CIBOLA COUNTY
JUNE 19, 1981

CITY OF GRANTS SPIRIT

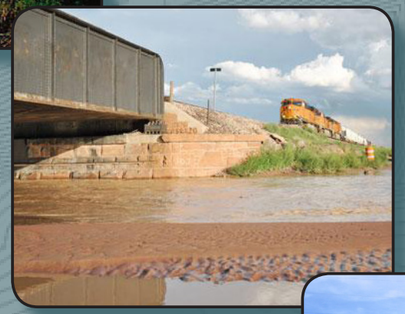
VILLAGE OF MILAN CORPORATION SEAL NEW MEXICO

Rio San Jose
Flood Control District

NMDOT

US Army Corps
of Engineers

Project No. 10-600-033-00 March 2011 Revised April 2011



WILSON
&COMPANY
ENGINEERS & ARCHITECTS

City of Grants and Village of Milan New Mexico

Drainage Master Plan Phase 2

Proposed Improvement Projects

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Certification

I hereby certify that this report for the City of Grants and Village of Milan, New Mexico, Drainage Master Plan – Phase 2, was prepared under my direction.

_____
Vancel S. Fossinger
State of New Mexico PE No. 13064

Cover Photos: *Photos representing some of the drainage problems in Grants and Milan. Photo descriptions are as follows (left to right): Floodwater overflowing College Boulevard at the Grants Canyon Arroyo crossing, Photo by the Cibola Beacon showing sediment and flood flows at a Railroad Bridge over the Rio San Jose, Damaged culvert ends at the College Boulevard crossing over Grants Canyon Arroyo, Rio San Jose north of High Street is attractive to look at but lacks capacity to convey significant flood flows, Pools of water in High Street at Iron Avenue after a small rainstorm.*

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1. Introduction

1.1 Authorization

Cibola County authorized Wilson & Company, Inc., Engineers & Architects (Wilson & Company) to prepare a Drainage Master Plan for the City of Grants and the Village of Milan, New Mexico under a contract dated April 23, 2010.

1.2 Study Area Location

The primary area of focus for this study includes the City of Grants and the Village of Milan, New Mexico (the Study Area). Grants and Milan are located along Interstate 40 approximately 75 miles west of Albuquerque, New Mexico.

The watershed analyzed in the course of this study encompasses approximately 40.5 square miles. A significant portion of this watershed originates in Grants Canyon located northeast of the City of Grants.

Figure 1-1 contained on the following page is a vicinity map that shows the primary areas of focus for the study as well as the overall boundary of the studied watershed.

1.3 Background

Portions of the City of Grants and Village of Milan have been subject to reoccurring flooding over the years. Runoff is generated in large offsite contributing watersheds as well as portions of Black Mesa within the Study Area. In significant storms, this runoff overwhelms the existing drainage facilities in the relatively flat areas that encompass much of the City of Grants and the Village of Milan, resulting in shallow flooding that damages public and private property. Significant pooling of water in streets within the Study Area is not uncommon, even in small, frequent rainfall events.

Photos presented on the cover of this report represent some of the drainage problems in the Study Area. These problems include existing drainage facilities with inadequate capacity and density and existing drainage facilities that are damaged or corroded.

Several drainage reports have been prepared over the years for the Study Area. Some of these reports have quantified runoff, identified problems and proposed solutions to flooding problems. Unfortunately, only a few of the projects have been funded and constructed. Thus, nearly all of the problems still exist, and in some cases, the opportunity to implement some of the proposed solutions has been lost due to development of real estate required for the projects. In addition, new development in the community has increased runoff and more development is expected over time.

The need for an updated drainage master plan was recognized by local community leaders in the process of working to solve localized drainage problems. Funding for the master plan was assembled through a collaborative effort between local, county, and federal agencies. The primary goal of the drainage master plan is to identify significant and beneficial drainage improvement projects and provide the technical documentation needed to support funding requests for the identified projects.

1.4 Purpose and Goals

This project is being executed in two phases. Phase 1 of the project is documented in a separate bound report. The primary goals of Phase 1 included the following:

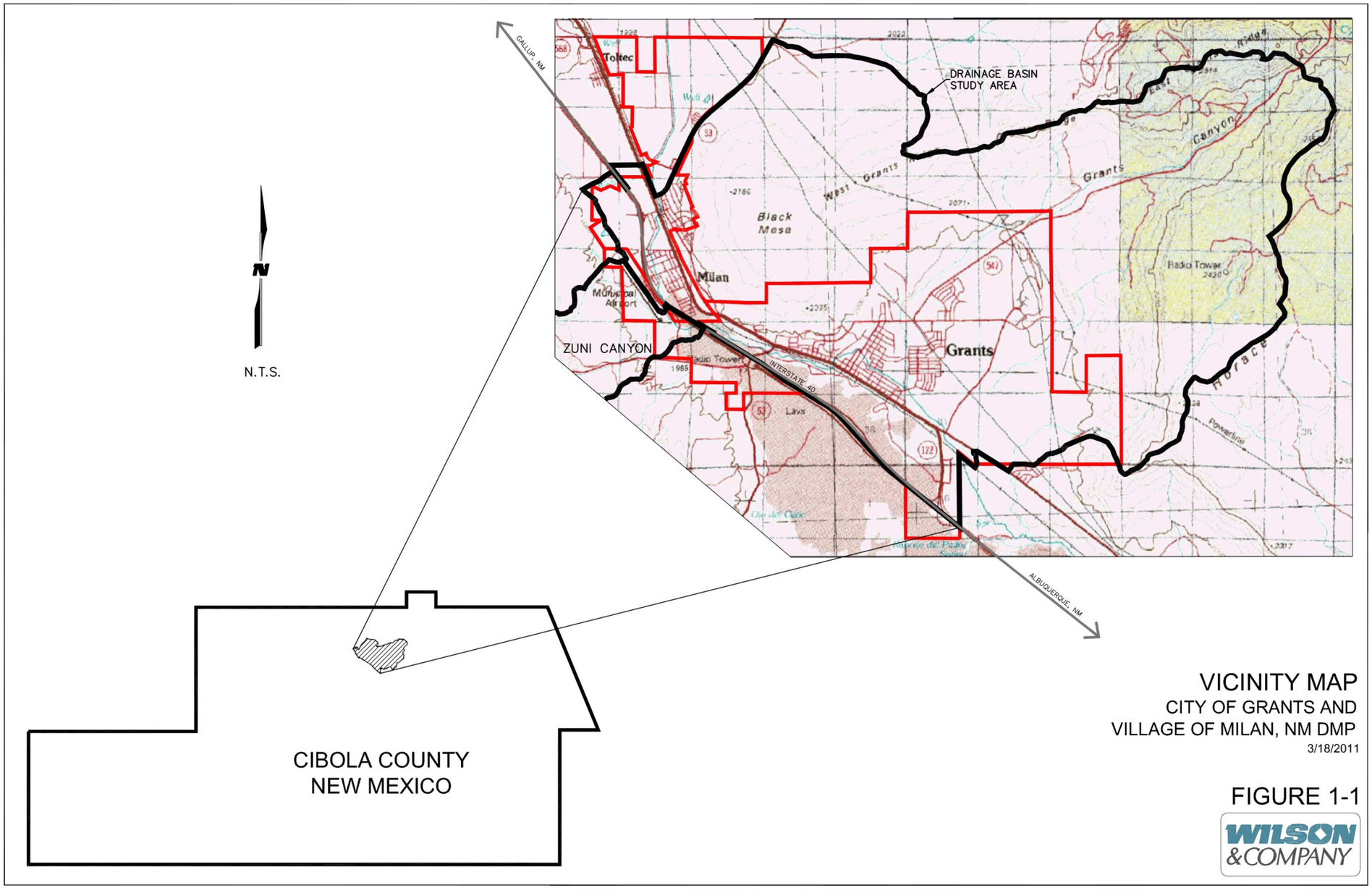
- Quantify Runoff (Hydrology) at points of interest in the watershed for the 10 and 100-year runoff events to provide a basis for analyzing existing facilities and planning adequate improvements.
- Evaluate Major Existing Drainage Facilities (Hydraulics) within the primary areas of focus to determine where improvements may be needed.
- Identify Significant Flooding Issues within the areas of focus through research of existing documents, interviews with local agency personnel, and hydrologic and hydraulic analysis.

The primary goals of Phase 2 of the project as documented by this report include the following:

- Develop Drainage Improvement Concepts to mitigate major flooding problems in the Study Area.
- Evaluate Drainage Improvement Concepts in regards to effectiveness, construction and long term costs, and constructability.
- Identify Drainage Improvement Concepts to be carried forward.

1.5 Project Team

Wilson & Company is preparing this Drainage Master Plan under contract to Cibola County.



VICINITY MAP
CITY OF GRANTS AND
VILLAGE OF MILAN, NM DMP
3/18/2011

FIGURE 1-1

1.6 Participating Agencies

Cibola County is the lead agency for the project and is also managing project funding. Funding for the project was a cooperative effort between Cibola County, the City of Grants, Rio San Jose Flood Control District, US Army Corps of Engineers (USACE), and the State of New Mexico through a Community Development Block Grant.

Other agencies that have participated by providing information and/or documents, review, and/or participated in project meetings include the Village of Milan and the New Mexico Department of Transportation (NMDOT).

1.7 Stakeholder Meetings

Two meetings open to the general public and agency stakeholders were held in the Cibola County office building in Grants, New Mexico during Phase 1 of this project. The first of these meetings was a project kickoff meeting held on June 3, 2010. The project scope and general information about the known drainage problems were presented and participants were invited to provide comments and information about specific problems. A second meeting was held on October 19, 2010 to discuss the first draft of the Phase 1 report. The preliminary findings were presented and participants were invited to provide comments.

The concept of widening and lowering the existing major channels through the Study Area was presented as the likely best solution for reduction of the potential for major flooding and improvement of local drainage throughout the Study Area. No disagreement with this concept was identified by stakeholders at or subsequent to the meeting.

A third and final stakeholder meeting is planned to be held at the end of March 2011. The purpose of the final meeting is to present and discuss the recommendations contained in this report and receive comments regarding the report and its recommendations from the stakeholders.

2. Hydrologic Analysis

2.1 Methodology

The peak runoff rates utilized to determine preliminary sizing of the proposed improvements were generated with the HEC-HMS model that was developed in Phase 1 of this study and documented in the Phase 1 report. The model was modified as needed to fit the various improvement configurations as they were developed. Where applicable, the revised HEC-HMS model output is presented along with other documentation provided for individual proposed projects within this report. Peak flow rates for the proposed improvements are shown on the exhibits depicting the proposed facilities and/or on the hydrologic modeling output for the alternative.

3. Hydraulic Analysis

3.1 Methodology

Hydraulic Analysis of the majority of the proposed facilities was performed with the USACE Hydrologic Engineering Center–River Analysis System (HEC-RAS). A few smaller culverts with less defined inflow channels have been analyzed with the Bentley CulvertMaster Program. Stage discharge curves for proposed detention ponds were developed with the Bentley CulvertMaster program.

Manning's roughness coefficients (n-values) were estimated based on site visits and photographs for the included portions of the major channels that are proposed to remain un-improved in this study. The Cowan Method as presented in "Open Channel Hydraulics", Ven Te Chow, Ph.D., 1959, was utilized in the estimates. With the Cowan Method, six primary factors affecting the n-value are assigned values and then the six values are added together to obtain the section value. Material, irregularity, cross section variation, obstructions, vegetation, and degree of meandering are the factors considered in the method. Manning n-values in the un-improved segments ranged from 0.040 to 0.045 for the main channel and 0.060 to 0.065 for the overbank areas. Further documentation and discussion of n-values is contained in the Phase 1 report.

Manning's n-values utilized for the analysis of the proposed improvements ranged from 0.13 to 0.040 for the main channel. Manning's n-value of 0.030 was utilized for the majority of the proposed modified main channel segments. Manning's n-value of 0.013 was used in very limited areas that are proposed to be lined with concrete and a Manning's n-value of 0.04 was utilized in some very flat areas are anticipated to be prone to having significant vegetation growth. Overbank areas were assigned manning's n-values ranging from 0.04 to 0.085 based on existing conditions in the overbank areas. However, these areas do not have impact on the 10 and 100-year hydraulics in the "future with project" condition as the flows are contained and conveyed within the main channel section and do not contact the modeled overbank areas.

The HEC-RAS model was executed in sub-critical flow regime consistent with FEMA methodology for floodplain analysis. Output from the hydraulic modeling effort is provided within the three "proposed improvements" appendix sections included in this report.

4. Proposed Improvements

4.1 Improvement Concepts Development Process

Conclusions developed during the execution of Phase 1 of the project included the following:

- The majority of the existing major drainage conveyance infrastructure in the Study Area is insufficient to convey runoff from the analyzed 100-year frequency storm event. A good portion of the major drainage infrastructure appears to have been designed for the 10-year frequency storm.

- In several locations, the major outfall channels are not located at the low point in the valleys or have banks that are in a levee condition. Thus, it is difficult to drain adjacent areas to the channels and in many cases the channels present a flood hazard to the adjacent areas.

- In most locations in the Study Area the existing channels are not sufficiently incised to serve as adequate drainage outfalls for adjacent areas.

- It was recognized that more problems exist in the Study Area than can be addressed with the limited resources of the current project. Thus, the study has been focused on what is believed to be the most significant core problems.

Based on these conclusions, the Phase 1 study team recommended that the primary effort in working toward improving the drainage systems and reducing flood hazards in the Study Area should be focused on the major outfall channels. If possible, the capacity of the channels and associated crossing structures should be increased to match or exceed the peak runoff rates of the 100-year frequency event. Inverts of the channels should be lowered to provide adequate outfalls for adjacent areas and reduce or eliminate leveed sections to the extent practical. If adequate capacity with lowered channel inverts in the core channels can be achieved, hundreds of properties could be removed from the regulatory floodplain and solutions to many of the more localized drainage problems will become much more effective and achievable.

These conclusions and recommendations were included in the Phase 1 report and were discussed at the second project stakeholder meeting.

The recommended improvements proposed in this report are consistent with these recommendations. Other potential alternatives to reduce flood hazards along the major outfall channels that were considered, but rejected, are identified and discussed in the following section.

4.1.1 Alternatives Considered But Rejected

The construction of by-pass channels outside of populated areas to divert runoff from the existing channels.

Previous drainage planning studies for the Study Area have proposed constructing at least two large floodwater by-pass channels.

One channel was proposed to divert the flow in the Rio San Jose along the south side of the railroad from a point near the 5th Street bridge to a point south of the southeastern railroad bridge over the Rio San Jose. This approximately 2.25 mile long channel would traverse a significant area with exposed or shallow malpais.

This channel by-pass alternative was rejected due to the following:

- Diverting flood flow at this location would have some positive effects on mitigating peak flow rates in the Rio San Jose in the Grants Downtown Area. However, further downstream, peak flow would remain fairly high due to runoff contributed from local basins, and still require replacement of structures and expansion of the channel section.

- The majority of the existing structures that might be found hydraulically sufficient with this alternative are nearing the end of their serviceable life and/or are planned to be reconstructed with roadway projects in the near future.

- The current channel invert is too high to provide adequate gravity based storm sewer outfalls through the downtown area and in other locations. The diversion would not solve this problem. Reconstruction of the current channel can mitigate this issue.

- It is anticipated that construction of the proposed diversion channel would require significant rock excavation and would be very costly to construct.

The second diversion channel was proposed to divert flow in Grants Canyon Arroyo from a point near the northeast corner of the City of Grants to a point on the Rio San Jose just upstream of McBride Road. This diversion channel would be approximately 3.3 miles long and would generally be located through land that is currently privately owned.

This alternative was rejected due to the following:

- Diverting flood flow at this location would have some positive effects on mitigating peak flow rates in the Grants Canyon Arroyo. However, peak flow rates would remain relatively high due to the very strong influence of the local steep basins on peak flow in the arroyo.

- Only three roadway crossings exist over the arroyo through the City of Grants. Construction of the by-pass channel would require at least two new roadway crossings to be constructed.

- Expansion of the existing channel will not require significant right-of-way acquisition. The by-pass channel would require substantial right-of-way acquisition.

- The existing roadway crossing structures are nearing the end of their serviceable life and/or are planned to be reconstructed with roadway projects in the near future. Capacity can be expanded with structure replacement projects that will be required even if the by-pass was constructed.

- Portions of the existing arroyo invert are too high to promote positive drainage to the channel. The diversion would not improve this situation. Reconstruction of the channel in its current alignment can improve this.

It is unlikely that projects of the magnitude of the proposed by-pass channels could be fully funded to be completely constructed in one phase. Thus, the projects would need to be divided into multiple phases. Little benefit would be realized from the by-pass channels prior to full completion. Reconstruction and enlargement of the existing facilities can be phased and completed as several smaller projects with immediate benefits from each phase that is completed.

Construction of large detention ponds upstream of Grants and Milan

Previous drainage planning studies for the Study Area have proposed constructing at least two large detention ponds at the upstream limits of the Study Area. One of these ponds was to detain runoff and reduce peak runoff rates from the Zuni Canyon watershed. The other pond was to detain runoff and reduce peak flow rates from the Grants Canyon Arroyo watershed. These ponds may have provided a viable solution when they were proposed several decades ago, but the detention pond solution was rejected in the current study due to the following:

- The current analysis found that the flow from Zuni Canyon is already significantly detained by the Interstate 40 (I-40) roadway embankment and 84” culvert that conveys the runoff below I-40 to the Rio San Jose. Due to the existing detention and lagging of the peak flow from Zuni Canyon, it has little impact on the peak flows that impact the Rio San Jose through the City of Grants. Thus, very little benefit would be realized from additional detention of runoff from Zuni Canyon and improvements to the Rio San Jose would still be required downstream.

- Construction of a large detention pond on the Grants Canyon Arroyo would provide some mitigation of peak flow in the arroyo. However, as demonstrated in the 2005 flood from this watershed, high intensity storms located in the steep basins near to and within the City limits (below the proposed dam location) can generate high peak rates in the arroyo without significant runoff from the upstream watershed. Thus, expansion of the capacity of the existing channel and crossing structures would still be desirable, even with the detention dam in place.

- The detention dam would likely require relocation of the existing Lobo Canyon road which would add significant cost to the project.

- The current requirements for the permitting and construction of dams are very costly to implement.

- A significant area of land would need to be acquired to construct the proposed dam. Expansion of capacity of the existing channel can generally be accomplished within the existing public right-of-way.

- Detention dams remove significant volumes of sediment from flood flows. Thus, regular removal of this sediment from the dam would be required in order to maintain the required storage volume. This could be a substantial maintenance cost. Some sediment will deposit in the proposed expanded channels as well. However, much of the sediment moves downstream with flood flow and will not require removal from the channel.

- Water that would be depleted of sediment load in the detention dam could become more erosive to the downstream channel.

Do nothing except improve maintenance to the major outfalls

This alternative was rejected due to the following:

- Some flood risk could be mitigated by increased maintenance of the existing conveyance facilities. However, these benefits are very limited as the capacity provided by the existing system is significantly lower than needed. Expansion of

the existing drainage system is desirable.

- Significant portions of the Study Area are at high risk of flooding. Flooding can lead to human safety concerns. Significant reduction of these risks is desirable and will not be provided by improved maintenance alone.

- A high number of properties within the Study Area are located within the FEMA regulatory floodplain and an increasing number will be required to purchase flood insurance as time passes and properties change hands and/or are refinanced. Improvements to the capacity of main channels will likely allow the regulatory floodplains to be reduced in size and thus reduce the amount of flood insurance premiums to be paid by property owners. Increased maintenance alone will not provide this benefit.

- Without expansion of the existing facilities many properties in the Study Area will continue to be flooded on a fairly regular basis. Many properties are at risk of damage from flooding which degrades property values and the local tax base.

- Regular flooding from small storm events and the potential for significant flooding from large storm events is a negative factor in the proposed redevelopment of the Grants Downtown Area and other portions of the Study Area.

4.2 Recommended Improvements

4.2.1 Rio San Jose

Primary Design Objectives

- Lower Channel Inverts to reduce leveed sections, enhance conveyance capacity and enhance the ability for the channel to collect runoff from adjacent areas.

- Increase Conveyance Capacity through widening of the channel section and replacement or enhancement of insufficient existing roadway and rail crossing structures to reduce upstream water surface elevations.

- Limit the Negative Impacts of proposed channel improvements to adjacent private property.

Proposed Improvements Description

The proposed improvements to the Rio San Jose are summarized in the tables at the end of Section 5 of this report and are shown on Figures 1-1 through 1-7 in Appendix Section 1. The proposed improvements begin approximately 350 linear feet downstream of the railroad crossing on the southeast side of the City of Grants and extend to a point approximately 600 linear feet upstream of Highway 605 in the Village of Milan. The total length of this reach is approximately 7.34 miles. Widening or a combination of widening and lowering of the channel bed is proposed for all but approximately 1.14 miles of this reach.

Improvements were not proposed by this study for the 1.14 mile reach of the channel between the El Morro Box Culverts (Station 251+12) and the confluence with the Zuni Canyon Arroyo (Station 310+00). Most of the area adjacent to the main channel in this reach is mapped as regulatory FEMA floodplain and contains very limited development. A sanitary sewer trunk line crosses the channel and at times parallels it. It appears that there may be some potential to improve the channel through this reach and thus narrow the physical and regulatory floodplain through a FEMA map revision process. Planning a channel improvement project for this reach is beyond the scope of the current project as it will require consideration to land use, access, and utility planning to properly execute.

Out of the 20 existing stream crossing structures located along the Rio San Jose reach to be improved, 12 are proposed for full replacement and 3 are proposed to be modified to improve conveyance capacity. More specifically:

- 10 - Roadway bridges are proposed to be replaced
- 2 - Pedestrian bridges are proposed to be replaced
- 1 - Roadway bridge is proposed to be modified
- 1 - Railroad bridge is proposed to be modified
- 1 – Roadway concrete box culvert is proposed to have additional cells

The current hydraulic analysis indicates that remaining five stream crossing structures either have adequate conveyance capacity or will have adequate conveyance capacity after downstream channel and crossing structure improvements are made.

Several drop structures have been proposed in the reach to be improved to protect existing sanitary sewer crossings or existing rail or roadway crossing structures.

Proposed channel bottom widths vary from 20 to 80 feet, dependant on design flow rates, available slope and available corridor width. The majority of the improved channel is proposed to have a 50 foot bottom width. Except in very short constrained areas, the maximum side slopes are proposed to be 2:1, which is an improvement over the 1:1 to

2:1 side slopes that currently exist in the reach. In areas where flatter side slopes are found to be readily achievable, they should be incorporated in the detailed design.

Utility Constraints

There are several existing utilities that cross the channel corridor and will require consideration during detailed design and construction of channel improvements. There are costs associated with relocating dry utilities such as electric, communication, and gas lines and waterlines. However, the relocation of these types of utilities is generally relatively economical. Relocation of gravity flow utilities, such as sanitary sewers can represent much greater design challenges and costs.

There are several known sanitary sewer crossings of the Rio San Jose within the segments proposed to be improved. The general locations of these crossings are shown on the profile exhibits in Appendix Sections 1. Accurate vertical information was not available for these sanitary sewer crossings at the time of this study. General information regarding the depths of the crossings was obtained from utility personnel and was utilized in the concept plan development. A few of the crossings appear to be redundant and it is expected that they can be removed from service. Others are believed to be deep enough to either not be impacted by the proposed improvements or can be protected in place. A few, such as the crossings at High Street and Second Street, are expected to be problematic, and may require significant sanitary sewer infrastructure modifications to remedy. Ballpark estimates of the potential costs associated with these modifications have been included in the estimates for channel improvements. More accurate vertical information on the sewers than is currently available is needed to refine the solutions and costs associated with these expected conflicts.

Very little is known about the depth of the sewer crossings in Milan. Thus, proposed channel invert lowering was limited in the concept design through Milan. If more detailed vertical information on the sanitary sewer crossings reveals that the sewers are deeper than anticipated, further lowering of the channel inverts would improve their function and decrease the need to raise street improvements at the points that existing streets cross the channel.

A detailed utility survey should be performed prior to design of the proposed facilities and conflicts should be resolved.

Potential Excavation Constraints

Construction of the proposed improvements will require substantial excavation. Shallow bedrock or very poor soils could greatly complicate construction and increase construction costs. Exploratory geotechnical boring, sampling, and logging should be conducted throughout the channel corridor prior to detailed design to determine the types of materials that will be encountered.

Real Estate Constraints

Where practical to do so, the concept design has been configured to fit within existing public parcels or right-of-ways. In other areas, construction of adequate facilities is expected to require acquisition of easements or fee title to adjacent privately owned real estate.

Freeboard

A primary goal of the concept design was to provide conveyance capacity for the 100-year future condition discharge within the main channel section with minimal leveed sections. Throughout most of the proposed improved channel, the proposed 100-year water surfaces are below the surface of land areas to minimize the flooding potential to those areas and to promote positive drainage to the channel. The hydraulic analysis indicates that over one foot of freeboard between the water surface and the high chord will be provided at the upstream side of all of the proposed and existing crossing structures with conveyance of the 100-year future flood. Bank freeboard, upstream of the crossing structures, will be determined in detailed design of the improvements.

4.2.2 Grants Canyon Arroyo

Primary Design Objectives

- Lower Channel Inverts to reduce leveed sections, enhance conveyance capacity and enhance the ability for the channel to collect runoff from adjacent areas.
- Increase Conveyance Capacity through widening of the channel section and replacement of insufficient existing roadway crossing structures to reduce upstream water surface elevations.
- Limit the Negative Impacts of proposed channel improvements to adjacent private property.

Proposed Improvements Description

The proposed improvements to the Grants Canyon Arroyo are summarized in the tables at the end of Section 5 of this report and are shown on Figures 2-1 and 2-2 in Appendix Section 2. The proposed improvements begin at the confluence with the Rio San Jose

and extend to a point approximately 700 linear feet upstream of College Boulevard in Grants. The total length of this reach is approximately 1.70 miles. Shaping, widening, or a combination of widening and lowering of the channel bed is proposed for the entire reach.

Two relatively small drop structures have been proposed for the reach in order to hold grades above estimated existing or proposed sanitary sewer elevations. A 3 foot high drop has been proposed at the confluence with the Rio San Jose and a 2 foot high drop has been proposed at Roosevelt Avenue. If more detailed information indicates that the channel can be lowered above these locations, consideration should be given to the potential to eliminate the drop structures and improve the vertical relationship of the channel to adjacent land.

Full replacement of all three existing stream crossing structures located along the Grants Canyon Arroyo improvement reach is proposed.

Proposed channel bottom widths are 40 to 50 feet. The majority of the reach is proposed to have a bottom width of 50 feet. The segment between Roosevelt Avenue and College Boulevard is planned for a 40 foot bottom width. Except in very short constrained areas, the maximum side slopes are proposed to be 2:1, which is an improvement over the 1:1 to 2:1 side slopes that currently exist in the reach. In areas where flatter side slopes are found to be readily achievable, they should be incorporated in the detailed design.

Utility Constraints

There are several existing utilities that cross the channel corridor and will required consideration in detailed design and construction of channel improvements. There are costs associated with relocating dry utilities such as electric, communication, and gas lines and waterlines. However, the relocation of these types of utilities is generally relatively economical. Relocation of gravity flow utilities, such as sanitary sewers can represent much greater design challenges and costs.

There are three known sanitary sewer crossings of the Grants Canyon Arroyo within the reach proposed to be improved. The general locations of these crossings are shown on the profile exhibits in Appendix Section 2. Accurate vertical information was not available for these sewer crossings at the time of this study. General information regarding the depths of the crossings was obtained from utility personnel and was utilized in the concept plan development.

One of the sanitary sewer crossings is between the Rio San Jose and Washington Street. It is anticipated that this crossing may be relatively shallow below the bed of the existing channel and thus a drop structure has been proposed just upstream of the confluence with the river to help hold the existing bed grade. Another crossing is located between Roosevelt Avenue and College Boulevard. The channel bed is proposed to be lowered in this area in order to lower flood depth and reduce flood hazards to adjacent areas. The depth and horizontal location of these crossings need to be determined prior to final design to verify that the proposed bed lowering can be accommodated.

The third sanitary crossing occurs at Roosevelt Avenue. It is anticipated that this crossing, which flows from east to west, will need to be lowered to accommodate the proposed channel bed lowering at this location. The sanitary line appears to extend a considerable distance to the west in Roosevelt before it turns south and then bends back to parallel the west side of the Grants Canyon Arroyo. It is expected that the sanitary crossing can be lowered by reconstructing the outfall line to take a more direct path to the portion of the sewer that parallels the arroyo. This will need to be verified with accurate survey information and additional concept design, prior to detailed design of the channel improvement project. If improvements to utilities and the roadway in this area precede design of the channel improvements, this required sanitary sewer lowering should be incorporated in the design and construction.

A detailed utility survey should be performed prior to design of the proposed facilities and conflicts should be resolved.

Potential Excavation Constraints

Construction of the proposed improvements will require substantial excavation. Shallow bedrock or very poor soils could greatly complicate construction and increase construction costs. Exploratory geotechnical boring, sampling, and logging should be conducted throughout the channel corridor prior to detailed design to determine the types of materials that will be encountered.

Real Estate Constraints

Where practical to do so, the concept design has been configured to fit within existing public parcels or right-of-ways. In other areas, construction of adequate facilities is expected to require acquisition of easements or fee title to adjacent privately owned real estate.

Grading modifications are proposed for the channel segment between Roosevelt Avenue and College Boulevard to improve channel capacity and reduce flood hazards to adjacent properties. A portion of the channel is located on land controlled by the U.S. Forest Service. An agreement with the Forest Service will be needed to facilitate construction and maintenance of this segment of channel.

Freeboard

A primary goal of the concept design was to provide conveyance capacity for the 100-year future condition discharge within the main channel section with minimal leveed sections. Throughout most of the proposed improved channel, the proposed 100-year water surfaces are below the surface of land areas to minimize the flooding potential to those areas and to promote positive drainage to the channel. The hydraulic analysis indicates that over one foot of freeboard between the water surface and the high chord will be provided at the upstream side of all of the proposed and existing crossing structures with conveyance of the 100-year future flood. Bank freeboard, upstream of the crossing structures, will be determined in detailed design of the improvements.

4.2.3 Grants Downtown Area

Primary Design Objectives

- Lower Peak Runoff Rates impacting the High School Campus.
- Reduce the Amount of Runoff impacting the downtown portions of First, Second, and Roosevelt Corridors so that drainage can be managed in those corridors.
- Reduce the Amount of Runoff reaching the County Office Complex and downstream portions of the Civic Center Area.

Proposed Improvements Description

The proposed improvements are summarized in the table at the beginning of Appendix Section 3 of this report and are shown on Figure 3-1 in Appendix Section 3. The proposed improvements include six small detention ponds with storm sewer outfalls and a widened and paved open channel along the west side of Second Street.

As shown on Figure 3-1, two of the ponds are proposed to be located along the western side of the High School Campus to decrease the peak rates that impact the campus and help minimize the size of the channel proposed along the west side of Second Street. Two of the ponds are proposed to be located along the northern side of Roosevelt Avenue to decrease flood hazards in the Roosevelt Avenue area, facilitate collection and conveyance of runoff under Roosevelt Avenue, and minimize the size of the channel proposed along the west side of Second Street. The other two ponds are proposed to be located adjacent to Iron Avenue just upstream of the County Office Complex. The purpose of these two ponds is to collect and reduce peak flow rates from runoff that is generated in the steep watershed located north and west of the County Complex. Discharge from these ponds will be routed in storm sewers to the Rio San Jose.

Minor facilities will be required in upstream streets and adjacent neighborhoods to collected the runoff and direct it to the proposed ponds. The proposed open channel along the west side of Second Street will convey flows from the High School Campus and offsite watershed as well as runoff from the watershed located north of Roosevelt Avenue that is tributary to the low point in Roosevelt Avenue at near Second Street. The proposed concrete lined channel and five small bridges would replace the existing earth lined channel and pipe culvert street and driveway crossings. The proposed channel is expected to have a 10 foot bottom width, 2:1 side slopes and be approximately 4 feet deep. Flatter side slopes will be desirable if they can be achieved in detailed design of the channel.

Utility Constraints

It is expected that some dry utilities and water lines may conflict with some of the proposed storm sewer outfalls proposed with this project and may required relocation. Most of the proposed facilities are anticipated to be relatively shallow and thus are not expected to conflict with sanitary sewer lines unless the sewers are abnormally shallow. One or more existing sanitary sewer crossings of the channel proposed along the west side of Second Street may limit the depth of that facility. If the sewer crossings are found to be deeper than expected, the channel can potentially be deepened to lower flood elevations and improve capacity. A detailed utility survey should be performed prior to design of the proposed facilities and conflicts should be resolved.

Excavation Constraints

Construction of the proposed improvements will require substantial excavation. Shallow bedrock or very poor soils could greatly complicate construction and increase construction costs. Exploratory geotechnical boring, sampling, and logging should be conducted throughout the channel corridor prior to detailed design to determine the types of materials that will be encountered.

Real Estate Constraints

The proposed ponds and collection and conveyance systems will impact portions of the High School Campus, vacant land adjacent to the County Complex, and some privately owned real estate.

Freeboard

A primary goal of the concept design was to provide conveyance capacity for the 100-year future condition discharge throughout the planned system. Detention ponds should be designed to contain routed flow below the elevation of the emergency spillway crest. Pond embankments should be designed to provide a minimum of 1 foot of freeboard above the maximum water surface in the pond with the emergency spillway operating at design capacity.

For the proposed open channel along the west side of Second Street, it is expected that at least 1 foot of freeboard can be achieved in the 100-year flood. It is desirable that the channel invert be designed low enough that the 100-year water surface in the channel is lower than the adjacent top of curb in Second Street if possible. However, utility conflict may prevent that.

4.2.4 Milan North Street Channel

Primary Design Objectives

- Lower Channel Inverts to enhance conveyance capacity and enhance the ability for the channel to collect runoff from adjacent areas.
- Increase Conveyance Capacity through widening of the channel section and replacement of insufficient existing roadway crossing structures to reduce upstream water surface elevations and associated flood hazards to adjacent properties.
- Limit the Negative Impacts of proposed channel improvements to adjacent private property.

Proposed Improvements Description

The proposed improvements are included in the tables at the end of Section 5 of this report and are shown on Figure 1-2 in Appendix Section 1 of this report. The proposed improvements include widening and deepening the channel section between Santa Fe Avenue and the Rio San Jose to improve conveyance capacity and facilitate collection of runoff from adjacent areas. Six existing roadway culverts crossing the channel that have inadequate conveyance capacity are proposed to be replaced. Two existing driveways crossing the existing channel are expected to be removed.

The upper portion of the proposed channel is proposed to be lined with concrete, have a 6 foot bottom width and 2:1 side slopes. The lower portion of the channel is proposed to earth lined, have a 25 foot bottom width and 2:1 side slopes. The concrete lined portion is proposed to minimize impacts to adjacent developed lots as real estate appears to be constrained. The earthen portion is proposed for a segment that appears to have sufficient existing public right-of-way to accommodate construction of a wider channel section.

Utility Constraints

It is expected that some dry utilities and water lines may conflict with some of the proposed channel roadway crossings and may require relocation. Most of the proposed facilities are anticipated to be relatively shallow and thus are not expected to conflict with sanitary sewer lines unless the sewers are abnormally shallow. A detailed utility survey should be performed prior to design of the proposed facilities and conflicts should be resolved.

Excavation Constraints

Construction of the proposed improvements will require substantial excavation. Shallow bedrock or very poor soils could greatly complicate construction and increase construction costs. Exploratory geotechnical boring, sampling, and logging should be conducted throughout the channel corridor prior to detailed design to determine the types of materials that will be encountered.

Real Estate Constraints

The majority of the proposed project is expected to fit within existing public right-of-way but will have some impacts on some of the adjacent residential lots. At least two lots have driveways that cross the channel but also appear to have access from adjacent public streets on the west side of the channel. The proposed crossing structures will be much larger and more expensive than the existing culvert in order to provide the required conveyance capacity. Thus, it is not expected that it will be practical to maintain the existing driveways.

Freeboard

A primary goal of the concept design was to provide conveyance capacity for the 100-year future condition discharge throughout the planned channel system. Over 1 foot of freeboard is expected to be provided at the upstream side of the proposed roadway crossings of the channel in the 100-year flood and flood elevations are expected to be even with or below adjacent property to promote positive drainage to the channel and reduce flood hazards.

4.2.5 Other Projects

A drainage structure inventory was developed and presented in the Phase 1 report to identify existing drainage facilities located throughout the Grants and Milan areas. Limited information was available regarding the specific characteristics of the existing facilities. Preliminary recommendations for replacement structures were identified for drainage facilities where adequate information was available. These preliminary recommendations are intended to serve as a tool for understanding the magnitude of necessary drainage improvements and additional investigation and data collection is recommended prior to the final design of replacement structures. Preliminary replacement structure recommendations are included with an updated Drainage Structure Inventory the end of Appendix Section 3.

There are multiple other areas within the Study Area that have needs for drainage planning and improvements but are beyond the limited scope and resources available for the current study. The projects planned with the current study will improve major outfalls to facilitate better solutions to localized drainage problems. Drainage planning should continue, as funding becomes available, to find solutions for the localized problems.

5. Recommended Project Priorities

Recommended project priorities were established by the project consultant and are summarized in the tables at the end of Section 5 of this report. Project priorities were established separately for the City of Grants and Village of Milan. The following sections provide recommended priorities and the logic behind the consultant's recommended project order. Stakeholder input regarding the recommended project priorities is welcome. It is anticipated that some revision to the order of project priorities may occur prior to publishing the final draft of this report.

Consideration was given to the following in the prioritization process:

- Existing roadway safety concerns
- Magnitude of flood protection benefits provided, with some emphasis on frequent flooding
- Required construction sequence - some projects need downstream improvements in place to function or to facilitate construction
- Linkage to planned roadway projects

5.1 Recommended City of Grants Project Priorities

1. **College Boulevard Bridge and Adjacent Upstream Channel –** This roadway crossing over the Grants Canyon Arroyo provides the only paved access to a residential community. According to City personnel, the existing structure is overtopped with floodwater nearly every summer. The existing crossing exhibits significant degradation and appears to be at relatively high risk of partial or full collapse and/or washout. This presents a potential roadway safety concern. The existing crossing and channel are proposed to be replaced with a bridge and wider and deeper channel with 100-year flood conveyance capacity.

Ends of the existing College Boulevard culverts showing significant deterioration

2. **George Hanosh Boulevard Bridge and Adjacent Upstream Channel –** This roadway crossing over the Rio San Jose provides a very important link to the eastern portion of Grants. The existing culverts are very corroded and are allowing water to erode soil from around the outsides of the pipes. This condition puts the existing crossing at risk of full or partial collapse and/or washout. This presents a potential roadway safety concern. The existing structure and channel are proposed to be replaced by a bridge and wider channel with capacity to convey the 100-year flood.

Holes corroded in the culvert pipes under George Hanosh Boulevard

3. **First Street Bridge and Adjacent Upstream and Downstream Channel** – The downtown area currently lacks adequate drainage outfalls. The existing Rio San Jose invert is too high to allow adequate storm sewers from adjacent areas to be constructed to drain into the river. In addition, inadequate crossing structures such as the existing structure will raise floodwater depths upstream to a point that they overflow the banks to flood adjacent areas in large flow events. The existing structure also shows some signs of deterioration. This project is one of three in the downtown area proposed to improve capacity of the Rio San Jose and lower its invert to pave the way for providing better drainage of adjacent areas. The existing structure and channel are proposed to be replaced by a bridge and wider and deeper channel with capacity to convey the 100-year flood. At the date of publication of this Drainage Master Plan, the City was underway with the design of First Street from Santa Fe Avenue to Roosevelt Avenue. The project is expected to go to construction in the Spring 2012. It is recommended that this document be acknowledged in the Design Report associated with the First Street project.

4. **Second Street Bridge and Adjacent Upstream Channel and Two Pedestrian Bridges** – This is the second of the three proposed downtown Rio San Jose improvement projects (See Project 3 above) to lower the channel invert and increase conveyance capacity. It requires Project 3 to be constructed to function properly and facilitate construction. The existing structure also shows some signs of deterioration. The existing structure and channel are proposed to be replaced by a bridge and wider and deeper channel with capacity to convey the 100-year flood. At the date of publication of this Master Drainage Plan, the City was underway with the planning of Second Street between Santa Fe Avenue and Roosevelt Avenue. The City presently has Local Government Road Funds (LGRF) for a cooperative project. The City is encouraged to phase Second Street in such manner as to allow for the bridge replacement and associated storm drain to be completed.

5. **High Street Bridge, Drop Structure and Adjacent Upstream Channel** – This is the third of the three proposed downtown Rio San Jose improvement projects (See Projects 3 and 4 above) to lower the channel invert and increase conveyance capacity. It requires Project 4 to be constructed to function properly and facilitate construction. Analysis of the existing structure indicates that significant flow would overtop the roadway at this location and flood adjacent areas in even the 10-year flood. The existing structure and channel are proposed to be replaced by a bridge and wider and deeper channel with capacity to convey the 100-year flood. The lower channel inverts achieved with this project will facilitate construction of an adequate drainage system in adjacent High Street.

6. **Grants Downtown Area Improvements** – This proposed project consists of six detention ponds, several storm sewers, and a concrete lined channel that will collect and convey runoff that currently impacts the downtown portions of First, Second, and Roosevelt, as well as the County offices and adjacent structures. Conveyance facilities constructed with this project will discharge to the portion of the Rio San Jose that will be improved with Projects 3, 4, and 5. The proposed improvements are expected to collect, control, and convey the 100-year flood. This project will mitigate existing drainage problems in the downtown area and will help facilitate implementation of the Grants Main Street Master Plan.

7. **Washington Avenue Bridge and Adjacent Upstream Channel –** This roadway crossing over the Grants Canyon Arroyo provides an important east/west linkage in the City of Grants. Hydraulic analysis indicates that floodwater will be diverted through adjacent residential neighborhood areas in floods greater than the 10-year recurrence event, due to the inadequate capacity of the existing crossing structure. This diversion and resultant flooding has been documented in reports of historic floods. The existing crossing also exhibits some deterioration. The existing crossing and channel are proposed to be replaced with a bridge and wider and deeper channel with 100-year flood conveyance capacity.

8. **Roosevelt Avenue Bridge and Adjacent Upstream Channel –** This roadway crossing over the Grants Canyon Arroyo provides a very important primary east/west linkage in the City of Grants. Hydraulic analysis indicates that floodwater will be diverted through adjacent commercial areas in floods not much greater than the 10-year recurrence event, due to the inadequate capacity of the existing crossing structure. The existing crossing also exhibits some deterioration. The existing crossing and channel are proposed to be replaced with a bridge and wider and deeper channel with 100-year flood conveyance capacity.

9. **Anderman Street Bridge and Adjacent Upstream Channel** – Lowering the invert and widening this roadway crossing over the Rio San Jose as well as

widening the upstream channel will further improve the capacity of the Rio San Jose and reduce flood hazards in the Grants Downtown Area. The existing crossing structure has inadequate capacity to pass even the 10-year recurrence flood. The existing structure also shows some signs of deterioration. The existing structure and channel are proposed to be replaced by a bridge and wider and deeper channel with capacity to convey the 100-year flood.

10. **Expansion of McBride Road Box Culvert and Adjacent Upstream Channel** – This project consists of adding additional cells to the existing box culvert crossing of the Rio San Jose and widening the upstream channel to increase capacity and lower flood depths in the channel. The existing crossing structure has inadequate capacity for the 100-year flood. The existing structure appears to be relatively sound. Thus, expansion instead of replacement is proposed. It is expected that McBride Road will gain in importance to Grants as further development on the east side of the City occurs.

11. **Expansion of the Hydraulic Opening at the Nimitz Drive Bridge and Adjacent Upstream Channel** – This project consists of constructing steepened abutment slope paving and vertical walled channel below the Nimitz Drive Bridge. The project also included deepening and widening the upstream channel to increase capacity and lower flood depths in the channel. The existing crossing structure was designed to convey the 100-year regulatory flood as reported in the effective FEMA Flood Insurance Rate Study. The current analysis indicates that the 100-year flood will have higher flow rates. Current hydraulic analysis indicates that the existing structure has inadequate capacity to the pass the 100-year flood without roadway overtopping occurring north of the bridge.

    The existing structure has recently been replaced and is in sound structural condition. Thus, modification of the channel section below the bridge rather than replacement of the structure is proposed. The planned modification will lower flood water depths upstream of the bridge and will reduce flood hazards for the residential neighborhood located southwest of the bridge.

12. **Expansion of the Hydraulic Opening at the Southeast Grants Railroad Bridge and Adjacent Upstream Channel** – This projects consists of constructing a nearly vertical walled, widened channel below the existing railroad bridge to increase conveyance capacity and decrease floodwater depths that ripple up the channel and affect upstream crossings and channel capacity. Little information is known about the existing structure. Full replacement of the structure may be required depending on type and condition of the existing structure foundation, and the age and condition of the structure. The planned modification will lower flood water depths upstream of the bridge and will reduce flood hazards for property adjacent to the upstream channel.

13. **Expansion of the Channel Between the Grants Railroad Bridge @ 5th Street and El Morro Road** – This project consists of deepening and widening the Rio San Jose channel though this reach to increase capacity and decrease floodwater depths in order to reduce flood hazards to adjacent properties. The modified channel is proposed to have capacity to convey the 100-year recurrence flood.

5.2 Recommended Village of Milan Project Priorities

The recommendations for project priorities in the Village of Milan follow a consistent downstream to upstream pattern. This is due the fact the channel invert is proposed to be lowered through the Village and in most cases will require the downstream section invert to be lowered in order to have positive drainage. In addition, improved downstream capacity will be required in order to achieve full benefit in increased conveyance capacity from any of the individual projects.

1. **Expansion of the Rio San Jose Channel Between the Zuni Canyon Arroyo Confluence and the Milan Street Bridge** – This project consists of deepening and widening the channel though this reach to increase capacity and decrease floodwater depths to reduce flood hazards to adjacent properties and decrease backwater that negatively influences upstream capacity. The modified channel is proposed to have capacity to convey the 100-year recurrence flood.

2. **North Street Channel Improvements –** This project will replace existing roadway crossing structures and expand the channel section of this important north/south drainage conveyance that serves as a drainage outfall for a portion of Milan Heights and the portion of Milan located around the Village offices. The existing structures and channel are proposed to be replaced by larger structures with lower inverts and wider channel sections with capacity to convey the 100-year flood.

3. **Milan Bridge and Adjacent Upstream Channel** –The existing bridge and Rio San Jose channel are proposed to be replaced by a longer bridge and wider and deeper channel with capacity to convey the 100-year flood below the grade of the adjacent area to mitigate flood hazards.

4. **Airport Road Bridge and Adjacent Upstream Channel** –The existing box culvert and Rio San Jose channel are proposed to be replaced by a bridge and wider and deeper channel with capacity to convey the 100-year flood below the grade of the adjacent area to mitigate flood hazards.

5. **Clay Street Bridge and Adjacent Upstream Channel** –The existing bridge and Rio San Jose channel are proposed to be replaced by a longer bridge and wider and deeper channel with capacity to convey the 100-year flood below the grade of the adjacent area to mitigate flood hazards.

6. **Sand Street Bridge and Upstream Channel to Highway 605** –The existing box culvert at Sand Street and upstream Rio San Jose channel are proposed to be replaced by a longer bridge and wider and deeper channel with capacity to convey the 100-year flood below the grade of the adjacent area. A 2 foot high drop structure is proposed just downstream of the existing Santa Fe Avenue box culvert. The existing Santa Fe Avenue culvert as well as the existing railroad bridge are to remain with widened channel sections upstream and downstream. This project will improve the drainage outfall condition from the southwestern portion of Milan Heights.

7. **Highway 605 Bridge and Adjacent Upstream Channel** –The existing structure and channel are proposed to be replaced by a longer bridge and wider channel with capacity to convey the 100-year flood to lower upstream flood depths and flood hazards to adjacent properties.

Summary of Proposed Major Drainage Improvements for the Rio San Jose in Grants

Channel Reach		Included Structures	Crossing Structure Description	Channel Description	Estimated Cost of Improvements	Recommended Priority
Downstream Limits	Upstream Limits					
~350 ft Downstream of Railroad Bridge 4250	McBride Road 7135	Railroad Bridge	Existing: Railroad bridge structure Proposed: Expand existing bridge hydraulic opening with near vertical abutments	Existing: 40 ft typical bottom width, 1:1 to 2:1 side slopes Proposed: 0.08% slope, 70 ft bottom width, 2:1 side slopes	$1.82 M	12
McBride Road 7135	George Hanosh Boulevard 8820	McBride Road Concrete Box Culverts 2 ft Drop Structure	Existing: Four cell CBC - 8 ft rise by 10 ft span Proposed: Add three cells - 8 ft rise by 10 ft span	Existing: 40 ft typical bottom width, 1:1 to 2:1 side slopes Proposed: 0.05% slope, 50 ft bottom width, 2:1 side slopes	$0.77 M	10
George Hanosh Boulevard 8820	Nimitz Drive 11290	George Hanosh Boulevard Bridge	Existing: Three 72" CMP culverts Proposed: 90 ft long by 44 ft wide bridge structure	Existing: 40 ft typical bottom width, 1:1 to 2:1 side slopes Proposed: 0.15% slope, 40 ft bottom width, 2:1 side slopes	$1.52 M	2
Nimitz Drive 11290	Anderman Street 14400	Nimitz Drive Bridge	Existing: Bridge Structure with 14 ft channel bottom width and 2:1 side slopes Proposed: Lower channel invert 4 ft and adjust channel side slopes to 1.5 to 1	Existing: 30 ft typical bottom width, 1:1 to 2:1 side slopes Proposed: 0.18% slope, 40 ft bottom width, 2:1 side slopes	$0.46 M	11*
Anderman Street 14400	First Street 15675	Anderman Street Bridge	Existing: Three - 6 ft rise by 9 ft span CM Arches Proposed: 80 ft long by 44 ft wide bridge structure	Existing: Varies 10 to 30 ft bottom width, 1:1 to 2:1 side slopes Proposed: 0.20% slope, 20 ft bottom width, 2:1 side slopes	$1.45 M	9
First Street 15675	Second Street 16300	First Street Bridge	Existing: Two - 6 ft rise by 9 ft span CM Arches Proposed: 80 ft long by 44 ft wide bridge structure	Existing: Varies 20 to 30 ft bottom width, 1:1 to 2:1 side slopes Proposed: 0.20% slope, 20 ft bottom width, 2:1 side slopes	$1.32 M	3
Second Street 16300	Downstream of City Park 17500	Second Street Bridge	Existing: Two - 6 ft rise by 9 ft span CM Arches Proposed: 80 ft long by 44 ft wide bridge structure	Existing: Varies 10 to 30 ft bottom width, 1:1 to 2:1 side slopes Proposed: 0.46% slope, 30 ft bottom width, 2:1 side slopes	$2.26 M	4*
Downstream of City Park 17500	High Street 18580	Pedestrian Bridges	Existing: Two pedestrian bridges Proposed: Two pedestrian bridges	Existing: Varies 10 to 20 ft bottom width, 1:1 to 2:1 side slopes Proposed: 0.46% slope, 20 ft bottom width, 2:1 side slopes		4*
High Street 18580	Santa Fe Avenue 19000	High Street Bridge 3 ft Drop Structure	Existing: Three cell CBC - 4 ft rise by 10 ft span Proposed: 70 ft long by 52 ft wide bridge structure	Existing: 20 ft typical bottom width, 1:1 to 2:1 side slopes Proposed: 0.63% slope, 30 ft bottom width, 2:1 side slopes	$1.54 M	5*
Santa Fe Avenue 19000	Railroad Bridge at 5th Street 19505	Santa Fe Bridge	Existing: Bridge structure Proposed: Existing structure to remain	Existing: Varies 20 to 50 ft bottom width, 1:1 to 2:1 side slopes Proposed: 0.03% slope, 40 ft bottom width (min.), 2:1 side slopes		5*
Railroad Bridge at 5th Street 19505	El Morro Road 25175	Railroad Bridge at 5th Street	Existing: Railroad bridge structure with concrete barrier wall and channel Proposed: Existing structure to remain	Existing: Varies 10 to 80 ft bottom width, 1:1 to 2:1 side slopes Proposed: 0.47% slope, 40 ft bottom width (min.), 2:1 side slopes	$0.49 M	13
El Morro Road 25175	Confluence with Zuni Canyon 31000	El Morro Road Concrete Box Culverts	Existing: Three cell CBC - 10 ft rise by 10 ft span Proposed: Existing structure to remain	Existing: Varies 5 to 40 ft bottom width, 1:1 to 3:1 side slopes Proposed: Existing channel to remain	N/A	N/A
Northwest of Second Street 16200	North of High Street 18580	Grants Downtown Area Local Drainage Improvements	Existing: Culvert crossings along existing 2nd Street drainage channel Proposed: Five slab bridge structures across proposed 2nd Street drainage channel	Existing: Varies ~4 to 8 ft bottom width, 1:1 to 3:1 side slopes, less than 0.10% Proposed: ~1800 LF concrete channel with 10 ft bottom width, 2:1 side slopes, 0.10%, concrete lined, six detention ponds and various drainage facilities proposed to mitigate peak discharge upstream of the downtown area	$2.77 M	6

* Multiple improvement projects combined into a single priority due to interdependence or proximity of drainage improvements.

Summary of Proposed Major Drainage Improvements for Grants Canyon Arroyo

Channel Reach		Included Structures	Crossing Structure Description	Channel Description	Estimated Cost of Improvements	Recommended Priority
Downstream Limits	Upstream Limits					
Confluence with Rio San Jose 0	Washington Avenue 2200	3 ft Drop Structure	Existing: N/A Proposed: N/A	Existing: Varies 35 to 50 ft bottom width, 1:1 to 2:1 side slopes Proposed: Match existing slope, 50 ft bottom width, 2:1 side slopes	$0.37 M	11*
Washington Avenue 2200	~980 ft Downstream of Roosevelt Ave. 4000	Washington Avenue Bridge	Existing: Four - 7 ft rise by 9 ft span CM Arches Proposed: 90 ft long by 44 ft wide bridge structure	Existing: 50 ft typical bottom width, 1:1 to 2:1 side slopes Proposed: 0.41% slope, 50 ft bottom width, 2:1 side slopes	$1.47 M	7*
~ 980 ft Downstream of Roosevelt Ave. 4000	Roosevelt Avenue 4980	N/A	Existing: N/A Proposed: N/A	Existing: 50 ft typical bottom width, 1:1 to 2:1 side slopes Proposed: 0.66% slope, 50 ft bottom width, 2:1 side slopes		7*
Roosevelt Avenue 4980	~300 Downstream of College Blvd. 8000	Roosevelt Avenue Bridge 2 ft Drop Structure	Existing: Four - 6.5 ft rise by 8 ft span CM Arches Proposed: 90 ft long by 44 ft wide bridge structure	Existing: Varies 5 to 30 ft bottom width, 1:1 to 2:1 side slopes Proposed: 0.76% slope, 40 ft bottom width, 2:1 side slopes	$1.77 M	8
~300 ft Downstream of College Blvd. 8000	College Boulevard 8300	N/A	Existing: N/A Proposed: N/A	Existing: 30 ft typical bottom width, 1:1 to 2:1 side slopes Proposed: 0.76% slope, 50 ft bottom width, 2:1 side slopes	$1.25 M	1*
College Boulevard 8300	~700 ft Upstream of College Blvd. 9000	College Boulevard Bridge	Existing: Three - 54" CMP culverts Proposed: 90 ft long by 44 ft wide bridge structure	Existing: Varies 20 to 30 ft bottom width, 1:1 to 2:1 side slopes Proposed: 0.98% slope, 50 ft bottom width, 2:1 side slopes		1*

* Multiple improvement projects combined into a single priority due to interdependence or proximity of drainage improvements.

Summary of Proposed Major Drainage Improvements for the Rio San Jose in Milan

Channel Reach		Included Structures	Crossing Structure Description	Channel Description	Estimated Cost of Improvements	Recommended Priority
Downstream Limits	Upstream Limits					
Confluence with Zuni Canyon 31000	Milan Street 34990	N/A	Existing: N/A Proposed: N/A	Existing: Varies 15 to 50 ft bottom width, 1:1 to 2:1 side slopes Proposed: 0.16% slope, 60 ft bottom width, 2:1 side slopes	$0.84 M	1
Rio San Jose 34400	Santa Fe Avenue 34400	North Street Channel	Existing: Culvert crossing structures Proposed: Six slab bridge structures over channel	Existing: Varies ~6 to 15 ft bottom width, 2:1 to 3:1 side slopes, less than 0.20% slope Proposed: ~1,000 LF concrete channel with 6 ft bottom width, 2:1 side slopes, 0.20% slope and ~850 LF earth channel with 25 ft bottom width, 2:1 side slopes, 0.20% slope	$1.65 M	2
Milan Street 34990	Airport Road 36118	Milan Bridge	Existing: Bridge structure Proposed: 90 ft long by 44 ft wide bridge structure	Existing: Varies 10 to 30 ft bottom width, 1:1 to 2:1 side slopes Proposed: 0.16% slope, 50 ft bottom width, 2:1 side slopes	$1.84 M	3
Airport Road 36118	Clay Street 37150	Airport Road Bridge	Existing: Two cell CBC - 6 ft rise by 12.5 ft span Proposed: 90 ft long by 68 ft wide bridge structure	Existing: Varies 10 to 20 ft bottom width, 1:1 to 2:1 side slopes Proposed: 0.12% slope, 50 ft bottom width, 2:1 side slopes	$2.37 M	4
Clay Street 37150	Sand Street 37980	Clay Street bridge	Existing: Bridge structure Proposed: 90 ft long by 44 ft wide bridge structure	Existing: 20 ft typical bottom width, 1:1 to 2:1 side slopes Proposed: 0.12% slope, 50 ft bottom width, 2:1 side slopes	$1.67 M	5
Sand Street 37980	~3050 ft Downstream of Santa Fe Ave. 37900	Sand Street Bridge	Existing: Two cell CBC - 5 ft rise by 12.5 ft span Proposed: 90 ft long by 44 ft wide bridge structure	Existing: Varies 15 to 30 ft bottom width, 1:1 to 2:1 side slopes Proposed: 0.12% slope, 50 ft bottom width, 2:1 side slopes	$2.07 M	6*
~3050 ft Downstream of Santa Fe Ave. 37900	~60 ft Downstream of Santa Fe Ave. 40890	N/A	Existing: N/A Proposed: N/A	Existing: Varies 10 to 35 ft bottom width, 1:1 to 2:1 side slopes Proposed: 0.27% slope, 35 ft bottom width, 2:1 side slopes		6*
~60 ft Downstream of Santa Fe Ave. 40890	Santa Fe Avenue 40950	2.5 ft Drop Structure	Existing: N/A Proposed: N/A	Existing: 20 ft typical bottom width, 1:1 to 2:1 side slopes Proposed: 0.94% slope, 50 ft bottom width, 2:1 side slopes		6*
Santa Fe Avenue 40950	Railroad Bridge 41190	Santa Fe Concrete Box Culverts	Existing: Eight cell CBC - 5 ft rise by 10 ft span Proposed: N/A	Existing: Varies 50 to 80 ft bottom width, 3:1 to 4:1 side slopes Proposed: 0.64% slope, 80 ft bottom width, 2:1 side slopes		6*
Railroad Bridge 41190	Highway 605 42375	Railroad Bridge	Existing: Railroad bridge structure Proposed: N/A	Existing: Varies 20 to 30 ft bottom width, 1:1 to 2:1 side slopes Proposed: 0.10% slope, 50 ft bottom width, 2:1 side slopes		6*
Highway 605 42375	Upstream of Highway 605 43000	Highway 605 Bridge	Existing: Bridge structure Proposed: 90 ft long by 68 ft wide bridge structure	Existing: 10 ft typical bottom width, 1:1 to 2:1 side slopes Proposed: 0.08% slope, 50 ft bottom width, 2:1 side slopes	$1.87 M	7

* Multiple improvement projects combined into a single priority due to interdependence or proximity of drainage improvements.

6. Maintenance

Existing and proposed storm sewer systems, culverts, detention ponds, and channels will require regular inspections and maintenance in order to provide the intended flood hazard mitigation. In addition to regular inspections and maintenance, inspections should be conducted after every significant flood event and maintenance should be done if problems are discovered.

The most frequent drainage maintenance expected within the Study Area, is cleanup and removal of sediment from drainage inlets, storm sewers, culverts, roadside ditches detention ponds and major channels. This removal of sediment is essential in order to maintain the required capacity in the facilities. Other capacity related maintenance activities may include clearing excess woody vegetation from open ditches and channels.

Some portions of the existing and proposed channel improvements include elevated, constructed banks to contain channel flow and protect adjacent areas from flooding. These sections should be inspected regularly and repaired promptly if problems with erosion or settling become apparent. These elevated sections should also be kept free of large woody vegetation which could degrade the water-tight integrity of the embankments.

Maintenance activities in the major channels and other areas that may be considered "Waters of the United States" should be coordinated with the U.S. Army Corps of Engineers (USACE). Section 404 Permits may be required for some maintenance activities.

7. Limitations on Development in the Floodplain

The City of Grants and Village of Milan have significant areas located within FEMA regulatory floodplains. The general locations of these regulatory floodplains are shown on Figure 1-2 of the Phase 1 report. Specific locations of the FEMA regulatory floodplain boundaries are shown on the effective FEMA Flood Insurance Rate Maps for Cibola County and Incorporated Areas. At a minimum, development or redevelopment within the FEMA regulatory floodplains must meet the requirements of the National Flood Insurance Program (NFIP).

Development proposed within regulatory floodplains should be reviewed by the City and Village for compliance with local ordinances and FEMA NFIP requirements through a floodplain development permit process. Permit applications for activities that will change grades or block areas of conveyance or storage in the floodplain should be accompanied with a supporting engineering analysis and certification by a professional engineer that the proposed development complies with the floodplain management regulations.

As major drainage improvement projects are completed and the physical floodplain is reduced, consideration can be given to requesting that the FEMA regulatory floodplain be adjusted to match the revised conditions through a letter of map revision (LOMR) process.

8. Summary and Recommendations

The primary goals of Phase 2 of the project as documented by this report included the following:

- Develop Drainage Improvement Concepts to mitigate major flooding problems in the Study Area.
- Evaluate Drainage Improvement Concepts
- Identify Drainage Improvement Concepts to be carried forward.

This report contains discussion of alternatives considered but rejected and some of the main reasons for rejecting the alternatives. The rejected alternatives included: by-pass channels for diverting flow from the major channels, large detention ponds to control runoff from areas upstream of Grants and Milan, and do nothing but increased maintenance.

In Phase 1 of this project, the study team identified that the primary effort in working toward improving the drainage systems and reducing flood hazards in the Study Area should be focused on the major outfall channels. If possible, the capacity of the channels and associated crossing structures should be increased to match or exceed the peak runoff rates of the 100-year frequency event. Inverts of the channels should be lowered to provide adequate outfalls for adjacent areas and reduce or eliminate leveed sections to the extent practical. If adequate capacity with lowered channel inverts in the core channels can be achieved, hundreds of properties can be removed from the regulatory floodplain and solutions to many of the more localized drainage problems will become much more effective and achievable.

Based on the above, concepts for recommended improvements to the Rio San Jose, Grant Canyon Arroyo, and North Street Channel in Milan were developed and analyzed. In addition, a concept for recommended drainage improvements for a portion of the Grants Downtown Area were developed and analyzed, to help facilitate planning for improvements to First Street, Second Street, and Roosevelt Avenue. These recommended improvement concepts are presented in this report along with

approximate estimated construction costs and hydraulic analysis of the proposed facilities.

The recommended improvements were divided into smaller projects which have estimated construction costs ranging from 0.37 to 3.12 million dollars. These projects were then prioritized based on consideration of:

- Existing roadway safety concerns
- Magnitude of flood protection benefits provided, with some emphasis on frequent flooding
- Required construction sequence - some projects need downstream improvement in place to function or to facilitate construction
- Linkage to planned roadway projects

The consultant's recommendations for prioritization and the logic behind the recommended project order are contained in this report. Combined costs for the proposed projects are summarized in the following table.

Summary of Cost Estimates	
Rio San Jose Improvements in Grants	$11.58 M
Rio San Jose Improvements in Milan	$10.64 M
Grants Canyon Arroyo Improvements	$4.84 M
Grants Downtown Area Improvements	$2.77 M
North Street Channel Improvements in Milan	$1.65 M

This study has identified flooding problems and quantified peak flow rates and volumes associated with the 10 and 100-year recurrence events. This study has also proposed solutions to mitigate the flooding problems. It is hoped that through cooperative efforts between the stakeholders, funding can be secured to design and construct the proposed improvements.

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Appendix Section 1-Rio San Jose Proposed Improvements

Figures	Description
	Rio San Jose Concept Cost Estimate - Grants
	Rio San Jose Concept Cost Estimate - Milan
1-1	Proposed Major Drainage Improvements and Rio San Jose HEC-RAS Sections, Sta 435+00 to 383+00
1-2	Proposed Major Drainage Improvements and Rio San Jose HEC-RAS Sections, Sta 383+00 to 319+00
1-3	Proposed Major Drainage Improvements and Rio San Jose HEC-RAS Sections, Sta 319+00 to 253+00
1-4	Proposed Major Drainage Improvements and Rio San Jose HEC-RAS Sections, Sta 253+00 to 177+00
1-5	Proposed Major Drainage Improvements and Rio San Jose HEC-RAS Sections, Sta 177+00 to 131+00
1-6	Proposed Major Drainage Improvements and Rio San Jose HEC-RAS Sections, Sta 131+00 to 74+50
1-7	Proposed Major Drainage Improvements and Rio San Jose HEC-RAS Sections, Sta 74+50 to 10+00
	HEC-RAS Profile Summary Table, Rio San Jose
	HEC-RAS Bridge Summary Table, Rio San Jose
	HEC-RAS Culvert Summary Table, Rio San Jose
	HEC-RAS Profile Exhibits, Rio San Jose
	HEC-RAS Cross Section Plots, Rio San Jose

Rio San Jose Concept Cost Estimate - Grants

Existing Railroad Bridge to McBride Road

PROPOSED IMPROVEMENTS	DESCRIPTION	UNIT	QUANTITY	COST per UNIT	ESTIMATED COST
Excavation and Embankment	Earthwork excavation for construction of proposed channel section	CU. YARD	35,000	$6	$210,000
Railroad Bridge Modification	Expand existing bridge structure to provide additional capacity through railroad embankment	LUMP SUM	1	$1,000,000	$1,000,000
Bridge Scour and Erosion Protection	Riprap or concrete channel bank lining	LUMP SUM	1	$50,000	$50,000
Land Acquisition	Acquire ROW and easements necessary to construct drainage channel. Cost based on $20,000 per acre	ACRES	5.9	$20,000	$118,000
Environmental Permitting	USACE Section 404 permitting and wetland mitigation	LUMP SUM	1	$20,000	$20,000

SUBTOTAL:	$1,398,000
30% CONTINGENCY:	$419,400
TOTAL:	**$1,817,400**

McBride Road to George Hanosh Boulevard including McBride Road Box Culvert Expansion

PROPOSED IMPROVEMENTS	DESCRIPTION	UNIT	QUANTITY	COST per UNIT	ESTIMATED COST
Excavation and Embankment	Earthwork excavation for construction of proposed channel section	CU. YARD	12,000	$6	$72,000
Concrete Box Culvert Expansion	Based on $788/LF with three cells each having a length of 60 ft	LUMP SUM	1	$142,000	$142,000
Concrete Wingwalls	Wingwalls upstream and downstream on the side of the CBC that is expanded	LUMP SUM	1	$20,000	$20,000
CBC Scour and Erosion Protection	Riprap bank protection	LUMP SUM	1	$20,000	$20,000
Grouted Boulder Drop Structure	2 ft drop structure 120 ft wide x 54 ft long	SQ. YARD	720	$200	$144,000
Removal of Existing Structure	Removal of existing wingwalls on the west side of the concrete box culvert	LUMP SUM	1	$10,000	$10,000
Removal of Existing Roadway	Removal of existing roadway for 200 ft east, 100 ft west of the existing box culvert including 60 ft of existing roadway above the box culvert, 44' width x 360' length	SQ. YARD	1,760	$10	$17,600
Roadway Construction	44' width x 360' length	SQ. YARD	1,760	$40	$70,400
Land Acquisition	Acquire ROW and easements necessary to construct drainage channel. Cost based on $20,000 per acre	ACRES	3.6	$20,000	$72,000
Environmental Permitting	USACE Section 404 permitting and wetland mitigation	LUMP SUM	1	$20,000	$20,000

SUBTOTAL:	$588,000
30% CONTINGENCY:	$176,400
TOTAL:	**$764,400**

George Hannosh Boulevard to Nimitz Drive including George Hannosh Boulevard Bridge

PROPOSED IMPROVEMENTS	DESCRIPTION	UNIT	QUANTITY	COST per UNIT	ESTIMATED COST
Excavation and Embankment	Earthwork excavation for construction of proposed channel section	CU. YARD	28,000	$6	$168,000
Low Rise Bridge	90' Length x 44' width	SQ. FT.	3,960	$150	$594,000
Bridge Approach Slabs	2-44' width x 15' length	SQ. FT.	1,320	$120	$158,400
Concrete Wingwalls	Wingwalls upstream and downstream of bridges	LUMP SUM	1	$50,000	$50,000
Bridge Scour and Erosion Protection	Riprap or concrete channel bank lining	LUMP SUM	1	$50,000	$50,000
Removal of Existing Crossing Structure	Removal of existing culvert structure and roadway paving	LUMP SUM	1	$10,000	$10,000
Removal of Existing Roadway	Removal of existing roadway for 120' each side of the structure, 32' existing width x 240' length	SQ. YARD	840	$10	$8,400
Roadway Construction	44' width x 210' length	SQ. YARD	1,320	$40	$52,800
Utility Relocation	Misc. utility relocation associated with construction of new crossing structure and channel segment	LUMP SUM	1	$10,000	$10,000
Land Acquisition	Acquire ROW and easements necessary to construct drainage channel. Cost based on $20,000 per acre	ACRES	2.10	$20,000	$42,000
Environmental Permitting	USACE Section 404 permitting and wetland mitigation	LUMP SUM	1	$20,000	$20,000

SUBTOTAL:	$1,163,600
30% CONTINGENCY:	$349,080
TOTAL:	**$1,512,680**

Rio San Jose Concept Cost Estimate - Grants

Nimitz Drive to Anderman Street including Channel Expansion through the Nimitz Bridge

PROPOSED IMPROVEMENTS	DESCRIPTION	UNIT	QUANTITY	COST per UNIT	ESTIMATED COST
Excavation and Embankment	Earthwork excavation for construction of proposed channel section	CU. YARD	32,000	$6	$192,000
Reinforced Concrete Channel Lining	Retaining wall and 8" thick channel lining for approximately 75 ft of channel	CU. YARD	150	$500	$75,000
Waterline Realignment and Lowering	Realign 6" water line to upstream side of bridge and provide lowering to below channel invert, concrete encasement across channel	LUMP SUM	1	$20,000	$20,000
Removal and Replacement of Roadway	Roadway repair to accommodate water line realignment and lowering	SQ. YARD	60	$50	$3,000
Removal of Existing Reinforced Concrete Channel Lining and Concrete Water Line Encasement	Removal and disposal of existing channel lining from the side slopes and bottom of the channel under the bridge. Removal and disposal of existing water line and encasement under the channel to allow lowering of channel invert.	SQ. YARD	470	$20	$9,400
Remove and Reinstall Wire Enclosed Riprap	Remove existing wire enclosed riprap aprons upstream and downstream of the bridge and use in the installation of new wire enclosed riprap aprons	CU. YARD	75	$150	$11,250
Land Acquisition	Acquire ROW and easements necessary to construct drainage channel. Cost based on $20,000 per acre	ACRES	0.51	$20,000	$10,200
Environmental Permitting	USACE Section 404 permitting and wetland mitigation	LUMP SUM	1	$30,000	$30,000

SUBTOTAL:	$350,850
30% CONTINGENCY:	$105,255
TOTAL:	**$456,105**

Anderman Street to First Street including Anderman Street Bridge

PROPOSED IMPROVEMENTS	DESCRIPTION	UNIT	QUANTITY	COST per UNIT	ESTIMATED COST
Excavation and Embankment	Earthwork excavation for construction of proposed channel section	CU. YARD	3,000	$6	$18,000
Excavation and Export	Earthwork excavation for construction of proposed channel section and export of excess excavated material	CU. YARD	8,000	$12	$96,000
Low Rise Bridge	70' Length x 44' width	SQ. FT.	3,080	$150	$462,000
Bridge Approach Slabs	2-44' width x 15' length	SQ. FT.	1,320	$120	$158,400
Concrete Wingwalls	Wingwalls upstream and downstream of bridges	LUMP SUM	1	$50,000	$50,000
Bridge Scour and Erosion Protection	Riprap or concrete channel bank lining	LUMP SUM	1	$50,000	$50,000
Removal of Existing Crossing Structure	Removal of existing culvert structure and roadway paving	LUMP SUM	1	$20,000	$20,000
Removal of Existing Roadway	Removal of existing roadway for 100' each side of the structure, 46' existing width x 200' length	SQ. YARD	1,030	$10	$10,300
Roadway Construction	44' width x 170' length	SQ. YARD	840	$40	$33,600
Utility Relocation	Misc. utility relocation associated with construction of new crossing structure and channel segment	LUMP SUM	1	$10,000	$10,000
Land Acquisition	Acquire ROW and easements necessary to construct drainage channel. Cost based on $3 per sq. ft	ACRES	1.3	$130,680	$169,884
Environmental Permitting	USACE Section 404 permitting and wetland mitigation	LUMP SUM	1	$30,000	$30,000

SUBTOTAL:	$1,108,184
30% CONTINGENCY:	$332,455
TOTAL:	**$1,440,639**

First Street to Second Street including First Street Bridge

PROPOSED IMPROVEMENTS	DESCRIPTION	UNIT	QUANTITY	COST per UNIT	ESTIMATED COST
Excavation and Export	Earthwork excavation for construction of proposed channel section and export of excess excavated material	CU. YARD	9,000	$12	$108,000
Low Rise Bridge	80' Length x 44' width	SQ. FT.	3,520	$150	$528,000
Bridge Approach Slabs	2-44' width x 15' length	SQ. FT.	1,320	$120	$158,400
Concrete Wingwalls	Wingwalls upstream and downstream of bridges	LUMP SUM	1	$50,000	$50,000
Bridge Scour and Erosion Protection	Riprap or concrete channel bank lining	LUMP SUM	1	$50,000	$50,000
Removal of Existing Crossing Structure	Removal of existing culvert structure and roadway paving	LUMP SUM	1	$20,000	$20,000
Removal of Existing Roadway	Removal of existing roadway for 100' each side of the structure, 46' existing width x 200' length	SQ. YARD	800	$10	$8,000
Roadway Construction	44' width x 170' length	SQ. YARD	840	$40	$33,600
Utility Relocation	Misc. utility relocation associated with construction of new crossing structure and channel segment	LUMP SUM	1	$10,000	$10,000
Land Acquisition	Acquire ROW and easements necessary to construct drainage channel. Cost based on $3 per sq. ft	ACRES	0.1	$130,680	$13,068
Environmental Permitting	USACE Section 404 permitting and wetland mitigation	LUMP SUM	1	$30,000	$30,000

SUBTOTAL:	$1,009,068
30% CONTINGENCY:	$302,720
TOTAL:	**$1,311,788**

Rio San Jose Concept Cost Estimate - Grants

Second Street to High Street including Second Street Bridge

PROPOSED IMPROVEMENTS	DESCRIPTION	UNIT	QUANTITY	COST per UNIT	ESTIMATED COST
Excavation and Embankment	Earthwork excavation for construction of proposed channel section	CU. YARD	2,000	$6	$12,000
Excavation and Export	Earthwork excavation for construction of proposed channel section and export of excess excavated material	CU. YARD	27,000	$12	$324,000
Low Rise Bridge	80' Length x 44' width	SQ. FT.	3,520	$150	$528,000
Bridge Approach Slabs	2-44' width x 15' length	SQ. FT.	1,320	$120	$158,400
Concrete Wingwalls	Wingwalls upstream and downstream of bridges	LUMP SUM	1	$50,000	$50,000
Bridge Scour and Erosion Protection	Riprap or concrete channel bank lining	LUMP SUM	1	$50,000	$50,000
Park Area Reconstruction	Misc. reconstruction of sidewalks, trails, and other features affected by the realignment of the channel	LUMP SUM	1	$20,000	$20,000
Pedestrian Bridge	Pedestrian bridges across the Rio San Jose adjacent to the park area, 60 ft span by 8 feet wide	EACH	2	$110,000	$220,000
Removal of Existing Crossing Structure	Removal of existing culvert structure and roadway paving	LUMP SUM	1	$20,000	$20,000
Removal of Existing Roadway	Removal of existing roadway for 100' each side of the structure, 46' existing width x 200' length	SQ. YARD	800	$10	$8,000
Roadway Construction	44' width x 170' length	SQ. YARD	840	$40	$33,600
Utility Relocation	Misc. utility relocation associated with construction of new crossing structure and channel segment	LUMP SUM	1	$10,000	$10,000
Sanitary Sewer Lift Station	Sanitary lift station for 8" line to cross Rio San Jose	LUMP SUM	1	$150,000	$150,000
Land Acquisition	Acquire ROW and easements necessary to construct drainage channel. Cost based on $3 per sq. ft	ACRES	0.9	$130,680	$117,612
Environmental Permitting	USACE Section 404 permitting and wetland mitigation	LUMP SUM	1	$30,000	$30,000

