FINAL DRAINAGE REPORT

SANTAN FREEWAY (SR 202L)

Elliot Road to Baseline Road

(Appendices A – D)

ADOT Contract No. 02-34

ADOT TRACS No. 202L MA 031 H5915 01 C

April 2003

Prepared for:

Arizona Department of Transportation

REGISTERED PROFESSIONAL ENGINEER (CIVIL)
CERTIFICATE NO.
26313
CHRISTOPHER
D'ARCANGELIS
Date Signed 4-29-03
ARIZONA, U.S.A.

Prepared by:

Stanley Consultants INC.

Table of Contents

Property of
Flood Control District of MC Library
Please Return to
2801 W. Durango
Phoenix, AZ 85009

List of Symbols and Abbreviations iii

I. INTRODUCTION 1

A. PROJECT LOCATION & DESCRIPTION 1
B. DRAINAGE PLANS 2

II. OFF-SITE HYDROLOGY 5

A. GENERAL 5
B. OFF-SITE WATERSHED CHARACTERISTICS 5
1. Existing Drainage Facilities 5
C. OFF-SITE HYDROLOGIC ANALYSES 6
1. Existing Off-Site Hydrologic Analyses 6
2. Methodology of Hydrologic Modeling 6
3. Analytical Assumptions 7
D. SUMMARY OF MODELING RESULTS 8

III. OFF-SITE DRAINAGE 8

A. GENERAL 8
B. DESIGN CRITERIA 9
1. Cross-Section 9
a) Side Slopes (maximum) 9
b) Bottom Width 9
c) Cross-Slope 9
2. Profile 9
3. Alignment 9
4. Transitions 9
5. Hydraulic Analysis 10
a) Flow Regime 10
b) Manning's "n" value 10
c) Energy Loss Coefficients 10
6. Flow Depth 10
7. Freeboard 10
8. Superelevation 10
9. Energy Dissipaters 10
10. Maintenance Access 11
C. DESIGN DISCHARGES 11
D. HYDRAULIC ANALYSES 11
E. OFF-SITE SYSTEM DESIGN DISCUSSION 12

IV. ON-SITE DRAINAGE 14

A. EXISTING CONDITIONS 14
B. DESIGN CRITERIA 14
1. Catch Basin Design 14
2. Storm Drain Design 15

REGISTERED PROFESSIONAL ENGINEER (CIVIL)
CERTIFICATE NO. 26313
CHRISTOPHER D'ARCANGELIS
Date Signed 4-29-03
ARIZONA, U.S.A.

C. PROPOSED DRAINAGE AND ROADWAY IMPROVEMENTS 16

V. PUMP STATION DESIGN 17

A. OVERVIEW & DISCUSSION 17
B. STORAGE 18
C. ENGINE WARM-UP CYCLE AND SEQUENCING 18
D. DISCHARGE BOX (WEIR) 19
E. SYSTEM LOSSES 19
F. ROUTING METHODOLOGY 20
G. RESULTS 21

VI. SUMMARY 22

VII. REFERENCES 25

List of Figures

Figure 1 Vicinity Map 3

Figure 2 Location Map 4

List of Tables

Table 1 Off-site Peak Discharge Values 8

Table 2 HEC-RAS Flow Change Locations 11

Appendices

APPENDIX A HECRAS & SPILLWAY ANALYSIS

APPENDIX B EAST CHANNEL PLANS

APPENDIX C CATCH BASIN SUMMARY

APPENDIX D STORMCAD MODELS

APPENDIX E INLET CALCULATIONS (HEC 22)

APPENDIX F DRAINAGE PLANS AND ROADWAY TYPICAL SECTIONS

APPENDIX G PUMP STATION CALCULATIONS

APPENDIX H PUMP STATION HYDROGRAPH ROUTING ANALYSIS

REGISTERED PROFESSIONAL ENGINEER (CIVIL)
CERTIFICATE NO.
26313
CHRISTOPHER D'ARCANGELISO
Date Signed 4-29-03
ARIZONA, U.S.A.

List of Symbols and Abbreviations

BHP -Break Horse Power
CA -Rational C x Rational Area in acres
CFS -Cubic Feet per Second
D -Diameter of Pipe
DIP -Ductile Iron Pipe
ΔS -Change in Storage
ΔT -Change in Time
ε -Relative Roughness
e -Absolute Roughness
f -Darcy-Weisbach friction factor
γ -Specific weight
GPM -Gallons per Minute
HP -Horse Power
FCDMC -Flood Control District Maricopa County
I -Rational Intensity (in/hr)
In -Inflow at time step n
K -Loss coefficient
L -Pipe Length
ν -Kinematic Viscosity of Water
MAG -Maricopa Association of Governments
O_n -Outflow at time step n
Re -Reynolds number
RPM -Revolutions per Minute
SCS -Soil Conservation Service
Sp. Gr. -Specific Gravity
SPRR -Southern Pacific Rail Road
TDH -Total Dynamic Head
T.I -Traffic Interchange

I. INTRODUCTION

The Santan Freeway (202L) is part of the Maricopa Association of Governments (MAG) Regional Freeway System and will connect Interstate 10 (1-10) to the Superstition Freeway (US 60) through the east valley. The completed freeway will serve the cities of Phoenix (COP), Chandler (COC) and Mesa (COM), the town of Gilbert (TOG), the Gila River Indian Community (GRIC), and unincorporated portions of Maricopa County. This 2.2-mile segment encompasses the portion of the Santan Freeway from Elliot Road to Baseline Road.

A. PROJECT LOCATION & DESCRIPTION

This segment of the Santan Freeway, extending from Elliot Road to Baseline Road, is located within the City of Mesa in Maricopa County, Arizona. A project Vicinity Map is provided as Figure 1 and a project Location Map is provided as Figure 2.

This freeway segment begins just south of Elliot Road and extends north and ends just north of Baseline Road. The 202L freeway mainline will consist of nine basic through lanes, five westbound and four eastbound, separated by cable barrier and an open median. Additional lanes will be added to support the lane requirements approaching and departing the 202L/US60 System Traffic Interchange. The open median will be designed to accommodate a future HOV lane in each direction, and a possible future HOV directional ramp connection between the 202L (south of US60) and US60 (east of the 202L). Auxiliary lanes will be provided in both directions of travel between the Elliot Road and Guadalupe Road traffic interchange.

The Santan Freeway mainline profile will be elevated over Elliot Road, transition to a depressed freeway at Guadalupe Road and back to an elevated freeway at Baseline Road.

A diamond traffic interchange will be provided at Elliot Road, with the north ramps constructed with this project. A diamond traffic interchange will also be constructed at Guadalupe Road. Elliot and Guadalupe Roads will be improved by the City of Mesa to provide a seven-lane urban arterial street, and to match the interchange geometries and turning lanes necessary to satisfy traffic operational requirements.

A half-diamond traffic interchange will be provided at Baseline Road (south side). Baseline Road will also be widened to match the interchange geometries, and to provide the turning lanes necessary to satisfy traffic operational requirements.

The bridges included with this project are the Elliot Road Traffic Interchange Overpass, the Guadalupe Road Traffic Interchange Underpass, and the 202L and directional ramp structures over Baseline Road. Sound walls will be required for the residential developments, with retaining walls also required at several locations within the project limits.

Off-site drainage flows will be collected between Baseline Road and Elliot Road in a channel located along the east side of the freeway. The concrete lined trapezoidal channel will begin at approximately 600 feet north of Baseline Road and extend downstream to the south, approximately 1000 feet south of Elliot Road. In subsequent sections of the report, as well as in the plans, this channel shall be referred to as the East Channel. Storm runoff will be conveyed southward, while combining on-site flows with discharges from subdivisions and other natural tributaries.

The on-site drainage system includes catch basins and pipes collecting and conveying the majority of the on-site runoff to the East Channel. In locations where a gravity flow outlet cannot be achieved due to the freeway being depressed, on-site runoff will be collected and conveyed to a pump station immediately south of Guadalupe Road on the east side of the freeway. This pump station will pump the on-site runoff into the East Channel and is ultimately conveyed to the East Maricopa Floodway (EMF).

B. DRAINAGE PLANS

The Stage IV (95%) Drainage Plans for the Santan Freeway segment from Elliot Road to Baseline Road are presented in Appendix F. These plans include the on-site drainage improvements recommended for this section of the Santan Freeway. East channel plans can be found in Appendix B and relevant excerpts from the pump station plans can be found in Appendix I.

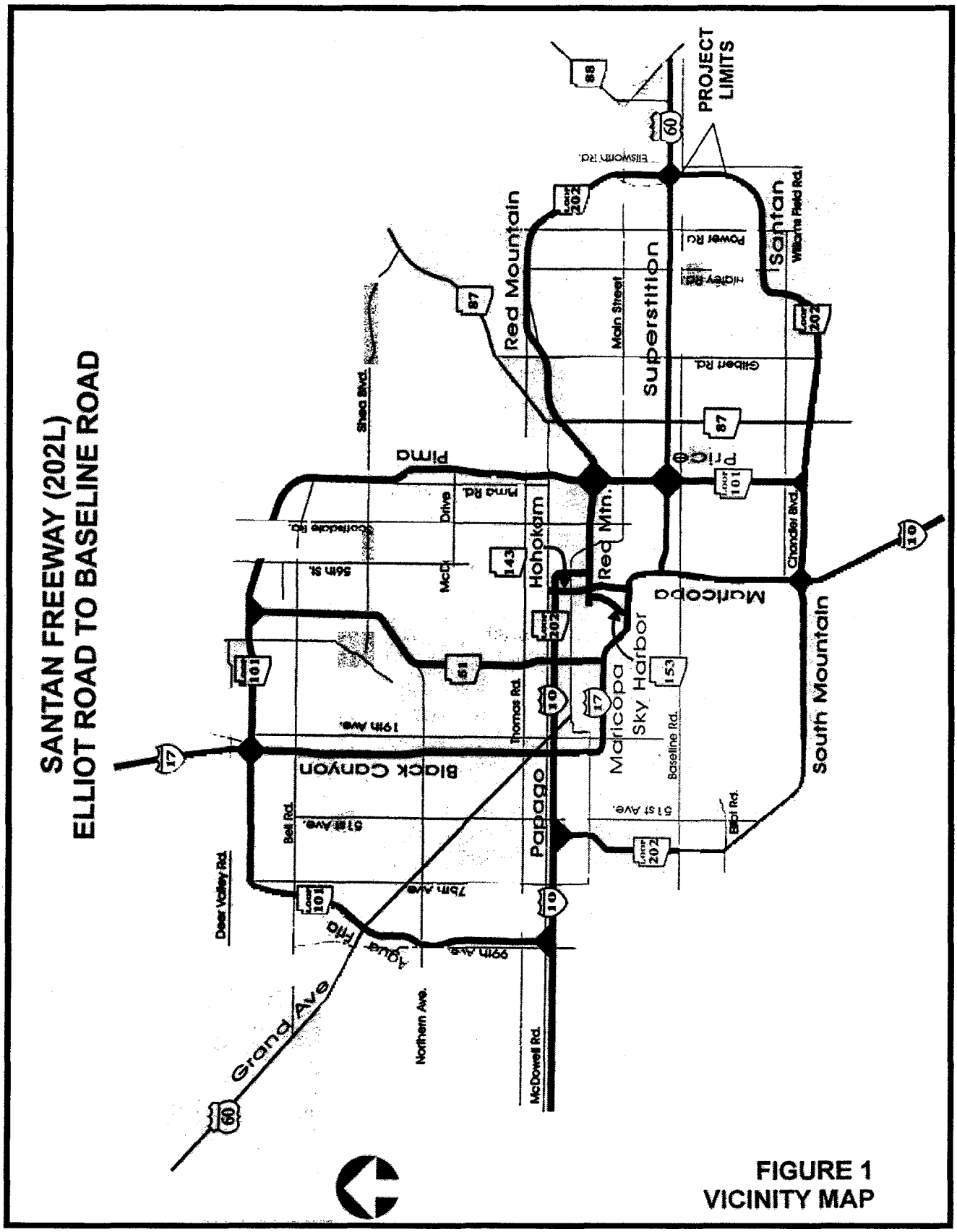


FIGURE 1
VICINITY MAP

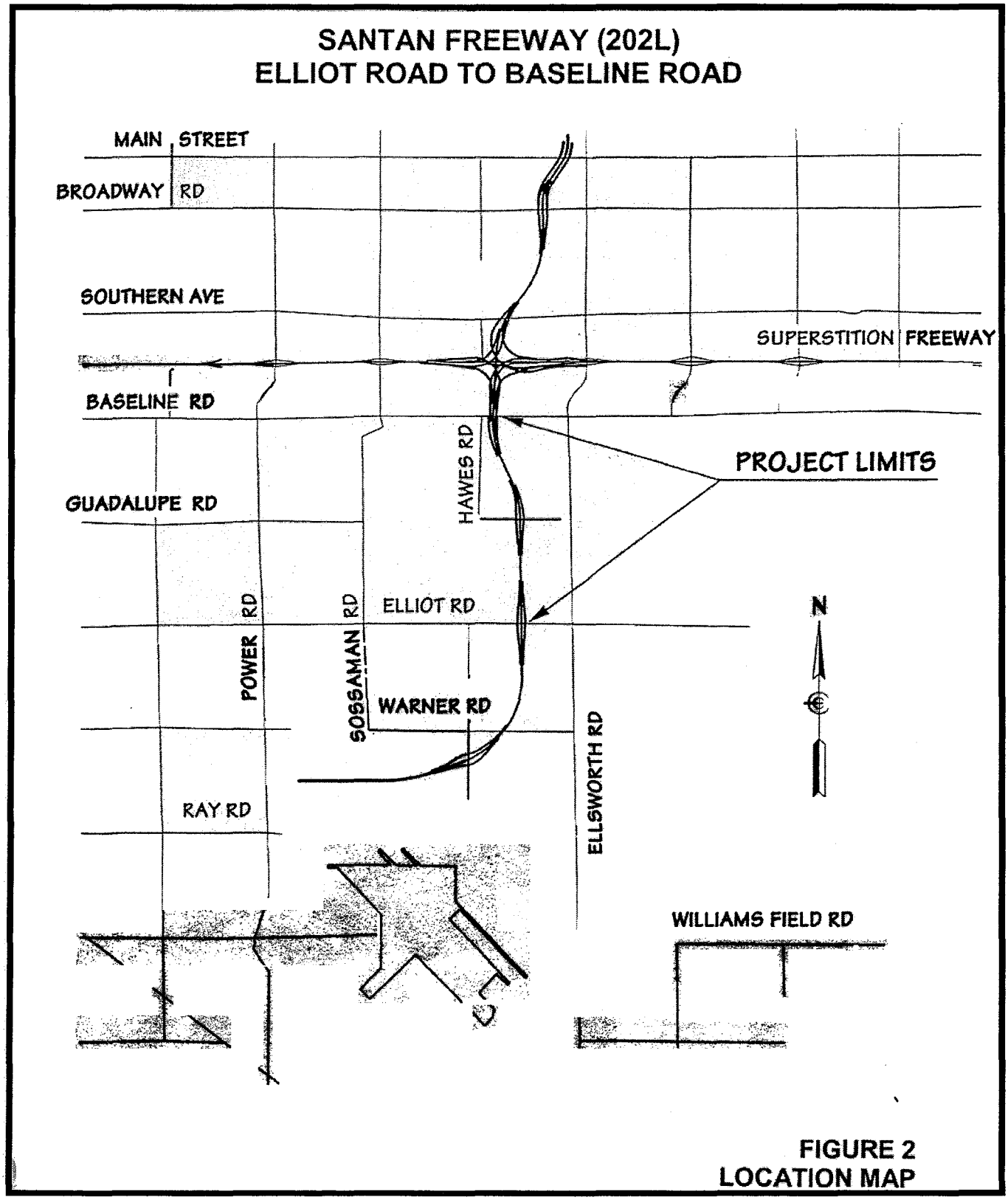


FIGURE 2
LOCATION MAP

II. OFF-SITE HYDROLOGY

This portion of the report presents the off-site hydrology for those watersheds bisected by the Santan Freeway (202L) corridor between Elliot and Baseline Roads.

A. GENERAL

Following the DMJM 30% submittal the Flood Control District of Maricopa County (FCDMC) provided an update to the East Mesa Area Drainage Master Plan (EMADMP) HEC-1 model. The updated EMADMP HEC-1 model reflects recent changes in land use. Wood/Patel and Associates subsequently contracted with DMJM to update the planned Elliot Road detention basin & outfall channel from just south of Elliot road to the EMF. The purpose of this modification was to optimize the design of the channel for a single detention basin concept. As part of this update Wood/Patel made additional modifications to the EMADMP HEC-1 model.

The current EMADMP HEC-1 model results in lower off-site discharges at the beginning of the East Channel and increased discharges at the end of the East Channel along the section of freeway between Elliot Rd. and Baseline Rd.

B. OFF-SITE WATERSHED CHARACTERISTICS

The off-site drainage watershed characteristics are described in terms of existing and future land uses as well as the various stormwater management facilities that either exist today or are planned in the future.

The total off-site drainage area contributing to this segment of the Santan Freeway is approximately 6.5 square miles at Elliot Road. The off-site drainage area east of the freeway alignment consists of residential development and natural desert. The off-site drainage area contributing to the East Channel within the project limits was increased from the original model to include diversions from the area east of Ellsworth Road.

Land use types and densities vary widely within the project area with a considerable number of small-lot and medium density residential land uses, mobile home parks, and retirement communities. Many vacant properties are planned for commercial or residential development in the future. Along the 202L corridor, several residential developments are located adjacent to or within the project area that will be impacted. Many of the vacant properties within the 202L corridor have been, or are in the process of being acquired by ADOT for the freeway construction.

The flow gradients of the contributing watershed includes very mild to flat slopes. Direction of runoff is generally from northeast to southwest. Within developed areas, most of the stormwater runoff is collected in residential streets and routed to existing storm drains, curb outlets and retention basins. All of the residential and roadway drainage facilities along the east side of the freeway corridor are planned to connect and drain into the East Channel via spillways and storm drain pipes.

1. Existing Drainage Facilities

The Drainage Report accompanying the 202L/US60 Traffic Interchange Design Concept Report found the current regional drainage systems can be divided into three hydrologically significant sub-

areas or regions: the Northwest, Northeast and Southeast Regions. These regions were segregated primarily based upon each having different and distinct outfall locations and as segregated by the various freeway corridors. This study shall focus only on the Southeast Region.

Off-site and on-site drainage along Baseline, Guadalupe and Elliot Roads is currently conveyed to the west. After completion of the 202L Freeway, the new western drainage boundary will be adjusted to the 202L west right-of-way limit.

An existing storm drain system is located along Baseline Road, which collects and conveys flows from east to west. As documented in the as-built construction drawings, the storm drain trunk line is a 36-inch diameter RCP located at the eastern right-of-way line of the 202L that increases to a 42-inch diameter pipe approximately 600 feet to the west. Another existing storm drain system, a 42-inch diameter RCP, is located in Guadalupe Road and conveys flows from east to west.

The majority of the residential areas within the study watershed include some on-site retention. From 1973 through 1987, the City of Mesa drainage ordinances required newly developed parcels to provide retention volume for the 50-year, 24-hour storm event. In 1987 the drainage ordinance was modified to require retention volume for the 100-year, 2-hour storm event.

C. OFF-SITE HYDROLOGIC ANALYSES

1. Existing Off-Site Hydrologic Analyses

The East Mesa Area Drainage Master Plan (EMADMP) was completed by the Flood Control District of Maricopa County (FCDMC) in 1998. This study incorporated many of the existing drainage facilities in the east Mesa area, along with the existing US60 off-site drainage facilities. An associated EMADMP Recommended Design Report identified various stormwater management facilities for implementation in this watershed. A preliminarily design was completed for these drainage facilities based on hydrology assuming an ultimate "build-out" land use condition. However, the study overlooked the impact of the 202L freeway construction within the study area, since the 202L was not funded at the time of the report.

As mentioned previously, Wood/Patel modified (September 2002) the existing HEC-1 model incorporating the latest Santan Freeway design concept and revising land-use types in the sub-basins. This model was used as the basis for design storm flows into the East Channel.

2. Methodology of Hydrologic Modeling

The general hydrologic criteria used for this study remains the same as the previous hydrologic modeling performed as part of the East Mesa Area Drainage Master Plan. The off-site hydrologic analysis for the Santan Freeway was performed according to procedures outlined in the Flood Control District of Maricopa County's (FCDMC) Drainage Design Manual for Maricopa County, Arizona, Volume / Hydrology, June 1992 (revised January 1995) and the ADOT's Highway Drainage Design Manual, Hydrology, August 1993, when appropriate.

The hydrologic models used in this study were developed using the U.S. Army Corps of Engineers' HEC-1 flood hydrograph package. The models were prepared in accordance with the methodology presented in the "Drainage Design Manual for Maricopa County, Arizona, Volume 1, Hydrology". The 100-year, 24-hour precipitation data was based upon the "Precipitation Frequency Atlas for Arizona" (NOAA, 1973). The rainfall was applied uniformly for critically centering over the

watersheds with depth-area reduction factors based upon Maricopa County methodology. Runoff parameters were based on soil data from the "Soil survey of Eastern Maricopa and Northern Pinal Counties Areas, Arizona" (USDA, 1974) and Maricopa County soils maps. The different land uses for the year 2002 and future conditions (build-out) models were assigned as they are planned according to Maricopa County and local municipalities.

As outlined in the Maricopa County Hydrology Manual, the Green and Ampt methodology was used to determine the rainfall losses and the S-Graph methodology was used for hydrograph generation. The Muskingum or normal-depth routing procedure was used for the majority of the sub-basin hydrograph routings.

3. Analytical Assumptions

As a result of several coordination meetings with ADOT, FCDMC, and the City of Mesa, agreement was reached regarding the level of development and the regional drainage facilities that will be constructed prior to the completion of the 202L. The FCDMC provided hydrologic models that included the incorporated developments and regional drainage capital improvement projects (CIP) proposed to be built by the year 2002. These hydrologic models were prepared as part of FCDMC's Preliminary East Maricopa Floodway Capacity Mitigation and Multi-Use Corridor Study. The 30% Drainage Report used these hydrologic models and represented them as "baseline condition". They are referred to as the baseline hydrologic models.

For this project's hydrologic models, further updates to the baseline hydrologic models (since the 202LUS60 TI DCR) were needed for the southeast region. Wood, Patel & Associates made modifications to the baseline model and developed a hydrologic model for the existing condition, this model has been used for the 95% East Channel design.

Because a portion of the Santan Freeway is depressed north and south of Guadalupe Road, a pump station is proposed to lift on-site runoff into the East Channel. The pump station inflow hydrograph was developed using on-site rational method calculations coupled with an SCS unit hydrograph. As a part of the pump station design, which will be discussed in greater detail in Section V, an outflow hydrograph was input into the interim hydrologic model (interim2.dat). Due to the timing of the two hydrograph peaks, as well as the difference in relative magnitudes, there appears to be a negligible effect on the East Channel design peak flow rates.

Additional modifications were made to the updated hydrologic models to reflect construction anticipated to occur by the time of freeway construction. Channel routing elements from Baseline Road south along the 202L were modified to depict the concrete lining of the East Channel instead of those used previously.

Between the 30% and the 60% design stages, the regional detention basin proposed near Ellsworth and Elliot Roads was eliminated. During this period the off-site drainage system included only one detention basin located at Warner Road. The hydrology was updated by Wood/Patel to account for these modifications. This 100-year 24-hour model is named Exist1_S.dat. It also incorporates updated land-use from 2001 aerial photos.

Recent developments indicate the regional detention basin near Ellsworth and Elliot Roads is now back on the plans for construction by the FCDMC. Development of the 95% channel plans is based on the two detention basin HEC-1 model.

D. SUMMARY OF MODELING RESULTS

A summary of the off-site peak discharges for the various concentration points throughout the project is presented in Table 1.

Table 1 Off-site Peak Discharge Values

Conc. Point	Description of Concentration Point	Q100
62A	Sub-basin contributing to SR202L and Baseline Road	230
C62C	Conc. point at SR202L and Guadalupe Road	681
CP62E	About 1,800 feet south of Guadalupe Road.	789
CP68A	Conc. point at SR202L and Elliot Road	1468

The peak flows presented in Table 1 reflect reasonable estimates of off-site flows to be conveyed in the East Channel.

III. OFF-SITE DRAINAGE

A. GENERAL

The purpose of the off-site drainage system is to protect the freeway from the stormwater generated by the contributing watershed adjacent to the freeway. The contributing stormwater will be intercepted and conveyed along the east side of the freeway in a concrete lined channel referred to as the East Channel. The East Channel has been sized to intercept runoff from adjacent subdivision storm drain laterals, the arterial roadway storm drain systems, the 202L on-site storm drain systems, and sheet flow from areas immediately adjacent to the freeway.

B. DESIGN CRITERIA

The design criteria summarized below will be applied to the off-site channel design. The majority of the criteria outlined below are found in the ADOT Roadway Design Guidelines (RDG), May 1996. Additional design criteria were taken from the Flood Control District of Maricopa County's (FCDMC) Drainage Design Manual for Maricopa County, Arizona, Volume II Hydraulics, November 1991 (revised January 1996).

1. Cross-Section

a) Side Slopes (maximum)

- Aggregate and unlined channels - 3:1 (H:V).
- Channels adjacent to a roadway without barrier protection - 4:1 (H:V).
- Concrete lined channels - 2:1 (H:V).

b) Bottom Width

- Channels adjacent to a roadway without barrier protection - 8 feet preferred minimum and 4 feet absolute minimum.
- Concrete lined channels 8 feet minimum.

c) Cross-Slope

- 2% cross-slope to one side with a 1-foot maximum drop across the total channel bottom width. The channel profile grade line will be defined as the low edge of the channel bottom.

2. Profile

- Earth and grass lined channels - minimum grade of 0.20%.
- Smooth paved channels (concrete lined) - preferred minimum grade of 0. 1 0%.

3. Alignment

- Horizontal and vertical channel alignments are independent of the freeway.

4. Transitions

- Vertical wall transitions are proposed for transitions into and out of reinforced concrete box culverts for this segment of the Santan Freeway. Pipe culverts will not use vertical wall transitions.
- Transitions between channel sections to accommodate increased peak discharges will be developed based on criteria presented in Table 608.3 of the RDG.

5. Hydraulic Analysis

a) Flow Regime

- Channel designed to convey flows in the subcritical flow regime should maintain Froude numbers less than 0.86.
- Channels to be designed to convey flows in the supercritical flow regime should maintain a Froude Number between 1.13 and 2.0. Exceptions are allowed at drop structures and at designated locations where controlled hydraulic jumps occur.

b) Manning's "n" value

- Earth channel: 0.020 to 0.025
- Concrete lined channel: 0.013 to 0.018
- Concrete lined channel with roughened surface: 0.023

Note: The 95% hydraulic analysis used Manning's "n" values of 0.016 for concrete line channels and 0.013 for box culverts.

c) Energy Loss Coefficients

- Vertical wall transition at culverts:

  Expansion - 0.30, Contraction - 0.10

6. Flow Depth

- Channel flow depth shall be limited to preclude saturation of the roadway pavement structural section.

7. Freeboard

- Water surface elevation below natural ground: 100-year discharge contained.

8. Superelevation

- Based on the equation presented in Section 608.5 of the RDG.
- The RDG equation computes the total rise in water surface due to Superelevation and standing waves. If the rise is less than one-half foot, the normally determined channel freeboard should be adequate and no special treatment such as increased wall heights or invert banking will be required.

9. Energy Dissipaters

- Energy dissipaters will be designed in accordance with FHWA HEC No. 14 Hydraulic Design of Energy Dissipaters for Culverts and Channels or the USBR Hydraulic Design of Stilling Basins and Energy Dissipaters.

10. Maintenance Access

- As a minimum, one continuous 12-foot wide maintenance access road is required along the off-site drainage channel system. Adjacent roadside ditches that convey small amounts of runoff will not require construction of maintenance roads.

C. DESIGN DISCHARGES

The following table was compiled to document the prorated flow changes along the east channel as modeled in the HEC-RAS hydraulic analysis.

Table 2 HEC-RAS Flow Change Locations

Station to	Station	100-Year Flow Rate (cfs)
115+00	134+00	1,468
134+00	140+00	1,370
140+00	160+00	1,271
160+00	179+02.66	976
179+02.66	192+00	681
192+00	206+00	569
206+00	220+00	456
220+00	233+94.82	342
233+94.82	239+00	230

D. HYDRAULIC ANALYSES

A hydraulic model was developed for the proposed off-site channel using the U.S. Army Corps of Engineers HEC-RAS computer program (Version 3.0.1). The design profile was run with the Wood/Patel new existing condition design flows. The HEC-RAS report and summary output are contained in Appendix A.

The hydraulic model was run in a mixed flow condition that includes both subcritical and supercritical flow regimes. As shown on the summary output in Appendix A, hydraulic jumps occur at several planned locations along the channel. Hydraulic jumps are contained within the channel lining.

E. OFF-SITE SYSTEM DESIGN DISCUSSION

Off-site storm water improvements within the region southeast of the 202L/US60 Traffic Interchange generally address the collection and conveyance of off-site runoff generated east of the Santan Freeway (202L) which flows in a southwesterly direction toward the freeway. The drainage system identified in the 1995 DCR was a "pass-through" type of drainage system. Since the parts of the 202L freeway profile are depressed the original concept was rendered unfeasible and requires the construction of a channel along the east side of 202L.

Michael Baker Jr. Inc. is currently under contract with ADOT to design the regional East Channel between Elliot Road and Power Road. This drainage channel will be designed to convey off-site flows collected at the Santan Freeway which discharge to the East Maricopa Floodway. Due to right-of-way limitations and a fairly steep grade, the focus of the East Channel has been on a concrete lined channel concept. Refer to Appendix B for the 95% East Channel Plans for this portion of the Santan Freeway.

The proposed concrete channel for this project extends approximately 600 feet north of Baseline Road centerline. This channel is sized with an 8 to 14-foot bottom width, side slopes of 2H:IV, and a 5 to 11-foot depth.

At Baseline Road, the 202L passes over the crossroad and a new 8' x 6' RCB culvert is proposed under Baseline Road to convey the East Channel flow (342 cfs) to the south. Vertical wall transitions will be used from the upstream and downstream ends of the box culvert to the channel. A 36-inch diameter storm drain, that conveys flows from east to west along Baseline Road, will connect into the box culvert.

As the channel continues south of Baseline Road, it will transition into a concrete lined channel having an 8 foot bottom width, 2H: I V side slopes, a longitudinal slope that varies from about 0.22% to 0.38% with an approximate depth varying from 5 to 8 feet. The channel is generally in a subcritical flow regime between Baseline and Guadalupe Roads. Modifications to the 60% vertical alignment were made in order to provide adequate clearance between the channel bottom and the 15" sanitary sewer crossing at about Station 205+80 (1/2 mile south of Baseline Road).

Between Baseline Road and Guadalupe Road, recent construction activity has occurred east of the 202L's eastern right-of-way to modify the Barrington subdivision's drainage systems. Subdivision grading and wall construction has also occurred. At several locations existing outfall storm drain pipes from these subdivisions will connect to the channel system. There is also surface flow that will be conveyed to the channel via concrete spillways.

At Guadalupe Road, a triple 8'x 6' RCB culvert is proposed to convey the channel flows (976 cfs) under the roadway and to the south. An existing 42-inch diameter storm drain that conveys flows from east to west along Guadalupe Road is shown as being approximately 13 feet deep based on available as-built drawings and survey data. Because this section of the 202L freeway is depressed and gravity flow to the channel is not possible at this location, several alternatives were evaluated, (by the general consultant DMJM), as to how to accommodate this runoff. One alternative considered was to deepen the box culvert and downstream channel. This would require construction of a rectangular concrete lined channel for a significant length due to right-of-way limitations. Another alternative was to direct the Guadalupe Road storm drain into the new pump station located immediately south of Guadalupe Road to lift on-site runoff to the off-site channel. The third alternative, which was considered the most feasible, is to extend the storm drain southward at a minimal slope until it can daylight to the concrete lined channel.

It is proposed that the extended storm drain be located between the concrete channel and the 202L since a sanitary sewer outfall is planned to be relocated between the East Channel and the eastern right-of- way line.

South of the Guadalupe Road culvert crossing and the downstream channel transition, the concrete lined channel continues to flow southward and matches adjoining ground slopes.

Of note is a wash that crosses (from east to west) the freeway corridor at about 1/3 of a mile north of Elliot Road. This wash has been designated a jurisdictional waters of the U.S. Early in the design process the possibility of a pass-through system for this wash was planned. Stanley Consultants has been closely monitoring the permit process by keeping in frequent contact with Wood/Patel & Associates whom are coordinating the 404 permit with the U.S. Army Corps of Engineers. Currently it appears that a pass-through system will not be required at this location.

At Elliot Road, a triple 8' x 7' RCB culvert is proposed to convey the channel flows (1,468 cfs) beneath Elliot Road. South of Elliot Road, the concrete lined channel has a bottom width of 14 feet, 2H:IV side slopes and a longitudinal slope of approximately 0.15%.

The Maricopa County Department of Transportation (MCDOT) is planning to construct a storm drain along Elliot Road from Ellsworth Road to the East Channel. Provisions have been made in the design to accommodate a storm drain system connection to the East Channel.

As previously mentioned Michael Baker Jr. Inc. is currently under contract to design the next section of the Santan Freeway. This contract includes designing the portion of the East Channel from just south of Elliot Road to Power Road. At this time no hydraulic grade line information is available for this downstream section of channel. As this project proceeds forward additional information concerning the starting water surface elevation at the two projects interface should be made available.

IV. ON-SITE DRAINAGE

A. Existing Conditions

The following paragraphs discuss the existing conditions of the three major arterials: Elliot Road, Guadalupe Road, and Baseline Road.

The existing Elliot Road typical section consists of one travel lane in each direction without curb and gutter. The existing roadway drains from east to west. A shallow roadside swale conveys runoff along the north side of the roadway until the swale's capacity is reached and the flow sheet flows across the roadway discharging to the southwest were the flow falls off the roadway and continues onto the natural terrain. Currently there are no storm drain improvements within the freeway corridor.

The Guadalupe Road existing typical section has 3 travel lanes for westbound traffic and one lane for eastbound traffic. The north side of Guadalupe Road incorporates curb and gutter, while the south side of the roadway has no curb and gutter. A raised landscaped median is constructed with left turn lanes located at required locations. Between Ellsworth Road and Sossaman Road an existing 36-inch storm increases to a 42-inch storm drain and runs along the north side of the road. The existing roadway drainage system intercepts the roadway runoff with catch basins and then discharges into the existing 42" storm drain along Guadalupe road.

Baseline Road currently has two travel lanes in each direction with curb and gutter along the north and south sides of the road. Within the freeway corridor, between Ellsworth Road and Sossaman Road an existing 42-inch storm drain runs along the north side of the road. The existing storm drain system intercepts the flow with catch basins and then discharge into the existing 42-inch storm drain.

B. Design Criteria

1. Catch Basin Design

The on-site drainage design criteria for the mainline and crossroads is based on ADOT's Highway drainage Design Manual-Hydrology (1993) and ADOT 's Roadway Design Guidelines (1996).

On-site runoff for the inlet design was estimated using the Rational Method. A site-specific Intensity Duration Frequency (IDF) curve was developed and used for the runoff calculations, refer to Appendix A. Rainfall runoff was calculated assuming a time of concentration of ten minutes for all the on-site sub-basins in the project. Sub-basin areas were delineated in CADD and documented in an excel spreadsheet. Runoff coefficients of 0.95 and 0.70 were used for paved and pervious areas respectively. See Appendix C, Table 3 for a summary of the discharges and associated Rational Method parameters.

Rational Method discharge calculations performed for the mainline portion of the freeway system were calculated based on the anticipated ultimate lane configuration. The anticipated ultimate condition was assumed to be a closed (paved) median with traffic separated by concrete median barrier. Catch basin inlets on this project may be classified into two groups, interim and ultimate. Catch basins located on the outside lanes of the freeway mainline are assumed to be in their ultimate location, while catch basins

located on the inside lanes can be removed and replaced by new ones in the future. Catch basin locations and storm drain alignments have been developed with consideration for the ultimate configuration and will be easily modified to the ultimate configuration in the future.

Catch basin inlets located in non-depressed locations were designed for the 10-year storm runoff. Inlets located in depressed sections of the corridor were designed for the 50-year storm runoff. Bypass flows from upstream catch basins were directly added to the subsequent down stream catch basin runoff calculations. In cases when a catch basin located on an elevated section contributed bypass flow to a downstream catch basin located in a depressed section the 50-year bypass flow was calculated and added to the downstream catch basin.

Inlet hydraulics were calculated using ADOT's computer program PDA1 which facilitates the standard pavement drainage methods and procedures outlined in FHWA Hydraulic Engineering Circular No. 22, Urban Drainage Design Manual (1996). Computer printouts for the individual catch basins can be found in Appendix E.

Roadway catch basins are located at all vertical sag low points and sized for 100 percent interception at acceptable depths and flow spread. Roadway catch basins located on grade are located to meet acceptable depths and flow spread, and are generally sized for 80 percent interception with 100 percent interception at critical locations. Roadway catch basins are also located upstream of points with zero percent superelevation, and at gore areas to prevent runoff from concentrating and crossing travel lanes. Inlet and catch basin efficiencies conform to ADOT standards and are indicated on the inlet program output.

Maximum roadway spread for the 10-year storm along the outside of the mainline sections included the shoulder and half the adjacent travel lane. Maximum roadway spread for the inside (high speed lane) was limited to only the shoulder. Maximum roadway spread for the 50-year storm included the shoulder and the adjacent travel lane. Maximum spread for the crossroads and ramps were designed to maintain a twelve-foot dry lane.

2. Storm Drain Design

Storm drain hydraulic grade lines (HGL) were computed using Hastead Method's StormCAD storm drain analysis and design program (Version 4.1.1). A site-specific Intensity Duration Frequency (IDF) curve was developed and input into the rainfall table in StormCAD. Refer to Appendix A, of this report to review the IDF curve. StormCAD calculates rainfall discharges based on the Rational Method. The contributing areas and runoff coefficients used for the inlet design were entered into the program.

There is a slight difference between the StormCAD discharge calculations and the runoff calculations presented for the inlet design. The reason for this is that the typical application of the rational equation assumes that the conversion from acre-inches per hour to cubic feet per second is 1.0000. This is the approach that was used to calculate the discharges for the purpose of inlet hydraulics. StormCAD calculates discharges using the actual conversion from acre-inches per hour to cubic feet per second, a factor of 1.0083.

The time of concentration to the first inlet was calculated for systems that have a flow time of more than ten minutes. For systems that have a flow time of less than ten minutes the time of concentration to the first inlet was assumed to be five minutes. Although the ADOT Rational Method does not account for times of concentration of less than ten minutes, this approach should not be used for storm drain hydrology. The reason for this is that if a storm drain calculation is based on an initial time of

concentration of ten minutes the rainfall intensity will begin to be reduced immediately downstream of the first inlet. This approach would lead to an artificially low discharge estimate.

Storm drain hydrology was calculated with the same contributing areas as delineated for the storm drain inlets. Bypass flows were not included in the storm drain analysis. All the runoff that discharges to an individual catch basin was input into the storm drain at the inlet location. This assumption will result in a slightly conservative storm drain design, and eases the calculation and review processes. This assumption is based on the concept that the first inlet in a storm drain system will have a bypass flow. By assuming no bypass flows for the storm drain analysis, a slightly larger discharge will be designed into the system than if bypass flows were accounted for in the analysis.

All storm drains are a minimum of 24 inches in diameter unless a special case prohibits their use and then 18-inch diameter pipes are used. For storm drains that discharge to the pump station the HGL is designed to be a minimum of 6 inches below the inlet grate elevation for the 50-year design storm. For storm drain systems that tie into the off-site collector channel the hydraulic grade line was designed to be below the inlet grate elevation for the 100-year HGL in the channel.

Friction losses along with minor losses at manholes, junctions, catch basins and bends are calculated based on the HEC-22 energy loss methodology.

Storm drains 48" in diameter and less were assumed to be constructed utilizing Corrugated High Density Polyethylene Plastic Pipe (CHDPEPP), and a Manning coefficient of 0.012 was used. Storm drains larger than 48" were assumed to be constructed utilizing Reinforced Concrete Pipe (RCP), and a Manning coefficient of 0.013 was used.

C. Proposed Drainage And Roadway Improvements

On-site drainage facilities for the freeway corridor and crossroads include ADOT standard curb and gutter, grated catch basins, slotted drain, median catch basins, curb opening catch basins, storm drain pipe, pump station storage pipe, and the pump station. Elevated portions of the Santan freeway are designed to drain into the proposed east side channel. Depressed portions of the freeway drain to the sump located at Guadalupe Road. The Guadalupe sump will be drained utilizing a pump station. The proposed pump station will then outfall into the proposed East Channel.

The Santan Freeway corridor crosses three major arterials: Elliot Road, Guadalupe Road, and Baseline Road. The Santan Freeway profile through these sections is elevated at Elliot Road, depressed at Guadalupe road, and then elevated at Baseline road. Guadalupe and Baseline Roads have existing drainage systems that will be partially removed within the limits of the Santan mainline right-of-way. Rainfall runoff colleted from the existing storm drains east of the freeway improvements will be redirected into the east channel. The remaining existing storm drains in Baseline Road and Guadalupe Road will be utilized to drain portions of the proposed crossroad improvements.

The proposed Elliot Road profile falls from east to west with a sump located approximately at the freeway overpass. Off-ramps and on-ramps are located to the north and south side of Elliot Road and as a result those storm drain systems along these ramps tie into the proposed storm drain systems along Elliot Road. The proposed Elliot Road typical section consists of three 11-foot travel lanes and a 6-foot bike lane in each direction with two-turn lanes varying in width as they approach the on-ramps and off-ramps. The median width varies from 4 feet to 30 feet and the crossroad width from back of curb to back of curb varies between 95 feet to 131 feet. A 6-inch vertical curb will be used for the cross-roads throughout the corridor and the roadway cross slope varies between 1.5 to 2.0 percent. Refer to Appendix F for the roadway typical sections.

Because no existing storm drain system exists along Elliot Road, all new storm drain systems except for one, will drain into the proposed 3-8'x 7' RCBC located under Elliot Road. The storm drain system located at the west end of the corridor will discharge intercepted flows into a temporary retention basin that will run along the south side of Elliot Road. This retention basin is approximately 450 feet in length and has an approximate volume of 770 cubic yards. The retention basin follows the existing terrain and slopes from east to west having a trapezoidal cross-section with a 4-foot bottom width and 3 to 1 (H:V) side slopes.

At present a wash crosses Elliot Road about 300 feet east of the proposed 3 – 8' X 7' RCBC. Flows from this wash will be intercepted by a drop inlet positioned on the north side of Elliot Road and conveyed west to the proposed box culvert by double 36 inch pipes.

The proposed Guadalupe Road profile typically falls from east to west with a sump located on the east side of the road. Off-ramps and on-ramps are located on the north and south sides of Guadalupe Road. The proposed typical sections consist of three 11-foot travel lanes, 6-foot bike lane in each direction with two-turn lanes varying in width as they approach the on-ramps and off-ramps and a right turn lane approaching the on-ramps. The median width varies from 4 feet to 26 feet and the crossroad width from back of curb to back of curb varies between 98 feet to 137 feet.

The Santan Freeway crosses under Guadalupe Road, which requires the relocation of an existing 42-inch storm drain. This relocation will require the existing storm drain to be routed along the west side of the East Channel until it matches the invert where it will then tie into the channel. Storm drain systems to the west of the Guadalupe Bridge will discharge into the existing storm drain and continue west. The proposed storm drain improvements on the east side will be routed to the proposed box culvert under Guadalupe Road.

The Santan Freeway crosses over the proposed Baseline Road profile that falls from east to west. The off-ramp and on-ramp (ramps A & B) are constructed on the south side of Baseline Road. The storm drain systems for these ramps will discharge into the proposed East Channel. The storm drain system for Ramp W-S (in the northwest quadrant), will connect to the Baseline Road storm drain. The proposed typical sections consist of three 11-foot travel lanes, 6-foot bike lane in each direction with two-turn lanes varying in width as they approach the on ramps. The median width varies from 8 feet to 30 feet and the crossroad width from back of curb to back of curb varies between 95 feet to 120 feet.

The crossroads: Elliot, Guadalupe and Baseline, all slope from east to west as they cross the Santan freeway corridor. Off-site flows for large storm events are currently being conveyed by these roads westward. Catch basins along the east side of the freeway on these crossroads were positioned based on the 10-year storm event. Curb inlet openings were designed by intercepting flow for the full curb height depth to prevent large flows from crossing to the west. Additionally if flow depth were to rise above the curb height it is likely that most flows will spill into the East Channel.

V. PUMP STATION DESIGN

A. OVERVIEW & DISCUSSION

The proposed pump station will be located at the southeast corner of the SR 202L freeway and Guadalupe Road. The pump station will handle on-site flows for the depressed portion of SR 202L from approximately 1/2 mile north to 1/2 mile south of Guadalupe Road (Station 3198+50 to Station 3252+00).

The pump station structure, number of pumps and pump sizes are based on typical ADOT configurations. The recommended configuration has been used as the design basis for other ADOT pump stations in the metropolitan Phoenix area (I-10/SR 202L System Traffic Interchange, Phase II).

The pump station will consist of four levels with the engine room at ground level and the wet well at the lowest level. Storm water from the wet well will be pumped an approximate height of 43 feet through three 30-inch diameter pipes to a discharge box. Storm water will be conveyed from the discharge box to the concrete lined trapezoidal East Channel via a 72-inch diameter pipe.

The pump station will be comprised of three main pumps designed to pump the inflow hydrograph associated with the 50-year design storm event. The main pumps are mixed flow pumps that have a pump capacity of 24,000 GPM (52.48 cfs) at 880 RPM. Natural gas fueled engines will drive the main pumps, which have no back-up units.

A relatively smaller 10-inch diameter submersible pump will be used to pump nuisance flows associated with small storm events or the remaining storm water volume after a larger storm event has occurred. The submersible pump has a pumping capacity of approximately 2,200 GPM (4.90 cfs) at a speed of about 1,170 RPM. Power for the submersible pump will be electric. This pump will be manually turned-on by ADOT personnel after a storm event has passed.

B. STORAGE

Storage in the pump station consists of two components - a 96-inch diameter storm drain inflow pipe and a wet well. By utilizing the inflow pipe as storage, the necessary wet well volume is reduced, which minimizes the overall cost of the pump station. In addition to increasing storage capacity, the oversized storm drain pipe minimizes pump cycling and allows more time for engine warm-up.

An iterative process between inflow, storage and outflow was utilized in order to estimate the length of storm drain necessary for storage. The estimated length of 96-inch diameter pipe necessary for storage is approximately 500 feet. However, additional storage pipe is recommended due to the lack of a redundant pump. The storage pipe "T" configuration depicted in the current 95% Drainage Reports will be utilized to account for a total of 882 feet of storage pipe. The stage-storage relationship for the 96-inch diameter storm drain was calculated using the five storage cases found in the FHWA CDS No. 5, Hydraulic Design of Stormwater Pumping Stations Using a Programmable Calculator, May 1982. Supporting calculations and documentation for the storage pipe is provided in Appendix H. The storage pipe plan and profile sheets are provided in Appendix F.

The wet well volume is based on the number, size and capacity of pumps and engines, as well as standard pump station configuration per current ADOT practice. The plan and elevation sheets depicting the pump station wet well are provided in Appendix I. The stage-storage relationship for the wet well is provided in Appendix H.

C. ENGINE WARM-UP CYCLE AND SEQUENCING

The three main pump engines require a 3-minute warm-up time before engaging the pumps. The warm-up cycle allows engine components to be brought up to operating temperature, which minimizes engine wear. This warm-up cycle is an input in the inflow/outflow portion of the Excel spreadsheet used to iterate between inflow, storage and outflow (see Appendix H). The warm-up time is entered into the

spreadsheet for each pump. The on-elevations for each pump are used to determine warm-up cycle starting points.

The sequencing of the pumps will be manual, i.e. the sequentially numbered 1 pump will remain the lead pump until manually reprogrammed. ADOT pump-house maintenance personnel prefer this procedure to automatic re-sequencing.

D. DISCHARGE BOX (Weir)

Three 30-inch diameter DIP discharge pipes from the mixed flow pumps, and a 12-inch diameter DIP discharge pipe from the submersible pump, carry flow to a discharge box located to the south of the pump station. A weir in the discharge box is used to prevent flow in the East Channel from backing-up into the discharge pipes. The top-of-weir elevation is set at 1407.4 feet.

Two possible conditions exist for a weir - an un-submerged weir or a submerged weir. An un-submerged weir condition occurs when a discharge over a weir is related to the head on the upstream side of the weir. A submerged weir condition occurs when a discharge over a weir is related to the head on the upstream and downstream side of the weir. The current 95% design system is based on un-submerged weir. The weir elevation was set to ensure that it would operate in a non-submerged weir condition and to avoid the 100-year HGL in the channel from backing up into the discharge side of the weir box.

E. SYSTEM LOSSES

Losses through a pump system are calculated to estimate the head a pump must generate in order to discharge the flow. Losses associated with the current pumping system include: expansion at the base of the pump column, pump column, long radius elbow, pipe fittings, discharge pipe, flap gate, and velocity head.

In addition to the losses through the pumping system, the static head must be overcome in order for the pumping system to work. The static head is the difference between the wet well water surface elevation (WSEL) and the WSEL at the point of discharge.

The losses through the pump system, combined with the static head, are the total dynamic head (TDH). TDH calculations are provided in Appendix H. The following is a break-down of the TDH for the main pump system:

Total Dynamic Head (TDH) = Static head + Velocity head + Friction Losses + Minor Losses.

Static Head = depth of water from the WSEL in the wet well to the WSEL over the weir.

Velocity Head = Outlet Loss = $\frac{V^2}{2g}$

Friction Losses are based on the Hazen and Williams empirical formula, supplied by the pump manufacturer:

$$- h_f = 0.002083L\left(\frac{100}{C}\right)^{1.85}\frac{gpm^{1.85}}{D^{4.8655}}$$

- L = length of pipe in feet,
- C = Constant for pipe material. It should be noted that the constant C is for an aged pipe (C = 140 for pump column; C = 100 for discharge pipe),
- gpm = gallons per minute flow through pipe, and
- D = pipe diameter in inches.

Minor Losses (valves, pipe fittings, bends, etc.) $= k\frac{V^2}{2g}$

The long radius elbow loss coefficient, k, was supplied by the pump manufacturer and is equal to 0.25. Losses through the submersible pump are similar to the losses described above for the mixed flow main pumps. Static head, velocity head, friction and minor loss calculations are provided in Appendix H.

The TDH is calculated for various water surface elevations and discharge rates. A system curve is then developed for each water surface elevation. System curves describe the TDH the pumps will encounter for various capacities. System curve calculations are provided in Appendix H.

F. ROUTING METHODOLOGY

The routing of the inflow hydrograph through the pump station was modeled by using Visual Basic macros in a Microsoft Excel spreadsheet (see Appendix H) developed by Stanley Consultants, Inc (SCI). Based on a chosen time step interval, the spreadsheet models the relationship between the inflow hydrograph, storage, and pumping rate (outflow hydrograph) for the main pumps.

A time step interval of 9 seconds (0.0025 hours) was used in calculating the inflow versus pumping rate for a particular amount of storage in the system. A 9 second time step interval provides reasonable inflow and outflow hydrographs. A smaller time step would be too burdensome for spreadsheet calculations.

The 50-year design inflow hydrograph was calculated utilizing the Baumgardner Method II for Determining Design Inflow Hydrographs – Rational Equation/SCS Hydrograph Method, which is discussed in the 1991 ADOT Storm Water Pump Station Design Documents, Volume I, Design Guidelines. The inflow hydrograph peak discharge, calculated with the Rational Equation, is equal to 210 cfs. The peak discharge is distributed over a SCS Type II unit hydrograph and occurs at approximately 1.2 hours after storm runoff begins to occur. Supporting calculations and documentation associated with the inflow hydrograph are provided in Appendix H.

The outflow hydrograph is dependent on the pump station storage and pumping rate produced by the three main pumps. Pump station storage is discussed in Section V.B. The pumping rate is dependent on the system curves (see Section V.E) and design pump curve. The design pump curve describes the relationship between TDH and pumping capacity for that particular pump model. The design pump curve was based on the Cascade Pump Company Curve No. MF2408A5, calculated brake horsepower and assumed pitch angle for the impeller. The maximum and minimum brake horsepower are approximately 330 and 290 HP, respectively. The design pitch angle for the impeller is approximately 40 degrees. Supporting calculations and documentation for the design pump curve are provided in Appendix H. The pumps then operate where the system curve and design pump curve intersect for a particular water surface elevation. The pump outflow curve is developed based on the operating discharge capacity for each water surface elevation in the wet well (see Appendix H).

Once the inflow hydrograph, stage-storage relationship and pump outflow curve have been estimated, determining an adequate routing hydrograph of the storm water through the pump system is an iterative process. Factors taken into account during the iteration process include the following: total storage, maximum allowable water surface elevation in the wet well, pump on- and off-elevations, pump warm-up time, top of weir elevation in the discharge box and loss coefficients. The total available storage (wet well and storage pipe) of the pump system is approximately 101,000 cubic feet at a water surface elevation of 1,382 feet. The assumed maximum allowable water surface elevation in the wet well is 1,381.0 feet, which would maintain a hydraulic grade line of at least 6 inches below the lowest inlet grate elevation. Pump on-elevations were set as necessary by trial and error. The number of starts for any pump is limited to no more than 6 per hour. The three main pumps have the same off elevation, which is preferred by ADOT, equal to 1,368 feet. In addition, on- and off-elevations are set in order to maintain the manufacturer recommended minimum submergence of 4 feet above the suction bell. As discussed in Section V.C, the warm-up time for each pump engine is 3 minutes. As discussed in Section V.D, the top of weir elevation is set at 1,407.4 feet. Loss coefficients range from 0.05 for a coupling to 0.25 for a long radius elbow. Because the pump system design is an iterative process, and many iterations were made, only the final iteration is provided in this report. The spreadsheet used for the iterative process of determining an adequate hydrograph routing through the pump station, and supporting calculations and documentation, are provided in Appendix H.

G. RESULTS

Results of the hydrograph routing through the pump station can be found in Appendix H. Several different trial and error runs were performed to see how different variables such as warm-up time and the time interval influenced the model. The model presented in Appendix H is the refined model based on the initial trial and error runs.

The peak inflow (210 cfs) occurs at 1.20 hours after the initial storm runoff happens. The maximum water surface in the wet well (1380.9 feet) and peak pumping outflow rate for the three main pumps (181 cfs) occur at approximately 1.24 hours after the initial storm runoff occurs. At the maximum water surface elevation, approximately 98,000 cubic feet of storage is utilized. The length of 96-inch diameter storage pipe is 882 feet providing approximately 44,000 cubic feet of storage.

The difference between the peak inflow and outflow is 29 cfs, which is primarily a function of the storage and pumping capacity of the system. The number, size and capacity of pumps, including pump station layout, is a typical ADOT configuration for a highway storm water pump station. The pumping capacity of each main pump is 24,000 gallons per minute at 880 revolutions per minute. A design iteration was performed using three smaller main pumps, each having a pumping capacity of 20,000 gallons per minute at 880 revolutions per minute. However, this smaller pumping configuration would necessitate an excessive length of storage pipe.

Float switch off-elevations for the three main pumps were set at elevation 1368 feet, which is the invert of the 96-inch diameter inflow storage pipe. On-elevations for pumps numbered 1, 2 and 3 were set at 1372.5, 1373.5 and 1375.5 feet, respectively. From the outflow hydrograph, the lead pump runs for approximately 52 minutes (duration of hydrograph is 5.5 hours) and is not engaged more than 2 times per hour. Pumps number 2 and 3 are engaged one time each for approximately 33 and 21 minutes, respectively. The inflow and outflow hydrographs are provided in Appendix H. In addition, inflow and outflow mass curves are provided in Appendix H.

VI. SUMMARY

The Santan Freeway (202L) is part of the MAG Regional Freeway System and will connect I-10 to the Superstition Freeway (US 60) just west of Ellsworth Road. This 2.2-mile segment extends from Elliot Road on the south to Baseline Road on the north.

Proposed drainage improvements for the Elliot Road to Baseline Road segment of the Santan Freeway are comprised of three major components, they are:

- A concrete lined trapezoidal channel along the east side of the freeway, (East Channel), from about 600 feet north of Baseline Road to about 1000 feet south of Elliot Road,
- An on-site system of catch basins and storm drain pipes that collect and convey flows to the East Channel or for the depressed freeway portion to the proposed pump station and,
- A pump station that handles the 50-year storm event for the depressed portion of the freeway and discharges to the East Channel.

Flows from off-site, on-site and the pump station all discharge into the East Channel, which ultimately conveys stormwater south and west to the East Maricopa Floodway (EMF).

Off-site Drainage Improvements

A new 8' x 6' RCBC is proposed under Baseline Road to convey the East Channel flow (342 cfs) to the south. An existing 36-inch diameter storm drain that conveys flows west along Baseline Road will connect into the RCBC. As the channel continues south of Baseline Road, it will transition into a concrete lined channel having an 8 foot bottom width, 2H: I V side slopes, and about 7 feet deep.

At Guadalupe Road, a triple 8'x 6' RCB culvert is proposed to convey the channel flows (976 cfs) under the roadway southward. The existing 42-inch storm sewer within Guadalupe Road is about 13 feet deep and cannot connect to the proposed RCB. This storm system will be connecting to the East Channel at about 0.43 miles south of Guadalupe Road.

At about 1500 feet north of Elliot Road the channel bottom width widens to 12 feet. At Elliot Road, a triple 8' x 7' RCB culvert is proposed to convey the channel flows (1,468 cfs) beneath Elliot Road.

On-site Drainage Improvements

On-site drainage facilities for the freeway corridor and crossroads include ADOT standard curb and gutter, grated catch basins, slotted drain, median catch basins, curb opening catch basins, storm drain pipe, pump station storage pipe, and the pump station. The on-site drainage design criteria for the crossroads are based on the ADOT's Highway drainage Design Manual-Hydrology (1993) and ADOT 's Roadway Design Guidelines (1996). Catch basin inlets located in non-depressed locations were designed for the 10-year storm runoff. Inlets located in depressed sections of the corridor were designed for the 50-year storm runoff. All storm drains are a minimum of 24 inches unless a special case prohibits their use and then 18-inch pipes are used.

Inlet hydraulics were calculated using the ADOT developed program known as PDA1.

Hydraulic Grade Lines (HGLs) were computed using Haested Method's StormCAD storm drain analysis and design program (Version 4.1.1).

Guadalupe and Baseline Roads have existing drainage systems that will be partially removed within the limits of the Santan mainline right-of-way. Storm drains approaching the freeway from the east will be connected to the East Channel. The remaining existing storm drains in Baseline Road and Guadalupe Road will be utilized to drain portions of the proposed crossroad improvements.

Proposed storm drain systems along Elliot Road will drain into the proposed 3-8'x7' RCBC located under Elliot Road. The storm drain system for the west portion of Elliot Road will intercept flows and discharge stormwater into a temporary retention basin on the south side of Elliot Road. This retention basin is approximately 450 feet in length and has an approximate volume of 770 cubic yards.

Pump Station

The proposed pump station will be located at the southeast corner of the freeway and Guadalupe Road. The pump station will handle on-site flows for about 1 mile of depressed freeway from about Sta 3198+50 to Sta 3252+00.

The inflow hydrograph for the 50-year storm was routed through the pump station by iterative steps using Visual Basic macros in a Microsoft Excel spreadsheet.

The inflow hydrograph was determined by distributing the 50-year peak flow over a SCS Type II unit hydrograph using the Baumgardner method. A spreadsheet was developed using the inflow hydrograph, pump information, stage-storage relationship, and a time step interval to calculate the accumulated storage volumes and storage elevations for the duration of the storm event.

The pump station will be comprised of three main pumps designed to pump the inflow hydrograph associated with the 50-year design storm event having a peak flow of 210 cfs. A relatively smaller submersible electric pump will handle nuisance flows.

The three main pumps are mixed flow pumps that have a capacity to pump 24,000 GPM (52.48 cfs) at 880 RPM and are comparable to those used at other ADOT pump stations in metropolitan Phoenix. Natural gas fueled engines will drive the main pumps. The main pumps and engines will have no back-up units. The electric submersible pump has a capacity to pump approximately 2,200 GPM (4.90 cfs) and will be manually turned-on by ADOT personnel.

The storage in the pump station consists of two components: a wet well and a storm drain inflow pipe. To minimize cost, the wet well volume has been sized as small as possible and the inflow storm drain pipe has been oversized to: accommodate additional storage; minimize pump cycling; and allow for engine warm-up. A length of 882 feet of 96-inch diameter inflow storm drain pipe is utilized for storage.

The direct drive engines that correspond to the main pumps have a 3-minute warm up cycle that allows all engine components to be brought up to operating temperature and to minimize engine wear before the pumps are engaged.

Three 30" DIP discharge pipes from the mixed flow pumps and a 12" DIP discharge pipe from the submersible pump carry flow to a discharge box located to the south of the pump station. Storm water will be conveyed from the discharge box to the concrete lined trapezoidal East Channel via a 72-inch diameter pipe.

VII. REFERENCES

1) Arizona Department of Transportation, Roadway Engineering Group "Roadway Design Guidelines," May 1996.

2) Arizona Department of Transportation, "Highway Drainage Design Manual, Volume 1-Hydrology," March 1993.

3) U.S. Department of Transportation, Federal Highway Administration, "Hydraulic Design of Highway Culverts," Hydraulic Design Series (HDS) No. 5, September 1985, (HY-8 computer program Version 6.0).

4) Standard Construction Drawings, Arizona Department of Transportation, April 2000.

5) Arizona Department of Transportation, Inlet Computer Program (PDA-1), Version 3.40, December 1995.

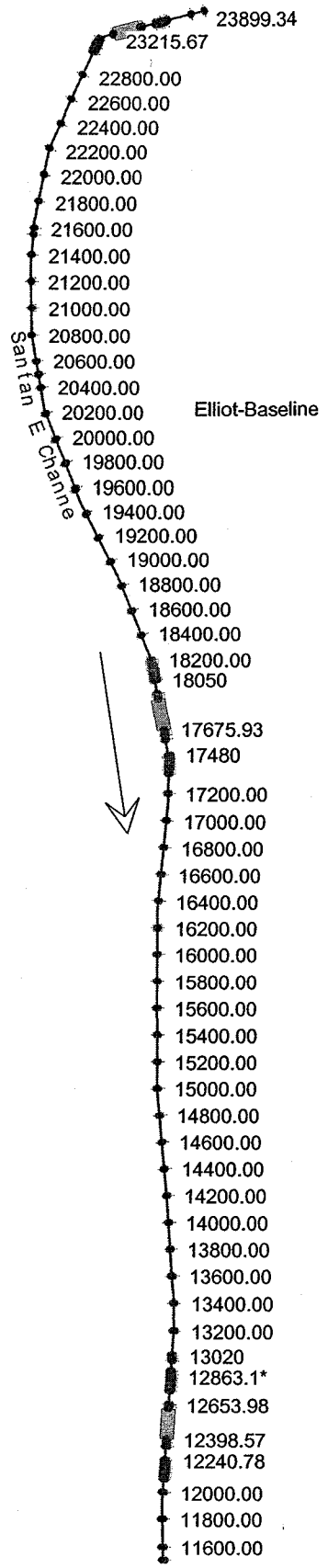
6) U.S. Department of Transportation, Federal Highway Administration, "Design of Roadside Drainage Channels," Hydraulic Design Series No. 4 September 1985.

7) U.S. Department of Transportation, Federal Highway Administration, "Drainage of Highway Pavements," Hydraulic Engineering Circular No. 12, March 1984.

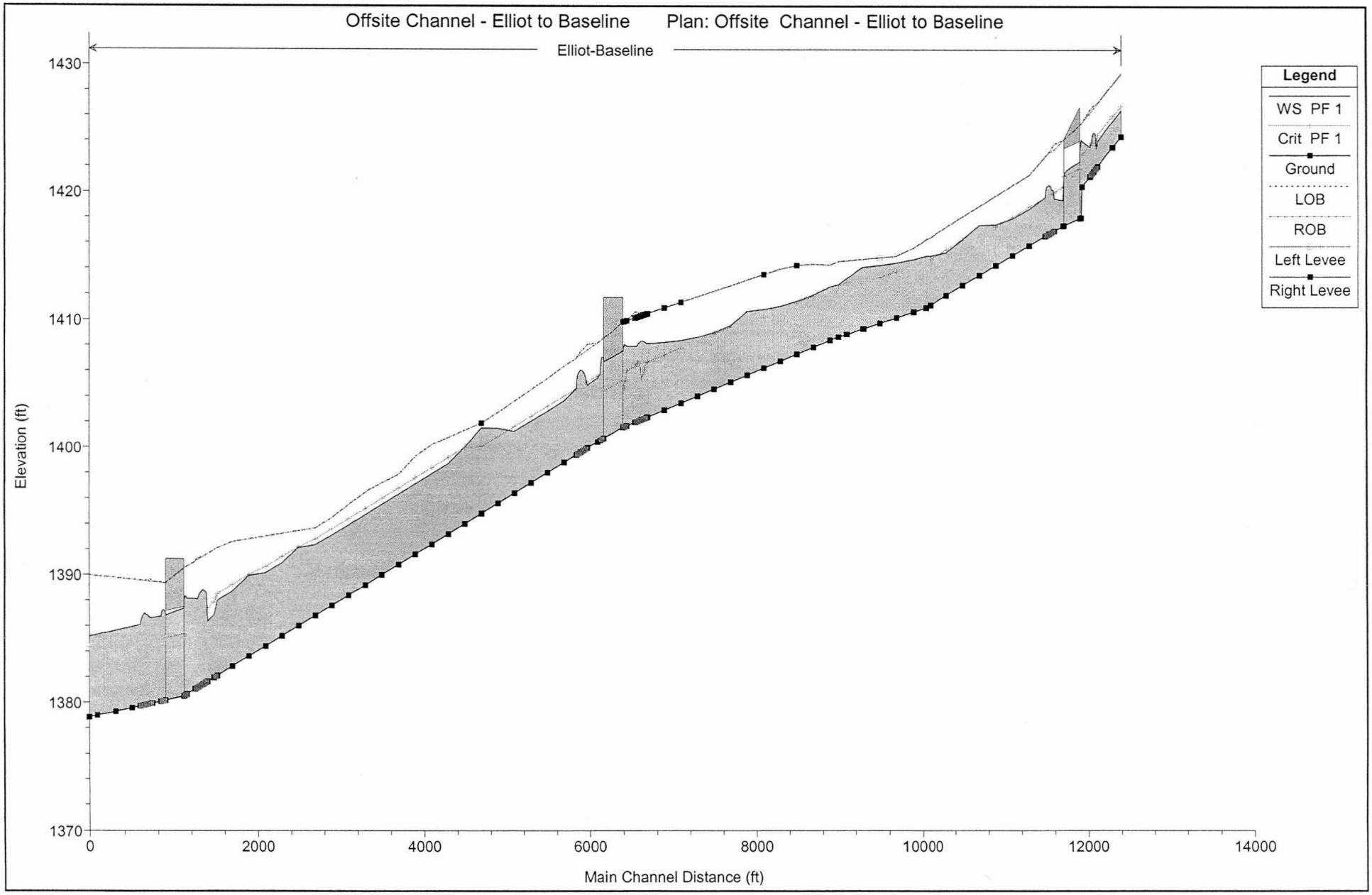
8) Chow, Ven Te, Ph.D., Open Channel Hydraulics, McGraw-Hill Book Company, New York-Toronto-London, 1959.

9) U.S. Department of Agriculture, Soil Conservation Service, "Soil Survey of Eastern Maricopa and Northern Pinal Counties Areas, Arizona," 1974.

APPENDIX A HECRAS & SPILLWAY ANALYSIS



Partial GIS data


Offsite Channel - Elliot to Baseline
Plan: Offsite Channel - Elliot to Baseline
Elliot-Baseline
Legend
WS PF 1
Crit PF 1
Ground
LOB
ROB
Left Levee
Right Levee
Elevation (ft)
1370
1380
1390
1400
1410
1420
1430
0
2000
4000
6000
8000
10000
12000
14000
Main Channel Distance (ft)

HEC-RAS Plan: Offsite Cha River: Santan E Channe Reach: Elliot-Baseline Profile: PF 1

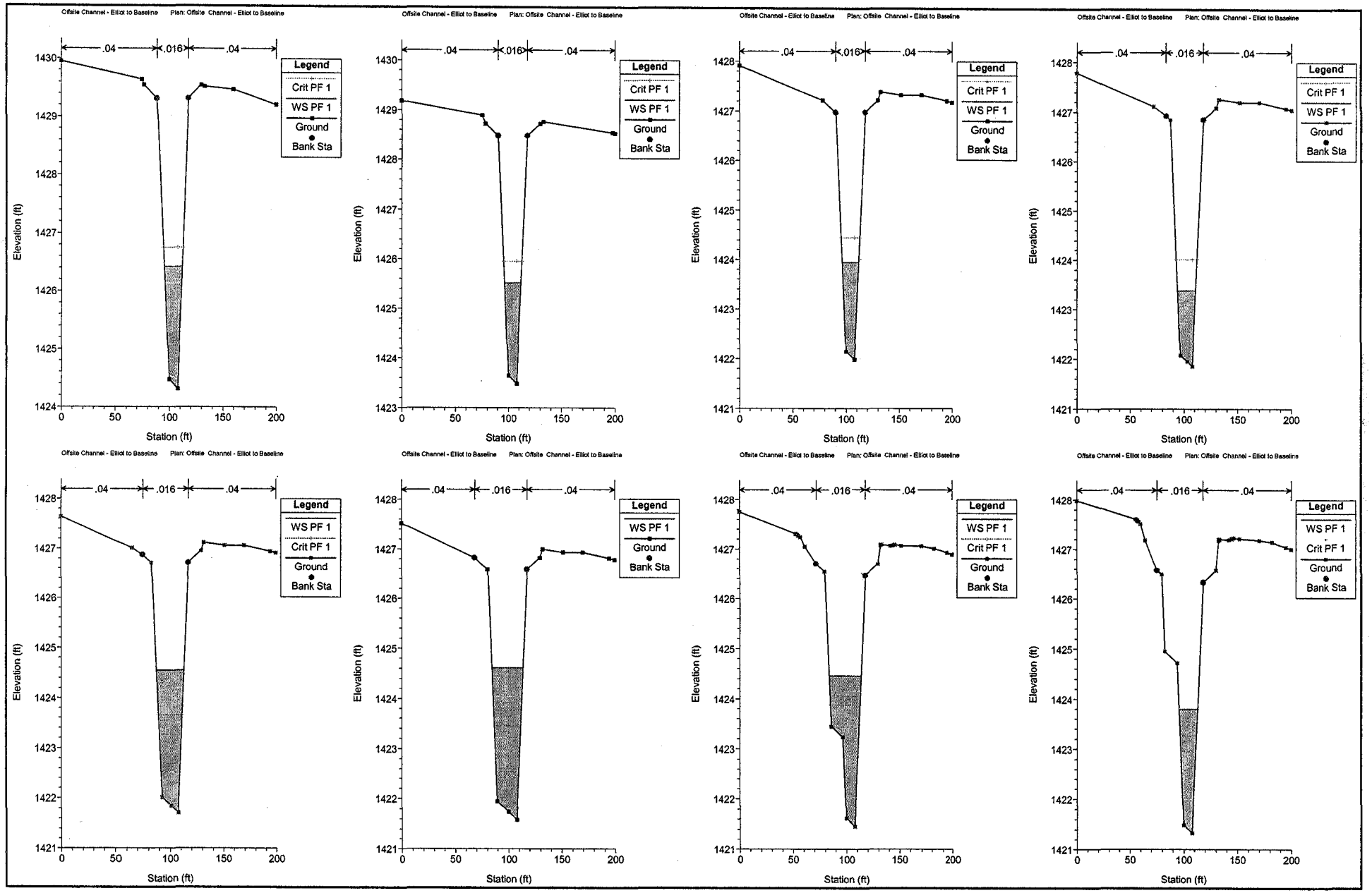
Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Elliot-Baseline	23899.34	230.00	1424.31	1426.42	1426.75	1427.72	0.006092	9.16	25.11	16.77	1.32
Elliot-Baseline	23800.00	230.00	1423.48	1425.51	1425.95	1427.04	0.007366	9.92	23.19	15.79	1.44
Elliot-Baseline	23621.55	230.00	1421.98	1423.94	1424.45	1425.62	0.008393	10.39	22.14	15.53	1.53
Elliot-Baseline	23605.8*	230.00	1421.85	1423.38	1424.01	1425.42	0.012885	11.47	20.05	16.99	1.86
Elliot-Baseline	23590.1*	230.00	1421.71	1424.55	1423.65	1424.83	0.000818	4.25	54.11	25.45	0.51
Elliot-Baseline	23574.5	230.00	1421.58	1424.61		1424.79	0.000467	3.40	67.71	29.41	0.39
Elliot-Baseline	23559.6*	230.00	1421.46	1424.46	1423.88	1424.76	0.001157	4.43	51.91	29.92	0.59
Elliot-Baseline	23544.8*	230.00	1421.33	1423.80	1423.80	1424.68	0.003424	7.54	30.51	17.54	1.01
Elliot-Baseline	23530	230.00	1421.21	1423.47	1423.68	1424.60	0.004829	8.53	26.97	16.72	1.18
Elliot-Baseline	23435.84	230.00	1420.42	1423.97	1422.89	1424.27	0.000800	4.45	51.74	21.86	0.51
Elliot-Baseline	23423.67	230.00	1417.99	1424.07		1424.22	0.000229	3.09	74.49	16.84	0.26
Elliot-Baseline	23408.67	343.00	1417.95	1422.98	1421.79	1424.11	0.002883	8.51	40.29	8.01	0.67
Elliot-Baseline	23393.56	Culvert									
Elliot-Baseline	23215.67	343.00	1417.38	1421.22	1421.22	1423.15	0.005899	11.17	30.71	8.01	1.01
Elliot-Baseline	23205.67	343.00	1417.35	1419.35	1420.41	1422.90	0.017444	15.12	22.68	15.66	2.21
Elliot-Baseline	23100	343.00	1416.94	1419.48	1420.00	1421.29	0.006804	10.79	31.78	17.84	1.43
Elliot-Baseline	23083.9*	343.00	1416.88	1420.18	1419.94	1421.02	0.002395	7.39	46.41	20.86	0.87
Elliot-Baseline	23067.9*	343.00	1416.82	1420.17	1419.87	1420.97	0.002893	7.18	47.74	26.16	0.94
Elliot-Baseline	23051.9*	343.00	1416.76	1420.47		1420.80	0.000882	4.61	74.33	32.71	0.54
Elliot-Baseline	23035.95	343.00	1416.70	1420.54		1420.76	0.000420	3.69	92.88	32.66	0.39
Elliot-Baseline	23020.3*	343.00	1416.64	1420.46		1420.74	0.000580	4.23	81.02	29.37	0.45
Elliot-Baseline	23004.7*	343.00	1416.58	1420.31		1420.72	0.000916	5.10	67.27	25.82	0.56
Elliot-Baseline	22989.16	343.00	1416.52	1419.58	1419.58	1420.64	0.003252	8.26	41.52	19.90	1.01
Elliot-Baseline	22800.00	343.00	1415.78	1418.65	1418.84	1419.92	0.004195	9.06	37.85	19.15	1.14
Elliot-Baseline	22600.00	343.00	1415.01	1417.91	1418.04	1419.10	0.003848	8.72	39.32	19.82	1.09
Elliot-Baseline	22400.00	343.00	1414.24	1417.46	1417.30	1418.37	0.002641	7.66	44.78	20.55	0.91
Elliot-Baseline	22200.00	343.00	1413.47	1417.41		1417.90	0.001154	5.66	60.63	23.43	0.62
Elliot-Baseline	22000.00	456.00	1412.70	1416.25	1416.25	1417.45	0.003131	8.80	51.81	21.87	1.01
Elliot-Baseline	21800.00	456.00	1411.93	1415.25	1415.48	1416.72	0.004101	9.71	46.95	20.96	1.14
Elliot-Baseline	21600.00	456.00	1411.16	1414.98	1414.71	1415.94	0.002321	7.89	57.82	22.95	0.88
Elliot-Baseline	21550	456.00	1410.97	1414.96		1415.80	0.001938	7.38	61.78	23.63	0.80
Elliot-Baseline	21400.00	456.00	1410.64	1414.70		1415.50	0.001795	7.18	63.55	23.92	0.78
Elliot-Baseline	21200.00	456.00	1410.21	1414.43	1413.76	1415.14	0.001524	6.76	67.50	24.57	0.72
Elliot-Baseline	21000.00	456.00	1409.78	1414.24	1413.33	1414.84	0.001215	6.21	73.38	25.51	0.65
Elliot-Baseline	20800.00	456.00	1409.34	1414.11		1414.60	0.000915	5.60	81.48	26.75	0.57
Elliot-Baseline	20600.00	569.00	1408.91	1413.23	1412.91	1414.26	0.002157	8.14	69.90	24.96	0.86
Elliot-Baseline	20500	569.00	1408.69	1412.74	1412.69	1414.00	0.002821	8.98	63.33	23.89	0.97
Elliot-Baseline	20400.00	569.00	1408.42	1412.58		1413.69	0.002455	8.49	67.04	24.90	0.91
Elliot-Baseline	20200.00	569.00	1407.87	1411.96	1411.87	1413.18	0.002715	8.86	64.23	24.04	0.96
Elliot-Baseline	20000.00	569.00	1407.32	1411.46	1411.31	1412.63	0.002585	8.70	65.40	24.23	0.93
Elliot-Baseline	19800.00	569.00	1406.77	1411.07		1412.11	0.002209	8.21	69.30	24.87	0.87
Elliot-Baseline	19600.00	569.00	1406.22	1410.83	1410.21	1411.67	0.001642	7.36	77.31	26.12	0.75
Elliot-Baseline	19400.00	569.00	1405.67	1410.69		1411.33	0.001148	6.45	88.24	27.75	0.64
Elliot-Baseline	19200.00	681.00	1405.12	1409.57	1409.48	1410.92	0.002725	9.30	73.22	25.49	0.97
Elliot-Baseline	19000.00	681.00	1404.57	1409.05	1408.93	1410.37	0.002654	9.21	73.93	25.60	0.96
Elliot-Baseline	18800.00	681.00	1404.01	1408.65		1409.83	0.002295	8.73	78.02	26.23	0.89
Elliot-Baseline	18600.00	681.00	1403.46	1408.39	1407.82	1409.37	0.001775	7.94	85.77	27.39	0.79
Elliot-Baseline	18400.00	681.00	1402.91	1408.24	1407.27	1409.00	0.001270	7.01	97.11	29.00	0.68
Elliot-Baseline	18200.00	681.00	1402.36	1408.15	1406.72	1408.74	0.000885	6.13	111.02	30.86	0.57
Elliot-Baseline	18186.11	681.00	1402.32	1408.15	1406.68	1408.72	0.000862	6.07	112.12	31.00	0.56
Elliot-Baseline	18171.5*	681.00	1402.28	1408.24	1406.30	1408.67	0.000587	5.23	130.16	33.93	0.47
Elliot-Baseline	18157.0*	681.00	1402.24	1408.29	1405.98	1408.63	0.000430	4.63	147.14	36.69	0.41
Elliot-Baseline	18142.5*	681.00	1402.20	1408.33	1405.70	1408.60	0.000328	4.15	163.98	39.39	0.36
Elliot-Baseline	18128.02	681.00	1402.16	1408.36	1405.46	1408.58	0.000257	3.77	180.79	42.07	0.32
Elliot-Baseline	18112.4*	681.00	1402.12	1408.29	1406.09	1408.57	0.000377	4.24	160.65	41.94	0.38
Elliot-Baseline	18096.8*	681.00	1402.08	1408.19	1406.60	1408.55	0.000581	4.84	140.72	41.68	0.46
Elliot-Baseline	18081.2*	681.00	1402.03	1408.03	1406.64	1408.53	0.000967	5.67	120.19	41.18	0.58
Elliot-Baseline	18065.6*	681.00	1401.99	1407.92	1406.52	1408.50	0.000896	6.14	110.94	31.16	0.57
Elliot-Baseline	18050	681.00	1401.95	1407.94	1406.35	1408.47	0.000788	5.87	115.96	31.51	0.54
Elliot-Baseline	17948.54	681.00	1401.67	1407.92	1406.05	1408.38	0.000636	5.43	125.52	32.68	0.49
Elliot-Baseline	17933.6*	681.00	1401.64	1408.05	1405.21	1408.31	0.000285	4.07	167.49	35.75	0.33

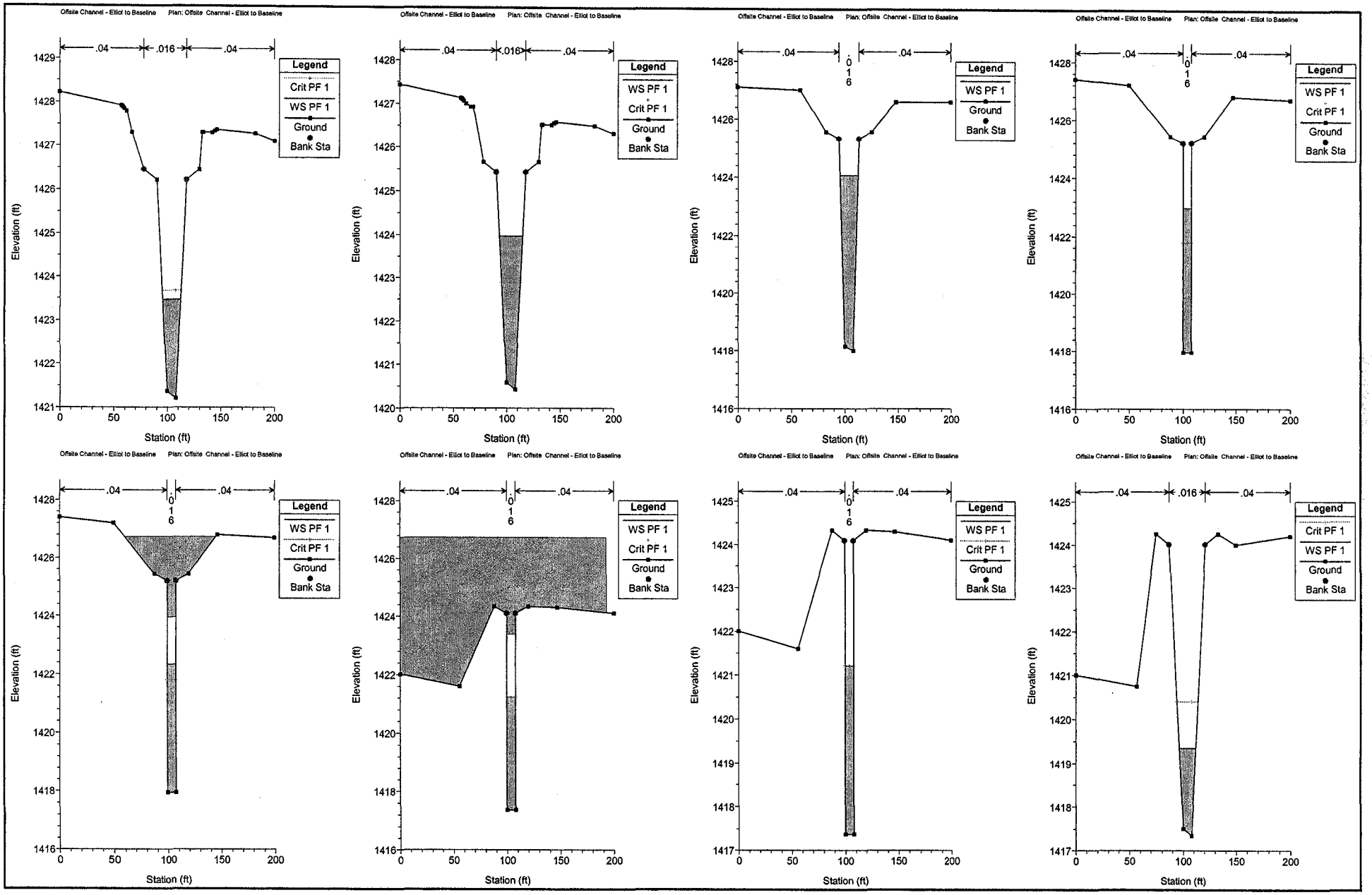
HEC-RAS Plan: Offsite Cha River: Santan E Channe Reach: Elliot-Baseline Profile: PF 1 (Continued)

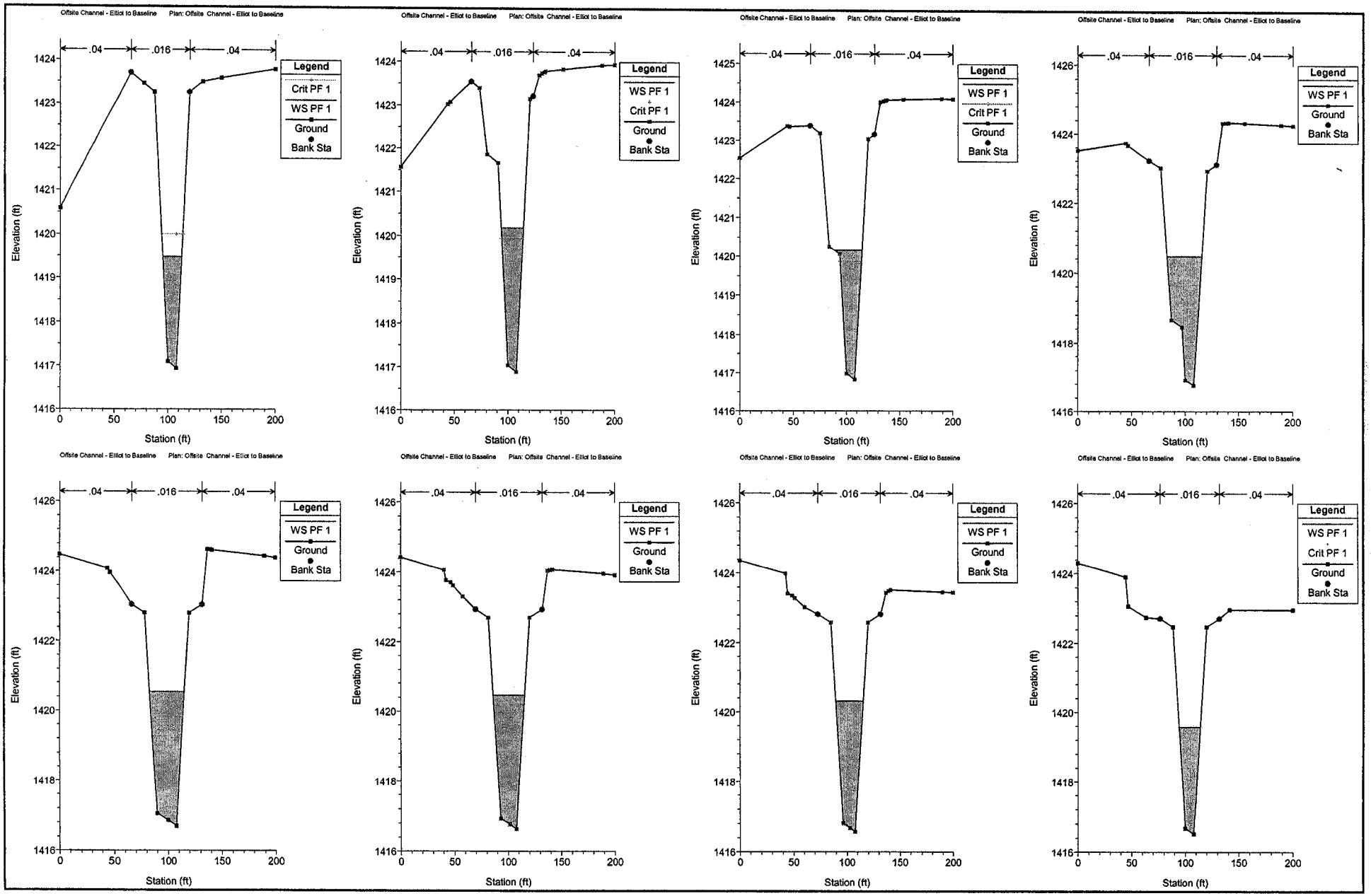
Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Elliot-Baseline	17918.8*	681.00	1401.60	1408.08	1404.59	1408.29	0.000209	3.73	182.49	30.64	0.27
Elliot-Baseline	17903.93	976.00	1401.57	1407.63	1405.13	1408.25	0.000704	6.32	154.48	25.51	0.45
Elliot-Baseline	17903.92	Culvert									
Elliot-Baseline	17675.93	976.00	1400.69	1407.03		1407.59	0.000617	6.04	161.60	25.52	0.42
Elliot-Baseline	17661.0*	976.00	1400.63	1407.09		1407.55	0.000446	5.44	179.51	29.98	0.39
Elliot-Baseline	17646.1*	976.00	1400.58	1407.00		1407.54	0.000582	5.86	166.47	34.45	0.47
Elliot-Baseline	17631.31	976.00	1400.52	1405.75	1405.75	1407.42	0.002838	10.37	94.11	28.58	1.01
Elliot-Baseline	17600	976.00	1400.39	1405.44	1405.61	1407.30	0.003297	10.96	89.03	27.86	1.08
Elliot-Baseline	17480	976.00	1399.92	1404.84	1405.15	1406.87	0.003672	11.41	85.55	27.35	1.14
Elliot-Baseline	17460.*	976.00	1399.84	1405.47	1405.08	1406.79	0.002065	9.22	105.88	30.17	0.87
Elliot-Baseline	17440.*	976.00	1399.76	1405.82		1406.59	0.001255	7.04	138.64	41.50	0.68
Elliot-Baseline	17420.*	976.00	1399.68	1405.97		1406.50	0.000704	5.86	166.44	42.43	0.52
Elliot-Baseline	17400.00	976.00	1399.60	1406.05		1406.45	0.000451	5.10	191.37	43.06	0.43
Elliot-Baseline	17386.5*	976.00	1399.54	1405.95		1406.44	0.000560	5.57	175.27	40.50	0.47
Elliot-Baseline	17373.0*	976.00	1399.49	1405.82		1406.42	0.000735	6.20	157.39	37.78	0.54
Elliot-Baseline	17359.5*	976.00	1399.44	1405.59		1406.38	0.001057	7.14	136.63	34.68	0.63
Elliot-Baseline	17346.12	976.00	1399.38	1404.61	1404.61	1406.28	0.002839	10.37	94.10	28.58	1.01
Elliot-Baseline	17200.00	976.00	1398.79	1403.64	1404.01	1405.75	0.003894	11.66	83.72	27.09	1.17
Elliot-Baseline	17000.00	976.00	1397.99	1402.81	1403.21	1404.96	0.003992	11.77	82.95	26.97	1.18
Elliot-Baseline	16800.00	976.00	1397.20	1402.03	1402.42	1404.17	0.003969	11.74	83.13	27.00	1.18
Elliot-Baseline	16600.00	976.00	1396.40	1401.25	1401.63	1403.36	0.003912	11.68	83.58	27.06	1.17
Elliot-Baseline	16400.00	976.00	1395.60	1401.47	1400.84	1402.62	0.001722	8.62	113.27	31.15	0.80
Elliot-Baseline	16200.00	976.00	1394.80	1401.52	1400.02	1402.24	0.000933	6.84	142.64	34.98	0.60
Elliot-Baseline	16000.00	1271.00	1394.00	1399.97	1399.97	1401.82	0.002709	10.91	116.47	31.55	1.00
Elliot-Baseline	15800.00	1271.00	1393.20	1398.69	1399.17	1401.11	0.003902	12.50	101.72	29.63	1.19
Elliot-Baseline	15600.00	1271.00	1392.40	1397.89	1398.37	1400.31	0.003902	12.50	101.72	29.63	1.19
Elliot-Baseline	15400.00	1271.00	1391.60	1397.09	1397.57	1399.51	0.003902	12.49	101.72	29.63	1.19
Elliot-Baseline	15200.00	1271.00	1390.80	1396.29	1396.77	1398.71	0.003901	12.49	101.73	29.63	1.19
Elliot-Baseline	15000.00	1271.00	1390.00	1395.49	1395.97	1397.91	0.003904	12.50	101.69	29.61	1.19
Elliot-Baseline	14800.00	1271.00	1389.20	1394.69	1395.17	1397.11	0.003901	12.49	101.73	29.63	1.19
Elliot-Baseline	14600.00	1271.00	1388.40	1393.89	1394.38	1396.31	0.003901	12.49	101.73	29.63	1.19
Elliot-Baseline	14400.00	1271.00	1387.60	1393.09	1393.58	1395.51	0.003901	12.49	101.73	29.63	1.19
Elliot-Baseline	14200.00	1271.00	1386.81	1392.36	1392.80	1394.73	0.003801	12.36	102.81	29.85	1.17
Elliot-Baseline	14000.00	1370.00	1386.01	1392.12	1392.20	1394.11	0.002846	11.33	120.91	32.11	1.03
Elliot-Baseline	13800.00	1370.00	1385.21	1390.91	1391.41	1393.40	0.003857	12.68	108.01	30.46	1.19
Elliot-Baseline	13600.00	1370.00	1384.41	1390.14	1390.62	1392.63	0.003860	12.68	108.05	30.53	1.19
Elliot-Baseline	13400.00	1468.00	1383.61	1389.92	1390.01	1391.98	0.002839	11.52	127.40	32.91	1.03
Elliot-Baseline	13200.00	1468.00	1382.81	1388.70	1389.21	1391.27	0.003827	12.87	114.02	31.24	1.19
Elliot-Baseline	13020	1468.00	1382.09	1387.98	1388.49	1390.55	0.003827	12.87	114.02	31.24	1.19
Elliot-Baseline	13000.*	1468.00	1382.01	1387.34	1388.17	1390.43	0.004871	14.10	104.10	29.84	1.33
Elliot-Baseline	12980	1468.00	1381.93	1386.84	1387.85	1390.29	0.005691	14.91	98.43	29.18	1.43
Elliot-Baseline	12902.79	1468.00	1381.62	1386.36	1387.41	1389.84	0.005996	14.97	98.06	30.47	1.47
Elliot-Baseline	12889.5*	1468.00	1381.57	1388.57	1387.03	1389.46	0.000962	7.59	193.32	41.91	0.62
Elliot-Baseline	12876.3*	1468.00	1381.52	1388.69		1389.40	0.000715	6.76	217.08	44.99	0.54
Elliot-Baseline	12863.1*	1468.00	1381.46	1388.76		1389.34	0.000558	6.13	239.46	47.92	0.48
Elliot-Baseline	12850	1468.00	1381.41	1388.82		1389.31	0.000447	5.61	261.57	50.75	0.44
Elliot-Baseline	12834.*	1468.00	1381.35	1388.72		1389.28	0.000560	6.01	244.21	50.61	0.48
Elliot-Baseline	12818.*	1468.00	1381.28	1388.61		1389.26	0.000719	6.49	226.20	50.42	0.54
Elliot-Baseline	12802.*	1468.00	1381.22	1388.44		1389.23	0.000983	7.15	205.23	50.00	0.62
Elliot-Baseline	12786.*	1468.00	1381.16	1388.11		1389.19	0.001575	8.31	176.57	48.95	0.77
Elliot-Baseline	12770.*	1468.00	1381.09	1388.11		1389.17	0.001180	8.24	178.06	39.60	0.69
Elliot-Baseline	12754	1468.00	1381.03	1388.13		1389.15	0.001127	8.11	181.11	39.91	0.67
Elliot-Baseline	12653.98	1468.00	1380.63	1388.14		1389.00	0.000885	7.41	198.06	41.57	0.60
Elliot-Baseline	12642.5*	1468.00	1380.58	1388.33		1388.90	0.000496	6.07	241.86	42.85	0.45
Elliot-Baseline	12631.0*	1468.00	1380.54	1388.33		1388.90	0.000441	6.04	243.17	34.18	0.40
Elliot-Baseline	12619.57	1468.00	1380.49	1387.91	1385.16	1388.84	0.000889	7.76	189.18	25.51	0.50
Elliot-Baseline	12619.56	Culvert									
Elliot-Baseline	12398.57	1468.00	1380.16	1386.94		1388.06	0.001152	8.50	172.80	25.51	0.58
Elliot-Baseline	12384.1*	1468.00	1380.14	1387.19		1387.93	0.000644	6.91	212.49	31.81	0.47
Elliot-Baseline	12369.6*	1468.00	1380.12	1387.24		1387.89	0.000567	6.48	226.60	38.12	0.47
Elliot-Baseline	12355.2*	1468.00	1380.10	1387.14		1387.87	0.000750	6.89	213.06	44.42	0.55

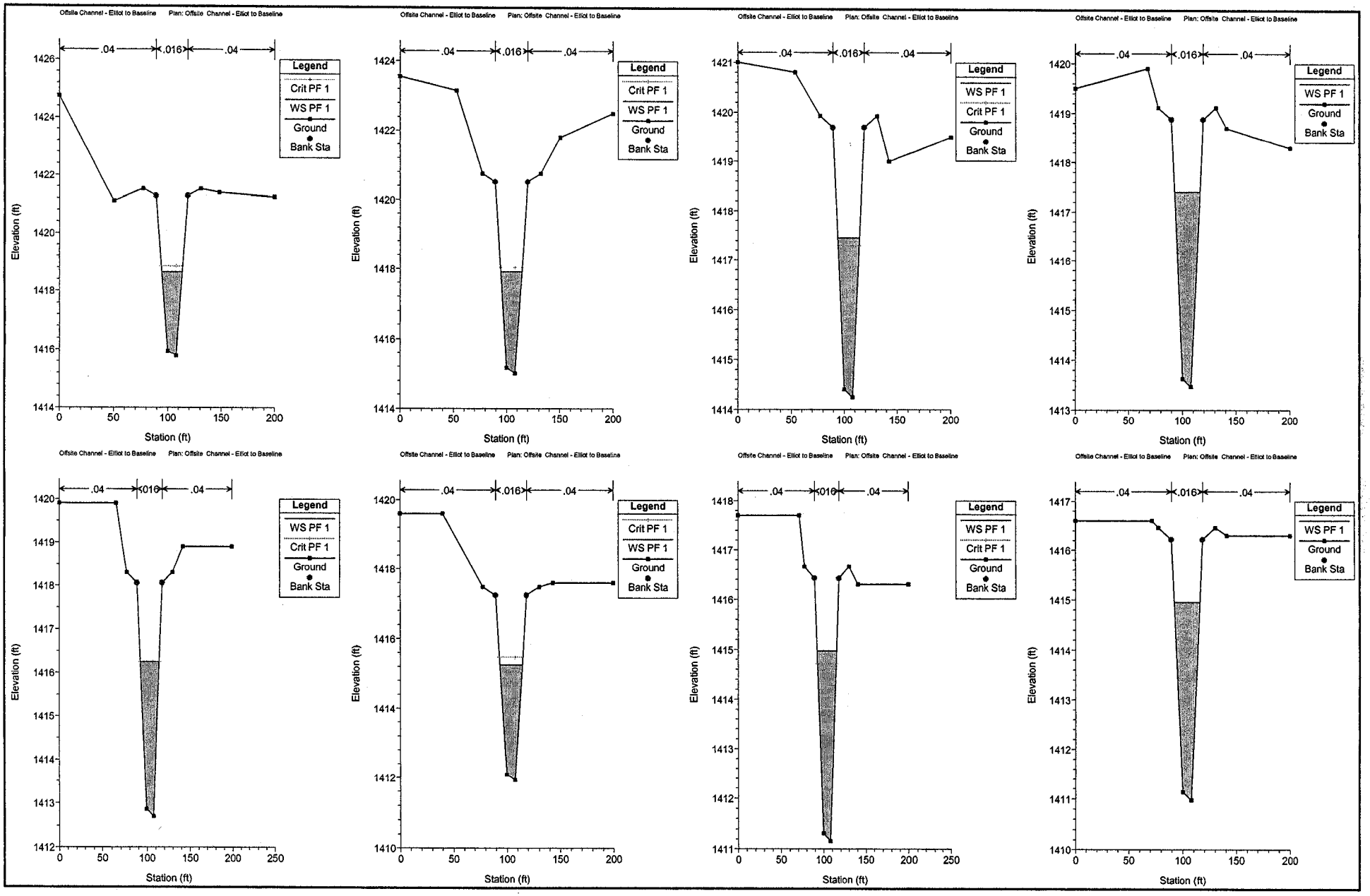
HEC-RAS Plan: Offsite Cha River: Santan E Channe Reach: Elliot-Baseline Profile: PF 1 (Continued)

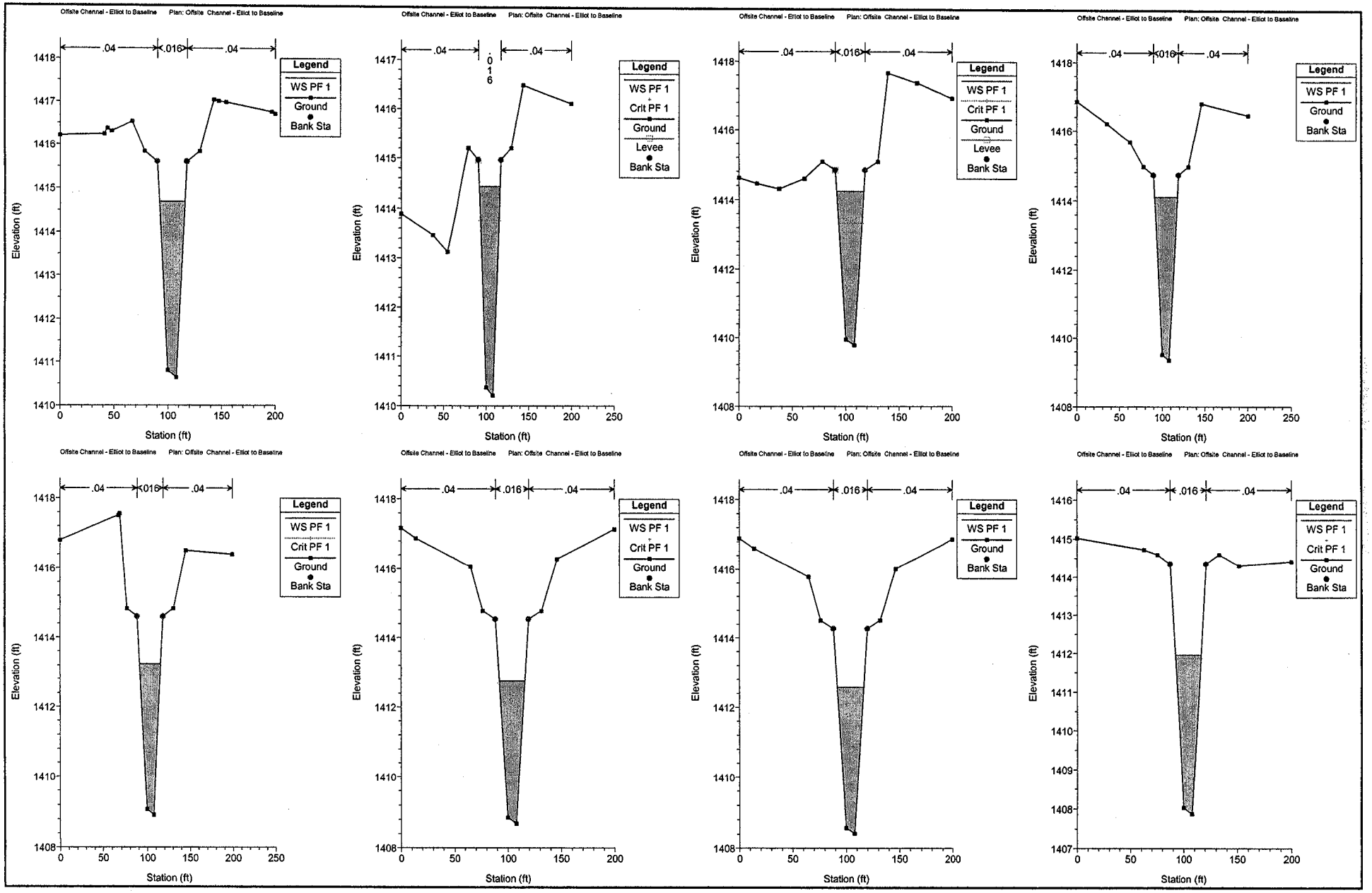
Reach	River Sta	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
		(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Elliot-Baseline	12340.78	1468.00	1380.08	1386.75		1387.82	0.001223	8.31	176.72	40.12	0.70
Elliot-Baseline	12240.78	1468.00	1379.93	1386.64		1387.69	0.001191	8.23	178.45	40.29	0.69
Elliot-Baseline	12225.1*	1468.00	1379.91	1386.64		1387.68	0.001180	8.20	179.08	40.36	0.69
Elliot-Baseline	12209.4*	1468.00	1379.88	1386.64		1387.65	0.001448	8.04	182.54	50.09	0.74
Elliot-Baseline	12193.8*	1468.00	1379.86	1386.77		1387.57	0.001003	7.17	204.79	50.68	0.63
Elliot-Baseline	12178.1*	1468.00	1379.84	1386.85		1387.51	0.000744	6.53	224.81	51.09	0.55
Elliot-Baseline	12162.5*	1468.00	1379.81	1386.91		1387.47	0.000573	6.02	243.79	51.41	0.49
Elliot-Baseline	12146.85	1468.00	1379.79	1386.95		1387.44	0.000454	5.60	261.92	51.68	0.44
Elliot-Baseline	12133.9*	1468.00	1379.77	1386.85		1387.42	0.000552	6.07	241.95	48.95	0.48
Elliot-Baseline	12120.9*	1468.00	1379.76	1386.71		1387.40	0.000702	6.67	219.98	46.06	0.54
Elliot-Baseline	12108.0*	1468.00	1379.74	1386.50		1387.37	0.000944	7.50	195.85	42.88	0.62
Elliot-Baseline	12095.13	1468.00	1379.72	1386.07		1387.31	0.001499	8.95	164.01	38.83	0.77
Elliot-Baseline	12000.00	1468.00	1379.57	1385.93		1387.17	0.001486	8.92	164.55	38.89	0.76
Elliot-Baseline	11800.00	1468.00	1379.28	1385.63		1386.87	0.001497	8.95	164.11	38.84	0.77
Elliot-Baseline	11600.00	1468.00	1378.98	1385.33		1386.57	0.001498	8.95	164.06	38.83	0.77
Elliot-Baseline	11500.00	1468.00	1378.83	1385.18	1384.34	1386.42	0.001501	8.95	163.95	38.82	0.77

