GWESCH

White Tanks FRS No. 3 Outfall Channel
30% Design Report
FCD 2007C016 Assignment 4

VOLUME II - APPENDICES

June 30, 2009

REGISTERED PROFESSIONAL ENGINEER (CIVIL)
CERTIFICATE NO. 19690
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EXPIRES 3/31/2012

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EXPIRES 3/31/2012

APPENDIX A MEETING MINUTES

MEETING MINUTES February 2, 2009

PROJECT NAME: White Tanks FRS No. 3 Outfall Channel
PROJECT NO: HRC 07-027-04, FCD 2007C016 (4)

PERSONS PRESENT:

Scott Vogel, FCDMC	Valerie Swick, FCDMC
Gary Wesch, FCDMC	Jon Loxley, FCDMC
Robert Sachs, FCDMC	Dave Degerness, FCDMC
John Stock, FCDMC	Paul Hoskin, HRC
Gary Maiers, FCDMC	Kristyn Van Meter, HRC
Kenneth Rakestraw, FCDMC	Luke Brazdys, HRC

PURPOSE: Kickoff Meeting

DISCUSSION:

Project Issues and Goals

1. The planned location of the basin south of Jackrabbit Estates is very expensive.
2. The previous design by Gannett-Fleming had erosive channel velocities.
3. Need to adopt the NOAA14 rainfall in the hydrologic modeling.
4. Determine if there is a need to underground the channel at the north end in order to pass the emergency spillway flows from west to east. What are the impacts to the hydrology?
5. Need a positive and controlled outfall from WT3.
6. Intercept tributary areas, but not mitigate the existing floodplain.
7. Implement trail access.

Survey

1. Currently, there are three separate sets of mapping – one for WT3, one for WT4, and one for Jackrabbit Trail. HRC was given a CD with CAD files.
2. The combined topo for the entire project area will be given to HRC at a later date.
3. Items for field survey may include:
   a. Overhead electric along the alignment
   b. Culverts under Jackrabbit Trail
   c. Principal outlet inverts
   d. Existing flowline elevations at culvert structures.
4. The WT4 topo is on a different control from the WT3 and overall mapping.
5. John does not believe subsidence will be an issue.
6. John recommends a full staking of the proposed ROW acquisition.
7. John has conducted field verification shots of the topo.
8. Black and white aerial photography from the mapping is provided with the CD.
9. Color aerial photography will be obtained from the FCD.

Right-of-Way

1. FCD will add the proposed ROW linework to the GIS layer info to be provided to HRC.
2. The channel section along Verrado will be established quickly in order to proceed with ROW acquisition.
3. ROW acquisition is planned to be complete by the end of the fiscal year.

Environmental

1. A Phase 1 study will be done in-house at FCD.
2. Kimley-Horn did a 404 Jurisdictional Delineation for the reach, however it will not likely influence the alignment.
3. There is potential for hazardous materials at the proposed basin site south of Jackrabbit Estates. A Level 1 mitigation study of the location will be done by FCD.

Landscape

1. The Gannett-Fleming landscaping plan will be adhered to for this study.
2. Make FCD aware of conflicts between the design and the GF landscape plans.
3. There are equestrian components of the trail use, as shown in the GF plans. Equestrian and pedestrian use with access road on both sides of channel.
4. Buckeye will handle Operations and Maintenance for the final channel.
5. The channel is considered County Trail Priority 1 per the Maricopa Trail plan. FCD is committed to adhering to the plan.
6. Jon Loxley will confirm with the County what the programmed uses for the trail are.

Utilities

1. Gary M. has most of the utilities location / coordination info, and contacts where to get the rest of the info.
2. There is an east-west waterline at Camelback Road approximately 17 feet deep.
3. APS has conducted some corridor studies for the location of new lines in the area. This may be further to the east toward Loop 303. Gary M. will check with APS to confirm.

Roads

1. Colter Road and Camelback Road will need to be culvert crossings on the channel plans.
2. Palm Lane, Encanto Boulevard, Virginia Avenue, and Thomas Road will all need access at the Park & Ride.
3. Design will include ultimate street ROW at channel crossings.
4. The proposed alignment of the Jackrabbit Trail Corridor impacts the channel alignment north of Jackrabbit Estates.
5. Gary gave HRC a CD with the Jackrabbit Corridor CAD files.
6. MCDOT has deemed Jackrabbit Trail/Parkway a road of regional significance.

Public Involvement

1. Only the Town of Buckeye and the Verrado development will be involved at this stage of the plans.
2. A meeting will be conducted at the Town of Buckeye the week of 2/9.
3. Buckeye has a Sewer Improvement District from I-10 to Indian School along Jackrabbit Trail.

Geotechnical

1. Lining of the channel needs to be kept flexible to account for fissures.
2. HRC was given CDs with the WT3 and WT4 geotech reports.

Hydrology

1. Valerie gave HRC a CD with HDR's GIS data. HEC-1 models are not ready.
2. Dave will send HRC the URS hydrology models.
3. The Gannett-Fleming HEC-1 is based on the URS modeling.
4. Do the flows west of Tuthill dike cross or stay to the west?
5. Two conditions for analysis:
   a. Assume the principal outlet is open – not the two 48" pipes, just the overflow structure

   b. Assume PMF=560 flow passes through the riser and 2 gates on upper portion of the channel. Downstream flows based on inflows from HEC-1.
6. Need to clearly document the operational vs. design function/state of the outlet workings.
7. The existing 24" pipe outlet/slide gate at the west end of WT3 is to be abandoned.
8. NOAA 14 will be used for the HEC-1 modeling.
9. URS prepared existing and future conditions models.
10. The Jackrabbit Trail Corridor Study may have newer future conditions modeling.
11. Investigate on-line vs. off-line basins.
12. Consider terraced basins – don't have a single bottom elevation and flood the entire basin.
13. The Verrado and planned Maracay developments have retention, the other existing developments do not. Assume any new development has 100-year, 2-hour retention.
14. Question as to what the land use is for the parcel south of Pasqualetti Mountain Ranch.
15. Discuss land use with Buckeye – they may not require retention for 1-acre lots.

Design/Hydraulics

1. Existing culverts under I-10 have capacity for 2100 cfs.
2. The existing channel will need to be visually inspected at the tie-in location – will it need replacement?
3. Freeboard in the channel may not be necessary if 100-year capacity can be provided. Primary goal fo the project is to provide an outfall for WT3.
4. The alignment through Jackrabbit Estates is fixed – FCD has purchased the land.
5. The existing cul-de-sac locations in Jackrabbit Estates will be good locations for drop structures due to narrower ROW.
6. Jackrabbit Estates is already collecting cross-drainage under Jackrabbit Trail into the channel along the east side of the road.
7. Make sure to account for landscape treatments and low flow channel Manning's 'n' values in the hydraulic modeling.
8. Park and Ride located south of Thomas Road – will need to provide access to lot.
9. Screen wall to be constructed in Jackrabbit Estates near existing sidewalk.
10. The wall along Jackrabbit Estates retains water.
11. Pasqualetti Mountain Ranch can be used as an example for landscape treatment, per Greg Jones; maintain this channel segment as much as possible.
12. The project will include HEC-RAS modeling between WT3 and WT4.
13. Slopes for channel 3:1 or 4:1 with low flow armoring.
14. Gary will send HRC the work assignment and scope of work. The Notice to Proceed date is 2/2/09.

MEETING MINUTES — February 13, 2009

PROJECT NAME: White Tanks FRS No. 3 Outfall Channel
PROJECT NO: HRC 07-027-04, FCD 2007C016 (4)

PERSONS PRESENT:
Woody Scoutten, WC Scoutten
Scott Zipprich, WC Scoutten
Scott Vogel, FCDMC
Gary Wesch, FCDMC
Valerie Swick, FCDMC
Paul Hoskin, HRC
Kristyn Van Meter, HRC

PURPOSE: Consultation with Town of Buckeye

DISCUSSION:

Buckeye Improvement District

1. Sewer improvements only, from Van Buren to Indian School Road along Jackrabbit Trail.
2. Provides sewer connection at Pasqualetti Ranch.
3. Woody will get a set of the plans to Gary.
4. Sewer stubs have been designed for the existing channel and not a proposed channel. Sewer stubs will need to be provided at each of the channel culvert crossings.

Verrado

1. The preliminary plat required future drainage facilities.
2. Verrado has an approved Preliminary Plan.+
3. Basin shown on the master plan is for on-site runoff only, not meant to handle off-site.
4. Tuthill Dike / Tuthill Road cuts off flow from west of Verrado.
5. Scott Gukin at Wood/Patel is the contact re. the site.
6. Woody will send Gary the preliminary plat and stipulations.
7. A future meeting will be held with FCD and W.C. Scoutten re. Verrado impacts. Meeting will be set up by Woody, and involve the Verrado parties.

Right-of-Way for Jackrabbit Trail

1. MAG has classified it as a "Road of Regional Significance." The County standard is 130' ROW.
2. Buckeye standard is 140' ROW.
3. Since plans call for Jackrabbit to be a Parkway/corridor, the existing road alignment may not need the larger ROW. There is no time frame for the Parkway construction, it is in the planning stages.
4. May be able to use the ROW for slopes, joint use trail.
5. Typically, a 6-foot sidewalk is required on both side of street per Buckeye standard. May be able to change this to only one side if have a trail on the other side.
6. Buckeye wants to preserve the planned ROW, with the channel outside of the ROW.
7. See the County's principal arterial section for reference.
8. All mile street intersections will widen out to 150 feet ROW for a distance of 300 feet north and south of the crossing street.
9. McDowell Road is classified as a parkway and requires a 200 foot ROW.

Benefit to Buckeye

1. Town Council has not seen the layout for the channel as it currently is, with detail.
2. Woody prefers to introduce the pre-design to Council before 30% design phase.
3. Add to the next Council work session for feedback.
   a. Present typical cross-sections at the session. HRC will provide sections to Woody before the session.
   b. Woody will schedule it for the next work session
4. Need to explore the potential for an IGA with Buckeye if the channel provides 100-year protection and removes floodplains. A majority of the area east of Jackrabbit Trail is in the County.
5. Need to explore the potential for the basin to be used as a park, and annexed to Buckeye.
6. The Town is working on a design for the ultimate section at the Jackrabbit Trail / Interstate 10 interchange.
   a. Includes driving lanes over box culverts on one side.
   b. There is potential benefit to Buckeye to increase the detention upstream, therefore reducing flow rate and required size of culverts at interchange.
7. At the north end of the project, MCDOT would benefit from capturing flow from the west so that Jackrabbit Parkway would not have to handle the flow.

Maracay

1. Have re-zoned the northeast corner of their property for commercial use.
2. Will be incorporated into Buckeye.
3. Currently in conceptual pre-plat phase.

Pasqualetti Mountain Ranch

1. Channel adjacent to Pasqualetti was designed for 100-year event.
2. The District hopes that this channel can remain with no improvements.
3. The parcels south of the existing Pasqualetti Mountain Ranch have been annexed to Buckeye.

Park and Ride

1. Need a 40-foot driveway off of Jackrabbit Trail.
2. Town is trying to close escrow, the remaining issue is access.
3. Palm Lane will wind up being a signaled shared driveway to Park and Ride and property to the south.
4. Power, water, sewer lines at the Palm Lane crossing.

Coordination

1. Buckeye coordination will be through Woody, Scott, and Dave Shoen (parks and trails).
2. Woody will provide typical road ROW sections to HRC.

MEETING MINUTES — February 23, 2009

PROJECT NAME: White Tanks FRS No. 3 Outfall Channel
PROJECT NO: HRC 07-027-04, FCD 2007C016 (4)

PERSONS PRESENT:
Gary Wesch, FCDMC
Bob Stevens, FCDMC
Jon Loxley, FCDMC
Dave Degerness, FCDMC
Kenneth Rakestraw, FCDMC
Paul Hoskin, HRC
Kristyn Van Meter, HRC

PURPOSE: Status Update Meeting

DISCUSSION:

Environmental

1. Bob is working on a Phase 1 assessment.
2. A Level 1 assessment of the entire basin and channel area shown in the Gannett-Fleming report should be done on the Missionary Wings property.
3. Cultural and Jurisdictional (404) assessments were already done in the 15% phase.

Survey

1. The combined topography file is not ready yet.
2. HRC started structure survey 2/23, and will pick up shots of the existing channel crossing under the I-10 bridge at Jackrabbit Trail.

Utilities

1. Gary has the Buckeye sewer improvement information and will get this to HRC.
2. HRC has contacted utility companies, using the list in the Gannett-Fleming report as a basis with additional contacts.

Right-of-Way

1. The District has started right-of-way acquisition on the piece through the Verrado property.
2. Three right-of-way pieces have not been acquired: Verrado, Missionary Wings, and north of Jackrabbit Estates.
3. A meeting with DMB re. the Verrado ROW piece has tentatively been set for Thursday. Gary and Paul will attend.

Landscaping

1. Adhere to the plans from the Gannett-Fleming 15% plans. Indicate changes needed, where necessary, to account for design changes.
2. The maintenance road can be used as part of the trail.
3. Landscape will be a part of the District's improvements. The District will leave room for amenities and design for them in place, however will not pay for or provide them.
4. Jon will contact EDAW to get the electronic files for the landscape design portion of the 15% plans.
5. Per Ken, Scott Vogel and Don Rerick did not like the riprap in the bottom of the channel in the 15% plans, due to difficulty of maintenance.
6. The District has no problems with confining the trail use to the top of the channel, instead of along the channel bottom.
7. In the final design, a landscape maintenance plan would be established which would provide directions re. the level of vegetation to be maintained.
8. Jon will provide a summary of the landscape goals for the project.

Hydrology

1. HRC has reviewed the URS and HDR watersheds, and has a concern regarding the watershed area concentrating at Tuthill Road / Missouri Ave alignment.
   a. The URS models show all of the flow heading south along west side of Tuthill Rd.
   b. The HDR model shows all of the flow heading east across Tuthill Road.
   c. HRC believes that the flow splits, with a portion heading east and a portion heading south.
   d. Amir Motamedi and John Holmes have taken a look at this concentration point, and believe that the flow heads south. Ken and Dave will review/confirm their results.
2. Flow from the west north of Verrado
   a. Wood/Patel WT4 models have diversions across Tuthill Rd based on existing channel capacity.
   b. Does this flow continue east across Tuthill? Are there facilities in the Verrado master plan for this flow?
   c. What are the future development conditions for Verrado north of where it currently is developed?
3. Paul will call Jeff Minch at Wood/Patel to discuss the models and reports.
4. HRC presented preliminary options for the north end of the channel.
5. The 30% channel design shall account for the existing flow patterns of the watershed, updated with future land use conditions.

Future Meetings

1. The next project status meeting will be held Monday, March 16th at 10am at the District.
2. A meeting with DMB re. the required Verrado ROW is tentatively scheduled for Thursday, February 26th.
3. A coordination meeting is needed between HDR, FCD, HRC re. the hydrology. To be held within the week of 2/23 to 3/2.

MEETING MINUTES March 2, 2009

PROJECT NAME: White Tanks FRS No. 3 Outfall Channel
PROJECT NO: HRC 07-027-04, FCD 2007C016 (4)

PERSONS PRESENT: Gary Wesch, FCDMC; Paul Hoskin, HRC; Kristyn Van Meter, HRC; John Mireles, HRC; Peng Zhang, HRC; Ben Bowles, HRC

PURPOSE: Weekly Status Meeting

DISCUSSION:

Note: These are not comprehensive meeting minutes.

1. The overall topography CAD file and DTM are being prepared by the District (Joe Wagner) and are not ready yet.

2. Gary spoke to Amir Motamedi, John Holmes, Dave Degerness, and Ken Rakestraw re. the runoff from the watershed concentrating at Tuthill Road and Missouri Avenue. The decision was made that all of the runoff from the watershed west of Tuthill flows south along the west side of Tuthill Road.

3. Currently, the hydrology models show a flow breakout from the Tuthill Channel at Interstate 10. The flow is directed under the Interstate through a series of berms and culverts. HDR will be verifying the flow that potentially heads east along the north side of I-10, west of Jackrabbit Trail, and will have a conclusion in about 2 weeks. Design will proceed assuming no breakout flow reaches Jackrabbit Trail.

4. Debris loading at culvert piers may need to be accounted for in the design and in the analysis of the existing box culverts. The design assumptions will be stated in the report.

5. The District desires to use the existing right-of-way and culvert structures whenever possible in the design options.

6. The Rational Method for existing conditions, 100-yr storm, will be used to define flow rates for flows entering along the west side of the channel.

7. An exhibit will be created which shows the existing culvert crossings and those required or proposed as part of the design (i.e. at the Park and Ride, and through the Jackrabbit Estates development).

8. Paul will contact Linda Potter at HDR regarding obtaining a progress copy of their new HEC-1 modeling.

MEETING MINUTES March 16, 2009

PROJECT NAME: White Tanks FRS No. 3 Outfall Channel
PROJECT NO: HRC 07-027-04, FCD 2007C016 (4)

PERSONS PRESENT: Gary Wesch, FCDMC; Gary Maiers, FCDMC; Dave Degerness, FCDMC; Kenneth Rakestraw, FCDMC; Kristyn Van Meter, HRC

PURPOSE: Status Update Meeting

DISCUSSION:

Hydrology

1. HRC received the HDR hydrology and reviewed the model and flow rates for the future conditions with CIP.
2. HRC has models set up for each of the five alternatives, based on the URS model and NOAA 2.
3. HRC will update the alternatives hydrology based on the HDR models and NOAA 14 rainfall.
4. John Holmes is the District reviewer for the HDR models.

Alternatives

1. There are currently five alternatives. All alternatives are similar in concept south of Minnezona Avenue. The primary differences are north of the Missouri Avenue alignment.
   a. Alternative 1 is the Gannett-Fleming design alignment, including the on-line basin on the Missionary Wings property.
   b. Alternative 2 places the flow in a culvert from downstream of the principal outlet to the north end of Jackrabbit Estates. Flow north of the Missouri Avenue alignment, including from the emergency spillway and the watershed area west of Jackrabbit Trail, passes over the culvert and continues to the east.
   c. Alternative 3 places the flow in a culvert only where necessary to pass under the proposed Jackrabbit Parkway alignment and the WT FRS#3 emergency spillway flow. Flow from the watershed west of Jackrabbit Trail north of Missouri Avenue will be intercepted in the channel.
   d. Alternative 4 includes an off-line basin north of Missouri Ave which intercepts flow from the west. The principal outlet flow is in a culvert through this region, and the emergency spillway flow passes over the culvert to the east.
   e. Alternative 5 includes an on-line basin north of Missouri Ave which intercepts flow from the principal outlet and the watershed to the west. Emergency spillway flow passes over the culvert.
2. It may be a possibility to reduce the "knuckle" of the streets in Jackrabbit Estates adjacent to the planned channel location, however it is preferable not to.
3. A Manning's 'n' value of 0.035 is currently being used for the preliminary sizing of the channels. It will be adjusted to reflect basin bottom vs. sideslope vegetation and the applicable channel lining materials.
4. Typical cross-sections for street and channel improvements have been created for the reaches between Camelback and Missouri (Jackrabbit Estates), and Indian School and Minnezona (Verrado). Typical sections for the remaining segments of the channel will be created for each alternative.
5. A review of the geotechnical reports for White Tanks FRS 3 and 4 may provide information regarding the permissible channel velocities.
6. Culverts are to be designed to the full improved section length.
7. Channel lining – what are the options and associated relative costs?

8. HRC will generate an existing ground profile north of the Jackrabbit Estates property in order to review the alternatives in this location. A minimum of 6 feet should be kept between the centerline road elevation and top of pipe in this area.

Cost Estimates

1. HRC is preparing preliminary cost estimates for the five alternatives.
2. The estimates will be broken down by segment.
3. The Reems Rd Channel and Basin project bid estimate is an applicable example.
4. Gary mentioned using $3.50 to $4 per square foot for undeveloped land acquisition cost. He would like to see a breakdown of land cost based on type of land: undeveloped, platted, improved, commercial.
5. The additional cost for providing improved access to the fire station on the Verrado/DMB property should be added.

Utilities

1. Need to confirm locations of overhead electric lines, and type of lines, along the alignment.
2. APS switches/boxes located at Camelback and Jackrabbit Trail will need to be relocated.
3. HRC has contacted Maricopa Water District regarding the ditch/parcel located north and east of Missouri Avenue and Jackrabbit Trail.

Future Meetings

1. The next project status meeting is scheduled for April 6th at the District. Time to be determined.
2. A meeting with DMB and Buckeye re. the required Verrado ROW is scheduled for March 26th at 3pm at the District.

MEETING MINUTES — March 26, 2009

PROJECT NAME: White Tanks FRS No. 3 Outfall Channel
PROJECT NO: HRC 07-027-04, FCD 2007C016 (4)

PERSONS PRESENT:
Scott Vogel, FCDMC
Gary Wesch, FCDMC
Woody Scoutten, Buckeye
David Nilsen, DMB Associates
Valerie Swick, FCDMC
Robert Sachs, FCDMC
Bob Kammerle, DMB Associates
Paul Hoskin, HRC

PURPOSE: Meeting to discuss right-of-way acquisition along Verrado frontage between Indian School Road and Campbell Avenue.

DISCUSSION:

David Nilsen asked if the District had given consideration any other alternatives other than a channel along Jackrabbit Trail. The District had looked at other alignments in earlier studies, including and outfall along the Beardsley Canal, and had concluded that the Jackrabbit Trail corridor was preferred.

David indicated that the current Verrado site provides some on-site retention storage, especially in the location of the recently constructed school.

Gary asked what the development schedule is for the Phase 3 East residential subdivision. David said that the schedule depends upon the market and could be in 2010, 2011 or 2012.

The typical road cross-section was discussed. Currently, Jackrabbit Trail is designated a Road of Regional Significance (RRS) by MAG. Even though there have been recent studies that propose a new Jackrabbit Parkway which exits I-10 at Perryville Road, Woody thinks that this designation is still in effect until changed. The RRS has a right-of-way width of 140 feet and a road cross-section which is wider than that shown in this study. Woody said that a traffic study needs to be performed to determine the volumes of flow before a change can be recommended.

Paul pointed out that the road cross-section was determined from a Design Concept Report (DCR) published by MCDOT in 2004. Paul will provide copies of this report to Woody.

Bob Kammerle said that a Preliminary Plat has been approved by Buckeye for Phase 3 East and that the Final Plat, although not submitted, is ready to be recorded. All the engineering has been completed for it. Verrado is willing to move forward with right-of-way acquisition based upon fair market value appraisals.

The District said that they are willing to move forward with acquisition in 2009-2010 and that funding is available. Currently, right-of-way is shown to be 70' for road and 32' for drainage. According to Bob, the drainage was planned to be conveyed within a concrete box culvert. That decision was made when land values were different than they are today.
The buildings which exist at the southeast corner of the Verrado site were built by Caterpiller and are now used for a temporary fire station. The fire station will be relocated.

Paul said that HRC has the Master Drainage Reports for Verrado, but not the final engineering plans or documents. These are available by request through David.

After Bob and David left the meeting, discussion continued about Buckeye's planned Park and Ride facility. This will be located on the north side of a driveway along Palm Lane. The site is approximately 5 acres and will allow for approximately 700 cars. The entrance road should be wide enough to accommodate 4 lanes, approximately 48 feet within 65 feet of right-of-way. Box culverts will need to be installed before the channel improvements are underway. Concrete channel transitions will be necessary both upstream and downstream of the entrance. An IGA may need to be written to cost share between Buckeye and the District.

c. Attendees.

MEETING MINUTES — March 30, 2009

PROJECT NAME: White Tanks FRS No. 3 Outfall Channel
PROJECT NO: HRC 07-027-04, FCD 2007C016 (4)

PERSONS PRESENT:
Gary Wesch, FCDMC
Bob Stevens, FCDMC
Dave Degerness, FCDMC
Kenneth Rakestraw, FCDMC
Scott Vogel, FCDMC
Rob Sachs, MC Public Works
Paul Hoskin, HRC
Kristyn Van Meter, HRC

PURPOSE: Status Update Meeting

DISCUSSION:

Right-of-Way

1. No right-of-way has been acquired yet.

2. Rob contacted Maricopa Water District regarding the parcel north of Missouri Avenue alignment. It is planned for the master-planned Zanjero Trails development.
3. Rob will check on the use and rights associated with the narrow MWD parcel that extends north-south from the old pipe outlet near the west end of FRS#3.

Pre-Design Submittal

1. HRC presented a draft version of the Preliminary Design Report.
2. Paul described the project reaches, Reaches 1-9.
3. The survey report will be submitted to Gary this week.
4. Paul presented the FRS#3 stage-storage-discharge table, the hydraulic analysis for the existing conditions and preliminary alternatives, and the proposed cross-sections.
5. Gary proposed obtaining more geotechnical testing be obtained in the Verrado, Missionary Wings, and MWD parcels as backup for the right-of-way take sizes. Ken and Scott are both okay with waiting until after the 30% plans phase to do this.
6. The fissure analysis will be incorporated in the 30% design plans report, if available.
7. Paul presented the existing and proposed right-of-way maps.
8. Scott suggested a 6:1 sideslope would be more stable due to the potential for rilling. Also suggested was using gravel mulch as a lining/cover in order to use steeper (4:1) slopes. The Ellsworth Channel project, PM Bobbie Ohler, is an example of using gravel mulch.
9. HRC will add the utilities contact list to the report.
10. HRC will create a map of the existing utilities.
11. HRC will check to make sure the OHE near Verrado have been located.
12. OHE and utility boxes at Jackrabbit Estates will need to be relocated.
13. Paul presented the 6 preliminary alternatives and their complete costs.
14. In the Alternative 3 and 6 cost estimates, a note should be included that the cost estimate assumes donation of MCDOT ROW. The additional cost of this land should be noted on the cost estimate.
15. Paul discussed the existing ground profile and proposed channel slope in Reaches 8 and 9.
16. HRC will add the wasteway cost to the cost estimates.
17. HRC compared the required channel width for the 560 base flow vs. the design flow. This information will be emailed to Gary and included in the report.
18. Paul presented Alternative 3 as the preferred alternative.
19. Paul discussed options to the alignment of Reach 6. By shifting the channel to the west side of Jackrabbit Trails, the four lots may be removed from the floodplain. A discussion of this option should be added to the report, along with the incremental additional cost.

Hydrology

1. HRC will submit the HEC-1 schematics, models, and a summary of changes made to the HDR models to Ken.
2. The area north of Interstate 10, west of Jackrabbit Trail is included in the HEC-1 models, however flow from west of Tuthill Road is not. HDR was tasked with determining if flow migrates to the east from west of Tuthill.
3. HRC made changes to land use and retention for a few sub-basins.

Environmental

1. Bob recommends avoiding use of the east end of the Missionary Wings property. A basin in this location is not preferable.
2. The entire length of the existing channel along the west side of Jackrabbit Trail is likely to be 404 Jurisdictional area. This will be added to the report.
3. The footprint of the channel will be sent to Bob during the 30% design phase so he can estimate 404 disturbance.
4. HRC will send Bob the current ROW maps for use in this Phase 1 study.

Action Items and Meetings

1. Gary will review the draft report by the end of the week.
2. HRC will send the survey report to Gary, and the hydrology information to Ken.
3. 5 copies of the revised preliminary design report will be submitted

MEETING MINUTES — April 21, 2009

PROJECT NAME: White Tanks FRS No. 3 Outfall Channel
PROJECT NO: HRC 07-027-04, FCD 2007C016 (4)

PERSONS PRESENT: Gary Wesch, FCDMC; Jon Loxley, FCDMC; Dennis Holcomb, FCDMC; Paul Hoskin, FCDMC

PURPOSE: Landscape Concept Review

DISCUSSION:

The concept plans submitted to the District show the minimum right-of-way necessary to construct the earthen channel with grade control structures. With the right-of-way limits proposed, which includes no additional area where the District currently has right-of-way, it may not be possible to construct a meandering channel or provide full landscape buffers. The discussion centered on the desired cross-section for the channel.

The Jackrabbit Channel will provide a regional trail connection from the Gila River, north to White Tanks FRS#4 and then on to White Tanks FRS#3. The trail will then continue north along the east side of FRS#3 to the North Inlet Channel.

Jon said that if we don't widen the channel, then we should plan on meeting the objective of a 20 foot setback in addition to the maintenance road. The current landscape plan prepared by EDAW shows the trail along the west bank of the channel.

This means that the off-site drainage will cross the road/trail and will need to be protected. Several possibilities exist:

- Provide erosion protection across the road at each major point of cross-drainage.
- Provide a fully improved road with curb and gutter to control local drainage.
- Provide a top of slope ditch to collect minor off-site drainage and direct to major downdrain location.
- Provide trail on the east side of the channel. A maintenance road may still be required on both sides of the channel.

If the trail is located along the road side, it may be possible to combine with the currently proposed sidewalk and bikepath for a single two-way path. The grade of this trail should be close to the road top of curb grade. Discussions need to be made with MCDOT if a joint use maintenance road/trail and bikepath is to be considered along the west of Jackrabbit Trail.

It would be preferable to have sideslopes of the channel in the range of 5:1 to 9:1. Several channel cross-sections which incorporate meanders were discussed, each of which require additional right-of-way. These include:

- Bottom meander with variable sideslope.
- Top and bottom meander with maximum 4:1 sideslope.
- Bottom meander with enlargement/contraction.

Gary said the District does not wish to buy additional right-of-way where right-of-way exists, but that a widened section where acquisition is necessary is a possibility worth considering. Gary will be meeting with Engineering staff to discuss the alternatives on 4-27-09.

MEETING MINUTES May 14, 2009

PROJECT NAME: White Tanks FRS No. 3 Outfall Channel
PROJECT NO: HRC 07-027-04, FCD 2007C016 (4)

PERSONS PRESENT: Gary Wesch, FCDMC; Robert Sachs, FCDMC; David Maguire, MWD; Paul Hoskin, HRC

PURPOSE: Meeting with MWD to review project and right-of-way needs

DISCUSSION:

Alternative 3 was presented as the Recommended Alternative. Work is proceeding with the completion of 30% design plans with this alternative. There is a proposed impact to the MWD property on the east side of Jackrabbit Trail, just north of Jackrabbit Estates.

The channel is sized for the greater of the PMF outflow from the White Tanks FRS #3 or the 100-year discharge. The PMF outflow is given as 560 cfs. If constructed as an open channel, the 100-year flow upstream (to the west), north of Missouri Avenue, will be intercepted, thus providing protection to the MWD property. The downstream 100-year floodplain may also be reduced. If right-of-way acquisition is difficult, it is possible that the flow may be conveyed within a closed conduit under the road. In this scenario, it is possible that drainage from the west could cross Jackrabbit Trail.

A wasteway will be constructed at the east end of the channel, near the outlet from the FRS. The purpose of this is to allow flow to continue along the Beardsley Canal, if the channel downstream of FRS #4 has not been completed. The Dam Safety Group can provide more details on the function of this system.

The District will prepare archaeology and environmental assessments before they complete right-of-way acquisition. MWD has a 404 delineation and letter from the Corps and they also have biological and archaeological studies. Dave will provide these to the District.

It is anticipated that the Final Design will commence in September 2009 with a construction start in mid to late 2010.

C. Attendees

APPENDIX B PUBLIC INFORMATION MAILERS

Open House

6:00—8:00PM
Wednesday, April 26, 2006

Scott L. Libby
Elementary School Cafeteria
18706 W. Thomas Rd., Litchfield Park

At the Open House members of the public will have an opportunity to talk informally with project team members and receive updates about the White Tanks FRS No. 4 Project.

For more information, visit the District's web site at www.fcd.maricopa.gov or contact us.

Contact Us

Larry Lambert
Dam Safety Project Manager
Flood Control District of Maricopa County
602 372 6110
LKL@mail.maricopa.gov

The District will distribute newsletters and other informational materials at key milestones in the project.

To receive these materials, contact Jessica White, Public Information Officer at 602.506.7841, or e-mail jlw@mail.maricopa.gov

Flood Control District of Maricopa County
2801 West Durango Street
Phoenix, Arizona 85009
(602)506-1501

White Tanks

Flood Retarding
Structure No. 4 Project

OPEN HOUSE

6:00 - 8:00 p.m
Wednesday, April 26, 2006

Scott L. Libby
Elementary School Cafeteria

Supervisor Max Wilson, District 4

Introduction

The Flood Control District of Maricopa County (District), in cooperation with the Natural Resources Conservation Service (NRCS), is considering rehabilitating White Tanks Flood Retarding Structure (FRS) No. 4 in order to extend its useful life and maintain flood control benefits to downstream properties. The structure will provide a minimum of 100-year flood protection. Alternatives currently being evaluated include a modification (rehabilitation) of the existing dam and replacement of the existing dam with a basin.

The District has retained the services of Gannett Fleming, Inc., a full-service engineering design firm to develop the alternatives for the project.

The NRCS and the District encourage public input to the plan as it is developed.

Project Overview

White Tanks FRS No. 4 is located south of I-10 freeway, immediately west of Jackrabbit Road and east of Tuthill Road. The dam was constructed in 1954 by the Soil Conservation Service (now known as the Natural Resources Conservation Service) the dam is 6,840 feet long and 20 feet high at its maximum section. Its primary purpose is to protect downstream areas from flooding from the White Tanks Mountains. In addition to the dam rehabilitation or replacement, the project will include development of alternatives for the White Tanks FRS No. 3 Outfall Channel along Jackrabbit Trail, from the dam that is just north of Bethany Home Road to I-10, which drains to White Tanks FRS No. 4, and the White Tanks FRS No. 4 Outfall Channel along Tuthill Road from I-10 to the Gila River. Currently, the dam is operated and maintained by the District.

Why Is This Project Necessary?

The Arizona Department of Water Resources has determined that the dam does not meet certain State of Arizona dam safety requirements. While these dam safety issues are not of an emergency nature, the issues must be addressed if the flood protection benefits provided by the dam are to be maintained for the long term. In addition the White Tanks/Loop 303 ADMP identified the need for the channel features. The District is therefore currently conducting a planning study intended to authorize and implement a large-scale project to maintain the dam's intended flood control function through rehabilitation or replacement. The NRCS will be developing a Work Plan/Environmental Assessment needed to obtain federal assistance for the project. The project will be evaluated to modify (rehabilitate) the existing dam or replace the existing dam with a basin.

Project Area

Alternative Process

Design Alternatives–Project engineers and landscape architects have developed a short list of project alternatives. The Alternatives include dam modifications and alternatives for the outfall channels associated with White Tanks FRS No. 3 and White Tanks FRS No. 4. The alternatives to be presented at the open house will include dam rehabilitation and repair options, replacing the dam with a basin, configurations of the outflow channels and locations of basins along the outfall channels.

Landscape Concepts–The study team will present landscape concepts for the dam modifications, basin design and channels that complement the natural and future character of the surrounding landsdape.

Recreation and Multi-Use–The study team is evaluating the opportunity for other local interests to fund and include future recreation and multi-use features in the project. The uses may include trails for hiking, biking and horseback riding. The dam or basin may provide regional recreational opportunities and connect to a regional trail system to access the White Tank Regional park and the Gila River Corridor.

Next Steps

The District's study team will begin developing final alternative designs for the project. The alternatives for the project will be reviewed in an Open House format in the summer of 2006. The District anticipates that an Implementable Plan will be recommended in the fall of 2006. Final design and construction dates have not been established.

Public Meeting

Tuesday, June 26
6:00—8:00PM
Presentation at 6:30PM

Scott L. Libby
Elementary School Cafeteria
18706 W. Thomas Rd., Litchfield Park

At the public meeting, members of the public will have an opportunity to talk informally with project team members and receive updates about the White Tanks FRS No.4 Project.

Contact Us

Larry Lambert
Dam Safety Project Manager
Flood Control District of Maricopa County
(602) 372-6110
LKL@mail.maricopa.gov

For more information, visit the District's web site at www.fcd.maricopa.gov or contact us.

Flood Control District of Maricopa County
2801 West Durango Street
Phoenix, Arizona 85009

June 2007

White Tanks

Flood Retarding
Structure No.4 Project

Public Meeting

Tuesday, June 26
6:00—8:00PM
Presentation at 6:30PM
Scott L. Libby
Elementary School Cafeteria
18706 W. Thomas Road
Litchfield Park

Supervisor Max Wilson, District 4

Introduction

The Flood Control District of Maricopa County (District), in cooperation with the Natural Resources Conservation Service (NRCS), is considering rehabilitating White Tanks Flood Retarding Structure (FRS) No.4 in order to extend its useful life and maintain flood control benefits to downstream properties. The structure will provide a minimum of 100-year flood protection. Alternatives evaluated include modification (rehabilitation) of the existing dam and replacement of the existing dam with a basin.

The District has retained the services of Gannett Fleming, Inc., a full-service engineering design firm to develop the alternatives for the project. The District and NRCS encourage public input as the plan is developed further.

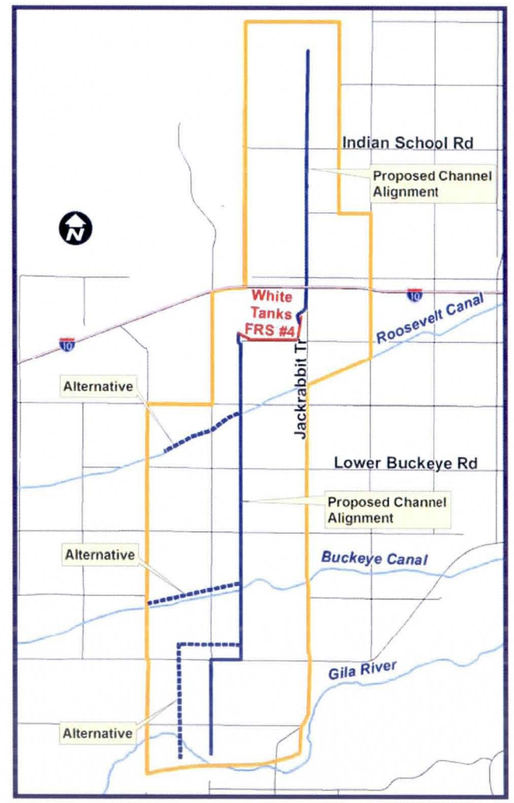
Project Overview

White Tanks FRS No.4 is located approximately one half-mile south of the I-10 freeway, immediately west of Jackrabbit Road and east of Tuthill Road. The dam was constructed in 1954 by the Soil Conservation Service (now known as the Natural Resources Conservation Service) and is 6,840 feet long and 20 feet high. Its primary purpose is to protect downstream areas from flooding from the White Tanks Mountains. In addition to the dam rehabilitation or replacement, the project includes development of alternatives for the White Tanks FRS No.3 Outfall Channel along Jackrabbit Road between Bethany Home Road and I-10, which drains to White Tanks FRS No.4 and the White Tanks FRS No.4 Outfall Channel along Tuthill Road from I-10 to the Gila River. The dam is operated and maintained by the District.

Why is this Project Necessary?

The Arizona Department of Water Resources has determined that the dam does not meet state of Arizona dam safety requirements. While the specific dam safety issues are not of an emergency nature, they must be addressed if flood protection benefits provided by the dam are to be maintained for the long term. The District is nearing completion of the planning study intended to authorize and implement a large-scale project to maintain the dam's intended flood control function through rehabilitation or replacement. The NRCS will be developing a Work Plan/Environmental Assessment needed to obtain federal assistance for the project. The project will evaluate a modification to rehabilitate the existing dam or replacement of the dam with a basin.

Project Area



Alternative Process

Design Alternatives—Project engineers and landscape architects developed a short list of project alternatives. The alternatives included dam modifications and alternatives for the outfall channels associated with White Tanks FRS No.3 and White Tanks FRS No.4. The alternatives to be presented at the public meeting will include dam rehabilitation, replacing the dam with a basin, configurations of the outflow channels and locations of basins along the outfall channels.

Landscape Concepts—The study team will present landscape concepts for the dam modifications, basin design and channels to complement the natural and future character of the surrounding landscape.

Recreation and Multi-Use—The study team is evaluating the opportunity for other local interests to fund and include future recreation and multi-use features in the project. The uses may include trails for hiking, biking and horseback riding. The dam or basin may provide regional recreational opportunities and connect to a regional trail system to access the White Tank Regional Park and the Gila River corridor.

Next Steps

The District's study team will present the recommended alternatives for the project, and there will be an opportunity to discuss the alternatives. The District anticipates that an implementable plan will be recommended in early 2008. Final design and construction dates have not been established.

FLOOD CONTROL DISTRICT
of Maricopa County
2801 West Durango Street
Phoenix, Arizona 85009

NOTICE

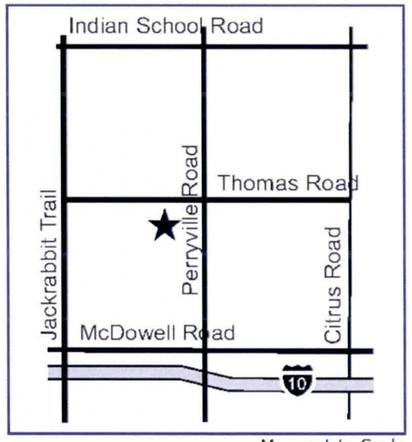
Public Meeting

White Tanks No.4 Flood Retarding Structure Rehabilitation

The Flood Control District of Maricopa County will host a public meeting presenting information regarding the White Tanks Flood Retarding Structure (FRS) No.4 Rehabilitation Project. The District, in conjunction with the Natural Resources Conservation Service (NRCS) will be rehabilitating White Tanks FRS No.4 in order to extend its service life and maintain flood control benefits to downstream properties. The selected alternative for the White Tanks FRS rehabilitation will be presented for public review.

The preferred alignment and configuration of the White Tanks FRS No. 3 Outfall Channel and a status report on the White FRS No. 4 Outfall channel will also be presented.

The public will have an opportunity to talk informally with the project team members about all aspects of the project.



Map not to Scale

Contact

David Degerness, P.E., Project Manager
Flood Control District of Maricopa County
(602)-506-4730
djd@mail.maricopa.gov

Public Meeting

June 3, 2008
6-7:30 p.m.
Brief presentation at 6:15 p.m.
Scott L. Libby Elementary School Cafeteria
18701 W Thomas Rd Litchfield Park

www.fcd.maricopa.gov Supervisor Max Wilson, District 4

Figure 2: Base Flow Soft Structural Channel - Section

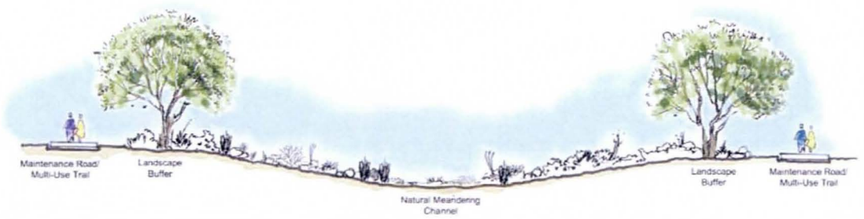


Figure 3: Natural Channel

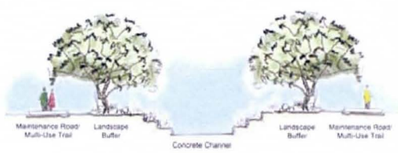


Figure 4: Channel with Aesthetic Treatment (Option)

Next Steps

The District's study team will present the proposed alternatives for the project, and there will be an opportunity to discuss the proposed alternatives. The District anticipates that a final design for the dam rehabilitation will be complete by late 2009. The channels will require further design and coordination with local interests in upcoming District projects.

For More Information

Dave Degerness, P.E.
Project Manager
Flood Control District of Maricopa County
2801 West Durango Street
Phoenix, Arizona 85009
Phone: (602) 506-4730
Fax: (602) 506-4601
djd@mail.maricopa.gov

Supervisor Max Wilson, District 4

White Tanks Flood Retarding Structure No.4 Rehabilitation

June 2008

Project Overview

The Flood Control District of Maricopa County (District), in conjunction with the Natural Resources Conservation Service (NRCS) will be rehabilitating White Tanks FRS No.4 flood control dam in order to extend its service life and maintain flood control benefits to downstream properties. The selected alternative for the White Tanks FRS No.4 rehabilitation will be presented for public review.

White Tanks FRS No.4 is located approximately one half-mile south of the I-10 freeway, immediately west of Jackrabbit Road and east of Tuthill Road. The dam was constructed in 1954 by the Soil Conservation Service (now known as the Natural Resources Conservation Service) and is 1.3 miles long and 20 feet high. Its primary purpose is to protect downstream areas from flooding from the White Tanks Mountains.

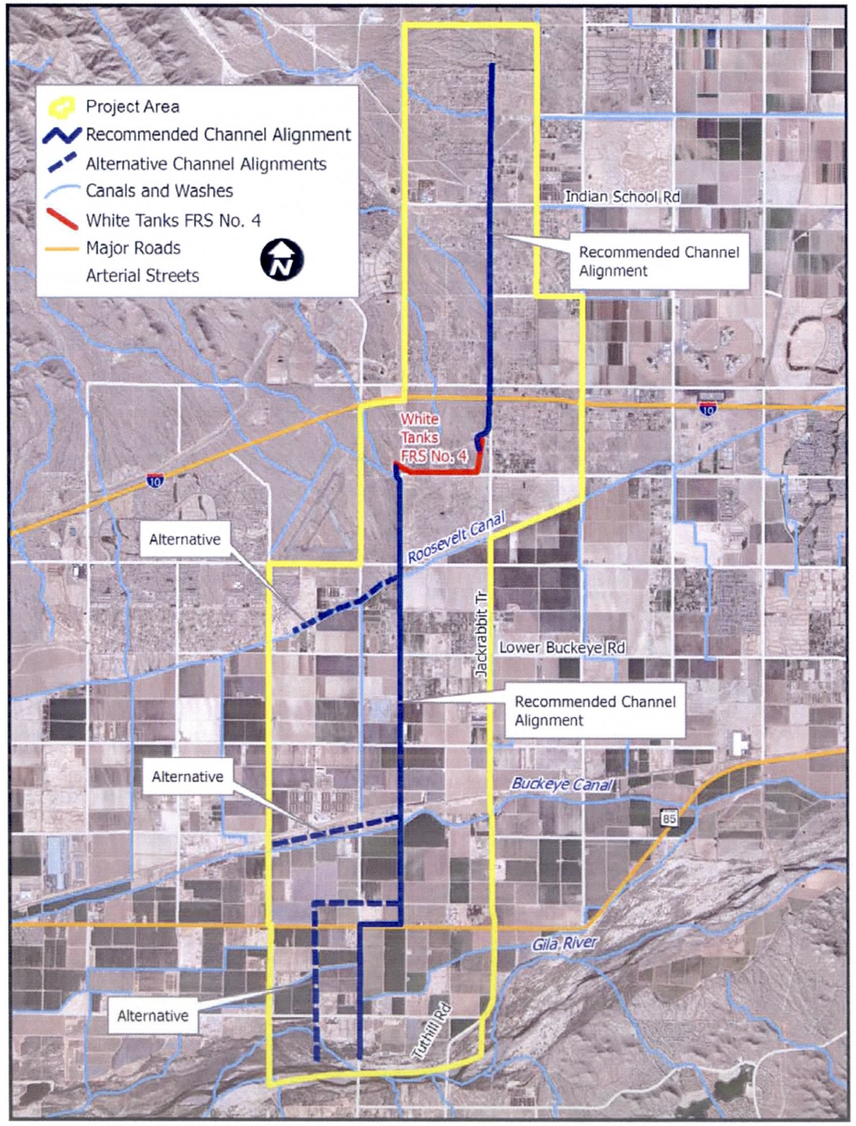
As part of this study, alternatives were developed for the White Tanks FRS No.3 Outfall Channel along Jackrabbit Road from White Tanks FRS No.3 to the White Tanks FRS No.4 and the White Tanks FRS No.4 Outfall Channel along Tuthill Road from White Tanks FRS No.4 to the Gila River. The selected alternative alignment and outstanding issues for each channel

View of upstream embankment looking west toward the White Tank Mountains

Flood Control District of Maricopa County

www.fcd.maricopa.gov

Study Area



Why is this Project Necessary?

The Arizona Department of Water Resources has determined that the dam does not meet state of Arizona dam safety requirements. While the specific dam safety issues are not of an emergency nature, they must be addressed if flood protection benefits provided by the dam are to be maintained for the long term. The District is nearing completion of the 15 percent design plans for rehabilitation for the structure. The NRCS will be developing a Work Plan/Environmental Assessment needed to obtain federal funding assistance for the project. **Figure 1** shows an aerial view of the dam in its proposed rehabilitated condition.

White Tanks FRS No.3 and White Tanks FRS No.4 currently do not have outfall channels. The project is also providing the 15 percent design for the preferred alternative for the outfall channel for floodwaters leaving White Tanks FRS No.3 and connecting with White Tanks FRS No.4 and providing alignment alternatives for conveying flows from White Tanks FRS No.4 to the Gila River. **Figure 2** shows a conceptual drawing of the proposed outfall channel north of Camelback Road. **Figure 3** shows a conceptual drawing of the proposed outfall channel where right of way is not limited. **Figure 4** shows a conceptual drawing of the proposed outfall channel where right of way is limited.

Alternative Process

Design Alternatives

Project engineers and landscape architects developed a short list of project alternatives. The alternatives included dam modification and dam replacement alternatives and alternatives for the outfall channels associated with White Tanks FRS No.3 and White Tanks FRS No.4. From the short list of alternatives the preferred alternatives were chosen and carried forward to 15 percent design.

Landscape Concepts

The study team will present landscape concepts for the dam modifications and channels to complement the natural and future character of the surrounding landscape.

Recreation and Multi-Use

The study team is evaluating the opportunity for other local interests to fund and include future recreation and multi-use features in the project. The uses may include trails for hiking, biking and horseback riding. The Project may provide regional recreational opportunities and connect to a regional trail system to access the White Tank Regional Park and the Gila River corridor.

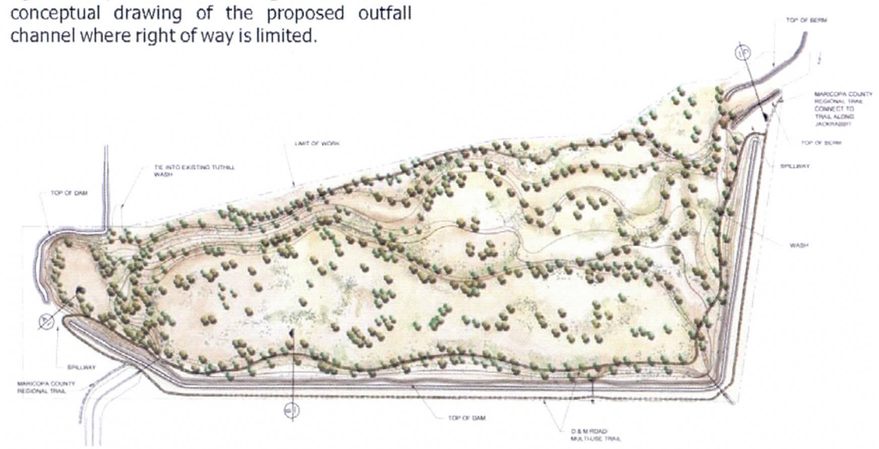


Figure 1

APPENDIX C JACKRABBIT TRAIL DCR EXCERPT

MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION

ENGINEERING DIVISION

JACKRABBIT TRAIL
(195th Avenue)
DESIGN CONCEPT REPORT

YUMA ROAD TO THOMAS ROAD

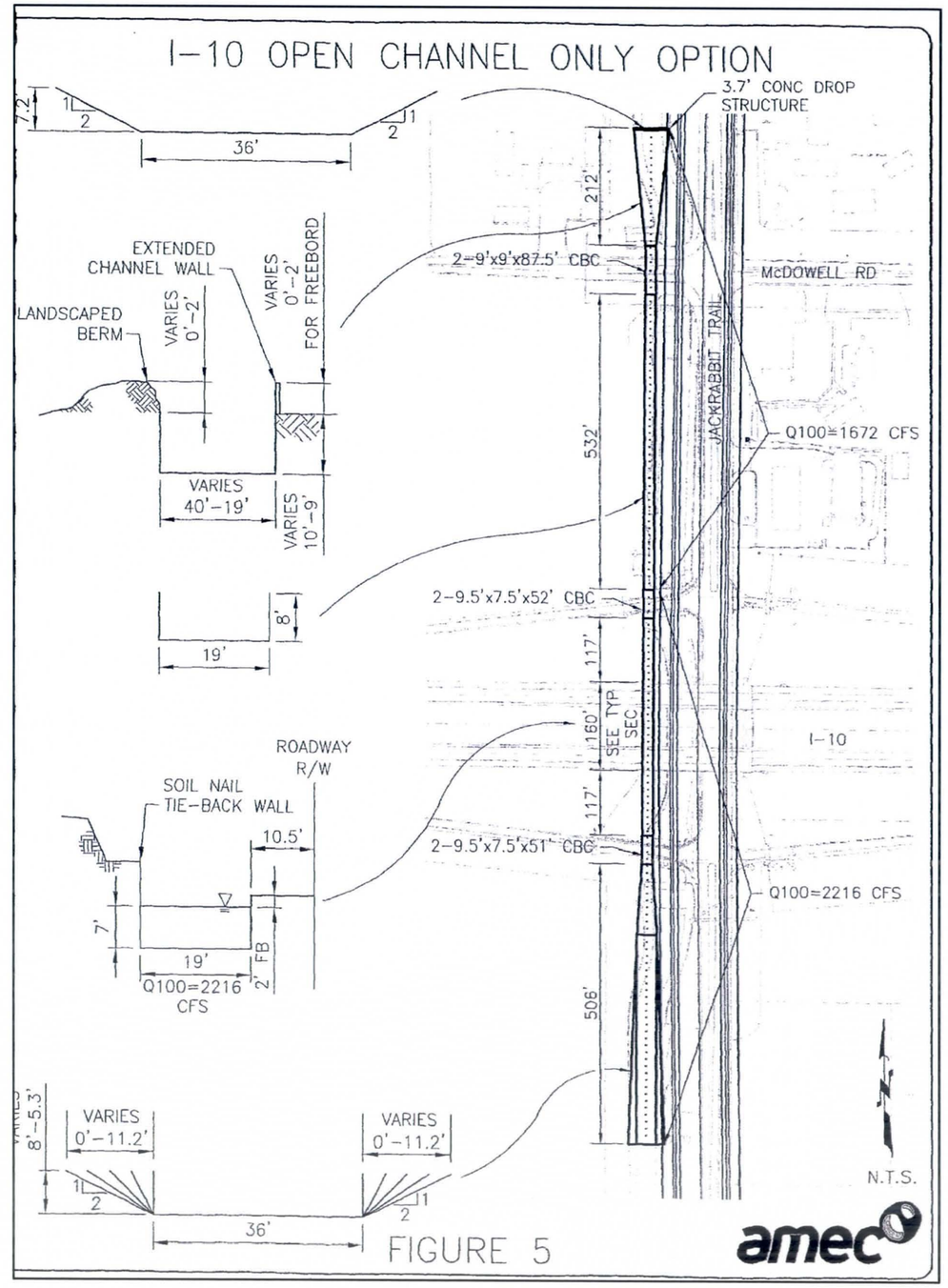
MCDOT WORK ORDER NO. 69039

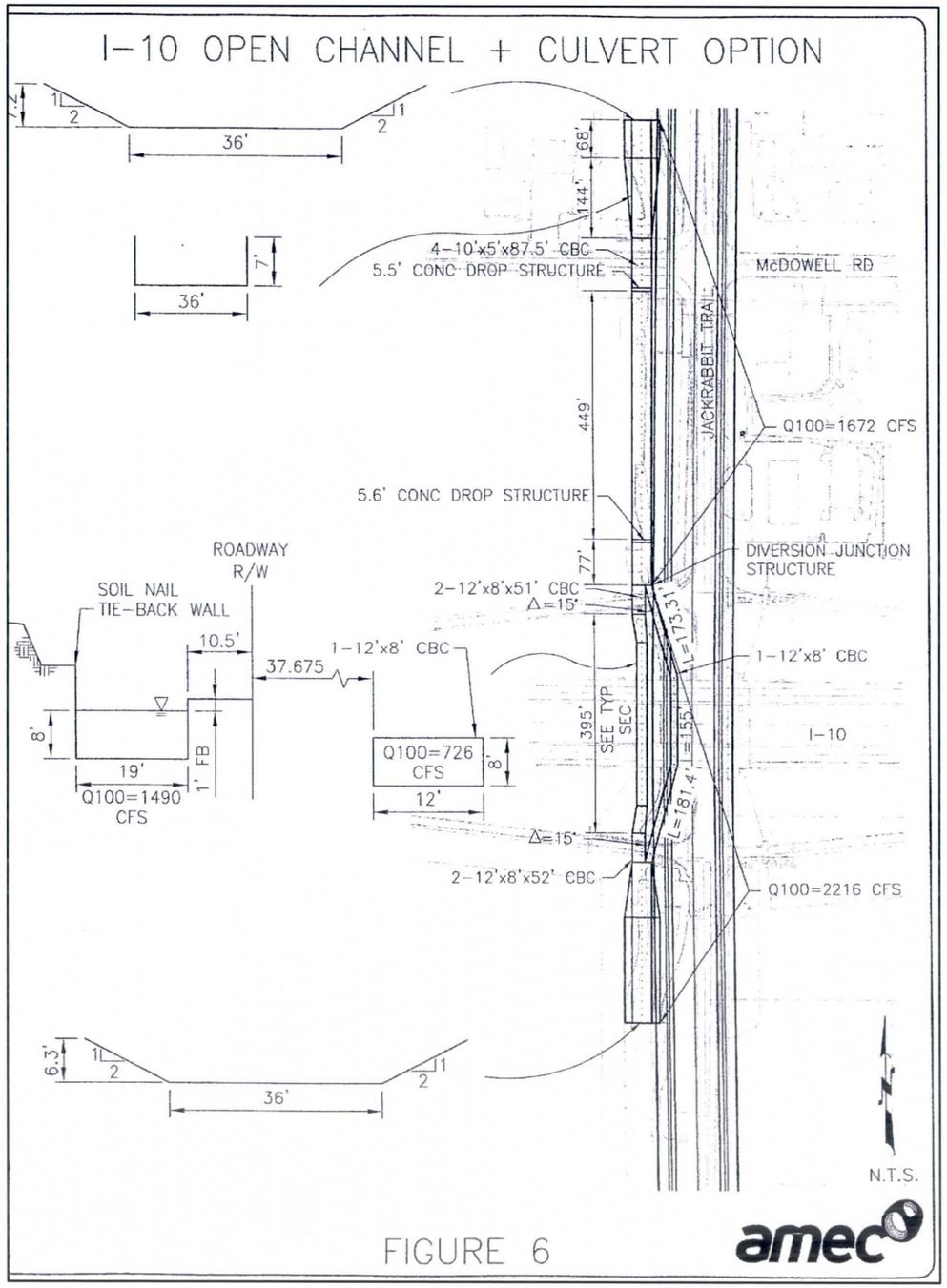
January 2004

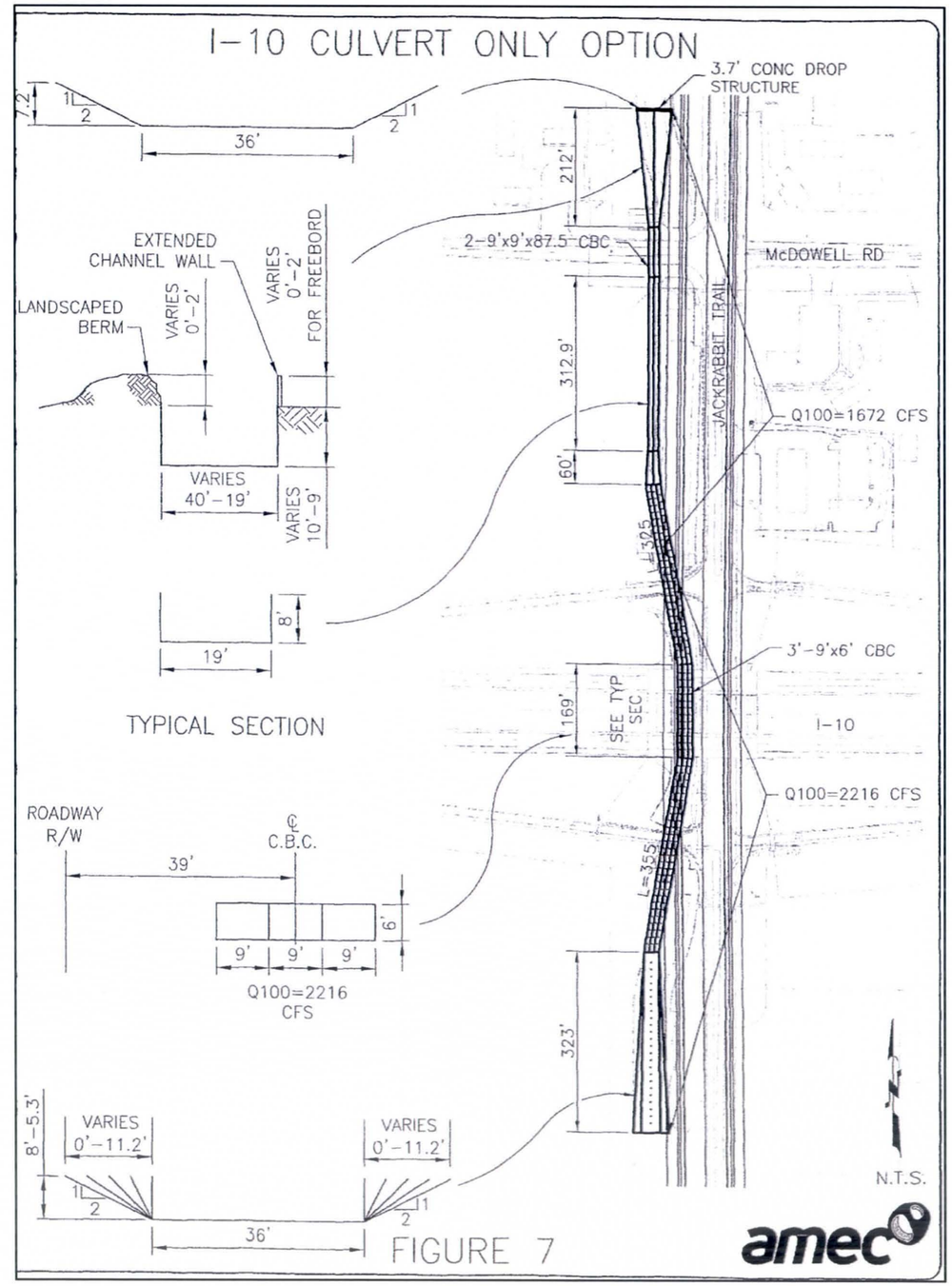
Prepared By

AMEC Infrastructure Inc.
4435 E. Holmes Avenue
Mesa, AZ 85204

Registered Professional Engineer (Civil) CERTIFICATE NO. 37898 ELIJAH E. WILLIAMS Date Signed 1/28/04 ARIZONA U.S.A.



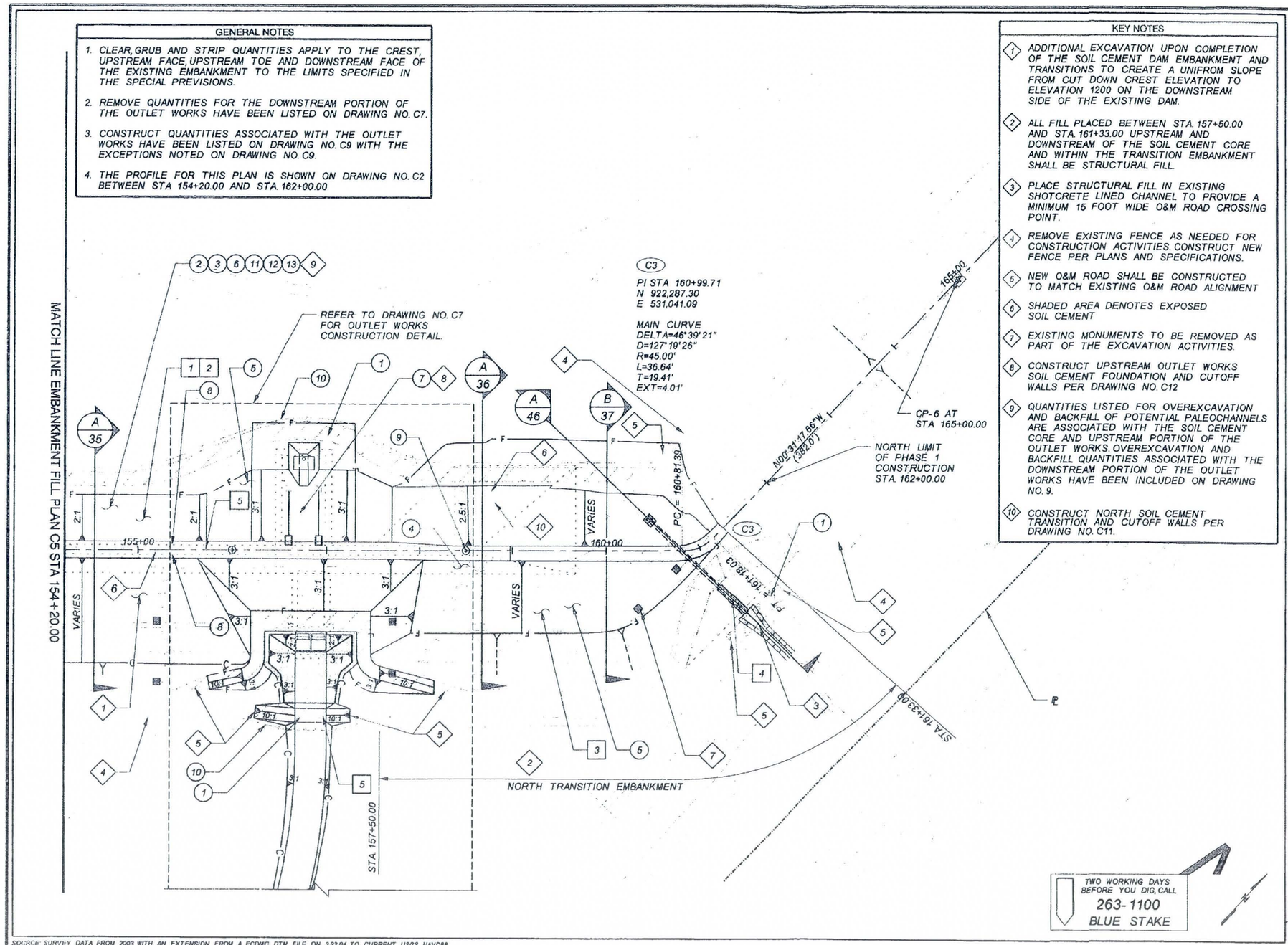

I-10 OPEN CHANNEL + CULVERT OPTION
36'
7.2
1
2
68'
144'
7'
4-10'x5'x87.5' CBC
5.5' CONC DROP STRUCTURE
McDOWELL RD
JACKRABBIT TRAIL
449'
Q100=1672 CFS
5.6' CONC DROP STRUCTURE
77'
DIVERSION JUNCTION STRUCTURE
ROADWAY R/W
SOIL NAIL TIE-BACK WALL
2-12'x8'x51' CBC
Δ=15'
10.5'
37.675
1-12'x8' CBC
L=173.31'
8'
19'
1' FB
Q100=1490 CFS
Q100=726 CFS
12'
395'
SEE TYP SEC
L=155'
L=181.4'
I-10
Δ=15'
2-12'x8'x52' CBC
Q100=2216 CFS
6.3'
N.T.S.
FIGURE 6
amec


I-10 CULVERT ONLY OPTION
3.7' CONC DROP STRUCTURE
36'
7.2
212'
EXTENDED CHANNEL WALL
VARIES 0'-2'
VARIES 0'-2' FOR FREEBORD
LANDSCAPED BERM
2-9'x9'x87.5' CBC
McDOWELL RD
312.9'
JACKRABBIT TRAIL
Q100=1672 CFS
60'
VARIES 40'-19'
VARIES 10'-9'
L=325'
8'
19'
TYPICAL SECTION
3'-9'x6' CBC
169'
SEE TYP SEC
I-10
Q100=2216 CFS
ROADWAY R/W
℄ C.B.C.
39'
6'
9' 9' 9'
Q100=2216 CFS
L=355'
323'
8'-5.3'
VARIES 0'-11.2'
VARIES 0'-11.2'
N.T.S.
FIGURE 7
amec

APPENDIX D WHITE TANKS FRS #3 REMEDIATION PROJECT

GENERAL NOTES

1. CLEAR, GRUB AND STRIP QUANTITIES APPLY TO THE CREST, UPSTREAM FACE, UPSTREAM TOE AND DOWNSTREAM FACE OF THE EXISTING EMBANKMENT TO THE LIMITS SPECIFIED IN THE SPECIAL PREVISIONS.
2. REMOVE QUANTITIES FOR THE DOWNSTREAM PORTION OF THE OUTLET WORKS HAVE BEEN LISTED ON DRAWING NO. C7.
3. CONSTRUCT QUANTITIES ASSOCIATED WITH THE OUTLET WORKS HAVE BEEN LISTED ON DRAWING NO. C9 WITH THE EXCEPTIONS NOTED ON DRAWING NO. C9.
4. THE PROFILE FOR THIS PLAN IS SHOWN ON DRAWING NO. C2 BETWEEN STA 154+20.00 AND STA. 162+00.00



KEY NOTES

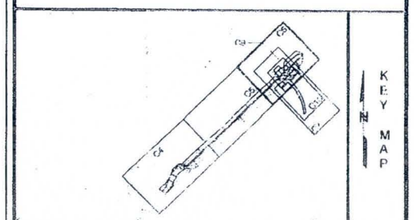
1. ADDITIONAL EXCAVATION UPON COMPLETION OF THE SOIL CEMENT DAM EMBANKMENT AND TRANSITIONS TO CREATE A UNIFROM SLOPE FROM CUT DOWN CREST ELEVATION TO ELEVATION 1200 ON THE DOWNSTREAM SIDE OF THE EXISTING DAM.
2. ALL FILL PLACED BETWEEN STA. 157+50.00 AND STA. 161+33.00 UPSTREAM AND DOWNSTREAM OF THE SOIL CEMENT CORE AND WITHIN THE TRANSITION EMBANKMENT SHALL BE STRUCTURAL FILL.
3. PLACE STRUCTURAL FILL IN EXISTING SHOTCRETE LINED CHANNEL TO PROVIDE A MINIMUM 15 FOOT WIDE O&M ROAD CROSSING POINT.
4. REMOVE EXISTING FENCE AS NEEDED FOR CONSTRUCTION ACTIVITIES. CONSTRUCT NEW FENCE PER PLANS AND SPECIFICATIONS.
5. NEW O&M ROAD SHALL BE CONSTRUCTED TO MATCH EXISTING O&M ROAD ALIGNMENT
6. SHADED AREA DENOTES EXPOSED SOIL CEMENT
7. EXISTING MONUMENTS TO BE REMOVED AS PART OF THE EXCAVATION ACTIVITIES.
8. CONSTRUCT UPSTREAM OUTLET WORKS SOIL CEMENT FOUNDATION AND CUTOFF WALLS PER DRAWING NO. C12
9. QUANTITIES LISTED FOR OVEREXCAVATION AND BACKFILL OF POTENTIAL PALEOCHANNELS ARE ASSOCIATED WITH THE SOIL CEMENT CORE AND UPSTREAM PORTION OF THE OUTLET WORKS. OVEREXCAVATION AND BACKFILL QUANTITIES ASSOCIATED WITH THE DOWNSTREAM PORTION OF THE OUTLET WORKS HAVE BEEN INCLUDED ON DRAWING NO. 9.
10. CONSTRUCT NORTH SOIL CEMENT TRANSITION AND CUTOFF WALLS PER DRAWING NO. C11.

REMOVE

1	CLEAR AND GRUB (201-1) (SEE NOTE 1)	4 AC
2	REMOVE (STRIP) AND STOCKPILE UPPER 6-INCHES OF SOIL (201-2) (SEE NOTE 1)	4 AC
3	EXCAVATE EXISTING DAM CREST, UPSTREAM FACE AND TOE (206-2)	34,857 CY
4	PERFORM CLOSURE ACTIVITIES FOR THE EXISTING OUTLET WORKS PER DRAWING NO. XS13 (350-1)	1 EA
5	REMOVE AND DISPOSE EXISTING FENCE (350-2)	806 LF

CONSTRUCT

1	CONSTRUCT O&M ROADWAY (205-1)	752 SY
2	PREPARE FOUNDATION FOR THE DAM EMBANKMENT AND UPSTREAM PORTION OF THE OUTLET WORKS (206-1)	10,371 CY
3	OVEREXCAVATE UNACCEPTABLE SOIL MATERIALS AND BACKFILL (206-3)	1,200 CY
4	CONSTRUCT GRADED FILTER PER DETAILS ON DRAWING NO. C11 AND XS12 (211-1)	100 CY
5	PLACE STRUCTURAL FILL FOR THE DAM EMBANKMENT AND THE UPSTREAM PORTION OF THE OUTLET WORKS (211-2)	15,890 CY
6	PLACE COMMON FILL FOR THE DAM EMBANKMENT (211-3)	21,746 CY
7	PLACE SOIL CEMENT FOR THE DAM EMBANKMENT AND UPSTREAM PORTION OF THE OUTLET WORKS FOUNDATION (221-1)	20,255 CY
8	PLACE UNTREATED BASE FOR THE DAM EMBANKMENT(310-1)	166 TON
9	INSTALL MONUMENTS PER DETAILS ON DRAWING NO. D2 (405-1)	2 EA
10	INSTALL NEW FENCING (420-1)	861 LF
11	PLACE CLSM BACKFILL FOR COAXIAL TDR CABLE PER DRAWING NO. D2 (604-1)	54 CY
12	CONSTRUCT CUTOFF WALLS (606-1)	36,395 SF
13	INSTALL TDR INSTRUMENTATION PER DETAILS ON DRAWING NO. D2 (796-1)	1620 LF



NO.	REVISION	BY	DATE

ADWR APPROVAL

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

WHITE TANKS FRS NO 3
REMEDIATION PROJECT - PHASE 1
PCN 470.04.30, FCD CONTRACT NO. 2004C017

	BY	DATE
DESIGNED	CDW	4-05
DRAWN	MSJ	4-05
CHECKED	TER	4-05

URS 7720 NORTH 16TH STREET SUITE 100 PHOENIX, AZ 85020

DRAWING NO. C6

EMBANKMENT FILL PLAN

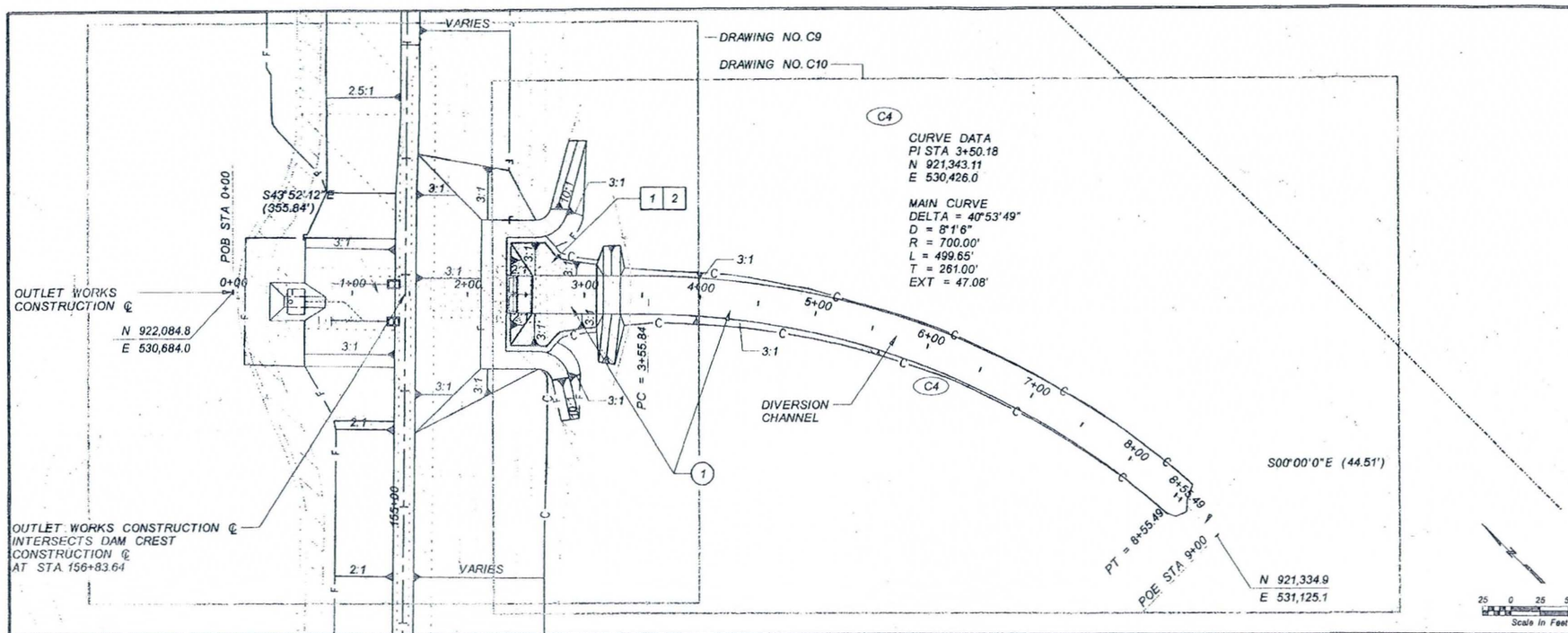
SHEET OF 10 48

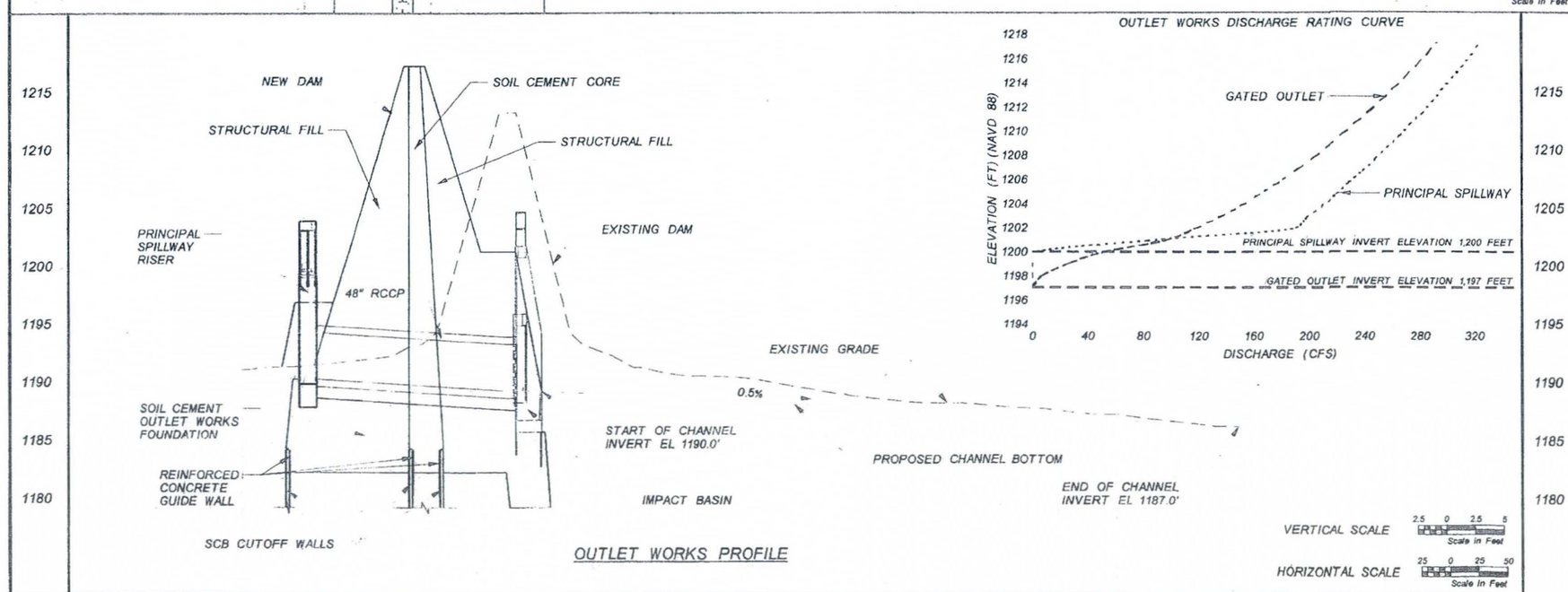
25 0 25 50
Scale In Feet
ONE FOOT CONTOURS

SOURCE: SURVEY DATA FROM 2003 WITH AN EXTENSION FROM A FCDMC DTM FILE ON 3.22.04 TO CURRENT USGS NAVD88

P:\FCDMC\23443698 White Tanks\cadd\P1\REV 0\WT3_C6-P1-REV0-PORT.dgn

XREFS: 52604_TOPO.DGN, PL-FCD.dgn, NEW STATIONING.dgn, WT3_CREST_MODEL.DGN, KEYMAP.DGN





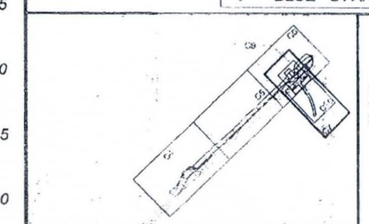
REMOVE	
1 CLEAR AND GRUB (201-1) (SEE NOTE 1)	1 AC
2 REMOVE (STRIP) AND STOCKPILE UPPER 6-INCHES OF SOIL (201-2) (SEE NOTE 1)	1 AC

CONSTRUCT	
1 EXCAVATE FOR DOWNSTREAM PORTION OF THE OUTLET WORKS AND DIVERSION CHANNEL (215-1)	12,516 CY

GENERAL NOTES

1. QUANTITIES LISTED APPLY TO THE ADDITIONAL CLEARING, GRUBBING AND STRIPPING REQUIRED FOR THE CONSTRUCTION OF THE DOWNSTREAM PORTION OF THE OUTLET WORKS AND THE DIVERSION CHANNEL.
2. THE OUTLET WORKS SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE OUTLET WORKS CONSTRUCTION SEQUENCE SHOWN ON DRAWING NO. C8
3. PROFILE SHOWN THROUGH THE ℄ OF THE OUTLET WORKS AND CHANNEL ALIGNMENT PRINCIPAL SPILLWAY RISER AND OUTLET PIPE SHOWN ON PROFILE FOR CLARITY.

TWO WORKING DAYS BEFORE YOU DIG, CALL
263-1100
BLUE STAKE



NO.	REVISION	BY	DATE

ADWR APPROVAL

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

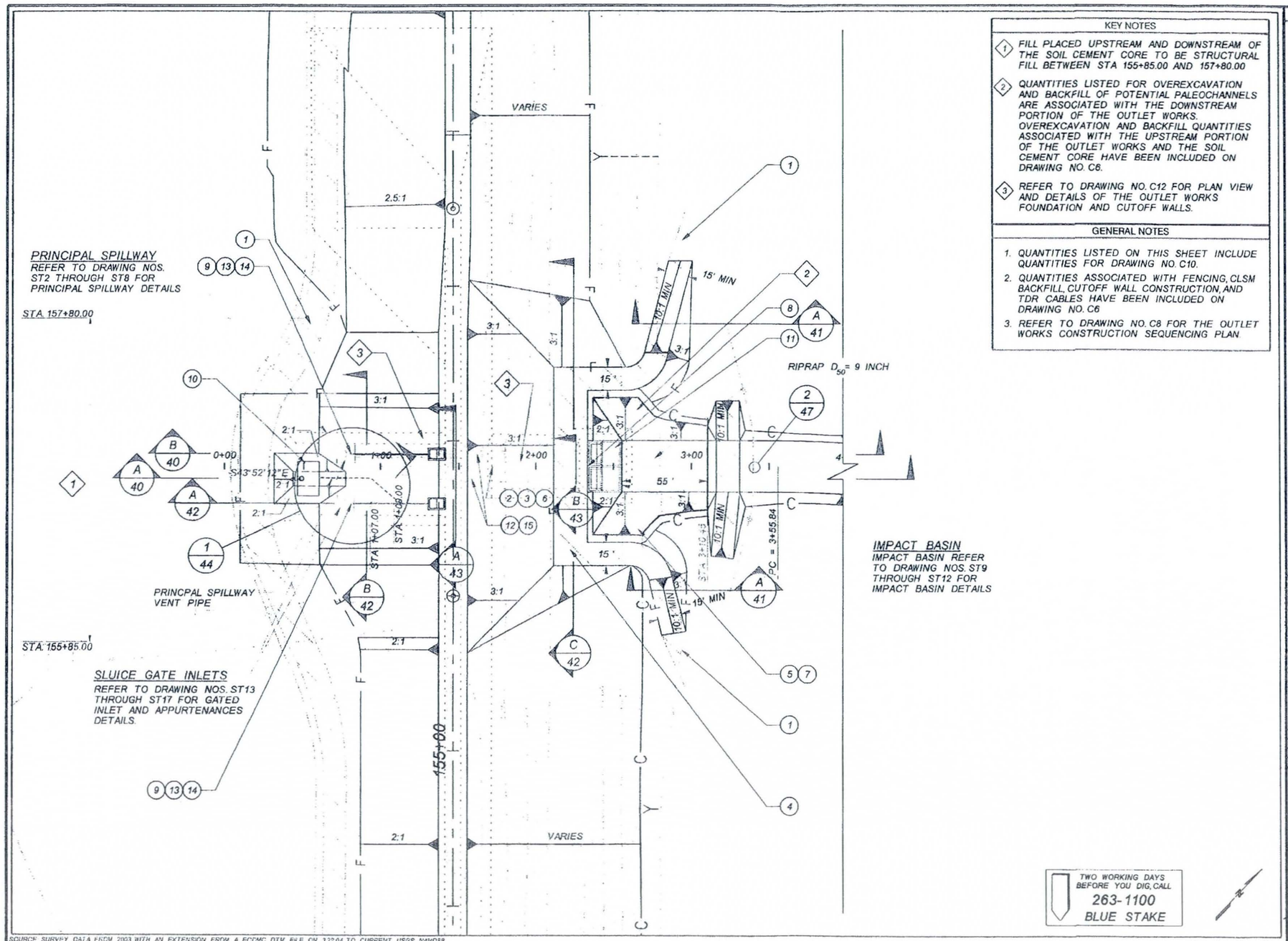
WHITE TANKS FRS NO 3
REMEDIATION PROJECT - PHASE 1
PCN 470.04.30, FCD CONTRACT NO. 2004C017

	BY	DATE
DESIGNED	CDW	3-05
DRAWN	MSJ	3-05
CHECKED	TER	3-05

URS
7720 NORTH 16TH STREET
SUITE 100
PHOENIX, AZ 85020

DRAWING NO.	OUTLET WORKS CHANNEL PLAN AND PROFILE	SHEET OF
C7		11 48

p:\fcdmc\23443698 white tanks\cadd\p1\sv 0\w13_c7-p1-rev0.dgn
XREFS: PP-FCD.DGN,5804 TOPO.DGN,WT3 CHESY MODEL.DGN,WT3 CHANNEL.DGN,KEYMAP.DGN



SOURCE SURVEY DATA FROM 2003 WITH AN EXTENSION FROM A FCDMC DTM FILE ON 3.22.04 TO CURRENT USGS NAVD88

p:\fcdmc\23443698 white tanks\cadd\p1\rev 0\wt3_c9-p1-rev0.dgn

XREFS: 52604_TOPO.DGN, WT3_CREST_MODEL.DGN, PL-FCD.DGN, KEYMAP.DGN

KEY NOTES

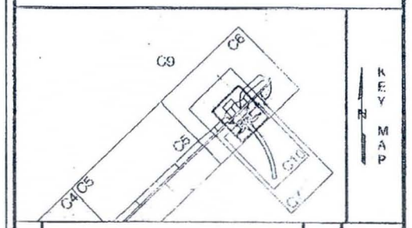
1. FILL PLACED UPSTREAM AND DOWNSTREAM OF THE SOIL CEMENT CORE TO BE STRUCTURAL FILL BETWEEN STA 155+85.00 AND 157+80.00
2. QUANTITIES LISTED FOR OVEREXCAVATION AND BACKFILL OF POTENTIAL PALEOCHANNELS ARE ASSOCIATED WITH THE DOWNSTREAM PORTION OF THE OUTLET WORKS. OVEREXCAVATION AND BACKFILL QUANTITIES ASSOCIATED WITH THE UPSTREAM PORTION OF THE OUTLET WORKS AND THE SOIL CEMENT CORE HAVE BEEN INCLUDED ON DRAWING NO. C6.
3. REFER TO DRAWING NO. C12 FOR PLAN VIEW AND DETAILS OF THE OUTLET WORKS FOUNDATION AND CUTOFF WALLS.

