDROGRAPH AT	SUBUB	184.	4.03	15.	4.	1.	.14
+	2 COMBINED AT	~@CPUB	666.	4.17	125.	32.	12.	1.39
+	HYDROGRAPH AT	SUBSF1	120.	4.13	11.	3.	1.	.13
+	HYDROGRAPH AT	DRTB	86.	4.13	7.	2.	1.	.89
+	ROUTED TO	RTDITB	80.	4.33	7.	2.	1.	.89
+	3 COMBINED AT	CPBA3	767.	4.17	140.	36.	13.	1.61
+	HYDROGRAPH AT	SUBTB2	705.	4.20	89.	22.	8.	.75
+	DIVERSION TO	RETTB	618.	4.07	40.	10.	4.	.75
+	HYDROGRAPH AT	RETTB	705.	4.20	50.	12.	4.	.75
+	DIVERSION TO	DITA	171.	4.20	12.	3.	1.	.75
+	HYDROGRAPH AT	DITBTA	534.	4.20	37.	9.	3.	.75
+	ROUTED TO	RTTBSF	449.	4.40	37.	9.	3.	.75
+	HYDROGRAPH AT	SUSFB2	162.	4.00	13.	3.	1.	.11
+	HYDROGRAPH AT	SUSF2A	209.	4.00	18.	5.	2.	.14
+	DIVERSION TO	RETSF2	209.	4.00	18.	5.	2.	.14
+	HYDROGRAPH AT	RSSF2A	0.	.00	0.	0.	0.	.14
+	3 COMBINED AT	CPSF2B	451.	4.40	49.	12.	4.	.81
+	2 COMBINED AT	CPBA3	906.	4.37	184.	47.	17.	2.42
+	ROUTED TO	BSN71	76.	7.43	75.	47.	17.	2.42
	DIVERSION TO							

+	BSN71	76.	7.43	75.	47.	17.	2.42
+ HYDROGRAPH AT	DBSN71	0.	.00	0.	0.	0.	2.42
+ HYDROGRAPH AT	SUBPB	1149.	4.13	121.	30.	11.	.41
+ DIVERSION TO	RETPB	1149.	4.13	87.	22.	8.	.41
+ HYDROGRAPH AT	RETPB	873.	4.27	35.	9.	3.	.41
+ HYDROGRAPH AT	PB75	36.	4.03	3.	1.	0.	.01
+ HYDROGRAPH AT	PBBU	59.	4.10	6.	2.	1.	.02
+ 2 COMBINED AT	CPBSD	91.	4.07	10.	2.	1.	.03
+ DIVERSION TO	SD75PB	23.	3.67	6.	1.	1.	.03
+ HYDROGRAPH AT	DPBSD1	68.	4.07	4.	1.	0.	.03
+ DIVERSION TO	SDBRPB	39.	3.93	3.	1.	0.	.03
+ HYDROGRAPH AT	DPBSD2	29.	4.07	1.	0.	0.	.03
+ 2 COMBINED AT	CPPB	873.	4.27	36.	9.	3.	.42
+ DIVERSION TO	DIPA1	166.	4.27	7.	2.	1.	.42
+ HYDROGRAPH AT	DIPBPA	707.	4.27	29.	7.	3.	.42
+ 2 COMBINED AT	CPPB1	707.	4.27	29.	7.	3.	.34
+ ROUTED TO	RTPBNA	301.	4.67	29.	7.	3.	.34
+ HYDROGRAPH AT	SUBNA	1927.	4.23	267.	67.	24.	.94
+ DIVERSION TO	RETNA	1927.	4.23	181.	45.	16.	.94
+ HYDROGRAPH AT	RETNA	1265.	4.47	87.	22.	8.	.94
+ HYDROGRAPH AT	NA75	63.	4.07	7.	2.	1.	.02
+ HYDROGRAPH AT	NALB	58.	4.10	6.	2.	1.	.02
+ 2 COMBINED AT	CNASD	121.	4.10	13.	3.	1.	.04
+ 3 COMBINED AT	CPNA1	1263.	4.47	124.	31.	11.	1.32
+ DIVERSION TO	SD75NA	40.	3.77	23.	6.	2.	1.32
+ HYDROGRAPH AT	DNASD1	1223.	4.47	101.	25.	9.	1.32
+ DIVERSION TO	SDLBNA	38.	4.47	14.	4.	1.	1.32
+ HYDROGRAPH AT	DNASD2	1185.	4.47	86.	22.	8.	1.32
+ DIVERSION TO	ADMP1	1112.	4.47	72.	18.	6.	1.32
+ HYDROGRAPH AT	DADMP1	73.	4.47	15.	4.	1.	1.32
+ HYDROGRAPH AT	SUBJC1	644.	4.03	48.	12.	4.	.47
+ DIVERSION TO	RETJC1	644.	4.03	48.	12.	4.	.47
+ HYDROGRAPH AT	RETJC1	0.	.00	0.	0.	0.	.47
+ HYDROGRAPH AT	JC75	32.	4.00	3.	1.	0.	.02
+ 2 COMBINED AT	CJCSD1	32.	4.00	3.	1.	0.	.49
+ HYDROGRAPH AT	SUBJC2	644.	4.03	42.	10.	4.	.48

+	DIVERSION TO	RETJC2	644.	4.03	40.	10.	4.	.48
+	HYDROGRAPH AT	RETJC2	89.	4.30	2.	0.	0.	.48
+	DIVERSION TO	DETJC2	89.	4.30	2.	0.	0.	.48
+	HYDROGRAPH AT	DETJC2	0.	.00	0.	0.	0.	.48
+	ROUTED TO	RTJCJC	0.	.00	0.	0.	0.	.48
+	2 COMBINED AT	CPJC1A	32.	4.00	3.	1.	0.	.97
+	HYDROGRAPH AT	JCBR	32.	4.00	3.	1.	0.	.02
+	2 COMBINED AT	CJCSD2	51.	4.00	5.	1.	0.	.99
+	2 COMBINED AT	CPJC1B	78.	4.47	20.	5.	2.	.99
+	DIVERSION TO	SDOSBR	41.	4.47	14.	3.	1.	.99
+	HYDROGRAPH AT	DJC2SD	37.	4.47	6.	2.	1.	.99
+	DIVERSION TO	SD75JC	37.	4.47	6.	2.	1.	.99
+	HYDROGRAPH AT	DJCSD1	7.	4.03	0.	0.	0.	.99
+	HYDROGRAPH AT	DIJD	73.	4.07	21.	7.	4.	2.25
+	ROUTED TO	RTJCJC	43.	5.83	21.	7.	4.	2.25
+	2 COMBINED AT	CPJC2	47.	5.57	22.	7.	4.	1.08
+	DIVERSION TO	DIJB2	22.	5.57	10.	3.	2.	1.08
+	HYDROGRAPH AT	DIJCJB	25.	5.57	11.	4.	2.	1.08
+	ROUTED TO	RTJCFB	23.	6.43	11.	4.	2.	1.08
+	HYDROGRAPH AT	DRB71	76.	7.43	75.	47.	17.	2.42
+	ROUTED TO	RT71PB	76.	7.50	75.	47.	17.	2.42
+	HYDROGRAPH AT	RSDPB1	23.	3.67	6.	1.	1.	.03
+	2 COMBINED AT	CPPBS1	88.	4.50	77.	49.	18.	2.44
+	HYDROGRAPH AT	RSDPB2	39.	3.93	3.	1.	0.	.03
+	2 COMBINED AT	CPPBS2	108.	4.10	80.	50.	18.	2.44
+	ROUTED TO	RTPBNA	108.	4.17	80.	50.	18.	2.44
+	HYDROGRAPH AT	RSDNA1	40.	3.77	23.	6.	2.	1.32
+	2 COMBINED AT	CPNAS1	147.	4.17	101.	55.	20.	3.10
+	HYDROGRAPH AT	RSDNA2	38.	4.47	14.	4.	1.	1.32
+	2 COMBINED AT	CPNAS2	177.	4.10	115.	59.	21.	3.43
+	ROUTED TO	RTNAJC	177.	4.17	115.	59.	21.	3.43
+	HYDROGRAPH AT	RSDJC1	37.	4.47	6.	2.	1.	.99
+	2 COMBINED AT	CPJCS1	211.	4.53	121.	60.	22.	3.67
+	HYDROGRAPH AT	RSDJC3	41.	4.47	14.	3.	1.	.99
+	2 COMBINED AT	CPJCS3	251.	4.53	134.	63.	23.	4.17
+	ROUTED TO	RTJCFB	251.	4.60	134.	63.	23.	4.17

+	HYDROGRAPH AT	FB75	27.	4.00	2.	1.	0.	.02
+	2 COMBINED AT	CPFB	254.	4.60	136.	64.	23.	4.19
+	3 COMBINED AT	DUMM	1300.	4.07	417.	175.	67.	10.65
+	HYDROGRAPH AT	SUBSH	153.	4.00	12.	3.	1.	.10
+	DIVERSION TO	RETSH	153.	4.00	12.	3.	1.	.10
+	HYDROGRAPH AT	RETSH	0.	.00	0.	0.	0.	.10
+	ROUTED TO	RSSH	0.	.00	0.	0.	0.	.10
+	DIVERSION TO	DIRJ2	0.	.00	0.	0.	0.	.10
+	HYDROGRAPH AT	DISHRJ	0.	.00	0.	0.	0.	.10
+	ROUTED TO	RTSHSG	0.	.00	0.	0.	0.	.10
+	HYDROGRAPH AT	SUBTA	346.	4.00	27.	7.	2.	.24
+	DIVERSION TO	RETTA	346.	4.00	27.	7.	2.	.24
+	HYDROGRAPH AT	RETTA	0.	.00	0.	0.	0.	.24
+	HYDROGRAPH AT	DRTA	171.	4.20	12.	3.	1.	.75
+	ROUTED TO	RTDITA	73.	5.03	12.	3.	1.	.75
+	2 COMBINED AT	@CPTA	77.	5.00	12.	3.	1.	.43
+	ROUTED TO	RTTASG	63.	5.30	12.	3.	1.	.43
+	HYDROGRAPH AT	SUBSG	198.	4.00	16.	4.	1.	.14
+	DIVERSION TO	RETSG	198.	4.00	16.	4.	1.	.14
+	HYDROGRAPH AT	RETSG	0.	.00	0.	0.	0.	.14
+	3 COMBINED AT	CPSG	63.	5.30	12.	3.	1.	.59
+	ROUTED TO	RSSG	0.	.00	0.	0.	0.	.59
+	DIVERSION TO	DIRJ4	0.	.00	0.	0.	0.	.59
+	HYDROGRAPH AT	DISGRJ	0.	.00	0.	0.	0.	.59
+	ROUTED TO	RTSGSE	0.	.00	0.	0.	0.	.59
+	HYDROGRAPH AT	SUBSC	596.	4.03	49.	12.	4.	.45
+	DIVERSION TO	RETSC	596.	4.03	49.	12.	4.	.45
+	HYDROGRAPH AT	RETSC	0.	.00	0.	0.	0.	.45
+	DIVERSION TO	DISD	0.	.00	0.	0.	0.	.45
+	HYDROGRAPH AT	DISCSD	0.	.00	0.	0.	0.	.45
+	ROUTED TO	RTSCSE	0.	.00	0.	0.	0.	.45
+	HYDROGRAPH AT	SUBSE	177.	4.00	13.	3.	1.	.13
+	DIVERSION TO	RETSE	177.	4.00	13.	3.	1.	.13
+	HYDROGRAPH AT	RETSE	0.	.00	0.	0.	0.	.13
+	3 COMBINED AT	CPSE	0.	.00	0.	0.	0.	.65
	ROUTED TO							

+		RSSE	3.	.00	3.	3.	3.	.65
+	DIVERSION TO	DIRJ5	3.	.00	3.	3.	3.	.65
+	HYDROGRAPH AT	DISERJ	0.	.00	0.	0.	0.	.65
+	ROUTED TO	RTSERI	0.	.00	0.	0.	0.	.65
+	HYDROGRAPH AT	SUBRJ	229.	4.00	19.	5.	2.	.16
+	DIVERSION TO	RETRJ	229.	4.00	19.	5.	2.	.16
+	HYDROGRAPH AT	RETRJ	0.	.00	0.	0.	0.	.16
+	HYDROGRAPH AT	CPRJ2	0.	.00	0.	0.	0.	.10
+	ROUTED TO	RTSHRJ	0.	.00	0.	0.	0.	.10
+	ROUTED TO	RTRJ3	0.	.00	0.	0.	0.	.10
+	HYDROGRAPH AT	CPRJ4A	0.	.00	0.	0.	0.	.59
+	2 COMBINED AT	CPRJ4B	0.	.00	0.	0.	0.	.35
+	ROUTED TO	RTSGRJ	0.	.00	0.	0.	0.	.35
+	HYDROGRAPH AT	CPRJ5	3.	.00	3.	3.	3.	.65
+	ROUTED TO	RTSERJ	3.	.00	3.	3.	3.	.65
+	3 COMBINED AT	@CPRJ6	3.	.00	3.	3.	3.	1.16
+	ROUTED TO	RSRJ	3.	21.40	3.	3.	2.	1.16
+	DIVERSION TO	DIPA2	0.	.00	0.	0.	0.	1.16
+	HYDROGRAPH AT	DIRJPA	3.	21.40	3.	3.	2.	1.16
+	ROUTED TO	RTRJRI	3.	22.40	3.	3.	2.	1.16
+	ROUTED TO	RTRIRI	3.	22.87	3.	3.	2.	1.16
+	HYDROGRAPH AT	SUBRI	341.	4.00	27.	7.	2.	.23
+	DIVERSION TO	RETRI	341.	4.00	27.	7.	2.	.23
+	HYDROGRAPH AT	RETRI	0.	.00	0.	0.	0.	.23
+	HYDROGRAPH AT	SUBSB	249.	4.00	20.	5.	2.	.17
+	DIVERSION TO	RETSB	249.	4.00	20.	5.	2.	.17
+	HYDROGRAPH AT	RETSB	0.	.00	0.	0.	0.	.17
+	ROUTED TO	RSSB	0.	.00	0.	0.	0.	.17
+	HYDROGRAPH AT	SUBSD	242.	4.00	19.	5.	2.	.17
+	DIVERSION TO	RETSD	242.	4.00	19.	5.	2.	.17
+	HYDROGRAPH AT	RETSD	0.	.00	0.	0.	0.	.17
+	HYDROGRAPH AT	DRSD	0.	.00	0.	0.	0.	.45
+	3 COMBINED AT	@CPSD	0.	.00	0.	0.	0.	.58
+	ROUTED TO	RSSD	0.	.00	0.	0.	0.	.58
+	ROUTED TO	RTSDRI	0.	.00	0.	0.	0.	.58
+	4 COMBINED AT	~@CPRI	3.	22.87	3.	3.	2.	1.81

+	ROUTED TO	MCRIRH	3.	24.43	3.	3.	2.	1.81
+	2 COMBINED AT	~DUMMY	1299.	4.07	417.	176.	69.	12.46
+	HYDROGRAPH AT	SUBPA	1158.	4.20	136.	34.	12.	.48
+	DIVERSION TO	RETPA	1158.	4.20	96.	24.	9.	.48
+	HYDROGRAPH AT	RETPA	854.	4.37	40.	10.	4.	.48
+	HYDROGRAPH AT	DRPA2	0.	.00	0.	0.	0.	1.16
+	ROUTED TO	RTRJPA	0.	.00	0.	0.	0.	1.16
+	2 COMBINED AT	CPPA	856.	4.37	40.	10.	4.	.64
+	DIVERSION TO	DIOE	132.	4.37	7.	2.	1.	.64
+	HYDROGRAPH AT	DIPAOE	600.	4.37	32.	8.	3.	.64
+	ROUTED TO	RTPAMH	328.	4.63	32.	8.	3.	.64
+	HYDROGRAPH AT	SUBMH	516.	4.30	62.	16.	6.	.24
+	DIVERSION TO	RETMH	516.	4.30	40.	10.	4.	.24
+	HYDROGRAPH AT	RETMH	456.	4.40	22.	6.	2.	.24
+	2 COMBINED AT	CPMH	490.	4.60	53.	13.	5.	.77
+	ROUTED TO	RTMHMD	403.	4.83	53.	13.	5.	.77
+	HYDROGRAPH AT	SUBMD	431.	4.50	68.	17.	6.	.25
+	DIVERSION TO	RETMD	431.	4.50	43.	11.	4.	.25
+	HYDROGRAPH AT	RETMD	388.	4.63	26.	6.	2.	.25
+	2 COMBINED AT	CPMD	604.	4.80	76.	19.	7.	1.02
+	DIVERSION TO	DIJB1	123.	4.80	16.	4.	1.	1.02
+	HYDROGRAPH AT	DIMDJB	481.	4.80	61.	15.	5.	1.02
+	DIVERSION TO	DIMFX	481.	4.80	61.	15.	5.	1.02
+	HYDROGRAPH AT	DIMDMF	0.	.00	0.	0.	0.	1.02
+	HYDROGRAPH AT	SUBMI	959.	4.23	109.	27.	10.	.41
+	DIVERSION TO	RETMI	959.	4.23	71.	18.	6.	.41
+	HYDROGRAPH AT	RETMI	857.	4.33	38.	10.	3.	.41
+	HYDROGRAPH AT	SUBMG	198.	4.20	22.	5.	2.	.08
+	DIVERSION TO	RETMG	198.	4.20	15.	4.	1.	.08
+	HYDROGRAPH AT	RETMG	161.	4.33	7.	2.	1.	.08
+	2 COMBINED AT	CPMG	1017.	4.33	45.	11.	4.	.49
+	ROUTED TO	RTMGJB	738.	4.57	45.	11.	4.	.49
+	HYDROGRAPH AT	SBJB1A	293.	4.37	42.	11.	4.	.15
+	DIVERSION TO	RTJB1A	7.	1.17	1.	0.	0.	.15
+	HYDROGRAPH AT	RTJB1A	293.	4.37	42.	10.	4.	.15
+	DIVERSION TO	RTJB1A	291.	4.33	22.	6.	2.	.15

+	HYDROGRAPH AT	RTJB1A	290.	4.40	20.	5.	2.	.15
+	HYDROGRAPH AT	ADMP1	1112.	4.47	72.	18.	6.	1.32
+	ROUTED TO	MCJCJB	853.	4.63	72.	18.	6.	1.32
+	ROUTED TO	MCJCJB	794.	4.77	72.	18.	6.	1.32
+	3 COMBINED AT	CPJB1A	1361.	4.70	136.	34.	12.	.97
+	ROUTED TO	RJB1A	1311.	4.80	136.	34.	12.	.97
+	HYDROGRAPH AT	SBJB1B	235.	4.20	26.	6.	2.	.10
+	DIVERSION TO	RTJB1B	6.	3.10	2.	0.	0.	.10
+	HYDROGRAPH AT	RTJB1B	235.	4.20	24.	6.	2.	.10
+	DIVERSION TO	RTJB1B	194.	4.07	9.	2.	1.	.10
+	HYDROGRAPH AT	RTJB1B	235.	4.20	15.	4.	1.	.10
+	2 COMBINED AT	CPJB1B	1317.	4.80	149.	37.	13.	1.07
+	ROUTED TO	RJB1B	1223.	4.93	149.	37.	13.	1.07
+	HYDROGRAPH AT	SBJB1C	496.	4.30	59.	15.	5.	.25
+	DIVERSION TO	RTJB1C	8.	2.60	2.	1.	0.	.25
+	HYDROGRAPH AT	RTJB1C	496.	4.30	57.	14.	5.	.25
+	DIVERSION TO	RTJB1C	496.	4.27	30.	7.	3.	.25
+	HYDROGRAPH AT	RTJB1	488.	4.33	27.	7.	2.	.25
+	HYDROGRAPH AT	DRJB	123.	4.80	16.	4.	1.	1.02
+	ROUTED TO	RDIJB1	100.	5.20	16.	4.	1.	1.02
+	4 COMBINED AT	~CPJB1	1274.	4.97	182.	46.	16.	1.54
+	DIVERSION TO	DIED	1274.	4.97	182.	46.	16.	1.54
+	HYDROGRAPH AT	DIED	0.	.00	0.	0.	0.	1.54
+	HYDROGRAPH AT	SUBOE	1108.	4.20	128.	32.	12.	.47
+	DIVERSION TO	RETOE	1108.	4.20	95.	24.	9.	.47
+	HYDROGRAPH AT	RETOE	697.	4.40	33.	8.	3.	.47
+	HYDROGRAPH AT	CPOE1	132.	4.37	7.	2.	1.	.64
+	ROUTED TO	RTDIOE	33.	5.67	7.	2.	1.	.64
+	2 COMBINED AT	@CPOE	697.	4.40	41.	10.	4.	.58
+	DIVERSION TO	DIOD	104.	4.40	7.	2.	1.	.58
+	HYDROGRAPH AT	DIOEOD	533.	4.40	33.	8.	3.	.58
+	ROUTED TO	RTOEMF	220.	4.90	33.	8.	3.	.58
+	HYDROGRAPH AT	SUBMF	1382.	4.57	245.	62.	22.	.97
+	DIVERSION TO	RETMF	1382.	4.57	162.	40.	15.	.97
+	HYDROGRAPH AT	RETMF	951.	4.83	84.	21.	8.	.97
	HYDROGRAPH AT							

+		CPMF	481.	4.80	61.	15.	5.	1.02
+	ROUTED TO	RTMDMF	354.	5.37	61.	15.	5.	1.02
+	3 COMBINED AT	CPMF1	947.	4.87	163.	41.	15.	2.25
+	DIVERSION TO	DIEB	438.	4.87	76.	19.	7.	2.25
+	HYDROGRAPH AT	DIMFEB	510.	4.87	87.	22.	8.	2.25
+	ROUTED TO	RTMFMC	382.	5.40	87.	22.	8.	2.25
+	HYDROGRAPH AT	SUBOD	1264.	4.20	150.	38.	14.	.51
+	DIVERSION TO	RETOD	1264.	4.20	128.	32.	12.	.51
+	HYDROGRAPH AT	RETOD	433.	4.53	22.	5.	2.	.51
+	HYDROGRAPH AT	DROD	104.	4.40	7.	2.	1.	.58
+	ROUTED TO	RTDIOD	35.	5.00	7.	2.	1.	.58
+	2 COMBINED AT	CPOD	427.	4.53	28.	7.	3.	.61
+	DIVERSION TO	DIOC	70.	4.53	5.	1.	0.	.61
+	HYDROGRAPH AT	DIODOC	318.	4.53	23.	6.	2.	.61
+	ROUTED TO	RTODMC	116.	5.17	23.	6.	2.	.61
+	HYDROGRAPH AT	SUBMC	1824.	4.33	291.	73.	26.	1.00
+	DIVERSION TO	RETMC	1824.	4.33	192.	48.	17.	1.00
+	HYDROGRAPH AT	RETMC	1323.	4.57	100.	25.	9.	1.00
+	3 COMBINED AT	CPMC1	1213.	4.57	198.	50.	18.	2.69
+	DIVERSION TO	DIMB	534.	4.57	87.	22.	8.	2.69
+	HYDROGRAPH AT	DIMCMB	679.	4.57	111.	28.	10.	2.69
+	DIVERSION TO	SW103	679.	4.57	111.	28.	10.	2.69
+	HYDROGRAPH AT	DIMCMB	0.	.00	0.	0.	0.	2.69
+	ROUTED TO	RTMCIE	0.	.00	0.	0.	0.	2.69
+	HYDROGRAPH AT	DREB	438.	4.87	76.	19.	7.	2.25
+	HYDROGRAPH AT	SUBEB	309.	4.23	32.	8.	3.	.14
+	DIVERSION TO	RETEB	309.	4.23	23.	6.	2.	.14
+	HYDROGRAPH AT	RETEB	233.	4.37	9.	2.	1.	.14
+	2 COMBINED AT	CPEB	513.	4.87	88.	22.	8.	1.20
+	HYDROGRAPH AT	RDIED	1274.	4.97	182.	46.	16.	1.54
+	ROUTED TO	MCJBED	1083.	5.40	181.	46.	16.	1.54
+	HYDROGRAPH AT	SUBED1	546.	4.53	84.	21.	8.	.38
+	DIVERSION TO	RETED1	8.	1.77	1.	0.	0.	.38
+	HYDROGRAPH AT	RETED1	546.	4.53	83.	21.	7.	.38
+	DIVERSION TO	RETED1	546.	4.53	53.	13.	5.	.38
+	HYDROGRAPH AT	RETED1	436.	4.70	30.	7.	3.	.38

+	HYDROGRAPH AT	SUBED2	218.	4.27	22.	5.	2.	.11
+	DIVERSION TO	RETED2	127.	4.03	5.	1.	0.	.11
+	HYDROGRAPH AT	RETED2	218.	4.27	17.	4.	2.	.11
+	3 COMBINED AT	~CPED1	1131.	5.40	211.	53.	19.	2.06
+	DIVERSION TO	89BSN	851.	5.40	112.	28.	10.	2.06
+	HYDROGRAPH AT	89BSN	280.	5.40	99.	25.	9.	2.06
+	2 COMBINED AT	~CPED2	626.	5.37	176.	44.	16.	3.26
+	HYDROGRAPH AT	R89BSN	851.	5.40	112.	28.	10.	2.06
+	ROUTED TO	D89BN	5.	6.73	5.	4.	3.	2.06
+	2 COMBINED AT	CPED2A	626.	5.37	179.	48.	19.	3.26
+	ROUTED TO	MCED95	591.	5.57	177.	48.	19.	3.26
+	ROUTED TO	MC95ID	577.	5.73	176.	48.	19.	3.26
+	HYDROGRAPH AT	SUBID2	563.	4.43	77.	19.	7.	.36
+	DIVERSION TO	RETID2	209.	4.00	11.	3.	1.	.36
+	HYDROGRAPH AT	RETID2	563.	4.43	66.	16.	6.	.36
+	DIVERSION TO	RETID2	547.	4.37	25.	6.	2.	.36
+	HYDROGRAPH AT	RETID2	563.	4.43	41.	10.	4.	.36
+	2 COMBINED AT	~CPID1	586.	5.73	205.	55.	21.	3.62
+	2 COMBINED AT	CPID2	586.	5.73	205.	55.	21.	3.62
+	ROUTED TO	MCIDIB	578.	5.83	203.	55.	21.	3.62
+	HYDROGRAPH AT	SUBIBA	546.	4.23	65.	16.	6.	.24
+	DIVERSION TO	ETIBBA	7.	1.07	1.	0.	0.	.24
+	HYDROGRAPH AT	RETIBA	546.	4.23	64.	16.	6.	.24
+	DIVERSION TO	RETIBA	405.	4.07	20.	5.	2.	.24
+	HYDROGRAPH AT	RETIBA	546.	4.23	44.	11.	4.	.24
+	HYDROGRAPH AT	SUBICA	400.	4.33	48.	12.	4.	.23
+	DIVERSION TO	RETICA	56.	3.80	4.	1.	0.	.23
+	HYDROGRAPH AT	RETICA	400.	4.33	44.	11.	4.	.23
+	DIVERSION TO	RETICA	394.	4.30	20.	5.	2.	.23
+	HYDROGRAPH AT	RETICA	399.	4.37	24.	6.	2.	.23
+	HYDROGRAPH AT	DR103	679.	4.57	111.	28.	10.	2.69
+	HYDROGRAPH AT	SUBIE	571.	4.40	78.	20.	7.	.30
+	DIVERSION TO	RETIE	571.	4.40	50.	13.	5.	.30
+	HYDROGRAPH AT	RETIE	480.	4.53	28.	7.	3.	.30
+	HYDROGRAPH AT	SUBID1	370.	4.43	52.	13.	5.	.20
+	DIVERSION TO	RETID1	5.	2.70	2.	0.	0.	.20

+	HYDROGRAPH AT	RETID1	370.	4.43	51.	13.	5.	.20
+	DIVERSION TO	RETID1	295.	4.23	17.	4.	1.	.20
+	HYDROGRAPH AT	RETID1	370.	4.43	34.	9.	3.	.20
+	3 COMBINED AT	CPIE	1193.	4.63	171.	43.	15.	2.02
+	ROUTED TO	RTDIIE	1107.	4.83	170.	43.	15.	2.02
+	4 COMBINED AT	CP103	1475.	4.87	398.	104.	39.	6.10
+	ROUTED TO	MCIBIB	1375.	5.00	396.	104.	39.	6.10
+	HYDROGRAPH AT	SUBIBB	519.	4.27	53.	13.	5.	.24
+	DIVERSION TO	RETIBB	212.	3.93	8.	2.	1.	.24
+	HYDROGRAPH AT	RETIBB	519.	4.27	45.	11.	4.	.24
+	DIVERSION TO	RETIBB	328.	4.03	5.	1.	0.	.24
+	HYDROGRAPH AT	RETIBB	519.	4.27	40.	10.	4.	.24
+	HYDROGRAPH AT	SUBICB	415.	4.33	53.	13.	5.	.23
+	DIVERSION TO	RETICB	8.	2.93	3.	1.	0.	.23
+	HYDROGRAPH AT	RETICB	415.	4.33	50.	13.	5.	.23
+	DIVERSION TO	RETICB	409.	4.30	25.	6.	2.	.23
+	HYDROGRAPH AT	RETICB	414.	4.37	26.	6.	2.	.23
+	3 COMBINED AT	~CPIB1	1473.	5.00	444.	116.	43.	6.57
+	DIVERSION TO	107L	273.	5.00	7.	2.	1.	6.57
+	HYDROGRAPH AT	DV107A	1200.	4.93	438.	115.	42.	6.57
+	HYDROGRAPH AT	SUBOC	861.	4.13	93.	23.	8.	.31
+	DIVERSION TO	RETOC	861.	4.13	63.	16.	6.	.31
+	HYDROGRAPH AT	RETOC	683.	4.27	30.	8.	3.	.31
+	HYDROGRAPH AT	DROC	70.	4.53	5.	1.	0.	.61
+	ROUTED TO	RTDIOC	22.	5.97	5.	1.	0.	.61
+	2 COMBINED AT	CPOC	683.	4.27	35.	9.	3.	.42
+	ROUTED TO	RTOCMB	320.	4.63	35.	9.	3.	.42
+	HYDROGRAPH AT	SUBMB	1651.	4.43	272.	68.	25.	1.00
+	DIVERSION TO	RETMB	1651.	4.43	178.	45.	16.	1.00
+	HYDROGRAPH AT	RETMB	1184.	4.67	95.	24.	9.	1.00
+	HYDROGRAPH AT	DRMB	534.	4.57	87.	22.	8.	2.69
+	ROUTED TO	RTDIMB	322.	5.07	87.	22.	8.	2.69
+	3 COMBINED AT	@CPMB	1299.	4.67	217.	55.	20.	1.42
+	DIVERSION TO	DIIBW	650.	4.67	108.	27.	10.	1.42
+	HYDROGRAPH AT	DIMBIB	650.	4.67	108.	27.	10.	1.42
	ROUTED TO							

+		RTMBIB	641.	4.90	108.	27.	10.	1.42
+	DIVERSION TO	107U	641.	4.90	108.	27.	10.	1.42
+	HYDROGRAPH AT	DV107B	0.	.00	0.	0.	0.	1.42
+	2 COMBINED AT	@CPIB2	1200.	4.93	438.	115.	42.	6.57
+	ROUTED TO	RRIB	787.	6.17	413.	115.	42.	6.57
+	ROUTED TO	MCIBIA	779.	6.47	410.	115.	42.	6.57
+	HYDROGRAPH AT	SUBME	541.	4.33	60.	15.	5.	.33
+	DIVERSION TO	RETME	541.	4.33	46.	11.	4.	.33
+	HYDROGRAPH AT	RETME	306.	4.57	14.	4.	1.	.33
+	HYDROGRAPH AT	RDIIBW	650.	4.67	108.	27.	10.	1.42
+	2 COMBINED AT	CPME	801.	4.67	121.	30.	11.	1.04
+	ROUTED TO	RTMEIA	634.	4.93	121.	30.	11.	1.04
+	HYDROGRAPH AT	SUBIA	586.	4.30	66.	17.	6.	.31
+	DIVERSION TO	RETIA	127.	3.87	7.	2.	1.	.31
+	HYDROGRAPH AT	RETIA	586.	4.30	59.	15.	5.	.31
+	3 COMBINED AT	~CPIA	849.	6.43	500.	145.	53.	9.81
+	ROUTED TO	MCIAHB	844.	6.77	495.	145.	53.	9.81
+	HYDROGRAPH AT	SUBHB	413.	4.03	28.	7.	2.	.34
+	DIVERSION TO	RETHB	240.	3.90	9.	2.	1.	.34
+	HYDROGRAPH AT	RETHB	413.	4.03	19.	5.	2.	.34
+	2 COMBINED AT	CPHB1	844.	6.77	496.	148.	54.	10.15
+	HYDROGRAPH AT	SUBDA	373.	4.10	29.	7.	3.	.33
+	DIVERSION TO	RETDA	274.	3.97	9.	2.	1.	.33
+	HYDROGRAPH AT	RETDA	373.	4.10	20.	5.	2.	.33
+	2 COMBINED AT	~CPDA	845.	6.77	501.	152.	56.	10.48
+	HYDROGRAPH AT	SUBLD	322.	4.07	24.	6.	2.	.28
+	DIVERSION TO	RETLD	322.	4.07	24.	6.	2.	.28
+	HYDROGRAPH AT	RETLD	0.	.00	0.	0.	0.	.28
+	ROUTED TO	RTLDMA	0.	.00	0.	0.	0.	.28
+	HYDROGRAPH AT	SUBMA	283.	4.03	17.	4.	2.	.25
+	DIVERSION TO	RETMA	283.	4.03	17.	4.	2.	.25
+	HYDROGRAPH AT	RETMA	0.	.00	0.	0.	0.	.25
+	2 COMBINED AT	CPMA	0.	.00	0.	0.	0.	.53
+	ROUTED TO	RTMAHB	0.	.00	0.	0.	0.	.53
+	2 COMBINED AT	CPHB2	845.	6.77	501.	152.	56.	11.00
+	HYDROGRAPH AT	SUBLB	276.	4.07	17.	4.	2.	.25

+	DIVERSION TO HYDROGRAPH AT	RETLB	276.	4.07	17.	4.	2.	.25
+	ROUTED TO	RETLB	0.	.00	0.	0.	0.	.25
+	HYDROGRAPH AT	RTLBHA	0.	.00	0.	0.	0.	.25
+	DIVERSION TO HYDROGRAPH AT	SUBHA	186.	4.03	13.	3.	1.	.15
+		RETHA	165.	3.97	6.	2.	1.	.15
+		RETHA	186.	4.03	6.	2.	1.	.15
+	3 COMBINED AT	CPHA	845.	6.77	505.	153.	56.	11.40
+	ROUTED TO	MCHACB	754.	7.40	466.	145.	53.	11.40
+	HYDROGRAPH AT	SUBJB2	513.	4.13	43.	11.	4.	.49
+	DIVERSION TO HYDROGRAPH AT	RETJB2	513.	4.13	43.	11.	4.	.49
+		RETJB2	0.	.00	0.	0.	0.	.49
+	HYDROGRAPH AT	DRJB2	22.	5.57	10.	3.	2.	1.08
+	ROUTED TO	RTJCJ	18.	7.00	10.	3.	2.	1.08
+	2 COMBINED AT	@CPJB2	19.	7.00	10.	3.	2.	.99
+	DIVERSION TO HYDROGRAPH AT	DIFA	12.	7.00	6.	2.	1.	.99
+		DIJBEE	7.	6.97	4.	1.	1.	.99
+	ROUTED TO	RTJBEE	6.	9.27	3.	1.	1.	.99
+	HYDROGRAPH AT	SUBEE	700.	4.20	71.	18.	6.	.96
+	DIVERSION TO HYDROGRAPH AT	RETEE	700.	4.20	71.	18.	6.	.96
+		RETEE	0.	.00	0.	0.	0.	.96
+	2 COMBINED AT	CPEE	6.	9.27	3.	1.	1.	1.31
+	ROUTED TO	RTEEEA	3.	17.30	3.	1.	1.	1.31
+	HYDROGRAPH AT	SUBEA	912.	4.13	93.	23.	8.	1.32
+	DIVERSION TO HYDROGRAPH AT	RETEA	912.	4.13	93.	23.	8.	1.32
+		RETEA	0.	.00	0.	0.	0.	1.32
+	2 COMBINED AT	CPEA	3.	17.30	3.	1.	1.	2.63
+	ROUTED TO	RTEADC	3.	19.40	3.	1.	1.	2.63
+	HYDROGRAPH AT	SUBDC	774.	4.07	63.	16.	6.	.83
+	DIVERSION TO HYDROGRAPH AT	RETDC	774.	4.07	52.	13.	5.	.83
+		RETDC	377.	4.23	11.	3.	1.	.83
+	2 COMBINED AT	~CPDC	71.	4.63	4.	2.	1.	3.46
+	ROUTED TO	RTDCCC	13.	5.63	4.	2.	1.	3.46
+	HYDROGRAPH AT	SUBDD	173.	4.00	11.	3.	1.	.13
+	DIVERSION TO HYDROGRAPH AT	RETDD	173.	4.00	11.	3.	1.	.13
+		RETDD	0.	.00	0.	0.	0.	.13
+	ROUTED TO	RTDDCC	0.	.00	0.	0.	0.	.13

+	HYDROGRAPH AT	SUBCC	845.	4.10	78.	19.	7.	.98
+	DIVERSION TO	RETCC	845.	4.10	69.	17.	6.	.98
+	HYDROGRAPH AT	RETCC	258.	4.33	9.	2.	1.	.98
+	3 COMBINED AT	~CPCC	16.	5.87	5.	2.	1.	4.57
+	ROUTED TO	RTCCSC	11.	6.83	5.	2.	1.	4.57
+	ROUTED TO	RTCCSC	8.	7.80	5.	2.	1.	4.57
+	HYDROGRAPH AT	SUBCB	766.	4.10	71.	18.	6.	.74
+	DIVERSION TO	RETCB	713.	4.03	32.	8.	3.	.74
+	HYDROGRAPH AT	RETCB	766.	4.10	39.	10.	4.	.74
+	3 COMBINED AT	~CPCB1	810.	7.20	524.	171.	62.	16.71
+	HYDROGRAPH AT	SUBGD1	670.	4.07	54.	14.	5.	.63
+	DIVERSION TO	RETGD1	629.	4.03	27.	7.	2.	.63
+	HYDROGRAPH AT	RETGD1	643.	4.10	28.	7.	2.	.63
+	HYDROGRAPH AT	SUBGD2	853.	4.10	78.	20.	7.	.21
+	DIVERSION TO	RETGD2	700.	4.00	32.	8.	3.	.21
+	HYDROGRAPH AT	RETGD2	853.	4.10	46.	12.	4.	.21
+	2 COMBINED AT	CPGD	1312.	4.10	72.	18.	6.	.84
+	HYDROGRAPH AT	SUBKC	316.	4.03	22.	5.	2.	.26
+	DIVERSION TO	RETKC	316.	4.03	22.	5.	2.	.26
+	HYDROGRAPH AT	RETKC	0.	.00	0.	0.	0.	.26
+	ROUTED TO	RTKCGD	0.	.00	0.	0.	0.	.26
+	HYDROGRAPH AT	SUBGC	268.	4.03	17.	4.	2.	.22
+	DIVERSION TO	RETGC	261.	4.00	10.	3.	1.	.22
+	HYDROGRAPH AT	RETGC	256.	4.07	7.	2.	1.	.22
+	ROUTED TO	RTGCGD	166.	4.13	7.	2.	1.	.22
+	3 COMBINED AT	CPGD1	1307.	4.13	76.	19.	7.	1.32
+	ROUTED TO	RTGDCB	769.	4.43	75.	19.	7.	1.32
+	2 COMBINED AT	~CPCB2	869.	7.17	568.	195.	71.	18.03
+	ROUTED TO	MCCBCA	560.	7.73	393.	142.	51.	18.03
+	HYDROGRAPH AT	SUBCA1	158.	4.10	14.	4.	1.	.14
+	DIVERSION TO	RETCA1	107.	3.97	5.	1.	0.	.14
+	HYDROGRAPH AT	RETCA1	158.	4.10	9.	2.	1.	.14
+	HYDROGRAPH AT	SUBCA2	771.	4.13	74.	19.	7.	.84
+	DIVERSION TO	RETCA2	755.	4.07	36.	9.	3.	.84
+	HYDROGRAPH AT	RETCA2	771.	4.13	38.	10.	3.	.84
	3 COMBINED AT							

APPENDIX D

HEC-RAS ANALYSES

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Scale in Feet

NO.	REVISION	BY	DATE
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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

DURANGO REGIONAL CONVEYANCE CHANNEL
PROJECT NUMBER
FCD2009C007-PRE-DESIGN

PRELIMINARY NOT FOR CONSTRUCTION

	BY	DATE
DESIGNED	J. LOUCKS	12/09
DRAWN	JL, JP, JW, MRT	12/09
CHECKED	J. HOLZMEISTER	12/09

J2 engineering and environmental design
4649 east cotton gin loop, suite 82
phoenix, arizona 85040
phone: 602.438.2221 www.j2design.us

DRAWING NO.

CROSS SECTION LOCATIONS

SHEET 1 OF 8

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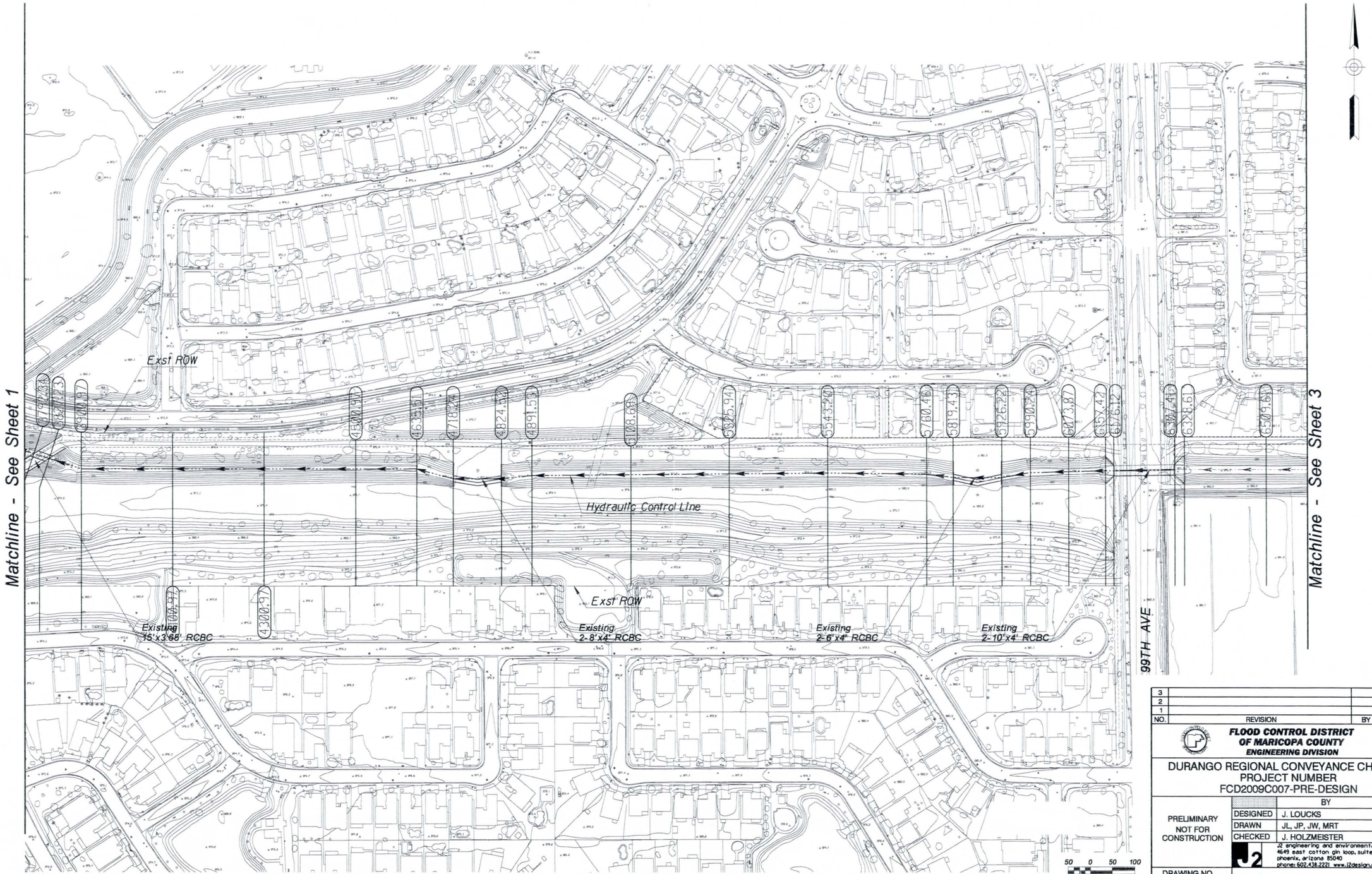

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DRAWING NO.