SUBTOTAL:	$1,731,612
30% CONTINGENCY:	$519,484
TOTAL:	**$2,251,096**

High Street to Existing Railroad Bridge including High Street Bridge

PROPOSED IMPROVEMENTS	DESCRIPTION	UNIT	QUANTITY	COST per UNIT	ESTIMATED COST
Excavation and Export	Earthwork excavation for construction of proposed channel section and export of excess excavated material	CU. YARD	7,000	$12	$84,000
Low Rise Bridge	70' Length x 52' width	SQ. FT.	3,640	$150	$546,000
Bridge Approach Slabs	2-52' width x 15' length	SQ. FT.	1,560	$120	$187,200
Concrete Wingwalls	Wingwalls upstream and downstream of bridges	LUMP SUM	1	$50,000	$50,000
Bridge Scour and Erosion Protection	Riprap or concrete channel bank lining	LUMP SUM	1	$60,000	$60,000
Removal of Existing Crossing Structure	Removal of existing culvert structure and roadway paving	LUMP SUM	1	$20,000	$20,000
Removal of Existing Roadway	Removal of existing roadway for 100' each side of the structure, 52' existing width x 200' length	SQ. YARD	1,160	$10	$11,600
Roadway Construction	52' width x 170' length	SQ. YARD	990	$40	$39,600
Grouted Boulder Drop Structure	Grouted boulder drop structure between High St. and Santa Fe Ave.	SQ. YARD	490	$200	$98,000
Utility Relocation	Utility relocation including relocating sanitary sewer to cross upstream of grade control structure	LUMP SUM	1	$30,000	$30,000
Land Acquisition	Acquire ROW and easements necessary to construct drainage channel. Cost based on $3 per sq. ft	ACRES	0.2	$130,680	$26,136
Environmental Permitting	USACE Section 404 permitting and wetland mitigation	LUMP SUM	1	$30,000	$30,000

SUBTOTAL:	$1,182,536
30% CONTINGENCY:	$354,761
TOTAL:	**$1,537,297**

Existing Railroad Bridge to El Morro Road

PROPOSED IMPROVEMENTS	DESCRIPTION	UNIT	QUANTITY	COST per UNIT	ESTIMATED COST
Excavation and Embankment	Earthwork excavation for construction of proposed channel section	CU. YARD	46,000	$6	$276,000
Land Acquisition	Acquire ROW and easements necessary to construct drainage channel. Cost based on $20,000 per acre	ACRES	4.0	$20,000	$80,000
Environmental Permitting	USACE Section 404 permitting and wetland mitigation	LUMP SUM	1	$15,000	$15,000

SUBTOTAL:	$371,000
30% CONTINGENCY:	$111,300
TOTAL:	**$482,300**

Rio San Jose Concept Cost Estimate - Milan

Confluence with Zuni Canyon to Milan Street

PROPOSED IMPROVEMENTS	DESCRIPTION	UNIT	QUANTITY	COST per UNIT	ESTIMATED COST
Excavation and Embankment	Earthwork excavation for construction of proposed channel section	CU. YARD	3,000	$6	$18,000
Excavation and Export	Earthwork excavation for construction of proposed channel section and export of excess excavated material.	CU. YARD	30,000	$12	$360,000
Utility Relocation	Misc. utility relocation associated with construction of channel segment	LUMP SUM	1	$20,000	$20,000
Sanitary Sewer Encasement	Concrete encasement for sanitary sewer main that crosses the Rio San Jose near Aspen Avenue	LUMP SUM	1	$6,000	$6,000
Land Acquisition	Acquire ROW and easements necessary to construct drainage channel. Cost based on $3 per sq. ft	ACRES	1.8	$130,680	$235,224
Environmental Permitting	USACE Section 404 permitting and wetland mitigation	LUMP SUM	1	$5,000	$5,000

SUBTOTAL:	$644,224
30% CONTINGENCY:	$193,267
TOTAL:	**$837,491**

North Street Channel from Rio San Jose to Santa Fe Avenue

PROPOSED IMPROVEMENTS	DESCRIPTION	UNIT	QUANTITY	COST per UNIT	ESTIMATED COST
North Street Channel	Construction of earthen channel, concrete lined channel and bridge slab crossing structures	LUMP SUM	1	$1,266,000	$1,266,000

SUBTOTAL:	$1,266,000
30% CONTINGENCY:	$379,800
TOTAL:	**$1,645,800**

Milan Street to Airport Road including Milan Street Bridge

PROPOSED IMPROVEMENTS	DESCRIPTION	UNIT	QUANTITY	COST per UNIT	ESTIMATED COST
Excavation and Export	Earthwork excavation for construction of proposed channel section and export of excess excavated material.	CU. YARD	12,000	$12	$144,000
Low Rise Bridge	90' Length x 44' width	SQ. FT.	3,960	$150	$594,000
Bridge Approach Slabs	2-44' width x 15' length	SQ. FT.	1,320	$120	$158,400
Concrete Wingwalls	Wingwalls upstream and downstream of bridges	LUMP SUM	1	$50,000	$50,000
Bridge Scour and Erosion Protection	Riprap or concrete channel bank lining	LUMP SUM	1	$50,000	$50,000
Removal of Existing Crossing Structure	Removal of existing culvert structure and roadway paving	LUMP SUM	1	$20,000	$20,000
Removal of Existing Roadway	Removal of existing roadway for 100' each side of the structure, 30' existing width x 200' length	SQ. YARD	670	$10	$6,700
Roadway Construction	44' width x 170' length	SQ. YARD	840	$40	$33,600
Utility Relocation	Misc. utility relocation associated with construction of new crossing structure and channel segment	LUMP SUM	1	$50,000	$50,000
Land Acquisition	Acquire ROW and easements necessary to construct drainage channel. Cost based on full lot with a house	LOT	2	$100,000	$200,000
Land Acquisition	Acquire ROW and easements necessary to construct drainage channel. Cost based on full lot without structures	LOT	2	$25,000	$50,000
Land Acquisition	Acquire ROW and easements necessary to construct drainage channel. Cost based on $3 per sq. ft	ACRES	0.4	$130,680	$52,272
Environmental Permitting	USACE Section 404 permitting and wetland mitigation	LUMP SUM	1	$5,000	$5,000

SUBTOTAL:	$1,413,972
30% CONTINGENCY:	$424,192
TOTAL:	**$1,838,164**

Rio San Jose Concept Cost Estimate - Milan

Airport Road to Clay Street including Airport Road Bridge

PROPOSED IMPROVEMENTS	DESCRIPTION	UNIT	QUANTITY	COST per UNIT	ESTIMATED COST
Excavation and Embankment	Earthwork excavation for construction of proposed channel section	CU. YARD	1,000	$6	$6,000
Excavation and Export	Earthwork excavation for construction of proposed channel section and export of excess excavated material.	CU. YARD	12,000	$12	$144,000
Low Rise Bridge	90' Length x 68' width	SQ. FT.	6,120	$150	$918,000
Bridge Approach Slabs	2-68' width x 15' length	SQ. FT.	2,040	$120	$244,800
Concrete Wingwalls	Wingwalls upstream and downstream of bridges	LUMP SUM	1	$50,000	$50,000
Bridge Scour and Erosion Protection	Riprap or concrete channel bank lining	LUMP SUM	1	$60,000	$60,000
Removal of Existing Crossing Structure	Removal of existing culvert structure and roadway paving	LUMP SUM	1	$30,000	$30,000
Removal of Existing Roadway	Removal of existing roadway for 100' each side of the structure, 58' existing width x 200' length	SQ. YARD	1,290	$10	$12,900
Roadway Construction	68' width x 170' length	SQ. YARD	1,290	$40	$51,600
Utility Relocation	Misc. utility relocation associated with construction of new crossing structure and channel segment	LUMP SUM	1	$50,000	$50,000
Land Acquisition	Acquire ROW and easements necessary to construct drainage channel. Cost based on large lot portion with large commercial building	LOT	1	$200,000	$200,000
Land Acquisition	Acquire ROW and easements necessary to construct drainage channel. Cost based on $3 per sq. ft	ACRES	0.4	$130,680	$52,272
Environmental Permitting	USACE Section 404 permitting and wetland mitigation	LUMP SUM	1	$5,000	$5,000

SUBTOTAL:	$1,818,572
30% CONTINGENCY:	$545,572
TOTAL:	**$2,364,144**

Clay Street to Sand Street including Clay Street Bridge

PROPOSED IMPROVEMENTS	DESCRIPTION	UNIT	QUANTITY	COST per UNIT	ESTIMATED COST
Excavation and Export	Earthwork excavation for construction of proposed channel section and export of excess excavated material.	CU. YARD	10,000	$12	$120,000
Low Rise Bridge	90' Length x 44' width	SQ. FT.	3,960	$150	$594,000
Bridge Approach Slabs	2-44' width x 15' length	SQ. FT.	1,320	$120	$158,400
Concrete Wingwalls	Wingwalls upstream and downstream of bridges	LUMP SUM	1	$50,000	$50,000
Bridge Scour and Erosion Protection	Riprap or concrete channel bank lining	LUMP SUM	1	$50,000	$50,000
Removal of Existing Crossing Structure	Removal of existing culvert structure and roadway paving	LUMP SUM	1	$20,000	$20,000
Removal of Existing Roadway	Removal of existing roadway for 100' each side of the structure, 32' existing width x 200' length	SQ. YARD	720	$10	$7,200
Roadway Construction	44' width x 170' length	SQ. YARD	840	$40	$33,600
Utility Relocation	Misc. utility relocation associated with construction of new crossing structure and channel segment	LUMP SUM	1	$50,000	$50,000
Land Acquisition	Acquire ROW and easements necessary to construct drainage channel. Cost based on full lot with a house	LOT	1	$100,000	$100,000
Land Acquisition	Acquire ROW and easements necessary to construct drainage channel. Cost based on full lot without structures	LOT	1	$25,000	$25,000
Land Acquisition	Acquire ROW and easements necessary to construct drainage channel. Cost based on $3 per sq. ft	ACRES	0.5	$130,680	$65,340
Environmental Permitting	USACE Section 404 permitting and wetland mitigation	LUMP SUM	1	$5,000	$5,000

SUBTOTAL:	$1,278,540
30% CONTINGENCY:	$383,562
TOTAL:	**$1,662,102**

Rio San Jose Concept Cost Estimate - Milan

Sand Street to Highway 605 including Sand Street Bridge

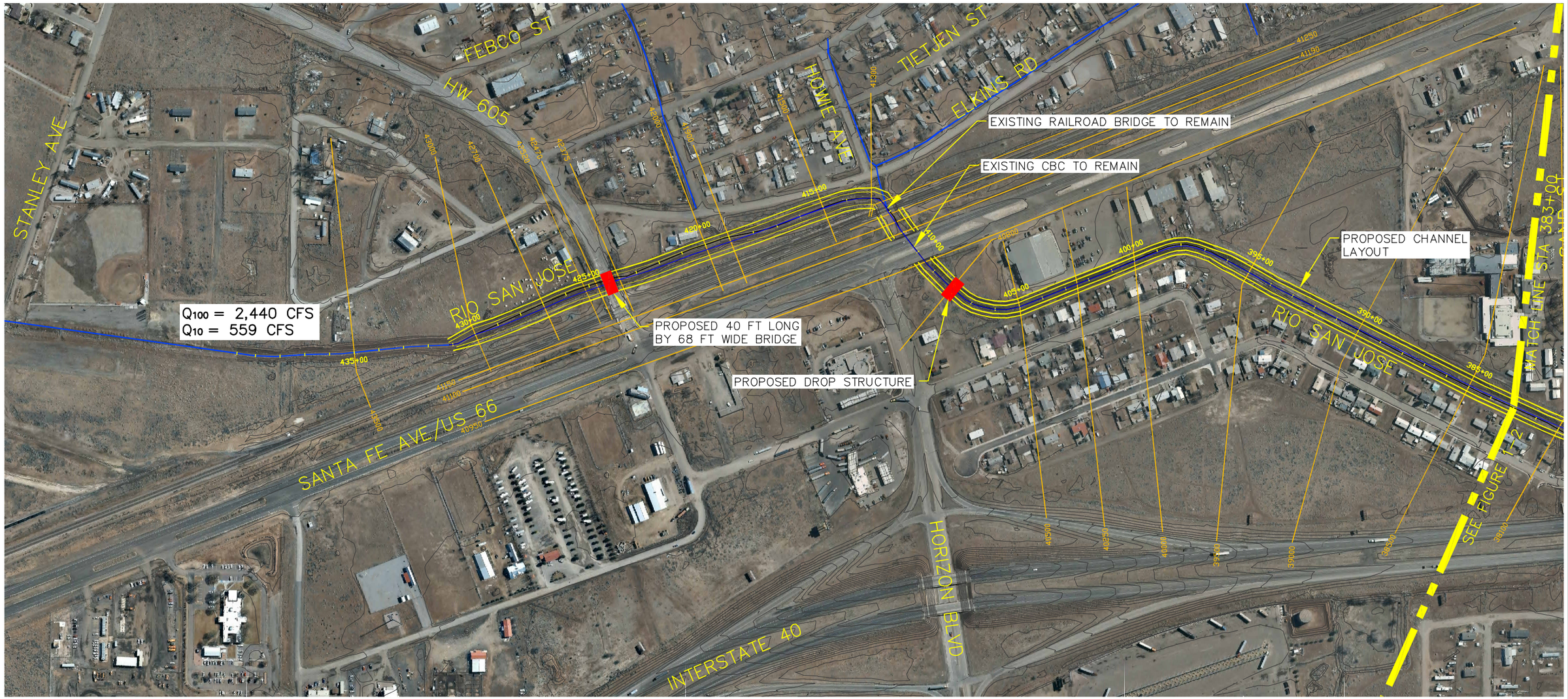
PROPOSED IMPROVEMENTS	DESCRIPTION	UNIT	QUANTITY	COST per UNIT	ESTIMATED COST
Excavation and Embankment	Earthwork excavation for construction of proposed channel section	CU. YARD	7,000	$6	$42,000
Excavation and Export	Earthwork excavation for construction of proposed channel section and export of excess excavated material.	CU. YARD	23,000	$12	$276,000
Low Rise Bridge	90' Length x 44' width	SQ. FT.	3,960	$150	$594,000
Bridge Approach Slabs	2-44' width x 15' length	SQ. FT.	1,320	$120	$158,400
Concrete Wingwalls	Wingwalls upstream and downstream of bridges	LUMP SUM	1	$50,000	$50,000
Bridge Scour and Erosion Protection	Riprap or concrete channel bank lining	LUMP SUM	1	$50,000	$50,000
Removal of Existing Crossing Structure	Removal of existing culvert structure and roadway paving	LUMP SUM	1	$20,000	$20,000
Removal of Existing Roadway	Removal of existing roadway for 100' each side of the structure, 42' existing width x 200' length	SQ. YARD	940	$10	$9,400
Roadway Construction	44' width x 170' length	SQ. YARD	840	$40	$33,600
Grouted Boulder Drop Structure	2.5 ft grouted boulder drop structure	SQ. YARD	600	$200	$120,000
Utility Relocation	Misc. utility relocation associated with construction of new crossing structure and channel segment	LUMP SUM	1	$70,000	$70,000
Land Acquisition	Acquire ROW and easements necessary to construct drainage channel. Cost based on full lot without structures	LOT	1	$25,000	$25,000
Land Acquisition	Acquire ROW and easements necessary to construct drainage channel. Cost based on $3 per sq. ft	ACRES	1.0	$130,680	$130,680
Environmental Permitting	USACE Section 404 permitting and wetland mitigation	LUMP SUM	1	$10,000	$10,000

SUBTOTAL:	$1,589,080
30% CONTINGENCY:	$476,724
TOTAL:	**$2,065,804**

Highway 605 and Transition to Existing Upstream Arroyo including Highway 605 Bridge

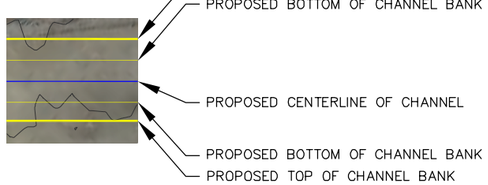
PROPOSED IMPROVEMENTS	DESCRIPTION	UNIT	QUANTITY	COST per UNIT	ESTIMATED COST
Excavation and Embankment	Earthwork excavation for construction of proposed channel section	CU. YARD	2,000	$6	$12,000
Excavation and Export	Earthwork excavation for construction of proposed channel section and export of excess excavated material.	CU. YARD	4,000	$12	$48,000
Low Rise Bridge	90' Length x 68' width	SQ. FT.	6,120	$150	$918,000
Bridge Approach Slabs	2-68' width x 15' length	SQ. FT.	2,040	$120	$244,800
Concrete Wingwalls	Wingwalls upstream and downstream of bridges	LUMP SUM	1	$50,000	$50,000
Bridge Scour and Erosion Protection	Riprap or concrete channel bank lining	LUMP SUM	1	$60,000	$60,000
Removal of Existing Crossing Structure	Removal of existing bridge structure and roadway paving	LUMP SUM	1	$30,000	$30,000
Removal of Existing Roadway	Removal of existing roadway for 100' each side of the structure, 62' existing width x 200' length	SQ. YARD	1,040	$10	$10,400
Roadway Construction	68' width x 170' length	SQ. YARD	910	$40	$36,400
Utility Relocation	Misc. utility relocation associated with construction of new crossing structure and channel segment	LUMP SUM	1	$5,000	$5,000
Land Acquisition	Acquire ROW and easements necessary to construct drainage channel. Cost based on $3 per sq. ft	ACRES	0.1	$130,680	$13,068
Environmental Permitting	USACE Section 404 permitting and wetland mitigation	LUMP SUM	1	$5,000	$5,000

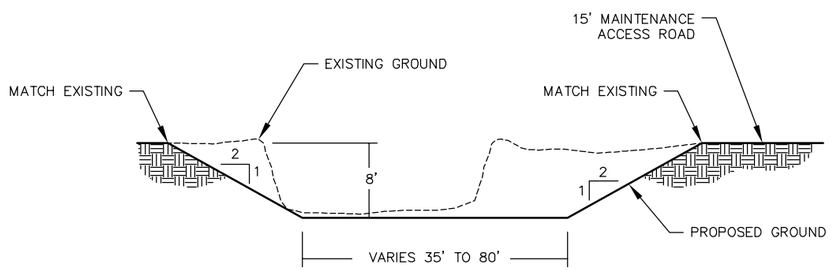
SUBTOTAL:	$1,432,668
30% CONTINGENCY:	$429,800
TOTAL:	**$1,862,468**



LEGEND

- HEC-RAS CROSS SECTIONS
- DRAINAGE CHANNEL
- 2' CONTOURS





TYPICAL CHANNEL SECTION
STA 430+00 TO 383+00
N.T.S.

PROPOSED MAJOR DRAINAGE IMPROVEMENTS AND RIO SAN JOSE HEC-RAS SECTIONS

STA 435+00 TO 383+00

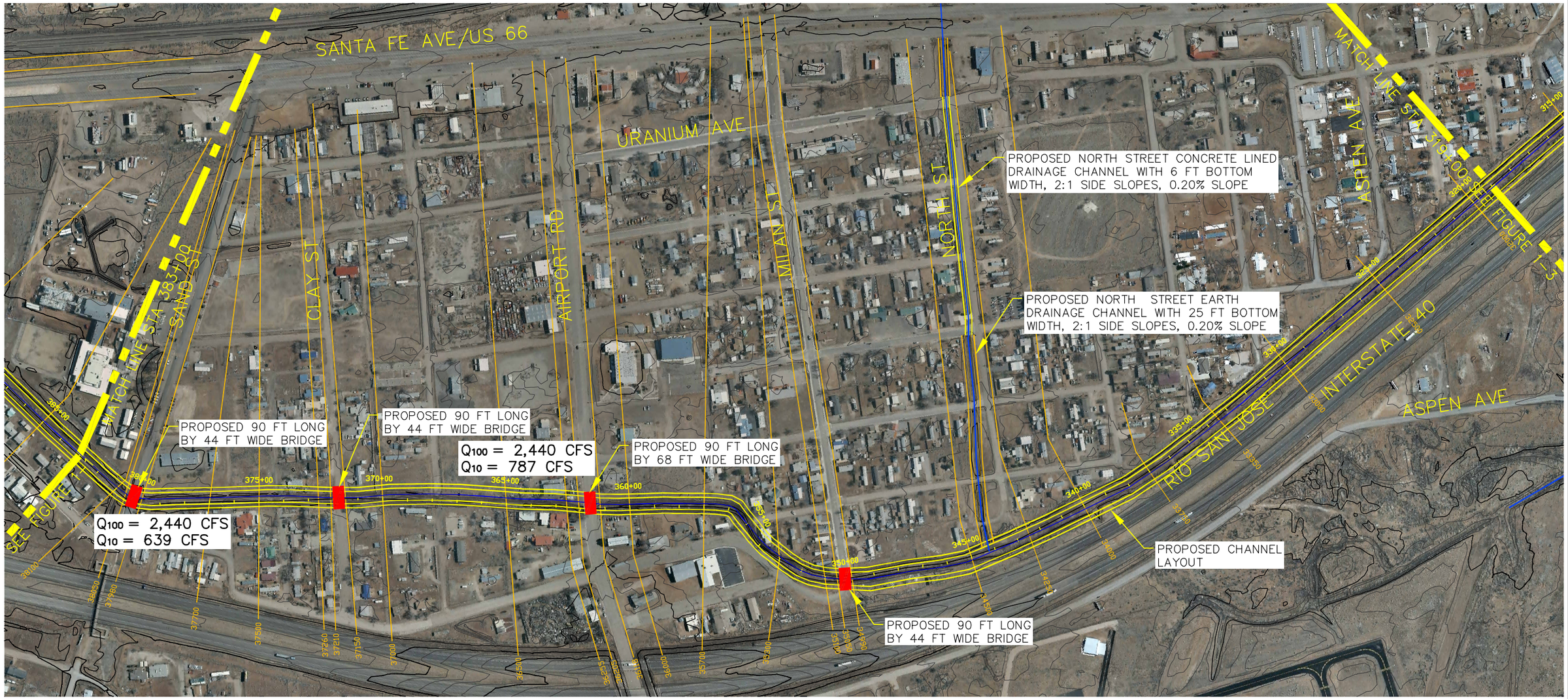
CITY OF GRANTS AND VILLAGE OF MILAN, NM DMP

03/14/2011

FIGURE 1-1

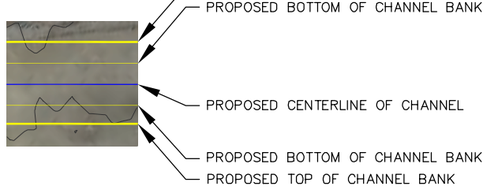
0 200 400

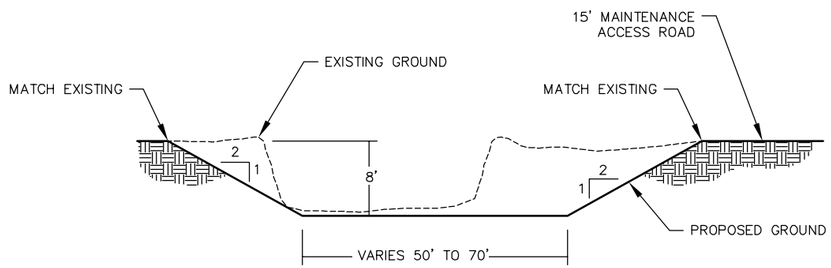
WILSON & COMPANY



LEGEND

- HEC-RAS CROSS SECTIONS
- DRAINAGE CHANNEL
- 2' CONTOURS





TYPICAL CHANNEL SECTION
STA 383+00 TO 319+00
N.T.S.

PROPOSED MAJOR DRAINAGE IMPROVEMENTS AND RIO SAN JOSE HEC-RAS SECTIONS

STA 383+00 TO 319+00

CITY OF GRANTS AND VILLAGE OF MILAN, NM DMP

03/14/2011

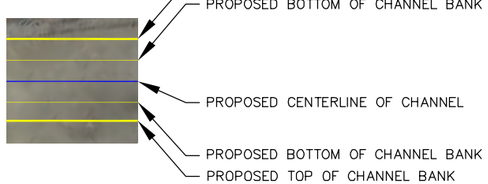
FIGURE 1-2

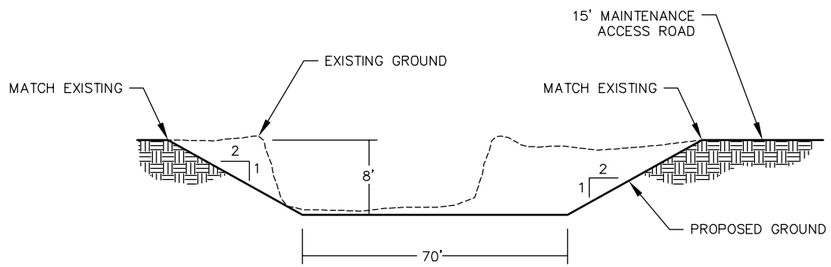
0 200 400

WILSON & COMPANY

LEGEND

- HEC-RAS CROSS SECTIONS
- DRAINAGE CHANNEL
- 2' CONTOURS





TYPICAL CHANNEL SECTION

STA 319+00 TO 309+00

N.T.S.

PROPOSED MAJOR DRAINAGE IMPROVEMENTS AND RIO SAN JOSE HEC-RAS SECTIONS

STA 319+00 TO 253+00

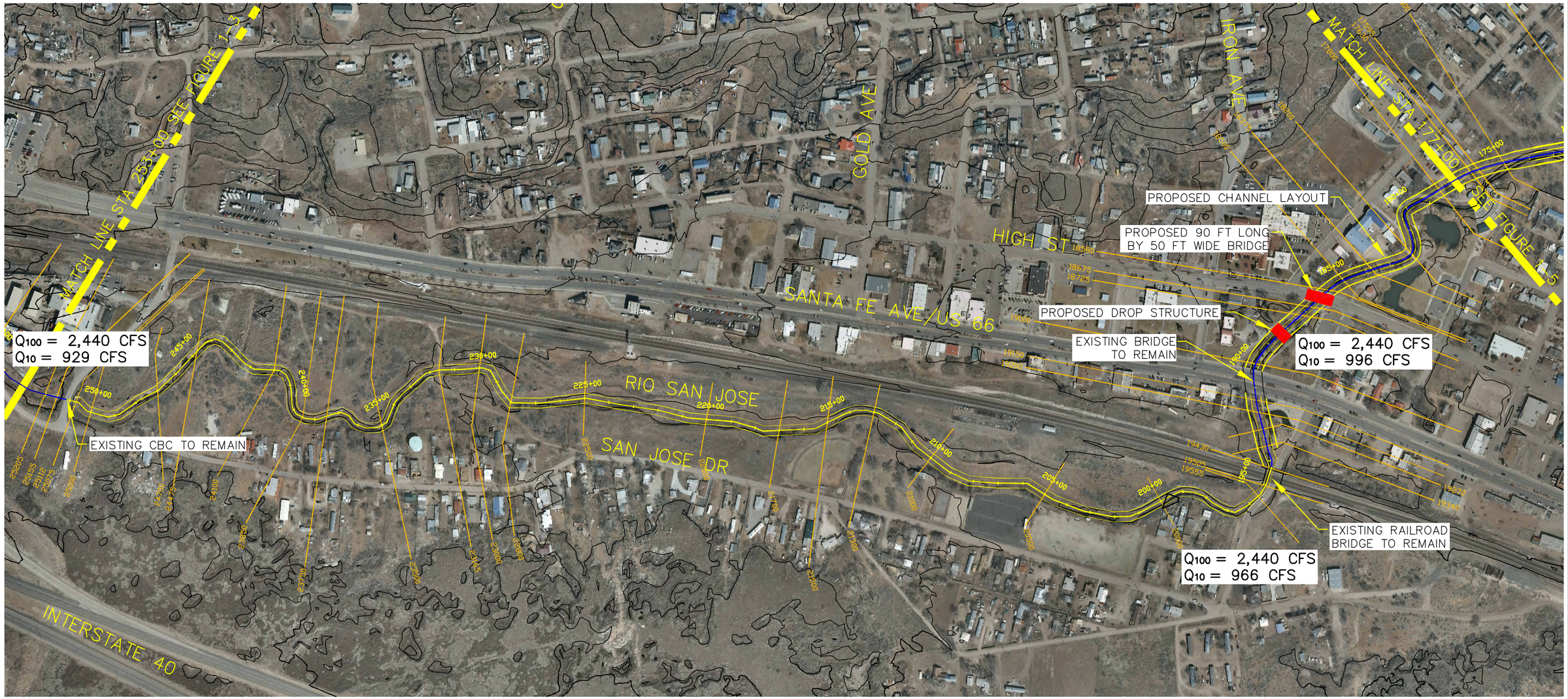
CITY OF GRANTS AND VILLAGE OF MILAN, NM DMP

03/14/2011

FIGURE 1-3

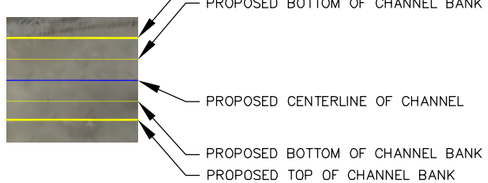
0 200 400

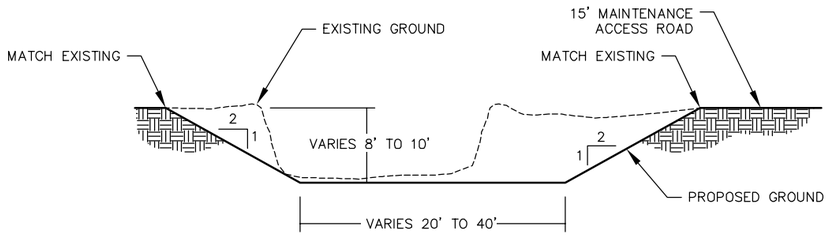
WILSON & COMPANY



LEGEND

- HEC-RAS CROSS SECTIONS
- DRAINAGE CHANNEL
- 2' CONTOURS





TYPICAL CHANNEL SECTION
STA 251+00 TO 177+00
N.T.S.

PROPOSED MAJOR DRAINAGE IMPROVEMENTS AND RIO SAN JOSE HEC-RAS SECTIONS

STA 253+00 TO 177+00

CITY OF GRANTS AND VILLAGE OF MILAN, NM DMP
03/14/2011

FIGURE 1-4

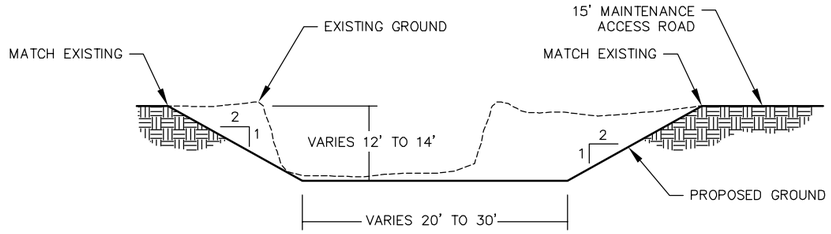
N

0 200 400

WILSON & COMPANY

LEGEND

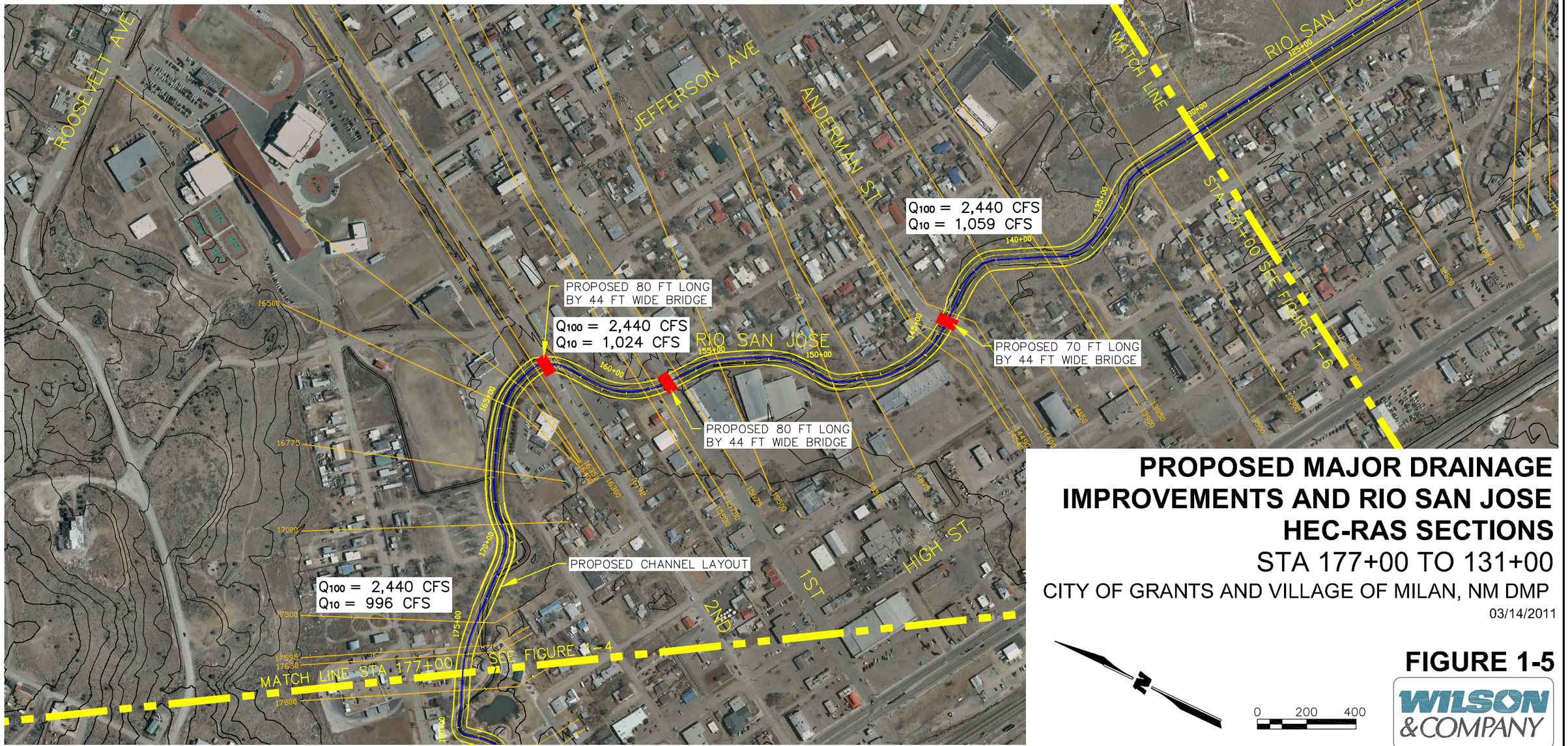
- HEC-RAS CROSS SECTIONS
- DRAINAGE CHANNEL
- 2' CONTOURS
- PROPOSED TOP OF CHANNEL BANK
- PROPOSED BOTTOM OF CHANNEL BANK
- PROPOSED CENTERLINE OF CHANNEL
- PROPOSED BOTTOM OF CHANNEL BANK
- PROPOSED TOP OF CHANNEL BANK



TYPICAL CHANNEL SECTION

STA 177+00 TO 144+00

N.T.S.



PROPOSED MAJOR DRAINAGE IMPROVEMENTS AND RIO SAN JOSE HEC-RAS SECTIONS

STA 177+00 TO 131+00

CITY OF GRANTS AND VILLAGE OF MILAN, NM DMP

03/14/2011

0 200 400

FIGURE 1-5

WILSON & COMPANY

GRANTS CANYON ARROYO

NIMITZ DR

BALSAM ST

GEORGE HANOSH

PROPOSED EXPANSION OF EXISTING BRIDGE OPENING

RIO SAN JOSE

RIO SAN JOSE

Q_{100} = 2,440 CFS
Q_{10} = 1,059 CFS

Q_{100} = 3,603 CFS
Q_{10} = 1,220 CFS

Q_{100} = 3,626 CFS
Q_{10} = 1,247 CFS

PROPOSED CHANNEL LAYOUT

PROPOSED 90 FT LONG BY 44 FT WIDE BRIDGE

SANTA FE AVE/US 66

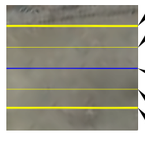
MATCH LINE STA 131+00 SEE FIGURE 1-5

SEE FIGURE 1-7

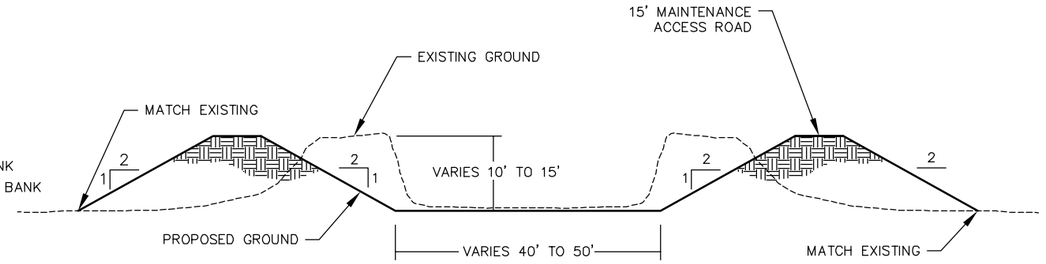
MATCH LINE STA 74+50

LEGEND

- HEC-RAS CROSS SECTIONS
- DRAINAGE CHANNEL
- 2' CONTOURS



- PROPOSED TOP OF CHANNEL BANK
- PROPOSED BOTTOM OF CHANNEL BANK
- PROPOSED CENTERLINE OF CHANNEL
- PROPOSED BOTTOM OF CHANNEL BANK
- PROPOSED TOP OF CHANNEL BANK



TYPICAL CHANNEL SECTION
STA 144+00 TO 74+50
N.T.S.

PROPOSED MAJOR DRAINAGE IMPROVEMENTS AND RIO SAN JOSE HEC-RAS SECTIONS

STA 131+00 TO 74+50

CITY OF GRANTS AND VILLAGE OF MILAN, NM DMP

03/14/2011

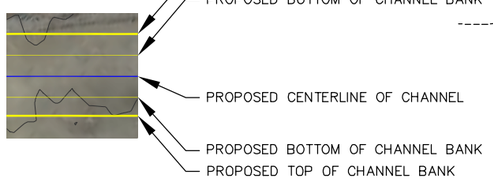
FIGURE 1-6

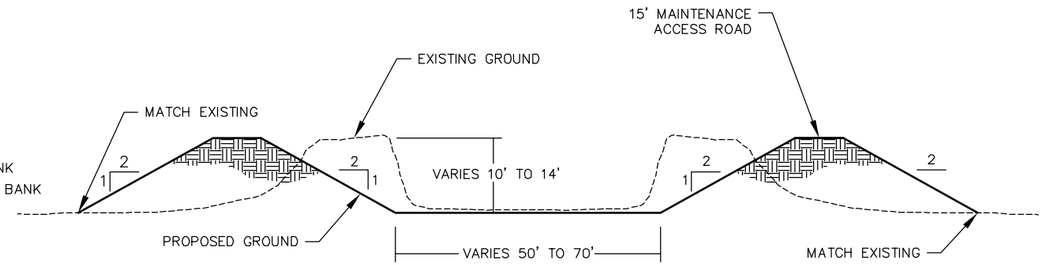
0 200 400

WILSON & COMPANY

LEGEND

- HEC-RAS CROSS SECTIONS
- DRAINAGE CHANNEL
- 2' CONTOURS





TYPICAL CHANNEL SECTION

STA 74+50 TO 42+00

N.T.S.

PROPOSED MAJOR DRAINAGE IMPROVEMENTS AND RIO SAN JOSE HEC-RAS SECTIONS

STA 74+50 TO 10+00

CITY OF GRANTS AND VILLAGE OF MILAN, NM DMP

03/14/2011

FIGURE 1-7

0 200 400

WILSON & COMPANY

Profile Summary Table

HEC-RAS Plan: Future with River: Rio San Jose Reach: grants - milan

Reach	River Sta	Profile	Q Total	Q Left	Q Channel	Q Right	Min Ch El	W.S. Elev	Crit W.S.	Max Chl Dpth	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(cfs)	(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
grants - milan	2500.	100 YR	4470.00	4.72	1443.30	3021.98	6406.80	6413.64	6411.79	6.84	0.001502	4.29	1666.02	2182.45	0.33
grants - milan	2500.	10 YR	1484.00		722.41	761.59	6406.80	6411.64	6410.00	4.83	0.001501	3.39	763.80	1111.35	0.31
grants - milan	3000.	100 YR	4470.00	0.26	754.89	3714.85	6407.88	6414.18	6411.48	6.30	0.000468	2.37	2984.02	1763.80	0.18
grants - milan	3000.	10 YR	1484.00		385.32	1098.68	6407.88	6412.14	6410.73	4.26	0.000483	1.90	1441.88	1195.66	0.17
grants - milan	3500.	100 YR	4470.00		945.03	3524.97	6408.40	6414.45	6411.72	6.05	0.000734	2.89	2269.75	1658.08	0.23
grants - milan	3500.	10 YR	1484.00		411.29	1072.71	6408.40	6412.41	6410.78	4.01	0.000593	2.04	1180.92	1119.56	0.19
grants - milan	4000.	100 YR	4470.00		1557.14	2912.86	6408.40	6414.99	6413.69	6.59	0.002274	5.02	1473.22	1348.69	0.40
grants - milan	4000.	10 YR	1484.00		1006.43	477.57	6408.40	6412.85	6412.64	4.45	0.004159	5.40	499.43	1109.00	0.51
grants - milan	4250	100 YR	4470.00		4470.00		6408.44	6415.39	6412.76	6.95	0.002082	5.09	877.99	1463.09	0.43
grants - milan	4250	10 YR	1484.00		1484.00		6408.44	6413.47	6410.64	5.03	0.000847	2.78	533.83	1047.83	0.26
grants - milan	4500.	100 YR	4470.00		4470.00		6408.55	6415.58	6413.36	7.03	0.002225	7.57	590.36	1305.11	0.54
grants - milan	4500.	10 YR	1484.00		1484.00		6408.55	6413.61	6410.90	5.06	0.000763	3.66	405.14	365.10	0.30
grants - milan	4540	100 YR	4470.00		4470.00		6408.68	6415.67		6.99	0.002274	7.62	586.66	97.95	0.55
grants - milan	4540	10 YR	1484.00		1484.00		6408.68	6413.64		4.96	0.000818	3.75	396.18	89.83	0.31
grants - milan	4566 Santa Fe RR-Mb		Bridge												
grants - milan	4605	100 YR	4470.00		4470.00		6408.80	6416.45	6413.57	7.65	0.001657	6.85	652.58	100.60	0.47
grants - milan	4605	10 YR	1484.00		1484.00		6408.80	6413.78	6411.15	4.98	0.000808	3.73	397.76	89.90	0.31
grants - milan	4655	100 YR	4541.00		4541.00		6408.84	6416.52		7.68	0.001685	6.92	655.83	100.73	0.48
grants - milan	4655	10 YR	1495.00		1495.00		6408.84	6413.81		4.97	0.000821	3.76	397.63	89.89	0.32
grants - milan	5000	100 YR	4541.00		4541.00		6409.10	6417.14		8.04	0.001436	6.56	692.29	102.17	0.44
grants - milan	5000	10 YR	1495.00		1495.00		6409.10	6414.10		5.00	0.000808	3.74	399.74	89.99	0.31
grants - milan	5500	100 YR	4541.00		4541.00		6409.48	6417.88		8.40	0.001233	6.23	728.96	103.59	0.41
grants - milan	5500	10 YR	1495.00		1495.00		6409.48	6414.50		5.02	0.000795	3.72	401.85	90.08	0.31
grants - milan	6000	100 YR	4541.00		4541.00		6409.86	6418.51		8.65	0.001112	6.01	755.03	104.60	0.39
grants - milan	6000	10 YR	1495.00		1495.00		6409.86	6414.90		5.04	0.000786	3.71	403.39	90.15	0.31
grants - milan	6500	100 YR	4541.00		4541.00		6410.24	6419.08		8.83	0.001032	5.86	774.56	105.34	0.38
grants - milan	6500	10 YR	1495.00		1495.00		6410.24	6415.29		5.05	0.000780	3.70	404.49	90.20	0.31
grants - milan	7100	100 YR	4541.00		4541.00		6410.71	6419.70		8.99	0.000971	5.74	790.91	105.96	0.37
grants - milan	7100	10 YR	1495.00		1495.00		6410.71	6415.76		5.05	0.000781	3.70	404.31	90.19	0.31
grants - milan	7135	100 YR	4541.00		4541.00		6412.60	6419.42		6.82	0.002549	7.96	570.60	97.29	0.58
grants - milan	7135	10 YR	1495.00		1495.00		6412.60	6415.44		2.84	0.005536	6.96	214.72	81.35	0.76
grants - milan	7174 McBride Road		Culvert												
grants - milan	7225	100 YR	4541.00		4541.00		6412.80	6420.82	6417.63	8.02	0.001449	6.58	690.24	102.09	0.45
grants - milan	7225	10 YR	1495.00		1495.00		6412.80	6416.34	6415.16	3.54	0.002630	5.49	272.46	84.14	0.54

Profile Summary Table

HEC-RAS Plan: Future with River: Rio San Jose Reach: grants - milan (Continued)

Reach	River Sta	Profile	Q Total	Q Left	Q Channel	Q Right	Min Ch El	W.S. Elev	Crit W.S.	Max Chl Dpth	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(cfs)	(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
grants - milan	7275	100 YR	4541.00		4541.00		6412.88	6420.75		7.87	0.002053	7.62	595.77	91.47	0.53
grants - milan	7275	10 YR	1495.00		1495.00		6412.88	6416.37		3.49	0.003690	6.39	233.99	73.97	0.63
grants - milan	7300	100 YR	3626.00		3626.00		6412.91	6421.00		8.09	0.001635	6.77	535.58	82.37	0.47
grants - milan	7300	10 YR	1247.00		1247.00		6412.91	6416.54		3.63	0.003185	5.99	208.04	64.53	0.59
grants - milan	7500	100 YR	3626.00		3626.00		6413.00	6421.37		8.37	0.001446	6.49	558.91	83.49	0.44
grants - milan	7500	10 YR	1247.00		1247.00		6413.00	6417.20		4.20	0.001927	5.08	245.55	66.82	0.47
grants - milan	7750	100 YR	3626.00		3626.00		6413.11	6421.77		8.66	0.001280	6.22	583.13	84.65	0.42
grants - milan	7750	10 YR	1247.00		1247.00		6413.11	6417.70		4.59	0.001427	4.59	271.39	68.35	0.41
grants - milan	8100	100 YR	3626.00		3626.00		6413.26	6422.25		8.99	0.001120	5.93	611.08	85.96	0.39
grants - milan	8100	10 YR	1247.00		1247.00		6413.26	6418.19		4.93	0.001110	4.22	295.19	69.72	0.36
grants - milan	8475	100 YR	3626.00		3626.00		6413.43	6422.69		9.26	0.001005	5.71	634.56	87.04	0.37
grants - milan	8475	10 YR	1247.00		1247.00		6413.43	6418.61		5.18	0.000938	3.99	312.33	70.70	0.33
grants - milan	8820	100 YR	3626.00		3626.00		6413.58	6423.02		9.43	0.001360	6.53	555.41	77.74	0.43
grants - milan	8820	10 YR	1247.00		1247.00		6413.58	6418.94		5.36	0.001248	4.59	271.67	61.43	0.38
grants - milan	8860 George Hanosh		Bridge												
grants - milan	8910	100 YR	3603.00		3603.00		6413.80	6423.87	6419.50	10.07	0.001053	5.95	605.67	80.28	0.38
grants - milan	8910	10 YR	1236.00		1236.00		6413.80	6419.34	6416.73	5.54	0.001086	4.36	283.20	62.17	0.36
grants - milan	9000	100 YR	3603.00		3603.00		6413.94	6423.96		10.02	0.001072	5.99	601.68	80.08	0.38
grants - milan	9000	10 YR	1236.00		1236.00		6413.94	6419.44		5.50	0.001118	4.41	280.41	61.99	0.37
grants - milan	9500	100 YR	3603.00		3603.00		6414.69	6424.50		9.81	0.001163	6.16	584.57	79.22	0.40
grants - milan	9500	10 YR	1236.00		1236.00		6414.69	6420.01		5.32	0.001255	4.59	269.57	61.29	0.39
grants - milan	10000	100 YR	3603.00		3603.00		6415.44	6425.08		9.64	0.001241	6.31	571.24	78.55	0.41
grants - milan	10000	10 YR	1236.00		1236.00		6415.44	6420.65		5.21	0.001351	4.70	262.80	60.85	0.40
grants - milan	10500	100 YR	3603.00		3603.00		6416.19	6425.70		9.51	0.001305	6.42	561.07	78.03	0.42
grants - milan	10500	10 YR	1236.00		1236.00		6416.19	6421.34		5.15	0.001414	4.78	258.77	60.58	0.41
grants - milan	11000	100 YR	3603.00		3603.00		6416.94	6426.35		9.41	0.001356	6.51	553.51	77.64	0.43
grants - milan	11000	10 YR	1236.00		1236.00		6416.94	6422.05		5.11	0.001453	4.82	256.41	60.43	0.41
grants - milan	11290	100 YR	3603.00		3603.00		6417.36	6426.74		9.38	0.001371	6.53	551.35	77.53	0.43
grants - milan	11290	10 YR	1236.00		1236.00		6417.36	6422.47		5.11	0.001451	4.82	256.50	60.43	0.41
grants - milan	11301	100 YR	3570.00		3570.00		6417.54	6426.83	6426.83	9.29	0.001873	14.52	245.79	37.86	1.00
grants - milan	11301	10 YR	1220.00		1220.00		6417.54	6422.23	6422.23	4.69	0.002255	11.80	103.42	24.06	1.00
grants - milan	11337 Nimitz Drive		Bridge												
grants - milan	11338	100 YR	3570.00		3570.00		6417.64	6428.38	6426.92	10.74	0.001058	11.75	303.85	42.21	0.77

Profile Summary Table

HEC-RAS Plan: Future with River: Rio San Jose Reach: grants - milan (Continued)

Reach	River Sta	Profile	Q Total	Q Left	Q Channel	Q Right	Min Ch El	W.S. Elev	Crit W.S.	Max Chl Dpth	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(cfs)	(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
grants - milan	11338	10 YR	1220.00		1220.00		6417.64	6423.28	6422.32	5.64	0.001281	9.56	127.59	26.91	0.77
grants - milan	11350	100 YR	3570.00		3570.00		6417.70	6430.60		12.90	0.000993	5.34	668.06	77.59	0.32
grants - milan	11350	10 YR	1220.00		1220.00		6417.70	6424.76		7.06	0.001229	4.31	283.33	54.25	0.33
grants - milan	11400	100 YR	3570.00		3570.00		6417.79	6430.71		12.92	0.000819	4.95	721.61	81.69	0.29
grants - milan	11400	10 YR	1220.00		1220.00		6417.79	6424.87		7.08	0.000969	3.90	312.80	58.33	0.30
grants - milan	11450	100 YR	3570.00		3570.00		6417.88	6430.81		12.93	0.000486	4.54	786.81	86.71	0.27
grants - milan	11450	10 YR	1220.00		1220.00		6417.88	6424.96		7.08	0.000553	3.51	347.97	63.31	0.26
grants - milan	11500	100 YR	3570.00		3570.00		6417.99	6430.88		12.89	0.000405	4.21	847.83	91.56	0.24
grants - milan	11500	10 YR	1220.00		1220.00		6417.99	6425.02		7.03	0.000453	3.21	379.83	68.11	0.24
grants - milan	12000	100 YR	2440.00		2440.00		6418.87	6431.18		12.31	0.000226	3.07	795.26	89.23	0.18
grants - milan	12000	10 YR	1059.00		1059.00		6418.87	6425.26		6.39	0.000481	3.14	337.11	65.55	0.24
grants - milan	12500	100 YR	2440.00		2440.00		6419.77	6431.29		11.52	0.000291	3.36	725.80	86.06	0.20
grants - milan	12500	10 YR	1059.00		1059.00		6419.77	6425.51		5.74	0.000703	3.58	295.73	62.97	0.29
grants - milan	13000	100 YR	2440.00		2440.00		6420.67	6431.43		10.76	0.000377	3.69	661.57	83.02	0.23
grants - milan	13000	10 YR	1059.00		1059.00		6420.67	6425.89		5.22	0.000986	4.02	263.34	60.88	0.34
grants - milan	13500	100 YR	2440.00		2440.00		6421.57	6431.61		10.04	0.000488	4.05	603.13	80.16	0.26
grants - milan	13500	10 YR	1059.00		1059.00		6421.57	6426.42		4.85	0.001282	4.40	240.82	59.38	0.38
grants - milan	14000	100 YR	2440.00		2440.00		6422.47	6431.85		9.38	0.000629	4.43	551.16	77.52	0.29
grants - milan	14000	10 YR	1059.00		1059.00		6422.47	6427.09		4.62	0.001520	4.66	227.30	58.47	0.42
grants - milan	14400	100 YR	2440.00		2440.00		6423.19	6432.02		8.83	0.002169	7.26	336.18	56.16	0.52
grants - milan	14400	10 YR	1059.00		1059.00		6423.19	6427.80		4.61	0.005051	7.81	135.54	38.86	0.74
grants - milan	14440 Anderman Street		Bridge												
grants - milan	14500	100 YR	2440.00		2440.00		6423.39	6433.38	6429.61	9.98	0.001346	6.11	399.06	59.94	0.42
grants - milan	14500	10 YR	1024.00		1024.00		6423.39	6428.62	6427.17	5.23	0.002971	6.43	159.35	40.92	0.57
grants - milan	14750	100 YR	2440.00		2440.00		6423.89	6433.70		9.81	0.001470	6.33	385.30	58.58	0.44
grants - milan	14750	10 YR	1024.00		1024.00		6423.89	6429.38		5.49	0.002500	6.06	169.10	41.60	0.53
grants - milan	15000	100 YR	2440.00		2440.00		6424.39	6434.06		9.67	0.001533	6.41	380.41	58.68	0.44
grants - milan	15000	10 YR	1024.00		1024.00		6424.39	6430.02		5.63	0.002249	5.82	176.05	42.53	0.50
grants - milan	15250	100 YR	2440.00		2440.00		6424.89	6434.41		9.52	0.001744	6.80	358.63	55.32	0.47
grants - milan	15250	10 YR	1024.00		1024.00		6424.89	6430.58		5.69	0.002269	5.90	173.69	41.09	0.51
grants - milan	15500	100 YR	2440.00		2440.00		6425.39	6434.89		9.50	0.001649	6.59	370.33	57.99	0.46
grants - milan	15500	10 YR	1024.00		1024.00		6425.39	6431.17		5.78	0.002040	5.62	182.32	43.11	0.48
grants - milan	15675	100 YR	2440.00		2440.00		6425.74	6435.17		9.43	0.001698	6.66	366.43	57.72	0.47
grants - milan	15675	10 YR	1024.00		1024.00		6425.74	6431.53		5.79	0.002028	5.60	182.72	43.15	0.48

Profile Summary Table

HEC-RAS Plan: Future with River: Rio San Jose Reach: grants - milan (Continued)

Reach	River Sta	Profile	Q Total	Q Left	Q Channel	Q Right	Min Ch El	W.S. Elev	Crit W.S.	Max Chl Dpth	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(cfs)	(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
grants - milan	15725 1st Street		Bridge												
grants - milan	15780	100 YR	2440.00		2440.00		6425.95	6435.60	6432.17	9.65	0.001548	6.44	379.04	58.59	0.45
grants - milan	15780	10 YR	1024.00		1024.00		6425.95	6431.99	6429.73	6.04	0.001724	5.29	193.70	44.15	0.44
grants - milan	15830	100 YR	2440.00		2440.00		6426.05	6435.67		9.62	0.001564	6.46	377.64	58.49	0.45
grants - milan	15830	10 YR	1024.00		1024.00		6426.05	6432.07		6.02	0.001740	5.30	193.08	44.10	0.45
grants - milan	16190	100 YR	2440.00		2440.00		6426.77	6436.23		9.46	0.001675	6.63	368.27	57.85	0.46
grants - milan	16190	10 YR	1024.00		1024.00		6426.77	6432.71		5.94	0.001841	5.41	189.17	43.74	0.46
grants - milan	16245 2nd Street		Bridge												
grants - milan	16300	100 YR	2440.00		2440.00		6426.99	6436.67	6433.21	9.68	0.001525	6.40	381.19	58.73	0.44
grants - milan	16300	10 YR	1024.00		1024.00		6426.99	6433.16	6430.77	6.17	0.001588	5.13	199.53	44.68	0.43
grants - milan	16500	100 YR	2440.00		2440.00		6427.91	6437.11		9.20	0.001060	5.48	445.49	66.81	0.37
grants - milan	16500	10 YR	1002.00		1002.00		6427.91	6433.56		5.65	0.001103	4.30	233.24	52.59	0.36
grants - milan	17000	100 YR	2440.00		2440.00		6430.21	6437.62		7.41	0.002407	7.35	332.01	59.63	0.55
grants - milan	17000	10 YR	996.00		996.00		6430.21	6434.22		4.01	0.003726	6.54	152.36	46.03	0.63
grants - milan	17500	100 YR	2440.00		2440.00		6432.31	6438.74	6438.52	6.42	0.007718	11.56	211.05	45.70	0.95
grants - milan	17500	10 YR	996.00		996.00		6432.31	6436.37	6436.03	4.06	0.007173	8.71	114.29	36.25	0.86
grants - milan	18000	100 YR	2440.00		2440.00		6434.61	6442.28	6440.83	7.67	0.003863	8.99	271.28	50.70	0.69
grants - milan	18000	10 YR	996.00		996.00		6434.61	6439.41		4.80	0.003889	7.02	141.94	39.19	0.65
grants - milan	18500	100 YR	2440.00		2440.00		6437.11	6444.29		7.18	0.005009	9.89	246.83	48.73	0.77
grants - milan	18500	10 YR	996.00		996.00		6437.11	6441.53		4.42	0.005265	7.81	127.47	37.68	0.75
grants - milan	18580	100 YR	2440.00		2440.00		6437.59	6445.19		7.60	0.003094	8.29	294.35	52.48	0.62
grants - milan	18580	10 YR	996.00		996.00		6437.59	6442.26		4.67	0.003089	6.38	156.18	41.89	0.58
grants - milan	18634 High Street		Bridge												
grants - milan	18640	100 YR	2440.00		2440.00		6437.91	6447.40	6443.62	9.49	0.001287	6.00	406.35	60.67	0.41
grants - milan	18640	10 YR	984.00		984.00		6437.91	6443.03	6441.23	5.12	0.002126	5.55	177.30	44.25	0.49
grants - milan	18700	100 YR	2440.00		2440.00		6438.24	6447.59		9.35	0.000997	5.36	455.35	67.40	0.36
grants - milan	18700	10 YR	984.00		984.00		6438.24	6443.26		5.02	0.001631	4.90	200.90	50.07	0.43
grants - milan	18845	100 YR	2440.00		2440.00		6439.17	6447.67		8.50	0.001435	6.11	399.47	64.00	0.43
grants - milan	18845	10 YR	984.00		984.00		6439.17	6443.44		4.27	0.002904	5.98	164.59	47.08	0.56
grants - milan	18850	100 YR	2440.00		2440.00		6442.17	6447.38	6447.38	5.20	0.008794	11.60	210.31	50.82	1.01
grants - milan	18850	10 YR	984.00		984.00		6442.17	6445.16	6445.16	2.99	0.010108	9.13	107.75	41.98	1.00
grants - milan	19000.	100 YR	2440.00		2440.00		6443.16	6449.54		6.38	0.002326	6.59	370.12	77.16	0.53
grants - milan	19000.	10 YR	984.00		984.00		6443.16	6446.79		3.63	0.002671	5.41	181.80	57.11	0.53

Profile Summary Table

HEC-RAS Plan: Future with River: Rio San Jose Reach: grants - milan (Continued)

Reach	River Sta	Profile	Q Total	Q Left	Q Channel	Q Right	Min Ch El	W.S. Elev	Crit W.S.	Max Chl Dpth	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(cfs)	(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
grants - milan	19076 Santa Fe Av-High		Bridge												
grants - milan	19150	100 YR	2440.00		2440.00		6443.20	6450.24	6447.39	7.04	0.001622	5.71	427.29	82.39	0.44
grants - milan	19150	10 YR	966.00		966.00		6443.20	6447.40	6445.45	4.20	0.001479	4.29	225.04	61.62	0.40
grants - milan	19200	100 YR	2440.00		2440.00		6443.22	6450.35		7.13	0.001492	5.52	442.29	88.01	0.43
grants - milan	19200	10 YR	966.00		966.00		6443.22	6447.48		4.26	0.001462	4.24	227.79	66.65	0.40
grants - milan	19270	100 YR	2440.00		2440.00		6443.23	6450.09		6.86	0.003292	8.25	295.87	56.49	0.64
grants - milan	19270	10 YR	966.00		966.00		6443.23	6447.41		4.18	0.003075	6.09	158.56	45.93	0.58
grants - milan	19340	100 YR	2440.00		2440.00		6443.24	6450.82	6447.76	7.57	0.001380	5.84	417.74	672.53	0.42
grants - milan	19340	10 YR	966.00		966.00		6443.24	6447.87	6445.75	4.63	0.001251	4.23	228.12	58.52	0.38
grants - milan	19430	100 YR	2440.00		2440.00		6443.27	6450.96	6447.75	7.69	0.001366	5.72	426.69	72.54	0.42
grants - milan	19430	10 YR	966.00		966.00		6443.27	6447.99	6447.51	4.72	0.001161	4.17	231.87	56.69	0.36
grants - milan	19464 Santa Fe RR-5th		Bridge												
grants - milan	19505	100 YR	2440.00		2440.00		6443.30	6452.31	6447.75	9.01	0.000877	4.70	519.01	85.42	0.34
grants - milan	19505	10 YR	966.00		966.00		6443.30	6450.04	6447.51	6.74	0.000327	2.72	355.38	62.80	0.20
grants - milan	19555	100 YR	2440.00		2440.00		6444.08	6452.45	6448.10	8.37	0.001583	4.13	590.15	280.53	0.33
grants - milan	19555	10 YR	942.00		942.00		6444.08	6450.08	6446.31	6.00	0.000577	2.53	372.03	75.22	0.20
grants - milan	20000.	100 YR	2440.00		2440.00		6446.40	6453.15		6.75	0.004095	7.15	341.07	61.42	0.53
grants - milan	20000.	10 YR	942.00		942.00		6446.40	6450.39		3.99	0.003761	5.12	184.12	52.35	0.48
grants - milan	20500.	100 YR	2440.00		2440.00		6448.70	6454.96		6.26	0.001914	4.97	491.43	87.68	0.37
grants - milan	20500.	10 YR	942.00		942.00		6448.70	6452.05		3.35	0.002320	3.78	249.49	79.03	0.37
grants - milan	21000.	100 YR	2440.00		2440.00		6451.00	6456.29		5.29	0.009384	8.35	292.28	81.00	0.77
grants - milan	21000.	10 YR	942.00		942.00		6451.00	6453.85		2.85	0.010746	6.91	136.24	55.58	0.78
grants - milan	21300	100 YR	2440.00		2440.00		6452.38	6458.53		6.15	0.006134	8.38	291.22	55.15	0.64
grants - milan	21300	10 YR	942.00		942.00		6452.38	6456.18		3.80	0.004680	5.58	168.76	49.00	0.53
grants - milan	21500.	100 YR	2440.00		2440.00		6453.30	6459.75		6.45	0.005411	8.14	299.76	52.99	0.60
grants - milan	21500.	10 YR	942.00		942.00		6453.30	6457.11		3.81	0.004717	5.64	167.03	47.68	0.53
grants - milan	21700	100 YR	2440.00		2440.00		6454.22	6461.09		6.87	0.002642	5.55	439.86	86.79	0.43
grants - milan	21700	10 YR	942.00		942.00		6454.22	6458.10		3.88	0.003367	4.52	208.30	67.46	0.45
grants - milan	22000.	100 YR	2440.00		2440.00		6455.59	6461.87		6.28	0.003391	6.42	380.09	70.76	0.49
grants - milan	22000.	10 YR	942.00		942.00		6455.59	6459.13		3.54	0.003661	4.76	197.91	62.26	0.47
grants - milan	22500.	100 YR	2440.00		2440.00		6457.60	6463.79		6.19	0.005561	7.79	313.14	62.86	0.62
grants - milan	22500.	10 YR	942.00		942.00		6457.60	6461.22		3.62	0.005391	5.72	164.67	51.88	0.57
grants - milan	22800	100 YR	2440.00		2440.00		6459.00	6465.68		6.67	0.003695	5.41	450.90	118.98	0.49

Profile Summary Table

HEC-RAS Plan: Future with River: Rio San Jose Reach: grants - milan (Continued)

Reach	River Sta	Profile	Q Total	Q Left	Q Channel	Q Right	Min Ch El	W.S. Elev	Crit W.S.	Max Chl Dpth	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(cfs)	(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
grants - milan	22800	10 YR	942.00		942.00		6459.00	6462.73		3.73	0.003736	4.68	201.25	66.55	0.47
grants - milan	23000	100 YR	2440.00		2440.00		6460.00	6466.23		6.23	0.005136	7.63	319.96	62.77	0.60
grants - milan	23000	10 YR	942.00		942.00		6460.00	6463.52		3.52	0.005612	5.77	163.25	52.86	0.58
grants - milan	23165	100 YR	2440.00		2440.00		6460.83	6467.30		6.47	0.003240	5.85	417.08	88.93	0.48
grants - milan	23165	10 YR	942.00		942.00		6460.83	6464.48		3.65	0.004106	4.80	196.28	67.59	0.50
grants - milan	23500.	100 YR	2440.00		2440.00		6462.50	6468.44		5.94	0.005549	7.59	321.27	68.17	0.62
grants - milan	23500.	10 YR	942.00		942.00		6462.50	6465.98		3.48	0.005547	5.62	167.67	56.48	0.57
grants - milan	23750	100 YR	2440.00		2440.00		6463.75	6469.80		6.05	0.006137	8.18	298.35	58.66	0.64
grants - milan	23750	10 YR	942.00		942.00		6463.75	6467.34		3.59	0.005491	5.77	163.30	51.07	0.57
grants - milan	23850	100 YR	2440.00		2440.00		6464.25	6470.73		6.48	0.003569	6.25	390.12	80.37	0.50
grants - milan	23850	10 YR	942.00		942.00		6464.25	6467.96		3.71	0.004097	4.92	191.44	63.12	0.50
grants - milan	24100	100 YR	2440.00		2440.00		6465.70	6471.58		5.88	0.006456	8.32	293.27	59.78	0.66
grants - milan	24100	10 YR	942.00		942.00		6465.70	6469.09		3.39	0.006436	6.07	155.07	51.41	0.62
grants - milan	24475	100 YR	2440.00		2440.00		6467.58	6474.01		6.43	0.004491	6.63	367.99	82.41	0.55
grants - milan	24475	10 YR	929.00		929.00		6467.58	6471.25		3.67	0.004450	5.20	178.70	57.32	0.52
grants - milan	24700	100 YR	2440.00	0.04	2439.95	0.01	6468.50	6475.25		6.75	0.007019	6.74	362.56	124.97	0.65
grants - milan	24700	10 YR	929.00		929.00		6468.50	6472.26		3.76	0.004990	5.66	164.22	48.51	0.54
grants - milan	25000.	100 YR	2440.00		2440.00		6470.00	6476.82		6.82	0.004290	7.03	346.89	66.36	0.54
grants - milan	25000.	10 YR	929.00		929.00		6470.00	6473.78		3.78	0.004986	5.54	167.56	51.46	0.54
grants - milan	25075	100 YR	2440.00		2440.00		6470.17	6477.25		7.08	0.004392	6.60	369.51	75.21	0.52
grants - milan	25075	10 YR	929.00		929.00		6470.17	6474.19		4.02	0.003402	4.97	186.92	47.56	0.44
grants - milan	25112 El Morro		Culvert												
grants - milan	25155	100 YR	2440.00		2440.00		6470.60	6480.31	6474.67	9.71	0.000762	3.48	700.60	107.30	0.24
grants - milan	25155	10 YR	929.00		929.00		6470.60	6475.65	6472.81	5.05	0.001059	3.14	295.97	68.21	0.27
grants - milan	25205	100 YR	2440.00	147.92	2210.56	81.52	6472.10	6480.02		7.92	0.003387	7.06	451.75	466.21	0.50
grants - milan	25205	10 YR	929.00		929.00		6472.10	6475.38	6475.38	3.28	0.018000	9.29	100.01	37.82	1.01
grants - milan	25500.	100 YR	2440.00	167.85	2171.25	100.90	6472.70	6481.10	6479.04	8.40	0.003278	6.60	490.38	466.90	0.48
grants - milan	25500.	10 YR	929.00		929.00		6472.70	6478.33	6476.26	5.63	0.003367	5.19	179.01	44.99	0.46
grants - milan	25725	100 YR	2440.00	938.02	1471.80	30.18	6475.22	6482.09		6.87	0.001383	3.96	1083.66	430.28	0.31
grants - milan	25725	10 YR	929.00		928.93	0.07	6475.22	6479.33		4.11	0.006620	5.41	171.76	71.38	0.61
grants - milan	25765	100 YR	2440.00	1147.73	1237.60	54.67	6476.90	6482.20		5.29	0.001529	3.75	1029.37	415.13	0.32
grants - milan	25765	10 YR	929.00		928.18	0.82	6476.90	6479.48	6479.44	2.58	0.018495	7.33	127.30	75.01	0.97
grants - milan	25800	100 YR	2440.00	1484.07	921.01	34.93	6476.04	6482.26		6.22	0.001308	4.00	1097.76	406.23	0.31
grants - milan	25800	10 YR	929.00	201.35	718.62	9.03	6476.04	6480.33		4.29	0.003800	4.99	327.22	366.34	0.49

Profile Summary Table

HEC-RAS Plan: Future with River: Rio San Jose Reach: grants - milan (Continued)

Reach	River Sta	Profile	Q Total	Q Left	Q Channel	Q Right	Min Ch El	W.S. Elev	Crit W.S.	Max Chl Dpth	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(cfs)	(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
grants - milan	26000.	100 YR	2440.00	1821.55	618.45		6475.20	6482.66		7.46	0.001450	3.65	1184.29	476.73	0.30
grants - milan	26000.	10 YR	887.00	448.55	438.45		6475.20	6481.17		5.97	0.002019	3.74	492.13	418.37	0.35
grants - milan	26500.	100 YR	2440.00	1320.84	1075.19	43.97	6476.47	6483.32		6.85	0.001901	4.51	1106.40	623.02	0.36
grants - milan	26500.	10 YR	887.00	270.52	614.85	1.63	6476.47	6481.95		5.47	0.001537	3.52	362.91	166.98	0.31
grants - milan	27000.	100 YR	2440.00	849.17	1510.82	80.02	6478.18	6485.18	6485.18	7.00	0.007122	8.55	584.01	412.62	0.69
grants - milan	27000.	10 YR	887.00	9.33	877.56	0.11	6478.18	6483.02	6483.02	4.83	0.014219	8.89	106.54	63.83	0.90
grants - milan	27500.	100 YR	2440.00	1462.71	728.10	249.19	6481.02	6487.54		6.52	0.001974	4.23	1140.23	530.29	0.36
grants - milan	27500.	10 YR	887.00	452.17	411.60	23.24	6481.02	6486.19		5.17	0.001786	3.40	516.80	394.33	0.33
grants - milan	28000.	100 YR	2440.00	1748.22	649.68	42.11	6481.25	6488.29		7.04	0.001027	2.96	1396.85	556.36	0.24
grants - milan	28000.	10 YR	887.00	516.64	368.29	2.07	6481.25	6486.85		5.60	0.000877	2.33	651.94	389.79	0.21
grants - milan	28300	100 YR	2440.00	751.02	1640.94	48.03	6483.45	6488.63	6486.27	5.76	0.001785	3.55	900.84	509.73	0.31
grants - milan	28300	10 YR	863.00	220.00	642.63	0.36	6483.45	6487.13	6484.99	4.26	0.001071	2.16	460.27	397.33	0.23
grants - milan	28500.	100 YR	2440.00	753.01	1546.39	140.61	6482.16	6488.96	6487.60	6.80	0.005247	6.33	532.70	336.06	0.53
grants - milan	28500.	10 YR	863.00	247.77	613.87	1.37	6482.16	6487.36	6485.88	5.20	0.003094	3.85	265.40	228.67	0.38
grants - milan	29000.	100 YR	2440.00	1147.34	916.15	376.51	6487.00	6492.48	6491.90	5.48	0.010691	7.40	515.15	323.86	0.72
grants - milan	29000.	10 YR	778.00	406.55	343.72	27.73	6487.00	6490.35	6490.35	3.35	0.025724	6.92	126.40	146.05	0.98
grants - milan	29500.	100 YR	2440.00	755.04	810.73	874.23	6492.17	6497.20	6496.84	5.03	0.007751	6.25	699.95	796.86	0.61
grants - milan	29500.	10 YR	778.00	293.21	414.01	70.78	6492.17	6496.16	6495.61	3.99	0.005687	4.58	262.32	572.76	0.50
grants - milan	29700	100 YR	2440.00	837.00	450.50	1152.50	6491.98	6498.22		6.24	0.002273	3.75	1357.66	849.99	0.33
grants - milan	29700	10 YR	778.00	265.78	315.56	196.66	6491.98	6497.04		5.06	0.002610	3.59	478.26	552.97	0.34
grants - milan	30000.	100 YR	2440.00	64.70	734.09	1641.20	6494.80	6499.35		5.35	0.013862	8.08	596.22	436.36	0.80
grants - milan	30000.	10 YR	778.00	1.94	430.05	346.01	6494.80	6498.36		4.36	0.014743	6.81	217.23	279.48	0.79
grants - milan	30400	100 YR	2440.00	1144.87	817.23	477.89	6495.88	6502.35		6.46	0.004440	6.17	598.75	202.39	0.49
grants - milan	30400	10 YR	778.00	347.23	340.45	90.32	6495.88	6500.75		4.87	0.002603	3.78	312.33	160.56	0.36
grants - milan	30500.	100 YR	2440.00	389.81	1283.23	766.96	6495.67	6502.64		6.97	0.008875	8.97	469.41	219.88	0.69
grants - milan	30500.	10 YR	778.00	115.22	553.64	109.15	6495.67	6500.91		5.24	0.005626	5.74	192.20	102.99	0.52
grants - milan	31000	100 YR	2440.00		2440.00		6500.72	6505.33		4.60	0.003822	7.66	318.67	78.42	0.67
grants - milan	31000	10 YR	778.00		778.00		6500.72	6503.13		2.41	0.003542	4.99	155.89	69.62	0.59
grants - milan	31500	100 YR	2440.00		2440.00		6501.52	6507.03		5.51	0.002055	6.23	391.46	82.05	0.50
grants - milan	31500	10 YR	778.00		778.00		6501.52	6504.48		2.96	0.001747	3.98	195.40	71.86	0.43
grants - milan	32000	100 YR	2440.00		2440.00		6502.32	6508.05		5.73	0.001798	5.96	409.38	82.92	0.47
grants - milan	32000	10 YR	778.00		778.00		6502.32	6505.34		3.02	0.001638	3.90	199.48	72.08	0.41
grants - milan	32500	100 YR	2440.00		2440.00		6503.12	6508.95		5.82	0.001697	5.85	417.34	83.30	0.46
grants - milan	32500	10 YR	787.00		787.00		6503.12	6506.16		3.04	0.001644	3.92	200.75	72.15	0.41

Profile Summary Table

HEC-RAS Plan: Future with River: Rio San Jose Reach: grants - milan (Continued)

Reach	River Sta	Profile	Q Total	Q Left	Q Channel	Q Right	Min Ch El	W.S. Elev	Crit W.S.	Max Chl Dpth	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(cfs)	(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
grants - milan	33000	100 YR	2440.00		2440.00		6503.92	6509.79		5.87	0.001650	5.79	421.33	83.49	0.45
grants - milan	33000	10 YR	787.00		787.00		6503.92	6506.98		3.05	0.001613	3.90	201.94	72.22	0.41
grants - milan	33350	100 YR	2440.00		2440.00		6504.48	6510.37		5.89	0.001632	5.77	422.88	83.56	0.45
grants - milan	33350	10 YR	787.00		787.00		6504.48	6507.54		3.06	0.001607	3.89	202.19	72.23	0.41
grants - milan	33750	100 YR	2440.00		2440.00		6505.12	6511.02		5.90	0.001619	5.75	423.98	83.62	0.45
grants - milan	33750	10 YR	787.00		787.00		6505.12	6508.18		3.06	0.001604	3.89	202.33	72.24	0.41
grants - milan	34000	100 YR	2440.00		2440.00		6505.52	6511.43		5.91	0.001614	5.75	424.43	83.64	0.45
grants - milan	34000	10 YR	787.00		787.00		6505.52	6508.58		3.06	0.001602	3.89	202.40	72.24	0.41
grants - milan	34250	100 YR	2440.00		2440.00		6505.92	6511.83		5.91	0.001610	5.74	424.76	83.65	0.45
grants - milan	34250	10 YR	787.00		787.00		6505.92	6508.98		3.06	0.001601	3.89	202.44	72.25	0.41
grants - milan	34500	100 YR	2440.00		2440.00		6506.32	6512.24		5.92	0.001608	5.74	425.00	83.67	0.45
grants - milan	34500	10 YR	639.00		639.00		6506.32	6509.40		3.08	0.001037	3.14	203.60	72.31	0.33
grants - milan	34990	100 YR	2440.00		2440.00		6507.10	6513.04		5.94	0.002224	6.64	367.20	73.74	0.52
grants - milan	34990	10 YR	639.00		639.00		6507.10	6509.99		2.89	0.001818	3.96	161.45	61.58	0.43
grants - milan	35000 Milan Street		Bridge												
grants - milan	35050	100 YR	2440.00		2440.00		6507.21	6513.43	6511.17	6.22	0.001888	6.28	388.28	74.88	0.49
grants - milan	35050	10 YR	639.00		639.00		6507.21	6510.28	6508.88	3.07	0.001495	3.71	172.07	62.26	0.39
grants - milan	35100	100 YR	2440.00		2440.00		6507.29	6513.53		6.24	0.001865	6.26	389.89	74.96	0.48
grants - milan	35100	10 YR	639.00		639.00		6507.29	6510.35		3.06	0.001503	3.72	171.76	62.24	0.39
grants - milan	35300	100 YR	2440.00		2440.00		6507.61	6513.91		6.30	0.001802	6.18	394.51	75.21	0.48
grants - milan	35300	10 YR	639.00		639.00		6507.61	6510.65		3.04	0.001534	3.75	170.61	62.17	0.40
grants - milan	35700	100 YR	2440.00		2440.00		6508.25	6514.64		6.39	0.001719	6.09	400.88	75.54	0.47
grants - milan	35700	10 YR	639.00		639.00		6508.25	6511.27		3.02	0.001573	3.78	169.24	62.08	0.40
grants - milan	36000	100 YR	2440.00		2440.00		6508.73	6515.16		6.43	0.001681	6.04	403.91	75.71	0.46
grants - milan	36000	10 YR	639.00		639.00		6508.73	6511.74		3.01	0.001588	3.79	168.73	62.05	0.40
grants - milan	36118	100 YR	2440.00		2440.00		6508.92	6515.36		6.44	0.001672	6.03	404.68	75.75	0.46
grants - milan	36118	10 YR	639.00		639.00		6508.92	6511.93		3.01	0.001592	3.79	168.58	62.04	0.41
grants - milan	36158 Airport Street		Bridge												
grants - milan	36205	100 YR	2440.00		2440.00		6509.06	6515.77	6513.02	6.71	0.001443	5.73	425.58	76.84	0.43
grants - milan	36205	10 YR	639.00		639.00		6509.06	6512.27	6510.73	3.21	0.001273	3.52	181.32	62.85	0.37
grants - milan	36255	100 YR	2440.00		2440.00		6509.12	6515.85		6.73	0.001430	5.72	426.86	76.91	0.43
grants - milan	36255	10 YR	639.00		639.00		6509.12	6512.34		3.22	0.001266	3.52	181.63	62.87	0.36
grants - milan	36500	100 YR	2440.00		2440.00		6509.41	6516.20		6.79	0.001381	5.65	432.01	77.18	0.42