GENERAL NOTES

1. QUANTITIES LISTED ON THIS SHEET INCLUDE QUANTITIES FOR DRAWING NO. C10.
2. QUANTITIES ASSOCIATED WITH FENCING, CLSM BACKFILL, CUTOFF WALL CONSTRUCTION, AND TDR CABLES HAVE BEEN INCLUDED ON DRAWING NO. C6
3. REFER TO DRAWING NO. C8 FOR THE OUTLET WORKS CONSTRUCTION SEQUENCING PLAN

CONSTRUCT

1	CONSTRUCT O&M ROADWAY (205-1)	723 SY
2	PREPARE FOUNDATION FOR THE DOWNSTREAM PORTION OF THE OUTLET WORKS (206-1)	2,133 SY
3	OVEREXCAVATE UNACCEPTABLE SOIL MATERIALS AND BACKFILL (206-3)	400 CY
4	PLACE STRUCTURAL FILL FOR THE CONSTRUCTION OF THE DOWNSTREAM PORTION OF THE OUTLET WORKS (211-2)	6,141 CY
5	PLACE RIPRAP D_{50}= 9 INCHES (220-1)	370 CY
6	PLACE SOIL CEMENT FOR DOWNSTREAM PORTION OF THE OUTLET WORKS FOUNDATION (221-2)	1,470 CY
7	PLACE GEOTEXTILE UNDERLAYMENT FOR RIPRAP (231-1)	400 SY
8	INSTALL GEOCOMPOSITE WALL DRAIN (232-1)	60 SY
9	CONSTRUCT SLUICE GATE INLET STRUCTURE AND APPURTENANCES PER DETAILS ON DRAWING NOS. ST13 TO ST17 (505-1)	2 EA
10	CONSTRUCT PRINCIPAL SPILLWAY PER DETAILS ON DRAWING NOS. ST2 TO ST8 (505-2)	1 LS
11	CONSTRUCT IMPACT BASIN PER DETAILS ON DRAWING NOS. ST9 TO ST12 (505-3)	1 LS
12	CONSTRUCT OUTLET PIPE ENCASEMENT PER DETAILS ON DRAWING NOS. XS7, XS9, AND XS10 (505-4)	1 LS
13	INSTALL TRASHRACK PER DETAILS ON DRAWING NOS. ST16 AND ST17 (516-1)	2 EA
14	INSTALL SLUICE GATES AND APPURTENANCES PER DETAILS ON DRAWING NOS. ST13 AND ST14 (517-1)	2 EA
15	INSTALL 48-INCH RCCP (618-1)	375 LF



NO.	REVISION	BY	DATE

ADWR APPROVAL

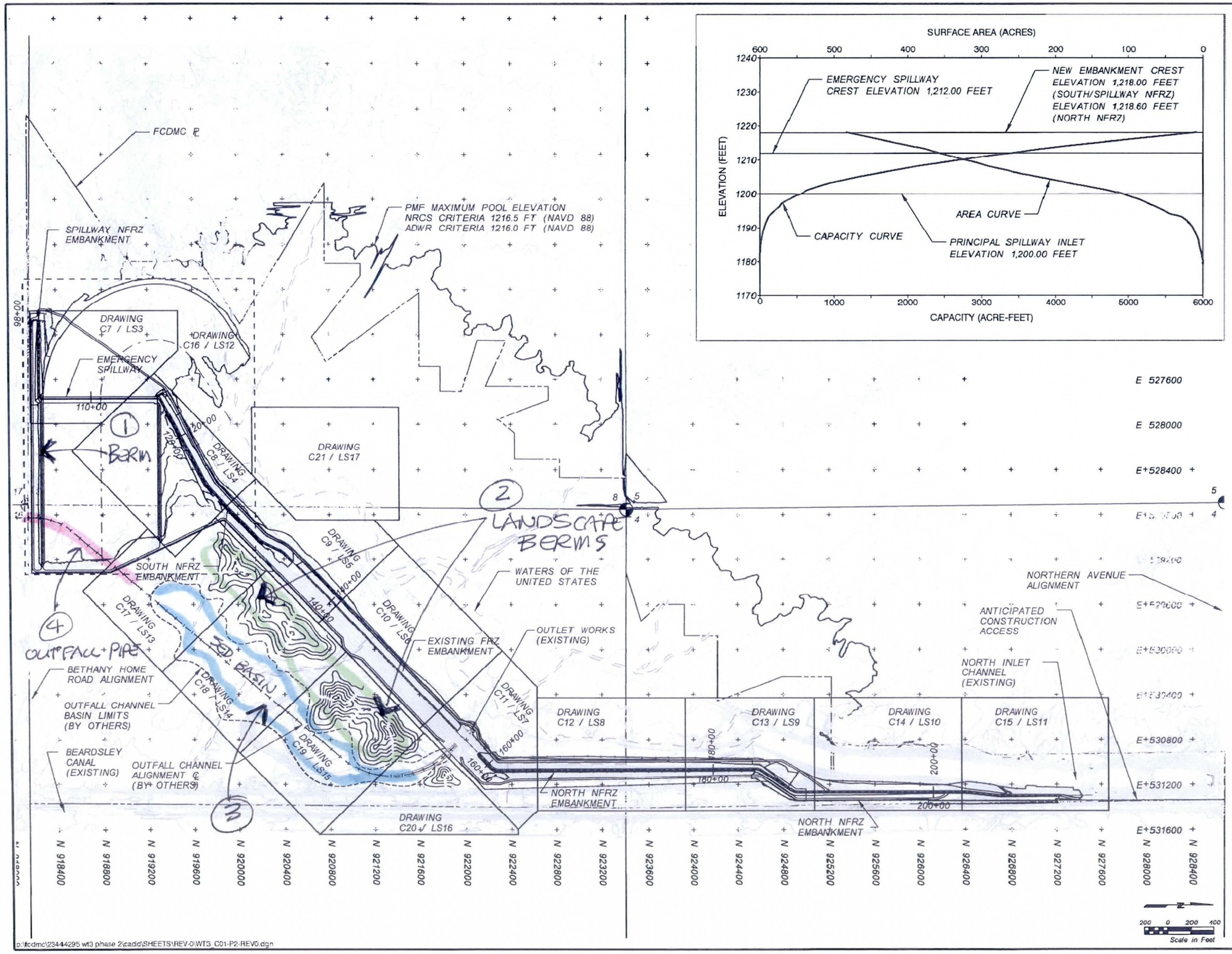
FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

WHITE TANKS FRS NO 3
REMEDIATION PROJECT - PHASE 1
PCN 470.04.30, FCD CONTRACT NO. 2003CO55

	BY	DATE
DESIGNED	CDW	3-05
DRAWN	MSJ	3-05
CHECKED	TER	3-05

URS 7720 NORTH 16TH STREET SUITE 100 PHOENIX, AZ 85020

DRAWING NO.		SHEET OF
C9	OUTLET WORKS FILL PLAN	13 48



REMOVE

7	REMOVAL OF PERIMETER FENCE (350-2)	1 LS
8	REMOVE AND STOCKPILE TOPSOIL (430-1)	559,717 SY

CONSTRUCT

11	UNTREATED BASE (310-1)	9,100 CY
12	DECOMPOSED GRANITE ROAD SURFACE (344-1)	23,200 SY
13	TRAFFIC CONTROL (401-1)	1 LS
15	FENCING (420-1)	22,300 LF

GENERAL NOTES

TWO WORKING DAYS BEFORE YOU DIG, CALL
263-1100
BLUE STAKE

NO.	REVISION	BY	DATE

ADWR APPROVAL

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

WHITE TANKS FRS NO 3
REMEDIATION PROJECT - PHASE 2
PCN 470.04.30, FCD CONTRACT NO. 2008C031

	BY	DATE
DESIGNED	MSJ	2-09
DRAWN	JEO, KLP, RBZ	2-09
CHECKED	TER	2-09

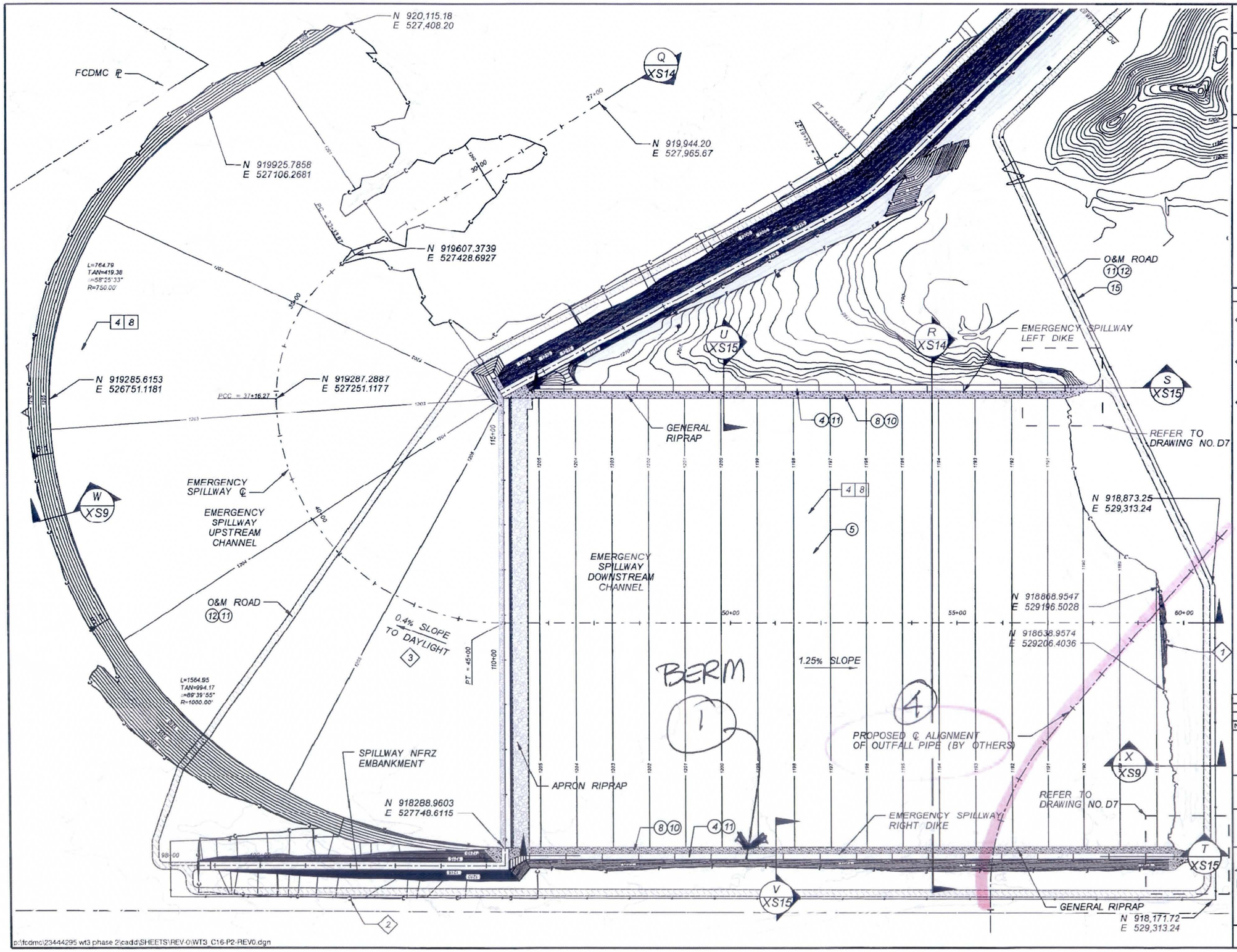
Registered Professional Engineer (Civil) CERTIFICATE NO. 32847 TODD E. RINGSMUTH ARIZONA, U.S.A. EXPIRES: 09-30-2010

URS
7720 NORTH 16TH STREET
SUITE 100
PHOENIX, AZ 85020

DRAWING NO. C1

GENERAL SITE PLAN

SHEET 6 OF 83



THE QUANTITIES SHOWN BELOW ARE FOR WORK WITHIN THE EMERGENCY SPILLWAY

REMOVE		
4	BORROW EXCAVATION - EMERGENCY SPILLWAY (210-2)	262,926 CY
8	REMOVE AND STOCKPILE TOPSOIL (430-1)	SEE DWG C1

CONSTRUCT		
4	STRUCTURAL FILL (211-3)	22,580 CY
5	COMMON FILL (211-4)	44,320 CY
8	GENERAL RIPRAP (220-2)	17,300 CY
9	APRON RIPRAP (220-1)	6,100 CY
10	GEOTEXTILE FOR RIPRAP (231-1)	29,500 SY
11	UNTREATED BASE (310-1)	SEE DWG C1
12	DECOMPOSED GRANITE ROAD SURFACE (344-1)	SEE DWG C1
15	FENCING (420-1)	SEE DWG C1

KEY NOTES

1. EXISTING CHANNEL WILL BE REMOVED AND EMERGENCY SPILLWAY CHANNEL WILL DAYLIGHT TO EXISTING GRADE AT A SLOPE OF 3:1
2. EXISTING FENCE IS NOT DISTRICT PROPERTY AND NEEDS TO BE PROTECTED DURING CONSTRUCTION ACTIVITIES (NOT SHOWN)
3. UPSTREAM CHANNEL SLOPE IS 0.4% ALONG STATION LINE. CHANNEL SLOPE IS FLATTER AT OUTSIDE EDGE AND STEEPER AT INSIDE EDGE.

TWO WORKING DAYS BEFORE YOU DIG, CALL
263-1100
BLUE STAKE

NO.	REVISION	BY	DATE

ADWR APPROVAL

FLOOD CONTROL DISTRICT OF MARICOPA COUNTY
ENGINEERING DIVISION

WHITE TANKS FRS NO 3
REMEDIATION PROJECT - PHASE 2
PCN 470.04.30, FCD CONTRACT NO. 2008C031

	BY	DATE
DESIGNED	MSJ	2-09
DRAWN	JEO, KLP, RBZ	2-09
CHECKED	TER	2-09

URS
7720 NORTH 16TH STREET
SUITE 100
PHOENIX, AZ 85020

DRAWING NO.	EMERGENCY SPILLWAY CHANNEL PLAN	SHEET OF
C16		21 83

p:\fcdmc\23444295 wt3 phase 2\cadd\SHEETS\REV-0\WT3_C16-P2-REV0.dgn

APPENDIX E ZANJERO TRAILS MASTER PLAN EXCERPT

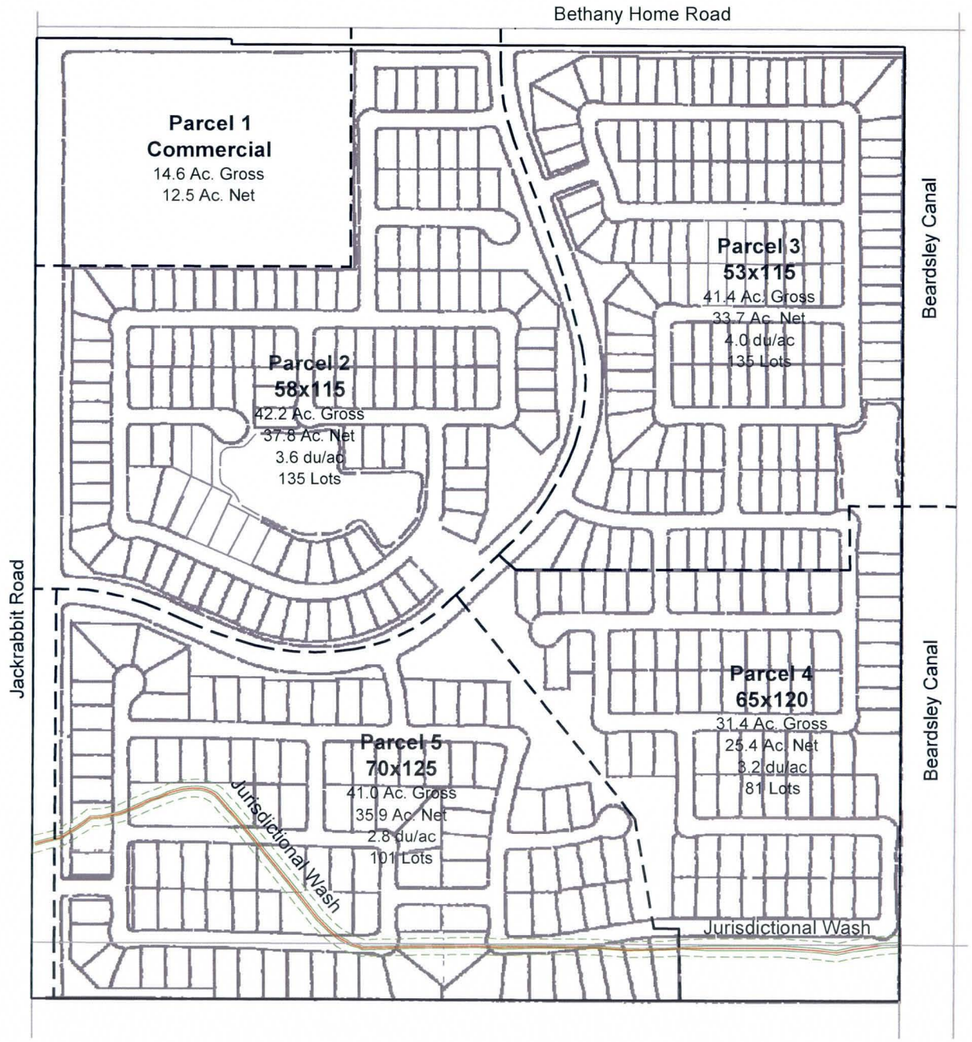
Zanjero Trails

Maricopa County, Arizona

Parcel 34 Conceptual Site Plan

North Scale: 1" = 200'

DRAFT



Site Data

Parcel	Land Use	Gross Area	Net Area	Number of Lots	Gross Density	Net Density
1	Commercial	14.6	12.5	---	---	---
2	58 x 115	42.2	37.8	135	3.2	3.6
3	53 x 115	41.4	33.7	135	3.3	4.0
4	65 x 120	31.4	25.4	81	2.6	3.2
5	70 x 125	41.0	35.9	101	2.5	2.8
Subtotal	--	**170.6**	**145.3**	**452**	**2.6**	**3.1**

NOTES:

1. Density Calculations are provided using the enitre Gross and Net areas, including the Commercial and Open Space Parcels.
2. This exhibit is conceptual and subject to change through the design and development process.

CMX

• Arizona • Florida • Maryland • Nevada • New Jersey • • New York • Pennsylvania • Mexico •

• Building Services • Sports Engineering
• Environmental • Telecommunications
• Land development • Transportation
• Public Works

March 30, 2009

CMX Project Number: 6714
Project Manager: G.Wagner
Designed By: CMX
Graphics By: N/A
Drawn By: C.Klock

X:\6700\6714\Exhibits\Engineering\Parcel-34-Site-Plan.dwg
Mar 30, 2009 10:51am

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Zanjero Trails

Maricopa County, Arizona
RUPD/CUPD-PAD Zone Change Request

Proposed Zoning

Figure 10

NORTH

0 1,000' 2,000' 3,000' 6,000'

Scale: 1" = 3,000'

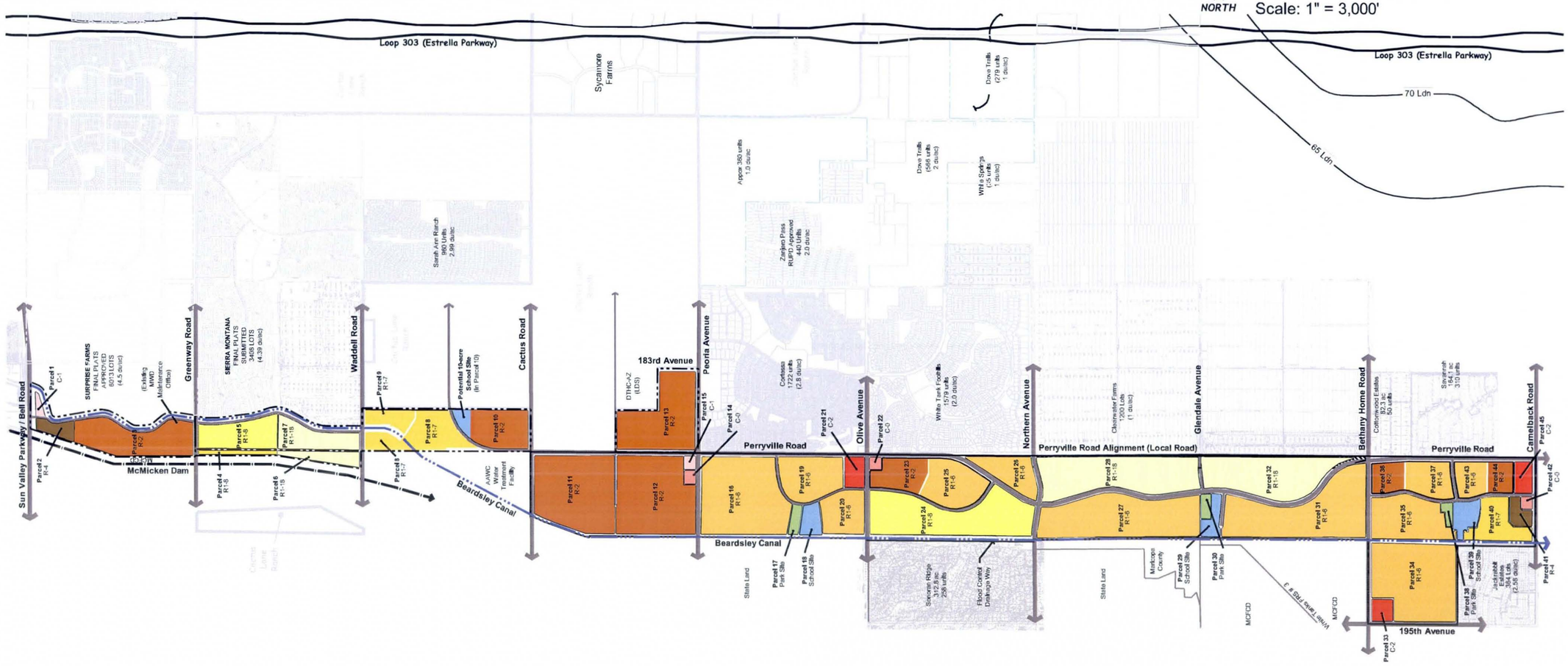
Vicinity Map
N.T.S.

Legend

- Boundary
- Beardsley Canal
- McMicken Dam
- Arterial
- Collector

Zoning Category

- R1-18 (RUPD) with PAD overlay
- R1-8 (RUPD) with PAD overlay
- R1-7 (RUPD) with PAD overlay
- R1-6 (RUPD) with PAD overlay
- R-2 (RUPD) with PAD overlay
- R-4 (RUPD) with PAD overlay
- C-2 (CUPD) with PAD overlay
- C-0 (CUPD) with PAD overlay
- C-1 (CUPD) with PAD overlay
- Rural - 43 (Park Site) with PAD overlay
- R1-6 (RUPD) (School) with PAD overlay
- Potential Church Site with PAD overlay



CMX Project Number: 6714 March 3, 2005

Project Manager: L. Dever Revision Date:
Designed By: CMX April, 2006
Drawn By: S. Bunting / J. Newbegin

X:\6700\6714\Planning\ZANJERO TRAILS-RUPD\4th Submittal\6714-Fig 10 Proposed Zoning.dwg 05-0

APPENDIX F VERRADO PRELIMINARY PLAT

PRELIMINARY PLAT FOR
VERRADO PHASE 3 EAST
UNITS 1, 2, 3 & 4
PARCELS 4.401 THRU 4.429

BUCKEYE, ARIZONA
A PORTION OF SECTION 20, T.2N., R.2W.
OF THE G&SRB&M, MARICOPA COUNTY, ARIZONA

DRAWINGS AND SPECIFICATIONS AS INSTRUMENTS OF SERVICE ARE THE PROPERTY OF DMB WHITE TANK, L.L.C. AND MAY NOT BE REPRODUCED FOR COMMERCIAL USE WITHOUT THE WRITTEN PERMISSION OF DMB WHITE TANK, L.L.C.

GENERAL NOTES

1) THE INTENT OF THIS PRELIMINARY PLAT IS TO MEET THE REQUIREMENTS OF THE VERRADO COMMUNITY MASTER PLAN APPROVED BY THE TOWN OF BUCKEYE AND INCORPORATED BY REFERENCE INTO THAT CERTAIN PRE-ANNEXATION AND DEVELOPMENT AGREEMENT BY AND BETWEEN THE TOWN OF BUCKEYE AND DMB WHITE TANK, LLC, AN ARIZONA LIMITED LIABILITY COMPANY RECORDED IN THE OFFICIAL RECORDS OF MARICOPA COUNTY AS DOCUMENT NO. 99-1071208 (THE "CMP"), INCLUDED ALL MAJOR AND MINOR AMENDMENTS THERETO.

2) THIS PRELIMINARY PLAT SHALL CONFORM TO THE MINIMUM REQUIREMENTS AS SET FORTH IN THE APPROVED POTABLE WATER AND MASTER WASTEWATER PLANS AS DESCRIBED IN VOLUMES 3.0A AND 3.0B OF THE PLANNING UNIT PLAN FOR PORTIONS OF PLANNING UNITS III AND IV DATED 11/01/2005 AND 11/01/2005 RESPECTIVELY.

3) WASTEWATER DISPOSAL FOR THE DEVELOPMENT WILL BE PROVIDED AT ON-SITE WATER RECLAMATION FACILITY "WRF" TO BE LOCATED NORTH OF McDOWELL ROAD IN THE SE 1/4 OF SECTION 31, TOWNSHIP 2N, RANGE 2W. THE WASTEWATER WILL BE TREATED TO STATE AND COUNTY EFFLUENT REUSE WATER QUALITY STANDARDS FOR USE AS GOLF COURSE IRRIGATION. AN ON-SITE RECHARGE FACILITY WILL BE CONSTRUCTED FOR RECHARGE OF EXCESS EFFLUENT. BOTH THE WRF AND RECHARGE FACILITIES WILL BE OWNED, OPERATED AND MAINTAINED BY ARIZONA-AMERICAN WATER COMPANY, A PRIVATE WATER COMPANY.

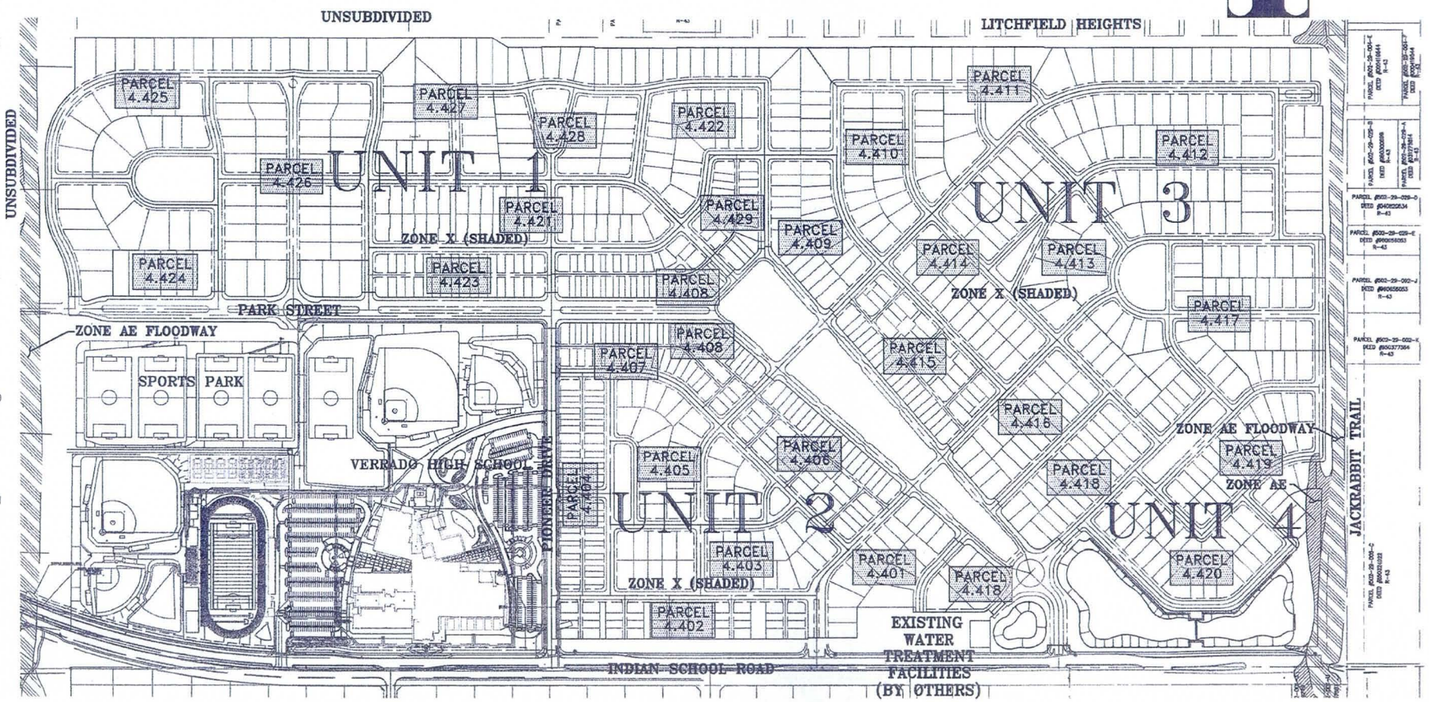
4) POTABLE WATER FOR THE DEVELOPMENT IS PROVIDED BY BOTH ON-SITE AND OFF-SITE PRODUCTION WELLS. IF NECESSARY TO MEET POTABLE DRINKING WATER STANDARDS, A BLENDING FACILITY OR WATER TREATMENT FACILITY IS LOCATED ON-SITE NORTH OF INDIAN SCHOOL ROAD IN THE SE 1/4 OF SECTION 20, TOWNSHIP 2N, RANGE 2W.

5) THE DEVELOPER HAS APPLIED TO THE ARIZONA DEPARTMENT OF WATER RESOURCES FOR A CERTIFICATE OF ASSURED WATER SUPPLY FOR THE PROJECT.

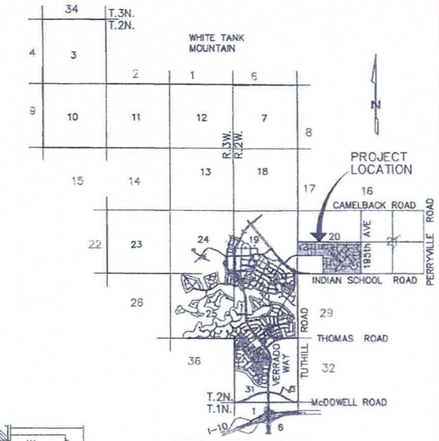
6) PARCELS 4.401 THRU 4.429 HAVE BEEN SUBJECTED TO THE COVENANTS, CONDITIONS, RESTRICTIONS, AND OTHER PROVISIONS CONTAINED IN THE COVENANT FOR COMMUNITY FOR VERRADO RECORDED IN DOCUMENT NUMBER 2002-1008904, AS SAME MAY BE AMENDED FROM TIME TO TIME, AND PRIOR TO DEVELOPMENT WILL BE SUBJECTED TO THE COMMUNITY CHARTER FOR VERRADO RECORDED IN DOCUMENT NUMBER 2002-1008905. ALL OWNERS OF LOTS IN THESE PARCELS WILL BECOME MEMBERS OF THE HOME OWNER'S ASSOCIATION ESTABLISHED BY THE COMMUNITY CHARTER FOR VERRADO.

7) THIS PRELIMINARY PLAT IS INTENDED TO COVER THE FOLLOWING PARCELS: 4.401 THRU 4.429. ALL OTHER PARCELS WILL HAVE TO BE SUBMITTED UNDER SEPARATE PRELIMINARY PLAT OR SITE PLAN SUBMITTALS AS REQUIRED BY THE TOWN OF BUCKEYE.

8) ALL SETBACKS SHALL CONFORM WITH THE VERRADO COMMUNITY MATER PLAN APPROVED BY THE TOWN OF BUCKEYE AND INCORPORATED BY REFERENCE INTO THAT CERTAIN PRE-ANNEXATION AND DEVELOPMENT AGREEMENT BY AND BETWEEN THE TOWN OF BUCKEYE AND DMB WHITE TANK, LLC, AN ARIZONA LIMITED LIABILITY COMPANY RECORDED IN THE OFFICIAL RECORDS OF MARICOPA COUNTY AS DOCUMENT NO. 99-1071208 (THE "CMP"), INCLUDING ALL MAJOR AND MINOR AMENDMENTS THERETO.



PROJECT SITE
1" = 300'



VICINITY MAP
N.T.S.

OWNER / DEVELOPER
DMB WHITE TANK, L.L.C.
4106 N. 195TH AVENUE
BUCKEYE, AZ 85326
CONTACT: MR. ERIC ORSBORN
TEL.: (623) 388-4214
FAX: (623) 853-0960

ENGINEER
DAVID EVANS AND ASSOCIATES, INC.
2141 E. HIGHLAND AVENUE, SUITE 200
PHOENIX, ARIZONA 85016
CONTACT: MR. JOEL HORNBURG, P.E.
TEL.: (602) 678-5151
FAX (602) 678-5155

LAND PLANNER
EDAW INC.
2737 CAMPUS DRIVE
IRVINE, CA. 92612
CONTACT: HELEN CHEUNG
TEL.: (949) 660-8044
FAX: (949) 660-1046

SUBMITTAL # 2
REVIEW SET ☐
EXTRA SET ☒
RECEIVED
MAY 05 2006
W.C. SCOUTTEN, INC.

PUBLIC UTILITIES

WATER	ARIZONA-AMERICAN WATER COMPANY
SEWER	ARIZONA-AMERICAN WATER COMPANY
FIRE	TOWN OF BUCKEYE
ELECTRIC	ARIZONA PUBLIC SERVICE
TELEPHONE/FIBER	COX/QWEST COMMUNICATIONS
GAS	SOUTHWEST GAS
CABLE	COX COMMUNICATIONS
WASTE DISPOSAL	TOWN OF BUCKEYE

BENCHMARK
BRASS CAP IN HANDHOLE AT THE INTERSECTION OF JACKRABBIT TRAIL AND INDIAN SCHOOL ROAD, SOUTHEAST CORNER OF SECTION 20, TOWNSHIP 2 NORTH, RANGE 2 WEST, GILA AND SALT RIVER MERIDIAN.
ELEV.= 1160.26
DATUM = NGVD '29
SOURCE:
REFERENCE MARK 3033 AS SHOWN ON FLOOD INSURANCE RATE MAP NO. 04013C2055 F, REVISED JULY 19, 2001.

LEGEND
- PARCEL BOUNDARY
- ROADWAY CENTERLINE
- PROPOSED RIGHT-OF-WAY
- VERTICAL CURB & GUTTER
- ROLL CURB OR RIBBON CURB
- SANITARY SEWER PIPE & MANHOLE
- POTABLE WATER PIPE & VALVE
- FIRE HYDRANT
- PUBLIC UTILITY EASEMENT
- D.E. DRAINAGE EASEMENT
- 1600 EXISTING CONTOUR ELEVATION
- DRAINAGE FLOW DIRECTION
- SURVEY MARKER
- 20,000 W / 4,100 N ADDRESS GRID
- R.O.W. RIGHT OF WAY
- EXISTING STORM DRAIN PIPE WITH EXISTING STORM DRAIN ACCESS EASEMENT
- EXISTING PRESSURE REDUCING VALVE
- EXISTING SANITARY SEWER PIPE & MANHOLE
- EXISTING WATERLINE AND VALVE

FLOOD ZONE CERTIFICATION
BASED ON FLOOD INSURANCE RATE MAP NOS. 04013C2055G AND 04013C1590H, REVISED DATED SEPTEMBER 30, 2005, THE PROPERTY DESCRIBED HEREON LIES IN ZONE X EXCEPT FOR THE EASTERN BOUNDARY ALONG JACKRABBIT TRAIL WASH WHICH IS ZONE AE AND ZONE AE FLOODWAY. ZONE X (SHADED) IS DESCRIBED AS: AREAS OF 0.2% ANNUAL CHANCE FLOOD; AREAS OF 1% ANNUAL CHANCE FLOOD WITH AVERAGE DEPTHS OF LESS THAN 1 FOOT OR WITH DRAINAGE AREAS LESS THAN 1 SQUARE MILE; AND AREAS PROTECTED BY LEVEES FROM 1% ANNUAL CHANCE FLOOD. ZONE AE IS DESCRIBED AS: AREAS WITH BASE FLOOD ELEVATIONS DETERMINED. FLOODWAY AREAS IN ZONE AE ARE DESCRIBED AS: THE FLOODWAY IS THE CHANNEL OF A STREAM PLUS ANY ADJACENT FLOODPLAIN AREAS THAT MUST BE KEPT FREE OF ENCROACHMENT SO THAT THE 1% ANNUAL FLOOD CAN BE CARRIED WITHOUT SUBSTANTIAL INCREASES IN FLOOD HEIGHTS.

LIST OF DRAWINGS

1	COVER SHEET
2-4	TRACT TABLES
5, 6	STREET SECTIONS
7-11	INDEX SHEET
12-47	PRELIMINARY PLAT

NOT FOR CONSTRUCTION OR RECORDING

CALL TWO WORKING DAYS BEFORE YOU DIG
263-1100
1-800-STAKE-IT
(OUTSIDE MARICOPA COUNTY)
BLUE STAKE CENTER

DMB

BY	REVISION	DATE

DRAWN BY: DCHO LOCA JELP
CHECKED BY: ROFL
DATE: 04-29-06

DAVID EVANS AND ASSOCIATES INC.
2141 East Highland Avenue, Suite 200
Phoenix, Arizona 85016
Phone: 602.678.5151

Registered Professional Engineer (Civil) CERTIFICATE NO. 33135 JOSEPH E. CABLE Jr. ARIZONA USA

VERRADO™
BUCKEYE, AZ
PHASE 3 EAST
PRELIMINARY PLAT COVER SHEET

SCALE: AS NOTED
SECTION: 20
TWNSHP: 2N
RANGE: 2W
SHEET 1 OF 47
JOB NO.: DMB100000004

P:\D\DMB100000004\04000CAD\PL\DWG\SHEET\DMB100000004-pl000b.dwg Jvv May 01, 2006 7:49:44am

Verrado// Ph3 East Pc/ 4.401 thru 4.429// Preliminary Plat// 2nd Extra

RECEIVED MAY 5 2006

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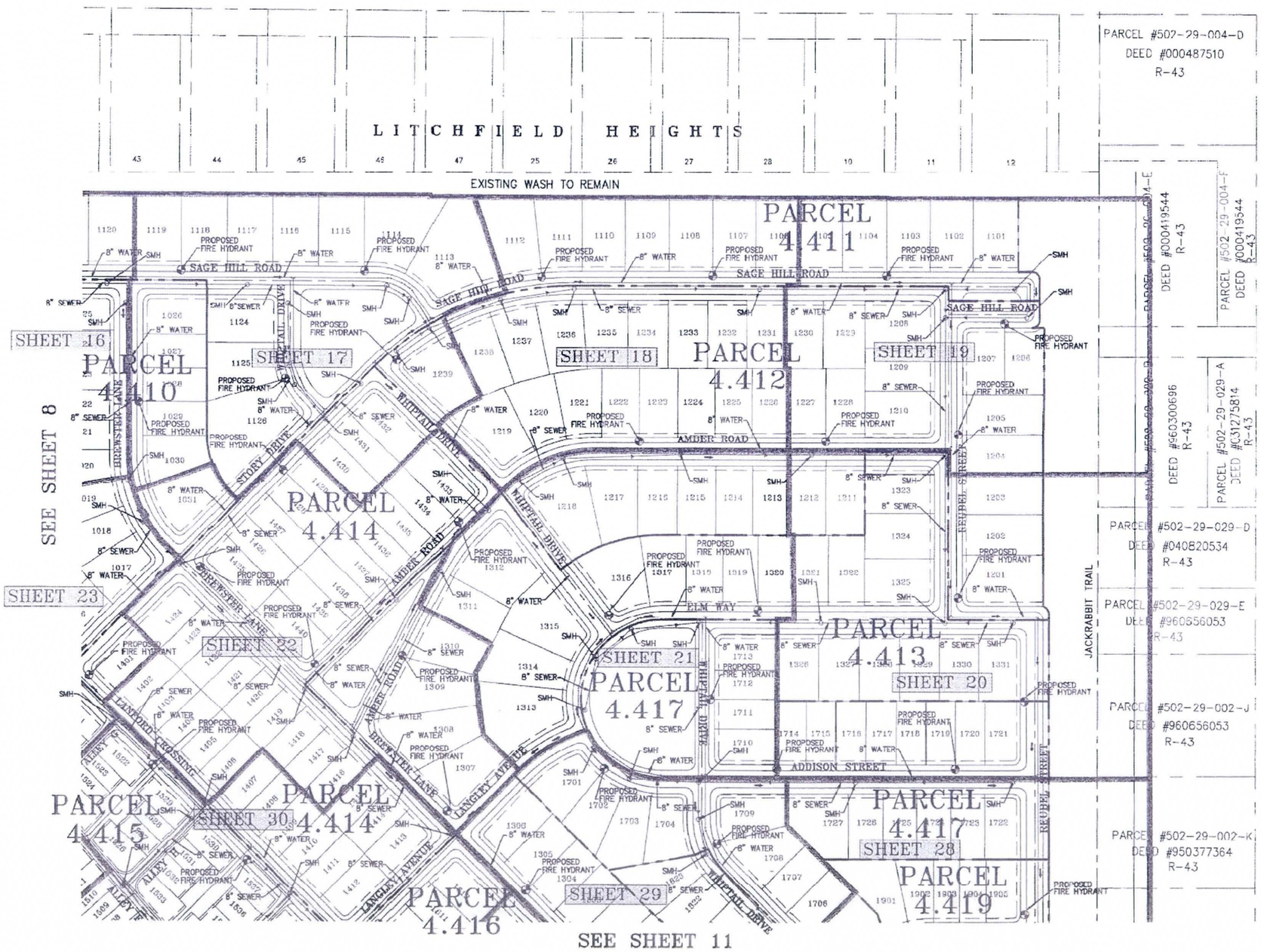

0 50' 100' 200'
SCALE: 1"=100'

LEGEND

- PARCEL BOUNDARY LINE
- SHEET MATCH LINE
- PROPOSED WATER LINE (SIZE AS INDICATED)
- PROPOSED SEWER LINE W/MANHOLE (SIZE AS INDICATED)
- PROPOSED FIRE HYDRANT
- SEWER FLOW DIRECTION
- DRAINAGE FLOW DIRECTION

ABBREVIATIONS

UBE = USE AND BENEFIT EASEMENT
PUE = PUBLIC UTILITY EASEMENT
F/L = FIRE LINE
VNAE = VEHICULAR NON-ACCESS EASEMENT

NOTE: WATER LINES ARE ZONE 2

NOT FOR CONSTRUCTION OR RECORDING

CALL TWO WORKING DAYS BEFORE YOU DIG
263-1100
1-800-STAKE-IT
(OUTSIDE MARICOPA COUNTY BLUE STAKE CENTER)

DMB

DATE	REVISION	BY

DRAWN BY: DGG LCCA JEJ
CHECKED BY: RJFL
DATE: 04-29-06

DAVID EVANS AND ASSOCIATES INC.
2141 East Highland Avenue, Suite 200
Phoenix, Arizona 85016
Phone: 602.616.5151

33135 JOSEPH E. CABLE

VERRADO™
BUCKEYE, AZ
PHASE 3 EAST
PRELIMINARY PLAT INDEX SHEET

SCALE: 1" = 100'
SECTION: 20
TWNSHP: 2N
RANGE: 2W
SHEET 9 OF 47
JOB NO.: DMB10000004

P:\D\DMB10000004\04050210\PL\DWG\SHEET\DMB10000004-PI0009.dwg Rolf Apr 29, 2006 12:29 24pm

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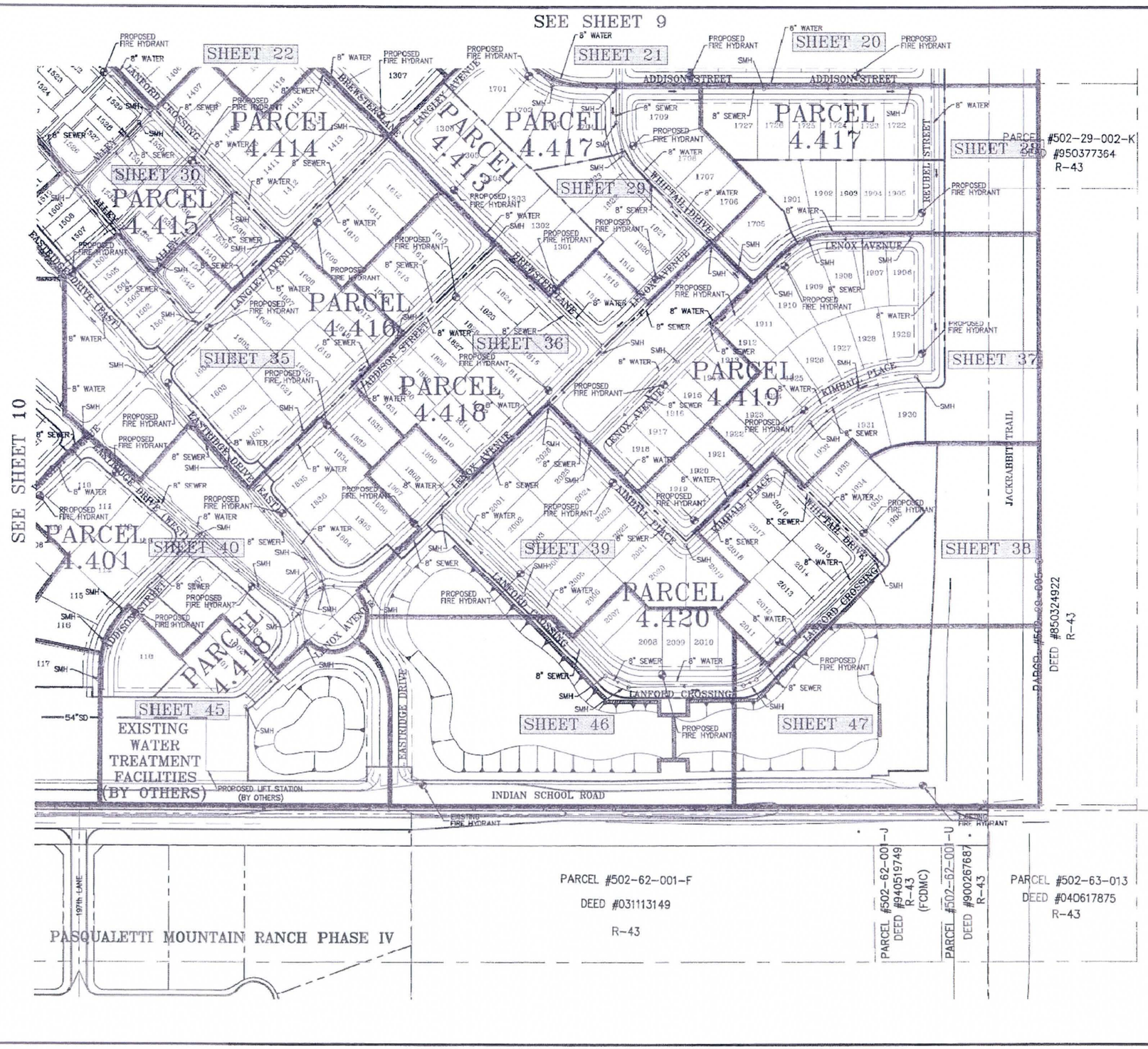

SCALE: 1" = 100'

LEGEND

- PARCEL BOUNDARY LINE
- SHEET MATCH LINE
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- PROPOSED SEWER LINE W/MANHOLE (SIZE AS INDICATED)
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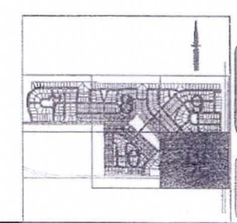

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1-800-STAKE-IT
OUTSIDE MARICOPA COUNTY BLUE STAKE CENTER

DMB

REVISION	DATE	BY

DRAWN BY: LCCA JELP
CHECKED BY: RCF.
DATE: 05-01-06

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2141 East Highland Avenue, Suite 200
Phoenix, Arizona 85016
Phone: 602.678.6151

33135 JOSEPH E. CARTER ARIZONA U.S.A.

VERRADO™
BUCKEYE, AZ
PHASE 3 EAST
PRELIMINARY PLAT INDEX SHEET

SCALE: 1" = 100'
SECTION: 20
TWNSHP: 2N
RANGE: 2W
SHEET 11 OF 47
JOB NO.: DMB10000004

P:\J:\DMB\0000004\04000A3\A1\VWC\SHEET1\DMB10000004-pl001.dwg John May 01, 2006 9:04:13am

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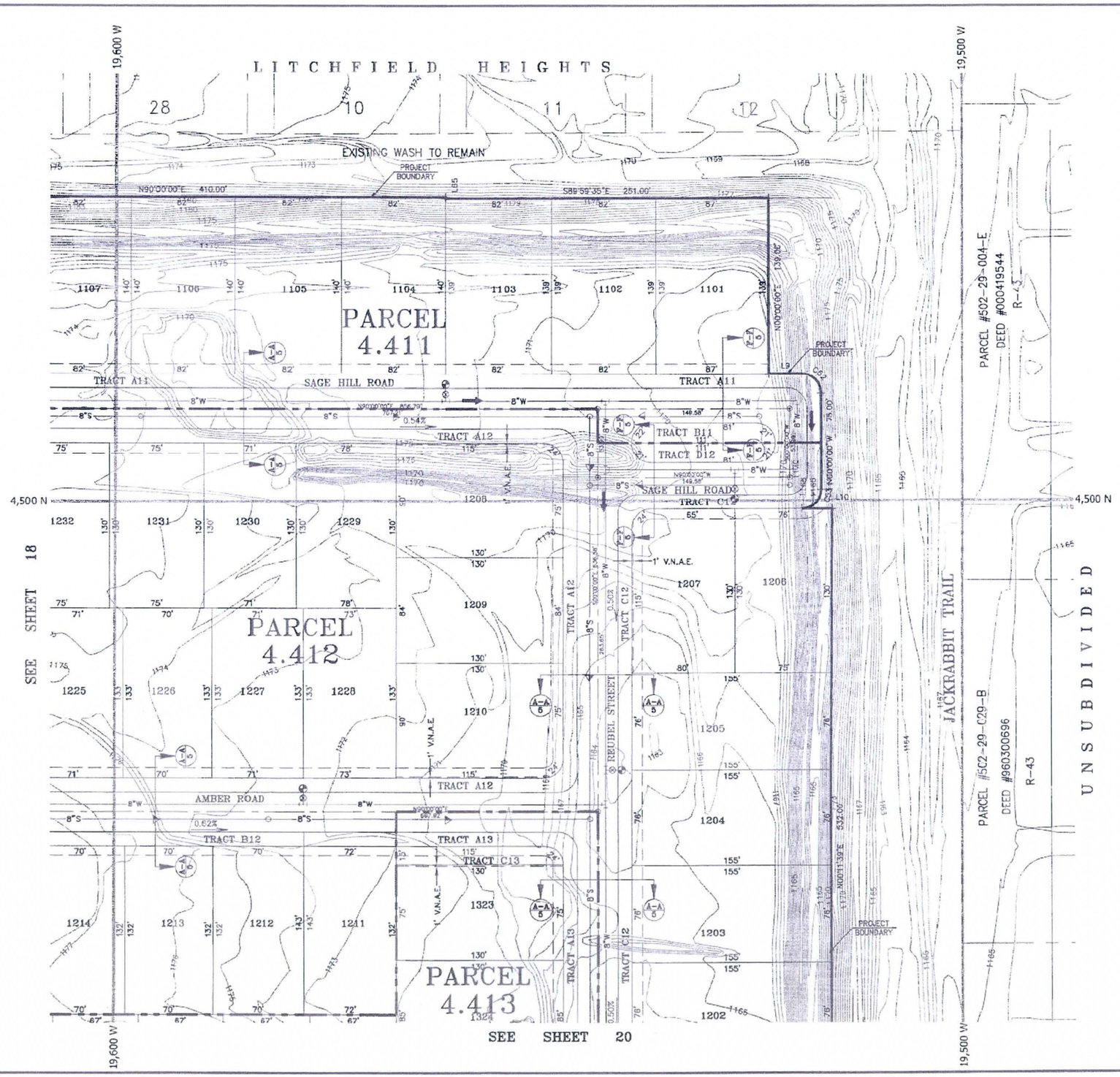

SCALE: 1"= 40'

LEGEND

- PROJECT BOUNDARY/UNIT BOUNDARY
- PARCEL BOUNDARY LINE
- ADDRESS GRID
- PROPOSED WATER LINE (SIZE AS INDICATED)
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CALL TWO WORKING DAYS BEFORE YOU DIG
263-1100
1-800-STAKE-IT
(OUTSIDE MARICOPA COUNTY IN LIF STATE STATES)

DMB

DATE	REVISION	BY

DRAWN BY: DCJ LOCA JELP
CHECKED BY: RCFL
DATE: 05-01-06

DAVID EVANS AND ASSOCIATES INC.
2141 East Highland Avenue, Suite 200
Phoenix, Arizona 85016
Phone: 602.616.5151

REGISTERED LAND SURVEYOR
33135
JOSEPH F. CABLE
ARIZONA U.S.A.

VERRADO™
BUCKEYE, AZ
PHASE 3 EAST
PRELIMINARY PLAT

SCALE: 1" = 40'
SECTION: 20
TWNSHP: 2N
RANGE: 2W
SHEET 19 OF 47
JOB NO.: DMB10000004

P:\P\DMB10000004\04000CAD\PL\DWG\SHEET\DMB10000004-pl0019.dwg jw Nov 01, 2006 11:35:14am

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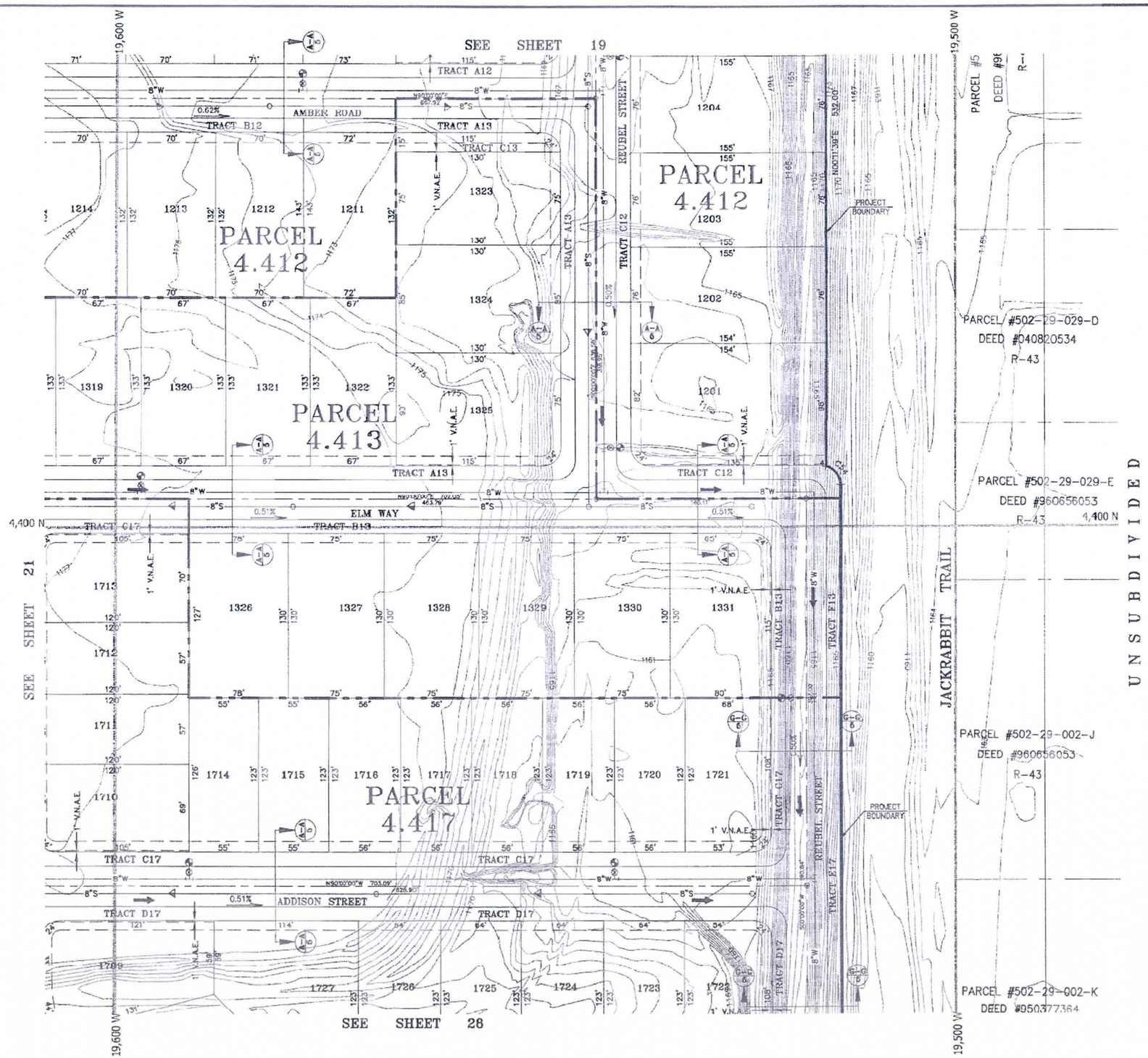

SCALE: 1" = 40'

LEGEND

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1-800-STAKE-IT
OUTSIDE MARICOPA COUNTY

DMB

REVISION	BY

DRAWN BY: DCHO LOCA JELP
CHECKED BY: ROPL
DATE: 05-01-06

DAVID EVANS AND ASSOCIATES INC.
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Phoenix, Arizona 85016
Phone: 602.678.5151

33135 JOSEPH E. CABLE

VERRADO™
BUCKEYE, AZ
PHASE 3 EAST
PRELIMINARY PLAT

SCALE: 1" = 40'
SECTION: 20
TWNSHP: 2N
RANGE: 2W
SHEET 20 OF 47
JOB NO.: DMB10000004

P:\D\DMB\10000004\D-00CAD\PL\DWG\SHEET\DMB00000004-p0020.dwg Jay May 01, 2006 11:37:49am

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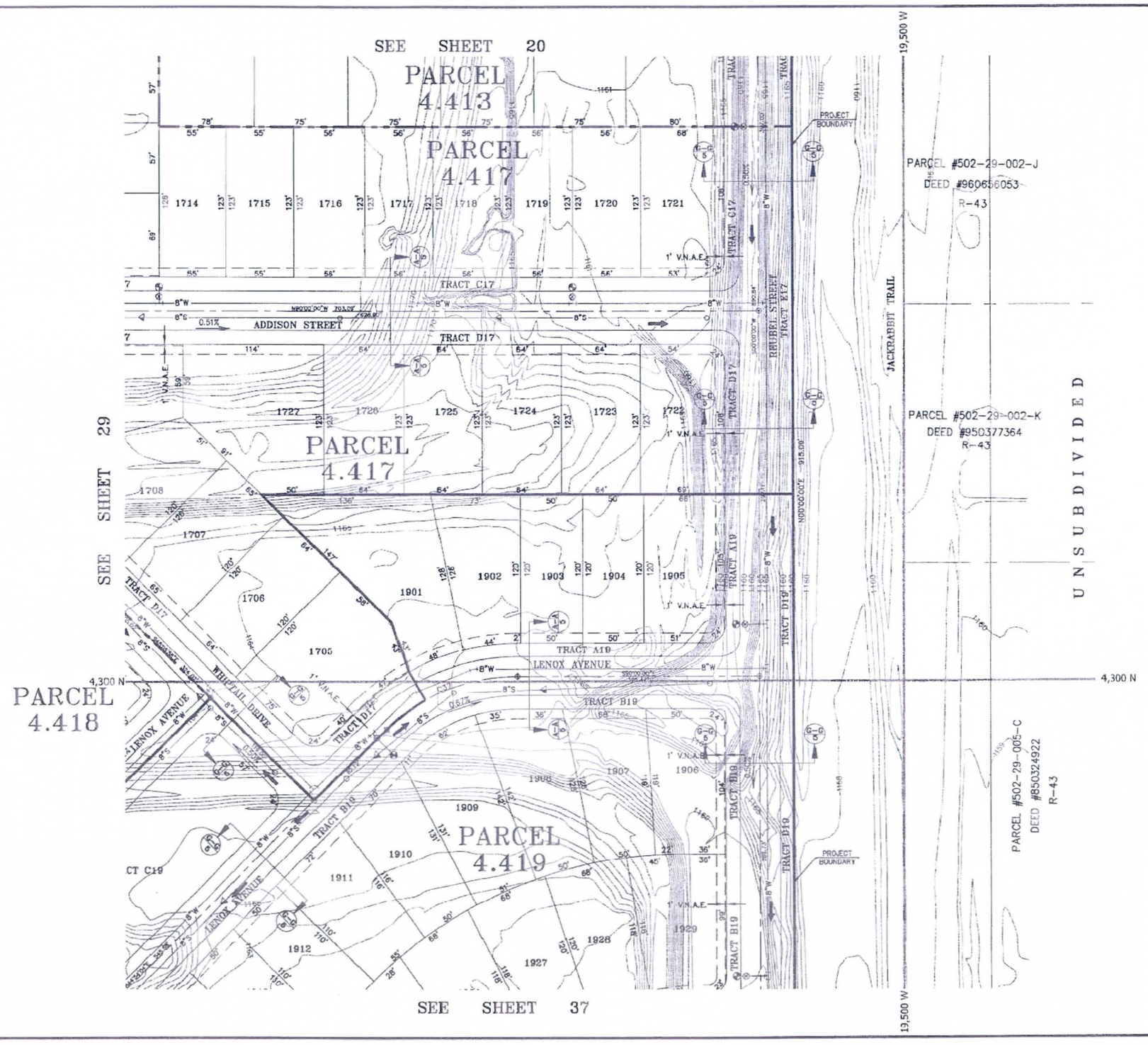

SCALE: 1"=40'

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263-1100
1-800-STAKE-IT
(OUTSIDE MARICOPA COUNTY BLUE STAKE COMMON)

DMB

DRAWN BY: DCO LCA JELP
CHECKED BY: RCPL
DATE: 05-01-06

DATE	REVISION	BY

DAVID EVANS AND ASSOCIATES INC.
2141 East Highland Avenue, Suite 250
Phoenix, Arizona 85016
Phone: 602.678.5151

3.31.35
JOSEPH E. CABLE

VERRADO™
BUCKEYE, AZ
PHASE 3 EAST
PRELIMINARY PLAT

SCALE: 1" = 40'
SECTION: 20
TWNSHP: 2N
RANGE: 2W
SHEET 28 OF 47
JOB NO.: DMB10000004

P:\0\DMB10000004\04000AD\PLY\WC\SHEET\DMB10000004-H0028.dwg Jvr May 01, 2006 12:28:00pm

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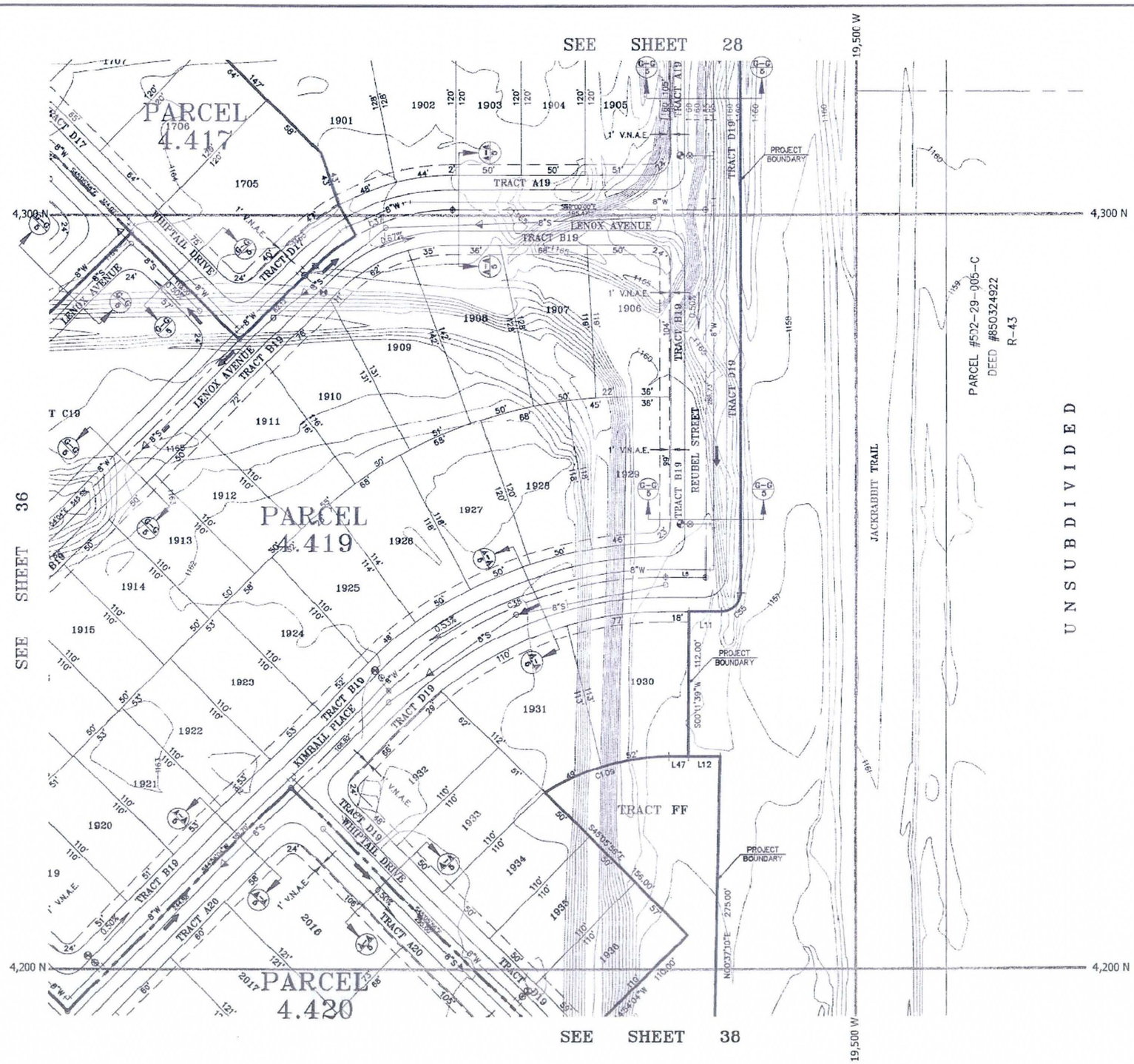

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1-800-STAKE-IT
(OUTSIDE MARICOPA COUNTY)
BLUE STAKE, INC.

DMB

REVISION	BY

DATE	
DRAWN BY:	DCHO LCCA JELP
CHECKED BY:	RCFL
DATE:	05-01-06

DAVID EVANS AND ASSOCIATES INC.
2141 East Highland Avenue, Suite 200
Phoenix, Arizona 85016
PHONE: 602.678.5151

JOSEPH E. CABLE
33135
ARIZONA U.S.A.

VERRADO™
BUCKEYE, AZ
PHASE 3 EAST
PRELIMINARY PLAT

SCALE: 1" = 40'
SECTION: 20
TWNSHP: 2N
RANGE: 2W

SHEET 37 OF 47

JOB NO.: DMB10000004

P:\D\DMB10000004\DAOCAD\PL\DWGS\SHEET\DMB00000004-pl0037.dwg jvv May 01, 2006 11:07:35pm

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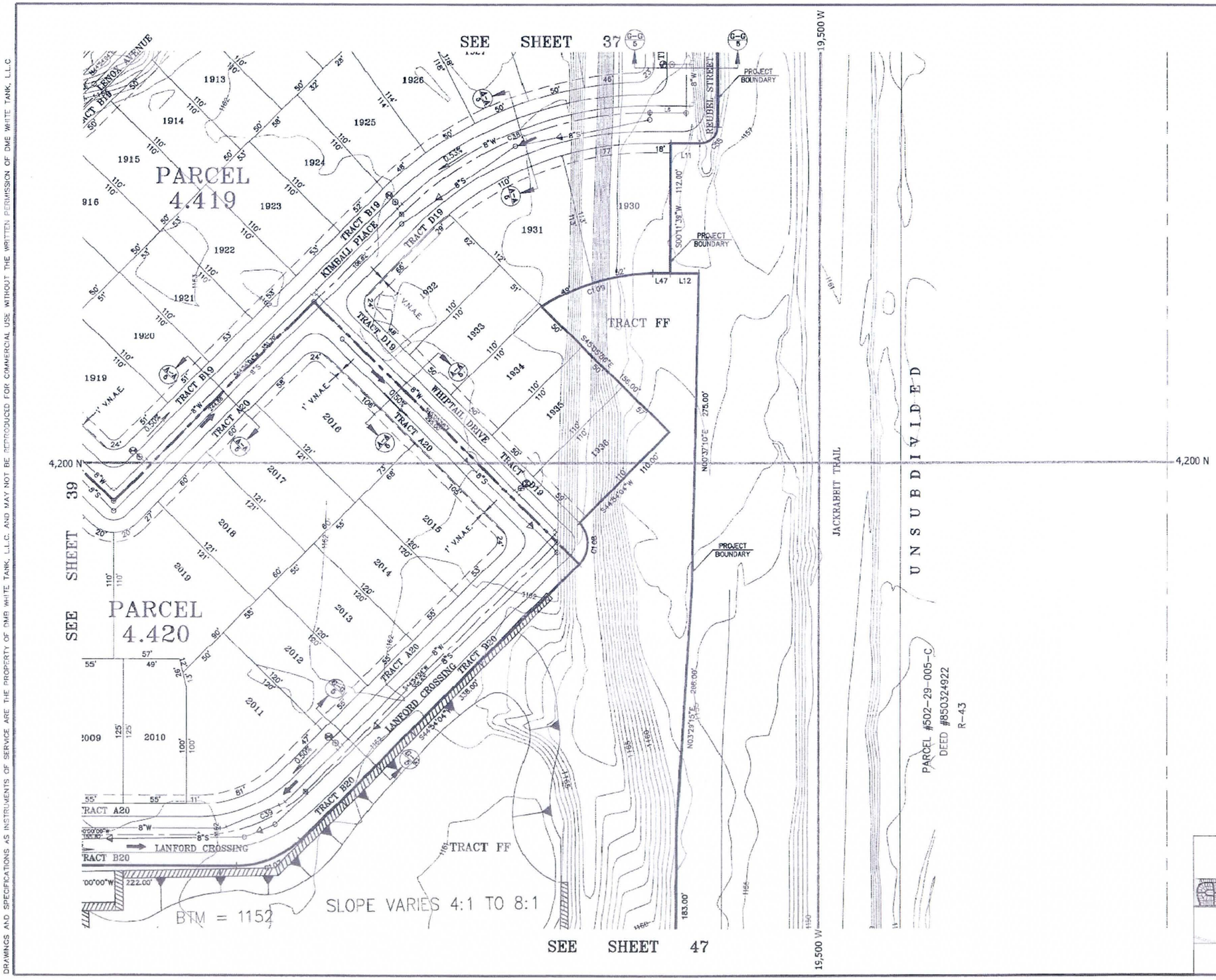

SCALE: 1" = 40'

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CALL TWO WORKING DAYS BEFORE YOU DIG
263-1100
1-800-STAKE-IT
(OUTSIDE MARICOPA COUNTY)
BLUE STAKE, INC.

DMB

REVISION	DATE	BY

DRAWN BY: DCHO, LCCL, JELP
CHECKED BY: RCFL
DATE: 05-01-06

DAVID EVANS AND ASSOCIATES INC.
2141 East Highland Avenue, Suite 200
Phoenix, Arizona 85016
Phone: 602.679.5151

JOSEPH E. CARLE
33135
ARIZONA, U.S.A.

VERRADO™
BUCKEYE, AZ
PHASE 3 EAST
PRELIMINARY PLAT

SCALE: 1" = 40'
SECTION: 20
TWNSHP: 2N
RANGE: 2W
SHEET 38 OF 47
JOB NO.: DMB10000004

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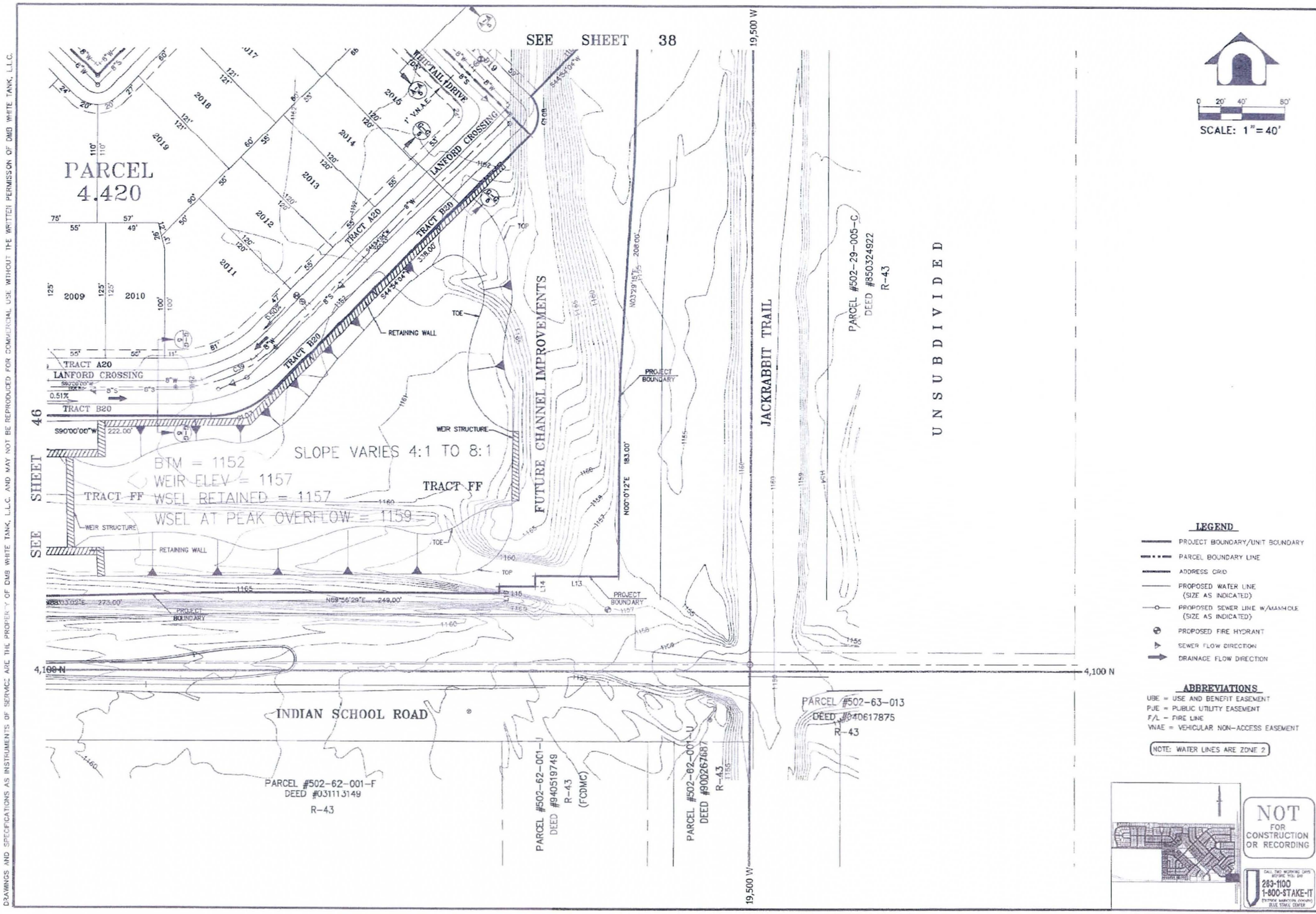

SCALE: 1" = 40'

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CALL TWO WORKING DAYS BEFORE YOU DIG
263-1100
1-800-STAKE-IT
(Arizona Blue Stake, Inc.)
BLUE STAKE, INC.

DMB

DATE	REVISION	BY

DRAWN BY: RCHD LOCA JELF
CHECKED BY: RCFL
DATE: 05-01-06

DAVID EVANS AND ASSOCIATES INC.
2141 East Highland Avenue, Suite 200
Phoenix, Arizona 85016
Phone: 602.678.6151

JOSEPH E. CABLE
33135
5/1/06
REGISTERED PROFESSIONAL ENGINEER (CIVIL)
ARIZONA U.S.A.

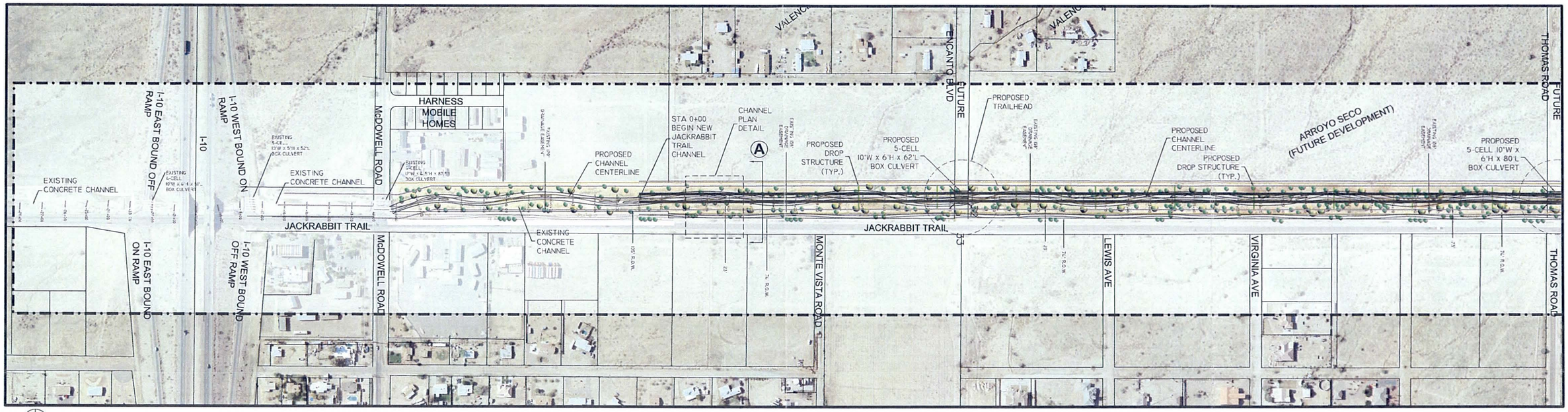
VERRADO™
BUCKEYE, AZ
PHASE 3 EAST
PRELIMINARY PLAT

SCALE: 1" = 40'
SECTION: 20
TWNSHIP: 2N
RANGE: 2W
SHEET 47 OF 47
JOB NO.: DMB00000004

P:\D\DMB00000004\04GCAD\PL\DMC\SHEET\DMB00000004-pl0047.dwg Last May 01, 2006 12:30 5:3pm

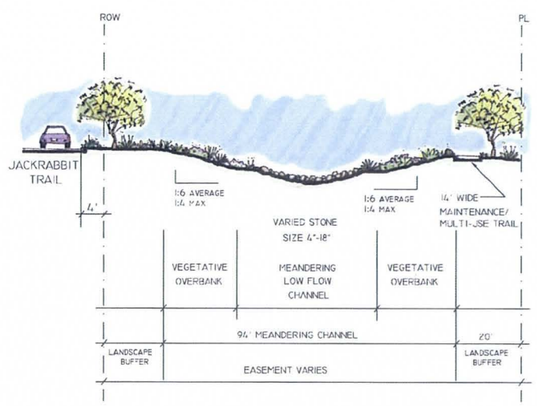
APPENDIX G LANDSCAPE PLANS

White Tanks No. 3 Outfall Channel

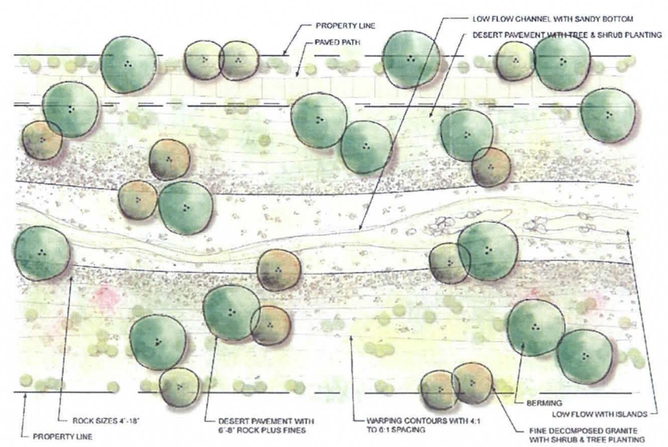


NORTH

Plan
SCALE: 1"=200'



Section A SCALE: 1"=20'
Existing Concrete Channel to the Existing Pasqualetti Ranch Channel McDowel Road to Osborn Road/

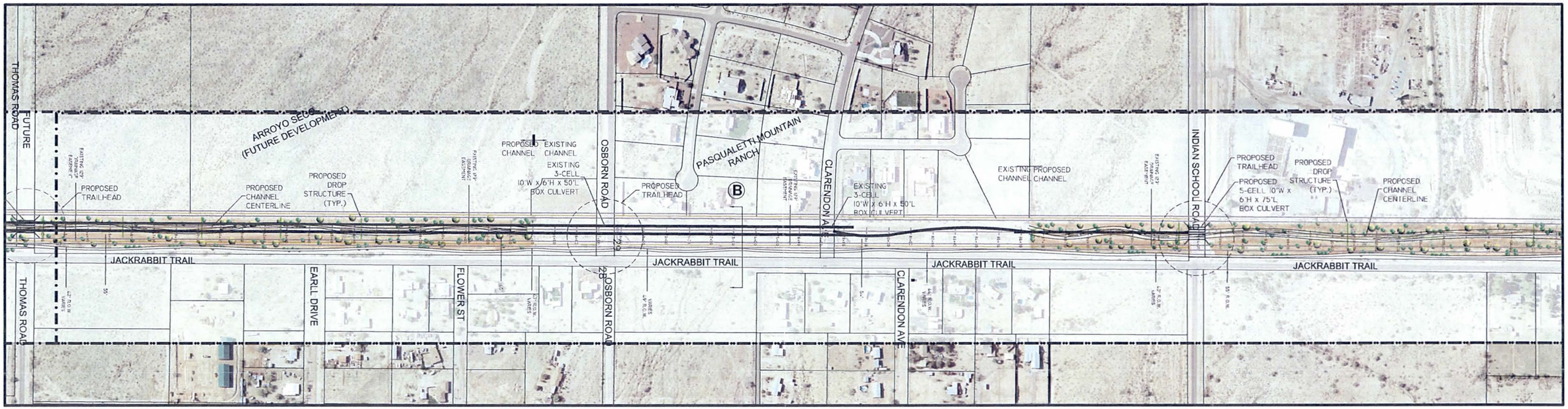


Channel Plan Detail SCALE: NTS

Low Flow Channel Images

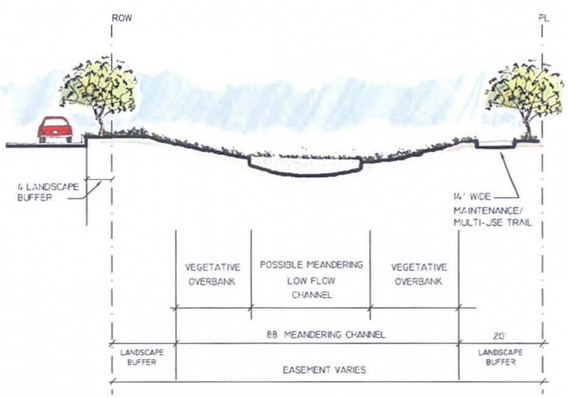
SHEET 1

White Tanks No. 3 Outfall Channel



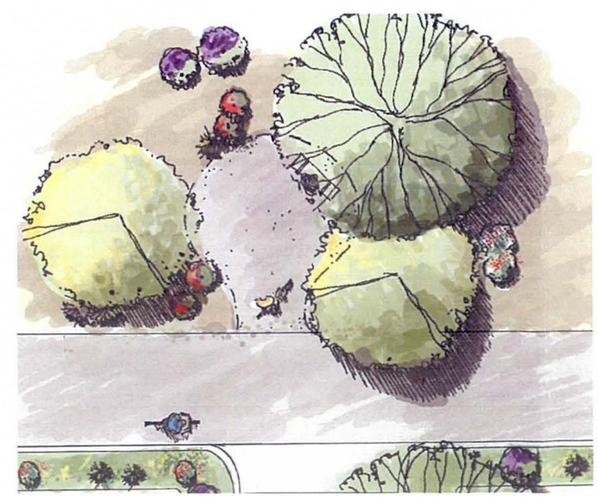
NORTH

Plan
SCALE: 1"=200'



Section (B) SCALE: 1"=20'
Existing Pasqualetti Ranch Channel
Osborn Road to Indian School Road

Trail Head

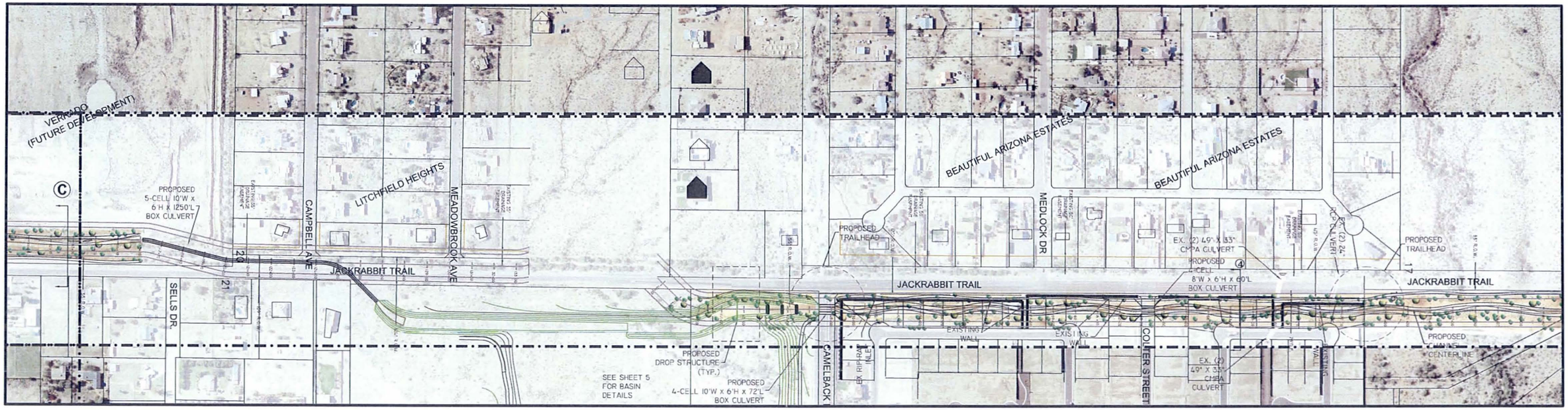


Trail Head Plan Detail N.T.S.