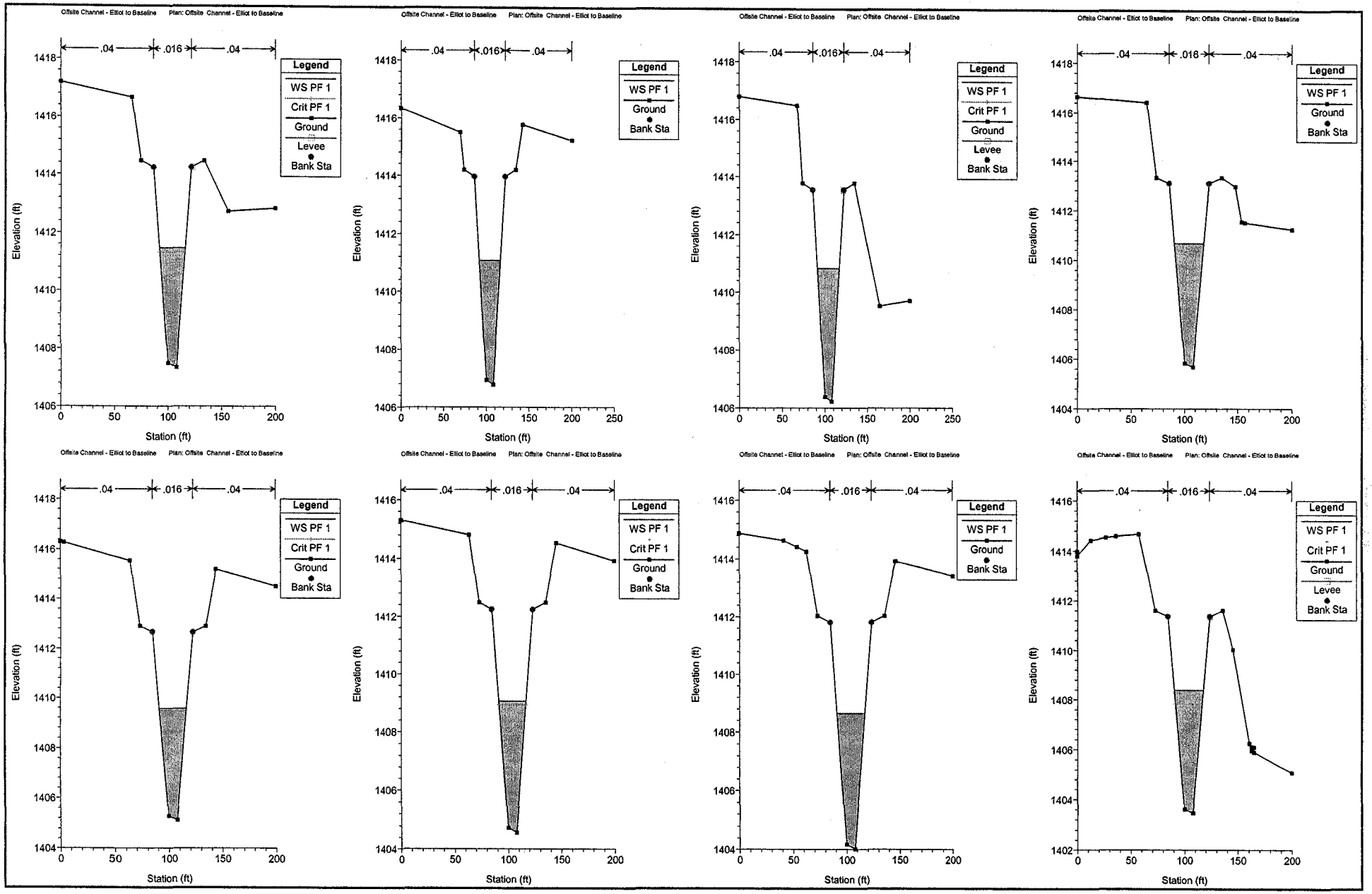

Offsite Channel - Elliot to Baseline Plan: Offsite Channel - Elliot to Baseline
.04
.016
.04
Legend
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

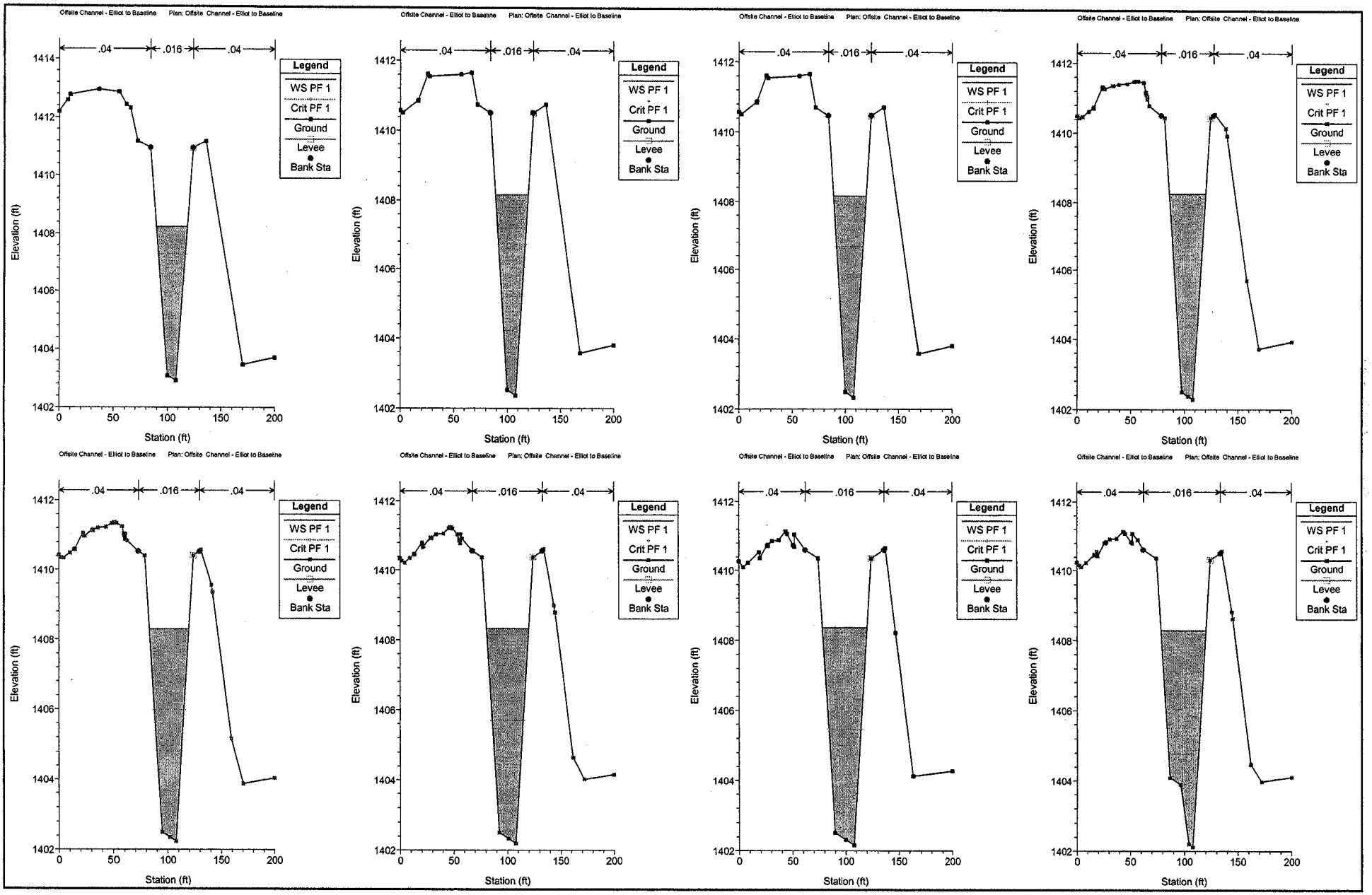

Offsite Channel - Elliot to Baseline Plan: Offsite Channel - Elliot to Baseline
.04
.016
.04
Legend
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Offsite Channel - Elliot to Baseline Plan: Offsite Channel - Elliot to Baseline
.04
.016
.04
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Offsite Channel - Elliot to Baseline Plan: Offsite Channel - Elliot to Baseline
.04
.04
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Offsite Channel - Elliot to Baseline Plan: Offsite Channel - Elliot to Baseline
.04
.04
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Offsite Channel - Elliot to Baseline Plan: Offsite Channel - Elliot to Baseline
.04
.04
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Offsite Channel - Elliot to Baseline Plan: Offsite Channel - Elliot to Baseline
.04
.04
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Offsite Channel - Elliot to Baseline Plan: Offsite Channel - Elliot to Baseline
.04
.04
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Offsite Channel - Elliot to Baseline Plan: Offsite Channel - Elliot to Baseline
.04
.016
.04
Legend
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

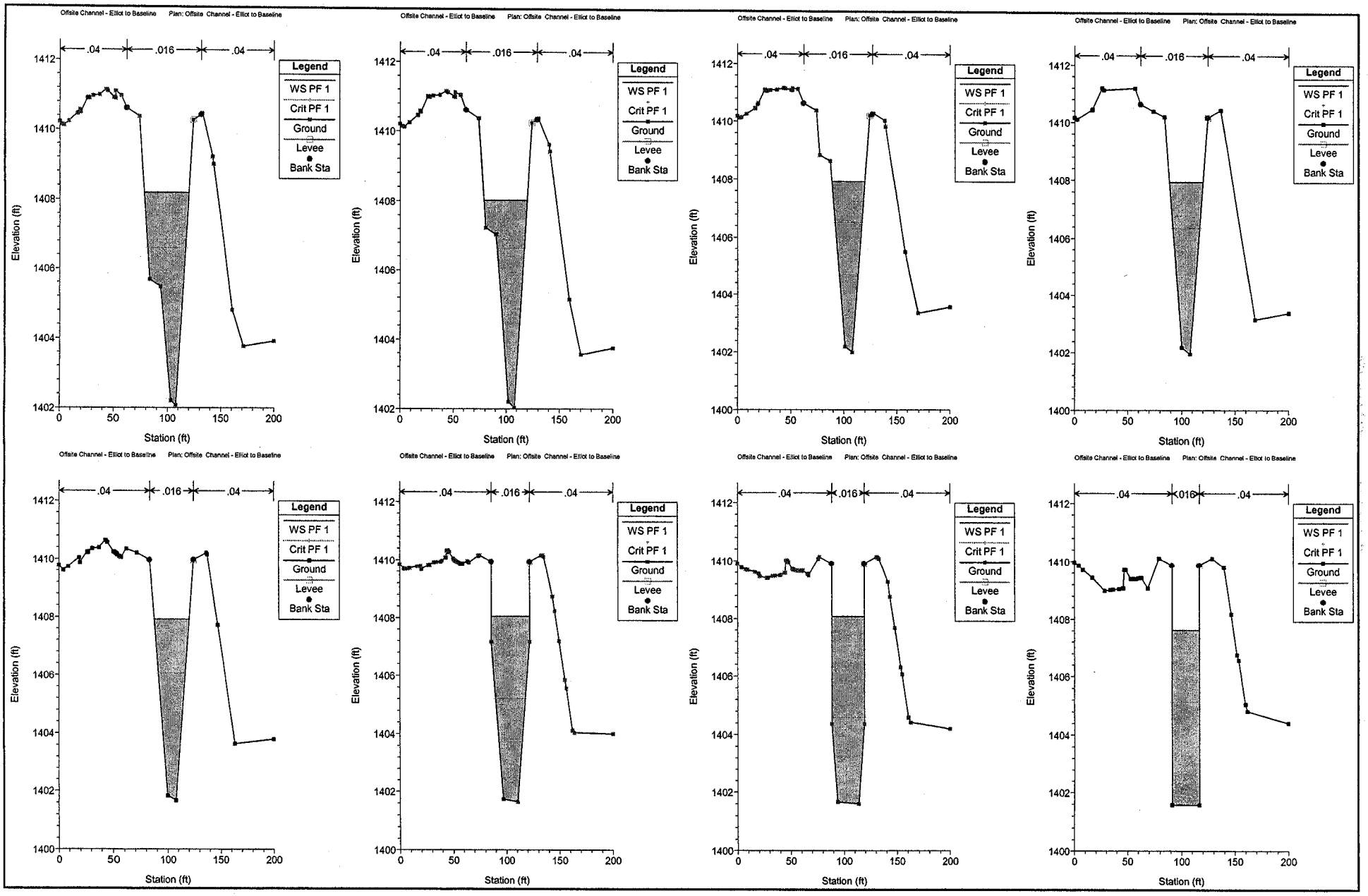

Offsite Channel - Elliot to Baseline Plan: Offsite Channel - Elliot to Baseline
.04
.016
.04
Legend
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Offsite Channel - Elliot to Baseline Plan: Offsite Channel - Elliot to Baseline
.04
.016
.04
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Offsite Channel - Elliot to Baseline Plan: Offsite Channel - Elliot to Baseline
.04
.016
.04
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Offsite Channel - Elliot to Baseline Plan: Offsite Channel - Elliot to Baseline
.04
.016
.04
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Offsite Channel - Elliot to Baseline Plan: Offsite Channel - Elliot to Baseline
.04
.016
.04
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Offsite Channel - Elliot to Baseline Plan: Offsite Channel - Elliot to Baseline
.04
.016
.04
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Offsite Channel - Elliot to Baseline Plan: Offsite Channel - Elliot to Baseline
.04
.016
.04
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Offsite Channel - Elliot to Baseline Plan: Offsite Channel - Elliot to Baseline
.04
.016
.04
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

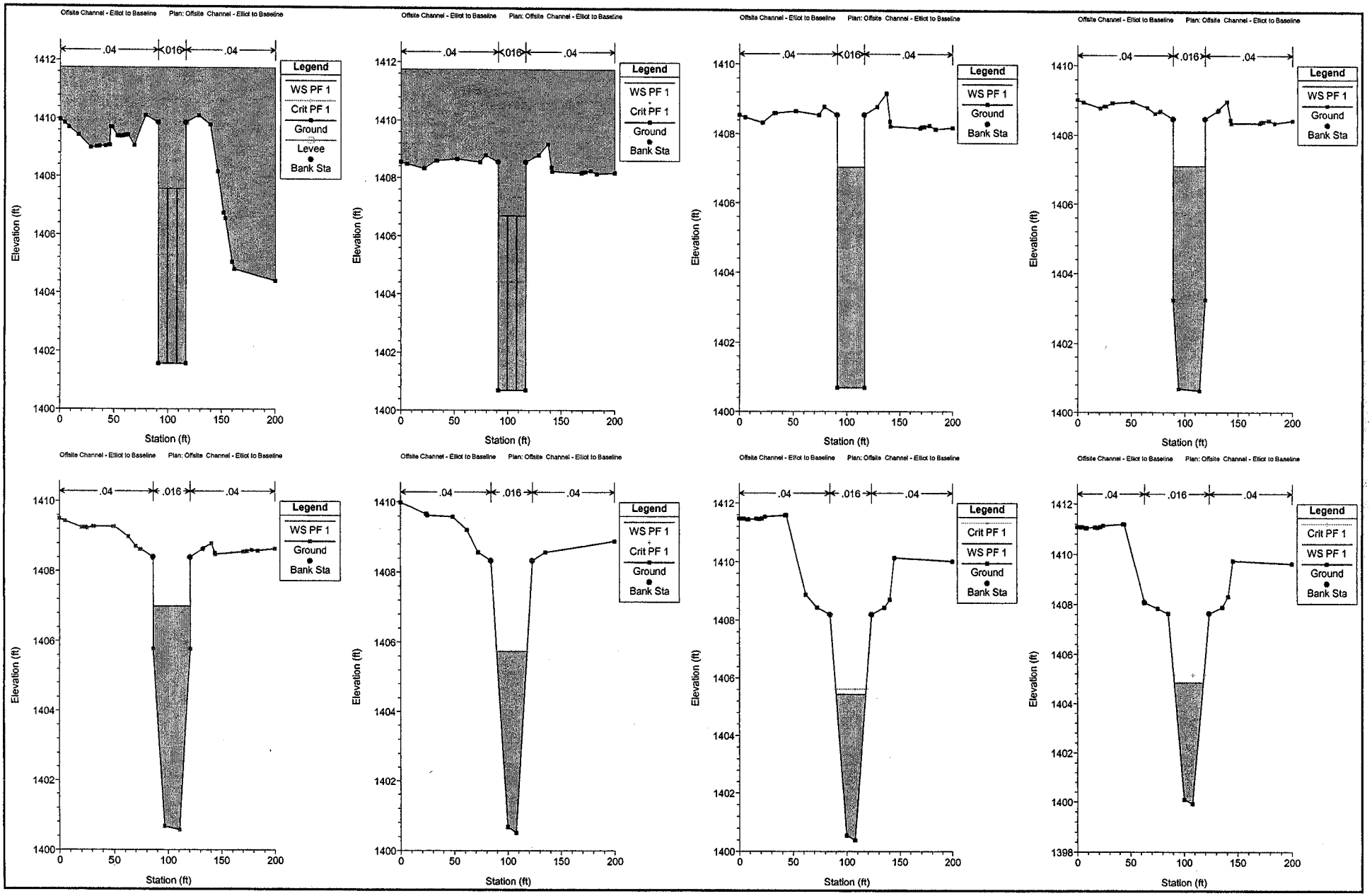

Offsite Channel - Elliot to Baseline Plan: Offsite Channel - Elliot to Baseline
.04
.016
.04
Legend
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

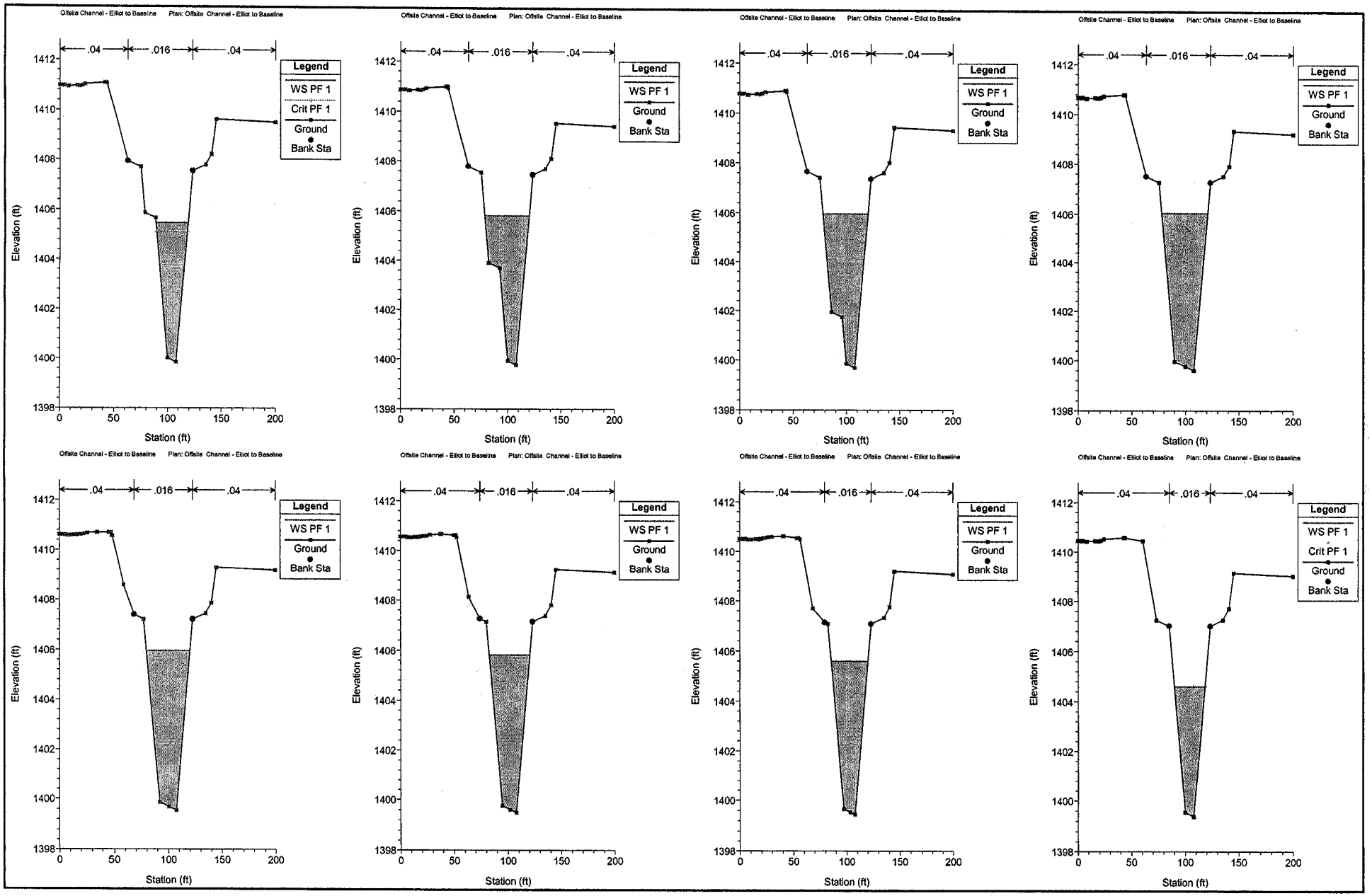

Offsite Channel - Elliot to Baseline Plan: Offsite Channel - Elliot to Baseline
.04
.016
.04
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Offsite Channel - Elliot to Baseline Plan: Offsite Channel - Elliot to Baseline
.04
.016
.04
Legend
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)
Offsite Channel - Elliot to Baseline Plan: Offsite Channel - Elliot to Baseline
.04
.016
.04
Legend
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)
Offsite Channel - Elliot to Baseline Plan: Offsite Channel - Elliot to Baseline
.04
.016
.04
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Offsite Channel - Elliot to Baseline Plan: Offsite Channel - Elliot to Baseline
.04
.016
.04
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Offsite Channel - Elliot to Baseline Plan: Offsite Channel - Elliot to Baseline
.04
.016
.04
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Offsite Channel - Elliot to Baseline Plan: Offsite Channel - Elliot to Baseline
.04
.016
.04
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Offsite Channel - Elliot to Baseline Plan: Offsite Channel - Elliot to Baseline
.04
.016
.04
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

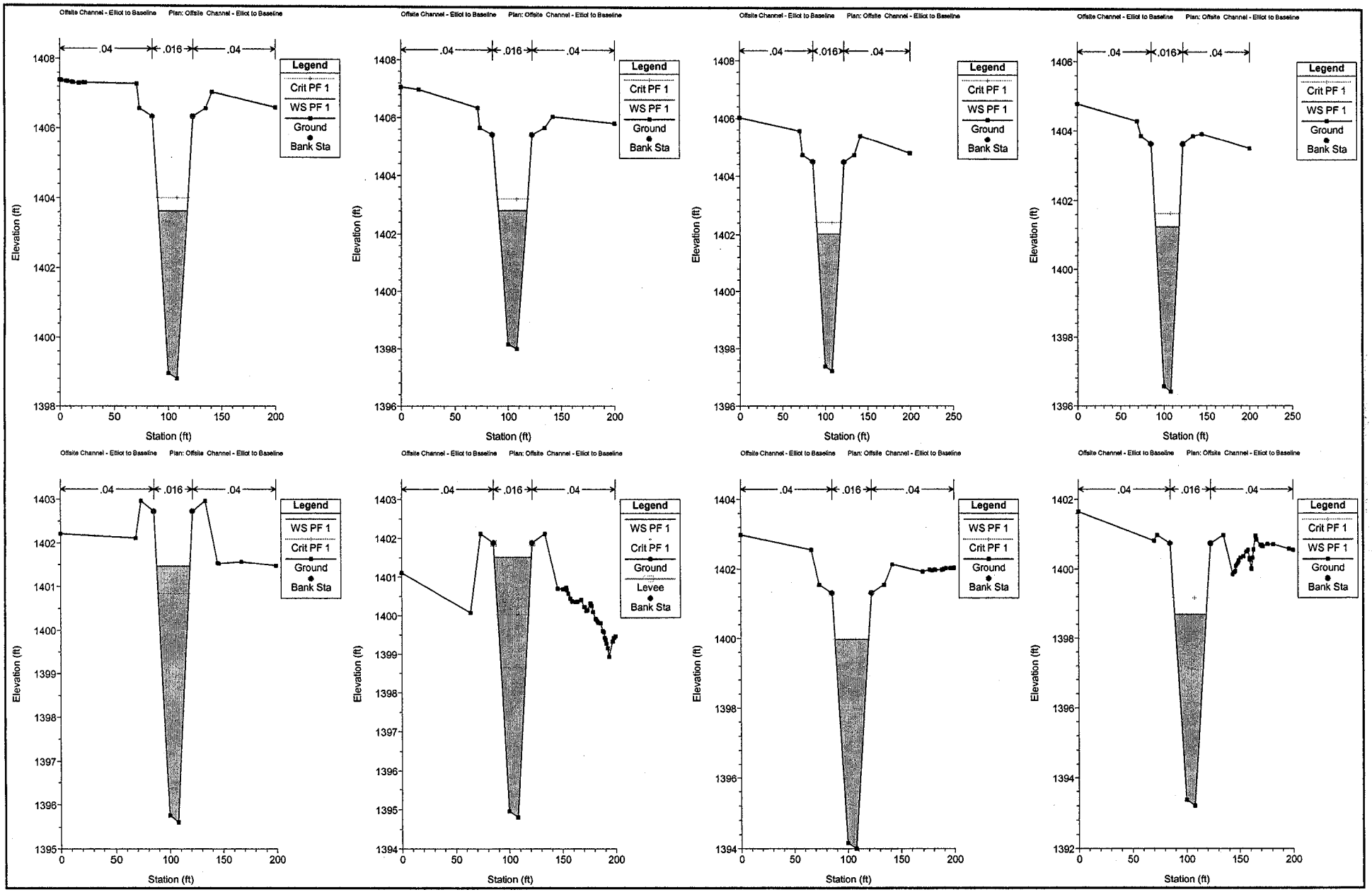

Offsite Channel - Elliot to Baseline Plan: Offsite Channel - Elliot to Baseline
.04
.016
.04
Legend
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)

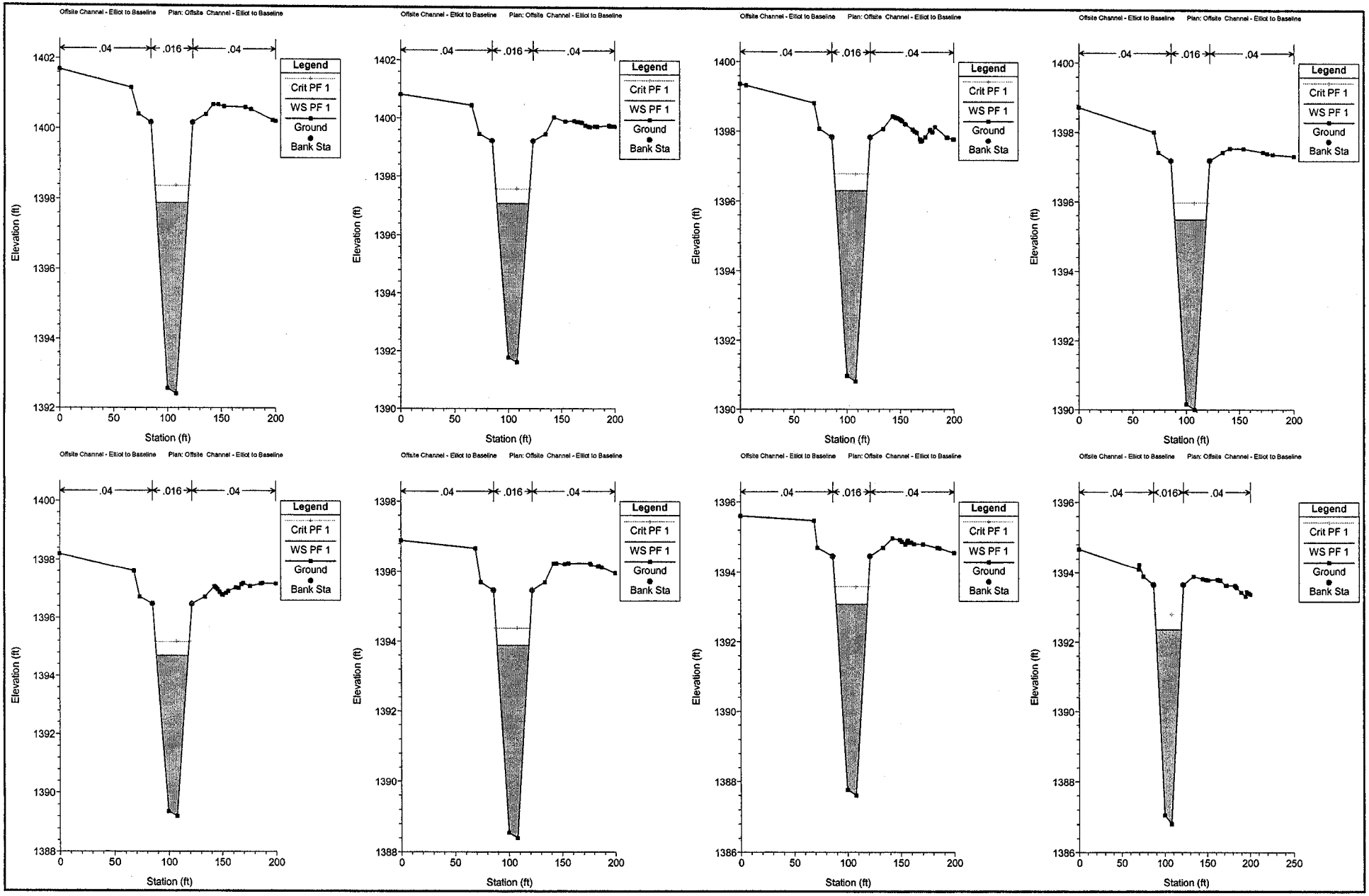

Offsite Channel - Elliot to Baseline Plan: Offsite Channel - Elliot to Baseline
.04
.016
.04
Legend
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)

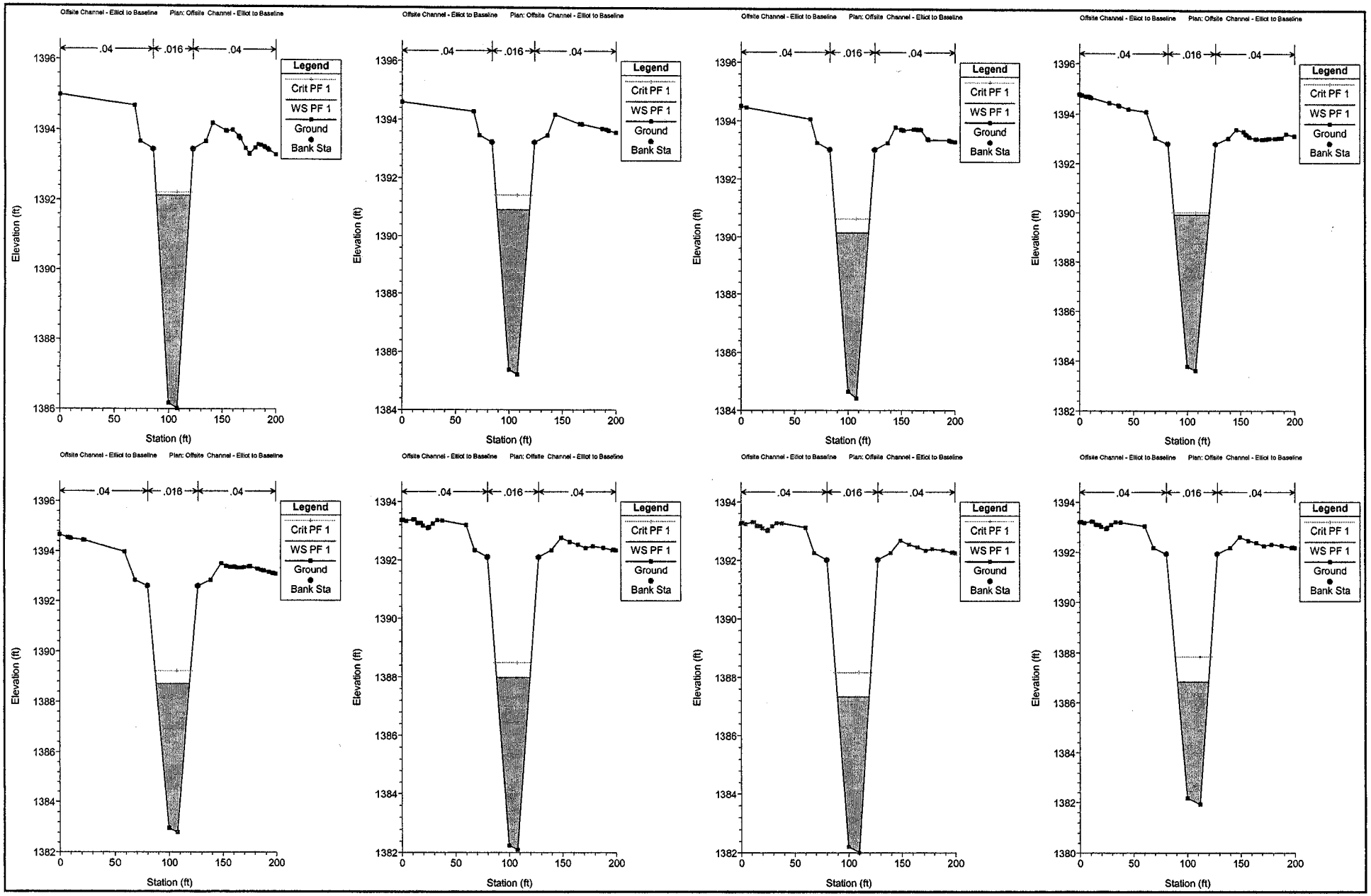

Offsite Channel - Elliot to Baseline Plan: Offsite Channel - Elliot to Baseline
.04
.016
.04
Legend
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)

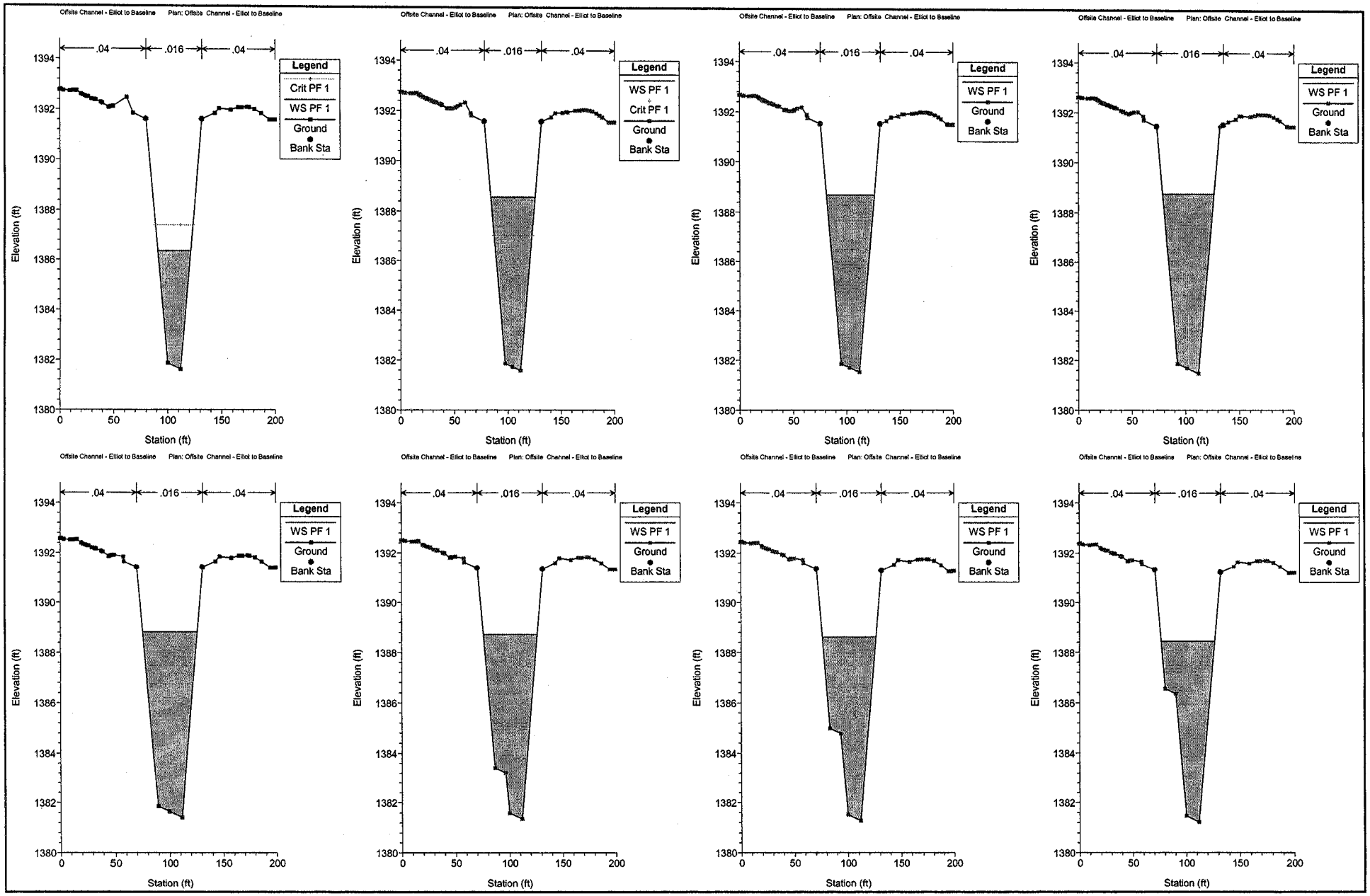

Offsite Channel - Elliot to Baseline Plan: Offsite Channel - Elliot to Baseline
.04
.016
.04
Legend
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)

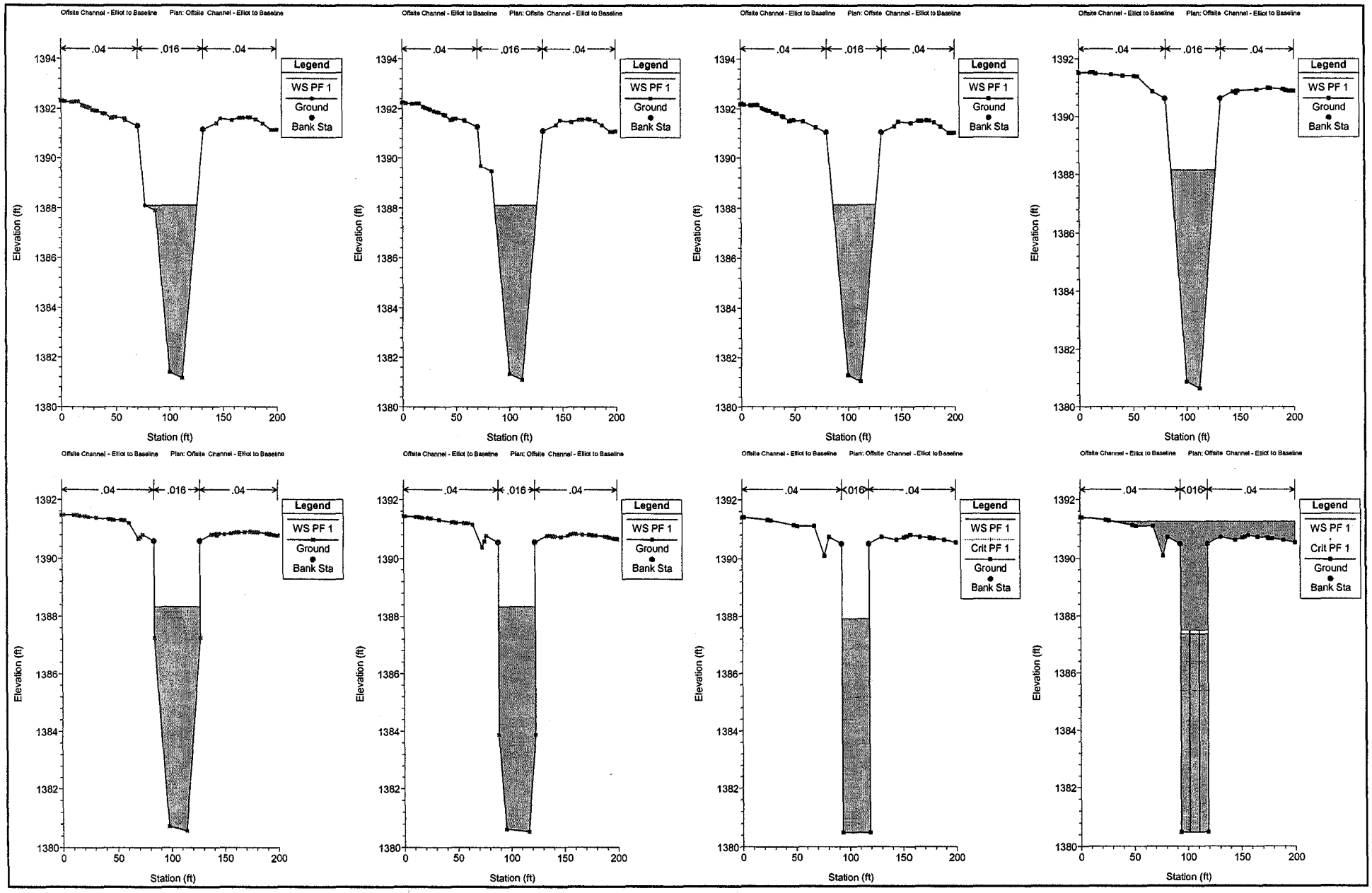

Offsite Channel - Elliot to Baseline Plan: Offsite Channel - Elliot to Baseline
.04
.016
.04
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
1398
1400
1402
1404
1406
1408
1410
1412
0
50
100
150
200

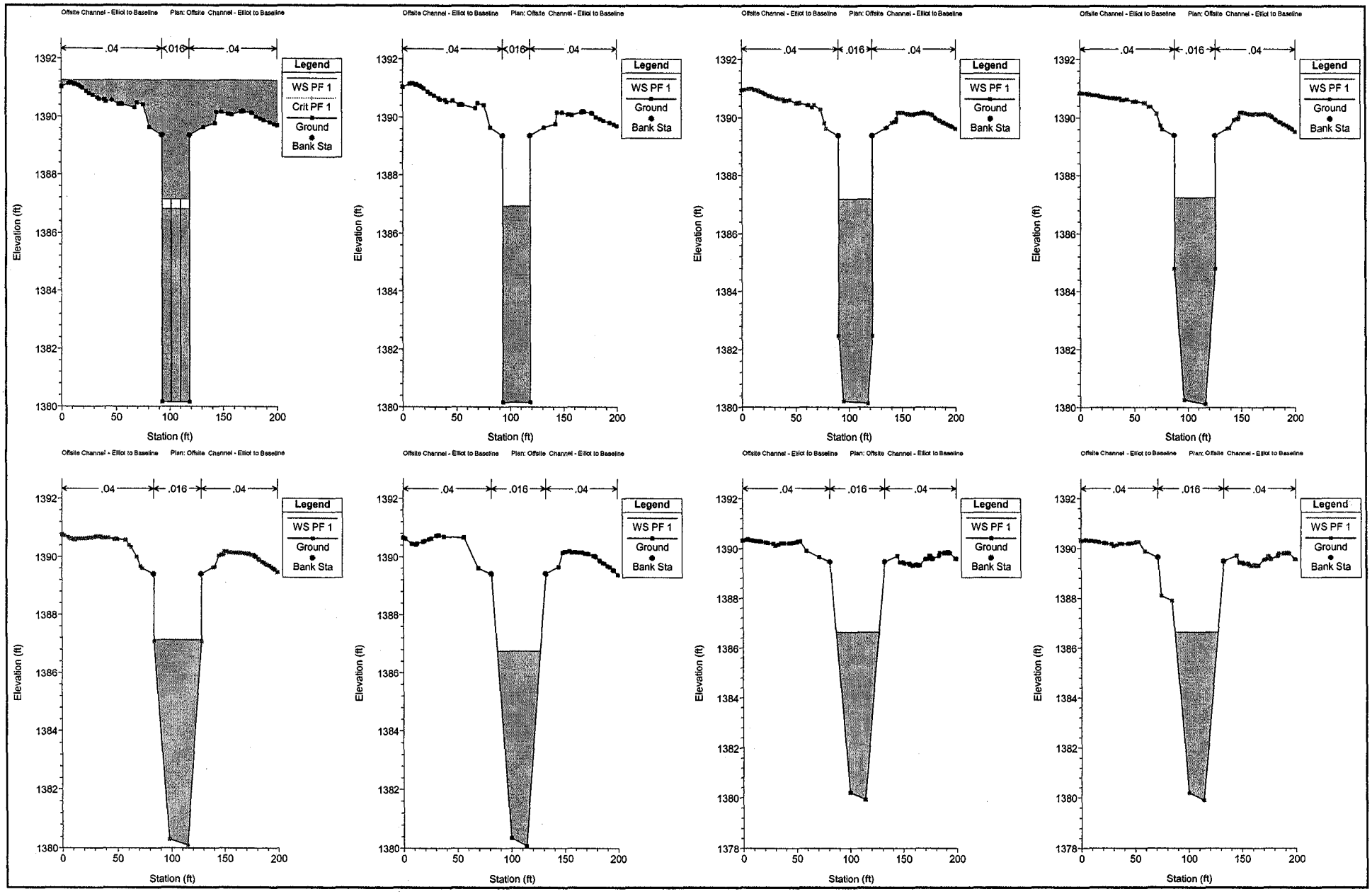

Offsite Channel - Elliot to Baseline Plan: Offsite Channel - Elliot to Baseline
.04
.016
.04
Legend
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Offsite Channel - Elliot to Baseline Plan: Offsite Channel - Elliot to Baseline
.04
.016
.04
Legend
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Offsite Channel - Elliot to Baseline Plan: Offsite Channel - Elliot to Baseline
.04
.016
.04
Legend
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Offsite Channel - Elliot to Baseline Plan: Offsite Channel - Elliot to Baseline
.04
.016
.04
Legend
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Offsite Channel - Elliot to Baseline Plan: Offsite Channel - Elliot to Baseline
.04
.016
.04
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Offsite Channel - Elliot to Baseline Plan: Offsite Channel - Elliot to Baseline
.04
.016
.04
Legend
WS PF 1
Crit PF 1
Ground
Levee
Bank Sta
Elevation (ft)
Station (ft)
Offsite Channel - Elliot to Baseline Plan: Offsite Channel - Elliot to Baseline
.04
.016
.04
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
Offsite Channel - Elliot to Baseline Plan: Offsite Channel - Elliot to Baseline
.04
.016
.04
Legend
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

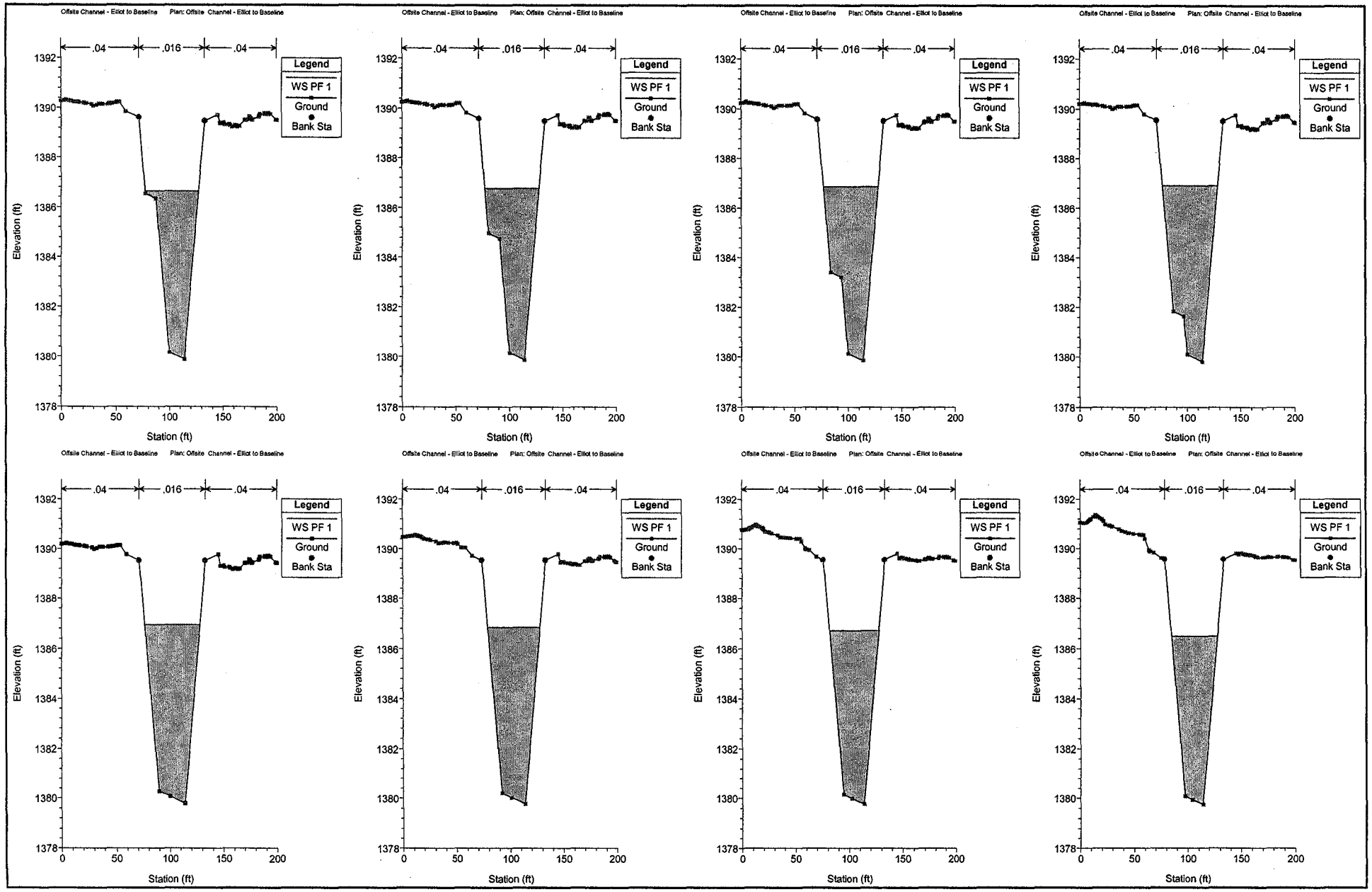

Offsite Channel - Elliot to Baseline Plan: Offsite Channel - Elliot to Baseline
.04
.016
.04
Legend
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)


Offsite Channel - Elliot to Baseline Plan: Offsite Channel - Elliot to Baseline
.04
.016
.04
Legend
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)

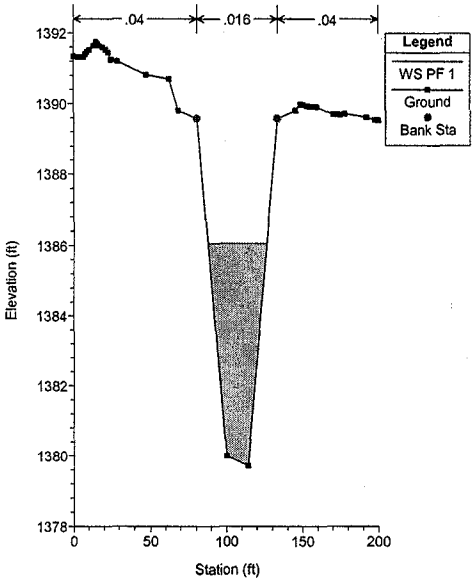

Offsite Channel - Elliot to Baseline Plan: Offsite Channel - Elliot to Baseline
.04
.016
.04
Legend
Crit PF 1
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
1394
1392
1390
1388
1386
1384
1382
1380
0
50
100
150
200


Offsite Channel - Elliot to Baseline Plan: Offsite Channel - Elliot to Baseline
.04
.016
.04
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
1380
1382
1384
1386
1388
1390
1392
1394
0
50
100
150
200

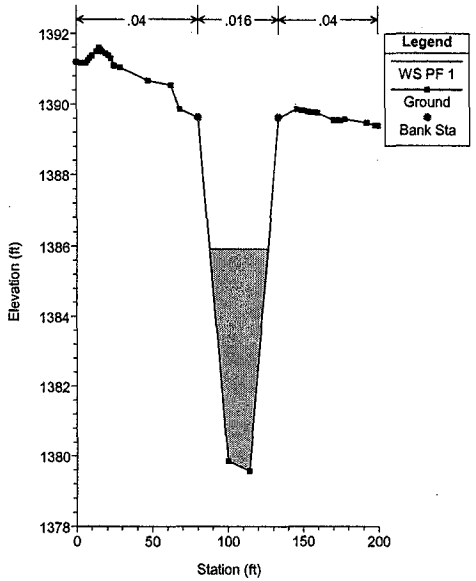

Offsite Channel - Elliot to Baseline Plan: Offsite Channel - Elliot to Baseline
.04
.016
.04
Legend
WS PF 1
Crit PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)


Offsite Channel - Elliot to Baseline Plan: Offsite Channel - Elliot to Baseline
.04
.016
.04
Legend
WS PF 1
Ground
Bank Sta
Elevation (ft)
Station (ft)
1378
1380
1382
1384
1386
1388
1390
1392
0
50
100
150
200

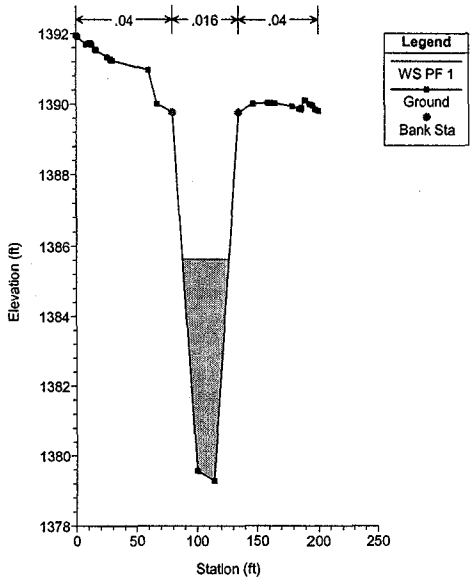
Offsite Channel - Elliot to Baseline Plan: Offsite Channel - Elliot to Baseline



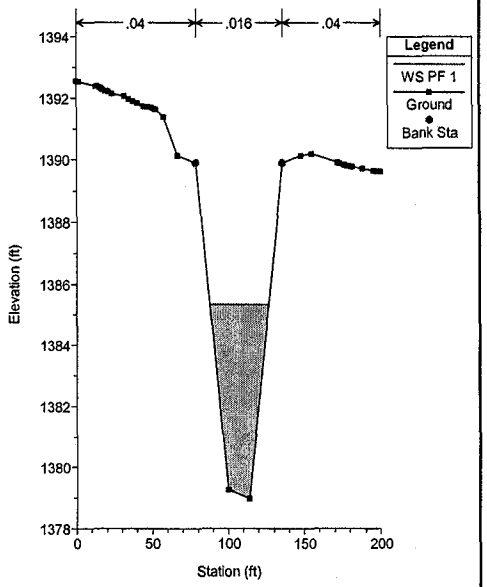
Offsite Channel - Elliot to Baseline Plan: Offsite Channel - Elliot to Baseline



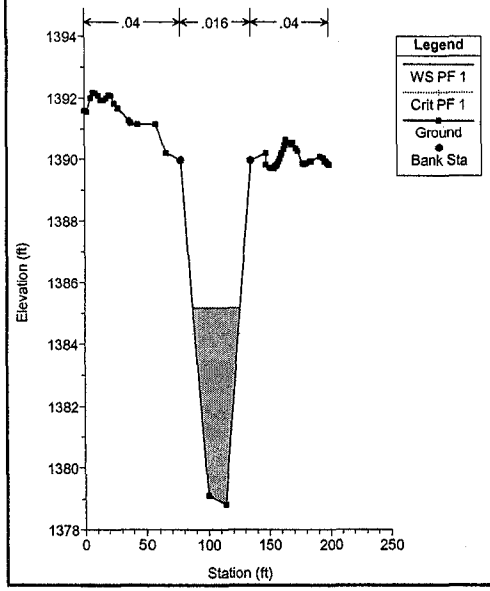
Offsite Channel - Elliot to Baseline Plan: Offsite Channel - Elliot to Baseline



Offsite Channel - Elliot to Baseline Plan: Offsite Channel - Elliot to Baseline



Offsite Channel - Elliot to Baseline Plan: Offsite Channel - Elliot to Baseline



Santan Freeway - Baseline Rd. to Elliot Rd, Spillway Summary

Stanley Consultants INC.

ADOT

Spillway Station (Channel)	Hydrology Source*	Concentration Point ID	Q 100-yr (cfs)	Spillway Slope (ft/ft)	Spillway Bottom Width (ft)	Spillway Flow Depth (ft)
Sta 121+98	HEC-1	66T70A[1]	440.00	0.0050	115	0.69
Sta 123+50	HEC-1	66T70A[1]	440.00	0.0050	95	0.78
Sta 141+00	HEC-1	67T68	1250.00	0.0050	100	1.40
Sta 179+32	Rational	1.0	48.00	0.0020	11	0.92
Sta 181+60	Rational	2.0	48.00	0.0072	23	0.43
Sta 183+50	Rational	3.0	192.00	0.0129	23	1.01
Sta 187+22	Rational	4.0[A]	99.00	0.0050	12	1.26
Sta 191+48	Rational	4.0[A]	99.00	0.0200	7	2.03
Sta 197+65	Rational	5.0	215.00	0.0234	12	2.45

* HEC-1 model by Wood/Patel and Associates Inc., file name EXIST1_S.DAT, Aug. 2, 2002.
* Rational Method by American Engineering Company Nov. 6, 1999
1) Concentration point 66T70A discharge equals 1754cfs 25% of this discharge was assumed to reach spillways at Sta 121+98 and Sta 123+50
A) Spillways at Sta 187+22 and 191+48 were both designed using the discharge from concentration point 4.0.

HYDROGRAPH AT	RECPIP	500.	12.58	468.	402.	384.	4.37
ROUTED TO	ROPIPE	500.	12.67	468.	402.	384.	4.37
HYDROGRAPH AT	REELL1	250.	12.75	149.	82.	66.	4.37
2 COMBINED AT	CPIPE1	750.	12.83	617.	485.	451.	4.34
ROUTED TO	ROPIP2	750.	12.83	617.	485.	451.	4.34
HYDROGRAPH AT	REELL2	250.	12.92	89.	22.	7.	4.37
2 COMBINED AT	CPIPE2	1000.	12.92	706.	507.	458.	4.34
ROUTED TO	ROPIP3	1000.	13.25	705.	507.	458.	4.34
HYDROGRAPH AT	RESTUB	100.	12.83	48.	12.	4.	5.18
2 COMBINED AT	CPIPE3	1100.	13.25	749.	519.	462.	4.34
ROUTED TO	ROPIP4	1100.	13.75	749.	519.	462.	4.34
2 COMBINED AT	C_FLOW	1762.	14.33	913.	560.	476.	9.52
ROUTED TO	66T70A	1754.	14.50	913.	560.	476.	9.52
HYDROGRAPH AT	66A	284.	12.33	32.	8.	3.	.26
ROUTED TO	66ATB	227.	12.75	32.	8.	3.	.26
HYDROGRAPH AT	66B	366.	13.00	77.	20.	7.	.67
DIVERSION TO	DIV66B	273.	12.75	26.	7.	2.	.67
HYDROGRAPH AT	D66B	366.	13.00	52.	13.	4.	.67
2 COMBINED AT	CP66B	539.	12.92	84.	21.	7.	.93
ROUTED TO	66BTC	524.	13.08	84.	21.	7.	.93
HYDROGRAPH AT	ADOT-E	246.	14.42	175.	64.	22.	.01
ROUTED TO	AET67A	245.	14.67	174.	64.	22.	.01
HYDROGRAPH AT	67A	216.	12.67	35.	10.	3.	.30
2 COMBINED AT	C67A	247.	14.67	192.	73.	25.	.31
ROUTED TO	67ATC	246.	15.08	191.	73.	25.	.31
HYDROGRAPH AT	SUP2	422.	13.00	381.	215.	72.	.01
ROUTED TO	RSUP2	395.	16.25	378.	215.	72.	.01

HYDROGRAPH AT	67B	366.	12.75	71.	20.	7.	.53
+ DIVERSION TO	DIV67B	295.	12.58	30.	8.	3.	.53
+ HYDROGRAPH AT	D67B	366.	12.75	46.	12.	4.	.53
+ 2 COMBINED AT	C67B	423.	12.83	386.	227.	76.	.54
+ ROUTED TO	67BTC	400.	16.83	386.	227.	76.	.54
+ HYDROGRAPH AT	67C	619.	12.75	108.	28.	9.	.93
+ DIVERSION TO	DIV67C	286.	12.25	15.	4.	1.	.93
+ HYDROGRAPH AT	D67C	619.	12.75	95.	24.	8.	.93
+ 3 COMBINED AT	C67C	925.	13.08	626.	323.	109.	1.78
+ 2 COMBINED AT	CP67C	1421.	13.08	705.	343.	116.	2.70
+ ROUTED TO	67CTD	1413.	13.17	705.	343.	116.	2.70
+ HYDROGRAPH AT	67D	145.	12.33	16.	4.	1.	.13
+ DIVERSION TO	DIV67D	145.	12.33	10.	3.	1.	.13
HYDROGRAPH AT	D67D	106.	12.42	7.	2.	1.	.13
+ 2 COMBINED AT	CP67D	1417.	13.17	709.	345.	116.	2.83
+ ROUTED TO	67DTE1	1412.	13.17	709.	345.	116.	2.83
+ ROUTED TO	67DTE2	1243.	13.58	698.	345.	116.	2.83
+ HYDROGRAPH AT	67E	421.	12.75	72.	19.	6.	.58
+ DIVERSION TO	DIV67E	360.	12.58	31.	8.	3.	.58
+ HYDROGRAPH AT	D67E	421.	12.75	42.	11.	4.	.58
+ 2 COMBINED AT	CP67E	1302.	13.58	719.	354.	119.	3.41
+ ROUTED TO	67T68	1250.	13.92	717.	354.	119.	3.41
+ HYDROGRAPH AT	62A	230.	12.67	35.	10.	3.	.38
+ ROUTED TO	62ATC	204.	12.75	35.	10.	3.	.38
+ HYDROGRAPH AT	62C	600.	12.33	69.	19.	6.	.55
DIVERSION TO	DIV62C	565.	12.25	32.	9.	3.	.55
HYDROGRAPH AT							

Offsite Spillway Sta 121+98
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	Offsite Spillway Sta 121+98
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.015	
Slope	0.005000	ft/ft
Left Side Slope	4.00	H : V
Right Side Slope	4.00	H : V
Bottom Width	115.00	ft
Discharge	440.00	cfs

Results		
Depth	0.69	ft
Flow Area	81.6	ft²
Wetted Perim	120.71	ft
Top Width	120.54	ft
Critical Depth	0.76	ft
Critical Slope	0.003627	ft/ft
Velocity	5.39	ft/s
Velocity Head	0.45	ft
Specific Energ	1.14	ft
Froude Numb	1.16	
Flow Type	Supercritical	

Offsite Spillway Sta 123+50
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	Offsite Spillway Sta 12
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.015	
Slope	0.005000	ft/ft
Left Side Slope	4.00	H : V
Right Side Slope	4.00	H : V
Bottom Width	95.00	ft
Discharge	440.00	cfs

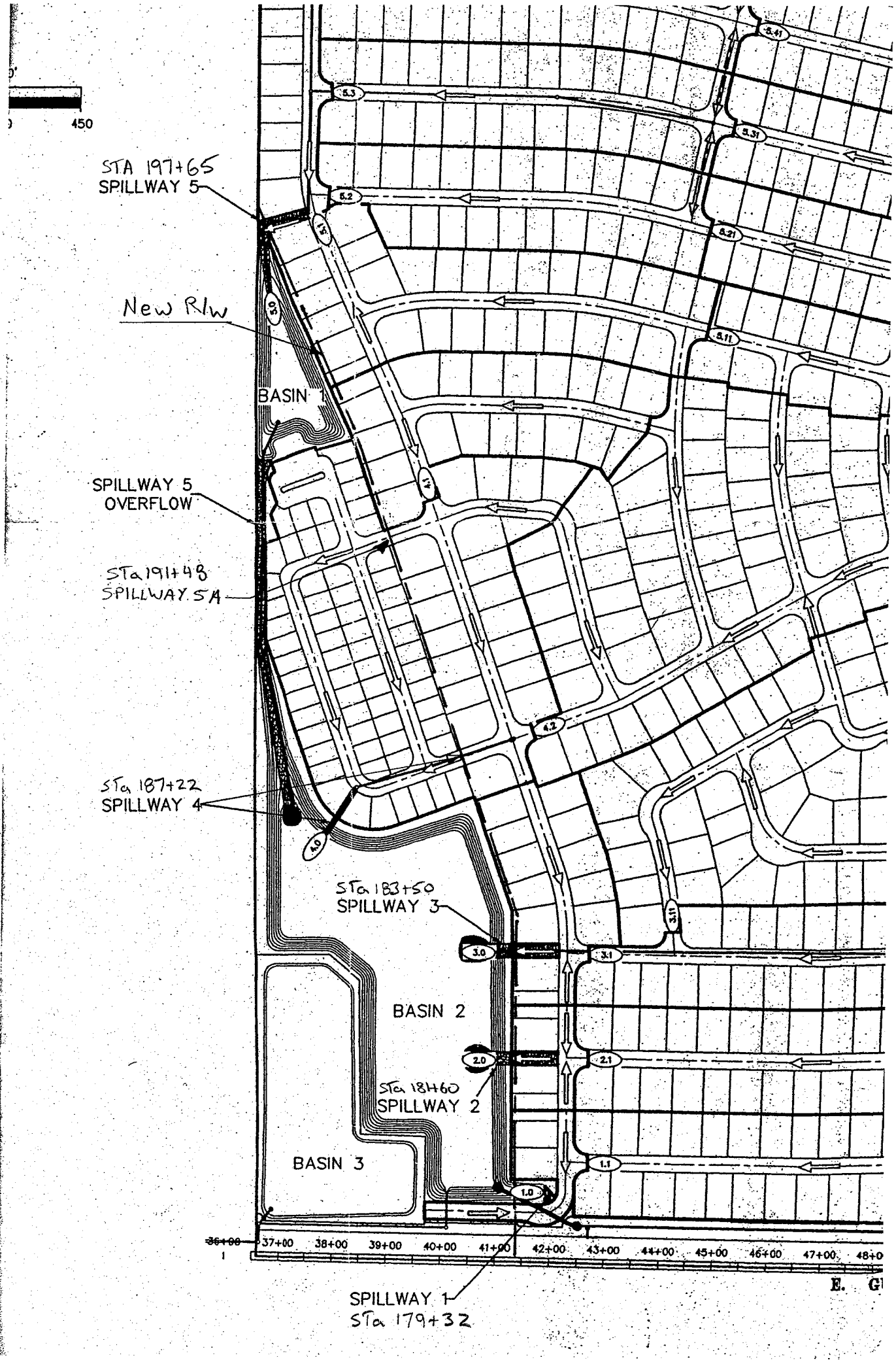
Results		
Depth	0.78	ft
Flow Area	76.1	ft²
Wetted Perim	101.39	ft
Top Width	101.20	ft
Critical Depth	0.86	ft
Critical Slope	0.003493	ft/ft
Velocity	5.78	ft/s
Velocity Head	0.52	ft
Specific Energ	1.30	ft
Froude Numb	1.18	
Flow Type	Supercritical	

Offsite Spillway Sta 141+00
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	Offsite Spillway Sta 14
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.015	
Slope	0.005000	ft/ft
Left Side Slope	4.00	H : V
Right Side Slope	4.00	H : V
Bottom Width	100.00	ft
Discharge	1,250.00	cfs

Results		
Depth	1.40	ft
Flow Area	147.9	ft²
Wetted Perim	111.55	ft
Top Width	111.20	ft
Critical Depth	1.66	ft
Critical Slope	0.002841	ft/ft
Velocity	8.45	ft/s
Velocity Head	1.11	ft
Specific Energ	2.51	ft
Froude Numb	1.29	
Flow Type	Supercritical	


450
STA 197+65
SPILLWAY 5
New R/W
BASIN 1
SPILLWAY 5
OVERFLOW
STa 191+48
SPILLWAY 5A
STa 187+22
SPILLWAY 4
STa 183+50
SPILLWAY 3
BASIN 2
STa 181+60
SPILLWAY 2
BASIN 3
SPILLWAY 1
STa 179+32
5.3
5.31
5.41
5.2
5.21
5.1
5.0
5.11
4.1
4.2
4.0
3.0
3.1
3.11
2.0
2.1
1.1
1.0
36+00
37+00
38+00
39+00
40+00
41+00
42+00
43+00
44+00
45+00
46+00
47+00
48+0

E. G

HYDROLOGICAL SUMMARY OF FLOWS

POINTS	5-YEAR	10-YEAR	100-YEAR
1	18	22	48
1.1	17	21	48
1.11	13	15	34
1.111	10	12	25
2	18	22	48
2.1	17	21	47
2.11	13	15	34
3	71	87	192
3.1	69	84	185
3.11	17	20	42
3.12	36	43	95
3.121	34	41	90
3.122	11	14	29
3.123	3	4	8
3.124	10	12	26
3.13	24	29	62
3.131	8	10	21
3.132	5	6	12
4	37	45	99
4.1	7	8	17
4.2	20	25	54
5	80	97	215
5.1	11	14	29
5.11	5	6	12
5.2	11	14	29
5.21	6	8	16
5.3	24	29	64
5.31	20	24	53
5.311	14	17	37
5.4	18	22	48
5.41	14	17	36
5.411	7	9	18
5.5	20	25	54
5.51	14	17	36
5.511	5	5	11
5.512	2	2	5

LEGEND

(#) DRAINAGE POINTS

DRAINAGE AREA BOUNDRY

AMERICAN ENGINEERING CO.

consulting engineers/surveyors

21442 NORTH 20TH AVENUE · PHOENIX, ARIZONA 85027 · 582-0260

OWNER/DEVELOPER
LAS PALMAS PARKS

PROJECT NAME
LAS PALMAS GRAND

PLAN TYPE
FINAL DRAINAGE MAP

SEALED

Registered Professional Engineer (Civil) CERTIFICATE NO. 11589 SCOTT MARVIN LARSON Date Signed Nov 13 ARIZONA U.S.A.

Las Palmas - Wall Opening Sta 179+32
Worksheet for Rectangular Channel

Spillway 1

Project Description	
Worksheet	Las Palmas Wall Opening S
Flow Element	Rectangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.015	
Slope	002000	ft/ft
Bottom Width	9.00	ft
Discharge	48.00	cfs

Results		
Depth	1.23	ft
Flow Area	11.1	ft²
Wetted Perim	11.46	ft
Top Width	9.00	ft
Critical Depth	0.96	ft
Critical Slope	0.004301	ft/ft
Velocity	4.33	ft/s
Velocity Head	0.29	ft
Specific Energ	1.52	ft
Froude Numb	0.69	
Flow Type	Subcritical	

Las Palmas - Spillway Sta 179+32
Worksheet for Trapezoidal Channel

Spillway 1

Project Description	
Worksheet	Las Palmas Spillway Sta
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.015	
Slope	0.002000	ft/ft
Left Side Slope	4.00	H : V
Right Side Slope	4.00	H : V
Bottom Width	11.00	ft
Discharge	48.00	cfs

Results		
Depth	0.92	ft
Flow Area	13.4	ft²
Wetted Perim	18.56	ft
Top Width	18.33	ft
Critical Depth	0.76	ft
Critical Slope	0.003889	ft/ft
Velocity	3.57	ft/s
Velocity Head	0.20	ft
Specific Energ	1.11	ft
Froude Numb	0.74	
Flow Type	Subcritical	

Las Palmas - Wall Opening Sta 181+60
Worksheet for Rectangular Channel

Spillway 2

Project Description	
Worksheet	Las Palmas Wall Opening S
Flow Element	Rectangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.015	
Slope	006000	ft/ft
Bottom Width	17.67	ft
Discharge	48.00	cfs

Results		
Depth	0.55	ft
Flow Area	9.7	ft²
Wetted Perim	18.77	ft
Top Width	17.67	ft
Critical Depth	0.61	ft
Critical Slope	0.004222	ft/ft
Velocity	4.94	ft/s
Velocity Head	0.38	ft
Specific Energ	0.93	ft
Froude Numb	1.18	
Flow Type	Supercritical	

Las Palmas - Spillway Sta 181+60
Worksheet for Trapezoidal Channel

Spillway 2

Project Description	
Worksheet	Las Palmas Spillway Sta
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.015	
Slope	0.007200	ft/ft
Left Side Slope	4.00	H : V
Right Side Slope	4.00	H : V
Bottom Width	23.00	ft
Discharge	48.00	cfs

Results		
Depth	0.43	ft
Flow Area	10.6	ft²
Wetted Perim	26.52	ft
Top Width	26.42	ft
Critical Depth	0.50	ft
Critical Slope	0.004268	ft/ft
Velocity	4.55	ft/s
Velocity Head	0.32	ft
Specific Energ	0.75	ft
Froude Numb	1.27	
Flow Type	Supercritical	

Las Palmas - Wall Opening Sta 183+50
Worksheet for Rectangular Channel

Spillway 3

Project Description	
Worksheet	Las Palmas Wall Opening S
Flow Element	Rectangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.015	
Slope	0.012900	ft/ft
Bottom Width	18.00	ft
Discharge	192.00	cfs

Results		
Depth	1.01	ft
Flow Area	18.2	ft²
Wetted Perim	20.02	ft
Top Width	18.00	ft
Critical Depth	1.52	ft
Critical Slope	0.003510	ft/ft
Velocity	10.55	ft/s
Velocity Head	1.73	ft
Specific Energ	2.74	ft
Froude Numb	1.85	
Flow Type	Supercritical	

Las Palmas - Spillway Sta 183+50
Worksheet for Trapezoidal Channel

Spillway 3

Project Description	
Worksheet	Las Palmas Spillway Sta
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.015	
Slope	0.012500	ft/ft
Left Side Slope	4.00	H : V
Right Side Slope	4.00	H : V
Bottom Width	23.00	ft
Discharge	192.00	cfs

Results		
Depth	0.82	ft
Flow Area	21.5	ft²
Wetted Perim	29.75	ft
Top Width	29.55	ft
Critical Depth	1.20	ft
Critical Slope	0.003291	ft/ft
Velocity	8.92	ft/s
Velocity Head	1.24	ft
Specific Energ	2.06	ft
Froude Numb	1.84	
Flow Type	Supercritical	

Las Palmas - Wall Opening Sta 187+22
Worksheet for Rectangular Channel

Spillway 4

Project Description	
Worksheet	Las Palmas Wall Opening S
Flow Element	Rectangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.015	
Slope	0.005000	ft/ft
Bottom Width	11.00	ft
Discharge	99.00	cfs

Results		
Depth	1.26	ft
Flow Area	13.9	ft²
Wetted Perim	13.52	ft
Top Width	11.00	ft
Critical Depth	1.36	ft
Critical Slope	0.003973	ft/ft
Velocity	7.13	ft/s
Velocity Head	0.79	ft
Specific Energ	2.05	ft
Froude Numb	1.12	
Flow Type	Supercritical	

Las Palmas - Spillway Sta 187+22
Worksheet for Trapezoidal Channel

Spillway 4

Project Description	
Worksheet	Las Palmas Spillway Sta
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.015	
Slope	0.020000	ft/ft
Left Side Slope	4.00	H : V
Right Side Slope	4.00	H : V
Bottom Width	12.00	ft
Discharge	99.00	cfs

Results		
Depth	0.69	ft
Flow Area	10.2	ft²
Wetted Perim	17.70	ft
Top Width	17.53	ft
Critical Depth	1.13	ft
Critical Slope	0.003476	ft/ft
Velocity	9.70	ft/s
Velocity Head	1.46	ft
Specific Energ	2.15	ft
Froude Numb	2.24	
Flow Type	Supercritical	

Las Palmas - Wall Opening Sta 191+48
Worksheet for Rectangular Channel

Spillway 5A

Project Description	
Worksheet	Las Palmas Wall Opening S
Flow Element	Rectangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.015	
Slope	0.005200	ft/ft
Bottom Width	6.00	ft
Discharge	99.00	cfs

Results		
Depth	2.03	ft
Flow Area	12.2	ft²
Wetted Perim	10.06	ft
Top Width	6.00	ft
Critical Depth	2.04	ft
Critical Slope	0.005162	ft/ft
Velocity	8.12	ft/s
Velocity Head	1.02	ft
Specific Energ	3.06	ft
Froude Numb	1.00	
Flow Type	Supercritical	

Las Palmas - Spillway Sta 191+48
Worksheet for Trapezoidal Channel

Spillway 5A

Project Description	
Worksheet	Las Palmas Spillway Sta
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.015	
Slope	0.020000	ft/ft
Left Side Slope	4.00	H : V
Right Side Slope	4.00	H : V
Bottom Width	7.00	ft
Discharge	99.00	cfs

Results		
Depth	0.89	ft
Flow Area	9.4	ft²
Wetted Perim	14.33	ft
Top Width	14.11	ft
Critical Depth	1.40	ft
Critical Slope	0.003394	ft/ft
Velocity	10.56	ft/s
Velocity Head	1.73	ft
Specific Energ	2.62	ft
Froude Numb	2.28	
Flow Type	Supercritical	

Las Palmas - Wall Opening Sta 197+65
Worksheet for Rectangular Channel

Spillway 5

Project Description	
Worksheet	Las Palmas Wall Opening S
Flow Element	Rectangular Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.015	
Slope	0.002600	ft/ft
Bottom Width	12.00	ft
Discharge	215.00	cfs

Results		
Depth	2.45	ft
Flow Area	29.4	ft²
Wetted Perim	16.90	ft
Top Width	12.00	ft
Critical Depth	2.15	ft
Critical Slope	0.003822	ft/ft
Velocity	7.31	ft/s
Velocity Head	0.83	ft
Specific Energ	3.28	ft
Froude Numb	0.82	
Flow Type	Subcritical	

Las Palmas Spillway Sta 197+65
Worksheet for Trapezoidal Channel

Spillway 5

Project Description	
Worksheet	Las Palmas Spillway Sta
Flow Element	Trapezoidal Channel
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.015	
Slope	0.023400	ft/ft
Left Side Slope	4.00	H : V
Right Side Slope	4.00	H : V
Bottom Width	15.00	ft
Discharge	215.00	cfs

Results		
Depth	0.92	ft
Flow Area	17.1	ft²
Wetted Perim	22.55	ft
Top Width	22.32	ft
Critical Depth	1.60	ft
Critical Slope	0.003118	ft/ft
Velocity	12.59	ft/s
Velocity Head	2.46	ft
Specific Energ	3.38	ft
Froude Numb	2.54	
Flow Type	Supercritical	

APPENDIX B EAST CHANNEL PLANS

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-C(005)B			
		202L MA 031			

All Coordinates Are Ground Coordinates And All Bearings Are Grid Bearings

G.A.F. = 1.00016

PLAN REF NO	LOCATION	P.I./P.O.T. STATION	COORDINATES									
80003	Channel Cst ℄ POT	115+00.00	N=854192.58	E=783675.30								
C1	Channel Cst ℄ PI	117+99.17	N=854490.93	E=783697.37	SIMPLE	Δ=3°57'54"	D=1°25'57"	R=4000	T=138.46	L=276.80	Ext=2.40	
70056	Channel Cst ℄ PI	123+40.78	N=855032.65	E=783699.89								
70057	Channel Cst ℄ PI	123+98.57	N=855090.02	E=783692.96								
70058	Channel Cst ℄ PI	126+19.57	N=855310.97	E=783688.44								
70059	Channel Cst ℄ PI	126+53.98	N=855344.85	E=783694.49								
C2	Channel Cst ℄ PI	134+66.37	N=856156.41	E=783657.93	SIMPLE	Δ=6°46'48"	D=3°10'59"	R=1800	T=106.63	L=213.00	Ext=3.16	
C3	Channel Cst ℄ PI	141+73.26	N=856854.13	E=783542.92	SIMPLE	Δ=9°03'06"	D=0°57'11"	R=6012	T=475.88	L=949.78	Ext=18.80	
C4	Channel Cst ℄ PI	163+10.06	N=858992.89	E=783531.41	SIMPLE	Δ=4°47'53"	D=2°51'53"	R=2000	T=83.79	L=167.48	Ext=1.75	
70016	Channel Cst ℄ PI	174+82.55	N=860161.88	E=783623.20								
70060	Channel Cst ℄ PI	176+31.31	N=860310.61	E=783625.96								
70061	Channel Cst ℄ PI	176+75.93	N=860354.52	E=783618.02								
70062	Channel Cst ℄ PI	179+03.93	N=860582.48	E=783622.26								
70063	Channel Cst ℄ PI	179+48.54	N=860626.06	E=783631.82								
C5	Channel Cst ℄ PI	184+75.19	N=861152.70	E=783632.84	SIMPLE	Δ=21°57'11"	D=2°51'53"	R=2000	T=387.91	L=766.31	Ext=37.27	
70021	Channel Cst ℄ PI	197+96.42	N=862387.92	E=783137.74								
70025	Channel Cst ℄ PI	205+80.80	N=863085.14	E=782778.40								
C6	Channel Cst ℄ PI	214+43.06	N=863879.23	E=782442.35	SIMPLE	Δ=12°36'04"	D=5°39'42"	R=1012	T=111.74	L=222.57	Ext=6.15	
C7	Channel Cst ℄ PI	222+91.18	N=864714.47	E=782290.02	SIMPLE	Δ=8°51'33"	D=11°11'26"	R=512	T=39.66	L=79.17	Ext=1.53	
C8	Channel Cst ℄ PI	229+84.20	N=865407.42	E=782272.15	SIMPLE	Δ=6°35'59"	D=5°43'46"	R=1000	T=57.66	L=115.19	Ext=1.66	
70052	Channel Cst ℄ PI	234+74.12	N=865895.51	E=782315.91								
80004	Channel Cst ℄ PI	238+99.34	N=866312.53	E=782398.98								

CURVE DATA TABLE

	NAME	DATE
DESIGN	RSR	4/03
DRAWN	CGS	4/03
CHECKED	CAD	4/03

Stanley Consultants inc.
2929 East Camelback Road, Suite 150
Phoenix, Arizona 85016
Phone (602) 957-6000

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

EAST CHANNEL
GEOMETRIC DATA

95%
PRELIMINARY
NOT FOR
CONSTRUCTION

ROUTE: 202L
LOCATION: SANTAN FWY, ELLIOT ROAD - BASELINE ROAD

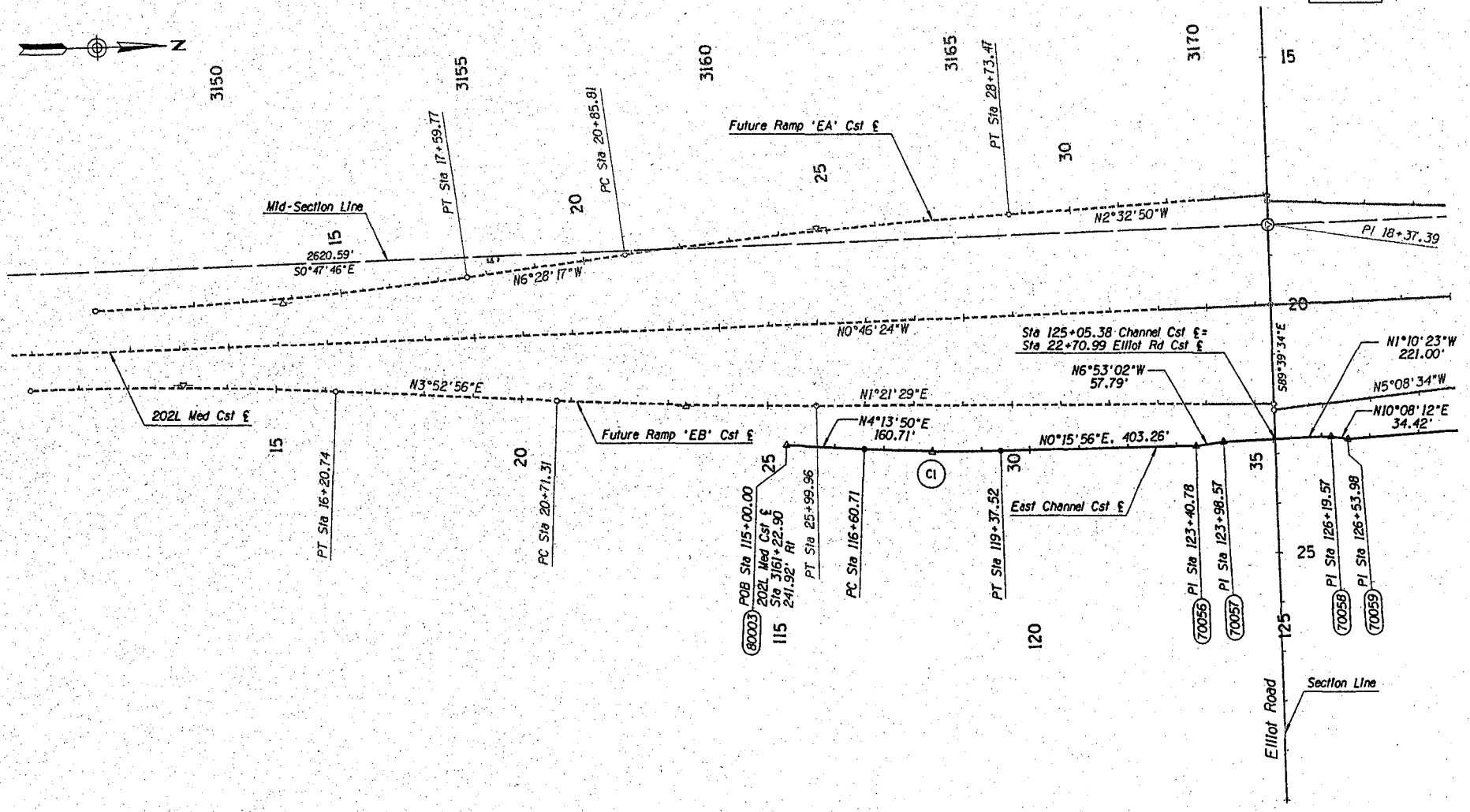
DWG NO. D-3.1

TRACS NO. H 5915 01C | 202-C(005)B | ___ OF ___

DATE: LOCATION: REVISIONS: FINISHED PLANS: SURVEY NO.

04/21/2003 q:\16110\Dgn\drainage\h5915d3a.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-C(005)B			
		202L MA 031			



	NAME	DATE
DESIGN	RSR	4/03
DRAWN	CGS	4/03
CHECKED	CAD	4/03

Stanley Consultants inc.
2929 East Camelback Road, Suite 170
Phoenix, Arizona 85016
Phone (602) 957-5500

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

EAST CHANNEL
GEOMETRIC LAYOUT

95%
PRELIMINARY
NOT FOR
CONSTRUCTION

ROUTE: 202L
LOCATION: SANTAN FWY, ELLIOT ROAD - BASELINE ROAD

DWG NO. D-3.2

TRACS NO. H 5915 01C

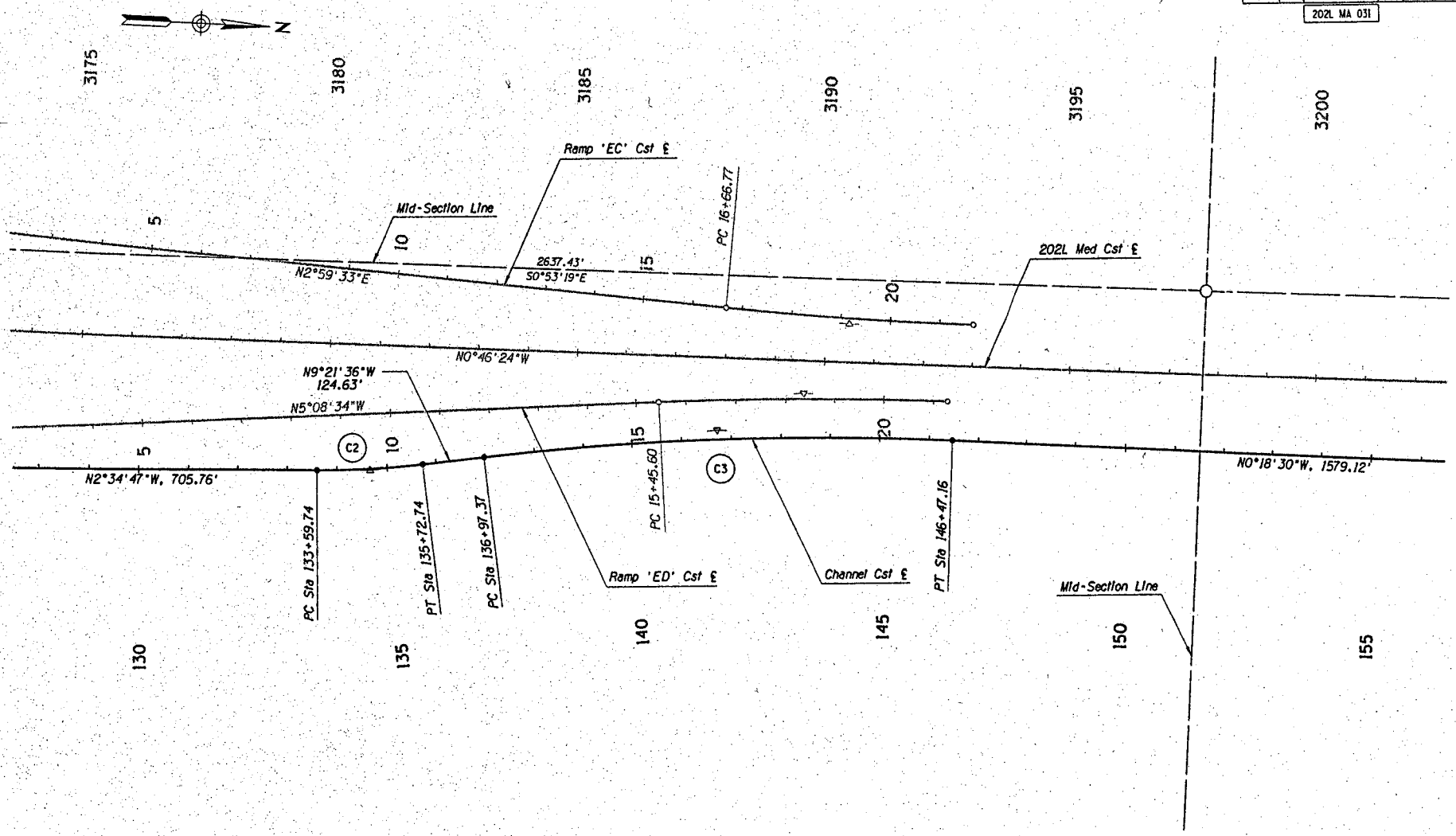
202-C(005)B

___ OF ___

04/21/2003 qr\16110\Dgn\drainage\h5915d36.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-C(005)B			

202L MA 031



	NAME	DATE
DESIGN	RSR	4/03
DRAWN	CGS	4/03
CHECKED	CAD	4/03

Stanley Consultants Inc.
7878 East Camelback Road, Suite 150
Phoenix, Arizona 85251
Phone (602) 97-4000

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

EAST CHANNEL
GEOMETRIC LAYOUT

95%
PRELIMINARY
NOT FOR
CONSTRUCTION

ROUTE: 202L
LOCATION: SANTAN FWY, ELLIOT ROAD - BASELINE ROAD

DWG NO. D-3.3

TRACS NO. H 5915 01C

202-C(005)B

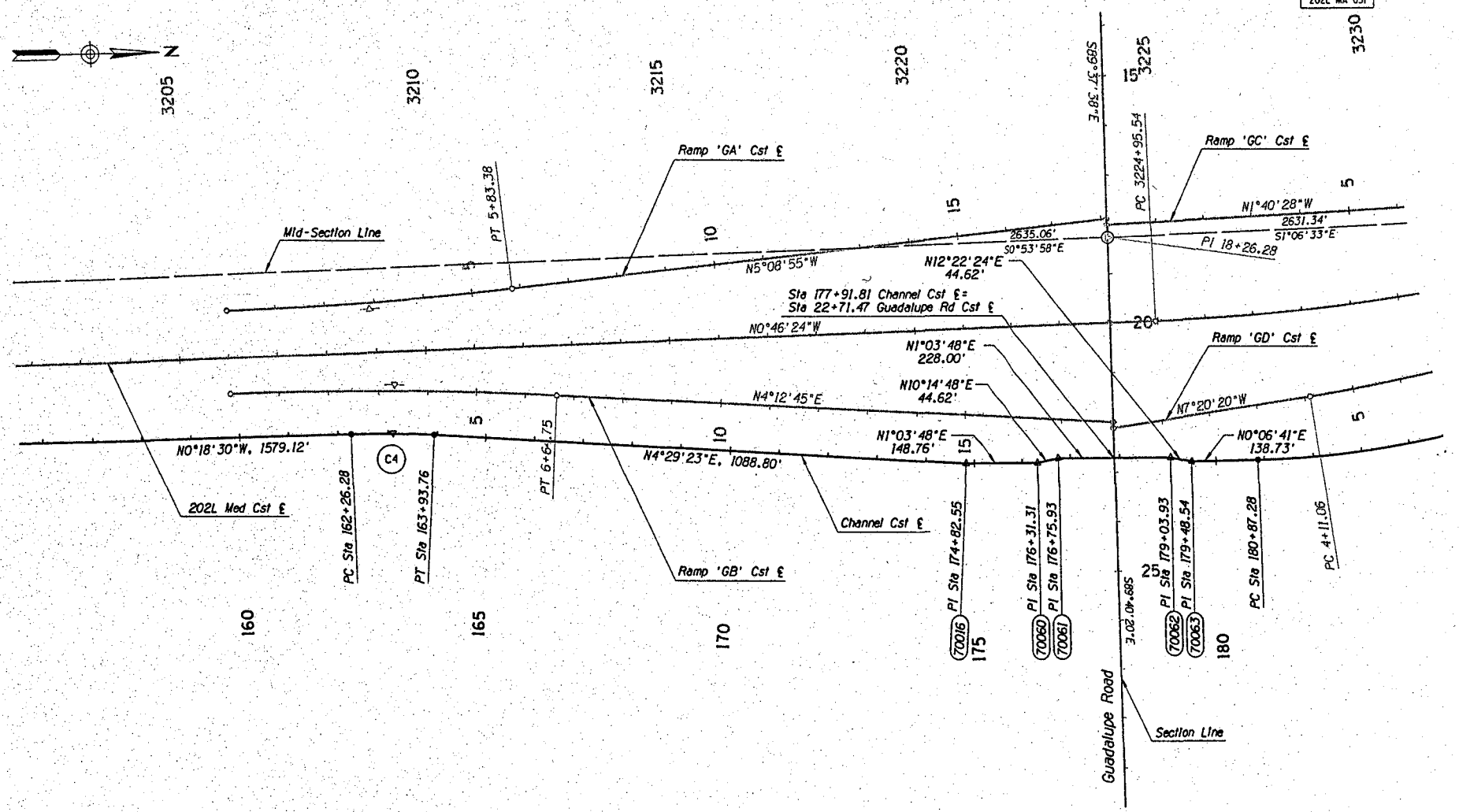
___ OF ___

04/21/2003 qt\16110\Dgn\drainage\h5915d3c.dgn

DATE- LOCATION- REVISIONS- FINISHED PLANS- SURVEY NO.

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-C(005)B			

202L MA 031



	NAME	DATE
DESIGN	RSR	4/03
DRAWN	CGS	4/03
CHECKED	CAD	4/03

Stanley Consultants INC.

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

EAST CHANNEL
GEOMETRIC LAYOUT

95%
PRELIMINARY
NOT FOR
CONSTRUCTION

ROUTE: 202L
LOCATION: SANTAN FWY, ELLIOT ROAD - BASELINE ROAD

DWG NO. D-3.4

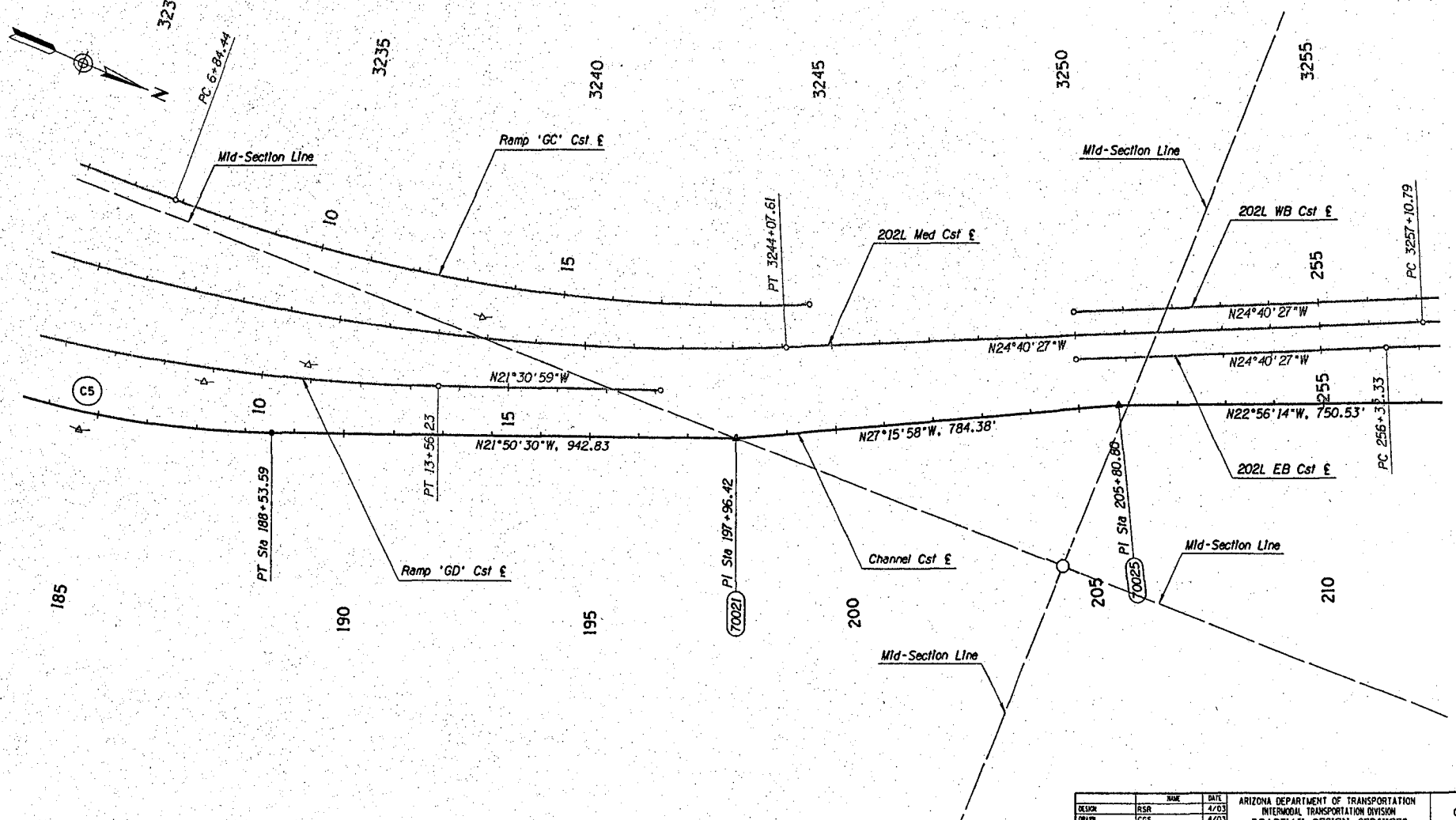
TRACS NO. H 5915 01C

202-C(005)B

___ OF ___

04/21/2003 q:\16110\dgn\drainage\h5915d3d.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-C(005)B			
		202L MA 031			



	NAME	DATE
DESIGN	RSR	4/03
DRAWN	CCS	4/03
CHECKED	CAD	4/03

Stanley Consultants inc.
2929 East Camelback Road, Suite 126
Phoenix, Arizona 85016
Phone: (602) 957-6200

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

EAST CHANNEL
GEOMETRIC LAYOUT

95%
PRELIMINARY
NOT FOR
CONSTRUCTION

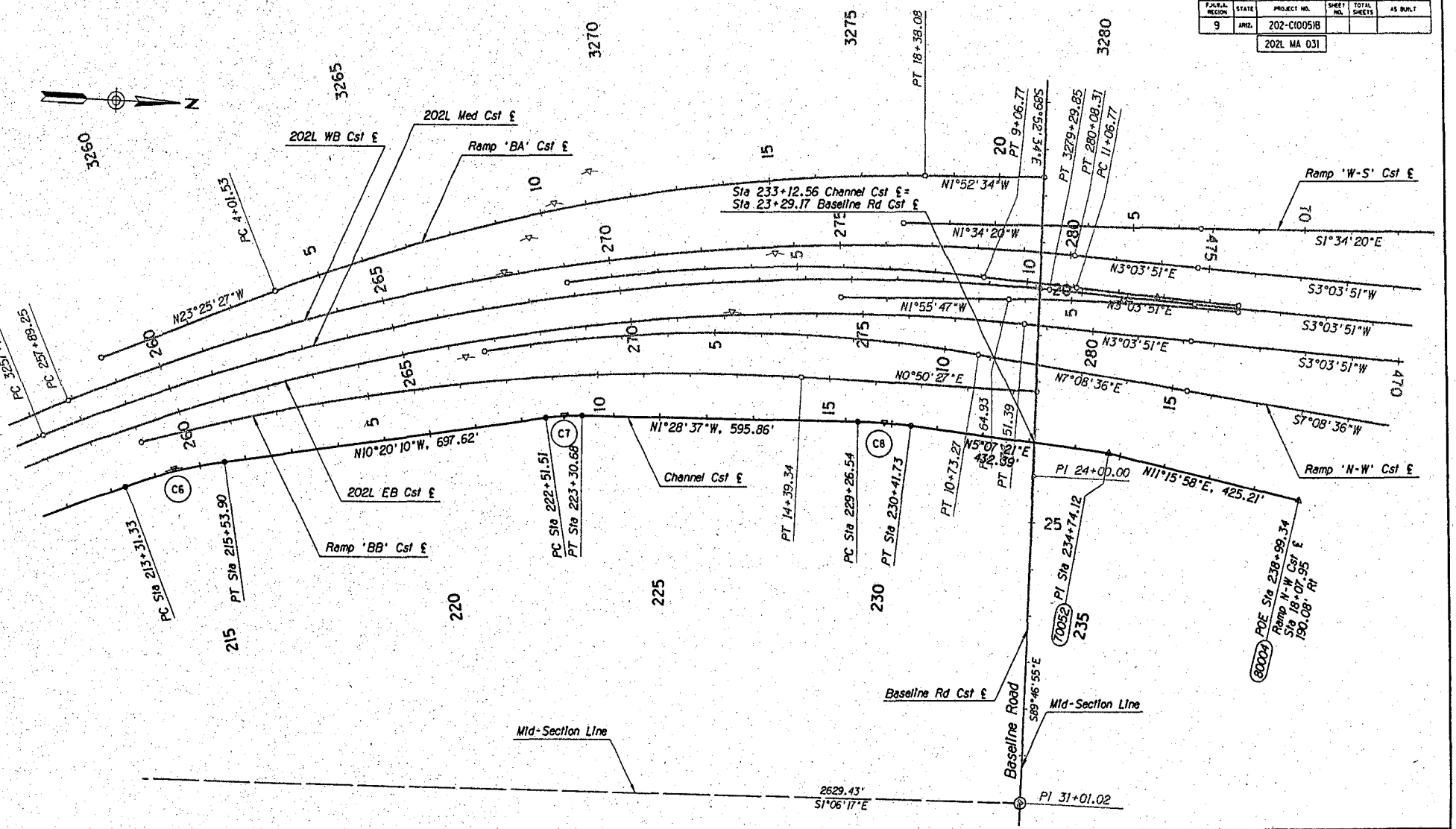
ROUTE: 202L
LOCATION: SANTAN FWY, ELLIOT ROAD - BASELINE ROAD
DWG NO. D-3.5

TRACS NO. H 5915 01C
202-C(005)B
___ OF ___

04/21/2003 qi\16110\Dgn\drainage\h5915d3e.dgn

SURVEY NO. | FINISHED PLANS | REVISIONS | LOCATION | DATE | SURVEY NO. | FINISHED PLANS | REVISIONS | LOCATION | DATE

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-C(005)B			
		202L MA 031			



	NAME	DATE
DESIGN	RSR	4/03
DRAWN	CGS	4/03
CHECKED	CAD	4/03

Stanley Consultants inc.
2929 East Camelback Road, Suite 130
Phoenix, Arizona 85016
Phone: (602) 312-8200

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

EAST CHANNEL
GEOMETRIC LAYOUT

95%
PRELIMINARY
NOT FOR
CONSTRUCTION

ROUTE: 202L
LOCATION: SANTAN FWY. ELLIOT ROAD - BASELINE ROAD

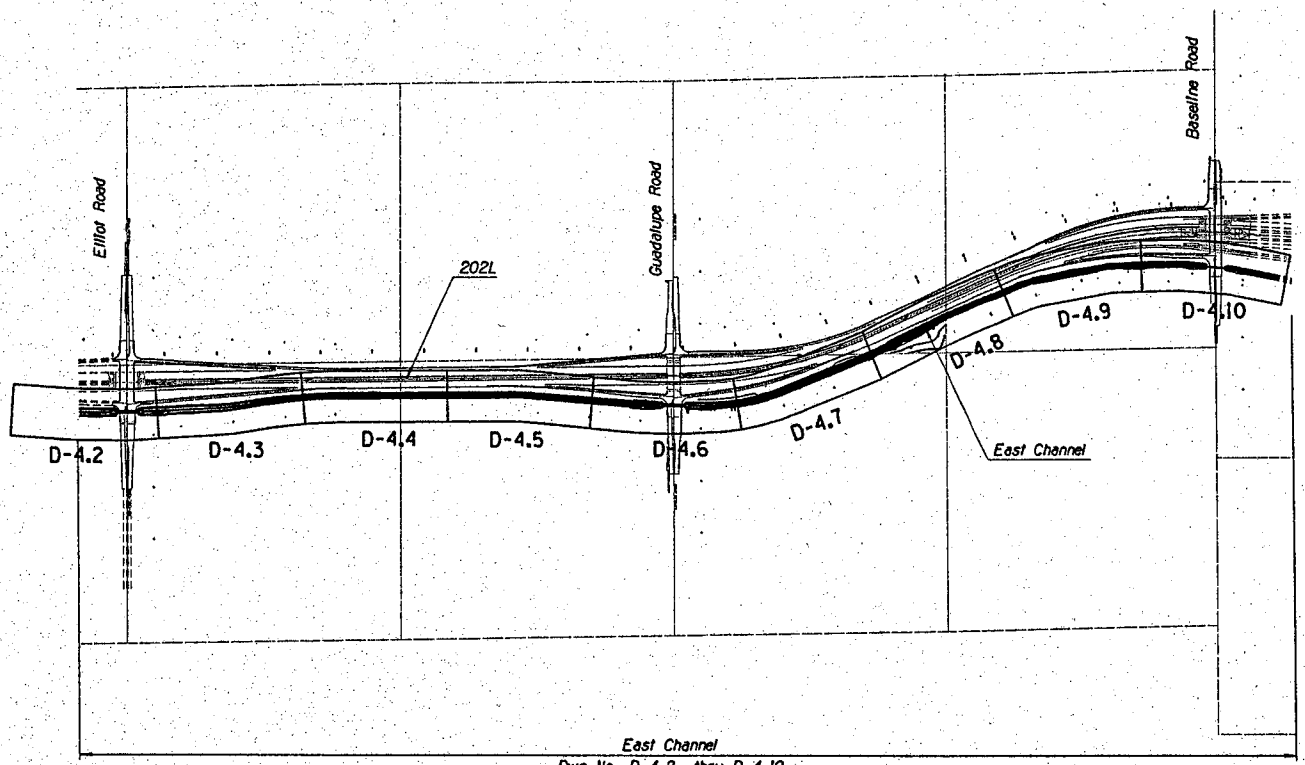
DWG NO. D-3.6

TRACS NO. H 5915 01C | 202-C(005)B | ___ OF ___

04/21/2003 gr\16110\Dgn\drainage\h5915d3f.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-C(005)B			

202L MA 031



Dwg No. D-4.2 thru D-4.10

	NAME	DATE
DESIGN	RSR	4/03
DRAWN	CGS	4/03
CHECKED	CAD	4/03

Stanley Consultants inc.

