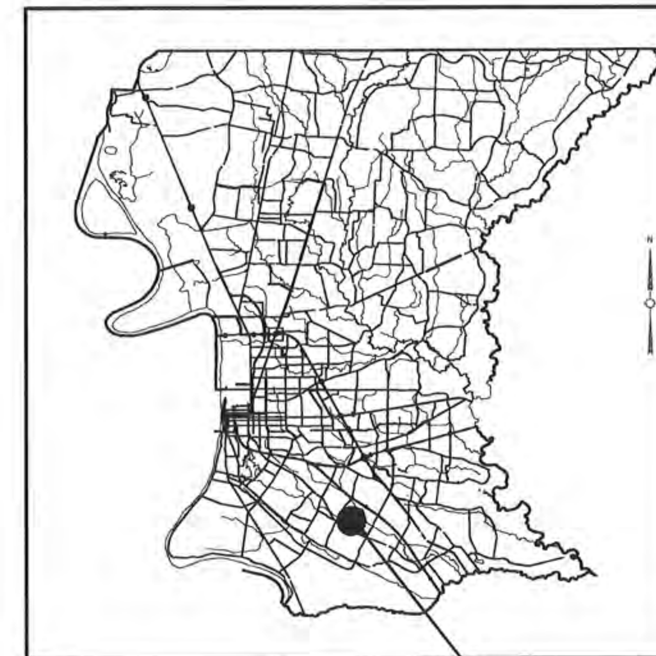
CITY OF BATON ROUGE
AND
PARISH OF EAST BATON ROUGE

DEPARTMENT OF PUBLIC WORKS
ENGINEERING DIVISION

DESIGN STUDY
FOR
PICARDY – PERKINS CONNECTOR

C.P. PROJECT No. 12-CS-HC-0043

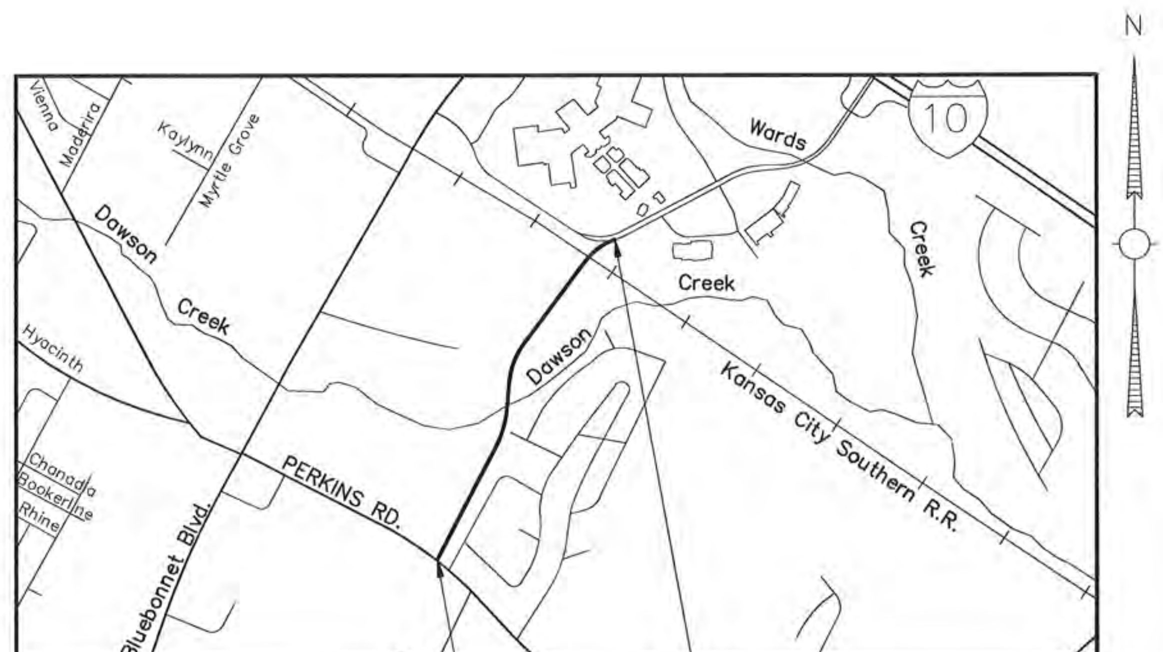


VICINITY MAP

PROJECT AREA

FOR: DEPARTMENT OF PUBLIC WORKS
CITY OF BATON ROUGE
PARISH OF EAST BATON ROUGE

ROADWAY CLASS: URBAN COLLECTOR
(CITY-PARISH ROADWAY)
DESIGN SPEED: 40 MPH



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END STUDY

LAYOUT MAP

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SCALE IN FEET

STATE OF LOUISIANA
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SHEET NUMBER	E1
PARISH	EAST BATON ROUGE
CITY	BATON ROUGE
PROJECT	12-CS-HC-0043
DESIGNED	L.R.F.
CHECKED	G.G.M.
DETAILED	M.L.R.
CHECKED	L.R.F.
DATE	JUNE 2014
SHEET	

NO.	DATE	REVISION DESCRIPTION	BY

PICARDY – PERKINS CONNECTOR
TITLE SHEET

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INTRODUCTION

A. Project Description, Location and Existing Conditions

The City of Baton Rouge and the Parish of East Baton Rouge has proposed this project to construct a new roadway beginning at Perkins Road (LA 427) and connecting to Mall of Louisiana Boulevard which borders the Mall of Louisiana. The project is one of the projects included in the 2005 Half-Cent Sales Tax Extension, known as the “Green Light Plan” (GLP). The proposed construction will consist of a four lane boulevard concrete curb and gutter roadway with sidewalks/multi-use paths and subsurface drainage. The project will also require a new bridge crossing at Dawson Creek and a crossing under the existing Kansas City Southern (KCS) railroad track.

It is noted that the name of the project, Picardy-Perkins Connector, is somewhat of a misnomer. It is correct that the proposed project does connect to Perkins Road on the south end; however, the connected road on the north end is named Mall of Louisiana Boulevard rather than Picardy Avenue.

Included in Appendix A is the December 2011 GLP conceptual plan labeled “Exhibit C”.

B. Purpose of Study

This Design Study provides a conceptual design, quantifies the right-of-way requirements, and establishes a preliminary construction cost estimate for the project. It includes the results of environmental, geotechnical, and traffic studies and other considerations to determine the most feasible project design.

C. Current and Proposed Commercial/Residential Developments in Corridor

The alignment of the Picardy-Perkins Connector (hereafter called Connector) passes adjacent to several existing and proposed commercial and residential developments. See Figure 1: Area Map. Beginning at the connection to Perkins Road, the proposed alignment passes between O’Neill Plaza and Citizen’s Bank. O’Neill Plaza contains two businesses: The Learning Center (a daycare) and O’Neill Music (a retail store). The entrance to O’Neill Plaza is on Rod Laver Avenue which connects to Perkins Road, east of the Connector. Citizen’s Bank’s driveway is on Perkins Road, west of the Connector. The bank is part of a much larger commercial and residential development called Perkins Rowe. The proposed roadway borders Perkins Rowe for approximately 685’. At this point, a high end apartment complex (also part of Perkins Rowe) is proposed.

On the east side of the proposed roadway north of O’Neill Plaza is an existing subdivision, Wimbledon Estates. The Connector will border Wimbledon until it crosses Dawson Creek. Once on the north end of Dawson Creek, the alignment cuts through the back of property owned by Jimmy Swaggart Ministries. This piece of property is home to the campus of Swaggart Ministries, from Dawson Creek to the KCS Railroad. Once the alignment crosses the railroad, it connects to the Mall of Louisiana Boulevard.

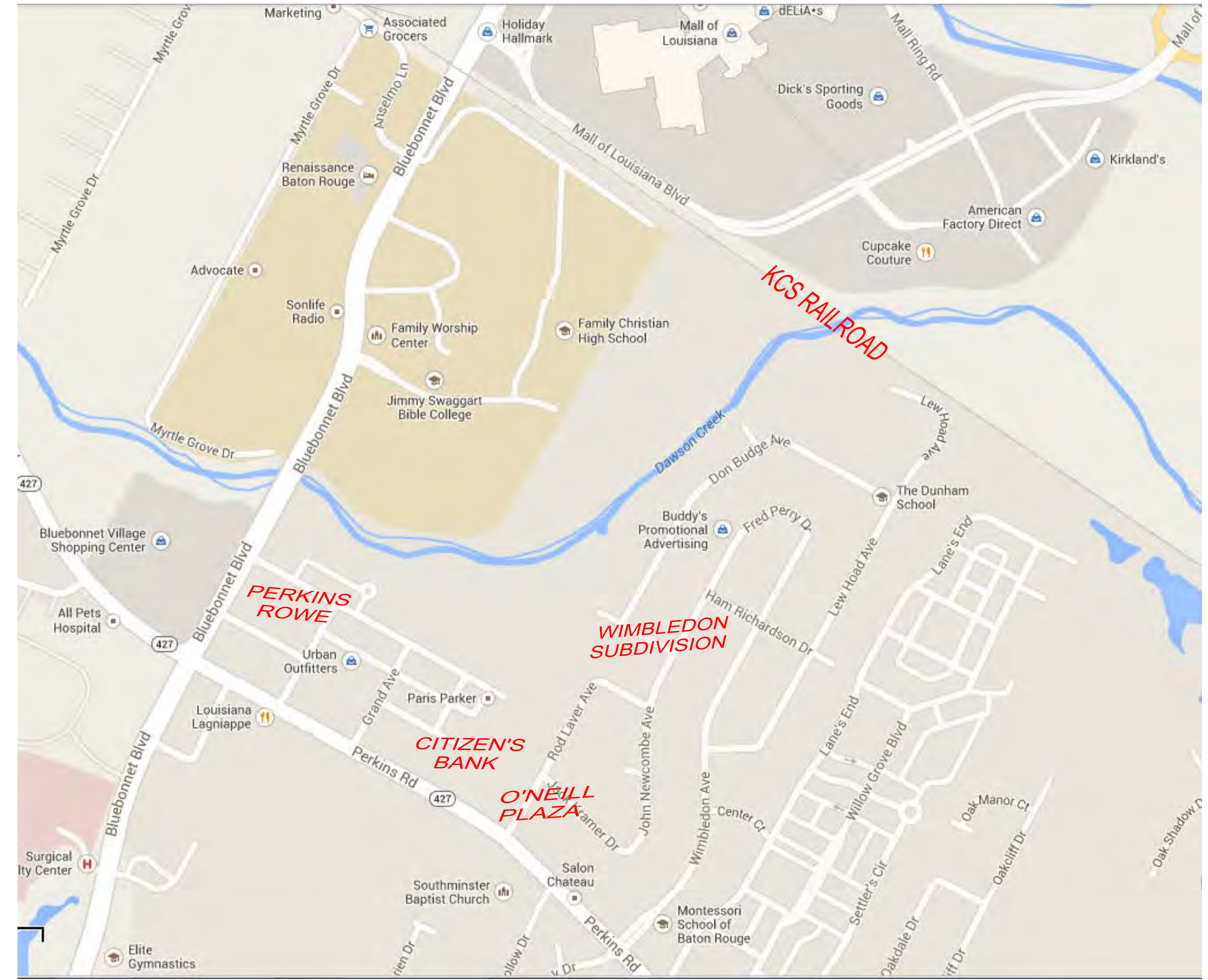


Figure 1: Area Map

PROJECT EXPLORATION

A. Topographic Survey

As part of this design study, a limited topographic survey was done in order to establish design constraints. Topographic survey was supplemented by Lidar (remote sensing technology) ground elevation data. Available Lidar data was from year 2006 and in some areas varied substantially from current field survey. More field survey was performed to provide more accurate data than provided by Lidar.

Most of the field survey was near the end of the railroad crossing and near the bridges over Dawson Creek. Other topographic and subsurface features were obtained from a drawing supplied by the consulting engineers for the Mall of Louisiana. A point file of surveyed items was supplied to GLP on February 3, 2014.

B. Geotechnical Exploration and Engineering

As part of the scope of this Design Study, a comprehensive geotechnical investigation was performed. The intent of the geotechnical investigation was to facilitate sizing of piling for the bridges and other roadway components in order to obtain better construction item quantities. This investigation is intended to be adequate for final design. See Appendix B for Soil Boring locations. A Geotechnical Report will be provided to GLP under separate cover.

TRAFFIC

A. Study Overview

A comprehensive traffic study of the area was performed by Urban Systems Inc., and the results are contained in a report titled, "Picardy Perkins Connector, Traffic Study, Baton Rouge, LA", dated February 2014. The objectives of the traffic study were to determine the appropriate lane configurations and type of control for the new intersections formed by the tie-in points, to predict the operational conditions for the implementation and design year, and to estimate the impact on the subject intersections. The existing signalized intersections studied were:

- Perkins Road at Grand Avenue
- Mall of Louisiana Blvd at Theater Entrance
- Mall of Louisiana Blvd at Mall Ring Road
- Mall of Louisiana Blvd at I-10 West Frontage Road
- Bluebonnet Blvd at Perkins Road
- Bluebonnet Blvd at I-10 East Ramps
- Bluebonnet Blvd at I-10 West Ramps
- Bluebonnet Blvd at Mall of Louisiana Southern Entrance/Exit
- Bluebonnet Blvd at Park Rowe Ave.

The existing unsignalized intersections studied were:

- Perkins Road at Rod Laver Avenue
- Mall of Louisiana Blvd at I-10 East Frontage Road

Something important to note: The LADOTD permit for the signal at the intersection of Perkins Rd and Grand Ave requires that it be removed when the signal for the Connector is installed. Likewise, the LADOTD driveway permit for Citizen's Bank requires that the driveway access to Perkins Road be eliminated when the Connector is constructed.

The conclusion of the traffic study states, "the installation of the Picardy-Perkins Connector is expected to improve the operational conditions in general for the surrounding area by providing an additional route to access the interstate and removing traffic from the already congested Bluebonnet corridor." The study also suggests modifying the signal timing of the existing Bluebonnet-Perkins intersection once the Connector is built and traffic patterns have adjusted to the new route choice.

B. Picardy Perkins Connector at Perkins Road

Five different lane configurations were studied for the Connector-Perkins intersection. The base condition is considered Perkins Road in its current 5 lane condition with restriping the middle turn lane into an eastbound left turn lane, and the Connector with a southbound shared right and left turn lane and a right turn only lane in addition to its two northbound lanes. The base condition has an overall LOS of D for both AM and PM peaks in 2022.

Four other scenarios were analyzed and the most desirable (looking only at traffic impacts) is the base condition plus an additional eastbound left turn lane on Perkins Road, an additional left turn lane on the Connector and a right turn only lane on Perkins Road westbound. This option raises the overall LOS to a B for both AM and PM peaks in 2022. However, this scenario causes significant impacts to Perkins Road due to the widening caused by the dual left turn lanes. These impacts may include utility relocations, drainage system relocations, and right of way/other possible impacts to adjacent businesses. Due to the significant nature of these impacts, additional turn lanes and access management improvements will be determined as part of final design. A single left turn lane on Perkins Road and its minimal cost is included in this study. Both options can be reviewed on sheet E12.

C. Picardy Perkins Connector at Mall of Louisiana Boulevard

The new Connector-Mall of LA Blvd intersection is a T-intersection with the Connector becoming the major street for through movements. The eastbound Mall of LA Blvd forms the third leg of the intersection. Each roadway will have four lanes. The traffic study states that additional turn lanes are not necessary for acceptable operating conditions. However, turn lanes may be beneficial to safety, stopping sight distance, and providing capacity for future traffic demands. The intersection is expected to operate at an overall LOS of B for both AM and PM peaks in 2022.

The existing intersections at Mall of LA Blvd and Westbound I-10 Frontage Road as well as Mall of LA Blvd and Mall Ring Road are expected to see an increase in delays and congestion due to the additional traffic using the Connector. Improvements were identified in the traffic study to alleviate the congestion created if left in its current configuration. Timing modifications and restriping to add additional turn lanes are recommended at both of these intersections. See Appendix C for drawings of the recommended improvements at the Mall Ring Road intersection. The improvements at the Westbound I-10 Frontage Road intersection include eliminating the striped shoulders which may allow three narrow lanes to provide dual northbound left turns on the bridge.

ENVIRONMENTAL

Two environmental studies were completed by other professional organizations, but are significant to the implementation of this project. The documents include:

1. The Phase I Environmental Site Assessment dated January 2013 by Gulf South Research Corporation
2. The Revised Wetland Data Report dated June 2013, prepared by C-K Associates, LLC.

A. Phase I Environmental Site Assessment

According to information gathered from document searches, database searches, historical maps and photographs, interviews, and site reconnaissance, possible environmental conditions were found in the form of several abandoned 55-gallon drums with unknown contents. There is a possible leaking sewer main on the subject property south of Dawson Creek.

B. Revised Wetland Data Report

The Revised Wetland Data Report states that based on field observations, the 11.5 acre project area contains 1.16 acres of wetlands and 0.84 acres of other waters of the U.S. This information represents the opinion of the investigators. The New Orleans District Army Corps of Engineers office then issued a Jurisdictional Determination on October 2, 2013, stating that there are indeed wetlands on the site. It can be found in Appendix D.

COMMUNITY INVOLVEMENT

A. Public Meeting

A Public Meeting was held on June 4, 2013, at the Bluebonnet Branch Library on Bluebonnet Boulevard from 5:00pm – 7:30 pm. Approximately 70 members from the public signed the sign-in sheet at the meeting. The meeting was open house format. Exhibits were displayed for the public to view, with members of the GLP and consultants available to explain the exhibits and answer questions. Attendees were supplied with comment forms which were collected at the meeting. In addition to the comment forms, comments could be e-mailed to the GLP subsequent to the public meeting. A summary memorandum of the Public Meeting is included in Appendix E.

B. BREC Capital Area Pathways System

BREC has recently completed construction of Phase I of the Capital Area Pathways Project (CAPP). The completed portion is a small part of the overall plan to provide approximately 8 miles of pathways. Since the Picardy-Perkins Connector will cross the proposed CAPP project, coordination efforts of this study with BREC are imperative for successful implementation of the CAPP project. See Appendix F for the Conceptual Plan of the CAPP Project.

As an early item of this study, GLP met with Mr. Ted Jack of BREC. The predominant reason for the meeting was the unfavorable response from the KCS Railroad to allow the path to traverse under the existing timber railroad bridge over Dawson Creek located approximately 600' southeast of the Connector's proposed railroad crossing. Therefore in order to make the CAPP project viable, BREC would like the path to follow the Picardy-Perkins Connector under the proposed railroad underpass. Notes from the meeting were added as text blocks onto the December 11, 2011 conceptual plan. A copy of the notes and map are included in the Appendix F.

The CAPP plan would incorporate much of an existing private path owned and maintained by Swaggart Ministries. A portion of the private path which runs parallel to the KCS railroad would be severed by the connector route. This portion of the path paralleling the railroad was not intended to be incorporated into the CAPP plan.

This study includes substantial accommodations for convenient access for pedestrians and bicycle riders. It was noted early that the proposed CAPP pathway is on the north side of Dawson Creek and the north side of the KCS railroad, therefore pedestrian and bicycle access from residential areas including the Wimbledon and Willow Grove Subdivisions are blocked by these barriers for convenient access to the CAPP pathways. The proposed Backcourt Street Bridge over Dawson Creek includes a joint use access to the Wimbledon and Willow Grove subdivisions. This connection will significantly enhance the ability for residential neighborhoods to use the CAPP pathways. In addition, a path from the Maureen Connolly Drive connection to Perkins Rowe is provided which will traverse under the proposed Picardy-Perkins Connector/Dawson Creek Bridge and eliminate any at-grade roadway crossing for pedestrians and bicyclists.

A modified CAPP pathway plan in the vicinity of this project is included with this study in Appendix F. The modified plan has not been accepted by BREC, but is included for BREC's consideration and possible acceptance.

ROADWAY DESIGN ELEMENTS

A. Design Criteria

This new route connecting Perkins to the Mall of Louisiana Boulevard was classified as an Urban Collector. As such the following design criteria in Table 1 was determined to be appropriate.

TABLE 1	
Design Speed	40 mph
Travel Lane Width	11’
Median Width	14’ – 25’
Pavement Cross Slope	2.5%
Horizontal Clearance (from back of curb)	4’ (min.) 15’ (des.)
Foreslope	3:1
Backslope	3:1
Maximum Superelevation	4%
Maximum Grade	9%
Minimum Grade	0.4%
Outside Lane Curb	Barrier
Minimum Radius Normal Crown	790’
Minimum Vertical Clearance	16’

B. Typical Section

Beginning the project at the Perkins Road intersection, the Picardy-Perkins Connector will generally consist of a 5 lane section including two northbound lanes, and 3 southbound lanes. The southbound lanes shall include double left turn lanes onto Perkins Road eastbound and a single right turn lane onto Perkins Road westbound.

Between the Perkins Rowe connection and Backcourt Street, the roadway will consist of dual roadways divided by a raised median. The divided roadways with a raised median are proposed from Backcourt Street to the End of Project, however roadway grading beyond the outside curbs changes significantly.

North of the Backcourt Street intersection, the roadway begins its descent below the existing ground and eventually below the proposed railroad underpass. The joint use path for pedestrians and bicyclists will also descend below the proposed underpass. Since the vertical clearance for pedestrians/bicyclists is less than required for vehicles (trucks), the descending grade for the joint-use path will be less steep. Levees will also be created to stop backwater flooding from inundating the depression created by the underpass. This issue will be more thoroughly discussed in other elements of this study.

C. Horizontal Alignment

The horizontal alignment begins at Perkins Road between O’Neill Plaza and Citizen’s Bank and ends with its tie in to Mall of Louisiana Boulevard. The alignment parallels the Wimbledon Estates property line until it passes Perkins Rowe. Then it veers away from Wimbledon to create a larger buffer between the existing homes and the new road. The alignment crosses Dawson Creek at a 50 degree angle. It curves through the Swaggart property to cross the KCS Railroad at a 90 degree angle between the existing power poles to create minimum impact to existing utilities. All curves were selected to avoid superelevation. Superelevation of 2.5% is utilized on the Connector at the connection with Mall of LA Blvd to aid in raising the profile of Mall of LA Blvd.

D. Vertical Profile

The vertical profile was set to maintain a minimum grade of 0.4% with vertical curves set to maintain a minimum K value of 64 for sag curves and 44 for crest curves. A minimum curve length of 120’ was set to facilitate positive drainage. Beginning the project at Perkins Road, the proposed profile generally follows the existing topography along the alignment until approximately Station 108+00. Between Stations 108+00 and 109+00, there is a significant drop-off of existing ground elevation. A study of the 100 year flood elevation was conducted to determine the proposed profile. The 2008 Flood Insurance Rate Map (FIRM), Map Number 22033C0265F (revised June 19, 2012) shows the 100 year flood to be elevation 24. In addition, the Flood Insurance Study (May 2008) Flood Profile for Dawson Creek shows a 100 year flood elevation of 24.5’ and a 50 year flood elevation of 24.0’. Based on this information, a minimum roadway grade of 25’ was set. See Appendix G for the Firm Map and FEMA Flood Profile.

The profile proceeding under the proposed railroad bridge is controlled by the rail elevation, railroad overpass structure depth, and required vertical clearance below the bottom of the railroad structure. It is imperative that the large depression created by the roadway profile be surrounded by a levee or watertight wall to keep backwater out of the depression. The levee or wall shall be constructed to elevation 25’ minimum.

Sight distance on the curve proceeding under the railroad was studied to determine the impact the railroad structure may have on drivers’ view of the traffic signal at the intersection with Mall of Louisiana Boulevard. Using a driver’s eye height of 3.5’ and a bottom of signal casing of 17’, a graphical review determined that 438’ of sight distance was available to drivers to the proposed location of the stop bar. The MUTCD lists 390’ as a minimum when approaching a signal light on a flat grade with a design speed of 40mph. Due to the downgrade and as an added factor of safety, an additional warning light or sidewalk pole with a lower stop light should be considered.

E. Roadway Lighting

Lighting was considered in the center island on poles spaced generally from 150’ to 200’. As the road gets closer to Perkins Road and the center island disappears, the lighting would shift to the side of the Connector. The cost estimate for the street lighting infrastructure is $80,000. However, this roadway is not currently in the city limits or in a lighting district. Therefore, there currently isn’t a mechanism to pay for electricity for lights. There is an existing lighting district at the Mall of Louisiana and it is assumed that the underpass lighting will be included in this district. The underpass lighting will consist of 8 wall-mounted lighting fixtures. The cost estimate for the underpass lighting is $10,000 and is included in the roadway cost estimate in the Predesign Opinion of Probable Construction Costs portion of this design study. The power for the lighting fixtures will be provided at a service panel near the lift station control panel. If the City-Parish decides to light the rest of the new roadway, they will need to find a way to pay for electricity.

F. Tie-in to Mall of Louisiana Boulevard

One of the key features to the success of this project is the efficient traffic flow when the Picardy-Perkins Connector is joined to the Mall of Louisiana Boulevard. The connection will occur in close proximity to the railroad underpass. Several unique features of the connection are necessitated by this proximity. The unique features include:

1. The connection will be within the sag curve of the connector profile, therefore the connection will be on a horizontal and vertical curve.
2. The connection will be vertically below the surrounding natural ground elevation.
3. If the intersection is signalized, there will be three closely spaced traffic signals between the railroad underpass and the interstate ramps.

Three conceptual alternatives for the connection of the Connector Route to the Mall of Louisiana Boulevard were considered during this design study and are included in Appendix H. They are described as follows:

<u>Alternative A</u>
Alternative A utilizes a tee intersection with a traffic signal on a roadway grade which is depressed below natural ground in order for the Connector to traverse under the railroad track(s). A concern is that traffic moving northbound on the connector may have limited vision of the traffic signal which could be blocked by the railroad bridge structure. Alternate A does provide all traffic movements while protected by a traffic signal.

<u>Alternative B</u>
This alternative eliminates the necessity for a traffic signal by providing a vehicular bridge over the connector route. The vehicular bridge is on a single lane flyover ramp which allows eastbound Mall of Louisiana Boulevard traffic to cross above the Connector traffic, thus eliminating the left turn traffic movement. A disadvantage of this concept is no traffic movement is allowed for northbound connector traffic to turn left onto the Mall of Louisiana Boulevard proceeding westbound. Since the left turn from the proposed Picardy-Perkins Connector to the Mall of LA Boulevard is prohibited in this Alternative, two options are available to accommodate the destinations in other ways. They include:

- Northbound Picardy-Perkins Connector traffic would be required to continue northeastward to the Mall Ring Road, and then turn left onto the ring road.
- A U-turn could be provided slightly north of the proposed tie-in location allowing an indirect destination accommodation.

<u>Alternative C</u>
This alternative is similar to Alternative B because it utilizes the flyover ramp, but does allow the traffic movement which was not allowed by Alternative B. The allowed traffic movement will not be protected by a traffic signal.

After consideration of the 3 alternatives, B and C were eliminated because an acceptable vertical alignment did not fit in the limited distances between the flyover and the Theater Entrance roadway. The flyover needed the proper vertical clearance over the Connector and therefore was too high at the point where the Connector and the flyover would come together horizontally. The connection point would have to be pushed further toward the theater and then became too close to the existing traffic light in addition to taking additional parking from the Mall. Therefore, Alternative A is considered to be the only feasible tie-in method. A variation to Alternative A that was considered is a skewed intersection at approximately 120°. This variation will have little impact on the overall cost of the project and will be studied further in the construction plan phase.

G. Construction Phasing

The majority of the project can be built in a single phase since the alignment is through undeveloped land. The complicated section is the tie-in with Mall of Louisiana Blvd. There is a significant amount of excavation in this area and closing a section of Mall of Louisiana Blvd while constructing the entire tie-in would be most desirable for construction and budget. The potential route drivers would take to divert around this closure would be through the Mall of LA and connecting with the Mall Ring Road. This path is through a private development (the Mall of LA), particularly through a pedestrian-friendly area of the Mall called The Boulevard. If traffic is required to be maintained during construction, two lanes of the Mall of LA Blvd would be closed while two-way traffic would occur on the other two lanes. The next phase of construction would require two-way traffic on the newly built lanes, while the other two lanes are completed. There would be a significant elevation difference between the existing two lanes containing traffic and the two lanes being constructed. Therefore, a temporary retaining wall would be required. Also, the transition after the construction zone will cut through the landscaped median of Mall of LA Blvd and additional temporary changes to the traffic signal may be required. All these factors were considered when developing a cost associated with sequence of construction in the cost estimate.

H. Rod Laver Avenue Modification

The existing Rod Laver Avenue is one of two roadway connections from the Wimbledon Subdivision to Perkins Road. The other connection is Wimbledon Avenue/Perkins Road which is controlled by a traffic signal at the intersection. The Rod Laver Avenue connection to Perkins Road is unsignalized. The Rod Laver connection to Perkins Road is approximately 200’ southeast of the proposed Picardy-Perkins Connector intersection with Perkins Road. The close proximity of the proposed Picardy-Perkins Connector and Rod Laver connections to Perkins Road warrants considerable evaluation related to traffic congestion. This area is complicated by several closely spaced business driveways across Perkins Road. These businesses include Iberia Bank, Baum’s Bakery, Appletree Storage, Sonic Drive-In, and a church.

A meeting was held on May 21, 2013, at the LADOTD headquarters to discuss possible access management and traffic signal requirements that LADOTD may require for the Picardy-Perkins Connector project. There was a lot of discussion about these issues, but no firm decisions or requirements were made.

Four options were developed as part of this study for the Rod Laver Avenue modifications and are included in Appendix I. All four options include the closure of driveway access from Perkins Road directly to O’Neill Plaza. In addition, all four options include a westbound Perkins Road to northbound Picardy-Perkins Connector right turn lane. Option 3 includes a new path through an empty lot connecting the Picardy-Perkins Connector and Rod Laver. It was selected as the best possible scenario when considering route continuity, access management, and traffic flow. The LADOTD will need to accept or modify this recommendation, since the Picardy-Perkins Connector project will need a permit from LADOTD to connect to Perkins Road which is a state highway under LADOTD jurisdiction.

I. Retaining Walls

Design Criteria

One key to successful completion of this project requires the construction of four (4) mechanically stabilized earth (MSE) retaining walls along the Picardy Perkins Connector and Mall of Louisiana Boulevard routes.

MSE Wall No. 1 is located approximately 47 ft left of profile grade of Picardy Perkins Connector at approximate station 130+30 to approximately 55 ft left of profile grade of Picardy Perkins Connector at approximate station 136+14. MSE Wall No. 1 utilizes the profile of Picardy Perkins at the front fascia to set top of leveling pad elevation. The top elevation of wall has been determined as 25.5' MSL for prevention of inundation as described below.

MSE Wall No. 2 is located approximately 30 feet right of profile grade of Picardy Perkins Connector at approximate station 131+40 to approximately 83 ft right of profile grade of Picardy Perkins Connector at approximate station 139+30. MSE Wall No. 2 utilizes the profile of Picardy Perkins at the front fascia to set the top of leveling pad elevation. The top elevation of wall has been determined by the profile grade of the multipurpose sidewalk.

MSE Wall No. 3 is located approximately 55 feet left of profile grade of Picardy Perkins Connector at approximate station 136+92.50 to approximately 34 ft right of profile grade of Mall of Louisiana Boulevard at approximate station 346+00. MSE Wall No. 3 utilizes both profile grades of Picardy Perkins Connector and Mall of Louisiana Boulevard at front fascia to set the top of leveling pad elevation. The top elevation of wall while tracking along the Picardy Perkins profile has been determined as 25.5' MSL for prevention of inundation as described below. The top elevation of wall while tracking along the Mall of Louisiana Boulevard has been determined by the existing ground profile.

MSE Wall No. 4 is located on the Mall of Louisiana side of Mall of LA Blvd and the Picardy Perkins Connector. It starts at approximate station 346+12 on the Mall of LA Blvd alignment and ends at approximate station 140+72 on the Picardy-Perkins Connector alignment. MSE Wall No. 4 utilizes both profile grades of the Connector and Mall of Louisiana Boulevard at front fascia to set the top of leveling pad elevation. The top of the wall has been determined by the existing ground profile.

These MSE walls serve multiple purposes as discussed below.

Earth Retention

Because the project consists mainly of constructing the roadway under an existing railroad line, the routes will need to be excavated to the proposed grade which allows for vehicular clearance under the new railroad bridge structure. To conserve right of way, MSE walls will be utilized to retain the excavated corridor. The leveling pads of the MSE walls will to need be approximately 18" to 24" below profile grade at the face of MSE wall.

Sidewalk Earth Retention

In addition to constructing the roadway under the new railroad bridge structure, a multipurpose sidewalk will be constructed to the right of profile grade of Picardy Perkins Connector. Because required clearance above the sidewalk is not as great as that for the roadway, the profile for the sidewalk will vary significantly from that of the roadway. The MSE Wall will be constructed to account for this variation.

Prevention of Inundation

In addition, the MSE Wall No. 1 serves to prevent flood waters from inundating the roadway underpass. The top of MSE wall at this location will be 25.5' MSL which is six (6) inches above the flood elevation provided. To the right of MSE Wall No. 2, prevention of inundation from flood waters was decided to be best provided by an earthen berm. The top of the earthen berm will be 25.0' MSL.

The top elevation of wall for MSE Wall No. 3 has been set to 25.5' MSL to create a pleasing top of wall profile along the corridor.

Aesthetics

Due to the proximity of the Mall of Louisiana, Perkins Rowe and the Mall of LA Boulevard I-10 Interchange, and due to the nature of the standard MSE wall blocks used, the design will include a context sensitive solution to provide an aesthetically pleasing fascia.

The MSE wall in this area can be further architecturally enhanced using precast concrete panels that are attached to the MSE wall block face, or by using a special pattern of texture coating, to create the Client's desired image or message. Landscaping in front of the MSE walls will be provided and shall conform to specifications set forth by the Client.

MSE Wall Requirements

The design, materials and construction of the MSE walls shall be in strict conformance with the latest edition of the Mechanically Stabilized Earth Wall Design Guide published by the Louisiana Department of Transportation and Development Pavement and Geotechnical Design Section. No design exceptions will be allowed. The MSE wall will be constructed utilizing the pre-qualified contracting method.

Drainage

Internal drainage of the MSE walls is critical to the longevity of the structures. Therefore, the design of the MSE wall will ensure that proper drainage details as delineated in the Design Guide have been provided.

Construction

All MSE Wall construction in addition to the Design Guide shall be in accordance with Louisiana Department of Transportation and Develop Standard Specifications for Roads and Bridges.

J. Privacy Wall

Since a portion of this project will create a transportation corridor adjacent to a long-established residential community, it is deemed appropriate to provide a privacy wall between the corridor and the residential area. The questionnaire provided at the public meeting revealed that 100% of residents at the meeting want a privacy wall. The overwhelming reason was for noise reduction; a second reason was for visual privacy.

The privacy wall is proposed to begin at approximate Station 100+50 and end at approximate Station 118+00. The wall is proposed along the east side of the proposed corridor adjacent to the Wimbledon Subdivision. Three photographs of privacy walls in the Baton Rouge area were available for viewing at the public meeting, but no comments were received relating to the type of privacy wall preferred. This issue will be studied in greater detail in the final design phase of the project.

UTILITIES

As an early task of the Project, a review of existing utility information provided by GLP was performed. Also, additional information was obtained from Baton Rouge Water Co. and Entergy Gas Division. The provided utility map information was supplemented by field survey and a Mall utility map provided by the consulting engineering firm for the Mall. As with almost any urban roadway project, this project has numerous utility issues. The area near the railroad underpass has numerous possible utility conflicts.

An existing Entergy electrical substation is located south of the Mall and abutting the KCS Railroad. In addition, there are high voltage overhead power lines running along each side of the railroad. The power line on the north side of the railroad is supported by prestressed concrete poles. The power line on the south side of the railroad is supported on galvanized steel poles. There is also a power line on the south side of the railroad supported by timber poles. The selection of the alignment location of the Connector considered these electrical lines and missing the two larger line support poles. All of these lines appear to connect to the electrical substation.

Construction of the railroad overpass will be complicated by the power lines parallel to the railroad. The metal poles supporting the high voltage transmission lines are about 25' from the centerline of the existing track. The power lines are cantilevered toward the railroad track from the poles. This line will probably need to be de-energized during pile driving and possibly during girder erection. De-energizing of these lines will probably be subject to seasonal constraints based on peak demands for power usage.

Between Sta. 139+00 to 139+50 of the proposed alignment are existing underground electric lines. These underground lines provide service to most of the Mall facilities. These lines will need to be lowered or relocated because of the lower roadway grade caused by the underpass.

There are also two separate telephone lines at Sta. 137+90 and 138+40. A single gas line crosses at Sta. 141+55. Again, these lines will be relocated or lowered.

Between Sta. 142+20 and 142+50 is a utility corridor consisting of at least two sanitary sewers, a water line, and another gas line. Likewise, these utilities will be relocated or lowered. Mall property sanitary sewer is pumped or flows by gravity to a point on the southeast side of the Entergy substation. A private pump station then lifts sewage into a public force main paralleling the north side of the KCS railroad, then flowing southeast. The EBROSCO Maps showing the sewer line and pump stations are found in Appendix J.

In addition to the utility conflicts at the Mall of LA Blvd, there is a power pole next to Perkins Road in the intersection with the Connector. This pole must be relocated.

DRAINAGE

A. Existing Drainage

The project lies within the Wards Creek/Dawson Creek watersheds. Wards Creek and Dawson Creek merge approximately 0.5 miles southeast of the project. The proposed alignment crosses Dawson Creek at approximately station 119+00 on a skew of 40˚. Dawson Creek curves to the north and parallels the alignment roughly 350' to the east. The land to the northeast of the creek drains to the creek in a variety of ways including sheet flow in some areas. On the Swaggart Ministries property, there is an existing subsurface system that collects a portion of the runoff and outfalls close to the proposed bridge. Further north, there is a swale that deepens gradually as it carries the runoff to the creek close to the existing KCS Railroad. The land on the south side of Dawson Creek, including Perkins Rowe and Wimbledon Estates, sheet flows north and east to the creek. See the Existing Drainage Maps (sheets E-17 through E-20) for clarification of drainage areas and flows.

Large ditches run parallel to the KCS railroad southeastward to Dawson Creek. Approximately one third of the Mall property drains to the southwest and eventually to a 72" pipe which outfalls into the large ditch on the north side of the railroad. The termination of the 72" pipe is just northwest of the proposed Picardy-Perkins Connector route.

Bluebonnet Boulevard crosses Dawson Creek about 0.5 miles upstream of the project corridor. Similar to this project, Bluebonnet Boulevard also traverses under the KCS railroad. A pump station lifts storm water runoff from the sag profile of the roadway and the pump station outfall is to the ditch on the south side of the railroad. The pumped water then travels along this ditch, crossing the proposed alignment and flowing into Dawson Creek.

B. Proposed Drainage

The proposed drainage system between Perkins and the Backcourt Street intersection is a typical enclosed subsurface drainage system consisting of curb inlet catch basins and an underground pipe system.

The drainage near the underpass is much more complex. As previously discussed, there is significant runoff quantities being conveyed by the ditches on either side of the railroad. Since these ditches will be severed by the roadway underpass, these drainage corridors will necessarily be rerouted. In order to minimize the cost of the pump station, the amount of runoff into the depression which will be pumped must be minimized. With that consideration, existing gravity drainage is intercepted and rerouted to the greatest extent possible. See sheets E-21 through E-24 for the proposed drainage system.

The pipe system currently draining the southwest quadrant of the Mall property is proposed to be rerouted to the south side of the KCS railroad. This concept will require a bore-and-jack of the 72" pipe under the railroad. The existing drainage system serving the Mall of Louisiana Boulevard northeast of the end of this project shall be intercepted and rerouted around the Entergy substation to the north side railroad ditch south of the Entergy substation. Finally, the flow in the south railroad ditch is diverted southwestward toward the Backcourt Street to Dawson Creek. This flow quantity is quite large and will require a concrete box culvert to accommodate the anticipated flow quantity. A more precise quantity will be determined during final design.

In order to eliminate any gravity drainage or backwater from Dawson Creek from flowing into the underpass excavation, earthen dams will be constructed to close the railroad ditch flow from entering the excavation. All gravity drainage which is connected to the Dawson Creek outfall without passing through the pumping system is subject to flow reversals during a high water event on Dawson Creek. Any catch basin or inlet below the 100 year storm elevation would allow Dawson Creek backwater to reverse flow continuously into the underpass excavation. Obviously, if that occurred, the pump station would not pump that amount of water, thus the excavation could stay continuously flooded until the Dawson Creek high water event subsided. In order to avoid this scenario, no inlet or catch basin connected to the gravity drainage system near the underpass excavation shall be lower than elevation 25'.

C. Bridge Hydraulics

A hydraulic analysis was performed to determine the effects of the proposed bridges on the existing water surface profiles in Dawson Creek. See Appendix K for the hydraulic calculations. For this analysis the computer program HEC-RAS was utilized. Existing cross sections of Dawson Creek were imputed into the program along with characteristics and parameters of the channel and flood plain. In total 7 cross sections were used. The furthest downstream cross section is 500 feet downstream of the proposed Backcourt Bridge. The furthest upstream cross section is 320 feet upstream from the proposed Perkins-Picardy Bridge.

Peak flow rates for the Perkins Picardy Connector bridge was taken from the Flood Insurance Study produced by the Federal Emergency Management Agency (FEMA) in 2008 and later revised in 2012. "Table 2 Summary of Discharges" gives the discharge rates in Dawson Creek at the Bluebonnet Bridge as follows:

10-year event=	2567 cfs
50-year event=	3450 cfs
100-year event=	4339 cfs
500-year event=	5361 cfs

The proposed Perkins Picardy Connector bridge is located about 2000 feet downstream from the existing Bluebonnet Bridge; therefore, a 5% increase in discharges were added to the given discharges in Table 2. The discharges used in the HEC-RAS model are as follows:

100-year event=	4556 cfs
500-year event=	5629 cfs

These same flow rates were used for the proposed Backcourt Bridge as well.

Starting water surface elevations are required for the HEC-RAS analysis. For this data, the Flood Insurance Study was referenced also. Panel 34P provides water surface elevations for the 100-year and 500-year events. The water surface elevations used at the most downstream cross section are as follows:

100-year event=	24.5'
500-year event=	25.5'

The results of the analysis indicate that the proposed bridges will have no significant impact on the water surface elevations in Dawson Creek. The highest 100-year water surface elevation in the study area was computed to be 24.6'. It should be noted that there were several large piles of soil material located on the banks of the creek when the topographic survey was taken. These piles contributed to the variation of the water surface profiles through the study area. Where a pile was located at a cross section, the water surface was contained in a smaller flow area, thus increasing the height of the water surface. Where there was no pile, the water surface spread out over a larger area thus decreasing the water surface.

Scour Analysis:
A scour analysis was performed using HEC-RAS as well. For this analysis only the 500-year event was used. The D50 and D90 particle size was determined through laboratory testing to be 0.001mm and 0.075mm. The results of the scour analysis indicate that relatively small depths of scour are anticipated, mostly due to the low velocities in the channel as well as the local clayey soils present in the project area. Both bridges resulted in scour depths of less than 7'. For design purposes, a scour depth of 10' is recommended.

PUMP STATION

The Picardy Perkins Connector road will require an underpass beneath the KCS RR. Drainage in this area requires collection, transmission, and discharge and therefore a Storm Water Pump Station.

A. Hydrologic Analysis

The design of the Storm Water PS is based upon our hydrologic analysis. Refer to Appendix L.

Results of run off and inflow are as follows:

5 yr. Storm	23.17 cfs
25 yr. Storm	36.70 cfs
50 yr. Storm	43.35 cfs (*)
100 yr. Storm	49.98 cfs

In accordance with the Louisiana DOTD Hydraulics Manual Section 10.2, we will use the 50 yr. design storm event as the basis for design flow for this facility.

The 50 yr. Storm maximum “Q” flow is 43.35 cfs and is equivalent to 19,455 gpm approximately 20,000 gpm.

B. Hydraulic Calculations and Selection of Equipment

Hydraulic calculations were prepared to determine the type, size, and number of pumps and electric motors required to meet the project discharge requirements. Calculations are presented in Appendix L.

Based upon requirements from the LADOTD 2011 Hydraulics Manual (which indicated a backup pump may be required), three (3) vertical 24” diameter mixed flow pumps were selected.

Each pump will provide capacity of 10,000 gpm requiring two (2) pumps to meet the 50 yr. storm event design flow of approximately, 20,000 gpm.

Wet well calculations, as presented in Appendix L, show that a ten foot (10’) diameter structure will provide enough volume and storage for a 20 minute cycle time; or 3 starts per hour per pump at the maximum inflow. The volume of surcharged influent storm sewers were included in the wet well volume calculations.

Electric submersible mixed – flow pumps Model SEMF-24 from MWI Corporation were selected for their expertise with these types of pumps. Each pump will have a rated capacity of 10,000 gpm at 37.5 feet total head. Each pump will require a minimum of 150 brake-house power. Refer to the selected major equipment in Appendix L. Xylem (Flygt Corp.) and Ebara Pump Corporation make similar electric submersible mixed flow pumps of equal quality.

This facility will not require trash racks or screens. Large debris and branches etc. will be screened out of the station through inlet grating and via the pump intake design. The pump suction bell will have a set of screening bars to prevent debris from entering the pump bowl. These bars also help prevent cavitation and break up eddy swirls.

In many cases liquid level is controlled through old fashioned mercury float switches. These devices can get tangled, are hard to set to the proper elevation and do not produce a 4-20 mA signal. We recommend a transducer or better yet an ultra- sonic water level control device. Current ultra-sonic devices monitor and control water levels and start/stop pump(s) with efficiency.

The station will be provided with a radio telemetry unit (RTU) that is compatible with the City’s current SCADA System. The RTU will provide capability to monitor and control the Station from a remote location such as Utility Department main office.

An emergency power generator with ATS will be required at the site to provide power during electric outages. A built-together diesel fuel tank or a separate fuel tank of substantial size will be required to provide genset operation. Fuel leak detection and monitoring systems are required to protect the environment.

C. Site Plan and Construction

The selected site for the pump station is on the south side of the Connector Road and on the southwest side of the RR. Refer to drawings C-01 and C-02.

The station will be located behind the retaining wall at a high enough elevation to prevent flood waters from damaging the facility.

The Station main discharge pipe will be a 30” diameter steel pipe. The discharge point will be the drainage ditch west of the railroad and south of the Connector Road. This flows into Dawson Creek.

The station will consist of a 10 foot diameter pre-cast concrete wet well with steel discharge tubes rising up above the top slab. Check valves and isolation valves will discharge across the slab and down below the surface. These will manifold into a 30 inch diameter discharge main.

Often steel sheet piling is used to construct a temporary coffer dam to install the 10’ diameter wet well structure. Additional flowable fill will be placed around the station to secure and stabilize the station from potential buoyant forces.

RAILROAD BRIDGE AND CONSTRUCTION PHASING

A. Design Criteria

The new roadway alignment requires construction of a grade separation railroad bridge in order to cross under the existing Kansas City Southern (KCS) Railroad mainline. Early in the study phase, a coordination conference call was held with representatives from the KCS Railroad to determine minimum acceptable design criteria for the project. The design shall generally conform to the AREMA Manual for Railway Engineering (MRE) guidelines. In addition, a summary of the specific requirements requested by KCS Railroad is included in Table 1. Project north has been established to coincide with railroad north along the KCS Railroad mainline.

Table 1: KCS Railroad Bridge Design Criteria	
Shoofly Design Speed	49 mph
Main Track Design Speed	59 mph
Minimum double track offset	15’
Train Traffic	6 - 8 trains per day (currently)
Bridge Superstructure	Concrete ballasted deck
Bridge Superstructure	AASHTO beams preferred over DVB Box Beams

B. Temporary Detour (Shoofly) Design

After reviewing options for the shoofly detour alignment on the east and west side of the existing mainline, an eastern alignment was selected. This location for the shoofly is the preferred alignment for several reasons. First, it eliminates the significant embankment construction that would be required for a western alignment, as the majority of the length of the shoofly is nearly at-grade with the railroad on the eastern side. Secondly, it eliminates impacts to the transmission line that runs along the western side of the railroad mainline.

Another consideration for the shoofly design is the avoidance of impacts to the existing timber railroad bridge over Dawson Creek. To reduce environmental (stream) impacts and project cost, the shoofly design will avoid this bridge. The shoofly design begins its detour off of the (railroad) north end of the timber bridge and provides a 20' offset (centerline mainline track to centerline shoofly) at the south end of the new bridge. The 20' offset was set in order to allow for construction of the new bridge, and specifically, provide a 9.5' minimum offset from the temporary support of the excavation to the centerline of the active railroad track. Impacts to the Mall access road will be mitigated by construction of temporary retaining walls.

C. Railroad Bridge Design

The new KCS Railroad Bridge is a 102' long, two-span bridge featuring TYPE IV AASHTO PCI-Beams supporting a reinforced concrete ballast trough. The longer span (61') spans the eastbound roadway lanes and the shared use pathway, which will be separated from the roadway by a short retaining wall in order to minimize excavation and slopes along the shared use path. The superstructure is estimated at 7'-8" deep from top of rail to bottom of beams. At this study phase, the substructures are assumed to consist of concrete encased pile bents. The abutment bents will be flanked by full depth wings founded on piles. Retaining walls will run to the east and west, adjacent to the wings.

One feature of the design is the accommodation of a future second mainline KCS track. Based on the recently reconstructed I-10 bridge over KCS Railroad, the future track is assumed to be constructed to the east of the existing track. The current intent is to build a single track bridge during this project. However, due to the extensive retaining walls that will be required adjacent to the abutment wings, and the difficulty with removing a portion of these retaining walls, the abutments will be built wide to accommodate the future second track. The pier bent will also be built wide. The construction of a second mainline track would involve the minor modification of the widened abutment back walls and construction of a second superstructure supported on the existing abutment and pier bents. In this manner, no major excavation or embankment work would be required in the future.

D. Construction Sequence

With any railroad grade separation project, construction sequencing is critical to the cost, schedule, and associated risk. The proposed sequence of construction is illustrated on the bridge plans in the appendix and below. A few key design constraints were incorporated into the proposed sequence. First, in the absence of a KCS requirement on horizontal offset from support of excavation (SOE) and centerline of active railroad track, a Norfolk-Southern Railway requirement of 9'-6" was utilized. Based on this requirement, the shoofly alignment was set to allow for a 20' minimum offset at the end of the bridge.

The proposed construction phasing consists of:

Stage 1

1. Construct shoofly track structure and shift train traffic to the shoofly detour.
2. Install SOE adjacent to shoofly by driving sheet piling (*tie-back sheet piling wall assumed for illustration purposes*).
3. Begin excavation for bridge construction to bottom of bent cap elevations. Installing initial tie-back wall anchors as the excavation progresses. Drive piles for bents and wings.
4. Construct bent concrete caps. Continue excavation around piles, installing pile bracing as construction progresses.
5. Continue excavation to required depth, setting additional tie-back anchors as required.
6. Place final bent pile bracing, install forms and reinforcing bars, and encase piles in concrete to finish substructures. Construct roadway retaining walls on south side of railroad alignment (railroad west).
7. Backfill abutments and wings and construct bridge superstructure.

Stage 2

1. Install SOE as required to retain embankment beyond bridge ends.
2. Shift train traffic back to original alignment over the new bridge.
3. Remove shoofly alignment and continue excavation (including removal of Stage 1 SOE) to required limits.
4. Construct widened abutment, wings and widened pier to accommodate the future second track. Construct roadway retaining walls on north side of railroad alignment.

DAWSON CREEK BRIDGES

Dual bridges were selected to span Dawson Creek at a 50˚ skew. Based on the characteristics of the creek and adjacent existing ground, a 6-span AASHTO Type II girder bridge was selected with span lengths of 60'. The profile was set such that the low chord of the main spans over the creek were above the 100 year high water elevation of 24.5'. The southbound bridge also carries a 8' wide sidewalk across the creek separated by a PL-2 highway barrier. The addition of the sidewalk accomplishes the goal of creating a fluid, interconnected pedestrian system by providing access across the creek to the 10' wide multi-use path. The substructure is estimated to consist of 24" PPC piles and concrete caps.

BACKCOURT STREET BRIDGE

To create an interconnected transportation system that benefits the whole community, it is desirable to provide access to the Connector for Wimbledon Estates Subdivision and The Dunham School at Backcourt Street. This connection requires a bridge over Dawson Creek. A two lane 36'-4" wide bridge is proposed which allows for two 12' lanes with 1' offset to the barrier as well as a 6'-11¾" sidewalk separated by a PL-2 highway barrier. This sidewalk is an integral part of the pedestrian transportation network connecting Wimbledon and adjacent subdivision Willow Grove to the multi-use path. Seven quad beams and a 7½" deck comprise the typical section of the superstructure. Quad beams were chosen to keep structure depth at a minimum. 24" PPC piles and concrete caps are proposed for the substructure. This bridge will cross at a 90 degree angle allowing for shorter spans than the mainline bridges. The bridge is proposed to be 4 spans, 40’ each. The low chord of the main spans is set above the 100 year flood elevation of 24.5’.

PRE-DESIGN OPINION OF PROBABLE CONSTRUCTION COSTS

The following tables itemize the construction costs for the project. They have been broken into Connector and Mall of LA Blvd. Roadway; Bridges on NB and SB Connector; Backcourt Street (Including Bridge); KCS Railroad Bridge and Shoofly; Pump Station; Utility Relocation; MSE Walls; and a Summary.

OPINION OF PROBABLE CONSTRUCTION COSTS

Connector and Mall of LA Blvd. Roadway

Item	Quantity	Unit	Unit Price	Total Price
Clearing and Grubbing	LUMP	LUMP	$36,000	$36,000
Removal of PCC Pavement	7043	SY	$10	$70,430
Embankment	36740	CY	$20	$734,800
Excavation	67567	CY	$5	$337,835
Base Course (10" Thick) (incl. geotextile fabric)	28600	SY	$27	$772,200
Portland Cement Concrete Pavement (8" thick)	27700	SY	$60	$1,662,000
Storm Drain Pipe (15")	3469	FT	$50	$173,450
Storm Drain Pipe (18")	721	FT	$60	$43,260
Storm Drain Pipe (24")	104	FT	$70	$7,280
Storm Drain Pipe (30")	324	FT	$80	$25,920
Storm Drain Pipe (36")	1792	FT	$100	$179,200
Storm Drain Pipe (42")	165	FT	$130	$21,450
Storm Drain Pipe (60")	48	FT	$300	$14,400
Storm Drain Pipe (72") (jack and bore)	122	FT	$900	$109,800
Grate Inlet	18	EA	$2,500	$45,000
Side Drain Inlet	28	EA	$3,800	$106,400
Double Side Drain Inlet	26	EA	$4,800	$124,800
7'x7' Box Culvert	952	FT	$600	$571,200
Guardrail	300	FT	$50	$15,000
6' Concrete Walk (4" thick)	433	SY	$50	$21,650
10' Multi-Use Path (4" thick)	4422	SY	$50	$221,100
Pavement Markings	LUMP	LUMP	$30,000	$30,000
Privacy Wall (10' Tall)	1350	FT	$75	$101,250
Underpass Roadway Lighting	LUMP	LUMP	$10,000	$10,000
Sequence of Construction at Mall of LA Blvd	LUMP	LUMP	$300,000	$300,000
Mobilization	LUMP	LUMP	$300,000	$300,000
	Subtotal			$6,034,425
Minor Items and Contingency @ 15%				$905,160
	Total			$6,939,585
NOTES:				
1. Earthwork based on LIDAR & limited survey; to be recalculated with complete survey				

OPINION OF PROBABLE CONSTRUCTION COSTS

Bridges on NB and SB Connector

Item	Quantity	Unit	Unit Price	Total Price
Precast Concrete Piles (16")	2400	FT	$100	$240,000
Precast Concrete Piles (24")	4275	FT	$150	$641,250
Precast Concrete Test Piles (16")	2	EACH	$30,000	$60,000
Precast Concrete Test Piles (24")	2	EACH	$35,000	$70,000
Loading Test Piles	1	EACH	$10,000	$10,000
Dynamic Monitoring	7	EACH	$3,000	$21,000
AASHTO Type II Girders	3213	FT	$75	$240,975
Class A Concrete (Bents)	300	CY	$700	$210,000
Class AA(M) Concrete (Decks)	613	CY	$800	$490,400
Reinforcing Steel	186000	LB	$1	$148,800
Strip Seal Joints	267	FT	$150	$40,050
Structural Metalwork	LUMP	LUMP	$10,000	$10,000
Concrete Railing (Standard Barrier)	1872	FT	$85	$159,120
Concrete Approach Slabs	560	SY	$220	$123,200
Rip Rap	1100	SY	$55	$60,500
Mobilization	LUMP	LUMP	$180,000	$180,000
	Subtotal			$2,705,295
Minor Items and Contingency @ 15%				$405,790
	Total			$3,111,085

OPINION OF PROBABLE CONSTRUCTION COSTS

Backcourt Street (Including Bridge)

Item	Quantity	Unit	Unit Price	Total Price
Clearing and Grubbing	LUMP	LUMP	$10,000	$10,000
Removal of PCC Pavement	347	SY	$12	$4,164
Embankment	3800	CY	$20	$76,000
Base Course (10" Thick)	980	SY	$25	$24,500
Portland Cement Concrete Pavement (8" thick)	980	SY	$60	$58,800
Precast Concrete Piles (24")	1240	FT	$150	$186,000
Precast Concrete Test Piles (24")	1	EACH	$35,000	$35,000
Loading Test Piles	1	EACH	$10,000	$10,000
Dynamic Monitoring	1	EACH	$4,500	$4,500
PCC Quad Beam Girders	1106	FT	$70	$77,420
Class A Concrete (Bents)	72	CY	$700	$50,400
Class AA(M) Concrete (Decks)	135	CY	$800	$108,000
Reinforcing Steel	51800	LB	$1	$41,440
Strip Seal Joints	64	FT	$150	$9,600
Structural Metalwork	LUMP	LUMP	$8,000	$8,000
Concrete Railing (Standard Barrier)	480	FT	$85	$40,800
Concrete Approach Slabs	355.6	SY	$250	$88,900
Mobilization	LUMP	LUMP	$60,000	$60,000
	Subtotal			$893,524
Minor Items and Contingency @ 15%				$134,030
	Total			$1,027,554

OPINION OF PROBABLE CONSTRUCTION COSTS

KCS Railroad Bridge & Shoofly

Item	Quantity	Unit	Unit Price	Total Price
Site/Civil				
Clearing & Grubbing	2	AC	$ 5,000	$ 10,000
Excavation[1]	3,186	CY	$ 10	$ 31,860
Subballast	3,043	Tons	$ 25	$ 76,075
Seeding & Mulching	2	AC	$ 5,000	$ 10,000
Drainage & Erosion Control (~20% of Site/Civil)	1	LS	$ 30,000	$ 30,000
Retaining Walls / Shoring	5,250	SF	$ 40	$ 210,000
	Site/Civil Subtotal:			$ 367,935
Track Construction				
Track (136# New Rail, Wood ties, ballast, and OTM)	1,084	TF	$ 200	$ 216,800
Shift Existing Track (x2 - to shoofly & back to	1,460	TF	$ 40	$ 58,400
Mainline Track Remove (200' for Bridge Const.)	1	EA	$ 10,000	$ 10,000
Mainline Track Replace	1	EA	$ 20,000	$ 20,000
Railroad Signal (by KCS)	1	LS		$ -
	Trackwork Subtotal:			$ 305,200
Bridge				
Structure Excavation	240	CY	$35	$8,400
HP14x89 Steel Piles	5150	LF	$60	$309,000
Class A Concrete	745	CY	$750	$558,750
Class AA Concrete	80	CY	$625	$50,000
Steel Reinforcement	111200	LB	$0.75	$83,400
Steel Reinforcement (Epoxy Ctd)	19500	LB	$1.00	$19,500
AASHTO Type IV I-Beams	392	LF	$220	$86,240
Ballast Trough Drainage System	250	LF	$35	$8,750
Railing	204	LF	$100	$20,400
SOE (Temp Shoring Wall)	7300	SF	$50	$365,000
Bridge Subtotal:				$ 1,509,440
	Subtotal:			$ 2,182,575
Contingency @ 25%				$ 545,644
Grand Total:				$ 2,728,219

NOTES:
1. Earthwork based on GIS contours & rough grading concept; to be recalculated with survey
2. Bridge unit costs based on LADOTD weighted average unit costs dated 10-04-2013

OPINION OF PROBABLE CONSTRUCTION COSTS

Pump Station

Item	Quantity	Unit	Unit Price	Total Price
Mobilization/Demob.	1	LS	$20,000	$20,000
General Requirements	1	LS	$15,000	$15,000
Insurance & Indemnification	1	LS	$8,000	$8,000
Record Documentation	1	LS	$2,000	$2,000
Payment/Perf Bonds	1	LS	$7,000	$7,000
Test Soil Borings	2	EA	$2,000	$4,000
10' Wet Well & Accessories	1	LS	$130,000	$130,000
24" Subm Pump & Accessory	2	EA	$95,000	$190,000
32" Discharge Can	2	EA	$45,000	$90,000
Main Disconn & Control Panel	1	LS	$45,000	$45,000
Starters Panel	1	LS	$30,000	$30,000
GenSet & ATS	1	LS	$150,000	$150,000
24" Check Valves	2	EA	$18,000	$36,000
24" Isolation Valves	3	EA	$18,000	$54,000
30" Steel Discharge Pipe	250	LF	$110	$27,500
RTU Panel/Antenna	1	EA	$14,000	$14,000
SCADA Programming	1	LS	$10,000	$10,000
Concrete End Wall	1	LS	$9,000	$9,000
SiteWork Conc Slab & Fence	1	LS	$8,500	$8,500
Contingency Items 7.5%	1	LS	$75,000	$75,000
Startups, Testing, Training	1	LS	$4,500	$4,500
Commissioning	1	LS	$2,500	$2,500
TOTAL				$932,000

[1] Electrical power service costs not included.

The estimate of probable construction costs of the pump station is $932,000. However, for all practical purposes, we recommend the probable construction cost of $1,000,000. This is based upon construction of the facility at or near same time as roadway construction. Note this cost does not include engineering design and inspections nor permit work. It also does not include power service costs.

OPINION OF PROBABLE CONSTRUCTION COSTS				
MSE Walls				
Description	Quantity	Unit	Unit Price	Total Price
Mechanically Stabilized Earth Wall (MSEW), Wall #1	8,706	SF	$23.00	$ 200,238
MSEW, Structural Excavation & Backfill, Wall #1	LUMP	LUMP	$44,500.00	$ 44,500
Mechanically Stabilized Earth Wall (MSEW), Wall #2	6,974	SF	$23.00	$ 160,402
MSEW, Structural Excavation & Backfill, Wall #2	LUMP	LUMP	$21,200.00	$ 21,200
Mechanically Stabilized Earth Wall (MSEW), Wall #3	6,114	SF	$23.00	$ 140,622
MSEW, Structural Excavation & Backfill, Wall #3	LUMP	LUMP	$32,300.00	$ 32,300
Mechanically Stabilized Earth Wall (MSEW), Wall #4	5,856	SF	$23.00	$ 134,688
MSEW, Structural Excavation & Backfill, Wall #4	LUMP	LUMP	$30,000.00	$ 30,000
	Subtotal:			$ 763,950
Contingency @ 25%				$ 190,988
	Total:			$ 954,938
NOTES:				
1. Earthwork based on GIS contours & rough grading concept; to be recalculated with survey				
2. Unit costs based on LADOTD weighted average unit costs dated 10-04-2013				

An estimate of utility relocation costs was provided by GLP.

OPINION OF PROBABLE CONSTRUCTION COSTS				
Utility Relocation				
Item	Quantity	Units	Unit Price	Total Price
AT&T	LUMP	LUMP	$50,000	$50,000
Entergy Electric Distribution	LUMP	LUMP	$75,000	$75,000
Entergy Electric Transmission	LUMP	LUMP	$1,000,000	$1,000,000
Entergy Gas	LUMP	LUMP	$30,000	$30,000
Sewer (Manhole/ARV Adjustments)	LUMP	LUMP	$2,500	$2,500
Mall of Louisiana Water	LUMP	LUMP	$50,000	$50,000
	Total			$1,207,500

OPINION OF PROBABLE CONSTRUCTION COSTS	
Summary	
Item	Total Price
Roadway Construction	$6,939,585
Connector Bridges	$3,111,085
Backcourt Street (Including Bridge)	$1,027,554
Railroad and Shoofly Construction	$2,728,219
Pump Station	$1,000,000
Retaining Walls	$954,938
Utility Relocation	$1,207,500
Traffic Signals	not included
Right of Way (13.15 Ac.)	not included
	$16,968,881

RIGHT OF WAY SERVITUDES

The path of the Picardy-Perkins Connector passes through 5 separate pieces of private property. The 5 properties were determined to be the following: Citizen's Bank abutting Perkins Road, Perkins Rowe (now or formerly) from Perkins Road to Dawson Creek, Swaggart Ministries from Dawson Creek to the KCS Railroad right of way, the Mall of Louisiana by Mall of Louisiana Blvd, and an unidentified property owner of a lot on Rod Laver Ave. The last piece of property is traversed by a segment of roadway connecting Rod Laver to the Picardy-Perkins Connector.

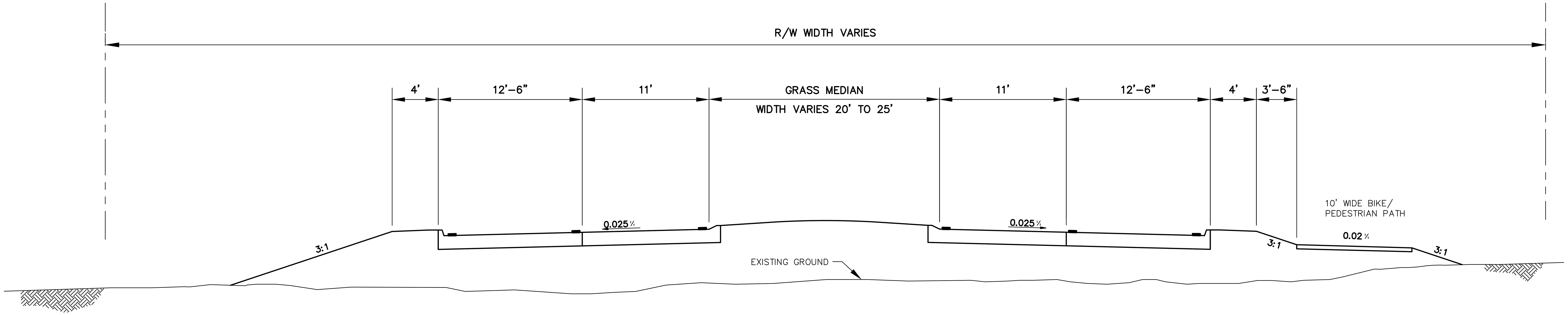
The necessary right of way was determined by establishing the limits of cut and fill for the project and then allowing for an average 10' offset. The right of way is narrowest where the Connector meets Perkins Road. There is an 80' opening between the Citizen's Bank parking lot and the property line/fence of O'Neill Plaza. There is almost no offset between the limits of cut and fill and right of way in that area. The right of way is at its widest (190') on the Swaggart Ministries property where the earthen berm was selected to prevent inundation. A right of way width of 105' was selected for the main bridge to allow for construction vehicles to work within the right of way. The Backcourt Street Connector right of way was set at 105'. The following acreages are an estimate of the required right of way to build the road: Citizen's Bank: 0.28 Ac., Perkins Rowe: 4.62 Ac., Swaggart Ministries: 6.82 Ac., Mall of LA: 1.26 Ac., Rod Laver Ave. Lot: 0.17 Ac.

RECOMMENDATIONS

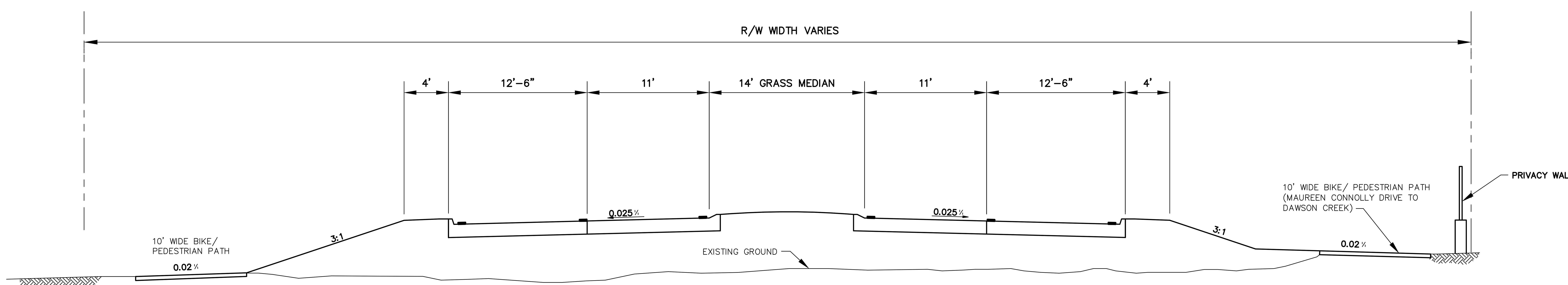
The Picardy Perkins Connector is a project that should benefit the Bluebonnet Perkins region of south Baton Rouge by providing an alternate route to the interstate and improving vehicular and pedestrian connectivity between residential and commercial developments in the area. In an effort to promote this positive connectivity, the Backcourt Street connection to Wimbledon Estates Subdivision is recommended. This connection would also provide another route to The Dunham School. Maureen Connolly will be a right in/right out connection. A left turn will be allowed from the Connector onto Maureen Connolly, but no left turns onto the Connector will be allowed due to the narrow median at this location. The recommendation for Rod Laver Avenue is Option 3 shown in Appendix I. A privacy wall is recommended to shield the existing Wimbledon Estates residents from the new 4 lane roadway. A barrier is recommended along the distance of the O'Neal Plaza Building to shield the existing daycare.

A t-intersection with turn lanes is recommended at the Mall of Louisiana Blvd intersection, with retaining walls to reduce right of way requirements. Additional improvements to the surrounding existing intersections are also recommended. See Appendix C and Urban Systems Traffic Report for details.

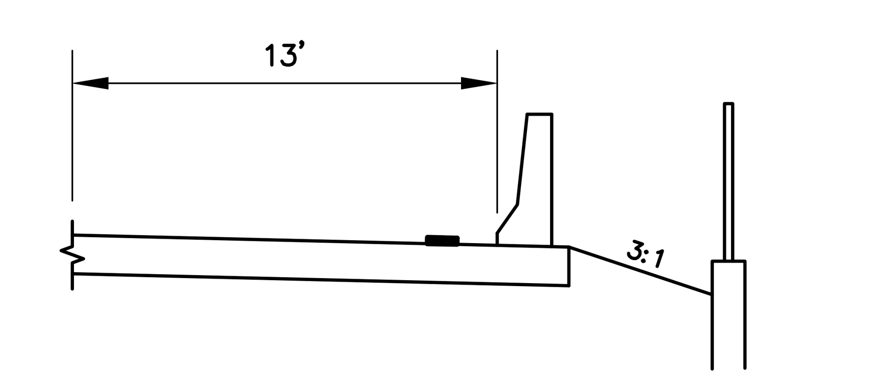
Determining factors such as the overall cost, significant right of way requirements, and complexity of the Picardy-Perkins Connector Project could influence how the project is constructed. This project is one that could be constructed in Phases. The public could benefit from improvements made to just the southern portion of the project before the bridge over Dawson Creek is completed and open to traffic. The first Phase of the project could include the new roadway from Perkins Road to Park Rowe Avenue. An intersection with Park Rowe Avenue would be constructed to provide additional access to the Perkins Rowe Development. It is anticipated that signalization of the new connection at Perkins Road may not be required under Phase I construction as eastbound access could be provided by the existing Perkins Road 5-Lane section.
Phase II of the project could complete the roadway and bridge construction to Mall of Louisiana Boulevard, and include the relocation of the signal from Grand Avenue to the new roadway. Additional turn lanes on Perkins Road along with access management improvements could be finalized during the next phase as this segment of Perkins Road is planned to be studied in an upcoming Environmental Assessment.



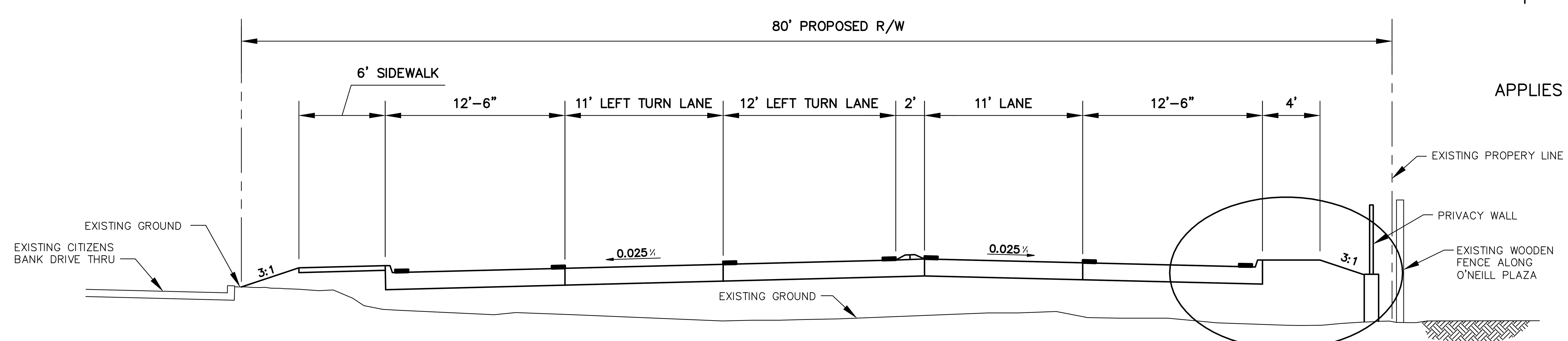
TYPICAL SECTION (DAWSON CREEK TO BACKCOURT DR. INTERSECTION)
APPROX. STA. 121+50 TO STA. 129+00



TYPICAL SECTION (PERKINS ROWE CONNECTION TO DAWSON CREEK)
APPROX. STA. 107+20 TO STA. 117+00



PARTIAL TYPICAL SECTION
APPLIES BEGIN PROJECT TO APPROX. STA. 102+50



TYPICAL SECTION (PERKINS ROAD TO PERKINS ROWE CONNECTION)
APPROX. STA. 100+00 TO 107+20

SHEET NUMBER E2

PARISH EAST BATON ROUGE
CITY BATON ROUGE
PROJECT 12-CS-HC-0043

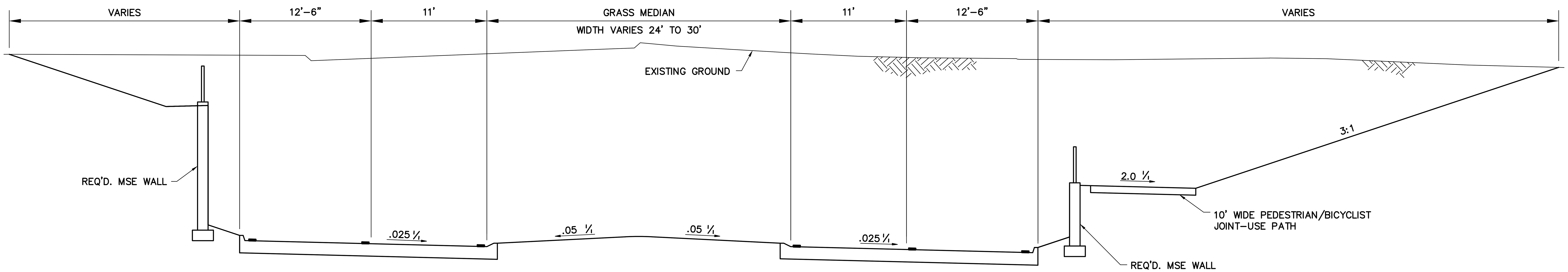
DESIGNED L.R.F.
CHECKED G.G.M.
DETAILED S.J.A.
CHECKED L.R.F.
DATE JUNE 2014
SHEET

NO.	DATE	REVISION DESCRIPTION	BY

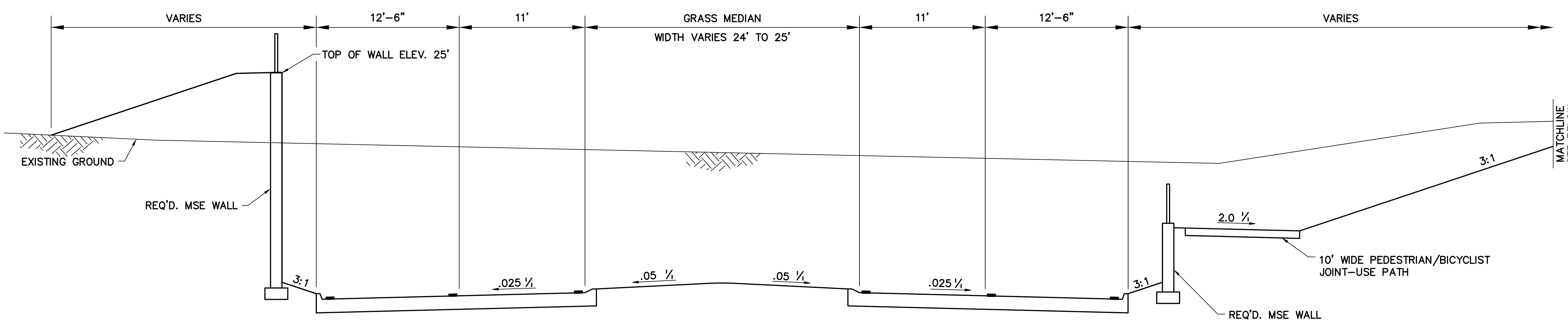
PICARDY – PERKINS CONNECTOR
TYPICAL ROADWAY SECTIONS

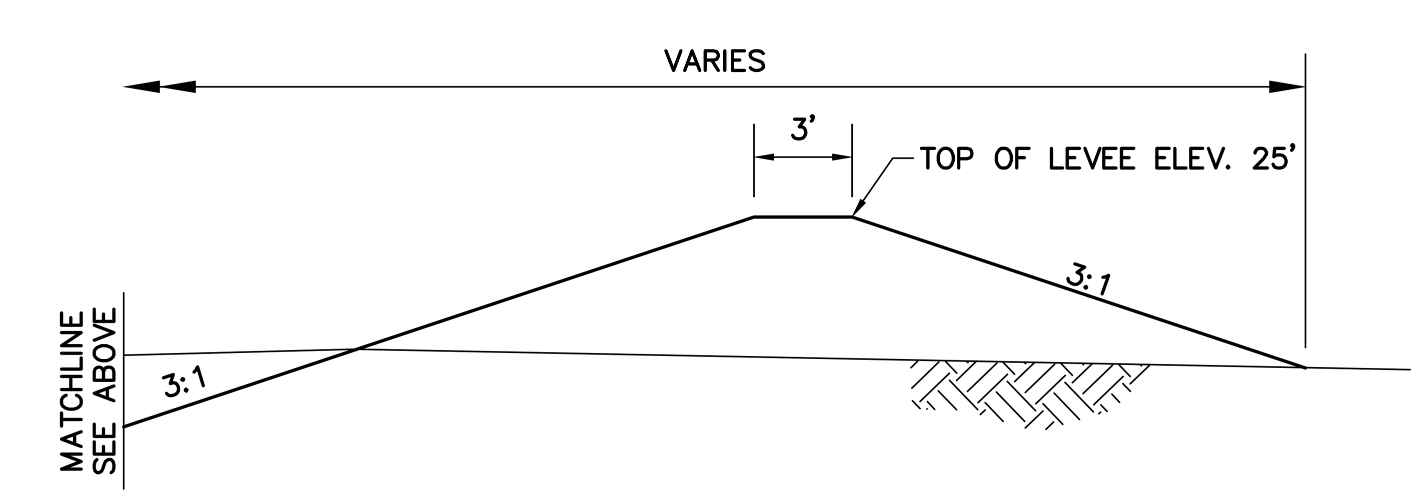
EC

F:\00_PROJECTS\12-500\Sheet_Sets\Design Study\12500ty03.dwg [TY11] Jun 13, 2014 - 9:58am



VICINITY OF MALL OF LA BLVD. INTERSECTION TO END PROJECT





BACKCOURT DR. INTERSECTION TO VICINITY OF MALL OF LA BLVD. INTERSECTION

SHEET NUMBER	E3
PARISH	EAST BATON ROUGE
CITY	BATON ROUGE
PROJECT	12–CS–HC–0043
DESIGNED	L.R.F.
CHECKED	G.G.M.
DETAILED	S.J.A.
CHECKED	L.R.F.
DATE	JUNE 2014
SHEET	

NO.	DATE	REVISION DESCRIPTION	BY

PICARDY – PERKINS CONNECTOR

TYPICAL ROADWAY SECTIONS

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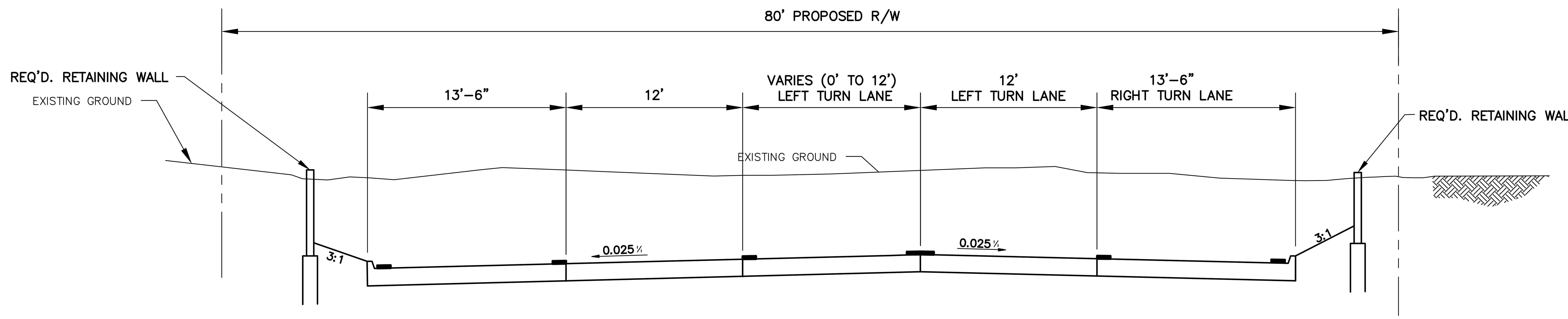


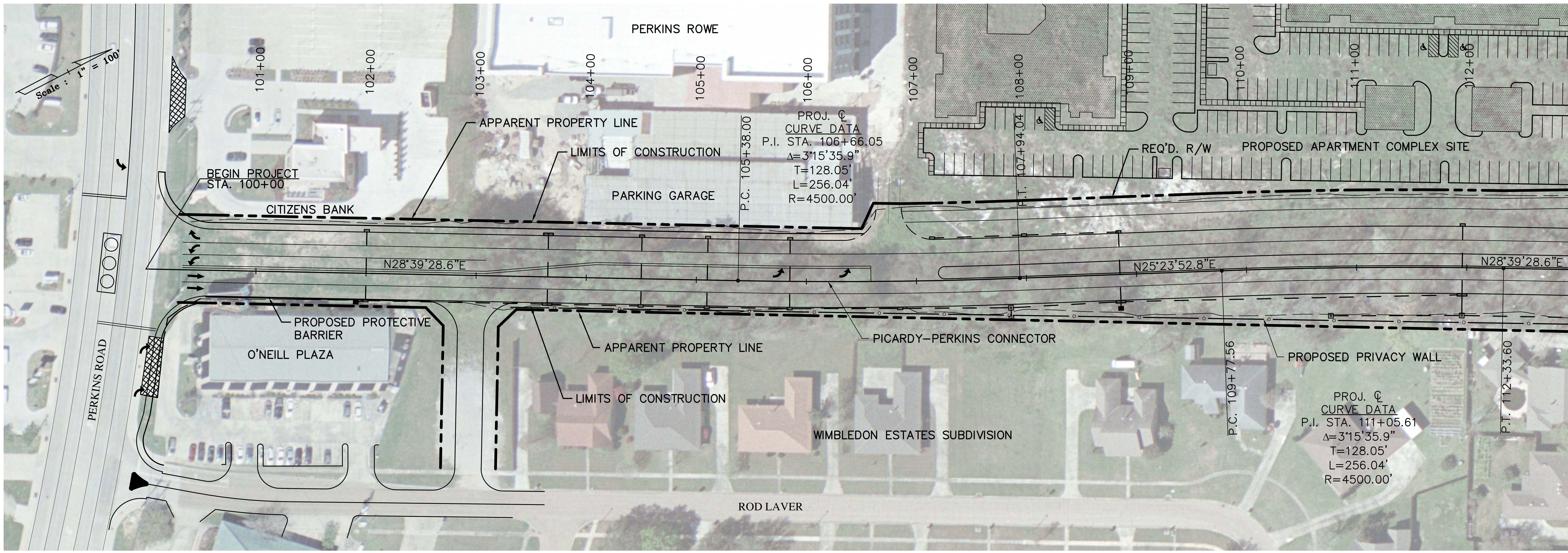
TYPICAL SECTION (MALL OF LOUISIANA BLVD.)

