Appendix G

Project Study Report

Appendix G.1

Buchanan Bypass Project Study Report (2003)

March 14, 2003 JN 35-100129
Revised
January 22, 2007

Mr. Paul Reinders
Senior Civil Engineer
CITY OF PITTSBURG
65 Civic Avenue
Pittsburg, CA 94565

Subject: Buchanan Road Bypass, Phase I
Between Somersville Road and Kirker Pass Road
Project Study Report

Dear Mr. Reinders,

RBF is pleased to transmit to the City of Pittsburg the Project Study Report and Environmental Constraints Analysis for the Buchanan Road Bypass for your review and consideration. In addition are reports from our geotechnical, biological, archeological, and traffic subconsultants. To accompany these reports are full size exhibits at a scale 1:1000 of the three final alternative alignments evaluated for this study.

RBF's evaluation indicates that the Central Alignment is the most favorable alignment to achieve the goal of an east-west connector from Somersville Road to Kirker Pass Road.

This project study report has been prepared under the direction of the following Registered Engineer. The Registered Civil Engineer attests to the technical information contained therein and has judged the qualifications of any technical specialists providing supportive data upon which recommendations, conclusion, and decisions are based.

Should you have any questions with regards to our report and exhibits, please do not hesitate to contact us at 925-906-1460. We look forward to presenting our findings to the City Council of Pittsburg, other agencies of whom have an interest, and the public.

Sincerely,
RBF Consulting

William J. Conyers, P.E.
Senior Associate

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PROJECT STUDY REPORT

Section 1 Introduction

Preparation of this Project Study Report (PSR) was requested by the City of Pittsburg. The City of Pittsburg has provided direction and project approvals for this study report. The East Contra Costa Regional Fee and Financing Authority allocated $4 million to fund initial studies and project development.

This report documents the analysis, conclusions and recommendations for the Buchanan Road Bypass Project. The primary reasons for pursuing the project at this time is to provide a limited access arterial roadway between Kirker Pass Road and Somersville Road south of the existing Pittsburg city limits, to serve sub-regional circulation needs. It would also serve a secondary function in providing access for residential development proposals in southeastern Pittsburg and southwestern Antioch, an area that is currently deficient in east-west circulation provisions.

A total of three primary alternative conceptual alignments (two northern alignments and one central alignment) were developed with one additional sub alternatives for the proposed Buchanan Road Bypass Project. A fourth alignment, the southerly alignment, was studied in the field, but was eliminated from consideration due to recent developments that preclude a southerly alignment. The three primary alternatives were evaluated using baseline engineering design criteria and environmental analysis to determine the preferred alignment for more detailed analysis.

The analysis of the technical merits of the primary alignments has identified the Central Alignment as the most promising alignment. Each of the alignments studied exhibited individual technical merits and weaknesses. This Project Study Report summaries design characteristics of the three primary alternative alignments and will serve as the basis for the Buchanan Road Bypass Project Environmental Impact Report.

The topography of the Buchanan Road Bypass Project study area is characterized by rolling undeveloped grasslands. The proposed roadway is 3.5 km (2.2 miles) in length, entirely within the Contra Costa County area. It has been designed to accommodate traffic volumes of 36,700 cars per day at a high level of service.

Each of the three primary alternative alignments analyzed as a part of this study were designed in accordance with Caltrans' Highway Design Manual and City of

Pittsburg's Standards. Any proposed design exceptions are identified in the discussion of the specific alignments.

The estimated construction cost for the alternative alignments range from $41.1 million to $48.7 million in 2002 dollars with the Central Alignment being estimated at $41.1 million.

Section 2 Background

Both the City of Pittsburg and surrounding jurisdictions, including regional and sub-regional agencies, have recognized the severe congestion on existing Buchanan Road and have defined the need for a supplemental east-west roadway between Somersville Road and Kirker Pass Road. The 1988 Pittsburg General Plan identified the need for a "Hillside Limited Access Arterial Roadway" identified as the Buchanan Bypass. The 1980 General Plan had previously indicated an arterial route in this area. As defined in the Pittsburg General Plan, the proposed Buchanan Road Bypass would supplement and roughly parallel Buchanan Road through the foothill area south of the city, providing an alternative access route between Somersville Road and Kirker Pass Road, the latter of which serves to connect the eastern and central Contra Costa County (i.e., Brentwood, Oakley, Antioch and Pittsburg to Concord and Walnut Creek).

The project extends from Kirker Pass Road on the west to Sommersville Road to the east. (See Figure 1 Location Map). The project will ultimately be a four-lane divided arterial highway with limited access. The purpose of this study is to identify a preferred alignment in Phase I by conducting appropriate engineering studies and building consensus through public and stakeholder input. Phase II will develop precise alignment plans for the selected alternative resulting in an approved project report.

The Phase I analysis will be used as the basis for preparation of an Environmental Impact Report with a goal of selecting a preferred alignment for the proposed Buchanan Road Bypass Project.

Buchanan Road Bypass preliminary drawings of three alternative project alignments and profiles were prepared in 1990 on behalf of the developer of the Highlands Ranch development area by the engineering firm of Stedman & Associates. At the time these preliminary drawing were prepared a tentative alignment of the Buchanan Road Bypass within the Antioch Sphere of Influence was illustrated in the preliminary Development Plans, and no other alternative alignments were defined for this segment. (Program EIR, 1994)

In 1994, the City of Pittsburg developed four alignments and profiles and had a Program EIR completed by Duncan & Jones.

In May of 2002 the City of Pittsburg hired RBF Consulting to refine the alignment evaluation previously completed and to provide a Project Study Report and updated environmental constraints analysis.

Section 3 Need and Purpose

Need and Purpose

This project would involve the construction of a limited access arterial roadway between Kirker Pass Road and Somersville Road south of the existing Pittsburg city limits, to serve sub-regional circulation needs. It would also serve a secondary function in providing access for potential residential developments in southeastern Pittsburg and southwest Antioch; an area that is currently deficient in east-west circulation provisions.

Existing Condition

State Route 4 (SR 4) provides a freeway-type facility for east-west circulation across eastern Contra Costa County. There are also several east-west arterial roadways, which connect Pittsburg to West Pittsburg and to Antioch, including the Pittsburg-Antioch Highway, parallel to and north of SR 4. South of SR 4, the two principal east-west routes through Pittsburg are Leland Road and Buchanan Road. Leland Road primarily serves Pittsburg and becomes Delta Fair Boulevard in Antioch, where it turns and continues as a north-south collector-type roadway, Gentrytown Drive. Buchanan Road is the southern-most east-west arterial roadway in Pittsburg. It extends into Antioch crossing Somersville Road and extending more than a mile to the east to terminate at Contra Loma Boulevard, close to the interchange with SR 4. West of Kirker Pass Road, Buchanan Road becomes a local collector-type street. James Donlon Boulevard is an important east-west arterial in Antioch, which presently ends on the west at Somersville Road, but does not extend into Pittsburg's southern area. (see Figure 1, Location Map)

Existing Traffic Volumes

Fehr & Peers Associates Inc, a traffic consultant, analyzed each east-west roadway segment to determine the existing daily Level of Service (LOS). As Table 1 shows, all four major east-west roadway segments currently operate at LOS E or LOS F conditions on a daily basis. The adopted City standard is to achieve a LOS of C.

TABLE 1 EXISTING PARALLEL ROADWAY SEGMENT LEVEL OF SERVICE ANALYSIS		
Roadway Segment	**Facility Type**	**Average Daily Volume/LOS**
Buchanan Road	Two-lane undivided arterial	24,800 / F
State Route 4	Four-lane freeway	96,700 / F
E. Leland Rd/Delta Fair Blvd	Four-lane undivided arterial	33,500 / E
Pittsburg-Antioch Highway	Two-lane undivided arterial	17, 400 / E
Notes: All road segments are generally identified as the section between Somersville Road and Railroad Avenue. Source: Fehr & Peers Associates, September, 2002. Page 8.		

Existing Intersection Level of Service

Table 2 summarizes the existing level of service for the intersections within the project limits. They are operating in the PM peak hours at conditions that exceed the City's standard of an LOS of C.

TABLE 2 EXISTING INTERSECTION LEVEL OF SERVICE ANALYSIS					
Intersection	**Control**	**AM Peak Hours**		**PM Peak Hours**	
		CCTALOS	**HCM**	**CCTALOS**	**HCM**
Buchanan Road /Railroad Ave	Signalized	0.51 / A	18 / B	0.84 / D	67 / E
Buchanan Road /Somersville Ave	Signalized	0.87 / D	78 / E	0.90 / D	39 / D
Somersville Rd /James Donlon Boulevard	Unsignalized	N / A	13 / B	N / A	67 / F
Source: Fehr & Peers Associates, September 2002, Page 8.					

Traffic Forecasts

Fehr & Peers Associates, Inc. prepared a report dated September 2002, summarizing extensive traffic analysis and forecasting in the vicinity of the project. Their analysis indicated that without the proposed improvements the existing level of service of Buchanan Road would deteriorate to "F" by the year 2015 and the other remaining east-west highways would deteriorate to an unacceptable level of service of "E" or "F" as indicated in Table 3 by the year 2030. Implementation of the improvements will increase the level of service for all facilities.

TABLE 3
EXISTING INTERSECTION LEVEL OF SERVICE ANALYSIS

Roadways	Facility Type	Average Daily Traffic / LOS					
		2015			2030		
		No Project	Metering	No Metering	No project	Metering	No Metering
Buchanan Road	Two-Lane undivided arterial	18,900 / F	7,900 / C	7,900 / C	22,900/ F	10,400 / F	10,400 / F
State Route 4	Eight-lane Freeway	143,400/ D	133,400/ D	133,400/ C	164,500 / E	156,900/ D	156,600/ D
E Leland Rd/Delta Fair Blvd	Four-lane undivided arterial	26,300 / C	21,200 / C	21,200 / C	38,400 / F	30,800 / D	30,000 / D
Pittsburg / Antioch Highway	Four-lane divided arterial	22,500 / C	19,300 / C	19,300 / C	34,100 / E	27,500 / C	26,800 / C
Buchanan Road Bypass	Four-lane Expressway	N/A	30,200 / C	30,900 / C	N/A	34,400 / C	35,700 / C

Notes: All road segments are generally identified as the section between Somersville Road and Railroad Avenue.
Sourse: Fehr & Peers Associates, September 2002, Page 21/

Physical Constraints

- The area of the proposed improvements is characterized by rolling undeveloped grasslands. Any roadway alignment through this area will require significant earthwork grading with large cut and fill embankments. Additionally the northern alignments pass through large land slide areas, which require additional remedial earthwork grading to repair the significant landslides.

- The western portion of the alignment, as it intersects Kirker Pass Road passes over Kirker Creek, a sensitive biological area. A plan will have to be developed in concert with RBF's engineers, biological subconsultants and regulatory agencies to mitigate the impacts to Kirker Creek.

Social Constraints

- The proposed improvement may have a significant impact on the operation of an existing livestock ranch. The proposed northern alignment alternatives directly impact existing structures. The third alternative (Central Alignment) avoids existing buildings; however this alignment may impact the agriculture use of the entire ranch.

- The proposed improvements, while enhancing much needed east-west circulation within the City of Pittsburg, will impose additional north-south traffic through the cities of Concord, Clayton and Walnut Creek along Ygnacio Valley Road.

- There are significant developments occurring in the southeastern portion of the City of Pittsburg and the southwestern portion of Antioch. They include Highland Ranch, Sky Ranch and Black Diamond Ranch developments. These developments along with the overall growth of the immediate region will require a much needed east-west circulation in the City of Pittsburg.

Environmental Constraints

- The western portion of the alignment, as it intersects Kirker Pass Road, passes over Kirker Creek, a sensitive biological area. A mitigation plan will be developed to mitigate the impacts the project may have on the biological resources within Kirker Creek. Appropriate permits will be obtained from the regulatory agencies.

- All alignments call for massive grading which will have a visual and descriptive impact to the environment. The Central Alignment has the least area of impacts.

- The northern alignments will impact the existing ranch.

- The northern alignments will impact the existing subdivision from a noise and visual perspective more than the Central Alignment.

Section 4 Alternatives

A. Alignment Description

The "no build" alternative and primary alternative "build" alignments and one sub-alternative have been analyzed for the proposed Buchanan Road Bypass Project. The "build" alignments include two northern alignments, one central alignment and one southerly alignment. The sub-alternative is a slight variation of the central alignment. Each alignment extends from Somersville to Kirker Pass Road. A portion of each alignment on the easterly end of the study are in the same location as the proposed and approved development for the Black Diamond Ranch has fixed the alignment in this area. The alternative alignments commence to diverge at the intersection of Buchanan Road Bypass and Ventura Drive located in the proposed Sky Ranch Development. (See Figure 1, Location Map) Of the four alternatives and one sub-alternative, three of these primary alignments were advanced from the conceptual design phase and analyzed at a scale of 1:1000. The preliminary plan and profile drawings are included in the report Appendix. A general description of each of the alternative alignments are described as follows:

No-Build Project Alternative

The "no-build" project alternative provides no improvements for the Buchanan Road Bypass. Forecast traffic volumes for the year 2030 indicate increased congestion in the City of Pittsburg on its primary east-west route to an unacceptable level of service. This increased congestion will cause significant negative social, economic and environmental consequences.

Northern Alignment #1

This alignment represents the most northerly alignment in the evaluation. It commences at the intersection of Ventura Drive and Buchanan Road Bypass and extends westerly to Kirker Pass Road. This alignment joins Kirker Pass Road with a sweeping horizontal curve. A connecting alignment intersects this proposed alignment to allow for north-south bound traffic on Kirker Pass Road to continue northerly or southerly on Kirker Pass Road. This alignment allows for the majority of the traffic to proceed in an east-west direction on Buchanan Road

Bypass consistent with the findings of the traffic analysis by Fehr & Peers dated September 2002.

The length of this alignment is 3.35 km. It has varying profile grades from +8% to –5%. The 8% grade exceeds the Highway Design Manual criteria of 7% for profile grades for urban highways in rolling terrain (HDM Table 204.3). The 8% grade was necessary to minimize earthwork and avoid impacts to an existing water reservoir. A minimum radius curve of 580 m with a super-elevation rate of 6% was utilized where Buchanan Road Bypass merged with Kirker Pass Road. This curve will allow for an acceptable join to Kirker Pass Road and to a highway tangent to the east that avoids an existing water reservoir. The super-elevation rate of 6% may be considered excessive for a cross slope in median openings (HDM A05.5(4)). Crossover slopes on curves in median openings are recommended to be limited to 5%. Considering the speed of the downhill traffic on Buchanan Bypass as the priority design criteria a 6% crossover slope is considered acceptable.

This alignment impacts Kirker Creek. This alignment impacts existing facilities on the livestock ranch. This alternative requires significant remedial grading to repair existing landslides. This grading coupled with the impacts to Kirker Creek makes it the most expensive alternative of the alternatives studied. This alignment will impact the existing subdivisions far greater from a noise and visual perspective than the Central Alignment.

Northern Alignment #2

This alignment is also a northerly alignment, but differs from alignment #1 by providing for a "T" intersection with Kirker Pass Road. This alignment also commences at the intersection of Ventura Drive and Buchanan Road. This alignment results in an undesirable intersection at Kirker Pass Road. The traffic analysis indicates that a majority of the traffic will be moving in an east-west direction on Buchanan Road Bypass. The northbound right turn movement and the west bound left turn movement will provide for a level of service of F at the intersection.

The length of this alignment is 3.05 km. This alignment also has an 8% grade that exceeds the Highway Design Manual criteria for profile grades of 7%. The 8% grade was necessary to minimize earthwork and to avoid impacts to a water reservoir. This grade also resulted in a crest vertical curve that has a reduced design speed of 80 km/hr. A minimum radius curve of 500 m was utilized to avoid the existing water reservoir, PG&E towers and in an attempt to minimize the impacts to the existing livestock ranch.

The major benefit of this alignment and the "T" intersection with Kirker Pass Road is that it allows for a culvert that is perpendicular to Kirker Creek. This results in the least impacts to Kirker Creek of the alternative alignments. However, this alignment requires the same remedial grading as Northern

Alignment #1 not only adding significant construction cost, but environmental impact to the area. This alignment also impacts existing facilities on the livestock ranch and will have the same noise and visual impact as Northern Alignment #1.