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

EAST CHANNEL
DRAWING LAYOUT

95%
PRELIMINARY
NOT FOR
CONSTRUCTION

ROUTE: 202L
LOCATION: SANTAN FWY, ELLIOT ROAD - BASELINE ROAD

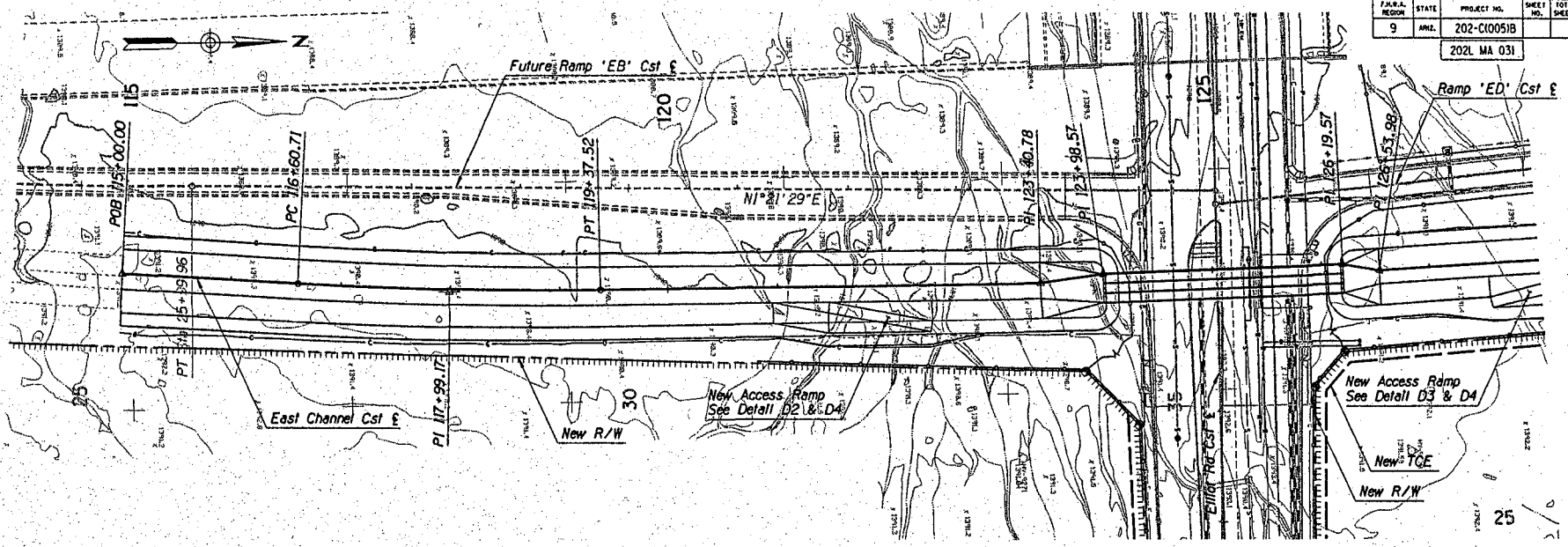
DWG NO. D-4.1

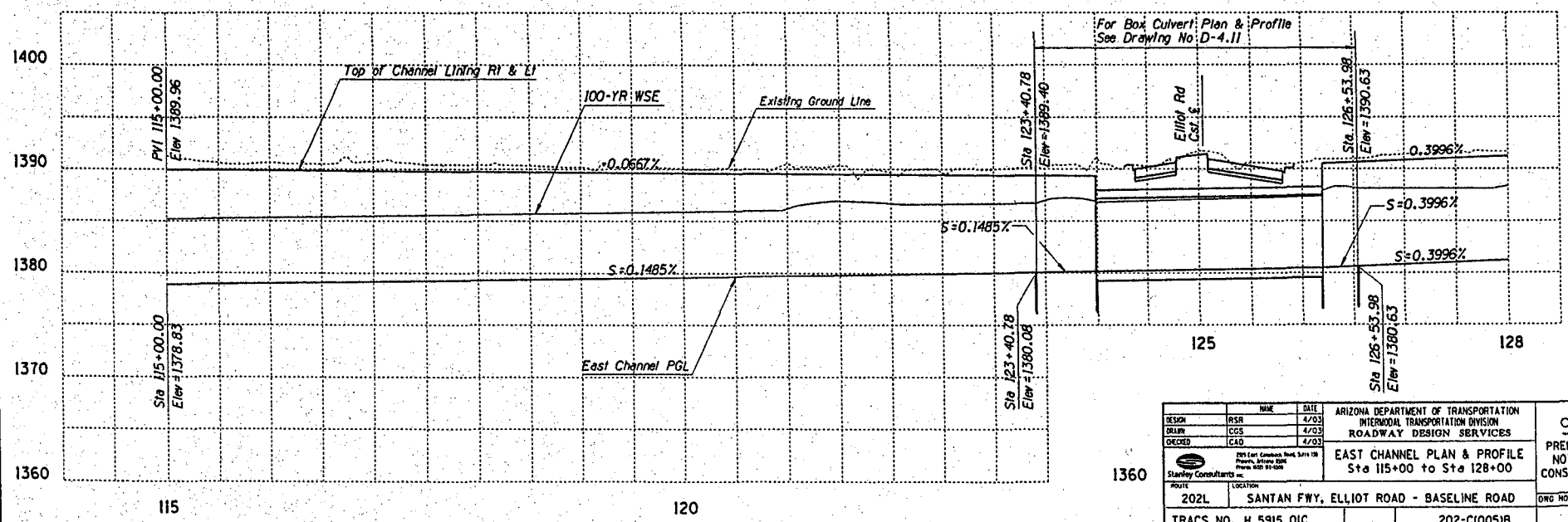
TRACS NO. H 5915 01C | 202-C(005)B | ___ OF ___

04/21/2003 qi\16110\Dgn\drainage\h5915d2a.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-C(005)B			

202L MA 031





	NAME	DATE
DESIGN	RSR	4/03
DRAWN	CGS	4/03
CHECKED	CAD	4/03

Stanley Consultants inc.
2125 East Camelback Road, Suite 150
Phoenix, Arizona 85016
Phone (602) 957-1069

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

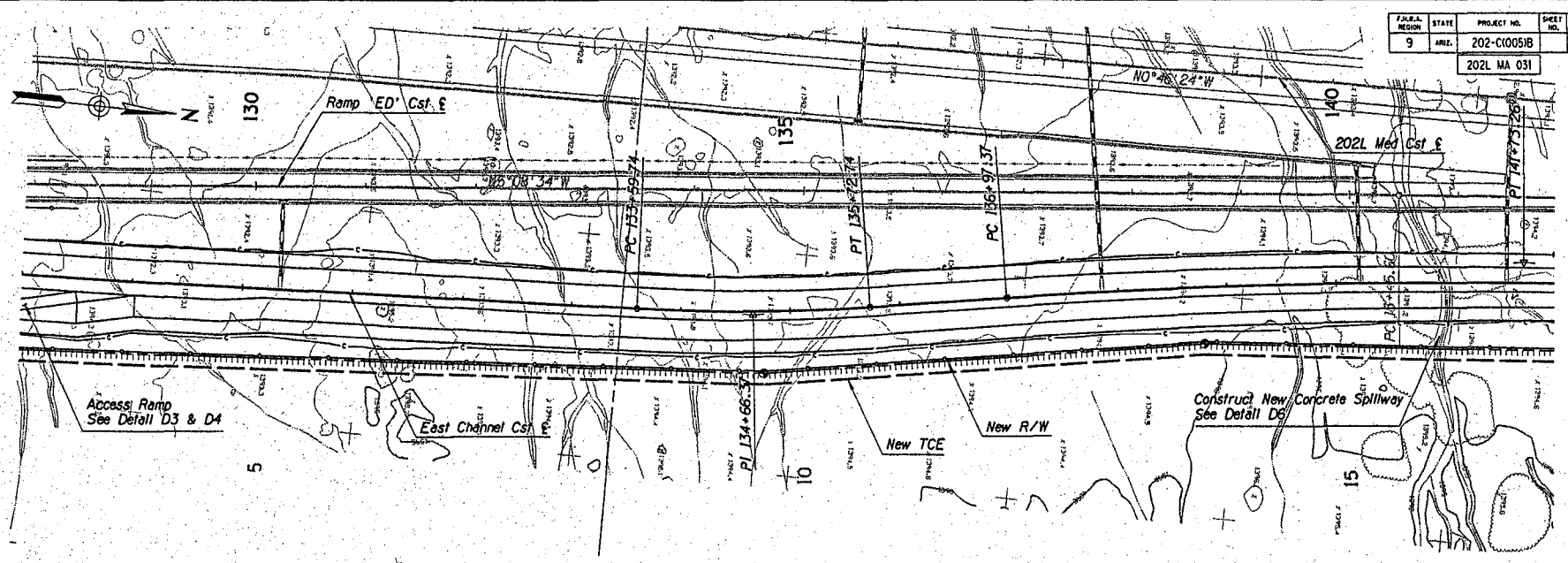
EAST CHANNEL PLAN & PROFILE
Sta 115+00 to Sta 128+00

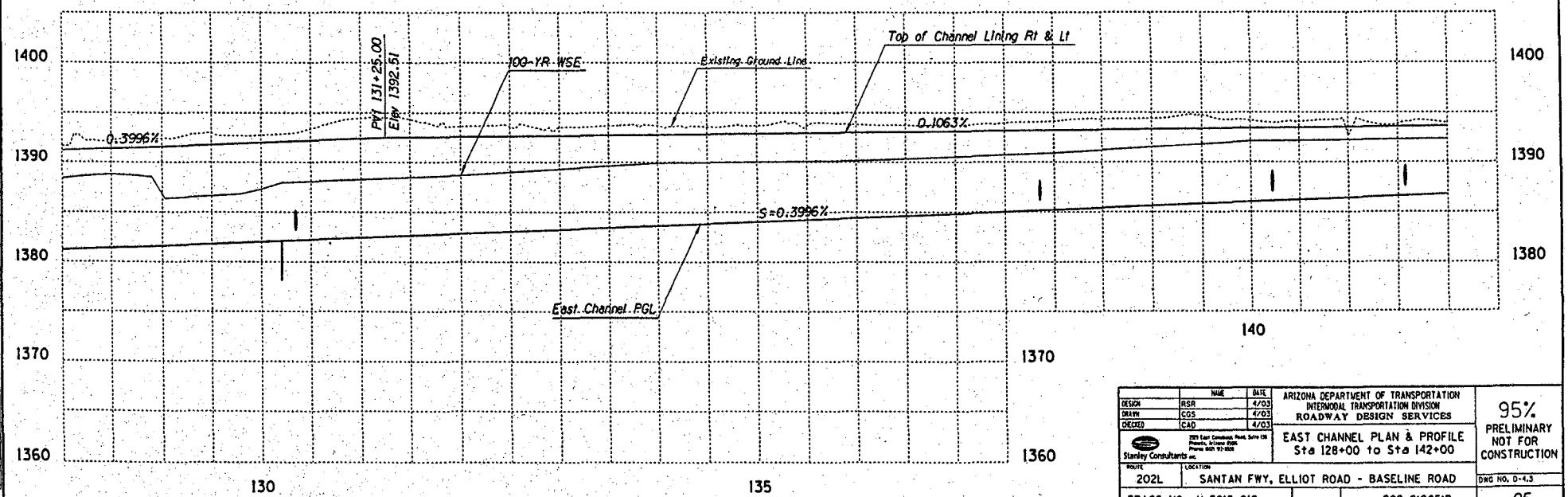
95%
PRELIMINARY
NOT FOR
CONSTRUCTION

ROUTE	LOCATION	DWG NO. D-4.2
202L	SANTAN FWY, ELLIOT ROAD - BASELINE ROAD	
TRACS NO. H 5915 01C	202-C(005)B	___ OF ___

04/21/2003 qt\16110\dgn\drainage\h5915d4a.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-C(005)B			
		202L MA 031			





	NAME	DATE
DESIGN	RSR	4/03
DRAWN	CGS	4/03
CHECKED	CAD	4/03

Stanley Consultants inc.
2325 East Camelback Road, Suite 130
Phoenix, Arizona 85016
Phone (602) 957-9008

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

EAST CHANNEL PLAN & PROFILE
Sta 128+00 to Sta 142+00

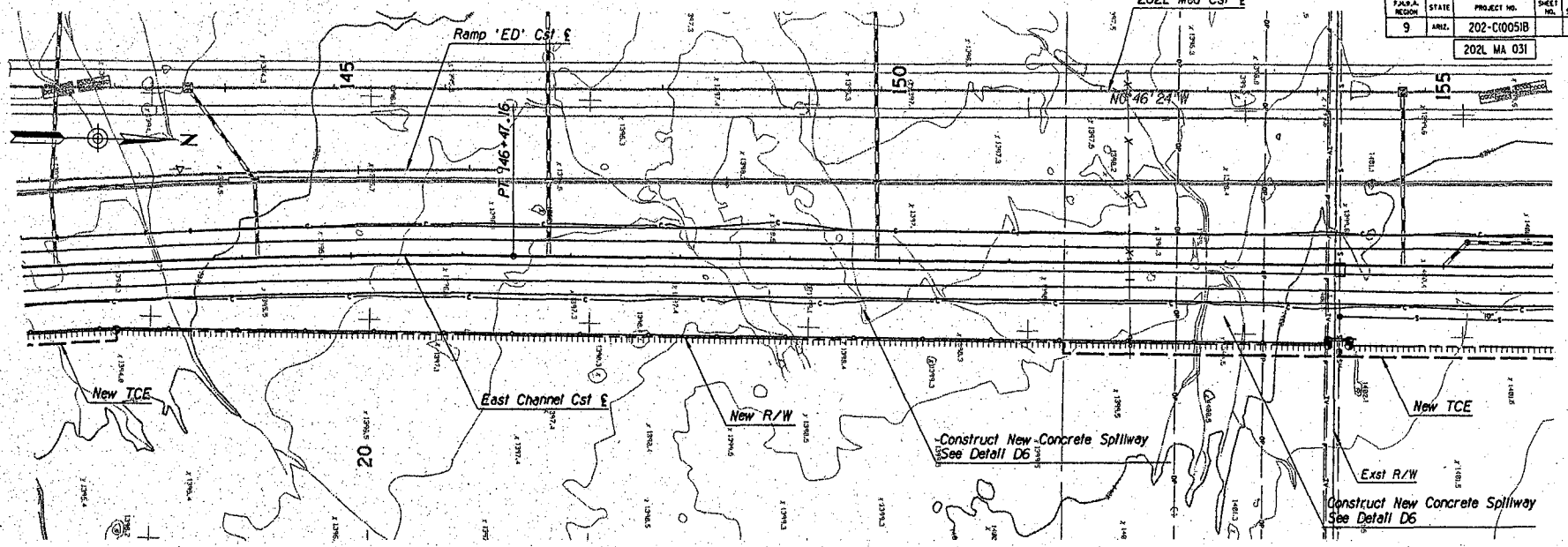
95%
PRELIMINARY
NOT FOR
CONSTRUCTION

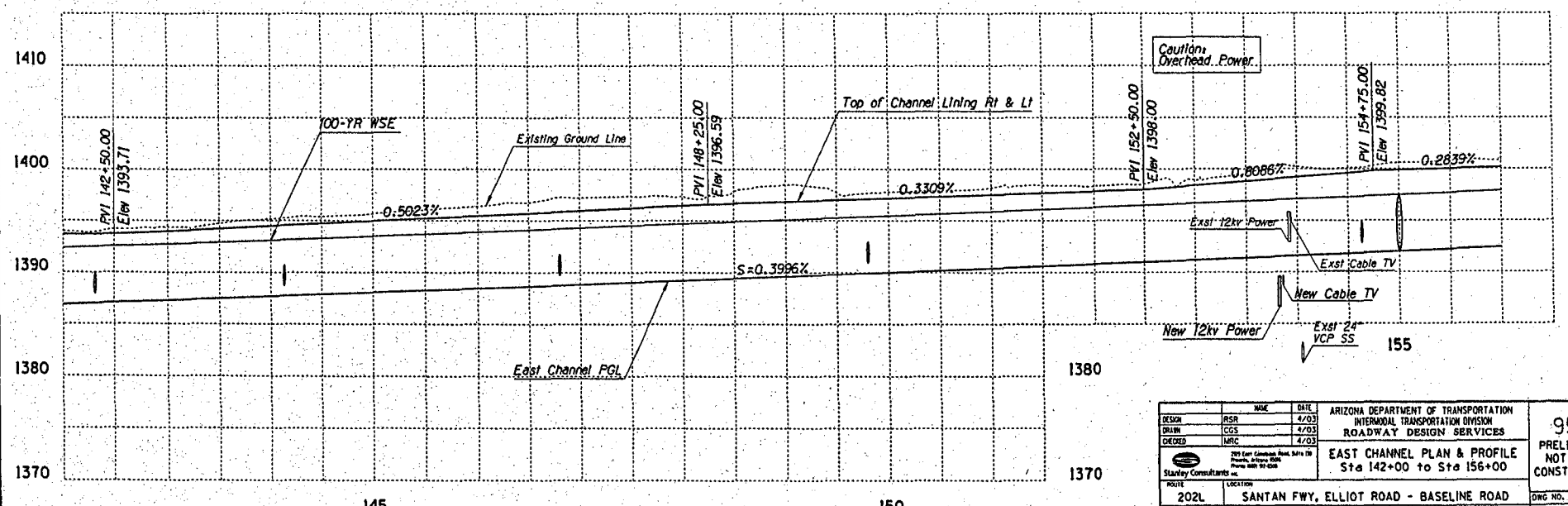
ROUTE	LOCATION	
202L	SANTAN FWY, ELLIOT ROAD - BASELINE ROAD	DWG NO. D-4.3
TRACS NO. H 5915 01C	202-C(005)B	___ OF ___

04/21/2003 q:\16110\dgn\drainage\h5915d46.dgn

F.A.H.P.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-C(005)B			

202L MA 031





	NAME	DATE
DESIGN	RSR	4/03
DRAWN	CGS	4/03
CHECKED	MRC	4/03

Stanley Consultants INC.
2175 East Camelback Road, Suite 730
Phoenix, Arizona 85016
Phone: (602) 957-8300

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

EAST CHANNEL PLAN & PROFILE
Sta 142+00 to Sta 156+00

95%
PRELIMINARY
NOT FOR
CONSTRUCTION

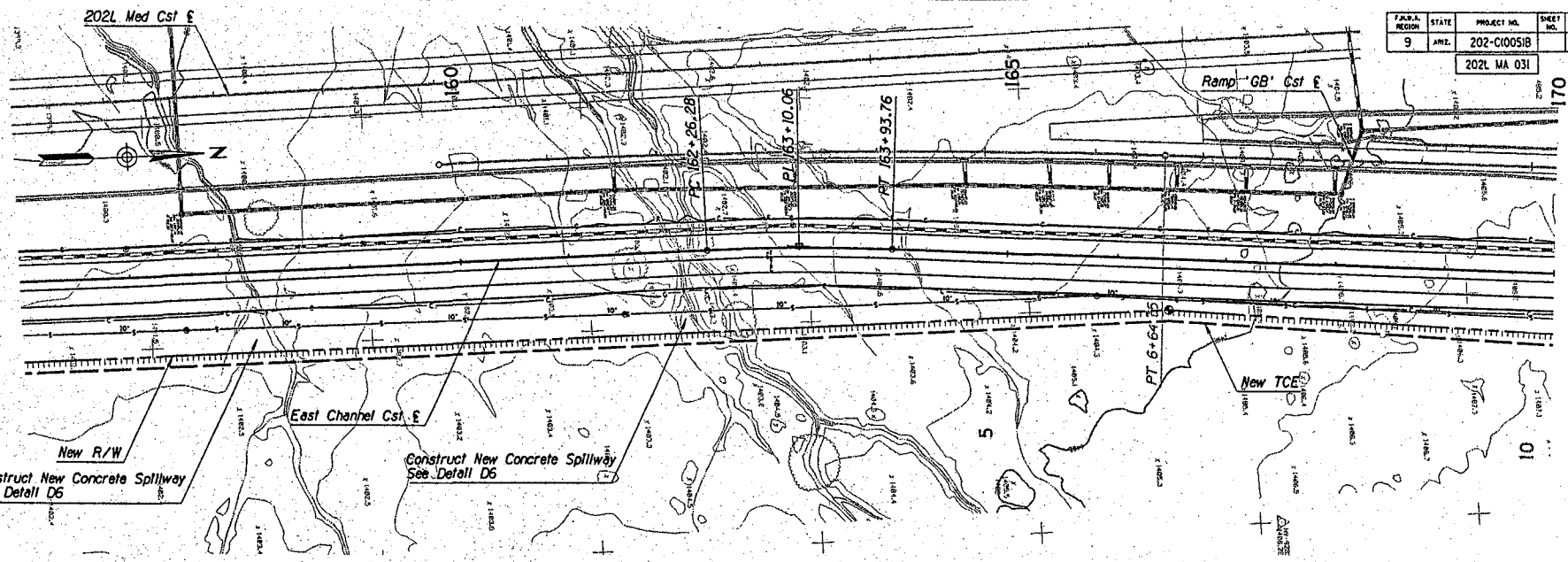
ROUTE: 202L
LOCATION: SANTAN FWY, ELLIOT ROAD - BASELINE ROAD

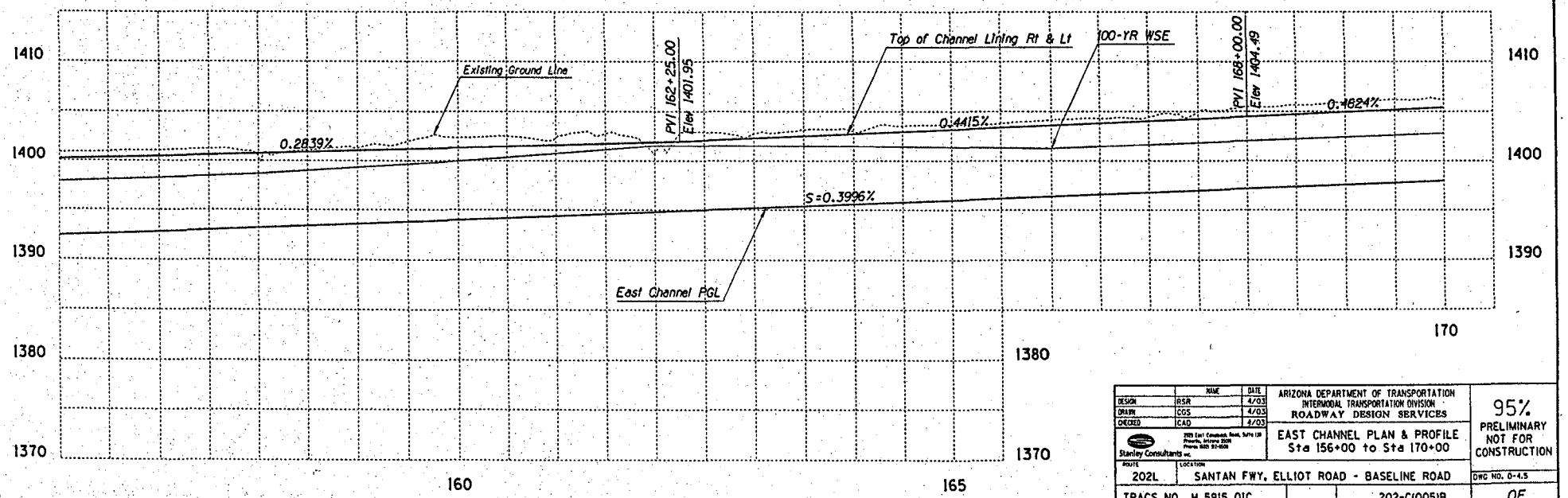
DWG NO. D-4.4

TRACS NO. H 5915 01C | 202-C(005)B | ___ OF ___

04/21/2003 gr\16110\Dgn\drainage\h5915d4a.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-C(005)B			
		202L MA 031			





	NAME	DATE
DESIGN	RSR	4/03
DRAWN	COS	4/03
CHECKED	CAD	4/03

Stanley Consultants INC.
2929 East Camelback Road, Suite 130
Phoenix, Arizona 85016
Phone: (602) 912-9600

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

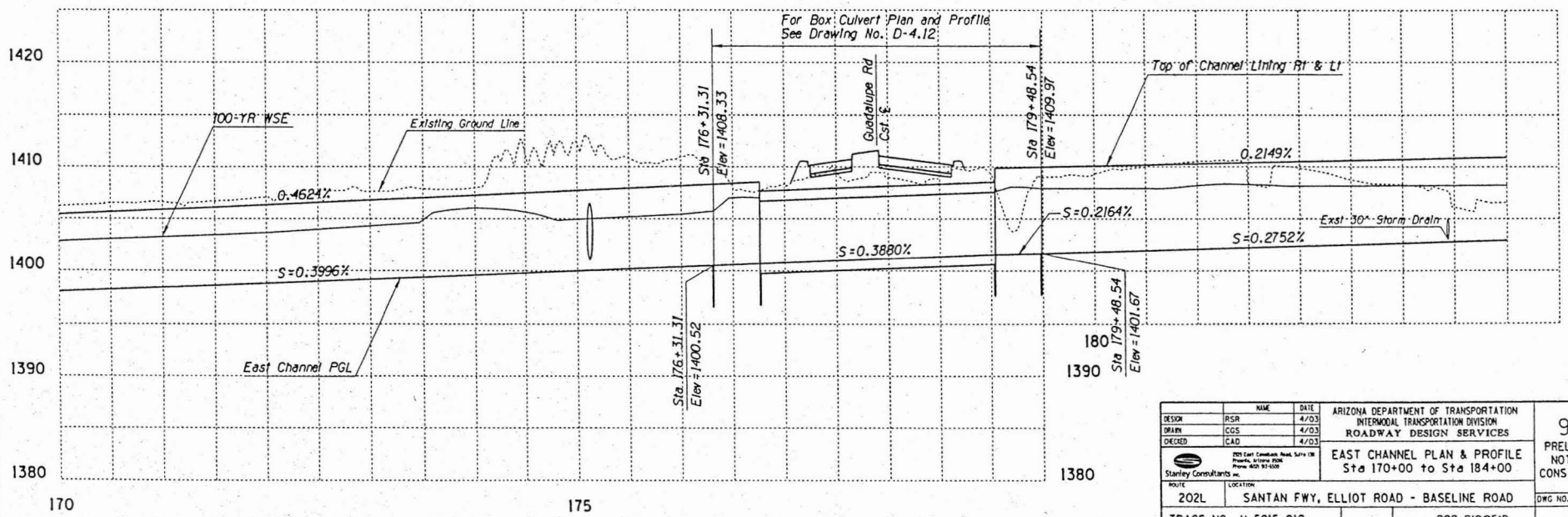
EAST CHANNEL PLAN & PROFILE
Sta 156+00 to Sta 170+00

95%
PRELIMINARY
NOT FOR
CONSTRUCTION

ROUTE	LOCATION	
202L	SANTAN FWY, ELLIOT ROAD - BASELINE ROAD	DWG NO. D-4.5
TRACS NO. H 5915 01C	202-C(005)B	___ OF ___

04/21/2003 qr\16110\Dgn\drainage\h5915d4d.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-C(005)B			
		202L MA 031			



	NAME	DATE
DESIGN	RSR	4/03
DRAWN	CGS	4/03
CHECKED	CAD	4/03

Stanley Consultants inc.
2525 East Camelback Road, Suite 130
Phoenix, Arizona 85016
Phone: (602) 957-6200

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

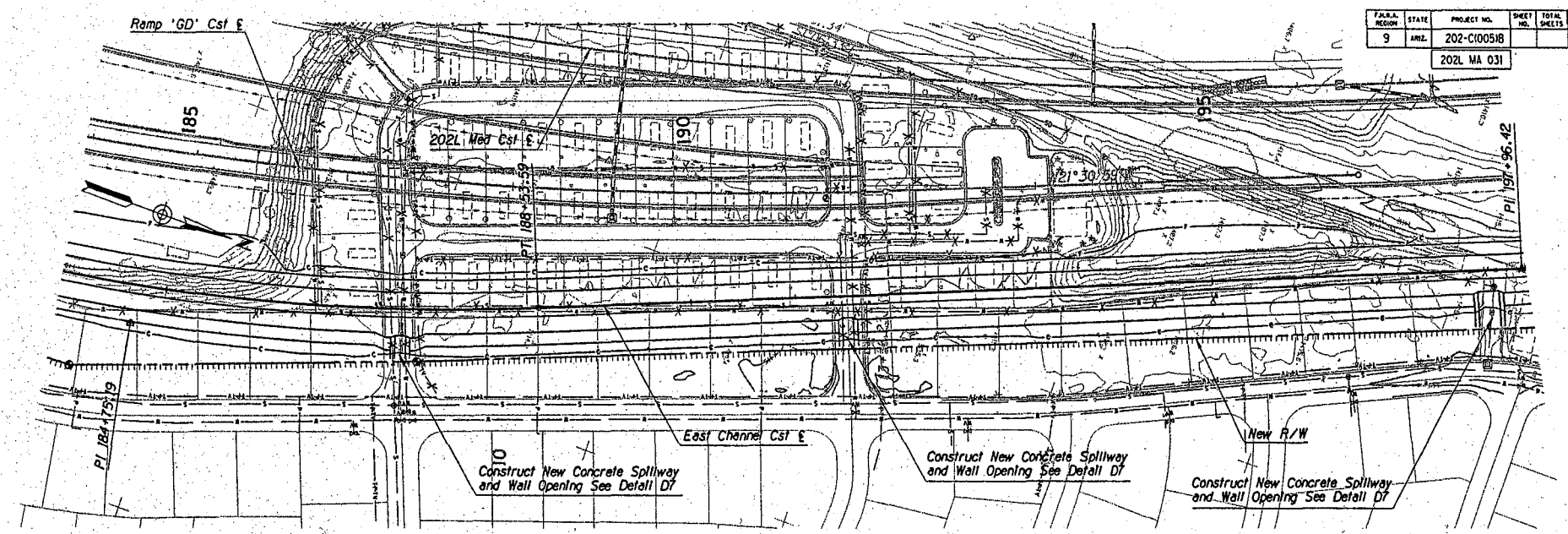
EAST CHANNEL PLAN & PROFILE
Sta 170+00 to Sta 184+00

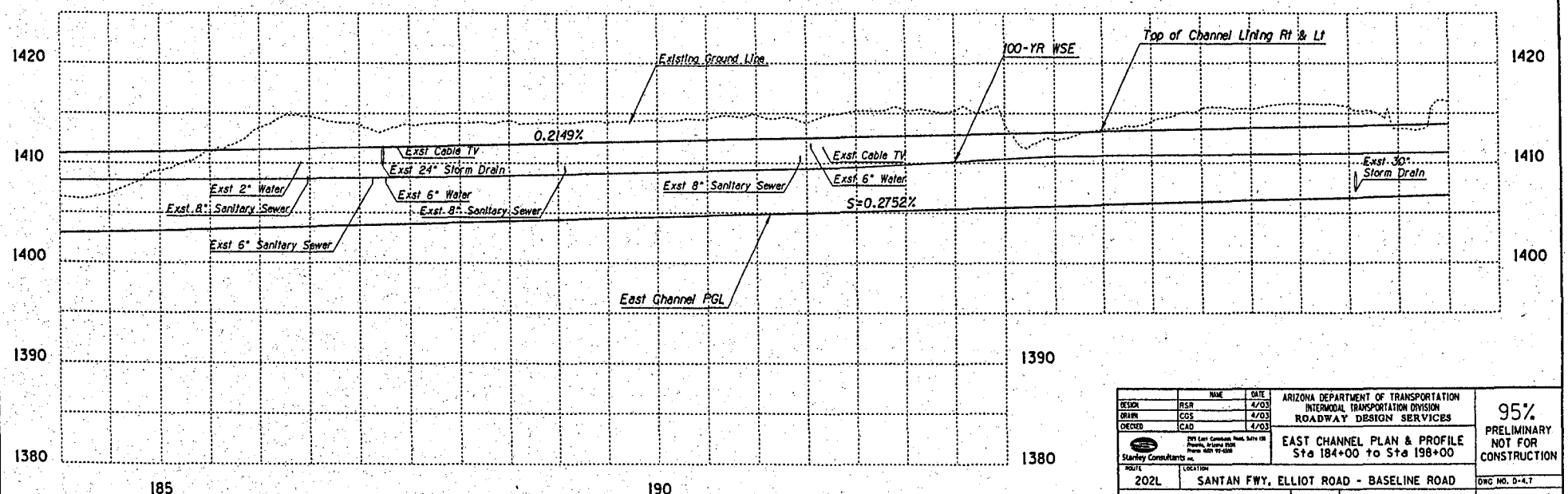
95%
PRELIMINARY
NOT FOR CONSTRUCTION

ROUTE	LOCATION	DWG NO. D-4.6
202L	SANTAN FWY, ELLIOT ROAD - BASELINE ROAD	
TRACS NO. H 5915 01C	202-C(005)B	___ OF ___

04/22/2003 gr\16110\Dgn\drainage\h5915d4a.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-C(005)B			
		202L MA 031			





	NAME	DATE
DESIGN	RSR	4/03
DRAWN	CGS	4/03
CHECKED	CAD	4/03

Stanley Consultants inc.
5151 East Broadway Road, Suite 100
Phoenix, Arizona 85008
Phone: (602) 99-4500

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

EAST CHANNEL PLAN & PROFILE
Sta 184+00 to Sta 198+00

95%
PRELIMINARY
NOT FOR CONSTRUCTION

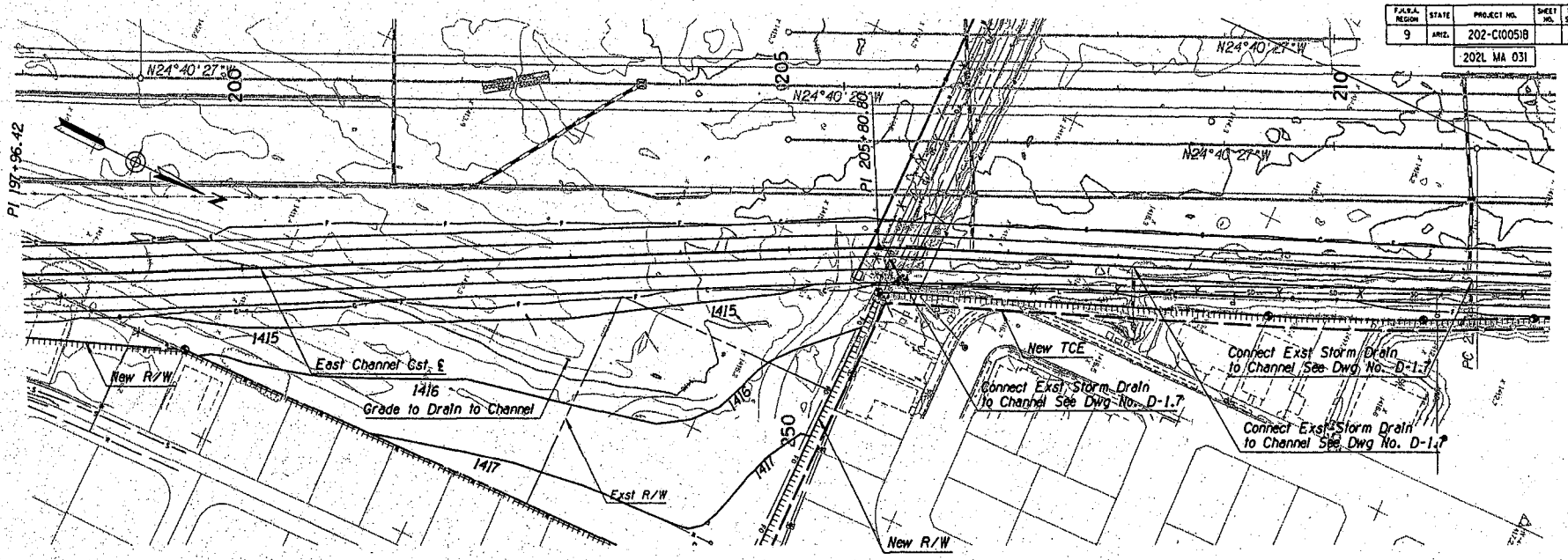
ROUTE	LOCATION
202L	SANTAN FWY, ELLIOT ROAD - BASELINE ROAD

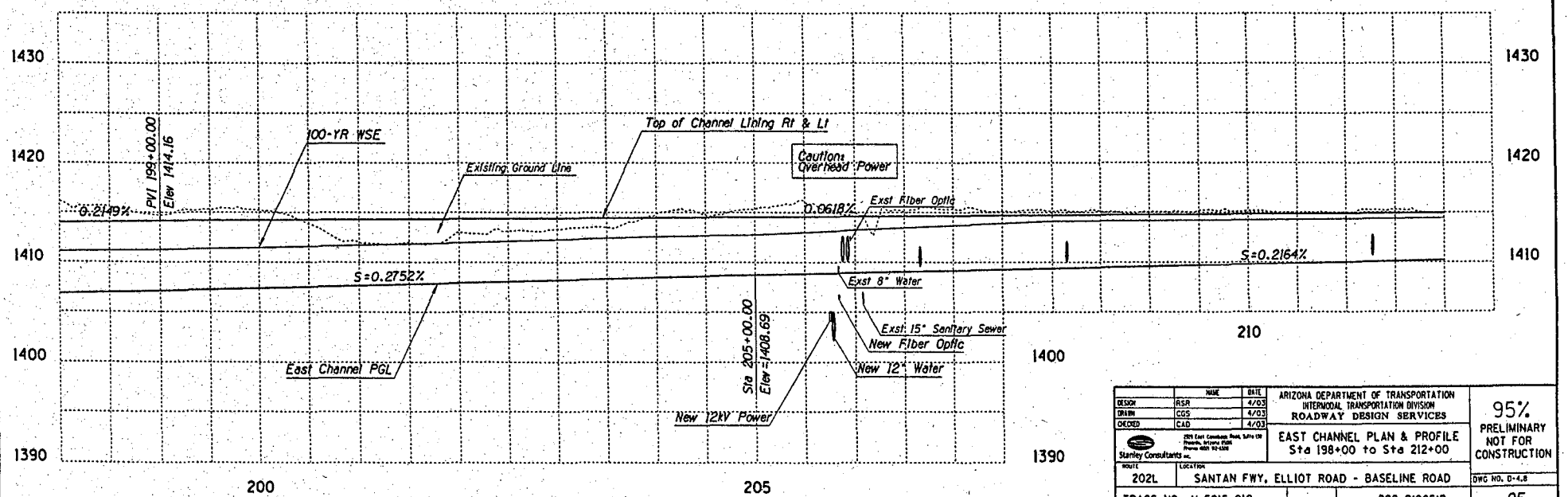
TRACS NO. H 5915 01C | 202-C(005)B | DWG NO. D-4.7 | ___ OF ___

04/21/2003 qt\16110\dgn\drainage\h5915d41.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-C(005)B			

202L MA 031





	NAME	DATE
DESIGN	RSR	4/03
DRAWN	CGS	4/03
CHECKED	CAD	4/03

Stanley Consultants inc.
2929 East Camelback Road, Suite 130
Phoenix, Arizona 85016
Phone (602) 912-1500

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

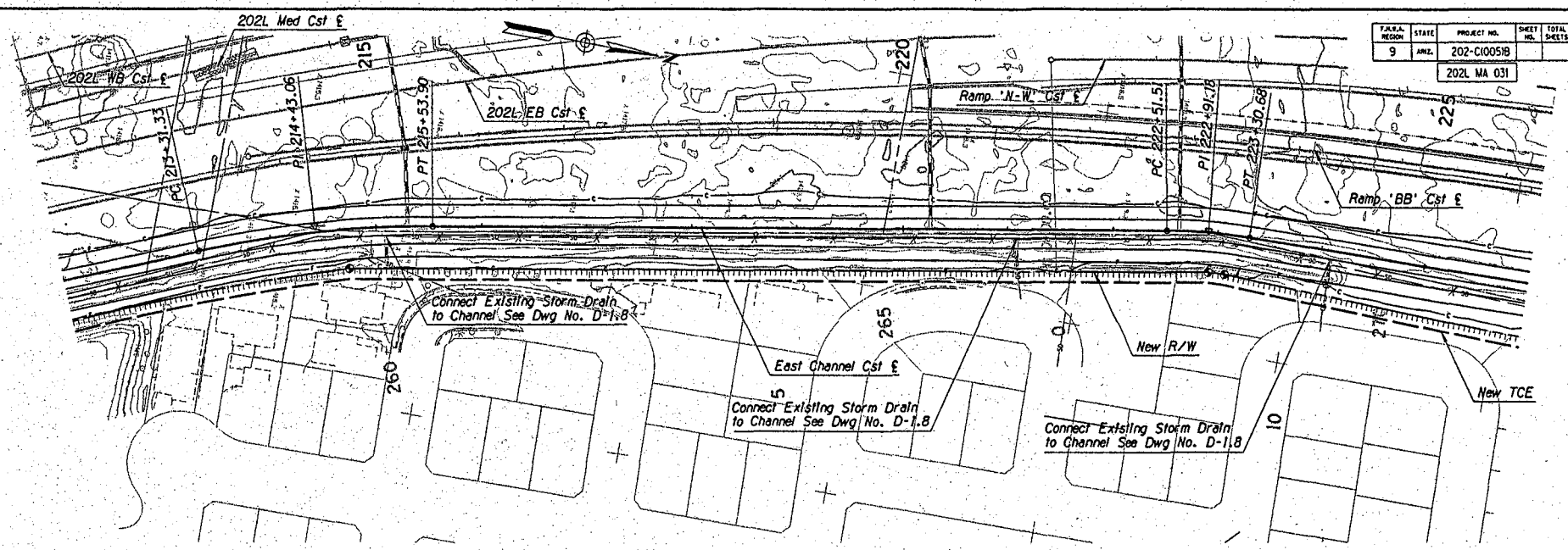
EAST CHANNEL PLAN & PROFILE
Sta 198+00 to Sta 212+00

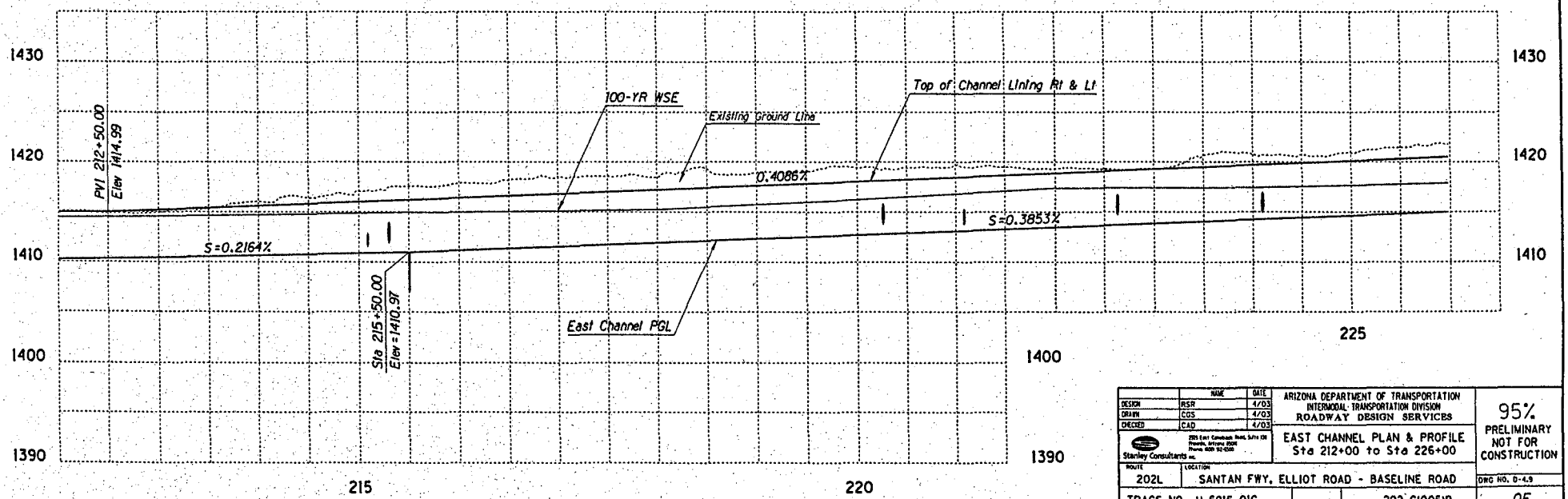
95%
PRELIMINARY
NOT FOR
CONSTRUCTION

ROUTE	LOCATION	
202L	SANTAN FWY, ELLIOT ROAD - BASELINE ROAD	DWG NO. D-4.8
TRACS NO. H 5915 01C	202-C(005)B	___ OF ___

04/21/2003 qt\16110\Dgn\drainage\h5915d4g.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-C(005)B			
		202L MA 031			





	NAME	DATE
DESIGN	RSR	4/03
DRAWN	CGS	4/03
CHECKED	CAD	4/03

Stanley Consultants inc.
2555 East Camelback Road, Suite 120
Phoenix, Arizona 85016
Phone (602) 952-0300

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

EAST CHANNEL PLAN & PROFILE
Sta 212+00 to Sta 226+00

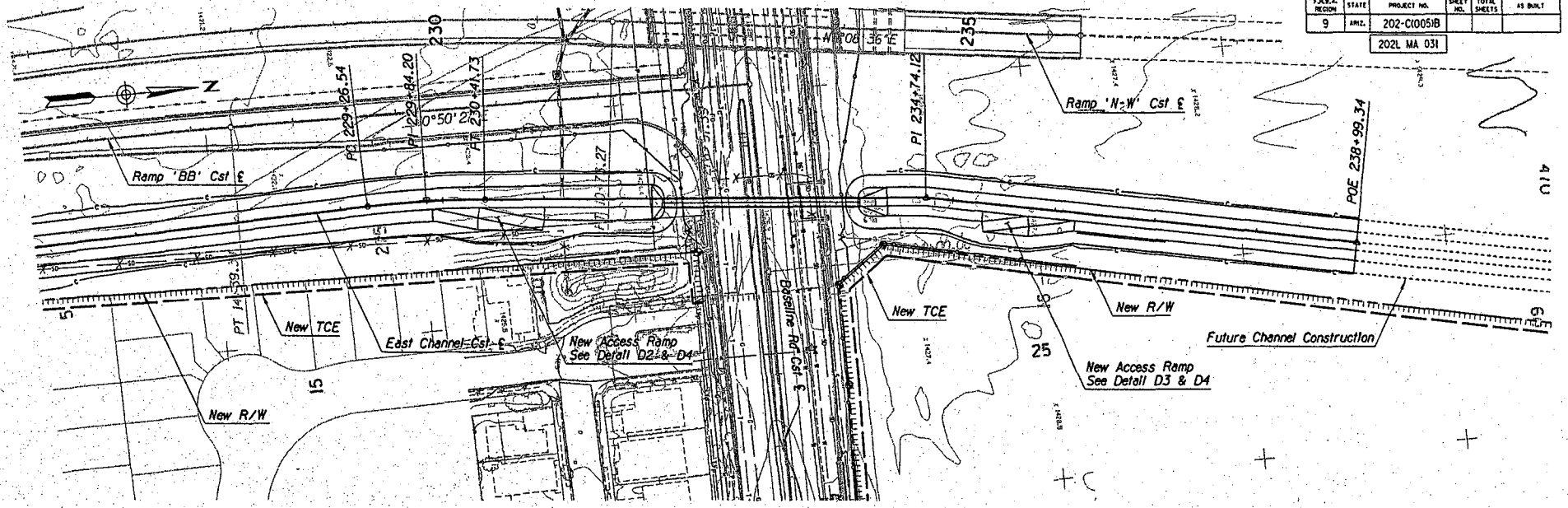
95%
PRELIMINARY
NOT FOR CONSTRUCTION

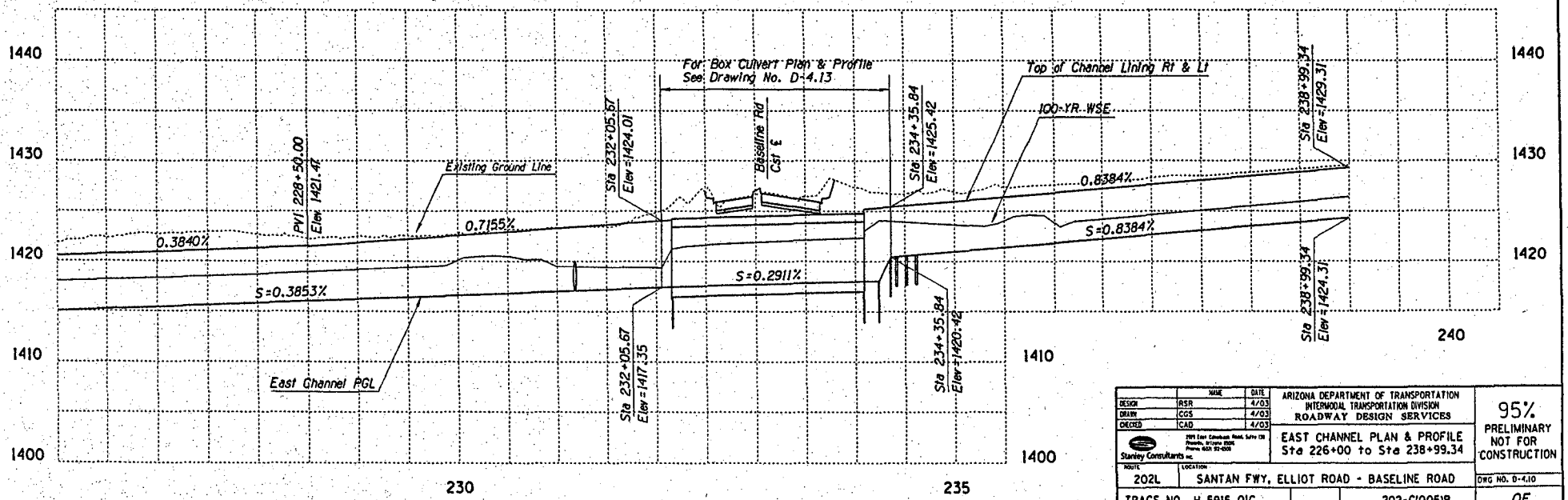
ROUTE	LOCATION	DWG NO. D-4.9
202L	SANTAN FWY, ELLIOT ROAD - BASELINE ROAD	
TRACS NO. H 5915 01C	202-C(005)B	___ OF ___

04/21/2003 q:\16110\Dgn\drainage\h5915d4h.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-C(005)B			

202L MA 031





	NAME	DATE
DESIGN	RSR	4/03
DRAWN	CGS	4/03
CHECKED	CAD	4/03

Stanley Consultants inc.
5991 East Cloudback Road, Suite 120
Phoenix, Arizona 85006
Phone: (623) 92-0500

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

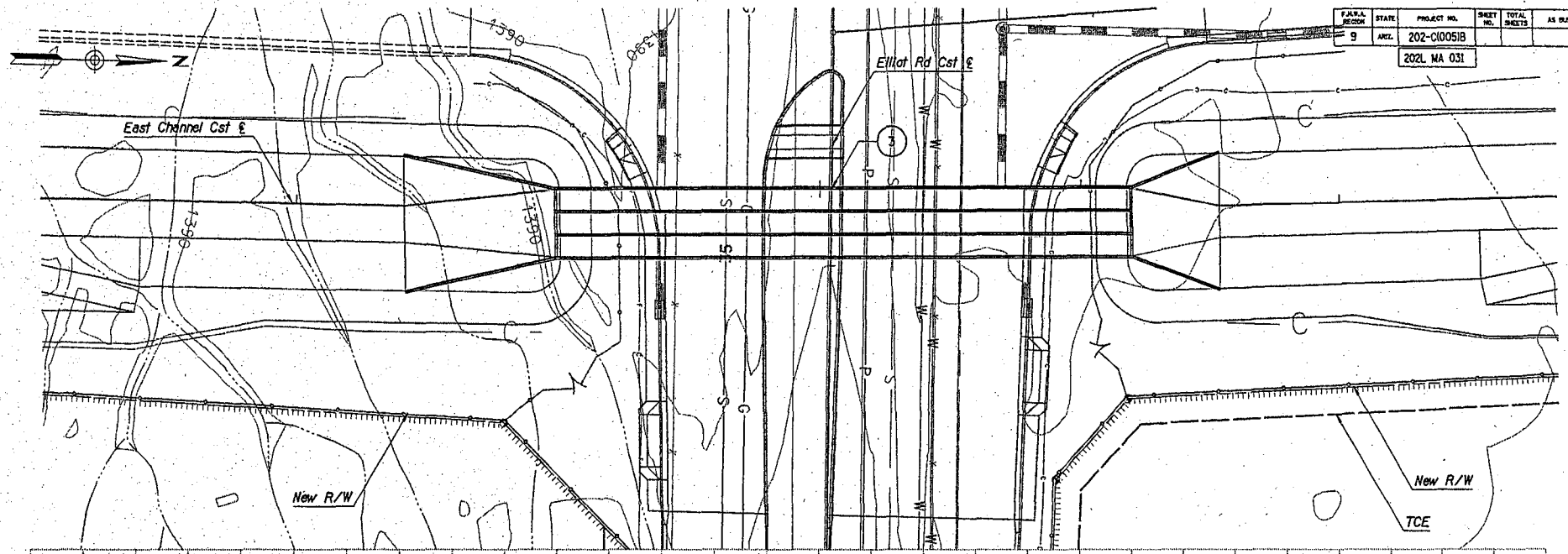
EAST CHANNEL PLAN & PROFILE
Sta 226+00 to Sta 238+99.34

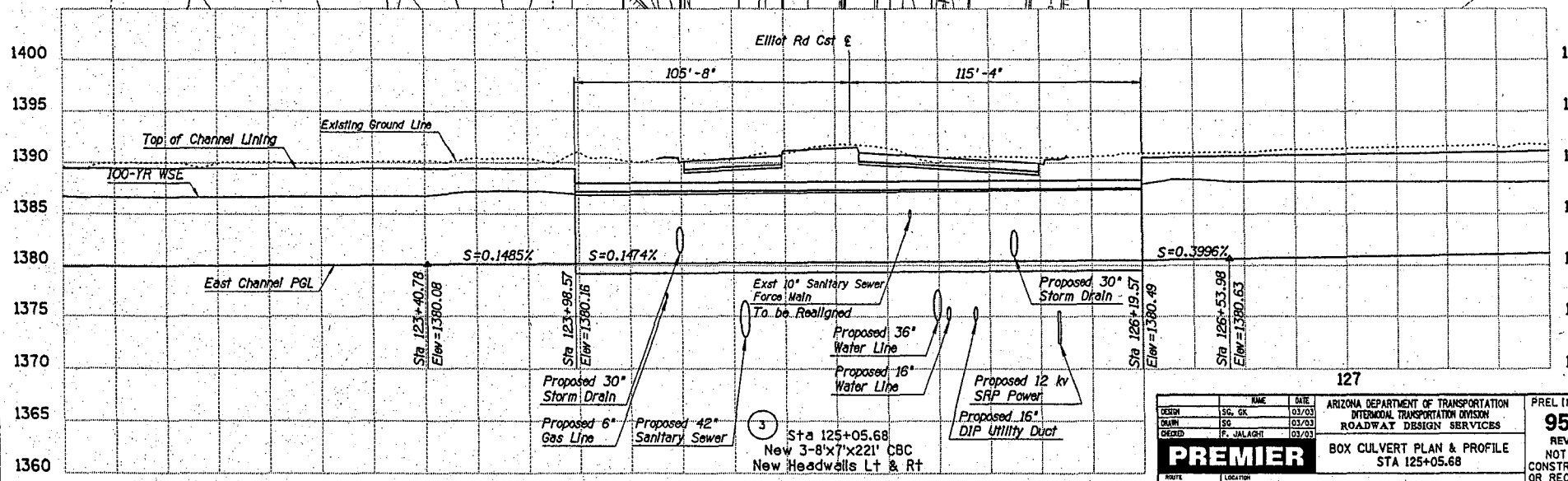
95%
PRELIMINARY
NOT FOR
CONSTRUCTION

ROUTE	LOCATION	DWG NO. D-4.10
202L	SANTAN FWY, ELLIOT ROAD - BASELINE ROAD	
TRACS NO. H 5915 01C	202-C(005)B	___ OF ___

04/22/2003 q:\16110\dgn\drainage\h5915d41.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-C(005)B			
		202L MA 031			





	NAME	DATE
DESIGN	SG, GK	03/03
DRAWN	SG	03/03
CHECKED	F. JALAGHI	03/03

PREMIER

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

BOX CULVERT PLAN & PROFILE
STA 125+05.68

PRELIMINARY
95%
REVIEW
NOT FOR CONSTRUCTION OR RECORDING

DWG NO. D-4.11

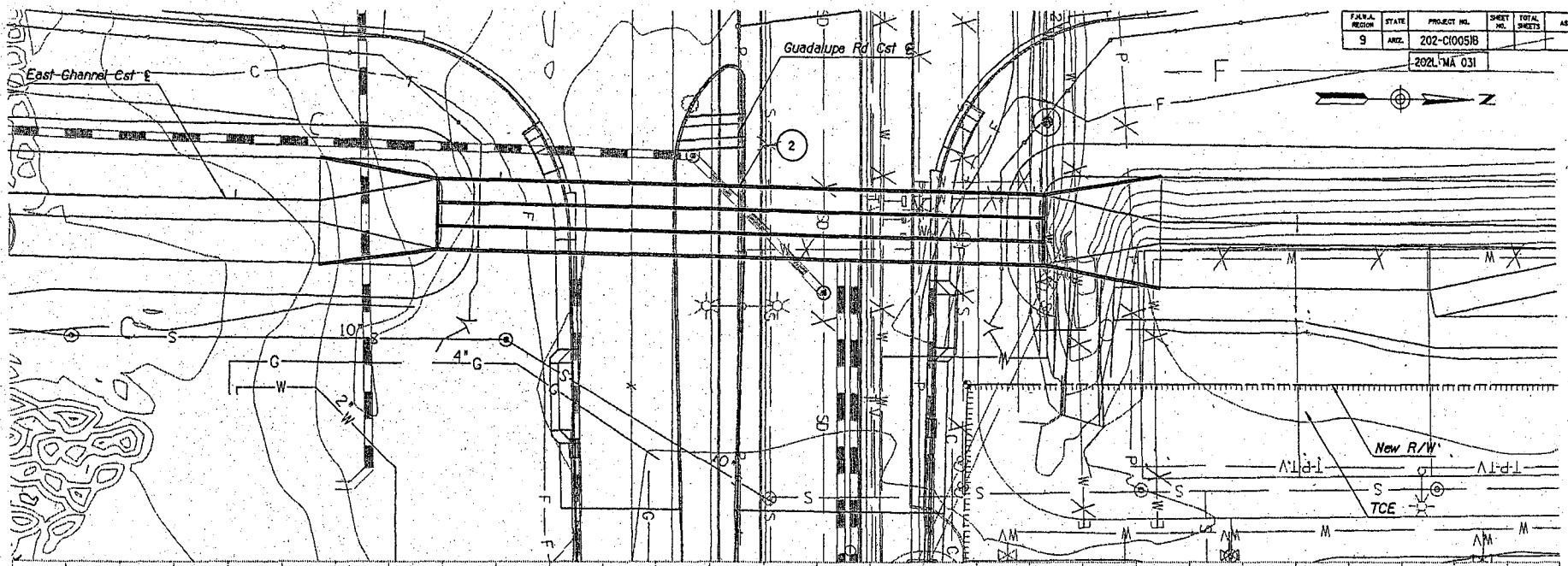
ROUTE: 202L
LOCATION: SANTAN FWY, ELLIOT ROAD - BASELINE ROAD

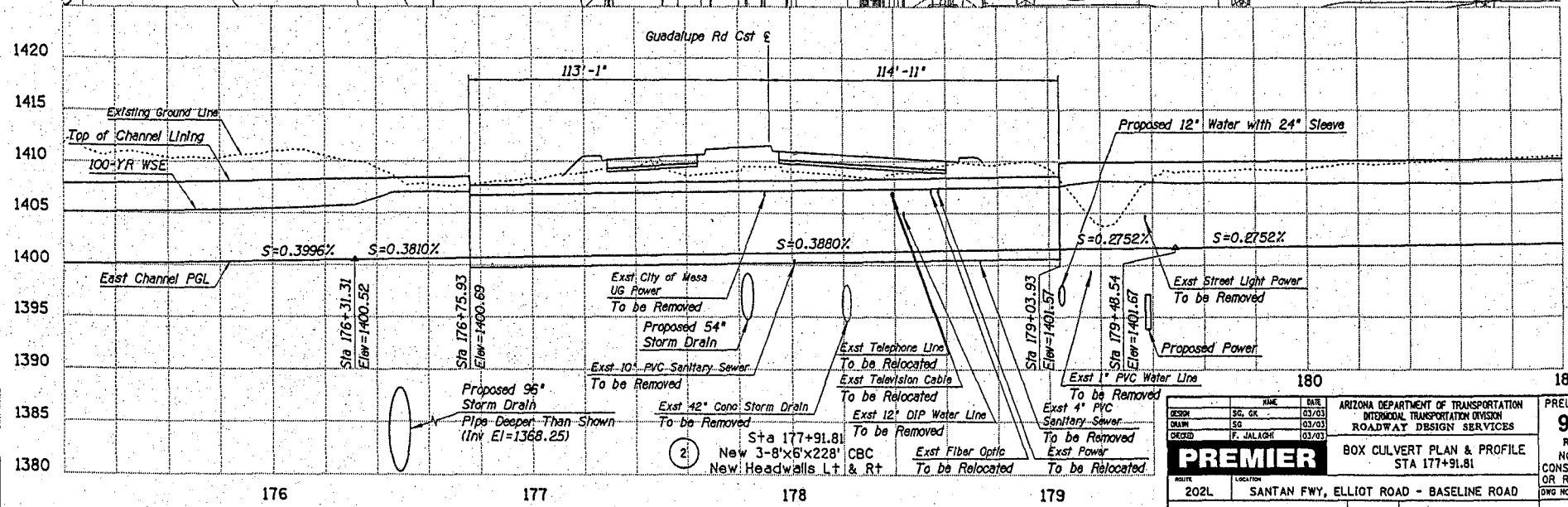
TRACS NO. H 5915 01C
202-C(0005)B
___ OF ___

p:\2002020\eadd\structures\h5915ebe03.dgn
Plotted By: SG 04/02/2003 06:43:05 PM

ooooSYSTIMEoooooo ooooJOBNoSPECIFICATIONoooooo

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-C(005)B			
		202L MA 031			





	NAME	DATE
DESIGN	SG, GK	03/03
DRAWN	SG	03/03
CHECKED	F. JALAGHI	03/03

PREMIER

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

BOX CULVERT PLAN & PROFILE
STA 177+91.81

PRELIMINARY
95%
REVIEW
NOT FOR CONSTRUCTION OR RECORDING

ROUTE: 202L
LOCATION: SANTAN FWY, ELLIOT ROAD - BASELINE ROAD

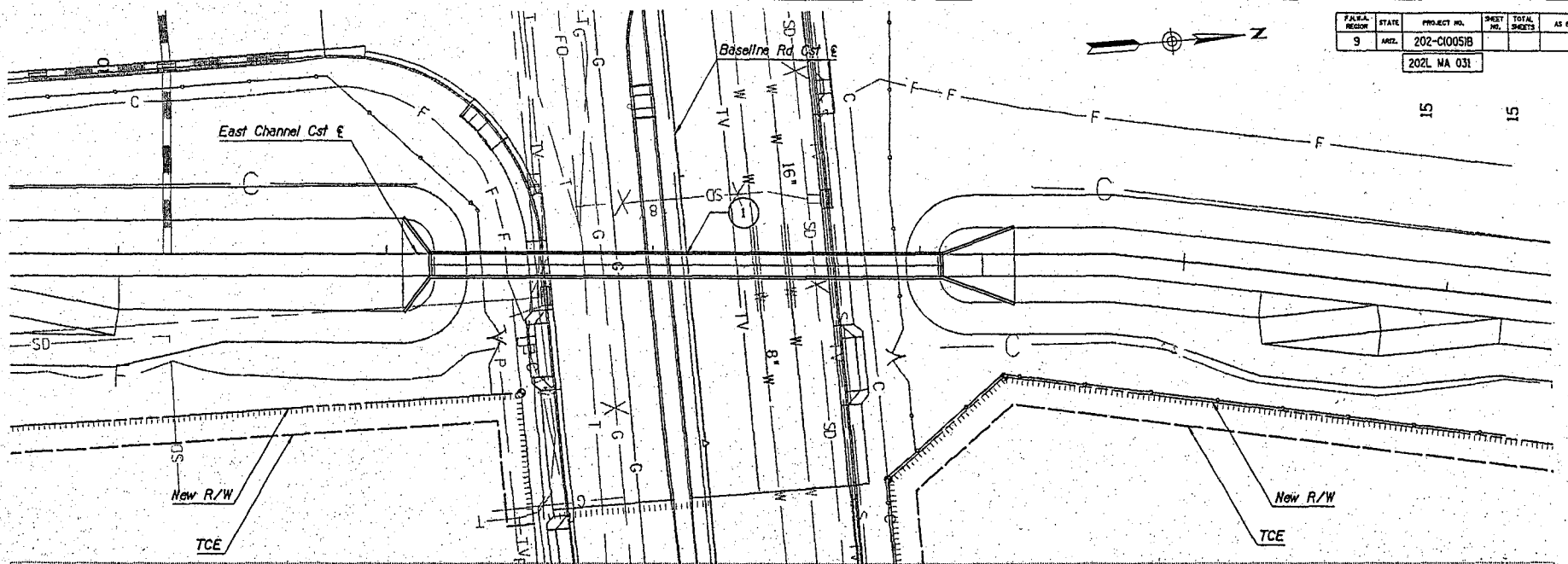
DWG NO. D-4.12

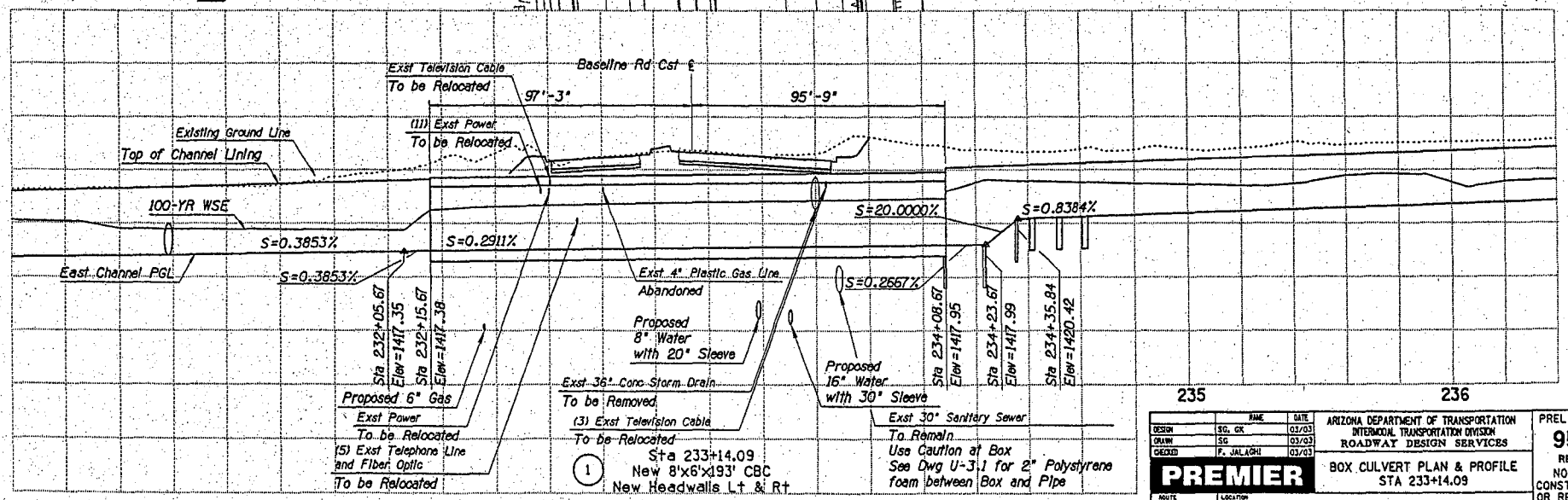
TRACS NO. H 5915 01C | 202-C(0005)B | ___ OF ___

p:\2002020\cadd\structures\h5915cbc02.dgn
Plotted By: SG 04/02/2003 06:42:03 PM

SYSTIME UNSPECIFICATION

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-C(005)B			
		202L MA 031			





	NAME	DATE
DESIGN	SG, GK	03/03
DRAWN	SG	03/03
CHECKED	F. JALAGHI	03/03

PREMIER

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

BOX CULVERT PLAN & PROFILE
STA 233+14.09

PRELIMINARY
95%
REVIEW
NOT FOR CONSTRUCTION OR RECORDING

ROUTE: 202L
LOCATION: SANTAN FWY, ELLIOT ROAD - BASELINE ROAD

TRACS NO. H 5915 01C

202-C(005)B

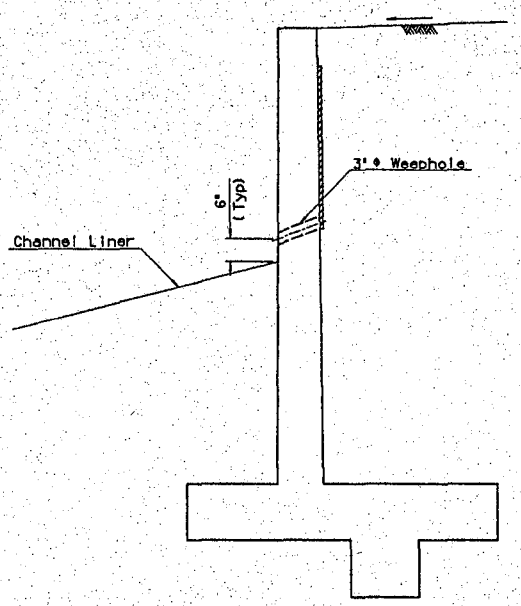
DWG NO. D-4.13

___ OF ___

p:\2002020\Cadd\Structures\h5915cbc01.dgn
Plotted By: SG 04/03/2003 11:02:41 AM

oooooSYSTIMEoooooooooooUGNoSPECIFICATIONoooooo

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-C(005)B			
		202L MA 031			



TRANSITION WALL (TW) TYPICAL SECTION

NTS

GENERAL NOTES

1. Construction Specifications - Arizona Department of Transportation (ADOT) Standard Specifications for Road and Bridge Construction, 2000.
2. Design Specifications - AASHTO Standard Specifications for Highway Bridges, Sixteenth Edition, 1996 including 1997 1998, 1999 and 2000 interim specifications.
3. Dead Load - Weight of backfill = 120 pcf
   Equivalent Fluid Pressure for Active Soil Pressure = 35 pcf
   (For Walls W/Level Backfill)
4. Live Load surcharge pressure is equal to weight of 2'-0" of backfill material.
5. Seismic Performance Category A (Aoo=0.03g).
6. All concrete shall be Class 'S' unless noted otherwise.
7. Reinforcing steel shall conform to ASTM Specification A615, except reinforcing bars which are to be welded shall conform to A706.
8. All Reinforcing steel shall be furnished as Grade 60.
9. All bends and hooks shall meet the requirements of AASHTO Article 8.23. All bend dimensions for reinforcing steel shall be out-to-out of bars. All placement dimensions for reinforcing steel shall be to center of bars unless noted otherwise.
10. All reinforcing shall have 2" clear cover unless noted otherwise.
11. Stresses:
12. Concrete . . . . . f'c = 3,000 psi
    Grade 60 reinforcing . . . . fs = 24,000 psi
13. Chamfer all exposed corners ¾" as per Std B-19.10 unless noted otherwise.
14. Dimensions shall not be scaled from the drawings.
15. ADOT Structures Section Standard Drawings (June 1992): B-01.10, B-02.10, B-18.10, B-18.20, B-19.10, B-19.50.
16. All wall elevations shown are developed elevations.
17. The wall design height indicated in wall elevation sheets may differ slightly from the actual height.

APPROXIMATE QUANTITIES

ITEM			WALL SURFACE AREA	HANDRAIL	REMARKS
Unit			Sq Ft	LF	
123+40.78	to	123+98.57	988	144	DWG NO D-4.15
126+19.57	to	126+53.98	661	98	DWG NO D-4.16
176+31.31	to	176+75.93	653	115	DWG NO D-4.17
179+03.93	to	179+48.54	697	115	DWG NO D-4.18
232+05.87	to	232+15.67	266	42	DWG NO D-4.19
234+08.67	to	234+35.84	452	67	DWG NO D-4.20
TOTAL			3717	581	
AS-BUILT					

	NAME	DATE
DESIGN	SG, GK	03/03
DRAWN	SG	03/03
CHECKED	F. JALAGHI	03/03

PREMIER

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

TRANSITION WALLS-
GENERAL NOTES

PRELIMINARY
95%
REVIEW
NOT FOR CONSTRUCTION OR RECORDING

ROUTE	LOCATION	DWG NO. D-4.14
202L	SANTAN FWY, ELLIOT ROAD - BASELINE ROAD	

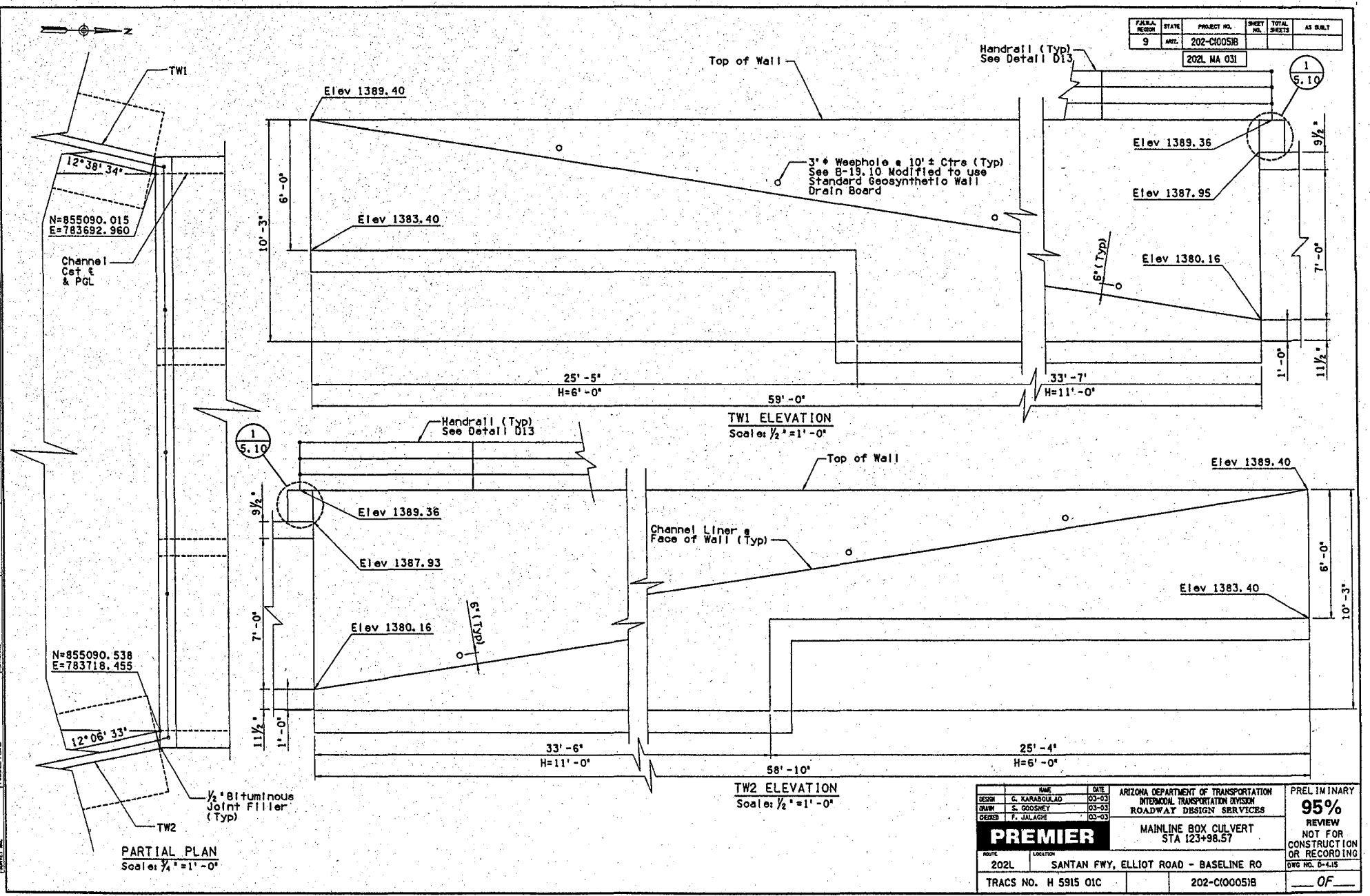
TRACS NO. H 5915 01C | 202-C(005)B | ___ OF ___

P:\2002020\Cadd\Structures\h5915cd03.DGN
Plotted By: TD 04/15/2002 10:50:25 AM

oooooSYSTIMEoooooo oooooOONoSPECIFICATIONoooooo

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-C(005)B			

202L MA 031



	NAME	DATE
DESIGN	G. KARABOULAO	03-03
DRAWN	S. GOOSNEY	03-03
CHECKED	F. JALAGHI	03-03

PREMIER

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

MAINLINE BOX CULVERT
STA 123+98.57

PRELIMINARY
95%
REVIEW
NOT FOR CONSTRUCTION OR RECORDING

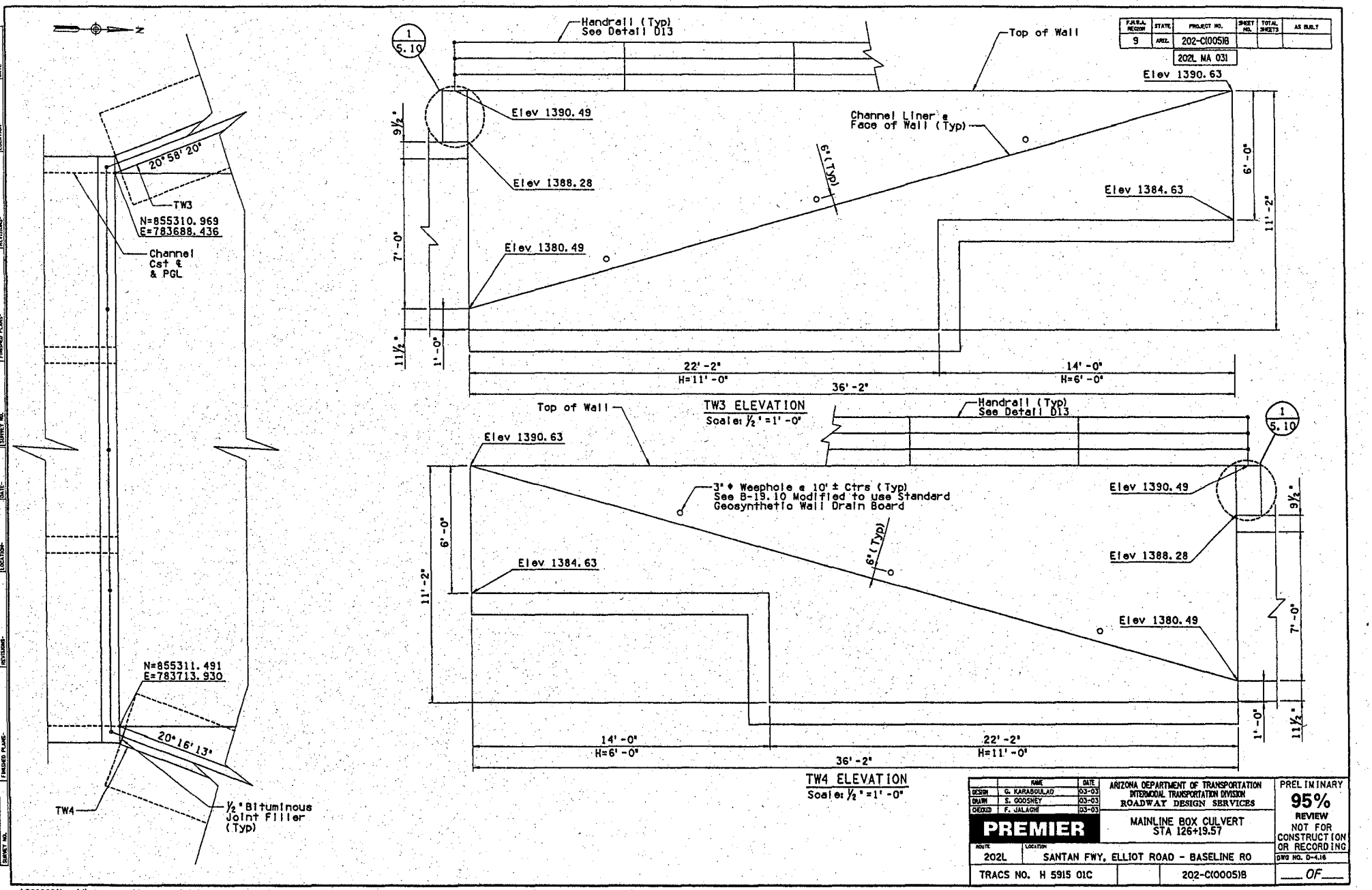
DWG NO. D-4.15

ROUTE	LOCATION	
202L	SANTAN FWY, ELLIOT ROAD - BASELINE RO	
TRACS NO. H 5915 01C		202-C(005)B

___ OF ___

p:\2002020\cadd\structures\h5915wwd01.dgn
Plotted By: SG 04/22/2003 09:52:29 AM

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-C(005)B			
		202L MA 031			



	NAME	DATE
DESIGN	G. KARABOULAD	03-03
DRAWN	S. GOOSNEY	03-03
CHECKED	F. JALAGHI	03-03

PREMIER

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

MAINLINE BOX CULVERT
STA 126+19.57

ROUTE	LOCATION
202L	SANTAN FWY, ELLIOT ROAD - BASELINE RO

TRACS NO. H 5915 01C | 202-C(0005)B

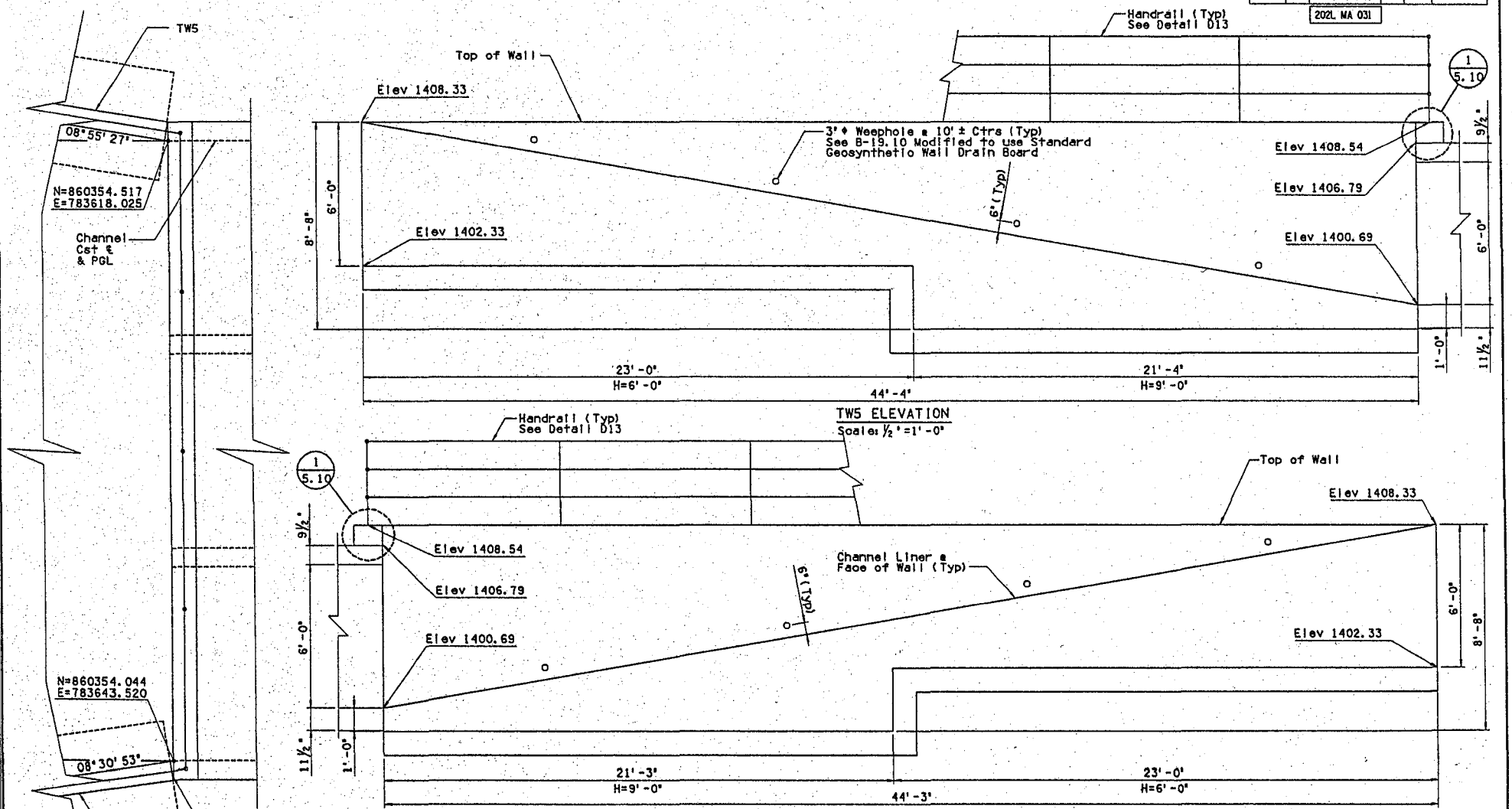
PRELIMINARY
95%
REVIEW
NOT FOR CONSTRUCTION OR RECORDING

DWG NO. D-4.16

___ OF ___

p:\2002020\cadd\structures\h5915wwd02.dgn
Plotted By: SG 04/22/2003 09:52:30 AM

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-C(005)B			
		202L MA 031			



	NAME	DATE
DESIGN	G. KARABOULAD	03-03
DRAWN	S. GOOSNEY	03-03
CHECKED	F. JALAGHI	03-03

PREMIER

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

MAINLINE BOX CULVERT
STA 176+75.93

PRELIMINARY
95%
REVIEW
NOT FOR CONSTRUCTION OR RECORDING

DWG NO. D-4.17

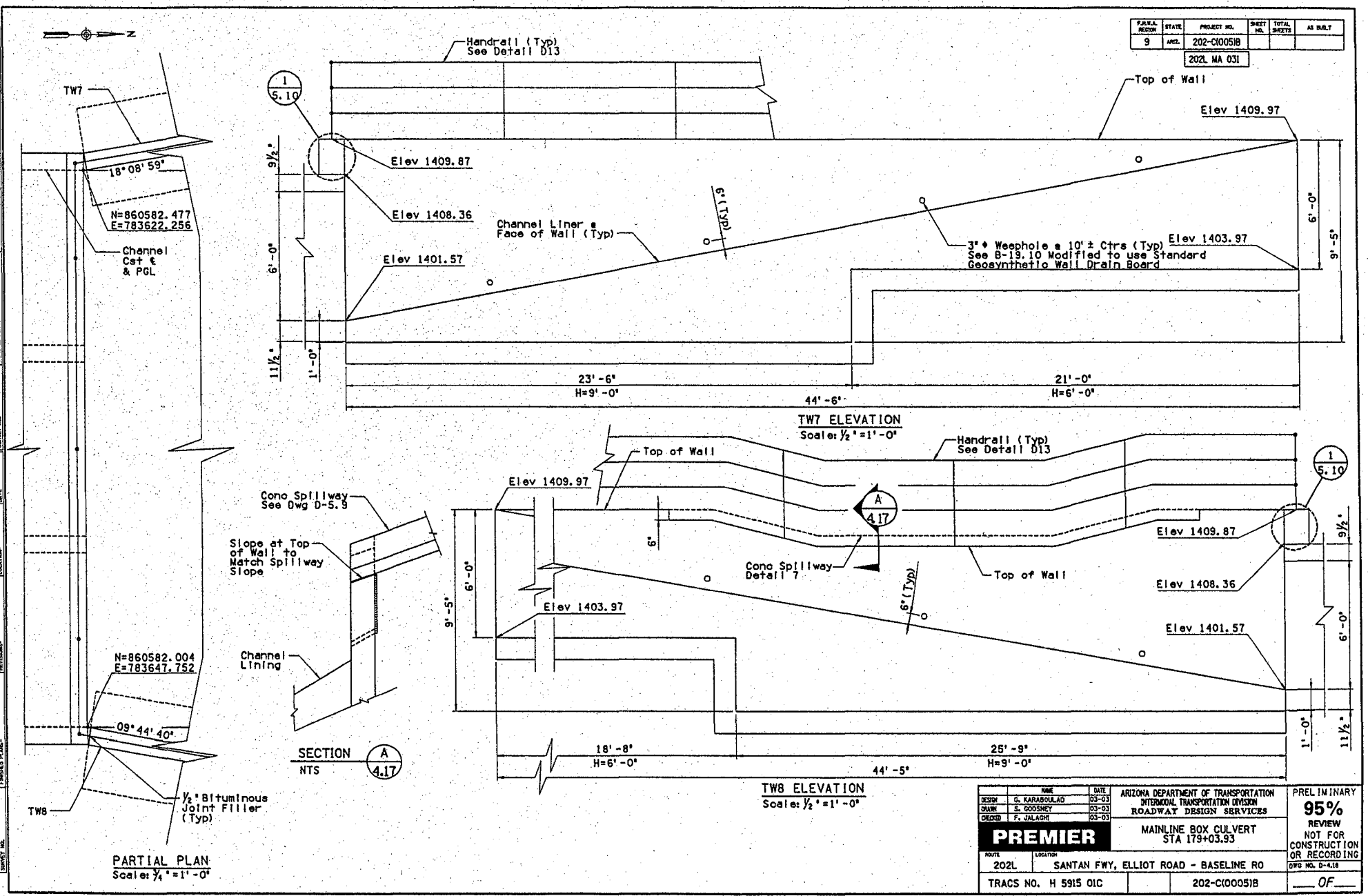
ROUTE: 202L
LOCATION: SANTAN FWY, ELLIOT ROAD - BASELINE RO

TRACS NO. H 5915 01C | 202-C(005)B | ___ OF ___

p:\2002020\cadd\structures\h5915wwd03.dgn
Plotted By: SG 04/22/2003 09:52:30 AM

F.A.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-C(005)B			

202L MA 031



	NAME	DATE
DESIGN	G. KARABOULAD	03-03
DRAWN	S. GOOSNEY	03-03
CHECKED	F. JALAGHI	03-03

PREMIER

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

MAINLINE BOX CULVERT
STA 179+03.93

ROUTE: 202L
LOCATION: SANTAN FWY, ELLIOT ROAD - BASELINE RO

TRACS NO. H 5915 01C | 202-C(005)B

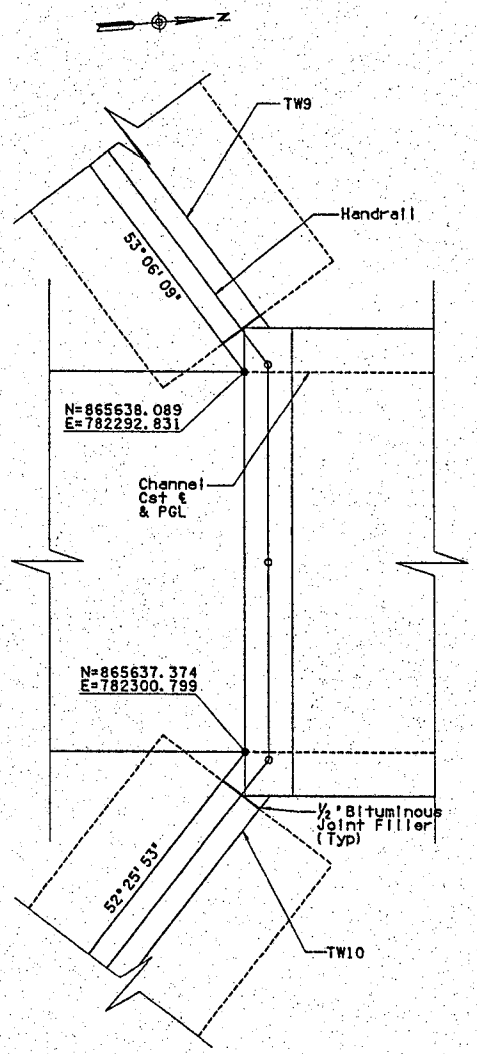
PRELIMINARY
95%
REVIEW
NOT FOR CONSTRUCTION OR RECORDING

DWG NO. D-4.18

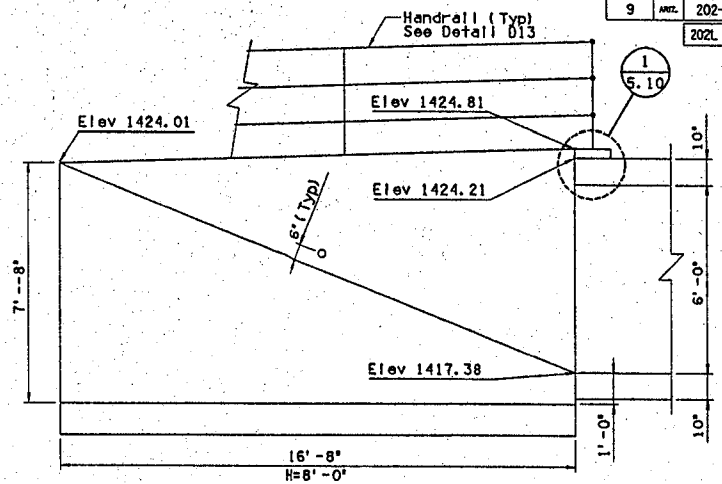
___ OF ___

p:\2002020\cadd\structures\h5915wwd04.dgn
Plotted By: SG 04/22/2003 09:52:31 AM

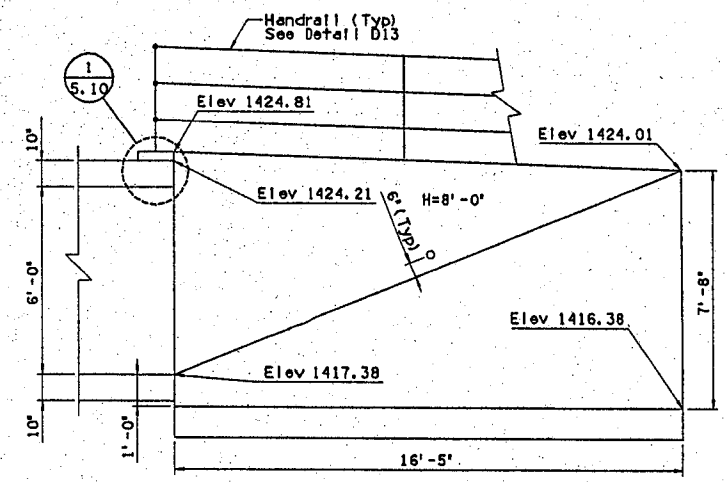
F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-C(005)B			
		202L MA 031			



PARTIAL PLAN
Scale: ¼" = 1'-0"



TW9 ELEVATION
Scale: ½" = 1'-0"



TW10 ELEVATION
Scale: ½" = 1'-0"

	NAME	DATE
DESIGN	G. KARABOULAD	03-03
DRAWN	S. GOOSNEY	03-03
CHECKED	F. JALAGHI	03-03

PREMIER

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

MAINLINE BOX CULVERT
STA 232+15.67

ROUTE 202L — LOCATION SANTAN FWY, ELLIOT ROAD - BASELINE RO

TRACS NO. H 5915 01C — 202-C(005)B

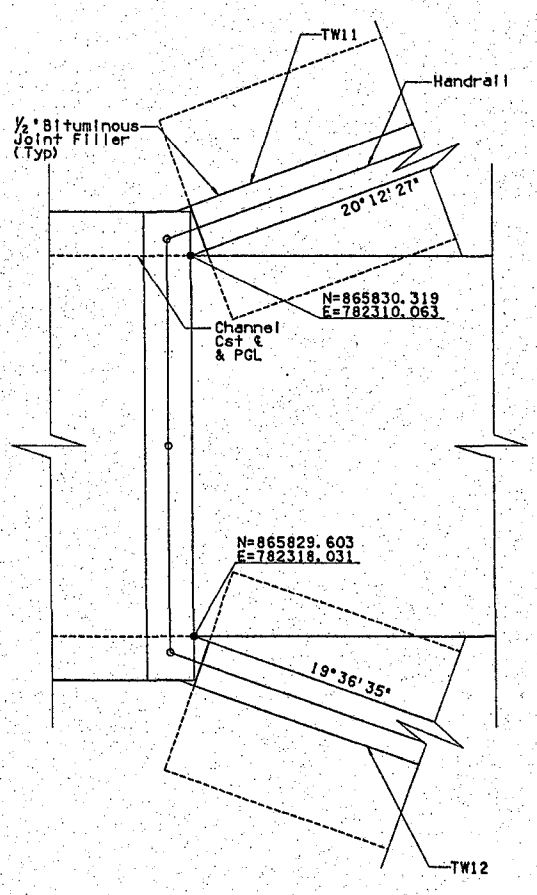
PRELIMINARY
95%
REVIEW
NOT FOR CONSTRUCTION OR RECORDING

DWG NO. 0-4.19

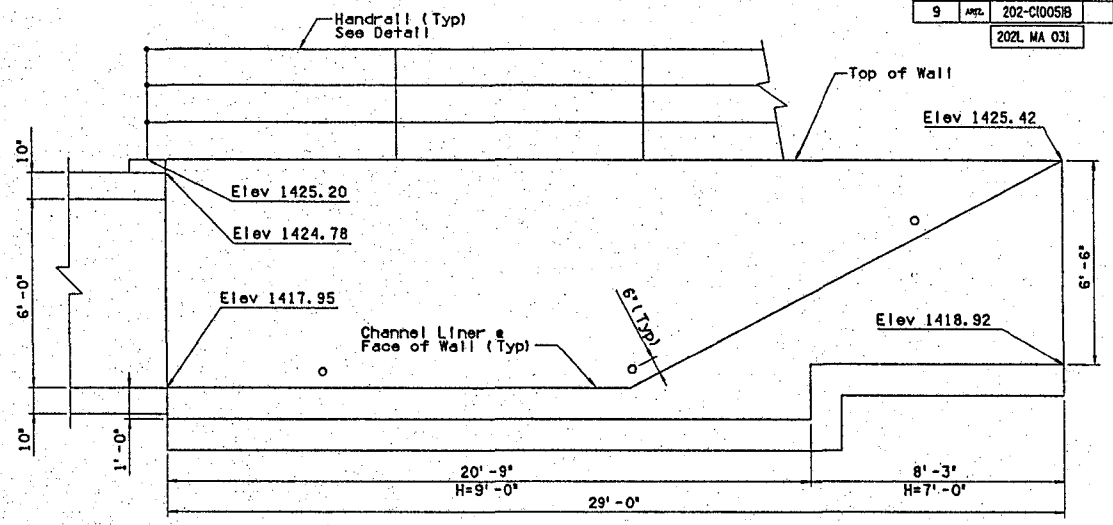
___ OF ___

p:\2002020\cadd\structures\h5915wwd05.dgn
Plotted By: SG 04/22/2003 09:52:31 AM

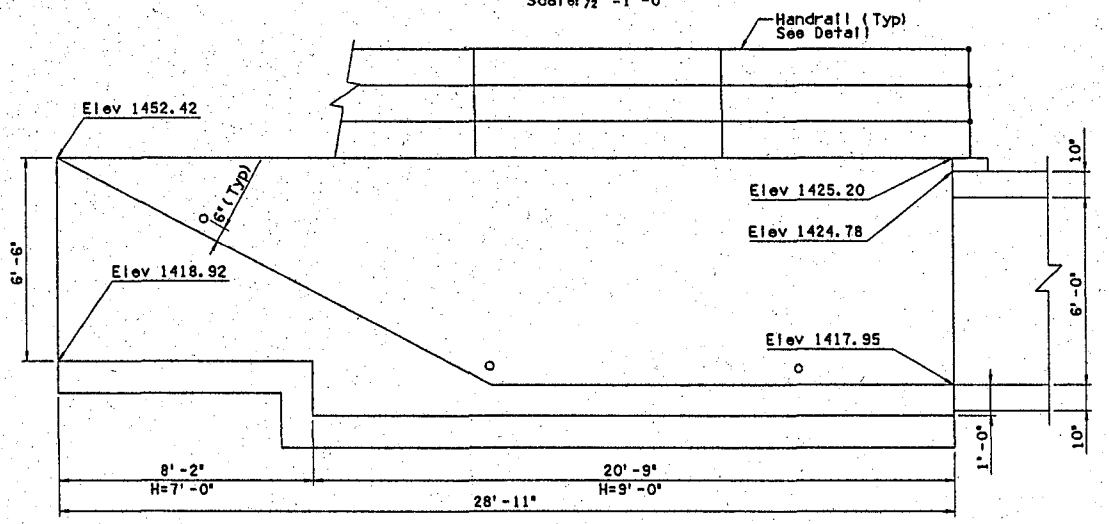
F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-C(005)B			
		202L MA 031			



PARTIAL PLAN
Scale: ¾" = 1'-0"



TW11 ELEVATION
Scale: ½" = 1'-0"



TW12 ELEVATION
Scale: ½" = 1'-0"

	NAME	DATE
DESIGN	G. KARAGOULAD	03-03
DRAWN	S. GOOSHEY	03-03
CHECKED	F. JALAGHI	03-03

PREMIER

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

MAINLINE BOX CULVERT
STA 234+08.67

PRELIMINARY
95%
REVIEW
NOT FOR CONSTRUCTION OR RECORDING

ROUTE: 202L
LOCATION: SANTAN FWY, ELLIOT ROAD - BASELINE RO

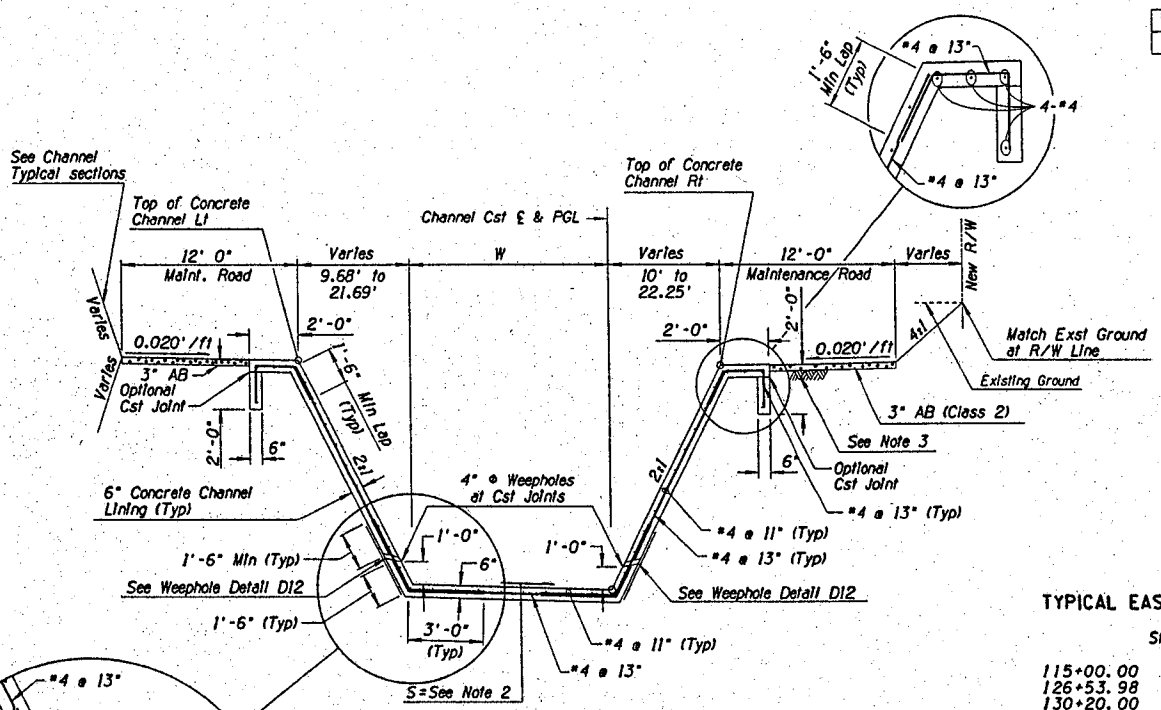
DWG NO. D-4.20

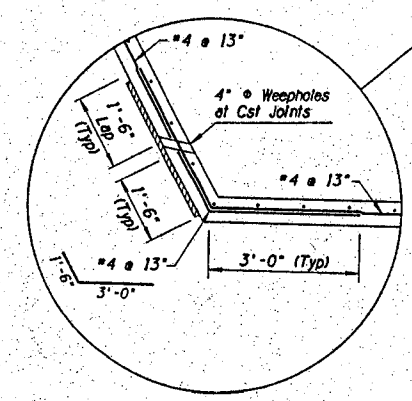
TRACS NO. H 5915 01C | 202-C(005)B | ___ OF ___

p:\2002020\cadd\structures\h5915wwd06.dgn
Plotted By: SG 04/22/2003 09:52:31 AM

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-C(005)B			

202L MA 031





TYPICAL EAST CHANNEL SECTION

Station			W
115+00.00	to	123+40.78	14'
126+53.98	to	129+80.00	12'
130+20.00	to	176+31.31	8'
179+48.54	to	232+05.67	8'
234+35.84	to	238+59.34	8'

Notes:

1. Top of channel lining Rt is to be a minimum of 6" below existing ground, at R/W line.
2. Drop in elevation across the channel bottom shall be 2% or 0.5 ft which ever is greater.
3. Top 2 ft of earth under the maintenance road shall be native material compacted 95% of maximum dry density.
4. All concrete shall be Class S (f'_c=3000 psi) See Special Provisions for detailed requirements.
5. All reinforced steel shall conform to ASTM A615/A615M-96a, Grade 60.
6. All reinforcing steel shall have a minimum 2" clear cover to grade and 2" to exposed surfaces unless otherwise noted.
7. Channel lining shall be continuously reinforced without expansion or tooled joints except as follows: Construction joints shall be located at the end of a day's pour or when concrete placement stops for more than forty-five (45) minutes and between longitudinal paving strips. Longitudinal construction joints shall be located one foot up each side slope. Reinforcing steel shall be continuous through lining construction joints and through joints with box culverts and other hydraulic structures unless noted otherwise.
8. Anchor slabs shall be installed in the locations shown on the plans.
9. Weep holes 10' on center typ.