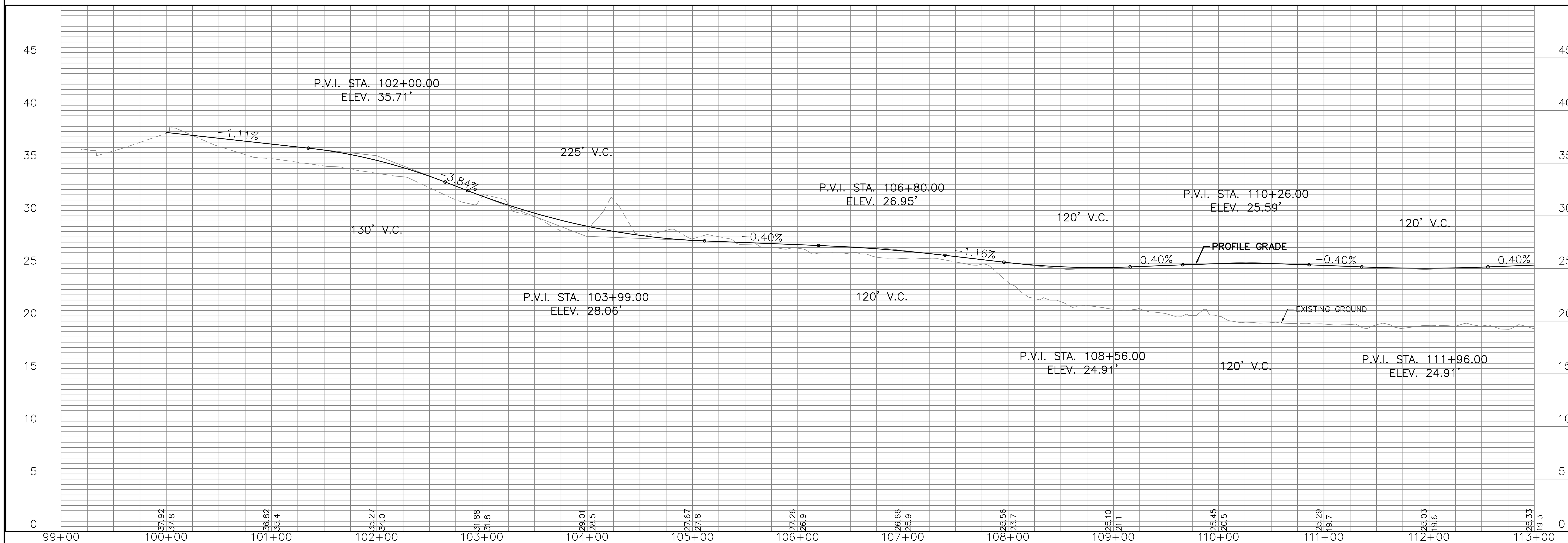
SHEET NUMBER	E4
PARISH	EAST BATON ROUGE
CITY	BATON ROUGE
PROJECT	12-CS-HC-0043
DESIGNED	L.R.F.
CHECKED	G.G.M.
DETAILED	S.J.A.
CHECKED	L.R.F.
DATE	JUNE 2014
SHEET	

NO.	DATE	REVISION DESCRIPTION	BY

PICARDY – PERKINS CONNECTOR

TYPICAL ROADWAY SECTIONS





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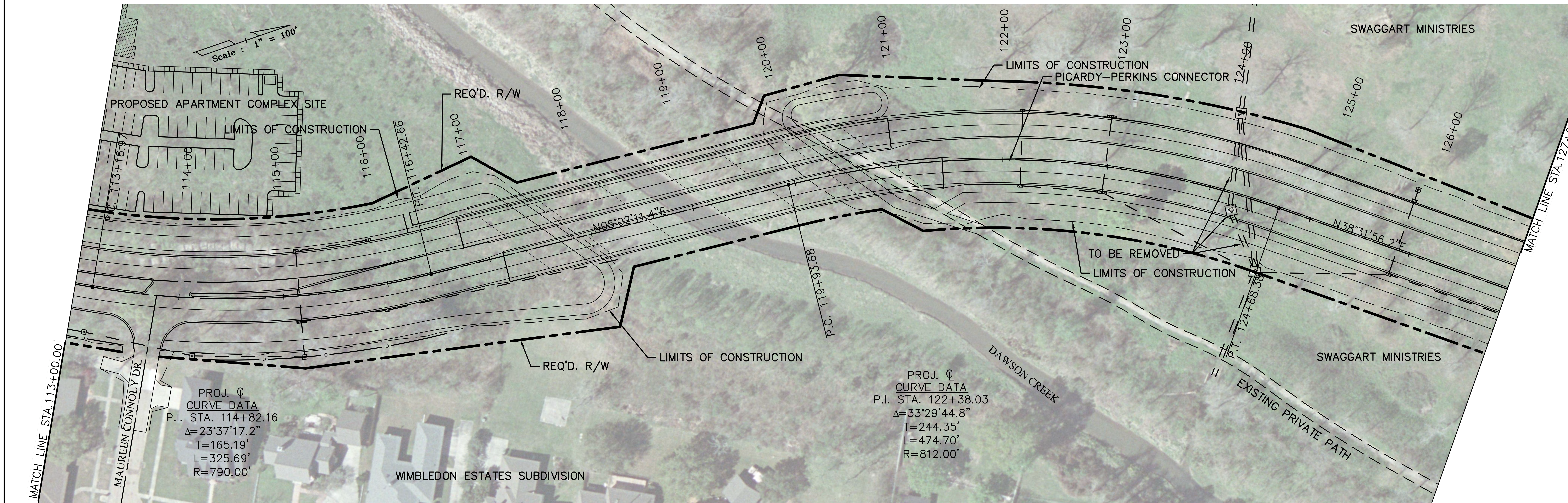
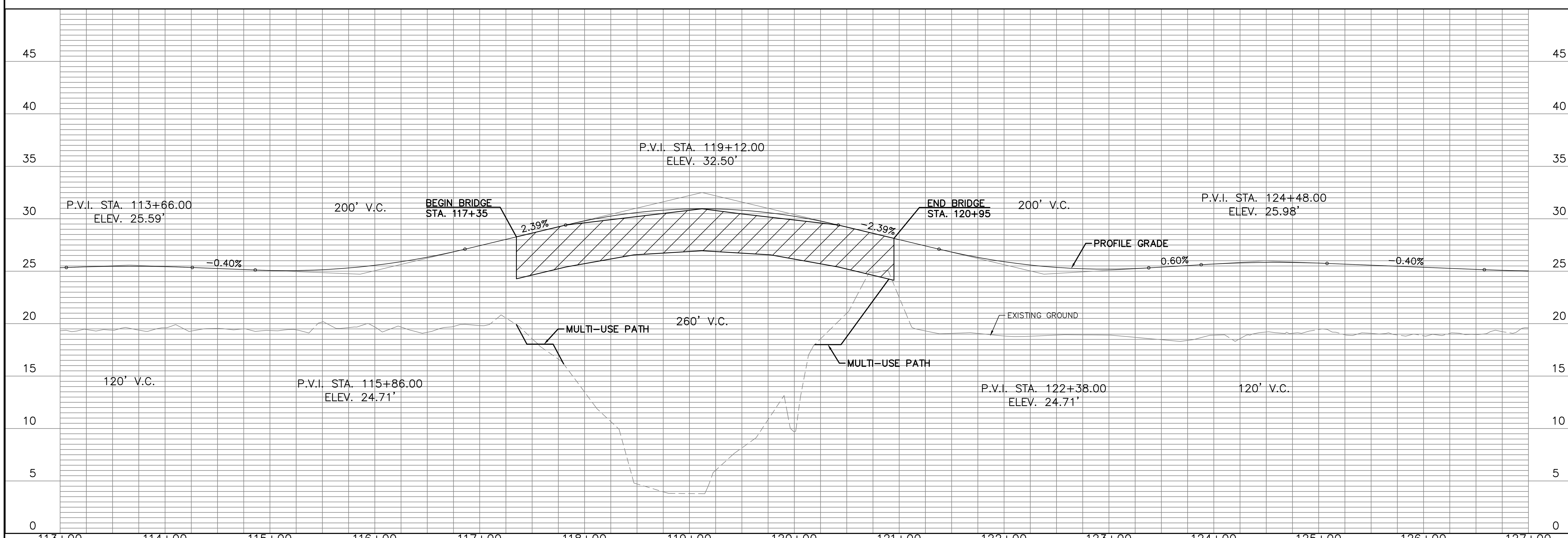
SHEET NUMBER	E5
PARISH	EAST BATON ROUGE
CITY	BATON ROUGE
PROJECT	12-CS-HC-0043
DESIGNED	L.R.F.
CHECKED	G.G.M.
DETAILED	M.L.R.
CHECKED	L.R.F.
DATE	JUNE 2014
SHEET	

NO.	DATE	REVISION DESCRIPTION	BY

PICARDY – PERKINS CONNECTOR

PLAN – PROFILE





SHEET NUMBER E6

PARISH	EAST BATON ROUGE
CITY	BATON ROUGE
PROJECT	12-CS-HC-0043
DESIGNED	L.R.F.
CHECKED	G.G.M.
DETAILED	S.J.A.
CHECKED	L.R.F.
DATE	JUNE 2014
SHEET	

NO.	DATE	REVISION DESCRIPTION	BY

PICARDY – PERKINS CONNECTOR

PLAN – PROFILE

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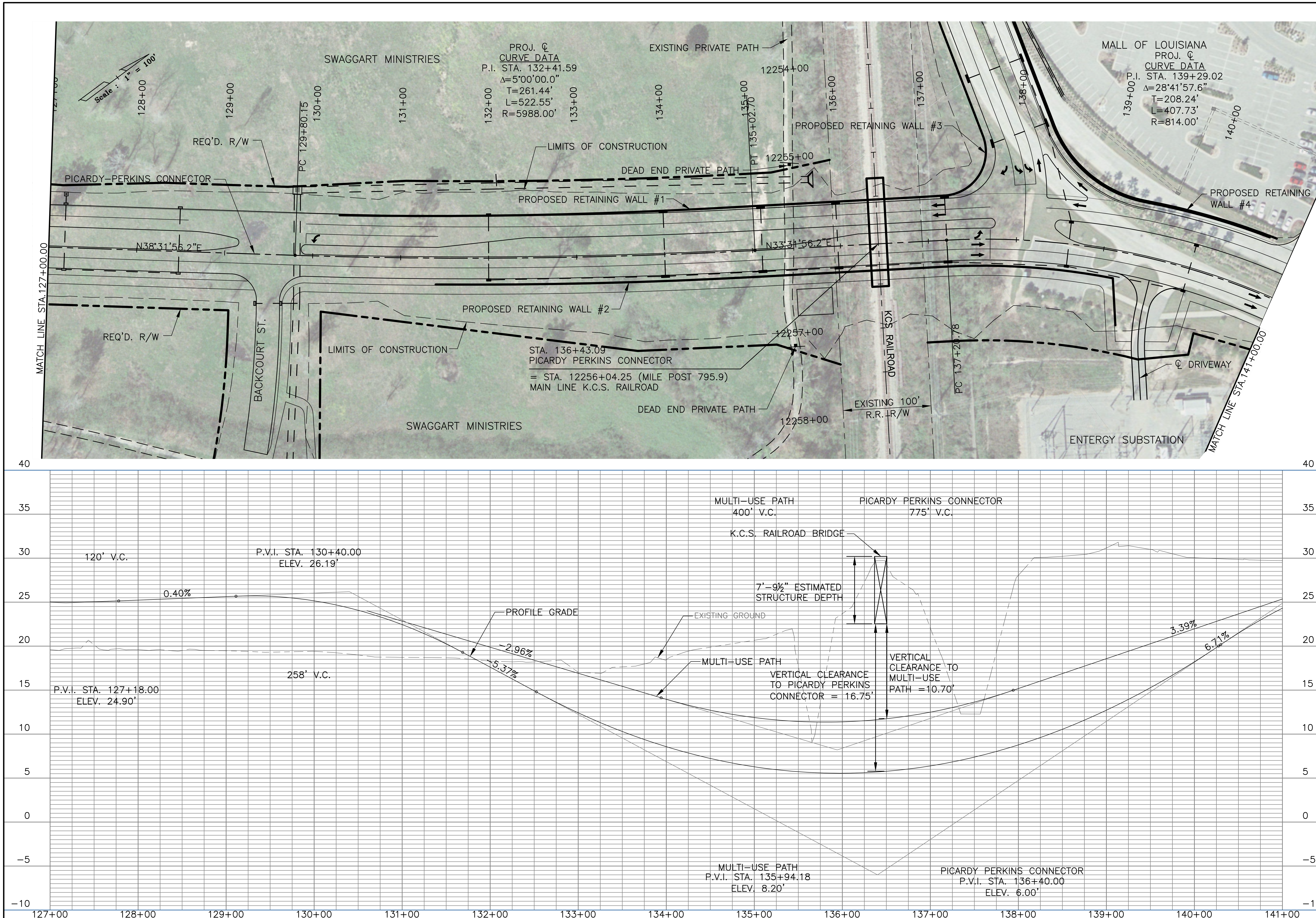

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SHEET NUMBER E7

PARISH: EAST BATON ROUGE
CITY: BATON ROUGE
PROJECT: 12-CS-HC-0043

DESIGNED L.R.F.
CHECKED G.G.M.
DETAILED M.L.R.
CHECKED L.R.F.
DATE JUNE 2014
SHEET

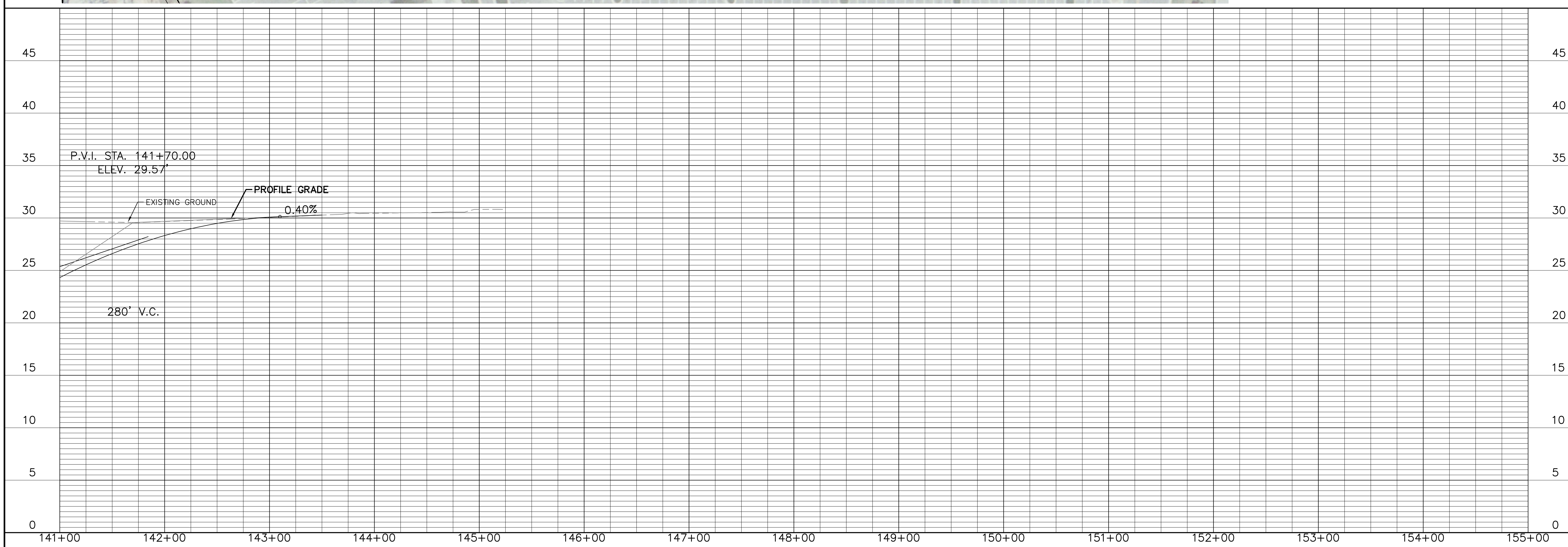
REVISION DESCRIPTION | BY | DATE | NO.

PICARDY - PERKINS CONNECTOR

PLAN - PROFILE

EG

Scale : 1" = 100'



SHEET NUMBER E8

PARISH EAST BATON ROUGE

CITY BATON ROUGE

PROJECT 12-CS-HC-0043

DESIGNED L.R.F.
CHECKED G.G.M.
DETAILED M.L.R.
CHECKED L.R.F.
DATE JUNE 2014
SHEET

NO.	DATE	REVISION DESCRIPTION	BY

PICARDY – PERKINS CONNECTOR

PLAN – PROFILE

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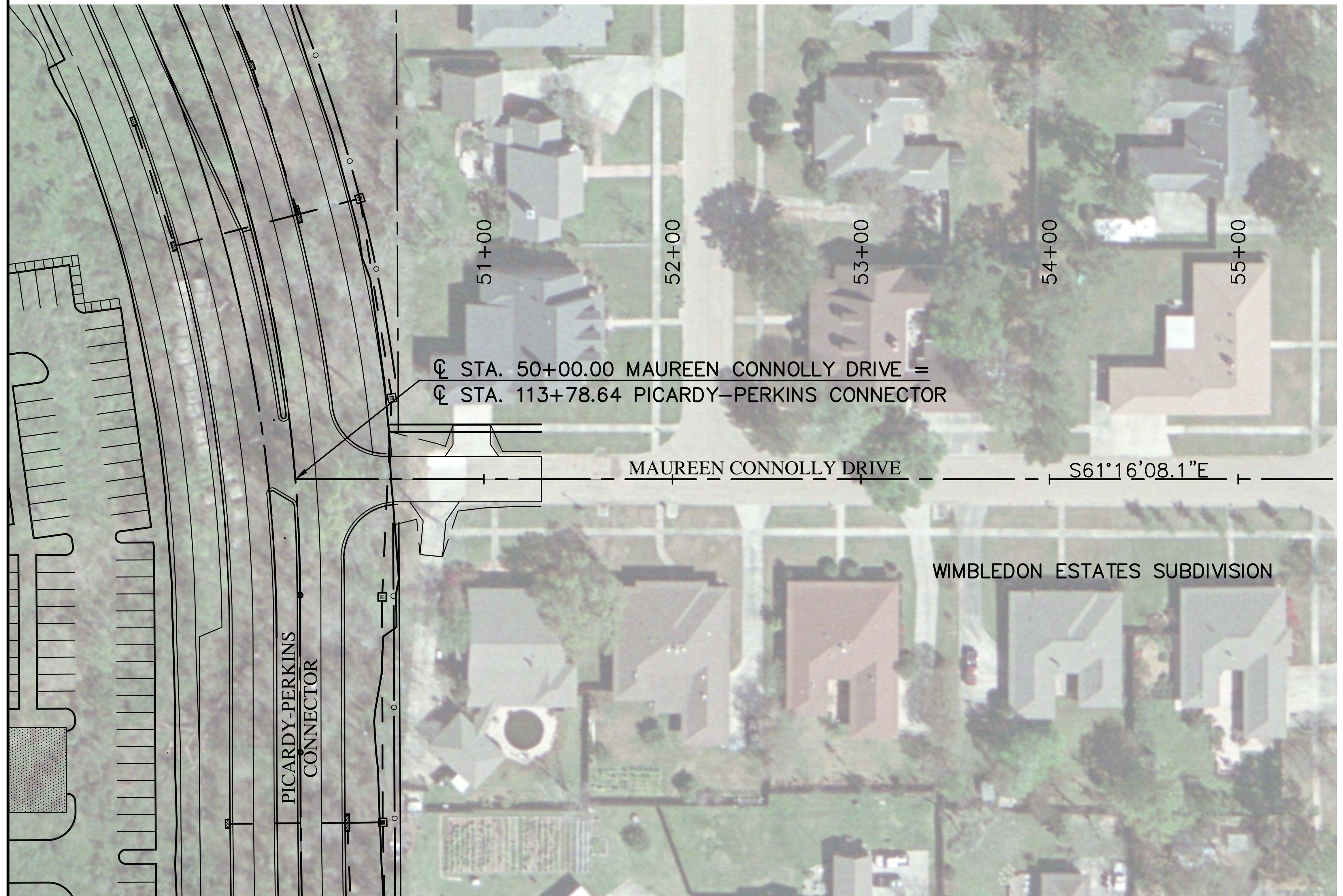

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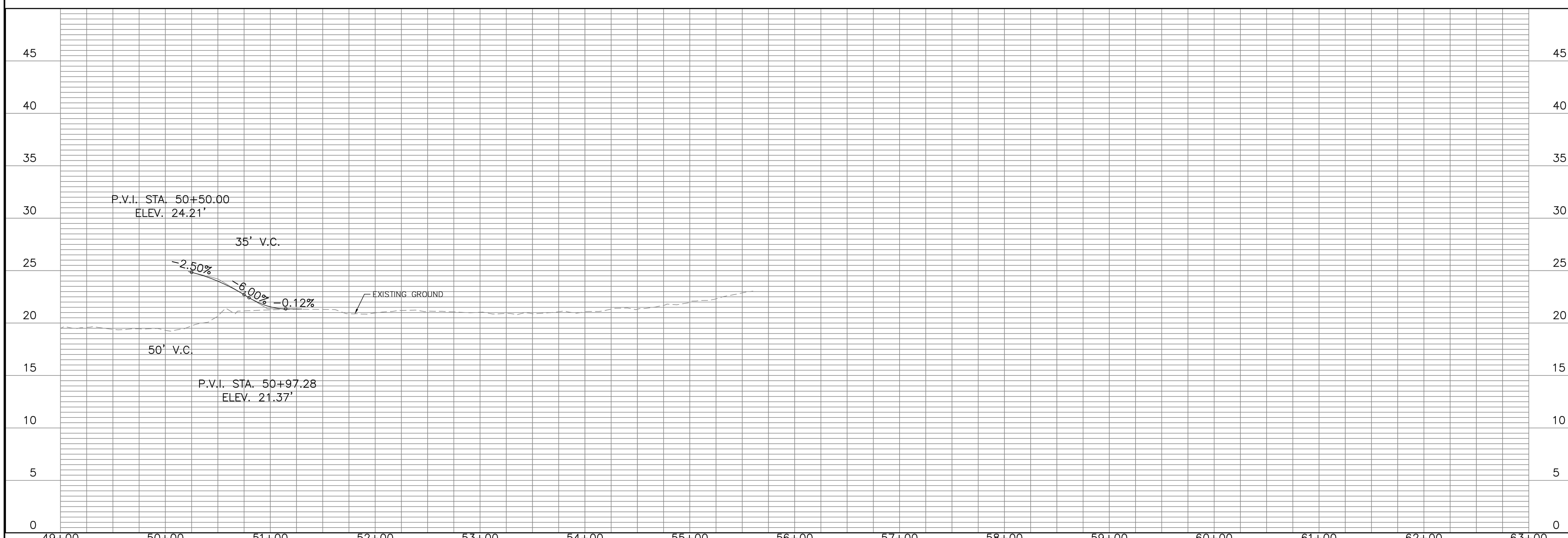

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SHEET NUMBER E9

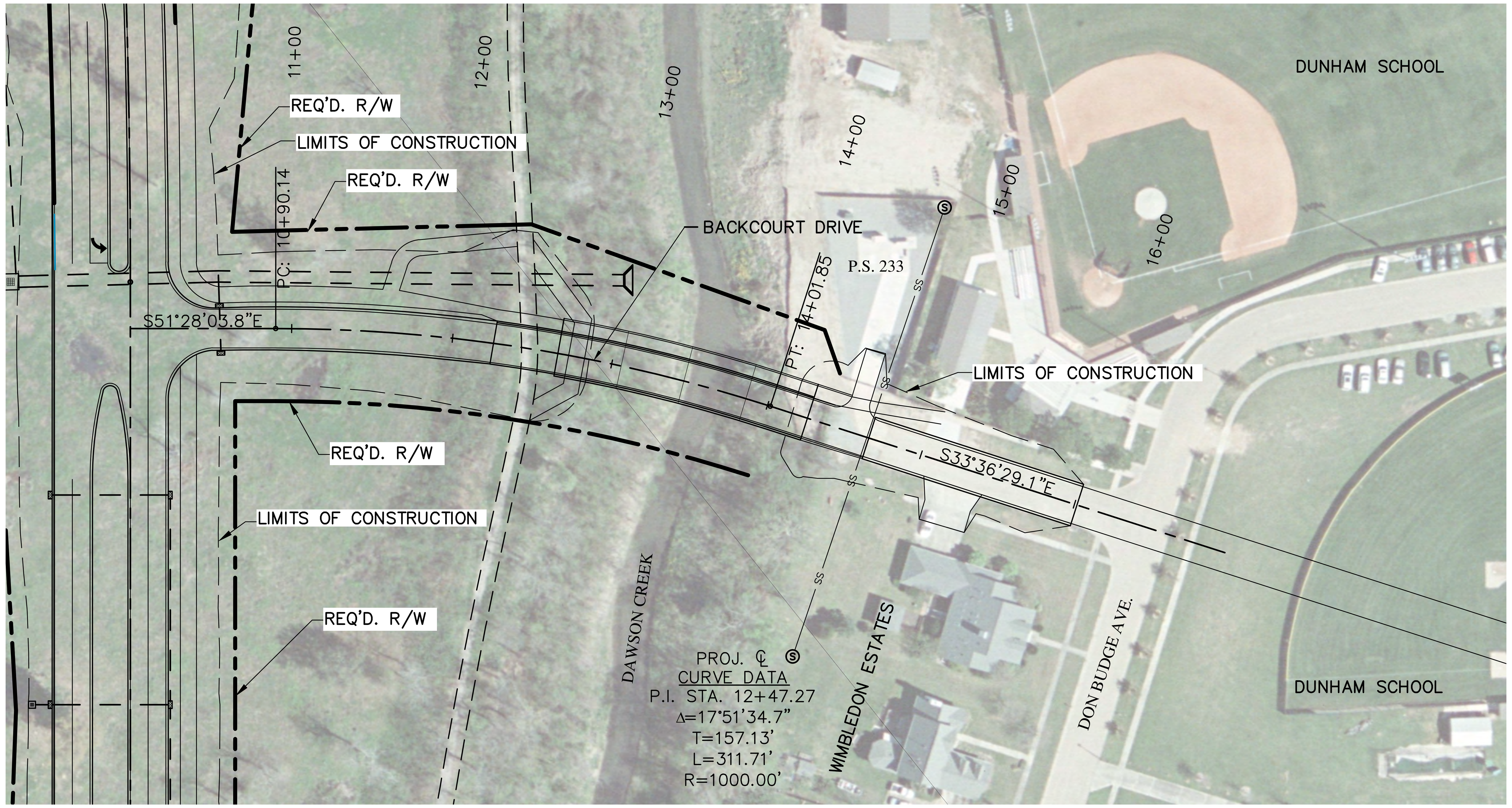
PARISH EAST BATON ROUGE
CITY BATON ROUGE
PROJECT 12-CS-HC-0043

DESIGNED L.R.F.
CHECKED G.G.M.
DETAILED M.L.R.
CHECKED L.R.F.
DATE JUNE 2014
SHEET

NO. | DATE | REVISION DESCRIPTION | BY

PICARDY – PERKINS CONNECTOR

PLAN – PROFILE



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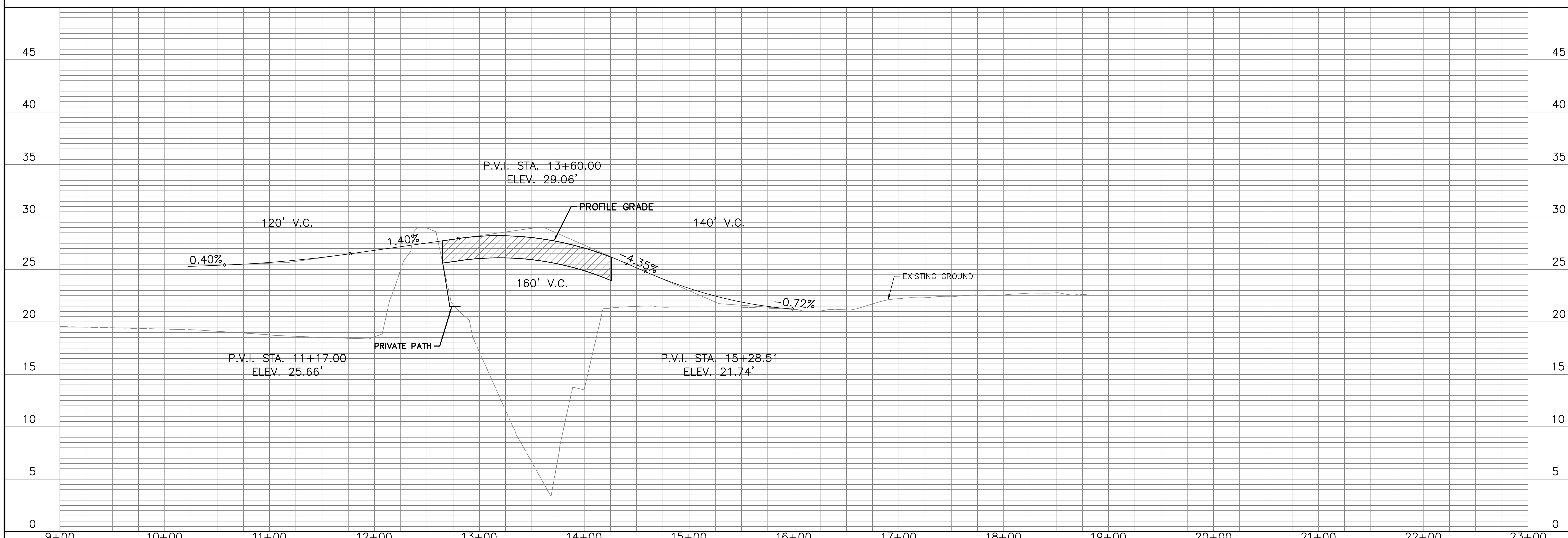

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SHEET NUMBER E10

PARISH EAST BATON ROUGE

CITY BATON ROUGE

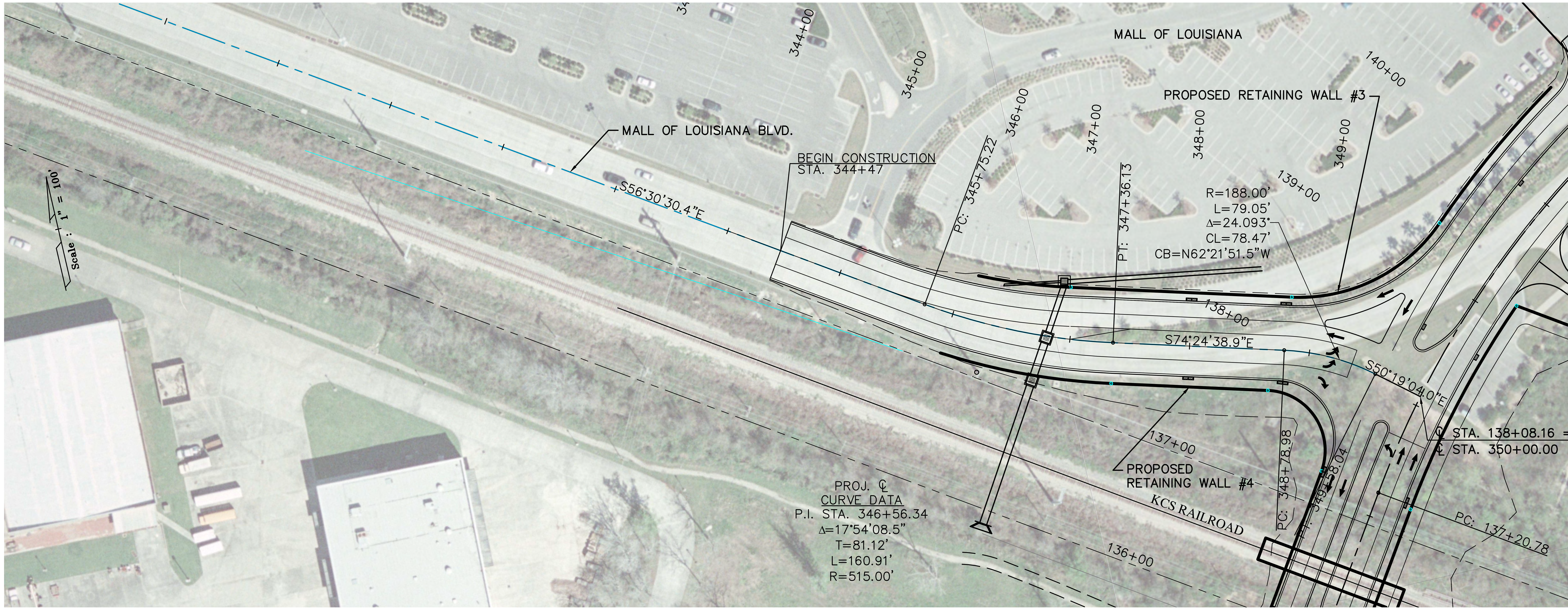
PROJECT 12-CS-HC-0043

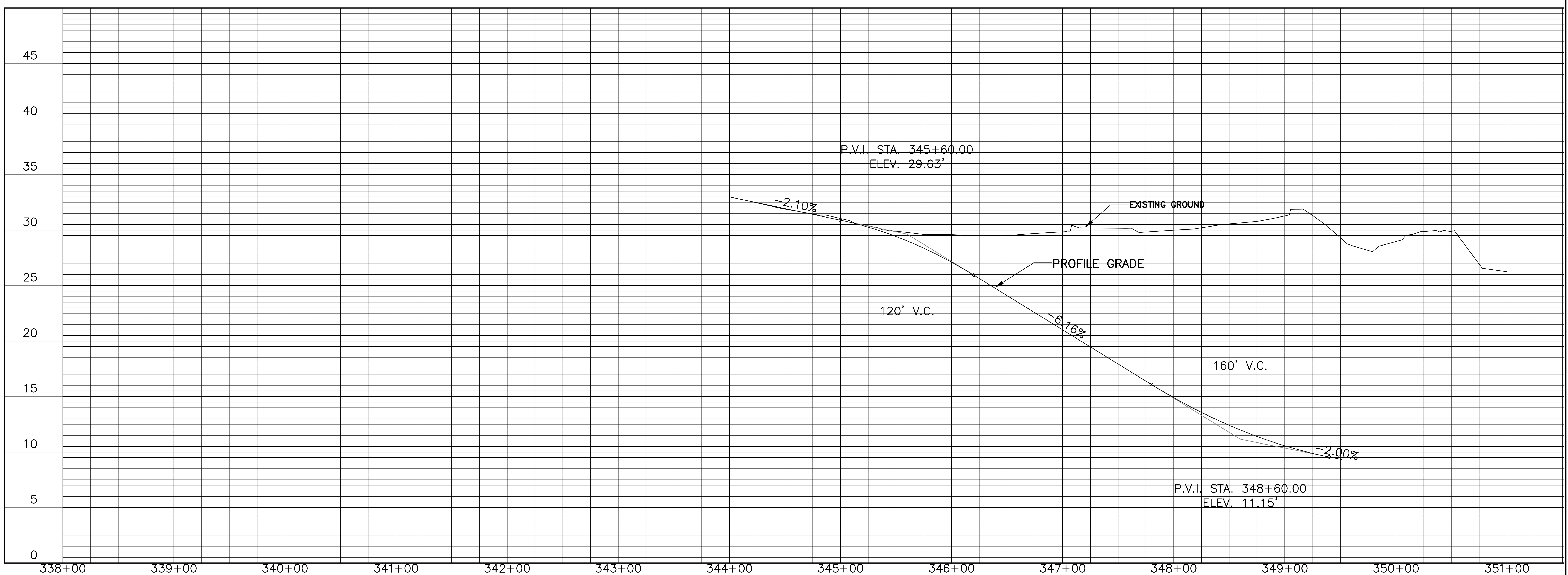
DESIGNED L.R.F.
CHECKED G.G.M.
DETAILED M.L.R.
CHECKED L.R.F.
DATE JUNE 2014
SHEET

NO.	DATE	REVISION DESCRIPTION	BY

PICARDY – PERKINS CONNECTOR

PLAN – PROFILE





SHEET NUMBER E11

PARISH	EAST BATON ROUGE
CITY	BATON ROUGE
PROJECT	12-CS-HC-0043
DESIGNED	L.R.F.
CHECKED	G.G.M.
DETAILED	M.L.R.
CHECKED	L.R.F.
DATE	JUNE 2014
SHEET	

NO.	DATE	REVISION DESCRIPTION	BY

PICARDY - PERKINS CONNECTOR

PLAN - PROFILE

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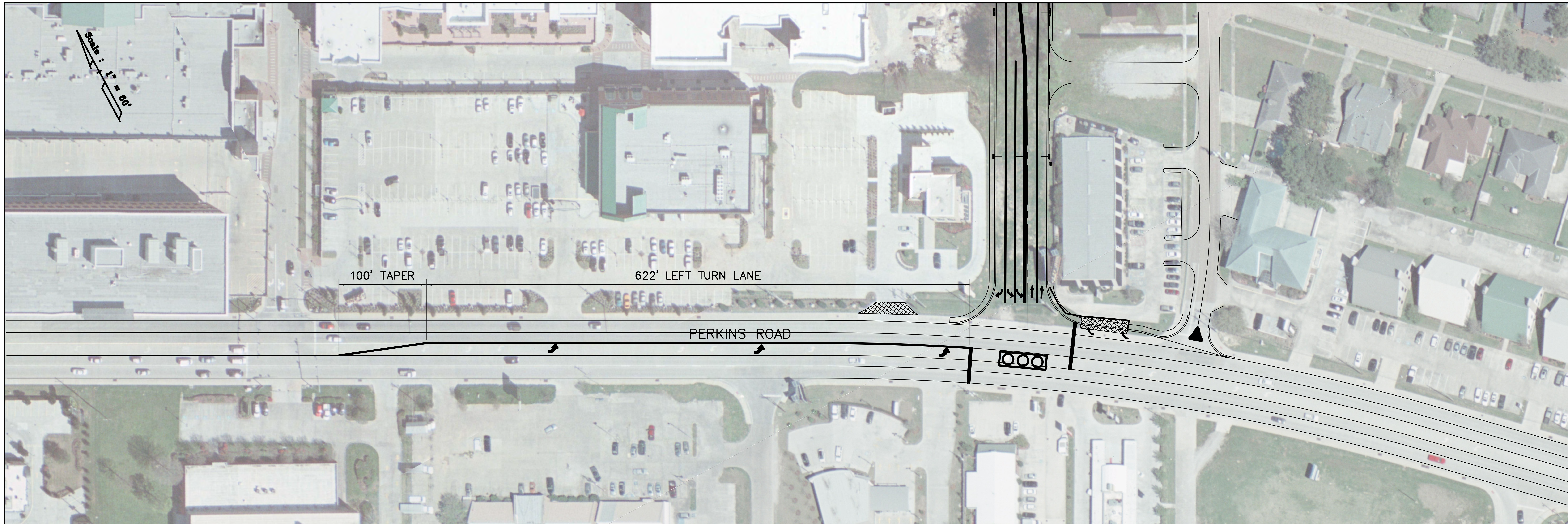
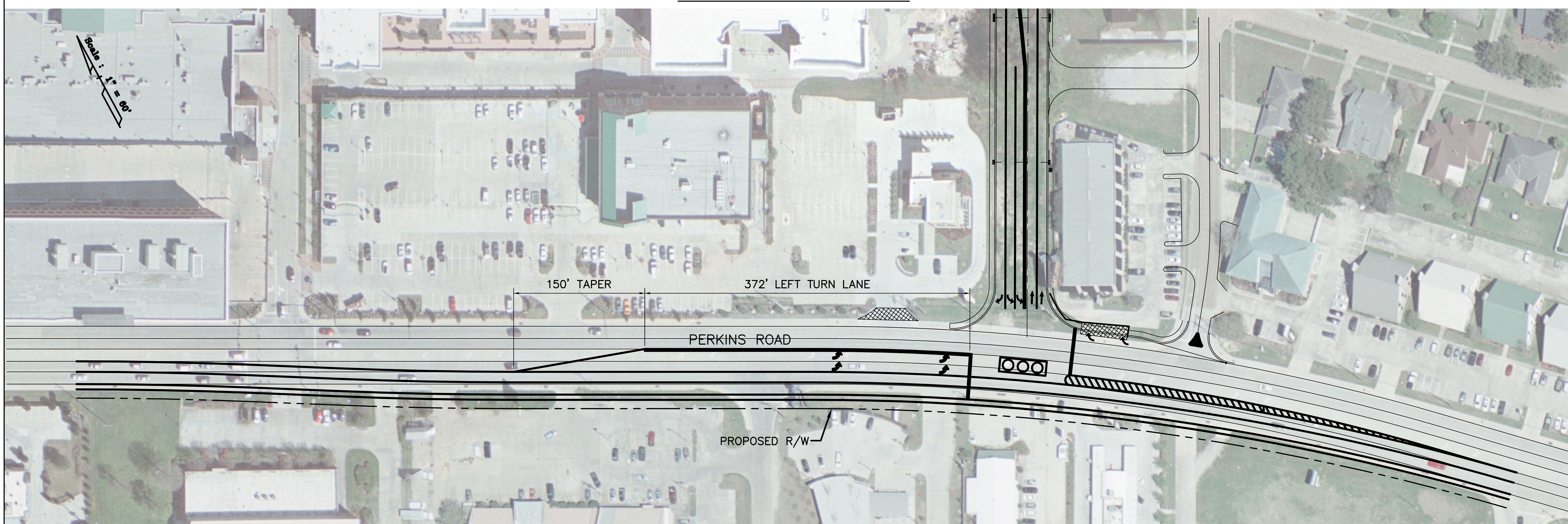


SINGLE LEFT TURN LANE OPTION



DOUBLE LEFT TURN LANE OPTION

SHEET NUMBER	E12
PARISH	EAST BATON ROUGE
CITY	BATON ROUGE
PROJECT	12-CS-HC-0043
DESIGNED	L.R.F.
CHECKED	G.G.M.
DETAILED	M.L.R.
CHECKED	L.R.F.
DATE	JUNE 2014
SHEET	

NO.	DATE	REVISION DESCRIPTION	BY

PICARDY – PERKINS CONNECTOR

PERKINS ROAD TURN LANE DETAILS

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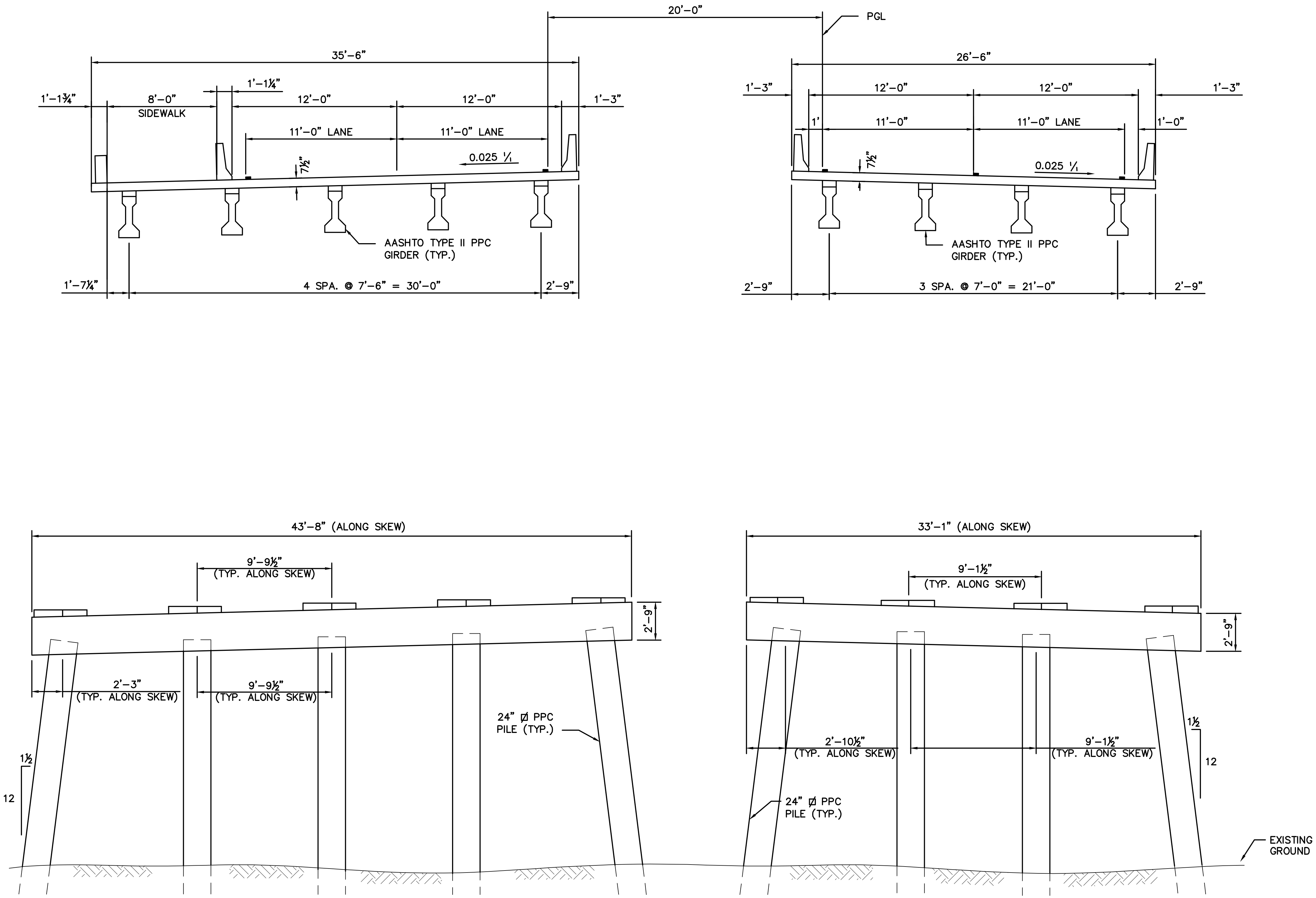
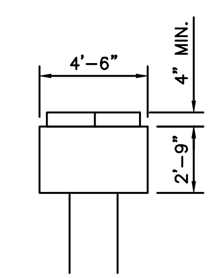


TYPICAL SECTION (PICARDY–PERKINS CONNECTOR BRIDGE OVER DAWSON CREEK)

SCALE: 1/8"=1'-0"



CAP CROSS–SECTION

SCALE: 1/8"=1'-0"

SHEET NUMBER E13

PARISH: EAST BATON ROUGE
CITY: BATON ROUGE
PROJECT: 12-CS-HC-0043

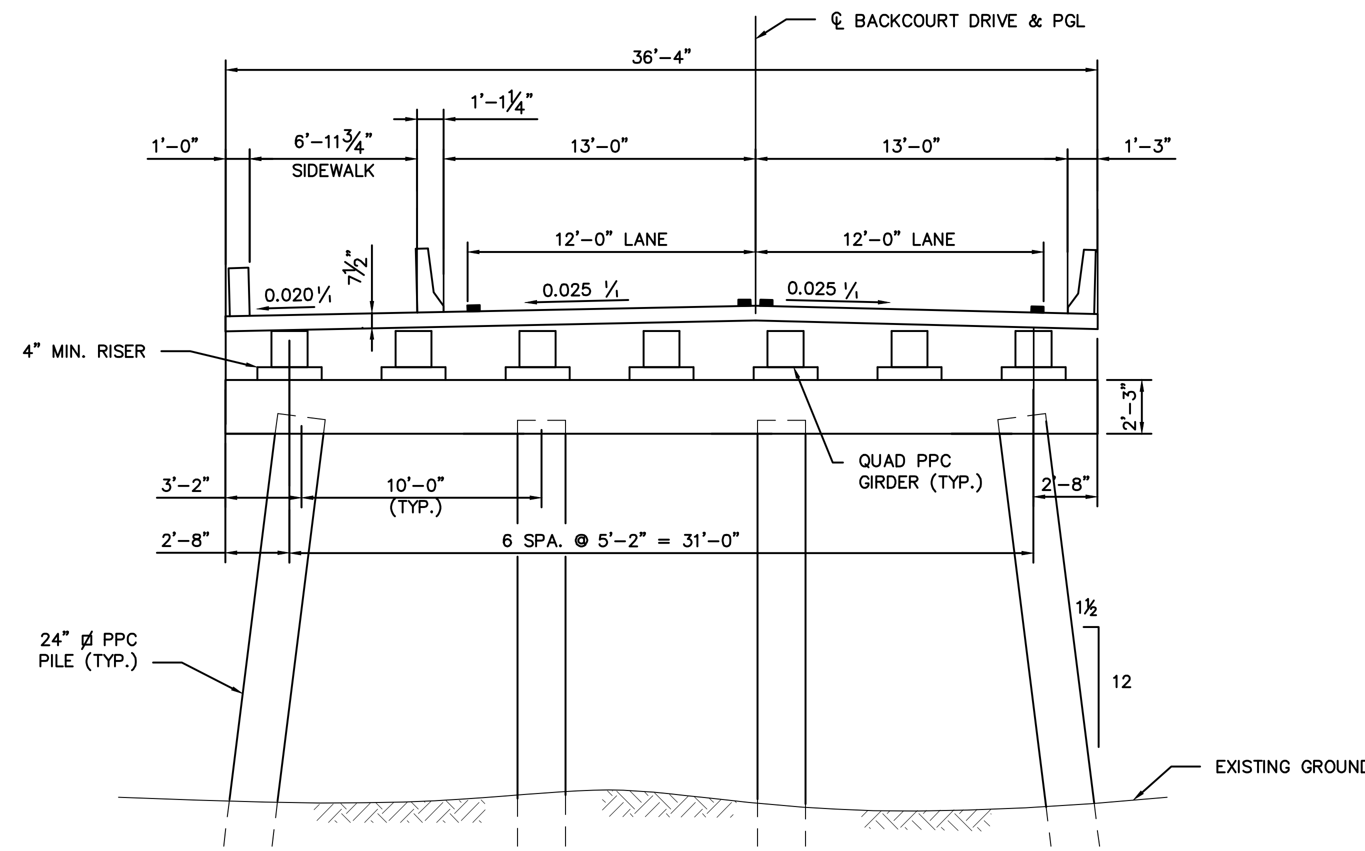
DESIGNED L.R.F.
CHECKED G.G.M.
DETAILED S.J.A.
CHECKED L.R.F.
DATE JUNE 2014
SHEET

NO.	DATE	REVISION DESCRIPTION	BY

PICARDY – PERKINS CONNECTOR

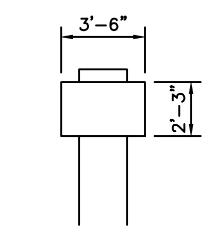
BRIDGE TYPICAL SECTIONS

F:\00_PROJECTS\12-500\Sheet_Sets\Design Study\12500ty01.dwg [TYPICAL BRIDGE SECTION] Jun 17, 2014 - 5:45pm



TYPICAL SECTION (BACKCOURT DRIVE BRIDGE OVER DAWSON CREEK)

SCALE: 1/8"=1'-0"



CAP CROSS-SECTION

SCALE: 1/8"=1'-0"

SHEET NUMBER E14

PARISH EAST BATON ROUGE
CITY BATON ROUGE
PROJECT 12-CS-HC-0043

DESIGNED L.R.F.
CHECKED G.G.M.
DETAILED S.J.A.
CHECKED L.R.F.
DATE JUNE 2014
SHEET

NO. | DATE | REVISION DESCRIPTION | BY

PICARDY – PERKINS CONNECTOR

BRIDGE TYPICAL SECTIONS

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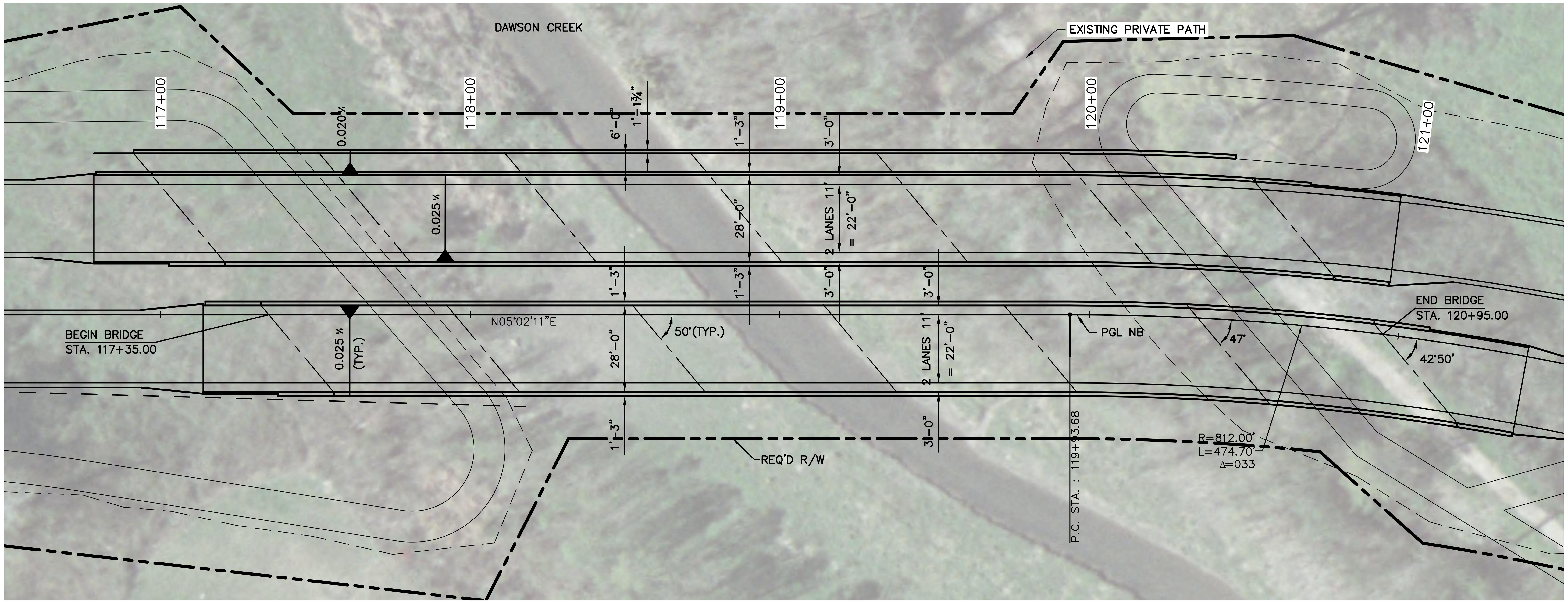
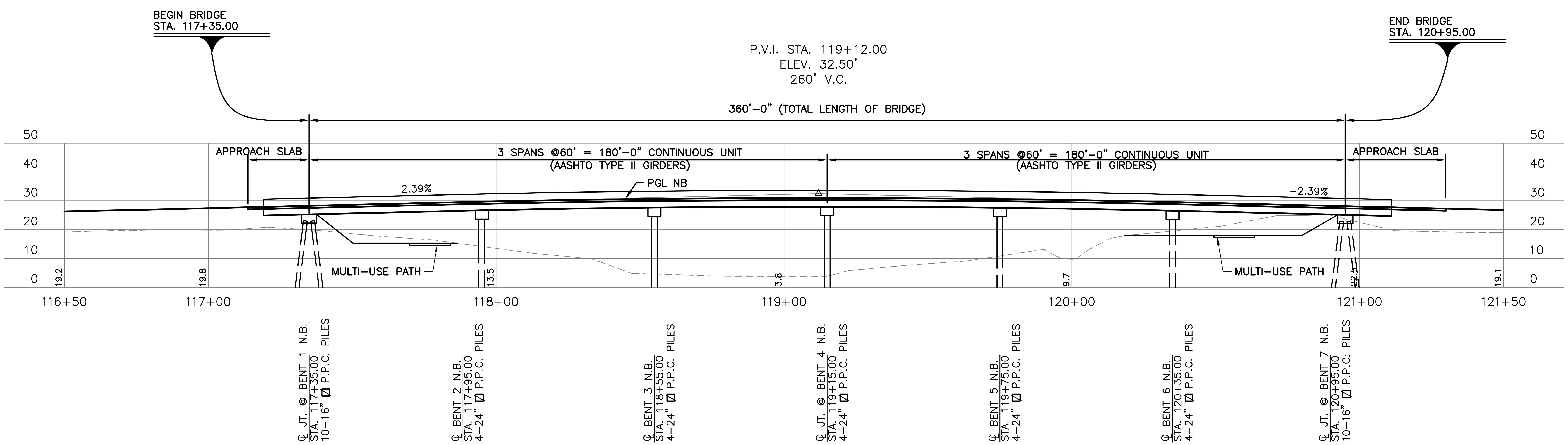


PLAN

SCALE 1"=40'



NORTH BOUND ELEVATION

(TAKEN ALONG PROFILE GRADE)

SCALE 1"=40'

F:\00_PROJECTS\12-500\Sheet_Sets\Design Study\12500GPE(01).dwg [GPE - (1)] Jun 13, 2014 - 9:22am

SHEET NUMBER E15

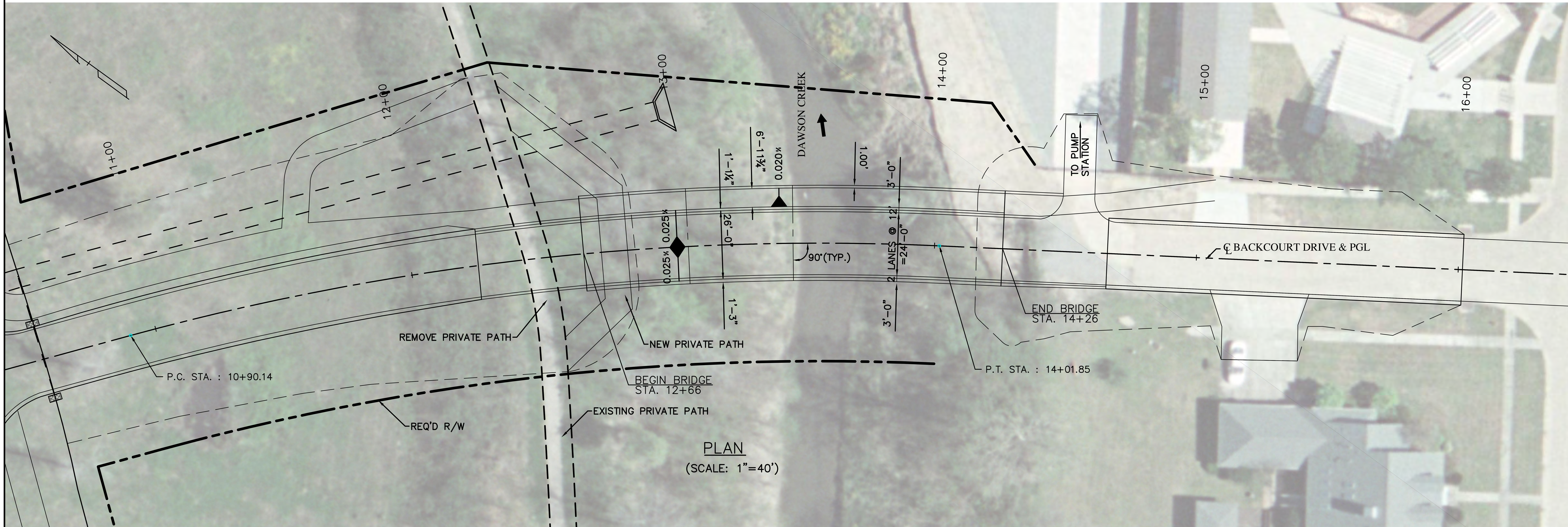
PARISH: EAST BATON ROUGE
CITY: BATON ROUGE
PROJECT: 12-CS-HC-0043

DESIGNED L.R.F.
CHECKED G.G.M.
DETAILED M.L.R.
CHECKED L.R.F.
DATE JUNE 2014
SHEET

NO.	DATE	REVISION DESCRIPTION	BY

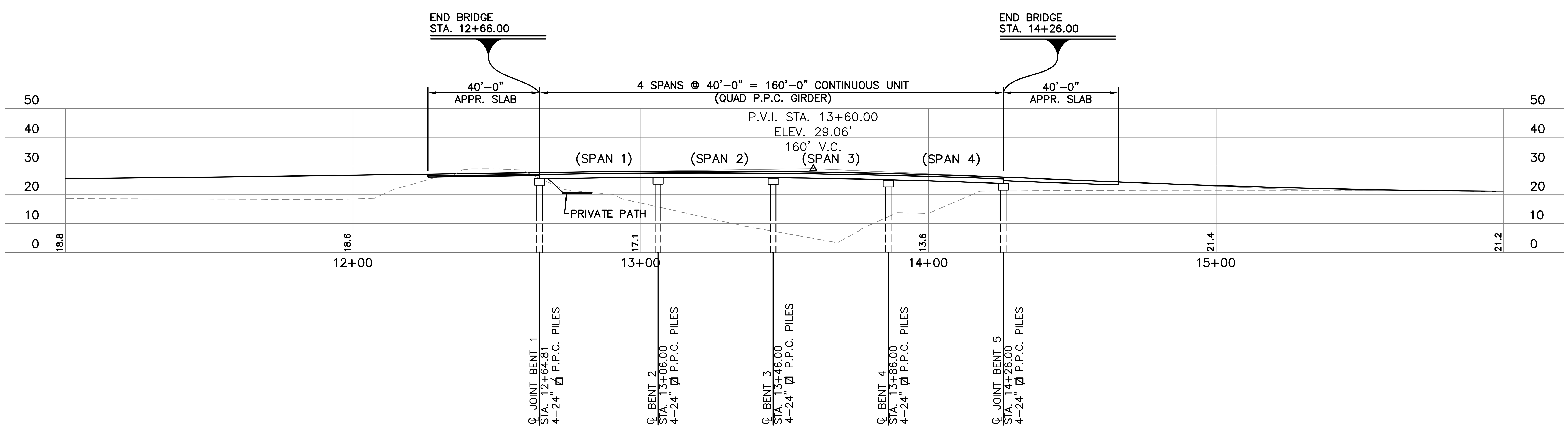
PICARDY - PERKINS CONNECTOR

GENERAL BRIDGE PLAN & ELEV. NB



PLAN

(SCALE: 1"=40')



ELEVATION

(TAKEN ALONG PROFILE GRADE)

(SCALE: 1"=40')

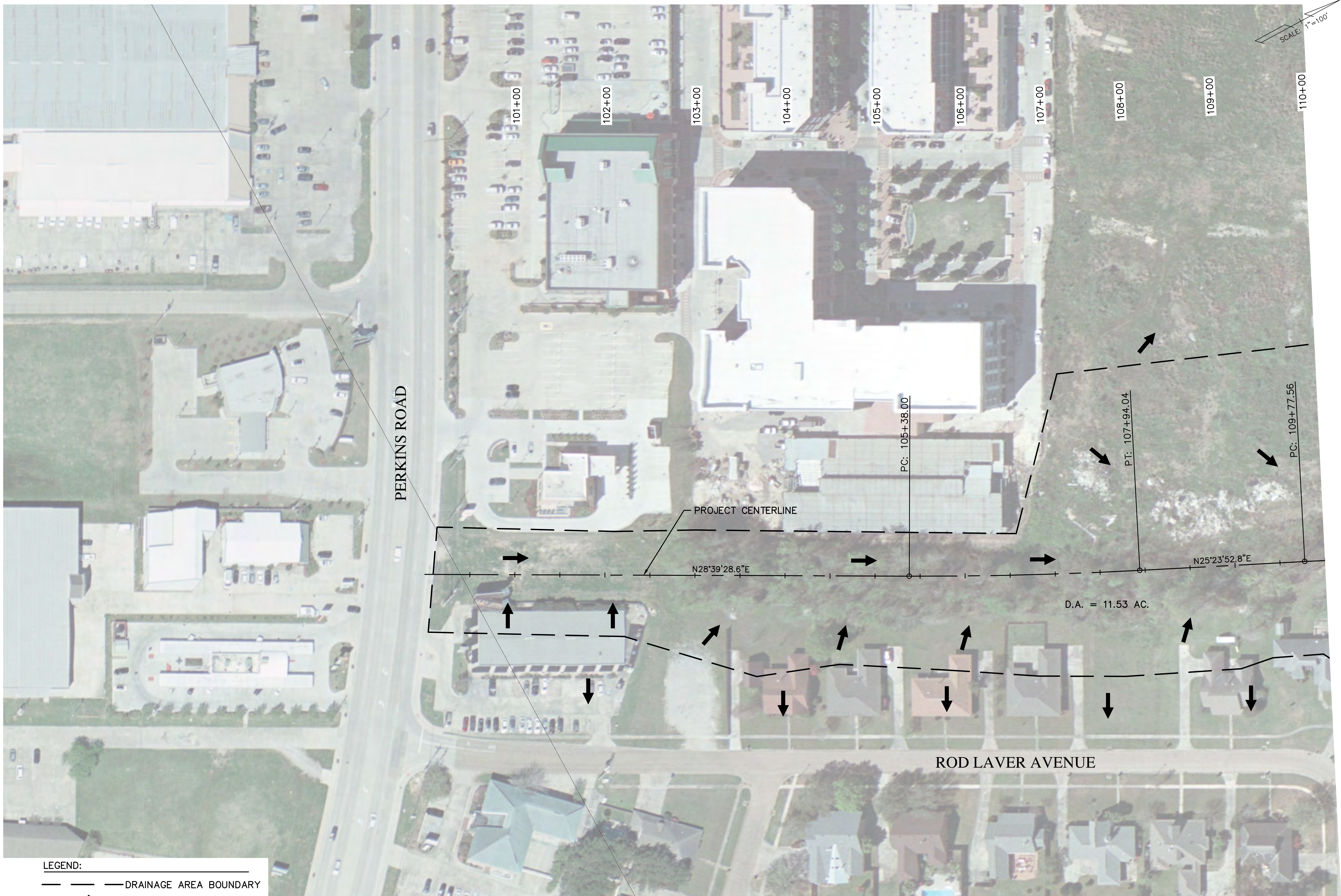
SHEET NUMBER	E16
PARISH	EAST BATON ROUGE
CITY	BATON ROUGE
PROJECT	12-CS-HC-0043
DESIGNED	L.R.F.
CHECKED	G.G.M.
DETAILED	S.J.A.
CHECKED	L.R.F.
DATE	JUNE 2014
SHEET	

NO.	DATE	REVISION DESCRIPTION	BY

PICARDY – PERKINS CONNECTOR

GENERAL BRIDGE PLAN & ELEVATION

F:\00_PROJECTS\12-500\Sheet_Sets\Design Study\12-500 GPE 02.dwg [Backcourt GPE]   Jun 13, 2014 – 9:39am



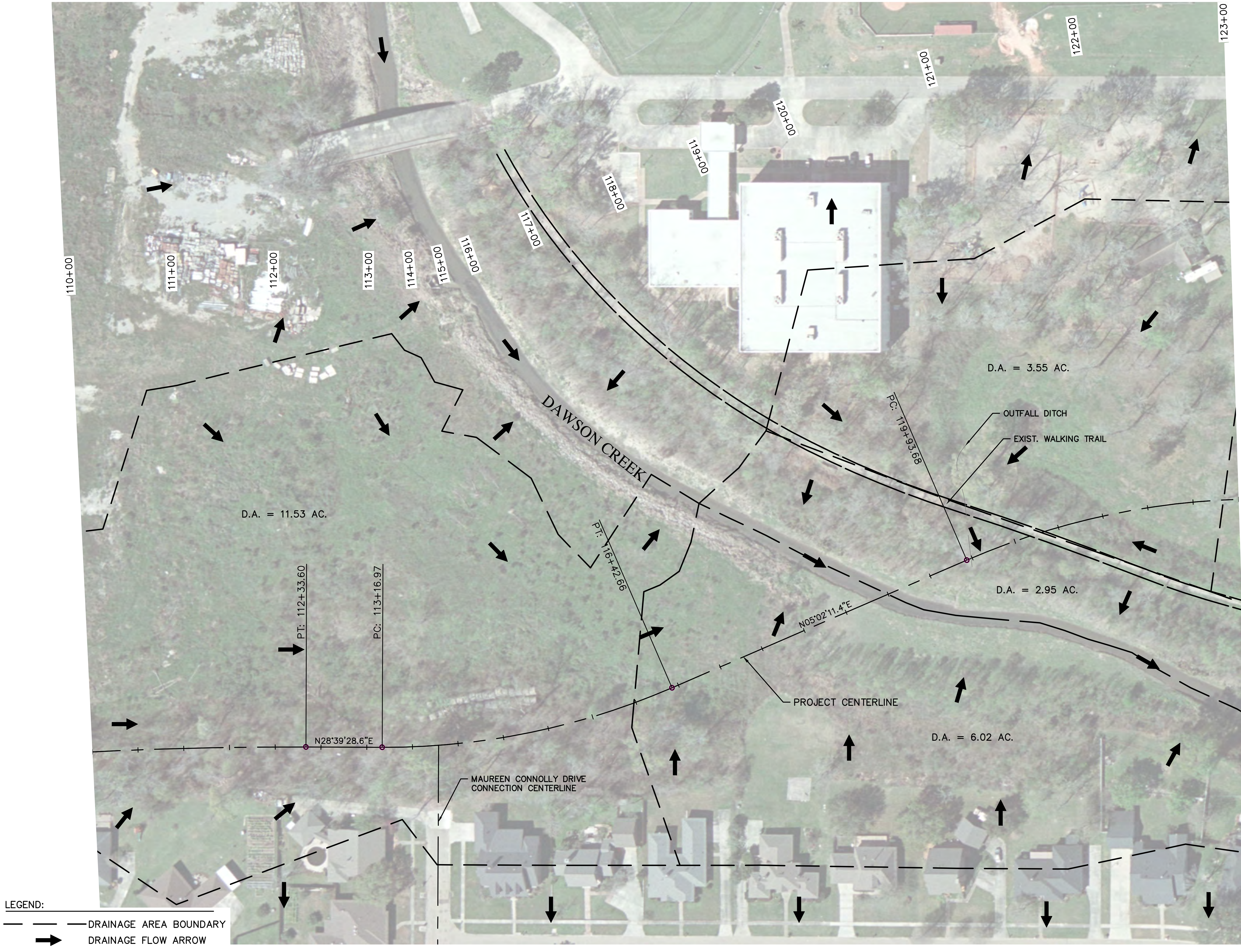
SHEET NUMBER	E17
PARISH	EAST BATON ROUGE
CITY	BATON ROUGE
PROJECT	12-CS-HC-0043
DESIGNED	L.R.F.
CHECKED	G.G.M.
DETAILED	D.R.W.
CHECKED	L.R.F.
DATE	JUNE 2014
SHEET	

NO.	DATE	REVISION DESCRIPTION	BY

PICARDY – PERKINS CONNECTOR

EXISTING DRAINAGE MAP

Drawing name: F:\00_PROJECTS\12-500\Sheet_Sets\Design Study\12500exdl01.dwg – Jun 24, 2014 – 4:45pm



Drawing name: F:\00_PROJECTS\12-500\Sheet_Sets\Design Study\12500exdl02.dwg - Jun 24, 2014 - 4:46pm

SHEET NUMBER	E18
PARISH	EAST BATON ROUGE
CITY	BATON ROUGE
PROJECT	12-CS-HC-0043
DESIGNED	L.R.F.
CHECKED	G.G.M.
DETAILED	D.R.W.
CHECKED	L.R.F.
DATE	JUNE 2014
SHEET	