Trails

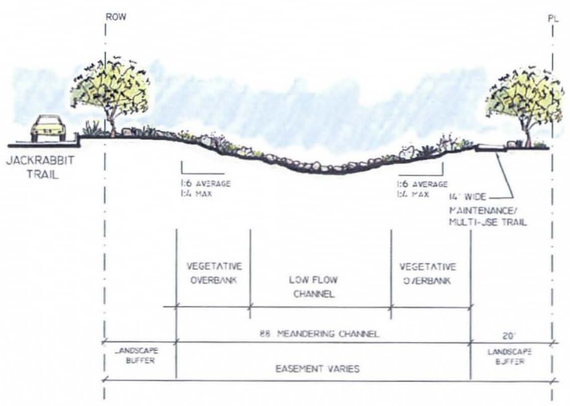
SHEET 2

White Tanks No. 3 Outfall Channel

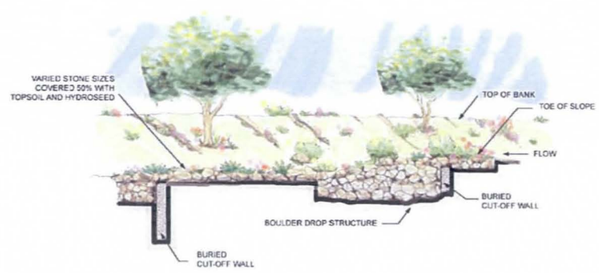


NORTH

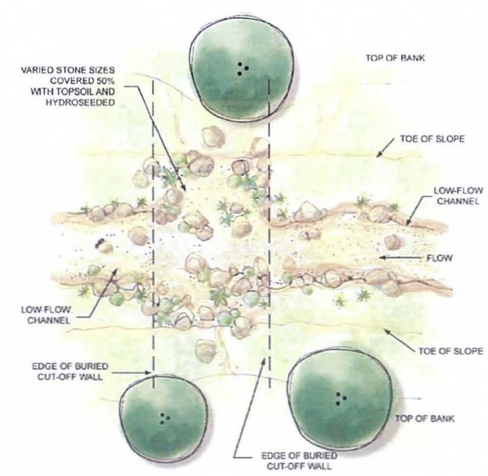
Plan
SCALE: 1"=200'



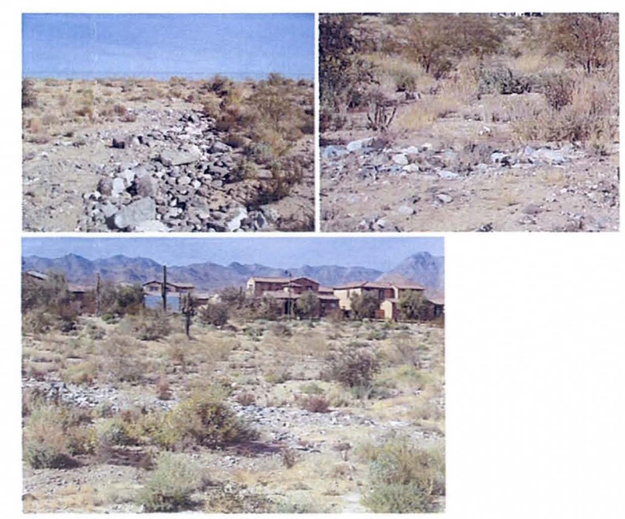
Section Ⓒ
SCALE: 1"=20'
Indian School Road to Sells Dr.



Typ. Drop Structure Section
SCALE: NTS



Drop Structure Plan
SCALE: NTS



Drop Structures

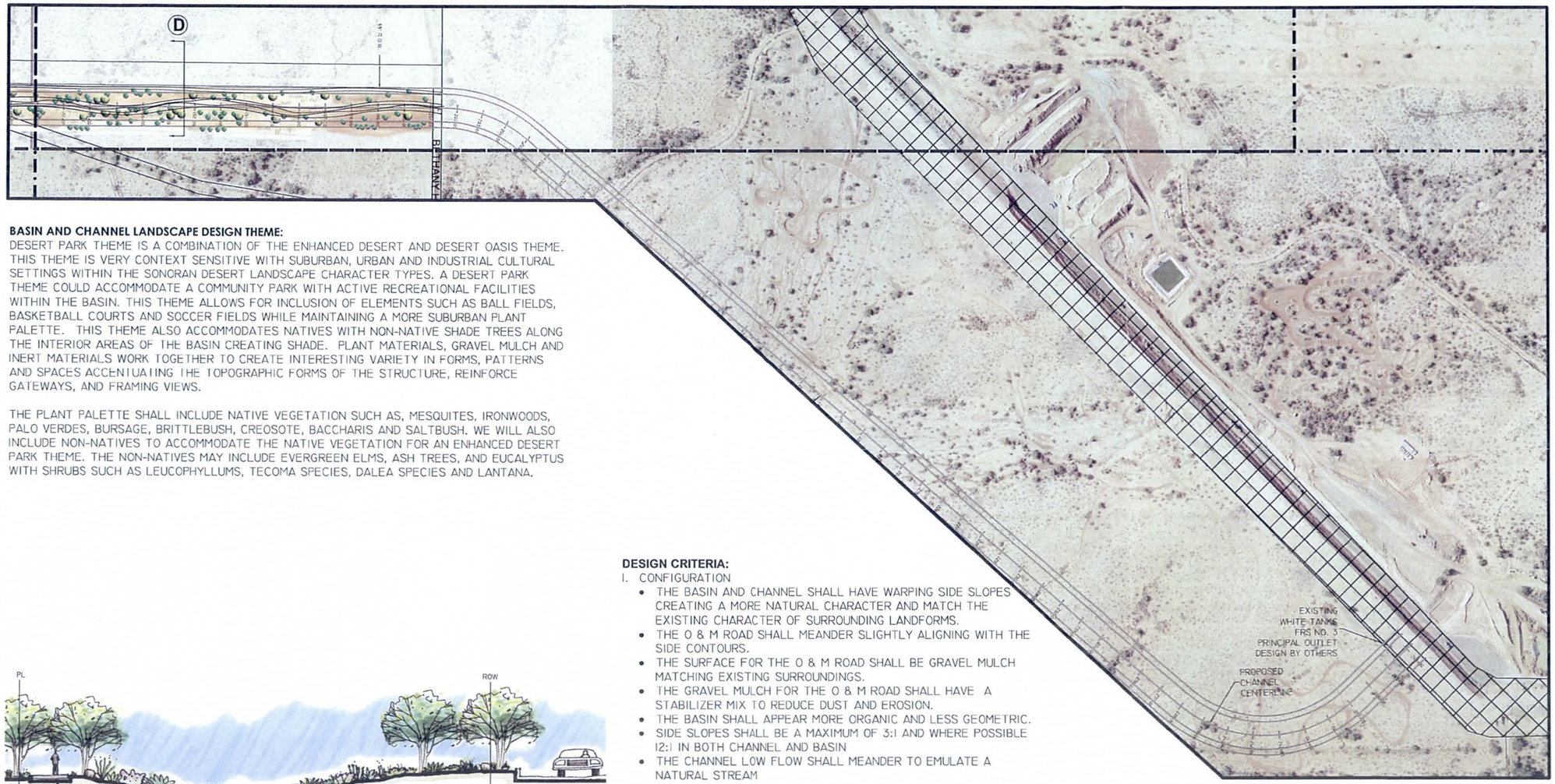
SHEET 3

2801 West Durango Street, Phoenix, Arizona 85009 (602)506-1501

White Tanks No. 3 Outfall Channel

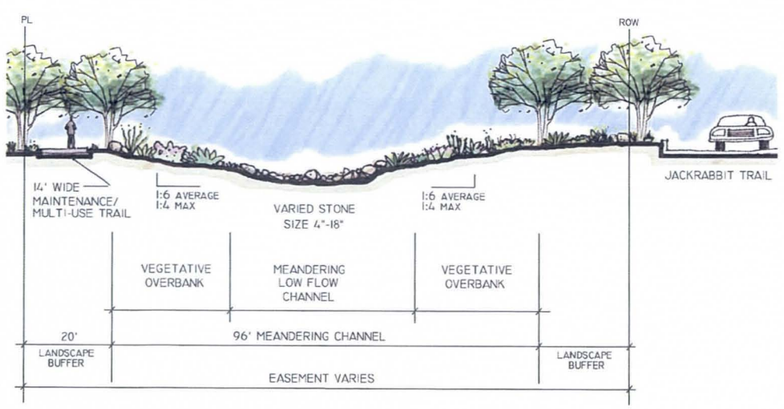
SCENERY RESOURCE ASSESSMENT (SRA)
THE SRA FINDINGS WITHIN THE WHITE TANKS FRS NO.4 AREA DRAINAGE MASTER PLAN REPORT IDENTIFIED THE SURROUNDING NATURAL AND LOCAL COMMUNITY CHARACTERISTICS, PREDOMINANTLY ANALYZING THE VISUAL IMPACT OF FLOOD CONTROL STRUCTURES. THIS ANALYSIS WAS THEN UTILIZED TO BETTER COMPLEMENT THE EXISTING LANDSCAPE SETTINGS. THE JACKRABBIT ROAD CHANNEL ALTERNATIVE WAS DEVELOPED TO ADDRESS THE INTERNAL EROSION AND STRUCTURAL INTEGRITY OF THE CHANNEL. THIS ALTERNATIVE SHALL BE COMPATIBLE WITH THE COMPATIBILITY CLASS 3 (NON-STRUCTURAL TO SEMI-SOFT STRUCTURAL). TO ACHIEVE A COMPATIBILITY CLASS 3 THE CHANNEL SHOULD APPEAR AS A NATURAL FEATURE WHERE POSSIBLE. MANIPULATION OF THE SLOPE OF THE BANKS AND CHANNEL THROUGH GRADING AND SURFACE LANDSCAPE TREATMENTS WILL SOFTEN THE OVERALL GEOMETRIC AND UNIFORM NATURE OF THE CHANNEL AND CREATE A VISUAL TRANSITION THAT BLENDS WITH THE SURROUNDING TERRAIN.

RECREATION AND MULTI-USE ASSESSMENT (RRA)
THE RECOMMENDED ALTERNATIVE HAS THE POTENTIAL TO INCORPORATE MULTI-USE OPPORTUNITIES, PLANNED ACTIVE OR PASSIVE RECREATION FACILITIES AND TO PROVIDE FOR THE MARICOPA COUNTY REGIONAL TRAIL CONNECTIONS. THE CONCEPT SHOULD INCLUDE A REGIONAL/MULTI-USE TRAIL ALONG THE O & M ALONG THE CHANNEL. THIS TRAIL WILL PROVIDE CONNECTIONS TO OTHER TRAILS THAT ARE PLANNED ALONG JACKRABBIT ROAD POTENTIALLY TO THE GILA RIVER, SOUTH OF WHITE TANKS FRS NO.4 . THIS CONCEPT CAN ALSO ACCOMMODATE A PARK WITHIN THE BASIN THAT WOULD BE DEVELOPED BY THE TOWN OF BUCKEYE. THE PARK COULD INCLUDE FACILITIES TO HELP MEET THE DEMAND FOR PASSIVE AND/OR ACTIVE USES THAT WILL BE GENERATED BY POPULATION GROWTH IN THE TOWN OF BUCKEYE.



BASIN AND CHANNEL LANDSCAPE DESIGN THEME:
DESERT PARK THEME IS A COMBINATION OF THE ENHANCED DESERT AND DESERT OASIS THEME. THIS THEME IS VERY CONTEXT SENSITIVE WITH SUBURBAN, URBAN AND INDUSTRIAL CULTURAL SETTINGS WITHIN THE SONORAN DESERT LANDSCAPE CHARACTER TYPES. A DESERT PARK THEME COULD ACCOMMODATE A COMMUNITY PARK WITH ACTIVE RECREATIONAL FACILITIES WITHIN THE BASIN. THIS THEME ALLOWS FOR INCLUSION OF ELEMENTS SUCH AS BALL FIELDS, BASKETBALL COURTS AND SOCCER FIELDS WHILE MAINTAINING A MORE SUBURBAN PLANT PALETTE. THIS THEME ALSO ACCOMMODATES NATIVES WITH NON-NATIVE SHADE TREES ALONG THE INTERIOR AREAS OF THE BASIN CREATING SHADE. PLANT MATERIALS, GRAVEL MULCH AND INERT MATERIALS WORK TOGETHER TO CREATE INTERESTING VARIETY IN FORMS, PATTERNS AND SPACES ACCENTUATING THE TOPOGRAPHIC FORMS OF THE STRUCTURE, REINFORCE GATEWAYS, AND FRAMING VIEWS.

THE PLANT PALETTE SHALL INCLUDE NATIVE VEGETATION SUCH AS, MESQUITES, IRONWOODS, PALO VERDES, BURSAGE, BRITTLEBUSH, CREOSOTE, BACCHARIS AND SALTBUSH. WE WILL ALSO INCLUDE NON-NATIVES TO ACCOMMODATE THE NATIVE VEGETATION FOR AN ENHANCED DESERT PARK THEME. THE NON-NATIVES MAY INCLUDE EVERGREEN ELMS, ASH TREES, AND EUCALYPTUS WITH SHRUBS SUCH AS LEUCOPHYLLUMS, TECOMA SPECIES, DALEA SPECIES AND LANTANA.



Section (D) SCALE: 1"=20'
Colter St. to White Tanks No.3

DESIGN CRITERIA:

1. CONFIGURATION
   - THE BASIN AND CHANNEL SHALL HAVE WARPING SIDE SLOPES CREATING A MORE NATURAL CHARACTER AND MATCH THE EXISTING CHARACTER OF SURROUNDING LANDFORMS.
   - THE O & M ROAD SHALL MEANDER SLIGHTLY ALIGNING WITH THE SIDE CONTOURS.
   - THE SURFACE FOR THE O & M ROAD SHALL BE GRAVEL MULCH MATCHING EXISTING SURROUNDINGS.
   - THE GRAVEL MULCH FOR THE O & M ROAD SHALL HAVE A STABILIZER MIX TO REDUCE DUST AND EROSION.
   - THE BASIN SHALL APPEAR MORE ORGANIC AND LESS GEOMETRIC.
   - SIDE SLOPES SHALL BE A MAXIMUM OF 3:1 AND WHERE POSSIBLE 12:1 IN BOTH CHANNEL AND BASIN
   - THE CHANNEL LOW FLOW SHALL MEANDER TO EMULATE A NATURAL STREAM
2. VEGETATION
   - PLANT MATERIAL SHALL MATCH EXISTING SPECIES AND SHALL RESPOND TO THE CONTEXT OF THE DAM.
   - HYDROSEED SHRUBS AND GROUNDCOVER WITH STAIN OVER DESERT PAVEMENT.
   - SALVAGE AND RE-ESTABLISH INDIGENOUS VEGETATION WHERE POSSIBLE.
   - PLACE ROCKS AND BOULDERS IN AN IRREGULAR PATTERN ALONG THE SIDE SLOPES OF THE CHANNEL
   - SALVAGE SURFACE SOIL (6"-8") FROM THE BASIN AREA AND REPLACE IN THE LANDSCAPE. MAXIMUM STOCKPILE HEIGHT FOR SURFACE SOIL SHOULD BE TO 8 FEET.
   - TREES SHALL BE LOCATED ALONG THE SIDE SLOPES IN AN IRREGULAR PATTERN.
   - AVOID DISTURBANCE TO SAGUAROS, IRONWOODS AND TO THE EXISTING XERORIPARIAN VEGETATION AS MUCH AS POSSIBLE.
3. STRUCTURAL COMPONENT
   - USE MATERIALS, SHAPES, AND COLORS THAT BLEND IN WITH THE SURROUNDINGS FOR THE CHANNEL, DROP STRUCTURES AND BASIN AS REQUIRED DURING FINAL DESIGN. USE OF BOULDERS NATIVE TO THE VICINITY IS PREFERRED AS A STRUCTURAL COMPONENT.

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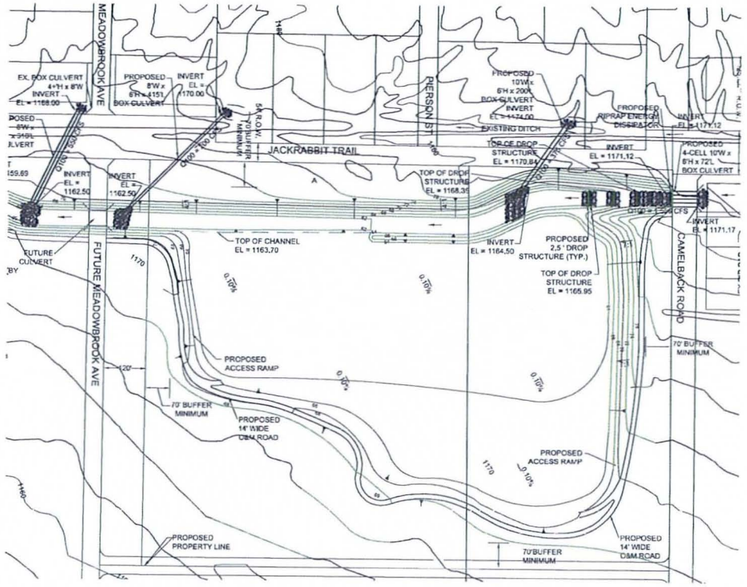
White Tanks No. 3 Outfall Channel



Holding Basin Plan

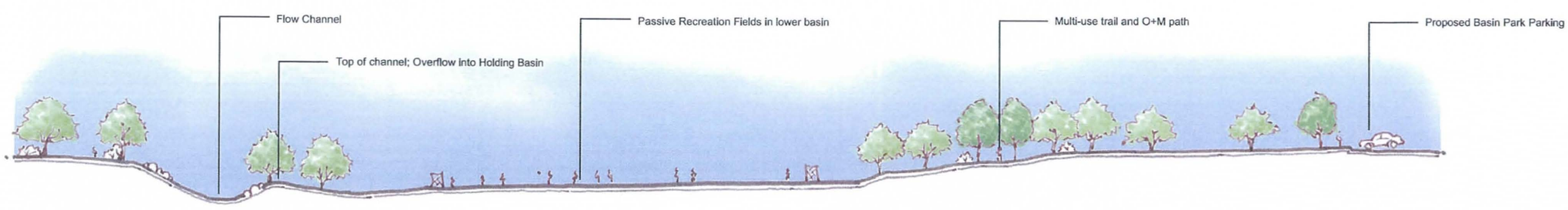
NORTH

Holding Basin Illustrative Plan

NORTH

Proposed Basin Park Illustrative Plan

NORTH



Holding Basin Section AA

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HYDROSEED / DESERT PAVEMENT

White Tanks No. 3 Outfall Channel

HYDROSEED METHOD:

THE WORK UNDER THIS SECTION SHALL CONSIST OF FURNISHING ALL MATERIAL, PREPARING THE SOIL AND APPLYING THE HYDROSEED MIXTURE TO ALL GRADED AND DISTURBED AREAS WITHIN THE DISTRICT'S BOUNDARY.

REQUIREMENTS:

- LIMIT OF WORK: THE CONTRACTOR SHALL STAY WITHIN ALL DEFINED LIMITS OF GRADING/DISTURBANCE.

SEEDMIX

- THE SEED SOURCE SHALL BE COMPATIBLE WITH THE DISTRICT'S STANDARDS AND MATCH EXISTING VEGETATION ALONG THE WASH. THE SEED SHALL BE DELIVERED TO THE PROJECT SITE IN STANDARD, SEALED UNDAMAGED CONTAINERS.
- ALL SEED SHALL BE CLEARLY TAGGED OR LABELED SHOWING THE TYPE OF SEED, PURITY, GERMINATION, TEST DATE AND WEED CONTENT. TETRAZOLIUM STAINING SHALL BE ACCEPTABLE TO TEST FOR GERMINATION AND HARD SEED.
- A CERTIFICATE OF ANALYSIS FROM AN ACCREDITED SEED TESTING LAB SHALL ACCOMPANY EACH CONTAINER OF SEED. SEED SHALL BE DELIVERED TO THE SITE IN INDIVIDUAL SEED CONTAINERS BY SPECIES.

IRRIGATION

- NO IRRIGATION REQUIRED.

TREES

- TREE QUANTITY AND SPACING SHALL MATCH THE NATURAL DESERT ADJACENT TO THE SITE.

REVEGETATION SEED MIX

- REFERENCE THE FPAP SHEET FOR SEEDMIX TYPE.

RECOMMENDED APPLICATION METHODS:

- RE-GRADE THE SITE TO MATCH THE NATURAL LANDSCAPE.
- TACKIFIER SHALL BE APPLIED AT THE RATE SHOWN IN THE FOLLOWING CHART WITH 200 POUNDS PER ACRE OF WOOD FIBER MULCH FOR SLOPES UP TO 3:1, 600 POUNDS PER ACRE FOR SLOPES EXCEEDING 3:1 AND 1000 POUNDS PER ACRE FOR EXTREMELY EROSIVE SLOPES ALONG WITH FERTILIZER AT 150 POUNDS PER ACRE IN THE SLURRY WITH THE SEED.
- SEED SHALL NOT BE IN THE SLURRY MORE THAN 30 MINUTES. SEED PLANTED BY THIS METHOD WILL NOT REQUIRE COVERING WITH SOIL.
- THE CONTRACTOR SHALL SUBMIT A BATCH (TANK) MIX OF THE ENGINEERS' APPROVAL PRIOR TO MIXING ANY SEED/MULCH SLURRY. BATCH MIXING AND COVERAGE WILL BE MONITORED THROUGHOUT THE SEEDING OPERATIONS. THE CONTRACTOR SHALL COORDINATE THE MIXING OPERATIONS WITH THE DISTRICT IN ADVANCE OF ALL MIXING.
- PLACE TACKIFIER IN HYDROMULCH SLURRY WITH SEED, FERTILIZER, WOOD FIBER MULCH AND WATER AT THE FOLLOWING RATES:

SLOPE	TACKIFIER AMOUNT OF PURE MUCILAGE PER ACRE
FLAT TO 4:1	40 POUNDS
4:1 TO 3:1	60 POUNDS
3:1 TO 2:1	80 POUNDS
2:1 +	100 POUNDS

TILLAGE:

- ALL SLOPES FLATTER THAN 3:1 SHALL BE TILLED A MINIMUM OF 6 INCHES IN DEPTH. TILLAGE SHALL BE ACCOMPLISHED WITH A RIPPER BAR, CHISEL PLOW OR HARROW TOOL OR WITH OTHER EQUIPMENT WHICH WILL PROVIDE THOROUGH SOIL CULTIVATION. SLOPES TO STEEP FOR EQUIPMENT TO OPERATE SHALL BE TILLED BY HAND RAKING.
- TILLAGE SHALL BE PERFORMED ALONG THE CONTOUR. NO WORK SHALL BE DONE WHEN THE MOISTURE CONTENT OF THE SOIL IS UNFAVORABLE OR THE GROUND IS OTHERWISE IN A CONDITION INIMICAL TO TILLAGE.
- ALL COMPETITIVE VEGETATION SHALL BE UPROOTED DURING THE TILLAGE OPERATION AND THE SOIL SHALL BE LEFT IN A ROUGHENED CONDITION FREE OF CLODS OR LARGE STONES OVER 6 INCHES IN ANY DIMENSION AND OTHER FOREIGN MATERIAL THAT WOULD INTERFERE WITH THE SEEDING OPERATION. EXISTING NATIVE TREES, SHRUBS, AND CACTI SHALL BE WORKED AROUND AND NOT DAMAGED. DO NOT TILL CLOSER TO THE CENTER OF EXISTING VEGETATION THAN THE DRIP LINE OF THE PLANT.

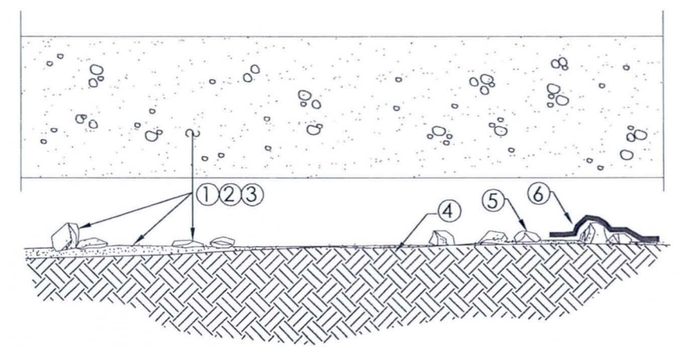
SEEDING:

- HYDROSEEDING SHALL BE THE PREFERRED METHOD FOR SEED DISTRIBUTION. SEEDMIX SHALL BE DISTRUBUTATED OVER THE DESERT PAVEMENT AND THEN THE INTEGRAL COLOR HARDENING POWDER (SHALL MATCH EXISTING DESERT SOIL)SHALL BE PLACED ON TOP OF THE DESERT PAVEMENT.
- TEST PANELS OF 20'x50' ARE REQUIRED PRIOR TO INSTALLATION FOR APPROVAL BY THE DISTRICT.

DESERT PAVEMENT SURFACE METHOD:

GENERAL NOTES:

1. All materials for desert paving shall be obtained from on-site stockpile areas as directed by owner's representative
2. Desert paving aggregates shall be scattered over all disturbed soil surfaces in an uneven layer no greater than 1/2" depth. Approximately 80 % of the disturbed area shall receive desert pavement stone.
3. Size of desert pavement stone material shall include a mix of soil and aggregate granular stones, up to 6" diameter.
4. Subgrade
5. Cobbles 4" and greater shall be half buried. Aggregate to be blended by means of a straw broom, and then water settle to create a naturalistic desert floor.
6. Hydroseed to be placed on top of desert pavement with color hardening powder matching the existing natural desert soil /pavement adjacent to site.



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APPENDIX H PRELIMINARY ALTERNATIVES

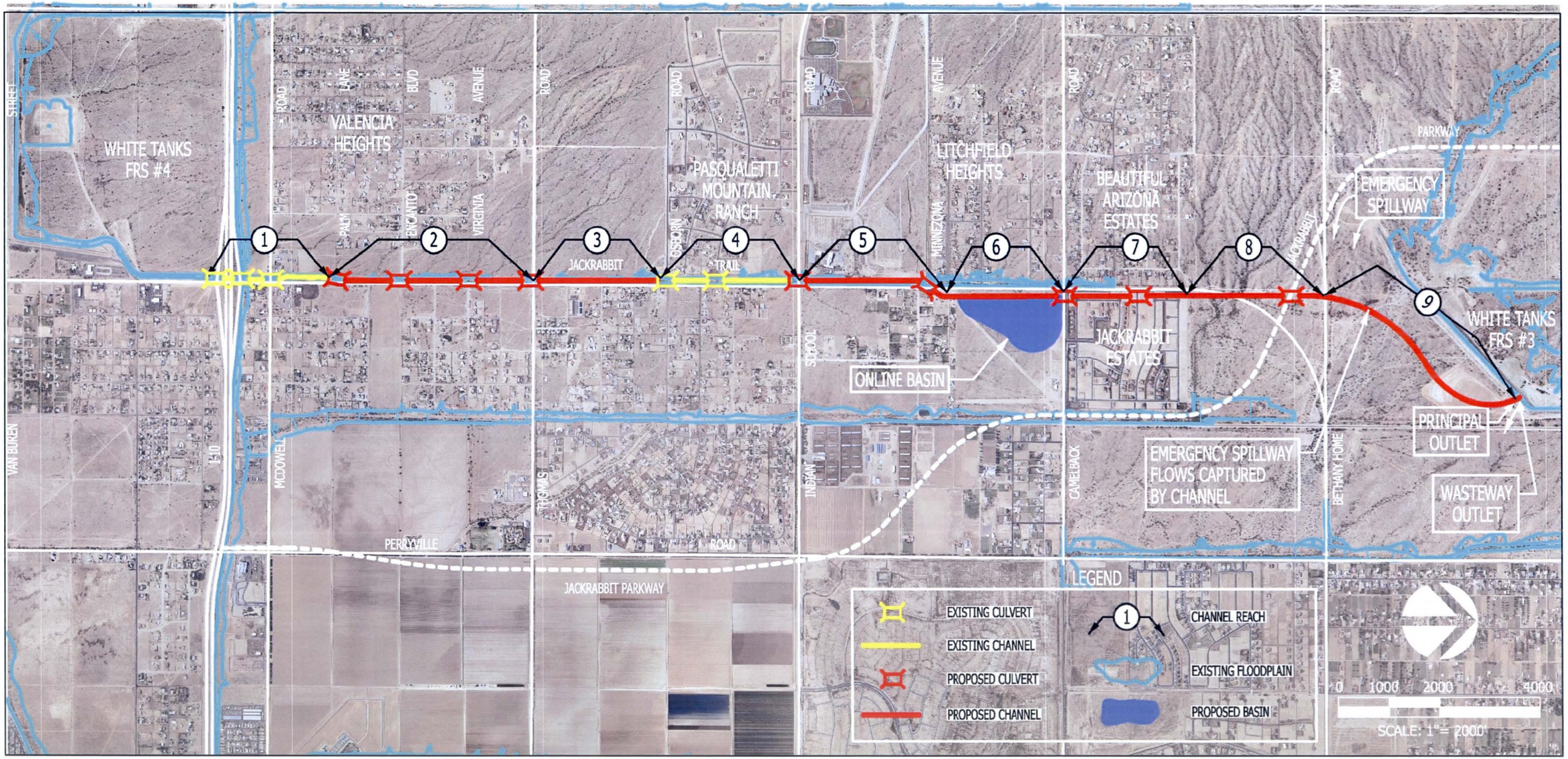

FIGURE 8A – PRELIMINARY ALTERNATIVE 1

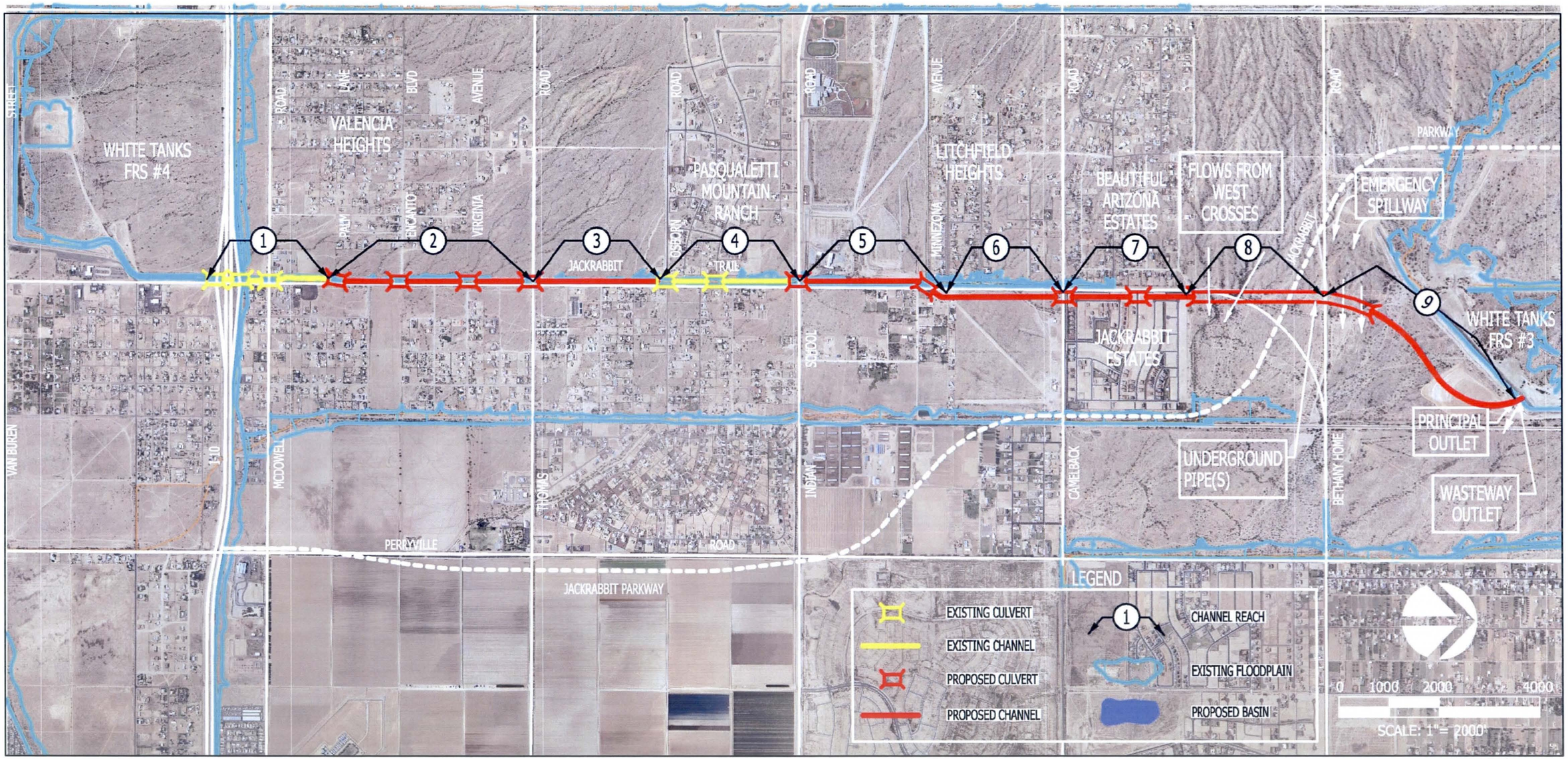

FIGURE 8B – PRELIMINARY ALTERNATIVE 2

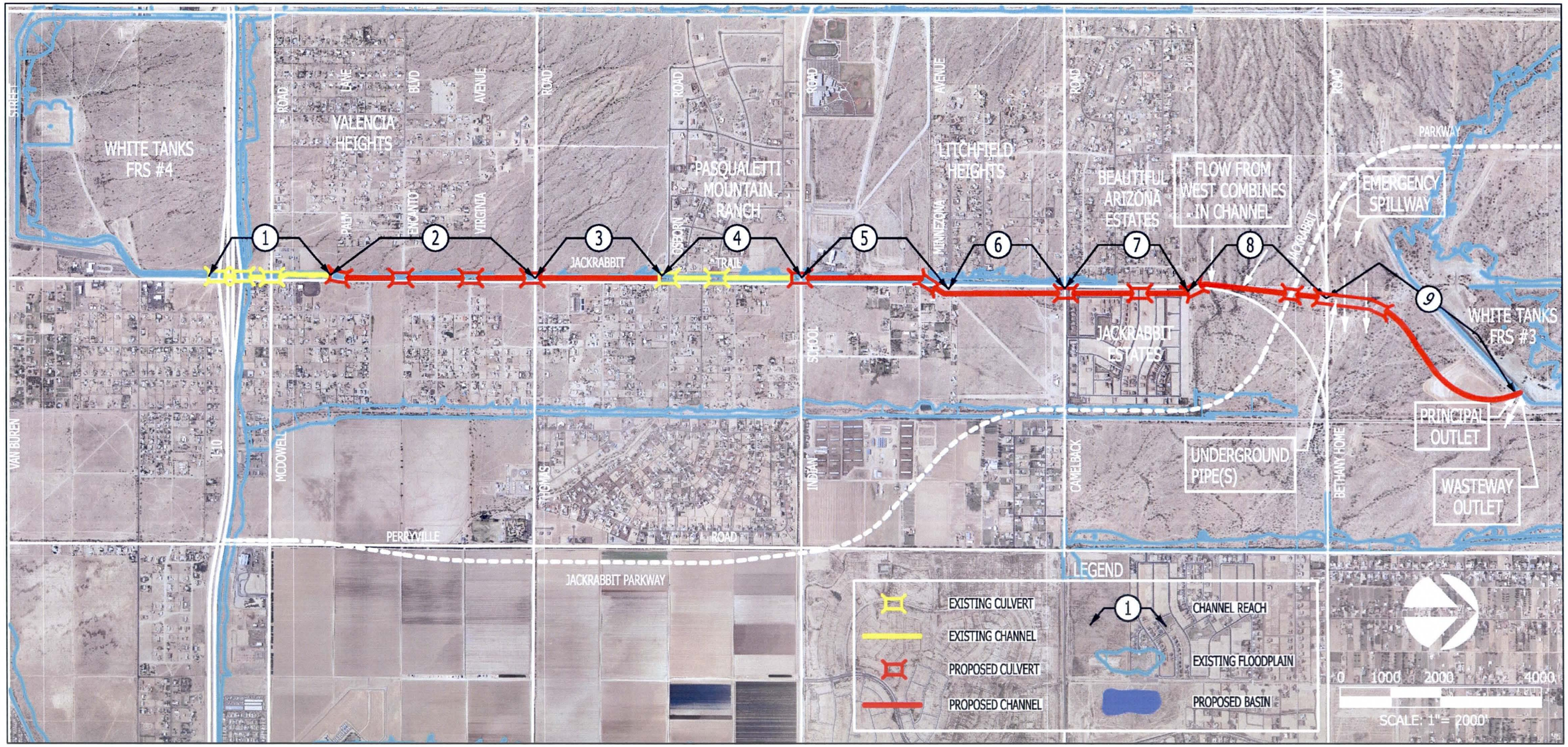

FIGURE 8C – PRELIMINARY ALTERNATIVE 3

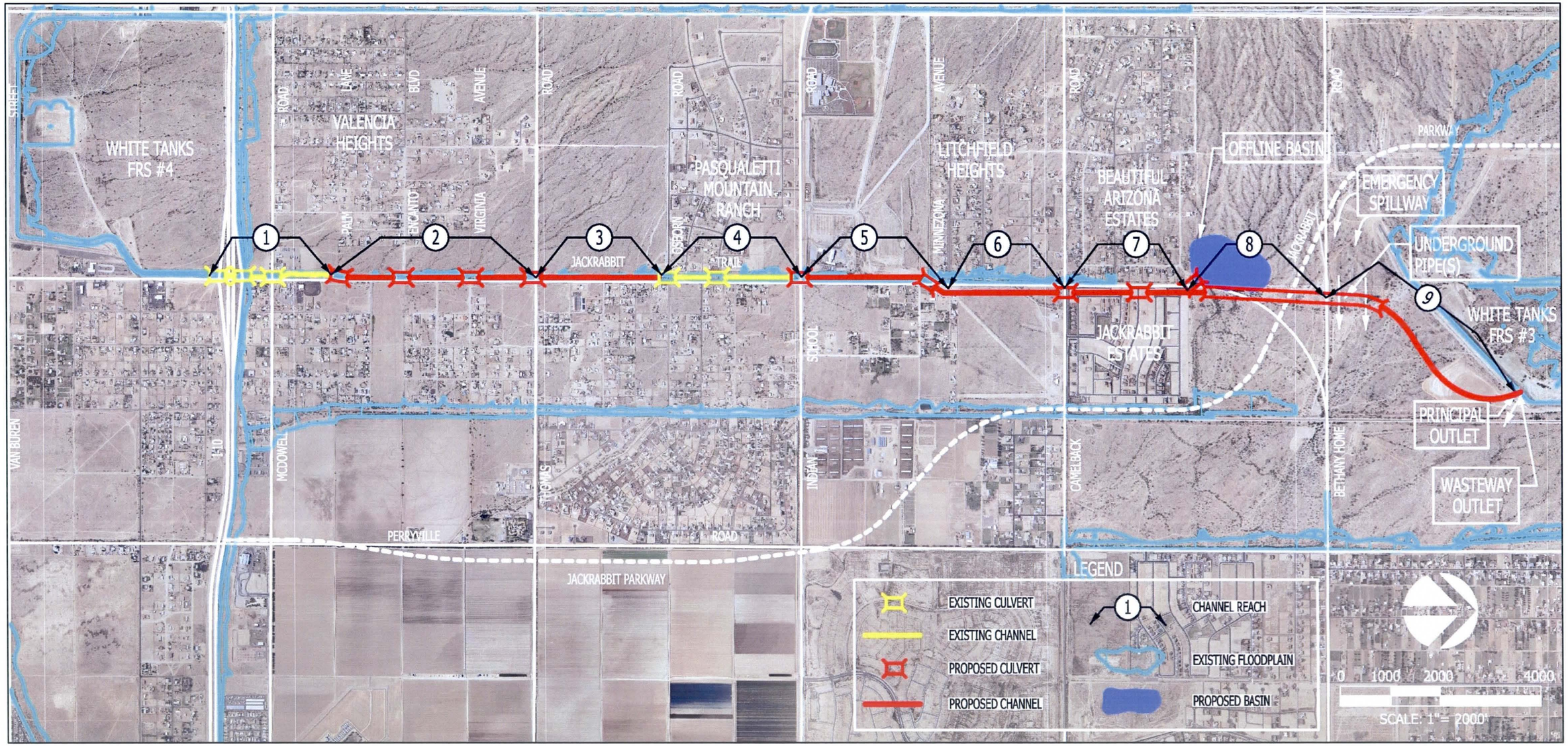

FIGURE 8D – PRELIMINARY ALTERNATIVE 4

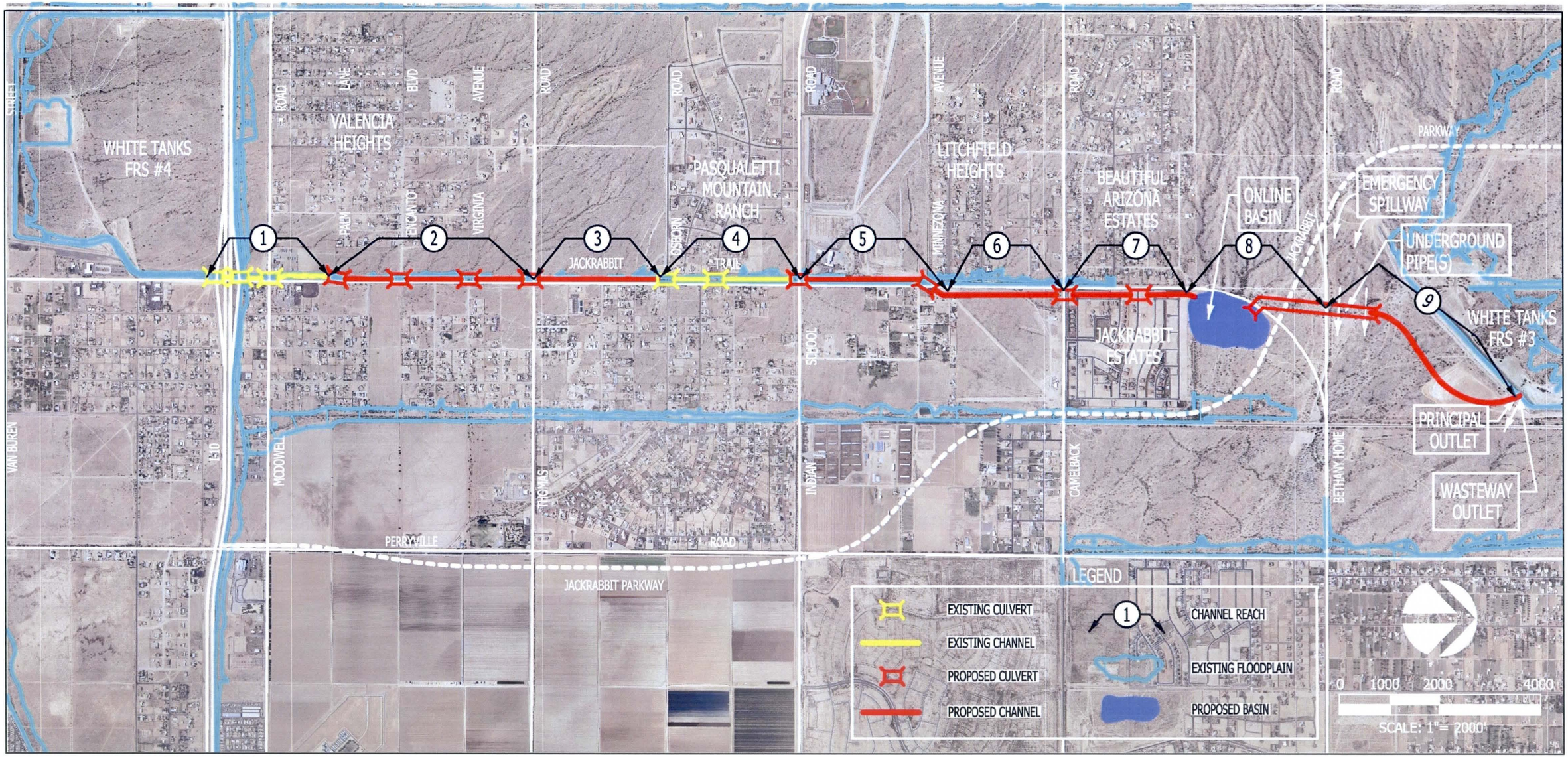

FIGURE 8E – PRELIMINARY ALTERNATIVE 5

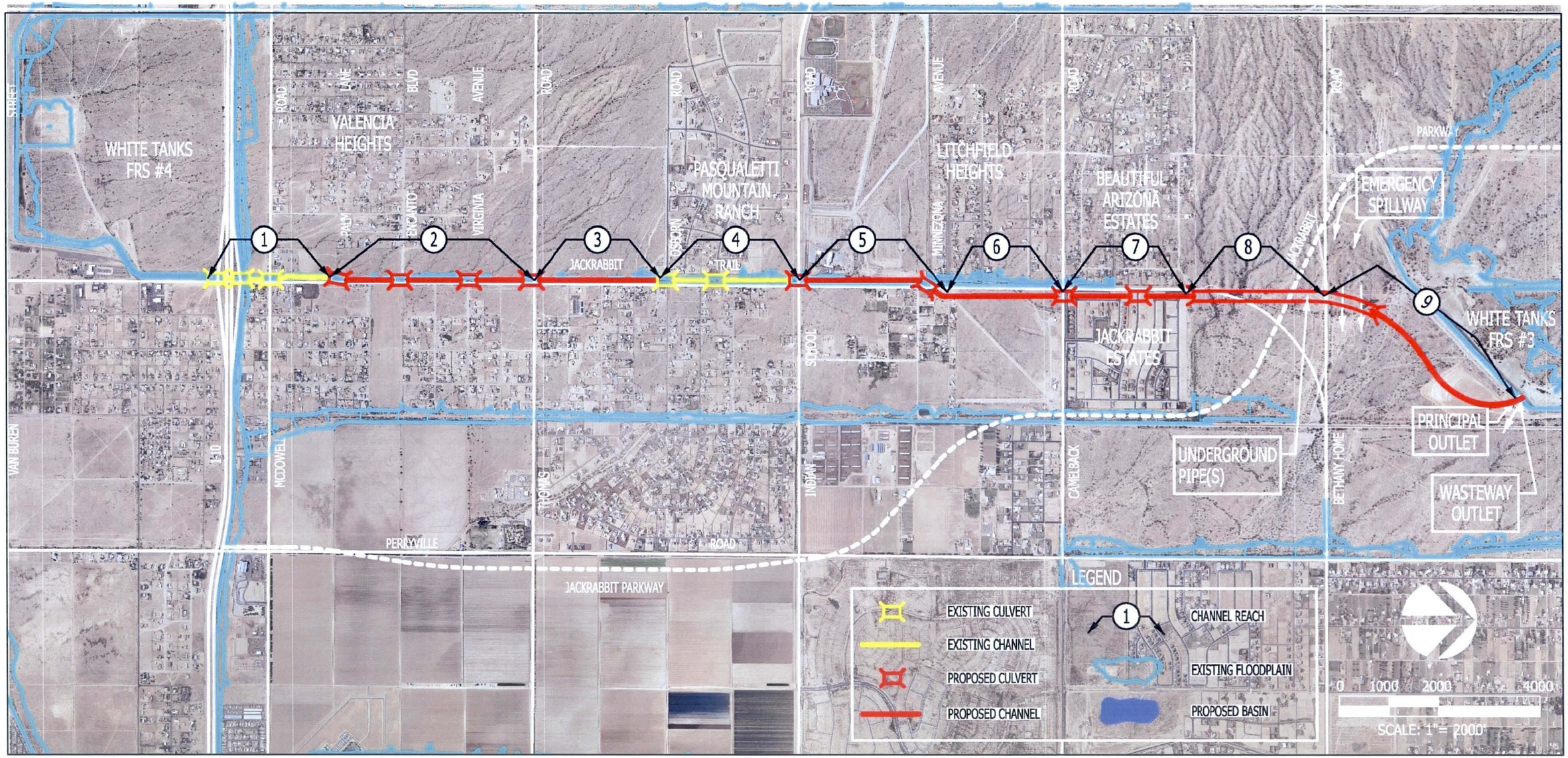

FIGURE 8F – PRELIMINARY ALTERNATIVE 6

WHITE TANKS FRS#3 OUTLET CHANNEL FCD 2007C016 ASSIGNMENT 4						PRELIMINARY ALTERNATIVES COST SUMMARY
ALTERNATIVE	1	2	3	4	5	6
REACH 1	$300,279	$300,279	$300,279	$300,279	$300,279	$300,279
REACH 2	$1,645,298	$1,645,298	$1,645,298	$1,645,298	$1,645,298	$1,645,298
REACH 3	$760,834	$760,834	$760,834	$760,834	$760,834	$760,834
REACH 4	$337,666	$337,666	$337,666	$337,666	$337,666	$337,666
REACH 5	$1,908,054	$1,908,054	$1,908,054	$1,908,054	$1,908,054	$1,908,054
REACH 6	$2,516,604	$409,429	$409,429	$409,429	$409,429	$409,429
REACH 7	$892,186	$892,186	$892,186	$892,186	$892,186	$892,186
REACH 8	$1,529,225	$4,547,260	$1,529,225	$7,394,338	$4,192,308	$4,547,260
REACH 9	$2,618,520	$2,618,520	$2,618,520	$2,618,520	$2,618,520	$2,618,520
CONSTRUCTION	**$12,508,667**	**$13,419,527**	**$10,401,493**	**$16,266,605**	**$13,064,575**	**$13,419,527**
REACH 1	$1,485	$1,485	$1,485	$1,485	$1,485	$1,485
REACH 2	$192,143	$192,143	$192,143	$192,143	$192,143	$192,143
REACH 3	$121,919	$121,919	$121,919	$121,919	$121,919	$121,919
REACH 4	$125,162	$125,162	$125,162	$125,162	$125,162	$125,162
REACH 5	$118,147	$118,147	$118,147	$118,147	$118,147	$118,147
REACH 6	$403,445	$92,370	$92,370	$92,370	$92,370	$92,370
REACH 7	$110,523	$110,523	$110,523	$110,523	$110,523	$110,523
REACH 8	$125,935	$0	$125,935	$311,074	$311,074	$0
REACH 9	$244,965	$185,372	$185,372	$185,372	$185,372	$185,372
SOIL STABILIZATION (EROSION CONTROL)	**$1,443,723**	**$947,120**	**$1,073,055**	**$1,258,195**	**$1,258,195**	**$947,120**
% of Construction						
REACH 1 5%	$15,014	$15,014	$15,014	$15,014	$15,014	$15,014
REACH 2 5%	$82,265	$82,265	$82,265	$82,265	$82,265	$82,265
REACH 3 5%	$38,042	$38,042	$38,042	$38,042	$38,042	$38,042
REACH 4 5%	$16,883	$16,883	$16,883	$16,883	$16,883	$16,883
REACH 5 5%	$95,403	$95,403	$95,403	$95,403	$95,403	$95,403
REACH 6 5%	$125,830	$20,471	$20,471	$20,471	$20,471	$20,471
REACH 7 5%	$44,609	$44,609	$44,609	$44,609	$44,609	$44,609
REACH 8 5%	$76,461	$227,363	$76,461	$369,717	$209,615	$227,363
REACH 9 5%	$130,926	$130,926	$130,926	$130,926	$130,926	$130,926
LANDSCAPE	**$625,433**	**$670,976**	**$520,075**	**$813,330**	**$653,229**	**$670,976**
Type % of Construction						
Utility Relocation and Miscellaneous Costs 25%	$3,127,167	$3,354,882	$2,600,373	$4,066,651	$3,266,144	$3,354,882
CONTINGENCIES 25%	**$3,127,167**	**$3,354,882**	**$2,600,373**	**$4,066,651**	**$3,266,144**	**$3,354,882**
SUB-TOTAL	**$17,704,990**	**$18,392,505**	**$14,594,995**	**$22,404,781**	**$18,242,142**	**$18,392,505**
Type % of Construction						
Engineering Design 10%	$1,770,499	$1,839,251	$1,459,500	$2,240,478	$1,824,214	$1,839,251
Construction Administration / Management 10%	$1,770,499	$1,839,251	$1,459,500	$2,240,478	$1,824,214	$1,839,251
TOTAL ENGINEERING DESIGN & CM 20%	**$3,540,998**	**$3,678,501**	**$2,918,999**	**$4,480,956**	**$3,648,428**	**$3,678,501**
SUB-TOTAL CONSTRUCTION, LANDSCAPE, AND CONTINGENCIES	**$21,245,988**	**$22,071,006**	**$17,513,994**	**$26,885,737**	**$21,890,571**	**$22,071,006**
REACH 1	$0	$0	$0	$0	$0	$0
REACH 2	$202,178	$202,178	$202,178	$202,178	$202,178	$202,178
REACH 3	$134,488	$134,488	$134,488	$134,488	$134,488	$134,488
REACH 4	$0	$0	$0	$0	$0	$0
REACH 5	$1,738,264	$1,738,264	$1,738,264	$1,738,264	$1,738,264	$1,738,264
REACH 6	$7,195,437	$1,095,437	$1,095,437	$1,095,437	$1,095,437	$1,095,437
REACH 7	$152,950	$152,950	$152,950	$152,950	$152,950	$152,950
REACH 8	$1,195,143	$0	$1,195,143	$6,100,000	$6,100,000	$0
REACH 9	$0	$0	$0	$0	$0	$0
TEMPORARY CONSTRUCTION EASEMENTS	$128,566	$128,566	$128,566	$128,566	$128,566	$128,566
SUB-TOTAL RIGHT-OF-WAY ACQUISITION	**$10,747,027**	**$3,451,883**	**$4,647,027**	**$9,551,883**	**$9,551,883**	**$3,451,883**
TOTAL ALTERNATIVE COST	**$31,993,015**	**$25,522,890**	**$22,161,021**	**$36,437,621**	**$31,442,454**	**$25,522,890**

APPENDIX J – REACH 6 OPTIONS

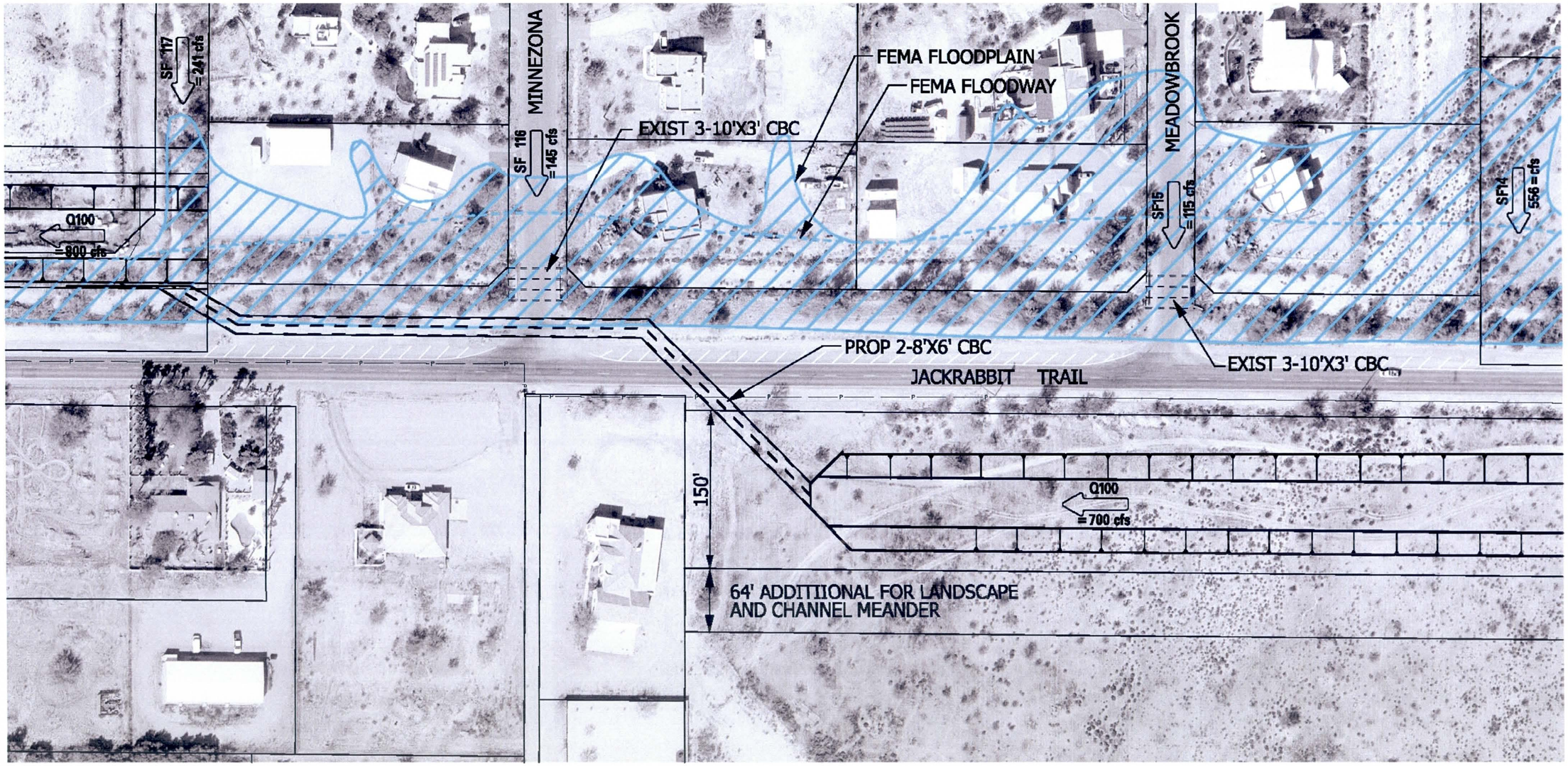

FIGURE 9A – REACH 6 OPTION A

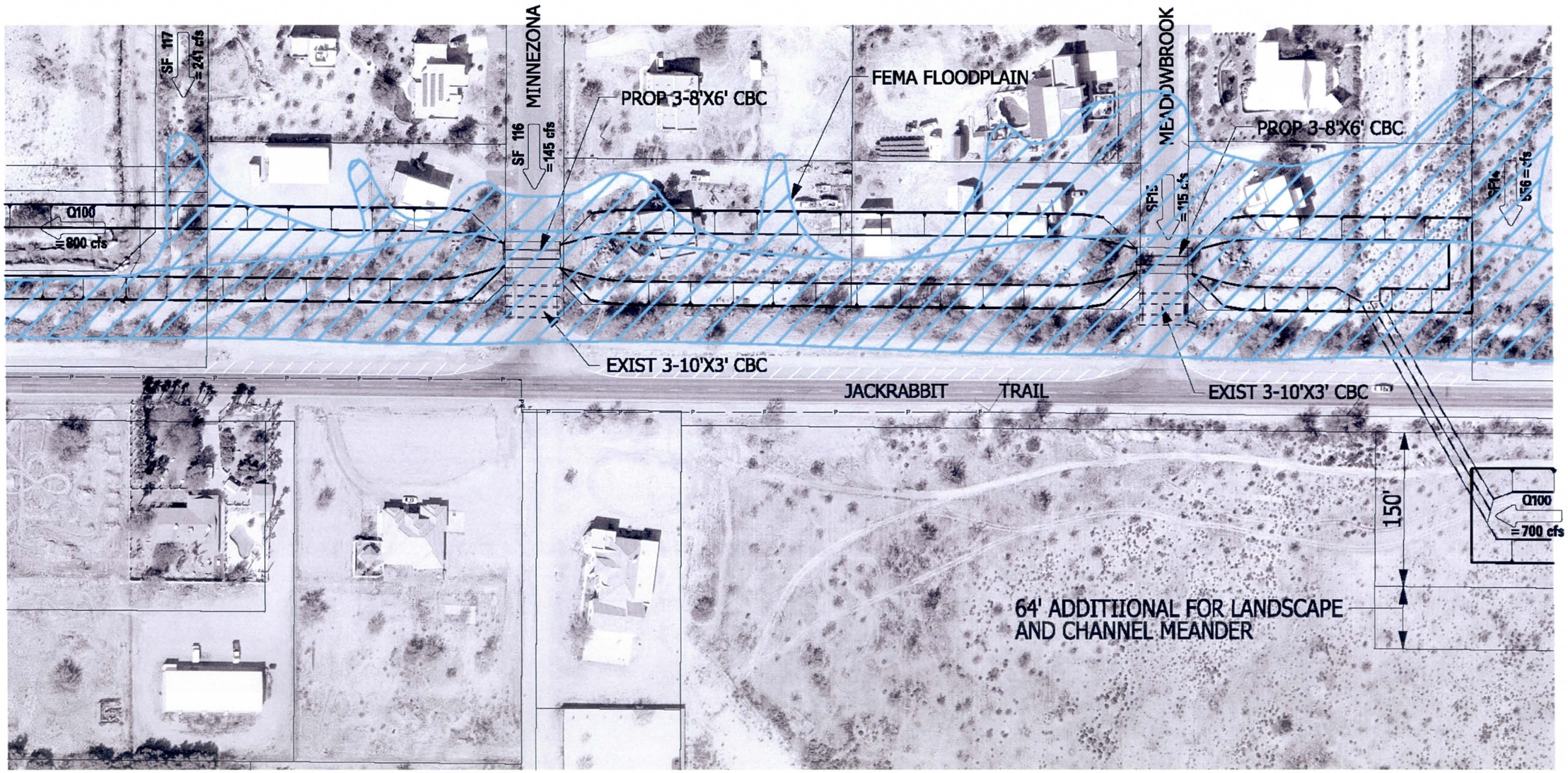

FIGURE 9B – REACH 6 OPTION B

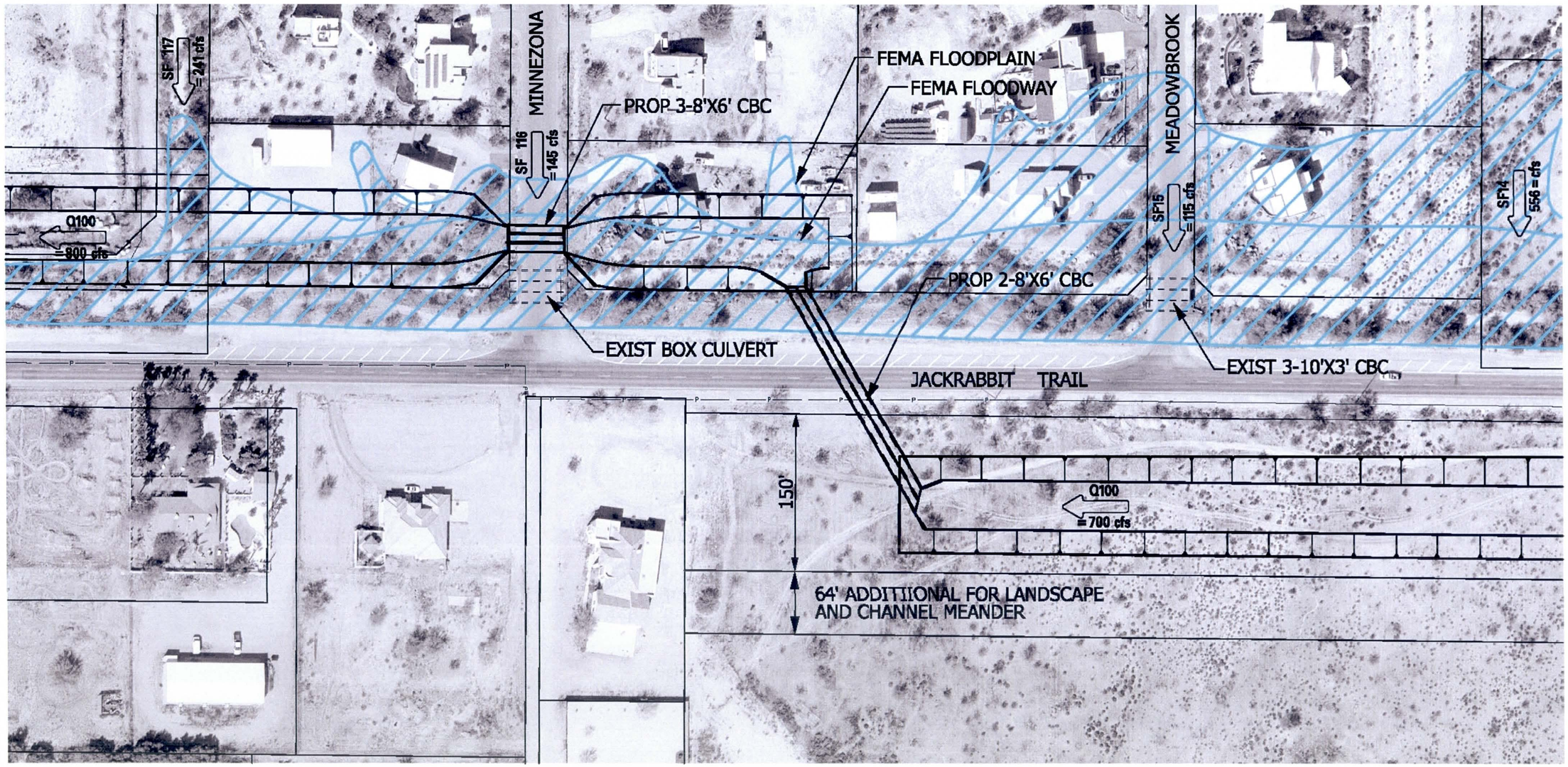

FIGURE 9C – REACH 6 OPTION C

Comparison of Design Options for Reach 6

Option 6A

Option 6A was presented in the Pre-Design report and is the basis for comparison of each of six alternatives. Option 6A, with the exception of Alternative 1, is identical in all alternatives. Option 6A avoids four residential lots located within the Litchfield Heights Unit 1 subdivision by placing the channel on the east side of Jackrabbit Trail on a vacant property currently owned by Missionary Wings. Because of limited right-of-way on both the east and west sides of Jackrabbit Trail, and anticipated future MCDOT widening, an underground conduit is proposed in this alternative. This two barrel 8' x 6' culvert is estimated to be 900 feet in length. Drainage which reaches Jackrabbit Trail from the west between Camelback Road and Sells Drive would be conveyed within an existing unlined and unimproved channel on the west side of Jackrabbit Trail.

Pros

- Avoids disturbance of residential lots west of Jackrabbit Trail
- Least Cost

Cons

- Does not provide a regional solution for drainage on the west side of Jackrabbit Trail
- Four existing residences remain within the 100-year floodplain
- Requires drainage improvements and creates potential slope challenges for MCDOT or Buckeye during future widening of Jackrabbit Trail
- Trail connection to the north is lost for a 1,000-foot segment
- Creates drainage challenges and possible additional costs near Sells Drive, where drainage from the west, north, and from the proposed culverts in Jackrabbit Trail confluence
- Maintenance and accessibility
- May limit future utilities within MCDOT right-of-way

Option 6B

Option 6B was developed to provide an alternative to the long box culvert proposed in Option 6A. This alternative would cross the channel from the east side of Jackrabbit Trail to the west side approximately 1,500 feet north of Sells Drive. This alternative requires the acquisition and relocation of four existing residences within the Litchfield Heights Unit 1 subdivision. Specifically, the parcels are identified as MCR 502-28-014 (51,836 SF lot) located on Meadowbrook Avenue, MCR 502-28-019 (45,100 SF lot) located on Meadowbrook Avenue, MCR 502-28-020 (45,100 SF lot) located on Minnezona Avenue, and MCR 502-28-025 (50,950 SF lot) located on Minnezona Avenue. Each of these lots currently has a drainage easement on a portion of the property. A culvert would cross Jackrabbit Trail from east to west, north of Meadowbrook Avenue, allowing the new channel to intercept concentrated flow which approaches from the west. New culverts would replace existing culverts which cross Meadowbrook Avenue and Minnezona Avenue.

Pros

- Continues the regional channel north for this broken segment
- Provides continuous trail access along Jackrabbit Trail
- Removes four (4) existing homes from the 100-year floodplain
- Simplifies a complex hydraulic junction at the confluence of three drainage courses

Cons

- Requires relocation of four (4) existing residences
- Additional cost over Option 6A

Option 6C

Option 6C represents a compromise between Options 6A and 6B. The channel would remain on the vacant Missionary Wings property until approximately 200 feet north of Minnezona Avenue. At this point, a culvert would convey flow from the east side of Jackrabbit Trail west into a new channel on the west side. The new channel would require relocation of two (2) existing residences . The parcels are identified as MCR 502-28-020 (45,100 SF lot) and MCR 502-28-025 (50,950 SF lot), both located on Minnezona Avenue. The existing unimproved channel on the west side of Jackrabbit Trail, from 200 feet north of Minnezona Avenue, would remain. A new culvert would replace the existing culvert crossing of Minnezona Avenue.

Pros

- Continues regional channel north for this broken segment
- Provides continuous trail access along Jackrabbit Trail
- Removes two (2) existing homes from the 100-year floodplain
- Simplifies a complex hydraulic channel junction at confluence of three drainage courses

Cons

- Does not provide a full regional solution to drainage on the west side of Jackrabbit Trail
- Requires relocation of two (2) existing residences
- Two (2) existing residences remain within the 100-year floodplain
- Requires drainage improvements and creates potential slope challenges for MCDOT or Buckeye during future widening of Jackrabbit Trail
- Additional cost over Option 6A

WHITE TANKS FRS#3 OUTLET CHANNEL FCD 2007C016 ASSIGNMENT 4		PRELIMINARY ALTERNATIVES COST SUMMARY REACH 6, OPTION A					
ALTERNATIVE		1	2	3	4	5	6
REACH 1		$300,279	$300,279	$300,279	$300,279	$300,279	$300,279
REACH 2		$1,645,298	$1,645,298	$1,645,298	$1,645,298	$1,645,298	$1,645,298
REACH 3		$760,834	$760,834	$760,834	$760,834	$760,834	$760,834
REACH 4		$337,666	$337,666	$337,666	$337,666	$337,666	$337,666
REACH 5		$1,908,054	$1,908,054	$1,908,054	$1,908,054	$1,908,054	$1,908,054
REACH 6		$2,516,604	$409,429	$409,429	$409,429	$409,429	$409,429
REACH 7		$892,186	$892,186	$892,186	$892,186	$892,186	$892,186
REACH 8		$1,529,225	$4,547,260	$1,529,225	$7,394,338	$4,192,308	$4,547,260
REACH 9		$2,618,520	$2,618,520	$2,618,520	$2,618,520	$2,618,520	$2,618,520
CONSTRUCTION		**$12,508,667**	**$13,419,527**	**$10,401,493**	**$16,266,605**	**$13,064,575**	**$13,419,527**
REACH 1		$1,485	$1,485	$1,485	$1,485	$1,485	$1,485
REACH 2		$192,143	$192,143	$192,143	$192,143	$192,143	$192,143
REACH 3		$121,919	$121,919	$121,919	$121,919	$121,919	$121,919
REACH 4		$125,162	$125,162	$125,162	$125,162	$125,162	$125,162
REACH 5		$118,147	$118,147	$118,147	$118,147	$118,147	$118,147
REACH 6		$403,445	$92,370	$92,370	$92,370	$92,370	$92,370
REACH 7		$110,523	$110,523	$110,523	$110,523	$110,523	$110,523
REACH 8		$125,935	$0	$125,935	$311,074	$311,074	$0
REACH 9		$244,965	$185,372	$185,372	$185,372	$185,372	$185,372
SOIL STABILIZATION (EROSION CONTROL)		**$1,443,723**	**$947,120**	**$1,073,055**	**$1,258,195**	**$1,258,195**	**$947,120**
	% of Construction						
REACH 1	5%	$15,014	$15,014	$15,014	$15,014	$15,014	$15,014
REACH 2	5%	$82,265	$82,265	$82,265	$82,265	$82,265	$82,265
REACH 3	5%	$38,042	$38,042	$38,042	$38,042	$38,042	$38,042
REACH 4	5%	$16,883	$16,883	$16,883	$16,883	$16,883	$16,883
REACH 5	5%	$95,403	$95,403	$95,403	$95,403	$95,403	$95,403
REACH 6	5%	$125,830	$20,471	$20,471	$20,471	$20,471	$20,471
REACH 7	5%	$44,609	$44,609	$44,609	$44,609	$44,609	$44,609
REACH 8	5%	$76,461	$227,363	$76,461	$369,717	$209,615	$227,363
REACH 9	5%	$130,926	$130,926	$130,926	$130,926	$130,926	$130,926
LANDSCAPE		**$625,433**	**$670,976**	**$520,075**	**$813,330**	**$653,229**	**$670,976**
Type	% of Construction						
Utility Relocation and Miscellaneous Costs	25%	$3,127,167	$3,354,882	$2,600,373	$4,066,651	$3,266,144	$3,354,882
CONTINGENCIES	**25%**	**$3,127,167**	**$3,354,882**	**$2,600,373**	**$4,066,651**	**$3,266,144**	**$3,354,882**
SUB-TOTAL		**$17,704,990**	**$18,392,505**	**$14,594,995**	**$22,404,781**	**$18,242,142**	**$18,392,505**
Type	% of Construction						
Engineering Design	10%	$1,770,499	$1,839,251	$1,459,500	$2,240,478	$1,824,214	$1,839,251
Construction Administration / Management	10%	$1,770,499	$1,839,251	$1,459,500	$2,240,478	$1,824,214	$1,839,251
TOTAL ENGINEERING DESIGN & CM	**20%**	**$3,540,998**	**$3,678,501**	**$2,918,999**	**$4,480,956**	**$3,648,428**	**$3,678,501**
SUB-TOTAL CONSTRUCTION, LANDSCAPE, AND CONTINGENCIES		**$21,245,988**	**$22,071,006**	**$17,513,994**	**$26,885,737**	**$21,890,571**	**$22,071,006**
REACH 1		$0	$0	$0	$0	$0	$0
REACH 2		$202,178	$202,178	$202,178	$202,178	$202,178	$202,178
REACH 3		$134,488	$134,488	$134,488	$134,488	$134,488	$134,488
REACH 4		$0	$0	$0	$0	$0	$0
REACH 5		$1,738,264	$1,738,264	$1,738,264	$1,738,264	$1,738,264	$1,738,264
REACH 6		$7,195,437	$1,095,437	$1,095,437	$1,095,437	$1,095,437	$1,095,437
REACH 7		$152,950	$152,950	$152,950	$152,950	$152,950	$152,950
REACH 8		$1,195,143	$0	$1,195,143	$6,100,000	$6,100,000	$0
REACH 9		$0	$0	$0	$0	$0	$0
TEMPORARY CONSTRUCTION EASEMENTS		$128,566	$128,566	$128,566	$128,566	$128,566	$128,566
SUB-TOTAL RIGHT-OF-WAY ACQUISITION		**$10,747,027**	**$3,451,883**	**$4,647,027**	**$9,551,883**	**$9,551,883**	**$3,451,883**
TOTAL ALTERNATIVE COST		**$31,993,015**	**$25,522,890**	**$22,161,021**	**$36,437,621**	**$31,442,454**	**$25,522,890**

WHITE TANKS FRS#3 OUTLET CHANNEL FCD 2007C016 ASSIGNMENT 4					PRELIMINARY ALTERNATIVES COST SUMMARY REACH 6, OPTION B	
ALTERNATIVE	1	2	3	4	5	6
REACH 1	$300,279	$300,279	$300,279	$300,279	$300,279	$300,279
REACH 2	$1,645,298	$1,645,298	$1,645,298	$1,645,298	$1,645,298	$1,645,298
REACH 3	$760,834	$760,834	$760,834	$760,834	$760,834	$760,834
REACH 4	$337,666	$337,666	$337,666	$337,666	$337,666	$337,666
REACH 5	$1,908,054	$954,762	$954,762	$954,762	$954,762	$954,762
REACH 6B	$2,516,604	$1,016,381	$1,016,381	$1,016,381	$1,016,381	$1,016,381
REACH 7	$892,186	$892,186	$892,186	$892,186	$892,186	$892,186
REACH 8	$1,529,225	$4,547,260	$1,529,225	$7,394,338	$4,192,308	$4,547,260
REACH 9	$2,618,520	$2,618,520	$2,618,520	$2,618,520	$2,618,520	$2,618,520
CONSTRUCTION	$12,508,667	$13,073,187	$10,055,153	$15,920,265	$12,718,235	$13,073,187
REACH 1	$1,485	$1,485	$1,485	$1,485	$1,485	$1,485
REACH 2	$192,143	$192,143	$192,143	$192,143	$192,143	$192,143
REACH 3	$121,919	$121,919	$121,919	$121,919	$121,919	$121,919
REACH 4	$125,162	$125,162	$125,162	$125,162	$125,162	$125,162
REACH 5	$118,147	$118,147	$118,147	$118,147	$118,147	$118,147
REACH 6B	$403,445	$127,195	$127,195	$127,195	$127,195	$127,195
REACH 7	$110,523	$110,523	$110,523	$110,523	$110,523	$110,523
REACH 8	$125,935	$0	$125,935	$311,074	$311,074	$0
REACH 9	$244,965	$185,372	$185,372	$185,372	$185,372	$185,372
SOIL STABILIZATION (EROSION CONTROL)	$1,443,723	$981,945	$1,107,880	$1,293,019	$1,293,019	$981,945
% of Construction						
REACH 1 5%	$15,014	$15,014	$15,014	$15,014	$15,014	$15,014
REACH 2 5%	$82,265	$82,265	$82,265	$82,265	$82,265	$82,265
REACH 3 5%	$38,042	$38,042	$38,042	$38,042	$38,042	$38,042
REACH 4 5%	$16,883	$16,883	$16,883	$16,883	$16,883	$16,883
REACH 5 5%	$95,403	$47,738	$47,738	$47,738	$47,738	$47,738
REACH 6B 5%	$125,830	$50,819	$50,819	$50,819	$50,819	$50,819
REACH 7 5%	$44,609	$44,609	$44,609	$44,609	$44,609	$44,609
REACH 8 5%	$76,461	$227,363	$76,461	$369,717	$209,615	$227,363
REACH 9 5%	$130,926	$130,926	$130,926	$130,926	$130,926	$130,926
LANDSCAPE	$625,433	$653,659	$502,758	$796,013	$635,912	$653,659
Type % of Construction						
Utility Relocation and Miscellaneous Costs 25%	$3,127,167	$3,268,297	$2,513,788	$3,980,066	$3,179,559	$3,268,297
CONTINGENCIES 25%	$3,127,167	$3,268,297	$2,513,788	$3,980,066	$3,179,559	$3,268,297
SUB-TOTAL	$17,704,990	$17,977,088	$14,179,578	$21,989,364	$17,826,725	$17,977,088
Type % of Construction						
Engineering Design 10%	$1,770,499	$1,797,709	$1,417,958	$2,198,936	$1,782,673	$1,797,709
Construction Administration / Management 10%	$1,770,499	$1,797,709	$1,417,958	$2,198,936	$1,782,673	$1,797,709
TOTAL ENGINEERING DESIGN & CM 20%	$3,540,998	$3,595,418	$2,835,916	$4,397,873	$3,565,345	$3,595,418
SUB-TOTAL CONSTRUCTION, LANDSCAPE, AND CONTINGENCIES	$21,245,988	$21,572,506	$17,015,494	$26,387,237	$21,392,070	$21,572,506
REACH 1	$0	$0	$0	$0	$0	$0
REACH 2	$202,178	$202,178	$202,178	$202,178	$202,178	$202,178
REACH 3	$134,488	$134,488	$134,488	$134,488	$134,488	$134,488
REACH 4	$0	$0	$0	$0	$0	$0
REACH 5	$1,738,264	$1,738,264	$1,738,264	$1,738,264	$1,738,264	$1,738,264
REACH 6B	$7,195,437	$2,201,035	$2,201,035	$2,201,035	$2,201,035	$2,201,035
REACH 7	$152,950	$152,950	$152,950	$152,950	$152,950	$152,950
REACH 8	$1,195,143	$0	$1,195,143	$6,100,000	$6,100,000	$0
REACH 9	$0	$0	$0	$0	$0	$0
TEMPORARY CONSTRUCTION EASEMENTS	$128,566	$128,566	$128,566	$128,566	$128,566	$128,566
SUB-TOTAL RIGHT-OF-WAY ACQUISITION	$10,747,027	$4,557,481	$5,752,625	$10,657,481	$10,657,481	$4,557,481
TOTAL ALTERNATIVE COST	$31,993,015	$26,129,987	$22,768,119	$37,044,718	$32,049,551	$26,129,987

WHITE TANKS FRS#3 OUTLET CHANNEL FCD 2007C016 ASSIGNMENT 4		PRELIMINARY ALTERNATIVES COST SUMMARY REACH 6, OPTION C					
ALTERNATIVE		1	2	3	4	5	6
REACH 1		$300,279	$300,279	$300,279	$300,279	$300,279	$300,279
REACH 2		$1,645,298	$1,645,298	$1,645,298	$1,645,298	$1,645,298	$1,645,298
REACH 3		$760,834	$760,834	$760,834	$760,834	$760,834	$760,834
REACH 4		$337,666	$337,666	$337,666	$337,666	$337,666	$337,666
REACH 5		$1,908,054	$954,762	$954,762	$954,762	$954,762	$954,762
REACH 6C		$2,516,604	$973,930	$973,930	$973,930	$973,930	$973,930
REACH 7		$892,186	$892,186	$892,186	$892,186	$892,186	$892,186
REACH 8		$1,529,225	$4,547,260	$1,529,225	$7,394,338	$4,192,308	$4,547,260
REACH 9		$2,618,520	$2,618,520	$2,618,520	$2,618,520	$2,618,520	$2,618,520
CONSTRUCTION		$12,508,667	$13,030,736	$10,012,702	$15,877,814	$12,675,784	$13,030,736
REACH 1		$1,485	$1,485	$1,485	$1,485	$1,485	$1,485
REACH 2		$192,143	$192,143	$192,143	$192,143	$192,143	$192,143
REACH 3		$121,919	$121,919	$121,919	$121,919	$121,919	$121,919
REACH 4		$125,162	$125,162	$125,162	$125,162	$125,162	$125,162
REACH 5		$118,147	$118,147	$118,147	$118,147	$118,147	$118,147
REACH 6C		$403,445	$130,225	$130,225	$130,225	$130,225	$130,225
REACH 7		$110,523	$110,523	$110,523	$110,523	$110,523	$110,523
REACH 8		$125,935	$0	$125,935	$311,074	$311,074	$0
REACH 9		$244,965	$185,372	$185,372	$185,372	$185,372	$185,372
SOIL STABILIZATION (EROSION CONTROL)		$1,443,723	$984,975	$1,110,909	$1,296,049	$1,296,049	$984,975
	% of Construction						
REACH 1	5%	$15,014	$15,014	$15,014	$15,014	$15,014	$15,014
REACH 2	5%	$82,265	$82,265	$82,265	$82,265	$82,265	$82,265
REACH 3	5%	$38,042	$38,042	$38,042	$38,042	$38,042	$38,042
REACH 4	5%	$16,883	$16,883	$16,883	$16,883	$16,883	$16,883
REACH 5	5%	$95,403	$47,738	$47,738	$47,738	$47,738	$47,738
REACH 6C	5%	$125,830	$48,696	$48,696	$48,696	$48,696	$48,696
REACH 7	5%	$44,609	$44,609	$44,609	$44,609	$44,609	$44,609
REACH 8	5%	$76,461	$227,363	$76,461	$369,717	$209,615	$227,363
REACH 9	5%	$130,926	$130,926	$130,926	$130,926	$130,926	$130,926
LANDSCAPE		$625,433	$651,537	$500,635	$793,891	$633,789	$651,537
Type	% of Construction						
Utility Relocation and Miscellaneous Costs	25%	$3,127,167	$3,257,684	$2,503,175	$3,969,454	$3,168,946	$3,257,684
CONTINGENCIES	25%	$3,127,167	$3,257,684	$2,503,175	$3,969,454	$3,168,946	$3,257,684
SUB-TOTAL		$17,704,990	$17,924,931	$14,127,421	$21,937,207	$17,774,568	$17,924,931
Type	% of Construction						
Engineering Design	10%	$1,770,499	$1,792,493	$1,412,742	$2,193,721	$1,777,457	$1,792,493
Construction Administration / Management	10%	$1,770,499	$1,792,493	$1,412,742	$2,193,721	$1,777,457	$1,792,493
TOTAL ENGINEERING DESIGN & CM	20%	$3,540,998	$3,584,986	$2,825,484	$4,387,441	$3,554,914	$3,584,986
SUB-TOTAL CONSTRUCTION, LANDSCAPE, AND CONTINGENCIES		$21,245,988	$21,509,918	$16,952,906	$26,324,649	$21,329,482	$21,509,918
REACH 1		$0	$0	$0	$0	$0	$0
REACH 2		$202,178	$202,178	$202,178	$202,178	$202,178	$202,178
REACH 3		$134,488	$134,488	$134,488	$134,488	$134,488	$134,488
REACH 4		$0	$0	$0	$0	$0	$0
REACH 5		$1,738,264	$1,738,264	$1,738,264	$1,738,264	$1,738,264	$1,738,264
REACH 6C		$7,195,437	$1,850,764	$1,850,764	$1,850,764	$1,850,764	$1,850,764
REACH 7		$152,950	$152,950	$152,950	$152,950	$152,950	$152,950
REACH 8		$1,195,143	$0	$1,195,143	$6,100,000	$6,100,000	$0
REACH 9		$0	$0	$0	$0	$0	$0
TEMPORARY CONSTRUCTION EASEMENTS		$128,566	$128,566	$128,566	$128,566	$128,566	$128,566
SUB-TOTAL RIGHT-OF-WAY ACQUISITION		$10,747,027	$4,207,211	$5,402,354	$10,307,211	$10,307,211	$4,207,211
TOTAL ALTERNATIVE COST		$31,993,015	$25,717,128	$22,355,260	$36,631,859	$31,636,693	$25,717,128

APPENDIX K – RATIONAL METHOD CALCULATIONS

Flood Control District of Maricopa County
Drainage Design Management System
SUB BASINS
Project Reference: JR CHANNEL INFLOW

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ID	Sub Basin Data							Sub Basin Hydrology Summary						
	Area (acres)	Length (ft)	USGE	DSGE	Slope (ft/mi)	Kb	CustomTc (min)		2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
Major Basin ID: JR														
SF01	36.1	465	1,190.00	1,186.00	45.4	0.11	-	Q (cfs)	37	56	70	99	122	150
								C	0.55	0.55	0.55	0.61	0.66	0.69
								CA (ac)	19.85	19.85	19.85	22.01	23.82	24.90
								Tc (min)	16	13	12	11	11	10
								i (in/hr)	1.88	2.83	3.53	4.49	5.13	6.01
SF02	23.0	1,997	1,211.50	1,190.00	56.8	0.12	-	Q (cfs)	15	22	28	41	51	64
								C	0.55	0.55	0.55	0.61	0.66	0.69
								CA (ac)	12.67	12.67	12.67	14.05	15.20	15.89
								Tc (min)	37	32	29	26	25	23
								i (in/hr)	1.16	1.71	2.18	2.89	3.38	4.02
SF03	6.6	608	1,206.00	1,194.00	104.2	0.13	-	Q (cfs)	7	10	13	18	23	28
								C	0.55	0.55	0.55	0.61	0.66	0.69
								CA (ac)	3.64	3.64	3.64	4.04	4.37	4.57
								Tc (min)	15	13	12	11	10	10
								i (in/hr)	1.93	2.83	3.53	4.49	5.33	6.01
SF04	25.7	2,753	1,231.00	1,193.00	72.9	0.11	-	Q (cfs)	15	23	29	42	54	66
								C	0.55	0.55	0.55	0.61	0.66	0.69
								CA (ac)	14.12	14.12	14.12	15.66	16.94	17.71
								Tc (min)	41	35	32	29	27	26
								i (in/hr)	1.09	1.63	2.05	2.67	3.21	3.71
SF05	14.2	1,564	1,213.00	1,187.50	86.1	0.12	-	Q (cfs)	11	16	21	29	38	46
								C	0.55	0.55	0.55	0.61	0.66	0.69
								CA (ac)	7.81	7.81	7.81	8.66	9.37	9.80
								Tc (min)	28	24	22	20	18	17
								i (in/hr)	1.37	2.07	2.62	3.38	4.07	4.71
SF06	8.8	1,108	1,202.00	1,183.50	88.2	0.13	-	Q (cfs)	8	11	14	20	26	31
								C	0.55	0.55	0.55	0.61	0.66	0.69
								CA (ac)	4.83	4.83	4.83	5.36	5.79	6.06
								Tc (min)	22	19	18	16	15	14
								i (in/hr)	1.60	2.36	2.91	3.76	4.40	5.16
SF07	156.8	6,230	1,284.00	1,180.00	88.1	0.10	-	Q (cfs)	71	112	144	211	270	329
								C	0.55	0.55	0.55	0.61	0.66	0.69
								CA (ac)	86.22	86.22	86.22	95.63	103.47	108.17
								Tc (min)	59	49	45	40	38	36
								i (in/hr)	0.82	1.30	1.67	2.21	2.61	3.04
SF08	144.8	6,353	1,284.00	1,180.00	86.4	0.08	-	Q (cfs)	71	110	141	202	262	310
								C	0.53	0.53	0.53	0.59	0.64	0.66
								CA (ac)	76.74	76.74	76.74	85.43	92.67	95.56
								Tc (min)	51	43	39	36	33	32
								i (in/hr)	0.93	1.43	1.84	2.36	2.83	3.24
SF09	15.0	1,908	1,214.50	1,183.50	85.8	0.04	-	Q (cfs)	14	21	26	36	45	55
								C	0.49	0.49	0.49	0.54	0.59	0.61
								CA (ac)	7.34	7.34	7.34	8.09	8.84	9.14
								Tc (min)	15	13	12	11	11	10
								i (in/hr)	1.93	2.83	3.53	4.49	5.13	6.01
SF10	57.4	5,833	1,282.00	1,184.00	88.7	0.03	-	Q (cfs)	42	62	78	111	143	166
								C	0.48	0.48	0.48	0.53	0.58	0.60
								CA (ac)	27.57	27.57	27.57	30.44	33.32	34.46
								Tc (min)	24	21	19	17	16	16
								i (in/hr)	1.52	2.24	2.83	3.66	4.29	4.83