Central Alignment

This alignment traverses the area in what is considered the center of the study area. It commences at the intersection of Ventura Drive and Buchanan Road Bypass and extends westerly to Kirker Pass Road. It ends in a sweeping horizontal curve, similar to Northern Alignment #1. A connecting alignment intersect this proposed alignment to allow for north-south bound traffic on Kirker Pass Road to continue northerly or southerly on Kirker Pass Road. This alignment allows for the majority of the traffic to proceed in an east-west direction on Buchanan Road Bypass.

The length of this alignment is 3.5 km. The profile grades of this alignment vary from +7% to –5%. The grades meet the design criteria of the Highway Design Manual. A minimum radius curve of 580 m with a super-elevation rate of 6% was utilized where Buchanan Road Bypass merged with Kirker Pass Road. This curve will allow for an acceptable join to Kirker Pass Road and is an attempt to thread through the hillsides to minimize earthwork quantities. The super-elevation rate of 6% may be considered excessive for a cross slope in median openings. Crossover slopes on curves in median openings are recommended to be limited to 5% (HDM 405.5(4)). Considering the speed of the downhill traffic on Buchanan Bypass as a priority design criteria a 6% crossover slope is considered acceptable. A minimum radius curve of 500 m with a 4% super-elevation was utilized at the intersection of Ventura Drive. This curve was used to avoid impacts to a water reservoir and provide for an acceptable intersection at Ventura Drive. This alignment has greater impacts on Kirker Creek, as compared to the other alternatives. However, it has the least remedial grading of the alignments studied and avoids the existing ranch and has the least noise and visual impacts to the adjoining subdivisions.

Central Alignment #2

This alignment is similar to the Central Alignment except that it creates a “T” intersection with Kirker Pass Road. Geometrics were advanced for this alternative alignment. But this alignment was withdrawn from consideration, as the level of service for the traffic movement from Kirker Pass Road to Buchanan Road Bypass is F.

Southerly Alignment

This alignment traverses the southerly portion of the study area. It commences at Ventura Drive and Buchanan Road Bypass and abruptly sweeps in a southerly direction through the site. This alternative alignment was studied in the field. Geotechnical, biological and archeological data was collected for this alignment. However, geometrics were not advanced for this alignment. Office research revealed that a tentative map for the Sky Ranch II Development had been prepared. This development precludes the southerly alignment.

Buchanan Road Bypass Alignment, Ventura Drive to Somersville Road

The plans show the horizontal alignment for the Buchanan Road Bypass from Ventura Drive to Somersville Road. However, final profile and grading for this portion of the alignment have not been shown. Improvement plans for this portion of the alignment are nearing completion by another engineering company under contract with A.D. Seeno, a development firm. The join condition between the selected alignment under this study and the alignment proposed between Ventura Drive and Somersville Road should be confirmed prior to implementation. The proposed geometrics, prepared by the other engineering firm, at the intersection of Buchanan Road Bypass and Somersville Road should also be reviewed by the City of Antioch based upon the recommendations of the traffic analysis of this study. The traffic analyses identified an insufficient storage length for the left turn movement at the intersection of Somersville Road and Buchanan Road Bypass.

Design Feature Comparison

Design features of the three primary alternative alignments for the Buchanan Road Bypass are compared in Table 4. Design features for the Kirker Pass connecting road for the Northern Alignment #1 and the Central Alignment are compared in Table 5.

TABLE 4
PRIMARY ALTERNATIVE ALIGNMENT DESIGN FEATURE COMPARISON
BUCHANAN ROAD BYPASS

Design Features	Northern Alignment #1	Northern Alignment #2	Central Alignment
Design Speed	100 km/hr	80 km/hr	100 k/hr
Minimum Horizontal Radius	580 m	500 m	500 m
Super-elevation Rate	6%	7%	4%
Maximum Grade	8%	8%	7%
Fill Slope Maximum Height	35 m	45 m	40 m
Cut Slope Maximum Height	43 m	60 m	55 m

Earthwork (Cut)	1.6 million m^3	2.2 million m^3	2.2 million m^3
Earthwork (Fill + 10% shrinkage)	1.74 million m^3	2.2 million m^3	2.0 million m^3
Earthwork (Remedial)	4.2 million m^3	4.3 million m^3	0.5 million m^3
Earthwork (Export)	0.14 million m^3 (import)	0	0.2 million m^3 (export)
Length of Alignment	3.35 km	3.05 km	3.5 km
Retaining Walls	60 m	0	0 m
Major Drainage Crossings	9	7	9
Acres of Wetlands Impacted	Moderate	Least	Most
Level of Service 2030	C	F	C
Geotechnical Impacts	Significant	Significant	Moderate
Archeological Impacts	Moderate	Moderate	Minor
Biological Impacts	Significant	Moderate	Significant

TABLE 5
PRIMARY ALTERNATIVE ALIGNMENT DESIGN FEATURE COMPARISON
KIRKER PASS ROAD

Design Features	**Northern Alignment #1**	**Northern Alignment #2**	**Central Alignment**
Design Speed	53 k/hr	N/A	65 k/hr
Minimum Horizontal Radius	180 m	N/A	200 m
Maximum Grade	6%	N/A	5.5%
Fill Slope Maximum Height	11 m	N/A	9 m
Cut Slope Maximum Height	0	N/A	3 m
Length of Alignment	520 m	N/A	580 m
Retaining Walls	65 m	N/A	50 m

B. Alignment Analysis

Each alternative alignment has been reviewed and compared in Table 6. The three alignments have been evaluated in relation to each other. The following discussion compares how the alternative alignments relate to each other.

1. Design Criteria

All alignments require design exceptions. The Central Alignment has a minimum radius curve of 500 m with a super-elevation rate of 4% that is below the Highway Design on Manual criteria of 7%. However, this curve is at the proposed signalized intersection of Ventura Drive is an area that will be developed. Actual traffic speeds in this area will be below 100 km/hour and the 4% super-elevation rate will provide for an acceptable intersection design. Northern Alignment #2 also has curves with a radius of 500 m with a 6% super-elevation rate. Both Northern Alignments #1 and #2 have 8% grades that exceed the Highway Design Manual criteria of 7%. Northern Alignment #2 has an intersection configuration that results in a level of service of F. The Central Alignment is the preferred alignment, as it provides the best alignment from a design criteria standpoint.

2. Geotechnical Constraints

Northern Alignment #1 has the least above grade earthwork grading, but passes through an area of significant landslides requiring major remedial grading work. Likewise Northern Alignment #2 passes through the same landslide area as Northern Alignment #1, requiring the same remedial work. The Central Alignment has the greatest above grade earthwork volume for project, but passes through an area of relatively speaking minor geotechnical constraints. The grading associated with each alignment impact a minimum of two PG&E transmission towers. Northern Alignment #1 may impact an additional three towers. The grading of both Northern Alignment #1 and #2 is in close proximity to an existing water reservoir. The final geotechnical evaluation may reveal the water reservoir and other PG&E towers are impacted. The Central Alignment remains the best alignment from a geotechnical perspective.

3. Environmental Constraints

All alignments pose significant environmental constraints that must be mitigated for a successful project. A biological report prepared by Monk & Associates dated September 23, 2002 provides specific information on the environmental impacts of each alignment. Kirker Creek has additional constraints as red-legged frogs, an endangered species, were observed in the streambed. Northern Alignment #2 has the least impact on the Kirker Creek riparian area as the alignment is perpendicular to the stream. Of the acceptable alignments, Northern Alignment #1 and the Central Alignment, both have impacts on Kirker Creek.

Additional Northern Alignments #1 and #2 impact the existing ranch, while the Central Alignment avoids impact to the existing homes. Additionally, the Northern Alignments will have greater noise and visual impacts to existing subdivision than the Central Alignment. As such, the Central Alignment is the most favorable alignment from an environmental and social standpoint.

4. Project Costs

Northern Alignment #1 is the most expensive. Therefore, the Central Alignment is the preferred alignment.

TABLE 6
PRIMARY ALTERNATIVE ALIGNMENT COMPARISON

Project Objective	Northern Alignment #1	Northern Alignment #2	Central Alignment
Design Criteria	Acceptable	Not Acceptable	Acceptable
Geotechnical Constraints	Most	Most	Least
Environmental Constraints	Most	Least	Most
Project Costs	Most	Medium	Least

Alternatives Withdrawn From Consideration

Two alignments were withdrawn from consideration for preliminary evaluation of plan and profile during this phase of the work. As previously discussed a southerly alignment was eliminated from consideration as a development in the northeast quadrant of the study area has precluded that alignment. Also eliminated was Central Alignment #2 as it provides for a “T” intersection at Kirker Pass Road. This alignment configuration provides a traffic level of service of F for the movement of traffic from Kirker Pass Road to Buchanan Road Bypass. Northern Alignment #2 also provides a “T” intersection configuration. It too provides for a level of service of F for the same movement of traffic from Kirker Pass Road to the Buchanan Road Bypass. However Northern Alignment #2 remained in consideration for purposes of indicating that “T” intersections from Buchanan Road Bypass to Kirker Pass Road were evaluated.

C. Additional Design Discussion

Design Criteria

Design standards utilized by the City of Pittsburg, and Caltrans Highway Design Manual have been used to develop the alternative alignments. The study alignments are within Contra Costa County, but as the City of Pittsburg is the lead agency. The alignments conform to the City of Pittsburg's design standards for a primary highway.

City design criteria will be utilized in preparation of final PS&E for establishing traffic index values and pavement structural sections.

Table 7 shows the design criteria utilized in the development of the alternative alignments for the Buchanan Road Bypass Project.

TABLE 7 – DESIGN CRITERIA

Design Feature	Criteria
Minimum Design Speed	100 km/hr
Desirable Minimum Horizontal Curve Radius	600 m
Minimum Horizontal Curve Radius	500 m
Desirable Maximum Grade	7%
Maximum Grade	8%
Minimum Tangent	120 m
Side Slopes	2:1
Through Traffic Lane Width	3.962 m (13')
Single Left Turn Lane Width	3.353 m (11')
Dual Turn Lane Width	3.353 m (11')
Single Turn Lane Median Nose Width	1.219 m (4')
Dual turn Lane Median Nose Width	1.219 m (4')
Maximum Super-elevation	6%
Normal Cross Slope	-2%
Minimum Vertical Curve Length	200 m
Parkway Width	3.048 m (10')

Standard Median Width	4.268 m (14’)
Minimum Median Width	1.219 m (4’)
Maximum Median Width	7.600 m (24.92’)
Parkway Curb Height	0.152 m (6”)
Median Curb Height	0.203 m (8”)
Emergency Shoulder/Class II Bike Lane	2.438 m (8’)
Typical Lane Configurations	3.962 m (13’), 3.658 m (12’), 2.438 m (8’)

D. Traffic Analysis

Fehr & Peers Associates, Inc., a traffic consultant, analyzed each study roadway and intersection to determine the future year LOS according to the analysis methodology described their report dated September 2002. The following sections summarize the results of the analysis.

Intersection Analysis

Tables 8 and 9 display the intersection analysis results under 2015 and 2030 conditions, respectively. As shown, all three existing intersections would operate at an unacceptable LOS in 2015 and 2030 without the Buchanan Road Bypass. Year 2030 congestion would be particularly severe as all three locations are projected to operate at LOS F during at least one peak hour. Construction of the Bypass would restore acceptable operations to these intersections.

Tables 8 and 9 display the analysis results for the new terminal intersections created by the Buchanan Road Bypass. As stated above, two options were evaluated for the western terminus at Kirker Pass Road. Option A would form a T-intersection between the Buchanan Road Bypass and existing Kirker Pass Road. Option B would re-orient the intersection such that the Buchanan Road Bypass and Kirker Pass Road south would serve as the east-west through roadway. Kirker Pass Road north would form the T-intersection. The analysis results indicate that Option A would not provide acceptable operations, even with extensive intersection widening. It is necessary to re-align the intersection under Option B in order to provide acceptable operations, regardless of future metering scenarios. The eastern terminal intersection at Somersville Road and James Donlon Boulevard is expected to operate acceptably under both build scenarios. (Fehr & Peers Sept. 2002)

Signal Warrants

The new terminal intersections at each end of the Bypass were evaluated for traffic signal warrants using Warrant 11 of the *Caltrans Traffic Manual*. The results indicate that the volumes would exceed peak hour thresholds to warrant a signal under 2015 and 2030 build scenarios.

The Somerville Road/James Donlan Boulevard intersection was evaluated for traffic signal warrants using Warrant 11 of the *Caltrans Traffic Manual* under future "No Build" Conditions. The initial results indicate that this intersection meets the peak hour warrant for a traffic signal. However, even though the volumes for certain movements are high, the number of conflicting movements is very low. Therefore, signalization would not be necessary. (Fehr & Peers Sept. 2002)

Roadway Segment Analysis

Future roadway segment operations were evaluated based on a comparison of the average daily traffic forecasts to the capacity of each segment shown in Table 4 on page 7 of the Fehr & Peers Report. As Table 3 of this report indicates, all four of the existing roadways would operate at LOS E or F in 2030 without the Buchanan Road Bypass Project. Construction of the Buchanan Road Bypass would restore LOS D or better operations to all roadways under both 2015 and 2030 scenarios. In addition, the Buchanan Road Bypass itself is expected to operate at LOS C as summing access is limited and the design speed of the road is such that it can serve as an expressway. (Fehr & Peers Sept. 2002).

TABLE 8
2015 INTERSECTION ANALYSIS RESULTS

AM Peak Hour	CCTALOS Analysis			HCM Analysis		
	No Project	**Metering**	**No Metering**	**No Project**	**Metering**	**No Metering**
Buchanan Road / Railroad Ave	0.57 / A	0.30 / A	0.29 / A	20 / B	16 / B	
Buchanan Road / Somersville Road	0.97 / E	0.46 / A	0.45 / A	91 /F	17 / B	
Somersville Road / James Donlon	Not applicable to unsignalized sections.			18 / C	N/A	
Buchanan Rd / kirker Pass Rd Option A	N/A	0.71 / A	0.80 / C	N/A	20 / B	
Buchanan Rd / kirker Pass Rd Option B	N/A	0.67 / B	0.73 / C	N/A	14 / B	
Buchanan Rd Bypass / Somersville Rd / James Donlon	N/A	0.74 / C	0.80 / C	N/A	13 / B	
PM Peak Hour	**CCTALOS Analysis**			**HCM Analysis**		
	No Project	**Metering**	**No Metering**	**No Project**	**Metering**	**No Metering**
Buchanan Road / Railroad Ave	0.84 / D	0.39 / A	0.39 / A	58	16 / B	16 / B
Buchanan Road / Somersville Road	0.97 / E	0.51 / A	0.51 / A	47	15 / B	15 / B
Somersville Road / James Donlon	Not applicable to unsignalized sections.			829		
Buchanan Rd / Kirker Pass Rd Option A	N/A	1.32 / F	1.32 / F	N/A	61 / E	61 / E
Buchanan Rd / Kirker Pass Rd Option B	N/A	0.69 / A	0.69 / B	N/A	12 / B	12 / B
Buchanan Rd Bypass / Somersville Rd / James Donlon	N/A	0.54 / A	0.54 / A	N/A	12 /B	12 /B

Source: Fehr & Peers Associates, Setpember 2002.
N/A Not Applicable.

TABLE 9
2030 INTERSECTION ANALYSIS RESULTS

AM Peak Hour	CCTALOS Analysis			HCM Analysis		
	No Project	**Metering**	**No Metering**	**No Project**	**Metering**	**No Metering**
Buchanan Road / Railroad Ave	0.68 / B	0.47 / A	0.47 / A	24 / C	16 / B	14 / B
Buchanan Road / Somersville Road	1.40 / F	0.61 / B	0.63 / A	320 /F	17 / B	17 / B
Somersville Road / James Donlon	Not applicable to unsignalized sections.			51 / C	N/A	N/A
Buchanan Rd / Kirker Pass Rd Option A	N/A	0.79 / C	0.94 / E	N/A	20 / B	24 / C
Buchanan Rd / Kirker Pass Rd Option B	N/A	0.78 / C	0.86 / D	N/A	14 / B	18 / B
Buchanan Rd Bypass / Somersville Rd / James Donlon	N/A	0.87 / D	0.80 / C	N/A	13 / B	12 / B
PM Peak Hour	**CCTALOS Analysis**			**HCM Analysis**		
	No Project	**Metering**	**No Metering**	**No Project**	**Metering**	**No Metering**
Buchanan Road / Railroad Ave	1.09 / F	0.47 / A	0.47 / A	79 / E	17 / B	17 / B
Buchanan Road / Somersville Road	1.20 / F	0.71 / C	0.71 / C	111 / F	36 / B	36 / B
Somersville Road / James Donlon	Not applicable to unsignalized sections.			1,072 / F	N/A	N/A
Buchanan Rd / kirker Pass Rd Option A	N/A	1.50 / F	1.50 / F	N/A	94 / F	94 / F
Buchanan Rd / kirker Pass Rd Option B	N/A	0.76 / C	0.76 / C	N/A	15 / B	15 / B
Buchanan Rd Bypass / Somersville Rd / James Donlon	N/A	0.71 / C	0.71 / C	N/A	15 / B	15 / B

Source: Fehr & Peers Associates, Setpember 2002.
N/A Not Applicable.