CROSS SECTION LOCATIONS

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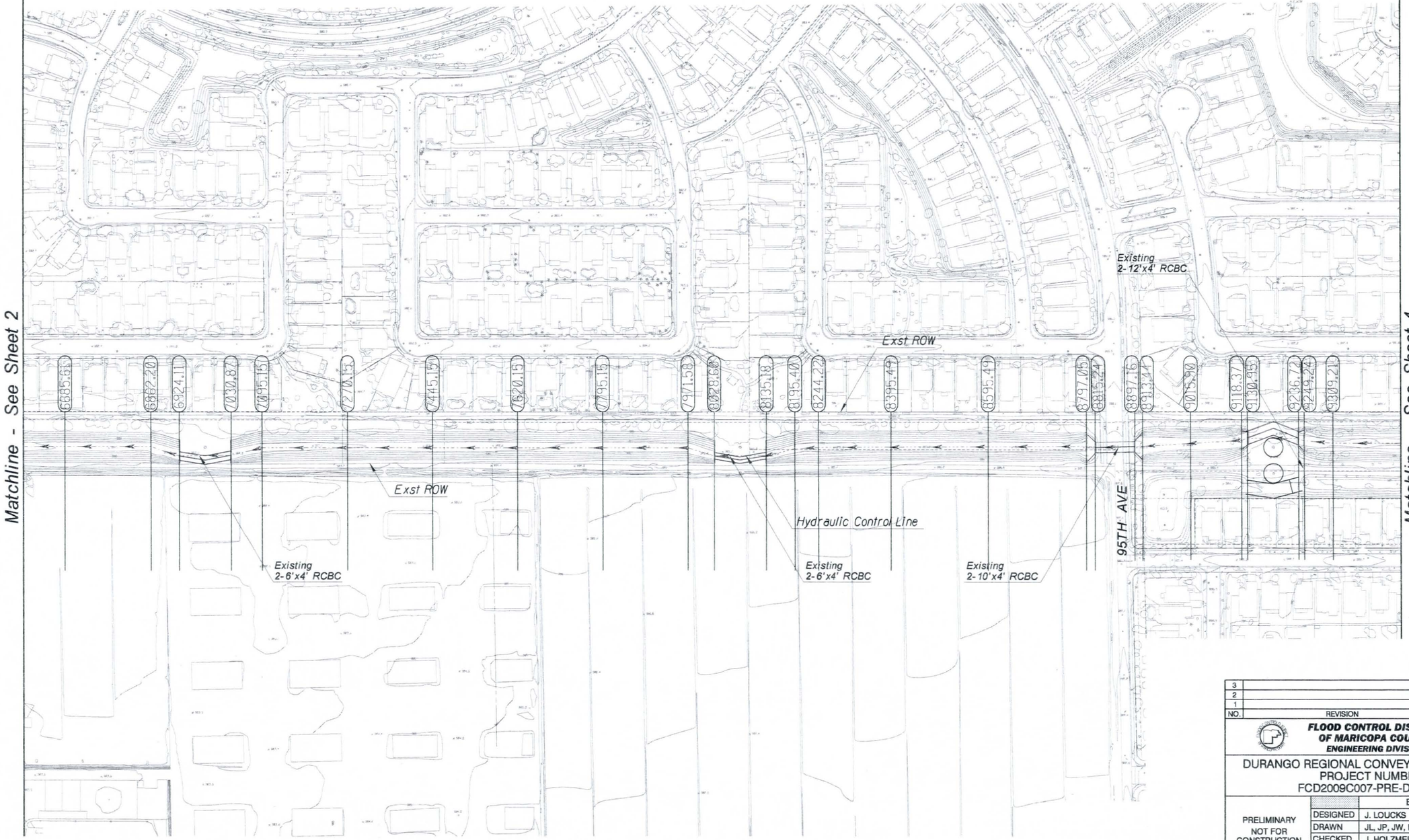

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DRAWING NO.

CROSS SECTION LOCATIONS

SHEET OF 3 8

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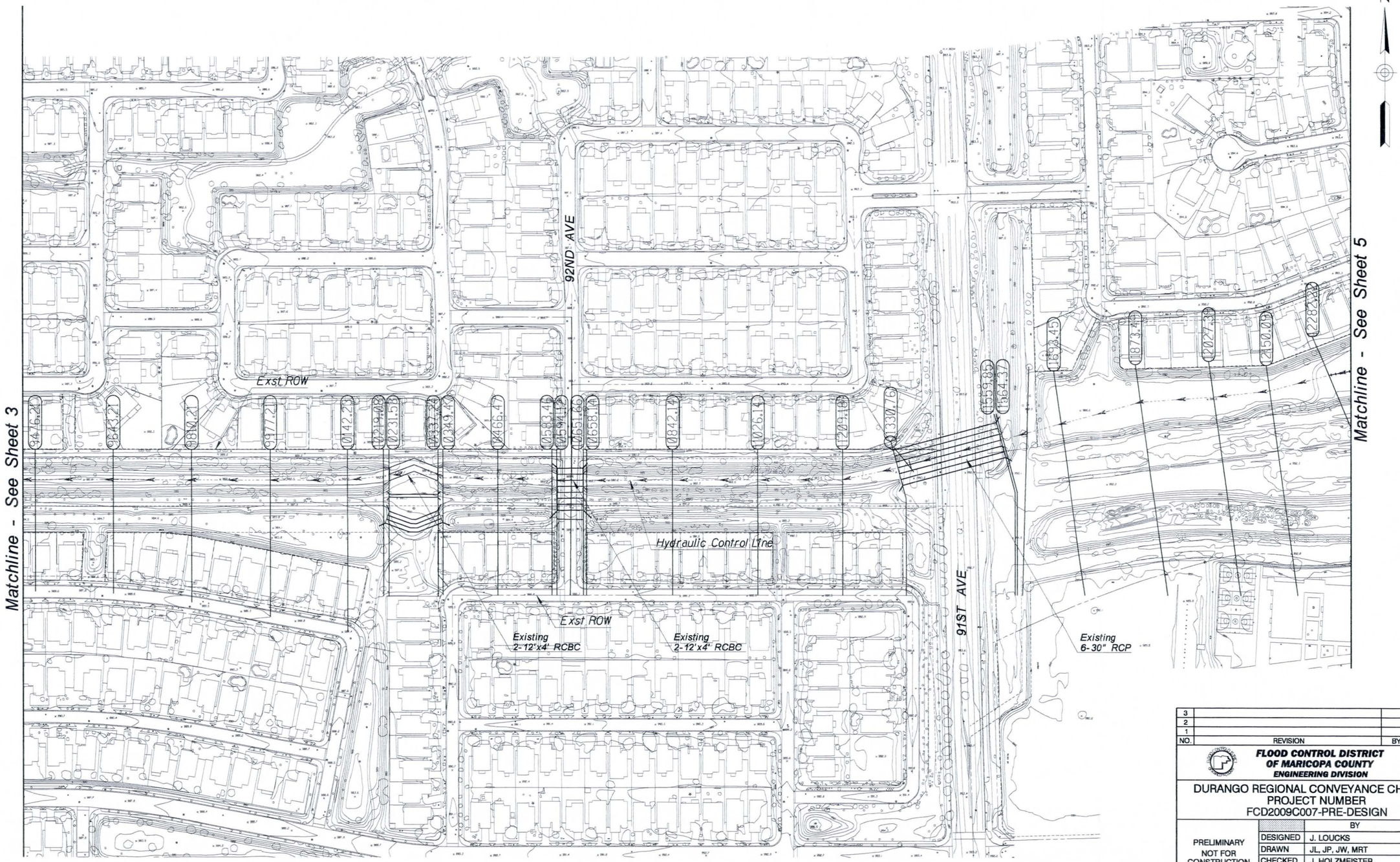

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Scale in Feet

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phoenix, arizona 85040
phone: 602.438.2221 www.j2design.us

DRAWING NO.

CROSS SECTION LOCATIONS

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Scale in Feet

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DRAWING NO.

CROSS SECTION LOCATIONS

SHEET 5 OF 8

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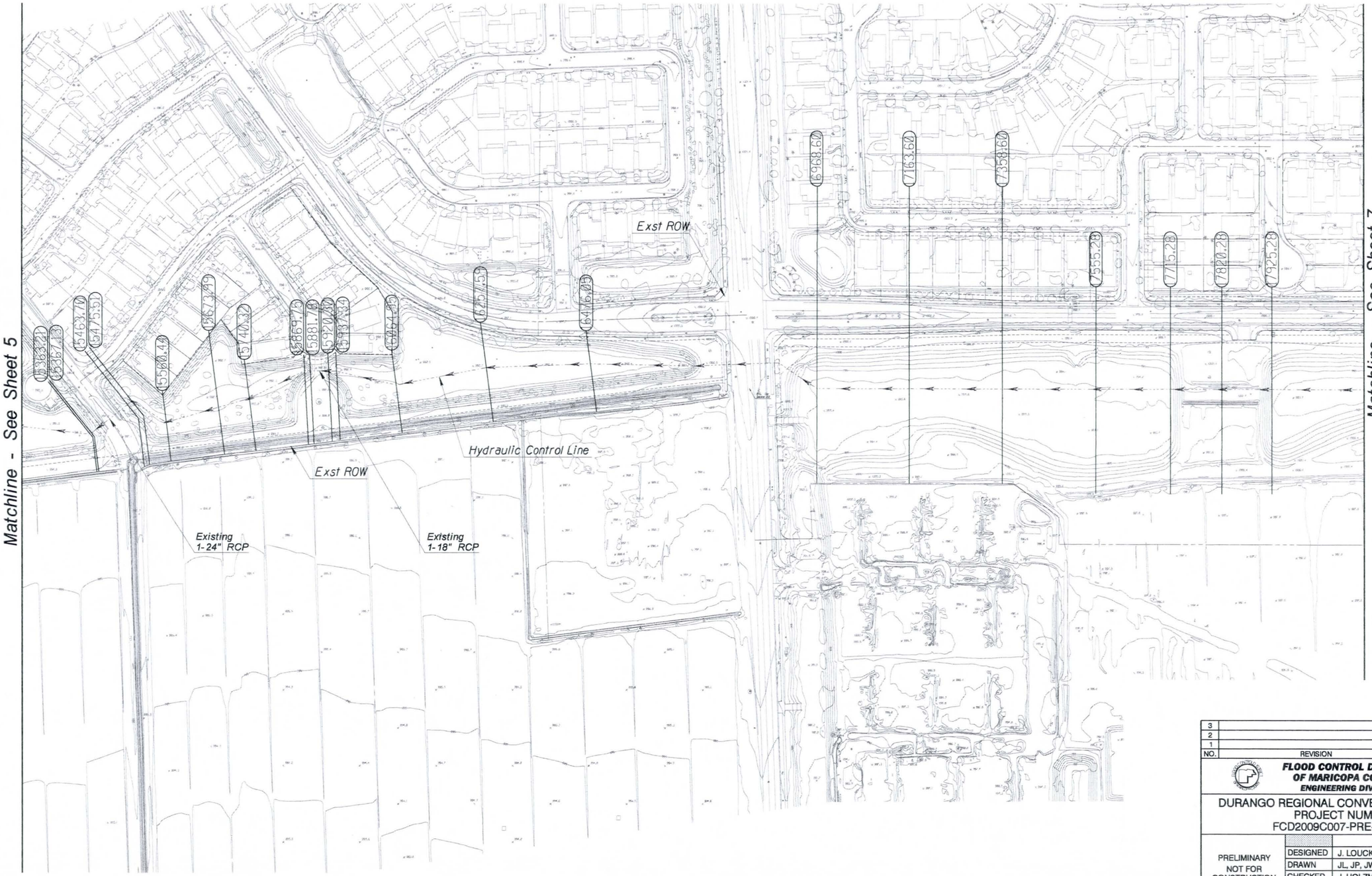

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DRAWING NO.

CROSS SECTION LOCATIONS

SHEET 6 OF 8

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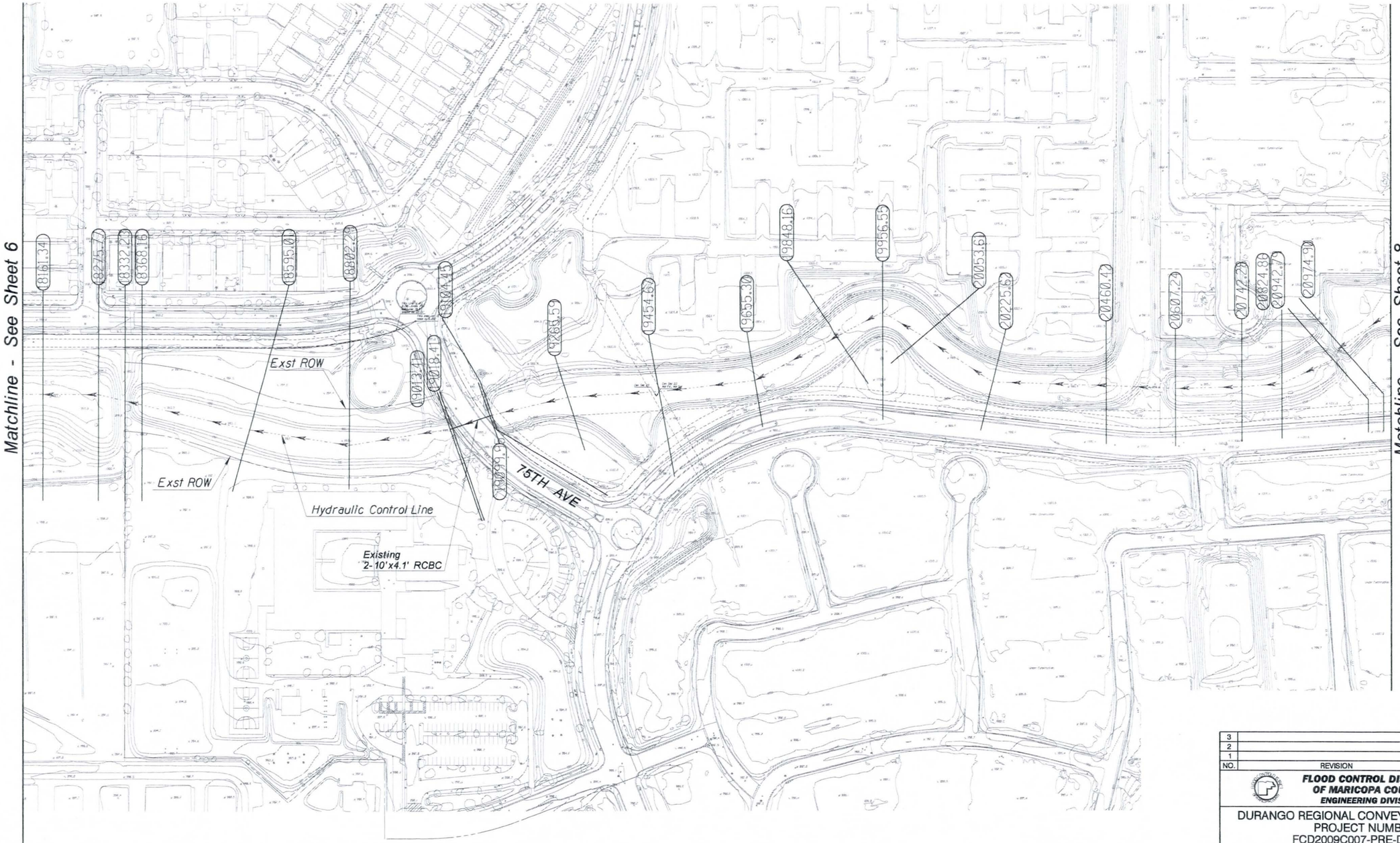

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DRAWING NO.

CROSS SECTION LOCATIONS

SHEET 7 OF 8

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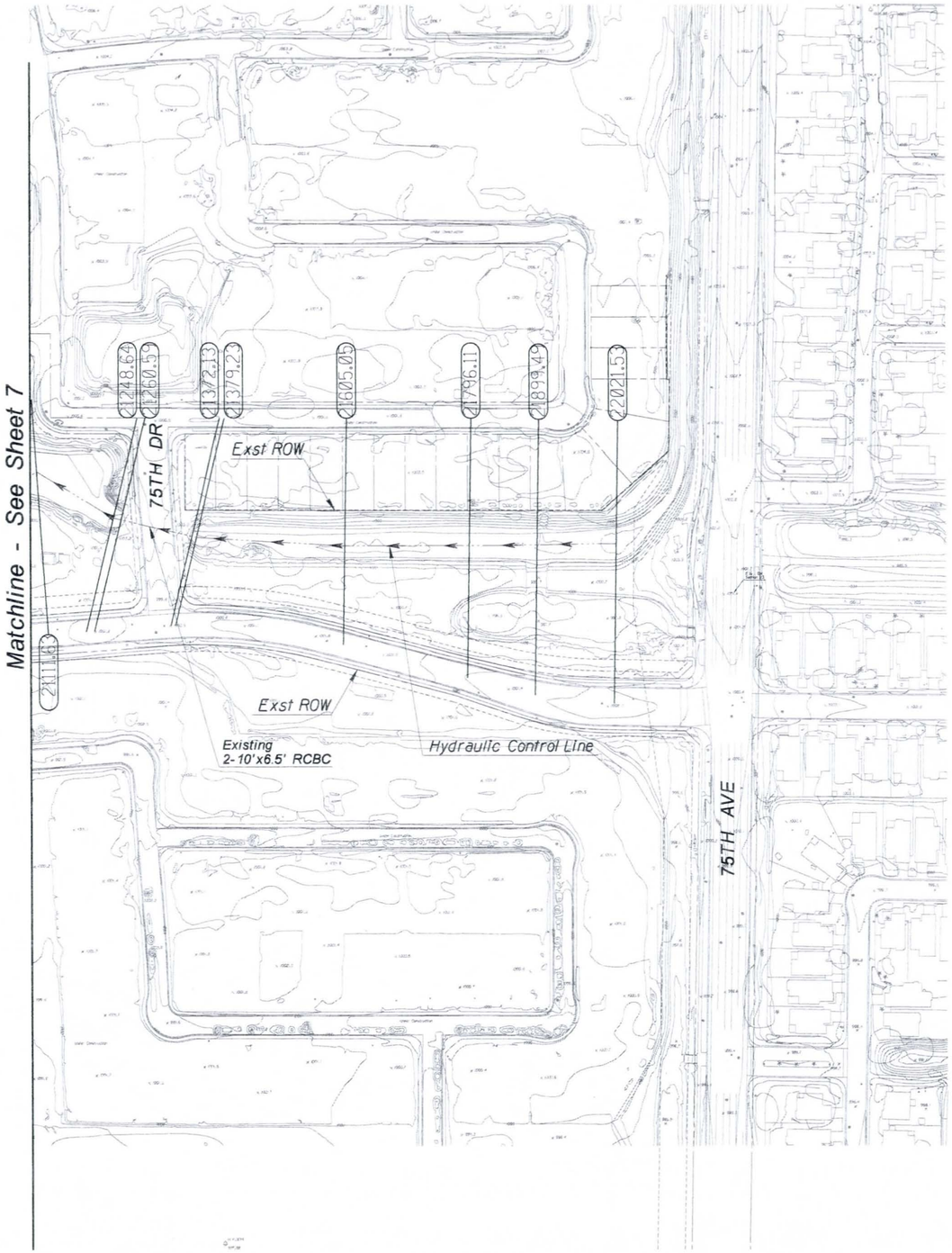

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DRAWING NO.

CROSS SECTION LOCATIONS

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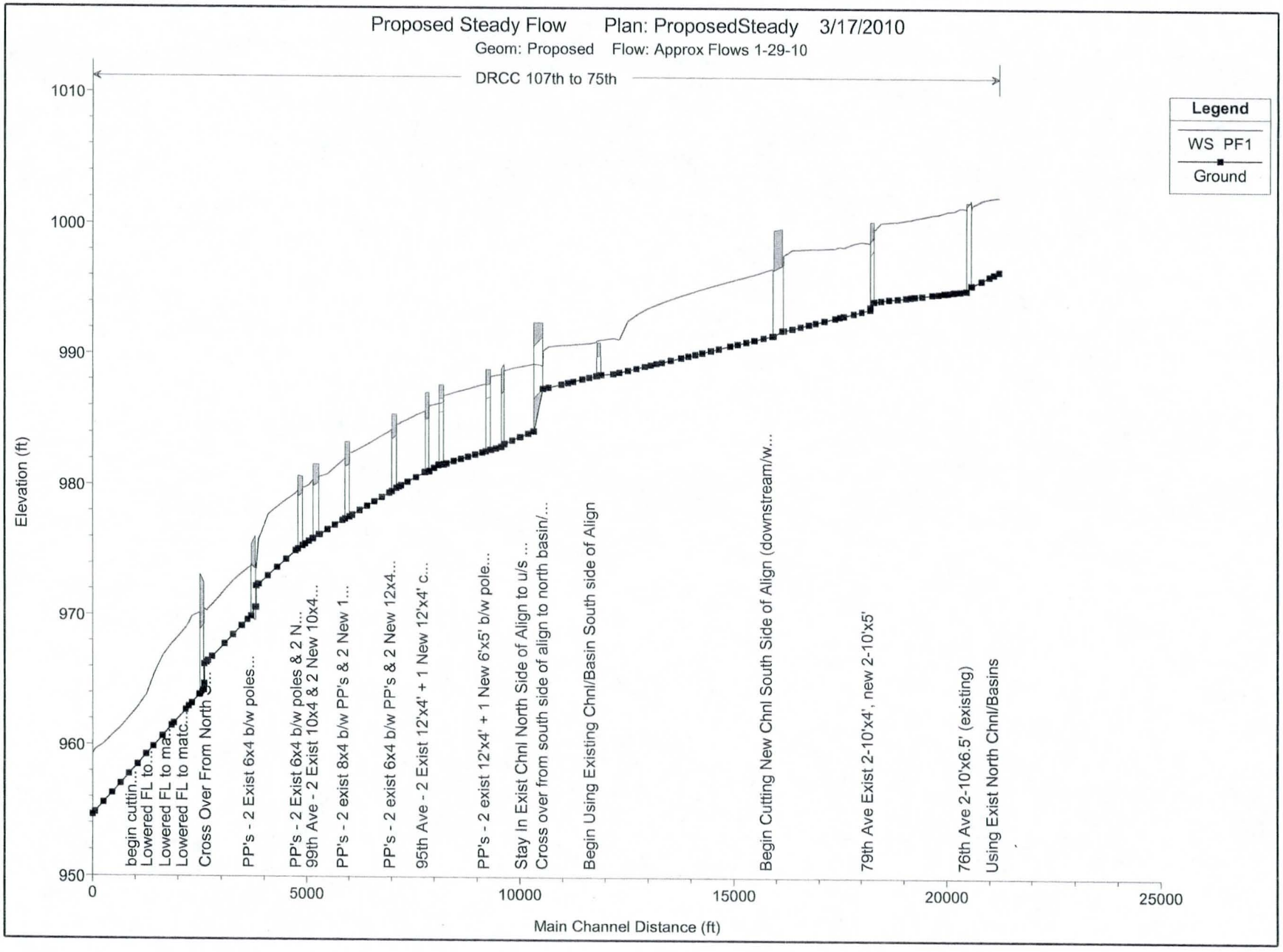

Proposed Steady Flow Plan: ProposedSteady 3/17/2010
Geom: Proposed Flow: Approx Flows 1-29-10
DRCC 107th to 75th
Legend
WS PF1
Ground
Elevation (ft)
1010
1000
990
980
970
960
950
0
5000
10000
15000
20000
25000
Main Channel Distance (ft)
begin cuttin...
Lowered FL to...
Lowered FL to ma...
Lowered FL to matc...
Cross Over From North S...
PP's - 2 Exist 6x4 b/w poles...
PP's - 2 Exist 6x4 b/w poles & 2 N...
99th Ave - 2 Exist 10x4 & 2 New 10x4...
PP's - 2 exist 8x4 b/w PP's & 2 New 1...
PP's - 2 exist 6x4 b/w PP's & 2 New 12x4...
95th Ave - 2 Exist 12'x4' + 1 New 12'x4' c...
PP's - 2 exist 12'x4' + 1 New 6'x5' b/w pole...
Stay In Exist Chnl North Side of Align to u/s ...
Cross over from south side of align to north basin/...
Begin Using Existing Chnl/Basin South side of Align
Begin Cutting New Chnl South Side of Align (downstream/w...
79th Ave Exist 2-10'x4', new 2-10'x5'
76th Ave 2-10'x6.5' (existing)
Using Exist North Chnl/Basins

HEC-RAS Plan: ProposedSteady River: DRCC Reach: 107th to 75th Profile: PF1

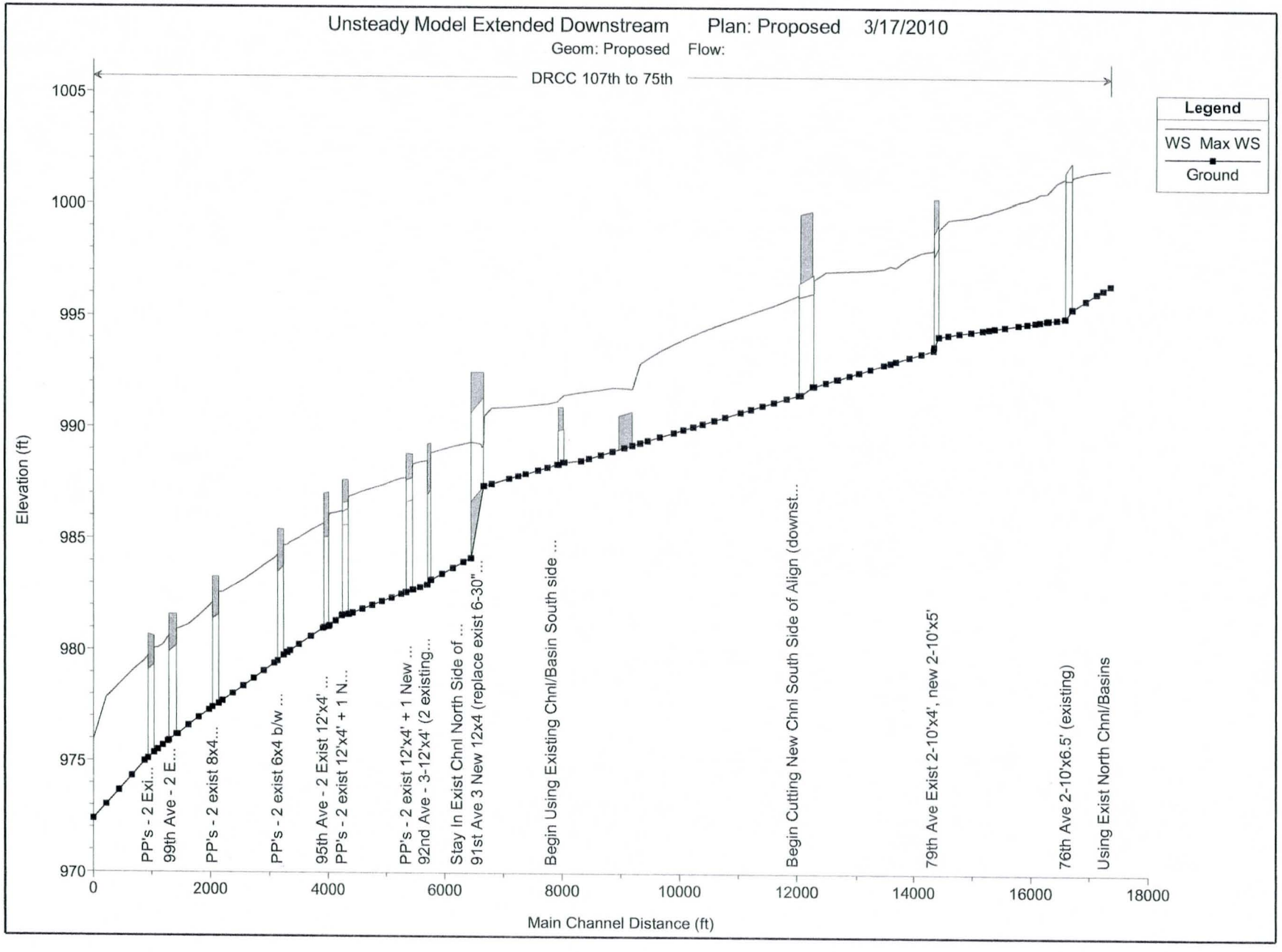
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
107th to 75th	22021.53	PF1	1112.00	996.44	1002.17	998.89	1002.29	0.000590	2.83	394.57	274.32	0.23
107th to 75th	21899.49	PF1	1112.00	996.24	1002.11		1002.22	0.000458	2.73	425.15	274.25	0.21
107th to 75th	21796.11	PF1	1112.00	996.08	1002.05		1002.17	0.000556	2.83	407.81	250.79	0.23
107th to 75th	21605.05	PF1	1112.00	995.77	1001.91		1002.05	0.000697	3.08	381.23	213.94	0.25
107th to 75th	21379.23	PF1	1112.00	995.41	1001.54		1001.81	0.001587	4.17	267.03	168.25	0.37
107th to 75th	21372.13	PF1	1112.00	995.40	1001.28	998.67	1001.77	0.002478	5.66	196.57	127.61	0.41
107th to 75th	21316.6		Culvert									
107th to 75th	21260.59	PF1	1112.00	994.99	1001.22	998.19	1001.63	0.001913	5.15	216.77	114.17	0.37
107th to 75th	21248.64	PF1	1112.00	994.98	1001.32		1001.53	0.001237	3.71	319.09	183.36	0.32
107th to 75th	21111.63	PF1	1112.00	994.93	1001.36		1001.42	0.000262	1.96	568.46	155.57	0.16
107th to 75th	20974.90	PF1	1112.00	994.89	1001.14		1001.34	0.001113	3.61	315.36	131.06	0.31
107th to 75th	20942.79	PF1	1112.00	994.87	1001.11		1001.30	0.001101	3.54	345.58	183.98	0.31
107th to 75th	20824.86	PF1	1112.00	994.82	1001.08		1001.19	0.000502	2.61	428.65	241.21	0.21
107th to 75th	20742.28	PF1	1112.00	994.79	1001.01		1001.14	0.000626	2.87	390.19	242.02	0.24
107th to 75th	20607.24	PF1	1317.00	994.73	1000.87		1001.04	0.000827	3.31	401.10	201.16	0.27
107th to 75th	20460.42	PF1	1317.00	994.68	1000.80		1000.92	0.000594	2.80	469.94	150.42	0.23
107th to 75th	20225.62	PF1	1317.00	994.58	1000.63		1000.78	0.000655	3.02	438.66	150.61	0.25
107th to 75th	20053.61	PF1	1317.00	994.52	1000.53		1000.66	0.000667	2.92	451.11	161.13	0.25
107th to 75th	19956.55	PF1	1317.00	994.48	1000.46		1000.59	0.000678	2.95	446.35	149.54	0.25
107th to 75th	19848.16	PF1	1317.00	994.43	1000.41		1000.52	0.000549	2.70	488.68	153.68	0.22
107th to 75th	19655.30	PF1	1317.00	994.36	1000.29		1000.41	0.000545	2.83	471.45	150.78	0.23
107th to 75th	19454.67	PF1	1317.00	994.30	1000.26		1000.32	0.000271	2.09	706.97	239.63	0.16
107th to 75th	19265.59	PF1	1317.00	994.21	1000.21		1000.27	0.000258	2.06	681.36	184.87	0.16
107th to 75th	19104.45	PF1	1317.00	994.14	999.64		1000.13	0.003643	5.58	236.22	86.06	0.54
107th to 75th	19099.95	PF1	1317.00	994.14	999.75	997.04	1000.04	0.001660	4.30	306.29	74.46	0.37
107th to 75th	19059.6		Culvert									
107th to 75th	19018.41	PF1	1317.00	993.70	998.85	996.61	999.25	0.002076	5.08	259.00	171.80	0.42
107th to 75th	19013.41	PF1	1317.00	993.54	998.64	996.65	999.21	0.002818	6.04	218.12	156.55	0.48
107th to 75th	18802.29	PF1	1317.00	993.37	998.73		998.84	0.000584	2.79	537.96	233.74	0.23
107th to 75th	18595.01	PF1	1317.00	993.20	998.61		998.72	0.000589	2.82	566.07	256.33	0.23
107th to 75th	18368.16	PF1	1317.00	993.02	998.29		998.52	0.001247	3.86	367.42	286.48	0.33
107th to 75th	18275.77	PF1	1317.00	992.94	998.37		998.42	0.000257	1.75	754.66	197.51	0.15
107th to 75th	18161.34	PF1	1317.00	992.85	998.25		998.37	0.000789	2.79	472.40	131.26	0.26
107th to 75th	17925.28	PF1	1317.00	992.66	998.21		998.25	0.000229	1.65	798.55	215.96	0.14
107th to 75th	17715.28	PF1	1317.00	992.49	998.17		998.21	0.000178	1.43	918.18	237.92	0.13
107th to 75th	17555.28	PF1	1317.00	992.36	998.17		998.18	0.000080	1.06	1248.22	270.58	0.09
107th to 75th	17358.60	PF1	1317.00	992.20	998.13		998.16	0.000130	1.34	983.99	213.72	0.11
107th to 75th	17163.60	PF1	1317.00	992.04	998.11		998.14	0.000104	1.24	1065.90	220.48	0.10
107th to 75th	16968.60	PF1	1317.00	991.88	997.68	994.73	998.03	0.001193	4.73	278.28	335.59	0.35
107th to 75th	16808.5		Culvert									
107th to 75th	16692.50	PF1	1274.00	991.48	996.55		996.99	0.001861	5.33	239.24	102.79	0.42
107th to 75th	16687.50	PF1	1274.00	991.47	996.61		996.93	0.001466	4.59	277.68	113.27	0.37
107th to 75th	16476.05	PF1	1274.00	991.32	996.39		996.62	0.001376	3.84	331.85	180.72	0.34
107th to 75th	16257.59	PF1	1274.00	991.14	996.17		996.34	0.001025	3.38	377.38	235.77	0.30
107th to 75th	16064.95	PF1	1274.00	990.99	996.00		996.15	0.000898	3.18	400.08	211.01	0.28
107th to 75th	15869.75	PF1	1274.00	990.83	995.82		995.97	0.000909	3.19	399.09	161.66	0.28
107th to 75th	15673.99	PF1	1274.00	990.69	995.65		995.81	0.000921	3.20	397.55	295.84	0.28
107th to 75th	15367.13	PF1	1274.00	990.48	995.42		995.57	0.000890	3.12	408.25	270.64	0.28
107th to 75th	15149.86	PF1	1274.00	990.33	995.24		995.40	0.000961	3.25	391.80	332.84	0.29
107th to 75th	14980.94	PF1	1274.00	990.17	995.04		995.21	0.000981	3.27	389.89	175.66	0.29
107th to 75th	14830.39	PF1	1274.00	990.04	994.87		995.05	0.001017	3.32	383.77	262.83	0.30
107th to 75th	14660.50	PF1	1274.00	989.91	994.70		994.87	0.001040	3.33	382.43	274.53	0.30
107th to 75th	14490.60	PF1	1274.00	989.78	994.52		994.70	0.001086	3.38	376.45	208.17	0.31
107th to 75th	14336.14	PF1	1274.00	989.59	994.25		994.43	0.001127	3.40	375.09	327.61	0.31
107th to 75th	14027.21	PF1	1274.00	989.42	993.98		994.18	0.001252	3.57	357.35	151.34	0.33
107th to 75th	13898.73	PF1	1274.00	989.32	993.81		994.02	0.001323	3.63	350.89	183.33	0.34
107th to 75th	13764.04	PF1	1274.00	989.21	993.64		993.84	0.001330	3.56	357.61	186.89	0.33
107th to 75th	13629.35	PF1	1274.00	989.10	993.42		993.64	0.001513	3.79	336.11	186.64	0.36
107th to 75th	13429.34	PF1	1274.00	988.94	993.06		993.31	0.001811	4.04	315.11	193.24	0.39
107th to 75th	13229.30	PF1	1274.00	988.78	992.57		992.89	0.002430	4.48	284.45	197.92	0.44
107th to 75th	13024.53	PF1	1274.00	988.62	991.15		991.95	0.010035	7.17	177.78	162.04	0.85
107th to 75th	12887.75	PF1	280.00	988.51	991.25		991.29	0.000364	1.43	195.47	222.14	0.16
107th to 75th	12743.96	PF1	280.00	988.45	991.11	989.33	991.15	0.000605	1.64	206.81	298.11	0.20
107th to 75th	12686		Culvert									
107th to 75th	12623.23	PF1	280.00	988.35	990.94		990.95	0.000178	0.88	395.08	319.83	0.11
107th to 75th	12444.37	PF1	280.00	988.22	990.85		990.89	0.000534	1.70	164.96	228.29	0.20
107th to 75th	12282.22	PF1	280.00	988.09	990.81		990.83	0.000241	1.18	236.80	214.70	0.13
107th to 75th	12150.09	PF1	280.00	987.92	990.75		990.78	0.000275	1.27	220.75	170.87	0.14
107th to 75th	12027.39	PF1	280.00	987.82	990.72		990.74	0.000233	1.19	235.07	205.10	0.13
107th to 75th	11873.49	PF1	280.00	987.70	990.69		990.71	0.000213	1.16	241.78	286.28	0.13
107th to 75th	11693.45	PF1	657.00	987.46	990.58		990.62	0.000347	1.58	414.81	281.19	0.17
107th to 75th	11564.37	PF1	657.00	987.36	990.30	989.01	990.50	0.002045	3.57	184.10	74.52	0.39
107th to 75th	11473.3		Culvert									
107th to 75th	11330.76	PF1	657.00	984.16	989.24		989.43	0.001174	3.48	188.71	47.18	0.31
107th to 75th	11209.18	PF1	657.00	983.98	989.15		989.28	0.000917	2.91	225.66	64.94	0.28
107th to 75th	11026.14	PF1	657.00	983.72	989.04		989.13	0.000625	2.50	262.47	71.03	0.23

HEC-RAS Plan: ProposedSteady River: DRCC Reach: 107th to 75th Profile: PF1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
107th to 75th	10842.14	PF1	657.00	983.45	988.90		989.01	0.000727	2.67	245.80	67.53	0.25
107th to 75th	10658.14	PF1	657.00	983.18	988.74		988.88	0.000679	2.95	222.55	60.02	0.25
107th to 75th	10651.66	PF1	657.00	983.17	988.74	985.22	988.87	0.000520	2.97	221.57	45.68	0.22
107th to 75th	10622.9		Culvert									
107th to 75th	10594.12	PF1	657.00	982.96	988.43		988.58	0.000629	3.03	216.72	43.22	0.23
107th to 75th	10583.46	PF1	657.00	982.95	988.43		988.57	0.000721	3.03	216.65	58.45	0.25
107th to 75th	10466.47	PF1	657.00	982.84	988.37		988.47	0.000695	2.64	248.44	67.06	0.24
107th to 75th	10349.47	PF1	657.00	982.73	988.27		988.40	0.000519	2.91	225.68	60.14	0.22
107th to 75th	10337.24	PF1	657.00	982.72	988.19	984.99	988.38	0.000730	3.54	185.48	59.14	0.27
107th to 75th	10284.4		Culvert									
107th to 75th	10231.53	PF1	657.00	982.62	987.66		987.89	0.000967	3.85	170.84	48.06	0.30
107th to 75th	10219.08	PF1	657.00	982.61	987.68		987.86	0.000910	3.45	190.60	55.67	0.29
107th to 75th	10142.23	PF1	657.00	982.53	987.64		987.78	0.000987	2.97	221.23	65.50	0.28
107th to 75th	9977.215	PF1	657.00	982.36	987.49		987.62	0.000900	2.86	229.69	67.13	0.27
107th to 75th	9810.214	PF1	657.00	982.20	987.32		987.46	0.000998	2.98	220.45	65.44	0.29
107th to 75th	9643.214	PF1	657.00	982.03	987.19		987.30	0.000803	2.73	240.32	69.07	0.26
107th to 75th	9476.214	PF1	657.00	981.86	987.04		987.16	0.000868	2.83	232.08	67.02	0.27
107th to 75th	9309.213	PF1	657.00	981.69	986.86		987.00	0.001071	3.04	215.93	65.56	0.30
107th to 75th	9249.244	PF1	657.00	981.63	986.81		986.94	0.000784	2.91	225.50	57.01	0.26
107th to 75th	9236.724	PF1	657.00	981.62	986.73	983.77	986.92	0.000784	3.52	186.39	51.63	0.27
107th to 75th	9183.8		Culvert									
107th to 75th	9130.952	PF1	657.00	981.59	986.19		986.42	0.001115	3.92	167.72	53.68	0.32
107th to 75th	9118.369	PF1	657.00	981.56	986.20		986.39	0.001291	3.47	189.34	53.31	0.32
107th to 75th	9015.904	PF1	657.00	981.34	986.11		986.26	0.001057	3.08	213.20	62.71	0.29
107th to 75th	8913.440	PF1	657.00	981.12	986.05		986.16	0.000660	2.66	247.44	62.30	0.23
107th to 75th	8897.158	PF1	657.00	981.08	985.96	983.13	986.14	0.000792	3.38	194.17	48.56	0.27
107th to 75th	8856.2		Culvert									
107th to 75th	8815.245	PF1	657.00	981.04	985.61		985.81	0.000969	3.61	182.16	51.59	0.30
107th to 75th	8797.054	PF1	657.00	981.00	985.62		985.78	0.000964	3.23	203.29	59.65	0.29
107th to 75th	8595.493	PF1	657.00	980.63	985.34		985.53	0.001518	3.55	184.93	57.60	0.35
107th to 75th	8395.491	PF1	657.00	980.26	985.00		985.21	0.001686	3.70	177.80	56.53	0.37
107th to 75th	8244.220	PF1	657.00	979.98	984.80		984.98	0.001342	3.37	194.70	59.77	0.33
107th to 75th	8195.404	PF1	657.00	979.89	984.67		984.90	0.001786	3.83	171.45	53.69	0.38
107th to 75th	8135.179	PF1	657.00	979.78	984.64	981.78	984.81	0.000745	3.31	198.66	62.77	0.26
107th to 75th	8081.9		Culvert									
107th to 75th	8028.601	PF1	657.00	979.52	984.25		984.43	0.000819	3.40	193.25	55.63	0.28
107th to 75th	7971.581	PF1	657.00	979.41	984.09		984.34	0.002009	4.00	164.07	52.48	0.40
107th to 75th	7795.150	PF1	657.00	979.07	983.77		984.00	0.001836	3.89	168.91	54.93	0.38
107th to 75th	7620.150	PF1	657.00	978.73	983.43		983.66	0.002011	3.90	168.38	56.35	0.40
107th to 75th	7445.150	PF1	657.00	978.39	983.09		983.32	0.001914	3.85	170.62	56.09	0.39
107th to 75th	7270.150	PF1	657.00	978.05	982.79		983.00	0.001688	3.70	177.48	56.24	0.37
107th to 75th	7095.150	PF1	657.00	977.71	982.47		982.70	0.001759	3.80	173.09	54.41	0.38
107th to 75th	7030.872	PF1	657.00	977.59	982.45	979.51	982.60	0.000663	3.08	213.13	51.99	0.25
107th to 75th	6977.5		Culvert									
107th to 75th	6924.108	PF1	657.00	977.42	982.04		982.20	0.000769	3.24	202.81	50.42	0.27
107th to 75th	6862.202	PF1	657.00	977.30	981.84		982.11	0.002202	4.14	158.76	51.85	0.42
107th to 75th	6685.607	PF1	657.00	976.95	981.35		981.66	0.002831	4.50	145.97	50.83	0.47
107th to 75th	6509.607	PF1	657.00	976.60	980.85		981.16	0.002841	4.49	146.29	51.32	0.47
107th to 75th	6328.607	PF1	597.00	976.20	980.63		980.79	0.001225	3.21	186.19	57.46	0.31
107th to 75th	6307.41	PF1	597.00	976.20	980.62	977.96	980.76	0.000693	3.00	198.71	72.98	0.25
107th to 75th	6241.77		Culvert									
107th to 75th	6176.120	PF1	597.00	975.92	980.37		980.51	0.000676	2.98	200.19	71.66	0.25
107th to 75th	6157.419	PF1	597.00	975.88	980.32		980.49	0.001259	3.29	181.71	55.71	0.32
107th to 75th	6073.870	PF1	597.00	975.69	979.98		980.32	0.003196	4.62	129.12	47.28	0.49
107th to 75th	5990.244	PF1	597.00	975.50	979.81		980.07	0.002283	4.05	147.27	51.03	0.42
107th to 75th	5926.216	PF1	597.00	975.36	979.78	977.25	979.95	0.000852	3.31	180.51	52.85	0.28
107th to 75th	5872.58		Culvert									
107th to 75th	5819.429	PF1	597.00	975.11	979.54		979.71	0.000879	3.31	180.39	49.12	0.28
107th to 75th	5760.464	PF1	597.00	974.99	979.33		979.61	0.002516	4.22	141.61	49.81	0.44
107th to 75th	5543.203	PF1	597.00	974.33	978.84		979.08	0.002241	4.01	149.00	51.82	0.42
107th to 75th	5325.945	PF1	597.00	973.68	978.27		978.56	0.002589	4.30	138.95	48.35	0.45
107th to 75th	5108.687	PF1	597.00	973.03	977.71		978.00	0.002559	4.31	138.56	47.55	0.44
107th to 75th	4891.529	PF1	597.00	972.38	975.81	975.81	976.82	0.014917	8.07	74.01	37.38	1.01
107th to 75th	4841	PF1	597.00	972.23	973.54	974.12	975.43	0.055613	11.03	54.13	46.50	1.80
107th to 75th	4824.515	PF1	597.00	970.58	974.10	972.50	974.38	0.002180	4.18	142.98	42.13	0.40
107th to 75th	4771.41		Culvert									
107th to 75th	4718.236	PF1	597.00	969.91	973.75		974.02	0.001672	4.12	144.86	50.92	0.37
107th to 75th	4635.514	PF1	597.00	969.63	973.59		973.85	0.002400	4.12	144.98	50.98	0.43
107th to 75th	4500.967	PF1	597.00	969.16	973.21		973.50	0.002760	4.34	137.63	49.68	0.46
107th to 75th	4300.967	PF1	597.00	968.47	972.64		972.94	0.002863	4.42	135.18	48.79	0.47
107th to 75th	4100.967	PF1	597.00	967.78	971.88		972.27	0.003844	5.00	119.40	110.91	0.54
107th to 75th	3900.967	PF1	597.00	966.80	970.77		971.12	0.004212	4.76	125.54	167.65	0.55
107th to 75th	3827.234	PF1	597.00	966.49	970.45		970.75	0.003486	4.41	135.32	166.61	0.51
107th to 75th	3792.336	PF1	597.00	966.36	970.29		970.61	0.003600	4.53	131.66	159.21	0.51
107th to 75th	3752.4	PF1	597.00	966.21	970.45		970.50	0.000304	1.70	350.76	150.57	0.16
107th to 75th	3744.401	PF1	597.00	964.71	970.45		970.50	0.000218	1.66	359.25	132.11	0.14