Profile Summary Table

HEC-RAS Plan: Future with River: Rio San Jose Reach: grants - milan (Continued)

Reach	River Sta	Profile	Q Total	Q Left	Q Channel	Q Right	Min Ch El	W.S. Elev	Crit W.S.	Max Chl Dpth	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(cfs)	(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
grants - milan	36500	10 YR	639.00		639.00		6509.41	6512.65		3.24	0.001240	3.49	182.86	62.95	0.36
grants - milan	37000	100 YR	2440.00		2440.00		6510.01	6516.90		6.89	0.001317	5.56	439.15	77.54	0.41
grants - milan	37000	10 YR	639.00		639.00		6510.01	6513.27		3.25	0.001218	3.47	183.93	63.02	0.36
grants - milan	37150	100 YR	2440.00		2440.00		6510.19	6517.10		6.91	0.001303	5.54	440.74	77.63	0.41
grants - milan	37150	10 YR	639.00		639.00		6510.19	6513.45		3.26	0.001214	3.47	184.12	63.03	0.36
grants - milan	37180 Clay Street		Bridge												
grants - milan	37210	100 YR	2440.00		2440.00		6510.26	6517.32	6514.22	7.06	0.001204	5.39	452.92	78.25	0.39
grants - milan	37210	10 YR	639.00		639.00		6510.26	6513.63	6511.93	3.37	0.001080	3.34	191.28	63.48	0.34
grants - milan	37260	100 YR	2440.00		2440.00		6510.32	6517.38		7.06	0.001203	5.39	453.00	78.26	0.39
grants - milan	37260	10 YR	639.00		639.00		6510.32	6513.69		3.36	0.001087	3.35	190.88	63.46	0.34
grants - milan	37500	100 YR	2440.00		2440.00		6510.61	6517.67		7.06	0.001204	5.39	452.88	78.25	0.39
grants - milan	37500	10 YR	639.00		639.00		6510.61	6513.95		3.34	0.001119	3.38	189.12	63.35	0.34
grants - milan	37700	100 YR	2440.00		2440.00		6510.85	6517.91		7.06	0.001204	5.39	452.92	78.25	0.39
grants - milan	37700	10 YR	639.00		639.00		6510.85	6514.17		3.32	0.001137	3.40	188.10	63.28	0.35
grants - milan	37980	100 YR	2440.00		2440.00		6511.19	6518.25		7.06	0.001205	5.39	452.69	78.24	0.39
grants - milan	37980	10 YR	639.00		639.00		6511.19	6514.49		3.30	0.001161	3.42	186.83	63.20	0.35
grants - milan	38000 Sand Street		Bridge												
grants - milan	38050	100 YR	2440.00		2440.00		6511.27	6518.49	6515.23	7.22	0.001113	5.25	465.20	78.88	0.38
grants - milan	38050	10 YR	559.00		559.00		6511.27	6514.66	6512.81	3.39	0.000809	2.90	192.62	63.57	0.29
grants - milan	38100	100 YR	2440.00		2440.00		6511.33	6518.55		7.21	0.001116	5.25	464.85	78.86	0.38
grants - milan	38100	10 YR	559.00		559.00		6511.33	6514.70		3.37	0.000826	2.92	191.35	63.49	0.30
grants - milan	38500	100 YR	2440.00		2440.00		6511.81	6518.99		7.18	0.001134	5.28	462.23	78.73	0.38
grants - milan	38500	10 YR	559.00		559.00		6511.81	6515.05		3.24	0.000950	3.06	182.79	62.95	0.32
grants - milan	39000	100 YR	2440.00		2440.00		6512.41	6519.56		7.15	0.001153	5.31	459.70	78.60	0.39
grants - milan	39000	10 YR	559.00		559.00		6512.41	6515.54		3.13	0.001064	3.17	176.18	62.53	0.33
grants - milan	39500	100 YR	2440.00		2440.00		6513.01	6520.14		7.13	0.001166	5.33	457.93	78.51	0.39
grants - milan	39500	10 YR	559.00		559.00		6513.01	6516.09		3.08	0.001131	3.24	172.70	62.30	0.34
grants - milan	39700	100 YR	2440.00		2440.00		6513.25	6520.21		6.96	0.002357	7.17	340.36	62.83	0.54
grants - milan	39700	10 YR	559.00		559.00		6513.25	6516.30		3.05	0.002306	4.47	125.14	47.18	0.48
grants - milan	40000	100 YR	2440.00		2440.00		6514.11	6520.91		6.80	0.002561	7.38	330.56	62.21	0.56
grants - milan	40000	10 YR	559.00		559.00		6514.11	6517.02		2.91	0.002700	4.71	118.75	46.64	0.52
grants - milan	40250	100 YR	2440.00		2440.00		6514.83	6521.55		6.72	0.002681	7.50	325.32	61.87	0.58
grants - milan	40250	10 YR	559.00		559.00		6514.83	6517.70		2.87	0.002828	4.78	116.95	46.48	0.53

Profile Summary Table

HEC-RAS Plan: Future with River: Rio San Jose Reach: grants - milan (Continued)

Reach	River Sta	Profile	Q Total	Q Left	Q Channel	Q Right	Min Ch El	W.S. Elev	Crit W.S.	Max Chl Dpth	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(cfs)	(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
grants - milan	40500	100 YR	2440.00		2440.00		6515.51	6522.22		6.71	0.002695	7.51	324.71	61.83	0.58
grants - milan	40500	10 YR	559.00		559.00		6515.51	6518.41		2.90	0.002745	4.73	118.11	46.58	0.52
grants - milan	40890	100 YR	2440.00		2440.00		6516.52	6523.27		6.75	0.002631	7.45	327.44	62.00	0.57
grants - milan	40890	10 YR	559.00		559.00		6516.52	6519.46		2.94	0.002604	4.65	120.18	46.76	0.51
grants - milan	40900	100 YR	2440.00		2440.00		6519.02	6522.98	6522.98	3.96	0.009049	10.63	229.52	65.85	1.00
grants - milan	40900	10 YR	559.00		559.00		6519.02	6520.55	6520.55	1.53	0.011907	6.87	81.42	56.14	1.00
grants - milan	40950	100 YR	2440.00		2440.00		6519.49	6524.59		5.10	0.001559	5.31	459.69	100.39	0.44
grants - milan	40950	10 YR	559.00		559.00		6519.49	6521.37		1.88	0.002373	3.55	157.59	87.53	0.47
grants - milan	41025 Santa Fe Av-Hrz		Culvert												
grants - milan	41100	100 YR	2440.00		2440.00		6520.20	6525.28	6523.18	5.08	0.001574	5.32	458.22	100.33	0.44
grants - milan	41100	10 YR	559.00		559.00		6520.20	6521.97	6521.33	1.77	0.002896	3.77	148.12	87.09	0.51
grants - milan	41150	100 YR	2440.00		2440.00		6520.51	6525.33		4.82	0.001885	5.65	432.10	99.28	0.48
grants - milan	41150	10 YR	559.00		559.00		6520.51	6522.11		1.60	0.004111	4.21	132.88	86.39	0.60
grants - milan	41190	100 YR	2440.00		2440.00		6520.76	6525.38		4.62	0.002184	5.92	411.96	98.47	0.51
grants - milan	41190	10 YR	559.00		559.00		6520.76	6522.26		1.50	0.005040	4.48	124.75	86.01	0.66
grants - milan	41220 Santa Fe RR-Hrz		Bridge												
grants - milan	41250	100 YR	2440.00		2440.00		6520.82	6526.25	6523.80	5.43	0.001259	4.95	492.94	101.70	0.40
grants - milan	41250	10 YR	559.00		559.00		6520.82	6523.06	6521.95	2.24	0.001314	2.95	189.56	88.97	0.36
grants - milan	41300	100 YR	2440.00		2440.00		6520.87	6525.91		5.04	0.003934	8.06	302.91	70.17	0.68
grants - milan	41300	10 YR	559.00		559.00		6520.87	6523.01		2.14	0.003865	4.81	116.25	58.57	0.60
grants - milan	41500	100 YR	2440.00		2440.00		6521.07	6526.83		5.76	0.002477	6.89	354.05	73.02	0.55
grants - milan	41500	10 YR	559.00		559.00		6521.07	6523.69		2.62	0.001961	3.87	144.50	60.46	0.44
grants - milan	41900	100 YR	2440.00		2440.00		6521.47	6527.82		6.35	0.001751	6.13	398.34	75.41	0.47
grants - milan	41900	10 YR	559.00		559.00		6521.47	6524.39		2.92	0.001355	3.43	162.87	61.67	0.37
grants - milan	42000	100 YR	2440.00		2440.00		6521.57	6528.02		6.45	0.001663	6.02	405.46	75.79	0.46
grants - milan	42000	10 YR	559.00		559.00		6521.57	6524.53		2.96	0.001295	3.38	165.28	61.82	0.36
grants - milan	42375	100 YR	2440.00		2440.00		6521.95	6528.65		6.70	0.001448	5.74	425.06	76.81	0.43
grants - milan	42375	10 YR	559.00		559.00		6521.95	6525.00		3.05	0.001166	3.27	171.00	62.19	0.35
grants - milan	42382 Hwy 605		Bridge												
grants - milan	42470	100 YR	2440.00		2440.00		6522.04	6528.99	6526.00	6.95	0.001276	5.50	443.97	77.79	0.41
grants - milan	42470	10 YR	559.00		559.00		6522.04	6525.24	6523.58	3.20	0.000985	3.09	180.65	62.81	0.32
grants - milan	42520	100 YR	2440.00		2440.00		6522.09	6529.06		6.97	0.001264	5.48	445.34	77.86	0.40
grants - milan	42520	10 YR	559.00		559.00		6522.09	6525.29		3.20	0.000985	3.09	180.65	62.81	0.32

Profile Summary Table

HEC-RAS Plan: Future with River: Rio San Jose Reach: grants - milan (Continued)

Reach	River Sta	Profile	Q Total	Q Left	Q Channel	Q Right	Min Ch El	W.S. Elev	Crit W.S.	Max Chl Dpth	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(cfs)	(cfs)	(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
grants - milan	42700	100 YR	2440.00		2440.00		6522.22	6529.30		7.08	0.001196	5.38	453.88	78.30	0.39
grants - milan	42700	10 YR	559.00		559.00		6522.22	6525.47		3.25	0.000936	3.04	183.66	63.00	0.31
grants - milan	43000	100 YR	2440.00	1441.69	562.25	436.06	6522.44	6529.98	6528.41	7.54	0.000571	2.68	1759.68	747.30	0.22
grants - milan	43000	10 YR	559.00		495.80	63.20	6522.44	6526.10	6526.10	3.66	0.010048	7.41	95.94	67.95	0.84
grants - milan	43500	100 YR	2440.00	1322.67	600.23	517.10	6522.95	6530.22		7.27	0.000414	2.38	2152.27	961.44	0.19
grants - milan	43500	10 YR	559.00	87.34	414.47	57.19	6522.95	6527.97		5.02	0.000985	2.89	373.54	450.34	0.28

Bridge Summary Table

HEC-RAS Plan: Future with River: Rio San Jose Reach: grants - milan

Reach	River Sta	Profile	Q Total	E.G. US.	W.S. US.	Q Bridge	BR Open Area	BR Open Vel
			(cfs)	(ft)	(ft)	(cfs)	(sq ft)	(ft/s)
grants - milan	4566 Santa Fe RR-Mb	100 YR	4470.00	6417.18	6416.45	4470.00	513.49	10.67
grants - milan	4566 Santa Fe RR-Mb	10 YR	1484.00	6413.99	6413.78	1484.00	513.49	4.66
grants - milan	8860 George Hanosh	100 YR	3603.00	6424.42	6423.87	3603.00	473.29	7.61
grants - milan	8860 George Hanosh	10 YR	1236.00	6419.64	6419.34	1236.00	473.29	4.87
grants - milan	11337 Nimitz Drive	100 YR	3570.00	6430.52	6428.38	3570.00	424.93	11.75
grants - milan	11337 Nimitz Drive	10 YR	1220.00	6424.70	6423.28	1220.00	424.93	9.56
grants - milan	14440 Anderman Street	100 YR	2440.00	6433.96	6433.38	2440.00	348.18	7.01
grants - milan	14440 Anderman Street	10 YR	1024.00	6429.26	6428.62	1024.00	348.18	7.12
grants - milan	15725 1st Street	100 YR	2440.00	6436.24	6435.60	2440.00	511.13	6.59
grants - milan	15725 1st Street	10 YR	1024.00	6432.42	6431.99	1024.00	511.13	5.50
grants - milan	16245 2nd Street	100 YR	2440.00	6437.31	6436.67	2440.00	462.63	6.52
grants - milan	16245 2nd Street	10 YR	1024.00	6433.57	6433.16	1024.00	462.63	5.27
grants - milan	18634 High Street	100 YR	2440.00	6447.96	6447.40	2440.00	301.00	8.11
grants - milan	18634 High Street	10 YR	984.00	6443.51	6443.03	984.00	301.00	7.24
grants - milan	19076 Santa Fe Av-High	100 YR	2440.00	6450.74	6450.24	2440.00	500.33	7.19
grants - milan	19076 Santa Fe Av-High	10 YR	966.00	6447.68	6447.40	966.00	500.33	5.53
grants - milan	19464 Santa Fe RR-5th	100 YR	2440.00	6452.65	6452.31	2440.00	463.53	10.27
grants - milan	19464 Santa Fe RR-5th	10 YR	966.00	6450.15	6450.04	966.00	463.53	7.92
grants - milan	35000 Milan Street	100 YR	2440.00	6514.04	6513.43	2440.00	411.34	7.07
grants - milan	35000 Milan Street	10 YR	639.00	6510.49	6510.28	639.00	411.34	4.20
grants - milan	36158 Airport Street	100 YR	2440.00	6516.28	6515.77	2440.00	422.50	6.41
grants - milan	36158 Airport Street	10 YR	639.00	6512.47	6512.27	639.00	422.50	4.05
grants - milan	37180 Clay Street	100 YR	2440.00	6517.77	6517.32	2440.00	483.61	5.85
grants - milan	37180 Clay Street	10 YR	639.00	6513.80	6513.63	639.00	483.61	3.68
grants - milan	38000 Sand Street	100 YR	2440.00	6518.92	6518.49	2440.00	524.47	5.67
grants - milan	38000 Sand Street	10 YR	559.00	6514.79	6514.66	559.00	524.47	3.15
grants - milan	41220 Santa Fe RR-Hrz	100 YR	2440.00	6526.63	6526.25	2440.00	545.91	9.32
grants - milan	41220 Santa Fe RR-Hrz	10 YR	559.00	6523.20	6523.06	559.00	545.91	6.59
grants - milan	42382 Hwy 605	100 YR	2440.00	6529.46	6528.99	2440.00	424.00	6.07
grants - milan	42382 Hwy 605	10 YR	559.00	6525.39	6525.24	559.00	424.00	3.46

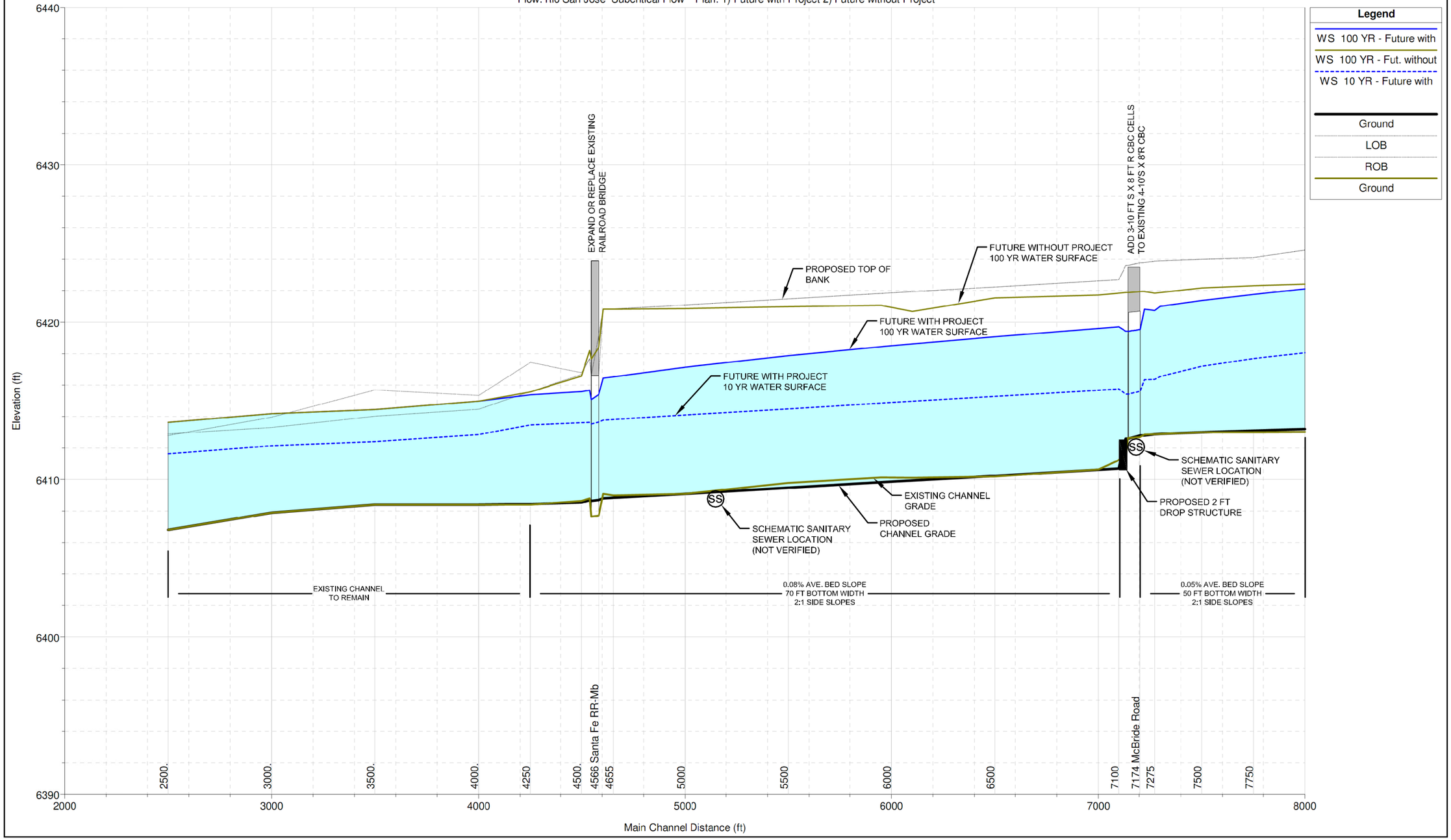
Culvert Summary Table

HEC-RAS Plan: Future with River: Rio San Jose Reach: grants - milan

Reach	River Sta	Profile	Q Total	E.G. US.	E.G. DS	W.S. US.	W.S. DS	Delta WS	Q Weir	Min El Weir Flow	Weir Max Depth	Wr Top Wdth	Q Culv Group	Culv Inv El Up	Culv Inv El Dn	Culv Vel US	Culv Vel DS
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft)	(cfs)	(ft)	(ft)	(ft)	(cfs)	(ft)	(ft)	(ft/s)	(ft/s)
grants - milan	7174 McBride Road McBride Rd	100 YR	4541.00	6421.49	6420.41	6420.82	6419.42	1.40		6423.51			4541.00	6412.70	6412.63	9.49	9.55
grants - milan	7174 McBride Road McBride Rd	10 YR	1495.00	6416.80	6416.19	6416.34	6415.44	0.90		6423.51			1495.00	6412.70	6412.63	7.35	7.61
grants - milan	25112 El Morro El Morrow	100 YR	2440.00	6480.50	6477.92	6480.31	6477.25	3.06		6483.64			2440.00	6470.60	6470.30	12.19	11.71
grants - milan	25112 El Morro El Morrow	10 YR	929.00	6475.81	6474.57	6475.65	6474.19	1.47		6483.64			929.00	6470.60	6470.30	8.66	7.97
grants - milan	41025 Santa Fe Av-Hrz US 66 (Horz)	100 YR	2440.00	6525.72	6525.02	6525.28	6524.59	0.70		6529.01			2440.00	6520.15	6519.69	6.85	6.36
grants - milan	41025 Santa Fe Av-Hrz US 66 (Horz)	10 YR	559.00	6522.19	6521.57	6521.97	6521.37	0.60		6529.01			559.00	6520.15	6519.69	4.95	4.42

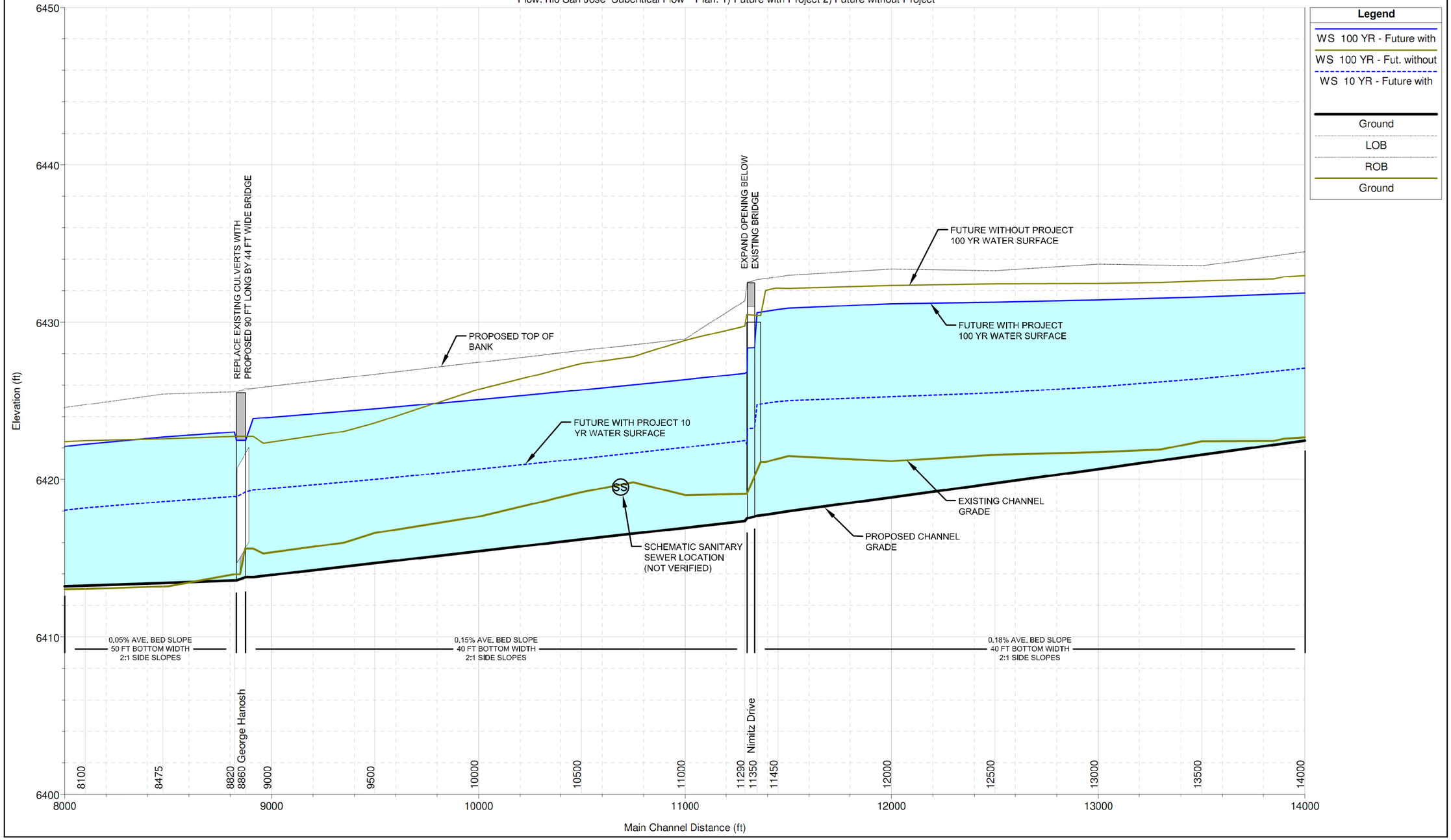
Rio San Jose Concept Design

Flow: Rio San Jose Subcritical Flow Plan: 1) Future with Project 2) Future without Project



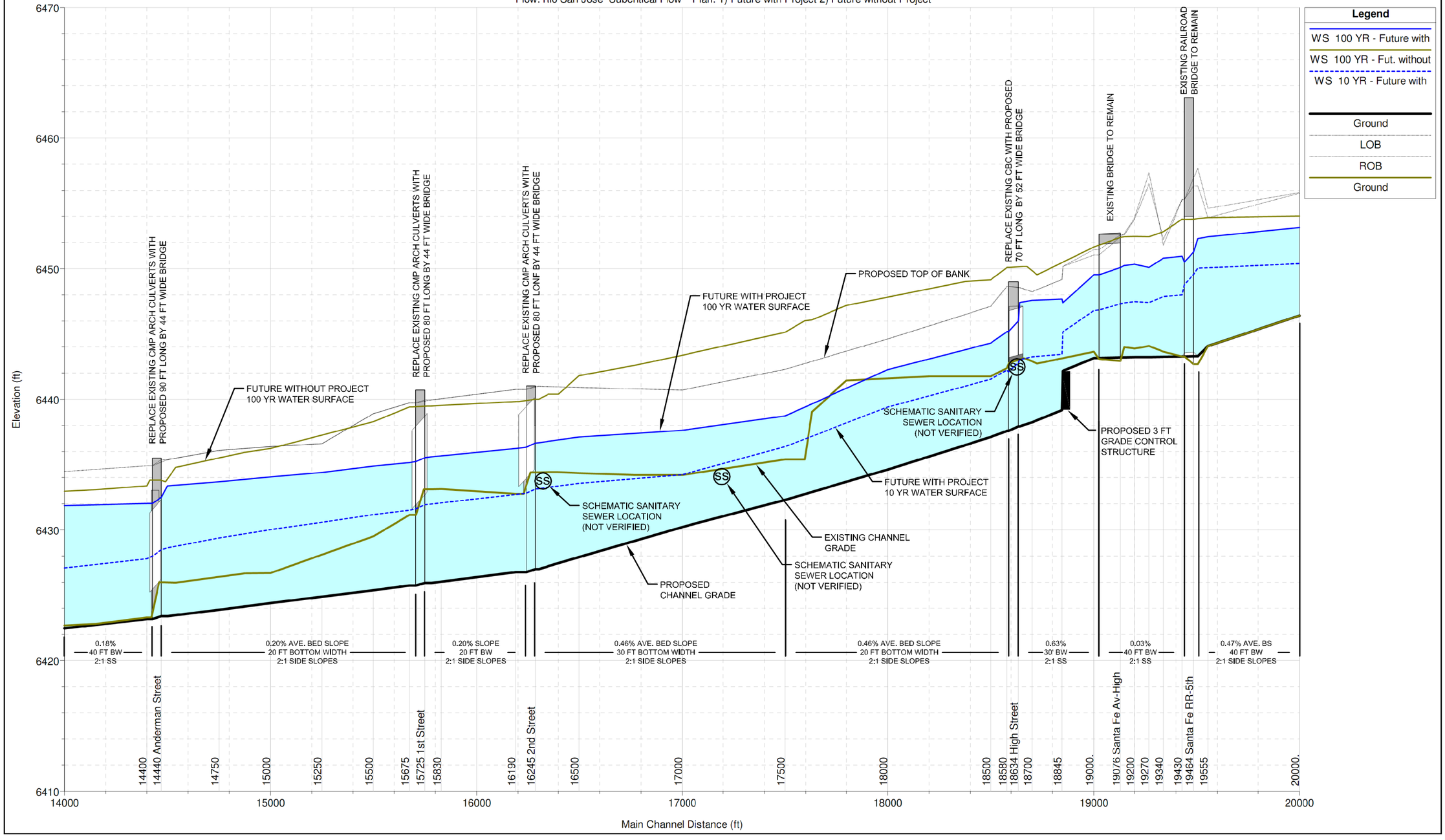
Rio San Jose Concept Design

Flow: Rio San Jose Subcritical Flow Plan: 1) Future with Project 2) Future without Project



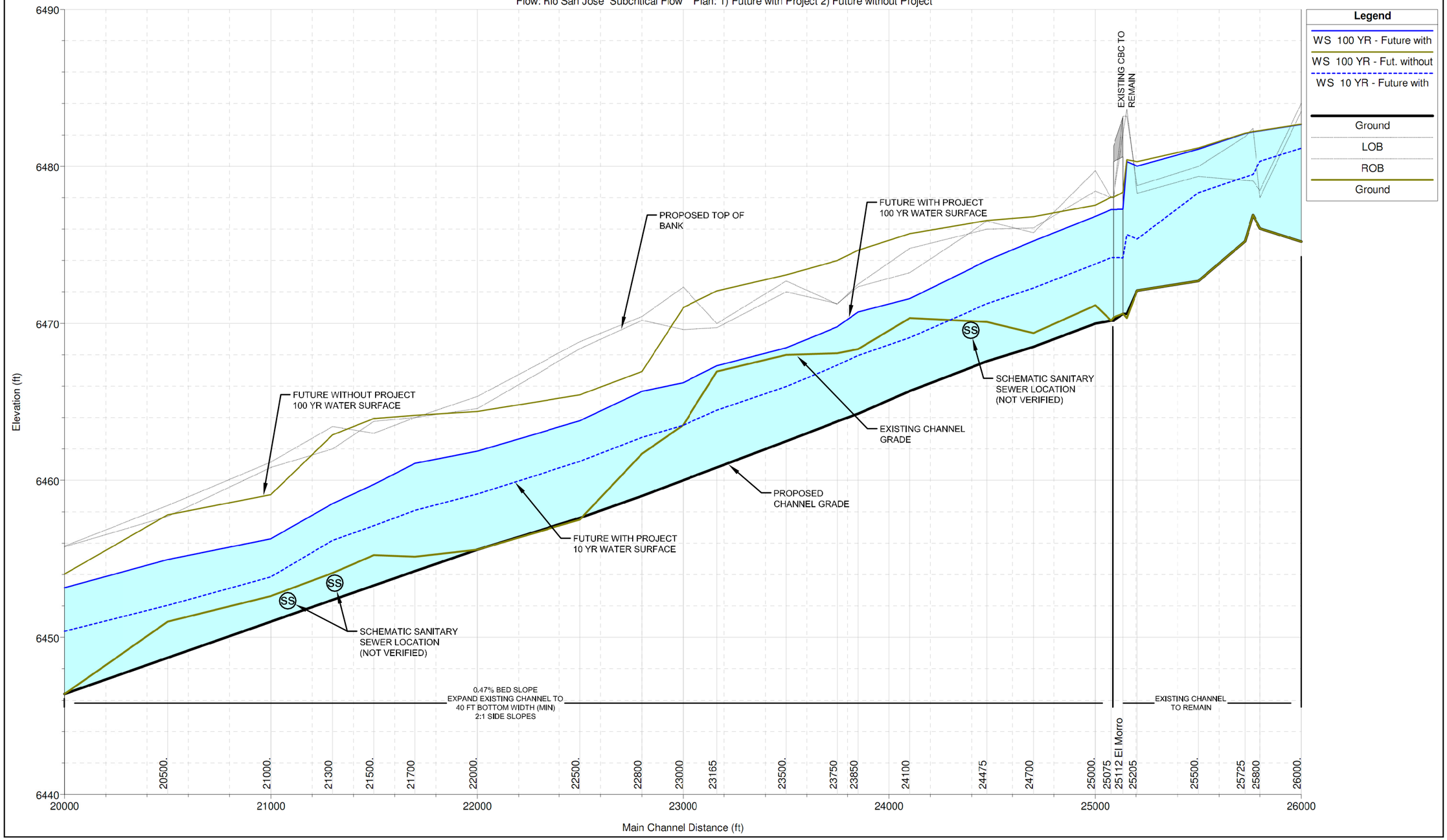
Rio San Jose Concept Design

Flow: Rio San Jose Subcritical Flow Plan: 1) Future with Project 2) Future without Project



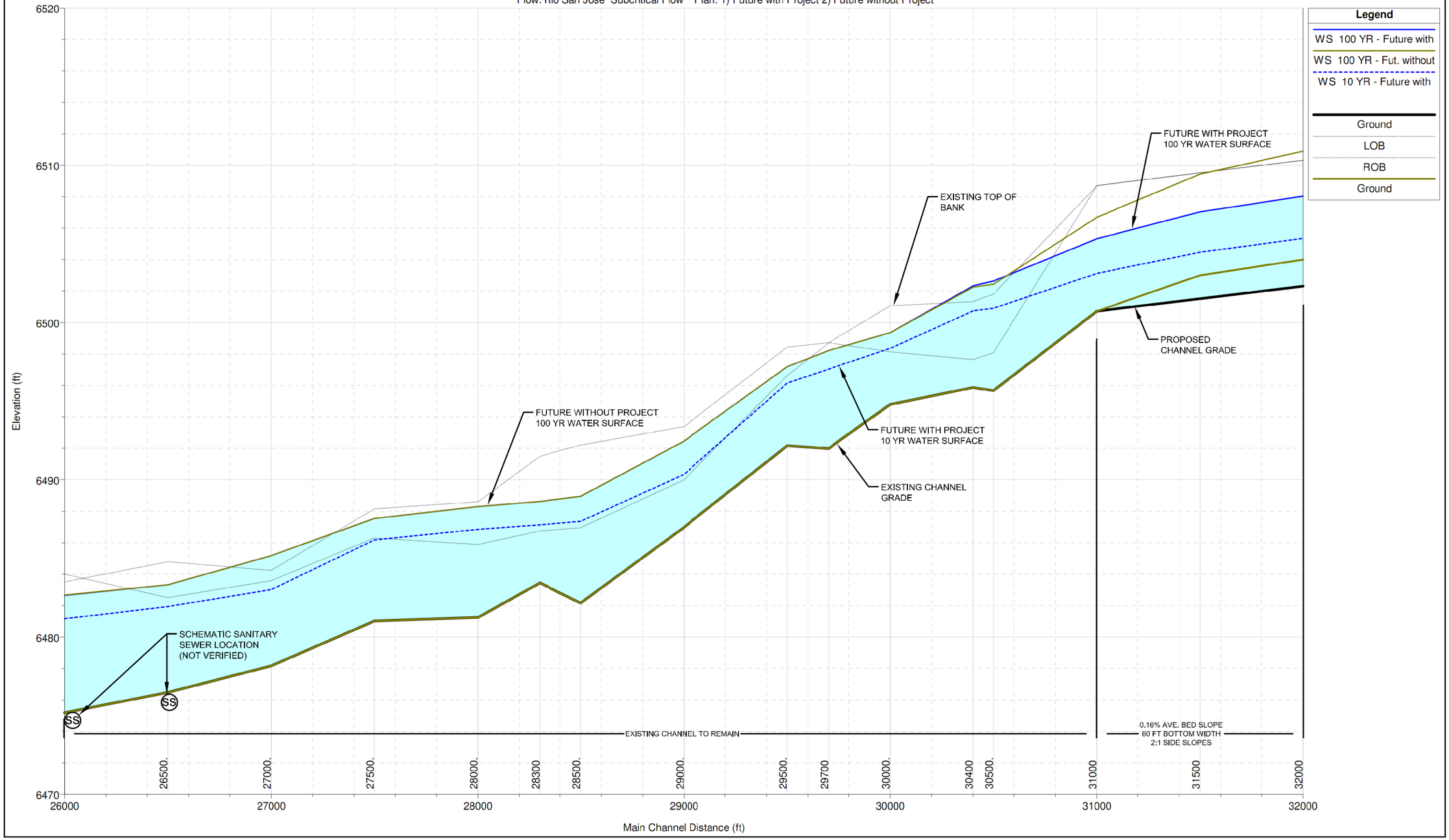
Rio San Jose Concept Design

Flow: Rio San Jose Subcritical Flow Plan: 1) Future with Project 2) Future without Project



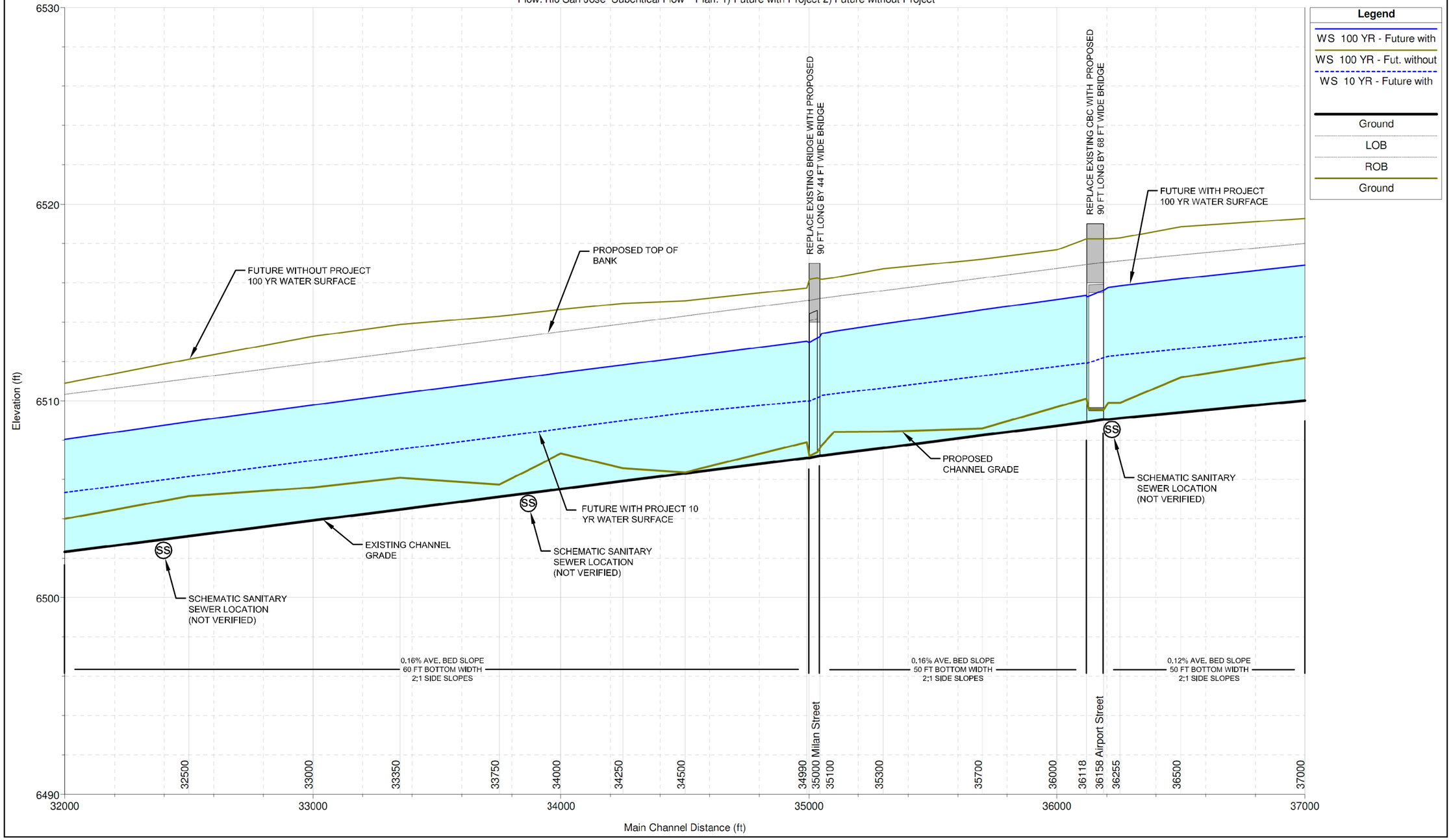
Rio San Jose Concept Design

Flow: Rio San Jose Subcritical Flow Plan: 1) Future with Project 2) Future without Project



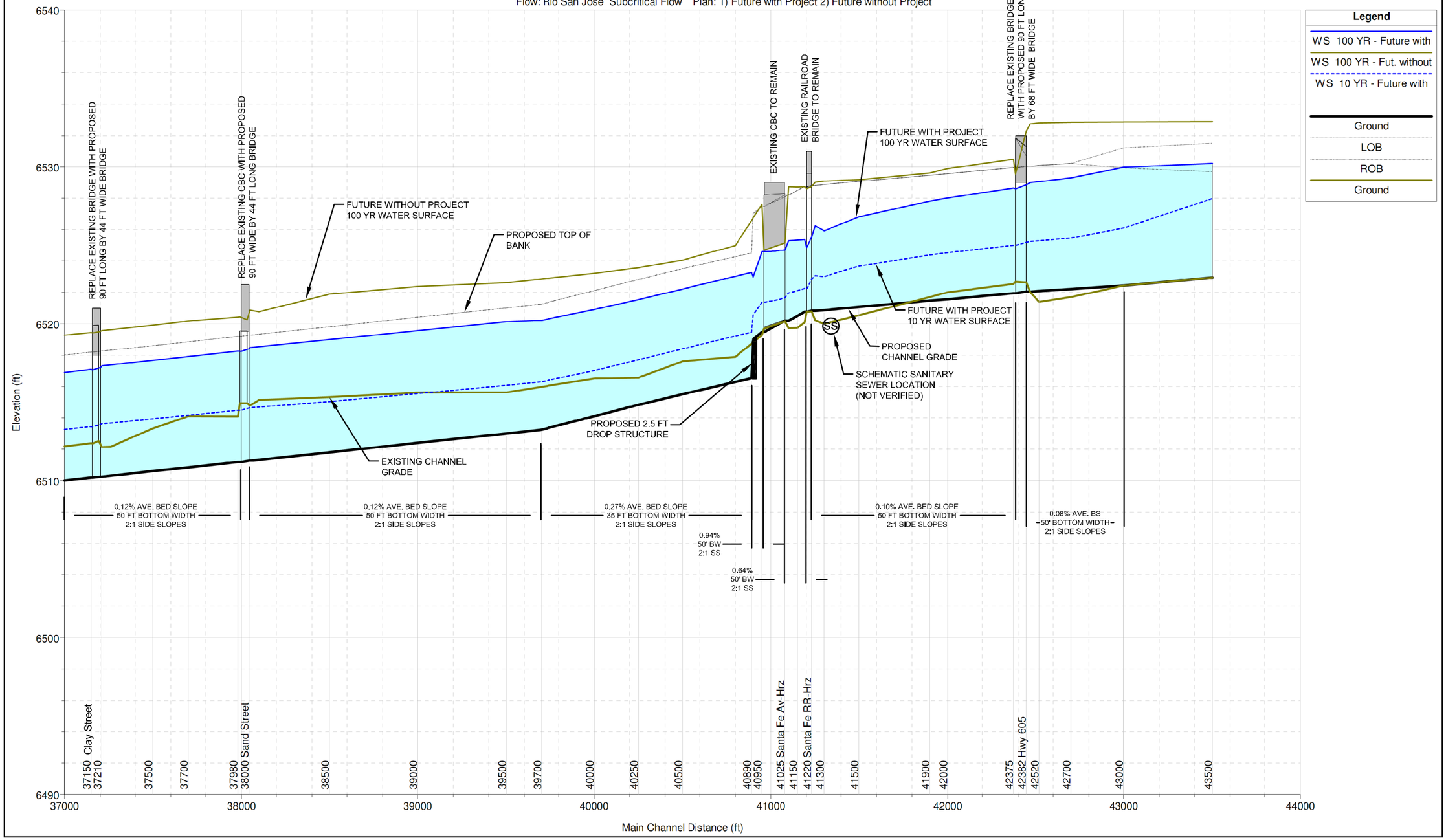
Rio San Jose Concept Design

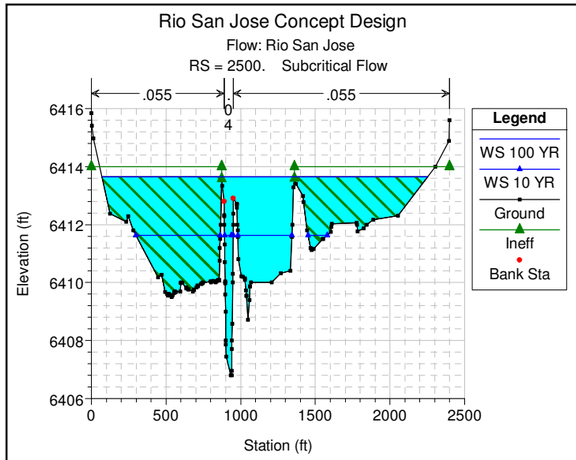
Flow: Rio San Jose Subcritical Flow Plan: 1) Future with Project 2) Future without Project



Rio San Jose Concept Design

Flow: Rio San Jose Subcritical Flow Plan: 1) Future with Project 2) Future without Project

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Legend
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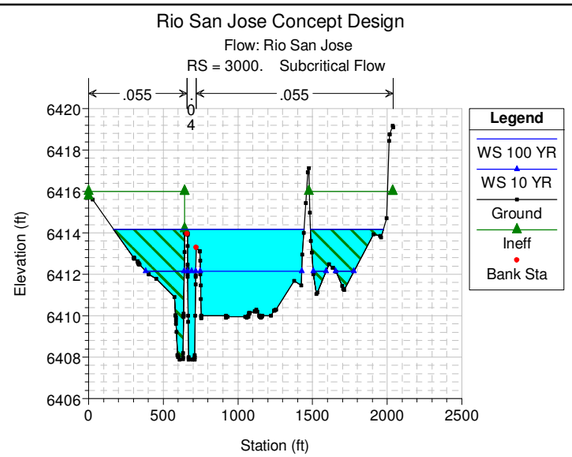
WS 10 YR
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
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0
4
Legend
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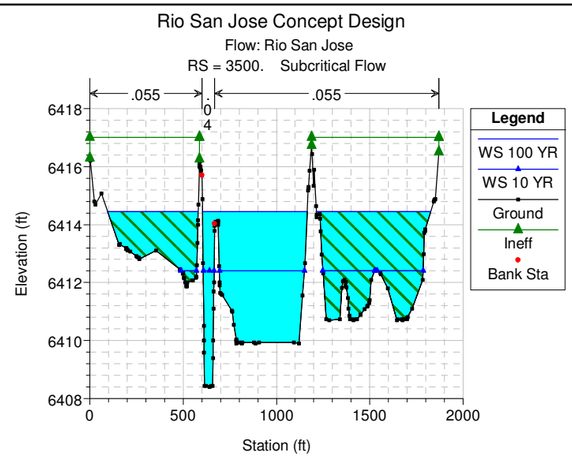
WS 10 YR
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)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Flow: Rio San Jose
RS = 3500. Subcritical Flow
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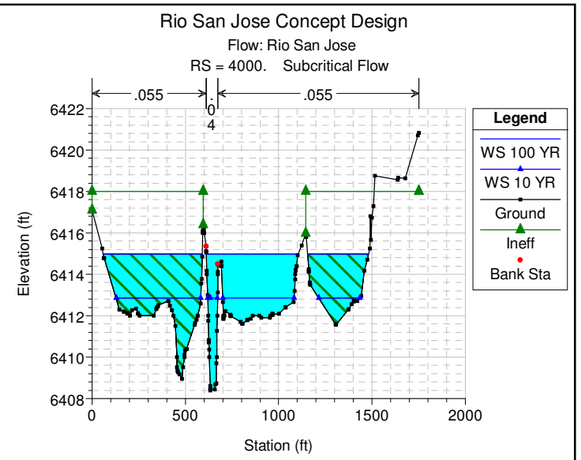
.055
0
4
Legend
WS 100 YR
WS 10 YR
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
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RS = 4000. Subcritical Flow
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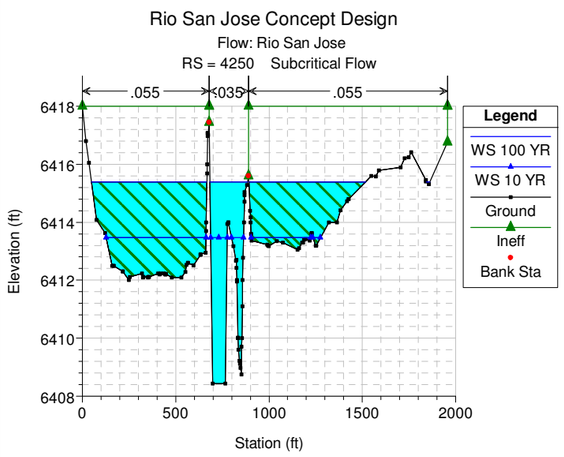
.055
0
4
Legend
WS 100 YR
WS 10 YR
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 4250 Subcritical Flow
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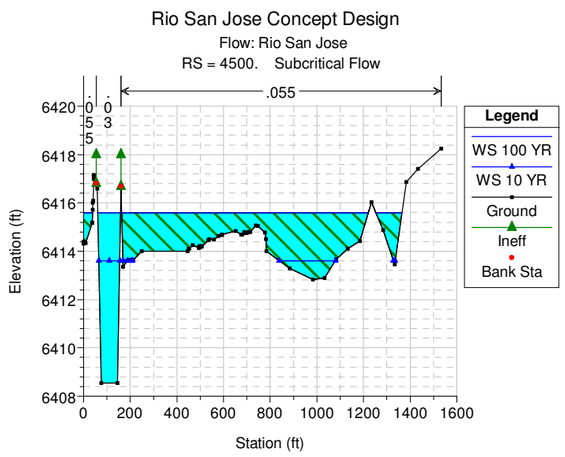
.035
.055
Legend
WS 100 YR
WS 10 YR
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 4500. Subcritical Flow
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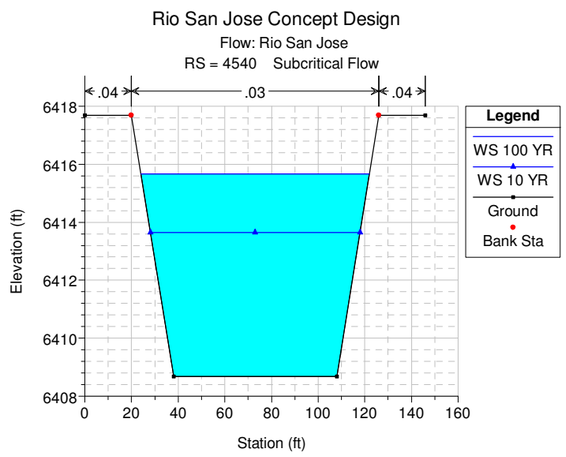
5
0
3
5
Legend
WS 100 YR
WS 10 YR
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)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Flow: Rio San Jose
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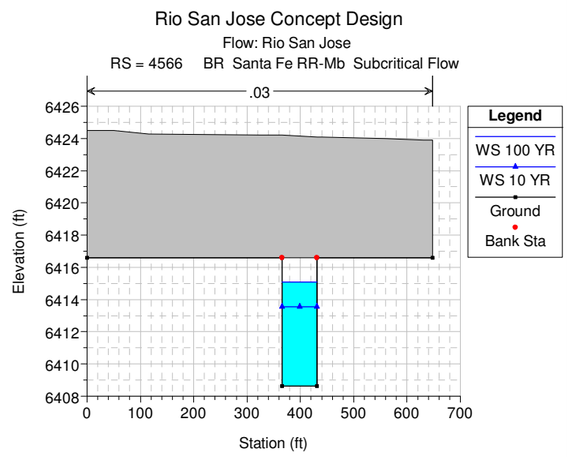
.03
.04
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
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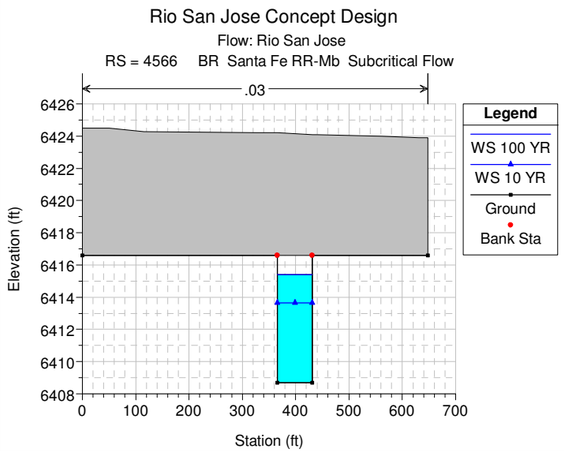
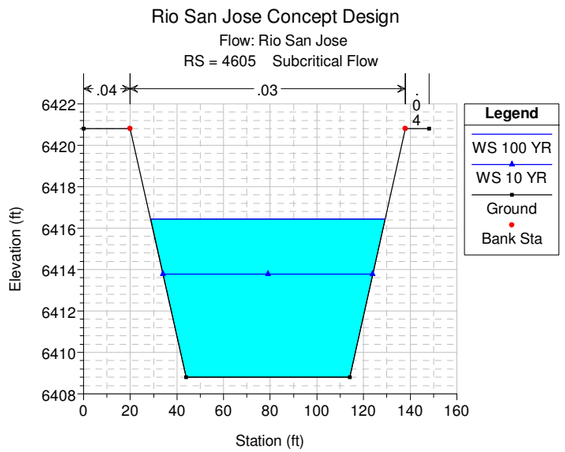
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 4566 BR Santa Fe RR-Mb Subcritical Flow
.03
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 4605 Subcritical Flow
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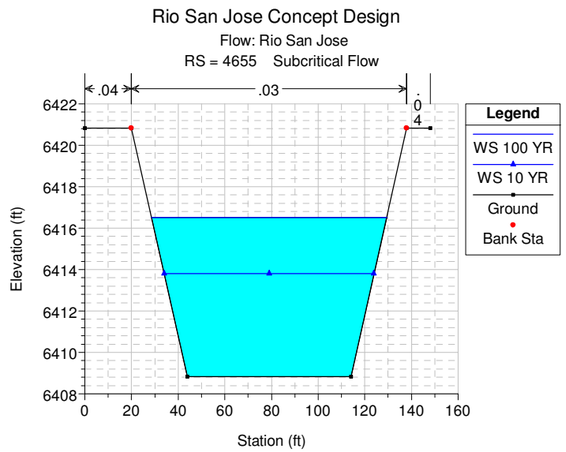
.03
0
4
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 4655 Subcritical Flow
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.03
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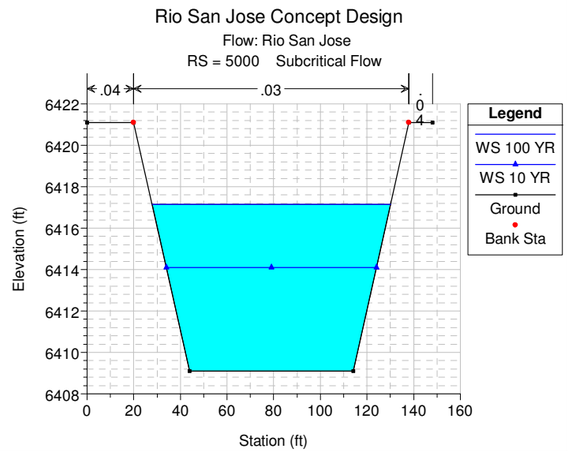
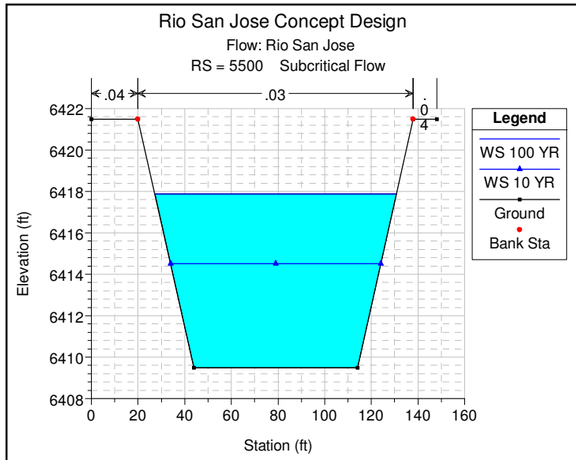
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 5000 Subcritical Flow
.04
.03
0
4
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 5500 Subcritical Flow
.04
.03
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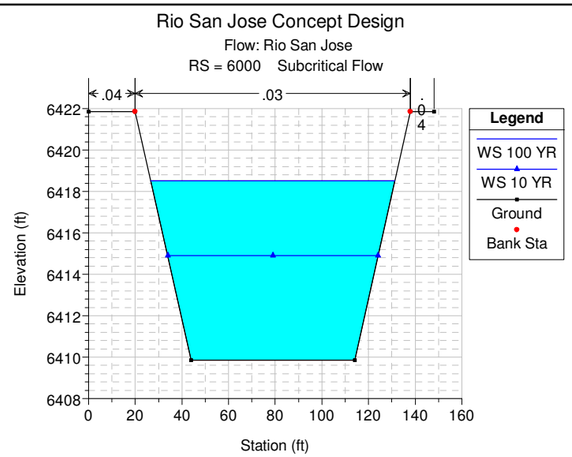
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 6000 Subcritical Flow
.04
.03
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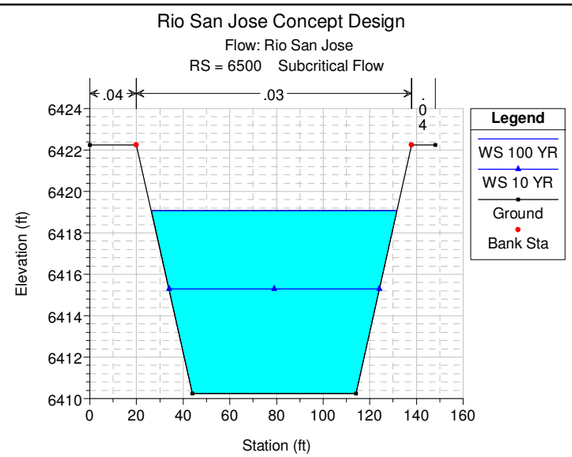
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 6500 Subcritical Flow
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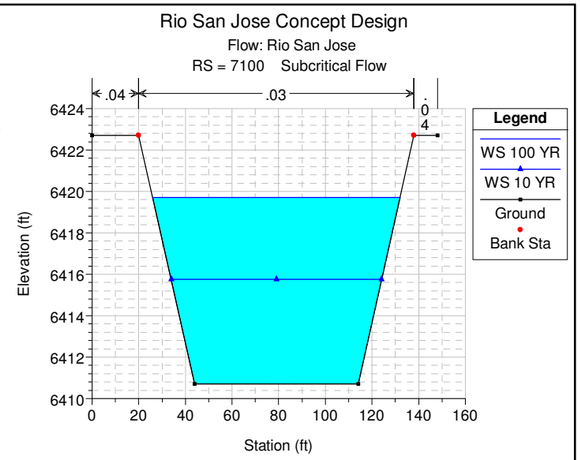
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 7100 Subcritical Flow
.04
.03
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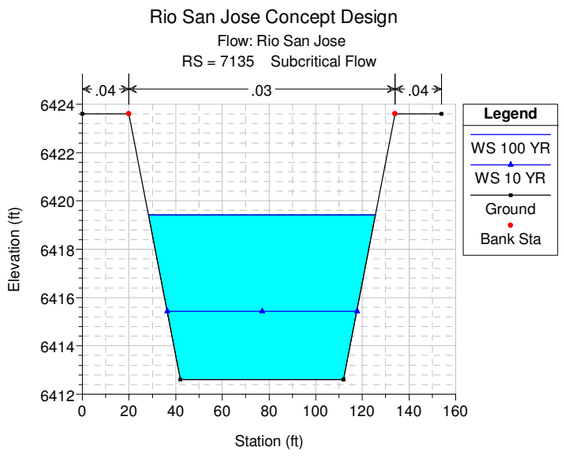
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 7135 Subcritical Flow
.04
.03
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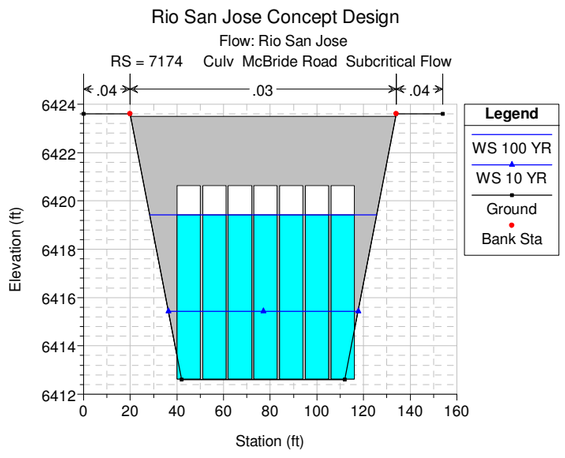
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 7174 Culv McBride Road Subcritical Flow
.04
.03
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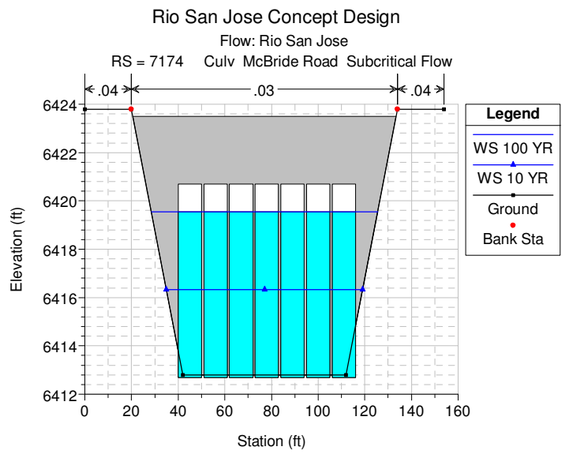
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 7174 Culv McBride Road Subcritical Flow
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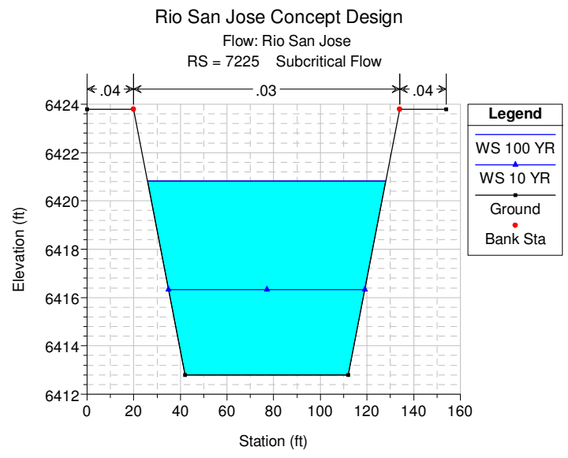
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 7225 Subcritical Flow
.04
.03
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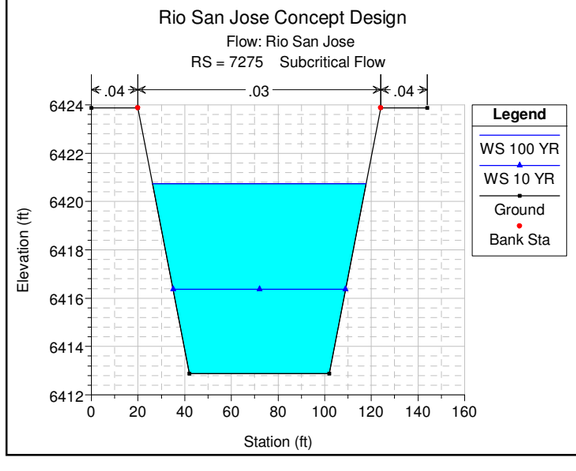
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 7275 Subcritical Flow
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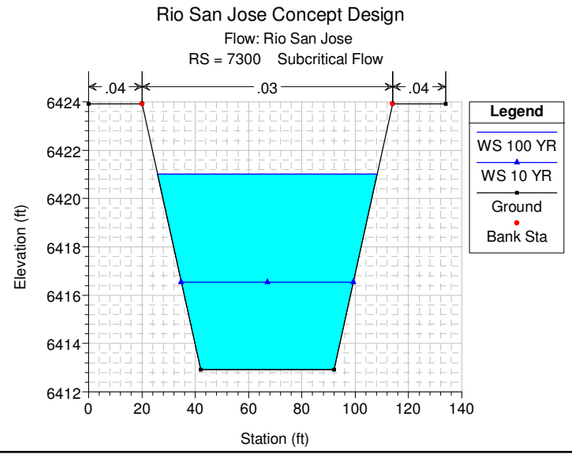
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 7300 Subcritical Flow
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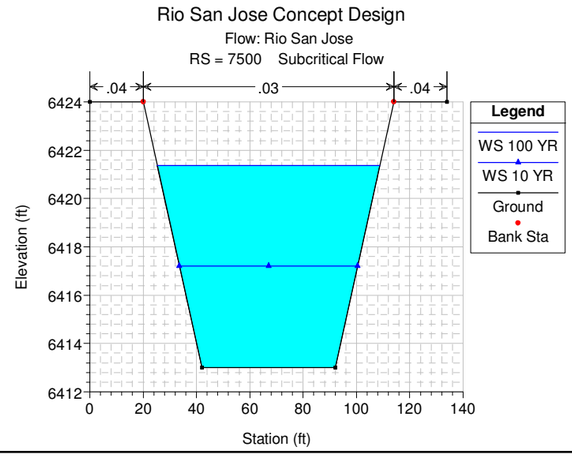
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 7500 Subcritical Flow
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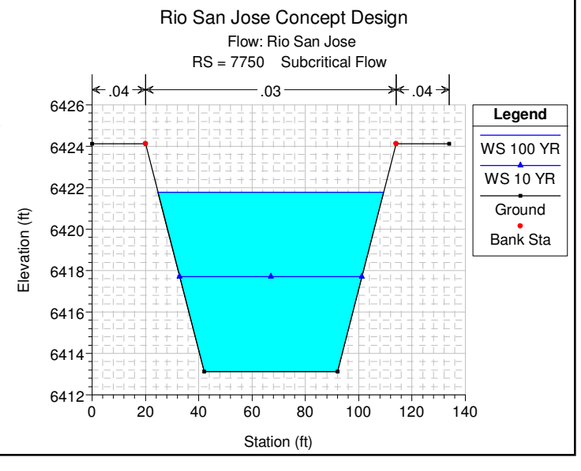
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 7750 Subcritical Flow
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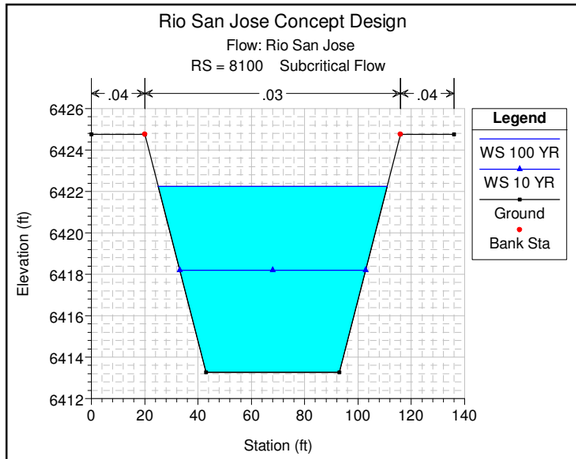
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
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Elevation (ft)
Station (ft)
Legend
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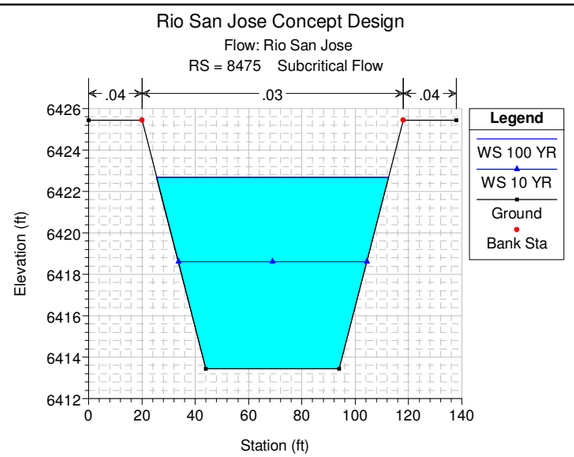
WS 10 YR
Ground
Bank Sta


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 8475 Subcritical Flow
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Elevation (ft)
Station (ft)
Legend
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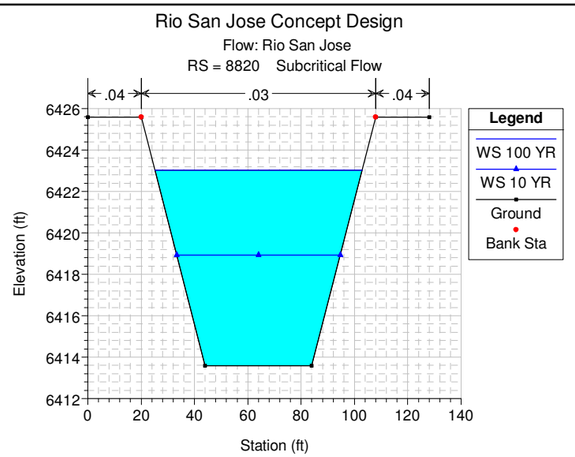
WS 10 YR
Ground
Bank Sta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Flow: Rio San Jose
RS = 8820 Subcritical Flow
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Elevation (ft)
Station (ft)
Legend
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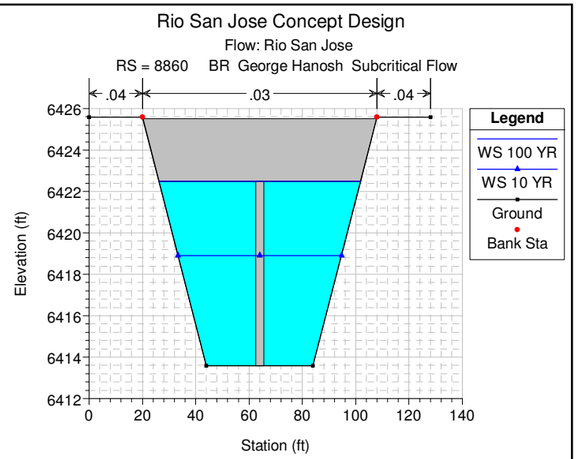
Ground
Bank Sta


Rio San Jose Concept Design
Flow: Rio San Jose
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Elevation (ft)
Station (ft)
Legend
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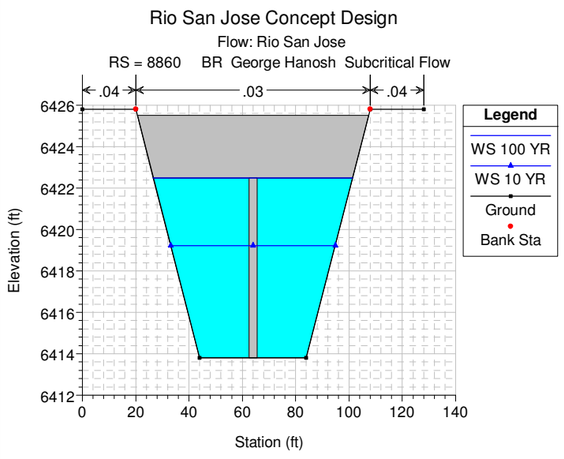
Ground
Bank Sta


Rio San Jose Concept Design
Flow: Rio San Jose
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Elevation (ft)
Station (ft)
Legend
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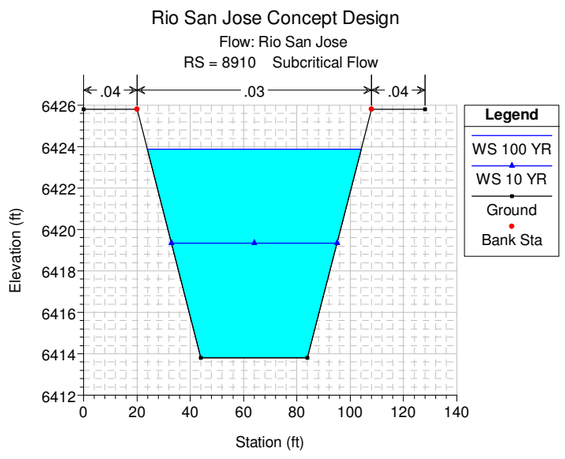
Ground
Bank Sta


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 8910 Subcritical Flow
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Elevation (ft)
Station (ft)
Legend
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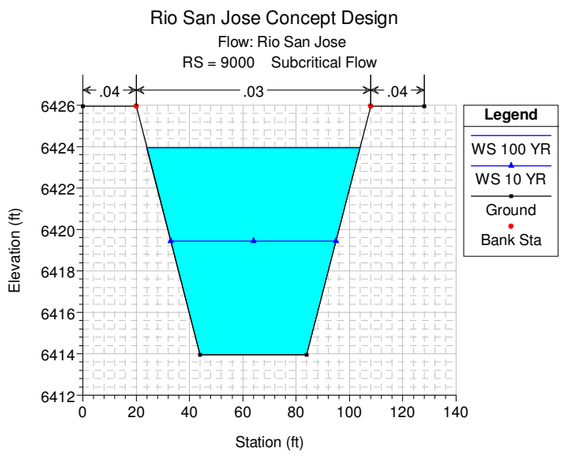
Ground
Bank Sta


Rio San Jose Concept Design
Flow: Rio San Jose
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Elevation (ft)
Station (ft)
Legend
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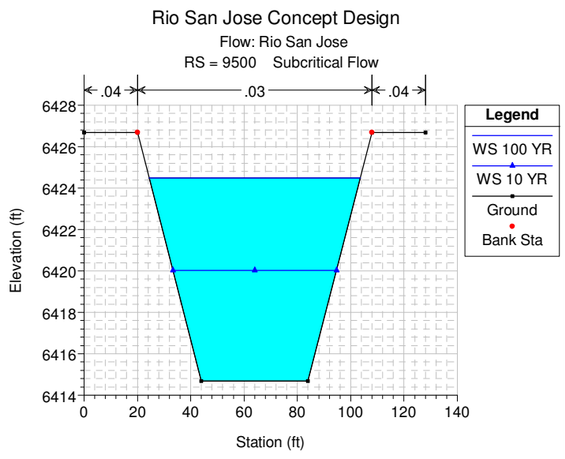
WS 10 YR
Ground
Bank Sta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Flow: Rio San Jose
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Elevation (ft)
Station (ft)
Legend
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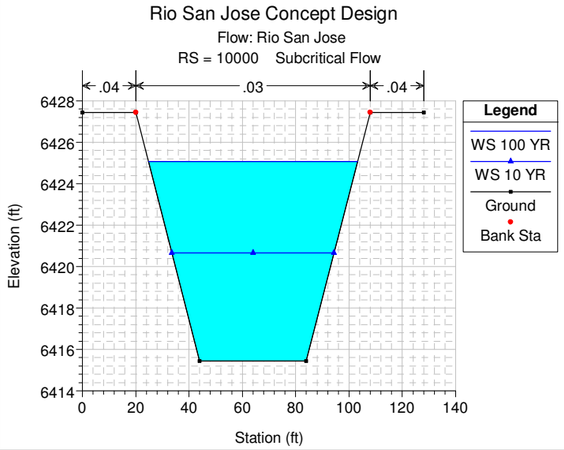
Ground
Bank Sta


Rio San Jose Concept Design
Flow: Rio San Jose
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.03
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Elevation (ft)
Station (ft)
Legend
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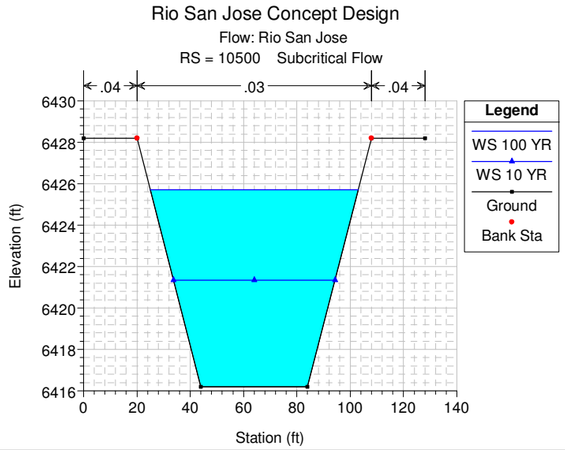
WS 10 YR
Ground
Bank Sta