NO.	DATE	REVISION DESCRIPTION	BY

PICARDY – PERKINS CONNECTOR

EXISTING DRAINAGE MAP

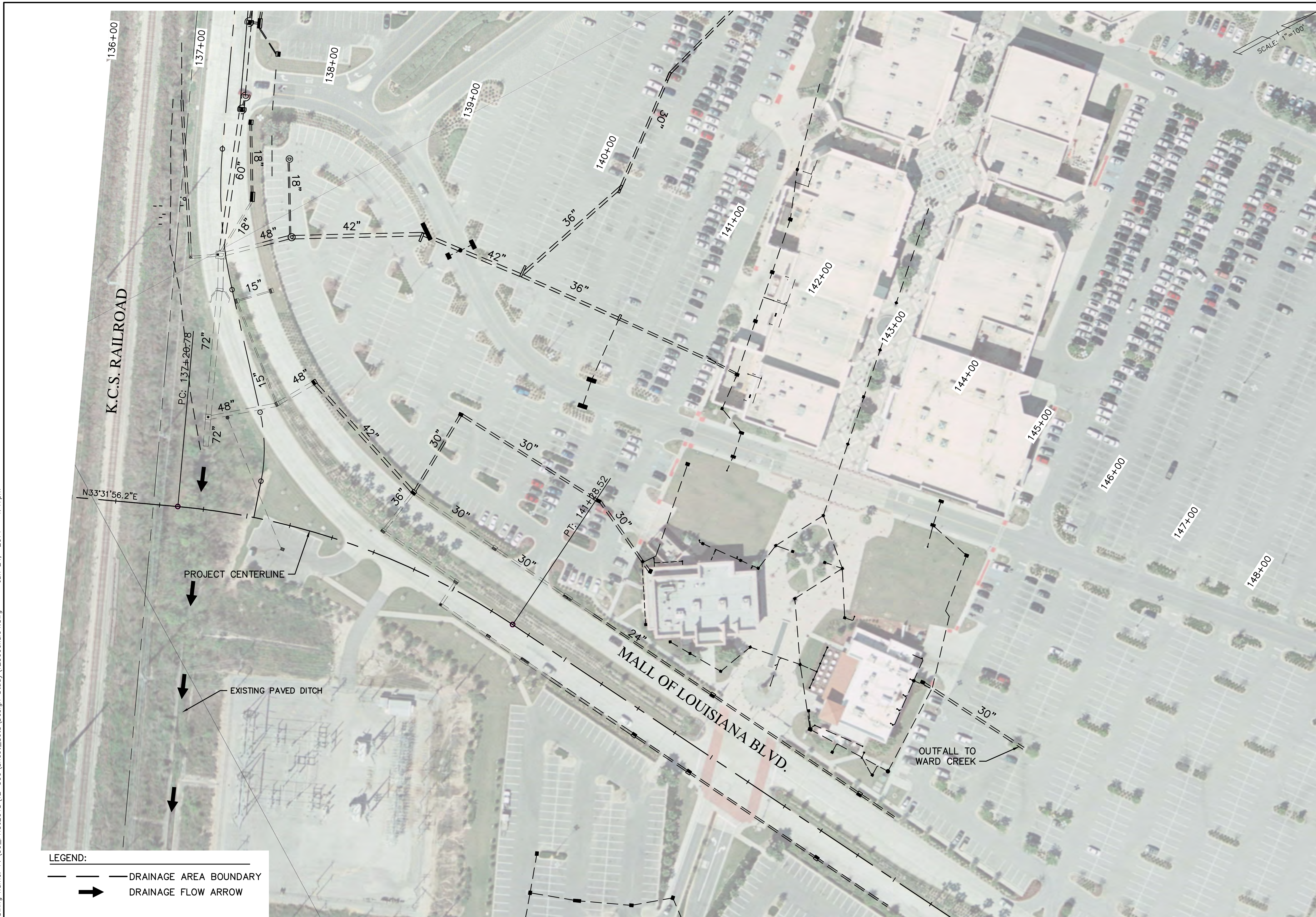
Drawing name: F:\00_PROJECTS\12-500\Sheet_Sets\Design Study\12500exdl03.dwg - Jun 24, 2014 - 4:46pm

SHEET NUMBER	E19
PARISH	EAST BATON ROUGE
CITY	BATON ROUGE
PROJECT	12-CS-HC-0043
DESIGNED	L.R.F.
CHECKED	G.G.M.
DETAILED	D.R.W.
CHECKED	L.R.F.
DATE	JUNE 2014
SHEET	

NO.	DATE	REVISION DESCRIPTION	BY

PICARDY – PERKINS CONNECTOR

EXISTING DRAINAGE MAP



Drawing name: F:\00_PROJECTS\12-500\Sheet_Sets\Design Study\12500exdl04.dwg - Jun 24, 2014 - 4:47pm

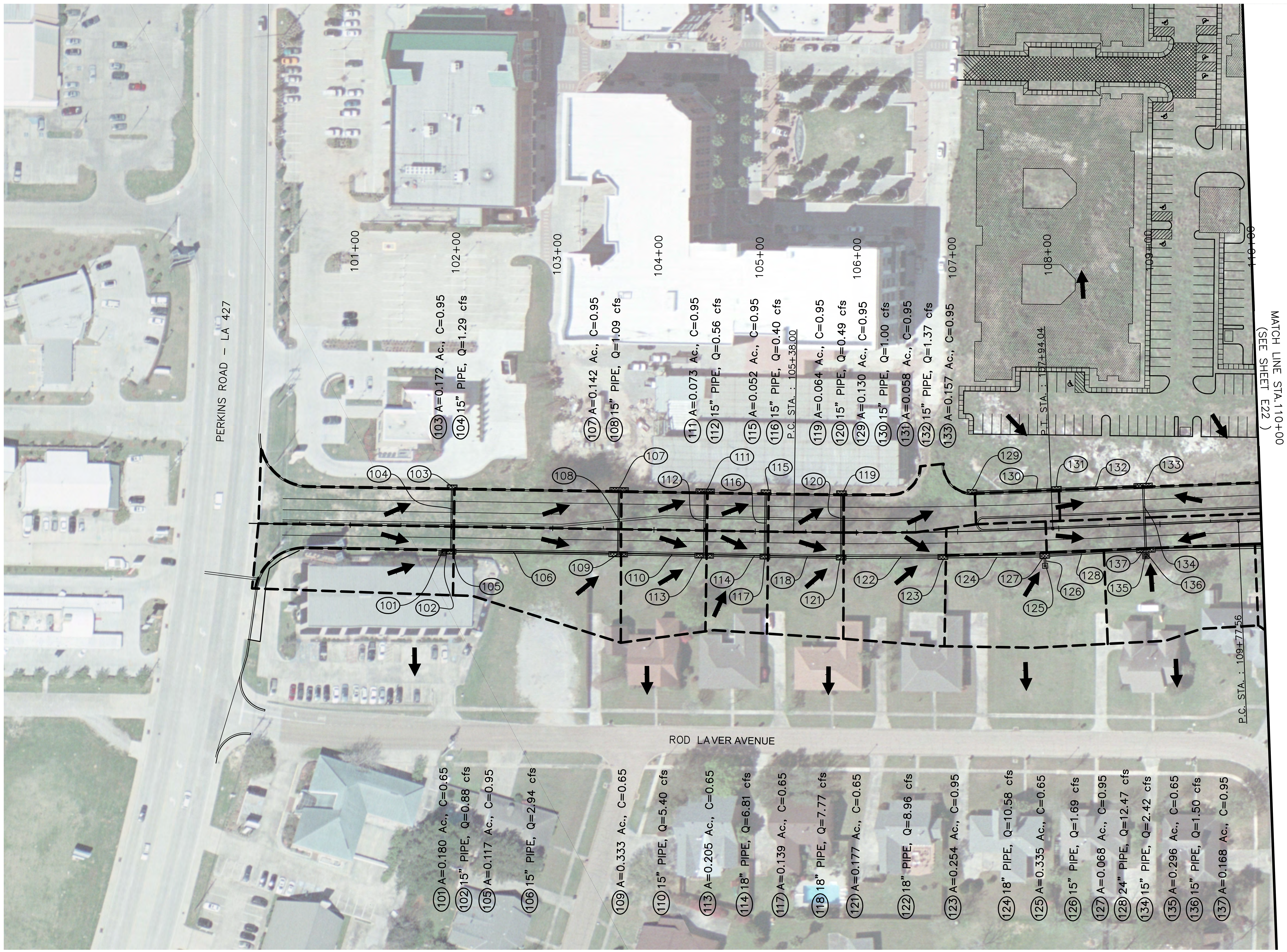
SHEET NUMBER	E20
PARISH	EAST BATON ROUGE
CITY	BATON ROUGE
PROJECT	12-CS-HC-0043
DESIGNED	L.R.F.
CHECKED	G.G.M.
DETAILED	D.R.W.
CHECKED	L.R.F.
DATE	JUNE 2014
SHEET	

NO.	DATE	REVISION DESCRIPTION	BY

PICARDY – PERKINS CONNECTOR

EXISTING DRAINAGE MAP

Scale : 1" = 100'



LEGEND:

- DRAINAGE AREA BOUNDARY
- DRAINAGE FLOW ARROW
- REQ'D. DOUBLE SIDE INLET
- REQ'D. SINGLE SIDE INLET
- REQ'D. GRATE INLET

F:\00_PROJECTS\12-500\Sheet_Sets\Design Study\12500prd01.dwg [DESIGN DRAINAGE MAP] Jun 13, 2014 – 9:51am

SHEET NUMBER E21

PARISH	EAST BATON ROUGE
CITY	BATON ROUGE
PROJECT	12-CS-HC-0043
DESIGNED	L.R.F.
CHECKED	G.G.M.
DETAILED	S.J.A.
CHECKED	L.R.F.
DATE	JUNE 2014
SHEET	

NO.	DATE	REVISION DESCRIPTION	BY

PICARDY – PERKINS CONNECTOR

DESIGN DRAINAGE MAP

LEGEND:

- DRAINAGE AREA BOUNDARY
- DRAINAGE FLOW ARROW
- REQ'D. DOUBLE SIDE INLET
- REQ'D. SINGLE SIDE INLET
- REQ'D. GRATE INLET

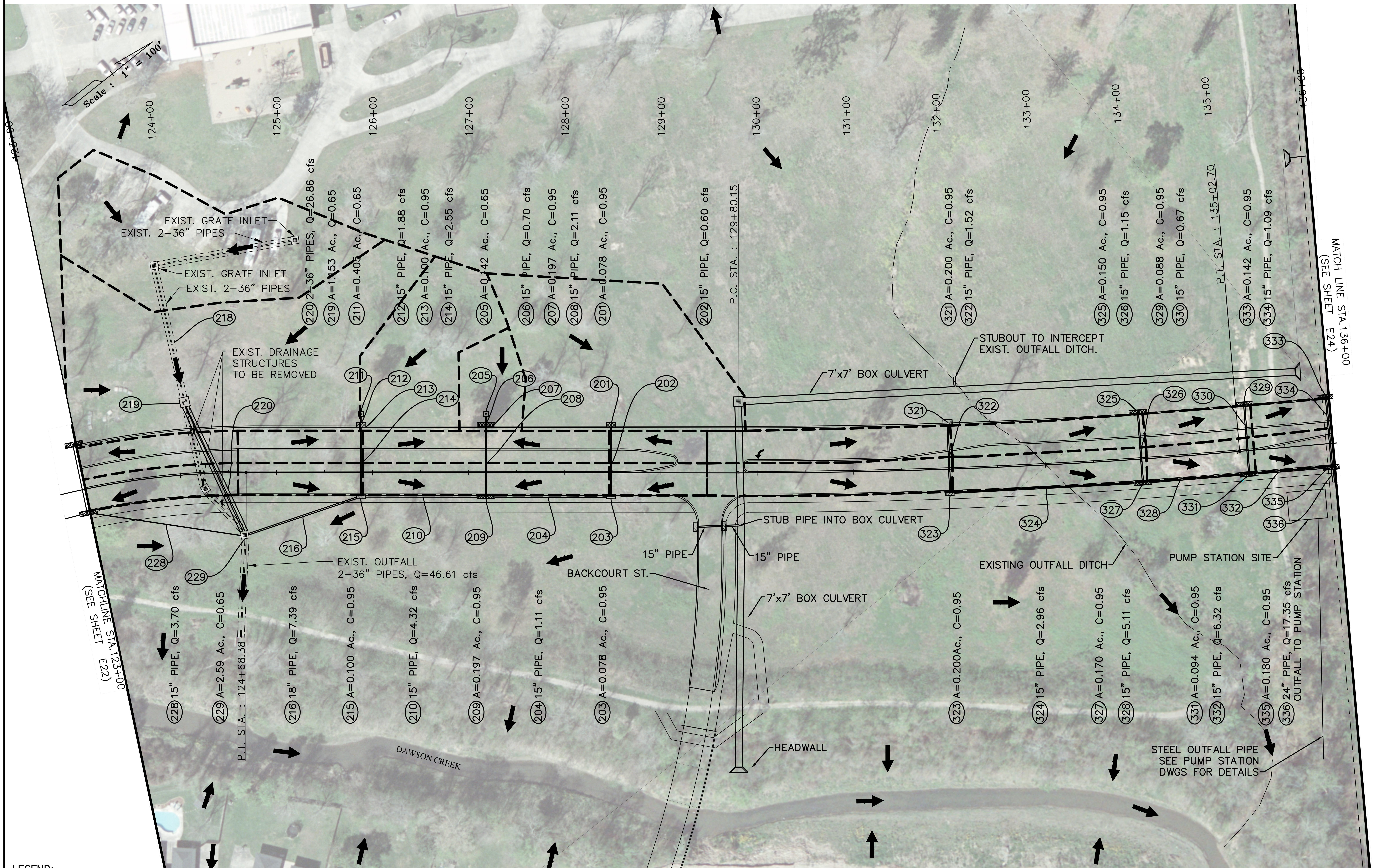
F:\00_PROJECTS\12-500\Sheet_Sets\Design Study\12500prd02.dwg [DESIGN DRAINAGE MAP] Jun 13, 2014 - 11:25am

SHEET NUMBER	E22
PARISH	EAST BATON ROUGE
CITY	BATON ROUGE
PROJECT	12-CS-HC-0043
DESIGNED	L.R.F.
CHECKED	G.G.M.
DETAILED	S.J.A.
CHECKED	L.R.F.
DATE	JUNE 2014
SHEET	

NO.	DATE	REVISION DESCRIPTION	BY

PICARDY – PERKINS CONNECTOR

DESIGN DRAINAGE MAP



LEGEND:

- DRAINAGE AREA BOUNDARY
- DRAINAGE FLOW ARROW
- REQ'D. DOUBLE SIDE INLET
- REQ'D. SINGLE SIDE INLET
- REQ'D. GRATE INLET

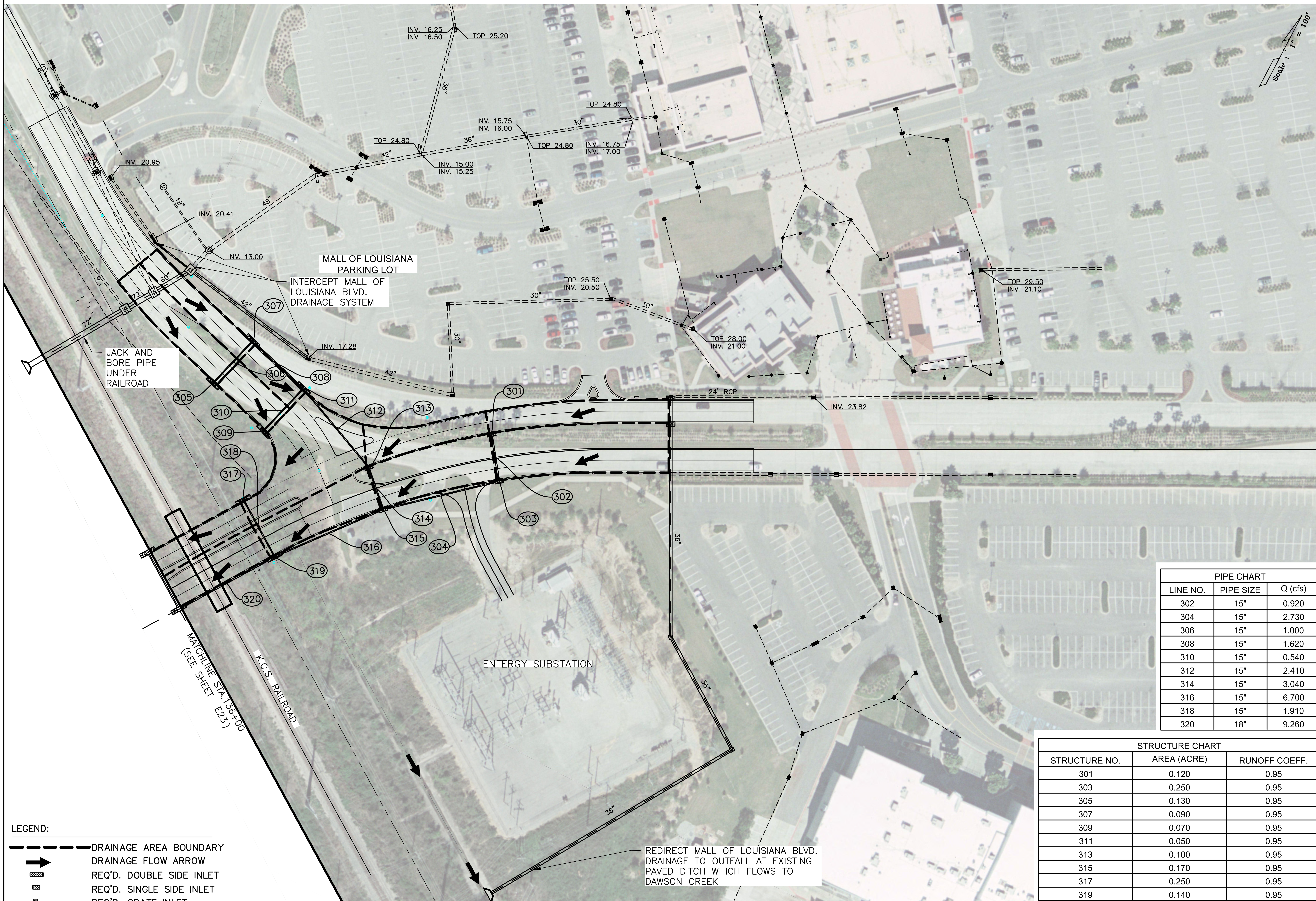
F:\00_PROJECTS\12-500\Sheet_Sets\Design Study\12500prd03.dwg [DESIGN DRAINAGE MAP] Jun 13, 2014 - 9:54am

SHEET NUMBER	E23
PARISH	EAST BATON ROUGE
CITY	BATON ROUGE
PROJECT	12-CS-HC-0043
DESIGNED	L.R.F.
CHECKED	G.G.M.
DETAILED	S.J.A.
CHECKED	L.R.F.
DATE	JUNE 2014
SHEET	

NO. | DATE | REVISION DESCRIPTION | BY

PICARDY – PERKINS CONNECTOR

DESIGN DRAINAGE MAP



LEGEND:

- DRAINAGE AREA BOUNDARY
- DRAINAGE FLOW ARROW
- REQ'D. DOUBLE SIDE INLET
- REQ'D. SINGLE SIDE INLET
- REQ'D. GRATE INLET

PIPE CHART

LINE NO.	PIPE SIZE	Q (cfs)
302	15"	0.920
304	15"	2.730
306	15"	1.000
308	15"	1.620
310	15"	0.540
312	15"	2.410
314	15"	3.040
316	15"	6.700
318	15"	1.910
320	18"	9.260

STRUCTURE CHART

STRUCTURE NO.	AREA (ACRE)	RUNOFF COEFF.
301	0.120	0.95
303	0.250	0.95
305	0.130	0.95
307	0.090	0.95
309	0.070	0.95
311	0.050	0.95
313	0.100	0.95
315	0.170	0.95
317	0.250	0.95
319	0.140	0.95

SHEET NUMBER E24

PARISH EAST BATON ROUGE
CITY BATON ROUGE
PROJECT 12-CS-HC-0043

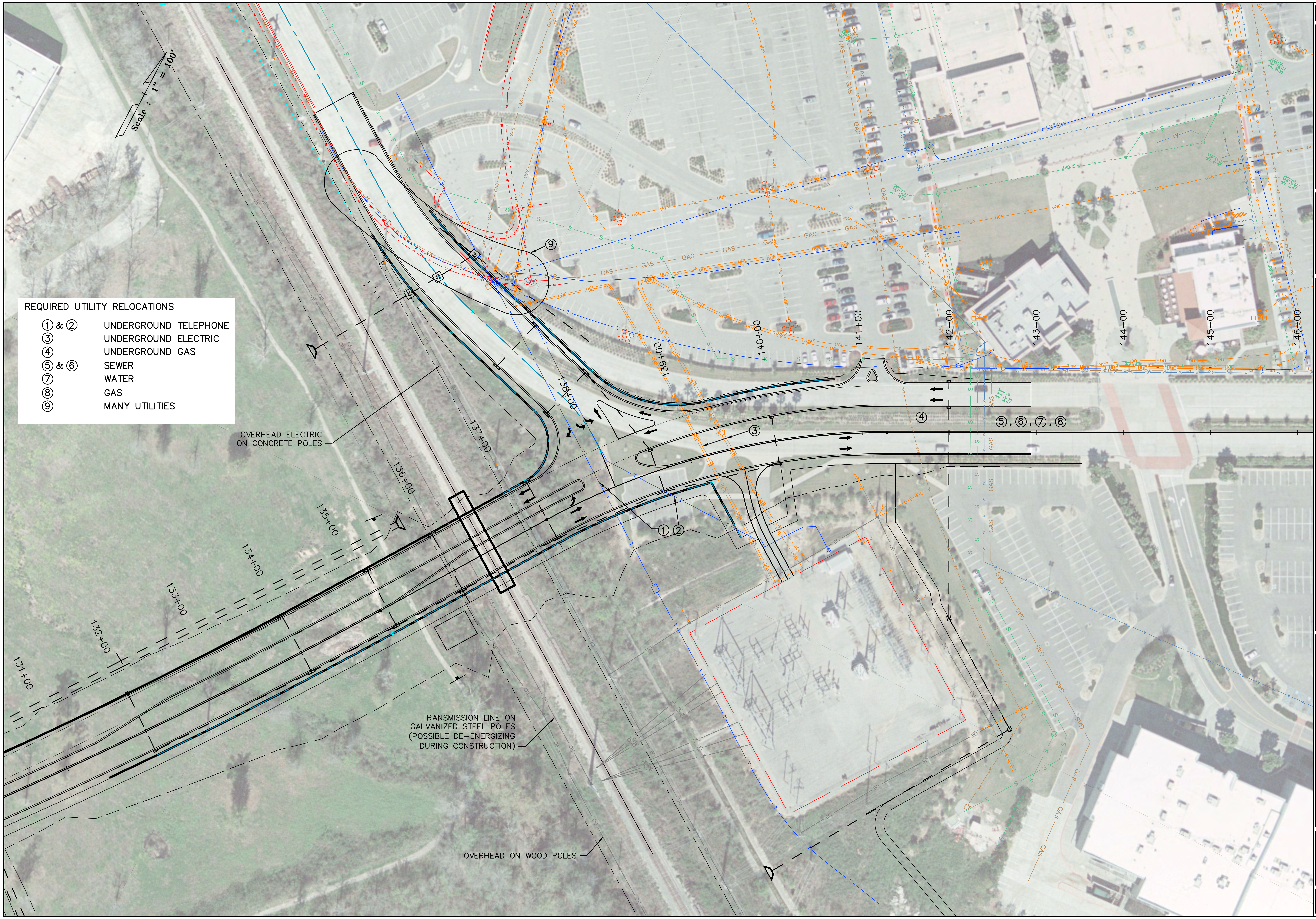
DESIGNED L.R.F.
CHECKED G.G.M.
DETAILED S.J.A.
CHECKED L.R.F.
DATE JUNE 2014
SHEET

NO. | DATE | REVISION DESCRIPTION | BY

PICARDY – PERKINS CONNECTOR

DESIGN DRAINAGE MAP

F:\00_PROJECTS\12-500\Sheet_Sets\Design Study\12500prd04.dwg [DESIGN DRAINAGE MAP] Jun 13, 2014 - 9:55am



SHEET NUMBER	E25
PARISH	EAST BATON ROUGE
CITY	BATON ROUGE
PROJECT	12-CS-HC-0043
DESIGNED	L.R.F.
CHECKED	G.G.M.
DETAILED	S.J.A.
CHECKED	L.R.F.
DATE	JUNE 2014
SHEET	

NO.	DATE	REVISION DESCRIPTION	BY

PICARDY – PERKINS CONNECTOR

UTILITY LAYOUT MAP

F:\00_PROJECTS\12-500\Sheet_Sets\Design Study\12500util.dwg [DESIGN DRAINAGE MAP] Jun 13, 2014 – 9:56am

CURVE #: 2 D = 1°15'00"
STA 12244+41.19 R = 4583.75'
L = 84.51'
T = 42.26'
S = 49 MPH

CURVE #: 1
STA 12243+75.60
LS = 70.00'

CURVE #: 3
STA 12245+06.77
LS = 70.00'

CURVE #: 5 D = 1°30'00"
STA 12254+28.48 R = 3819.83'
L = 265.94'
T = 133.03'
S = 49 MPH

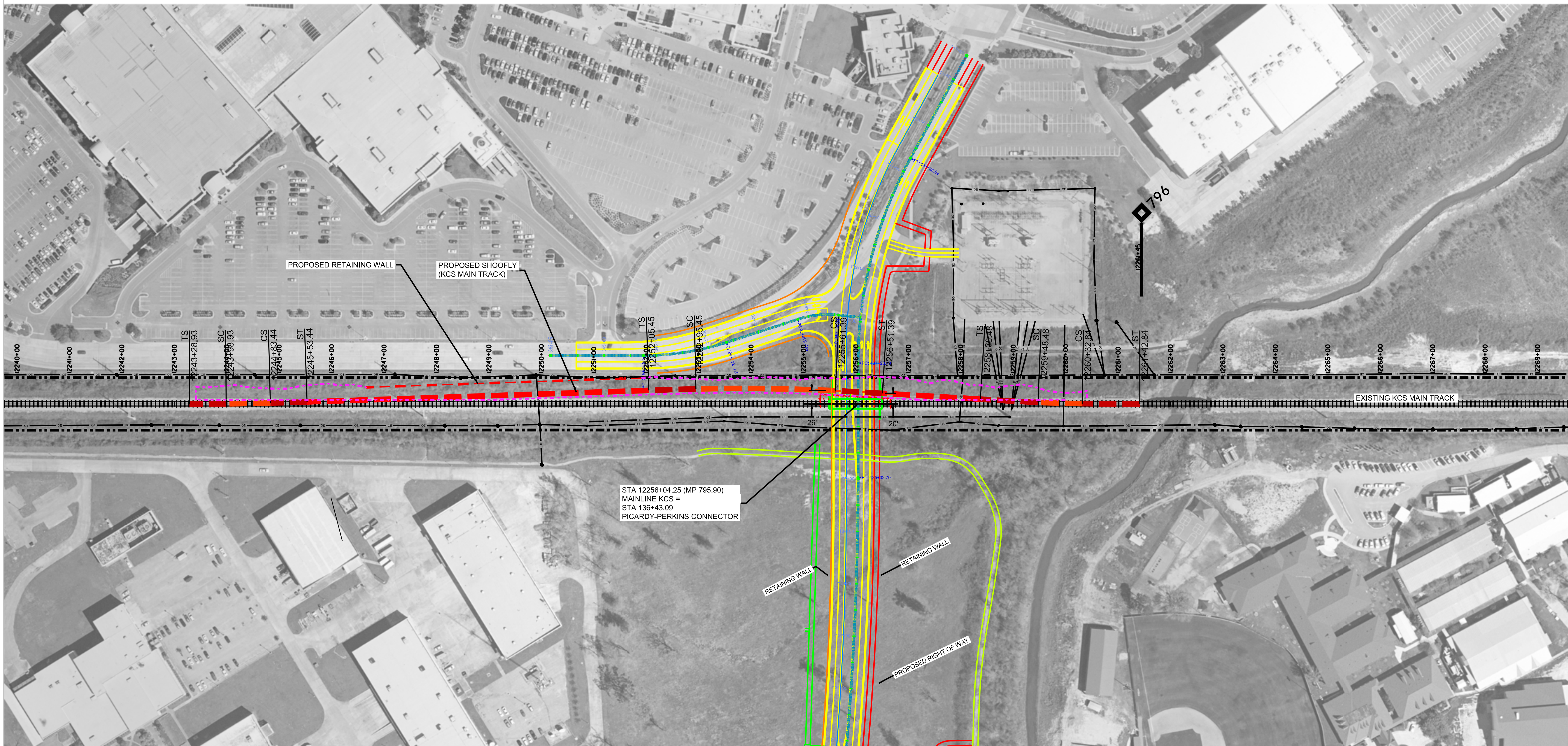
CURVE #: 4
STA 12252+65.45
LS = 90.00'

CURVE #: 6
STA 12255+91.39
LS = 90.00'

CURVE #: 8 D = 1°45'00"
STA 12259+90.66 R = 3274.17'
L = 84.36'
T = 42.19'
S = 49 MPH

CURVE #: 7
STA 12259+11.81
LS = 110.00'

CURVE #: 9
STA 12260+69.51
LS = 110.00'



LEGEND

EXISTING RAILROAD
PROPOSED RAILROAD
RIGHT-OF-WAY
OVERHEAD POWER LINE
LIMIT OF GRADING
RETAINING WALL

TRUE NORTH
RR NORTH

100 0 100 200
SCALE IN FEET

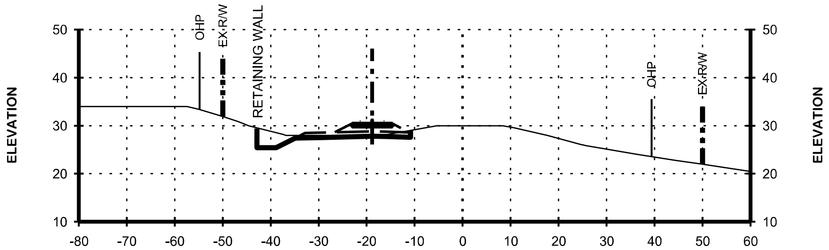
SHEET NUMBER	E26
PARISH	EAST BATON ROUGE
CITY	BATON ROUGE
PROJECT	12-CS-HC-0043
DESIGNED	B. THOMPSON
CHECKED	G. DAVIS
DETAILED	B. THOMPSON
CHECKED	G. DAVIS
DATE	JUNE 2014
SHEET	1 OF 3

NO.	DATE	REVISION DESCRIPTION	BY

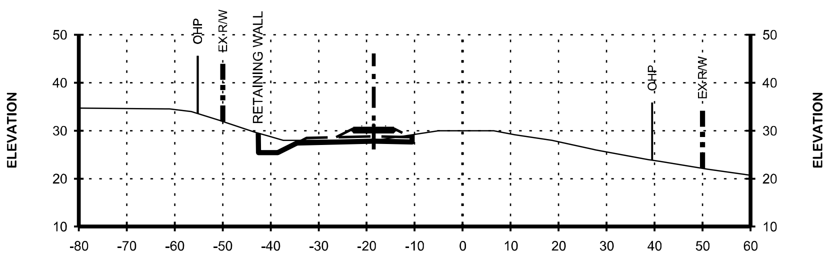
KCS BRIDGE STUDY
SHOOFLY – SKEWED ALIGNMENT
(20 FT. OFFSET)

PICARDY – PERKINS CONNECTOR

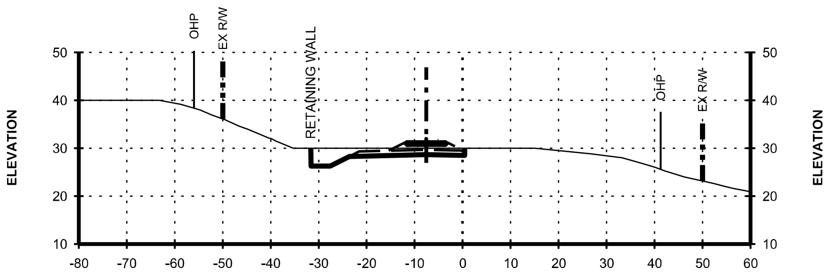
Stantec



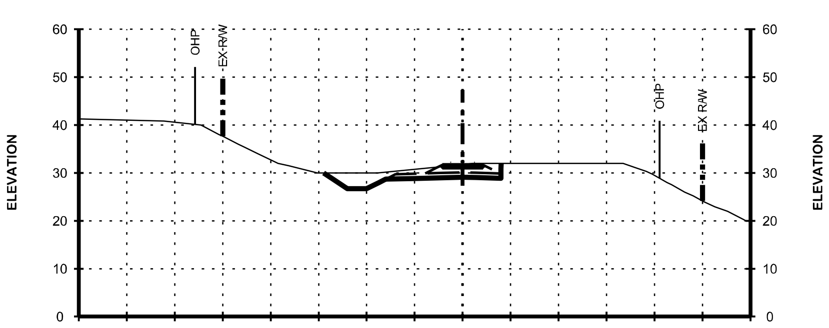
STATION 12250+00



STATION 12249+91



STATION 12246+66



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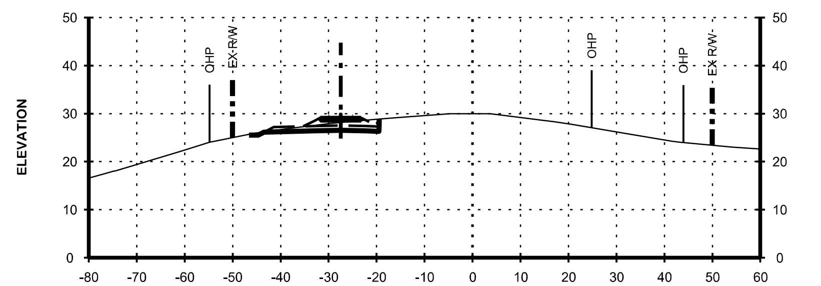

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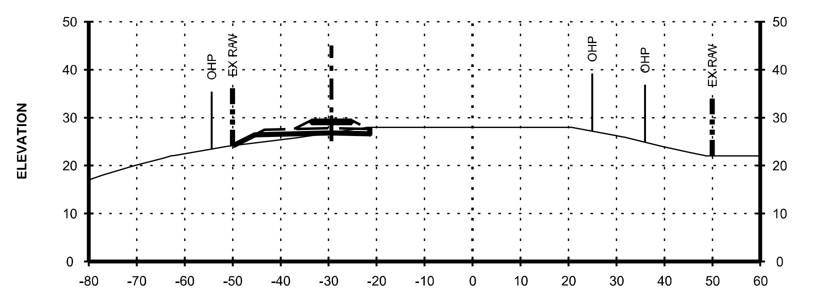

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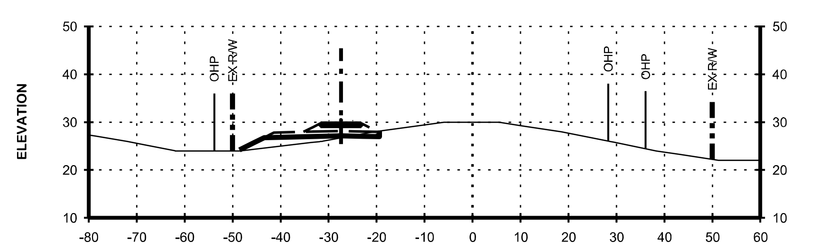
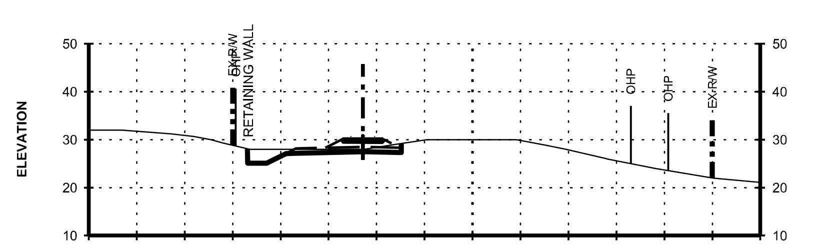
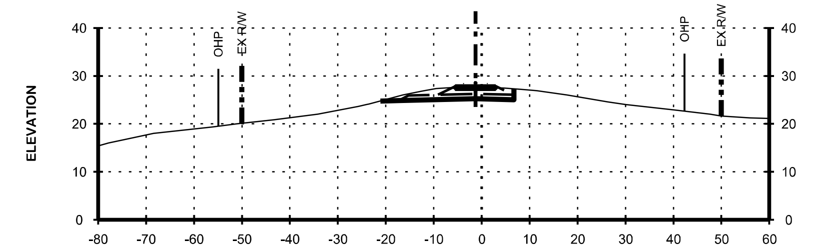


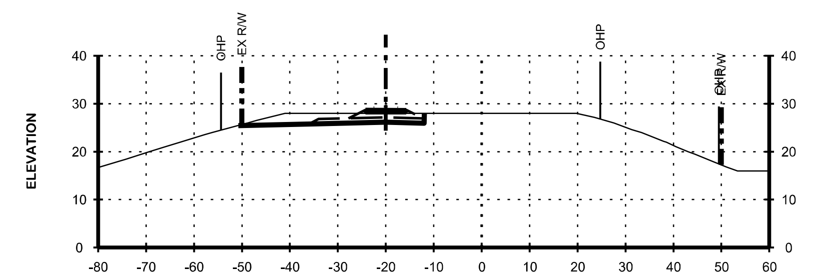
STATION 12252+56



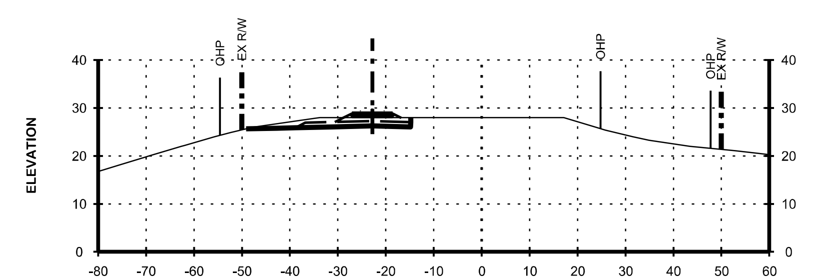
STATION 12251+19



STATION 12260+00

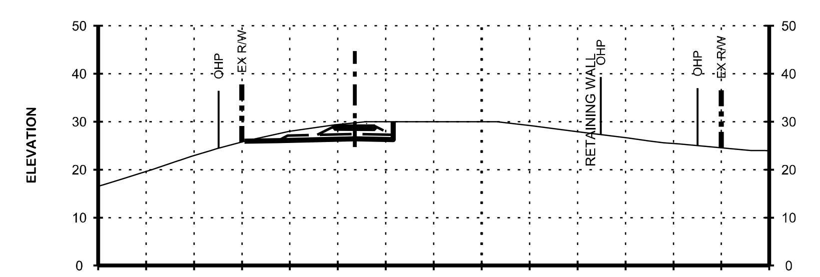


STATION 12256+53



STATION 12256+04

(PROPOSED ROADWAY ℄)



STATION 12255+29

STATION S 12245+00 THRU 12260+00

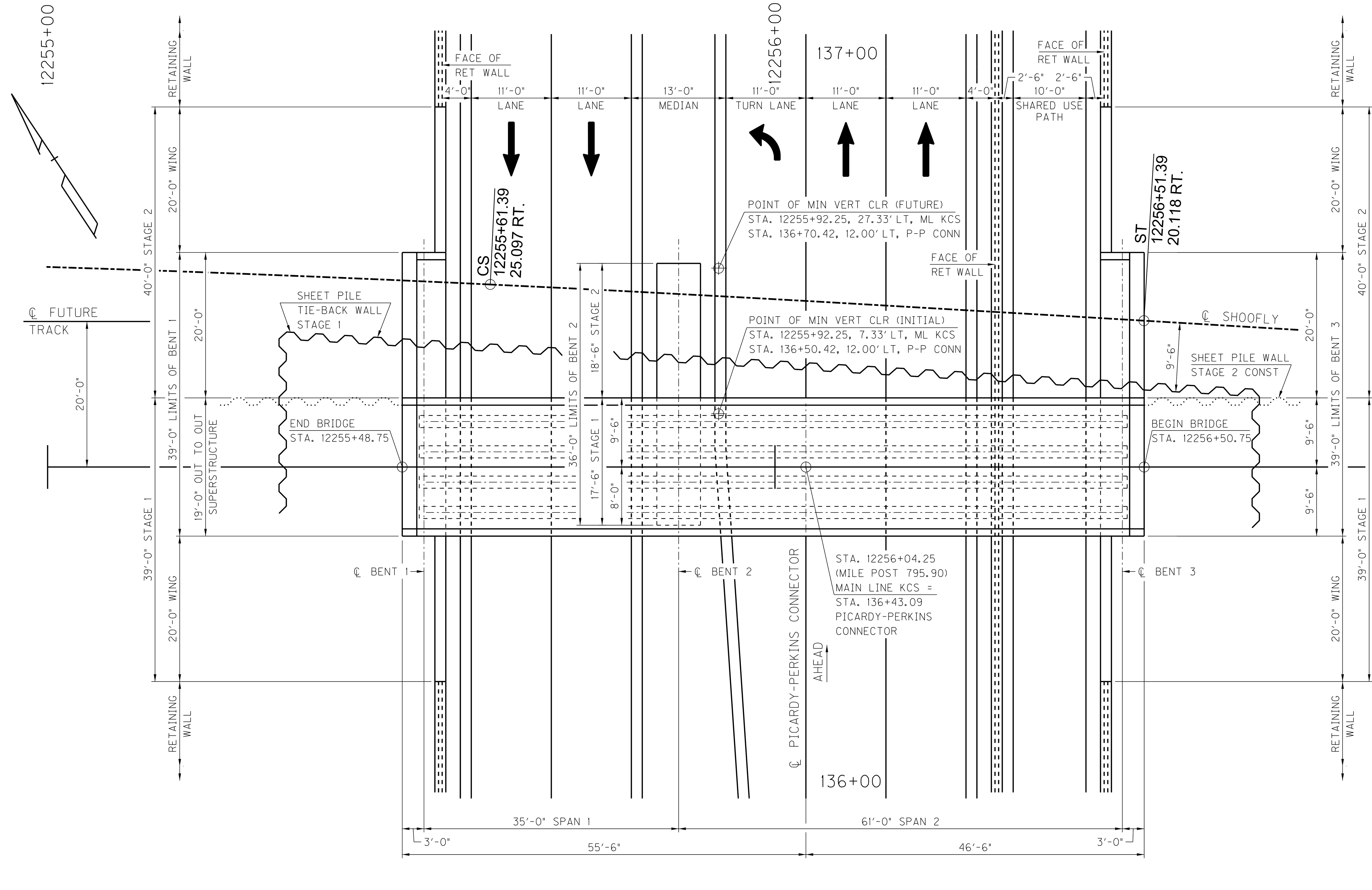
SHEET NUMBER	E27
PARISH	EAST BATON ROUGE
CITY	BATON ROUGE
PROJECT	12-CS-HC-0043
DESIGNED	B. THOMPSON
CHECKED	G. DAVIS
DETAILED	B. THOMPSON
CHECKED	G. DAVIS
DATE	JULY 2014
SHEET	2 OF 3

NO.	DATE	REVISION DESCRIPTION	BY

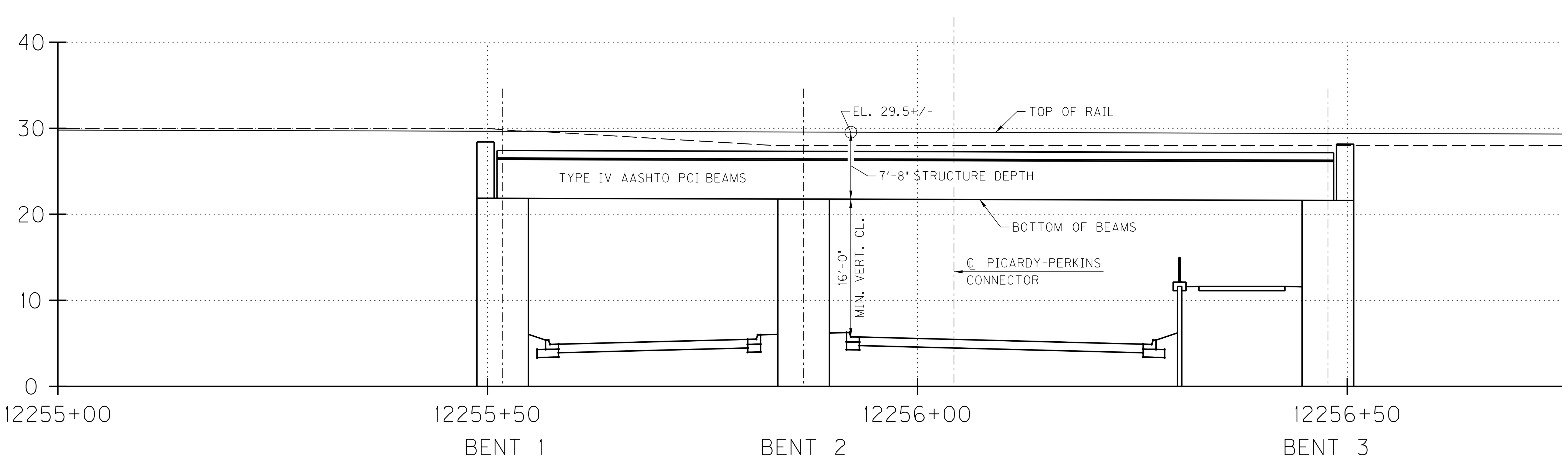
KCS BRIDGE STUDY
SHOOFLY - SKEWED ALIGNMENT
(20 FT. OFFSET)

PICARDY - PERKINS CONNECTOR

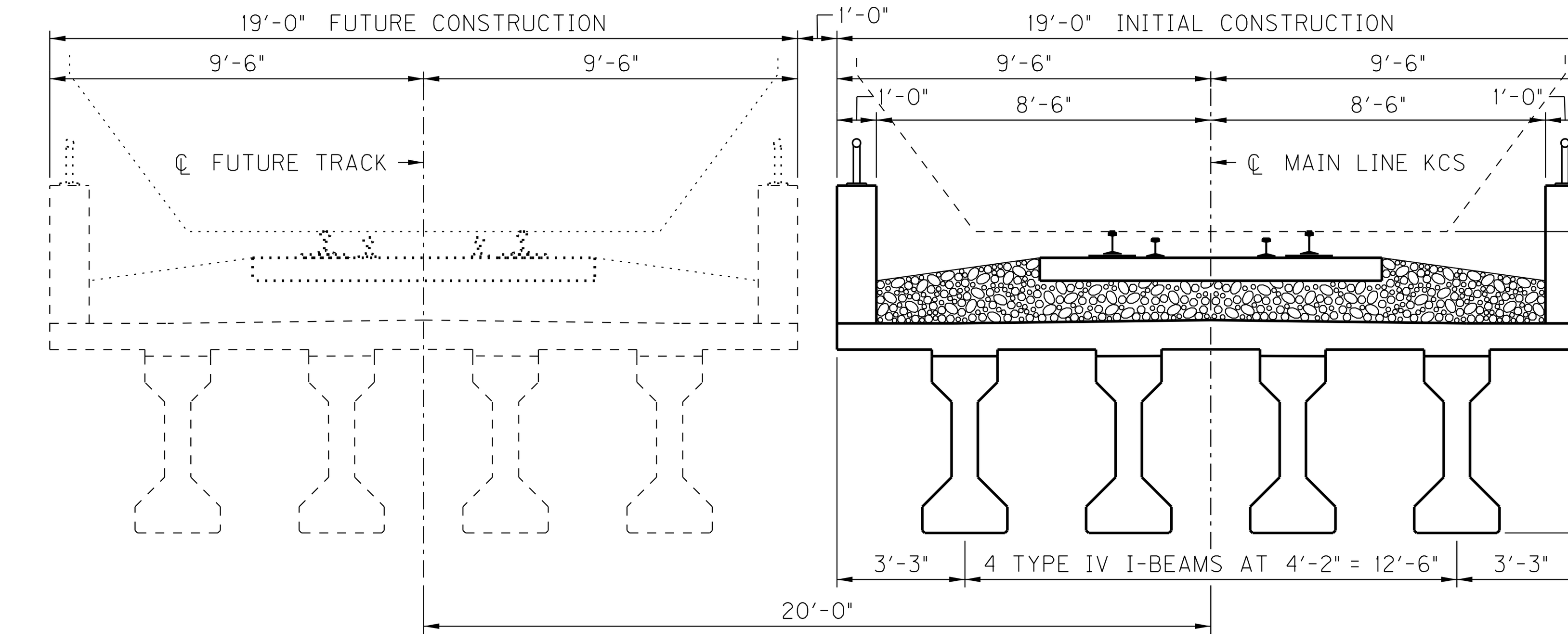
Stantec



PLAN



SECTION ALONG CL KCS RR



TYPICAL SECTION

LOOKING AHEAD

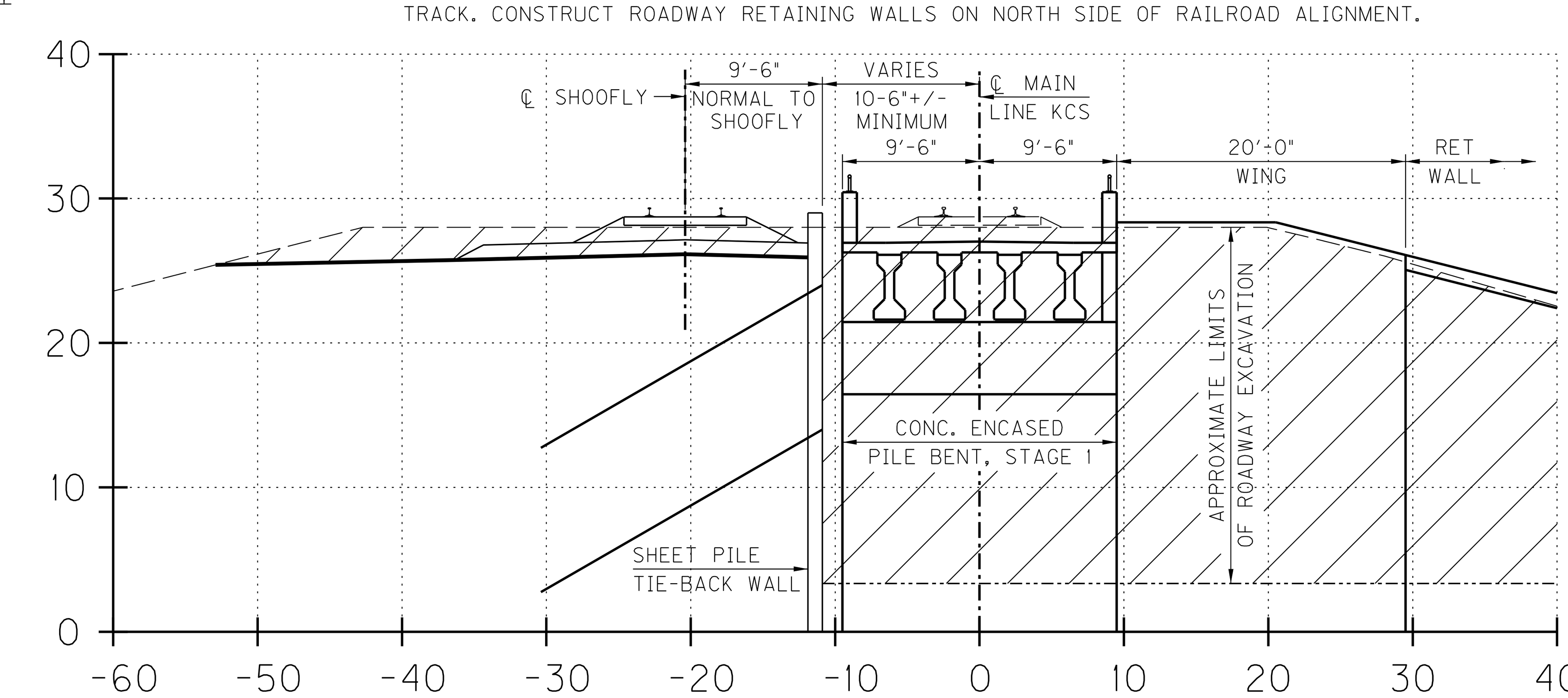
CONSTRUCTION STAGING

STAGE 1

1. CONSTRUCT SHOOFLY TRACK STRUCTURE AND SHIFT TRAIN TRAFFIC TO THE SHOOFLY DETOUR.
2. INSTALL SOE ADJACENT TO SHOOFLY BY DRIVING SHEET PILING (TIE-BACK SHEET PILING WALL ASSUMED FOR ILLUSTRATION PURPOSES).
3. BEGIN EXCAVATION FOR BRIDGE CONSTRUCTION TO BOTTOM OF BENT CAP ELEVATIONS, INSTALLING INITIAL TIE-BACK WALL ANCHORS AS THE EXCAVATION PROGRESSES. DRIVE PILES FOR BENTS AND WINGS.
4. CONSTRUCT BENT CONCRETE CAPS. CONTINUE EXCAVATION AROUND PILES, INSTALLING PILE BRACING AS CONSTRUCTION PROGRESSES.
5. CONTINUE EXCAVATION TO REQUIRED DEPTH, SETTING ADDITIONAL TIE-BACK ANCHORS AS REQUIRED.
6. PLACE FINAL BENT PILE BRACING, INSTALL FORMS AND REINFORCING BARS, AND ENCASE PILES IN CONCRETE TO FINISH SUBSTRUCTURES. CONSTRUCT ROADWAY RETAINING WALLS ON SOUTH SIDE OF RAILROAD ALIGNMENT (RAILROAD WEST).
7. BACKFILL ABUTMENT AND WINGS AND CONSTRUCT BRIDGE SUPERSTRUCTURE.

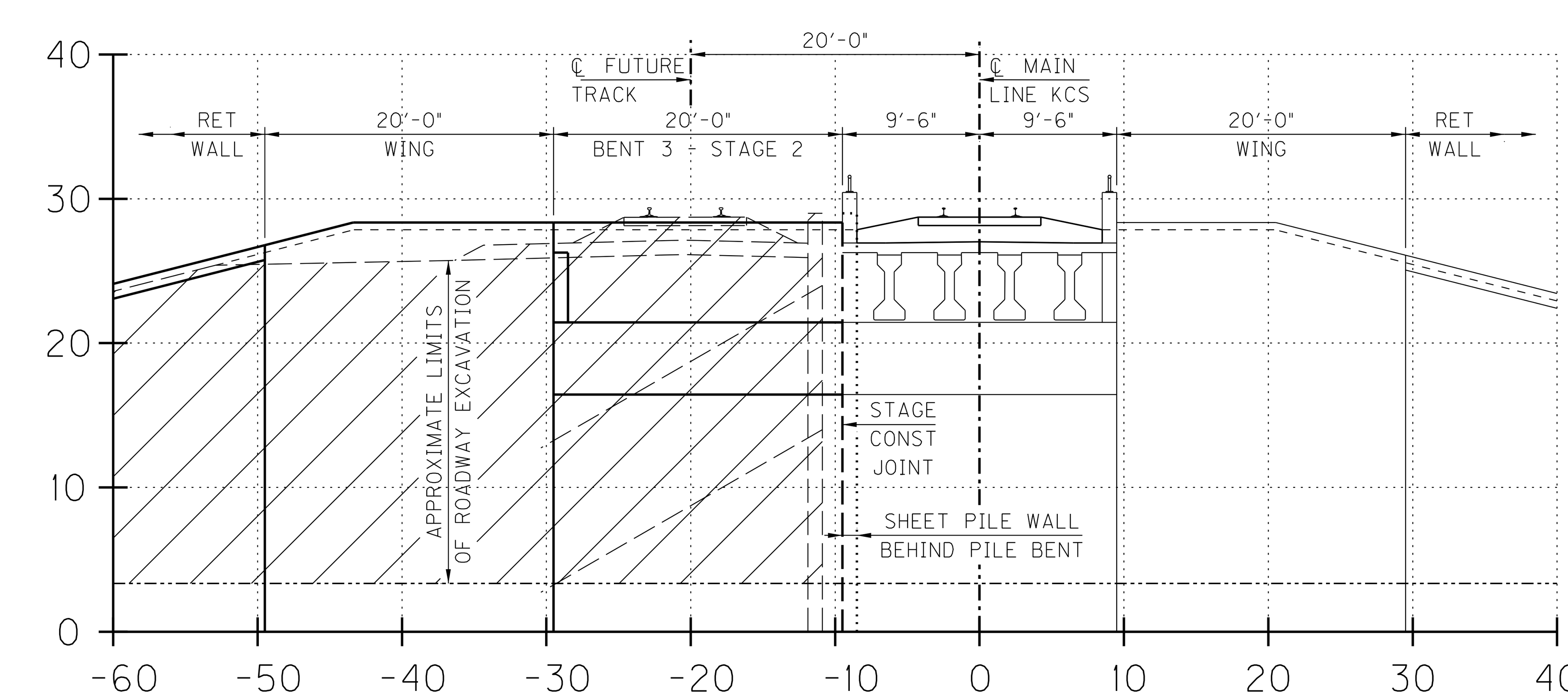
STAGE 2

1. INSTALL SOE AS REQUIRED TO RETAIN EMBANKMENT BEYOND BRIDGE ENDS.
2. SHIFT TRAIN TRAFFIC BACK TO ORIGINAL ALIGNMENT OVER THE NEW BRIDGE.
3. REMOVE SHOOFLY ALIGNMENT AND CONTINUE EXCAVATION (INCLUDING REMOVAL OF STAGE 1 SOE) TO REQUIRED LIMITS.
4. CONSTRUCT ABUTMENT, INCLUDING WINGS, AND PIER WIDENING TO ACCOMMODATE FUTURE SECOND TRACK. CONSTRUCT ROADWAY RETAINING WALLS ON NORTH SIDE OF RAILROAD ALIGNMENT.



STAGE 1 CONSTRUCTION

LOOKING AHEAD - AT STATION 12256+44 +/- KCS MAIN LINE TRACK
SHOWING BENT 3



STAGE 2 CONSTRUCTION

LOOKING AHEAD - AT STATION 12256+44 +/- KCS MAIN LINE TRACK
SHOWING BENT 3

FILE NAME: \\US1515-F01\DATA\PROJECTS\2018024\11 PICARDY-PERKINS CONNECTOR\ENGINEERING\PRELIMINARY DESIGN\BRIDGE\2 SPAN STB OVERBUILD SHEET E28.DGN

USER: alformer
DATE PLOTTED: June 16, 2014

SHEET NUMBER	E28
PARISH	EAST BATON ROUGE
CITY	BATON ROUGE
PROJECT	12-CS-HC-0043
DESIGNED	CAH
CHECKED	JTP
DETAILED	ALF
CHECKED	CAH
DATE	JUNE 2014
SHEET	3 OF 3

NO.	DATE	REVISION DESCRIPTION	BY

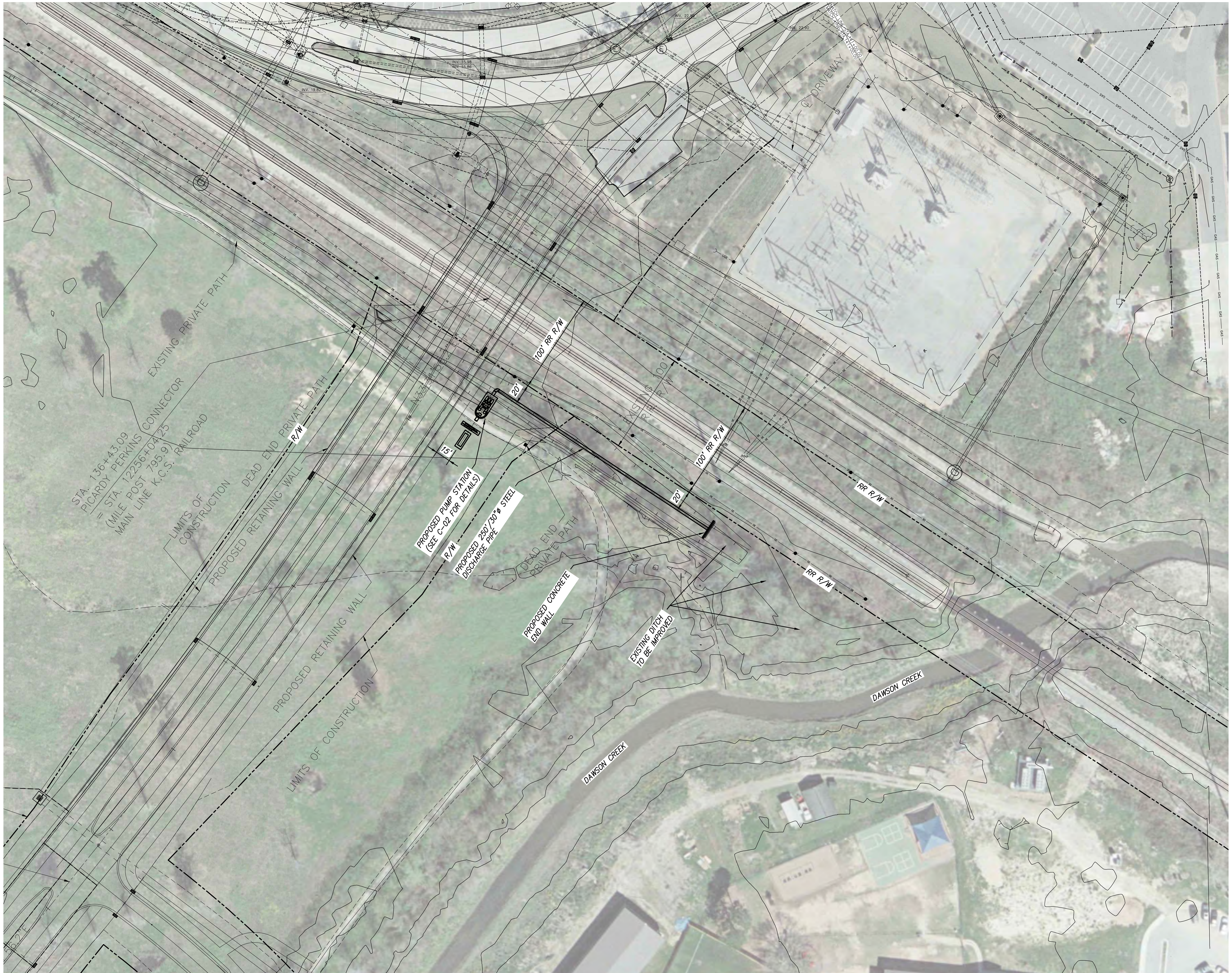
THE GREEN LIGHT PLAN
BUILDING BETTER ROADS FOR EAST BATON ROUGE PARISH

KCSRR BRIDGE STUDY
SKEWED SHOOFLY ALIGNMENT
TWO SPAN SINGLE TRACK ALTERNATE

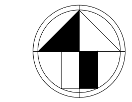
PICARDY - PERKINS CONNECTOR

CITY OF BATON ROUGE ★ PARISH OF EAST BATON ROUGE

Stantec



PUMP STATION PLAN



Scale: 1" = 50'
(Reduced Scale: 1" = 100')

0 25 50 100

EDWARD J. DVORAK, PE, CCS, F.ASCE
PROFESSIONAL ENGINEER NO. 38366
STATE OF LOUISIANA

SHEET NUMBER	E29
PARISH	EAST BATON ROUGE
CITY	BATON ROUGE
PROJECT	12-CS-HC-0043
DESIGNED	EJD
CHECKED	TCA
DETAILED	ELR
CHECKED	EJD
DATE	JUNE 2014
SHEET	1 OF 2

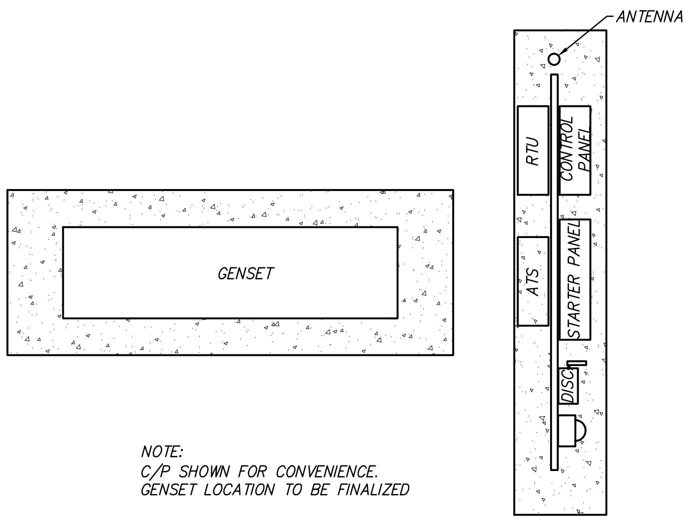
NO.	DATE	REVISION DESCRIPTION	BY

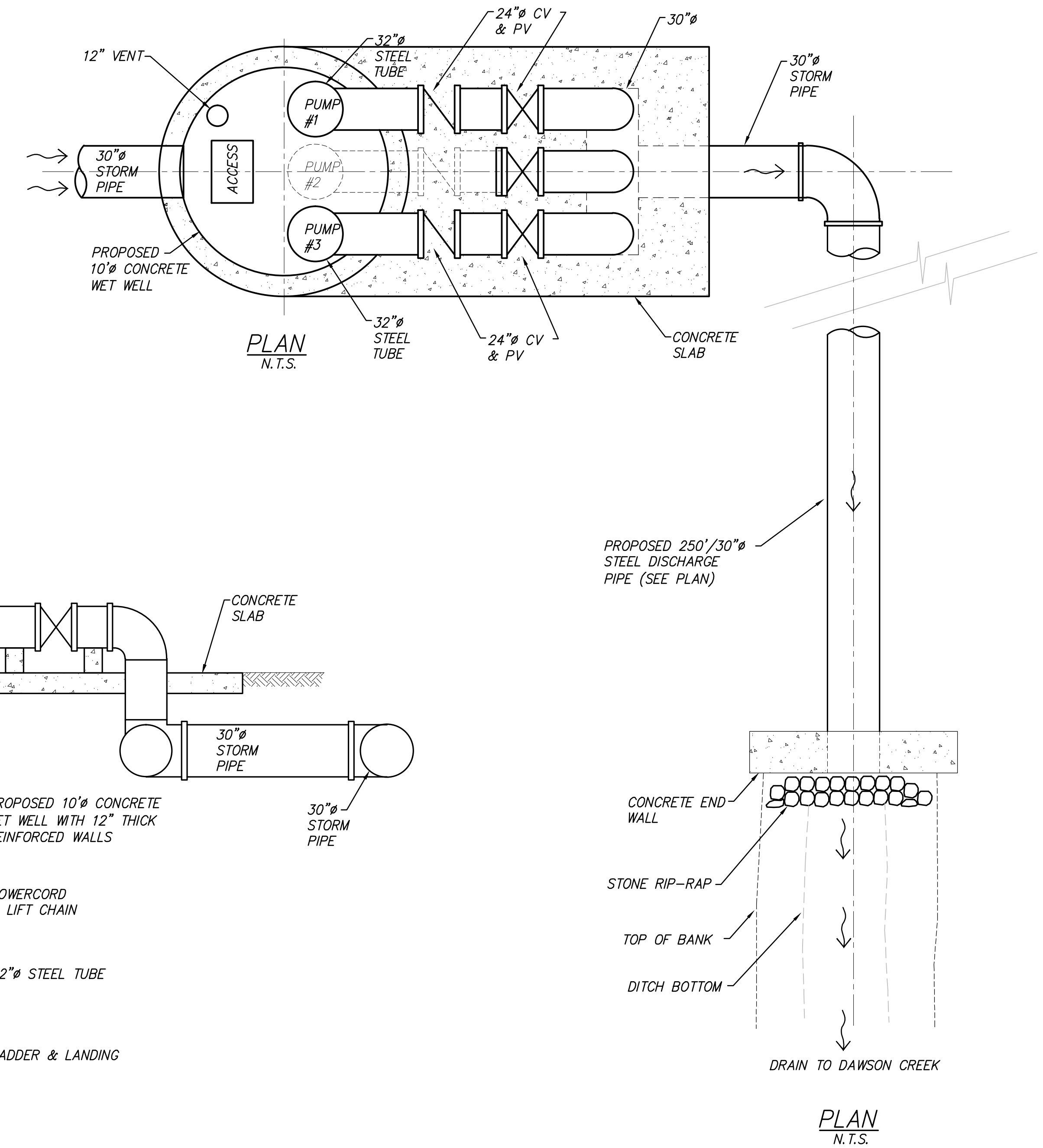
PICARDY – PERKINS CONNECTOR

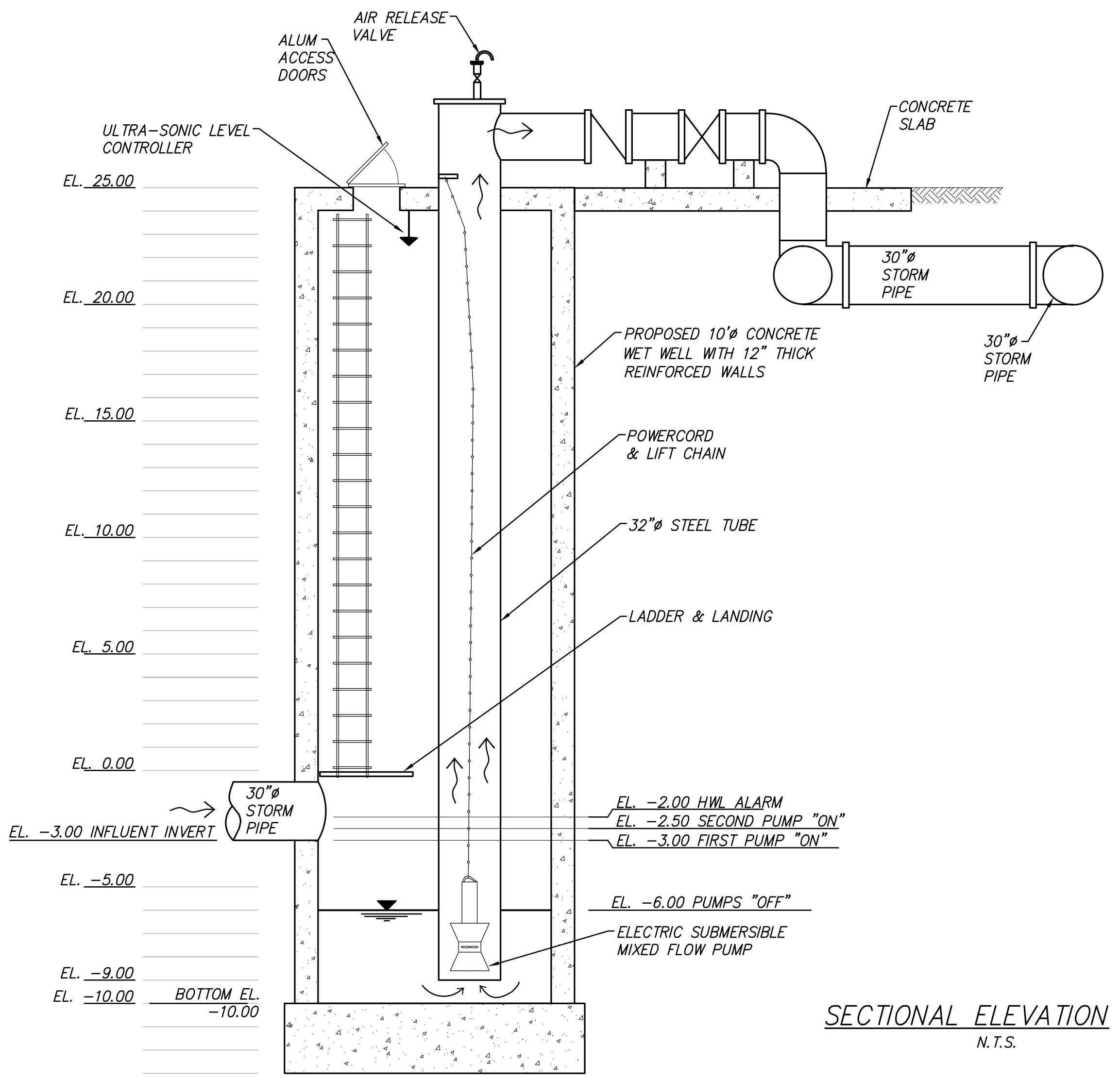
PUMP STATION PLAN

Stantec

V:\1773\active\1773-20180241\dwg\E29.dwg
2014/06/16 3:47 PM By: Robaina, Eduardo







SECTIONAL ELEVATION
N.T.S.