E. Hydrology Analysis

Background

The purpose of this section is to document the preliminary hydrologic analyses performed as part of the evaluation of three alternative alignments for Buchanan Road Bypass Project. Off-site drainage boundaries tributary to the proposed roadway are delineated on Exhibit A in the appendix. The area of the Kirker Creek watershed between the evaluated alternatives and the existing Buchanan Road is also shown and was used in the analysis to compare the results of the methodology used for this study to results provided by Contra Costa County Flood Control and Water Conservation District (CCCFC & WCD). Due to the closeness of Northern Alignments #1 and #2 at the points where the roadway would cross the creeks, one set of flow values was calculated for the Northern Alignments #1 and #2 culvert locations and another set of flow values was calculated for the Central Alignment.

The proposed alignments are located in the hills south of the Pittsburg city limits. Kirker Creek is the primary drainage feature in the project area, with a tributary area up to approximately 14.5 square kilometers at the limits of the evaluated projects. A number of smaller creeks, that ultimately flow into Kirker Creek further downstream, with a combined drainage area of approximately 5.2 square kilometers would be crossed by the proposed alignments east of Kirker Creek. The locations of crossings required for each alternative are shown on Exhibit B in the appendix. The identifiers for the culvert locations are related to the corresponding drainage areas identifiers.

Summary

Culvert Sizing

The Army Corps of Engineers computer program HEC-1 was used to calculate runoff hydrographs for 10-, 25- and 100-year storms for each of the creek crossing points for each alternative. Culvert sizes were selected to convey the 100-year peak discharge based on a maximum full pipe culvert velocity of 1.8 meters per second. This should provide ample conveyance without excessively erosive discharge velocities. The following tables list the calculated discharges and required culvert diameters for the evaluated alternatives. Northern Alignment 1 and 2 were considered together because the creek crossing locations are approximately the same.

TABLE 10 CULVERT SIZING FOR NORTHERN ALIGNMENTS 1 & 2						
Location	Drainage Area	10-Year Discharge	25-Year Discharge	100-Year Discharge	Culvert Barrels	
					Number	Diameter
	Km^2	cms	cms	cms		mm
1	0.19	0.4	0.7	1.1	1	900
2AB	2.64	3.9	5.6	9.3	2	1800
M12	0.08	0.3	0.4	0.6	1	750
3ABCD	1.55	3.4	5.1	8.3	2	1800
4AB	0.39	1.0	1.5	2.4	1	1350
5AB	0.35	0.8	1.1	1.8	1	1200
K1	8.56	12	16	26	Box	4mx4m
K3	0.60	1.4	2.0	3.2	1 (alt. 1 only)	1500
K1235	14.4	20	29	45	Box	2-4mx4m

TABLE 11 CULVERT SIZING FOR THE CENTRAL ALIGNMENT						
Location	Drainage Area	10-Year Discharge	25-Year Discharge	100-Year Discharge	Culvert Barrels	
					Number	Diameter
	Km^2	cms	cms	cms		mm
1	0.19	0.4	0.7	1.1	1	900
2AB	2.64	3.9	5.6	9.3	2	1800
M1	0.05	0.2	0.3	0.4	1	750
3ABC	1.21	2.9	4.1	6.8	2	1800
4A	0.18	0.6	0.8	1.4	1	1350
5A	0.26	0.6	0.9	1.5	1	1200
K1	8.56	12	16	26	Box	4mx4m
K3	0.60	1.4	2.0	3.2	1	1500
K5	0.10	0.4	0.5	0.9	1	900

Erosion and Sedimentation

The soils in the watersheds tributary to the project have moderate to high erosion potential. Sedimentation upstream and within culverts could occur and will require regular inspection and periodic maintenance. Rapid deposition of material could occur if risers are used to create water quality/flood control detention basins upstream from culverts. Care must be taken to consider long-term maintenance of such basins, particularly if more than site drainage is controlled. Erosion downstream from sediment basins can occur if the velocities are erosive and there is a deficit in the sediment carrying capacity of the flow.

Downstream Impacts and Mitigation Measures

Flooding in the immediate vicinity of the project is not a significant issue because the terrain is steep and the existing channels have ample capacity. However, over-bank flooding does occur further downstream, between Contra Costa Canal and State Highway 4.

The proposed project would increase the impermeable area in each drainage area through which it passes. This would increase the runoff from these areas. The overall expected increase in the 100-year peak discharges in Kirker Creek could be about 0.1 percent and could be considered less than significant. However, the increase in discharge due to the roadway could significantly impact the hydrology of some of the smaller drainage areas through which it would pass because it would cover a relatively high percentage of the area.

Stormwater detention could be used to help mitigate the potential increase in discharge rates that could result from increased impermeable area. Detention can effectively mitigate some negative impacts, such as potential for erosion and flooding proximate to a project. However, the impact of increased flow volumes and the timing of flows should be considered when selecting the location and size of detention facilities. Site detention facilities may not benefit the downstream flooding problem.

At this preliminary analysis stage, $650,000 has been budgeted for stormwater volume/rate mitigation. This amount could be used to pay the fee required per Chapter 15.104 entitled “Stormwater Management Plan for Kirker Creek Watershed” in the City of Pittsburg Municipal Code. Alternatively, it may be possible to integrate design of flood control detention into the design of the roadway. Any alternative to the fee would require approval from Contra Costa County Flood Control and Water Conservation District and the City of Pittsburg.

Runoff rates and volumes are dependent on tributary impermeable area. The following table summarizes the increase in impermeable area that could result from the proposed roadway:

TABLE 12: INCREASE IN IMPERMEABLE AREA	
Location	**Increase in Impermeable Area by % of Watershed**
1	4.5%
2AB	0.4%
M12	8.7%
3ABCD	0.8%
4AB	2.4%
5AB	2.2%
K1235	0.1%

Site Drainage
Site drainage involves the flows that originate from the proposed roadway. Detailed design of the site drainage system would follow Caltrans Highway Design Manual procedures and be configured to contain the spread width to the shoulder during a 25-year design storm based on a minimum time of concentration of 10-minutes. Inlet spacing is generally a function of roadway width and longitudinal slope. For the proposed cross section, a maximum inlet spacing of 200-meters was assumed. More frequent inlets were assumed along flatter slopes and proximate to roadway sags.

Site storm drainage networks would be configured to discharge toward logical stream crossings to maintain close to existing drainage patterns and minimize erosion potential. Laterals from catch basins would be 375 mm pipe and trunk lines would be 450 mm pipe. Each network would include water quality treatment measures such as a hydrodynamic separator or water quality basin.

Precipitation
The hydrologic calculations for estimating flows at the creek crossing points used a 5-minute precipitation pattern for a 24-hour period based on the Contra Costa County Depth-Duration-Frequency (DDF) curve for a 25-year event with a mean seasonal precipitation of 15-inches. The 5-minute pattern was selected to provide a reasonable estimate of peak discharges from the smaller watersheds where lag time could be less that 15-minutes. The 24-hour precipitation depth was based on CCCFC & WCD mean seasonal isohyets and the appropriate DDF curve. Use of a 24-hour storm duration can provide reasonable results for both peak flows and total runoff volumes.

Methodology
The Army Corps of Engineers computer program HEC-1 was used to calculate runoff hydrographs using Soil Conservation Service (SCS) methodology. This methodology reduces the effective infiltration rate as the ground becomes saturated. An initial abstraction (loss) and subsequent direct runoff as a function of total rainfall are determined as functions of SCS curve number. A curve number of 69 (AMC II) was selected as being representative of the soil types and ground cover in the study watersheds.

SCS methodology routes runoff using a unit hydrograph method where the scale of the unit hydrograph is determined based on the basin lag time. Basin lag time take to be 0.6 times the time of concentration. Times of concentration were estimated using the SCS equation:

$$t_c = \frac{100L^{0.8}[(1000/CN)-9]^{0.7}}{1900S^{0.5}}$$

In this equation, *L* is the longest flow path in feet, *S* is the average watershed slope in percent and *CN* is the SCS runoff curve number.

The following table provides precipitation depths, lag times and pre-project impermeable area percentage for the study watersheds:

TABLE 13
HYDROLOGIC PARAMETERS

Area	MSP	100-YR 24-hr	25-YR 24-hr	10-YR 24-hr	Lag Hours	% Imper.
	In	Mm	mm	mm		
1	14	107	87	74	0.12	0
2A	15	112	92	79	0.30	0
2B	16.25	122	97	84	0.55	0
M1	15	112	92	79	0.07	0
M2	15	112	92	79	0.03	0
3A	16.25	122	97	84	0.22	0
3B	16.25	122	97	84	0.14	0
3C	16	120	96	83	0.22	0
3D	15	112	92	79	0.15	0
4A	16	120	96	83	0.09	0
4B	15.5	117	93	82	0.17	0
5A	16	120	96	83	0.19	0
5B	15.5	117	93	82	0.10	0

K1	18	133	107	92	1.13	0
K2	18	133	107	92	0.81	3
K3	16.25	122	97	84	0.26	2
K4	16.25	122	97	84	0.82	8
K5	16.25	122	97	84	0.09	0

The watershed tributary to Kirker Creek upstream from the existing Buchanan Road covers approximately 19 square kilometers. The following table compares calculated flow values at Buchanan Road provided by CCCFC & WCD with values based on the methodology described above:

TABLE 14
COMPARISON OF METHODOLOGY RESULTS

Recurrence Interval	CCCFC&WCD	SCS methodology
10-year	40 cms	37 cms
100-year	70 cms	71 cms

This table shows that the two methodologies provide similar results. As would be expected, the SCS methodology identifies a greater variation between the 10- and 100-year events than flows based on initial and uniform loss rate.

F. Interim Roadway Structural Section

In order to reduce construction cost it is proposed to construct a single travel lane with shoulder with AC dikes for the initial project. The typical section for this interim structural section, Exhibit C, is illustrated in the Appendix. The ultimate improvements call for the two travel lanes plus shoulder with curb and gutter and sidewalk. The typical section for the ultimate structural section is illustrated, Exhibit C, in the appendix. The grading and bridge width will be constructed for the ultimate improvements. The costs presented in this report are for the ultimate improvements. But if the interim structural section is implemented, it will result in costs savings of $1.5 million, $1.45 million, and $1.85 million for Northern Alignment #1, Northern Alignment #2 and the Central Alignment, respectively.

G. Rights-of-Way

Right-of-way, slope and construction easements must be acquired from the private property owners with whom this project traverses. Permanent easements will also be required for slope areas and temporary easements will be required for construction areas. The temporary construction easements consist of an area 3 meters outside the daylight line for the slope construction, the remedial grading areas and a 10 ha for construction staging and access road. The approximate areas for the alternative alignments are compared on the following chart.

TABLE 15 RIGHT OF ACQUISITION AREAS			
Alignment	**Right-of-Way**	**Slope Easement**	**Construction Easement**
Northern Alignment #1	11.11 ha	23.91 ha	60 ha
Northern Alignment #2	9.14 ha	25.54 ha	52 ha
Central Alignment	11.09 ha	29.59 ha	56 ha

H. Geotechnical Analysis

A preliminary geotechnical evaluation dated August 28, 2002 conducted by Kleinfelder, Inc. for the Buchanan Road Bypass Project. All alignment alternatives are considered feasible from a geotechnical viewpoint, and all would likely require some level of mitigation for geotechnical hazards. The geotechnical evaluation report contains a general discussion of the site geology including the following conclusions:

- There are numerous active and dormant landslide deposits that have been mapped within the site area. Some of these landslide deposits are massive while others are part of a larger landslide complex and will underlie portions of the northern alignments. Grading within landslide areas would require stabilization of the slide mass by buttressing or removal and compaction.

- All the bedrock formations mapped within this site dip northeastward. Such a dip slope condition could render all proposed north/northeast-facing cut slopes as adverse since slope failures could occur. Final design may require that these slopes should have inclinations of 3:1 (horizontal to vertical) or flatter, which may add substantially to the earthwork volumes.

- A number of colluvial and slope deposits were mapped within the site area. These deposits will have to be removed and replaced as engineered fill in fill areas and where exposed along proposed cut areas. This will add to the total earthwork volume also.

- The project site is located in an active seismic area which will require appropriate design elements in structures and related facilities.

- The deep cuts could encounter strongly cemented bedrock. Special excavation techniques and possible blasting may be necessary in these deeper excavations.

- Some tuff/tuffaceous materials have been identified within the project area. These materials are difficult to compact and they will have to be placed in the lower portion of large fills. These materials should also not be placed in areas where they may be exposed to concrete.

- Erosion control will be a significant design element for this project.

- A detailed subsurface investigation and grading plan review will be necessary to provide appropriate mitigation recommendations for the selected alignment

The Central Alignment has the least amount of geotechnical constraints. The Central Alignment may encounter hard deposits in the deep cuts and the north facing cut slopes may require special mitigation.

Northern Alignments #1 and #2 have more geotechnical constraints. Both of these alignments traverse areas of massive landslides, which will have to be mitigated. These alignments will also, most likely encounter hard deposits in the deep cuts and the north facing cut slopes may require special mitigation also.

I. Utilities

The following utility companies have been contacted as a part of this study;

- Pacific Gas & Electric
- Pacific Bell Telephone

There are several large electrical transmission lines that traverse the project site. It appears that it will be necessary to relocate several of the transmission towers as part of this project.

J. Estimated Costs

TABLE 16
ALTERNATIVE ALIGNMENT PRELIMINARY COST ESTIMATE COMPARISON
(IN $ MILLIONS)

Item	Northern Alignment #1	Northern Alignment #2	Central Alignment
1. Earthwork	16,709,962	17,569,300	8,508,799
2. Structural Section	4,696,623	3,859,685	5,269,710
3. Specialty Items	7,813,520	6,708,434	8,984,558

4. Drainage	3,598,700	3,499,223	4,658,019
5. Traffic	638,150	550,525	714,750
6. Miscellaneous	3,595,696	3,468,717	3,063,584
7. Engineering (15%)	5,557,897	5,348,383	4,679,913
8. Contingencies (15%)	5,557,898	5,348,382	4,679,913
9. Right of Way	481,000	449,180	508,380
TOTAL*	**$48,649,446**	**$46,801,829**	**$41,067,625**

*****Estimate in 2002 Dollars.

Detailed preliminary cost estimates are included in the Appendix. The final preliminary cost estimate is dependant upon additional geotechnical investigations to determine final remedial and slope grading requirements.

K. Recommended Alignment

The recommended alternative is the Central Alignment. It is an acceptable alignment from a design criteria, traffic analysis and environmental constraints analysis. The Central Alignment has the least impacts and the least cost.

Section 5 System Planning

Eastern Contra County has become one of the fastest growing areas within the County. According to ABAG Projections 2002, the combined population of the Cities of Pittsburg, Antioch, Brentwood, and Oakley, as well as unincorporated areas, grew by nearly 150,000 from 1990-2000. ABAG also expects the East County to continue to experience high levels of growth with projections of another 261,000 residents and 134,000 jobs between 2000 and 2025.