Note:

Channel Geometry at Ramps, See Details D2 & D3

Channel Geometry at Transitions, See Details D-4.15 to D-4.20
Channel Depths, See Profile Sheets D-4.2 to D-4.10

Maintenance Roads Continue through Ramp Transitions.

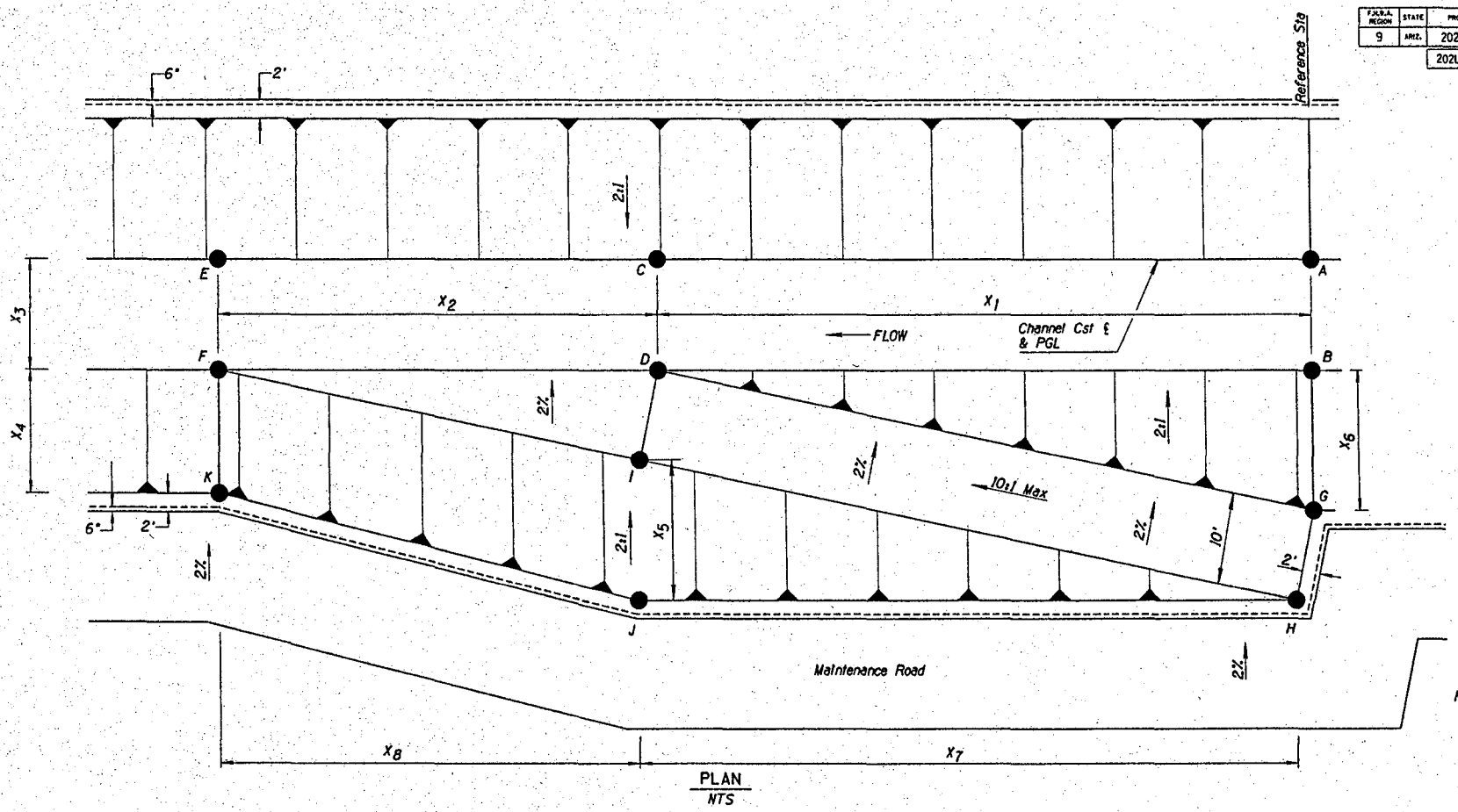
DETAIL D1

	NAME	DATE	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION ROADWAY DESIGN SERVICES	95% PRELIMINARY NOT FOR CONSTRUCTION
DESIGN	RSR	4/03		
DRAWN	CGS	4/03		
CHECKED	CAD	4/03	TYPICAL CHANNEL SECTION	
Stanley Consultants inc.				
ROUTE 202L	LOCATION SANTAN FWY, ELLIOT ROAD - BASELINE ROAD			DWG NO. D-5.1
TRACS NO. H 5915 01C			202-C(005)B	___ OF ___

04/22/2003 qt\16110\dgn\drainage\h5915dd01.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-C(005)B			

202L MA 031



Note: All dimensions shown are measured in the horizontal plane.

PLAN
NTS

CHANNEL REACH	RAMP REFERENCE STATION	DISTANCES (FT)								ELEVATIONS										
		X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	A	B	C	D	E	F	G	H	I	J	K
EAST	122+40.78	93.93	51.72	14	19.14	18.52	18.50	93.88	49.79	1379.93	1380.21	1379.79	1380.07	1379.72	1380.00	1389.46	1389.66	1380.27	1389.53	1389.57
EAST	174+80.00	80	53.88	8	14.94	14.62	15.10	80	52.02	1399.92	1400.09	1399.60	1399.76	1399.38	1399.54	1407.64	1407.84	1399.96	1407.27	1407.01
EAST	233+08.82																			

DETAIL D2

	NAME	DATE
DESIGN	RSR	4/03
DRAWN	CGS	4/03
CHECKED	CAD	4/03

Stanley Consultants inc
1929 East Camelback Road, Suite 150
Phoenix, Arizona 85016
Phone (602) 92-0202

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

CHANNEL ACCESS RAMP LAYOUT

95%
PRELIMINARY
NOT FOR CONSTRUCTION

ROUTE: 202L
LOCATION: SANTAN FWY, ELLIOT ROAD - BASELINE ROAD

DWG NO. D-5.2

TRACS NO. H 5915 01C

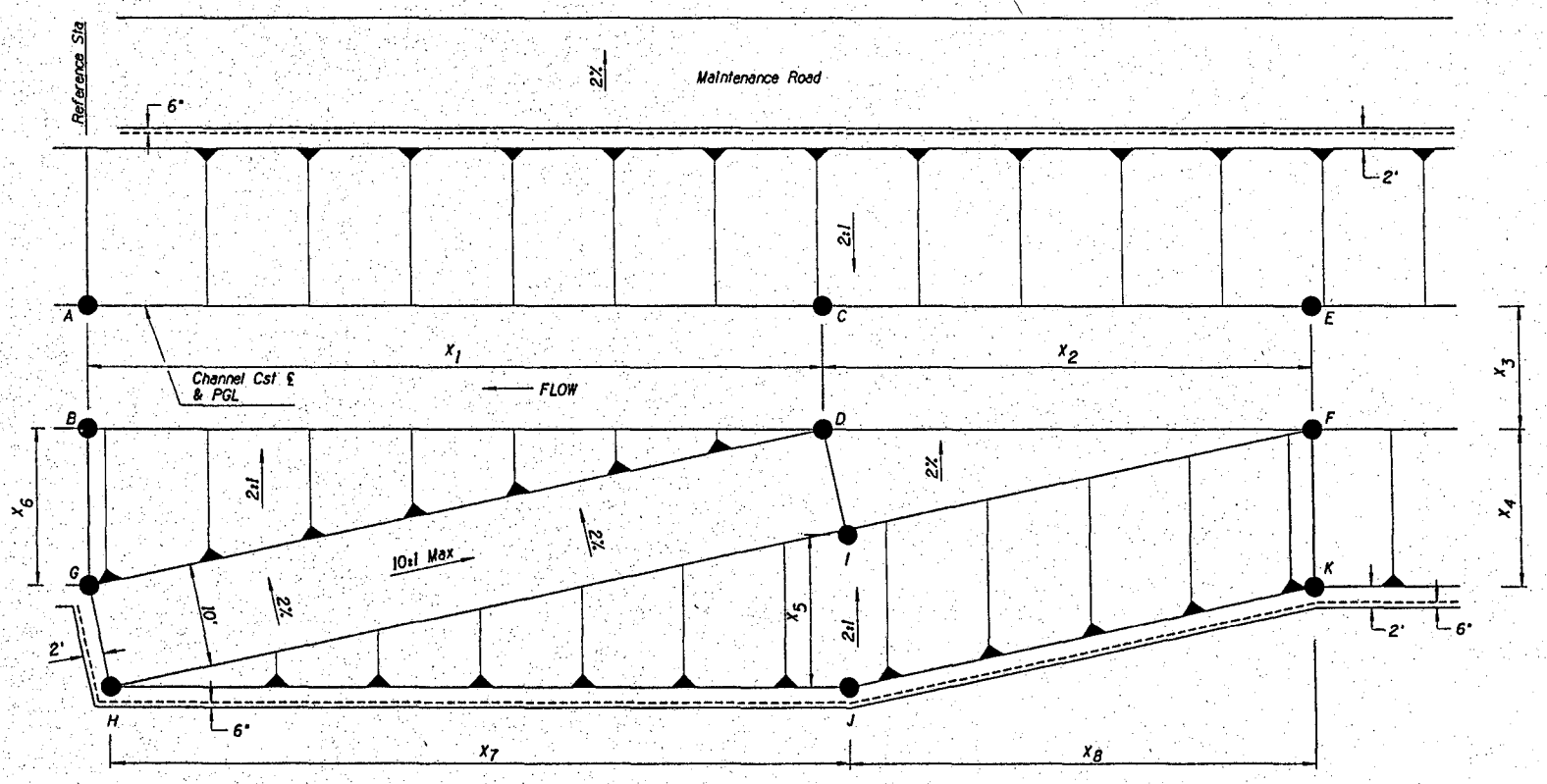
202-C(005)B

___ OF ___

847227200J

gt\16110\dgn\drainage\h5915dd02.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-C(005)B			
		202L MA 031			



Note: All dimensions shown are measured in the horizontal plane.

PLAN
NTS

CHANNEL REACH	RAMP REFERENCE STATION	DISTANCES (FT)								ELEVATIONS										
		X_1	X_2	X_3	X_4	X_5	X_6	X_7	X_8	A	B	C	D	E	F	G	H	I	J	K
EAST	127+54.00	96	52.79	12	19.52	19.12	19.52	96	51.76	1381.03	1381.27	1381.41	1381.65	1381.62	1381.86	1391.03	1391.23	1381.85	1391.41	1391.62
EAST	179+39.93																			
EAST																				

DETAIL D3

	NAME	DATE
DESIGN	RSR	4/03
DRAWN	CGS	4/03
CHECKED	CAD	4/03

Stanley Consultants INC.
2929 East Camelback Road, Suite 130
Phoenix, Arizona 85016
Phone (602) 95-6620

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

CHANNEL ACCESS RAMP LAYOUT

95%
PRELIMINARY
NOT FOR CONSTRUCTION

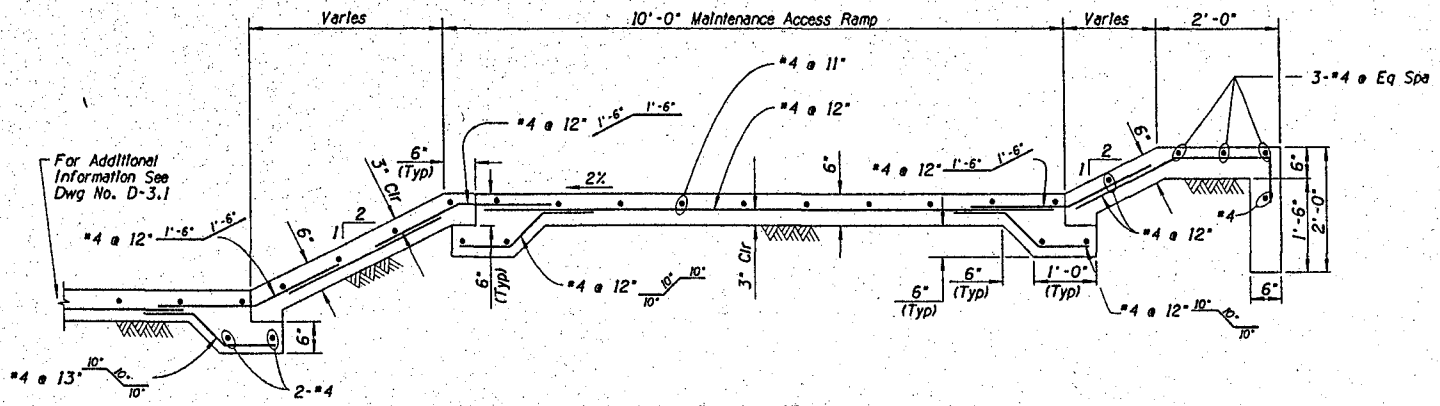
ROUTE: 202L
LOCATION: SANTAN FWY. ELLIOT ROAD - BASELINE ROAD

DWG NO. D-5.3

TRACS NO. H 5915 01C
202-C(005)B
___ OF ___

04/22/2003 q:\16110\Dgn\drainage\h5915dd03.dgn

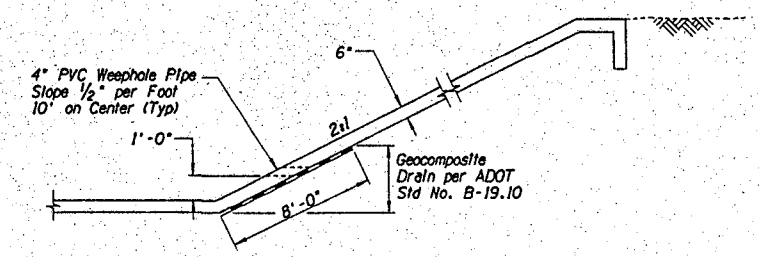
F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-C(005)B			
		202L MA 031			



ACCESS RAMP - TYPICAL SECTION FOR CONCRETE

Scale: 1" = 1'-0"

DETAIL D5



See Section 1014-5
of the Standard Specifications
for Fabric Requirements

NOTE:
Weephole Typical along
Channel and Transitions

WEEPHOLE DETAIL

NTS

DETAIL D4

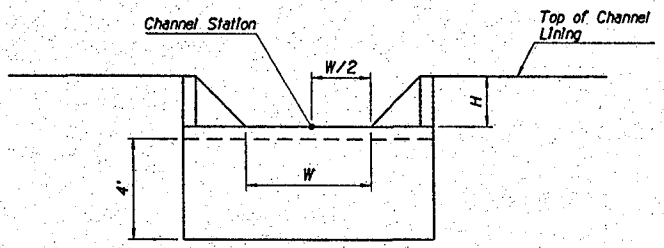
	NAME	DATE	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION ROADWAY DESIGN SERVICES	95% PRELIMINARY NOT FOR CONSTRUCTION
DESIGN	RSR	4/03		
DRAWN	CGS	4/03		
CHECKED	CAD	4/03		
Stanley Consultants inc.			TYPICAL CHANNEL ACCESS RAMP DETAIL	
ROUTE 202L	LOCATION SANTAN FWY, ELLIOT ROAD - BASELINE ROAD			DWG NO. D-5.4
TRACS NO. H 5915 01C			202-C(005)B	___ OF ___

0472272003 gi\16110\Dgn\drainage\H5915D005.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-C(005)B			
		202L MA 031			

STATION/OFFSET	L	W	H
141+00 Rt			
149+__ Rt			
152+8_ Rt			
158+__ Rt			
162+__ Rt			

CHANNEL STATION/OFFSET	L (FT)	W (FT)	H_1 (FT)	H_2 (FT)	ELEV 1	ELEV 2	ELEV 3
179+32, 63' Rt	38.76	11	2.20	1.22	1408.66	N/A	1408.77
181+60, 57' Rt	31.65	23	0.77	1.16	1409.26	N/A	1409.52
183+50, 72' Rt	51.14	23	1.23	1.11	1409.71	N/A	1410.35
187+22, 47' Rt	21.64	12	1.37	1.00	1412.74	1410.87	1413.15
191+48, 48' Rt	26.70	7	2.20	1.00	1411.55	1411.79	1414.17
197+65, 54' Rt	33.76	15	2.72	1.00	1413.44	N/A	1413.63



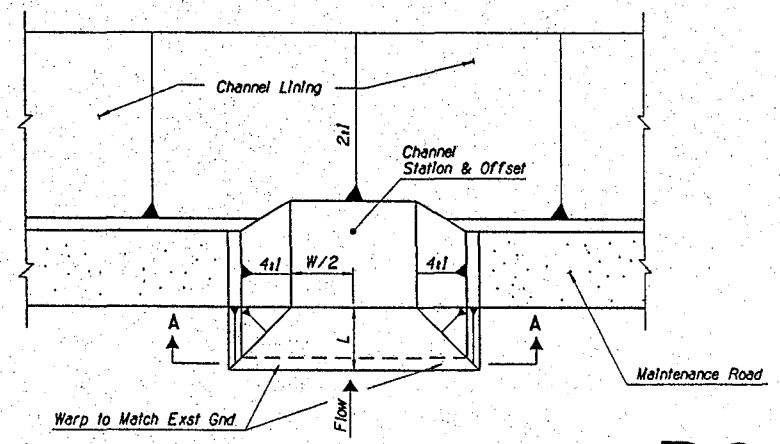
SECTION A-A
NTS

Notes:

1) All concrete shall be class B.

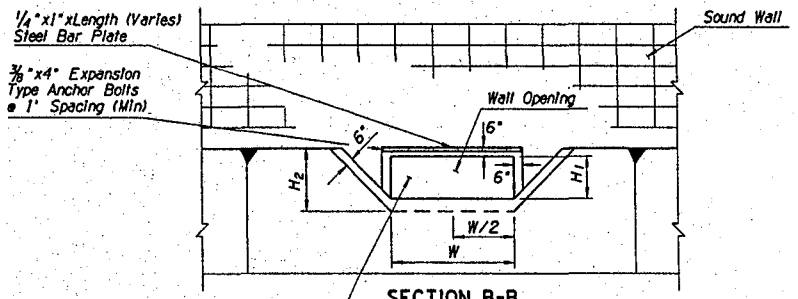
2) All steel shall be in accordance with ASTM A36

3) Place #4 reinforcing steel 12" O.C. in both directions.

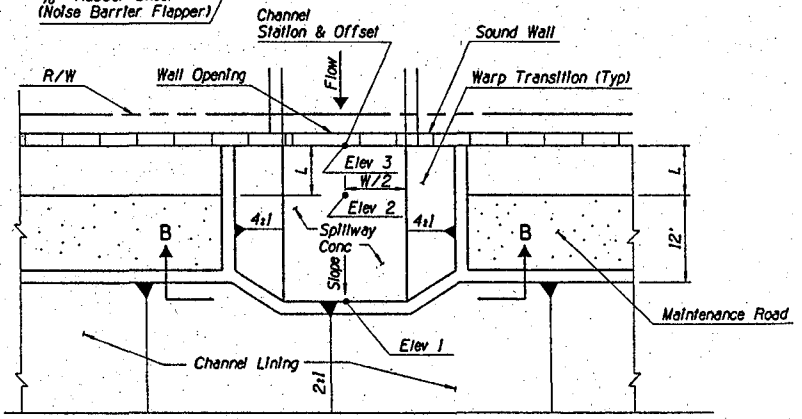


PLAN
NTS

DETAIL D6



SECTION B-B



Notes:

1) All concrete shall be class B.

2) All steel shall be in accordance with ASTM A36

3) Metal surfaces to be painted per section 610-3.05 of the ADOT Standard Specifications.

4) See detail D8 for wall opening grate.

5) Place #4 reinforcing steel 12" O.C. in both directions.

PLAN
NTS

DETAIL D7

	NAME	DATE
DESIGN	RSR	4/03
DRAWN	CGS	4/03
CHECKED	CAD	4/03

Stanley Consultants Inc.
2575 East Camelback Road, Suite 170
Phoenix, Arizona 85016
Phone: (602) 952-0099

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

MISC CHANNEL DETAILS

95%
PRELIMINARY
NOT FOR CONSTRUCTION

ROUTE: 202L
LOCATION: SANTAN FWY, ELLIOT ROAD - BASELINE ROAD

DWG NO. D-5.5

TRACS NO. H 5915 01C | 202-C(005)B | ___ OF ___

04/22/2003 q:\16110\dgn\drainage\h5915dd12.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-C(005)B			
		202L MA 031			

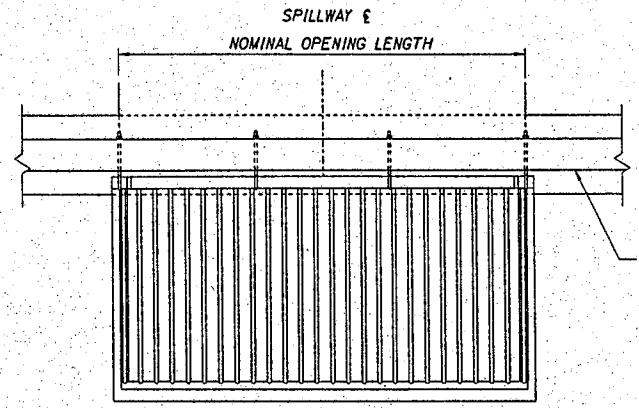
Notes:

1) All concrete shall be class B.

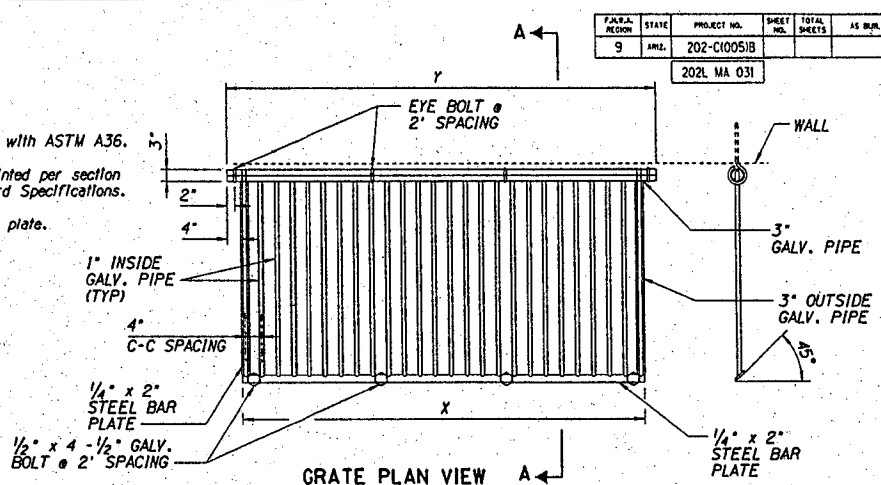
2) All steel shall be in accordance with ASTM A36.

3) All ungalvanized metal to be painted per section 610-3.05 of the ADOT Standard Specifications.

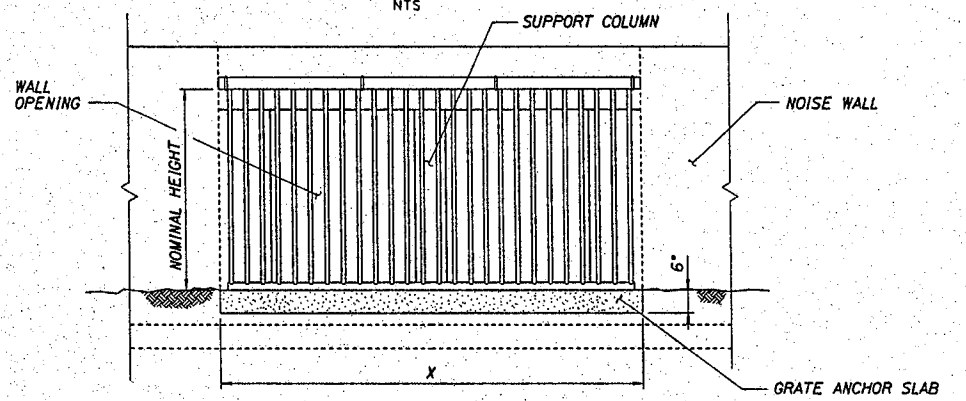
4) Remove all scale from steel bar plate.



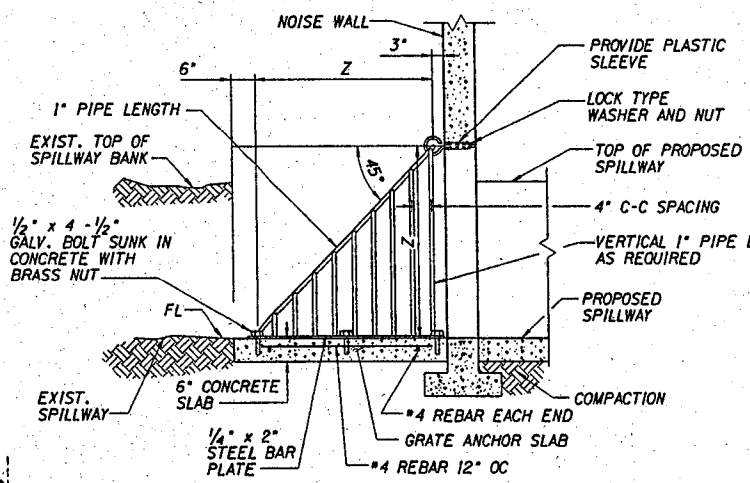
PLAN VIEW
NTS



GRATE PLAN VIEW
NTS

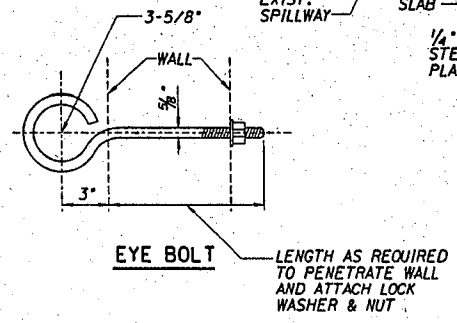


ELEVATION VIEW
NTS



SECTION A-A
NTS

TRASH RACK DIMENSIONS						
CHANNEL STATION	NOMINAL OPENING HEIGHT	NOMINAL OPENING LENGTH	1" PIPE LENGTH	DIMENSIONS		
				X	Y	Z
179+32	2.20'	11'	3.96'	11.2'	11.87'	2.89'
181+60	0.77'	23'	1.39'	23.2'	23.87'	1.07'
183+50	1.23'	23'	2.04'	23.2'	23.87'	1.53'
187+22	1.37'	12'	2.24'	12.2'	12.87'	1.67'
191+48	2.20'	7'	3.41'	7.2'	7.87'	2.50'
197+65	2.72'	15'	4.67'	15.2'	15.87'	3.39'



EYE BOLT

DETAIL D8

	NAME	DATE	ARIZONA DEPARTMENT OF TRANSPORTATION INTERMODAL TRANSPORTATION DIVISION ROADWAY DESIGN SERVICES	95% PRELIMINARY NOT FOR CONSTRUCTION
DESIGN		4/03		
DRAWN		4/03		
CHECKED		4/03		
Stanley Consultants INC. 2901 East Camelback Road, Suite 130 Phoenix, Arizona 85016 Phone: (602) 957-5300			DRAINAGE STRUCTURE WALL OPENING GRATE	
ROUTE 202L	LOCATION SANTAN FWY. ELLIOT ROAD - BASELINE ROAD			DWG NO. D-5.6
TRACS NO. H 5915 01C			202-C(005)B	___ OF ___

APPENDIX C CATCH BASIN SUMMARY

Table 3: Santan Freeway - Baseline Rd to Elliot Rd, Roadway Catch Basin Summary

Stanley Consultants INC.

ADOT

Plan Ref. No.	Alignment	Station	Offset	Dir.	Curb Type	EP Elev	Grate Elev	$S_{L\ (\%)}$	S_X (ft/ft)	Area Unpaved (sf)	Area Paved (sf)	Area Unpaved (ac)	Area Paved (ac)	CA	Qb10yr (cfs)	Q10yr (cfs)	Qb50yr (cfs)	Q50yr (cfs)
101	Elliot Rd.	21+01.00	63.00	Rt	D	1388.83	N/A	0.4680%	0.0150	0	4930	0.000	0.113	0.108	0.00	0.46	N/A	N/A
102	Elliot Rd.	20+19.72	63.00	Rt	D	1388.64	N/A	0.0000%	0.0150	0	5835	0.000	0.134	0.127	0.00	0.54	N/A	N/A
*	Elliot Rd.	20+19.72	N/A	N/A	N/A	N/A	N/A	0.0000%	0.0150	0	5768	0.000	0.132	0.126	0.05	0.58	N/A	N/A
103	Elliot Rd.	19+37.00	63.00	Rt	D	1388.85	N/A	0.4000%	0.0150	0	9070	0.000	0.208	0.198	0.00	0.84	N/A	N/A
105	Ramp EC	1+64.26	23.50	Lt	C	1388.29	1388.15	0.0000%	0.0200	1470	15589	0.034	0.358	0.364	0.00	1.55	N/A	N/A
*	Ramp EC	1+42.26	N/A	N/A	N/A	N/A	N/A	0.3520%	0.0200	418	11990	0.010	0.275	0.268	0.00	1.14	N/A	N/A
*	Ramp EC	1+66.26	N/A	N/A	N/A	N/A	N/A	0.0321%	0.0200	791	2655	0.018	0.061	0.071	0.33	0.63	N/A	N/A
106	Ramp EC	2+26.00	23.50	Lt	C	1388.43	1388.29	0.9880%	0.0200	1222	32566	0.028	0.748	0.730	0.00	3.10	N/A	N/A
107	Ramp EC	1+64.26	25.50	Rt	N/A	N/A	1388.02	N/A	N/A	63315	0	1.454	0.000	1.017	0.00	4.32	N/A	N/A
108	Elliot Rd.	21+01.00	63.00	Lt	D	1388.83	N/A	0.4680%	0.0150	0	5224	0.000	0.120	0.114	0.00	0.48	N/A	N/A
109	Elliot Rd.	20+19.72	63.00	Lt	D	1388.64	N/A	0.0000%	0.0150	0	5835	0.000	0.134	0.127	0.00	0.54	N/A	N/A
*	Elliot Rd.	20+19.72	N/A	N/A	N/A	N/A	N/A	0.0000%	0.0150	0	5768	0.000	0.132	0.126	0.05	0.59	N/A	N/A
110	Elliot Rd.	19+37.00	63.00	Lt	D	1388.85	N/A	0.4000%	0.0150	0	8792	0.000	0.202	0.192	0.00	0.81	N/A	N/A
112	Ramp ED	1+70.00	11.50	Rt	C	1388.09	1387.96	0.5744%	0.0200	1608	14826	0.037	0.340	0.349	0.00	1.48	N/A	N/A
113	Ramp ED	2+17.67	11.50	Rt	C	1387.95	1387.82	0.0000%	0.0200	1990	2945	0.046	0.068	0.096	0.25	0.66	N/A	N/A
*	Ramp ED	2+19.67	N/A	N/A	N/A	N/A	N/A	0.0242%	0.0200	1016	1483	0.023	0.034	0.049	0.06	0.27	N/A	N/A
*	Ramp ED	2+15.67	N/A	N/A	N/A	N/A	N/A	0.0240%	0.0200	974	1462	0.022	0.034	0.048	0.19	0.39	N/A	N/A
114	Ramp ED	2+65.00	11.50	Rt	C	1388.09	1387.95	0.5704%	0.0200	4935	8579	0.113	0.197	0.266	0.57	1.70	N/A	N/A
115	Ramp ED	2+17.67	24.00	Lt	N/A	N/A	1387.82	N/A	N/A	91270	0	2.095	0.000	1.467	0.00	6.23	N/A	N/A
116	Ramp ED	5+25.00	11.50	Rt	C	1390.59	1390.46	0.9922%	0.0200	3799	37926	0.087	0.871	0.888	0.00	3.77	N/A	N/A

* Data used to facilitate design of roadway sag inlets

Table 3: Santan Freeway - Baseline Rd to Elliot Rd, Roadway Catch Basin Summary

Stanley Consultants INC.

ADOT

Plan Ref. No.	Alignment	Station	Offset	Dir.	Curb Type	EP Elev	Grate Elev	$S_{L\ (\%)}$	S_X (ft/ft)	Area Unpaved (sf)	Area Paved (sf)	Area Unpaved (ac)	Area Paved (ac)	CA	Qb10yr (cfs)	Q10yr (cfs)	Qb50yr (cfs)	Q50yr (cfs)
117	ML Med WB	3183+63.00	91.50	Lt	C	1399.87	1399.74	1.5320%	0.0200	0	18882	0.000	0.433	0.412	1.59	3.34	N/A	N/A
118	ML Med WB	3181+69.00	91.50	Lt	F	1403.24	1403.07	1.8000%	0.0200	0	101094	0.000	2.321	2.205	0.00	9.37	N/A	N/A
119	ML Med EB	3181+69.00	67.50	Rt	F	1403.72	1403.55	1.8000%	0.0200	0	88589	0.000	2.034	1.932	0.00	8.21	N/A	N/A
120	ML Med EB	3186+27.00	67.50	Rt	C	1397.31	1397.18	0.7711%	0.0200	0	38970	0.000	0.895	0.850	0.76	4.37	N/A	N/A
121	ML Med EB	3187+67.00	96.74	Rt	C	1395.93	1395.79	0.1970%	0.0200	0	16947	0.000	0.389	0.370	0.00	1.57	N/A	N/A
122	ML Med EB	3188+42.00	90.69	Rt	C	1395.86	1395.72	0.0000%	0.0200	0	14705	0.000	0.338	0.321	0.20	1.56	N/A	N/A
*	ML Med EB	3188+25.00	N/A	N/A	N/A	N/A	N/A	0.0458%	0.0200	0	8228	0.000	0.189	0.179	0.10	0.86	N/A	N/A
*	ML Med EB	3188+54.00	N/A	N/A	N/A	N/A	N/A	0.0326%	0.0200	0	6477	0.000	0.149	0.141	0.10	0.70	N/A	N/A
124	ML Med WB	3188+53.00	114.62	Lt	C	1395.36	1395.23	0.0000%	0.0200	0	16408	0.000	0.377	0.358	0.00	1.52	N/A	N/A
*	ML Med WB	3188+31.00	N/A	N/A	N/A	N/A	N/A	0.0645%	0.0200	0	10432	0.000	0.239	0.228	0.00	0.97	N/A	N/A
*	ML Med WB	3188+60.00	N/A	N/A	N/A	N/A	N/A	0.0179%	0.0200	0	5976	0.000	0.137	0.130	0.00	0.55	N/A	N/A
125	ML Med WB	3187+67.00	120.09	Lt	C	1395.46	1395.33	0.2374%	0.0200	0	22183	0.000	0.509	0.484	0.00	2.06	N/A	N/A
126	ML Med WB	3185+96.00	131.34	Lt	C	1396.29	1396.15	0.7302%	0.0200	0	38965	0.000	0.895	0.850	0.00	3.61	N/A	N/A
127	ML Med WB	3189+04.00	115.80	Lt	C	1395.39	1395.26	0.1327%	0.0200	0	13890	0.000	0.319	0.303	0.00	1.29	N/A	N/A
128	ML Med WB	3190+27.00	106.39	Lt	C	1395.75	1395.62	0.3975%	0.0200	0	28942	0.000	0.664	0.631	0.00	2.68	N/A	N/A
129	ML Med EB	3189+04.00	86.25	Rt	C	1395.91	1395.77	0.1647%	0.0200	0	12184	0.000	0.280	0.266	0.49	1.62	N/A	N/A
131	ML Med EB	3190+27.00	80.76	Rt	C	1396.27	1396.13	0.4432%	0.0200	0	25623	0.000	0.588	0.559	0.25	2.62	N/A	N/A
132	ML Med EB	3192+95.00	79.50	Rt	C	1397.62	1397.49	0.5057%	0.0200	0	28650	0.000	0.658	0.625	0.34	3.00	N/A	N/A
133	ML Med WB	3192+95.00	103.50	Lt	C	1397.11	1396.97	0.5057%	0.0200	0	32250	0.000	0.740	0.703	0.00	2.99	N/A	N/A
134	ML Med EB	3195+95.00	79.50	Rt	C	1399.06	1398.93	0.3588%	0.0200	0	24475	0.000	0.562	0.534	0.00	2.27	N/A	N/A

* Data used to facilitate design of roadway sag inlets

Table 3: Santan Freeway - Baseline Rd to Elliot Rd, Roadway Catch Basin Summary

Stanley Consultants INC.

ADOT

Plan Ref. No.	Alignment	Station	Offset	Dir.	Curb Type	EP Elev	Grate Elev	$S_{L\ (\%)}$	S_X (ft/ft)	Area Unpaved (sf)	Area Paved (sf)	Area Unpaved (ac)	Area Paved (ac)	CA	Qb10yr (cfs)	Q10yr (cfs)	Qb50yr (cfs)	Q50yr (cfs)
135	ML Med WB	3195+95.00	103.50	Lt	C	1398.58	1398.45	0.3589%	0.0200	0	27550	0.000	0.632	0.601	0.00	2.55	N/A	N/A
200	Elliot Rd.	10+00.00	46.20	Rt	D	1386.29	N/A	0.5000%	0.0200	0	44064	0.000	1.012	0.961	0.00	4.08	N/A	N/A
201	Elliot Rd.	10+00.00	46.20	Lt	D	1386.29	N/A	0.5000%	0.0200	0	49673	0.000	1.140	1.083	0.00	4.60	N/A	N/A
202	Elliot Rd.	23+18.00	62.39	Rt	D	1390.32	N/A	0.7474%	0.0160	0	42256	0.000	0.970	0.922	0.00	3.92	N/A	N/A
203	Elliot Rd.	23+14.00	73.50	Lt	D	1390.12	N/A	0.7470%	0.0160	0	51114	0.000	1.173	1.115	0.00	4.74	N/A	N/A
307	ML Med EB	3203+65.00	79.50	Rt	C	1397.71	1397.58	0.6141%	0.0200	6246	49060	0.143	1.126	1.170	0.00	4.97	0.00	6.87
308	ML Med WB	3203+65.00	103.50	Lt	C	1397.24	1397.10	0.6134%	0.0200	19961	55225	0.458	1.268	1.525	0.00	6.48	0.00	8.95
309	Ramp GA	6+48.09	11.50	Lt	B	1391.68	1391.43	0.0000%	0.0200	6501	6433	0.149	0.148	0.245	0.03	1.07	0.68	2.12
*	Ramp GA	6+41.09	N/A	N/A	N/A	N/A	N/A	0.0420%	0.0200	3211	4359	0.074	0.100	0.147	0.02	0.64	N/A	N/A
*	Ramp GA	6+55.09	N/A	N/A	N/A	N/A	N/A	0.0421%	0.0200	3290	2074	0.076	0.048	0.098	0.01	0.43	N/A	N/A
310	Ramp GA	5+83.00	11.05	Lt	B	1391.82	1391.57	0.4758%	0.0200	8697	21601	0.200	0.496	0.611	0.00	2.60	0.02	3.61
311	ML Med WB	3210+10.00	113.43	Lt	B	1393.08	1392.83	0.7494%	0.0200	7002	14777	0.161	0.339	0.435	0.00	1.85	0.01	2.56
312	ML Med WB	3208+80.00	106.64	Lt	B	1394.01	1393.76	0.6854%	0.0200	6984	13053	0.160	0.300	0.397	0.00	1.69	0.12	2.45
313	ML Med WB	3207+60.00	103.50	Lt	B	1394.81	1394.56	0.6134%	0.0200	23469	42463	0.539	0.975	1.303	1.03	6.57	2.11	9.76
314	Ramp GA	7+15.00	11.50	Lt	B	1391.82	1391.57	0.4022%	0.0200	5328	3565	0.122	0.082	0.163	1.41	2.10	2.70	3.66
315	Ramp GA	8+30.00	11.50	Lt	B	1392.68	1392.43	1.0933%	0.0200	42464	35487	0.975	0.815	1.456	0.00	6.19	0.00	8.55
316	ML Med EB	3222+50.00	79.50	Rt	B	1386.14	1385.89	0.0000%	0.0200	10944	10755	0.251	0.247	0.410	0.72	2.46	2.14	4.55
*	ML Med EB	3222+48.00	N/A	N/A	N/A	N/A	N/A	0.6141%	0.0200	3857	3841	0.089	0.088	0.146	0.72	1.34	N/A	N/A
*	ML Med EB	3222+52.00	N/A	N/A	N/A	N/A	N/A	0.1531%	0.0197	3857	6914	0.089	0.159	0.213	0.00	0.90	N/A	N/A
317	ML Med EB	3222+04.00	79.50	Rt	B	1386.42	1386.17	0.6141%	0.0200	22471	27889	0.516	0.640	0.969	0.35	4.47	0.00	5.69

* Data used to facilitate design of roadway sag inlets

Table 3: Santan Freeway - Baseline Rd to Elliot Rd, Roadway Catch Basin Summary

Stanley Consultants INC.

ADOT

Plan Ref. No.	Alignment	Station	Offset	Dir.	Curb Type	EP Elev	Grate Elev	$S_{L\,(\%)}$	S_X (ft/ft)	Area Unpaved (sf)	Area Paved (sf)	Area Unpaved (ac)	Area Paved (ac)	CA	Qb10yr (cfs)	Q10yr (cfs)	Qb50yr (cfs)	Q50yr (cfs)
318	ML Med EB	3218+70.00	79.50	Rt	B	1388.47	1388.22	0.6141%	0.0200	18759	45501	0.431	1.045	1.294	1.13	6.63	2.24	9.83
319	ML Med WB	3218+70.00	91.50	Lt	B	1388.24	1387.99	0.6134%	0.0200	22281	63417	0.512	1.456	1.741	0.00	7.40	0.00	10.22
320	Ramp GB	10+50.00	12.06	Rt	B	1396.49	1396.24	1.9786%	0.0200	17201	35406	0.395	0.813	1.049	0	4.46	0	6.16
321	Ramp GB	8+20.00	5.50	Rt	B	1392.72	1392.47	0.9870%	0.0200	10081	7812	0.231	0.179	0.332	0.48	1.89	1.21	3.16
322	Ramp GB	7+39.00	5.50	Rt	B	1392.14	1391.89	0.4331%	0.0200	3803	2508	0.087	0.058	0.116	0.00	0.49	0.17	0.85
323	Ramp GB	6+75.88	5.50	Rt	B	1392.00	1391.75	0.0000%	0.0200	5814	11249	0.133	0.258	0.339	0.01	1.45	0.05	2.04
*	Ramp GB	6+48.88	N/A	N/A	N/A	N/A	N/A	0.1832%	0.0200	2899	7201	0.067	0.165	0.204	0.01	0.88	N/A	N/A
*	Ramp GB	6+92.88	N/A	N/A	N/A	N/A	N/A	0.1177%	0.0200	2915	4048	0.067	0.093	0.135	0.00	0.57	N/A	N/A
324	Ramp GB	6+13.00	5.50	Rt	B	1392.14	1391.89	0.4286%	0.0200	2448	6162	0.056	0.141	0.174	0.01	0.75	0.09	1.11
325	ML Med EB	3211+57.00	97.85	Rt	B	1392.48	1392.23	0.7631%	0.0200	3265	8103	0.075	0.186	0.229	0.00	0.97	0.09	1.44
326	ML Med EB	3210+80.00	96.61	Rt	B	1393.06	1392.81	0.7421%	0.0200	6108	15244	0.140	0.350	0.431	0.00	1.83	0.19	2.72
327	ML Med EB	3209+25.00	82.14	Rt	B	1394.18	1393.93	0.6981%	0.0200	5260	15758	0.121	0.362	0.428	0.05	1.87	0.63	3.14
328	ML Med EB	3207+60.00	79.50	Rt	B	1395.29	1395.04	0.6141%	0.0200	10230	37723	0.235	0.866	0.987	1.71	5.91	2.85	8.64
401	Guadalupe Rd.	10+63.00	45.80	Lt	D	1400.65	N/A	0.5911%	0.0200	0	45170	0.000	1.037	0.985	0.00	4.19	N/A	N/A
403	Guadalupe Rd.	11+23.00	47.30	Rt	D	1400.98	N/A	0.5911%	0.0200	0	45148	0.000	1.036	0.985	0.00	4.18	N/A	N/A
404	Guadalupe Rd.	18+28.25	61.00	Rt	D	1408.37	N/A	1.1418%	0.0150	0	23278	0.000	0.534	0.508	0.00	2.16	N/A	N/A
406	Guadalupe Rd.	18+30.18	61.00	Lt	D	1408.39	N/A	1.1418%	0.0150	0	23451	0.000	0.538	0.511	0.00	2.17	N/A	N/A
407	Guadalupe Rd.	23+60.00	59.29	Rt	D	1409.58	N/A	0.5013%	0.0184	0	7188	0.000	0.165	0.157	0.00	0.67	N/A	N/A
408	Guadalupe Rd.	24+62.18	57.33	Rt	D	1409.24	N/A	0.0000%	0.0200	0	6894	0.000	0.158	0.150	0.13	0.77	N/A	N/A
*	Guadalupe Rd.	24+62.18	N/A	N/A	N/A	N/A	N/A	0.0000%	0.0200	0	7079	0.000	0.163	0.154	1.33	1.99	N/A	N/A

* Data used to facilitate design of roadway sag inlets

Table 3: Santan Freeway - Baseline Rd to Elliot Rd, Roadway Catch Basin Summary

Stanley Consultants INC.

ADOT

Plan Ref. No.	Alignment	Station	Offset	Dir.	Curb Type	EP Elev	Grate Elev	$S_{L\ (\%)}$	S_X (ft/ft)	Area Unpaved (sf)	Area Paved (sf)	Area Unpaved (ac)	Area Paved (ac)	CA	Qb10yr (cfs)	Q10yr (cfs)	Qb50yr (cfs)	Q50yr (cfs)
409	Guadalupe Rd.	25+64.00	54.78	Rt	D	1409.57	N/A	0.5520%	0.0200	0	25093	0.000	0.576	0.547	0.00	2.33	N/A	N/A
410	Guadalupe Rd.	24+62.18	68.33	Lt	D	1409.02	N/A	0.0000%	0.0200	0	8582	0.000	0.197	0.187	0.19	0.98	N/A	N/A
*	Guadalupe Rd.	24+62.18	N/A	N/A	N/A	N/A	N/A	0.0000%	0.0200	0	8286	0.000	0.190	0.181	1.40	2.17	N/A	N/A
411	Guadalupe Rd.	25+64.00	62.56	Lt	D	1409.42	N/A	0.5520%	0.0200	0	26075	0.000	0.599	0.569	0.00	2.42	N/A	N/A
412	Guadalupe Rd.	23+60.00	70.29	Lt	D	1409.38	N/A	0.5013%	0.0184	0	8640	0.000	0.198	0.188	0.00	0.80	N/A	N/A
509	ML Med WB	3242+30.00	105.98	Lt	B	1401.21	1400.96	1.4797%	0.0360	49177	100675	1.129	2.311	2.986	0.27	12.96	0.76	18.29
511	ML Med EB	3246+38.00	91.50	Rt	C	1410.10	1409.97	1.2952%	0.0036	0	6971	0.000	0.160	0.152	0.02	0.67	0.55	1.44
512	ML Med EB	3247+11.00	91.50	Rt	C	1410.54	1410.41	1.2952%	0.0127	0	43644	0.000	1.002	0.952	0.61	4.66	1.73	7.32
516	ML Med WB	3223+60.00	91.50	Lt	B	1385.25	1385.00	0.5871%	0.0200	35096	44358	0.806	1.018	1.531	0.30	6.81	1.18	10.17
517	ML Med WB	3225+39.00	91.50	Lt	B	1384.10	1383.85	0.8437%	0.0305	5361	6171	0.123	0.142	0.221	0.80	1.74	2.28	3.58
518	ML Med EB	3225+70.00	18.50	Rt	C	1385.63	1385.50	0.0000%	0.0360	0	11291	0.000	0.259	0.246	0.00	1.05	0.04	1.49
*	ML Med EB	3225+63.00	N/A	N/A	N/A	N/A	N/A	0.1329%	0.0348	0	5561	0.000	0.128	0.121	0.00	0.52	N/A	N/A
*	ML Med EB	3225+77.00	N/A	N/A	N/A	N/A	N/A	0.1663%	0.0360	0	5730	0.000	0.132	0.125	0.00	0.53	N/A	N/A
519	ML Med EB	3225+04.00	18.50	Rt	C	1385.79	1385.65	0.3154%	0.0245	0	2661	0.000	0.061	0.058	0.00	0.25	0.00	0.34
521	ML Med EB	3226+38.00	18.50	Rt	C	1385.79	1385.66	0.3119%	0.0360	0	17863	0.000	0.410	0.390	0.02	1.68	0.13	2.42
523	ML Med WB	3225+81.92	91.50	Lt	B	1383.78	1383.53	0.0000%	0.0320	17649	19562	0.405	0.449	0.710	0.32	3.34	1.71	5.88
*	ML Med WB	3225+74.92	N/A	N/A	N/A	N/A	N/A	0.7579%	0.0353	3698	4056	0.085	0.093	0.148	0.13	0.76	N/A	N/A
*	ML Med WB	3226+08.92	N/A	N/A	N/A	N/A	N/A	0.0645%	0.0360	13951	15506	0.320	0.356	0.562	0.19	2.58	N/A	N/A
524	ML Med WB	3227+46.00	91.50	Lt	B	1384.10	1383.85	0.3917%	0.0360	8398	9829	0.193	0.226	0.349	2.03	3.51	3.69	5.74
525	ML Med WB	3228+50.00	91.50	Lt	B	1384.64	1384.39	0.6400%	0.0360	33768	65070	0.775	1.494	1.962	0.00	8.34	0.00	11.52

* Data used to facilitate design of roadway sag inlets

Table 3: Santan Freeway - Baseline Rd to Elliot Rd, Roadway Catch Basin Summary

Stanley Consultants INC.

ADOT

Plan Ref. No.	Alignment	Station	Offset	Dir.	Curb Type	EP Elev	Grate Elev	$S_{L\ (\%)}$	S_X (ft/ft)	Area Unpaved (sf)	Area Paved (sf)	Area Unpaved (ac)	Area Paved (ac)	CA	Qb10yr (cfs)	Q10yr (cfs)	Qb50yr (cfs)	Q50yr (cfs)
526	ML Med EB	3228+50.00	18.50	Rt	C	1386.99	1386.85	0.8179%	0.0360	0	31513	0.000	0.723	0.687	0.00	2.92	0.05	4.08
527	ML Med EB	3232+24.00	18.50	Rt	C	1391.35	1391.22	1.2952%	0.0360	0	31682	0.000	0.727	0.691	0.74	3.68	1.61	5.67
529	Ramp GC	8+76.00	17.50	Lt	B	1391.15	1390.90	0.6374%	0.0360	30368	43661	0.697	1.002	1.440	0	6.12	0	8.45
530	Ramp GC	9+75.74	17.50	Lt	B	1390.83	1390.58	0.0000%	0.0360	12496	7356	0.287	0.169	0.361	0.57	2.11	2.52	4.64
*	Ramp GC	9+73.74	N/A	N/A	N/A	N/A	N/A	0.0128%	0.0360	5858	3687	0.134	0.085	0.175	0.3	1.04	N/A	N/A
*	Ramp GC	9+77.74	N/A	N/A	N/A	N/A	N/A	0.0128%	0.0360	6638	3669	0.152	0.084	0.187	0.27	1.06	N/A	N/A
531	Ramp GD	10+96.52	11.50	Lt	C	1399.36	1399.22	0.0000%	0.0320	0	6231	0.000	0.143	0.136	0.15	0.73	0.43	1.23
*	Ramp GD	10+89.52	N/A	N/A	N/A	N/A	N/A	0.0224%	0.0320	0	3116	0.000	0.072	0.068	0.14	0.43	N/A	N/A
*	Ramp GD	11+03.52	N/A	N/A	N/A	N/A	N/A	0.0224%	0.0320	0	3115	0.000	0.072	0.068	0.01	0.30	N/A	N/A
532	Ramp GD	9+96.00	11.50	Lt	C	1399.52	1399.39	0.3220%	0.0320	0	4526	0.000	0.104	0.099	0.53	0.95	1.01	1.59
533	Ramp GD	8+50.00	11.50	Lt	C	1400.33	1400.20	0.7897%	0.0320	0	32681	0.000	0.750	0.713	0	3.03	0	4.18
534	ML Med EB	3236+00.00	18.50	Rt	C	1396.22	1396.09	1.2952%	0.0360	0	31751	0.000	0.729	0.692	0.74	3.68	1.56	5.62
535	Ramp GD	11+97.00	11.50	Lt	C	1399.52	1399.39	0.3219%	0.0320	0	4342	0.000	0.100	0.095	0	0.40	0	0.56
537	Ramp GC	10+75.00	17.50	Lt	B	1391.15	1390.90	0.6343%	0.0360	7207	12418	0.165	0.285	0.387	2.18	3.82	5.08	7.35
538	Ramp GC	11+75.00	17.50	Lt	B	1392.10	1391.85	1.2734%	0.0360	38926	74685	0.894	1.715	2.254	1.76	11.34	4.02	17.25
539	ML Med EB	3239+03.00	18.50	Rt	C	1400.15	1400.01	1.2952%	0.0360	0	31905	0.000	0.732	0.696	0.72	3.68	1.43	5.51
540	ML Med EB	3242+30.00	18.50	Rt	C	1404.38	1404.25	1.2952%	0.0360	0	39141	0.000	0.899	0.854	0.00	3.63	0.24	5.25
601	Baseline Rd.	26+35.00	46.71	Rt	D	1427.38	N/A	0.5400%	0.0200	0	15958	0.000	0.366	0.348	0.30	1.78	N/A	N/A
602	Baseline Rd.	26+35.00	48.86	Lt	D	1427.33	N/A	0.5400%	0.0200	0	17703	0.000	0.406	0.386	0.30	1.94	N/A	N/A
603	Baseline Rd.	23+13.00	52.00	Lt	D	1425.81	N/A	0.5275%	0.0150	0	21413	0.000	0.492	0.467	0.00	1.98	N/A	N/A

* Data used to facilitate design of roadway sag inlets

Table 3: Santan Freeway - Baseline Rd to Elliot Rd, Roadway Catch Basin Summary

Stanley Consultants INC

ADOT

Plan Ref. No.	Alignment	Station	Offset	Dir.	Curb Type	EP Elev	Grate Elev	$S_{L\ (\%)}$	S_X (ft/ft)	Area Unpaved (sf)	Area Paved (sf)	Area Unpaved (ac)	Area Paved (ac)	CA	Qb10yr (cfs)	Q10yr (cfs)	Qb50yr (cfs)	Q50yr (cfs)
604	Baseline Rd.	23+40.00	52.00	Lt	D	1425.93	N/A	0.5277%	0.0160	0	17100	0.000	0.393	0.373	0.00	1.58	N/A	N/A
700	ML EB	251+68.00	43.50	Rt	C	1416.05	1415.92	1.2966%	0.0200	0	43853	0.000	1.007	0.956	0.85	4.91	1.96	7.57
701	ML Med WB	3251+58.00	110.22	Lt	F	1415.91	1415.74	1.5107%	0.0200	0	56135	0.000	1.289	1.224	0.00	5.20	0.00	7.19
702	ML EB	256+27.00	43.50	Rt	F	1421.81	1421.64	1.2966%	0.0245	0	42961	0.000	0.986	0.937	1.34	5.32	2.53	8.03
703	ML WB	256+20.00	29.50	Rt	C	1423.73	1423.59	1.4184%	0.0082	0	5013	0.000	0.115	0.109	0.00	0.46	0.06	0.70
704	ML WB	256+61.00	29.50	Rt	C	1424.19	1424.05	1.4073%	0.0123	0	8436	0.000	0.194	0.184	0.01	0.79	0.15	1.23
705	ML WB	257+30.00	29.50	Rt	C	1424.95	1424.81	1.3886%	0.0192	0	13911	0.000	0.319	0.303	0.19	1.48	0.64	2.42
706	ML WB	258+43.00	29.50	Rt	C	1426.16	1426.03	1.3580%	0.0306	0	27077	0.000	0.622	0.591	0.34	2.85	0.91	4.38
707	ML EB	260+50.00	51.82	Rt	F	1426.49	1426.33	1.2966%	0.0360	0	74460	0.000	1.709	1.624	0.00	6.90	0.23	9.76
708	ML WB	260+58.00	29.50	Rt	C	1428.86	1428.72	1.2998%	0.0360	0	35566	0.000	0.816	0.776	0.28	3.58	0.80	5.35
709	ML WB	263+11.00	29.50	Rt	C	1432.13	1432.00	1.2941%	0.0360	0	32692	0.000	0.751	0.713	0.33	3.36	0.87	5.06
710	Ramp BA	4+98	11.50	Rt	B	1436.58	1436.33	1.1819%	0.0320	0	10342	0.000	0.237	0.226	0	0.96	N/A	N/A
711	ML EB	265+57.00	43.50	Rt	C	1433.37	1433.23	1.2966%	0.0360	0	27642	0.000	0.635	0.603	0.73	3.29	2.13	5.67
712	ML WB	265+60.00	29.50	Rt	C	1435.36	1435.22	1.2941%	0.0360	0	34675	0.000	0.796	0.756	0.34	3.55	0.82	5.26
713	ML EB	268+00.00	43.50	Rt	F	1436.52	1436.35	1.2966%	0.0360	0	125220	0.000	2.875	2.731	0.00	11.61	1.00	17.03
714	ML WB	268+25.00	29.50	Rt	C	1438.78	1438.65	1.2941%	0.0360	0	38617	0.000	0.887	0.842	0.01	3.59	0.18	5.12
715	ML WB	271+02.00	29.50	Rt	C	1442.37	1442.23	1.2941%	0.0360	0	36564	0.000	0.839	0.797	0.25	3.64	0.67	5.35
716	ML WB	273+52.00	29.50	Rt	C	1445.33	1445.19	1.0451%	0.0360	0	34015	0.000	0.781	0.742	0.14	3.29	0.40	4.75
717	ML WB	275+80.00	29.50	Rt	C	1447.42	1447.28	0.7903%	0.0360	0	30936	0.000	0.710	0.675	0.00	2.87	0.00	3.96
718	Ramp BB	17+62.00	23.50	Rt	C	1423.81	1423.67	0.0000%	0.0200	0	3870	0.000	0.089	0.084	0.74	1.10	N/A	N/A

* Data used to facilitate design of roadway sag inlets

Table 3: Santan Freeway - Baseline Rd to Elliot Rd, Roadway Catch Basin Summary

Stanley Consultants INC.

ADOT

Plan Ref. No.	Alignment	Station	Offset	Dir.	Curb Type	EP Elev	Grate Elev	$S_{L\ (\%)}$	S_X (ft/ft)	Area Unpaved (sf)	Area Paved (sf)	Area Unpaved (ac)	Area Paved (ac)	CA	Qb10yr (cfs)	Q10yr (cfs)	Qb50yr (cfs)	Q50yr (cfs)
*	Ramp BB	17+60.00	N/A	N/A	N/A	N/A	N/A	0.2712%	0.0200	0	2064	0.000	0.047	0.045	0.46	0.65	N/A	N/A
*	Ramp BB	17+64.00	N/A	N/A	N/A	N/A	N/A	0.2095%	0.0196	0	1806	0.000	0.041	0.039	0.28	0.45	N/A	N/A
720	Ramp NW	10+27.00	17.50	Rt	F	1445.81	1445.64	1.3060%	0.0356	0	27423	0.000	0.630	0.598	0.00	2.54	N/A	N/A
722	Ramp BB	18+04.00	23.50	Rt	C	1424.03	1423.89	0.4067%	0.0121	0	12604	0.000	0.289	0.275	0	1.17	N/A	N/A
723	Ramp BB	17+14.00	23.50	Rt	C	1424.10	1423.97	0.9798%	0.0200	0	27214	0.000	0.625	0.594	0	2.52	N/A	N/A
724	ML EB	277+51.00	39.79	Rt	Bridge	1447.20	1447.13	0.6638%	0.0360	0	55027	0.000	1.263	1.200	0.00	5.10	N/A	N/A
726	Baseline Rd.	18+07.00	52.00	Rt	D	1423.19	N/A	0.5200%	0.0150	0	24799	0.000	0.569	0.541	0.00	2.30	N/A	N/A
727	Ramp BA	19+39.00	11.50	Rt	B	1421.51	1421.26	0.6601%	0.0101	6073	8866	0.139	0.204	0.291	0	1.24	N/A	N/A
728	Ramp BA	18+80.00	11.50	Rt	B	1421.27	1421.02	0.0000%	0.0188	7061	3978	0.162	0.091	0.200	0.63	1.48	N/A	N/A
*	Ramp BA	18+78.00	N/A	N/A	N/A	N/A	N/A	0.0321%	0.0191	3483	1992	0.080	0.046	0.099	0.56	0.98	N/A	N/A
*	Ramp BA	18+82.00	N/A	N/A	N/A	N/A	N/A	0.0379%	0.0185	3578	1986	0.082	0.046	0.101	0.07	0.50	N/A	N/A
729	Ramp BA	18+21.00	11.50	Rt	B	1421.51	1421.26	0.8300%	0.0275	49894	34339	1.145	0.788	1.551	0	6.59	N/A	N/A
730	Baseline Rd.	18+06.00	52.00	Lt	D	1423.19	N/A	0.5200%	0.0150	0	35226	0.000	0.809	0.768		3.27	N/A	N/A
732	Ramp WS	5+81.06	13.50	Rt	C	1451.57	1451.43	0.0000%	0.0200	0	4850	0.000	0.111	0.106	0.00	0.45	N/A	N/A
733	ML WB	282+26.00	43.50	Lt	C	1451.22	1451.09	0.4001%	0.0121	0	8982	0.000	0.206	0.196	0.00	0.83	N/A	N/A
734	ML WB	282+72.00	43.50	Lt	C	1451.06	1450.93	0.4001%	0.0200	0	11638	0.000	0.267	0.254	0.00	1.08	N/A	N/A
735	Ramp WS	6+45.00	13.50	Rt	C	1451.65	1451.52	0.2758%	0.0200	0	20000	0.000	0.459	0.436	0.00	1.85	N/A	N/A
736	Ramp WS	5+26.00	13.50	Rt	C	1451.63	1451.50	0.2375%	0.0200	0	715	0.000	0.016	0.016	0.00	0.07	N/A	N/A

* Data used to facilitate design of roadway sag inlets

Santan Freeway - Baseline Rd. to Elliot Rd, Area Catch Basins

Stanley Consultants INC.

ADOT

Median Catch Basin Design ADOT Standard C-15.80

Parameters:

I= 5.87

Effective Perimeter (ft)= 7

Effective Area (ft^2)= 2.05

Inlet Station	CB ID	Area Unpaved (ac)	Area Paved (ac)	Weighted C	Q 50yr (cfs)	Depth Weir ft	Depth Orifice (ft)
WB 274+32	737	0.87	1.46	0.86	11.75	0.68	1.14
WB 260+17	738	1.79	0.24	0.73	8.71	0.56	0.62
Med 3248+65	513	0.85	0.36	0.77	5.52	0.41	0.25
Med 3241+41	514	0.50	0.16	0.76	2.96	0.27	0.07
Med 3226+38	522	1.13	0.29	0.75	6.26	0.45	0.32
Med 3222+21	515	1.55	0.78	0.78	10.71	0.64	0.94
Med 3200+79	136	0.27	0.14	0.78	1.87	0.20	0.03
Med 3195+10	139	0.68	0.00	0.70	2.77	0.26	0.06
Med 3189+66	137	0.70	0.35	0.78	4.79	0.37	0.19
Med 3187+64	138	1.18	0.59	0.78	8.13	0.53	0.54
Ramp BB 17+62	719	1.15	0.00	0.70	4.74	0.37	0.18
Ramp GD 10+96.52	536	1.34	0.00	0.70	5.52	0.41	0.25
Med 3225+13	520	1.62	0.00	0.70	6.64	0.46	0.36
Ramp ED 2+17.67	115	1.67	0.00	0.70	6.86	0.47	0.39
Ramp EC 1+64.26	109	1.45	0.00	0.70	5.97	0.43	0.29

APPENDIX D STORMCAD MODELS

Scenario: Base

Pipe Report

Label	Up. Node	Dn. Node	Up. Inlet Area (acres)	Up. Inlet Rat. Coef.	Up. Calc. Sys. CA (acres)	I (in/hr)	System Tc (min)	System Q (cfs)	Avg. v (ft/s)	L (ft)	S (ft/ft)	Size	Mannings n	Up. Invert (ft)	Dn. Invert (ft)	HGL In (ft)	HGL Out (ft)
P-100	CB 100	Jct 100	0.102	0.95	2.260	4.25	6.85	9.68	1.97	171.71	0.003320	30 inch	0.012	1,381.79	1,381.22	1,387.01	1,386.93
P-101	CB 101	CB 100	0.042	0.95	2.159	4.25	6.13	9.25	1.88	81.28	0.003076	30 inch	0.012	1,382.04	1,381.79	1,387.05	1,387.02
P-102	CB 102	CB 101	0.145	0.95	2.117	4.25	5.39	9.07	1.85	82.72	0.003143	30 inch	0.012	1,382.30	1,382.04	1,387.09	1,387.06
P-103	Jct 103	CB 102	1.971	0.79	1.971	4.25	5.00	8.45	2.69	62.47	0.003041	24 inch	0.012	1,382.49	1,382.30	1,387.18	1,387.11
P-104	MH 104	Jct 104	N/A	N/A	4.566	4.25	9.80	19.56	3.98	60.07	0.003163	30 inch	0.012	1,381.08	1,380.89	1,387.37	1,387.25
P-105	CB 105	MH 104	0.114	0.95	2.407	4.25	8.95	10.31	2.10	108.20	0.003142	30 inch	0.012	1,381.42	1,381.08	1,387.48	1,387.42
P-106	CB 106	CB 105	0.044	0.95	2.293	4.25	8.27	9.82	2.00	81.27	0.003076	30 inch	0.012	1,381.67	1,381.42	1,387.53	1,387.49
P-107	CB 107	CB 106	0.138	0.95	2.250	4.25	7.57	9.64	1.96	82.72	0.003143	30 inch	0.012	1,381.93	1,381.67	1,387.57	1,387.53
P-108	MH 108	CB 107	N/A	N/A	2.112	4.25	7.21	9.05	2.88	62.48	0.003041	24 inch	0.012	1,382.12	1,381.93	1,387.67	1,387.59
P-109	CB 109	MH 108	1.018	0.70	2.112	4.25	6.60	9.05	2.88	104.12	0.003073	24 inch	0.012	1,382.44	1,382.12	1,387.97	1,387.82
P-110	CB 110	CB 109	0.364	0.93	1.094	4.25	6.03	4.69	1.49	51.00	0.003137	24 inch	0.012	1,382.60	1,382.44	1,388.04	1,388.02
P-111	CB 111	CB 110	0.730	0.94	0.730	4.25	5.00	3.13	1.00	61.73	0.003078	24 inch	0.012	1,382.79	1,382.60	1,388.10	1,388.09
P-112	CB 112	MH 104	0.349	0.93	2.159	4.25	7.59	9.25	2.94	105.51	0.005308	24 inch	0.012	1,382.14	1,381.58	1,387.64	1,387.49
P-113	CB 113	CB 112	0.097	0.85	1.810	4.25	7.26	7.75	2.47	47.67	0.003356	24 inch	0.012	1,382.30	1,382.14	1,387.73	1,387.68
P-114	CB 114	CB 113	0.256	0.85	0.256	4.25	5.00	1.09	0.35	47.33	0.003169	24 inch	0.012	1,382.45	1,382.30	1,387.76	1,387.76
P-115	CB 115	CB 113	1.457	0.70	1.457	4.25	5.00	6.24	1.99	37.00	0.041081	24 inch	0.012	1,383.82	1,382.30	1,387.84	1,387.82
P-116	CB 116	Jct 116	0.722	0.92	0.722	4.25	5.00	3.10	0.99	77.32	0.023409	24 inch	0.012	1,384.96	1,383.15	1,388.05	1,388.04
P-202	CB 202	Jct 202	0.921	0.95	0.921	4.25	10.00	3.95	1.36	19.85	0.066499	24 inch	0.013	1,385.32	1,384.00	1,386.93	1,386.93
P-203	CB 203	Jct 203	1.114	0.95	1.114	4.25	10.00	4.77	1.52	19.49	0.057465	24 inch	0.013	1,385.12	1,384.00	1,387.28	1,387.27

Scenario: Base

Inlet Report

Label	Area (acres)	C	Inlet CA (acres)	TC (min)	Total Flow To Inlet (cfs)	Add. Q (cfs)	Struct. Depth (ft)	Rim (ft)	Sump (ft)	HGL In (ft)	HGL Out (ft)	EGL In (ft)	EGL Out (ft)	Headloss Mtd
CB 100	0.107	0.95	0.102	5.00	0.44	0.00	7.04	1,388.83	1,381.79	1,387.02	1,387.01	1,387.07	1,387.07	HEC-22 Energy
CB 101	0.044	0.95	0.042	5.00	0.18	0.00	6.60	1,388.64	1,382.04	1,387.06	1,387.05	1,387.11	1,387.11	HEC-22 Energy
CB 102	0.153	0.95	0.145	5.00	0.62	0.00	6.53	1,388.83	1,382.30	1,387.11	1,387.09	1,387.22	1,387.15	HEC-22 Energy
CB 105	0.120	0.95	0.114	5.00	0.49	0.00	7.41	1,388.83	1,381.42	1,387.49	1,387.48	1,387.55	1,387.55	HEC-22 Energy
CB 106	0.046	0.95	0.044	5.00	0.19	0.00	6.97	1,388.64	1,381.67	1,387.53	1,387.53	1,387.59	1,387.59	HEC-22 Energy
CB 107	0.145	0.95	0.138	5.00	0.59	0.00	6.90	1,388.83	1,381.93	1,387.59	1,387.57	1,387.72	1,387.63	HEC-22 Energy
CB 109	1.454	0.70	1.018	5.00	4.36	0.00	5.58	1,388.02	1,382.44	1,388.02	1,387.97	1,388.10	1,388.10	HEC-22 Energy
CB 110	0.392	0.93	0.364	5.00	1.56	0.00	5.55	1,388.15	1,382.60	1,388.09	1,388.04	1,388.10	1,388.07	HEC-22 Energy
CB 111	0.776	0.94	0.730	5.00	3.13	0.00	5.50	1,388.29	1,382.79	1,388.10	1,388.10	1,388.11	1,388.11	HEC-22 Energy
CB 112	0.377	0.93	0.349	5.00	1.49	0.00	5.82	1,387.96	1,382.14	1,387.68	1,387.64	1,387.77	1,387.77	HEC-22 Energy
CB 113	0.114	0.85	0.097	5.00	0.41	0.00	5.52	1,387.82	1,382.30	1,387.76	1,387.73	1,387.82	1,387.82	HEC-22 Energy
CB 114	0.299	0.85	0.256	5.00	1.09	0.00	5.50	1,387.95	1,382.45	1,387.76	1,387.76	1,387.76	1,387.76	HEC-22 Energy
CB 115	2.082	0.70	1.457	5.00	6.24	0.00	4.00	1,387.82	1,383.82	1,387.82	1,387.82	1,387.88	1,387.88	HEC-22 Energy
CB 116	0.785	0.92	0.722	5.00	3.10	0.00	5.50	1,390.46	1,384.96	1,388.05	1,388.05	1,388.07	1,388.07	HEC-22 Energy
CB 202	0.970	0.95	0.921	10.00	3.95	0.00	5.00	1,390.32	1,385.32	1,386.93	1,386.93	1,386.96	1,386.96	HEC-22 Energy
CB 203	1.173	0.95	1.114	10.00	4.77	0.00	5.00	1,390.12	1,385.12	1,387.28	1,387.28	1,387.31	1,387.31	HEC-22 Energy
Jct 103	2.485	0.79	1.971	5.00	8.45	0.00	6.89	1,389.38	1,382.49	1,387.18	1,387.18	1,387.29	1,387.29	HEC-22 Energy

Scenario: Base

DOT Report

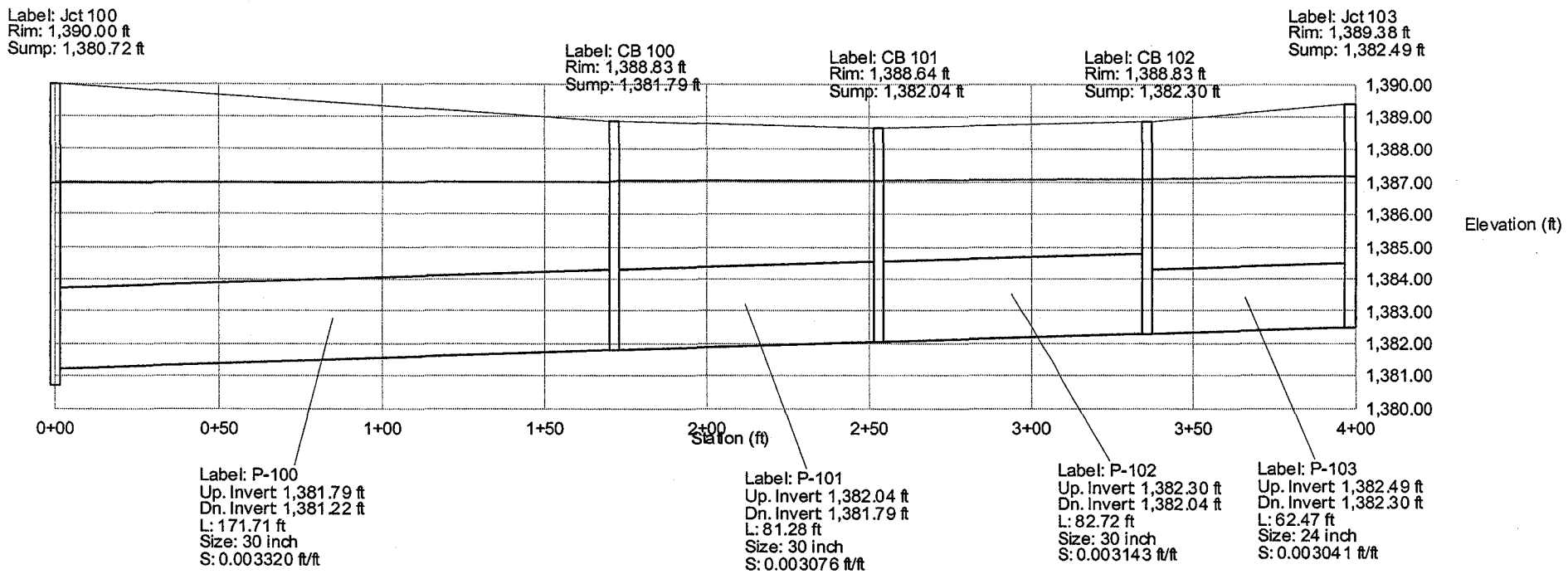
Label	-Node- Up. Dn.	v In (ft/s)	v Out (ft/s)	v Head In (ft)	v Head Out (ft)	Avg. v (ft/s)	Up. Calc. Sys. CA (acres)	Section Disch Cap. (cfs)	Section Shape Size	L (ft)	-Ground- Up. Dn. (ft)	-Invert- Up. Dn. (ft)	-HGL- Up. Dn. (ft)	-EGL- Up. Dn. (ft)
P-100	CB 100	1.97	1.97	0.06	0.06	1.97	2.260	9.68	Circular	171.71	1,388.83	1,381.79	1,387.01	1,387.07
	Jct 100							25.60	30 inch		1,390.00	1,381.22	1,386.93	1,386.99
P-101	CB 101	1.88	1.88	0.06	0.06	1.88	2.159	9.25	Circular	81.28	1,388.64	1,382.04	1,387.05	1,387.11
	CB 100							24.64	30 inch		1,388.83	1,381.79	1,387.02	1,387.07
P-102	CB 102	1.85	1.85	0.05	0.05	1.85	2.117	9.07	Circular	82.72	1,388.83	1,382.30	1,387.09	1,387.15
	CB 101							24.91	30 inch		1,388.64	1,382.04	1,387.06	1,387.11
P-103	Jct 103	2.69	2.69	0.11	0.11	2.69	1.971	8.45	Circular	62.47	1,389.38	1,382.49	1,387.18	1,387.29
	CB 102							13.52	24 inch		1,388.83	1,382.30	1,387.11	1,387.22
P-104	MH 104	3.98	3.98	0.25	0.25	3.98	4.566	19.56	Circular	60.07	1,389.50	1,381.08	1,387.37	1,387.61
	Jct 104							24.99	30 inch		1,390.50	1,380.89	1,387.25	1,387.50
P-105	CB 105	2.10	2.10	0.07	0.07	2.10	2.407	10.31	Circular	108.20	1,388.83	1,381.42	1,387.48	1,387.55
	MH 104							24.91	30 inch		1,389.50	1,381.08	1,387.42	1,387.49
P-106	CB 106	2.00	2.00	0.06	0.06	2.00	2.293	9.82	Circular	81.27	1,388.64	1,381.67	1,387.53	1,387.59
	CB 105							24.64	30 inch		1,388.83	1,381.42	1,387.49	1,387.55
P-107	CB 107	1.96	1.96	0.06	0.06	1.96	2.250	9.64	Circular	82.72	1,388.83	1,381.93	1,387.57	1,387.63
	CB 106							24.91	30 inch		1,388.64	1,381.67	1,387.53	1,387.59
P-108	MH 108	2.88	2.88	0.13	0.13	2.88	2.112	9.05	Circular	62.48	1,389.39	1,382.12	1,387.67	1,387.80
	CB 107							13.51	24 inch		1,388.83	1,381.93	1,387.59	1,387.72
P-109	CB 109	2.88	2.88	0.13	0.13	2.88	2.112	9.05	Circular	104.12	1,388.02	1,382.44	1,387.97	1,388.10
	MH 108							13.59	24 inch		1,389.39	1,382.12	1,387.82	1,387.95
P-110	CB 110	1.49	1.49	0.03	0.03	1.49	1.094	4.69	Circular	51.00	1,388.15	1,382.60	1,388.04	1,388.07
	CB 109							13.73	24 inch		1,388.02	1,382.44	1,388.02	1,388.05
P-111	CB 111	1.00	1.00	0.02	0.02	1.00	0.730	3.13	Circular	61.73	1,388.29	1,382.79	1,388.10	1,388.11
	CB 110							13.60	24 inch		1,388.15	1,382.60	1,388.09	1,388.10
P-112	CB 112	2.94	2.94	0.13	0.13	2.94	2.159	9.25	Circular	105.51	1,387.96	1,382.14	1,387.64	1,387.77
	MH 104							17.85	24 inch		1,389.50	1,381.58	1,387.49	1,387.62
P-113	CB 113	2.47	2.47	0.09	0.09	2.47	1.810	7.75	Circular	47.67	1,387.82	1,382.30	1,387.73	1,387.82
	CB 112							14.20	24 inch		1,387.96	1,382.14	1,387.68	1,387.77
P-114	CB 114	0.35	0.35	1.89e-3	1.89e-3	0.35	0.256	1.09	Circular	47.33	1,387.95	1,382.45	1,387.76	1,387.76
	CB 113							13.80	24 inch		1,387.82	1,382.30	1,387.76	1,387.76
P-115	CB 115	1.99	1.99	0.06	0.06	1.99	1.457	6.24	Circular	37.00	1,387.82	1,383.82	1,387.84	1,387.90
	CB 113							49.67	24 inch		1,387.82	1,382.30	1,387.82	1,387.88
P-116	CB 116	0.99	0.99	0.02	0.02	0.99	0.722	3.10	Circular	77.32	1,390.46	1,384.96	1,388.05	1,388.07
	Jct 116							37.49	24 inch		1,385.15	1,383.15	1,388.04	1,388.06
P-202	CB 202	1.46	1.26	0.03	0.02	1.36	0.921	3.95	Circular	19.85	1,390.32	1,385.32	1,386.93	1,386.96

Scenario: Base

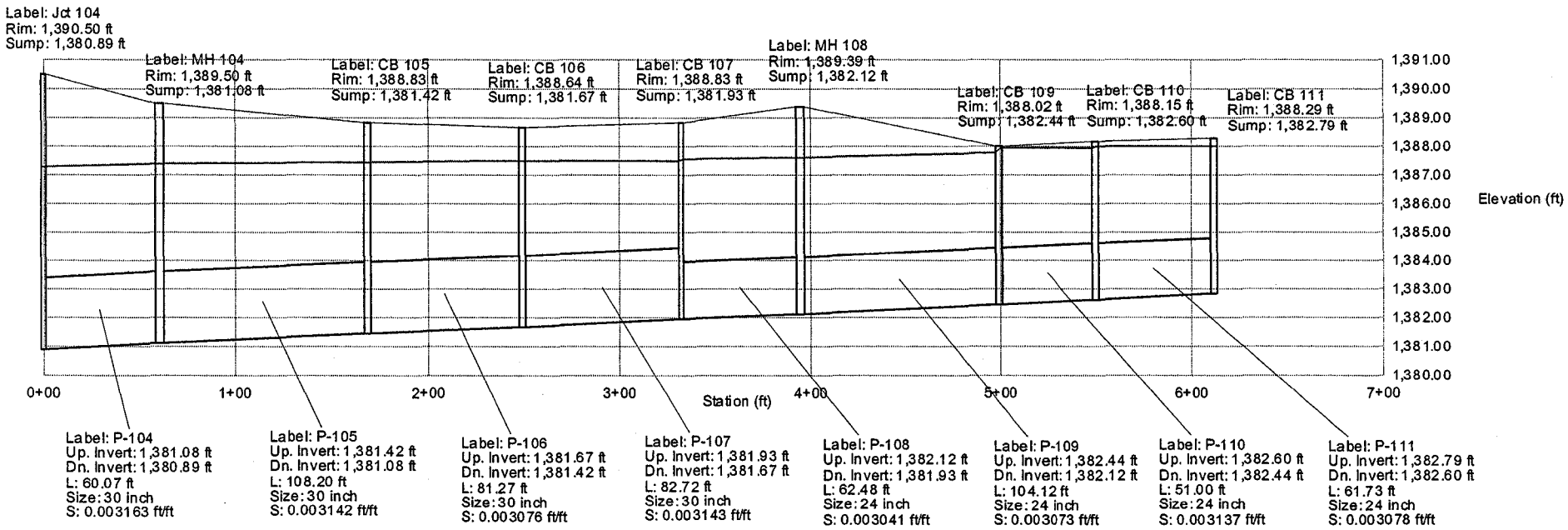
DOT Report

Label	-Node- Up. Dn.	v In (ft/s)	v Out (ft/s)	v Head In (ft)	v Head Out (ft)	Avg. v (ft/s)	Up. Calc. Sys. CA (acres)	Section Disch Cap. (cfs)	Section Shape Size	L (ft)	-Ground- Up. Dn. (ft)	-Invert- Up. Dn. (ft)	-HGL- Up. Dn. (ft)	-EGL- Up. Dn. (ft)
	Jct 202							58.33	24 inch		1,390.00	1,384.00	1,386.93	1,386.95
P-203	CB 203	1.52	1.52	0.04	0.04	1.52	1.114	4.77	Circular	19.49	1,390.12	1,385.12	1,387.28	1,387.31
	Jct 203							54.23	24 inch		1,390.00	1,384.00	1,387.27	1,387.31

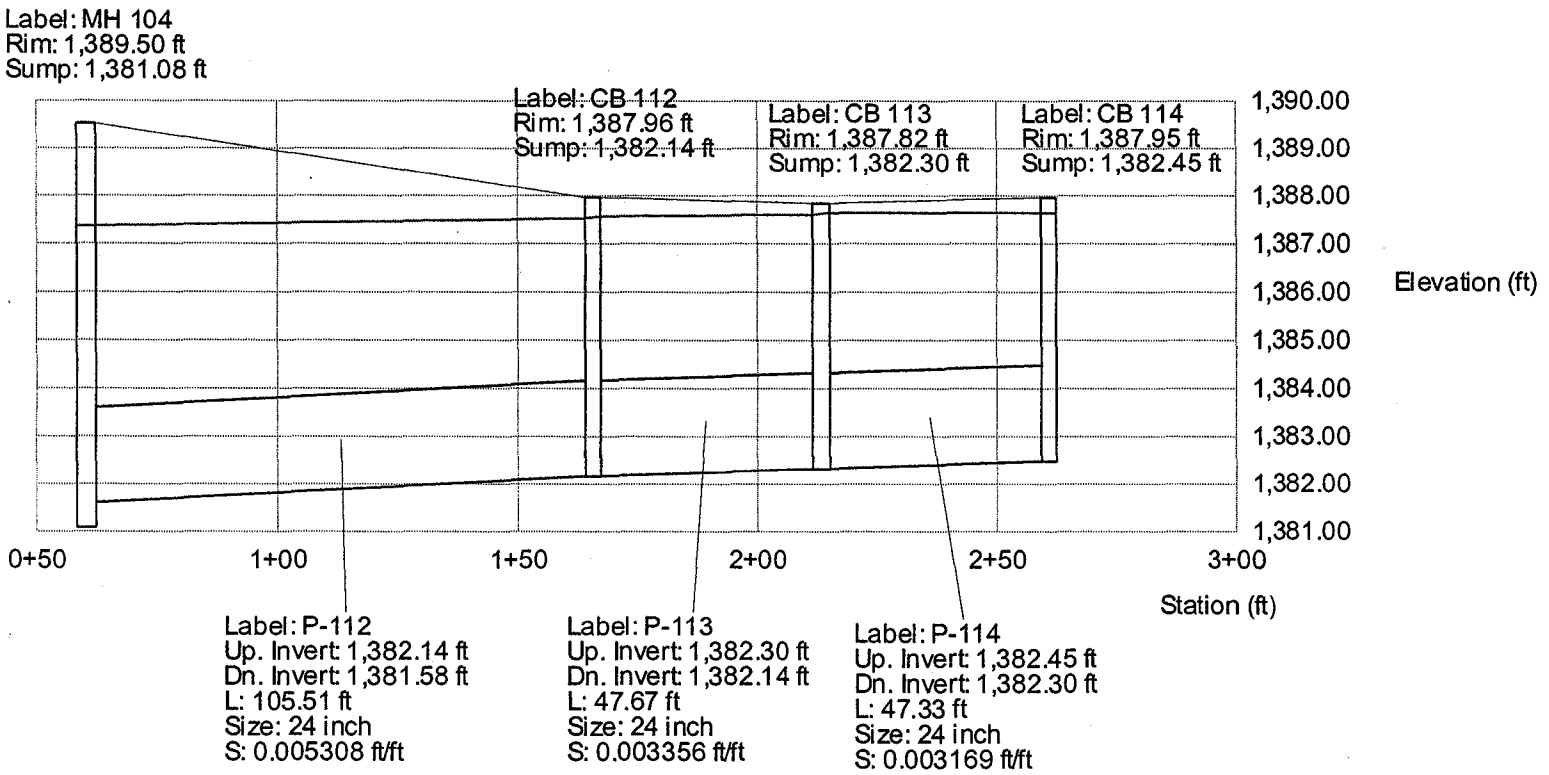
Profile
Scenario: Base



Profile
Scenario: Base



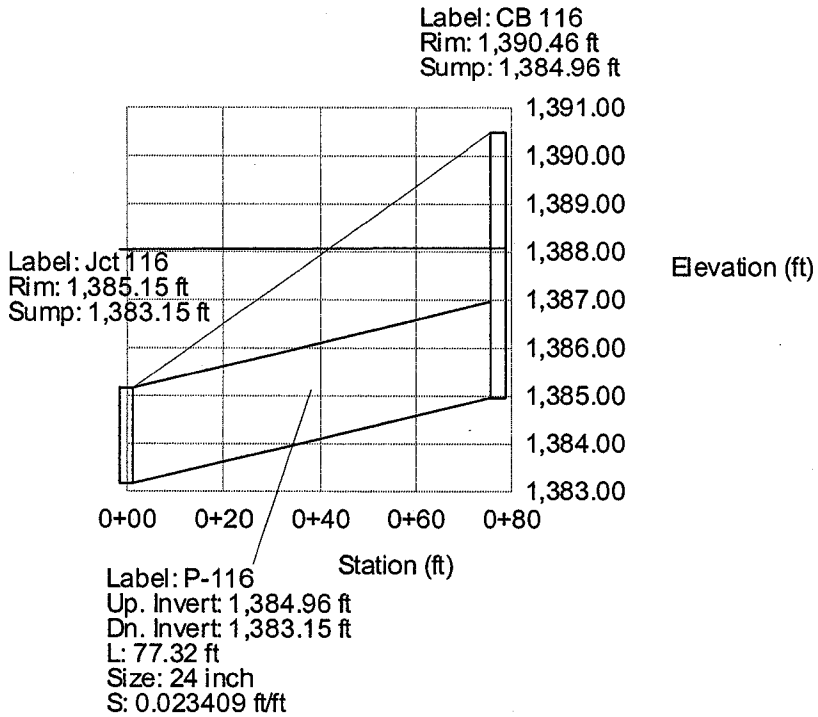
Profile
Scenario: Base



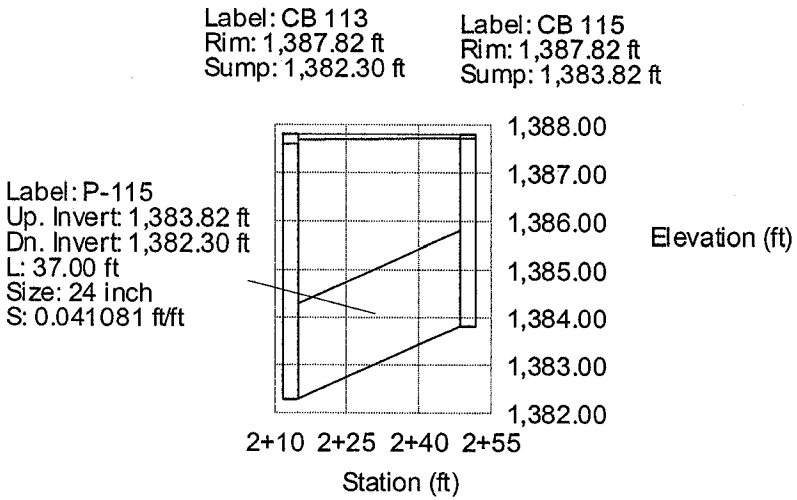
© Haestad Methods, Inc.