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 10500 Subcritical Flow
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.03
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Elevation (ft)
Station (ft)
Legend
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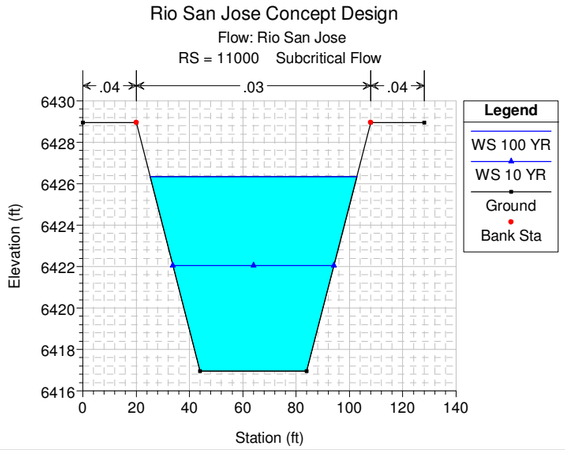
WS 10 YR
Ground
Bank Sta


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 11000 Subcritical Flow
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.03
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Elevation (ft)
Station (ft)
Legend
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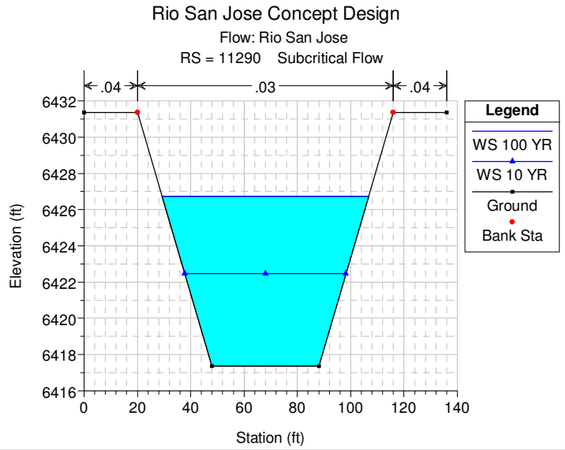
Ground
Bank Sta


Rio San Jose Concept Design
Flow: Rio San Jose
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.03
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Elevation (ft)
Station (ft)
Legend
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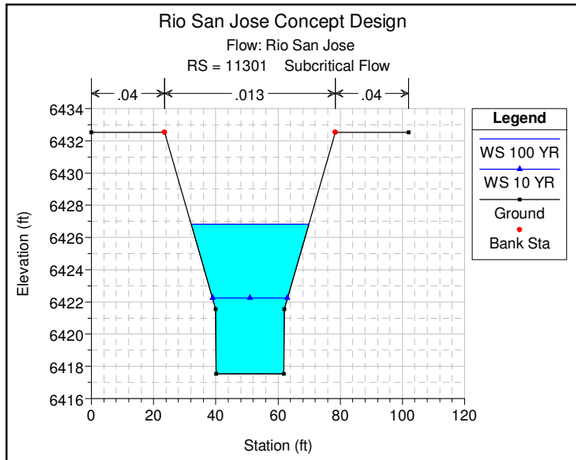
Ground
Bank Sta


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 11301 Subcritical Flow
.04
.013
.04
Elevation (ft)
Station (ft)
Legend
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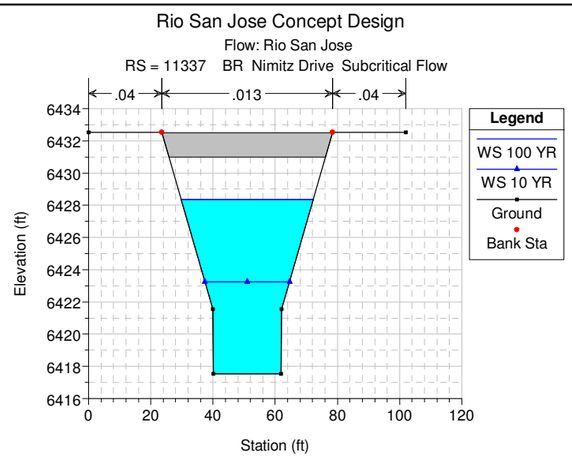
Ground
Bank Sta


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 11337 BR Nimitz Drive Subcritical Flow
.04
.013
.04
Elevation (ft)
Station (ft)
Legend
WS 100 YR
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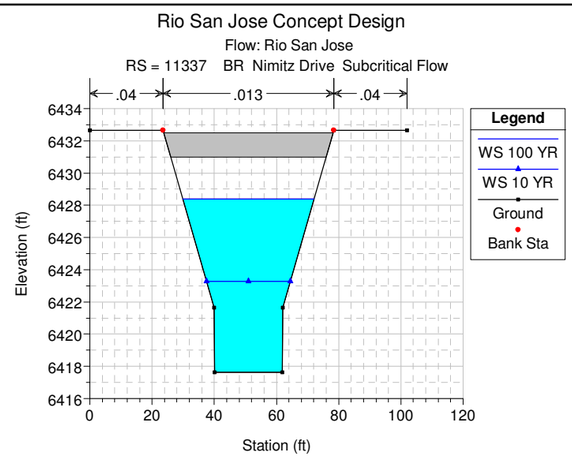
Ground
Bank Sta


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 11337 BR Nimitz Drive Subcritical Flow
.04
.013
.04
Elevation (ft)
Station (ft)
Legend
WS 100 YR
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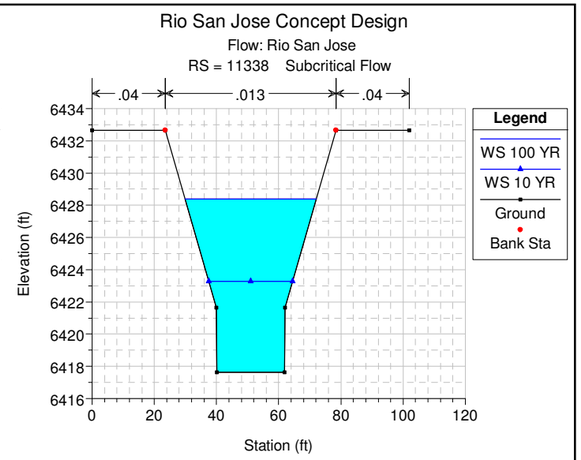
Ground
Bank Sta


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 11338 Subcritical Flow
.04
.013
.04
Elevation (ft)
Station (ft)
Legend
WS 100 YR
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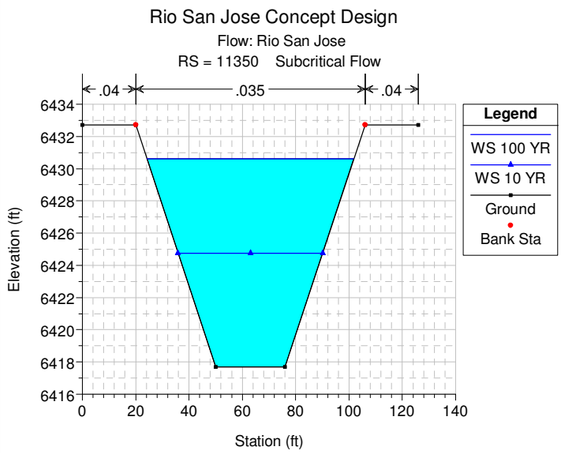
Ground
Bank Sta


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 11350 Subcritical Flow
.04
.035
.04
Elevation (ft)
Station (ft)
Legend
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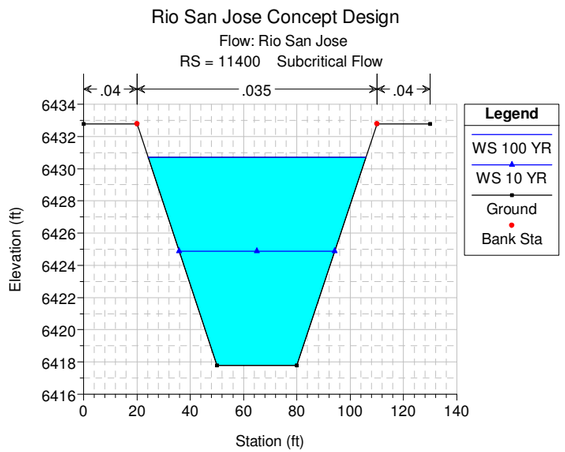
Ground
Bank Sta


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 11400 Subcritical Flow
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.04
Elevation (ft)
Station (ft)
Legend
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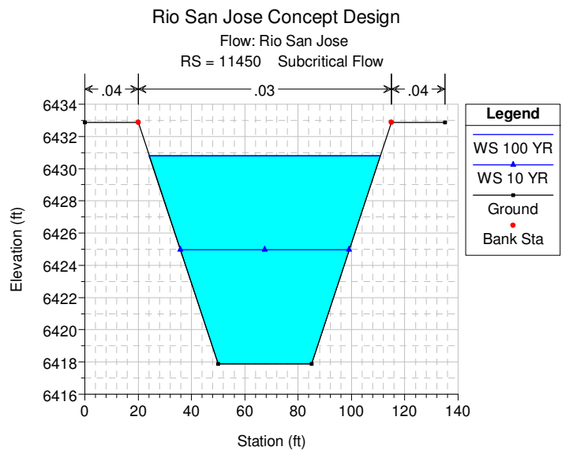
Ground
Bank Sta


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 11450 Subcritical Flow
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Elevation (ft)
Station (ft)
Legend
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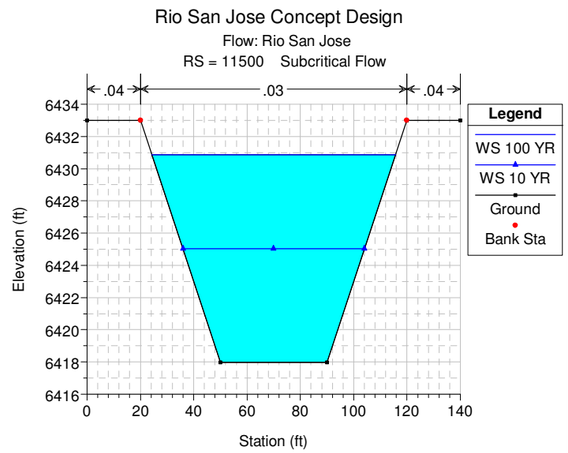
Ground
Bank Sta


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 11500 Subcritical Flow
.04
.03
.04
Elevation (ft)
Station (ft)
Legend
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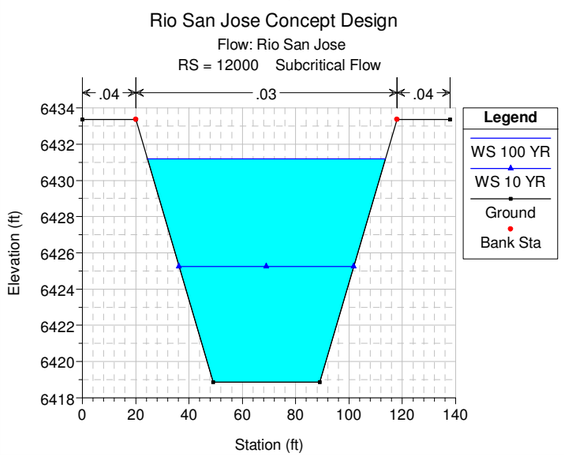
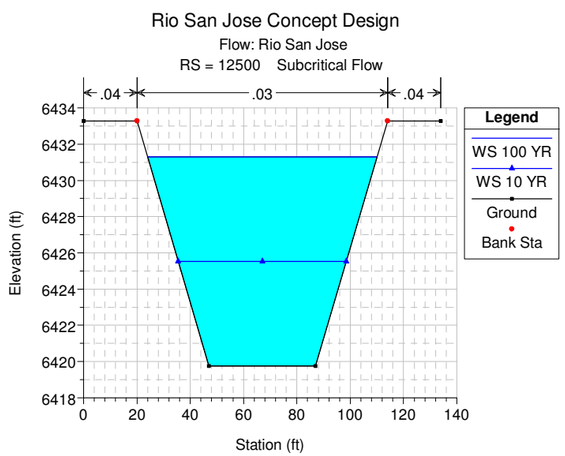
WS 10 YR
Ground
Bank Sta


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 12000 Subcritical Flow
.04
.03
.04
Elevation (ft)
Station (ft)
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 12500 Subcritical Flow
.04
.03
.04
Elevation (ft)
Station (ft)
Legend
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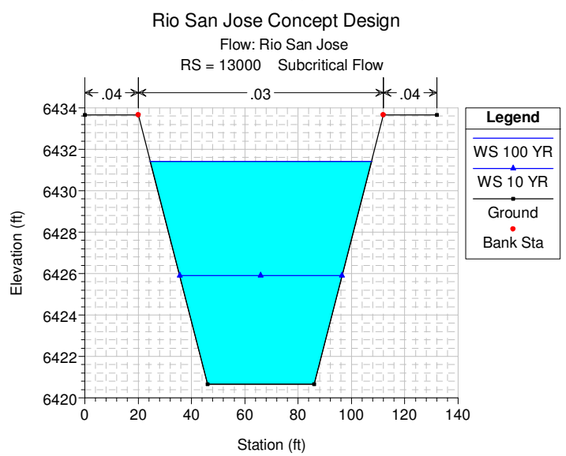
WS 10 YR
Ground
Bank Sta


Rio San Jose Concept Design
Flow: Rio San Jose
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.03
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Elevation (ft)
Station (ft)
Legend
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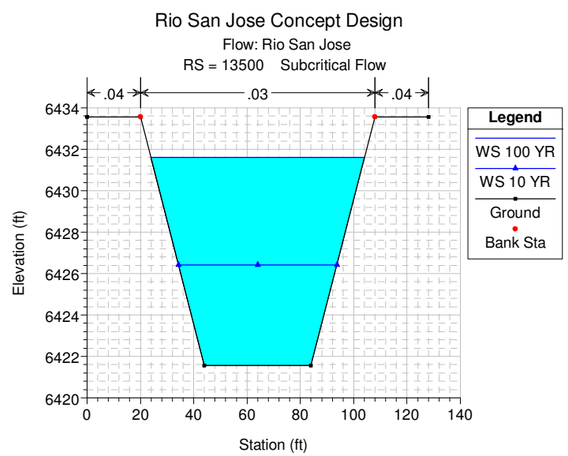
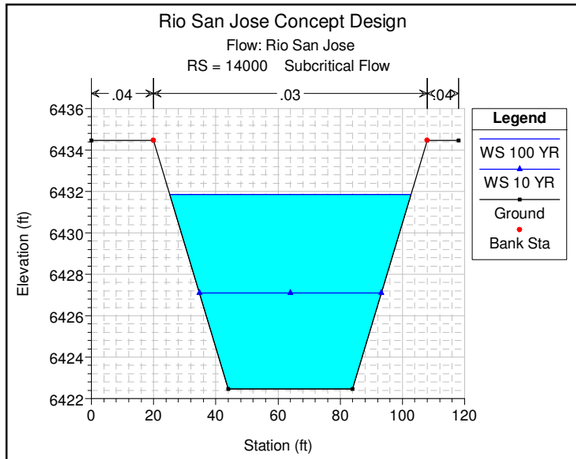
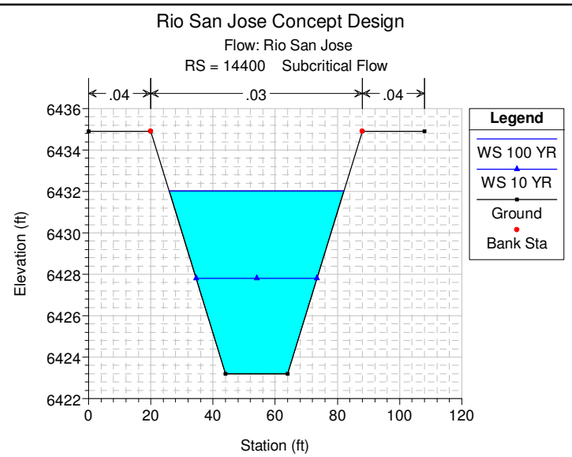
Ground
Bank Sta


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 13500 Subcritical Flow
.04
.03
.04
Elevation (ft)
Station (ft)
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 14000 Subcritical Flow
.04
.03
.04
Elevation (ft)
Station (ft)
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 14400 Subcritical Flow
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.03
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Elevation (ft)
Station (ft)
Legend
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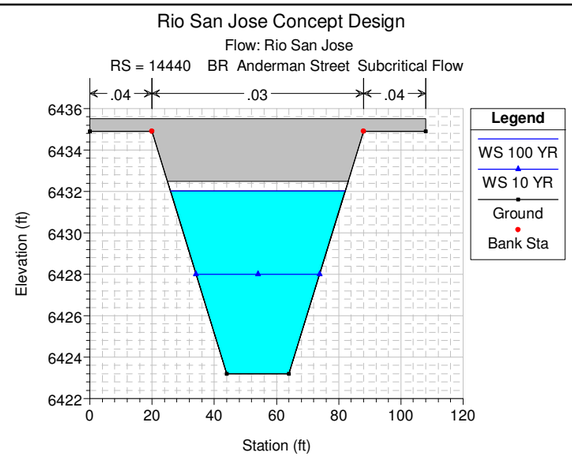
WS 10 YR
Ground
Bank Sta


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 14440 BR Anderman Street Subcritical Flow
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.03
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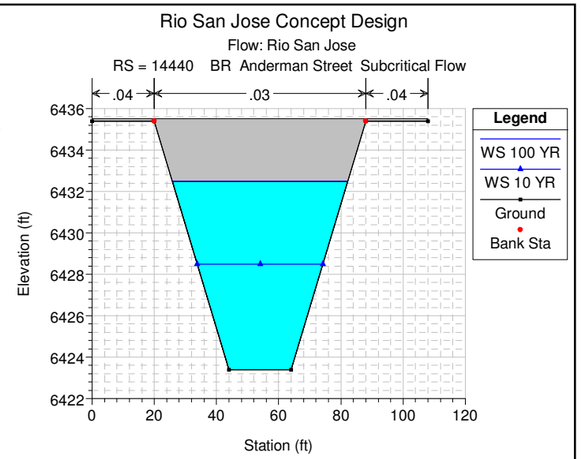
Elevation (ft)
Station (ft)
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 14440 BR Anderman Street Subcritical Flow
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.03
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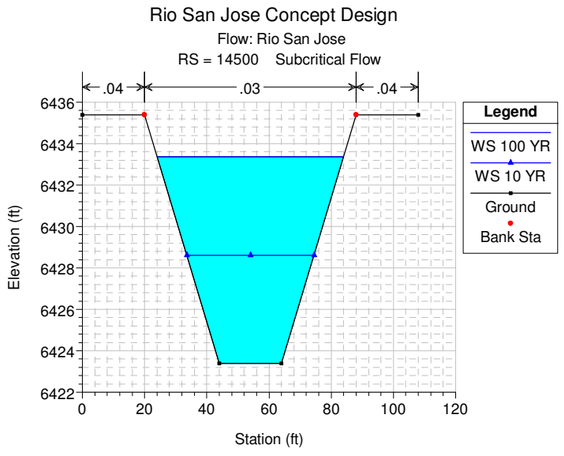
Elevation (ft)
Station (ft)
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 14500 Subcritical Flow
.04
.03
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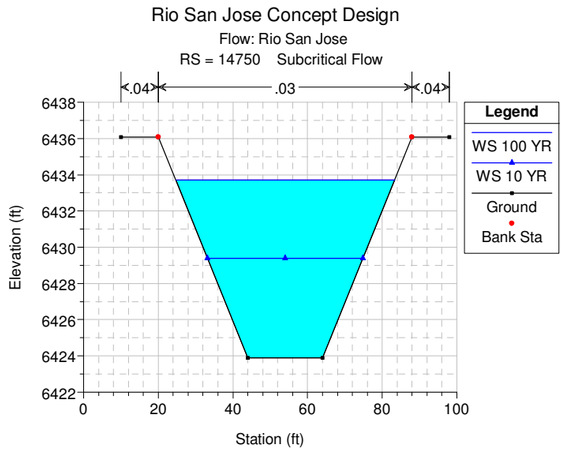
Elevation (ft)
Station (ft)
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 14750 Subcritical Flow
.04
.03
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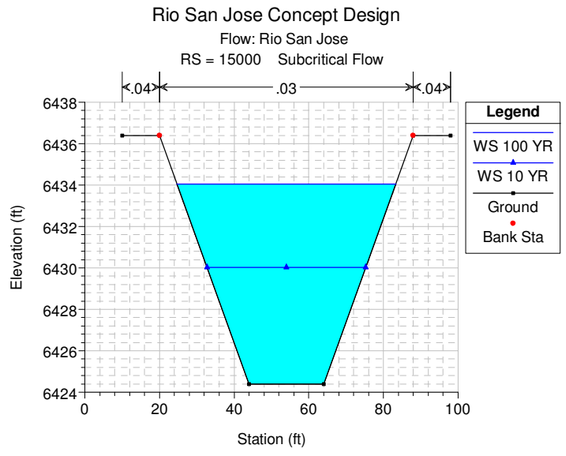
Elevation (ft)
Station (ft)
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 15000 Subcritical Flow
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Elevation (ft)
Station (ft)
Legend
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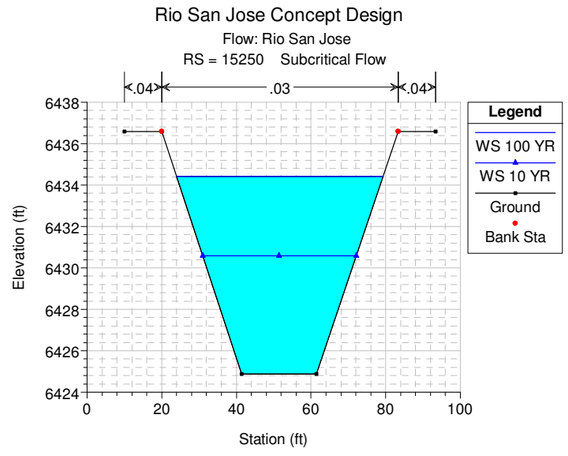
WS 10 YR
Ground
Bank Sta


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 15250 Subcritical Flow
.04
.03
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Elevation (ft)
Station (ft)
Legend
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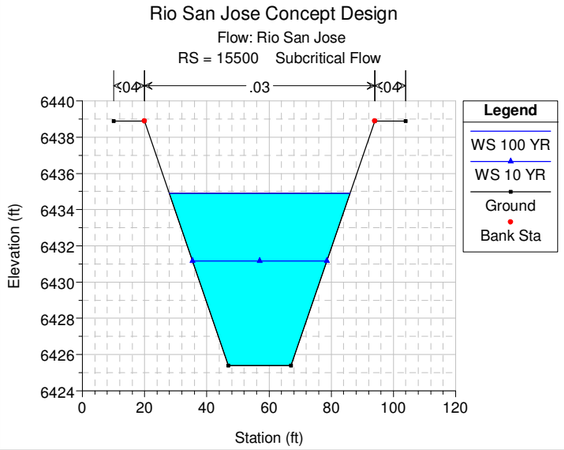
WS 10 YR
Ground
Bank Sta


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 15500 Subcritical Flow
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.03
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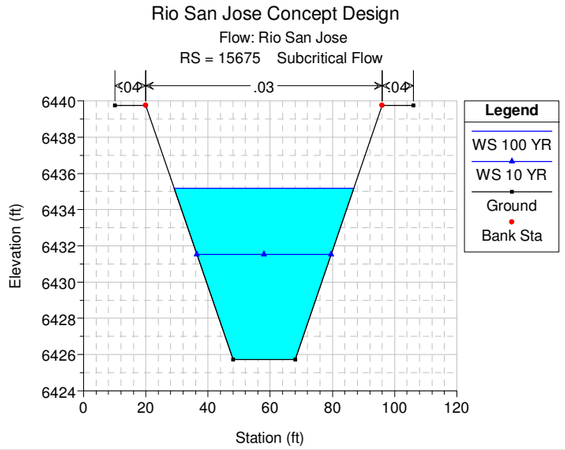
Elevation (ft)
Station (ft)
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 15675 Subcritical Flow
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.03
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Elevation (ft)
Station (ft)
Legend
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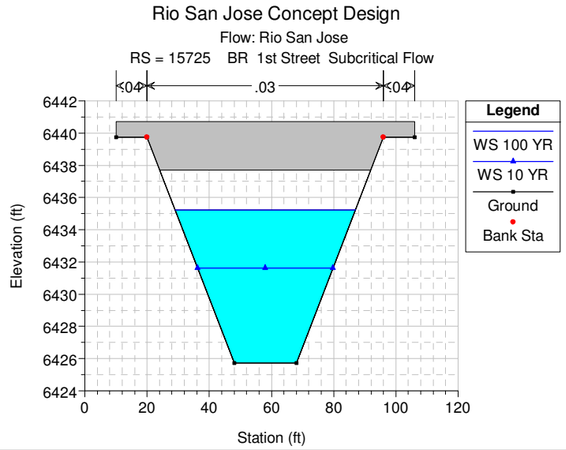
WS 10 YR
Ground
Bank Sta


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 15725 BR 1st Street Subcritical Flow
.04
.03
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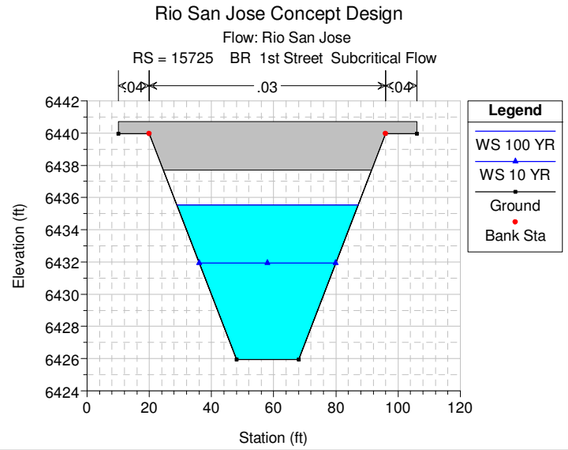
Elevation (ft)
Station (ft)
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 15725 BR 1st Street Subcritical Flow
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Elevation (ft)
Station (ft)
Legend
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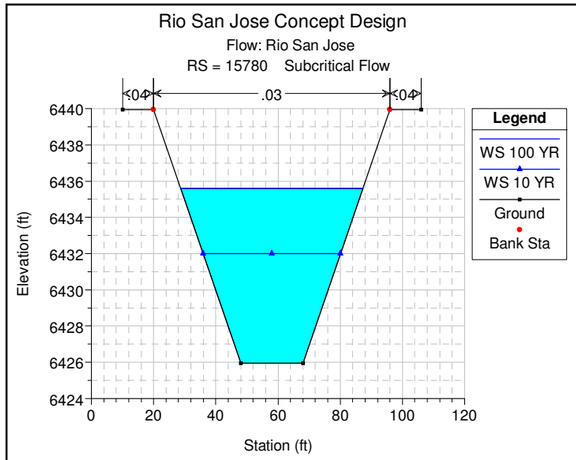
WS 10 YR
Ground
Bank Sta


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 15780 Subcritical Flow
.04
.03
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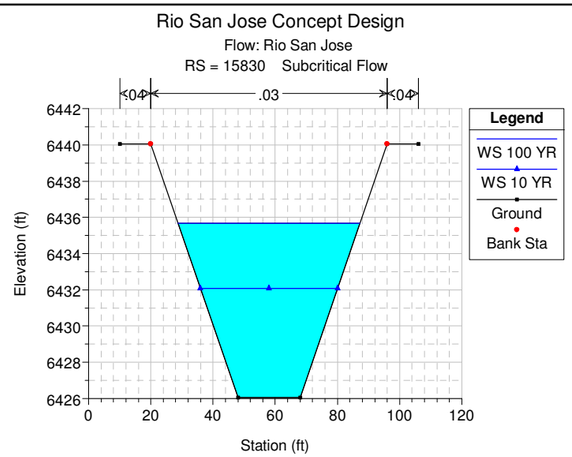
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 15830 Subcritical Flow
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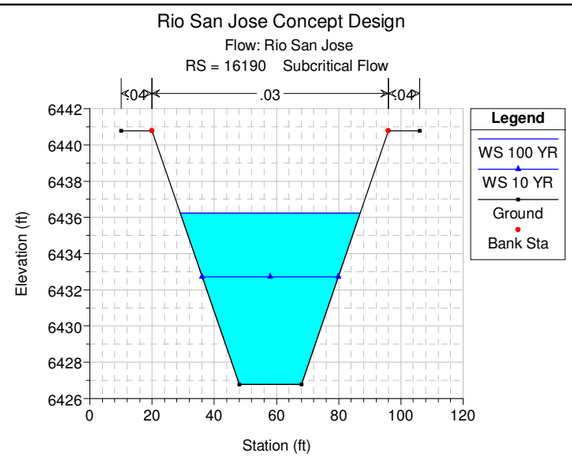
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 16190 Subcritical Flow
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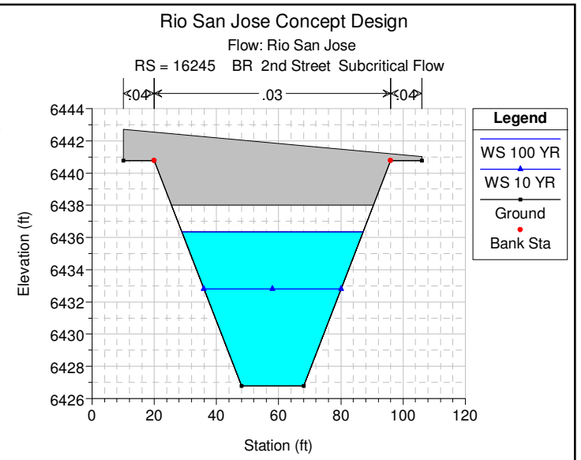
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 16245 BR 2nd Street Subcritical Flow
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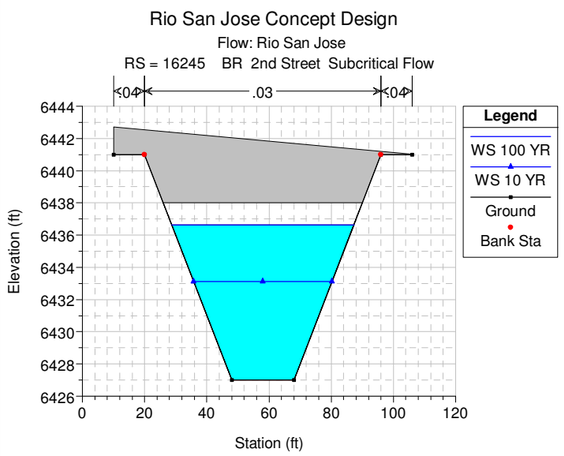
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 16245 BR 2nd Street Subcritical Flow
.04
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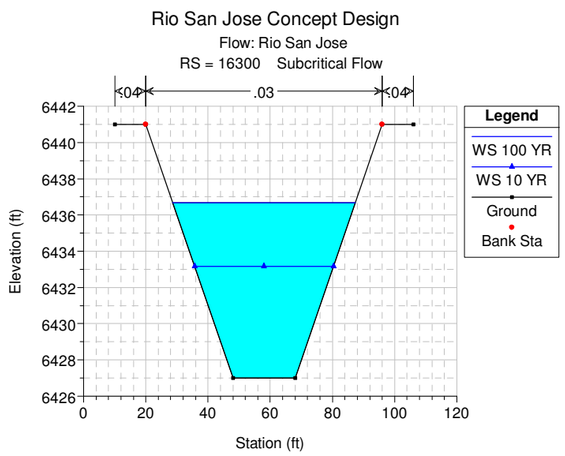
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 16300 Subcritical Flow
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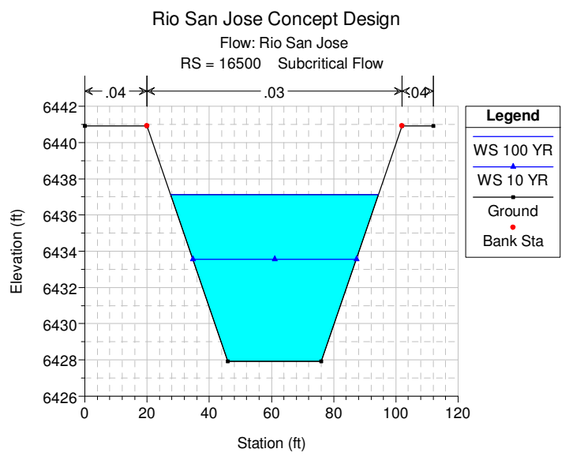
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 16500 Subcritical Flow
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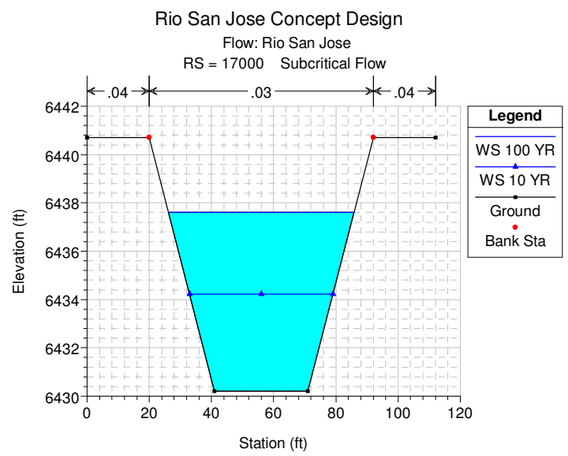
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 17000 Subcritical Flow
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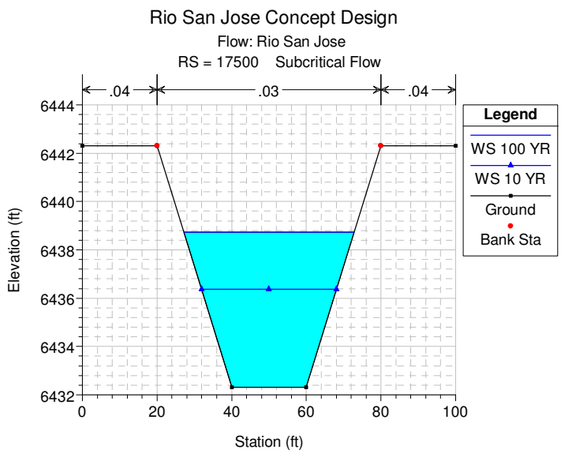
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 17500 Subcritical Flow
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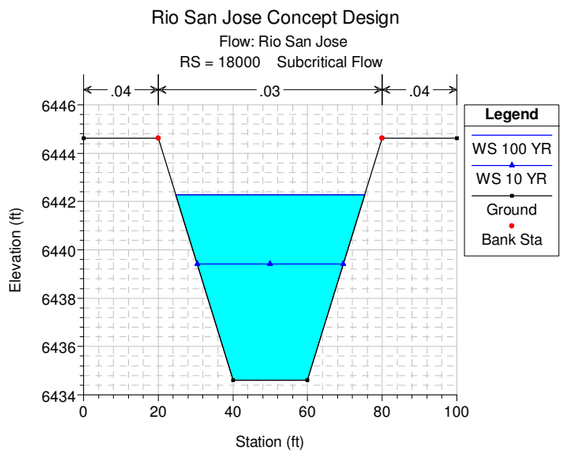
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 18000 Subcritical Flow
.04
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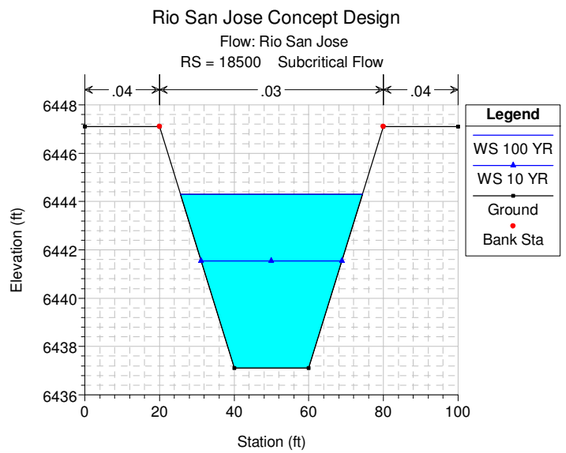
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 18500 Subcritical Flow
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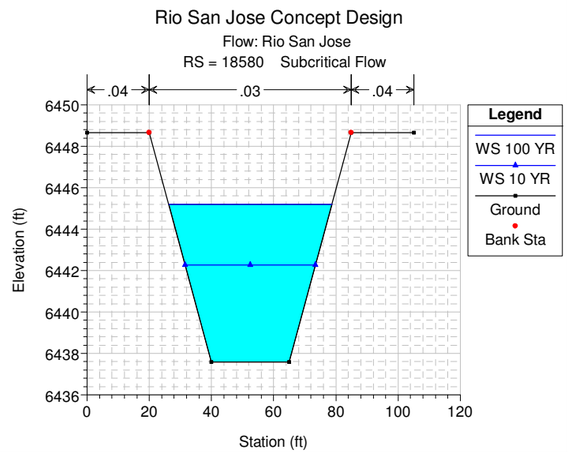
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 18580 Subcritical Flow
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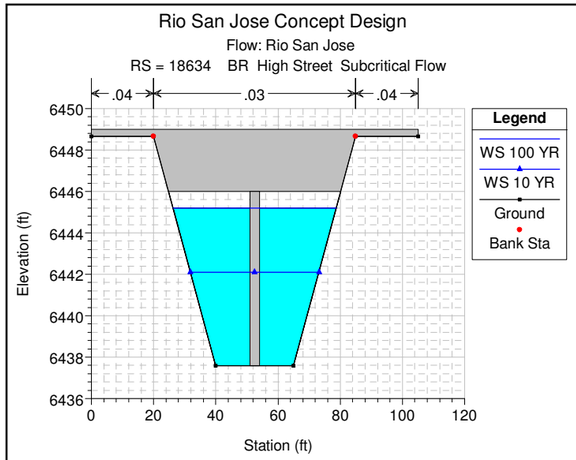
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 18634 BR High Street Subcritical Flow
.04
.03
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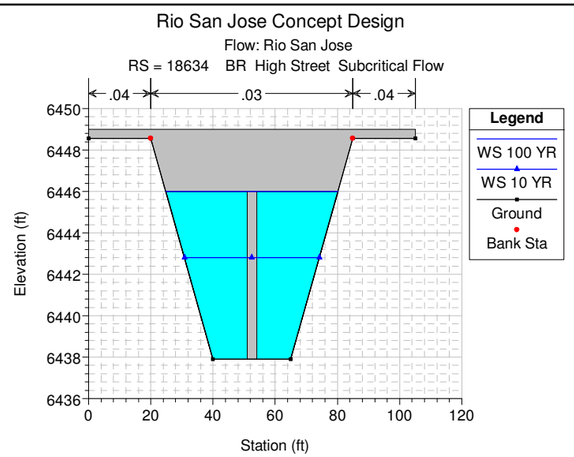
Elevation (ft)
Station (ft)
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 18634 BR High Street Subcritical Flow
.04
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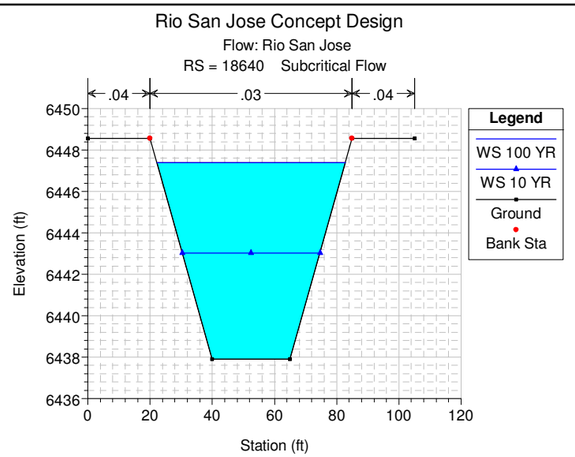
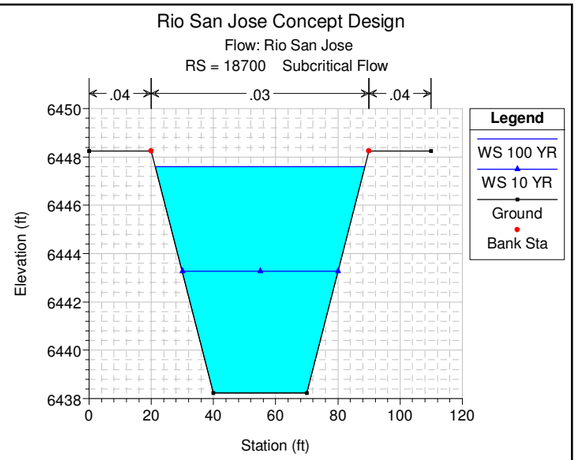
Elevation (ft)
Station (ft)
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 18640 Subcritical Flow
.04
.03
.04
Elevation (ft)
Station (ft)
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 18700 Subcritical Flow
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.03
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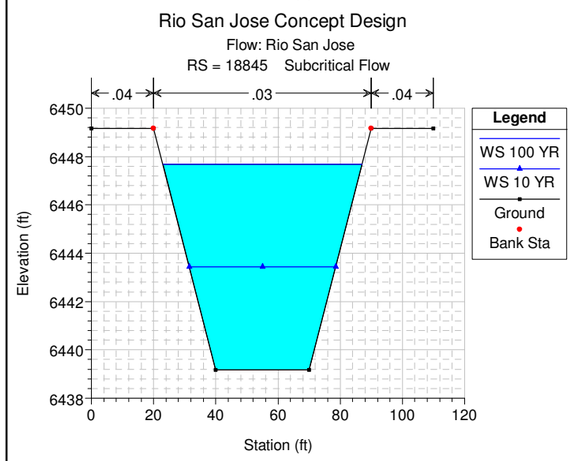
Elevation (ft)
Station (ft)
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 18845 Subcritical Flow
.04
.03
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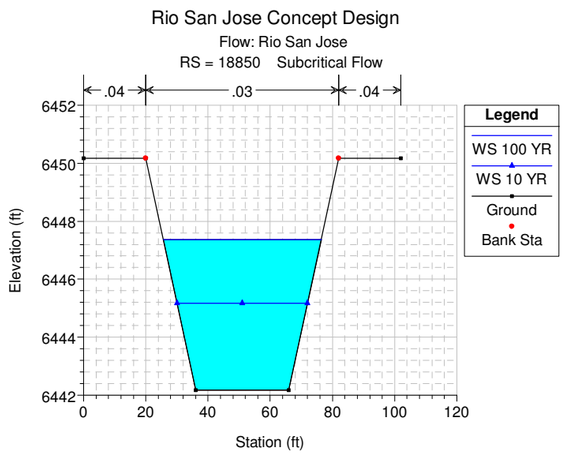
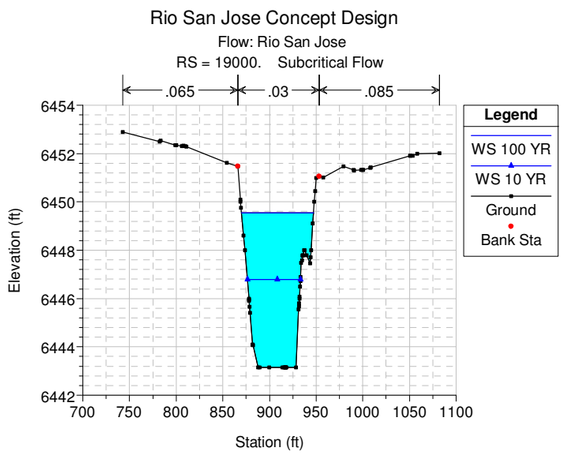
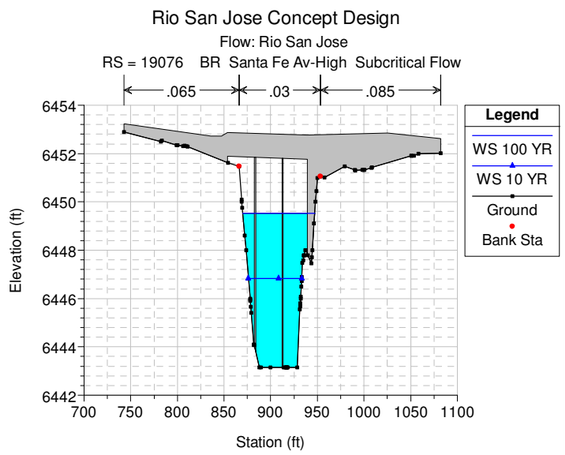
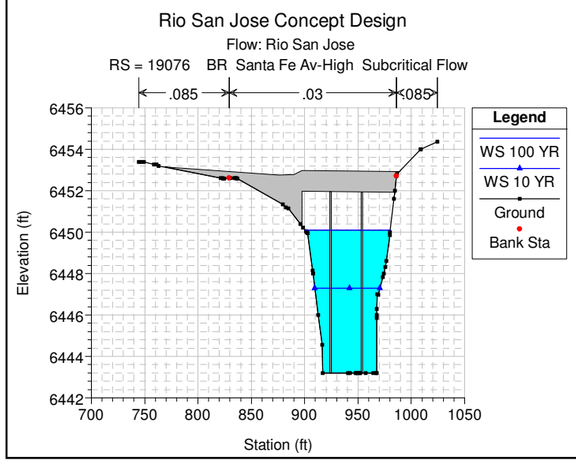
Elevation (ft)
Station (ft)
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 18850 Subcritical Flow
.04
.03
.04
Elevation (ft)
Station (ft)
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 19000. Subcritical Flow
.065
.03
.085
Elevation (ft)
Station (ft)
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 19076 BR Santa Fe Av-High Subcritical Flow
.065
.03
.085
Elevation (ft)
Station (ft)
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 19076 BR Santa Fe Av-High Subcritical Flow
.085
.03
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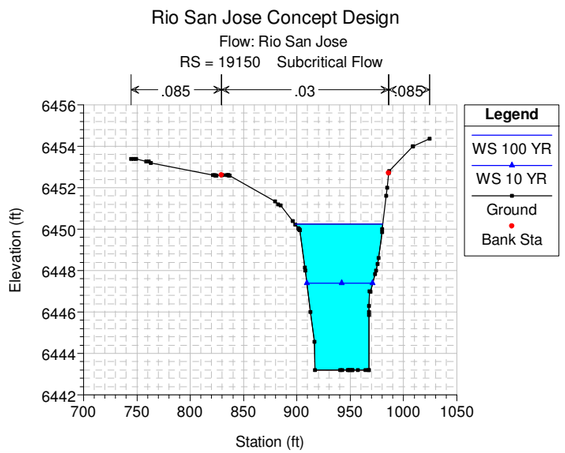
Elevation (ft)
Station (ft)
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 19150 Subcritical Flow
.085
.03
.085
Elevation (ft)
Station (ft)
Legend
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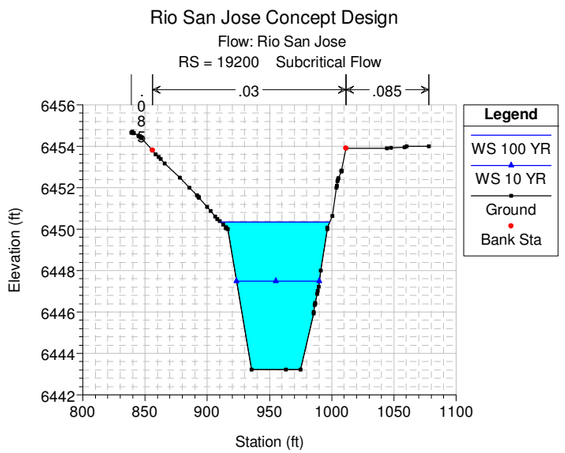
WS 10 YR
Ground
Bank Sta


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 19200 Subcritical Flow
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Elevation (ft)
Station (ft)
Legend
WS 100 YR
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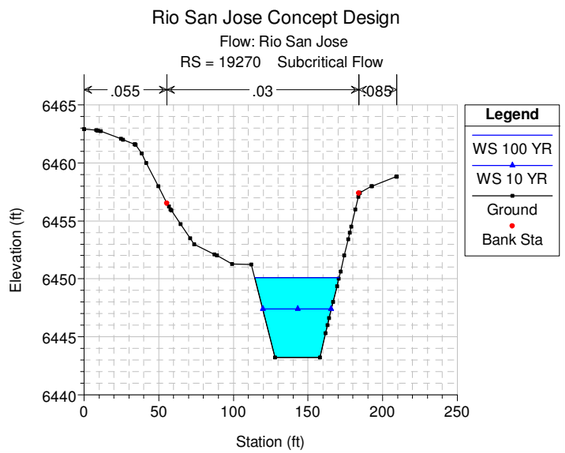
Ground
Bank Sta


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 19270 Subcritical Flow
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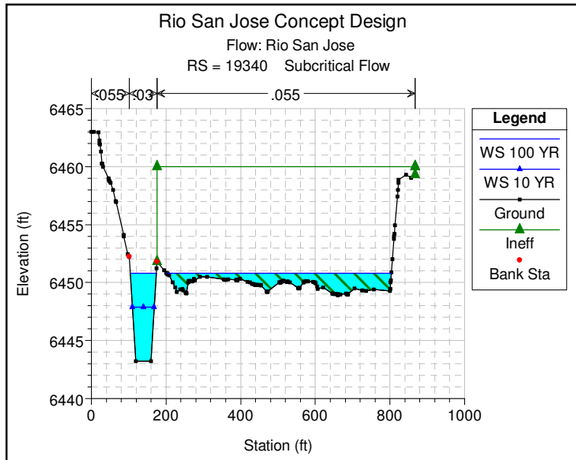
.03
.085
Elevation (ft)
Station (ft)
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 19340 Subcritical Flow
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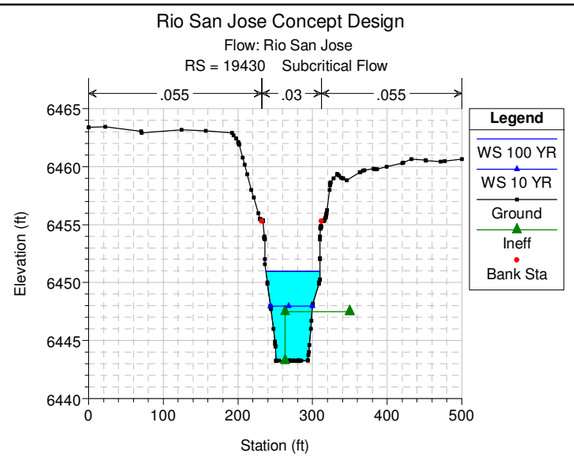
.055
Elevation (ft)
Station (ft)
Legend
WS 100 YR
WS 10 YR
Ground
Ineff
Bank Sta


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 19430 Subcritical Flow
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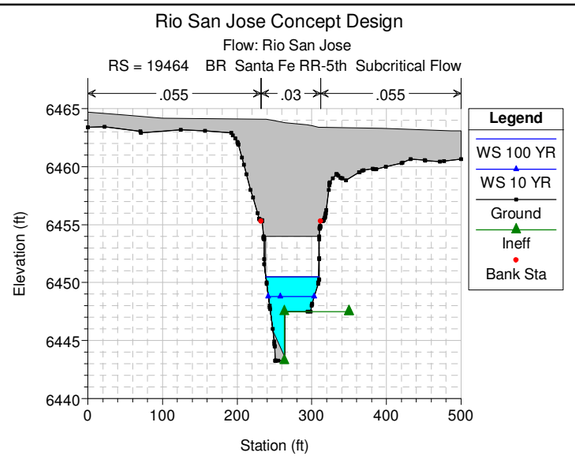
Elevation (ft)
Station (ft)
Legend
WS 100 YR
WS 10 YR
Ground
Ineff
Bank Sta


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 19464 BR Santa Fe RR-5th Subcritical Flow
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.03
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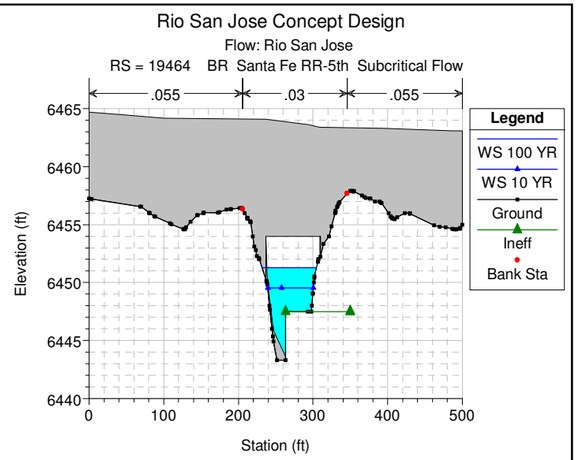
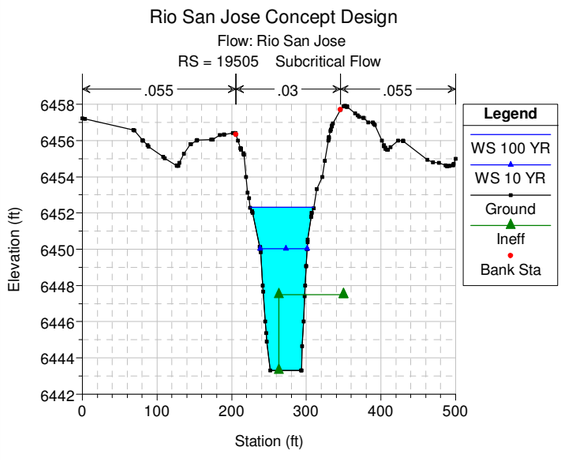
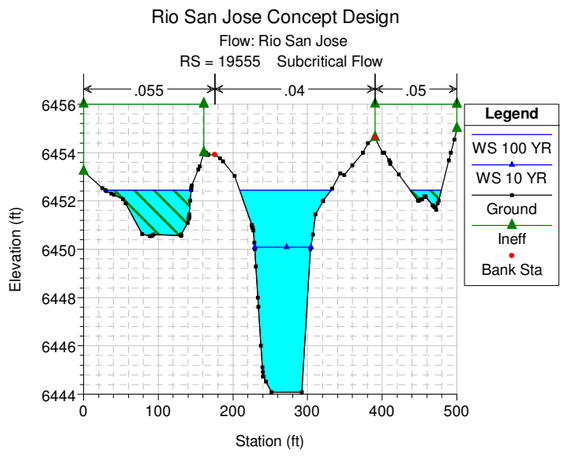
Elevation (ft)
Station (ft)
Legend
WS 100 YR
WS 10 YR
Ground
Ineff
Bank Sta


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 19464 BR Santa Fe RR-5th Subcritical Flow
.055
.03
.055
Elevation (ft)
Station (ft)
Legend
WS 100 YR
WS 10 YR
Ground
Ineff
Bank Sta


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 19505 Subcritical Flow
.055
.03
.055
Elevation (ft)
Station (ft)
Legend
WS 100 YR
WS 10 YR
Ground
Ineff
Bank Sta


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 19555 Subcritical Flow
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.04
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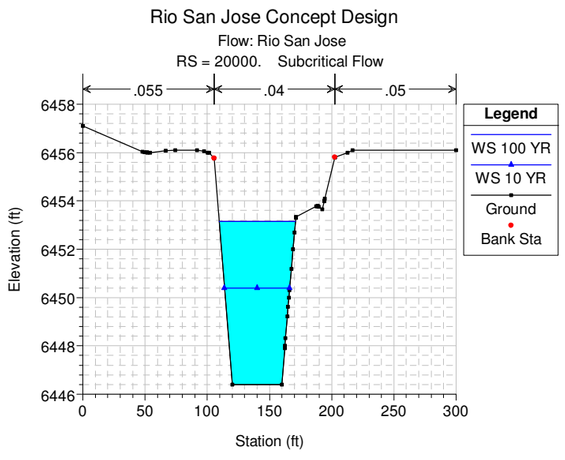
Elevation (ft)
Station (ft)
Legend
WS 100 YR
WS 10 YR
Ground
Ineff
Bank Sta


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 20000. Subcritical Flow
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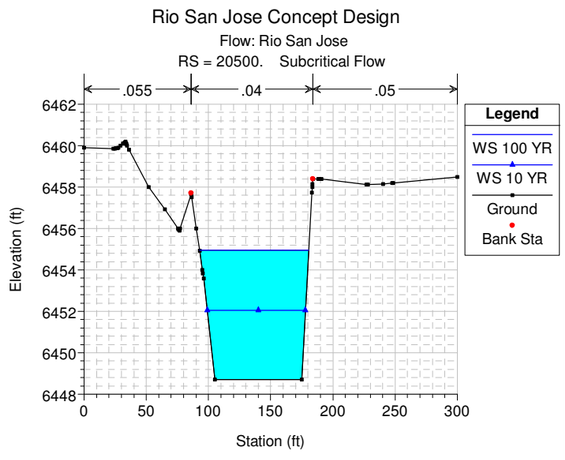
Elevation (ft)
Station (ft)
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta


Rio San Jose Concept Design
Flow: Rio San Jose
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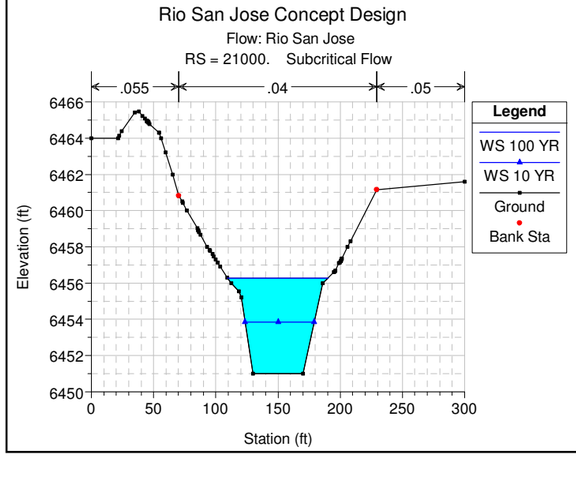
Elevation (ft)
Station (ft)
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 21000. Subcritical Flow
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Elevation (ft)
Station (ft)
Legend
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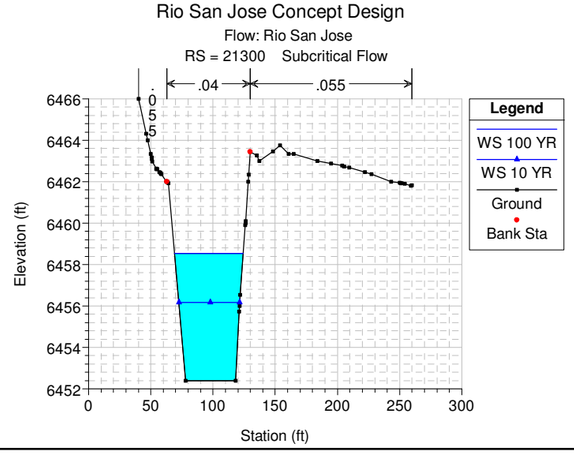
WS 10 YR
Ground
Bank Sta


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 21300 Subcritical Flow
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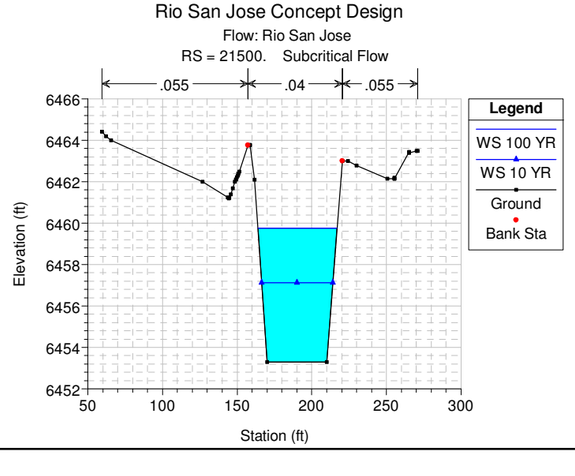
Elevation (ft)
Station (ft)
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 21500. Subcritical Flow
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Elevation (ft)
Station (ft)
Legend
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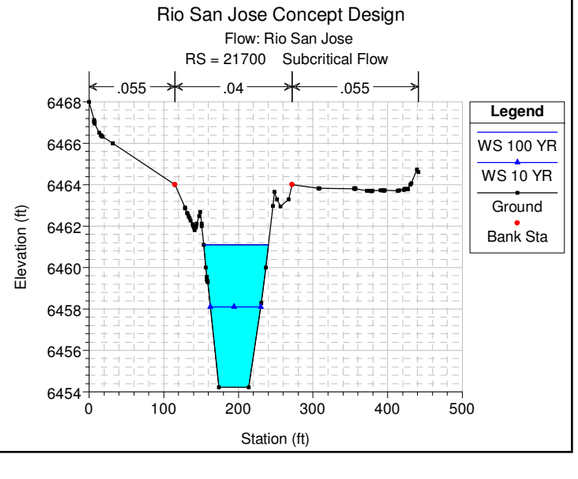
WS 10 YR
Ground
Bank Sta


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 21700 Subcritical Flow
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Elevation (ft)
Station (ft)
Legend
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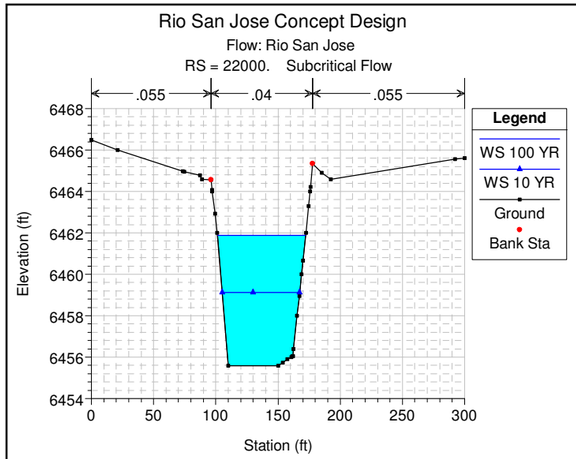
WS 10 YR
Ground
Bank Sta