DATA TABLE

SUBMERSIBLE ELECTRIC MOTOR HORSEPOWER	150 HP
MOTOR SPEED	850 RPM
NUMBER OF PUMPS	2
PUMP MODEL NUMBER	MWI CORP. MF 24-5700B
PUMP TYPE	MIXED FLOW
INTAKE DIAMETER	32 INCH
IMPELLER DIAMETER SIZE	19.9 INCH
PRIMARY PUMP CAPACITY	10,000 GPM
TOTAL HEAD @ PRIMARY CONDITION	37.5 FEET
PUMP BOWL EFFICIENCY @ PRIMARY CONDITION	83 %
SPECIFIC SPEED	5700

EDWARD J. DVORAK, PE, CCS, F.ASCE
PROFESSIONAL ENGINEER NO. 38366
STATE OF LOUISIANA

SHEET NUMBER E30

PARISH: EAST BATON ROUGE
CITY: BATON ROUGE
PROJECT: 12-CS-HC-0043

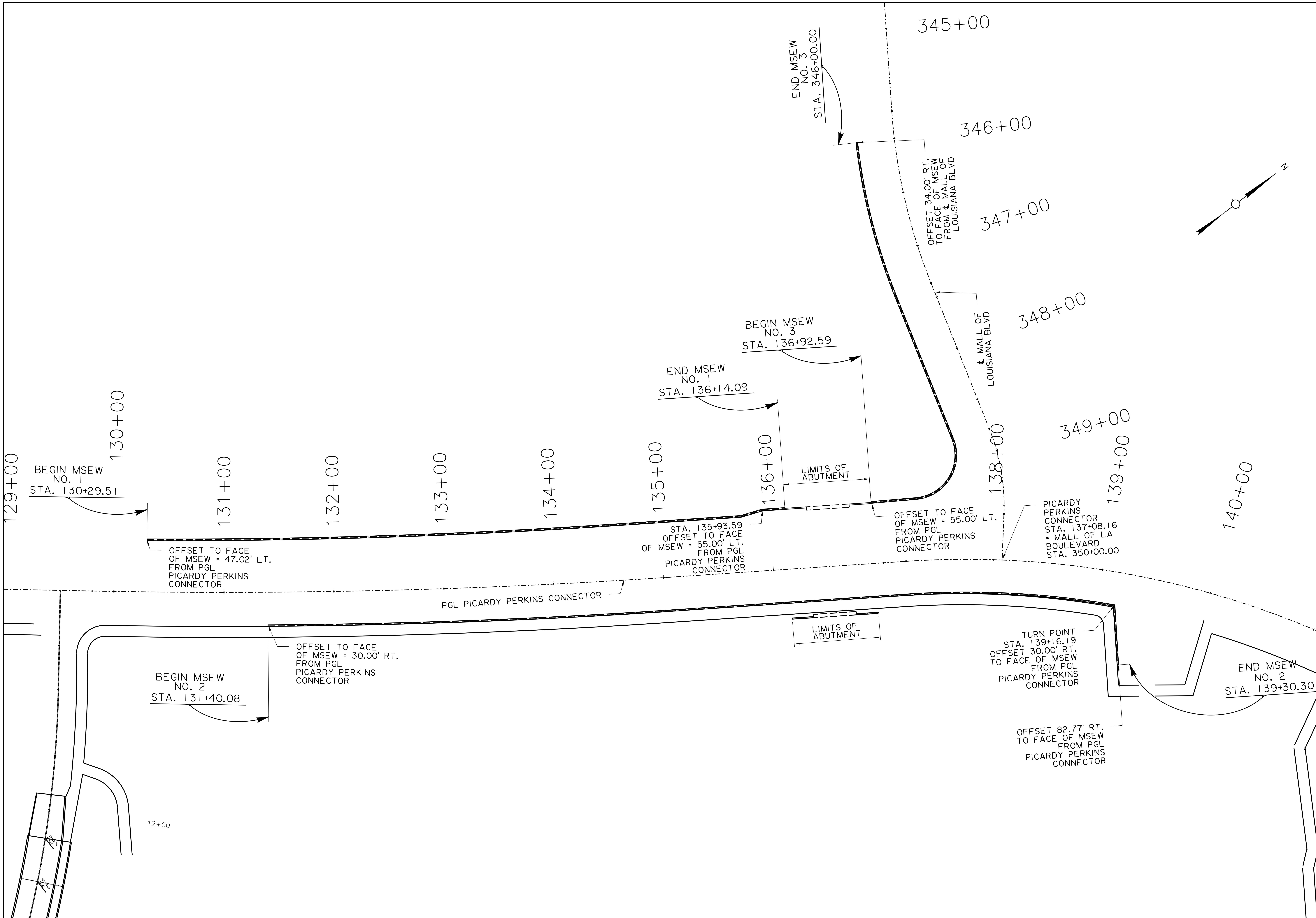
DESIGNED: EJD
CHECKED: TCA
DETAILED: ELR
CHECKED: EJD
DATE: JUNE 2014
SHEET: 2 OF 2

NO.	DATE	REVISION DESCRIPTION	BY

PICARDY – PERKINS CONNECTOR
PUMP STATION DETAILS

Stantec

2014/06/16 3:48 PM By: Rebollo, Eduardo



SHEET NUMBER E31

PARISH EAST BATON ROUGE

CITY BATON ROUGE

PROJECT 12-CS-HC-0043

DESIGNED JAP
CHECKED AS

DETAILED JAP
CHECKED AS

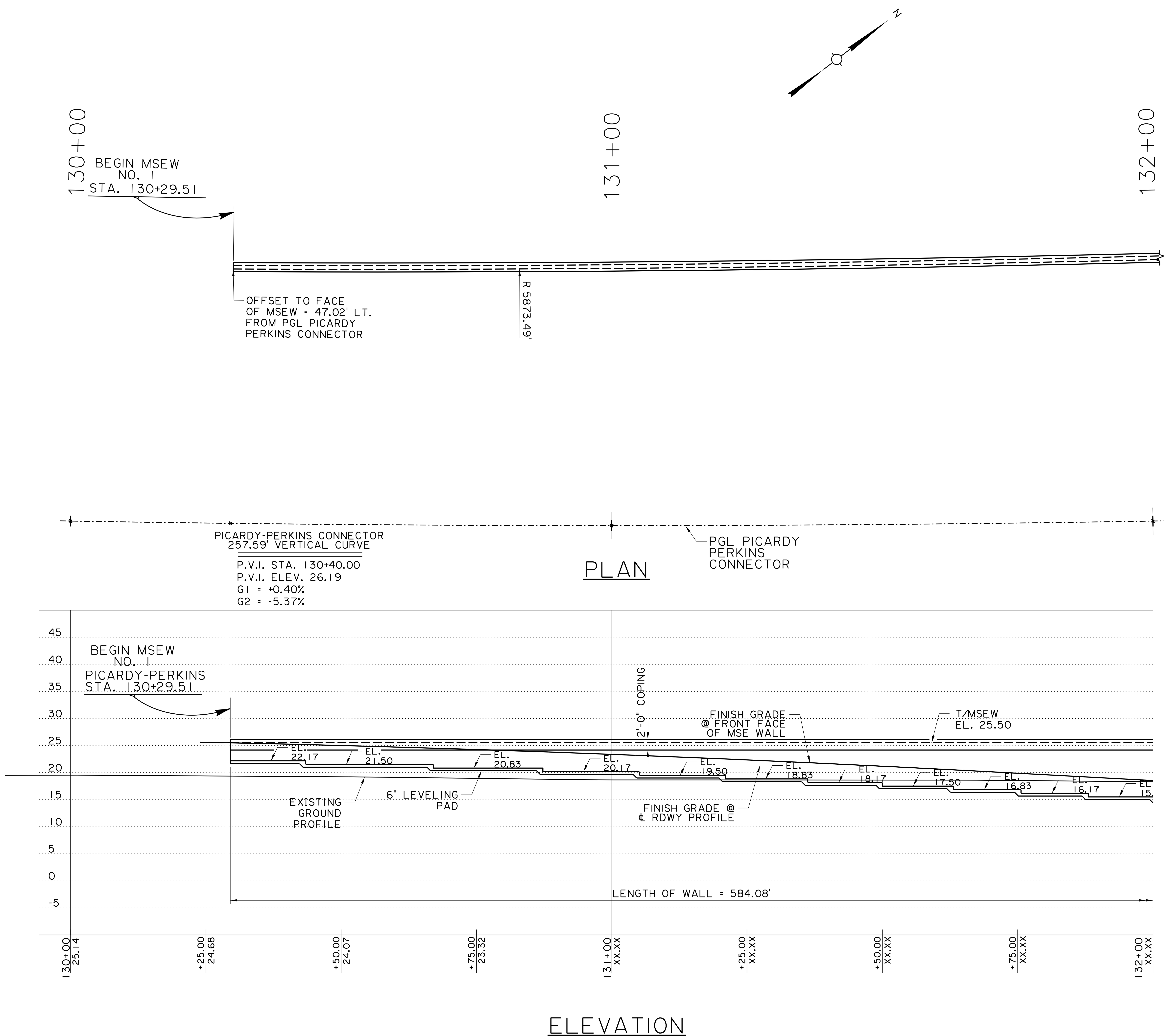
DATE JUNE 2014
SHEET 1 OF 12

NO.	DATE	REVISION DESCRIPTION	BY

SITE PLAN

PICARDY – PERKINS DESIGN STUDY

Stantec



SHEET NUMBER E32

PARISH EAST BATON ROUGE
CITY BATON ROUGE
PROJECT 12-CS-HC-0043

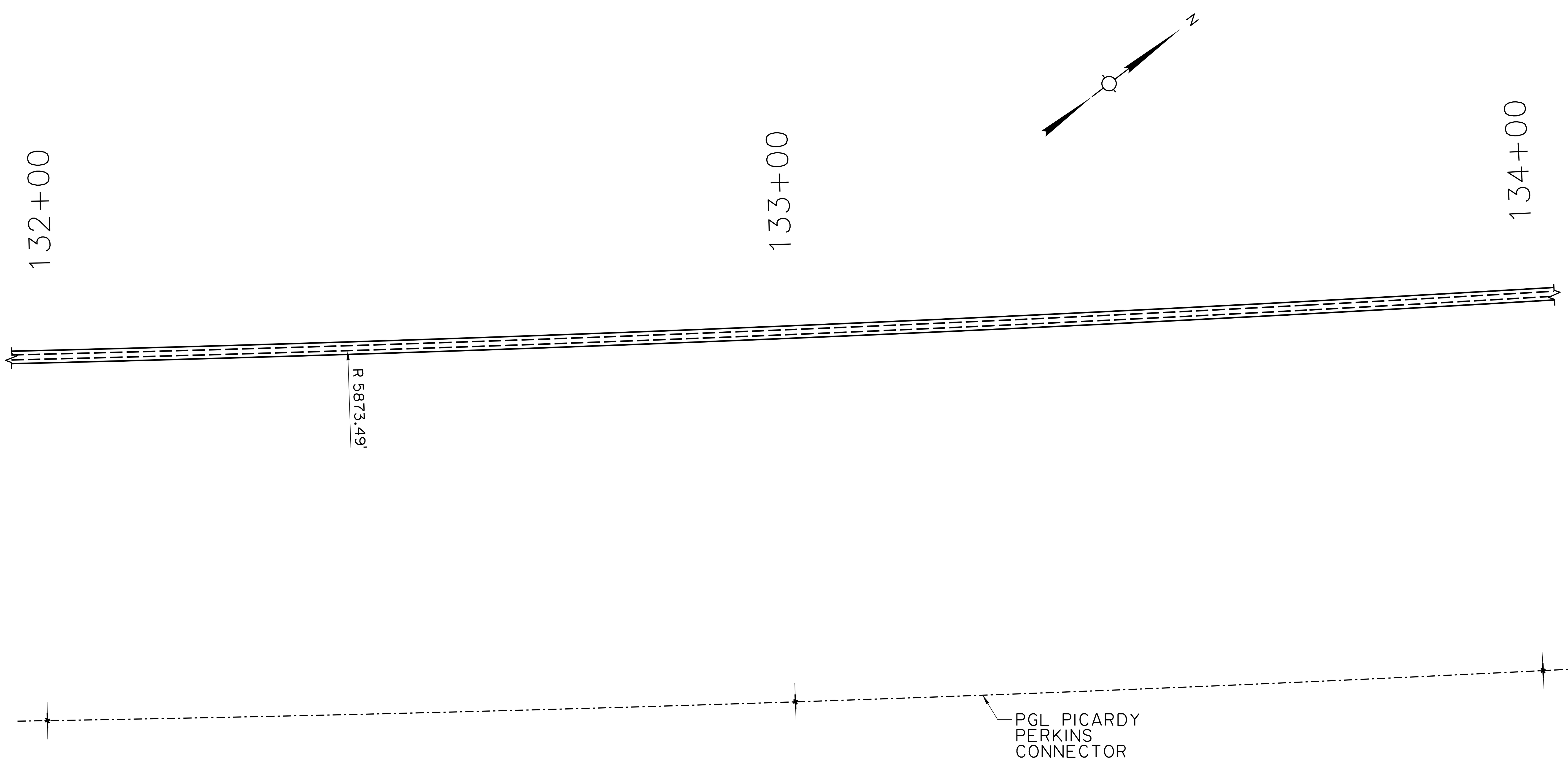
DESIGNED JAP
CHECKED AS
DETAILED JAP
CHECKED AS
DATE JUNE 2014
SHEET 2 OF 12

NO.	DATE	REVISION DESCRIPTION	BY

PLAN AND ELEVATION
MSE WALL NO. 1

PICARDY – PERKINS DESIGN STUDY

Stantec



PLAN

ELEVATION

SHEET NUMBER E33

PARISH: EAST BATON ROUGE
CITY: BATON ROUGE
PROJECT: 12-CS-HC-0043

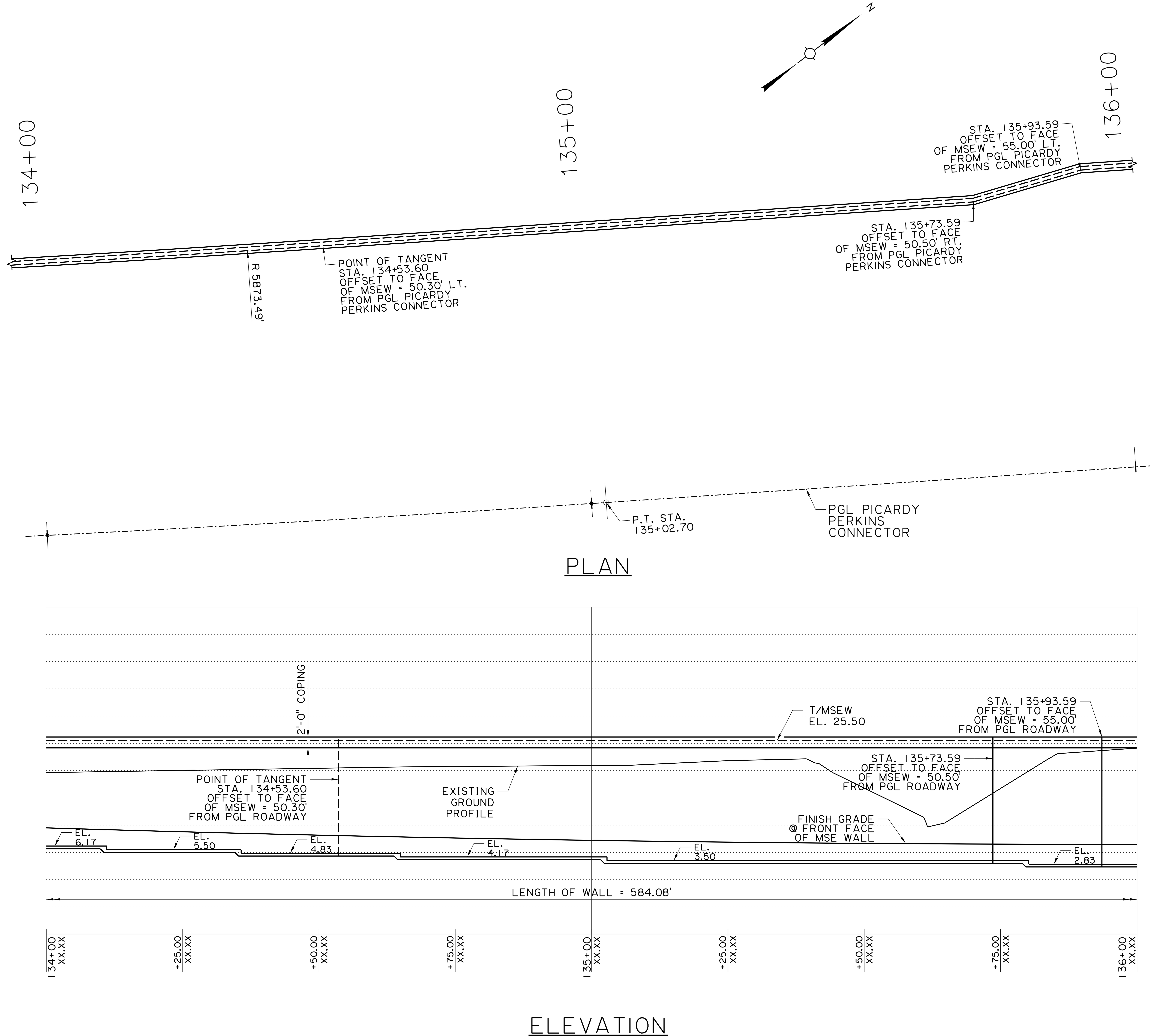
DESIGNED: JAP
CHECKED: AS
DETAILED: JAP
CHECKED: AS
DATE: JUNE 2014
SHEET: 3 OF 12

NO.	DATE	REVISION DESCRIPTION	BY

PLAN AND ELEVATION
MSE WALL NO. 1

PICARDY – PERKINS DESIGN STUDY

Stantec



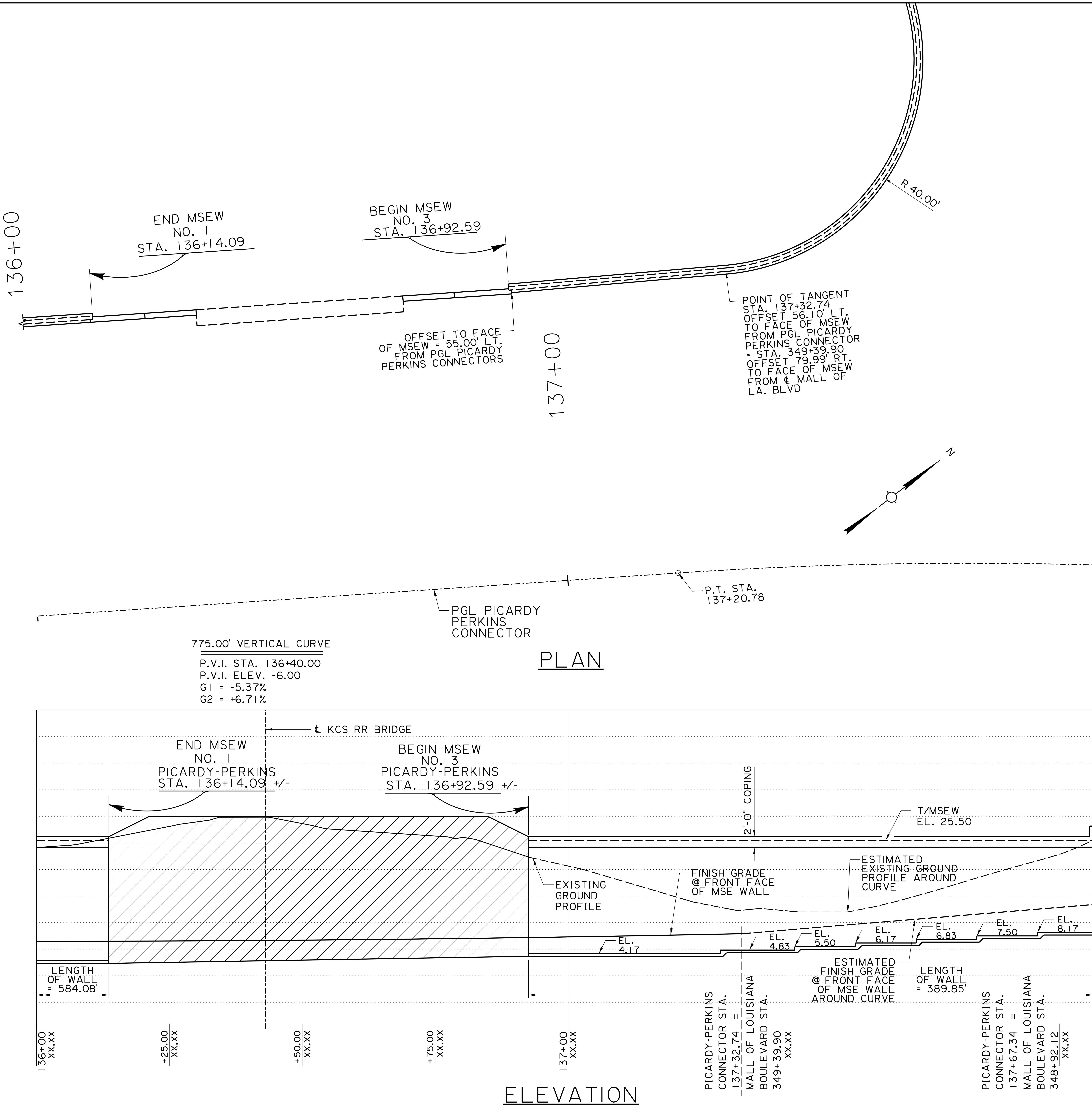
SHEET NUMBER	E34
PARISH	EAST BATON ROUGE
CITY	BATON ROUGE
PROJECT	12-CS-HC-0043
DESIGNED	JAP
CHECKED	AS
DETAILED	JAP
CHECKED	AS
DATE	JUNE 2014
SHEET	4 OF 12

NO.	DATE	REVISION DESCRIPTION	BY

PLAN AND ELEVATION
MSE WALL NO. 1

PICARDY – PERKINS DESIGN STUDY

Stantec



SHEET NUMBER E35

PARISH EAST BATON ROUGE
CITY BATON ROUGE
PROJECT 12-CS-HC-0043

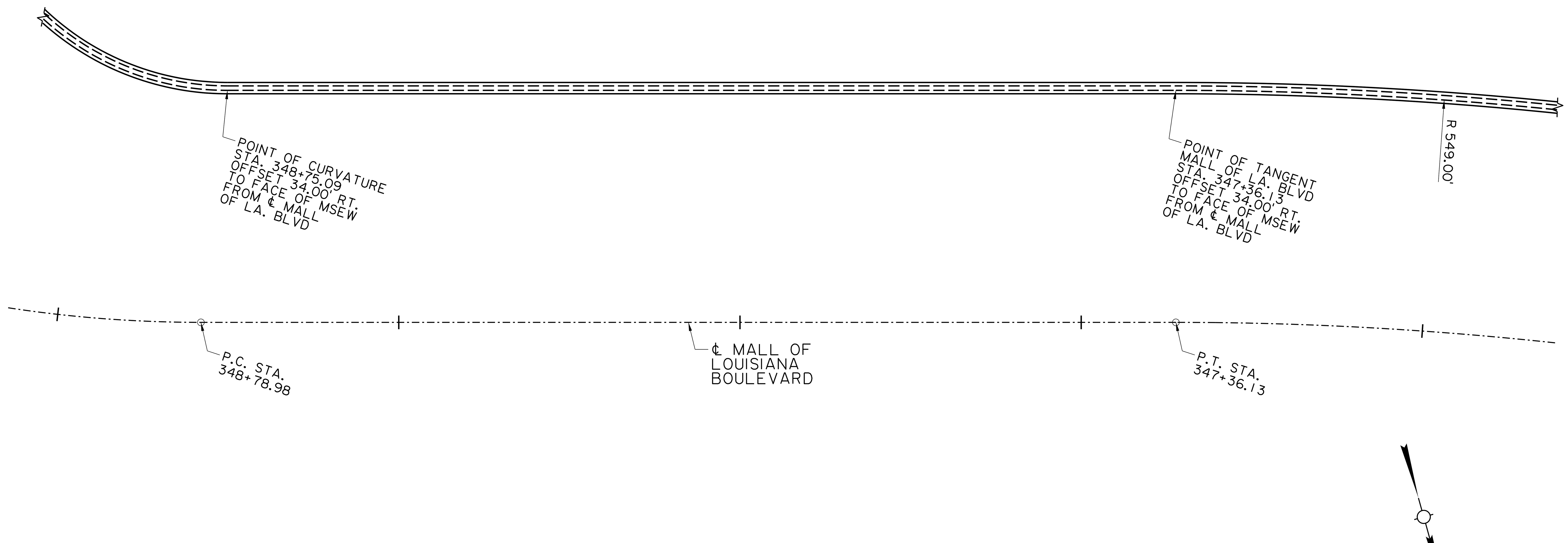
DESIGNED JAP
CHECKED AS
DETAILED JAP
CHECKED AS
DATE JUNE 2014
SHEET 5 OF 12

NO.	DATE	REVISION DESCRIPTION	BY

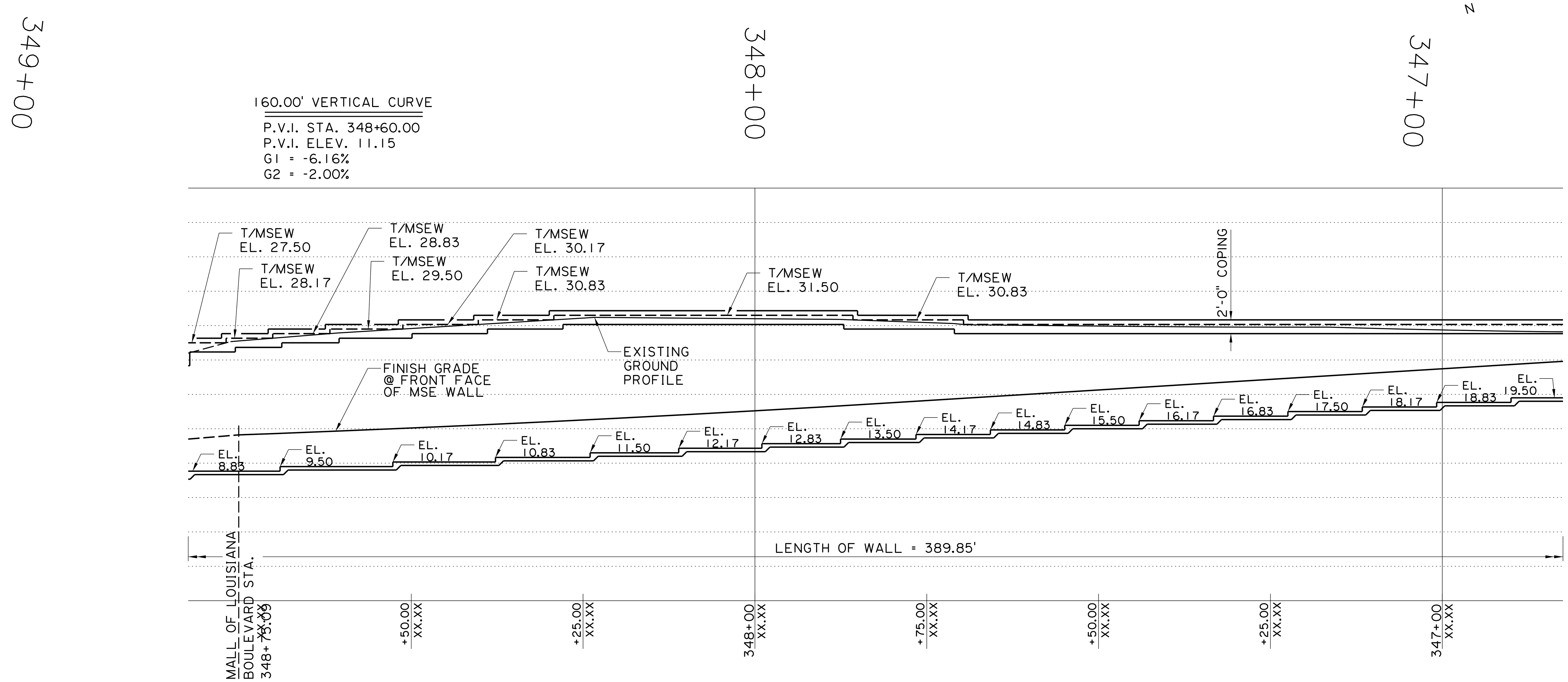
PLAN AND ELEVATION
MSE WALL NO. 1 & 3

PICARDY – PERKINS DESIGN STUDY

Stantec



PLAN



ELEVATION

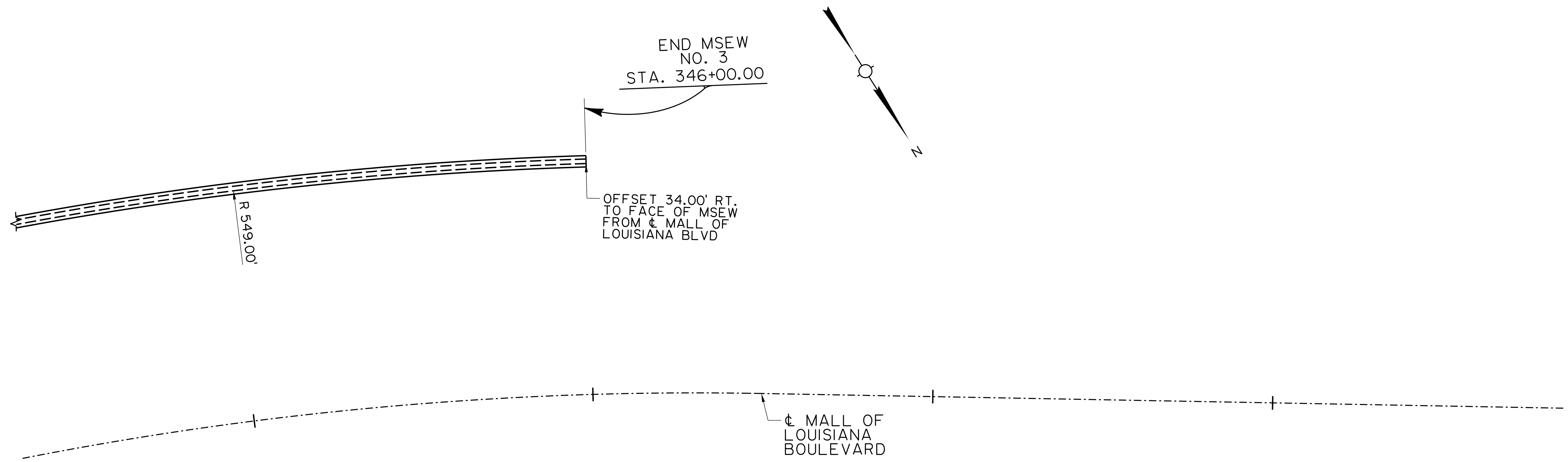
SHEET NUMBER	E36
PARISH	EAST BATON ROUGE
CITY	BATON ROUGE
PROJECT	12-CS-HC-0043
DESIGNED	JAP
CHECKED	AS
DETAILED	JAP
CHECKED	AS
DATE	JUNE 2014
SHEET	6 OF 12

NO.	DATE	REVISION DESCRIPTION	BY

PLAN AND ELEVATION
MSE WALL NO. 3

PICARDY – PERKINS DESIGN STUDY

Stantec



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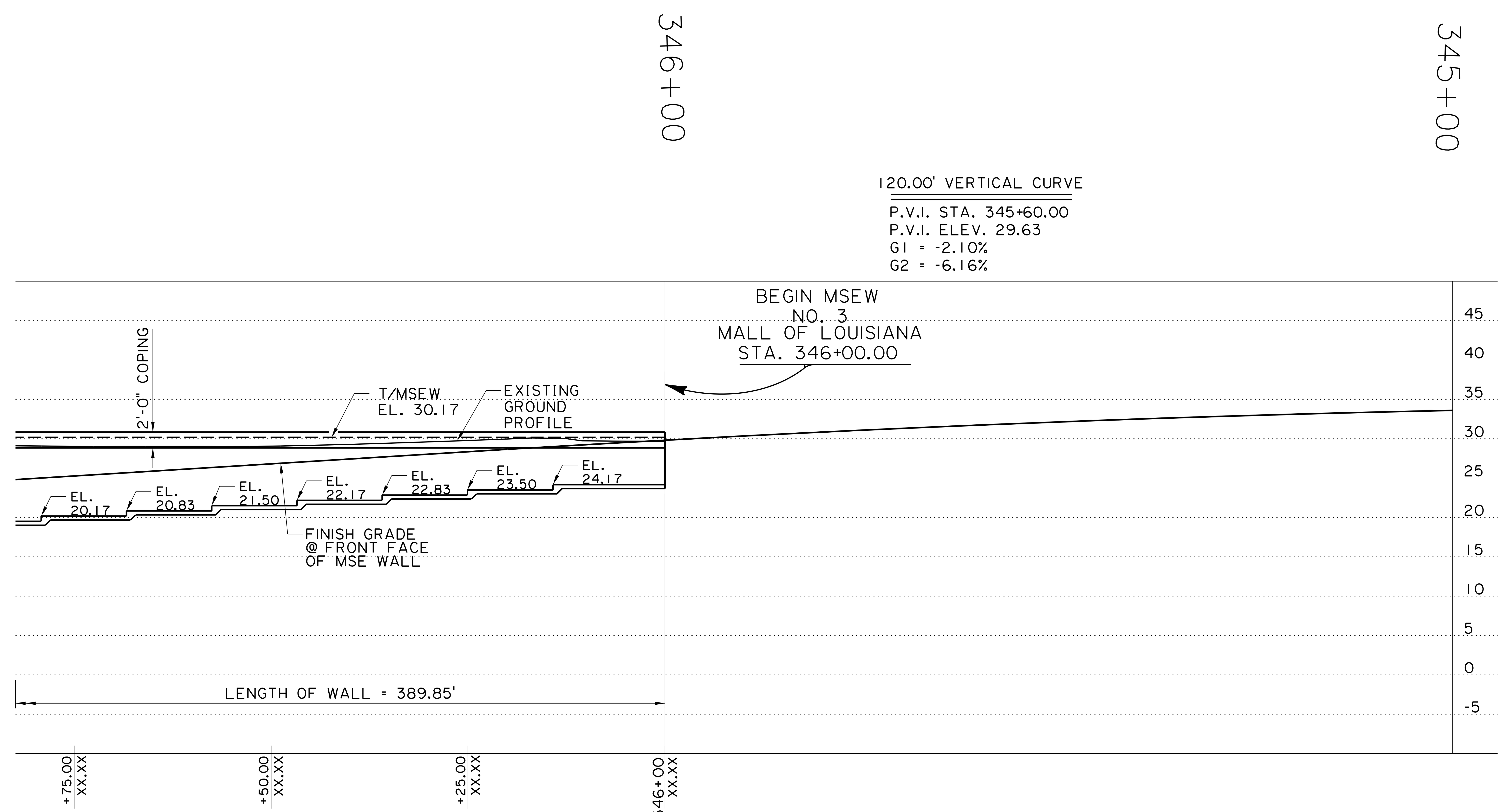


ELEVATION

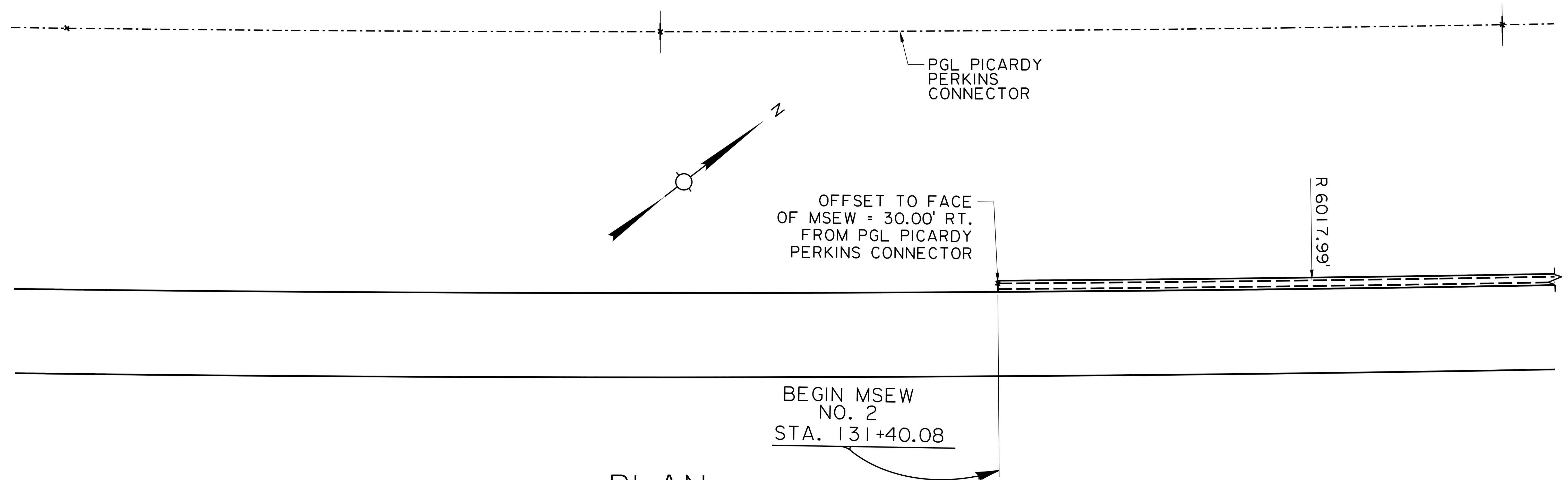
SHEET NUMBER	E37
PARISH	EAST BATON ROUGE
CITY	BATON ROUGE
PROJECT	12-CS-HC-0043
DESIGNED / CHECKED	JAP / AS
DETAILED / CHECKED	JAP / AS
DATE	JUNE 2014
SHEET	7 OF 12

NO.	DATE	REVISION DESCRIPTION	BY

PLAN AND ELEVATION
MSE WALL NO. 3

PICARDY – PERKINS DESIGN STUDY

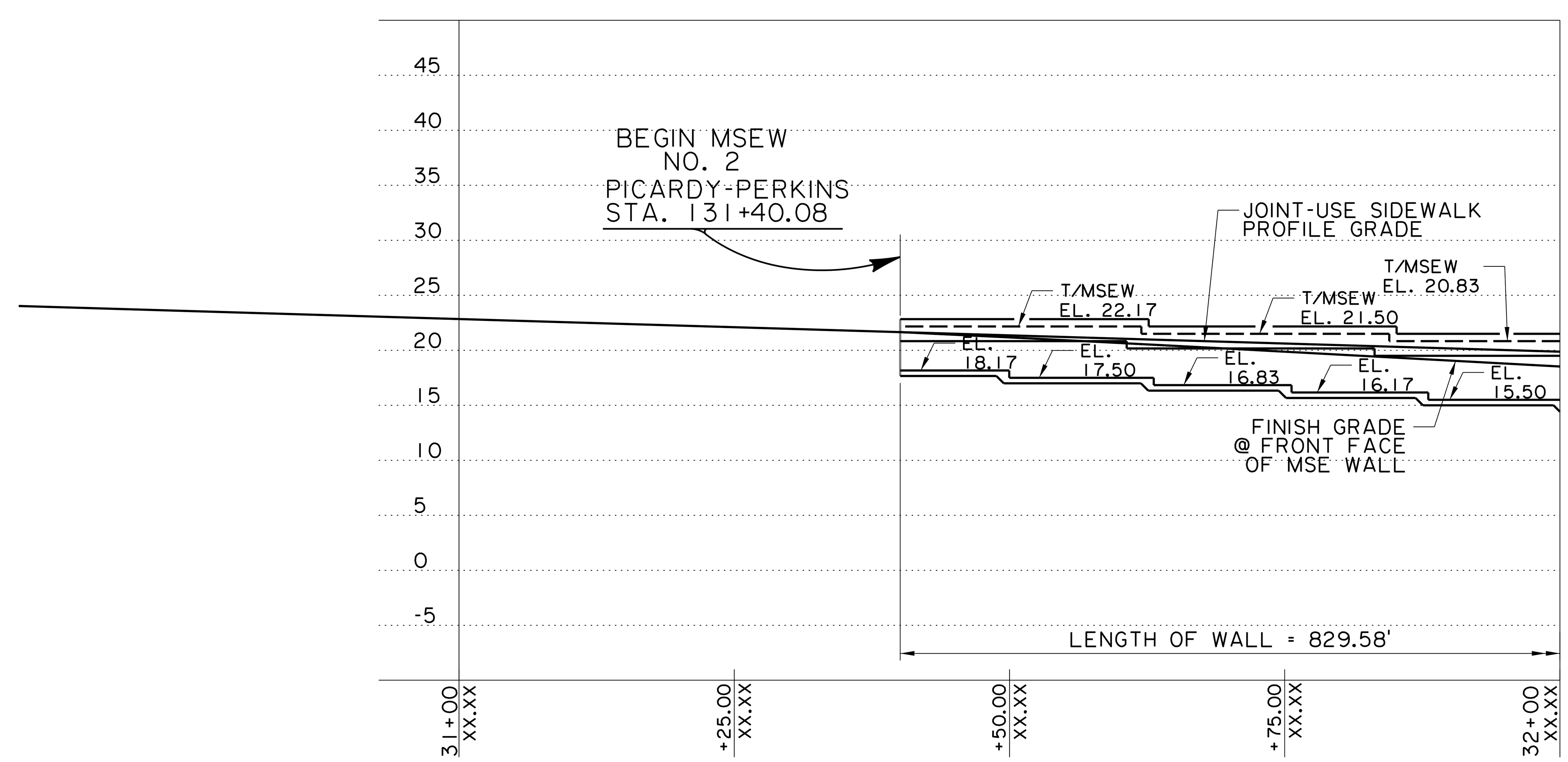
Stantec



PLAN

PICARDY-PERKINS CONNECTOR
257.59' VERTICAL CURVE

P.V.I. STA. 130+40.00
P.V.I. ELEV. 26.19
G1 = +0.40%
G2 = -5.37%



ELEVATION

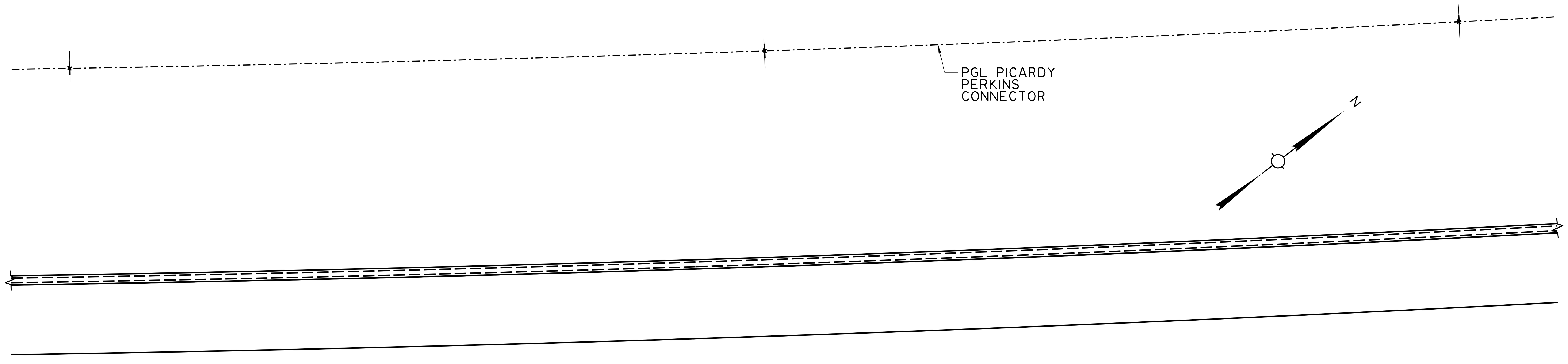
SHEET NUMBER	E38
PARISH	EAST BATON ROUGE
CITY	BATON ROUGE
PROJECT	12-CS-HC-0043
DESIGNED	JAP
CHECKED	AS
DETAILED	JAP
CHECKED	AS
DATE	JUNE 2014
SHEET	8 OF 12

NO.	DATE	REVISION DESCRIPTION	BY

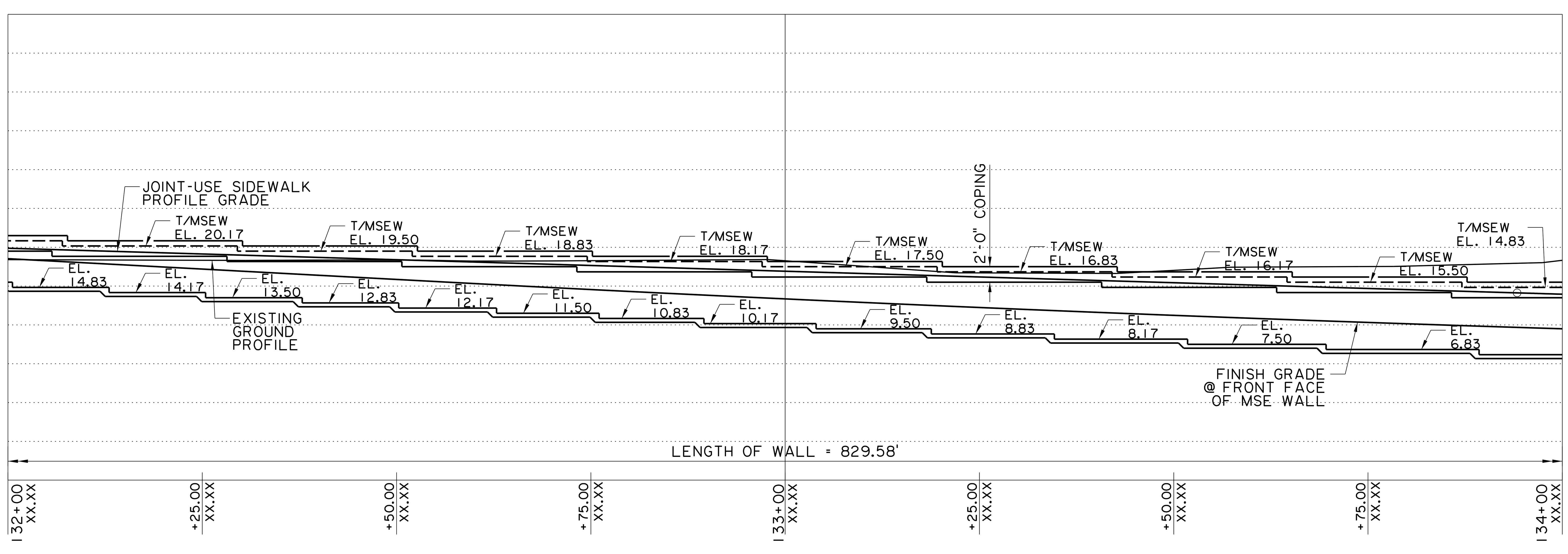
PLAN AND ELEVATION
MSE WALL NO. 2

PICARDY – PERKINS DESIGN STUDY

Stantec



PLAN



ELEVATION

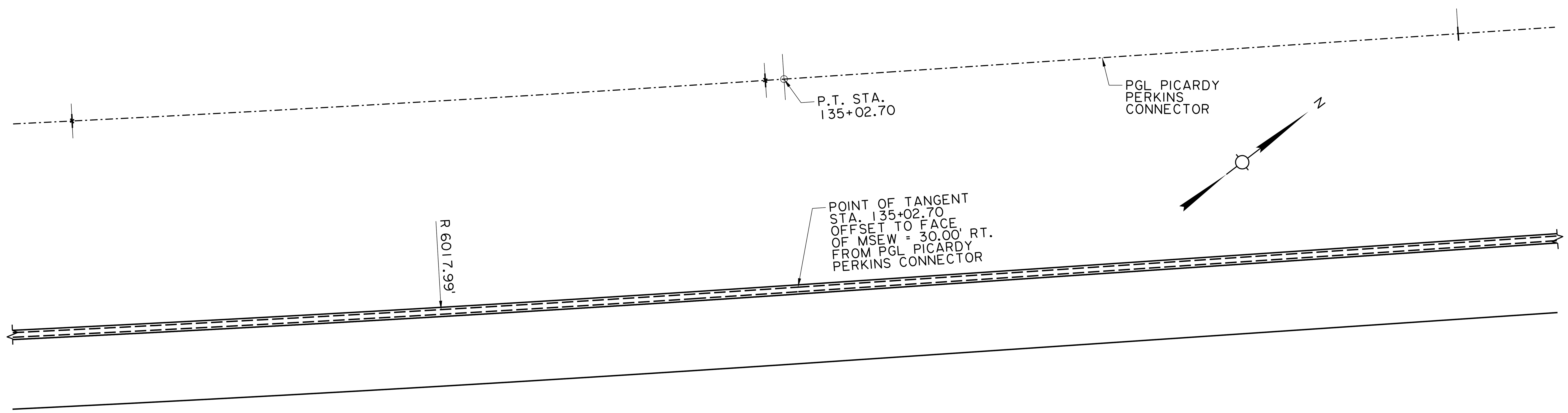
SHEET NUMBER	E39
PARISH	EAST BATON ROUGE
CITY	BATON ROUGE
PROJECT	12-CS-HC-0043
DESIGNED	JAP
CHECKED	AS
DETAILED	JAP
CHECKED	AS
DATE	JUNE 2014
SHEET	9 OF 12

NO.	DATE	REVISION DESCRIPTION	BY

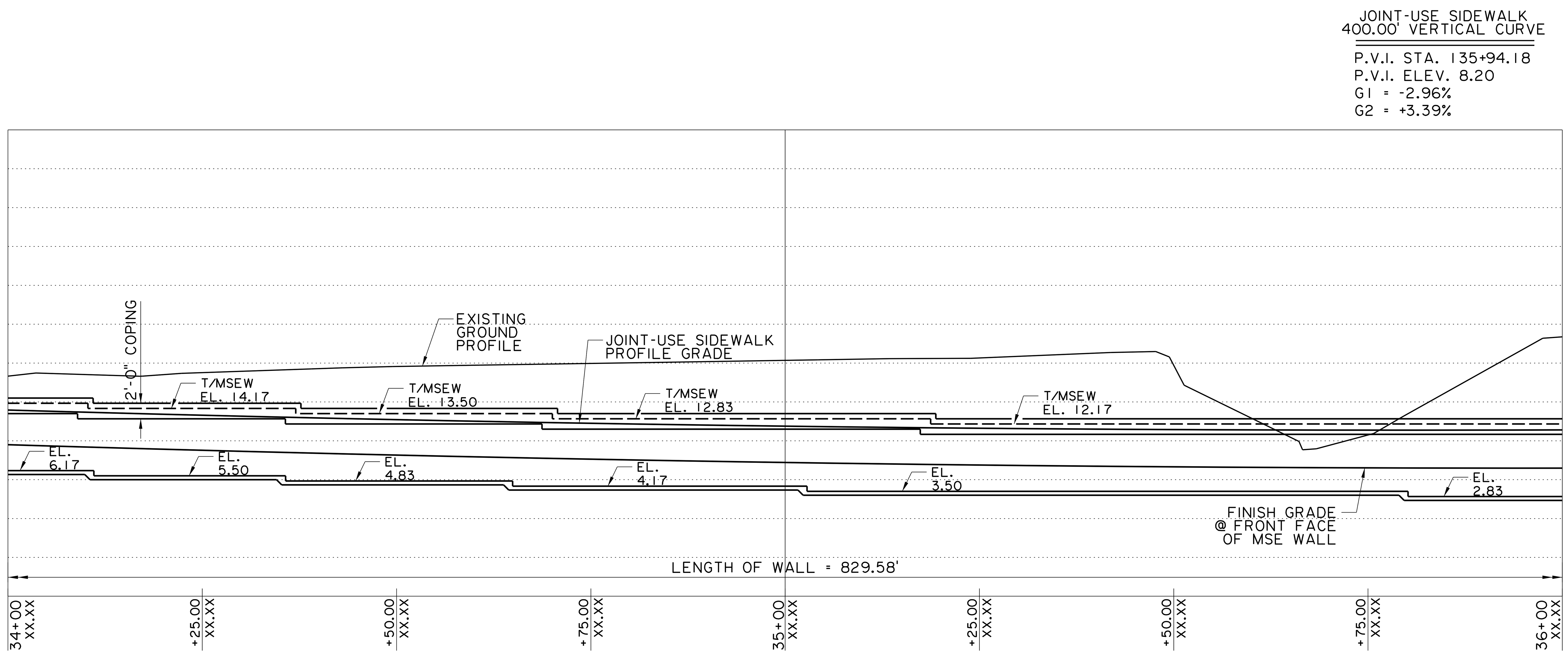
PLAN AND ELEVATION
MSE WALL NO. 2

PICARDY – PERKINS DESIGN STUDY

Stantec



PLAN



ELEVATION

SHEET NUMBER E40

PARISH EAST BATON ROUGE
CITY BATON ROUGE
PROJECT 12-CS-HC-0043

DESIGNED JAP
CHECKED AS
DETAILED JAP
CHECKED AS
DATE JUNE 2014
SHEET 10 OF 12

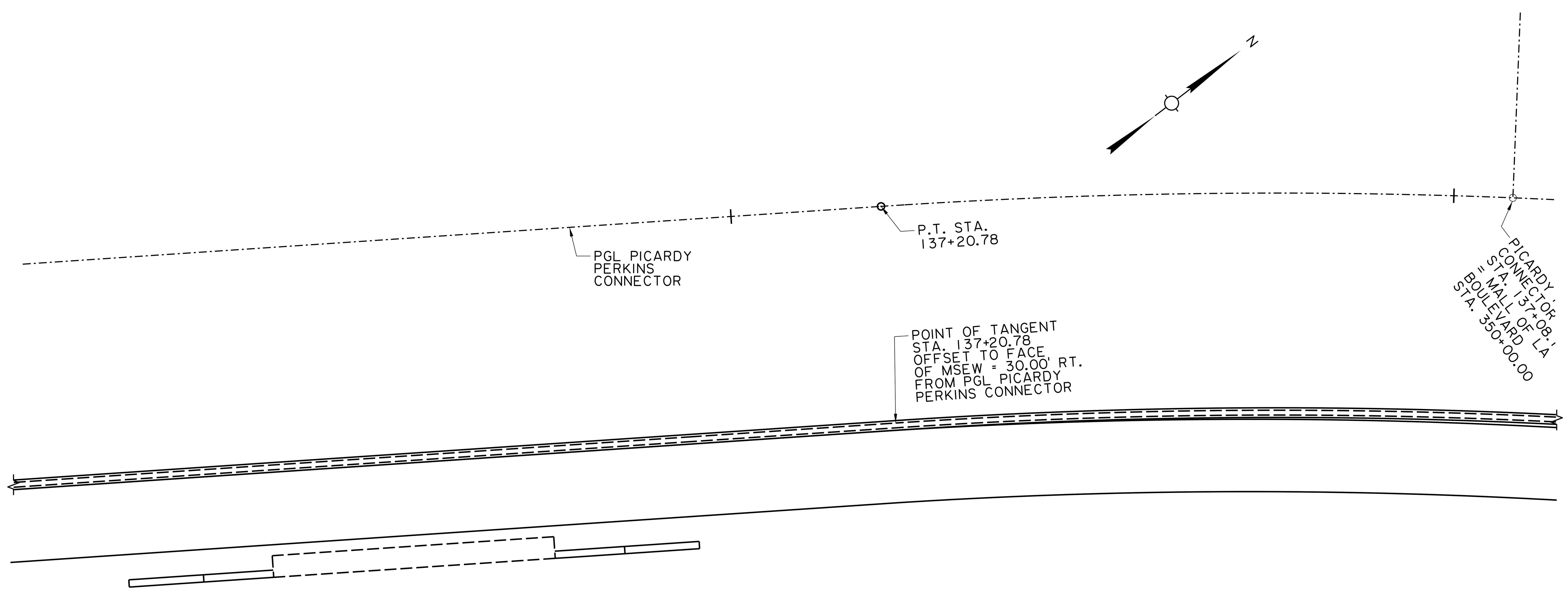
NO.	DATE	REVISION DESCRIPTION	BY

PLAN AND ELEVATION
MSE WALL NO. 2

PICARDY – PERKINS DESIGN STUDY

Stantec

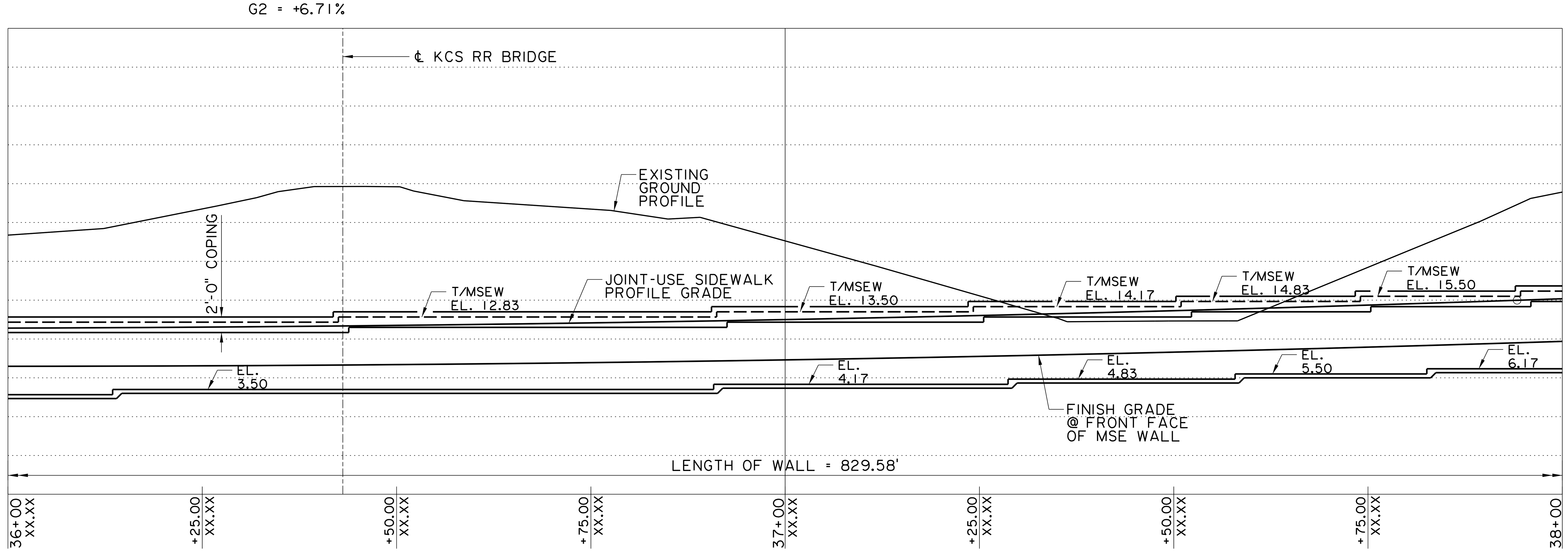
SHEET NUMBER E41



PICARDY-PERKINS CONNECTOR
775.00' VERTICAL CURVE

P.V.I. STA. 136+40.00
P.V.I. ELEV. -6.00
G1 = -5.37%
G2 = +6.71%

PLAN



ELEVATION

PARISH: EAST BATON ROUGE
CITY: BATON ROUGE
PROJECT: 12-CS-HC-0043

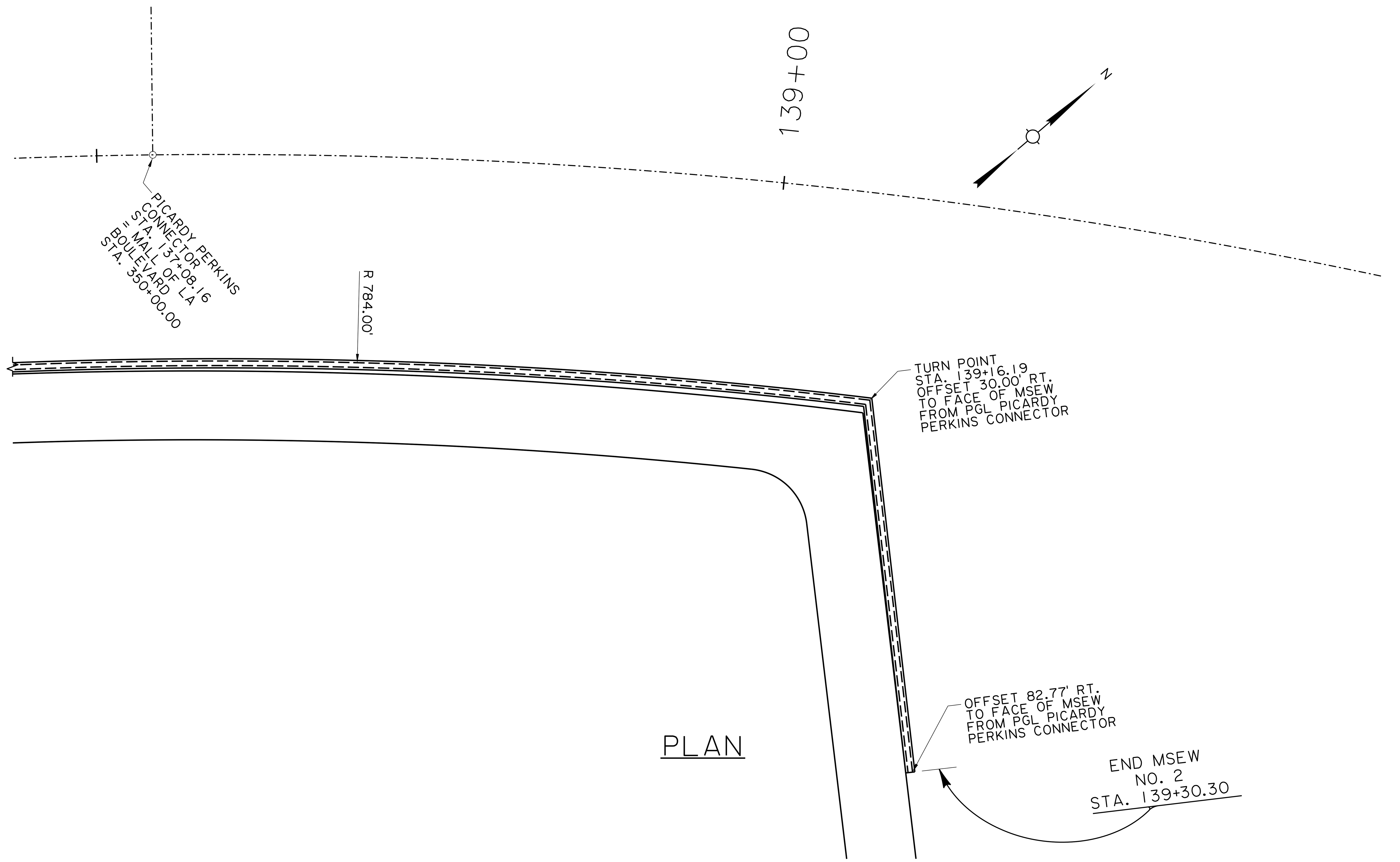
DESIGNED: JAP
CHECKED: AS
DETAILED: JAP
CHECKED: AS
DATE: JUNE 2014
SHEET: 11 OF 12

NO.	DATE	REVISION DESCRIPTION	BY

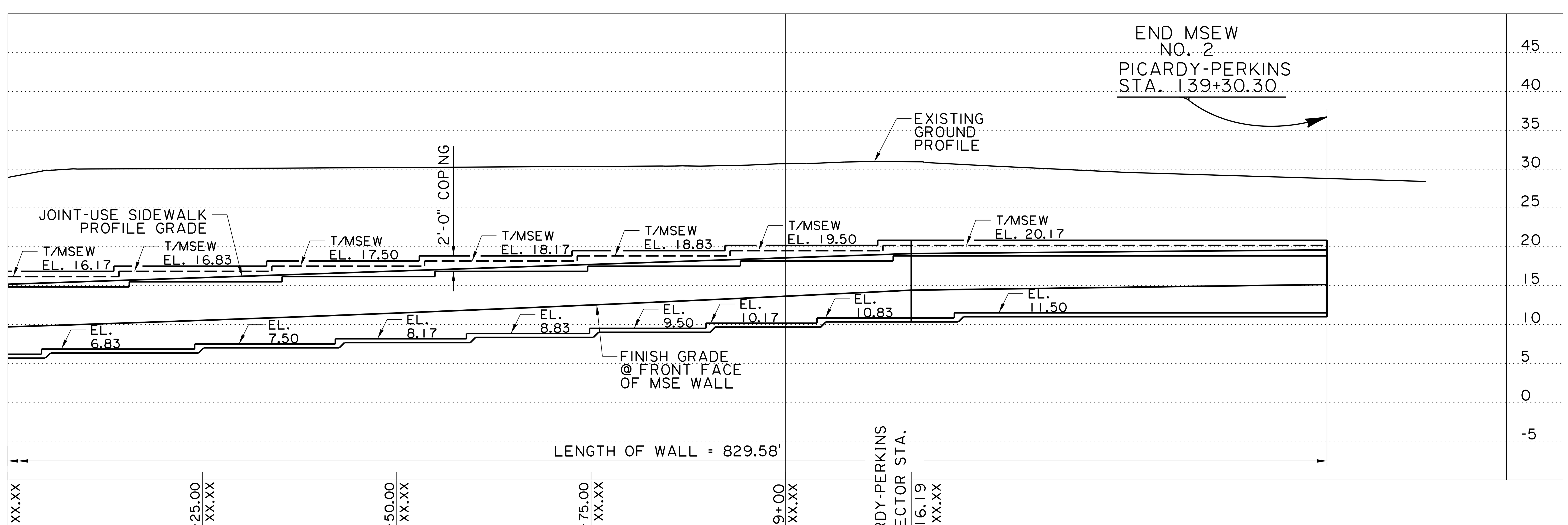
PLAN AND ELEVATION
MSE WALL NO. 2

PICARDY – PERKINS DESIGN STUDY

Stantec



PLAN



ELEVATION

SHEET NUMBER E42

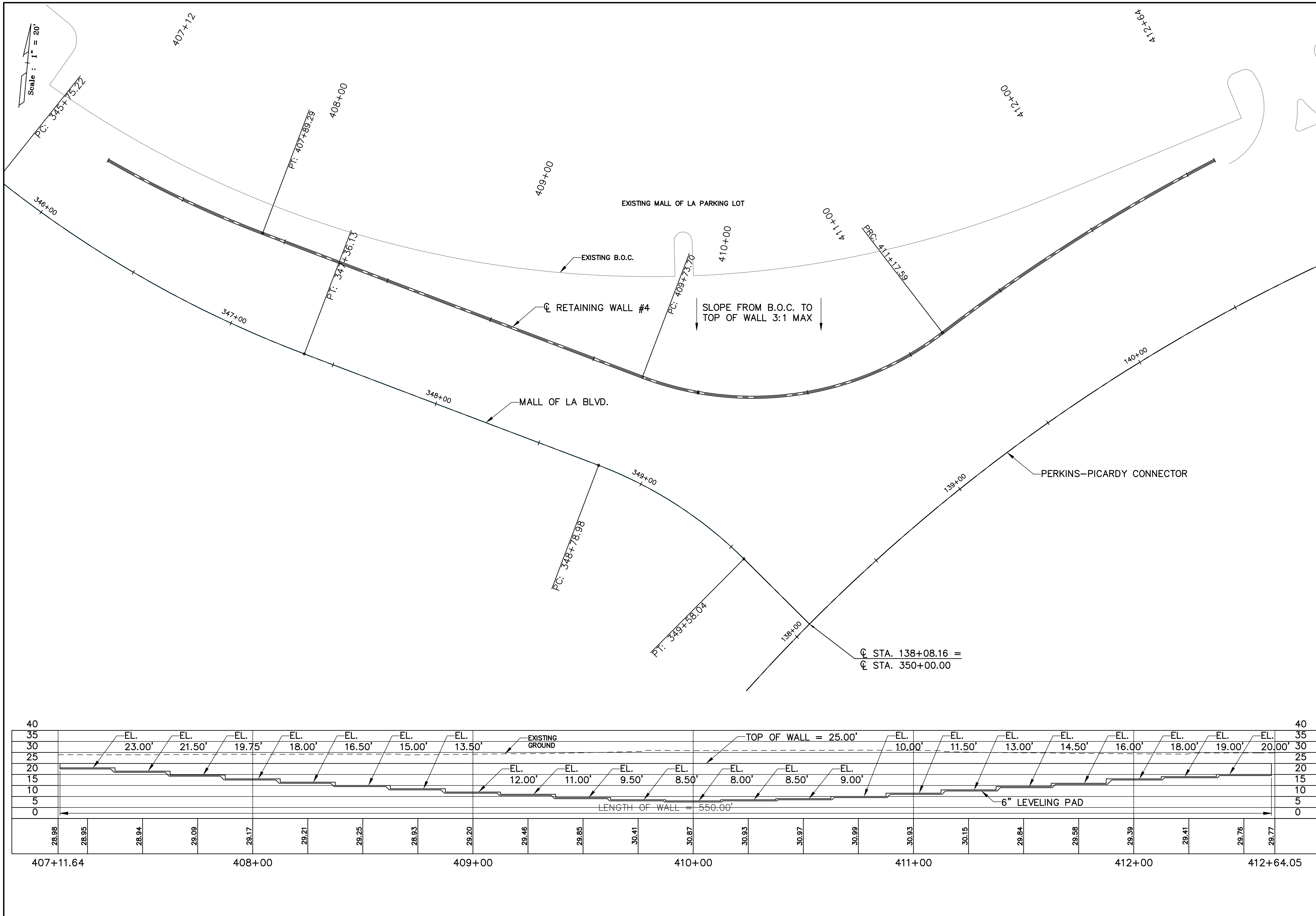
PARISH	EAST BATON ROUGE
CITY	BATON ROUGE
PROJECT	12-CS-HC-0043
DESIGNED	JAP
CHECKED	AS
DETAILED	JAP
CHECKED	AS
DATE	JUNE 2014
SHEET	12 OF 12

NO.	DATE	REVISION DESCRIPTION	BY

PLAN AND ELEVATION MSE WALL NO. 2

PICARDY – PERKINS DESIGN STUDY

Stantec



F:\00_PROJECTS\12-500\Sheet_Sets\Design Study\12500wall.dwg [WALL] Jun 13, 2014 – 10:00am

SHEET NUMBER	E43
PARISH	EAST BATON ROUGE
CITY	BATON ROUGE
PROJECT	12-CS-HC-0043
DESIGNED	L.R.F.
CHECKED	G.G.M.
DETAILED	M.L.R.
CHECKED	L.R.F.
DATE	JUNE 2014
SHEET	

NO.	DATE	REVISION DESCRIPTION	BY

PICARDY – PERKINS CONNECTOR

MSE WALL

APPENDIX A

THE GREEN LIGHT PLAN

BUILDING BETTER ROADS FOR EAST BATON ROUGE PARISH

CSRS program management

In association with:

PBS&J

GOTECH, Inc.

Neel-Schaffer, Inc.

Compliance Consultants, Inc.

Jones Walker, LLP

John C. Doiron
MAI Appraisal Services

Rampart Resources

SSA Consultants, LLC

Project

Picardy-Perkins Connector (Perkins Road to Picardy Avenue)

Sheet Title

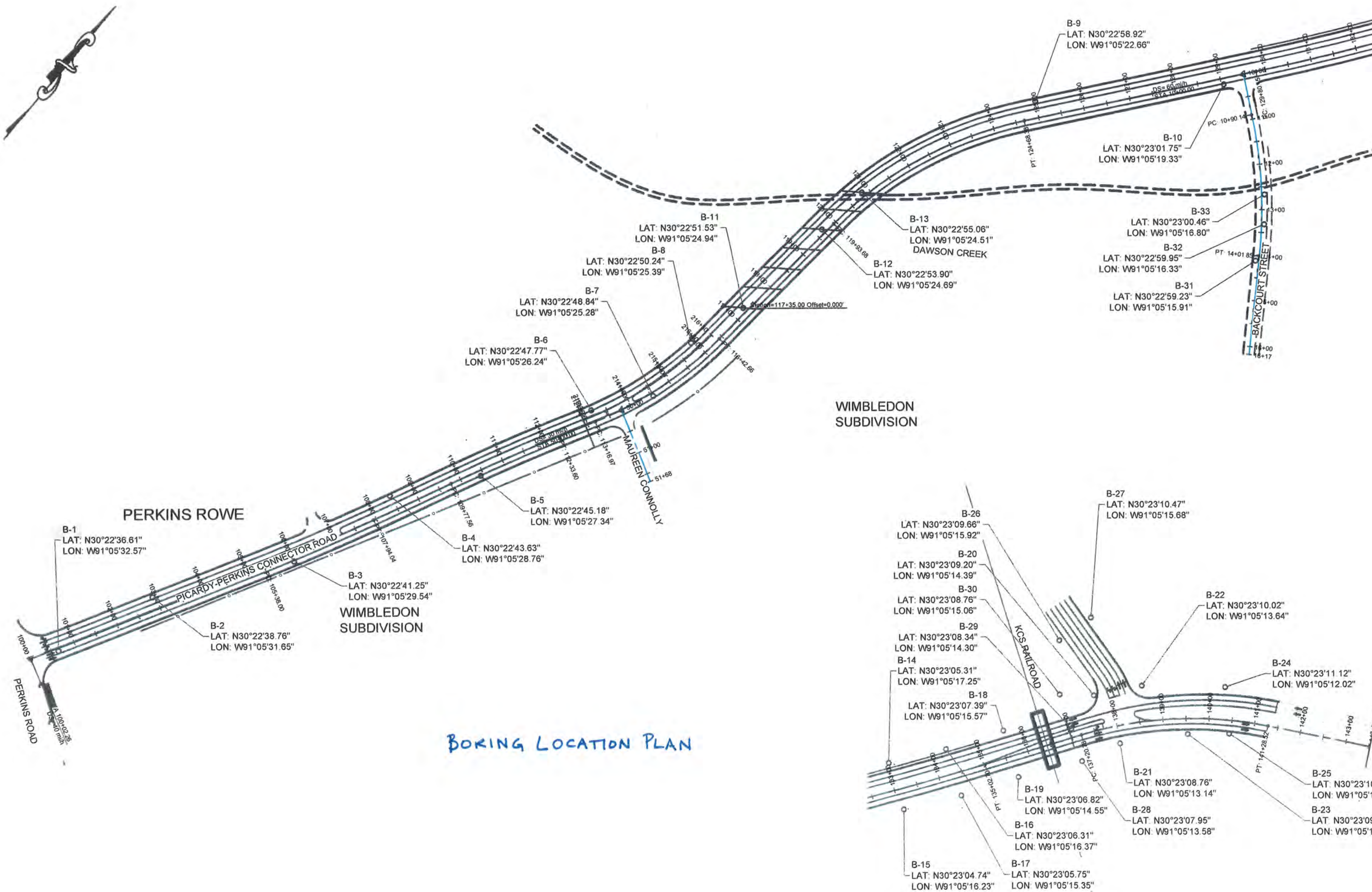
EXHIBIT C

Date	December 7, 2011
Project Number	25041.00
Drawn By	MMG
Checked By	HT

Sheet

II-135

APPENDIX B



BORING LOCATION PLAN

APPENDIX C

EAST BATON ROUGE PARISH

LEGEND:

REQUIRED STRIPING

CURRENT LANE ASSIGNMENT

PROPOSED LANE ASSIGNMENT

URBAN SYSTEMS Inc.
400 N Peters Street, Suite 206
New Orleans, Louisiana 70130
504.523.5511 504.523.5522 f

DESIGNED BY:	JMG
CHECKED BY:	ACM
DRAWN BY:	JMG
CHECKED BY:	ACM
APPROVED BY:	ACM
DATE:	JANUARY 2014

POTENTIAL IMPROVEMENTS
PICARDY PERKINS CONNECTOR
MALL OF LA BLVD AT MALL RING RD

FIGURE 7

PROJECT NO. 06-087-21

EAST BATON ROUGE PARISH

LEGEND:

← CURRENT LANE ASSIGNMENT

← PROPOSED LANE ASSIGNMENT

URBAN SYSTEMS Inc.
400 N Peters Street, Suite 206
New Orleans, Louisiana 70130
504.523.5511 504.523.5522 f

DESIGNED BY:	JMG
CHECKED BY:	ACM
DRAWN BY:	JMG
CHECKED BY:	ACM
APPROVED BY:	ACM
DATE:	JANUARY 2014

POTENTIAL IMPROVEMENTS
PICARDY PERKINS CONNECTOR
MALL OF LA BLVD AT MALL RING RD

FIGURE 8

PROJECT NO. 06-087-21

PRINTED Jan 20, 2014 - 6:25pm FILENAME U:\Projects\FNCPROJ\2006proj\06-08\PicardyPerkins 06 21\ACAD Dwgs\NewLane.dwg

APPENDIX D

DEPARTMENT OF THE ARMY
NEW ORLEANS DISTRICT, CORPS OF ENGINEERS
P.O. BOX 60267
NEW ORLEANS, LOUISIANA 70160-0267

REPLY TO
ATTENTION OF

OCT 0 2 2013

Operations Division
Surveillance and Enforcement Section

Mr. Sparky Hoffman
CSRS, Inc.
6767 Perkins Road, Suite 200
Baton Rouge, Louisiana 70808

Dear Mr. Hoffman:

Reference is made to your request, on behalf of Baton Rouge Public Works, for a U.S. Army Corps of Engineers' (Corps) jurisdictional determination on property located in Section 58, Township 7 South, Range 1 East, and Section 57, Township 8 South, Range 1 East, East Baton Rouge Parish, Louisiana (enclosed map). Specifically, this property is identified as the proposed location for the Picardy-Perkins Connector Project north of LA-427.

Based on review of recent maps, aerial photography, and soils data, we have determined that part of the property is wetland and may be subject to Corps' jurisdiction. The approximate limits of the wetland are designated in red on the map. A Department of the Army (DA) permit under Section 404 of the Clean Water Act will be required prior to the deposition or redistribution of dredged or fill material into wetlands that are waters of the United States. Additionally, a DA permit will be required if you propose to deposit dredged or fill material into other waters subject to Corps' jurisdiction. Other waters that may be subject to Corps' jurisdiction are indicated in blue on the map.

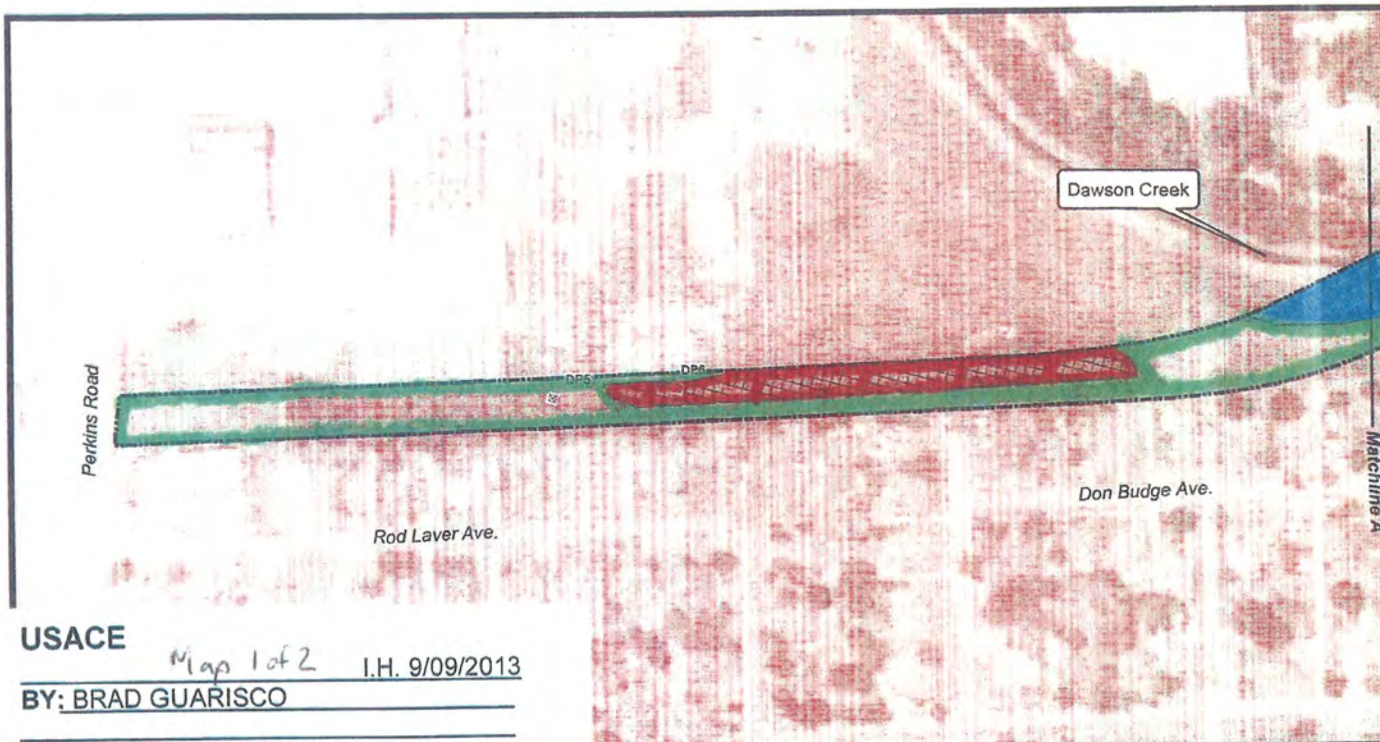
You and your client are advised that this preliminary jurisdictional determination is valid for a period of 5 years from the date of this letter unless new information warrants revision prior to the expiration date or the District Commander has identified, after public notice and comment, that specific geographic areas with rapidly changing environmental conditions merit re-verification on a more frequent basis.

Should there be any questions concerning these matters, please contact Mr. Brad Guarisco at (504) 862-2274 and reference our Account No. MVN-2013-01914-SB. If you have specific questions regarding the permit process or permit applications, please contact our Central Evaluation Section at (504) 862-2577. The New Orleans District Regulatory Branch is committed to providing quality and timely service to our customers. In an effort to improve customer service, please complete the survey on our web site at http://per2.nwp.usace.army.mil/survey.html.

Sincerely,

for Martin S. Mayer
Chief, Regulatory Branch

Enclosures



USACE

Map 1 of 2 I.H. 9/09/2013

BY: BRAD GUARISCO

FOR: HOFFMAN
(# MVN-2013-01914-SB)

=WETLAND (404)
=NON-WETLAND
=WATERS OF THE U.S. (404)

1.) Background is 2010 USDA NAIP Imagery for East Baton Rouge Parish, LA.
2.) Project Area created utilizing revised concept plan drawing dated 12/7/11 provided by GOTECH, Inc.
3.) Dawson Creek crossing location based on GOTECH, Inc. conceptual sketch.

0 50 100 200 300 400 500
Feet

THE GREEN LIGHT PLAN PROJECT
BATON ROUGE, LOUISIANA
PICARDY-PERKINS CONNECTOR

WETLANDS MAP
SHEET 1 OF 2

EAST BATON ROUGE PARISH

C-K ASSOCIATES, LLC
ENVIRONMENTAL & ENGINEERING CONSULTANTS

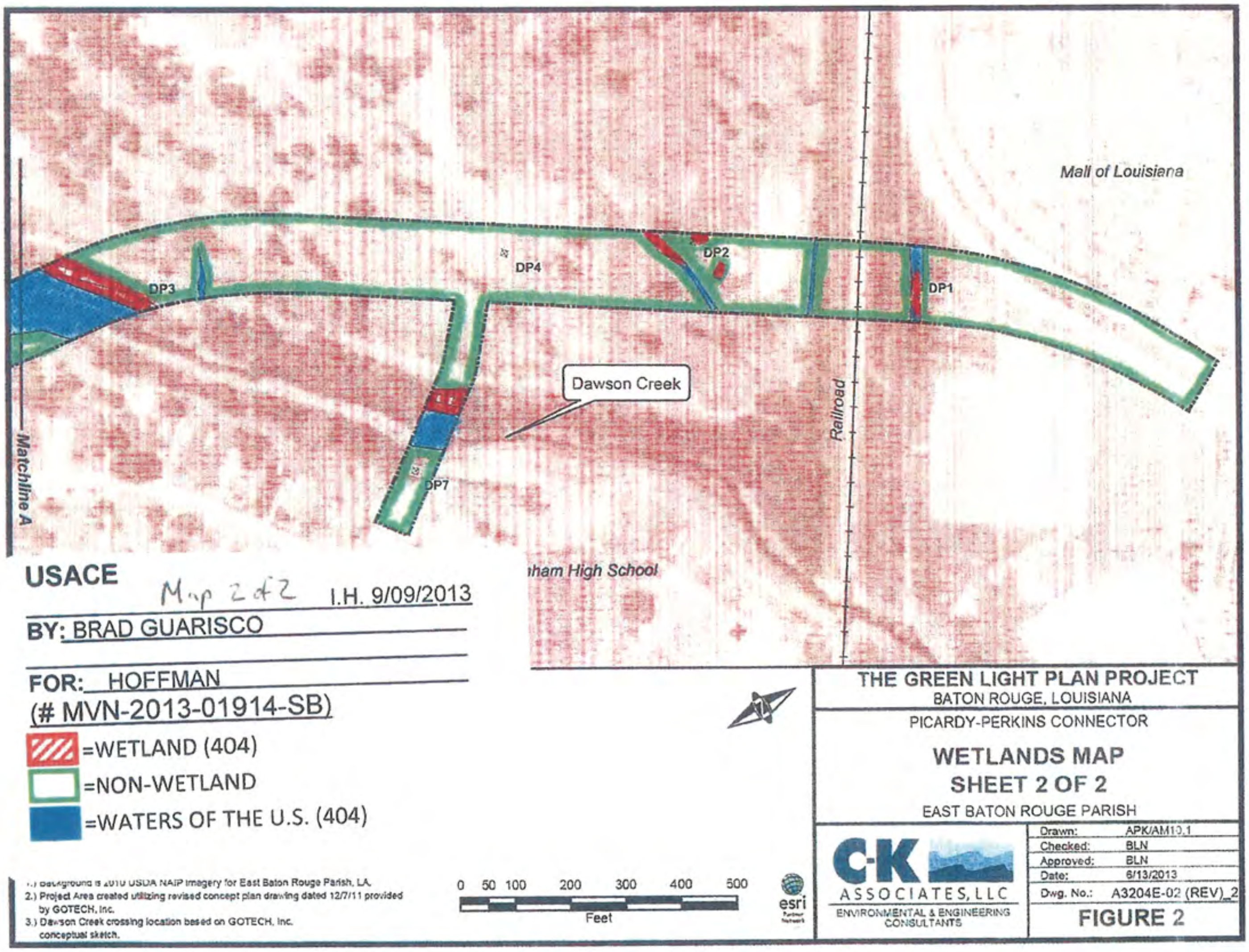
Drawn:	APK/AM10.1
Checked:	BLN
Approved:	BLN
Date:	6/13/2013
Dwg. No.:	A3204E-02 (REV)

FIGURE 2

U.S. ARMY CORPS OF ENGINEERS

PRELIMINARY

JURISDICTIONAL DETERMINATION



U.S. ARMY CORPS OF ENGINEERS

PRELIMINARY

JURISDICTIONAL DETERMINATION

PRELIMINARY JURISDICTIONAL DETERMINATION FORM

This preliminary JD finds that there *"may be"* waters of the United States on the subject project site, and identifies all aquatic features on the site that could be affected by the proposed activity, based on the following information:

District Office: New Orleans District | File/ORM #: MVN-2013-01914-SB | PJD Date: Sep 9, 2013

State: LA | City/County: East Baton Rouge

Nearest Waterbody: Dawson Creek

Location: TRS, LatLong or UTM: 30.381642°; -91.089512

Name/ Address of Person Requesting PJD: Mr. Sparky Hoffman, CSRS, Inc., 6767 Perkins Road, Suite 200, Baton Rouge, LA 70808

Identify (Estimate) Amount of Waters in the Review Area:

Non-Wetland Waters: linear ft; width 0.84 acres; Stream Flow: Per. (seasonal)

Wetlands: 1.16 acre(s); Cowardin Class: Palustrine, forested

Name of Any Water Bodies on the Site Identified as Section 10 Waters: Tidal: ; Non-Tidal:

☑ Office (Desk) Determination
☐ Field Determination: Date of Field Trip:

SUPPORTING DATA: Data reviewed for preliminary JD (check all that apply - checked items should be included in case file and, where checked and requested, appropriately reference sources below):

- ☑ Maps, plans, plots or plat submitted by or on behalf of the applicant/consultant:
- ☑ Data sheets prepared/submitted by or on behalf of the applicant/consultant.
  - ☐ Office concurs with data sheets/delineation report.
  - ☐ Office does not concur with data sheets/delineation report.
- ☐ Data sheets prepared by the Corps
- ☐ Corps navigable waters' study:
- ☑ U.S. Geological Survey Hydrologic Atlas:
  - ☐ USGS NHD data.
  - ☑ USGS 8 and 12 digit HUC maps.
- ☑ U.S. Geological Survey map(s). Cite quad name: 1:24,000 Baton Rouge East
- ☑ USDA Natural Resources Conservation Service Soil Survey. Citation: Soil Survey of East Baton Rouge Parish, Louisiana
- ☐ National wetlands inventory map(s). Cite name:
- ☐ State/Local wetland inventory map(s):
- ☐ FEMA/FIRM maps:
- ☐ 100-year Floodplain Elevation is:
- ☑ Photographs: ☑ Aerial (Name & Date): ArcMap '98, '04, '05, '08, '10, '12
  - ☑ Other (Name & Date): Google EarthPRO, LIDAR, Consultant photos
- ☐ Previous determination(s). File no. and date of response letter:
- ☐ Other information (please specify):

IMPORTANT NOTE: The information recorded on this form has not necessarily been verified by the Corps and should not be relied upon for later jurisdictional determinations.