Along with the growth in population and employment, inevitably comes the growth in travel demand. According to the State Route 4 Major Investment Study, Contra Costa Transportation Authority (CCTA), January 1999, several improvements to the transportation system are needed to adequately serve the East County in the future. One of the most important elements is the need to enhance the flow of east-west travel since many of the large regional attractions are located in Contra Costa County and points further east. Both the Pittsburg 2000 General Plan, November 2001, and the East County Action Plan – Final 2000 Update, CCTA, June 20, 2000, identify a series of improvements to better serve east-west travel, including the widening of State Route 4, the extension of commuter rail service beyond Pittsburg/Bay Point, and improvements to parallel arteries such as Leland Road and Pittsburg-Antioch Highway. In addition, the plans propose the Buchanan Bypass – a new east-west arterial design to provide additional east-west capacity in the southern portion of Pittsburg and also to bypass the residential areas along Buchanan Road.

In 1996, The East Contra Costa Regional Fee and Financing Authority (ECCRFFA) allocated $4 million in regional fee revenue to fund feasibility studies and initial project development of the Buchanan Road Bypass. The City of Pittsburg is now proceeding with a preliminary assessment of the feasibility of the Bypass, which includes the identification of conceptual roadway alignments and an environmental constraints/opportunities analysis.

Section 6 Hazardous Material / Waste

No initial Site Assessment has been completed at this time.

Section 7 Traffic Management Plan

A Traffic Management Plan (TMP) will be prepared as part of the final design to minimize the impacts of any construction-related traffic, including stage construction and traffic detours. This plan will focus on Kirker Pass Road, the major north-south arterial road for the area.

Section 8 Environmental Review

A separate environmental constraints analysis has been prepared for this study. Information concerning environmental review are within that report.

Section 9 Funding/Schedule

The City of Pittsburg will be responsible for funding for all structures, PG&E, right of way acquisition, construction cost and construction administration. The funding source is unknown at this time.

No formal schedule has been established for this project. However a tentative schedule could be as follows:

Year 2003 Complete Phase II Design Study and EIR Certification
Year 2004 Complete Final Design
Year 2005 Secure Funding
Year 2006 Commence Construction

Appendix A List of Attachments

1. Exhibit A Watershed Designations

2. Exhibit B Culvert Locations

3. Exhibit C Interim & Ultimate Cross Section

4. Northern Alignment #1 Detailed Cost Estimate

5. Northern Alignment #2 Detailed Cost Estimate

6. Central Alignment Detailed Cost Estimate

7. Exhibit D Northern Alignment #1 Plan and Profile

8. Exhibit E Northern Alignment #2 Plan and Profile

9. Exhibit F Central Alignment Plan and Profile

Appendix G.2

James Donlon Boulevard Extension Technical Memorandum Report (2012)

NOVEMBER 2012

James Donlon Boulevard Extension

TECHNICAL MEMORANDUM REPORT

Prepared for:

City of Pittsburg

Prepared by:

RBF Consulting

A Company of Michael Baker Corporation

PITTSBURG 1903 100 YEARS 2003 CALIFORNIA

RBF CONSULTING
A Baker Company

November 30, 2012

JN 35-100129

Mr. Paul Reinders
Senior Civil Engineer
CITY OF PITTSBURG
65 Civic Avenue
Pittsburg, CA 94565

Subject: James Donlon Boulevard Extension
Technical Memorandum Report

Dear Mr. Reinders,

RBF is pleased to transmit to the City of Pittsburg this Technical Memorandum Report for the James Donlon Boulevard Extension for your review and consideration. In addition are reports from our geotechnical, biological, archeological, and traffic subconsultants.

This report presents an update on the "Project Study Report" (PSR) prepared for the James Donlon Boulevard Extension Project, formerly known as the Buchanan Road Bypass Project, dated March 2003.

RBF's evaluation indicates that a now modified Central Alignment still is the most favorable alignment to achieve the goal of an east-west connector from Somersville Road to Kirker Pass Road.

This technical memorandum report has been prepared under the direction of the following Registered Engineer. The Registered Civil Engineer attests to the Technical information contained therein and has judged the qualifications of any technical specialists providing supportive data upon which recommendations, conclusion, and decisions are based.

Should you have any questions with regards to our report and exhibits, please do not hesitate to contact us at 925-906-1460. We look forward to presenting our findings to the City Council of Pittsburg, other agencies of whom have an interest, and the public.

Sincerely,
RBF Consulting

William J. Conyers

William J. Conyers, P.E.
Vice President
Public Works/Transportation Dept.

REGISTERED PROFESSIONAL ENGINEER
WILLIAM J. CONYERS
No. 45585
Exp. 12-31-12
CIVIL
STATE OF CALIFORNIA

November 2012

James Donlon Boulevard Extension

Technical Memorandum
Report

Prepared for:
City of Pittsburg

Prepared by:
RBF Consulting,
A Baker Company

RBF CONSULTING
A Baker Company

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Sincerely,
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William J. Conyers, P.E.
Vice President
Public Works/Transportation Dept.

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JAMES DONLON BOULEVARD EXTENSION
TECHNICAL MEMORANDUM REPORT

SECTION 1 – INTRODUCTION

This report presents an update on the "Project Study Report" (PSR) prepared for the James Donlon Boulevard Extension Project, formerly known as the Buchanan Road Bypass Project, dated March 2003.

The previously selected alignment (preferred alternative alignment) known as the "Central Alignment" has been modified to accommodate a new proposed Montreux Residential Development and to mitigate environmental impacts to Kirker Creek and other stream crossings.

This report updates:

- The alignment modifications and resultant right-of-way impacts;
- Steps taken by the City of Pittsburg to mitigate environmental impacts to the greatest extent possible;
- The previously prepared traffic analysis from 2007 to 2011 and confirmation of the new alignment modification functions at an acceptable level of service (LOS);
- The previously prepared hydrology analysis performed in 2002 to the latest hydrology analysis procedures required by the Contra Costa County Flood Control District and a new analysis of what will be necessary to meet water quality and hydro modification management criteria as required by the Municipal Regional and NPDES permits;
- Biological, geotechnical and archeological assessments associated with the new alignment modifications;
- A preliminary structural analysis of two proposed bridges;
- A quantity and cost estimate; and
- Final alignment presentation.

SECTION 2 – PREVIOUS PROJECT STUDY REPORTS

RBF Consulting prepared a Project Study Report for the James Donlon Boulevard Extension, formerly known as the Buchanan Road Bypass Project, in March of 2003. This report was updated in January 2007 to initiate the EIR. The modification to the report in 2007 provided for a more sweeping, to standards, curve for James Donlon Boulevard at the intersection of Kirker Pass Road. It also eliminated a bridge across Kirker Creek. This previous report documented the analysis, recommendations and conclusion for the James Donlon Boulevard Extension Project. The primary reason for pursuing this project is to provide a limited access arterial roadway between Kirker Pass Road and Somersville Road south of the existing Pittsburg City limits to serve the sub-regional circulation needs of the Cities of Pittsburg and Antioch. This extension would provide an alternative access route that would link the eastern portion of Contra Costa County (e.g. the Cities of Brentwood, Antioch, and Pittsburg) to the central portion of Contra Costa County (e.g. the Cities of Concord and Walnut Creek). It would also serve as a secondary function of providing access for residential development proposals in southeastern Pittsburg and southwestern Antioch, an area that is currently deficient in east to west circulation provisions.

A total of three primary alternative conceptual alignments were developed, two northern alignments and one central alignment. The three primary alternatives were evaluated using base line engineering design criteria and environmental analysis to determine the preferred alignment for more detailed analysis. The analysis and subsequent report identified the Central Alignment as the most promising of the three alignments. The northern alignments were eliminated from consideration as they traverse massive landslide areas, would directly impact an existing ranch and would meet resistance from residents living just north of the proposed northern alignments because of noise and visual impacts.

A separate feasibility study was conducted in January 2006 for widening of the existing Buchanan Road to determine if this was an alternative to eliminate the need for the James Donlon Boulevard Extension. Preliminary geometric drawings were developed to determine the impacts.

The traffic analysis indicated the widening of existing Buchanan Road will not enhance the movement of traffic through the City of Pittsburg; rather the proposed bypass project represents the most favorable solution.

Additionally, the geometric drawings revealed overwhelming social and monetary impacts. Forty six homes would have to be removed to accommodate the widening including the removal of one apartment building and impacts to parking and drive through facilities for the mall area. Also included are impacts to school property and park property. The project also includes high-end construction items including, the relocation of a major concrete irrigation channel that operates year round, the relocation of major utilities, eight new intersection and traffic signal improvements, new storm drain system and box culvert extension of Kirker Creek, along with the conventional cost of widening a road.

SECTION 3 – PROPOSED MODIFICATIONS TO CENTRAL ALIGNMENT

The existing central alignment as proposed in 2003 and modified in 2007 transverses the area which is considered the center of the study area. The proposed alignment commences at the intersection of Ventura Drive and James Donlon Boulevard, and then extends westerly ending in a sweeping horizontal curve to Kirker Pass Road. A connecting alignment intersects the proposed alignment to allow traffic access to Kirker Pass Road. This proposed alignment allows for the majority of traffic from Kirker Pass Road to proceed in an east to west direction onto James Donlon Boulevard. Although this alignment has significant impacts to Kirker Creek, the alignment has the least remedial grading, avoids the existing ranch, and the least amount of noise and visual impacts to the adjoining subdivision of the alignments studied.

This is discussed under Section 4 Technical Studies, Part B Environmental Mitigation, Item #1 Landslide Avoidance, and Item #2 Intersection Design. See also Exhibit B-1 and B-2.

The new configuration for the proposed central alignment is to tee the alignment with Kirker Pass Road to create a four-leg intersection that would accommodate the proposed Montreux Residential Development west of the James Donlon Boulevard Extension/Kirker Pass Road Intersection. This new intersection would also have a free north to eastbound right turn ramp movement with a design speed of 50 mph. This proposed intersection is illustrated in Exhibit B-2. This proposal, aside from accommodating the Montreux Residential Development will significantly reduce the impacts to Kirker Creek by creating an alignment that is perpendicular to Kirker Creek that will be crossed by two new bridges. (See Exhibit B-2)

A component of this intersection improvement is to raise the profile on Kirker Pass Road from Nortonville Road to the Southerly Boundary of the City limits of Pittsburg. Also the radius along Kirker Pass Road at the intersection with James Donlon Boulevard was increased to provide for a flatter super elevation at the intersection. This increase in the height of the profile and modification to the radius along Kirker Pass

Road allows for an approach grade of -7% from east to west along James Donlon Boulevard as it intersects Kirker Pass road.

Additionally approximately 1.34 miles of James Donlon Boulevard was reduced from a four lane divided highway to a two lane rural highway in the mid portion of the project to reduce grading impacts to the project. This length includes the transitions from four lanes to two lanes. This is discussed under Section 4 Technical Studies, Part B Environmental Mitigation, Item #5, Four Lanes vs. Two Lane Grading Impacts.

Also a slight modification to the alignment has been made near the mid-point of the project. This adjustment to the alignment to the north reduces environmental impacts to two stream crossings; by squaring the alignment more perpendicular with the stream crossings. The length of streams being impacted by the roadway crossings has been reduced. This is discussed at length under Section 4 Technical Studies, Part B Environmental Mitigation, Item #6 Sub-Alternative Alignment Alternative Analysis. (See Exhibit B-6)

The project was also modified from Metric to English.

SECTION 4 – TECHNICAL STUDIES

A. Alignment Description; Analysis

The Central Alignment transverses in what is considered the center of the study area. It commences now at the westerly boundary of the proposed Sky Ranch Development. Previously the alignment started at the intersection of James Donlon Boulevard and Ventura Drive. However that portion of James Donlon Boulevard that extends from the westerly edge of Sky Ranch east to Ventura Drive, approximately 1,800 feet will now be constructed by the Developer, and is now not a part of this project. Thus the altered alignment commences at the westerly boundary of Sky Ranch extending westerly to tee at Kirker Pass Road. This new configuration will accommodate the proposed Montreux Residential Development. This new intersection will also have a free north to eastbound right turn movement.

Kirker Pass Road will also be upgraded from a four lane high speed rural highway to a four lane divided urban highway. The limits of this work are from the intersection of Kirker Pass Road at Nortonville Road to the southerly boundary of the City limits of Pittsburg.

The following represents a listing of the design features of the modified central alignment project:

James Donlon Boulevard

- The length of the alignment is approximately 1.71 miles;

- The horizontal radius curves for this project vary from a minimum radius of 3,500 feet with a 3% super-elevation rate to a maximum radius of 3,936 feet with a 3% super-elevation rate. This alignment exceeds the minimum design for a 60 mph design speed per Table 203.2, Standards for Curve Radius of the Highway Design Manual (HDM) and the super-elevation rates comply with Table 202.2, Standard Super-Elevation Rates of the HDM for 2-Lane Conventional Highways.

- The profile grades of this alignment vary from +7% to -6% which meets the design criteria for rolling hills for Urban Highways per Table 204.3, Maximum Grades for Type of Highway and Terrain Conditions of the HDM. The vertical curves vary in length, algebraic difference in grades and meet the requirements of Figure 201.4 and 201.5 for Stopping Sight Distance on Crest and Sag Vertical Curves of HDM,

- The approach of James Donlon Boulevard intersects Kirker Pass Road at a Skew of 7 degrees 08 minutes which is acceptable per Section 403.3, Angle of Intersection of the HDM. The skew in the design, enhances the large traffic turning movement of west to south.

- The storage length for the west to south bound is 860 feet. This is based upon the summation of the "95th Percentile Queue" for the year 2015 for the length of 330 feet from Table 2 "Four-Leg Intersection Configuration Vehicle Queuing Summary" from Fehr & Peers traffic Memorandum dated July 1, 2011 and a deceleration lane length of 530 feet based upon a 60 mph Design Speed per Table 405.2B "Deceleration Lane Length" of the HDM.

- The typical section for James Donlon Boulevard is per Exhibit A-1 for a four lane and two-lane configuration and the recommendation of Fehr & Peers per their Traffic Memorandum dated July 1, 2011.

Ramp

- The horizontal radius for the north to eastbound free right-turn movement ramp is 950 feet with a 10% super-elevation rate. This alignment configuration exceeds minimum design for a 50 mph design speed per Table 203.2, Standards for Curve Radius of the HDM and the super-elevation rate complies with Table 202.2, "Standard Super-Elevation Rates" of the HDM.

- The profile grades of the ramps alignment varies from -3.00% to 7.0%. The vertical curve length is 1,385 feet and exceeds a 50 mph design speed per Figure 201.5 "Stopping Sight Distance for Vertical Curves."

- The entrance and exit of the ramp were designed per Figure 504.2A "Single Lane Freeway Entrance" and Figure 504.2B "Single Lane Freeway Exit" of the HDM.

- The typical section of the ramp is per the attached Exhibit A-3.

Kirker Pass Road

- The length of Kirker Pass Road realignment is 0.63 miles.

- The horizontal radius curves vary from a minimum radius of 1,445 feet with a 6% super-elevation rate to a maximum of 2,625 feet with a 2% super-elevation rate. The 6% super-elevation rate on the smaller radius curve was utilized to match the existing super-elevation rate at the join condition at the southerly boundary of the City Limits of Pittsburg. This alignment exceeds the minimum design criteria for a 45 mph design speed per Table 203.2, "Standards for Super-Elevation Rates", of the HDM for Urban Roads posted at 45 mph.

- The profile grades of this alignment vary from -2.16% to -2.82%, which meets the design criteria for rolling hills of the HDM as previously indicated.

- The storage length for the various turning movements as outlined below are based upon the summation of the "95th Percentile Queue" for the 2030 from the length indicated in Table 2, "Four-Leg Intersection Configuration Vehicle Queuing Summary", from Fehr & Peers Traffic Memorandum dated July 1, 2011 and a deceleration lane length of 435 feet based upon a 50 mph Design Speed for Kirker Pass Road per Table 405.2B "Deceleration Lane Length" of the HDM.

Turning Movement	95th Percentile Queue	Deceleration Lane Length	Total Storage Length
Northbound Left	50 feet	435 feet	485 feet
Southbound Left	150 feet	435 feet	585 feet
Southbound Right	40 feet	435 feet	475 feet

- The typical section for Kirker Pass Road is for a four lane configuration and the recommendation of Fehr & Peers per their Traffic Memorandum dated July 1, 2011. (See Exhibit A-2)

B. Environmental Mitigation

The mitigation of environmental impacts is a significant issue for this project. Numerous steps have been taken to mitigate the impacts and are recorded here to document the specific mitigations.