Rio San Jose Concept Design
Flow: Rio San Jose
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Legend
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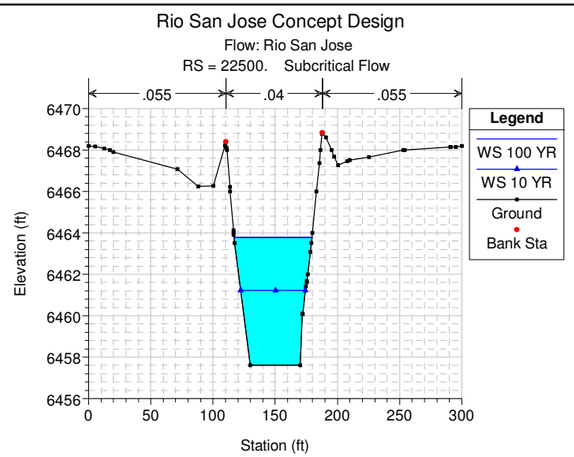
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 22500. Subcritical Flow
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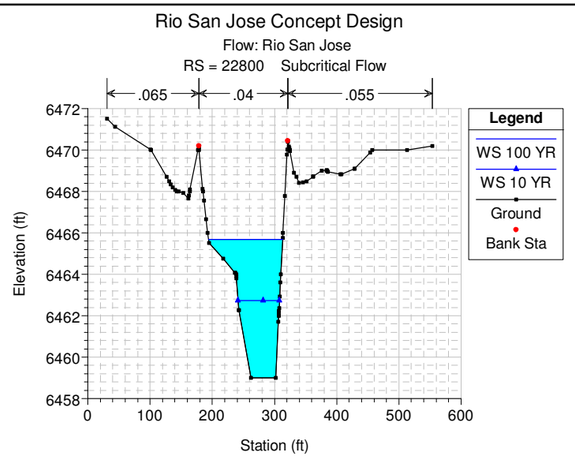
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 22800 Subcritical Flow
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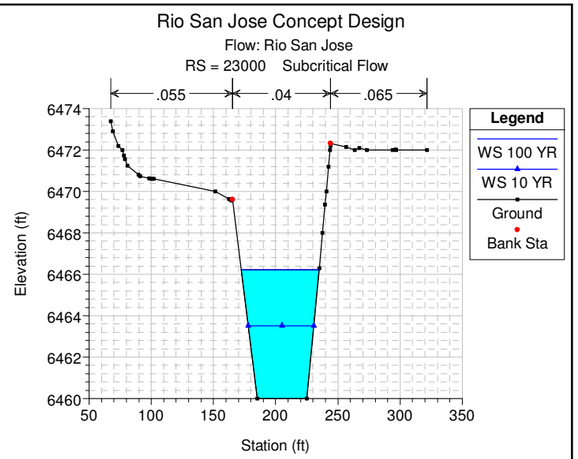
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 23000 Subcritical Flow
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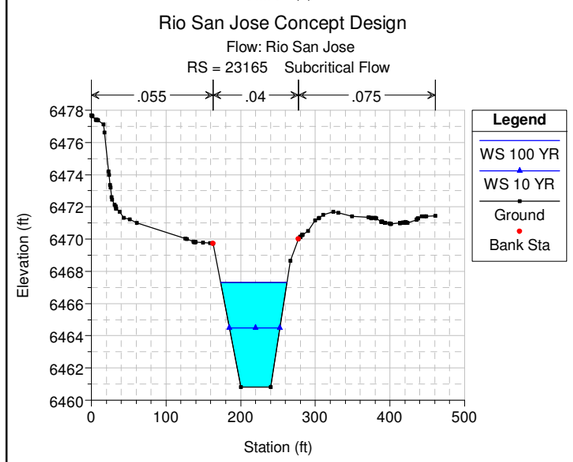
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 23165 Subcritical Flow
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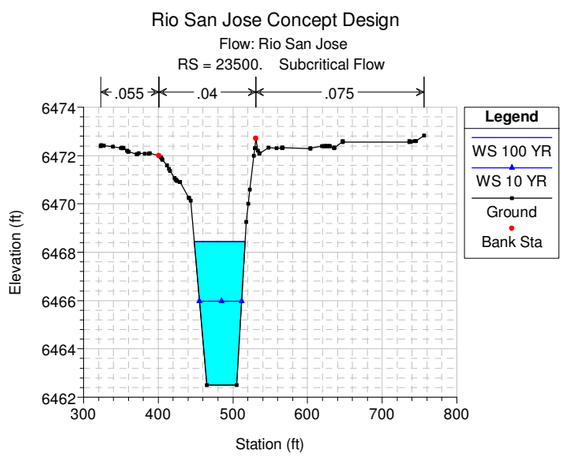
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 23500. Subcritical Flow
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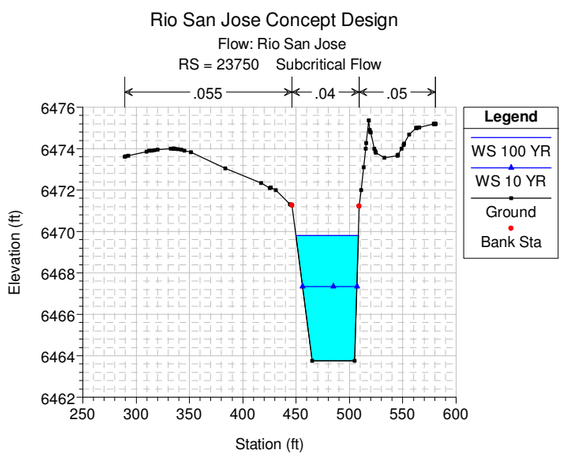
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 23750 Subcritical Flow
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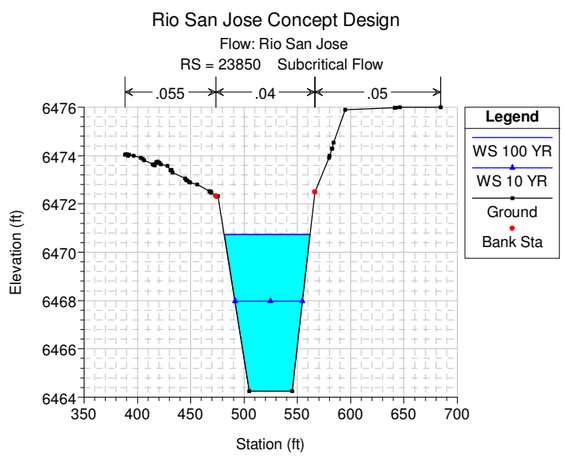
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 23850 Subcritical Flow
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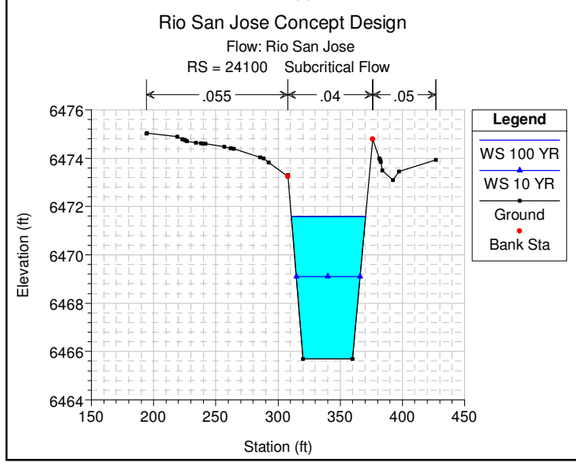
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 24100 Subcritical Flow
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.04
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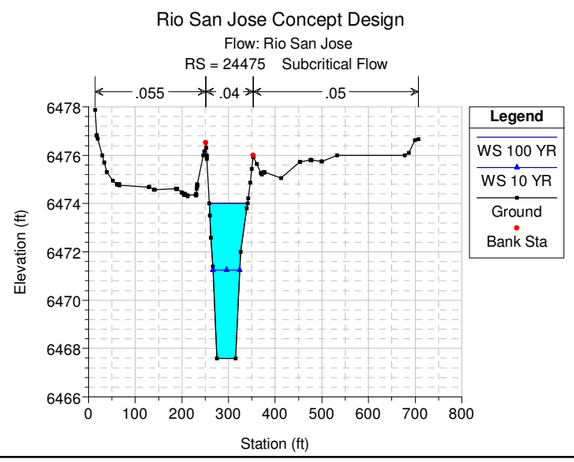
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 24475 Subcritical Flow
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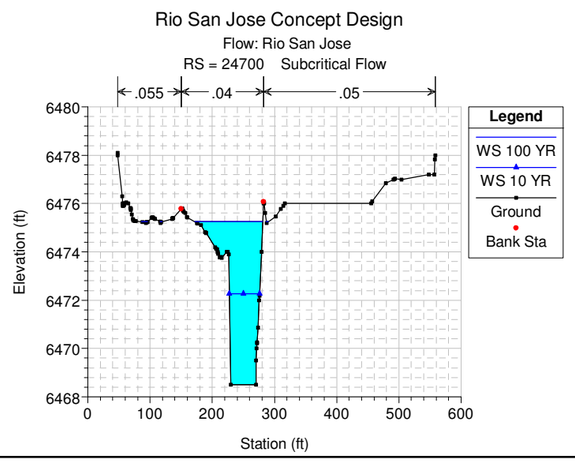
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 24700 Subcritical Flow
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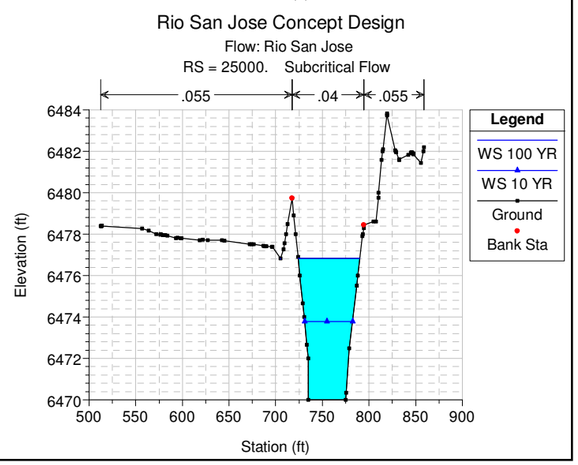
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 25000. Subcritical Flow
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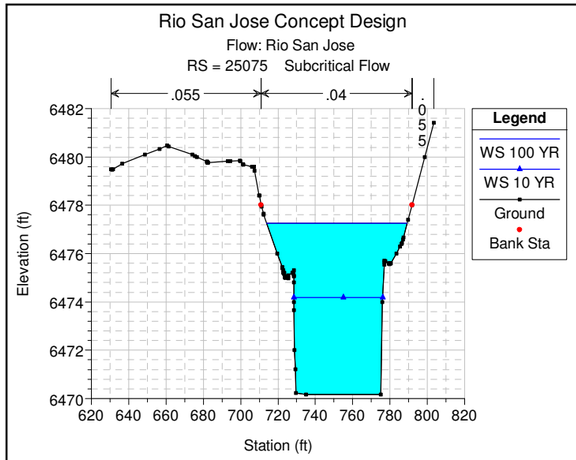
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 25075 Subcritical Flow
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Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
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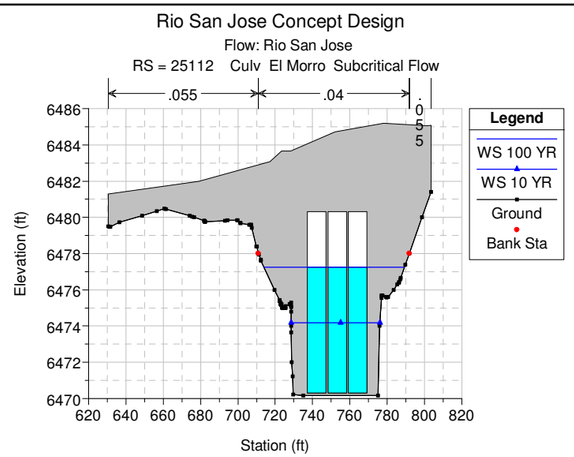
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 25112 Culv El Morro Subcritical Flow
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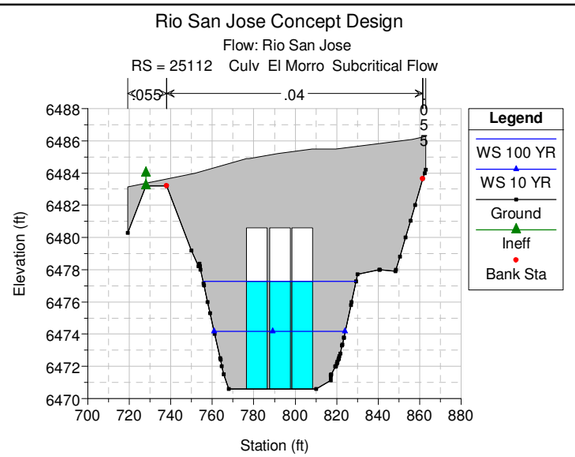
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 25112 Culv El Morro Subcritical Flow
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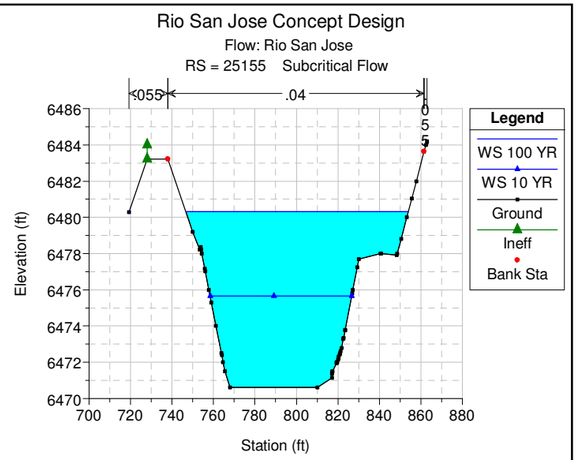
Legend
WS 100 YR
WS 10 YR
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 25155 Subcritical Flow
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Legend
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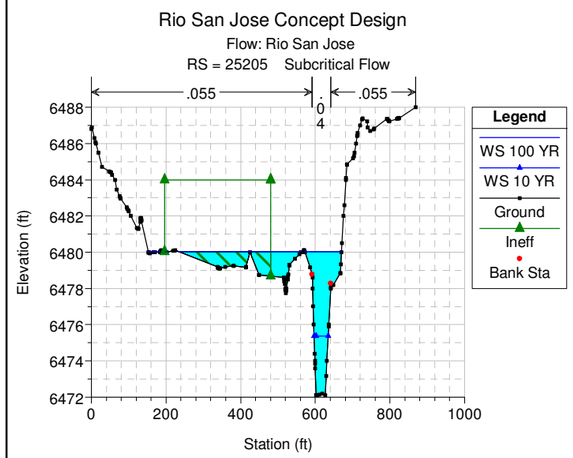
WS 10 YR
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 25205 Subcritical Flow
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Legend
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Ground
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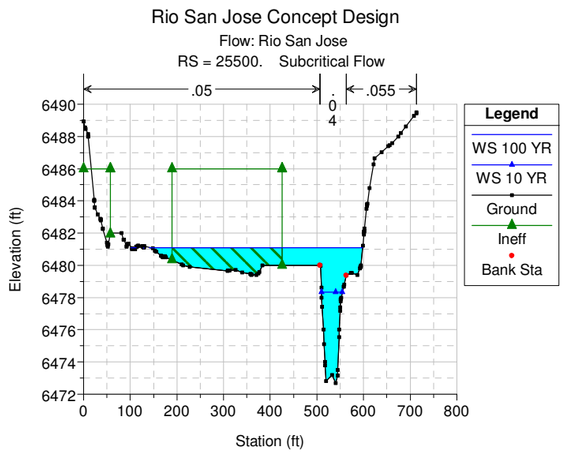
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 25500. Subcritical Flow
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Legend
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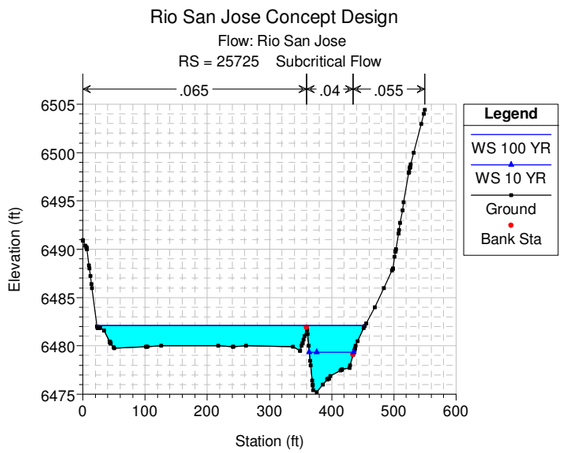
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 25725 Subcritical Flow
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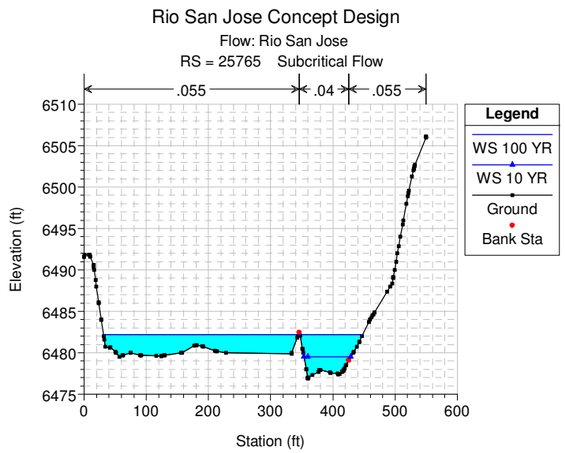
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 25765 Subcritical Flow
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Legend
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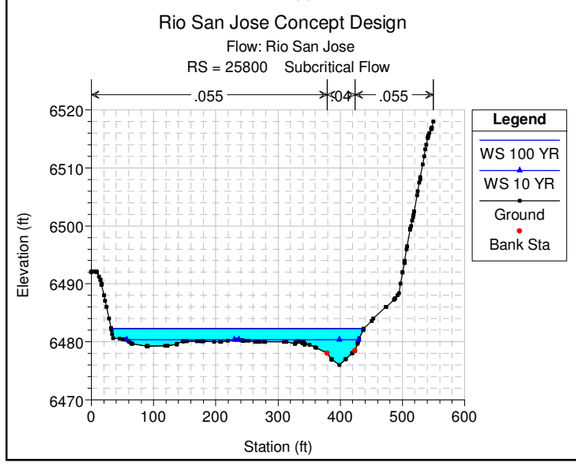
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
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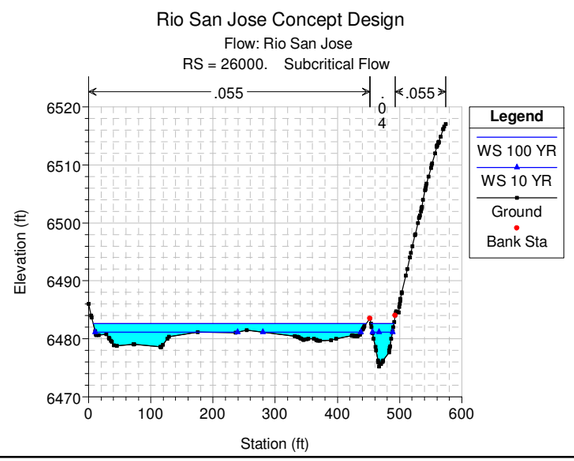
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
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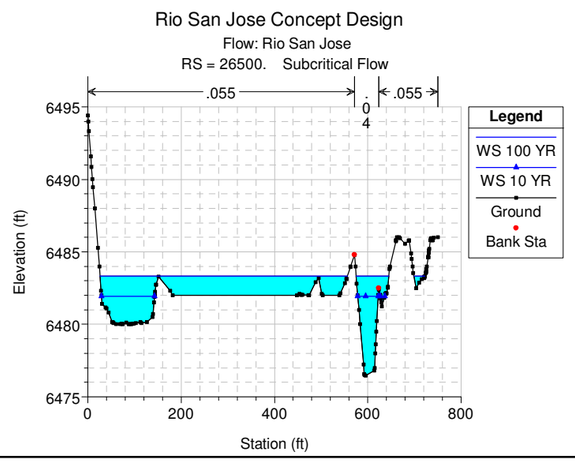
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 26500. Subcritical Flow
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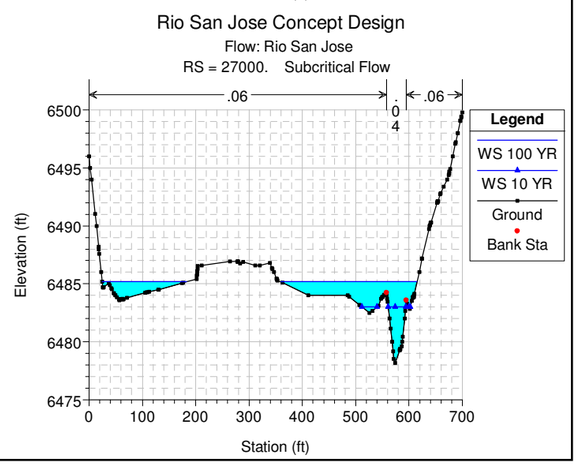
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 27000. Subcritical Flow
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Legend
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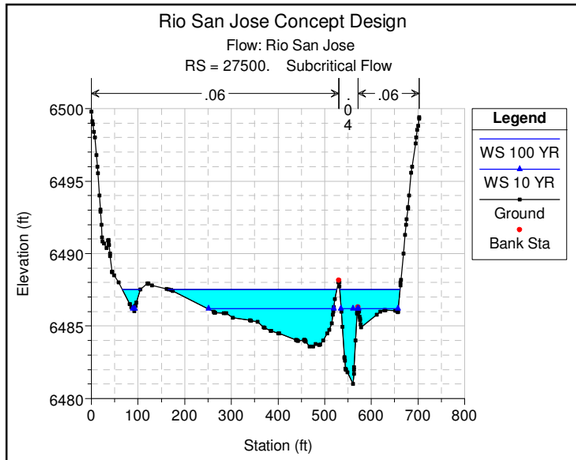
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 27500. Subcritical Flow
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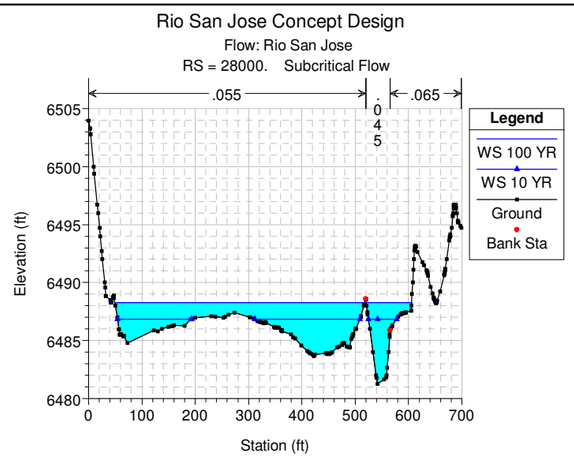
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
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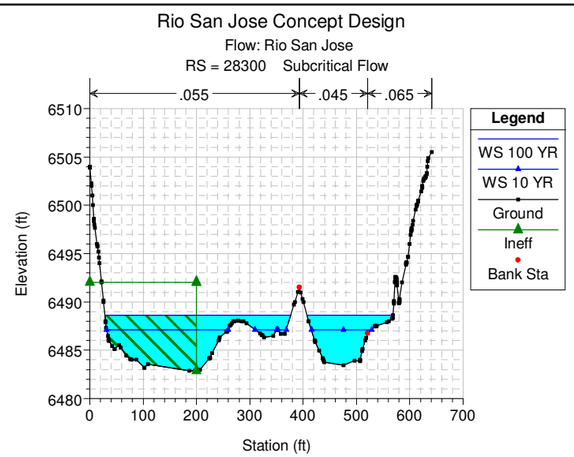
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 28300 Subcritical Flow
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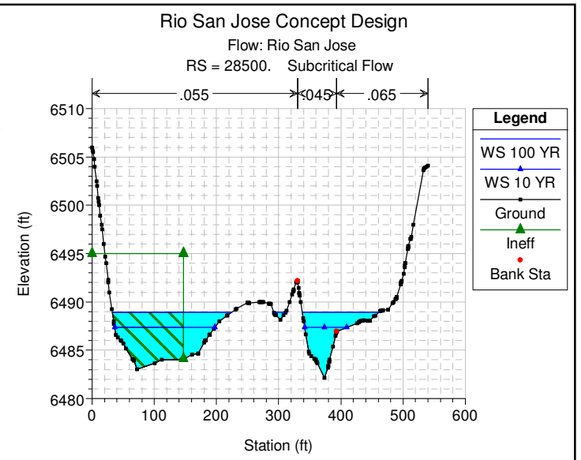
Legend
WS 100 YR
WS 10 YR
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 28500. Subcritical Flow
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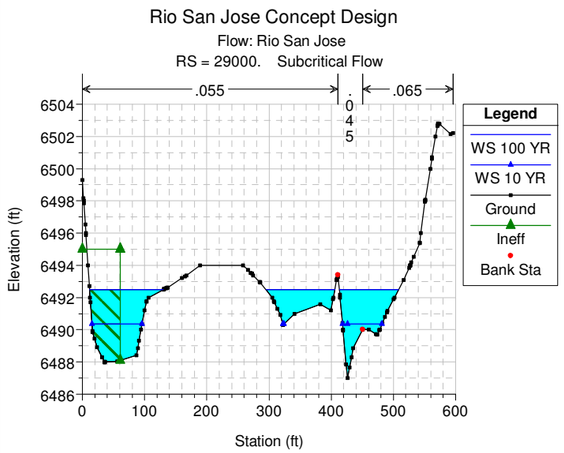
Legend
WS 100 YR
WS 10 YR
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 29000. Subcritical Flow
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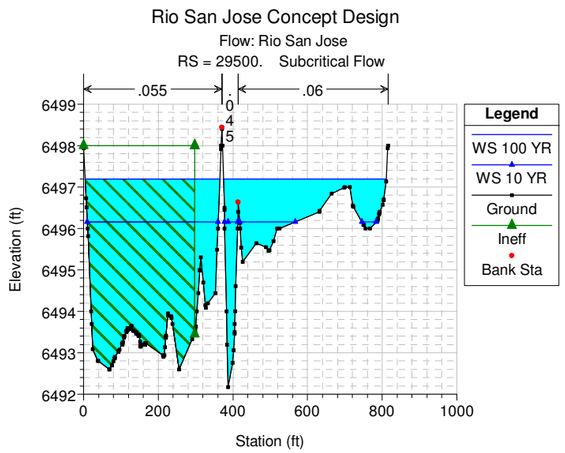
Legend
WS 100 YR
WS 10 YR
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 29500. Subcritical Flow
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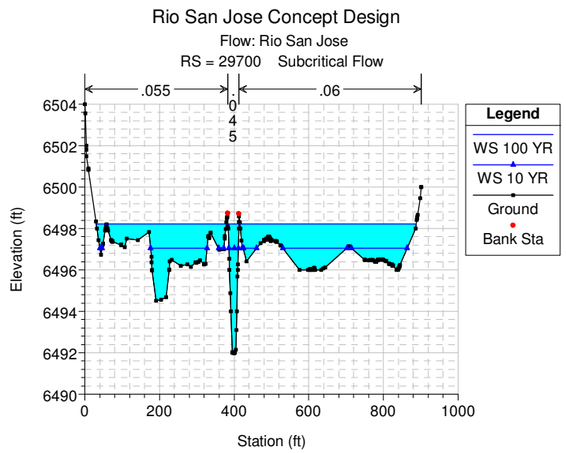
Legend
WS 100 YR
WS 10 YR
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)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Flow: Rio San Jose
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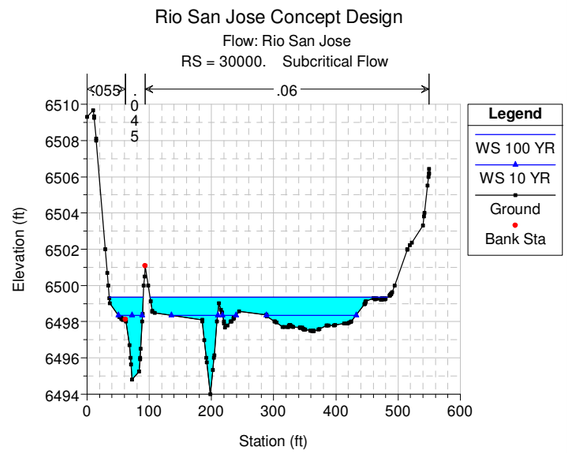
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 30000. Subcritical Flow
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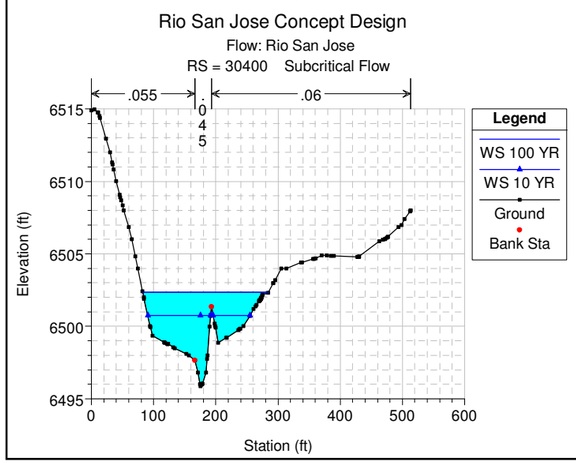
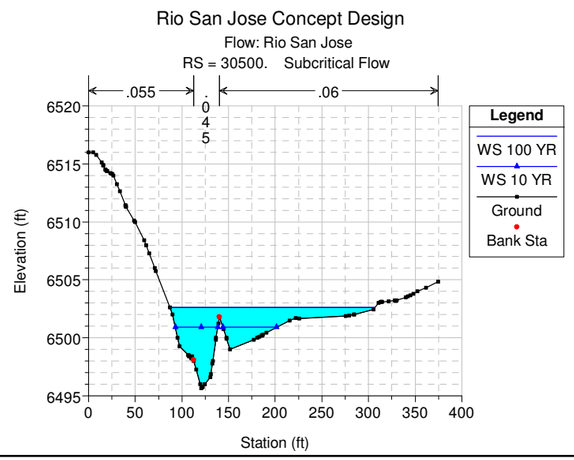
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 30400 Subcritical Flow
.055
.045
.06
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 30500. Subcritical Flow
.055
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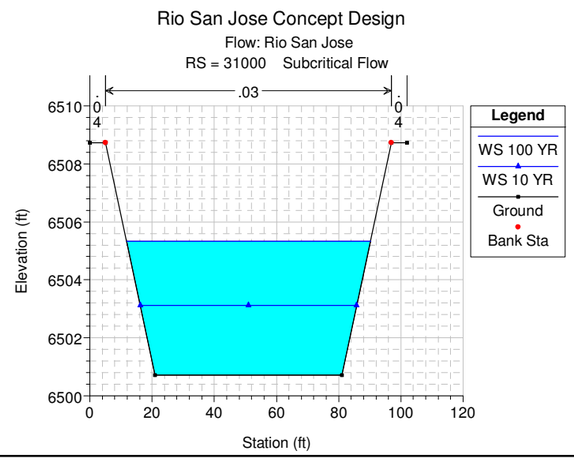
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 31000 Subcritical Flow
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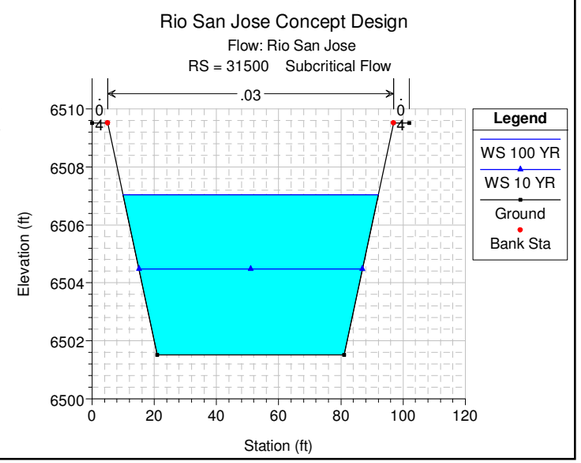
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 31500 Subcritical Flow
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Legend
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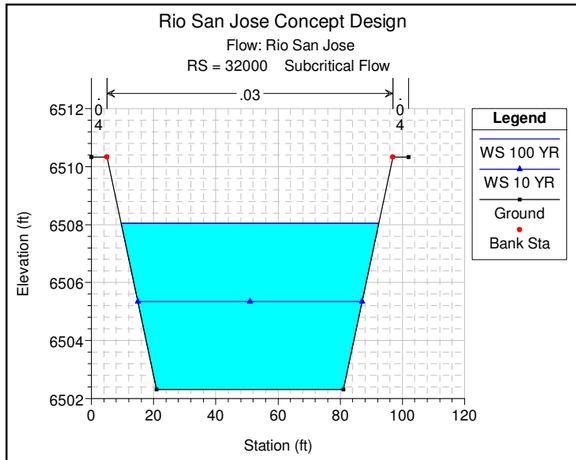
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 32000 Subcritical Flow
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Legend
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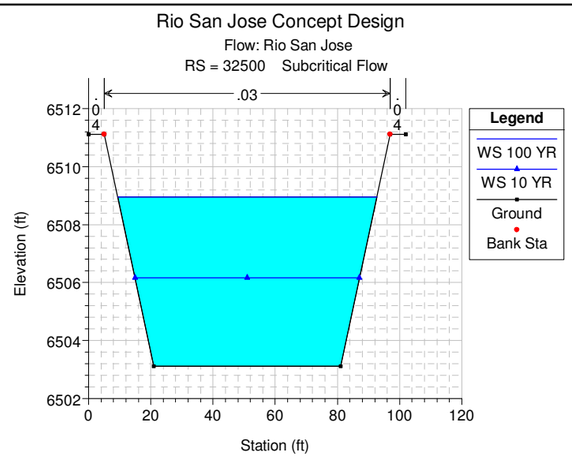
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 32500 Subcritical Flow
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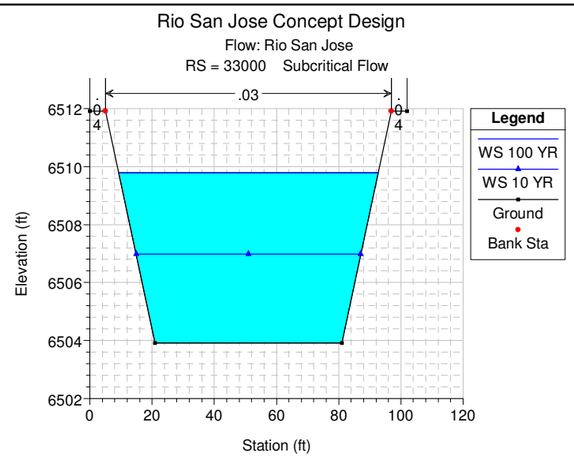
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 33000 Subcritical Flow
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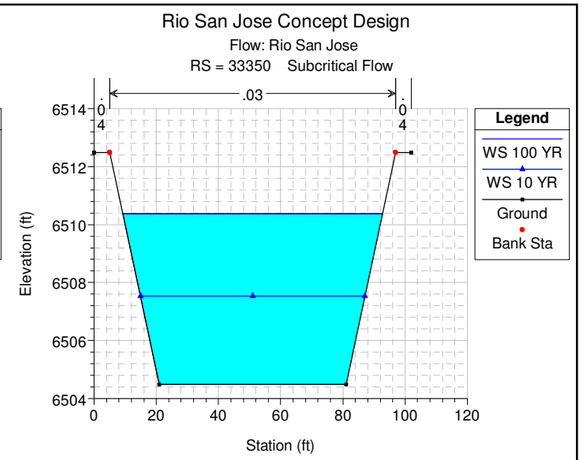
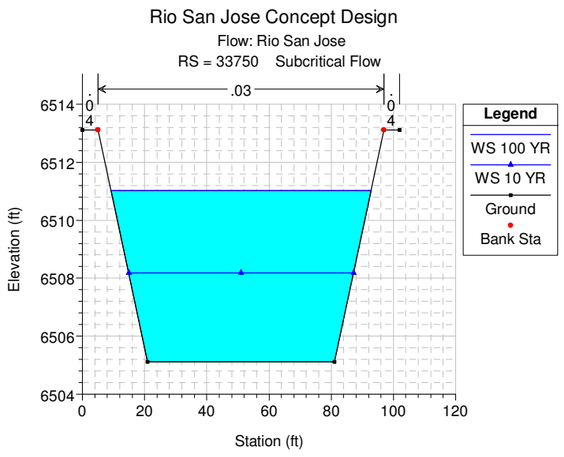
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 33350 Subcritical Flow
.03
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 33750 Subcritical Flow
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Legend
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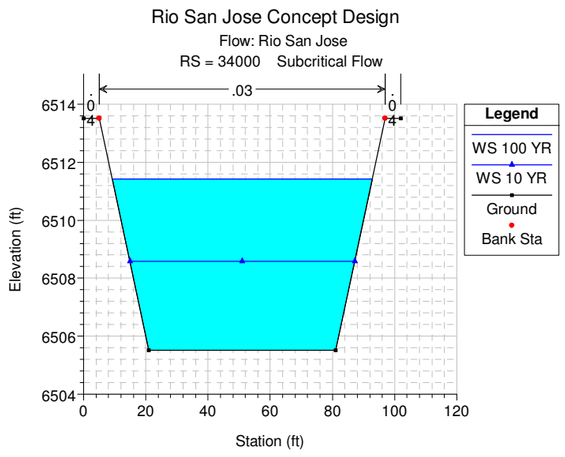
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 34000 Subcritical Flow
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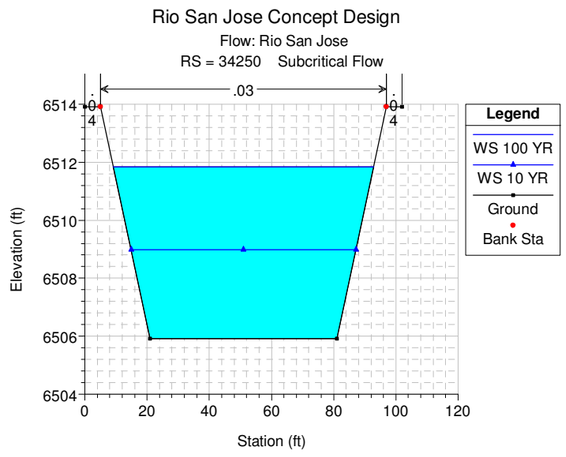
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
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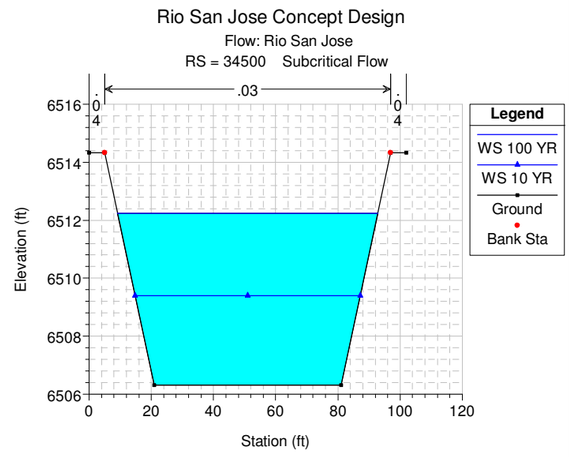
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 34500 Subcritical Flow
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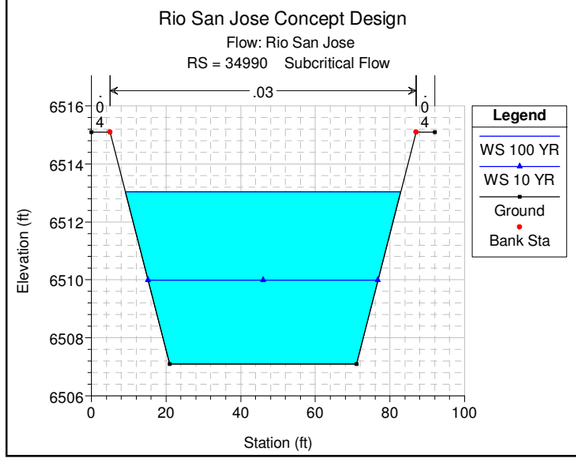
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 34990 Subcritical Flow
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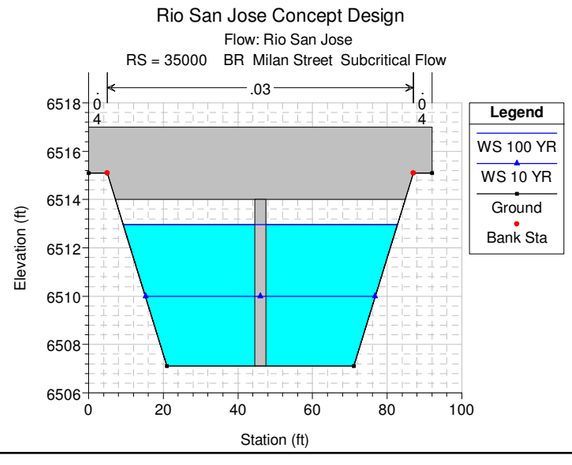
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 35000 BR Milan Street Subcritical Flow
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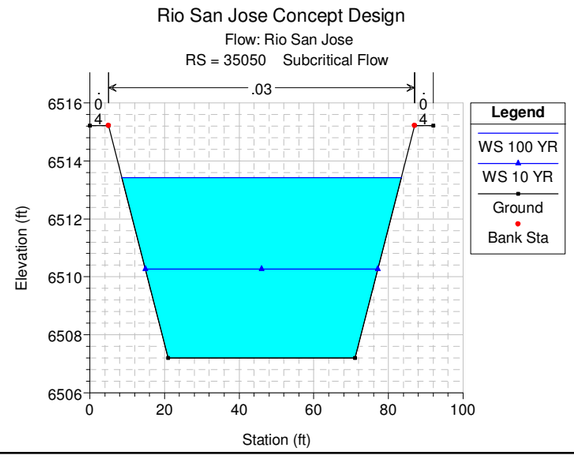
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 35050 Subcritical Flow
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Legend
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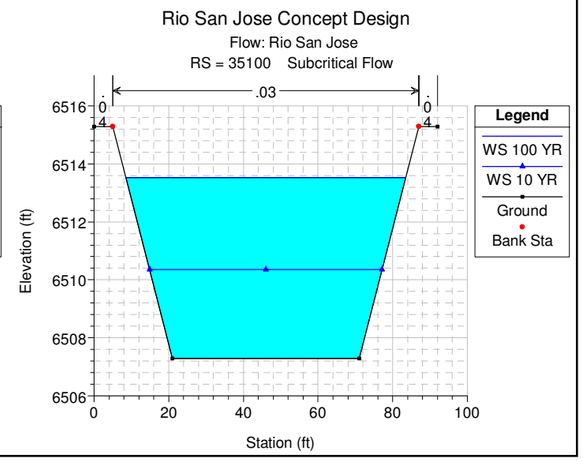
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 35100 Subcritical Flow
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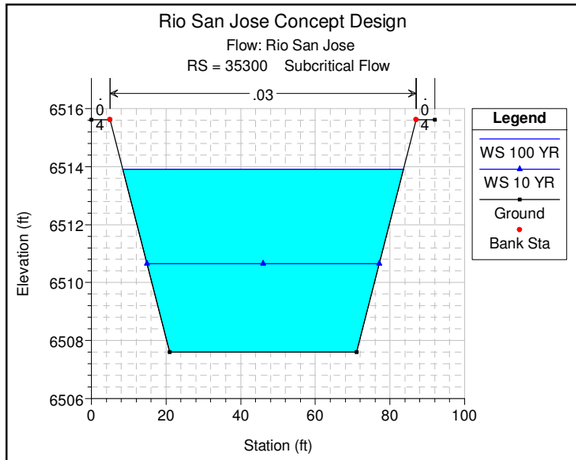
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 35300 Subcritical Flow
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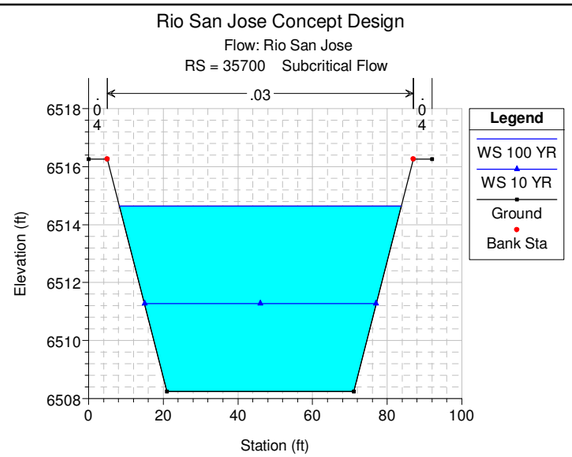
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 35700 Subcritical Flow
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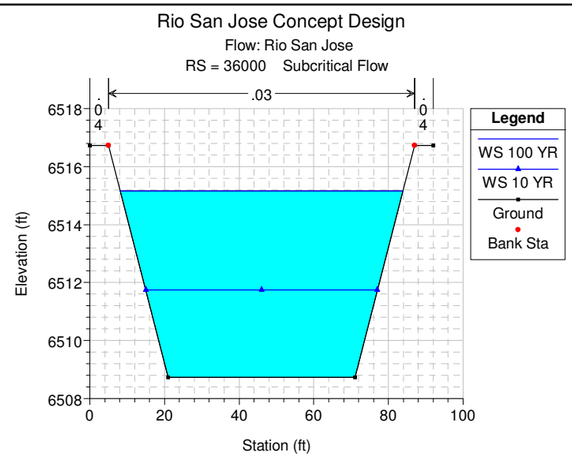
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 36000 Subcritical Flow
.03
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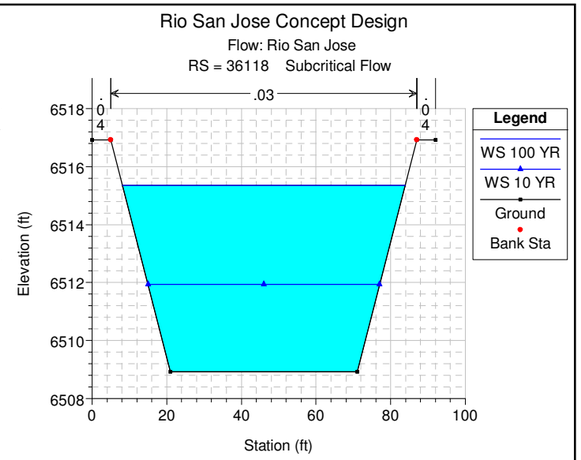
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 36118 Subcritical Flow
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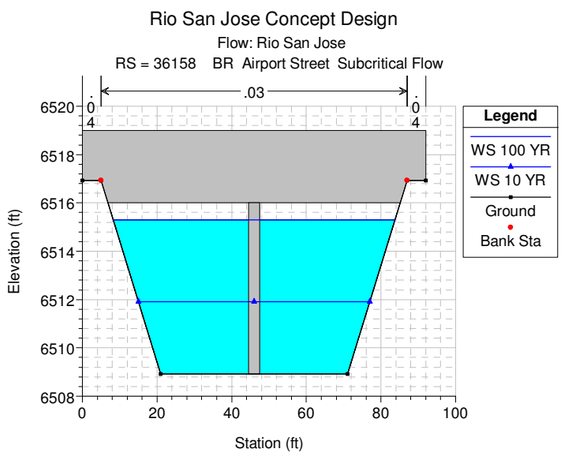
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 36158 BR Airport Street Subcritical Flow
.03
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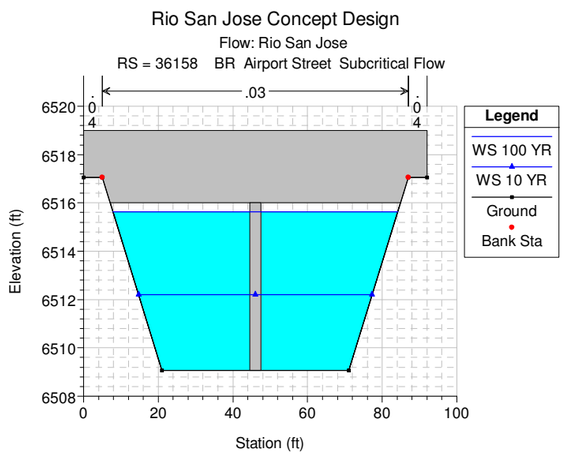
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 36158 BR Airport Street Subcritical Flow
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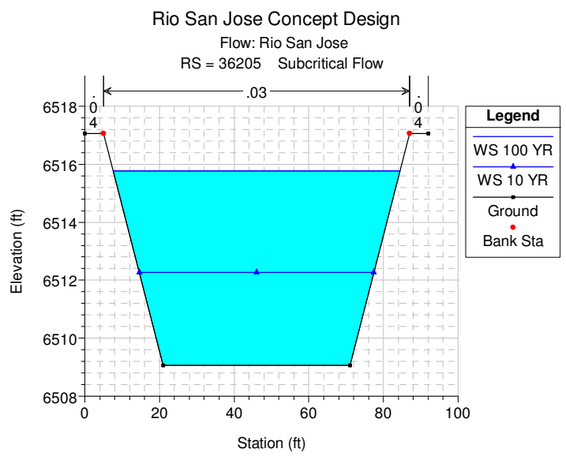
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
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Legend
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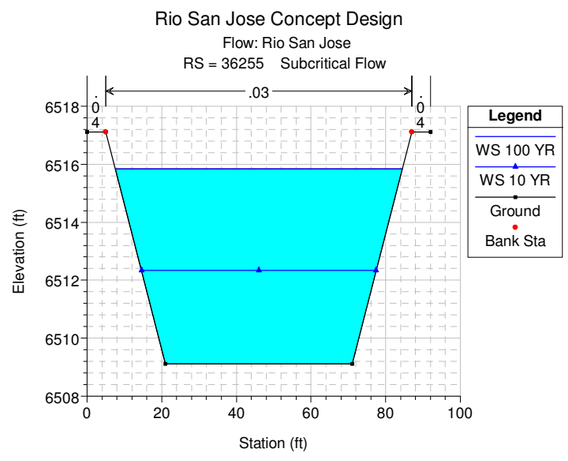
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 36255 Subcritical Flow
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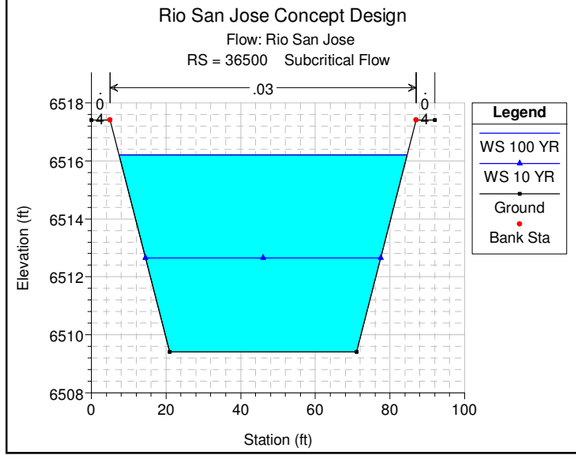
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 36500 Subcritical Flow
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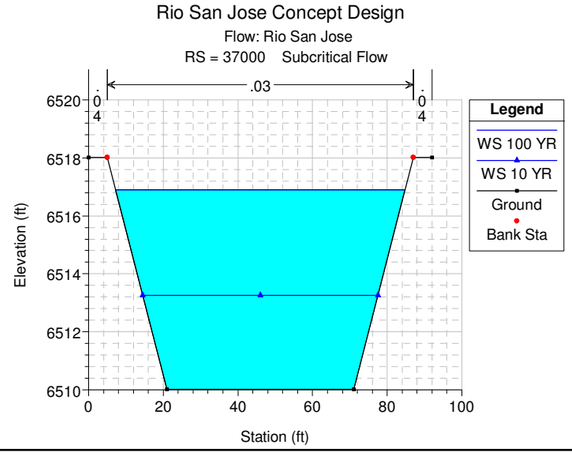
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 37000 Subcritical Flow
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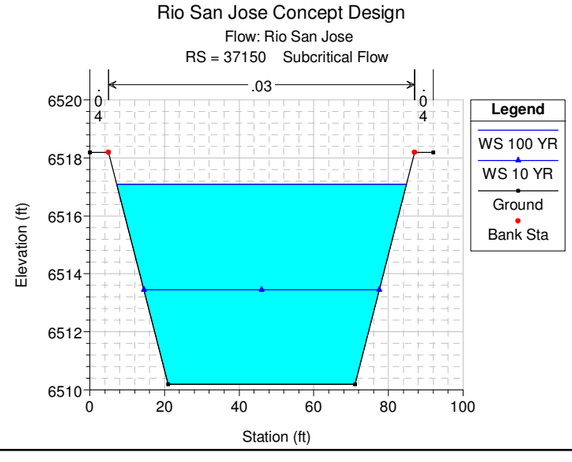
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 37150 Subcritical Flow
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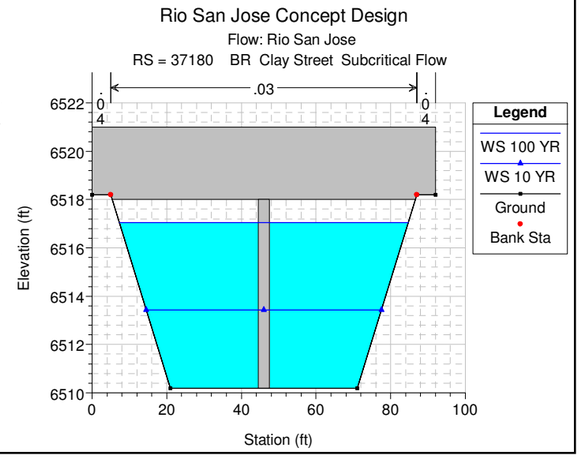
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 37180 BR Clay Street Subcritical Flow
.03
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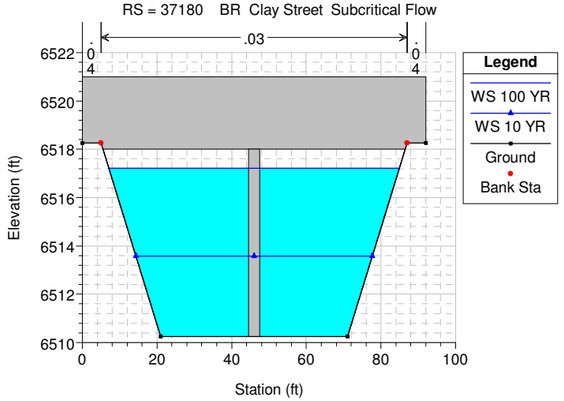
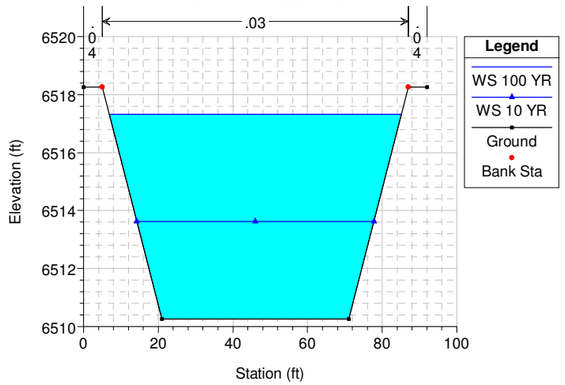
.04
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

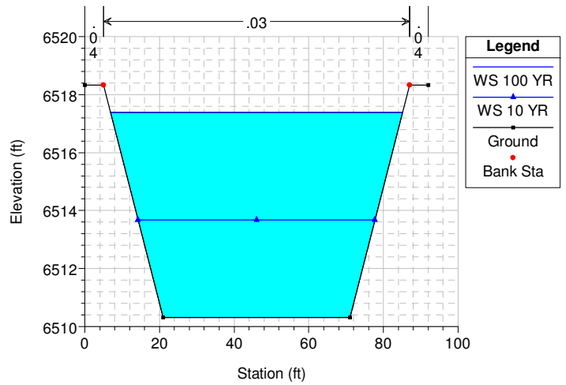
Rio San Jose Concept Design
Flow: Rio San Jose
RS = 37180 BR Clay Street Subcritical Flow



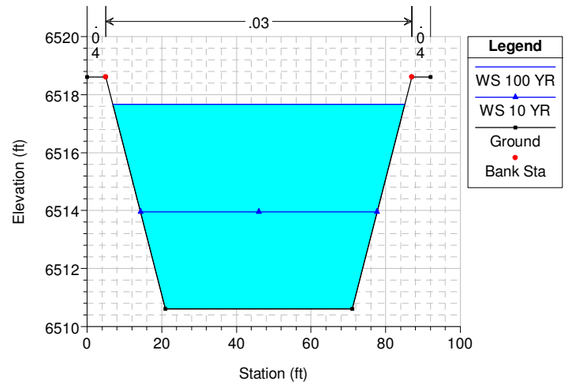
Rio San Jose Concept Design
Flow: Rio San Jose
RS = 37210 Subcritical Flow



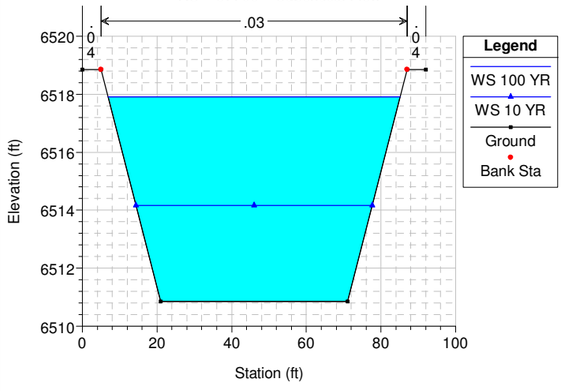
Rio San Jose Concept Design
Flow: Rio San Jose
RS = 37260 Subcritical Flow



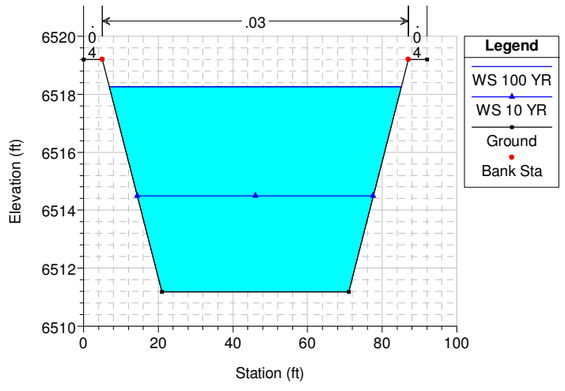
Rio San Jose Concept Design
Flow: Rio San Jose
RS = 37500 Subcritical Flow



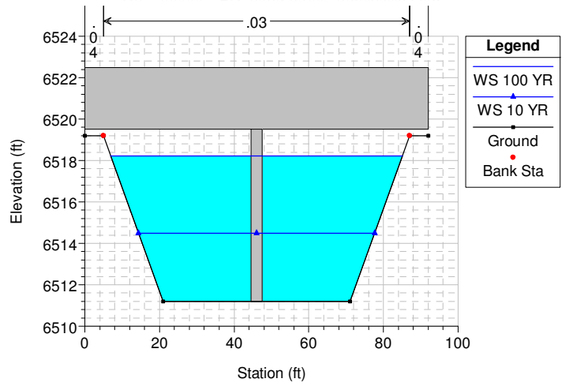
Rio San Jose Concept Design
Flow: Rio San Jose
RS = 37700 Subcritical Flow



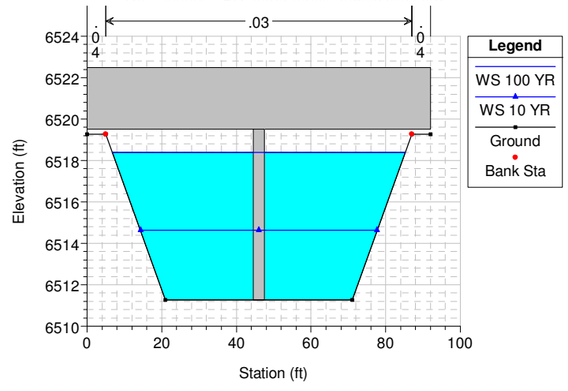
Rio San Jose Concept Design
Flow: Rio San Jose
RS = 37980 Subcritical Flow



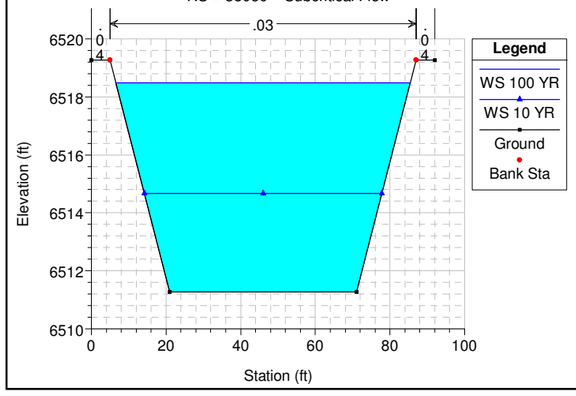
Rio San Jose Concept Design
Flow: Rio San Jose
RS = 38000 BR Sand Street Subcritical Flow



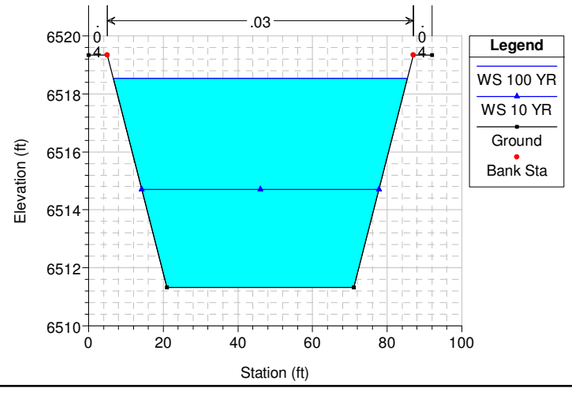
Rio San Jose Concept Design
Flow: Rio San Jose
RS = 38000 BR Sand Street Subcritical Flow



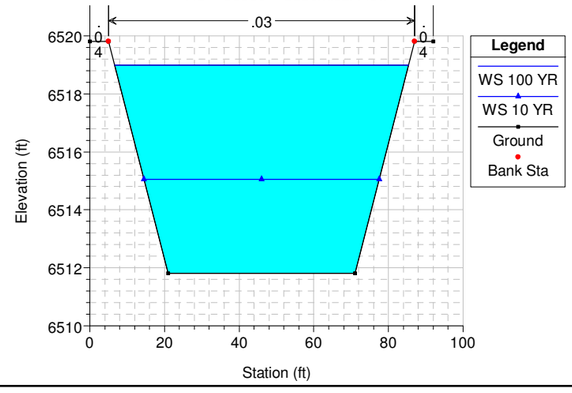
Rio San Jose Concept Design
Flow: Rio San Jose
RS = 38050 Subcritical Flow



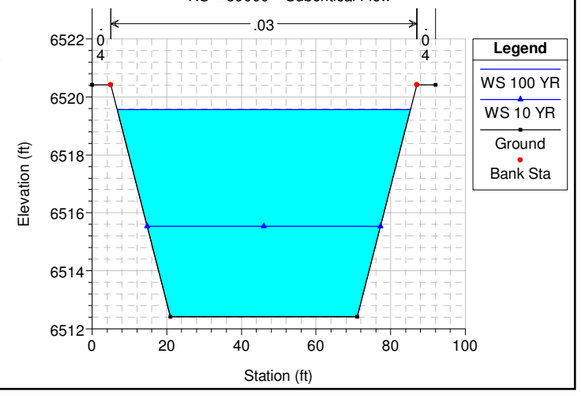
Rio San Jose Concept Design
Flow: Rio San Jose
RS = 38100 Subcritical Flow

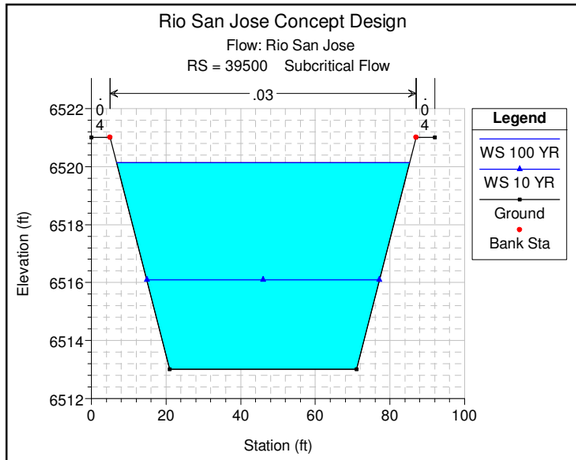


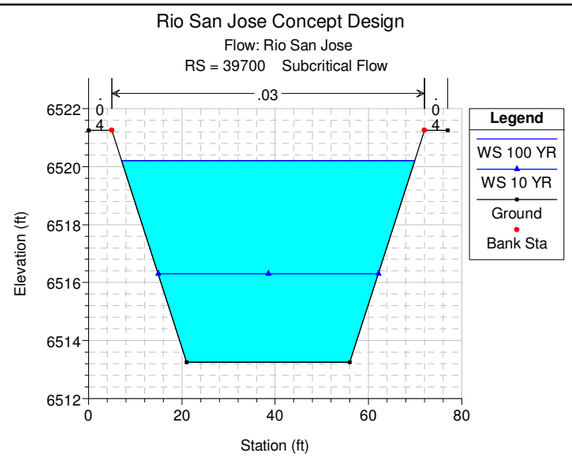
Rio San Jose Concept Design
Flow: Rio San Jose
RS = 38500 Subcritical Flow



Rio San Jose Concept Design
Flow: Rio San Jose
RS = 39000 Subcritical Flow




Rio San Jose Concept Design
Flow: Rio San Jose
RS = 39500 Subcritical Flow
.03
.04
.04
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 39700 Subcritical Flow
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.04
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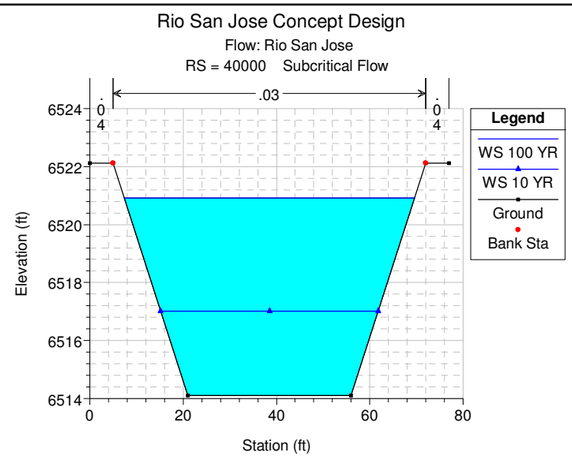
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 40000 Subcritical Flow
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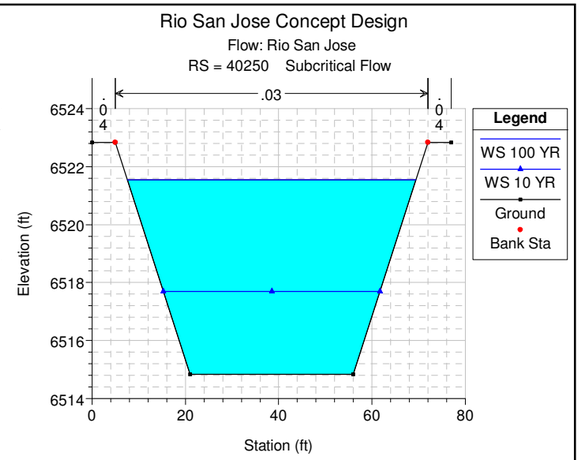
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Rio San Jose Concept Design
Flow: Rio San Jose
RS = 40250 Subcritical Flow
.03
.04
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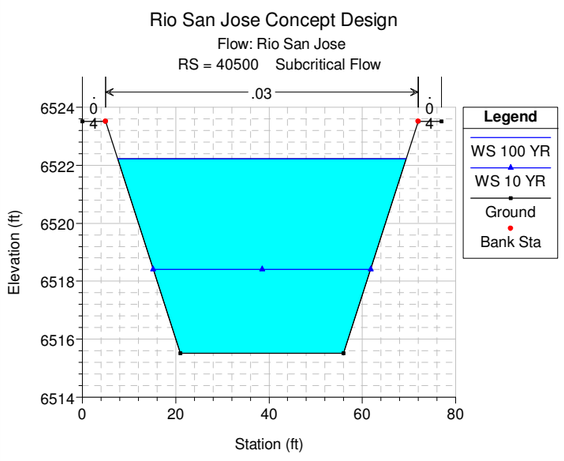
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)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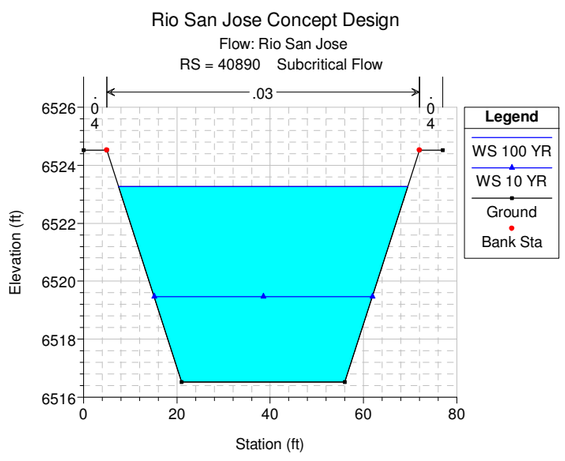
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)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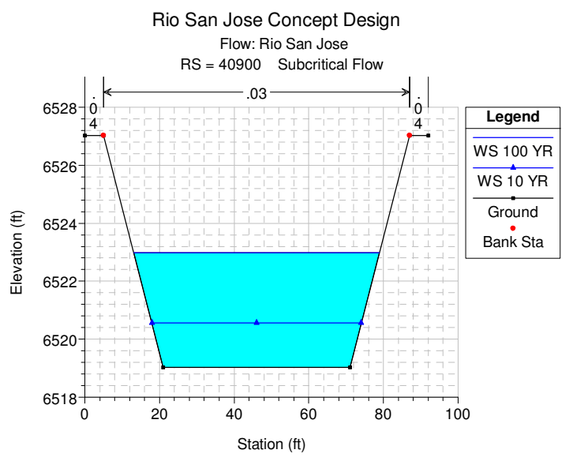
Station (ft)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Bank Sta
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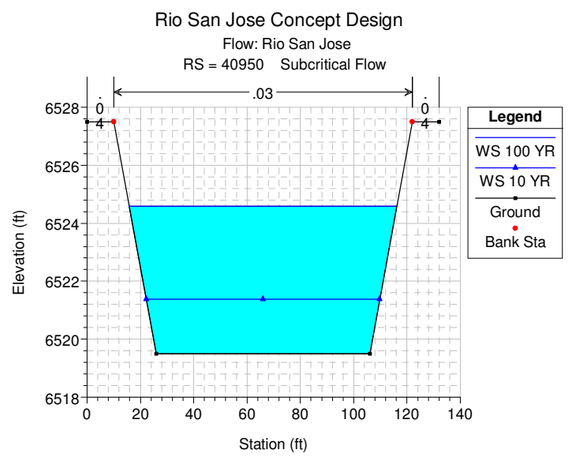
Station (ft)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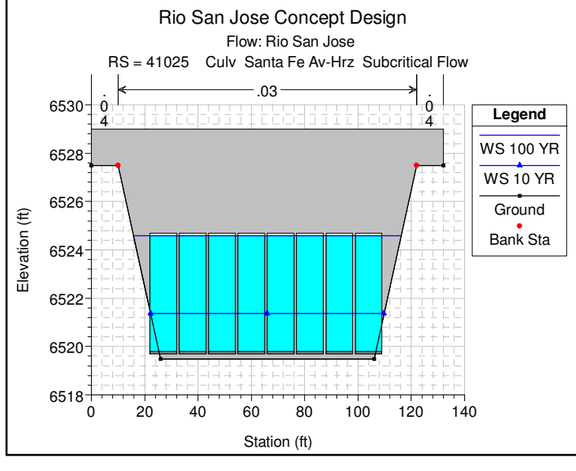
Bank Sta
Elevation (ft)
Station (ft)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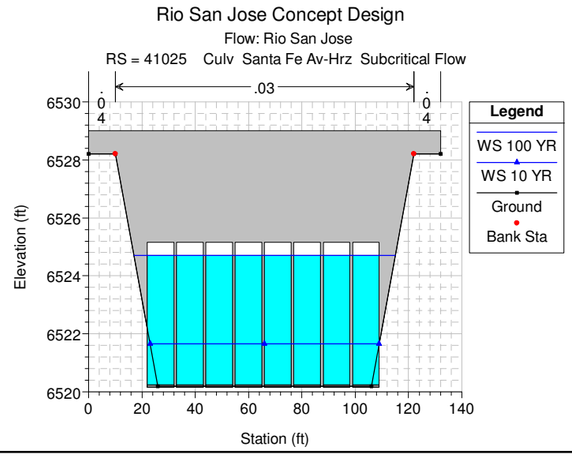
Ground
Bank Sta
Elevation (ft)
Station (ft)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Ground
Bank Sta
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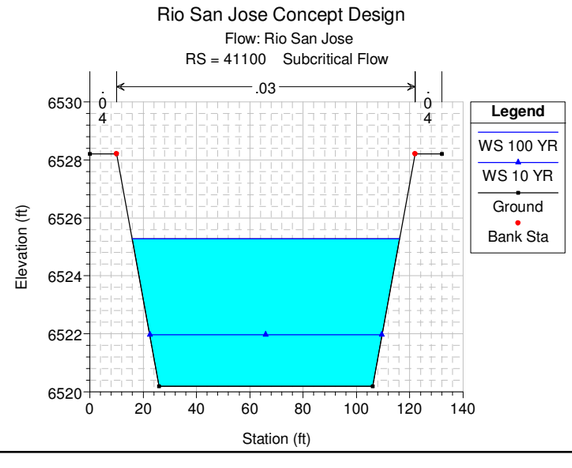
Station (ft)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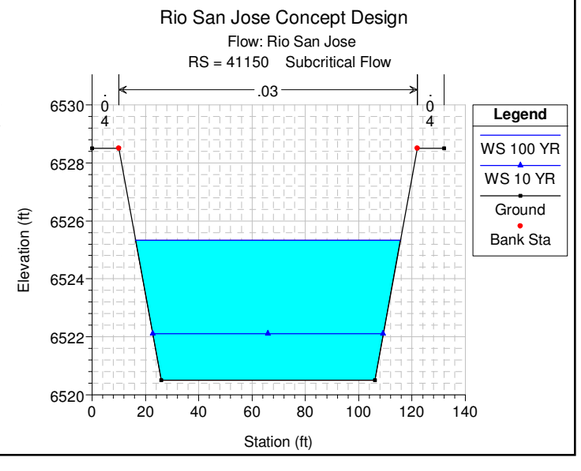
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)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Bank Sta
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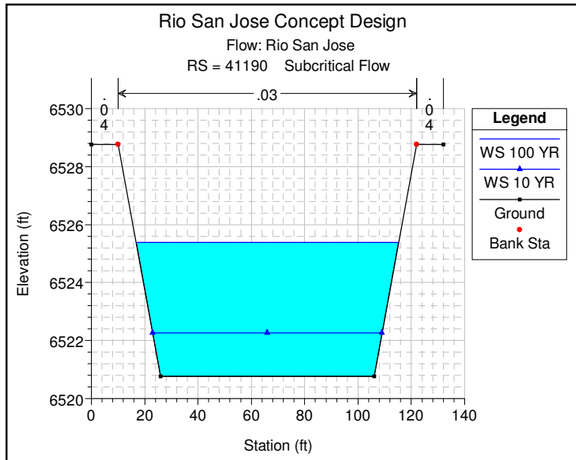
Station (ft)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Bank Sta
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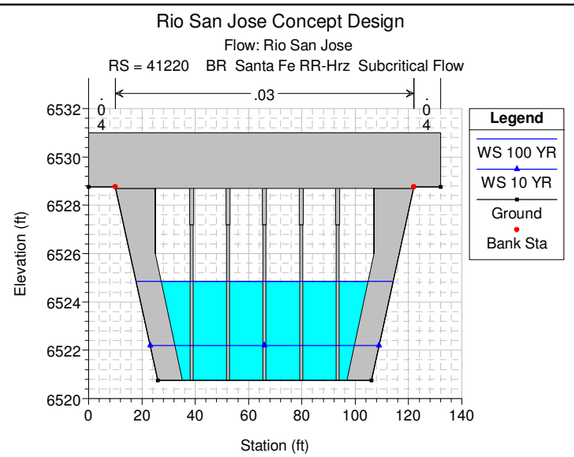
Station (ft)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Bank Sta
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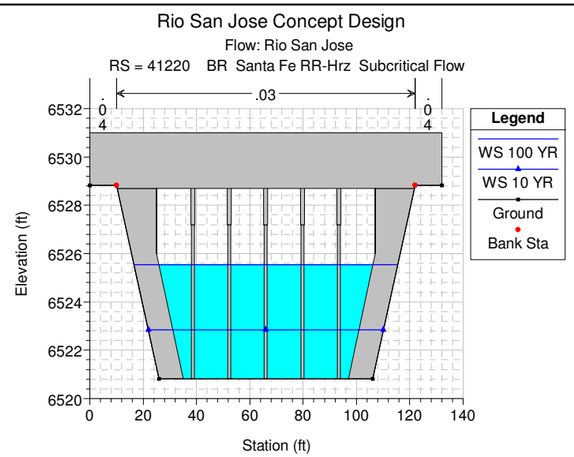
Station (ft)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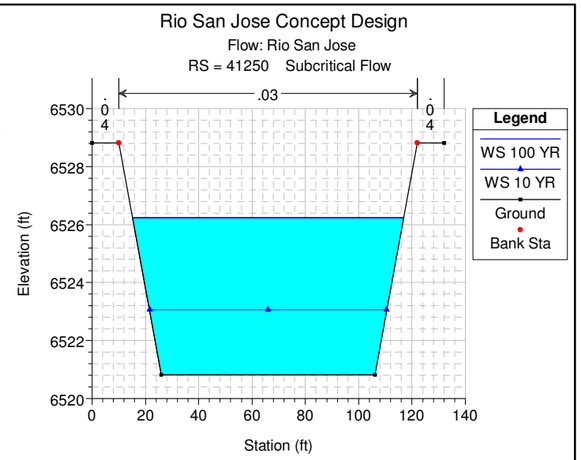
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)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Legend
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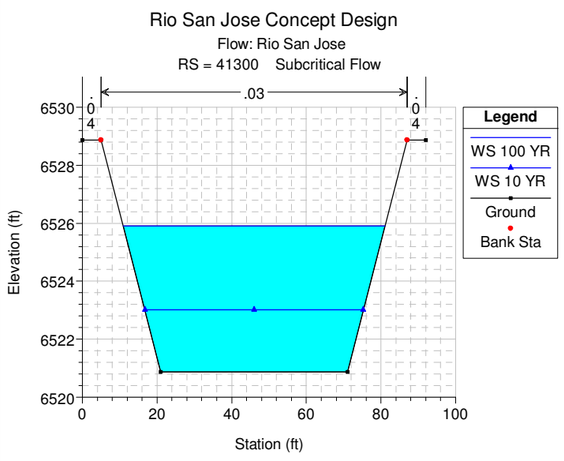
Ground
Bank Sta
Elevation (ft)
Station (ft)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Legend
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WS 10 YR
Ground
Bank Sta
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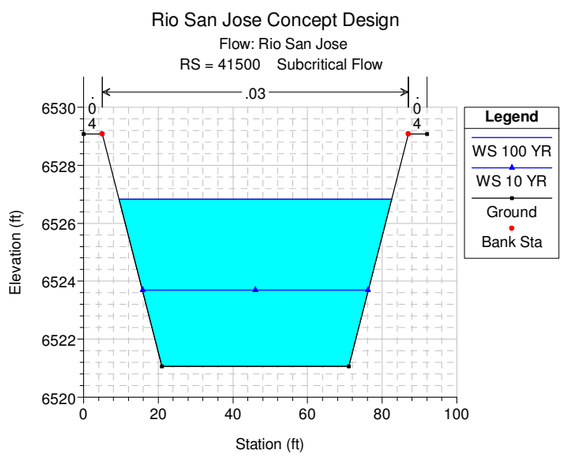
Station (ft)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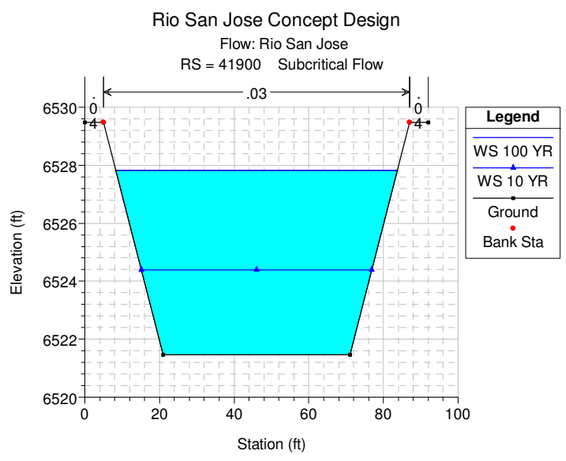
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)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Ground
Bank Sta
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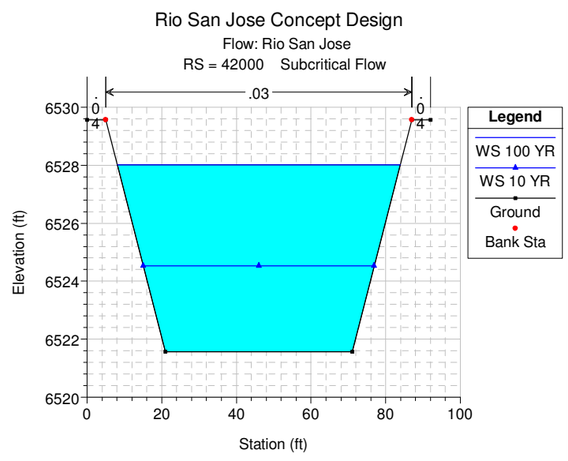
Station (ft)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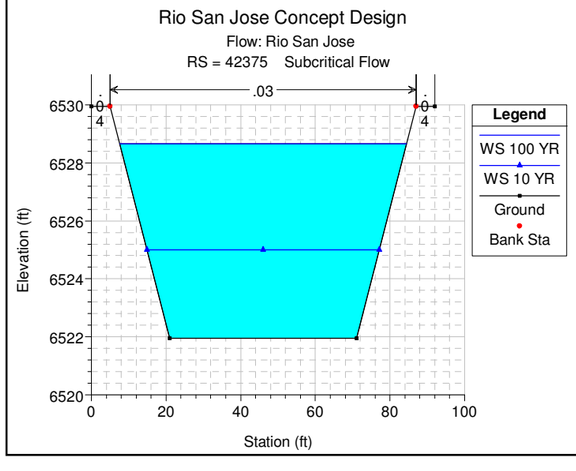
Ground
Bank Sta
Elevation (ft)
Station (ft)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Legend
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Ground
Bank Sta
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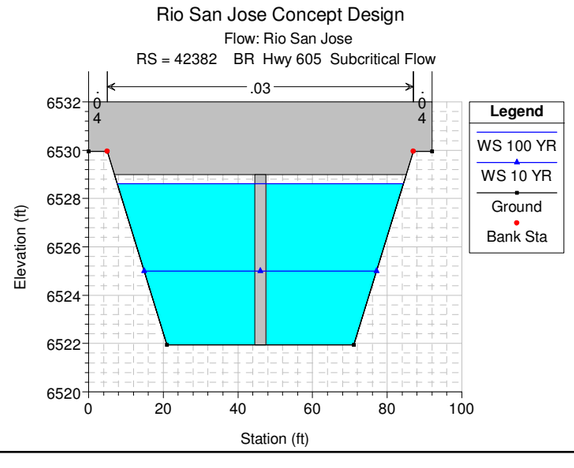
Station (ft)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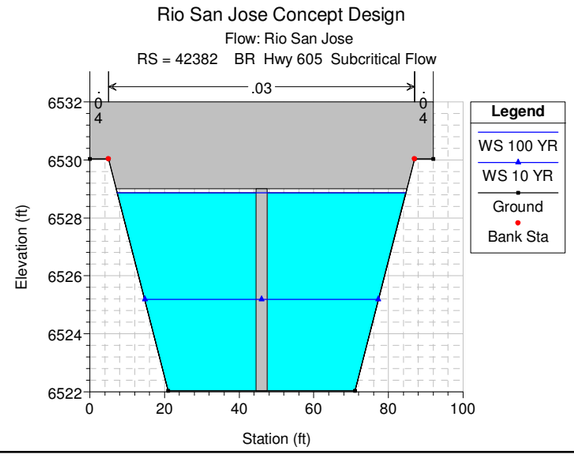
Ground
Bank Sta
Elevation (ft)
Station (ft)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.04
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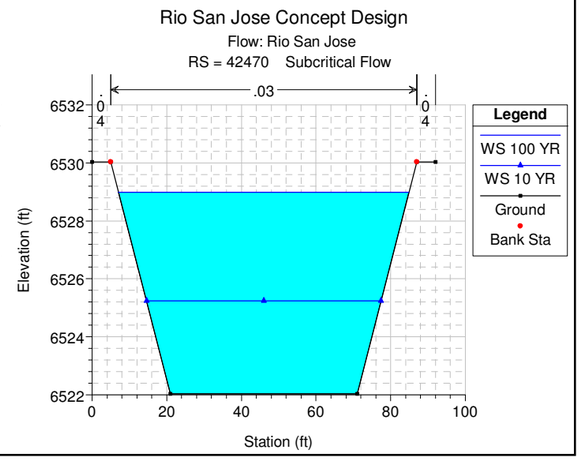
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)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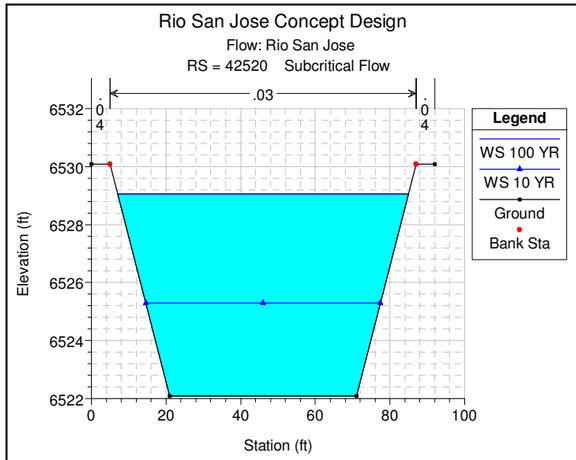
Ground
Bank Sta
Elevation (ft)
Station (ft)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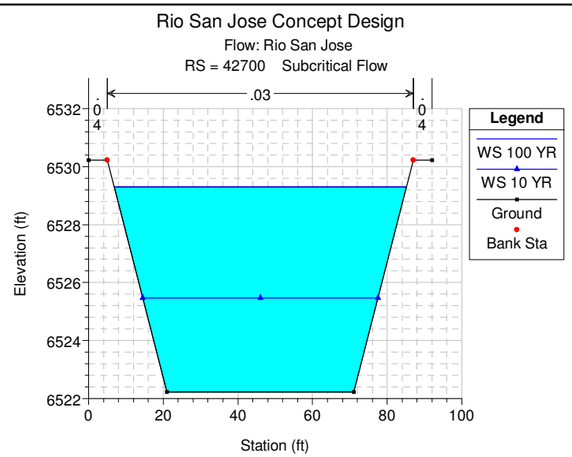
Ground
Bank Sta
Elevation (ft)
Station (ft)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.04
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Legend
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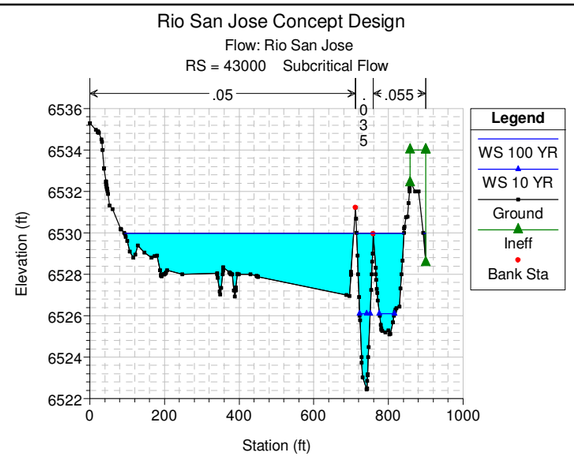
Ground
Bank Sta
Elevation (ft)
Station (ft)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Flow: Rio San Jose
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.05
.055
.035
Legend
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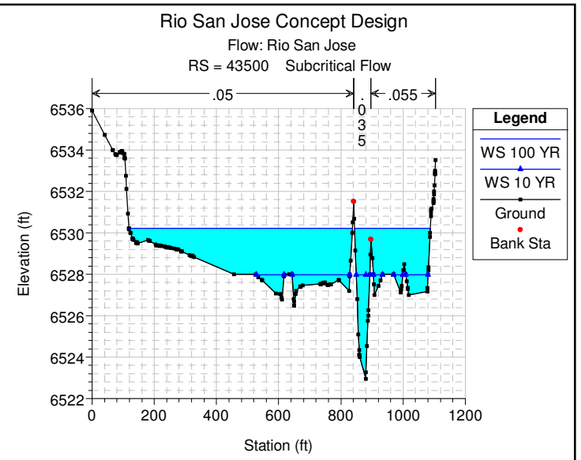
WS 10 YR
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)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Flow: Rio San Jose
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Legend
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WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

Appendix Section 2-Grants Canyon Arroyo Proposed Improvements

Figures	Description
	Grants Canyon Arroyo Concept Cost Estimate
2-1	Proposed Major Drainage Improvements and Grants Canyon HEC-RAS Sections, Sta 0+00 to 42+00
2-2	Proposed Major Drainage Improvements and Grants Canyon HEC-RAS Sections, Sta 42+00 to 110+00
	HEC-RAS Profile Summary Table, Grants Canyon
	HEC-RAS Bridge Summary Table, Grants Canyon
	HEC-RAS Profile Exhibits, Grants Canyon
	HEC-RAS Cross Section Plots, Grants Canyon

Grants Canyon Arroyo Concept Cost Estimate

Confluence with Rio San Jose to Washington Avenue

PROPOSED IMPROVEMENTS	DESCRIPTION	UNIT	QUANTITY	COST per UNIT	ESTIMATED COST
Earthwork and Embankment	Earthwork excavation for construction of proposed channel section	CU. YARD	16,000	$6	$96,000
Grouted Boulder Drop Structure	114 ft wide by 58 ft long grouted boulder drop structure downstream of existing sanitary sewer mainline to protect sanitary mainline	SQ. YARD	740	$200	$148,000
Land Acquisition	Acquire ROW and easements necessary to construct drainage channel. Cost based on $20,000 per acre	ACRES	1.4	$20,000	$28,000
Environmental Permitting	USACE Section 404 permitting and wetland mitigation	LUMP SUM	1	$10,000	$10,000

SUBTOTAL:	$282,000
30% CONTINGENCY:	$84,600
TOTAL:	**$366,600**

Washington Avenue to Roosevelt Avenue including Washington Avenue Bridge

PROPOSED IMPROVEMENTS	DESCRIPTION	UNIT	QUANTITY	COST per UNIT	ESTIMATED COST
Earthwork and Embankment	Earthwork excavation for construction of proposed channel section	CU. YARD	23,000	$6	$138,000
Low Rise Bridge	90 ft length x 44 ft width	SQ. FT.	3,960	$150	$594,000
Bridge Approach Slabs	2 - 44 ft width x 15 ft length	SQ. FT.	1,320	$120	$158,400
Concrete Wingwalls	Wingwalls upstream and downstream of bridges	LUMP SUM	1	$50,000	$50,000
Bridge Scour and Erosion Protection	Riprap or concrete channel bank lining	LUMP SUM	1	$50,000	$50,000
Removal of Existing Crossing Structure	Removal of existing culvert structure and roadway paving	LUMP SUM	1	$20,000	$20,000
Removal of Existing Roadway	Removal of existing roadway for 100 ft each side of the structure, 44 ft width x 200 ft length	SQ. YARD	980	$10	$9,800
Roadway Construction	44 ft width x 170 ft length	SQ. YARD	840	$40	$33,600
Utility Relocation	Misc. utility relocation associated with construction of new crossing structure and channel segment	LUMP SUM	1	$10,000	$10,000
Land Acquisition	Acquire ROW and easements necessary to construct drainage channel. Cost based on $20,000 per acre	ACRES	2.5	$20,000	$50,000
Environmental Permitting	USACE Section 404 permitting and wetland mitigation	LUMP SUM	1	$10,000	$10,000

SUBTOTAL:	$1,123,800
30% CONTINGENCY:	$337,140
TOTAL:	**$1,460,940**

Grants Canyon Arroyo Concept Cost Estimate

Roosevelt Avenue to College Boulevard including Roosevelt Avenue Bridge

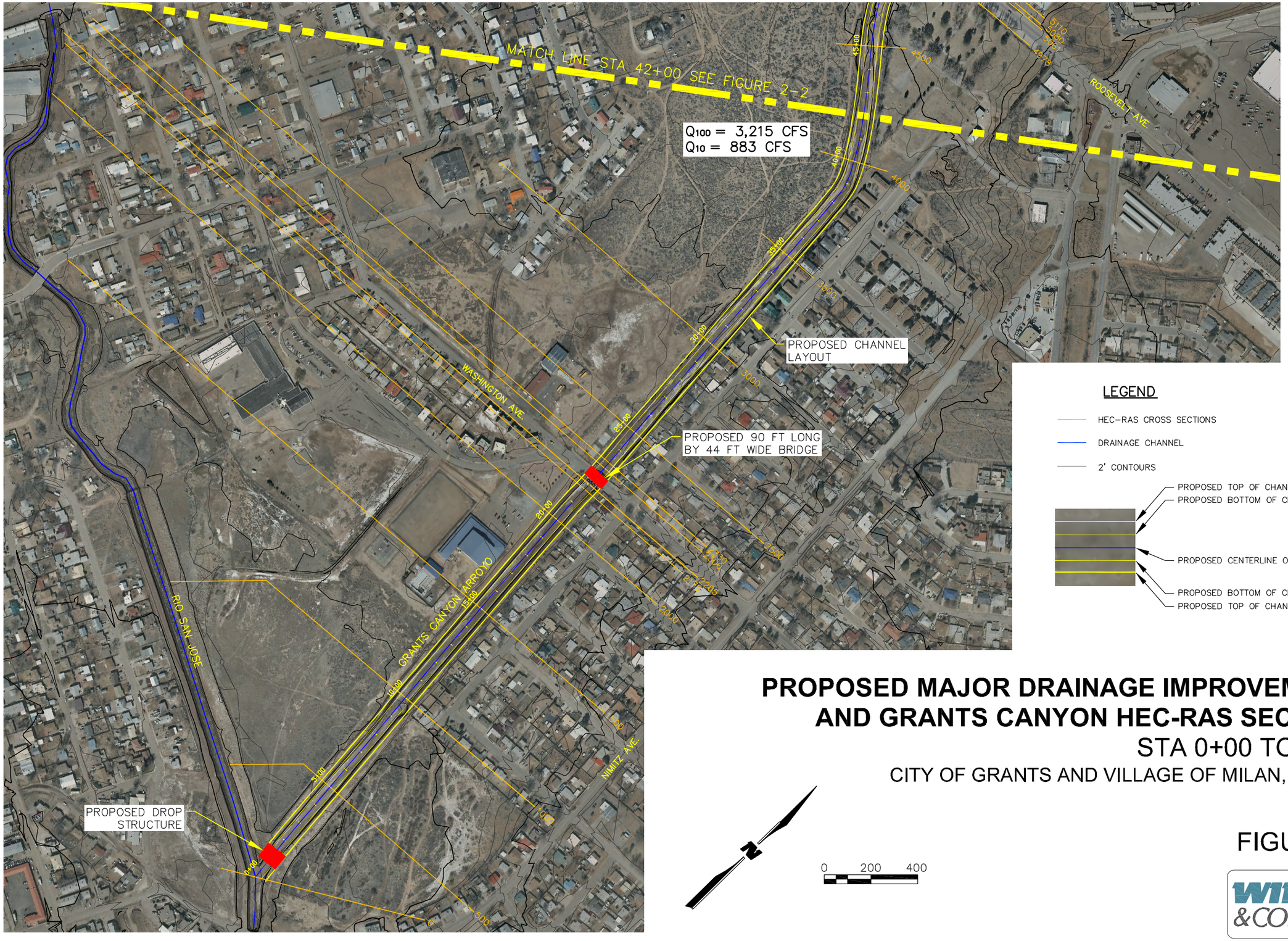
PROPOSED IMPROVEMENTS	DESCRIPTION	UNIT	QUANTITY	COST per UNIT	ESTIMATED COST
Earthwork and Embankment	Earthwork excavation for construction of proposed channel section	CU. YARD	33,000	$6	$198,000
Low Rise Bridge	90 ft length x 44 ft width	SQ. FT.	3,520	$150	$528,000
Bridge Approach Slabs	2 - 44 ft width x 15 ft length	SQ. FT.	1,320	$120	$158,400
Concrete Wingwalls	Wingwalls upstream and downstream of bridges	LUMP SUM	1	$50,000	$50,000
Bridge Scour and Erosion Protection	Riprap or concrete channel bank lining	LUMP SUM	1	$50,000	$50,000
Grouted Boulder Drop Structure	Grouted boulder drop structure downstream of Roosevelt to pprotect sanitary sewer mainline	SQ. YARD	580	$200	$116,000
Removal of Existing Crossing Structure	Removal of existing culvert structure and roadway paving	LUMP SUM	1	$20,000	$20,000
Removal of Existing Roadway	Removal of existing roadway for 100 ft each side of the structure, 44 ft width x 200 ft length	SQ. YARD	980	$10	$9,800
Roadway Construction	44 ft width x 170 ft length	SQ. YARD	840	$40	$33,600
Utility Relocation	Misc. utility relocation associated with construction of new crossing structure and channel segment	LUMP SUM	1	$10,000	$10,000
Sanitary Sewer Relocation	Cost to relocate sanitatry sewer mainline	LUMP SUM	1	$60,000	$60,000
Land Acquisition	Acquire ROW and easements necessary to construct drainage channel. Cost based on $20,000 per acre	ACRES	5.8	$20,000	$116,000
Environmental Permitting	USACE Section 404 permitting and wetland mitigation	LUMP SUM	1	$10,000	$10,000

SUBTOTAL:	$1,359,800
30% CONTINGENCY:	$407,940
TOTAL:	**$1,767,740**

College Boulevard and Transition to Existing Upstream Arroyo including College Boulevard Bridge

PROPOSED IMPROVEMENTS	DESCRIPTION	UNIT	QUANTITY	COST per UNIT	ESTIMATED COST
Earthwork and Embankment	Earthwork excavation for construction of proposed channel section	CU. YARD	4,000	$6	$24,000
Low Rise Bridge	90 ft length x 44 ft width	SQ. FT.	3,960	$150	$594,000
Bridge Approach Slabs	2 - 44 ft width x 15 ft length	SQ. FT.	1,320	$120	$158,400
Concrete Wingwalls	Wingwalls upstream and downstream of bridges	LUMP SUM	1	$50,000	$50,000
Bridge Scour and Erosion Protection	Riprap or concrete channel bank lining	LUMP SUM	1	$50,000	$50,000
Removal of Existing Crossing Structure	Removal of existing culvert structure and roadway paving	LUMP SUM	1	$10,000	$10,000
Removal of Existing Roadway	Removal of existing roadway for 120 ft each side of the structure, 32 ft existing width x 240 ft length	SQ. YARD	860	$10	$8,600
Roadway Construction	44 ft width x 170 ft length	SQ. YARD	1,030	$40	$41,200
Land Acquisition	Acquire ROW and easements necessary to construct drainage channel. Cost based on $20,000 per acre	ACRES	0.5	$20,000	$10,000
Environmental Permitting	USACE Section 404 permitting and wetland mitigation	LUMP SUM	1	$10,000	$10,000

SUBTOTAL:	$956,200
30% CONTINGENCY:	$286,860
TOTAL:	**$1,243,060**



PROPOSED MAJOR DRAINAGE IMPROVEMENTS AND GRANTS CANYON HEC-RAS SECTIONS

STA 0+00 TO 42+00

CITY OF GRANTS AND VILLAGE OF MILAN, NM DMP

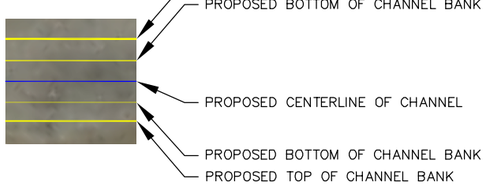
03/14/2011

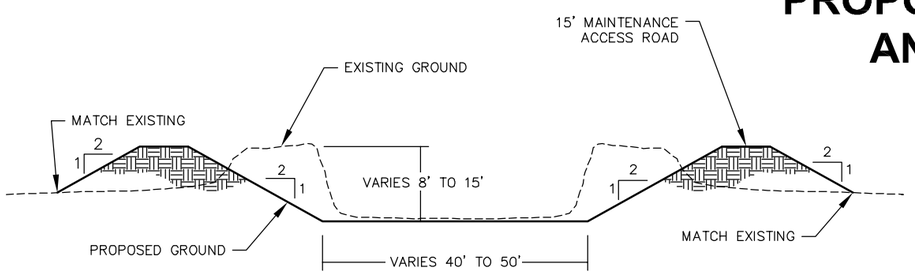
FIGURE 2-1

WILSON & COMPANY

LEGEND

- HEC–RAS CROSS SECTIONS
- DRAINAGE CHANNEL
- 2' CONTOURS





TYPICAL CHANNEL SECTION

STA 0+00 TO 86+50

N.T.S.