Flood Control District of Maricopa County
Drainage Design Management System
SUB BASINS
Project Reference: JR CHANNEL INFLOW

Page 1 3/26/2009

ID	Sub Basin Data							Sub Basin Hydrology Summary						
	Area (acres)	Length (ft)	USGE	DSGE	Slope (ft/mi)	Kb	CustomTc (min)		2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
SF11	27.0	2,011	1,216.50	1,183.50	86.6	0.03	-	Q (cfs)	27	40	48	67	84	98
								C	0.48	0.48	0.48	0.53	0.58	0.60
								CA (ac)	12.97	12.97	12.97	14.33	15.68	16.22
								Tc (min)	13	11	11	10	10	10
								i (in/hr)	2.08	3.05	3.67	4.67	5.33	6.01
SF12	60.2	5,013	1,259.00	1,182.50	80.6	0.03	-	Q (cfs)	45	66	84	120	150	179
								C	0.48	0.48	0.48	0.53	0.58	0.60
								CA (ac)	28.88	28.88	28.88	31.88	34.89	36.10
								Tc (min)	23	20	18	16	16	15
								i (in/hr)	1.56	2.30	2.91	3.76	4.29	4.96
SF13	99.8	6,632	1,282.00	1,182.50	79.2	0.03	-	Q (cfs)	67	102	129	184	236	282
								C	0.48	0.48	0.48	0.53	0.58	0.60
								CA (ac)	47.88	47.88	47.88	52.87	57.86	59.86
								Tc (min)	27	23	21	19	18	17
								i (in/hr)	1.40	2.12	2.69	3.47	4.07	4.71
SF14	191.7	6,714	1,278.00	1,173.50	82.2	0.03	-	Q (cfs)	136	201	254	363	465	556
								C	0.48	0.48	0.48	0.53	0.58	0.60
								CA (ac)	92.00	92.00	92.00	101.59	111.17	115.00
								Tc (min)	25	22	20	18	17	16
								i (in/hr)	1.48	2.18	2.76	3.57	4.18	4.83
SF15	34.5	2,967	1,213.00	1,173.00	71.2	0.03	-	Q (cfs)	30	42	54	76	99	115
								C	0.48	0.48	0.48	0.53	0.58	0.60
								CA (ac)	16.55	16.55	16.55	18.27	19.99	20.68
								Tc (min)	18	16	14	13	12	12
								i (in/hr)	1.78	2.55	3.27	4.16	4.94	5.57
SF16	43.3	3,031	1,209.00	1,172.00	64.5	0.03	-	Q (cfs)	37	53	65	95	119	145
								C	0.48	0.48	0.48	0.53	0.58	0.60
								CA (ac)	20.77	20.77	20.77	22.93	25.10	25.96
								Tc (min)	18	16	15	13	13	12
								i (in/hr)	1.78	2.55	3.15	4.16	4.75	5.57
SF17	83.2	6,169	1,261.00	1,169.00	78.7	0.03	-	Q (cfs)	58	87	110	157	202	241
								C	0.48	0.48	0.48	0.53	0.58	0.60
								CA (ac)	39.94	39.94	39.94	44.10	48.26	49.92
								Tc (min)	26	22	20	18	17	16
								i (in/hr)	1.44	2.18	2.76	3.57	4.18	4.83
SF19	10.5	1,134	1,168.00	1,154.00	65.2	0.12	-	Q (cfs)	9	13	16	23	29	35
								C	0.55	0.55	0.55	0.61	0.66	0.69
								CA (ac)	5.80	5.80	5.80	6.43	6.96	7.27
								Tc (min)	25	22	20	18	17	16
								i (in/hr)	1.48	2.18	2.76	3.57	4.18	4.83
SF20	6.6	1,234	1,168.00	1,152.00	68.5	0.13	-	Q (cfs)	5	8	10	14	18	22
								C	0.55	0.55	0.55	0.61	0.66	0.69
								CA (ac)	3.65	3.65	3.65	4.04	4.38	4.57
								Tc (min)	27	23	21	19	18	17
								i (in/hr)	1.40	2.12	2.69	3.47	4.07	4.71
SF21	60.1	3,786	1,184.00	1,150.00	47.4	0.03	-	Q (cfs)	45	66	82	117	150	179
								C	0.48	0.48	0.48	0.53	0.58	0.60
								CA (ac)	28.85	28.85	28.85	31.86	34.86	36.07
								Tc (min)	23	20	19	17	16	15
								i (in/hr)	1.56	2.30	2.83	3.66	4.29	4.96
SF22	40.7	3,487	1,176.00	1,148.00	42.4	0.03	-	Q (cfs)	30	44	55	79	101	121
								C	0.48	0.48	0.48	0.53	0.58	0.60
								CA (ac)	19.52	19.52	19.52	21.55	23.58	24.40
								Tc (min)	24	21	19	17	16	15
								i (in/hr)	1.52	2.24	2.83	3.66	4.29	4.96

Flood Control District of Maricopa County
Drainage Design Management System
SUB BASINS
Project Reference: JR CHANNEL INFLOW

Page 1

3/26/2009

ID	Sub Basin Data							Sub Basin Hydrology Summary						
	Area (acres)	Length (ft)	USGE	DSGE	Slope (ft/mi)	Kb	CustomTc (min)		2 Year	5 Year	10 Year	25 Year	50 Year	100 Year
SF23	25.2	2,710	1,169.00	1,146.00	44.8	0.03	-	Q (cfs)	20	29	37	52	67	81
								C	0.48	0.48	0.48	0.53	0.58	0.60
								CA (ac)	12.10	12.10	12.10	13.36	14.62	15.12
								Tc (min)	20	18	16	15	14	13
								i (in/hr)	1.69	2.42	3.07	3.86	4.58	5.36
SF24	177.5	7,664	1,212.00	1,144.00	46.8	0.03	-	Q (cfs)	102	150	195	279	368	440
								C	0.48	0.48	0.48	0.53	0.58	0.60
								CA (ac)	85.20	85.20	85.20	94.08	102.95	106.50
								Tc (min)	35	30	27	25	23	22
								i (in/hr)	1.20	1.76	2.29	2.96	3.57	4.13
SF25	11.6	1,693	1,158.50	1,138.50	62.4	0.03	-	Q (cfs)	11	16	20	29	36	42
								C	0.48	0.48	0.48	0.53	0.58	0.60
								CA (ac)	5.57	5.57	5.57	6.15	6.73	6.96
								Tc (min)	14	12	11	10	10	10
								i (in/hr)	2.00	2.94	3.67	4.67	5.33	6.01
SF26	16.5	1,869	1,158.00	1,137.00	59.3	0.03	-	Q (cfs)	15	22	28	39	51	60
								C	0.48	0.48	0.48	0.53	0.58	0.60
								CA (ac)	7.93	7.93	7.93	8.76	9.58	9.91
								Tc (min)	15	13	12	11	10	10
								i (in/hr)	1.93	2.83	3.53	4.49	5.33	6.01
SF27	31.1	3,843	1,173.00	1,128.00	61.8	0.03	-	Q (cfs)	24	35	44	62	79	96
								C	0.48	0.48	0.48	0.53	0.58	0.60
								CA (ac)	14.94	14.94	14.94	16.49	18.05	18.67
								Tc (min)	22	19	18	16	15	14
								i (in/hr)	1.60	2.36	2.91	3.76	4.40	5.16
SF28	87.6	4,783	1,175.00	1,116.50	64.6	0.03	-	Q (cfs)	64	97	119	170	218	261
								C	0.48	0.48	0.48	0.53	0.58	0.60
								CA (ac)	42.03	42.03	42.03	46.41	50.78	52.54
								Tc (min)	24	20	19	17	16	15
								i (in/hr)	1.52	2.30	2.83	3.66	4.29	4.96
SF29	78.5	5,921	1,179.00	1,111.00	60.6	0.03	-	Q (cfs)	52	78	99	141	180	216
								C	0.48	0.48	0.48	0.53	0.58	0.60
								CA (ac)	37.70	37.70	37.70	41.63	45.55	47.12
								Tc (min)	28	24	22	20	19	18
								i (in/hr)	1.37	2.07	2.62	3.38	3.96	4.59
SF30	19.0	2,957	1,140.00	1,104.00	64.3	0.03	-	Q (cfs)	16	23	29	41	52	64
								C	0.48	0.48	0.48	0.53	0.58	0.60
								CA (ac)	9.13	9.13	9.13	10.09	11.04	11.42
								Tc (min)	19	17	15	14	13	12
								i (in/hr)	1.73	2.49	3.15	4.01	4.75	5.57
SF31	151.9	8,621	1,200.00	1,095.00	64.3	0.03	-	Q (cfs)	89	132	172	245	322	386
								C	0.48	0.48	0.48	0.53	0.58	0.60
								CA (ac)	72.89	72.89	72.89	80.49	88.08	91.12
								Tc (min)	34	29	26	24	22	21
								i (in/hr)	1.22	1.81	2.36	3.04	3.66	4.24

APPENDIX L – HEC-1 PRE-PROJECT CONDITIONS

FIGURE 10A – PRE-PROJECT CONDITIONS HEC-1 SCHEMATIC

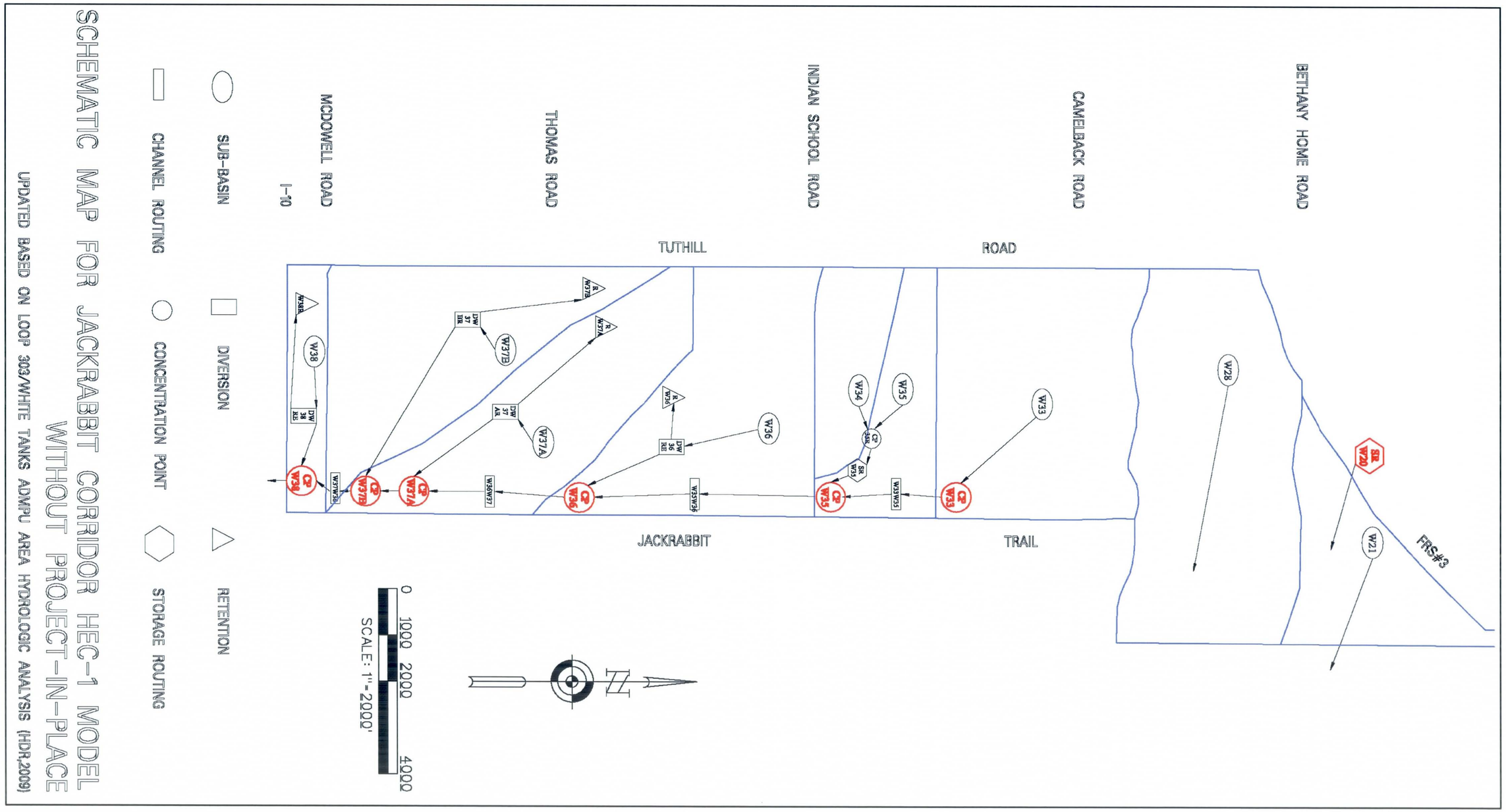

FIGURE 10B – PRE-PROJECT CONDITIONS HEC-1 SCHEMATIC

MODEL UPSTREAM OF WHITE TANKS FRS#3

```
1****************************************                    ****************************************
 *                                      *                    *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                    *   U.S. ARMY CORPS OF ENGINEERS       *
 *              JUN   1998              *                    *   HYDROLOGIC ENGINEERING CENTER      *
 *           VERSION 4.1                *                    *         609 SECOND STREET            *
 *                                      *                    *      DAVIS, CALIFORNIA 95616         *
 *  RUN DATE   27MAR09  TIME  10:22:54  *                    *          (916) 756-1104              *
 *                                      *                    *                                      *
 ****************************************                    ****************************************

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

          THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND
HEC1KW.  THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE
INPUT STRUCTURE.  THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS
THE FORTRAN77 VERSION   NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION,
DSS:WRITE STAGE FREQUENCY, DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT
INFILTRATION KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

1                                                HEC-1 INPUT
PAGE  1

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

             1          ID         WHITE TANKS AREA, WATERSHED CONTRIBUTING TO FRS#3
             2          ID         PREPARED BY HOSKIN RYAN CONSULTANTS EXCLUSIVELY FOR
             3          ID         FRS#3 OUTLET CHANNEL DESIGN, 03-17-2009
             4          ID         BASED ON HDR HEC-1 MODEL OF FUTURE CONDITION WITH CIP
             5          ID         MODIFICATIONS INCLUDE:
             6          ID         (1) UPDATE WITH AVERAGE RAINFALL DEPTH FOR FRS#3 WATERSHED ONLY
             7          ID         (2) UPDATE THE STAGE-STORAGE-DISCHARGE CURVE BASED ON URS DESIGN
             8          ID             OF FRS#3 PRINCIPAL AND EMERGENCY SPILLWAY (DISCHARGE
             9          ID             INCLUDING INFILTRATION)
            10          ID         (3) SEPARATE FRS#3 OUTFLOW AND INFILTRATION
            11          ID     ***************************************************************
            12          ID        Flood Control District of Maricopa County
            13          ID        FU_CIP_MB02 - Loop 303/ White Tanks ADMPU AHA
            14          ID        Major Basin: 02
            15          ID        100 Year - Return Period
            16          ID        24 Hour Storm
            17          ID        Multiple Storms
            18          ID        Unit Hydrograph: S-Graph
            19          ID        03/08/2009
            20          IT      5  1JAN99    1200    2000
            21          IN     15
            22          IO      5
                        *DIAGRAM
                        *
            23          JD   4.016  0.0001
            24          PC   0.000   0.002   0.005   0.008   0.011   0.014   0.017   0.020   0.023   0.026
            25          PC   0.029   0.032   0.035   0.038   0.041   0.044   0.048   0.052   0.056   0.060
            26          PC   0.064   0.068   0.072   0.076   0.080   0.085   0.090   0.095   0.100   0.105
            27          PC   0.110   0.115   0.120   0.126   0.133   0.140   0.147   0.155   0.163   0.172
            28          PC   0.181   0.191   0.203   0.218   0.236   0.257   0.283   0.387   0.663   0.707
            29          PC   0.735   0.758   0.776   0.791   0.804   0.815   0.825   0.834   0.842   0.849
            30          PC   0.856   0.863   0.869   0.875   0.881   0.887   0.893   0.898   0.903   0.908
            31          PC   0.913   0.918   0.922   0.926   0.930   0.934   0.938   0.942   0.946   0.950
            32          PC   0.953   0.956   0.959   0.962   0.965   0.968   0.971   0.974   0.977   0.980
            33          PC   0.983   0.986   0.989   0.992   0.995   0.998   1.000
            34          JD   3.815    10.0
            35          JD   3.614    30.0
                        *
            36          KK     L21   BASIN
            37          BA   0.525
            38          LG    0.34    0.25    4.55    0.45      14
            39          UI       0      16      15      16      16      15      41      45      62      70
            40          UI      82      93     101     112     121     131     136     144     143     150
            41          UI     152     150     149     145     141     136     130     115     109     102
            42          UI      91      87      79      73      68      64      59      55      49      46
            43          UI      43      40      35      34      30      30      27      25      24      24
                        *
            44          KK  DL21RE  DIVERT
            45          DT    RL21    57.3     0.0
            46          DI     0.0   500.0  5000.0 50000.0     0.0     0.0     0.0     0.0     0.0     0.0
            47          DQ     0.0   500.0  5000.0 50000.0     0.0     0.0     0.0     0.0     0.0     0.0
                        *
1                                                HEC-1 INPUT
PAGE  2

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

            48          KK  L21L22   ROUTE
            49          RS       1    FLOW      -1
            50          RC   0.032   0.032   0.032    8793  0.0020    0.00
            51          RX  100.00  101.00  107.00  117.00  169.00  409.00  512.00  513.00
            52          RY  1328.1 1328.00 1326.00 1324.00 1324.10 1326.00 1328.00 1328.10
                        *
            53          KK     L22   BASIN
            54          BA   0.362
            55          LG    0.46    0.25    4.35    0.58       2
            56          UI       0       7       6       7       7       6       7       7       7      14
            57          UI      19      19      24      26      30      32      36      38      40      43
            58          UI      48      47      49      55      55      57      60      60      61      61
            59          UI      64      64      64      64      65      65      62      61      61      60
            60          UI      58      57      54      50      48      46      46      42      39      38
                        *
            61          KK  DL22RE  DIVERT
            62          DT    RL22    15.6     0.0
            63          DI     0.0   500.0  5000.0 50000.0     0.0     0.0     0.0     0.0     0.0     0.0
            64          DQ     0.0   500.0  5000.0 50000.0     0.0     0.0     0.0     0.0     0.0     0.0
                        *
            65          KK   CPL22 COMBINE
            66          HC       2   0.887
                        *
            67          KK  L22W01   ROUTE
            68          RS       1    FLOW      -1
            69          RC   0.032   0.032   0.032    3159  0.0063    0.00
            70          RX  100.00  101.00  102.00  115.00  128.00  140.00  141.00  142.00
            71          RY  1320.2 1320.10 1320.00 1314.00 1314.10 1320.00 1320.10 1320.20
                        *
            72          KK     W01   BASIN
            73          BA   0.191
            74          LG    0.50    0.25    3.95    0.40       0
            75          UI       0       9      10       9      24      34      46      55      65      74
            76          UI      82      86      89      89      89      82      77      68      59      52
            77          UI      46      41      35      32      28      24      21      19      17      14
            78          UI      14      10      10      10       7       6       7       6       5       2
```

```
 79          UI       2       3       2       2       2       3       2       2       2       2
             *

 80          KK   CPW01 COMBINE
 81          HC       2   1.078
             *

 82          KK  W01W02   ROUTE
 83          RS       2    FLOW      -1
 84          RC   0.035   0.035   0.035    2650  0.0053    0.00
 85          RX  100.00  111.00  122.00  139.00  162.00  182.00  191.00  200.00
 86          RY  1290.5 1290.25 1290.00 1286.00 1286.10 1290.00 1290.25 1290.50
             *
1                                    HEC-1 INPUT
PAGE  3

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

 87          KK     W02   BASIN
 88          BA   0.394
 89          LG    0.31    0.25    4.65    0.40      16
 90          UI       0      41      81     192     284     356     393     378     320     238
 91          UI     185     142     107      82      64      45      35      29      21      10
 92          UI      11      10       9      11       0       0       0       0       0       0
 93          UI       0       0       0       0       0       0       0       0       0       0
 94          UI       0       0       0       0       0       0       0       0       0       0
             *

 95          KK   CPW02 COMBINE
 96          HC       2   1.472
             *

 97          KK  W02W05   ROUTE
 98          RS       1    FLOW      -1
 99          RC   0.035   0.035   0.035    2214  0.0045    0.00
100          RX  100.00  106.00  112.00  119.00  135.00  137.00  138.00  141.00
101          RY  1280.0 1278.00 1277.00 1276.00 1275.90 1277.00 1278.00 1280.00
             *

102          KK     W03   BASIN
103          BA   1.971
104          LG    0.10    0.25    4.00    0.74      25
105          UI       0     251     720    1471    1998    2675    1648    1355    1116     875
106          UI     660     563     428     312     278     192     163     123     123      52
107          UI      49      48      47      49      48       0       0       0       0       0
108          UI       0       0       0       0       0       0       0       0       0       0
109          UI       0       0       0       0       0       0       0       0       0       0
             *

110          KK  W03W04   ROUTE
111          RS       3    FLOW      -1
112          RC   0.035   0.035   0.035   18417  0.0490    0.00
113          RX  100.00  140.00  180.00  210.00  235.00  305.00  345.00  385.00
114          RY  1511.0 1510.50 1510.00 1502.00 1502.10 1510.00 1511.00 1512.00
             *

115          KK     W04   BASIN
116          BA   2.034
117          LG    0.14    0.25    4.60    0.50      26
118          UI       0     233     582    1223    1697    2408    2028    1390    1203     990
119          UI     795     619     527     421     317     265     212     181     125     115
120          UI     109      45      45      46      45      44      46       0       0       0
121          UI       0       0       0       0       0       0       0       0       0       0
122          UI       0       0       0       0       0       0       0       0       0       0
             *

123          KK   CPW04 COMBINE
124          HC       2   4.005
             *
```

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1                                                                    HEC-1 INPUT
PAGE  4

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

125          KK  W04W05   ROUTE
126          RS       3    FLOW      -1
127          RC   0.038   0.038   0.038    5298  0.0098    0.00
128          RX  100.00  120.00  140.00  160.00  174.00  214.00  234.00  254.00
129          RY  1313.0 1312.50 1312.00 1308.00 1308.10 1312.00 1312.50 1313.00
             *

130          KK     W05   BASIN
131          BA   0.316
132          LG    0.26    0.25    4.25    0.47      14
133          UI       0      48     200     294     451     549     367     251     129      72
134          UI      41      15      15      15       0       0       0       0       0       0
135          UI       0       0       0       0       0       0       0       0       0       0
136          UI       0       0       0       0       0       0       0       0       0       0
137          UI       0       0       0       0       0       0       0       0       0       0
             *

138          KK   CPW05 COMBINE
139          HC       3   5.793
             *

140          KK   SRW05 STORAGE
141          KO
142          RS       1    STOR      -1
143          SV                                                    0.70    2.75    8.64   29.89   76.16
144          SQ          87.84  302.83  591.07 1137.58 1394.68 1845.95 2402.27 2963.92 8536.34
145          SE  1258.0 1260.00 1262.00 1264.00 1268.00 1270.00 1272.00 1274.00 1276.00 1278.00
             *

146          KK  W05W12   ROUTE
147          RS       1    FLOW      -1
148          RC   0.025   0.025   0.025    5316  0.0071    0.00
149          RX  100.00  105.00  109.00  125.00  135.00  151.00  155.00  160.00
150          RY  1000.0  999.50  999.00  995.00  995.10  999.00  999.50 1000.00
             *

151          KK     W06   BASIN
152          BA   0.707
153          LG    0.10    0.25    4.30    0.64      25
154          UI       0     328    1223    1551     876     569     363     215     139      86
155          UI      43      35      34       0       0       0       0       0       0       0
156          UI       0       0       0       0       0       0       0       0       0       0
157          UI       0       0       0       0       0       0       0       0       0       0
158          UI       0       0       0       0       0       0       0       0       0       0
             *

159          KK     W07   BASIN
160          BA   0.312
161          LG    0.10    0.25    4.25    0.60      96
162          UI       0     306     934     548     303     157      82      44      20      21
163          UI       0       0       0       0       0       0       0       0       0       0
164          UI       0       0       0       0       0       0       0       0       0       0
165          UI       0       0       0       0       0       0       0       0       0       0
166          UI       0       0       0       0       0       0       0       0       0       0
             *
1                                                                    HEC-1 INPUT
PAGE  5

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

167          KK   CPW07 COMBINE
168          HC       2   1.019
             *
```

```
169          KK  W07W08   ROUTE
170          RS       1    FLOW      -1
171          RC   0.032   0.022   0.032    5589  0.0796    0.00
172          RX  100.00  136.00  173.00  197.00  234.00  254.00  298.00  342.00
173          RY  2880.0 2865.00 2850.00 2840.00 2840.00 2850.00 2865.00 2880.00
             *

174          KK     W08   BASIN
175          BA   0.445
176          LG    0.10    0.25    3.95    0.40      25
177          UI       0     496    1400     767     395     198      98      45      32       0
178          UI       0       0       0       0       0       0       0       0       0       0
179          UI       0       0       0       0       0       0       0       0       0       0
180          UI       0       0       0       0       0       0       0       0       0       0
181          UI       0       0       0       0       0       0       0       0       0       0
             *

182          KK   CPW08 COMBINE
183          HC       2   1.464
             *

184          KK     W09   BASIN
185          BA   0.335
186          LG    0.15    0.25    3.95    0.40      64
187          UI       0     394    1068     570     288     141      71      30      24       0
188          UI       0       0       0       0       0       0       0       0       0       0
189          UI       0       0       0       0       0       0       0       0       0       0
190          UI       0       0       0       0       0       0       0       0       0       0
191          UI       0       0       0       0       0       0       0       0       0       0
             *

192          KK   CPW09 COMBINE
193          HC       2   1.799
             *

194          KK  W09W10   ROUTE
195          RS       1    FLOW      -1
196          RC   0.035   0.022   0.035   11134  0.0683    0.00
197          RX  100.00  137.00  172.00  192.00  220.00  230.00  284.00  338.00
198          RY  1990.0 1975.00 1960.00 1950.00 1950.00 1960.00 1975.00 1990.00
             *

199          KK     W10   BASIN
200          BA   1.338
201          LG    0.10    0.25    3.95    0.40      25
202          UI       0     395    1548    2646    1783    1282     874     611     394     273
203          UI     184     135      70      52      53      53       0       0       0       0
204          UI       0       0       0       0       0       0       0       0       0       0
205          UI       0       0       0       0       0       0       0       0       0       0
206          UI       0       0       0       0       0       0       0       0       0       0
             *
```



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                                          HEC-1 INPUT

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

207          KK   CPW10 COMBINE
208          HC       2   3.137
             *

209          KK     W11   BASIN
210          BA   0.812
211          LG    0.10    0.25    3.95    0.40      25
212          UI       0     275    1046    1697    1048     762     488     340     214     147
213          UI      93      65      34      34      34       0       0       0       0       0
214          UI       0       0       0       0       0       0       0       0       0       0
215          UI       0       0       0       0       0       0       0       0       0       0
216          UI       0       0       0       0       0       0       0       0       0       0
             *

217          KK   CPW11 COMBINE
218          HC       2   3.949
             *

219          KK  W11W12   ROUTE
220          RS       6    FLOW      -1
221          RC   0.035   0.022   0.035   21182  0.0205    0.00
222          RX  100.00  107.00  114.00  125.00  140.00  154.00  244.00  334.00
223          RY  1310.0 1309.00 1308.00 1306.00 1305.90 1308.00 1309.00 1310.00
             *

224          KK     W12   BASIN
225          BA   1.805
226          LG    0.18    0.25    4.60    0.46      14
227          UI       0     176     316     723    1114    1380    1905    1487    1091     947
228          UI     808     705     564     448     406     338     262     222     192     151
229          UI     137     103      85      87      64      34      34      34      34      34
230          UI      33      34       0       0       0       0       0       0       0       0
231          UI       0       0       0       0       0       0       0       0       0       0
             *

232          KK   CPW12 COMBINE
233          HC       3  11.547
             *

234          KK  W12W13   ROUTE
235          RS       1    FLOW      -1
236          RC   0.022   0.022   0.022    2059  0.0121    0.00
237          RX  100.00  107.00  124.00  130.00  159.00  165.00  177.00  183.00
238          RY  1230.0 1228.00 1224.00 1222.00 1221.90 1224.00 1228.00 1230.00
             *

239          KK     W13   BASIN
240          BA   1.584
241          LG    0.21    0.25    4.90    0.36      14
242          UI       0     163     322     742    1082    1371    1809    1158     947     811
243          UI     694     579     443     387     335     252     205     181     140     125
244          UI      91      80      80      46      31      32      31      31      31      32
245          UI      31       0       0       0       0       0       0       0       0       0
246          UI       0       0       0       0       0       0       0       0       0       0
             *
```



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                                          HEC-1 INPUT

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

247          KK   CPW13 COMBINE
248          HC       2  13.131
             *

249          KK  W13W16   ROUTE
250          RS       3    FLOW      -1
251          RC   0.035   0.022   0.035    6232  0.0042    0.00
252          RX  100.00  167.00  178.00  189.00  218.00  228.00  239.00  250.00
253          RY  1216.0 1214.00 1212.00 1210.00 1209.90 1212.00 1214.00 1216.00
             *

254          KK     W15   BASIN
255          BA   1.227
256          LG    0.25    0.25    4.55    0.40      24
257          UI       0     140     338     725    1009    1399    1252     848     726     601
258          UI     489     377     321     260     195     162     134     109      82      68
259          UI      70      31      27      27      27      27      27      26       0       0
260          UI       0       0       0       0       0       0       0       0       0       0
261          UI       0       0       0       0       0       0       0       0       0       0
             *

262          KK  DW15RE  DIVERT
263          DT    W15R    91.9     0.0
264          DI     0.0   500.0  5000.0 50000.0     0.0     0.0     0.0     0.0     0.0     0.0
```

```
 265          DQ     0.0   500.0  5000.0 50000.0     0.0     0.0     0.0     0.0     0.0     0.0
              *

 266          KK     W14   BASIN
 267          BA   1.582
 268          LG    0.14    0.25    5.20    0.37      19
 269          UI       0     330    1263    2143    2612    1581    1214     868     644     451
 270          UI     324     238     167     134      76      52      52      53       0       0
 271          UI       0       0       0       0       0       0       0       0       0       0
 272          UI       0       0       0       0       0       0       0       0       0       0
 273          UI       0       0       0       0       0       0       0       0       0       0
              *

 274          KK  W14W15   ROUTE
 275          RS       1    FLOW      -1
 276          RC   0.025   0.025   0.025    7308  0.0104    0.00
 277          RX  100.00  105.00  109.00  125.00  135.00  151.00  155.00  160.00
 278          RY  1000.0  999.50  999.00  995.00  995.10  999.00  999.50 1000.00
              *

 279          KK   CPW15 COMBINE
 280          HC       2   2.809
              *

 281          KK  W15W16   ROUTE
 282          RS       2    FLOW      -1
 283          RC   0.035   0.035   0.035    2750  0.0087    0.00
 284          RX  100.00  135.00  232.00  328.00  360.00  498.00  635.00  735.00
 285          RY  1202.0 1200.00 1199.00 1198.00 1197.90 1199.00 1200.00 1202.00
              *
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LINE          ID.......1.......2.......3.......4.......5.......6.......7.......8.......9......10

 286          KK     W16   BASIN
 287          BA   0.530
 288          LG    0.27    0.25    4.55    0.41      21
 289          UI       0      67     213     353     466     717     736     529     396     266
 290          UI     131      94      58      21      20      21       0       0       0       0
 291          UI       0       0       0       0       0       0       0       0       0       0
 292          UI       0       0       0       0       0       0       0       0       0       0
 293          UI       0       0       0       0       0       0       0       0       0       0
              *

 294          KK  DW16RE  DIVERT
 295          DT    W16R    39.7     0.0
 296          DI     0.0   500.0  5000.0 50000.0     0.0     0.0     0.0     0.0     0.0     0.0
 297          DQ     0.0   500.0  5000.0 50000.0     0.0     0.0     0.0     0.0     0.0     0.0
              *

 298          KK   CPW16 COMBINE
 299          HC       3   16.47
              *

 300          KK  W16W20   ROUTE
 301          RS       1    FLOW      -1
 302          RC   0.025   0.025   0.025    3633  0.0130    0.00
 303          RX  100.00  105.00  109.00  125.00  135.00  151.00  155.00  160.00
 304          RY  1000.0  999.50  999.00  995.00  995.10  999.00  999.50 1000.00
              *

 305          KK     W18   BASIN
 306          BA   1.260
 307          LG    0.24    0.25    4.40    0.44      46
 308          UI       0    7025    2342     356       0       0       0       0       0       0
 309          UI       0       0       0       0       0       0       0       0       0       0
 310          UI       0       0       0       0       0       0       0       0       0       0
 311          UI       0       0       0       0       0       0       0       0       0       0
 312          UI       0       0       0       0       0       0       0       0       0       0
              *

 313          KK  DW18RE  DIVERT
 314          DT    W18R    94.3     0.0
 315          DI     0.0   500.0  5000.0 50000.0     0.0     0.0     0.0     0.0     0.0     0.0
 316          DQ     0.0   500.0  5000.0 50000.0     0.0     0.0     0.0     0.0     0.0     0.0
              *

 317          KK     W17   BASIN
 318          BA   1.497
 319          LG    0.28    0.25    4.30    0.43      24
 320          UI       0     266    1071    1806    2464    1531    1172     893     631     493
 321          UI     334     263     187     126     121      49      47      47      47       0
 322          UI       0       0       0       0       0       0       0       0       0       0
 323          UI       0       0       0       0       0       0       0       0       0       0
 324          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

 325          KK  W17W18   ROUTE
 326          RS       1    FLOW      -1
 327          RC   0.045   0.035   0.045    8559  0.0257    0.00
 328          RX  100.00  140.00  150.00  156.00  194.00  216.00  255.00  342.00
 329          RY  1302.0 1300.00 1298.00 1296.00 1295.90 1298.00 1300.00 1302.00
              *

 330          KK   CPW18 COMBINE
 331          HC       2   2.757
              *

 332          KK  W18W20   ROUTE
 333          RS       3    FLOW      -1
 334          RC   0.025   0.025   0.025    6914  0.0058    0.00
 335          RX  100.00  105.00  109.00  125.00  135.00  151.00  155.00  160.00
 336          RY  1000.0  999.50  999.00  995.00  995.10  999.00  999.50 1000.00
              *

 337          KK     W19   BASIN
 338          BA   1.158
 339          LG    0.11    0.25    3.88    0.42      97
 340          UI       0     923    3202    2092    1231     701     372     209     106      70
 341          UI       0       0       0       0       0       0       0       0       0       0
 342          UI       0       0       0       0       0       0       0       0       0       0
 343          UI       0       0       0       0       0       0       0       0       0       0
 344          UI       0       0       0       0       0       0       0       0       0       0
              *

 345          KK  DW19RE  DIVERT
 346          DT    RW19    86.7     0.0
 347          DI     0.0   500.0  5000.0 50000.0     0.0     0.0     0.0     0.0     0.0     0.0
 348          DQ     0.0   500.0  5000.0 50000.0     0.0     0.0     0.0     0.0     0.0     0.0
              *

 349          KK  W19W20   ROUTE
 350          RS       1    FLOW      -1
 351          RC   0.025   0.025   0.025    3790  0.0158    0.00
 352          RX  100.00  105.00  109.00  125.00  135.00  151.00  155.00  160.00
 353          RY  1000.0  999.50  999.00  995.00  995.10  999.00  999.50 1000.00
              *

 354          KK     W20   BASIN
 355          BA   1.137
 356          LG    0.26    0.25    4.10    0.54      25
 357          UI       0     138     365     765    1050    1503     993     779     662     534
 358          UI     409     332     276     203     166     136     105      82      67      65
 359          UI      27      26      27      26      27      26       0       0       0       0
 360          UI       0       0       0       0       0       0       0       0       0       0
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 361          UI       0       0       0       0       0       0       0       0       0       0
                       *
1                                          HEC-1 INPUT
PAGE 10

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


 362          KK  DW20RE  DIVERT
 363          DT    W20R    85.2     0.0
 364          DI     0.0   500.0  5000.0 50000.0     0.0     0.0     0.0     0.0     0.0     0.0
 365          DQ     0.0   500.0  5000.0 50000.0     0.0     0.0     0.0     0.0     0.0     0.0
                       *

 366          KK   CPW20 COMBINE
 367          HC       4  21.522
                       *

 368          KK   SRW20 STORAGE
 369          KM   STAGE-STORAGE-DISCHARGE CURVE FROM URS DESIGN OF FRS#3 OUTLET STRUCTURE
 370          KM   THE DISCHARGE INCLUDING OUTFLOW FROM PRINCIPAL AND EMERGENCY SPILLWAY,
 371          KM   AS WELL AS INFILTRATION
 372          RS       1    STOR      -1
 373          SV    44.8     388     585     846    1002    2045    3218    3557    4693    6510
 374          SQ    0.02    0.17     4.5     187     203     276     330    2936   24545   70439
 375          SE    1188    1198    1200    1202    1203    1208    1212    1213    1216    1220
                       *

 376          KK   OUTFL
 377          KM   SEPRATE OUTFLOW FROM INFILTRATION
                   * KO      1
 378          ZW   A=WT B=FRS3 C=FLOW
 379          DT    INFL
 380          DI       0     4.5      86     203     330    2936   24545   70439
 381          DQ       0     4.5      10      22      73      79      96     121
 382          ZZ
1
                SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

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

    36         L21
                .
                .
    45          .------->    RL21
    44      DL21RE
                V
                V
    48      L21L22
                .
                .
    53          .         L22
                .           .
                .           .
    62          .           .------->    RL22
    61          .      DL22RE
                .           .
                .           .
    65       CPL22...........
                V
                V
    67      L22W01
                .
                .
    72          .         W01
                .           .
                .           .
    80       CPW01...........
                V
                V
    82      W01W02
                .
                .
    87          .         W02
                .           .
                .           .
    95       CPW02...........
                V
                V
    97      W02W05
                .
                .
   102          .         W03
                .           V
                .           V
   110          .      W03W04
                .           .
                .           .
   115          .           .         W04
                .           .           .
                .           .           .
   123          .       CPW04...........
                .           V
                .           V
   125          .      W04W05
                .           .
                .           .
   130          .           .         W05
                .           .           .
                .           .           .
   138       CPW05........................
                V
                V
   140       SRW05
                V
                V
   146      W05W12
                .
                .
   151          .         W06
                .           .
                .           .
   159          .           .         W07
                .           .           .
                .           .           .
   167          .       CPW07...........
                .           V
                .           V
   169          .      W07W08
                .           .
                .           .
   174          .           .         W08
                .           .           .
                .           .           .
   182          .       CPW08...........
                .           .
                .           .
   184          .           .         W09
                .           .           .
                .           .           .
   192          .       CPW09...........
                .           V
                .           V
   194          .      W09W10
                .           .
                .           .
   199          .           .         W10
                .           .           .
                .           .           .
   207          .       CPW10...........
```

```
                .          .
                .          .
209             .          .          W11
                .          .            .
                .          .            .
217             .      CPW11............
                .          V
                .          V
219             .     W11W12
                .          .
                .          .
224             .          .          W12
                .          .            .
                .          .            .
232       CPW12........................
              V
              V
234      W12W13
                .
                .
239             .        W13
                .          .
                .          .
247       CPW13............
              V
              V
249      W13W16
                .
                .
254             .        W15
                .          .
                .          .
263             .          .-------->    W15R
262             .     DW15RE
                .          .
                .          .
266             .          .          W14
                .          .            V
                .          .            V
274             .          .      W14W15
                .          .            .
                .          .            .
279             .      CPW15............
                .          V
                .          V
281             .     W15W16
                .          .
                .          .
286             .          .          W16
                .          .            .
                .          .            .
295             .          .          .-------->    W16R
294             .          .      DW16RE
                .          .            .
                .          .            .
298       CPW16........................
              V
              V
300      W16W20
                .
                .
305             .        W18
                .          .
                .          .
314             .          .-------->    W18R
313             .     DW18RE
                .          .
                .          .
317             .          .          W17
                .          .            V
                .          .            V
```

```
325             .          .      W17W18
                .          .          .
                .          .          .
330             .      CPW18............
                .          V
                .          V
332             .     W18W20
                .          .
                .          .
337             .          .        W19
                .          .          .
                .          .          .
346             .          .          .-------->    RW19
345             .          .      DW19RE
                .          .          V
                .          .          V
349             .          .      W19W20
                .          .          .
                .          .          .
354             .          .          .        W20
                .          .          .          .
                .          .          .          .
363             .          .          .          .-------->    W20R
362             .          .          .     DW20RE
                .          .          .          .
                .          .          .          .
366       CPW20.................................
              V
              V
368       SRW20
                .
                .
379             .-------->    INFL
376       OUTFL
```

1

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

MAXIMUM STAGE +	TIME OF OPERATION MAX STAGE	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA
+	HYDROGRAPH AT	L21	170.	13.58	65.	18.	6.	.52
+	DIVERSION TO	RL21	170.	13.58	65.	18.	6.	.52
+	HYDROGRAPH AT	DL21RE	0.	.00	0.	0.	0.	.52
+	ROUTED TO	L21L22	0.	.00	0.	0.	0.	.52
+	HYDROGRAPH AT	L22	56.	14.75	25.	6.	2.	.36
+	DIVERSION TO	RL22	56.	14.75	25.	6.	2.	.36
+	HYDROGRAPH AT	DL22RE	0.	.00	0.	0.	0.	.36
+	2 COMBINED AT	CPL22	0.	.00	0.	0.	0.	.89

	ROUTED TO						
+	L22W01	0.	.00	0.	0.	0.	.89
	HYDROGRAPH AT						
+	W01	90.	12.92	21.	5.	2.	.19
	2 COMBINED AT						
+	CPW01	89.	12.92	21.	5.	2.	1.08
	ROUTED TO						
+	W01W02	86.	13.08	21.	5.	2.	1.08
	HYDROGRAPH AT						
+	W02	397.	12.42	55.	16.	5.	.39
	2 COMBINED AT						
+	CPW02	411.	12.42	75.	21.	7.	1.47
	ROUTED TO						
+	W02W05	394.	12.50	75.	21.	7.	1.47
	HYDROGRAPH AT						
+	W03	1963.	12.33	272.	83.	28.	1.97
	ROUTED TO						
+	W03W04	1598.	12.58	272.	83.	28.	1.97
	HYDROGRAPH AT						
+	W04	2123.	12.33	311.	93.	31.	2.03
	2 COMBINED AT						
+	CPW04	3223.	12.42	579.	175.	59.	4.01
	ROUTED TO						
+	W04W05	3016.	12.67	579.	175.	59.	4.01
	HYDROGRAPH AT						
+	W05	434.	12.33	42.	12.	4.	.32
	3 COMBINED AT						
+	CPW05	3535.	12.58	693.	207.	69.	5.79
	ROUTED TO						
+	SRW05	2948.	12.83	693.	207.	69.	5.79
	ROUTED TO						
+	W05W12	2902.	12.92	693.	207.	69.	5.79
	HYDROGRAPH AT						
+	W06	1115.	12.17	102.	31.	10.	.71
	HYDROGRAPH AT						
+	W07	705.	12.08	90.	31.	11.	.31
	2 COMBINED AT						
+	CPW07	1794.	12.17	191.	62.	21.	1.02
	ROUTED TO						
+	W07W08	1694.	12.17	191.	62.	21.	1.02
	HYDROGRAPH AT						
+	W08	890.	12.08	72.	21.	7.	.44
	2 COMBINED AT						
+	CPW08	2522.	12.17	262.	83.	28.	1.46
	HYDROGRAPH AT						
+	W09	737.	12.08	77.	26.	9.	.34
	2 COMBINED AT						
+	CPW09	3200.	12.17	338.	109.	36.	1.80
	ROUTED TO						
+	W09W10	2893.	12.17	338.	109.	36.	1.80
	HYDROGRAPH AT						
+	W10	2104.	12.17	216.	64.	21.	1.34
	2 COMBINED AT						
+	CPW10	4978.	12.17	553.	172.	57.	3.14
	HYDROGRAPH AT						
+	W11	1324.	12.17	132.	39.	13.	.81
	2 COMBINED AT						
+	CPW11	6283.	12.17	682.	210.	70.	3.95
	ROUTED TO						
+	W11W12	4366.	12.67	682.	210.	70.	3.95
	HYDROGRAPH AT						
+	W12	1601.	12.42	240.	68.	23.	1.80
	3 COMBINED AT						
+	CPW12	7893.	12.67	1589.	477.	160.	11.55
	ROUTED TO						
+	W12W13	7895.	12.67	1589.	477.	160.	11.55
	HYDROGRAPH AT						
+	W13	1528.	12.33	223.	62.	21.	1.58
	2 COMBINED AT						
+	CPW13	8728.	12.58	1791.	533.	179.	13.13
	ROUTED TO						
+	W13W16	8512.	12.83	1791.	533.	179.	13.13
	HYDROGRAPH AT						
+	W15	1315.	12.33	191.	57.	19.	1.23
	DIVERSION TO						
+	W15R	1315.	12.33	174.	46.	15.	1.23
	HYDROGRAPH AT						
+	DW15RE	173.	13.33	32.	10.	3.	1.23
	HYDROGRAPH AT						
+	W14	2159.	12.25	234.	68.	23.	1.58
	ROUTED TO						
+	W14W15	1878.	12.33	234.	67.	23.	1.58
	2 COMBINED AT						
+	CPW15	1871.	12.33	258.	77.	26.	2.81
	ROUTED TO						
+	W15W16	1676.	12.50	258.	77.	26.	2.81
	HYDROGRAPH AT						
+	W16	678.	12.33	79.	23.	8.	.53
	DIVERSION TO						
+	W16R	678.	12.33	76.	20.	7.	.53
	HYDROGRAPH AT						
+	DW16RE	33.	12.83	9.	3.	1.	.53
	3 COMBINED AT						
+	CPW16	9419.	12.75	2007.	600.	201.	16.47

```
          ROUTED TO
+                    W16W20     9326.  12.83       2007.       600.       201.     16.47
          HYDROGRAPH AT
+                       W18     3082.  12.08        244.        78.        26.      1.26
          DIVERSION TO
+                      W18R     2993.  12.00        171.        48.        16.      1.26
          HYDROGRAPH AT
+                    DW18RE     2095.  12.08        104.        31.        10.      1.26
          HYDROGRAPH AT
+                       W17     1981.  12.25        229.        68.        23.      1.50
          ROUTED TO
+                    W17W18     1587.  12.33        229.        68.        23.      1.50
          2 COMBINED AT
+                     CPW18     2589.  12.08        326.        98.        33.      2.76
          ROUTED TO
+                    W18W20     1903.  12.33        325.        98.        33.      2.76
          HYDROGRAPH AT
+                       W19     2526.  12.17        332.       116.        39.      1.16
          DIVERSION TO
+                      RW19     1230.  11.92        139.        44.        15.      1.16
          HYDROGRAPH AT
+                    DW19RE     2526.  12.17        252.        73.        24.      1.16
          ROUTED TO
+                    W19W20     2452.  12.17        251.        73.        24.      1.16
          HYDROGRAPH AT
+                       W20     1197.  12.33        169.        51.        17.      1.14
          DIVERSION TO
+                      W20R     1197.  12.33        160.        43.        14.      1.14
          HYDROGRAPH AT
+                    DW20RE       76.  13.67         23.         8.         3.      1.14
          4 COMBINED AT
+                     CPW20    10703.  12.75       2492.       751.       251.     21.52
          ROUTED TO
+                     SRW20      226.  20.08        225.       220.       155.     21.52
          DIVERSION TO
+                      INFL       31.  20.17         31.        29.        19.     21.52
          HYDROGRAPH AT
+                     OUTFL      195.  20.08        194.       191.       135.     21.52
:    .0
```

MODEL DOWNSTREAM OF WHITE TANKS FRS#3

```
1****************************************
 *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
 *              JUN   1998              *
 *           VERSION 4.1                *
 *                                      *
 *  RUN DATE   12MAY09  TIME  17:34:43  *
 *                                      *
 ****************************************

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

1                                                HEC-1 INPUT
PAGE  1

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

        1           ID         WHITE TANKS AREA, WATERSHED CONTRIBUTING TO FRS#3
        2           ID         PREPARED BY HOSKIN RYAN CONSULTANTS EXCLUSIVELY FOR
        3           ID         FRS#3 OUTLET CHANNEL DESIGN, 03-17-2009
        4           ID         BASED ON HDR HEC-1 MODEL OF FUTURE CONDITION WITHOUT CIP
        5           ID         MODIFICATIONS INCLUDE:
        6           ID         (1) UPDATE WITH AVERAGE RAINFALL DEPTH FOR JACKRABBIT CORRIDOR
        7           ID         (2) REMOVE RETENTION DIVERSION FOR W33. BEAUTIFUL ARIZONA ESTATE
        8           ID             AND LITCHFIELD HEIGHTS DO NOT PROVIDE RETENTION.
        9           ID         (3) UPDATE VERRADO DEVELOPMENT FOR W34 AND W35
       10           ID         (4) UPDATE RETENTION FOR W36 AND W37 (ARROYO SECO DEVELOPMENT)
       11           ID         (5) DIVIDE BASIN W37 INTO W37A AND W37B
       12           ID
       13           ID         ******************************************************************
       14           ID       Flood Control District of Maricopa County
       15           ID       FUTURE02 - Loop 303/ White Tanks ADMPU AHA
       16           ID       100 YEAR
       17           ID       24 Hour Storm
       18           ID       Unit Hydrograph: S-Graph
       19           ID       03/08/2009
       20           IT       5  1JAN99    1200    2000
       21           IN      15
       22           IO       5
                    *DIAGRAM
                    *
       23           JD   3.661  0.0001
       24           PC   0.000   0.002   0.005   0.008   0.011   0.014   0.017   0.020   0.023   0.026
       25           PC   0.029   0.032   0.035   0.038   0.041   0.044   0.048   0.052   0.056   0.060
       26           PC   0.064   0.068   0.072   0.076   0.080   0.085   0.090   0.095   0.100   0.105
       27           PC   0.110   0.115   0.120   0.126   0.133   0.140   0.147   0.155   0.163   0.172
       28           PC   0.181   0.191   0.203   0.218   0.236   0.257   0.283   0.387   0.663   0.707
       29           PC   0.735   0.758   0.776   0.791   0.804   0.815   0.825   0.834   0.842   0.849
       30           PC   0.856   0.863   0.869   0.875   0.881   0.887   0.893   0.898   0.903   0.908
       31           PC   0.913   0.918   0.922   0.926   0.930   0.934   0.938   0.942   0.946   0.950
       32           PC   0.953   0.956   0.959   0.962   0.965   0.968   0.971   0.974   0.977   0.980
       33           PC   0.983   0.986   0.989   0.992   0.995   0.998   1.000
       34           JD   3.478    10.0
                    *

       35           KK     WT3
       36           KM   OUTFLOW FROM WT FRS#3 OUTLET
       37           BA   21.52
       38           KO       5
       39           ZR  =QI A=WT B=FRS3 C=FLOW
                    *

       40           KK     W33   BASIN
       41           ZW   A=WT B=W33 C=FLOW
       42           BA   0.839
       43           LG    0.30    0.25    4.00    0.55      15
       44           UI       0      96     254     469     595     819    1172     911     714     530
       45           UI     367     191     142      97      37      29      30      29       0       0
       46           UI       0       0       0       0       0       0       0       0       0       0
       47           UI       0       0       0       0       0       0       0       0       0       0
       48           UI       0       0       0       0       0       0       0       0       0       0
                    *

1                                                HEC-1 INPUT
PAGE  2

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

       49           KK  W33W35   ROUTE
       50           KM        Cross-section: Estimated 4' deep and 4:1 side slopes, width based on aer
       51           KM        Manning's N Value: clean straight earth
       52           ZW   A=WT B=W33W35 C=FLOW
       53           RS       2    FLOW      -1
       54           RC   0.025   0.025   0.025    2658  0.0034
       55           RX  100.00  105.00  109.00  125.00  135.00  151.00  155.00  160.00
       56           RY  1000.0  999.50  999.00  995.00  995.10  999.00  999.50 1000.00
                    *
                    *
                    * UPDATE VERRADO DEVELOPMENT AT INDIAN SCHOOL AND JACKRABBIT TRAIL RD
                    * PER VERRADO MASTER DRAINAGE PLAN PREPARED BY WOOD PATEL. THE SCHOOL
                    * SITE (~0.184 SQ MI) COULD RETAIN 100-YR 24-HR RAINFALL, THEREFORE IS
                    * REMOVED FROM HEC-1 MODEL AS NON-CONTRIBUTING AREA, PER VERRADO MDP.
                    *

       57           KK     W34
       58           KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
       59           KM    L=      .78  Lca=      .35   S=   69.7  Kn= .054  LAG=    21
       60           KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
       61           BA    .238
       62           LG     .25     .25    3.95     .58      31
       63           UI      40     161     238     384     397     267     176      80      48      22
       64           UI      12      12      0.      0.      0.      0.      0.      0.      0.      0.
       65           UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                    *

       66           KK     W35
       67           KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
       68           KM    L=    0.860  Lca=      .32   S=   49.2  Kn= .054  LAG=    23
       69           KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
       70           BA    .089
       71           LG     .25     .25    3.95     .57      25
       72           UI      13      50      75     108     155     108      76      50      22      14
       73           UI      7.      4.      4.      0.      0.      0.      0.      0.      0.      0.
       74           UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
                    *

       75           KK   CP35R
       76           KM        ADD HYDROGRAPHS AT SRW35
```

```
 77          HC       2
             *

 78          KK   SRW35
 79          KM        RET BASIN AT CP30 - 54' WEIR OUTFALL
 80          RS       1    STOR       0       0
 81          SV       0    3.67    7.67   12.21   17.26   19.89   22.59   25.36   28.21
 82          SE    1153    1154    1155    1156    1157  1157.5    1158  1158.5    1159
 83          SQ     0.1    0.11    0.12    0.13    0.14    0.15    0.15   50.21  142.02
             *
1                                          HEC-1 INPUT
PAGE  3

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

 84          KK   CPW35
 85          KM        ADD HYDROGRAPHS AT JACKRABBIT TRAIL AND INDIAN SCHOOL RD
 86          HC       2    1.35
             *
             *

 87          KK  W35W36   ROUTE
 88          KM        Cross-section: Estimated 3' deep and 4:1 side slopes, width based on aer
 89          KM        Manning's N Value: earth w/ sparse trees and shrubs
 90          RS       3    FLOW      -1
 91          RC   0.025   0.025   0.025    6051  0.0076    0.00
 92          RX  100.00  105.00  109.00  125.00  135.00  151.00  155.00  160.00
 93          RY  1000.0  999.50  999.00  995.00  995.10  999.00  999.50 1000.00
             *

 94          KK     W36   BASIN
 95          BA   0.720
 96          LG    0.30    0.25    4.00    0.55      15
 97          UI       0      75     166     331     432     543     773     886     660     517
 98          UI     403     292     150     125      75      48      23      23      23      23
 99          UI       0       0       0       0       0       0       0       0       0       0
100          UI       0       0       0       0       0       0       0       0       0       0
101          UI       0       0       0       0       0       0       0       0       0       0
             *

102          KK  DW36RE  DIVERT
103          KM   ARROYO SECO FUTURE DEVELOPMENT HOLDS 127AC VACANT LAND IN BASIN W36. ASSUME 8
104          KM   100-YEAR 2-HOUR RETENTION. (C=0.65)(P=2.3IN). PASSQUALITY MOUNTAIN RANCH
105          KM   PROVIDES A DETENTION BASIN OF NEGLIGIBLE SIZE AND NO RETENTION.
106          DT    RW36    12.7
             * DT  W36R    53.9     0.0
107          DI     0.0   500.0  5000.0 50000.0     0.0     0.0     0.0     0.0     0.0     0.0
108          DQ     0.0   500.0  5000.0 50000.0     0.0     0.0     0.0     0.0     0.0     0.0
             *

109          KK   CPW36 COMBINE
110          HC       2    2.07
             *

111          KK  W36W37   ROUTE
112          KM        Cross-section: Estimated 4' deep and 4:1 side slopes, width based on aer
113          KM        Manning's N Value: earth w/ sparse trees and brush
114          RS       1    FLOW      -1
115          RC   0.025   0.025   0.025    4527  0.0084
116          RX  100.00  105.00  109.00  125.00  135.00  151.00  155.00  160.00
117          RY  1000.0  999.50  999.00  995.00  995.10  999.00  999.50 1000.00
             *

118          KK    W37A
119          KM    LG VARIABLE VALUES FROM HDR MODEL.
120          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
121          KM    L=      1.9  Lca=      1.0   S=   60.1  Kn= .034  LAG=  28.5
122          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
123          BA     .63
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1                                          HEC-1 INPUT
PAGE  4

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

124          LG     .29     .25    4.30     .48   19.00
125          UI     74.    203.    370.    478.    657.    903.    674.    517.    388.    244.
126          UI    128.     96.     62.     23.     23.     23.     23.      0.      0.      0.
127          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *

128          KK  DW37AR  DIVERT
129          KM   ARROYO SECO FUTURE DEVELOPMENT HOLDS 162AC VACANT LAND IN BASIN W37A. ASSUME
130          KM   80% 100-YEAR 2-HOUR RETENTION. (C=0.65)(P=2.3IN). THE SOUTH SUBDIVIION IN
131          KM   BASIN W37A DOES NOT PROVIDE RETENTION.
132          DT   RW37A    16.1
133          DI     0.0   500.0  5000.0 50000.0     0.0     0.0     0.0     0.0     0.0     0.0
134          DQ     0.0   500.0  5000.0 50000.0     0.0     0.0     0.0     0.0     0.0     0.0
             *

135          KK  CPW37A COMBINE
136          HC       2   2.703
             *

137          KK    W37B
138          KM    LG VARIABLE VALUES FROM HDR MODEL.
139          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
140          KM    L=      2.0  Lca=      1.0   S=   59.2  Kn= .034  LAG=  28.7
141          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
142          BA     .67
143          LG     .29     .25    4.30     .48   19.00
144          UI     79.    214.    390.    503.    686.    962.    720.    553.    416.    270.
145          UI    137.    105.     69.     24.     24.     24.     24.      0.      0.      0.
146          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *

147          KK  DW37BR  DIVERT
148          KM   ARROYO SECO FUTURE DEVELOPMENT HOLDS 30AC VACANT LAND IN BASIN W37B. ASSUME
149          KM   80% 100-YEAR 2-HOUR RETENTION. (C=0.65)(P=2.3IN). THE SOUTH SUBDIVIION IN
150          KM   BASIN W37B DOES NOT PROVIDE RETENTION.
151          DT   RW37B     3.0
152          DI     0.0   500.0  5000.0 50000.0     0.0     0.0     0.0     0.0     0.0     0.0
153          DQ     0.0   500.0  5000.0 50000.0     0.0     0.0     0.0     0.0     0.0     0.0
             *

154          KK  CPW37B COMBINE
155          HC       2   3.373
             *

156          KK  W37W38   ROUTE
157          KM        Cross-section: Estimated 4' deep and 4:1 side slopes
158          KM        width based on aerial / Manning's N Value: concrete channel
159          RS       1    FLOW      -1
160          RC   0.015   0.015   0.015     833  0.0072    0.00
161          RX  100.00  105.00  109.00  125.00  135.00  151.00  155.00  160.00
162          RY  1000.0  999.50  999.00  995.00  995.10  999.00  999.50 1000.00
             *
1                                          HEC-1 INPUT
PAGE  5

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

163          KK     W38   BASIN
164          BA   0.163
165          LG    0.10    0.25    4.15    0.59      84
166          UI       0      72     224     403     305     162      58      21      11       0
167          UI       0       0       0       0       0       0       0       0       0       0
168          UI       0       0       0       0       0       0       0       0       0       0
169          UI       0       0       0       0       0       0       0       0       0       0
170          UI       0       0       0       0       0       0       0       0       0       0
```

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                    *

171                 KK  DW38RE  DIVERT
172                 DT    W38    12.2     0.0
173                 DI    0.0    500.0  5000.0 50000.0     0.0     0.0     0.0     0.0     0.0     0.0
174                 DQ    0.0    500.0  5000.0 50000.0     0.0     0.0     0.0     0.0     0.0     0.0
                    *

175                 KK   CPW38 COMBINE
176                 HC       2   3.536
                    *
177                 ZZ
1
                 SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

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

   35          WT3
                .
                .
   40           .         W33
                .           V
                .           V
   49           .      W33W35
                .          .
                .          .
   57           .          .         W34
                .          .           .
                .          .           .
   66           .          .           .         W35
                .          .           .           .
                .          .           .           .
   75           .          .      CP35R............
                .          .           V
                .          .           V
   78           .          .      SRW35
                .          .           .
                .          .           .
   84           .       CPW35............
                .          V
                .          V
   87           .      W35W36
                .          .
                .          .
   94           .          .         W36
                .          .           .
                .          .           .
  106           .          .           .-------->    RW36
  102           .          .      DW36RE
                .          .           .
                .          .           .
  109           .       CPW36............
                .          V
                .          V
  111           .      W36W37
                .          .
                .          .
  118           .          .       W37A
                .          .           .
                .          .           .
  132           .          .           .-------->   RW37A
  128           .          .      DW37AR
                .          .           .
                .          .           .
  135           .      CPW37A............
                .          .
                .          .
  137           .          .       W37B
                .          .           .
                .          .           .
  151           .          .           .-------->   RW37B
  147           .          .      DW37BR
                .          .           .
                .          .           .
  154           .      CPW37B............
                .          V
                .          V
  156           .      W37W38
                .          .
                .          .
  163           .          .        W38
                .          .          .
                .          .          .
  172           .          .          .-------->    W38R
  171           .          .      DW38RE
                .          .          .
                .          .          .
  175           .      CPW38............
1
                                                   RUNOFF SUMMARY
                                              FLOW IN CUBIC FEET PER SECOND
                                           TIME IN HOURS,  AREA IN SQUARE MILES

                                                   PEAK   TIME OF     AVERAGE FLOW FOR MAXIMUM PERIOD      BASIN
MAXIMUM     TIME OF
            OPERATION       STATION      FLOW     PEAK                                                     AREA
STAGE       MAX STAGE
+                                                          6-HOUR     24-HOUR     72-HOUR

            HYDROGRAPH AT
+                              WT3       195.   20.08        194.        191.        135.      21.52

            HYDROGRAPH AT
+                              W33       799.   12.42         93.         27.          9.        .84

            ROUTED TO
+                           W33W35       781.   12.50         93.         27.          9.        .84

            HYDROGRAPH AT
+                              W34       301.   12.17         33.         10.          3.        .24

            HYDROGRAPH AT
+                              W35       106.   12.25         12.          4.          1.        .09

            2 COMBINED AT
+                            CP35R       406.   12.25         45.         14.          5.        .33

            ROUTED TO
+                            SRW35        10.   13.92          7.          2.          1.        .33

            2 COMBINED AT
+                            CPW35       781.   12.50         98.         29.         10.       1.35

            ROUTED TO
+                           W35W36       720.   12.67         97.         29.         10.       1.35

            HYDROGRAPH AT
+                              W36       640.   12.50         80.         23.          8.        .72

            DIVERSION TO
+                             RW36       330.   12.25         23.          6.          2.        .72

            HYDROGRAPH AT
+                           DW36RE       640.   12.50         63.         17.          6.        .72

            2 COMBINED AT
+                            CPW36      1249.   12.58        158.         45.         15.       2.07
```

```
                ROUTED TO
+                          W36W37     1168.   12.67        158.        45.        15.      2.07
                HYDROGRAPH AT
+                            W37A      650.   12.33         78.        23.         8.       .63
                DIVERSION TO
+                           RW37A      471.   12.17         29.         8.         3.       .63
                HYDROGRAPH AT
+                          DW37AR      650.   12.33         55.        15.         5.       .63
                2 COMBINED AT
+                          CPW37A     1432.   12.58        211.        59.        20.      2.70
                HYDROGRAPH AT
+                            W37B      690.   12.33         83.        24.         8.       .67
                DIVERSION TO
+                           RW37B        6.    8.42          5.         2.         1.       .67
                HYDROGRAPH AT
+                          DW37BR      690.   12.33         83.        23.         8.       .67
                2 COMBINED AT
+                          CPW37B     1804.   12.50        290.        82.        27.      3.37
                ROUTED TO
+                          W37W38     1836.   12.50        290.        82.        27.      3.37
                HYDROGRAPH AT
+                             W38      320.   12.17         39.        14.         5.       .16
                DIVERSION TO
+                             W38R     260.   12.08         21.         6.         2.       .16
                HYDROGRAPH AT
+                          DW38RE      294.   12.25         25.         7.         2.       .16
                2 COMBINED AT
+                           CPW38     1908.   12.50        313.        89.        30.      3.54
```

APPENDIX M – HEC-1 PROPOSED CONDITIONS

FIGURE 11A – PROPOSED CONDITIONS HEC-1 SCHEMATIC

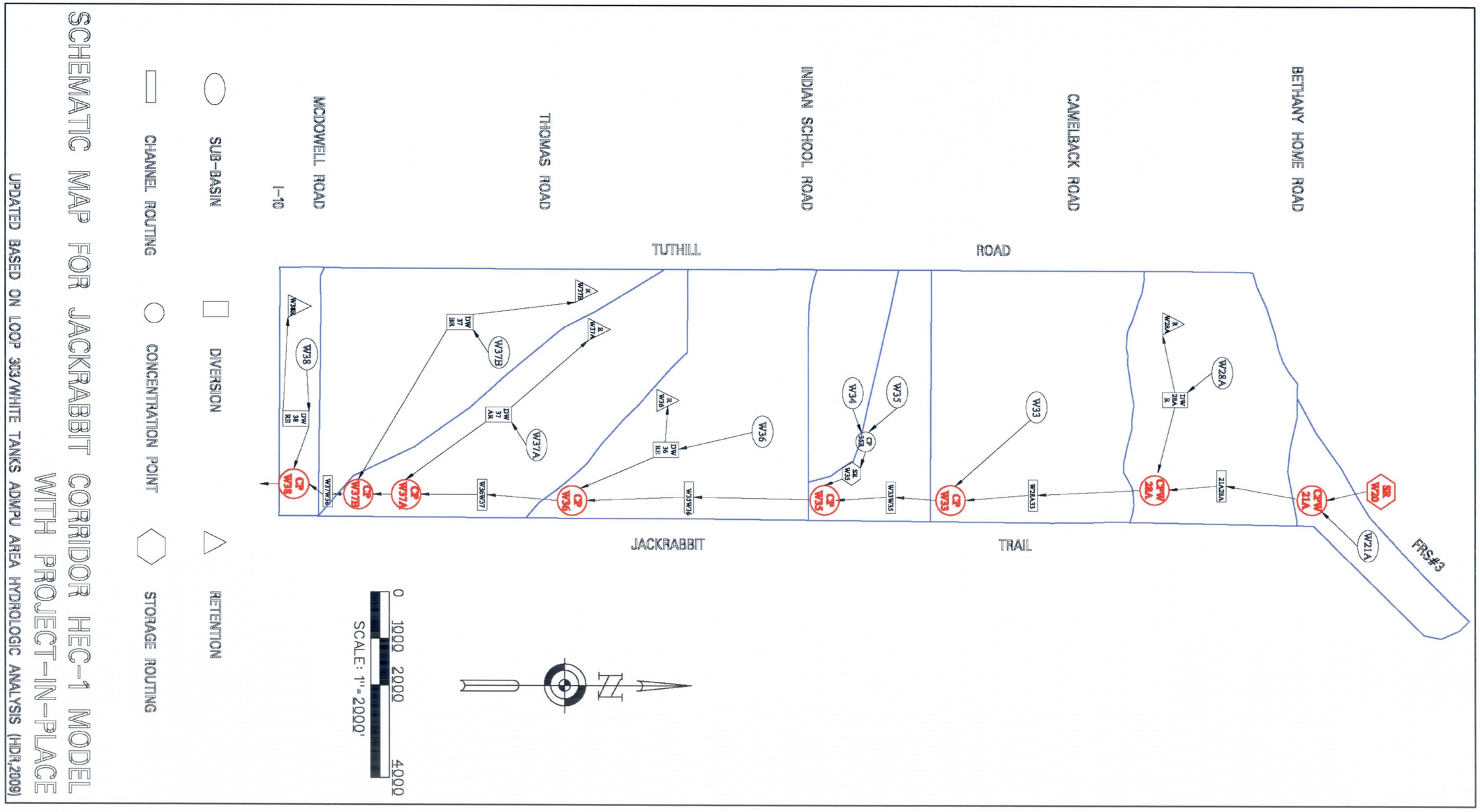

FIGURE 11B – PROPOSED CONDITIONS HEC-1 SCHEMATIC

MODEL UPSTREAM OF WHITE TANKS FRS#3

```
1****************************************                    ****************************************
 *                                      *                    *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *                    *   U.S. ARMY CORPS OF ENGINEERS       *
 *              JUN   1998              *                    *   HYDROLOGIC ENGINEERING CENTER      *
 *           VERSION 4.1                *                    *         609 SECOND STREET            *
 *                                      *                    *      DAVIS, CALIFORNIA 95616         *
 *  RUN DATE   27MAR09  TIME  10:22:54  *                    *          (916) 756-1104              *
 *                                      *                    *                                      *
 ****************************************                    ****************************************


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


          THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND
HEC1KW.  THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE
INPUT STRUCTURE.  THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS
THE FORTRAN77 VERSION   NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION,
DSS:WRITE STAGE FREQUENCY, DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL   LOSS RATE:GREEN AND AMPT
INFILTRATION KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM


1                                                HEC-1 INPUT
PAGE  1

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

            1           ID         WHITE TANKS AREA, WATERSHED CONTRIBUTING TO FRS#3
            2           ID         PREPARED BY HOSKIN RYAN CONSULTANTS EXCLUSIVELY FOR
            3           ID         FRS#3 OUTLET CHANNEL DESIGN, 03-17-2009
            4           ID         BASED ON HDR HEC-1 MODEL OF FUTURE CONDITION WITH CIP
            5           ID         MODIFICATIONS INCLUDE:
            6           ID         (1) UPDATE WITH AVERAGE RAINFALL DEPTH FOR FRS#3 WATERSHED ONLY
            7           ID         (2) UPDATE THE STAGE-STORAGE-DISCHARGE CURVE BASED ON URS DESIGN
            8           ID             OF FRS#3 PRINCIPAL AND EMERGENCY SPILLWAY (DISCHARGE
            9           ID             INCLUDING INFILTRATION)
           10           ID         (3) SEPARATE FRS#3 OUTFLOW AND INFILTRATION
           11           ID     ***************************************************************
           12           ID        Flood Control District of Maricopa County
           13           ID        FU_CIP_MB02 - Loop 303/ White Tanks ADMPU AHA
           14           ID        Major Basin: 02
           15           ID        100 Year - Return Period
           16           ID        24 Hour Storm
           17           ID        Multiple Storms
           18           ID        Unit Hydrograph: S-Graph
           19           ID        03/08/2009
           20           IT       5  1JAN99    1200    2000
           21           IN      15
           22           IO       5
                        *DIAGRAM
                        *
           23           JD   4.016  0.0001
           24           PC   0.000   0.002   0.005   0.008   0.011   0.014   0.017   0.020   0.023   0.026
           25           PC   0.029   0.032   0.035   0.038   0.041   0.044   0.048   0.052   0.056   0.060
           26           PC   0.064   0.068   0.072   0.076   0.080   0.085   0.090   0.095   0.100   0.105
           27           PC   0.110   0.115   0.120   0.126   0.133   0.140   0.147   0.155   0.163   0.172
           28           PC   0.181   0.191   0.203   0.218   0.236   0.257   0.283   0.387   0.663   0.707
           29           PC   0.735   0.758   0.776   0.791   0.804   0.815   0.825   0.834   0.842   0.849
           30           PC   0.856   0.863   0.869   0.875   0.881   0.887   0.893   0.898   0.903   0.908
           31           PC   0.913   0.918   0.922   0.926   0.930   0.934   0.938   0.942   0.946   0.950
           32           PC   0.953   0.956   0.959   0.962   0.965   0.968   0.971   0.974   0.977   0.980
           33           PC   0.983   0.986   0.989   0.992   0.995   0.998   1.000
           34           JD   3.815    10.0
           35           JD   3.614    30.0
                        *

           36           KK     L21   BASIN
           37           BA   0.525
           38           LG    0.34    0.25    4.55    0.45      14
           39           UI       0      16      15      16      16      15      41      45      62      70
           40           UI      82      93     101     112     121     131     136     144     143     150
           41           UI     152     150     149     145     141     136     130     115     109     102
           42           UI      91      87      79      73      68      64      59      55      49      46
           43           UI      43      40      35      34      30      30      27      25      24      24
                        *

           44           KK  DL21RE  DIVERT
           45           DT    RL21    57.3     0.0
           46           DI     0.0   500.0  5000.0 50000.0     0.0     0.0     0.0     0.0     0.0     0.0
           47           DQ     0.0   500.0  5000.0 50000.0     0.0     0.0     0.0     0.0     0.0     0.0
                        *
1                                                HEC-1 INPUT
PAGE  2

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

           48           KK  L21L22   ROUTE
           49           RS       1    FLOW      -1
           50           RC   0.032   0.032   0.032    8793  0.0020    0.00
           51           RX  100.00  101.00  107.00  117.00  169.00  409.00  512.00  513.00
           52           RY  1328.1 1328.00 1326.00 1324.00 1324.10 1326.00 1328.00 1328.10
                        *

           53           KK     L22   BASIN
           54           BA   0.362
           55           LG    0.46    0.25    4.35    0.58       2
           56           UI       0       7       6       7       7       6       7       7       7      14
           57           UI      19      19      24      26      30      32      36      38      40      43
           58           UI      48      47      49      55      55      57      60      60      61      61
           59           UI      64      64      64      64      65      65      62      61      61      60
           60           UI      58      57      54      50      48      46      46      42      39      38
                        *

           61           KK  DL22RE  DIVERT
           62           DT    RL22    15.6     0.0
           63           DI     0.0   500.0  5000.0 50000.0     0.0     0.0     0.0     0.0     0.0     0.0
           64           DQ     0.0   500.0  5000.0 50000.0     0.0     0.0     0.0     0.0     0.0     0.0
                        *

           65           KK   CPL22 COMBINE
           66           HC       2   0.887
                        *

           67           KK  L22W01   ROUTE
           68           RS       1    FLOW      -1
           69           RC   0.032   0.032   0.032    3159  0.0063    0.00
           70           RX  100.00  101.00  102.00  115.00  128.00  140.00  141.00  142.00
           71           RY  1320.2 1320.10 1320.00 1314.00 1314.10 1320.00 1320.10 1320.20
                        *

           72           KK     W01   BASIN
           73           BA   0.191
           74           LG    0.50    0.25    3.95    0.40       0
           75           UI       0       9      10       9      24      34      46      55      65      74
           76           UI      82      86      89      89      89      82      77      68      59      52
           77           UI      46      41      35      32      28      24      21      19      17      14
           78           UI      14      10      10      10       7       6       7       6       5       2
```

```
 79          UI       2       3       2       2       2       3       2       2       2       2
             *

 80          KK   CPW01 COMBINE
 81          HC       2   1.078
             *

 82          KK  W01W02   ROUTE
 83          RS       2    FLOW      -1
 84          RC   0.035   0.035   0.035    2650  0.0053    0.00
 85          RX  100.00  111.00  122.00  139.00  162.00  182.00  191.00  200.00
 86          RY  1290.5 1290.25 1290.00 1286.00 1286.10 1290.00 1290.25 1290.50
             *
1                                        HEC-1 INPUT
PAGE  3

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

 87          KK     W02   BASIN
 88          BA   0.394
 89          LG    0.31    0.25    4.65    0.40      16
 90          UI       0      41      81     192     284     356     393     378     320     238
 91          UI     185     142     107      82      64      45      35      29      21      10
 92          UI      11      10       9      11       0       0       0       0       0       0
 93          UI       0       0       0       0       0       0       0       0       0       0
 94          UI       0       0       0       0       0       0       0       0       0       0
             *

 95          KK   CPW02 COMBINE
 96          HC       2   1.472
             *

 97          KK  W02W05   ROUTE
 98          RS       1    FLOW      -1
 99          RC   0.035   0.035   0.035    2214  0.0045    0.00
100          RX  100.00  106.00  112.00  119.00  135.00  137.00  138.00  141.00
101          RY  1280.0 1278.00 1277.00 1276.00 1275.90 1277.00 1278.00 1280.00
             *

102          KK     W03   BASIN
103          BA   1.971
104          LG    0.10    0.25    4.00    0.74      25
105          UI       0     251     720    1471    1998    2675    1648    1355    1116     875
106          UI     660     563     428     312     278     192     163     123     123      52
107          UI      49      48      47      49      48       0       0       0       0       0
108          UI       0       0       0       0       0       0       0       0       0       0
109          UI       0       0       0       0       0       0       0       0       0       0
             *

110          KK  W03W04   ROUTE
111          RS       3    FLOW      -1
112          RC   0.035   0.035   0.035   18417  0.0490    0.00
113          RX  100.00  140.00  180.00  210.00  235.00  305.00  345.00  385.00
114          RY  1511.0 1510.50 1510.00 1502.00 1502.10 1510.00 1511.00 1512.00
             *

115          KK     W04   BASIN
116          BA   2.034
117          LG    0.14    0.25    4.60    0.50      26
118          UI       0     233     582    1223    1697    2408    2028    1390    1203     990
119          UI     795     619     527     421     317     265     212     181     125     115
120          UI     109      45      45      46      45      44      46       0       0       0
121          UI       0       0       0       0       0       0       0       0       0       0
122          UI       0       0       0       0       0       0       0       0       0       0
             *

123          KK   CPW04 COMBINE
124          HC       2   4.005
             *
```

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1                                        HEC-1 INPUT
PAGE  4

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

125          KK  W04W05   ROUTE
126          RS       3    FLOW      -1
127          RC   0.038   0.038   0.038    5298  0.0098    0.00
128          RX  100.00  120.00  140.00  160.00  174.00  214.00  234.00  254.00
129          RY  1313.0 1312.50 1312.00 1308.00 1308.10 1312.00 1312.50 1313.00
             *

130          KK     W05   BASIN
131          BA   0.316
132          LG    0.26    0.25    4.25    0.47      14
133          UI       0      48     200     294     451     549     367     251     129      72
134          UI      41      15      15      15       0       0       0       0       0       0
135          UI       0       0       0       0       0       0       0       0       0       0
136          UI       0       0       0       0       0       0       0       0       0       0
137          UI       0       0       0       0       0       0       0       0       0       0
             *

138          KK   CPW05 COMBINE
139          HC       3   5.793
             *

140          KK   SRW05 STORAGE
141          KO
142          RS       1    STOR      -1
143          SV                                                  0.70    2.75    8.64   29.89   76.16
144          SQ           87.84  302.83  591.07 1137.58 1394.68 1845.95 2402.27 2963.92 8536.34
145          SE  1258.0 1260.00 1262.00 1264.00 1268.00 1270.00 1272.00 1274.00 1276.00 1278.00
             *

146          KK  W05W12   ROUTE
147          RS       1    FLOW      -1
148          RC   0.025   0.025   0.025    5316  0.0071    0.00
149          RX  100.00  105.00  109.00  125.00  135.00  151.00  155.00  160.00
150          RY  1000.0  999.50  999.00  995.00  995.10  999.00  999.50 1000.00
             *

151          KK     W06   BASIN
152          BA   0.707
153          LG    0.10    0.25    4.30    0.64      25
154          UI       0     328    1223    1551     876     569     363     215     139      86
155          UI      43      35      34       0       0       0       0       0       0       0
156          UI       0       0       0       0       0       0       0       0       0       0
157          UI       0       0       0       0       0       0       0       0       0       0
158          UI       0       0       0       0       0       0       0       0       0       0
             *

159          KK     W07   BASIN
160          BA   0.312
161          LG    0.10    0.25    4.25    0.60      96
162          UI       0     306     934     548     303     157      82      44      20      21
163          UI       0       0       0       0       0       0       0       0       0       0
164          UI       0       0       0       0       0       0       0       0       0       0
165          UI       0       0       0       0       0       0       0       0       0       0
166          UI       0       0       0       0       0       0       0       0       0       0
             *
1                                        HEC-1 INPUT
PAGE  5

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

167          KK   CPW07 COMBINE
168          HC       2   1.019
             *
```

```
169          KK  W07W08   ROUTE
170          RS       1    FLOW      -1
171          RC   0.032   0.022   0.032    5589  0.0796    0.00
172          RX  100.00  136.00  173.00  197.00  234.00  254.00  298.00  342.00
173          RY  2880.0 2865.00 2850.00 2840.00 2840.00 2850.00 2865.00 2880.00
             *

174          KK     W08   BASIN
175          BA   0.445
176          LG    0.10    0.25    3.95    0.40      25
177          UI       0     496    1400     767     395     198      98      45      32       0
178          UI       0       0       0       0       0       0       0       0       0       0
179          UI       0       0       0       0       0       0       0       0       0       0
180          UI       0       0       0       0       0       0       0       0       0       0
181          UI       0       0       0       0       0       0       0       0       0       0
             *

182          KK   CPW08 COMBINE
183          HC       2   1.464
             *

184          KK     W09   BASIN
185          BA   0.335
186          LG    0.15    0.25    3.95    0.40      64
187          UI       0     394    1068     570     288     141      71      30      24       0
188          UI       0       0       0       0       0       0       0       0       0       0
189          UI       0       0       0       0       0       0       0       0       0       0
190          UI       0       0       0       0       0       0       0       0       0       0
191          UI       0       0       0       0       0       0       0       0       0       0
             *

192          KK   CPW09 COMBINE
193          HC       2   1.799
             *

194          KK  W09W10   ROUTE
195          RS       1    FLOW      -1
196          RC   0.035   0.022   0.035   11134  0.0683    0.00
197          RX  100.00  137.00  172.00  192.00  220.00  230.00  284.00  338.00
198          RY  1990.0 1975.00 1960.00 1950.00 1950.00 1960.00 1975.00 1990.00
             *

199          KK     W10   BASIN
200          BA   1.338
201          LG    0.10    0.25    3.95    0.40      25
202          UI       0     395    1548    2646    1783    1282     874     611     394     273
203          UI     184     135      70      52      53      53       0       0       0       0
204          UI       0       0       0       0       0       0       0       0       0       0
205          UI       0       0       0       0       0       0       0       0       0       0
206          UI       0       0       0       0       0       0       0       0       0       0
             *
```



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                                          HEC-1 INPUT

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

207          KK   CPW10 COMBINE
208          HC       2   3.137
             *

209          KK     W11   BASIN
210          BA   0.812
211          LG    0.10    0.25    3.95    0.40      25
212          UI       0     275    1046    1697    1048     762     488     340     214     147
213          UI      93      65      34      34      34       0       0       0       0       0
214          UI       0       0       0       0       0       0       0       0       0       0
215          UI       0       0       0       0       0       0       0       0       0       0
216          UI       0       0       0       0       0       0       0       0       0       0
             *

217          KK   CPW11 COMBINE
218          HC       2   3.949
             *

219          KK  W11W12   ROUTE
220          RS       6    FLOW      -1
221          RC   0.035   0.022   0.035   21182  0.0205    0.00
222          RX  100.00  107.00  114.00  125.00  140.00  154.00  244.00  334.00
223          RY  1310.0 1309.00 1308.00 1306.00 1305.90 1308.00 1309.00 1310.00
             *

224          KK     W12   BASIN
225          BA   1.805
226          LG    0.18    0.25    4.60    0.46      14
227          UI       0     176     316     723    1114    1380    1905    1487    1091     947
228          UI     808     705     564     448     406     338     262     222     192     151
229          UI     137     103      85      87      64      34      34      34      34      34
230          UI      33      34       0       0       0       0       0       0       0       0
231          UI       0       0       0       0       0       0       0       0       0       0
             *

232          KK   CPW12 COMBINE
233          HC       3  11.547
             *

234          KK  W12W13   ROUTE
235          RS       1    FLOW      -1
236          RC   0.022   0.022   0.022    2059  0.0121    0.00
237          RX  100.00  107.00  124.00  130.00  159.00  165.00  177.00  183.00
238          RY  1230.0 1228.00 1224.00 1222.00 1221.90 1224.00 1228.00 1230.00
             *

239          KK     W13   BASIN
240          BA   1.584
241          LG    0.21    0.25    4.90    0.36      14
242          UI       0     163     322     742    1082    1371    1809    1158     947     811
243          UI     694     579     443     387     335     252     205     181     140     125
244          UI      91      80      80      46      31      32      31      31      31      32
245          UI      31       0       0       0       0       0       0       0       0       0
246          UI       0       0       0       0       0       0       0       0       0       0
             *
```



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                                          HEC-1 INPUT

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

247          KK   CPW13 COMBINE
248          HC       2  13.131
             *

249          KK  W13W16   ROUTE
250          RS       3    FLOW      -1
251          RC   0.035   0.022   0.035    6232  0.0042    0.00
252          RX  100.00  167.00  178.00  189.00  218.00  228.00  239.00  250.00
253          RY  1216.0 1214.00 1212.00 1210.00 1209.90 1212.00 1214.00 1216.00
             *

254          KK     W15   BASIN
255          BA   1.227
256          LG    0.25    0.25    4.55    0.40      24
257          UI       0     140     338     725    1009    1399    1252     848     726     601
258          UI     489     377     321     260     195     162     134     109      82      68
259          UI      70      31      27      27      27      27      27      26       0       0
260          UI       0       0       0       0       0       0       0       0       0       0
261          UI       0       0       0       0       0       0       0       0       0       0
             *

262          KK  DW15RE  DIVERT
263          DT    W15R    91.9     0.0
264          DI     0.0   500.0  5000.0 50000.0     0.0     0.0     0.0     0.0     0.0     0.0
```

```
265          DQ     0.0   500.0  5000.0 50000.0     0.0     0.0     0.0     0.0     0.0     0.0
             *

266          KK     W14   BASIN
267          BA   1.582
268          LG    0.14    0.25    5.20    0.37      19
269          UI       0     330    1263    2143    2612    1581    1214     868     644     451
270          UI     324     238     167     134      76      52      52      53       0       0
271          UI       0       0       0       0       0       0       0       0       0       0
272          UI       0       0       0       0       0       0       0       0       0       0
273          UI       0       0       0       0       0       0       0       0       0       0
             *

274          KK  W14W15   ROUTE
275          RS       1    FLOW      -1
276          RC   0.025   0.025   0.025    7308  0.0104    0.00
277          RX  100.00  105.00  109.00  125.00  135.00  151.00  155.00  160.00
278          RY  1000.0  999.50  999.00  995.00  995.10  999.00  999.50 1000.00
             *