9/9/2013

Signature and Date of Regulatory Project Manager (REQUIRED)

Requested by phone on September 9, 2013

Signature and Date of Person Requesting Preliminary JD (REQUIRED, unless obtaining the signature is impracticable)

EXPLANATION OF PRELIMINARY AND APPROVED JURISDICTIONAL DETERMINATIONS:

1. The Corps of Engineers believes that there may be jurisdictional waters of the United States on the subject site, and the permit applicant or other affected party who requested this preliminary JD is hereby advised of his or her option to request and obtain an approved jurisdictional determination (JD) for that site. Nevertheless, the permit applicant or other person who requested this preliminary JD has declined to exercise the option to obtain an approved JD in this instance and at this time.

2. In any circumstance where a permit applicant obtains an individual permit, or a Nationwide General Permit (NWP) or other general permit verification requiring "preconstruction notification" (PCN), or requests verification for a non-reporting NWP or other general permit, and the permit applicant has not requested an approved JD for the activity, the permit applicant is hereby made aware of the following: (1) the permit applicant has elected to seek a permit authorization based on a preliminary JD, which does not make an official determination of jurisdictional waters; (2) that the applicant has the option to request an approved JD before accepting the terms and conditions of the permit authorization, and that basing a permit authorization on an approved JD could possibly result in less compensatory mitigation being required or different special conditions; (3) that the applicant has the right to request an individual permit rather than accepting the terms and conditions of the NWP or other general permit authorization; (4) that the applicant can accept a permit authorization and thereby agree to comply with all the terms and conditions of that permit, including whatever mitigation requirements the Corps has determined to be necessary; (5) that undertaking any activity in reliance upon the subject permit authorization without requesting an approved JD constitutes the applicant's acceptance of the use of the preliminary JD, but that either form of JD will be processed as soon as is practicable; (6) accepting a permit authorization (e.g., signing a proffered individual permit) or undertaking any activity in reliance on any form of Corps permit authorization based on a preliminary JD constitutes agreement that all wetlands and other water bodies on the site affected in any way by that activity are jurisdictional waters of the United States, and precludes any challenge to such jurisdiction in any administrative or judicial compliance or enforcement action, or in any administrative appeal or in any Federal court; and (7) whether the applicant elects to use either an approved JD or a preliminary JD, that JD will be processed as soon as is practicable. Further, an approved JD, a proffered individual permit (and all terms and conditions contained therein), or individual permit denial can be administratively appealed pursuant to 33 C.F.R. Part 331, and that in any administrative appeal, jurisdictional issues can be raised (see 33 C.F.R. 331.5(a)(2)). If, during that administrative appeal, it becomes necessary to make an official determination whether CWA jurisdiction exists over a site, or to provide an official delineation of jurisdictional waters on the site, the Corps will provide an approved JD to accomplish that result, as soon as is practicable.

NOTIFICATION OF ADMINISTRATIVE APPEAL OPTIONS AND PROCESS AND REQUEST FOR APPEAL

Applicant: Baton Rouge Public Works	File Number: MVN-2013-01914-SB	Date: OCT 0 2 2013

Attached is:		See Section below
	INITIAL PROFFERED PERMIT (Standard Permit or Letter of permission)	A
	PROFFERED PERMIT (Standard Permit or Letter of permission)	B
	PERMIT DENIAL	C
	APPROVED JURISDICTIONAL DETERMINATION	D
X	PRELIMINARY JURISDICTIONAL DETERMINATION	E

SECTION I - The following identifies your rights and options regarding an administrative appeal of the above decision. Additional information may be found at http://www.usace.army.mil/cecw/pages/reg_materials.aspx or Corps regulations at 33 CFR Part 331.

A: INITIAL PROFFERED PERMIT: You may accept or object to the permit.

- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- OBJECT: If you object to the permit (Standard or LOP) because of certain terms and conditions therein, you may request that the permit be modified accordingly. You must complete Section II of this form and return the form to the district engineer. Your objections must be received by the district engineer within 60 days of the date of this notice, or you will forfeit your right to appeal the permit in the future. Upon receipt of your letter, the district engineer will evaluate your objections and may: (a) modify the permit to address all of your concerns, (b) modify the permit to address some of your objections, or (c) not modify the permit having determined that the permit should be issued as previously written. After evaluating your objections, the district engineer will send you a proffered permit for your reconsideration, as indicated in Section B below.

B: PROFFERED PERMIT: You may accept or appeal the permit

- ACCEPT: If you received a Standard Permit, you may sign the permit document and return it to the district engineer for final authorization. If you received a Letter of Permission (LOP), you may accept the LOP and your work is authorized. Your signature on the Standard Permit or acceptance of the LOP means that you accept the permit in its entirety, and waive all rights to appeal the permit, including its terms and conditions, and approved jurisdictional determinations associated with the permit.
- APPEAL: If you choose to decline the proffered permit (Standard or LOP) because of certain terms and conditions therein, you may appeal the declined permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

C: PERMIT DENIAL: You may appeal the denial of a permit under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

D: APPROVED JURISDICTIONAL DETERMINATION: You may accept or appeal the approved JD or provide new information.

- ACCEPT: You do not need to notify the Corps to accept an approved JD. Failure to notify the Corps within 60 days of the date of this notice, means that you accept the approved JD in its entirety, and waive all rights to appeal the approved JD.
- APPEAL: If you disagree with the approved JD, you may appeal the approved JD under the Corps of Engineers Administrative Appeal Process by completing Section II of this form and sending the form to the division engineer. This form must be received by the division engineer within 60 days of the date of this notice.

E: PRELIMINARY JURISDICTIONAL DETERMINATION: You do not need to respond to the Corps regarding the preliminary JD. The Preliminary JD is not appealable. If you wish, you may request an approved JD (which may be appealed), by contacting the Corps district for further instruction. Also you may provide new information for further consideration by the Corps to reevaluate the JD.

APPENDIX E

Picardy-Perkins Connector

Summary of June 4, 2013 Public Meeting

THE GREEN LIGHT PLAN

BUILDING BETTER ROADS FOR EAST BATON ROUGE PARISH

Location: Bluebonnet Branch Library
Time: 5-7:30pm

Summary of Attendees

About 70 members from the public signed the sign in sheet. Some people that attended the meeting might not have signed in. Here is a list of some of the attendees:

1. Approximately 30 residents of the 207-lot Wimbledon Subdivision.
2. 2-3 residents/tenants from Perkins Rowe
3. Wimbledon Subdivision Homeowners Association President
4. O'Neill Plaza owners.
5. O'Neill Plaza tenant that owns the daycare business.
6. Tony Stephens (Jones Lang LaSalle), Ty Harvison (Latter & Blum), Jimmy Backofen (Vintage Reality Co.); whom are connected to the Perkins Rowe Development and the open track of land behind Perkins Rowe.
7. Ted Jack (BREC)
8. Matt Watson (Councilman Ryan Heck's legislative assistant)
9. Lonnie Bickford (owner of Appletree Storage)
10. Bill Blackwood (Citizens Bank)
11. Nikki Tracy (Jimmy Swaggart Ministries)
12. Bobby Welch (Dunham School)
13. Tim Landry (Baum's Fine Pastries)
14. The Advocate, Channel 2 News, and NBC-33
15. DPW and GLP

Comment Forms:

32 comment forms were filled out at the meeting.

18 of the forms were filled out by Wimbledon Residents. Here is a summary of their comment forms

1. Privacy Wall: 18 of 18 of the Wimbledon Residents' forms indicated that they want a privacy wall. The overwhelming reason was for noise reduction. Privacy was a close second. A lot of them stated that noise is bad enough now due to the interstate and Perkins Rowe.

2. Side Street Connection from Wimbledon: 14 out of 18 of the Wimbledon Residents prefer the connection at Backcourt Drive near the Dunham School instead of the Maureen Connolly Drive option.

3. Rod Laver Ave.: 10 out of the 18 forms stated that they don't want any changes to Rod Laver. 5 stated that they want Rod Laver to connect to Picardy-Perkins. The other 3 either stated that they didn't care.

Some Key and Reoccurring Comments from the Meeting:

1. The O'Neill Plaza owners and tenants are very anxious to see what will happen to Rod Laver Ave. and how it will impact their business. They want all available turning movements from Perkins Road to be able to access their property either from Perkins Road or from the new Picardy-Perkins. They requested a private meeting to discuss the project in greater detail.

2. There is a daycare at the O'Neill Plaza. The owner requested a barrier wall that will protect the kids from being hit by cars that leave the Picardy-Perkins wall and to also prevent her kids from leaving the property and getting to the roadway.

3. Tony Stephens, of Perkins Rowe, requested a meeting to discuss the project in greater detail. Especially, how Perkins Rowe will connect to the Picardy-Perkins Connector.

4. The owner of Appletree Storage wants the Picardy-Perkins signal to line up with their driveway to make sure that all available turning movements can turn into his driveway. He stated that he will challenge any attempt to restrict left turns into or out of his driveway. He requested a meeting with whoever is going to make the final decision on the access management on Perkins Road.

5. The Wimbledon Residents want to be a part of the decision making process on determining the location and type of the privacy wall.

6. Some of the Wimbledon Residents are concerned that that the public will use their subdivision streets as cut-through to get to the side street connections to access Picardy-Perkins.

7. The Wimbledon Residents want to be updated on the decision making process of determining if Maureen Connolly Drive or Backcourt Drive is the best connection to Picardy-Perkins.

8. A pedestrian and bike crossing over or under Picardy-Perkins near Maureen Connolly will allow the residents of Wimbledon and Settlement of Willow Grove to get to Perkins Rowe and the BREC bike path. This feature should be considered even if a street connection isn't made at Maureen Connolly Drive.

9. Some people from the meeting questioned the need for the project and why don't we just widen Bluebonnet Blvd. instead of building an expensive new route. They also viewed the road as just way to let people get to and from the Mall rather than a connection to I-10.

Post Meeting Items:

1. GLP will post the meeting exhibits and comment form on the GLP website.
2. The design consultant will continue with the design study.

Attachments:

1. Sign in Sheets
2. Public Comments forms that were filled out at the Public Meeting.
3. Map showing addresses of some of Wimbledon Residents that filled out a public comment form
4. Media Articles

APPENDIX F

CAPP

Capital Area Pathways Project

BREC Planning & Engineering
December 2012

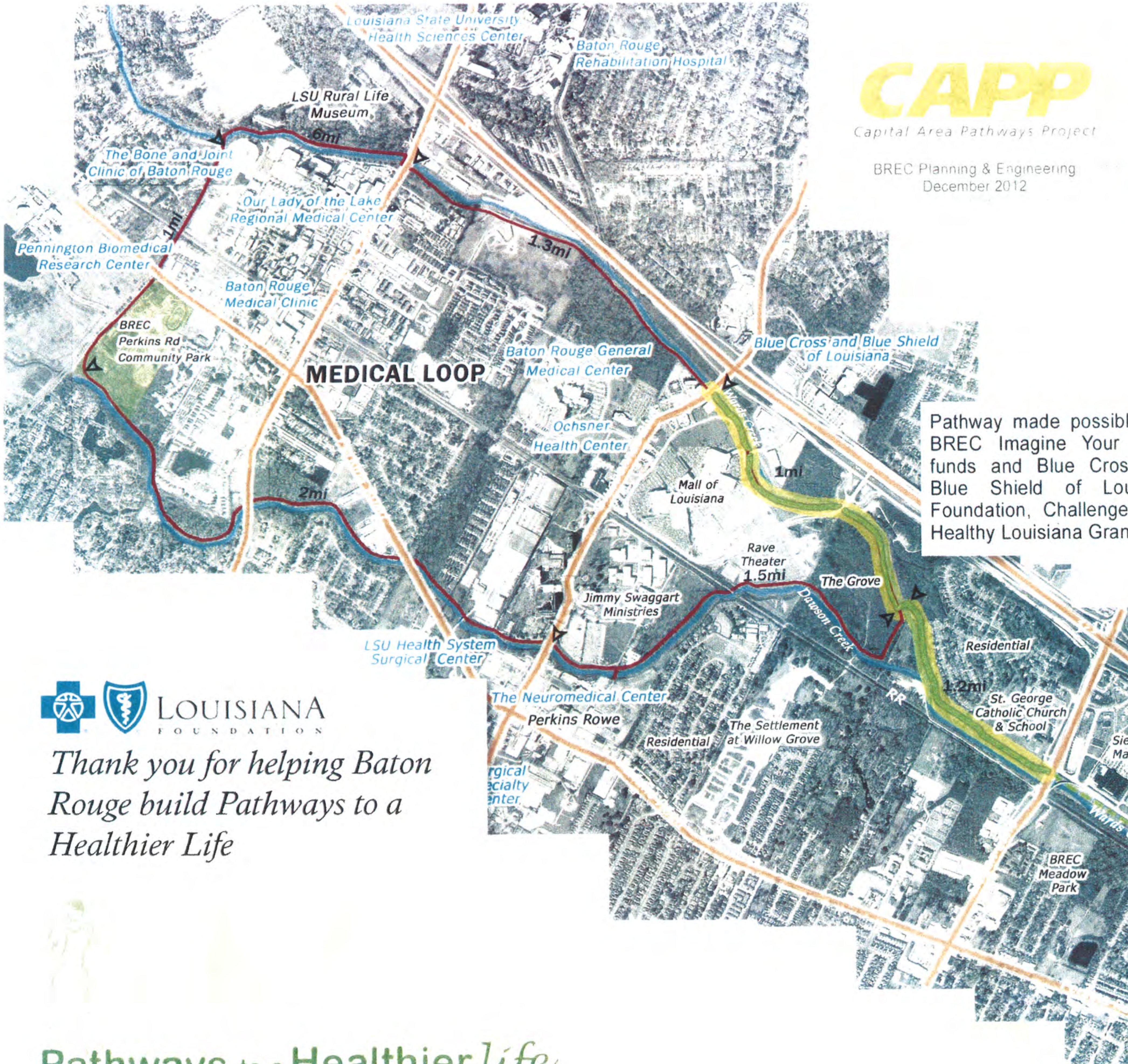
WARDS CREEK TRAIL

LINEAR PARK - PATHWAY SYSTEM

CONCEPTUAL PLAN

Parks

BREC



Pathway made possible with BREC Imagine Your Parks funds and Blue Cross and Blue Shield of Louisiana Foundation, Challenge for a Healthy Louisiana Grant

- Medical Loop (7.4 miles)
- Wards Creek Trail Phase I
- Mileage Point

LOUISIANA
FOUNDATION

Thank you for helping Baton Rouge build Pathways to a Healthier Life

Pathways to a Healthier life

THE GREEN LIGHT PLAN

LEGEND

EXISTING APPARENT R O.W
PROPOSED R.O W
TRAVEL LANES
EDGE OF ROAD

CSRS program management

In association with:

PBS&J
GOTECH, Inc.
Neel-Schaffer, Inc.
Compliance Consultants, Inc.
Jones Walker, LLP
John C. Doiron MAI Appraisal Services
Rampart Resources
SSA Consultants, LLC

Project

Picardy-Perkins Connector (Perkins Road to Picardy Avenue)

Sheet Title

EXHIBIT C

Date: December 7, 2011
Project Number: 25041.00
Drawn By: MMG
Checked By: HT

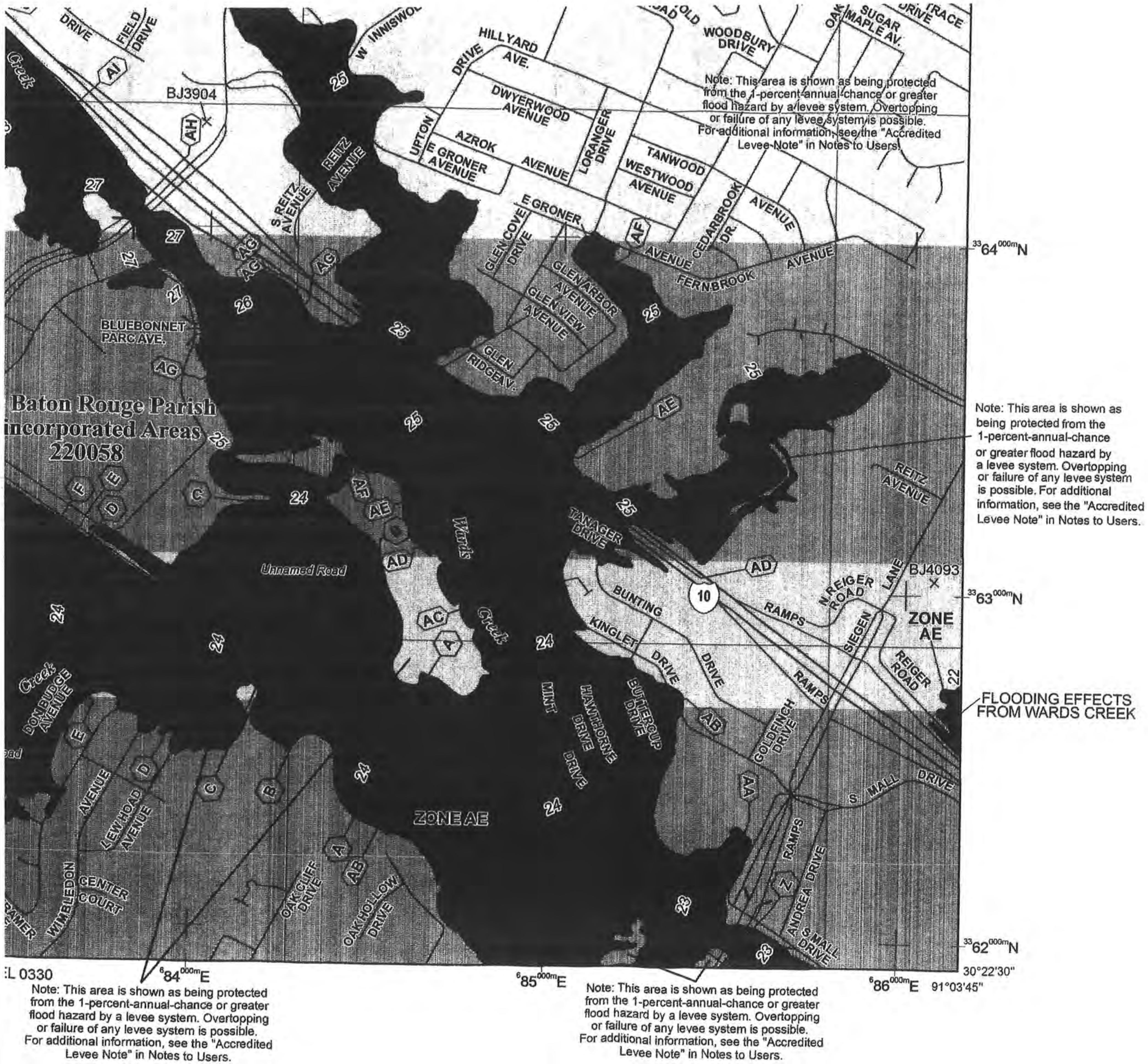
Sheet

II-135

1 of 1 Sheet No


1.3mi
Baton Rouge General Medical Center
Blue Cross and Blue Shield of Louisiana
Ochsner Health Center
1mi
Mall of Louisiana
Rave Theater
1.5mi
The Grove
Jimmy Swaggart Ministries
Dawson Creek
Neuromedical Center
Perkins Rowe
The Settlement at Willow Grove
Residential

APPENDIX G



For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 1000'

500 0 1000 2000 FEET

300 0 300 600 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0265F

FIRM

FLOOD INSURANCE RATE MAP

EAST BATON ROUGE PARISH, LOUISIANA

AND INCORPORATED AREAS

PANEL 265 OF 360

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

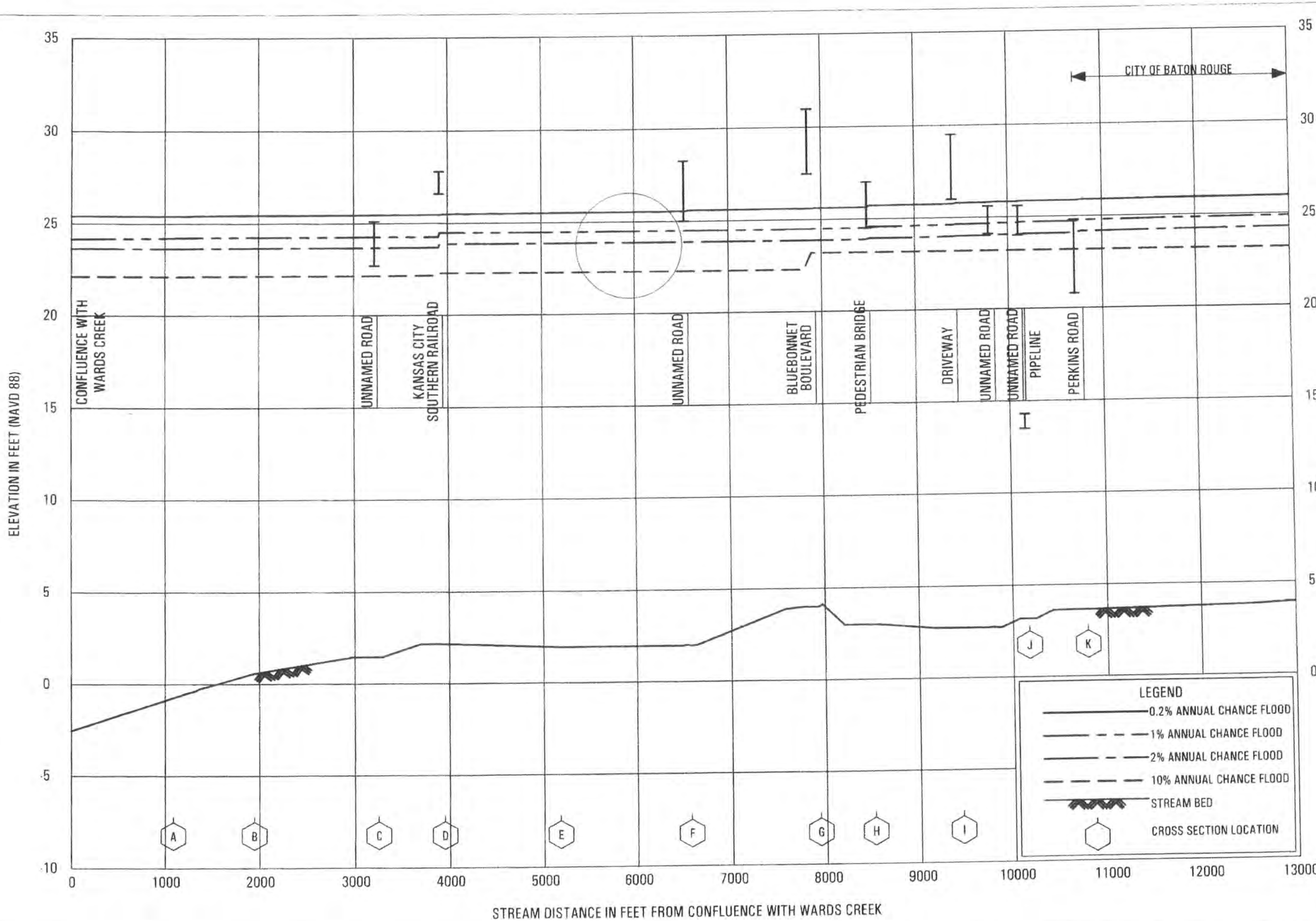
COMMUNITY	NUMBER	PANEL	SUFFIX
BATON ROUGE, CITY OF	220058	0265	F
EAST BATON ROUGE PARISH	220058	0265	F

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
22033C0265F

MAP REVISED
JUNE 19, 2012

Federal Emergency Management Agency



FLOOD PROFILES

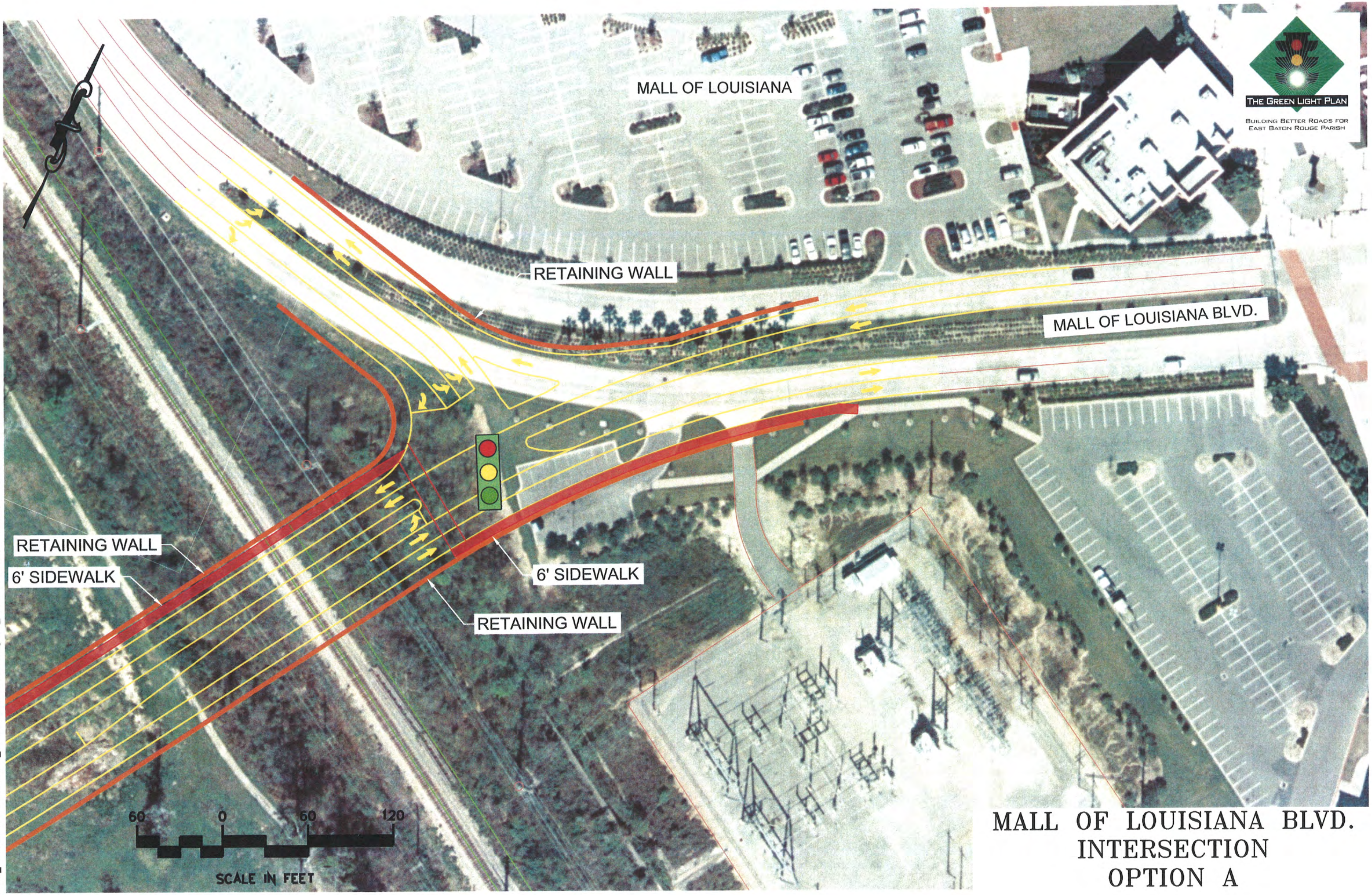
DAWSON CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

EAST BATON ROUGE PARISH, LA

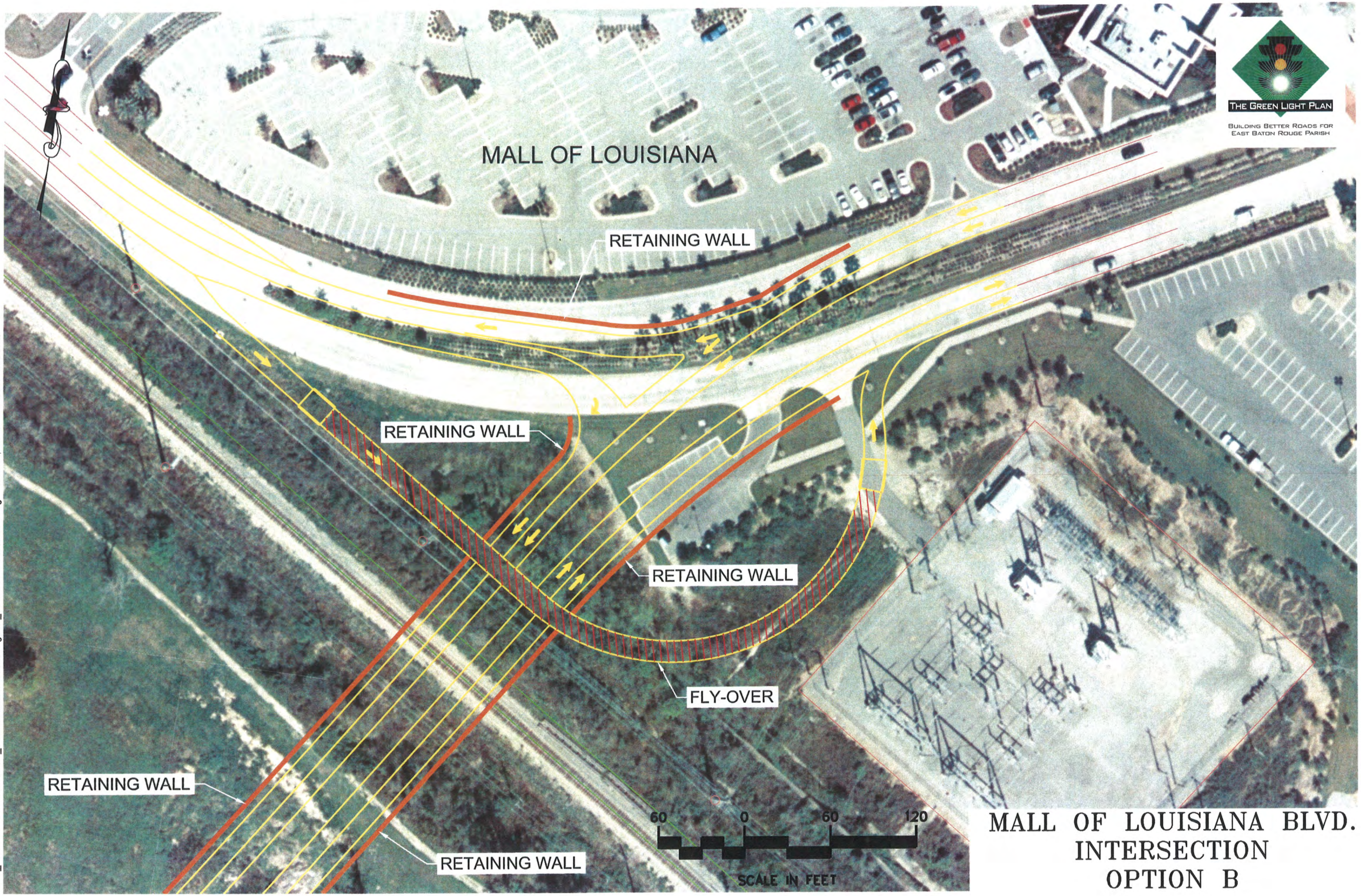
AND INCORPORATED AREAS

APPENDIX H



MALL OF LOUISIANA BLVD. INTERSECTION OPTION A

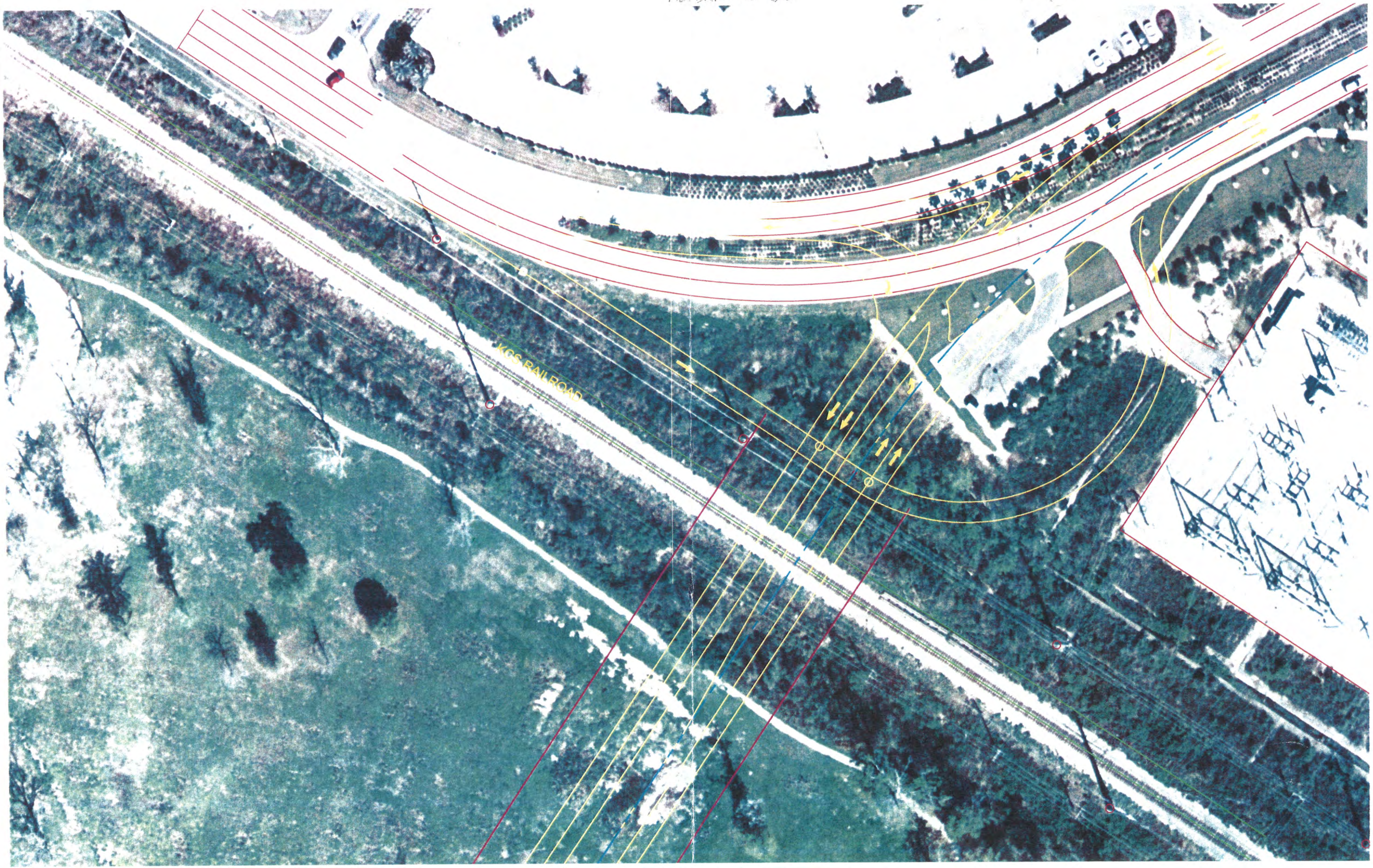
F:\00_PROJECTS\12-500\Sheet_Sets\Exhibits\12500xdesign7C_MALL OF LOUISIANA.dwg - Jun 04, 2013 - 6:39am - mroberts



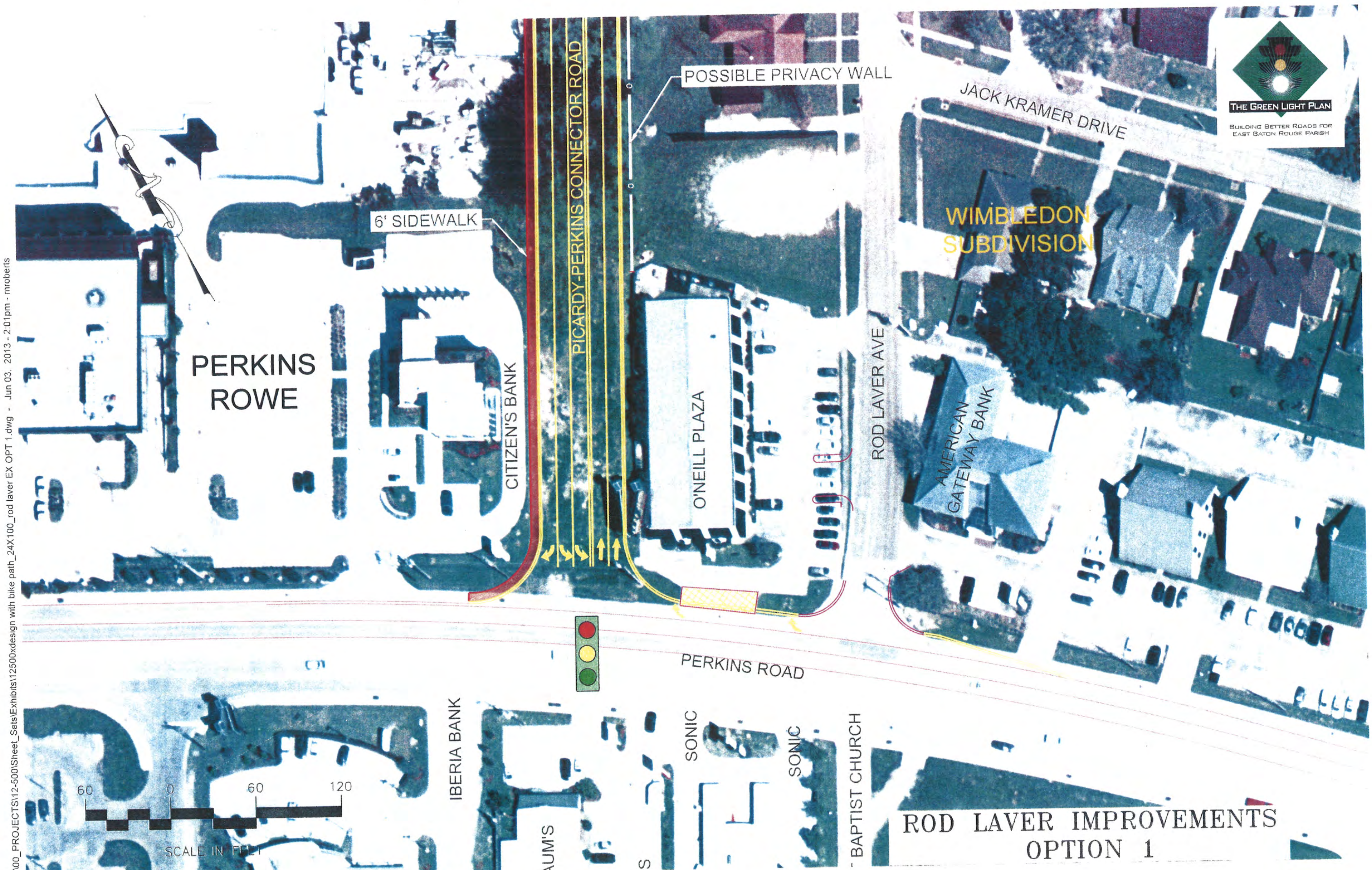
MALL OF LOUISIANA BLVD.
INTERSECTION
OPTION B

F:\00_PROJECTS\12-500\Sheet_Sets\Exhibits\12500xdesign7D_MALL OF LOUISIANA.dwg - Jun 04, 2013 - 11:16am - mroberts

ALTERNATIVE 8C



APPENDIX I



F:\00_PROJECTS\12-500\Sheet_Sets\Exhibits\12500xdesign with bike path_24X100_rod laver EX OPT 1.dwg - Jun 03, 2013 - 2:01pm - mroberts

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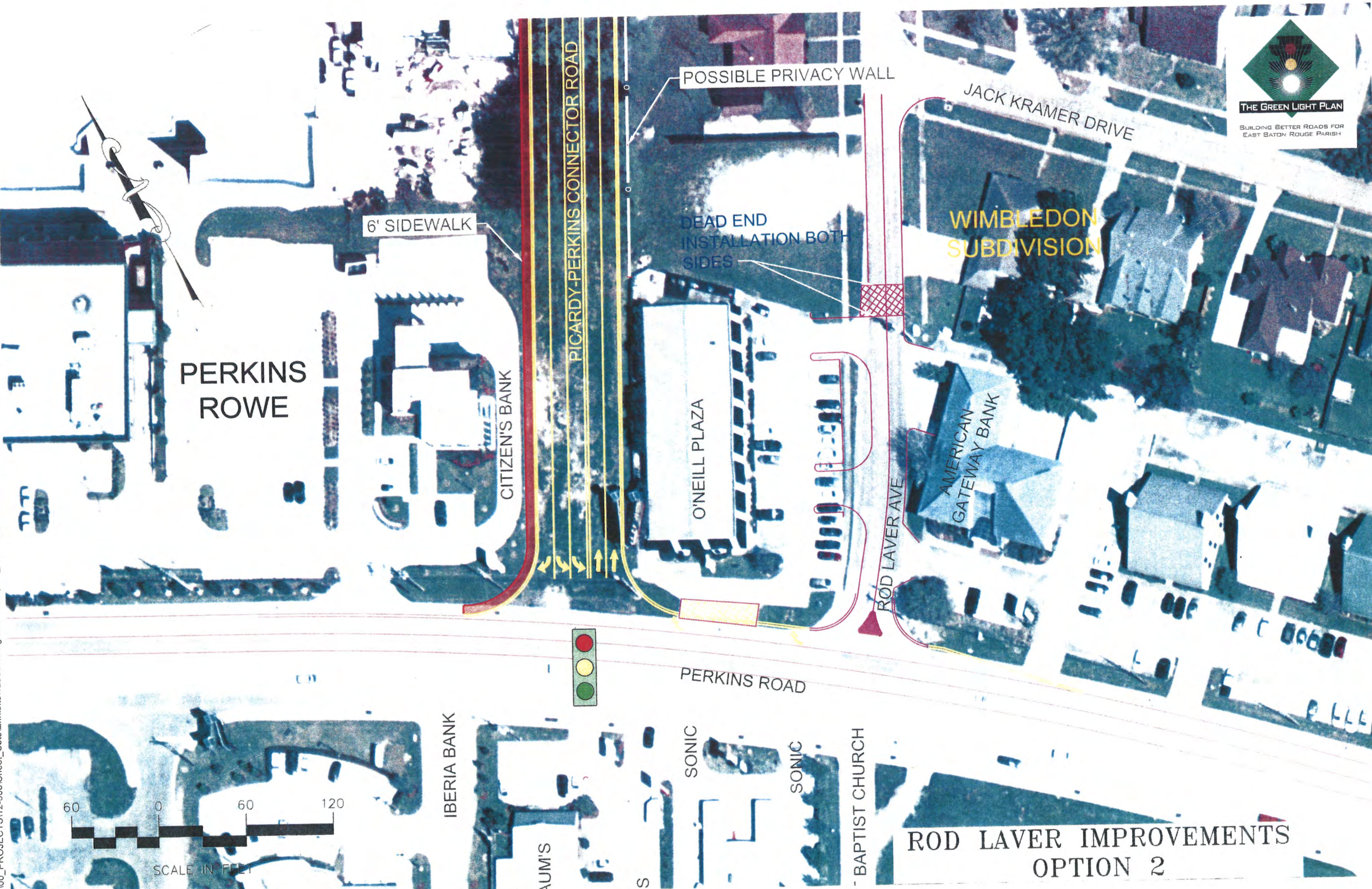

ROD LAVER IMPROVEMENTS OPTION 3

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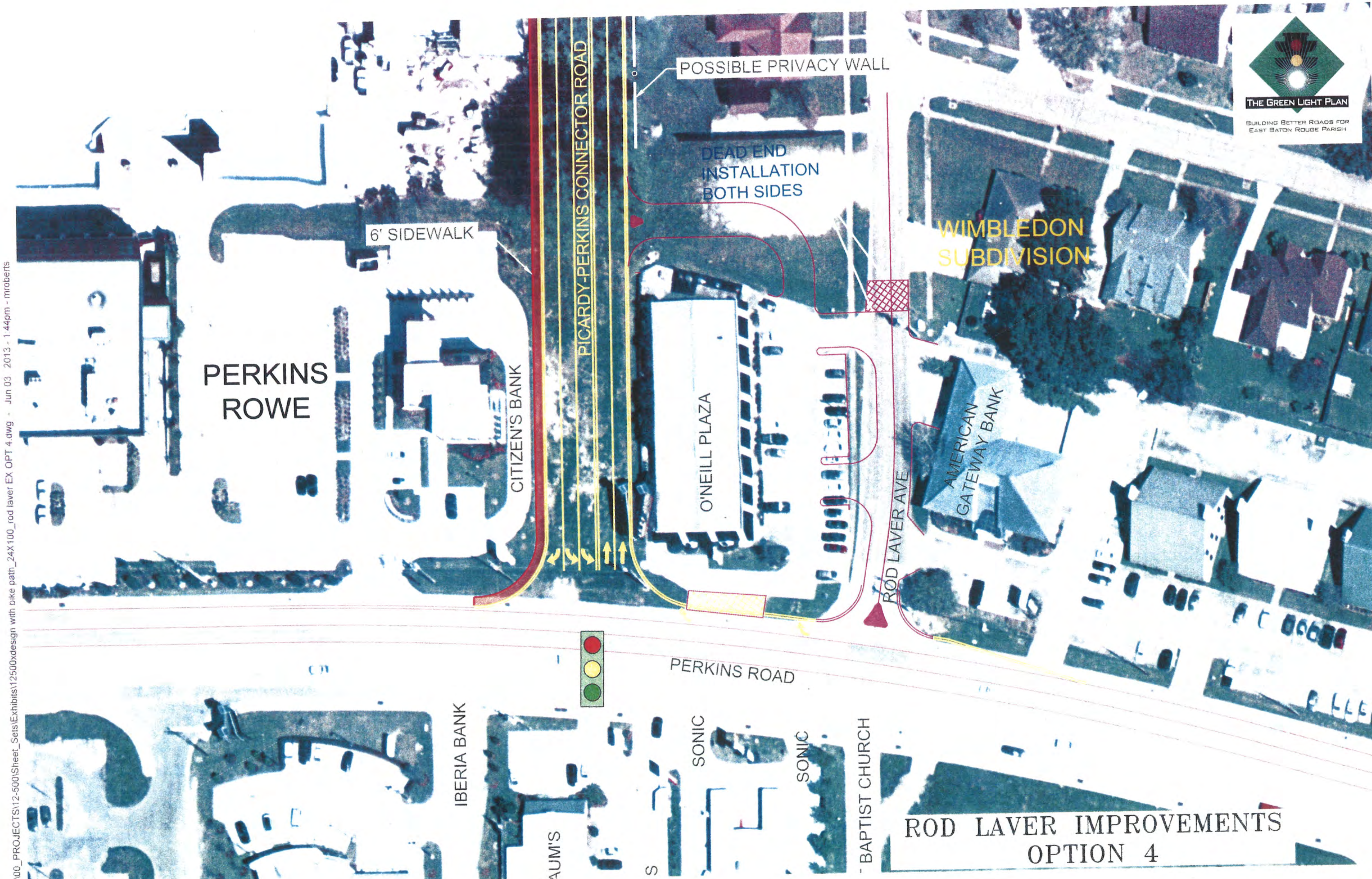


ROD LAVER IMPROVEMENTS
OPTION 4

F:\00_PROJECTS\12-500\Sheet_Sets\Exhibits\12500xdesign with bike path_24X100_rod laver EX OPT 4.dwg - Jun 03 2013 - 1:44pm - mroberts

APPENDIX J

EBROSCO

PLAN BASED ON LOUISIANA STATE PLANE COORDINATE SYSTEM, NAD '83

FOR LOCATION WITHIN PARISH REFER TO KEY MAP

SCALE:

NOTE: SCALE OF 1"=300' TO BE USED ON 18"x24" MAPS

REVISIONS					
NO.	DESCRIPTION	DES'N	DWN	APP'D	DATE

EBROSCO SEWERAGE SYSTEM

EAST BATON ROUGE PARISH, LA

MWH MONTGOMERYWATSON HARZA

SHEET NO. 354-682

EB

SHEET NO. 354-678

354-682

LEGEND

(DISTANCE)-(DIA)	EXISTING SEWER LINES
(DISTANCE)-(DIA)	EXISTING FORCE MAINS
	EXISTING SURFACE DRAINAGE
	EXISTING RAILROADS
(NUMBER)	EXISTING MANHOLES
(NUMBER)	EXISTING LIFT STATIONS
	EXISTING CLEANOUTS
(42)	STATE HIGHWAY
(61)	PARISH ROAD
(55)	U.S. HIGHWAY
(10)	INTERSTATE HIGHWAY
	LA GEODETIC SURVEY MARKER
	ISOLATION VALVE
	PUMP STATION
	BOOSTER STATION
	AIR RELEASE VALVE
	LINED PIPE SEGMENTS
	SCADA PUMP STATION

ISSUE DATE: JUNE 2005

CITY OF BATON ROUGE · PARISH OF EAST BATON ROUGE

EBROSCO

PLAN BASED ON LOUISIANA STATE PLANE COORDINATE SYSTEM, NAD '83

FOR LOCATION WITHIN PARISH REFER TO KEY MAP

N

SCALE: 0 300 150 300

NOTE: SCALE OF 1"=300' TO BE USED ON 18"x24" MAPS

REVISIONS					
NO.	DESCRIPTION	DES'N	DWN	APP'D	DATE

EBROSCO SEWERAGE SYSTEM

EAST BATON ROUGE PARISH, LA

MWH MONTGOMERY WATSON HARZA

SHEET NO. 354-678

THESE MAPS HAVE BEEN PREPARED BASED ON INFORMATION PROVIDED BY OTHERS. THE CITY OF BATON ROUGE, PARISH OF EAST BATON ROUGE, AND THE ENGINEER HAVE NOT VERIFIED THE ACCURACY OF SUCH INFORMATION AND SHALL NOT BE RESPONSIBLE FOR ANY ERRORS OR OMISSIONS WHICH MAY BE INCORPORATED HEREIN AS A RESULT.

APPENDIX K

Dawson’s Creek
Existing Conditions
HEC-RAS Report

~ 2008 Flood insurance study ~

DAWSON Creek @ Bluebonnet (Model STA 7915)

Drainage Area	10-YR Runoff	50-YR Runoff	100-YR Runoff	500-YR Runoff
11.4 □Miles	2567 cfs W.S. = [illegible]3	3450 cfs W.S. = [illegible]3.9	4339 cfs W.S. = [illegible]4.5	5361 cfs W.S. = 25.

NotE: 2012 Flood insurance Study
indicates <u>No</u> change in flows or W.S.

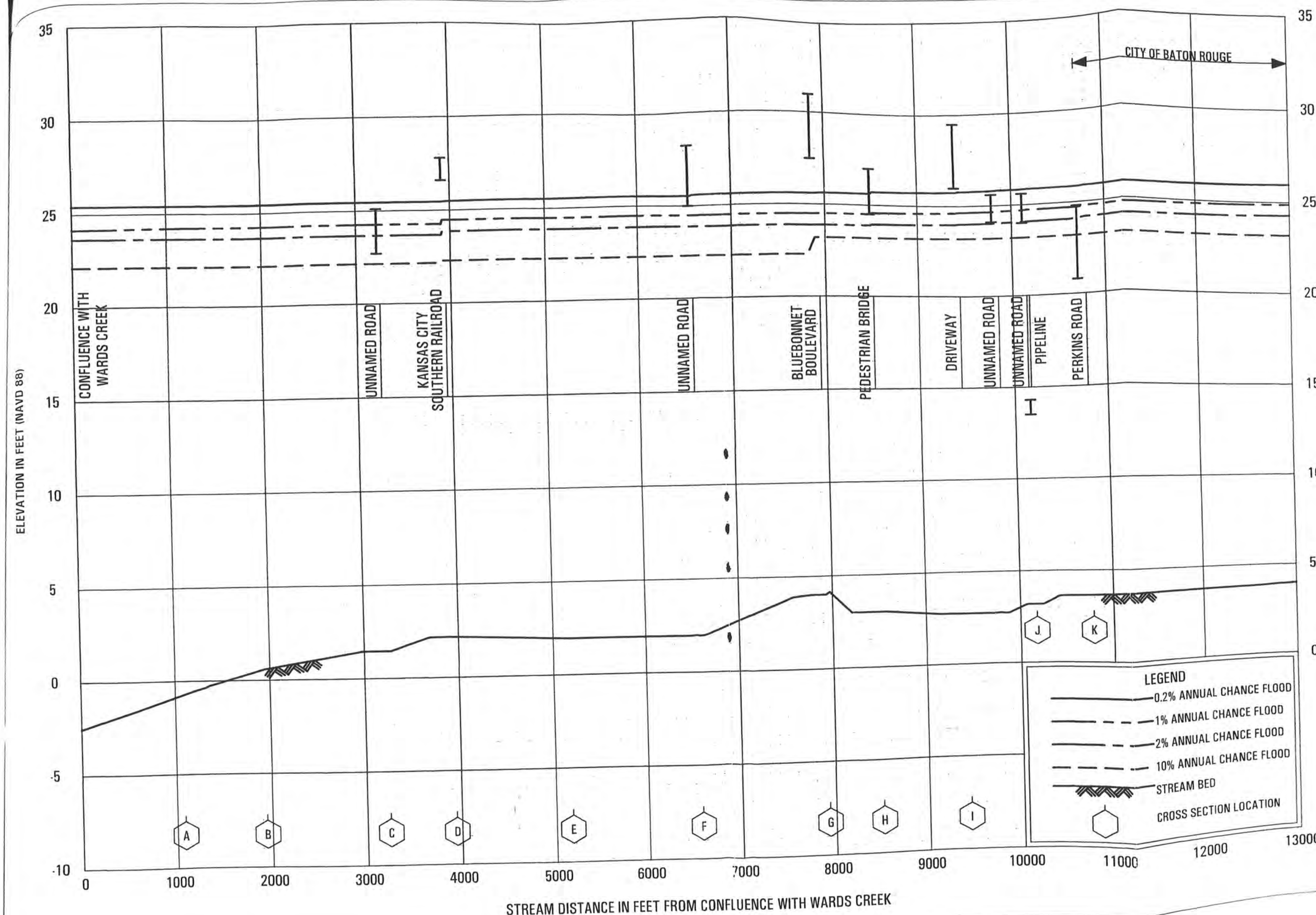
Since Bridge location is ± 2000 L.F.
downstream of Bluebonnet Blvd 5%
increase in Runoff will be used.

10-YR Runoff = 2695 cfs W.S. = 22.3'
50-YR Runoff = 3623 cfs W.S. = 23.9'
100-YR Runoff = 4556 cfs W.S. = 24.5'
500-YR Runoff = 5629 cfs W.S. = 25.5'

Table 2 Summary of Discharges

Flooding Source and Location	Drainage Area (square miles)	Peak Discharge (cubic feet per second) 10-Percent-Annual Chance	2-Percent-Annual Chance	1-Percent-Annual Chance	0.2-Percent-Annual Chance
DETAILED STUDY STREAMS					
Bayou Duplantier and Corporation Canal (Unsteady-state)					
At Lee Drive	5.04[b]	768	894	1,009	1,398
At Stanford Drive	2.48[b]	1,412	1,686	1,804	1,935
At McKinley Road	1.98[a]	918	1,378	1,570	2,086
Bayou Fountain (Unsteady-state)					
At Blue Bonnet	3.20[a]	1,193	1,587	1,819	2,277
At Lee Drive	1.18[a]	1,494	1,665	1,845	2,235
Bayou Fountain Trib. No. 1 (Unsteady-state)					
At confluence w/Bayou Fountain	2.16[b]	544	850	1,084	1,689
Clay Cut Bayou					
At Elliot Road	8.16[a]	5,968	7,872	8,823	1,078
At Airline Highway	2.80[a]	2,632	3,603	4,096	5,194
At Bluebonnet Blvd.	0.18[a]	29	40	45	57
Dawson Creek (Unsteady-state)					
At Blue Bonnet	11.37[a]	2,567	3,450	4,339	5,361
At Quail Drive	8.17[a]	2,971	3,589	3,850	4,559
At College Drive	2.92[b]	2,154	2,705	3,044	3,748
At Hundred Oaks Drive	1.65[b]	1,804	2,433	2,730	3,478
Elbow Bayou (Unsteady-state)					
At Burbank Drive	13.76[a]	669	782	827	942
Jacks Bayou					
At Stumberg Lane	0.57[a]	605	839	956	1,222
North Branch Wards Creek					
At Interstate-10	8.91[a]	5,330	7,401	8,443	10,771
At Old Hammond Way	5.82[a]	3,248	4,512	5,152	6,609
Unnamed Tributary to North Branch Wards Creek					
At 100 ft downstream from Airline Highway	1.20	1,340	1,874	2,142	2,751
At 800 ft upstream from Old Hammond Highway	0.26	322	445	506	645
Upper Cypress Bayou					
Confluence with South Canal	12.53	3,797	5,232	5,958	7,609
At access road off Old Zachary Road	9.51	2,973	4,083	4,643	5,915
At Highway 64	2.20	719	990	1,127	1,437
Headwaters	0.61	219	301	343	438

2008 Flood Insurance Study FEMA



FLOOD PROFILES

DAWSON CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY

EAST BATON ROUGE PARISH, LA

AND INCORPORATED AREAS

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

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

****

PROJECT DATA
Project Title: Perkins to Picardy Connector
Project File : DawsonCreek.prj
Run Date and Time: 6/17/2014 1:29:17 PM

Project in English units

****

PLAN DATA

Plan Title: Plan 17
Plan File : f:\00_PROJECTS\12-500\Documents\Calculations\DawsonCreek.p17

Geometry Title: Existing Dawson's Creek
Geometry File :
f:\00_PROJECTS\12-500\Documents\Calculations\DawsonCreek.g01

Flow Title : Dawson's Creek Flow Data
Flow File :
f:\00_PROJECTS\12-500\Documents\Calculations\DawsonCreek.f01

Plan Summary Information:

Number of:	Cross Sections =	7	Multiple Openings =	0
	Culverts =	0	Inline Structures =	0
	Bridges =	0	Lateral Structures =	0

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

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

****

FLOW DATA

Flow Title: Dawson's Creek Flow Data
Flow File : f:\00_PROJECTS\12-500\Documents\Calculations\DawsonCreek.f01

Flow Data (cfs)

```
*************************************************************************************
*********
* River             Reach              RS      *         100-Year           50-Year
500-Year *
* DAWSONS CREEK     DAWSONS CREEK      6200    *            4556              3623
 5629 *
*************************************************************************************
*********
```

Boundary Conditions

```
*************************************************************************************
********************
* River             Reach              Profile              *             Upstream
    Downstream     *
*************************************************************************************
********************
* DAWSONS CREEK     DAWSONS CREEK      100-Year             *
  Known WS = 24.5 *
* DAWSONS CREEK     DAWSONS CREEK      50-Year              *
  Known WS = 23.9 *
* DAWSONS CREEK     DAWSONS CREEK      500-Year             *
  Known WS = 25.5 *
*************************************************************************************
********************

**********************************************************************************
```

GEOMETRY DATA

Geometry Title: Existing Dawson's Creek
Geometry File : f:\00_PROJECTS\12-500\Documents\Calculations\DawsonCreek.g01

CROSS SECTION

RIVER: DAWSONS CREEK
REACH: DAWSONS CREEK   RS: 6200

INPUT
Description:
Station Elevation Data   num=   15

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	25	10	24	28	23	45	20	58	15
90	10	92	9	105	3.5	114	9	116	10
135	20	136	21	152	22	171	24	205	25

Manning's n Values   num=   3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	10	.02	171	.1

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
10	171	185	190	195	.1	.3

CROSS SECTION OUTPUT Profile #100-Year

```
*************************************************************************************
***********
```

```
* E.G. Elev (ft)              *    24.75  * Element                   *  Left OB *  Channel *
Right OB *
* Vel Head (ft)               *     0.20  * Wt. n-Val.                *   0.100  *   0.020  *
 0.100   *
* W.S. Elev (ft)              *    24.55  * Reach Len. (ft)           *  185.00  *  190.00  *
195.00   *
* Crit W.S. (ft)              *           * Flow Area (sq ft)         *    1.53  * 1274.98  *
  5.19   *
* E.G. Slope (ft/ft)          *0.000156   * Area (sq ft)              *    1.53  * 1274.98  *
  5.19   *
* Q Total (cfs)               * 4556.00   * Flow (cfs)                *    0.12  * 4555.47  *
  0.41   *
* Top Width (ft)              *   185.32  * Top Width (ft)            *    5.53  *  161.00  *
 18.79   *
* Vel Total (ft/s)            *     3.55  * Avg. Vel. (ft/s)          *    0.08  *    3.57  *
  0.08   *
* Max Chl Dpth (ft)           *    21.05  * Hydr. Depth (ft)          *    0.28  *    7.92  *
  0.28   *
* Conv. Total (cfs)           *364756.6   * Conv. (cfs)               *     9.6  *364714.3  *
  32.7   *
* Length Wtd. (ft)            *   190.01  * Wetted Per. (ft)          *    5.55  *  168.76  *
 18.80   *
* Min Ch El (ft)              *     3.50  * Shear (lb/sq ft)          *    0.00  *    0.07  *
  0.00   *
* Alpha                       *     1.01  * Stream Power (lb/ft s)    *    0.00  *    0.26  *
  0.00   *
* Frctn Loss (ft)             *     0.03  * Cum Volume (acre-ft)      *    8.90  *   76.62  *
 18.74   *
* C & E Loss (ft)             *     0.01  * Cum SA (acres)            *    2.62  *    6.47  *
 10.56   *
*******************************************************************************************
***********

CROSS SECTION OUTPUT  Profile #50-Year
*******************************************************************************************
***********
* E.G. Elev (ft)              *    24.08  * Element                   *  Left OB *  Channel *
Right OB *
* Vel Head (ft)               *     0.15  * Wt. n-Val.                *          *   0.020  *
         *
* W.S. Elev (ft)              *    23.94  * Reach Len. (ft)           *  185.00  *  190.00  *
195.00   *
* Crit W.S. (ft)              *           * Flow Area (sq ft)         *          * 1175.82  *
         *
* E.G. Slope (ft/ft)          *0.000127   * Area (sq ft)              *          * 1175.82  *
         *
* Q Total (cfs)               * 3623.00   * Flow (cfs)                *          * 3623.00  *
         *
* Top Width (ft)              *   159.25  * Top Width (ft)            *          *  159.25  *
         *
* Vel Total (ft/s)            *     3.08  * Avg. Vel. (ft/s)          *          *    3.08  *
         *
* Max Chl Dpth (ft)           *    20.44  * Hydr. Depth (ft)          *          *    7.38  *
         *
* Conv. Total (cfs)           *320900.8   * Conv. (cfs)               *          *320900.8  *
         *
* Length Wtd. (ft)            *   190.00  * Wetted Per. (ft)          *          *  167.01  *
         *
* Min Ch El (ft)              *     3.50  * Shear (lb/sq ft)          *          *    0.06  *
         *
* Alpha                       *     1.00  * Stream Power (lb/ft s)    *          *    0.17  *
         *
* Frctn Loss (ft)             *     0.02  * Cum Volume (acre-ft)      *    7.39  *   72.73  *
```

```
 12.98   *
* C & E Loss (ft)          *     0.00  * Cum SA (acres)          *    2.40  *    6.45  *
  8.63   *
*******************************************************************************************
***********

CROSS SECTION OUTPUT  Profile #500-Year
*******************************************************************************************
***********
* E.G. Elev (ft)           *    25.80  * Element                 *  Left OB *  Channel *
Right OB *
* Vel Head (ft)            *     0.24  * Wt. n-Val.              *   0.100  *   0.020  *
  0.100  *
* W.S. Elev (ft)           *    25.56  * Reach Len. (ft)         *  185.00  *  190.00  *
 195.00  *
* Crit W.S. (ft)           *           * Flow Area (sq ft)       *   10.65  * 1437.96  *
 36.21   *
* E.G. Slope (ft/ft)       *0.000159   * Area (sq ft)            *   10.65  * 1437.96  *
 36.21   *
* Q Total (cfs)            * 5629.00   * Flow (cfs)              *    2.00  * 5620.00  *
  7.00   *
* Top Width (ft)           *  205.00   * Top Width (ft)          *   10.00  *  161.00  *
 34.00   *
* Vel Total (ft/s)         *     3.79  * Avg. Vel. (ft/s)        *    0.19  *    3.91  *
  0.19   *
* Max Chl Dpth (ft)        *    22.06  * Hydr. Depth (ft)        *    1.06  *    8.93  *
  1.06   *
* Conv. Total (cfs)        *446392.3   * Conv. (cfs)             *   158.6  *445679.0  *
 554.8   *
* Length Wtd. (ft)         *  190.01   * Wetted Per. (ft)        *   10.61  *  168.76  *
 34.58   *
* Min Ch El (ft)           *     3.50  * Shear (lb/sq ft)        *    0.01  *    0.08  *
  0.01   *
* Alpha                    *     1.06  * Stream Power (lb/ft s)  *    0.00  *    0.33  *
  0.00   *
* Frctn Loss (ft)          *     0.03  * Cum Volume (acre-ft)    *   11.75  *   83.09  *
 30.89   *
* C & E Loss (ft)          *     0.01  * Cum SA (acres)          *    3.02  *    6.49  *
 13.10   *
*******************************************************************************************
***********

Warning: The cross-section end points had to be extended vertically for the computed
water surface.

CROSS SECTION


RIVER: DAWSONS CREEK
REACH: DAWSONS CREEK        RS: 6010

INPUT
Description: 570 FEET DOWNSTREAM OF UNNAMED ROAD
Station Elevation Data      num=        17
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
****************************************************************************************
       0       25       32       30       45       35       86       35       95       30
     115       25      136       20      150       15      167       10      172        9
     185      3.5      197        9      200       10      224       22      268       25
     315       25      400       25

Manning's n Values          num=        3
     Sta    n Val      Sta    n Val      Sta    n Val
```

```
**************************************************
      0       .1     115     .02     224      .1

Bank Sta: Left   Right    Lengths: Left Channel   Right      Coeff Contr.    Expan.
          115     224                290     350     430             .1         .3

CROSS SECTION OUTPUT  Profile #100-Year
************************************************************************************
***********
* E.G. Elev (ft)           *    24.72  * Element                 *  Left OB *  Channel *
Right OB *
* Vel Head (ft)            *     0.26  * Wt. n-Val.              *          *   0.020  *
  0.100  *
* W.S. Elev (ft)           *    24.46  * Reach Len. (ft)         *  290.00  *  350.00  *
 430.00  *
* Crit W.S. (ft)           *           * Flow Area (sq ft)       *          * 1120.70  *
 44.44  *
* E.G. Slope (ft/ft)       *0.000142   * Area (sq ft)            *          * 1120.70  *
 44.44  *
* Q Total (cfs)            * 4556.00   * Flow (cfs)              *          * 4546.97  *
  9.03  *
* Top Width (ft)           *   142.85  * Top Width (ft)          *          *  106.74  *
 36.11  *
* Vel Total (ft/s)         *     3.91  * Avg. Vel. (ft/s)        *          *    4.06  *
  0.20  *
* Max Chl Dpth (ft)        *    20.96  * Hydr. Depth (ft)        *          *   10.50  *
  1.23  *
* Conv. Total (cfs)        *382276.9   * Conv. (cfs)             *          *381519.5  *
 757.3  *
* Length Wtd. (ft)         *   350.62  * Wetted Per. (ft)        *          *  114.26  *
 36.19  *
* Min Ch El (ft)           *     3.50  * Shear (lb/sq ft)        *          *    0.09  *
  0.01  *
* Alpha                    *     1.07  * Stream Power (lb/ft s)  *          *    0.35  *
  0.00  *
* Frctn Loss (ft)          *     0.01  * Cum Volume (acre-ft)    *    8.90  *   71.40  *
 18.63  *
* C & E Loss (ft)          *     0.06  * Cum SA (acres)          *    2.61  *    5.89  *
 10.44  *
************************************************************************************
***********

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)
is less than
         0.7 or greater than 1.4.  This may indicate the need for additional cross
sections.

CROSS SECTION OUTPUT  Profile #50-Year
************************************************************************************
***********
* E.G. Elev (ft)           *    24.06  * Element                 *  Left OB *  Channel *
Right OB *
* Vel Head (ft)            *     0.18  * Wt. n-Val.              *          *   0.020  *
  0.100  *
* W.S. Elev (ft)           *    23.88  * Reach Len. (ft)         *  290.00  *  350.00  *
 430.00  *
* Crit W.S. (ft)           *           * Flow Area (sq ft)       *          * 1059.03  *
 25.85  *
* E.G. Slope (ft/ft)       *0.000105   * Area (sq ft)            *          * 1059.03  *
 25.85  *
* Q Total (cfs)            * 3623.00   * Flow (cfs)              *          * 3619.23  *
  3.78  *
* Top Width (ft)           *   131.82  * Top Width (ft)          *          *  104.28  *
```

```
 27.53  *
* Vel Total (ft/s)     *    3.34  * Avg. Vel. (ft/s)       *        *    3.42  *
 0.15  *
* Max Chl Dpth (ft)    *   20.38  * Hydr. Depth (ft)       *        *   10.16  *
 0.94  *
* Conv. Total (cfs)    *352748.8  * Conv. (cfs)            *        *352381.2  *
 367.6  *
* Length Wtd. (ft)     *  350.43  * Wetted Per. (ft)       *        *  111.74  *
 27.60  *
* Min Ch El (ft)       *    3.50  * Shear (lb/sq ft)       *        *    0.06  *
 0.01  *
* Alpha                *    1.05  * Stream Power (lb/ft s) *        *    0.21  *
 0.00  *
* Frctn Loss (ft)      *    0.01  * Cum Volume (acre-ft)   *   7.39 *   67.86  *
 12.92  *
* C & E Loss (ft)      *    0.04  * Cum SA (acres)         *   2.40 *    5.88  *
 8.57  *
*******************************************************************************
***********
```

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

```
CROSS SECTION OUTPUT  Profile #500-Year
*******************************************************************************
***********
* E.G. Elev (ft)       *   25.76  * Element                * Left OB * Channel *
Right OB *
* Vel Head (ft)        *    0.32  * Wt. n-Val.             *  0.100 *   0.020  *
 0.100  *
* W.S. Elev (ft)       *   25.44  * Reach Len. (ft)        * 290.00 *  350.00  *
 430.00  *
* Crit W.S. (ft)       *          * Flow Area (sq ft)      *   1.00 * 1226.67  *
 143.37  *
* E.G. Slope (ft/ft)   *0.000164  * Area (sq ft)           *   1.00 * 1226.67  *
 143.37  *
* Q Total (cfs)        * 5629.00  * Flow (cfs)             *   0.06 * 5605.18  *
 23.75  *
* Top Width (ft)       *  289.57  * Top Width (ft)         *   4.57 *  109.00  *
 176.00  *
* Vel Total (ft/s)     *    4.11  * Avg. Vel. (ft/s)       *   0.06 *    4.57  *
 0.17  *
* Max Chl Dpth (ft)    *   21.94  * Hydr. Depth (ft)       *   0.22 *   11.25  *
 0.81  *
* Conv. Total (cfs)    *439468.4  * Conv. (cfs)            *    5.1 *437609.0  *
 1854.4  *
* Length Wtd. (ft)     *  351.00  * Wetted Per. (ft)       *   5.10 *  116.58  *
 176.54  *
* Min Ch El (ft)       *    3.50  * Shear (lb/sq ft)       *   0.00 *    0.11  *
 0.01  *
* Alpha                *    1.23  * Stream Power (lb/ft s) *   0.00 *    0.49  *
 0.00  *
* Frctn Loss (ft)      *    0.02  * Cum Volume (acre-ft)   *  11.73 *   77.28  *
 30.48  *
* C & E Loss (ft)      *    0.08  * Cum SA (acres)         *   2.99 *    5.90  *
 12.63  *
*******************************************************************************
***********
```

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed

water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: DAWSONS CREEK
REACH: DAWSONS CREEK RS: 5660

INPUT
Description: 920 FEET DOWNSTREAM OF UNNAMED ROAD
Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	25	113	20	122	19	135	18	142	17
150	15	174	5	176	4	190	3.5	200	4
210	5	244	10	270	15	305	20	333	21
394	22	510	22	525	23	570	24	600	25

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	113	.02	305	.1

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
113	305	180	160	130	.1	.3

CROSS SECTION OUTPUT Profile #100-Year

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	24.64				
Vel Head (ft)	0.05	Wt. n-Val.	0.100	0.020	0.100
W.S. Elev (ft)	24.59	Reach Len. (ft)	180.00	160.00	130.00
Crit W.S. (ft)		Flow Area (sq ft)	238.23	2478.58	689.51
E.G. Slope (ft/ft)	0.000020	Area (sq ft)	238.23	2478.58	689.51
Q Total (cfs)	4556.00	Flow (cfs)	27.38	4446.09	82.53
Top Width (ft)	578.52	Top Width (ft)	103.77	192.00	282.75
Vel Total (ft/s)	1.34	Avg. Vel. (ft/s)	0.11	1.79	0.12
Max Chl Dpth (ft)	21.09	Hydr. Depth (ft)	2.30	12.91	2.44
Conv. Total (cfs)	1024538.0	Conv. (cfs)	6156.4	999823.1	18558.8
Length Wtd. (ft)	159.42	Wetted Per. (ft)	103.87	195.92	282.83
Min Ch El (ft)	3.50	Shear (lb/sq ft)	0.00	0.02	0.00
Alpha	1.76	Stream Power (lb/ft s)	0.00	0.03	0.00
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	8.11	56.94	15.01
C & E Loss (ft)	0.01	Cum SA (acres)	2.26	4.69	8.87

****
****

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)
is less than
0.7 or greater than 1.4. This may indicate the need for additional cross
sections.

CROSS SECTION OUTPUT Profile #50-Year
****
****
* E.G. Elev (ft) * 24.00 * Element * Left OB * Channel *
Right OB *
* Vel Head (ft) * 0.03 * Wt. n-Val. * 0.100 * 0.020 *
0.100 *
* W.S. Elev (ft) * 23.97 * Reach Len. (ft) * 180.00 * 160.00 *
130.00 *
* Crit W.S. (ft) * * Flow Area (sq ft) * 177.99 * 2359.00 *
519.24 *
* E.G. Slope (ft/ft) *0.000015 * Area (sq ft) * 177.99 * 2359.00 *
519.24 *
* Q Total (cfs) * 3623.00 * Flow (cfs) * 16.14 * 3559.99 *
46.87 *
* Top Width (ft) * 545.29 * Top Width (ft) * 89.69 * 192.00 *
263.59 *
* Vel Total (ft/s) * 1.19 * Avg. Vel. (ft/s) * 0.09 * 1.51 *
0.09 *
* Max Chl Dpth (ft) * 20.47 * Hydr. Depth (ft) * 1.98 * 12.29 *
1.97 *
* Conv. Total (cfs) *937024.9 * Conv. (cfs) * 4173.6 *920729.3 *
12122.0 *
* Length Wtd. (ft) * 159.63 * Wetted Per. (ft) * 89.78 * 195.92 *
263.66 *
* Min Ch El (ft) * 3.50 * Shear (lb/sq ft) * 0.00 * 0.01 *
0.00 *
* Alpha * 1.59 * Stream Power (lb/ft s) * 0.00 * 0.02 *
0.00 *
* Frctn Loss (ft) * 0.00 * Cum Volume (acre-ft) * 6.80 * 54.13 *
10.23 *
* C & E Loss (ft) * 0.01 * Cum SA (acres) * 2.10 * 4.69 *
7.13 *
****
****

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)
is less than
0.7 or greater than 1.4. This may indicate the need for additional cross
sections.