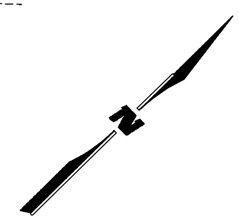
PROPOSED MAJOR DRAINAGE IMPROVEMENTS AND GRANTS CANYON HEC-RAS SECTIONS

STA 42+00 TO 110+00

CITY OF GRANTS AND VILLAGE OF MILAN, NM DMP

03/14/2011

FIGURE 2-2



0 200 400

WILSON & COMPANY

Profile Summary Table

HEC-RAS Plan: Future with River: Grants Canyon Reach: Grants Canyon

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	Max Chl Dpth	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Grants Canyon	0	100 YR	3215.00	6418.50	6431.00	6423.21	12.50	0.000262	3.43	937.50	100.00	0.20
Grants Canyon	0	10 YR	883.00	6418.50	6425.10	6420.57	6.60	0.000200	2.12	417.13	76.40	0.16
Grants Canyon	50	100 YR	3215.00	6418.65	6431.01		12.36	0.000273	3.48	923.48	99.44	0.20
Grants Canyon	50	10 YR	883.00	6418.65	6425.11		6.46	0.000216	2.17	406.31	75.83	0.17
Grants Canyon	55	100 YR	3215.00	6421.65	6430.86		9.21	0.000806	5.10	630.19	86.84	0.33
Grants Canyon	55	10 YR	883.00	6421.65	6424.91		3.26	0.002304	4.79	184.49	63.05	0.49
Grants Canyon	500	100 YR	3215.00	6423.54	6431.18		7.64	0.001580	6.45	498.71	80.56	0.46
Grants Canyon	500	10 YR	883.00	6423.54	6426.19		2.65	0.004706	6.03	146.33	60.59	0.68
Grants Canyon	1000	100 YR	3215.00	6424.36	6431.97		7.61	0.001602	6.48	496.35	80.44	0.46
Grants Canyon	1000	10 YR	883.00	6424.36	6427.86		3.50	0.001819	4.43	199.31	63.99	0.44
Grants Canyon	1500	100 YR	3215.00	6424.91	6432.78		7.87	0.001420	6.21	517.42	81.48	0.43
Grants Canyon	1500	10 YR	883.00	6424.91	6428.70		3.79	0.001380	4.04	218.29	65.16	0.39
Grants Canyon	2000	100 YR	3215.00	6426.77	6433.51		6.73	0.002473	7.52	427.46	76.94	0.56
Grants Canyon	2000	10 YR	883.00	6426.77	6429.61		2.83	0.003725	5.59	157.82	61.34	0.61
Grants Canyon	2175	100 YR	3215.00	6427.27	6433.94		6.66	0.002567	7.62	422.06	76.66	0.57
Grants Canyon	2175	10 YR	883.00	6427.27	6430.27		3.00	0.003072	5.26	168.00	62.00	0.56
Grants Canyon	2200	100 YR	3215.00	6427.37	6433.99		6.62	0.002625	7.68	418.84	76.49	0.58
Grants Canyon	2200	10 YR	883.00	6427.37	6430.35		2.97	0.003162	5.31	166.43	61.90	0.57
Grants Canyon	2278 Washington Ave		Bridge									
Grants Canyon	2300	100 YR	3215.00	6427.78	6435.91	6432.49	8.13	0.001264	5.97	538.68	82.52	0.41
Grants Canyon	2300	10 YR	883.00	6427.78	6431.20	6429.85	3.42	0.001973	4.55	194.11	63.66	0.46
Grants Canyon	2500	100 YR	3215.00	6428.60	6436.12		7.52	0.001675	6.58	488.79	80.06	0.47
Grants Canyon	2500	10 YR	883.00	6428.60	6431.61		3.01	0.003052	5.24	168.36	62.02	0.56
Grants Canyon	3000	100 YR	3215.00	6430.65	6436.98		6.33	0.003075	8.10	396.79	75.33	0.62
Grants Canyon	3000	10 YR	883.00	6430.65	6433.35		2.69	0.004426	5.92	149.27	60.78	0.67
Grants Canyon	3500	100 YR	3215.00	6432.70	6438.59		5.89	0.003974	8.84	363.64	73.55	0.70
Grants Canyon	3500	10 YR	883.00	6432.70	6435.48		2.78	0.003978	5.72	154.50	61.12	0.63
Grants Canyon	4000	100 YR	3215.00	6434.75	6440.59		5.83	0.004099	8.93	359.84	73.34	0.71
Grants Canyon	4000	10 YR	883.00	6434.75	6437.50		2.75	0.004139	5.79	152.54	60.99	0.65
Grants Canyon	4500.	100 YR	3215.00	6438.05	6442.87	6442.76	4.82	0.007962	11.17	287.72	69.29	0.97
Grants Canyon	4500.	10 YR	883.00	6438.05	6440.22	6440.12	2.17	0.009211	7.48	117.97	58.68	0.93
Grants Canyon	4975	100 YR	3215.00	6441.20	6446.49	6445.91	5.29	0.005783	10.04	320.33	71.15	0.83
Grants Canyon	4975	10 YR	883.00	6441.20	6443.76	6443.27	2.56	0.005285	6.26	140.96	60.23	0.72
Grants Canyon	4980	100 YR	3215.00	6443.20	6448.52	6448.52	5.31	0.008535	11.95	269.06	61.26	1.00

Profile Summary Table

HEC-RAS Plan: Future with River: Grants Canyon Reach: Grants Canyon (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	Max Chl Dpth	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Grants Canyon	4980	10 YR	883.00	6443.20	6445.57	6445.57	2.36	0.010621	8.35	105.77	49.46	1.01
Grants Canyon	5060 Roosevelt Ave		Bridge									
Grants Canyon	5061	100 YR	3215.00	6443.50	6450.81	6448.81	7.31	0.002728	8.05	399.24	69.24	0.59
Grants Canyon	5061	10 YR	883.00	6443.50	6447.12	6445.87	3.62	0.002455	5.16	171.23	54.50	0.51
Grants Canyon	5080	100 YR	3215.00	6443.66	6450.83		7.17	0.002929	8.26	389.44	68.67	0.61
Grants Canyon	5080	10 YR	883.00	6443.66	6447.15		3.49	0.002805	5.39	163.79	53.95	0.55
Grants Canyon	5200	100 YR	3215.00	6444.57	6451.03		6.46	0.004267	9.41	341.64	65.83	0.73
Grants Canyon	5200	10 YR	883.00	6444.57	6447.43		2.86	0.005567	6.76	130.60	51.43	0.75
Grants Canyon	5500	100 YR	3215.00	6446.85	6452.20	6452.17	5.35	0.008320	11.84	271.43	61.41	0.99
Grants Canyon	5500	10 YR	883.00	6446.85	6449.33	6449.21	2.48	0.008976	7.90	111.72	49.94	0.93
Grants Canyon	5800	100 YR	3215.00	6449.13	6454.76	6454.45	5.63	0.006965	11.14	288.49	62.51	0.91
Grants Canyon	5800	10 YR	883.00	6449.13	6451.83	6451.50	2.70	0.006716	7.19	122.81	50.82	0.82
Grants Canyon	6000	100 YR	3215.00	6450.65	6456.13	6455.96	5.48	0.007672	11.52	279.08	61.91	0.96
Grants Canyon	6000	10 YR	883.00	6450.65	6453.23	6453.02	2.58	0.007920	7.59	116.37	50.31	0.88
Grants Canyon	6500	100 YR	3215.00	6454.45	6459.96	6459.77	5.51	0.007526	11.44	280.92	62.03	0.95
Grants Canyon	6500	10 YR	883.00	6454.45	6457.08		2.63	0.007349	7.40	119.25	50.54	0.85
Grants Canyon	7100	100 YR	3215.00	6459.01	6464.49	6464.32	5.48	0.007643	11.51	279.44	61.93	0.95
Grants Canyon	7100	10 YR	883.00	6459.01	6461.60	6461.38	2.59	0.007788	7.55	117.01	50.36	0.87
Grants Canyon	7500	100 YR	3215.00	6462.05	6467.55	6467.36	5.50	0.007559	11.46	280.50	62.00	0.95
Grants Canyon	7500	10 YR	883.00	6462.05	6464.67	6464.42	2.62	0.007447	7.44	118.73	50.50	0.85
Grants Canyon	8000	100 YR	3215.00	6465.85	6471.30		5.45	0.005206	9.69	331.88	71.80	0.79
Grants Canyon	8000	10 YR	883.00	6465.85	6468.28		2.43	0.006277	6.62	133.38	59.72	0.78
Grants Canyon	8300	100 YR	2744.00	6468.18	6473.16		4.98	0.004678	8.49	323.24	79.87	0.74
Grants Canyon	8300	10 YR	715.00	6468.18	6470.30		2.12	0.006275	5.99	119.46	62.72	0.76
Grants Canyon	8365 College Blvd		Bridge									
Grants Canyon	8370	100 YR	2744.00	6468.67	6475.80	6472.81	7.13	0.001149	5.38	543.96	154.77	0.39
Grants Canyon	8370	10 YR	715.00	6468.67	6471.40	6470.45	2.73	0.002627	4.50	158.83	66.38	0.51
Grants Canyon	8650	100 YR	2744.00	6471.41	6476.70	6476.70	5.29	0.008696	11.30	242.87	61.76	1.00
Grants Canyon	8650	10 YR	715.00	6471.41	6473.80	6473.80	2.39	0.010735	8.06	88.73	44.33	1.00
Grants Canyon	9000	100 YR	2744.00	6474.82	6480.37	6480.37	5.55	0.008507	11.43	240.17	72.89	0.99
Grants Canyon	9000	10 YR	715.00	6474.82	6477.52	6477.48	2.70	0.010165	7.79	91.75	46.12	0.97
Grants Canyon	9500	100 YR	2744.00	6477.48	6484.30	6484.27	6.82	0.008518	12.65	216.90	43.19	0.99
Grants Canyon	9500	10 YR	715.00	6477.48	6481.25	6480.60	3.77	0.005264	7.16	99.87	33.38	0.73

Profile Summary Table

HEC-RAS Plan: Future with River: Grants Canyon Reach: Grants Canyon (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	Max Chl Dpth	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Grants Canyon	10000	100 YR	2744.00	6480.38	6489.19	6487.13	8.81	0.004299	6.80	403.28	82.96	0.54
Grants Canyon	10000	10 YR	715.00	6480.38	6484.57	6483.58	4.19	0.007515	6.27	114.06	39.82	0.65
Grants Canyon	10500	100 YR	2744.00	6485.11	6492.28	6492.25	7.17	0.016198	10.34	265.36	79.14	1.00
Grants Canyon	10500	10 YR	715.00	6485.11	6489.82	6489.68	4.71	0.016567	7.13	100.26	52.87	0.91
Grants Canyon	11000	100 YR	2744.00	6488.90	6496.84	6495.37	7.94	0.003508	6.21	554.03	191.27	0.49
Grants Canyon	11000	10 YR	715.00	6488.90	6493.96	6492.60	5.06	0.004013	4.59	176.69	131.78	0.48

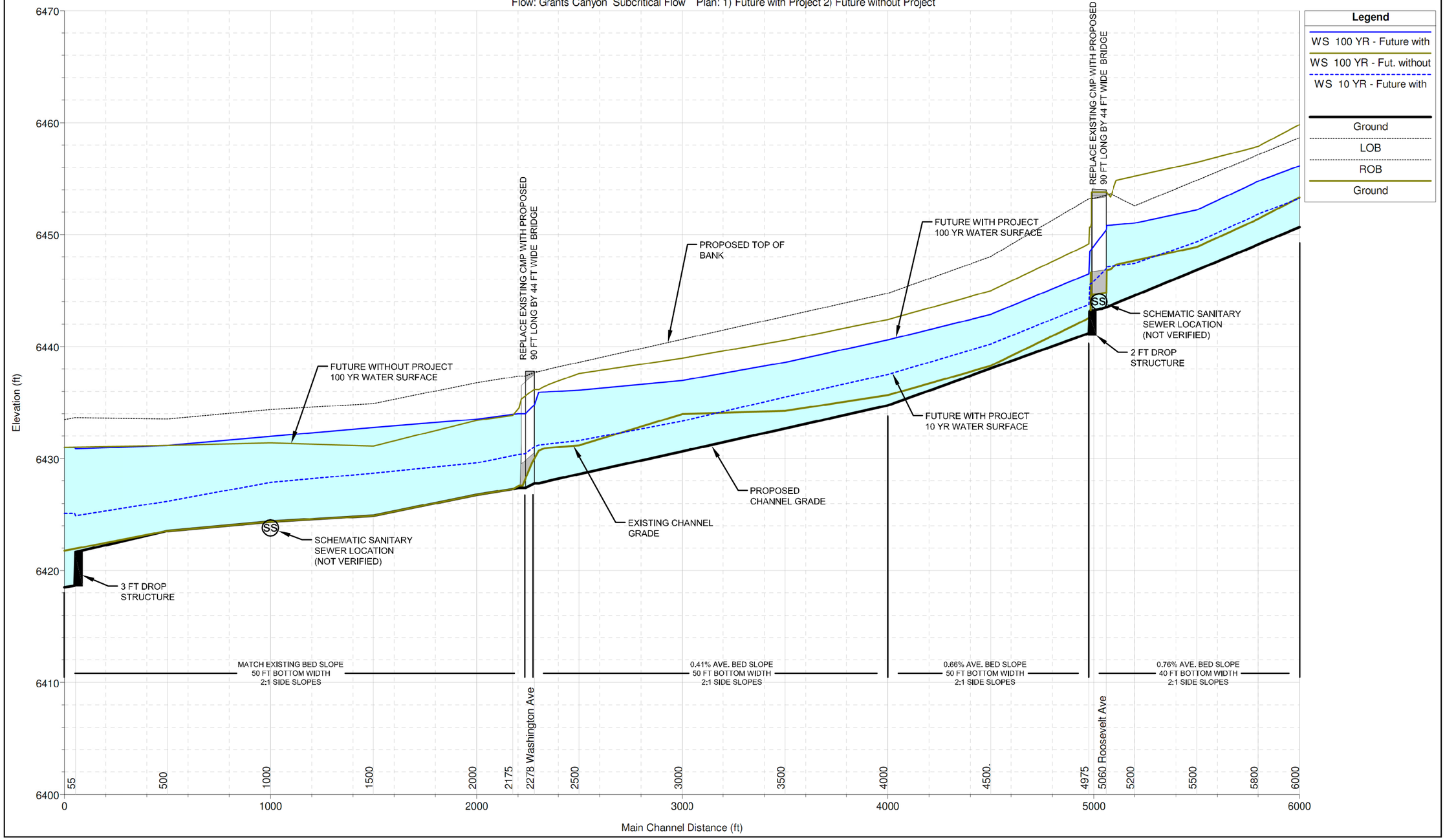
Bridge Summary Table

HEC-RAS Plan: Future with River: Grants Canyon Reach: Grants Canyon

Reach	River Sta	Profile	Q Total	E.G. US.	W.S. US.	Q Bridge	BR Open Area	BR Open Vel
			(cfs)	(ft)	(ft)	(cfs)	(sq ft)	(ft/s)
Grants Canyon	2278 Washington Ave	100 YR	3215.00	6436.46	6435.91	3215.00	428.50	7.50
Grants Canyon	2278 Washington Ave	10 YR	883.00	6431.52	6431.20	883.00	428.50	5.40
Grants Canyon	5060 Roosevelt Ave	100 YR	3215.00	6451.82	6450.81	3215.00	390.00	11.97
Grants Canyon	5060 Roosevelt Ave	10 YR	883.00	6447.54	6447.12	883.00	390.00	8.40
Grants Canyon	8365 College Blvd	100 YR	2744.00	6476.25	6475.80	2744.00	335.74	8.17
Grants Canyon	8365 College Blvd	10 YR	715.00	6471.71	6471.40	715.00	335.74	5.85

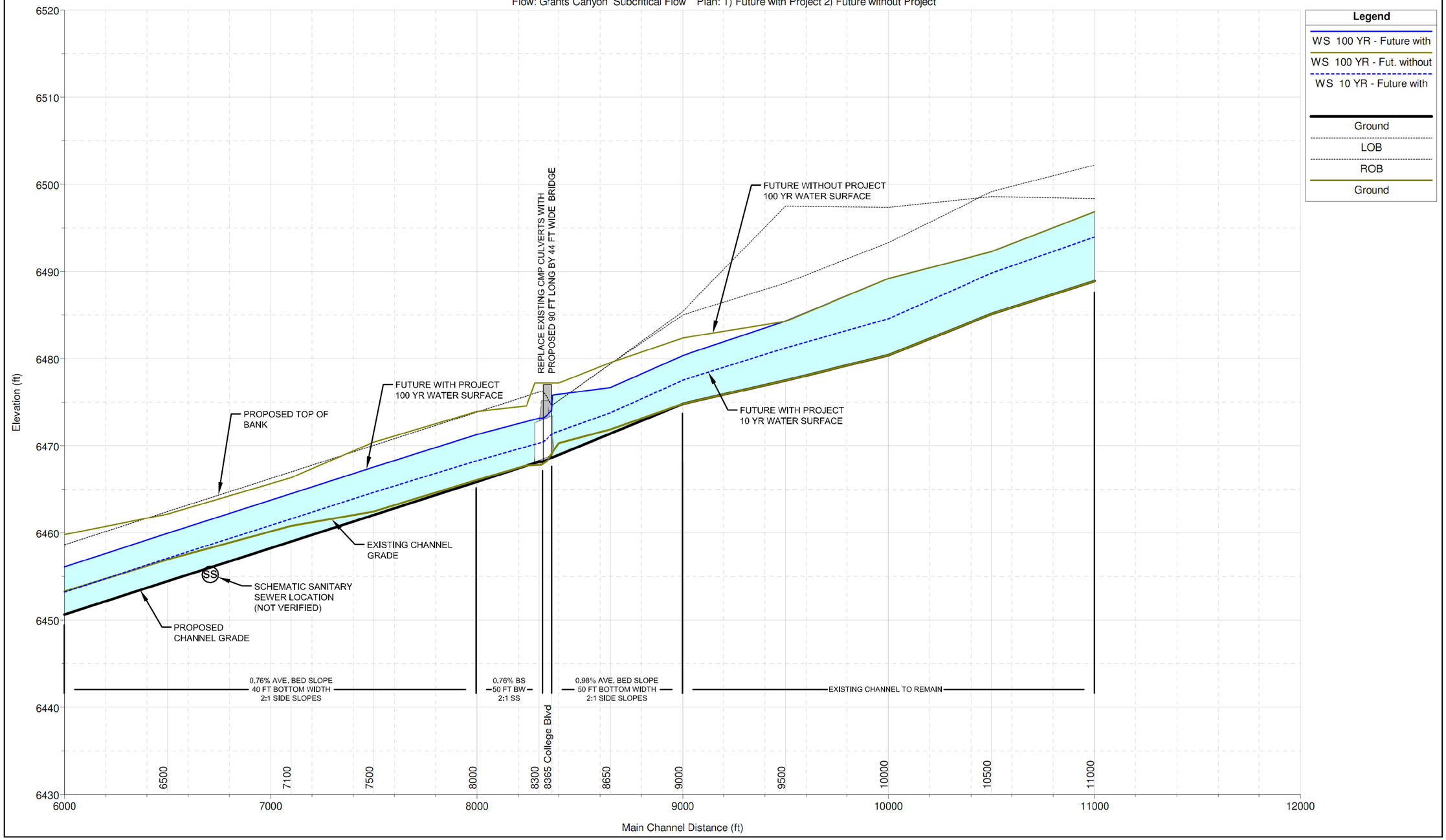
Grants Canyon Concept Design

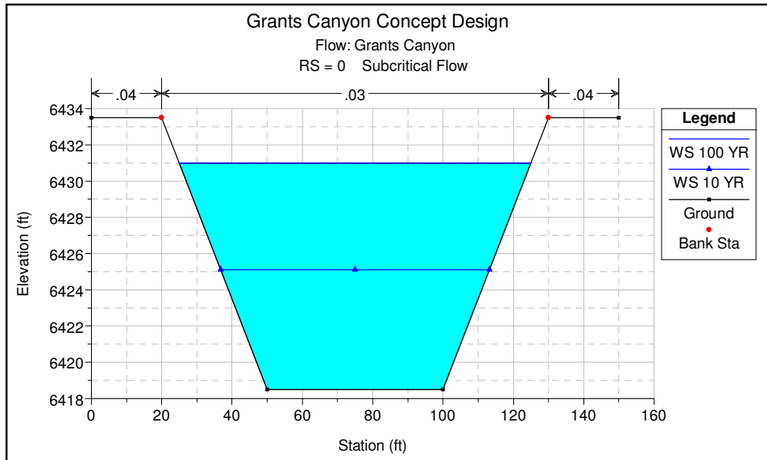
Flow: Grants Canyon Subcritical Flow Plan: 1) Future with Project 2) Future without Project

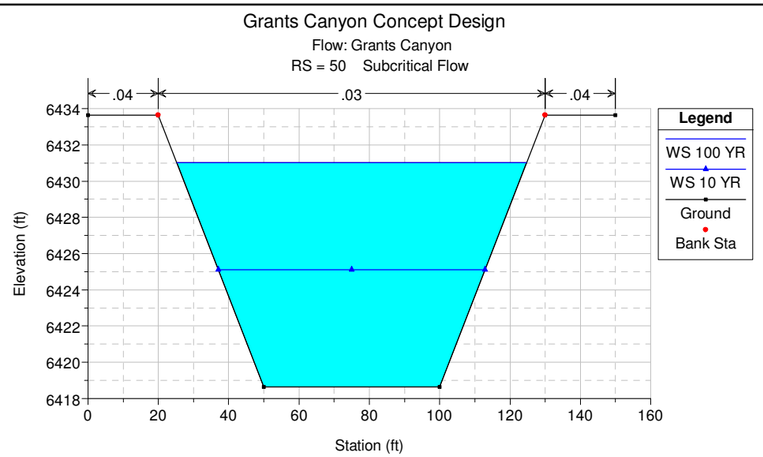


Grants Canyon Concept Design

Flow: Grants Canyon Subcritical Flow Plan: 1) Future with Project 2) Future without Project




Grants Canyon Concept Design
Flow: Grants Canyon
RS = 0 Subcritical Flow
.04
.03
.04
Elevation (ft)
Station (ft)
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta


Grants Canyon Concept Design
Flow: Grants Canyon
RS = 50 Subcritical Flow
.04
.03
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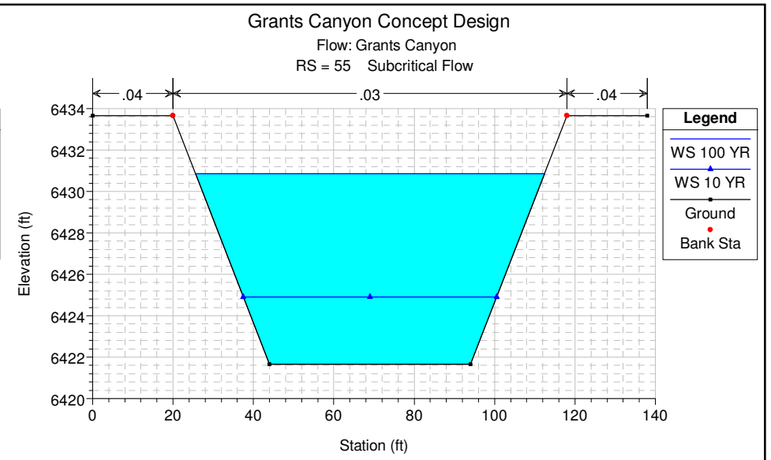
Elevation (ft)
Station (ft)
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta


Grants Canyon Concept Design
Flow: Grants Canyon
RS = 55 Subcritical Flow
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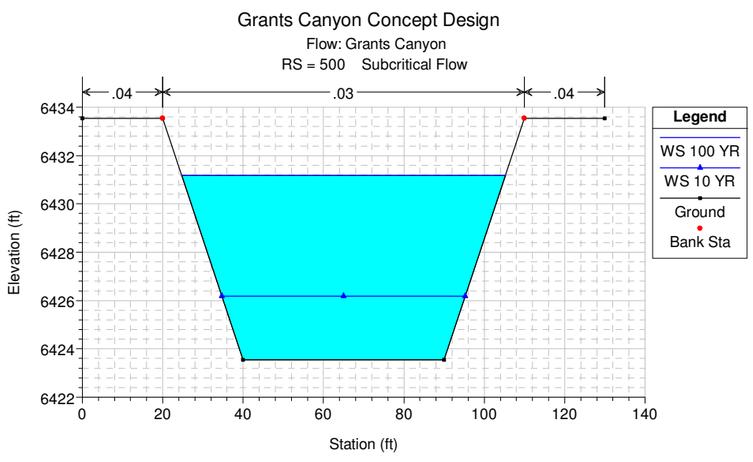
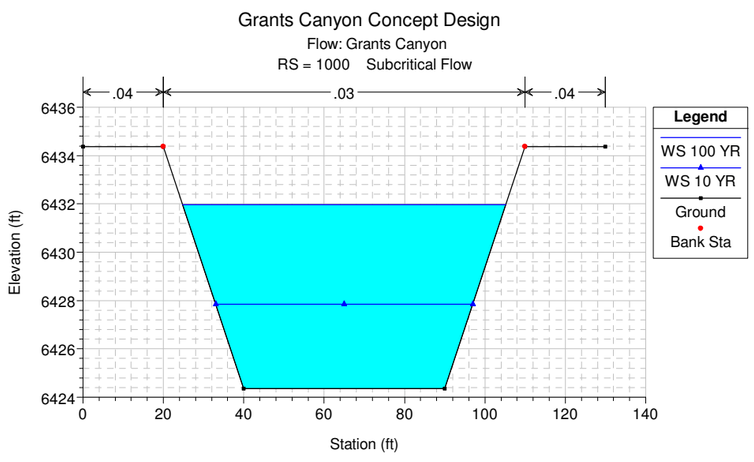
.03
.04
Elevation (ft)
Station (ft)
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta


Grants Canyon Concept Design
Flow: Grants Canyon
RS = 500 Subcritical Flow
.04
.03
.04
Elevation (ft)
Station (ft)
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta


Grants Canyon Concept Design
Flow: Grants Canyon
RS = 1000 Subcritical Flow
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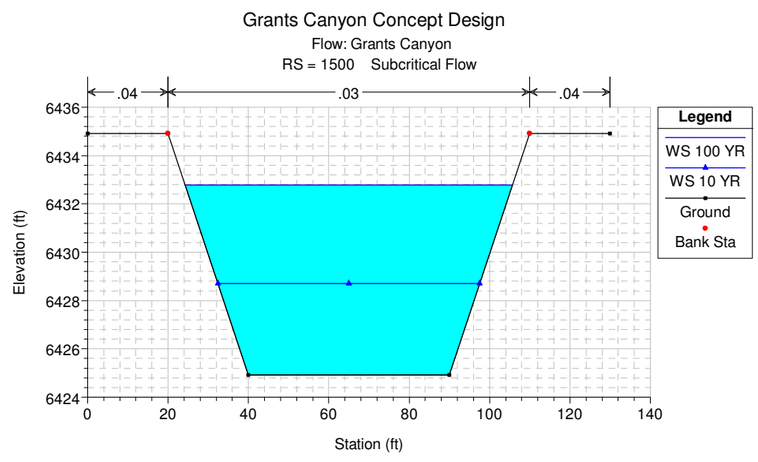
.03
.04
Elevation (ft)
Station (ft)
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta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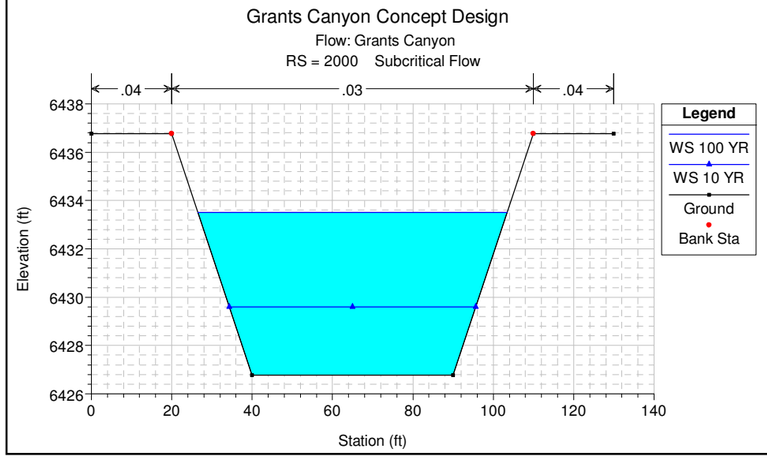
.03
.04
Elevation (ft)
Station (ft)
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta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Flow: Grants Canyon
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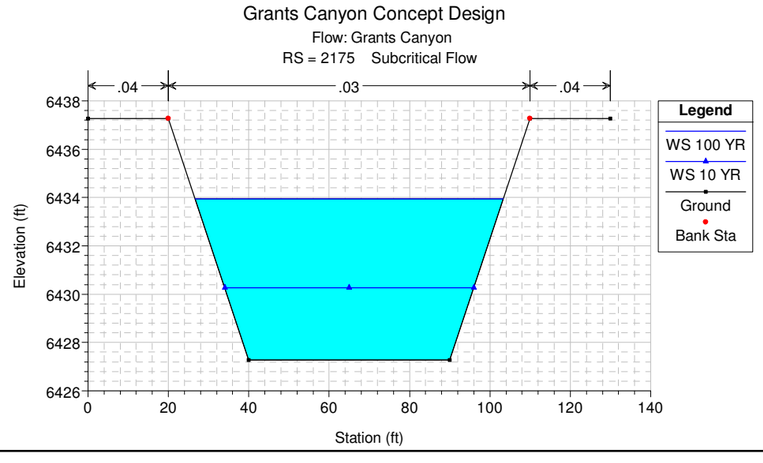
.03
.04
Elevation (ft)
Station (ft)
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta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Flow: Grants Canyon
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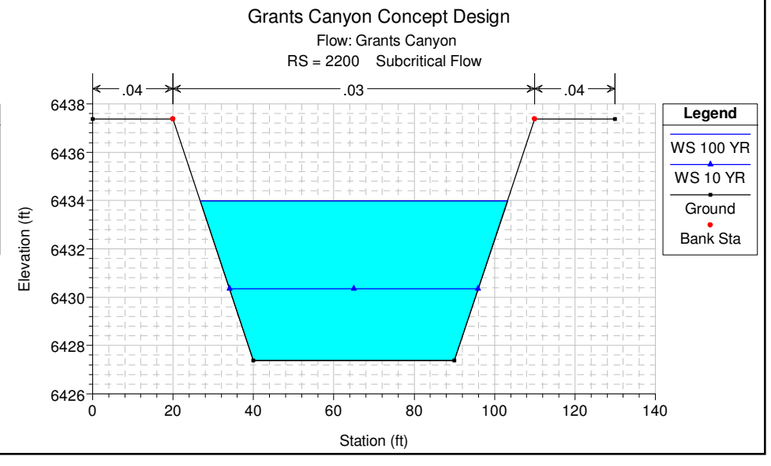
.03
.04
Elevation (ft)
Station (ft)
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta


Grants Canyon Concept Design
Flow: Grants Canyon
RS = 2200 Subcritical Flow
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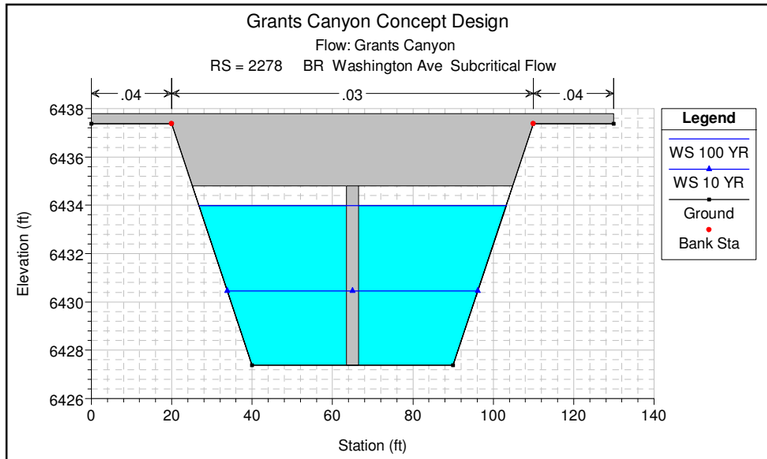
.03
.04
Elevation (ft)
Station (ft)
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta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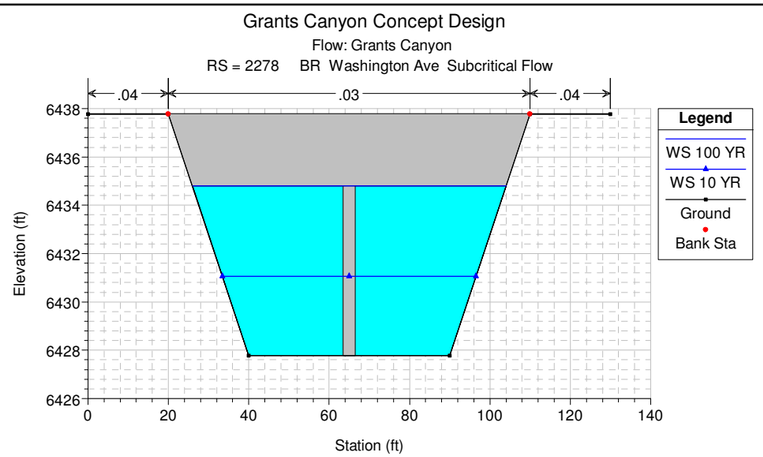
Flow: Grants Canyon
RS = 2278 BR Washington Ave Subcritical Flow
.04
.03
.04
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)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Flow: Grants Canyon
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Legend
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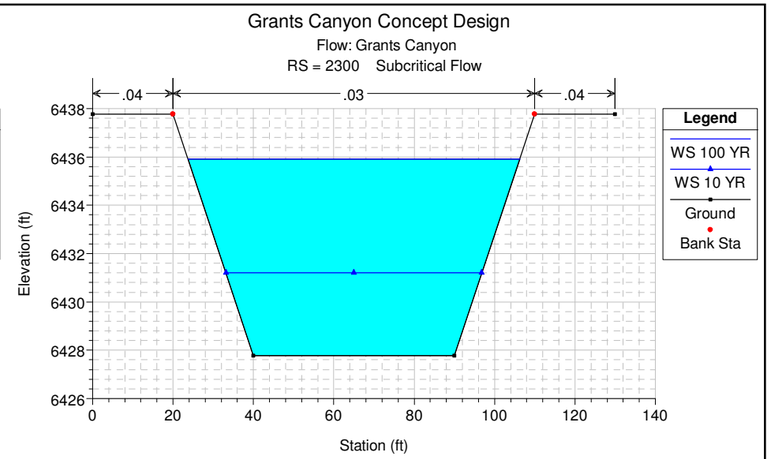
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)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Flow: Grants Canyon
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.03
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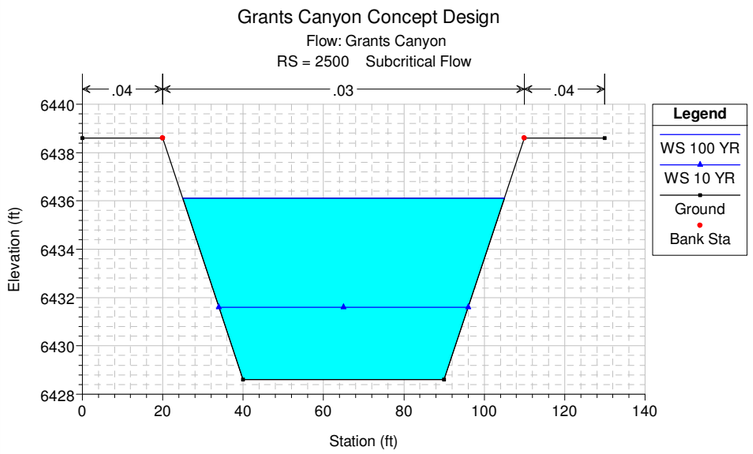
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)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Flow: Grants Canyon
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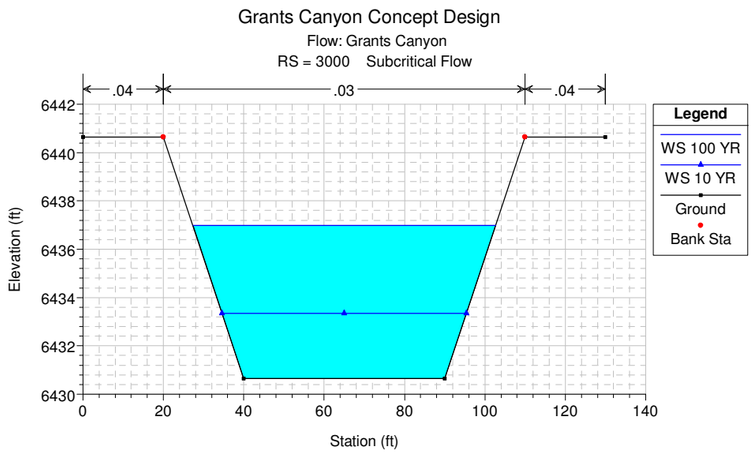
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)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.04
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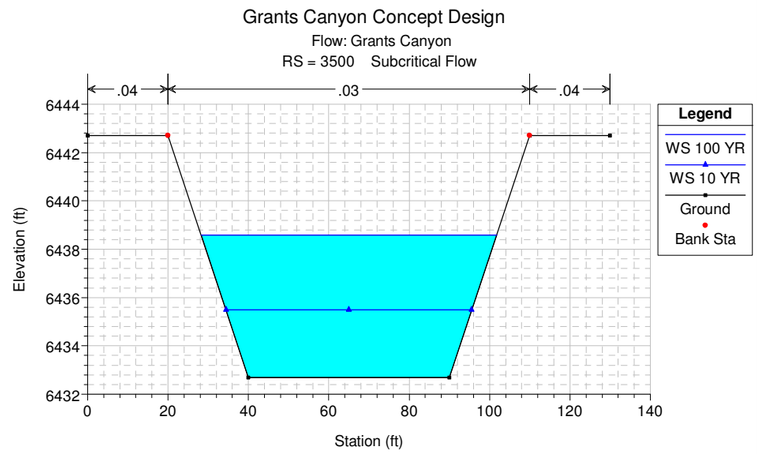
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)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.03
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Legend
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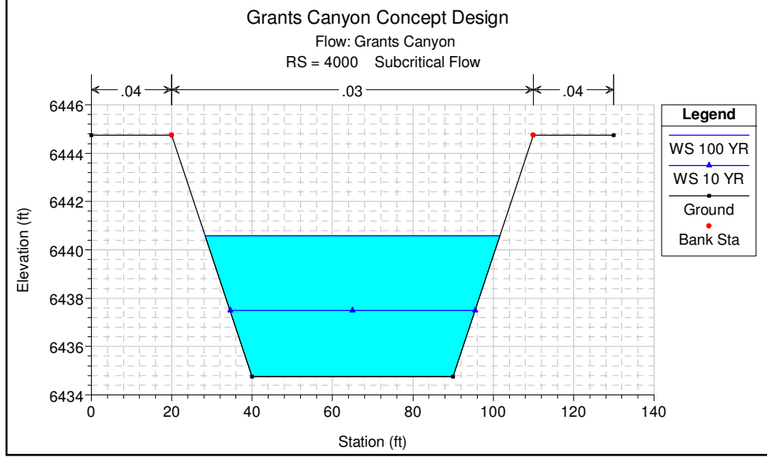
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)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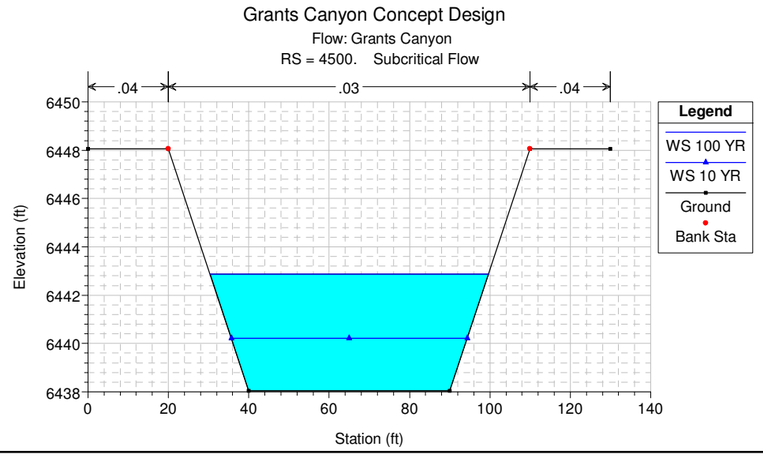
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)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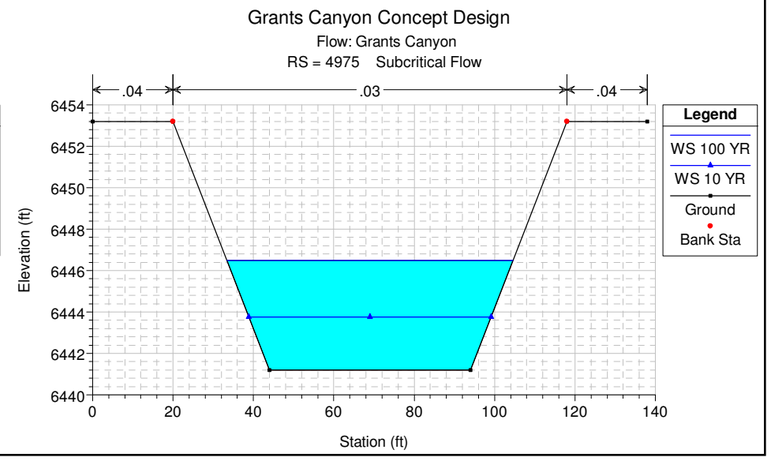
Bank Sta
Elevation (ft)
Station (ft)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Legend
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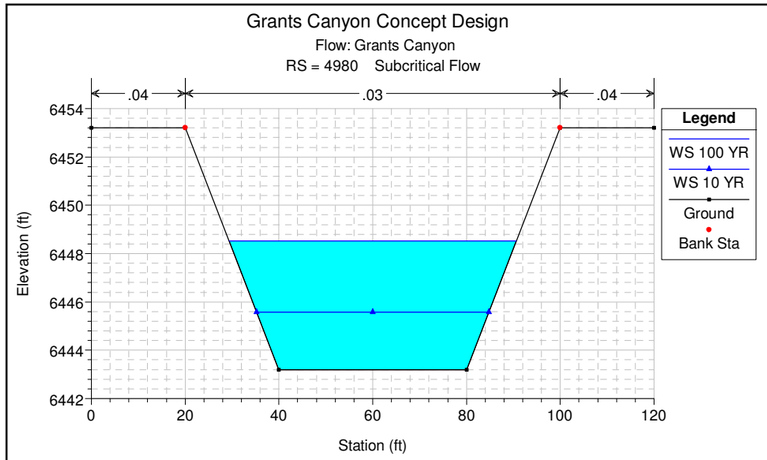
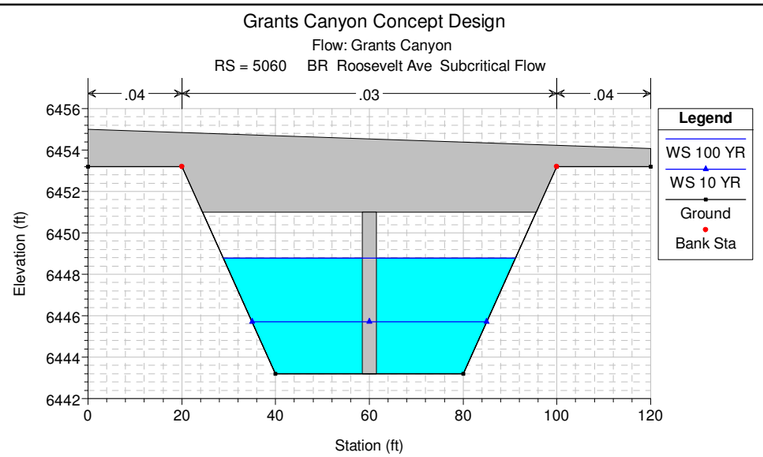
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)


Grants Canyon Concept Design
Flow: Grants Canyon
RS = 4980 Subcritical Flow
.04
.03
.04
Elevation (ft)
Station (ft)
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta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Flow: Grants Canyon
RS = 5060 BR Roosevelt Ave Subcritical Flow
.04
.03
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Elevation (ft)
Station (ft)
Legend
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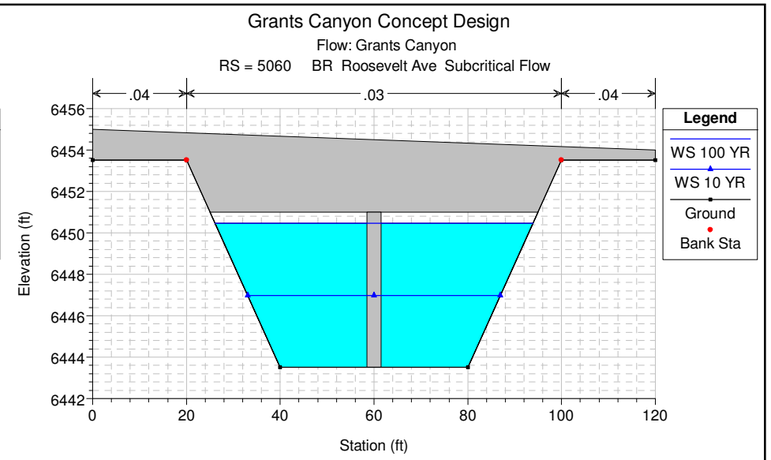
WS 10 YR
Ground
Bank Sta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Flow: Grants Canyon
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Elevation (ft)
Station (ft)
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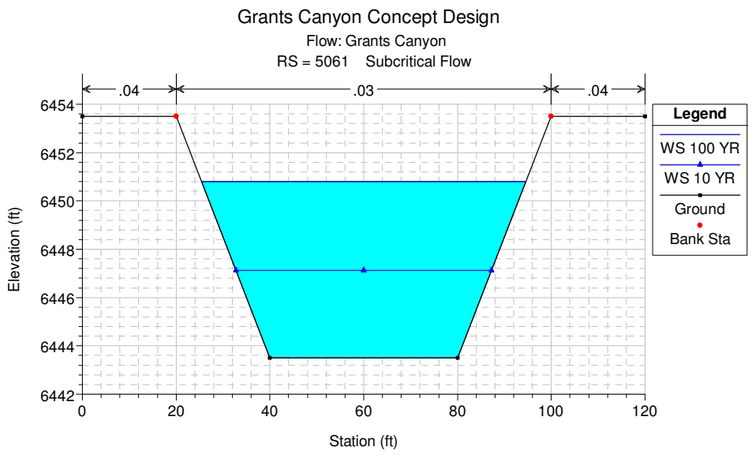
WS 10 YR
Ground
Bank Sta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Flow: Grants Canyon
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Elevation (ft)
Station (ft)
Legend
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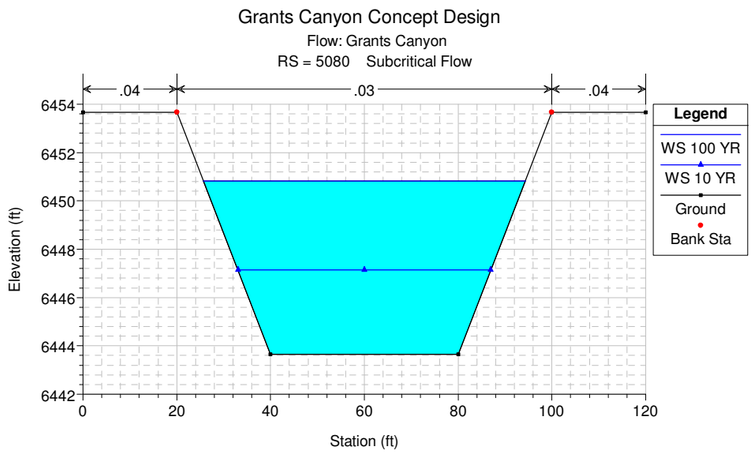
WS 10 YR
Ground
Bank Sta


Grants Canyon Concept Design
Flow: Grants Canyon
RS = 5080 Subcritical Flow
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.04
Elevation (ft)
Station (ft)
Legend
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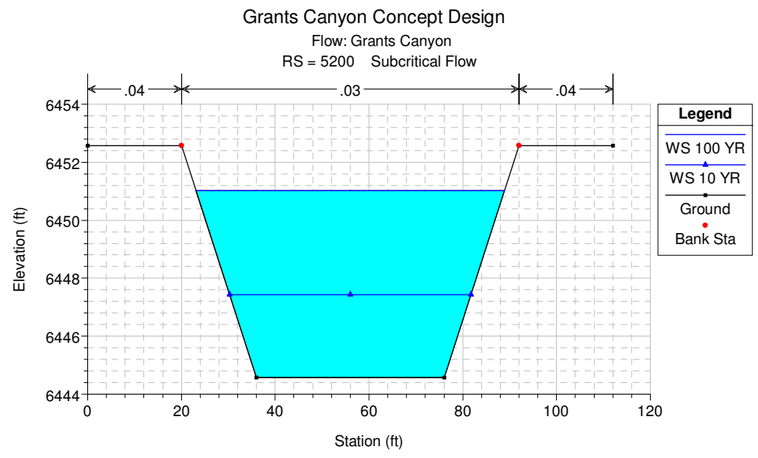
WS 10 YR
Ground
Bank Sta


Grants Canyon Concept Design
Flow: Grants Canyon
RS = 5200 Subcritical Flow
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.03
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Elevation (ft)
Station (ft)
Legend
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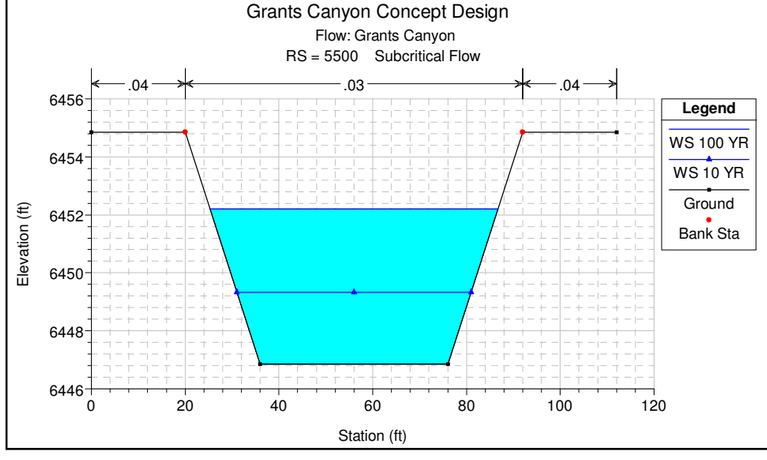
WS 10 YR
Ground
Bank Sta


Grants Canyon Concept Design
Flow: Grants Canyon
RS = 5500 Subcritical Flow
.04
.03
.04
Elevation (ft)
Station (ft)
Legend
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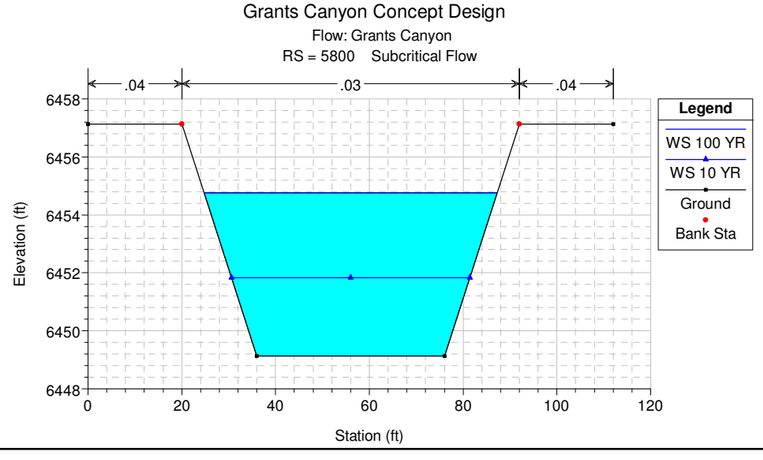
WS 10 YR
Ground
Bank Sta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Flow: Grants Canyon
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.03
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Elevation (ft)
Station (ft)
Legend
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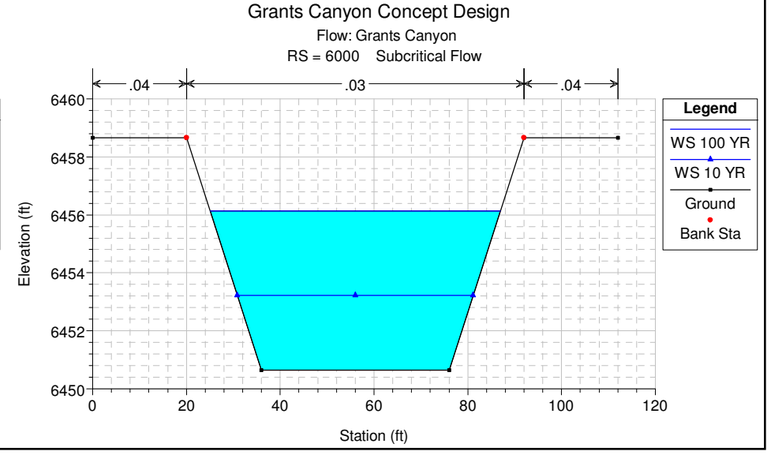
WS 10 YR
Ground
Bank Sta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.03
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Elevation (ft)
Station (ft)
Legend
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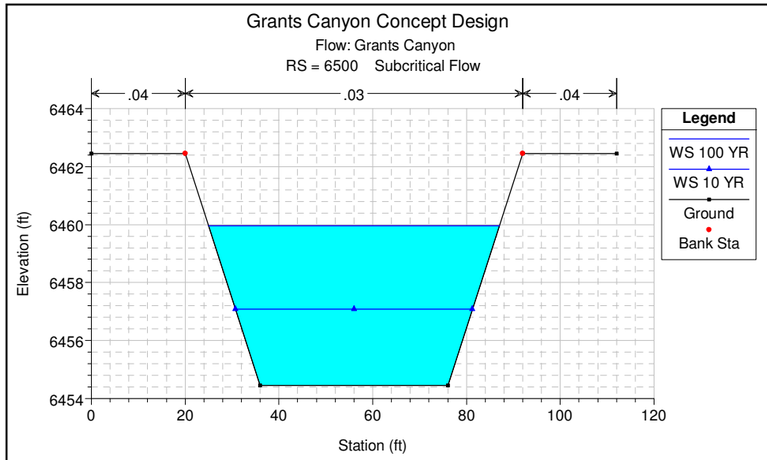
WS 10 YR
Ground
Bank Sta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Flow: Grants Canyon
RS = 6500 Subcritical Flow
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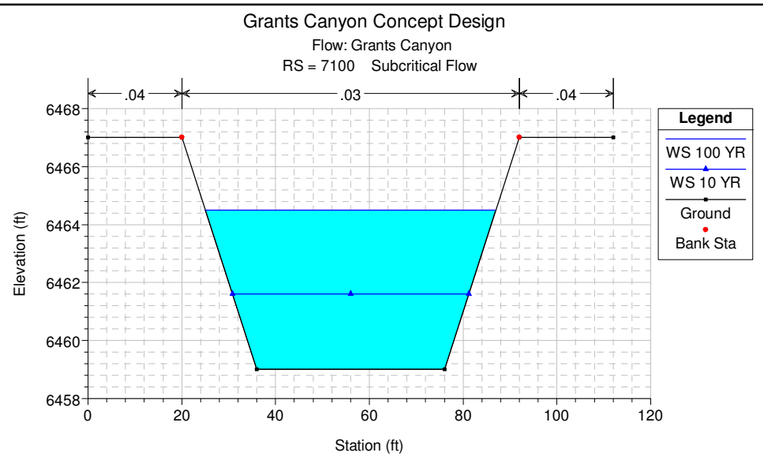
.03
.04
Elevation (ft)
Station (ft)
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta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Flow: Grants Canyon
RS = 7100 Subcritical Flow
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.03
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Elevation (ft)
Station (ft)
Legend
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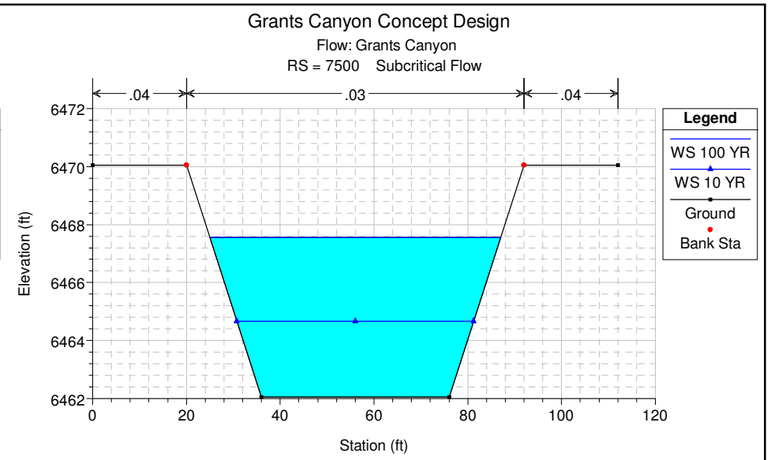
WS 10 YR
Ground
Bank Sta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Flow: Grants Canyon
RS = 7500 Subcritical Flow
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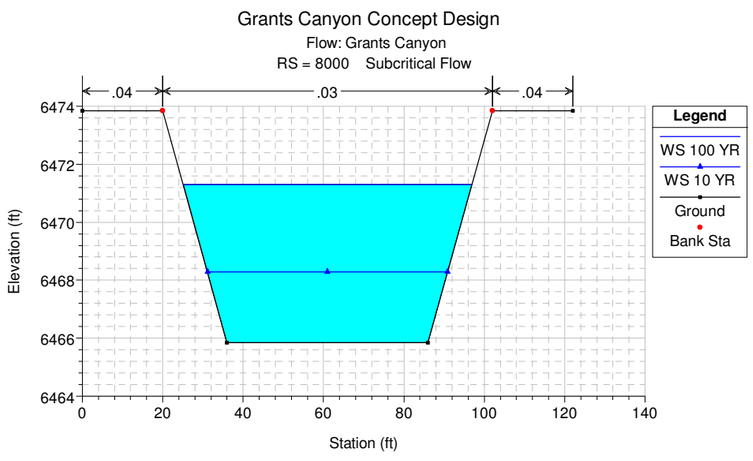
.03
.04
Elevation (ft)
Station (ft)
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta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Station (ft)
Legend
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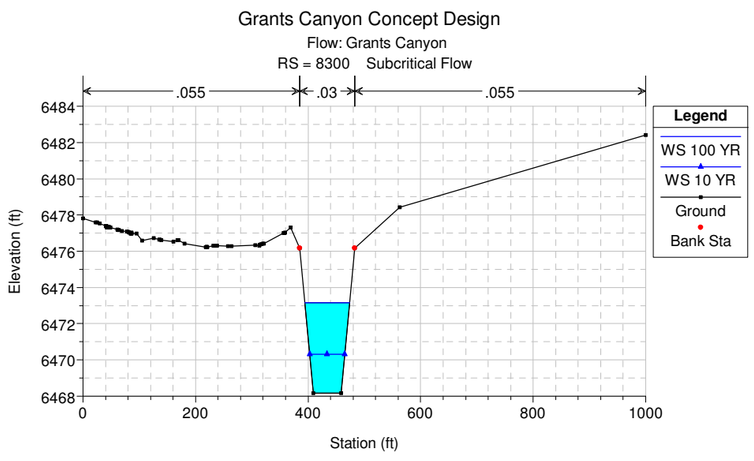
WS 10 YR
Ground
Bank Sta


Grants Canyon Concept Design
Flow: Grants Canyon
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.055
.03
.055
Elevation (ft)
Station (ft)
Legend
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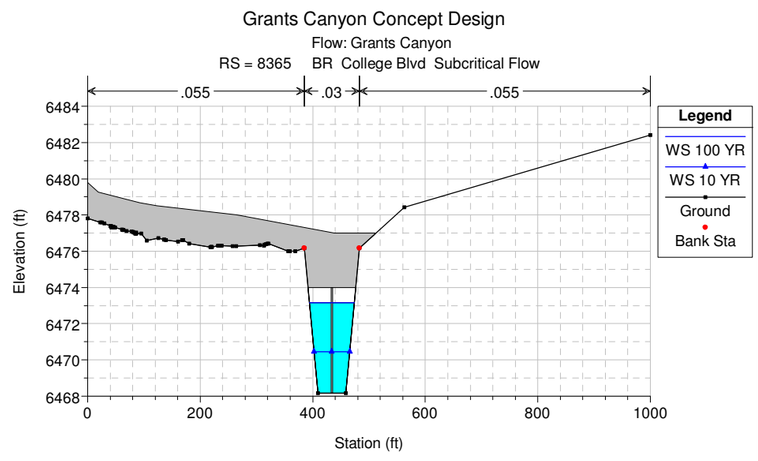
WS 10 YR
Ground
Bank Sta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Flow: Grants Canyon
RS = 8365 BR College Blvd Subcritical Flow
.055
.03
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Elevation (ft)
Station (ft)
Legend
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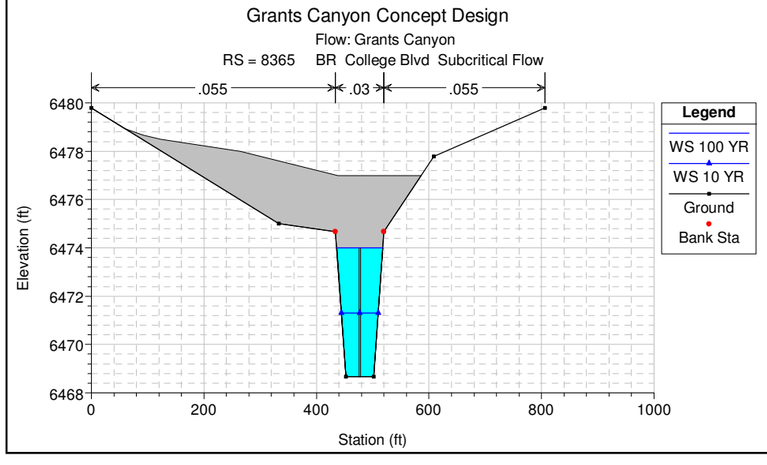
WS 10 YR
Ground
Bank Sta


Grants Canyon Concept Design
Flow: Grants Canyon
RS = 8365 BR College Blvd Subcritical Flow
.055
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.055
Elevation (ft)
Station (ft)
Legend
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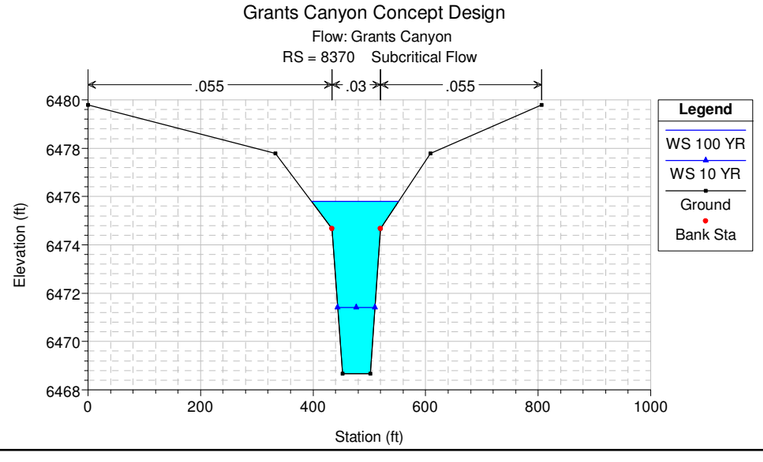
WS 10 YR
Ground
Bank Sta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.055
Elevation (ft)
Station (ft)
Legend
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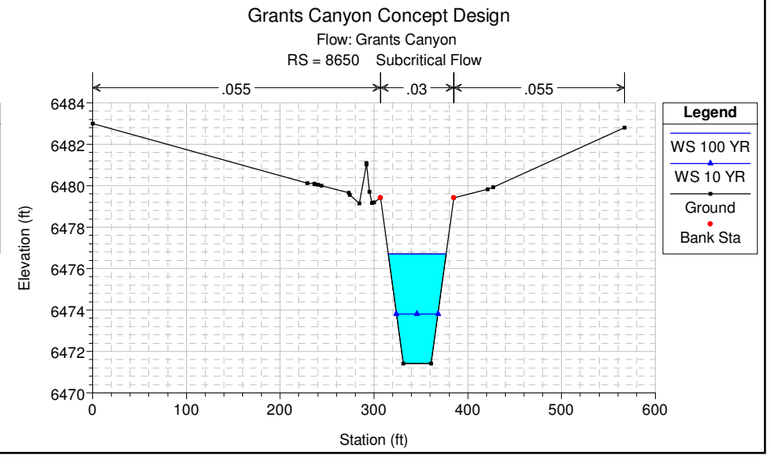
WS 10 YR
Ground
Bank Sta


Grants Canyon Concept Design
Flow: Grants Canyon
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.055
.03
.055
Elevation (ft)
Station (ft)
Legend
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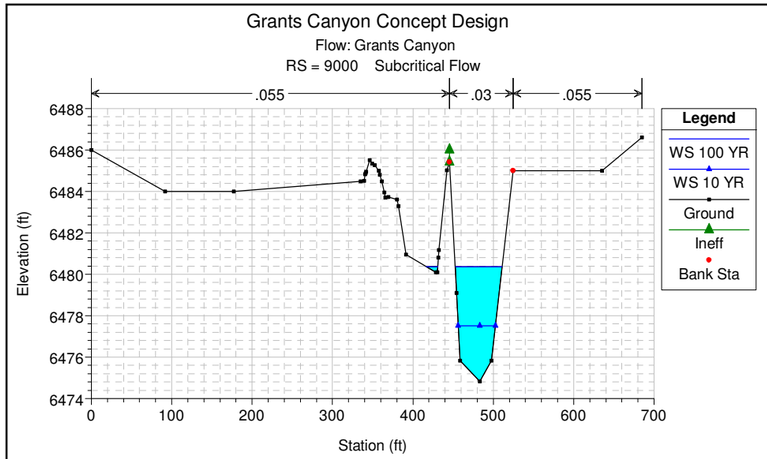
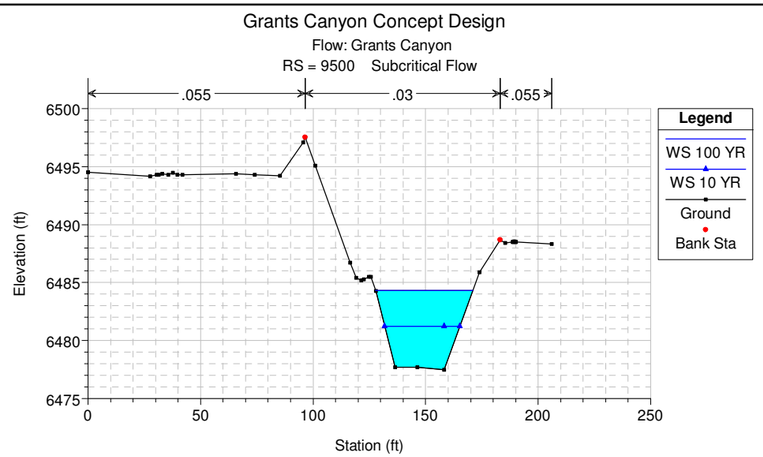
WS 10 YR
Ground
Bank Sta


Grants Canyon Concept Design
Flow: Grants Canyon
RS = 9000 Subcritical Flow
.055
.03
.055
Elevation (ft)
Station (ft)
Legend
WS 100 YR
WS 10 YR
Ground
Ineff
Bank Sta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Elevation (ft)
Station (ft)
Legend
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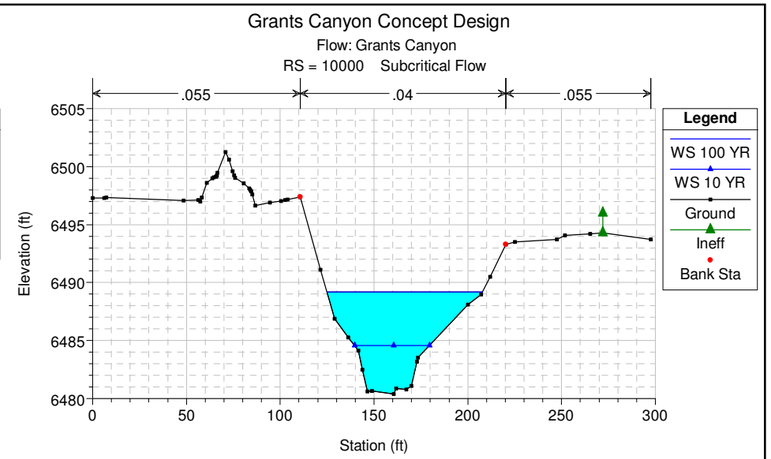
Ground
Bank Sta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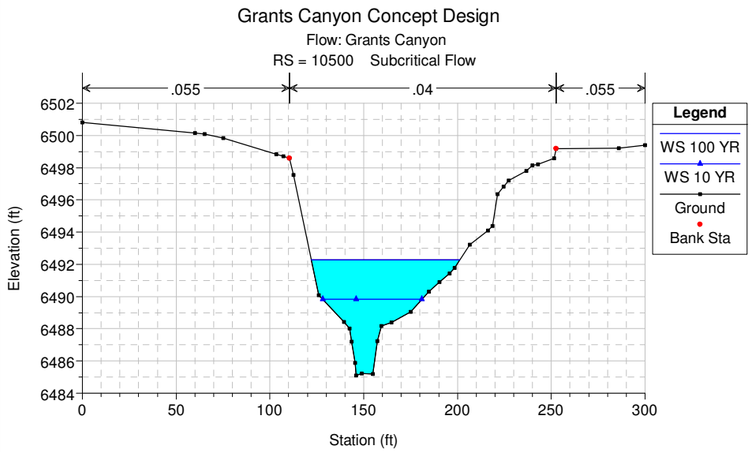
.055
.04
.055
Elevation (ft)
Station (ft)
Legend
WS 100 YR
WS 10 YR
Ground
Ineff
Bank Sta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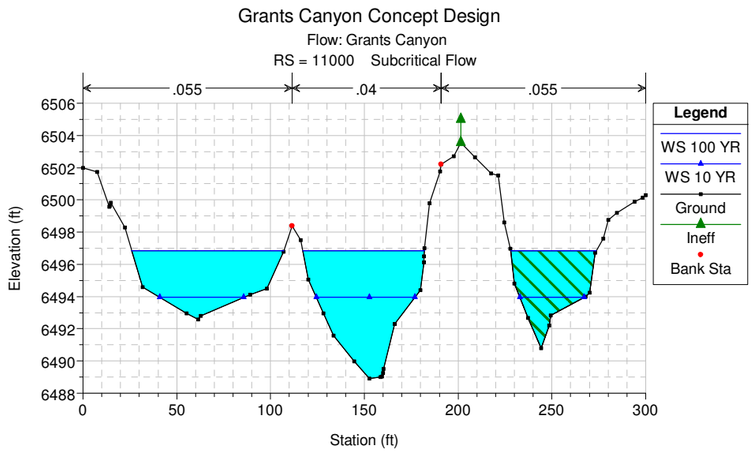
Flow: Grants Canyon
RS = 10500 Subcritical Flow
.055
.04
.055
Elevation (ft)
Station (ft)
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta


Grants Canyon Concept Design
Flow: Grants Canyon
RS = 11000 Subcritical Flow
.055
.04
.055
Elevation (ft)
Station (ft)
Legend
WS 100 YR
WS 10 YR
Ground
Ineff
Bank Sta

Appendix Section 3- Local Area Proposed Drainage Improvements in Grants and Milan

Figures	Description
	Proposed Local Drainage Improvements Concept Cost Estimate - Grants Downtown Area
3-1	Proposed Local Drainage Improvements - Grants Downtown Area HEC-RAS Profile Summary Table, 2nd Street Channel HEC-RAS Bridge Summary Table, 2nd Street Channel HEC-RAS Profile Plots, 2nd Street Channel HEC-RAS Cross Section Plots, 2nd Street Channel
3-2	HEC-HMS Routing Diagram – Grants Downtown Area Improvements HEC-HMS Results - Element Summary HEC-HMS Results - Pond 1 HEC-HMS Results - Pond 2 HEC-HMS Results - Pond 3 HEC-HMS Results - Pond 4 HEC-HMS Results - Pond 5 HEC-HMS Results - Pond 6 HEC-HMS Results - Diversion CulvertMaster Hydraulic Calculations
	North Street Channel HEC-RAS Profile Summary Table HEC-RAS Bridge Summary Table, North Street Channel HEC-RAS Profile Plot, North Street Channel HEC-RAS Cross Section Plots, North Street Channel
	Drainage Structure Inventory

Proposed Local Drainage Improvements Concept Cost Estimate

Grants Downtown Area

PROPOSED IMPROVEMENTS	DESCRIPTION	UNIT	QUANTITY	COST per UNIT	ESTIMATED COST
Detention Pond 1	Items anticipated for detention pond construction include earthwork, outlet structures, rundown and outlet protection, drainage facilities, and property acquisition	LUMP SUM	1	$165,000	$165,000
Detention Pond 2	Items anticipated for detention pond construction include earthwork, outlet structures, rundown and outlet protection, drainage facilities, and property acquisition	LUMP SUM	1	$282,000	$282,000
Detention Pond 3	Items anticipated for detention pond construction include earthwork, outlet structures, rundown and outlet protection, drainage facilities, and property acquisition	LUMP SUM	1	$48,000	$48,000
Detention Pond 4	Items anticipated for detention pond construction include earthwork, outlet structures, rundown and outlet protection, drainage facilities, and property acquisition	LUMP SUM	1	$87,000	$87,000
Detention Pond 5	Items anticipated for detention pond construction include earthwork, outlet structures, rundown and outlet protection, drainage facilities, and property acquisition	LUMP SUM	1	$162,000	$162,000
Detention Pond 6	Items anticipated for detention pond construction include earthwork, outlet structures, rundown and outlet protection, drainage facilities, and property acquisition	LUMP SUM	1	$386,000	$386,000
Second Street Drainage Channel	Construction of concrete lined drainage channel and earthen drainage channel	LUMP SUM	1	$975,000	$975,000
Roosevelt Drainage Channel	Stabilization of existing channel with grading and riprap grade control structures	LUMP SUM	1	$20,000	$20,000

SUBTOTAL:	$2,125,000
30% CONTINGENCY:	$637,500
TOTAL:	**$2,762,500**

PROPOSED DETENTION POND 1
$Q_{100(IN)}$ = 104 CFS
$Q_{100(OUT)}$ = 46 CFS
VOLUME = 1.8 AC-FT
30" RCP OUTLET

PROPOSED DETENTION POND 2
$Q_{100(IN)}$ = 82 CFS
$Q_{100(OUT)}$ = 28 CFS
VOLUME = 5.5 AC-FT
30" RCP OUTLET

PROPOSED DETENTION POND 3
$Q_{100(IN)}$ = 24 CFS
$Q_{100(OUT)}$ = 4 CFS
VOLUME = 0.6 AC-FT
15" RCP OUTLET

PROPOSED DETENTION POND 4
$Q_{100(IN)}$ = 91
$Q_{100(OUT)}$ = 17
VOLUME = 3.1 AC-FT
18" RCP OUTLET

PROPOSED DETENTION POND 5
$Q_{100(IN)}$ = 200 CFS
$Q_{100(OUT)}$ = 92 CFS
VOLUME = 3.7 AC-FT
48" RCP OUTLET

PROPOSED DETENTION POND 6
$Q_{100(IN)}$ = 115 CFS
$Q_{100(OUT)}$ = 40 CFS
VOLUME = 3.1 AC-FT
36" ELLIPTICAL RCP OUTLET

PROPOSED DIVERSION BERM

PROPOSED 30" STORM SEWER

PROPOSED ROOSEVELT CHANNEL STABILIZATION

PROPOSED EARTH DRAINAGE CHANNEL WITH 10 FT BW, 3 FT DEPTH 2:1 SS

PROPOSED RIO SAN JOSE CHANNEL LAYOUT

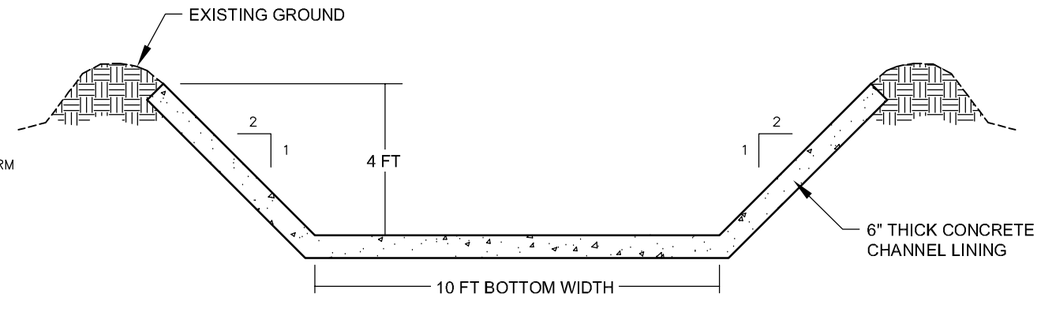
PROPOSED CONCRETE LINED DRAINAGE CHANNEL WITH 10 FT BW, 4 FT DEPTH, 2:1 SS, 0.10% SLOPE

PROPOSED SLAB CROSSINGS AT 5 LOCATIONS ALONG CHANNEL

WARREN ST
IRON AVE
HIGH ST
MOUNTAIN RD
RIO SAN JOSE
WASHINGTON AVE
PENA DR
ROOSEVELT AVE
SECOND ST
FIRST ST
6510
6490
6470
6450
6430
6410
6450
180+00
185+00
175+00
170+00
165+00

LEGEND

- PROPOSED EARTH EMBANKMENT/BERM
- PROPOSED STORM SEWER
- FLOW ARROW
- DRAINAGE CHANNEL
- MAJOR CONTOUR
- MINOR CONTOUR



TYPICAL CONCRETE CHANNEL SECTION
N.T.S.