Stanley Consultants Inc
37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

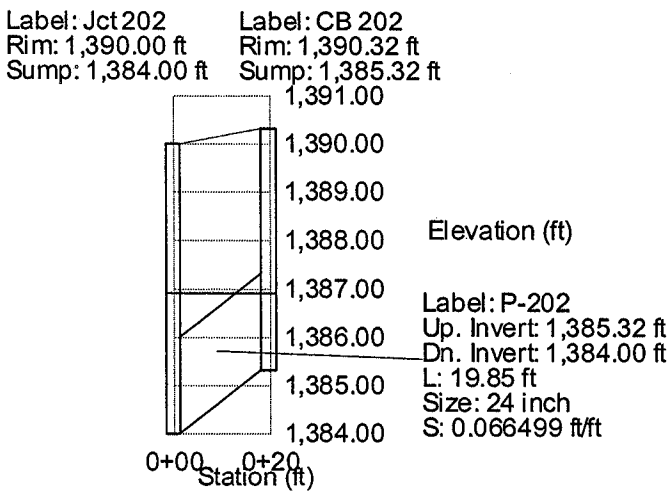
Profile
Scenario: Base



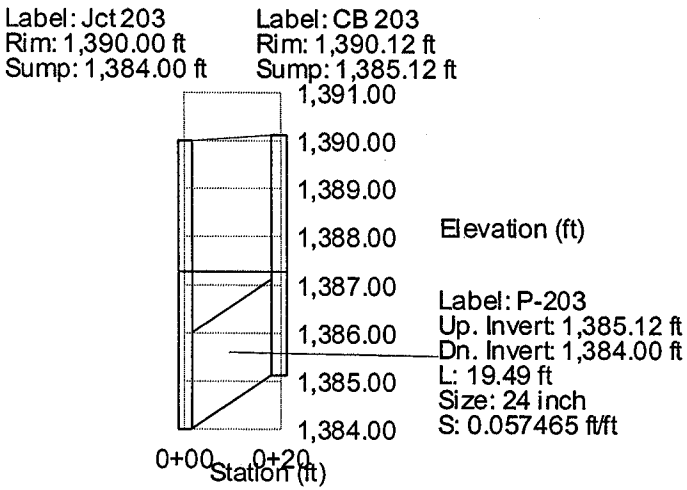
Profile
Scenario: Base



Profile
Scenario: Base



Profile
Scenario: Base



Scenario: Base

Pipe Report

Label	Up. Node	Dn. Node	Up. Inlet Area (acres)	Up. Inlet Rat. Coef.	Up. Calc. Sys. CA (acres)	I (in/hr)	System Tc (min)	System Q (cfs)	Avg. v (ft/s)	L (ft)	S (ft/ft)	Size	Mannings n	Up. Invert (ft)	Dn. Invert (ft)	HGL In (ft)	HGL Out (ft)
P-117	CB 117	Jct 117	0.411	0.95	4.277	4.25	6.41	18.32	6.44	298.14	0.027135	24 inch	0.012	1,394.24	1,386.15	1,395.78	1,393.06
P-118	CB 118	CB 117	2.205	0.95	3.866	4.25	5.87	16.56	5.99	194.00	0.015361	24 inch	0.012	1,397.22	1,394.24	1,398.69	1,396.26
P-119	CB 119	CB 118	1.661	0.95	1.661	4.25	5.00	7.11	3.21	167.00	0.004970	24 inch	0.012	1,398.05	1,397.22	1,399.13	1,399.11

Scenario: Base

Inlet Report

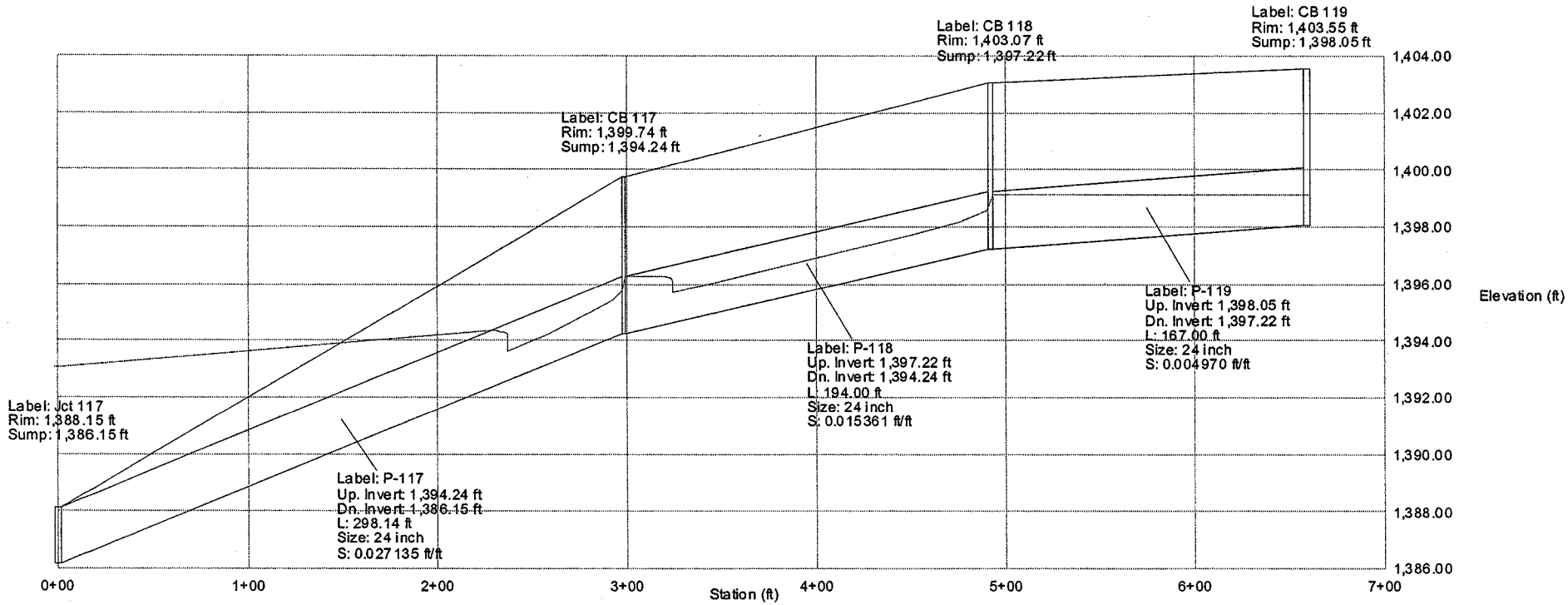
Label	Area (acres)	C	Inlet CA (acres)	TC (min)	Total Flow To Inlet (cfs)	Add. Q (cfs)	Struct. Depth (ft)	Rim (ft)	Sump (ft)	HGL In (ft)	HGL Out (ft)	EGL In (ft)	EGL Out (ft)	Headloss Mtd
CB 117	0.433	0.95	0.411	5.00	1.76	0.00	5.50	1,399.74	1,394.24	1,396.26	1,395.78	1,396.69	1,396.55	HEC-22 Energy
CB 118	2.321	0.95	2.205	5.00	9.45	0.00	5.85	1,403.07	1,397.22	1,399.11	1,398.69	1,399.39	1,399.39	HEC-22 Energy
CB 119	1.748	0.95	1.661	5.00	7.11	0.00	5.50	1,403.55	1,398.05	1,399.13	1,399.13	1,399.39	1,399.39	HEC-22 Energy

Scenario: Base

DOT Report

Label	-Node- Up. Dn.	v In (ft/s)	v Out (ft/s)	v Head In (ft)	v Head Out (ft)	Avg. v (ft/s)	Up. Calc. Sys. CA (acres)	Section Disch Cap. (cfs)	Section Shape Size	L (ft)	-Ground- Up. Dn. (ft)	-Invert- Up. Dn. (ft)	-HGL- Up. Dn. (ft)	-EGL- Up. Dn. (ft)
P-117	CB 117	7.05	5.83	0.77	0.53	6.44	4.277	18.32	Circular	298.14	1,399.74	1,394.24	1,395.78	1,396.55
	Jct 117							40.37	24 inch		1,388.15	1,386.15	1,393.06	1,393.59
P-118	CB 118	6.70	5.27	0.70	0.43	5.99	3.866	16.56	Circular	194.00	1,403.07	1,397.22	1,398.69	1,399.39
	CB 117							30.37	24 inch		1,399.74	1,394.24	1,396.26	1,396.69
P-119	CB 119	4.10	2.32	0.26	0.08	3.21	1.661	7.11	Circular	167.00	1,403.55	1,398.05	1,399.13	1,399.39
	CB 118							17.28	24 inch		1,403.07	1,397.22	1,399.11	1,399.19

Profile
Scenario: Base



Scenario: Base

Pipe Report

Label	Up. Node	Dn. Node	Up. Inlet Area (acres)	Up. Inlet Rat. Coef.	Up. Calc. Sys. CA (acres)	I (in/hr)	System Tc (min)	System Q (cfs)	Avg. v (ft/s)	L (ft)	S (ft/ft)	Size	Mannings n	Up. Invert (ft)	Dn. Invert (ft)	HGL In (ft)	HGL Out (ft)
P-120	CB 120	Jct 120	0.411	0.95	0.411	4.92	5.00	2.04	2.01	105.75	0.043404	24 inch	0.012	1,391.68	1,387.09	1,392.18	1,392.14
P-121	CB 121	Jct 121	0.328	0.95	0.328	4.92	5.00	1.63	0.52	64.77	0.041068	24 inch	0.012	1,390.29	1,387.63	1,392.24	1,392.24

Scenario: Base

Inlet Report

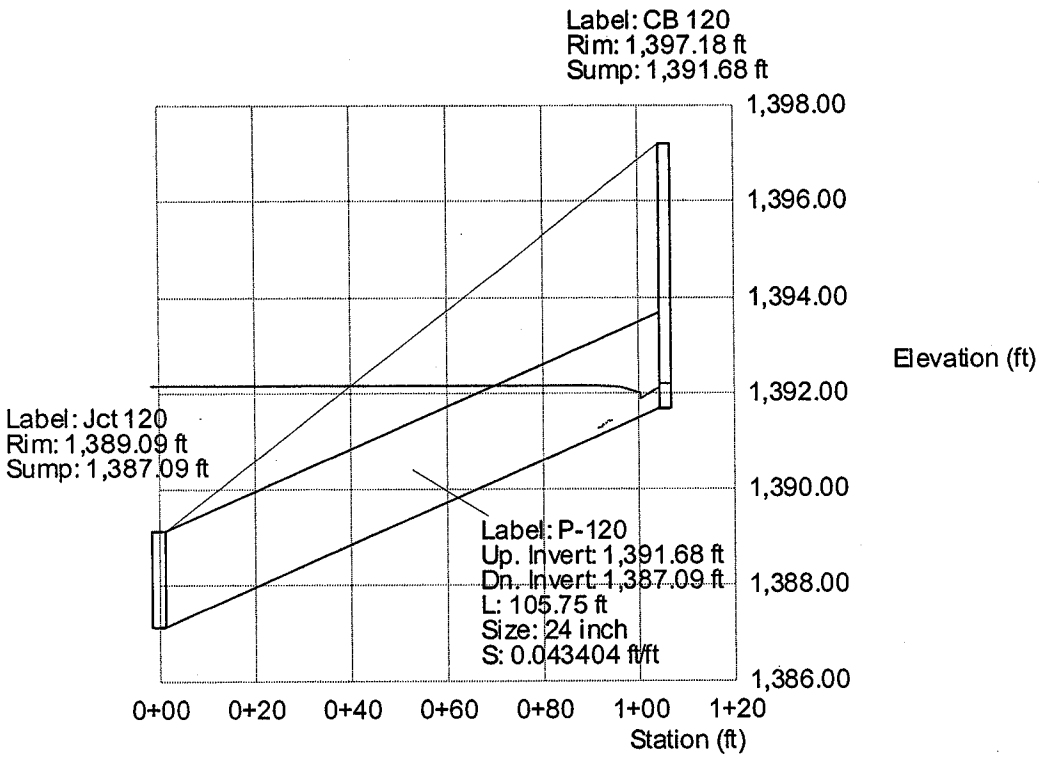
Label	Area (acres)	C	Inlet CA (acres)	TC (min)	Total Flow To Inlet (cfs)	Add. Q (cfs)	Struct. Depth (ft)	Rim (ft)	Sump (ft)	HGL In (ft)	HGL Out (ft)	EGL In (ft)	EGL Out (ft)	Headloss Mtd
CB 120	0.433	0.95	0.411	5.00	2.04	0.00	5.50	1,397.18	1,391.68	1,392.18	1,392.18	1,392.35	1,392.35	HEC-22 Energy
CB 121	0.345	0.95	0.328	5.00	1.63	0.00	5.50	1,395.79	1,390.29	1,392.24	1,392.24	1,392.25	1,392.25	Absolute

Scenario: Base

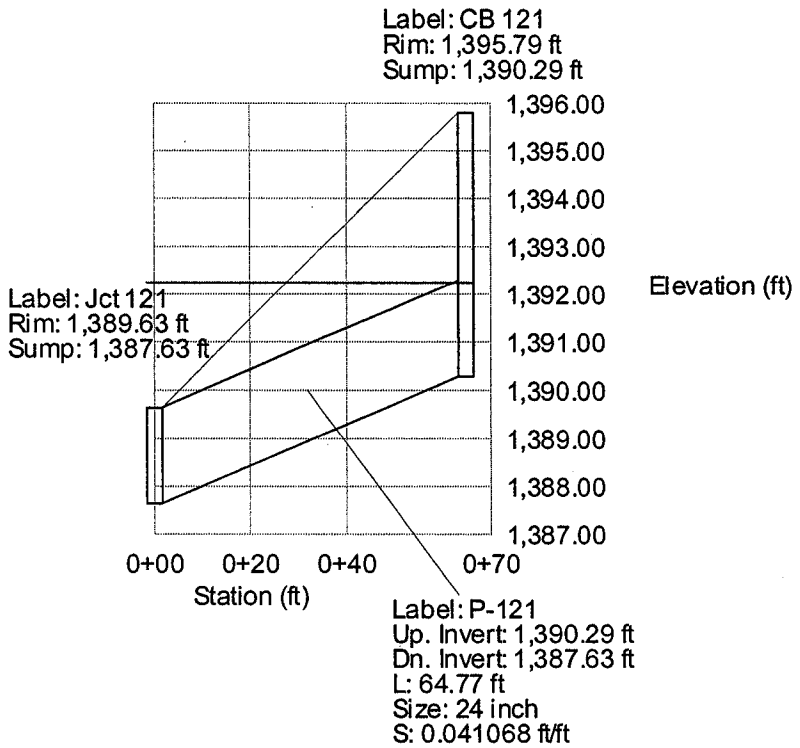
DOT Report

Label	-Node- Up. Dn.	v In (ft/s)	v Out (ft/s)	v Head In (ft)	v Head Out (ft)	Avg. v (ft/s)	Up. Calc. Sys. CA (acres)	Section Disch Cap. (cfs)	Section Shape Size	L (ft)	-Ground- Up. Dn. (ft)	-Invert- Up. Dn. (ft)	-HGL- Up. Dn. (ft)	-EGL- Up. Dn. (ft)
P-120	CB 120	3.36	0.65	0.18	0.01	2.01	0.411	2.04	Circular	105.75	1,397.18	1,391.68	1,392.18	1,392.35
	Jct 120							51.06	24 inch		1,389.09	1,387.09	1,392.14	1,392.15
P-121	CB 121	0.52	0.52	4.21e-3	4.16e-3	0.52	0.328	1.63	Circular	64.77	1,395.79	1,390.29	1,392.24	1,392.25
	Jct 121							49.66	24 inch		1,389.63	1,387.63	1,392.24	1,392.24

Profile
Scenario: Base



Profile
Scenario: Base



Scenario: Base

Pipe Report

Label	Up. Node	Dn. Node	Up. Inlet Area (acres)	Up. Inlet Rat. Coef.	Up. Calc. Sys. CA (acres)	I (in/hr)	System Tc (min)	System Q (cfs)	Avg. v (ft/s)	L (ft)	S (ft/ft)	Size	Mannings n	Up. Invert (ft)	Dn. Invert (ft)	HGL In (ft)	HGL Out (ft)
P-122	CB 122	Jct 122	0.285	0.95	3.145	4.25	9.23	13.47	4.29	65.91	0.005007	24 inch	0.012	1,388.19	1,387.86	1,392.67	1,392.47
P-124	CB 124	CB 122	0.358	0.95	2.626	4.25	8.25	11.25	3.58	209.61	0.005009	24 inch	0.012	1,389.24	1,388.19	1,393.17	1,392.73
P-125	CB 125	CB 124	0.484	0.95	1.334	4.25	7.46	5.71	1.82	86.18	0.004990	24 inch	0.012	1,389.79	1,389.36	1,393.31	1,393.26
P-126	CB 126	CB 125	0.850	0.95	0.850	4.25	5.00	3.64	1.16	171.36	0.005019	24 inch	0.012	1,390.65	1,389.79	1,393.35	1,393.31
P-127	CB 127	CB 124	0.303	0.95	0.934	4.25	7.39	4.00	1.27	51.07	0.005091	24 inch	0.012	1,389.50	1,389.24	1,393.25	1,393.24
P-128	CB 128	CB 127	0.631	0.95	0.631	4.25	5.00	2.70	0.86	123.12	0.005036	24 inch	0.012	1,390.12	1,389.50	1,393.27	1,393.25
P-129	CB 129	CB 122	0.234	0.95	0.234	4.25	5.00	1.00	0.32	62.16	0.004987	24 inch	0.012	1,390.27	1,389.96	1,393.01	1,393.00
P-131	CB 131	Jct 131	0.488	0.95	0.488	4.25	5.00	2.09	0.67	67.22	0.029307	24 inch	0.012	1,390.63	1,388.66	1,394.21	1,394.21
P-132	CB 132	Jct 132	0.546	0.95	1.249	4.25	8.25	5.35	1.70	66.08	0.012258	24 inch	0.012	1,390.53	1,389.72	1,394.24	1,394.21
P-133	CB 133	CB 132	0.703	0.95	0.703	4.25	5.00	3.01	0.96	187.01	0.005026	24 inch	0.012	1,391.47	1,390.53	1,394.28	1,394.25
P-134	CB 134	Jct 134	0.466	0.95	1.539	4.25	7.13	6.59	2.10	69.52	0.005035	24 inch	0.012	1,390.77	1,390.42	1,395.46	1,395.41
P-135	CB 135	CB 134	0.600	0.95	1.073	4.25	5.00	4.60	1.46	187.00	0.005027	24 inch	0.012	1,391.71	1,390.77	1,395.54	1,395.47
P-139	CB 139	CB 135	0.472	0.70	0.472	4.25	0.00	2.02	0.64	99.31	0.005035	24 inch	0.012	1,392.21	1,391.71	1,395.58	1,395.57

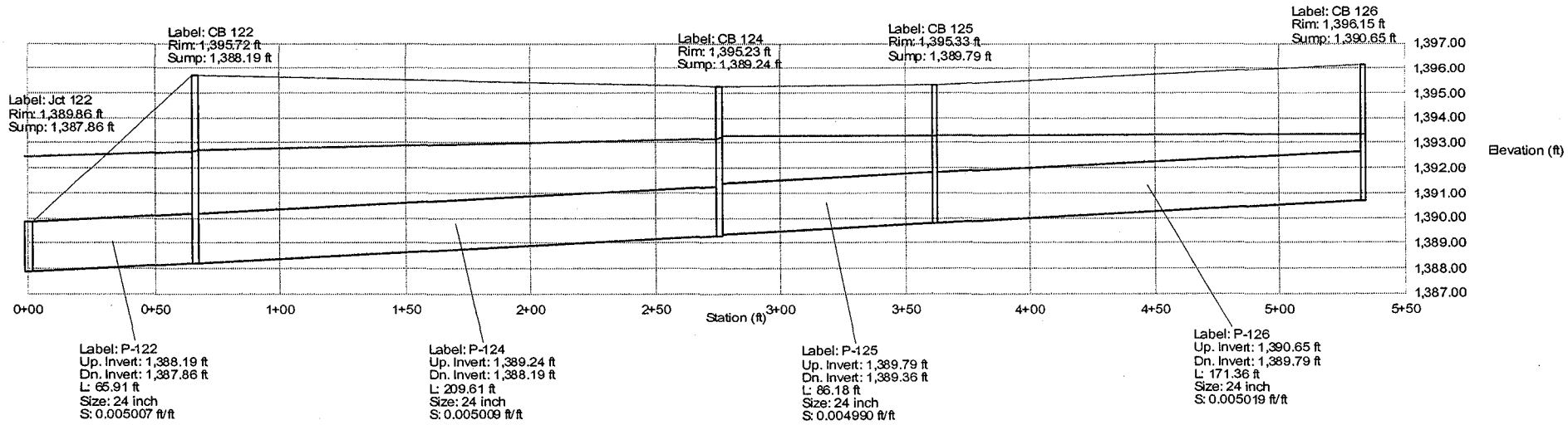
Scenario: Base

DOT Report

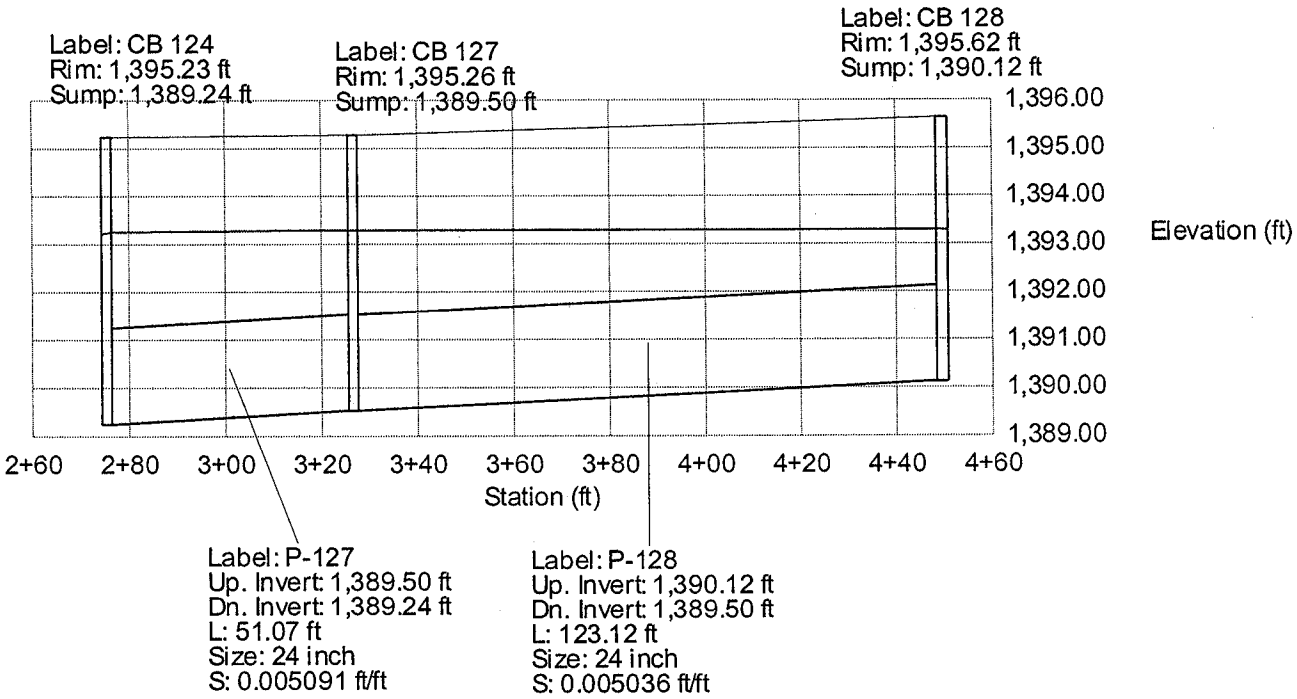
Label	-Node- Up. Dn.	v In (ft/s)	v Out (ft/s)	v Head In (ft)	v Head Out (ft)	Avg. v (ft/s)	Up. Calc. Sys. CA (acres)	Section Disch Cap. (cfs)	Section Shape Size	L (ft)	-Ground- Up. Dn. (ft)	-Invert- Up. Dn. (ft)	-HGL- Up. Dn. (ft)	-EGL- Up. Dn. (ft)
P-122	CB 122	4.29	4.29	0.29	0.29	4.29	3.145	13.47	Circular	65.91	1,395.72	1,388.19	1,392.67	1,392.95
	Jct 122							17.34	24 inch		1,389.86	1,387.86	1,392.47	1,392.76
P-124	CB 124	3.58	3.58	0.20	0.20	3.58	2.626	11.25	Circular	209.61	1,395.23	1,389.24	1,393.17	1,393.37
	CB 122							17.34	24 inch		1,395.72	1,388.19	1,392.73	1,392.93
P-125	CB 125	1.82	1.82	0.05	0.05	1.82	1.334	5.71	Circular	86.18	1,395.33	1,389.79	1,393.31	1,393.36
	CB 124							17.31	24 inch		1,395.23	1,389.36	1,393.26	1,393.31
P-126	CB 126	1.16	1.16	0.02	0.02	1.16	0.850	3.64	Circular	171.36	1,396.15	1,390.65	1,393.35	1,393.37
	CB 125							17.36	24 inch		1,395.33	1,389.79	1,393.31	1,393.34
P-127	CB 127	1.27	1.27	0.03	0.03	1.27	0.934	4.00	Circular	51.07	1,395.26	1,389.50	1,393.25	1,393.27
	CB 124							17.49	24 inch		1,395.23	1,389.24	1,393.24	1,393.26
P-128	CB 128	0.86	0.86	0.01	0.01	0.86	0.631	2.70	Circular	123.12	1,395.62	1,390.12	1,393.27	1,393.28
	CB 127							17.39	24 inch		1,395.26	1,389.50	1,393.25	1,393.26
P-129	CB 129	0.32	0.32	1.58e-3	1.58e-3	0.32	0.234	1.00	Circular	62.16	1,395.77	1,390.27	1,393.01	1,393.01
	CB 122							17.31	24 inch		1,395.72	1,389.96	1,393.00	1,393.01
P-131	CB 131	0.67	0.67	0.01	0.01	0.67	0.488	2.09	Circular	67.22	1,396.13	1,390.63	1,394.21	1,394.22
	Jct 131							41.95	24 inch		1,390.66	1,388.66	1,394.21	1,394.22
P-132	CB 132	1.70	1.70	0.05	0.05	1.70	1.249	5.35	Circular	66.08	1,397.49	1,390.53	1,394.24	1,394.29
	Jct 132							27.13	24 inch		1,391.72	1,389.72	1,394.21	1,394.26
P-133	CB 133	0.96	0.96	0.01	0.01	0.96	0.703	3.01	Circular	187.01	1,396.97	1,391.47	1,394.28	1,394.29
	CB 132							17.37	24 inch		1,397.49	1,390.53	1,394.25	1,394.26
P-134	CB 134	2.10	2.10	0.07	0.07	2.10	1.539	6.59	Circular	69.52	1,398.93	1,390.77	1,395.46	1,395.53
	Jct 134							17.39	24 inch		1,392.92	1,390.42	1,395.41	1,395.48
P-135	CB 135	1.46	1.46	0.03	0.03	1.46	1.073	4.60	Circular	187.00	1,398.45	1,391.71	1,395.54	1,395.57
	CB 134							17.37	24 inch		1,398.93	1,390.77	1,395.47	1,395.50
P-139	CB 139	0.64	0.64	0.01	0.01	0.64	0.472	2.02	Circular	99.31	1,395.61	1,392.21	1,395.58	1,395.58
	CB 135							17.39	24 inch		1,398.45	1,391.71	1,395.57	1,395.58

© Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

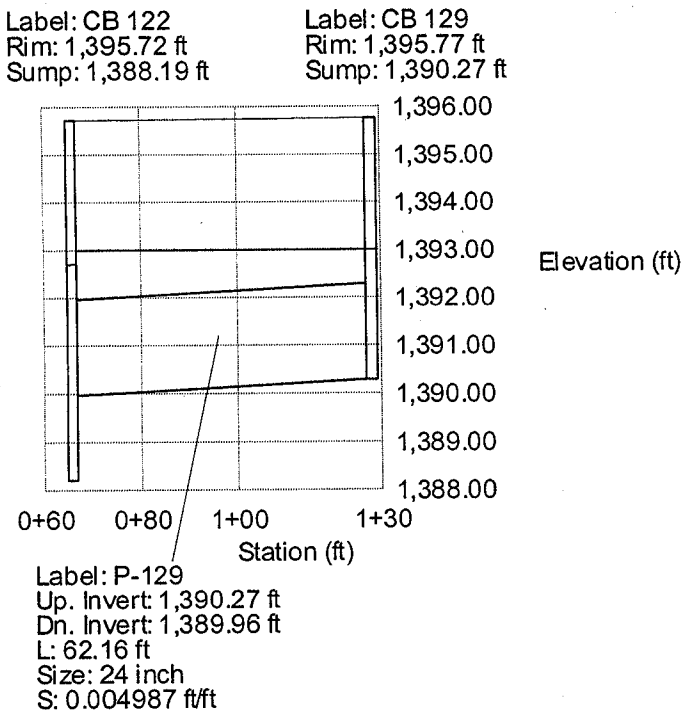
Profile
Scenario: Base



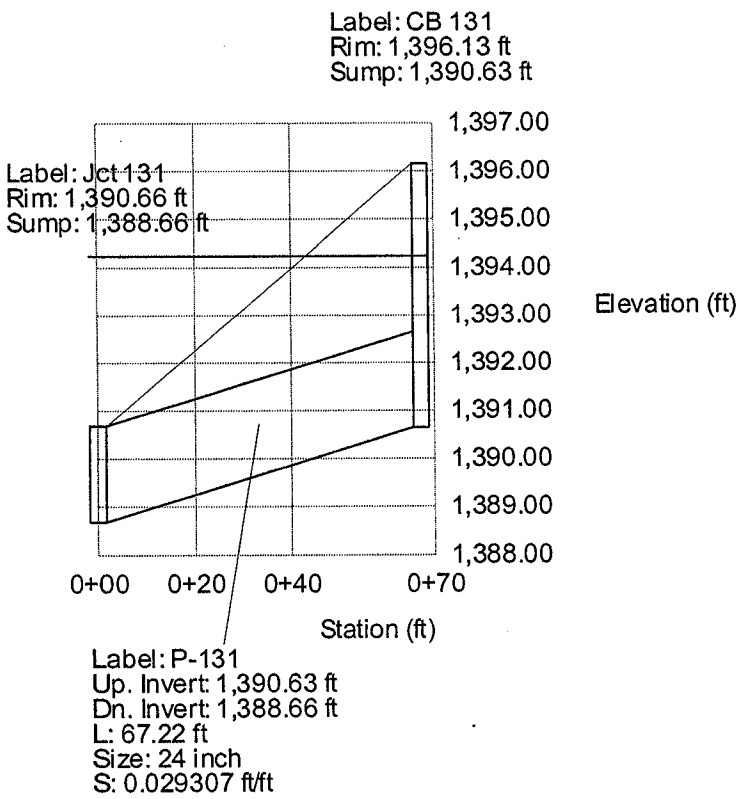
Profile
Scenario: Base



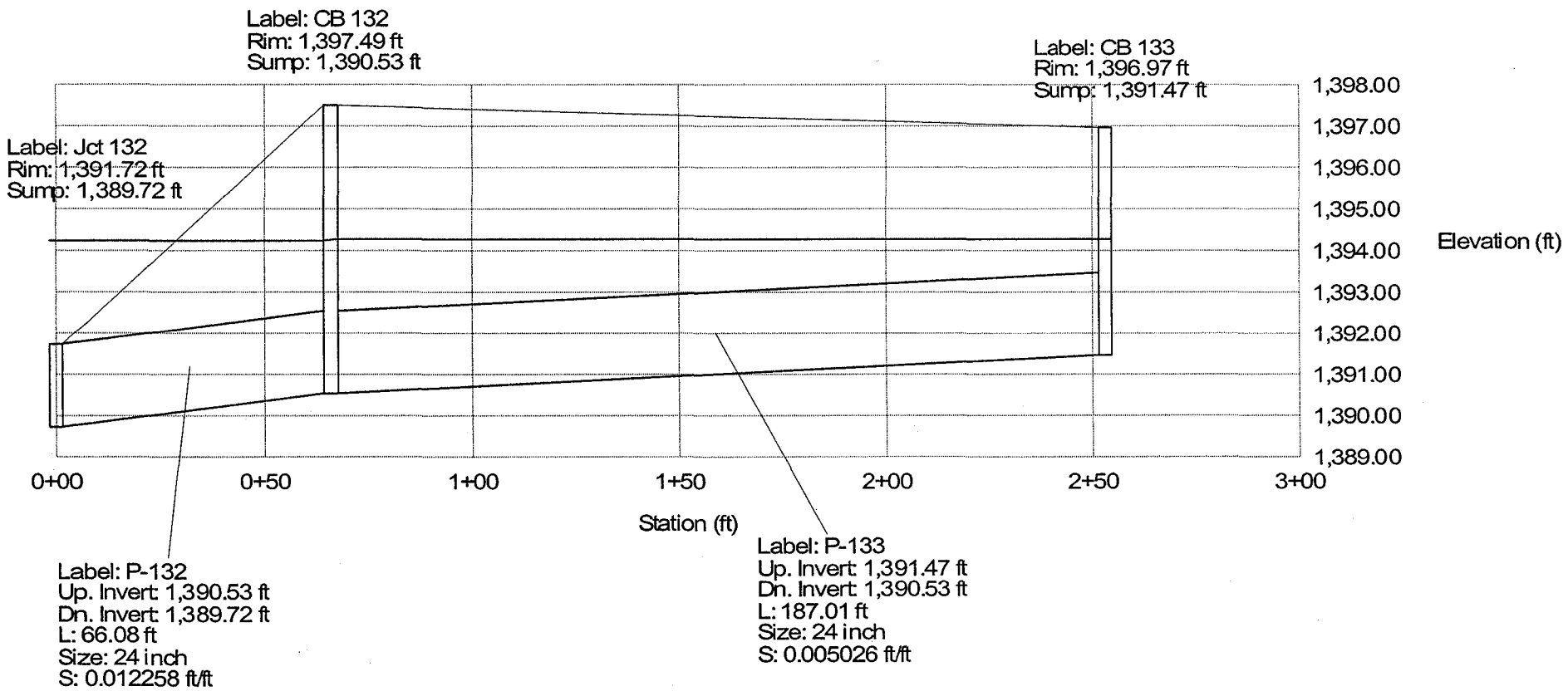
Profile
Scenario: Base



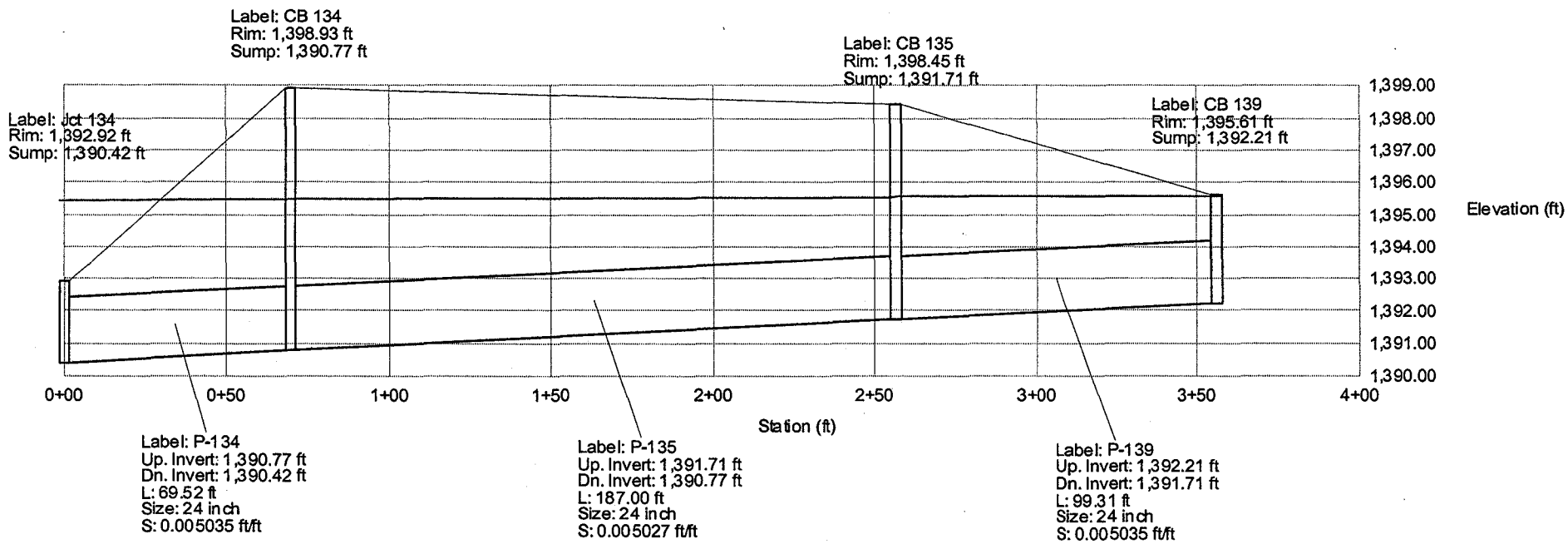
Profile
Scenario: Base



Profile
Scenario: Base



Profile
Scenario: Base



© Haestad Methods, Inc.

Stanley Consultants Inc
37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Scenario: Elliot

Pipe Report

Label	Up. Node	Dn. Node	Up. Inlet Area (acres)	Up. Inlet Rat. Coef.	Up. Calc. Sys. CA (acres)	I (in/hr)	System Tc (min)	System Q (cfs)	Avg. v (ft/s)	L (ft)	S (ft/ft)	Size	Mannings n	Up. Invert (ft)	Dn. Invert (ft)	HGL In (ft)	HGL Out (ft)
P-200	CB 200	JCT 200	0.96	0.95	2.04	4.25	5.44	8.76	8.07	25.00	0.059880	24 inch	0.012	1,381.83	1,380.33	1,382.88	1,380.93
P-201	CB 201	CB 200	1.08	0.95	1.08	4.25	5.00	4.64	3.46	92.40	0.005011	24 inch	0.012	1,382.29	1,381.83	1,383.05	1,382.91

Scenario: Elliot

Inlet Report

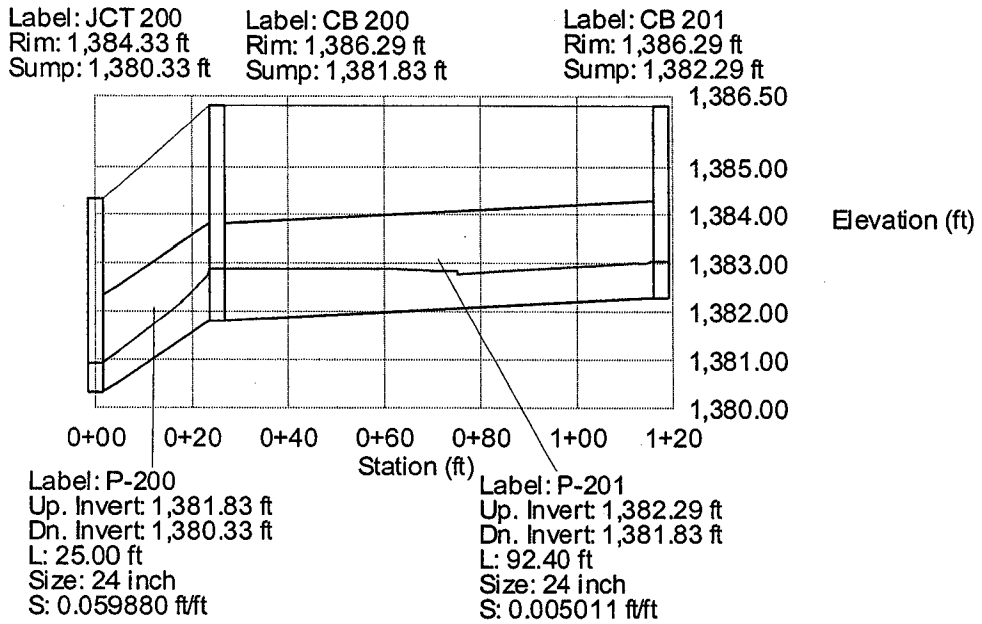
Label	Area (acres)	C	Inlet CA (acres)	TC (min)	Total Flow To Inlet (cfs)	Add. Q (cfs)	Struct. Depth (ft)	Rim (ft)	Sump (ft)	HGL In (ft)	HGL Out (ft)	EGL In (ft)	EGL Out (ft)	Headloss Mtd
CB 200	1.01	0.95	0.96	5.00	4.12	0.00	4.46	1,386.29	1,381.83	1,382.91	1,382.88	1,383.30	1,383.30	HEC-22 Energy
CB 201	1.14	0.95	1.08	5.00	4.64	0.00	4.00	1,386.29	1,382.29	1,383.05	1,383.05	1,383.33	1,383.33	HEC-22 Energy

Scenario: Elliot

DOT Report

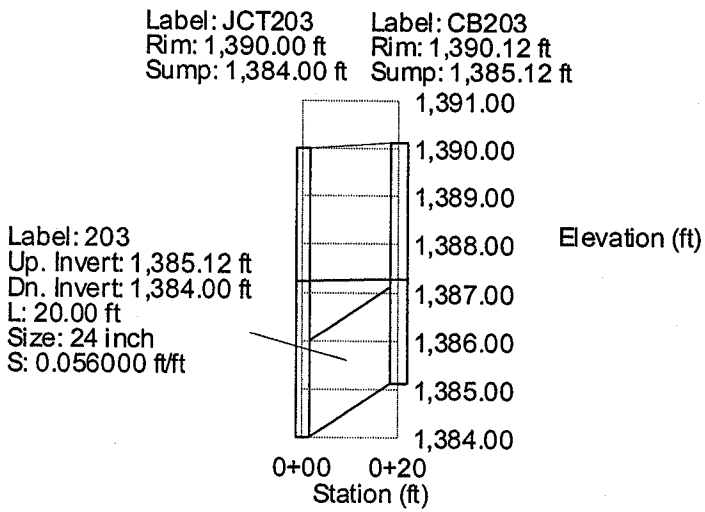
Label	-Node- Up. Dn.	v In (ft/s)	v Out (ft/s)	v Head In (ft)	v Head Out (ft)	Avg. v (ft/s)	Up. Calc. Sys. CA (acres)	Section Disch Cap. (cfs)	Section Shape Size	L (ft)	-Ground- Up. Dn. (ft)	-Invert- Up. Dn. (ft)	-HGL- Up. Dn. (ft)	-EGL- Up. Dn. (ft)
P-200	CB 200	5.21	10.94	0.42	1.86	8.07	2.04	8.76	Circular	25.00	1,386.29	1,381.83	1,382.88	1,383.30
	JCT 200							59.97	24 inch		1,384.33	1,380.33	1,380.93	1,382.79
P-201	CB 201	4.25	2.67	0.28	0.11	3.46	1.08	4.64	Circular	92.40	1,386.29	1,382.29	1,383.05	1,383.33
	CB 200							17.35	24 inch		1,386.29	1,381.83	1,382.91	1,383.02

Profile
Scenario: Elliot



Stanley Consultants Inc
© Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Profile
Scenario: Base



Scenario: Base

Pipe Report

Label	Up. Node	Dn. Node	Up. Inlet Area (acres)	Up. Inlet Rat. Coef.	Up. Calc. Sys. CA (acres)	I (in/hr)	System Tc (min)	System Q (cfs)	Avg. v (ft/s)	L (ft)	S (ft/ft)	Size	Mannings n	Up. Invert (ft)	Dn. Invert (ft)	HGL In (ft)	HGL Out (ft)
P-300	MH 300	Jct 317	N/A	N/A	14.432	5.87	9.04	85.4	1.70	334.00	0.0020	96 inch	0.013	1,369.38	1,368.72	1,381.66	1,381.63
P-300A	Jct 317	Jct 316	N/A	N/A	15.401	5.47	12.32	84.9	1.69	46.01	0.0020	96 inch	0.013	1,368.72	1,368.63	1,381.62	1,381.62
P-300B	Jct 316	MH 500	N/A	N/A	15.812	5.39	12.77	85.9	1.71	8.00	0.0020	96 inch	0.013	1,368.63	1,368.61	1,381.62	1,381.62
P-301	MH 301	MH 300	N/A	N/A	11.396	5.87	8.67	67.4	9.91	223.00	0.0050	36 inch	0.012	1,381.84	1,380.72	1,385.47	1,383.34
P-302	MH 302	MH 301	N/A	N/A	10.347	5.87	8.28	61.2	8.66	202.00	0.0050	36 inch	0.012	1,382.85	1,381.84	1,387.04	1,385.58
P-303	MH 303	MH 302	N/A	N/A	5.730	5.87	8.14	33.9	6.91	58.97	0.0049	30 inch	0.012	1,384.96	1,384.67	1,388.35	1,388.00
P-304	MH 304	Jct 325	N/A	N/A	4.541	5.87	7.19	26.9	5.47	77.25	0.0050	30 inch	0.012	1,386.68	1,386.29	1,390.06	1,389.78
P-304A	Jct 325	Jct 324	N/A	N/A	4.771	5.87	7.42	28.2	5.75	53.06	0.0051	30 inch	0.012	1,386.29	1,386.02	1,389.72	1,389.51
P-304B	Jct 324	Jct 323	N/A	N/A	4.944	5.87	7.57	29.3	5.96	62.67	0.0049	30 inch	0.012	1,386.02	1,385.71	1,389.45	1,389.18
P-304C	Jct 323	Jct 322	N/A	N/A	5.282	5.87	7.75	31.3	6.37	63.12	0.0051	30 inch	0.012	1,385.71	1,385.39	1,389.11	1,388.80
P-304D	Jct 322	Jct 321	N/A	N/A	5.398	5.87	7.91	31.9	6.51	81.00	0.0049	30 inch	0.012	1,385.39	1,384.99	1,388.80	1,388.38
P-304E	Jct 321	MH 303	N/A	N/A	5.730	5.87	8.12	33.9	6.91	5.99	0.0050	30 inch	0.012	1,384.99	1,384.96	1,388.38	1,388.35
P-305	MH 305	Jct-327	N/A	N/A	3.682	5.87	6.45	21.8	6.94	165.13	0.0070	24 inch	0.012	1,389.43	1,388.27	1,392.96	1,391.66
P-305A	Jct-327	MH 304	N/A	N/A	4.111	5.87	6.85	24.3	7.74	155.13	0.0070	24 inch	0.012	1,388.27	1,387.18	1,391.66	1,390.13
P-306	MH 306	MH 305	N/A	N/A	2.695	5.87	5.16	15.9	5.08	395.01	0.0036	24 inch	0.012	1,390.85	1,389.43	1,394.64	1,392.96
P-307	CB 307	MH 306	1.170	0.92	2.695	5.87	5.09	15.9	5.08	22.00	0.0036	24 inch	0.012	1,390.93	1,390.85	1,394.73	1,394.64
P-308	CB 308	CB 307	1.525	0.88	1.525	5.87	4.00	9.0	2.87	187.01	0.0036	24 inch	0.012	1,391.60	1,390.93	1,395.04	1,394.78
P-309	CB 309	CB 314	0.245	0.82	2.991	5.87	6.42	17.7	5.63	66.91	0.0042	24 inch	0.012	1,385.65	1,385.37	1,390.08	1,389.73
P-310	CB 310	CB 309	0.611	0.88	2.747	5.87	6.21	16.3	5.17	65.08	0.0070	24 inch	0.012	1,386.10	1,385.65	1,390.44	1,390.15
P-311	CB 311	CB 310	0.435	0.87	2.135	5.87	5.49	12.6	4.02	172.17	0.0070	24 inch	0.012	1,387.31	1,386.10	1,390.96	1,390.51
P-312	CB 312	CB 311	0.397	0.86	1.701	5.87	4.81	10.1	3.20	130.18	0.0070	24 inch	0.012	1,388.22	1,387.31	1,391.23	1,391.01
P-313	CB 313	CB 312	1.304	0.86	1.304	5.87	4.00	7.7	2.46	120.04	0.0070	24 inch	0.012	1,389.06	1,388.22	1,391.37	1,391.25
P-314	CB 314	CB 315	0.169	0.83	3.161	5.87	6.61	18.7	3.81	115.00	0.0043	30 inch	0.012	1,384.87	1,384.38	1,389.70	1,389.50
P-315	CB 315	MH 302	1.457	0.81	4.618	5.87	7.12	27.3	5.57	241.16	0.0043	30 inch	0.012	1,384.38	1,383.35	1,388.98	1,388.07
P-316	CB 316	Jct 316	0.410	0.82	0.410	5.87	4.00	2.4	0.85	9.78	0.5245	24 inch	0.012	1,380.09	1,374.96	1,381.65	1,381.66
P-317	CB 317	Jct 317	0.969	0.84	0.969	5.87	4.00	5.7	3.18	10.00	0.5570	24 inch	0.012	1,380.67	1,375.10	1,381.52	1,381.66
P-318	CB 318	MH 300	1.294	0.88	3.036	5.87	4.63	18.0	6.81	10.00	0.0050	24 inch	0.012	1,381.61	1,381.56	1,383.22	1,383.09
P-319	CB 319	CB 318	1.742	0.88	1.742	5.87	4.00	10.3	4.60	175.01	0.0050	24 inch	0.012	1,382.49	1,381.61	1,383.64	1,383.27
P-320	CB 320	MH 301	1.049	0.87	1.049	5.87	4.00	6.2	3.31	53.34	0.1481	24 inch	0.012	1,390.74	1,382.84	1,391.62	1,386.63
P-321	CB 321	Jct 321	0.332	0.81	0.332	5.87	4.00	2.0	0.73	22.03	0.0754	24 inch	0.012	1,386.97	1,385.31	1,388.38	1,388.38
P-322	CB 322	Jct 322	0.116	0.80	0.116	5.87	4.00	0.7	0.22	22.55	0.0319	24 inch	0.012	1,386.39	1,385.67	1,388.80	1,388.80
P-323	CB 323	Jct 323	0.338	0.86	0.338	5.87	4.00	2.0	0.64	22.94	0.0122	24 inch	0.012	1,386.25	1,385.97	1,389.14	1,389.14
P-324	CB 324	Jct 324	0.173	0.88	0.173	5.87	4.00	1.0	0.33	23.16	0.0052	24 inch	0.012	1,386.39	1,386.27	1,389.47	1,389.47
P-325	CB 325	Jct 325	0.229	0.88	0.229	5.87	4.00	1.4	0.43	23.02	0.0113	24 inch	0.012	1,386.81	1,386.55	1,389.74	1,389.74
P-326	CB 326	MH 304	0.431	0.88	0.431	5.87	4.00	2.5	0.81	22.04	0.0059	24 inch	0.012	1,387.31	1,387.18	1,390.10	1,390.09

Scenario: Base

Pipe Report

Label	Up. Node	Dn. Node	Up. Inlet Area (acres)	Up. Inlet Rat. Coef.	Up. Calc. Sys. CA (acres)	I (in/hr)	System Tc (min)	System Q (cfs)	Avg. v (ft/s)	L (ft)	S (ft/ft)	Size	Mannings n	Up. Invert (ft)	Dn. Invert (ft)	HGL In (ft)	HGL Out (ft)
P-327	CB 327	Jct-327	0.429	0.89	0.429	5.87	4.00	2.5	0.81	23.86	0.0067	24 inch	0.012	1,388.43	1,388.27	1,391.66	1,391.66
P-328	CB 328	MH 305	0.987	0.90	0.987	5.87	4.00	5.8	1.86	22.00	0.0050	24 inch	0.012	1,389.54	1,389.43	1,392.98	1,392.96
P-500	MH 500	45 ^	0.000	0.00	36.668	5.37	12.85	198.6	3.95	283.01	0.0020	96 inch	0.013	1,368.61	1,368.04	1,381.42	1,381.28
P-500A	45 ^	45^	N/A	N/A	36.668	5.17	14.05	190.9	3.80	10.00	0.0020	96 inch	0.013	1,368.04	1,368.02	1,381.14	1,381.14
P-500B	45^	Jct 500	N/A	N/A	36.668	5.16	14.09	190.7	3.79	6.00	0.0027	96 inch	0.013	1,368.02	1,368.00	1,381.00	1,381.00

Scenario: Base

Inlet Report

Label	Area (acres)	C	Inlet CA (acres)	TC (min)	Total Flow To Inlet (cfs)	Add. Q (cfs)	Struct. Depth (ft)	Rim (ft)	Sump (ft)	HGL In (ft)	HGL Out (ft)	EGL In (ft)	EGL Out (ft)	Headloss Mtd
CB 307	1.269	0.92	1.170	4.00	6.9	0.0	6.65	1,397.58	1,390.93	1,394.78	1,394.73	1,395.13	1,395.13	HEC-22 Energy
CB 308	1.726	0.88	1.525	4.00	9.0	0.0	5.50	1,397.10	1,391.60	1,395.04	1,395.04	1,395.17	1,395.17	HEC-22 Energy
CB 309	0.297	0.82	0.245	4.00	1.4	0.0	5.78	1,391.43	1,385.65	1,390.15	1,390.08	1,390.57	1,390.57	HEC-22 Energy
CB 310	0.696	0.88	0.611	4.00	3.6	0.0	5.47	1,391.57	1,386.10	1,390.51	1,390.44	1,390.86	1,390.86	HEC-22 Energy
CB 311	0.500	0.87	0.435	4.00	2.6	0.0	5.52	1,392.83	1,387.31	1,391.01	1,390.96	1,391.22	1,391.22	HEC-22 Energy
CB 312	0.460	0.86	0.397	4.00	2.3	0.0	5.54	1,393.76	1,388.22	1,391.25	1,391.23	1,391.39	1,391.39	HEC-22 Energy
CB 313	1.514	0.86	1.304	4.00	7.7	0.0	5.50	1,394.56	1,389.06	1,391.37	1,391.37	1,391.46	1,391.46	HEC-22 Energy
CB 314	0.204	0.83	0.169	4.00	1.0	0.0	6.70	1,391.57	1,384.87	1,389.73	1,389.70	1,390.22	1,389.93	HEC-22 Energy
CB 315	1.790	0.81	1.457	4.00	8.6	0.0	8.05	1,392.43	1,384.38	1,389.50	1,388.98	1,389.73	1,389.47	HEC-22 Energy
CB 316	0.498	0.82	0.410	4.00	2.4	0.0	5.80	1,385.89	1,380.09	1,381.65	1,381.65	1,381.67	1,381.67	HEC-22 Energy
CB 317	1.156	0.84	0.969	4.00	5.7	0.0	5.50	1,386.17	1,380.67	1,381.52	1,381.52	1,381.84	1,381.84	HEC-22 Energy
CB 318	1.476	0.88	1.294	4.00	7.7	0.0	6.61	1,388.22	1,381.61	1,383.27	1,383.22	1,383.90	1,383.90	HEC-22 Energy
CB 319	1.968	0.88	1.742	4.00	10.3	0.0	5.50	1,387.99	1,382.49	1,383.64	1,383.64	1,384.11	1,384.11	HEC-22 Energy
CB 320	1.208	0.87	1.049	4.00	6.2	0.0	5.50	1,396.24	1,390.74	1,391.62	1,391.62	1,391.96	1,391.96	HEC-22 Energy
CB 321	0.410	0.81	0.332	4.00	2.0	0.0	5.50	1,392.47	1,386.97	1,388.38	1,388.38	1,388.39	1,388.39	HEC-22 Energy
CB 322	0.145	0.80	0.116	4.00	0.7	0.0	5.50	1,391.89	1,386.39	1,388.80	1,388.80	1,388.80	1,388.80	HEC-22 Energy
CB 323	0.391	0.86	0.338	4.00	2.0	0.0	5.50	1,391.75	1,386.25	1,389.14	1,389.14	1,389.15	1,389.15	HEC-22 Energy
CB 324	0.197	0.88	0.173	4.00	1.0	0.0	5.50	1,391.89	1,386.39	1,389.47	1,389.47	1,389.47	1,389.47	HEC-22 Energy
CB 325	0.261	0.88	0.229	4.00	1.4	0.0	5.42	1,392.23	1,386.81	1,389.74	1,389.74	1,389.75	1,389.75	HEC-22 Energy
CB 326	0.490	0.88	0.431	4.00	2.5	0.0	5.50	1,392.81	1,387.31	1,390.10	1,390.10	1,390.11	1,390.11	HEC-22 Energy
CB 327	0.483	0.89	0.429	4.00	2.5	0.0	5.50	1,393.93	1,388.43	1,391.66	1,391.66	1,391.67	1,391.67	HEC-22 Energy
CB 328	1.101	0.90	0.987	4.00	5.8	0.0	5.50	1,395.04	1,389.54	1,392.98	1,392.98	1,393.03	1,393.03	HEC-22 Energy
MH 500	0.000	0.00	0.000	4.00	0.0	0.0	17.47	1,386.08	1,368.61	1,381.62	1,381.42	1,381.66	1,381.66	HEC-22 Energy

Scenario: Base

DOT Report

Label	-Node- Up. Dn.	v In (ft/s)	v Out (ft/s)	v Head In (ft)	v Head Out (ft)	Avg. v (ft/s)	Up. Calc. Sys. CA (acres)	Section Disch Cap. (cfs)	Section Shape Size	L (ft)	-Ground- Up. Dn. (ft)	-Invert- Up. Dn. (ft)	-HGL- Up. Dn. (ft)	-EGL- Up. Dn. (ft)
P-300	MH 300	1.70	1.70	0.04	0.04	1.70	14.432	85.4	Circular	334.00	1,388.40	1,369.38	1,381.66	1,381.70
	Jct 317							406.0	96 inch		1,386.35	1,368.72	1,381.63	1,381.67
P-300A	Jct 317	1.69	1.69	0.04	0.04	1.69	15.401	84.9	Circular	46.01	1,386.35	1,368.72	1,381.62	1,381.67
	Jct 316							407.8	96 inch		1,386.07	1,368.63	1,381.62	1,381.66
P-300B	Jct 316	1.71	1.71	0.05	0.05	1.71	15.812	85.9	Circular	8.00	1,386.07	1,368.63	1,381.62	1,381.66
	MH 500							407.9	96 inch		1,386.08	1,368.61	1,381.62	1,381.66
P-301	MH 301	9.54	10.29	1.41	1.65	9.91	11.396	67.4	Circular	223.00	1,389.77	1,381.84	1,385.47	1,386.89
	MH 300							51.1	36 inch		1,388.40	1,380.72	1,383.34	1,384.99
P-302	MH 302	8.66	8.66	1.17	1.17	8.66	10.347	61.2	Circular	202.00	1,392.16	1,382.85	1,387.04	1,388.20
	MH 301							51.2	36 inch		1,389.77	1,381.84	1,385.58	1,386.75
P-303	MH 303	6.91	6.91	0.74	0.74	6.91	5.730	33.9	Circular	58.97	1,395.52	1,384.96	1,388.35	1,389.09
	MH 302							31.2	30 inch		1,392.16	1,384.67	1,388.00	1,388.74
P-304	MH 304	5.47	5.47	0.47	0.47	5.47	4.541	26.9	Circular	77.25	1,395.56	1,386.68	1,390.06	1,390.53
	Jct 325							31.6	30 inch		1,395.85	1,386.29	1,389.78	1,390.24
P-304A	Jct 325	5.75	5.75	0.51	0.51	5.75	4.771	28.2	Circular	53.06	1,395.85	1,386.29	1,389.72	1,390.24
	Jct 324							31.7	30 inch		1,395.53	1,386.02	1,389.51	1,390.02
P-304B	Jct 324	5.96	5.96	0.55	0.55	5.96	4.944	29.3	Circular	62.67	1,395.53	1,386.02	1,389.45	1,390.00
	Jct 323							31.3	30 inch		1,395.04	1,385.71	1,389.18	1,389.73
P-304C	Jct 323	6.37	6.37	0.63	0.63	6.37	5.282	31.3	Circular	63.12	1,395.04	1,385.71	1,389.11	1,389.74
	Jct 322							31.6	30 inch		1,395.10	1,385.39	1,388.80	1,389.43
P-304D	Jct 322	6.51	6.51	0.66	0.66	6.51	5.398	31.9	Circular	81.00	1,395.10	1,385.39	1,388.80	1,389.46
	Jct 321							31.2	30 inch		1,395.47	1,384.99	1,388.38	1,389.04
P-304E	Jct 321	6.91	6.91	0.74	0.74	6.91	5.730	33.9	Circular	5.99	1,395.47	1,384.99	1,388.38	1,389.12
	MH 303							31.4	30 inch		1,395.52	1,384.96	1,388.35	1,389.09
P-305	MH 305	6.94	6.94	0.75	0.75	6.94	3.682	21.8	Circular	165.13	1,397.00	1,389.43	1,392.96	1,393.71
	Jct-327							20.5	24 inch		1,397.00	1,388.27	1,391.66	1,392.41
P-305A	Jct-327	7.74	7.74	0.93	0.93	7.74	4.111	24.3	Circular	155.13	1,397.00	1,388.27	1,391.66	1,392.59
	MH 304							20.5	24 inch		1,395.56	1,387.18	1,390.13	1,391.06
P-306	MH 306	5.08	5.08	0.40	0.40	5.08	2.695	15.9	Circular	395.01	1,398.48	1,390.85	1,394.64	1,395.04
	MH 305							14.7	24 inch		1,397.00	1,389.43	1,392.96	1,393.36
P-307	CB 307	5.08	5.08	0.40	0.40	5.08	2.695	15.9	Circular	22.00	1,397.58	1,390.93	1,394.73	1,395.13
	MH 306							14.8	24 inch		1,398.48	1,390.85	1,394.64	1,395.04
P-308	CB 308	2.87	2.87	0.13	0.13	2.87	1.525	9.0	Circular	187.01	1,397.10	1,391.60	1,395.04	1,395.17
	CB 307							14.7	24 inch		1,397.58	1,390.93	1,394.78	1,394.91
P-309	CB 309	5.63	5.63	0.49	0.49	5.63	2.991	17.7	Circular	66.91	1,391.43	1,385.65	1,390.08	1,390.57

Scenario: Base

DOT Report

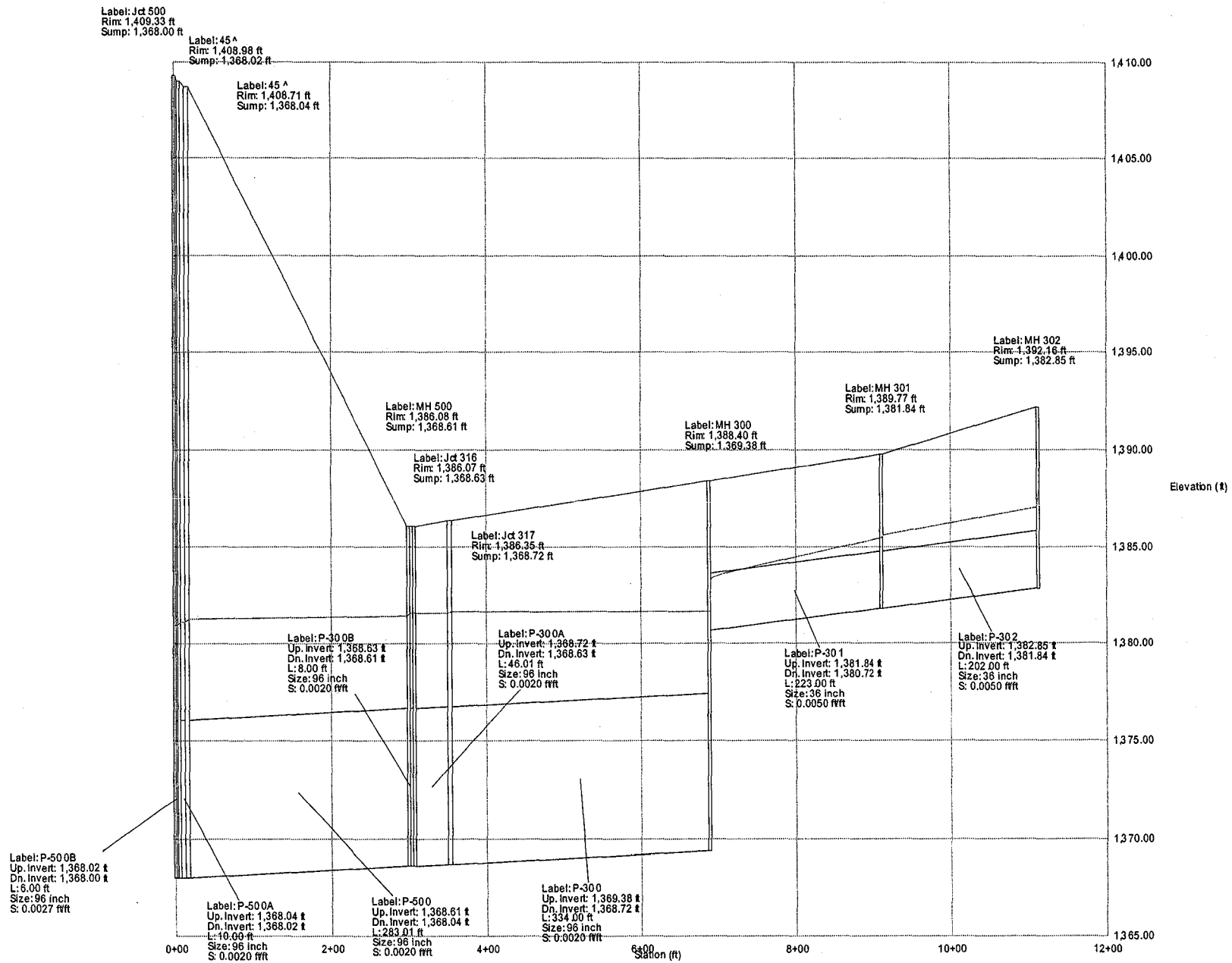
Label	-Node- Up. Dn.	v In (ft/s)	v Out (ft/s)	v Head In (ft)	v Head Out (ft)	Avg. v (ft/s)	Up. Calc. Sys. CA (acres)	Section Disch Cap. (cfs)	Section Shape Size	L (ft)	-Ground- Up. Dn. (ft)	-Invert- Up. Dn. (ft)	-HGL- Up. Dn. (ft)	-EGL- Up. Dn. (ft)
	CB 314							15.9	24 inch		1,391.57	1,385.37	1,389.73	1,390.22
P-310	CB 310	5.17	5.17	0.42	0.42	5.17	2.747	16.3	Circular	65.08	1,391.57	1,386.10	1,390.44	1,390.86
	CB 309							20.5	24 inch		1,391.43	1,385.65	1,390.15	1,390.57
P-311	CB 311	4.02	4.02	0.25	0.25	4.02	2.135	12.6	Circular	172.17	1,392.83	1,387.31	1,390.96	1,391.22
	CB 310							20.5	24 inch		1,391.57	1,386.10	1,390.51	1,390.76
P-312	CB 312	3.20	3.20	0.16	0.16	3.20	1.701	10.1	Circular	130.18	1,393.76	1,388.22	1,391.23	1,391.39
	CB 311							20.5	24 inch		1,392.83	1,387.31	1,391.01	1,391.17
P-313	CB 313	2.46	2.46	0.09	0.09	2.46	1.304	7.7	Circular	120.04	1,394.56	1,389.06	1,391.37	1,391.46
	CB 312							20.5	24 inch		1,393.76	1,388.22	1,391.25	1,391.34
P-314	CB 314	3.81	3.81	0.23	0.23	3.81	3.161	18.7	Circular	115.00	1,391.57	1,384.87	1,389.70	1,389.93
	CB 315							29.0	30 inch		1,392.43	1,384.38	1,389.50	1,389.73
P-315	CB 315	5.57	5.57	0.48	0.48	5.57	4.618	27.3	Circular	241.16	1,392.43	1,384.38	1,388.98	1,389.47
	MH 302							29.0	30 inch		1,392.16	1,383.35	1,388.07	1,388.55
P-316	CB 316	0.92	0.77	0.01	0.01	0.85	0.410	2.4	Circular	9.78	1,385.89	1,380.09	1,381.65	1,381.67
	Jct 316							177.5	24 inch		1,386.07	1,374.96	1,381.66	1,381.67
P-317	CB 317	4.54	1.83	0.32	0.05	3.18	0.969	5.7	Circular	10.00	1,386.17	1,380.67	1,381.52	1,381.84
	Jct 317							182.9	24 inch		1,386.35	1,375.10	1,381.66	1,381.71
P-318	CB 318	6.64	6.98	0.69	0.76	6.81	3.036	18.0	Circular	10.00	1,388.22	1,381.61	1,383.22	1,383.90
	MH 300							17.3	24 inch		1,388.40	1,381.56	1,383.09	1,383.84
P-319	CB 319	5.52	3.69	0.47	0.21	4.60	1.742	10.3	Circular	175.01	1,387.99	1,382.49	1,383.64	1,384.11
	CB 318							17.4	24 inch		1,388.22	1,381.61	1,383.27	1,383.48
P-320	CB 320	4.65	1.98	0.34	0.06	3.31	1.049	6.2	Circular	53.34	1,396.24	1,390.74	1,391.62	1,391.96
	MH 301							94.3	24 inch		1,389.77	1,382.84	1,386.63	1,386.69
P-321	CB 321	0.83	0.62	0.01	0.01	0.73	0.332	2.0	Circular	22.03	1,392.47	1,386.97	1,388.38	1,388.39
	Jct 321							67.3	24 inch		1,395.47	1,385.31	1,388.38	1,388.39
P-322	CB 322	0.22	0.22	7.42e-4	7.42e-4	0.22	0.116	0.7	Circular	22.55	1,391.89	1,386.39	1,388.80	1,388.80
	Jct 322							43.8	24 inch		1,395.10	1,385.67	1,388.80	1,388.80
P-323	CB 323	0.64	0.64	0.01	0.01	0.64	0.338	2.0	Circular	22.94	1,391.75	1,386.25	1,389.14	1,389.15
	Jct 323							27.1	24 inch		1,395.04	1,385.97	1,389.14	1,389.15
P-324	CB 324	0.33	0.33	1.65e-3	1.65e-3	0.33	0.173	1.0	Circular	23.16	1,391.89	1,386.39	1,389.47	1,389.47
	Jct 324							17.6	24 inch		1,395.53	1,386.27	1,389.47	1,389.47
P-325	CB 325	0.43	0.43	2.9e-3	2.9e-3	0.43	0.229	1.4	Circular	23.02	1,392.23	1,386.81	1,389.74	1,389.75
	Jct 325							26.0	24 inch		1,395.85	1,386.55	1,389.74	1,389.75
P-326	CB 326	0.81	0.81	0.01	0.01	0.81	0.431	2.5	Circular	22.04	1,392.81	1,387.31	1,390.10	1,390.11
	MH 304							18.8	24 inch		1,395.56	1,387.18	1,390.09	1,390.10

Scenario: Base

DOT Report

Label	-Node- Up. Dn.	v In (ft/s)	v Out (ft/s)	v Head In (ft)	v Head Out (ft)	Avg. v (ft/s)	Up. Calc. Sys. CA (acres)	Section Disch Cap. (cfs)	Section Shape Size	L (ft)	-Ground- Up. Dn. (ft)	-Invert- Up. Dn. (ft)	-HGL- Up. Dn. (ft)	-EGL- Up. Dn. (ft)
P-327	CB 327	0.81	0.81	0.01	0.01	0.81	0.429	2.5	Circular	23.86	1,393.93	1,388.43	1,391.66	1,391.67
	Jct-327							20.1	24 inch		1,397.00	1,388.27	1,391.66	1,391.67
P-328	CB 328	1.86	1.86	0.05	0.05	1.86	0.987	5.8	Circular	22.00	1,395.04	1,389.54	1,392.98	1,393.03
	MH 305							17.3	24 inch		1,397.00	1,389.43	1,392.96	1,393.02
P-500	MH 500	3.95	3.95	0.24	0.24	3.95	36.668	198.6	Circular	283.01	1,386.08	1,368.61	1,381.42	1,381.66
	45 ^							410.7	96 inch		1,408.71	1,368.04	1,381.28	1,381.52
P-500A	45 ^	3.80	3.80	0.22	0.22	3.80	36.668	190.9	Circular	10.00	1,408.71	1,368.04	1,381.14	1,381.37
	45^							407.9	96 inch		1,408.98	1,368.02	1,381.14	1,381.36
P-500B	45^	3.79	3.79	0.22	0.22	3.79	36.668	190.7	Circular	6.00	1,408.98	1,368.02	1,381.00	1,381.23
	Jct 500							471.0	96 inch		1,409.33	1,368.00	1,381.00	1,381.22

Profile
Scenario: Base

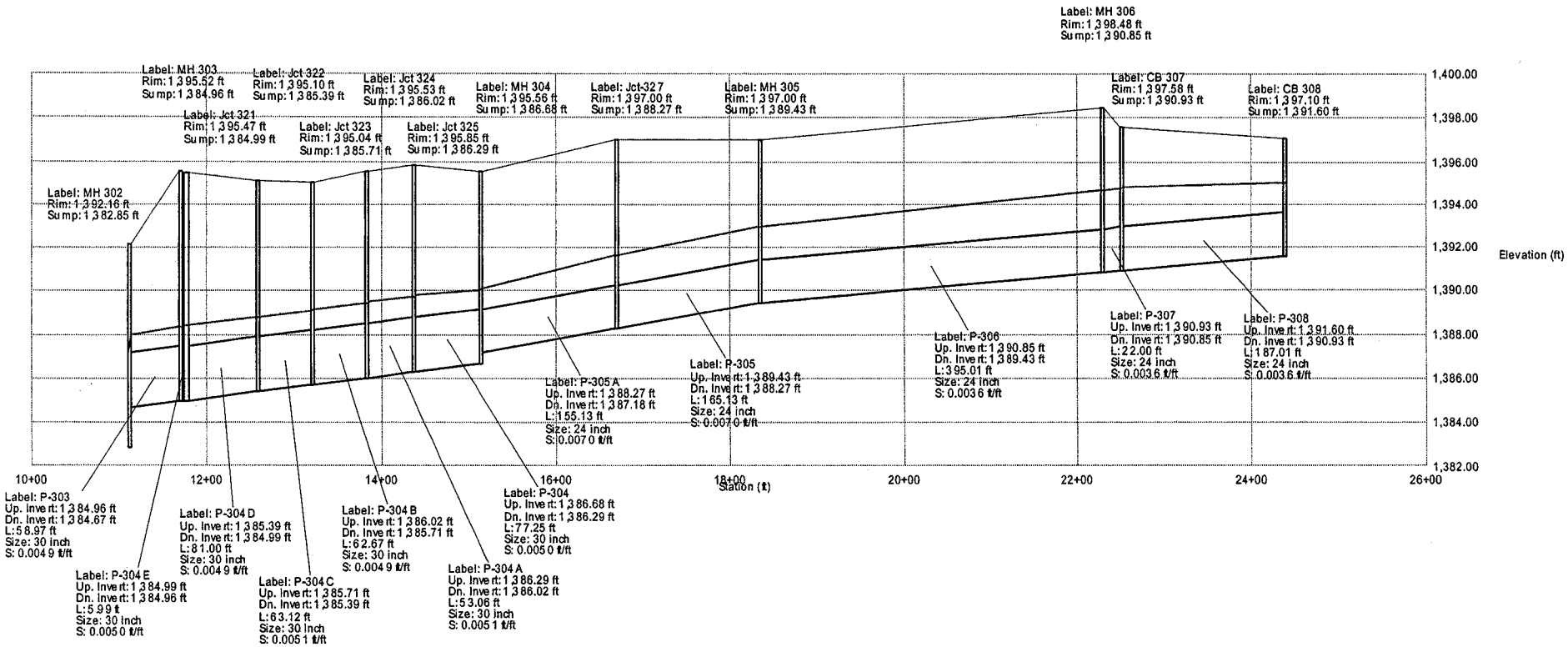


Title: Santan Freeway - Baseline to Elliot
q:\...\stormcad\95%-submittal\pumpsationsouth.stm
04/23/03 10:59:05 AM

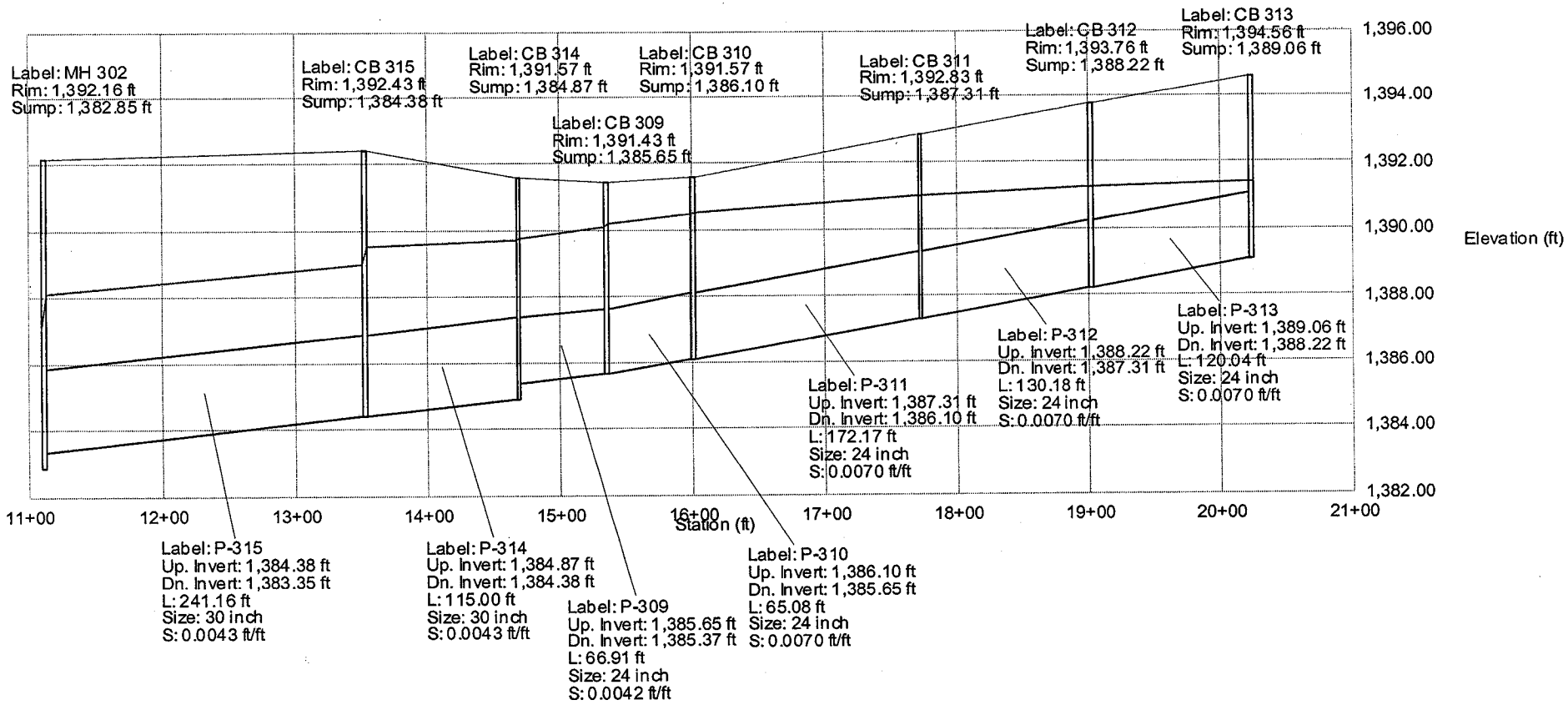
Stanley Consultants Inc
© Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Project Engineer: System Administrator
StormCAD v4.1.1 [4.2014a]
Page 1 of 1

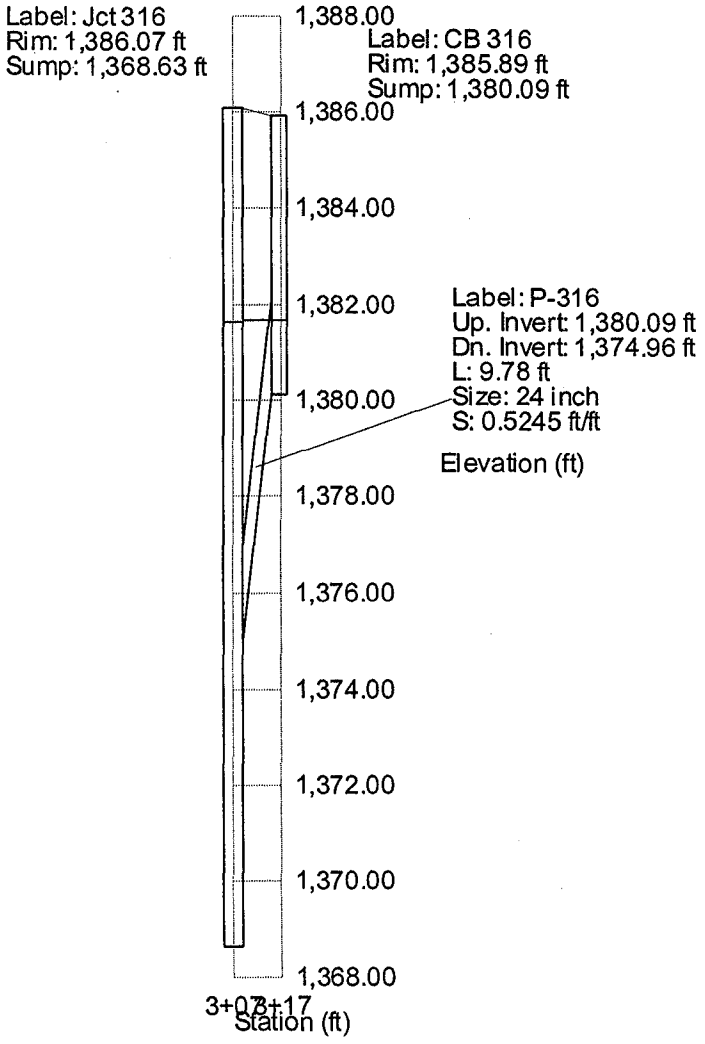
Profile
Scenario: Base



Profile
Scenario: Base

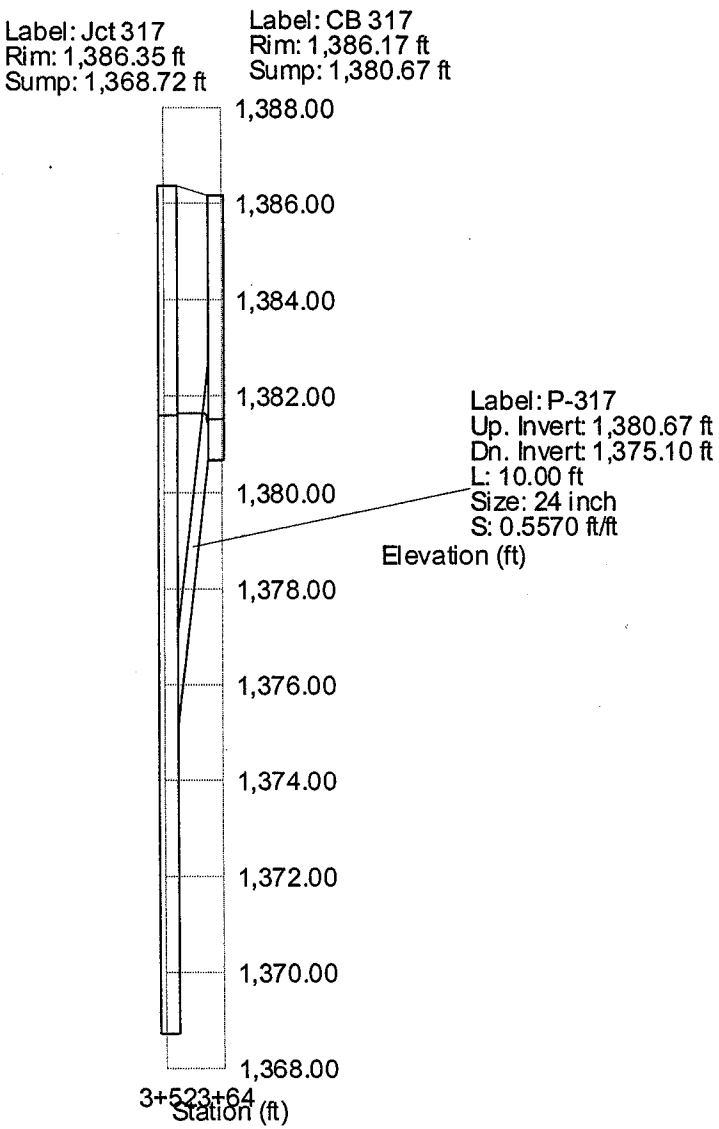


Profile
Scenario: Base



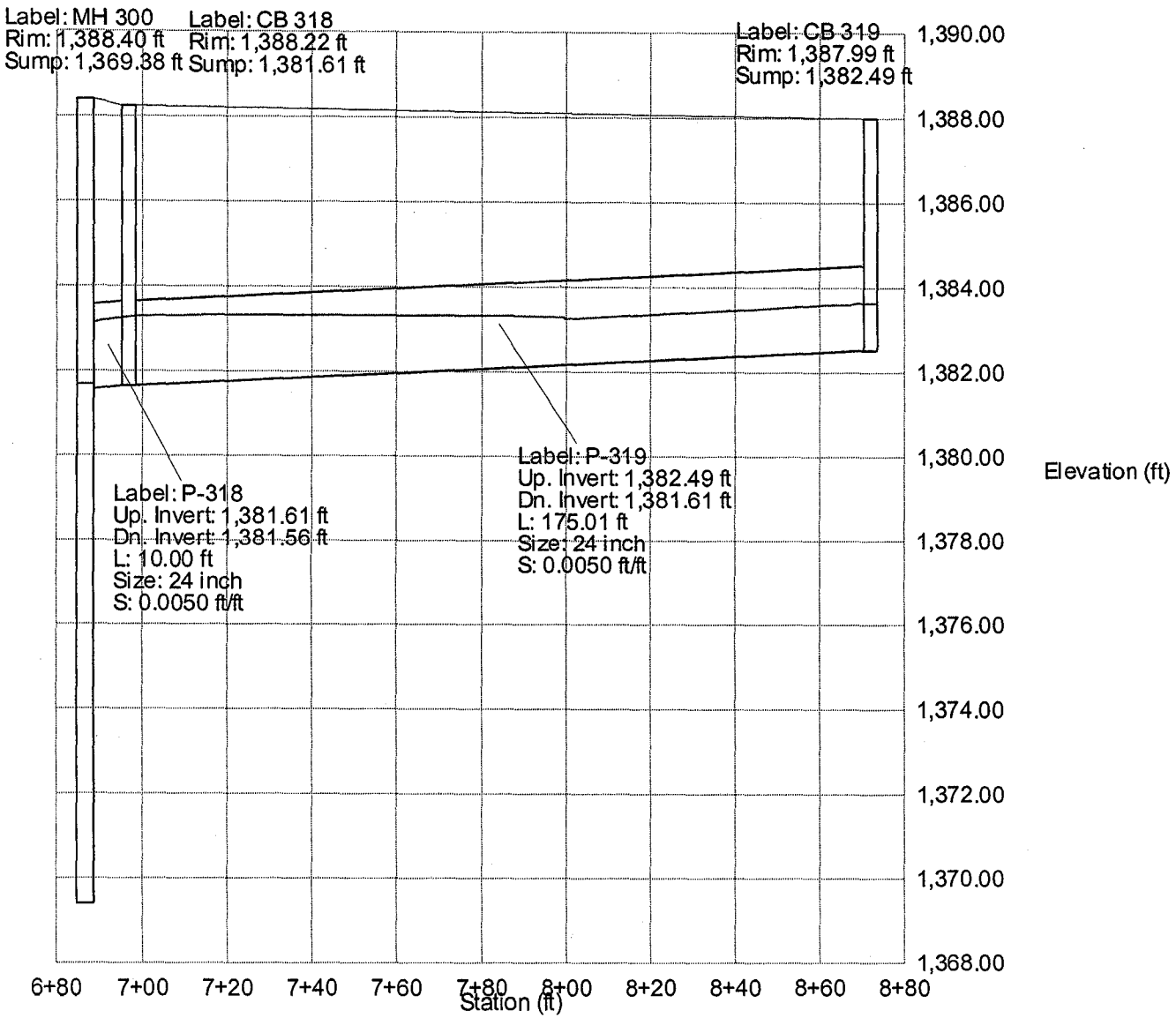
© Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Profile
Scenario: Base

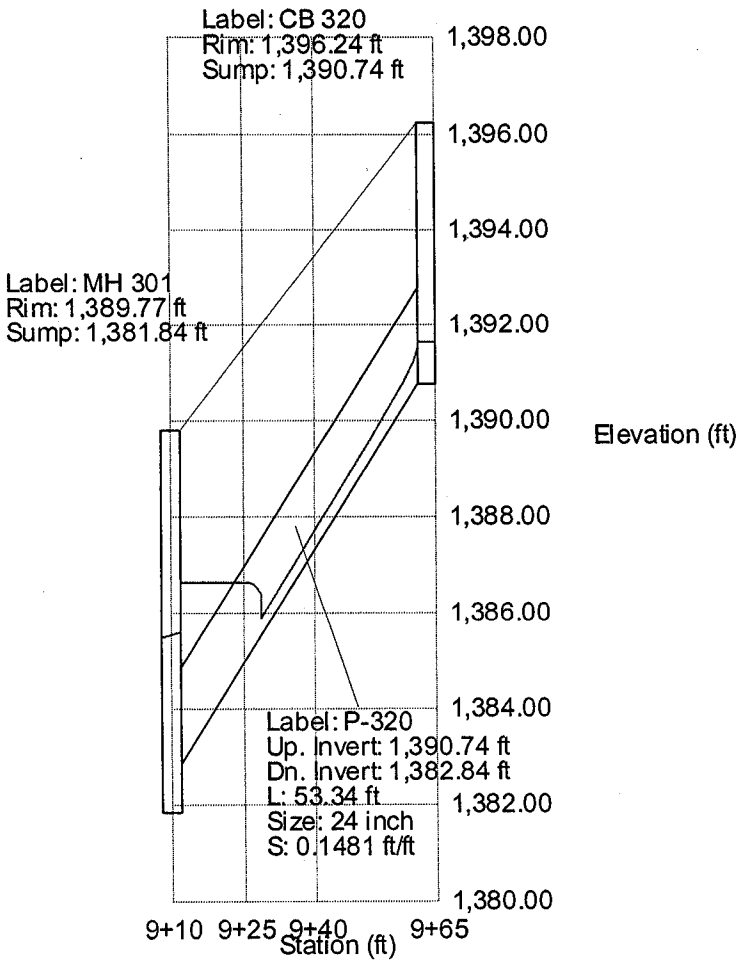


© Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Profile
Scenario: Base



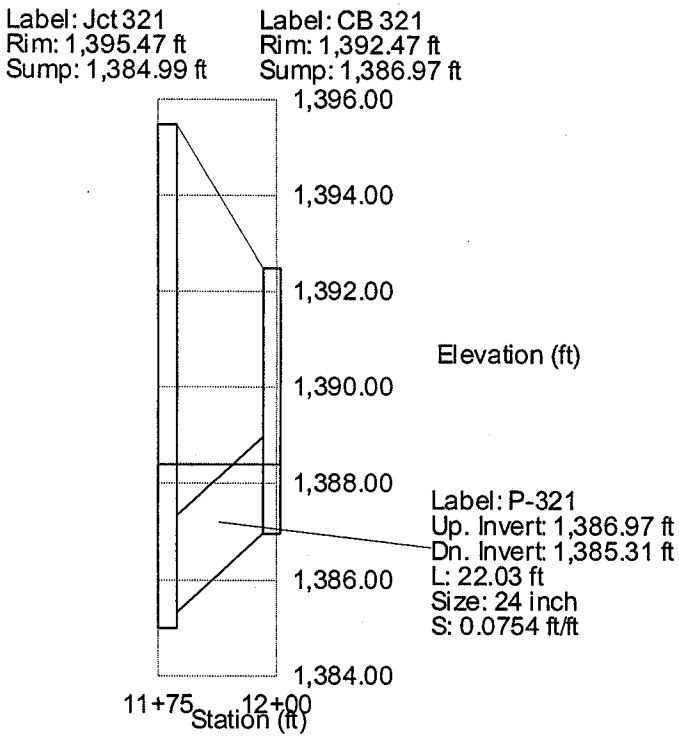
Profile
Scenario: Base



© Haestad Methods, Inc.

Stanley Consultants Inc
37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

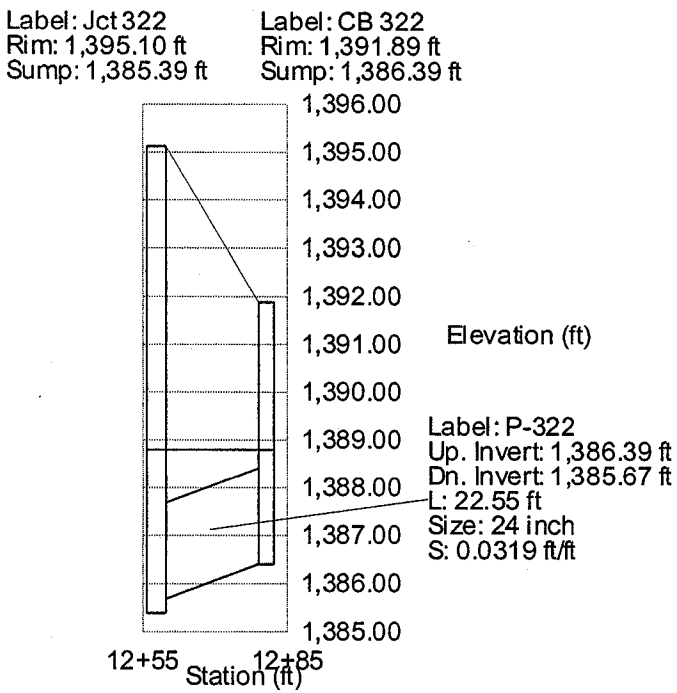
Profile
Scenario: Base



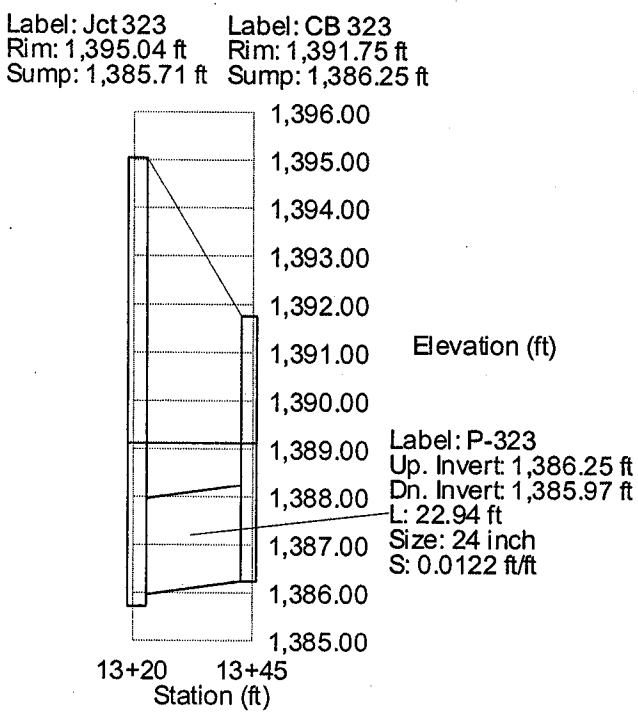
© Haestad Methods, Inc.

Stanley Consultants Inc
37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Profile
Scenario: Base

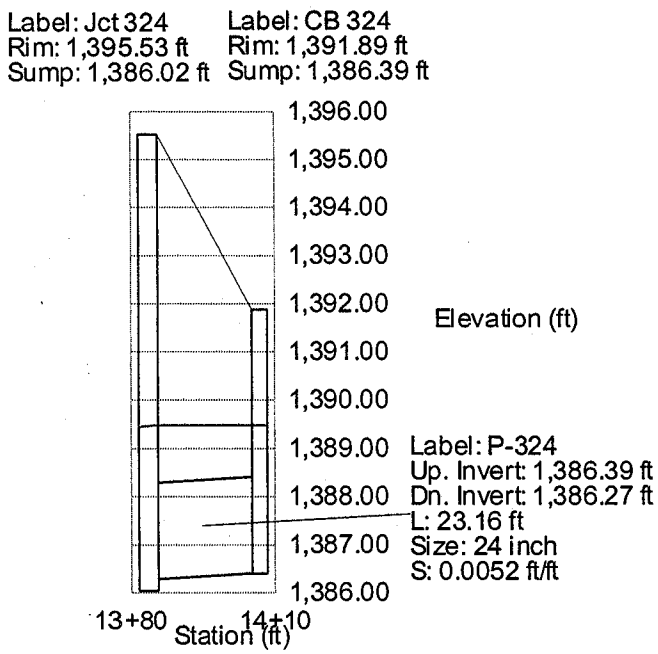


Profile
Scenario: Base

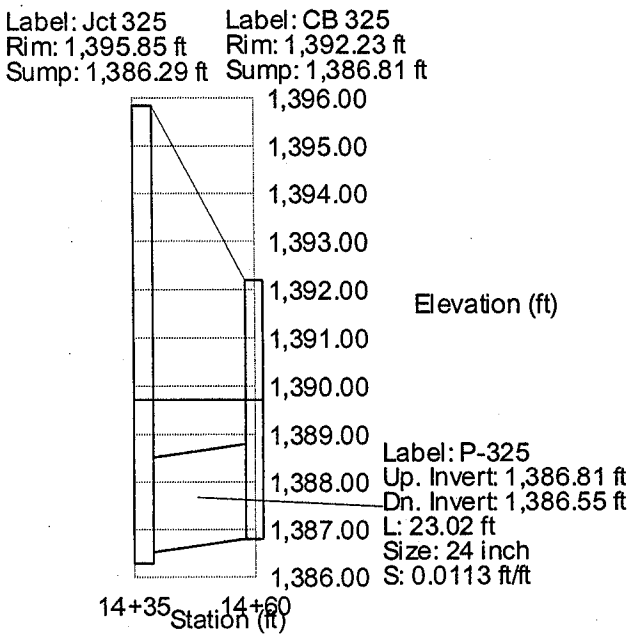


© Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Profile
Scenario: Base

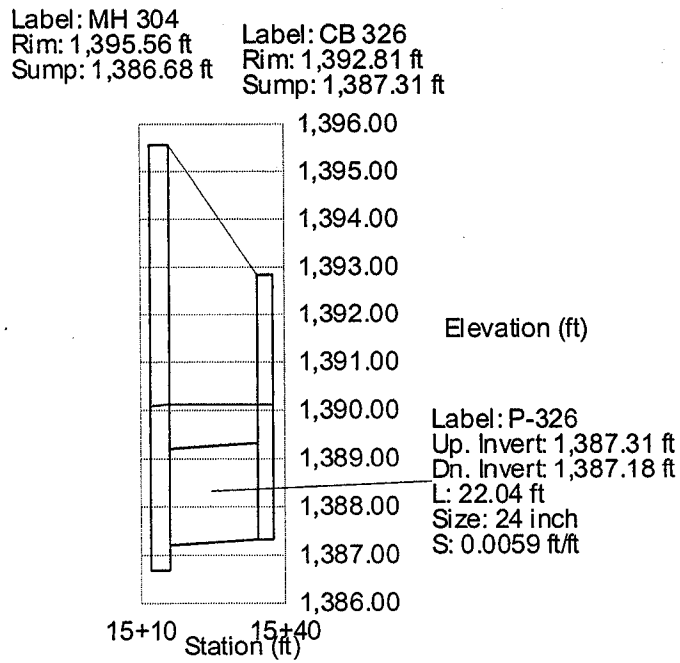


Profile
Scenario: Base



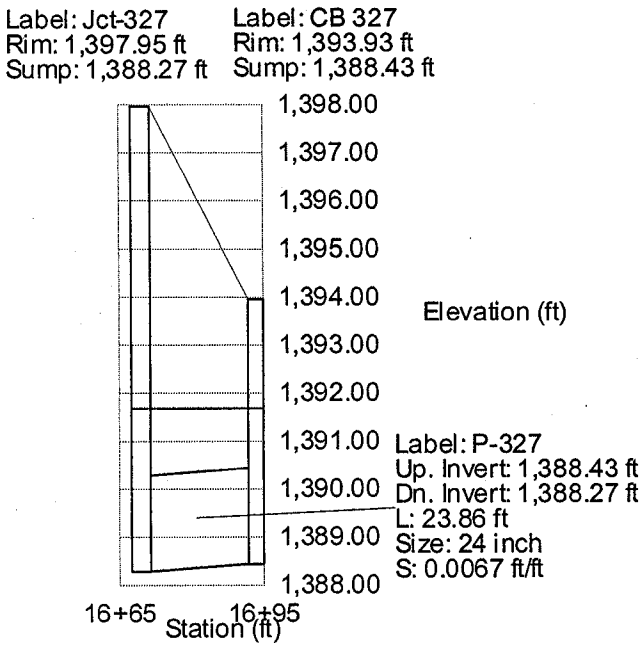
© Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Profile
Scenario: Base



© Haestad Methods, Inc.

Profile
Scenario: Base



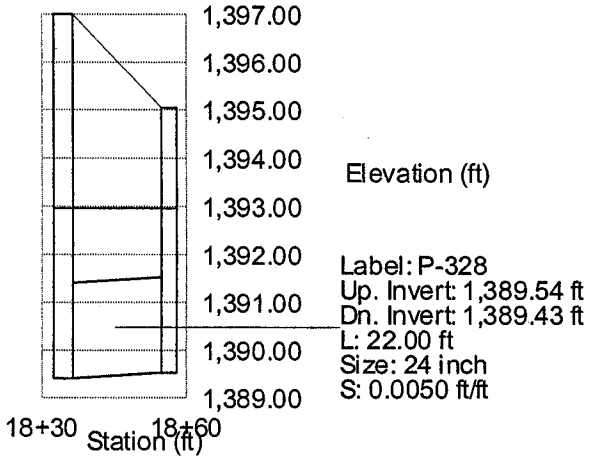
© Haestad Methods, Inc.

Stanley Consultants Inc
37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Profile
Scenario: Base

Label: MH 305
Rim: 1,397.00 ft
Sump: 1,389.43 ft

Label: CB 328
Rim: 1,395.04 ft
Sump: 1,389.54 ft



© Haestad Methods, Inc.

Stanley Consultants Inc
37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Scenario: Base

Pipe Report

Label	Up. Node	Dn. Node	Up. Inlet Area (acres)	Up. Inlet Rat. Coef.	Up. Calc. Sys. CA (acres)	I (in/hr)	System Tc (min)	System Q (cfs)	Avg. v (ft/s)	L (ft)	S (ft/ft)	Size	Mannings n	Up. Invert (ft)	Dn. Invert (ft)	HGL In (ft)	HGL Out (ft)
Exst 42"	MH 400	O-4	N/A	N/A	0.99	4.25	5.19	4.22	0.44	5.00	0.004600	42 inch	0.013	1,389.11	1,389.09	1,399.92	1,399.92
Exst 42"	MH 405	O-2	N/A	N/A	1.02	4.25	7.28	4.36	0.45	5.00	0.004600	42 inch	0.013	1,392.58	1,392.56	1,407.81	1,407.81
Exst 42"	CB 402	O-3	N/A	N/A	0.98	4.25	6.01	4.22	0.44	5.00	0.004600	42 inch	0.013	1,389.38	1,389.36	1,400.28	1,400.28
P-401	CB 401	MH 400	0.99	0.95	0.99	4.25	5.00	4.22	1.34	15.41	0.042180	24 inch	0.012	1,396.65	1,396.00	1,399.93	1,399.92
P-403	CB 403	CB 402	0.98	0.95	0.98	4.25	5.00	4.22	1.34	81.67	0.005020	24 inch	0.012	1,396.98	1,396.57	1,400.31	1,400.28
P-404	CB 404	MH 405	0.51	0.95	0.51	4.25	5.00	2.17	0.69	94.81	0.005010	24 inch	0.012	1,404.37	1,403.90	1,407.82	1,407.81
P-406	CB 406	MH 405	0.51	0.95	0.51	4.25	5.00	2.19	0.70	31.26	0.005022	24 inch	0.012	1,404.39	1,404.23	1,407.81	1,407.81
P-407	CB 407	Jct 407	0.16	0.95	0.85	4.25	8.90	3.66	1.16	73.30	0.005048	24 inch	0.012	1,402.27	1,401.90	1,406.92	1,406.90
P-408	CB 408	CB 407	0.15	0.95	0.70	4.25	7.27	2.99	0.95	92.70	0.004962	24 inch	0.012	1,402.73	1,402.27	1,406.93	1,406.92
P-409	CB 409	CB 408	0.55	0.95	0.55	4.25	5.00	2.34	0.75	101.85	0.005007	24 inch	0.012	1,403.24	1,402.73	1,406.95	1,406.94
P-410	CB 410	Jct 410	0.19	0.95	0.94	4.25	8.85	4.05	1.29	62.09	0.004993	24 inch	0.012	1,401.72	1,401.41	1,407.43	1,407.41
P-411	CB 411	CB 410	0.19	0.95	0.76	4.25	7.20	3.24	1.03	102.20	0.004990	24 inch	0.012	1,403.23	1,402.72	1,407.45	1,407.43
P-412	CB 412	CB 411	0.57	0.95	0.57	4.25	5.00	2.44	0.78	102.23	0.004989	24 inch	0.012	1,403.74	1,403.23	1,407.46	1,407.45

Scenario: Base

Inlet Report

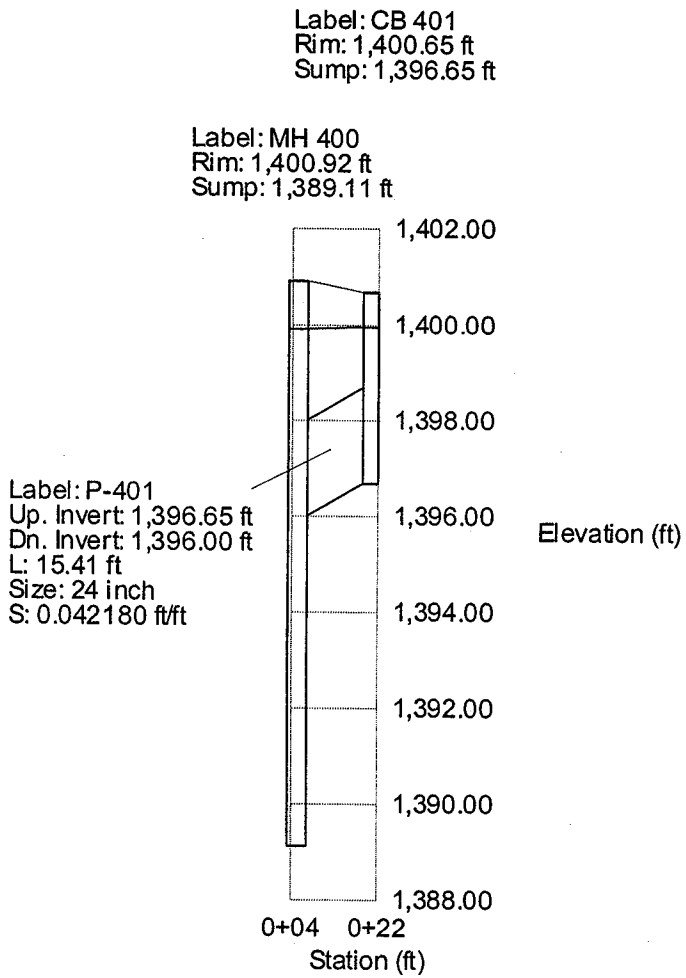
Label	Area (acres)	C	Inlet CA (acres)	TC (min)	Total Flow To Inlet (cfs)	Add. Q (cfs)	Struct. Depth (ft)	Rim (ft)	Sump (ft)	HGL In (ft)	HGL Out (ft)	EGL In (ft)	EGL Out (ft)	Headloss Mtd
CB 401	1.04	0.95	0.99	5.00	4.22	0.00	4.00	1,400.65	1,396.65	1,399.93	1,399.93	1,399.95	1,399.95	HEC-22 Energy
CB 403	1.04	0.95	0.98	5.00	4.22	0.00	4.00	1,400.98	1,396.98	1,400.31	1,400.31	1,400.33	1,400.33	HEC-22 Energy
CB 404	0.53	0.95	0.51	5.00	2.17	0.00	4.00	1,408.37	1,404.37	1,407.82	1,407.82	1,407.83	1,407.83	HEC-22 Energy
CB 406	0.54	0.95	0.51	5.00	2.19	0.00	4.00	1,408.39	1,404.39	1,407.81	1,407.81	1,407.82	1,407.82	HEC-22 Energy
CB 407	0.17	0.95	0.16	5.00	0.67	0.00	7.24	1,409.51	1,402.27	1,406.92	1,406.92	1,406.94	1,406.94	HEC-22 Energy
CB 408	0.16	0.95	0.15	5.00	0.64	0.00	6.51	1,409.24	1,402.73	1,406.94	1,406.93	1,406.95	1,406.95	HEC-22 Energy
CB 409	0.58	0.95	0.55	5.00	2.34	0.00	6.33	1,409.57	1,403.24	1,406.95	1,406.95	1,406.95	1,406.95	HEC-22 Energy
CB 410	0.20	0.95	0.19	5.00	0.81	0.00	7.66	1,409.38	1,401.72	1,407.43	1,407.43	1,407.45	1,407.45	HEC-22 Energy
CB 411	0.20	0.95	0.19	5.00	0.80	0.00	5.79	1,409.02	1,403.23	1,407.45	1,407.45	1,407.47	1,407.47	HEC-22 Energy
CB 412	0.60	0.95	0.57	5.00	2.44	0.00	5.68	1,409.42	1,403.74	1,407.46	1,407.46	1,407.47	1,407.47	HEC-22 Energy

Scenario: Base

DOT Report

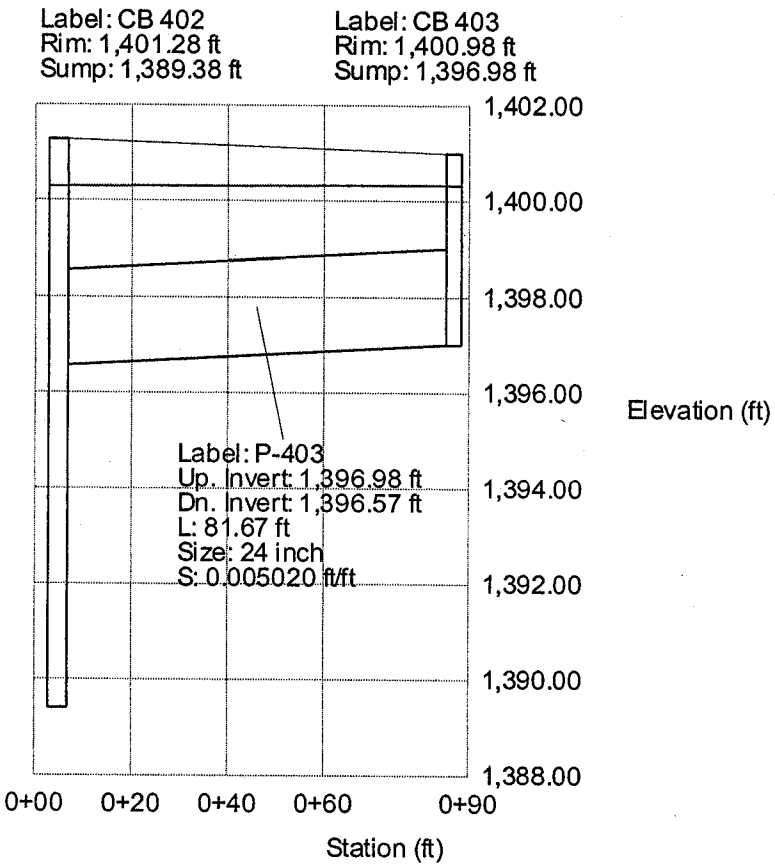
Label	-Node- Up. Dn.	v In (ft/s)	v Out (ft/s)	v Head In (ft)	v Head Out (ft)	Avg. v (ft/s)	Up. Calc. Sys. CA (acres)	Section Disch Cap. (cfs)	Section Shape Size	L (ft)	-Ground- Up. Dn. (ft)	-Invert- Up. Dn. (ft)	-HGL- Up. Dn. (ft)	-EGL- Up. Dn. (ft)
Exst 42"	MH 400	0.44	0.44	2.99e-3	2.99e-3	0.44	0.99	4.22	Circular	5.00	1,400.92	1,389.11	1,399.92	1,399.92
	O-4							68.23	42 inch		1,400.92	1,389.09	1,399.92	1,399.92
Exst 42"	MH 405	0.45	0.45	3.2e-3	3.2e-3	0.45	1.02	4.36	Circular	5.00	1,408.81	1,392.58	1,407.81	1,407.81
	O-2							68.23	42 inch		1,408.81	1,392.56	1,407.81	1,407.81
Exst 42"	CB 402	0.44	0.44	2.98e-3	2.98e-3	0.44	0.98	4.22	Circular	5.00	1,401.28	1,389.38	1,400.28	1,400.28
	O-3							68.23	42 inch		1,401.28	1,389.36	1,400.28	1,400.28
P-401	CB 401	1.34	1.34	0.03	0.03	1.34	0.99	4.22	Circular	15.41	1,400.65	1,396.65	1,399.93	1,399.95
	MH 400							50.33	24 inch		1,400.92	1,396.00	1,399.92	1,399.95
P-403	CB 403	1.34	1.34	0.03	0.03	1.34	0.98	4.22	Circular	81.67	1,400.98	1,396.98	1,400.31	1,400.33
	CB 402							17.36	24 inch		1,401.28	1,396.57	1,400.28	1,400.31
P-404	CB 404	0.69	0.69	0.01	0.01	0.69	0.51	2.17	Circular	94.81	1,408.37	1,404.37	1,407.82	1,407.83
	MH 405							17.35	24 inch		1,408.81	1,403.90	1,407.81	1,407.82
P-406	CB 406	0.70	0.70	0.01	0.01	0.70	0.51	2.19	Circular	31.26	1,408.39	1,404.39	1,407.81	1,407.82
	MH 405							17.37	24 inch		1,408.81	1,404.23	1,407.81	1,407.82
P-407	CB 407	1.16	1.16	0.02	0.02	1.16	0.85	3.66	Circular	73.30	1,409.51	1,402.27	1,406.92	1,406.94
	Jct 407							17.41	24 inch		1,410.08	1,401.90	1,406.90	1,406.92
P-408	CB 408	0.95	0.95	0.01	0.01	0.95	0.70	2.99	Circular	92.70	1,409.24	1,402.73	1,406.93	1,406.95
	CB 407							17.26	24 inch		1,409.51	1,402.27	1,406.92	1,406.93
P-409	CB 409	0.75	0.75	0.01	0.01	0.75	0.55	2.34	Circular	101.85	1,409.57	1,403.24	1,406.95	1,406.95
	CB 408							17.34	24 inch		1,409.24	1,402.73	1,406.94	1,406.94
P-410	CB 410	1.29	1.29	0.03	0.03	1.29	0.94	4.05	Circular	62.09	1,409.38	1,401.72	1,407.43	1,407.45
	Jct 410							17.32	24 inch		1,409.80	1,401.41	1,407.41	1,407.44
P-411	CB 411	1.03	1.03	0.02	0.02	1.03	0.76	3.24	Circular	102.20	1,409.02	1,403.23	1,407.45	1,407.47
	CB 410							17.31	24 inch		1,409.38	1,402.72	1,407.43	1,407.45
P-412	CB 412	0.78	0.78	0.01	0.01	0.78	0.57	2.44	Circular	102.23	1,409.42	1,403.74	1,407.46	1,407.47
	CB 411							17.31	24 inch		1,409.02	1,403.23	1,407.45	1,407.46