279          KK   CPW15 COMBINE
280          HC       2   2.809
             *

281          KK  W15W16   ROUTE
282          RS       2    FLOW      -1
283          RC   0.035   0.035   0.035    2750  0.0087    0.00
284          RX  100.00  135.00  232.00  328.00  360.00  498.00  635.00  735.00
285          RY  1202.0 1200.00 1199.00 1198.00 1197.90 1199.00 1200.00 1202.00
             *
```

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PAGE 8

HEC-1 INPUT

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

286          KK     W16   BASIN
287          BA   0.530
288          LG    0.27    0.25    4.55    0.41      21
289          UI       0      67     213     353     466     717     736     529     396     266
290          UI     131      94      58      21      20      21       0       0       0       0
291          UI       0       0       0       0       0       0       0       0       0       0
292          UI       0       0       0       0       0       0       0       0       0       0
293          UI       0       0       0       0       0       0       0       0       0       0
             *

294          KK  DW16RE  DIVERT
295          DT    W16R    39.7     0.0
296          DI     0.0   500.0  5000.0 50000.0     0.0     0.0     0.0     0.0     0.0     0.0
297          DQ     0.0   500.0  5000.0 50000.0     0.0     0.0     0.0     0.0     0.0     0.0
             *

298          KK   CPW16 COMBINE
299          HC       3   16.47
             *

300          KK  W16W20   ROUTE
301          RS       1    FLOW      -1
302          RC   0.025   0.025   0.025    3633  0.0130    0.00
303          RX  100.00  105.00  109.00  125.00  135.00  151.00  155.00  160.00
304          RY  1000.0  999.50  999.00  995.00  995.10  999.00  999.50 1000.00
             *

305          KK     W18   BASIN
306          BA   1.260
307          LG    0.24    0.25    4.40    0.44      46
308          UI       0    7025    2342     356       0       0       0       0       0       0
309          UI       0       0       0       0       0       0       0       0       0       0
310          UI       0       0       0       0       0       0       0       0       0       0
311          UI       0       0       0       0       0       0       0       0       0       0
312          UI       0       0       0       0       0       0       0       0       0       0
             *

313          KK  DW18RE  DIVERT
314          DT    W18R    94.3     0.0
315          DI     0.0   500.0  5000.0 50000.0     0.0     0.0     0.0     0.0     0.0     0.0
316          DQ     0.0   500.0  5000.0 50000.0     0.0     0.0     0.0     0.0     0.0     0.0
             *

317          KK     W17   BASIN
318          BA   1.497
319          LG    0.28    0.25    4.30    0.43      24
320          UI       0     266    1071    1806    2464    1531    1172     893     631     493
321          UI     334     263     187     126     121      49      47      47      47       0
322          UI       0       0       0       0       0       0       0       0       0       0
323          UI       0       0       0       0       0       0       0       0       0       0
324          UI       0       0       0       0       0       0       0       0       0       0
             *
```

1
PAGE 9

HEC-1 INPUT

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

325          KK  W17W18   ROUTE
326          RS       1    FLOW      -1
327          RC   0.045   0.035   0.045    8559  0.0257    0.00
328          RX  100.00  140.00  150.00  156.00  194.00  216.00  255.00  342.00
329          RY  1302.0 1300.00 1298.00 1296.00 1295.90 1298.00 1300.00 1302.00
             *

330          KK   CPW18 COMBINE
331          HC       2   2.757
             *

332          KK  W18W20   ROUTE
333          RS       3    FLOW      -1
334          RC   0.025   0.025   0.025    6914  0.0058    0.00
335          RX  100.00  105.00  109.00  125.00  135.00  151.00  155.00  160.00
336          RY  1000.0  999.50  999.00  995.00  995.10  999.00  999.50 1000.00
             *

337          KK     W19   BASIN
338          BA   1.158
339          LG    0.11    0.25    3.88    0.42      97
340          UI       0     923    3202    2092    1231     701     372     209     106      70
341          UI       0       0       0       0       0       0       0       0       0       0
342          UI       0       0       0       0       0       0       0       0       0       0
343          UI       0       0       0       0       0       0       0       0       0       0
344          UI       0       0       0       0       0       0       0       0       0       0
             *

345          KK  DW19RE  DIVERT
346          DT    RW19    86.7     0.0
347          DI     0.0   500.0  5000.0 50000.0     0.0     0.0     0.0     0.0     0.0     0.0
348          DQ     0.0   500.0  5000.0 50000.0     0.0     0.0     0.0     0.0     0.0     0.0
             *

349          KK  W19W20   ROUTE
350          RS       1    FLOW      -1
351          RC   0.025   0.025   0.025    3790  0.0158    0.00
352          RX  100.00  105.00  109.00  125.00  135.00  151.00  155.00  160.00
353          RY  1000.0  999.50  999.00  995.00  995.10  999.00  999.50 1000.00
             *

354          KK     W20   BASIN
355          BA   1.137
356          LG    0.26    0.25    4.10    0.54      25
357          UI       0     138     365     765    1050    1503     993     779     662     534
358          UI     409     332     276     203     166     136     105      82      67      65
359          UI      27      26      27      26      27      26       0       0       0       0
360          UI       0       0       0       0       0       0       0       0       0       0
```

```
 361          UI       0       0       0       0       0       0       0       0       0       0
              *
1                                          HEC-1 INPUT
PAGE 10

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

 362          KK  DW20RE  DIVERT
 363          DT    W20R    85.2     0.0
 364          DI     0.0   500.0  5000.0 50000.0     0.0     0.0     0.0     0.0     0.0     0.0
 365          DQ     0.0   500.0  5000.0 50000.0     0.0     0.0     0.0     0.0     0.0     0.0
              *

 366          KK   CPW20 COMBINE
 367          HC       4  21.522
              *

 368          KK   SRW20 STORAGE
 369          KM   STAGE-STORAGE-DISCHARGE CURVE FROM URS DESIGN OF FRS#3 OUTLET STRUCTURE
 370          KM   THE DISCHARGE INCLUDING OUTFLOW FROM PRINCIPAL AND EMERGENCY SPILLWAY,
 371          KM   AS WELL AS INFILTRATION
 372          RS       1    STOR      -1
 373          SV    44.8     388     585     846    1002    2045    3218    3557    4693    6510
 374          SQ    0.02    0.17     4.5     187     203     276     330    2936   24545   70439
 375          SE    1188    1198    1200    1202    1203    1208    1212    1213    1216    1220
              *

 376          KK   OUTFL
 377          KM   SEPRATE OUTFLOW FROM INFILTRATION
              * KO     1
 378          ZW   A=WT B=FRS3 C=FLOW
 379          DT    INFL
 380          DI       0     4.5      86     203     330    2936   24545   70439
 381          DQ       0     4.5      10      22      73      79      96     121
 382          ZZ
1
                SCHEMATIC DIAGRAM OF STREAM NETWORK
 INPUT
  LINE      (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

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

   36          L21
                .
                .
   45           .------->    RL21
   44       DL21RE
                V
                V
   48       L21L22
                .
                .
   53           .         L22
                .           .
                .           .
   62           .           .------->    RL22
   61           .      DL22RE
                .           .
                .           .
   65        CPL22...........
                V
                V
   67       L22W01
                .
                .
   72           .         W01
                .           .
                .           .
   80        CPW01...........
                V
```

```
                V
   82       W01W02
                .
                .
   87           .         W02
                .           .
                .           .
   95        CPW02...........
                V
                V
   97       W02W05
                .
                .
  102           .         W03
                .           V
                .           V
  110           .      W03W04
                .           .
                .           .
  115           .           .         W04
                .           .           .
                .           .           .
  123           .       CPW04...........
                .           V
                .           V
  125           .      W04W05
                .           .
                .           .
  130           .           .         W05
                .           .           .
                .           .           .
  138        CPW05........................
                V
                V
  140        SRW05
                V
                V
  146       W05W12
                .
                .
  151           .         W06
                .           .
                .           .
  159           .           .         W07
                .           .           .
                .           .           .
  167           .       CPW07...........
                .           V
                .           V
  169           .      W07W08
                .           .
                .           .
  174           .           .         W08
                .           .           .
                .           .           .
  182           .       CPW08...........
                .           .
                .           .
  184           .           .         W09
                .           .           .
                .           .           .
  192           .       CPW09...........
                .           V
                .           V
  194           .      W09W10
                .           .
                .           .
  199           .           .         W10
                .           .           .
                .           .           .
  207           .       CPW10...........
```

```
            .          .
            .          .
209         .          .        W11
            .          .          .
            .          .          .
217         .      CPW11...........
            .          V
            .          V
219         .     W11W12
            .          .
            .          .
224         .          .        W12
            .          .          .
            .          .          .
232      CPW12........................
            V
            V
234     W12W13
            .
            .
239         .        W13
            .          .
            .          .
247      CPW13...........
            V
            V
249     W13W16
            .
            .
254         .        W15
            .          .
            .          .
263         .          .-------->    W15R
262         .     DW15RE
            .          .
            .          .
266         .          .        W14
            .          .          V
            .          .          V
274         .          .     W14W15
            .          .          .
            .          .          .
279         .      CPW15...........
            .          V
            .          V
281         .     W15W16
            .          .
            .          .
286         .          .        W16
            .          .          .
            .          .          .
295         .          .          .-------->    W16R
294         .          .     DW16RE
            .          .          .
            .          .          .
298      CPW16........................
            V
            V
300     W16W20
            .
            .
305         .        W18
            .          .
            .          .
314         .          .-------->    W18R
313         .     DW18RE
            .          .
            .          .
317         .          .        W17
            .          .          V
            .          .          V
```

```
325         .          .     W17W18
            .          .          .
            .          .          .
330         .     CPW18............
            .          V
            .          V
332         .     W18W20
            .          .
            .          .
337         .          .        W19
            .          .          .
            .          .          .
346         .          .          .-------->    RW19
345         .          .     DW19RE
            .          .          V
            .          .          V
349         .          .     W19W20
            .          .          .
            .          .          .
354         .          .          .        W20
            .          .          .          .
            .          .          .          .
363         .          .          .          .-------->    W20R
362         .          .          .     DW20RE
            .          .          .          .
            .          .          .          .
366      CPW20.......................................
            V
            V
368      SRW20
            .
            .
379         .-------->    INFL
376      OUTFL
```

1

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

MAXIMUM STAGE +	TIME OF OPERATION MAX STAGE	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA
+	HYDROGRAPH AT	L21	170.	13.58	65.	18.	6.	.52
+	DIVERSION TO	RL21	170.	13.58	65.	18.	6.	.52
+	HYDROGRAPH AT	DL21RE	0.	.00	0.	0.	0.	.52
+	ROUTED TO	L21L22	0.	.00	0.	0.	0.	.52
+	HYDROGRAPH AT	L22	56.	14.75	25.	6.	2.	.36
+	DIVERSION TO	RL22	56.	14.75	25.	6.	2.	.36
+	HYDROGRAPH AT	DL22RE	0.	.00	0.	0.	0.	.36
+	2 COMBINED AT	CPL22	0.	.00	0.	0.	0.	.89

```
                ROUTED TO
+                    L22W01      0.    .00       0.       0.       0.     .89
                HYDROGRAPH AT
+                       W01     90.  12.92      21.       5.       2.     .19
                2 COMBINED AT
+                     CPW01     89.  12.92      21.       5.       2.    1.08
                ROUTED TO
+                    W01W02     86.  13.08      21.       5.       2.    1.08
                HYDROGRAPH AT
+                       W02    397.  12.42      55.      16.       5.     .39
                2 COMBINED AT
+                     CPW02    411.  12.42      75.      21.       7.    1.47
                ROUTED TO
+                    W02W05    394.  12.50      75.      21.       7.    1.47
                HYDROGRAPH AT
+                       W03   1963.  12.33     272.      83.      28.    1.97
                ROUTED TO
+                    W03W04   1598.  12.58     272.      83.      28.    1.97
                HYDROGRAPH AT
+                       W04   2123.  12.33     311.      93.      31.    2.03
                2 COMBINED AT
+                     CPW04   3223.  12.42     579.     175.      59.    4.01
                ROUTED TO
+                    W04W05   3016.  12.67     579.     175.      59.    4.01
                HYDROGRAPH AT
+                       W05    434.  12.33      42.      12.       4.     .32
                3 COMBINED AT
+                     CPW05   3535.  12.58     693.     207.      69.    5.79
                ROUTED TO
+                     SRW05   2948.  12.83     693.     207.      69.    5.79
                ROUTED TO
+                    W05W12   2902.  12.92     693.     207.      69.    5.79
                HYDROGRAPH AT
+                       W06   1115.  12.17     102.      31.      10.     .71
                HYDROGRAPH AT
+                       W07    705.  12.08      90.      31.      11.     .31
                2 COMBINED AT
+                     CPW07   1794.  12.17     191.      62.      21.    1.02
                ROUTED TO
+                    W07W08   1694.  12.17     191.      62.      21.    1.02
                HYDROGRAPH AT
+                       W08    890.  12.08      72.      21.       7.     .44
                2 COMBINED AT
+                     CPW08   2522.  12.17     262.      83.      28.    1.46
                HYDROGRAPH AT
+                       W09    737.  12.08      77.      26.       9.     .34
                2 COMBINED AT
+                     CPW09   3200.  12.17     338.     109.      36.    1.80
                ROUTED TO
+                    W09W10   2893.  12.17     338.     109.      36.    1.80
                HYDROGRAPH AT
+                       W10   2104.  12.17     216.      64.      21.    1.34
                2 COMBINED AT
+                     CPW10   4978.  12.17     553.     172.      57.    3.14
                HYDROGRAPH AT
+                       W11   1324.  12.17     132.      39.      13.     .81
                2 COMBINED AT
+                     CPW11   6283.  12.17     682.     210.      70.    3.95
                ROUTED TO
+                    W11W12   4366.  12.67     682.     210.      70.    3.95
                HYDROGRAPH AT
+                       W12   1601.  12.42     240.      68.      23.    1.80
                3 COMBINED AT
+                     CPW12   7893.  12.67    1589.     477.     160.   11.55
                ROUTED TO
+                    W12W13   7895.  12.67    1589.     477.     160.   11.55
                HYDROGRAPH AT
+                       W13   1528.  12.33     223.      62.      21.    1.58
                2 COMBINED AT
+                     CPW13   8728.  12.58    1791.     533.     179.   13.13
                ROUTED TO
+                    W13W16   8512.  12.83    1791.     533.     179.   13.13
                HYDROGRAPH AT
+                       W15   1315.  12.33     191.      57.      19.    1.23
                DIVERSION TO
+                      W15R   1315.  12.33     174.      46.      15.    1.23
                HYDROGRAPH AT
+                     DW15RE    173.  13.33      32.      10.       3.    1.23
                HYDROGRAPH AT
+                       W14   2159.  12.25     234.      68.      23.    1.58
                ROUTED TO
+                    W14W15   1878.  12.33     234.      67.      23.    1.58
                2 COMBINED AT
+                     CPW15   1871.  12.33     258.      77.      26.    2.81
                ROUTED TO
+                    W15W16   1676.  12.50     258.      77.      26.    2.81
                HYDROGRAPH AT
+                       W16    678.  12.33      79.      23.       8.     .53
                DIVERSION TO
+                      W16R    678.  12.33      76.      20.       7.     .53
                HYDROGRAPH AT
+                     DW16RE     33.  12.83       9.       3.       1.     .53
                3 COMBINED AT
+                     CPW16   9419.  12.75    2007.     600.     201.   16.47
```

```
          ROUTED TO
+                    W16W20     9326.  12.83      2007.      600.      201.    16.47
          HYDROGRAPH AT
+                       W18     3082.  12.08       244.       78.       26.     1.26
          DIVERSION TO
+                      W18R     2993.  12.00       171.       48.       16.     1.26
          HYDROGRAPH AT
+                    DW18RE     2095.  12.08       104.       31.       10.     1.26
          HYDROGRAPH AT
+                       W17     1981.  12.25       229.       68.       23.     1.50
          ROUTED TO
+                    W17W18     1587.  12.33       229.       68.       23.     1.50
          2 COMBINED AT
+                     CPW18     2589.  12.08       326.       98.       33.     2.76
          ROUTED TO
+                    W18W20     1903.  12.33       325.       98.       33.     2.76
          HYDROGRAPH AT
+                       W19     2526.  12.17       332.      116.       39.     1.16
          DIVERSION TO
+                      RW19     1230.  11.92       139.       44.       15.     1.16
          HYDROGRAPH AT
+                    DW19RE     2526.  12.17       252.       73.       24.     1.16
          ROUTED TO
+                    W19W20     2452.  12.17       251.       73.       24.     1.16
          HYDROGRAPH AT
+                       W20     1197.  12.33       169.       51.       17.     1.14
          HYDROGRAPH AT
+                       W20     1197.  12.33       169.       51.       17.     1.14
          DIVERSION TO
+                      W20R     1197.  12.33       160.       43.       14.     1.14
          HYDROGRAPH AT
+                    DW20RE       76.  13.67        23.        8.        3.     1.14
          4 COMBINED AT
+                     CPW20    10703.  12.75      2492.      751.      251.    21.52
          ROUTED TO
+                     SRW20      226.  20.08       225.      220.      155.    21.52
          DIVERSION TO
+                      INFL       31.  20.17        31.       29.       19.    21.52
          HYDROGRAPH AT
+                     OUTFL      195.  20.08       194.      191.      135.    21.52
:    .0
```

MODEL DOWNSTREAM OF WHITE TANKS FRS#3

```
1****************************************
 *                                      *
 *   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
 *              JUN   1998              *
 *           VERSION 4.1                *
 *                                      *
 *  RUN DATE   28MAY09  TIME  18:11:33  *
 *                                      *
 ****************************************

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

1                                          HEC-1 INPUT
PAGE  1

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

         1          ID         WHITE TANKS AREA, WATERSHED CONTRIBUTING TO FRS#3
         2          ID         PREPARED BY HOSKIN RYAN CONSULTANTS EXCLUSIVELY FOR
         3          ID         FRS#3 OUTLET CHANNEL DESIGN, 04-30-2009
         4          ID         BASED ON HDR HEC-1 MODEL OF FUTURE CONDITION WITH CIP
         5          ID         MODIFICATIONS INCLUDE:
         6          ID         (1) UPDATE WITH AVERAGE RAINFALL DEPTH FOR JACKRABBIT CORRIDOR
         7          ID         (2) CHANGE BASIN W21A TO UNDEVELOPMENT CONDITION
         8          ID         (3) ADD RETENTION DIVERSION FOR W28A
         9          ID         (4) REMOVE RETENTION DIVERSION FOR W33
        10          ID         (5) UPDATE VERRADO DEVELOPMENT FOR W34 AND W35
        11          ID         (6) UPDATE RETENTION FOR W36 AND W37 (ARROYO SECO DEVELOPMENT)
        12          ID         (7) DIVIDE BASIN W37 INTO W37A AND W37B
        13          ID         (8) UPDATE PROPOSED CHANNEL ALONG JACKRABBIT TRAIL
        14          ID         ******************************************************************
        15          ID       Flood Control District of Maricopa County
        16          ID       FU_CIP_MB02 - Loop 303/ White Tanks ADMPU AHA
        17          ID       Major Basin: 02
        18          ID       100 Year - Return Period
        19          ID       24 Hour Storm
        20          ID       Multiple Storms
        21          ID       Unit Hydrograph: S-Graph
        22          ID       03/08/2009
        23          IT       5  1JAN99    1200    2000
        24          IN      15
        25          IO       5
                    *DIAGRAM
                    *
        26          JD   3.661  0.0001
        27          PC   0.000   0.002   0.005   0.008   0.011   0.014   0.017   0.020   0.023   0.026
        28          PC   0.029   0.032   0.035   0.038   0.041   0.044   0.048   0.052   0.056   0.060
        29          PC   0.064   0.068   0.072   0.076   0.080   0.085   0.090   0.095   0.100   0.105
        30          PC   0.110   0.115   0.120   0.126   0.133   0.140   0.147   0.155   0.163   0.172
        31          PC   0.181   0.191   0.203   0.218   0.236   0.257   0.283   0.387   0.663   0.707
        32          PC   0.735   0.758   0.776   0.791   0.804   0.815   0.825   0.834   0.842   0.849
        33          PC   0.856   0.863   0.869   0.875   0.881   0.887   0.893   0.898   0.903   0.908
        34          PC   0.913   0.918   0.922   0.926   0.930   0.934   0.938   0.942   0.946   0.950
        35          PC   0.953   0.956   0.959   0.962   0.965   0.968   0.971   0.974   0.977   0.980
        36          PC   0.983   0.986   0.989   0.992   0.995   0.998   1.000
        37          JD   3.478    10.0
                    *
        38          KK     WT3
        39          KM   OUTFLOW FROM WT FRS#3 OUTLET
        40          BA   21.52
        41          KO       5
        42          ZR  =QI A=WT B=FRS3 C=FLOW
                    *
        43          KK    W21A   BASIN
        44          KM   FCD PROPERTY ADJACENT TO EMERGENCY AND PRINCIPAL SPILLWAY, NO LAND DEVELOPMEN
        45          KM   IN FUTURE
        46          ZW   A=WT B=W21A C=FLOW
        47          BA   0.199
        48          LG    0.35    0.35    4.35    0.40       0
        49          UI       0      38     150     260     315     274     179     117      75      49
1                                                   HEC-1 INPUT
PAGE  2

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

        50          UI      30      23       8       8       9       0       0       0       0       0
        51          UI       0       0       0       0       0       0       0       0       0       0
        52          UI       0       0       0       0       0       0       0       0       0       0
        53          UI       0       0       0       0       0       0       0       0       0       0
                    *
        54          KK  CPW21A COMBINE
        55          ZW   A=WT B=CPW21A C=FLOW
        56          HC       2   0.199
                    *
        57          KK  21A28A   ROUTE
        58          KM   PROPOSED JACKRABBIT CHANNEL, BOTTOM WIDTH=30FT, SIDE SLOPE 6:1
        59          ZW   A=WT B=21A28A C=FLOW
        60          RS       4    FLOW      -1
        61          RC   0.045   0.035   0.045    3560  0.0010
        62          RX     100     110     120     150     180     210     220     230
        63          RY    1001    1000    1000     995     995    1000    1000    1001
                    *
        64          KK    W28A   BASIN
        65          BA   0.642
        66          LG    0.26    0.25    4.55    0.41      22
        67          UI       0      85     281     456     611     978     845     622     457     266
        68          UI     145      96      47      26      26      27       0       0       0       0
        69          UI       0       0       0       0       0       0       0       0       0       0
        70          UI       0       0       0       0       0       0       0       0       0       0
        71          UI       0       0       0       0       0       0       0       0       0       0
                    *
        72          KK  DW28AR
        73          KM   FUTURE DEVELOPMENT ON 301AC VACANT LAND OF MARACAY, 80% RETENTION VOLUME ASSU
        74          KM   (C=0.65)(P=2.3IN)
        75          ZW   A=WT B=DW28AR C=FLOW
        76          DT   RW28A    30.0
        77          DI       0   10000
        78          DQ       0   10000
                    *
        79          KK  CPW28A COMBINE
        80          ZW   A=WT B=CPW28A C=FLOW
```

```
 81          HC       2   0.841
             *

 82          KK  W28A33   ROUTE
 83          KM   PROPOSED JACKRABBIT CHANNEL, BOTTOM WIDTH=40FT, SIDE SLOPE 4:1
 84          ZW   A=WT B=W28A33 C=FLOW
 85          RS       5    FLOW      -1
 86          RC   0.045   0.035   0.045    4336  0.0010
 87          RX     100     110     120     140     180     200     210     220
 88          RY    1001    1000    1000     995     995    1000    1000    1001
             *
1                                        HEC-1 INPUT
PAGE  3

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

 89          KK     W33   BASIN
 90          ZW   A=WT B=W33 C=FLOW
 91          BA   0.839
 92          LG    0.30    0.25    4.00    0.55      15
 93          UI       0      96     254     469     595     819    1172     911     714     530
 94          UI     367     191     142      97      37      29      30      29       0       0
 95          UI       0       0       0       0       0       0       0       0       0       0
 96          UI       0       0       0       0       0       0       0       0       0       0
 97          UI       0       0       0       0       0       0       0       0       0       0
             *

 98          KK   CPW33 COMBINE
 99          ZW   A=WT B=CPW33 C=FLOW
100          HC       2    1.68
             *

101          KK  W33W35   ROUTE
102          KM   PROPOSED JACKRABBIT CHANNEL, BOTTOM WIDTH=40FT, SIDE SLOPE 6:1
103          ZW   A=WT B=W33W35 C=FLOW
104          RS       3    FLOW      -1
105          RC   0.045   0.035   0.045    2658  0.0010
106          RX     100     110     116     152     192     228     240     250
107          RY    1001    1000    1000     994     994    1000    1000    1001
             *
             * UPDATE VERRADO DEVELOPMENT AT INDIAN SCHOOL AND JACKRABBIT TRAIL RD
             * PER VERRADO MASTER DRAINAGE PLAN PREPARED BY WOOD PATEL. THE SCHOOL
             * SITE (~0.184 SQ MI) COULD RETAIN 100-YR 24-HR RAINFALL, THEREFORE IS
             * REMOVED FROM HEC-1 MODEL AS NON-CONTRIBUTING AREA, PER VERRADO MDP.
             *

108          KK     W34
109          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
110          KM    L=      .78  Lca=      .35   S=   69.7  Kn= .054  LAG=    21
111          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
112          BA    .238
113          LG     .25     .25    3.95     .58      31
114          UI      40     161     238     384     397     267     176      80      48      22
115          UI      12      12      0.      0.      0.      0.      0.      0.      0.      0.
116          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *

117          KK     W35
118          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
119          KM    L=    0.860  Lca=      .32   S=   49.2  Kn= .054  LAG=    23
120          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
121          BA    .089
122          LG     .25     .25    3.95     .57      25
123          UI      13      50      75     108     155     108      76      50      22      14
124          UI      7.      4.      4.      0.      0.      0.      0.      0.      0.      0.
125          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

126          KK   CP35R
127          KM        ADD HYDROGRAPHS AT SRW35
128          HC       2
             *

129          KK   SRW35
130          KM        RET BASIN AT CP30 - 54' WEIR OUTFALL
131          ZW   A=WT B=SRW35 C=FLOW
132          RS       1    STOR       0       0
133          SV       0    3.67    7.67   12.21   17.26   19.89   22.59   25.36   28.21
134          SE    1153    1154    1155    1156    1157  1157.5    1158  1158.5    1159
135          SQ     0.1    0.11    0.12    0.13    0.14    0.15    0.15   50.21  142.02
             *

136          KK   CPW35
137          KM        ADD HYDROGRAPHS AT JACKRABBIT TRAIL AND INDIAN SCHOOL RD
138          ZW   A=WT B=CPW35 C=FLOW
139          HC       2
             *

140          KK  W35W36   ROUTE
141          KM   PROPOSED JACKRABBIT CHANNEL, BOTTOM WIDTH=40FT, SIDE SLOPE 4:1
142          ZW   A=WT B=W35W36 C=FLOW
143          RS       7    FLOW      -1
144          RC   0.045   0.035   0.045    6051  0.0010
145          RX     100     110     116     140     180     204     220     230
146          RY    1001    1000    1000     994     994    1000    1000    1001
             *

147          KK     W36   BASIN
148          BA   0.720
149          LG    0.30    0.25    4.00    0.55      15
150          UI       0      75     166     331     432     543     773     886     660     517
151          UI     403     292     150     125      75      48      23      23      23      23
152          UI       0       0       0       0       0       0       0       0       0       0
153          UI       0       0       0       0       0       0       0       0       0       0
154          UI       0       0       0       0       0       0       0       0       0       0
             *

155          KK  DW36RE  DIVERT
156          KM   ARROYO SECO FUTURE DEVELOPMENT HOLDS 127AC VACANT LAND IN BASIN W36. ASSUME 8
157          KM   100-YEAR 2-HOUR RETENTION. (C=0.65)(P=2.3IN). PASSQUALITY MOUNTAIN RANCH
158          KM   PROVIDES A DETENTION BASIN OF NEGLIGIBLE SIZE AND NO RETENTION.
159          ZW   A=WT B=DW36RE C=FLOW
160          DT    RW36    12.7
161          DI     0.0   500.0  5000.0 50000.0     0.0     0.0     0.0     0.0     0.0     0.0
162          DQ     0.0   500.0  5000.0 50000.0     0.0     0.0     0.0     0.0     0.0     0.0
             *
1                                        HEC-1 INPUT
PAGE  5

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

163          KK   CPW36 COMBINE
164          ZW   A=WT B=CPW36 C=FLOW
165          HC       2   2.911
             *

166          KK  W36W37   ROUTE
167          KM   PROPOSED JACKRABBIT CHANNEL, BOTTOM WIDTH=30FT, SIDE SLOPE 5:1
168          ZW   A=WT B=W36W37 C=FLOW
169          RS       5    FLOW      -1
170          RC   0.045   0.035   0.045    4527  0.0010
171          RX     100     110     120     150     180     210     220     230
172          RY    1001    1000    1000     994     994    1000    1000    1001
             *
```

```
173          KK    W37A
174          KM    LG VARIABLE VALUES FROM HDR MODEL.
175          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
176          KM    L=      1.9  Lca=      1.0   S=   60.1  Kn= .034  LAG=  28.5
177          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
178          BA     .63
179          LG     .29     .25    4.30     .48   19.00
180          UI     74.    203.    370.    478.    657.    903.    674.    517.    388.    244.
181          UI    128.     96.     62.     23.     23.     23.     23.      0.      0.      0.
182          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *

183          KK  DW37AR  DIVERT
184          KM   ARROYO SECO FUTURE DEVELOPMENT HOLDS 162AC VACANT LAND IN BASIN W37A. ASSUME
185          KM   80% 100-YEAR 2-HOUR RETENTION. (C=0.65)(P=2.3IN). THE SOUTH SUBDIVIION IN
186          KM   BASIN W37A DOES NOT PROVIDE RETENTION.
187          ZW   A=WT B=DW37AR C=FLOW
188          DT   RW37A    16.1
189          DI     0.0   500.0  5000.0 50000.0     0.0     0.0     0.0     0.0     0.0     0.0
190          DQ     0.0   500.0  5000.0 50000.0     0.0     0.0     0.0     0.0     0.0     0.0
             *

191          KK  CPW37A COMBINE
192          ZW   A=WT B=CPW37A C=FLOW
193          HC       2   3.541
             *

194          KK    W37B
195          KM    LG VARIABLE VALUES FROM HDR MODEL.
196          KM    THE FOLLOWING PARAMETERS WERE PROVIDED FOR THIS BASIN
197          KM    L=      2.0  Lca=      1.0   S=   59.2  Kn= .034  LAG=  28.7
198          KM    PHOENIX VALLEY S-GRAPH WAS USED FOR THIS BASIN
199          BA     .67
200          LG     .29     .25    4.30     .48   19.00
201          UI     79.    214.    390.    503.    686.    962.    720.    553.    416.    270.
202          UI    137.    105.     69.     24.     24.     24.     24.      0.      0.      0.
203          UI      0.      0.      0.      0.      0.      0.      0.      0.      0.      0.
             *
```

1
PAGE 6

HEC-1 INPUT

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

204          KK  DW37BR  DIVERT
205          KM   ARROYO SECO FUTURE DEVELOPMENT HOLDS 30AC VACANT LAND IN BASIN W37B. ASSUME
206          KM   80% 100-YEAR 2-HOUR RETENTION. (C=0.65)(P=2.3IN). THE SOUTH SUBDIVIION IN
207          KM   BASIN W37B DOES NOT PROVIDE RETENTION.
208          ZW   A=WT B=DW37BR C=FLOW
209          DT   RW37B     3.0
210          DI     0.0   500.0  5000.0 50000.0     0.0     0.0     0.0     0.0     0.0     0.0
211          DQ     0.0   500.0  5000.0 50000.0     0.0     0.0     0.0     0.0     0.0     0.0
             *

212          KK  CPW37B COMBINE
213          ZW   A=WT B=CPW37B C=FLOW
214          HC       2   4.214
             *

215          KK  W37W38   ROUTE
216          ZW   A=WT B=W37W38 C=FLOW
217          RS       1    FLOW      -1
218          RC   0.015   0.015   0.015     833  0.0015    0.00
219          RX  100.00  105.00  109.00  125.00  135.00  151.00  155.00  160.00
220          RY  1000.0  999.50  999.00  995.00  995.10  999.00  999.50 1000.00
             *

221          KK     W38   BASIN
222          BA   0.163
223          LG    0.10    0.25    4.15    0.59      84
224          UI       0      72     224     403     305     162      58      21      11       0
225          UI       0       0       0       0       0       0       0       0       0       0
226          UI       0       0       0       0       0       0       0       0       0       0
227          UI       0       0       0       0       0       0       0       0       0       0
228          UI       0       0       0       0       0       0       0       0       0       0
             *

229          KK  DW38RE  DIVERT
230          KM   ASSUME 80% 100-YEAR 2-HOUR RETENTION. (C=0.65)(P=2.3IN).
231          ZW   A=WT B=DW38RE C=FLOW
232          DT    W38R    10.4     0.0
233          DI     0.0   500.0  5000.0 50000.0     0.0     0.0     0.0     0.0     0.0     0.0
234          DQ     0.0   500.0  5000.0 50000.0     0.0     0.0     0.0     0.0     0.0     0.0
             *

235          KK   CPW38 COMBINE
236          ZW   A=WT B=CPW38 C=FLOW
237          HC       2   4.377
             *
238          ZZ
```

1

SCHEMATIC DIAGRAM OF STREAM NETWORK

```
INPUT
 LINE     (V) ROUTING          (--->) DIVERSION OR PUMP FLOW

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

   38        WT3
               .
               .
   43          .        W21A
               .           .
               .           .
   54     CPW21A............
               V
               V
   57     21A28A
               .
               .
   64          .        W28A
               .           .
               .           .
   76          .           .------->   RW28A
   72          .      DW28AR
               .           .
               .           .
   79     CPW28A............
               V
               V
   82     W28A33
               .
               .
   89          .         W33
               .           .
               .           .
   98      CPW33............
               V
               V
  101     W33W35
               .
               .
  108          .         W34
               .           .
               .           .
  117          .           .         W35
               .           .           .
               .           .           .
  126          .       CP35R............
               .           V
               .           V
  129          .       SRW35
               .           .
```

```
                .          .
136       CPW35...........
                V
                V
140      W35W36
                .
                .
147             .         W36
                .          .
                .          .
160             .          .-------->   RW36
155             .      DW36RE
                .          .
                .          .
163       CPW36...........
                V
                V
166      W36W37
                .
                .
173             .        W37A
                .          .
                .          .
188             .          .-------->   RW37A
183             .      DW37AR
                .          .
                .          .
191      CPW37A...........
                .
                .
194             .        W37B
                .          .
                .          .
209             .          .-------->   RW37B
204             .      DW37BR
                .          .
                .          .
212      CPW37B...........
                V
                V
215      W37W38
                .
                .
221             .         W38
                .          .
                .          .
232             .          .-------->   W38R
229             .      DW38RE
                .          .
                .          .
235       CPW38...........
```

1

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

MAXIMUM STAGE	TIME OF OPERATION MAX STAGE	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA
+	HYDROGRAPH AT	WT3	195.	20.08	194.	191.	135.	21.52
+	HYDROGRAPH AT	W21A	218.	12.25	17.	4.	1.	.20
+	2 COMBINED AT	CPW21A	218.	12.25	194.	191.	136.	.20
+	ROUTED TO	21A28A	195.	20.42	194.	191.	136.	.20
+	HYDROGRAPH AT	W28A	748.	12.33	86.	25.	8.	.64
+	DIVERSION TO	RW28A	748.	12.33	56.	15.	5.	.64
+	HYDROGRAPH AT	DW28AR	576.	12.50	36.	10.	3.	.64
+	2 COMBINED AT	CPW28A	664.	12.50	212.	198.	140.	.84
+	ROUTED TO	W28A33	340.	13.00	204.	196.	139.	.84
+	HYDROGRAPH AT	W33	799.	12.42	93.	27.	9.	.84
+	2 COMBINED AT	CPW33	795.	12.42	265.	213.	147.	1.68
+	ROUTED TO	W33W35	701.	12.58	263.	212.	147.	1.68
+	HYDROGRAPH AT	W34	301.	12.17	33.	10.	3.	.24
+	HYDROGRAPH AT	W35	106.	12.25	12.	4.	1.	.09
+	2 COMBINED AT	CP35R	406.	12.25	45.	14.	5.	.33
+	ROUTED TO	SRW35	10.	13.92	7.	2.	1.	.33
+	2 COMBINED AT	CPW35	701.	12.58	268.	214.	148.	2.01
+	ROUTED TO	W35W36	583.	13.08	262.	213.	148.	2.01
+	HYDROGRAPH AT	W36	640.	12.50	80.	23.	8.	.72
+	DIVERSION TO	RW36	330.	12.25	23.	6.	2.	.72
+	HYDROGRAPH AT	DW36RE	640.	12.50	63.	17.	6.	.72
+	2 COMBINED AT	CPW36	670.	13.08	307.	225.	153.	2.91
+	ROUTED TO	W36W37	620.	13.42	299.	224.	153.	2.91
+	HYDROGRAPH AT	W37A	650.	12.33	78.	23.	8.	.63
+	DIVERSION TO	RW37A	471.	12.17	29.	8.	3.	.63
+	HYDROGRAPH AT	DW37AR	650.	12.33	55.	15.	5.	.63

```
          2 COMBINED AT
+                    CPW37A      648.   12.33        337.       235.       157.      3.54
          HYDROGRAPH AT
+                     W37B      690.   12.33         83.        24.         8.       .67
          DIVERSION TO
+                    RW37B        6.    8.42          5.         2.         1.       .67
          HYDROGRAPH AT
+                    DW37BR      690.   12.33         83.        23.         8.       .67
          2 COMBINED AT
+                    CPW37B     1328.   12.33        404.       253.       164.      4.21
          ROUTED TO
+                    W37W38     1355.   12.33        404.       252.       164.      4.21
          HYDROGRAPH AT
+                     W38       320.   12.17         39.        14.         5.       .16
          DIVERSION TO
+                     W38R      181.   12.00         17.         5.         2.       .16
          HYDROGRAPH AT
+                    DW38RE      320.   12.17         29.         8.         3.       .16
          2 COMBINED AT
+                     CPW38     1549.   12.33        432.       261.       167.      4.38
```

APPENDIX N – HEC-RAS PROPOSED CONDITIONS

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
FRS3	31100	PF 1	560	1188.88	1192.55	1190.57	1192.65	0.000907	2.48	226.00	83.14	0.26
FRS3	30830	PF 1	560	1188.61	1192.32	1190.30	1192.41	0.000876	2.45	228.83	83.53	0.26
FRS3	30800	PF 1	560	1188.58	1191.79	1190.79	1192.31	0.005157	5.83	96.13	30.00	0.57
FRS3	30720	PF 1	560	1188.52	1191.89	1190.21	1192.01	0.001254	2.78	201.47	79.59	0.31
FRS3	30500	PF 1	560	1188.28	1191.67		1191.76	0.000932	2.45	228.85	87.68	0.27
FRS3	30200	PF 1	560	1187.98	1191.42		1191.50	0.000795	2.25	249.29	96.44	0.25
FRS3	29900	PF 1	560	1187.68	1191.13		1191.23	0.001052	2.53	221.42	88.45	0.28
FRS3	29600	PF 1	560	1187.38	1190.94	1188.74	1191.00	0.000539	1.92	290.99	106.06	0.20
FRS3	29300	PF 1	560	1187.08	1190.78	1188.57	1190.83	0.000544	1.87	300.08	115.54	0.20
FRS3	29000	PF 1	560	1186.78	1190.68	1188.00	1190.71	0.000283	1.51	371.93	121.05	0.15
FRS3	28700	PF 1	560	1186.48	1190.56	1187.93	1190.61	0.000394	1.76	318.37	104.98	0.18
FRS3	28400	PF 1	560	1186.18	1190.44	1187.82	1190.49	0.000433	1.80	310.92	106.21	0.19
FRS3	28100	PF 1	560	1185.88	1190.34	1187.41	1190.38	0.000308	1.60	350.07	110.64	0.16
FRS3	27860	PF 1	560	1185.64	1190.22	1187.31	1190.29	0.000432	2.02	277.14	78.79	0.19
FRS3	27826		Culvert									
FRS3	26450	PF 1	700	1182.91	1187.37		1187.51	0.001274	3.00	233.20	82.73	0.32
FRS3	26115.6	PF 1	700	1182.58	1186.91		1187.08	0.001328	3.26	214.41	68.99	0.33
FRS3	25840	PF 1	700	1182.03	1186.60		1186.74	0.001078	3.03	231.09	71.13	0.30
FRS3	25600	PF 1	700	1181.79	1186.34		1186.48	0.001100	3.05	229.41	70.91	0.30
FRS3	25300	PF 1	700	1181.49	1186.09		1186.19	0.000798	2.53	276.61	89.50	0.25
FRS3	25000	PF 1	700	1181.19	1185.88		1185.97	0.000660	2.39	292.58	89.10	0.23
FRS3	24700	PF 1	700	1180.89	1185.70	1183.01	1185.78	0.000567	2.27	308.19	96.98	0.22
FRS3	24400	PF 1	700	1180.59	1185.53		1185.61	0.000567	2.19	319.08	99.03	0.22
FRS3	24100	PF 1	700	1180.29	1185.31	1182.55	1185.41	0.000724	2.60	268.94	77.13	0.25
FRS3	24006.1		Culvert									
FRS3	23620	PF 1	700	1179.45	1184.31		1184.44	0.000908	2.91	240.52	68.91	0.27
FRS3	23300	PF 1	700	1179.12	1184.03		1184.16	0.000879	2.88	243.36	69.23	0.27
FRS3	23000	PF 1	700	1178.82	1183.77		1183.90	0.000850	2.84	246.34	69.58	0.27
FRS3	22750	PF 1	700	1178.57	1183.56	1180.87	1183.69	0.000821	2.81	249.37	69.93	0.26
FRS3	22703.8		Culvert									
FRS3	22600	PF 1	700	1178.32	1182.79		1182.96	0.001259	3.27	213.97	65.75	0.32
FRS3	22500	PF 1	700	1178.22	1182.75		1182.85	0.000686	2.52	278.29	80.73	0.24
FRS3	22200	PF 1	700	1177.92	1182.40		1182.57	0.001246	3.26	214.75	65.84	0.32
FRS3	21900	PF 1	700	1177.62	1182.00		1182.18	0.001359	3.36	208.23	65.07	0.33
FRS3	21600	PF 1	700	1177.32	1181.54		1181.74	0.001566	3.54	197.95	63.77	0.35
FRS3	21310	PF 1	700	1177.03	1181.13		1181.30	0.001412	3.33	210.39	68.89	0.34
FRS3	21269	PF 1	700	1176.99	1180.82	1179.32	1181.24	0.000595	5.22	133.98	35.67	0.48
FRS3	21260		Culvert									
FRS3	21142	PF 1	800	1173.68	1177.79		1178.02	0.001877	3.86	207.16	67.08	0.39
FRS3	20800	PF 1	800	1173.34	1177.23		1177.41	0.001589	3.43	233.34	80.19	0.35
FRS3	20497.5	PF 1	800	1173.04	1176.71		1176.90	0.001815	3.49	229.16	84.87	0.37
FRS3	20491.5	PF 1	800	1173.98	1176.01	1176.01	1176.82	0.006109	7.20	111.09	69.44	1.00
FRS3	20475	PF 1	800	1170.53	1174.40		1174.78	0.001545	4.90	163.42	64.59	0.54
FRS3	20395	PF 1	800	1170.45	1174.44		1174.60	0.001373	3.20	250.05	85.53	0.33
FRS3	20100	PF 1	800	1170.16	1174.08		1174.21	0.001209	2.87	278.74	102.24	0.31
FRS3	19832.3	PF 1	800	1169.89	1173.63		1173.82	0.001731	3.46	233.78	103.32	0.37
FRS3	19826.3	PF 1	800	1170.89	1172.92	1172.92	1173.74	0.006131	7.25	110.38	68.51	1.01
FRS3	19809.8	PF 1	800	1167.48	1172.02		1172.26	0.000798	3.89	205.52	69.72	0.40
FRS3	19729.8	PF 1	800	1167.31	1172.05		1172.15	0.000715	2.56	313.04	91.86	0.24
FRS3	19550	PF 1	800	1167.13	1171.95	1169.17	1172.03	0.000598	2.31	346.38	127.36	0.22
FRS3	19325	PF 1	800	1166.90	1171.75	1169.13	1171.87	0.000826	2.80	285.95	109.10	0.26
FRS3	19297.6	PF 1	800	1166.87	1171.42	1169.46	1171.83	0.000466	5.09	157.26	62.02	0.43
FRS3	19288.5		Culvert									
FRS3	18425	PF 1	800	1160.20	1164.38		1164.55	0.001343	3.37	237.10	69.93	0.32
FRS3	18300	PF 1	800	1160.07	1164.23		1164.39	0.001204	3.19	250.44	77.42	0.31
FRS3	18000	PF 1	800	1159.77	1163.84		1164.00	0.001427	3.15	254.19	91.68	0.33
FRS3	17676	PF 1	800	1159.45	1163.27		1163.47	0.001791	3.65	219.28	74.97	0.38

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
FRS3	17670	PF 1	800	1160.44	1162.53	1162.53	1163.39	0.006025	7.45	107.39	63.03	1.01
FRS3	17653.5	PF 1	800	1156.98	1161.07		1161.44	0.001377	4.88	163.95	59.51	0.52
FRS3	17573.5	PF 1	800	1156.86	1161.13		1161.27	0.001081	2.96	270.27	86.71	0.30
FRS3	17200	PF 1	800	1156.49	1160.63		1160.81	0.001399	3.41	234.27	73.28	0.34
FRS3	16900	PF 1	800	1156.19	1160.20		1160.36	0.001538	3.16	253.20	96.13	0.34
FRS3	16600	PF 1	800	1155.89	1159.80		1159.94	0.001268	2.95	270.80	98.54	0.31
FRS3	16300	PF 1	800	1155.59	1159.41		1159.55	0.001327	2.96	270.13	101.45	0.32
FRS3	15910	PF 1	800	1155.20	1158.42		1158.74	0.003392	4.59	174.14	68.02	0.51
FRS3	15885.4	PF 1	800	1155.17	1157.45	1157.45	1158.59	0.002804	8.54	93.68	41.71	1.00
FRS3	15876.4		Culvert									
FRS3	15778.5	PF 1	700	1151.89	1155.34		1155.50	0.001415	3.18	220.32	77.66	0.33
FRS3	15576	PF 1	700	1151.69	1155.05		1155.20	0.001495	3.17	220.82	81.55	0.34
FRS3	15570	PF 1	700	1152.68	1154.39	1154.39	1155.13	0.006291	6.91	101.35	68.92	1.00
FRS3	15553.5	PF 1	700	1149.18	1152.57		1152.89	0.001313	4.52	154.85	60.94	0.50
FRS3	15473.5	PF 1	700	1149.10	1152.58		1152.73	0.001388	3.16	221.70	77.76	0.33
FRS3	15306	PF 1	700	1148.94	1152.32		1152.49	0.001524	3.26	214.77	77.05	0.34
FRS3	15300	PF 1	700	1149.93	1151.65	1151.65	1152.41	0.006293	7.01	99.91	66.47	1.01
FRS3	15283.5	PF 1	700	1146.65	1150.03		1150.34	0.001259	4.47	156.45	60.54	0.49
FRS3	15203.5	PF 1	700	1146.57	1150.03		1150.19	0.001397	3.16	221.20	77.71	0.33
FRS3	14900	PF 1	700	1146.04	1149.61		1149.76	0.001370	3.13	223.62	78.69	0.33
FRS3	14600	PF 1	700	1145.50	1149.17		1149.33	0.001495	3.24	215.95	77.04	0.34
FRS3	14300	PF 1	700	1145.56	1148.33		1148.64	0.003858	4.43	157.89	71.88	0.53
FRS3	14260	PF 1	700	1144.70	1147.14	1147.14	1148.28	0.015911	8.55	81.83	36.54	1.01
FRS3	14235	PF 1	700	1141.68	1145.11	1144.00	1145.62	0.000800	5.73	122.07	36.70	0.55
FRS3	14227		Culvert									
FRS3	14150	PF 1	700	1141.27	1144.61		1144.88	0.002633	4.16	168.32	62.78	0.45
FRS3	13900	PF 1	700	1140.88	1144.13		1144.31	0.001797	3.41	205.15	77.85	0.37
FRS3	13600	PF 1	700	1140.27	1143.54		1143.74	0.002020	3.59	195.21	75.03	0.39
FRS3	13300	PF 1	700	1139.68	1142.72		1142.99	0.003086	4.17	168.04	70.99	0.48
FRS3	13275	PF 1	700	1139.65	1141.76	1141.76	1142.77	0.015327	8.07	86.72	43.35	1.01
FRS3	13250	PF 1	700	1135.92	1139.96	1138.24	1140.33	0.000481	4.87	143.65	36.73	0.43
FRS3	13238		Culvert									
FRS3	13150	PF 1	700	1135.81	1139.71		1139.90	0.001467	3.44	203.78	65.10	0.34
FRS3	12900	PF 1	700	1135.30	1139.48		1139.60	0.000879	2.69	260.15	82.33	0.27
FRS3	12750	PF 1	700	1135.01	1139.22		1139.41	0.001578	3.55	197.43	63.72	0.35
FRS3	12466	PF 1	700	1134.72	1138.70		1138.92	0.001909	3.75	186.47	63.84	0.39
FRS3	12460	PF 1	700	1135.72	1137.95	1137.95	1138.84	0.005972	7.54	92.85	53.06	1.00
FRS3	12443.5	PF 1	700	1132.22	1136.24		1136.79	0.002329	5.93	118.07	47.26	0.66
FRS3	12363.5	PF 1	700	1132.14	1136.38		1136.53	0.001314	3.16	221.51	74.43	0.32
FRS3	12200	PF 1	700	1131.97	1136.17		1136.32	0.001280	3.07	228.11	78.63	0.32
FRS3	11966	PF 1	700	1131.74	1135.77		1135.97	0.001670	3.59	195.25	64.76	0.36
FRS3	11960	PF 1	700	1132.73	1134.99	1134.99	1135.89	0.005974	7.62	91.85	51.61	1.01
FRS3	11943.5	PF 1	700	1129.24	1133.04		1133.75	0.003205	6.76	103.53	43.16	0.77
FRS3	11863.5	PF 1	700	1129.15	1133.19		1133.41	0.001861	3.76	186.19	62.31	0.38
FRS3	11606	PF 1	700	1128.90	1132.74		1132.93	0.001796	3.46	202.50	75.34	0.37
FRS3	11600	PF 1	700	1129.89	1132.04	1132.04	1132.85	0.006135	7.23	96.85	60.32	1.01
FRS3	11583.5	PF 1	700	1126.39	1130.37		1130.83	0.002080	5.42	129.13	54.56	0.62
FRS3	11503.5	PF 1	700	1126.31	1130.46		1130.61	0.001337	3.11	224.98	78.51	0.32
FRS3	11300	PF 1	700	1126.11	1130.11		1130.30	0.001695	3.49	200.60	70.31	0.36
FRS3	11116	PF 1	700	1125.92	1129.79		1129.98	0.001816	3.50	199.98	73.56	0.37
FRS3	11110	PF 1	700	1126.92	1129.07	1129.07	1129.89	0.006133	7.28	96.21	59.30	1.01
FRS3	11093.5	PF 1	700	1123.42	1127.35		1127.86	0.002390	5.71	122.68	53.26	0.66
FRS3	11013.5	PF 1	700	1123.34	1127.45		1127.61	0.001390	3.16	221.18	77.45	0.33
FRS3	10856	PF 1	700	1123.18	1127.14		1127.35	0.001877	3.68	189.96	66.13	0.38
FRS3	10850	PF 1	700	1124.17	1126.39	1126.39	1127.27	0.006000	7.49	93.47	54.17	1.00
FRS3	10833.5	PF 1	700	1120.68	1124.04	1123.91	1124.99	0.004909	7.82	89.48	41.37	0.94
FRS3	10753.5	PF 1	700	1120.59	1124.35		1124.54	0.001727	3.46	202.27	72.74	0.37
FRS3	10630	PF 1	700	1120.47	1123.91		1124.23	0.003373	4.56	153.41	60.16	0.50
FRS3	10603.7	PF 1	700	1120.44	1122.92	1122.92	1124.07	0.002686	8.61	81.30	35.53	1.00

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FRS3	10594.7		Culvert									
FRS3	10510	PF 1	700	1117.18	1121.38		1121.58	0.001598	3.56	196.49	63.59	0.36
FRS3	10106	PF 1	700	1116.77	1120.69		1120.89	0.001827	3.58	195.72	69.95	0.38
FRS3	10100	PF 1	700	1117.77	1119.96	1119.96	1120.80	0.006075	7.38	94.84	56.76	1.01
FRS3	10083.5	PF 1	700	1114.27	1118.14		1118.71	0.002656	6.04	115.91	49.95	0.70
FRS3	10003.5	PF 1	700	1114.18	1118.26		1118.43	0.001547	3.35	208.76	72.56	0.35
FRS3	9696	PF 1	700	1113.88	1117.73		1117.92	0.001796	3.47	202.02	74.86	0.37
FRS3	9690	PF 1	700	1114.87	1117.02	1117.02	1117.84	0.006117	7.24	96.67	59.90	1.00
FRS3	9673.5	PF 1	700	1111.37	1115.14		1115.73	0.002903	6.16	113.70	50.94	0.73
FRS3	9593.5	PF 1	700	1111.29	1115.24		1115.43	0.001740	3.50	199.82	71.02	0.37
FRS3	9310	PF 1	700	1111.01	1114.37		1114.73	0.003628	4.78	146.41	56.41	0.52
FRS3	9284.1	PF 1	700	1110.98	1113.43	1113.43	1114.57	0.002693	8.57	81.72	36.11	1.00
FRS3	9275.1		Culvert									
FRS3	9200	PF 1	700	1108.12	1112.20		1112.41	0.001792	3.71	188.66	62.59	0.38
FRS3	9056	PF 1	700	1107.98	1111.94		1112.15	0.001866	3.67	190.52	66.32	0.38
FRS3	9050	PF 1	700	1108.97	1111.19	1111.19	1112.06	0.005978	7.47	93.71	54.38	1.00
FRS3	9033.5	PF 1	700	1105.48	1109.27		1109.93	0.003008	6.49	107.84	45.69	0.74
FRS3	8953.5	PF 1	700	1105.39	1109.41		1109.61	0.001715	3.54	197.57	68.22	0.37
FRS3	8836	PF 1	700	1105.28	1109.20		1109.40	0.001859	3.62	193.24	68.59	0.38
FRS3	8830	PF 1	700	1106.27	1108.46	1108.46	1109.32	0.006065	7.41	94.47	56.13	1.01
FRS3	8813.5	PF 1	700	1102.77	1106.65		1107.24	0.002757	6.19	113.01	48.17	0.71
FRS3	8733.5	PF 1	700	1102.69	1106.75		1106.95	0.001745	3.63	193.08	65.12	0.37
FRS3	8406	PF 1	700	1102.36	1106.24		1106.40	0.001547	3.17	220.97	83.89	0.34
FRS3	8400	PF 1	700	1103.36	1105.50	1105.50	1106.32	0.006138	7.24	96.70	60.09	1.01
FRS3	8383.5	PF 1	700	1099.86	1103.79		1104.31	0.002414	5.75	121.73	52.61	0.67
FRS3	8303.5	PF 1	700	1099.78	1103.88		1104.05	0.001508	3.33	210.21	72.42	0.34
FRS3	8156	PF 1	700	1099.63	1103.59		1103.80	0.001873	3.69	189.66	65.76	0.38
FRS3	8150	PF 1	700	1100.62	1102.84	1102.84	1103.72	0.006009	7.50	93.35	54.05	1.01
FRS3	8133.5	PF 1	700	1097.15	1100.48	1100.48	1101.53	0.005756	8.23	85.06	41.09	1.01
FRS3	8000	PF 1	700	1096.99	1100.30		1100.65	0.003587	4.71	148.57	58.08	0.52
FRS3	7970.2	PF 1	700	1096.95	1099.35	1099.35	1100.48	0.002713	8.52	82.16	36.79	1.00
FRS3	7961.2		Culvert									
FRS3	7885	PF 1	700	1094.06	1098.18		1098.39	0.001718	3.65	191.54	62.97	0.37
FRS3	7656	PF 1	700	1093.83	1097.77		1097.98	0.001871	3.66	191.21	67.09	0.38
FRS3	7650	PF 1	700	1094.82	1097.04	1097.04	1097.89	0.005992	7.44	94.10	55.05	1.00
FRS3	7633.5	PF 1	700	1091.32	1095.16		1095.80	0.002936	6.42	109.10	46.19	0.74
FRS3	7553.5	PF 1	700	1091.24	1095.28		1095.49	0.001786	3.66	191.18	64.64	0.38
FRS3	7376	PF 1	700	1091.06	1094.96		1095.16	0.001846	3.58	195.40	70.20	0.38
FRS3	7370	PF 1	700	1092.06	1094.24	1094.24	1095.08	0.006050	7.35	95.25	57.20	1.00
FRS3	7353.5	PF 1	700	1088.56	1092.60		1092.99	0.001831	5.04	138.93	59.64	0.58
FRS3	7273.5	PF 1	700	1088.48	1092.64		1092.79	0.001336	3.12	224.07	77.64	0.32
FRS3	6956	PF 1	700	1088.16	1092.08		1092.29	0.001896	3.66	191.22	67.80	0.38
FRS3	6950	PF 1	700	1089.16	1091.35	1091.35	1092.20	0.006048	7.41	94.51	56.05	1.01
FRS3	6933.5	PF 1	700	1085.67	1089.33		1089.92	0.002959	6.14	114.05	52.18	0.73
FRS3	6853.5	PF 1	700	1085.58	1089.42		1089.61	0.001823	3.49	200.33	74.11	0.37
FRS3	6690	PF 1	700	1085.41	1088.88		1089.21	0.003318	4.60	152.07	58.05	0.50
FRS3	6659.2	PF 1	700	1085.38	1087.87	1087.87	1089.03	0.002696	8.65	80.90	35.04	1.00
FRS3	6651.2		Culvert									
FRS3	6570	PF 1	700	1082.98	1085.40	1085.21	1086.24	0.002046	7.35	95.22	44.16	0.88
FRS3	6500	PF 1	700	1082.91	1085.08	1085.08	1086.07	0.002737	7.99	87.56	44.68	1.01
FRS3	6200	PF 1	700	1081.48	1084.19	1084.19	1085.19	0.002742	8.00	87.53	44.77	1.01
FRS3	5921	PF 1	700	1080.19	1082.55	1082.55	1083.52	0.002746	7.92	88.41	46.02	1.01
FRS3	5905	PF 1	700	1075.34	1079.40		1079.68	0.000406	4.22	166.05	52.33	0.42
FRS3	5700	PF 1	700	1075.14	1079.38		1079.58	0.000331	3.63	192.63	65.76	0.37
FRS3	5400	PF 1	1328	1074.81	1077.86	1077.86	1079.18	0.002497	9.22	143.99	55.24	1.01
FRS3	5342.1		Culvert									
FRS3	5200	PF 1	1328	1073.54	1076.40	1076.40	1077.71	0.002560	9.17	144.76	55.98	1.01
FRS3	5185	PF 1	1328	1070.99	1074.36		1075.26	0.001406	7.61	174.47	56.18	0.76
FRS3	5000	PF 1	1328	1069.14	1074.68		1074.98	0.000302	4.40	301.52	71.46	0.38
FRS3	4730	PF 1	1549	1070.12	1073.51	1073.51	1074.69	0.002581	8.72	177.63	77.91	1.01
FRS3	4729.5		Culvert									
FRS3	4650	PF 1	1549	1066.60	1071.10		1071.63	0.000581	5.83	265.63	67.67	0.52
FRS3	4500	PF 1	1549	1066.08	1069.73	1069.73	1071.36	0.002409	10.24	151.30	46.93	1.00
FRS3	4300	PF 1	1549	1065.11	1069.86	1068.47	1070.48	0.000683	6.32	244.94	61.58	0.56
FRS3	4271		Culvert									
FRS3	4185.5	PF 1	1549	1064.70	1067.59	1067.59	1068.98	0.002598	9.46	163.68	59.52	1.01
FRS3	4172	PF 1	1549	1061.23	1064.82		1065.52	0.000992	6.68	231.90	72.21	0.66
FRS3	4100	PF 1	1549	1060.15	1064.90		1065.41	0.000574	5.72	270.77	70.27	0.51
FRS3	3800	PF 1	1549	1059.99	1063.52	1063.52	1065.00	0.002379	9.77	158.55	53.51	1.00
FRS3	3500	PF 1	1549	1056.41	1060.24	1060.24	1061.78	0.002370	9.95	155.61	50.80	1.00
FRS3	3200	PF 1	1549	1054.85	1058.75	1058.75	1060.28	0.002377	9.95	155.76	51.06	1.00
FRS3	2906.9	PF 1	1549	1054.02	1057.67	1057.67	1059.18	0.002400	9.87	156.90	52.71	1.01
FRS3	2890	PF 1	1549	1050.06	1053.69	1053.69	1055.23	0.002395	9.98	155.28	50.85	1.01
FRS3	2700	PF 1	1549	1047.62	1052.74		1053.63	0.001058	7.59	204.00	54.23	0.69
FRS3	2400	PF 1	1549	1047.87	1052.29	1051.55	1053.28	0.001223	7.98	194.02	53.39	0.74
FRS3	2100	PF 1	1549	1047.51	1051.77		1052.87	0.001465	8.42	183.97	53.68	0.80
FRS3	1800	PF 1	1549	1047.29	1051.76		1052.41	0.000809	6.49	238.61	66.29	0.60
FRS3	1567.4	PF 1	1549	1046.27	1051.99		1052.20	0.000192	3.70	500.28	178.68	0.31
FRS3	1556.5	PF 1	1549	1044.08	1052.07		1052.16	0.000051	2.40	743.34	197.04	0.17
FRS3	1500	PF 1	1549	1043.22	1052.10		1052.15	0.000024	1.82	994.45	200.00	0.12
FRS3	1300	PF 1	1549	1042.29	1052.10		1052.14	0.000017	1.59	1209.48	200.00	0.10
FRS3	1000	PF 1	1549	1040.44	1052.10	1044.30	1052.13	0.000014	1.55	1315.29	187.73	0.09

```
                    HEC-RAS Version 4.0.0 March 2008
                      U.S. Army Corps of Engineers
                     Hydrologic Engineering Center
                           609 Second Street
                           Davis, California

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


PROJECT DATA
Project Title: FRS3 Outlet Channel
Project File : FRS3OutletChannel.prj
Run Date and Time: 6/26/2009 12:16:38 PM

Project in English units


PLAN DATA

Plan Title: Subcritical Calc
Plan File : g:\Projects\07\07-027 On-Call Flood Control District\04 - White Tanks 3 Channel\Hydro\HEC-
RAS\FRS3OutletChannel.p01

          Geometry Title: Proposed Channel
          Geometry File : g:\Projects\07\07-027 On-Call Flood Control District\04 - White Tanks 3
Channel\Hydro\HEC-RAS\FRS3OutletChannel.g01

          Flow Title    : 100-year design flow
          Flow File     : g:\Projects\07\07-027 On-Call Flood Control District\04 - White Tanks 3
Channel\Hydro\HEC-RAS\FRS3OutletChannel.f01

Plan Summary Information:
Number of:  Cross Sections =  183    Multiple Openings  =    0
            Culverts       =   15    Inline Structures  =    0
            Bridges        =    0    Lateral Structures =    0

Computational Information
    Water surface calculation tolerance  =  0.01
    Critical depth calculation tolerance =  0.01
    Maximum number of iterations         =  20
    Maximum difference tolerance         =  0.3
    Flow tolerance factor                =  0.001

Computation Options
    Critical depth computed only where necessary
    Conveyance Calculation Method: At breaks in n values only
    Friction Slope Method:         Average Conveyance
    Computational Flow Regime:     Subcritical Flow


FLOW DATA

Flow Title: 100-year design flow
Flow File : g:\Projects\07\07-027 On-Call Flood Control District\04 - White Tanks 3 Channel\Hydro\HEC-
RAS\FRS3OutletChannel.f01

Flow Data (cfs)

  River          Reach          RS                 PF 1
  Channel        FRS3           31100               560
  Channel        FRS3           26450               700
  Channel        FRS3           21142               800
  Channel        FRS3           15778.5             700
  Channel        FRS3           5400               1328
  Channel        FRS3           4730               1549


Boundary Conditions

  River          Reach          Profile                        Upstream                Downstream

  Channel        FRS3           PF 1                                                 Known WS = 1052.1

Inline Structure Gate Openings
River = Channel
Reach = FRS3              RS = 30790
Gate  = Slide Gate
  # Open Open Ht
      5       2


SUMMARY OF MANNING'S N VALUES

River:Channel

      Reach          River Sta.       n1        n2        n3

 FRS3                 31100            .045      .035      .045
 FRS3                 30830            .045      .035      .045
 FRS3                 30800            .045      .035      .045
 FRS3                 30720            .045      .035      .045
 FRS3                 30500            .045      .035      .045
 FRS3                 30200            .045      .035      .045
 FRS3                 29900            .045      .035      .045
 FRS3                 29600            .045      .035      .045
 FRS3                 29300            .045      .035      .045
 FRS3                 29000            .045      .035      .045
 FRS3                 28700            .045      .035      .045
 FRS3                 28400            .045      .035      .045
 FRS3                 28100            .045      .035      .045
 FRS3                 27860            .045      .035      .045
 FRS3                 27826       Culvert
 FRS3                 26450            .045      .035      .045
 FRS3                 26115.6          .045      .035      .045
 FRS3                 25840            .045      .035      .045
 FRS3                 25600            .045      .035      .045
 FRS3                 25300            .045      .035      .045
 FRS3                 25000            .045      .035      .045
 FRS3                 24700            .045      .035      .045
 FRS3                 24400            .045      .035      .045
 FRS3                 24100            .045      .035      .045
 FRS3                 24006.1     Culvert
 FRS3                 23620            .045      .035      .045
 FRS3                 23300            .045      .035      .045
 FRS3                 23000            .045      .035      .045
 FRS3                 22750            .045      .035      .045
 FRS3                 22703.8     Culvert
 FRS3                 22600            .045      .035      .045
 FRS3                 22500            .045      .035      .045
 FRS3                 22200            .045      .035      .045
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FRS3	21900	.045	.035	.045
FRS3	21600	.045	.035	.045
FRS3	21310	.045	.035	.045
FRS3	21269	.045	.015	.045
FRS3	21260	Culvert		
FRS3	21142	.045	.035	.045
FRS3	20800	.045	.035	.045
FRS3	20497.5	.045	.035	.045
FRS3	20491.5	.045	.022	.045
FRS3	20475	.045	.022	.045
FRS3	20395	.045	.035	.045
FRS3	20100	.045	.035	.045
FRS3	19832.3	.045	.035	.045
FRS3	19826.3	.045	.022	.045
FRS3	19809.8	.045	.022	.045
FRS3	19729.8	.045	.035	.045
FRS3	19550	.045	.035	.045
FRS3	19325	.045	.035	.045
FRS3	19297.6	.045	.015	.045
FRS3	19288.5	Culvert		
FRS3	18425	.045	.035	.045
FRS3	18300	.045	.035	.045
FRS3	18000	.045	.035	.045
FRS3	17676	.045	.035	.045
FRS3	17670	.045	.022	.045
FRS3	17653.5	.045	.022	.045
FRS3	17573.5	.045	.035	.045
FRS3	17200	.045	.035	.045
FRS3	16900	.045	.035	.045
FRS3	16600	.045	.035	.045
FRS3	16300	.045	.035	.045
FRS3	15910	.045	.035	.045
FRS3	15885.4	.045	.015	.045
FRS3	15876.4	Culvert		
FRS3	15778.5	.045	.035	.045
FRS3	15576	.045	.035	.045
FRS3	15570	.045	.022	.045
FRS3	15553.5	.045	.022	.045
FRS3	15473.5	.045	.035	.045
FRS3	15306	.045	.035	.045
FRS3	15300	.045	.022	.045
FRS3	15283.5	.045	.022	.045
FRS3	15203.5	.045	.035	.045
FRS3	14900	.045	.035	.045
FRS3	14600	.045	.035	.045
FRS3	14300	.045	.035	.045
FRS3	14260	.045	.035	.045
FRS3	14235	.045	.015	.045
FRS3	14227	Culvert		
FRS3	14150	.045	.035	.045
FRS3	13900	.045	.035	.045
FRS3	13600	.045	.035	.045
FRS3	13300	.045	.035	.045
FRS3	13275	.045	.035	.045
FRS3	13250	.045	.015	.045
FRS3	13238	Culvert		
FRS3	13150	.045	.035	.045
FRS3	12900	.045	.035	.045
FRS3	12750	.045	.035	.045
FRS3	12466	.045	.035	.045
FRS3	12460	.045	.022	.045
FRS3	12443.5	.045	.022	.045
FRS3	12363.5	.045	.035	.045
FRS3	12200	.045	.035	.045
FRS3	11966	.045	.035	.045
FRS3	11960	.045	.022	.045
FRS3	11943.5	.045	.022	.045
FRS3	11863.5	.045	.035	.045
FRS3	11606	.045	.035	.045
FRS3	11600	.045	.022	.045
FRS3	11583.5	.045	.022	.045
FRS3	11503.5	.045	.035	.045
FRS3	11300	.045	.035	.045
FRS3	11116	.045	.035	.045
FRS3	11110	.045	.022	.045
FRS3	11093.5	.045	.022	.045
FRS3	11013.5	.045	.035	.045
FRS3	10856	.045	.035	.045
FRS3	10850	.045	.022	.045
FRS3	10833.5	.045	.022	.045
FRS3	10753.5	.045	.035	.045
FRS3	10630	.045	.035	.045
FRS3	10603.7	.045	.015	.045
FRS3	10594.7	Culvert		
FRS3	10510	.045	.035	.045
FRS3	10106	.045	.035	.045
FRS3	10100	.045	.022	.045
FRS3	10083.5	.045	.022	.045
FRS3	10003.5	.045	.035	.045
FRS3	9696	.045	.035	.045
FRS3	9690	.045	.022	.045
FRS3	9673.5	.045	.022	.045
FRS3	9593.5	.045	.035	.045
FRS3	9310	.045	.035	.045
FRS3	9284.1	.045	.015	.045
FRS3	9275.1	Culvert		
FRS3	9200	.045	.035	.045
FRS3	9056	.045	.035	.045
FRS3	9050	.045	.022	.045
FRS3	9033.5	.045	.022	.045
FRS3	8953.5	.045	.035	.045
FRS3	8836	.045	.035	.045
FRS3	8830	.045	.022	.045
FRS3	8813.5	.045	.022	.045
FRS3	8733.5	.045	.035	.045
FRS3	8406	.045	.035	.045
FRS3	8400	.045	.022	.045
FRS3	8383.5	.045	.022	.045
FRS3	8303.5	.045	.035	.045
FRS3	8156	.045	.035	.045
FRS3	8150	.045	.022	.045
FRS3	8133.5	.045	.022	.045
FRS3	8000	.045	.035	.045
FRS3	7970.2	.045	.015	.045
FRS3	7961.2	Culvert		
FRS3	7885	.045	.035	.045
FRS3	7656	.045	.035	.045
FRS3	7650	.045	.022	.045
FRS3	7633.5	.045	.022	.045
FRS3	7553.5	.045	.035	.045
FRS3	7376	.045	.035	.045
FRS3	7370	.045	.022	.045
FRS3	7353.5	.045	.022	.045
FRS3	7273.5	.045	.035	.045
FRS3	6956	.045	.035	.045
FRS3	6950	.045	.022	.045
FRS3	6933.5	.045	.022	.045
FRS3	6853.5	.045	.035	.045
FRS3	6690	.045	.035	.045
FRS3	6659.2	.045	.015	.045
FRS3	6651.2	Culvert		
FRS3	6570	.035	.015	.035
FRS3	6500	.035	.015	.035
FRS3	6200	.035	.015	.035
FRS3	5921	.035	.015	.035
FRS3	5905	.035	.015	.035
FRS3	5700	.035	.015	.035
FRS3	5400	.035	.015	.035
FRS3	5342.1	Culvert		
FRS3	5200	.035	.015	.035
FRS3	5185	.035	.015	.035
FRS3	5000	.035	.015	.035

FRS3	4730	.035	.015	.035
FRS3	4729.5	Culvert		
FRS3	4650	.035	.015	.035
FRS3	4500	.035	.015	.035
FRS3	4300	.035	.015	.035
FRS3	4271	Culvert		
FRS3	4185.5	.035	.015	.035
FRS3	4172	.035	.015	.035
FRS3	4100	.035	.015	.035
FRS3	3800	.035	.015	.035
FRS3	3500	.035	.015	.035
FRS3	3200	.035	.015	.035
FRS3	2906.9	.035	.015	.035
FRS3	2890	.035	.015	.035
FRS3	2700	.035	.015	.035
FRS3	2400	.035	.015	.035
FRS3	2100	.035	.015	.035
FRS3	1800	.035	.015	.035
FRS3	1567.4	.035	.015	.035
FRS3	1556.5	.035	.015	.035
FRS3	1500	.035	.015	.035
FRS3	1300	.035	.015	.035
FRS3	1000	.035	.015	.035

SUMMARY OF REACH LENGTHS

River: Channel

Reach	River Sta.	Left	Channel	Right
FRS3	31100	270	270	270
FRS3	30830	30	30	30
FRS3	30800	80	80	80
FRS3	30720	220	220	220
FRS3	30500	300	300	300
FRS3	30200	300	300	300
FRS3	29900	300	300	300
FRS3	29600	300	300	300
FRS3	29300	300	300	300
FRS3	29000	300	300	300
FRS3	28700	300	300	300
FRS3	28400	300	300	300
FRS3	28100	240	240	240
FRS3	27860	1410	1410	1410
FRS3	27826	Culvert		
FRS3	26450	334.4	334.4	334.4
FRS3	26115.6	275.6	275.6	275.6
FRS3	25840	240	240	240
FRS3	25600	300	300	300
FRS3	25300	300	300	300
FRS3	25000	300	300	300
FRS3	24700	300	300	300
FRS3	24400	300	300	300
FRS3	24100	480	480	480
FRS3	24006.1	Culvert		
FRS3	23620	320	320	320
FRS3	23300	300	300	300
FRS3	23000	250	250	250
FRS3	22750	150	150	150
FRS3	22703.8	Culvert		
FRS3	22600	100	100	100
FRS3	22500	300	300	300
FRS3	22200	300	300	300
FRS3	21900	300	300	300
FRS3	21600	290	290	290
FRS3	21310	41	41	41
FRS3	21269	127	127	127
FRS3	21260	Culvert		
FRS3	21142	342	342	342
FRS3	20800	302.5	302.5	302.5
FRS3	20497.5	6	6	6
FRS3	20491.5	16.5	16.5	16.5
FRS3	20475	80	80	80
FRS3	20395	295	295	295
FRS3	20100	267.7	267.7	267.7
FRS3	19832.3	6	6	6
FRS3	19826.3	16.5	16.5	16.5
FRS3	19809.8	80	80	80
FRS3	19729.8	179.8	179.8	179.8
FRS3	19550	225	225	225
FRS3	19325	27.4	27.4	27.4
FRS3	19297.6	872.6	872.6	872.6
FRS3	19288.5	Culvert		
FRS3	18425	125	125	125
FRS3	18300	300	300	300
FRS3	18000	324	324	324
FRS3	17676	6	6	6
FRS3	17670	16.5	16.5	16.5
FRS3	17653.5	80	80	80
FRS3	17573.5	373.5	373.5	373.5
FRS3	17200	300	300	300
FRS3	16900	300	300	300
FRS3	16600	300	300	300
FRS3	16300	390	390	390
FRS3	15910	24.6	24.6	24.6
FRS3	15885.4	106.9	106.9	106.9
FRS3	15876.4	Culvert		
FRS3	15778.5	202.5	202.5	202.5
FRS3	15576	6	6	6
FRS3	15570	16.5	16.5	16.5
FRS3	15553.5	80	80	80
FRS3	15473.5	167.5	167.5	167.5
FRS3	15306	6	6	6
FRS3	15300	16.5	16.5	16.5
FRS3	15283.5	80	80	80
FRS3	15203.5	303.5	303.5	303.5
FRS3	14900	300	300	300
FRS3	14600	300	300	300
FRS3	14300	40	40	40
FRS3	14260	25	25	25
FRS3	14235	85	85	85
FRS3	14227	Culvert		
FRS3	14150	250	250	250
FRS3	13900	300	300	300
FRS3	13600	300	300	300
FRS3	13300	25	25	25
FRS3	13275	25	25	25
FRS3	13250	100	100	100
FRS3	13238	Culvert		
FRS3	13150	250	250	250
FRS3	12900	150	150	150
FRS3	12750	284	284	284
FRS3	12466	6	6	6
FRS3	12460	16.5	16.5	16.5
FRS3	12443.5	80	80	80
FRS3	12363.5	163.5	163.5	163.5
FRS3	12200	234	234	234
FRS3	11966	6	6	6
FRS3	11960	16.5	16.5	16.5
FRS3	11943.5	80	80	80
FRS3	11863.5	257.5	257.5	257.5
FRS3	11606	6	6	6
FRS3	11600	16.5	16.5	16.5
FRS3	11583.5	80	80	80
FRS3	11503.5	203.5	203.5	203.5
FRS3	11300	184	184	184
FRS3	11116	6	6	6
FRS3	11110	16.5	16.5	16.5
FRS3	11093.5	80	80	80

FRS3	11013.5	157.5	157.5	157.5
FRS3	10856	6	6	6
FRS3	10850	16.5	16.5	16.5
FRS3	10833.5	80	80	80
FRS3	10753.5	123.5	123.5	123.5
FRS3	10630	26.3	26.3	26.3
FRS3	10603.7	93.7	93.7	93.7
FRS3	10594.7	Culvert		
FRS3	10510	404	404	404
FRS3	10106	6	6	6
FRS3	10100	16.5	16.5	16.5
FRS3	10083.5	80	80	80
FRS3	10003.5	307.5	307.5	307.5
FRS3	9696	6	6	6
FRS3	9690	16.5	16.5	16.5
FRS3	9673.5	80	80	80
FRS3	9593.5	283.5	283.5	283.5
FRS3	9310	25.9	25.9	25.9
FRS3	9284.1	84.1	84.1	84.1
FRS3	9275.1	Culvert		
FRS3	9200	144	144	144
FRS3	9056	6	6	6
FRS3	9050	16.5	16.5	16.5
FRS3	9033.5	80	80	80
FRS3	8953.5	117.5	117.5	117.5
FRS3	8836	6	6	6
FRS3	8830	16.5	16.5	16.5
FRS3	8813.5	80	80	80
FRS3	8733.5	327.5	327.5	327.5
FRS3	8406	6	6	6
FRS3	8400	16.5	16.5	16.5
FRS3	8383.5	80	80	80
FRS3	8303.5	147.5	147.5	147.5
FRS3	8156	6	6	6
FRS3	8150	16.5	16.5	16.5
FRS3	8133.5	133.5	133.5	133.5
FRS3	8000	29.8	29.8	29.8
FRS3	7970.2	85.2	85.2	85.2
FRS3	7961.2	Culvert		
FRS3	7885	229	229	229
FRS3	7656	6	6	6
FRS3	7650	16.5	16.5	16.5
FRS3	7633.5	80	80	80
FRS3	7553.5	177.5	177.5	177.5
FRS3	7376	6	6	6
FRS3	7370	16.5	16.5	16.5
FRS3	7353.5	80	80	80
FRS3	7273.5	317.5	317.5	317.5
FRS3	6956	6	6	6
FRS3	6950	16.5	16.5	16.5
FRS3	6933.5	80	80	80
FRS3	6853.5	163.5	163.5	163.5
FRS3	6690	30.8	30.8	30.8
FRS3	6659.2	89.2	89.2	89.2
FRS3	6651.2	Culvert		
FRS3	6570	70	70	70
FRS3	6500	300	300	300
FRS3	6200	279	279	279
FRS3	5921	16	16	16
FRS3	5905	205	205	205
FRS3	5700	300	300	300
FRS3	5400	200	200	200
FRS3	5342.1	Culvert		
FRS3	5200	15	15	15
FRS3	5185	185	185	185
FRS3	5000	270	270	270
FRS3	4730	80	80	80
FRS3	4729.5	Culvert		
FRS3	4650	150	150	150
FRS3	4500	200	200	200
FRS3	4300	114.5	114.5	114.5
FRS3	4271	Culvert		
FRS3	4185.5	13.5	13.5	13.5
FRS3	4172	72	72	72
FRS3	4100	300	300	300
FRS3	3800	300	300	300
FRS3	3500	300	300	300
FRS3	3200	293.1	293.1	293.1
FRS3	2906.9	16.9	16.9	16.9
FRS3	2890	190	190	190
FRS3	2700	300	300	300
FRS3	2400	300	300	300
FRS3	2100	300	300	300
FRS3	1800	232.6	232.6	232.6
FRS3	1567.4	10.9	10.9	10.9
FRS3	1556.5	56.5	56.5	56.5
FRS3	1500	200	200	200
FRS3	1300	300	300	300
FRS3	1000	0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Channel

Reach	River Sta.	Contr.	Expan.
FRS3	31100	.1	.3
FRS3	30830	.1	.3
FRS3	30800	.1	.3
FRS3	30720	.1	.3
FRS3	30500	.1	.3
FRS3	30200	.1	.3
FRS3	29900	.1	.3
FRS3	29600	.1	.3
FRS3	29300	.1	.3
FRS3	29000	.1	.3
FRS3	28700	.1	.3
FRS3	28400	.1	.3
FRS3	28100	.1	.3
FRS3	27860	.1	.3
FRS3	27826	Culvert	
FRS3	26450	.1	.3
FRS3	26115.6	.1	.3
FRS3	25840	.1	.3
FRS3	25600	.1	.3
FRS3	25300	.1	.3
FRS3	25000	.1	.3
FRS3	24700	.1	.3
FRS3	24400	.1	.3
FRS3	24100	.1	.3
FRS3	24006.1	Culvert	
FRS3	23620	.1	.3
FRS3	23300	.1	.3
FRS3	23000	.1	.3
FRS3	22750	.1	.3
FRS3	22703.8	Culvert	
FRS3	22600	.1	.3
FRS3	22500	.1	.3
FRS3	22200	.1	.3
FRS3	21900	.1	.3
FRS3	21600	.1	.3
FRS3	21310	.1	.3
FRS3	21269	.1	.3
FRS3	21260	Culvert	
FRS3	21142	.1	.3
FRS3	20800	.1	.3
FRS3	20497.5	.1	.3
FRS3	20491.5	.1	.3
FRS3	20475	.1	.3

FRS3	20395		.1	.3
FRS3	20100		.1	.3
FRS3	19832.3		.1	.3
FRS3	19826.3		.1	.3
FRS3	19809.8		.1	.3
FRS3	19729.8		.1	.3
FRS3	19550		.1	.3
FRS3	19325		.1	.3
FRS3	19297.6		.1	.3
FRS3	19288.5	Culvert		
FRS3	18425		.1	.3
FRS3	18300		.1	.3
FRS3	18000		.1	.3
FRS3	17676		.1	.3
FRS3	17670		.1	.3
FRS3	17653.5		.1	.3
FRS3	17573.5		.1	.3
FRS3	17200		.1	.3
FRS3	16900		.1	.3
FRS3	16600		.1	.3
FRS3	16300		.1	.3
FRS3	15910		.1	.3
FRS3	15885.4		.1	.3
FRS3	15876.4	Culvert		
FRS3	15778.5		.1	.3
FRS3	15576		.1	.3
FRS3	15570		.1	.3
FRS3	15553.5		.1	.3
FRS3	15473.5		.1	.3
FRS3	15306		.1	.3
FRS3	15300		.1	.3
FRS3	15283.5		.1	.3
FRS3	15203.5		.1	.3
FRS3	14900		.1	.3
FRS3	14600		.1	.3
FRS3	14300		.1	.3
FRS3	14260		.1	.3
FRS3	14235		.1	.3
FRS3	14227	Culvert		
FRS3	14150		.1	.3
FRS3	13900		.1	.3
FRS3	13600		.1	.3
FRS3	13300		.1	.3
FRS3	13275		.1	.3
FRS3	13250		.1	.3
FRS3	13238	Culvert		
FRS3	13150		.1	.3
FRS3	12900		.1	.3
FRS3	12750		.1	.3
FRS3	12466		.1	.3
FRS3	12460		.1	.3
FRS3	12443.5		.1	.3
FRS3	12363.5		.1	.3
FRS3	12200		.1	.3
FRS3	11966		.1	.3
FRS3	11960		.1	.3
FRS3	11943.5		.1	.3
FRS3	11863.5		.1	.3
FRS3	11606		.1	.3
FRS3	11600		.1	.3
FRS3	11583.5		.1	.3
FRS3	11503.5		.1	.3
FRS3	11300		.1	.3
FRS3	11116		.1	.3
FRS3	11110		.1	.3
FRS3	11093.5		.1	.3
FRS3	11013.5		.1	.3
FRS3	10856		.1	.3
FRS3	10850		.1	.3
FRS3	10833.5		.1	.3
FRS3	10753.5		.1	.3
FRS3	10630		.1	.3
FRS3	10603.7		.1	.3
FRS3	10594.7	Culvert		
FRS3	10510		.1	.3
FRS3	10106		.1	.3
FRS3	10100		.1	.3
FRS3	10083.5		.1	.3
FRS3	10003.5		.1	.3
FRS3	9696		.1	.3
FRS3	9690		.1	.3
FRS3	9673.5		.1	.3
FRS3	9593.5		.1	.3
FRS3	9310		.1	.3
FRS3	9284.1		.1	.3
FRS3	9275.1	Culvert		
FRS3	9200		.1	.3
FRS3	9056		.1	.3
FRS3	9050		.1	.3
FRS3	9033.5		.1	.3
FRS3	8953.5		.1	.3
FRS3	8836		.1	.3
FRS3	8830		.1	.3
FRS3	8813.5		.1	.3
FRS3	8733.5		.1	.3
FRS3	8406		.1	.3
FRS3	8400		.1	.3
FRS3	8383.5		.1	.3
FRS3	8303.5		.1	.3
FRS3	8156		.1	.3
FRS3	8150		.1	.3
FRS3	8133.5		.1	.3
FRS3	8000		.1	.3
FRS3	7970.2		.1	.3
FRS3	7961.2	Culvert		
FRS3	7885		.1	.3
FRS3	7656		.1	.3
FRS3	7650		.1	.3
FRS3	7633.5		.1	.3
FRS3	7553.5		.1	.3
FRS3	7376		.1	.3
FRS3	7370		.1	.3
FRS3	7353.5		.1	.3
FRS3	7273.5		.1	.3
FRS3	6956		.1	.3
FRS3	6950		.1	.3
FRS3	6933.5		.1	.3
FRS3	6853.5		.1	.3
FRS3	6690		.1	.3
FRS3	6659.2		.1	.3
FRS3	6651.2	Culvert		
FRS3	6570		.1	.3
FRS3	6500		.1	.3
FRS3	6200		.1	.3
FRS3	5921		.1	.3
FRS3	5905		.1	.3
FRS3	5700		.1	.3
FRS3	5400		.1	.3
FRS3	5342.1	Culvert		
FRS3	5200		.1	.3
FRS3	5185		.1	.3
FRS3	5000		.1	.3
FRS3	4730		.1	.3
FRS3	4729.5	Culvert		
FRS3	4650		.1	.3
FRS3	4500		.1	.3
FRS3	4300		.1	.3
FRS3	4271	Culvert		
FRS3	4185.5		.1	.3
FRS3	4172		.1	.3
FRS3	4100		.1	.3
FRS3	3800		.1	.3