HEC-RAS Plan: ProposedSteady River: DRCC Reach: 107th to 75th Profile: PF1 (Continued)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
107th to 75th	3723.66	PF1	597.00	964.21	970.46	966.09	970.49	0.000187	1.55	384.72	137.59	0.13
107th to 75th	3680.99		Culvert									
107th to 75th	3638.766	PF1	597.00	963.89	970.15		970.18	0.000163	1.47	407.41	167.92	0.12
107th to 75th	3626.628	PF1	597.00	963.84	970.15		970.18	0.000160	1.47	407.35	151.39	0.12
107th to 75th	3447.652	PF1	1475.00	963.19	969.87		970.07	0.001019	3.63	406.55	215.03	0.30
107th to 75th	3378.689	PF1	1475.00	962.94	969.35		969.92	0.003733	6.05	243.87	139.55	0.56
107th to 75th	3311.179	PF1	1475.00	962.69	969.01		969.64	0.004288	6.37	231.68	107.80	0.60
107th to 75th	3029.130	PF1	1475.00	961.65	967.93		968.48	0.003805	5.95	248.09	246.83	0.56
107th to 75th	2978.586	PF1	1475.00	961.46	967.78		968.28	0.003494	5.67	260.29	134.81	0.54
107th to 75th	2764.104	PF1	1475.00	960.67	966.85		967.46	0.004011	6.27	235.17	103.27	0.58
107th to 75th	2550.215	PF1	1475.00	959.88	965.33		966.31	0.007149	7.93	186.09	80.00	0.76
107th to 75th	2380.141	PF1	1475.00	959.26	963.81	963.42	964.92	0.009234	8.44	174.87	57.73	0.85
107th to 75th	2180.141	PF1	1475.00	958.52	962.88		963.49	0.004669	6.25	235.98	73.58	0.62
107th to 75th	1980.141	PF1	1475.00	957.79	962.08		962.61	0.003985	5.83	252.98	77.79	0.57
107th to 75th	1780.141	PF1	1475.00	957.05	961.30		961.79	0.004012	5.64	261.61	85.23	0.57
107th to 75th	1580.141	PF1	1475.00	956.32	960.72		961.10	0.002767	4.91	300.19	91.04	0.48
107th to 75th	1380.141	PF1	1475.00	955.58	960.04		960.49	0.003339	5.36	275.38	84.35	0.52
107th to 75th	1180.141	PF1	1200.00	954.84	959.59		959.89	0.002201	4.38	273.93	105.02	0.42
107th to 75th	1124.085	PF1	1200.00	954.64	959.29	957.84	959.72	0.003601	5.31	225.87	100.08	0.54

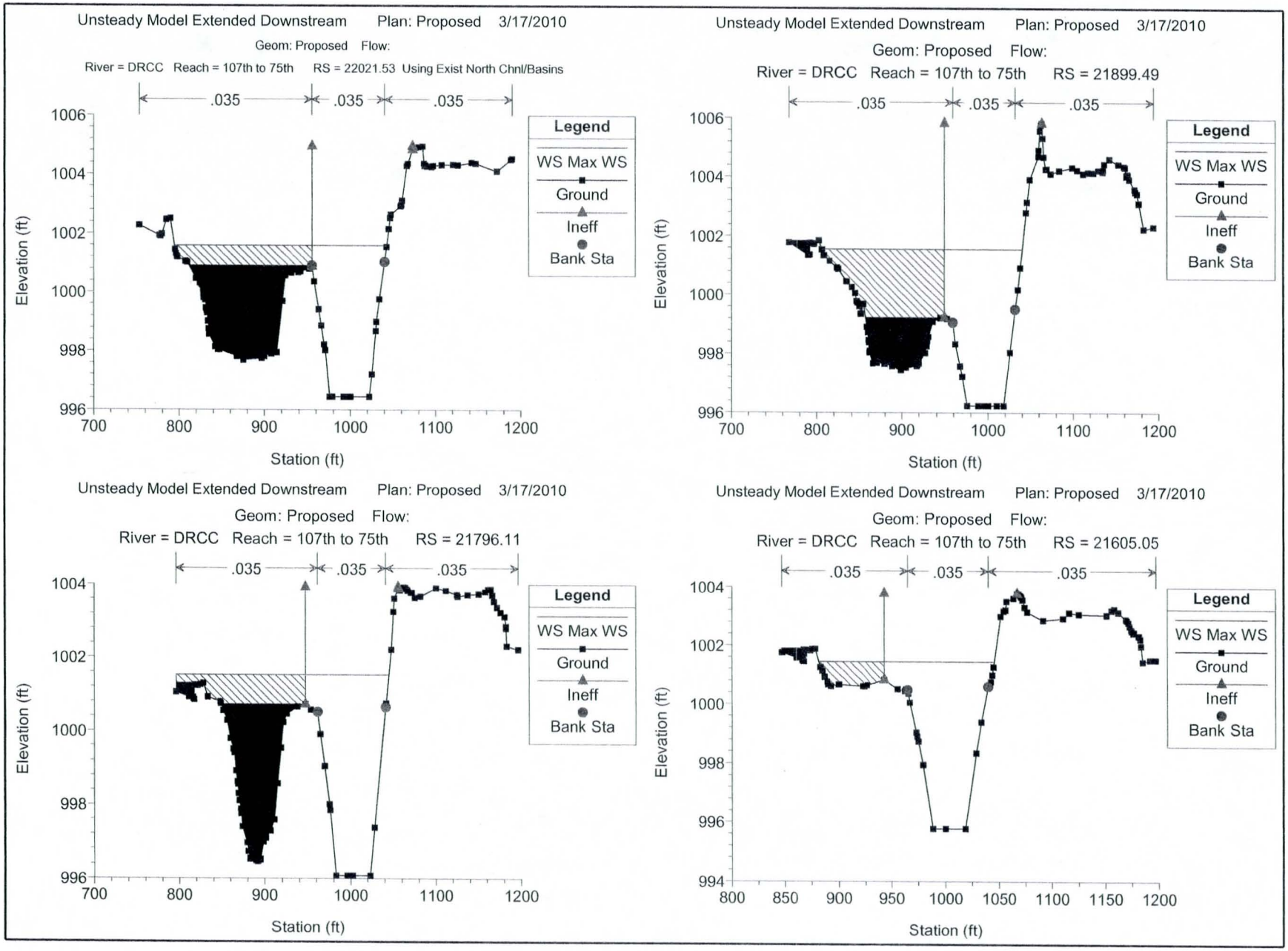

Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
DRCC 107th to 75th
Legend
WS Max WS
Ground
Elevation (ft)
1005
1000
995
990
985
980
975
970
0
2000
4000
6000
8000
10000
12000
14000
16000
18000
Main Channel Distance (ft)
PP's - 2 Exi...
99th Ave - 2 E...
PP's - 2 exist 8x4...
PP's - 2 exist 6x4 b/w ...
95th Ave - 2 Exist 12'x4' ...
PP's - 2 exist 12'x4' + 1 N...
PP's - 2 exist 12'x4' + 1 New ...
92nd Ave - 3-12'x4' (2 existing...
Stay In Exist Chnl North Side of ...
91st Ave 3 New 12x4 (replace exist 6-30" ...
Begin Using Existing Chnl/Basin South side ...
Begin Cutting New Chnl South Side of Align (downst...
79th Ave Exist 2-10'x4', new 2-10'x5'
76th Ave 2-10'x6.5' (existing)
Using Exist North Chnl/Basins

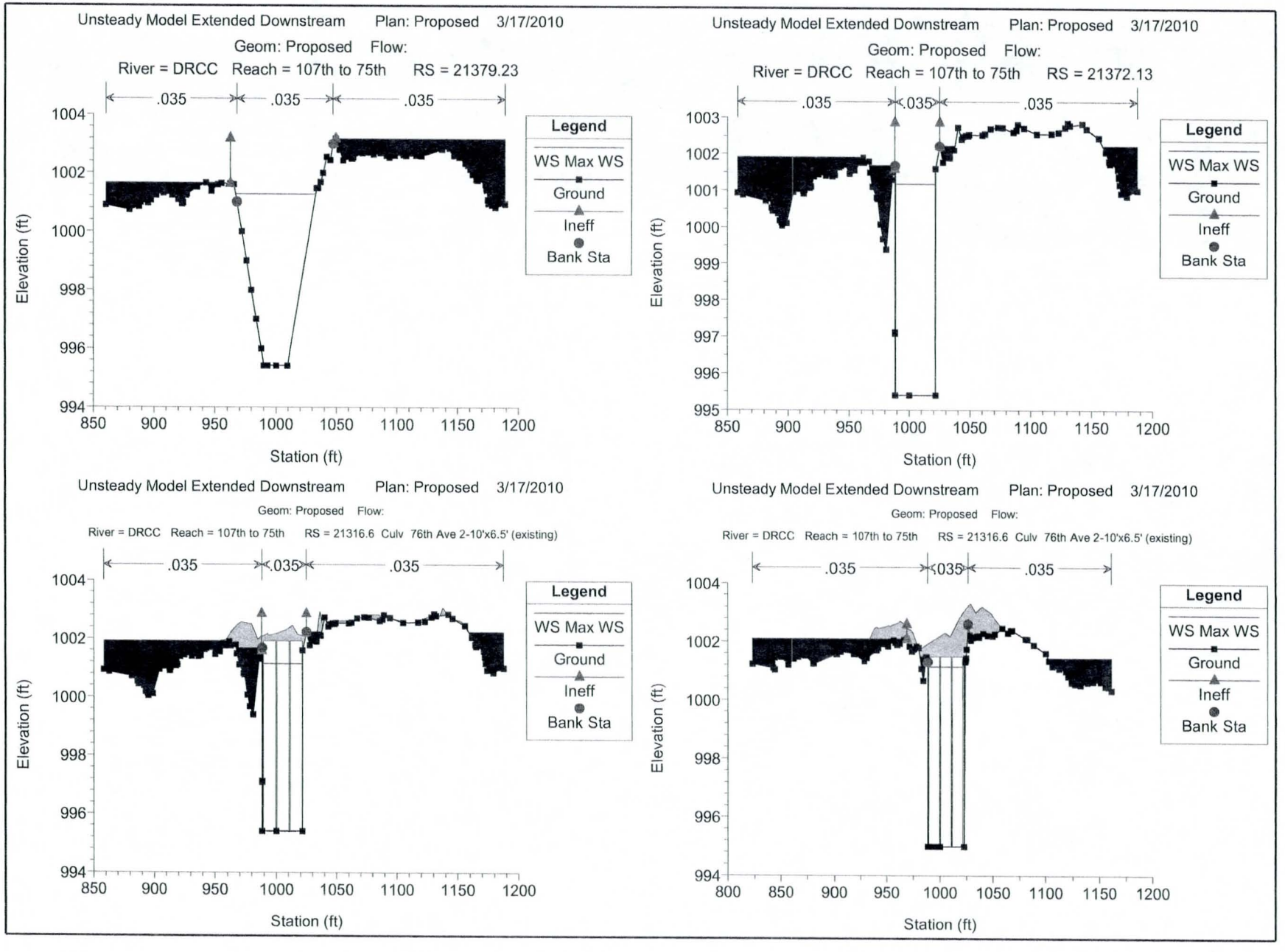
HEC-RAS Plan: Proposed River: DRCC Reach: 107th to 75th Profile: Max WS

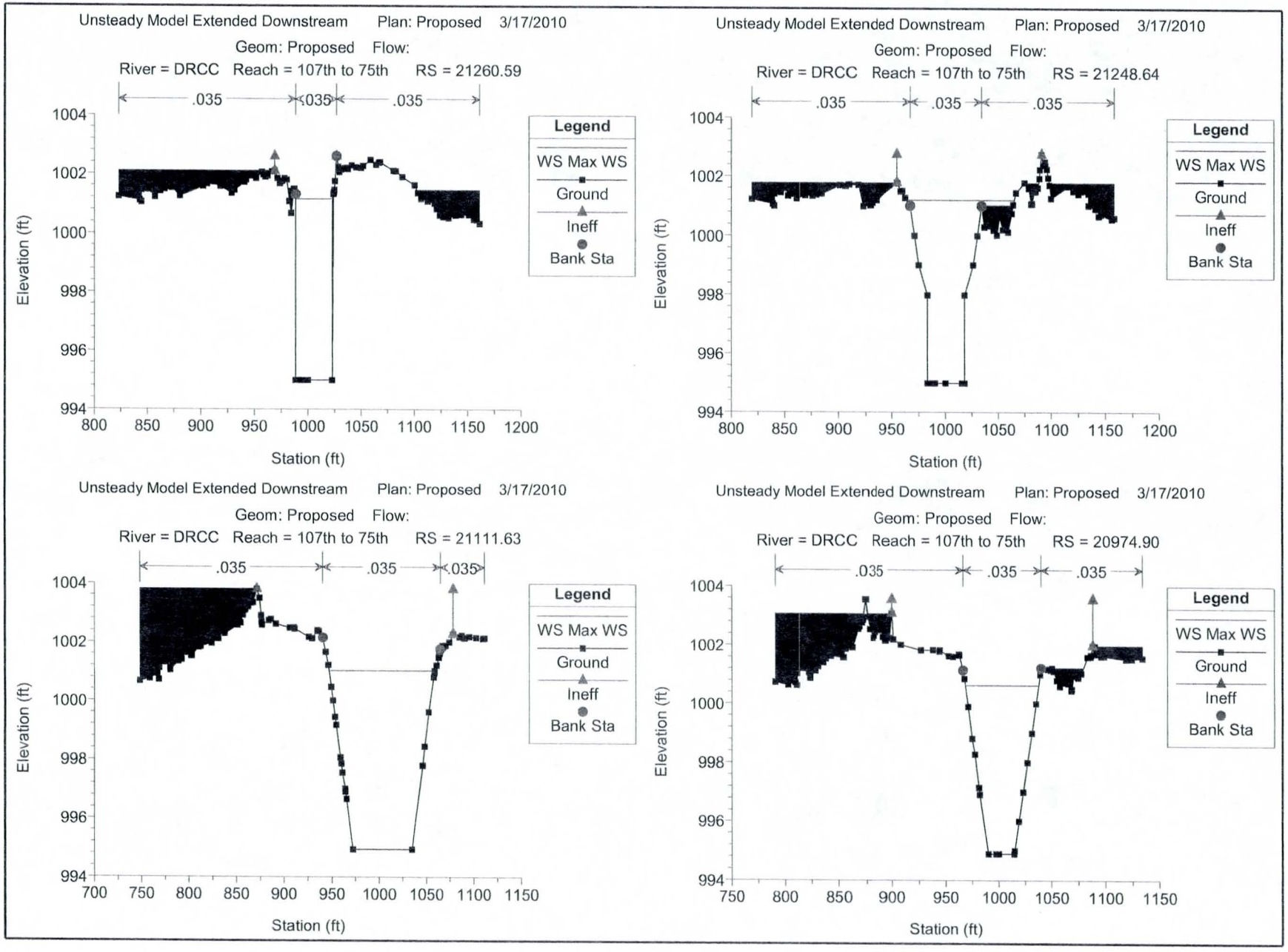
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
107th to 75th	22021.53	Max WS	739.57	996.44	1001.59		1001.66	0.000411	2.16	343.10	248.06	0.19
107th to 75th	21899.49	Max WS	732.95	996.24	1001.56		1001.62	0.000296	2.03	374.27	234.03	0.17
107th to 75th	21796.11	Max WS	729.30	996.08	1001.52		1001.59	0.000362	2.11	355.64	248.61	0.18
107th to 75th	21605.05	Max WS	719.96	995.77	1001.44		1001.52	0.000432	2.26	333.04	163.76	0.20
107th to 75th	21379.23	Max WS	684.21	995.41	1001.27		1001.39	0.000720	2.75	248.79	65.95	0.25
107th to 75th	21372.13	Max WS	673.76	995.40	1001.17		1001.38	0.001069	3.64	185.19	32.09	0.27
107th to 75th	21316.6		Culvert									
107th to 75th	21260.59	Max WS	673.35	994.99	1001.13		1001.29	0.000766	3.21	209.69	34.13	0.23
107th to 75th	21248.64	Max WS	674.59	994.98	1001.20		1001.29	0.000541	2.40	285.34	101.18	0.21
107th to 75th	21111.63	Max WS	1280.66	994.93	1001.02		1001.11	0.000414	2.42	530.08	111.82	0.20
107th to 75th	20974.90	Max WS	1251.37	994.89	1000.63		1000.96	0.001997	4.64	269.76	69.10	0.41
107th to 75th	20942.79	Max WS	1241.06	994.87	1000.54		1000.89	0.002334	4.71	263.54	74.35	0.44
107th to 75th	20824.86	Max WS	1237.33	994.82	1000.52		1000.69	0.000960	3.31	373.31	177.81	0.29
107th to 75th	20742.28	Max WS	1225.17	994.79	1000.39		1000.60	0.001252	3.68	332.71	86.40	0.33
107th to 75th	20607.24	Max WS	1214.08	994.73	1000.25		1000.45	0.001078	3.53	344.32	84.22	0.31
107th to 75th	20460.42	Max WS	1234.89	994.68	1000.16		1000.30	0.000802	3.05	404.56	98.76	0.27
107th to 75th	20225.62	Max WS	1207.92	994.58	999.94		1000.10	0.000931	3.25	371.39	92.21	0.29
107th to 75th	20053.61	Max WS	1196.12	994.52	999.79		999.95	0.000893	3.16	378.64	95.13	0.28
107th to 75th	19956.55	Max WS	1181.97	994.48	999.71		999.86	0.000898	3.17	373.08	93.66	0.28
107th to 75th	19848.16	Max WS	1171.82	994.43	999.65		999.77	0.000742	2.87	407.61	102.83	0.25
107th to 75th	19655.30	Max WS	1165.04	994.36	999.49		999.63	0.000773	3.00	387.78	94.10	0.26
107th to 75th	19454.67	Max WS	1164.28	994.30	999.43		999.51	0.000425	2.34	545.27	236.60	0.20
107th to 75th	19265.59	Max WS	1164.86	994.21	999.36		999.44	0.000378	2.22	543.44	151.96	0.19
107th to 75th	19104.45	Max WS	1162.37	994.14	998.94		999.28	0.002093	4.65	249.97	64.02	0.41
107th to 75th	19099.95	Max WS	1162.21	994.14	998.92		999.27	0.001950	4.75	244.86	66.06	0.41
107th to 75th	19059.6		Culvert									
107th to 75th	19018.41	Max WS	1149.63	993.70	998.15		998.57	0.002543	5.22	220.16	54.09	0.46
107th to 75th	19013.41	Max WS	1135.93	993.54	997.99		998.55	0.003361	6.00	189.33	59.94	0.51
107th to 75th	18802.29	Max WS	1129.56	993.37	997.90		998.04	0.000967	3.13	391.71	162.74	0.29
107th to 75th	18595.01	Max WS	1097.51	993.20	997.66		997.83	0.001085	3.28	354.24	169.25	0.30
107th to 75th	18368.16	Max WS	885.09	993.02	997.22		997.41	0.001500	3.57	248.79	84.22	0.35
107th to 75th	18275.77	Max WS	897.77	992.94	997.27		997.31	0.000262	1.59	566.10	160.82	0.15
107th to 75th	18161.34	Max WS	875.49	992.85	997.15		997.25	0.000869	2.59	338.64	113.31	0.26
107th to 75th	17925.28	Max WS	855.91	992.66	997.09		997.12	0.000238	1.45	590.49	178.73	0.14
107th to 75th	17715.28	Max WS	850.08	992.49	997.06		997.08	0.000188	1.26	674.25	210.90	0.12
107th to 75th	17555.28	Max WS	848.75	992.36	997.05		997.06	0.000074	0.89	956.72	252.29	0.08
107th to 75th	17358.60	Max WS	847.03	992.20	997.03		997.05	0.000114	1.12	757.90	195.40	0.10
107th to 75th	17163.60	Max WS	845.46	992.04	997.01		997.03	0.000085	1.01	834.49	199.31	0.09
107th to 75th	16968.60	Max WS	1017.28	991.88	996.66		996.96	0.001355	4.43	229.42	212.91	0.36
107th to 75th	16808.5		Culvert									
107th to 75th	16692.50	Max WS	1009.00	991.48	995.87		996.24	0.001907	4.89	206.49	75.05	0.42
107th to 75th	16687.50	Max WS	1010.26	991.47	995.95		996.23	0.001506	4.22	239.65	75.78	0.37
107th to 75th	16476.05	Max WS	1007.08	991.32	995.72		995.93	0.001448	3.64	276.51	80.60	0.35
107th to 75th	16257.59	Max WS	1002.64	991.14	995.50		995.66	0.001063	3.18	315.76	89.82	0.30
107th to 75th	16064.95	Max WS	1000.79	990.99	995.33		995.47	0.000928	2.99	335.24	94.52	0.28
107th to 75th	15869.75	Max WS	998.37	990.83	995.14		995.28	0.000940	2.99	333.69	94.69	0.28
107th to 75th	15673.99	Max WS	996.65	990.69	994.98		995.12	0.000955	3.00	331.70	94.69	0.28
107th to 75th	15367.13	Max WS	994.69	990.48	994.73		994.87	0.000944	2.94	338.23	99.02	0.28
107th to 75th	15149.86	Max WS	994.27	990.33	994.55		994.69	0.001012	3.06	324.75	94.08	0.29
107th to 75th	14980.94	Max WS	993.77	990.17	994.34		994.49	0.001048	3.09	321.49	94.28	0.29
107th to 75th	14830.39	Max WS	993.67	990.04	994.16		994.31	0.001100	3.15	315.14	93.04	0.30
107th to 75th	14660.50	Max WS	993.60	989.91	993.97		994.13	0.001150	3.19	311.57	93.57	0.31
107th to 75th	14490.60	Max WS	993.40	989.78	993.76		993.93	0.001233	3.27	303.95	92.69	0.32
107th to 75th	14336.14	Max WS	990.67	989.59	993.44		993.62	0.001356	3.34	296.21	93.77	0.33
107th to 75th	14027.21	Max WS	974.50	989.42	993.10		993.30	0.001576	3.54	275.29	89.54	0.36
107th to 75th	13898.73	Max WS	943.37	989.32	992.87		993.07	0.001672	3.57	264.13	88.65	0.36
107th to 75th	13764.04	Max WS	1145.55	989.21	991.72		992.35	0.008100	6.35	180.29	83.53	0.76
107th to 75th	13763		Lat Struct									
107th to 75th	13629.35	Max WS	692.35	989.10	991.75		991.96	0.002497	3.68	188.28	81.88	0.43
107th to 75th	13429.34	Max WS	332.23	988.94	991.78		991.82	0.000458	1.64	202.59	82.84	0.18
107th to 75th	13229.30	Max WS	330.23	988.78	991.69		991.73	0.000414	1.59	208.22	82.97	0.18
107th to 75th	13024.53	Max WS	326.18	988.62	991.62		991.65	0.000362	1.51	216.70	84.53	0.17
107th to 75th	12887.75	Max WS	326.19	988.51	991.57		991.61	0.000336	1.47	222.39	85.13	0.16
107th to 75th	12743.96	Max WS	324.25	988.45	991.44		991.48	0.000565	1.72	188.46	83.90	0.20
107th to 75th	12686		Culvert									
107th to 75th	12623.23	Max WS	323.56	988.35	991.15		991.19	0.000447	1.47	219.39	103.67	0.18
107th to 75th	12444.37	Max WS	323.51	988.22	991.05		991.10	0.000551	1.80	179.73	73.27	0.20
107th to 75th	12282.22	Max WS	323.28	988.09	991.01		991.04	0.000250	1.26	256.81	99.26	0.14
107th to 75th	12150.09	Max WS	322.42	987.92	990.95		990.98	0.000287	1.35	238.95	92.25	0.15
107th to 75th	12027.39	Max WS	321.73	987.82	990.92		990.94	0.000244	1.27	253.72	95.15	0.14
107th to 75th	11873.49	Max WS	319.86	987.70	990.88		990.91	0.000223	1.23	260.22	95.67	0.13
107th to 75th	11693.45	Max WS	319.04	987.46	990.85		990.86	0.000061	0.70	454.69	147.64	0.07
107th to 75th	11564.37	Max WS	721.67	987.36	990.49		990.70	0.001932	3.64	198.14	76.08	0.39
107th to 75th	11473.3		Culvert									
107th to 75th	11330.76	Max WS	691.07	984.16	989.32		989.52	0.001228	3.59	192.62	47.59	0.31
107th to 75th	11209.18	Max WS	690.84	983.98	989.26		989.39	0.000936	2.97	232.63	65.96	0.28

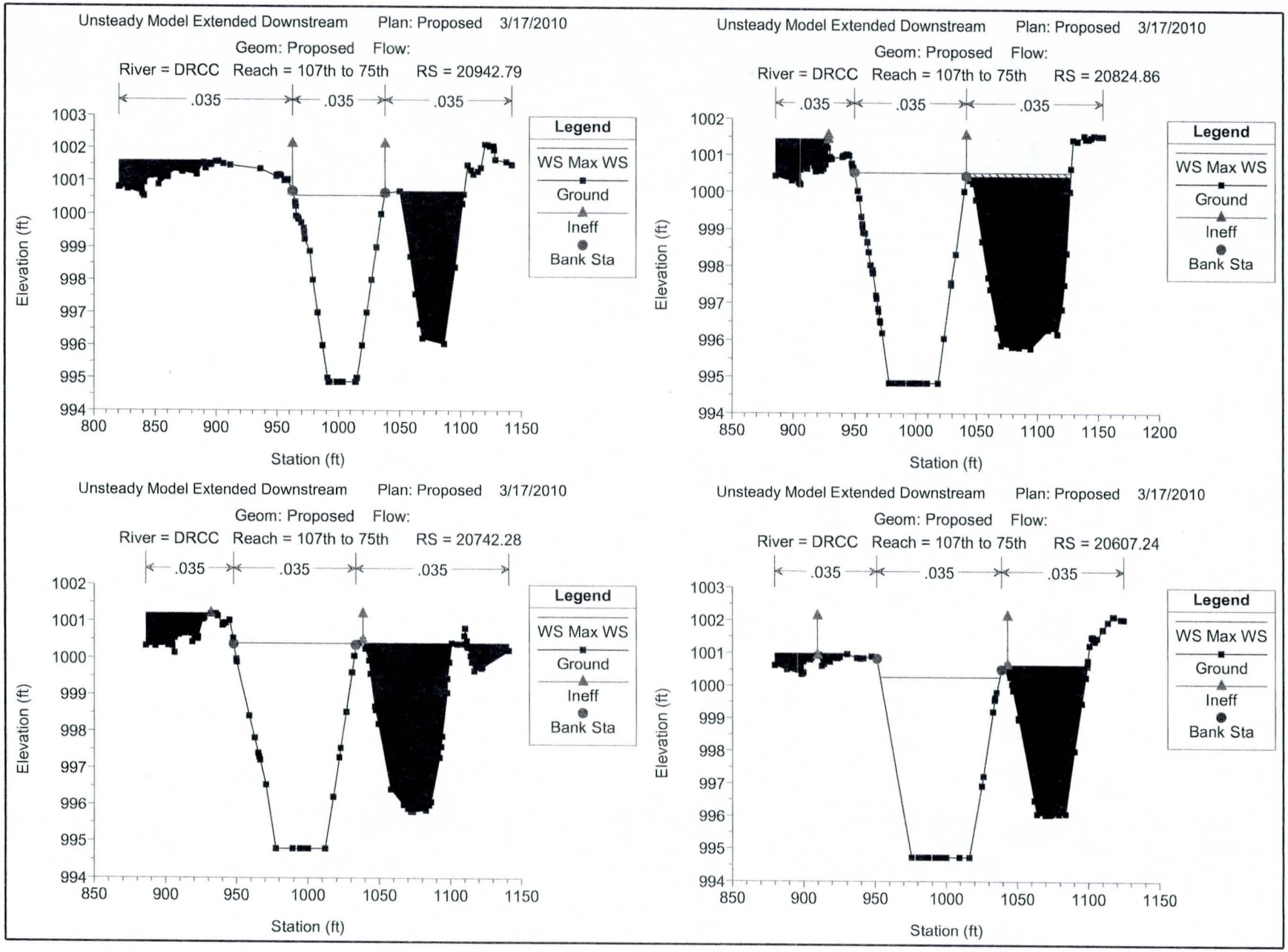
HEC-RAS Plan: Proposed River: DRCC Reach: 107th to 75th Profile: Max WS (Continued)

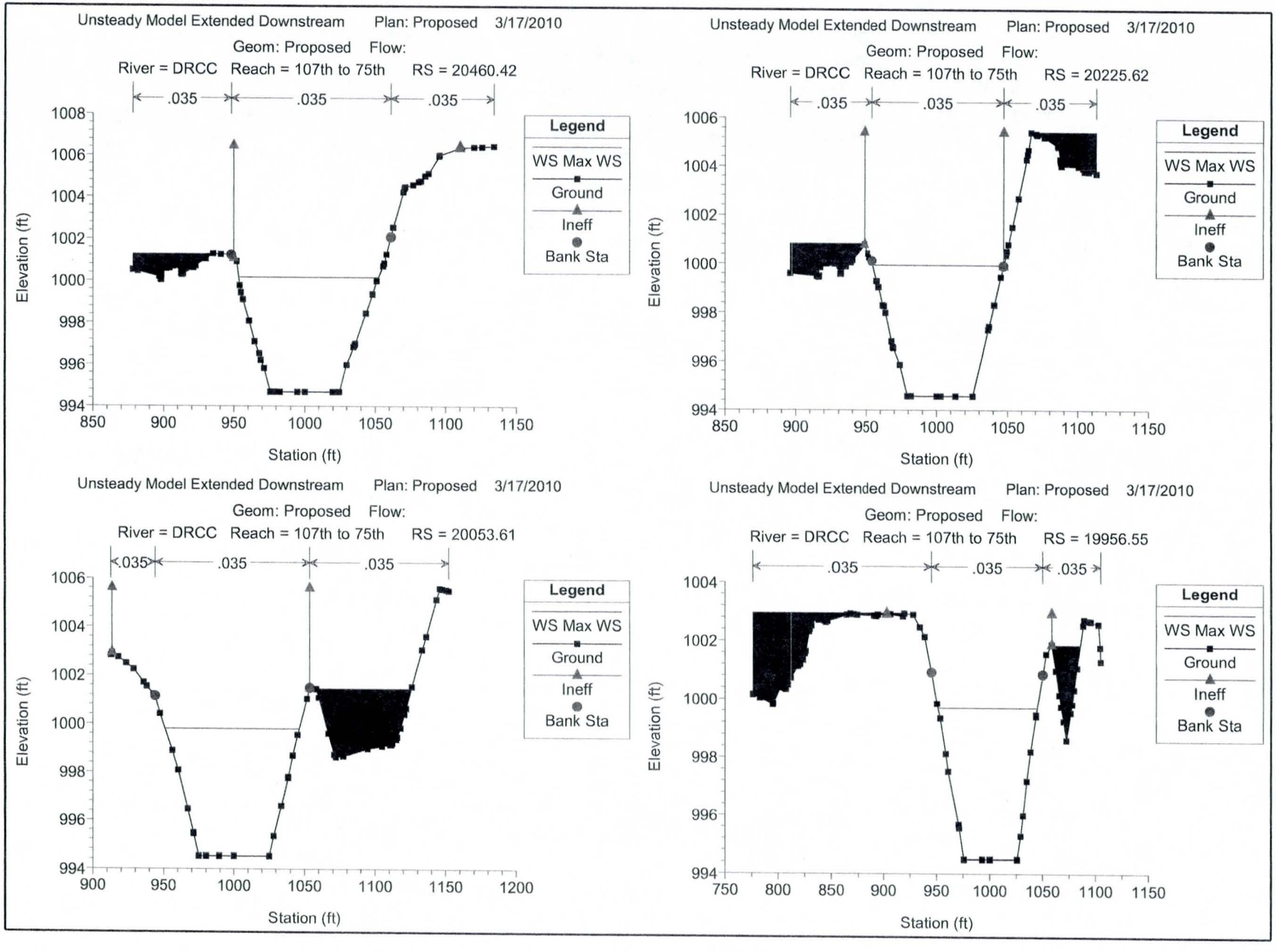
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
107th to 75th	11026.14	Max WS	689.57	983.72	989.15		989.25	0.000632	2.55	270.59	71.90	0.23
107th to 75th	10842.14	Max WS	687.10	983.45	989.01		989.13	0.000732	2.71	253.59	68.59	0.25
107th to 75th	10658.14	Max WS	685.59	983.18	988.86		989.00	0.000690	3.00	228.24	61.10	0.25
107th to 75th	10651.66	Max WS	685.63	983.17	988.85		988.99	0.000529	3.03	226.09	42.72	0.22
107th to 75th	10622.9		Culvert									
107th to 75th	10594.12	Max WS	682.04	982.96	988.50		988.65	0.000648	3.11	219.61	41.24	0.23
107th to 75th	10583.46	Max WS	682.00	982.95	988.50		988.65	0.000742	3.10	220.14	58.86	0.25
107th to 75th	10466.47	Max WS	681.72	982.84	988.45		988.56	0.000700	2.68	254.20	67.59	0.24
107th to 75th	10349.47	Max WS	680.55	982.73	988.35		988.49	0.000528	2.97	229.22	60.65	0.22
107th to 75th	10337.24	Max WS	680.38	982.72	988.28		988.48	0.000738	3.61	188.72	59.61	0.27
107th to 75th	10284.4		Culvert									
107th to 75th	10231.53	Max WS	675.34	982.62	987.67		987.92	0.001015	3.94	171.20	48.09	0.31
107th to 75th	10219.08	Max WS	675.61	982.61	987.71		987.90	0.000940	3.52	191.98	55.83	0.29
107th to 75th	10142.23	Max WS	675.45	982.53	987.69		987.83	0.001002	3.01	224.51	65.90	0.29
107th to 75th	9977.215	Max WS	673.92	982.36	987.54		987.67	0.000908	2.89	233.23	67.59	0.27
107th to 75th	9810.214	Max WS	672.34	982.20	987.37		987.51	0.001002	3.00	223.95	65.92	0.29
107th to 75th	9643.214	Max WS	672.11	982.03	987.25		987.36	0.000801	2.75	244.48	69.51	0.26
107th to 75th	9476.214	Max WS	671.46	981.86	987.10		987.23	0.000863	2.84	236.29	67.55	0.27
107th to 75th	9309.213	Max WS	671.12	981.69	986.92		987.07	0.001059	3.05	220.26	66.16	0.29
107th to 75th	9249.244	Max WS	671.01	981.63	986.88		987.01	0.000775	2.92	229.44	57.55	0.26
107th to 75th	9236.724	Max WS	670.99	981.62	986.81		987.00	0.000776	3.54	189.33	51.87	0.27
107th to 75th	9183.8		Culvert									
107th to 75th	9130.952	Max WS	669.79	981.59	986.19		986.43	0.001157	3.99	167.78	53.69	0.33
107th to 75th	9118.369	Max WS	669.88	981.56	986.23		986.42	0.001314	3.51	190.75	53.45	0.33
107th to 75th	9015.904	Max WS	669.65	981.34	986.15		986.30	0.001064	3.11	215.60	62.98	0.30
107th to 75th	8913.440	Max WS	669.59	981.12	986.10		986.21	0.000661	2.67	250.33	62.65	0.23
107th to 75th	8897.158	Max WS	669.48	981.08	986.02		986.20	0.000789	3.41	196.59	48.69	0.27
107th to 75th	8856.2		Culvert									
107th to 75th	8815.245	Max WS	668.19	981.04	985.63		985.83	0.000991	3.66	182.79	51.63	0.30
107th to 75th	8797.054	Max WS	668.70	981.00	985.65		985.82	0.000970	3.26	205.07	59.84	0.29
107th to 75th	8595.493	Max WS	667.80	980.63	985.37		985.56	0.001533	3.58	186.46	57.80	0.35
107th to 75th	8395.491	Max WS	667.07	980.26	985.03		985.24	0.001702	3.72	179.21	56.77	0.37
107th to 75th	8244.220	Max WS	666.76	979.98	984.83		985.01	0.001344	3.39	196.74	60.07	0.33
107th to 75th	8195.404	Max WS	666.68	979.89	984.71		984.94	0.001776	3.84	173.56	53.93	0.38
107th to 75th	8135.179	Max WS	666.64	979.78	984.69		984.86	0.000740	3.32	200.82	63.03	0.26
107th to 75th	8081.9		Culvert									
107th to 75th	8028.601	Max WS	665.80	979.52	984.27		984.46	0.000826	3.43	194.30	55.72	0.28
107th to 75th	7971.581	Max WS	665.63	979.41	984.12		984.37	0.002010	4.02	165.64	52.71	0.40
107th to 75th	7795.150	Max WS	664.68	979.07	983.80		984.04	0.001805	3.89	171.03	55.36	0.38
107th to 75th	7620.150	Max WS	663.66	978.73	983.48		983.71	0.001967	3.88	171.05	56.79	0.39
107th to 75th	7445.150	Max WS	662.97	978.39	983.15		983.38	0.001850	3.81	174.07	56.70	0.38
107th to 75th	7270.150	Max WS	663.33	978.05	982.87		983.07	0.001606	3.64	182.00	56.87	0.36
107th to 75th	7095.150	Max WS	663.10	977.71	982.58		982.79	0.001641	3.71	178.73	55.17	0.36
107th to 75th	7030.872	Max WS	663.13	977.59	982.57		982.72	0.000623	3.04	218.41	52.25	0.24
107th to 75th	6977.5		Culvert									
107th to 75th	6924.108	Max WS	662.68	977.42	982.13		982.29	0.000735	3.21	206.68	50.56	0.26
107th to 75th	6862.202	Max WS	662.46	977.30	981.95		982.20	0.002029	4.03	164.54	52.66	0.40
107th to 75th	6685.607	Max WS	661.69	976.95	981.53		981.81	0.002432	4.26	155.23	52.31	0.44
107th to 75th	6509.607	Max WS	661.19	976.60	981.15		981.41	0.002178	4.09	161.78	53.52	0.41
107th to 75th	6328.607	Max WS	661.16	976.20	980.94		981.11	0.001143	3.23	204.42	58.88	0.31
107th to 75th	6307.41	Max WS	661.19	976.20	980.94		981.09	0.000676	3.11	212.86	75.10	0.25
107th to 75th	6241.77		Culvert									
107th to 75th	6176.120	Max WS	661.05	975.92	980.61		980.76	0.000700	3.14	210.62	73.15	0.26
107th to 75th	6157.419	Max WS	661.07	975.88	980.56		980.74	0.001255	3.39	194.99	56.25	0.32
107th to 75th	6073.870	Max WS	660.81	975.69	980.22		980.56	0.003118	4.70	140.57	49.26	0.49
107th to 75th	5990.244	Max WS	660.85	975.50	980.08		980.34	0.002180	4.10	161.27	53.09	0.41
107th to 75th	5926.216	Max WS	660.82	975.36	980.06		980.24	0.000850	3.44	192.04	53.76	0.28
107th to 75th	5872.58		Culvert									
107th to 75th	5819.429	Max WS	660.78	975.11	979.74		979.93	0.000931	3.51	188.41	49.62	0.29
107th to 75th	5760.464	Max WS	660.67	974.99	979.53		979.83	0.002552	4.35	151.73	51.37	0.45
107th to 75th	5543.203	Max WS	660.50	974.33	979.04		979.30	0.002284	4.14	159.59	53.62	0.42
107th to 75th	5325.945	Max WS	660.41	973.68	978.45		978.76	0.002684	4.47	147.90	49.91	0.46
107th to 75th	5108.687	Max WS	660.35	973.03	977.85		978.17	0.002761	4.54	145.40	48.80	0.46
107th to 75th	4891.529	Max WS	660.33	972.38	975.97	975.98	977.02	0.014616	8.23	80.23	38.71	1.01

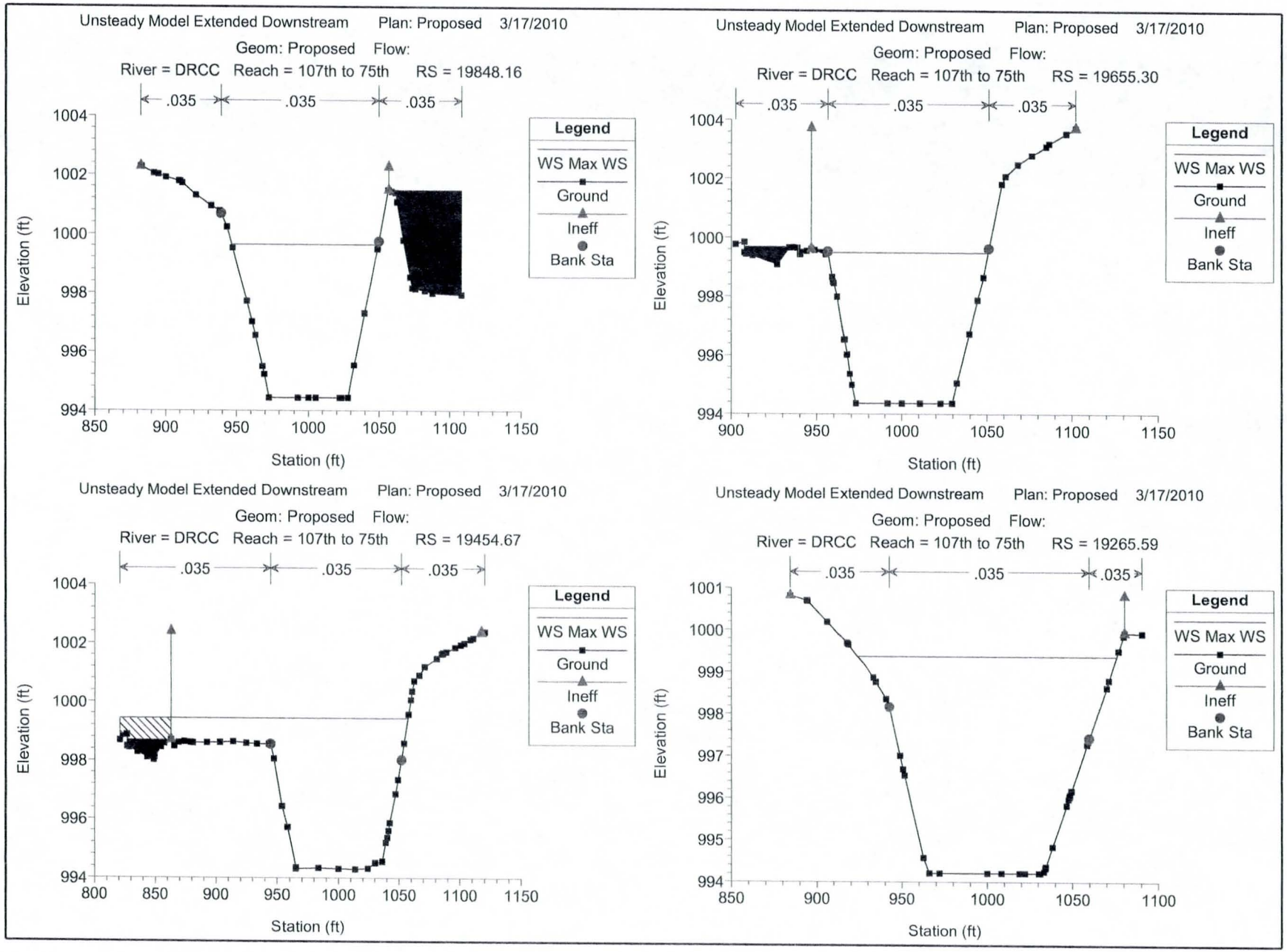

Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 22021.53 Using Exist North Chnl/Basins
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 21899.49
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 21796.11
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 21605.05

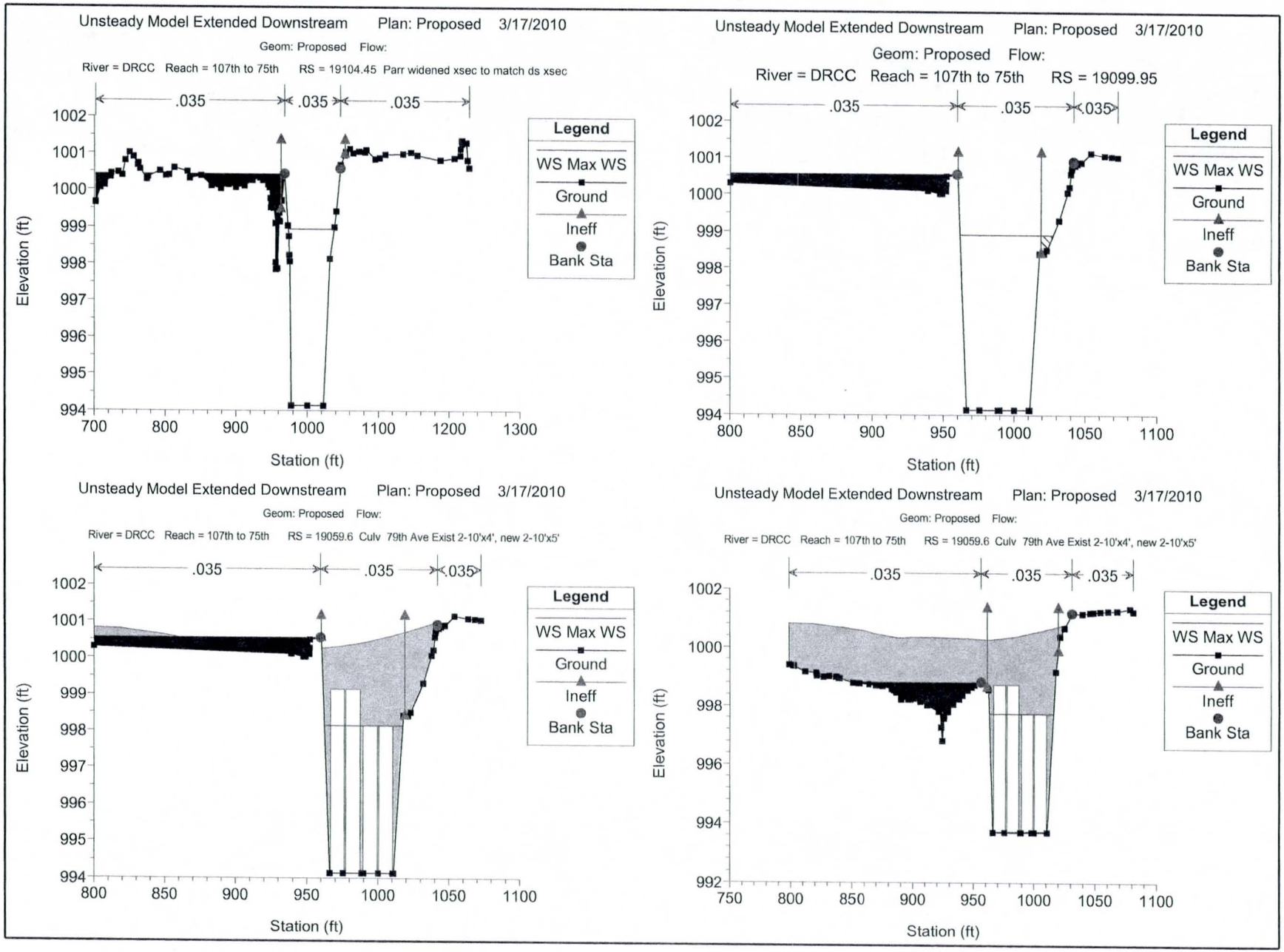

Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 21379.23
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 21372.13
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 21316.6 Culv 76th Ave 2-10'x6.5' (existing)
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 21316.6 Culv 76th Ave 2-10'x6.5' (existing)
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