Profile
Scenario: Base

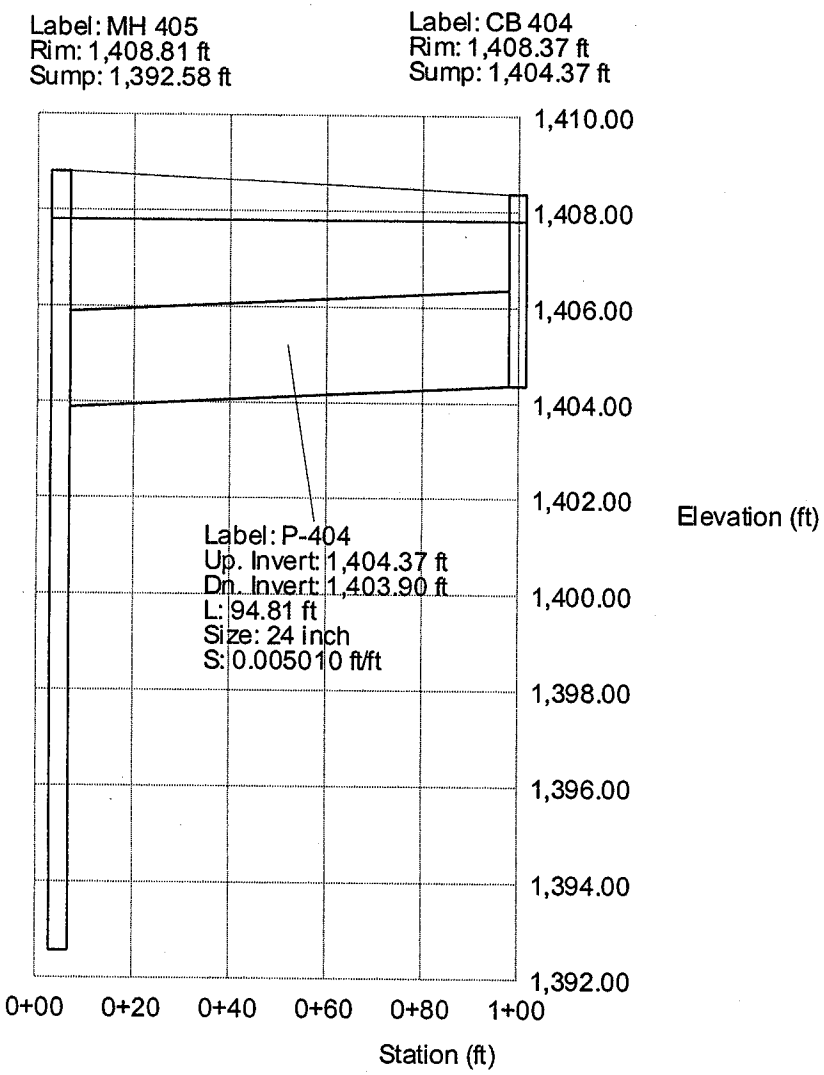


Title: Santan
q:\16110\drainage\stormcad\guadalupe.stm
03/17/03 05:21:22 PM

Profile
Scenario: Base

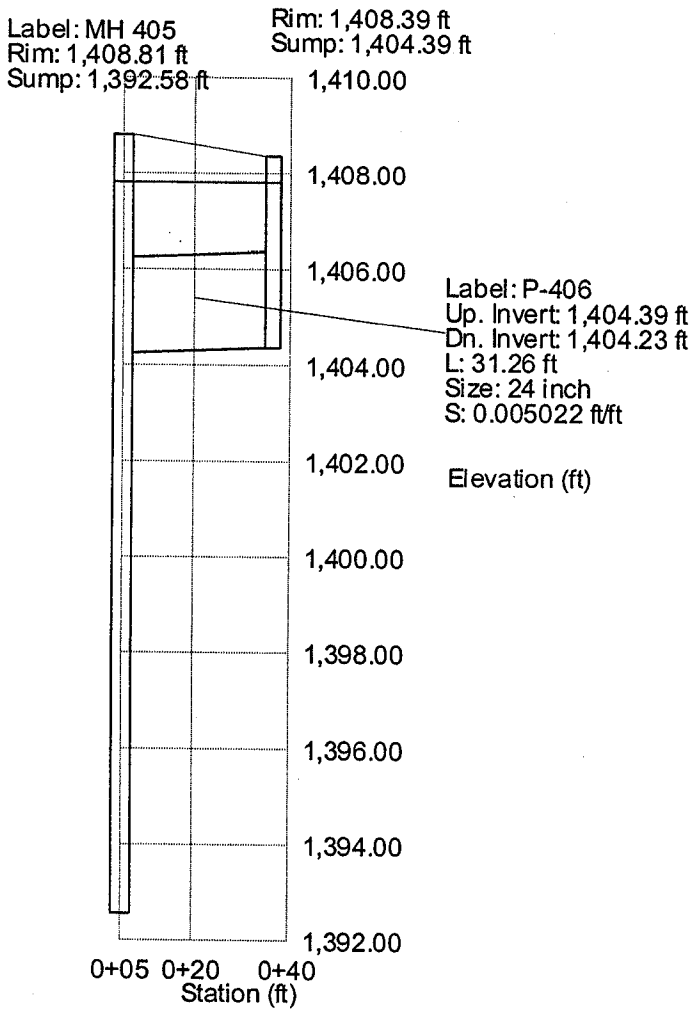


Profile
Scenario: Base

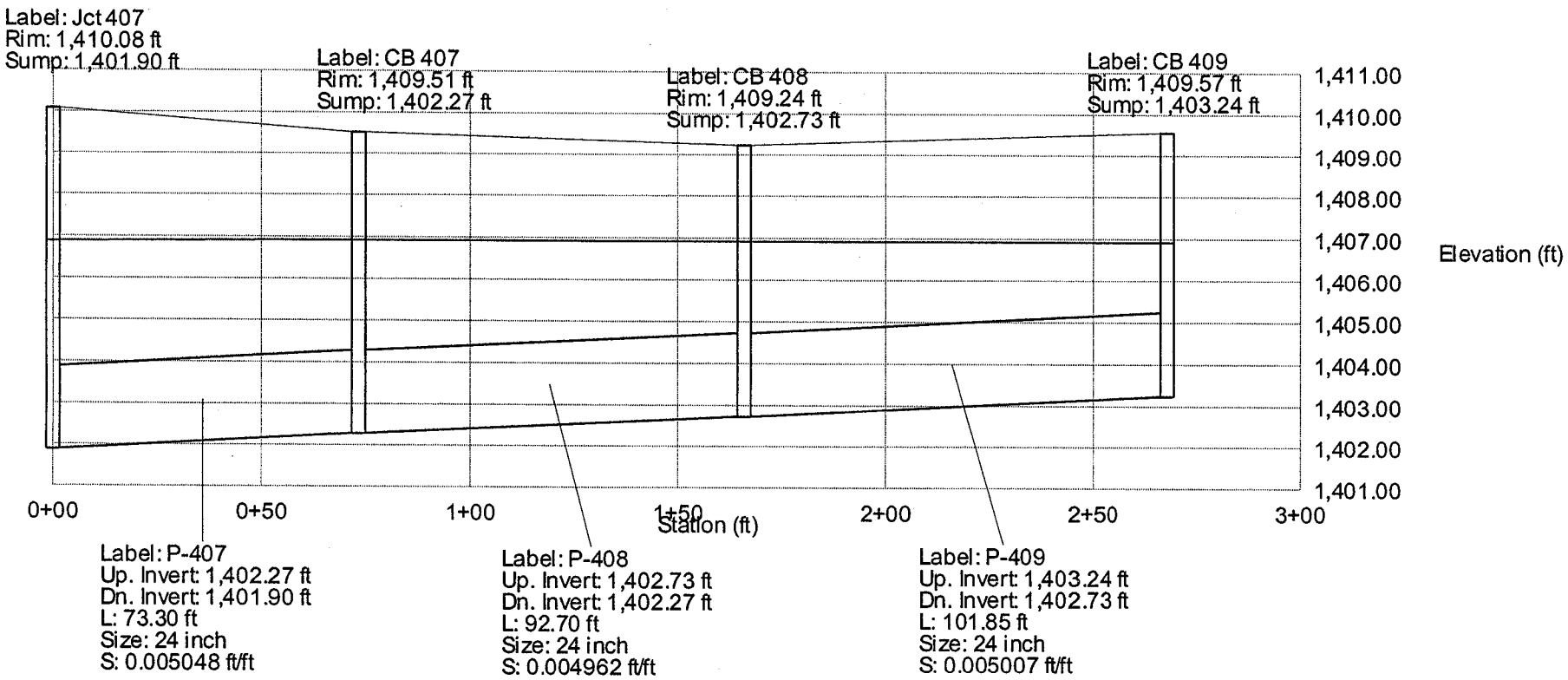


Title: Santan
q:\16110\drainage\stormcad\guadalupe.stm
03/17/03 05:20:44 PM

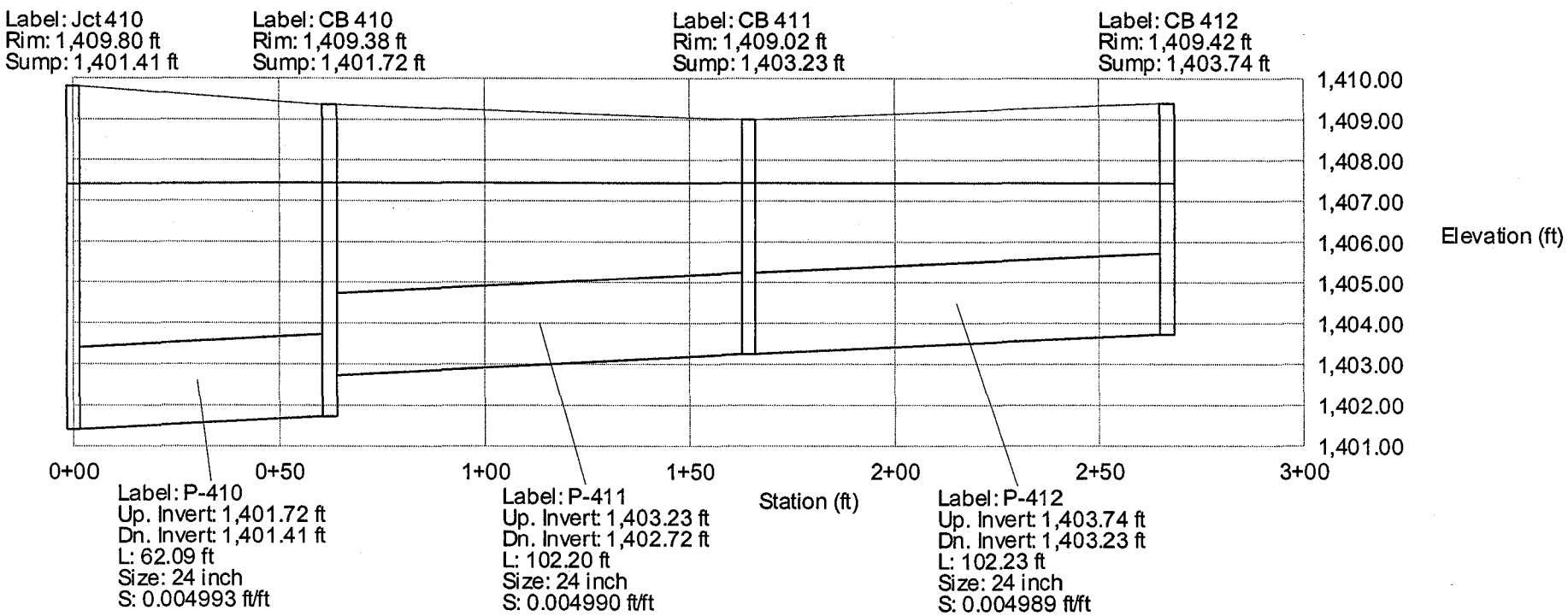
Profile
Scenario: Base



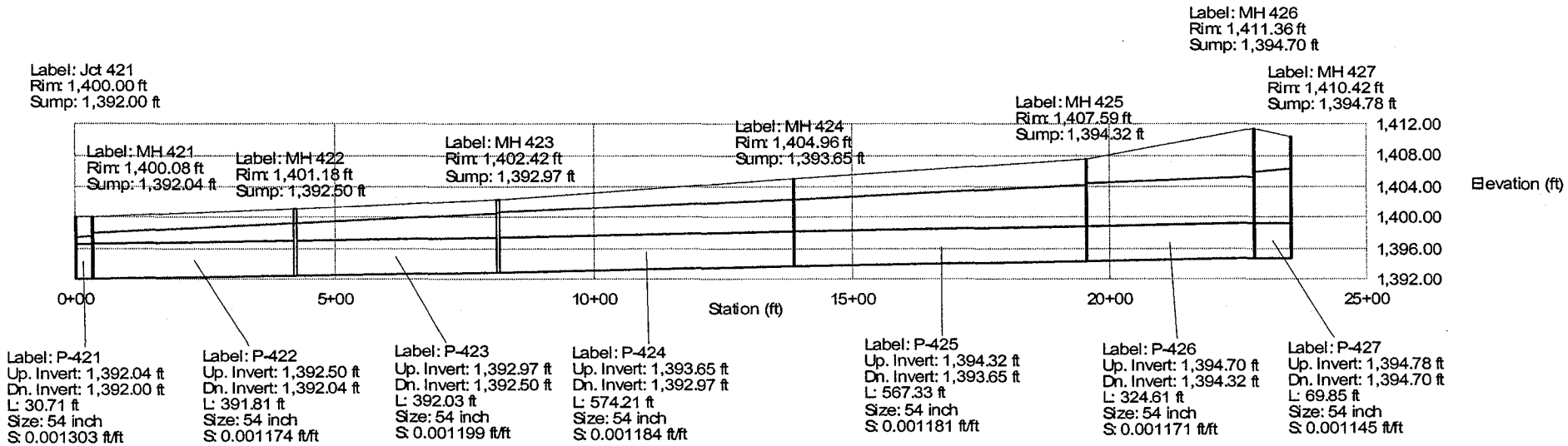
Profile
Scenario: Base



Profile
Scenario: Base



Profile
Scenario: Base



Scenario: Base

Pipe Report

Label	Up. Node	Dn. Node	Up. Inlet Area (acres)	Up. Inlet Rat. Coef.	Up. Calc. Sys. CA (acres)	I (in/hr)	System Tc (min)	System Q (cfs)	Avg. v (ft/s)	L (ft)	S (ft/ft)	Size	Mannings n	Up. Invert (ft)	Dn. Invert (ft)	HGL In (ft)	HGL Out (ft)
P-421	MH 421	Jct 421	N/A	N/A	0.00	0.00	5.59	110.00	6.92	31.00	0.001290	54 inch	0.013	1,392.04	1,392.00	1,397.59	1,397.49
P-422	MH 422	MH 421	N/A	N/A	0.00	0.00	4.65	110.00	6.92	392.00	0.001173	54 inch	0.013	1,392.50	1,392.04	1,399.24	1,398.02
P-423	MH 423	MH 422	N/A	N/A	0.00	0.00	3.70	110.00	6.92	392.00	0.001199	54 inch	0.013	1,392.97	1,392.50	1,400.51	1,399.28
P-424	MH 424	MH 423	N/A	N/A	0.00	0.00	2.32	110.00	6.92	574.00	0.001185	54 inch	0.013	1,393.65	1,392.97	1,402.40	1,400.61
P-425	MH 425	MH 424	N/A	N/A	0.00	0.00	0.95	110.00	6.92	567.00	0.001182	54 inch	0.013	1,394.32	1,393.65	1,404.23	1,402.45
P-426	MH 426	MH 425	N/A	N/A	0.00	0.00	0.17	110.00	6.92	325.00	0.001169	54 inch	0.013	1,394.70	1,394.32	1,405.33	1,404.32
P-427	MH 427	MH 426	0.00	0.00	0.00	0.00	0.00	110.00	6.92	70.00	0.001143	54 inch	0.013	1,394.78	1,394.70	1,406.17	1,405.95

Scenario: Base

Inlet Report

Label	Area (acres)	C	Inlet CA (acres)	TC (min)	Total Flow To Inlet (cfs)	Add. Q (cfs)	Struct. Depth (ft)	Rim (ft)	Sump (ft)	HGL In (ft)	HGL Out (ft)	EGL In (ft)	EGL Out (ft)	Headloss Mtd
MH 427	0.00	0.00	0.00	0.00	0.00	0.00	15.64	1,410.42	1,394.78	1,406.17	1,406.17	1,406.91	1,406.91	HEC-22 Energy

Scenario: Base

DOT Report

Label	-Node- Up. Dn.	v In (ft/s)	v Out (ft/s)	v Head In (ft)	v Head Out (ft)	Avg. v (ft/s)	Up. Calc. Sys. CA (acres)	Section Disch Cap. (cfs)	Section Shape Size	L (ft)	-Ground- Up. Dn. (ft)	-Invert- Up. Dn. (ft)	-HGL- Up. Dn. (ft)	-EGL- Up. Dn. (ft)
P-421	MH 421	6.92	6.92	0.74	0.74	6.92	0.00	110.00	Circular	31.00	1,400.08	1,392.04	1,397.59	1,398.33
	Jct 421							70.63	54 inch		1,400.00	1,392.00	1,397.49	1,398.23
P-422	MH 422	6.92	6.92	0.74	0.74	6.92	0.00	110.00	Circular	392.00	1,401.18	1,392.50	1,399.24	1,399.99
	MH 421							67.36	54 inch		1,400.08	1,392.04	1,398.02	1,398.76
P-423	MH 423	6.92	6.92	0.74	0.74	6.92	0.00	110.00	Circular	392.00	1,402.42	1,392.97	1,400.51	1,401.25
	MH 422							68.09	54 inch		1,401.18	1,392.50	1,399.28	1,400.03
P-424	MH 424	6.92	6.92	0.74	0.74	6.92	0.00	110.00	Circular	574.00	1,404.96	1,393.65	1,402.40	1,403.15
	MH 423							67.68	54 inch		1,402.42	1,392.97	1,400.61	1,401.35
P-425	MH 425	6.92	6.92	0.74	0.74	6.92	0.00	110.00	Circular	567.00	1,407.59	1,394.32	1,404.23	1,404.97
	MH 424							67.59	54 inch		1,404.96	1,393.65	1,402.45	1,403.20
P-426	MH 426	6.92	6.92	0.74	0.74	6.92	0.00	110.00	Circular	325.00	1,411.36	1,394.70	1,405.33	1,406.08
	MH 425							67.24	54 inch		1,407.59	1,394.32	1,404.32	1,405.06
P-427	MH 427	6.92	6.92	0.74	0.74	6.92	0.00	110.00	Circular	70.00	1,410.42	1,394.78	1,406.17	1,406.91
	MH 426							66.48	54 inch		1,411.36	1,394.70	1,405.95	1,406.69

Scenario: Base

Pipe Report

Label	Up. Node	Dn. Node	Up. Inlet Area (acres)	Up. Inlet Rat. Coef.	Up. Calc. Sys. CA (acres)	I (in/hr)	System Tc (min)	System Q (cfs)	Avg. v (ft/s)	L (ft)	S (ft/ft)	Size	Mannings n	Up. Invert (ft)	Dn. Invert (ft)	HGL In (ft)	HGL Out (ft)
P-501	MH 501	MH 500	N/A	N/A	20.856	5.78	10.53	121.46	2.42	195.00	0.002000	96 inch	0.013	1,369.00	1,368.61	1,381.54	1,381.51
P-502	MH 502	Jct 516	N/A	N/A	19.325	5.87	9.75	114.34	5.82	178.03	0.004999	60 inch	0.013	1,373.40	1,372.51	1,382.22	1,381.88
P-502A	Jct 516	MH 501	N/A	N/A	20.856	5.82	10.26	122.46	6.24	101.99	0.005000	60 inch	0.013	1,372.51	1,372.00	1,381.85	1,381.62
P-503	MH 503	JCT 524	N/A	N/A	16.219	5.87	8.93	95.97	6.03	101.64	0.005018	54 inch	0.013	1,375.42	1,374.91	1,383.11	1,382.86
P-503A	JCT 524	Jct 523	N/A	N/A	16.569	5.87	9.21	98.04	6.16	160.31	0.004990	54 inch	0.013	1,374.91	1,374.11	1,382.83	1,382.43
P-503B	Jct 523	MH 502	N/A	N/A	17.279	5.87	9.64	102.24	6.43	41.96	0.005005	54 inch	0.013	1,374.11	1,373.90	1,382.39	1,382.27
P-504	MH 504	MH 503	N/A	N/A	13.570	5.87	8.20	80.29	8.35	365.45	0.009933	42 inch	0.012	1,380.05	1,376.42	1,385.16	1,383.18
P-505	MH 505	Jct 530	N/A	N/A	11.078	5.87	7.82	65.55	9.27	37.97	0.011588	36 inch	0.012	1,383.18	1,382.74	1,387.81	1,387.50
P-505A	Jct 530	Jct 529	N/A	N/A	11.440	5.87	7.89	67.69	9.58	98.86	0.011633	36 inch	0.012	1,382.74	1,381.59	1,387.34	1,386.47
P-505B	Jct 529	MH 504	N/A	N/A	12.879	5.87	8.06	76.21	10.78	89.92	0.011566	36 inch	0.012	1,381.59	1,380.55	1,386.30	1,385.30
P-506	MH 506	MH 505	N/A	N/A	8.404	5.87	7.04	49.72	7.03	83.88	0.011564	36 inch	0.012	1,384.15	1,383.18	1,389.13	1,388.74
P-507	MH 507	MH 506	N/A	N/A	8.017	5.87	6.87	47.44	9.66	99.10	0.011604	30 inch	0.012	1,385.80	1,384.65	1,390.80	1,389.67
P-508	MH 508	MH 507	N/A	N/A	5.762	5.87	6.22	34.10	6.95	272.18	0.016460	30 inch	0.012	1,390.28	1,385.80	1,392.75	1,391.15
P-509	CB 509	MH 508	2.986	0.87	5.067	5.87	5.66	29.98	9.54	319.21	0.014661	24 inch	0.012	1,395.46	1,390.78	1,397.63	1,392.86
P-510	MH 510	CB 509	N/A	N/A	1.227	5.87	3.79	7.26	3.60	403.85	0.017754	24 inch	0.012	1,402.63	1,395.46	1,403.59	1,398.10
P-511	CB 511	MH 510	1.227	0.92	1.227	5.87	3.00	7.26	4.40	208.99	0.008804	24 inch	0.012	1,404.47	1,402.63	1,405.43	1,403.77
P-512	CB 512	CB 511	N/A	N/A	0.000	0.00	0.00	0.00	0.00	73.00	0.006027	24 inch	0.012	1,404.91	1,404.47	1,405.61	1,405.61
P-516	CB 516	Jct 516	1.531	0.84	1.531	5.87	3.00	9.06	2.88	10.07	0.388282	24 inch	0.012	1,379.50	1,375.59	1,382.45	1,382.44
P-517	CB 517	MH 502	0.221	0.83	2.046	5.87	5.10	12.11	3.85	10.00	0.013000	24 inch	0.012	1,378.35	1,378.22	1,382.75	1,382.73
P-518	CB 518	CB 517	0.246	0.95	1.825	5.87	4.55	10.80	3.44	114.21	0.012871	24 inch	0.012	1,379.82	1,378.35	1,383.07	1,382.85
P-519	CB 519	CB 518	0.058	0.95	1.190	5.87	3.37	7.04	2.24	57.21	0.005768	24 inch	0.012	1,380.15	1,379.82	1,383.23	1,383.18
P-520	CB 520	CB 519	1.132	0.70	1.132	5.87	3.00	6.70	3.45	77.00	0.032597	24 inch	0.012	1,382.66	1,380.15	1,383.58	1,383.31
P-521	CB 521	CB 518	0.389	0.95	0.389	5.87	3.00	2.30	0.73	68.25	0.004982	24 inch	0.012	1,380.16	1,379.82	1,383.12	1,383.11
P-523	CB 523	Jct 523	0.710	0.83	0.710	5.87	3.00	4.20	1.34	11.23	0.178985	24 inch	0.012	1,378.03	1,376.02	1,383.03	1,383.02
P-524	CB 524	JCT 524	0.350	0.83	0.350	5.87	3.00	2.07	0.66	12.30	0.141463	24 inch	0.012	1,378.35	1,376.61	1,383.40	1,383.40
P-525	CB 525	MH 503	1.962	0.86	2.649	5.87	4.42	15.67	4.99	10.00	0.022000	24 inch	0.012	1,378.89	1,378.67	1,383.68	1,383.64
P-526	CB 526	CB 525	0.687	0.95	0.687	5.87	3.00	4.06	1.29	110.00	0.022364	24 inch	0.012	1,381.35	1,378.89	1,383.77	1,383.74
P-527	CB 527	MH 504	0.691	0.95	0.691	5.87	3.00	4.09	2.70	120.00	0.034750	24 inch	0.012	1,385.72	1,381.55	1,386.43	1,386.13
P-529	CB 529	Jct 529	1.440	0.85	1.440	5.87	3.00	8.52	2.71	63.42	0.051246	24 inch	0.012	1,385.40	1,382.15	1,388.11	1,388.03
P-530	CB 530	Jct 530	0.361	0.79	0.361	5.87	3.00	2.14	0.68	53.21	0.033828	24 inch	0.012	1,385.08	1,383.28	1,388.69	1,388.68
P-531	CB 531	Jct 534	0.136	0.95	1.982	5.87	7.15	11.73	5.20	99.63	0.042859	24 inch	0.012	1,393.39	1,389.12	1,394.62	1,390.63
P-531A	Jct 534	MH 505	N/A	N/A	2.675	5.87	7.47	15.83	5.80	120.00	0.042750	24 inch	0.012	1,389.12	1,383.99	1,390.55	1,389.08
P-532	CB 532	CB 531	0.099	0.95	0.811	5.87	3.62	4.80	3.23	100.17	0.004992	24 inch	0.012	1,393.89	1,393.39	1,394.66	1,394.72
P-533	CB 533	CB 532	0.712	0.95	0.712	5.87	3.00	4.22	3.89	145.47	0.005568	24 inch	0.012	1,394.70	1,393.89	1,395.42	1,394.68
P-534	CB 534	Jct 534	0.693	0.95	0.693	5.87	3.00	4.10	2.85	144.05	0.010205	24 inch	0.012	1,390.59	1,389.12	1,391.30	1,390.64

Scenario: Base

Pipe Report

Label	Up. Node	Dn. Node	Up. Inlet Area (acres)	Up. Inlet Rat. Coef.	Up. Calc. Sys. CA (acres)	I (in/hr)	System Tc (min)	System Q (cfs)	Avg. v (ft/s)	L (ft)	S (ft/ft)	Size	Mannings n	Up. Invert (ft)	Dn. Invert (ft)	HGL In (ft)	HGL Out (ft)
P-535	CB 535	CB 531	0.095	0.95	0.095	5.87	3.00	0.56	0.40	100.12	0.004994	24 inch	0.012	1,393.89	1,393.39	1,394.63	1,394.63
P-536	CB 536	CB 531	0.940	0.70	0.940	5.87	3.00	5.56	3.52	39.06	0.052227	24 inch	0.012	1,395.43	1,393.39	1,396.26	1,394.71
P-537	CB 537	MH 506	0.386	0.86	0.386	5.87	3.00	2.29	0.73	10.00	0.075000	24 inch	0.012	1,385.40	1,384.65	1,389.48	1,389.48
P-538	CB 538	MH 507	2.255	0.86	2.255	5.87	3.00	13.34	4.25	10.00	0.055000	24 inch	0.012	1,386.35	1,385.80	1,391.20	1,391.17
P-539	CB 539	MH 508	0.695	0.95	0.695	5.87	3.00	4.11	2.71	148.55	0.028475	24 inch	0.012	1,394.51	1,390.28	1,395.22	1,392.81
P-540	CB 540	CB 509	0.854	0.95	0.854	5.87	3.00	5.05	2.99	124.49	0.017110	24 inch	0.012	1,397.59	1,395.46	1,398.38	1,397.79

Scenario: Base

Inlet Report

Label	Area (acres)	C	Inlet CA (acres)	TC (min)	Total Flow To Inlet (cfs)	Add. Q (cfs)	Struct. Depth (ft)	Rim (ft)	Sump (ft)	HGL In (ft)	HGL Out (ft)	EGL In (ft)	EGL Out (ft)	Headloss Mtd
CB 509	3.440	0.87	2.986	3.00	17.67	0.00	5.50	1,400.96	1,395.46	1,397.79	1,397.63	1,399.05	1,399.05	HEC-22 Energy
CB 511	1.338	0.92	1.227	3.00	7.26	0.00	5.50	1,409.97	1,404.47	1,405.61	1,405.43	1,405.80	1,405.80	HEC-22 Energy
CB 516	1.824	0.84	1.531	3.00	9.06	0.00	5.50	1,385.00	1,379.50	1,382.45	1,382.45	1,382.58	1,382.58	HEC-22 Energy
CB 517	0.265	0.83	0.221	3.00	1.31	0.00	5.50	1,383.85	1,378.35	1,382.85	1,382.75	1,383.04	1,382.98	HEC-22 Energy
CB 518	0.259	0.95	0.246	3.00	1.46	0.00	5.68	1,385.50	1,379.82	1,383.11	1,383.07	1,383.26	1,383.26	HEC-22 Energy
CB 519	0.061	0.95	0.058	3.00	0.34	0.00	5.50	1,385.65	1,380.15	1,383.31	1,383.23	1,383.38	1,383.31	HEC-22 Energy
CB 520	1.617	0.70	1.132	3.00	6.70	0.00	4.00	1,386.66	1,382.66	1,383.58	1,383.58	1,383.93	1,383.93	HEC-22 Energy
CB 521	0.410	0.95	0.389	3.00	2.30	0.00	5.50	1,385.66	1,380.16	1,383.12	1,383.12	1,383.13	1,383.13	HEC-22 Energy
CB 523	0.854	0.83	0.710	3.00	4.20	0.00	5.50	1,383.53	1,378.03	1,383.03	1,383.03	1,383.05	1,383.05	HEC-22 Energy
CB 524	0.419	0.83	0.350	3.00	2.07	0.00	5.50	1,383.85	1,378.35	1,383.40	1,383.40	1,383.40	1,383.40	HEC-22 Energy
CB 525	2.269	0.86	1.962	3.00	11.61	0.00	5.50	1,384.39	1,378.89	1,383.74	1,383.68	1,384.07	1,384.07	HEC-22 Energy
CB 526	0.723	0.95	0.687	3.00	4.06	0.00	5.50	1,386.85	1,381.35	1,383.77	1,383.77	1,383.80	1,383.80	HEC-22 Energy
CB 527	0.727	0.95	0.691	3.00	4.09	0.00	5.50	1,391.22	1,385.72	1,386.43	1,386.43	1,386.69	1,386.69	HEC-22 Energy
CB 529	1.699	0.85	1.440	3.00	8.52	0.00	5.50	1,390.90	1,385.40	1,388.11	1,388.11	1,388.22	1,388.22	HEC-22 Energy
CB 530	0.456	0.79	0.361	3.00	2.14	0.00	5.50	1,390.58	1,385.08	1,388.69	1,388.69	1,388.70	1,388.70	HEC-22 Energy
CB 531	0.143	0.95	0.136	3.00	0.80	0.00	5.83	1,399.22	1,393.39	1,394.63	1,394.62	1,395.14	1,395.14	HEC-22 Energy
CB 532	0.104	0.95	0.099	3.00	0.58	0.00	5.50	1,399.39	1,393.89	1,394.68	1,394.66	1,394.95	1,394.95	HEC-22 Energy
CB 533	0.750	0.95	0.712	3.00	4.22	0.00	5.50	1,400.20	1,394.70	1,395.42	1,395.42	1,395.69	1,395.69	HEC-22 Energy
CB 534	0.729	0.95	0.693	3.00	4.10	0.00	5.50	1,396.09	1,390.59	1,391.30	1,391.30	1,391.56	1,391.56	HEC-22 Energy
CB 535	0.100	0.95	0.095	3.00	0.56	0.00	5.50	1,399.39	1,393.89	1,394.63	1,394.63	1,394.64	1,394.64	HEC-22 Energy
CB 536	1.343	0.70	0.940	3.00	5.56	0.00	4.00	1,399.43	1,395.43	1,396.26	1,396.26	1,396.58	1,396.58	HEC-22 Energy
CB 537	0.450	0.86	0.386	3.00	2.29	0.00	5.50	1,390.90	1,385.40	1,389.48	1,389.48	1,389.49	1,389.49	HEC-22 Energy
CB 538	2.609	0.86	2.255	3.00	13.34	0.00	5.50	1,391.85	1,386.35	1,391.20	1,391.20	1,391.48	1,391.48	HEC-22 Energy
CB 539	0.732	0.95	0.695	3.00	4.11	0.00	5.50	1,400.01	1,394.51	1,395.22	1,395.22	1,395.48	1,395.48	HEC-22 Energy
CB 540	0.899	0.95	0.854	3.00	5.05	0.00	6.66	1,404.25	1,397.59	1,398.38	1,398.38	1,398.68	1,398.68	HEC-22 Energy

Scenario: Base

DOT Report

Label	-Node- Up. Dn.	v In (ft/s)	v Out (ft/s)	v Head In (ft)	v Head Out (ft)	Avg. v (ft/s)	Up. Calc. Sys. CA (acres)	Section Disch Cap. (cfs)	Section Shape Size	L (ft)	-Ground- Up. Dn. (ft)	-Invert- Up. Dn. (ft)	-HGL- Up. Dn. (ft)	-EGL- Up. Dn. (ft)
P-512	CB 512	0.00	0.00	0.00	0.00	0.00	0.000	0.00	Circular	73.00	1,410.41	1,404.91	1,405.61	1,405.61
	CB 511							19.03	24 inch		1,409.97	1,404.47	1,405.61	1,405.61
P-511	CB 511	4.89	3.91	0.37	0.24	4.40	1.227	7.26	Circular	208.99	1,409.97	1,404.47	1,405.43	1,405.80
	MH 510							22.99	24 inch		1,408.13	1,402.63	1,403.77	1,404.01
P-540	CB 540	4.36	1.61	0.30	0.04	2.99	0.854	5.05	Circular	124.49	1,404.25	1,397.59	1,398.38	1,398.68
	CB 509							32.06	24 inch		1,400.96	1,395.46	1,397.79	1,397.83
P-510	MH 510	4.89	2.31	0.37	0.08	3.60	1.227	7.26	Circular	403.85	1,408.13	1,402.63	1,403.59	1,403.96
	CB 509							32.65	24 inch		1,400.96	1,395.46	1,398.10	1,398.18
P-509	CB 509	9.54	9.54	1.42	1.42	9.54	5.067	29.98	Circular	319.21	1,400.96	1,395.46	1,397.63	1,399.05
	MH 508							29.67	24 inch		1,396.28	1,390.78	1,392.86	1,394.27
P-539	CB 539	4.10	1.31	0.26	0.03	2.71	0.695	4.11	Circular	148.55	1,400.01	1,394.51	1,395.22	1,395.48
	MH 508							41.35	24 inch		1,396.28	1,390.28	1,392.81	1,392.83
P-533	CB 533	4.13	3.66	0.27	0.21	3.89	0.712	4.22	Circular	145.47	1,400.20	1,394.70	1,395.42	1,395.69
	CB 532							18.29	24 inch		1,399.39	1,393.89	1,394.68	1,394.89
P-508	MH 508	6.96	6.95	0.75	0.75	6.95	5.762	34.10	Circular	272.18	1,396.28	1,390.28	1,392.75	1,393.50
	MH 507							57.01	30 inch		1,392.04	1,385.80	1,391.15	1,391.90
P-538	CB 538	4.25	4.25	0.28	0.28	4.25	2.255	13.34	Circular	10.00	1,391.85	1,386.35	1,391.20	1,391.48
	MH 507							57.47	24 inch		1,392.04	1,385.80	1,391.17	1,391.45
P-536	CB 536	4.49	2.54	0.31	0.10	3.52	0.940	5.56	Circular	39.06	1,399.43	1,395.43	1,396.26	1,396.58
	CB 531							56.00	24 inch		1,399.22	1,393.39	1,394.71	1,394.81
P-532	CB 532	4.30	2.17	0.29	0.07	3.23	0.811	4.80	Circular	100.17	1,399.39	1,393.89	1,394.66	1,394.95
	CB 531							17.31	24 inch		1,399.22	1,393.39	1,394.72	1,394.79
P-535	CB 535	0.53	0.27	4.36e-3	1.17e-3	0.40	0.095	0.56	Circular	100.12	1,399.39	1,393.89	1,394.63	1,394.64
	CB 531							17.32	24 inch		1,399.22	1,393.39	1,394.63	1,394.63
P-537	CB 537	0.73	0.73	0.01	0.01	0.73	0.386	2.29	Circular	10.00	1,390.90	1,385.40	1,389.48	1,389.49
	MH 506							67.11	24 inch		1,391.08	1,384.65	1,389.48	1,389.49
P-507	MH 507	9.66	9.66	1.45	1.45	9.66	8.017	47.44	Circular	99.10	1,392.04	1,385.80	1,390.80	1,392.25
	MH 506							47.86	30 inch		1,391.08	1,384.65	1,389.67	1,391.12
P-531	CB 531	5.79	4.61	0.52	0.33	5.20	1.982	11.73	Circular	99.63	1,399.22	1,393.39	1,394.62	1,395.14
	Jct 534							50.73	24 inch		1,394.48	1,389.12	1,390.63	1,390.96
P-534	CB 534	4.10	1.60	0.26	0.04	2.85	0.693	4.10	Circular	144.05	1,396.09	1,390.59	1,391.30	1,391.56
	Jct 534							24.76	24 inch		1,394.48	1,389.12	1,390.64	1,390.68
P-506	MH 506	7.03	7.03	0.77	0.77	7.03	8.404	49.72	Circular	83.88	1,391.08	1,384.15	1,389.13	1,389.90
	MH 505							77.70	36 inch		1,391.52	1,383.18	1,388.74	1,389.51
P-531A	Jct 534	6.56	5.04	0.67	0.39	5.80	2.675	15.83	Circular	120.00	1,394.48	1,389.12	1,390.55	1,391.22

Scenario: Base

DOT Report

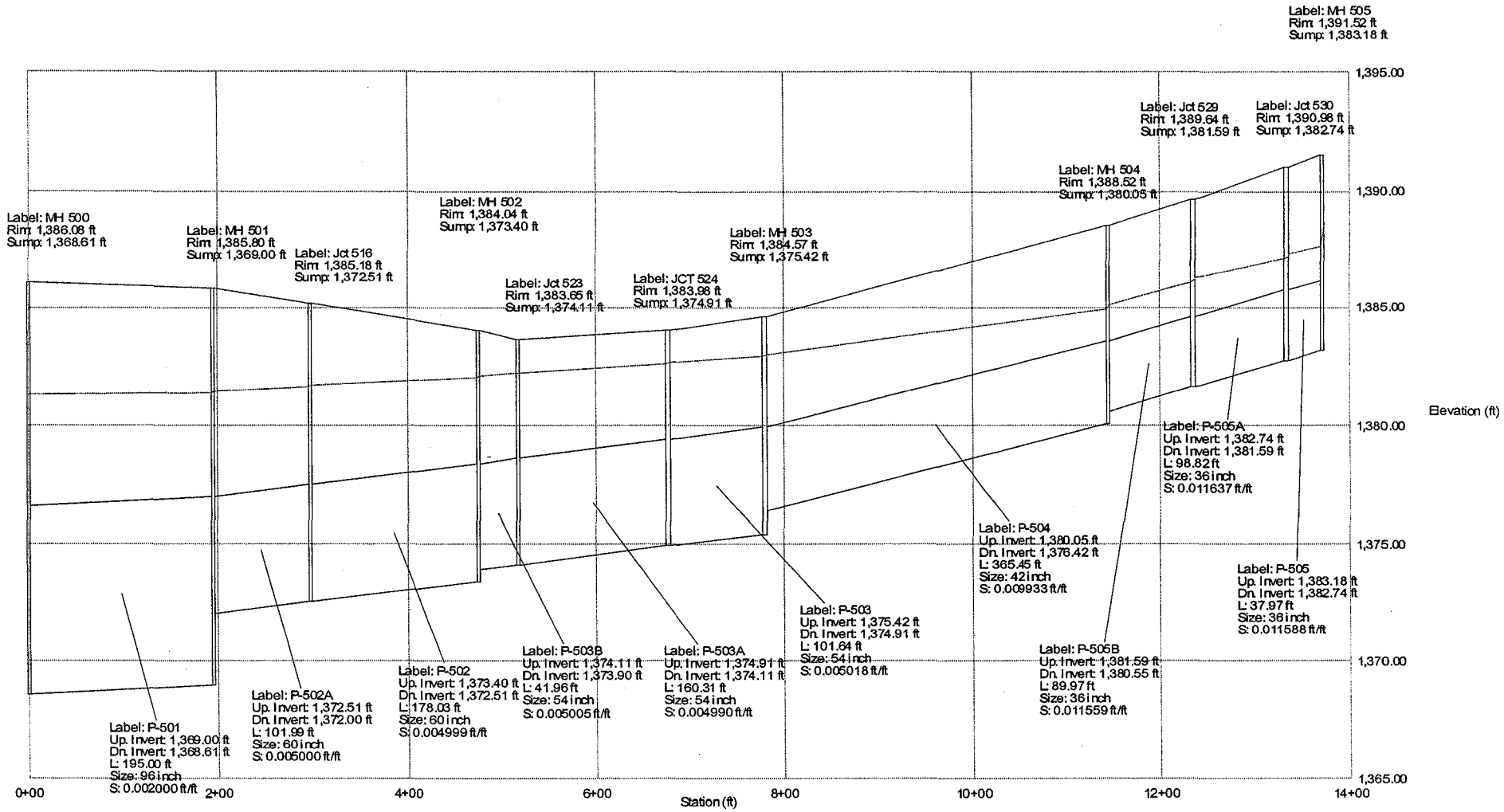
Label	-Node- Up. Dn.	v In (ft/s)	v Out (ft/s)	v Head In (ft)	v Head Out (ft)	Avg. v (ft/s)	Up. Calc. Sys. CA (acres)	Section Disch Cap. (cfs)	Section Shape Size	L (ft)	-Ground- Up. Dn. (ft)	-Invert- Up. Dn. (ft)	-HGL- Up. Dn. (ft)	-EGL- Up. Dn. (ft)
	MH 505							50.67	24 inch		1,391.52	1,383.99	1,389.08	1,389.47
P-505	MH 505	9.27	9.27	1.34	1.34	9.27	11.078	65.55	Circular	37.97	1,391.52	1,383.18	1,387.81	1,389.15
	Jct 530							77.78	36 inch		1,390.98	1,382.74	1,387.50	1,388.83
P-530	CB 530	0.68	0.68	0.01	0.01	0.68	0.361	2.14	Circular	53.21	1,390.58	1,385.08	1,388.69	1,388.70
	Jct 530							45.07	24 inch		1,390.98	1,383.28	1,388.68	1,388.69
P-529	CB 529	2.71	2.71	0.11	0.11	2.71	1.440	8.52	Circular	63.42	1,390.90	1,385.40	1,388.11	1,388.22
	Jct 529							55.48	24 inch		1,389.64	1,382.15	1,388.03	1,388.14
P-505A	Jct 530	9.58	9.58	1.43	1.43	9.58	11.440	67.69	Circular	98.86	1,390.98	1,382.74	1,387.34	1,388.76
	Jct 529							77.93	36 inch		1,389.64	1,381.59	1,386.47	1,387.89
P-526	CB 526	1.29	1.29	0.03	0.03	1.29	0.687	4.06	Circular	110.00	1,386.85	1,381.35	1,383.77	1,383.80
	CB 525							36.65	24 inch		1,384.39	1,378.89	1,383.74	1,383.77
P-505B	Jct 529	10.78	10.78	1.81	1.81	10.78	12.879	76.21	Circular	89.92	1,389.64	1,381.59	1,386.30	1,388.10
	MH 504							77.70	36 inch		1,388.52	1,380.55	1,385.30	1,387.10
P-527	CB 527	4.10	1.30	0.26	0.03	2.70	0.691	4.09	Circular	120.00	1,391.22	1,385.72	1,386.43	1,386.69
	MH 504							45.68	24 inch		1,388.52	1,381.55	1,386.13	1,386.16
P-525	CB 525	4.99	4.99	0.39	0.39	4.99	2.649	15.67	Circular	10.00	1,384.39	1,378.89	1,383.68	1,384.07
	MH 503							36.35	24 inch		1,384.57	1,378.67	1,383.64	1,384.03
P-504	MH 504	8.35	8.35	1.08	1.08	8.35	13.570	80.29	Circular	365.45	1,388.52	1,380.05	1,385.16	1,386.24
	MH 503							108.62	42 inch		1,384.57	1,376.42	1,383.18	1,384.26
P-520	CB 520	4.76	2.13	0.35	0.07	3.45	1.132	6.70	Circular	77.00	1,386.66	1,382.66	1,383.58	1,383.93
	CB 519							44.25	24 inch		1,385.65	1,380.15	1,383.31	1,383.38
P-503	MH 503	6.03	6.03	0.57	0.57	6.03	16.219	95.97	Circular	101.64	1,384.57	1,375.42	1,383.11	1,383.67
	JCT 524							139.29	54 inch		1,383.98	1,374.91	1,382.86	1,383.43
P-524	CB 524	0.66	0.66	0.01	0.01	0.66	0.350	2.07	Circular	12.30	1,383.85	1,378.35	1,383.40	1,383.40
	JCT 524							92.17	24 inch		1,383.98	1,376.61	1,383.40	1,383.40
P-521	CB 521	0.73	0.73	0.01	0.01	0.73	0.389	2.30	Circular	68.25	1,385.66	1,380.16	1,383.12	1,383.13
	CB 518							17.30	24 inch		1,385.50	1,379.82	1,383.11	1,383.12
P-519	CB 519	2.24	2.24	0.08	0.08	2.24	1.190	7.04	Circular	57.21	1,385.65	1,380.15	1,383.23	1,383.31
	CB 518							18.61	24 inch		1,385.50	1,379.82	1,383.18	1,383.26
P-503A	JCT 524	6.16	6.16	0.59	0.59	6.16	16.569	98.04	Circular	160.31	1,383.98	1,374.91	1,382.83	1,383.42
	Jct 523							138.91	54 inch		1,383.65	1,374.11	1,382.43	1,383.02
P-523	CB 523	1.34	1.34	0.03	0.03	1.34	0.710	4.20	Circular	11.23	1,383.53	1,378.03	1,383.03	1,383.05
	Jct 523							103.68	24 inch		1,383.65	1,376.02	1,383.02	1,383.05
P-518	CB 518	3.44	3.44	0.18	0.18	3.44	1.825	10.80	Circular	114.21	1,385.50	1,379.82	1,383.07	1,383.26
	CB 517							27.80	24 inch		1,383.85	1,378.35	1,382.85	1,383.04

Scenario: Base

DOT Report

Label	-Node- Up. Dn.	v In (ft/s)	v Out (ft/s)	v Head In (ft)	v Head Out (ft)	Avg. v (ft/s)	Up. Calc. Sys. CA (acres)	Section Disch Cap. (cfs)	Section Shape Size	L (ft)	-Ground- Up. Dn. (ft)	-Invert- Up. Dn. (ft)	-HGL- Up. Dn. (ft)	-EGL- Up. Dn. (ft)
P-503B	Jct 523	6.43	6.43	0.64	0.64	6.43	17.279	102.24	Circular	41.96	1,383.65	1,374.11	1,382.39	1,383.03
	MH 502							139.11	54 inch		1,384.04	1,373.90	1,382.27	1,382.92
P-517	CB 517	3.85	3.85	0.23	0.23	3.85	2.046	12.11	Circular	10.00	1,383.85	1,378.35	1,382.75	1,382.98
	MH 502							27.94	24 inch		1,384.04	1,378.22	1,382.73	1,382.96
P-516	CB 516	2.88	2.88	0.13	0.13	2.88	1.531	9.06	Circular	10.07	1,385.00	1,379.50	1,382.45	1,382.58
	Jct 516							152.70	24 inch		1,385.18	1,375.59	1,382.44	1,382.57
P-502	MH 502	5.82	5.82	0.53	0.53	5.82	19.325	114.34	Circular	178.03	1,384.04	1,373.40	1,382.22	1,382.75
	Jct 516							184.14	60 inch		1,385.18	1,372.51	1,381.88	1,382.41
P-502A	Jct 516	6.24	6.24	0.60	0.60	6.24	20.856	122.46	Circular	101.99	1,385.18	1,372.51	1,381.85	1,382.45
	MH 501							184.16	60 inch		1,385.80	1,372.00	1,381.62	1,382.22
P-501	MH 501	2.42	2.42	0.09	0.09	2.42	20.856	121.46	Circular	195.00	1,385.80	1,369.00	1,381.54	1,381.64
	MH 500							407.87	96 inch		1,386.08	1,368.61	1,381.51	1,381.60

Profile
Scenario: Base

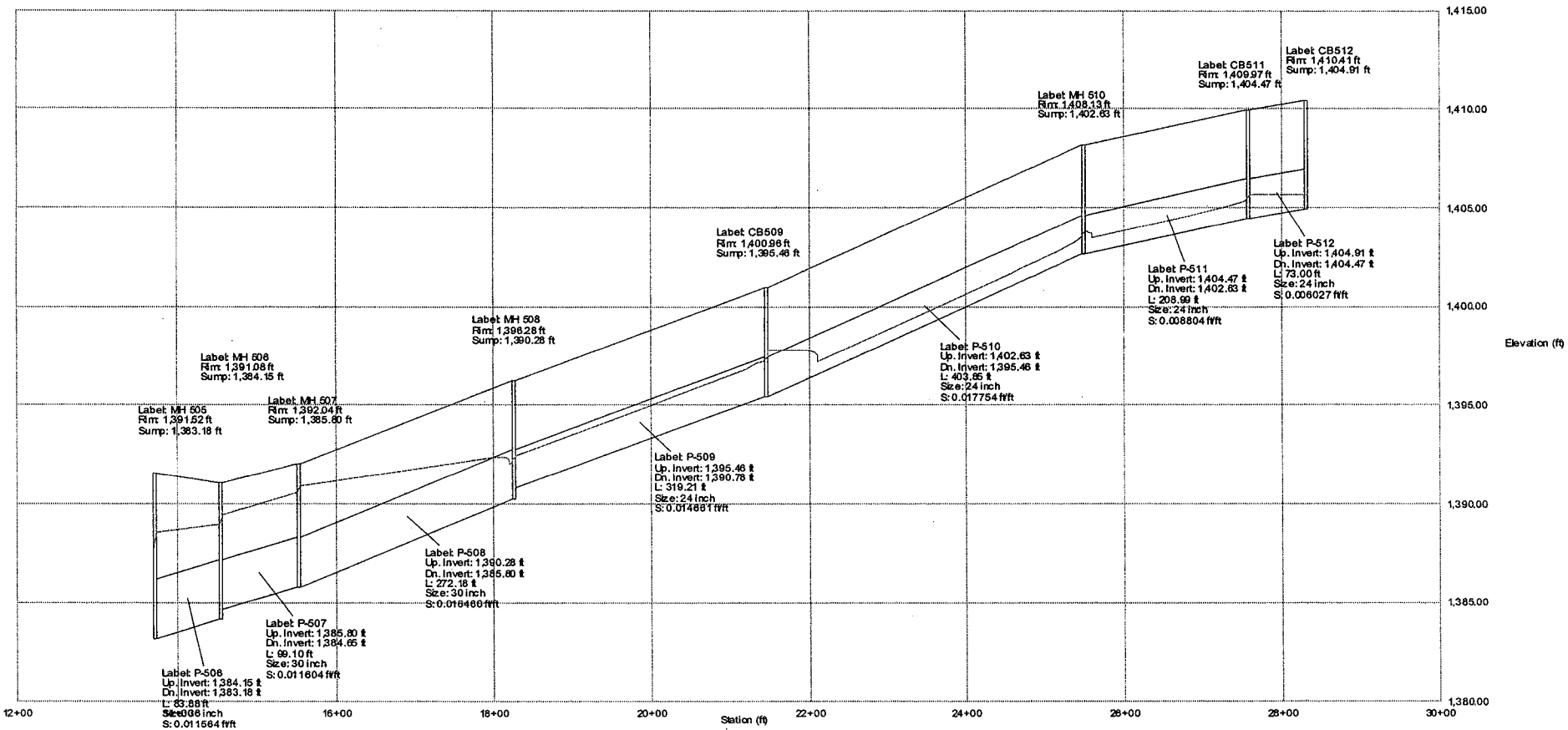


Title: Santan Freeway - Baseline to Elliot
q:\16110\drainage\stormcad\pumpsationnorth.stm
03/13/03 04:45:09 PM

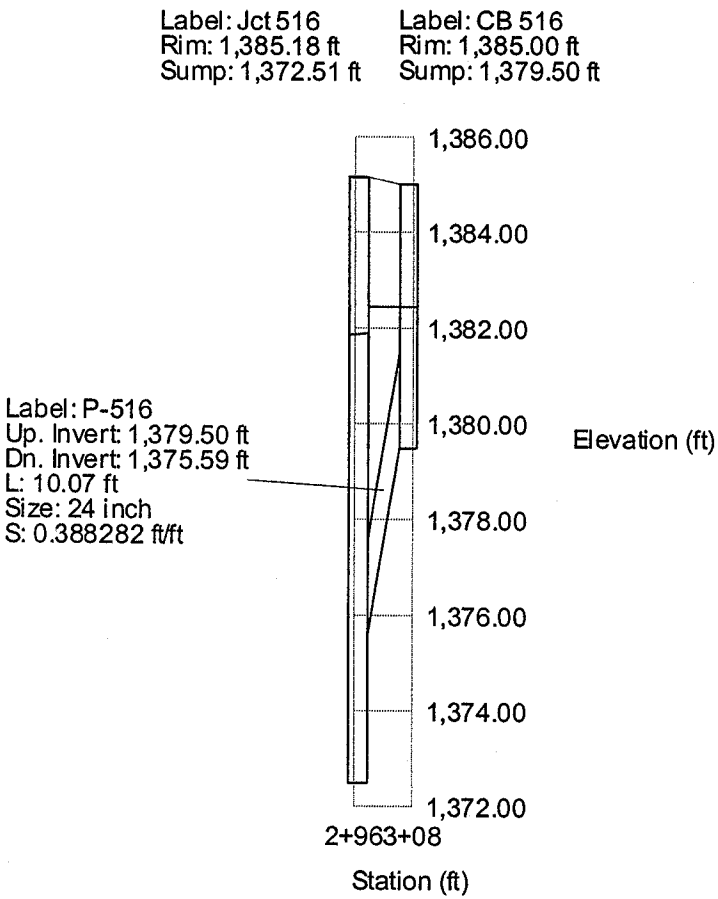
Stanley Consultants Inc
© Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Project Engineer: System Administrator
StormCAD v4.1.1 [4.2014a]
Page 1 of 1

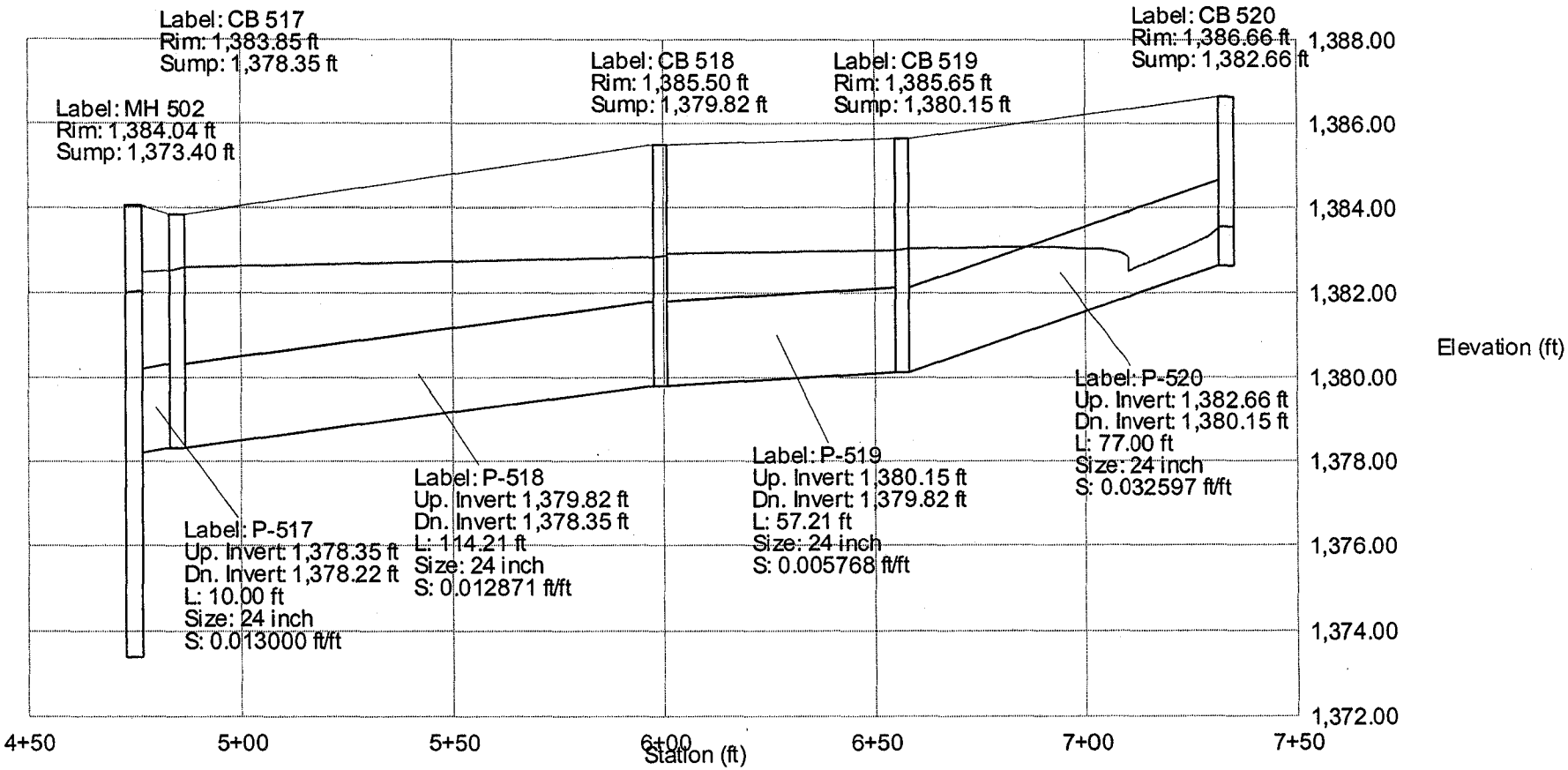
Profile
Scenario: Base



Profile
Scenario: Base



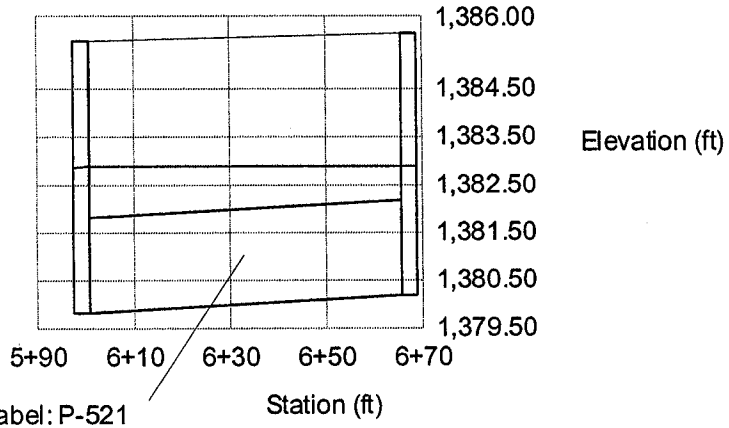
Profile
Scenario: Base



Profile
Scenario: Base

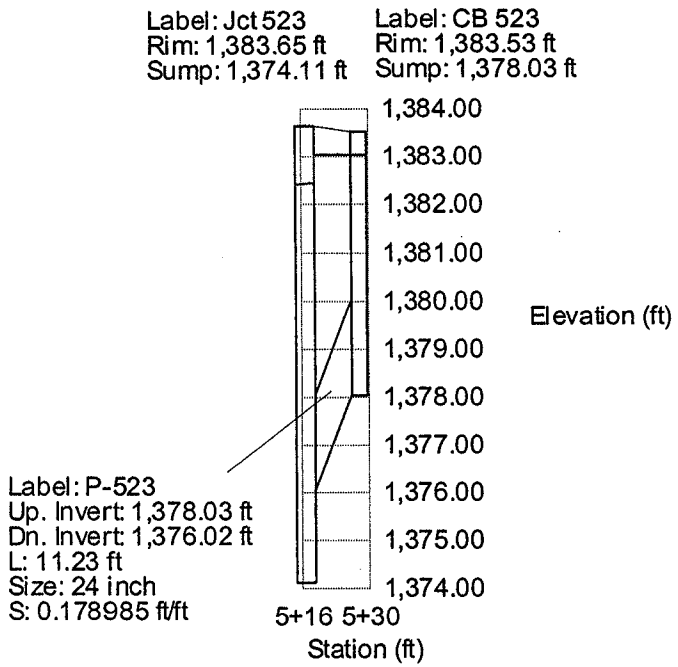
Label: CB 518
Rim: 1,385.50 ft
Sump: 1,379.82 ft

Label: CB 521
Rim: 1,385.66 ft
Sump: 1,380.16 ft



Label: P-521
Up. Invert: 1,380.16 ft
Dn. Invert: 1,379.82 ft
L: 68.25 ft
Size: 24 inch
S: 0.004982 ft/ft

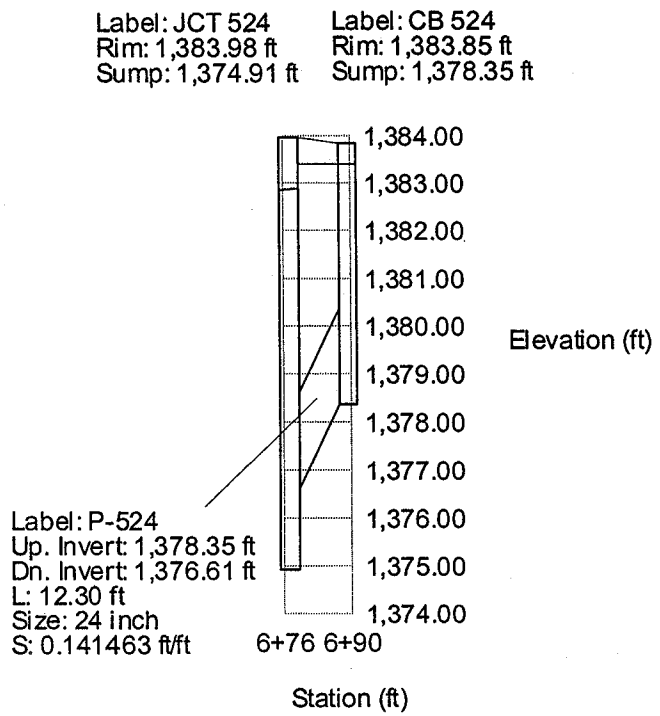
Profile
Scenario: Base



© Haestad Methods, Inc.

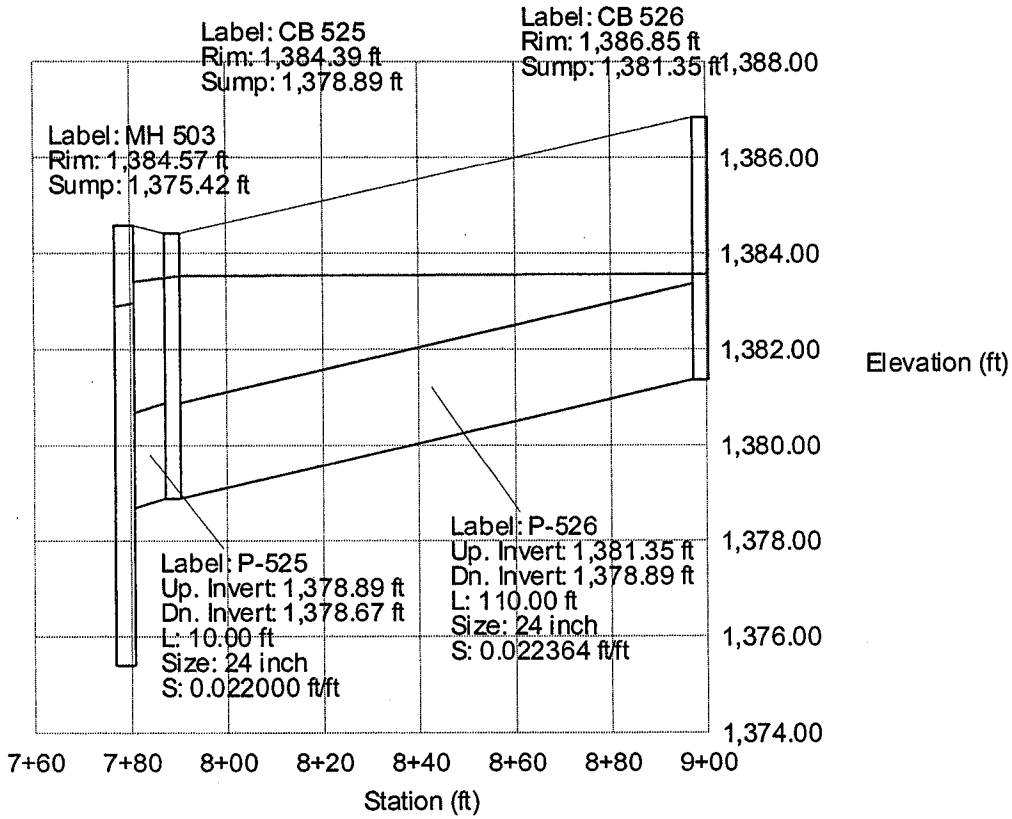
Stanley Consultants Inc
37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Profile
Scenario: Base

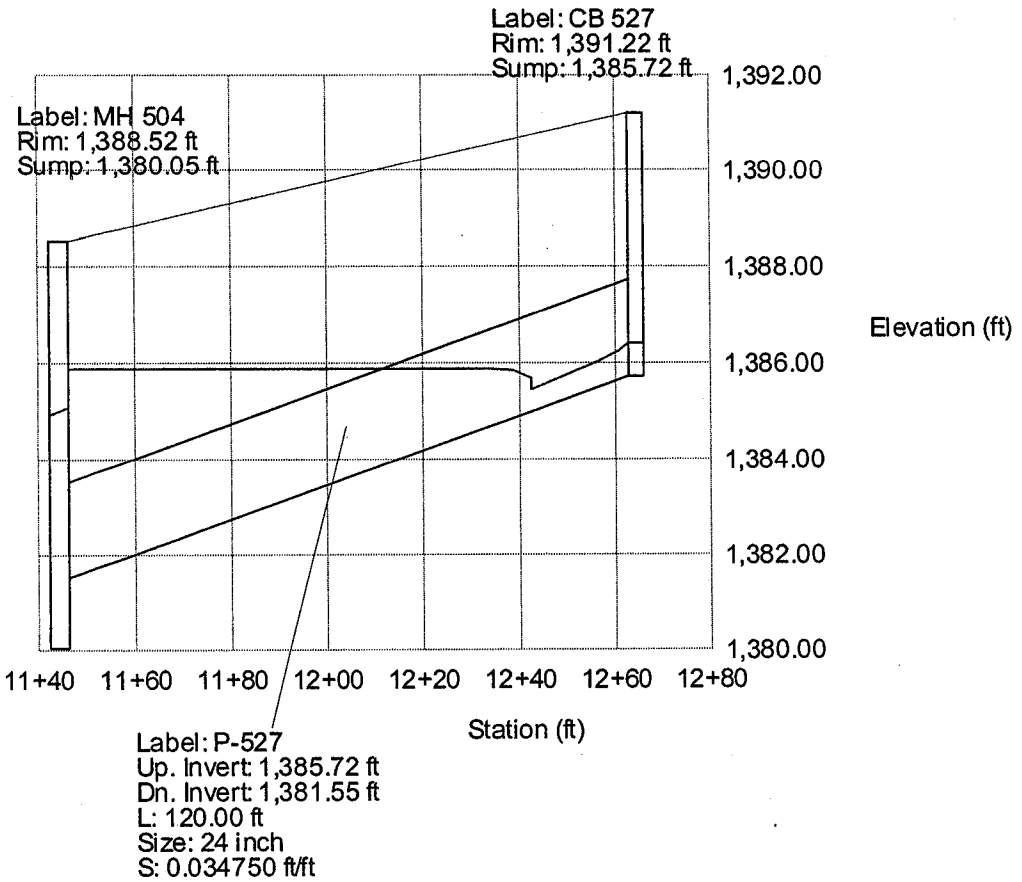


© Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

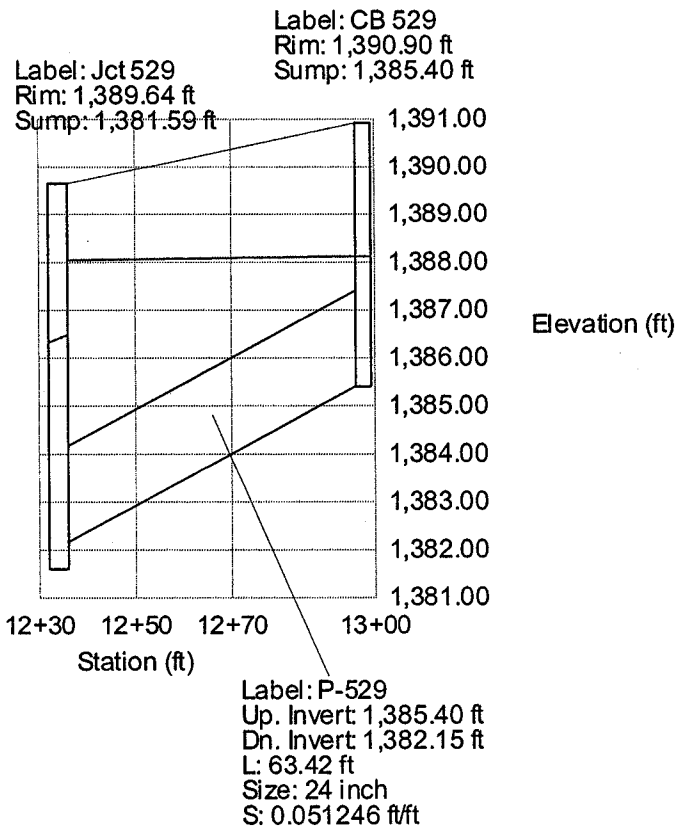
Profile
Scenario: Base



Profile
Scenario: Base



Profile
Scenario: Base

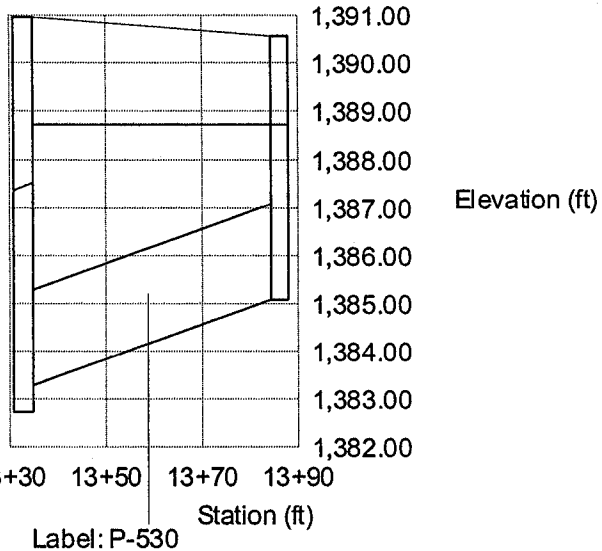


© Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Profile
Scenario: Base

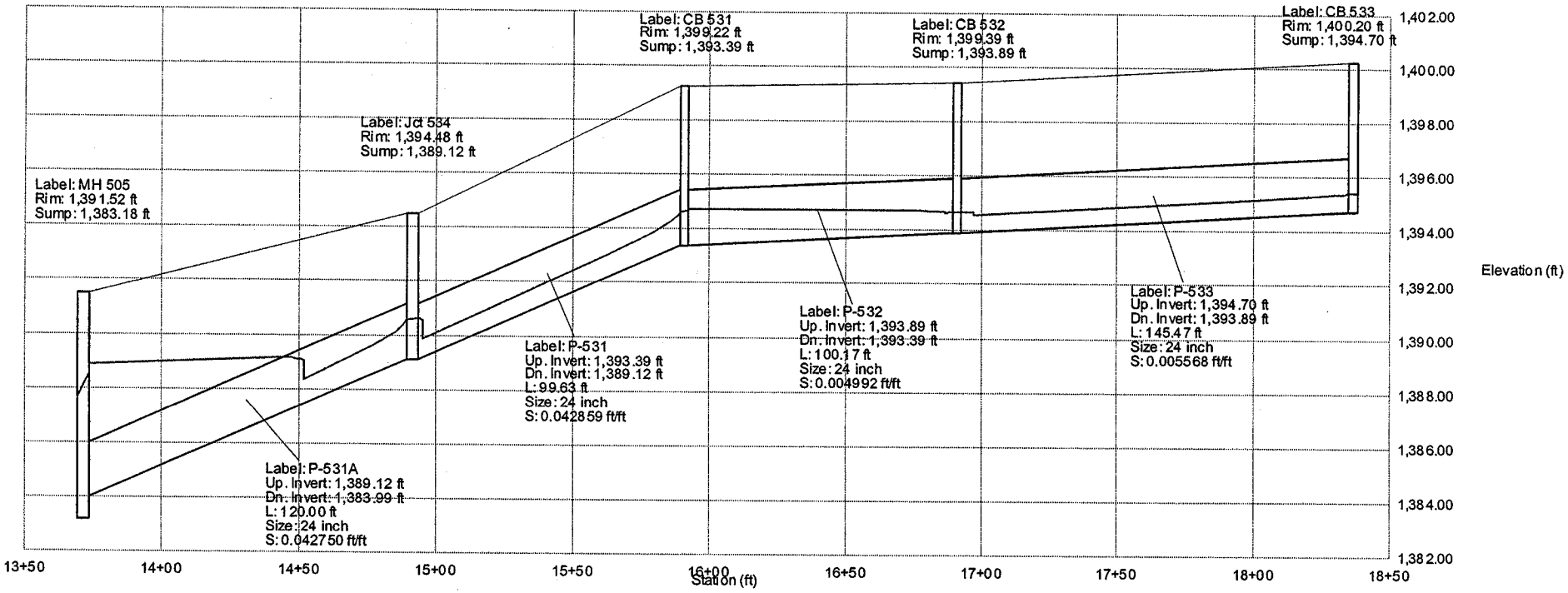
Label: Jct 530
Rim: 1,390.98 ft
Sump: 1,382.74 ft

Label: CB 530
Rim: 1,390.58 ft
Sump: 1,385.08 ft



Label: P-530
Up. Invert: 1,385.08 ft
Dn. Invert: 1,383.28 ft
L: 53.21 ft
Size: 24 inch
S: 0.033828 ft/ft

Profile
Scenario: Base

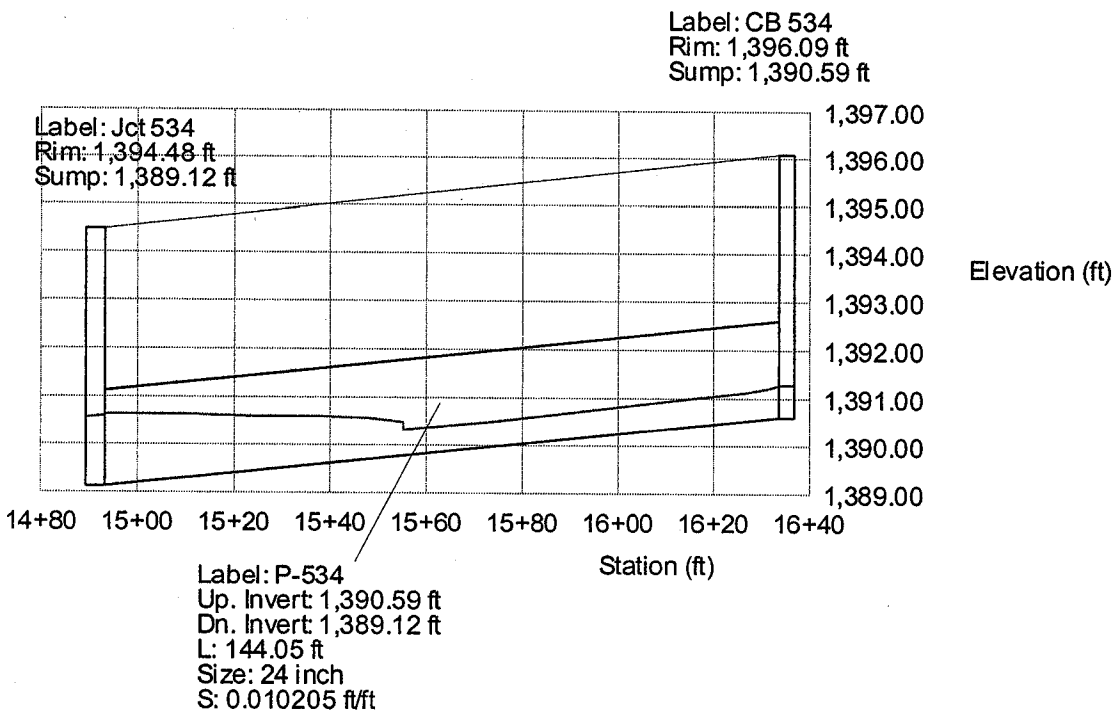


Title: Santan Freeway - Baseline to Elliot
q:\16110\drainage\stormcad\pumpsationnorth.stm
03/13/03 04:55:10 PM

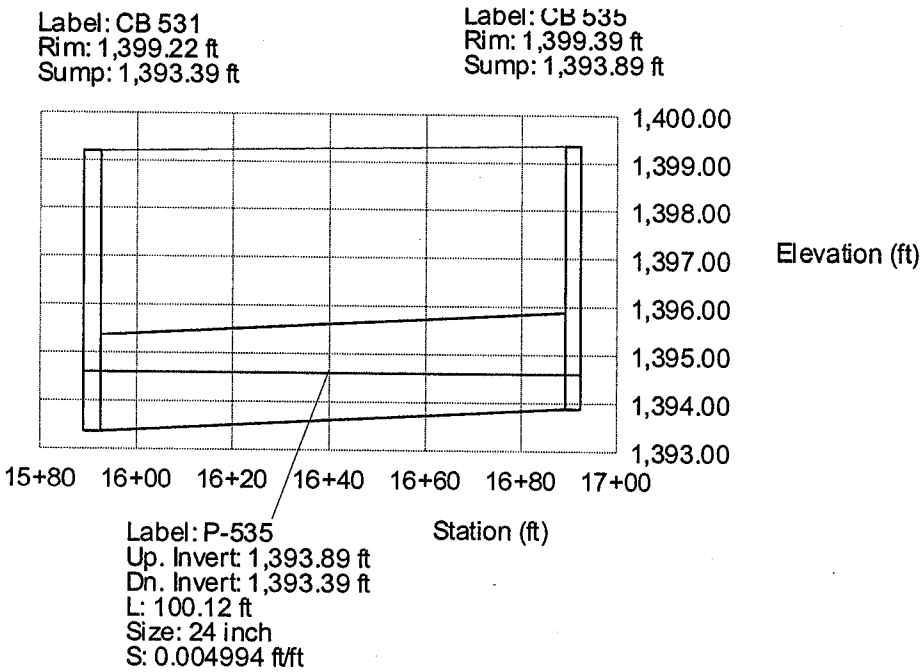
Stanley Consultants Inc
© Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Project Engineer: System Administrator
StormCAD v4.1.1 [4.2014a]

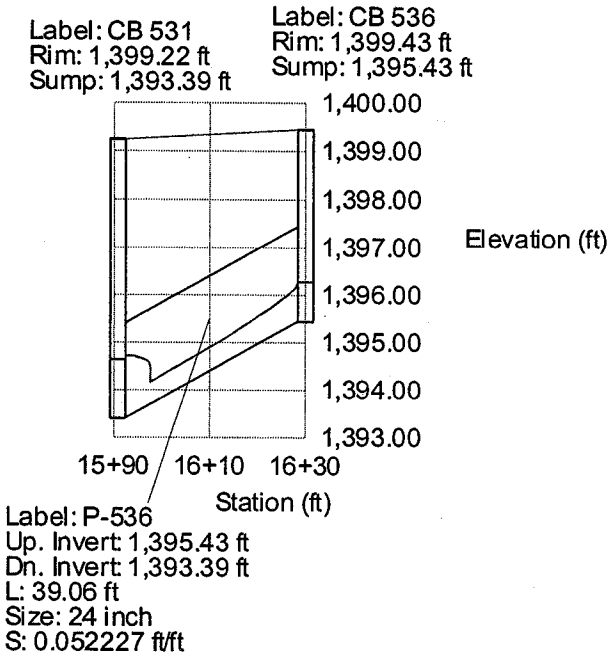
Profile
Scenario: Base



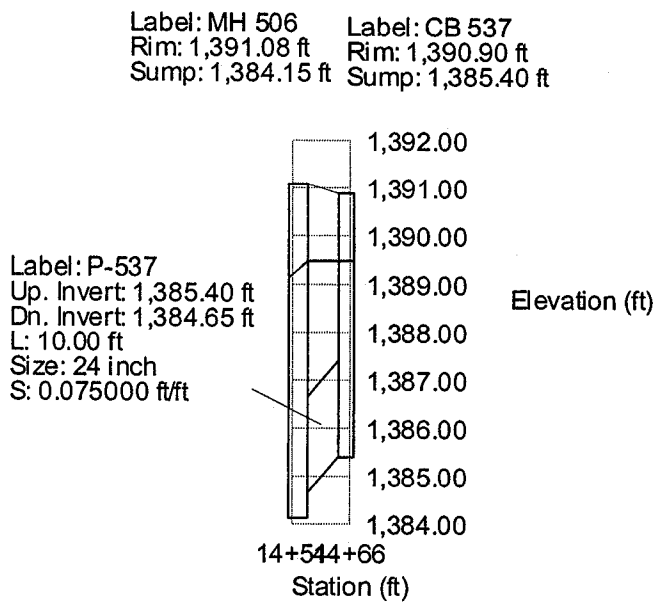
Profile
Scenario: Base



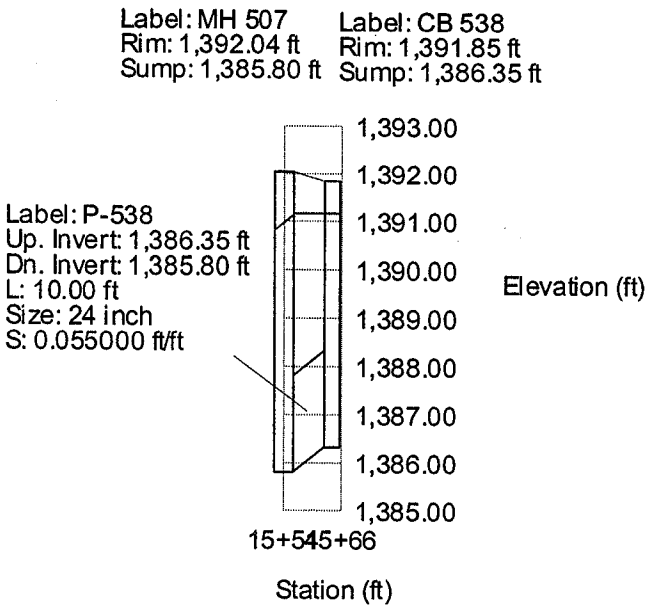
Profile
Scenario: Base



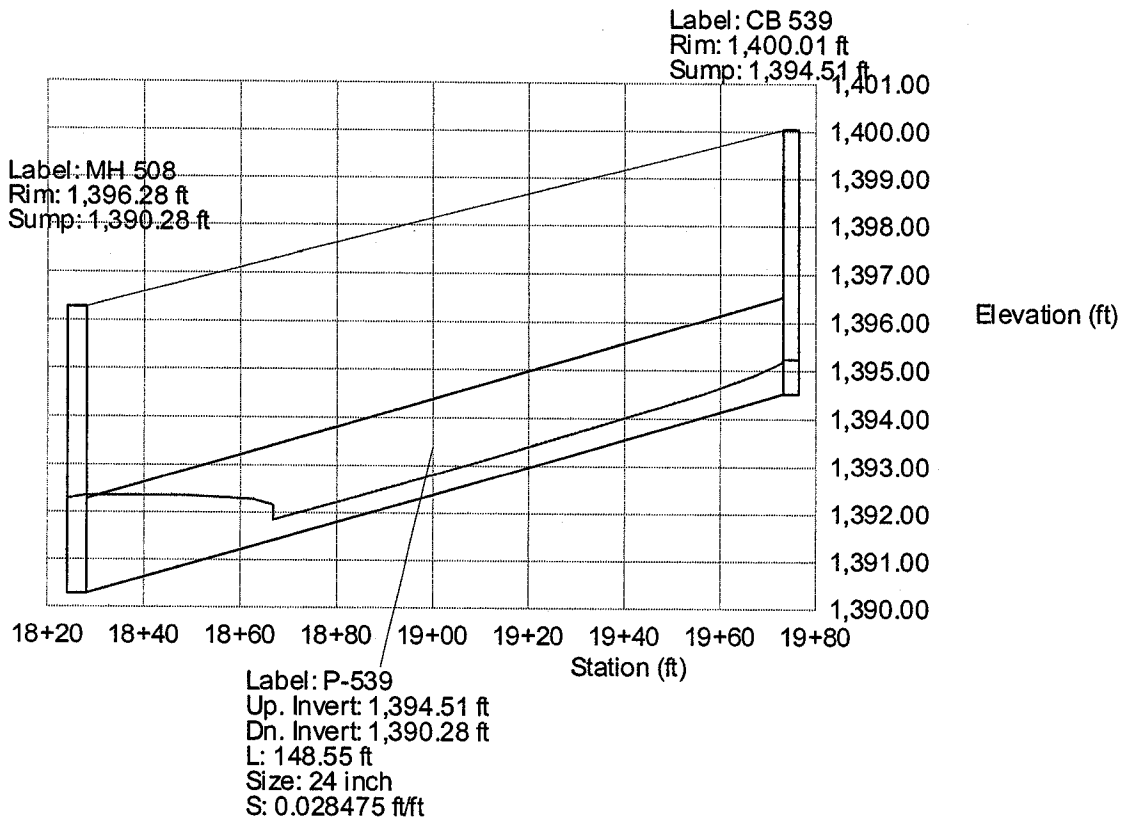
Profile
Scenario: Base



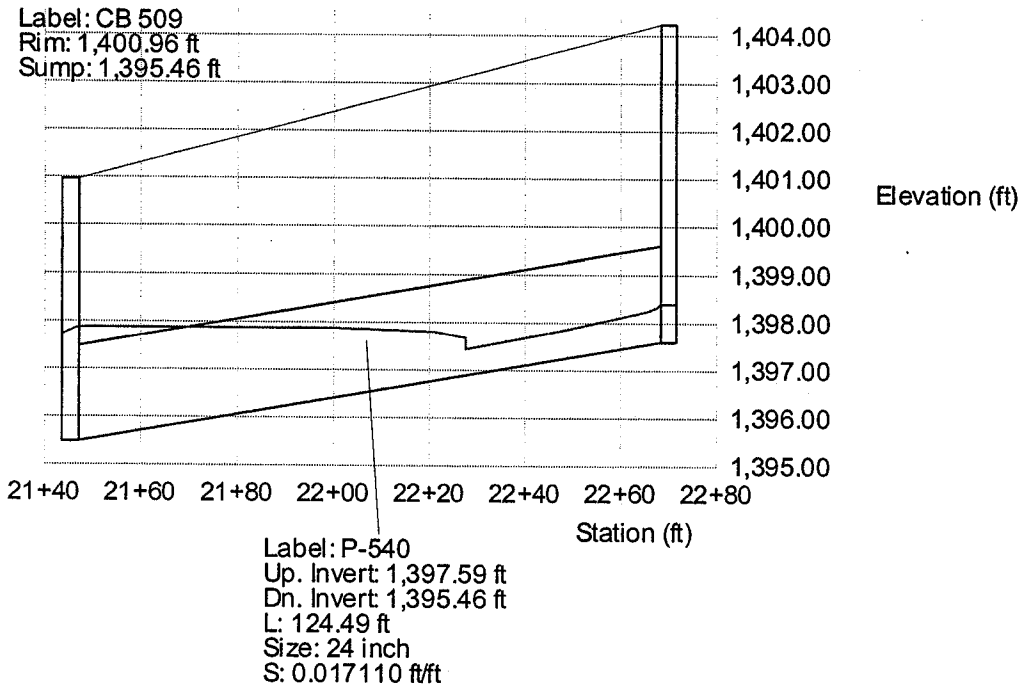
Profile
Scenario: Base



Profile
Scenario: Base



Profile
Scenario: Base



Scenario: Base

Pipe Report

Label	Up. Node	Dn. Node	Up. Inlet Area (acres)	Up. Inlet Rat. Coef.	Up. Calc. Sys. CA (acres)	I (in/hr)	System Tc (min)	System Q (cfs)	Avg. v (ft/s)	L (ft)	S (ft/ft)	Size	Mannings n	Up. Invert (ft)	Dn. Invert (ft)	HGL In (ft)	HGL Out (ft)
P-700	CB 700	Jct 700	0.957	0.95	2.181	4.25	7.08	9.34	2.97	51.55	0.002716	24 inch	0.012	1,409.68	1,409.54	1,413.59	1,413.52
P-701	CB 701	CB 700	1.225	0.95	1.225	4.25	5.00	5.25	1.67	207.96	0.002693	24 inch	0.012	1,410.24	1,409.68	1,413.72	1,413.62
P-702	CB 702	Jct 702	0.937	0.95	2.124	4.25	6.44	9.10	2.90	62.31	0.009950	24 inch	0.012	1,411.67	1,411.05	1,414.45	1,414.36
P-703	CB 703	CB 702	0.109	0.95	1.188	4.25	6.10	5.09	5.49	112.37	0.012192	24 inch	0.012	1,418.09	1,416.72	1,418.88	1,417.31
P-704	CB 704	CB 703	0.184	0.95	1.078	4.25	5.92	4.62	3.75	41.00	0.011220	24 inch	0.012	1,418.55	1,418.09	1,419.31	1,419.02
P-705	CB 705	CB 704	0.303	0.95	0.894	4.25	5.61	3.83	3.73	69.00	0.011014	24 inch	0.012	1,419.31	1,418.55	1,420.00	1,419.32
P-706	CB 706	CB 705	0.591	0.95	0.591	4.25	5.00	2.53	3.08	112.62	0.010833	24 inch	0.012	1,420.53	1,419.31	1,421.08	1,420.01
P-707	CB 707	Jct 707	1.624	0.95	3.337	4.25	7.29	14.30	4.55	68.83	0.009734	24 inch	0.012	1,412.59	1,411.92	1,415.15	1,414.92
P-708	CB 708	CB 707	0.775	0.95	1.714	4.25	6.96	7.34	6.68	131.81	0.018132	24 inch	0.012	1,422.72	1,420.33	1,423.68	1,420.97
P-709	CB 709	CB 708	0.713	0.95	0.939	4.25	6.16	4.02	5.20	251.23	0.013056	24 inch	0.012	1,426.50	1,423.22	1,427.20	1,423.73
P-710	CB 710	CB 709	0.225	0.95	0.225	4.25	5.00	0.96	1.79	124.60	0.034751	24 inch	0.012	1,430.83	1,426.50	1,431.17	1,427.29
P-711a	J-711ab	Jct 711	N/A	N/A	1.359	4.25	6.17	5.82	1.85	47.97	0.010006	24 inch	0.012	1,414.28	1,413.80	1,416.43	1,416.40
P-711b	CB 711	J-711ab	0.603	0.95	1.359	4.25	5.74	5.82	3.21	82.75	0.162538	24 inch	0.012	1,427.73	1,414.28	1,428.58	1,416.43
P-712	CB 712	CB 711	0.756	0.95	0.756	4.25	5.00	3.24	3.11	138.15	0.008397	24 inch	0.012	1,428.89	1,427.73	1,429.52	1,428.62
P-713	CB 713	Jct 713	2.731	0.95	5.787	4.25	8.74	24.79	7.89	135.53	0.009887	24 inch	0.012	1,416.05	1,414.71	1,418.81	1,417.42
P-714	CB 714	CB 713	0.843	0.95	3.056	4.25	8.39	13.09	6.83	145.26	0.009018	24 inch	0.012	1,431.73	1,430.42	1,433.03	1,431.49
P-715	CB 715	CB 714	0.797	0.95	2.214	4.25	7.34	9.48	4.40	275.05	0.009017	24 inch	0.012	1,434.21	1,431.73	1,435.31	1,433.37
P-716	CB 716	CB 715	0.742	0.95	1.416	4.25	6.30	6.07	3.95	248.25	0.008983	24 inch	0.012	1,436.44	1,434.21	1,437.31	1,435.35
P-717	CB 717	CB 716	0.674	0.95	0.674	4.25	5.00	2.89	2.91	226.41	0.009010	24 inch	0.012	1,438.48	1,436.44	1,439.07	1,437.34

Scenario: Base

Pipe Report

Label	Up. Node	Dn. Node	Up. Inlet Area (acres)	Up. Inlet Rat. Coef.	Up. Calc. Sys. CA (acres)	I (in/hr)	System Q (cfs)	Avg. v (ft/s)	L (ft)	S (ft/ft)	Size	Mannings n	Up. Invert (ft)	Dn. Invert (ft)	HGL In (ft)	HGL Out (ft)
P-700	CB 700	Jct 700	0.957	0.95	2.181	4.25	9.34	2.97	51.55	0.002716	24 inch	0.012	1,409.68	1,409.54	1,413.59	1,413.52
P-701	CB 701	CB 700	1.225	0.95	1.225	4.25	5.25	1.67	207.96	0.002693	24 inch	0.012	1,410.24	1,409.68	1,413.72	1,413.62
P-702	CB 702	Jct 702	0.937	0.95	2.124	4.25	9.10	2.90	62.31	0.009950	24 inch	0.012	1,411.67	1,411.05	1,414.45	1,414.36
P-703	CB 703	CB 702	0.109	0.95	1.188	4.25	5.09	5.49	112.37	0.012192	24 inch	0.012	1,418.09	1,416.72	1,418.88	1,417.31
P-704	CB 704	CB 703	0.184	0.95	1.078	4.25	4.62	3.75	41.00	0.011220	24 inch	0.012	1,418.55	1,418.09	1,419.31	1,419.02
P-705	CB 705	CB 704	0.303	0.95	0.894	4.25	3.83	3.73	69.00	0.011014	24 inch	0.012	1,419.31	1,418.55	1,420.00	1,419.32
P-706	CB 706	CB 705	0.591	0.95	0.591	4.25	2.53	3.08	112.62	0.010833	24 inch	0.012	1,420.53	1,419.31	1,421.08	1,420.01
P-707	CB 707	Jct 707	1.624	0.95	3.337	4.25	14.30	4.55	68.83	0.009734	24 inch	0.012	1,412.59	1,411.92	1,415.15	1,414.92
P-708	CB 708	CB 707	0.775	0.95	1.714	4.25	7.34	6.68	131.81	0.018132	24 inch	0.012	1,422.72	1,420.33	1,423.68	1,420.97
P-709	CB 709	CB 708	0.713	0.95	0.939	4.25	4.02	5.20	251.23	0.013056	24 inch	0.012	1,426.50	1,423.22	1,427.20	1,423.73
P-710	CB 710	CB 709	0.225	0.95	0.225	4.25	0.96	1.79	124.60	0.034751	24 inch	0.012	1,430.83	1,426.50	1,431.17	1,427.29
P-711a	J-711ab	Jct 711	N/A	N/A	1.359	4.25	5.82	1.85	47.97	0.010006	24 inch	0.012	1,414.28	1,413.80	1,416.43	1,416.40
P-711b	CB 711	J-711ab	0.603	0.95	1.359	4.25	5.82	3.21	82.75	0.162538	24 inch	0.012	1,427.73	1,414.28	1,428.58	1,416.43
P-712	CB 712	CB 711	0.756	0.95	0.756	4.25	3.24	3.11	138.15	0.008397	24 inch	0.012	1,428.89	1,427.73	1,429.52	1,428.62
P-713	CB 713	Jct 713	2.731	0.95	5.787	4.25	24.79	7.89	135.53	0.009887	24 inch	0.012	1,416.05	1,414.71	1,418.81	1,417.42
P-714	CB 714	CB 713	0.843	0.95	3.056	4.25	13.09	6.83	145.26	0.009018	24 inch	0.012	1,431.73	1,430.42	1,433.03	1,431.49
P-715	CB 715	CB 714	0.797	0.95	2.214	4.25	9.48	4.40	275.05	0.009017	24 inch	0.012	1,434.21	1,431.73	1,435.31	1,433.37
P-716	CB 716	CB 715	0.742	0.95	1.416	4.25	6.07	3.95	248.25	0.008983	24 inch	0.012	1,436.44	1,434.21	1,437.31	1,435.35
P-717	CB 717	CB 716	0.674	0.95	0.674	4.25	2.89	2.91	226.41	0.009010	24 inch	0.012	1,438.48	1,436.44	1,439.07	1,437.34

Scenario: Base

Inlet Report

Label	Area (acres)	C	Inlet CA (acres)	TC (min)	Total Flow To Inlet (cfs)	Add. Q (cfs)	Struct. Depth (ft)	Rim (ft)	Sump (ft)	HGL In (ft)	HGL Out (ft)	EGL In (ft)	EGL Out (ft)	Headloss Mtd
CB 700	1.007	0.95	0.957	5.00	4.10	0.00	6.24	1,415.92	1,409.68	1,413.62	1,413.59	1,413.73	1,413.73	HEC-22 Energy
CB 701	1.289	0.95	1.225	5.00	5.25	0.00	5.50	1,415.74	1,410.24	1,413.72	1,413.72	1,413.76	1,413.76	HEC-22 Energy
CB 702	0.986	0.95	0.937	5.00	4.01	0.00	9.97	1,421.64	1,411.67	1,414.47	1,414.45	1,414.58	1,414.58	HEC-22 Energy
CB 703	0.115	0.95	0.109	5.00	0.47	0.00	5.50	1,423.59	1,418.09	1,419.02	1,418.88	1,419.18	1,419.18	HEC-22 Energy
CB 704	0.194	0.95	0.184	5.00	0.79	0.00	5.50	1,424.05	1,418.55	1,419.32	1,419.31	1,419.59	1,419.59	HEC-22 Energy
CB 705	0.319	0.95	0.303	5.00	1.30	0.00	5.50	1,424.81	1,419.31	1,420.01	1,420.00	1,420.25	1,420.25	HEC-22 Energy
CB 706	0.622	0.95	0.591	5.00	2.53	0.00	5.50	1,426.03	1,420.53	1,421.08	1,421.08	1,421.28	1,421.28	HEC-22 Energy
CB 707	1.709	0.95	1.624	5.00	6.96	0.00	13.74	1,426.33	1,412.59	1,415.22	1,415.15	1,415.48	1,415.48	HEC-22 Energy
CB 708	0.816	0.95	0.775	5.00	3.32	0.00	6.00	1,428.72	1,422.72	1,423.87	1,423.68	1,424.35	1,424.06	HEC-22 Energy
CB 709	0.751	0.95	0.713	5.00	3.06	0.00	5.50	1,432.00	1,426.50	1,427.29	1,427.20	1,427.46	1,427.46	HEC-22 Energy
CB 710	0.237	0.95	0.225	5.00	0.96	0.00	5.50	1,436.33	1,430.83	1,431.17	1,431.17	1,431.29	1,431.29	HEC-22 Energy
CB 711	0.635	0.95	0.603	5.00	2.58	0.00	5.50	1,433.23	1,427.73	1,428.62	1,428.58	1,428.91	1,428.91	HEC-22 Energy
CB 712	0.796	0.95	0.756	5.00	3.24	0.00	6.33	1,435.22	1,428.89	1,429.52	1,429.52	1,429.75	1,429.75	HEC-22 Energy
CB 713	2.875	0.95	2.731	5.00	11.70	0.00	20.30	1,436.35	1,416.05	1,418.95	1,418.81	1,419.78	1,419.78	HEC-22 Energy
CB 714	0.887	0.95	0.843	5.00	3.61	0.00	6.92	1,438.65	1,431.73	1,433.37	1,433.03	1,433.60	1,433.60	HEC-22 Energy
CB 715	0.839	0.95	0.797	5.00	3.41	0.00	8.02	1,442.23	1,434.21	1,435.35	1,435.31	1,435.76	1,435.76	HEC-22 Energy
CB 716	0.781	0.95	0.742	5.00	3.18	0.00	8.75	1,445.19	1,436.44	1,437.34	1,437.31	1,437.64	1,437.64	HEC-22 Energy
CB 717	0.710	0.95	0.674	5.00	2.89	0.00	8.80	1,447.28	1,438.48	1,439.07	1,439.07	1,439.29	1,439.29	HEC-22 Energy

Scenario: Base

DOT Report

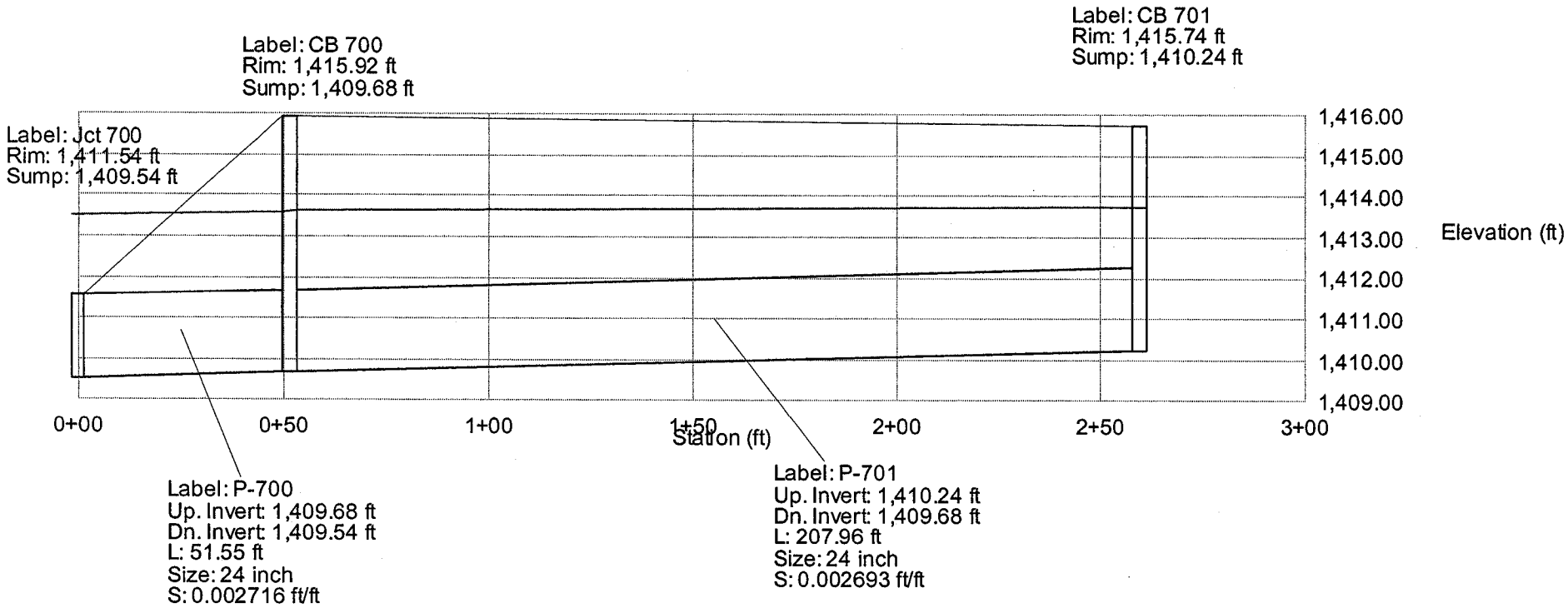
Label	-Node- Up. Dn.	v In (ft/s)	v Out (ft/s)	v Head In (ft)	v Head Out (ft)	Avg. v (ft/s)	Up. Calc. Sys. CA (acres)	Section Disch Cap. (cfs)	Section Shape Size	L (ft)	-Ground- Up. Dn. (ft)	-Invert- Up. Dn. (ft)	-HGL- Up. Dn. (ft)	-EGL- Up. Dn. (ft)
P-701	CB 701	1.67	1.67	0.04	0.04	1.67	1.225	5.25	Circular	207.96	1,415.74	1,410.24	1,413.72	1,413.76
	CB 700							12.72	24 inch		1,415.92	1,409.68	1,413.62	1,413.67
P-700	CB 700	2.97	2.97	0.14	0.14	2.97	2.181	9.34	Circular	51.55	1,415.92	1,409.68	1,413.59	1,413.73
	Jct 700							12.77	24 inch		1,411.54	1,409.54	1,413.52	1,413.66
P-706	CB 706	3.57	2.59	0.20	0.10	3.08	0.591	2.53	Circular	112.62	1,426.03	1,420.53	1,421.08	1,421.28
	CB 705							25.51	24 inch		1,424.81	1,419.31	1,420.01	1,420.11
P-705	CB 705	4.02	3.43	0.25	0.18	3.73	0.894	3.83	Circular	69.00	1,424.81	1,419.31	1,420.00	1,420.25
	CB 704							25.72	24 inch		1,424.05	1,418.55	1,419.32	1,419.50
P-704	CB 704	4.25	3.25	0.28	0.16	3.75	1.078	4.62	Circular	41.00	1,424.05	1,418.55	1,419.31	1,419.59
	CB 703							25.96	24 inch		1,423.59	1,418.09	1,419.02	1,419.18
P-703	CB 703	4.37	6.61	0.30	0.68	5.49	1.188	5.09	Circular	112.37	1,423.59	1,418.09	1,418.88	1,419.18
	CB 702							27.06	24 inch		1,421.64	1,416.72	1,417.31	1,417.99
P-702	CB 702	2.90	2.90	0.13	0.13	2.90	2.124	9.10	Circular	62.31	1,421.64	1,411.67	1,414.45	1,414.58
	Jct 702							24.45	24 inch		1,413.05	1,411.05	1,414.36	1,414.49
P-710	CB 710	2.75	0.83	0.12	0.01	1.79	0.225	0.96	Circular	124.60	1,436.33	1,430.83	1,431.17	1,431.29
	CB 709							45.68	24 inch		1,432.00	1,426.50	1,427.29	1,427.30
P-709	CB 709	4.08	6.33	0.26	0.62	5.20	0.939	4.02	Circular	251.23	1,432.00	1,426.50	1,427.20	1,427.46
	CB 708							28.00	24 inch		1,428.72	1,423.22	1,423.73	1,424.35
P-708	CB 708	4.91	8.45	0.37	1.11	6.68	1.714	7.34	Circular	131.81	1,428.72	1,422.72	1,423.68	1,424.06
	CB 707							33.00	24 inch		1,426.33	1,420.33	1,420.97	1,422.08
P-707	CB 707	4.55	4.55	0.32	0.32	4.55	3.337	14.30	Circular	68.83	1,426.33	1,412.59	1,415.15	1,415.48
	Jct 707							24.18	24 inch		1,413.92	1,411.92	1,414.92	1,415.24
P-717	CB 717	3.71	2.12	0.21	0.07	2.91	0.674	2.89	Circular	226.41	1,447.28	1,438.48	1,439.07	1,439.29
	CB 716							23.26	24 inch		1,445.19	1,436.44	1,437.34	1,437.41
P-716	CB 716	4.62	3.28	0.33	0.17	3.95	1.416	6.07	Circular	248.25	1,445.19	1,436.44	1,437.31	1,437.64
	CB 715							23.23	24 inch		1,442.23	1,434.21	1,435.35	1,435.52
P-715	CB 715	5.35	3.44	0.45	0.18	4.40	2.214	9.48	Circular	275.05	1,442.23	1,434.21	1,435.31	1,435.76
	CB 714							23.27	24 inch		1,438.65	1,431.73	1,433.37	1,433.55
P-714	CB 714	6.04	7.63	0.57	0.90	6.83	3.056	13.09	Circular	145.26	1,438.65	1,431.73	1,433.03	1,433.60
	CB 713							23.27	24 inch		1,436.35	1,430.42	1,431.49	1,432.40
P-713	CB 713	7.89	7.89	0.97	0.97	7.89	5.787	24.79	Circular	135.53	1,436.35	1,416.05	1,418.81	1,419.78
	Jct 713							24.37	24 inch		1,417.49	1,414.71	1,417.42	1,418.39
P-712	CB 712	3.83	2.38	0.23	0.09	3.11	0.756	3.24	Circular	138.15	1,435.22	1,428.89	1,429.52	1,429.75
	CB 711							22.46	24 inch		1,433.23	1,427.73	1,428.62	1,428.71
P-711b	CB 711	4.56	1.85	0.32	0.05	3.21	1.359	5.82	Circular	82.75	1,433.23	1,427.73	1,428.58	1,428.91