```
FRS3                3500            .1        .3
FRS3                3200            .1        .3
FRS3                2906.9          .1        .3
FRS3                2890            .1        .3
FRS3                2700            .1        .3
FRS3                2400            .1        .3
FRS3                2100            .1        .3
FRS3                1800            .1        .3
FRS3                1567.4          .1        .3
FRS3                1556.5          .1        .3
FRS3                1500            .1        .3
FRS3                1300            .1        .3
FRS3                1000            .1        .3
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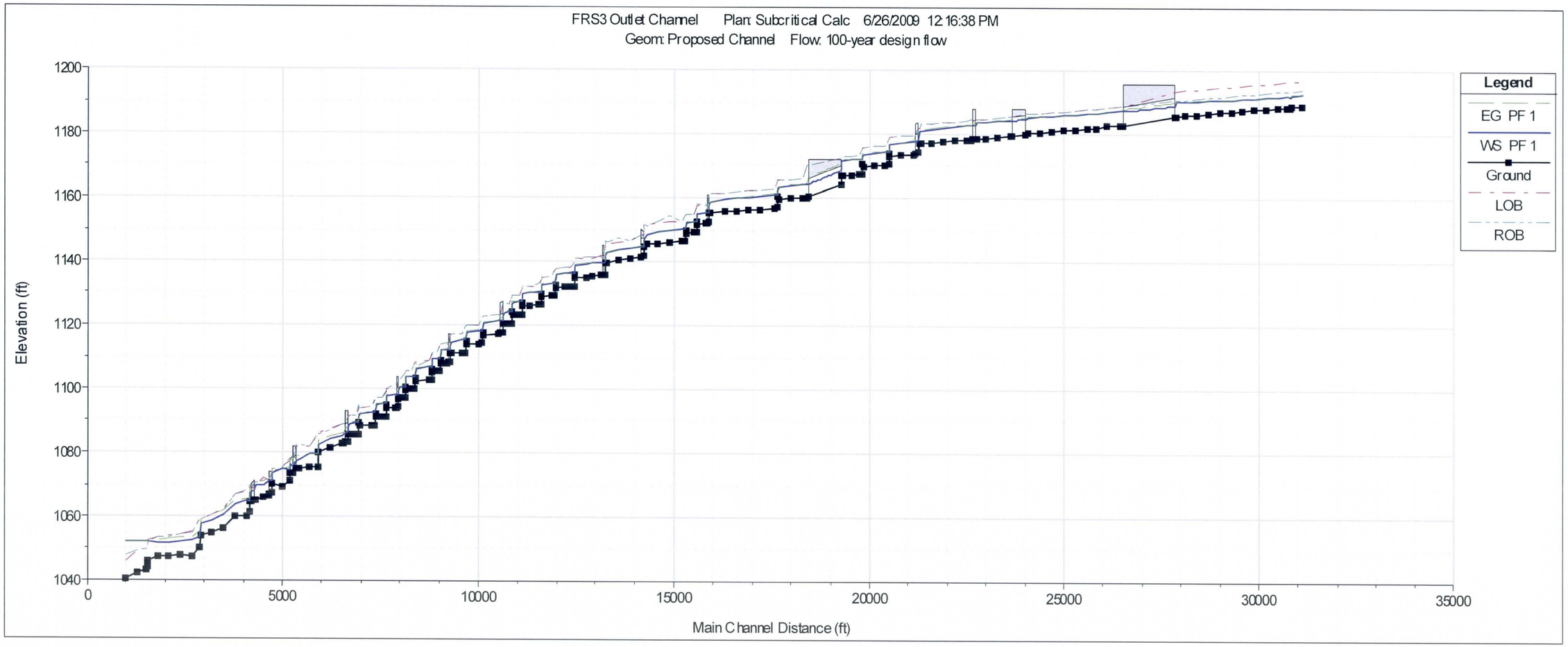
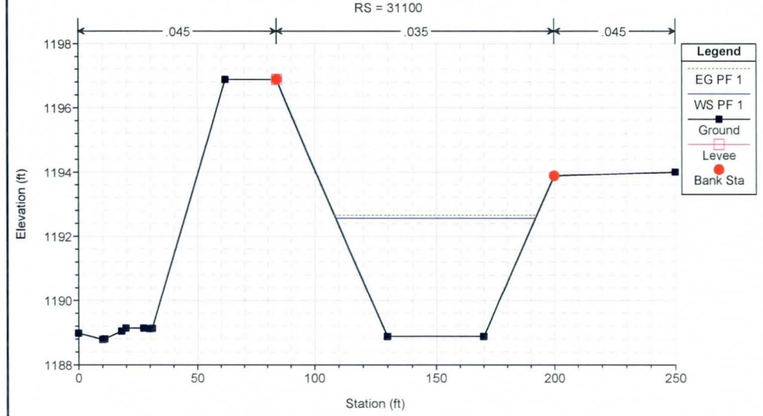

FRS3 Outlet Channel Plan: Subcritical Calc 6/26/2009 12:16:38 PM
Geom: Proposed Channel Flow: 100-year design flow
Elevation (ft)
1200
1180
1160
1140
1120
1100
1080
1060
1040
0
5000
10000
15000
20000
25000
30000
35000
Main Channel Distance (ft)
Legend
EG PF 1
WS PF 1
Ground
LOB
ROB

FRS3 Outlet Channel Plan: Subcritical Calc 6/26/2009 12:16:38 PM
Geom: Proposed Channel Flow: 100-year design flow
RS = 31100



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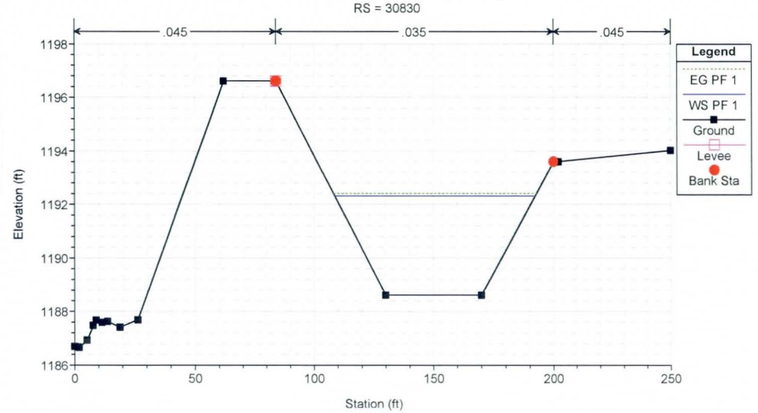
Geom: Proposed Channel Flow: 100-year design flow
RS = 30830



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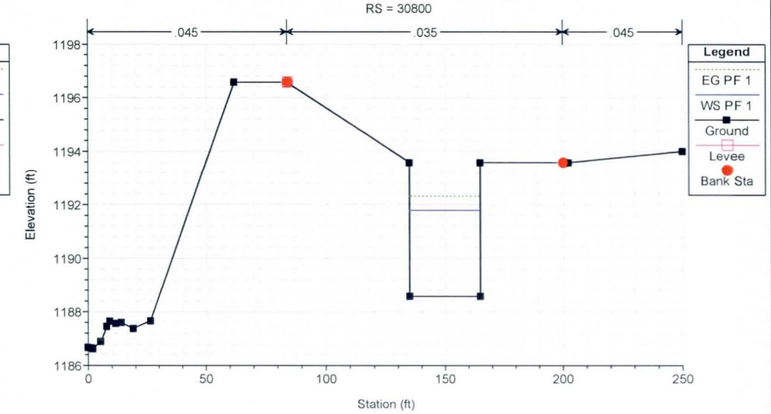
Geom: Proposed Channel Flow: 100-year design flow
RS = 30800



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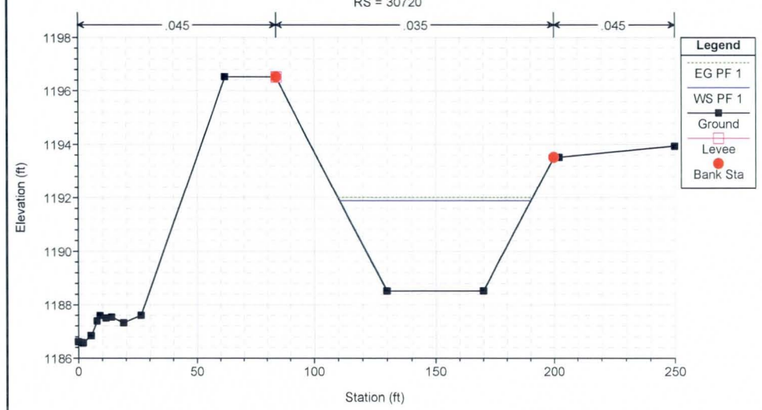
Geom: Proposed Channel Flow: 100-year design flow
RS = 30720



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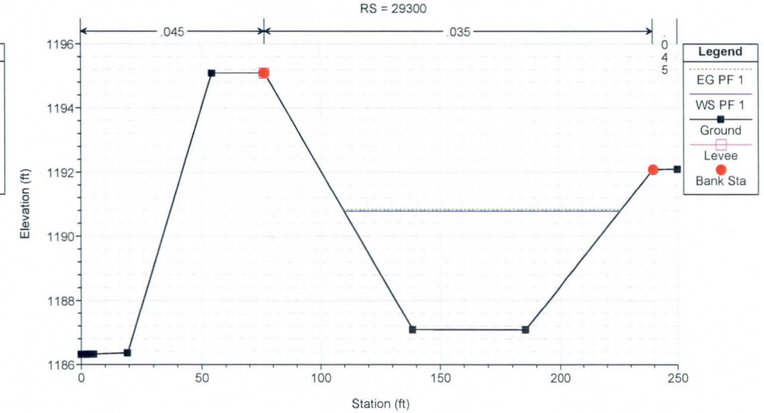
Geom: Proposed Channel Flow: 100-year design flow
RS = 29300



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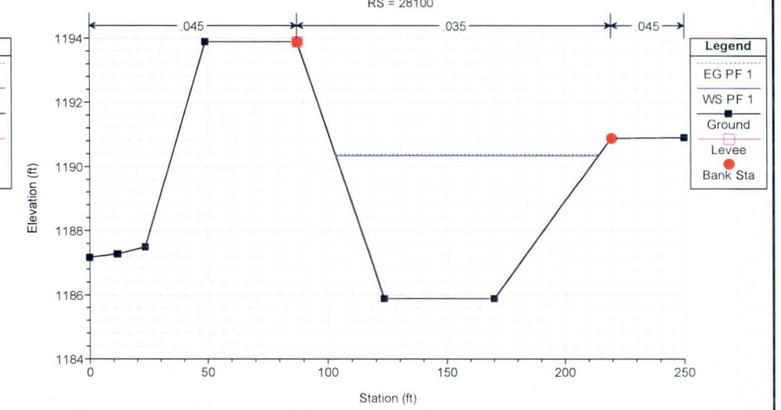
Geom: Proposed Channel Flow: 100-year design flow
RS = 28100



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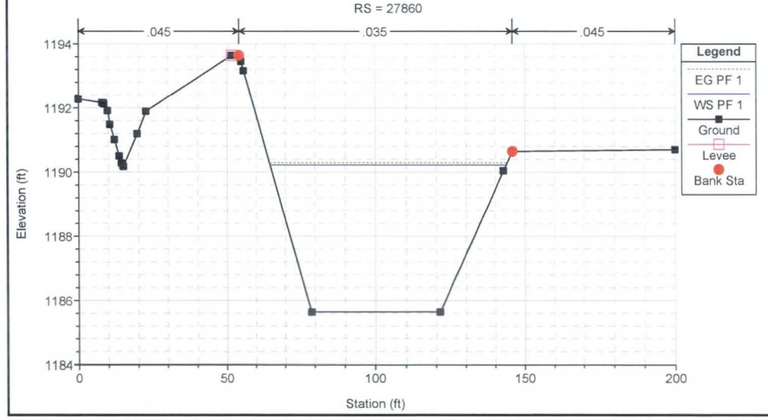
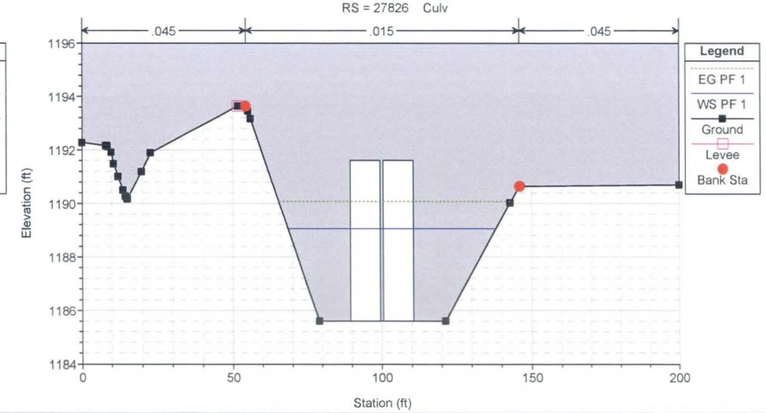
Geom: Proposed Channel Flow: 100-year design flow
RS = 27860



FRS3 Outlet Channel Plan: Subcritical Calc 6/26/2009 12:16:38 PM
Geom: Proposed Channel Flow: 100-year design flow
RS = 27826 Culv



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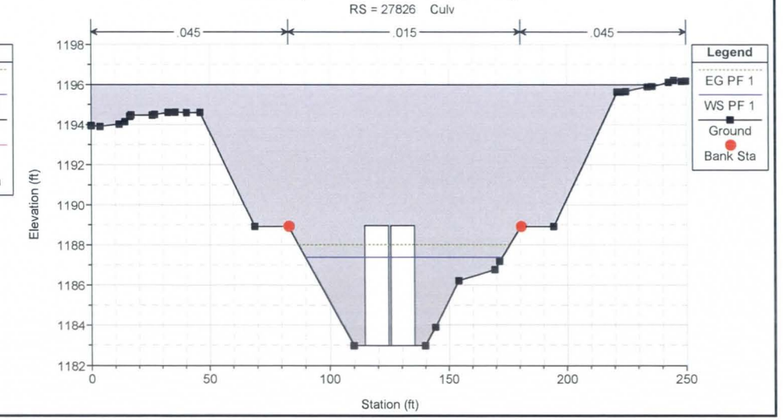
Geom: Proposed Channel Flow: 100-year design flow
RS = 27826 Culv



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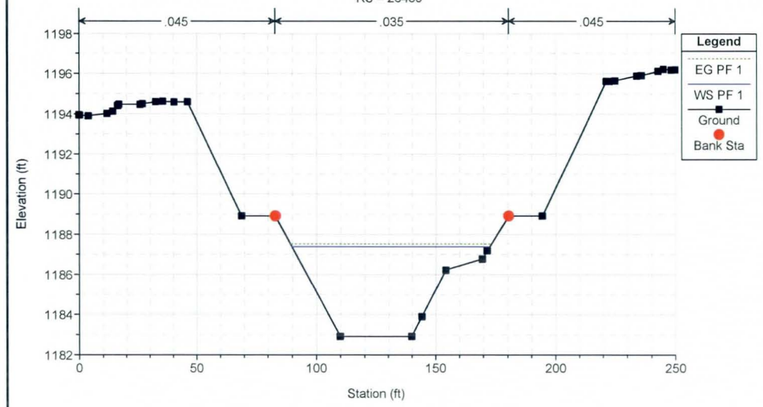
Geom: Proposed Channel Flow: 100-year design flow
RS = 26450



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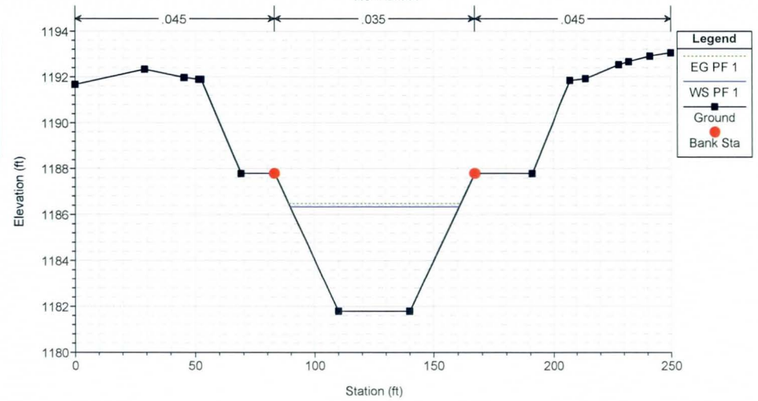
Geom: Proposed Channel Flow: 100-year design flow
RS = 25600



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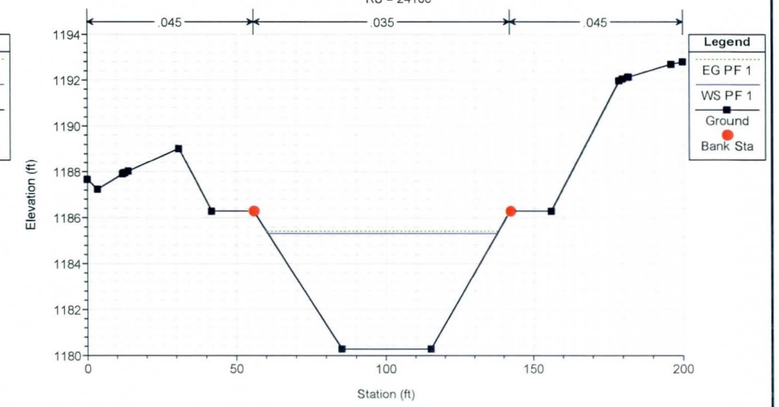
Geom: Proposed Channel Flow: 100-year design flow
RS = 24100



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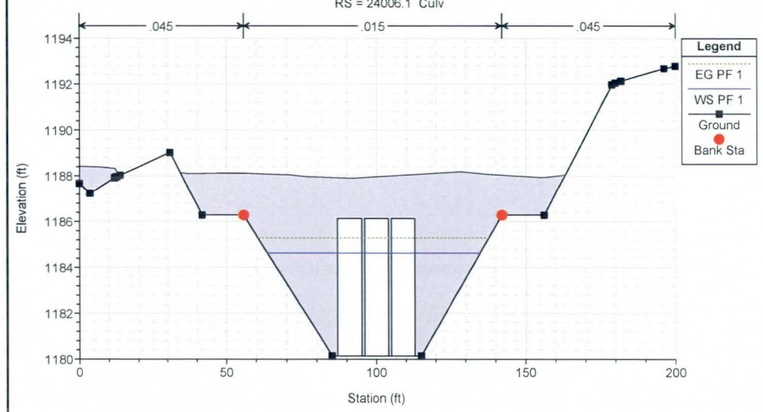
Geom: Proposed Channel Flow: 100-year design flow
RS = 24006.1 Culv



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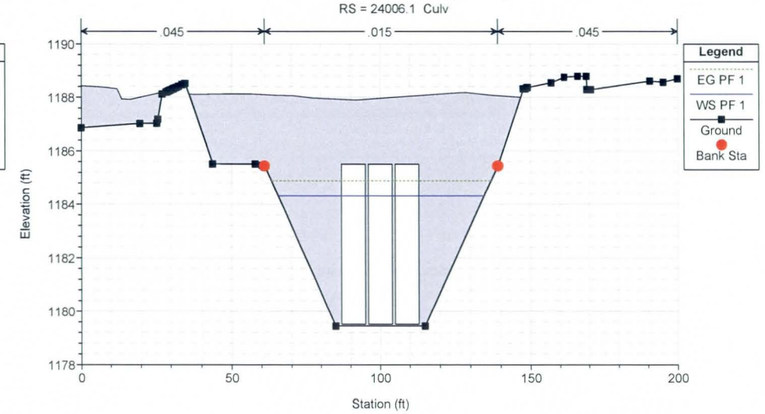
Geom: Proposed Channel Flow: 100-year design flow
RS = 24006.1 Culv



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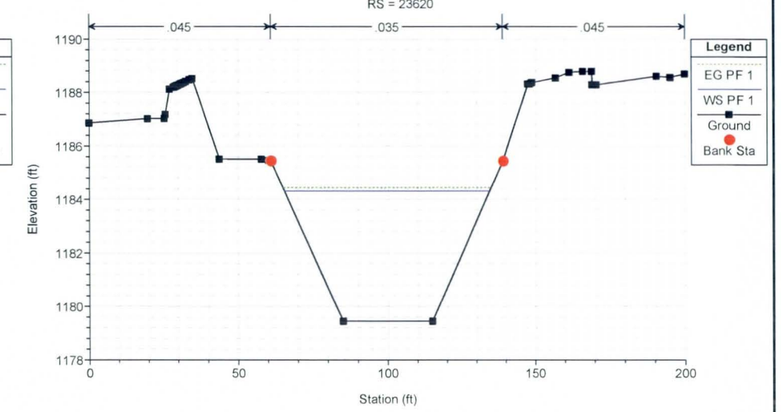
Geom: Proposed Channel Flow: 100-year design flow
RS = 23620



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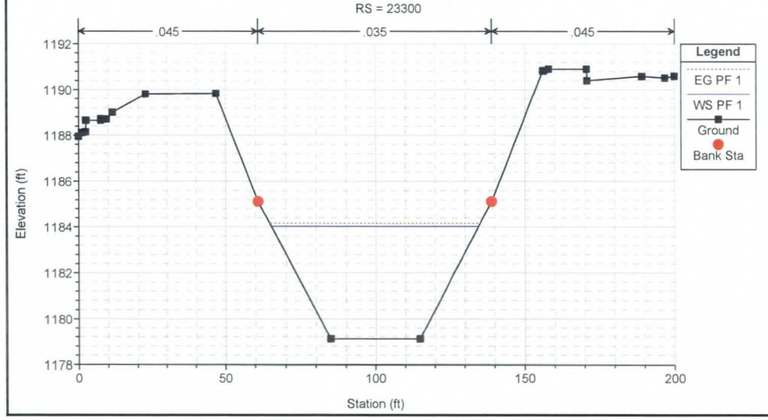
Geom: Proposed Channel Flow: 100-year design flow
RS = 23300



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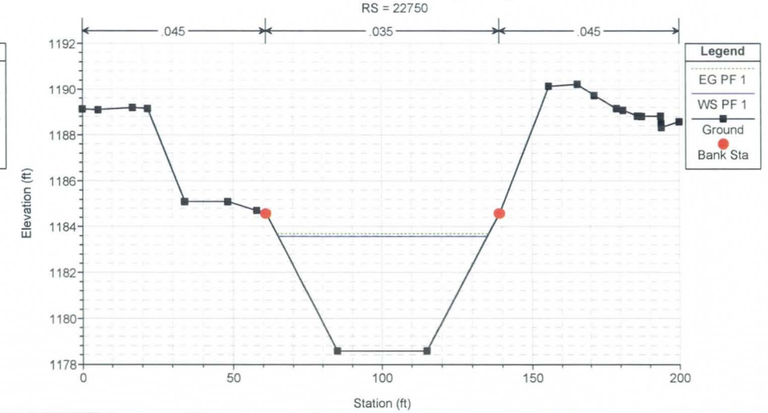
Geom: Proposed Channel Flow: 100-year design flow
RS = 22750



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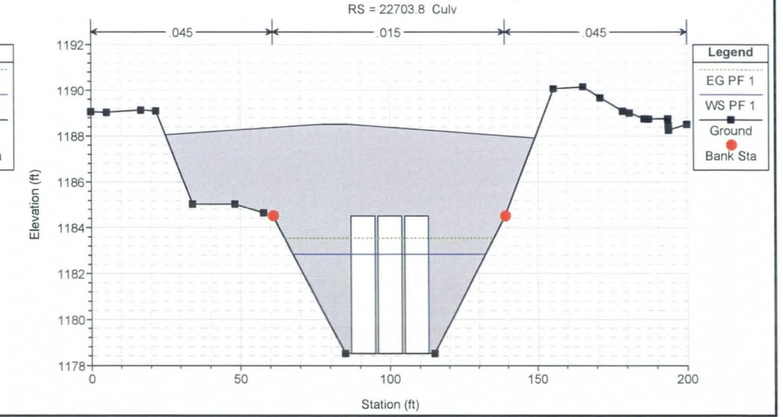
Geom: Proposed Channel Flow: 100-year design flow
RS = 22703.8 Culv



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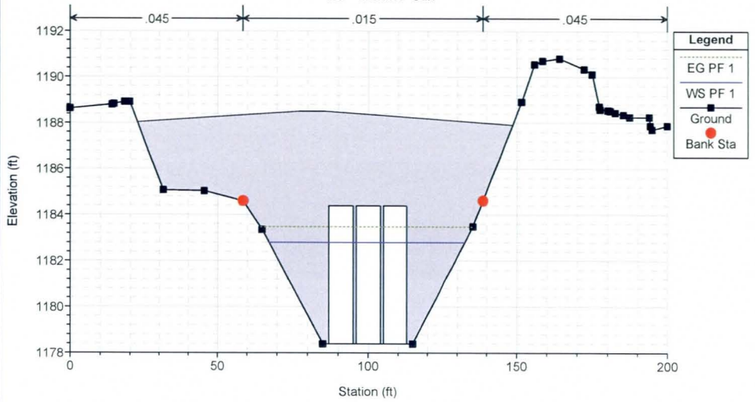
Geom: Proposed Channel Flow: 100-year design flow
RS = 22703.8 Culv



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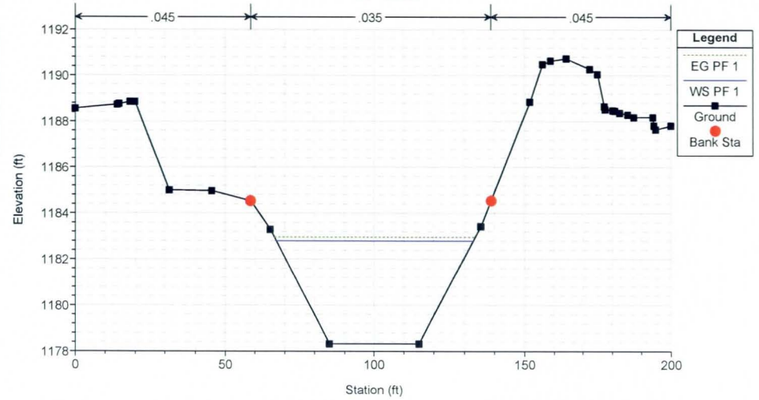
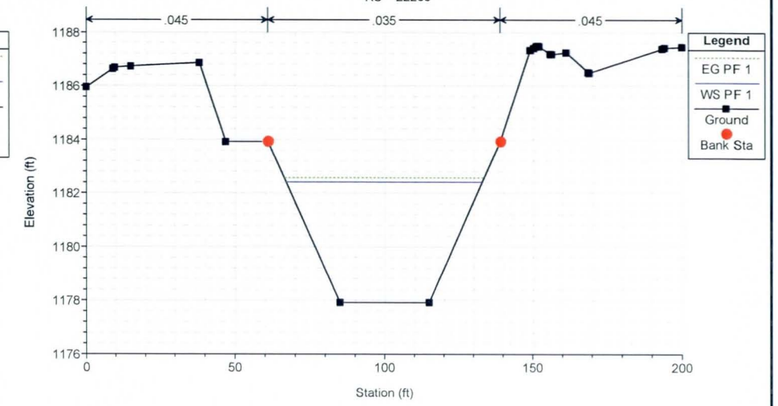
Geom: Proposed Channel Flow: 100-year design flow
RS = 22600



FRS3 Outlet Channel Plan: Subcritical Calc 6/26/2009 12:16:38 PM
Geom: Proposed Channel Flow: 100-year design flow
RS = 22200



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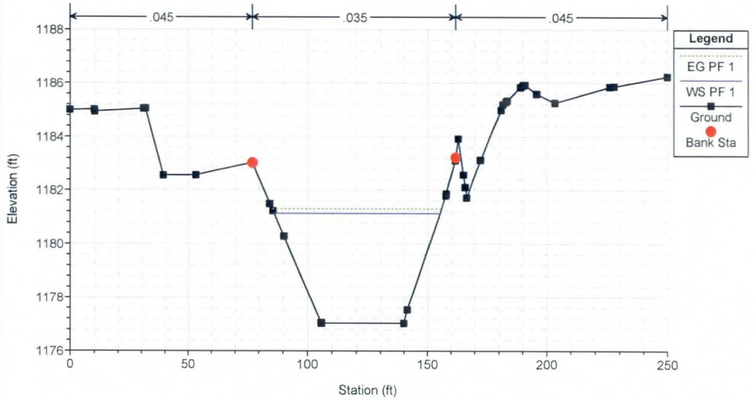
Geom: Proposed Channel Flow: 100-year design flow
RS = 21310



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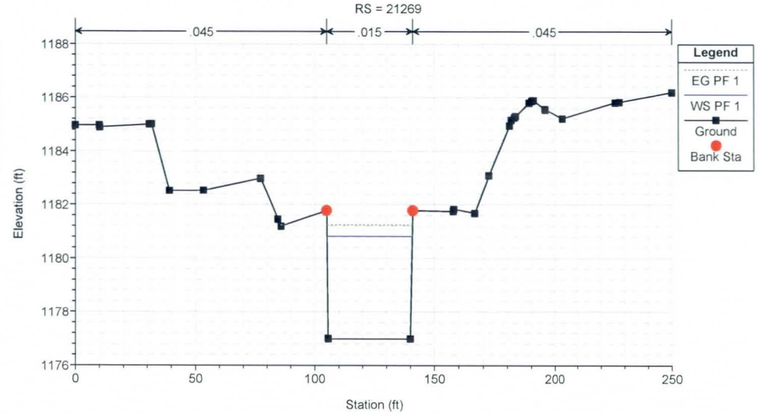
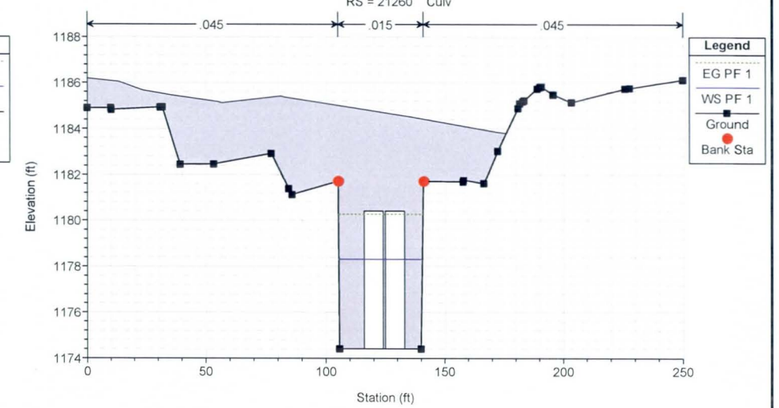
Geom: Proposed Channel Flow: 100-year design flow
RS = 21269



FRS3 Outlet Channel Plan: Subcritical Calc 6/26/2009 12:16:38 PM
Geom: Proposed Channel Flow: 100-year design flow
RS = 21260 Culv



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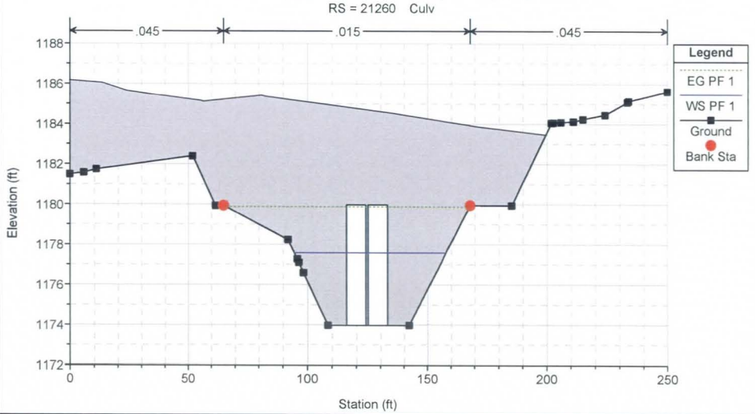
Geom: Proposed Channel Flow: 100-year design flow
RS = 21260 Culv



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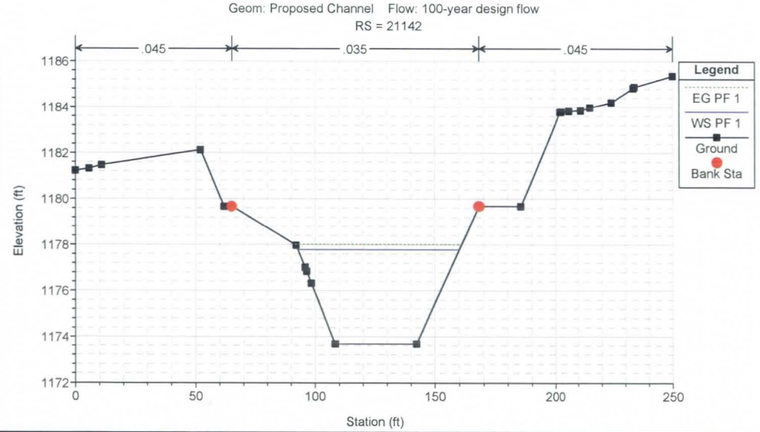
Geom: Proposed Channel Flow: 100-year design flow
RS = 21142



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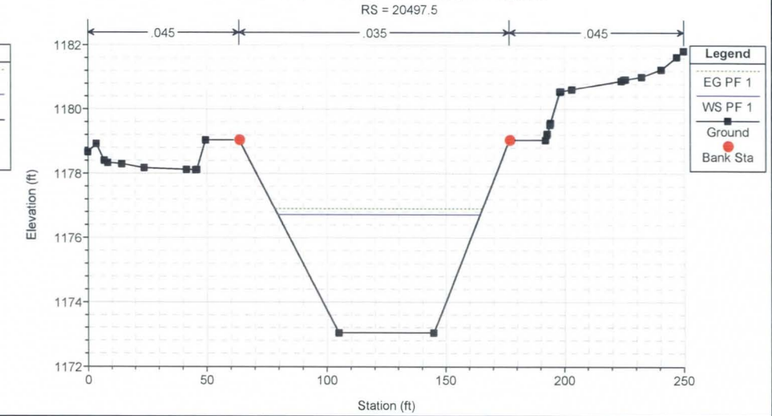
Geom: Proposed Channel Flow: 100-year design flow
RS = 20497.5



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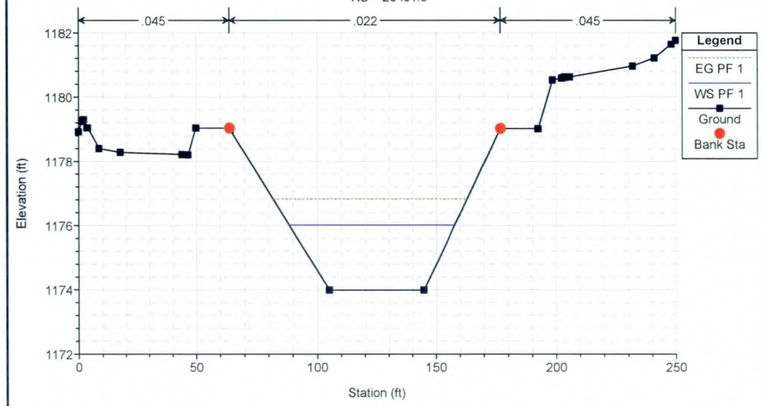
Geom: Proposed Channel Flow: 100-year design flow
RS = 20491.5



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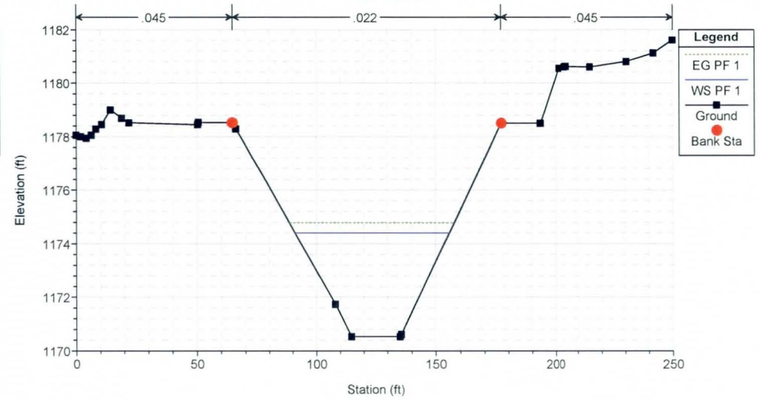
Geom: Proposed Channel Flow: 100-year design flow
RS = 20475



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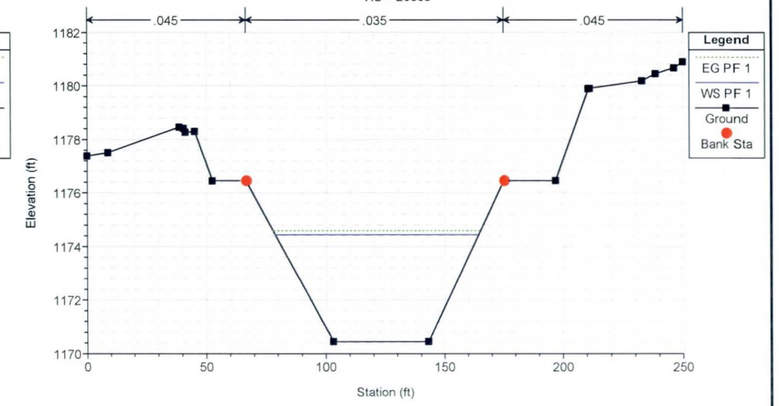
Geom: Proposed Channel Flow: 100-year design flow
RS = 20395



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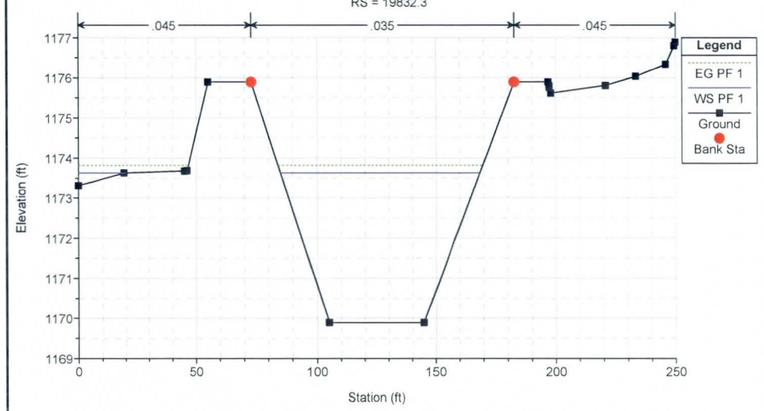
Geom: Proposed Channel Flow: 100-year design flow
RS = 19832.3



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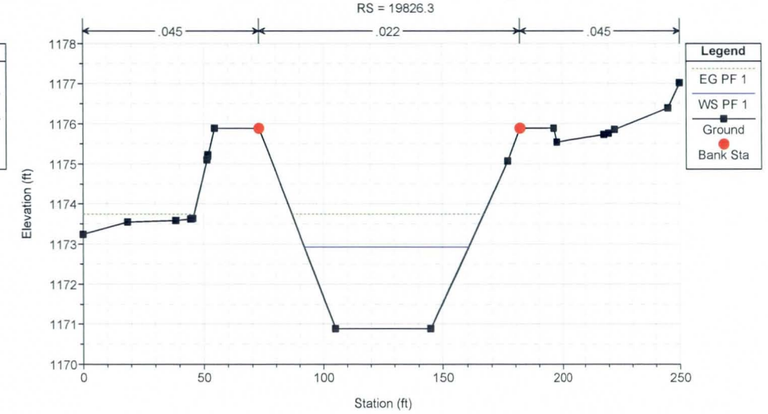
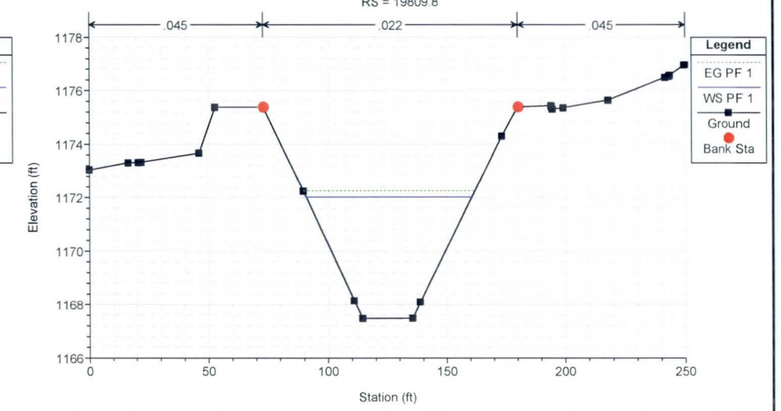
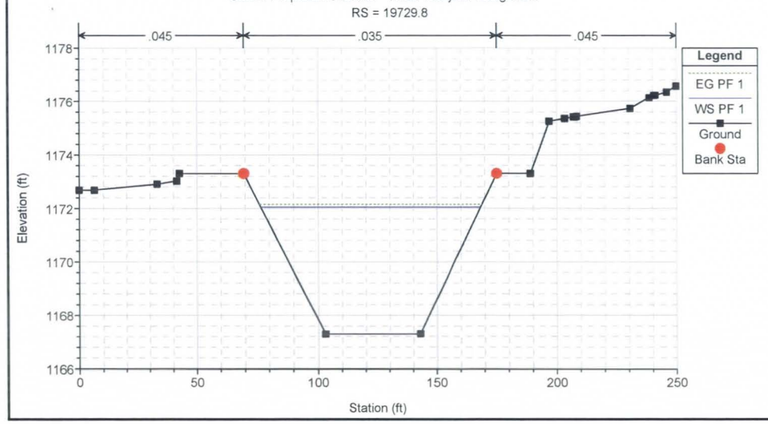
Geom: Proposed Channel Flow: 100-year design flow
RS = 19826.3



FRS3 Outlet Channel Plan: Subcritical Calc 6/26/2009 12:16:38 PM
Geom: Proposed Channel Flow: 100-year design flow
RS = 19809.8



FRS3 Outlet Channel Plan: Subcritical Calc 6/26/2009 12:16:38 PM
Geom: Proposed Channel Flow: 100-year design flow
RS = 19729.8



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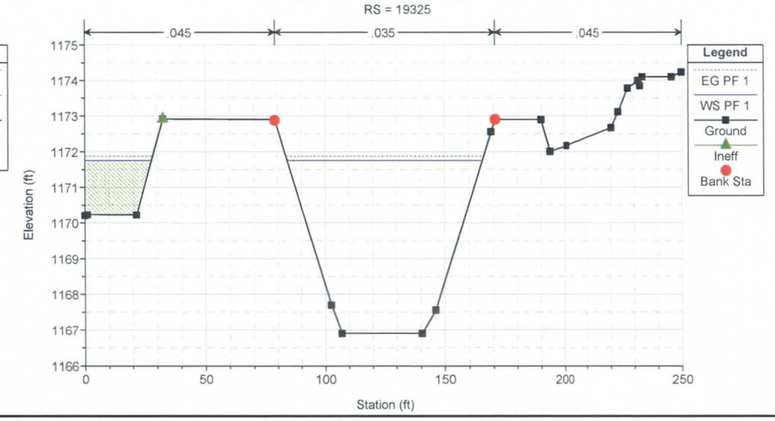
Geom: Proposed Channel Flow: 100-year design flow
RS = 19325



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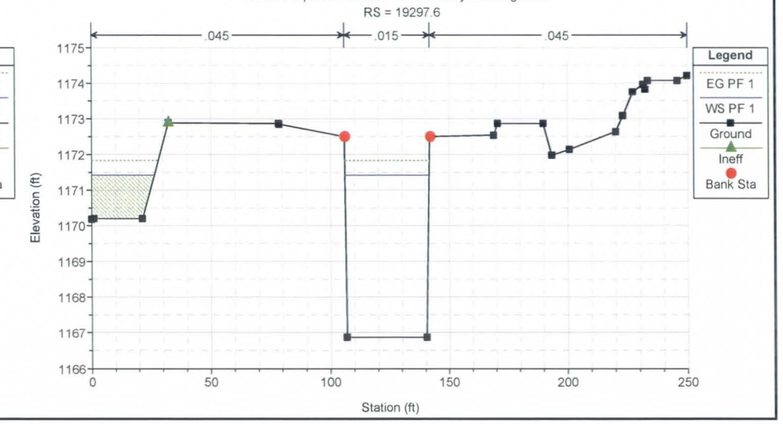
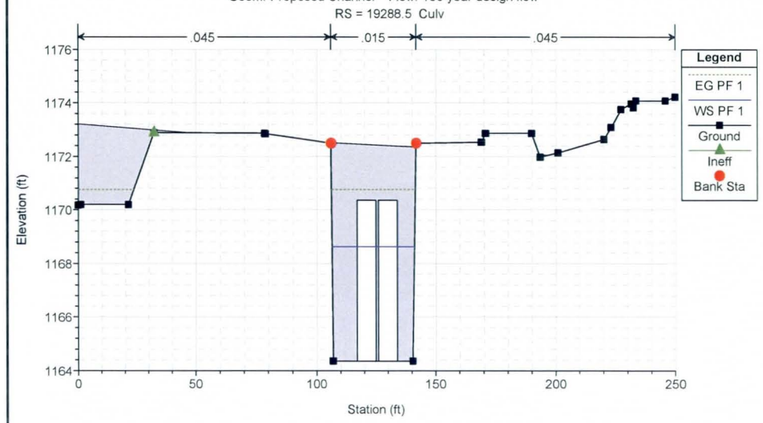
Geom: Proposed Channel Flow: 100-year design flow
RS = 19297.6



FRS3 Outlet Channel Plan: Subcritical Calc 6/26/2009 12:16:38 PM
Geom: Proposed Channel Flow: 100-year design flow
RS = 19288.5 Culv



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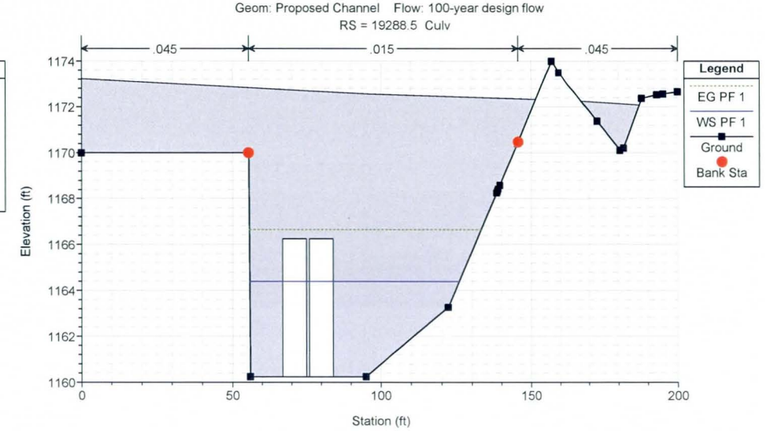
Geom: Proposed Channel Flow: 100-year design flow
RS = 19288.5 Culv



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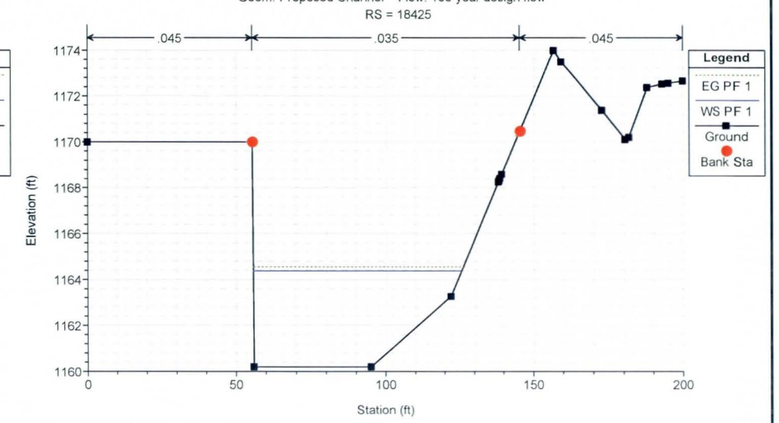
Geom: Proposed Channel Flow: 100-year design flow
RS = 18425



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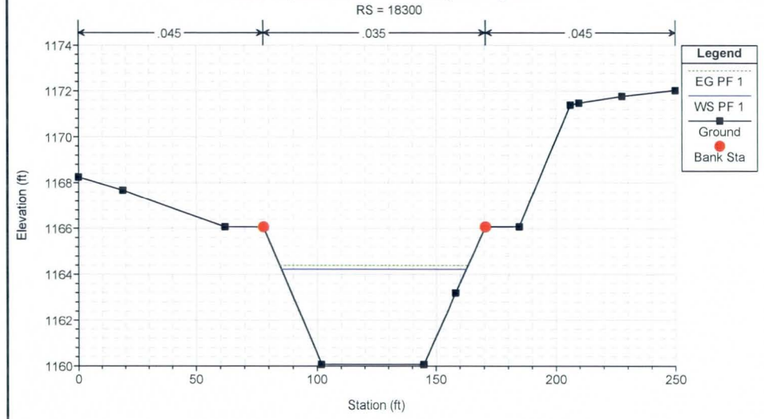
Geom: Proposed Channel Flow: 100-year design flow
RS = 18300



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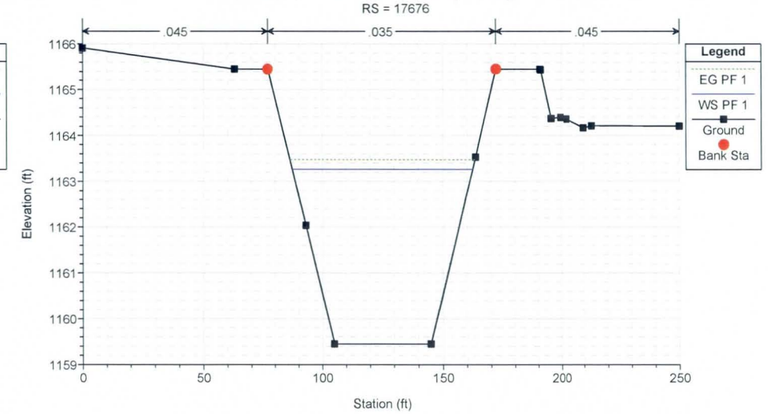
Geom: Proposed Channel Flow: 100-year design flow
RS = 17676



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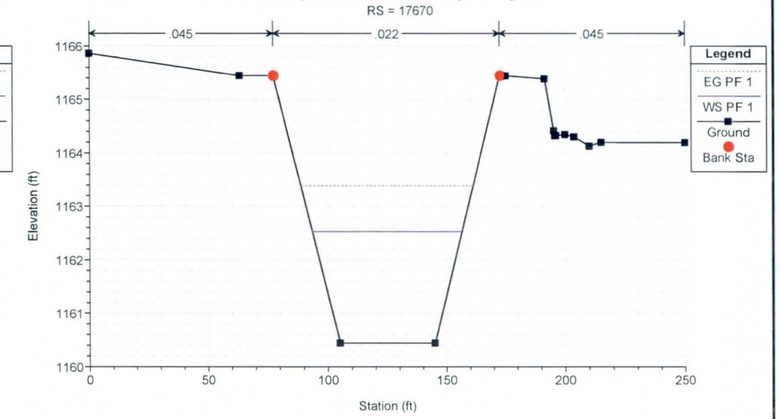
Geom: Proposed Channel Flow: 100-year design flow
RS = 17670



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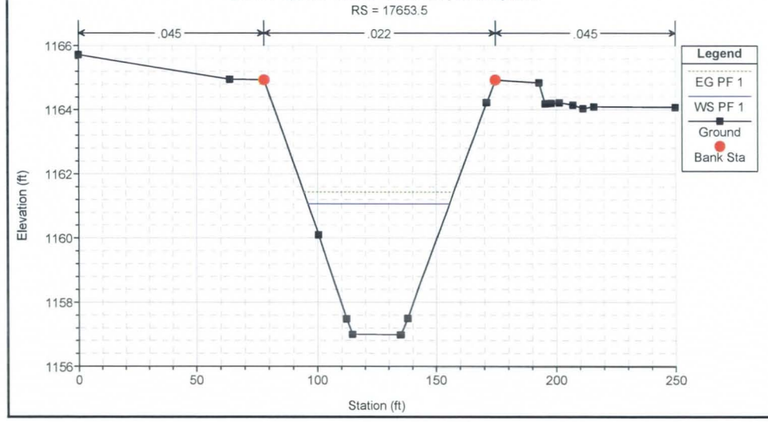
Geom: Proposed Channel Flow: 100-year design flow
RS = 17653.5



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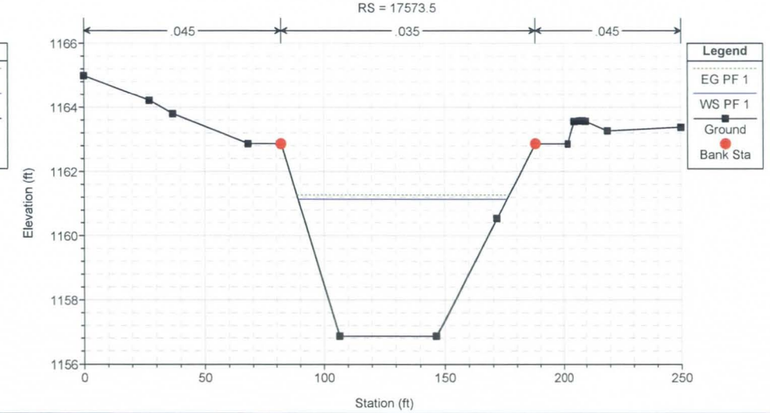

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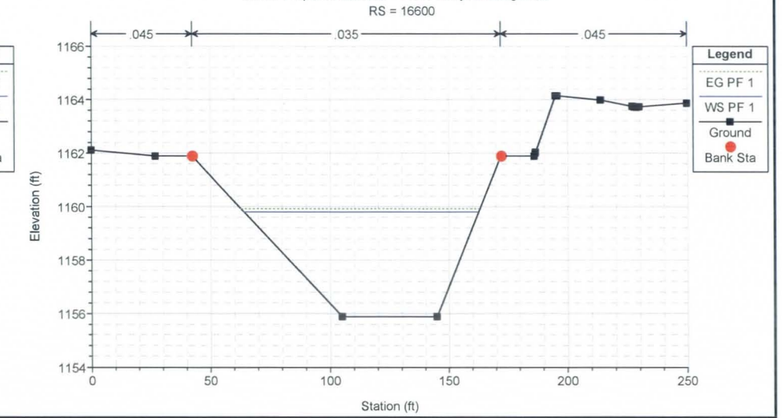
Geom: Proposed Channel Flow: 100-year design flow
RS = 16600



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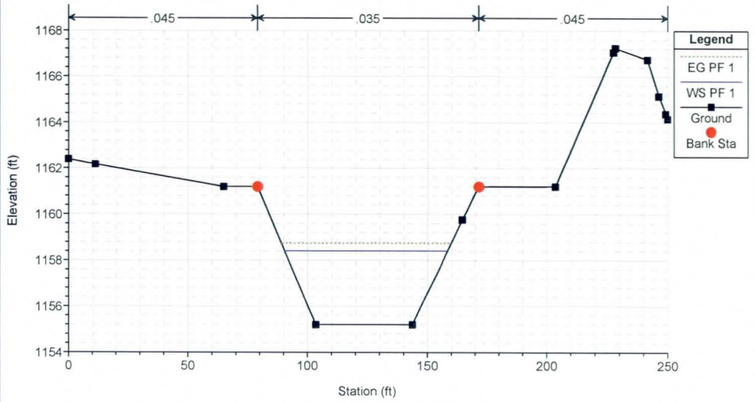
Geom: Proposed Channel Flow: 100-year design flow
RS = 15910



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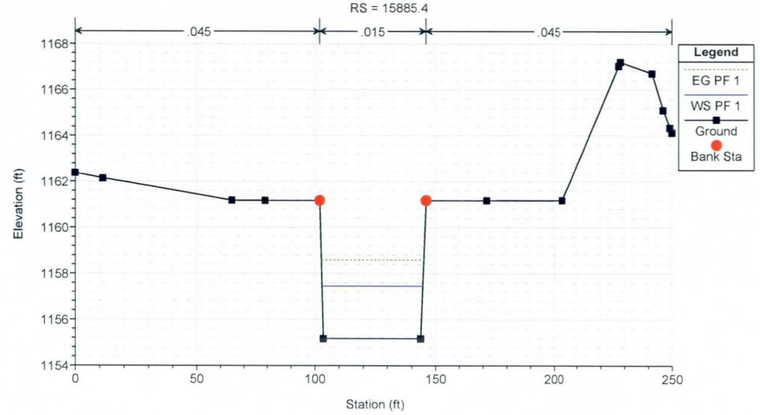
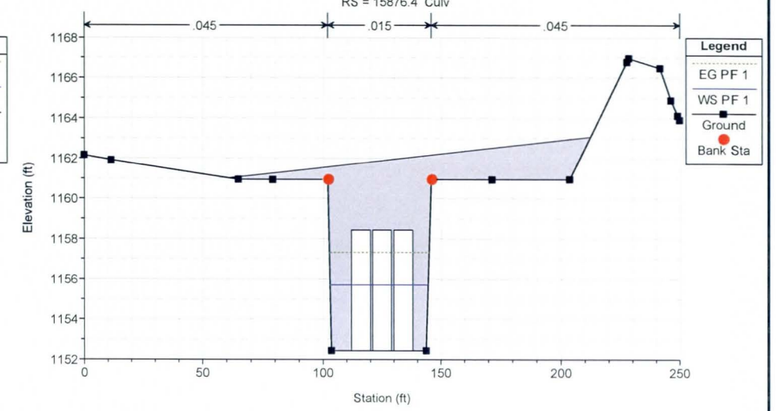
Geom: Proposed Channel Flow: 100-year design flow
RS = 15885.4



FRS3 Outlet Channel Plan: Subcritical Calc 6/26/2009 12:16:38 PM
Geom: Proposed Channel Flow: 100-year design flow
RS = 15876.4 Culv



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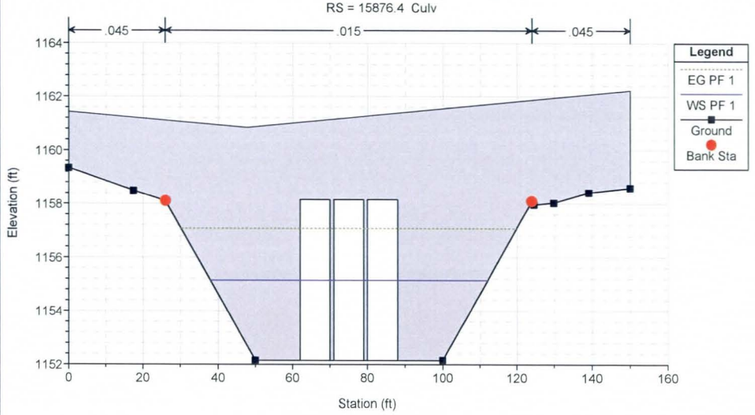
Geom: Proposed Channel Flow: 100-year design flow
RS = 15876.4 Culv



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Geom: Proposed Channel Flow: 100-year design flow
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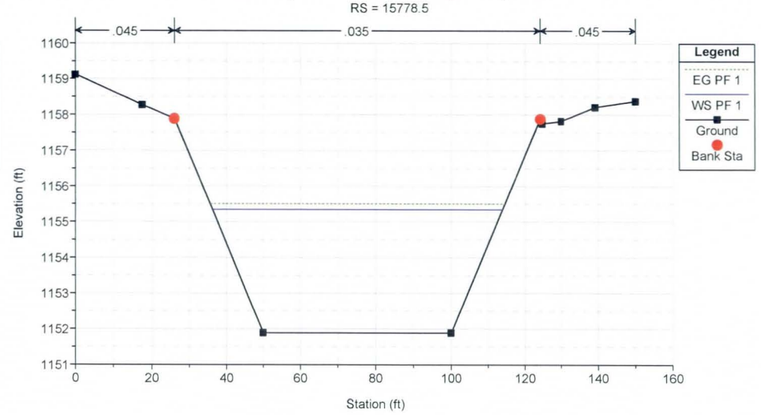

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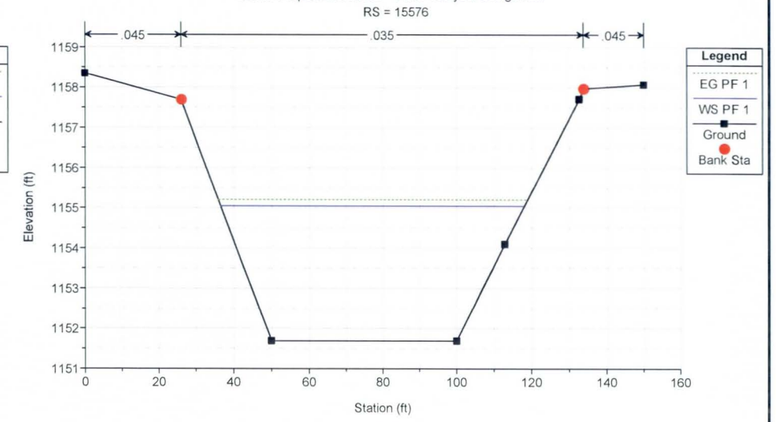
Geom: Proposed Channel Flow: 100-year design flow
RS = 15576



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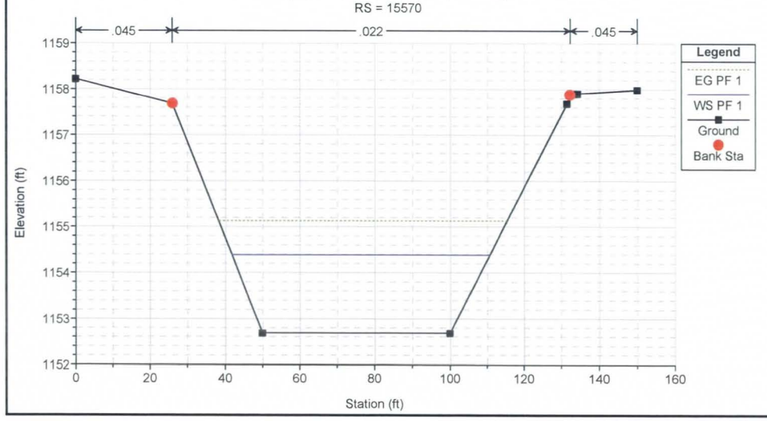
Geom: Proposed Channel Flow: 100-year design flow
RS = 15570



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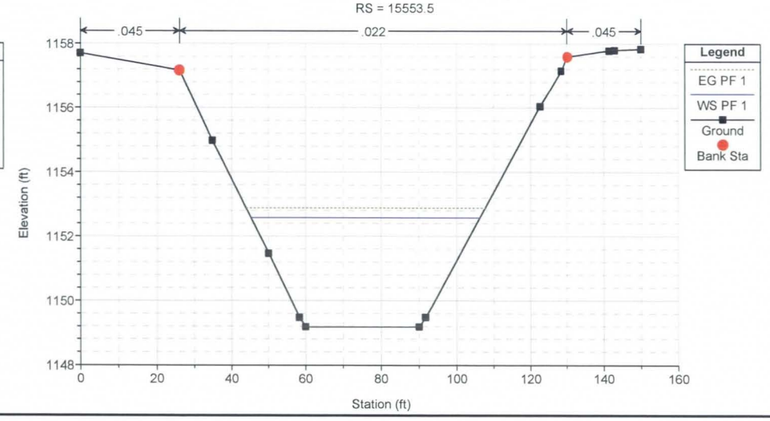
Geom: Proposed Channel Flow: 100-year design flow
RS = 15553.5



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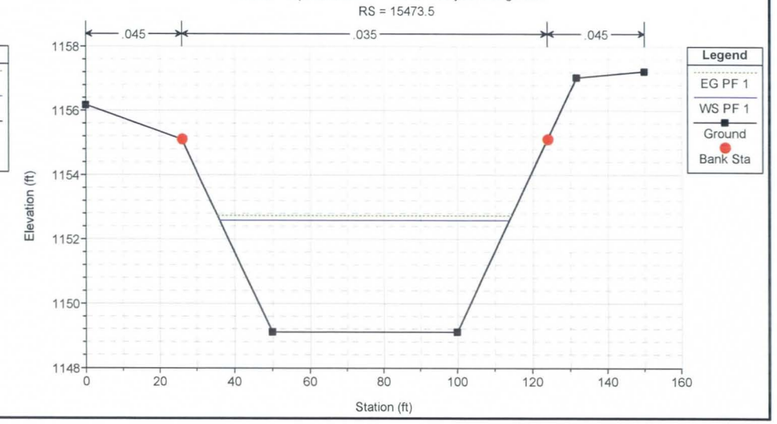
Geom: Proposed Channel Flow: 100-year design flow
RS = 15473.5



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Geom: Proposed Channel Flow: 100-year design flow
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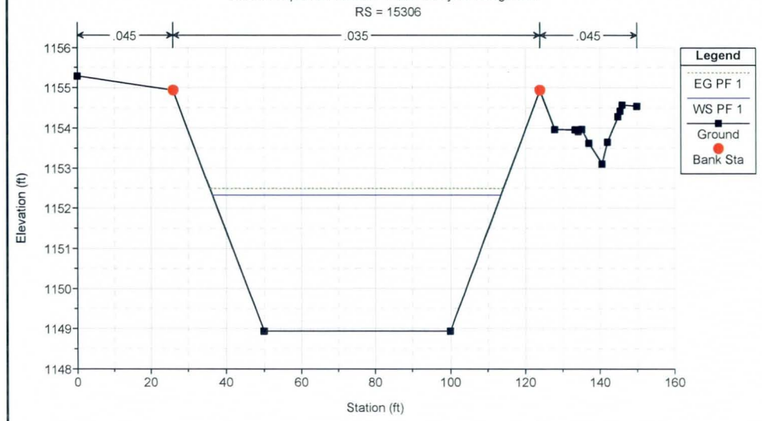

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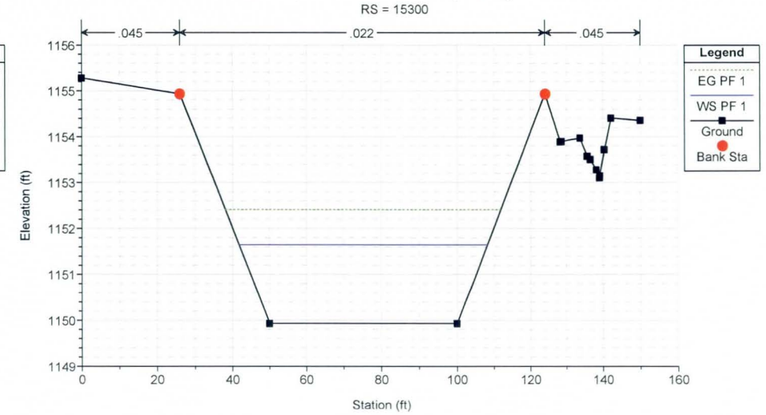
Geom: Proposed Channel Flow: 100-year design flow
RS = 15300



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Geom: Proposed Channel Flow: 100-year design flow
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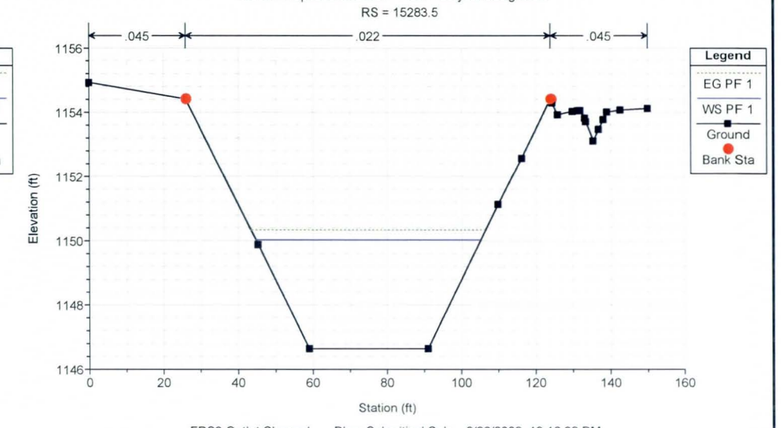

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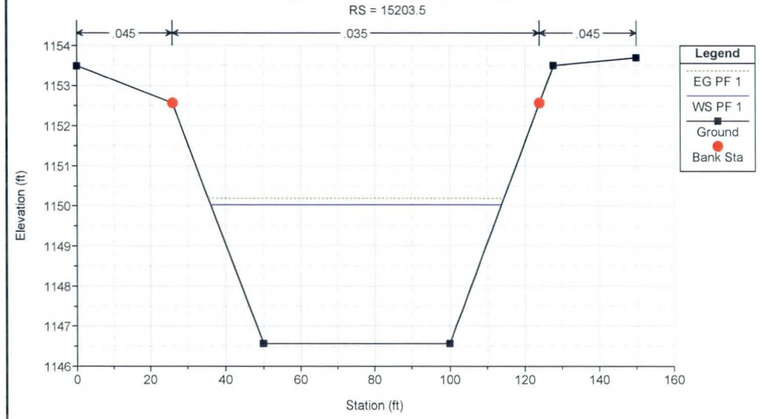
Geom: Proposed Channel Flow: 100-year design flow
RS = 15203.5



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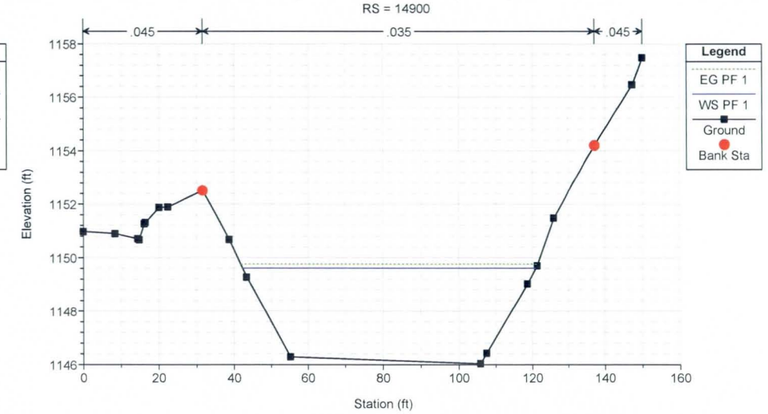
Geom: Proposed Channel Flow: 100-year design flow
RS = 14900



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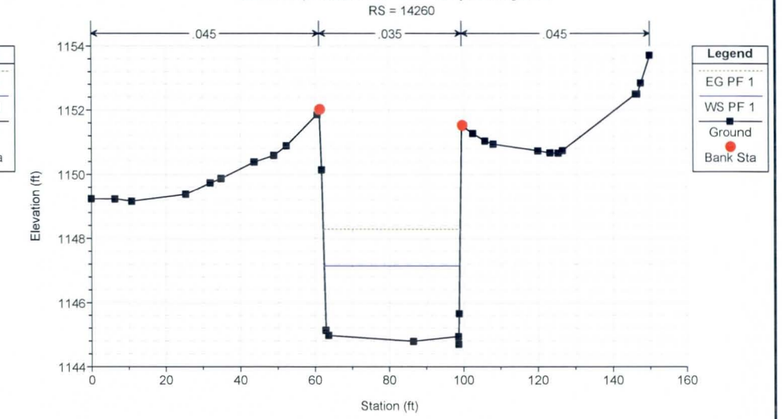
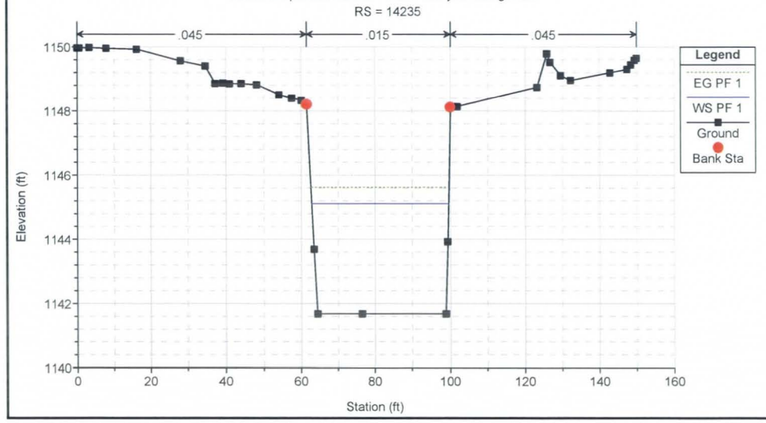
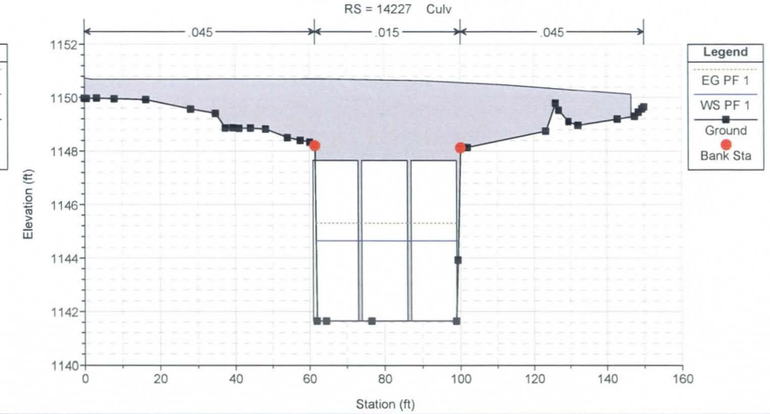
Geom: Proposed Channel Flow: 100-year design flow
RS = 14260



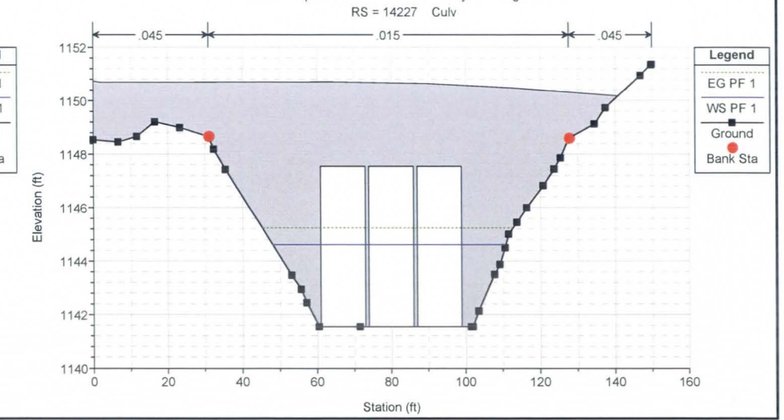
FRS3 Outlet Channel Plan: Subcritical Calc 6/26/2009 12:16:38 PM
Geom: Proposed Channel Flow: 100-year design flow
RS = 14235



FRS3 Outlet Channel Plan: Subcritical Calc 6/26/2009 12:16:38 PM
Geom: Proposed Channel Flow: 100-year design flow
RS = 14227 Culv



FRS3 Outlet Channel Plan: Subcritical Calc 6/26/2009 12:16:38 PM
Geom: Proposed Channel Flow: 100-year design flow
RS = 14227 Culv



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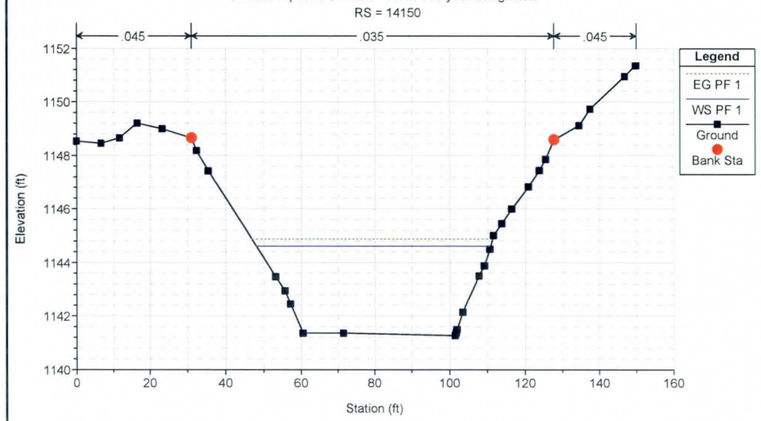
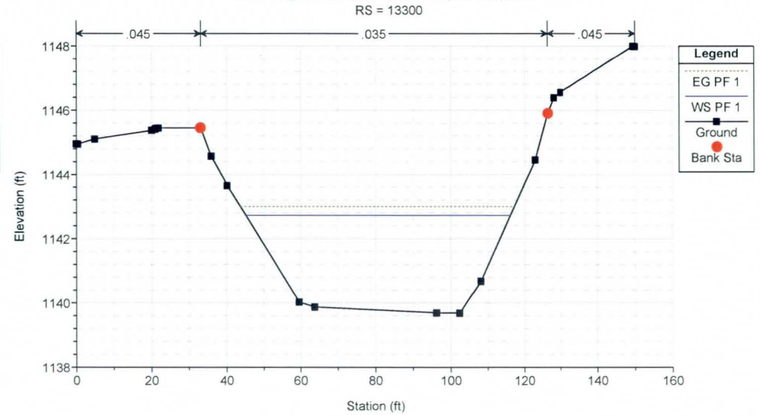
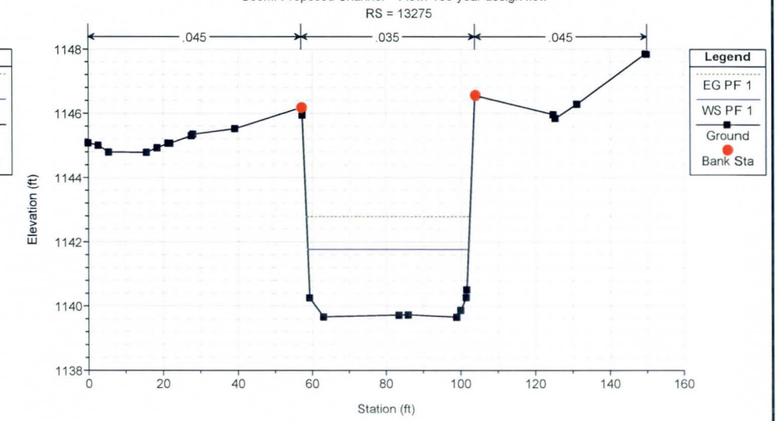
Geom: Proposed Channel Flow: 100-year design flow
RS = 14150



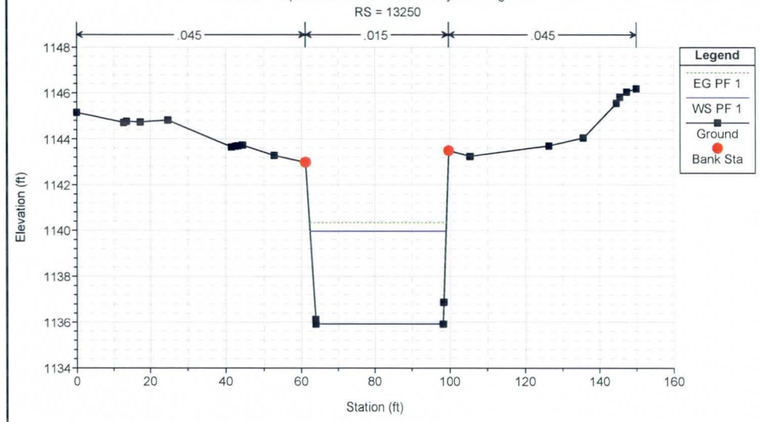
FRS3 Outlet Channel Plan: Subcritical Calc 6/26/2009 12:16:38 PM
Geom: Proposed Channel Flow: 100-year design flow
RS = 13300



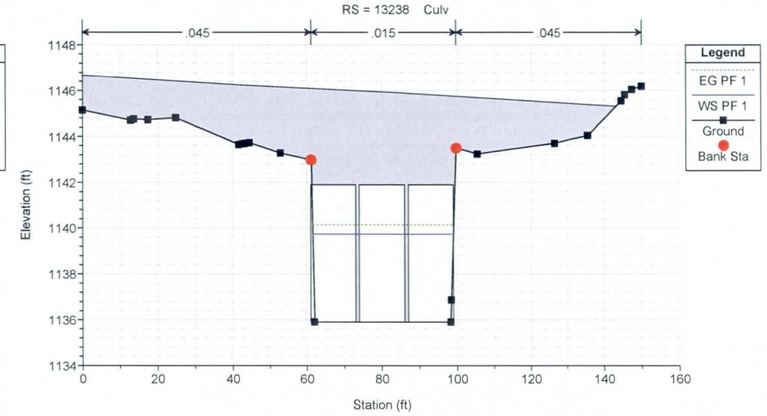
FRS3 Outlet Channel Plan: Subcritical Calc 6/26/2009 12:16:38 PM
Geom: Proposed Channel Flow: 100-year design flow
RS = 13275



FRS3 Outlet Channel Plan: Subcritical Calc 6/26/2009 12:16:38 PM
Geom: Proposed Channel Flow: 100-year design flow
RS = 13250



FRS3 Outlet Channel Plan: Subcritical Calc 6/26/2009 12:16:38 PM
Geom: Proposed Channel Flow: 100-year design flow
RS = 13238 Culv



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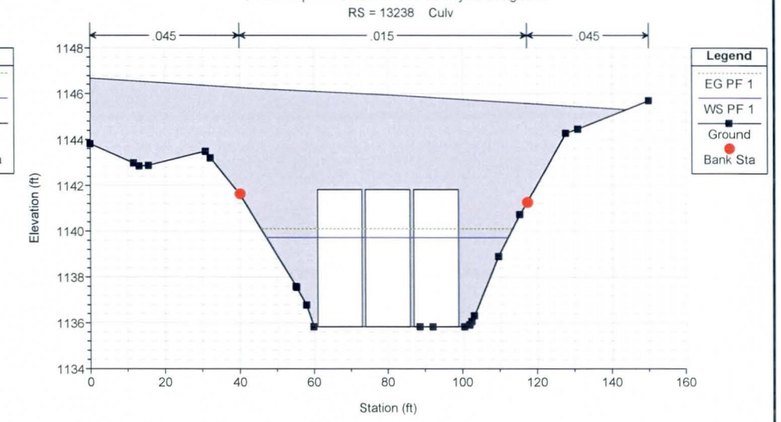
Geom: Proposed Channel Flow: 100-year design flow
RS = 13238 Culv



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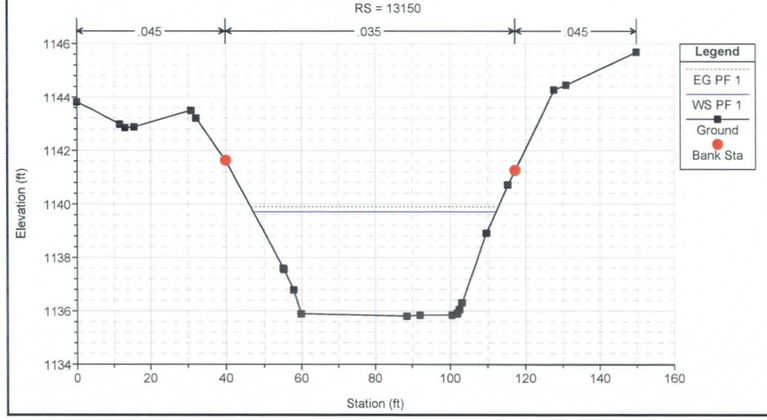
Geom: Proposed Channel Flow: 100-year design flow
RS = 13150



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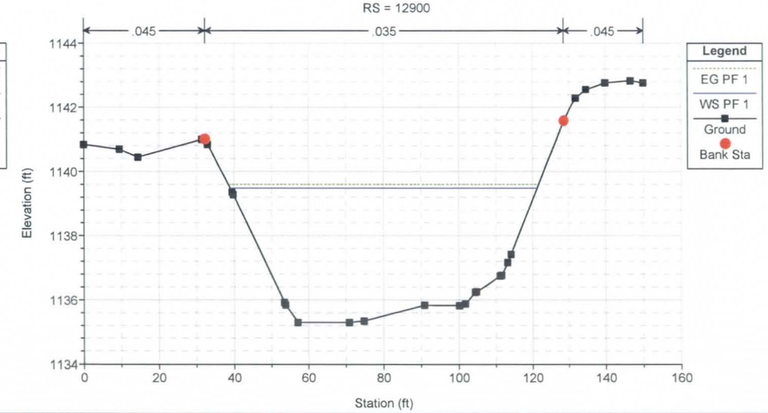
Geom: Proposed Channel Flow: 100-year design flow
RS = 12900



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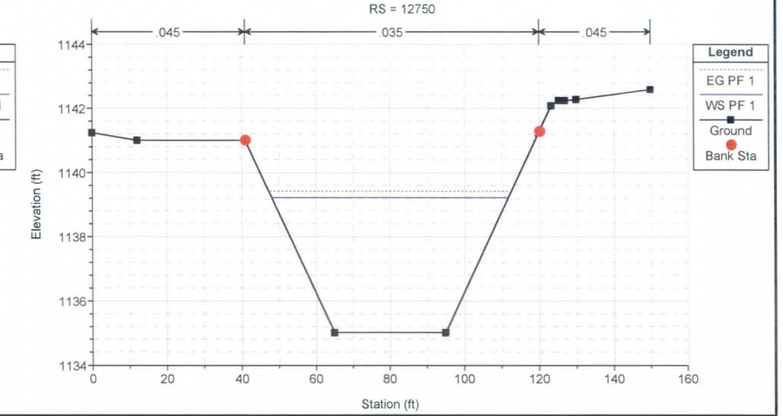
Geom: Proposed Channel Flow: 100-year design flow
RS = 12750



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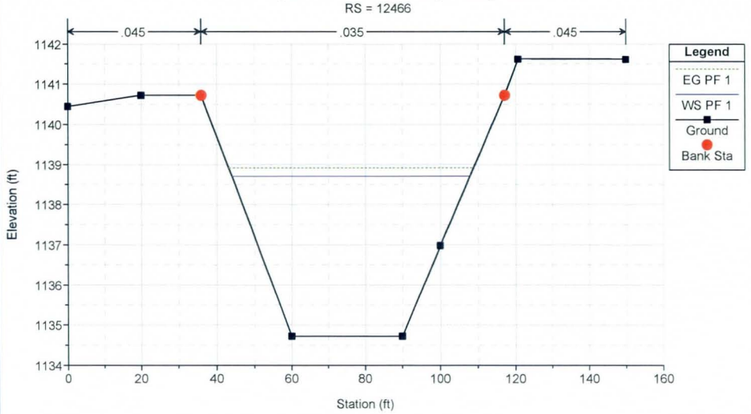
Geom: Proposed Channel Flow: 100-year design flow
RS = 12466



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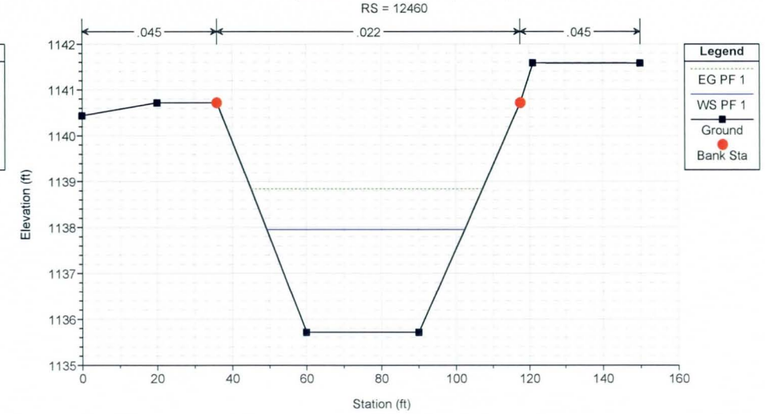
Geom: Proposed Channel Flow: 100-year design flow
RS = 12460



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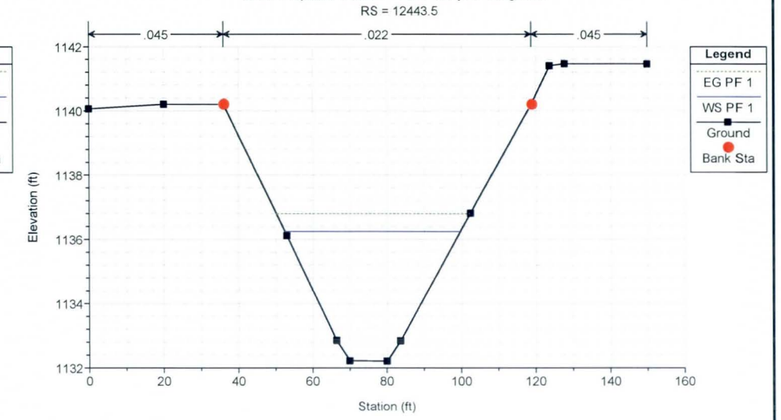
Geom: Proposed Channel Flow: 100-year design flow
RS = 12443.5



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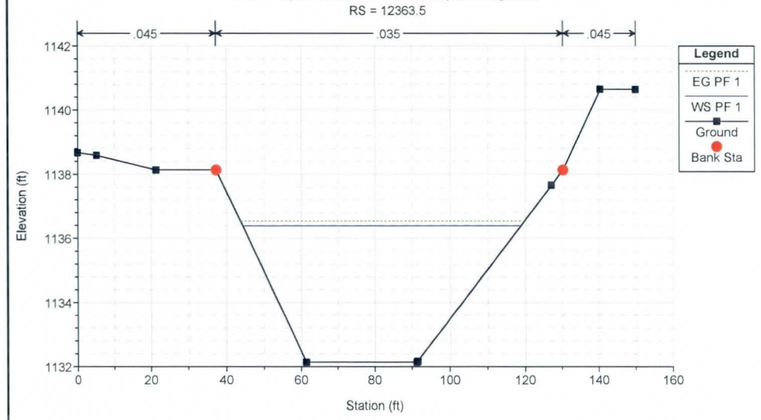
Geom: Proposed Channel Flow: 100-year design flow
RS = 12363.5



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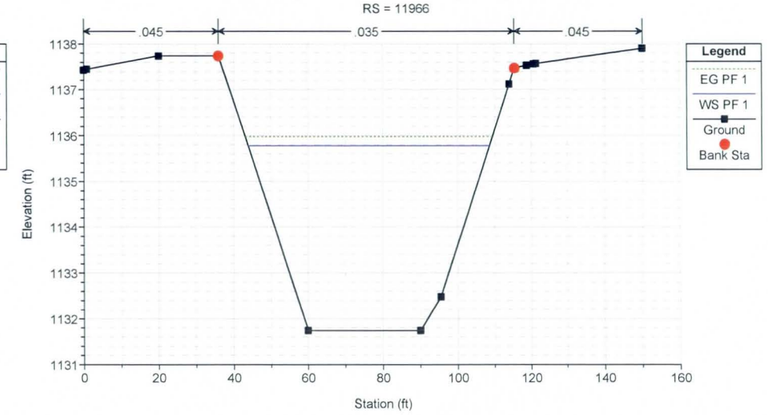
Geom: Proposed Channel Flow: 100-year design flow
RS = 11966