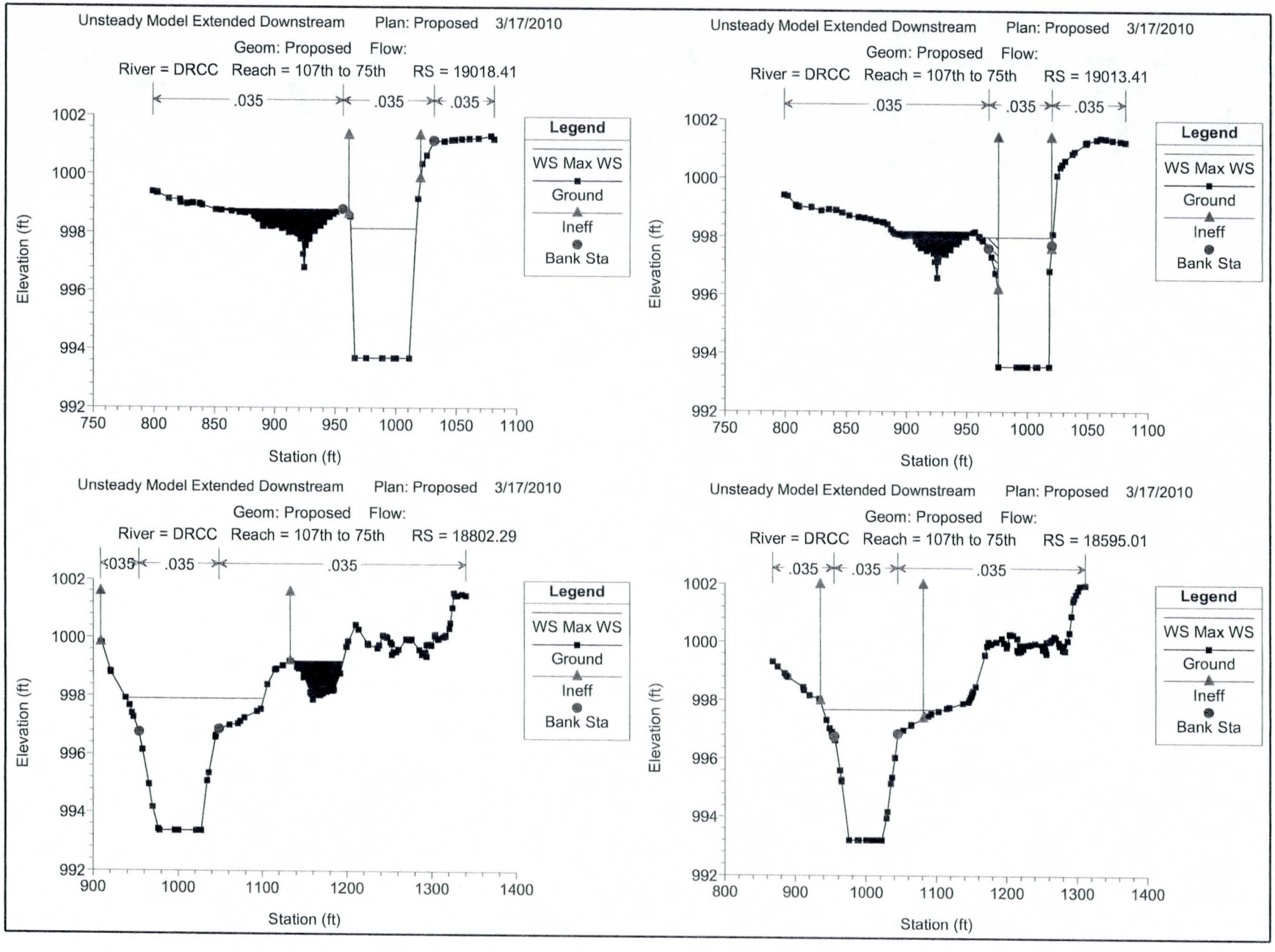

Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 21260.59
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 21248.64
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 21111.63
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 20974.90
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

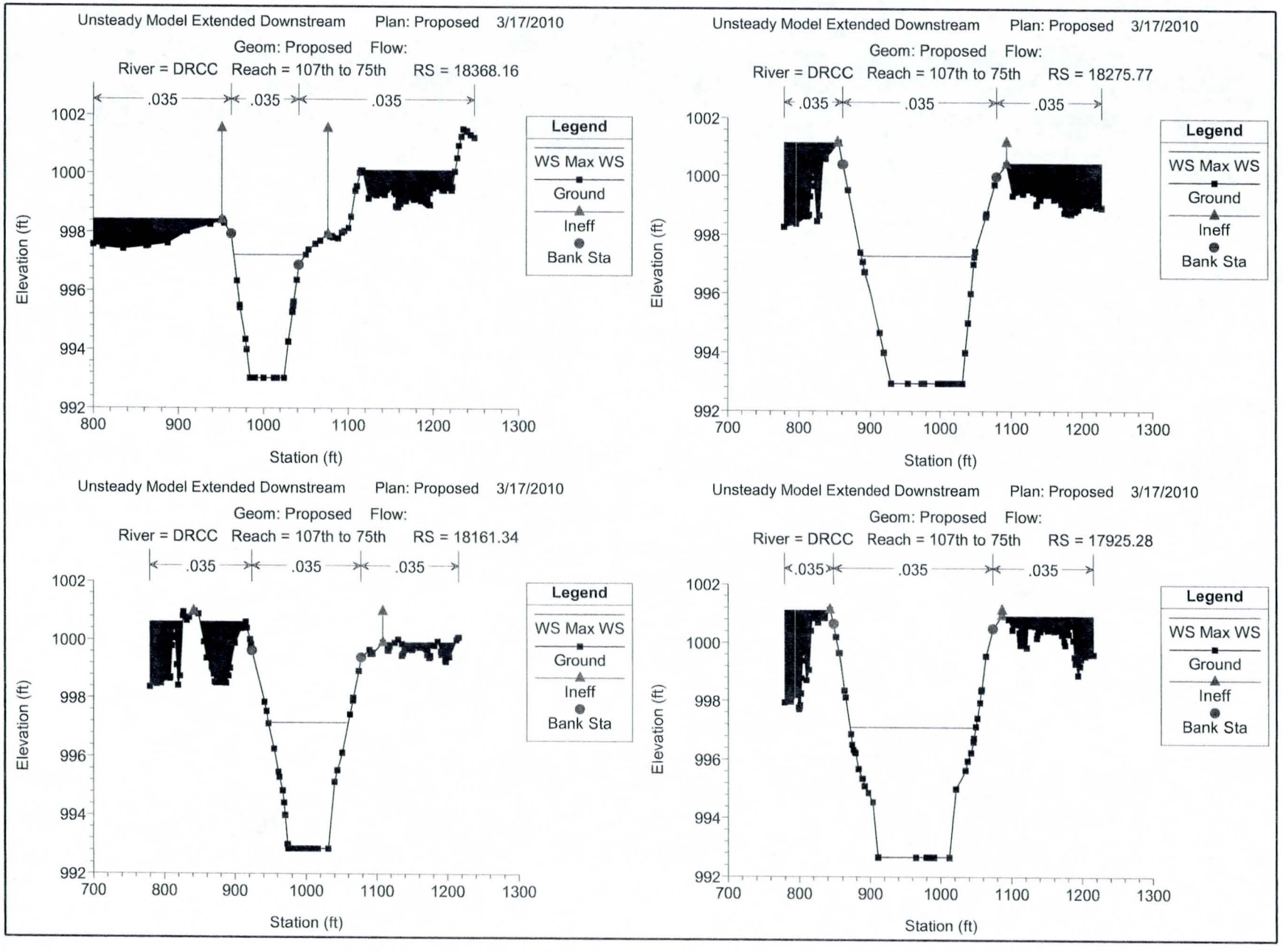

Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 20942.79
.035 .035 .035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 20824.86
.035 .035 .035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 20742.28
.035 .035 .035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 20607.24
.035 .035 .035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

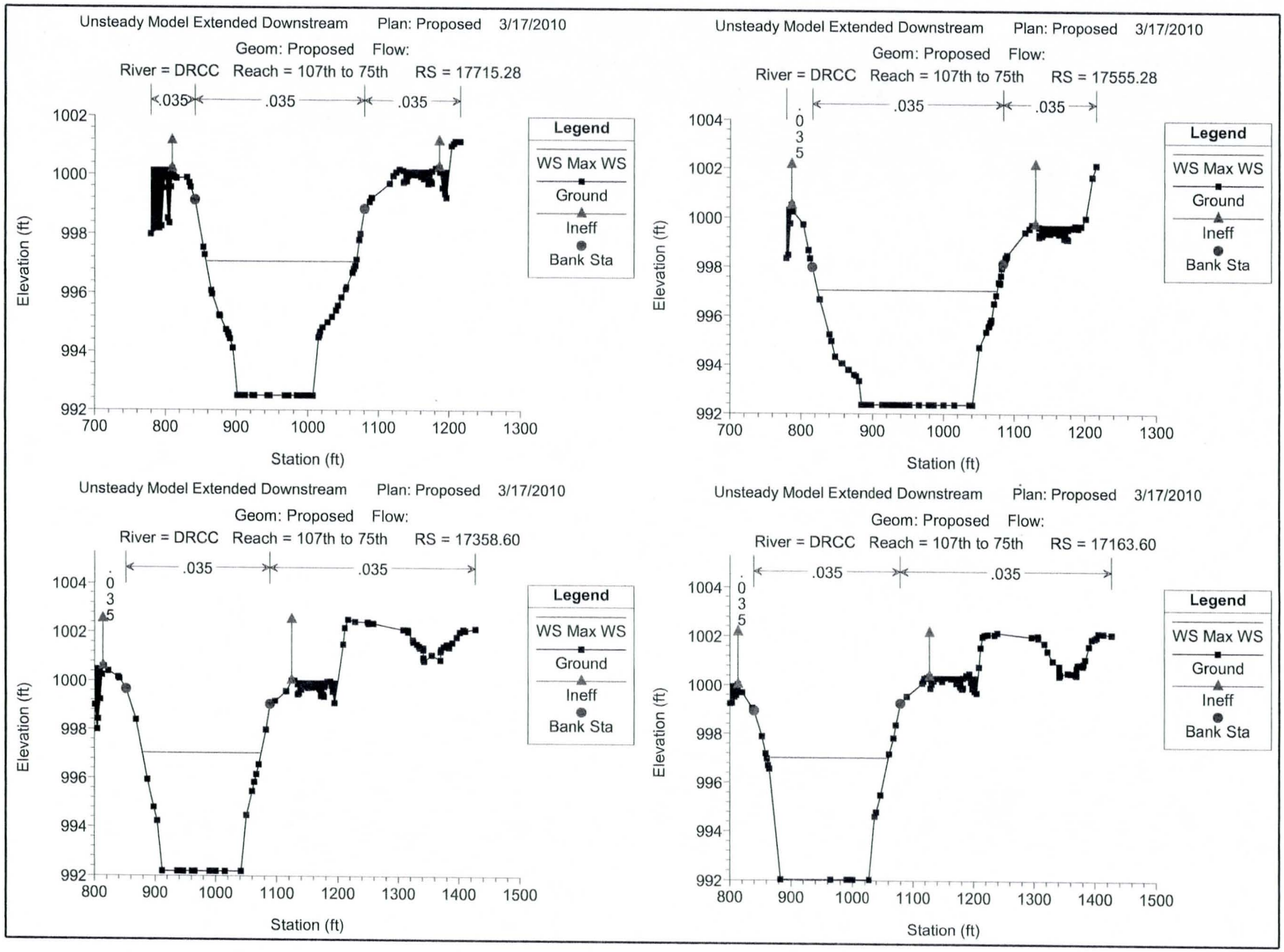

Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 20460.42
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 20225.62
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 20053.61
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 19956.55
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

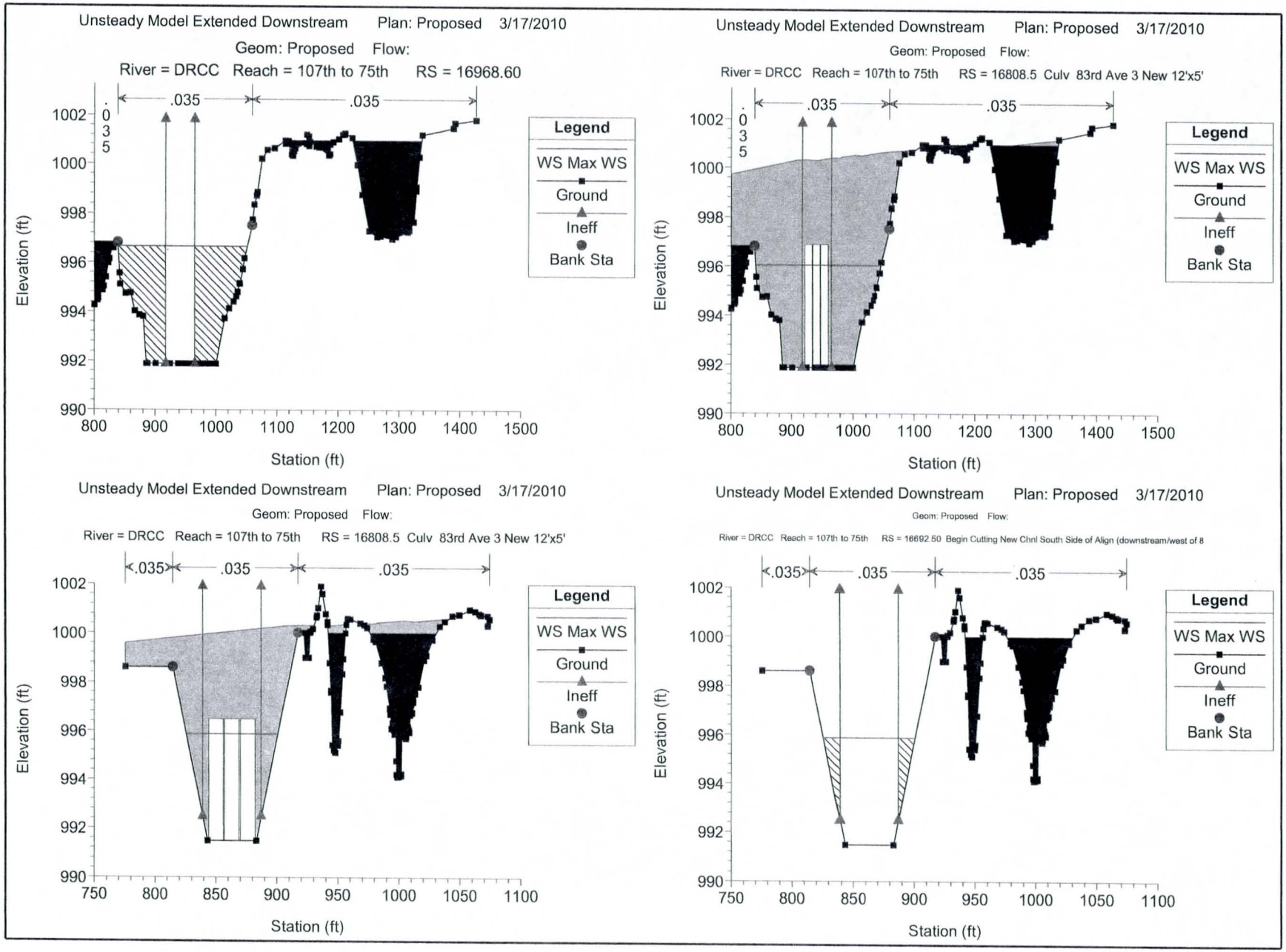

Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 19848.16
.035 .035 .035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 19655.30
.035 .035 .035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 19454.67
.035 .035 .035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 19265.59
.035 .035 .035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

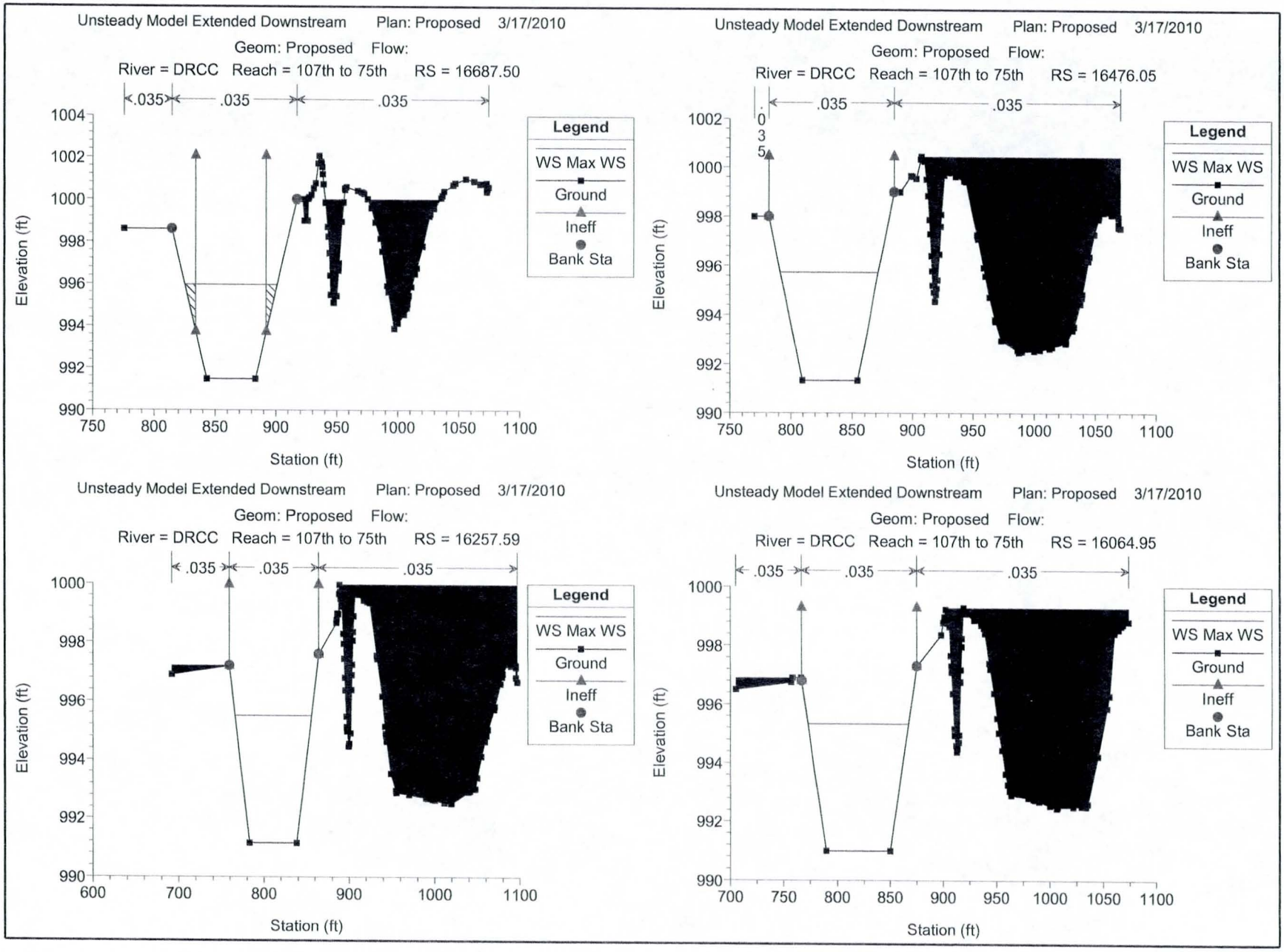

Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 19104.45 Parr widened xsec to match ds xsec
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 19099.95
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 19059.6 Culv 79th Ave Exist 2-10'x4', new 2-10'x5'
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 19059.6 Culv 79th Ave Exist 2-10'x4', new 2-10'x5'
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

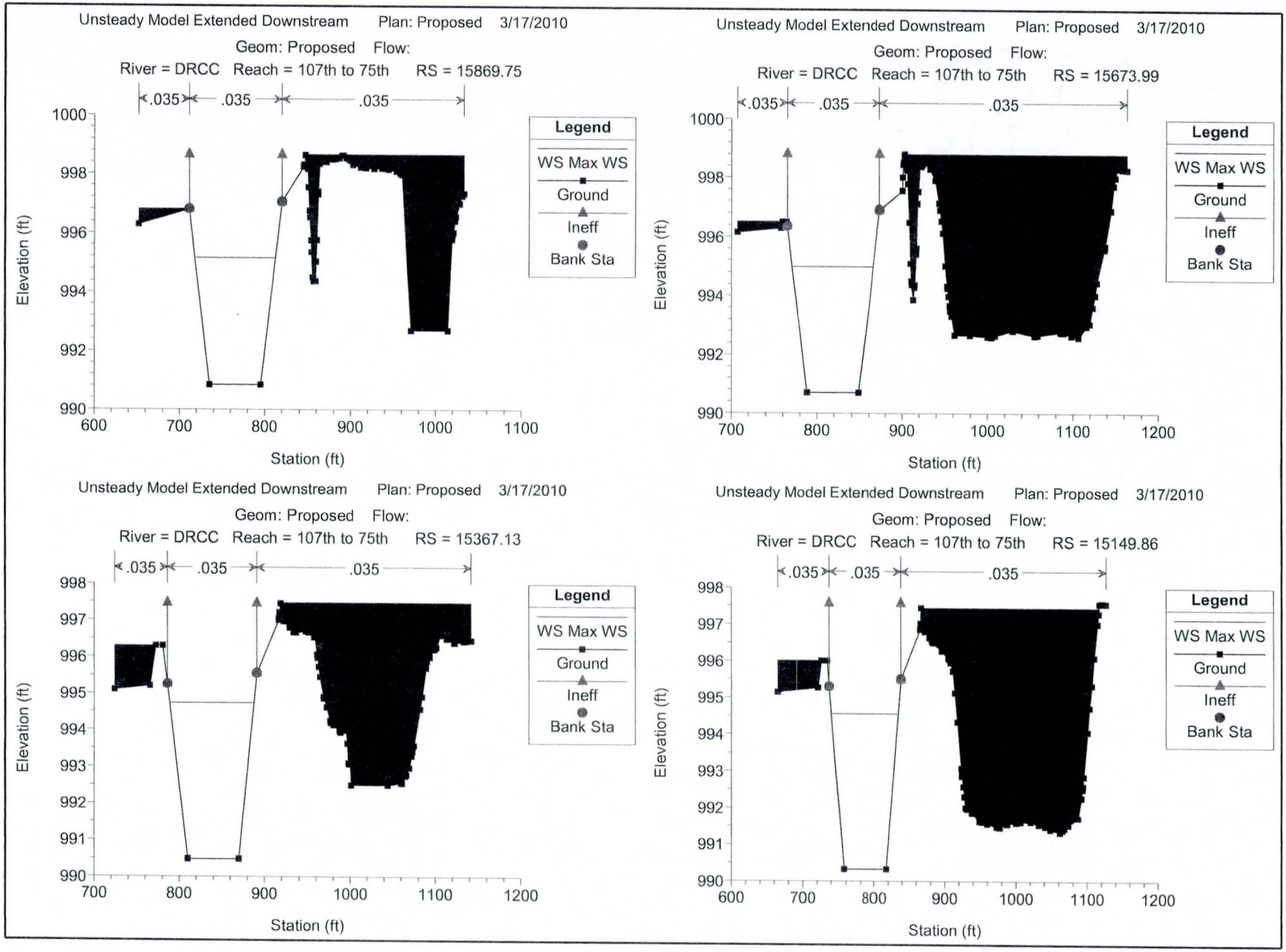

Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 19018.41
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 19013.41
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 18802.29
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 18595.01
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

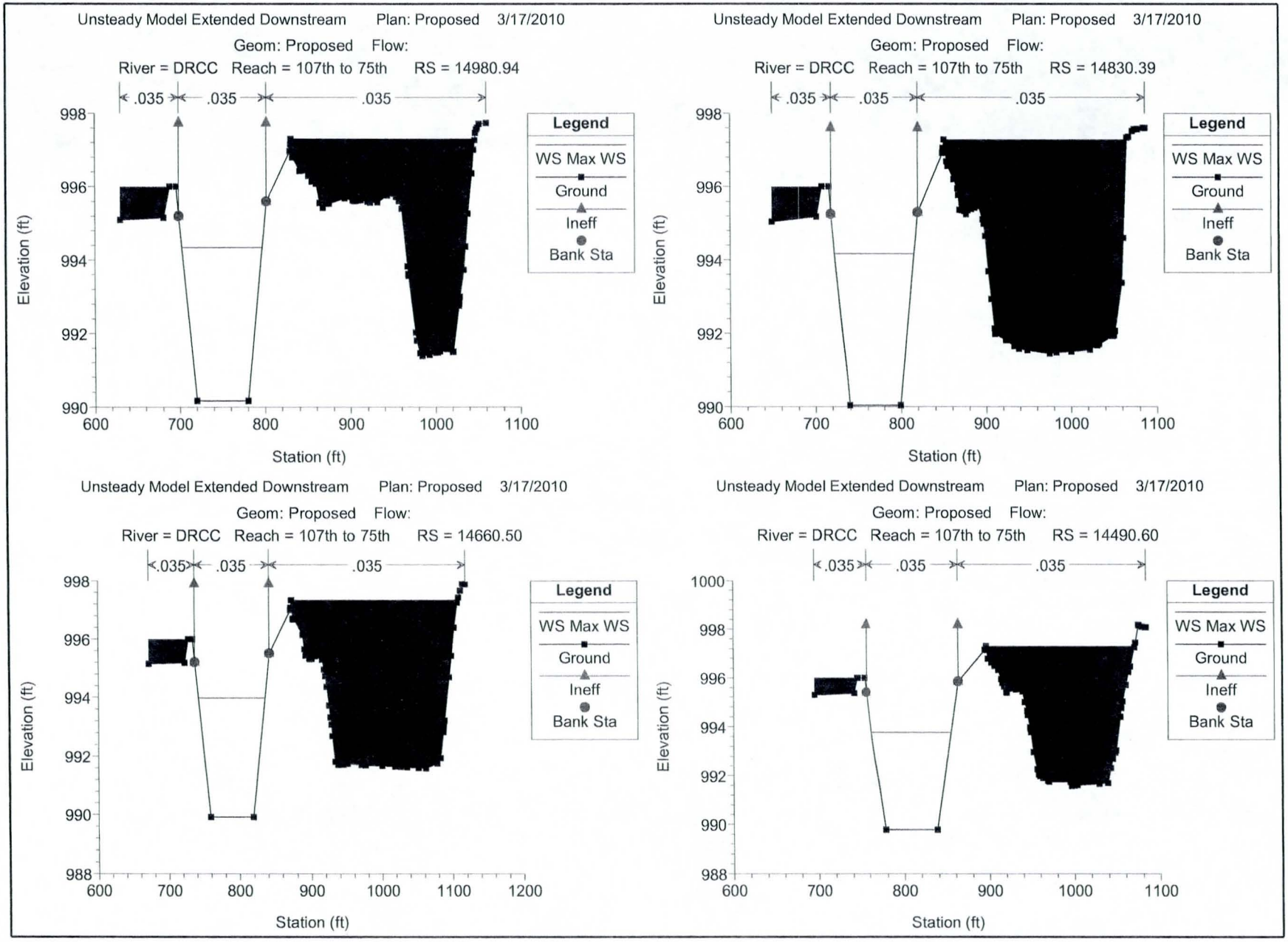

Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 18368.16
.035 .035 .035
Elevation (ft)
Station (ft)
Legend
WS Max WS
Ground
Ineff
Bank Sta
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 18275.77
.035 .035 .035
Elevation (ft)
Station (ft)
Legend
WS Max WS
Ground
Ineff
Bank Sta
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 18161.34
.035 .035 .035
Elevation (ft)
Station (ft)
Legend
WS Max WS
Ground
Ineff
Bank Sta
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 17925.28
.035 .035 .035
Elevation (ft)
Station (ft)
Legend
WS Max WS
Ground
Ineff
Bank Sta

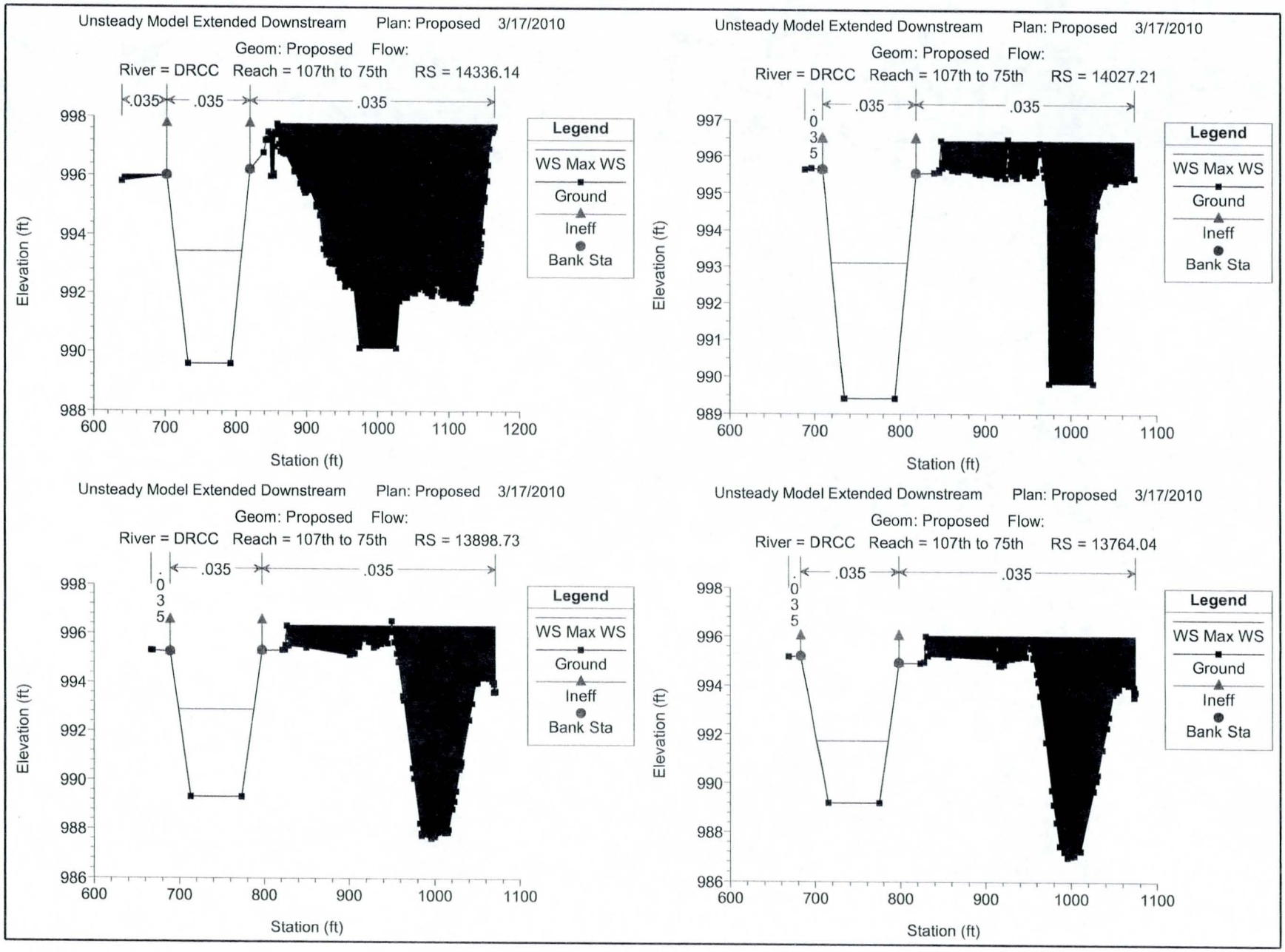

Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 17715.28
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 17555.28
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 17358.60
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 17163.60
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

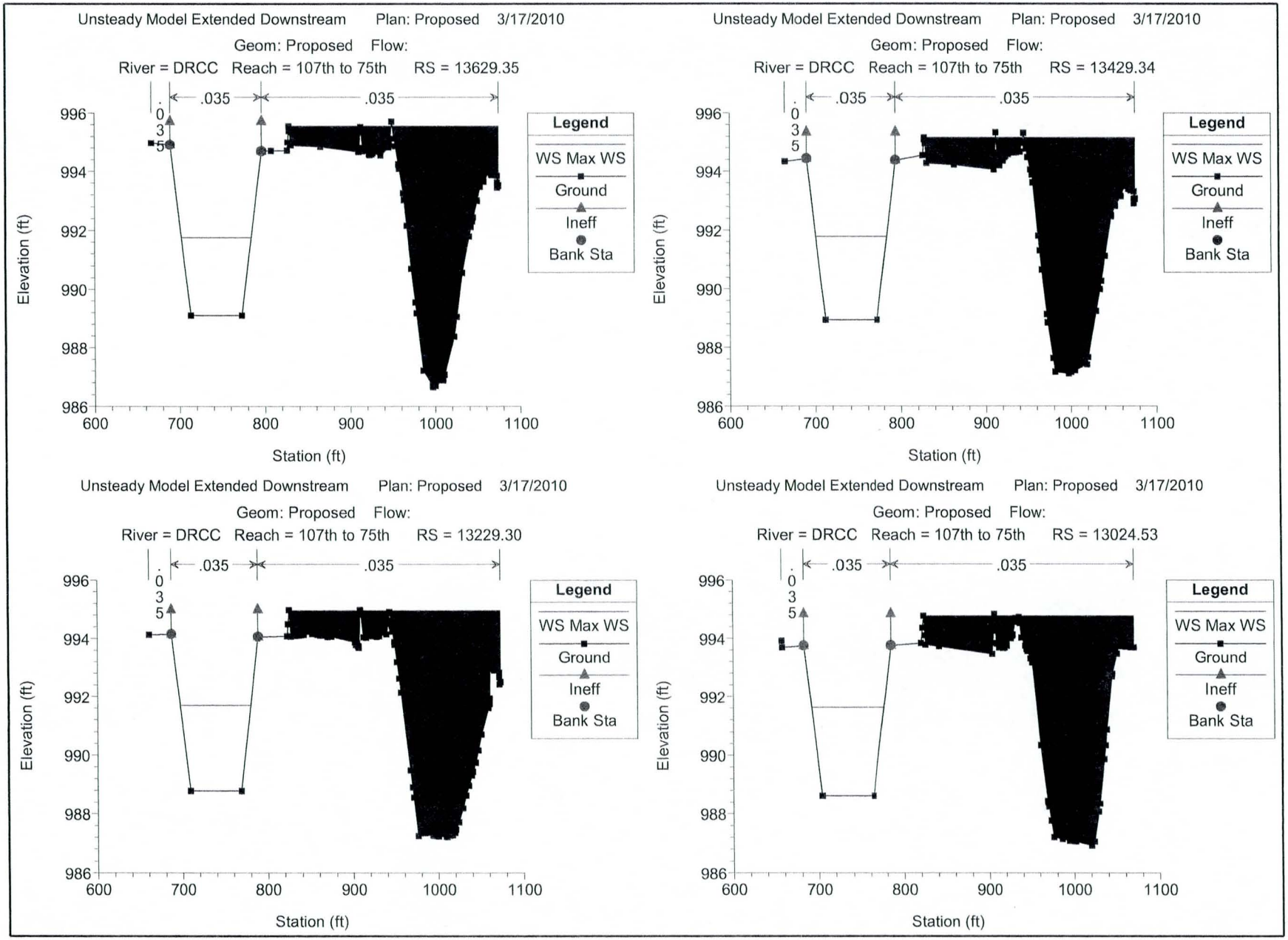

Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 16968.60
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 16808.5 Culv 83rd Ave 3 New 12'x5'
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 16808.5 Culv 83rd Ave 3 New 12'x5'
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 16692.50 Begin Cutting New Chnl South Side of Align (downstream/west of 8
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

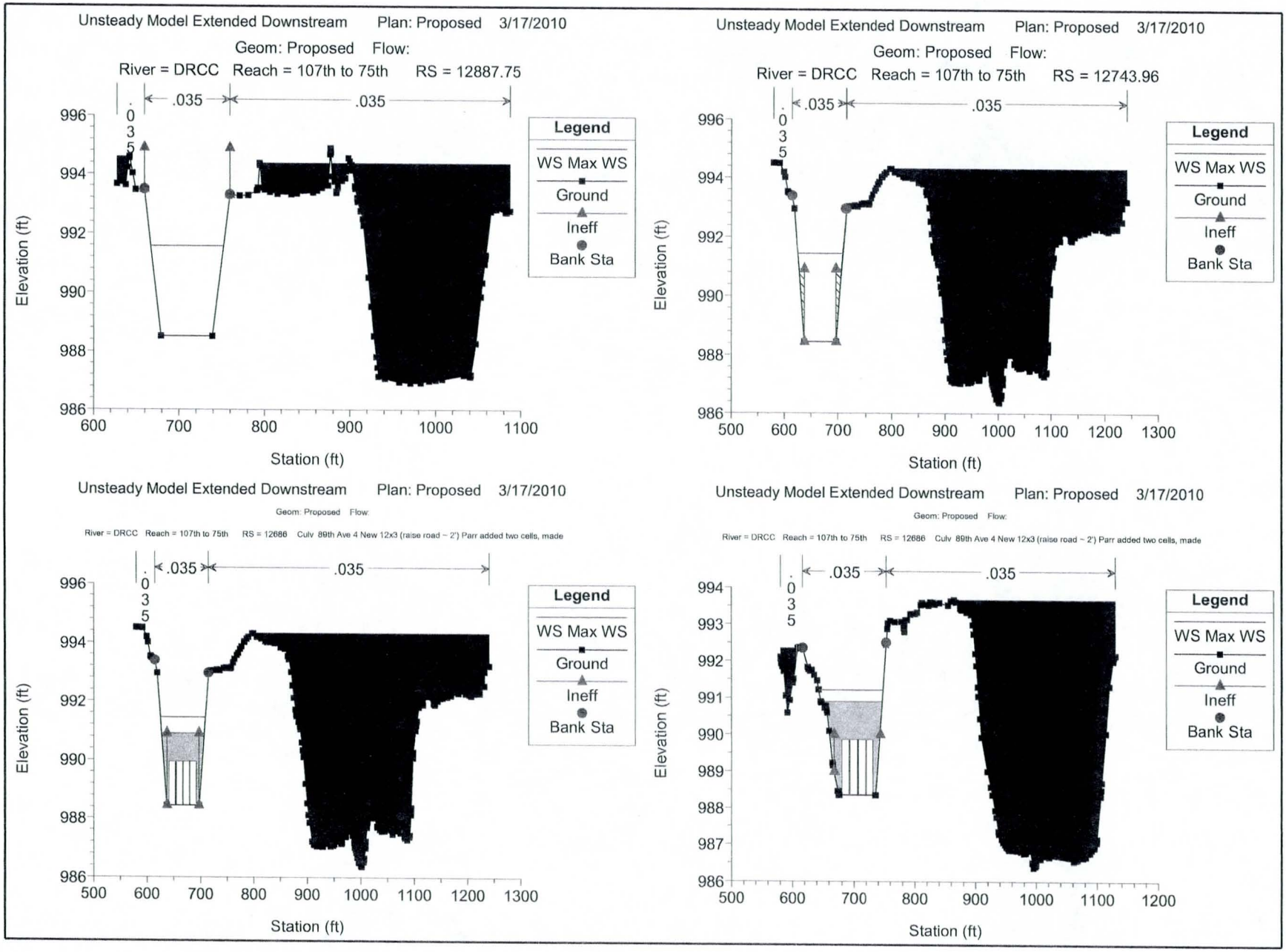

Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 16687.50
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 16476.05
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 16257.59
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 16064.95
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

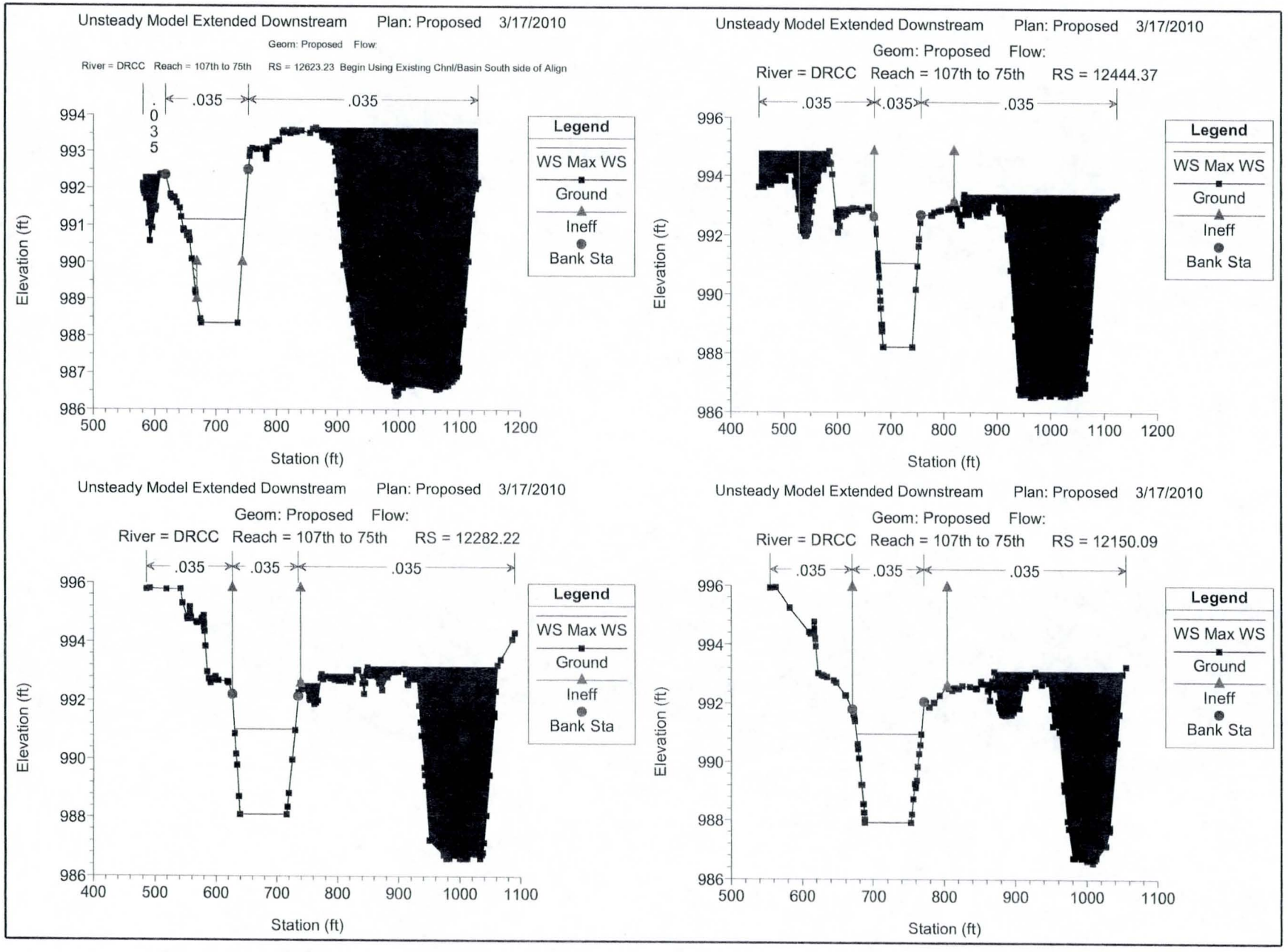

Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 15869.75
.035 .035 .035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 15673.99
.035 .035 .035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 15367.13
.035 .035 .035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 15149.86
.035 .035 .035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

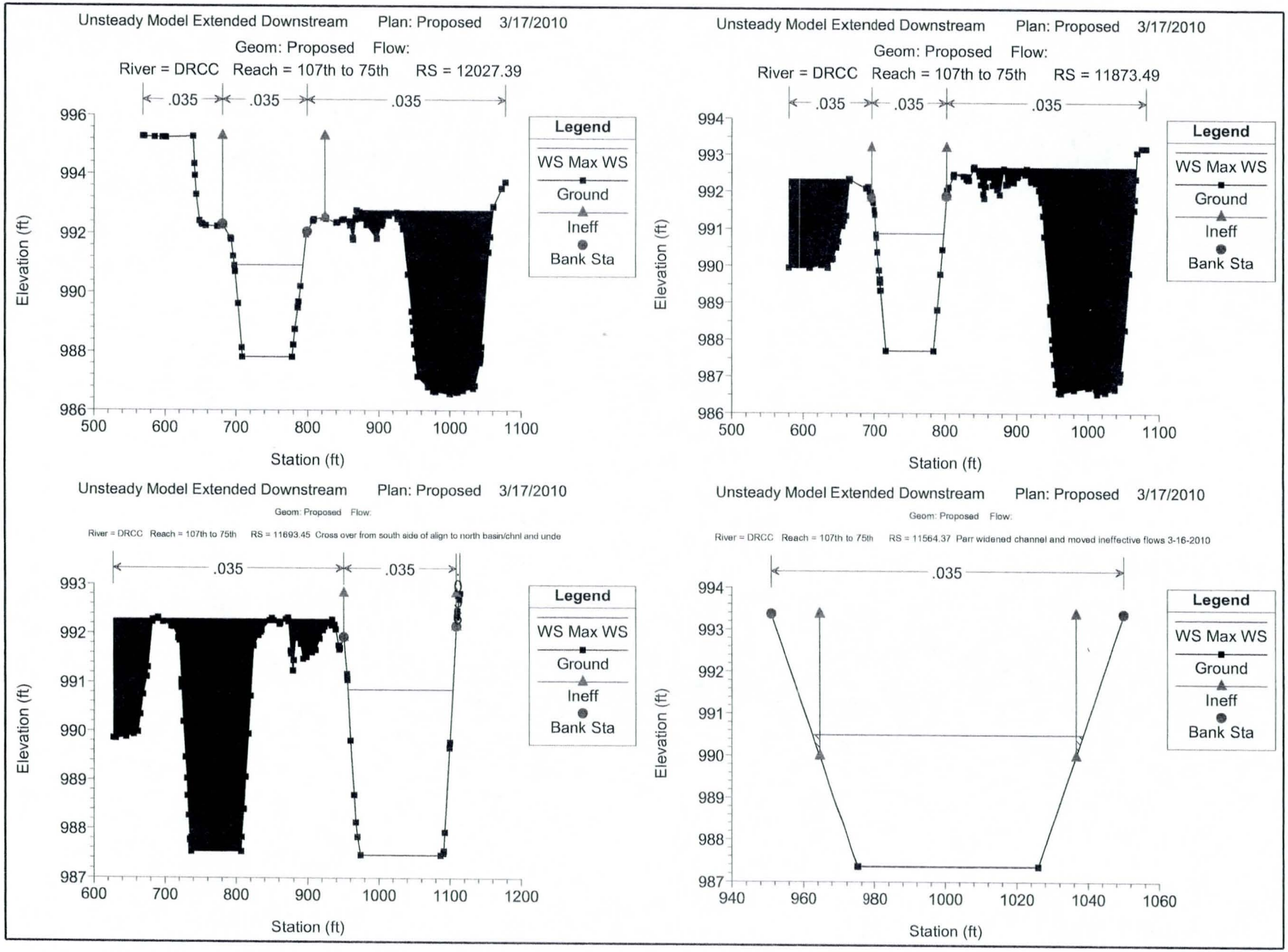

Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 14980.94
.035 .035 .035
Elevation (ft)
Station (ft)
Legend
WS Max WS
Ground
Ineff
Bank Sta
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 14830.39
.035 .035 .035
Elevation (ft)
Station (ft)
Legend
WS Max WS
Ground
Ineff
Bank Sta
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 14660.50
.035 .035 .035
Elevation (ft)
Station (ft)
Legend
WS Max WS
Ground
Ineff
Bank Sta
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 14490.60
.035 .035 .035
Elevation (ft)
Station (ft)
Legend
WS Max WS
Ground
Ineff
Bank Sta