Scenario: Base

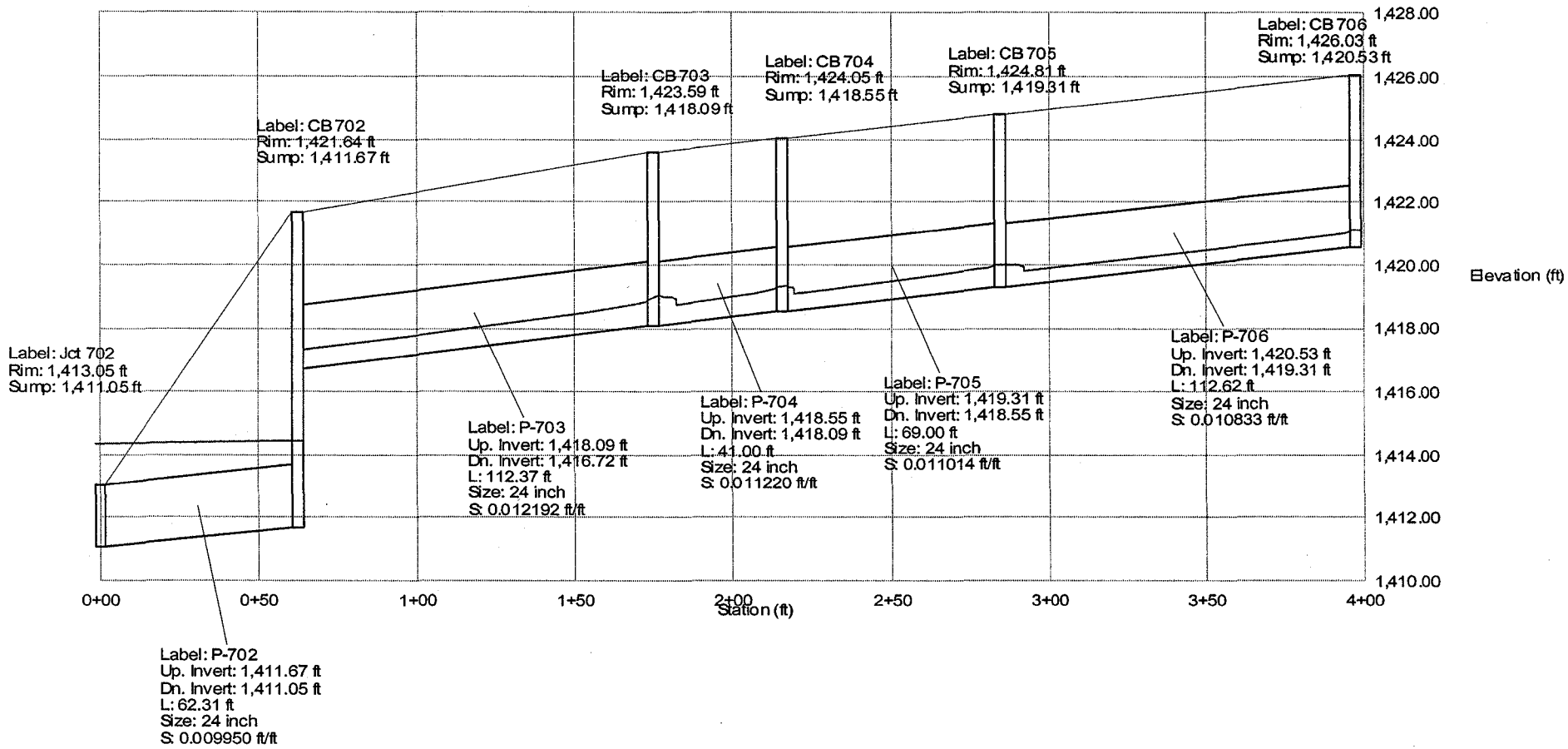
DOT Report

Label	-Node- Up. Dn.	v In (ft/s)	v Out (ft/s)	v Head In (ft)	v Head Out (ft)	Avg. v (ft/s)	Up. Calc. Sys. CA (acres)	Section Disch Cap. (cfs)	Section Shape Size	L (ft)	-Ground- Up. Dn. (ft)	-Invert- Up. Dn. (ft)	-HGL- Up. Dn. (ft)	-EGL- Up. Dn. (ft)
	J-711ab							98.80	24 inch		1,421.00	1,414.28	1,416.43	1,416.48
P-711a	J-711ab	1.85	1.85	0.05	0.05	1.85	1.359	5.82	Circular	47.97	1,421.00	1,414.28	1,416.43	1,416.48
	Jct 711							24.51	24 inch		1,415.80	1,413.80	1,416.40	1,416.45

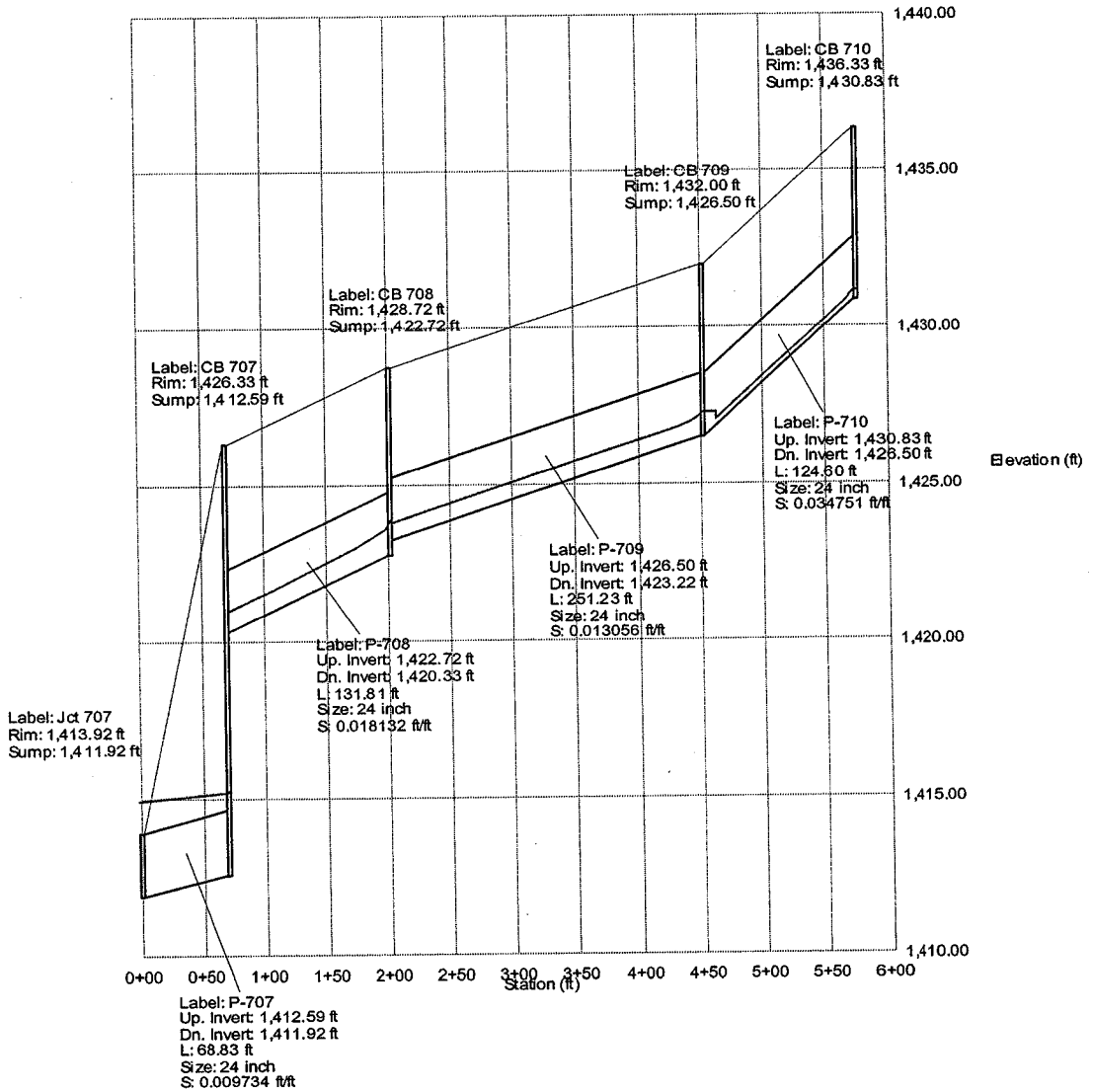
Profile
Scenario: Base



Profile
Scenario: Base



Profile
Scenario: Base

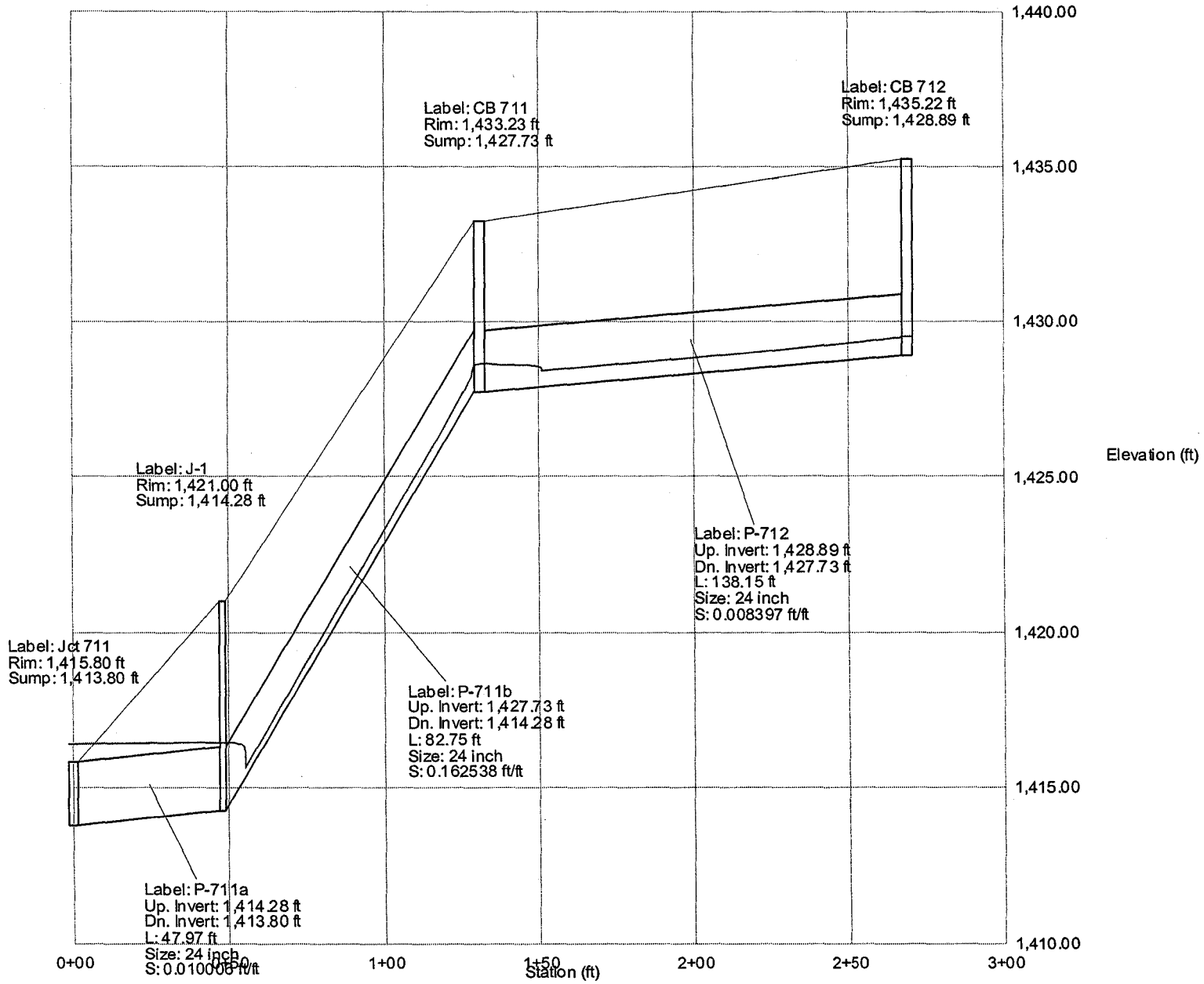


Title: Santan Freeway - Baseline to Elliot
q:\16110\drainage\stormcad\mlnorth.stm
03/12/03 05:38:41 PM

Stanley Consultants Inc
© Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Project Engineer: System Administrator
StormCAD v4.1.1 [4.2014a]
Page 1 of 1

Profile
Scenario: Base



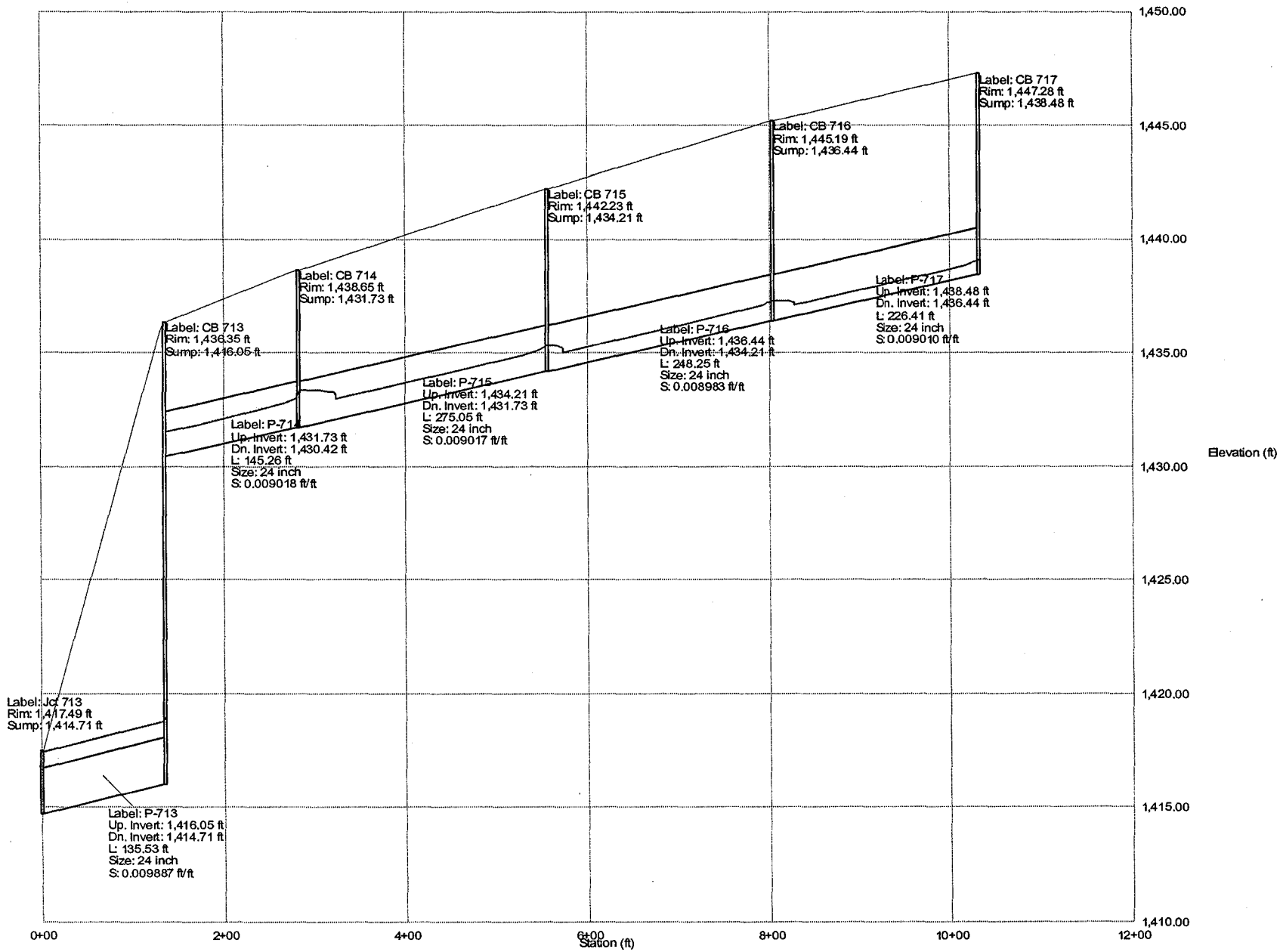
Title: Santan Freeway - Baseline to Elliot
q:\16110\drainage\stormcad\mlnorth.stm
03/12/03 04:56:08 PM

Stanley Consultants Inc

© Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Project Engineer: System Administrator
StormCAD v4.1.1 [4.2014a]

Profile
Scenario: Base



Title: Santan Freeway - Baseline to Elliot
q:\16110\drainage\stormcad\mlnorth.stm
03/12/03 05:24:52 PM

Stanley Consultants Inc
© Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Project Engineer: System Administrator
StormCAD v4.1.1 [4.2014a]
Page 1 of 1

Scenario: Base

Pipe Report

Label	Up. Node	Dn. Node	Up. Inlet Area (acres)	Up. Inlet Rat. Coef.	Up. Calc. Sys. CA (acres)	I (in/hr)	System Tc (min)	System Q (cfs)	Avg. v (ft/s)	L (ft)	S (ft/ft)	Size	Mannings n	Up. Invert (ft)	Dn. Invert (ft)	HGL In (ft)	HGL Out (ft)
P-718	CB 718	Jct 718	0.085	0.95	5.562	4.25	9.96	23.83	3.92	70.28	0.001850	36 inch	0.012	1,417.14	1,417.01	1,419.52	1,419.45
P-719	CB 719	CB 718	0.808	0.70	4.609	4.25	9.71	19.74	3.30	49.01	0.001836	36 inch	0.012	1,417.23	1,417.14	1,419.57	1,419.54
P-720	CB 720	CB 719	0.598	0.95	3.801	4.25	9.51	16.28	2.74	32.88	0.001825	36 inch	0.012	1,417.29	1,417.23	1,419.62	1,419.61
P-722	CB 722	CB 718	0.275	0.95	0.275	4.25	5.00	1.18	0.51	42.00	0.005238	24 inch	0.012	1,418.39	1,418.17	1,419.67	1,419.67
P-723	CB 723	CB 718	0.594	0.95	0.594	4.25	5.00	2.54	1.15	48.00	0.006250	24 inch	0.012	1,418.47	1,418.17	1,419.67	1,419.67
P-724	CB 724	CB 720	1.259	0.95	1.259	4.25	5.00	5.39	6.39	63.38	0.023509	24 inch	0.012	1,441.63	1,440.14	1,442.45	1,440.66
P-727	CB 727	CB 728	0.194	0.95	0.194	4.25	5.00	0.83	0.47	59.00	0.004068	18 inch	0.012	1,418.26	1,418.02	1,420.42	1,420.42
P-728	CB 728	CB 720	0.200	0.79	1.944	4.25	7.09	8.33	2.65	384.04	0.001901	24 inch	0.012	1,418.02	1,417.29	1,420.41	1,419.97
P-729	CB 729	CB 728	1.550	0.80	1.550	4.25	5.00	6.64	3.76	58.93	0.004073	18 inch	0.012	1,418.26	1,418.02	1,420.68	1,420.47

Scenario: Base

Inlet Report

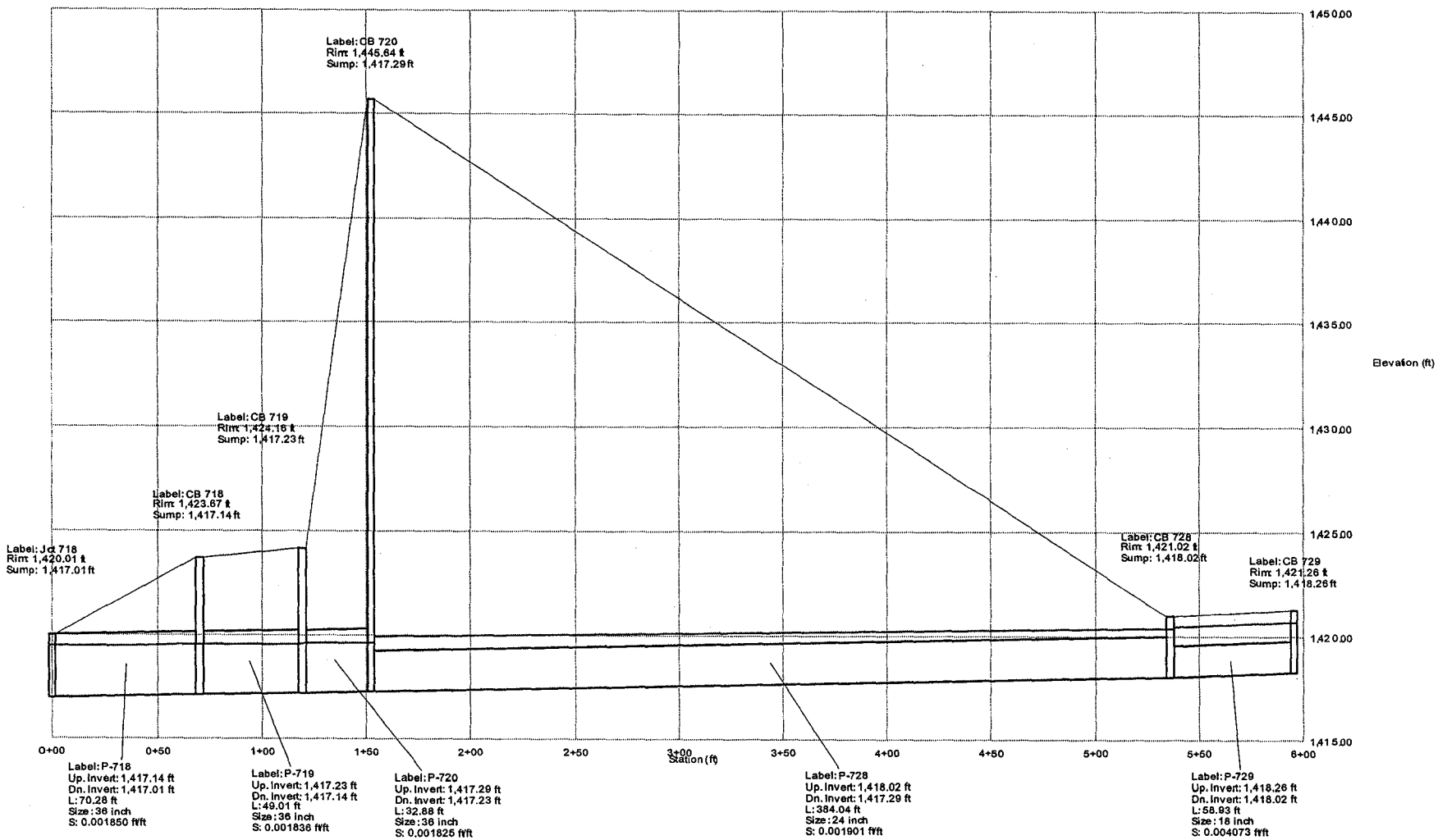
Label	Area (acres)	C	Inlet CA (acres)	TC (min)	Total Flow To Inlet (cfs)	Add. Q (cfs)	Struct. Depth (ft)	Rim (ft)	Sump (ft)	HGL In (ft)	HGL Out (ft)	EGL In (ft)	EGL Out (ft)	Headloss Mtd
CB 718	0.089	0.95	0.085	5.00	0.36	0.00	6.53	1,423.67	1,417.14	1,419.54	1,419.52	1,419.76	1,419.76	HEC-22 Energy
CB 719	1.154	0.70	0.808	5.00	3.46	0.00	6.93	1,424.16	1,417.23	1,419.61	1,419.57	1,419.74	1,419.74	HEC-22 Energy
CB 720	0.630	0.95	0.598	5.00	2.56	0.00	28.35	1,445.64	1,417.29	1,419.66	1,419.62	1,420.08	1,419.74	HEC-22 Energy
CB 722	0.289	0.95	0.275	5.00	1.18	0.00	5.50	1,423.89	1,418.39	1,419.67	1,419.67	1,419.68	1,419.68	HEC-22 Energy
CB 723	0.625	0.95	0.594	5.00	2.54	0.00	5.50	1,423.97	1,418.47	1,419.67	1,419.67	1,419.70	1,419.70	HEC-22 Energy
CB 724	1.325	0.95	1.259	5.00	5.39	0.00	5.50	1,447.13	1,441.63	1,442.45	1,442.45	1,442.76	1,442.76	HEC-22 Energy
CB 727	0.204	0.95	0.194	5.00	0.83	0.00	3.00	1,421.26	1,418.26	1,420.42	1,420.42	1,420.42	1,420.42	HEC-22 Energy
CB 728	0.253	0.79	0.200	5.00	0.86	0.00	3.00	1,421.02	1,418.02	1,420.42	1,420.41	1,420.52	1,420.52	HEC-22 Energy
CB 729	1.933	0.80	1.550	5.00	6.64	0.00	3.00	1,421.26	1,418.26	1,420.68	1,420.68	1,420.89	1,420.89	HEC-22 Energy

Scenario: Base

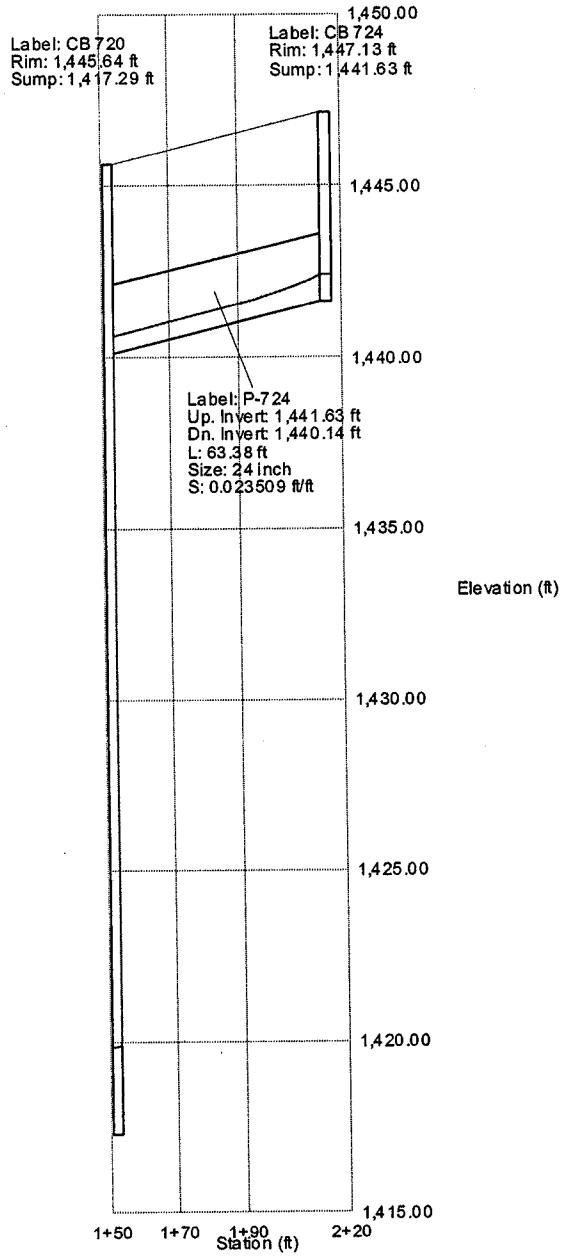
DOT Report

Label	-Node- Up. Dn.	v In (ft/s)	v Out (ft/s)	v Head In (ft)	v Head Out (ft)	Avg. v (ft/s)	Up. Calc. Sys. CA (acres)	Section Disch Cap. (cfs)	Section Shape Size	L (ft)	-Ground- Up. Dn. (ft)	-Invert- Up. Dn. (ft)	-HGL- Up. Dn. (ft)	-EGL- Up. Dn. (ft)
P-729	CB 729	3.76	3.76	0.22	0.22	3.76	1.550	6.64	Circular	58.93	1,421.26	1,418.26	1,420.68	1,420.89
	CB 728							7.26	18 inch		1,421.02	1,418.02	1,420.47	1,420.69
P-727	CB 727	0.47	0.47	3.43e-3	3.43e-3	0.47	0.194	0.83	Circular	59.00	1,421.26	1,418.26	1,420.42	1,420.42
	CB 728							7.26	18 inch		1,421.02	1,418.02	1,420.42	1,420.42
P-728	CB 728	2.65	2.65	0.11	0.11	2.65	1.944	8.33	Circular	384.04	1,421.02	1,418.02	1,420.41	1,420.52
	CB 720							10.68	24 inch		1,445.64	1,417.29	1,419.97	1,420.08
P-724	CB 724	4.45	8.33	0.31	1.08	6.39	1.259	5.39	Circular	63.38	1,447.13	1,441.63	1,442.45	1,442.76
	CB 720							37.57	24 inch		1,445.64	1,440.14	1,440.66	1,441.74
P-720	CB 720	2.76	2.71	0.12	0.11	2.74	3.801	16.28	Circular	32.88	1,445.64	1,417.29	1,419.62	1,419.74
	CB 719							30.86	36 inch		1,424.16	1,417.23	1,419.61	1,419.72
P-722	CB 722	0.55	0.46	4.76e-3	3.36e-3	0.51	0.275	1.18	Circular	42.00	1,423.89	1,418.39	1,419.67	1,419.68
	CB 718							17.74	24 inch		1,423.67	1,418.17	1,419.67	1,419.67
P-719	CB 719	3.34	3.26	0.17	0.17	3.30	4.609	19.74	Circular	49.01	1,424.16	1,417.23	1,419.57	1,419.74
	CB 718							30.96	36 inch		1,423.67	1,417.14	1,419.54	1,419.70
P-723	CB 723	1.29	1.01	0.03	0.02	1.15	0.594	2.54	Circular	48.00	1,423.97	1,418.47	1,419.67	1,419.70
	CB 718							19.37	24 inch		1,423.67	1,418.17	1,419.67	1,419.69
P-718	CB 718	3.97	3.87	0.24	0.23	3.92	5.562	23.83	Circular	70.28	1,423.67	1,417.14	1,419.52	1,419.76
	Jct 718							31.07	36 inch		1,420.01	1,417.01	1,419.45	1,419.68

Profile
Scenario: Base



Profile
Scenario: Base



Title: Santan Freeway - Baseline to Elliot
q:\16110\drainage\stormcad\baselinerampb&rampa.stm
03/13/03 10:43:14 AM

© Haestad Methods, Inc.

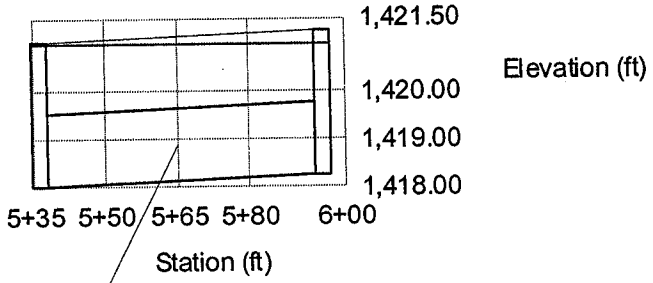
Stanley Consultants Inc
37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Project Engineer: System Administrator
StormCAD v4.1.1 [4.2014a]

Profile
Scenario: Base

Label: CB 728
Rim: 1,421.02 ft
Sump: 1,418.02 ft

Label: CB 727
Rim: 1,421.26 ft
Sump: 1,418.26 ft

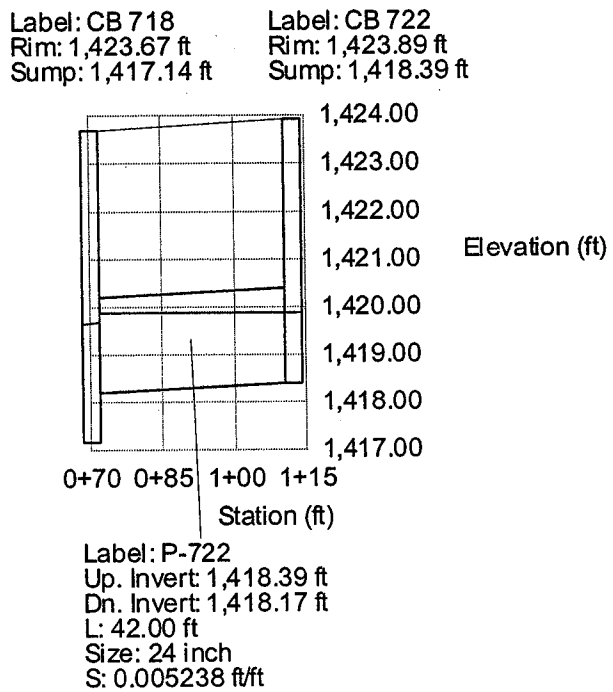


Label: P-727
Up. Invert: 1,418.26 ft
Dn. Invert: 1,418.02 ft
L: 59.00 ft
Size: 18 inch
S: 0.004068 ft/ft

© Haestad Methods, Inc.

Stanley Consultants Inc
37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

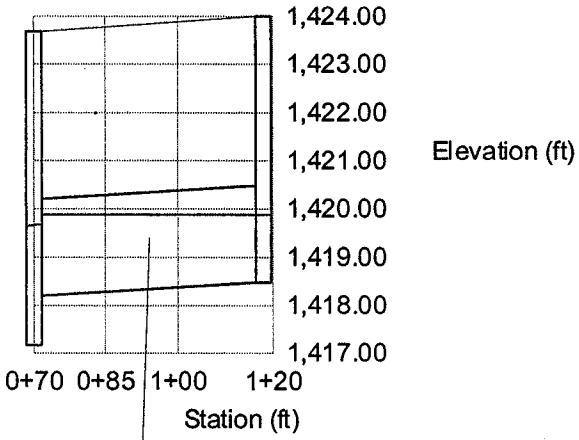
Profile
Scenario: Base



Profile
Scenario: Base

Label: CB 718
Rim: 1,423.67 ft
Sump: 1,417.14 ft

Label: CB 723
Rim: 1,423.97 ft
Sump: 1,418.47 ft



Label: P-723
Up. Invert: 1,418.47 ft
Dn. Invert: 1,418.17 ft
L: 48.00 ft
Size: 24 inch
S: 0.006250 ft/ft

Scenario: Base

Pipe Report

Label	Up. Node	Dn. Node	Up. Inlet Area (acres)	Up. Inlet Rat. Coef.	Up. Calc. Sys. CA (acres)	I (in/hr)	System Tc (min)	System Q (cfs)	Avg. v (ft/s)	L (ft)	S (ft/ft)	Size	Mannings n	Up. Invert (ft)	Dn. Invert (ft)	HGL In (ft)	HGL Out (ft)
Exst 36"	CB 602	O-2	0.330	0.950	0.330	4.25	5.00	1.41	0.20	10.00	0.004000	36 inch	0.010	1,422.70	1,422.66	1,425.66	1,425.66
Exst 42"	MH 725	O-1	N/A	N/A	1.931	4.25	8.34	8.27	0.86	20.62	0.003395	42 inch	0.013	1,417.70	1,417.63	1,421.23	1,421.23
P-601	CB 601	CB 602	0.000	0.000	0.000	0.00	0.00	0.00	0.00	98.01	0.002041	18 inch	0.012	1,423.15	1,422.95	1,425.66	1,425.66
P-603	CB 603	JCT 603	0.467	0.950	0.467	4.25	10.00	2.00	3.75	5.00	0.012000	24 inch	0.013	1,421.31	1,421.25	1,421.80	1,421.67
P-604	CB 604	JCT 604	0.373	0.950	0.373	4.25	10.00	1.60	1.18	7.00	0.130000	24 inch	0.013	1,420.93	1,420.02	1,421.59	1,421.63
P-726	CB 726	MH 725	0.516	0.950	0.516	4.25	5.00	2.21	0.78	99.53	0.005225	24 inch	0.012	1,419.69	1,419.17	1,421.24	1,421.23
P-730	CB 730	MH 725	0.823	0.950	1.415	4.25	8.27	6.06	1.93	8.47	0.011806	24 inch	0.012	1,417.80	1,417.70	1,421.24	1,421.23
P-731	MH 731	CB 730	N/A	N/A	0.593	4.25	6.55	2.54	2.19	226.62	0.113538	24 inch	0.012	1,444.84	1,419.11	1,445.39	1,421.25
P-732	CB 732	MH 731	0.105	0.950	0.593	4.25	6.29	2.54	3.30	50.32	0.004968	24 inch	0.012	1,445.09	1,444.84	1,445.64	1,445.47
P-733	CB 733	CB 732	0.196	0.950	0.449	4.25	5.34	1.93	2.89	22.18	0.004959	24 inch	0.012	1,445.20	1,445.09	1,445.68	1,445.68
P-734	CB 734	CB 733	0.254	0.950	0.254	4.25	5.00	1.09	2.23	46.01	0.004999	24 inch	0.012	1,445.43	1,445.20	1,445.79	1,445.73
P-735	CB 735	CB 732	0.023	0.950	0.023	4.25	5.00	0.10	0.82	63.93	0.014547	24 inch	0.012	1,446.02	1,445.09	1,446.13	1,445.65
P-736	CB 736	CB 732	0.015	0.950	0.015	4.25	5.00	0.07	0.73	55.06	0.016527	24 inch	0.012	1,446.00	1,445.09	1,446.09	1,445.65

Scenario: Base

Inlet Report

Label	Area (acres)	C	Inlet CA (acres)	TC (min)	Total Flow To Inlet (cfs)	Add. Q (cfs)	Struct. Depth (ft)	Rim (ft)	Sump (ft)	HGL In (ft)	HGL Out (ft)	EGL In (ft)	EGL Out (ft)	Headloss Mtd
CB 601	0.000	0.000	0.000	0.00	0.00	0.00	4.24	1,427.39	1,423.15	1,425.66	1,425.66	1,425.66	1,425.66	HEC-22 Energy
CB 602	0.347	0.950	0.330	5.00	1.41	0.00	4.64	1,427.34	1,422.70	1,425.66	1,425.66	1,425.66	1,425.66	HEC-22 Energy
CB 603	0.492	0.950	0.467	10.00	2.00	0.00	4.50	1,425.81	1,421.31	1,421.80	1,421.80	1,421.97	1,421.97	HEC-22 Energy
CB 604	0.393	0.950	0.373	10.00	1.60	0.00	5.00	1,425.93	1,420.93	1,421.59	1,421.59	1,421.64	1,421.64	HEC-22 Energy
CB 726	0.543	0.950	0.516	5.00	2.21	0.00	3.50	1,423.19	1,419.69	1,421.24	1,421.24	1,421.25	1,421.25	HEC-22 Energy
CB 730	0.866	0.950	0.823	5.00	3.52	0.00	5.39	1,423.19	1,417.80	1,421.25	1,421.24	1,421.30	1,421.30	HEC-22 Energy
CB 732	0.111	0.950	0.105	5.00	0.45	0.00	6.34	1,451.43	1,445.09	1,445.65	1,445.64	1,445.84	1,445.84	HEC-22 Energy
CB 733	0.206	0.950	0.196	5.00	0.84	0.00	5.89	1,451.09	1,445.20	1,445.73	1,445.68	1,445.85	1,445.85	HEC-22 Energy
CB 734	0.267	0.950	0.254	5.00	1.09	0.00	5.50	1,450.93	1,445.43	1,445.79	1,445.79	1,445.91	1,445.91	HEC-22 Energy
CB 735	0.024	0.950	0.023	5.00	0.10	0.00	5.50	1,451.52	1,446.02	1,446.13	1,446.13	1,446.16	1,446.16	HEC-22 Energy
CB 736	0.016	0.950	0.015	5.00	0.07	0.00	5.50	1,451.50	1,446.00	1,446.09	1,446.09	1,446.12	1,446.12	HEC-22 Energy

Scenario: Base

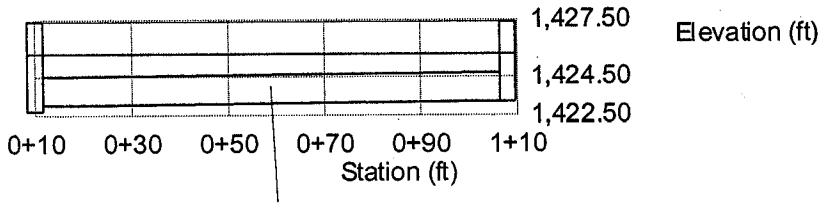
DOT Report

Label	-Node- Up. Dn.	v In (ft/s)	v Out (ft/s)	v Head In (ft)	v Head Out (ft)	Avg. v (ft/s)	Up. Calc. Sys. CA (acres)	Section Disch Cap. (cfs)	Section Shape Size	L (ft)	-Ground- Up. Dn. (ft)	-Invert- Up. Dn. (ft)	-HGL- Up. Dn. (ft)	-EGL- Up. Dn. (ft)
Exst 36"	CB 602	0.20	0.20	6.24e-4	6.2e-4	0.20	0.330	1.41	Circular	10.00	1,427.34	1,422.70	1,425.66	1,425.66
	O-2							54.84	36 inch		1,427.31	1,422.66	1,425.66	1,425.66
Exst 42"	MH 725	0.86	0.86	0.01	0.01	0.86	1.931	8.27	Circular	20.62	1,423.29	1,417.70	1,421.23	1,421.24
	O-1							58.62	42 inch		1,422.50	1,417.63	1,421.23	1,421.24
P-601	CB 601	0.00	0.00	0.00	0.00	0.00	0.000	0.00	Circular	98.01	1,427.39	1,423.15	1,425.66	1,425.66
	CB 602							5.14	18 inch		1,427.34	1,422.95	1,425.66	1,425.66
P-603	CB 603	3.35	4.16	0.17	0.27	3.75	0.467	2.00	Circular	5.00	1,425.81	1,421.31	1,421.80	1,421.97
	JCT 603							24.78	24 inch		1,425.88	1,421.25	1,421.67	1,421.94
P-604	CB 604	1.78	0.59	0.05	0.01	1.18	0.373	1.60	Circular	7.00	1,425.93	1,420.93	1,421.59	1,421.64
	JCT 604							81.56	24 inch		1,425.93	1,420.02	1,421.63	1,421.64
P-726	CB 726	0.85	0.70	0.01	0.01	0.78	0.516	2.21	Circular	99.53	1,423.19	1,419.69	1,421.24	1,421.25
	MH 725							17.71	24 inch		1,423.29	1,419.17	1,421.23	1,421.24
P-730	CB 730	1.93	1.93	0.06	0.06	1.93	1.415	6.06	Circular	8.47	1,423.19	1,417.80	1,421.24	1,421.30
	MH 725							26.63	24 inch		1,423.29	1,417.70	1,421.23	1,421.29
P-731	MH 731	3.57	0.81	0.20	0.01	2.19	0.593	2.54	Circular	226.62	1,448.98	1,444.84	1,445.39	1,445.59
	CB 730							82.57	24 inch		1,423.19	1,419.11	1,421.25	1,421.26
P-732	CB 732	3.57	3.02	0.20	0.14	3.30	0.593	2.54	Circular	50.32	1,451.43	1,445.09	1,445.64	1,445.84
	MH 731							17.27	24 inch		1,448.98	1,444.84	1,445.47	1,445.61
P-733	CB 733	3.31	2.47	0.17	0.09	2.89	0.449	1.93	Circular	22.18	1,451.09	1,445.20	1,445.68	1,445.85
	CB 732							17.26	24 inch		1,451.43	1,445.09	1,445.68	1,445.78
P-734	CB 734	2.83	1.63	0.12	0.04	2.23	0.254	1.09	Circular	46.01	1,450.93	1,445.43	1,445.79	1,445.91
	CB 733							17.33	24 inch		1,451.09	1,445.20	1,445.73	1,445.77
P-735	CB 735	1.51	0.14	0.04	2.86e-4	0.82	0.023	0.10	Circular	63.93	1,451.52	1,446.02	1,446.13	1,446.16
	CB 732							29.56	24 inch		1,451.43	1,445.09	1,445.65	1,445.65
P-736	CB 736	1.37	0.09	0.03	1.3e-4	0.73	0.015	0.07	Circular	55.06	1,451.50	1,446.00	1,446.09	1,446.12
	CB 732							31.51	24 inch		1,451.43	1,445.09	1,445.65	1,445.65

Profile
Scenario: Base

Label: CB 602
Rim: 1,427.34 ft
Sump: 1,422.70 ft

Label: CB 601
Rim: 1,427.39 ft
Sump: 1,423.15 ft

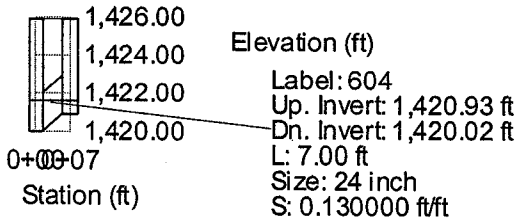


Label: P-601
Up. Invert: 1,423.15 ft
Dn. Invert: 1,422.95 ft
L: 98.01 ft
Size: 18 inch
S: 0.002041 ft/ft

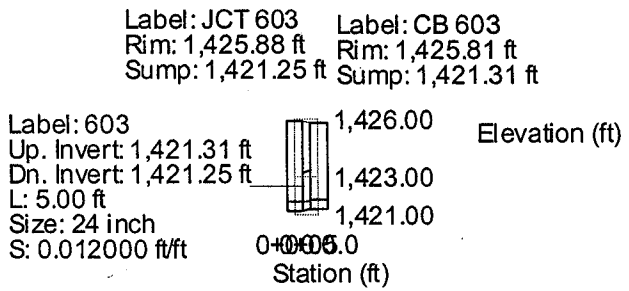
Profile
Scenario: Base

Label: JCT 604
Rim: 1,425.93 ft
Sump: 1,420.02 ft

Label: CB 604
Rim: 1,425.93 ft
Sump: 1,420.93 ft



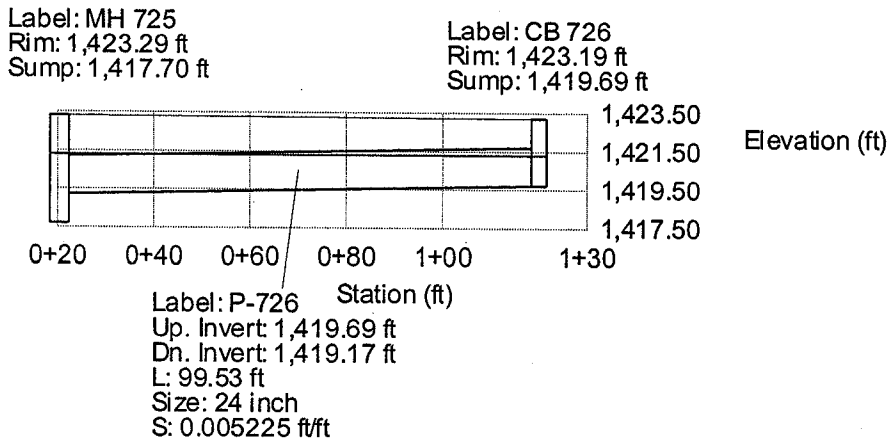
Profile
Scenario: Base



© Haestad Methods, Inc.

Stanley Consultants Inc
37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Profile
Scenario: Base

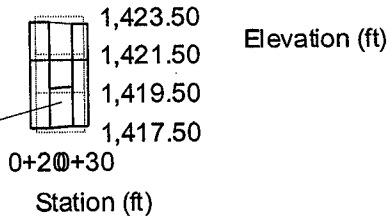


© Haestad Methods, Inc.

Profile
Scenario: Base

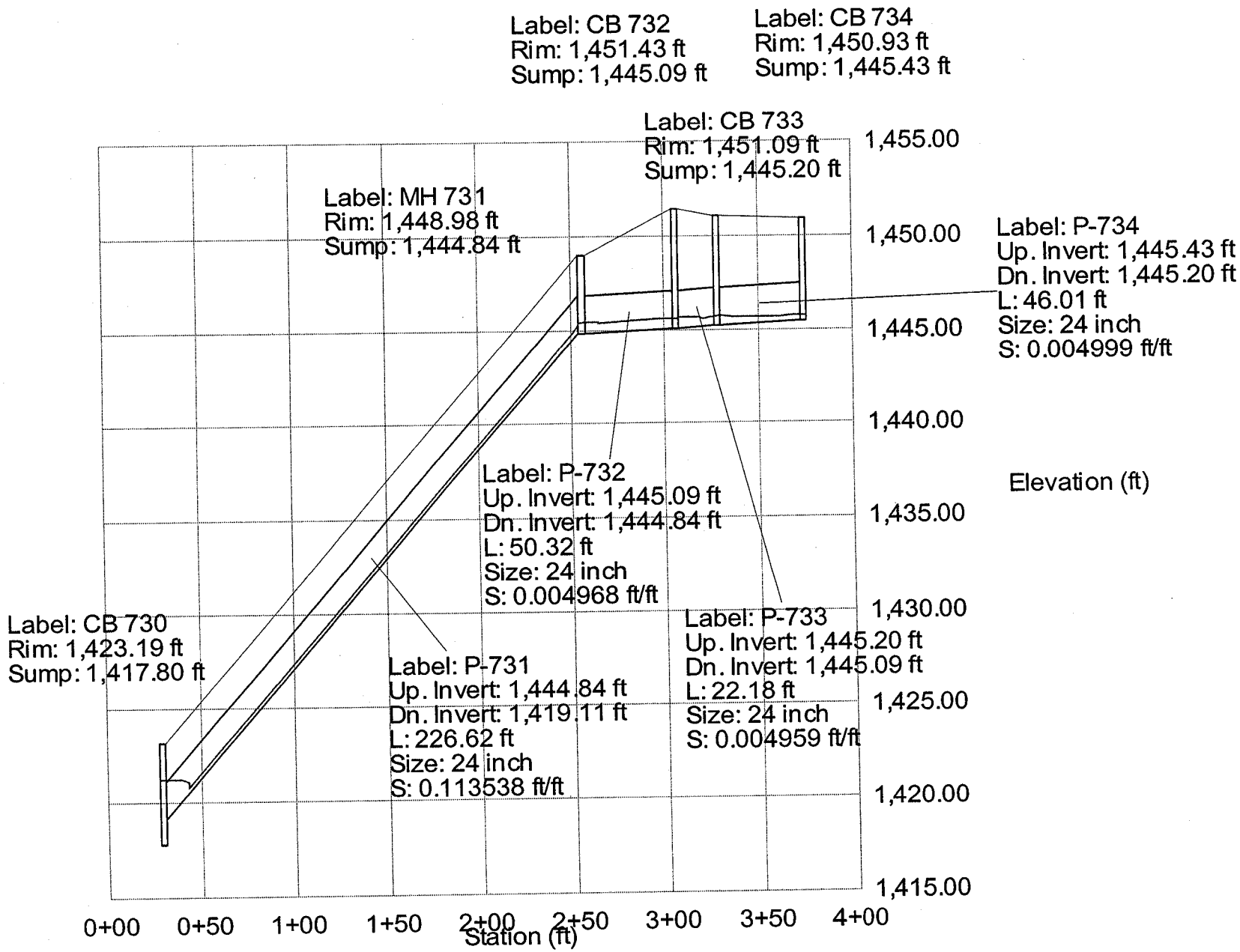
Label: MH 725
Rim: 1,423.29 ft
Sump: 1,417.70 ft

Label: CB 730
Rim: 1,423.19 ft
Sump: 1,417.80 ft



Label: P-730
Up. Invert: 1,417.80 ft
Dn. Invert: 1,417.70 ft
L: 8.47 ft
Size: 24 inch
S: 0.011806 ft/ft

Profile
Scenario: Base



Title: Santan
q:\...\stormcad\95%-submittal\baseline&rampa.stm
04/23/03 12:45:16 PM

© Haestad Methods, Inc.

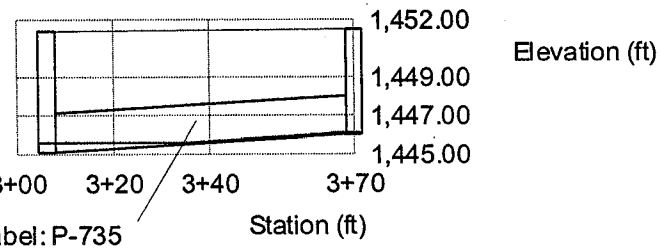
Stanley Consultants Inc
37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

StormCAD v4.1.1 [4.2014a]

Profile
Scenario: Base

Label: CB 732
Rim: 1,451.43 ft
Sump: 1,445.09 ft

Label: CB 735
Rim: 1,451.52 ft
Sump: 1,446.02 ft



Label: P-735
Up. Invert: 1,446.02 ft
Dn. Invert: 1,445.09 ft
L: 63.93 ft
Size: 24 inch
S: 0.014547 ft/ft

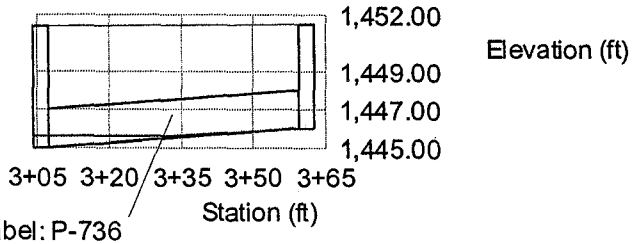
© Haestad Methods, Inc.

Stanley Consultants Inc
37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Profile
Scenario: Base

Label: CB 732
Rim: 1,451.43 ft
Sump: 1,445.09 ft

Label: CB 736
Rim: 1,451.50 ft
Sump: 1,446.00 ft



Label: P-736
Up. Invert: 1,446.00 ft
Dn. Invert: 1,445.09 ft
L: 55.06 ft
Size: 24 inch
S: 0.016527 ft/ft

© Haestad Methods, Inc. 37 Brookside Road Waterbury, CT 06708 USA +1-203-755-1666

Scenario: Base

Pipe Report

Label	Up. Node	Dn. Node	Up. Inlet Area (acres)	Up. Inlet Rat. Coef.	Up. Calc. Sys. CA (acres)	I (in/hr)	System Tc (min)	System Q (cfs)	Avg. v (ft/s)	L (ft)	S (ft/ft)	Size	Mannings n	Up. Invert (ft)	Dn. Invert (ft)	HGL In (ft)	HGL Out (ft)
P-802	Jct 802	Jct 802A	8.75	0.70	8.75	6.57	10.00	57.95	6.70	20.95	0.272554	30 inch	0.012	1,408.56	1,402.85	1,410.40	1,409.78
P-802A	Jct 802A	Jct 802B	N/A	N/A	8.75	6.56	10.05	57.86	5.89	39.76	0.002515	30 inch	0.012	1,402.85	1,402.75	1,409.25	1,409.08
P-802B	Jct 802B	Jct 803	N/A	N/A	8.75	6.54	10.16	57.67	5.87	316.93	0.002398	30 inch	0.012	1,402.75	1,401.99	1,408.62	1,407.29
P-825	Jct 825	Jct 825A	21.00	0.70	21.00	6.57	10.00	139.07	9.84	5.66	0.349823	36 inch	0.012	1,387.70	1,385.72	1,391.55	1,391.49
P-825A	Jct 825A	Jct 825B	N/A	N/A	21.00	6.57	10.01	139.04	9.83	10.00	0.349000	36 inch	0.012	1,385.72	1,382.23	1,390.64	1,390.55
P-825B	Jct 825B	Jct 826	N/A	N/A	21.00	6.56	10.03	138.97	9.83	236.99	0.003460	36 inch	0.012	1,382.23	1,381.41	1,389.44	1,387.25

Scenario: Base

Inlet Report

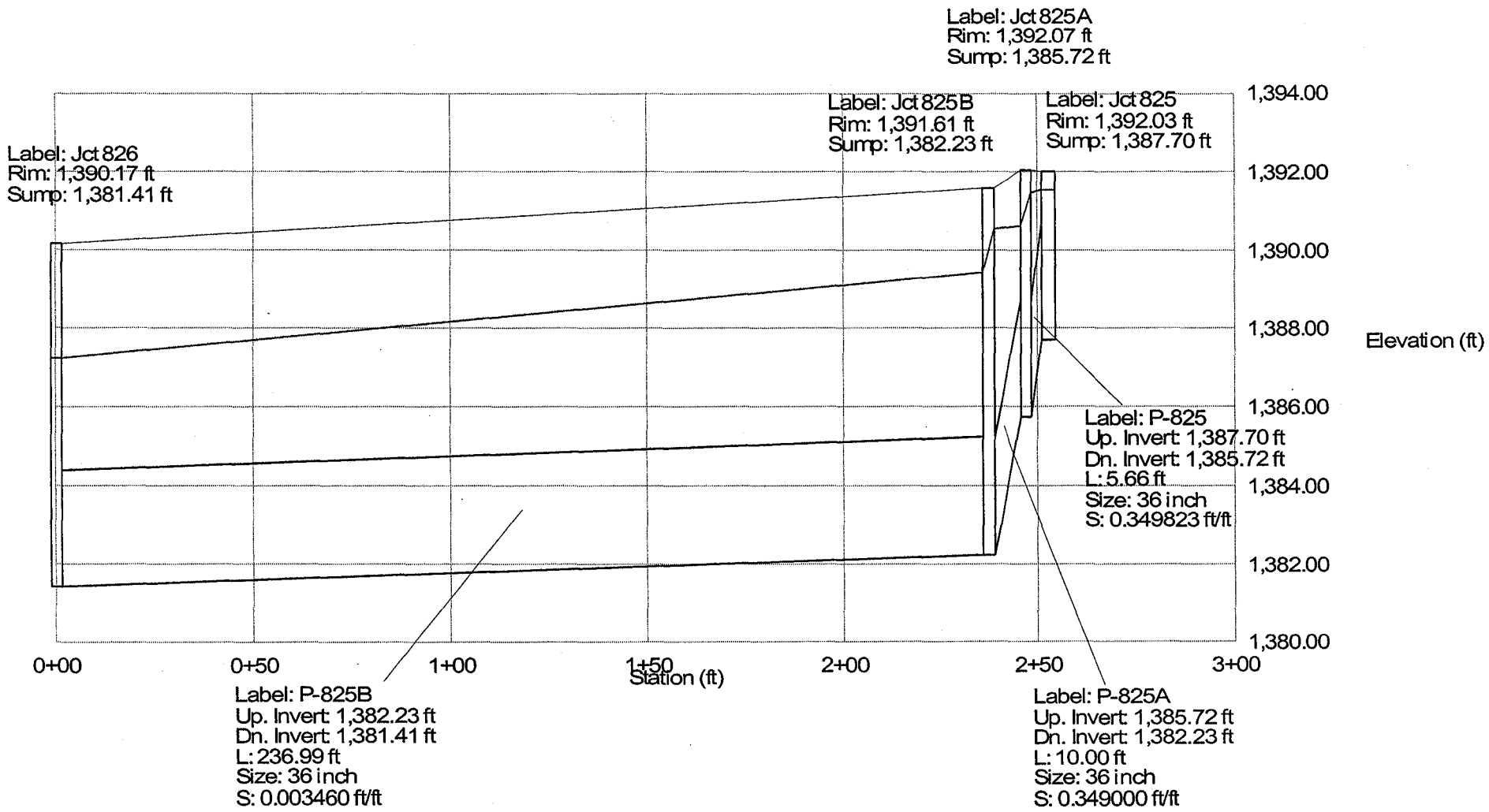
Label	Area (acres)	C	Inlet CA (acres)	TC (min)	Total Flow To Inlet (cfs)	Add. Q (cfs)	Struct. Depth (ft)	Rim (ft)	Sump (ft)	HGL In (ft)	HGL Out (ft)	EGL In (ft)	EGL Out (ft)	Headloss Mtd
Jct 802	12.50	0.70	8.75	10.00	57.95	0.00	3.44	1,412.00	1,408.56	1,410.40	1,410.40	1,411.27	1,411.27	HEC-22 Energy
Jct 825	30.00	0.70	21.00	10.00	139.07	0.00	4.33	1,392.03	1,387.70	1,391.55	1,391.55	1,393.05	1,393.05	HEC-22 Energy

Scenario: Base

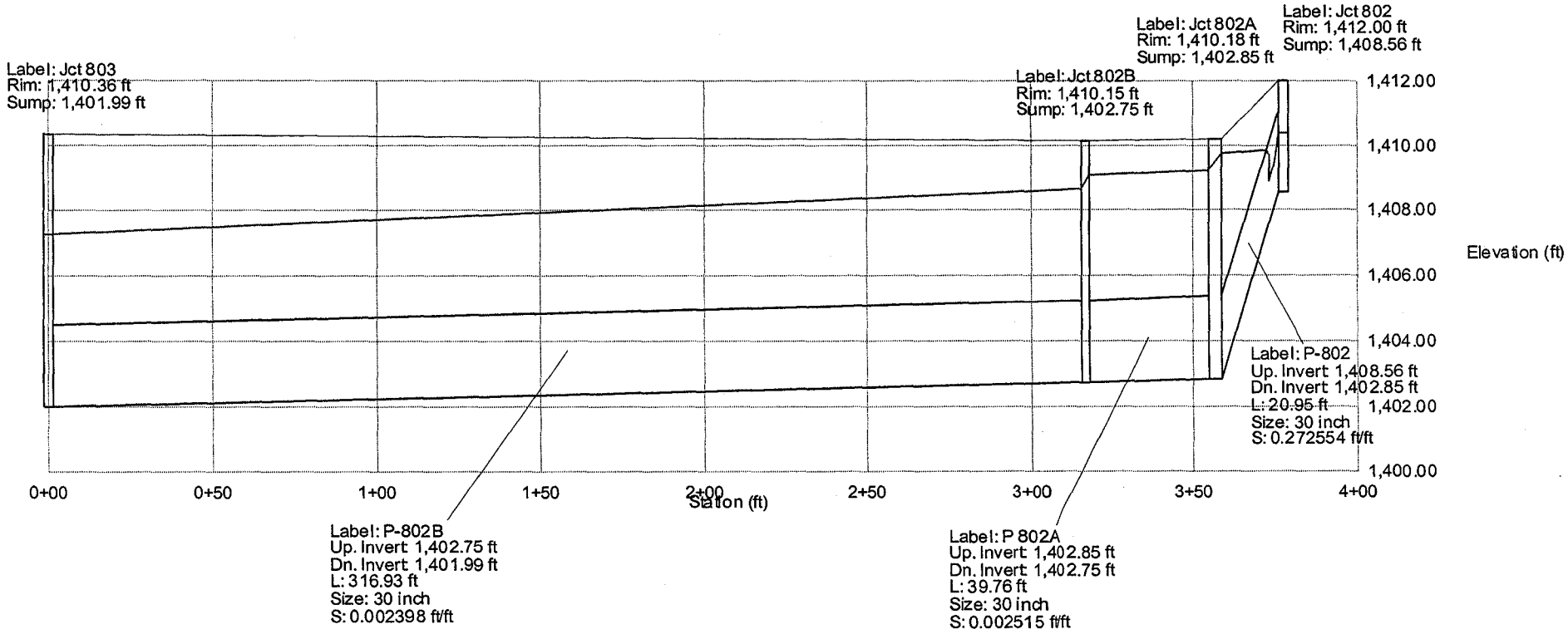
DOT Report

Label	-Node- Up. Dn.	v In (ft/s)	v Out (ft/s)	v Head In (ft)	v Head Out (ft)	Avg. v (ft/s)	Up. Calc. Sys. CA (acres)	Section Disch Cap. (cfs)	Section Shape Size	L (ft)	-Ground- Up. Dn. (ft)	-Invert- Up. Dn. (ft)	-HGL- Up. Dn. (ft)	-EGL- Up. Dn. (ft)
P-802	Jct 802	7.50	5.90	0.87	0.54	6.70	8.75	57.95	Circular	20.95	1,412.00	1,408.56	1,410.40	1,411.27
	Jct 802A							463.94	30 inch		1,410.18	1,402.85	1,409.78	1,410.32
P-802A	Jct 802A	5.89	5.89	0.54	0.54	5.89	8.75	57.86	Circular	39.76	1,410.18	1,402.85	1,409.25	1,409.79
	Jct 802B							44.57	30 inch		1,410.15	1,402.75	1,409.08	1,409.62
P-802B	Jct 802B	5.87	5.87	0.54	0.54	5.87	8.75	57.67	Circular	316.93	1,410.15	1,402.75	1,408.62	1,409.16
	Jct 803							43.52	30 inch		1,410.36	1,401.99	1,407.29	1,407.83
P-825	Jct 825	9.84	9.84	1.50	1.50	9.84	21.00	139.07	Circular	5.66	1,392.03	1,387.70	1,391.55	1,393.05
	Jct 825A							854.69	36 inch		1,392.07	1,385.72	1,391.49	1,393.00
P-825A	Jct 825A	9.83	9.83	1.50	1.50	9.83	21.00	139.04	Circular	10.00	1,392.07	1,385.72	1,390.64	1,392.14
	Jct 825B							853.68	36 inch		1,391.61	1,382.23	1,390.55	1,392.05
P-825B	Jct 825B	9.83	9.83	1.50	1.50	9.83	21.00	138.97	Circular	236.99	1,391.61	1,382.23	1,389.44	1,390.94
	Jct 826							85.00	36 inch		1,390.17	1,381.41	1,387.25	1,388.75

Profile
Scenario: Base



Profile
Scenario: Base



CAST IN PLACE PIPE HYDRAULIC ANALYSIS

Scenario: Base

Pipe Report

Label	Up. Node	Dn. Node	Up. Inlet Area (acres)	Up. Inlet Rat. Coef.	Up. Calc. Sys. CA (acres)	I (in/hr)	System Tc (min)	System Q (cfs)	Avg. v (ft/s)	L (ft)	S (ft/ft)	Size	Mannings n	Up. Invert (ft)	Dn. Invert (ft)	HGL In (ft)	HGL Out (ft)
P-300	MH 300	Jct 317	N/A	N/A	14.432	5.87	9.04	85.4	1.70	334.00	0.0020	96 inch	0.014	1,369.38	1,368.72	1,381.66	1,381.63
P-300A	Jct 317	Jct 316	N/A	N/A	15.401	5.47	12.32	84.9	1.69	46.01	0.0020	96 inch	0.014	1,368.72	1,368.63	1,381.63	1,381.62
P-300B	Jct 316	MH 500	N/A	N/A	15.812	5.39	12.77	85.9	1.71	8.00	0.0020	96 inch	0.014	1,368.63	1,368.61	1,381.62	1,381.62
P-301	MH 301	MH 300	N/A	N/A	11.396	5.87	8.67	67.4	9.91	223.00	0.0050	36 inch	0.012	1,381.84	1,380.72	1,385.47	1,383.34
P-302	MH 302	MH 301	N/A	N/A	10.347	5.87	8.28	61.2	8.66	202.00	0.0050	36 inch	0.012	1,382.85	1,381.84	1,387.04	1,385.58
P-303	MH 303	MH 302	N/A	N/A	5.730	5.87	8.14	33.9	6.91	58.97	0.0049	30 inch	0.012	1,384.96	1,384.67	1,388.35	1,388.00
P-304	MH 304	Jct 325	N/A	N/A	4.541	5.87	7.19	26.9	5.47	77.25	0.0050	30 inch	0.012	1,386.68	1,386.29	1,390.06	1,389.78
P-304A	Jct 325	Jct 324	N/A	N/A	4.771	5.87	7.42	28.2	5.75	53.06	0.0051	30 inch	0.012	1,386.29	1,386.02	1,389.72	1,389.51
P-304B	Jct 324	Jct 323	N/A	N/A	4.944	5.87	7.57	29.3	5.96	62.67	0.0049	30 inch	0.012	1,386.02	1,385.71	1,389.45	1,389.18
P-304C	Jct 323	Jct 322	N/A	N/A	5.282	5.87	7.75	31.3	6.37	63.12	0.0051	30 inch	0.012	1,385.71	1,385.39	1,389.11	1,388.80
P-304D	Jct 322	Jct 321	N/A	N/A	5.398	5.87	7.91	31.9	6.51	81.00	0.0049	30 inch	0.012	1,385.39	1,384.99	1,388.80	1,388.38
P-304E	Jct 321	MH 303	N/A	N/A	5.730	5.87	8.12	33.9	6.91	5.99	0.0050	30 inch	0.012	1,384.99	1,384.96	1,388.38	1,388.35
P-305	MH 305	Jct-327	N/A	N/A	3.682	5.87	6.45	21.8	6.94	165.13	0.0070	24 inch	0.012	1,389.43	1,388.27	1,392.96	1,391.66
P-305A	Jct-327	MH 304	N/A	N/A	4.111	5.87	6.85	24.3	7.74	155.13	0.0070	24 inch	0.012	1,388.27	1,387.18	1,391.66	1,390.13
P-306	MH 306	MH 305	N/A	N/A	2.695	5.87	5.16	15.9	5.08	395.01	0.0036	24 inch	0.012	1,390.85	1,389.43	1,394.64	1,392.96
P-307	CB 307	MH 306	1.170	0.92	2.695	5.87	5.09	15.9	5.08	22.00	0.0036	24 inch	0.012	1,390.93	1,390.85	1,394.73	1,394.64
P-308	CB 308	CB 307	1.525	0.88	1.525	5.87	4.00	9.0	2.87	187.01	0.0036	24 inch	0.012	1,391.60	1,390.93	1,395.04	1,394.78
P-309	CB 309	CB 314	0.245	0.82	2.991	5.87	6.42	17.7	5.63	66.91	0.0042	24 inch	0.012	1,385.65	1,385.37	1,390.08	1,389.73
P-310	CB 310	CB 309	0.611	0.88	2.747	5.87	6.21	16.3	5.17	65.08	0.0070	24 inch	0.012	1,386.10	1,385.65	1,390.44	1,390.15
P-311	CB 311	CB 310	0.435	0.87	2.135	5.87	5.49	12.6	4.02	172.17	0.0070	24 inch	0.012	1,387.31	1,386.10	1,390.96	1,390.51
P-312	CB 312	CB 311	0.397	0.86	1.701	5.87	4.81	10.1	3.20	130.18	0.0070	24 inch	0.012	1,388.22	1,387.31	1,391.23	1,391.01
P-313	CB 313	CB 312	1.304	0.86	1.304	5.87	4.00	7.7	2.46	120.04	0.0070	24 inch	0.012	1,389.06	1,388.22	1,391.37	1,391.25
P-314	CB 314	CB 315	0.169	0.83	3.161	5.87	6.61	18.7	3.81	115.00	0.0043	30 inch	0.012	1,384.87	1,384.38	1,389.70	1,389.50
P-315	CB 315	MH 302	1.457	0.81	4.618	5.87	7.12	27.3	5.57	241.16	0.0043	30 inch	0.012	1,384.38	1,383.35	1,388.98	1,388.07
P-316	CB 316	Jct 316	0.410	0.82	0.410	5.87	4.00	2.4	0.85	9.78	0.5245	24 inch	0.012	1,380.09	1,374.96	1,381.65	1,381.66
P-317	CB 317	Jct 317	0.969	0.84	0.969	5.87	4.00	5.7	3.18	10.00	0.5570	24 inch	0.012	1,380.67	1,375.10	1,381.52	1,381.66
P-318	CB 318	MH 300	1.294	0.88	3.036	5.87	4.63	18.0	6.81	10.00	0.0050	24 inch	0.012	1,381.61	1,381.56	1,383.22	1,383.09
P-319	CB 319	CB 318	1.742	0.88	1.742	5.87	4.00	10.3	4.60	175.01	0.0050	24 inch	0.012	1,382.49	1,381.61	1,383.64	1,383.27
P-320	CB 320	MH 301	1.049	0.87	1.049	5.87	4.00	6.2	3.31	53.34	0.1481	24 inch	0.012	1,390.74	1,382.84	1,391.62	1,386.63
P-321	CB 321	Jct 321	0.332	0.81	0.332	5.87	4.00	2.0	0.73	22.03	0.0754	24 inch	0.012	1,386.97	1,385.31	1,388.38	1,388.38
P-322	CB 322	Jct 322	0.116	0.80	0.116	5.87	4.00	0.7	0.22	22.55	0.0319	24 inch	0.012	1,386.39	1,385.67	1,388.80	1,388.80
P-323	CB 323	Jct 323	0.338	0.86	0.338	5.87	4.00	2.0	0.64	22.94	0.0122	24 inch	0.012	1,386.25	1,385.97	1,389.14	1,389.14
P-324	CB 324	Jct 324	0.173	0.88	0.173	5.87	4.00	1.0	0.33	23.16	0.0052	24 inch	0.012	1,386.39	1,386.27	1,389.47	1,389.47
P-325	CB 325	Jct 325	0.229	0.88	0.229	5.87	4.00	1.4	0.43	23.02	0.0113	24 inch	0.012	1,386.81	1,386.55	1,389.74	1,389.74
P-326	CB 326	MH 304	0.431	0.88	0.431	5.87	4.00	2.5	0.81	22.04	0.0059	24 inch	0.012	1,387.31	1,387.18	1,390.10	1,390.09

Scenario: Base

Pipe Report

Label	Up. Node	Dn. Node	Up. Inlet Area (acres)	Up. Inlet Rat. Coef.	Up. Calc. Sys. CA (acres)	I (in/hr)	System Tc (min)	System Q (cfs)	Avg. v (ft/s)	L (ft)	S (ft/ft)	Size	Mannings n	Up. Invert (ft)	Dn. Invert (ft)	HGL In (ft)	HGL Out (ft)
P-327	CB 327	Jct-327	0.429	0.89	0.429	5.87	4.00	2.5	0.81	23.86	0.0067	24 inch	0.012	1,388.43	1,388.27	1,391.66	1,391.66
P-328	CB 328	MH 305	0.987	0.90	0.987	5.87	4.00	5.8	1.86	22.00	0.0050	24 inch	0.012	1,389.54	1,389.43	1,392.98	1,392.96
P-500	MH 500	45 ^	0.000	0.00	36.668	5.37	12.85	198.6	3.95	283.01	0.0020	96 inch	0.013	1,368.61	1,368.04	1,381.42	1,381.28
P-500A	45 ^	45^	N/A	N/A	36.668	5.17	14.05	190.9	3.80	10.00	0.0020	96 inch	0.013	1,368.04	1,368.02	1,381.14	1,381.14
P-500B	45^	Jct 500	N/A	N/A	36.668	5.16	14.09	190.7	3.79	6.00	0.0027	96 inch	0.013	1,368.02	1,368.00	1,381.00	1,381.00

Scenario: Base

Inlet Report

Label	Area (acres)	C	Inlet CA (acres)	TC (min)	Total Flow To Inlet (cfs)	Add. Q (cfs)	Struct. Depth (ft)	Rim (ft)	Sump (ft)	HGL In (ft)	HGL Out (ft)	EGL In (ft)	EGL Out (ft)	Headloss Mtd
CB 307	1.269	0.92	1.170	4.00	6.9	0.0	6.65	1,397.58	1,390.93	1,394.78	1,394.73	1,395.13	1,395.13	HEC-22 Energy
CB 308	1.726	0.88	1.525	4.00	9.0	0.0	5.50	1,397.10	1,391.60	1,395.04	1,395.04	1,395.17	1,395.17	HEC-22 Energy
CB 309	0.297	0.82	0.245	4.00	1.4	0.0	5.78	1,391.43	1,385.65	1,390.15	1,390.08	1,390.57	1,390.57	HEC-22 Energy
CB 310	0.696	0.88	0.611	4.00	3.6	0.0	5.47	1,391.57	1,386.10	1,390.51	1,390.44	1,390.86	1,390.86	HEC-22 Energy
CB 311	0.500	0.87	0.435	4.00	2.6	0.0	5.52	1,392.83	1,387.31	1,391.01	1,390.96	1,391.22	1,391.22	HEC-22 Energy
CB 312	0.460	0.86	0.397	4.00	2.3	0.0	5.54	1,393.76	1,388.22	1,391.25	1,391.23	1,391.39	1,391.39	HEC-22 Energy
CB 313	1.514	0.86	1.304	4.00	7.7	0.0	5.50	1,394.56	1,389.06	1,391.37	1,391.37	1,391.46	1,391.46	HEC-22 Energy
CB 314	0.204	0.83	0.169	4.00	1.0	0.0	6.70	1,391.57	1,384.87	1,389.73	1,389.70	1,390.22	1,389.93	HEC-22 Energy
CB 315	1.790	0.81	1.457	4.00	8.6	0.0	8.05	1,392.43	1,384.38	1,389.50	1,388.98	1,389.73	1,389.47	HEC-22 Energy
CB 316	0.498	0.82	0.410	4.00	2.4	0.0	5.80	1,385.89	1,380.09	1,381.65	1,381.65	1,381.67	1,381.67	HEC-22 Energy
CB 317	1.156	0.84	0.969	4.00	5.7	0.0	5.50	1,386.17	1,380.67	1,381.52	1,381.52	1,381.84	1,381.84	HEC-22 Energy
CB 318	1.476	0.88	1.294	4.00	7.7	0.0	6.61	1,388.22	1,381.61	1,383.27	1,383.22	1,383.90	1,383.90	HEC-22 Energy
CB 319	1.968	0.88	1.742	4.00	10.3	0.0	5.50	1,387.99	1,382.49	1,383.64	1,383.64	1,384.11	1,384.11	HEC-22 Energy
CB 320	1.208	0.87	1.049	4.00	6.2	0.0	5.50	1,396.24	1,390.74	1,391.62	1,391.62	1,391.96	1,391.96	HEC-22 Energy
CB 321	0.410	0.81	0.332	4.00	2.0	0.0	5.50	1,392.47	1,386.97	1,388.38	1,388.38	1,388.39	1,388.39	HEC-22 Energy
CB 322	0.145	0.80	0.116	4.00	0.7	0.0	5.50	1,391.89	1,386.39	1,388.80	1,388.80	1,388.80	1,388.80	HEC-22 Energy
CB 323	0.391	0.86	0.338	4.00	2.0	0.0	5.50	1,391.75	1,386.25	1,389.14	1,389.14	1,389.15	1,389.15	HEC-22 Energy
CB 324	0.197	0.88	0.173	4.00	1.0	0.0	5.50	1,391.89	1,386.39	1,389.47	1,389.47	1,389.47	1,389.47	HEC-22 Energy
CB 325	0.261	0.88	0.229	4.00	1.4	0.0	5.42	1,392.23	1,386.81	1,389.74	1,389.74	1,389.75	1,389.75	HEC-22 Energy
CB 326	0.490	0.88	0.431	4.00	2.5	0.0	5.50	1,392.81	1,387.31	1,390.10	1,390.10	1,390.11	1,390.11	HEC-22 Energy
CB 327	0.483	0.89	0.429	4.00	2.5	0.0	5.50	1,393.93	1,388.43	1,391.66	1,391.66	1,391.67	1,391.67	HEC-22 Energy
CB 328	1.101	0.90	0.987	4.00	5.8	0.0	5.50	1,395.04	1,389.54	1,392.98	1,392.98	1,393.03	1,393.03	HEC-22 Energy
MH 500	0.000	0.00	0.000	4.00	0.0	0.0	17.47	1,386.08	1,368.61	1,381.62	1,381.42	1,381.66	1,381.66	HEC-22 Energy

Scenario: Base

DOT Report

Label	-Node- Up. Dn.	v In (ft/s)	v Out (ft/s)	v Head In (ft)	v Head Out (ft)	Avg. v (ft/s)	Up. Calc. Sys. CA (acres)	Section Disch Cap. (cfs)	Section Shape Size	L (ft)	-Ground- Up. Dn. (ft)	-Invert- Up. Dn. (ft)	-HGL- Up. Dn. (ft)	-EGL- Up. Dn. (ft)
P-300	MH 300	1.70	1.70	0.04	0.04	1.70	14.432	85.4	Circular	334.00	1,388.40	1,369.38	1,381.66	1,381.71
	Jct 317							377.0	96 inch		1,386.35	1,368.72	1,381.63	1,381.67
P-300A	Jct 317	1.69	1.69	0.04	0.04	1.69	15.401	84.9	Circular	46.01	1,386.35	1,368.72	1,381.63	1,381.67
	Jct 316							378.7	96 inch		1,386.07	1,368.63	1,381.62	1,381.66
P-300B	Jct 316	1.71	1.71	0.05	0.05	1.71	15.812	85.9	Circular	8.00	1,386.07	1,368.63	1,381.62	1,381.66
	MH 500							378.7	96 inch		1,386.08	1,368.61	1,381.62	1,381.66
P-301	MH 301	9.54	10.29	1.41	1.65	9.91	11.396	67.4	Circular	223.00	1,389.77	1,381.84	1,385.47	1,386.89
	MH 300							51.1	36 inch		1,388.40	1,380.72	1,383.34	1,384.99
P-302	MH 302	8.66	8.66	1.17	1.17	8.66	10.347	61.2	Circular	202.00	1,392.16	1,382.85	1,387.04	1,388.20
	MH 301							51.2	36 inch		1,389.77	1,381.84	1,385.58	1,386.75
P-303	MH 303	6.91	6.91	0.74	0.74	6.91	5.730	33.9	Circular	58.97	1,395.52	1,384.96	1,388.35	1,389.09
	MH 302							31.2	30 inch		1,392.16	1,384.67	1,388.00	1,388.74
P-304	MH 304	5.47	5.47	0.47	0.47	5.47	4.541	26.9	Circular	77.25	1,395.56	1,386.68	1,390.06	1,390.53
	Jct 325							31.6	30 inch		1,395.85	1,386.29	1,389.78	1,390.24
P-304A	Jct 325	5.75	5.75	0.51	0.51	5.75	4.771	28.2	Circular	53.06	1,395.85	1,386.29	1,389.72	1,390.24
	Jct 324							31.7	30 inch		1,395.53	1,386.02	1,389.51	1,390.02
P-304B	Jct 324	5.96	5.96	0.55	0.55	5.96	4.944	29.3	Circular	62.67	1,395.53	1,386.02	1,389.45	1,390.00
	Jct 323							31.3	30 inch		1,395.04	1,385.71	1,389.18	1,389.73
P-304C	Jct 323	6.37	6.37	0.63	0.63	6.37	5.282	31.3	Circular	63.12	1,395.04	1,385.71	1,389.11	1,389.74
	Jct 322							31.6	30 inch		1,395.10	1,385.39	1,388.80	1,389.43
P-304D	Jct 322	6.51	6.51	0.66	0.66	6.51	5.398	31.9	Circular	81.00	1,395.10	1,385.39	1,388.80	1,389.46
	Jct 321							31.2	30 inch		1,395.47	1,384.99	1,388.38	1,389.04
P-304E	Jct 321	6.91	6.91	0.74	0.74	6.91	5.730	33.9	Circular	5.99	1,395.47	1,384.99	1,388.38	1,389.12
	MH 303							31.4	30 inch		1,395.52	1,384.96	1,388.35	1,389.09
P-305	MH 305	6.94	6.94	0.75	0.75	6.94	3.682	21.8	Circular	165.13	1,397.00	1,389.43	1,392.96	1,393.71
	Jct-327							20.5	24 inch		1,397.00	1,388.27	1,391.66	1,392.41
P-305A	Jct-327	7.74	7.74	0.93	0.93	7.74	4.111	24.3	Circular	155.13	1,397.00	1,388.27	1,391.66	1,392.59
	MH 304							20.5	24 inch		1,395.56	1,387.18	1,390.13	1,391.06
P-306	MH 306	5.08	5.08	0.40	0.40	5.08	2.695	15.9	Circular	395.01	1,398.48	1,390.85	1,394.64	1,395.04
	MH 305							14.7	24 inch		1,397.00	1,389.43	1,392.96	1,393.36
P-307	CB 307	5.08	5.08	0.40	0.40	5.08	2.695	15.9	Circular	22.00	1,397.58	1,390.93	1,394.73	1,395.13
	MH 306							14.8	24 inch		1,398.48	1,390.85	1,394.64	1,395.04
P-308	CB 308	2.87	2.87	0.13	0.13	2.87	1.525	9.0	Circular	187.01	1,397.10	1,391.60	1,395.04	1,395.17
	CB 307							14.7	24 inch		1,397.58	1,390.93	1,394.78	1,394.91
P-309	CB 309	5.63	5.63	0.49	0.49	5.63	2.991	17.7	Circular	66.91	1,391.43	1,385.65	1,390.08	1,390.57

Scenario: Base

DOT Report

Label	-Node- Up. Dn.	v In (ft/s)	v Out (ft/s)	v Head In (ft)	v Head Out (ft)	Avg. v (ft/s)	Up. Calc. Sys. CA (acres)	Section Disch Cap. (cfs)	Section Shape Size	L (ft)	-Ground- Up. Dn. (ft)	-Invert- Up. Dn. (ft)	-HGL- Up. Dn. (ft)	-EGL- Up. Dn. (ft)
	CB 314							15.9	24 inch		1,391.57	1,385.37	1,389.73	1,390.22
P-310	CB 310	5.17	5.17	0.42	0.42	5.17	2.747	16.3	Circular	65.08	1,391.57	1,386.10	1,390.44	1,390.86
	CB 309							20.5	24 inch		1,391.43	1,385.65	1,390.15	1,390.57
P-311	CB 311	4.02	4.02	0.25	0.25	4.02	2.135	12.6	Circular	172.17	1,392.83	1,387.31	1,390.96	1,391.22
	CB 310							20.5	24 inch		1,391.57	1,386.10	1,390.51	1,390.76
P-312	CB 312	3.20	3.20	0.16	0.16	3.20	1.701	10.1	Circular	130.18	1,393.76	1,388.22	1,391.23	1,391.39
	CB 311							20.5	24 inch		1,392.83	1,387.31	1,391.01	1,391.17
P-313	CB 313	2.46	2.46	0.09	0.09	2.46	1.304	7.7	Circular	120.04	1,394.56	1,389.06	1,391.37	1,391.46
	CB 312							20.5	24 inch		1,393.76	1,388.22	1,391.25	1,391.34
P-314	CB 314	3.81	3.81	0.23	0.23	3.81	3.161	18.7	Circular	115.00	1,391.57	1,384.87	1,389.70	1,389.93
	CB 315							29.0	30 inch		1,392.43	1,384.38	1,389.50	1,389.73
P-315	CB 315	5.57	5.57	0.48	0.48	5.57	4.618	27.3	Circular	241.16	1,392.43	1,384.38	1,388.98	1,389.47
	MH 302							29.0	30 inch		1,392.16	1,383.35	1,388.07	1,388.55
P-316	CB 316	0.92	0.77	0.01	0.01	0.85	0.410	2.4	Circular	9.78	1,385.89	1,380.09	1,381.65	1,381.67
	Jct 316							177.5	24 inch		1,386.07	1,374.96	1,381.66	1,381.67
P-317	CB 317	4.54	1.83	0.32	0.05	3.18	0.969	5.7	Circular	10.00	1,386.17	1,380.67	1,381.52	1,381.84
	Jct 317							182.9	24 inch		1,386.35	1,375.10	1,381.66	1,381.71
P-318	CB 318	6.64	6.98	0.69	0.76	6.81	3.036	18.0	Circular	10.00	1,388.22	1,381.61	1,383.22	1,383.90
	MH 300							17.3	24 inch		1,388.40	1,381.56	1,383.09	1,383.84
P-319	CB 319	5.52	3.69	0.47	0.21	4.60	1.742	10.3	Circular	175.01	1,387.99	1,382.49	1,383.64	1,384.11
	CB 318							17.4	24 inch		1,388.22	1,381.61	1,383.27	1,383.48
P-320	CB 320	4.65	1.98	0.34	0.06	3.31	1.049	6.2	Circular	53.34	1,396.24	1,390.74	1,391.62	1,391.96
	MH 301							94.3	24 inch		1,389.77	1,382.84	1,386.63	1,386.69
P-321	CB 321	0.83	0.62	0.01	0.01	0.73	0.332	2.0	Circular	22.03	1,392.47	1,386.97	1,388.38	1,388.39
	Jct 321							67.3	24 inch		1,395.47	1,385.31	1,388.38	1,388.39
P-322	CB 322	0.22	0.22	7.42e-4	7.42e-4	0.22	0.116	0.7	Circular	22.55	1,391.89	1,386.39	1,388.80	1,388.80
	Jct 322							43.8	24 inch		1,395.10	1,385.67	1,388.80	1,388.80
P-323	CB 323	0.64	0.64	0.01	0.01	0.64	0.338	2.0	Circular	22.94	1,391.75	1,386.25	1,389.14	1,389.15
	Jct 323							27.1	24 inch		1,395.04	1,385.97	1,389.14	1,389.15
P-324	CB 324	0.33	0.33	1.65e-3	1.65e-3	0.33	0.173	1.0	Circular	23.16	1,391.89	1,386.39	1,389.47	1,389.47
	Jct 324							17.6	24 inch		1,395.53	1,386.27	1,389.47	1,389.47
P-325	CB 325	0.43	0.43	2.9e-3	2.9e-3	0.43	0.229	1.4	Circular	23.02	1,392.23	1,386.81	1,389.74	1,389.75
	Jct 325							26.0	24 inch		1,395.85	1,386.55	1,389.74	1,389.75
P-326	CB 326	0.81	0.81	0.01	0.01	0.81	0.431	2.5	Circular	22.04	1,392.81	1,387.31	1,390.10	1,390.11
	MH 304							18.8	24 inch		1,395.56	1,387.18	1,390.09	1,390.10

Scenario: Base

DOT Report

Label	-Node- Up. Dn.	v In (ft/s)	v Out (ft/s)	v Head In (ft)	v Head Out (ft)	Avg. v (ft/s)	Up. Calc. Sys. CA (acres)	Section Disch Cap. (cfs)	Section Shape Size	L (ft)	-Ground- Up. Dn. (ft)	-Invert- Up. Dn. (ft)	-HGL- Up. Dn. (ft)	-EGL- Up. Dn. (ft)
P-327	CB 327	0.81	0.81	0.01	0.01	0.81	0.429	2.5	Circular	23.86	1,393.93	1,388.43	1,391.66	1,391.67
	Jct-327							20.1	24 inch		1,397.00	1,388.27	1,391.66	1,391.67
P-328	CB 328	1.86	1.86	0.05	0.05	1.86	0.987	5.8	Circular	22.00	1,395.04	1,389.54	1,392.98	1,393.03
	MH 305							17.3	24 inch		1,397.00	1,389.43	1,392.96	1,393.02
P-500	MH 500	3.95	3.95	0.24	0.24	3.95	36.668	198.6	Circular	283.01	1,386.08	1,368.61	1,381.42	1,381.66
	45 ^							410.7	96 inch		1,408.71	1,368.04	1,381.28	1,381.52
P-500A	45 ^	3.80	3.80	0.22	0.22	3.80	36.668	190.9	Circular	10.00	1,408.71	1,368.04	1,381.14	1,381.37
	45^							407.9	96 inch		1,408.98	1,368.02	1,381.14	1,381.36
P-500B	45^	3.79	3.79	0.22	0.22	3.79	36.668	190.7	Circular	6.00	1,408.98	1,368.02	1,381.00	1,381.23
	Jct 500							471.0	96 inch		1,409.33	1,368.00	1,381.00	1,381.22

Scenario: Base

Pipe Report

Label	Up. Node	Dn. Node	Up. Inlet Area (acres)	Up. Inlet Rat. Coef.	Up. Calc. Sys. CA (acres)	I (in/hr)	System Tc (min)	System Q (cfs)	Avg. v (ft/s)	L (ft)	S (ft/ft)	Size	Mannings n	Up. Invert (ft)	Dn. Invert (ft)	HGL In (ft)	HGL Out (ft)
P-421	MH 421	Jct 421	N/A	N/A	0.00	0.00	5.59	110.00	6.92	30.71	0.001303	54 inch	0.014	1,392.04	1,392.00	1,397.60	1,397.49
P-422	MH 422	MH 421	N/A	N/A	0.00	0.00	4.65	110.00	6.92	391.81	0.001174	54 inch	0.014	1,392.50	1,392.04	1,399.45	1,398.03
P-423	MH 423	MH 422	N/A	N/A	0.00	0.00	3.70	110.00	6.92	392.03	0.001199	54 inch	0.014	1,392.97	1,392.50	1,400.92	1,399.50
P-424	MH 424	MH 423	N/A	N/A	0.00	0.00	2.32	110.00	6.92	574.21	0.001184	54 inch	0.014	1,393.65	1,392.97	1,403.10	1,401.02
P-425	MH 425	MH 424	N/A	N/A	0.00	0.00	0.95	110.00	6.92	567.33	0.001181	54 inch	0.014	1,394.32	1,393.65	1,405.21	1,403.15
P-426	MH 426	MH 425	N/A	N/A	0.00	0.00	0.17	110.00	6.92	324.61	0.001171	54 inch	0.014	1,394.70	1,394.32	1,406.49	1,405.31
P-427	MH 427	MH 426	0.00	0.00	0.00	0.00	0.00	110.00	6.92	69.85	0.001145	54 inch	0.014	1,394.78	1,394.70	1,407.39	1,407.14

Scenario: Base

Inlet Report

Label	Area (acres)	C	Inlet CA (acres)	TC (min)	Total Flow To Inlet (cfs)	Add. Q (cfs)	Struct. Depth (ft)	Rim (ft)	Sump (ft)	HGL In (ft)	HGL Out (ft)	EGL In (ft)	EGL Out (ft)	Headloss Mtd
MH 427	0.00	0.00	0.00	0.00	0.00	0.00	15.64	1,410.42	1,394.78	1,407.39	1,407.39	1,408.14	1,408.14	HEC-22 Energy

Scenario: Base

DOT Report

Label	-Node- Up. Dn.	v In (ft/s)	v Out (ft/s)	v Head In (ft)	v Head Out (ft)	Avg. v (ft/s)	Up. Calc. Sys. CA (acres)	Section Disch Cap. (cfs)	Section Shape Size	L (ft)	-Ground- Up. Dn. (ft)	-Invert- Up. Dn. (ft)	-HGL- Up. Dn. (ft)	-EGL- Up. Dn. (ft)
P-421	MH 421	6.92	6.92	0.74	0.74	6.92	0.00	110.00	Circular	30.71	1,400.08	1,392.04	1,397.60	1,398.34
	Jct 421							65.90	54 inch		1,400.00	1,392.00	1,397.49	1,398.23
P-422	MH 422	6.92	6.92	0.74	0.74	6.92	0.00	110.00	Circular	391.81	1,401.18	1,392.50	1,399.45	1,400.20
	MH 421							62.56	54 inch		1,400.08	1,392.04	1,398.03	1,398.77
P-423	MH 423	6.92	6.92	0.74	0.74	6.92	0.00	110.00	Circular	392.03	1,402.42	1,392.97	1,400.92	1,401.66
	MH 422							63.22	54 inch		1,401.18	1,392.50	1,399.50	1,400.24
P-424	MH 424	6.92	6.92	0.74	0.74	6.92	0.00	110.00	Circular	574.21	1,404.96	1,393.65	1,403.10	1,403.84
	MH 423							62.84	54 inch		1,402.42	1,392.97	1,401.02	1,401.76
P-425	MH 425	6.92	6.92	0.74	0.74	6.92	0.00	110.00	Circular	567.33	1,407.59	1,394.32	1,405.21	1,405.96
	MH 424							62.75	54 inch		1,404.96	1,393.65	1,403.15	1,403.90
P-426	MH 426	6.92	6.92	0.74	0.74	6.92	0.00	110.00	Circular	324.61	1,411.36	1,394.70	1,406.49	1,407.23
	MH 425							62.47	54 inch		1,407.59	1,394.32	1,405.31	1,406.05
P-427	MH 427	6.92	6.92	0.74	0.74	6.92	0.00	110.00	Circular	69.85	1,410.42	1,394.78	1,407.39	1,408.14
	MH 426							61.79	54 inch		1,411.36	1,394.70	1,407.14	1,407.88

Scenario: Base

Pipe Report

Label	Up. Node	Dn. Node	Up. Inlet Area (acres)	Up. Inlet Rat. Coef.	Up. Calc. Sys. CA (acres)	I (in/hr)	System Tc (min)	System Q (cfs)	Avg. v (ft/s)	L (ft)	S (ft/ft)	Size	Mannings n	Up. Invert (ft)	Dn. Invert (ft)	HGL In (ft)	HGL Out (ft)
P-501	MH 501	MH 500	N/A	N/A	20.856	5.77	10.56	121.34	2.41	195.00	0.002000	96 inch	0.014	1,369.00	1,368.61	1,381.66	1,381.62
P-502	MH 502	Jct 516	N/A	N/A	19.325	5.87	9.78	114.34	5.82	178.03	0.004999	60 inch	0.014	1,373.40	1,372.51	1,382.43	1,382.03
P-502A	Jct 516	MH 501	N/A	N/A	20.856	5.82	10.29	122.34	6.23	101.99	0.005000	60 inch	0.014	1,372.51	1,372.00	1,382.00	1,381.74
P-503	MH 503	JCT 524	N/A	N/A	16.219	5.87	8.96	95.97	6.03	101.64	0.005018	54 inch	0.014	1,375.42	1,374.91	1,383.43	1,383.15
P-503A	JCT 524	Jct 523	N/A	N/A	16.569	5.87	9.24	98.04	6.16	160.31	0.004990	54 inch	0.014	1,374.91	1,374.11	1,383.12	1,382.65
P-503B	Jct 523	MH 502	N/A	N/A	17.279	5.87	9.67	102.24	6.43	41.96	0.005005	54 inch	0.014	1,374.11	1,373.90	1,382.61	1,382.48
P-504	MH 504	MH 503	N/A	N/A	13.570	5.87	8.23	80.29	8.35	365.45	0.009933	42 inch	0.014	1,380.05	1,376.42	1,386.21	1,383.51
P-505	MH 505	Jct 530	N/A	N/A	11.078	5.87	7.85	65.55	9.27	37.97	0.011588	36 inch	0.012	1,383.18	1,382.74	1,388.92	1,388.60
P-505A	Jct 530	Jct 529	N/A	N/A	11.440	5.87	7.92	67.69	9.58	98.86	0.011633	36 inch	0.012	1,382.74	1,381.59	1,388.42	1,387.55
P-505B	Jct 529	MH 504	N/A	N/A	12.879	5.87	8.09	76.21	10.78	89.92	0.011566	36 inch	0.012	1,381.59	1,380.55	1,387.36	1,386.36
P-506	MH 506	MH 505	N/A	N/A	8.404	5.87	7.04	49.72	7.03	83.88	0.011564	36 inch	0.012	1,384.15	1,383.18	1,390.37	1,389.97
P-507	MH 507	MH 506	N/A	N/A	8.017	5.87	6.87	47.44	9.66	99.10	0.011604	30 inch	0.012	1,385.80	1,384.65	1,392.11	1,390.98
P-508	MH 508	MH 507	N/A	N/A	5.762	5.87	6.22	34.10	6.95	272.18	0.016460	30 inch	0.012	1,390.28	1,385.80	1,393.64	1,392.04
P-509	CB 509	MH 508	2.986	0.87	5.067	5.87	5.66	29.98	9.54	319.21	0.014661	24 inch	0.012	1,395.46	1,390.78	1,398.55	1,393.77
P-510	MH 510	CB 509	N/A	N/A	1.227	5.87	3.79	7.26	3.60	403.85	0.017754	24 inch	0.012	1,402.63	1,395.46	1,403.59	1,399.12
P-511	CB 511	MH 510	1.227	0.92	1.227	5.87	3.00	7.26	4.40	208.99	0.008804	24 inch	0.012	1,404.47	1,402.63	1,405.43	1,403.77
P-512	CB 512	CB 511	N/A	N/A	0.000	0.00	0.00	0.00	0.00	73.00	0.006027	24 inch	0.012	1,404.91	1,404.47	1,405.61	1,405.61
P-516	CB 516	Jct 516	1.531	0.84	1.531	5.87	3.00	9.06	2.88	10.07	0.388282	24 inch	0.012	1,379.50	1,375.59	1,382.61	1,382.60
P-517	CB 517	MH 502	0.221	0.83	2.046	5.87	5.10	12.11	3.85	10.00	0.013000	24 inch	0.012	1,378.35	1,378.22	1,382.96	1,382.94
P-518	CB 518	CB 517	0.246	0.95	1.825	5.87	4.55	10.80	3.44	114.21	0.012871	24 inch	0.012	1,379.82	1,378.35	1,383.29	1,383.07
P-519	CB 519	CB 518	0.058	0.95	1.190	5.87	3.37	7.04	2.24	57.21	0.005768	24 inch	0.012	1,380.15	1,379.82	1,383.45	1,383.40
P-520	CB 520	CB 519	1.132	0.70	1.132	5.87	3.00	6.70	3.45	77.00	0.032597	24 inch	0.012	1,382.66	1,380.15	1,383.58	1,383.53
P-521	CB 521	CB 518	0.389	0.95	0.389	5.87	3.00	2.30	0.73	68.25	0.004982	24 inch	0.012	1,380.16	1,379.82	1,383.34	1,383.33
P-523	CB 523	Jct 523	0.710	0.83	0.710	5.87	3.00	4.20	1.34	11.23	0.178985	24 inch	0.012	1,378.03	1,376.02	1,383.26	1,383.26
P-524	CB 524	JCT 524	0.350	0.83	0.350	5.87	3.00	2.07	0.66	12.30	0.141463	24 inch	0.012	1,378.35	1,376.61	1,383.70	1,383.70
P-525	CB 525	MH 503	1.962	0.86	2.649	5.87	4.42	15.67	4.99	10.00	0.022000	24 inch	0.012	1,378.89	1,378.67	1,384.03	1,383.98
P-526	CB 526	CB 525	0.687	0.95	0.687	5.87	3.00	4.06	1.29	110.00	0.022364	24 inch	0.012	1,381.35	1,378.89	1,384.12	1,384.09
P-527	CB 527	MH 504	0.691	0.95	0.691	5.87	3.00	4.09	1.41	120.00	0.034750	24 inch	0.012	1,385.72	1,381.55	1,387.32	1,387.29
P-529	CB 529	Jct 529	1.440	0.85	1.440	5.87	3.00	8.52	2.71	63.42	0.051246	24 inch	0.012	1,385.40	1,382.15	1,389.39	1,389.32
P-530	CB 530	Jct 530	0.361	0.79	0.361	5.87	3.00	2.14	0.68	53.21	0.033828	24 inch	0.012	1,385.08	1,383.28	1,389.96	1,389.95
P-531	CB 531	Jct 534	0.136	0.95	1.982	5.87	7.15	11.73	5.01	99.63	0.042859	24 inch	0.012	1,393.39	1,389.12	1,394.62	1,390.77
P-531A	Jct 534	MH 505	N/A	N/A	2.675	5.87	7.48	15.83	5.49	120.00	0.042750	24 inch	0.012	1,389.12	1,383.99	1,390.70	1,390.36
P-532	CB 532	CB 531	0.099	0.95	0.811	5.87	3.62	4.80	3.23	100.17	0.004992	24 inch	0.012	1,393.89	1,393.39	1,394.66	1,394.72
P-533	CB 533	CB 532	0.712	0.95	0.712	5.87	3.00	4.22	3.89	145.47	0.005568	24 inch	0.012	1,394.70	1,393.89	1,395.42	1,394.68
P-534	CB 534	Jct 534	0.693	0.95	0.693	5.87	3.00	4.10	2.79	144.05	0.010205	24 inch	0.012	1,390.59	1,389.12	1,391.30	1,390.78

Scenario: Base

Pipe Report

Label	Up. Node	Dn. Node	Up. Inlet Area (acres)	Up. Inlet Rat. Coef.	Up. Calc. Sys. CA (acres)	I (in/hr)	System Tc (min)	System Q (cfs)	Avg. v (ft/s)	L (ft)	S (ft/ft)	Size	Mannings n	Up. Invert (ft)	Dn. Invert (ft)	HGL In (ft)	HGL Out (ft)
P-535	CB 535	CB 531	0.095	0.95	0.095	5.87	3.00	0.56	0.40	100.12	0.004994	24 inch	0.012	1,393.89	1,393.39	1,394.63	1,394.63
P-536	CB 536	CB 531	0.940	0.70	0.940	5.87	3.00	5.56	3.52	39.06	0.052227	24 inch	0.012	1,395.43	1,393.39	1,396.26	1,394.71
P-537	CB 537	MH 506	0.386	0.86	0.386	5.87	3.00	2.29	0.73	10.00	0.075000	24 inch	0.012	1,385.40	1,384.65	1,390.76	1,390.76
P-538	CB 538	MH 507	2.255	0.86	2.255	5.87	3.00	13.34	4.25	10.00	0.055000	24 inch	0.012	1,386.35	1,385.80	1,392.07	1,392.04
P-539	CB 539	MH 508	0.695	0.95	0.695	5.87	3.00	4.11	2.71	148.55	0.028475	24 inch	0.012	1,394.51	1,390.28	1,395.22	1,393.71
P-540	CB 540	CB 509	0.854	0.95	0.854	5.87	3.00	5.05	2.18	124.49	0.017110	24 inch	0.012	1,397.59	1,395.46	1,398.73	1,398.74

Scenario: Base

Inlet Report

Label	Area (acres)	C	Inlet CA (acres)	TC (min)	Total Flow To Inlet (cfs)	Add. Q (cfs)	Struct. Depth (ft)	Rim (ft)	Sump (ft)	HGL In (ft)	HGL Out (ft)	EGL In (ft)	EGL Out (ft)	Headloss Mtd
CB 509	3.440	0.87	2.986	3.00	17.67	0.00	5.50	1,400.96	1,395.46	1,398.74	1,398.55	1,399.96	1,399.96	HEC-22 Energy
CB 511	1.338	0.92	1.227	3.00	7.26	0.00	5.50	1,409.97	1,404.47	1,405.61	1,405.43	1,405.80	1,405.80	HEC-22 Energy
CB 516	1.824	0.84	1.531	3.00	9.06	0.00	5.50	1,385.00	1,379.50	1,382.61	1,382.61	1,382.74	1,382.74	HEC-22 Energy
CB 517	0.265	0.83	0.221	3.00	1.31	0.00	5.50	1,383.85	1,378.35	1,383.07	1,382.96	1,383.25	1,383.19	HEC-22 Energy
CB 518	0.259	0.95	0.246	3.00	1.46	0.00	5.68	1,385.50	1,379.82	1,383.33	1,383.29	1,383.47	1,383.47	HEC-22 Energy
CB 519	0.061	0.95	0.058	3.00	0.34	0.00	5.50	1,385.65	1,380.15	1,383.53	1,383.45	1,383.60	1,383.53	HEC-22 Energy
CB 520	1.617	0.70	1.132	3.00	6.70	0.00	4.00	1,386.66	1,382.66	1,383.58	1,383.58	1,383.93	1,383.93	HEC-22 Energy
CB 521	0.410	0.95	0.389	3.00	2.30	0.00	5.50	1,385.66	1,380.16	1,383.34	1,383.34	1,383.35	1,383.35	HEC-22 Energy
CB 523	0.854	0.83	0.710	3.00	4.20	0.00	5.50	1,383.53	1,378.03	1,383.26	1,383.26	1,383.29	1,383.29	HEC-22 Energy
CB 524	0.419	0.83	0.350	3.00	2.07	0.00	5.50	1,383.85	1,378.35	1,383.70	1,383.70	1,383.71	1,383.71	HEC-22 Energy
CB 525	2.269	0.86	1.962	3.00	11.61	0.00	5.50	1,384.39	1,378.89	1,384.09	1,384.03	1,384.41	1,384.41	HEC-22 Energy
CB 526	0.723	0.95	0.687	3.00	4.06	0.00	5.50	1,386.85	1,381.35	1,384.12	1,384.12	1,384.14	1,384.14	HEC-22 Energy
CB 527	0.727	0.95	0.691	3.00	4.09	0.00	5.50	1,391.22	1,385.72	1,387.32	1,387.32	1,387.35	1,387.35	HEC-22 Energy
CB 529	1.699	0.85	1.440	3.00	8.52	0.00	5.50	1,390.90	1,385.40	1,389.39	1,389.39	1,389.51	1,389.51	HEC-22 Energy
CB 530	0.456	0.79	0.361	3.00	2.14	0.00	5.50	1,390.58	1,385.08	1,389.96	1,389.96	1,389.96	1,389.96	HEC-22 Energy
CB 531	0.143	0.95	0.136	3.00	0.80	0.00	5.83	1,399.22	1,393.39	1,394.63	1,394.62	1,395.14	1,395.14	HEC-22 Energy
CB 532	0.104	0.95	0.099	3.00	0.58	0.00	5.50	1,399.39	1,393.89	1,394.68	1,394.66	1,394.95	1,394.95	HEC-22 Energy
CB 533	0.750	0.95	0.712	3.00	4.22	0.00	5.50	1,400.20	1,394.70	1,395.42	1,395.42	1,395.69	1,395.69	HEC-22 Energy
CB 534	0.729	0.95	0.693	3.00	4.10	0.00	5.50	1,396.09	1,390.59	1,391.30	1,391.30	1,391.56	1,391.56	HEC-22 Energy
CB 535	0.100	0.95	0.095	3.00	0.56	0.00	5.50	1,399.39	1,393.89	1,394.63	1,394.63	1,394.64	1,394.64	HEC-22 Energy
CB 536	1.343	0.70	0.940	3.00	5.56	0.00	4.00	1,399.43	1,395.43	1,396.26	1,396.26	1,396.58	1,396.58	HEC-22 Energy
CB 537	0.450	0.86	0.386	3.00	2.29	0.00	5.50	1,390.90	1,385.40	1,390.76	1,390.76	1,390.77	1,390.77	HEC-22 Energy
CB 538	2.609	0.86	2.255	3.00	13.34	0.00	5.50	1,391.85	1,386.35	1,391.85	1,391.85	1,392.13	1,392.13	HEC-22 Energy
CB 539	0.732	0.95	0.695	3.00	4.11	0.00	5.50	1,400.01	1,394.51	1,395.22	1,395.22	1,395.48	1,395.48	HEC-22 Energy
CB 540	0.899	0.95	0.854	3.00	5.05	0.00	6.66	1,404.25	1,397.59	1,398.73	1,398.73	1,398.84	1,398.84	HEC-22 Energy