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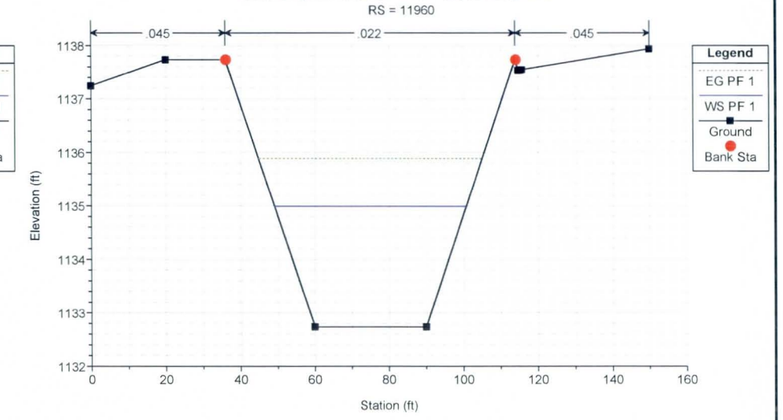
Geom: Proposed Channel Flow: 100-year design flow
RS = 11960



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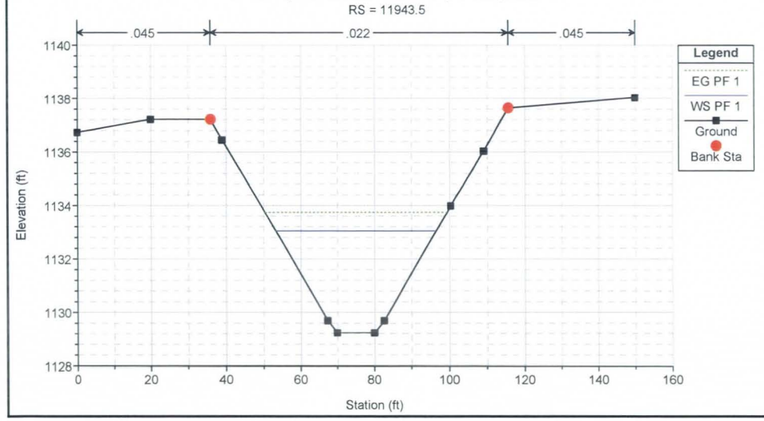
Geom: Proposed Channel Flow: 100-year design flow
RS = 11943.5



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Geom: Proposed Channel Flow: 100-year design flow
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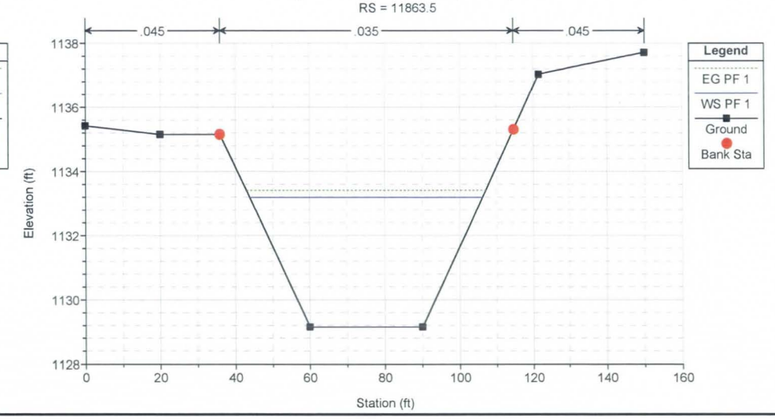
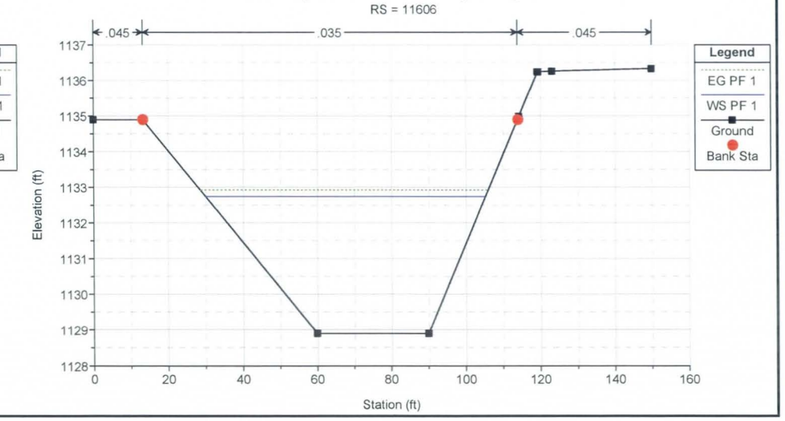


FRS3 Outlet Channel Plan: Subcritical Calc 6/26/2009 12:16:38 PM
Geom: Proposed Channel Flow: 100-year design flow
RS = 11606



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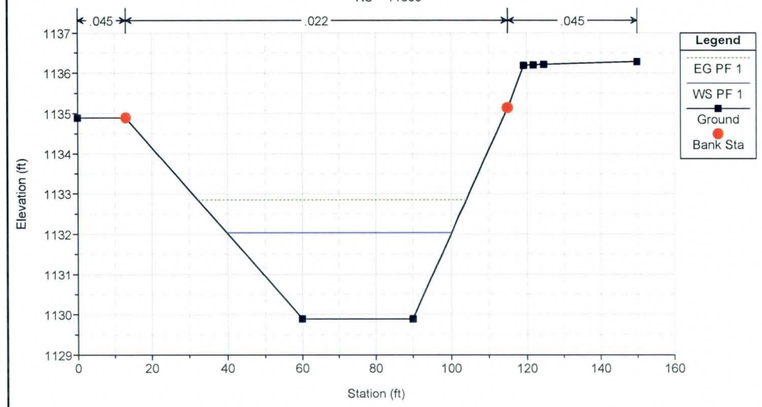
Geom: Proposed Channel Flow: 100-year design flow
RS = 11600



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Geom: Proposed Channel Flow: 100-year design flow
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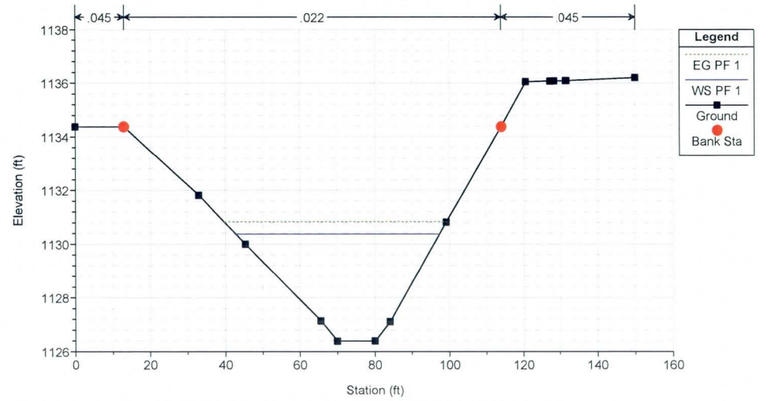

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Geom: Proposed Channel Flow: 100-year design flow
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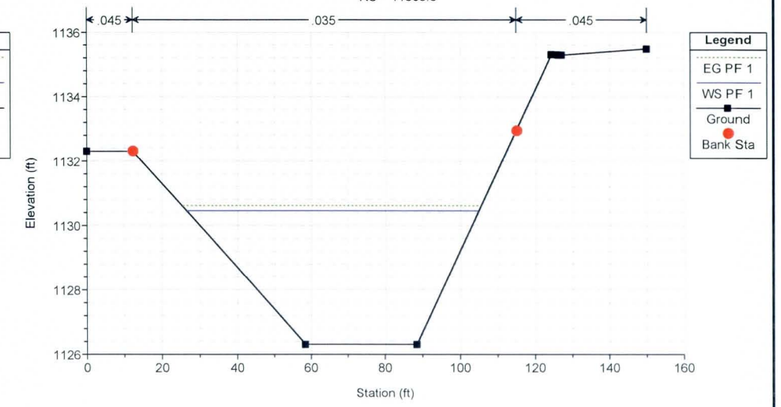

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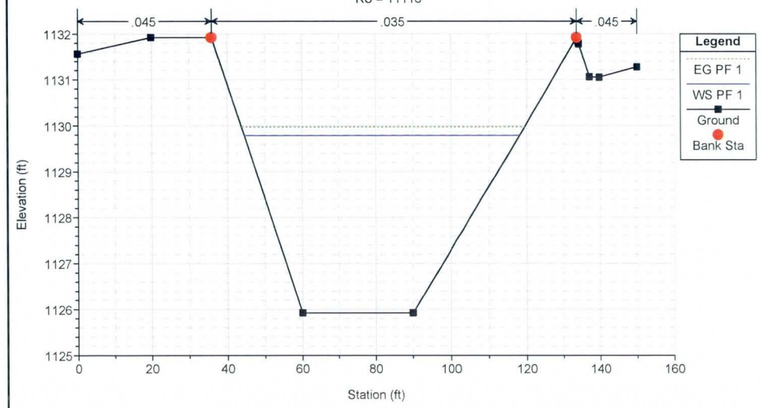
Geom: Proposed Channel Flow: 100-year design flow
RS = 11116



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Geom: Proposed Channel Flow: 100-year design flow
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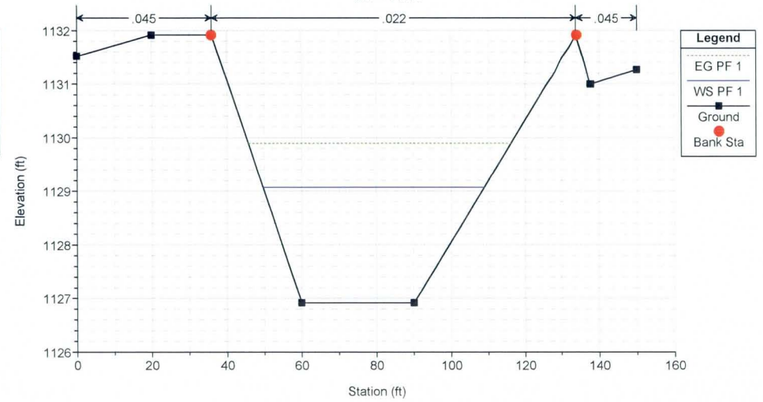

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Geom: Proposed Channel Flow: 100-year design flow
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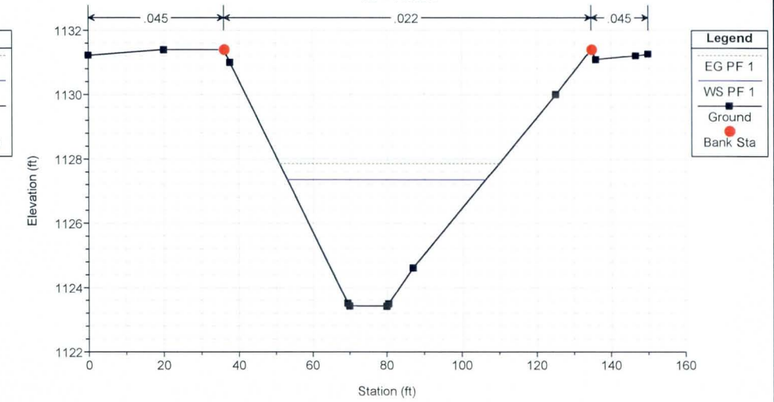

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Geom: Proposed Channel Flow: 100-year design flow
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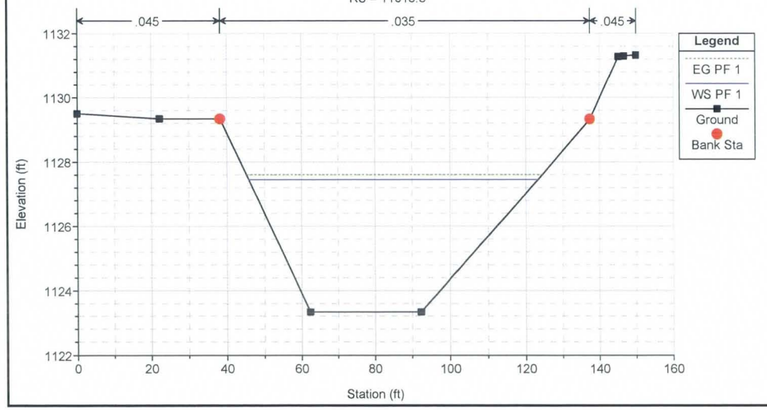

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Geom: Proposed Channel Flow: 100-year design flow
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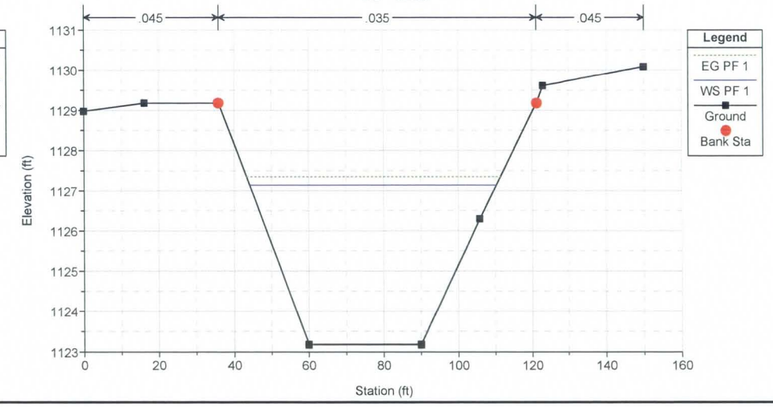

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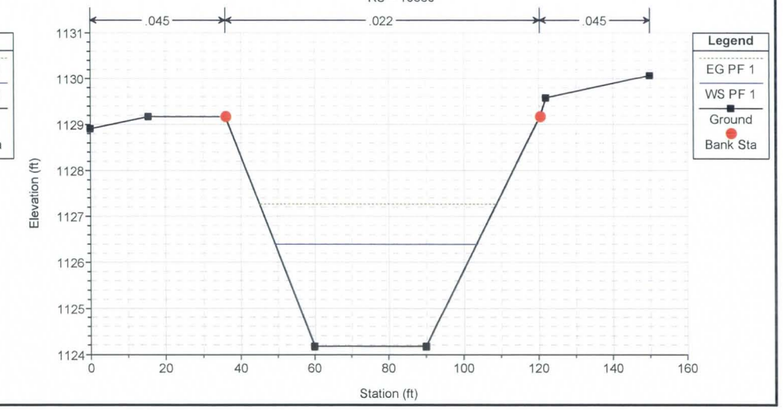
Geom: Proposed Channel Flow: 100-year design flow
RS = 10850



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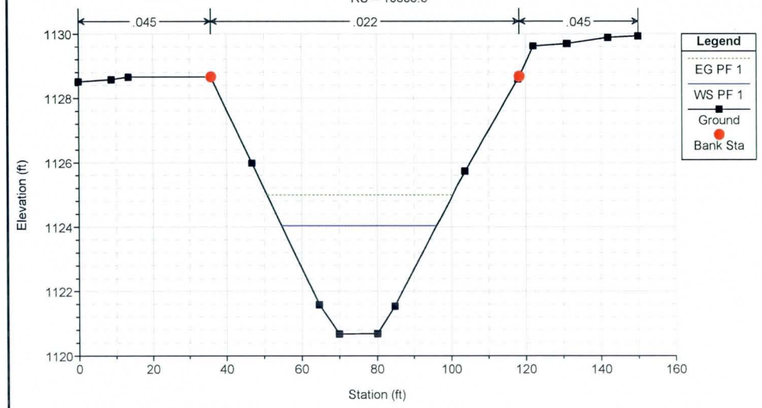
Geom: Proposed Channel Flow: 100-year design flow
RS = 10833.5



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Geom: Proposed Channel Flow: 100-year design flow
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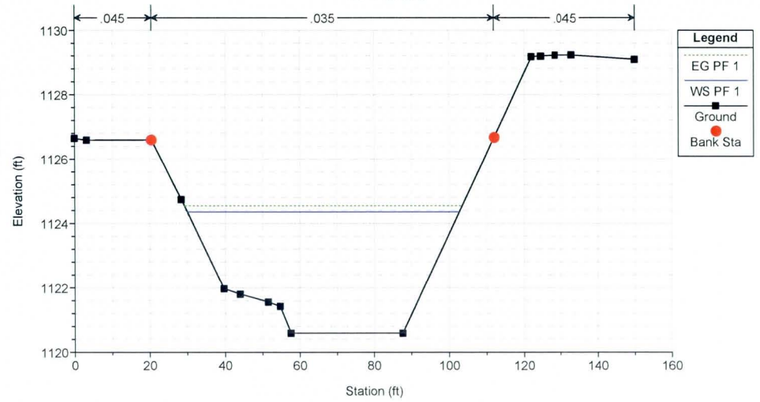

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Geom: Proposed Channel Flow: 100-year design flow
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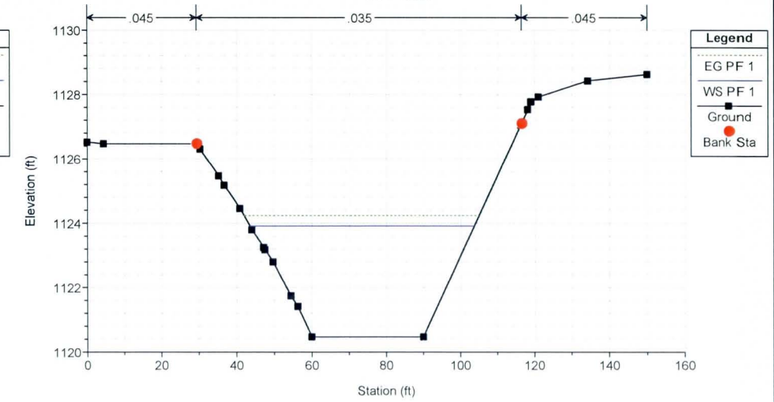

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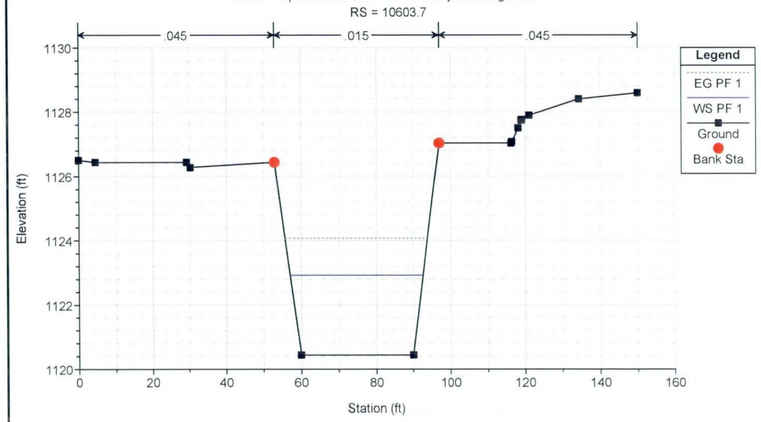
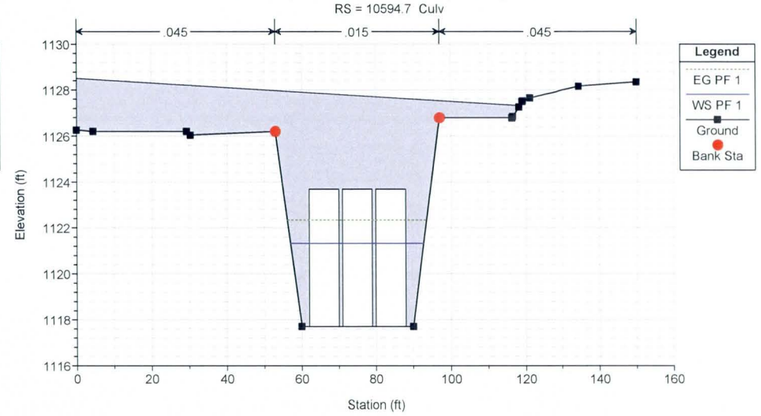
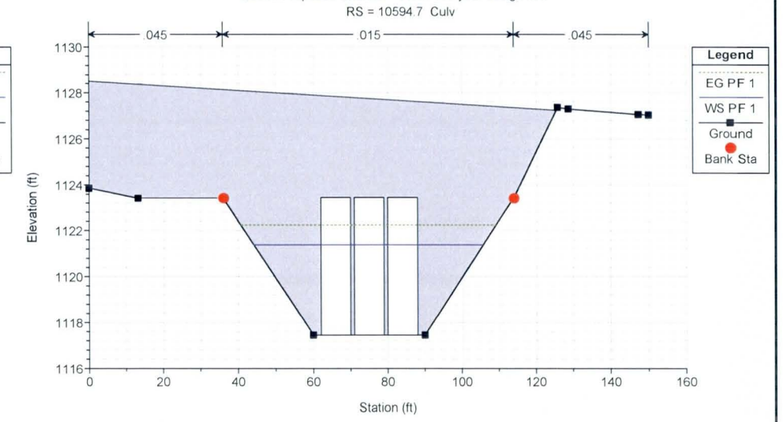
Geom: Proposed Channel Flow: 100-year design flow
RS = 10603.7



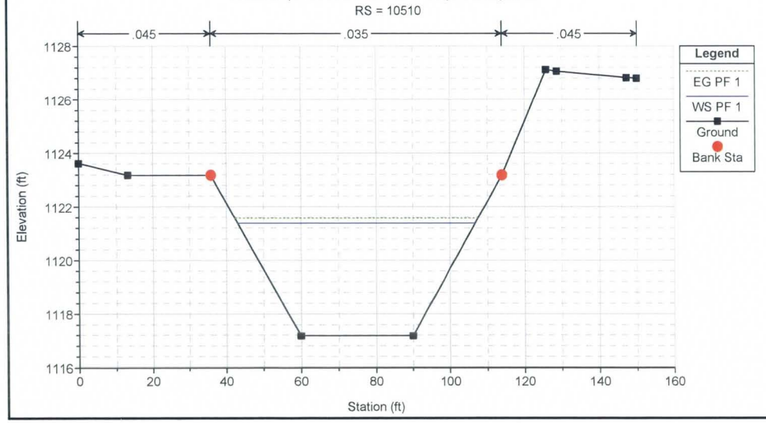
FRS3 Outlet Channel Plan: Subcritical Calc 6/26/2009 12:16:38 PM
Geom: Proposed Channel Flow: 100-year design flow
RS = 10594.7 Culv



FRS3 Outlet Channel Plan: Subcritical Calc 6/26/2009 12:16:38 PM
Geom: Proposed Channel Flow: 100-year design flow
RS = 10594.7 Culv



FRS3 Outlet Channel Plan: Subcritical Calc 6/26/2009 12:16:38 PM
Geom: Proposed Channel Flow: 100-year design flow
RS = 10510



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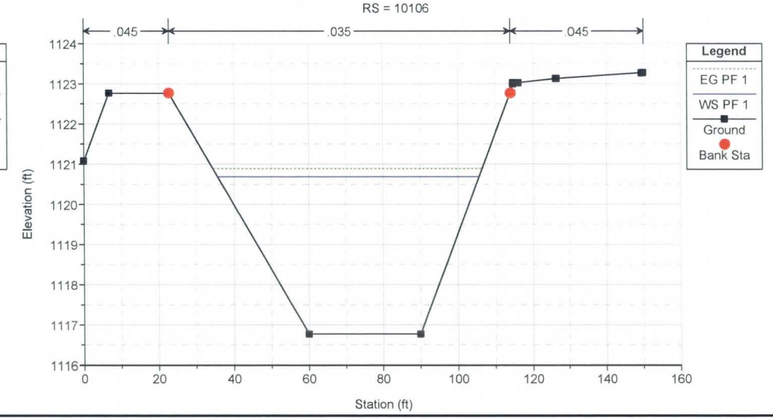
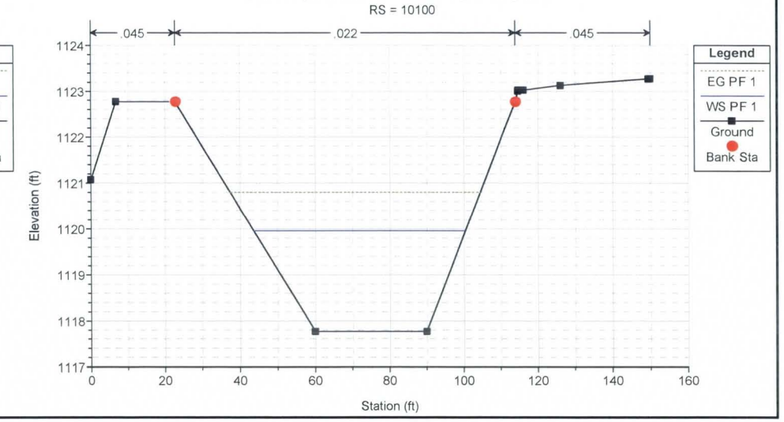
Geom: Proposed Channel Flow: 100-year design flow
RS = 10106



FRS3 Outlet Channel Plan: Subcritical Calc 6/26/2009 12:16:38 PM
Geom: Proposed Channel Flow: 100-year design flow
RS = 10100



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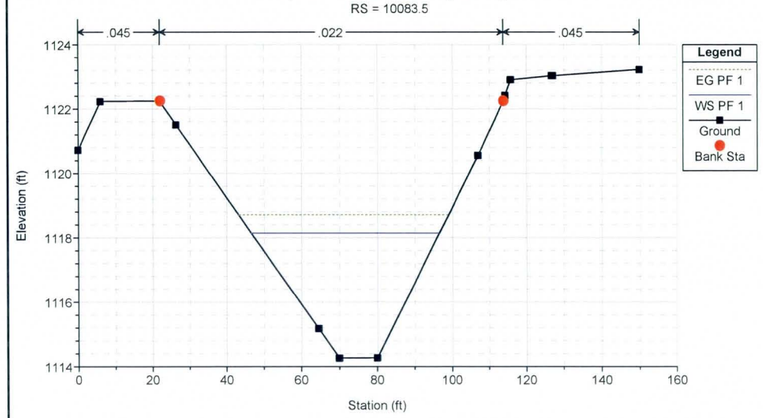
Geom: Proposed Channel Flow: 100-year design flow
RS = 10083.5



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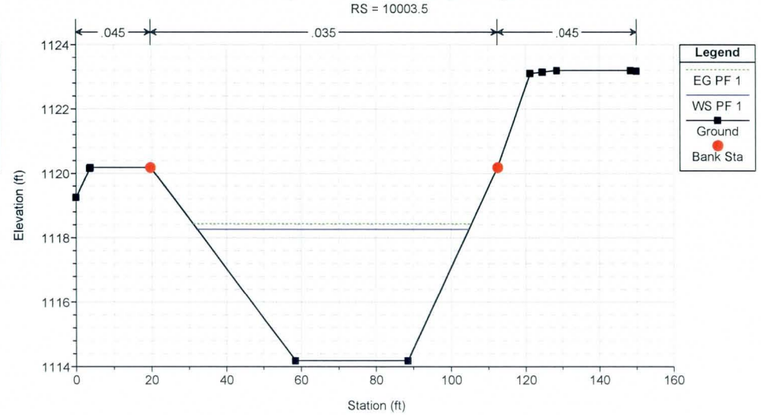
Geom: Proposed Channel Flow: 100-year design flow
RS = 10003.5



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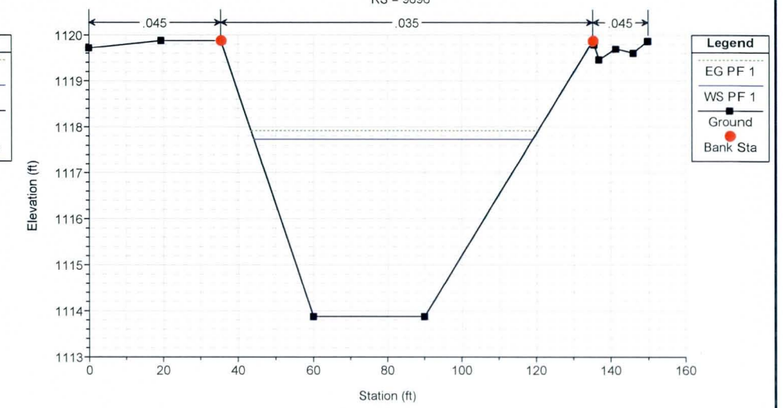
Geom: Proposed Channel Flow: 100-year design flow
RS = 9696



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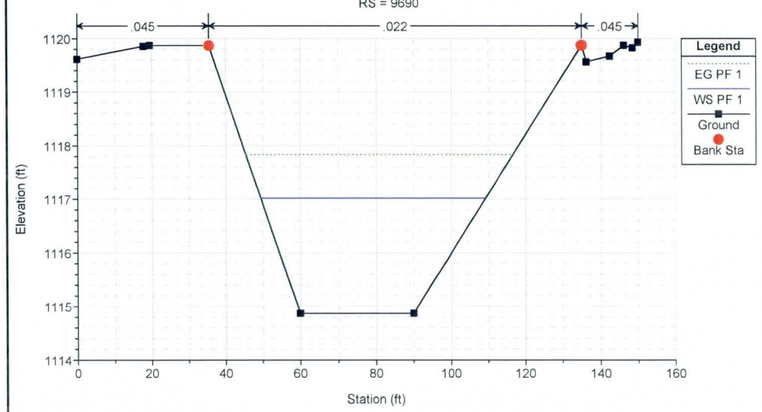
Geom: Proposed Channel Flow: 100-year design flow
RS = 9690



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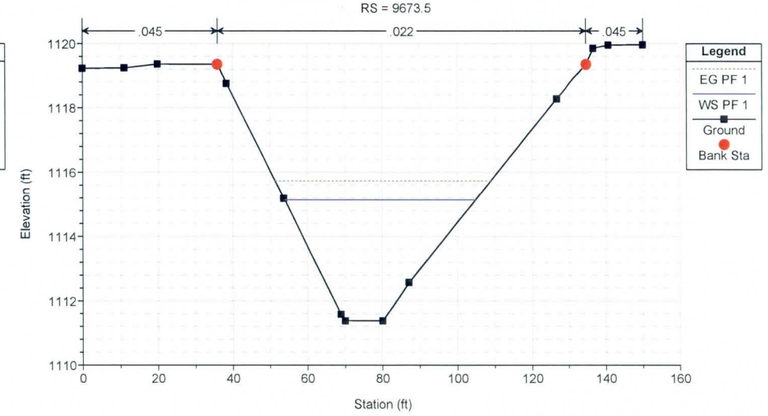
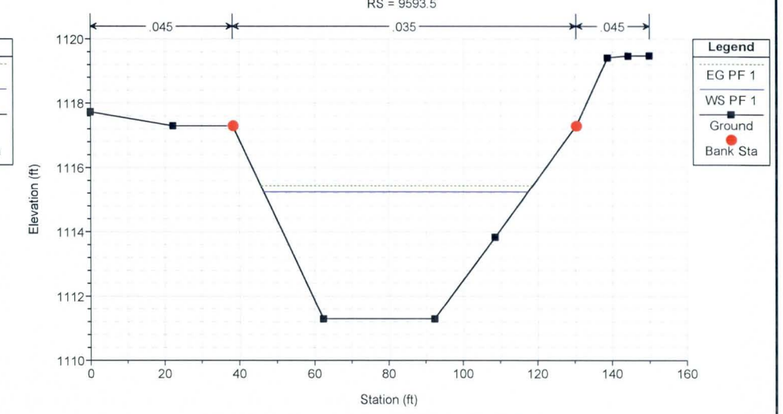
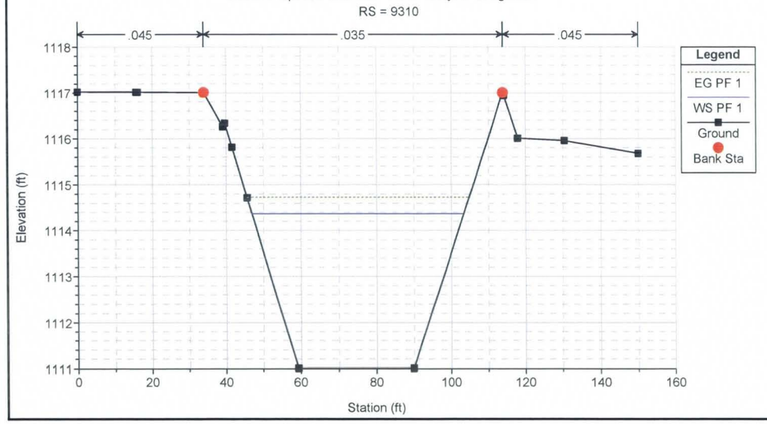
Geom: Proposed Channel Flow: 100-year design flow
RS = 9673.5



FRS3 Outlet Channel Plan: Subcritical Calc 6/26/2009 12:16:38 PM
Geom: Proposed Channel Flow: 100-year design flow
RS = 9593.5



FRS3 Outlet Channel Plan: Subcritical Calc 6/26/2009 12:16:38 PM
Geom: Proposed Channel Flow: 100-year design flow
RS = 9310



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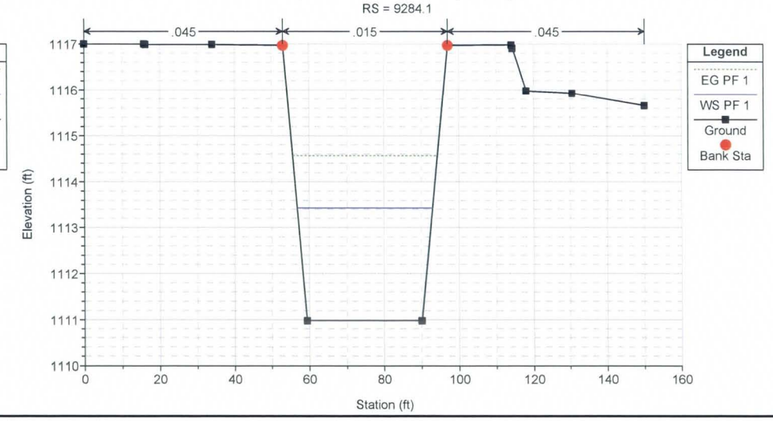
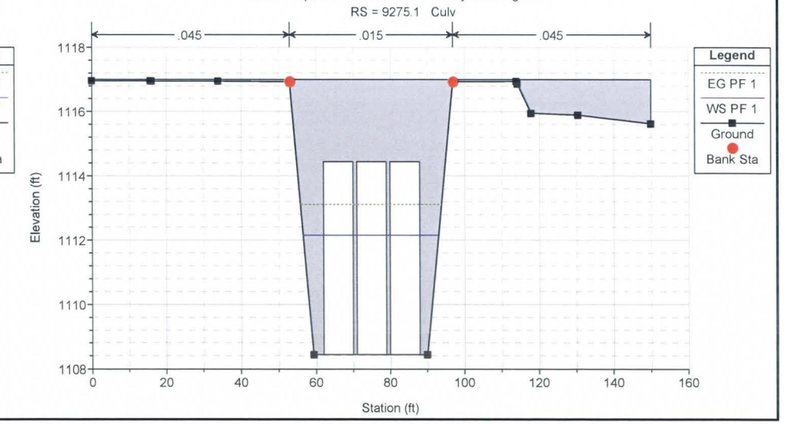
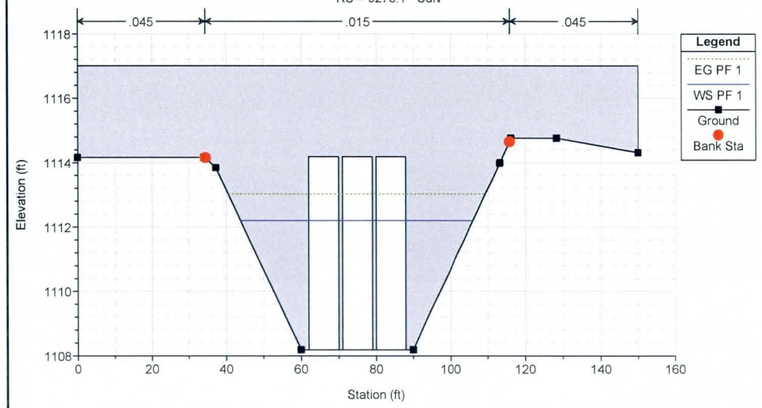
Geom: Proposed Channel Flow: 100-year design flow
RS = 9284.1



FRS3 Outlet Channel Plan: Subcritical Calc 6/26/2009 12:16:38 PM
Geom: Proposed Channel Flow: 100-year design flow
RS = 9275.1 Culv



FRS3 Outlet Channel Plan: Subcritical Calc 6/26/2009 12:16:38 PM
Geom: Proposed Channel Flow: 100-year design flow
RS = 9275.1 Culv



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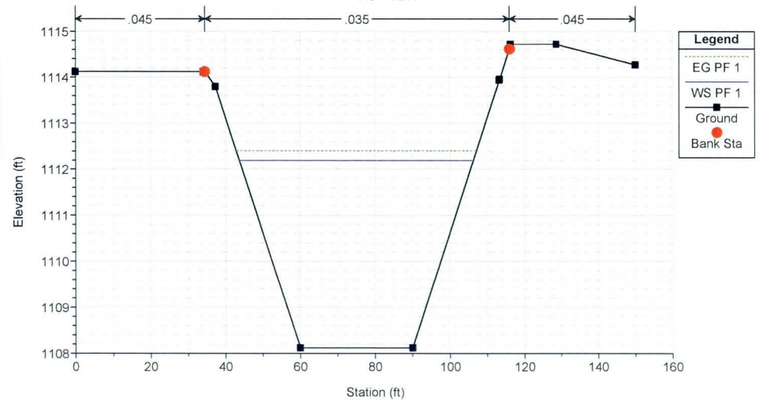
Geom: Proposed Channel Flow: 100-year design flow
RS = 9200



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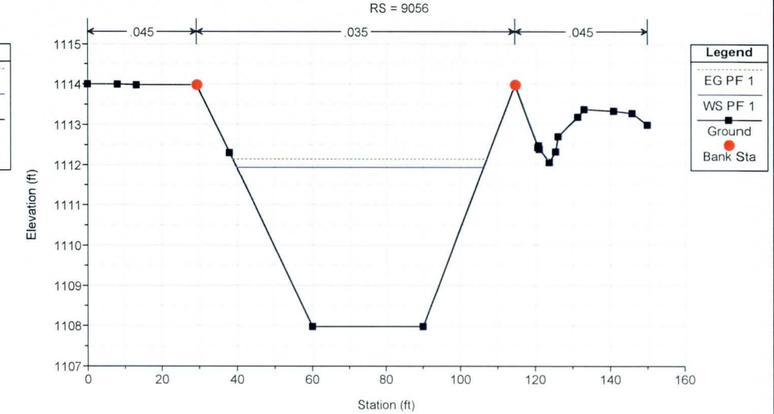
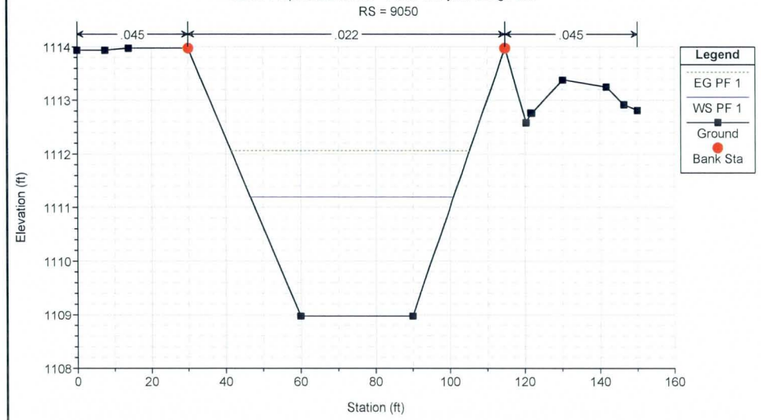
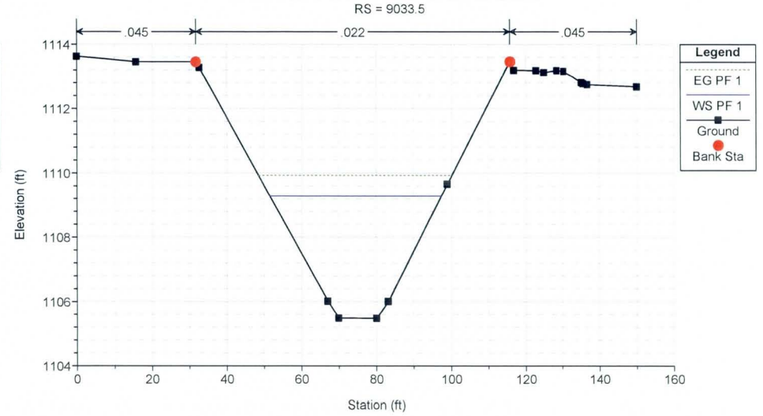
Geom: Proposed Channel Flow: 100-year design flow
RS = 9056



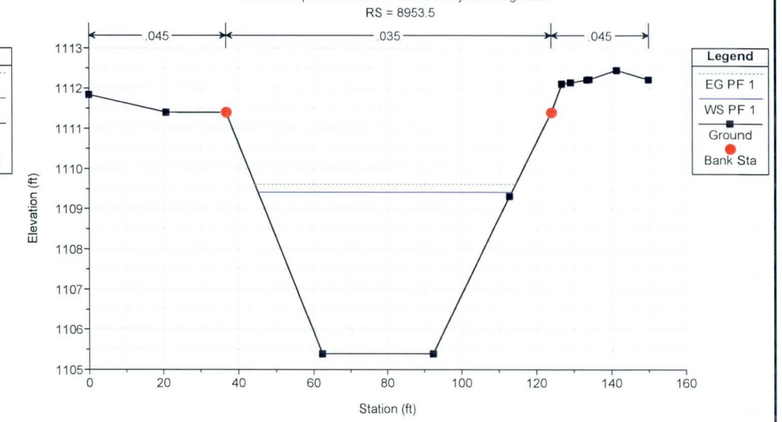
FRS3 Outlet Channel Plan: Subcritical Calc 6/26/2009 12:16:38 PM
Geom: Proposed Channel Flow: 100-year design flow
RS = 9050



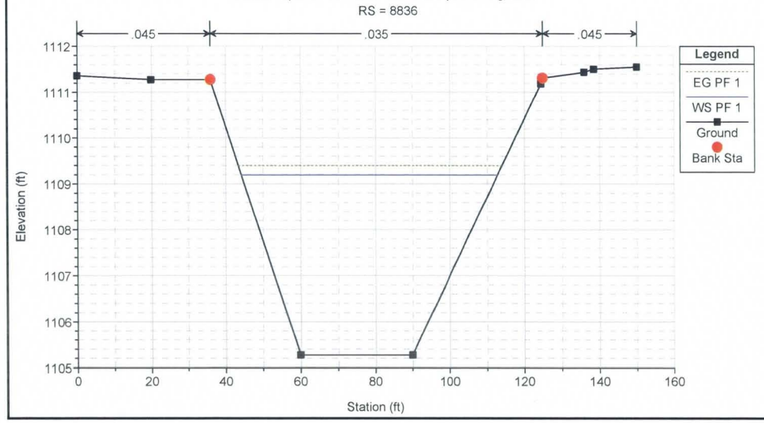
FRS3 Outlet Channel Plan: Subcritical Calc 6/26/2009 12:16:38 PM
Geom: Proposed Channel Flow: 100-year design flow
RS = 9033.5



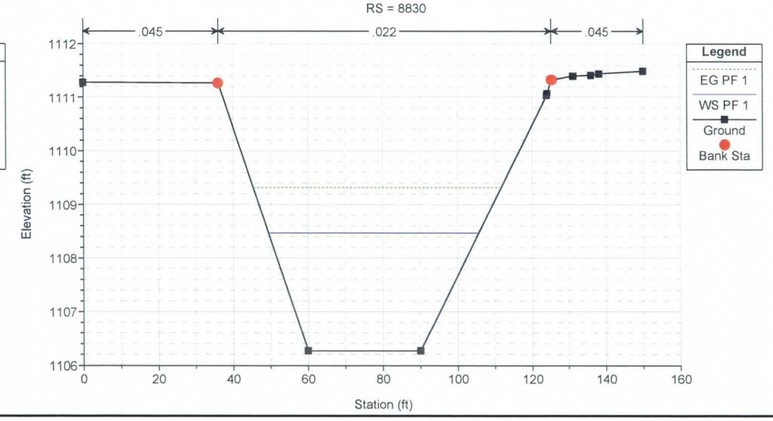
FRS3 Outlet Channel Plan: Subcritical Calc 6/26/2009 12:16:38 PM
Geom: Proposed Channel Flow: 100-year design flow
RS = 8953.5



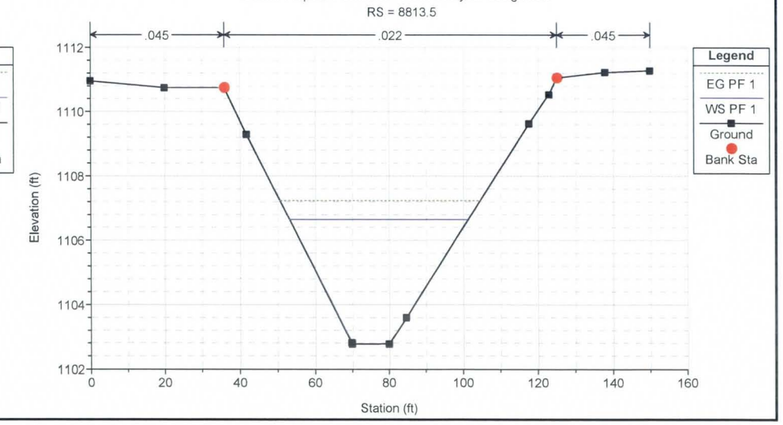
FRS3 Outlet Channel Plan: Subcritical Calc 6/26/2009 12:16:38 PM
Geom: Proposed Channel Flow: 100-year design flow
RS = 8836



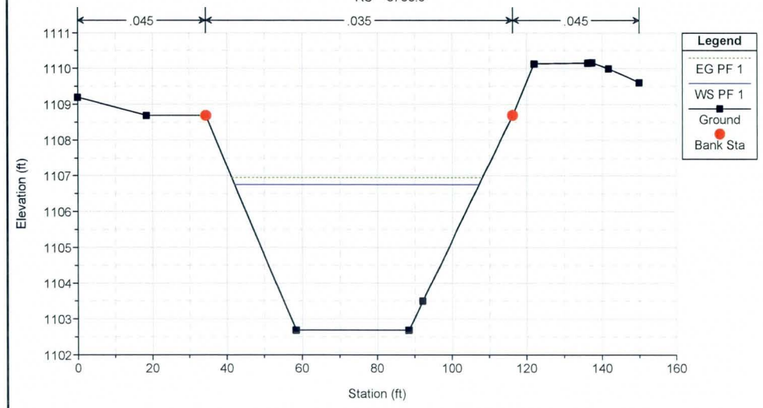
FRS3 Outlet Channel Plan: Subcritical Calc 6/26/2009 12:16:38 PM
Geom: Proposed Channel Flow: 100-year design flow
RS = 8830



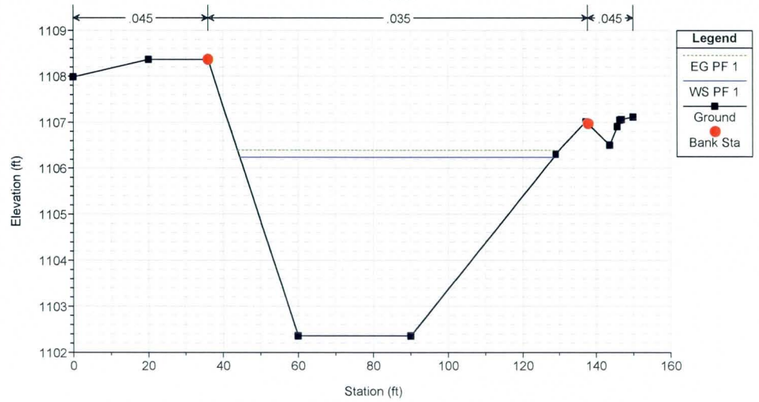
FRS3 Outlet Channel Plan: Subcritical Calc 6/26/2009 12:16:38 PM
Geom: Proposed Channel Flow: 100-year design flow
RS = 8813.5



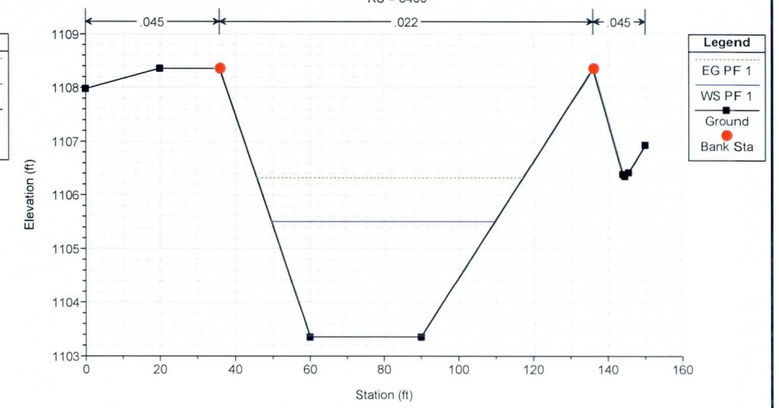
FRS3 Outlet Channel Plan: Subcritical Calc 6/26/2009 12:16:38 PM
Geom: Proposed Channel Flow: 100-year design flow
RS = 8733.5



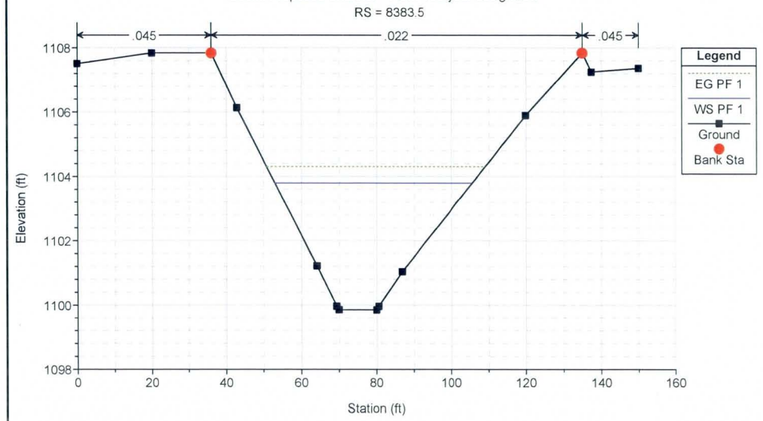
FRS3 Outlet Channel Plan: Subcritical Calc 6/26/2009 12:16:38 PM
Geom: Proposed Channel Flow: 100-year design flow
RS = 8406



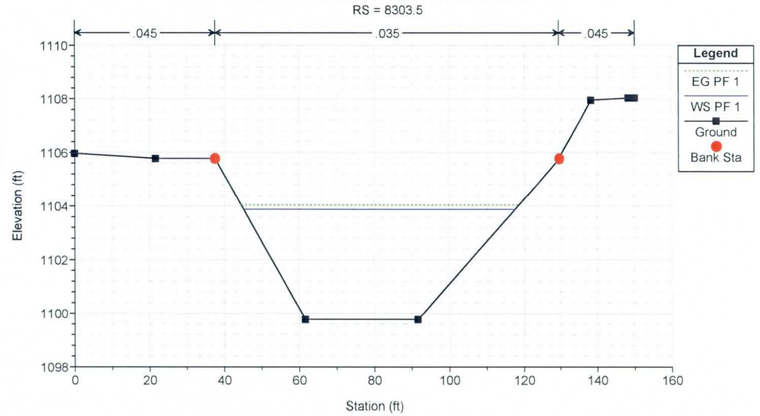
FRS3 Outlet Channel Plan: Subcritical Calc 6/26/2009 12:16:38 PM
Geom: Proposed Channel Flow: 100-year design flow
RS = 8400



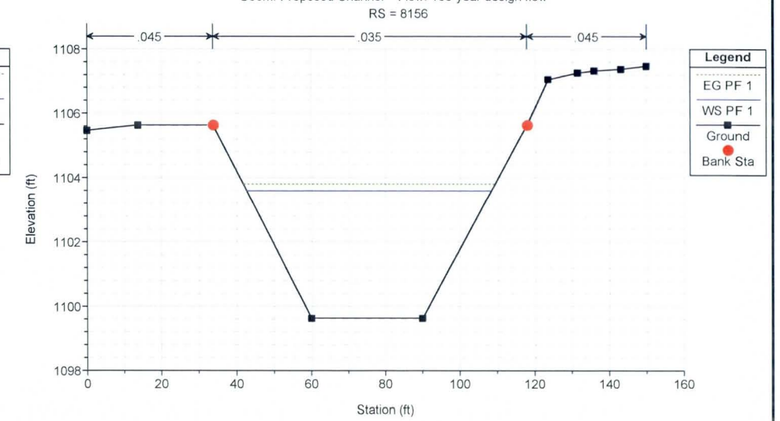
FRS3 Outlet Channel Plan: Subcritical Calc 6/26/2009 12:16:38 PM
Geom: Proposed Channel Flow: 100-year design flow
RS = 8383.5



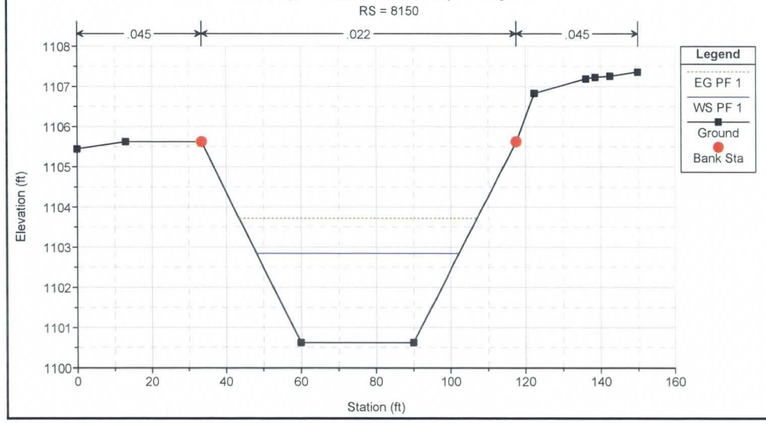
FRS3 Outlet Channel Plan: Subcritical Calc 6/26/2009 12:16:38 PM
Geom: Proposed Channel Flow: 100-year design flow
RS = 8303.5



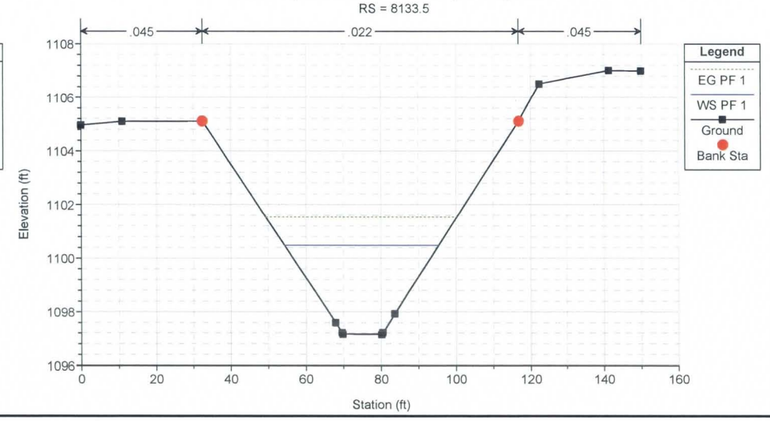
FRS3 Outlet Channel Plan: Subcritical Calc 6/26/2009 12:16:38 PM
Geom: Proposed Channel Flow: 100-year design flow
RS = 8156



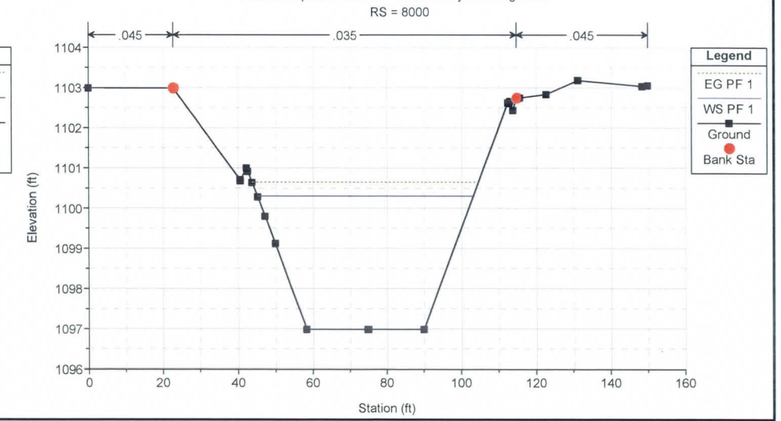
FRS3 Outlet Channel Plan: Subcritical Calc 6/26/2009 12:16:38 PM
Geom: Proposed Channel Flow: 100-year design flow
RS = 8150



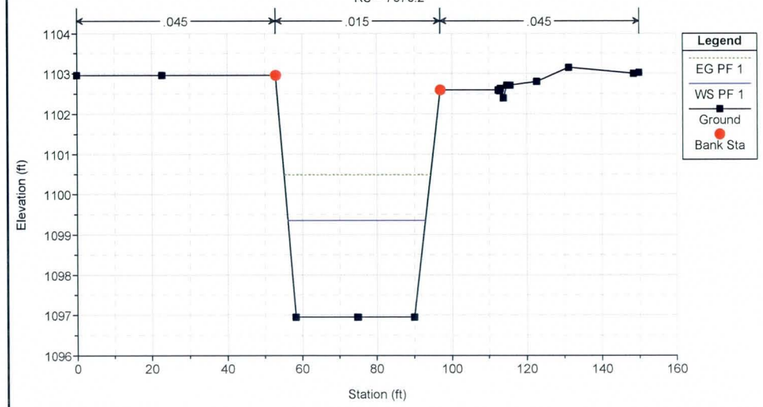
FRS3 Outlet Channel Plan: Subcritical Calc 6/26/2009 12:16:38 PM
Geom: Proposed Channel Flow: 100-year design flow
RS = 8133.5



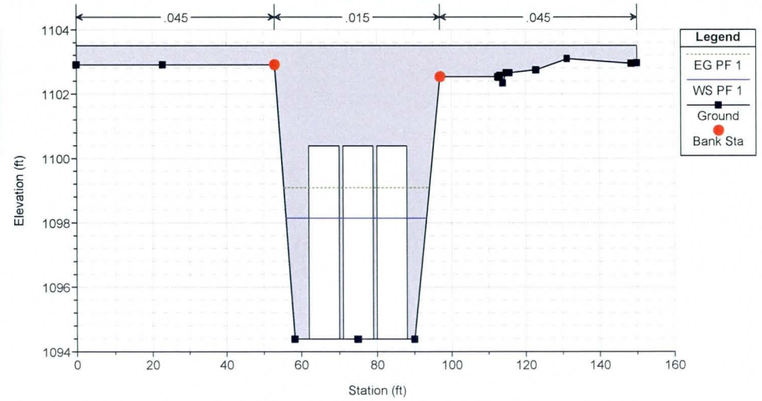
FRS3 Outlet Channel Plan: Subcritical Calc 6/26/2009 12:16:38 PM
Geom: Proposed Channel Flow: 100-year design flow
RS = 8000



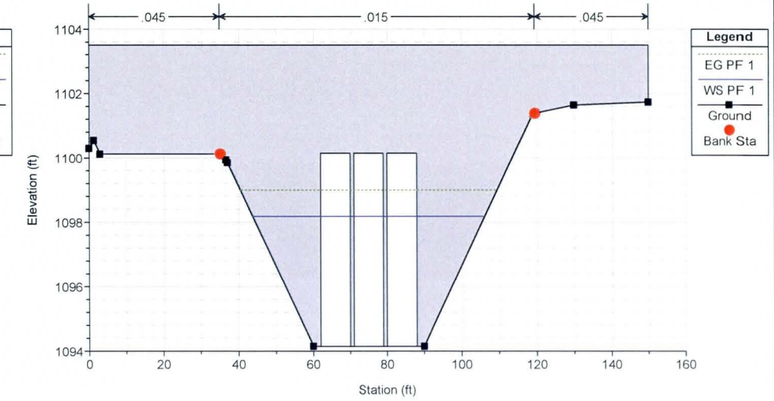
FRS3 Outlet Channel Plan: Subcritical Calc 6/26/2009 12:16:38 PM
Geom: Proposed Channel Flow: 100-year design flow
RS = 7970.2



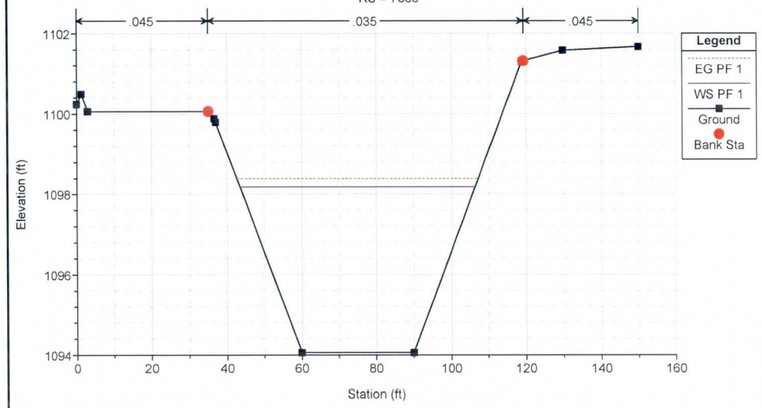
FRS3 Outlet Channel Plan: Subcritical Calc 6/26/2009 12:16:38 PM
Geom: Proposed Channel Flow: 100-year design flow
RS = 7961.2 Culv



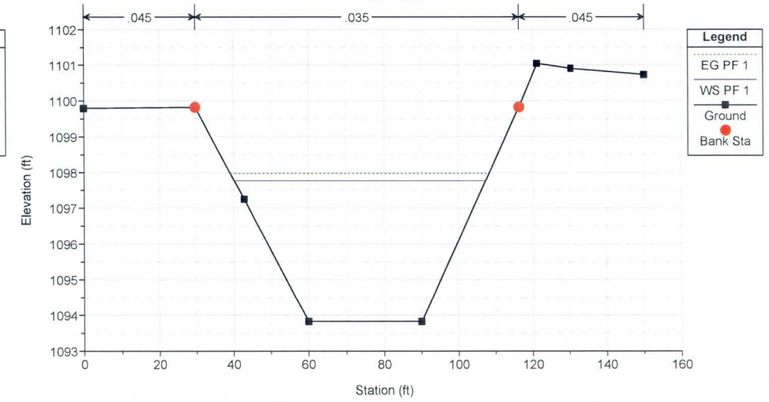
FRS3 Outlet Channel Plan: Subcritical Calc 6/26/2009 12:16:38 PM
Geom: Proposed Channel Flow: 100-year design flow
RS = 7961.2 Culv



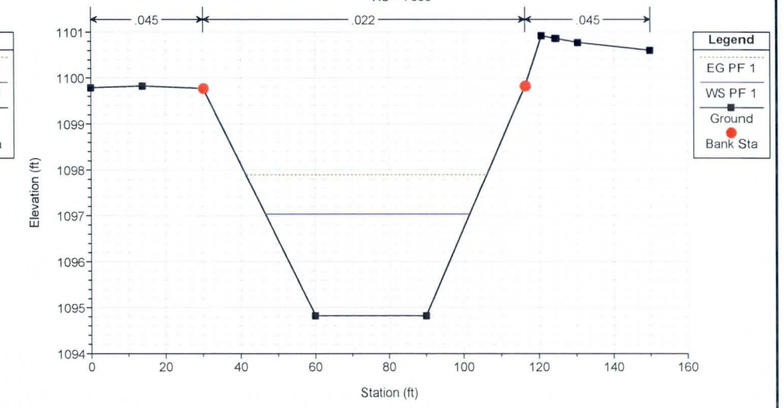
FRS3 Outlet Channel Plan: Subcritical Calc 6/26/2009 12:16:38 PM
Geom: Proposed Channel Flow: 100-year design flow
RS = 7885



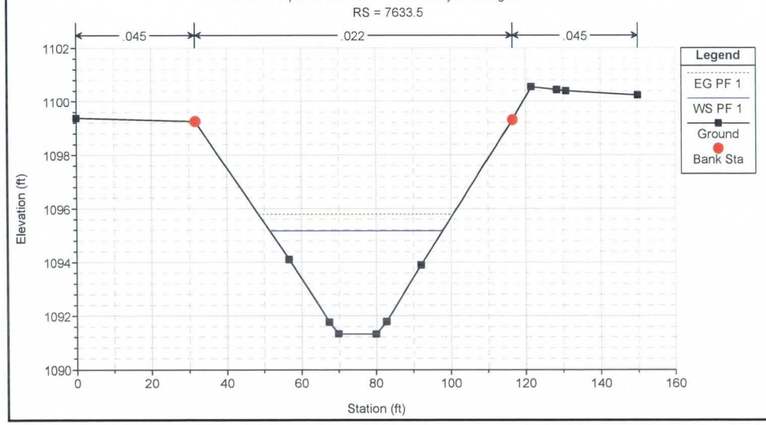
FRS3 Outlet Channel Plan: Subcritical Calc 6/26/2009 12:16:38 PM
Geom: Proposed Channel Flow: 100-year design flow
RS = 7656



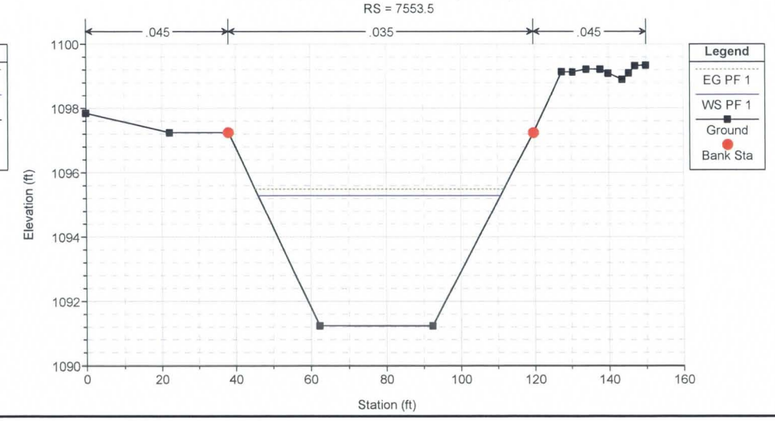
FRS3 Outlet Channel Plan: Subcritical Calc 6/26/2009 12:16:38 PM
Geom: Proposed Channel Flow: 100-year design flow
RS = 7650



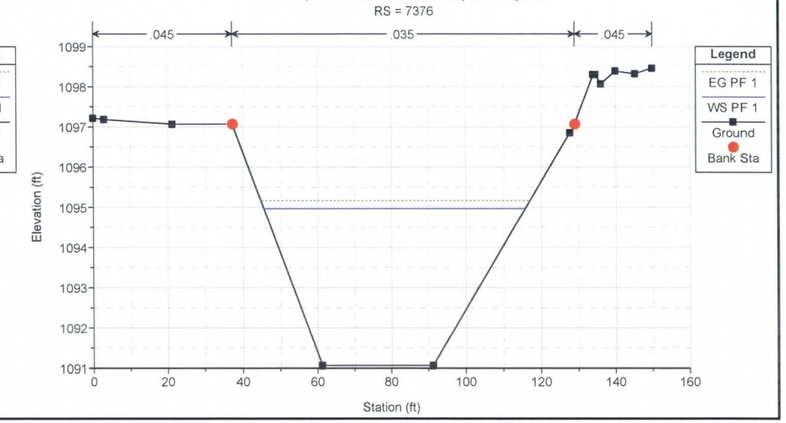
FRS3 Outlet Channel Plan: Subcritical Calc 6/26/2009 12:16:38 PM
Geom: Proposed Channel Flow: 100-year design flow
RS = 7633.5



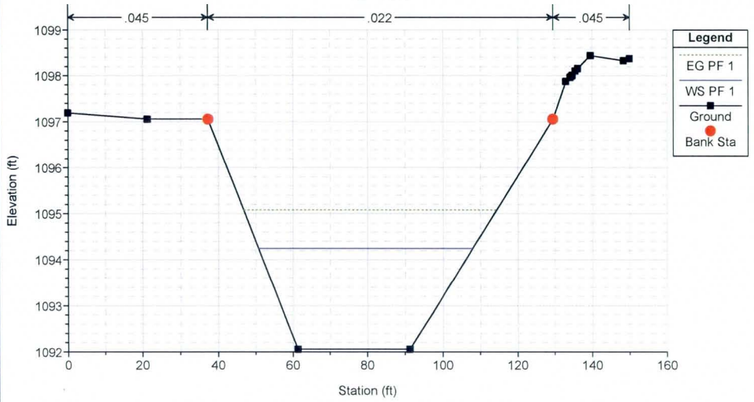
FRS3 Outlet Channel Plan: Subcritical Calc 6/26/2009 12:16:38 PM
Geom: Proposed Channel Flow: 100-year design flow
RS = 7553.5



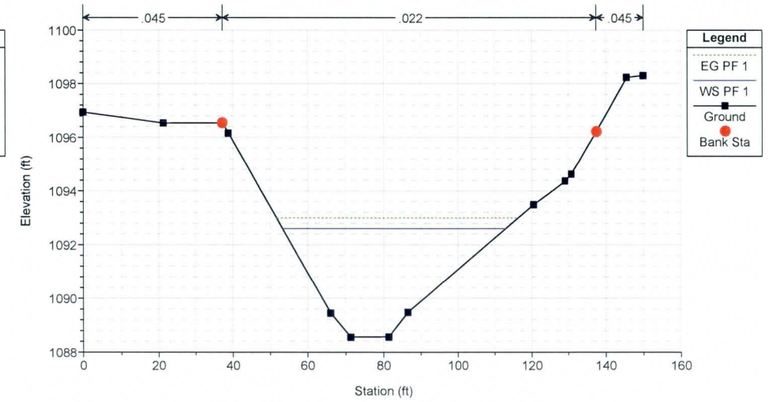
FRS3 Outlet Channel Plan: Subcritical Calc 6/26/2009 12:16:38 PM
Geom: Proposed Channel Flow: 100-year design flow
RS = 7376



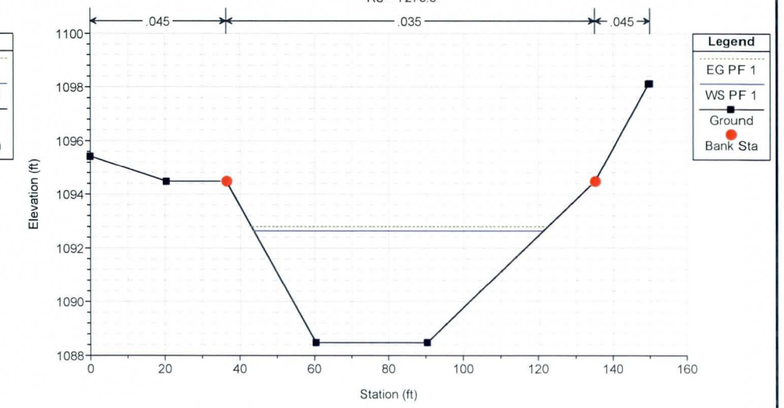
FRS3 Outlet Channel Plan: Subcritical Calc 6/26/2009 12:16:38 PM
Geom: Proposed Channel Flow: 100-year design flow
RS = 7370



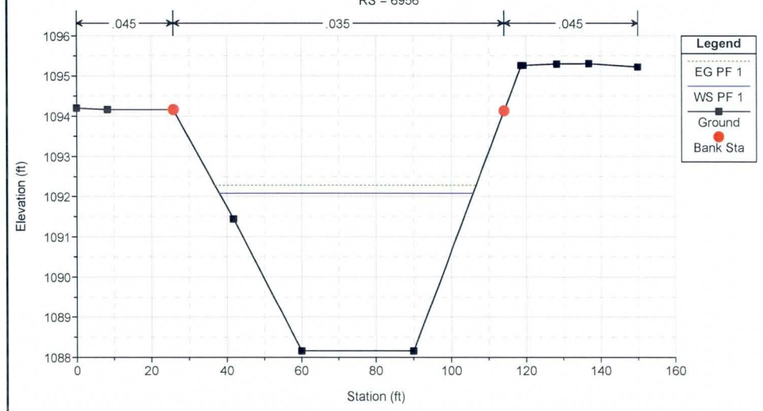
FRS3 Outlet Channel Plan: Subcritical Calc 6/26/2009 12:16:38 PM
Geom: Proposed Channel Flow: 100-year design flow
RS = 7353.5



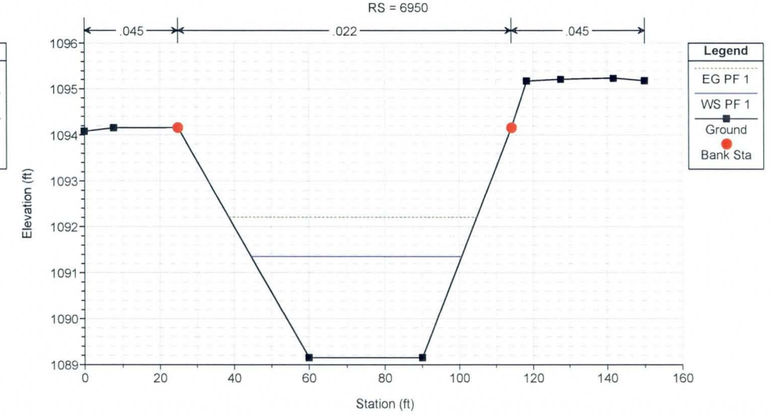
FRS3 Outlet Channel Plan: Subcritical Calc 6/26/2009 12:16:38 PM
Geom: Proposed Channel Flow: 100-year design flow
RS = 7273.5



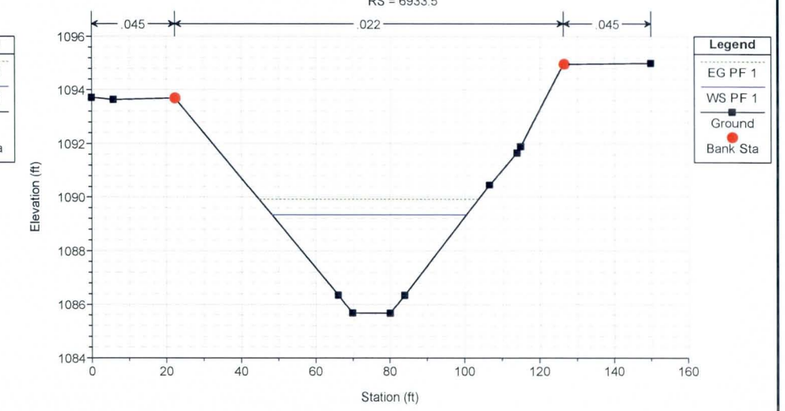
FRS3 Outlet Channel Plan: Subcritical Calc 6/26/2009 12:16:38 PM
Geom: Proposed Channel Flow: 100-year design flow
RS = 6956



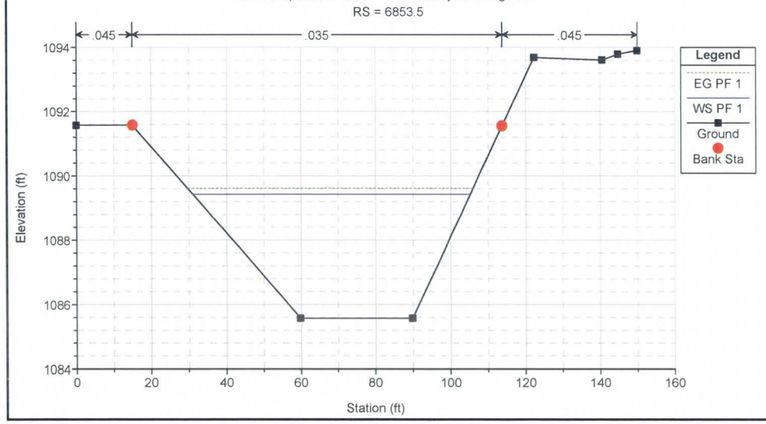
FRS3 Outlet Channel Plan: Subcritical Calc 6/26/2009 12:16:38 PM
Geom: Proposed Channel Flow: 100-year design flow
RS = 6950



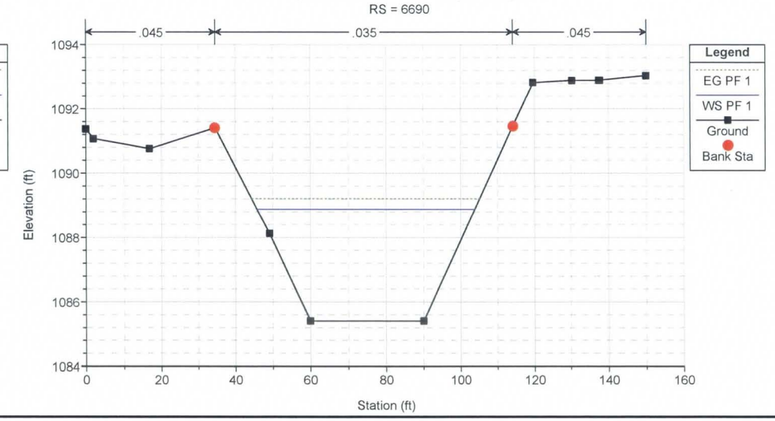
FRS3 Outlet Channel Plan: Subcritical Calc 6/26/2009 12:16:38 PM
Geom: Proposed Channel Flow: 100-year design flow
RS = 6933.5



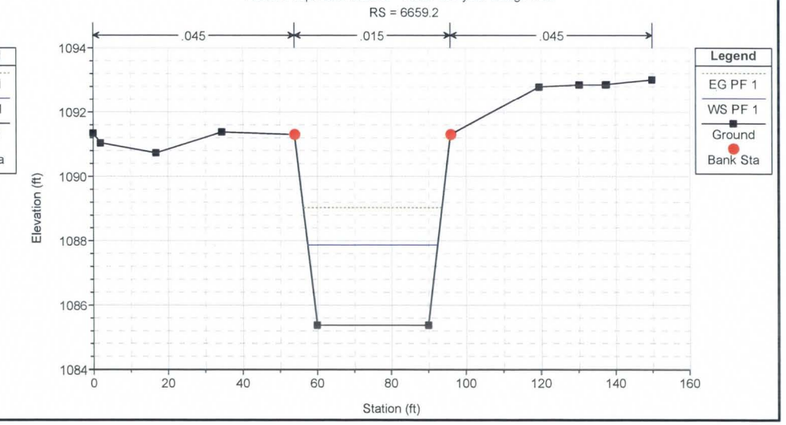
FRS3 Outlet Channel Plan: Subcritical Calc 6/26/2009 12:16:38 PM
Geom: Proposed Channel Flow: 100-year design flow
RS = 6853.5

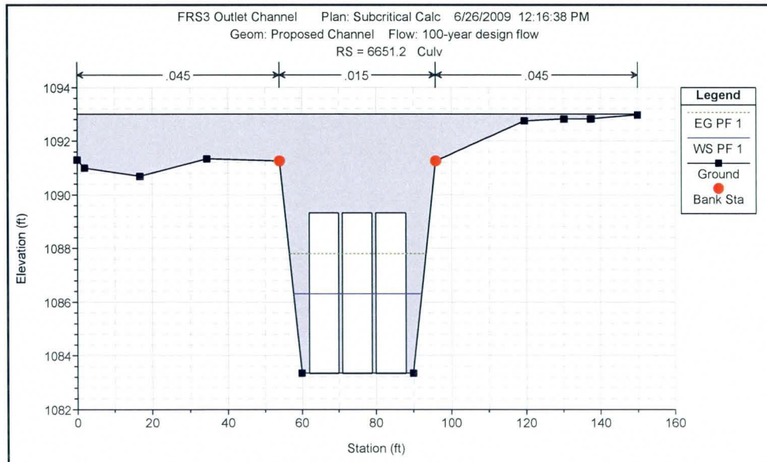


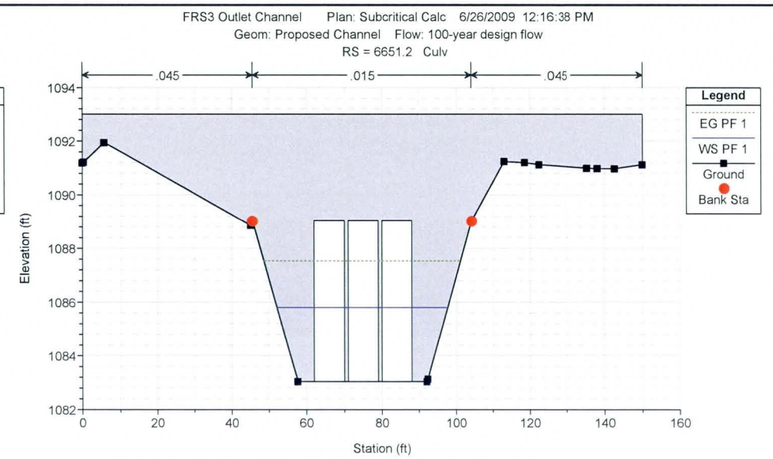
FRS3 Outlet Channel Plan: Subcritical Calc 6/26/2009 12:16:38 PM
Geom: Proposed Channel Flow: 100-year design flow
RS = 6690

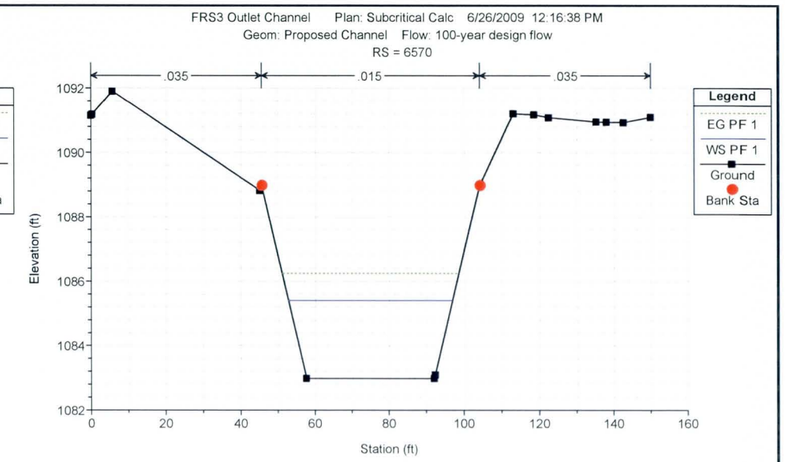


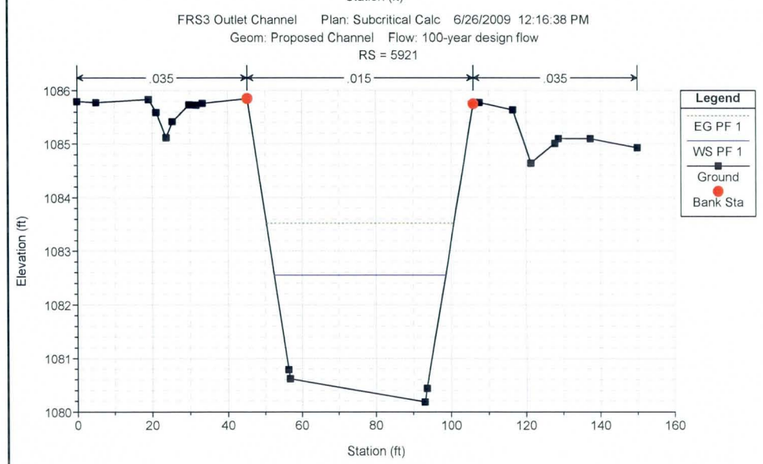
FRS3 Outlet Channel Plan: Subcritical Calc 6/26/2009 12:16:38 PM
Geom: Proposed Channel Flow: 100-year design flow
RS = 6659.2

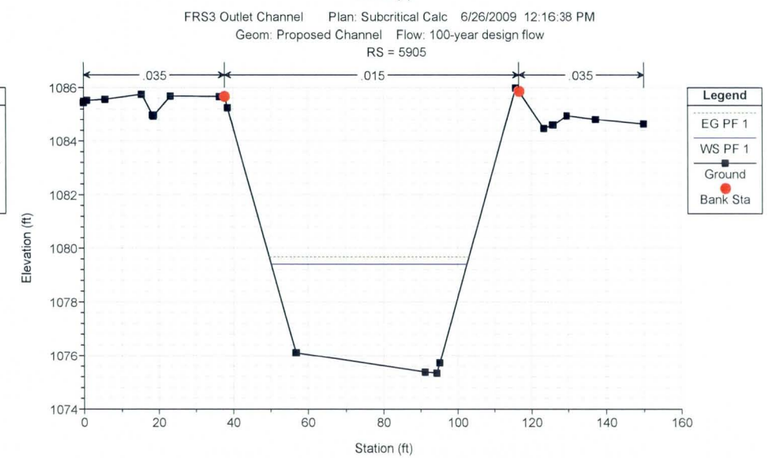


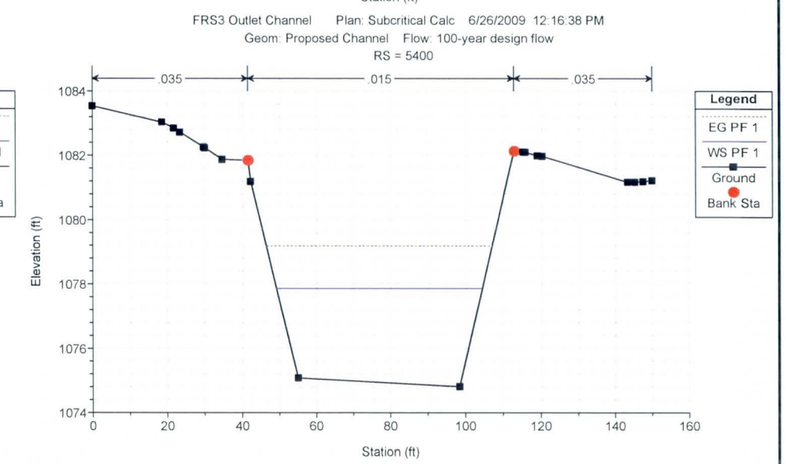

FRS3 Outlet Channel Plan: Subcritical Calc 6/26/2009 12:16:38 PM
Geom: Proposed Channel Flow: 100-year design flow
RS = 6651.2 Culv
.045
.015
.045
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

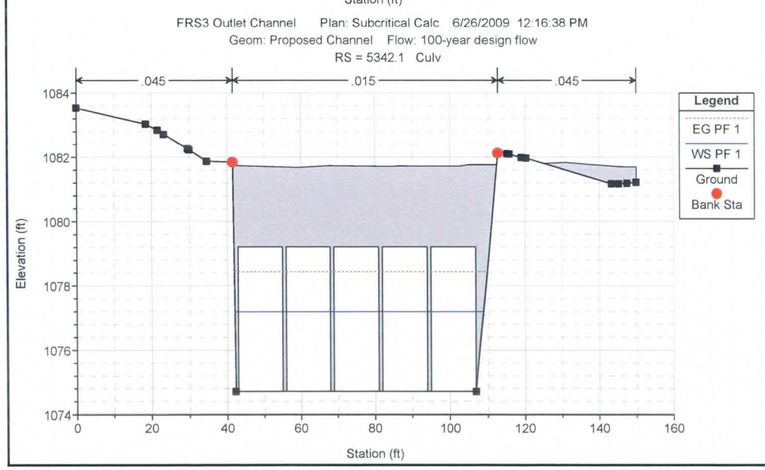

FRS3 Outlet Channel Plan: Subcritical Calc 6/26/2009 12:16:38 PM
Geom: Proposed Channel Flow: 100-year design flow
RS = 6651.2 Culv
.045
.015
.045
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

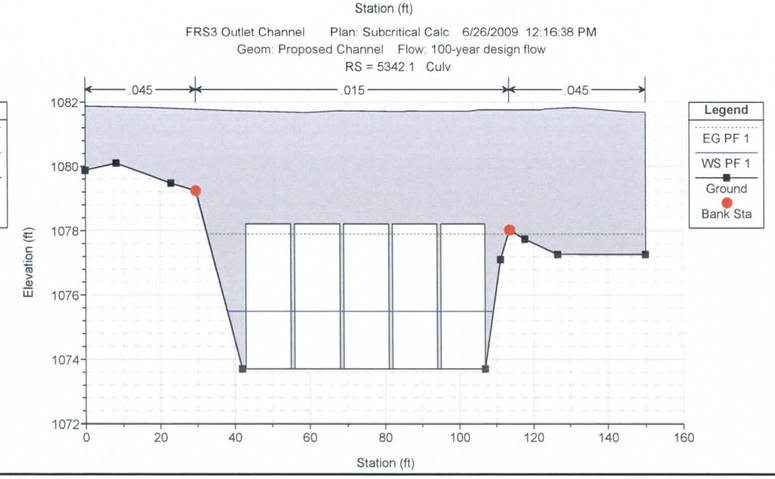

FRS3 Outlet Channel Plan: Subcritical Calc 6/26/2009 12:16:38 PM
Geom: Proposed Channel Flow: 100-year design flow
RS = 6570
.035
.015
.035
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