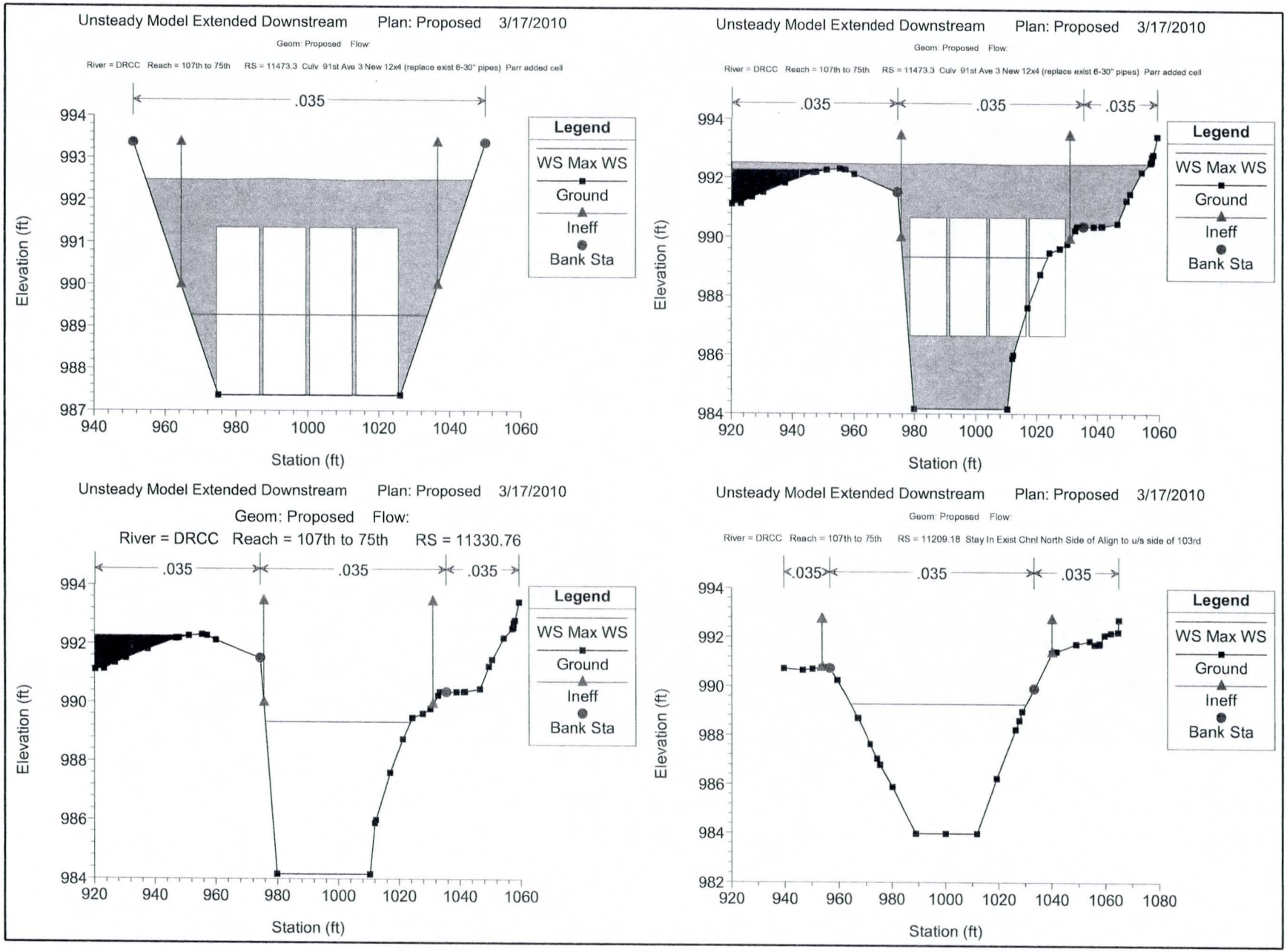

Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 14336.14
.035 .035 .035
Elevation (ft)
Station (ft)
Legend
WS Max WS
Ground
Ineff
Bank Sta
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 14027.21
.035 .035
Elevation (ft)
Station (ft)
Legend
WS Max WS
Ground
Ineff
Bank Sta
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 13898.73
.035 .035
Elevation (ft)
Station (ft)
Legend
WS Max WS
Ground
Ineff
Bank Sta
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 13764.04
.035 .035
Elevation (ft)
Station (ft)
Legend
WS Max WS
Ground
Ineff
Bank Sta

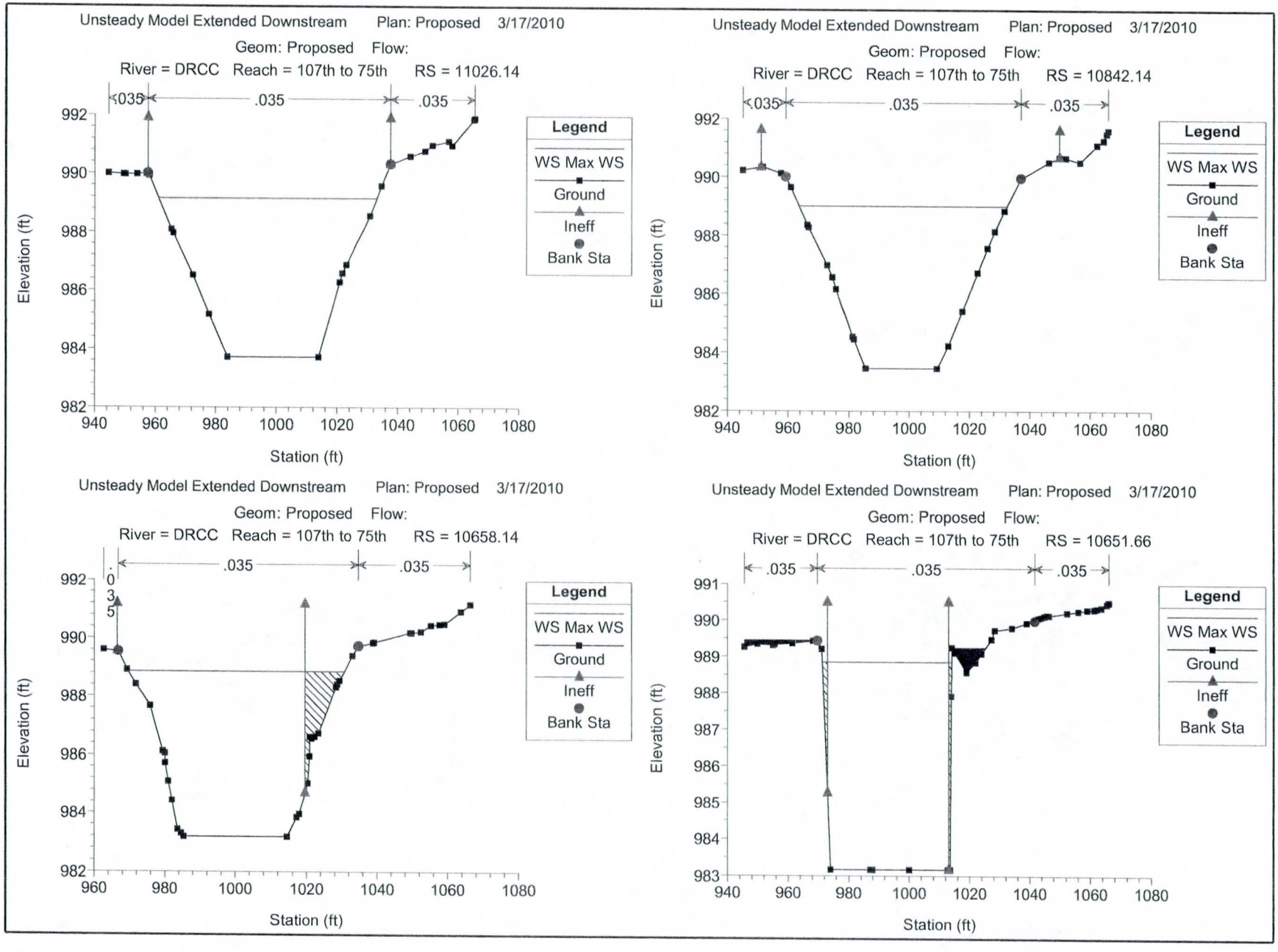

Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 13629.35
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 13429.34
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 13229.30
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 13024.53

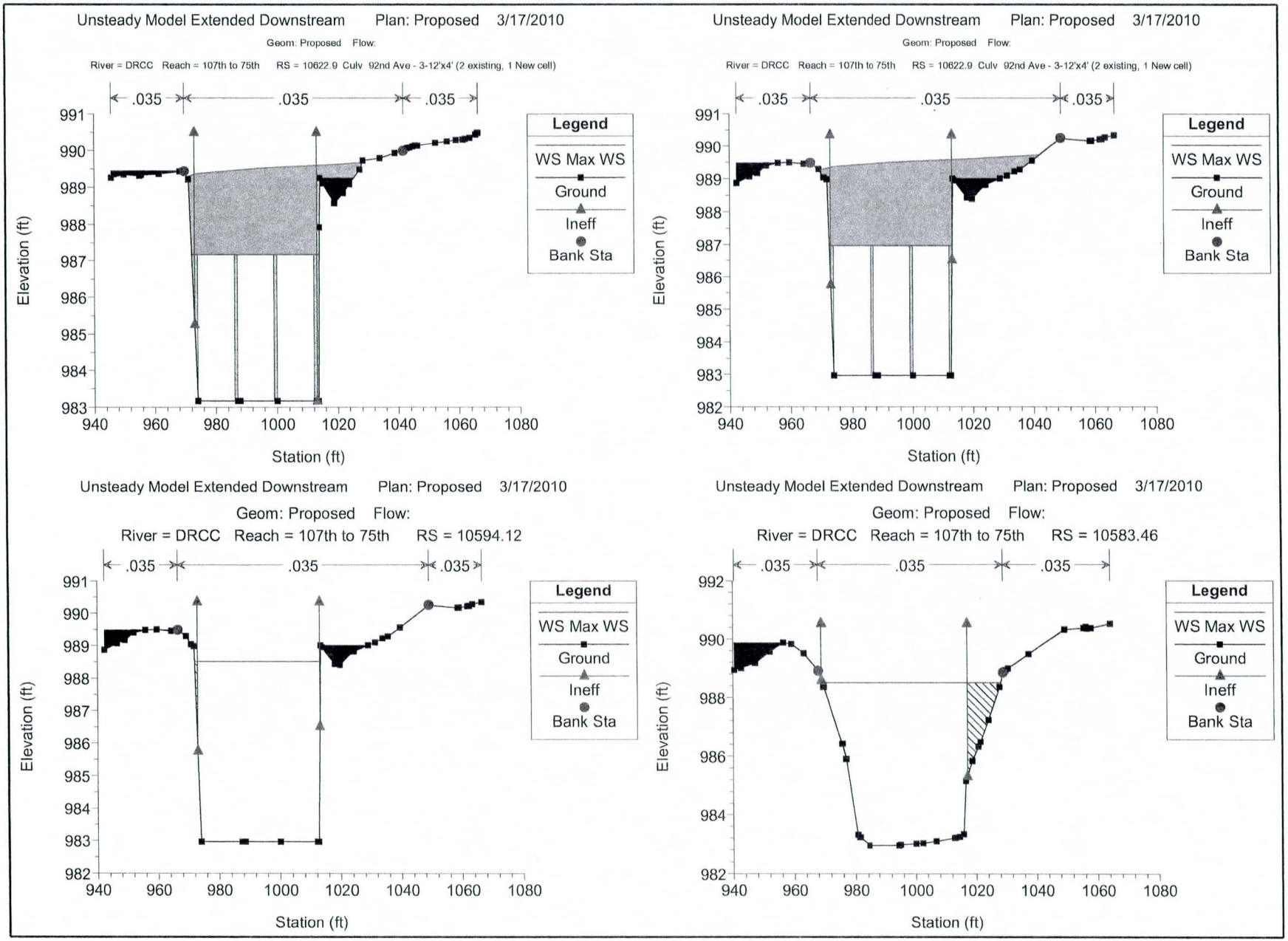

Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 12887.75
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 12743.96
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 12686 Culv 89th Ave 4 New 12x3 (raise road ~ 2') Parr added two cells, made
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 12686 Culv 89th Ave 4 New 12x3 (raise road ~ 2') Parr added two cells, made
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

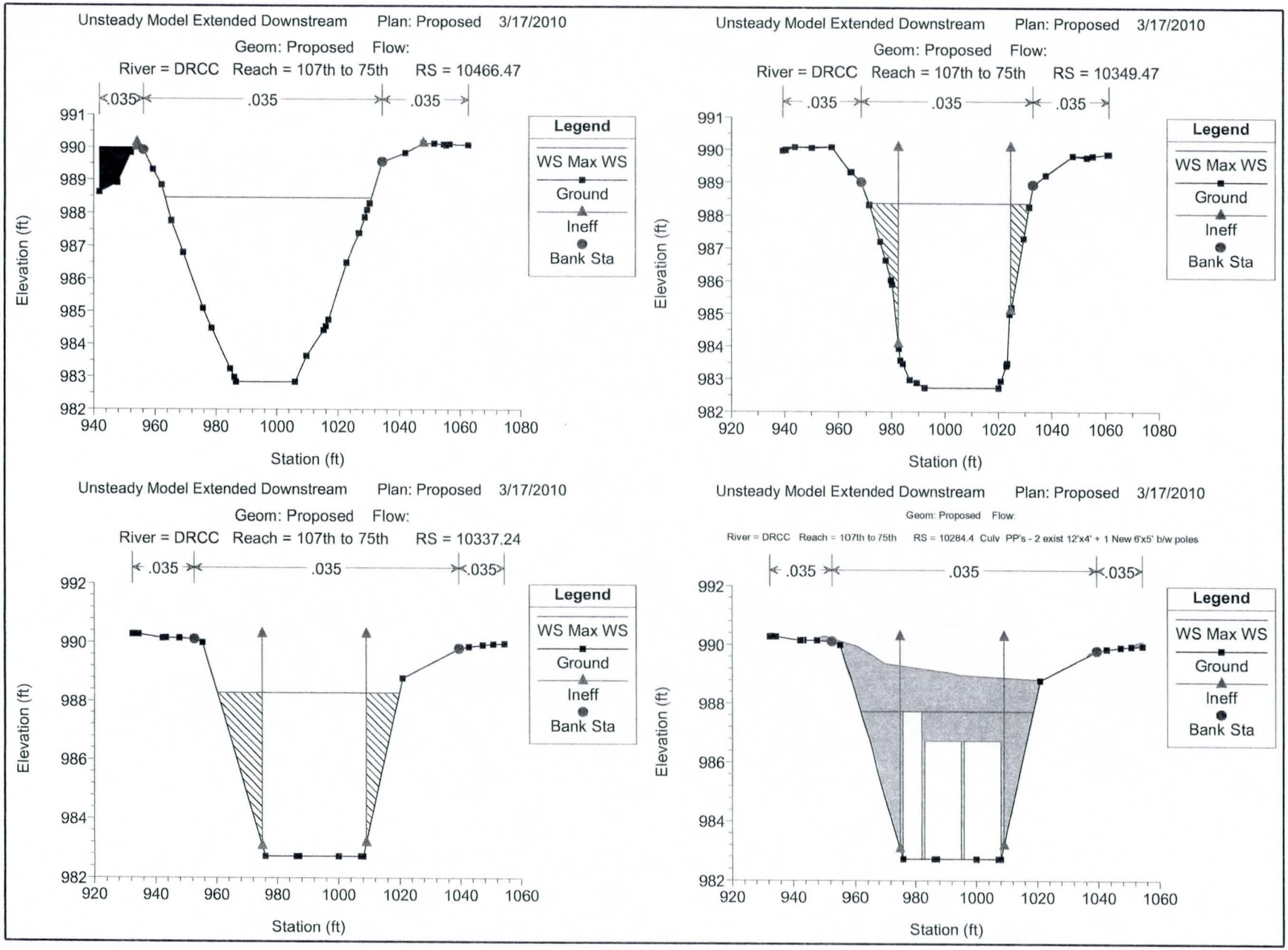

Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 12623.23 Begin Using Existing Chnl/Basin South side of Align
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 12444.37
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 12282.22
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 12150.09
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

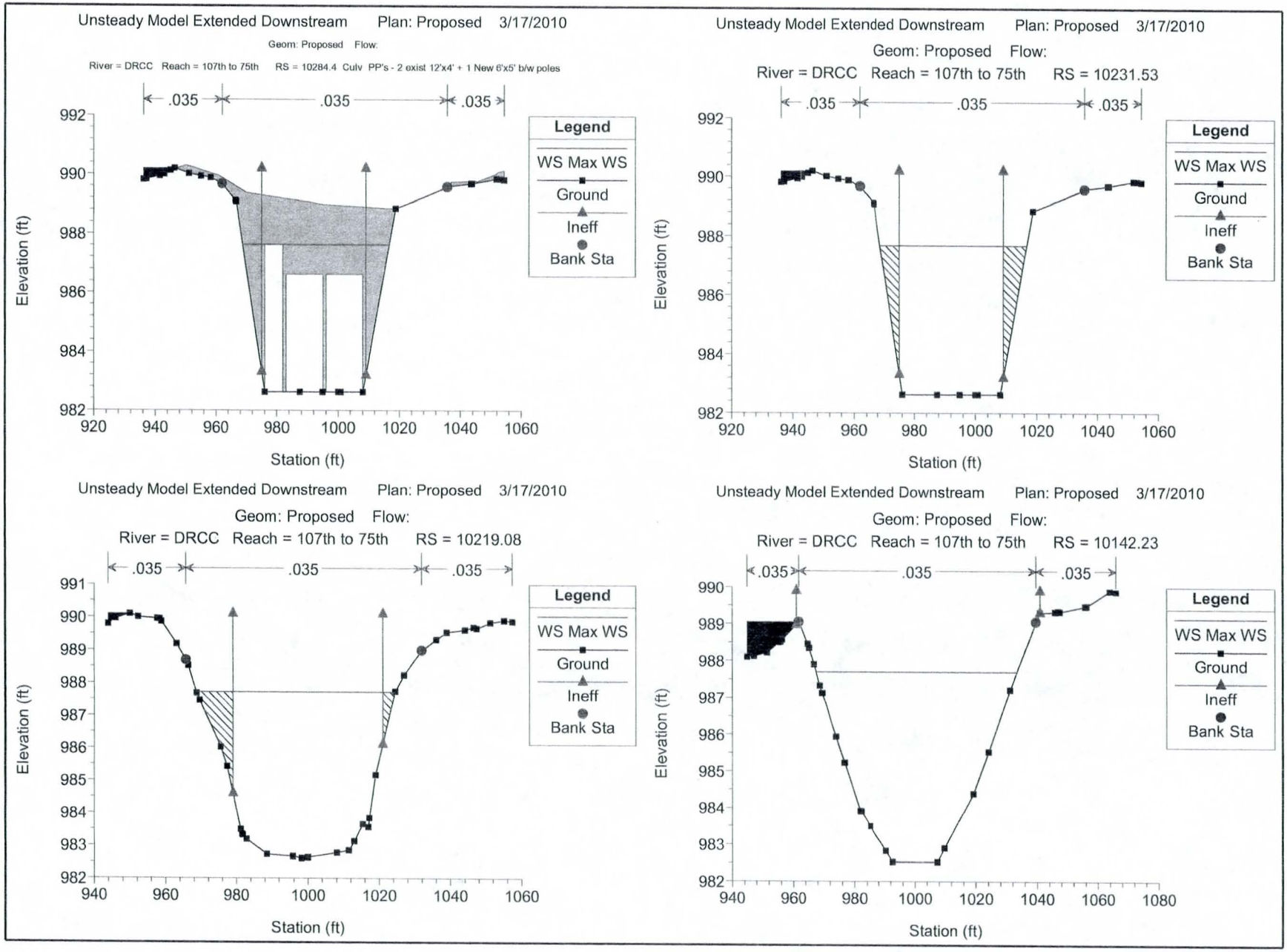

Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 12027.39
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 11873.49
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 11693.45 Cross over from south side of align to north basin/chnl and unde
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 11564.37 Parr widened channel and moved ineffective flows 3-16-2010
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

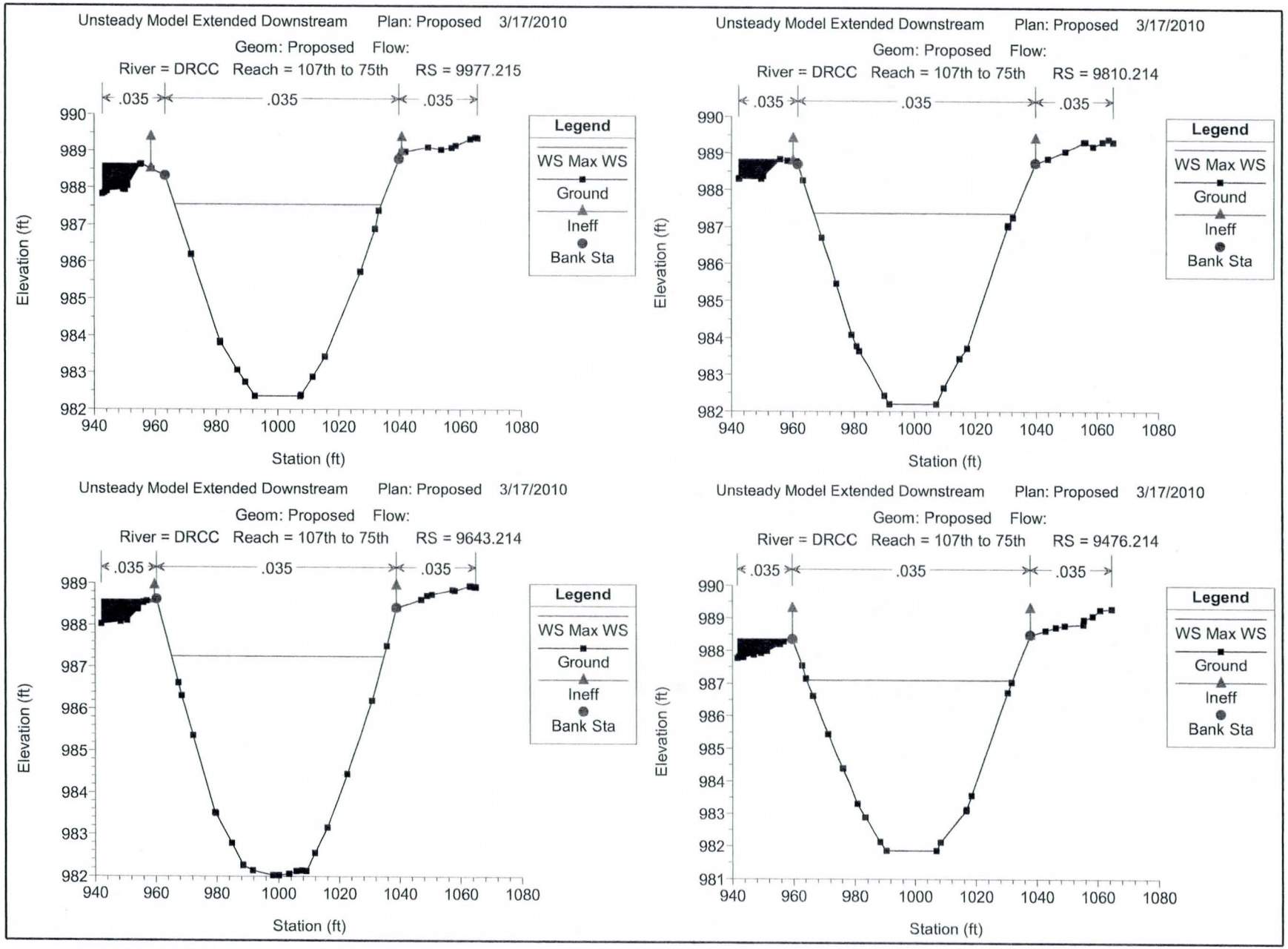

Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 11473.3 Culv 91st Ave 3 New 12x4 (replace exist 6-30" pipes) Parr added cell
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 11473.3 Culv 91st Ave 3 New 12x4 (replace exist 6-30" pipes) Parr added cell
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 11330.76
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 11209.18 Stay In Exist Chnl North Side of Align to u/s side of 103rd
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

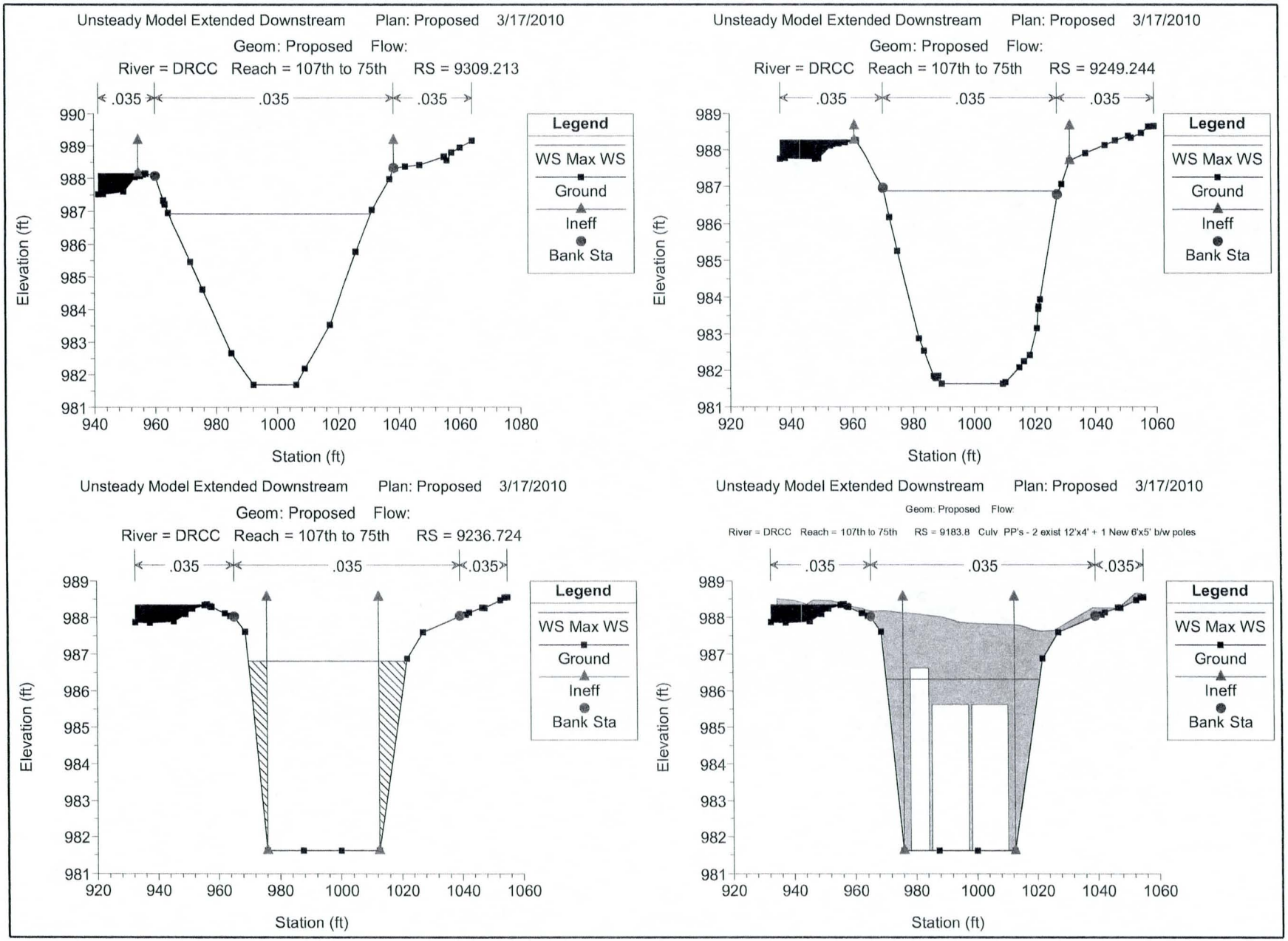

Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 11026.14
.035
.035
.035
Elevation (ft)
992
990
988
986
984
982
940
960
980
1000
1020
1040
1060
1080
Station (ft)
Legend
WS Max WS
Ground
Ineff
Bank Sta
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 10842.14
.035
.035
.035
Elevation (ft)
992
990
988
986
984
982
940
960
980
1000
1020
1040
1060
1080
Station (ft)
Legend
WS Max WS
Ground
Ineff
Bank Sta
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 10658.14
.035
.035
Elevation (ft)
992
990
988
986
984
982
960
980
1000
1020
1040
1060
1080
Station (ft)
Legend
WS Max WS
Ground
Ineff
Bank Sta
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 10651.66
.035
.035
.035
Elevation (ft)
991
990
989
988
987
986
985
984
983
940
960
980
1000
1020
1040
1060
1080
Station (ft)
Legend
WS Max WS
Ground
Ineff
Bank Sta

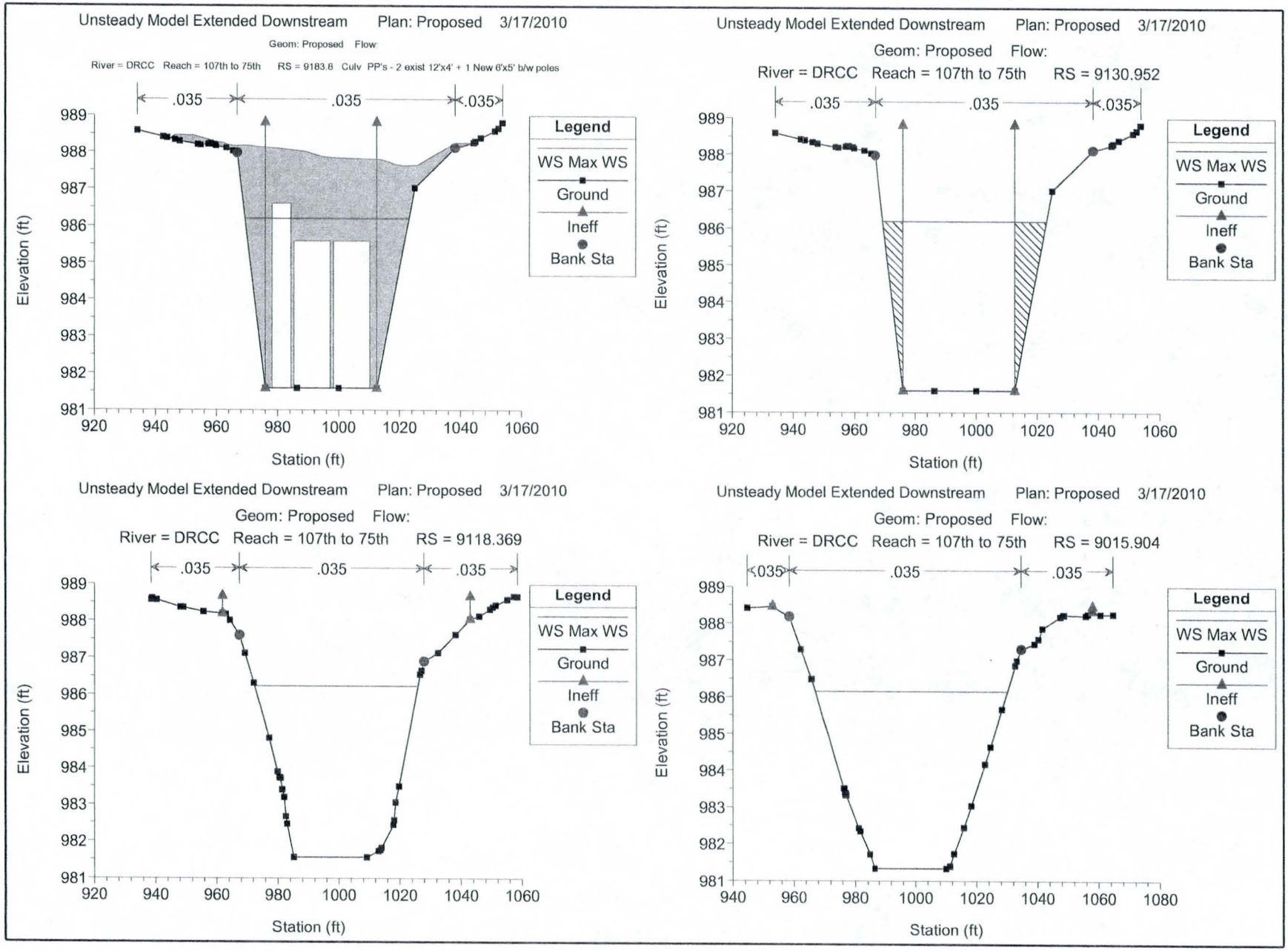

Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 10622.9 Culv 92nd Ave - 3-12'x4' (2 existing, 1 New cell)
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 10622.9 Culv 92nd Ave - 3-12'x4' (2 existing, 1 New cell)
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 10594.12
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 10583.46
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

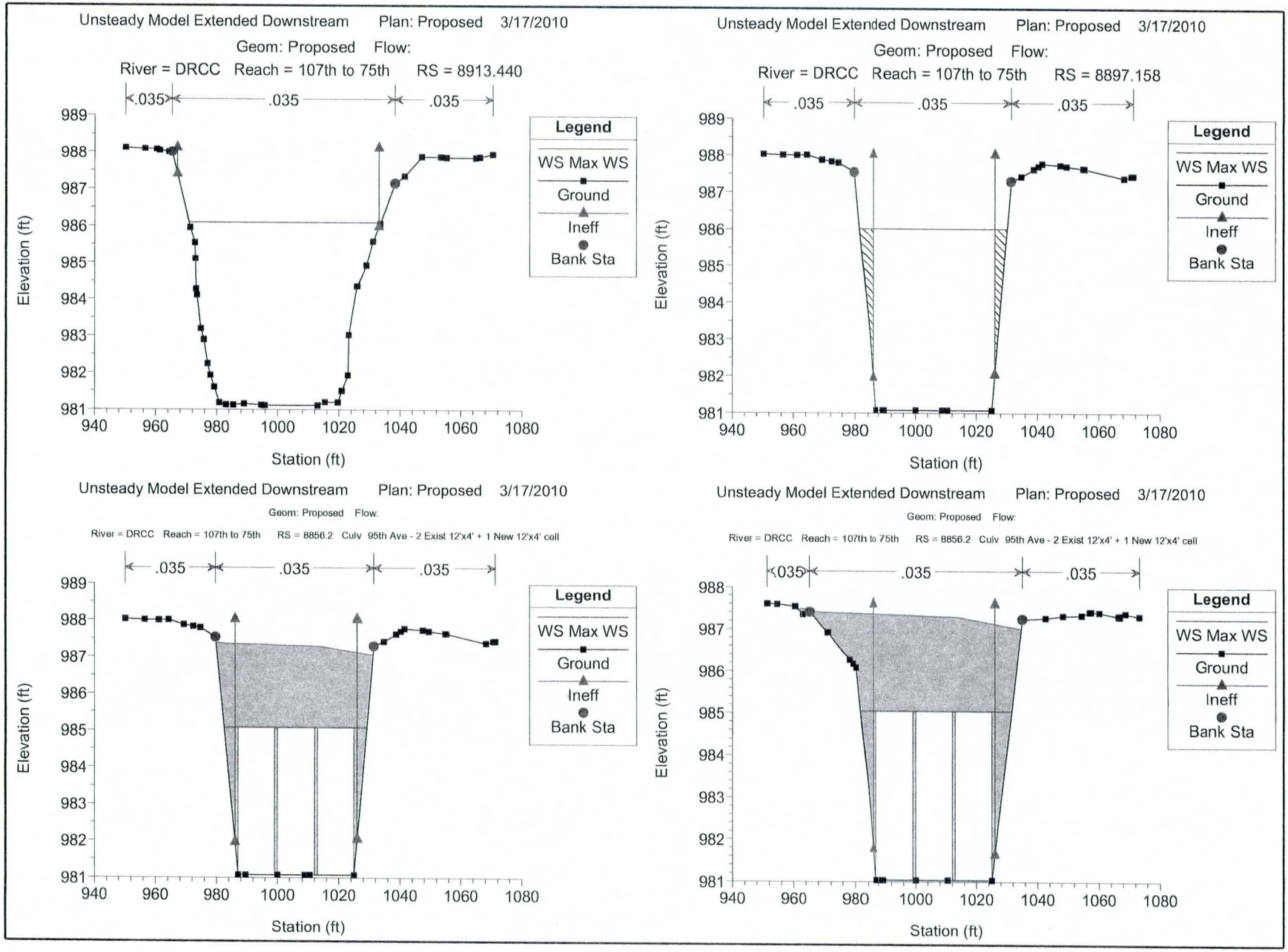

Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 10466.47
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 10349.47
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 10337.24
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 10284.4 Culv PP's - 2 exist 12'x4' + 1 New 6'x5' b/w poles
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

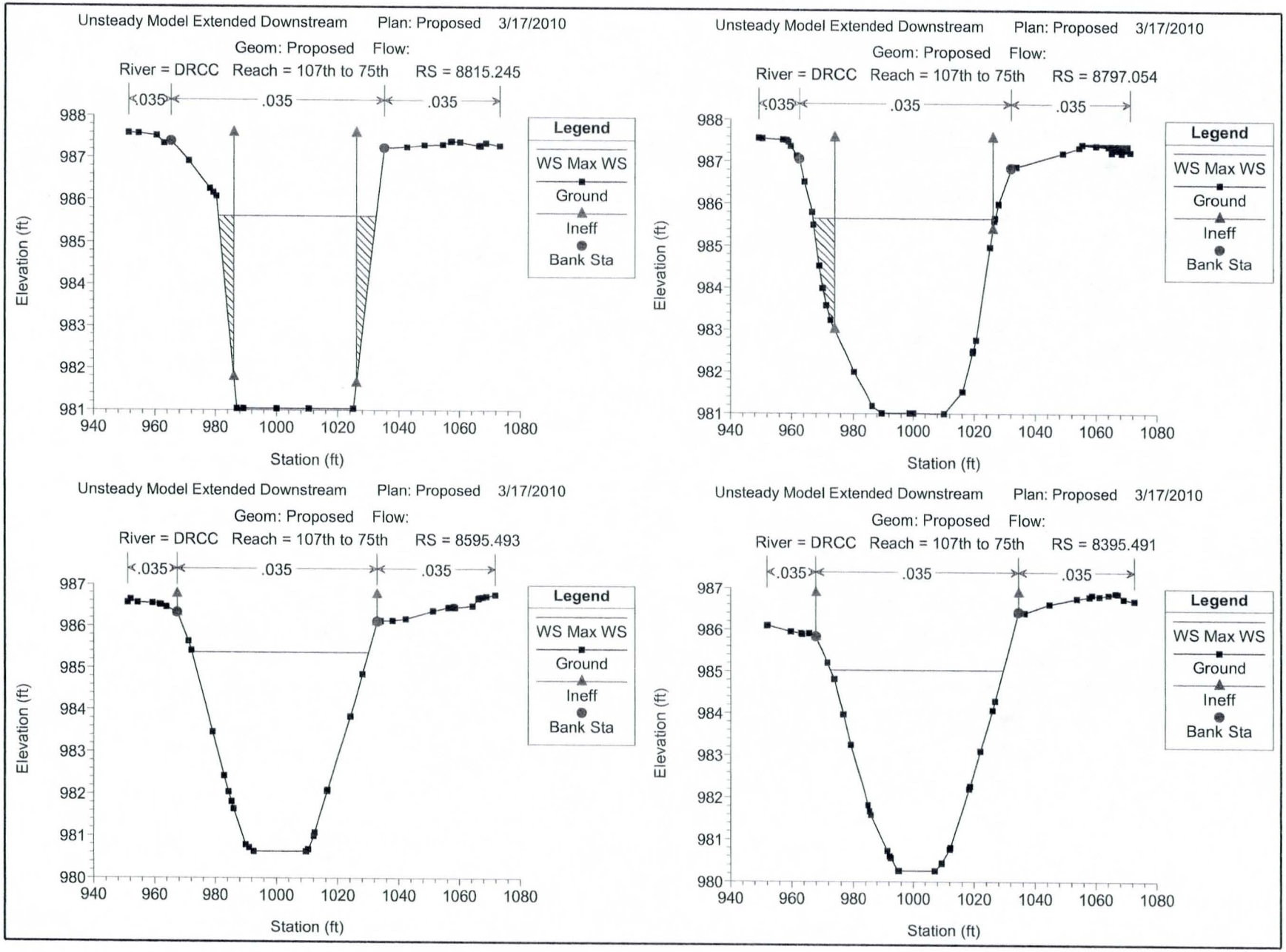

Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 10284.4 Culv PP's - 2 exist 12'x4' + 1 New 6'x5' b/w poles
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 10231.53
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 10219.08
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 10142.23

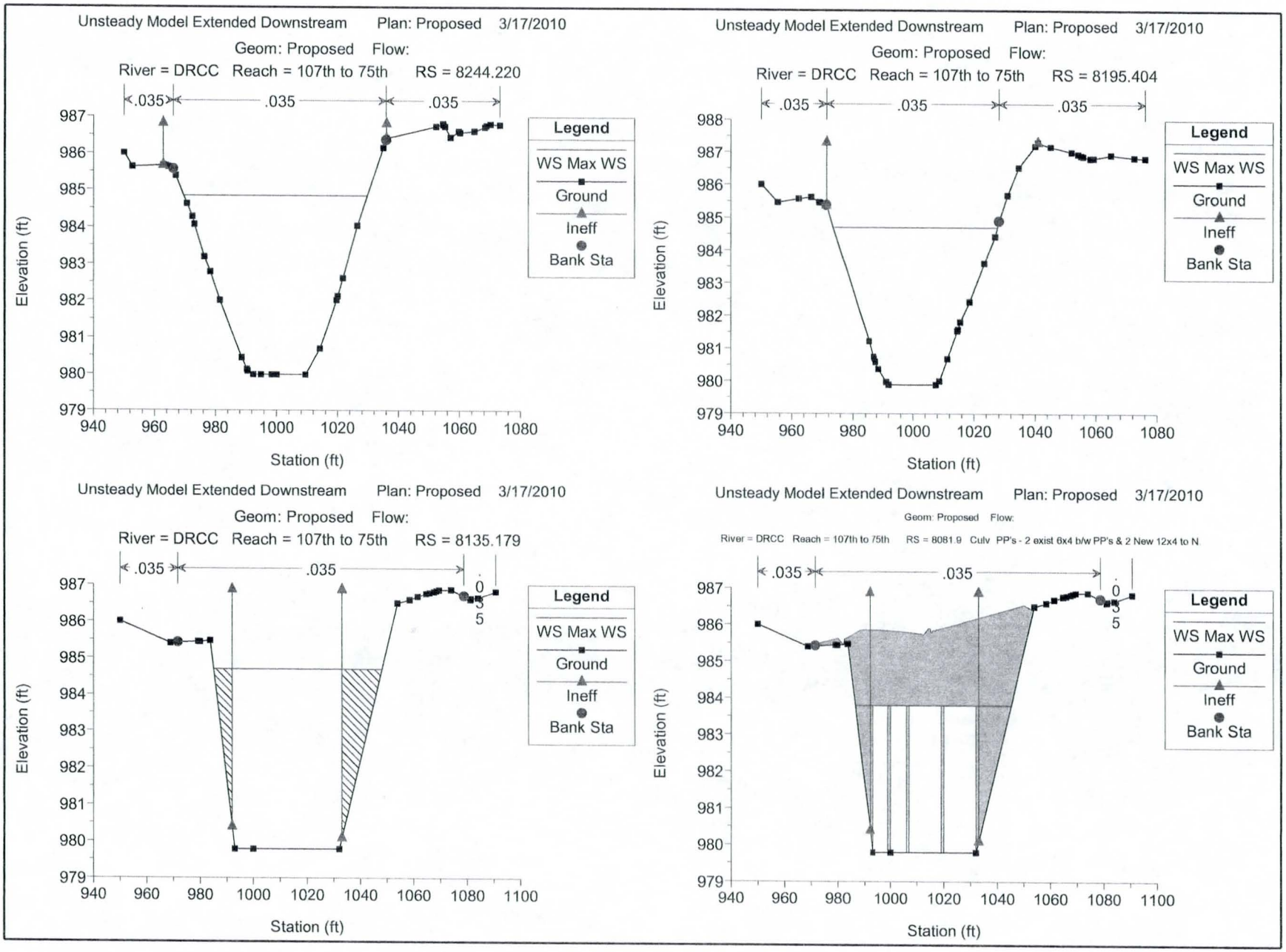

Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 9977.215
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 9810.214
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 9643.214
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 9476.214
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