Scenario: Base

DOT Report

Label	-Node- Up. Dn.	v In (ft/s)	v Out (ft/s)	v Head In (ft)	v Head Out (ft)	Avg. v (ft/s)	Up. Calc. Sys. CA (acres)	Section Disch Cap. (cfs)	Section Shape Size	L (ft)	-Ground- Up. Dn. (ft)	-Invert- Up. Dn. (ft)	-HGL- Up. Dn. (ft)	-EGL- Up. Dn. (ft)
P-501	MH 501	2.41	2.41	0.09	0.09	2.41	20.856	121.34	Circular	195.00	1,385.80	1,369.00	1,381.66	1,381.75
	MH 500							378.74	96 inch		1,386.08	1,368.61	1,381.62	1,381.71
P-502	MH 502	5.82	5.82	0.53	0.53	5.82	19.325	114.34	Circular	178.03	1,384.04	1,373.40	1,382.43	1,382.96
	Jct 516							170.98	60 inch		1,385.18	1,372.51	1,382.03	1,382.56
P-502A	Jct 516	6.23	6.23	0.60	0.60	6.23	20.856	122.34	Circular	101.99	1,385.18	1,372.51	1,382.00	1,382.60
	MH 501							171.01	60 inch		1,385.80	1,372.00	1,381.74	1,382.34
P-503	MH 503	6.03	6.03	0.57	0.57	6.03	16.219	95.97	Circular	101.64	1,384.57	1,375.42	1,383.43	1,384.00
	JCT 524							129.34	54 inch		1,383.98	1,374.91	1,383.15	1,383.72
P-503A	JCT 524	6.16	6.16	0.59	0.59	6.16	16.569	98.04	Circular	160.31	1,383.98	1,374.91	1,383.12	1,383.71
	Jct 523							128.99	54 inch		1,383.65	1,374.11	1,382.65	1,383.24
P-503B	Jct 523	6.43	6.43	0.64	0.64	6.43	17.279	102.24	Circular	41.96	1,383.65	1,374.11	1,382.61	1,383.25
	MH 502							129.17	54 inch		1,384.04	1,373.90	1,382.48	1,383.12
P-504	MH 504	8.35	8.35	1.08	1.08	8.35	13.570	80.29	Circular	365.45	1,388.52	1,380.05	1,386.21	1,387.29
	MH 503							93.10	42 inch		1,384.57	1,376.42	1,383.51	1,384.59
P-505	MH 505	9.27	9.27	1.34	1.34	9.27	11.078	65.55	Circular	37.97	1,391.52	1,383.18	1,388.92	1,390.25
	Jct 530							77.78	36 inch		1,390.98	1,382.74	1,388.60	1,389.94
P-505A	Jct 530	9.58	9.58	1.43	1.43	9.58	11.440	67.69	Circular	98.86	1,390.98	1,382.74	1,388.42	1,389.85
	Jct 529							77.93	36 inch		1,389.64	1,381.59	1,387.55	1,388.98
P-505B	Jct 529	10.78	10.78	1.81	1.81	10.78	12.879	76.21	Circular	89.92	1,389.64	1,381.59	1,387.36	1,389.17
	MH 504							77.70	36 inch		1,388.52	1,380.55	1,386.36	1,388.17
P-506	MH 506	7.03	7.03	0.77	0.77	7.03	8.404	49.72	Circular	83.88	1,391.08	1,384.15	1,390.37	1,391.14
	MH 505							77.70	36 inch		1,391.52	1,383.18	1,389.97	1,390.74
P-507	MH 507	9.66	9.66	1.45	1.45	9.66	8.017	47.44	Circular	99.10	1,392.04	1,385.80	1,392.11	1,393.56
	MH 506							47.86	30 inch		1,391.08	1,384.65	1,390.98	1,392.43
P-508	MH 508	6.95	6.95	0.75	0.75	6.95	5.762	34.10	Circular	272.18	1,396.28	1,390.28	1,393.64	1,394.39
	MH 507							57.01	30 inch		1,392.04	1,385.80	1,392.04	1,392.79
P-509	CB 509	9.54	9.54	1.42	1.42	9.54	5.067	29.98	Circular	319.21	1,400.96	1,395.46	1,398.55	1,399.96
	MH 508							29.67	24 inch		1,396.28	1,390.78	1,393.77	1,395.18
P-510	MH 510	4.89	2.31	0.37	0.08	3.60	1.227	7.26	Circular	403.85	1,408.13	1,402.63	1,403.59	1,403.96
	CB 509							32.65	24 inch		1,400.96	1,395.46	1,399.12	1,399.20
P-511	CB 511	4.89	3.91	0.37	0.24	4.40	1.227	7.26	Circular	208.99	1,409.97	1,404.47	1,405.43	1,405.80
	MH 510							22.99	24 inch		1,408.13	1,402.63	1,403.77	1,404.01
P-512	CB 512	0.00	0.00	0.00	0.00	0.00	0.000	0.00	Circular	73.00	1,410.41	1,404.91	1,405.61	1,405.61
	CB 511							19.03	24 inch		1,409.97	1,404.47	1,405.61	1,405.61
P-516	CB 516	2.88	2.88	0.13	0.13	2.88	1.531	9.06	Circular	10.07	1,385.00	1,379.50	1,382.61	1,382.74

Scenario: Base

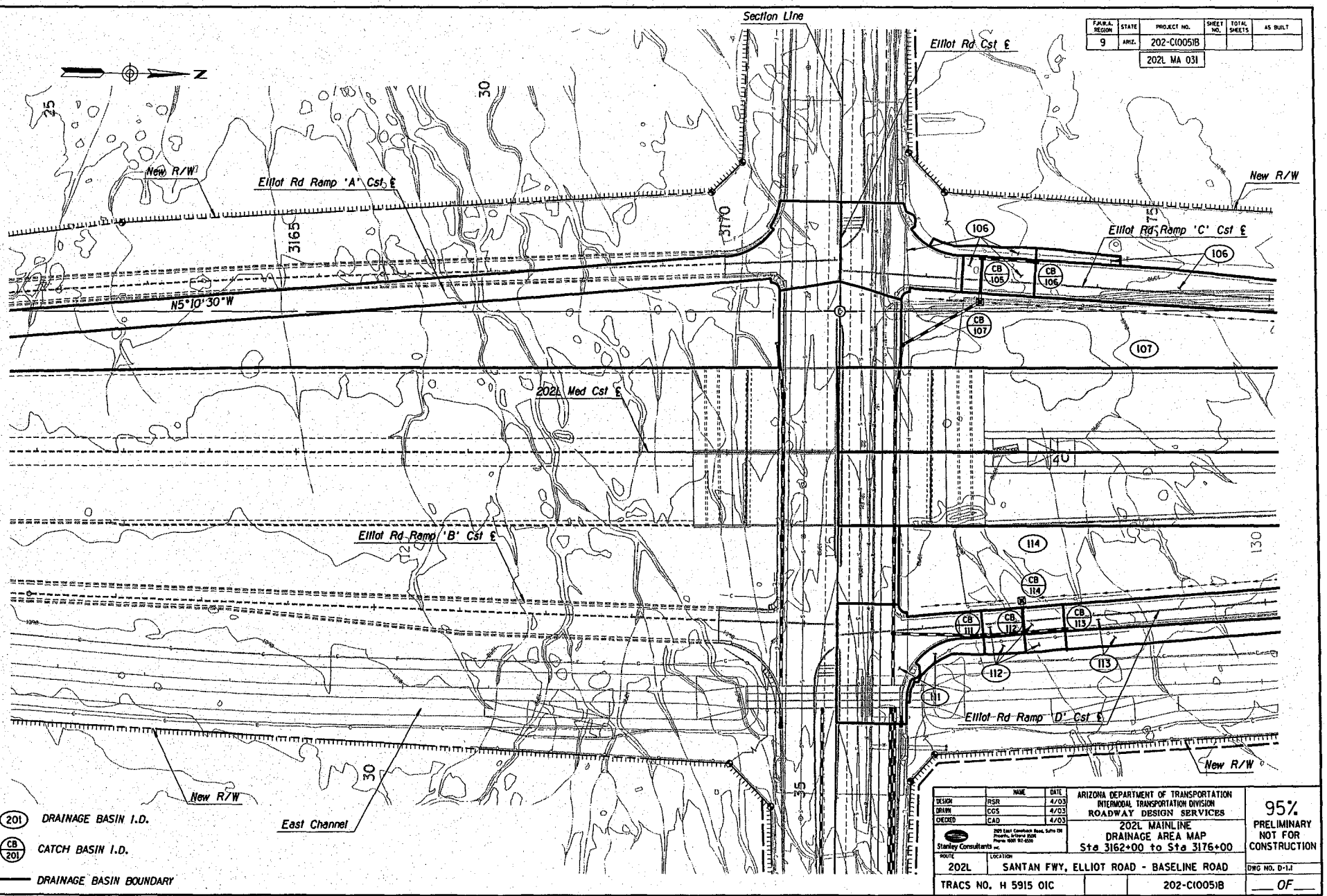
DOT Report

Label	-Node- Up. Dn.	v In (ft/s)	v Out (ft/s)	v Head In (ft)	v Head Out (ft)	Avg. v (ft/s)	Up. Calc. Sys. CA (acres)	Section Disch Cap. (cfs)	Section Shape Size	L (ft)	-Ground- Up. Dn. (ft)	-Invert- Up. Dn. (ft)	-HGL- Up. Dn. (ft)	-EGL- Up. Dn. (ft)
	Jct 516							152.70	24 inch		1,385.18	1,375.59	1,382.60	1,382.73
P-517	CB 517	3.85	3.85	0.23	0.23	3.85	2.046	12.11	Circular	10.00	1,383.85	1,378.35	1,382.96	1,383.19
	MH 502							27.94	24 inch		1,384.04	1,378.22	1,382.94	1,383.17
P-518	CB 518	3.44	3.44	0.18	0.18	3.44	1.825	10.80	Circular	114.21	1,385.50	1,379.82	1,383.29	1,383.47
	CB 517							27.80	24 inch		1,383.85	1,378.35	1,383.07	1,383.25
P-519	CB 519	2.24	2.24	0.08	0.08	2.24	1.190	7.04	Circular	57.21	1,385.65	1,380.15	1,383.45	1,383.53
	CB 518							18.61	24 inch		1,385.50	1,379.82	1,383.40	1,383.48
P-520	CB 520	4.76	2.13	0.35	0.07	3.45	1.132	6.70	Circular	77.00	1,386.66	1,382.66	1,383.58	1,383.93
	CB 519							44.25	24 inch		1,385.65	1,380.15	1,383.53	1,383.60
P-521	CB 521	0.73	0.73	0.01	0.01	0.73	0.389	2.30	Circular	68.25	1,385.66	1,380.16	1,383.34	1,383.35
	CB 518							17.30	24 inch		1,385.50	1,379.82	1,383.33	1,383.34
P-523	CB 523	1.34	1.34	0.03	0.03	1.34	0.710	4.20	Circular	11.23	1,383.53	1,378.03	1,383.26	1,383.29
	Jct 523							103.68	24 inch		1,383.65	1,376.02	1,383.26	1,383.29
P-524	CB 524	0.66	0.66	0.01	0.01	0.66	0.350	2.07	Circular	12.30	1,383.85	1,378.35	1,383.70	1,383.71
	JCT 524							92.17	24 inch		1,383.98	1,376.61	1,383.70	1,383.71
P-525	CB 525	4.99	4.99	0.39	0.39	4.99	2.649	15.67	Circular	10.00	1,384.39	1,378.89	1,384.03	1,384.41
	MH 503							36.35	24 inch		1,384.57	1,378.67	1,383.98	1,384.37
P-526	CB 526	1.29	1.29	0.03	0.03	1.29	0.687	4.06	Circular	110.00	1,386.85	1,381.35	1,384.12	1,384.14
	CB 525							36.65	24 inch		1,384.39	1,378.89	1,384.09	1,384.11
P-527	CB 527	1.52	1.30	0.04	0.03	1.41	0.691	4.09	Circular	120.00	1,391.22	1,385.72	1,387.32	1,387.35
	MH 504							45.68	24 inch		1,388.52	1,381.55	1,387.29	1,387.32
P-529	CB 529	2.71	2.71	0.11	0.11	2.71	1.440	8.52	Circular	63.42	1,390.90	1,385.40	1,389.39	1,389.51
	Jct 529							55.48	24 inch		1,389.64	1,382.15	1,389.32	1,389.43
P-530	CB 530	0.68	0.68	0.01	0.01	0.68	0.361	2.14	Circular	53.21	1,390.58	1,385.08	1,389.96	1,389.96
	Jct 530							45.07	24 inch		1,390.98	1,383.28	1,389.95	1,389.96
P-531	CB 531	5.79	4.23	0.52	0.28	5.01	1.982	11.73	Circular	99.63	1,399.22	1,393.39	1,394.62	1,395.14
	Jct 534							50.73	24 inch		1,394.48	1,389.12	1,390.77	1,391.05
P-531A	Jct 534	5.93	5.04	0.55	0.39	5.49	2.675	15.83	Circular	120.00	1,394.48	1,389.12	1,390.70	1,391.25
	MH 505							50.67	24 inch		1,391.52	1,383.99	1,390.36	1,390.75
P-532	CB 532	4.30	2.17	0.29	0.07	3.23	0.811	4.80	Circular	100.17	1,399.39	1,393.89	1,394.66	1,394.95
	CB 531							17.31	24 inch		1,399.22	1,393.39	1,394.72	1,394.79
P-533	CB 533	4.13	3.66	0.27	0.21	3.89	0.712	4.22	Circular	145.47	1,400.20	1,394.70	1,395.42	1,395.69
	CB 532							18.29	24 inch		1,399.39	1,393.89	1,394.68	1,394.89
P-534	CB 534	4.10	1.47	0.26	0.03	2.79	0.693	4.10	Circular	144.05	1,396.09	1,390.59	1,391.30	1,391.56
	Jct 534							24.76	24 inch		1,394.48	1,389.12	1,390.78	1,390.81

Scenario: Base

DOT Report

Label	-Node- Up. Dn.	v In (ft/s)	v Out (ft/s)	v Head In (ft)	v Head Out (ft)	Avg. v (ft/s)	Up. Calc. Sys. CA (acres)	Section Disch Cap. (cfs)	Section Shape Size	L (ft)	-Ground- Up. Dn. (ft)	-Invert- Up. Dn. (ft)	-HGL- Up. Dn. (ft)	-EGL- Up. Dn. (ft)
P-535	CB 535	0.53	0.27	4.36e-3	1.17e-3	0.40	0.095	0.56	Circular	100.12	1,399.39	1,393.89	1,394.63	1,394.64
	CB 531							17.32	24 inch		1,399.22	1,393.39	1,394.63	1,394.63
P-536	CB 536	4.49	2.54	0.31	0.10	3.52	0.940	5.56	Circular	39.06	1,399.43	1,395.43	1,396.26	1,396.58
	CB 531							56.00	24 inch		1,399.22	1,393.39	1,394.71	1,394.81
P-537	CB 537	0.73	0.73	0.01	0.01	0.73	0.386	2.29	Circular	10.00	1,390.90	1,385.40	1,390.76	1,390.77
	MH 506							67.11	24 inch		1,391.08	1,384.65	1,390.76	1,390.77
P-538	CB 538	4.25	4.25	0.28	0.28	4.25	2.255	13.34	Circular	10.00	1,391.85	1,386.35	1,392.07	1,392.35
	MH 507							57.47	24 inch		1,392.04	1,385.80	1,392.04	1,392.32
P-539	CB 539	4.10	1.31	0.26	0.03	2.71	0.695	4.11	Circular	148.55	1,400.01	1,394.51	1,395.22	1,395.48
	MH 508							41.35	24 inch		1,396.28	1,390.28	1,393.71	1,393.74
P-540	CB 540	2.74	1.61	0.12	0.04	2.18	0.854	5.05	Circular	124.49	1,404.25	1,397.59	1,398.73	1,398.84
	CB 509							32.06	24 inch		1,400.96	1,395.46	1,398.74	1,398.78



F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-C(005)B			
		202L MA 031			

	NAME	DATE
DESIGN	RSR	4/03
DRAWN	CGS	4/03
CHECKED	CAD	4/03

Stanley Consultants INC.
2929 East Camelback Road, Suite 130
Phoenix, Arizona 85016
Phone (602) 957-6500

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

202L MAINLINE
DRAINAGE AREA MAP
Sta 3162+00 to Sta 3176+00

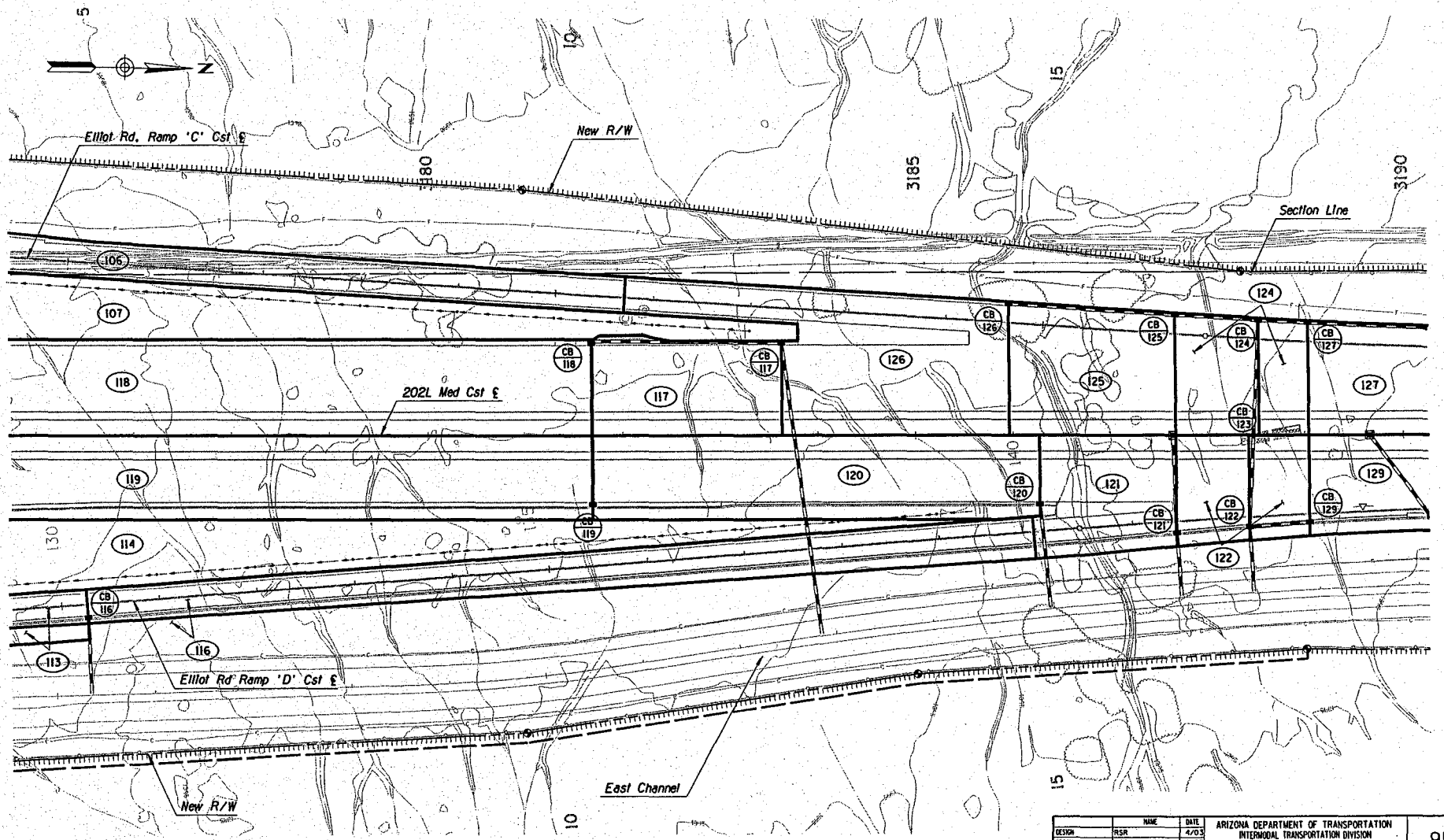
95%
PRELIMINARY
NOT FOR
CONSTRUCTION

ROUTE: 202L
LOCATION: SANTAN FWY, ELLIOT ROAD - BASELINE ROAD
DWG NO. D-1.1

TRACS NO. H 5915 01C | 202-C(005)B | ___ OF ___

04/29/2003 gt:\16110\Drainage\Schalk\dgn\16110 CB Area 16200 - 17600.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-C(005)B			
		202L MA 031			



(201) DRAINAGE BASIN I.D.

(CB 201) CATCH BASIN I.D.

—— DRAINAGE BASIN BOUNDARY

	NAME	DATE
DESIGN	RSR	4/03
DRAWN	CGS	4/03
CHECKED	CAD	4/03

Stanley Consultants INC.
2929 East Camelback Road, Suite 130
Phoenix, Arizona 85016
Phone (602) 957-6500

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

202L MAINLINE
DRAINAGE AREA MAP
Sta 3176+00 to Sta 3190+00

95%
PRELIMINARY
NOT FOR
CONSTRUCTION

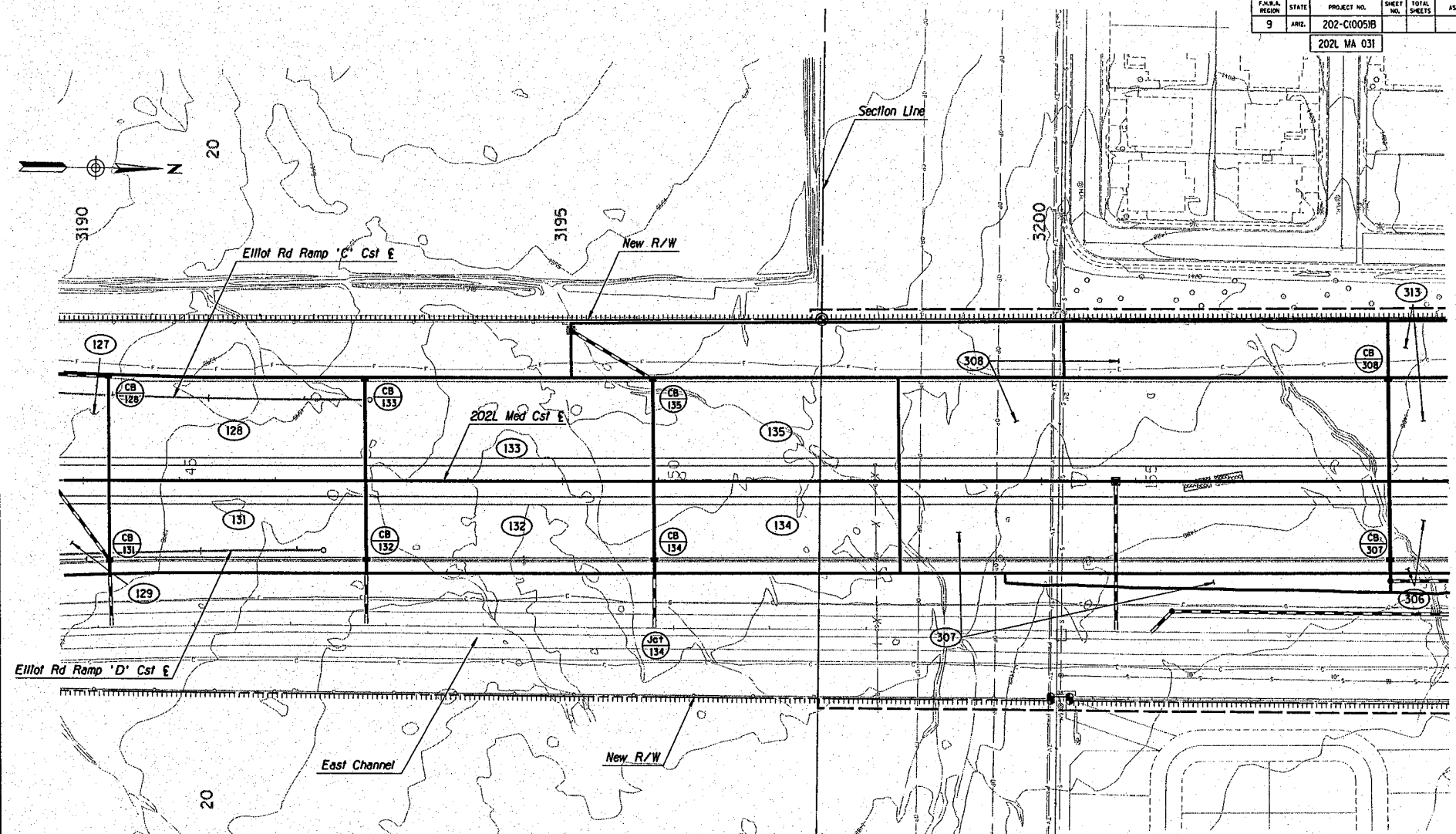
ROUTE: 202L
LOCATION: SANTAN FWY, ELLIOT ROAD - BASELINE ROAD
DWG NO. D-1.2

TRACS NO. H 5915 01C | 202-C(005)B | ___ OF ___

04/29/2003 q:\16110\Drainage\Schalk\dgn\16110 CB Area 17600 - 19000.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-C(005)B			

202L MA 031



(201) DRAINAGE BASIN I.D.

(CB/201) CATCH BASIN I.D.

DRAINAGE BASIN BOUNDARY

	NAME	DATE
DESIGN	RSR	4/03
DRAWN	CGS	4/03
CHECKED	CAD	4/03

Stanley Consultants inc.
2929 East Camelback Road, Suite 130
Phoenix, Arizona 85016
Phone: (602) 912-8500

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

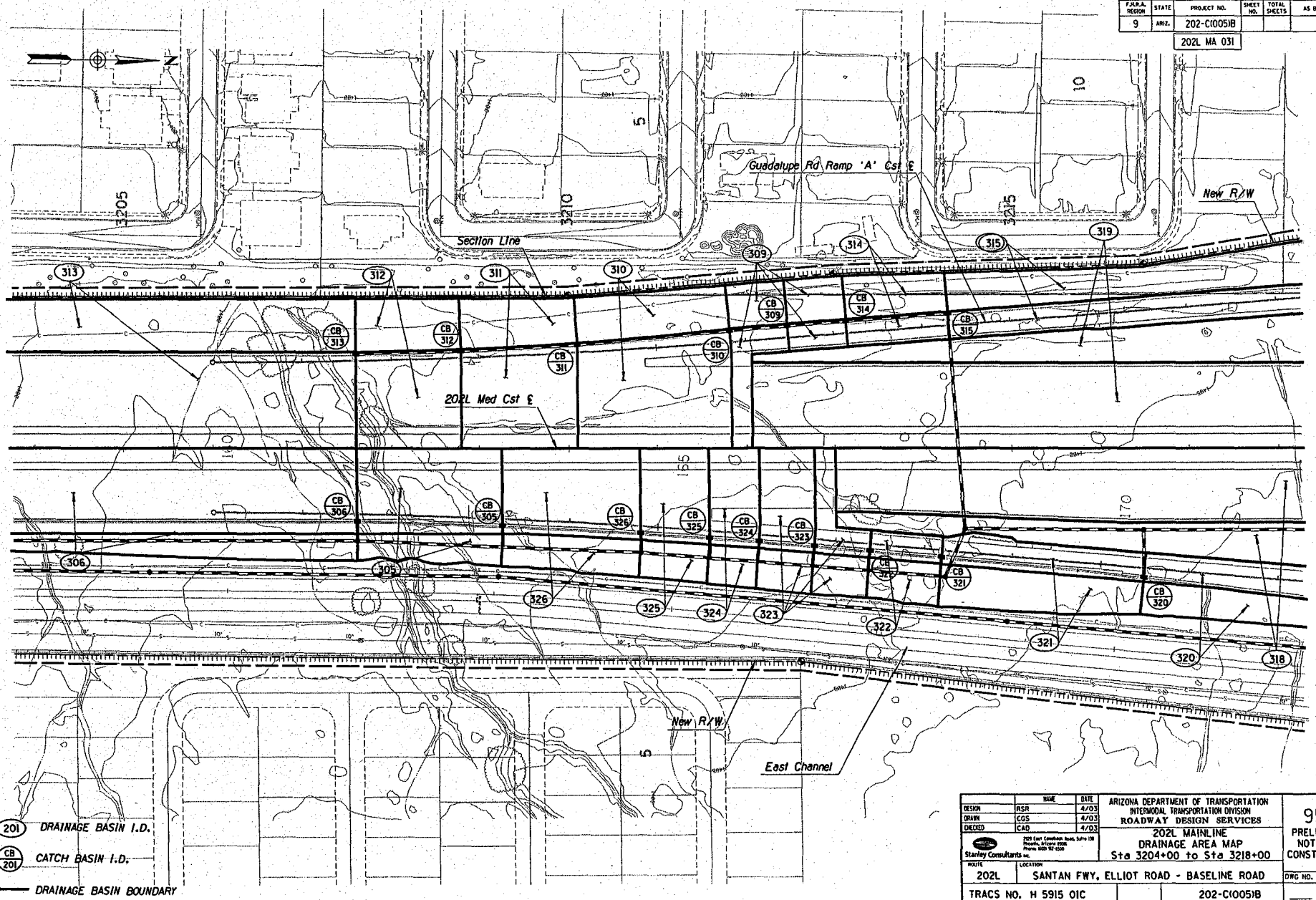
202L MAINLINE
DRAINAGE AREA MAP
Sta 3190+00 to Sta 3204+00

95%
PRELIMINARY
NOT FOR
CONSTRUCTION

ROUTE	LOCATION	
202L	SANTAN FWY, ELLIOT ROAD - BASELINE ROAD	DWG NO. D-1.3
TRACS NO. H 5915 01C		202-C(005)B ___ OF ___

04/29/2003 gt\16110\Drainage\Schalk\dgn\16110 CB Area 19000 - 20400.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-C(005)B			
		202L MA 031			



	NAME	DATE
DESIGN	RSR	4/03
DRAWN	CGS	4/03
CHECKED	CAD	4/03

Stanley Consultants inc.
2929 East Camelback Road, Suite 130
Phoenix, Arizona 85016
Phone: (602) 957-6500

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

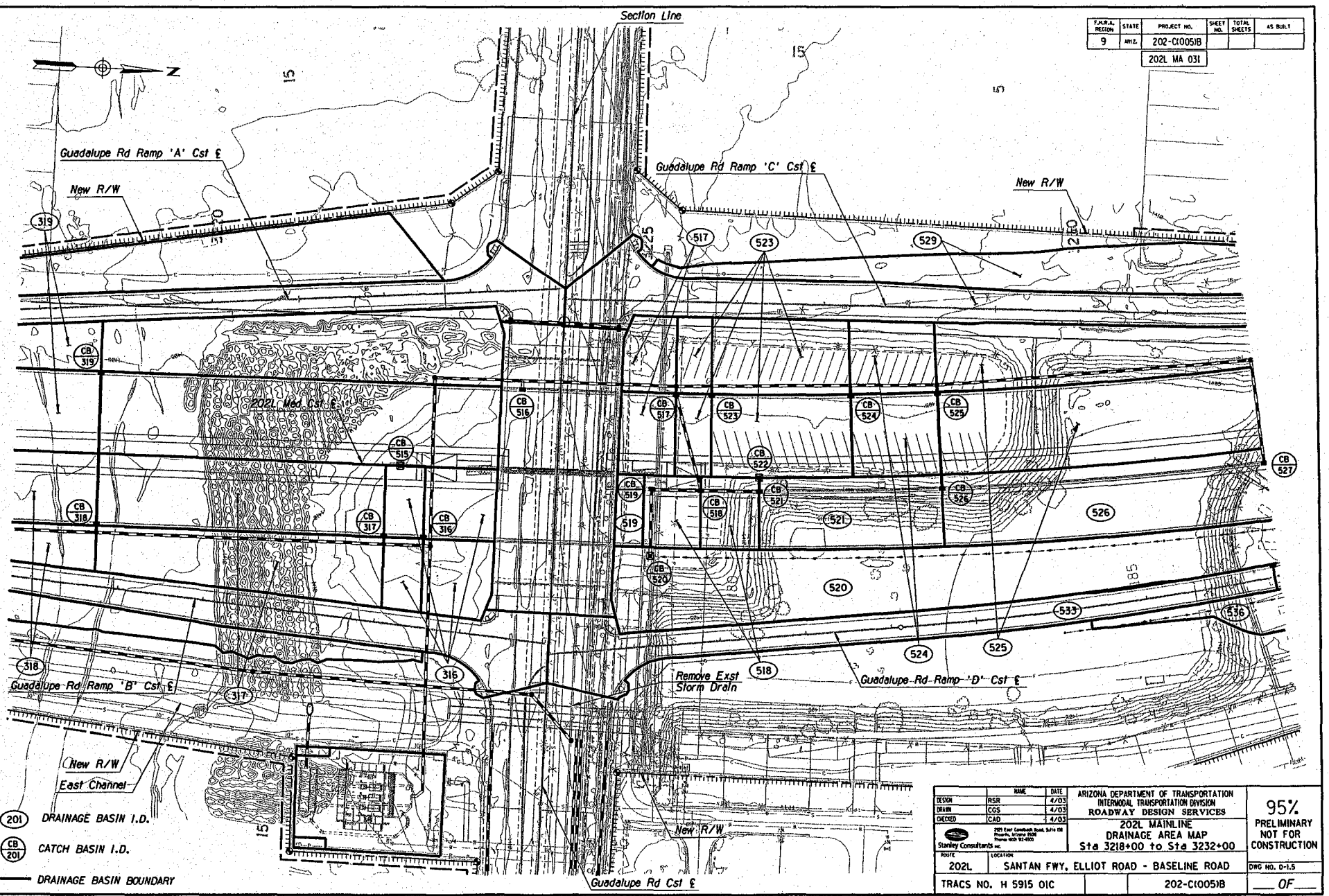
202L MAINLINE
DRAINAGE AREA MAP
Sta 3204+00 to Sta 3218+00

95%
PRELIMINARY
NOT FOR
CONSTRUCTION

ROUTE	LOCATION	
202L	SANTAN FWY. ELLIOT ROAD - BASELINE ROAD	DWG NO. D-1.4
TRACS NO. H 5915 01C	202-C(005)B	___ OF ___

0472472003 q:\16110\Drainage\Schalk\dgn\16110 CB Area 20400 - 21800.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-C(005)B			
		202L MA 031			



	NAME	DATE
DESIGN	RSR	4/03
DRAWN	CGS	4/03
CHECKED	CAD	4/03

Stanley Consultants INC.
2929 East Camelback Road, Suite 130
Phoenix, Arizona 85016
Phone (602) 952-6500

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

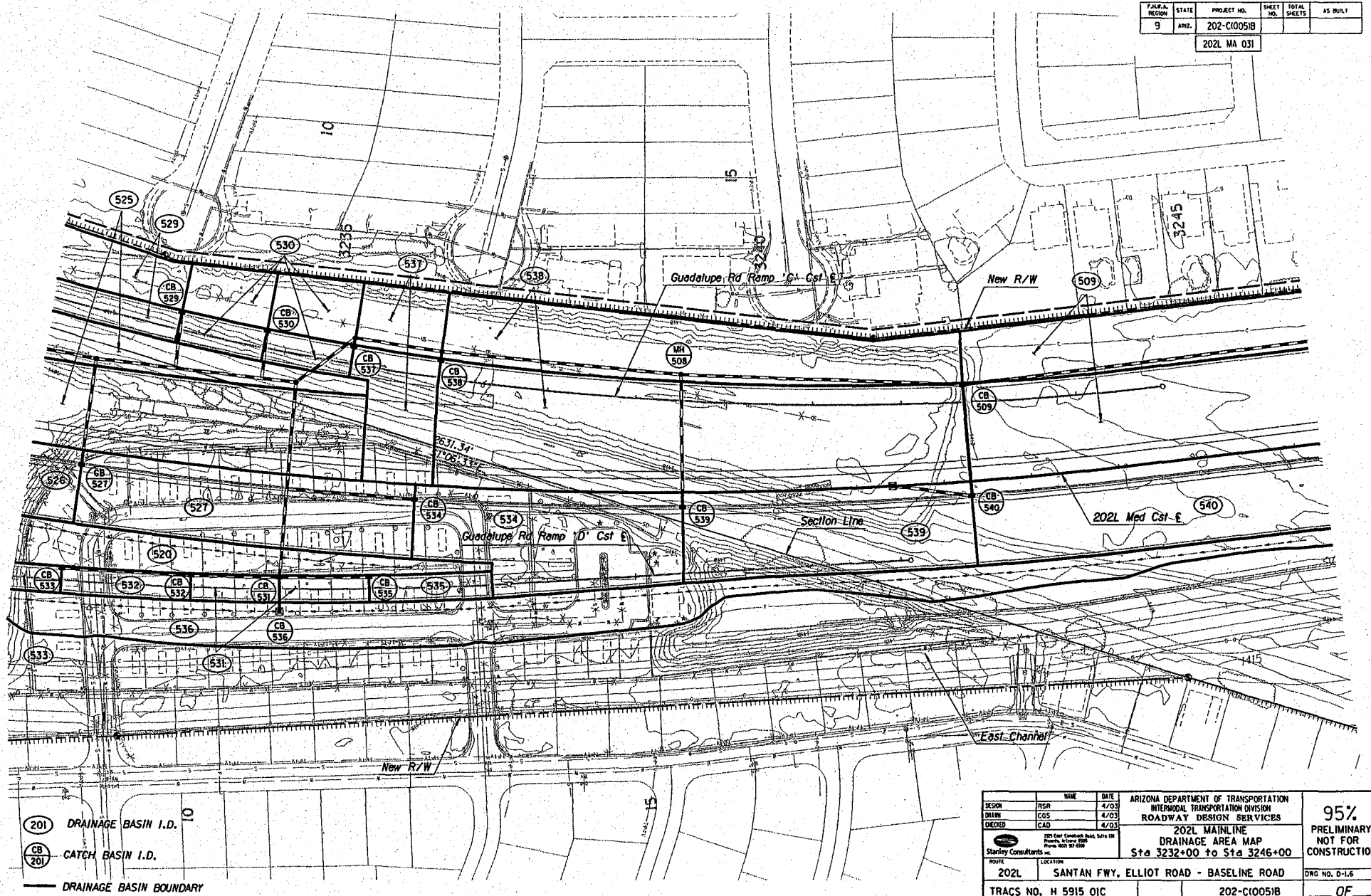
202L MAINLINE
DRAINAGE AREA MAP
Sta 3218+00 to Sta 3232+00

95%
PRELIMINARY
NOT FOR CONSTRUCTION

ROUTE	LOCATION	DWG NO. D-1.5
202L	SANTAN FWY, ELLIOT ROAD - BASELINE ROAD	
TRACS NO. H 5915 01C	202-C(005)B	___ OF ___

04/24/2003 q:\16110\Drainage\Schalk\dgn\16110 CB Area 21800 - 23200.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-C(005)B			
		202L MA 031			



	NAME	DATE
DESIGN	RSR	4/03
DRAWN	CGS	4/03
CHECKED	CAD	4/03

Stanley Consultants inc.
2929 East Camelback Road, Suite 130
Phoenix, Arizona 85016
Phone (602) 957-5500

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

202L MAINLINE
DRAINAGE AREA MAP
Sta 3232+00 to Sta 3246+00

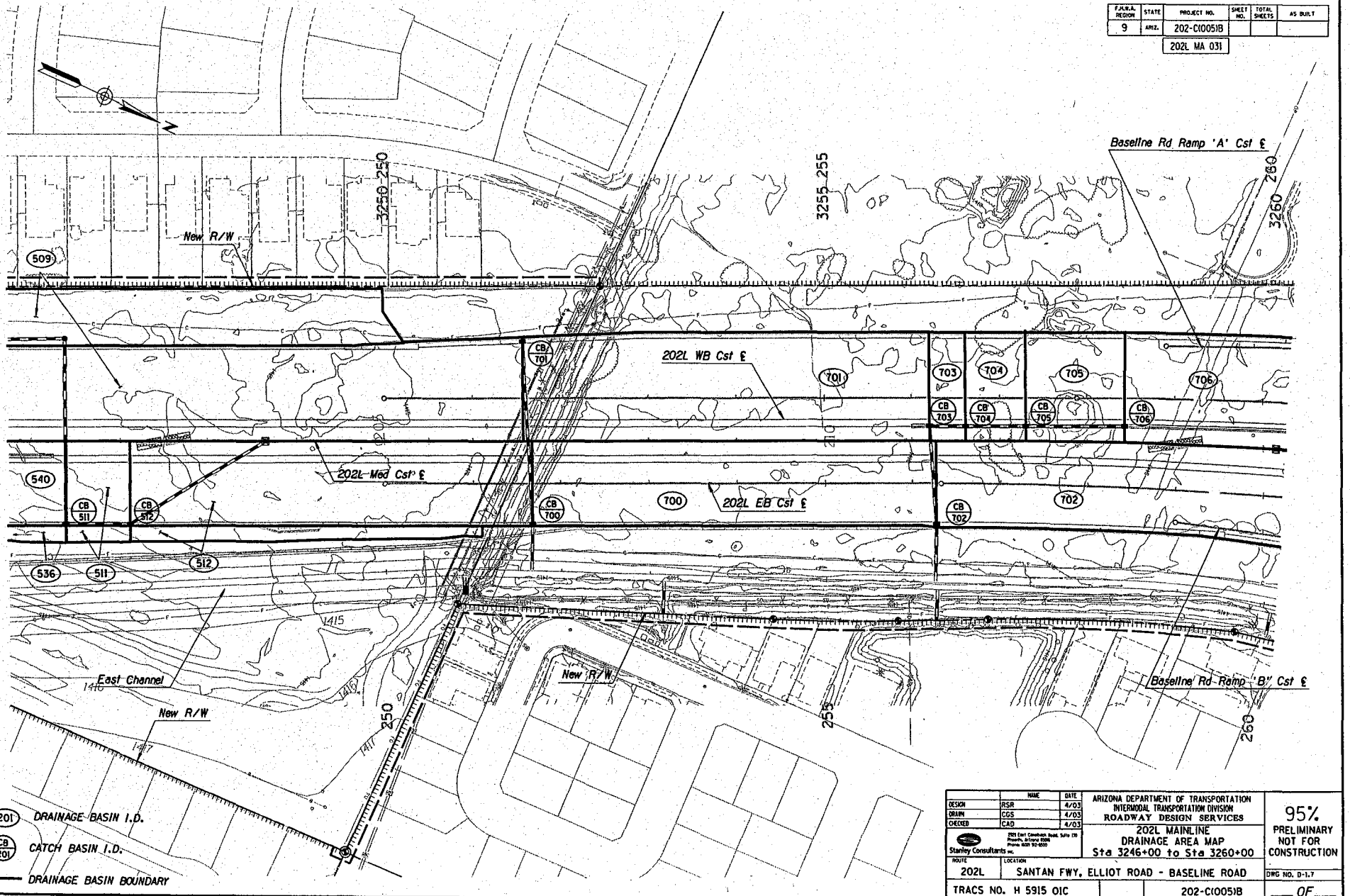
95%
PRELIMINARY
NOT FOR
CONSTRUCTION

ROUTE: 202L
LOCATION: SANTAN FWY, ELLIOT ROAD - BASELINE ROAD
DWG NO. D-1.6
TRACS NO. H 5915 01C
202-C(005)B
___ OF ___

04/29/2003 q:\16110\Drainage\Schalk\dgn\16110 CB Area 23200 - 24600.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-C(005)B			

202L MA 031



	NAME	DATE
DESIGN	RSR	4/03
DRAWN	CGS	4/03
CHECKED	CAD	4/03

Stanley Consultants INC.
2929 East Camelback Road, Suite 170
Phoenix, Arizona 85016
Phone: (602) 912-0200

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

202L MAINLINE
DRAINAGE AREA MAP
Sta 3246+00 to Sta 3260+00

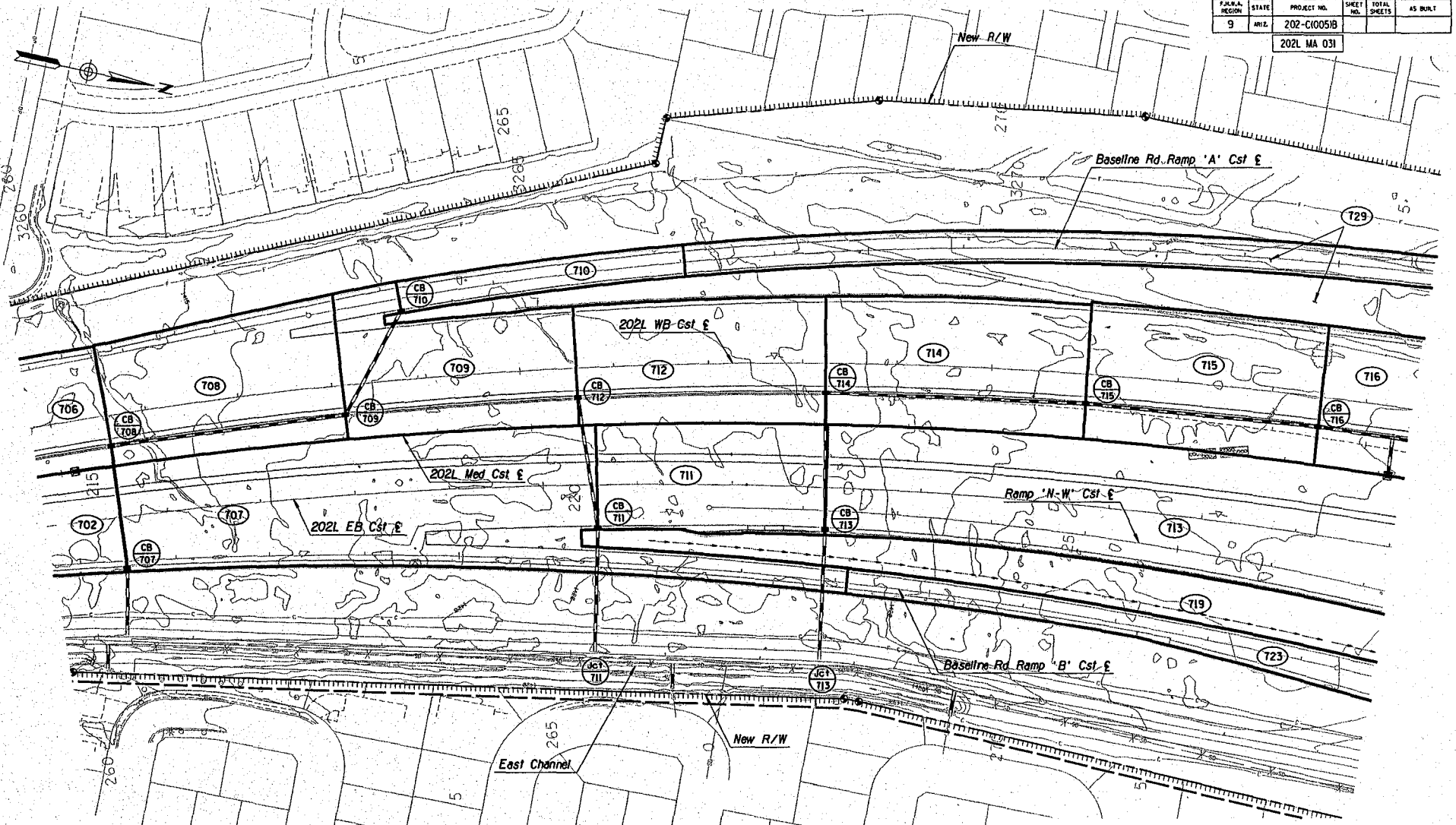
95%
PRELIMINARY
NOT FOR
CONSTRUCTION

ROUTE: 202L
LOCATION: SANTAN FWY, ELLIOT ROAD - BASELINE ROAD
DWG NO. D-1.7

TRACS NO. H 5915 01C
202-C(005)B
___ OF ___

04/29/2003 gt\16110\Drainage\Schalk\dgn\16110 LB Area 24600 - 26000.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-C(005)B			
		202L MA 031			



(201) DRAINAGE BASIN I.D.

(CB 201) CATCH BASIN I.D.

DRAINAGE BASIN BOUNDARY

	NAME	DATE
DESIGN	RSR	4/03
DRAWN	CGS	4/03
CHECKED	CAD	4/03

Stanley Consultants Inc.
3636 East Camelback Road, Suite 130
Phoenix, Arizona 85018
Phone: (602) 952-0000

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

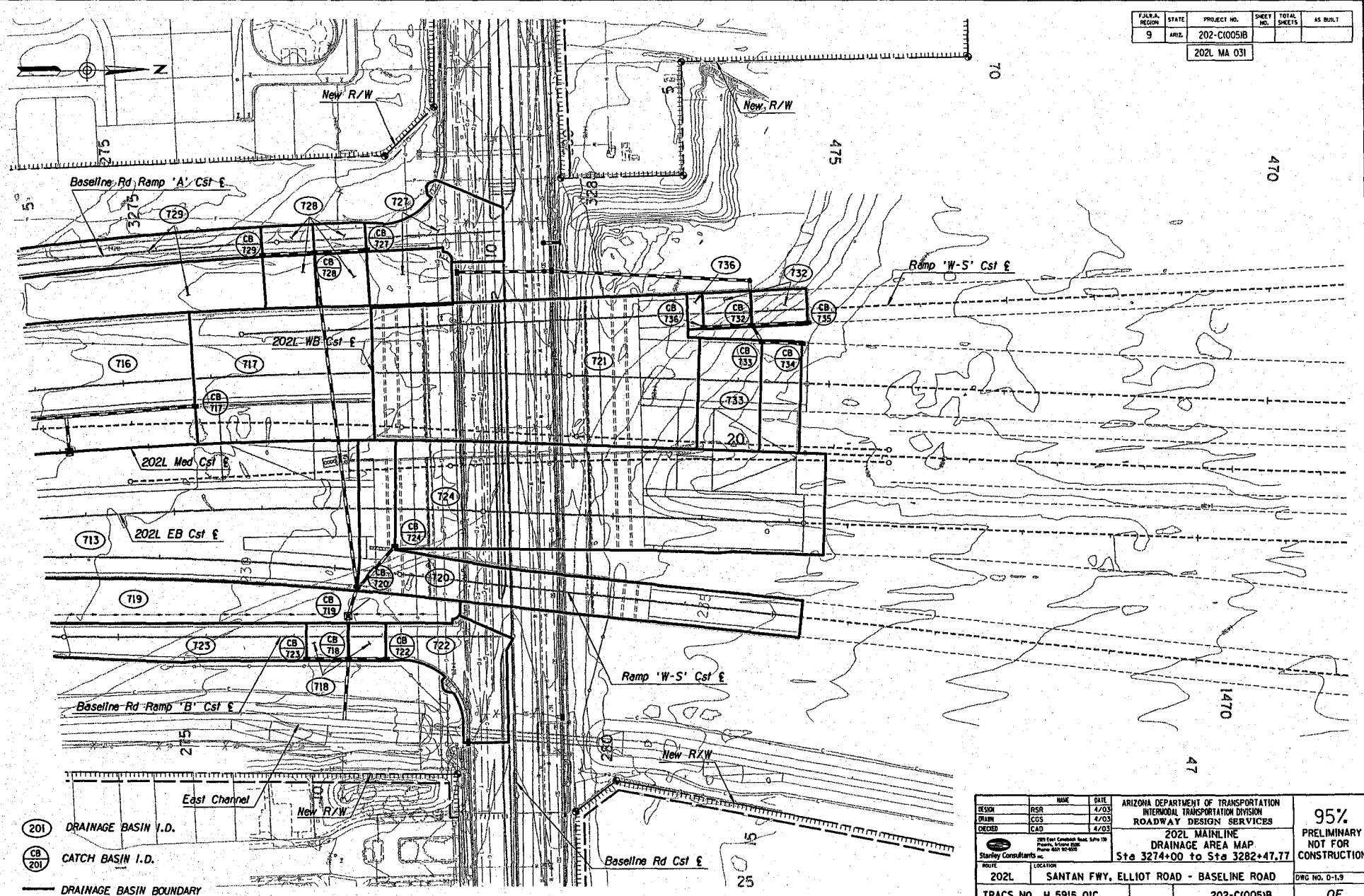
202L MAINLINE
DRAINAGE AREA MAP
Sta 3260+00 to Sta 3274+00

95%
PRELIMINARY
NOT FOR CONSTRUCTION

ROUTE	LOCATION	DWG NO. D-1.8
202L	SANTAN FWY, ELLIOT ROAD - BASELINE ROAD	
TRACS NO. H 5915 01C	202-C(005)B	___ OF ___

04/29/2003 qt\16110\Drainage\Schalk\dgn\16110 CB Area 26000 - 27400.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-C(005)B			
		202L MA 031			



	NAME	DATE
DESIGN	RSR	4/03
DRAWN	CGS	4/03
CHECKED	CAD	4/03

Stanley Consultants inc.
2929 East Camelback Road, Suite 130
Phoenix, Arizona 85016
Phone (602) 957-9000

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

202L MAINLINE
DRAINAGE AREA MAP
Sta 3274+00 to Sta 3282+47.77

95%
PRELIMINARY
NOT FOR
CONSTRUCTION

ROUTE	LOCATION
202L	SANTAN FWY, ELLIOT ROAD - BASELINE ROAD

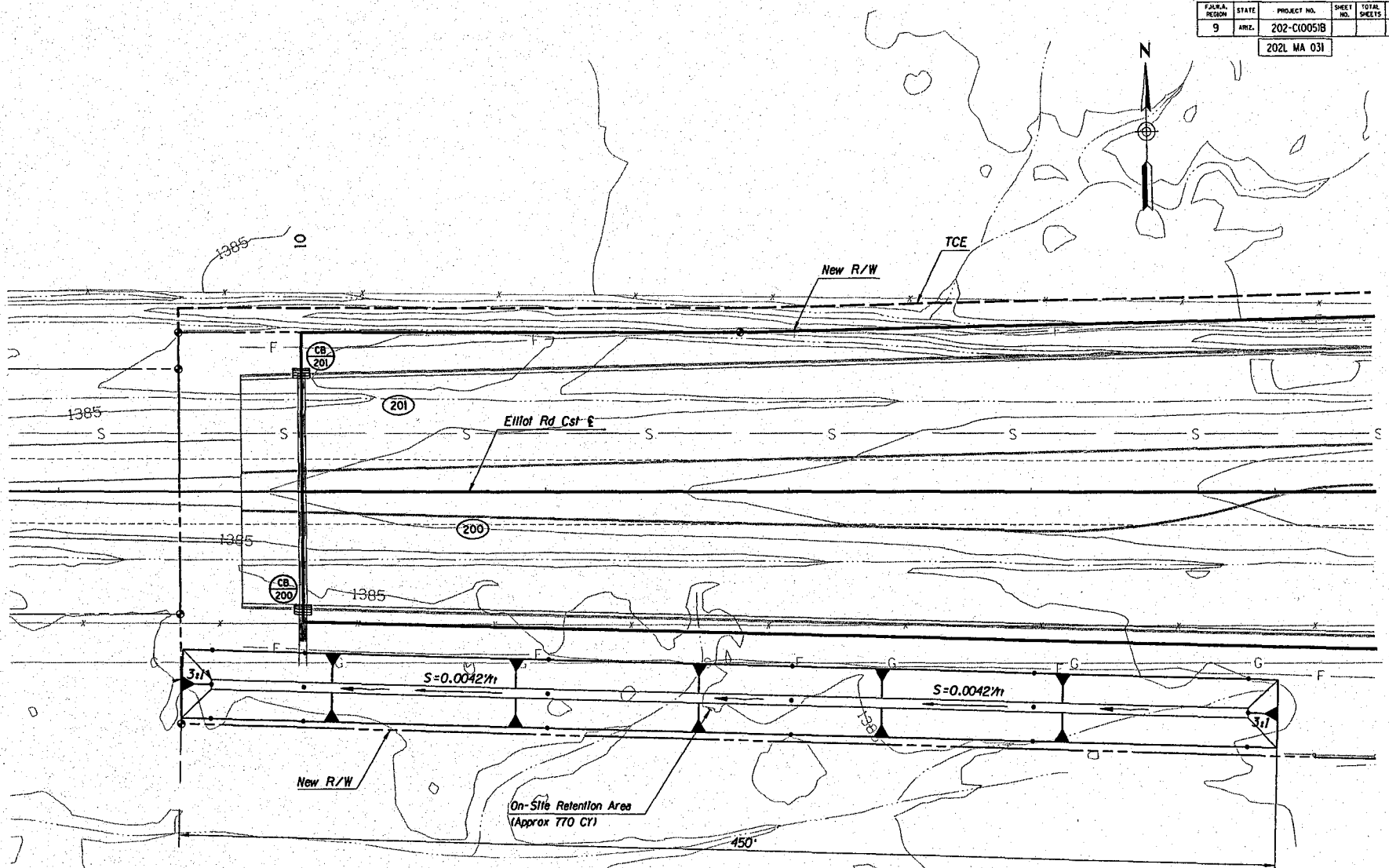
DWG NO. D-1.9

TRACS NO. H 5915 01C | 202-C(005)B | ___ OF ___

04/29/2003 qr\16110\Drainage\Schalk\dgn\16110 CB Area 27400 - 28247.77.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-C(005)B			

202L MA 031



201 DRAINAGE BASIN I.D.

CB 201 CATCH BASIN I.D.

DRAINAGE BASIN BOUNDARY

	NAME	DATE
DESIGN	MRG	4/03
DRAWN	CGS	4/03
CHECKED	CAD	4/03

Stanley Consultants inc.

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

ELLIOT ROAD
DRAINAGE AREA MAP
Sta 9+00 to Sta 14+50

95%
PRELIMINARY
NOT FOR
CONSTRUCTION

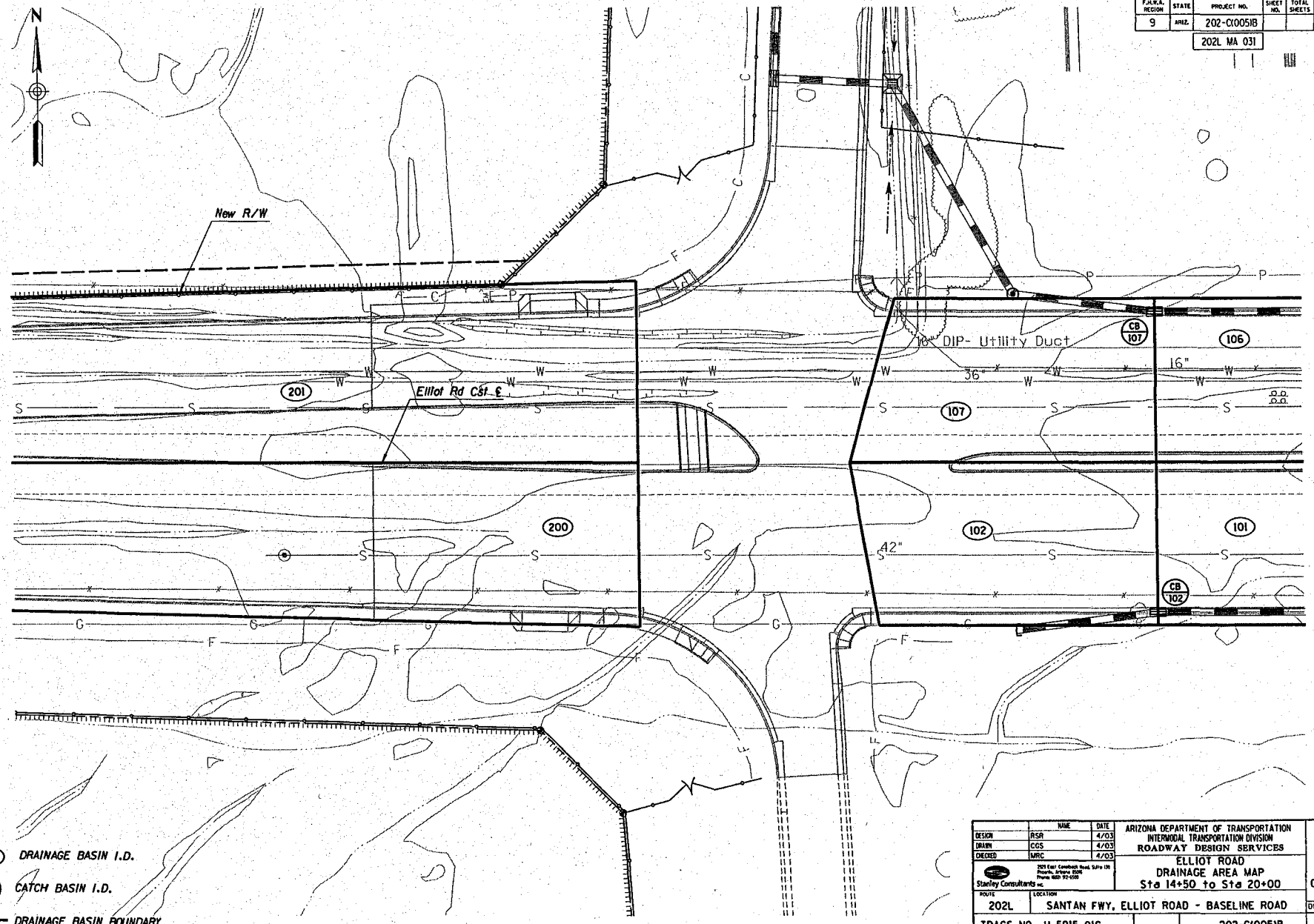
ROUTE	LOCATION
202L	SANTAN FWY, ELLIOT ROAD - BASELINE ROAD

DWG NO. D-1.10

TRACS NO. H 5915 01C | 202-C(005)B | ___ OF ___

04/29/2003 gr\16110\Drainage\Schalk\dgn\h5915sdj.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-C(005)B			
		202L MA 031			



201 DRAINAGE BASIN I.D.

CB 201 CATCH BASIN I.D.

DRAINAGE BASIN BOUNDARY

	NAME	DATE
DESIGN	RSR	4/03
DRAWN	CGS	4/03
CHECKED	MRC	4/03

Stanley Consultants INC.
2929 East Camelback Road, Suite 130
Phoenix, Arizona 85016
Phone (602) 952-0500

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

ELLIOT ROAD
DRAINAGE AREA MAP
Sta 14+50 to Sta 20+00

95%
PRELIMINARY
NOT FOR
CONSTRUCTION

ROUTE	LOCATION
202L	SANTAN FWY, ELLIOT ROAD - BASELINE ROAD

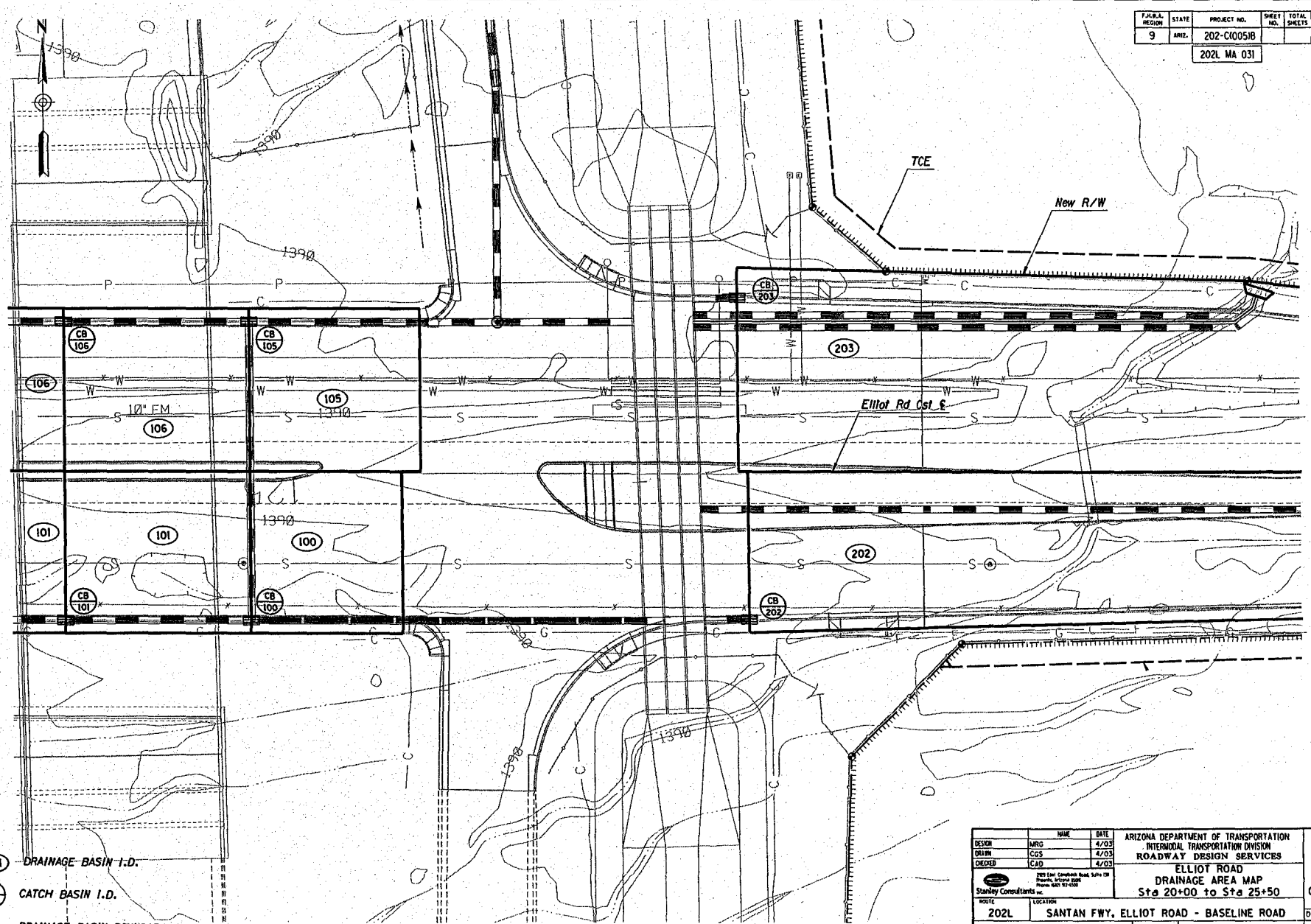
DWG NO. D-1.11

TRACS NO. H 5915 01C | 202-C(005)B | ___ OF ___

04/29/2003 q:\16110\Drainage\Schalk\dgn\h5915sdk.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-C(005)B			

202L MA 031



201 DRAINAGE BASIN I.D.

CB 201 CATCH BASIN I.D.

DRAINAGE BASIN BOUNDARY

	NAME	DATE
DESIGN	MRG	4/03
DRAWN	CGS	4/03
CHECKED	CAD	4/03

Stanley Consultants Inc.
2929 East Camelback Road, Suite 130
Phoenix, Arizona 85016
Phone: (602) 912-6500

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

ELLIOT ROAD
DRAINAGE AREA MAP
Sta 20+00 to Sta 25+50

95%
PRELIMINARY
NOT FOR
CONSTRUCTION

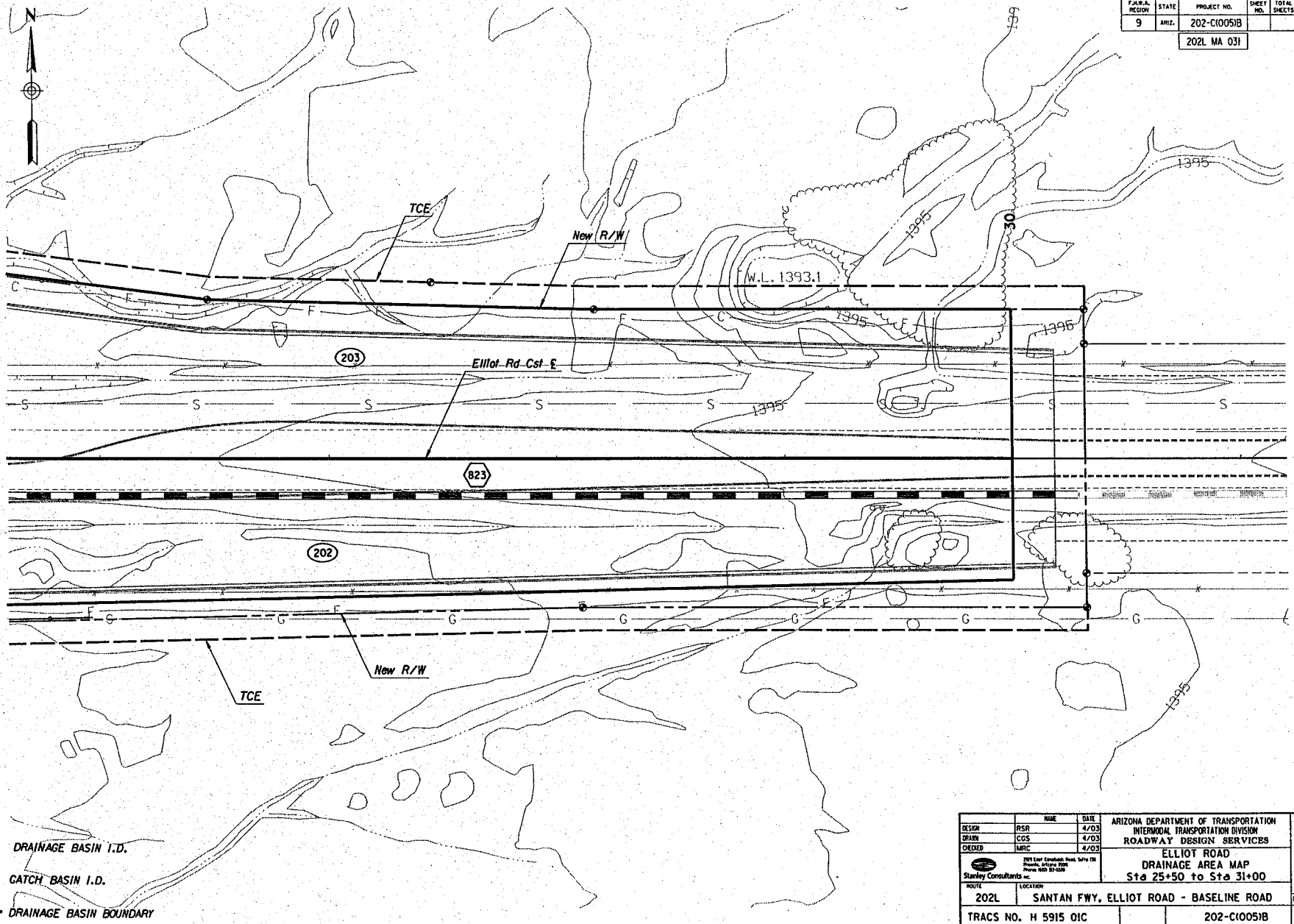
ROUTE: 202L
LOCATION: SANTAN FWY. ELLIOT ROAD - BASELINE ROAD

DWG NO. D-1.12

TRACS NO. H 5915 01C | 202-C(005)B | ___ OF ___

04/24/2003 d:\16110\Drainage\Schalk\dgn\h5915sdl.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-C(005)B			
		202L MA 031			



	NAME	DATE
DESIGN	RSR	4/03
DRAWN	CGS	4/03
CHECKED	MRC	4/03

Stanley Consultants inc.
2929 East Camelback Road, Suite 126
Phoenix, Arizona 85016
Phone: (602) 957-6500

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

ELLIOT ROAD
DRAINAGE AREA MAP
Sta 25+50 to Sta 31+00

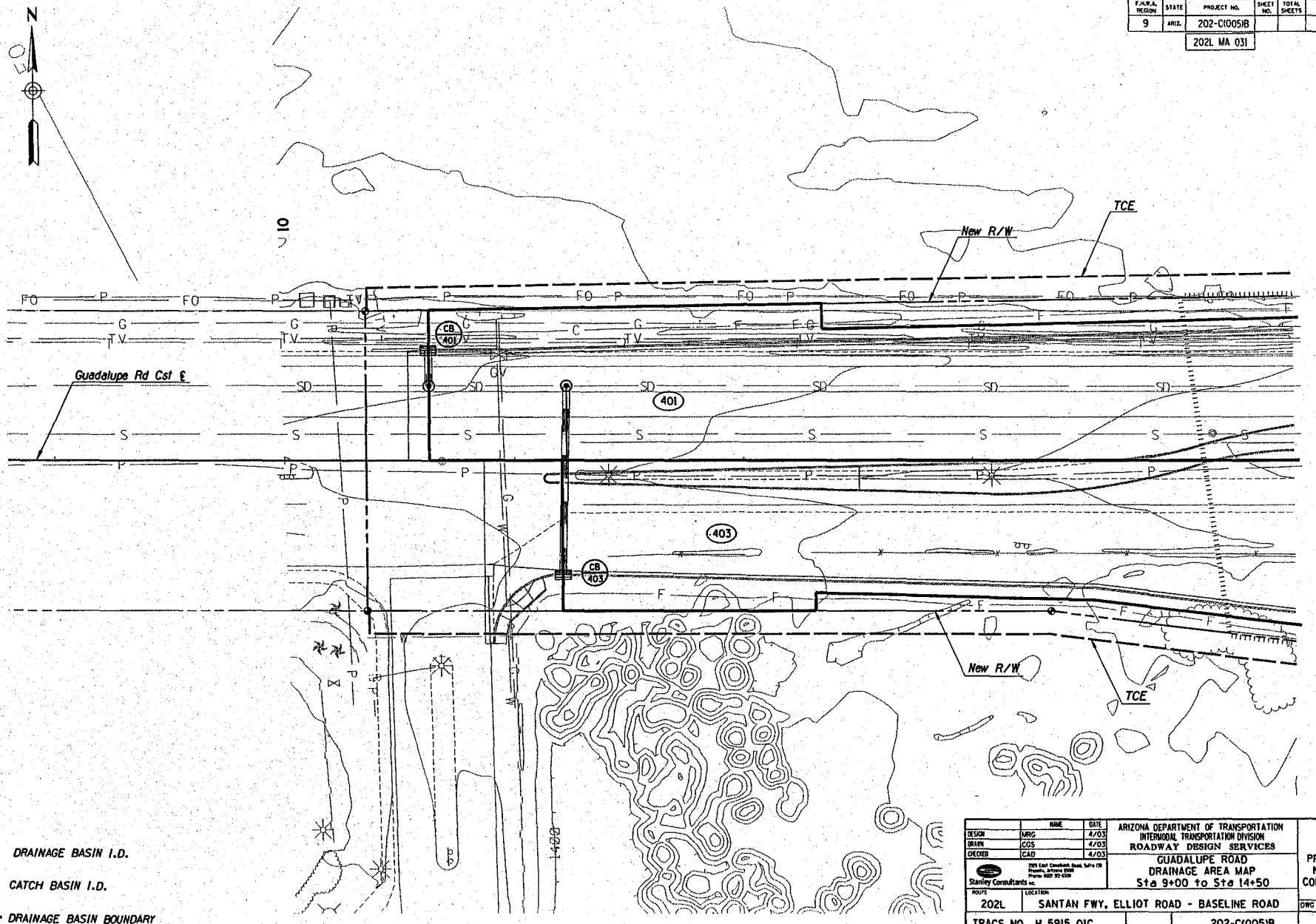
95%
PRELIMINARY
NOT FOR
CONSTRUCTION

ROUTE: 202L
LOCATION: SANTAN FWY, ELLIOT ROAD - BASELINE ROAD
DWG NO. D-1.13

TRACS NO. H 5915 01C | 202-C(005)B | ___ OF ___

04/29/2003 q:\18110\Drainage\Schalk\dgn\h5915sdm.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-C(005)B			
		202L MA 031			



201 DRAINAGE BASIN I.D.

CB 201 CATCH BASIN I.D.

DRAINAGE BASIN BOUNDARY

	NAME	DATE
DESIGN	MRG	4/03
DRAWN	CGS	4/03
CHECKED	CAD	4/03

Stanley Consultants Inc.
2929 East Camelback Road, Suite 170
Phoenix, Arizona 85016
Phone (602) 312-5500

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

GUADALUPE ROAD
DRAINAGE AREA MAP
Sta 9+00 to Sta 14+50

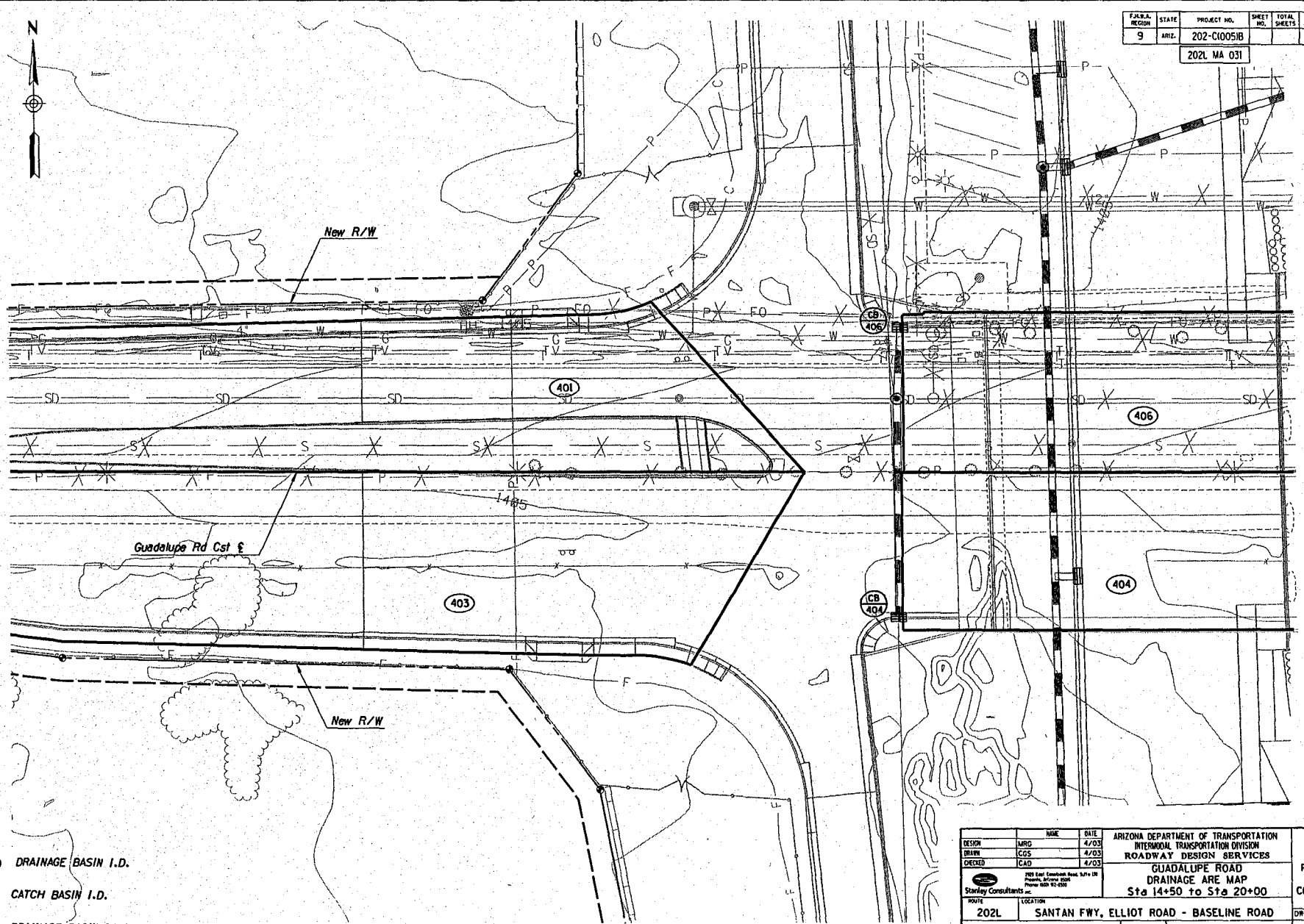
95%
PRELIMINARY
NOT FOR
CONSTRUCTION

ROUTE	LOCATION	DWG NO. D-1.14
202L	SANTAN FWY, ELLIOT ROAD - BASELINE ROAD	
TRACS NO. H 5915 01C	202-C(005)B	___ OF ___

04/24/2003 qt\16110\Drainage\Schalk\dgn\h5915sdn.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-C(005)B			

202L MA 031



201 DRAINAGE BASIN I.D.

CB 201 CATCH BASIN I.D.

DRAINAGE BASIN BOUNDARY

	NAME	DATE
DESIGN	MRG	4/03
DRAWN	CGS	4/03
CHECKED	CAD	4/03

Stanley Consultants inc.
2905 East Camelback Road, Suite 130
Phoenix, Arizona 85016
Phone (602) 912-8500

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

GUADALUPE ROAD
DRAINAGE ARE MAP
Sta 14+50 to Sta 20+00

95%
PRELIMINARY
NOT FOR
CONSTRUCTION

ROUTE	LOCATION
202L	SANTAN FWY, ELLIOT ROAD - BASELINE ROAD

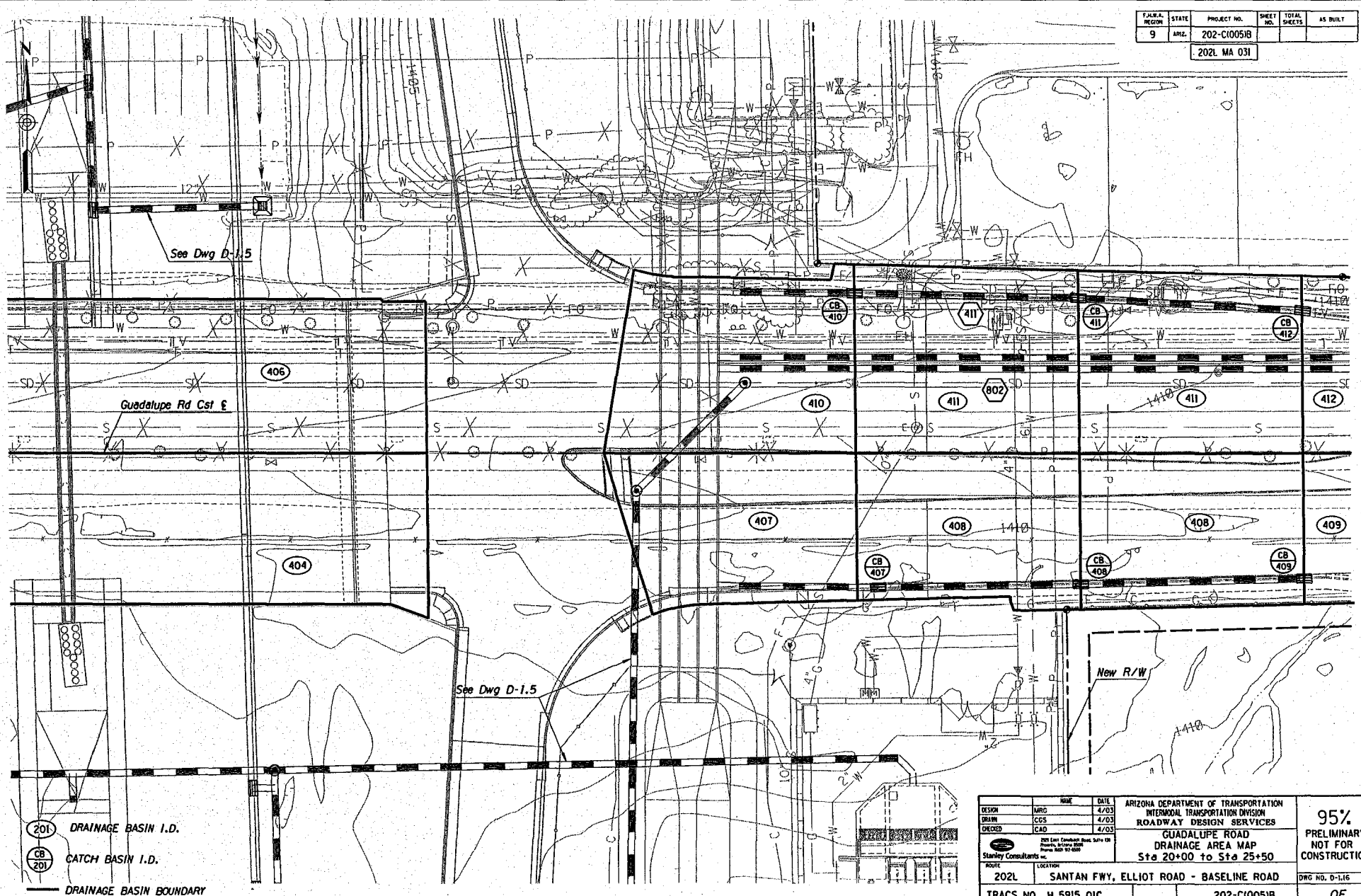
DRG NO. D-1.15

TRACS NO. H 5915 01C | 202-C(005)B | ___ OF ___

SURVEY NO. | FINISHED PLANS | REVISIONS | LOCATION | DATE

04/24/2003 q:\16110\Drainage\Schalk\dgn\h5915sdo.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-C(005)B			
		202L MA 031			



	NAME	DATE
DESIGN	MRG	4/03
DRAWN	CGS	4/03
CHECKED	CAD	4/03

Stanley Consultants inc.
2125 East Camelback Road, Suite 120
Phoenix, Arizona 85016
Phone (602) 957-6500

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

GUADALUPE ROAD
DRAINAGE AREA MAP
Sta 20+00 to Sta 25+50

95%
PRELIMINARY
NOT FOR CONSTRUCTION

ROUTE: 202L
LOCATION: SANTAN FWY, ELLIOT ROAD - BASELINE ROAD

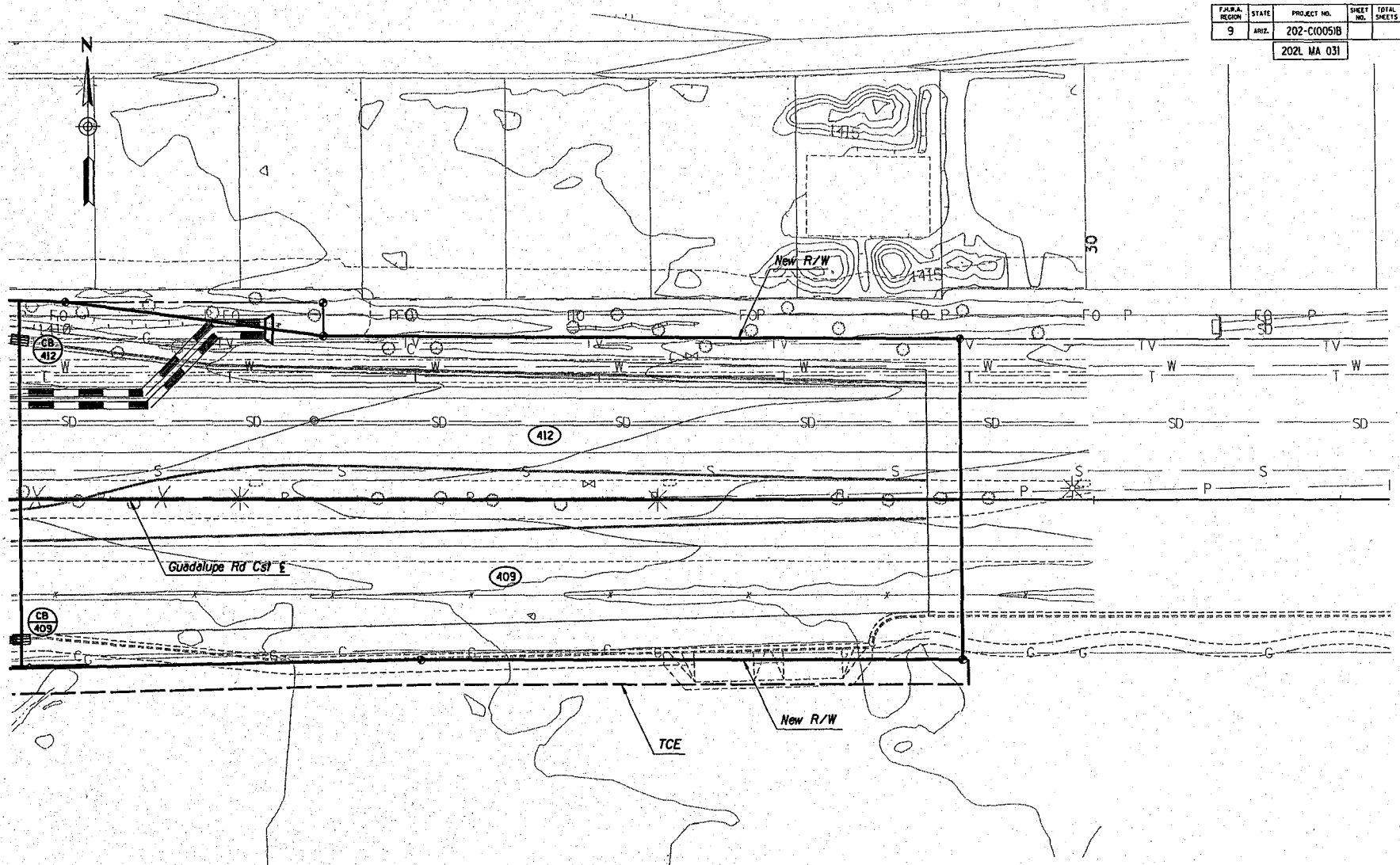
DWG NO. D-1.16

TRACS NO. H 5915 01C | 202-C(005)B | ___ OF ___

04/29/2003 q:\16110\Drainage\Schalk\dgn\h5915sdp.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-C(005)B			

202L MA 031



(201) DRAINAGE BASIN I.D.

(CB 201) CATCH BASIN I.D.

DRAINAGE BASIN BOUNDARY

	NAME	DATE
DESIGN	RSR	4/03
DRAWN	CGS	4/03
CHECKED	MRC	4/03

Stanley Consultants inc.
2925 East Camelback Road, Suite 130
Phoenix, Arizona 85016
Phone: (602) 952-8100

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

GUADALUPE ROAD
DRAINAGE AREA MAP
Sta 25+50 to 31+00

95%
PRELIMINARY
NOT FOR
CONSTRUCTION

ROUTE: 202L
LOCATION: SANTAN FWY. ELLIOT ROAD - BASELINE ROAD

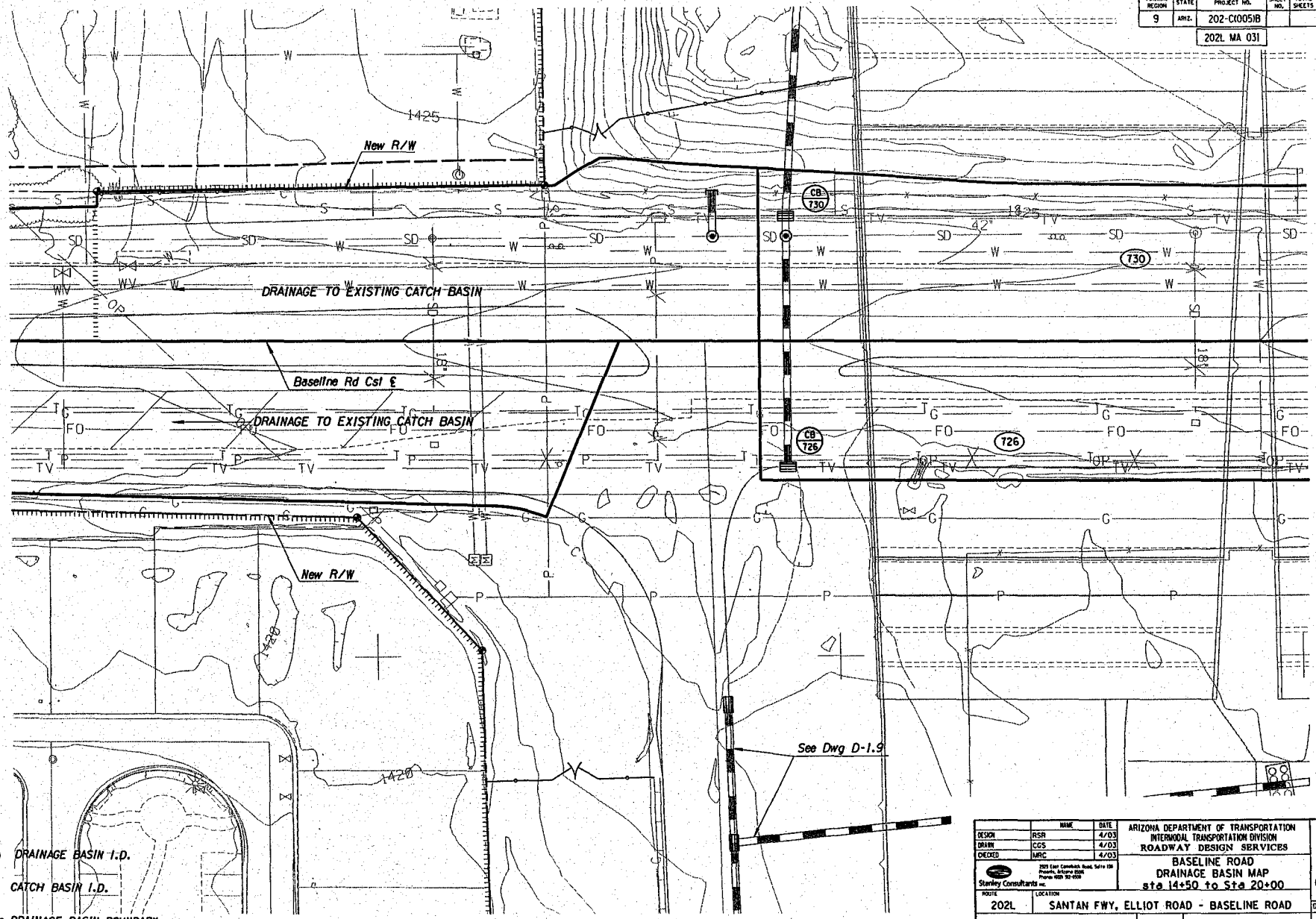
DWG NO. D-1.17

TRACS NO. H 5915 01C | 202-C(005)B | ___ OF ___

04/29/2003 gr\16110\Drainage\Schalk\dgn\h5915sdq.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-C(005)B			

202L MA 031



	NAME	DATE
DESIGN	RSR	4/03
DRAWN	CCS	4/03
CHECKED	MRC	4/03

Stanley Consultants inc.
2555 East Camelback Road, Suite 136
Phoenix, Arizona 85016
Phone (602) 912-0508

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

BASELINE ROAD
DRAINAGE BASIN MAP
sta 14+50 to Sta 20+00

95%
PRELIMINARY
NOT FOR
CONSTRUCTION

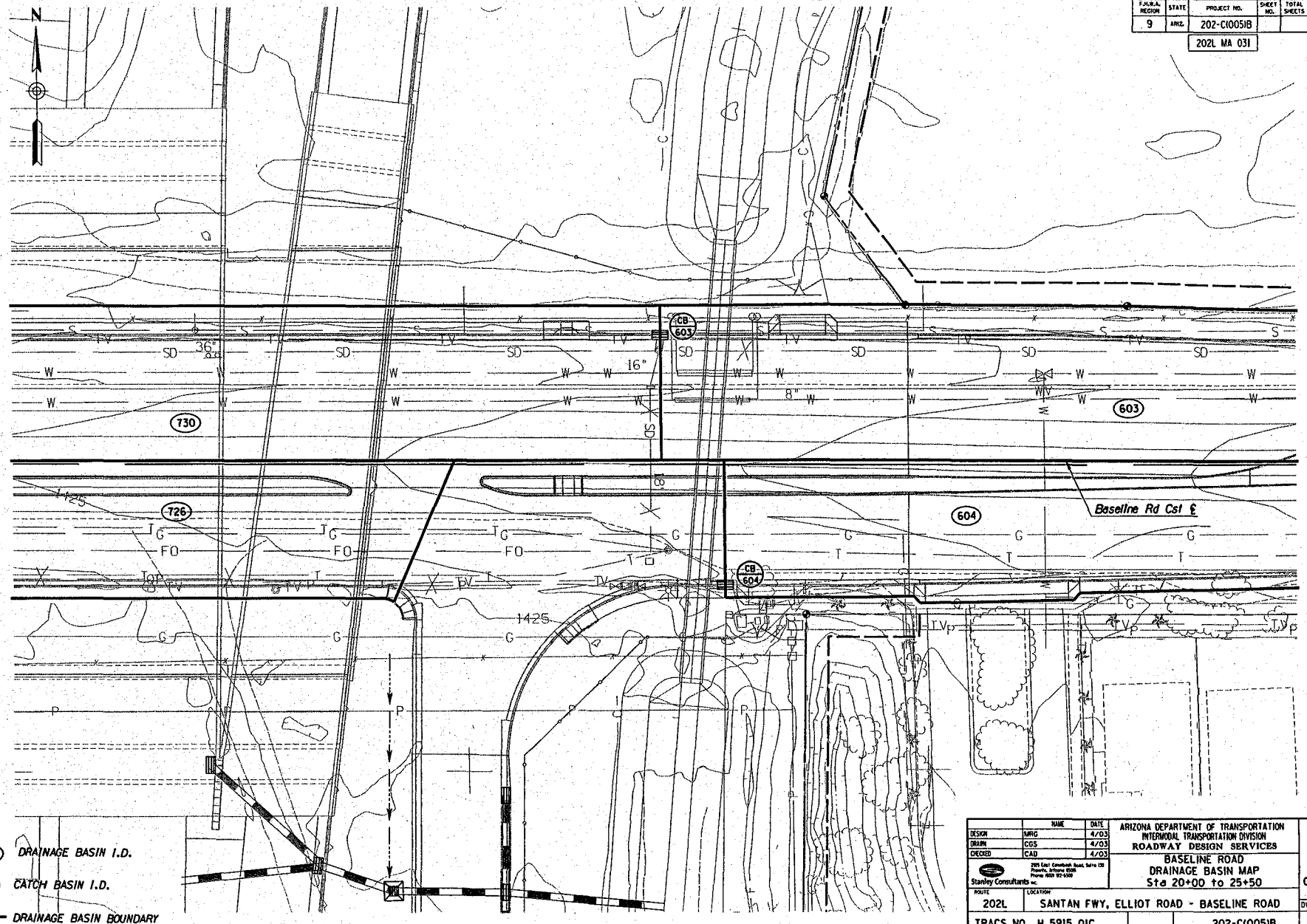
ROUTE	LOCATION
202L	SANTAN FWY, ELLIOT ROAD - BASELINE ROAD

DWG NO. D-1.18

TRACS NO. H 5915 01C | 202-C(005)B | ___ OF ___

04/29/2003 q:\16110\Drainage\Schalk\dgn\h5915sds.dgn

F.H.W.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-C(005)B			
		202L MA 031			



	NAME	DATE
DESIGN	MRG	4/03
DRAWN	CGS	4/03
CHECKED	CAD	4/03

Stanley Consultants INC.
2525 East Camelback Road, Suite 130
Phoenix, Arizona 85016
Phone (602) 957-6300

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

BASELINE ROAD
DRAINAGE BASIN MAP
Sta 20+00 to 25+50

95%
PRELIMINARY
NOT FOR
CONSTRUCTION

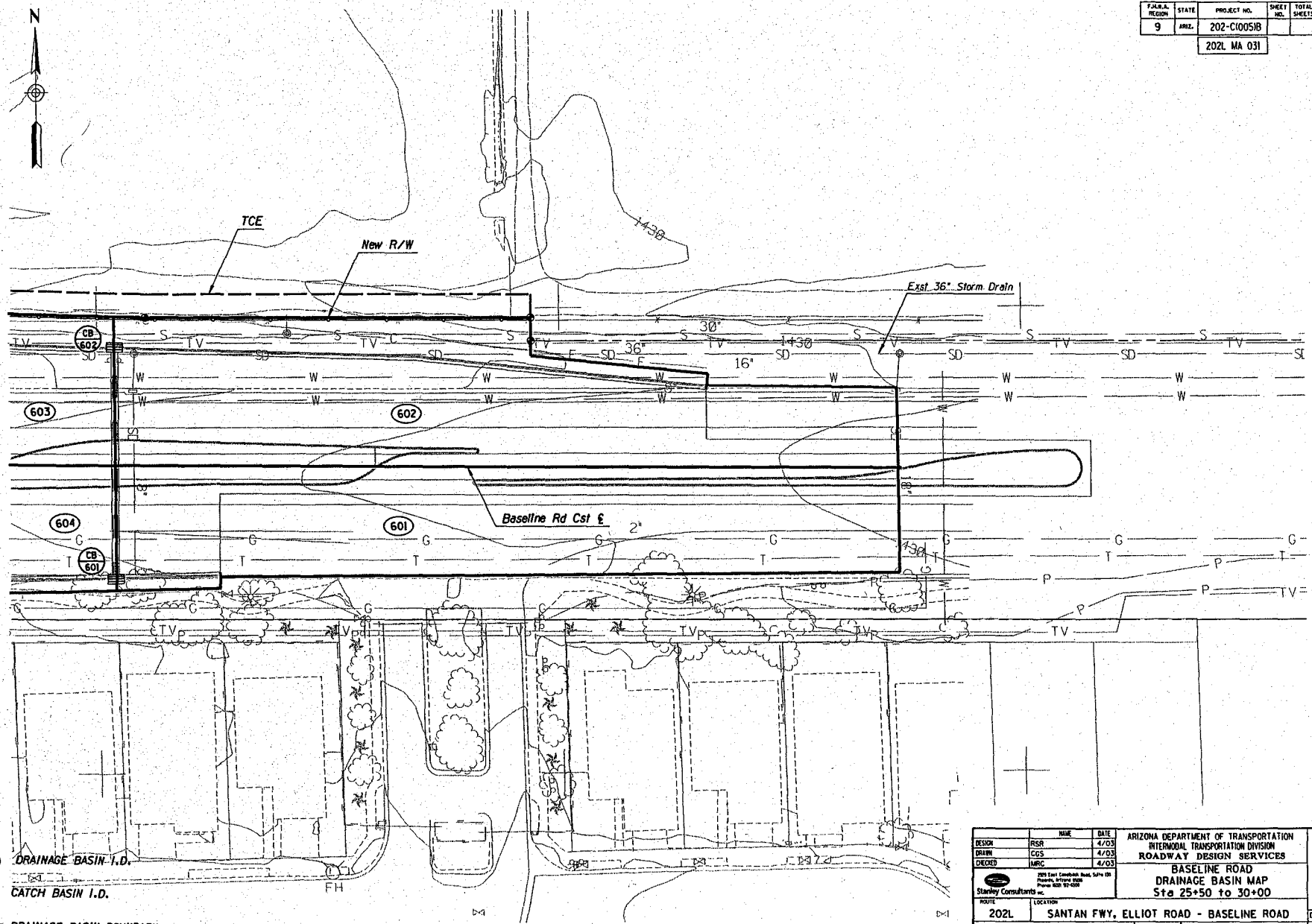
ROUTE: 202L
LOCATION: SANTAN FWY, ELLIOT ROAD - BASELINE ROAD

DWG NO. D-1.19

TRACS NO. H 5915 01C | 202-C(005)B | ___ OF ___

04/29/2003 q:\16110\Drainage\Schalk\dgn\h5915sdt.dgn

F.A.H.A. REGION	STATE	PROJECT NO.	SHEET NO.	TOTAL SHEETS	AS BUILT
9	ARIZ.	202-C(005)B			
		202L MA 031			



	NAME	DATE
DESIGN	RSR	4/03
DRAWN	CGS	4/03
CHECKED	MRC	4/03

Stanley Consultants INC.

ARIZONA DEPARTMENT OF TRANSPORTATION
INTERMODAL TRANSPORTATION DIVISION
ROADWAY DESIGN SERVICES

BASELINE ROAD
DRAINAGE BASIN MAP
Sta 25+50 to 30+00

95%
PRELIMINARY
NOT FOR CONSTRUCTION

ROUTE: 202L
LOCATION: SANTAN FWY, ELLIOT ROAD - BASELINE ROAD

TRACS NO. H 5915 01C | 202-C(005)B | DWG NO. D-1.20 | ___ OF ___

04/29/2003 qi\15110\Drainage\Schalk\dgn\h5915sdu.dgn