PROPOSED LOCAL DRAINAGE IMPROVEMENTS

GRANTS DOWNTOWN AREA

CITY OF GRANTS AND VILLAGE OF MILAN, NM DMP

03/16/2011

N

0 150 300

FIGURE 3-1

WILSON & COMPANY

Profile Summary Table

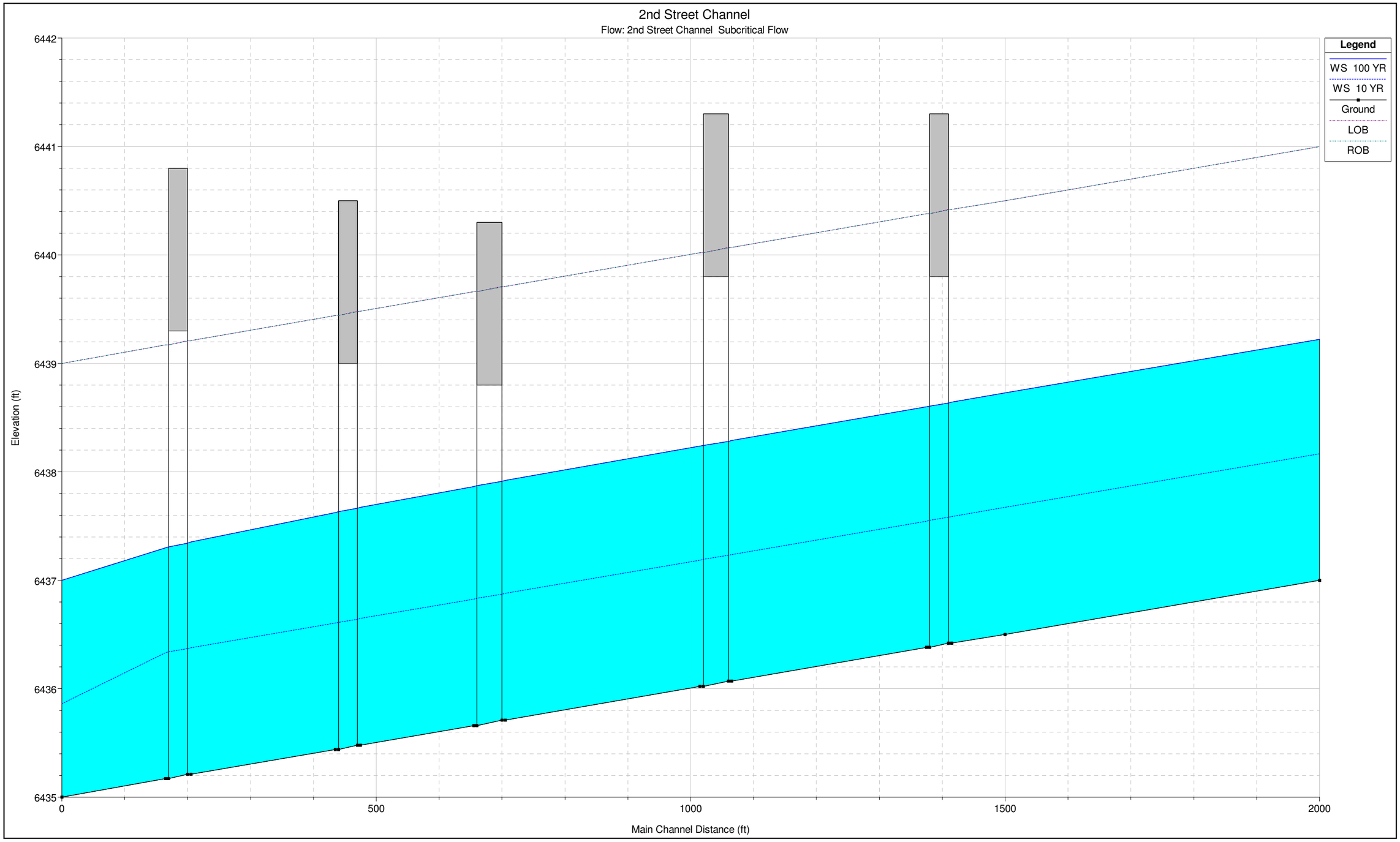
HEC-RAS Plan: 2nd St River: 2nd Street Chann Reach: 2nd Street

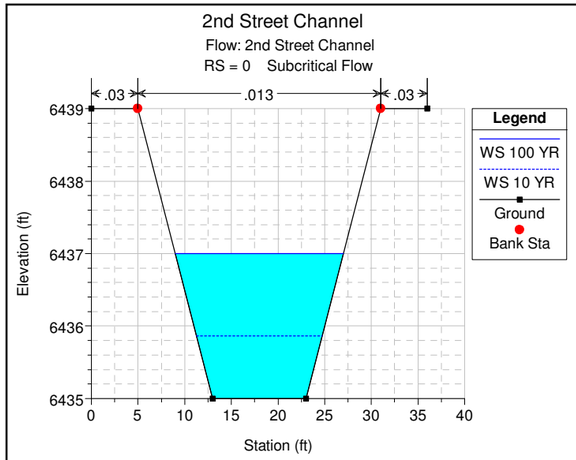
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	Max Chl Dpth	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
2nd Street	0	100 YR	159.00	6435.00	6437.00	6436.75	2.00	0.001466	5.68	28.00	18.00	0.80
2nd Street	0	10 YR	50.00	6435.00	6435.86	6435.86	0.86	0.002861	4.95	10.10	13.45	1.01
2nd Street	165	100 YR	159.00	6435.17	6437.30		2.13	0.001165	5.24	30.36	18.52	0.72
2nd Street	165	10 YR	50.00	6435.17	6436.33	6436.04	1.16	0.001005	3.49	14.34	14.65	0.62
2nd Street	200		Bridge									
2nd Street	205	100 YR	159.00	6435.21	6437.35	6436.96	2.14	0.001140	5.20	30.60	18.57	0.71
2nd Street	205	10 YR	50.00	6435.21	6436.38	6436.08	1.17	0.000995	3.47	14.39	14.67	0.62
2nd Street	435	100 YR	159.00	6435.44	6437.63		2.19	0.001059	5.06	31.40	18.74	0.69
2nd Street	435	10 YR	50.00	6435.44	6436.61		1.17	0.000998	3.48	14.38	14.66	0.62
2nd Street	470		Bridge									
2nd Street	475	100 YR	159.00	6435.48	6437.67	6437.23	2.19	0.001045	5.04	31.55	18.77	0.69
2nd Street	475	10 YR	50.00	6435.48	6436.65	6436.34	1.17	0.000992	3.47	14.41	14.67	0.62
2nd Street	655	100 YR	159.00	6435.66	6437.86		2.20	0.001026	5.01	31.76	18.82	0.68
2nd Street	655	10 YR	50.00	6435.66	6436.83		1.17	0.000996	3.48	14.39	14.67	0.62
2nd Street	700		Bridge									
2nd Street	705	100 YR	159.00	6435.71	6437.92	6437.46	2.21	0.001015	4.99	31.88	18.84	0.68
2nd Street	705	10 YR	50.00	6435.71	6436.88	6436.58	1.17	0.000991	3.47	14.42	14.67	0.62
2nd Street	1015	100 YR	159.00	6436.02	6438.24		2.22	0.001004	4.97	32.00	18.87	0.67
2nd Street	1015	10 YR	50.00	6436.02	6437.19		1.17	0.000999	3.48	14.37	14.66	0.62
2nd Street	1060		Bridge									
2nd Street	1065	100 YR	159.00	6436.07	6438.29	6437.81	2.22	0.001000	4.96	32.04	18.88	0.67
2nd Street	1065	10 YR	50.00	6436.07	6437.24	6436.93	1.17	0.000993	3.47	14.40	14.67	0.62
2nd Street	1375	100 YR	159.00	6436.38	6438.60		2.22	0.000999	4.96	32.05	18.88	0.67
2nd Street	1375	10 YR	50.00	6436.38	6437.55		1.17	0.000999	3.48	14.37	14.66	0.62
2nd Street	1410		Bridge									
2nd Street	1415	100 YR	159.00	6436.42	6438.64	6438.17	2.22	0.000996	4.96	32.09	18.89	0.67
2nd Street	1415	10 YR	50.00	6436.42	6437.59	6437.29	1.17	0.000993	3.47	14.40	14.67	0.62
2nd Street	1500	100 YR	159.00	6436.50	6438.73		2.23	0.000985	4.94	32.22	18.91	0.67
2nd Street	1500	10 YR	50.00	6436.50	6437.67		1.17	0.000976	3.45	14.49	14.69	0.61
2nd Street	2000	100 YR	159.00	6437.00	6439.22		2.22	0.000997	4.96	32.08	18.88	0.67
2nd Street	2000	10 YR	50.00	6437.00	6438.17		1.17	0.000999	3.48	14.37	14.66	0.62

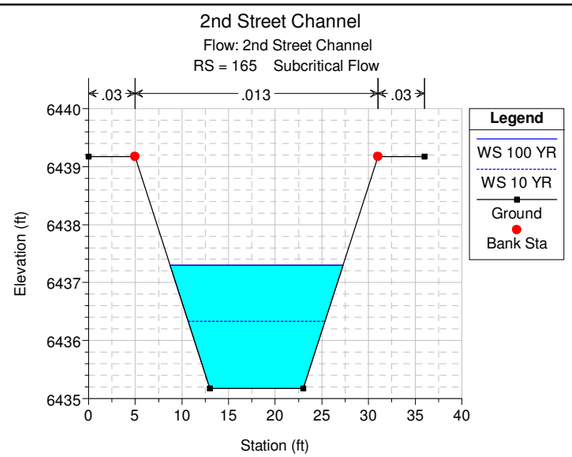
Bridge Summary Table

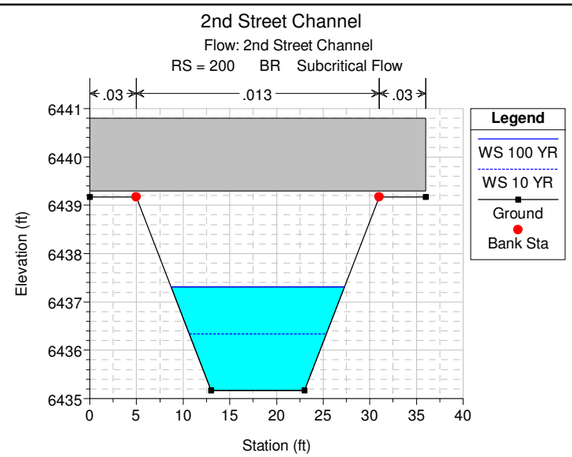
HEC-RAS Plan: 2nd St River: 2nd Street Chann Reach: 2nd Street

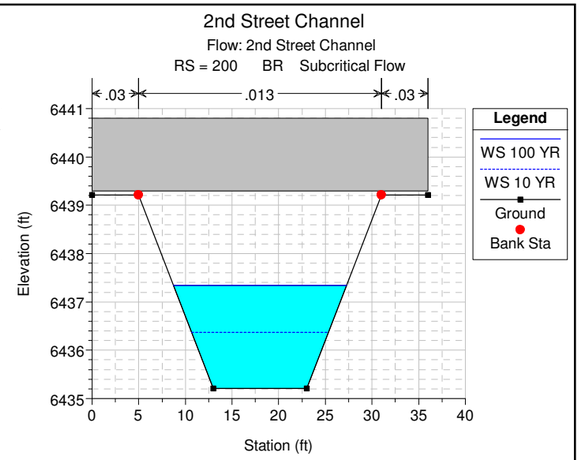
Reach	River Sta	Profile	Q Total	E.G. US.	W.S. US.	Q Bridge	BR Open Area	BR Open Vel
			(cfs)	(ft)	(ft)	(cfs)	(sq ft)	(ft/s)
2nd Street	200	100 YR	159.00	6437.77	6437.35	159.00	75.23	5.23
2nd Street	200	10 YR	50.00	6436.56	6436.38	50.00	75.23	3.50
2nd Street	470	100 YR	159.00	6438.07	6437.67	159.00	59.98	5.07
2nd Street	470	10 YR	50.00	6436.84	6436.65	50.00	59.98	3.50
2nd Street	700	100 YR	159.00	6438.31	6437.92	159.00	49.99	5.01
2nd Street	700	10 YR	50.00	6437.07	6436.88	50.00	49.99	3.49
2nd Street	1060	100 YR	159.00	6438.67	6438.29	159.00	65.13	4.98
2nd Street	1060	10 YR	50.00	6437.42	6437.24	50.00	65.13	3.50
2nd Street	1410	100 YR	159.00	6439.02	6438.64	159.00	56.65	4.98
2nd Street	1410	10 YR	50.00	6437.77	6437.59	50.00	56.65	3.50

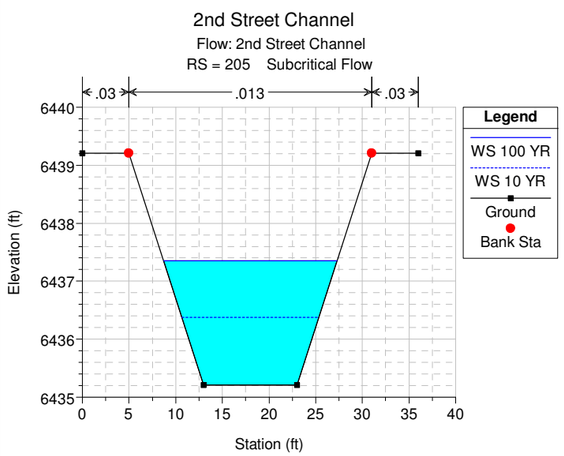

2nd Street Channel
Flow: 2nd Street Channel Subcritical Flow
Legend
WS 100 YR
WS 10 YR
Ground
LOB
ROB
Elevation (ft)
6442
6441
6440
6439
6438
6437
6436
6435
0
500
1000
1500
2000
Main Channel Distance (ft)

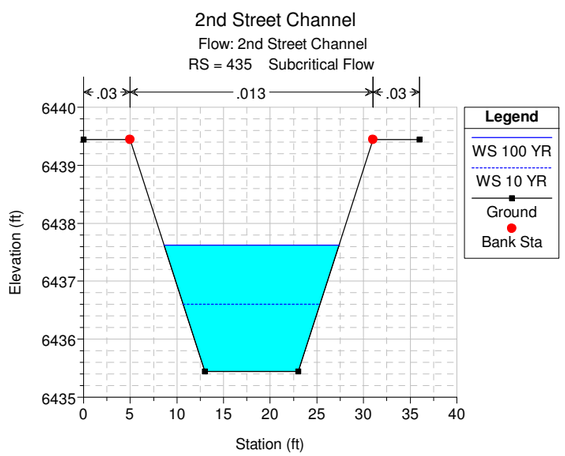

2nd Street Channel
Flow: 2nd Street Channel
RS = 0 Subcritical Flow
.03
.013
.03
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

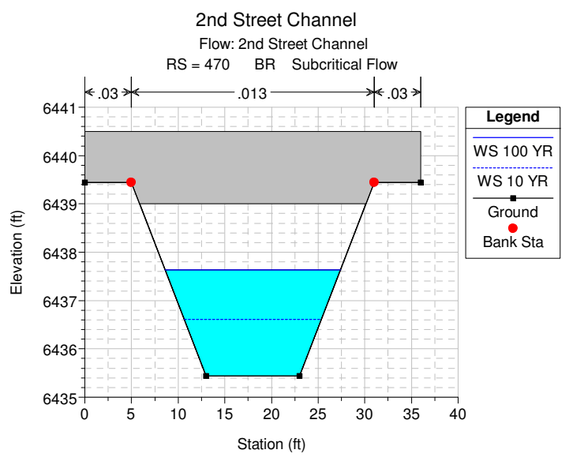

2nd Street Channel
Flow: 2nd Street Channel
RS = 165 Subcritical Flow
.03
.013
.03
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

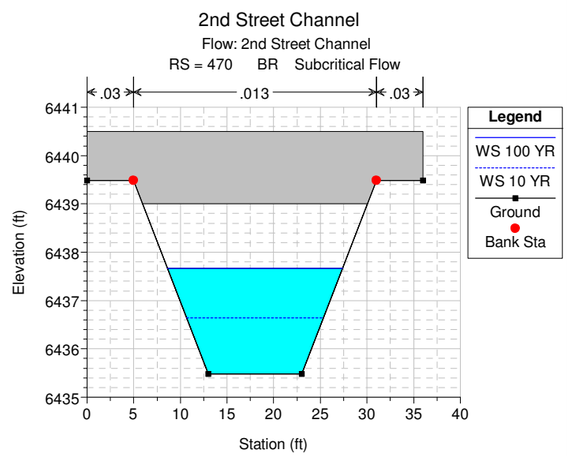

2nd Street Channel
Flow: 2nd Street Channel
RS = 200 BR Subcritical Flow
.03
.013
.03
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

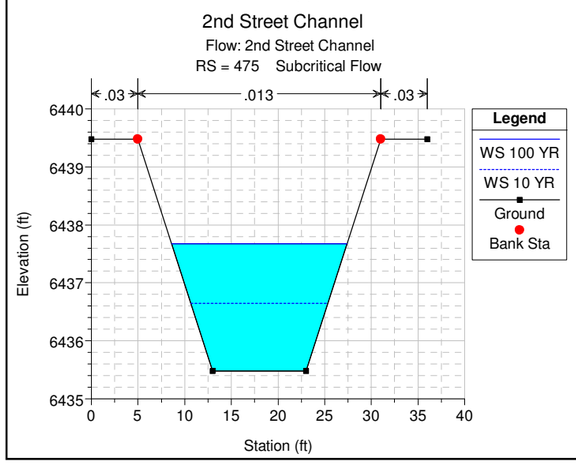

2nd Street Channel
Flow: 2nd Street Channel
RS = 200 BR Subcritical Flow
.03
.013
.03
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

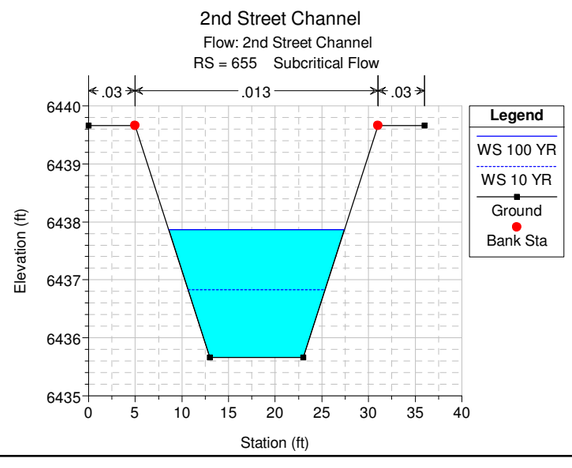

2nd Street Channel
Flow: 2nd Street Channel
RS = 205 Subcritical Flow
.03
.013
.03
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

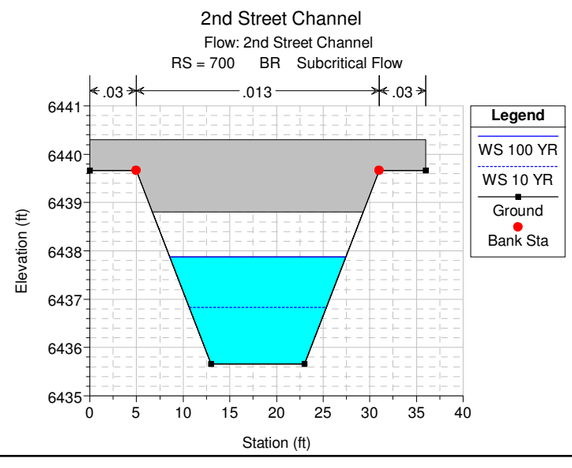

2nd Street Channel
Flow: 2nd Street Channel
RS = 435 Subcritical Flow
.03
.013
.03
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

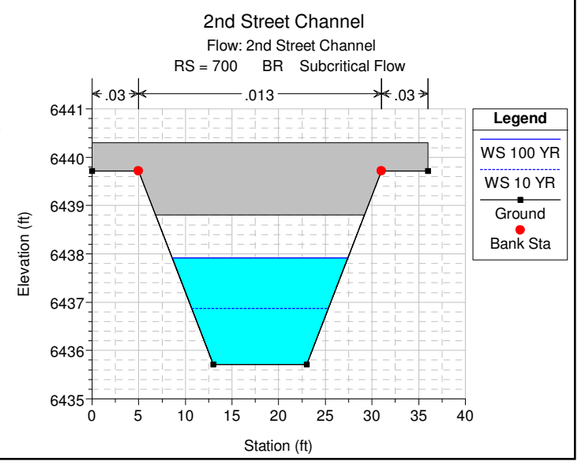

2nd Street Channel
Flow: 2nd Street Channel
RS = 470 BR Subcritical Flow
.03
.013
.03
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

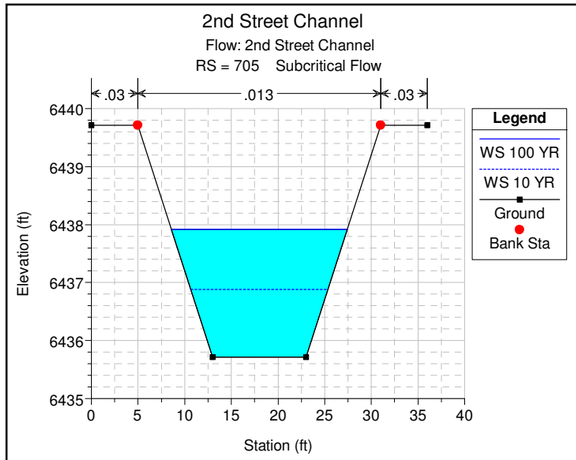

2nd Street Channel
Flow: 2nd Street Channel
RS = 470 BR Subcritical Flow
.03
.013
.03
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

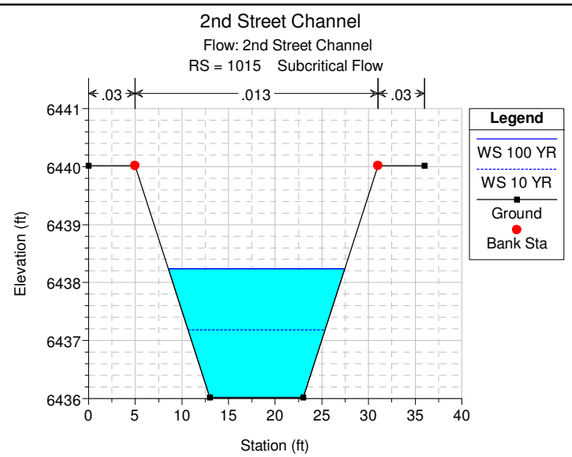

2nd Street Channel
Flow: 2nd Street Channel
RS = 475 Subcritical Flow
.03
.013
.03
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

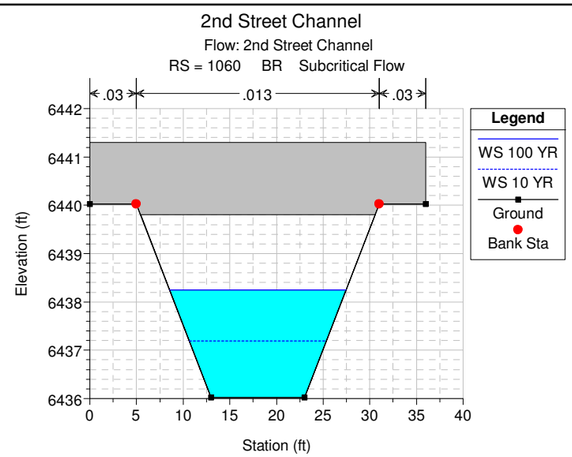

2nd Street Channel
Flow: 2nd Street Channel
RS = 655 Subcritical Flow
.03
.013
.03
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

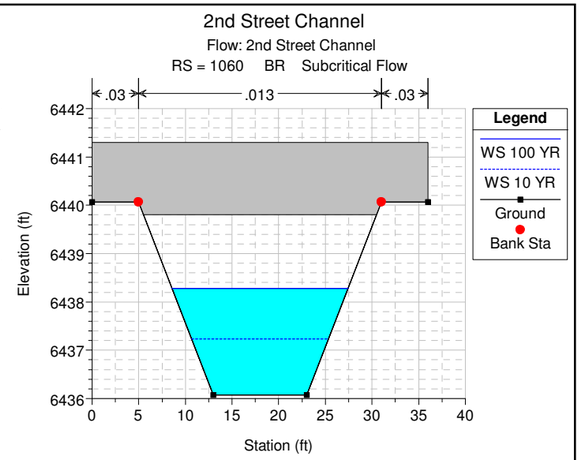

2nd Street Channel
Flow: 2nd Street Channel
RS = 700 BR Subcritical Flow
.03
.013
.03
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

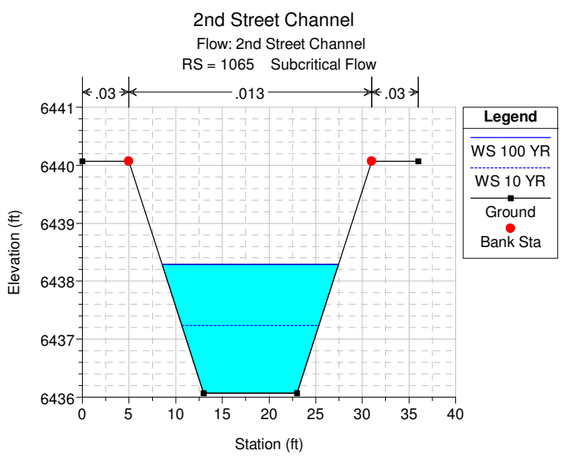

2nd Street Channel
Flow: 2nd Street Channel
RS = 700 BR Subcritical Flow
.03
.013
.03
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta
Elevation (ft)
Station (ft)

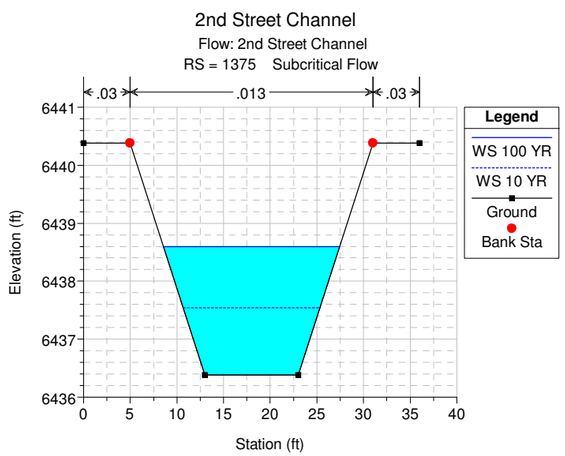

2nd Street Channel
Flow: 2nd Street Channel
RS = 705 Subcritical Flow
.03
.013
.03
Elevation (ft)
Station (ft)
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta

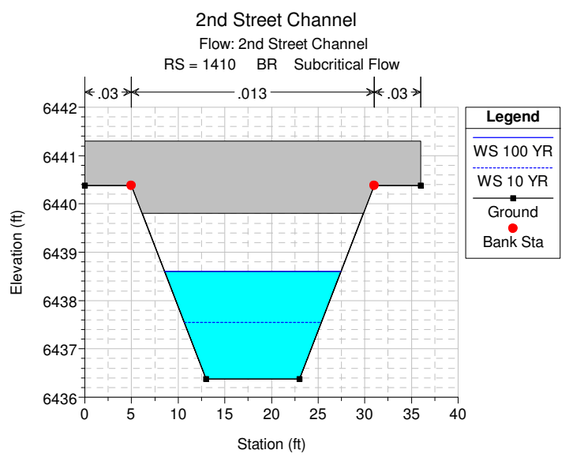

2nd Street Channel
Flow: 2nd Street Channel
RS = 1015 Subcritical Flow
.03
.013
.03
Elevation (ft)
Station (ft)
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta

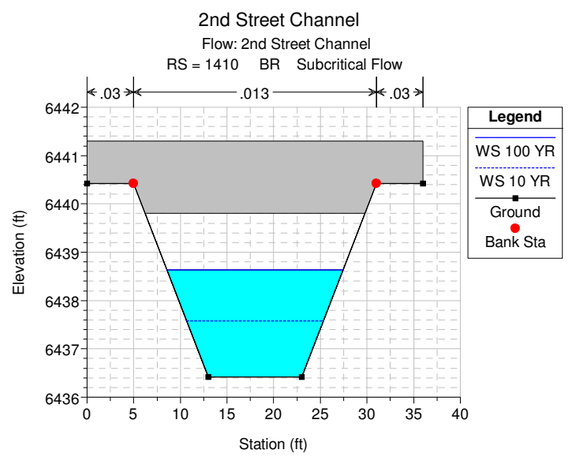

2nd Street Channel
Flow: 2nd Street Channel
RS = 1060 BR Subcritical Flow
.03
.013
.03
Elevation (ft)
Station (ft)
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta

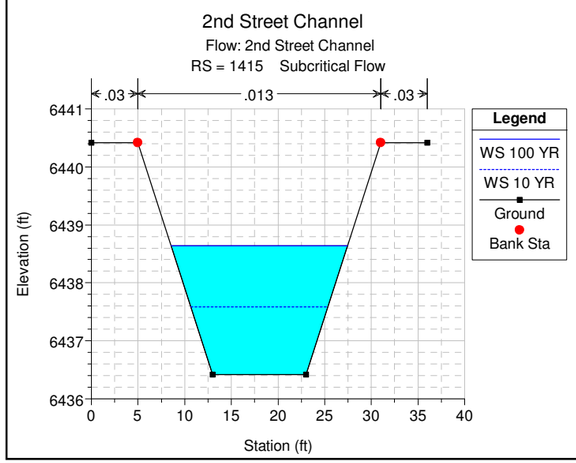

2nd Street Channel
Flow: 2nd Street Channel
RS = 1060 BR Subcritical Flow
.03
.013
.03
Elevation (ft)
Station (ft)
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta

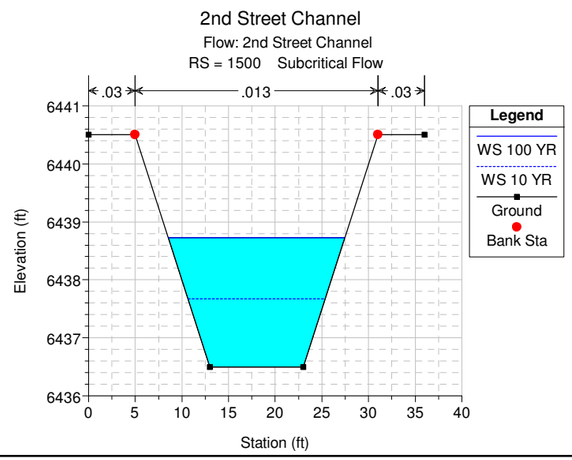

2nd Street Channel
Flow: 2nd Street Channel
RS = 1065 Subcritical Flow
.03
.013
.03
Elevation (ft)
Station (ft)
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta

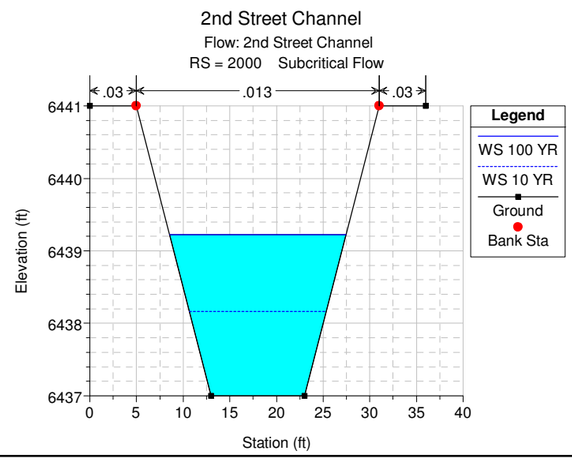

2nd Street Channel
Flow: 2nd Street Channel
RS = 1375 Subcritical Flow
.03
.013
.03
Elevation (ft)
Station (ft)
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta

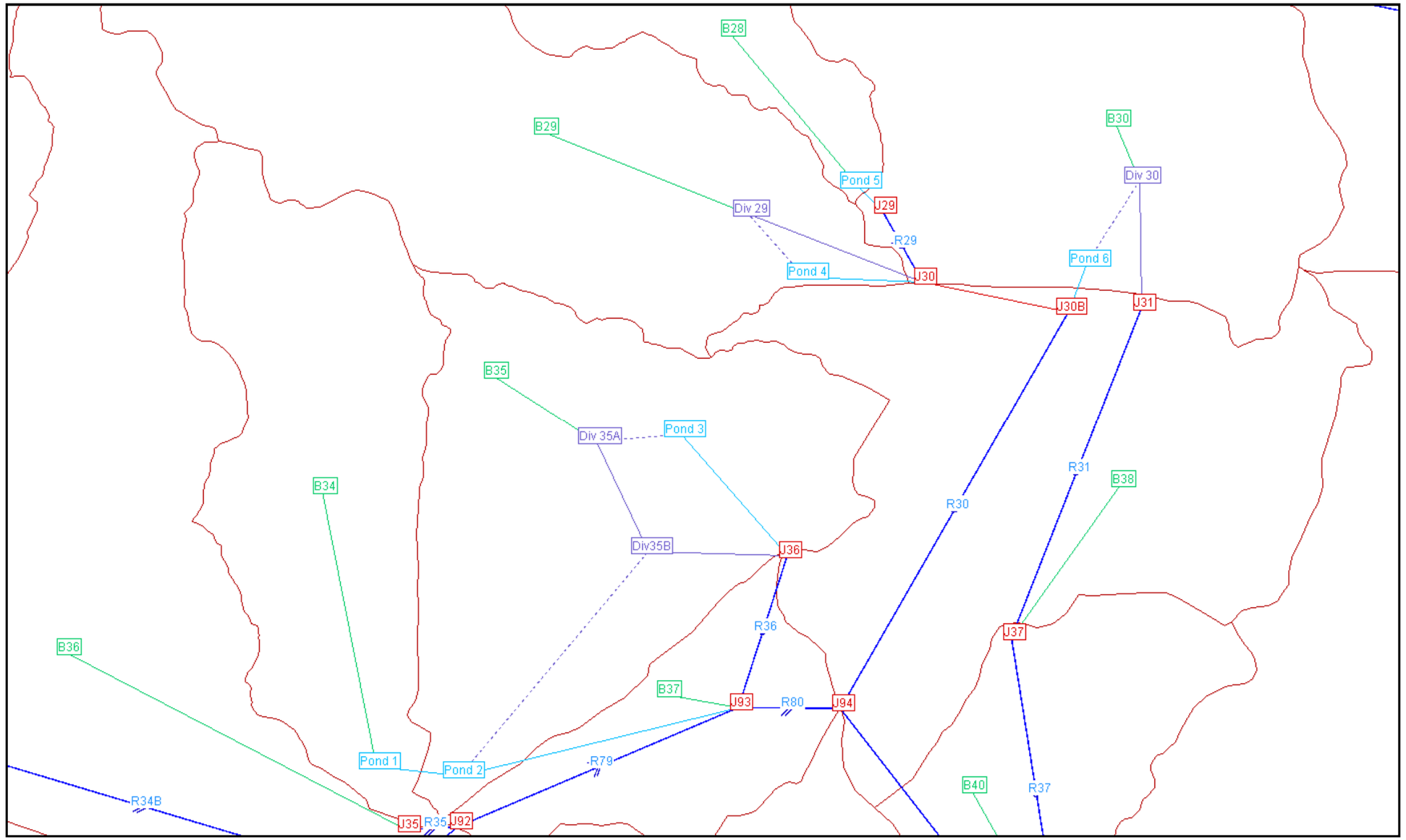

2nd Street Channel
Flow: 2nd Street Channel
RS = 1410 BR Subcritical Flow
.03
.013
.03
Elevation (ft)
Station (ft)
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta


2nd Street Channel
Flow: 2nd Street Channel
RS = 1410 BR Subcritical Flow
.03
.013
.03
Elevation (ft)
Station (ft)
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta


2nd Street Channel
Flow: 2nd Street Channel
RS = 1415 Subcritical Flow
.03
.013
.03
Elevation (ft)
Station (ft)
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta


2nd Street Channel
Flow: 2nd Street Channel
RS = 1500 Subcritical Flow
.03
.013
.03
Elevation (ft)
Station (ft)
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta


2nd Street Channel
Flow: 2nd Street Channel
RS = 2000 Subcritical Flow
.03
.013
.03
Elevation (ft)
Station (ft)
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta



HEC-HMS ROUTING DIAGRAM

GRANTS DOWNTOWN AREA PROPOSED IMPROVEMENTS

FIGURE 3-2

Project: Concept Design Simulation Run: 10-YR Future Condition

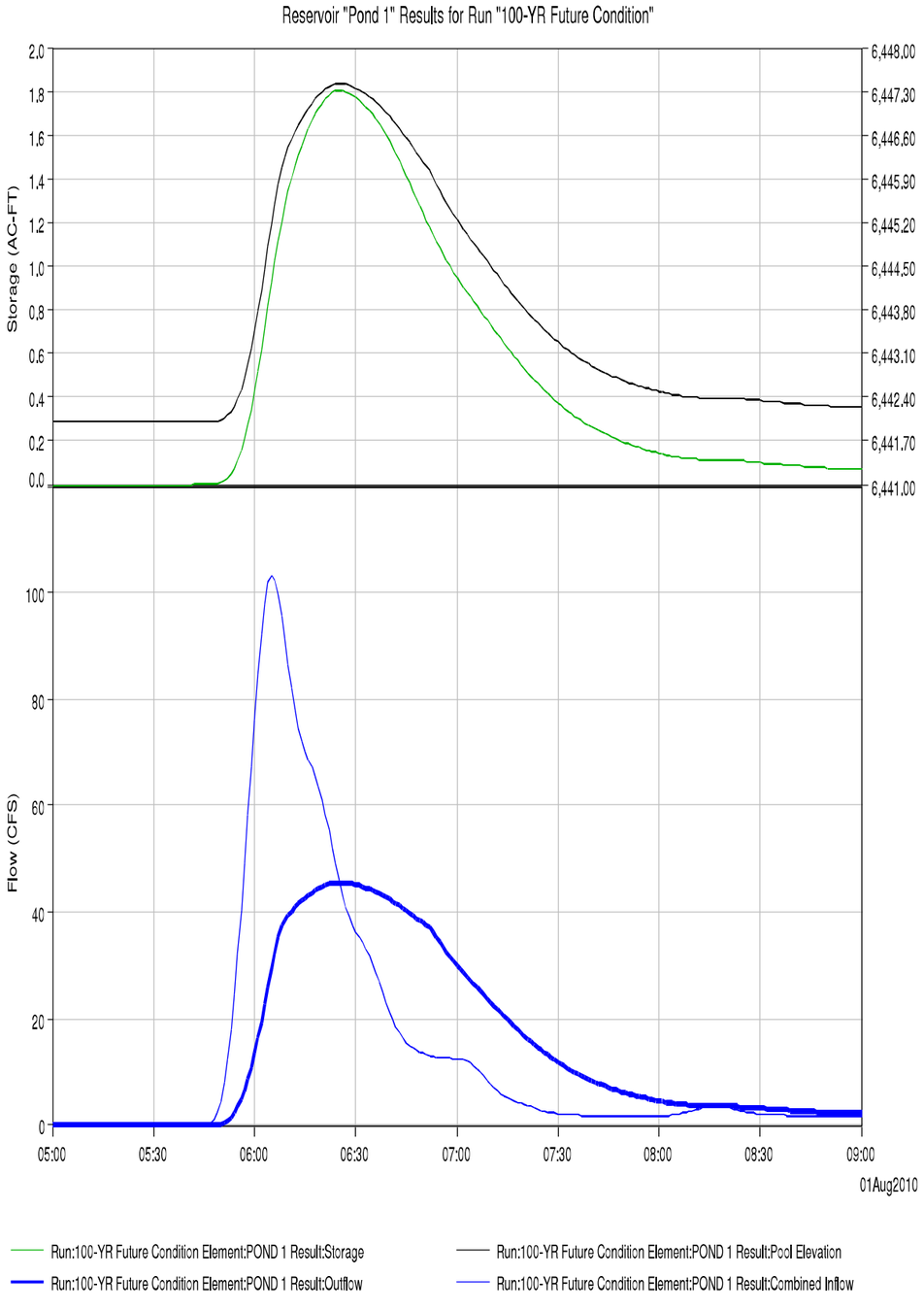
Start of Run: 01Aug2010, 00:00 Basin Model: Grants/Cibola County [
End of Run: 02Aug2010, 00:00 Meteorologic Model: 10-YR
Compute Time: 20Mar2011, 12:42:13 Control Specifications: Control

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
B28	0.350	57.7	01Aug2010, 06:18	5.3
B29	0.145	43.3	01Aug2010, 06:10	3.4
B30	0.123	40.6	01Aug2010, 06:04	2.7
B34	0.100	41.3	01Aug2010, 06:06	2.8
B35	0.130	57.0	01Aug2010, 06:05	3.6
Div 29	0.145	10.0	01Aug2010, 06:10	0.8
Div 30	0.123	0.0	01Aug2010, 00:00	0.0
Div 35A	0.130	47.6	01Aug2010, 06:05	3.0
Div35B	0.130	27.3	01Aug2010, 06:05	1.7
J29	0.350	43.8	01Aug2010, 06:27	5.3
J30	0.495	55.4	01Aug2010, 06:28	8.6
J30B	0.495	72.8	01Aug2010, 06:28	11.3
J36	0.130	29.0	01Aug2010, 06:05	2.3
Pond 1	0.100	22.1	01Aug2010, 06:25	2.7
Pond 2	0.100	17.4	01Aug2010, 06:54	4.0
Pond 3	0.000	2.7	01Aug2010, 06:37	0.6
Pond 4	0.000	6.7	01Aug2010, 07:05	2.5
Pond 5	0.350	43.8	01Aug2010, 06:27	5.3
Pond 6	0.000	17.4	01Aug2010, 06:28	2.6
R29	0.350	43.8	01Aug2010, 06:29	5.3
R30	0.495	72.5	01Aug2010, 06:38	11.2

Project: Concept Design Simulation Run: 100-YR Future Condition

Start of Run: 01Aug2010, 00:00 Basin Model: Grants/Cibola County [
End of Run: 02Aug2010, 00:00 Meteorologic Model: 100-YR
Compute Time: 18Mar2011, 08:44:40 Control Specifications: Control

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
B28	0.350	199.4	01Aug2010, 06:07	14.2
B29	0.145	117.7	01Aug2010, 06:08	7.9
B30	0.123	114.5	01Aug2010, 06:03	6.3
B34	0.100	103.3	01Aug2010, 06:05	6.0
B35	0.130	141.6	01Aug2010, 06:04	7.8
Div 29	0.145	27.1	01Aug2010, 06:08	1.8
Div 30	0.123	0.0	01Aug2010, 00:00	0.0
Div 35A	0.130	118.2	01Aug2010, 06:04	6.5
Div35B	0.130	68.0	01Aug2010, 06:04	3.8
J29	0.350	91.3	01Aug2010, 06:33	14.1
J30	0.495	119.1	01Aug2010, 06:25	21.8
J30B	0.495	158.7	01Aug2010, 06:25	28.0
J36	0.130	70.6	01Aug2010, 06:04	5.1
Pond 1	0.100	45.5	01Aug2010, 06:25	6.0
Pond 2	0.100	27.8	01Aug2010, 07:09	8.7
Pond 3	0.000	3.8	01Aug2010, 06:41	1.3
Pond 4	0.000	16.1	01Aug2010, 06:49	5.9
Pond 5	0.350	91.3	01Aug2010, 06:33	14.1
Pond 6	0.000	39.7	01Aug2010, 06:26	6.3
R29	0.350	91.3	01Aug2010, 06:34	14.1
R30	0.495	158.5	01Aug2010, 06:34	27.9



Project: Concept Design

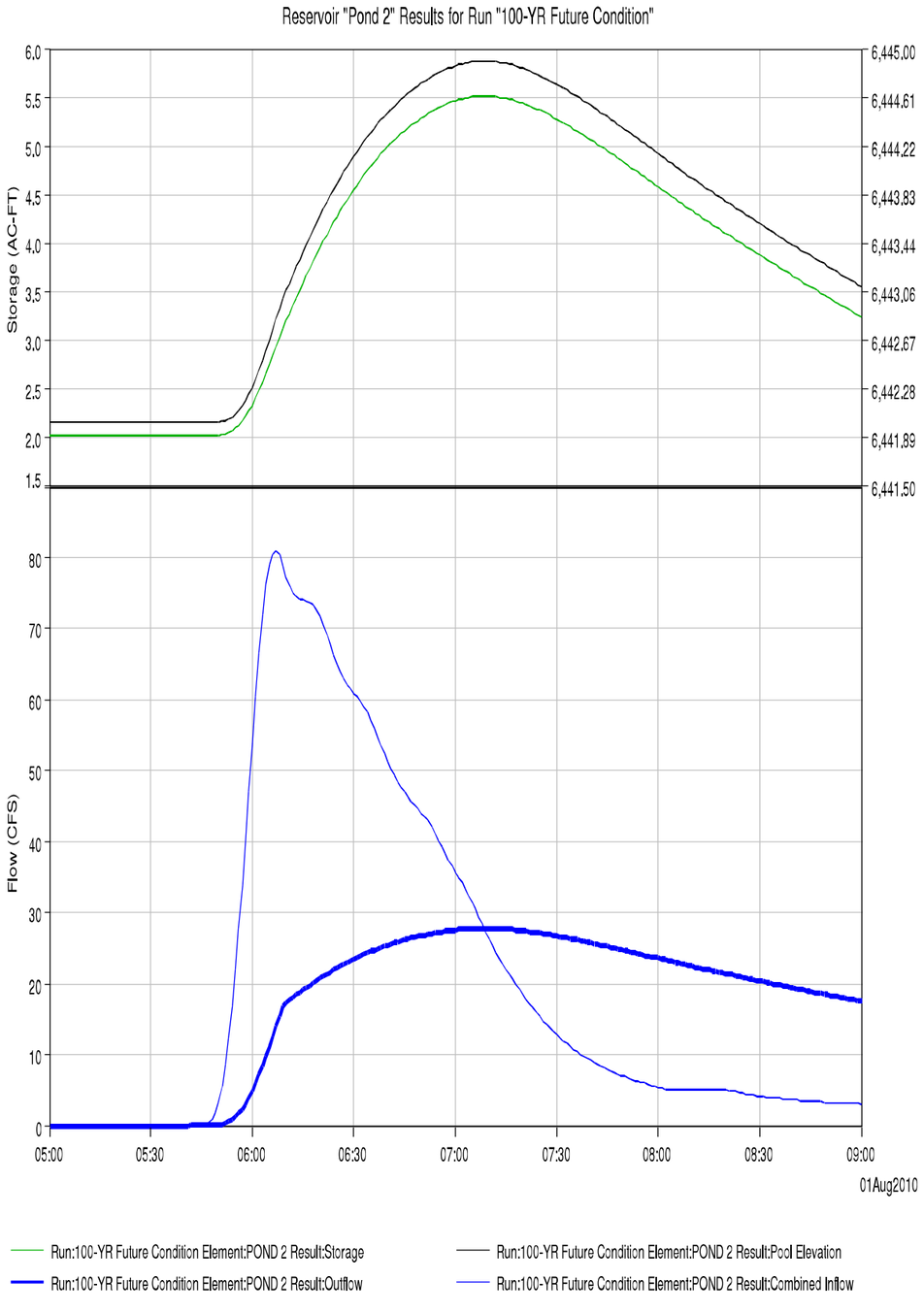
Simulation Run: 100-YR Future Condition Reservoir: Pond 1

Start of Run:	01Aug2010, 00:00	Basin Model:	Grants/Cibola County DMP
End of Run:	02Aug2010, 00:00	Meteorologic Model:	100-YR
Compute Time:	18Mar2011, 08:44:40	Control Specifications:	Control

Volume Units: AC-FT

Computed Results

Peak Inflow :	103.3 (CFS)	Date/Time of Peak Inflow :	01Aug2010, 06:05
Peak Outflow :	45.5 (CFS)	Date/Time of Peak Outflow :	01Aug2010, 06:25
Total Inflow :	6.0 (AC-FT)	Peak Storage :	1.8 (AC-FT)
Total Outflow :	6.0 (AC-FT)	Peak Elevation :	6447.4 (FT)



Project: Concept Design

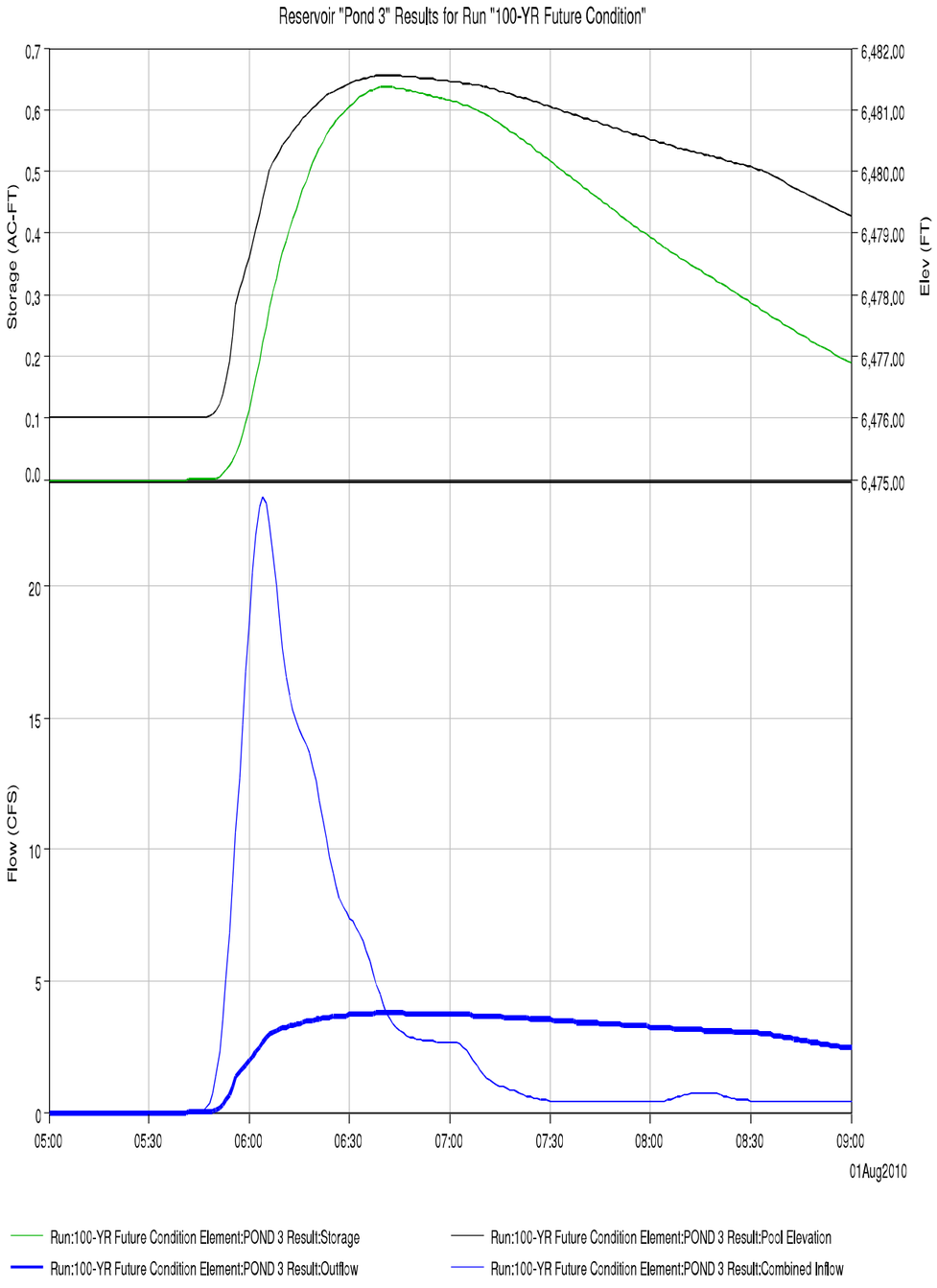
Simulation Run: 100-YR Future Condition Reservoir: Pond 2

Start of Run:	01Aug2010, 00:00	Basin Model:	Grants/Cibola County DMP
End of Run:	02Aug2010, 00:00	Meteorologic Model:	100-YR
Compute Time:	18Mar2011, 08:44:40	Control Specifications:	Control

Volume Units: AC-FT

Computed Results

Peak Inflow :	81.0 (CFS)	Date/Time of Peak Inflow :	01Aug2010, 06:07
Peak Outflow :	27.8 (CFS)	Date/Time of Peak Outflow :	01Aug2010, 07:09
Total Inflow :	8.8 (AC-FT)	Peak Storage :	5.5 (AC-FT)
Total Outflow :	8.7 (AC-FT)	Peak Elevation :	6444.9 (FT)



Project: Concept Design

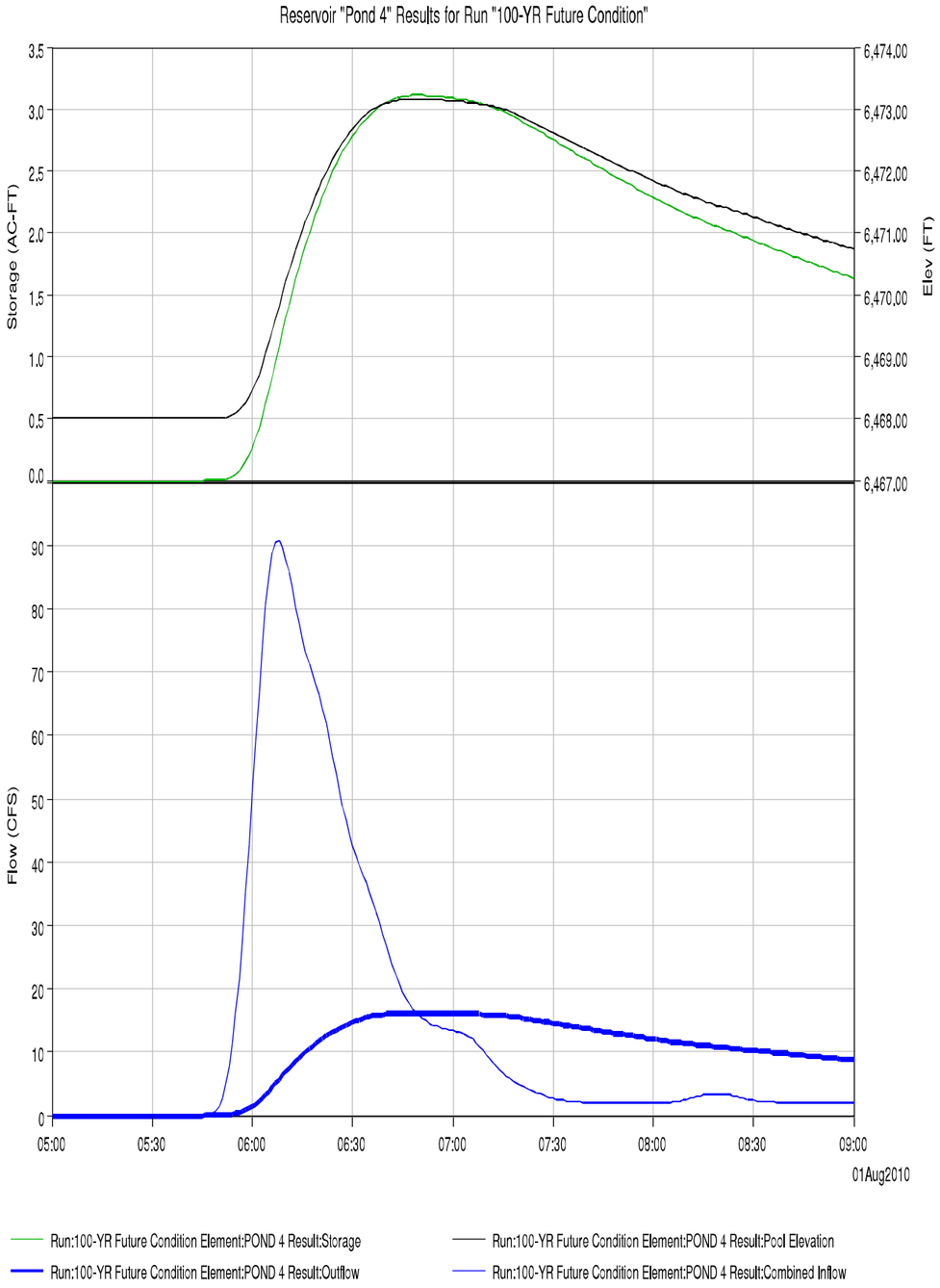
Simulation Run: 100-YR Future Condition Reservoir: Pond 3

Start of Run:	01Aug2010, 00:00	Basin Model:	Grants/Cibola County DMP
End of Run:	02Aug2010, 00:00	Meteorologic Model:	100-YR
Compute Time:	18Mar2011, 08:44:40	Control Specifications:	Control

Volume Units: AC-FT

Computed Results

Peak Inflow :	23.4 (CFS)	Date/Time of Peak Inflow :	01Aug2010, 06:04
Peak Outflow :	3.8 (CFS)	Date/Time of Peak Outflow :	01Aug2010, 06:41
Total Inflow :	1.3 (AC-FT)	Peak Storage :	0.6 (AC-FT)
Total Outflow :	1.3 (AC-FT)	Peak Elevation :	6481.6 (FT)



Project: Concept Design

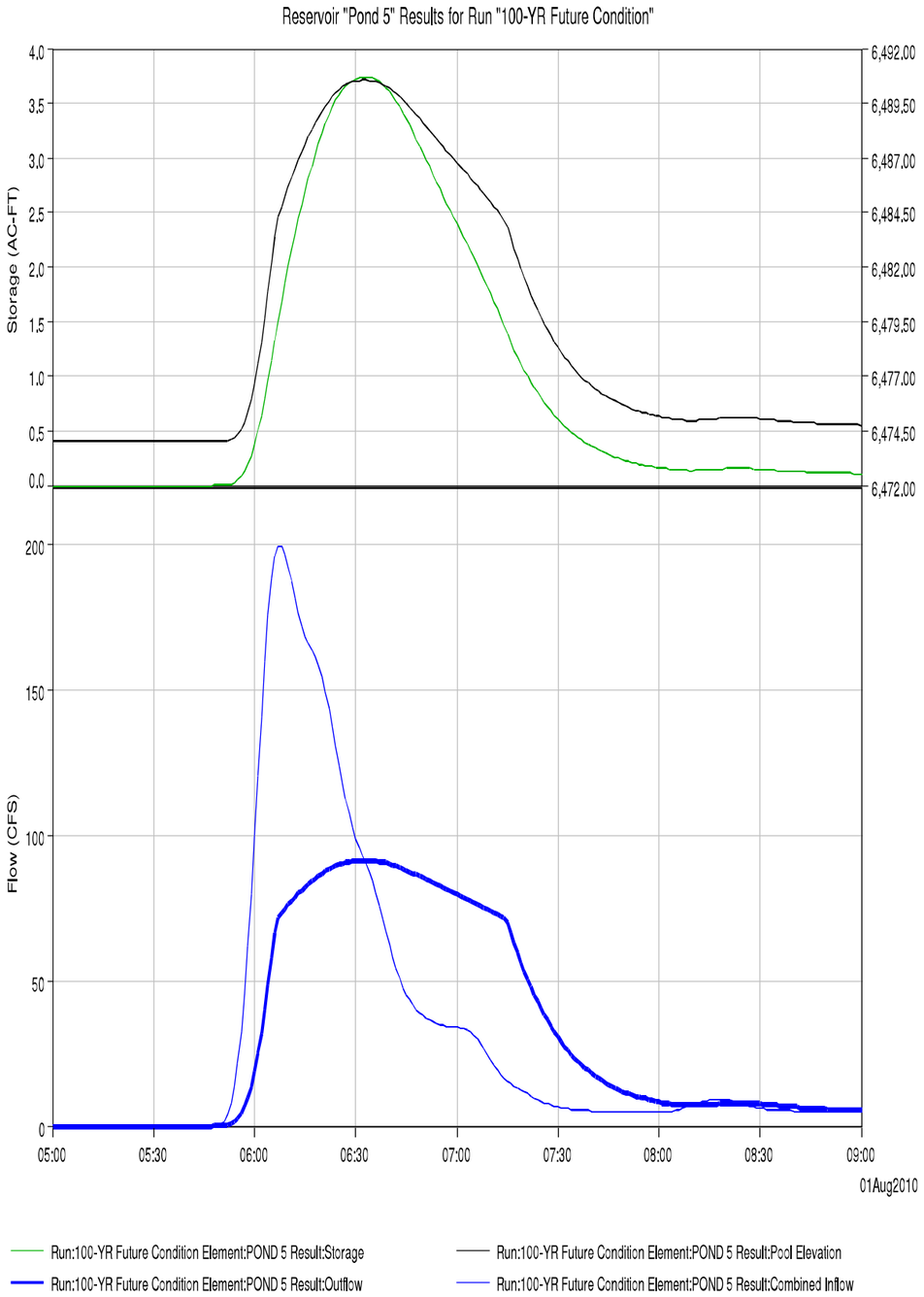
Simulation Run: 100-YR Future Condition Reservoir: Pond 4

Start of Run:	01Aug2010, 00:00	Basin Model:	Grants/Cibola County DMP
End of Run:	02Aug2010, 00:00	Meteorologic Model:	100-YR
Compute Time:	18Mar2011, 08:44:40	Control Specifications:	Control

Volume Units: AC-FT

Computed Results

Peak Inflow :	90.6 (CFS)	Date/Time of Peak Inflow :	01Aug2010, 06:08
Peak Outflow :	16.1 (CFS)	Date/Time of Peak Outflow :	01Aug2010, 06:49
Total Inflow :	6.0 (AC-FT)	Peak Storage :	3.1 (AC-FT)
Total Outflow :	5.9 (AC-FT)	Peak Elevation :	6473.2 (FT)



Project: Concept Design

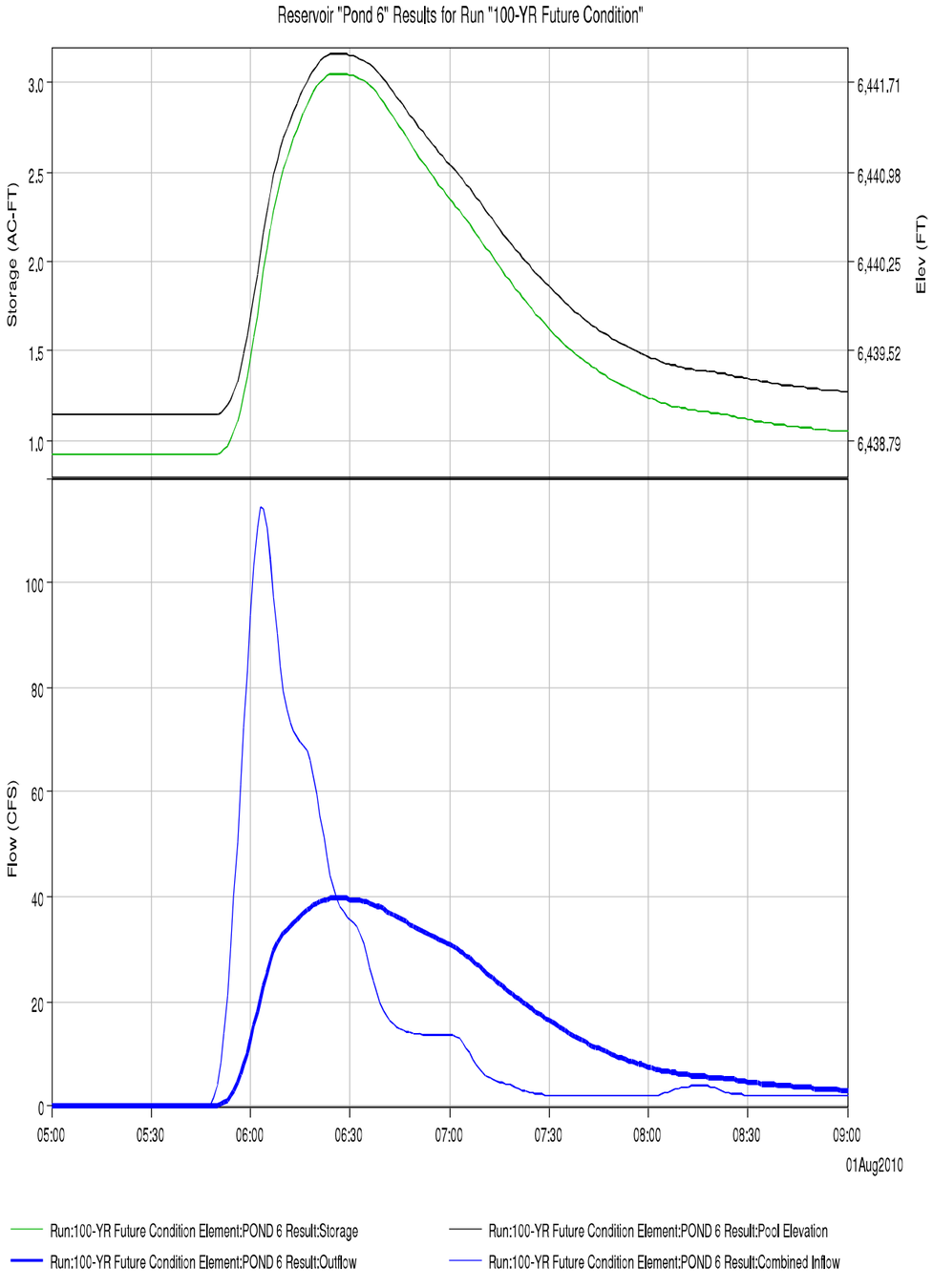
Simulation Run: 100-YR Future Condition Reservoir: Pond 5

Start of Run:	01Aug2010, 00:00	Basin Model:	Grants/Cibola County DMP
End of Run:	02Aug2010, 00:00	Meteorologic Model:	100-YR
Compute Time:	18Mar2011, 08:44:40	Control Specifications:	Control

Volume Units: AC-FT

Computed Results

Peak Inflow :	199.4 (CFS)	Date/Time of Peak Inflow :	01Aug2010, 06:07
Peak Outflow :	91.3 (CFS)	Date/Time of Peak Outflow :	01Aug2010, 06:33
Total Inflow :	14.2 (AC-FT)	Peak Storage :	3.7 (AC-FT)
Total Outflow :	14.1 (AC-FT)	Peak Elevation :	6490.5 (FT)



Project: Concept Design

Simulation Run: 100-YR Future Condition Reservoir: Pond 6

Start of Run:	01Aug2010, 00:00	Basin Model:	Grants/Cibola County DMP
End of Run:	02Aug2010, 00:00	Meteorologic Model:	100-YR
Compute Time:	18Mar2011, 08:44:40	Control Specifications:	Control

Volume Units: AC-FT

Computed Results

Peak Inflow :	114.5 (CFS)	Date/Time of Peak Inflow :	01Aug2010, 06:03
Peak Outflow :	39.7 (CFS)	Date/Time of Peak Outflow :	01Aug2010, 06:26
Total Inflow :	6.3 (AC-FT)	Peak Storage :	3.1 (AC-FT)
Total Outflow :	6.3 (AC-FT)	Peak Elevation :	6441.9 (FT)

Project: Concept Design
Simulation Run: 100-YR Future Condition Diversion: Div 29

Start of Run:	01Aug2010, 00:00	Basin Model:	Grants/Cibola County DMP
End of Run:	02Aug2010, 00:00	Meteorologic Model:	100-YR
Compute Time:	18Mar2011, 08:44:40	Control Specifications:	Control

Volume Units: AC-FT

Computed Results

Peak Inflow :	117.7 (CFS)	Date/Time of Peak Inflow :	01Aug2010, 06:08
Peak Outflow :	27.1 (CFS)	Date/Time of Peak Outflow :	01Aug2010, 06:08
Peak Diversion :	90.6 (CFS)	Date/Time of Peak Diversion :	01Aug2010, 06:08
Total Inflow :	7.9 (AC-FT)		
Total Outflow :	1.8 (AC-FT)	Total Diversion :	6.0 (AC-FT)

Project: Concept Design
Simulation Run: 100-YR Future Condition Diversion: Div 30

Start of Run:	01Aug2010, 00:00	Basin Model:	Grants/Cibola County DMP
End of Run:	02Aug2010, 00:00	Meteorologic Model:	100-YR
Compute Time:	18Mar2011, 08:44:40	Control Specifications:	Control

Volume Units: AC-FT

Computed Results

Peak Inflow :	114.5 (CFS)	Date/Time of Peak Inflow :	01Aug2010, 06:03
Peak Outflow :	0.0 (CFS)	Date/Time of Peak Outflow :	01Aug2010, 00:00
Peak Diversion :	114.5 (CFS)	Date/Time of Peak Diversion :	01Aug2010, 06:03
Total Inflow :	6.3 (AC-FT)		
Total Outflow :	0.0 (AC-FT)	Total Diversion :	6.3 (AC-FT)

Project: Concept Design
Simulation Run: 100-YR Future Condition Diversion: Div 35A

Start of Run:	01Aug2010, 00:00	Basin Model:	Grants/Cibola County DMP
End of Run:	02Aug2010, 00:00	Meteorologic Model:	100-YR
Compute Time:	18Mar2011, 08:44:40	Control Specifications:	Control

Volume Units: AC-FT

Computed Results

Peak Inflow :	141.6 (CFS)	Date/Time of Peak Inflow :	01Aug2010, 06:04
Peak Outflow :	118.2 (CFS)	Date/Time of Peak Outflow :	01Aug2010, 06:04
Peak Diversion :	23.4 (CFS)	Date/Time of Peak Diversion :	01Aug2010, 06:04
Total Inflow :	7.8 (AC-FT)		
Total Outflow :	6.5 (AC-FT)	Total Diversion :	1.3 (AC-FT)

Project: Concept Design
Simulation Run: 100-YR Future Condition Diversion: Div35B

Start of Run:	01Aug2010, 00:00	Basin Model:	Grants/Cibola County DMP
End of Run:	02Aug2010, 00:00	Meteorologic Model:	100-YR
Compute Time:	18Mar2011, 08:44:40	Control Specifications:	Control

Volume Units: AC-FT

Computed Results

Peak Inflow :	118.2 (CFS)	Date/Time of Peak Inflow :	01Aug2010, 06:04
Peak Outflow :	68.0 (CFS)	Date/Time of Peak Outflow :	01Aug2010, 06:04
Peak Diversion :	50.3 (CFS)	Date/Time of Peak Diversion :	01Aug2010, 06:04
Total Inflow :	6.5 (AC-FT)		
Total Outflow :	3.8 (AC-FT)	Total Diversion :	2.8 (AC-FT)