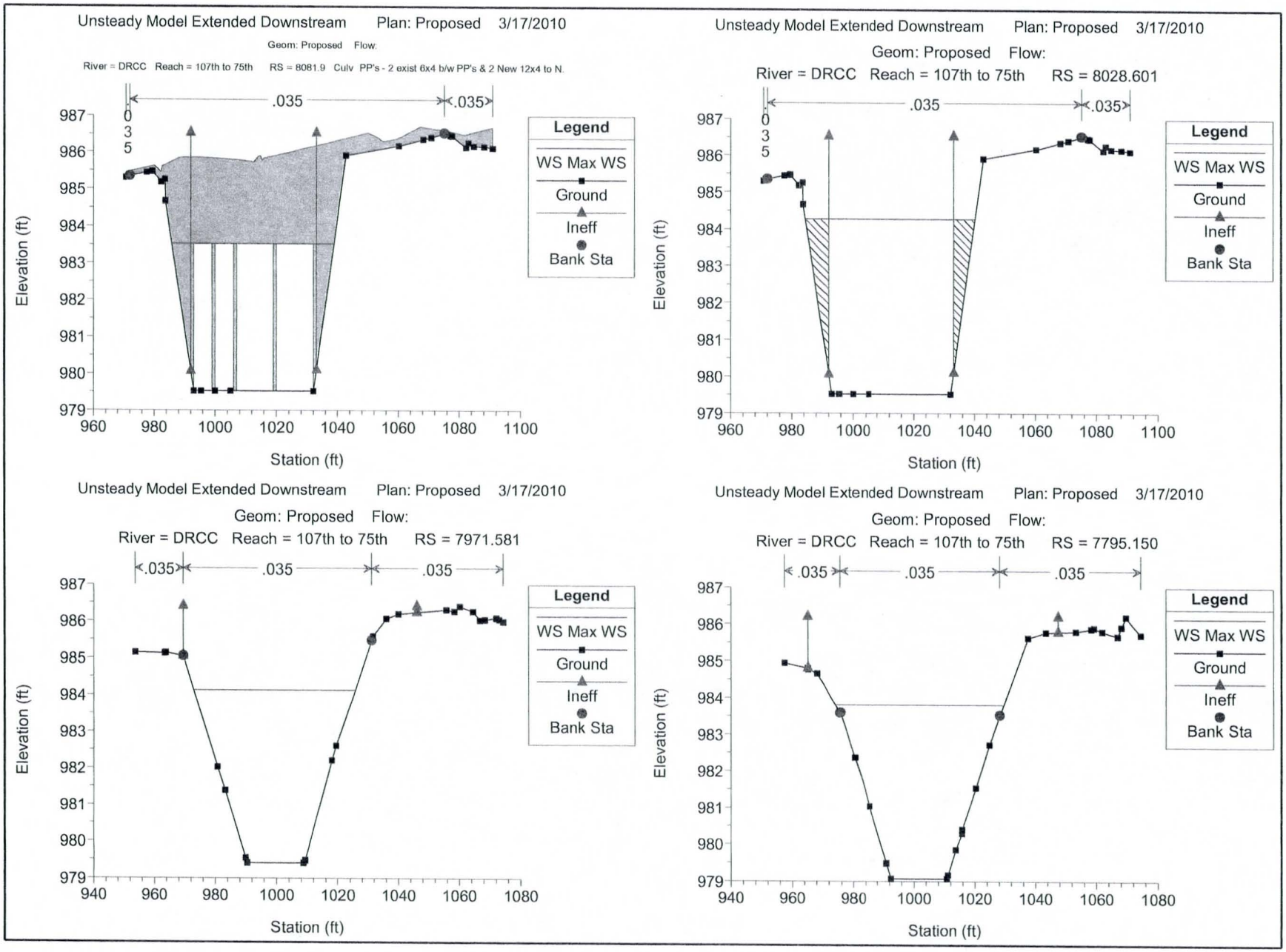

Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 9309.213
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 9249.244
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 9236.724
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 9183.8 Culv PP's - 2 exist 12'x4' + 1 New 6'x5' b/w poles
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

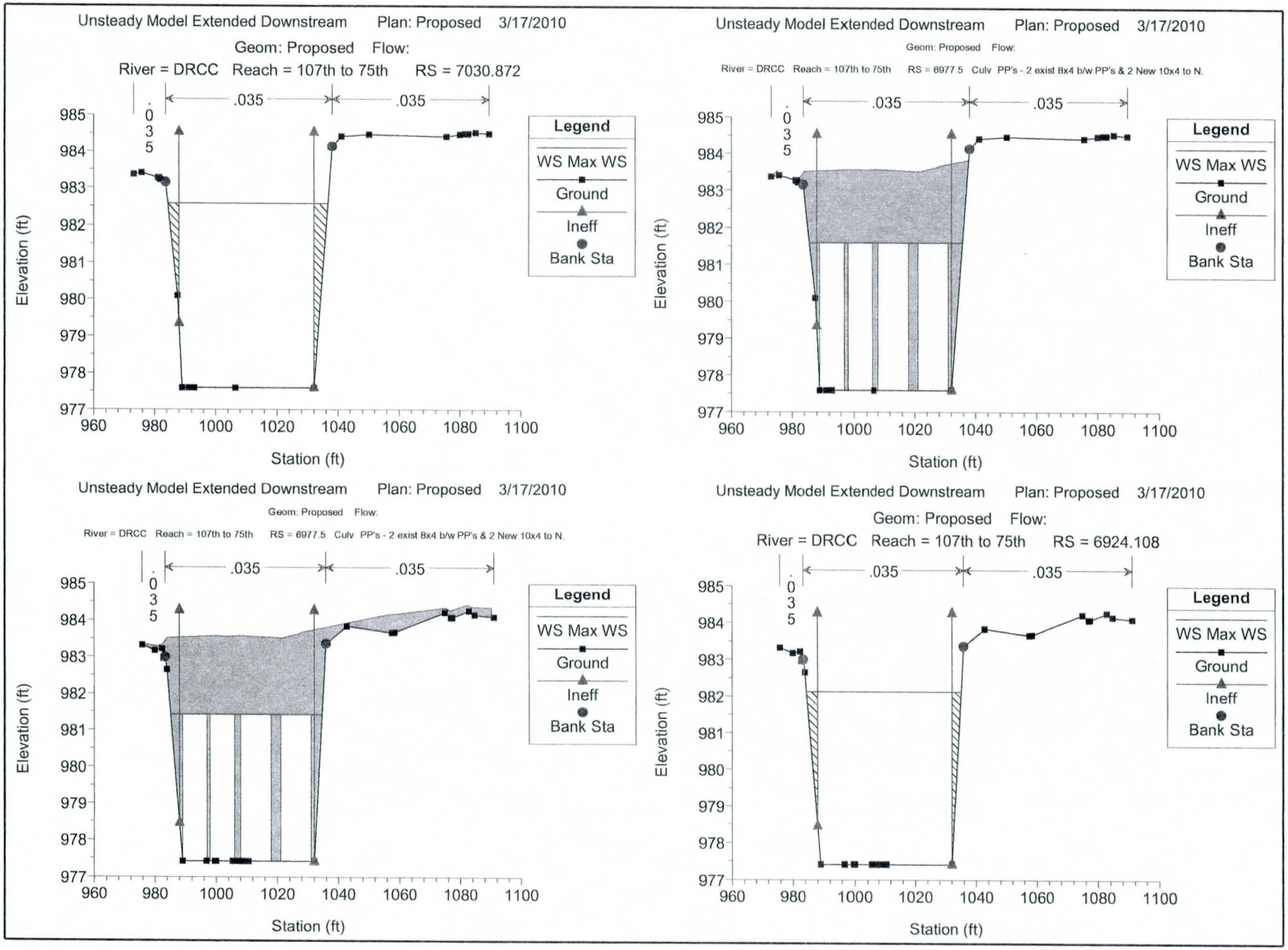

Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 9183.8 Culv PP's - 2 exist 12'x4' + 1 New 6'x5' b/w poles
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 9130.952
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 9118.369
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 9015.904

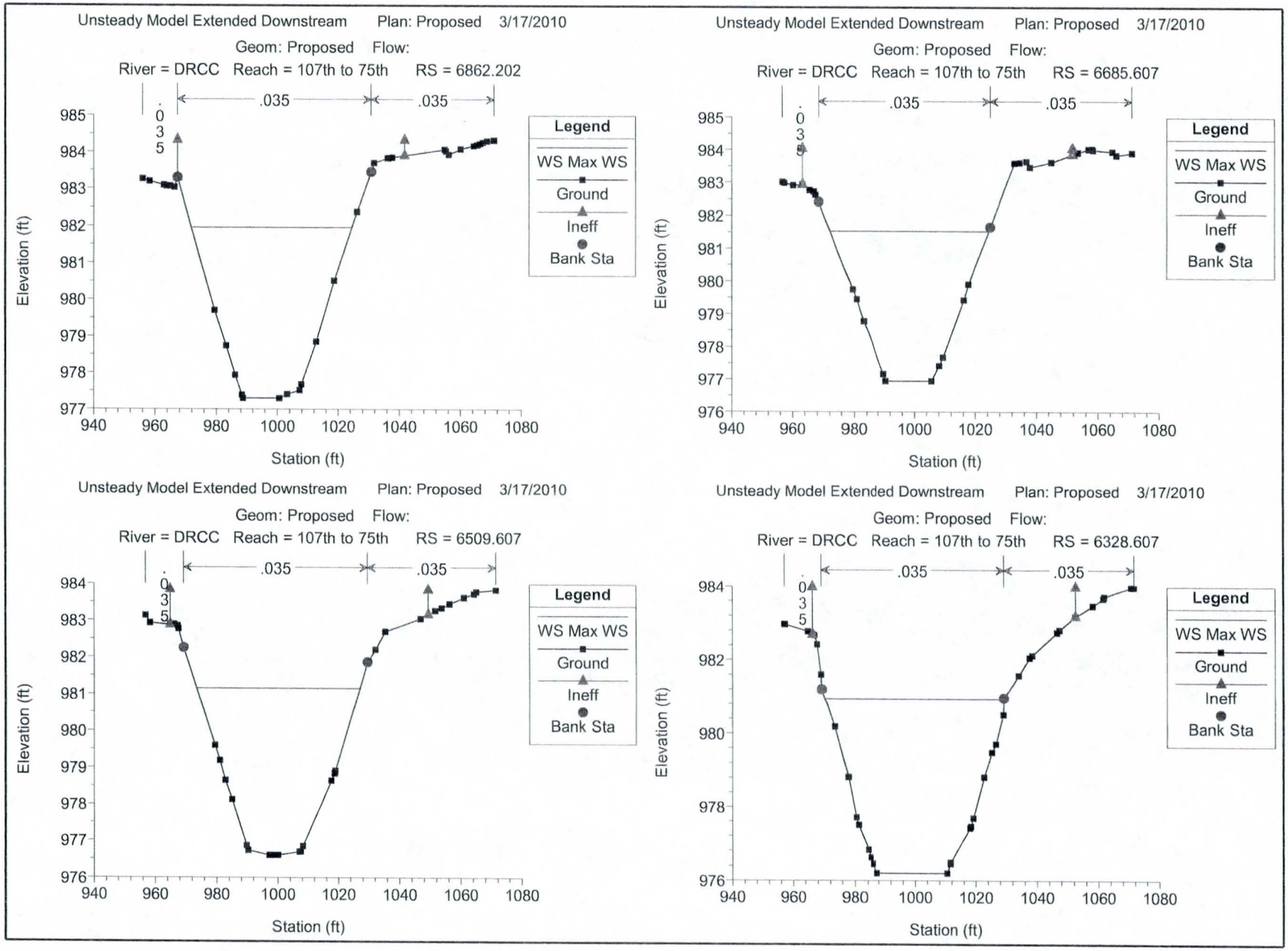

Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 8913.440
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 8897.158
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 8856.2 Culv 95th Ave - 2 Exist 12'x4' + 1 New 12'x4' cell
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 8856.2 Culv 95th Ave - 2 Exist 12'x4' + 1 New 12'x4' cell
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

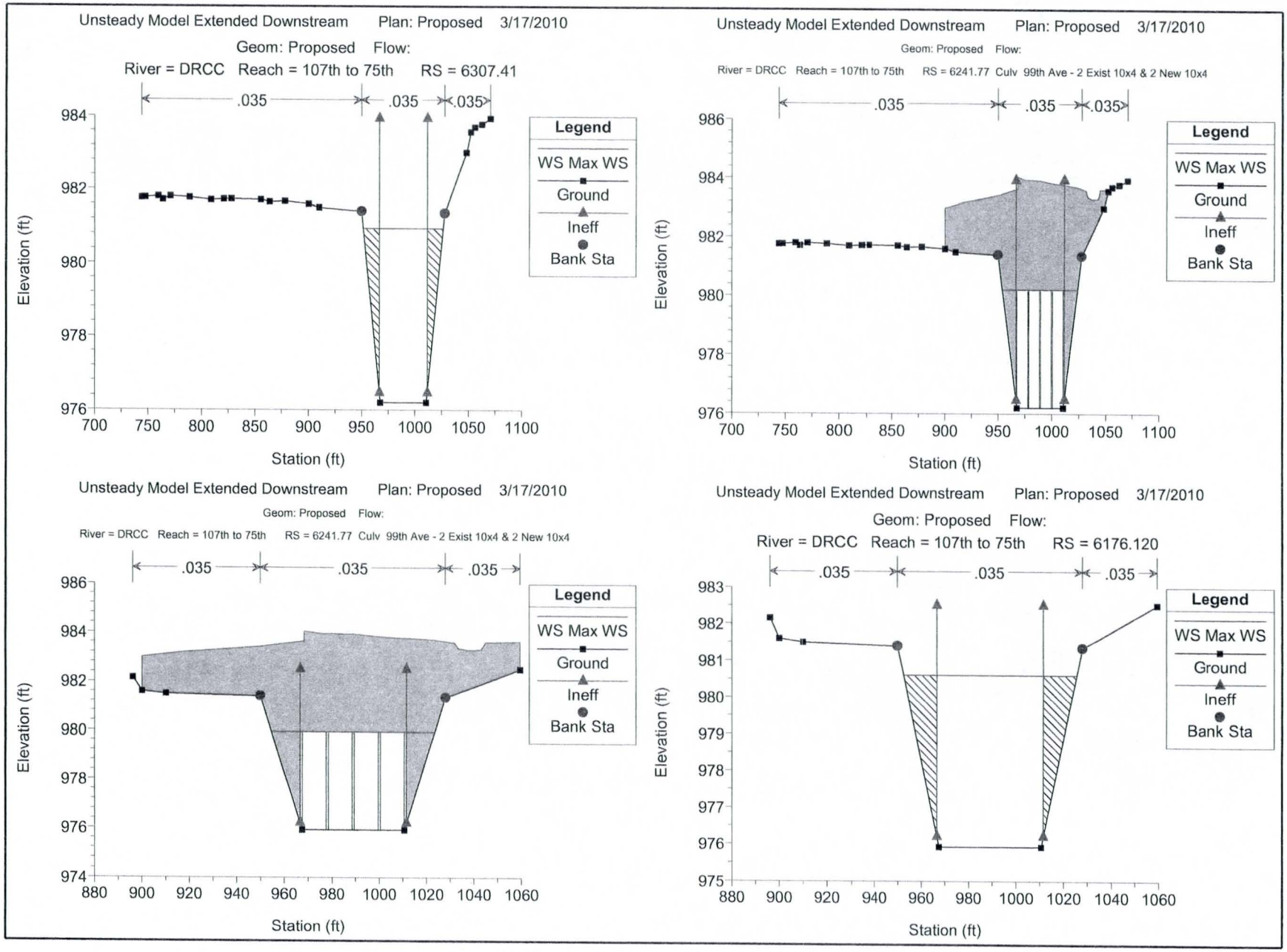

Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 8815.245
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 8797.054
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 8595.493
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 8395.491
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

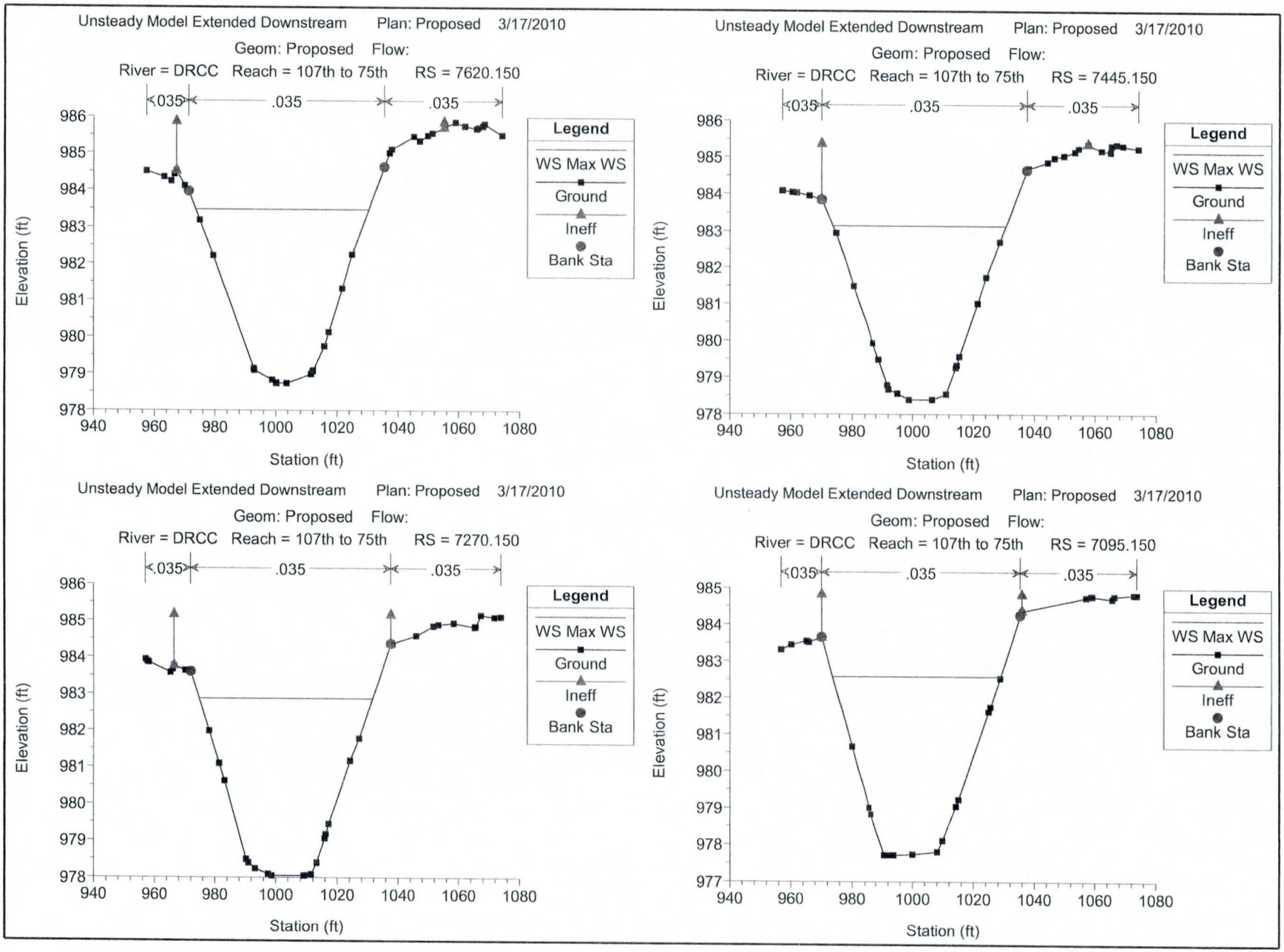

Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 8244.220
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 8195.404
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 8135.179
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 8081.9 Culv PP's - 2 exist 6x4 b/w PP's & 2 New 12x4 to N
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

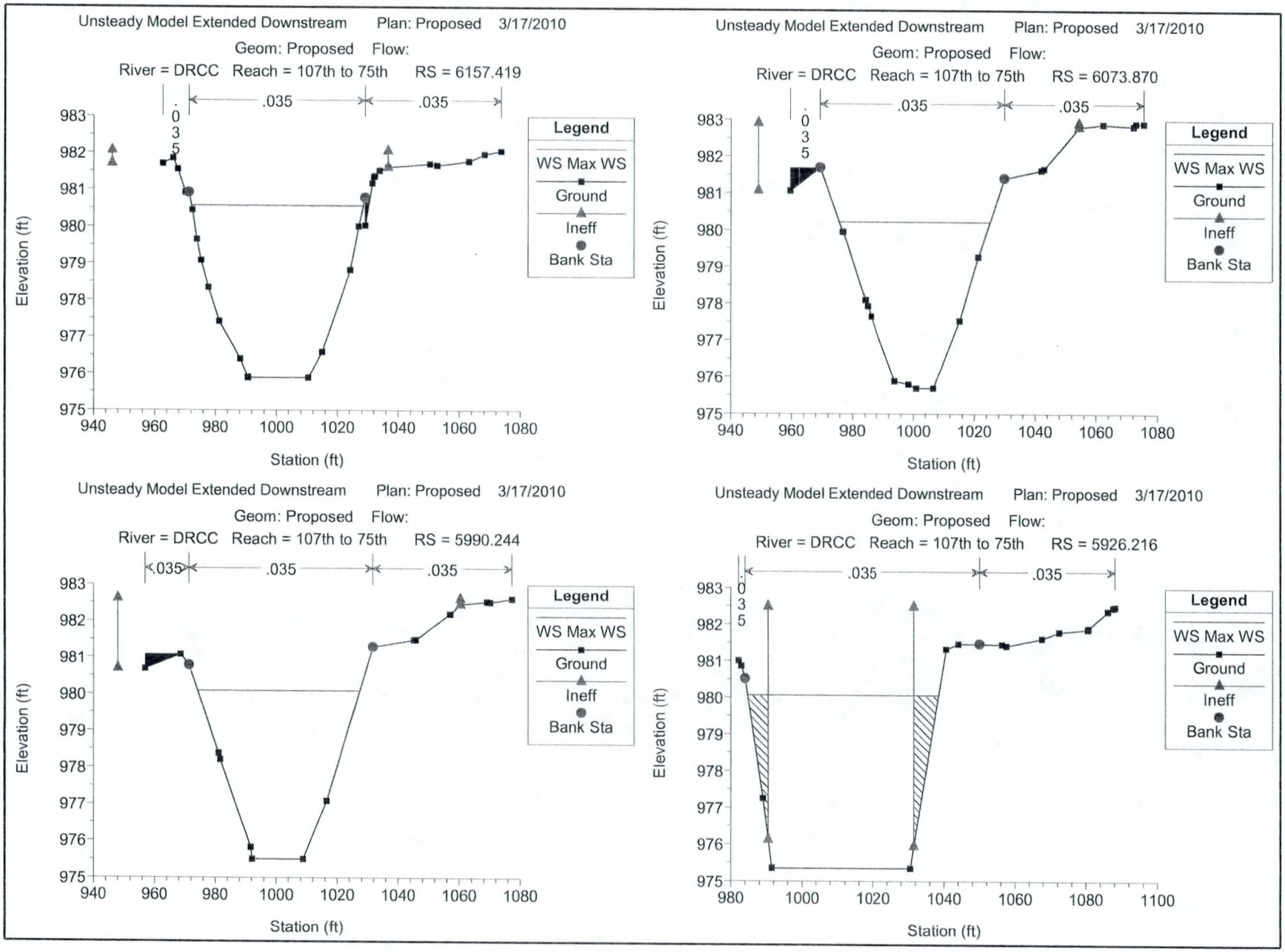

Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 8081.9 Culv PP's - 2 exist 6x4 b/w PP's & 2 New 12x4 to N.
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 8028.601
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 7971.581
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 7795.150

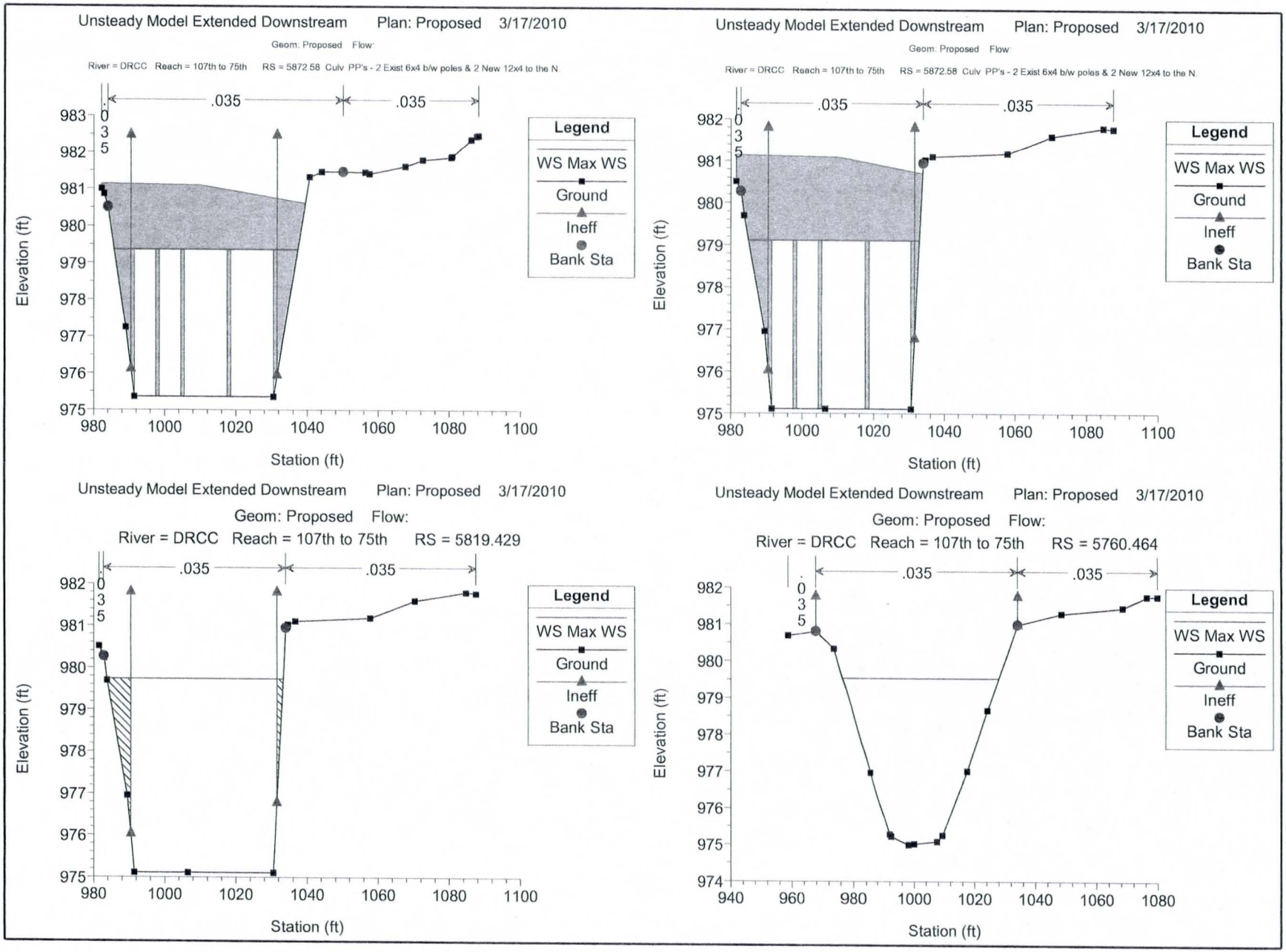

Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 7030.872
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 6977.5 Culv PP's - 2 exist 8x4 b/w PP's & 2 New 10x4 to N.
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 6924.108

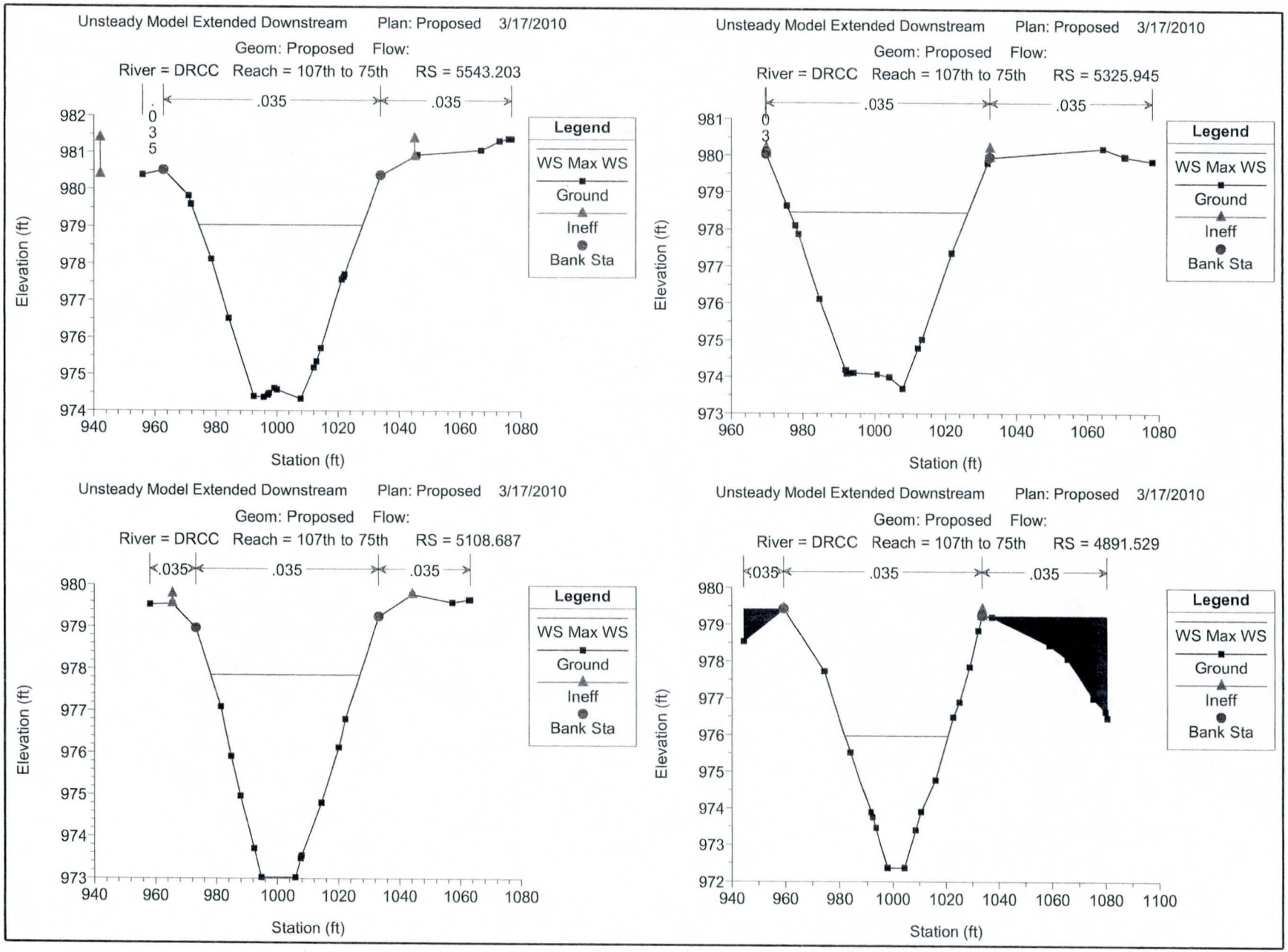

Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 6862.202
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 6685.607
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 6509.607
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 6328.607
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

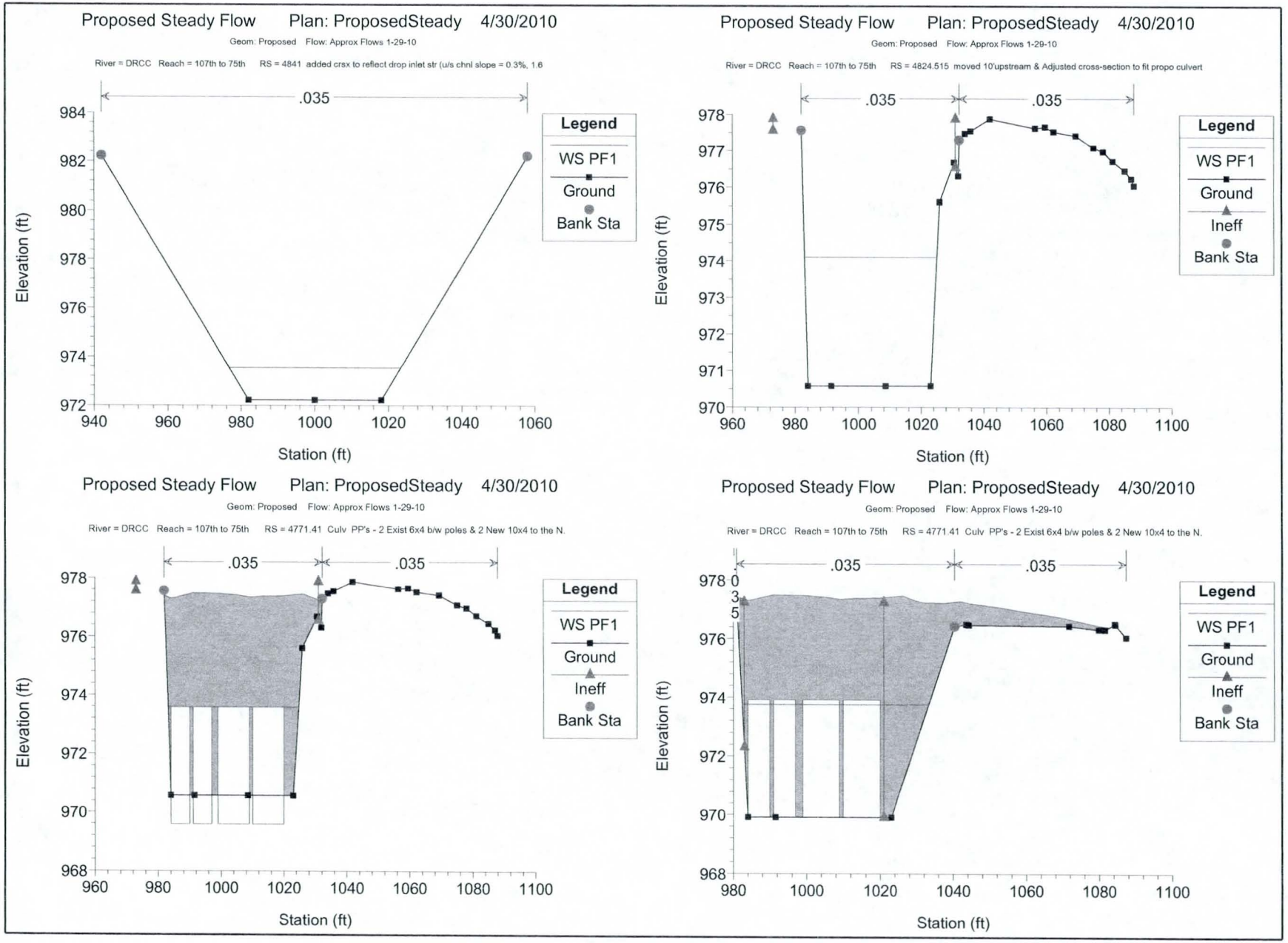

Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 6307.41
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 6241.77 Culv 99th Ave - 2 Exist 10x4 & 2 New 10x4
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 6241.77 Culv 99th Ave - 2 Exist 10x4 & 2 New 10x4
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 6176.120
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

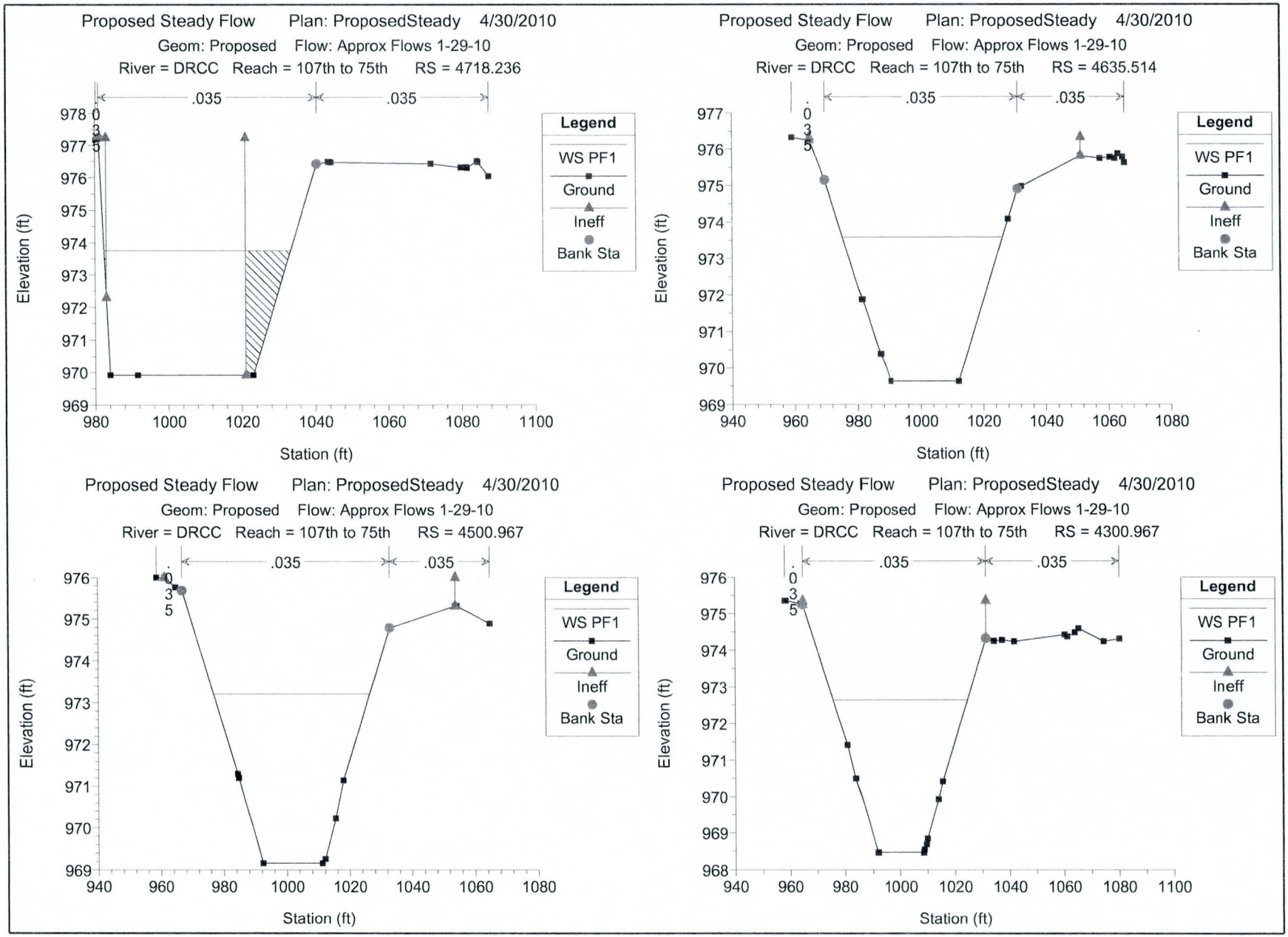

Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 7620.150
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 7445.150
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 7270.150
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 7095.150
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

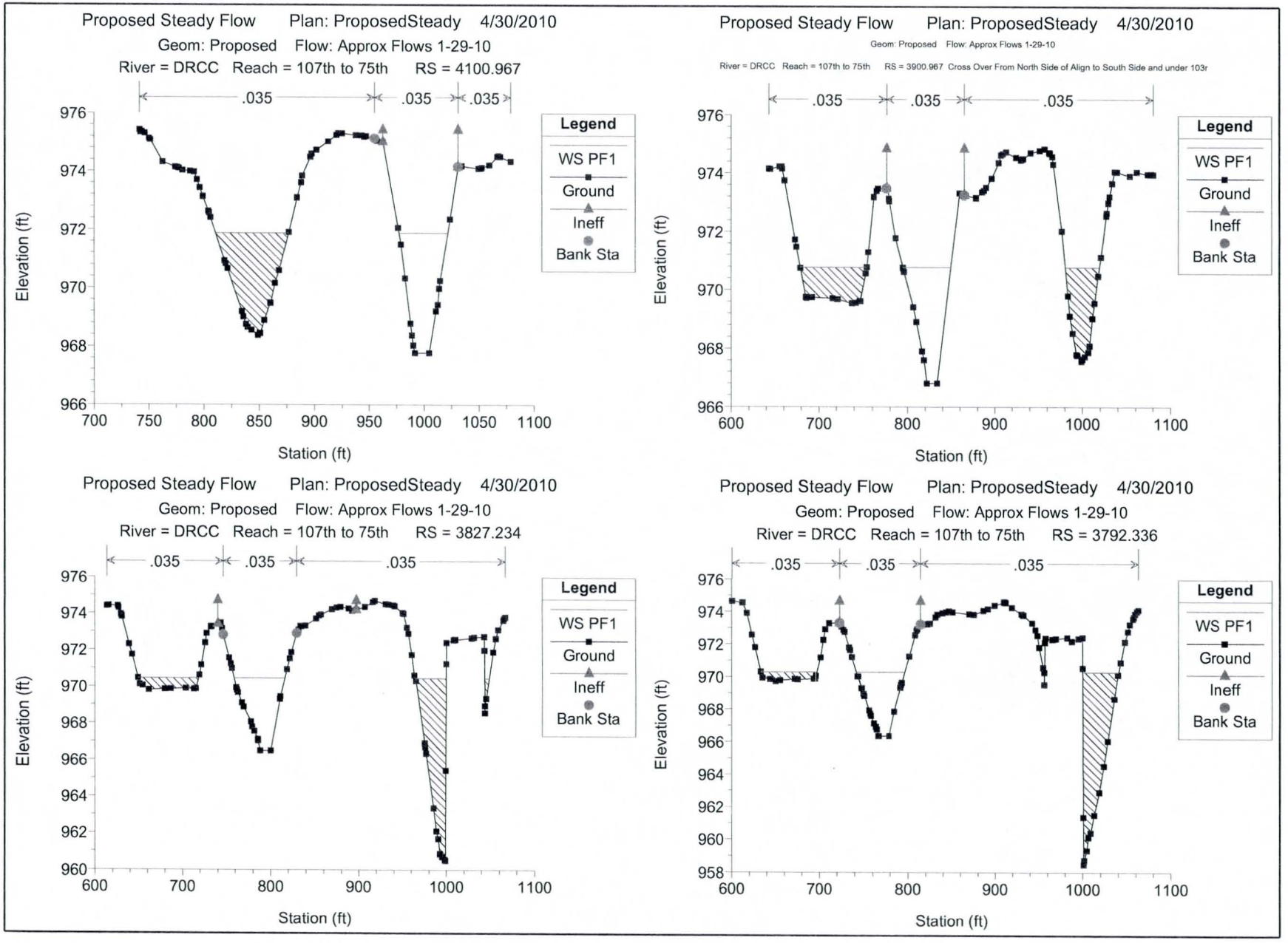

Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 6157.419
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 6073.870
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 5990.244
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 5926.216
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

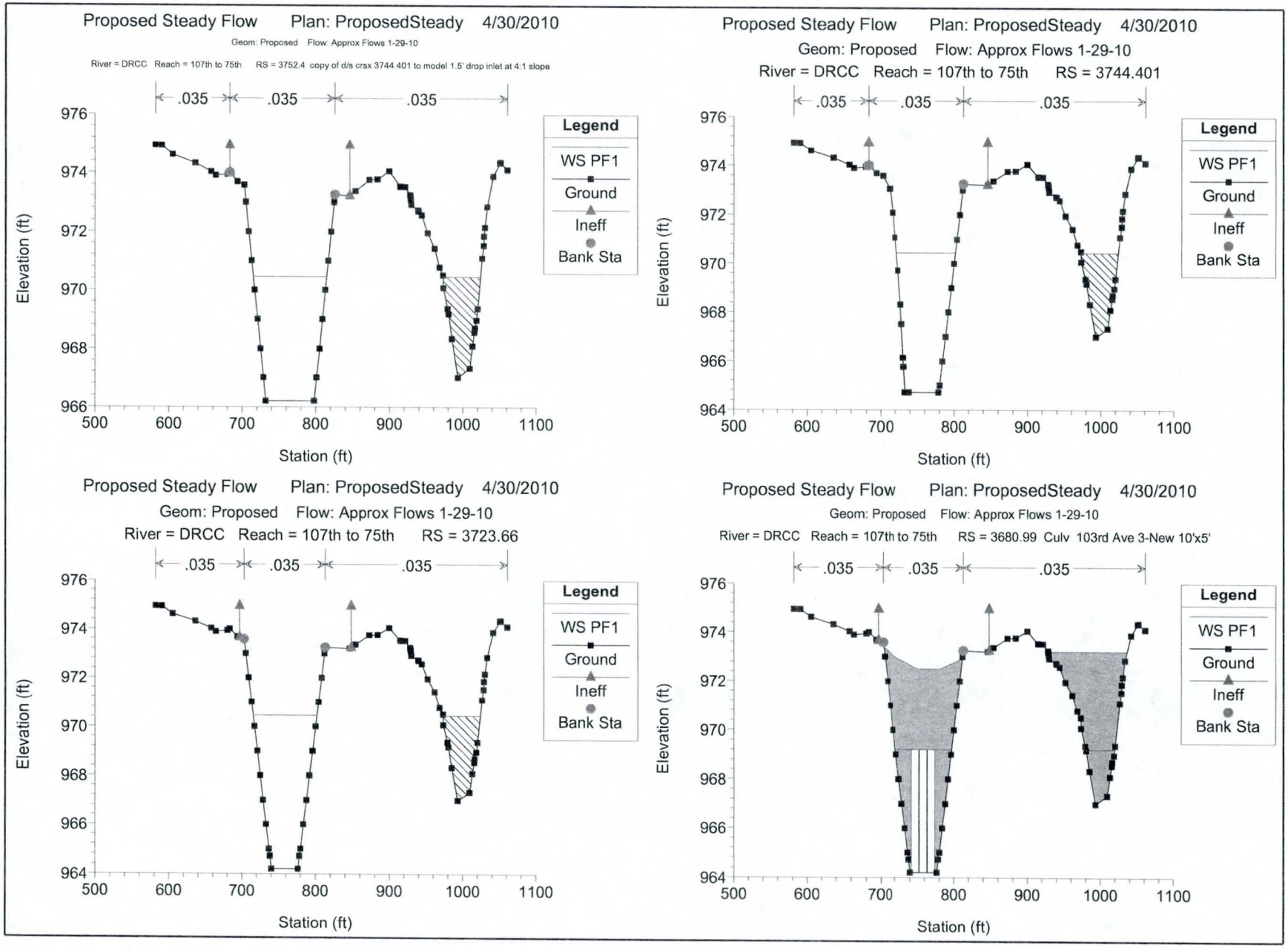

Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 5872.58 Culv PP's - 2 Exist 6x4 b/w poles & 2 New 12x4 to the N.
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 5819.429
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 5760.464