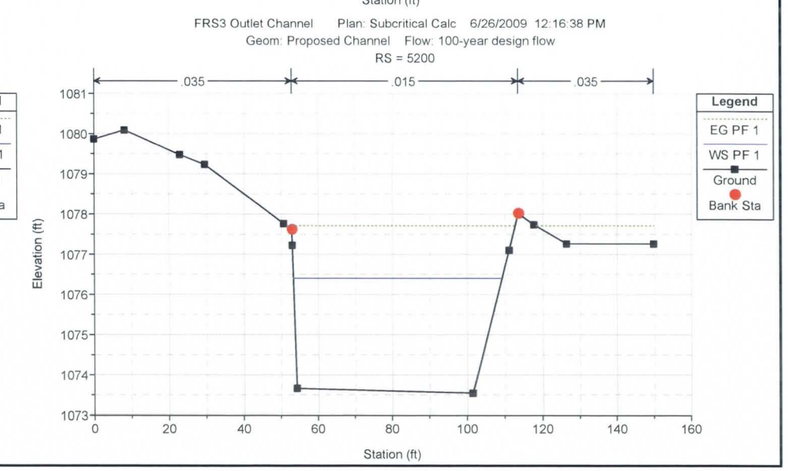

FRS3 Outlet Channel Plan: Subcritical Calc 6/26/2009 12:16:38 PM
Geom: Proposed Channel Flow: 100-year design flow
RS = 5921
.035
.015
.035
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)


FRS3 Outlet Channel Plan: Subcritical Calc 6/26/2009 12:16:38 PM
Geom: Proposed Channel Flow: 100-year design flow
RS = 5905
.035
.015
.035
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

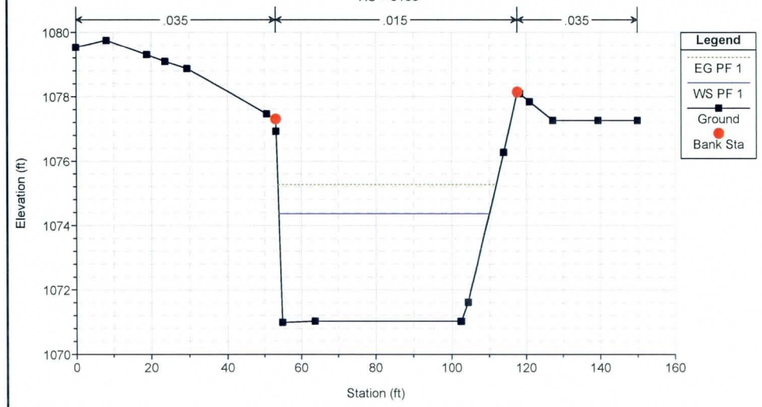

FRS3 Outlet Channel Plan: Subcritical Calc 6/26/2009 12:16:38 PM
Geom: Proposed Channel Flow: 100-year design flow
RS = 5400
.035
.015
.035
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)


FRS3 Outlet Channel Plan: Subcritical Calc 6/26/2009 12:16:38 PM
Geom: Proposed Channel Flow: 100-year design flow
RS = 5342.1 Culv
.045
.015
.045
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

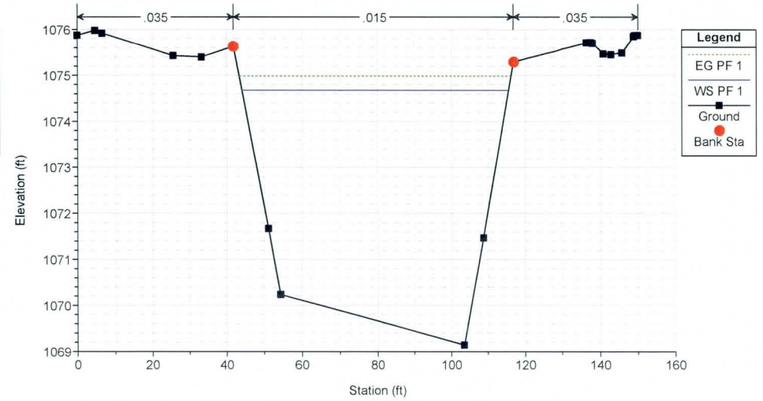

FRS3 Outlet Channel Plan: Subcritical Calc 6/26/2009 12:16:38 PM
Geom: Proposed Channel Flow: 100-year design flow
RS = 5342.1 Culv
.045
.015
.045
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)


FRS3 Outlet Channel Plan: Subcritical Calc 6/26/2009 12:16:38 PM
Geom: Proposed Channel Flow: 100-year design flow
RS = 5200
.035
.015
.035
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

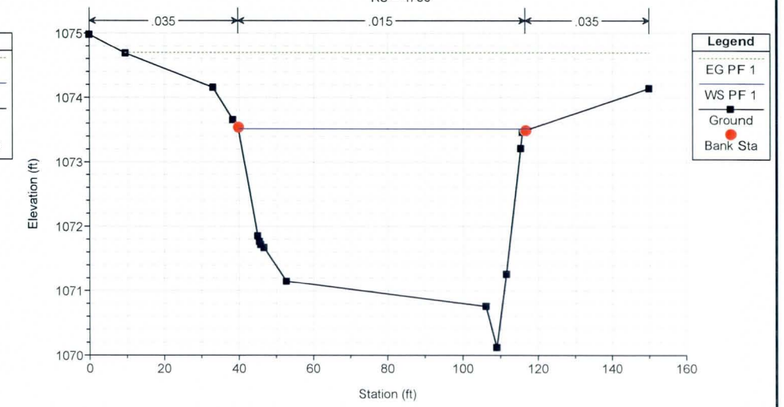
FRS3 Outlet Channel Plan: Subcritical Calc 6/26/2009 12:16:38 PM
Geom: Proposed Channel Flow: 100-year design flow
RS = 5185



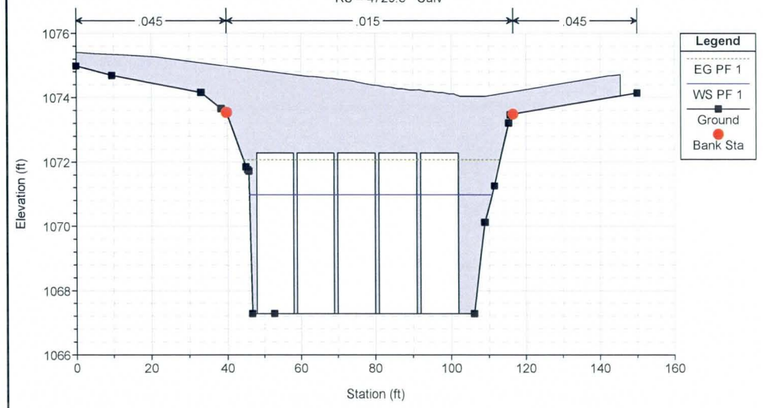
FRS3 Outlet Channel Plan: Subcritical Calc 6/26/2009 12:16:38 PM
Geom: Proposed Channel Flow: 100-year design flow
RS = 5000



FRS3 Outlet Channel Plan: Subcritical Calc 6/26/2009 12:16:38 PM
Geom: Proposed Channel Flow: 100-year design flow
RS = 4730



FRS3 Outlet Channel Plan: Subcritical Calc 6/26/2009 12:16:38 PM
Geom: Proposed Channel Flow: 100-year design flow
RS = 4729.5 Culv



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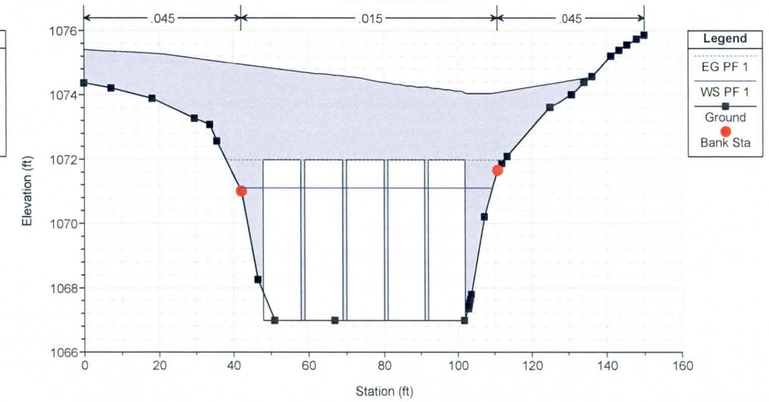
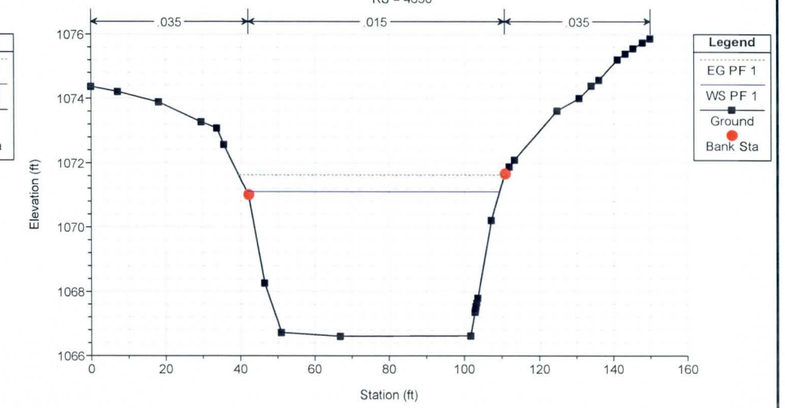
Geom: Proposed Channel Flow: 100-year design flow
RS = 4729.5 Culv



FRS3 Outlet Channel Plan: Subcritical Calc 6/26/2009 12:16:38 PM
Geom: Proposed Channel Flow: 100-year design flow
RS = 4650



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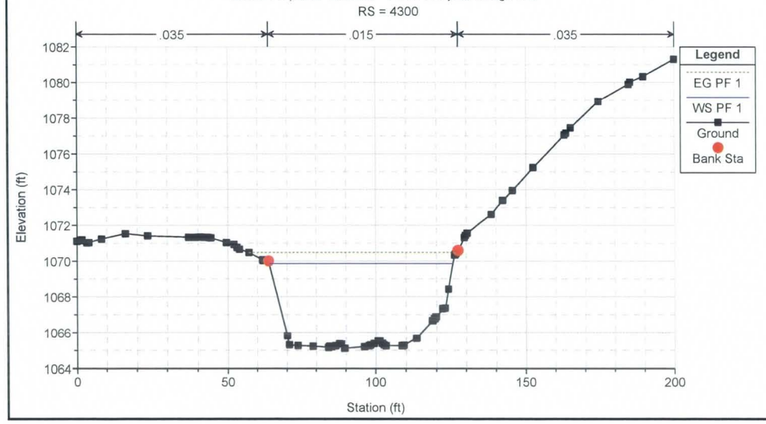
Geom: Proposed Channel Flow: 100-year design flow
RS = 4300



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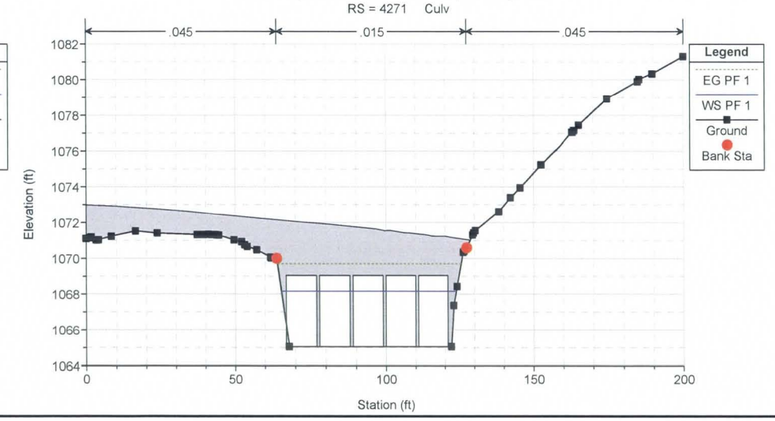
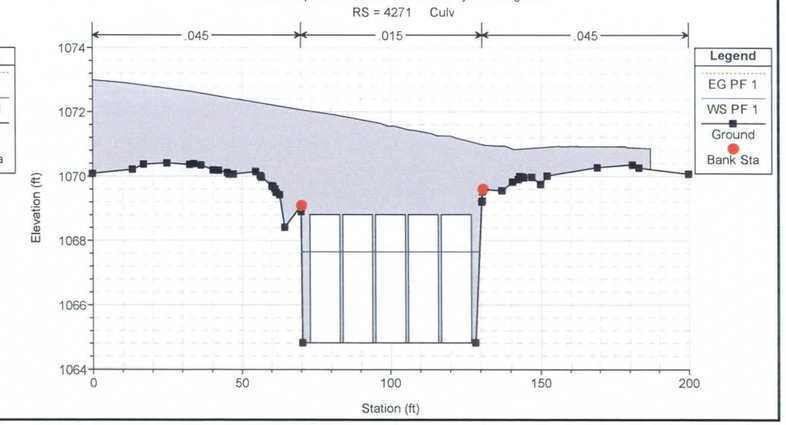
Geom: Proposed Channel Flow: 100-year design flow
RS = 4271 Culv



FRS3 Outlet Channel Plan: Subcritical Calc 6/26/2009 12:16:38 PM
Geom: Proposed Channel Flow: 100-year design flow
RS = 4271 Culv



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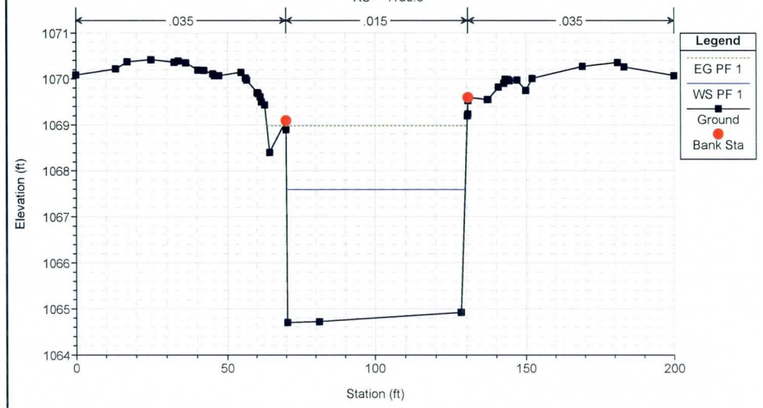
Geom: Proposed Channel Flow: 100-year design flow
RS = 4185.5



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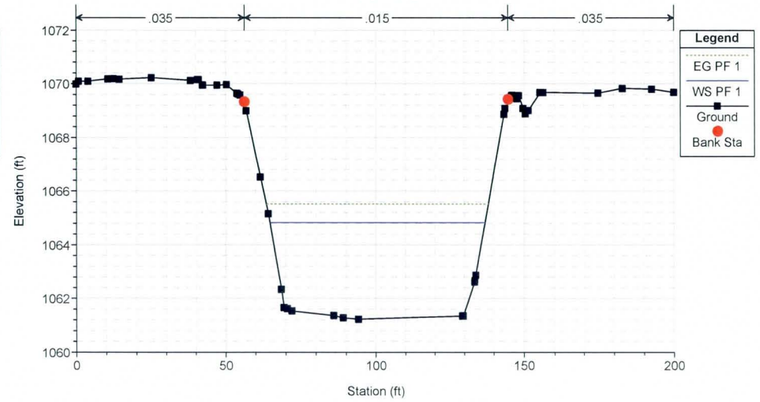
Geom: Proposed Channel Flow: 100-year design flow
RS = 4172



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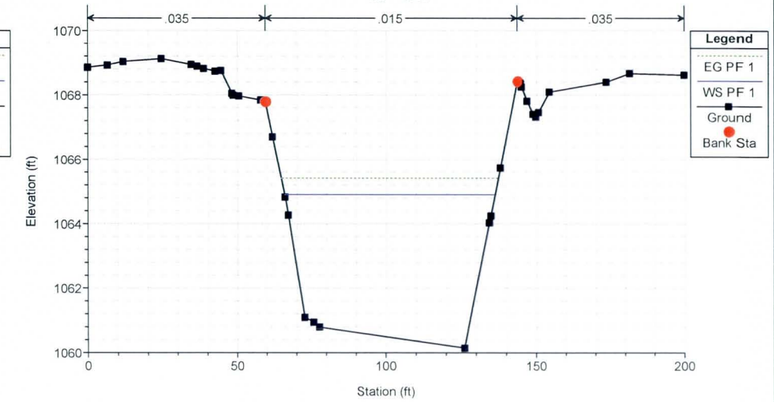
Geom: Proposed Channel Flow: 100-year design flow
RS = 4100



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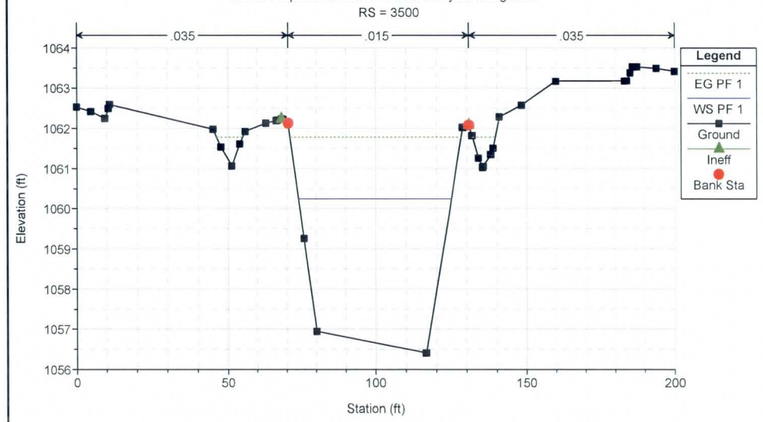
Geom: Proposed Channel Flow: 100-year design flow
RS = 3500



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Geom: Proposed Channel Flow: 100-year design flow
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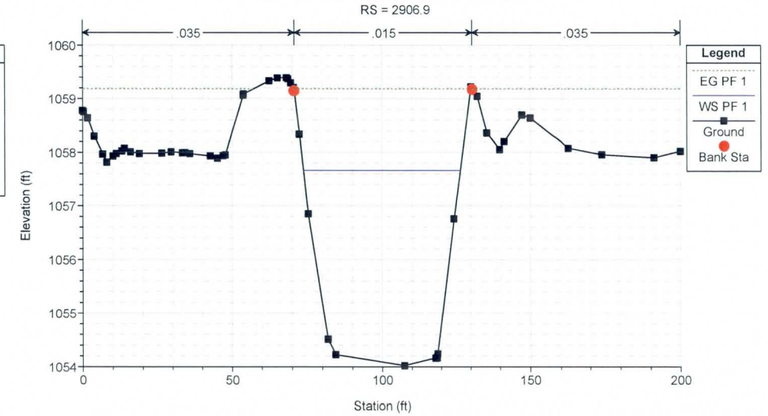

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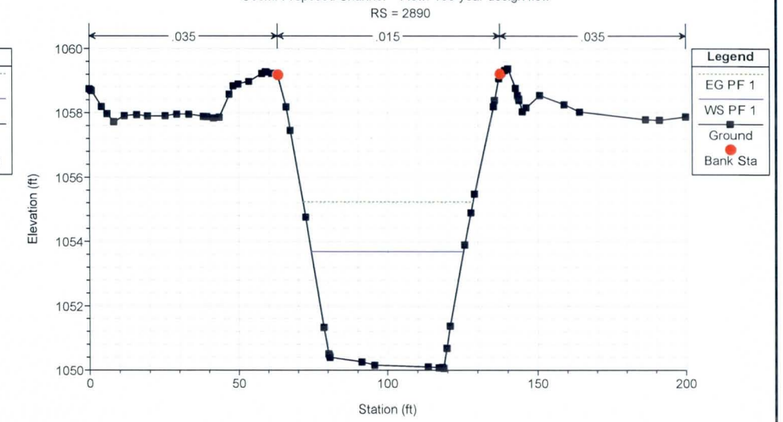
Geom: Proposed Channel Flow: 100-year design flow
RS = 2890



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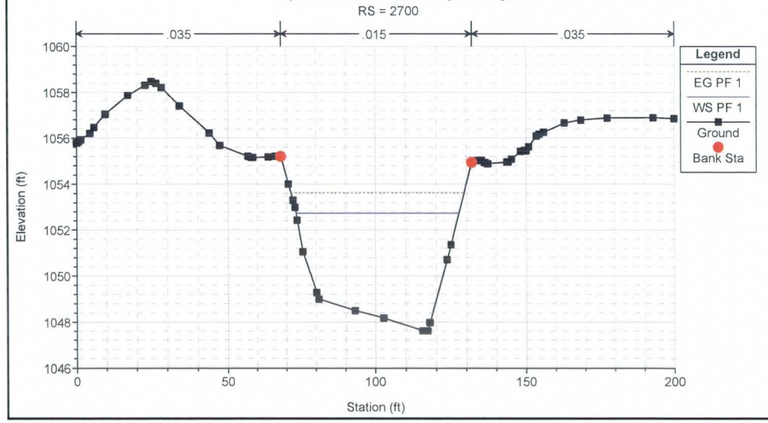
Geom: Proposed Channel Flow: 100-year design flow
RS = 2700



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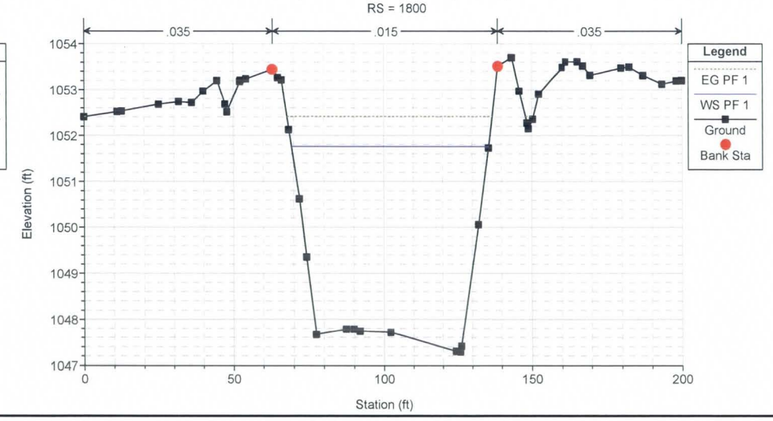
Geom: Proposed Channel Flow: 100-year design flow
RS = 1800



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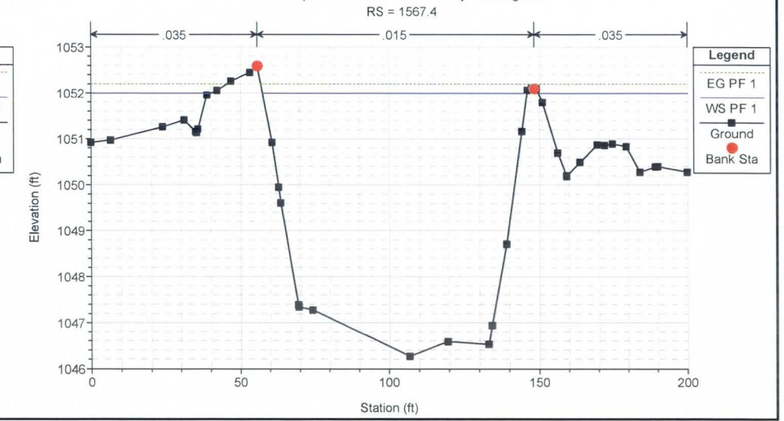
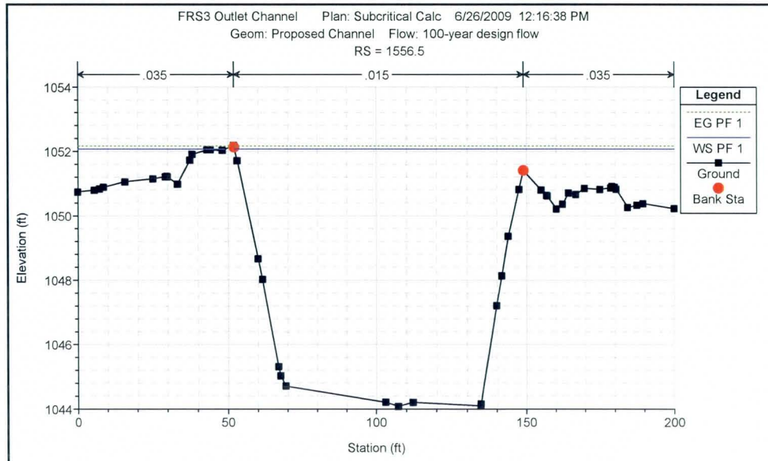
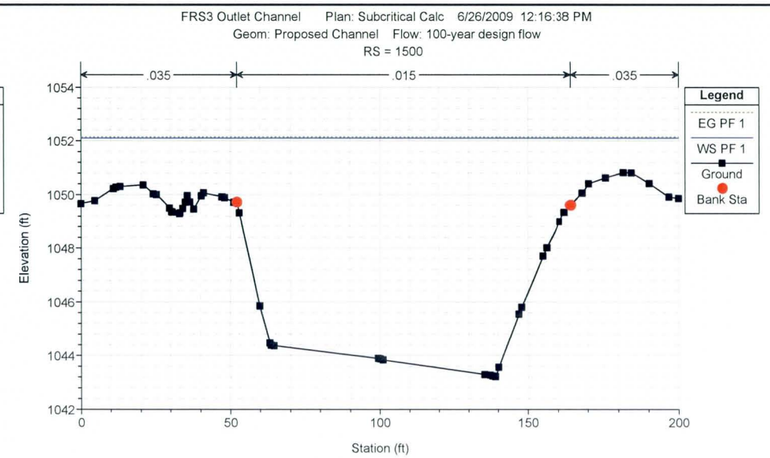
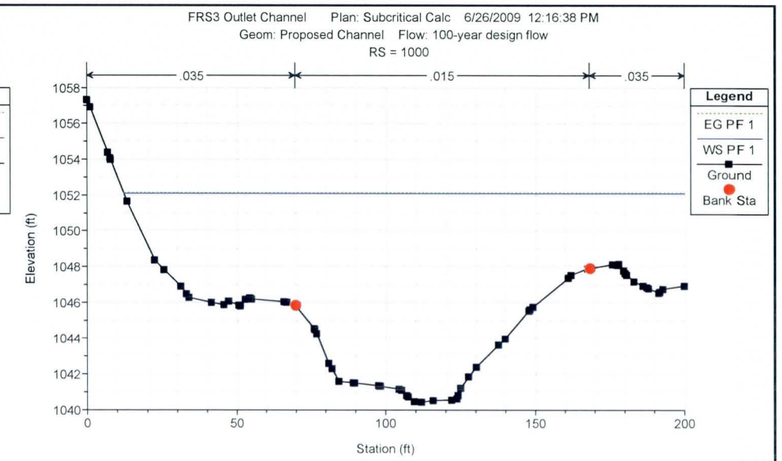
Geom: Proposed Channel Flow: 100-year design flow
RS = 1567.4




FRS3 Outlet Channel Plan: Subcritical Calc 6/26/2009 12:16:38 PM
Geom: Proposed Channel Flow: 100-year design flow
RS = 1556.5
.035
.015
.035
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)


FRS3 Outlet Channel Plan: Subcritical Calc 6/26/2009 12:16:38 PM
Geom: Proposed Channel Flow: 100-year design flow
RS = 1500
.035
.015
.035
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

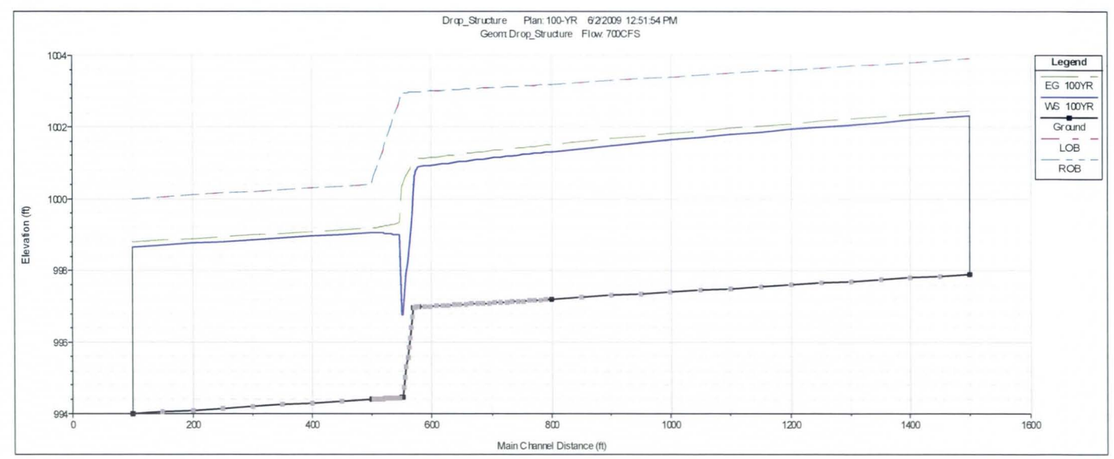

FRS3 Outlet Channel Plan: Subcritical Calc 6/26/2009 12:16:38 PM
Geom: Proposed Channel Flow: 100-year design flow
RS = 1000
.035
.015
.035
Legend
EG PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

APPENDIX P – HYDRAULIC CALCULATIONS

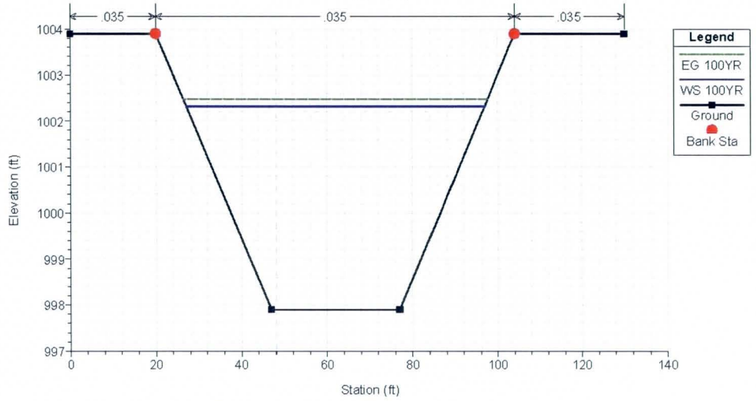
P.1 DROP STRUCTURE HEC-RAS ANALYSIS

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
DropStructure	1500	100YR	700.00	997.90	1002.32	1000.17	1002.47	0.001232	3.18	220.28	69.75	0.32
DropStructure	1450.*	100YR	700.00	997.85	1002.25		1002.41	0.001246	3.19	219.36	69.63	0.32
DropStructure	1400.*	100YR	700.00	997.80	1002.19		1002.35	0.001262	3.21	218.37	69.50	0.32
DropStructure	1350.*	100YR	700.00	997.75	1002.12		1002.29	0.001279	3.22	217.31	69.37	0.32
DropStructure	1300.*	100YR	700.00	997.70	1002.06		1002.22	0.001298	3.24	216.19	69.22	0.32
DropStructure	1250.*	100YR	700.00	997.65	1001.99		1002.16	0.001318	3.26	214.99	69.06	0.33
DropStructure	1200.*	100YR	700.00	997.60	1001.92		1002.09	0.001340	3.28	213.71	68.90	0.33
DropStructure	1150.*	100YR	700.00	997.55	1001.85		1002.02	0.001364	3.30	212.34	68.72	0.33
DropStructure	1100.*	100YR	700.00	997.50	1001.78		1001.95	0.001391	3.32	210.88	68.53	0.33
DropStructure	1050.*	100YR	700.00	997.45	1001.71		1001.88	0.001420	3.34	209.30	68.32	0.34
DropStructure	1000.*	100YR	700.00	997.40	1001.63		1001.81	0.001453	3.37	207.61	68.10	0.34
DropStructure	950.*	100YR	700.00	997.35	1001.56		1001.74	0.001489	3.40	205.79	67.85	0.34
DropStructure	900.*	100YR	700.00	997.30	1001.48		1001.66	0.001530	3.43	203.81	67.59	0.35
DropStructure	850.*	100YR	700.00	997.25	1001.40		1001.58	0.001575	3.47	201.67	67.31	0.35
DropStructure	800	100YR	700.00	997.20	1001.31		1001.50	0.001627	3.51	199.35	66.99	0.36
DropStructure	790.391*	100YR	700.00	997.19	1001.29		1001.49	0.001637	3.52	198.91	66.94	0.36
DropStructure	780.782*	100YR	700.00	997.18	1001.28		1001.47	0.001647	3.53	198.47	66.88	0.36
DropStructure	771.173*	100YR	700.00	997.17	1001.26		1001.46	0.001658	3.54	198.02	66.82	0.36
DropStructure	761.565*	100YR	700.00	997.16	1001.24		1001.44	0.001669	3.54	197.56	66.75	0.36
DropStructure	751.956*	100YR	700.00	997.15	1001.23		1001.42	0.001680	3.55	197.09	66.69	0.36
DropStructure	742.347*	100YR	700.00	997.14	1001.21		1001.41	0.001691	3.56	196.61	66.63	0.37
DropStructure	732.739*	100YR	700.00	997.13	1001.19		1001.39	0.001703	3.57	196.13	66.56	0.37
DropStructure	723.130*	100YR	700.00	997.12	1001.18		1001.37	0.001715	3.58	195.64	66.49	0.37
DropStructure	713.521*	100YR	700.00	997.11	1001.16		1001.36	0.001727	3.59	195.14	66.43	0.37
DropStructure	703.913*	100YR	700.00	997.10	1001.14		1001.34	0.001740	3.60	194.63	66.36	0.37
DropStructure	694.304*	100YR	700.00	997.09	1001.12		1001.32	0.001753	3.61	194.10	66.29	0.37
DropStructure	684.695*	100YR	700.00	997.09	1001.10		1001.31	0.001786	3.63	192.80	66.11	0.37
DropStructure	675.087*	100YR	700.00	997.08	1001.08		1001.29	0.001801	3.64	192.25	66.03	0.38
DropStructure	665.478*	100YR	700.00	997.07	1001.07		1001.27	0.001816	3.65	191.69	65.96	0.38
DropStructure	655.869*	100YR	700.00	997.06	1001.05		1001.26	0.001831	3.66	191.11	65.88	0.38
DropStructure	646.260*	100YR	700.00	997.05	1001.03		1001.24	0.001847	3.67	190.52	65.80	0.38
DropStructure	636.652*	100YR	700.00	997.04	1001.01		1001.22	0.001863	3.69	189.93	65.72	0.38
DropStructure	627.043*	100YR	700.00	997.03	1000.99		1001.20	0.001880	3.70	189.31	65.63	0.38
DropStructure	617.434*	100YR	700.00	997.02	1000.97		1001.18	0.001898	3.71	188.69	65.55	0.39
DropStructure	607.826*	100YR	700.00	997.01	1000.95		1001.17	0.001916	3.72	188.05	65.46	0.39
DropStructure	598.217*	100YR	700.00	997.00	1000.93		1001.15	0.001934	3.74	187.40	65.37	0.39
DropStructure	588.608*	100YR	700.00	996.99	1000.91		1001.13	0.001954	3.75	186.74	65.28	0.39
DropStructure	579	100YR	700.00	996.98	1000.89		1001.11	0.001971	3.76	186.14	65.20	0.39
DropStructure	578	100YR	700.00	996.98	1000.89		1001.11	0.000780	3.76	186.05	65.18	0.39
DropStructure	577.*	100YR	700.00	996.98	1000.86		1001.11	0.000909	3.96	176.74	64.35	0.42
DropStructure	576.*	100YR	700.00	996.98	1000.83		1001.10	0.001065	4.18	167.64	63.53	0.45
DropStructure	575.*	100YR	700.00	996.98	1000.79		1001.10	0.001263	4.42	158.39	62.63	0.49
DropStructure	574.*	100YR	700.00	996.97	1000.75		1001.09	0.001506	4.69	149.39	61.74	0.53
DropStructure	573.*	100YR	700.00	996.97	1000.70		1001.09	0.001822	4.99	140.24	60.77	0.58
DropStructure	572.*	100YR	700.00	996.97	1000.63		1001.08	0.002271	5.37	130.27	59.56	0.64
DropStructure	571.*	100YR	700.00	996.97	1000.53	1000.05	1001.07	0.002939	5.86	119.45	58.13	0.72
DropStructure	570	100YR	700.00	996.97	1000.14	1000.14	1001.03	0.006149	7.56	92.62	53.45	1.01
DropStructure	568.055*	100YR	700.00	996.69	999.59	999.95	1000.97	0.011127	9.40	74.46	48.39	1.34
DropStructure	566.111*	100YR	700.00	996.41	999.24	999.72	1000.91	0.014239	10.37	67.49	45.58	1.50
DropStructure	564.166*	100YR	700.00	996.13	998.90	999.50	1000.85	0.017022	11.19	62.55	43.11	1.64
DropStructure	562.222*	100YR	700.00	995.85	998.57	999.26	1000.78	0.019511	11.91	58.76	40.86	1.75
DropStructure	560.277*	100YR	700.00	995.58	998.24	999.02	1000.71	0.021938	12.62	55.48	38.66	1.86
DropStructure	558.333*	100YR	700.00	995.30	997.89	998.74	1000.64	0.024274	13.30	52.61	36.51	1.95
DropStructure	556.388*	100YR	700.00	995.02	997.53	998.46	1000.56	0.026149	13.97	50.12	34.16	2.03
DropStructure	554.444*	100YR	700.00	994.74	997.15	998.18	1000.48	0.027825	14.65	47.78	31.71	2.10

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
DropStructure	552.5	100YR	700.00	994.46	996.75	997.85	1000.39	0.029945	15.32	45.69	29.93	2.19
DropStructure	551.5	100YR	700.00	994.46	996.76	997.85	1000.34	0.073704	15.17	46.16	30.06	2.16
DropStructure	546.818*	100YR	700.00	994.45	998.99	997.70	999.36	0.003461	4.88	143.30	51.36	0.52
DropStructure	542.136*	100YR	700.00	994.45	999.00		999.33	0.002948	4.58	152.77	53.48	0.48
DropStructure	537.454*	100YR	700.00	994.44	999.01		999.30	0.002526	4.31	162.43	55.55	0.44
DropStructure	532.772*	100YR	700.00	994.44	999.02		999.28	0.002206	4.08	171.54	57.57	0.42
DropStructure	528.090*	100YR	700.00	994.43	999.03		999.26	0.001927	3.86	181.13	59.62	0.39
DropStructure	523.409*	100YR	700.00	994.43	999.04		999.25	0.001710	3.68	190.27	61.68	0.37
DropStructure	518.727*	100YR	700.00	994.42	999.04		999.23	0.001515	3.50	199.85	63.72	0.35
DropStructure	514.045*	100YR	700.00	994.42	999.05		999.22	0.001362	3.35	208.86	65.73	0.33
DropStructure	509.363*	100YR	700.00	994.41	999.05		999.21	0.001220	3.20	218.47	67.78	0.31
DropStructure	504.681*	100YR	700.00	994.41	999.05		999.20	0.001107	3.07	227.68	69.86	0.30
DropStructure	500	100YR	700.00	994.40	999.06		999.19	0.001001	2.95	237.34	71.92	0.29
DropStructure	450.*	100YR	700.00	994.35	999.01		999.14	0.001001	2.95	237.34	71.92	0.29
DropStructure	400.*	100YR	700.00	994.30	998.96		999.09	0.001001	2.95	237.33	71.92	0.29
DropStructure	350.*	100YR	700.00	994.25	998.91		999.04	0.001001	2.95	237.33	71.92	0.29
DropStructure	300.*	100YR	700.00	994.20	998.86		998.99	0.001001	2.95	237.33	71.92	0.29
DropStructure	250.*	100YR	700.00	994.15	998.81		998.94	0.001001	2.95	237.32	71.92	0.29
DropStructure	200.*	100YR	700.00	994.10	998.76		998.89	0.001001	2.95	237.32	71.92	0.29
DropStructure	150.*	100YR	700.00	994.05	998.71		998.84	0.001001	2.95	237.32	71.91	0.29
DropStructure	100	100YR	700.00	994.00	998.66	996.27	998.79	0.001001	2.95	237.31	71.91	0.29



Drop_Structure Plan: 100-YR 6/2/2009 12:51:54 PM
Geom: Drop_Structure Flow: 700CFS
RS = 1500



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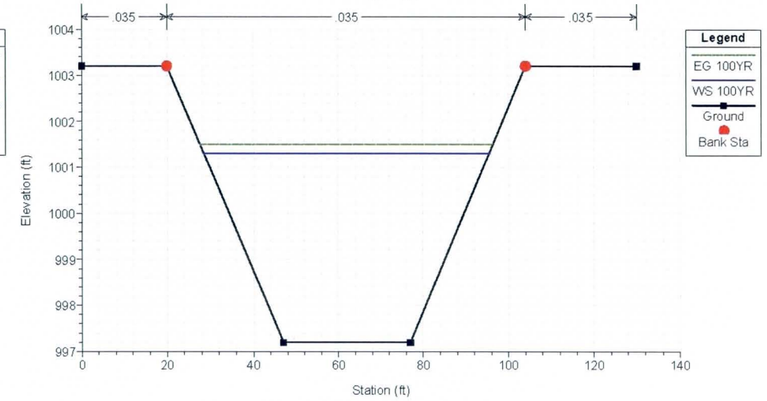
Geom: Drop_Structure Flow: 700CFS
RS = 800



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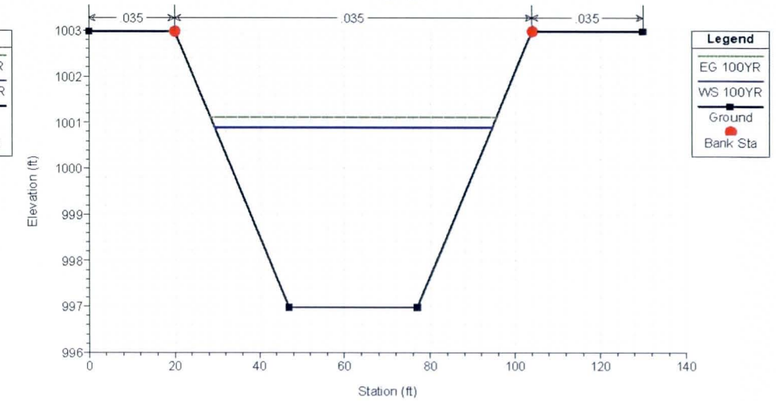
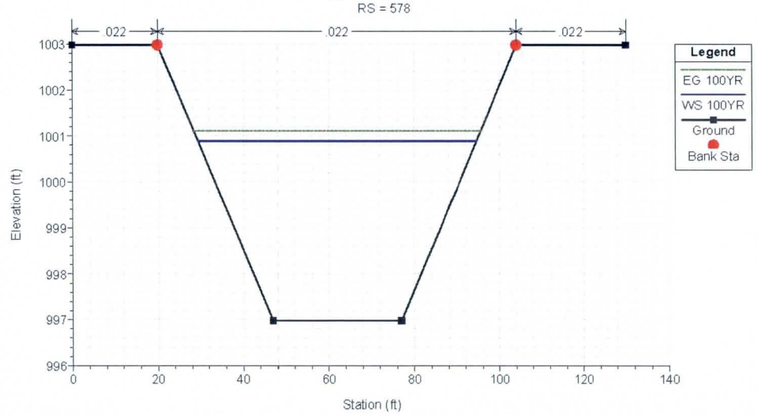
Geom: Drop_Structure Flow: 700CFS
RS = 579



Drop_Structure Plan: 100-YR 6/2/2009 12:51:54 PM
Geom: Drop_Structure Flow: 700CFS
RS = 578



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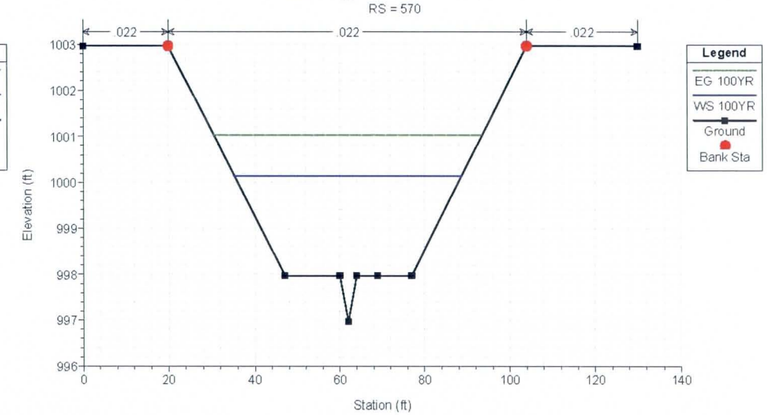
RS = 570



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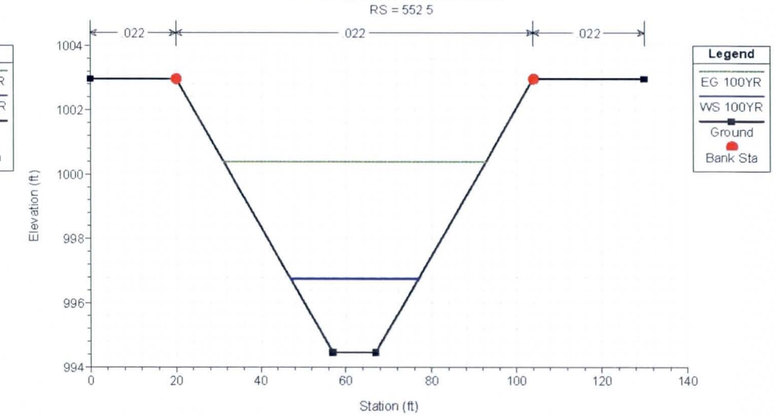
RS = 552.5



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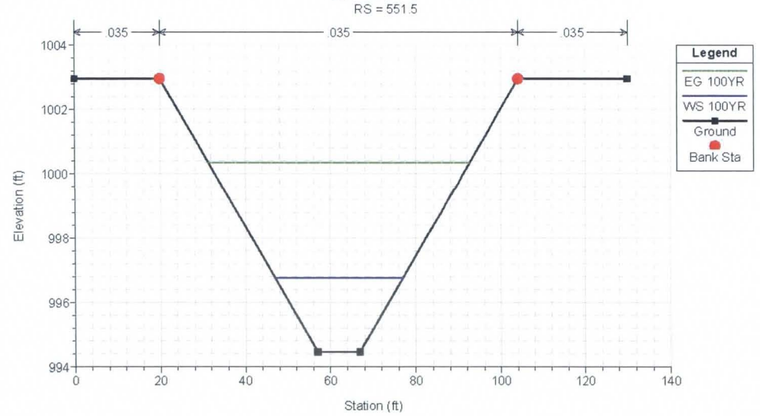

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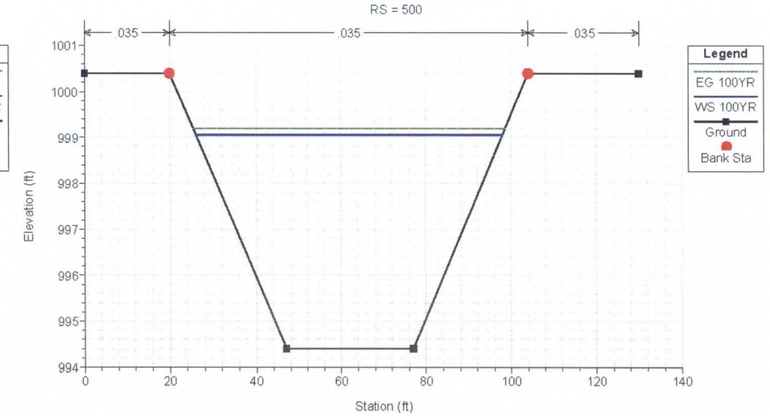
RS = 500



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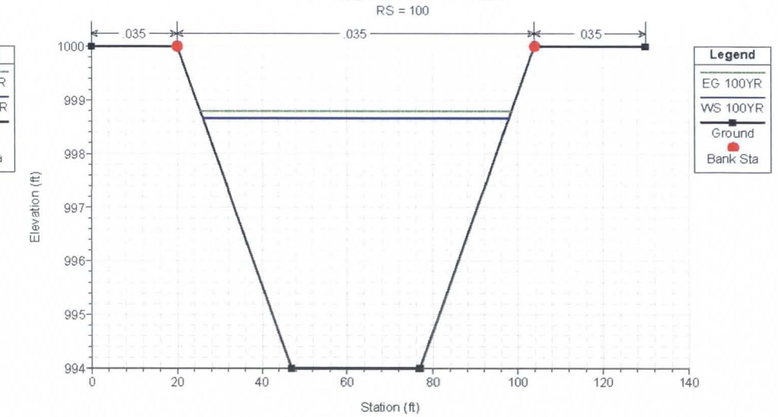
RS = 100



P.2 JUNCTION STRUCTURE DESIGN AT STA 184+50

Baffled Chute 1

Design Flow Rate (W33) =	799	cfs
Design Flow Rate Per Linear Foot=	27	cfs/ft
Required Chute Width =	30	ft
Critical Depth, Hc =	2.8	ft
Baffle Height, H = 0.8Hc =	2.2	ft
Baffle Width = 1.5H =	3.4	ft
Baffle Spacing (horizontal) = 1.5H =	3.4	ft
Spacing Between Two Rows = 2H =	4.5	ft
Side Wall Height = 3H =	6.7	ft
Height of Drop =	6.5	ft
Toe Down Depth = 2H =	4.5	ft
Total Chute Height =	11.0	ft
Total Chute Length =	22.0	ft

Baffled Chute 2

Design Flow Rate (W33) =	241	cfs
Design Flow Rate Per Linear Foot=	25	cfs/ft
Required Chute Width =	10	ft
Critical Depth, Hc =	2.7	ft
Baffle Height, H = 0.8Hc =	2.1	ft
Baffle Width = 1.5H =	3.2	ft
Baffle Spacing (horizontal) = 1.5H =	3.2	ft
Spacing Between Two Rows = 2H =	4.3	ft
Side Wall Height = 3H =	6.4	ft
Height of Drop =	9.5	ft
Toe Down Depth = 2H =	4.3	ft
Total Chute Height =	13.8	ft
Total Chute Length =	27.5	ft

P.3 CULVERT BEND LOSS CALCULATIONS AND MANNING'S N ADJUSTMENT

RS19288.5 – (2)8'X6' CBC

Culvert Bend Loss		
Radius of bend, R =	50	ft
Equivalent diameter, r=	3.9	ft
Ratio, R/r =	12.8	
Angle of bend =	45	degree
Bend loss coefficient, Kb =	0.11	
Velocity in barrel =	12.0	ft/s
Head loss for one bend = $Kb(V^2/2g)$ =	0.25	ft
Head loss for two bends =	**0.49**	**ft**

Culvert Friction Loss		
Flow depth, d=	4.25	ft
Flow area for each barrel, A =	34	sq ft
Wet peremeter, P=	16.5	ft
Hydraulic radius, R = A/P =	2.06	ft
Flow rate for each barrel, Q =	400	cfs
Culvert length, L=	826	ft
For n = 0.013		
Friction loss = LS = $L(Q/A)^2(n/1.49)^2/R^{4/3}$ =	3.33	ft
For n = 0.014		
Friction loss = LS = $L(Q/A)^2(n/1.49)^2/R^{4/3}$ =	3.86	ft
Friction Loss Difference =	**0.53**	**ft**

* Values from HEC-RAS outputs

RS24006.1 – (3)8'X6' CBC

Culvert Bend Loss		
Radius of bend, R =	50	ft
Equivalent diameter, r=	3.9	ft
Ratio, R/r =	12.8	
Angle of bend =	45	degree
Bend loss coefficient, Kb =	0.11	
Velocity in barrel =	6.5	ft/s
Head loss for one bend = $Kb(V^2/2g)$ =	**0.07**	**ft**

Culvert Friction Loss		
Flow depth, d=	4.5	ft
Flow area for each barrel, A =	36	sq ft
Wet peremeter, P=	17	ft
Hydraulic radius, R = A/P =	2.12	ft
Flow rate for each barrel, Q =	233	cfs
Culvert length, L=	316	ft
For n = 0.013		
Friction loss = LS = $L(Q/A)^2(n/1.49)^2/R^{4/3}$ =	0.37	ft
For n = 0.014		
Friction loss = LS = $L(Q/A)^2(n/1.49)^2/R^{4/3}$ =	0.43	ft
Friction Loss Difference =	**0.06**	**ft**

* Values from HEC-RAS outputs

APPENDIX Q – PROPOSED DESIGN COST ESTIMATE

WHITE TANKS FRS#3 OUTLET CHANNEL - COST ESTIMATE BY REACH
FCD 2007C016 ASSIGNMENT 4
PCN 470.04.32

6/30/2009
HOSKIN-RYAN CONSULTANTS, INC.
HRC 07-027-04

QUANTITY SUMMARY

ITEM NO.	ITEM DESCRIPTION	UNIT	REACH 1	REACH 2	REACH 3	REACH 4	REACH 5	REACH 6	REACH 7	REACH 8	REACH 9	LUMP SUM ITEMS	TOTAL QUANTITY	UNIT PRICE	TOTAL AMOUNT
	GENERAL CONDITIONS														
105-1	PARTNERING ALLOWANCE	LS										1	1	$15,000.00	$15,000
107-1	AZDPES/SWPPP PERMITS	LS										1	1	$100,000.00	$100,000
107-2	PUBLIC INFORMATION & NOTIFICATION ALLOWANCE	LS										1	1	$20,000.00	$20,000
107-3	PROJECT SIGNS ALLOWANCE	EA										1	1	$5,000.00	$5,000
107-4	WATER MANAGEMENT	LS										1	1	$55,884.74	$55,885
107-5	VANDALISM ALLOWANCE	LS										1	1	$25,000.00	$25,000
												$220,885			
	EARTHWORK														
201-1	CLEARING AND GRUBBING	LS										1	1	$288,562.50	$288,563
202-1	MOBILIZATION	LS										1	1	$110,034.84	$110,035
211-1	FILL CONSTRUCTION (DITCHES, FARM ROAD AND OVERBANK)	CY	383	18,920	13,267	4,429	11,957	1,864	150	625	57,639		109,234	$7.00	$764,638
211-2	FINAL AESTHETIC GRADING	LS										1	1	$227,496.40	$227,496
215-1	CHANNEL EXCAVATION	CY	2,187	65,372	36,371	10,764	84,667	46,736	63,919	92,535	68,038		470,589	$3.00	$1,411,767
220-1	PLAIN RIPRAP (D_{50} =2")	CY	0	170	60	42	16	20	0	151	0		459	$45.00	$20,655
220-2	PLAIN RIPRAP (D_{50} =12")	CY	67	893	127	67	33	324	196	1,311	20		3,038	$70.00	$212,660
220-3	PLAIN RIPRAP (D_{50} =15")	CY	0	2,619	1,285	522	281	562	0	748			6,017	$75.00	$451,275
230-1	GRAVEL MULCH	SY	1,494	38,791	21,146	7,310	42,122	37,711	27,513	44,512	31,284		251,884	$4.00	$1,007,535
230-2	HYDROSEEDING	AC	0.31	10.57	5.91	2.04	11.08	9	7.29	10.97	11.23		69	$6,000.00	$412,630
			$21,762	$813,738	$429,998	$150,525	$596,766	$426,044	$360,338	$680,485	$801,502	$626,094			
	STREETS & RELATED WORK														
310-1	ABC MAINTENANCE ROAD & RAMP (4-INCH)	SY	401	6,636	4,020	4,351	8,461	7,504	3,077	8,098	6,535		49,082	$4.63	$227,252
336-1	TEMPORARY PAVEMENT REPLACEMENT (2" A.C.)	SY	0	0	0	0	996	0	0	0	0		996	$20.00	$19,924
336-2	PERMANENT PAVEMENT REPLACEMENT (3" A.C.)	SY	0	0	0	0	86	274	322	0	0		682	$30.00	$20,467
340-1	CONCRETE VERTICAL CURB & GUTTER, MAG STD DET 220, TYPE 'A'	LF	0	0	0	0	0	0	36	0	0		36	$19.00	$684
340-2	CONCRETE ROLL CURB & GUTTER, MAG STD DET 220, TYPE 'C'	LF	0	0	0	0	0	0	80	0	0		80	$17.00	$1,360
340-3	CONCRETE SIDEWALK, MAG STD DET 230	SF	0	0	0	0	0	0	1,004	0	0		1,004	$15.00	$15,060
340-4	CONCRETE DRIVEWAY ENTRANCE, MAG STD DET 250-1	SF	0	0	0	0	0	0	144	0	0		144	$15.00	$2,160
340-5	CONCRETE DRIVEWAY ENTRANCE, MAG STD DET 250-2	SF	0	0	0	0	0	0	576	0	0		576	$15.00	$8,640
350-1	REMOVE EXISTING WIRE FENCE	LF	254	193	0	2,073	1,137	0	0	0	175		3,832	$1.00	$3,832
350-2	REMOVE PAVEMENT	SY	0	0	0	0	1,739	0	0	0	0		1,739	$7.00	$12,171
350-3	BURIED TRASH REMOVAL ALLOWANCE	LS										1	1	$50,000.00	$50,000
350-4	REMOVE CONCRETE CURB & GUTTER	LF	0	0	0	0	0	0	236	0	0		236	$6.00	$1,416
350-5	REMOVE GROUTED RIPRAP	SY	0	0	2,388	2,209	0	0	0	0	0		4,597	$18.92	$86,952
350-6	REMOVE EXISTING BLOCK WALL, RETAINIGN WALL	LF	0	0	0	0	346	0	3,711	0	0		4,057	$8.00	$32,456
350-7	REMOVE EXISTING CONCRETE LINED CHANNEL	SY	1,950	970	0	0	0	0	0	0	0		2,920	$18.92	$55,232
350-8	REMOVE EXISTING CONCRETE SIDEWALK	SY	0	0	0	0	0	0	112	0	0		112	$18.92	$2,110
			$38,996	$49,265	$63,788	$63,992	$77,756	$42,977	$85,014	$37,495	$30,432	$50,000			
	RIGHT-OF-WAY AND TRAFFIC CONTROL														
401-1	MISCELLANEOUS TRAFFIC CONTROL	LS										1	1	$100,000.00	$100,000
412-1	4 STRAND SMOOTH WIRE FENCE	LF	521	7,150	4,140	3,164	4,794	3,488	4,460	4,714	3,471		35,902	$5.00	$179,510
421-1	INSTALL GATE	EA	0	0	0	0	0	0	0	0	1		1	$1,000.00	$1,000
			$2,605	$35,750	$20,700	$15,820	$23,970	$17,440	$22,300	$23,570	$18,355	$100,000			
	STRUCTURES														
505-1	CONCRETE CHANNEL LINING (7" THICK)	SF	17,476	0	0	0	0	0	0	0	0		17,476	$10.80	$188,784
505-2	CONCRETE BOX CULVERT TYPE A (2 BARREL 8' x 6'), ADOT B-02.20	LF	0	0	0	0	0	826	85	0	0		911	$1,121.25	$1,021,459
505-3	CONCRETE BOX CULVERT TYPE B (3 BARREL 8' x 6'), ADOT B-02.30	LF	0	162	50	0	58	0	58	393	0		721	$1,604.20	$1,156,628
505-4	CONCRETE BOX CULVERT TYPE E (2 BARREL 10' x 6'), ADOT B-02.20	LF	0	0	0	0	0	0	0	0	1,320		1,320	$1,475.50	$1,947,660
505-5	CONCRETE BOX CULVERT INLET HEADWALL, ADOT B-04.30	EA	0	3	1	0	1	1	2	1	1		10	$8,801.00	$88,010
505-6	CONCRETE BOX CULVERT OUTLET HEADWALL, ADOT B-04.30	EA	0	4	0	0	1	1	2	2	0		10	$14,768.00	$147,680
505-7	CONCRETE GRADE CONTROL STRUCTURE, (30'-10' BOTTOM WIDTH TRANSITION) TYPE 1	CY	0	609	342	0	0	0	0	0	0		951	$500.00	$475,500
505-8	CONCRETE GRADE CONTROL STRUCTURE, (40'-20' BOTTOM WIDTH TRANSITION) TYPE 2	CY	0	0	0	0	84	168	0	0	0		252	$500.00	$126,000
505-9	CONCRETE GRADE CONTROL STRUCTURE, (50'-30' BOTTOM WIDTH TRANSITION) TYPE 3	CY	0	0	0	154	0	0	0	0	0		154	$500.00	$77,000
505-10	CONCRETE TEST PANELS - 10' x 10' x 6"	EA										3	3	$1,851.85	$5,556
505-11	CONCRETE SIDE FLOW SPILLWAY, (10' BOTTOM WIDTH) TYPE1	CY	0	0	35	0	0	0	0	0	0		35	$500.00	$17,500
505-12	CONCRETE SIDE FLOW SPILLWAY, (20' BOTTOM WIDTH) TYPE2	CY	0	80	0	0	0	0	0	0	0		80	$500.00	$40,000
505-13	CONCRETE SIDE FLOW SPILLWAY, (30' BOTTOM WIDTH) TYPE3	CY	0	65	0	0	0	0	0	0	0		65	$500.00	$32,500
505-14	CONCRETE SIDE FLOW SPILLWAY, (40' BOTTOM WIDTH) TYPE4	CY	0	63	0	0	0	0	0	0	0		63	$500.00	$31,500

WHITE TANKS FRS#3 OUTLET CHANNEL - COST ESTIMATE BY REACH

FCD 2007C016 ASSIGNMENT 4
PCN 470.04.32

6/30/2009
HOSKIN-RYAN CONSULTANTS, INC.
HRC 07-027-04

QUANTITY SUMMARY

ITEM NO.	ITEM DESCRIPTION	UNIT	REACH 1	REACH 2	REACH 3	REACH 4	REACH 5	REACH 6	REACH 7	REACH 8	REACH 9	LUMP SUM ITEMS	TOTAL QUANTITY	UNIT PRICE	TOTAL AMOUNT
505-15	CONCRETE SIDE FLOW SPILLWAY, (50' BOTTOM WIDTH) TYPE5	CY	0	0	0	0	0	0	0	140	0		140	$500.00	$70,000
505-16	CONCRETE SIDE FLOW SPILLWAY, (80' BOTTOM WIDTH) TYPE6	CY	0	0	0	0	0	0	0	251	0		251	$500.00	$125,500
505-17	CONCRETE DROP INLET STRUCTURE, (3-8'X6' BOX CULVERT) TYPE 1	CY	0	48	16	0	16	0	0	0	0		80	$500.00	$40,000
505-18	CONCRETE DROP INLET STRUCTURE, (2-8'X6' BOX CULVERT) TYPE 2	CY	0	0	0	0	0	14	14	0	0		28	$500.00	$14,000
505-19	WASTEWAY STRUCTURE	CY	0	0	0	0	0	0	0	0	202		202	$500.00	$101,000
505-20	FLOW JUNCTION STRUCTURE	CY	0	0	0	0	0	137	0	0	0		137	$500.00	$68,500
505-21	SLIDE GATE STRUCTURE	EA	0	0	0	0	0	0	0	0	3		3	$50,000.00	$150,000
505-22	GROUTED RIPRAP DOWNDRAIN	EA	0	7	9	1	0	0	6	4	0		27	$1,630.00	$44,010
505-23	ALLOWANCE FOR HARDENED STRUCTURE WITHIN FISSURE ZONE	LS										1	1	$2,225,826.96	$2,225,827
510-1	RETAINING WALL, 2' TO 3'	LF	0	0	0	0	0	0	300	100	0		400	$40.00	$16,000
515-1	BOLLARDS, MAG STD DET 140, TYPE 2 REMOVABLE	EA	3	18	3	18	9	12	21	9	3		96	$1,000.00	$96,000
520-1	STEEL SAFETY RAIL, MAG STD DET 145, TYPE 1	LF	0	680	101	128	119	617	415	220	118		2,398	$75.00	$179,850
			$191,784	$858,265	$310,756	$106,230	$184,538	$1,167,497	$316,393	$900,308	$2,219,311	$2,231,383			
	SUBTOTAL CONSTRUCTION ITEMS		**$255,148**	**$1,757,019**	**$825,242**	**$336,568**	**$883,030**	**$1,653,958**	**$784,045**	**$1,641,857**	**$3,069,600**	**$3,228,361**			**$14,434,827**
	Relocation and/or Removal of Existing Utilities		$12,757	$87,851	$41,262	$16,828	$44,152	$82,698	$39,202	$82,093	$153,480	$161,418		5%	$721,741
	Engineering Contingencies for Unknown Items		$12,757	$87,851	$41,262	$16,828	$44,152	$82,698	$39,202	$82,093	$153,480	$161,418		5%	$721,741
	TOTAL CONSTRUCTION COST		**$280,663**	**$1,932,721**	**$907,766**	**$370,225**	**$971,333**	**$1,819,353**	**$862,450**	**$1,806,043**	**$3,376,560**	**$3,551,197**			**$15,878,310**
	Landscaping as Aesthetic Treatment		$6,175	$160,292	$87,381	$30,207	$174,060	$155,829	$113,690	$183,934	$129,275	$0	52	$20,000	$1,040,842
	Non-Landscaping Aesthetic Treatment		$11,227	$77,309	$36,311	$14,809	$38,853	$72,774	$34,498	$72,242	$135,062	$142,048		4%	$635,132
	TOTAL CONSTRUCTION AND LANDSCAPE COST		**$298,064**	**$2,170,322**	**$1,031,457**	**$415,240**	**$1,184,246**	**$2,047,957**	**$1,010,637**	**$2,062,218**	**$3,640,897**	**$3,693,245**			**$17,554,284**
	Engineering and Landscape Design		$29,806	$217,032	$103,146	$41,524	$118,425	$204,796	$101,064	$206,222	$364,090	$369,324		10%	$1,755,428
	Construction Administration		$17,884	$130,219	$61,887	$24,914	$71,055	$122,877	$60,638	$123,733	$218,454	$221,595		6%	$1,053,257
	TOTAL CONSTRUCTION, LANDSCAPE, AND CONTINGENCIES COST		**$345,755**	**$2,517,573**	**$1,196,490**	**$481,679**	**$1,373,725**	**$2,375,630**	**$1,172,339**	**$2,392,173**	**$4,223,440**	**$4,284,164**			**$20,362,969**
	Required FCDMC Right-of-Way Acquisition - Undeveloped Property	AC	0.00	0.00	0.00	0.00	0.00	10.08	0.00	13.11	0.00	0.00	23.19	$152,500.00	$3,536,547
	Required FCDMC Right-of-Way Acquisition - Platted Property	AC	0.00	0.00	0.00	0.00	12.51	0.00	0.00	0.00	0.00	0.00	12.51	$205,000.00	$2,565,195
		AC	**0.00**	**0.00**	**0.00**	**0.00**	**12.51**	**10.08**	**0.00**	**13.11**	**0.00**	**0.00**	**35.70**		
	TOTAL REQUIRED RIGHT-OF-WAY ACQUISITION		**$0**	**$0**	**$0**	**$0**	**$2,565,195**	**$1,537,440**	**$0**	**$1,999,107**	**$0**	**$0**			**$6,101,742**
	TOTAL PROJECT COST		**$345,755**	**$2,517,573**	**$1,196,490**	**$481,679**	**$3,938,921**	**$3,913,070**	**$1,172,339**	**$4,391,280**	**$4,223,440**	**$4,284,164**			**$26,464,711**

WHITE TANKS FRS#3 OUTLET CHANNEL - COST ESTIMATE BY PLAN SHEET
FCD 2007C016 ASSIGNMENT 4
PCN 470.04.32

6/30/2009
HOSKIN-RYAN CONSULTANTS, INC.
HRC 07-027-04

QUANTITY SUMMARY

ITEM NO.	ITEM DESCRIPTION	UNIT	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	TOTAL QUANTITY	UNIT PRICE	TOTAL AMOUNT
	GENERAL CONDITIONS																																
105-1	PARTNERING ALLOWANCE	LS																													1	$15,000.00	$15,000
107-1	AZDPES/SWPPP PERMITS	LS																													1	$100,000.00	$100,000
107-2	PUBLIC INFORMATION & NOTIFICATION ALLOWANCE	LS																													1	$20,000.00	$20,000
107-3	PROJECT SIGNS ALLOWANCE	EA																													1	$5,000.00	$5,000
107-4	WATER MANAGEMENT	LS																													1	$55,884.74	$55,885
107-5	VANDALISM ALLOWANCE	LS																													1	$25,000.00	$25,000
	EARTHWORK																																
201-1	CLEARING AND GRUBBING	LS																													1	$288,562.50	$288,563
202-1	MOBILIZATION	LS																													1	$110,034.84	$110,035
211-1	FILL CONSTRUCTION (DITCHES, FARM ROAD AND OVERBANK)	CY	1,904	3,636	4,468	5,471	3,824	5,003	4,769	3,495	0	73	4,902	8,072	2,503	836	1,346	506	41	26	86	29	566	24	15	0	14,710	22,092	7,821	13,016	109,234	$7.00	$764,638
211-2	FINAL AESTHETIC GRADING	LS																													1	$227,496.40	$227,496
215-1	CHANNEL EXCAVATION	CY	10,090	16,648	12,819	13,078	15,844	14,472	16,008	4,971	0	259	13,405	28,445	25,626	28,896	8,329	19,317	22,449	21,875	26,148	16,299	28,371	32,035	29,217	6,130	3,471	2,485	42,836	11,066	470,589	$3.00	$1,411,767
220-1	PLAIN RIPRAP (D_{50}=2")	CY	10	47	41	46	26	30	20	10	0	0	42	0	16	0	0	20	0	0	0	0	151	0	0	0	0	0	0	0	459	$45.00	$20,655
220-2	PLAIN RIPRAP (D_{50}=12")	CY	100	187	260	223	190	127	0	0	0	0	100	0	0	240	29	0	84	0	100	100	1,217	0	61	0	20	0	0	0	3,038	$70.00	$212,660
220-3	PLAIN RIPRAP (D_{50}=15")	CY	247	628	600	819	325	544	494	247	0	0	522	0	281	0	0	562	0	0	0	0	748	0	0	0	0	0	0	0	6,017	$75.00	$451,275
230-1	GRAVEL MULCH	SY	5,150	9,400	8,669	8,878	8,188	8,028	8,500	4,618	0	699	8,389	14,600	14,600	11,745	9,499	15,600	13,661	10,600	10,011	8,044	15,600	15,600	12,588	0	6,418	7,600	7,600	7,600	251,884	$4.00	$1,007,535
230-2	HYDROSEEDING	AC	1.31	2.56	2.36	2.42	2.23	2.24	2.38	1.29	0.00	0.20	2.31	3.84	3.84	3.16	2.34	3.84	3.40	2.81	2.65	2.08	3.84	3.84	3.02	0.00	2.37	2.81	2.81	2.81	69	$6,000.00	$412,630
																0																	
	STREETS & RELATED WORK															0																	
310-1	ABC MAINTENANCE ROAD & RAMP (4-INCH)	SY	1,150	1,493	1,493	1,587	1,493	1,493	1,493	957	1,369	1,363	1,983	3,004	2,845	2,665	1,784	2,929	2,585	1,400	1,164	915	2,909	2,909	2,251	0	1,524	1,524	1,400	1,400	49,082	$4.63	$227,252
336-1	TEMPORARY PAVEMENT REPLACEMENT (2" A.C.)	SY	0	0	0	0	0	0	0	0	0	0	356	640	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	996	$20.00	$19,924
336-2	PERMANENT PAVEMENT REPLACEMENT (3" A.C.)	SY	0	0	0	0	0	0	0	0	0	0	86	0	0	0	274	0	140	0	182	0	0	0	0	0	0	0	0	0	682	$30.00	$20,467
340-1	CONCRETE VERTICAL CURB & GUTTER, MAG STD DET 220, TYPE 'A'	LF	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	36	0	0	0	0	0	0	0	0	0	0	0	36	$19.00	$684
340-2	CONCRETE ROLL CURB & GUTTER, MAG STD DET 220, TYPE 'C'	LF	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	80	0	0	0	0	0	0	0	0	0	80	$17.00	$1,360
340-3	CONCRETE SIDEWALK, MAG STD DET 230	SF	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	300	0	608	96	0	0	0	0	0	0	0	0	1,004	$15.00	$15,060
340-4	CONCRETE DRIVEWAY ENTRANCE, MAG STD DET 250-1	SF	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	144	0	0	0	0	0	0	0	0	0	0	0	144	$15.00	$2,160
340-5	CONCRETE DRIVEWAY ENTRANCE, MAG STD DET 250-2	SF	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	432	144	0	0	0	0	0	0	0	0	576	$15.00	$8,640
350-1	REMOVE EXISTING WIRE FENCE	LF	447	0	0	0	0	0	0	326	873	868	6	1,070	67	0	0	0	0	0	0	0	0	0	0	0	0	0	0	175	3,832	$1.00	$3,832
350-2	REMOVE PAVEMENT	SY	0	0	0	0	0	0	0	0	0	0	481	1,258	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1,739	$7.00	$12,171
350-3	BURIED TRASH REMOVAL ALLOWANCE	LS																													1	$50,000.00	$50,000
350-4	REMOVE CONCRETE CURB & GUTTER	LF	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	60	0	152	24	0	0	0	0	0	0	0	0	236	$6.00	$1,416
350-5	REMOVE GROUTED RIPRAP	SY	0	0	0	0	0	0	0	2,388	117	438	1,654	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4,597	$18.92	$86,952
350-6	REMOVE EXISTING BLOCK WALL, RETAINIGN WALL	LF	0	0	0	0	0	0	0	0	0	0	170	176	0	0	0	0	291	1,114	1,125	1,181	0	0	0	0	0	0	0	0	4,057	$8.00	$32,456
350-7	REMOVE EXISTING CONCRETE LINED CHANNEL	SY	2,920	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2,920	$18.92	$55,232
350-8	REMOVE EXISTING CONCRETE SIDEWALK	SY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	33	0	68	11	0	0	0	0	0	0	0	0	112	$18.92	$2,110
	RIGHT-OF-WAY AND TRAFFIC CONTROL																																
401-1	MISCELLANEOUS TRAFFIC CONTROL	LS																													1	$100,000.00	$100,000
412-1	4 STRAND SMOOTH WIRE FENCE	LF	1,175	1,700	1,640	1,600	1,556	1,664	1,783	998	811	839	1,291	1,786	1,786	1,140	550	1,800	1,338	1,800	1,614	886	1,800	1,800	1,074	0	746	900	900	925	35,902	$5.00	$179,510
421-1	INSTALL GATE	EA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	$1,000.00	$1,000
	STRUCTURES																																
505-1	CONCRETE CHANNEL LINING (7" THICK)	SF	17,476	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17,476	$10.80	$188,784
505-2	CONCRETE BOX CULVERT TYPE A (2 BARREL 8' x 6'), ADOT B-02.20	LF	0	0	0	0	0	0	0	0	0	0	0	0	0	238	588	0	85	0	0	0	0	0	0	0	0	0	0	0	911	$1,121.25	$1,021,459
505-3	CONCRETE BOX CULVERT TYPE B (3 BARREL 8' x 6'), ADOT B-02.30	LF	62	0	50	50	50	0	0	0	0	0	58	0	0	0	0	0	0	0	58	393	0	0	0	0	0	0	0	0	721	$1,604.20	$1,156,628
505-4	CONCRETE BOX CULVERT TYPE E (2 BARREL 10' x 6'), ADOT B-02.20	LF	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	295	900	125	0	0	0	1,320	$1,475.50	$1,947,660
505-5	CONCRETE BOX CULVERT INLET HEADWALL, ADOT B-04.30	EA	1	0	1	1	0	1	0	0	0	0	1	0	0	0	1	0	1	0	1	1	0	0	0	0	1	0	0	0	10	$8,801.00	$88,010
505-6	CONCRETE BOX CULVERT OUTLET HEADWALL, ADOT B-04.30	EA	1	1	0	1	1	0	0	0	0	0	1	0	0	1	0	0	1	0	1	1	0	0	1	0	0	0	0	0	10	$14,768.00	$147,680
505-7	CONCRETE GRADE CONTROL STRUCTURE, (30'-10' BOTTOM WIDTH TRANSITION) TYPE 1	CY	69	135	135	201	69	135	138	69	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	951	$500.00	$475,500
505-8	CONCRETE GRADE CONTROL STRUCTURE, (40'-20' BOTTOM WIDTH TRANSITION) TYPE 2	CY	0	0	0	0	0	0	0	0	0	0	0	0	84	0	0	168	0	0	0	0	0	0	0	0	0	0	0	0	252	$500.00	$126,000
505-9	CONCRETE GRADE CONTROL STRUCTURE, (50'-30' BOTTOM WIDTH TRANSITION) TYPE 3	CY	0	0	0	0	0	0	0	0	0	0	154	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	154	$500.00	$77,000
505-10	CONCRETE TEST PANELS - 10' x 10' x 6"	EA																													3	$1,851.85	$5,556
505-11	CONCRETE SIDE FLOW SPILLWAY, (10' BOTTOM WIDTH) TYPE1	CY	0	0	0	0	0	35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	35	$500.00	$17,500
505-12	CONCRETE SIDE FLOW SPILLWAY, (20' BOTTOM WIDTH) TYPE2	CY	0	0	0	40	40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	80	$500.00	$40,000
505-13	CONCRETE SIDE FLOW SPILLWAY, (30' BOTTOM WIDTH) TYPE3	CY	0	0	65	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	65	$500.00	$32,500
505-14	CONCRETE SIDE FLOW SPILLWAY, (40' BOTTOM WIDTH) TYPE4	CY	0	63	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	63	$500.00	$31,500
505-15	CONCRETE SIDE FLOW SPILLWAY, (50' BOTTOM WIDTH) TYPE5	CY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	140	0	0	0	0	0	0	0	140	$500.00	$70,000
505-16	CONCRETE SIDE FLOW SPILLWAY, (80' BOTTOM WIDTH) TYPE6	CY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	251	0	0	0	0	0	0	0	251	$500.00	$125,500
505-17	CONCRETE DROP INLET STRUCTURE, (3-8'X6' BOX CULVERT) TYPE 1	CY	16	0	16	16	0	16	0	0	0	0	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	80	$500.00	$40,000
505-18	CONCRETE DROP INLET STRUCTURE, (2-8'X6' BOX CULVERT) TYPE 2	CY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	0	14	0	0	0	0	0	0	0	0	0	0	0	28	$500.00	$14,000
505-19	WASTEWAY STRUCTURE	CY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	202	202	$500.00	$101,000
505-20	FLOW JUNCTION STRUCTURE	CY	0	0	0	0	0	0	0	0	0	0	0	0	0	137	0	0	0	0	0	0	0	0	0	0	0	0	0	0	137	$500.00	$68,500
505-21	SLIDE GATE STRUCTURE	EA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3	$50,000.00	$150,000
505-22	GROUTED RIPRAP DOWNDRAIN	EA	1	2	1	2	1	3	4	2	1	0	0	0	0	0	0	0	0	3	0	3	1	1	2	0	0	0	0	0	27	$1,630.00	$44,010
505-23	ALLOWANCE FOR HARDENED STRUCTURE WITHIN FISSURE ZONE	LS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	$2,225,826.96	$2,225,827
510-1	RETAINING WALL, 2' TO 3'	LF	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	130	170	100	0	0	0	0	0	0	0	0	400	$40.00	$16,000
515-1	BOLLARDS, MAG STD DET 140, TYPE 2 REMOVABLE	EA	6	3	3	6	3	3	0	6	3	3	12	0	0	3	6	0	9	0	12	12	0	0	6	0	0	0	0	0	96	$1,000.00	$96,000
520-1	STEEL SAFETY RAIL, MAG STD DET 145, TYPE 1	LF	173	101	105	200	101	101	0	0	0	0	247	0	0	380	122	0	230	0	200	209	0	0	111	0	118	0	0	0	2,398	$75.00	$179,850

	SUBTOTAL CONSTRUCTION ITEMS		**$14,434,827**
	Relocation and/or Removal of Existing Utilities	5%	$721,741
	Engineering Contingencies for Unknown Items	5%	$721,741
	TOTAL CONSTRUCTION COST		**$15,878,310**

WHITE TANKS FRS#3 OUTLET CHANNEL - COST ESTIMATE BY PLAN SHEET
FCD 2007C016 ASSIGNMENT 4
PCN 470.04.32

6/30/2009
HOSKIN-RYAN CONSULTANTS, INC.
HRC 07-027-04

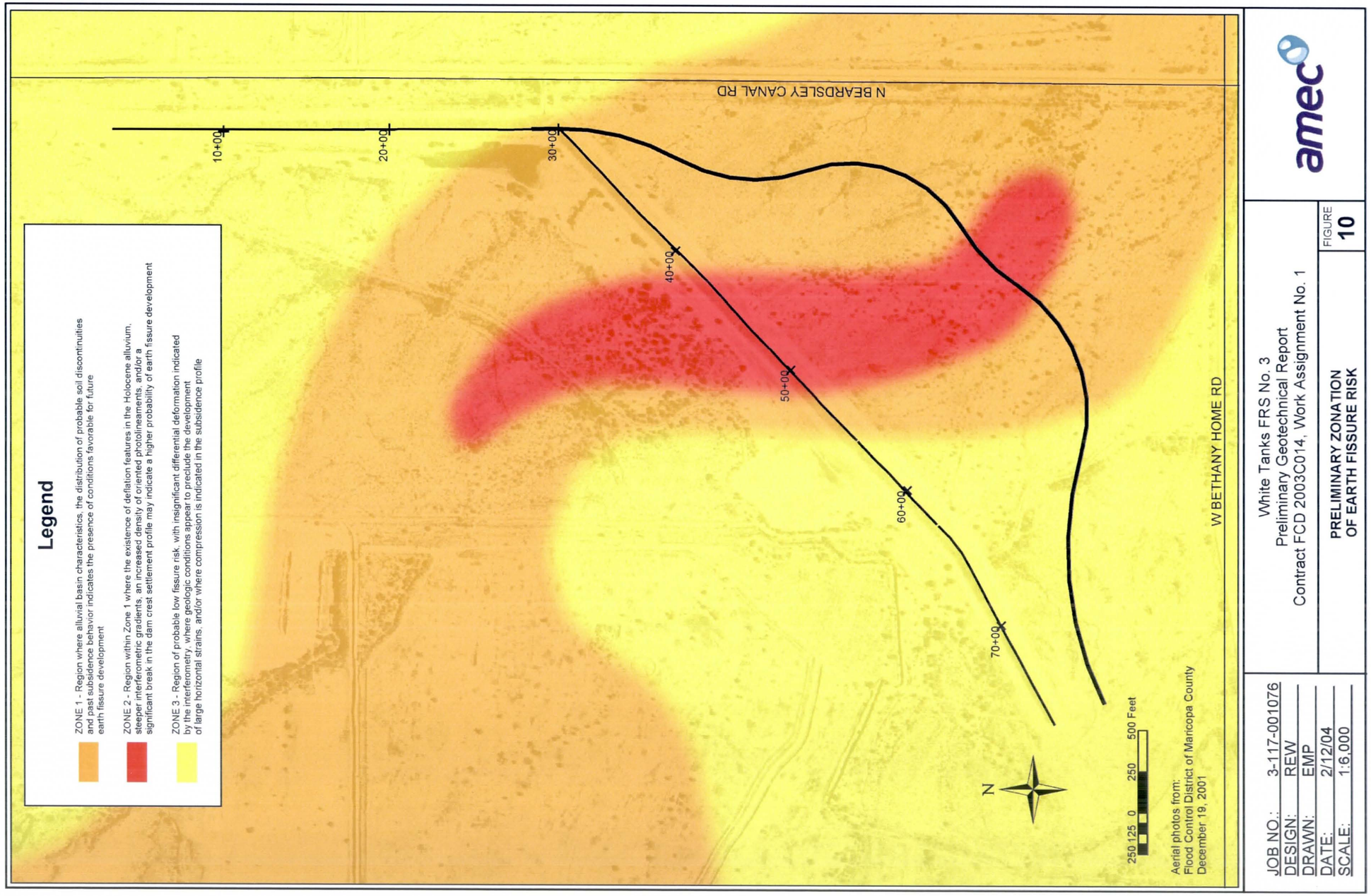
QUANTITY SUMMARY

ITEM NO.	ITEM DESCRIPTION	UNIT	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	TOTAL QUANTITY	UNIT PRICE	TOTAL AMOUNT
	Landscaping as Aesthetic Treatment																														52	$20,000	$1,040,842
	Non-Landscaping Aesthetic Treatment																															4%	$635,132
	TOTAL CONSTRUCTION AND LANDSCAPE COST																																**$17,554,284**
	Engineering and Landscape Design																															10%	$1,755,428
	Construction Administration																															6%	$1,053,257
	TOTAL CONSTRUCTION, LANDSCAPE, AND CONTINGENCIES COST																																**$20,362,969**
	Required FCDMC Right-of-Way Acquisition - Undeveloped Property	AC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.69	4.42	2.97	0.00	0.00	1.00	4.42	4.42	3.27	0.00	0.00	0.00	0.00	0.00	23.19	$152,500.00	$3,536,547
	Required FCDMC Right-of-Way Acquisition - Platted Property	AC	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.35	4.37	4.42	3.37	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	12.51	$205,000.00	$2,565,195
	TOTAL REQUIRED RIGHT-OF-WAY ACQUISITION	**AC**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.35**	**4.37**	**4.42**	**3.37**	**2.69**	**4.42**	**2.97**	**0.00**	**0.00**	**1.00**	**4.42**	**4.42**	**3.27**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**35.70**		**$6,101,742**
	TOTAL PROJECT COST																																**$26,464,711**

APPENDIX R – PROPOSED UTILITY CONFLICTS

Utility Type	Approx. Channel Station	Description
Electric	79+15	Overhead Electric Line. Pole location is approx. 28' east of proposed culvert
	105+37	Overhead Electric Line. Pole location is approx. 18' east of proposed culvert
	105+90	Transformer box is approx. 9' east of propsed culvert
	158+82	Overhead Electric Line. Pole location is approx. 32' west of proposed culvert
	163+00 to 165+00	Three power poles are within the proposed channel alignment
	190+35 to 191+00	Underground power line crosses proposed culvert
	212+45 to 213+00	Underground power lines cross proposed culvert
	226+24 to 226+74	Underground power lines cross proposed culvert
Telephone	65+30	Two underground telephone lines cross the propposed channel
	72+10	Two underground telephone lines cross the proposed channel
	106+10	One underground telephone line crosses the proposed culvert
	158+20	One underground telephone line crosses the proposed culvert
Water	105+50	6" water line crosses proposed culvert
	158+60	12" water line crosses proposed culvert
	158+64	8" water line crosses proposed culvert
	158+93	20" water line crosses under the proposed culvert within a 36" steel casing sleeve
	188+15	8" water line crosses proposed culvert
	190+50 to 191+50	8" water line crosses proposed culvert
	212+03	12" water line crosses proposed culvert
	226+82	8" water line crosses proposed culvert
Gas	79+15	Gas line crosses proposed channel
	159+13	Gas line crosses proposed culvert
Sewer	226+66	12" Sewer line crosses proposed culvert at Colter St

APPENDIX S – AMEC FISSURE STUDY


Legend
ZONE 1 - Region where alluvial basin characteristics, the distribution of probable soil discontinuities and past subsidence behavior indicates the presence of conditions favorable for future earth fissure development
ZONE 2 - Region within Zone 1 where the existence of deflation features in the Holocene alluvium, steeper interferometric gradients, an increased density of oriented photolineaments, and/or a significant break in the dam crest settlement profile may indicate a higher probability of earth fissure development
ZONE 3 - Region of probable low fissure risk, with insignificant differential deformation indicated by the interferometry, where geologic conditions appear to preclude the development of large horizontal strains, and/or where compression is indicated in the subsidence profile
10+00
20+00
30+00
40+00
50+00
60+00
70+00
N BEARDSLEY CANAL RD
W BETHANY HOME RD
N
250 125 0 250 500 Feet
Aerial photos from:
Flood Control District of Maricopa County
December 19, 2001
amec
White Tanks FRS No. 3
Preliminary Geotechnical Report
Contract FCD 2003C014, Work Assignment No. 1
PRELIMINARY ZONATION
OF EARTH FISSURE RISK
FIGURE
10
JOB NO.: 3-117-001076
DESIGN: REW
DRAWN: EMP
DATE: 2/12/04
SCALE: 1:6,000