CROSS SECTION OUTPUT Profile #500-Year
****
****
* E.G. Elev (ft) * 25.67 * Element * Left OB * Channel *
Right OB *
* Vel Head (ft) * 0.06 * Wt. n-Val. * 0.100 * 0.020 *
0.100 *
* W.S. Elev (ft) * 25.61 * Reach Len. (ft) * 180.00 * 160.00 *
130.00 *
* Crit W.S. (ft) * * Flow Area (sq ft) * 350.93 * 2673.27 *
986.14 *
* E.G. Slope (ft/ft) *0.000023 * Area (sq ft) * 350.93 * 2673.27 *
986.14 *
* Q Total (cfs) * 5629.00 * Flow (cfs) * 52.82 * 5419.86 *

```
 156.31  *
* Top Width (ft)         *  600.00  * Top Width (ft)          *  113.00  *  192.00  *
 295.00  *
* Vel Total (ft/s)       *    1.40  * Avg. Vel. (ft/s)        *    0.15  *    2.03  *
  0.16  *
* Max Chl Dpth (ft)      *   22.11  * Hydr. Depth (ft)        *    3.11  *   13.92  *
  3.34  *
* Conv. Total (cfs)      *1177876.0  * Conv. (cfs)            * 11053.0  *1134114.0
* 32709.1  *
* Length Wtd. (ft)       *  159.03  * Wetted Per. (ft)        *  113.72  *  195.92  *
 295.69  *
* Min Ch El (ft)         *    3.50  * Shear (lb/sq ft)        *    0.00  *    0.02  *
  0.00  *
* Alpha                  *    2.01  * Stream Power (lb/ft s)  *    0.00  *    0.04  *
  0.00  *
* Frctn Loss (ft)        *    0.01  * Cum Volume (acre-ft)    *   10.55  *   61.61  *
 24.91  *
* C & E Loss (ft)        *    0.01  * Cum SA (acres)          *    2.60  *    4.69  *
 10.31  *
*****************************************************************************************
***********
```

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
        0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: DAWSONS CREEK
REACH: DAWSONS CREEK   RS: 5500

INPUT
Description: 1080 FEET DOWNSTREAM OF UNNAMED ROAD

```
Station Elevation Data      num=        15
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
*****************************************************************************************
       0       28       14       25       24       20       34       19       49       18
      82       10       85        9       98      3.5      111        9      114       10
     158       21      272       22      430       23      472       24      500       25

Manning's n Values          num=         3
     Sta    n Val      Sta    n Val      Sta    n Val
****************************************************
       0       .1       49      .02      158       .1

Bank Sta: Left   Right    Lengths: Left Channel   Right      Coeff Contr.    Expan.
            49     158              500      500     500                .1        .3

CROSS SECTION OUTPUT  Profile #100-Year
*****************************************************************************************
***********
* E.G. Elev (ft)         *   24.62  * Element                 *  Left OB *  Channel *
Right OB *
* Vel Head (ft)          *    0.17  * Wt. n-Val.              *   0.100  *   0.020  *
  0.100  *
* W.S. Elev (ft)         *   24.46  * Reach Len. (ft)         *  500.00  *  500.00  *
 500.00  *
* Crit W.S. (ft)         *          * Flow Area (sq ft)       *  158.81  * 1302.39  *
 689.65  *
```

```
* E.G. Slope (ft/ft)      *0.000078  * Area (sq ft)         *  158.81  * 1302.39  *
 689.65   *
* Q Total (cfs)           * 4556.00  * Flow (cfs)           *   57.22  * 4349.51  *
 149.27   *
* Top Width (ft)          *  469.73  * Top Width (ft)       *   33.92  *  109.00  *
 326.82   *
* Vel Total (ft/s)        *    2.12  * Avg. Vel. (ft/s)     *    0.36  *    3.34  *
   0.22   *
* Max Chl Dpth (ft)       *   20.96  * Hydr. Depth (ft)     *    4.68  *   11.95  *
   2.11   *
* Conv. Total (cfs)       *514533.1  * Conv. (cfs)          *  6461.6  *491213.3  *
16858.2   *
* Length Wtd. (ft)        *  500.00  * Wetted Per. (ft)     *   35.05  *  113.87  *
 326.84   *
* Min Ch El (ft)          *    3.50  * Shear (lb/sq ft)     *    0.02  *    0.06  *
   0.01   *
* Alpha                   *    2.37  * Stream Power (lb/ft s) * 0.01   *    0.19  *
   0.00   *
* Frctn Loss (ft)         *    0.02  * Cum Volume (acre-ft) *    7.29  *   49.99  *
  12.95   *
* C & E Loss (ft)         *    0.03  * Cum SA (acres)       *    1.98  *    4.14  *
   7.96   *
*********************************************************************************
***********

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)
is less than
        0.7 or greater than 1.4.  This may indicate the need for additional cross
sections.

CROSS SECTION OUTPUT  Profile #50-Year
*********************************************************************************
***********
* E.G. Elev (ft)          *   23.99  * Element              *  Left OB *  Channel *
Right OB *
* Vel Head (ft)           *    0.12  * Wt. n-Val.           *   0.100  *   0.020  *
  0.100   *
* W.S. Elev (ft)          *   23.87  * Reach Len. (ft)      *  500.00  *  500.00  *
 500.00   *
* Crit W.S. (ft)          *          * Flow Area (sq ft)    *  139.25  * 1238.41  *
 502.76   *
* E.G. Slope (ft/ft)      *0.000060  * Area (sq ft)         *  139.25  * 1238.41  *
 502.76   *
* Q Total (cfs)           * 3623.00  * Flow (cfs)           *   41.28  * 3501.53  *
  80.19   *
* Top Width (ft)          *  450.31  * Top Width (ft)       *   32.74  *  109.00  *
 308.57   *
* Vel Total (ft/s)        *    1.93  * Avg. Vel. (ft/s)     *    0.30  *    2.83  *
   0.16   *
* Max Chl Dpth (ft)       *   20.37  * Hydr. Depth (ft)     *    4.25  *   11.36  *
   1.63   *
* Conv. Total (cfs)       *467325.8  * Conv. (cfs)          *  5324.0  *451658.2  *
10343.7   *
* Length Wtd. (ft)        *  500.00  * Wetted Per. (ft)     *   33.74  *  113.87  *
 308.59   *
* Min Ch El (ft)          *    3.50  * Shear (lb/sq ft)     *    0.02  *    0.04  *
   0.01   *
* Alpha                   *    2.08  * Stream Power (lb/ft s) * 0.00   *    0.12  *
   0.00   *
* Frctn Loss (ft)         *    0.02  * Cum Volume (acre-ft) *    6.14  *   47.52  *
   8.71   *
* C & E Loss (ft)         *    0.02  * Cum SA (acres)       *    1.85  *    4.14  *
   6.27   *
```

```
***********************************************************************************************
***********

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)
is less than
        0.7 or greater than 1.4.  This may indicate the need for additional cross
sections.

CROSS SECTION OUTPUT  Profile #500-Year
***********************************************************************************************
***********
* E.G. Elev (ft)          *     25.65  * Element                  *  Left OB *  Channel *
Right OB *
* Vel Head (ft)           *      0.20  * Wt. n-Val.               *    0.100 *    0.020 *
  0.100  *
* W.S. Elev (ft)          *     25.45  * Reach Len. (ft)          *   500.00 *   500.00 *
 500.00  *
* Crit W.S. (ft)          *            * Flow Area (sq ft)        *   193.55 *  1410.04 *
1023.30  *
* E.G. Slope (ft/ft)      *0.000088    * Area (sq ft)             *   193.55 *  1410.04 *
1023.30  *
* Q Total (cfs)           *  5629.00   * Flow (cfs)               *    79.24 *  5254.19 *
 295.57  *
* Top Width (ft)          *   488.08   * Top Width (ft)           *    37.08 *   109.00 *
 342.00  *
* Vel Total (ft/s)        *     2.14   * Avg. Vel. (ft/s)         *     0.41 *     3.73 *
   0.29  *
* Max Chl Dpth (ft)       *    21.95   * Hydr. Depth (ft)         *     5.22 *    12.94 *
   2.99  *
* Conv. Total (cfs)       *600732.1    * Conv. (cfs)              *   8456.2 *560732.4  *
31543.4  *
* Length Wtd. (ft)        *   500.00   * Wetted Per. (ft)         *    38.39 *   113.87 *
 342.48  *
* Min Ch El (ft)          *     3.50   * Shear (lb/sq ft)         *     0.03 *     0.07 *
   0.02  *
* Alpha                   *     2.82   * Stream Power (lb/ft s)   *     0.01 *     0.25 *
   0.00  *
* Frctn Loss (ft)         *     0.02   * Cum Volume (acre-ft)     *     9.43 *    54.11 *
  21.91  *
* C & E Loss (ft)         *     0.03   * Cum SA (acres)           *     2.29 *     4.14 *
   9.36  *
***********************************************************************************************
***********

Warning: The cross-section end points had to be extended vertically for the computed
water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)
is less than
        0.7 or greater than 1.4.  This may indicate the need for additional cross
sections.

CROSS SECTION


RIVER: DAWSONS CREEK
REACH: DAWSONS CREEK        RS: 5000

INPUT
Description:
Station Elevation Data    num=       19
     Sta     Elev     Sta     Elev     Sta     Elev     Sta     Elev     Sta     Elev
*******************************************************************************************
       0       19      40       20      55       25      71       30      76       31
```

```
   125       30      160       20      180       15      198      10      205        8
   225      3.5      245        8      280       10      295      15      322       20
   330       21      372       22      406       23      700      25

Manning's n Values        num=         3
   Sta    n Val    Sta    n Val     Sta    n Val
*************************************************
     0      .1      160     .02      322      .1

Bank Sta: Left   Right   Lengths: Left Channel   Right      Coeff Contr.   Expan.
           160    322              200     200    200                .1       .3

CROSS SECTION OUTPUT  Profile #100-Year
**************************************************************************************
***********
* E.G. Elev (ft)          *    24.57  * Element                * Left OB *  Channel *
Right OB *
* Vel Head (ft)           *     0.07  * Wt. n-Val.             *  0.100  *   0.020  *
 0.100   *
* W.S. Elev (ft)          *    24.50  * Reach Len. (ft)        * 200.00  *  200.00  *
200.00   *
* Crit W.S. (ft)          *           * Flow Area (sq ft)      * 266.16  * 2126.81  *
392.89   *
* E.G. Slope (ft/ft)      *0.000027   * Area (sq ft)           * 266.16  * 2126.81  *
392.89   *
* Q Total (cfs)           * 4556.00   * Flow (cfs)             *  48.13  * 4472.18  *
 35.69   *
* Top Width (ft)          *   536.51  * Top Width (ft)         *  69.28  *  162.00  *
305.23   *
* Vel Total (ft/s)        *     1.64  * Avg. Vel. (ft/s)       *   0.18  *    2.10  *
 0.09    *
* Max Chl Dpth (ft)       *    21.00  * Hydr. Depth (ft)       *   3.84  *   13.13  *
 1.29    *
* Conv. Total (cfs)       *881733.4   * Conv. (cfs)            * 9315.5  *865511.1  *
6906.8   *
* Length Wtd. (ft)        *   200.00  * Wetted Per. (ft)       *  76.16  *  165.90  *
305.33   *
* Min Ch El (ft)          *     3.50  * Shear (lb/sq ft)       *   0.01  *    0.02  *
 0.00    *
* Alpha                   *     1.62  * Stream Power (lb/ft s) *   0.00  *    0.04  *
 0.00    *
* Frctn Loss (ft)         *     0.01  * Cum Volume (acre-ft)   *   4.85  *   30.31  *
 6.74    *
* C & E Loss (ft)         *     0.00  * Cum SA (acres)         *   1.39  *    2.58  *
 4.33    *
**************************************************************************************
***********

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed
water surface.

CROSS SECTION OUTPUT  Profile #50-Year
**************************************************************************************
***********
* E.G. Elev (ft)          *    23.95  * Element                * Left OB *  Channel *
Right OB *
* Vel Head (ft)           *     0.05  * Wt. n-Val.             *  0.100  *   0.020  *
 0.100   *
* W.S. Elev (ft)          *    23.91  * Reach Len. (ft)        * 200.00  *  200.00  *
200.00   *
* Crit W.S. (ft)          *           * Flow Area (sq ft)      * 225.79  * 2029.68  *
236.31   *
```

```
* E.G. Slope (ft/ft)      *0.000020  * Area (sq ft)            *  225.79  * 2029.68  *
 236.31   *
* Q Total (cfs)           * 3623.00  * Flow (cfs)              *   33.00  * 3573.43  *
 16.58   *
* Top Width (ft)          *  444.49  * Top Width (ft)          *   65.39  *  162.00  *
 217.10   *
* Vel Total (ft/s)        *    1.45  * Avg. Vel. (ft/s)        *    0.15  *    1.76  *
  0.07   *
* Max Chl Dpth (ft)       *   20.41  * Hydr. Depth (ft)        *    3.45  *   12.53  *
  1.09   *
* Conv. Total (cfs)       *811751.3  * Conv. (cfs)             *  7393.0  *800643.8  *
 3714.6   *
* Length Wtd. (ft)        *  200.00  * Wetted Per. (ft)        *   71.48  *  165.90  *
 217.19   *
* Min Ch El (ft)          *    3.50  * Shear (lb/sq ft)        *    0.00  *    0.02  *
  0.00   *
* Alpha                   *    1.45  * Stream Power (lb/ft s) *    0.00  *    0.03  *
  0.00   *
* Frctn Loss (ft)         *    0.00  * Cum Volume (acre-ft)    *    4.05  *   28.77  *
  4.47   *
* C & E Loss (ft)         *    0.00  * Cum SA (acres)          *    1.29  *    2.58  *
  3.26   *
**************************************************************************************
***********

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed
water surface.

CROSS SECTION OUTPUT  Profile #500-Year
**************************************************************************************
***********
* E.G. Elev (ft)          *   25.59  * Element                 *  Left OB *  Channel *
Right OB *
* Vel Head (ft)           *    0.09  * Wt. n-Val.              *   0.100  *   0.020  *
 0.100   *
* W.S. Elev (ft)          *   25.50  * Reach Len. (ft)         *  200.00  *  200.00  *
 200.00   *
* Crit W.S. (ft)          *          * Flow Area (sq ft)       *  338.48  * 2288.30  *
 751.69   *
* E.G. Slope (ft/ft)      *0.000031  * Area (sq ft)            *  338.48  * 2288.30  *
 751.69   *
* Q Total (cfs)           * 5629.00  * Flow (cfs)              *   72.57  * 5457.94  *
 98.49   *
* Top Width (ft)          *  615.86  * Top Width (ft)          *   75.86  *  162.00  *
 378.00   *
* Vel Total (ft/s)        *    1.67  * Avg. Vel. (ft/s)        *    0.21  *    2.39  *
  0.13   *
* Max Chl Dpth (ft)       *   22.00  * Hydr. Depth (ft)        *    4.46  *   14.13  *
  1.99   *
* Conv. Total (cfs)       *1008438.0  * Conv. (cfs)             * 13000.9  *977792.6
* 17644.6   *
* Length Wtd. (ft)        *  200.00  * Wetted Per. (ft)        *   84.04  *  165.90  *
 378.60   *
* Min Ch El (ft)          *    3.50  * Shear (lb/sq ft)        *    0.01  *    0.03  *
  0.00   *
* Alpha                   *    1.99  * Stream Power (lb/ft s) *    0.00  *    0.06  *
  0.00   *
* Frctn Loss (ft)         *    0.01  * Cum Volume (acre-ft)    *    6.38  *   32.89  *
 11.72   *
* C & E Loss (ft)         *    0.00  * Cum SA (acres)          *    1.64  *    2.58  *
  5.22   *
**************************************************************************************
```

****

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.

CROSS SECTION

RIVER: DAWSONS CREEK
REACH: DAWSONS CREEK   RS: 4800

INPUT
Description:
Station Elevation Data   num=   20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	19	78	20	94	25	118	25	150	20
159	19	180	17	190	15	200	11	208	10
230	9	238	8	250	3.5	275	8	280	10
302	15	314	20	320	22	345	23	700	25

Manning's n Values   num=   3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	150	.02	314	.1

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
150	314	400	400	400	.1	.3

CROSS SECTION OUTPUT Profile #100-Year

			Left OB	Channel	Right OB
E.G. Elev (ft)	24.57	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.07	Wt. n-Val.	0.100	0.020	0.100
W.S. Elev (ft)	24.50	Reach Len. (ft)	400.00	400.00	400.00
Crit W.S. (ft)		Flow Area (sq ft)	486.85	2070.28	269.83
E.G. Slope (ft/ft)	0.000029	Area (sq ft)	486.85	2070.28	269.83
Q Total (cfs)	4556.00	Flow (cfs)	98.46	4437.18	20.37
Top Width (ft)	581.91	Top Width (ft)	121.17	164.00	296.74
Vel Total (ft/s)	1.61	Avg. Vel. (ft/s)	0.20	2.14	0.08
Max Chl Dpth (ft)	21.00	Hydr. Depth (ft)	4.02	12.62	0.91
Conv. Total (cfs)	841157.4	Conv. (cfs)	18177.9	819219.1	3760.4
Length Wtd. (ft)	400.00	Wetted Per. (ft)	127.71	168.43	297.09
Min Ch El (ft)	3.50	Shear (lb/sq ft)	0.01	0.02	0.00
Alpha	1.72	Stream Power (lb/ft s)	0.00	0.05	0.00
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	3.12	20.68	5.22
C & E Loss (ft)	0.01	Cum SA (acres)	0.95	1.83	2.95

```
*************************************************************************************
***********

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed
water surface.

CROSS SECTION OUTPUT  Profile #50-Year
*************************************************************************************
***********
* E.G. Elev (ft)          *    23.95  * Element                 *  Left OB *  Channel *
Right OB *
* Vel Head (ft)           *     0.05  * Wt. n-Val.              *   0.100  *   0.020  *
  0.100  *
* W.S. Elev (ft)          *    23.90  * Reach Len. (ft)         *  400.00  *  400.00  *
 400.00  *
* Crit W.S. (ft)          *           * Flow Area (sq ft)       *  416.13  * 1972.24  *
 124.16  *
* E.G. Slope (ft/ft)      *0.000022   * Area (sq ft)            *  416.13  * 1972.24  *
 124.16  *
* Q Total (cfs)           * 3623.00   * Flow (cfs)              *   68.02  * 3548.48  *
   6.50  *
* Top Width (ft)          *   470.06  * Top Width (ft)          *  115.43  *  164.00  *
 190.63  *
* Vel Total (ft/s)        *     1.44  * Avg. Vel. (ft/s)        *    0.16  *    1.80  *
   0.05  *
* Max Chl Dpth (ft)       *    20.40  * Hydr. Depth (ft)        *    3.60  *   12.03  *
   0.65  *
* Conv. Total (cfs)       *771455.6   * Conv. (cfs)             * 14482.9  *755588.1  *
 1384.5  *
* Length Wtd. (ft)        *   400.00  * Wetted Per. (ft)        *  121.24  *  168.43  *
 190.98  *
* Min Ch El (ft)          *     3.50  * Shear (lb/sq ft)        *    0.00  *    0.02  *
   0.00  *
* Alpha                   *     1.53  * Stream Power (lb/ft s) *    0.00  *    0.03  *
   0.00  *
* Frctn Loss (ft)         *     0.01  * Cum Volume (acre-ft)    *    2.57  *   19.58  *
   3.64  *
* C & E Loss (ft)         *     0.00  * Cum SA (acres)          *    0.87  *    1.83  *
   2.32  *
*************************************************************************************
***********

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed
water surface.

CROSS SECTION OUTPUT  Profile #500-Year
*************************************************************************************
***********
* E.G. Elev (ft)          *    25.58  * Element                 *  Left OB *  Channel *
Right OB *
* Vel Head (ft)           *     0.09  * Wt. n-Val.              *   0.100  *   0.020  *
  0.100  *
* W.S. Elev (ft)          *    25.49  * Reach Len. (ft)         *  400.00  *  400.00  *
 400.00  *
* Crit W.S. (ft)          *           * Flow Area (sq ft)       *  622.93  * 2233.58  *
 631.73  *
* E.G. Slope (ft/ft)      *0.000034   * Area (sq ft)            *  622.93  * 2233.58  *
 631.73  *
* Q Total (cfs)           * 5629.00   * Flow (cfs)              *  134.82  * 5418.31  *
  75.86  *
* Top Width (ft)          *   700.00  * Top Width (ft)          *  150.00  *  164.00  *
```

```
 386.00  *
* Vel Total (ft/s)         *     1.61  * Avg. Vel. (ft/s)        *    0.22  *    2.43  *
  0.12  *
* Max Chl Dpth (ft)        *    21.99  * Hydr. Depth (ft)        *    4.15  *   13.62  *
  1.64  *
* Conv. Total (cfs)        *965873.9  * Conv. (cfs)             * 23134.4  *929721.9  *
13017.5  *
* Length Wtd. (ft)         *   400.00  * Wetted Per. (ft)        *  157.65  *  168.43  *
 386.84  *
* Min Ch El (ft)           *     3.50  * Shear (lb/sq ft)        *    0.01  *    0.03  *
  0.00  *
* Alpha                    *     2.18  * Stream Power (lb/ft s)  *    0.00  *    0.07  *
  0.00  *
* Frctn Loss (ft)          *     0.01  * Cum Volume (acre-ft)    *    4.17  *   22.50  *
  8.55  *
* C & E Loss (ft)          *     0.01  * Cum SA (acres)          *    1.12  *    1.83  *
  3.47  *
*********************************************************************************************
***********
```

Warning: The cross-section end points had to be extended vertically for the computed water surface.

CROSS SECTION

RIVER: DAWSONS CREEK
REACH: DAWSONS CREEK   RS: 4400

INPUT
Description:

```
Station Elevation Data      num=        12
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
*******************************************************************************************
       0       25       95       20      135       15      147       10      160        9
     182      3.5      200        9      208       10      230       15      330       20
     600       23      700       25

Manning's n Values          num=         3
     Sta    n Val      Sta    n Val      Sta    n Val
*******************************************************
       0       .1       95      .02      330       .1

Bank Sta: Left    Right     Lengths: Left Channel    Right      Coeff Contr.    Expan.
            95      330                 0       0        0                .1        .3
```

CROSS SECTION OUTPUT Profile #100-Year

```
*********************************************************************************************
***********
* E.G. Elev (ft)           *    24.55  * Element                 *  Left OB *  Channel *
Right OB *
* Vel Head (ft)            *     0.05  * Wt. n-Val.              *   0.100  *   0.020  *
  0.100  *
* W.S. Elev (ft)           *    24.50  * Reach Len. (ft)         *          *          *
         *
* Crit W.S. (ft)           *    12.98  * Flow Area (sq ft)       *  192.38  * 2433.00  *
 866.25  *
* E.G. Slope (ft/ft)       *0.000027  * Area (sq ft)            *  192.38  * 2433.00  *
 866.25  *
* Q Total (cfs)            * 4556.00  * Flow (cfs)              *   25.43  * 4407.29  *
 123.28  *
* Top Width (ft)           *   665.50  * Top Width (ft)          *   85.50  *  235.00  *
 345.00  *
```

```
* Vel Total (ft/s)        *     1.30  * Avg. Vel. (ft/s)        *    0.13  *     1.81  *
   0.14  *
* Max Chl Dpth (ft)       *    21.00  * Hydr. Depth (ft)        *    2.25  *    10.35  *
   2.51  *
* Conv. Total (cfs)       *878694.8   * Conv. (cfs)             *  4903.8  *850013.8   *
23777.2  *
* Length Wtd. (ft)        *           * Wetted Per. (ft)        *   85.62  *   238.60  *
 345.03  *
* Min Ch El (ft)          *     3.50  * Shear (lb/sq ft)        *    0.00  *     0.02  *
   0.00  *
* Alpha                   *     1.86  * Stream Power (lb/ft s)  *    0.00  *     0.03  *
   0.00  *
* Frctn Loss (ft)         *           * Cum Volume (acre-ft)    *          *           *
         *
* C & E Loss (ft)         *           * Cum SA (acres)          *          *           *
         *
*****************************************************************************************
***********

CROSS SECTION OUTPUT  Profile #50-Year
*****************************************************************************************
***********
* E.G. Elev (ft)          *    23.94  * Element                 *  Left OB *  Channel  *
Right OB *
* Vel Head (ft)           *     0.04  * Wt. n-Val.              *   0.100  *    0.020  *
  0.100  *
* W.S. Elev (ft)          *    23.90  * Reach Len. (ft)         *          *           *
         *
* Crit W.S. (ft)          *    12.22  * Flow Area (sq ft)       *  144.50  * 2292.00   *
 668.25  *
* E.G. Slope (ft/ft)      *0.000021   * Area (sq ft)            *  144.50  * 2292.00   *
 668.25  *
* Q Total (cfs)           * 3623.00   * Flow (cfs)              *   15.37  * 3532.38   *
  75.25  *
* Top Width (ft)          *   624.10  * Top Width (ft)          *   74.10  *   235.00  *
 315.00  *
* Vel Total (ft/s)        *     1.17  * Avg. Vel. (ft/s)        *    0.11  *     1.54  *
   0.11  *
* Max Chl Dpth (ft)       *    20.40  * Hydr. Depth (ft)        *    1.95  *     9.75  *
   2.12  *
* Conv. Total (cfs)       *789249.9   * Conv. (cfs)             *  3348.1  *769508.6   *
16393.2  *
* Length Wtd. (ft)        *           * Wetted Per. (ft)        *   74.20  *   238.60  *
 315.03  *
* Min Ch El (ft)          *     3.50  * Shear (lb/sq ft)        *    0.00  *     0.01  *
   0.00  *
* Alpha                   *     1.70  * Stream Power (lb/ft s)  *    0.00  *     0.02  *
   0.00  *
* Frctn Loss (ft)         *           * Cum Volume (acre-ft)    *          *           *
         *
* C & E Loss (ft)         *           * Cum SA (acres)          *          *           *
         *
*****************************************************************************************
***********

CROSS SECTION OUTPUT  Profile #500-Year
*****************************************************************************************
***********
* E.G. Elev (ft)          *    25.56  * Element                 *  Left OB *  Channel  *
Right OB *
* Vel Head (ft)           *     0.06  * Wt. n-Val.              *   0.100  *    0.020  *
  0.100  *
* W.S. Elev (ft)          *    25.50  * Reach Len. (ft)         *          *           *
```

```
         *
* Crit W.S. (ft)        *   13.77  * Flow Area (sq ft)      *  285.00  * 2668.00  *
1230.00   *
* E.G. Slope (ft/ft)    *0.000029  * Area (sq ft)           *  285.00  * 2668.00  *
1230.00   *
* Q Total (cfs)         * 5629.00  * Flow (cfs)             *   47.44  * 5361.57  *
 219.99   *
* Top Width (ft)        *  700.00  * Top Width (ft)         *   95.00  *  235.00  *
 370.00   *
* Vel Total (ft/s)      *    1.35  * Avg. Vel. (ft/s)       *    0.17  *    2.01  *
  0.18    *
* Max Chl Dpth (ft)     *   22.00  * Hydr. Depth (ft)       *    3.00  *   11.35  *
  3.32    *
* Conv. Total (cfs)     *1040650.0  * Conv. (cfs)            *  8770.1  *991209.5
* 40670.8   *
* Length Wtd. (ft)      *          * Wetted Per. (ft)       *   95.63  *  238.60  *
 370.54   *
* Min Ch El (ft)        *    3.50  * Shear (lb/sq ft)       *    0.01  *    0.02  *
  0.01    *
* Alpha                 *    2.12  * Stream Power (lb/ft s) *    0.00  *    0.04  *
  0.00    *
* Frctn Loss (ft)       *          * Cum Volume (acre-ft)   *          *          *
          *
* C & E Loss (ft)       *          * Cum SA (acres)         *          *          *
          *
*****************************************************************************************
***********

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SUMMARY OF MANNING'S N VALUES

River:DAWSONS CREEK

Reach	River Sta.	n1	n2	n3
DAWSONS CREEK	6200	.1	.02	.1
DAWSONS CREEK	6010	.1	.02	.1
DAWSONS CREEK	5660	.1	.02	.1
DAWSONS CREEK	5500	.1	.02	.1
DAWSONS CREEK	5000	.1	.02	.1
DAWSONS CREEK	4800	.1	.02	.1
DAWSONS CREEK	4400	.1	.02	.1

SUMMARY OF REACH LENGTHS

River: DAWSONS CREEK

Reach	River Sta.	Left	Channel	Right
DAWSONS CREEK	6200	185	190	195
DAWSONS CREEK	6010	290	350	430
DAWSONS CREEK	5660	180	160	130
DAWSONS CREEK	5500	500	500	500
DAWSONS CREEK	5000	200	200	200
DAWSONS CREEK	4800	400	400	400
DAWSONS CREEK	4400	0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: DAWSONS CREEK

Reach	River Sta.	Contr.	Expan.
DAWSONS CREEK	6200	.1	.3
DAWSONS CREEK	6010	.1	.3
DAWSONS CREEK	5660	.1	.3
DAWSONS CREEK	5500	.1	.3
DAWSONS CREEK	5000	.1	.3
DAWSONS CREEK	4800	.1	.3
DAWSONS CREEK	4400	.1	.3

Profile Output Table - Standard Table 1

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
DAWSONS CREEK	6200	100-Year	4556.00	3.50	24.55		24.75	0.000156	3.57	1281.70	185.32	0.22
DAWSONS CREEK	6200	50-Year	3623.00	3.50	23.94		24.08	0.000127	3.08	1175.82	159.25	0.20
DAWSONS CREEK	6200	500-Year	5629.00	3.50	25.56		25.80	0.000159	3.91	1484.81	205.00	0.23
DAWSONS CREEK	6010	100-Year	4556.00	3.50	24.46		24.72	0.000142	4.06	1165.14	142.85	0.22
DAWSONS CREEK	6010	50-Year	3623.00	3.50	23.88		24.06	0.000105	3.42	1084.87	131.82	0.19
DAWSONS CREEK	6010	500-Year	5629.00	3.50	25.44		25.76	0.000164	4.57	1371.05	289.57	0.24
DAWSONS CREEK	5660	100-Year	4556.00	3.50	24.59		24.64	0.000020	1.79	3406.32	578.52	0.09
DAWSONS CREEK	5660	50-Year	3623.00	3.50	23.97		24.00	0.000015	1.51	3056.23	545.29	0.08
DAWSONS CREEK	5660	500-Year	5629.00	3.50	25.61		25.67	0.000023	2.03	4010.34	600.00	0.10
DAWSONS CREEK	5500	100-Year	4556.00	3.50	24.46		24.62	0.000078	3.34	2150.85	469.73	0.17
DAWSONS CREEK	5500	50-Year	3623.00	3.50	23.87		23.99	0.000060	2.83	1880.42	450.31	0.15
DAWSONS CREEK	5500	500-Year	5629.00	3.50	25.45		25.65	0.000088	3.73	2626.89	488.08	0.18
DAWSONS CREEK	5000	100-Year	4556.00	3.50	24.50		24.57	0.000027	2.10	2785.86	536.51	0.10
DAWSONS CREEK	5000	50-Year	3623.00	3.50	23.91		23.95	0.000020	1.76	2491.79	444.49	0.09
DAWSONS CREEK	5000	500-Year	5629.00	3.50	25.50		25.59	0.000031	2.39	3378.47	615.86	0.11

```
*                   *                   *          *          *              *              *
   *          *           *          *          *              *              *
* DAWSONS CREEK * 4800        * 100-Year * 4556.00 *      3.50 *       24.50 *
   *      24.57 *    0.000029 *     2.14 *   2826.96 *    581.91 *         0.11 *
* DAWSONS CREEK * 4800        * 50-Year  * 3623.00 *      3.50 *       23.90 *
   *      23.95 *    0.000022 *     1.80 *   2512.53 *    470.06 *         0.09 *
* DAWSONS CREEK * 4800        * 500-Year * 5629.00 *      3.50 *       25.49 *
   *      25.58 *    0.000034 *     2.43 *   3488.23 *    700.00 *         0.12 *
*                   *                   *          *          *              *              *
   *          *           *          *          *              *              *
* DAWSONS CREEK * 4400        * 100-Year * 4556.00 *      3.50 *       24.50 *
12.98 *      24.55 *  0.000027 *     1.81 *    3491.63 *    665.50 *          0.10 *
* DAWSONS CREEK * 4400        * 50-Year  * 3623.00 *      3.50 *       23.90 *
12.22 *      23.94 *  0.000021 *     1.54 *    3104.75 *    624.10 *          0.09 *
* DAWSONS CREEK * 4400        * 500-Year * 5629.00 *      3.50 *       25.50 *
13.77 *      25.56 *  0.000029 *     2.01 *    4183.00 *    700.00 *          0.11 *
*************************************************************************************
*********************************************************************************

Profile Output Table - Standard Table 2
*************************************************************************************
****************************************************************
* Reach         * River Sta  * Profile  * E.G. Elev * W.S. Elev * Vel Head * Frctn
Loss * C & E Loss * Q Left * Q Channel * Q Right * Top Width *
*               *            *          *     (ft) *      (ft) *      (ft) *
(ft) *        (ft) *  (cfs) *     (cfs) *   (cfs) *      (ft) *
*************************************************************************************
****************************************************************
* DAWSONS CREEK * 6200        * 100-Year *     24.75 *     24.55 *      0.20 *
0.03 *       0.01 *    0.12 *   4555.47 *    0.41 *    185.32 *
* DAWSONS CREEK * 6200        * 50-Year  *     24.08 *     23.94 *      0.15 *
0.02 *       0.00 *         *   3623.00 *         *    159.25 *
* DAWSONS CREEK * 6200        * 500-Year *     25.80 *     25.56 *      0.24 *
0.03 *       0.01 *    2.00 *   5620.00 *    7.00 *    205.00 *
*               *            *          *          *          *          *
   *          *          *          *          *          *
* DAWSONS CREEK * 6010        * 100-Year *     24.72 *     24.46 *      0.26 *
0.01 *       0.06 *         *   4546.97 *    9.03 *    142.85 *
* DAWSONS CREEK * 6010        * 50-Year  *     24.06 *     23.88 *      0.18 *
0.01 *       0.04 *         *   3619.23 *    3.78 *    131.82 *
* DAWSONS CREEK * 6010        * 500-Year *     25.76 *     25.44 *      0.32 *
0.02 *       0.08 *    0.06 *   5605.18 *   23.75 *    289.57 *
*               *            *          *          *          *          *
   *          *          *          *          *          *
* DAWSONS CREEK * 5660        * 100-Year *     24.64 *     24.59 *      0.05 *
0.01 *       0.01 *   27.38 *   4446.09 *   82.53 *    578.52 *
* DAWSONS CREEK * 5660        * 50-Year  *     24.00 *     23.97 *      0.03 *
0.00 *       0.01 *   16.14 *   3559.99 *   46.87 *    545.29 *
* DAWSONS CREEK * 5660        * 500-Year *     25.67 *     25.61 *      0.06 *
0.01 *       0.01 *   52.82 *   5419.86 *  156.31 *    600.00 *
*               *            *          *          *          *          *
   *          *          *          *          *          *
* DAWSONS CREEK * 5500        * 100-Year *     24.62 *     24.46 *      0.17 *
0.02 *       0.03 *   57.22 *   4349.51 *  149.27 *    469.73 *
* DAWSONS CREEK * 5500        * 50-Year  *     23.99 *     23.87 *      0.12 *
0.02 *       0.02 *   41.28 *   3501.53 *   80.19 *    450.31 *
* DAWSONS CREEK * 5500        * 500-Year *     25.65 *     25.45 *      0.20 *
0.02 *       0.03 *   79.24 *   5254.19 *  295.57 *    488.08 *
*               *            *          *          *          *          *
   *          *          *          *          *          *
* DAWSONS CREEK * 5000        * 100-Year *     24.57 *     24.50 *      0.07 *
0.01 *       0.00 *   48.13 *   4472.18 *   35.69 *    536.51 *
* DAWSONS CREEK * 5000        * 50-Year  *     23.95 *     23.91 *      0.05 *
```

```
0.00 *        0.00 *  33.00 *   3573.43 *   16.58 *    444.49 *
 * DAWSONS CREEK * 5000         * 500-Year *       25.59 *      25.50 *        0.09 *
0.01 *        0.00 *  72.57 *   5457.94 *   98.49 *    615.86 *
*                *              *            *            *              *              *
   *               *        *           *           *         *
 * DAWSONS CREEK * 4800         * 100-Year *       24.57 *      24.50 *        0.07 *
0.01 *        0.01 *  98.46 *   4437.18 *   20.37 *    581.91 *
 * DAWSONS CREEK * 4800         * 50-Year  *       23.95 *      23.90 *        0.05 *
0.01 *        0.00 *  68.02 *   3548.48 *    6.50 *    470.06 *
 * DAWSONS CREEK * 4800         * 500-Year *       25.58 *      25.49 *        0.09 *
0.01 *        0.01 * 134.82 *   5418.31 *   75.86 *    700.00 *
*                *              *            *            *              *              *
   *               *        *           *           *         *
 * DAWSONS CREEK * 4400         * 100-Year *       24.55 *      24.50 *        0.05 *
   *               *  25.43 *   4407.29 *  123.28 *    665.50 *
 * DAWSONS CREEK * 4400         * 50-Year  *       23.94 *      23.90 *        0.04 *
   *               *  15.37 *   3532.38 *   75.25 *    624.10 *
 * DAWSONS CREEK * 4400         * 500-Year *       25.56 *      25.50 *        0.06 *
   *               *  47.44 *   5361.57 *  219.99 *    700.00 *
************************************************************************************************
*****************************************************************************
```

Existing Conditions

HEC-RAS Plan: Plan 05 River: DAWSONS CREEK Reach: DAWSONS CREEK

Reach	River Sta	Profile	E.G. Elev	W.S. Elev	Vel Head	Frctn Loss	C & E Loss	Q Left	Q Channel	Q Right	Top Width
			(ft)	(ft)	(ft)	(ft)	(ft)	(cfs)	(cfs)	(cfs)	(ft)
DAWSONS CREEK	6200	100-Year	24.75	$\boxed{24.55}$	0.20	0.03	0.01	0.12	4555.47	0.41	185.32
DAWSONS CREEK	6200	50-Year	24.08	23.94	0.15	0.02	0.00		3623.00		159.25
DAWSONS CREEK	6200	500-Year	25.80	25.56	0.24	0.03	0.01	2.00	5620.00	7.00	205.00
DAWSONS CREEK	6010	100-Year	24.72	24.46	0.26	0.01	0.06		4546.97	9.03	142.85
DAWSONS CREEK	6010	50-Year	24.06	23.88	0.18	0.01	0.04		3619.23	3.78	131.82
DAWSONS CREEK	6010	500-Year	25.76	25.44	0.32	0.02	0.08	0.06	5605.18	23.75	289.57
DAWSONS CREEK	5660	100-Year	24.64	24.59	0.05	0.01	0.01	27.38	4446.09	82.53	578.52
DAWSONS CREEK	5660	50-Year	24.00	23.97	0.03	0.00	0.01	16.14	3559.99	46.87	545.29
DAWSONS CREEK	5660	500-Year	25.67	25.61	0.06	0.01	0.01	52.82	5419.86	156.31	600.00
DAWSONS CREEK	5500	100-Year	24.62	24.46	0.17	0.02	0.03	57.22	4349.51	149.27	469.73
DAWSONS CREEK	5500	50-Year	23.99	23.87	0.12	0.02	0.02	41.28	3501.53	80.19	450.31
DAWSONS CREEK	5500	500-Year	25.65	25.45	0.20	0.02	0.03	79.24	5254.19	295.57	488.08
DAWSONS CREEK	5000	100-Year	24.57	24.50	0.07	0.01	0.00	48.13	4472.18	35.69	536.51
DAWSONS CREEK	5000	50-Year	23.95	23.91	0.05	0.00	0.00	33.00	3573.43	16.58	444.49
DAWSONS CREEK	5000	500-Year	25.59	25.50	0.09	0.01	0.00	72.57	5457.94	98.49	615.86
DAWSONS CREEK	4800	100-Year	24.57	24.50	0.07	0.01	0.01	98.46	4437.18	20.37	581.91
DAWSONS CREEK	4800	50-Year	23.95	23.90	0.05	0.01	0.00	68.02	3548.48	6.50	470.06
DAWSONS CREEK	4800	500-Year	25.58	25.49	0.09	0.01	0.01	134.82	5418.31	75.86	700.00
DAWSONS CREEK	4400	100-Year	24.55	24.50	0.05			25.43	4407.29	123.28	665.50
DAWSONS CREEK	4400	50-Year	23.94	23.90	0.04			15.37	3532.38	75.25	624.10
DAWSONS CREEK	4400	500-Year	25.56	25.50	0.06			47.44	5361.57	219.99	700.00

Dawson's Creek
Proposed Conditions
with Bridges
HEC-RAS Report

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

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

****

PROJECT DATA
Project Title: Perkins to Picardy Connector
Project File : DawsonCreek.prj
Run Date and Time: 6/17/2014 1:27:28 PM

Project in English units

****

PLAN DATA

Plan Title: Plan 16
Plan File : f:\00_PROJECTS\12-500\Documents\Calculations\DawsonCreek.p16

Geometry Title: Dawson's Creek with Bridge
Geometry File :
f:\00_PROJECTS\12-500\Documents\Calculations\DawsonCreek.g02

Flow Title : Dawson's Creek Flow Data
Flow File :
f:\00_PROJECTS\12-500\Documents\Calculations\DawsonCreek.f01

```
Plan Summary Information:
Number of:  Cross Sections =    7   Multiple Openings  =    0
            Culverts       =    0   Inline Structures  =    0
            Bridges        =    2   Lateral Structures =    0

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

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

****

FLOW DATA

```
Flow Title: Dawson's Creek Flow Data
Flow File : f:\00_PROJECTS\12-500\Documents\Calculations\DawsonCreek.f01

Flow Data (cfs)
************************************************************************************
*********
* River          Reach          RS      *        100-Year        50-Year
500-Year *
* DAWSONS CREEK   DAWSONS CREEK  6200    *           4556           3623
  5629 *
************************************************************************************
*********

Boundary Conditions
************************************************************************************
********************
* River          Reach          Profile          *          Upstream
    Downstream    *
************************************************************************************
********************
* DAWSONS CREEK   DAWSONS CREEK   100-Year         *
  Known WS = 24.5 *
* DAWSONS CREEK   DAWSONS CREEK   50-Year          *
  Known WS = 23.9 *
* DAWSONS CREEK   DAWSONS CREEK   500-Year         *
  Known WS = 25.5 *
************************************************************************************
********************

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

GEOMETRY DATA

Geometry Title: Dawson's Creek with Bridge
Geometry File : f:\00_PROJECTS\12-500\Documents\Calculations\DawsonCreek.g02

CROSS SECTION


RIVER: DAWSONS CREEK
REACH: DAWSONS CREEK        RS: 6200

INPUT
Description:
Station Elevation Data      num=       15
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
************************************************************************************
       0       25       10       24       28       23       45       20       58       15
      90       10       92        9      105      3.5      114        9      116       10
     135       20      136       21      152       22      171       24      205       25

Manning's n Values          num=        3
     Sta    n Val      Sta    n Val      Sta    n Val
**************************************************
       0       .1       45      .02      135       .1

Bank Sta: Left    Right    Lengths: Left Channel    Right       Coeff Contr.    Expan.
            45      135              185      190     195                 .1        .3

CROSS SECTION OUTPUT  Profile #100-Year
************************************************************************************
***********
```

```
* E.G. Elev (ft)         *    24.77  * Element                 *  Left OB *  Channel *
Right OB *
* Vel Head (ft)          *     0.25  * Wt. n-Val.              *   0.100  *   0.020  *
 0.100   *
* W.S. Elev (ft)         *    24.52  * Reach Len. (ft)         *  185.00  *  190.00  *
 195.00  *
* Crit W.S. (ft)         *           * Flow Area (sq ft)       *   70.93  * 1118.54  *
 85.66   *
* E.G. Slope (ft/ft)     *0.000113   * Area (sq ft)            *   70.93  * 1118.54  *
 85.66   *
* Q Total (cfs)          * 4556.00   * Flow (cfs)              *   16.32  * 4521.27  *
 18.41   *
* Top Width (ft)         *   183.75  * Top Width (ft)          *   40.17  *   90.00  *
 53.58   *
* Vel Total (ft/s)       *     3.57  * Avg. Vel. (ft/s)        *    0.23  *    4.04  *
  0.21   *
* Max Chl Dpth (ft)      *    21.02  * Hydr. Depth (ft)        *    1.77  *   12.43  *
  1.60   *
* Conv. Total (cfs)      *427650.3   * Conv. (cfs)             *  1531.8  *424390.1  *
 1728.3  *
* Length Wtd. (ft)       *   190.01  * Wetted Per. (ft)        *   40.49  *   96.92  *
 54.14   *
* Min Ch El (ft)         *     3.50  * Shear (lb/sq ft)        *    0.01  *    0.08  *
  0.01   *
* Alpha                  *     1.27  * Stream Power (lb/ft s)  *    0.00  *    0.33  *
  0.00   *
* Frctn Loss (ft)        *     0.02  * Cum Volume (acre-ft)    *    9.27  *   77.00  *
 17.58   *
* C & E Loss (ft)        *     0.00  * Cum SA (acres)          *    2.73  *    6.21  *
  9.92   *
***************************************************************************************
***********

CROSS SECTION OUTPUT  Profile #50-Year
***************************************************************************************
***********
* E.G. Elev (ft)         *    24.10  * Element                 *  Left OB *  Channel *
Right OB *
* Vel Head (ft)          *     0.18  * Wt. n-Val.              *   0.100  *   0.020  *
 0.100   *
* W.S. Elev (ft)         *    23.92  * Reach Len. (ft)         *  185.00  *  190.00  *
 195.00  *
* Crit W.S. (ft)         *           * Flow Area (sq ft)       *   48.71  * 1064.66  *
 59.60   *
* E.G. Slope (ft/ft)     *0.000085   * Area (sq ft)            *   48.71  * 1064.66  *
 59.60   *
* Q Total (cfs)          * 3623.00   * Flow (cfs)              *    8.51  * 3603.02  *
 11.47   *
* Top Width (ft)         *   158.76  * Top Width (ft)          *   33.53  *   90.00  *
 35.23   *
* Vel Total (ft/s)       *     3.09  * Avg. Vel. (ft/s)        *    0.17  *    3.38  *
  0.19   *
* Max Chl Dpth (ft)      *    20.42  * Hydr. Depth (ft)        *    1.45  *   11.83  *
  1.69   *
* Conv. Total (cfs)      *393039.0   * Conv. (cfs)             *   923.0  *390871.5  *
 1244.5  *
* Length Wtd. (ft)       *   190.00  * Wetted Per. (ft)        *   33.82  *   96.92  *
 35.77   *
* Min Ch El (ft)         *     3.50  * Shear (lb/sq ft)        *    0.01  *    0.06  *
  0.01   *
* Alpha                  *     1.19  * Stream Power (lb/ft s)  *    0.00  *    0.20  *
  0.00   *
* Frctn Loss (ft)        *     0.02  * Cum Volume (acre-ft)    *    7.66  *   73.25  *
```

```
  12.21   *
 * C & E Loss (ft)          *     0.00  * Cum SA (acres)           *    2.57  *    6.24  *
   7.99   *
*******************************************************************************************
***********

CROSS SECTION OUTPUT  Profile #500-Year
*******************************************************************************************
***********
 * E.G. Elev (ft)           *    25.83  * Element                  *  Left OB *  Channel *
 Right OB *
 * Vel Head (ft)            *     0.32  * Wt. n-Val.               *   0.100  *   0.020  *
  0.100   *
 * W.S. Elev (ft)           *    25.51  * Reach Len. (ft)          *  185.00  *  190.00  *
 195.00   *
 * Crit W.S. (ft)           *           * Flow Area (sq ft)        *  114.34  * 1207.68  *
 151.03   *
 * E.G. Slope (ft/ft)       *0.000132   * Area (sq ft)             *  114.34  * 1207.68  *
 151.03   *
 * Q Total (cfs)            * 5629.00   * Flow (cfs)               *   35.96  * 5550.35  *
  42.69   *
 * Top Width (ft)           *  205.00   * Top Width (ft)           *   45.00  *   90.00  *
  70.00   *
 * Vel Total (ft/s)         *     3.82  * Avg. Vel. (ft/s)         *    0.31  *    4.60  *
   0.28   *
 * Max Chl Dpth (ft)        *    22.01  * Hydr. Depth (ft)         *    2.54  *   13.42  *
   2.16   *
 * Conv. Total (cfs)        *489081.0   * Conv. (cfs)              *  3124.6  *482247.0  *
 3709.4   *
 * Length Wtd. (ft)         *  190.01   * Wetted Per. (ft)         *   45.85  *   96.92  *
  71.07   *
 * Min Ch El (ft)           *     3.50  * Shear (lb/sq ft)         *    0.02  *    0.10  *
   0.02   *
 * Alpha                    *     1.43  * Stream Power (lb/ft s)   *    0.01  *    0.47  *
   0.00   *
 * Frctn Loss (ft)          *     0.03  * Cum Volume (acre-ft)     *   12.12  *   83.15  *
  28.97   *
 * C & E Loss (ft)          *     0.00  * Cum SA (acres)           *    2.92  *    6.04  *
  12.10   *
*******************************************************************************************
***********

Warning: The cross-section end points had to be extended vertically for the computed
water surface.

CROSS SECTION


RIVER: DAWSONS CREEK
REACH: DAWSONS CREEK         RS: 6010

INPUT
Description: 570 FEET DOWNSTREAM OF UNNAMED ROAD
Station Elevation Data      num=       17
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
*******************************************************************************************
       0       25       32       30       45       35       86       35       95       30
     115       25      136       20      150       15      167       10      172        9
     185      3.5      197        9      200       10      224       22      268       25
     315       25      400       25

Manning's n Values          num=        3
     Sta    n Val      Sta    n Val      Sta    n Val
```

```
******************************************************
      0       .1     115     .02     224       .1

Bank Sta: Left   Right    Lengths: Left Channel   Right      Coeff Contr.    Expan.
           115    224              290     350     430              .1          .3
Skew Angle = 40

CROSS SECTION OUTPUT  Profile #100-Year
*****************************************************************************************
***********
* E.G. Elev (ft)          *     24.74  * Element                *  Left OB *  Channel *
Right OB *
* Vel Head (ft)           *      0.25  * Wt. n-Val.             *          *    0.020  *
  0.100   *
* W.S. Elev (ft)          *     24.49  * Reach Len. (ft)        *   80.00  *    80.00  *
  80.00   *
* Crit W.S. (ft)          *     15.13  * Flow Area (sq ft)      *          *  1123.78  *
  45.49   *
* E.G. Slope (ft/ft)      *0.000141    * Area (sq ft)           *          *  1123.78  *
  45.49   *
* Q Total (cfs)           *  4556.00   * Flow (cfs)             *          *  4546.73  *
   9.27   *
* Top Width (ft)          *   143.39   * Top Width (ft)         *          *   106.86  *
  36.53   *
* Vel Total (ft/s)        *     3.90   * Avg. Vel. (ft/s)       *          *     4.05  *
   0.20   *
* Max Chl Dpth (ft)       *    20.99   * Hydr. Depth (ft)       *          *    10.52  *
   1.25   *
* Conv. Total (cfs)       *383774.3    * Conv. (cfs)            *          *382993.0  *
  781.3   *
* Length Wtd. (ft)        *    80.00   * Wetted Per. (ft)       *          *   114.38  *
  36.62   *
* Min Ch El (ft)          *     3.50   * Shear (lb/sq ft)       *          *     0.09  *
   0.01   *
* Alpha                   *     1.08   * Stream Power (lb/ft s) *          *     0.35  *
   0.00   *
* Frctn Loss (ft)         *     0.01   * Cum Volume (acre-ft)   *    9.12  *    72.11  *
  17.29   *
* C & E Loss (ft)         *     0.00   * Cum SA (acres)         *    2.65  *     5.78  *
   9.72   *
*****************************************************************************************
***********

CROSS SECTION OUTPUT  Profile #50-Year
*****************************************************************************************
***********
* E.G. Elev (ft)          *     24.08  * Element                *  Left OB *  Channel *
Right OB *
* Vel Head (ft)           *      0.18  * Wt. n-Val.             *          *    0.020  *
  0.100   *
* W.S. Elev (ft)          *     23.90  * Reach Len. (ft)        *   80.00  *    80.00  *
  80.00   *
* Crit W.S. (ft)          *     14.15  * Flow Area (sq ft)      *          *  1061.03  *
  26.38   *
* E.G. Slope (ft/ft)      *0.000105    * Area (sq ft)           *          *  1061.03  *
  26.38   *
* Q Total (cfs)           *  3623.00   * Flow (cfs)             *          *  3619.13  *
   3.87   *
* Top Width (ft)          *   132.18   * Top Width (ft)         *          *   104.37  *
  27.82   *
* Vel Total (ft/s)        *     3.33   * Avg. Vel. (ft/s)       *          *     3.41  *
   0.15   *
* Max Chl Dpth (ft)       *    20.40   * Hydr. Depth (ft)       *          *    10.17  *
```

```
 0.95   *
* Conv. Total (cfs)       *353694.9  * Conv. (cfs)             *           *353317.2  *
 377.7   *
* Length Wtd. (ft)        *    80.00  * Wetted Per. (ft)        *           *  111.82  *
 27.88   *
* Min Ch El (ft)          *     3.50  * Shear (lb/sq ft)        *           *    0.06  *
 0.01   *
* Alpha                   *     1.05  * Stream Power (lb/ft s)  *           *    0.21  *
 0.00   *
* Frctn Loss (ft)         *     0.01  * Cum Volume (acre-ft)    *     7.55  *   68.61  *
 12.02   *
* C & E Loss (ft)         *     0.00  * Cum SA (acres)          *     2.50  *    5.82  *
 7.85   *
***************************************************************************************
***********

CROSS SECTION OUTPUT  Profile #500-Year
***************************************************************************************
***********
* E.G. Elev (ft)          *    25.80  * Element                 *  Left OB  *  Channel *
Right OB *
* Vel Head (ft)           *     0.32  * Wt. n-Val.              *    0.100  *   0.020  *
 0.100   *
* W.S. Elev (ft)          *    25.48  * Reach Len. (ft)         *    80.00  *   80.00  *
 80.00   *
* Crit W.S. (ft)          *    16.10  * Flow Area (sq ft)       *     1.21  * 1231.29  *
 150.83   *
* E.G. Slope (ft/ft)      *0.000162   * Area (sq ft)            *     1.21  * 1231.29  *
 150.83   *
* Q Total (cfs)           * 5629.00   * Flow (cfs)              *     0.08  * 5603.25  *
 25.67   *
* Top Width (ft)          *   290.01  * Top Width (ft)          *     5.01  *  109.00  *
 176.00   *
* Vel Total (ft/s)        *     4.07  * Avg. Vel. (ft/s)        *     0.07  *    4.55  *
 0.17   *
* Max Chl Dpth (ft)       *    21.98  * Hydr. Depth (ft)        *     0.24  *   11.30  *
 0.86   *
* Conv. Total (cfs)       *442383.3   * Conv. (cfs)             *      6.5  *440359.2  *
 2017.7   *
* Length Wtd. (ft)        *    80.00  * Wetted Per. (ft)        *     5.59  *  116.58  *
 176.58   *
* Min Ch El (ft)          *     3.50  * Shear (lb/sq ft)        *     0.00  *    0.11  *
 0.01   *
* Alpha                   *     1.24  * Stream Power (lb/ft s)  *     0.00  *    0.49  *
 0.00   *
* Frctn Loss (ft)         *     0.02  * Cum Volume (acre-ft)    *    11.88  *   77.83  *
 28.29   *
* C & E Loss (ft)         *     0.00  * Cum SA (acres)          *     2.81  *    5.60  *
 11.55   *
***************************************************************************************
***********
```

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.

BRIDGE

RIVER: DAWSONS CREEK
REACH: DAWSONS CREEK   RS: 5880

INPUT

Description: Proposed Connector Road Bridge
Distance from Upstream XS = 80
Deck/Roadway Width = 100
Weir Coefficient = 2.6
Bridge Deck/Roadway Skew = 40
Upstream Deck/Roadway Coordinates
num= 8

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	28.27	23.77	60	29.67	25.19	120	30.65	26.15
180	30.95	26.45	240	30.58	26.08	300	29.56	25.06
360	28.13	23.63	400	25	20.5			

Upstream Bridge Cross Section Data
Station Elevation Data num= 17

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	25	32	30	45	35	86	35	95	30
115	25	136	20	150	15	167	10	172	9
185	3.5	197	9	200	10	224	22	268	25
315	25	400	25						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	115	.02	224	.1

Bank Sta: Left Right Coeff Contr. Expan.
115 224 .1 .3
Skew Angle = 40

Downstream Deck/Roadway Coordinates
num= 8

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	28.27	23.77	60	29.67	25.19	120	30.65	26.15
180	30.95	26.45	240	30.58	26.08	300	29.56	25.06
360	28.13	23.63	500	25	20.5			

Downstream Bridge Cross Section Data
Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	25	113	20	122	19	135	18	142	17
150	15	174	5	176	4	190	3.5	200	4
210	5	244	10	270	15	305	20	333	21
394	22	510	22	525	23	570	24	600	25

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	113	.02	305	.1

Bank Sta: Left Right Coeff Contr. Expan.
113 305 .1 .3
Skew Angle = 40

Upstream Embankment side slope = 3 horiz. to 1.0 vertical
Downstream Embankment side slope = 3 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .98
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =

```
Weir crest shape                                  = Broad Crested

Number of Piers =  7

Pier Data
Pier Station     Upstream=        0    Downstream=        0
Upstream       num=       4
   Width    Elev    Width   Elev    Width   Elev    Width   Elev
*****************************************************************
      2       0        2   20.17     4.5   20.17     4.5    23.5
Downstream      num=        4
   Width    Elev    Width   Elev    Width   Elev    Width   Elev
*****************************************************************
      2       0        2   20.17     4.5   20.17     4.5    23.5

Pier Data
Pier Station     Upstream=       60    Downstream=       60
Upstream       num=       4
   Width    Elev    Width   Elev    Width   Elev    Width   Elev
*****************************************************************
      2       0        2    21.7     4.5    21.7     4.5      25
Downstream      num=        4
   Width    Elev    Width   Elev    Width   Elev    Width   Elev
*****************************************************************
      2       0        2    21.7     4.5    21.7     4.5      25

Pier Data
Pier Station     Upstream=      120    Downstream=      120
Upstream       num=       4
   Width    Elev    Width   Elev    Width   Elev    Width   Elev
*****************************************************************
      2       0        2    22.7     4.5    22.7     4.5      26
Downstream      num=        4
   Width    Elev    Width   Elev    Width   Elev    Width   Elev
*****************************************************************
      2       0        2    22.7     4.5    22.7     4.5      26

Pier Data
Pier Station     Upstream=      180    Downstream=      180
Upstream       num=       4
   Width    Elev    Width   Elev    Width   Elev    Width   Elev
*****************************************************************
      2       0        2   23.07     4.5   23.07     4.5    26.4
Downstream      num=        4
   Width    Elev    Width   Elev    Width   Elev    Width   Elev
*****************************************************************
      2       0        2   23.07     4.5   23.07     4.5    26.4

Pier Data
Pier Station     Upstream=      240    Downstream=      240
Upstream       num=       4
   Width    Elev    Width   Elev    Width   Elev    Width   Elev
*****************************************************************
      2       0        2    22.7     4.5    22.7     4.5      26
Downstream      num=        4
   Width    Elev    Width   Elev    Width   Elev    Width   Elev
*****************************************************************
      2       0        2    22.7     4.5    22.7     4.5      26

Pier Data
Pier Station     Upstream=      300    Downstream=      300
Upstream       num=       4
   Width    Elev    Width   Elev    Width   Elev    Width   Elev
```

```
************************************************************
       2        0        2   21.7     4.5   21.7     4.5     25
Downstream      num=        4
    Width   Elev    Width   Elev    Width   Elev    Width   Elev
************************************************************
       2        0        2   21.7     4.5   21.7     4.5     25

Pier Data
Pier Station      Upstream=      360    Downstream=      360
Upstream      num=        4
    Width   Elev    Width   Elev    Width   Elev    Width   Elev
************************************************************
       2        0        2  20.17     4.5  20.17     4.5   23.5
Downstream      num=        4
    Width   Elev    Width   Elev    Width   Elev    Width   Elev
************************************************************
       2        0        2  20.17     4.5  20.17     4.5   23.5

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
       Energy
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
       Energy Only

Additional Bridge Parameters
       Add Friction component to Momentum
       Do not add Weight component to Momentum
       Class B flow critical depth computations use critical depth
           inside the bridge at the upstream end
       Criteria to check for pressure flow = Upstream energy grade line

BRIDGE OUTPUT  Profile #100-Year
**********************************************************************************
*********
* E.G. US. (ft)           *       24.74  * Element                *Inside BR US
*Inside BR DS *
* W.S. US. (ft)           *       24.49  * E.G. Elev (ft)         *      24.73  *
24.65  *
* Q Total (cfs)           *     4556.00  * W.S. Elev (ft)         *      24.45  *
24.60  *
* Q Bridge (cfs)          *     4556.00  * Crit W.S. (ft)         *      15.46  *
10.75  *
* Q Weir (cfs)            *              * Max Chl Dpth (ft)      *      20.95  *
21.10  *
* Weir Sta Lft (ft)       *              * Vel Total (ft/s)       *       4.09  *
 1.55  *
* Weir Sta Rgt (ft)       *              * Flow Area (sq ft)      *    1113.49  *
2947.42  *
* Weir Submerg            *              * Froude # Chl           *       0.16  *
 0.06  *
* Weir Max Depth (ft)     *              * Specif Force (cu ft)   *    7984.49  *
19472.26  *
* Min El Weir Flow (ft)   *       25.01  * Hydr Depth (ft)        *       8.62  *
 8.43  *
* Min El Prs (ft)         *       26.45  * W.P. Total (ft)        *     183.12  *
730.50  *
* Delta EG (ft)           *        0.10  * Conv. Total (cfs)      *   299339.3  *
723800.4  *
* Delta WS (ft)           *       -0.11  * Top Width (ft)         *     129.15  *
349.80  *
```

```
* BR Open Area (sq ft)   *     1366.61  * Frctn Loss (ft)          *        0.01  *
 0.00  *
* BR Open Vel (ft/s)     *        4.09  * C & E Loss (ft)          *        0.07  *
 0.00  *
* Coef of Q              *              * Shear Total (lb/sq ft) *          0.09  *
 0.01  *
* Br Sel Method          *Energy only   * Power Total (lb/ft s)  *          0.36  *
 0.02  *
*****************************************************************************************
*********

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)
is less than
        0.7 or greater than 1.4.  This may indicate the need for additional cross
sections.
Warning: Critical depth could not be determined within the specified number of
iterations.  The program
        used the iteration with the lowest energy.

BRIDGE OUTPUT   Profile #50-Year
*****************************************************************************************
*********
* E.G. US. (ft)          *       24.08  * Element                  *Inside BR US
*Inside BR DS *
* W.S. US. (ft)          *       23.90  * E.G. Elev (ft)           *       24.07  *
24.01  *
* Q Total (cfs)          *     3623.00  * W.S. Elev (ft)           *       23.87  *
23.97  *
* Q Bridge (cfs)         *     3623.00  * Crit W.S. (ft)           *       14.49  *
 9.99  *
* Q Weir (cfs)           *              * Max Chl Dpth (ft)        *       20.37  *
20.47  *
* Weir Sta Lft (ft)      *              * Vel Total (ft/s)         *        3.48  *
 1.33  *
* Weir Sta Rgt (ft)      *              * Flow Area (sq ft)        *     1041.10  *
2719.93  *
* Weir Submerg           *              * Froude # Chl             *        0.14  *
 0.05  *
* Weir Max Depth (ft)    *              * Specif Force (cu ft)     *     7160.66  *
17613.39  *
* Min El Weir Flow (ft)  *       25.01  * Hydr Depth (ft)          *        8.66  *
 7.38  *
* Min El Prs (ft)        *       26.45  * W.P. Total (ft)          *      170.50  *
656.27  *
* Delta EG (ft)          *        0.07  * Conv. Total (cfs)        *    276883.8  *
675131.1  *
* Delta WS (ft)          *       -0.08  * Top Width (ft)           *      120.17  *
368.71  *
* BR Open Area (sq ft)   *     1366.61  * Frctn Loss (ft)          *        0.01  *
 0.00  *
* BR Open Vel (ft/s)     *        3.48  * C & E Loss (ft)          *        0.05  *
 0.00  *
* Coef of Q              *              * Shear Total (lb/sq ft) *          0.07  *
 0.01  *
* Br Sel Method          *Energy only   * Power Total (lb/ft s)  *          0.23  *
 0.01  *
*****************************************************************************************
*********

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)
is less than
        0.7 or greater than 1.4.  This may indicate the need for additional cross
sections.
```

```
Warning: Critical depth could not be determined within the specified number of
iterations.  The program
         used the iteration with the lowest energy.

BRIDGE OUTPUT  Profile #500-Year
****************************************************************************************
*********
* E.G. US. (ft)           *       25.80  * Element               *Inside BR US
*Inside BR DS *
* W.S. US. (ft)           *       25.48  * E.G. Elev (ft)        *      25.78  *
25.69   *
* Q Total (cfs)           *     5629.00  * W.S. Elev (ft)        *      25.43  *
25.62   *
* Q Bridge (cfs)          *     5628.90  * Crit W.S. (ft)        *      16.44  *
11.52   *
* Q Weir (cfs)            *              * Max Chl Dpth (ft)     *      21.93  *
22.12   *
* Weir Sta Lft (ft)       *              * Vel Total (ft/s)      *       4.47  *
 1.72   *
* Weir Sta Rgt (ft)       *              * Flow Area (sq ft)     *    1258.43  *
3277.78   *
* Weir Submerg            *              * Froude # Chl          *       0.17  *
 0.06   *
* Weir Max Depth (ft)     *              * Specif Force (cu ft)  *    9375.80  *
22749.65   *
* Min El Weir Flow (ft)   *       25.01  * Hydr Depth (ft)       *       8.02  *
11.12   *
* Min El Prs (ft)         *       26.45  * W.P. Total (ft)       *     265.88  *
873.85   *
* Delta EG (ft)           *        0.12  * Conv. Total (cfs)     *   337099.3  *
746950.2   *
* Delta WS (ft)           *       -0.13  * Top Width (ft)        *     156.98  *
294.78   *
* BR Open Area (sq ft)    *     1366.61  * Frctn Loss (ft)       *       0.01  *
 0.01   *
* BR Open Vel (ft/s)      *        4.48  * C & E Loss (ft)       *       0.08  *
 0.00   *
* Coef of Q               *              * Shear Total (lb/sq ft) *      0.08  *
 0.01   *
* Br Sel Method           *Energy only  * Power Total (lb/ft s)  *      0.37  *
 0.02   *
****************************************************************************************
*********

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)
is less than
         0.7 or greater than 1.4.  This may indicate the need for additional cross
sections.
Warning: Critical depth could not be determined within the specified number of
iterations.  The program
         used the iteration with the lowest energy.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)
is less than
         0.7 or greater than 1.4.  This may indicate the need for additional cross
sections.
Warning: Critical depth could not be determined within the specified number of
iterations.  The program
         used the iteration with the lowest energy.

CROSS SECTION


RIVER: DAWSONS CREEK
```

```
REACH: DAWSONS CREEK        RS: 5660

INPUT
Description: 920 FEET DOWNSTREAM OF UNNAMED ROAD
Station Elevation Data      num=        20
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
*****************************************************************************************
       0       25      113       20      122       19      135       18      142       17
     150       15      174        5      176        4      190      3.5      200        4
     210        5      244       10      270       15      305       20      333       21
     394       22      510       22      525       23      570       24      600       25

Manning's n Values          num=         3
     Sta    n Val      Sta    n Val      Sta    n Val
*****************************************************
       0       .1      113      .02      305       .1

Bank Sta: Left    Right     Lengths: Left Channel    Right      Coeff Contr.    Expan.
           113      305               180     160      130               .1        .3
Skew Angle = 40

CROSS SECTION OUTPUT  Profile #100-Year
*****************************************************************************************
***********
* E.G. Elev (ft)           *    24.65  * Element                 *  Left OB *  Channel *
Right OB *
* Vel Head (ft)            *     0.05  * Wt. n-Val.              *   0.100  *   0.020  *
  0.100  *
* W.S. Elev (ft)           *    24.60  * Reach Len. (ft)         *  180.00  *  160.00  *
 130.00  *
* Crit W.S. (ft)           *           * Flow Area (sq ft)       *  238.92  * 2479.85  *
 691.38  *
* E.G. Slope (ft/ft)       *0.000020   * Area (sq ft)            *  238.92  * 2479.85  *
 691.38  *
* Q Total (cfs)            * 4556.00   * Flow (cfs)              *   27.46  * 4445.76  *
  82.79  *
* Top Width (ft)           *  578.86   * Top Width (ft)          *  103.92  *  192.00  *
 282.95  *
* Vel Total (ft/s)         *     1.34  * Avg. Vel. (ft/s)        *    0.11  *    1.79  *
  0.12  *
* Max Chl Dpth (ft)        *    21.10  * Hydr. Depth (ft)        *    2.30  *   12.92  *
  2.44  *
* Conv. Total (cfs)        *1025493.0  * Conv. (cfs)             *   6180.1  *1000678.0
* 18634.2  *
* Length Wtd. (ft)         *  159.42   * Wetted Per. (ft)        *  104.02  *  195.92  *
 283.03  *
* Min Ch El (ft)           *     3.50  * Shear (lb/sq ft)        *    0.00  *    0.02  *
  0.00  *
* Alpha                    *     1.76  * Stream Power (lb/ft s)  *    0.00  *    0.03  *
  0.00  *
* Frctn Loss (ft)          *     0.01  * Cum Volume (acre-ft)    *    7.96  *   56.68  *
 14.71  *
* C & E Loss (ft)          *     0.01  * Cum SA (acres)          *    2.21  *    4.56  *
  8.75  *
*****************************************************************************************
***********

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)
is less than
        0.7 or greater than 1.4.  This may indicate the need for additional cross
sections.

CROSS SECTION OUTPUT  Profile #50-Year
```

```
*****************************************************************************************
***********
* E.G. Elev (ft)          *    24.01  * Element                * Left OB *  Channel *
Right OB *
* Vel Head (ft)           *     0.03  * Wt. n-Val.             *   0.100 *    0.020 *
  0.100  *
* W.S. Elev (ft)          *    23.97  * Reach Len. (ft)        *  180.00 *   160.00 *
 130.00  *
* Crit W.S. (ft)          *           * Flow Area (sq ft)      *  178.36 *  2359.81 *
 520.35  *
* E.G. Slope (ft/ft)      *0.000015   * Area (sq ft)           *  178.36 *  2359.81 *
 520.35  *
* Q Total (cfs)           * 3623.00   * Flow (cfs)             *   16.17 *  3559.84 *
  46.99  *
* Top Width (ft)          *  545.57   * Top Width (ft)         *   89.79 *   192.00 *
 263.78  *
* Vel Total (ft/s)        *     1.18  * Avg. Vel. (ft/s)       *    0.09 *     1.51 *
  0.09   *
* Max Chl Dpth (ft)       *    20.47  * Hydr. Depth (ft)       *    1.99 *    12.29 *
  1.97   *
* Conv. Total (cfs)       *937600.7   * Conv. (cfs)            *  4185.5 *921255.8 *
12159.5  *
* Length Wtd. (ft)        *  159.63   * Wetted Per. (ft)       *   89.88 *   195.92 *
 263.85  *
* Min Ch El (ft)          *     3.50  * Shear (lb/sq ft)       *    0.00 *     0.01 *
  0.00   *
* Alpha                   *     1.59  * Stream Power (lb/ft s) *    0.00 *     0.02 *
  0.00   *
* Frctn Loss (ft)         *     0.00  * Cum Volume (acre-ft)   *    6.67 *    53.93 *
  10.03  *
* C & E Loss (ft)         *     0.01  * Cum SA (acres)         *    2.06 *     4.61 *
  6.93   *
*****************************************************************************************
***********
```

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.

```
CROSS SECTION OUTPUT  Profile #500-Year
*****************************************************************************************
***********
* E.G. Elev (ft)          *    25.68  * Element                * Left OB *  Channel *
Right OB *
* Vel Head (ft)           *     0.06  * Wt. n-Val.             *   0.100 *    0.020 *
  0.100  *
* W.S. Elev (ft)          *    25.62  * Reach Len. (ft)        *  180.00 *   160.00 *
 130.00  *
* Crit W.S. (ft)          *           * Flow Area (sq ft)      *  352.18 *  2675.40 *
 989.42  *
* E.G. Slope (ft/ft)      *0.000023   * Area (sq ft)           *  352.18 *  2675.40 *
 989.42  *
* Q Total (cfs)           * 5629.00   * Flow (cfs)             *   53.05 *  5419.00 *
 156.94  *
* Top Width (ft)          *  600.00   * Top Width (ft)         *  113.00 *   192.00 *
 295.00  *
* Vel Total (ft/s)        *     1.40  * Avg. Vel. (ft/s)       *    0.15 *     2.03 *
  0.16   *
* Max Chl Dpth (ft)       *    22.12  * Hydr. Depth (ft)       *    3.12 *    13.93 *
  3.35   *
* Conv. Total (cfs)       *1179629.0  * Conv. (cfs)            * 11118.2 *1135621.0
* 32889.5  *
```

```
* Length Wtd. (ft)      *  159.05  * Wetted Per. (ft)       *  113.73  *  195.92  *
 295.70  *
* Min Ch El (ft)        *    3.50  * Shear (lb/sq ft)       *    0.00  *    0.02  *
 0.00  *
* Alpha                 *    2.01  * Stream Power (lb/ft s) *    0.00  *    0.04  *
 0.00  *
* Frctn Loss (ft)       *    0.01  * Cum Volume (acre-ft)   *   10.33  *   61.20  *
 24.60  *
* C & E Loss (ft)       *    0.01  * Cum SA (acres)         *    2.50  *    4.48  *
 10.30  *
************************************************************************************
***********
```

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: DAWSONS CREEK
REACH: DAWSONS CREEK   RS: 5500

INPUT
Description: 1080 FEET DOWNSTREAM OF UNNAMED ROAD
Station Elevation Data   num=   15

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	28	14	25	24	20	34	19	49	18
82	10	85	9	98	3.5	111	9	114	10
158	21	272	22	430	23	472	25	500	24

Manning's n Values   num=   3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	49	.02	158	.1

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
49	158	500	500	500	.1	.3

CROSS SECTION OUTPUT Profile #100-Year

```
************************************************************************************
***********
* E.G. Elev (ft)        *   24.63  * Element                *  Left OB * Channel  *
Right OB *
* Vel Head (ft)         *    0.17  * Wt. n-Val.             *   0.100  *   0.020  *
 0.100  *
* W.S. Elev (ft)        *   24.46  * Reach Len. (ft)        *  500.00  *  500.00  *
 500.00  *
* Crit W.S. (ft)        *          * Flow Area (sq ft)      *  159.05  * 1303.14  *
 673.90  *
* E.G. Slope (ft/ft)    *0.000078  * Area (sq ft)           *  159.05  * 1303.14  *
 673.90  *
* Q Total (cfs)         * 4556.00  * Flow (cfs)             *   57.27  * 4348.73  *
 149.99  *
* Top Width (ft)        *  458.69  * Top Width (ft)         *   33.93  *  109.00  *
 315.76  *
* Vel Total (ft/s)      *    2.13  * Avg. Vel. (ft/s)       *    0.36  *    3.34  *
 0.22  *
* Max Chl Dpth (ft)     *   20.96  * Hydr. Depth (ft)       *    4.69  *   11.96  *
```

```
 2.13  *
* Conv. Total (cfs)       *515118.3  * Conv. (cfs)           *  6475.5  *491684.1  *
16958.7  *
* Length Wtd. (ft)        *  500.00  * Wetted Per. (ft)      *   35.07  *  113.87  *
 316.28  *
* Min Ch El (ft)          *    3.50  * Shear (lb/sq ft)      *    0.02  *    0.06  *
  0.01  *
* Alpha                   *    2.34  * Stream Power (lb/ft s) *   0.01  *    0.19  *
  0.00  *
* Frctn Loss (ft)         *    0.02  * Cum Volume (acre-ft)  *    7.13  *   49.74  *
 12.68  *
* C & E Loss (ft)         *    0.03  * Cum SA (acres)        *    1.93  *    4.01  *
  7.86  *
*************************************************************************************
***********
```

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.

```
CROSS SECTION OUTPUT  Profile #50-Year
*************************************************************************************
***********
* E.G. Elev (ft)          *   23.99  * Element               *  Left OB *  Channel *
Right OB *
* Vel Head (ft)           *    0.12  * Wt. n-Val.            *   0.100  *   0.020  *
  0.100  *
* W.S. Elev (ft)          *   23.88  * Reach Len. (ft)       *  500.00  *  500.00  *
 500.00  *
* Crit W.S. (ft)          *          * Flow Area (sq ft)     *  139.40  * 1238.90  *
 496.09  *
* E.G. Slope (ft/ft)      *0.000060  * Area (sq ft)          *  139.40  * 1238.90  *
 496.09  *
* Q Total (cfs)           * 3623.00  * Flow (cfs)            *   41.30  * 3500.13  *
  81.58  *
* Top Width (ft)          *  432.13  * Top Width (ft)        *   32.75  *  109.00  *
 290.38  *
* Vel Total (ft/s)        *    1.93  * Avg. Vel. (ft/s)      *    0.30  *    2.83  *
  0.16  *
* Max Chl Dpth (ft)       *   20.38  * Hydr. Depth (ft)      *    4.26  *   11.37  *
  1.71  *
* Conv. Total (cfs)       *467819.6  * Conv. (cfs)           *  5332.3  *451953.3  *
10534.0  *
* Length Wtd. (ft)        *  500.00  * Wetted Per. (ft)      *   33.75  *  113.87  *
 290.41  *
* Min Ch El (ft)          *    3.50  * Shear (lb/sq ft)      *    0.02  *    0.04  *
  0.01  *
* Alpha                   *    2.06  * Stream Power (lb/ft s) *   0.00  *    0.12  *
  0.00  *
* Frctn Loss (ft)         *    0.02  * Cum Volume (acre-ft)  *    6.02  *   47.32  *
  8.51  *
* C & E Loss (ft)         *    0.02  * Cum SA (acres)        *    1.80  *    4.06  *
  6.10  *
*************************************************************************************
***********
```

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross

sections.