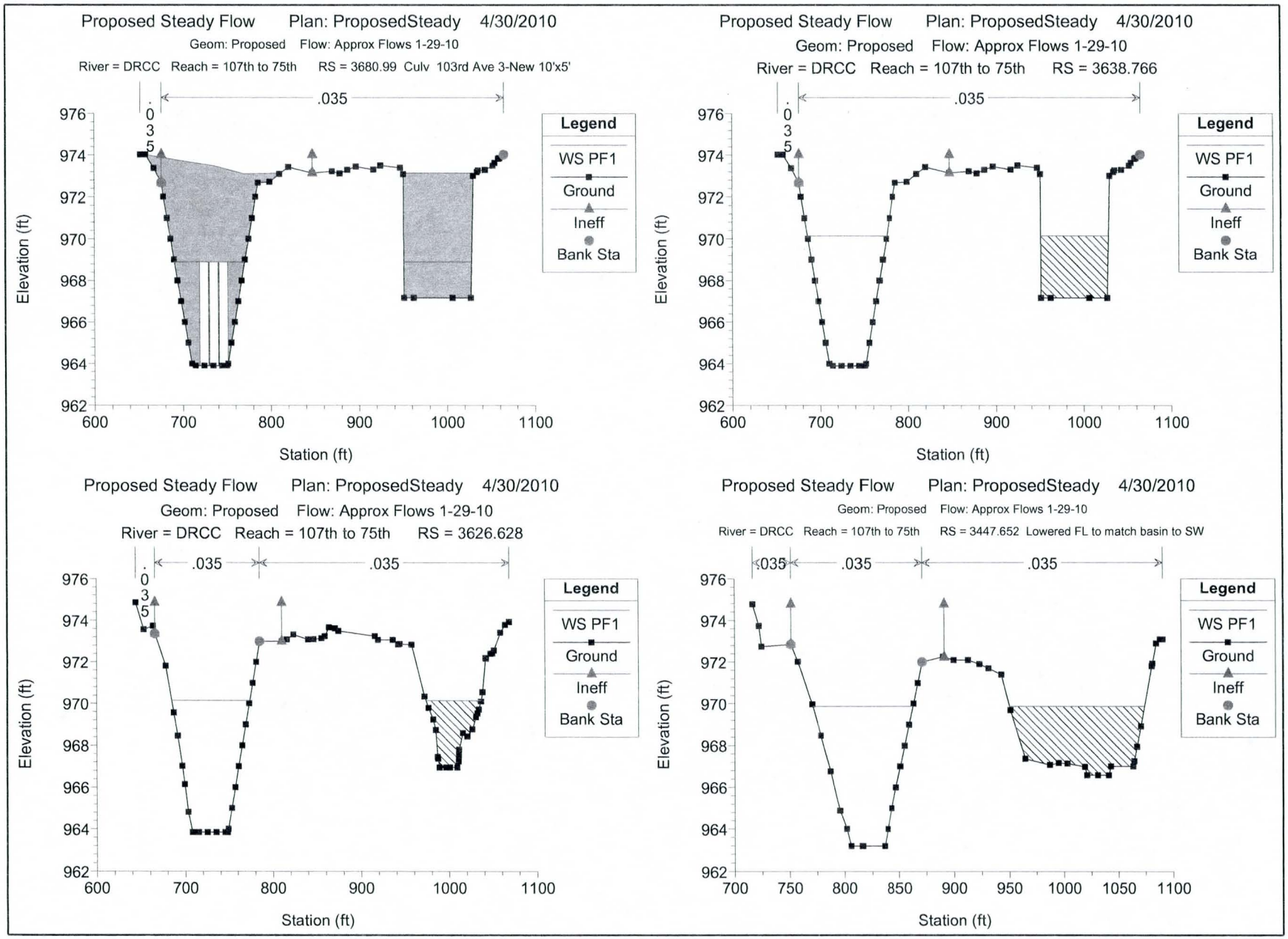

Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 5543.203
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 5325.945
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 5108.687
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Unsteady Model Extended Downstream Plan: Proposed 3/17/2010
Geom: Proposed Flow:
River = DRCC Reach = 107th to 75th RS = 4891.529
.035
.035
.035
Legend
WS Max WS
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

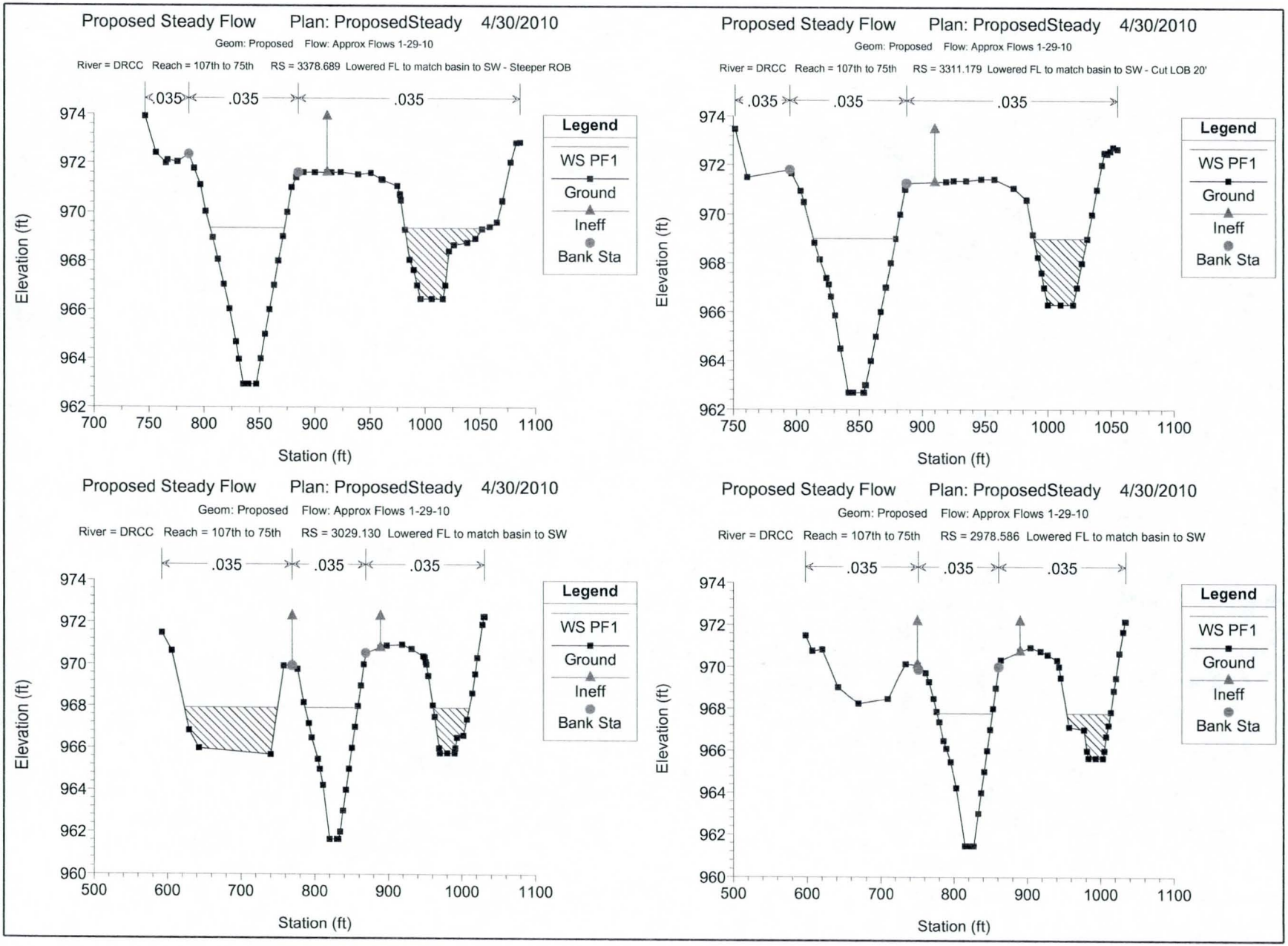

Proposed Steady Flow Plan: ProposedSteady 4/30/2010
Geom: Proposed Flow: Approx Flows 1-29-10
River = DRCC Reach = 107th to 75th RS = 4841 added crsx to reflect drop inlet str (u/s chnl slope = 0.3%, 1.6
.035
Legend
WS PF1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Proposed Steady Flow Plan: ProposedSteady 4/30/2010
Geom: Proposed Flow: Approx Flows 1-29-10
River = DRCC Reach = 107th to 75th RS = 4824.515 moved 10'upstream & Adjusted cross-section to fit propo culvert
.035
.035
Legend
WS PF1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Proposed Steady Flow Plan: ProposedSteady 4/30/2010
Geom: Proposed Flow: Approx Flows 1-29-10
River = DRCC Reach = 107th to 75th RS = 4771.41 Culv PP's - 2 Exist 6x4 b/w poles & 2 New 10x4 to the N.
.035
.035
Legend
WS PF1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Proposed Steady Flow Plan: ProposedSteady 4/30/2010
Geom: Proposed Flow: Approx Flows 1-29-10
River = DRCC Reach = 107th to 75th RS = 4771.41 Culv PP's - 2 Exist 6x4 b/w poles & 2 New 10x4 to the N.
.035
.035
Legend
WS PF1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

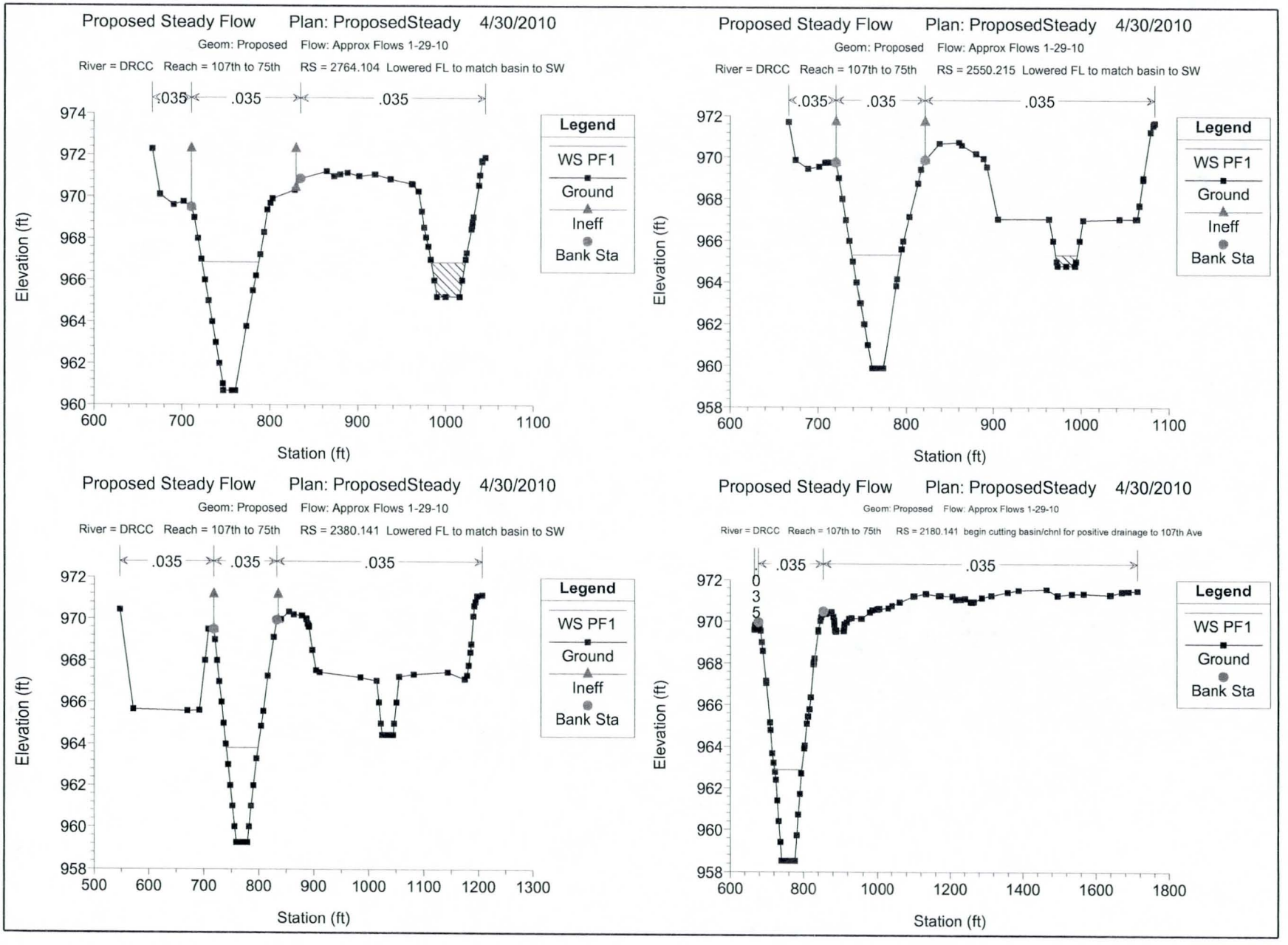

Proposed Steady Flow Plan: ProposedSteady 4/30/2010
Geom: Proposed Flow: Approx Flows 1-29-10
River = DRCC Reach = 107th to 75th RS = 4718.236
.035
.035
Legend
WS PF1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Proposed Steady Flow Plan: ProposedSteady 4/30/2010
Geom: Proposed Flow: Approx Flows 1-29-10
River = DRCC Reach = 107th to 75th RS = 4635.514
.035
.035
Legend
WS PF1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Proposed Steady Flow Plan: ProposedSteady 4/30/2010
Geom: Proposed Flow: Approx Flows 1-29-10
River = DRCC Reach = 107th to 75th RS = 4500.967
.035
.035
Legend
WS PF1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Proposed Steady Flow Plan: ProposedSteady 4/30/2010
Geom: Proposed Flow: Approx Flows 1-29-10
River = DRCC Reach = 107th to 75th RS = 4300.967
.035
.035
Legend
WS PF1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

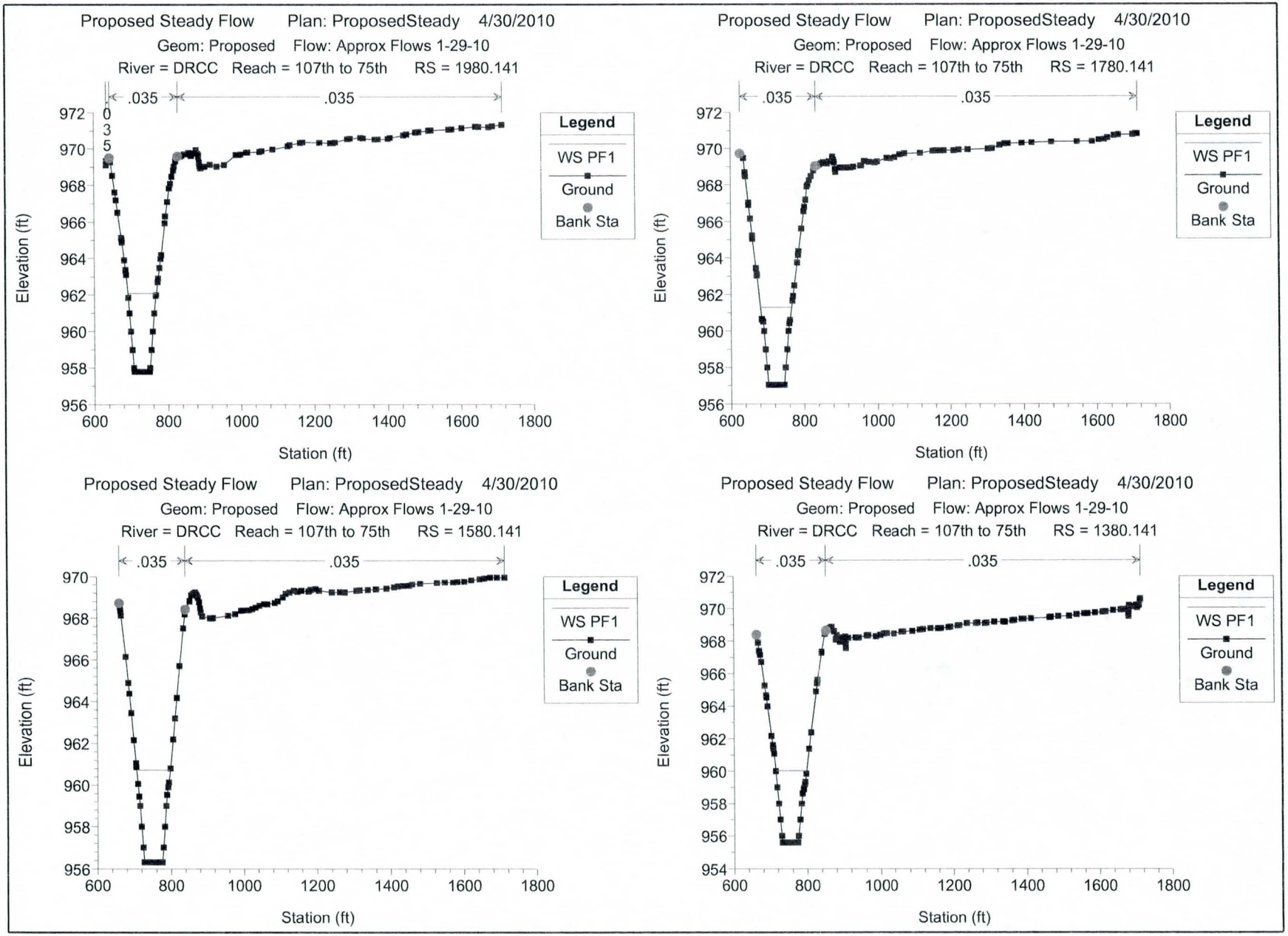

Proposed Steady Flow Plan: ProposedSteady 4/30/2010
Geom: Proposed Flow: Approx Flows 1-29-10
River = DRCC Reach = 107th to 75th RS = 4100.967
.035
.035
.035
Legend
WS PF1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Proposed Steady Flow Plan: ProposedSteady 4/30/2010
Geom: Proposed Flow: Approx Flows 1-29-10
River = DRCC Reach = 107th to 75th RS = 3900.967 Cross Over From North Side of Align to South Side and under 103r
.035
.035
.035
Legend
WS PF1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Proposed Steady Flow Plan: ProposedSteady 4/30/2010
Geom: Proposed Flow: Approx Flows 1-29-10
River = DRCC Reach = 107th to 75th RS = 3827.234
.035
.035
.035
Legend
WS PF1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Proposed Steady Flow Plan: ProposedSteady 4/30/2010
Geom: Proposed Flow: Approx Flows 1-29-10
River = DRCC Reach = 107th to 75th RS = 3792.336
.035
.035
.035
Legend
WS PF1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

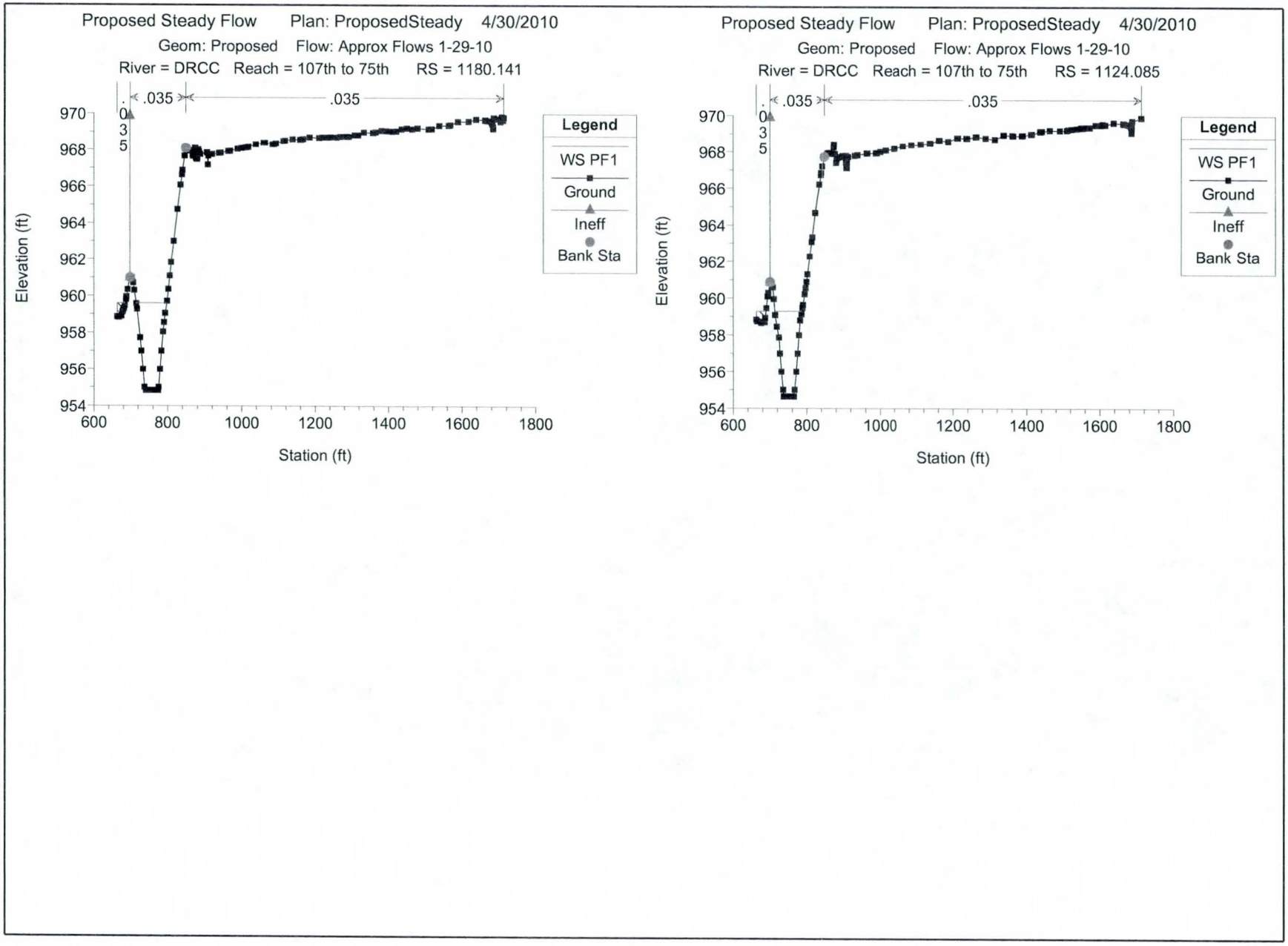

Proposed Steady Flow Plan: ProposedSteady 4/30/2010
Geom: Proposed Flow: Approx Flows 1-29-10
River = DRCC Reach = 107th to 75th RS = 3752.4 copy of d/s crsx 3744.401 to model 1.5' drop inlet at 4:1 slope
.035 .035 .035
Legend
WS PF1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Proposed Steady Flow Plan: ProposedSteady 4/30/2010
Geom: Proposed Flow: Approx Flows 1-29-10
River = DRCC Reach = 107th to 75th RS = 3744.401
Proposed Steady Flow Plan: ProposedSteady 4/30/2010
Geom: Proposed Flow: Approx Flows 1-29-10
River = DRCC Reach = 107th to 75th RS = 3723.66
Proposed Steady Flow Plan: ProposedSteady 4/30/2010
Geom: Proposed Flow: Approx Flows 1-29-10
River = DRCC Reach = 107th to 75th RS = 3680.99 Culv 103rd Ave 3-New 10'x5'


Proposed Steady Flow Plan: ProposedSteady 4/30/2010
Geom: Proposed Flow: Approx Flows 1-29-10
River = DRCC Reach = 107th to 75th RS = 3680.99 Culv 103rd Ave 3-New 10'x5'
.035
Legend
WS PF1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Proposed Steady Flow Plan: ProposedSteady 4/30/2010
Geom: Proposed Flow: Approx Flows 1-29-10
River = DRCC Reach = 107th to 75th RS = 3638.766
.035
Legend
WS PF1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Proposed Steady Flow Plan: ProposedSteady 4/30/2010
Geom: Proposed Flow: Approx Flows 1-29-10
River = DRCC Reach = 107th to 75th RS = 3626.628
.035
.035
Legend
WS PF1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Proposed Steady Flow Plan: ProposedSteady 4/30/2010
Geom: Proposed Flow: Approx Flows 1-29-10
River = DRCC Reach = 107th to 75th RS = 3447.652 Lowered FL to match basin to SW
.035
.035
.035
Legend
WS PF1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


Proposed Steady Flow Plan: ProposedSteady 4/30/2010
Geom: Proposed Flow: Approx Flows 1-29-10
River = DRCC Reach = 107th to 75th RS = 3378.689 Lowered FL to match basin to SW - Steeper ROB
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS PF1
Ground
Ineff
Bank Sta
Proposed Steady Flow Plan: ProposedSteady 4/30/2010
Geom: Proposed Flow: Approx Flows 1-29-10
River = DRCC Reach = 107th to 75th RS = 3311.179 Lowered FL to match basin to SW - Cut LOB 20'
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS PF1
Ground
Ineff
Bank Sta
Proposed Steady Flow Plan: ProposedSteady 4/30/2010
Geom: Proposed Flow: Approx Flows 1-29-10
River = DRCC Reach = 107th to 75th RS = 3029.130 Lowered FL to match basin to SW
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS PF1
Ground
Ineff
Bank Sta
Proposed Steady Flow Plan: ProposedSteady 4/30/2010
Geom: Proposed Flow: Approx Flows 1-29-10
River = DRCC Reach = 107th to 75th RS = 2978.586 Lowered FL to match basin to SW
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS PF1
Ground
Ineff
Bank Sta


Proposed Steady Flow Plan: ProposedSteady 4/30/2010
Geom: Proposed Flow: Approx Flows 1-29-10
River = DRCC Reach = 107th to 75th RS = 2764.104 Lowered FL to match basin to SW
.035
.035
.035
Legend
WS PF1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Proposed Steady Flow Plan: ProposedSteady 4/30/2010
Geom: Proposed Flow: Approx Flows 1-29-10
River = DRCC Reach = 107th to 75th RS = 2550.215 Lowered FL to match basin to SW
.035
.035
.035
Legend
WS PF1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Proposed Steady Flow Plan: ProposedSteady 4/30/2010
Geom: Proposed Flow: Approx Flows 1-29-10
River = DRCC Reach = 107th to 75th RS = 2380.141 Lowered FL to match basin to SW
.035
.035
.035
Legend
WS PF1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
Proposed Steady Flow Plan: ProposedSteady 4/30/2010
Geom: Proposed Flow: Approx Flows 1-29-10
River = DRCC Reach = 107th to 75th RS = 2180.141 begin cutting basin/chnl for positive drainage to 107th Ave
.035
.035
Legend
WS PF1
Ground
Bank Sta
Elevation (ft)
Station (ft)


Proposed Steady Flow Plan: ProposedSteady 4/30/2010
Geom: Proposed Flow: Approx Flows 1-29-10
River = DRCC Reach = 107th to 75th RS = 1980.141
.035
.035
Legend
WS PF1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Proposed Steady Flow Plan: ProposedSteady 4/30/2010
Geom: Proposed Flow: Approx Flows 1-29-10
River = DRCC Reach = 107th to 75th RS = 1780.141
.035
.035
Legend
WS PF1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Proposed Steady Flow Plan: ProposedSteady 4/30/2010
Geom: Proposed Flow: Approx Flows 1-29-10
River = DRCC Reach = 107th to 75th RS = 1580.141
.035
.035
Legend
WS PF1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Proposed Steady Flow Plan: ProposedSteady 4/30/2010
Geom: Proposed Flow: Approx Flows 1-29-10
River = DRCC Reach = 107th to 75th RS = 1380.141
.035
.035
Legend
WS PF1
Ground
Bank Sta
Elevation (ft)
Station (ft)


Proposed Steady Flow Plan: ProposedSteady 4/30/2010
Geom: Proposed Flow: Approx Flows 1-29-10
River = DRCC Reach = 107th to 75th RS = 1180.141
.035
.035
Legend
WS PF1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)
970
968
966
964
962
960
958
956
954
600
800
1000
1200
1400
1600
1800
Proposed Steady Flow Plan: ProposedSteady 4/30/2010
Geom: Proposed Flow: Approx Flows 1-29-10
River = DRCC Reach = 107th to 75th RS = 1124.085
.035
.035
Legend
WS PF1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

APPENDIX E

QUANTITIES AND COSTS

	Cut (C.Y.)	Fill (C.Y.)	Total (C.Y.)
Channel Only	-150,467	81,597	-68,870
107th Avenue Basin	-294,541	44	-294,497
89th Avenue Basin	-161,880	0	-161,880
	---	---	---
Project Totals	-606,888	81,641	-525,247

ESTIMATE OF CONSTRUCTION COSTS
75TH AVENUE TO 107TH AVE
(RECOMMENDED OPTION)

	ITEM DESCRIPTION	QUANTITY	UNIT	PRICE	TOTAL
	CHANNEL				
1	Channel Excavation	CY	68870	$8.00	$550,960.00
2	EarthWork for 107th Ave Retention Basin	CY	294497	$8.00	$2,355,976.00
3	EarthWork for 89th Ave Retention Basin	CY	161880	$8.00	$1,295,040.00
4	Street Crossing	EA	8	$20,000.00	$160,000.00
5	Irrigation Ditch/Line Crossing	EA	3	$25,000.00	$75,000.00
6	Lateral Weir (89th Ave Basin)	LF	250	$400.00	$100,000.00
7	Remove 6-30" RCP (91st Ave)	LF	1300	$10.00	$13,000.00
8	Relocate Irrigation Manhole	EA	1	$5,000.00	$5,000.00
9	Relocate 24" Irrigation Line	LF	210	$40.00	$8,400.00
10	Relocate Utilities	LS	1	$300,000.00	$300,000.00
11	Remove Existing Culvert (103rd Ave)	LF	85	$25.00	$2,125.00
12	36" Storm Sewer Pipe (Retention Basins Outlets)	LF	2100	$100.00	$210,000.00
13	Headwall for 36" Storm Sewer Outlet Pipe	EA	3	$2,000.00	$6,000.00
14	Concrete Box Culvert (4-Barrel 12'x4') ADOT	LF	213	$2,635.66	$561,395.58
15	Concrete Box Culvert (2-Barrel 12'x4') ADOT	LF	260	$1,474.06	$383,254.30
16	Concrete Box Culvert (3-Barrel 12'x5') ADOT	LF	250	$2,192.91	$548,226.25
17	Concrete Box Culvert (2-Barrel 10'x5') ADOT	LF	82	$1,312.25	$107,604.09
18	Concrete Box Culvert (4-Barrel 8'x1.5') ADOT	LF	97	$1,214.83	$117,838.51
19	Concrete Box Culvert (1-Barrel 12'x4') ADOT	LF	140	$866.20	$121,268.00
20	Concrete Box Culvert (1-Barrel 6'x5') ADOT	LF	244	$529.49	$129,195.56
21	Concrete Box Culvert (2-Barrel 10'x4') ADOT	LF	392	$1,220.29	$478,353.68
22	Concrete Box Culvert (3-Barrel 10'x5') ADOT	LF	82	$1,845.11	$151,299.02
23	Concrete Box Culvert (2-Barrel 12'x5') ADOT	LF	87	$1,591.21	$138,435.27
24	Concrete Box Culvert (1-Barrel 12'x5') ADOT	LF	210	$970.04	$203,708.40
25	Riprap	LS	1	$100,000.00	$100,000.00
26	Drainage Easements	AC	30	$76,000.00	$2,280,000.00
27	Lateral Weir Inlet Structure at 105th	LS	1	$25,000.00	$25,000.00
28	Irrigation Canal	LF	2650	$25.00	$66,250.00
	LANDSCAPE & IRRIGATION				
27	Seeding areas (inlcudes two basins and channel area)	AC	66.45	$4,138.20	$274,983.01
28	Major Restoration Areas	AC	14.49	$119,790.00	$1,736,306.00
29	Minor Restoration Areas	AC	6.71	$17,424.00	$116,942.40
				TOTAL	$12,621,561.07
				15% Contingency	$1,893,234.16
				EST TOTAL	$14,514,795.23
	Note: Cost for Concrete Box Culverts Includes Headwalls				

Elwood Dual vs Single

Won't need	$/ft	ft	$
2-10x4 boxes	1220	100	122,000
2-10x4 boxes	1220	100	122,000
2-12x4 boxes	1475	100	147,500
2-12x4 boxes	1475	100	147,500
1-6x5 box	530	100	53,000
TOTAL			**592,000**

Need

land	length	width	acres	$/acre	$
	2550	70	4.10	50,000	204,890
	2550	80	4.68	50,000	234,160
	2550	90	5.27	50,000	263,430

Channel Design

Q	V	A
350	5	70
350	4	88
350	3	117

Q	V	A
400	5	80
400	4	100
400	3	133

Top width 70-15 for road=55
Side slope 4:1
Excavation cost/cy=$4 to $8

D	W	A	Vol/cy	$4	$6	$8
1	47	51	4,817	19,267	28,900	38,533
2	39	86	8,122	32,489	48,733	64,978
3	31	105	9,917	39,667	59,500	79,333
4	23	108	10,200	40,800	61,200	81,600
5	15	95	8,972	35,889	53,833	71,778

Top width 80-15 for road= 65
Side slope 4:1

D	W	A	Vol/cy	$4	$6	$8
1	57	61	5,761	23,044	34,567	46,089
2	49	106	10,011	40,044	60,067	80,089
3	41	135	12,750	51,000	76,500	102,000
4	33	148	13,978	55,911	83,867	111,822
5	25	145	13,694	54,778	82,167	109,556

Top width 90-15 for road= 75
Side slope 4:1

D	W	A	Vol/cy	$4	$6	$8
1	67	71	6,706	26,822	40,233	53,644
2	59	126	11,900	47,600	71,400	95,200
3	51	165	15,583	62,333	93,500	124,667
4	43	188	17,756	71,022	106,533	142,044
5	35	195	18,417	73,667	110,500	147,333

Hydroseeding

acres	$/acre	$
4	5000	20000
5	5000	**25000**

TOTAL	**370,982**	**269,556**

Relocate 4 barns/covers?	592,000 - 371,000 =	221,000
	592,000 - 270,000 =	322,000

Bobbie Ohler - FCDX

From: Matt Kapfer [MKapfer@j2design.us]
Sent: Monday, May 03, 2010 3:38 PM
To: Bobbie Ohler - FCDX
Cc: Jeff Holzmeister
Subject: FW: DRCC Elwood - revised Predesign Report
Attachments: Rev Exec Summ 4-30-10.pdf

Bobbie – Attached is a pdf of the revised Executive Summary and Addendum#1 to address your comments.

The last two paragraphs in section "**Reach 3 – 91st Avenue to 99th Avenue**" on page 8, state the reasons for recommending that only one channel be constructed between 95th & 99th Avenue.
Pages 9 and 10 are the cost estimates for both the one channel and two channel options.
Page 11 illustrates the lack of positive drainage for this reach.
Pages 17 & 18 illustrate/summarize the pros and cons of two channels vs. one channel.

Please let me know if you have any questions.

For the kick-off meeting, we will make any day and time that works for you. Here are a few suggestions:
Any time Thursday, May 6th.
Afternoon Monday, May 10th.
Any time Wednesday, May 12th.

Thank you and have a good evening,
Matthew Kapfer, P.E.
J2 Engineering and Environmental Design

From: Bobbie Ohler - FCDX [mailto:BAO@mail.maricopa.gov]
Sent: Monday, May 03, 2010 1:53 PM
To: Jeff Holzmeister
Cc: Gary Shapiro - FCDX
Subject: DRCC Elwood - revised Predesign Report

Jeff – thanks for providing a new revised Predesign Report. However I am really busy the next couple of days and do not have time to re-read the entire report. Can you please send me your revisions to the report, including reasons and cost estimate for recommending that we construct and use only one channel, vs. two channels, between 95th Avenue and 99th Avenue.

Can you also please let me know your days and times of availability for a kick-off meeting, this week and next?

Bobbie Ohler, P.E.
Project Manager
Flood Control District of Maricopa County
2801 W. Durango St.
Phoenix, AZ 85009
(602) 506-2943

----(Scanned by Google Postini)----

Executive Summary

The conceptual design developed for the Durango Regional Conveyance Channel (DRCC) overlooked several constraints that needed to be mitigated prior to the Final Design. The constraining items included the following:

- Vertical alignment of 89th Avenue
- Vertical alignment of the 91st Avenue sanitary sewer
- Channel capacity downstream of 91st Avenue
- Culvert capacity downstream of 91st Avenue
- Vertical alignment of 92nd Avenue
- Storm water siphon at 103rd Avenue

In order to mitigate these items, the DRCC conceptual design needed to be revised. The FCDMC performed a VA Study to develop design recommendations for the project. The J2 design team evaluated the VA recommendations and developed a preferred alternative. The preferred alternative is presented in the Final Pre-Design Report. The most significant change to the DRCC design was the addition of a detention/retention basin between 87th Avenue and 89th Avenue. This basin significantly reduces the peak discharge from 89th Avenue to 99th Avenue.

Addendum No.1 provides an overview of the project and a discussion of the VA recommendations. The Final Pre-Design Report documents the engineering analyses conducted to date for the project. It is anticipated that the analyses will be modified during the final design process to optimize the design. A landscape site analysis is included in the report. A steady state and unsteady state HEC-RAS model is provided in the report. The unsteady state model was run from 75th Avenue to 103rd Avenue. The model verifies that the conceptual design will function for the 100-yer design event. The unsteady state model will be refined based on the final channel and basin geometries.

The Final Pre-Design Report defines a conceptual design that may be carried forward into final design. The preferred alternative will serve as the baseline condition for the final design.

Durango Regional Conveyance Channel
75th Avenue to 107th Avenue
Pre-Design Report
Addendum No. 1

1.0 Introduction

The Draft Pre-Design Report (PDR) was based on conceptual designs developed as part of the Durango Regional Conveyance Channel Candidate Assessment Report (CAR) developed by Aspen Engineering and the Addendum to the Durango Regional Conveyance Channel Candidate Assessment Report (ACAR) developed by Prestige Engineering, LLC. The goal of the project was to "connect" the previously constructed private development drainage facilities to form a regional conveyance channel. The regional conveyance channel originates at 75th Avenue and extends to 107th Avenue. The detention/retention basin (originally located at 95th Avenue) was relocated to the northeast corner of 107th Avenue and Elwood Street. The preliminary regional drainage channel alignment minimized the need for additional right-of-way (locate the channel along the northern portion of the corridor).

During J2 Engineering & Environmental Design's (J2) Pre-Design work effort several design constraints and/or issues were identified. First, the vertical alignment of 89th Avenue and the vertical alignment of the 91st Avenue sanitary sewer severely restricted the hydraulic capacity of the regional channel (the 89th Avenue culvert is limited to a height of 1.5 feet). Second, the channel capacity between 91st Avenue and 95th Avenue was not adequate to convey the 100-year peak discharge. Third, construction of a large storm water siphon would have significant operation and maintenance concerns. Therefore, the regional channel horizontal and vertical alignment was shifted to the south from 103rd Avenue to 107th Avenue. Fourth, the reservoir routing operation of the retention/detention basin was modified to accommodate the channel revisions.

The Flood Control District of Maricopa County (FCDMC) conducted a Value Analysis Workshop (VA) to provide recommendations for value enhancement of the project. They reviewed/refined the project assumptions and design constraints in order to optimize the design. In addition, team members provided recommendations on possible solutions to mitigate the design constraints. A VA report was prepared that documented the recommendations discussed. The J2 design team reviewed the VA recommendations and developed a preferred design alternative for the project. The purpose of this Addendum is to document the VA recommendations and present the preferred design alternative to FCDMC staff. It is anticipated that the Final Design will be based on the preferred design discussed in the Addendum.

2.0 Design Alternatives

The VA Team developed several design alternatives for J2 to evaluate for the regional conveyance channel. J2 staff members evaluated the merits of each design alternative and developed a preferred design alternative. A brief description of each alternative (along with pros and cons) is provided in the following paragraphs. The recommendations included the following:

Recommendation No. 1: Divert flow south along 83rd Avenue. Begin new channel west of 83rd Avenue.

The Tuscano development constructed a large portion of the infrastructure (streets, utilities, earth channel, etc.) from 75th Avenue to 83rd Avenue. An earth lined channel was constructed from 75th Avenue to 83rd Avenue along the Elwood Street alignment. Another channel was constructed along the east side of 83rd Avenue from the Elwood Street alignment to Broadway Road. A small earth berm separates the two channels. The drainage report for Tuscano shows storm water runoff being conveyed in these channels to the northeast corner of Broadway Road and 83rd Avenue. The southern discharge concept is not in conformance with the Durango Regional Conveyance Channel. The future SR-801 freeway will be located approximately ½ mile south of Broadway Road at 83rd Avenue. The VA team requested that J2 consider routing storm water runoff east of 83rd Avenue to the south. The Durango Regional Conveyance Channel would start west of 83rd Avenue. The reduced peak discharge could flow through the constrained channel segments.

Pros

Cost effective way to reduce flows in the regional channel west of 83rd Avenue.

Utilizes previously constructed earthen channel.

Cons

Diverts flow to a location without an outlet (could adversely impact adjacent properties).

SR-801 is not funded at the current time.

Concept differs from the FCDMC regional plan.

Summary: It appears that this option may be viable. Since the SR-801 is not funded at the current time it was abandoned.

Recommendation No. 2: Re-grade the channel east of 83rd Avenue into a detention/retention basin. Begin a new channel west of 83rd Avenue.

The City of Phoenix Park Department owns a parcel of land within the corridor (immediately east of 83rd Avenue). The VA Team requested that J2 determine the feasibility of widening the channel within the City property (online detention basin) to reduce the peak discharge west of 83rd Avenue. The proposed channel widening did not significantly reduce the peak discharge west of 83rd Avenue.

Pros

Reduced peak discharge downstream of 83rd Avenue

Cons

Required purchase of additional City property.

Did not significantly reduce the peak discharge west of 83rd Avenue.

Long term maintenance of shallow online detention basin.

Summary: This basin location was not in the optimum location. This alternative was abandoned.

Recommendation No. 3: Maintain the existing landscaped areas as retention/detention basins and construct a new conveyance channel on undeveloped land (acquire additional right-of-way/easements).

The City of Phoenix required developments to designate drainage easements within the future Durango Channel alignment. These developments constructed channels and retention basins in the drainage easement. Several of the developments installed significant irrigation and landscaping within the easement. The conceptual design was to connect the existing drainage facilities to form a regional conveyance channel. However, the individual designs did not integrate well into a regional facility. When the original concept was developed the project corridor was undergoing rapid development (i.e., land prices were escalating rapidly). Therefore, it was feasible to construct the regional channel within designated drainage easements. Following the economic downturn, the price of land fell significantly. It appears to be more feasible to purchase drainage easements from agricultural property owners than to modify the existing drainage facilities. The cost of re-grading, plant salvage and/or replacement, irrigation replacement, turf replacement, etc. and the impact to existing homeowners was greater than the cost of acquiring new drainage easements.

Specifically, additional right-of-way/easements were required in the area from 79th Avenue to 91st Avenue (a retention/detention basin is required in the City of Phoenix property between 87th Avenue and 89th Avenue). The proposed retention/detention basin will allow the existing channel to be utilized in the area from 91st Avenue to 103rd Avenue. The hydraulic capacity of the existing culverts will need to be expanded to match the hydraulic capacity of the channel.

Team members developed preliminary cost estimates for the two alternatives (north channel with improved culvert capacity and dual channels) for the 91st Avenue to 99th Avenue segment. It was determined that the north channel option was the most cost effective design. A copy of the cost estimate is included in the Addendum.

This recommendation appears to reduce the capital cost of the project.

Pros

Reduce capital cost

Minimize disturbance to existing property owners

Improve hydraulic performance of the facility

Cons

Impact agricultural properties

Cost for drainage easements (the drainage easements would be "donated" when the property develops in the future)

Summary: This alternative will be utilized for a portion of the corridor (79th Avenue to 91st Avenue). It will reduce capital cost, but will not resolve the design issue. This recommendation will be utilized with Recommendation #6 (basin at 89th Avenue). The southern channel

Recommendation No. 4: Maximize the online storage within the utility corridor to reduce peak discharge.

The VA Team recommended that J2 evaluate the impact of increase channel storage throughout the corridor by widening the channel in areas with excess right-of-way/easements. They felt that the additional channel storage may reduce peak discharge values within the corridor. J2 evaluated this alternative and found that it had a small impact on the peak discharge values. This alternative may be incorporated into other alternatives to optimize the system.

Pros

Slight reduction of peak discharge values

Cons

Creates additional waste material

Does not solve the problem (may supplement other alternatives)

Impacts a larger footprint (more mitigation required)

Summary: This alternative may be utilized to supplement Recommendation #6, the basin at 89th Avenue. It will allow for the basin storage volume to be reduced slightly.

Recommendation No. 5: Consider dual channel alternatives in undeveloped areas.

The VA Team suggested that a dual channel configuration be considered for areas that do not have adequate hydraulic conveyance. This concept would utilize the existing channels/basins and construct new channels as needed. J2 found this concept to provide a feasible design alternative. The hydraulic conveyance could be increased to accommodate the design flows. However, this concept required the conversion of existing retention basins into channels (loss of first flush water quality basins). It also significantly altered the maintenance road configuration for the APS and WAPA overhead power lines.