1. Landslide Avoidance

The original project study evaluated three alternative alignments, two northern alignments and a central alignment. Of these three alignments the central alignment was selected due to the avoidance of massive landslide areas that the two northern alignments cross. The Northern Alignment #1 would impact 42.1 acres and the Northern Alignment #2 would impact 39.6 acres of area requiring repair. Both of the northern alignments would require approximately 5.6 million cubic yards of remedial and corrective grading done. The Central Alignment impacts 15.8 acres of area requiring repair and approximately 0.63 million cubic yards of remedial and corrective grading done. There will be significantly greater impacts to the environment with the northern alignments verses the central alignment. (See Exhibit B-1). The landslide areas shown on the exhibit were derived from the **"*Geological and Geotechnical Investigation Report, Proposed Buchanan Road Bypass, Pittsburg, California*"** prepared by Kleinfelder dated January 9, 2008.

2. Intersection Design

The central alignment from the original project study had a long sweeping radius curve and transversed from westbound James Donlon Boulevard to southbound Kirker Pass Road. This proposal would have severely impacted Kirker Creek and several adjoining tributaries. To mitigate impacts the alignment has been modified to have Kirker Creek spanned by two bridges ending at a tee with Kirker Pass Road. The results of the modification are that there will be minimal impacts to Kirker Creek and its tributaries. (See Exhibit B-2).

3. Additional Bridges

Three additional bridge crossings were evaluated to avoid impacts to additional streams that cross the proposed improvement area. As shown illustrated in Exhibit B-3 the cost, varying from $8.3 mil to $17.0 mil, for the bridges is prohibitive. The reason the cost are high are the bridge heights above the original ground creates long bridge spans over the proposed stream crossings. Thus the use of additional bridges along the alignment is not recommended as a mitigation measure.

4. Retaining Walls

Numerous retaining walls will be installed along Kirker Pass Road, and ramp to eliminate grading impacts to Kirker Creek and its tributaries. Selection of the type of wall at each location will be decided during the final design. This decision will be based upon geotechnical criteria, cost, and minimizing impacts to the streambed during construction. (See Exhibit B-4).

Various retaining wall types will be considered to achieve an economical project design. Standard “Type 1” Retaining Walls are generally assumed (see Caltrans Standard Plan B3-1 through B3-2). Retaining walls with retained height greater than 12 feet, as measured from top of wall to top of footing, may require a pile supported foundation as recommended in the Preliminary Geotechnical Design Report (PGDR). Retaining wall costs incorporate pile costs for walls greater than 12 feet. Driven piles are generally more economical than Cast-in-Drilled-Hole (CIHD) piles; CIDH piles typically are used to avoid noise associated with driving piles or where soil conditions prevent driving. Without a noise constraint on this project, and given that driven piles are feasible per the PGDR, driven piles are required for portions of Retaining Wall No. 17 and 116.

Caltrans Memo to Designers 5-17 indicates Mechanically Stabilized Embankment (MSE) walls may be more cost effective for retaining walls in a fill condition and retaining approximately 20 feet and greater. MSE walls are considered as a conceivable wall height for walls where a significant length of wall on spread footing exceeds 16 to 20 feet. Where a retaining wall is potentially pile-supported, an MSE design is more economical for all retained heights. At Retaining Wall No. 123 an MSE wall type is proposed due to the approximate 25-foot wall height and fill condition at this location.

5. Four Lane vs. Two Lane Grading Impact

James Donlon Boulevard as illustrated in Exhibit B-5 was reduced from a four lane divided highway (five lanes) to a two lane rural highway. This reduced the longitual grading impact and subsequent environmental impacts along the highway by 8.6 acres and reduced the right of way take by 7.2 acres and reduces stream impacts by 270 linear feet.

6. Sub-Alternative Alignment Analysis

Six sub-alternative alignments were evaluated approximately midpoint of the central alignment. The alignment analysis was performed as an effort to mitigate environmental impacts to the project, particularly to two streams that cross the proposed improvements.

The six sub-alignments were labeled C1-High Profile, C1- Low Profile, C2-High Profile, C2-Low Profile, C3-High Profile, and C3-Low Profile. C1-High was designated as the original central alignment configuration. C2 is just north of C1 and C3 is just north of C2. The sub-alternate alignments are illustrated in Exhibit B-6. All six sub-alignments were evaluated from an engineering, geotechnical, and biological perspective. The following table represents a comparison of the six sub-alignments studied. The three High Profile alignments are not illustrated on this exhibit for clarity sake. C1-High Profile and C1-Low Profile transverse the same centerline, likewise, C2-High Profile and C2-Low Profile transverse the same centerline and, likewise, C3-High Profile and C3-Low Profile transverse the same centerline.

Engineering Alignment Alternative Selection

TABLE 1 Sub-Alternative Alignment Comparison						
Design Elements	**C1-High**	**C1-Low**	**C2-High**	**C2-Low**	**C3-High**	**C3-Low**
Engineering Design Criteria	Acceptable	Acceptable	Acceptable	Recommended	Acceptable	Acceptable
Grading Excavation	1,800,649 yd3	1,896,501 yd3	1,873,643 yd3	2,198,152 yd3	2,187,327 yd3	2,423,917 yd3
Borrow	335,723 yd3	60,497 yd3	823,153 yd3	60,994 yd3	616,091 yd3	79,138 yd3
Buttress Excavation	457,376 yd3	464,871 yd3	397,717 yd3	442,310 yd3	504,704 yd3	532,235 yd3
Remedial Excavation	626,947 yd3	626,947 yd3	626,947 yd3	626,947 yd3	626,947 yd3	626,947 yd3
Mitigation Fee	$4,527,472	$4,411,903	$4,713,735	$4,355,012	$4,716,180	$4,579,468
Total Program Cost	$53.3 m	$52.0 m	$56.9 m	$53.3 m	$57.8 m	$55.5.m
Jurisdiction Habitats (COE)	1.21 ac	1.19 ac	1.19 ac	1.14 ac	1.16 ac	1.14 ac
CDFG Habitat	5.83 ac	5.63 ac	5.52 ac	4.77 ac	5.25 ac	5.01 ac
Geotechnical Impacts	Acceptable	Acceptable	Acceptable	Recommended	Acceptable	Acceptable

By comparing the six sub-alternative alignments in the table above, alignment C2-Low Profile shows to be the least in environmental impacts and mitigation fees of the alternatives evaluated. The geotechnical report also recommends C2-Low Profile, thus we recommend C2-Low Profile as the preferred alignment.

Biological Alignment Alternative Selection

A summary of the relevant impacts discussed above that differ between the alternative alignments is provided in Table 2. The relative potential impacts of Alignments C1-High Profile, C1-Low Profile, C2-High Profile, C2-Low Profile, C3-High Profile, and C3-Low Profile vary among specific biological resources, and none of the alignments minimizes impacts on all or most of the biological resources we evaluated.

The impacts of Alignments C1-High Profile and C1-Low Profile on biological resources are similar, and minimize impacts on land cover types, with the exception of impacts on streams. However, Alignments C1-High Profile and C1-Low Profile will result in impacts on 29 trees, which reveals a proportionately greater impact on oak savannah and oak woodland habitats than the acreages indicate. Alignments C1-High Profile and C1-Low Profile would have the least impact on acreages of jurisdictional other waters, and the greatest impact on jurisdictional wetlands and CDFG regulated habitats. These alignments minimize impacts on potential habitat for covered branchiopods.

The potential impacts of Alignment C2-High Profile on biological resources are generally intermediate compared to the other alternatives. This alignment impacts the greatest area of streams and the longest linear footage of streams. However, the relatively low number of trees that would be impacted by this alignment suggests a proportionately lower impact on oak savannah and oak woodland habitats than the acreages indicate. This alignment minimizes impacts on potential branchiopod breeding sites.

Alignment C2-Low Profile minimizes impacts on streams, jurisdictional waters, CDFG regulated habitats, and potential branchiopod breeding sites. This alignment would have moderate impacts on acreages of rock outcrops and oak savannah habitat, but would minimize impacts on oak woodland habitat. Alignment C2-Low Profile would impact a relatively high number of trees.

The impacts of Alignments C3-High Profile and C3-Low Profile on biological resources are similar. These Alignments would potentially impact the largest areas of rock outcrops (and, correspondingly, potential branchiopod breeding sites), oak savannah, and oak woodland habitats. These alignments would impact moderate areas of streams, moderate areas of jurisdictional waters, and moderate lengths of linear footage of streams. Alignments C3-High Profile and C3-Low Profile would impact relatively high numbers of trees.

The differences in impacts between the alignment alternatives are, in most cases, relatively minor. Acreages of oak savannah habitat, streams, jurisdictional habitats, CDFG-regulated habitats, and habitats for covered and no-take wildlife species are relatively similar for the six alignments. Impacts on wildlife movement would not differ substantially among the six alignments. No one alignment clearly minimizes impacts on biological resources more than the others. However, Alignment C2-High Profile would result in a relatively low impact on trees (and associated oak savannah and oak woodland habitats) and only a moderate impact on most other resources that were evaluated, while Alignment C2-Low Profile would result in relatively low impacts on streams and jurisdictional wetlands.

The evaluation of environmental impacts is from the report, **"*James Donlon Boulevard Project Alternative Alignment Assessment (HTH #2739-01)*"**, prepared by H.T. Harvey & Associates dated May 24, 2012.

TABLE 2

Summary of Impacts on Biological Resources that Differ Between Alignments C1-High Profile, C1-Low Profile, C2-High Profile, C2-Low Profile, C3-High Profile, and C3-Low Profile

	Alignment C1-High Profile	**Alignment C1-Low Profile**	**Alignment C2-High Profile**	**Alignment C2-Low Profile**	**Alignment C3-High Profile**	**Alignment C3-Low Profile**
Land Cover Types/Landscape Features						
Rock Out Crops (ac)	14.87	14.82	16.02	16.82	17.42	17.90
Oak Savannah (ac)	8.24	7.71	9.15	9.04	9.81	9.46
Total Streams (ac)	1.80	1.75	1.80	1.67	1.73	1.70
Oak Woodland (ac)	0.07	0.07	0.11	0.08	0.23	0.23
Wildlife Movement						
Culvert 2 Length (ft)	594.09	585.01	593.14	457.00	599.07	582.81
Culvert 3 Length (ft)	1072.56	1012.40	882.06	760.00	798.38	729.46
Jurisdictional Habitats						
Wetlands (ac)	1.17	1.15	1.14	1.09	1.10	1.08
Other Waters (ac)	0.04	0.04	0.05	0.05	0.06	0.06
Total Jurisdictional Waters (ac)	1.21	1.19	1.19	1.14	1.16	1.14
CDFG Regulated Habitats (ac)	5.83	5.63	5.52	4.77	5.25	5.01
Linear Feet of Stream Impacts (ft)	3628	3470	3811	3318	3708	3521
Stream Setback Encroachment (ac)	4.04	3.79	4.26	3.82	4.32	4.13
Certain covered Wildlife Species						
Branchiopod Breeding Sites (ft^2)	116.60	116.60	116.60	116.60	120.60	120.60
Protected Trees						
Approx. number of trees	29	29	20	29	31	31

*See Table II Summary of Impacts…from report prepared by H.T. Harvey & Associates, "James Donlon Boulevard Extension Project Alternative Alignment Assessment (HTH #2739-01)", dated May 24, 2012.

Geotechnical Alignment Alternative Selection

Based on our feasibility assessment, it is our opinion that the five optional roadway extension alignment alternatives, Original C1-High Profile, C1-Low Profile, Middle C2-High Profile, Middle C2-Low Profile, and Northern C3-High Profile are geologically and geotechnically feasible. However, the Middle Alignment C2-Low Profile has the following advantages:

- It is mostly underlain by the Neroly formation which is considered most stable and less susceptible to landslide activities than the other formations found at the site;
- Its only prominent north-facing cut planned between Stations 47+00 and 59+00, of the Middle Alignment C2-Low will encounter the Neroly formation;
- Cut materials generated from the Neroly formation are considered suitable fill materials and will most likely require less compaction effort than material generated from other formations underlying the site;
- Cut slopes into the Neroly formation would be less susceptible to slope instability and erosion than cuts into other formations found at the site; and
- Its proposed magnitude of cut and fill should balance out the need for full material importation. It will either be avoided or significantly reduced.
- In our opinion, this alignment alternative would be better suited to receive and support deep fills than the other two alternatives.

Based on the above, Kleinfelder recommended that the Middle Alignment C2-Low be selected.

These conclusions are from the reports prepared by Kleinfelder titled, **"*Engineering Geologic and Geotechnical Feasibility Report for the Four Projected James Donlon Boulevard Alignment Extension Alternatives, in Pittsburg, California*"**, dated March 7, 2012 and, **"*Limited Geological and Geotechnical Feasibility Study for Proposed Stream Crossing Alternative Original Alignment C1-Low, James Donlon Boulevard Extension Project, Pittsburg, California*"**, dated May 31, 2012.

7. Buttress Construction

Buttress construction is an earthwork technique that allows for the support of steep slopes in areas of unstable ground. This technique also minimizes permanent impacts to the grading of cut slopes by allowing for steeper slopes. Three earthwork buttresses will be installed on the project. This technique will save 5.3 acres of grading. (See Exhibit B-7) The recommendation for buttress construction is from the, **"*Geological and Geotechnical Investigation Report, Proposed Buchanan Road Bypass, Pittsburg, California*"**, prepared by Kleinfelder dated January 9, 2008.

8. Reinforced Slopes using Geogrids

A reinforced slope is a compacted fill embankment that incorporates the use of horizontally placed geosynthetic reinforcement to enhance the stability of the soil structure. This allows the slope of the embankment to be steepened from its normal earth construction slope of 2:1 to 1:1. The advantages of this construction technique is that the fill slopes can be constructed with less soil and will reduce the impacts to the streams crossing James Donlon Boulevard. Unfortunately the costs associated with this construction technique adds $13.3 million to the project, deeming this option as prohibited and unacceptable. A complete analysis and illustration of this approach is illustrated on Exhibit B-8. The costs for the slope reinforcement was obtained form an analysis by Tencate Geosynthetics, a supplier of Mirafi Reinforced Slope Material.

C. Traffic Analysis

Fehr & Peers submitted the Transportation/Traffic chapter of the James Donlon Boulevard Extension Administrative Draft Environmental Impact Report (ADEIR) in July 2008. The analysis presented in the ADEIR was based on data collected in 2007. Since the ADEIR was based on data collected over four years ago, Fehr & Peers has collected more recent data in November 2011 to confirm that the assumptions used in the ADEIR continue to be valid. Our analysis focuses on comparing traffic volumes at key intersections and the results of the Contra Costa Transportation Authority (CCTA) Countywide Travel Demand Model.

Fehr & Peers analysis shows the following:

- Traffic volumes in 2011 are about the same or slightly less than in 2007, confirming that the existing conditions analysis presented in the DEIR continues to be valid.

- The most recent version of the CCTA Model forecasts similar or less growth in traffic volumes than forecasted in 2007, confirming that the future volume forecasts presented in the DEIR continue to be valid.

Overall, Fehr & Peers work confirms that the analysis presented in the ADEIR is conservative and continues to remain valid. The rest of this memorandum describes Fehr & Peers analysis in more detail.

Existing Intersection Volumes

The ADEIR collected weekday traffic counts at 12 study intersections during the AM peak period (7:00 AM to 9:00 AM) and PM peak period (4:00 PM to 6:00 PM) in June 2007 and November 2007. Fehr & Peers collected traffic counts at two of the intersections in November 2011. The 2011 traffic counts were collected at the Railroad Avenue/Buchanan Road and Kirker Pass Road/ Concord Boulevard intersections only because they are major intersections in the study and are most likely to show changes in traffic volumes.

Table 3 compared the AM and PM peak hour intersection volumes between 2007 and 2011 counts. The overall intersection volume at the Railroad Avenue/Buchanan Road decreases by less than one percent during the AM peak hour and increases by less than one percent during the PM peak hour; while the intersection volume at the Kirker Pass Road/Concord Boulevard intersection decreases during both AM and PM peak hours. The overall difference between the 2007 and 2011 volumes are within the daily fluctuations expected at these intersections.