CROSS SECTION OUTPUT Profile #500-Year
```
************************************************************************************
***********
* E.G. Elev (ft)          *    25.66  * Element                 *  Left OB *  Channel *
Right OB *
* Vel Head (ft)           *     0.20  * Wt. n-Val.              *   0.100  *   0.020  *
  0.100  *
* W.S. Elev (ft)          *    25.46  * Reach Len. (ft)         *  500.00  *  500.00  *
 500.00  *
* Crit W.S. (ft)          *           * Flow Area (sq ft)       *  193.93  * 1411.16  *
1005.80  *
* E.G. Slope (ft/ft)      *0.000088   * Area (sq ft)            *  193.93  * 1411.16  *
1005.80  *
* Q Total (cfs)           * 5629.00   * Flow (cfs)              *   79.45  * 5262.84  *
 286.70  *
* Top Width (ft)          *  488.13   * Top Width (ft)          *   37.13  *  109.00  *
 342.00  *
* Vel Total (ft/s)        *     2.16  * Avg. Vel. (ft/s)        *    0.41  *    3.73  *
   0.29  *
* Max Chl Dpth (ft)       *    21.96  * Hydr. Depth (ft)        *    5.22  *   12.95  *
   2.94  *
* Conv. Total (cfs)       *600535.6   * Conv. (cfs)             *  8476.7  *561471.7  *
30587.2  *
* Length Wtd. (ft)        *   500.00  * Wetted Per. (ft)        *   38.44  *  113.87  *
 343.53  *
* Min Ch El (ft)          *     3.50  * Shear (lb/sq ft)        *    0.03  *    0.07  *
   0.02  *
* Alpha                   *     2.80  * Stream Power (lb/ft s)  *    0.01  *    0.25  *
   0.00  *
* Frctn Loss (ft)         *     0.02  * Cum Volume (acre-ft)    *    9.20  *   53.70  *
  21.62  *
* C & E Loss (ft)         *     0.03  * Cum SA (acres)          *    2.19  *    3.93  *
   9.35  *
************************************************************************************
***********
```

Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: DAWSONS CREEK
REACH: DAWSONS CREEK   RS: 5000

INPUT
Description: 100 feet upstream of Backcourt Bridge
Station Elevation Data   num=   19

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	19	40	20	55	25	71	30	76	31
125	30	160	20	180	15	198	10	205	8
225	3.5	245	8	280	10	295	15	322	20
330	21	372	22	406	23	700	25		

Manning's n Values   num=   3

Sta	n Val	Sta	n Val	Sta	n Val

```
***************************************************
      0      .1     160    .02    322     .1

Bank Sta: Left   Right   Lengths: Left Channel   Right    Coeff Contr.   Expan.
          160    322              200     200     200              .1       .3

CROSS SECTION OUTPUT  Profile #100-Year
*****************************************************************************************
***********
* E.G. Elev (ft)           *    24.58  * Element                  *  Left OB *  Channel *
Right OB *
* Vel Head (ft)            *     0.07  * Wt. n-Val.               *   0.100  *   0.020  *
  0.100  *
* W.S. Elev (ft)           *    24.51  * Reach Len. (ft)          *  100.00  *  100.00  *
 100.00  *
* Crit W.S. (ft)           *    12.04  * Flow Area (sq ft)        *  266.63  * 2127.90  *
 394.96  *
* E.G. Slope (ft/ft)       *0.000027   * Area (sq ft)             *  266.63  * 2127.90  *
 394.96  *
* Q Total (cfs)            * 4556.00   * Flow (cfs)               *   48.21  * 4471.90  *
  35.89  *
* Top Width (ft)           *   537.55  * Top Width (ft)           *   69.33  *  162.00  *
 306.23  *
* Vel Total (ft/s)         *     1.63  * Avg. Vel. (ft/s)         *    0.18  *    2.10  *
  0.09  *
* Max Chl Dpth (ft)        *    21.01  * Hydr. Depth (ft)         *    3.85  *   13.14  *
  1.29  *
* Conv. Total (cfs)        *882546.7   * Conv. (cfs)              *  9338.5  *866255.8  *
 6952.5  *
* Length Wtd. (ft)         *   100.00  * Wetted Per. (ft)         *   76.21  *  165.90  *
 306.32  *
* Min Ch El (ft)           *     3.50  * Shear (lb/sq ft)         *    0.01  *    0.02  *
  0.00  *
* Alpha                    *     1.63  * Stream Power (lb/ft s)   *    0.00  *    0.04  *
  0.00  *
* Frctn Loss (ft)          *     0.00  * Cum Volume (acre-ft)     *    4.69  *   30.04  *
  6.54  *
* C & E Loss (ft)          *     0.00  * Cum SA (acres)           *    1.34  *    2.46  *
  4.29  *
*****************************************************************************************
***********

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed
water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)
is less than
         0.7 or greater than 1.4.  This may indicate the need for additional cross
sections.

CROSS SECTION OUTPUT  Profile #50-Year
*****************************************************************************************
***********
* E.G. Elev (ft)           *    23.96  * Element                  *  Left OB *  Channel *
Right OB *
* Vel Head (ft)            *     0.05  * Wt. n-Val.               *   0.100  *   0.020  *
  0.100  *
* W.S. Elev (ft)           *    23.91  * Reach Len. (ft)          *  100.00  *  100.00  *
 100.00  *
* Crit W.S. (ft)           *    11.39  * Flow Area (sq ft)        *  226.07  * 2030.39  *
 237.26  *
* E.G. Slope (ft/ft)       *0.000020   * Area (sq ft)             *  226.07  * 2030.39  *
 237.26  *
```

```
* Q Total (cfs)         * 3623.00  * Flow (cfs)            *   33.03  * 3573.32  *
  16.65  *
* Top Width (ft)        *  445.15  * Top Width (ft)        *   65.41  *  162.00  *
 217.74  *
* Vel Total (ft/s)      *    1.45  * Avg. Vel. (ft/s)      *    0.15  *    1.76  *
  0.07  *
* Max Chl Dpth (ft)     *   20.41  * Hydr. Depth (ft)      *    3.46  *   12.53  *
  1.09  *
* Conv. Total (cfs)     *812244.3  * Conv. (cfs)           *  7406.1  *801106.1  *
 3732.1  *
* Length Wtd. (ft)      *  100.00  * Wetted Per. (ft)      *   71.52  *  165.90  *
 217.83  *
* Min Ch El (ft)        *    3.50  * Shear (lb/sq ft)      *    0.00  *    0.02  *
  0.00  *
* Alpha                 *    1.45  * Stream Power (lb/ft s) *   0.00  *    0.03  *
  0.00  *
* Frctn Loss (ft)       *    0.00  * Cum Volume (acre-ft)  *    3.92  *   28.56  *
  4.30  *
* C & E Loss (ft)       *    0.00  * Cum SA (acres)        *    1.24  *    2.50  *
  3.18  *
*************************************************************************************
***********
```

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.

```
CROSS SECTION OUTPUT  Profile #500-Year
*************************************************************************************
***********
* E.G. Elev (ft)        *   25.60  * Element               *  Left OB *  Channel *
Right OB *
* Vel Head (ft)         *    0.09  * Wt. n-Val.            *   0.100  *   0.020  *
 0.100  *
* W.S. Elev (ft)        *   25.51  * Reach Len. (ft)       *  100.00  *  100.00  *
 100.00  *
* Crit W.S. (ft)        *   12.72  * Flow Area (sq ft)     *  339.30  * 2290.06  *
 755.80  *
* E.G. Slope (ft/ft)    *0.000031  * Area (sq ft)          *  339.30  * 2290.06  *
 755.80  *
* Q Total (cfs)         * 5629.00  * Flow (cfs)            *   72.71  * 5457.05  *
  99.24  *
* Top Width (ft)        *  615.94  * Top Width (ft)        *   75.94  *  162.00  *
 378.00  *
* Vel Total (ft/s)      *    1.66  * Avg. Vel. (ft/s)      *    0.21  *    2.38  *
  0.13  *
* Max Chl Dpth (ft)     *   22.01  * Hydr. Depth (ft)      *    4.47  *   14.14  *
  2.00  *
* Conv. Total (cfs)     *1009895.0  * Conv. (cfs)          * 13044.4  *979045.7
* 17805.1  *
* Length Wtd. (ft)      *  100.00  * Wetted Per. (ft)      *   84.12  *  165.90  *
 378.61  *
* Min Ch El (ft)        *    3.50  * Shear (lb/sq ft)      *    0.01  *    0.03  *
  0.00  *
* Alpha                 *    1.99  * Stream Power (lb/ft s) *   0.00  *    0.06  *
  0.00  *
* Frctn Loss (ft)       *    0.01  * Cum Volume (acre-ft)  *    6.14  *   32.45  *
 11.51  *
* C & E Loss (ft)       *    0.00  * Cum SA (acres)        *    1.55  *    2.38  *
```

```
   5.22  *
*******************************************************************************************
***********

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed
water surface.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance)
is less than
         0.7 or greater than 1.4.  This may indicate the need for additional cross
sections.

BRIDGE


RIVER: DAWSONS CREEK
REACH: DAWSONS CREEK        RS: 4900

INPUT
Description: Backcourt Bridge
Distance from Upstream XS =        100
Deck/Roadway Width           =      40
Weir Coefficient             =     2.6
Upstream  Deck/Roadway Coordinates
    num=        8
     Sta Hi Cord Lo Cord      Sta Hi Cord Lo Cord      Sta Hi Cord Lo Cord
*******************************************************************************
      93      25   22.75    134.5   27.75    25.5    174.5   28.18   25.93
   214.5   28.08   25.83    254.5   27.41   25.16    294.5   26.16   23.91
   334.5   24.46   22.21      400      22   19.75

Upstream Bridge Cross Section Data
Station Elevation Data      num=       19
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
******************************************************************************************
       0       19       40       20       55       25       71       30       76       31
     125       30      160       20      180       15      198       10      205        8
     225      3.5      245        8      280       10      295       15      322       20
     330       21      372       22      406       23      700       25

Manning's n Values          num=        3
     Sta    n Val      Sta    n Val      Sta    n Val
*****************************************************
       0       .1      160      .02      322       .1

Bank Sta: Left    Right    Coeff Contr.    Expan.
           160     322               .1        .3

Downstream   Deck/Roadway Coordinates
    num=        8
     Sta Hi Cord Lo Cord      Sta Hi Cord Lo Cord      Sta Hi Cord Lo Cord
*******************************************************************************
      93      25   22.75    134.5   27.75    25.5    174.5   28.18   25.93
   214.5   28.08   25.83    254.5   27.41   25.16    294.5   26.16   23.91
   334.5   24.46   22.21      400      22   19.75

Downstream Bridge Cross Section Data
Station Elevation Data      num=       20
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
******************************************************************************************
       0       19       78       20       94       25      118       25      150       20
     159       19      180       17      190       15      200       11      208       10
     230        9      238        8      250      3.5      275        8      280       10
```

```
     302       15      314       20      320       22      345       23      700       25

Manning's n Values          num=       3
     Sta    n Val      Sta    n Val      Sta    n Val
******************************************************
       0       .1      150      .02      314       .1

Bank Sta: Left    Right     Coeff Contr.    Expan.
           150      314              .1        .3

Upstream Embankment side slope                  =       4 horiz. to 1.0 vertical
Downstream Embankment side slope                =       4 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =      .95
Elevation at which weir flow begins             =
Energy head used in spillway design             =
Spillway height used in design                  =
Weir crest shape                                = Broad Crested

Number of Piers =  6

Pier Data
Pier Station      Upstream=    134.5     Downstream=     134.5
Upstream       num=        4
    Width    Elev    Width    Elev    Width    Elev    Width    Elev
************************************************************************
       2        0        2   23.25      3.5   23.25      3.5    25.5
Downstream       num=        4
    Width    Elev    Width    Elev    Width    Elev    Width    Elev
************************************************************************
       2        0        2   23.25      3.5   23.25      3.5    25.5

Pier Data
Pier Station      Upstream=    174.5     Downstream=     174.5
Upstream       num=        4
    Width    Elev    Width    Elev    Width    Elev    Width    Elev
************************************************************************
       2        0        2   23.25      3.5   23.25      3.5    25.5
Downstream       num=        4
    Width    Elev    Width    Elev    Width    Elev    Width    Elev
************************************************************************
       2        0        2   23.25      3.5   23.25      3.5    25.5

Pier Data
Pier Station      Upstream=    214.5     Downstream=     214.5
Upstream       num=        4
    Width    Elev    Width    Elev    Width    Elev    Width    Elev
************************************************************************
       2        0        2   23.25      3.5   23.25      3.5    25.5
Downstream       num=        4
    Width    Elev    Width    Elev    Width    Elev    Width    Elev
************************************************************************
       2        0        2   23.25      3.5   23.25      3.5    25.5

Pier Data
Pier Station      Upstream=    254.5     Downstream=     254.5
Upstream       num=        4
    Width    Elev    Width    Elev    Width    Elev    Width    Elev
************************************************************************
       2        0        2   23.25      3.5   23.25      3.5    25.5
Downstream       num=        4
    Width    Elev    Width    Elev    Width    Elev    Width    Elev
************************************************************************
       2        0        2   23.25      3.5   23.25      3.5    25.5
```

```
Pier Data
Pier Station     Upstream=   294.5    Downstream=   294.5
Upstream      num=       4
    Width   Elev    Width   Elev    Width   Elev    Width   Elev
*****************************************************************
       2       0       2  23.25     3.5  23.25     3.5    25.5
Downstream      num=       4
    Width   Elev    Width   Elev    Width   Elev    Width   Elev
*****************************************************************
       2       0       2  23.25     3.5  23.25     3.5    25.5

Pier Data
Pier Station     Upstream=   334.5    Downstream=   334.5
Upstream      num=       4
    Width   Elev    Width   Elev    Width   Elev    Width   Elev
*****************************************************************
       2       0       2  23.25     3.5  23.25     3.5    25.5
Downstream      num=       4
    Width   Elev    Width   Elev    Width   Elev    Width   Elev
*****************************************************************
       2       0       2  23.25     3.5  23.25     3.5    25.5

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
       Energy
Selected Low Flow Methods = Highest Energy Answer

High Flow Method
       Energy Only

Additional Bridge Parameters
       Add Friction component to Momentum
       Do not add Weight component to Momentum
       Class B flow critical depth computations use critical depth
           inside the bridge at the upstream end
       Criteria to check for pressure flow = Upstream energy grade line

BRIDGE OUTPUT  Profile #100-Year
********************************************************************************
*********
* E.G. US. (ft)           *       24.58  * Element                *Inside BR US
*Inside BR DS *
* W.S. US. (ft)           *       24.51  * E.G. Elev (ft)         *      24.57  *
24.57   *
* Q Total (cfs)           *     4556.00  * W.S. Elev (ft)         *      24.50  *
24.49   *
* Q Bridge (cfs)          *     4452.19  * Crit W.S. (ft)         *      12.23  *
12.65   *
* Q Weir (cfs)            *              * Max Chl Dpth (ft)      *      21.00  *
20.99   *
* Weir Sta Lft (ft)       *              * Vel Total (ft/s)       *       1.80  *
 1.74   *
* Weir Sta Rgt (ft)       *              * Flow Area (sq ft)      *    2525.57  *
2617.08   *
* Weir Submerg            *              * Froude # Chl           *       0.07  *
 0.07   *
* Weir Max Depth (ft)     *              * Specif Force (cu ft)   *   16082.37  *
15647.20   *
* Min El Weir Flow (ft)   *       19.01  * Hydr Depth (ft)        *       5.41  *
 5.14   *
* Min El Prs (ft)         *       25.93  * W.P. Total (ft)        *     738.10  *
```

```
746.44  *
* Delta EG (ft)          *        0.01  * Conv. Total (cfs)       *   518305.0  *
511006.7  *
* Delta WS (ft)          *        0.02  * Top Width (ft)          *     466.96  *
509.52  *
* BR Open Area (sq ft)   *     2151.19  * Frctn Loss (ft)         *       0.00  *
 0.00  *
* BR Open Vel (ft/s)     *        2.22  * C & E Loss (ft)         *       0.00  *
 0.00  *
* Coef of Q              *              * Shear Total (lb/sq ft)  *       0.02  *
 0.02  *
* Br Sel Method          *Energy only   * Power Total (lb/ft s)   *       0.03  *
 0.03  *
****************************************************************************************
*********
```

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.

```
BRIDGE OUTPUT  Profile #50-Year
****************************************************************************************
*********
* E.G. US. (ft)          *       23.96  * Element                 *Inside BR US
*Inside BR DS *
* W.S. US. (ft)          *       23.91  * E.G. Elev (ft)          *      23.95  *
23.95  *
* Q Total (cfs)          *     3623.00  * W.S. Elev (ft)          *      23.90  *
23.90  *
* Q Bridge (cfs)         *     3566.69  * Crit W.S. (ft)          *      11.56  *
11.97  *
* Q Weir (cfs)           *              * Max Chl Dpth (ft)       *      20.40  *
20.40  *
* Weir Sta Lft (ft)      *              * Vel Total (ft/s)        *       1.59  *
 1.54  *
* Weir Sta Rgt (ft)      *              * Flow Area (sq ft)       *    2273.19  *
2345.40  *
* Weir Submerg           *              * Froude # Chl            *       0.06  *
 0.06  *
* Weir Max Depth (ft)    *              * Specif Force (cu ft)    *   14548.49  *
14067.68  *
* Min El Weir Flow (ft)  *       19.01  * Hydr Depth (ft)         *       6.04  *
 5.88  *
* Min El Prs (ft)        *       25.93  * W.P. Total (ft)         *     609.18  *
596.46  *
* Delta EG (ft)          *        0.01  * Conv. Total (cfs)       *   507730.3  *
496487.5  *
* Delta WS (ft)          *        0.01  * Top Width (ft)          *     376.60  *
399.04  *
* BR Open Area (sq ft)   *     2151.19  * Frctn Loss (ft)         *       0.00  *
 0.00  *
* BR Open Vel (ft/s)     *        1.86  * C & E Loss (ft)         *       0.00  *
 0.00  *
* Coef of Q              *              * Shear Total (lb/sq ft)  *       0.01  *
 0.01  *
* Br Sel Method          *Energy only   * Power Total (lb/ft s)   *       0.02  *
 0.02  *
****************************************************************************************
*********
```

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than

0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: Critical depth could not be determined within the specified number of iterations. The program
used the iteration with the lowest energy.

BRIDGE OUTPUT Profile #500-Year
```
****************************************************************************************
*********
* E.G. US. (ft)          *      25.60  * Element                    *Inside BR US
*Inside BR DS *
* W.S. US. (ft)          *      25.51  * E.G. Elev (ft)            *       25.59  *
25.59  *
* Q Total (cfs)          *    5629.00  * W.S. Elev (ft)            *       25.49  *
25.49  *
* Q Bridge (cfs)         *    5372.27  * Crit W.S. (ft)            *       12.93  *
13.34  *
* Q Weir (cfs)           *             * Max Chl Dpth (ft)         *       21.99  *
21.99  *
* Weir Sta Lft (ft)      *             * Vel Total (ft/s)          *        1.85  *
 1.77  *
* Weir Sta Rgt (ft)      *             * Flow Area (sq ft)         *     3043.92  *
3182.71  *
* Weir Submerg           *             * Froude # Chl              *        0.07  *
 0.07  *
* Weir Max Depth (ft)    *             * Specif Force (cu ft)      *    18969.44  *
18642.99  *
* Min El Weir Flow (ft)  *      19.01  * Hydr Depth (ft)           *        5.71  *
 5.47  *
* Min El Prs (ft)        *      25.93  * W.P. Total (ft)           *      886.60  *
926.76  *
* Delta EG (ft)          *       0.02  * Conv. Total (cfs)         *    514496.0  *
519528.3  *
* Delta WS (ft)          *       0.02  * Top Width (ft)            *      533.24  *
581.70  *
* BR Open Area (sq ft)   *    2151.19  * Frctn Loss (ft)           *        0.00  *
 0.00  *
* BR Open Vel (ft/s)     *       2.53  * C & E Loss (ft)           *        0.00  *
 0.00  *
* Coef of Q              *             * Shear Total (lb/sq ft)    *        0.03  *
 0.03  *
* Br Sel Method          *Energy only  * Power Total (lb/ft s)     *        0.05  *
 0.04  *
****************************************************************************************
*********
```

Warning: Critical depth could not be determined within the specified number of iterations. The program
used the iteration with the lowest energy.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: DAWSONS CREEK
REACH: DAWSONS CREEK   RS: 4800

INPUT
Description: 100 feet downstream of Backcourt Bridge
Station Elevation Data   num=   20

```
     Sta     Elev     Sta     Elev     Sta     Elev     Sta     Elev     Sta     Elev
*******************************************************************************
       0       19      78       20      94       25     118       25     150       20
     159       19     180       17     190       15     200       11     208       10
     230        9     238        8     250      3.5     275        8     280       10
     302       15     314       20     320       22     345       23     700       25

Manning's n Values          num=        3
     Sta    n Val     Sta    n Val     Sta    n Val
*************************************************
       0       .1     150      .02     314       .1

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.    Expan.
           150     314              400     400     400              .1        .3

CROSS SECTION OUTPUT  Profile #100-Year
*******************************************************************************
***********
* E.G. Elev (ft)          *     24.57  * Element                  *  Left OB *  Channel *
Right OB *
* Vel Head (ft)           *      0.07  * Wt. n-Val.               *   0.100  *   0.020  *
  0.100  *
* W.S. Elev (ft)          *     24.50  * Reach Len. (ft)          *  400.00  *  400.00  *
 400.00  *
* Crit W.S. (ft)          *            * Flow Area (sq ft)        *  486.78  * 2070.18  *
 269.65  *
* E.G. Slope (ft/ft)      *0.000029    * Area (sq ft)             *  486.78  * 2070.18  *
 269.65  *
* Q Total (cfs)           *  4556.00   * Flow (cfs)               *   98.44  * 4437.20  *
  20.35  *
* Top Width (ft)          *   581.80   * Top Width (ft)           *  121.17  *  164.00  *
 296.63  *
* Vel Total (ft/s)        *     1.61   * Avg. Vel. (ft/s)         *    0.20  *    2.14  *
  0.08  *
* Max Chl Dpth (ft)       *    21.00   * Hydr. Depth (ft)         *    4.02  *   12.62  *
  0.91  *
* Conv. Total (cfs)       *841084.2    * Conv. (cfs)              * 18173.9  *819153.2  *
 3757.1  *
* Length Wtd. (ft)        *   400.00   * Wetted Per. (ft)         *  127.70  *  168.43  *
 296.98  *
* Min Ch El (ft)          *     3.50   * Shear (lb/sq ft)         *    0.01  *    0.02  *
  0.00  *
* Alpha                   *     1.72   * Stream Power (lb/ft s)   *    0.00  *    0.05  *
  0.00  *
* Frctn Loss (ft)         *     0.01   * Cum Volume (acre-ft)     *    3.07  *   20.78  *
  5.22  *
* C & E Loss (ft)         *     0.01   * Cum SA (acres)           *    0.93  *    1.85  *
  2.95  *
*******************************************************************************
***********

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed
water surface.

CROSS SECTION OUTPUT  Profile #50-Year
*******************************************************************************
***********
* E.G. Elev (ft)          *     23.95  * Element                  *  Left OB *  Channel *
Right OB *
* Vel Head (ft)           *      0.05  * Wt. n-Val.               *   0.100  *   0.020  *
  0.100  *
* W.S. Elev (ft)          *     23.90  * Reach Len. (ft)          *  400.00  *  400.00  *
```

```
 400.00   *
* Crit W.S. (ft)          *            * Flow Area (sq ft)      *  416.08  * 1972.17  *
 124.08   *
* E.G. Slope (ft/ft)      *0.000022   * Area (sq ft)           *  416.08  * 1972.17  *
 124.08   *
* Q Total (cfs)           * 3623.00   * Flow (cfs)             *   68.01  * 3548.49  *
   6.50   *
* Top Width (ft)          *  469.99   * Top Width (ft)         *  115.43  *  164.00  *
 190.56   *
* Vel Total (ft/s)        *     1.44  * Avg. Vel. (ft/s)       *    0.16  *    1.80  *
   0.05   *
* Max Chl Dpth (ft)       *   20.40   * Hydr. Depth (ft)       *    3.60  *   12.03  *
   0.65   *
* Conv. Total (cfs)       *771409.4   * Conv. (cfs)            * 14480.6  *755545.4  *
 1383.4   *
* Length Wtd. (ft)        *  400.00   * Wetted Per. (ft)       *  121.23  *  168.43  *
 190.91   *
* Min Ch El (ft)          *     3.50  * Shear (lb/sq ft)       *    0.00  *    0.02  *
   0.00   *
* Alpha                   *     1.52  * Stream Power (lb/ft s) *    0.00  *    0.03  *
   0.00   *
* Frctn Loss (ft)         *     0.01  * Cum Volume (acre-ft)   *    2.54  *   19.67  *
   3.64   *
* C & E Loss (ft)         *     0.00  * Cum SA (acres)         *    0.85  *    1.85  *
   2.32   *
******************************************************************************************
***********

Warning: Divided flow computed for this cross-section.
Warning: The cross-section end points had to be extended vertically for the computed
water surface.

CROSS SECTION OUTPUT  Profile #500-Year
******************************************************************************************
***********
* E.G. Elev (ft)          *    25.58  * Element                *  Left OB *  Channel *
Right OB *
* Vel Head (ft)           *     0.09  * Wt. n-Val.             *   0.100  *   0.020  *
  0.100   *
* W.S. Elev (ft)          *    25.49  * Reach Len. (ft)        *  400.00  *  400.00  *
 400.00   *
* Crit W.S. (ft)          *            * Flow Area (sq ft)      *  622.80  * 2233.44  *
 631.42   *
* E.G. Slope (ft/ft)      *0.000034   * Area (sq ft)           *  622.80  * 2233.44  *
 631.42   *
* Q Total (cfs)           * 5629.00   * Flow (cfs)             *  134.80  * 5418.39  *
  75.81   *
* Top Width (ft)          *  700.00   * Top Width (ft)         *  150.00  *  164.00  *
 386.00   *
* Vel Total (ft/s)        *     1.61  * Avg. Vel. (ft/s)       *    0.22  *    2.43  *
   0.12   *
* Max Chl Dpth (ft)       *   21.99   * Hydr. Depth (ft)       *    4.15  *   13.62  *
   1.64   *
* Conv. Total (cfs)       *965762.4   * Conv. (cfs)            * 23126.9  *929628.9  *
13006.7   *
* Length Wtd. (ft)        *  400.00   * Wetted Per. (ft)       *  157.65  *  168.43  *
 386.84   *
* Min Ch El (ft)          *     3.50  * Shear (lb/sq ft)       *    0.01  *    0.03  *
   0.00   *
* Alpha                   *     2.18  * Stream Power (lb/ft s) *    0.00  *    0.07  *
   0.00   *
* Frctn Loss (ft)         *     0.01  * Cum Volume (acre-ft)   *    4.10  *   22.63  *
   8.55   *
```

```
* C & E Loss (ft)          *      0.01  * Cum SA (acres)           *    1.10  *     1.85  *
   3.47   *
***************************************************************************************
***********

Warning: The cross-section end points had to be extended vertically for the computed
water surface.

CROSS SECTION


RIVER: DAWSONS CREEK
REACH: DAWSONS CREEK        RS: 4400

INPUT
Description:
Station Elevation Data     num=        13
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
*************************************************************************************
       0       25       90       20       95       20      135       15      147       10
     160        9      182      3.5      200        9      208       10      230       15
     330       20      600       23      700       25

Manning's n Values         num=        3
     Sta    n Val      Sta    n Val      Sta    n Val
*****************************************************
       0       .1       90      .02      330       .1

Bank Sta: Left    Right    Lengths: Left Channel    Right      Coeff Contr.     Expan.
             90     330                0        0        0                .1         .3

CROSS SECTION OUTPUT  Profile #100-Year
***************************************************************************************
***********
* E.G. Elev (ft)           *     24.55  * Element                  *  Left OB *  Channel *
Right OB *
* Vel Head (ft)            *      0.05  * Wt. n-Val.               *   0.100  *    0.020  *
   0.100   *
* W.S. Elev (ft)           *     24.50  * Reach Len. (ft)          *          *           *
          *
* Crit W.S. (ft)           *     12.98  * Flow Area (sq ft)        *  182.25  *  2455.50  *
 866.25   *
* E.G. Slope (ft/ft)       *0.000027  * Area (sq ft)             *  182.25  *  2455.50  *
 866.25   *
* Q Total (cfs)            *  4556.00  * Flow (cfs)               *   24.06  *  4408.80  *
 123.14   *
* Top Width (ft)           *   666.00  * Top Width (ft)           *   81.00  *   240.00  *
 345.00   *
* Vel Total (ft/s)         *      1.30  * Avg. Vel. (ft/s)         *    0.13  *     1.80  *
   0.14   *
* Max Chl Dpth (ft)        *     21.00  * Hydr. Depth (ft)         *    2.25  *    10.23  *
   2.51   *
* Conv. Total (cfs)        *879725.8  * Conv. (cfs)              *  4645.2  *851303.4  *
23777.2   *
* Length Wtd. (ft)         *           * Wetted Per. (ft)         *   81.12  *   243.60  *
 345.03   *
* Min Ch El (ft)           *      3.50  * Shear (lb/sq ft)         *    0.00  *     0.02  *
   0.00   *
* Alpha                    *      1.85  * Stream Power (lb/ft s)   *    0.00  *     0.03  *
   0.00   *
* Frctn Loss (ft)          *           * Cum Volume (acre-ft)     *          *           *
          *
* C & E Loss (ft)          *           * Cum SA (acres)           *          *           *
```

```
     *
*************************************************************************************************
***********

CROSS SECTION OUTPUT  Profile #50-Year
*************************************************************************************************
***********
* E.G. Elev (ft)         *    23.94  * Element                *  Left OB *  Channel *
Right OB *
* Vel Head (ft)          *     0.04  * Wt. n-Val.             *   0.100  *   0.020  *
  0.100   *
* W.S. Elev (ft)         *    23.90  * Reach Len. (ft)        *          *          *
          *
* Crit W.S. (ft)         *    12.22  * Flow Area (sq ft)      *  136.89  * 2311.50  *
 668.25   *
* E.G. Slope (ft/ft)     *0.000021   * Area (sq ft)           *  136.89  * 2311.50  *
 668.25   *
* Q Total (cfs)          * 3623.00   * Flow (cfs)             *   14.56  * 3533.20  *
 75.25    *
* Top Width (ft)         *  625.20   * Top Width (ft)         *   70.20  *  240.00  *
 315.00   *
* Vel Total (ft/s)       *     1.16  * Avg. Vel. (ft/s)       *    0.11  *    1.53  *
  0.11    *
* Max Chl Dpth (ft)      *    20.40  * Hydr. Depth (ft)       *    1.95  *    9.63  *
  2.12    *
* Conv. Total (cfs)      *789299.1   * Conv. (cfs)            *  3171.6  *769734.4  *
16393.2   *
* Length Wtd. (ft)       *           * Wetted Per. (ft)       *   70.31  *  243.60  *
 315.03   *
* Min Ch El (ft)         *     3.50  * Shear (lb/sq ft)       *    0.00  *    0.01  *
  0.00    *
* Alpha                  *     1.69  * Stream Power (lb/ft s) *    0.00  *    0.02  *
  0.00    *
* Frctn Loss (ft)        *           * Cum Volume (acre-ft)   *          *          *
          *
* C & E Loss (ft)        *           * Cum SA (acres)         *          *          *
          *
*************************************************************************************************
***********

CROSS SECTION OUTPUT  Profile #500-Year
*************************************************************************************************
***********
* E.G. Elev (ft)         *    25.56  * Element                *  Left OB *  Channel *
Right OB *
* Vel Head (ft)          *     0.06  * Wt. n-Val.             *   0.100  *   0.020  *
  0.100   *
* W.S. Elev (ft)         *    25.50  * Reach Len. (ft)        *          *          *
          *
* Crit W.S. (ft)         *    13.76  * Flow Area (sq ft)      *  270.00  * 2695.50  *
1230.00   *
* E.G. Slope (ft/ft)     *0.000029   * Area (sq ft)           *  270.00  * 2695.50  *
1230.00   *
* Q Total (cfs)          * 5629.00   * Flow (cfs)             *   44.81  * 5364.78  *
 219.41   *
* Top Width (ft)         *  700.00   * Top Width (ft)         *   90.00  *  240.00  *
 370.00   *
* Vel Total (ft/s)       *     1.34  * Avg. Vel. (ft/s)       *    0.17  *    1.99  *
  0.18    *
* Max Chl Dpth (ft)      *    22.00  * Hydr. Depth (ft)       *    3.00  *   11.23  *
  3.32    *
* Conv. Total (cfs)      *1043428.0  * Conv. (cfs)            *  8306.0  *994450.9
* 40670.8   *
```

```
* Length Wtd. (ft)      *            * Wetted Per. (ft)      *    90.64  *  243.60  *
 370.54   *
* Min Ch El (ft)        *    3.50    * Shear (lb/sq ft)      *     0.01  *    0.02  *
  0.01    *
* Alpha                 *    2.10    * Stream Power (lb/ft s) *    0.00  *    0.04  *
  0.00    *
* Frctn Loss (ft)       *            * Cum Volume (acre-ft)  *           *          *
          *
* C & E Loss (ft)       *            * Cum SA (acres)        *           *          *
          *
*****************************************************************************************
***********

***************************************************************************************
```

SUMMARY OF MANNING'S N VALUES

River:DAWSONS CREEK

Reach	River Sta.	n1	n2	n3
DAWSONS CREEK	6200	.1	.02	.1
DAWSONS CREEK	6010	.1	.02	.1
DAWSONS CREEK	5880	Bridge		
DAWSONS CREEK	5660	.1	.02	.1
DAWSONS CREEK	5500	.1	.02	.1
DAWSONS CREEK	5000	.1	.02	.1
DAWSONS CREEK	4900	Bridge		
DAWSONS CREEK	4800	.1	.02	.1
DAWSONS CREEK	4400	.1	.02	.1

SUMMARY OF REACH LENGTHS

River: DAWSONS CREEK

Reach	River Sta.	Left	Channel	Right
DAWSONS CREEK	6200	185	190	195
DAWSONS CREEK	6010	290	350	430
DAWSONS CREEK	5880	Bridge		
DAWSONS CREEK	5660	180	160	130
DAWSONS CREEK	5500	500	500	500
DAWSONS CREEK	5000	200	200	200
DAWSONS CREEK	4900	Bridge		
DAWSONS CREEK	4800	400	400	400
DAWSONS CREEK	4400	0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: DAWSONS CREEK

Reach	River Sta.	Contr.	Expan.
DAWSONS CREEK	6200	.1	.3
DAWSONS CREEK	6010	.1	.3
DAWSONS CREEK	5880	Bridge	
DAWSONS CREEK	5660	.1	.3

```
*DAWSONS CREEK   *   5500    *       .1*       .3*
*DAWSONS CREEK   *   5000    *       .1*       .3*
*DAWSONS CREEK   *   4900    *Bridge  *         *
*DAWSONS CREEK   *   4800    *       .1*       .3*
*DAWSONS CREEK   *   4400    *       .1*       .3*
*****************************************************

Profile Output Table - Standard Table 1
********************************************************************************
******************************************************************************
* Reach          * River Sta  * Profile  * Q Total * Min Ch El * W.S. Elev * Crit
W.S. * E.G. Elev * E.G. Slope * Vel Chnl * Flow Area * Top Width * Froude # Chl *
*             *              *          *  (cfs) *    (ft) *      (ft) *
(ft) *      (ft) *    (ft/ft) *   (ft/s) *  (sq ft) *       (ft) *              *
********************************************************************************
******************************************************************************
* DAWSONS CREEK * 6200        * 100-Year * 4556.00 *      3.50 *     24.52 *
    *     24.77 *   0.000113 *      4.04 *   1275.13 *    183.75 *        0.20 *
* DAWSONS CREEK * 6200        * 50-Year  * 3623.00 *      3.50 *     23.92 *
    *     24.10 *   0.000085 *      3.38 *   1172.96 *    158.76 *        0.17 *
* DAWSONS CREEK * 6200        * 500-Year * 5629.00 *      3.50 *     25.51 *
    *     25.83 *   0.000132 *      4.60 *   1473.06 *    205.00 *        0.22 *
*             *              *          *          *           *           *
    *        *            *          *          *           *              *
* DAWSONS CREEK * 6010        * 100-Year * 4556.00 *      3.50 *     24.49 *
15.13 *     24.74 *   0.000141 *      4.05 *   1169.28 *    143.39 *        0.22 *
* DAWSONS CREEK * 6010        * 50-Year  * 3623.00 *      3.50 *     23.90 *
14.15 *     24.08 *   0.000105 *      3.41 *   1087.40 *    132.18 *        0.19 *
* DAWSONS CREEK * 6010        * 500-Year * 5629.00 *      3.50 *     25.48 *
16.10 *     25.80 *   0.000162 *      4.55 *   1383.33 *    290.01 *        0.24 *
*             *              *          *          *           *           *
    *        *            *          *          *           *              *
* DAWSONS CREEK * 5880        *          * Bridge *            *           *
    *        *            *          *          *           *              *
*             *              *          *          *           *           *
    *        *            *          *          *           *              *
* DAWSONS CREEK * 5660        * 100-Year * 4556.00 *      3.50 *     24.60 *
    *     24.65 *   0.000020 *      1.79 *   3410.15 *    578.86 *        0.09 *
* DAWSONS CREEK * 5660        * 50-Year  * 3623.00 *      3.50 *     23.97 *
    *     24.01 *   0.000015 *      1.51 *   3058.53 *    545.57 *        0.08 *
* DAWSONS CREEK * 5660        * 500-Year * 5629.00 *      3.50 *     25.62 *
    *     25.68 *   0.000023 *      2.03 *   4017.00 *    600.00 *        0.10 *
*             *              *          *          *           *           *
    *        *            *          *          *           *              *
* DAWSONS CREEK * 5500        * 100-Year * 4556.00 *      3.50 *     24.46 *
    *     24.63 *   0.000078 *      3.34 *   2136.08 *    458.69 *        0.17 *
* DAWSONS CREEK * 5500        * 50-Year  * 3623.00 *      3.50 *     23.88 *
    *     23.99 *   0.000060 *      2.83 *   1874.38 *    432.13 *        0.15 *
* DAWSONS CREEK * 5500        * 500-Year * 5629.00 *      3.50 *     25.46 *
    *     25.66 *   0.000088 *      3.73 *   2610.88 *    488.13 *        0.18 *
*             *              *          *          *           *           *
    *        *            *          *          *           *              *
* DAWSONS CREEK * 5000        * 100-Year * 4556.00 *      3.50 *     24.51 *
12.04 *     24.58 *   0.000027 *      2.10 *   2789.50 *    537.55 *        0.10 *
* DAWSONS CREEK * 5000        * 50-Year  * 3623.00 *      3.50 *     23.91 *
11.39 *     23.96 *   0.000020 *      1.76 *   2493.72 *    445.15 *        0.09 *
* DAWSONS CREEK * 5000        * 500-Year * 5629.00 *      3.50 *     25.51 *
12.72 *     25.60 *   0.000031 *      2.38 *   3385.16 *    615.94 *        0.11 *
*             *              *          *          *           *           *
    *        *            *          *          *           *              *
* DAWSONS CREEK * 4900        *          * Bridge *            *           *
    *        *            *          *          *           *              *
*             *              *          *          *           *           *
```

```
   *          *           *          *          *          *            *
 * DAWSONS CREEK * 4800        * 100-Year * 4556.00 *     3.50 *     24.50 *
   *      24.57 *  0.000029 *     2.14 *   2826.61 *   581.80 *         0.11 *
 * DAWSONS CREEK * 4800        * 50-Year  * 3623.00 *     3.50 *     23.90 *
   *      23.95 *  0.000022 *     1.80 *   2512.34 *   469.99 *         0.09 *
 * DAWSONS CREEK * 4800        * 500-Year * 5629.00 *     3.50 *     25.49 *
   *      25.58 *  0.000034 *     2.43 *   3487.66 *   700.00 *         0.12 *
*             *           *          *          *          *            *
   *          *           *          *          *          *            *
 * DAWSONS CREEK * 4400        * 100-Year * 4556.00 *     3.50 *     24.50 *
12.98 *     24.55 *    0.000027 *      1.80 *    3504.00 *    666.00 *          0.10 *
 * DAWSONS CREEK * 4400        * 50-Year  * 3623.00 *     3.50 *     23.90 *
12.22 *     23.94 *    0.000021 *      1.53 *    3116.64 *    625.20 *          0.09 *
 * DAWSONS CREEK * 4400        * 500-Year * 5629.00 *     3.50 *     25.50 *
13.76 *     25.56 *    0.000029 *      1.99 *    4195.50 *    700.00 *          0.10 *
*******************************************************************************************
*****************************************************************************************

Profile Output Table - Standard Table 2
*******************************************************************************************
***************************************************************
* Reach          * River Sta  * Profile  * E.G. Elev * W.S. Elev * Vel Head * Frctn
Loss * C & E Loss * Q Left * Q Channel * Q Right * Top Width *
*               *            *          *     (ft) *     (ft) *     (ft) *
(ft) *        (ft) *  (cfs) *     (cfs) *   (cfs) *     (ft) *
*******************************************************************************************
***************************************************************
* DAWSONS CREEK * 6200        * 100-Year *     24.77 *     24.52 *      0.25 *
0.02 *       0.00 *  16.32 *   4521.27 *   18.41 *   183.75 *
* DAWSONS CREEK * 6200        * 50-Year  *     24.10 *     23.92 *      0.18 *
0.02 *       0.00 *   8.51 *   3603.02 *   11.47 *   158.76 *
* DAWSONS CREEK * 6200        * 500-Year *     25.83 *     25.51 *      0.32 *
0.03 *       0.00 *  35.96 *   5550.35 *   42.69 *   205.00 *
*             *           *          *          *          *            *
   *          *       *          *          *          *
* DAWSONS CREEK * 6010        * 100-Year *     24.74 *     24.49 *      0.25 *
0.01 *       0.00 *          *   4546.73 *    9.27 *   143.39 *
* DAWSONS CREEK * 6010        * 50-Year  *     24.08 *     23.90 *      0.18 *
0.01 *       0.00 *          *   3619.13 *    3.87 *   132.18 *
* DAWSONS CREEK * 6010        * 500-Year *     25.80 *     25.48 *      0.32 *
0.02 *       0.00 *   0.08 *   5603.25 *   25.67 *   290.01 *
*             *           *          *          *          *            *
   *          *       *          *          *          *
* DAWSONS CREEK * 5880        *          *    Bridge *            *            *
   *          *       *          *          *          *
*             *           *          *          *          *            *
   *          *       *          *          *          *
* DAWSONS CREEK * 5660        * 100-Year *     24.65 *     24.60 *      0.05 *
0.01 *       0.01 *  27.46 *   4445.76 *   82.79 *   578.86 *
* DAWSONS CREEK * 5660        * 50-Year  *     24.01 *     23.97 *      0.03 *
0.00 *       0.01 *  16.17 *   3559.84 *   46.99 *   545.57 *
* DAWSONS CREEK * 5660        * 500-Year *     25.68 *     25.62 *      0.06 *
0.01 *       0.01 *  53.05 *   5419.00 *  156.94 *   600.00 *
*             *           *          *          *          *            *
   *          *       *          *          *          *
* DAWSONS CREEK * 5500        * 100-Year *     24.63 *     24.46 *      0.17 *
0.02 *       0.03 *  57.27 *   4348.73 *  149.99 *   458.69 *
* DAWSONS CREEK * 5500        * 50-Year  *     23.99 *     23.88 *      0.12 *
0.02 *       0.02 *  41.30 *   3500.13 *   81.58 *   432.13 *
* DAWSONS CREEK * 5500        * 500-Year *     25.66 *     25.46 *      0.20 *
0.02 *       0.03 *  79.45 *   5262.84 *  286.70 *   488.13 *
*             *           *          *          *          *            *
   *          *       *          *          *          *
```

```
* DAWSONS CREEK * 5000        * 100-Year *     24.58 *     24.51 *       0.07 *
0.00 *       0.00 *  48.21 *   4471.90 *   35.89 *   537.55 *
* DAWSONS CREEK * 5000        * 50-Year  *     23.96 *     23.91 *       0.05 *
0.00 *       0.00 *  33.03 *   3573.32 *   16.65 *   445.15 *
* DAWSONS CREEK * 5000        * 500-Year *     25.60 *     25.51 *       0.09 *
0.01 *       0.00 *  72.71 *   5457.05 *   99.24 *   615.94 *
*            *                *          *           *           *            *
   *            *        *         *         *          *
* DAWSONS CREEK * 4900        *          *    Bridge *           *            *
   *            *        *         *         *          *
*            *                *          *           *           *            *
   *            *        *         *         *          *
* DAWSONS CREEK * 4800        * 100-Year *     24.57 *     24.50 *       0.07 *
0.01 *       0.01 *  98.44 *   4437.20 *   20.35 *   581.80 *
* DAWSONS CREEK * 4800        * 50-Year  *     23.95 *     23.90 *       0.05 *
0.01 *       0.00 *  68.01 *   3548.49 *    6.50 *   469.99 *
* DAWSONS CREEK * 4800        * 500-Year *     25.58 *     25.49 *       0.09 *
0.01 *       0.01 * 134.80 *   5418.39 *   75.81 *   700.00 *
*            *                *          *           *           *            *
   *            *        *         *         *          *
* DAWSONS CREEK * 4400        * 100-Year *     24.55 *     24.50 *       0.05 *
   *            *  24.06 *   4408.80 *  123.14 *   666.00 *
* DAWSONS CREEK * 4400        * 50-Year  *     23.94 *     23.90 *       0.04 *
   *            *  14.56 *   3533.20 *   75.25 *   625.20 *
* DAWSONS CREEK * 4400        * 500-Year *     25.56 *     25.50 *       0.06 *
   *            *  44.81 *   5364.78 *  219.41 *   700.00 *
*************************************************************************************
*****************************************************************
```

Proposed Conditions

HEC-RAS Plan: Plan 05 River: DAWSONS CREEK Reach: DAWSONS CREEK

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
DAWSONS CREEK	6200	100-Year	4556.00	3.50	24.52		24.77	0.000113	4.04	1275.13	183.75	0.20
DAWSONS CREEK	6200	50-Year	3623.00	3.50	23.92		24.10	0.000085	3.38	1172.96	158.76	0.17
DAWSONS CREEK	6200	500-Year	5629.00	3.50	25.51		25.83	0.000132	4.60	1473.06	205.00	0.22
DAWSONS CREEK	6010	100-Year	4556.00	3.50	24.49	15.13	24.74	0.000141	4.05	1169.28	143.39	0.22
DAWSONS CREEK	6010	50-Year	3623.00	3.50	23.90	14.15	24.08	0.000105	3.41	1087.40	132.18	0.19
DAWSONS CREEK	6010	500-Year	5629.00	3.50	25.48	16.10	25.80	0.000162	4.55	1383.33	290.01	0.24
DAWSONS CREEK	5880		Bridge									
DAWSONS CREEK	5660	100-Year	4556.00	3.50	24.60		24.65	0.000020	1.79	3410.15	578.86	0.09
DAWSONS CREEK	5660	50-Year	3623.00	3.50	23.97		24.01	0.000015	1.51	3058.53	545.57	0.08
DAWSONS CREEK	5660	500-Year	5629.00	3.50	25.62		25.68	0.000023	2.03	4017.00	600.00	0.10
DAWSONS CREEK	5500	100-Year	4556.00	3.50	24.46		24.63	0.000078	3.34	2136.08	458.69	0.17
DAWSONS CREEK	5500	50-Year	3623.00	3.50	23.88		23.99	0.000060	2.83	1874.38	432.13	0.15
DAWSONS CREEK	5500	500-Year	5629.00	3.50	25.46		25.66	0.000088	3.73	2610.88	488.13	0.18
DAWSONS CREEK	5000	100-Year	4556.00	3.50	24.51	12.04	24.58	0.000027	2.10	2789.50	537.55	0.10
DAWSONS CREEK	5000	50-Year	3623.00	3.50	23.91	11.39	23.96	0.000020	1.76	2493.72	445.15	0.09
DAWSONS CREEK	5000	500-Year	5629.00	3.50	25.51	12.72	25.60	0.000031	2.38	3385.16	615.94	0.11
DAWSONS CREEK	4900		Bridge									
DAWSONS CREEK	4800	100-Year	4556.00	3.50	24.50		24.57	0.000029	2.14	2826.61	581.80	0.11
DAWSONS CREEK	4800	50-Year	3623.00	3.50	23.90		23.95	0.000022	1.80	2512.34	469.99	0.09
DAWSONS CREEK	4800	500-Year	5629.00	3.50	25.49		25.58	0.000034	2.43	3487.66	700.00	0.12
DAWSONS CREEK	4400	100-Year	4556.00	3.50	24.50	12.98	24.55	0.000027	1.80	3504.00	666.00	0.10
DAWSONS CREEK	4400	50-Year	3623.00	3.50	23.90	12.22	23.94	0.000021	1.53	3116.64	625.20	0.09
DAWSONS CREEK	4400	500-Year	5629.00	3.50	25.50	13.76	25.56	0.000029	1.99	4195.50	700.00	0.10

Picardy Bridge

500-year Scour Report

Eric Erikson

From: Larry D. Sant <lsant@geoengineers.com>
Sent: Friday, June 06, 2014 2:05 PM
To: Lisa Fruge; Gerry Menard; Eric Erikson
Cc: Jim M. Aronstein; Ivy A. Harmon
Subject: RE: Picardy-Perkins Connector Geotechnical Report

Good afternoon, Lisa.

The two borings located in Dawson Creek are B-12 and B-32. The top 10 feet in those borings encountered medium to stiff very silty clay (CL) with a PI of 9 to 14. Because this is a clay material, then the majority of the material has a dimension less than 0.005 mm. So, although the D99 might be on the order of 0.075 mm, the **D50 could be around 0.001 mm**. Either way, it would be VERY small.

Larry D. Sant, PE
Associate & Geotechnical Engineer / **GeoEngineers**
Tel: 225.663.1522 (office); 509.570.6081 (mobile)
e-mail: LSant@geoengineers.com LinkedIn: http://www.linkedin.com/in/larrysant

From: Lisa Fruge [mailto:lrodriguez@evans-graves.com]
Sent: Friday, June 06, 2014 11:16 AM
To: Larry D. Sant; Gerry Menard; Eric Erikson
Cc: Jim M. Aronstein; Ivy A. Harmon
Subject: RE: Picardy-Perkins Connector Geotechnical Report

Thanks for the report, Larry.

I am looking for the D50 # a the bridge to use in HEC-RAS to determine scour. It might be provided in the report already and I missed it. If so, would you please let me know where to find it. I know we discussed in our meeting that in this case the D50 will yield high scour numbers because the formulas aren't taking cohesion into account; however, I still need a number from you to plug into the program. We can then possibly add some text about using engineering judgment to select a more appropriate scour number. Thanks,

Lisa Fruge, P.E.
Evans-Graves Engineers
225-926-1620

From: Larry D. Sant [mailto:lsant@geoengineers.com]
Sent: Thursday, June 05, 2014 4:39 PM
To: Gerry Menard
Cc: Lisa Fruge; CJ Roth; Jim M. Aronstein; Ivy A. Harmon
Subject: Picardy-Perkins Connector Geotechnical Report

Good afternoon, Gerry.

I have attached our report for the Picardy-Perkins Connector project. Let me know if you have any questions or need anything else.

Thank you.

Larry D. Sant, PE
Associate & Geotechnical Engineer / **GeoEngineers**
Tel: 225.663.1522 (office), 509.570.6081 (mobile)
e-mail: LSant@geoengineers.com **LinkedIn:** http://www.linkedin.com/in/larrysant

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See who we are at GeoEngineers.com

30 YEARS

Contraction Scour

	Left	Channel	Right
Input Data			
Average Depth (ft):	2.54	13.42	2.16
Approach Velocity (ft/s):	0.31	4.60	0.28
Br Average Depth (ft):	0.21	11.73	1.54
BR Opening Flow (cfs):	0.03	5603.46	25.51
BR Top WD (ft):	1.72	100.00	55.27
Grain Size D50 (mm):	0.001	0.001	0.001
Approach Flow (cfs):	35.96	5550.35	42.69
Approach Top WD (ft):	45.00	90.00	70.00
K1 Coefficient:	0.590	0.590	0.590
Results			
Scour Depth Ys (ft):	0.00	0.98	0.06
Critical Velocity (ft/s):	0.19	0.26	0.19
Equation:	Live	Live	Live

Pier Scour

Pier: #1 (CL = 0)

Input Data	
Pier Shape:	Square nose
Pier Width (ft):	2.00
Grain Size D50 (mm):	0.00100
Depth Upstream (ft):	0.48
Velocity Upstream (ft/s):	0.07
K1 Nose Shape:	1.10
Pier Angle:	0.00
Pier Length (ft):	100.00
K2 Angle Coef:	1.00
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	0.08000
K4 Armouring Coef:	1.00
Results	
Scour Depth Ys (ft):	0.51
Froude #:	0.02
Equation:	CSU equation

Pier: #2 (CL = 60)

Input Data	
Pier Shape:	Square nose
Pier Width (ft):	2.00
Grain Size D50 (mm):	0.00100
Depth Upstream (ft):	-9.52
Velocity Upstream (ft/s):	0.07
K1 Nose Shape:	1.10
Pier Angle:	0.00
Pier Length (ft):	100.00
K2 Angle Coef:	1.00
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	0.08000
K4 Armouring Coef:	1.00
Results	
Scour Depth Ys (ft):	
Froude #:	
Equation:	CSU equation

Pier: #3 (CL = 120)
Input Data

Pier Shape:	Square nose
Pier Width (ft):	2.00
Grain Size D50 (mm):	0.00100
Depth Upstream (ft):	1.67
Velocity Upstream (ft/s):	4.55
K1 Nose Shape:	1.10
Pier Angle:	0.00
Pier Length (ft):	100.00
K2 Angle Coef:	1.00
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	0.08000
K4 Armouring Coef:	1.00

Results

Scour Depth Ys (ft):	3.70
Froude #:	0.62
Equation:	CSU equation

Pier: #4 (CL = 180)
Input Data

Pier Shape:	Square nose
Pier Width (ft):	2.00
Grain Size D50 (mm):	0.00100
Depth Upstream (ft):	19.87
Velocity Upstream (ft/s):	4.55
K1 Nose Shape:	1.10
Pier Angle:	0.00
Pier Length (ft):	100.00
K2 Angle Coef:	1.00
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	0.08000
K4 Armouring Coef:	1.00

Results

Scour Depth Ys (ft):	5.17
Froude #:	0.18
Equation:	CSU equation

Pier: #5 (CL = 240)
Input Data

Pier Shape:	Square nose
Pier Width (ft):	2.00
Grain Size D50 (mm):	0.00100
Depth Upstream (ft):	2.39
Velocity Upstream (ft/s):	0.17
K1 Nose Shape:	1.10
Pier Angle:	0.00
Pier Length (ft):	100.00
K2 Angle Coef:	1.00
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	0.08000
K4 Armouring Coef:	1.00

Results

Scour Depth Ys (ft):	0.95
Froude #:	0.02
Equation:	CSU equation

Pier: #6 (CL = 300)

Input Data

Pier Shape:	Square nose
Pier Width (ft):	2.00
Grain Size D50 (mm):	0.00100
Depth Upstream (ft):	0.48
Velocity Upstream (ft/s):	0.17
K1 Nose Shape:	1.10
Pier Angle:	0.00
Pier Length (ft):	100.00
K2 Angle Coef:	1.00
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	0.08000
K4 Armouring Coef:	1.00

Results

Scour Depth Ys (ft):	0.76
Froude #:	0.04
Equation:	CSU equation

Pier: #7 (CL = 360)

Input Data

Pier Shape:	Square nose
Pier Width (ft):	2.00
Grain Size D50 (mm):	0.00100
Depth Upstream (ft):	0.48
Velocity Upstream (ft/s):	0.17
K1 Nose Shape:	1.10
Pier Angle:	0.00
Pier Length (ft):	100.00
K2 Angle Coef:	1.00
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	0.08000
K4 Armouring Coef:	1.00

Results

Scour Depth Ys (ft):	0.76
Froude #:	0.04
Equation:	CSU equation

Abutment Scour

	Left	Right
Input Data		
Station at Toe (ft):	110.98	302.52
Toe Sta at appr (ft):	40.98	213.52
Abutment Length (ft):	45.00	70.00
Depth at Toe (ft):	-0.52	0.48
K1 Shape Coef:	1.00 - Vertical abutment	
Degree of Skew (degrees):	90.00	90.00
K2 Skew Coef:	1.00	1.00
Projected Length L' (ft):	45.00	70.00
Avg Depth Obstructed Ya (ft)	2.54	2.16
Flow Obstructed Qe (cfs):	35.96	42.69
Area Obstructed Ae (sq ft):	114.34	151.03
Results		
Scour Depth Ys (ft):		1.24
Froude #:		0.04

Equation:	Default	HIRE
Combined Scour Depths		
Pier : #1 (CL = 0) (Contr + Pier) (ft):	0.51	
Pier : #2 (CL = 60) (Contr + Pier) (ft):		
Pier : #3 (CL = 120) (Contr + Pier) (ft):	4.69	
Pier : #4 (CL = 180) (Contr + Pier) (ft):	6.15	
Pier : #5 (CL = 240) (Contr + Pier) (ft):	1.00	
Pier : #6 (CL = 300) (Contr + Pier) (ft):	0.82	
Pier : #7 (CL = 360) (Contr + Pier) (ft):	0.82	
Right abutment scour + contraction scour (ft):	1.30	

Backcourt Bridge

500-year Scour Report

Contraction Scour

		Left	Channel	Right
Input Data				
	Average Depth (ft):	5.22	12.95	2.94
	Approach Velocity (ft/s):	0.41	3.73	0.29
	Br Average Depth (ft):	4.46	26.05	1.69
	BR Opening Flow (cfs):	141.84	5348.88	138.27
	BR Top WD (ft):	75.80	79.43	378.00
	Grain Size D50 (mm):	0.001	0.001	0.001
	Approach Flow (cfs):	79.45	5262.84	286.70
	Approach Top WD (ft):	37.13	109.00	342.00
	K1 Coefficient:	0.690	0.690	0.690
Results				
	Scour Depth Ys (ft):	0.78	0.00	0.00
	Critical Velocity (ft/s):	0.22	0.26	0.20
	Equation:	Live	Live	Live

Pier Scour

Pier: #1 (CL = 134.5)

Input Data		
	Pier Shape:	Square nose
	Pier Width (ft):	2.00
	Grain Size D50 (mm):	0.00100
	Depth Upstream (ft):	-1.77
	Velocity Upstream (ft/s):	0.21
	K1 Nose Shape:	1.10
	Pier Angle:	0.00
	Pier Length (ft):	40.00
	K2 Angle Coef:	1.00
	K3 Bed Cond Coef:	1.10
	Grain Size D90 (mm):	0.08000
	K4 Armouring Coef:	1.00
Results		
	Scour Depth Ys (ft):	
	Froude #:	
	Equation:	CSU equation

Pier: #2 (CL = 174.5)

Input Data		
	Pier Shape:	Square nose
	Pier Width (ft):	2.00
	Grain Size D50 (mm):	0.00100
	Depth Upstream (ft):	9.14
	Velocity Upstream (ft/s):	2.38
	K1 Nose Shape:	1.10
	Pier Angle:	0.00
	Pier Length (ft):	40.00
	K2 Angle Coef:	1.00
	K3 Bed Cond Coef:	1.10
	Grain Size D90 (mm):	0.08000
	K4 Armouring Coef:	1.00
Results		
	Scour Depth Ys (ft):	3.53
	Froude #:	0.14
	Equation:	CSU equation

Pier: #3 (CL = 214.5)

Input Data

Pier Shape:	Square nose
Pier Width (ft):	2.00
Grain Size D50 (mm):	0.00100
Depth Upstream (ft):	19.65
Velocity Upstream (ft/s):	2.38
K1 Nose Shape:	1.10
Pier Angle:	0.00
Pier Length (ft):	40.00
K2 Angle Coef:	1.00
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	0.08000
K4 Armouring Coef:	1.00

Results

Scour Depth Ys (ft):	3.91
Froude #:	0.09
Equation:	CSU equation

Pier: #4 (CL = 254.5)

Input Data

Pier Shape:	Square nose
Pier Width (ft):	2.00
Grain Size D50 (mm):	0.00100
Depth Upstream (ft):	16.97
Velocity Upstream (ft/s):	2.38
K1 Nose Shape:	1.10
Pier Angle:	0.00
Pier Length (ft):	40.00
K2 Angle Coef:	1.00
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	0.08000
K4 Armouring Coef:	1.00

Results

Scour Depth Ys (ft):	3.83
Froude #:	0.10
Equation:	CSU equation

Pier: #5 (CL = 294.5)

Input Data

Pier Shape:	Square nose
Pier Width (ft):	2.00
Grain Size D50 (mm):	0.00100
Depth Upstream (ft):	10.68
Velocity Upstream (ft/s):	2.38
K1 Nose Shape:	1.10
Pier Angle:	0.00
Pier Length (ft):	40.00
K2 Angle Coef:	1.00
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	0.08000
K4 Armouring Coef:	1.00

Results

Scour Depth Ys (ft):	3.60
Froude #:	0.13
Equation:	CSU equation

Pier: #6 (CL = 334.5)

Input Data

Pier Shape:	Square nose
Pier Width (ft):	2.00
Grain Size D50 (mm):	0.00100
Depth Upstream (ft):	4.41
Velocity Upstream (ft/s):	0.13
K1 Nose Shape:	1.10
Pier Angle:	0.00
Pier Length (ft):	40.00
K2 Angle Coef:	1.00
K3 Bed Cond Coef:	1.10
Grain Size D90 (mm):	0.07500
K4 Armouring Coef:	1.00

Results

Scour Depth Ys (ft):	0.92
Froude #:	0.01
Equation:	CSU equation

Abutment Scour

Input Data

	Left	Right
Station at Toe (ft):	140.52	352.47
Toe Sta at appr (ft):	29.52	188.47
Abutment Length (ft):	37.13	342.00
Depth at Toe (ft):	-0.05	3.98
K1 Shape Coef:	1.00 - Vertical abutment	
Degree of Skew (degrees):	90.00	90.00
K2 Skew Coef:	1.00	1.00
Projected Length L' (ft):	37.13	342.00
Avg Depth Obstructed Ya (ft):	5.22	2.94
Flow Obstructed Qe (cfs):	79.45	286.70
Area Obstructed Ae (sq ft):	193.93	1005.80

Results

	Left	Right
Scour Depth Ys (ft):		6.63
Froude #:		0.01
Equation:	Default	HIRE

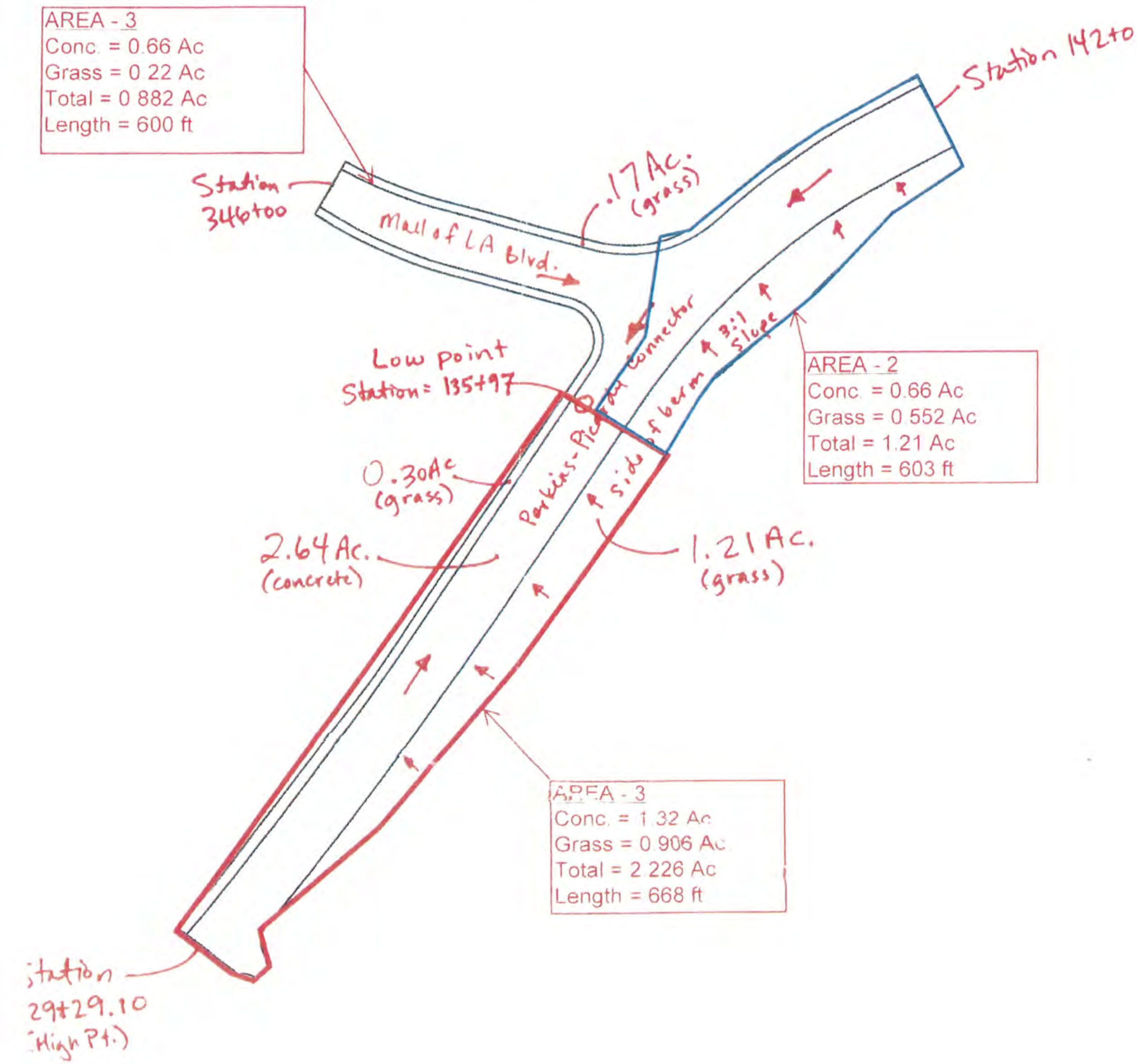
Combined Scour Depths

Pier : #1 (CL = 134.5) (Contr + Pier) (ft):	
Pier : #2 (CL = 174.5) (Contr + Pier) (ft):	3.53
Pier : #3 (CL = 214.5) (Contr + Pier) (ft):	3.91
Pier : #4 (CL = 254.5) (Contr + Pier) (ft):	3.83
Pier : #5 (CL = 294.5) (Contr + Pier) (ft):	3.60
Pier : #6 (CL = 334.5) (Contr + Pier) (ft):	0.92

Right abutment scour + contraction scour (ft):	6.63

APPENDIX L

HYDROLOGIC ANALYSIS


AREA - 3
Conc. = 0.66 Ac
Grass = 0.22 Ac
Total = 0.882 Ac
Length = 600 ft
Station 142+0
Station 346+00
.17 Ac. (grass)
Mall of LA Blvd.
Low point Station= 135+97
Perkins-Pickett connector
side of berm 3:1 slope
AREA - 2
Conc. = 0.66 Ac
Grass = 0.552 Ac
Total = 1.21 Ac
Length = 603 ft
0.30Ac (grass)
2.64 Ac. (concrete)
1.21 Ac. (grass)
AREA - 3
Conc. = 1.32 Ac
Grass = 0.906 Ac
Total = 2.226 Ac
Length = 668 ft
Station 29+29.10 (High Pt.)