Pros

Provides increased hydraulic conveyance

Cons

Adversely impacts APS and WAPA access

Impacts the existing basins and channels (requires mitigation)

Requires purchase of drainage easements

Dual channel configuration more difficult to maintain than single channel

Summary: This alternative increased the capital cost and increased the maintenance concerns for APS/WAPA. This alternative was abandoned.

Recommendation No. 6: Construct detention/retention basins within corridor to limit peak discharge values to the hydraulic capacity of the channels.

The VA Team requested that J2 evaluate vacant parcels within the corridor that could be utilized for detention/retention basins to reduce the peak discharge in the critical design segment (89th Avenue to 95th Avenue). J2 evaluated a detention/retention basin on the City of Phoenix Park property located between 87th Avenue and 89th Avenue. J2 determined that the basin reduced the peak discharge enough to allow the critical segment to function within City of Phoenix guidelines. This appears to be a viable design option.

Pros

Reduced peak discharge values

Located on City of Phoenix property (need to purchase from Parks Department)

Opportunity for multi-use park facility

Enables critical segment to function hydraulically

Cons

Additional cost to project

Additional long term maintenance cost

Summary: This alternative optimized the hydraulic operation of the corridor. It was determined to be the preferred solution. This alternative will serve as the basis for the final design. It is anticipated that other recommendations will be utilized to optimize the design.

Recommendation No. 7: Connect grass lined basins between 83rd Avenue and 87th Avenue

The VA Team requested that J2 evaluate the opportunity to connect the existing retention basins located between 83rd Avenue and 87th Avenue to eliminate the need for new channel to the south. J2 determined that the basin inverts would need to be re-graded, irrigation replaced, turf replaced, vegetation replaced, etc. The cost of the basin mitigation exceeded the cost of obtaining a drainage easement for a channel to the south. This does not appear to be a viable option.

Pros

Reduces easements

Cons

More Expensive

Hydraulically inefficient

Requires additional culverts

Summary: This alternative was determined not to be cost effective. It was abandoned.

3.0 Description of the Preferred Alternative

J2 completed analyses of the recommendations developed during the VA process and developed a preferred alternative for the project. The construction plan for the preferred alternative is included in Appendix B of the report. The following paragraphs describe the preferred alternative. It is recommended that this alternative be carried forward into Final Design.

Initially, the project was required to pass the 10-year peak discharge under the roadways and pass the 100-year discharge over the roadways (with a maximum overtopping depth of 0.5 feet). Since the existing roadways are very flat, it was determined to be more cost effective to pass the entire 100-year discharge under the roadways. This change in the conceptual design eliminates the need to modify the vertical alignment of several roadways within the project corridor.

Reach 1 – 75th Avenue to 83rd Avenue

This reach consists of several independent linear retention basins with culverts at 76th Avenue and 79th Avenue. These facilities were constructed as part of the Tuscano development. The linear retention basins will be converted into a regional conveyance channel. This will require minimal grading within the basins and removal of small earthen berms between the basins. The longitudinal slope of the channel will be dictated by the invert of the existing culverts. The existing 76th Avenue culvert will be expanded from a 2 – 10' X 6' RCBC to a 3 – 10' X 6' RCBC. The existing culvert at 79th Avenue will be expanded from a 2 – 10' X 4' RCBC to a 4 – 10' X 4' RCBC. It is anticipated that minor grading will be required on the banks of the existing channel/basin to provide adequate freeboard for the regional system.

The inverts of the existing retention basins (Tuscano School site and the City of Phoenix Park Department property) will be re-graded. The proposed channel longitudinal slope in this reach is governed by the 91st Avenue crossing and the 79th Avenue culvert invert. The channel may be enlarged in these areas to provide inline storage volume (slight reduction in peak discharge) for the system and to minimize the impact to the school's playground and the future park site. The channel geometry will be optimized during the final design process. 83rd Avenue does not have a culvert crossing at the current time. A 3 – 12' X 5' RCBC will be constructed as part of this project.

The 83rd Avenue crossing will require coordination with several utilities. The most critical will be SRP irrigation, APS and WAPA (power poles west side of 83rd Avenue). The proposed channel will be located south of the APS/WAPA power poles.

Reach 2 – 83rd Avenue to 91st Avenue

This segment contains three of the most significant project design constraints. They are the SRP irrigation crossing at Riley Road (87th Avenue), 89th Avenue (vertical roadway alignment), and the 91st Avenue sanitary sewer (72 inch diameter pipe). A major goal was to minimize the number of SRP siphons required for the project. The SRP irrigation crossing at Riley Road will need to be siphoned under the conveyance channel. SRP would not review/comment on the proposed project features until construction plans had been prepared. SRP has not commented on the siphon at the current time. The existing crossings at 89th Avenue and 91st Avenue have limited hydraulic conveyance. In order to convey the 100-year storm event through these constraints, the peak discharge will need to be significantly reduced. Therefore, a detention basin with the bottom 3' serving as retention is proposed within the City of Phoenix Parks Department parcel. This parcel is located between 87th Avenue and 89th Avenue on the south side of the conveyance corridor. In addition, the recommended alternative will leave the existing landscaped retention basins in place and will construct the conveyance channel south of the APS/WAPA overhead power lines (from 83rd Avenue to the basin and from the basin to 91st Avenue). The proposed alignment will require a private irrigation line to be siphoned under the conveyance channel.

The City Parks and Recreation Department requested that team members evaluate the opportunity to maintain a portion of the park site above the 100-year water surface elevation.

Team members determined that the entire park area is required for the retention basin. If the City's Park and Recreation Department requires a park at this location, then additional right-of-way may be required.

The existing 6 – 30" pipe culvert crossing at 91st Avenue will be replaced with a 4 - 12' X 4' RCBC. The existing vertical alignment of 89th Avenue allows a 1.5' high custom culvert. Team members will optimize the vertical alignment of 89th Avenue during final design. The alignment will be constrained by the Hurley Ranch School Parking Lot entrance and the intersection of 89th Drive and Forest Grove. The proposed design will limit the depth of 100-yr overtopping at 89th Drive to 0.5 feet.

Reach 3 – 91st Avenue to 99th Avenue

This segment contains two of the most significant project design constraints. They are the existing channel and box culverts in this reach and the APS/WAPA power poles. Team members attempted to utilize the existing channel and maintain the existing linear retention basin within this segment (water quality basins). The hydraulic capacity of the channel is limited by the box culverts because several of the existing culverts are only 2 – 6' X 4' RCBC and therefore will need additional cells constructed to convey the 100-yr peak flow. The existing channel from 91st Avenue to 95th Avenue will require some minor grading of the channel bottom to maintain positive drainage and some grading around the culvert entrances and exits to accommodate the additional cells required to convey the 100-yr peak flow. The existing 2 – 12' X 4' RCBC's at 92nd Avenue and 95th Avenue will each be expanded to 3 – 12' X 4' RCBC's. Team members worked with WAPA representatives and verified the design criteria for construction adjacent to their power poles. Team members maximized the culvert and channel configuration at the power poles. The remaining channel segments remained in their existing condition. The peak flow reduction provided by the proposed basin at 89th Avenue in conjunction with the aforementioned culvert modifications enables the channel in this segment to pass the 100-year storm event.

The existing 2 – 10' X 4' RCBC at 99th Avenue will be expanded to a 4 – 10' X 4' RCBC.

The dual channel option from 91st Avenue to 99th Avenue was considered and determined to not be cost effective. Two of the culverts around the power poles between 95th Avenue and 99th Avenue could be eliminated with the dual channel option in this segment, but the savings would be offset by the additional cost of right-of-way, excavation, and seeding. In addition, the impact to 4 existing barns, the vertical alignment of 95th Avenue, and maintenance of two channels is also an issue.

The following figure shows the cost estimate for the two design alternatives within the 91st Avenue to 99th Avenue segment. The cost of the northern channel alternative was substantially less than the dual channel option. Team member developed a profile along the southern channel alignment to show the lack of positive grade in the 91st Avenue to 99th Avenue corridor.

Reach 4 – 99th Avenue to 107th Avenue

This segment utilizes the existing channel from 99th Avenue to 103rd Avenue. The existing channel siphons under the SRP irrigation line near 103rd Avenue. Immediately west of 103rd Avenue a large channel outfalls into the regional channel. Team members realigned the conveyance channel to the south from 102nd Drive to 107th Avenue to eliminate the siphon. In order to pass under the SRP irrigation line and still be able to discharge into the conveyance channel a 2 – 12' X 5' RCBC designed with a change/break in longitudinal slope will be required

2-10×4 $1220/ft (11) 125ft = $152,500

2-12×4 $1475/ft (11) 125ft = $184,375

1-6×5 $530/ft (1) 125ft = $66,250

$403,125

BOXES NOT NEEDED

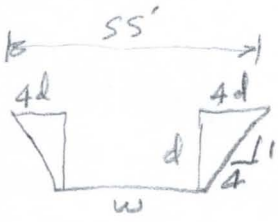
$70' \times \frac{2250' + 300'}{2550'} = 178\,500\,ft^2 \left(\frac{acre}{43560\,ft^2}\right) = 4.1\,acres$

(4.1 acres)($50K/acre) = $205,000 land

Q = 350 cfs

V = 5 ft/s

A = 70 ft²



$= \frac{[(8d + w) + w]d}{2}$

$\frac{8d^2 + 2wd}{2}$

$(4d + w)d = 70\,ft^2$

d	w	A
1	47	51
2	39	94

$94 \times 2550'/27 = 8,900\,cy\ ($4/cy) = 35600

CHANNEL EX

HYDROSEED $120K

TOTAL $260,600

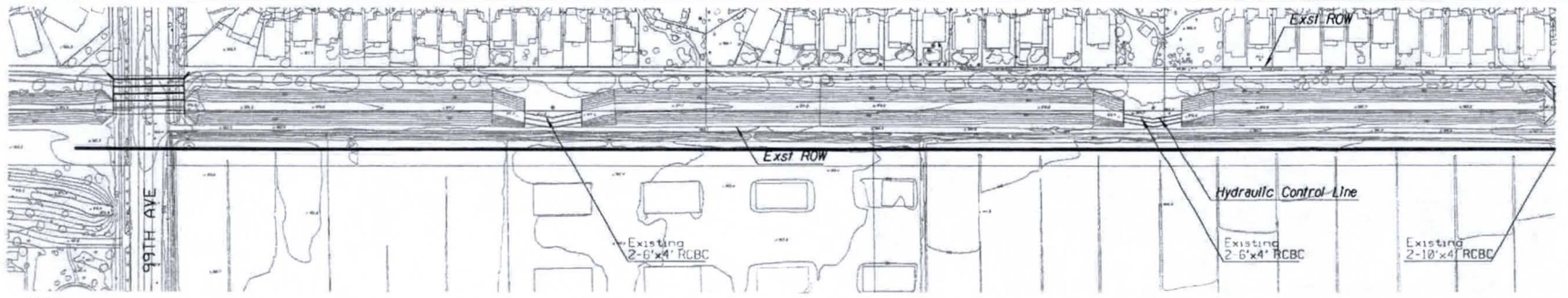
ADD 4 BARNS or COVERS ? $130K

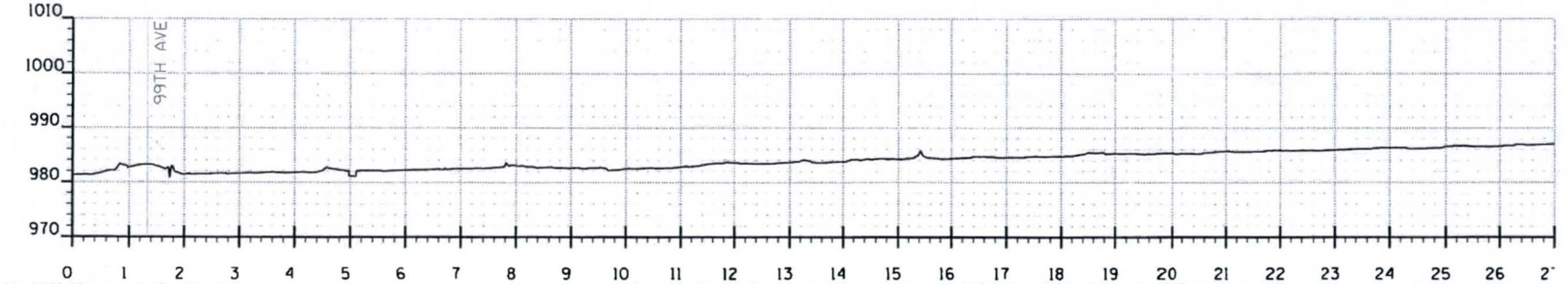
ESTIMATE OF CONSTRUCTION COSTS
91ST AVENUE TO 99TH AVE
(DUAL CHANNEL OPTION)

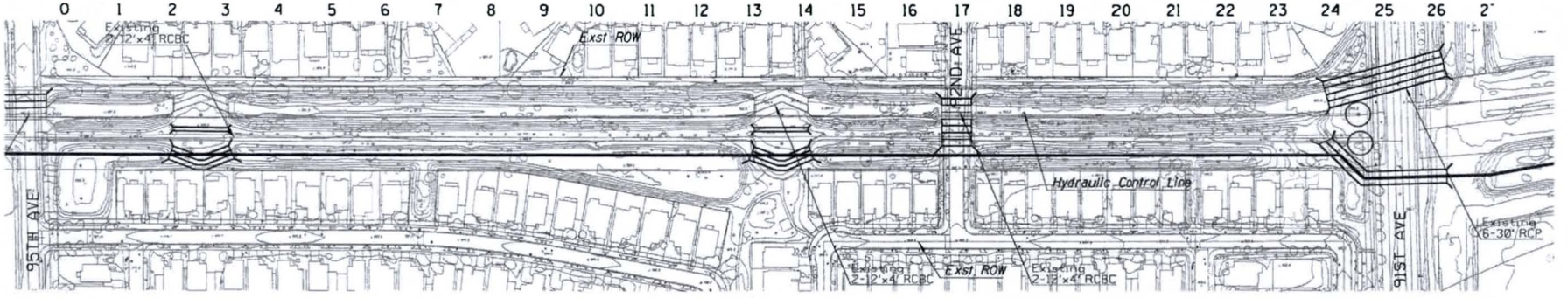
	ITEM DESCRIPTION	QUANTITY	UNIT	PRICE	TOTAL
	CHANNEL				
1	Channel Excavation	CY	20000	$8.00	$160,000.00
2	Street Crossing - Small - Including Utilities (91st(1), 92nd & 95th)	EA	3	$20,000.00	$60,000.00
3	Street Crossing - Large - Including Utilities (91st(2) & 99th)	EA	2	$40,000.00	$80,000.00
4	Remove 6-30" RCP (91st Ave)	LF	1300	$10.00	$13,000.00
5	Relocate Irrigation Manhole	EA	1	$5,000.00	$5,000.00
6	Relocate 24" Irrigation Line	LF	210	$40.00	$8,400.00
7	Concrete Box Culvert (2-Barrel 12'x4') ADOT - 91st Ave (1) & (2)	LF	460	$1,476.06	$678,987.60
8	Concrete Box Culvert (1-Barrel 12'x4') ADOT - 92nd Ave & 95th Ave	LF	140	$866.20	$121,268.00
9	Concrete Box Culvert (1-Barrel 6'x5') ADOT - 2 PP's b/w 92nd & 95th	LF	244	$529.49	$129,195.56
10	Riprap	LS	1	$20,000.00	$20,000.00
11	Irrigation Canal	LF	2650	$25.00	$66,250.00
12	Drainage Easements	AC	5	$76,000.00	$380,000.00
	LANDSCAPE & IRRIGATION				
13	Minor Restoration Areas	AC	2.5	$17,424.00	$43,560.00
14	Major Restoration Areas	AC	1.0	$119,790.00	$119,790.00
15	Seeding	AC	5	$4,138.20	$20,691.00
				TOTAL	$1,906,142.16
				15% Contingency	$285,921.32
				EST TOTAL	$2,192,063.48
	Note: Cost for Concrete Box Culverts Includes Headwalls				

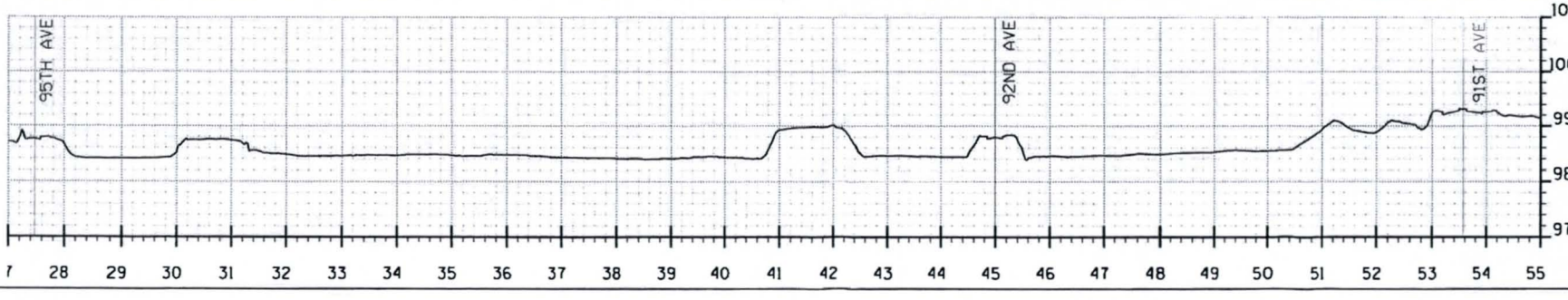
ESTIMATE OF CONSTRUCTION COSTS
91ST AVENUE TO 99TH AVE
(RECOMMENDED OPTION-SINGLE CHANNEL NORTH)

	ITEM DESCRIPTION	QUANTITY	UNIT	PRICE	TOTAL
	CHANNEL				
1	Channel Excavation	CY	3300	$8.00	$26,400.00
2	Street Crossing - Small - Including Utilities (92nd & 95th)	EA	2	$20,000.00	$40,000.00
3	Street Crossing - Large - Including Utilities (91st & 99th)	EA	2	$40,000.00	$80,000.00
4	Remove 6-30" RCP (91st Ave)	LF	1300	$10.00	$13,000.00
5	Relocate Irrigation Manhole	EA	1	$5,000.00	$5,000.00
6	Relocate 24" Irrigation Line	LF	210	$40.00	$8,400.00
7	Concrete Box Culvert (4-Barrel 12'x4') ADOT - 91st Ave	LF	213	$2,635.66	$561,395.58
8	Concrete Box Culvert (2-Barrel 12'x4') ADOT - PP W of 95th	LF	130	$1,474.06	$191,627.15
9	Concrete Box Culvert (1-Barrel 12'x4') ADOT - 92nd Ave & 95th Ave	LF	140	$866.20	$121,268.00
10	Concrete Box Culvert (1-Barrel 6'x5') ADOT - 2 PP's b/w 92nd & 95th	LF	244	$529.49	$129,195.56
11	Concrete Box Culvert (2-Barrel 10'x4') ADOT - PP E of 99th	LF	130	$1,220.29	$158,637.70
12	Riprap	LS	1	$20,000.00	$20,000.00
	LANDSCAPE & IRRIGATION				
13	Minor Restoration Areas	AC	2.00	$17,424.00	$34,848.00
				TOTAL	$1,389,771.99
				15% Contingency	$208,455.80
				EST TOTAL	$1,598,237.79
	Note: Cost for Concrete Box Culverts Includes Headwalls				









J2 engineering and environmental design
PROJECT NO. 090388 DRAWN BY JW
DATE 04-30-10 CHECKED BY JH

to route storm water from the tributary channel that passes under Country Place Boulevard and along the west side of 103rd Avenue. The existing landscaped retention basin alignment (Lions Gate) will be utilized for the proposed channel from 103rd Avenue to 107th Avenue. The existing basin will be re-graded to conform to the future crossing of 107th Avenue.

A regional detention basin will be located at the northwest corner of 107th Avenue and the conveyance channel. It is anticipated that the basin may serve as a multi-use park in the future. The City of Phoenix may construct sports field within this park in the future. The basin will be graded to accommodate future sports fields and will be seeded for erosion control. A lateral weir/box culvert structure will route flow from the channel into the basin and a 30" – 36" RCP will be utilized to drain the basin in 36 hours. The regional drainage system will be constructed from 75th Avenue to 107th Avenue. The remaining section of the system (107th Avenue to Agua Fria River) will be constructed at a later date. The system will function as a retention basin until the downstream portion of the channel is constructed. The RCBC at 107th Avenue will be designed but not constructed with the rest of the project.

Reach 1 to 4 – 75th Avenue to 107th Avenue

All disturbed areas are to be hydroseeded, except where existing landscape is replaced and at operation and maintenance roads and ramps. Where a new channel is constructed, a drainage easement will be acquired.

4.0 Hydraulic Models

Team members have developed HEC-RAS models for the project. Initially, they developed steady-state models to evaluate the conceptual design. The models indicated that issues existed in the conceptual design. The models were revised to incorporate a detention basin at 89th Avenue.

After the steady state models were developed for the proposed system, team members developed unsteady state models to verify the feasibility of the design. Unsteady state models have known stability issues as was the case with this model just upstream of 103rd Avenue at River Station 4891.53; therefore, the unsteady state model was run from 75th Avenue to 103rd Avenue to verify the feasibility of the proposed drainage facility. The model will be extended to 107th during final design or an additional model developed to address the model between 103rd and 107th. Results of the models are included in Appendix D.

5.0 Utilities

Team members will work with the City of Phoenix, APS, WAPA, SRP Power, SRP Irrigation and other private utility companies during final design. Team members have met with APS and WAPA representatives to discuss the proposed project. Preliminary discussions indicate that the proposed improvements will not adversely impact their operations. SRP irrigation has not reviewed the project. It is anticipated that team members and District staff will need to coordinate the design of the proposed siphoned crossings with them. Team members will invite all the utility companies to the stakeholder meetings and provide them with 30% plans when they have been completed. A complete list and description of the utilities within the corridor is provided in the Pre-Design Report.

6.0 Drainage Easements

The preferred alternative will require acquisition of additional drainage easements. The existing developments designated drainage easements within the proposed corridor. It appears that it may be several years before development may occur in the project area. Therefore, it appears

that the District and City will be required to purchase drainage easements on these parcels. In addition, the District and City Streets Department will be required to purchase drainage easements from the City of Phoenix Parks Department. Team members have identified the easements required for the project. The drainage easements will be finalized prior to the 30% submittal. The total drainage easement area was estimated to be 30 acres.

7.0 Site Analysis Memorandum

The Updated Site Analysis Memorandum is contained in Appendix A.

Flood Control District
of Maricopa County

INTEROFFICE MEMORANDUM

Date: March 25, 2010

To: **Bobbie Ohler, P.E.**
Project Management

From: Gary Shapiro
Engineering Division

Subject: DRCC Elwood Final Predesign Report

After reviewing the Predesign Report for the DRCC Elwood Channel the following concerns need to be addressed:

Comment No. 1 - For the overall preferred concept the District thought that we were to stay out of the channel on the north where there is some pretty good landscaping. This is from 83rd to 99th Avenue. A channel to the south was suppose to be designed. There is no indication of acquiring any land from Jacquelynn Accomazzo Trust.

Response No. 1 – We are staying out of the existing landscaped areas from 83rd Avenue to 91st Avenue. We will need to acquire a parcel from the Jacquelynn Accomazzo Trust (see recommended alternative alignment in Appendix B). The recommended alternative required a retention/detention basin between 87th Avenue and 89th Avenue. This allowed us to utilize the existing channel from 91st Avenue to 103rd Avenue. The channel is this section is adequate. However, the hydraulic capacity of the RCBC's will need to be increased. This will require minor channel modifications at the culverts. We attempted to maintain the existing retention/water quality basins in the corridor.

Comment No. 2 - At 91st Avenue there might still be a conflict with the 72" sewer and the proposed 4-12x4 box culverts. The clearance at best is less than a foot. Also ADOT does not provide for a 12x4 box.

Response No. 2 – We realize that the separation will be less than the preferred 2 feet between utilities. We feel that the 4 foot tall crossing may be constructed at this location. We will verify the elevation of the pipe (pothole). If the allowable clearance is less than 4 feet, then we can design a customized RCBC for the crossing (i.e., 3.5 feet tall, etc.).

Comment No. 3 - Section 3.2 states "A constraint that affects all four reaches is the existing landscape and irrigation. Channel modification may require replacement of the existing landscaping and irrigation systems. Because the HOAs maintain the landscaping and irrigation systems it is probable that many different irrigation systems exist. The replacement of the systems will be costly." It appears that this really pertains to reach 2 and 3 where the landscaping is pretty plush. It was also an understanding that the Basin at 89th was to reduce the flows enough that the existing

2801 West Durango Street Phoenix, Arizona 85009 Phone: 602-506-1501 Fax: 602-506-4601

condition would be adequate. If not a channel was to be developed to the south within these reaches to accept the excess flows and void landscaping and irrigation replacement.

Response No. 3 – The statement is correct. The proposed alternative will have a different impact on each reach. Segment 1 will have minimal impact for the Tuscano development, but will impact the Tuscano School turf area. A retention/detention basin and channels south of the existing inear basins will be added to Segment 2. In addition, a small area of turf east of 91st Avenue will be impacted. Segment 3 will have minor impacts at the existing RCBC locations. Segment 4 will require significant regarding of the existing turf area west of 103rd Avenue. The recommended alternative alignment shows the impacted areas.

Comment No. 4 - Section 3.2 has an "Additional Analysis: Do a plant inventory to document the existing landscape plan corridor. Do an analysis of the existing irrigation system to document the different types of systems. The proposed irrigation system will conform to the existing system". It was also an understanding that the Basin at 89th was to reduce the flows enough that the existing condition would be adequate. If not a channel was to be developed to the south within these reaches to accept the excess flows and void landscaping and irrigation replacement.

Response No. 5 – We will need to document the existing plants and irrigation in the areas that we are going to disturb. The basin between 87th Avenue and 89th Avenue will greatly reduce the area impacted.

Comment No. 6 - I thought that we wanted to stay out of the existing channel/basins west of 83rd because of the plush landscaping and irrigation and to replace this would cost a lot of bucks. From 83rd to 91st the proposed channel is to the south. From 91st to 95th the bottleneck reach is why we have a basin at 89th to reduce the flows so the bottle neck reach will work without any modification. It is proposed that we still have to go in and increase the culvert size around the power poles disrupting some of the landscaping and irrigation plus the added cost of the special design boxes to handle the equipment load around the power poles. West of 91st Ave there are 5 box locations that are proposed. We may need to use both existing channels.

Response No. 6 – We can make the system work by utilizing the existing north channel. The hydraulic capacity of the RCBC's will need to be increased to match the channel capacity. This would require minor channel modifications at each RCBC location. If we utilize a dual channel option we lose the existing retention basins/water quality basins, and may impact the access to the power poles. It was cost effective to increase the hydraulic capacity of the RCBC's and utilize the north channel in its existing configuration.

Comment No. 7 - Hec Ras cross sections from just west of 99th Avenue to 107th Avenue were not included in the report.

Response No. 7 – We will add the missing sections to the report.

Comment No. 8 - West of 99th there appears to be some minor reshaping of the channel. It appears that both channels could be utilized without any work at all. Minor or major shaping of the existing channels we are replacing landscaping and irrigation.

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Response No. 8 – We will keep the existing channel configuration from 99th Avenue to 103rd Avenue. We want to minimize our area of disturbance in this reach. We will impact the areas adjacent to the RCBC's.

Comment No. 9 - East of 99th to 95th it appears that a channel to the south could be built to avoid the landscaping and irrigation replacement.

Response No. 9 – We may utilize the existing channel in this location. We do not need to construct a channel to the south.

Comment No. 10 - With the flow rate being about a third it would appear that from 95th to 91st the dual system is feasible without making modifications to the channel.

Response No. 10 – The dual channel system would require utilizing the existing linear retention basins as a channel and may limit access to the power poles. We can make the system work without using the southern basins/channel. The southern basins/channel would require some grading (disturbance to landscaping).

Comment No. 11 - Can the basin at 89th be enlarged and the channel pushed north to capture more volume and reduce the flow rate. This would require bending the channel to the north a bit.

Response No. 11 – We will optimize the basin configuration during the final design. We will make the basin as large as possible utilizing the City of Phoenix Park parcel. I don't think that we would want to acquire additional right-of-way at this location.

Comment No. 12 - Around 77th Drive it appears that the flows from the north (the channel north of Elwood) were not included in the Hec Ras model. River station 20742 just up stream of the channel has a Q of 1225 and river station 20225 just downstream of the channel has a Q of 1208.

Response No. 12 – The hydrograph from 77th Drive was included in the model. The timing of the hydrographs may result in a minimal increase in peak discharge.

Comment No. 13 - River station 19454 indicates a break out 79th Ave.

Response No. 13 – We will acquire supplemental survey to verify that the flows are contained within the channel. We may be able to increase the height of the banks slightly in this location.

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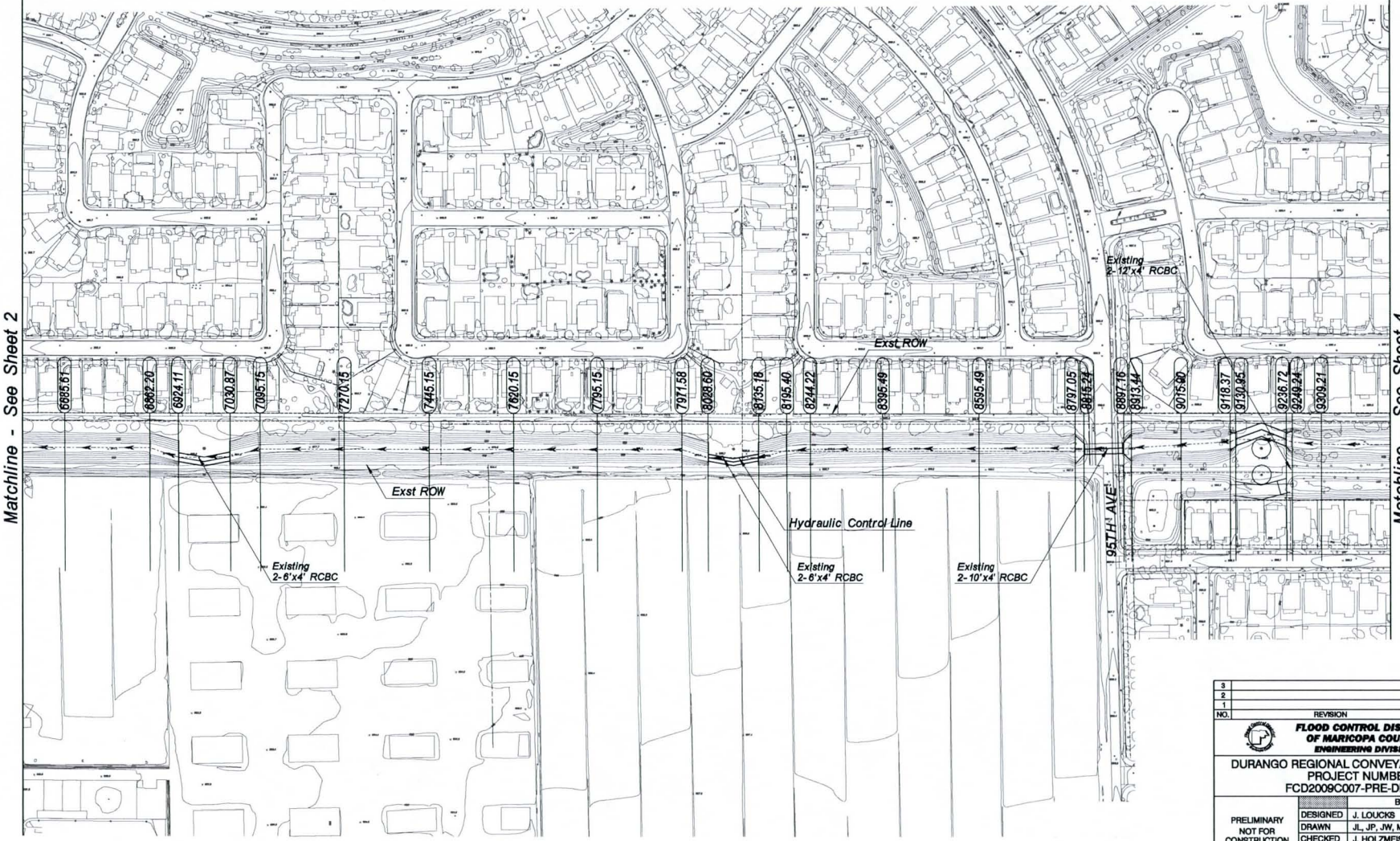

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FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

DURANGO REGIONAL CONVEYANCE CHANNEL
PROJECT NUMBER
FCD2009C007-PRE-DESIGN

		BY	DATE
PRELIMINARY NOT FOR CONSTRUCTION	DESIGNED	J. LOUCKS	12/09
	DRAWN	JL, JP, JW, MRT	12/09
	CHECKED	J. HOLZMEISTER	12/09

J2 engineering and environmental design
4646 east cotton gin loop, suite 102
phoenix, arizona 85040
phone: 602.438.2221 www.j2design.us

DRAWING NO.	CROSS SECTION LOCATIONS	SHEET OF
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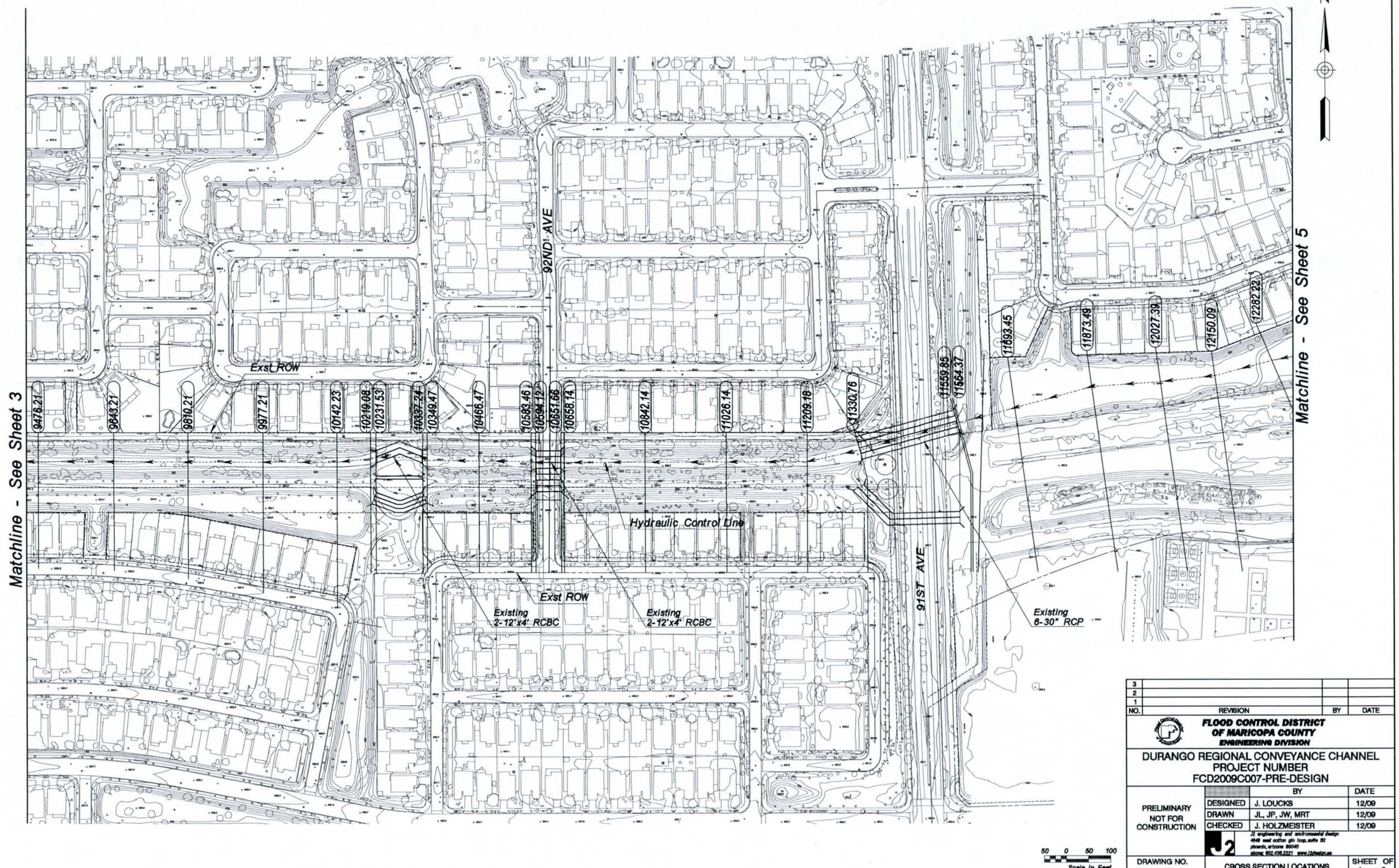

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4649 east cotton gin loop, suite B2
phoenix, arizona 85040
phone: 602.438.2221 www.j2design.us

DRAWING NO.	CROSS SECTION LOCATIONS	SHEET 4 OF 8

Bobbie Ohler - FCDX

From: Jeff Holzmeister [JHolzmeister@J2Design.us]
Sent: Tuesday, April 13, 2010 12:04 PM
To: Bobbie Ohler - FCDX; Gary Shapiro - FCDX
Cc: Matt Kapfer
Subject: FW: DRCC Response for 91st to 95th St cmnts
Attachments: 91st to 95th Comm Resp 4-13-10.pdf

Bobbie and Gary,

We prepared the attached exhibit to show why the dual channel system was not the preferred alternative between 91st and 99th Avenue. Starting at the 91st Street crossing; if you were to utilize the dual channel concept you would need a culvert south of the power poles immediately west of 91st Avenue (not enough room between the power poles and the fence for a channel).

Another culvert would be required at 92nd Avenue. In addition, a 3' high RCBC will not fit under 92nd Avenue (the retention basin would need to be excavated and irrigation/plants mitigated)

Culverts would be required at the next two power pole crossings. The distance between the clear zone and the fence is not enough for a channel. Also, the retention basin may not be deep enough to accommodate a 3' high RCBC.

Culverts would be required at the 95th Avenue crossing – west of 95th Avenue the southern channel can be located in the agricultural field and eliminate the need for culverts at the next two power poles. However, the southern alignment appears to impact access to 4 of the existing hay barns.

In summary, the dual channel option would eliminate the need to two culvert crossings, but these savings would be offset by the cost of right-of-way, excavation, seeding, etc.)

Please look over the exhibit that Matt put together and see if that clarifies some of Gary's questions.

Thanks

Jeff

From: Matt Kapfer
Sent: Tuesday, April 13, 2010 11:19 AM
To: Jeff Holzmeister
Subject: DRCC Response for 91st to 95th St cmnts

Matthew Kapfer, P. E.
J2 Engineering and Environmental Design
Civil Engineer

(602) 438-2221 Work
mkapfer@j2design.us

4649 E. Cotton Gin Loop, Suite B2
Phoenix, AZ 85040

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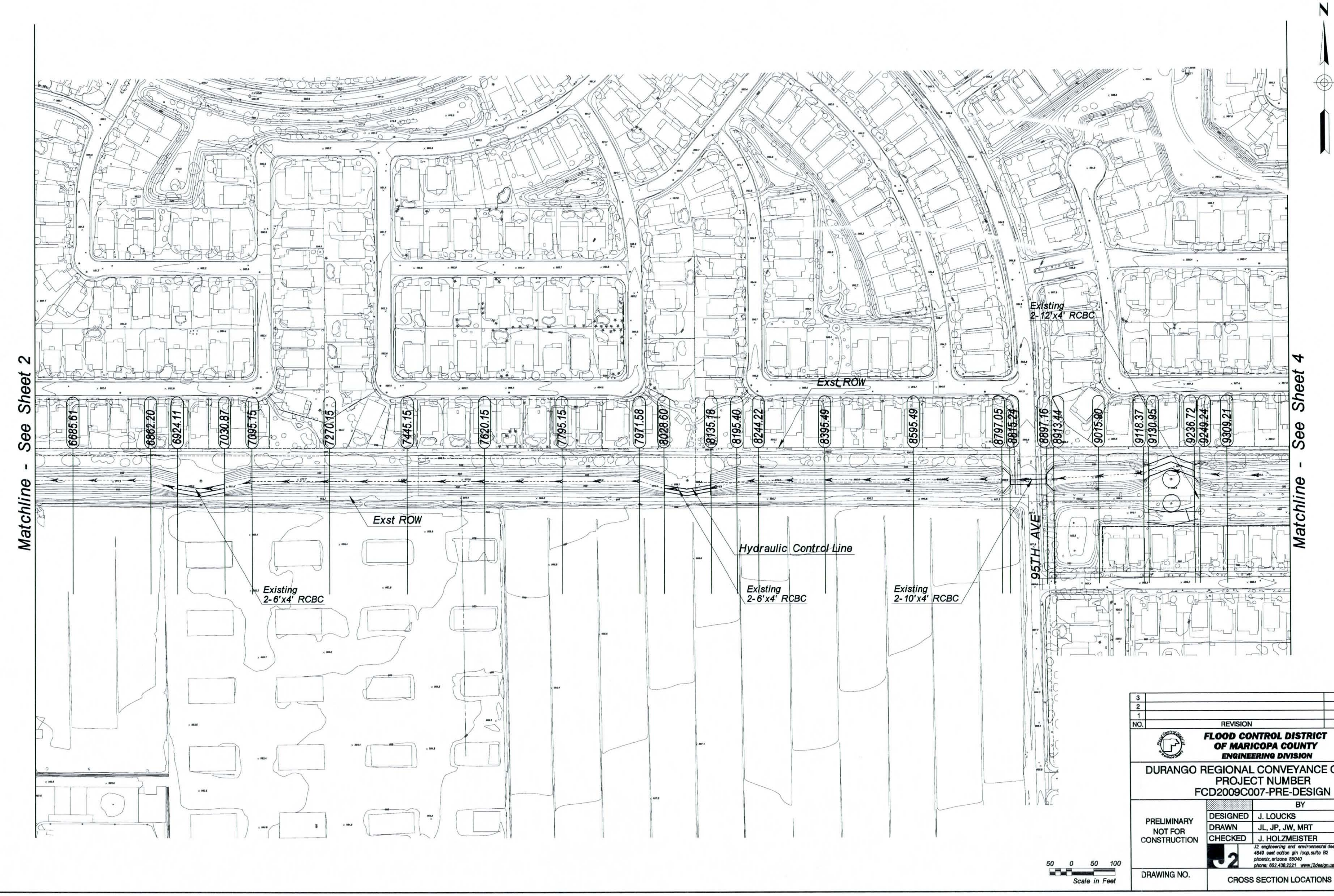

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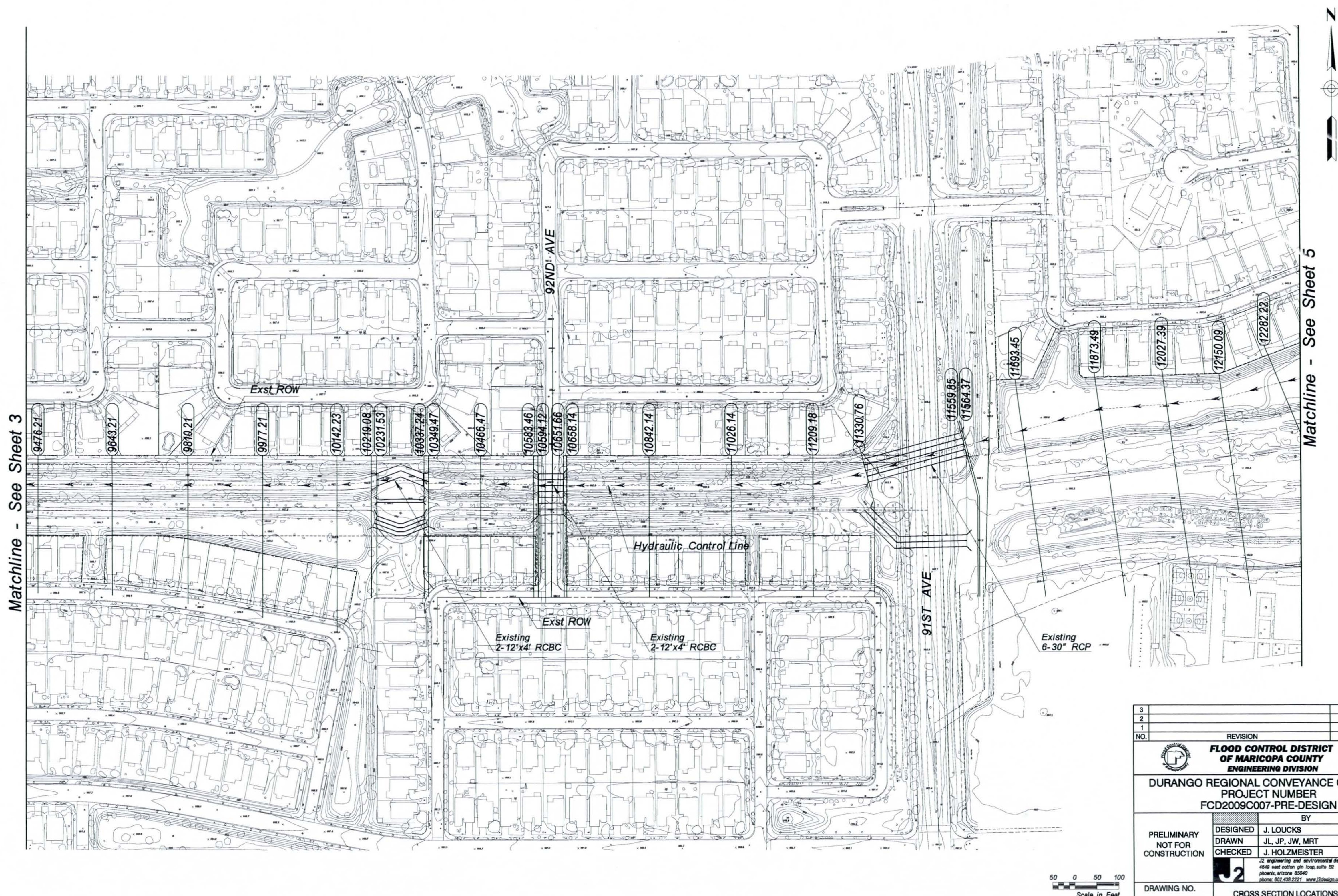

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