TABLE 3
Intersection Volume Summary

Intersection	AM Intersection Volume			PM Intersection Volume		
	2007[1]	2011[2]	% Change	2007[1]	2011[2]	% Change
1. Railroad Avenue / Buchanan Road	2,397	2,382	- <1%	2,437	2,445	+ < 1%
2. Kirker Pass Road / Concord Boulevard	3,522	3,241	- 8%	3,457	3,359	- 3%

Notes:
1. Intersection volumes based on counts collected in 2007 and shown on Figure 4.13-2 of the ADEIR.
2. Intersection volumes based on counts collected in November 2011.

Fehr & Peers, 2011

Considering that intersection traffic volumes have not changed substantially since 2007, the existing conditions analysis presented in the ADEIR remain valid.

Model Validation

The 2015 and 2030 traffic volume forecasts presented in the ADEIR were developed using the CCTA Model released in Spring 2007. The land use database in this version of the model is consistent with the Association of Bay Area Governments' (ABAG) *Projections 2005 (*P'2005). Since then, ABAG has published *Projections 2009* (P'2009). The CCTA Model has been updated to reflect the new P'2009 land uses.

Consistent with CCTA guidelines, the future traffic volumes presented in the ADEIR were based on the growth between the base and future years as forecasted by the CCTA model. Tables 4 and 5 compare the growth on ten roadway segments between the base and future years as forecasted by the P'2005 and P'2009 based models for AM and PM peak hours, respectively. Note that the P'2009 based model extends five more years to 2035 than the P'2005 based model.

As shown in Tables 4 and 5, although the more recent P'2009 based forecasts extend five more years into the future, it forecasts less traffic growth than the P'2005 based model that was used for the ADEIR. Considering that traffic volume growth forecasts have not increased since 2007, the 2015 and 2030 conditions analyses presented in the ADEIR represent conservative conditions and remain valid.

TABLE 4

AM Peak Hour Model Validation

Roadway Segment	2005 Projections[1]			2009 Projections[2]		
	2005 Base Year	2030 Future Year	Model Growth	2005 Base Year	2035 Future Year	Model Growth
SR-4 (east of Loveridge Road)	7,330	13,310	+ 5,980	7,530	13,500	+ 5,970
James Donlon Drive (east of Somersville Road)	50	510	+ 460	430	580	+ 150
Somersville Road (north of James Donlon Drive)	70	740	+ 670	470	710	+ 240
Buchanan Road (east of Railroad Avenue)	1,260	1,620	+ 360	1,430	1,590	+ 160
Railroad Avenue (north of Buchanan Road)	1,220	2,680	+ 1,460	1,540	2,750	+ 1,210
Railroad Avenue (south of Buchanan Road)	2,430	4,200	+ 1,770	2,880	4,240	+ 1,360
Buchanan Road (west of Somersville Road)	1,290	1,820	+ 530	1,540	1,800	+ 260
Somersville Road (north of Buchanan Road)	960	2,070	+ 1,110	1,520	2,000	+ 480
Concord Avenue (east of Kirker Pass Road)	400	800	+ 400	470	720	+ 250
Concord Avenue (west of Kirker Pass Road)	960	1,150	+ 190	1,170	1,330	+ 160

Notes:
1. CCTA Model forecasts based on *P'2005* land uses.
2. CCTA Model forecasts based on *P'2009* land uses.

Fehr & Peer, 2011.

TABLE 5 PM Peak Hour Model Validation						
Roadway Segment	2005 Projections[1]			2009 Projections[2]		
	2005 Base Year	2030 Future Year	Model Growth	2005 Base Year	2035 Future Year	Model Growth
SR-4 (east of Loveridge Road)	7,840	14,710	+ 6,870	8,970	14,730	+ 5,760
James Donlon Drive (east of Somersville Road)	70	490	+ 420	350	520	+ 170
Somersville Road (north of James Donlon Drive)	100	710	+ 610	410	640	+ 230
Buchanan Road (east of Railroad Avenue)	1,490	1,710	+ 220	1,630	1,710	+ 80
Railroad Avenue (north of Buchanan Road)	850	2,840	+ 1,990	1,440	2,790	+ 1,350
Railroad Avenue (south of Buchanan Road)	2,220	4,350	+ 2,130	2,950	4,270	+ 1,320
Buchanan Road (west of Somersville Road)	1,700	1,860	+ 160	1,870	1,850	- 20
Somersville Road (north of Buchanan Road)	930	1,530	+ 600	1,520	1,550	+ 30
Concord Avenue (east of Kirker Pass Road)	510	860	+ 350	590	810	+ 220
Concord Avenue (west of Kirker Pass Road)	780	1,150	+ 370	900	1,230	+ 330

Notes:
1. CCTA Model forecasts based on *P'2005* land uses.
2. CCTA Model forecasts based on *P'2009* land uses.

Fehr & Peer, 2011.

Intersection Operational Analysis

Fehr & Peers analyzed traffic operations of the proposed James Donlon Boulevard Extension/ Kirker Pass Road intersection as part of our work for the proposed James Donlon Boulevard Extension (JDBE) project. We submitted the Transportation/Traffic chapter of the Administrative Draft Environmental Impact Report (ADEIR) for the proposed JDBE project in July 2008. Our analysis recommended that Kirker Pass Road be realigned such that through traffic on JDBE would continue straight onto Kirker Pass Road towards the City of Concord. Kirker Pass Road to the north would then tee into JDBE (see Figure 1).

The Montreux Residential Development is proposed to the west of the JDBE/Kirker Pass Road intersection. The three leg intersection configuration analyzed for the ADEIR would not accommodate access for the Montreux project. Thus, the Montreux project proposes to maintain the existing alignment of Kirker Pass Road and create a four-leg intersection with the proposed Montreux Drive as the eastbound approach, proposed JDBE as the westbound approach and Kirker Pass Road as the northbound/southbound approaches. Figure 1 shows this proposed configuration based on the latest plan dated June 16, 2011.

Ferh & Peer's compared future traffic operations under both the three-leg and four-leg intersection configurations. Based on their analysis, the three-leg intersection would operate better than the four-leg configuration. However, the four-leg intersection would continue to operate at acceptable conditions.

Our analysis assumptions and detailed results are presented below.

Traffic Forecasts

Figure 1 presents 2015 and 2030 intersection traffic volume forecasts during both AM and PM peak hours for both the three-leg and four-leg intersections. Traffic forecasts for the three-leg JDBE/Kirker Pass Road intersection are from the ADEIR. These volumes were developed using the Spring 2007 version of the CCTA Decennial Update Countywide Travel

Demand Model

The *Preliminary Analysis of the Proposed Buchanan Bypass Connection to Kirker Pass Road* dated August 24, 2010 by Abrams Associates presents the trip generation, distribution, and assignment for the proposed 375-unit Montreux project. Since the ADEIR forecasts did not account for the Montreux project, trips generated by the Montreux project were added to the ADEIR forecasts to estimate the traffic volumes at the JDBE/Kirker Pass Road intersection under the four-leg intersection configuration.

Intersection Analysis

Peak hour intersection operations were evaluated using Synchro based on the *2000 Highway Capacity Manual* (HCM) methodologies and the Contra Costa Transportation Authority Level of Service (CCTALOS) methodology. Figure 1 presents the intersection lane configurations for both three-leg and four-leg configurations. For the three-leg intersection configuration, the lane configuration presented in the ADEIR was used.

We assumed the following for the four-leg intersection configuration:

- Northbound Kirker Pass Road approach: one left-turn lane, two through lanes, and one free right-turn lane, not controlled by the signal with a 30 mph posted advisory turning speed.
- Westbound JDBE approach: two left-turn lanes, one through lane, and one right-turn lane.
- Southbound Kirker Pass Road approach: one left-turn lane, two through lanes, and one right-turn lane.
- Eastbound Montreux Drive approach: one left-turn lane and one through/right turn lane.

Table 6 presents level of service (LOS) results for both HCM and CCTALOS methodologies. The Appendix presents the detailed LOS calculation sheets. As shown in the table, both the three-leg and four-leg intersections would operate at LOS C or better in 2015 or 2030. However, the three-leg configuration would result in less average delay in both 2015 and 2030.

TABLE 6

Intersection Operations Summary[1]

Configuration	Peak Hour	2015				2030			
		HCM[1]		CCTALOS[2]		HCM[1]		CCTALOS[2]	
		Delay	LOS	V/C	LOS	Delay	LOS	V/C	LOS
Three-Leg Intersection	AM	20	C	0.71	C	24	C	0.72	C
	PM	7	A	0.36	A	14	B	0.62	B
Four-Leg Intersection	AM	21	C	0.57	A	22	C	0.58	A
	PM	16	B	0.39	A	22	C	0.61	B

Notes:

1. Traffic operations results include LOS (level of service) and delay (seconds per vehicle). LOS is based on delay thresholds published in the *Highway Capacity Manual* (Transportation Research Board, 2000).
2. Volume-to-capacity (v/c) ratio and corresponding LOS based on the CCTALOS methodology

Source: Fehr & Peers, 2011.

Table 7 presents the 95th percentile vehicle queues for each movement of the four-leg intersection configuration. The Appendix presents the detailed queuing information. The turn-pocket lengths include sufficient distance for full deceleration from 60 mph in the pocket. Fehr & Peers recommends the following:

- Turn pocket storage lengths should be based on the 95th percentile queue length reported in Table 7.
- Consider reducing the deceleration length to account for at least 10 mph of deceleration in the through lanes.

TABLE 7

Four-Leg Intersection Configuration Vehicle Queuing Summary[1]

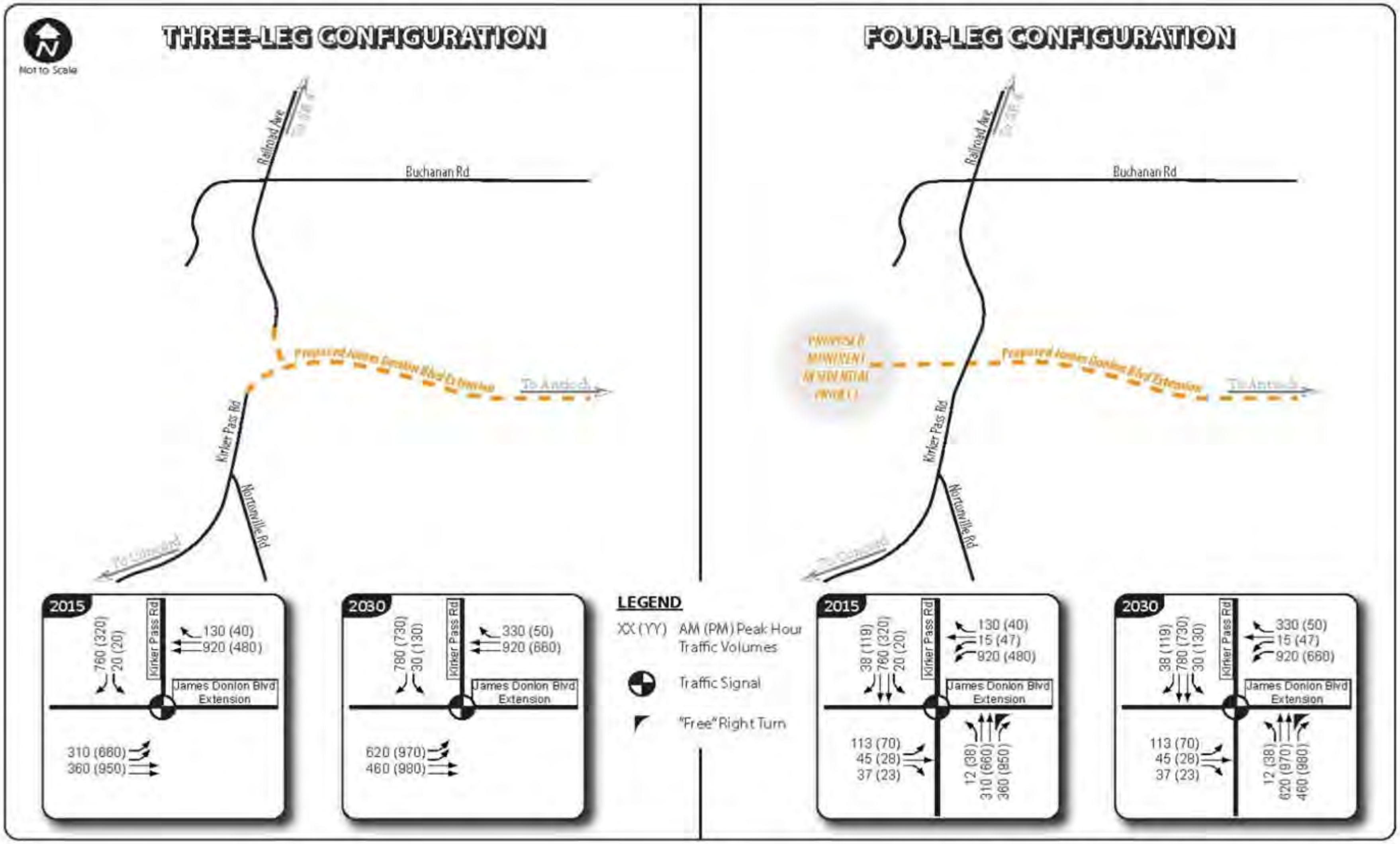
Approach	Movement	95th Percentile Queue[2] (feet)			
		2015		2030	
		AM	PM	AM	PM
Northbound	Left	20	50	20	50
	Through	100	230	200	340
	Right[3]	0	0	0	0
Southbound	Left	30	30	50	150
	Through	240	110	260	220
	Right	20	40	20	30
Eastbound	Left	130	80	110	100
	Through	50	40	60	40
	Right	30	20	30	20
Westbound	Left	330	180	300	230
	Through	20	40	20	50
	Right	40	20	100	30

Notes:
1. Based on plan dated June 16, 2011.
2. As reported by Synchro.
3. Right-turning traffic does not stop.

Source: Fehr & Peers, 2011.

The information presented in this section is from the following two technical memorandums prepared by Fehr & Peers:

- ***James Donlon Boulevard Extension/ Kirker Pass Road Connection*** dated January 28, 2011; and
- ***James Donlon Boulevard Extension/ Kirker Pass Road Connection*** dated July 1, 2011.



Kirker Pass Road / James Donlan Boulevard Extension Connection

FEHR & PEERS

July 2011
Graphics\October2010\1021-1822A_1_PH-VolsGeo

PEAK HOUR INTERSECTION VOLUMES, LANE CONFIGURATIONS AND TRAFFIC CONTROL

FIGURE 1

D. Hydrology and Water Quality Analysis

The purpose of this section is to discuss the preliminary hydrologic and water quality analyses performed as part of the evaluation of three alternative alignments for James Donlon Boulevard extension.

Drainage Setting

The proposed alignments are located in the hills south of the Pittsburg city limits. Kirker Creek is the primary drainage feature in the project area, with a tributary area up to approximately 5.6 square miles at the project limits. A number of smaller creeks, which ultimately flow into Kirker Creek further downstream, with a combined drainage area of approximately 1.68 square miles, would be crossed by the proposed alignments east of Kirker Creek. Off-site drainage boundaries tributary to the proposed roadway are delineated on Exhibit D-1.

Hydrology

The hydrologic analysis for estimating flows at the creek crossings was performed using the guidelines provided by the Contra Costa County Flood Control and Water Conservation District (District). The key components of the analysis include,

a) Delineation of tributary drainage areas,

b) Application of appropriate precipitation depth and storm distribution,

c) Calculating loss rates, and,

d) Application of appropriate transformation and routing methods.

Offsite drainage areas tributary to the proposed bridge/culvert crossings were delineated using topographic data generated from the U.S. Geological Survey National Elevation Dataset's Digital Terrain Model (DTM). Refer to Exhibit D-1 for Offsite drainage boundaries. Due to the closeness of the evaluated Alternatives, drainage areas were only delineated to the points where the southern most alignment crosses the creeks and the corresponding analysis results were used in perform culvert calculations for all the Alternatives. The locations of crossings required for each alternative are shown on Exhibit D-2.

<u>Precipitation</u>

The District's isohyetal map and Duration Frequency Depth (DFD) Curves were used to determine the 24-hour precipitation depth for 10-, 25-, and 100-year recurrence intervals. Based on the isohyetal map, the Project's site is determined to accumulate a mean seasonal precipitation ranging from 15-inches to 16.25-inches. The District's 24-hour rainfall distribution curve was used to distribute the total depth over a period of 24-hours.