AREA 1 - 2.226 Acres (0.003478 mi²)

1. Runoff Curve Number

Cover Description	CN	Area (ac.)	Product of CNxArea
Streets & Roads, paved	98	1.32	129.36
Grass Cover	74	0.906	67.044
	Totals:	2.226	196.404

CN (weighted)= $\frac{\text{total product}}{\text{total area}} = \frac{196.404}{2.226}$ **USE CN =** **88**

2. Runoff

	Storm #1	Storm #2	Storm #3	Storm #4
Frequency........................ Yr	25	50	100	5
Rainfall, P (24-hour) ..... in	9.6	11.1	12.6	6.5
Max. Retention, S............in	1.33	1.33	1.33	1.33
Initial Abstraction, Ia.....in	0.27	0.27	0.27	0.27
Runoff, Q .... In	8.17	9.65	11.13	5.13

AREA 2 - 1.212 Acres (0.00189 mi²)

1. Runoff Curve Number

Cover Description	CN	Area (ac.)	Product of CNxArea
Streets & Roads, paved	98	0.66	64.68
Grass Cover	74	0.552	40.848
	Totals:	1.212	105.528

CN (weighted)= $\frac{\text{total product}}{\text{total area}} = \frac{105.528}{1.212}$ **USE CN =** **87**

2. Runoff

	Storm #1	Storm #2	Storm #3	Storm #4
Frequency........................ Yr	25	50	100	5
Rainfall, P (24-hour) ..... in	9.6	11.1	12.6	6.5
Max. Retention, S............in	1.49	1.49	1.49	1.49
Initial Abstraction, Ia.....in	0.30	0.30	0.30	0.30
Runoff, Q .... In	8.02	9.50	10.98	5.00

AREA 3 - 0.882 Acres (0.00137 mi²)

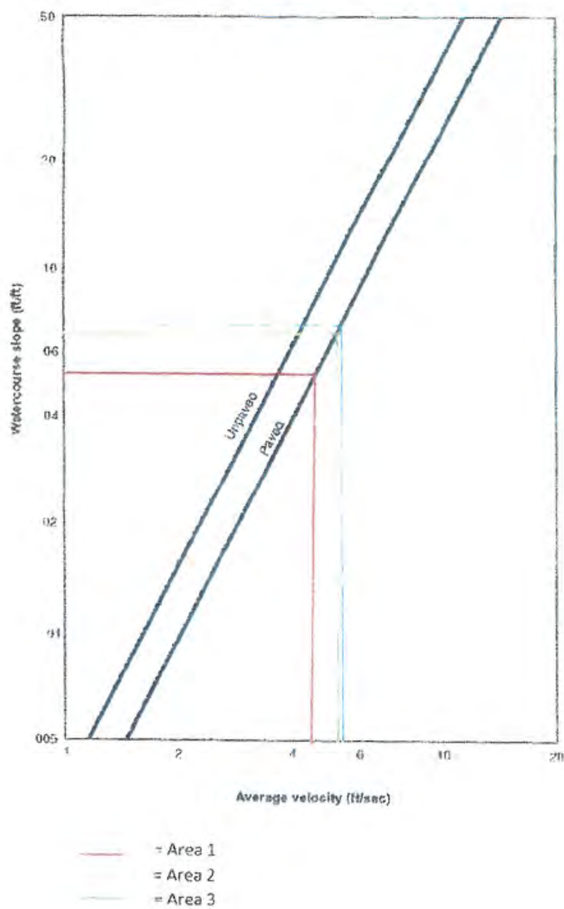
1. Runoff Curve Number

Cover Description	CN	Area (ac.)	Product of CNxArea
Streets & Roads, paved	98	0.66	64.68
Grass Cover	74	0.22	16.28
	Totals:	0.88	80.96

CN (weighted)= $\frac{\text{total product}}{\text{total area}} = \frac{80.96}{0.88}$ **USE CN =** **92**

2. Runoff

	Storm #1	Storm #2	Storm #3	Storm #4
Frequency........................ Yr	25	50	100	5
Rainfall, P (24-hour) ..... in	9.6	11.1	12.6	6.5
Max. Retention, S............in	0.87	0.87	0.87	0.87
Initial Abstraction, Ia.....in	0.17	0.17	0.17	0.17
Runoff, Q .... In	8.63	10.12	11.61	5.56



AREA 1 - 2.226 Acres (0.003478 mi²)		
Travel Time		
Flow Length L (ft)	Slope (ft/ft)	Average Velocity (ft/sec)
668	0.0537	4.6
Travel time, Tt (hr)=	$\frac{L}{3600*V}$ =	$\frac{668}{16560}$
Tt (hr)=	0.040	

AREA 2 - 1.217 Acres (0.00189 mi²)		
Travel Time		
Flow Length L (ft)	Slope (ft/ft)	Average Velocity (ft/sec)
603	0.0671	5.3
Travel time, Tt (hr)=	$\frac{L}{3600*V}$ =	$\frac{603}{19080}$
Tt (hr)=	0.032	

AREA 3 - 0.882 Acres (0.00137 mi²)		
Travel Time		
Flow Length, L (ft)	Slope (ft/ft)	Average Velocity (ft/sec)
600	0.07	5.4
Travel time, Tt (hr)=	$\frac{L}{3600*V}$ =	$\frac{600}{19440}$
Tt (hr)=	0.031	

PICARDI PERKINS - TABULAR HYDROGRAPH

Frequency (yr) 25

SUB-AREA NAME	Am (mi^2)	Tc (hr)	Tt (hr)	Ia/P (use 0.10)	RUNOFF Q(in)	AmQ (mi^2-in)
1	0.00348		0.040	0.028	8.17	0.028
2	0.00189		0.032	0.031	8.02	0.015
3	0.00138		0.031	0.018	8.63	0.012

Hydrograph times (hrs)	0.0	1.0	11.0	11.3	11.6	11.9	12.0	12.1	12.2	12.3	12.4	12.5	12.6	12.7	12.8	13.0	13.2	13.4	13.6	13.8	14.0	14.3	14.6	15.0	15.5	16.0	16.5	17.0	17.5	18.0	19.0	20.0	22.0	26.0
Tabular Discharges at Selected hours, from Exhibit 5-III (csm/in)	0	0	29.000	38.000	57.000	172.000	241.000	425.000	662.000	531.000	345.000	265.000	191.000	130.000	101.000	83.000	68.000	62.000	58.000	54.000	50.000	44.000	41.000	37.000	32.000	27.000	23.000	21.000	16.000	14.000	13.000	11.000	0.000	0.000
Discharges at Selected Hydrograph (cfs) q=qt*(AmQ): 1	0	0	0.824	1.079	1.619	4.885	6.845	12.071	18.803	15.082	9.799	7.527	5.425	3.692	2.869	2.357	1.931	1.761	1.647	1.534	1.420	1.250	1.165	1.051	0.909	0.767	0.653	0.596	0.454	0.398	0.369	0.312	0.000	0.000
2	0	0	0.441	0.577	0.866	2.613	3.661	6.457	10.057	8.067	5.241	4.026	2.902	1.975	1.534	1.261	1.033	0.942	0.881	0.820	0.760	0.668	0.623	0.562	0.486	0.410	0.349	0.319	0.243	0.213	0.198	0.167	0.000	0.000
3	0	0	0.345	0.452	0.678	2.046	2.866	5.055	7.873	6.315	4.103	3.152	2.272	1.546	1.201	0.987	0.809	0.737	0.690	0.642	0.595	0.523	0.488	0.440	0.381	0.321	0.274	0.250	0.190	0.167	0.155	0.131	0.000	0.000
Composite Hydrograph at Outlet (cfs)	0.000	0.000	1.609	2.109	3.163	9.544	13.373	23.583	36.734	29.465	19.144	14.705	10.598	7.214	5.604	4.606	3.773	3.440	3.218	2.996	2.774	2.442	2.275	2.053	1.776	1.498	1.276	1.165	0.888	0.777	0.721	0.610	0.000	0.000

PICARDI PERKINS - TABULAR HYDROGRAPH

Frequency (yr) 50

SUB-AREA NAME	Am (mi^2)	Tc (hr)	Tt (hr)	Ia/P (use 0.10)	RUNOFF Q(in)	AmQ (mi^2-in)
1	0.00348		0.040	0.024	9.65	0.034
2	0.00189		0.040	0.027	9.50	0.018
3	0.00138		0.040	0.016	10.12	0.014

Hydrograph times (hrs)	0.0	1.0	11.0	11.3	11.6	11.9	12.0	12.1	12.2	12.3	12.4	12.5	12.6	12.7	12.8	13.0	13.2	13.4	13.6	13.8	14.0	14.3	14.6	15.0	15.5	16.0	16.5	17.0	17.5	18.0	19.0	20.0	22.0	26.0
Tabular Discharges at Selected hours, qt, from Exhibit 5-III (csm/in)	0	0	29.000	38.000	57.000	172.000	241.000	425.000	662.000	531.000	345.000	265.000	191.000	130.000	101.000	83.000	68.000	62.000	58.000	54.000	50.000	44.000	41.000	37.000	32.000	27.000	23.000	21.000	16.000	14.000	13.000	11.000	0.000	0.000
Discharges at Selected Hydrograph (cfs) q=qt*(AmQ): 1	0	0	0.973	1.275	1.912	5.770	8.085	14.258	22.209	17.815	11.574	8.890	6.408	4.361	3.388	2.785	2.281	2.080	1.946	1.812	1.677	1.476	1.376	1.241	1.074	0.906	0.772	0.705	0.537	0.470	0.436	0.369	0.000	0.000
2	0	0	0.521585	0.683457	1.025185	3.093541	4.334555	7.643924	11.906536	9.550409	6.205068	4.766212	3.435269	2.338142	1.816556	1.492813	1.223028	1.115114	1.043171	0.971228	0.899285	0.791371	0.737414	0.665471	0.575543	0.485614	0.413671	0.3777	0.287771	0.2518	0.233814	0.197843	0	0
3	0	0	0.404479	0.530007	0.79501	2.398978	3.361359	5.927708	9.2332764	7.406148	4.811904	3.6961	2.663982	1.813181	1.408702	1.157646	0.948433	0.864748	0.808958	0.753168	0.697377	0.613692	0.571849	0.516059	0.446322	0.376584	0.320794	0.292898	0.223161	0.195266	0.182318	0.153423	0	0
Composite Hydrograph at Outlet (cfs)	0.000	0.000	1.899	2.488	3.732	11.263	15.781	27.830	43.349	34.771	22.591	17.353	12.507	8.513	6.614	5.435	4.453	4.060	3.798	3.536	3.274	2.881	2.685	2.423	2.095	1.768	1.506	1.375	1.048	0.917	0.851	0.720	0.000	0.000

PICARDI PERKINS - TABULAR HYDROGRAPH

Frequency (yr) 100

SUB-AREA NAME	Am (mi^2)	Tc (hr)	Tt (hr)	Ia/P (use 0.10)	RUNOFF Q(in)	AmQ (mi^2-in)
1	0.00348		0.040	0.021	11.13	0.039
2	0.00189		0.040	0.024	10.98	0.021
3	0.00138		0.040	0.014	11.61	0.016

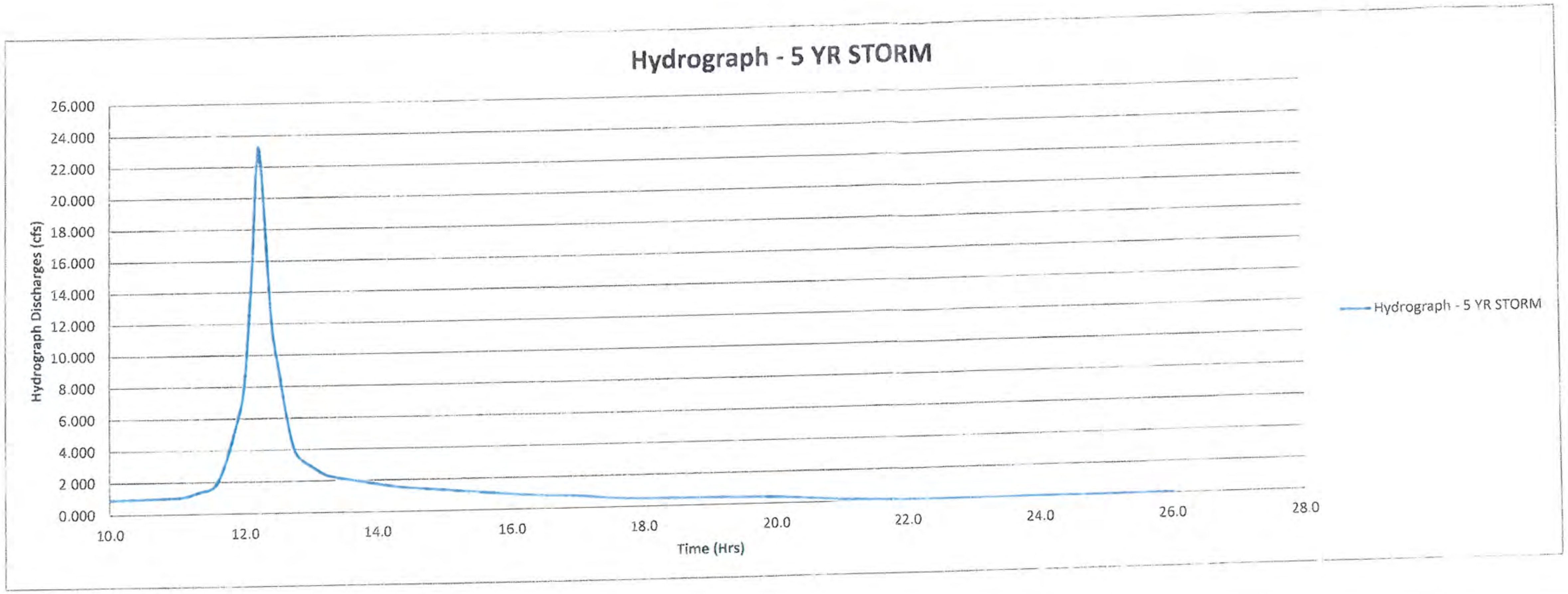
Hydrograph times (hrs)	0.0	1.0	11.0	11.3	11.6	11.9	12.0	12.1	12.2	12.3	12.4	12.5	12.6	12.7	12.8	13.0	13.2	13.4	13.6	13.8	14.0	14.3	14.6	15.0	15.5	16.0	16.5	17.0	17.5	18.0	19.0	20.0	22.0	26.0
Tabular Discharges at Selected hours, qt, from Exhibit 5-III (csm/in)	0	0	29.000	38.000	57.000	172.000	241.000	425.000	662.000	531.000	345.000	265.000	191.000	130.000	101.000	83.000	68.000	62.000	58.000	54.000	50.000	44.000	41.000	37.000	32.000	27.000	23.000	21.000	16.000	14.000	13.000	11.000	0.000	0.000
Discharges at Selected Hydrograph (cfs) q=qt*(AmQ): 1	0	0	1.123	1.471	2.206	6.658	9.329	16.452	25.626	20.555	13.355	10.258	7.394	5.032	3.910	3.213	2.632	2.400	2.245	2.090	1.936	1.703	1.587	1.432	1.239	1.045	0.890	0.813	0.619	0.542	0.503	0.426	0.000	0.000
2	0	0	0.602892	0.789996	1.184994	3.57577	5.010237	8.835479	13.762558	11.03915	7.17233	5.509181	3.970768	2.702617	2.099726	1.725517	1.413677	1.288911	1.205783	1.122626	1.039468	0.914732	0.852364	0.769206	0.66526	0.561313	0.478155	0.436577	0.33263	0.291051	0.270262	0.228683	0	0
3	0	0	0.464139	0.608182	0.912272	2.752822	3.857151	6.80203	10.595163	8.498537	5.521648	4.241266	3.056912	2.080621	1.616483	1.328397	1.088325	0.992296	0.928277	0.864258	0.800239	0.70421	0.656196	0.592177	0.51215	0.432129	0.36811	0.3361	0.256076	0.224067	0.208062	0.176053	0	0
Composite Hydrograph at Outlet (cfs)	0.000	0.000	2.190	2.869	4.304	12.987	18.197	32.089	49.984	40.093	26.049	20.009	14.421	9.816	7.626	6.267	5.134	4.681	4.379	4.077	3.775	3.322	3.096	2.794	2.416	2.039	1.737	1.586	1.208	1.057	0.982	0.831	0.000	0.000

PICARDI PERKINS - TABULAR HYDROGRAPH

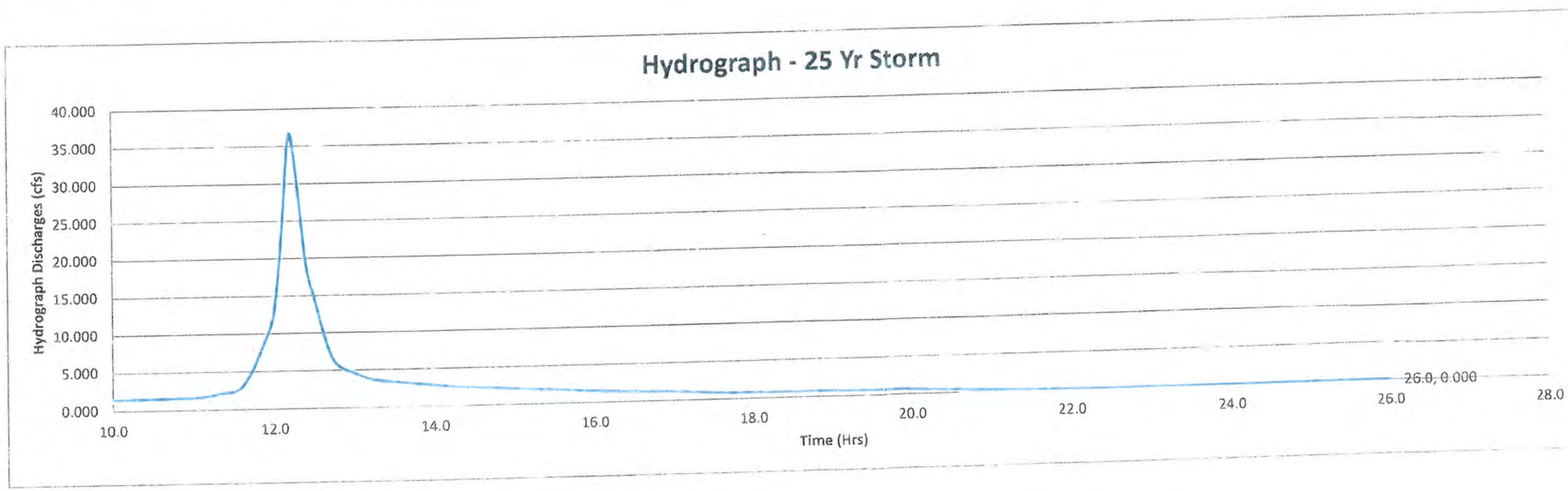
Frequency (yr) 5

SUB-AREA NAME	Am (mi^2)	Tc (hr)	Tt (hr)	Ia/P (use 0.10)	RUNOFF Q(in)	AmQ (mi^2-in)
1	0.00348		0.040	0.041	5.13	0.018
2	0.00189		0.040	0.046	5.00	0.009
3	0.00138		0.040	0.027	5.56	0.008

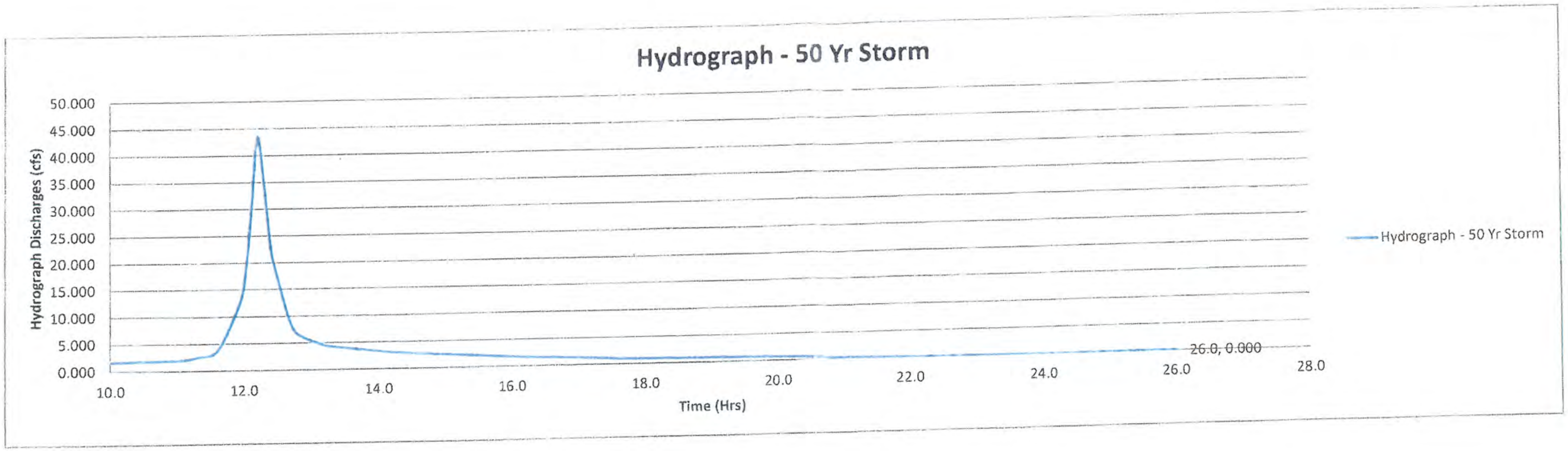
Hydrograph times (hrs)	0.0	1.0	11.0	11.3	11.6	11.9	12.0	12.1	12.2	12.3	12.4	12.5	12.6	12.7	12.8	13.0	13.2	13.1	13.6	13.8	14.0	14.3	14.6	15.0	15.5	16.0	16.5	17.0	17.5	18.0	19.0	20.0	22.0	26.0
Tabular Discharges at Selected hours, qt, from Exhibit 5-III (csm/in)	0	0	29.000	38.000	57.000	172.000	241.000	425.000	662.000	531.000	345.000	265.000	191.000	130.000	101.000	83.000	68.000	62.000	58.000	54.000	50.000	44.000	41.000	37.000	32.000	27.000	23.000	21.000	16.000	14.000	13.000	11.000	0.000	0.000
Discharges at Selected Hydrograph (cfs) q=qt*(AmQ): 1	0	0	0.518	0.679	1.018	3.072	4.304	7.590	11.822	9.483	6.161	4.733	3.411	2.321632	1.803729	1.482273	1.214392	1.10724	1.035805	0.96437	0.892935	0.785783	0.732207	0.660772	0.571479	0.492185	0.41075	0.375033	0.285739	0.250022	0.232163	0.196446	0	0
2	0	0	0.275	0.360	0.540	1.630	2.284	4.028	6.274	5.033	3.270	2.512	1.810	1.232113	0.957257	0.786657	0.64449	0.587623	0.549712	0.511801	0.47389	0.417023	0.388589	0.350678	0.303289	0.2559	0.217989	0.199034	0.151645	0.132689	0.123211	0.104256	0	0
3	0	0	0.222	0.291	0.437	1.318	1.847	3.257	5.074	4.070	2.644	2.031	1.464	0.996	0.774	0.636	0.521	0.475	0.445	0.414	0.383	0.337	0.314	0.284	0.245	0.207	0.176	0.161	0.123	0.107	0.100	0.081	0.000	0.000
Composite Hydrograph at Outlet (cfs)	0.000	0.000	1.015	1.330	1.995	6.020	8.435	14.875	23.171	18.586	12.075	9.275	6.685	4.550	3.535	2.905	2.380	2.170	2.030	1.890	1.750	1.540	1.435	1.295	1.120	0.945	0.805	0.735	0.560	0.490	0.455	0.385	0.000	0.000

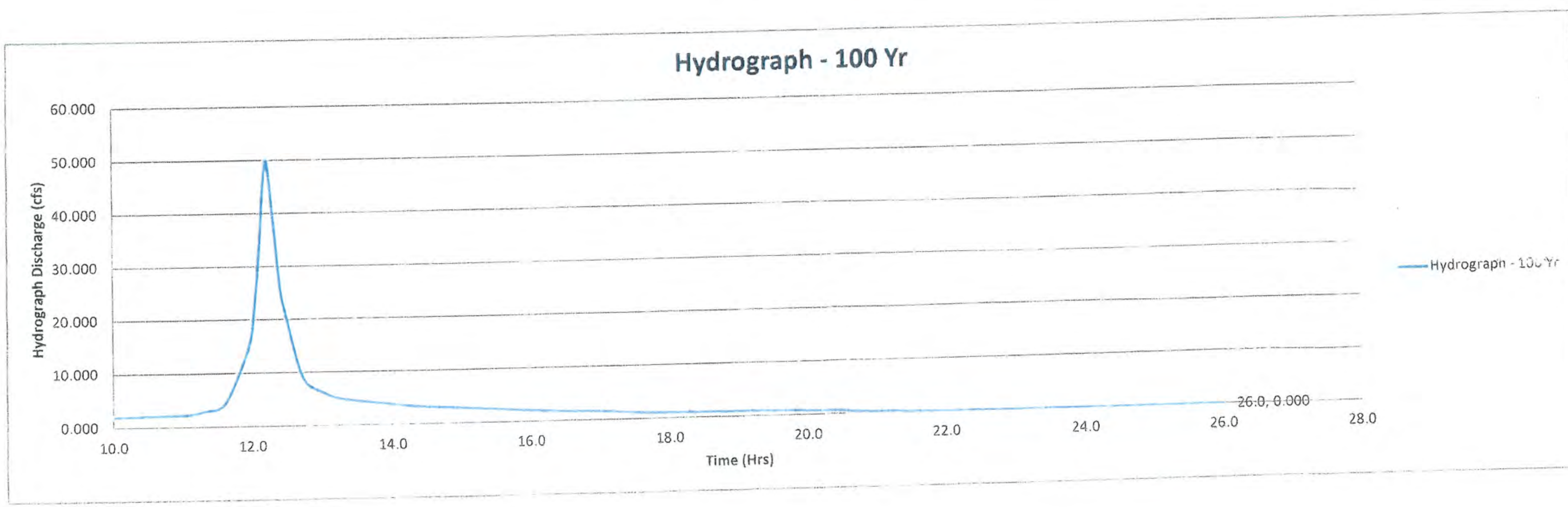


Hydrograph - 5 YR STORM
Hydrograph Discharges (cfs)
26.000
24.000
22.000
20.000
18.000
16.000
14.000
12.000
10.000
8.000
6.000
4.000
2.000
0.000
10.0
12.0
14.0
16.0
18.0
20.0
22.0
24.0
26.0
28.0
Time (Hrs)
Hydrograph - 5 YR STORM



Hydrograph - 25 Yr Storm
Hydrograph Discharges (cfs)
40.000
35.000
30.000
25.000
20.000
15.000
10.000
5.000
0.000
26.0, 0.000
10.0
12.0
14.0
16.0
18.0
20.0
22.0
24.0
26.0
28.0
Time (Hrs)


Hydrograph - 50 Yr Storm
Hydrograph Discharges (cfs)
50.000
45.000
40.000
35.000
30.000
25.000
20.000
15.000
10.000
5.000
0.000
10.0
12.0
14.0
16.0
18.0
20.0
22.0
24.0
26.0
28.0
Time (Hrs)
26.0, 0.000
Hydrograph - 50 Yr Storm


Hydrograph - 100 Yr
Hydrograph Discharge (cfs)
60.000
50.000
40.000
30.000
20.000
10.000
0.000
10.0
12.0
14.0
16.0
18.0
20.0
22.0
24.0
26.0
28.0
Time (Hrs)
26.0, 0.000

HYDRAULIC CALCULATIONS

Stantec — Baton Rouge LA

Storm Water P.S. Calculations

A. Use 50 yr. Storm $Q = 43.35$ cfs $\approx Q = 19{,}455$ gpm

B. Determine Static Lift (H_S). See Station Plan/Profile

Pumps OFF −6.0' EL.
Discharge +27.0' EL.

33.0' Ft.

C. Determine Friction Head (H_F) both pumps "ON".

Station $Q_S = 20{,}000$ gpm ∴ Q_P for each pump = 10,000 gpm

Description		Loss.
30"-32" Disch. Tube		
35' 10,000 gpm = h_f: 0.12/100	=	0.04
4-24" 90° bends = 30'		
1-24" CV. = -0-		
1-24" PX = 4' — 64' (24") h_f: 0.57/100 @ 10,000 gpm	=	0.37'
24" Steel Pipe = 30'		
24x30" Red. ≈ 25' @ 10,000	=	0.14'
30" Tee = 72' @ 20,000	=	0.50'
250' 30" @ 20,000 gpm h_f = 0.70/100	=	1.75'
Suction Bell Intake losses	=	.05'
	H_F =	2.85'

Designed by: Checked by:

Stantec

D. Determine Velocity Head $\left(\frac{V_1^2}{2g}\right)$

Per Tables: Vel Hd @ 20,000 gpm (30") = 1.28'

E. Summation with both Pumps 'ON':

Velocity Head	=	1.28'
Friction Head	=	2.85'
Static Head	=	33.00'
Total Head w/both ON	=	37.13'

F. Make preliminary Pump Selection

MWI Corp. Mixed-Flow 24" Model 24-5700B
See attached pump curve.

G. Determine TH with ONE pump 'ON' [ie. 10,000 gpm]

1. Friction Head

32' Disch Tube		=	0.04'
Fittings		=	0.27'
24 x 30" Red		=	0.14'
30" TEE		=	0.50'
250' 30" @ 10,000 gpm	h_f = 0.83	=	0.46
Suction Bell Intake		=	0.05
Friction Head Total	H_f	=	1.56'

Designed by: Checked by:

Stantec

H. Summation with One Pump 'ON':

Velocity Head$_{24"}$	=	0.78'
Friction Head	=	1.56'
Static Head	=	33.00'
TOTAL HEAD [One pump 'ON']	=	35.34'

I. Pump Selection

Therefore use 24" Mixed-Flow pump

Pumped $Q \simeq$ 10,000 gpm to 12,000 gpm

@ 880 rpm with 19.875" ϕ impeller

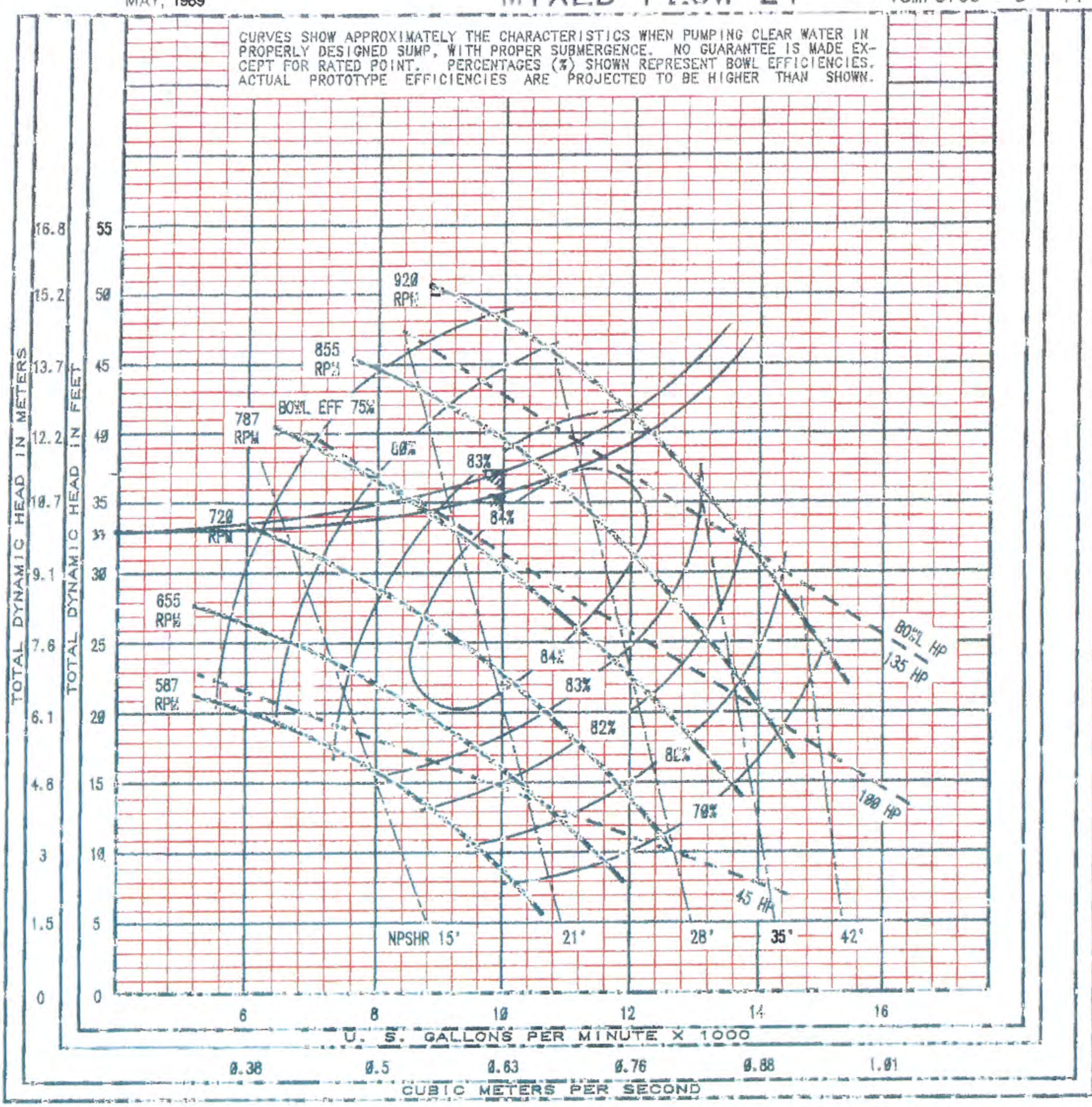
Use 150 horsepower submersible motor

Designed by: Checked by:

MAY, 1989

MIXED FLOW 24"

VSMF5700 - B - 14



Storm PS Baton Rouge, LA

M&W

M & W PUMP CORPORATION
33 N. W. 2nd STREET
DEERFIELD BEACH
FLORIDA 33441
U. S. A.
ESTABLISHED 1920

PUMP PERFORMANCE CURVE

VARIABLE SPEED

TYPE: MIXED FLOW	PROPELLER DIA: 19.875"
MODEL NO: MF 24-5700B	SPEED (RPM): AS NOTED
INTAKE DIA: 32"	DISCHARGE COLUMN DIA: 24"
CURVE NO: N24578 - RPM	Ns: 5700 CODE: B

SINGLE STAGE
FOR TWO STAGES MULTIPLY HEAD AND HORSEPOWER BY 2.0 AND EFFICIENCY BY 1.0 .

PERFORMANCE BASED ON PUMPING CLEAR COLD NON-AERATED WATER, SPECIFIC GRAVITY 1.0, TEMPERATURE 85 DEGREES (FAHRENHEIT) OR LESS, AT SEA LEVEL. PERFORMANCE MAY BE AFFECTED BY HIGHER TEMPERATURES, SPECIFIC GRAVITIES, ALTITUDES AND SUMP CONDITIONS.

IT IS CERTIFIED THAT THE CURVES REPRESENT TRUE PERFORMANCE CHARACTERISTICS OF THE M&W PUMP MODEL AND WERE OBTAINED BY SCALE MODEL TESTS AND CALCULATIONS IN ACCORDANCE WITH HYDRAULIC INSTITUTE STANDARDS.

M & W PUMP CORPORATION

CERTIFICATION

AVAILABLE UPON REQUEST

Stantec

Determine Wet Well Size

Determine Effective Volume

$$V_e = \frac{\Theta q}{4}$$

where Θ = Cycle Time
where q = Pump capacity for one pump

but $V_e = V_{SS} + V_{WW}$

where V_{SS} = pipe surcharge
where V_{WW} = Vol. used in Wetwell

Determine (V_{SS}) Storm Sewer Volume(s)

Assume 1000 lf of 24" I diameter piping

$V_{SS} = 1000' \times 3.1416$ SF

$V_{SS} = 3141.6$ CF

$V_{SS} = 3141.6 \times 7.5$ gal/CF $= 23,562$ gallons

Solve for Effective Volume (V_e)

Large pumps so consider 20 min cycle time

$\Theta = 20$ min

but with two pumps divide by 2 ∴ $\Theta = 10$ min

$q = 10,000$ gpm

$$V_e = \frac{10 \text{ min} \times 10,000}{4} = 25,000 \text{ gallons}$$

but $V_e = V_{SS} + V_{WW}$

25,000 gal = 23,562 gal + V_{WW}

$V_{WW} = 25,000 - 23,562$ gal

$V_{WW} = 1438$ gal

Designed by: Checked by:

Stantec

Assume 10' diameter Wet Well
Each rising foot = 590 gallons

Req'd WW Volume (V_{WW}) = 1438 gal

$1438 \div 590 \, \text{gal}/\text{VFT} = 2.5 \text{ ft (min)}$

Therefore provide a 10' diam Wet Well
and 2.5 ft to 3.5 ft of vertical storage

Designed by: Checked by:

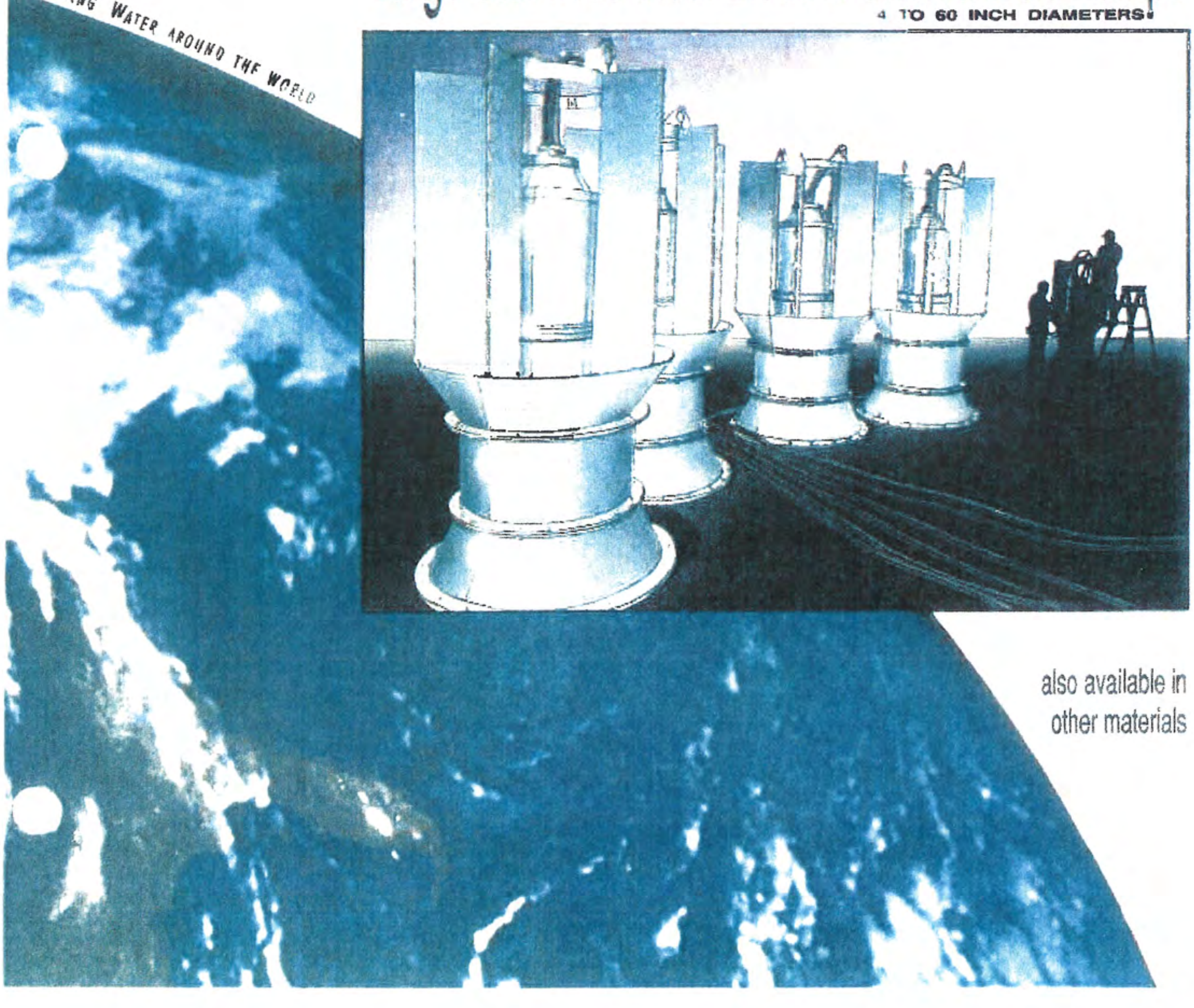
- STORM DRAINAGE
- FLOOD IRRIGATION
- ENVIRONMENTAL CLEAN-UP
- SEWAGE EFFLUENT PUMPING
- FLOOD CONTROL
- WATER TREATMENT SYSTEMS
- CONSTRUCTION DEWATERING
- INDUSTRIAL PROCESS PUMPING
- OPEN PIT MINING DEWATERING
- AQUACULTURE

M&W PUMP-CORP.
SINCE 1926

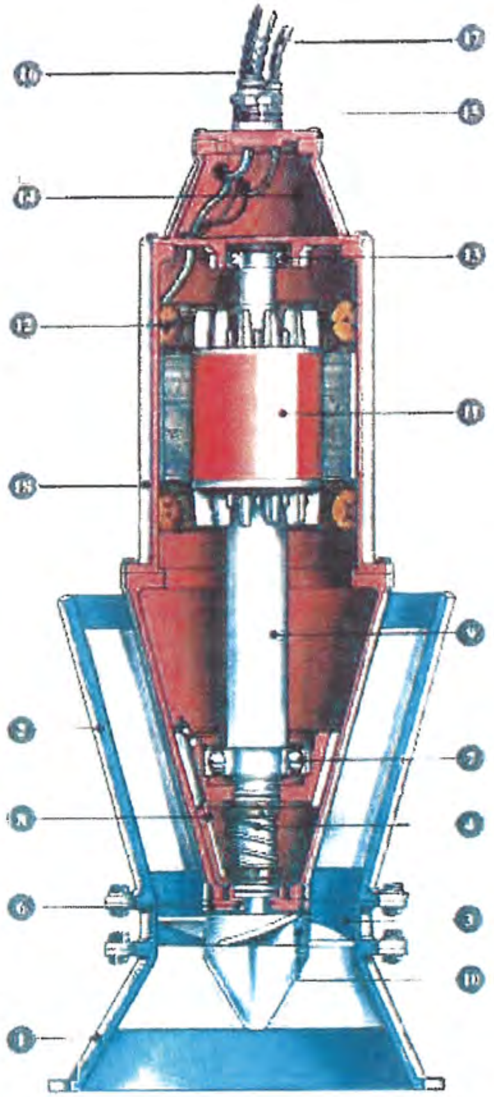
Large Stainless Steel Electric Submersible Pumps

4 TO 60 INCH DIAMETERS

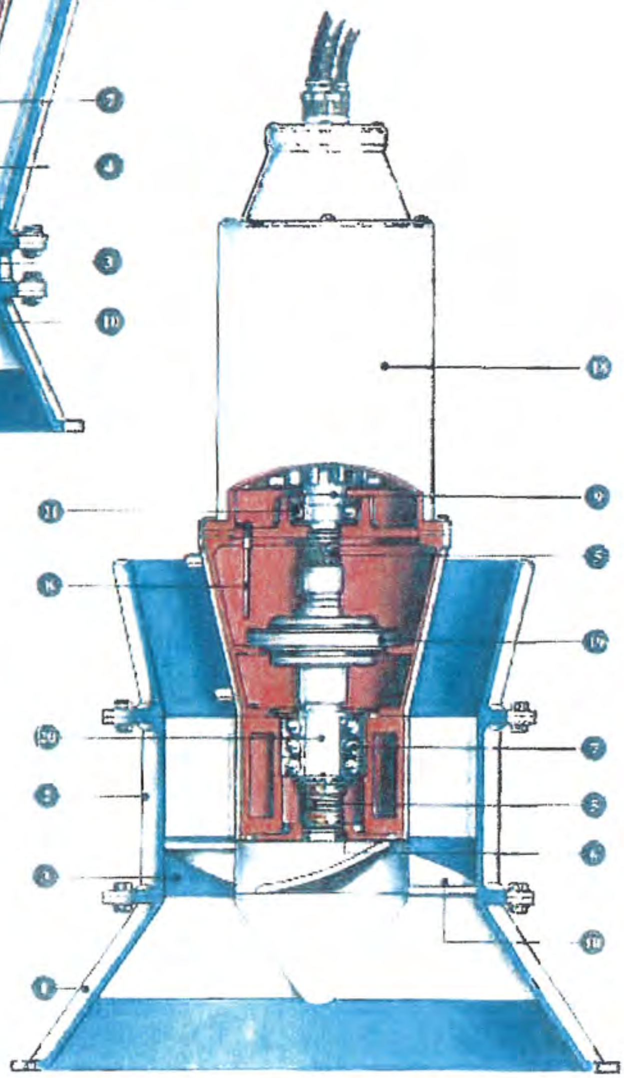
MOVING WATER AROUND THE WORLD



also available in
other materials



1. Intake bell with guide vanes
2. Pump bowl assembly with flow straightening vanes
3. Optional replaceable liner
4. Double mechanical seal (optional materials available)
5. Single mechanical seals (optional materials available)
6. Seal protector
7. Heavy duty thrust bearing (high L10 life)
8. Moisture detection probe
9. Heavy duty shaft with extra safety factor
10. Propeller with taper lock attachment
11. Dynamically balanced rotor
12. Stator windings with thermal protection
13. Upper support bearing (high L10 life)
14. Wire connection chamber, junction box
15. Double cable seal
16. Heavy insulated power cable
17. Control cable
18. Motor housing
19. Speed reducer assembly
20. Pump bowl shaft
21. Intermediate support bearing



WITH M&W ELECTRIC SUBMERSIBLE PUMPS, YOU BENEFIT FROM:

LOWER INSTALLATION COSTS
VERTICAL, ANGLED AND HORIZONTAL CONFIGURATIONS UTILIZE COST-EFFECTIVE INSTALLATIONS.

HIGHER OPERATIONAL EFFICIENCY
OVERALL EFFICIENCIES ARE NORMALLY HIGHER THAN CONVENTIONAL LINE SHAFT PUMPS.

FEWER WEARING PARTS
PUMP PROPELLER DIRECT MOUNTING ONTO THE MOTOR SHAFT ELIMINATES LONG SHAFTS, SHAFT COUPLINGS, BEARINGS AND OTHER ASSOCIATED PARTS.

COST-EFFICIENT PARTS
LARGE PUMPS REQUIRING LOW PROPELLER SPEEDS CAN BE MADE MORE COST-EFFECTIVE UTILIZING SPEED REDUCERS AS OPPOSED TO LOW RPM MOTORS.

IN ADDITION, WITH M&W YOU GET STANDARD FEATURES WHICH ARE USUALLY COSTLY OPTIONS WITH OTHER PUMPS:

MOISTURE AND CORROSION RESISTANT
DOUBLE MECHANICAL SEALS ARE PROVIDED BETWEEN THE MOTOR AND PUMPED LIQUID.
A PRESSURE COMPENSATION DEVICE IS INSTALLED IN THE MECHANICAL SEAL OIL CHAMBER TO LIMIT THE OIL PRESSURE CAUSED BY THERMAL EXPANSION.
ELECTRIC MOTORS ARE AIR FILLED AND ARE PROVIDED WITH A MOISTURE DETECTION PROBE.
MOTOR HOUSINGS ARE AVAILABLE IN SEVERAL STANDARD CORROSION RESISTANT MATERIALS.

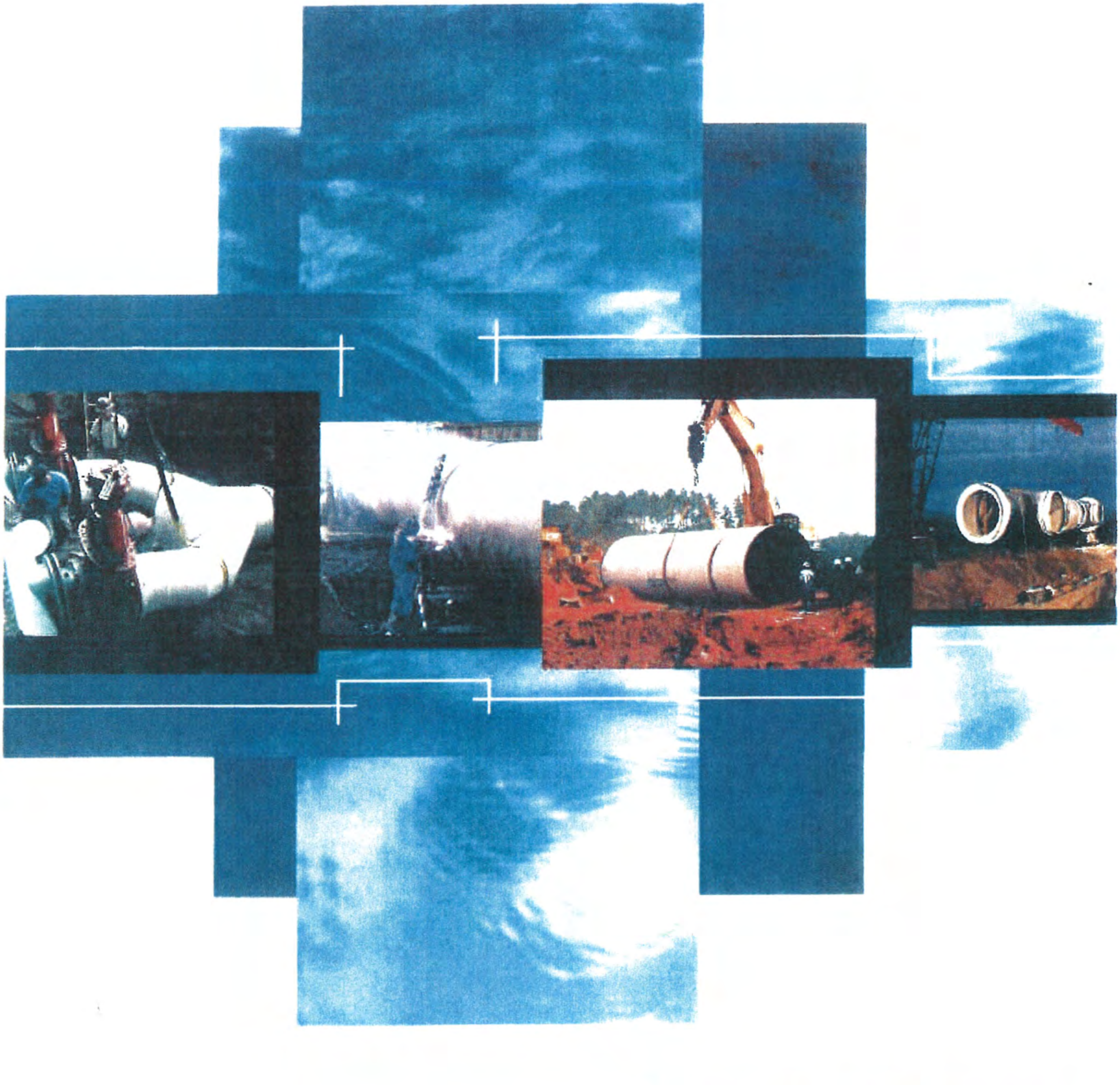
MOTOR STATOR WINDING INSULATION
"STATE OF THE ART" VACUUM PRESSURE IMPREGNATION SYSTEM, WHICH PROVIDES SUPERIOR HEAT TRANSFER, MOISTURE RESISTANCE AND MECHANICAL STRENGTH OVER CONVENTIONAL "CLASS F" DIP AND BAKE INSULATION SYSTEMS.
THE BURNOUT TEMPERATURE IS 290°C.

OVER HEATING PROTECTION
THERMAL SENSORS ARE EMBEDDED IN THE MOTOR STATOR WINDINGS FOR OVERHEATING PROTECTION.

MINIMIZED FRICTION LOSS
WATER FLOW THROUGH THE PUMP'S CONTOURED DESIGN MINIMIZES FRICTION LOSS.

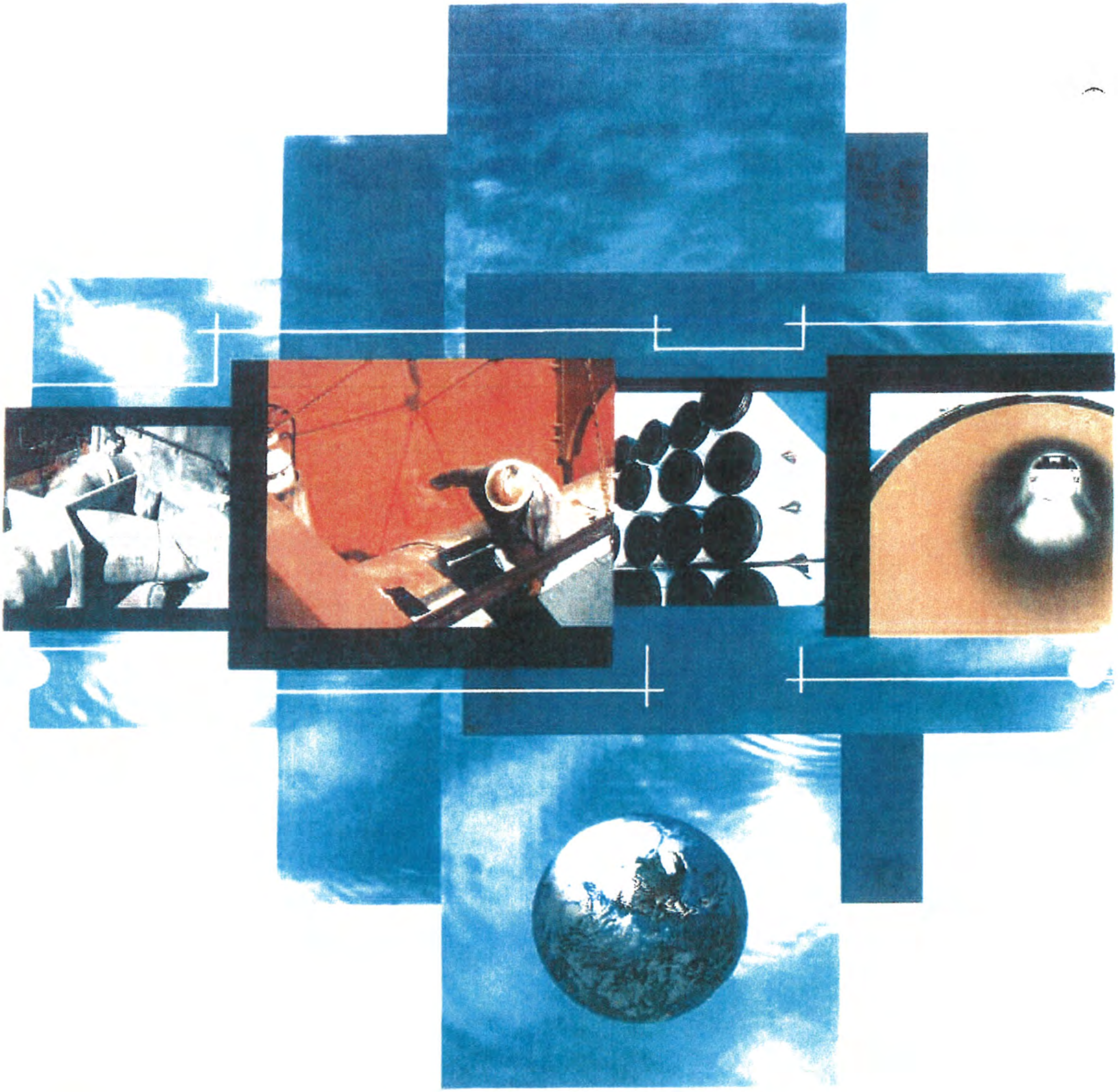
M&W ELECTRIC SUBMERSIBLE PUMPS ARE QUITE SIMPLY THE MOST COST-EFFECTIVE, LARGE VOLUME PUMPING EQUIPMENT YOU CAN OBTAIN.

Engineered Steel Pipe Water Systems



Northwest Pipe Company

Charlotte-Mecklenburg chose Northwest Pipe for this 120-inch raw water main installed in 1999.



Northwest Pipe Company

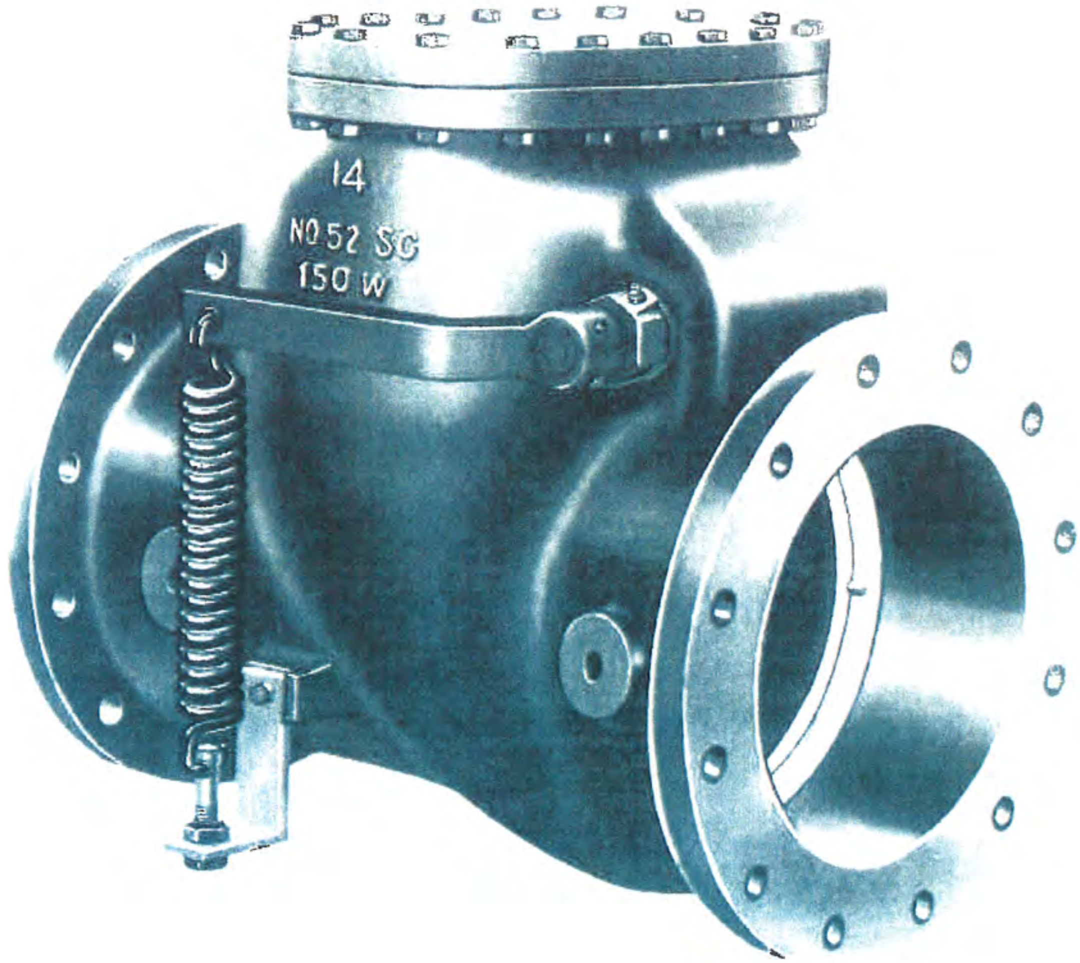
HEADQUARTERS: 200 SW MARKET ST, SUITE 1800 • PORTLAND, OR 97201 • 800-989-9631 • 503-946-1200 • FAX 503-978-2561

PORTLAND, OR: 12005 N BURGARD ST • PORTLAND, OR 97203
ADELANTO, CA: 12351 RANCHO RD • ADELANTO, CA 92301
DENVER, CO: 6030 N WASHINGTON ST • DENVER, CO 80216
PARKERSBURG, WV: ROUTE 892, DUPONT RD • WASHINGTON, WV 26181
SAGINAW, TX: 351 LONGHORN RD • SAGINAW, TX 76179

www.nwpipe.com

50 LINE SWING CHECK VALVES

Spring and Weight Assemblies



SPRING AND WEIGHT ASSEMBLIES

In an extended shaft check valve, the clapper arm shaft is keyed to the clapper arm with a stainless steel key retained by the retaining plugs. The extended end of the clapper arm shaft is fitted with an octagonal shaped ductile iron nut secured to the shaft with a hardened steel pin. The lever fits on the shaft nut and is held in place by two set screws. The lever is ductile iron and can be fitted with a cast iron weight or a steel spring. The closing force of the weight can be varied by adjusting its position on the lever and locking with a set screw or by adjusting the position of the weight on the lever.

The closing force of the spring can be varied by adjusting spring tension with an adjusting screw attached to a boss on the valve body.

Levers may be mounted on either side of the valve, but are normally furnished on left side of valve when facing downstream. On special order, shafts can be supplied extended on both sides for double lever operation if desired. The octagonal nut permits easy field modification for weight and springs in different valve orientation. External levers are not allowed in FM or UL installations.

American-Darling Butterfly Valves

General Information

American-Darling resilient seated butterfly valves are designed, manufactured and tested in accordance with the latest revision of AWWA C504. Valve construction, materials, dimensions, coatings, and input torque fully comply with or exceed the requirements of this standard. Performance tests, leakage tests, and hydrostatic tests are a part of the testing for each American-Darling butterfly valve. Proof-of-Design tests were conducted for the entire size range of valves to ensure reliability of the design.

American-Darling butterfly valves are available in Classes 25 and 75 in sizes 30" through 72" and Class 150 in sizes 4" through 72". Valves are also available in Classes 250 and 350 which include design features and materials that exceed the requirements of AWWA C504. Dimensions and details of valves not shown in the following pages are available upon request.

A complete range of manual actuators and installation accessories such as floorstands and extension stems or extended bonnets can be furnished. Other means of valve actuation available include air or hydraulic cylinders, electric motors, and chainwheels.

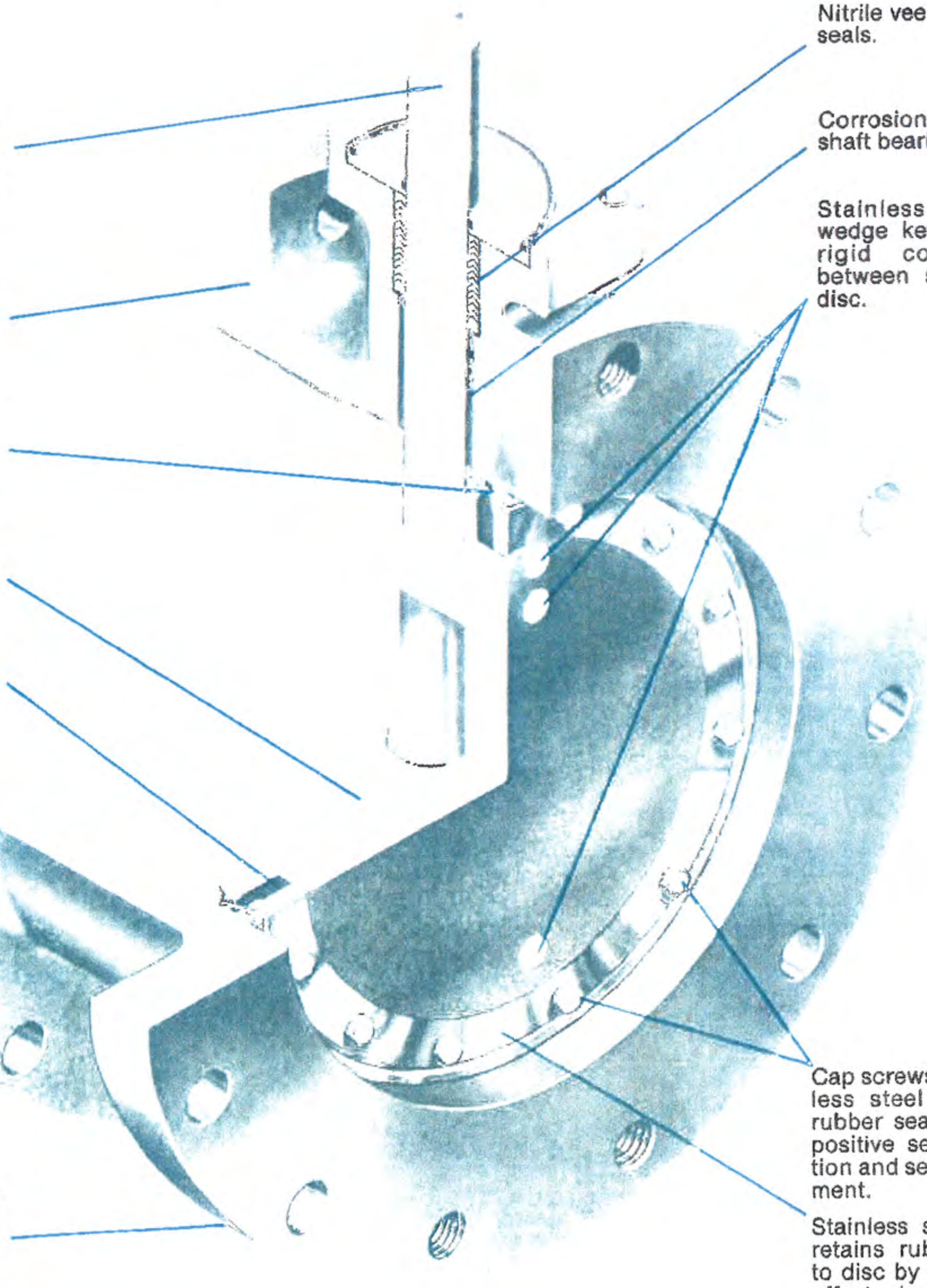
Services in which American-Darling butterfly valves are utilized include raw water, potable water, treated wastewater, cooling water and low temperature air. With slight modifications, other applications such as seawater can be served.

The standard coating for American-Darling butterfly valves is black asphaltic. Epoxies and other special coatings can be furnished at added cost upon request.

American-Darling Valve also produces a wide range of metric flanged butterfly valves manufactured to International Standards. Dimensions and details of the metric flanged butterfly valves are available upon request.

Sectional View — Class 150

(Same for Class 25 and 75)



Stainless steel drive shaft—AWWA diameters—machined for attachment to various actuators.

High tensile cast iron body. Various end conections available.

Mechanically retained stainless steel body seat ring and O-ring seal.

Solid ductile iron disc of streamlined design.

360° Resilient seat fully adjustable and replaceable.

Two-way, bronze thruster at end of haft—adjustable on valves 30" and larger (not shown in this view).

Nitrile vee ring stem seals.

Corrosion resistant shaft bearings.

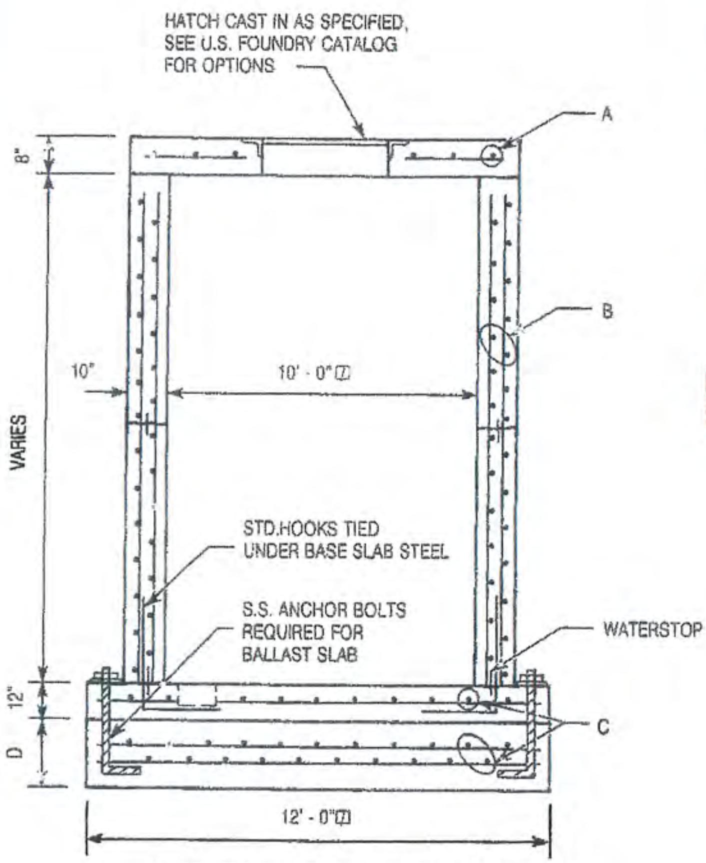
Stainless steel wedge keys assure rigid connection between shaft and disc.

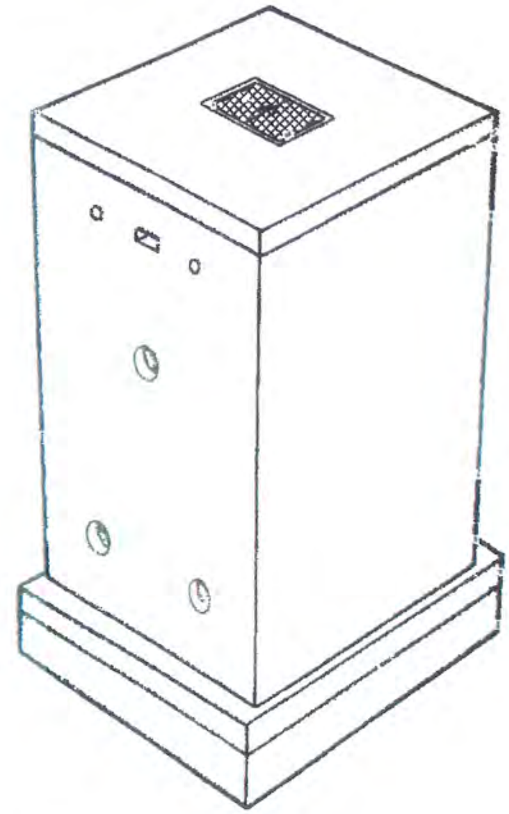
Cap screws of stainless steel through rubber seat provide positive seat retention and seat adjustment.

Stainless steel ring retains rubber seat to disc by means of offset shoulders in seat and disc, fastened by stainless steel cap screws.

10'□ SEWAGE PUMP STATION WITH BOLTED BALLAST SLAB

PRODUCT NO. USP 2-7.0

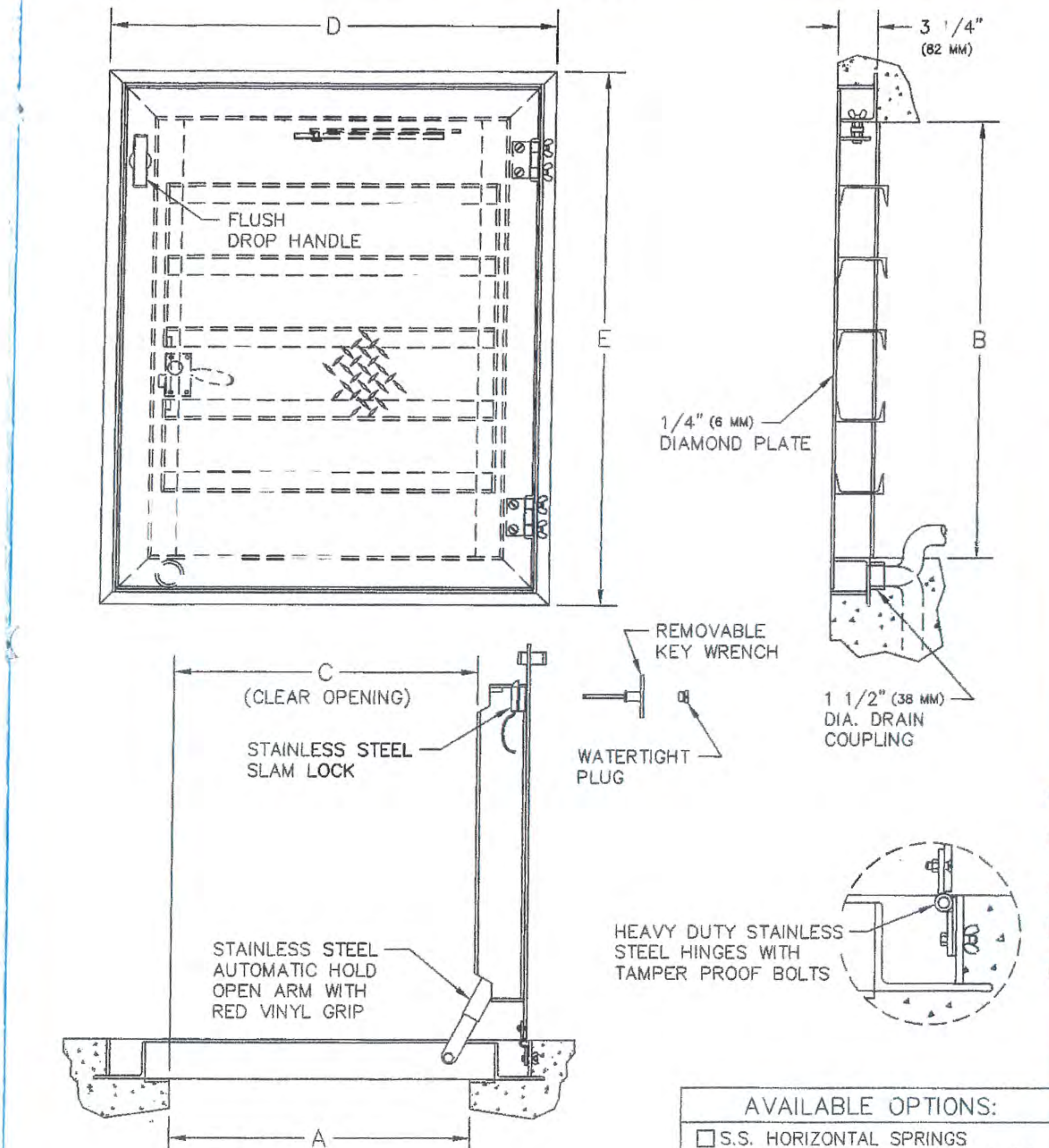




A , B , C : REINFORCING AS SPECIFIED BY THE ENGINEER.
D = 12" OR AS SPECIFIED BY THE ENGINEER.

PRODUCT DESCRIPTION

THIS STRUCTURE IS USED AS A SEWAGE PUMP STATION. IT IS COMMONLY USED BY MIAMI-DADE WATER AND SEWER AUTHORITY TO HOUSE PUMPING AND CONTROL EQUIPMENT. THE BOTTOM SLAB IS SPLIT AND BOLTED WITH 6-1¼" DIAMETER STAINLESS STEEL BOLTS. THE LOWER BALLAST SLAB IS MANUFACTURED TO GIVE 100% COUNTERFLOTATION, AS SPECIFIED BY THE ENGINEER. THE SPLIT BOTTOM IS USED TO ALLOW THE STRUCTURES TO BE MANUFACTURED IN SECTIONS OF SHIPPABLE WEIGHT. THE BASE SECTION WALL HEIGHT IS MANUFACTURED BY THE USE OF SLIP POUR CONSTRUCTION TECHNIQUES TO GET THE FIRST FIELD CONSTRUCTED JOINT ABOVE THE WATER TABLE.



NOTE:
- MATERIAL: STEEL WITH STAINLESS STEEL BOLTS, NUTS, HINGES & HOLD OPEN ARM.
- LOADING: DESIGNED FOR OFF STREET LOCATIONS WHICH MAY OCCASIONALLY RECEIVE H-20 WHEEL LOADS.
- FINISH: ONE COAT SHOP PRIMER.

AVAILABLE OPTIONS:
☐ S.S. HORIZONTAL SPRINGS ☐ RECESSED STAPLE FOR PADLOCK ☐ OTHERS (SEE PAGE 50): ______
U.S.F. FABRICATION, INC. HIALEAH, FLORIDA
THS ____ X ____ (A) (B)

TROUGH FRAME, HEAVY DUTY, SINGLE DOOR

STEEL

The heavy duty trough type floor access doors with drainable frames are designed for interior and exterior applications where dirt and water are to be prevented from falling into area below. They are intended for off street locations that may occasionally receive AASHTO H-20 wheel loads.

SPECIFICATIONS: The floor access door shall be Model THS as manufactured by U.S.F. Fabrication, Inc., Hialeah, Florida, with the size being specified on the plans. Door leaf shall be 1/4 inch thick steel diamond plate reinforced to an AASHTO H-20 wheel load. (Floor access doors are designed for off street locations that may occasionally receive AASHTO H-20 wheel loads.) The frame shall be fabricated from 1/4 inch steel stock to a channel shape with a continuous anchor flange on all four (4) sides. Frame shall drain water out through a 1-1/2 inch pipe coupling. The entire frame including the seat on which the reinforcing rest shall be supported by concrete or other material designed to support the cover loading. The floor access door shall be equipped with a flush steel drop handle that does not protrude above the cover, and a stainless steel automatic hold open arm with a red vinyl grip to lock the cover in the open position. The door shall have stainless steel hinges with stainless steel tamper proof bolts and nuts. The door shall have a watertight stainless steel slam lock operated by a removable key from the outside and by a fixed handle inside. The floor access door shall be furnished with one coat of shop primer. Installation shall be in accordance with the manufacturer's attached instructions. Manufacturer shall guarantee against defects in materials and workmanship for a period of five (5) years.

OPTIONAL FEATURES

- Staple and other locking devices, see page 60
- Stainless steel compression springs for easy opening, see page 61
- Frame skirts for easy casting into a concrete top slab, see page 62
- 2" fiberglass insulation with metal liner
- Nut rails with stainless steel sliding nuts for attaching hardware, see page 65
- Custom lettering, see page 62
- Stainless steel safety chains and posts, see page 63
- Hatch Net to prevent persons from falling through opening, see page 63
- All stainless steel material
- Hot dipped galvanized finish
- Odor reduction gasket, see page 62

H-20 LOADING*

MODEL	MAT'L THK	CONCRETE OPENING		CLEAR OPENING		OVERALL SIZE		WEIGHT
	In (mm)	A in (mm)	B in (mm)	C in (mm)	B in. (mm)	D in (mm)	E in (mm)	Lbs (KG)
THS	1/4 (6)	24 (609)	24 (609)	24 (609)	24 (609)	36 (914)	32 (812)	220 (100)
THS	1/4 (6)	24 (609)	36 (914)	24 (609)	36 (914)	36 (914)	44 (1117)	300 (136)
THS	1/4 (6)	30 (761)	30 (761)	30 (761)	30 (761)	42 (1066)	38 (964)	295 (134)
THS	1/4 (6)	30 (761)	36 (914)	30 (761)	36 (914)	42 (1066)	44 (1117)	340 (154)
THS	1/4 (6)	30 (761)	48 (1218)	30 (761)	48 (1218)	42 (1066)	56 (1421)	435 (197)
THS	1/4 (6)	36 (914)	36 (914)	35 (888)	35 (888)	48 (1218)	44 (1117)	405 (184)

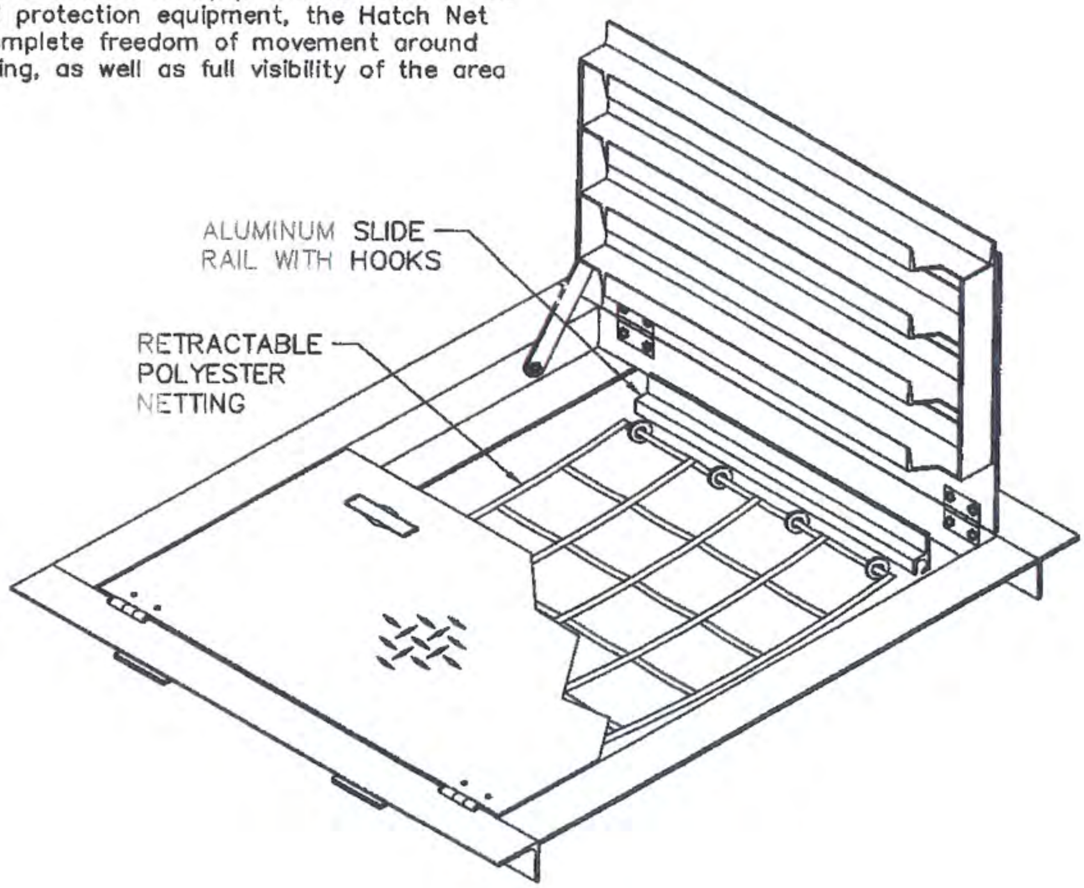
*THS Steel floor access doors are intended for off street locations that may occasionally receive AASHTO H-20 wheel loads (16,000 lbs. over 8" x 20" area).

See page 59 for direct traffic applications.

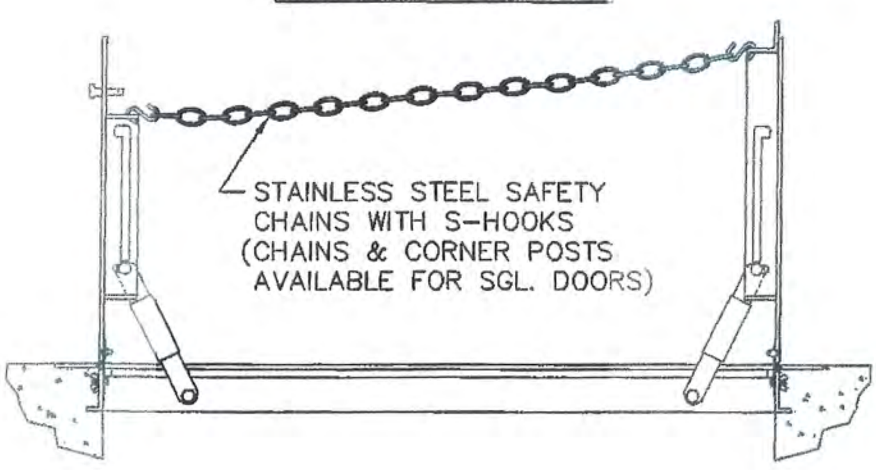
CUSTOM SIZES READILY AVAILABLE

HATCH NET
FALL THROUGH PREVENTION SYSTEM

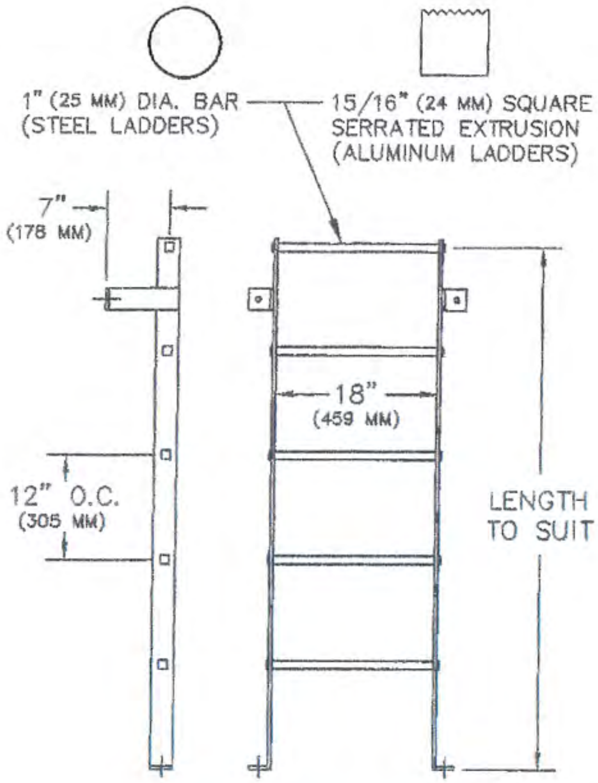
This permanently installed safety net is made of heavy duty polyester that is easily retracted to facilitate access or equipment removal. Unlike other fall protection equipment, the Hatch Net allows complete freedom of movement around the opening, as well as full visibility of the area below.



SAFETY CHAINS

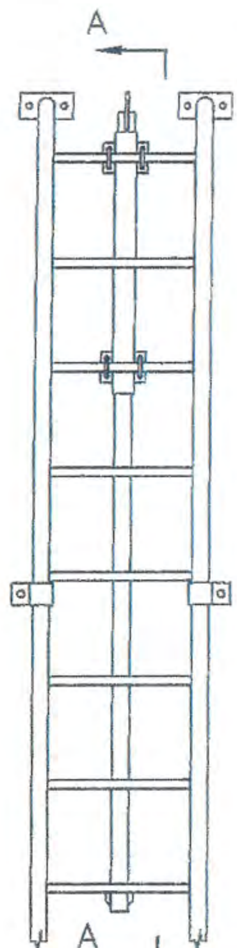


LADDERS

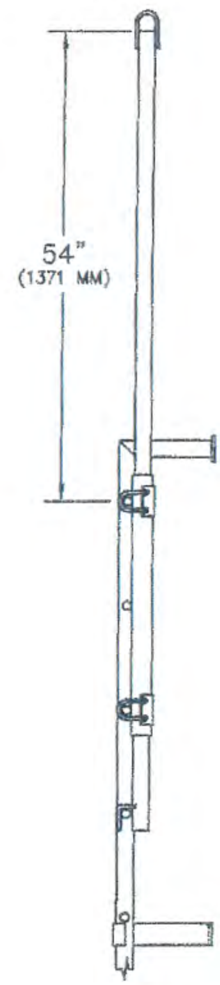


FLOOR MOUNTED LADDER
(WALL MOUNTED ALSO AVAILABLE)

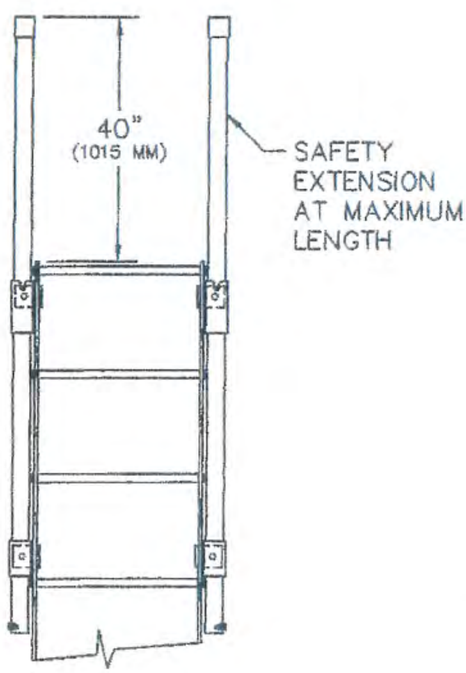
U.S.F. Fabrication makes ladders for mounting on any diameter basin. Just supply us with the diameter and desired offset.



RETROFIT SAFETY POST



SECTION A–A
(SAFETY POST AT MAX. LENGTH)



LADDER WITH SAFETY EXTENSION

LADDER:	SAFETY OPTIONS:
☐ FLOOR MOUNTED	☐ SAFETY EXTENSION
☐ WALL MOUNTED	☐ RETROFIT SAFETY POST
DIMENSIONS:	**MATERIAL:**
☐ LENGTH ________	☐ ALUMINUM
☐ BASIN DIA. ______	☐ ST. STEEL 304
☐ OFFSET ________	☐ OTHER ______

Prosonic T Ultrasonic Level Switch

* compact non-contact level switch
* integrated temperature sensor
* local push-button operation

FTU 230 and FTU 231 compact ultrasonic level switches for non-contact level detection in liquids and solids

level

The Prosonic T is a low-cost compact ultrasonic transmitter for non-contact level detection. The Prosonic T provides simple points for monitoring conveyor belt delivery, pump control, two-point control and distance measurement. Ideal system for level indication in liquids and coarse grained or pelletized solids.

- *measurement in liquids and solids*
- *indicates changes in level in silos, tanks, on conveyors and at conveyor transfer points*

FTU 230
1-1/2" NPT
process connection

FTU 231
2" NPT
process connection

Calibration and setup is simple with push-buttons. Removable display provides visual access.

- *LEDs visible through housing cover for quick monitoring of operation*
  - *green indicates power on and entry acknowledgement*
  - *red indicates relay status and fault*
- *4-pushbuttons allow empty / full calibration in percent at the transmitter site*
- *SPDT relay output for dual-point control*

Specifications

Housing:	PC/ABS; threaded boss and sensor, PVDF
Electrical Rating:	General purpose
Process Seals:	EPDM internal and external
Process Connection:	FTU 230, 1-1/2" NPT
	FTU 231, 2" NPT
Power Input.	90 to 127 VAC, 50/60 Hz
Output:	5 amp SPDT relay

Application Guidelines

Process Temperature:	-40°F to + 176°F
Ambient Temperature:	-4°F to + 140°F (electronics)
Maximum Pressure:	43 psi

Sensor measuring ranges are according to the chart below.

Sensor	Coarse Solids	Liquids
FTU 230	0.83 up to 6.5 feet	0.83 up to 13.2 feet
FTU 231	1.3 up to 11.5 feet	1 3 up to 23 feet