Culvert Calculator Report
Pond 1 - 30" RCP Outlet

Solve For: Discharge

Culvert Summary					
Allowable HW Elevation	6,450.00	ft	Headwater Depth/Height	3.20	
Computed Headwater Eleva	6,450.00	ft	Discharge	61.36	cfs
Inlet Control HW Elev.	6,449.88	ft	Tailwater Elevation	6,443.00	ft
Outlet Control HW Elev.	6,450.00	ft	Control Type	Outlet Control	

Grades					
Upstream Invert	6,442.00	ft	Downstream Invert	6,440.00	ft
Length	150.00	ft	Constructed Slope	0.013333	ft/ft

Hydraulic Profile					
Profile	PressureProfile		Depth, Downstream	3.00	ft
Slope Type	N/A		Normal Depth	N/A	ft
Flow Regime	N/A		Critical Depth	2.40	ft
Velocity Downstream	12.50	ft/s	Critical Slope	0.019511	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.013	
Section Material	Concrete		Span	2.50	ft
Section Size	30 inch		Rise	2.50	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	6,450.00	ft	Upstream Velocity Head	2.43	ft
Ke	0.50		Entrance Loss	1.21	ft

Inlet Control Properties					
Inlet Control HW Elev.	6,449.88	ft	Flow Control	N/A	
Inlet Type	Square edge w/headwall		Area Full	4.9	ft²
K	0.00980		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	1	
C	0.03980		Equation Form	1	
Y	0.67000				

Rating Table Report
Pond 1 - 30" RCP Outlet

Range Data:			
	Minimum	Maximum	Increment
Allowable HW E	6,442.00	6,450.00	1.00 ft

HW Elev. (ft)	Discharge (cfs)
6,442.00	0.00
6,443.00	0.00
6,444.00	13.96
6,445.00	27.00
6,446.00	37.65
6,447.00	44.98
6,448.00	51.27
6,449.00	56.81
6,450.00	61.36

Culvert Calculator Report
Pond 2 - 30" RCP Outlet

Solve For: Discharge

Culvert Summary					
Allowable HW Elevation	6,446.00	ft	Headwater Depth/Height	2.40	
Computed Headwater Eleva	6,446.00	ft	Discharge	34.58	cfs
Inlet Control HW Elev.	6,443.63	ft	Tailwater Elevation	6,442.00	ft
Outlet Control HW Elev.	6,446.00	ft	Control Type	Outlet Control	

Grades					
Upstream Invert	6,440.00	ft	Downstream Invert	6,434.50	ft
Length	400.00	ft	Constructed Slope	0.013750	ft/ft

Hydraulic Profile					
Profile	PressureProfile		Depth, Downstream	7.50	ft
Slope Type	N/A		Normal Depth	1.57	ft
Flow Regime	N/A		Critical Depth	2.00	ft
Velocity Downstream	7.04	ft/s	Critical Slope	0.007452	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.013	
Section Material	Concrete		Span	2.50	ft
Section Size	30 inch		Rise	2.50	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	6,446.00	ft	Upstream Velocity Head	0.77	ft
Ke	0.50		Entrance Loss	0.39	ft

Inlet Control Properties					
Inlet Control HW Elev.	6,443.63	ft	Flow Control	N/A	
Inlet Type	Square edge w/headwall		Area Full	4.9	ft²
K	0.00980		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	1	
C	0.03980		Equation Form	1	
Y	0.67000				

Rating Table Report
Pond 2 - 30" RCP Outlet

Range Data:			
	Minimum	Maximum	Increment
Allowable HW E	6,440.00	6,446.00	1.00 ft

HW Elev. (ft)	Discharge (cfs)
6,440.00	0.00
6,441.00	0.00
6,442.00	0.00
6,443.00	17.29
6,444.00	24.45
6,445.00	29.95
6,446.00	34.58

Culvert Calculator Report
Pond 3 - 15" RCP Outlet

Solve For: Discharge

Culvert Summary					
Allowable HW Elevation	6,482.00	ft	Headwater Depth/Height	4.80	
Computed Headwater Eleva	6,482.00	ft	Discharge	14.02	cfs
Inlet Control HW Elev.	6,482.00	ft	Tailwater Elevation	6,473.50	ft
Outlet Control HW Elev.	6,480.31	ft	Control Type	Inlet Control	

Grades					
Upstream Invert	6,476.00	ft	Downstream Invert	6,472.00	ft
Length	80.00	ft	Constructed Slope	0.050000	ft/ft

Hydraulic Profile					
Profile	PressureProfile		Depth, Downstream	1.01	ft
Slope Type	N/A		Normal Depth	0.99	ft
Flow Regime	N/A		Critical Depth	1.23	ft
Velocity Downstream	13.15	ft/s	Critical Slope	0.042755	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.013	
Section Material	Concrete		Span	1.25	ft
Section Size	15 inch		Rise	1.25	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	6,480.31	ft	Upstream Velocity Head	2.04	ft
Ke	0.50		Entrance Loss	1.01	ft

Inlet Control Properties					
Inlet Control HW Elev.	6,482.00	ft	Flow Control	N/A	
Inlet Type	Square edge w/headwall		Area Full	1.2	ft²
K	0.00980		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	1	
C	0.03980		Equation Form	1	
Y	0.67000				

Rating Table Report
Pond 3 - 15" RCP Outlet

Range Data:				
	Minimum	Maximum	Increment	
Allowable HW E	6,476.00	6,482.00	1.00	ft

HW Elev. (ft)	Discharge (cfs)
6,476.00	0.00
6,477.00	2.47
6,478.00	6.72
6,479.00	9.11
6,480.00	10.99
6,481.00	12.60
6,482.00	14.02

Culvert Calculator Report
Pond 4 - 18" RCP Outlet

Solve For: Discharge

Culvert Summary					
Allowable HW Elevation	6,478.00	ft	Headwater Depth/Height	6.67	
Computed Headwater Eleva	6,478.00	ft	Discharge	25.81	cfs
Inlet Control HW Elev.	6,478.00	ft	Tailwater Elevation	6,470.00	ft
Outlet Control HW Elev.	6,477.99	ft	Control Type	Inlet Control	

Grades					
Upstream Invert	6,468.00	ft	Downstream Invert	6,468.50	ft
Length	50.00	ft	Constructed Slope	-0.010000	ft/ft

Hydraulic Profile					
Profile	PressureProfile		Depth, Downstream	1.50	ft
Slope Type	N/A		Normal Depth	N/A	ft
Flow Regime	N/A		Critical Depth	1.49	ft
Velocity Downstream	14.60	ft/s	Critical Slope	0.056063	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.013	
Section Material	Concrete		Span	1.50	ft
Section Size	18 inch		Rise	1.50	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	6,477.99	ft	Upstream Velocity Head	3.31	ft
Ke	0.50		Entrance Loss	1.66	ft

Inlet Control Properties					
Inlet Control HW Elev.	6,478.00	ft	Flow Control	N/A	
Inlet Type	Square edge w/headwall		Area Full	1.8	ft²
K	0.00980		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	1	
C	0.03980		Equation Form	1	
Y	0.67000				

Rating Table Report
Pond 4 - 18" RCP Outlet

Range Data:			
	Minimum	Maximum	Increment
Allowable HW E	6,468.00	6,478.00	1.00 ft

HW Elev. (ft)	Discharge (cfs)
6,468.00	0.00
6,469.00	0.00
6,470.00	0.00
6,471.00	9.13
6,472.00	12.91
6,473.00	15.81
6,474.00	18.26
6,475.00	20.42
6,476.00	22.36
6,477.00	24.16
6,478.00	25.81

Culvert Calculator Report
Pond 4 - 42" RCP Inlet

Solve For: Discharge

Culvert Summary					
Allowable HW Elevation	6,483.50	ft	Headwater Depth/Height	1.57	
Computed Headwater Eleva	6,483.50	ft	Discharge	97.01	cfs
Inlet Control HW Elev.	6,483.50	ft	Tailwater Elevation	6,472.00	ft
Outlet Control HW Elev.	6,483.27	ft	Control Type	Inlet Control	

Grades					
Upstream Invert	6,478.00	ft	Downstream Invert	6,468.00	ft
Length	150.00	ft	Constructed Slope	0.080000	ft/ft

Hydraulic Profile					
Profile	CompositePressureProfileS1S2		Depth, Downstream	1.51	ft
Slope Type	N/A		Normal Depth	1.41	ft
Flow Regime	N/A		Critical Depth	3.03	ft
Velocity Downstream	24.51	ft/s	Critical Slope	0.008520	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.013	
Section Material	Concrete		Span	3.50	ft
Section Size	42 inch		Rise	3.50	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	6,483.27	ft	Upstream Velocity Head	1.86	ft
Ke	0.20		Entrance Loss	0.37	ft

Inlet Control Properties					
Inlet Control HW Elev.	6,483.50	ft	Flow Control	N/A	
Inlet Type	Beveled ring, 45° bevels		Area Full	9.6	ft²
K	0.00180		HDS 5 Chart	3	
M	2.50000		HDS 5 Scale	A	
C	0.03000		Equation Form	1	
Y	0.74000				

Culvert Calculator Report
Pond 5 - 30" RCP Outlet

Solve For: Discharge

Culvert Summary					
Allowable HW Elevation	6,494.00	ft	Headwater Depth/Height	8.00	
Computed Headwater Eleva	6,494.00	ft	Discharge	102.43	cfs
Inlet Control HW Elev.	6,492.99	ft	Tailwater Elevation	6,473.00	ft
Outlet Control HW Elev.	6,494.00	ft	Control Type	Outlet Control	

Grades					
Upstream Invert	6,474.00	ft	Downstream Invert	6,472.00	ft
Length	150.00	ft	Constructed Slope	0.013333	ft/ft

Hydraulic Profile					
Profile	CompositeM2PressureProfile		Depth, Downstream	2.49	ft
Slope Type	Mild		Normal Depth	N/A	ft
Flow Regime	Subcritical		Critical Depth	2.49	ft
Velocity Downstream	20.88	ft/s	Critical Slope	0.058673	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.013	
Section Material	Concrete		Span	2.50	ft
Section Size	30 inch		Rise	2.50	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	6,494.00	ft	Upstream Velocity Head	6.77	ft
Ke	0.50		Entrance Loss	3.38	ft

Inlet Control Properties					
Inlet Control HW Elev.	6,492.99	ft	Flow Control	N/A	
Inlet Type	Square edge w/headwall		Area Full	4.9	ft²
K	0.00980		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	1	
C	0.03980		Equation Form	1	
Y	0.67000				

Rating Table Report
Pond 5 - 30" RCP Outlet

Range Data:				
	Minimum	Maximum	Increment	
Allowable HW E	6,474.00	6,494.00	1.00	ft

HW Elev. (ft)	Discharge (cfs)
6,474.00	0.00
6,475.00	3.93
6,476.00	13.96
6,477.00	27.00
6,478.00	37.65
6,479.00	44.98
6,480.00	51.27
6,481.00	56.87
6,482.00	61.96
6,483.00	66.67
6,484.00	71.07
6,485.00	75.20
6,486.00	78.70
6,487.00	82.04
6,488.00	85.25
6,489.00	88.34
6,490.00	91.33
6,491.00	94.23
6,492.00	97.04
6,493.00	99.77
6,494.00	102.43

Culvert Calculator Report
Pond 5 - 48" RCP Emergency Outlet

Solve For: Section Size

Culvert Summary					
Allowable HW Elevation	6,490.00	ft	Headwater Depth/Height	3.18	
Computed Headwater Eleva	6,486.73	ft	Discharge	200.00	cfs
Inlet Control HW Elev.	6,486.73	ft	Tailwater Elevation	6,473.00	ft
Outlet Control HW Elev.	6,484.74	ft	Control Type	Inlet Control	

Grades					
Upstream Invert	6,474.00	ft	Downstream Invert	6,472.00	ft
Length	150.00	ft	Constructed Slope	0.013333	ft/ft

Hydraulic Profile					
Profile	CompositeM2Pressure	Profile	Depth, Downstream	3.85	ft
Slope Type	Mild		Normal Depth	N/A	ft
Flow Regime	Subcritical		Critical Depth	3.85	ft
Velocity Downstream	16.12	ft/s	Critical Slope	0.016914	ft/ft

Section				
Section Shape	Circular	Mannings Coefficient	0.013	
Section Material	Concrete	Span	4.00	ft
Section Size	48 inch	Rise	4.00	ft
Number Sections	1			

Outlet Control Properties					
Outlet Control HW Elev.	6,484.74	ft	Upstream Velocity Head	3.94	ft
Ke	0.50		Entrance Loss	1.97	ft

Inlet Control Properties					
Inlet Control HW Elev.	6,486.73	ft	Flow Control	N/A	
Inlet Type	Square edge w/headwall		Area Full	12.6	ft²
K	0.00980		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	1	
C	0.03980		Equation Form	1	
Y	0.67000				

Culvert Calculator Report
Pond 6 - 36" Equilavent Elliptical RCP Outlet

Solve For: Discharge

Culvert Summary					
Allowable HW Elevation	6,442.00	ft	Headwater Depth/Height	1.33	
Computed Headwater Eleva	6,442.00	ft	Discharge	40.15	cfs
Inlet Control HW Elev.	6,441.31	ft	Tailwater Elevation	6,439.00	ft
Outlet Control HW Elev.	6,442.00	ft	Control Type	Outlet Control	

Grades					
Upstream Invert	6,438.00	ft	Downstream Invert	6,437.00	ft
Length	500.00	ft	Constructed Slope	0.002000	ft/ft

Hydraulic Profile					
Profile	CompositeM2PressureProfile		Depth, Downstream	2.06	ft
Slope Type	Mild		Normal Depth	N/A	ft
Flow Regime	Subcritical		Critical Depth	2.06	ft
Velocity Downstream	7.74	ft/s	Critical Slope	0.005416	ft/ft

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

Outlet Control Properties					
Outlet Control HW Elev.	6,442.00	ft	Upstream Velocity Head	0.50	ft
Ke	0.50		Entrance Loss	0.25	ft

Inlet Control Properties					
Inlet Control HW Elev.	6,441.31	ft	Flow Control	N/A	
Inlet Type	Square edge w/headwall		Area Full	7.1	ft²
K	0.00980		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	1	
C	0.03980		Equation Form	1	
Y	0.67000				

Rating Table Report
Pond 6 - 36" Equilavent Elliptical RCP Outlet

Range Data:			
	Minimum	Maximum	Increment
Allowable HW E	6,438.00	6,442.00	1.00 ft

HW Elev. (ft)	Discharge (cfs)
6,438.00	0.00
6,439.00	0.00
6,440.00	15.92
6,441.00	30.50
6,442.00	40.15

Culvert Calculator Report
Existing 60" CMP at North High School Entrance from Roosevelt Avenue

Solve For: Discharge

Culvert Summary					
Allowable HW Elevation	6,456.50	ft	Headwater Depth/Height	1.10	
Computed Headwater Eleva	6,456.50	ft	Discharge	121.62	cfs
Inlet Control HW Elev.	6,456.27	ft	Tailwater Elevation	6,453.00	ft
Outlet Control HW Elev.	6,456.50	ft	Control Type	Outlet Control	

Grades					
Upstream Invert	6,451.00	ft	Downstream Invert	6,450.50	ft
Length	65.00	ft	Constructed Slope	0.007692	ft/ft

Hydraulic Profile					
Profile	M2		Depth, Downstream	3.15	ft
Slope Type	Mild		Normal Depth	4.02	ft
Flow Regime	Subcritical		Critical Depth	3.15	ft
Velocity Downstream	9.32	ft/s	Critical Slope	0.014189	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.024	
Section Material	CMP		Span	5.00	ft
Section Size	60 inch		Rise	5.00	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	6,456.50	ft	Upstream Velocity Head	0.93	ft
Ke	0.90		Entrance Loss	0.84	ft

Inlet Control Properties					
Inlet Control HW Elev.	6,456.27	ft	Flow Control	N/A	
Inlet Type	Projecting		Area Full	19.6	ft²
K	0.03400		HDS 5 Chart	2	
M	1.50000		HDS 5 Scale	3	
C	0.05530		Equation Form	1	
Y	0.54000				

North Street Channel Profile Summary Table

HEC-RAS Plan: North St River: North St Channel Reach: North St Channel

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	Max Chl Dpth	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
North St Channel	0	100 YR	431.00	6506.40	6512.00	6508.38	5.60	0.000285	2.13	202.72	47.40	0.18
North St Channel	0	10 YR	147.00	6506.40	6509.00	6507.39	2.60	0.000517	1.87	78.52	35.40	0.22
North St Channel	250	100 YR	431.00	6506.90	6512.07		5.17	0.000383	2.36	182.75	45.68	0.21
North St Channel	250	10 YR	147.00	6506.90	6509.15		2.25	0.000856	2.22	66.33	33.99	0.28
North St Channel	285		Bridge									
North St Channel	290	100 YR	431.00	6506.98	6512.08	6508.95	5.10	0.000401	2.40	179.72	45.42	0.21
North St Channel	290	10 YR	147.00	6506.98	6509.18	6507.97	2.20	0.000921	2.27	64.72	33.80	0.29
North St Channel	540	100 YR	431.00	6507.48	6512.19		4.71	0.000540	2.66	161.92	43.82	0.24
North St Channel	540	10 YR	147.00	6507.48	6509.44		1.96	0.001368	2.59	56.76	32.85	0.35
North St Channel	580		Bridge									
North St Channel	590	100 YR	431.00	6507.58	6512.21	6509.56	4.63	0.000572	2.72	158.66	43.52	0.25
North St Channel	590	10 YR	147.00	6507.58	6509.51	6508.58	1.93	0.001447	2.64	55.72	32.72	0.36
North St Channel	850	100 YR	431.00	6508.10	6511.78	6511.78	3.68	0.002078	8.78	49.09	20.71	1.00
North St Channel	850	10 YR	147.00	6508.10	6510.18	6510.18	2.08	0.002399	6.95	21.16	14.33	1.01
North St Channel	900		Bridge									
North St Channel	910	100 YR	431.00	6508.22	6512.14	6511.89	3.92	0.001588	7.95	54.23	21.68	0.89
North St Channel	910	10 YR	147.00	6508.22	6510.49	6510.30	2.27	0.001715	6.15	23.90	15.07	0.86
North St Channel	1150	100 YR	431.00	6508.70	6512.46	6512.38	3.76	0.001888	8.47	50.86	21.04	0.96
North St Channel	1150	10 YR	147.00	6508.70	6510.89	6510.78	2.19	0.001987	6.49	22.66	14.74	0.92
North St Channel	1190		Bridge									
North St Channel	1200	100 YR	431.00	6508.80	6512.71	6512.47	3.91	0.001596	7.96	54.12	21.66	0.89
North St Channel	1200	10 YR	147.00	6508.80	6511.07	6510.88	2.27	0.001724	6.16	23.86	15.06	0.86
North St Channel	1460	100 YR	431.00	6509.32	6513.07	6512.99	3.75	0.001912	8.51	50.63	21.00	0.97
North St Channel	1460	10 YR	147.00	6509.32	6511.50	6511.40	2.18	0.002003	6.51	22.59	14.72	0.93
North St Channel	1500		Bridge									
North St Channel	1510	100 YR	431.00	6509.42	6513.33	6513.09	3.91	0.001605	7.98	54.02	21.64	0.89
North St Channel	1510	10 YR	147.00	6509.42	6511.69	6511.50	2.26	0.001727	6.16	23.85	15.06	0.86
North St Channel	1770	100 YR	431.00	6509.94	6514.04		4.10	0.000897	6.33	68.08	25.22	0.68
North St Channel	1770	10 YR	147.00	6509.94	6512.25		2.31	0.001009	4.94	29.76	17.72	0.67
North St Channel	1820		Bridge									
North St Channel	1830	100 YR	431.00	6510.06	6514.07	6513.40	4.01	0.000987	6.56	65.73	24.82	0.71
North St Channel	1830	10 YR	147.00	6510.06	6512.29	6511.89	2.23	0.001156	5.19	28.35	17.38	0.72

North Street Channel Profile Summary Table

HEC-RAS Plan: North St River: North St Channel Reach: North St Channel (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	Max Chl Dpth	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
North St Channel	2050	100 YR	431.00	6512.00	6515.37	6515.37	3.37	0.002070	8.67	49.70	21.48	1.00
North St Channel	2050	10 YR	147.00	6512.00	6513.85	6513.85	1.85	0.002432	6.81	21.59	15.38	1.01

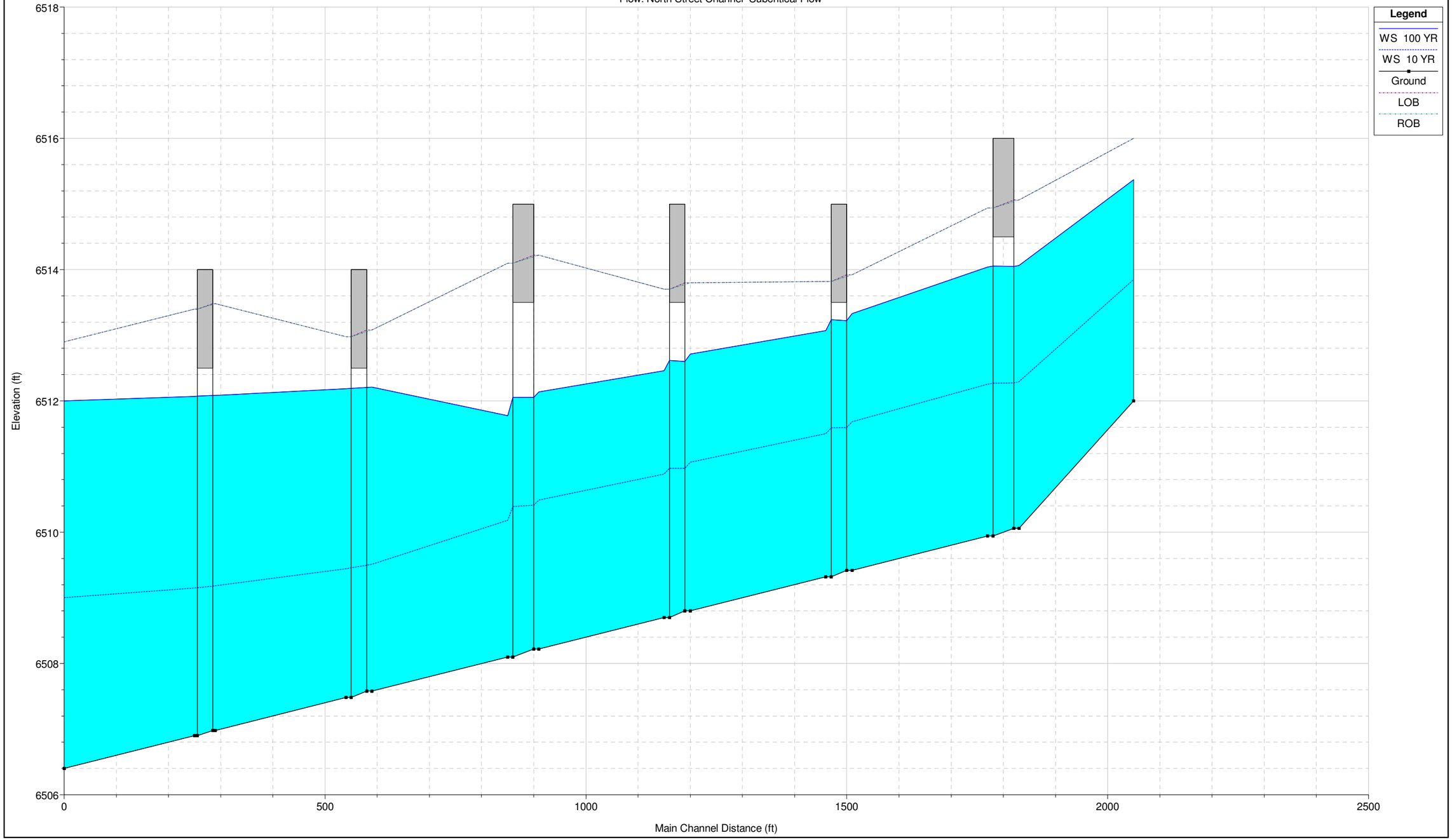
Bridge Summary Table

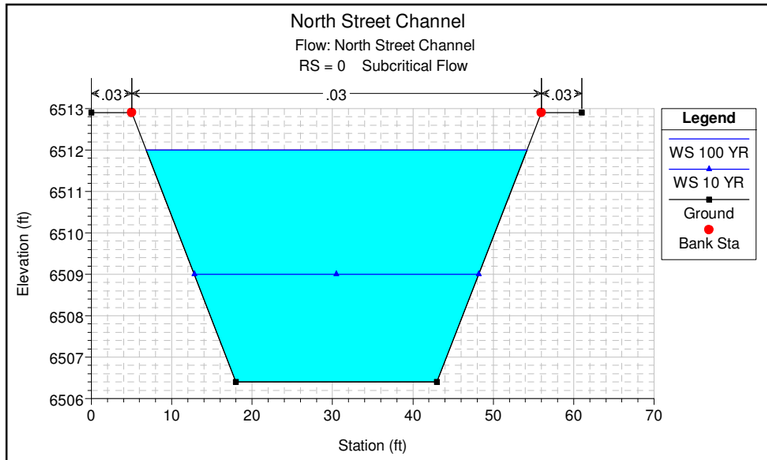
HEC-RAS Plan: North St River: North St Channel Reach: North St Channel

Reach	River Sta	Profile	Q Total	E.G. US.	W.S. US.	Q Bridge	BR Open Area	BR Open Vel
			(cfs)	(ft)	(ft)	(cfs)	(sq ft)	(ft/s)
North St Channel	285	100 YR	431.00	6512.17	6512.08	431.00	198.94	2.40
North St Channel	285	10 YR	147.00	6509.26	6509.18	147.00	198.94	2.28
North St Channel	580	100 YR	431.00	6512.33	6512.21	431.00	171.41	2.72
North St Channel	580	10 YR	147.00	6509.62	6509.51	147.00	171.41	2.66
North St Channel	900	100 YR	431.00	6513.12	6512.14	431.00	87.43	8.23
North St Channel	900	10 YR	147.00	6511.08	6510.49	147.00	87.43	6.47
North St Channel	1190	100 YR	431.00	6513.70	6512.71	431.00	72.38	8.34
North St Channel	1190	10 YR	147.00	6511.66	6511.07	147.00	72.38	6.53
North St Channel	1500	100 YR	431.00	6514.32	6513.33	431.00	57.77	8.33
North St Channel	1500	10 YR	147.00	6512.28	6511.69	147.00	57.77	6.54
North St Channel	1820	100 YR	431.00	6514.73	6514.07	431.00	76.92	6.59
North St Channel	1820	10 YR	147.00	6512.71	6512.29	147.00	76.92	5.24

North Street Channel

Flow: North Street Channel Subcritical Flow




North Street Channel
Flow: North Street Channel
RS = 0 Subcritical Flow
.03
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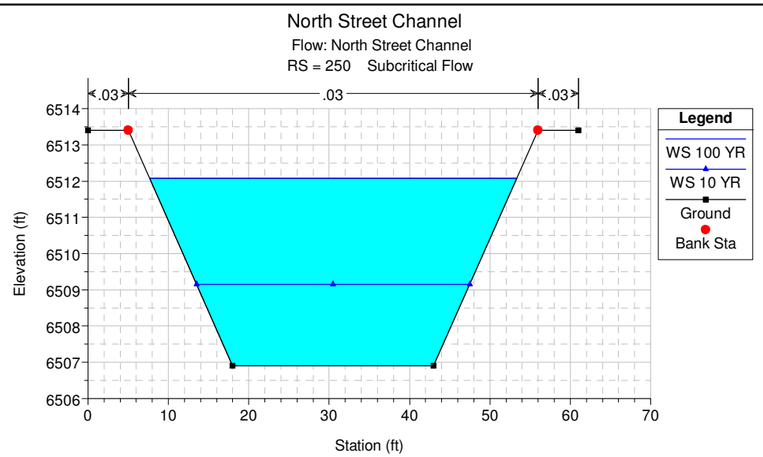
Elevation (ft)
Station (ft)
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta


North Street Channel
Flow: North Street Channel
RS = 250 Subcritical Flow
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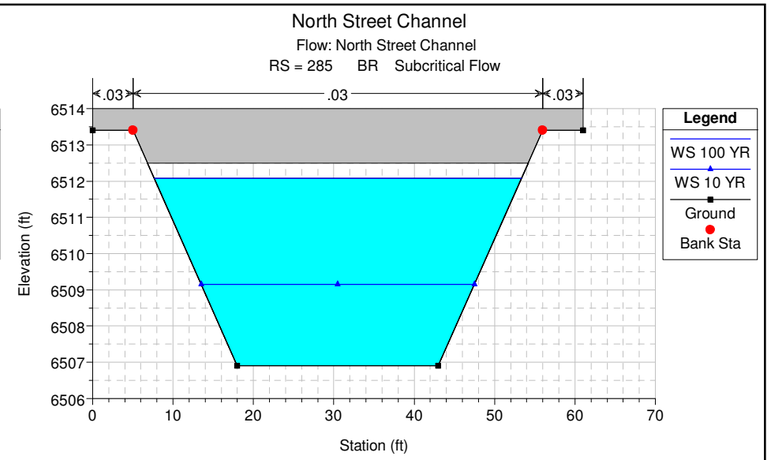
Elevation (ft)
Station (ft)
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta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Flow: North Street Channel
RS = 285 BR Subcritical Flow
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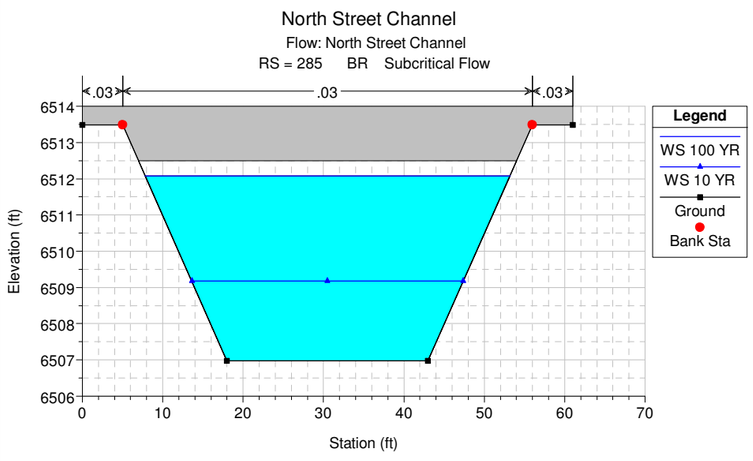
Elevation (ft)
Station (ft)
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta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Flow: North Street Channel
RS = 285 BR Subcritical Flow
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Elevation (ft)
Station (ft)
Legend
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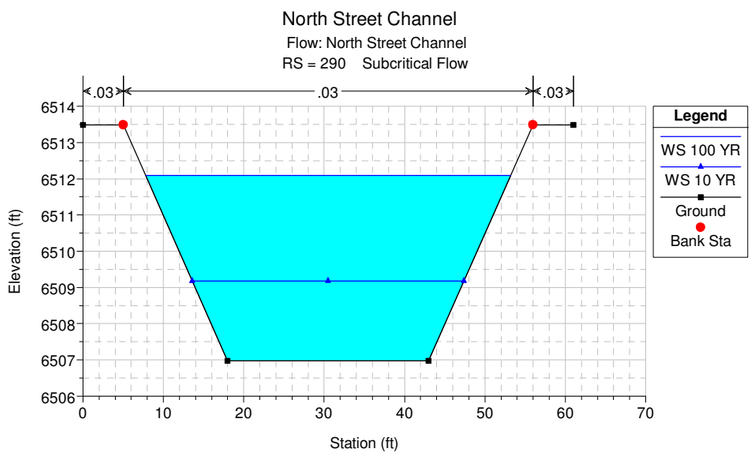
WS 10 YR
Ground
Bank Sta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Flow: North Street Channel
RS = 290 Subcritical Flow
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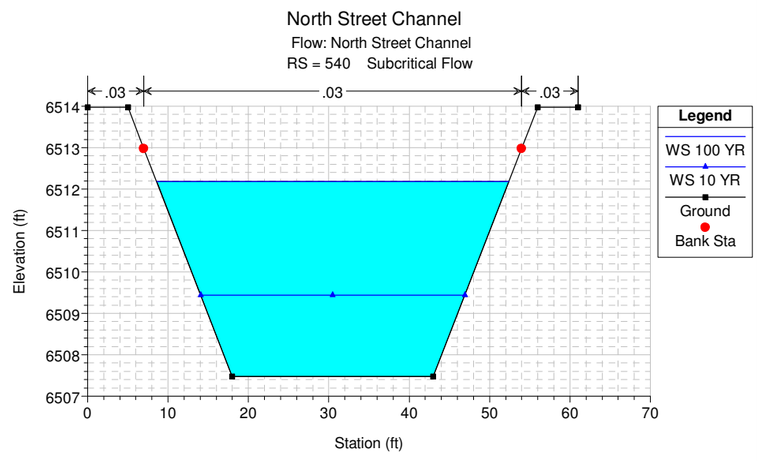
Elevation (ft)
Station (ft)
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta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Flow: North Street Channel
RS = 540 Subcritical Flow
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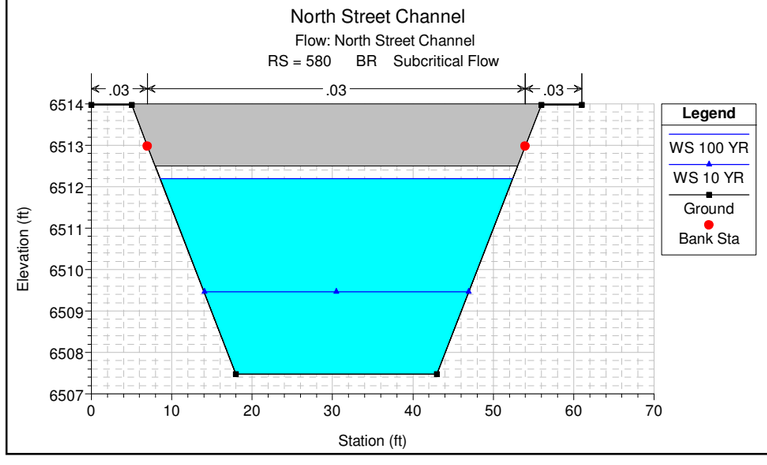
Elevation (ft)
Station (ft)
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta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Flow: North Street Channel
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Elevation (ft)
Station (ft)
Legend
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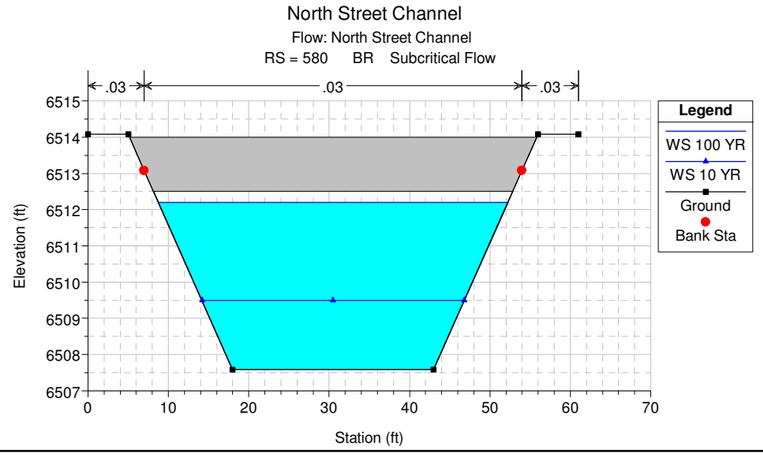
WS 10 YR
Ground
Bank Sta


North Street Channel
Flow: North Street Channel
RS = 580 BR Subcritical Flow
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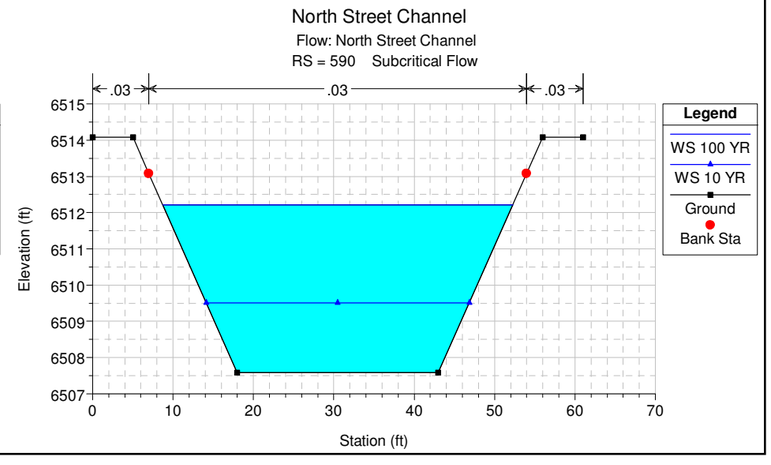
Elevation (ft)
Station (ft)
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta


North Street Channel
Flow: North Street Channel
RS = 590 Subcritical Flow
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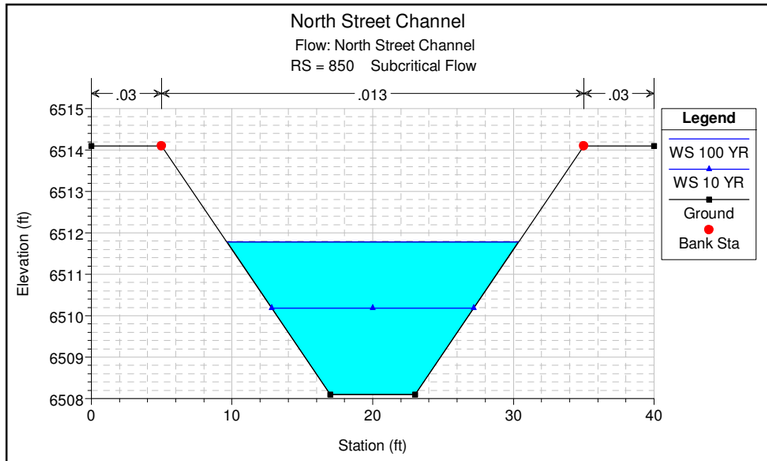
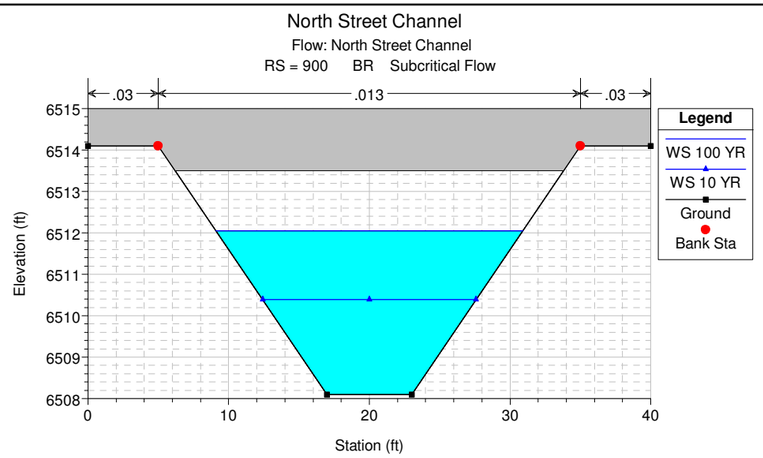
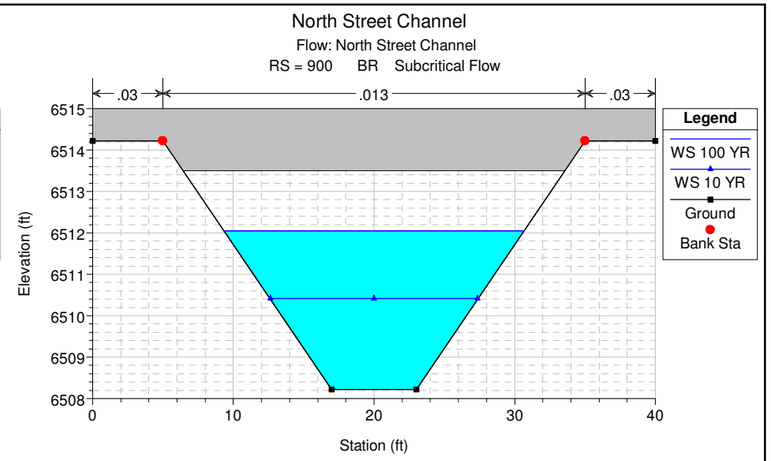
.03
.03
Elevation (ft)
Station (ft)
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta


North Street Channel
Flow: North Street Channel
RS = 850 Subcritical Flow
.03
.013
.03
Elevation (ft)
Station (ft)
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta


North Street Channel
Flow: North Street Channel
RS = 900 BR Subcritical Flow
.03
.013
.03
Elevation (ft)
Station (ft)
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta


North Street Channel
Flow: North Street Channel
RS = 900 BR Subcritical Flow
.03
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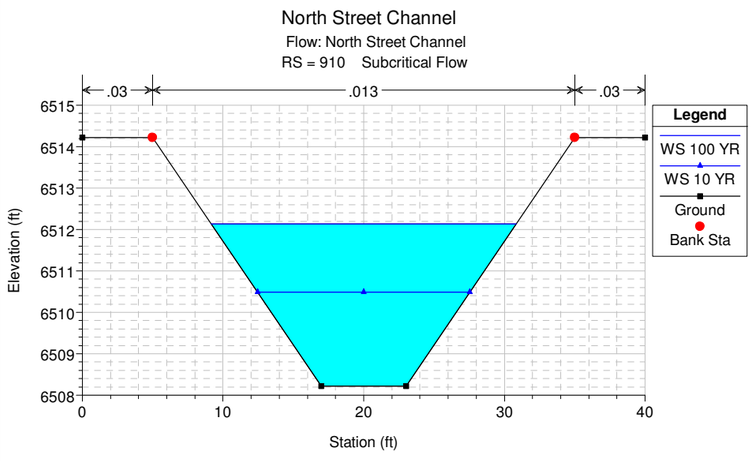
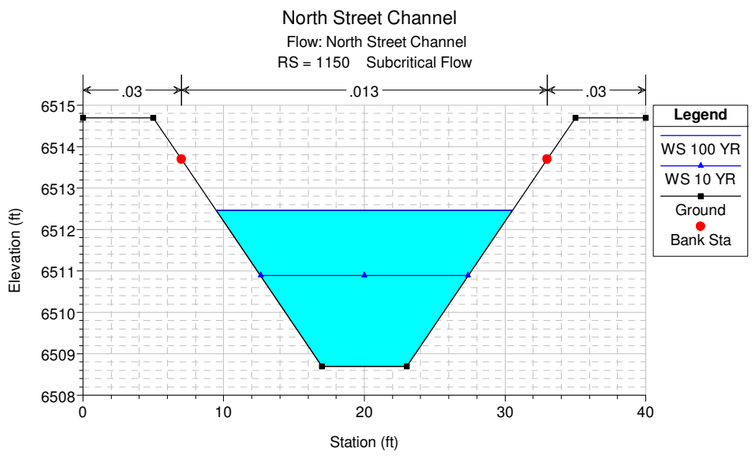
Elevation (ft)
Station (ft)
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta


North Street Channel
Flow: North Street Channel
RS = 910 Subcritical Flow
.03
.013
.03
Elevation (ft)
Station (ft)
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta


North Street Channel
Flow: North Street Channel
RS = 1150 Subcritical Flow
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.013
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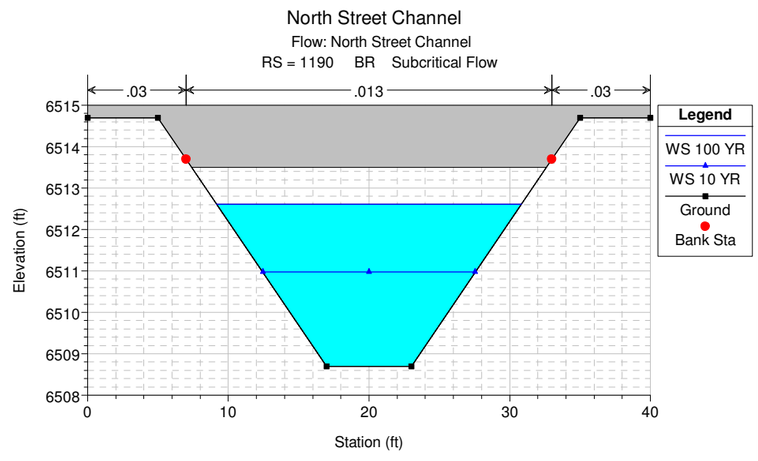
Elevation (ft)
Station (ft)
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta


North Street Channel
Flow: North Street Channel
RS = 1190 BR Subcritical Flow
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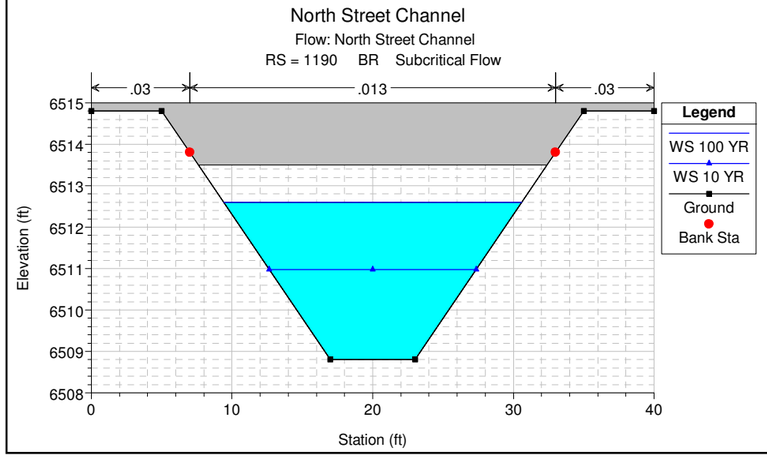
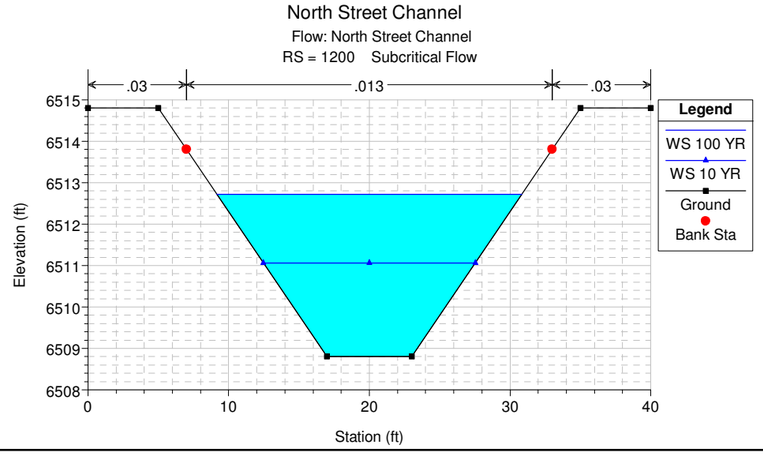
Elevation (ft)
Station (ft)
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta


North Street Channel
Flow: North Street Channel
RS = 1190 BR Subcritical Flow
.03
.013
.03
Elevation (ft)
Station (ft)
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta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Flow: North Street Channel
RS = 1200 Subcritical Flow
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.013
.03
Elevation (ft)
Station (ft)
Legend
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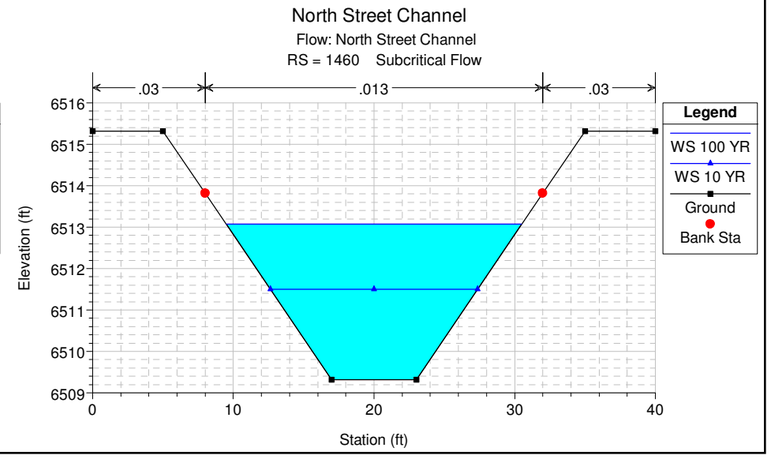
WS 10 YR
Ground
Bank Sta


North Street Channel
Flow: North Street Channel
RS = 1460 Subcritical Flow
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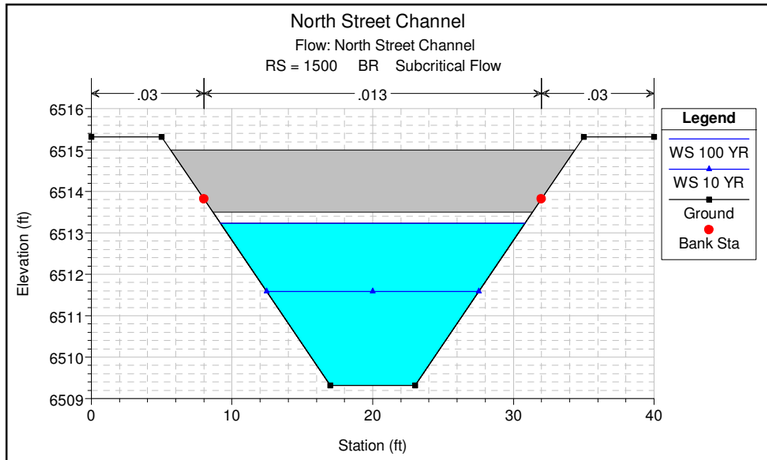
Elevation (ft)
Station (ft)
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta


North Street Channel
Flow: North Street Channel
RS = 1500 BR Subcritical Flow
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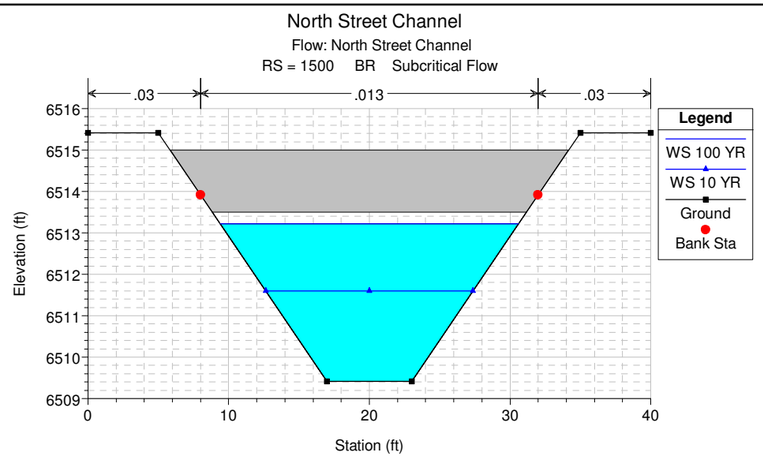
.013
.03
Elevation (ft)
Station (ft)
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta


North Street Channel
Flow: North Street Channel
RS = 1500 BR Subcritical Flow
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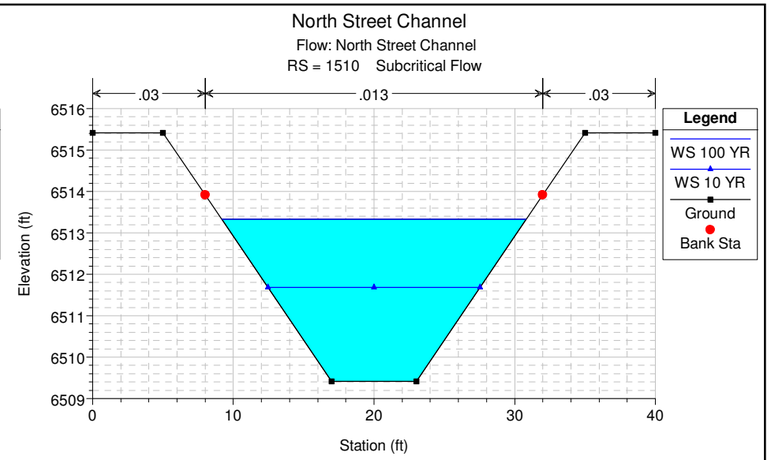
Elevation (ft)
Station (ft)
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta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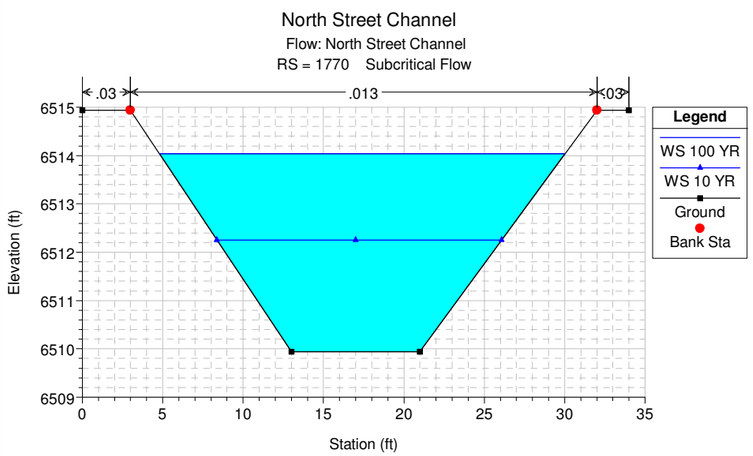
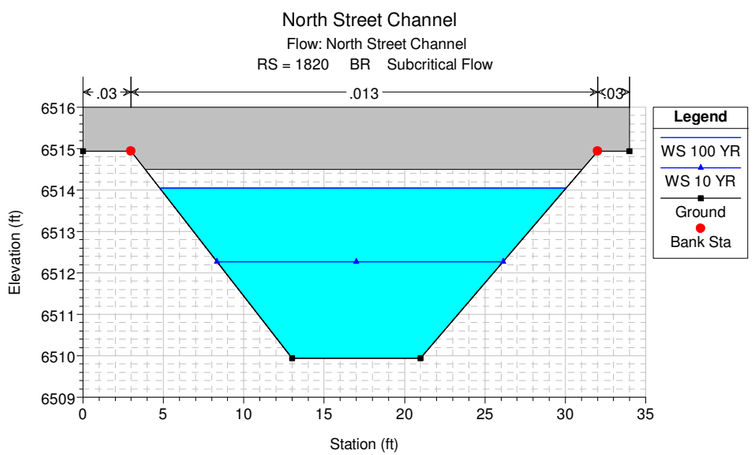
Flow: North Street Channel
RS = 1510 Subcritical Flow
.03
.013
.03
Elevation (ft)
Station (ft)
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta


North Street Channel
Flow: North Street Channel
RS = 1770 Subcritical Flow
.03
.013
.03
Elevation (ft)
Station (ft)
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta


North Street Channel
Flow: North Street Channel
RS = 1820 BR Subcritical Flow
.03
.013
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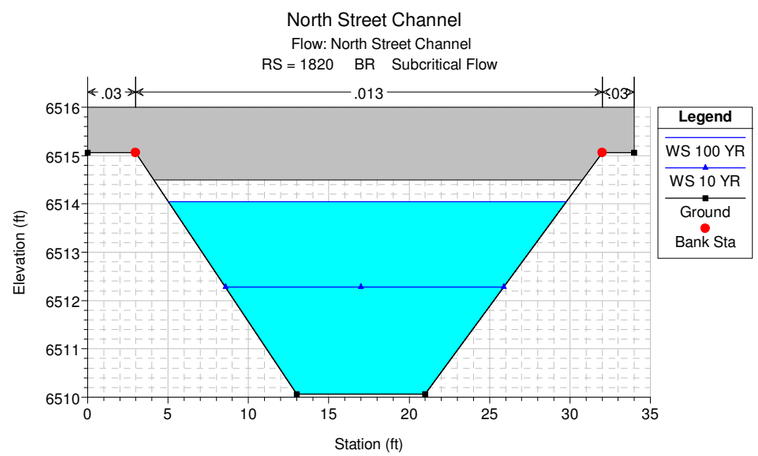
Elevation (ft)
Station (ft)
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta


North Street Channel
Flow: North Street Channel
RS = 1820 BR Subcritical Flow
.03
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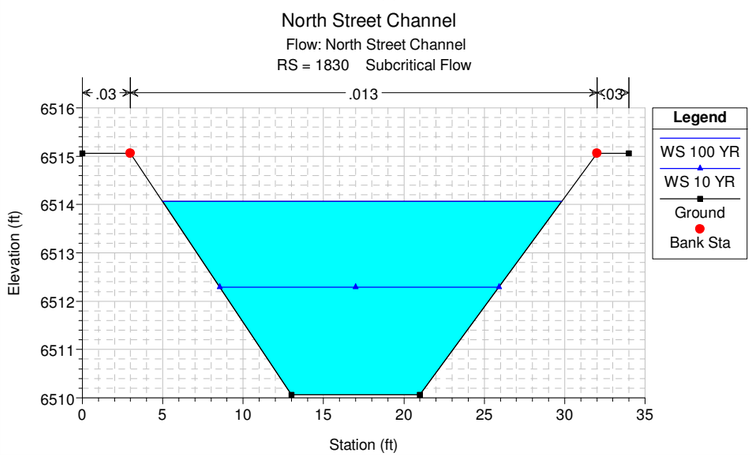
Elevation (ft)
Station (ft)
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta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Flow: North Street Channel
RS = 1830 Subcritical Flow
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Elevation (ft)
Station (ft)
Legend
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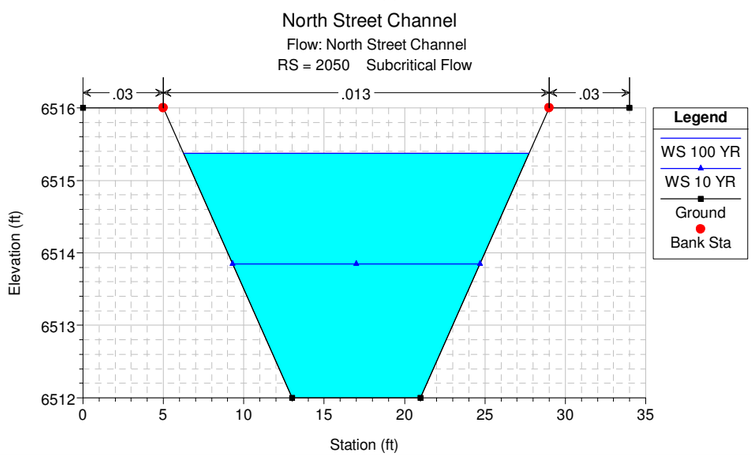
WS 10 YR
Ground
Bank Sta


North Street Channel
Flow: North Street Channel
RS = 2050 Subcritical Flow
.03
.013
.03
Elevation (ft)
Station (ft)
Legend
WS 100 YR
WS 10 YR
Ground
Bank Sta

Drainage Structure Inventory

City of Grants and Village of Milan, New Mexico Drainage Master Plan

4/6/2011

Structure ID	Analysis Point	Structure Location	Description/Existing Size	Existing Material	Assumed Existing Hw/D	Q_{10} (cfs)	Sufficient Existing Capacity to Pass Q_{10}	Q_{100} (cfs)	Sufficient Existing Capacity to Pass Q_{100}	Preliminary Recommendation for Replacement Structures***	Structure Notes
1	43	HW 605 North of Milan	n/a	n/a	n/a	31	n/a	188	n/a	3-57" span x 38" rise CMP Arch culverts	Assumed proposed Hw/D=1.5 with end projecting
2	44	HW 605 North of Milan	n/a	n/a	n/a	58	n/a	337	n/a	5-57" span x 38" rise CMP Arch culverts	Assumed proposed Hw/D=1.5 with end projecting
3	45	HW 605 North of Milan	n/a	n/a	n/a	26	n/a	109	n/a	2-57" span x 38" rise CMP Arch culverts	Assumed proposed Hw/D=1.5 with end projecting
4	46	HW 605 North of Milan	3-42"	CMP	1.5	14	Yes	53	Yes		Size and location obtained from report by Sulivan Design Group 1996
5	46*	HW 605 North of Milan	2-48"	CMP	1.5	14	Yes	53	Yes		Size and location obtained from report by Sulivan Design Group 1996
6	47	HW 605 North of Milan	1-48"	CMP	1.5	4	Yes	14	Yes		Size and location obtained from report by Sulivan Design Group 1996
7	48	HW 605 North of Milan	3-48"	CMP	1.5	14	Yes	56	Yes		Size and location obtained from report by Sulivan Design Group 1996
8	49	HW 605 North of Milan	1-54"	CMP	1.5	2	Yes	8	Yes		Size and location obtained from report by Sulivan Design Group 1996
9	50	HW 605 North of Milan	1-42"	CMP	1.5	5	Yes	19	Yes		Size and location obtained from report by Sulivan Design Group 1996
10	51	HW 605 North of Milan	1-36"	CMP	1.5	6	Yes	18	Yes		Size and location obtained from report by Sulivan Design Group 1996
11	52	HW 605 North of Milan	2-36"	CMP	1.5	6	Yes	20	Yes		Size and location obtained from report by Sulivan Design Group 1996
12	53	HW 605 North of Milan	1-42"	CMP	1.5	6	Yes	17	Yes		Size and location obtained from report by Sulivan Design Group 1996
13	54	HW 605 North of Milan	2-36"	CMP	1.5	13	Yes	42	Yes		Size and location obtained from report by Sulivan Design Group 1996
14	RSJ	Rio San Jose/Stanley Ave	1-36" 1-48"	CMP	1.5	559	No	2,440	No	Bridge	Channel full of weeds
15	Basin 73	Berryhill St/HW 605	1-30"	CMP	1.4	9	Yes	26	Yes		
16	Basin 73	Elkins Rd/HW 605	1-36"	CMP	1.0	9	Yes	26	Yes		Downstream end of culvert damaged
17	RSJ	Rio San Jose/HW 605	Bridge	Concrete	n/a	559	Yes	2,440	No	Bridge	
18	56B	Westbrook St	Culvert	n/a	n/a	38	n/a	141	n/a	2-57" span x 38" rise CMP Arch culverts	Assumed proposed Hw/D=1.2 with headwall
19	57	Prewitt St	Culvert	n/a	n/a	56	n/a	200	n/a	3-57" span x 38" rise CMP Arch culverts	Assumed proposed Hw/D=1.2 with headwall
20	57	Febco St	1-36" 1-58" x 39" Arch	CMP	1.2	56	Yes	200	No	3-57" span X 38" rise CMP Arch culverts	Assumed proposed Hw/D=1.2 with headwall
21	58	Berryhill St	1-36" 1-58" x 39" Arch	CMP	1.2	59	Yes	211	No	3-57" span X 38" rise CMP Arch culverts	Assumed proposed Hw/D=1.2 with headwall
22	59	Elkins Rd	Culvert	n/a	n/a	59	n/a	211	n/a	3-57" span X 38" rise CMP Arch culverts	Assumed proposed Hw/D=1.2 with headwall
23	60	Berryhill St/Howie Ave	2-42" x 24" Arch 1-24"	CMP	1.5	6	Yes	21	Yes		
24	61*	Elkins Rd/Howie Ave	3-24"	CMP	1.3	15	Yes	52	Yes		
25	61*	Elkins Rd/Howie Ave	1-48"	CMP	1.3	15	Yes	52	Yes		
26	61	Elkins Rd/Howie Ave	3-48"	CMP	1.5	15	Yes	52	Yes		
27	64	Rio San Jose/RR	RR Bridge	Steel	n/a	559	Yes	2,440	No	Proposed channel improvements	Existing backwater causes channel overflow upstream in 100-yr
28	64	Rio San Jose/Santa Fe Ave	8-10' x 5' CBC	Concrete	n/a	559	Yes	2,440	No	Proposed channel improvements	
29	60*	Febco St/Haystack Pl	1-18"	CMP	2.0	6	Yes	21	No	1-24" CMP culvert	Assumed proposed Hw/D=1.5 with headwall
30	Basin 65B	Haystack Pl/Crater Ave	1-15"	CMP	2.0	22	No	89	No		
31	Basin 65B	Haystack Pl/Crater Ave	2-54" x 40" Arch	CMP	1.2	22	Yes	89	Yes		
32	Basin 65B	Pintada Ave/Crater Ave	1-36" 1-54" x 40" Arch	CMP	1.2	22	Yes	89	Yes		
33	Basin 65B	Crater Ave	2-54" x 40" Arch	CMP	1.5	22	Yes	89	Yes		
34	Basin 65B	Crater Ave/Berryhill St	1-48" 1-36"	CMP	2.3	22	Yes	89	Yes		
35	62B*	Forest Park Rd	Diversion Channel	Earth	n/a	12	n/a	46	n/a		
36	62B	Berryhill St	1-54" x 40" Arch	CMP	1.3	12	Yes	46	Yes		
37	63B	Tietjen St/Crater Ave	2-54" x 39" Arch	CMP	1.6	44	Yes	153	Yes		
38	63B	Elkins Rd/Crater Ave	Culvert	n/a	n/a	44	n/a	153	n/a	2-57" span x 38" rise CMP Arch culverts	Assumed proposed Hw/D=1.3 with headwall
39	65*	Elkins Rd/Tietjen St	1-24" Storm Sewer w/ Inlet	RCP	1.0	16	No	53	No	36" RCP with expanded inlets	Assumed proposed Hw/D=1.5 with headwall
40	65	Elkins Rd/Forest Park Rd	1-24"	CMP	1.5	16	Yes	53	No	2-30" CMP culverts	Assumed proposed Hw/D=1.2 with headwall
41	65*	Elkins Rd/Forest Park Rd	1-24"	CMP	1.5	16	Yes	53	No	2-30" CMP culverts	Assumed proposed Hw/D=1.2 with headwall
42	66	Minnick St	Culvert	n/a	n/a	23	n/a	85	n/a	1-54" CMP culvert	Assumed proposed Hw/D=1.0 with end projecting
43	69	Elkins Rd/North St Ditch	1-48" w/ FES 1-48" with 4'x3' Grate Inlet	CMP	1.6	84	Yes	310	No	3-48" CMP culverts	Assumed proposed Hw/D=1.6 with headwall
44	70	RR/North St Ditch	Bridge	n/a	n/a	96	n/a	329	n/a		
45	70	Santa Fe Ave/North St Ditch	Bridge	n/a	n/a	96	n/a	329	n/a		
46	71	Elkins Rd/Black Mesa Rd	Culvert	n/a	n/a	8	n/a	22	n/a	1-24" CMP culvert	Assumed proposed Hw/D=1.7 with headwall
47	72	RR/Santa Fe Ave	Culvert	Concrete	n/a	72	n/a	206	n/a		Likely concrete box culverts, but not confimed
48	85	Santa Fe/ Aspen Ave	Culvert	Concrete	n/a	89	n/a	244	n/a		Likely concrete box culverts, but not confimed
49	79	I-40/Sand St	1-58" x 39" Arch	CMP	1.3	24	Yes	57	Yes		
50	79*	Pinon Dr/Sand St	2-58" x 39" Arch	CMP	1.2	24	Yes	57	Yes		
51	80	Rio San Jose/Sand St	2-12.5' x 5' CBC	Concrete	n/a	639	No	2,440	No	Bridge	Backwater causes channel overflow upstream in 100-yr
52	80*	Rio San Jose/Clay St	~28' x 7.5' Bridge	Concrete	n/a	639	No	2,440	No	Bridge	Backwater causes channel overflow upstream in 100-yr
53	80*	Rio San Jose/Airport Rd	2-12.5' x 6' CBC	Concrete	n/a	639	Yes	2,440	No	Bridge	
54	80*	Rio San Jose/Milan St	~28' x 6.5' Bridge	Concrete	n/a	639	Yes	2,440	No	Bridge	
55	Basin 90*	Milan St	Storm Sewer System w/ Inlets	RCP	n/a	56	n/a	128	n/a		
56	81	North St/Uranium Ave	Trench Drain	Steel	n/a	54	n/a	131	n/a		

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Drainage Structure Inventory

City of Grants and Village of Milan, New Mexico Drainage Master Plan

4/6/2011

Structure ID	Analysis Point	Structure Location	Description/Existing Size	Existing Material	Assumed Existing Hw/D	Q_{10} (cfs)	Sufficient Existing Capacity to Pass Q_{10}	Q_{100} (cfs)	Sufficient Existing Capacity to Pass Q_{100}	Preliminary Recommendation for Replacement Structures***	Structure Notes
57	82	North St/Uranium Ave	3-36"	CMP	1.3	147	Yes	431	No	Slab bridge structure	
58	82	North St Ditch	Drainage Ditch	Earth	n/a	147	No	431	No	Proposed channel section expansion with slab bridge crossings	Multiple driveway and street culverts limit capacity for channel
59	Zuni	Zuni Canyon Arroyo/Aspen Ave	1-72"	CMP	1.3	559	No	2,440	No		
60	Zuni	Zuni Canyon Arroyo/I-40	1-84"	CMP	2.1	559	Yes	2,440	No		
61	74	Cedar Dr/Santa Fe Ave	Culvert	n/a	n/a	15	n/a	38	n/a		
62	75B	Cedar Dr/Santa Fe Ave	1-5' x 6' CBC	Concrete	3.0	31	Yes	100	Yes		
63	75B*	Cedar Dr/Santa Fe Ave	1-24" Storm Sewer with 10' x 6.5' Area Inlet	CMP	2.0	31	Yes	100	No		
64	77	RR/ Ice Caves Rd	Culvert	Concrete	n/a	125	n/a	308	n/a		Likely concrete box culverts, but not confimed
65	76	Santa Fe Ave/Ice Caves Rd	Area and Curb Inletsw/Storm Sewer	n/a	n/a	26	n/a	58	n/a		
66	88	Rio San Jose/El Morro Rd	3-10' x 10' CBC	Concrete	n/a	929	Yes	2,440	No	Proposed channel section expansion	
67	32*	Santa Fe Ave/El Morro Rd	Culvert	n/a	n/a	48	n/a	153	n/a		
68	33*	Santa Fe Ave/ El Morro Rd	Storm Sewer System w/ Inlets	RCP	n/a	37	n/a	91	n/a		
69	33*	RR/Acoma St	Culvert	Concrete	n/a	37	n/a	91	n/a		Likely concrete box culverts, but not confimed
70	90	Rio San Jose RR/5th St	RR Bridge and Concrete Channel	Steel/Concrete	n/a	966	Yes	2,440	Yes		
71	91	Rio San Jose/Santa Fe Ave	Bridge w/ Curb Inlets Nearby	Concrete	n/a	984	Yes	2,440	Yes		
72	35	High St/Mountain Rd	Trench Drain	Steel	n/a	141	n/a	336	n/a		
73	92	Rio San Jose/High St	3-4' x 10' CBC	Concrete	n/a	996	No	2,440	No	Bridge	Heavy sedimentation present at the upstream end of the culverts
74	92	Rio San Jose/City Park	Pedestrian Bridge	Concrete	n/a	996	No	2,440	No	Bridge	
75	92	Rio San Jose/Ampitheater	Pedestrian Bridge	Concrete	n/a	996	No	2,440	No	Bridge	
76	36	Mountain Rd/Washington Ave	1-30"	CMP	1.0	57	No	142	No	1-49" span x 33" rise CMP Arch culvert	Assumed proposed Hw/D=1.0 with headwall
77	36	Mountain Rd/Washington Ave	1-15"	CMP	1.0	57	No	142	No	1-49" span x 33" rise CMP Arch culvert	Assumed proposed Hw/D=1.0 with headwall
78	36	Mountain Rd/Washington Ave	Drainage Ditch	Earth	n/a	57	No	142	No		
79	94	Rio San Jose/2nd St	2-9' x 6' CM Arch w/ Concrete Bottom	CMP/Concrete	n/a	1,024	Yes	2,440	No	Bridge	Relatively good condition with some cracks in concrete slope paving
80	36**	Warren St/Roosevelt Ave	Culvert	n/a	n/a	7**	n/a	17**	n/a		
81	Basin 29*	Warren St/Roosevelt Ave	2-30"	CMP	1.4	34**	Yes	91**	No	1-42" RCP culvert	Assumed proposed Hw/D=1.6 and grooved end with headwall
82	30*	Roosevelt Ave/Pena Dr	Drainage Ditch	Earth	n/a	98	No	316	No	5 ft bottom width with 2:1 side slopes and grade control structures with implementation of upstream detention as proposed with the Grants Downtown Area Drainage Improvemets	South bank of existing channel limits capacity
83	30	Roosevelt Ave/Pena Dr	1-60"	CMP	1.1	98	No	316	No	Add headwall to existing 60" CMP and stabilize upstream drainage channel (Structure 82) along with implementation of upstream detention as proposed with the Grants Downtown Area Drainage Improvements	
84	30*	2nd St	Drainage Ditch/ 1-58" x 39" Arch	Earth	1.2	98	No	316	No	Proposed conrete channel with 10 ft bottom width and 2:1 side slopes, slab bridge crossing structures	
85	94	Rio San Jose/1st St	2-9' x 6' CM Arch w/ Concrete Bottom	CMP/Concrete	n/a	1,024	Yes	2,440	No	Bridge	Some degradation of concrete, corrugated metal arches in relatively good condition
86	94*	Rio San Jose/Anderman St	3-9' x 6' CM Arch w/ Concrete Bottom	CMP/Concrete	n/a	1,024	Yes	2,440	No	Bridge	Culvert inverts show degradation due to rust, concrete rundown at southeast side is broken, cracks present in sidewalk that appear to be caused by tilting of headwall
87	Basin 26*	University Blvd	1-30"	CMP	1.4	11	Yes	28	No	Add headwall to existing 30" CMP	Assumed proposed Hw/D=1.4 with headwall
88	25	University Blvd	1-36"	CMP	1.3	23	Yes	59	No	1-57" span x 38" rise CMP Arch culvert	Assumed proposed Hw/D=1.3 with headwall
89	19	North Dr	Culvert	n/a	n/a	67	n/a	213	n/a	3-57" span x 38" rise CMP Arch culverts	Assumed proposed Hw/D=1.2 with headwall
90	19	Northhills Blvd	Culvert	n/a	n/a	67	n/a	213	n/a	3-57" span x 38" rise CMP Arch culverts	Assumed proposed Hw/D=1.2 with headwall
91	20	Terrace Dr/College Blvd	2-48"	CMP	0.8	103	Yes	314	No	Lower upstream channel invert 2.5 ft, 3-57" span x 38" rise CMP Arch culverts	Assumed proposed Hw/D=1.7 with headwall
92	13	Terrace Dr/College Blvd	3-54"	CMP	1.4	715	No	2,744	No	Bridge	Culverts badly degraded with downstream end undermined and center FES missing
93	-	Lobo Canyon Rd	Storm Sewer System w/ Inlets	Smooth Interior Metal	n/a	-	n/a	-	n/a		
94	28	Grants Canyon Arroyo/Roosevelt Ave	4-8' x 6.5' CM Arch w/ Concrete Bottom	CMP/Concrete	n/a	883	Yes	3,215	No	Bridge	Downstream cutoff wall nearly undermined, downstream utility line exposed
95	-	Roosevelt Ave/Ash St	Concrete Swale	Concrete	n/a	-	n/a	-	n/a		
96	Basin 42*	Sage St/Jackson Ave	Area Inlet and Storm Sewer	n/a	n/a	23	n/a	73	n/a		
97	Basin 41*	Jefferson Ave/Washington Ave	Trench Drain	Steel	n/a	35	n/a	86	n/a		
98	Basin 41*	Washington Ave/Jefferson Ave	Inlet w/ 24" Storm Sewer	RCP	1.2	35	No	86	No		
99	39	Grants Canyon Arroyo/Washington Ave	4-9' x 7' CM Arch w/ Concrete Bottom Area Inlets and Storm Sewer from Sage St	CMP/Concrete	n/a	885	Yes	3,225	No	Bridge	Some deterioration mostly at the upstream end, some of the approach slab is worn away, some corrosion in arches, concrete base in some cells degraded, channel bed, ~1.5' to 2 ' below outlet invert
100	97	Rio San Jose/Nimitz Dr	Bridge	Concrete	n/a	1,236	Yes	3,603	No	Expand existing bridge opening	High potential for flow to be trapped behind levee and cross Nimitz
101	40*	Mt Taylor Dr/Mesa Blvd	12' x 1' Channel	Concrete	n/a	70	Yes	200	No		
102	16	Sakelares Blvd/George Hanosh Blvd	8-42" x 29" Arch	CMP	1.2	446	No	1,328	No		Upstream ends of several culverts need debris and vegetation removed
103	16*	George Hanosh Blvd/Sakelares Blvd	2-24"	CMP	1.0	446	No	1,328	No		
104	16*	George Hanosh Blvd/Redondo Ln	2-24"	CMP	2.0	446	No	1,328	No		
105	98	Rio San Jose/George Hanosh Blvd	3-72"	CMP	n/a	1,247	No	3,626	No	Bridge	Southwest culvert badly rusted on along invert and side
106	99	Rio San Jose/McBride Rd	4-10' x 8' CBC	Concrete	n/a	1,495	Yes	4,541	No	Add 3-10' span x 8' rise CBC cells	
107	100	Rio San Jose/RR	Bridge	n/a	n/a	1,484	Yes	4,470	Yes	Expand existing bridge opening	
108	5	McBride Rd/Michael St	Culvert	n/a	n/a	418	n/a	1,417	n/a		
109	5	McBride Rd/Glynn St	Culvert	n/a	n/a	418	n/a	1,417	n/a		
110	3	George Hanosh Blvd/Golf Course	2-48"	CMP	2.3	178	Yes	584	No	2-72" CMP culverts	Assumed proposed Hw/D= 1.5 with end projecting
111	-	Ice Caves Rd/Rodeo Ground Rd	Culvert	n/a	n/a	n/a	n/a	n/a	n/a		

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