<u>Loss and Transformation Methodology</u>

The Army Corps of Engineers HEC-HMS computer program was used to calculate runoff hydrographs using the District's S-Graph method. Soil Moisture Accounting loss method was used to estimate loss rates. An initial abstraction (loss) of 0.25-inches was applied in terms of surface storage. A constant infiltration of 0.17 inches per hour was used for land uses designated as open areas.

The S-Graph represents the response of a sub-basin to a unit of precipitation and is defined as the percentage of unit flow versus percentage of time lag. The sub-basin time lag is defined as the length of time between the centroid of precipitation mass and the peak flow of the resulting hydrograph and is expressed by the following equation:

$T_{lag} = 24 \times N \times (L \cdot L_{ca} / S^{0.5})^{0.38}$

In this equation, *L* is the longest flow path in miles, L_{ca} is the length along flow path from a point opposite the centroid of the watershed in miles, *S* is the average watershed slope in feet per miles, and *N* is the weighted watershed Manning Coefficient.

The following table provides precipitation depths, lag times and pre-project impermeable area percentage for the study watersheds:

TABLE 8

Hydrologic Parameters

Area	MSP (in)	24-HOURS (in)			Lag (hrs)	Infiltration (in/hr)	Impervious (%)
		10-YR	25-YR	100-YR			
2A	15	3.1	3.6	4.4	0.43	0.17	0
2B	16.25	3.3	3.8	4.8	0.75	0.17	0
2C	15	3.1	3.6	4.4	0.11	0.17	0
M1	15	3.1	3.6	4.4	0.12	0.17	0
3A	16.25	3.3	3.8	4.8	0.35	0.17	0
3B	16.25	3.3	3.8	4.8	0.25	0.17	0
3C	16	3.3	3.8	4.7	0.25	0.17	0
3D	16	3.3	3.8	4.7	0.12	0.17	0
4A	16	3.3	3.8	4.7	0.17	0.17	0
4B	16	3.3	3.8	4.7	0.12	0.17	0
5A	16	3.3	3.8	4.7	0.29	0.17	0
K1	18	3.6	4.2	5.2	1.33	0.17	0
K2	18	3.6	4.2	5.2	0.93	0.17	3
K3	16.25	3.3	3.8	4.8	0.39	0.17	2

Culvert Sizing

The 100-year runoff hydrograph computed at each of the creek crossing points was used to perform culvert sizing calculations. Culvert sizes were selected to convey the 100-year peak discharge based on a maximum full pipe culvert velocity of 6.0 foot per second. This was determined to provide ample conveyance without excessively erosive discharge velocities. The following tables list the calculated discharges and required culvert diameters for the evaluated alternatives. All the

Alternatives were considered together because the tributary areas to creek crossing locations are approximately the same.

TABLE 9

Preliminary Culvert Sizes – All Alternatives

Location	Drainage Area (mi^2)	Flow (cfs)			Culvert Barrels	
		10-Year	25-Year	100-Year	Number	Diameter (in)
2A	0.19	60	77	113	1	60
2B	0.81	240	311	454	1	120
2C	0.02	12	15	20	1	24
J-2ABC	1.02	305	395	569	1	132
M1	0.02	12	15	20	1	30
3D	0.03	19	24	32	1	30
J-3ABCD	0.46	218	278	396	1	114
4A	0.04	23	29	39	1	36
4B	0.03	19	24	32	1	36
J-4AB	0.07	43	53	72	1	48
5A	0.10	45	57	82	1	54
K1	3.35	788	1038	1463	Bridge	
J-K12	5.34	1364	1782	2485	Bridge	

Roadway Drainage

Roadway drainage involves the flows that originate from the proposed roadway. Detailed design of the site drainage system would follow CALTRANS Highway Design Manual procedures and be configured to contain the spread width to the shoulder during a 25-year design storm based on a minimum time of concentration of 5-minutes. Inlet spacing is generally a function of roadway width and longitudinal slope. For the proposed cross section, a maximum inlet spacing of 700-feet was assumed. More frequent inlets were assumed along flatter slopes and proximate to roadway sags.

Water Quality and Hydrograph Modification Management

The project area lies within the jurisdiction of the San Francisco Bay Regional Water Quality Control Board (RWQCB), which has adopted a Municipal Regional Stormwater NPDES permit (MRP) in October 2009. The MRP applies to 77 municipal Bay Area permittees including City of Pittsburg. The Provision C.3 of MRP requires that applicable new developments and redevelopments:

- Design the site to minimize imperviousness, detain runoff, and infiltrate, reuse, or evapotranspirate runoff where feasible,

- Treat runoff prior to discharge from the site,
- Ensure runoff does not exceed pre-project peak and durations, and,
- Maintain treatment and flow-control facilities.

Provision C.3 applies to the Project as each of the proposed roadway alignments would add approximately 10 acres of impervious area requiring the Project to implement Low Impact Development (LID) source and treatment control measures to the maximum extent practicable. Additionally, the Project is required to implement Hydrograph Modification Management Plan (HMP) flow-control measures as the roadway discharges to several natural creeks with a potential for increased erosion.

The Contra Costa Clean Water Program (CCCWP) Stormwater C.3 Guidebook (Guidebook) was referenced in the process of evaluating feasible alternatives to demonstrate compliance. The environmental, geotechnical and physical constraints were taken into consideration while determining the feasibility of incorporating LID measures in to the Project's design. The key constraints that limit the implementation of available LID measures for treatment and flow-control include:

1) Impacts to biological resources due to potential increase in grading limits,
2) Sedimentation due to moderate to high erosive nature of site soils,
3) Susceptibility of constructed fill embankments to failure due to seepage and percolation,
4) Impacts to stream bed, and,
5) Constructability and maintenance of proposed measures.

In evaluating opportunities to incorporate treatment and flow-control measures, it was determined that three potentially feasible alternatives could be implemented to meet Provision C.3. Because all of the proposed roadway alignments would add the same amount of impervious area per linear foot, the conceptual design of the measures evaluated along the southern most alignment would also apply to the other roadway alignments. Therefore, a separate analysis was not performed.

<u>Alternative 1</u>

This alternative would implement bio-retention in the cut embankments areas along the edge of the roadway. The runoff from the roadway and cut embankments will be directed to the bio-retention areas using inlet and storm drain configuration. In general, the surface area of the bio-retention areas required for treatment control is approximately 6-percent of the tributary impervious area, which equates to 3 square feet for every linear foot of roadway section. To minimize the required size of the bio-retention areas, terrace drains in the cut embankments will be directed away from the bio-retention areas. Refer to Exhibit D-3 for general location and configuration of the bio-retention areas. Due to the steep nature of the roadway profile, concrete side cutoff walls with check dams will be required to maximize storage per linear foot of the roadway segment. Larger diameter pipes will be used for underdrain to provide required flow-control volume. This volume is approximately 7-percent of the tributary impervious area (i.e., a dual 18-inch pipe per linear foot of roadway section). The sizing of the underdrain orifice will follow the procedures developed in the Guidebook.

Alternative 2

Alternative 2 will implement bio-retention in the cut embankments areas and flow-through planter boxes in the fill embankment areas, along the edge of the roadway segment. Exhibit D-4 depicts the locations and general widths required. Similar to Alternative 1, large perforated pipes will be used to provide flow-control volume.

Alternative 3

Alternative 3 will implement underground box storage with a control structure to meet HMP. Runoff from the roadway and terrace drains will enter the underground storage system where a required treatment and flow control volume will be allowed to drawdown over a period of 48 hours using an appropriately sized orifice opening. The flow through the orifice will be spread over natural ground to achieve further treatment. Refer to Exhibit D-5 for location of the boxes, preliminary sizes, and, general configuration. The preliminary sizes are calculated using the volume required for treatment and flow control per Table 4-11 of the Guidebook. This volume is approximately 11-percent of the tributary impervious area and is reasonable for preliminary estimates. A continuous simulation hydrologic computer model such as Hydrograph Simulation Program – Fortran (HSPF) or similar approved tool will need to be used to determine the actual volume during the Project's design phase.

All of the alternatives require additional volume to mitigate for increase in peak flow during a 25-year event. This volume is only required where the tributary roadway area to the stream crossing points is significant when compared to the offsite tributary area to that point. A preliminary estimate of the additional volume required is shown in Table 10 below. The volumes computed during the final design might be lower than the estimates provided. The following table summarizes the roadway area as a percentage of the overall tributary area and preliminary estimates of the required peak mitigation volume.

TABLE 10

Increase in Impermeable Area

Location	Impervious Roadway Area as % of Watershed	25-Year Peak Mitigation Volume (ft^3)
2ABC	0.3%	Insignificant
M1	11%	2,000
3ABCD	0.7%	Insignificant
4AB	3%	Insignificant
5A	1.7%	Insignificant
K12	0.1%	Insignificant

Summary

Implementation of the proposed alternatives will provide the treatment and flow-control required per Provision C.3. Alternatives 1 and 2 will require irrigation to maintain a healthy plant life and will require seasonal maintenance at least for the first two to three years. Alternative 3 would require scheduled maintenance to clear clogging of outlet structures from debris and trash for the life of the

Project. As no irrigation or other water utility lines are going to be installed in the James Donlon Boulevard Extension, Alternative Number 3 is the only viable alternative for this Project.

E. Bridge Planning Studies

Introduction

The James Donlon Boulevard Extension is a proposed roadway project near the City of Pittsburg, located in Contra Costa County in Northern California. Figure 2 shows the Project Location Map. The project will extend James Donlon Boulevard from Kirker Pass Road easterly to a subdivision called Sky Ranch II. The road will provide an alternative access route from eastern Contra Costa County cities (Brentwood, Antioch, and Pittsburg), to central Contra Costa County cities (Concord and Walnut Creek). The roadway starts as a 4 lane road at the subdivision areas and will transition to a 2 lane road that will meet City and Caltrans standards.

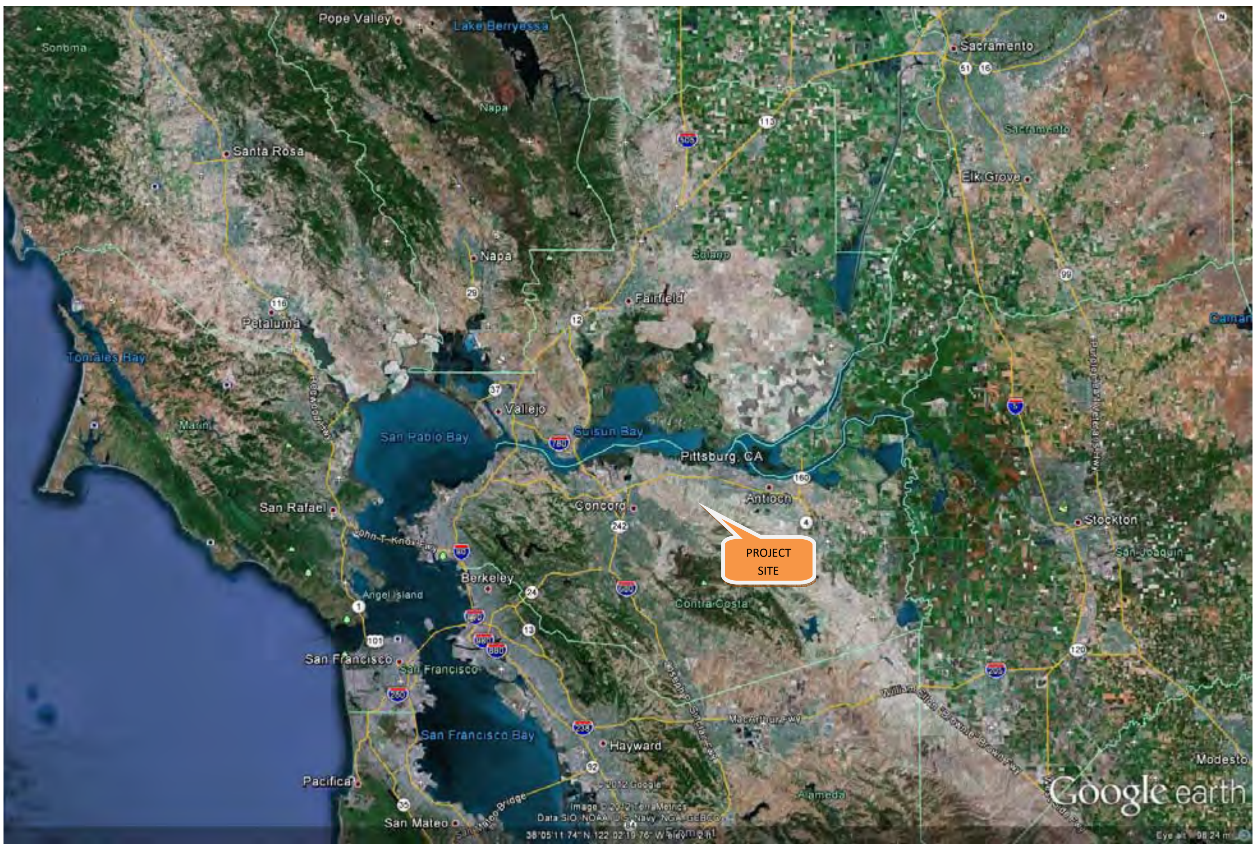


Figure 2 – Project Location Map

Site

The proposed site is currently used for horse and cattle grazing (see Figure 3). To the north, east and west of the project site area, the land use is or will be residential areas. South of the project site, land use is mainly agricultural and park. The City's future plans for the project site area is open space.

There are several streams throughout the area, with flow going from south to north. Further downstream, water from the streams enters the city's storm drain system and is discharged into Suisun Bay.

These bridge planning studies address two locations where the proposed road will span Kirker Creek (Figure 5). Figure 3 shows the locations of the two bridge structures that will be required: (1) James Donlon Blvd will span Kirker creek east of Kirker Pass Road and, (2) Ramp bridge will connect Kirker Pass Road to eastbound James Donlon Blvd. Two alternatives each are proposed for the James Donlon Blvd Bridge and Ramp Bridge.

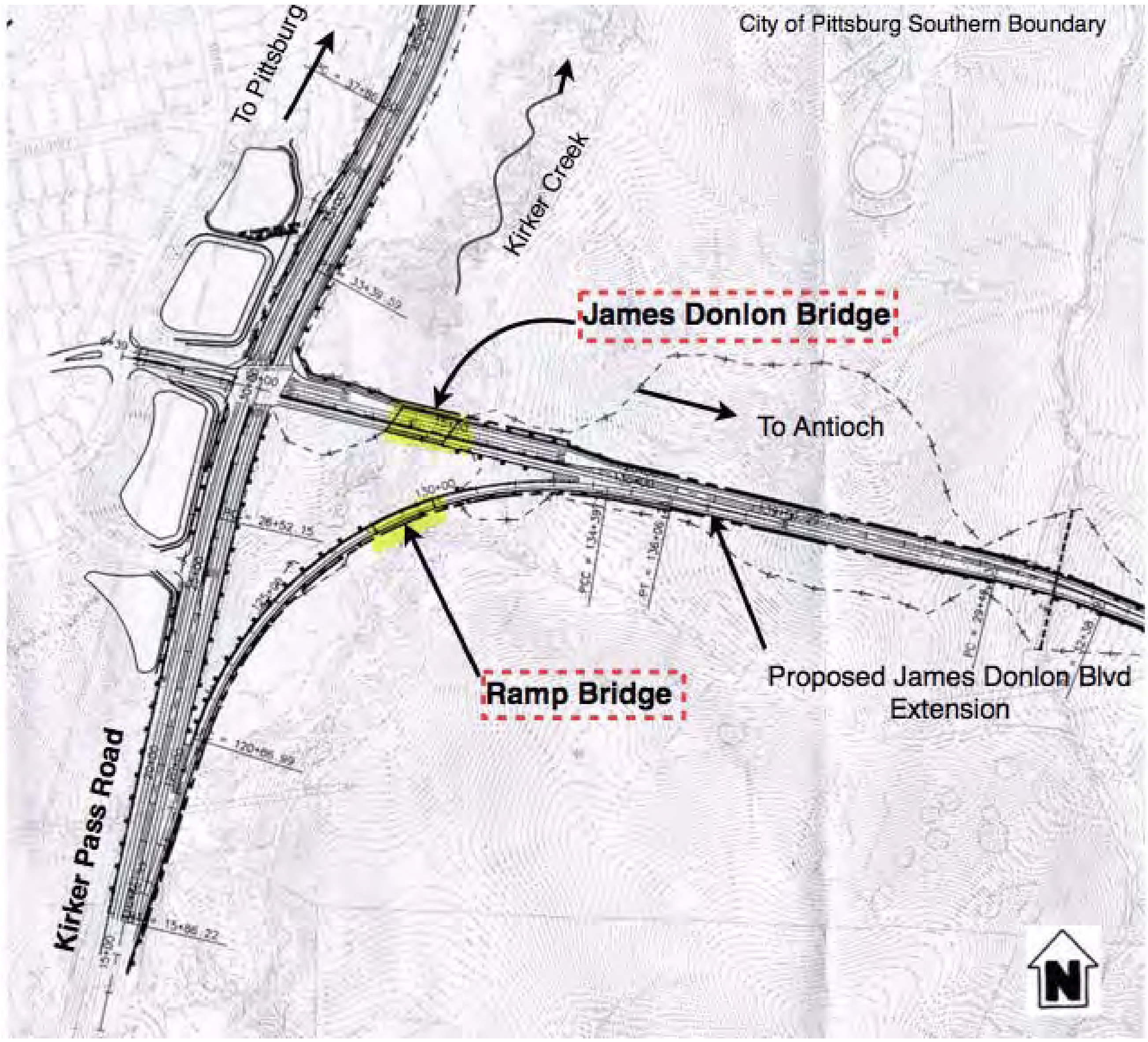


Figure 3 – Site Location

Figure 4 – General Site Location: On Kirker Pass Road Looking North

Figure 5 – Kirker Creek

Work Limits

There are two project constraints which affect all alternatives.

The first constraint is the biological limit in the stream which was provided by the project ecological consultant H. T. Harvey & Associates (January, 2012), and shown on the bridge planning studies for all alternatives in Appendix A on Exhibit E-1 thru E-4. No temporary or permanent construction should occur within this stream within the biological limit, such as bent footings or shoring/ falsework for bridge construction. Temporary impacts can occur but will need an Army Corps of Engineers 404 permit. It is feasible to construct all alternatives proposed in this study without temporary or permanent construction within the biological limit.

The second constraint is the design high water surface (HWS) elevation. The HWS elevation is +256 for the James Donlon Blvd. Bridge, and +260 for the Ramp Bridge. The HWS is shown in elevation, and the HWS contour is shown in plan, on the bridge planning studies for all alternatives in Appendix A. There should be no permanent construction proposed within the HWS limit. Temporary construction, such as grading and falsework, are anticipated to occur for the bridge construction.

Traffic

There is no traffic at the site, and temporary vertical clearance for traffic under falsework is not required. The bridge soffit has ample clearance from the design high water elevation of the creek. The top of deck elevation is dictated by the roadway profile. This is the case for all the bridge alternatives considered.

James Donlon Blvd Alternative 1

Alternative 1 spans Kirker Creek with a bridge length of 148 ft. It is proposed as a single span cast-in-place prestressed box girder bridge with a depth of 6'-9". The cast-in-place (CIP) prestressed box girder is the preferred bridge type in California, because of its superior seismic performance, aesthetic appeal, and lower depth to span ratio. This type of bridge was proposed for all the bridge alternatives. The width of the bridge is proposed 76'-6" and will carry 4 lanes of traffic, two 8' shoulders, and a sidewalk on the west side of the bridge. The location of the abutments was selected to minimize the span length. Minimizing the span length, however, resulted in taller abutments (30 ft tall abutments). Tall retaining walls will also be required at abutment 2.

A taller abutment and retaining wall requires more piles than a lower height abutment, which increases the foundation cost for this alternative. The creek crossing is an environmentally sensitive area, and there are construction limitations near the creek, which dictates the boundaries where no permanent construction is allowed. These boundary limitations dictated the location of the abutments and the minimum feasible span length. The boundaries for temporary and permanent construction near the creek are shown in the bridge planning study plan which is included in Appendix A. Considering the proximity of the abutment to the stream, sheet piling is anticipated in this alternative in front of the proposed abutments to protect the foundations from scour. The geotechnical engineer recommends 30" cast-in-drilled hole (CIDH) piles for abutment 2. Abutment 1 will be founded on bedrock according to the information obtained from the soil borings; therefore, a spread footing foundation is proposed at this location. See Appendix C for the Preliminary Foundation Report.

The estimated planning study cost for this new bridge, including roadway retaining walls, shoring, 10 % mobilization and 25% contingencies is $4,848,000. For a detailed cost estimate see the attached in this section.

James Donlon Blvd Alternative 2

For alternative 2, the location of the abutment was placed to minimize the abutment height. The lower abutment reduced the foundation cost. However, the span length for this alternative increased to 196’, and a structure depth of 8’-8”, increasing the superstructure costs. This bridge is proposed to be a single 196’ span bridge with a width of 76’-6” and carrying the same number of lanes as in alternative 1. Due to the longer span length, sheet piling is not required for this alternative, as the abutments are further away from the stream. As in alternative 1, 30” CIDH piles are required at abutment 2, and a spread footing is proposed at abutment 1. However, the lower abutment height requires fewer piles than in the first alternative.

The estimated planning study cost for this new bridge, including 10 % mobilization and 25% contingencies is $3,830,000; see the attached in this section.

Ramp Bridge Alternative 1

The ramp bridge will carry one lane of traffic from Kirker Pass Road eastbound to James Donlon Blvd. Alternative 1 is proposed to span 166’ over Kirker Creek with a superstructure depth of 7’-8”. Because it spans Kirker Creek at one of the creek’s most narrow portions, sheet piling will not be needed for the abutment excavations. However, in order to minimize the span lengths, the location for the abutments require taller abutments (25’ tall) than for the second alternative considered. Extended retaining walls will also be required at both abutments. The taller abutments require more piles, increasing the foundation cost. The proposed bridge width is 27’, for one traffic lane, and two shoulders.

The estimated planning study cost for this new bridge, including retaining walls, 10 % mobilization, and 25% contingencies is $2,180,000, see the attached in this section.

Ramp Bridge Alternative 2

For this alternative, the location of the abutments was placed to minimize the abutment height. The height is reduced to 18’ tall, which requires less piles and a lower cost for the foundations. However, the span increased to 180’-6”, requiring a superstructure depth of 8’6” and increasing the superstructure cost. Bridge wingwalls are required at both abutments, but extended retaining walls beyond the abutments are not required for this alternative. The bridge width proposed is 27’ as in the first alternative. The bridge crosses the creek at one of the most narrow portions. Sheet piling is not considered in this alternative since the abutment footings are located outside the scour affected zone.

The estimated planning study cost for this new bridge, including 10 % mobilization and 25% contingencies is $1,600,000; see the attached in this section.

Summary of Costs

To summarize, the costs for each alternative are as follows:

James Donlon Blvd. Bridge

Unit of Work	Alternative 1	Alternative 2
Bridge	$3,808,000	$3,830,000
Retaining Walls	$400,000	--
Sheet Piling	$640,000	--
Bridge Total	**$4,848,000**	**$3,830,000**

Ramp Bridge

Unit of Work	Alternative 1	Alternative 2
Bridge	$1,780,000	$1,600,000
Retaining Walls	$400,000	--
Bridge Total	**$2,180,000**	**$1,600,000**

These cost estimates above, include a contingency built into the bridge line item. The total cost estimate for the entire project shown in Section H of this report removes the bridge contingency from the bridge line item and adds it back in at the end of estimate to eliminate double contingencies.

Preliminary Geotechnical Information

Kleinfelder provided the Preliminary Foundation Report for this project in a technical memorandum included in a separate report.

The bridge abutments and retaining walls require 90-ton piles. Kleinfelder recommends 30" diameter cast-in-drilled hole (CIDH) piles and 24" diameter CIDH piles respectively for the abutment and retaining walls. For the James Donlon Bridge Abutment 1, spread footings are recommended due to the very stiff soils and soil rock encountered during drilling of the borings.

The site is located 3.0 and 9.3 miles (4.9 and 15 km) from the nearest controlling faults, the Greenville (Clayton section) and Great Valley 5 faults, respectively. These faults could generate a maximum credible earthquake of approximately 6.6.

The soil at the site is classified by the stiffness of the soil, as determined by the shear wave velocity in the upper 100 ft of the soil profile. As defined in the AASHTO LRFD Bridge Design Specifications section 3.10.2: "The behavior of a bridge during an earthquake is strongly related to the soil conditions at the site. Soils can amplify ground motions in the underlying rock, the extent of this amplification is dependent on the profile of soil types at the site and the intensity of shaking in the rock below. Sites are classified by type and profile for the purpose of defining the overall seismic hazard, which is quantified as the product of the soil amplification and the intensity of shaking in the underlying rock."

The soil at the site is primarily Site Class D, except for the west abutment of the James Donlon Bridge, which is Site Class C. Site class D is defined as stiff soil with a shear wave velocity between 600 and 1200 ft/ sec with either blow counts between 15 and 50 blows/ft or a bearing capacity between 1 and 2 ksf. Site Class C soils are very dense soils and soil rock with a shear wave velocity between 1200 and 2500 ft/sec, with either blow counts greater than 50 blows/ft or a bearing capacity greater than 2.0 ksf.

Base on preliminary information, liquifaction is not a concern at the site. Groundwater was encountered at approximately 50 feet from existing ground. These recommendations will be confirmed during the PS & E phase. Additional testing is suggested during PS & E for corrosion and soil erodability recommendations. For more detailed information see the Preliminary Foundation Report.

The bridges will be designed using the latest editions of the AASHTO LRFD Bridge Design Specifications and the Caltrans Seismic Design Criteria.

Preliminary Channel Stability Assessment and Scour Analysis

A preliminary analysis of the channel was performed with the objective to (1) evaluate the historical lateral movement based on available historical data, and (2) estimate the potential scour based on a 1-percent annual chance event

Historical lateral movement

The historical aerial imagery listed in Table 11 were registered to the project-specific aerial topography and compared to estimate the lateral drift of the creek.

Table 11. Aerial Imagery/Topographic Data Sources

Year	Source	Scale
1939	Fairchild	1" = 555'
1949	USGS	1" = 655'
1958	Cartwright	1" = 555'
1965	Cartwright	1" = 666'
1974	NASA	1" = 601'
1982	USGS	1" = 690'
1993	EDR	1" = 500'
1998	USGS	1" = 666'
2005	EDR	1" = 500'
2006	EDR	1" = 500'
2010	Project-specific aerial topography	1' contour interval

Over a 70-year period, Kirker Creek appears to have moved laterally 5 to 10 feet at some locations in the immediate vicinity of the proposed crossing locations. Some locations appear more susceptible to lateral movement than others (e.g., on the outside bank before the terminus of a bend).

Potential scour

Peak flow rates in Kirker Creek at Buchanan Road (tributary area of 7.31 square miles, less than a mile downstream from the Project location) are presented in the Contra Costa County FEMA Flood Insurance Study (FIS) with a preliminary revision date of July 16, 2010 (FIS Number is 06013CV001B), 1- and 10-percent annual chance peak flow rates are 1,757 cfs and 1,154 cfs, respectively. These flow rates were used to compute the uniform flow hydraulics and subsequent scour calculations. The peak flow rates at the Project locations are expected to be lower than the values published in the FIS.

The thalweg slope generally oscillates between 2 and 3 percent. The flow regime is assumed to go supercritical through the 3-percent-slope sections and transition to critical depth/subcritical depth through the 2-percent-slope sections. The hydraulic roughness of 0.044 was determined using the Guide for Selecting Manning's Roughness Coefficients for Natural Channels and Floodplains, USGS Water-Supply Paper 2339.

A single cross section was analyzed at each bridge location applying uniform flow hydraulics. The hydraulic roughness of 0.044 is consistent with the assumption of alternating flow regimes associated with a change in slope from 2- to 3-percent or 3- to 2-percent. The computed mean velocity ranges between 12 and 14 feet per second. The soil at the Project location is Rincon clay based on the Natural Resources Conservation Service soil database, which is generally consistent with the draft log of test borings conducted for the Project.

For the Ramp Bridge, the crossing is located at a contracted section. As a result, contraction scour governed producing a potential scour depth of roughly 17' (this includes a thalweg adjustment and a safety factor of 1.3).

For the James Donlon Road Bridge, the competent velocity method was applied to produce a potential scour depth of 15' (this includes the influence of bedforms, a thalweg adjustment, and a safety factor of 1.3).

A more rigorous analysis in conjunction with additional geotechnical field tests might offer justification for reducing the potential scour predictions based on the higher resistance to erosion often encountered with clay soils.

A final hydraulic and scour analysis of Kirker Creek will be completed during final design. The creek will be sized for a 100 year storm. For this analysis, it is suggested the project geotechnical engineer perform an on-site test to measure erodability and additional soil characteristics pertinent to a hydraulic analysis

For the bridge cost estimates, the length of the piles at the abutments was increased from that recommended by the geotechnical engineer, by the amount given above due to the potential scour.

In addition, the retaining height of sheet pile length for Alternative 1 of James Donlon Boulevard Bridge is assumed equal to the anticipated scour depth.

Environmental Permits

The bridge site is located adjacent to Kirker Creek, an environmentally sensitive area. As previously mentioned, there are biologically defined boundaries which limit access and require temporary and permanent construction limits next to the creek. This area is subject to jurisdiction and approval from several agencies, some of which are:

- The US Army Corps of Engineers;
- U.S. Fish and Wildlife Service;
- California Department of Fish and Game.

Utilities

No utilities are anticipated in the bridge at this time. If during final design, utilities are required to be accommodated on the bridge, these can be placed inside the bridge cells in the superstructure. Lighting conduits or any other small conduit may be placed in the barrier or in the sidewalk. Future utilities are to be identified and coordinated with the utility owners.

Bridge Deck Drainage

During final design, the bridge will be evaluated to determine if deck drainage is required. The drainage design will be based on recommendations given in Caltrans Bridge Design Aids manual, requiring that the flooded width on the bridge be contained within the shoulder. The water would be collected from the deck drains, to outlet from the abutment into the nearest storm drain.

Aesthetics

During this planning phase of the project, there are no aesthetic requirements or guidelines. If requested by the client, architectural textures may be added to the bridge barriers.

ATTACHMENTS

Appendix A: PLANS

James Donlon Blvd Bridge Alternative 1 – Shown as Exhibit E-1

James Donlon Blvd Bridge Alternative 2 – Shown as Exhibit E-2

Ramp Bridge Alternative 1 – Shown as Exhibit E-3

Ramp Bridge Alternative 2 – Shown as Exhibit E-4

F. Sub-Consultant Analyses & Updates

1. Archaeological Evaluation and Report

The sub-consultant, Archaeological/Historical Consultants of Oakland, California completed additional survey of the site along the modified central alignment of James Donlon Boulevard. They completed an additional report titled, **"*Cultural Resources Survey of the James Donlon Boulevard Extension Report, Contra Costa County, California, Addendum 1*"**, by Suzanne Baker dated April 2012. Their findings are as follows:

Three cultural resources surveys of the James Donlon Boulevard Extension Project have taken place—in 2002, 2007, and 2012. The latest survey in 2012 ascertained that all of the 2012 Preferred Alignment and its adjacent cut and fill areas have been subjected to archaeological reconnaissance.

As a result of these surveys one prehistoric and two historic sites have been recorded. Recommendations with regard to these sites are as follows:

P-07-002566, the Warren and William Abrams Ranch Complex (the Thomas Ranch)

The site is believed eligible for the National Register of Historic Places and the California Register of Historic Resources. The road will be built far enough from the ranch complex that construction should not directly impact the buildings. To ensure that impacts are less than significant, we strongly recommend that any road construction and auxiliary activities avoid the Abrams Ranch complex. In addition, the ranch complex should not be used as a construction staging area.

Road construction will further affect the integrity of the ranch setting. Although the setting was previously judged as having only fair integrity because of encroachment by a modern subdivision, the setting to the south of the ranch is largely pristine. Construction will undoubtedly reduce the integrity of setting to poor. We recommend that, prior to construction, additional photographs be taken of the landscape setting of the ranch complex, particularly to the east and south, to try to preserve the historic memory of the ranch setting as it was during the first half of the 20th century, its period of significance.

P-07-002564 (CA-CCO-747H), historic road segment

The proposed construction is at least 250m (~820') north of this feature and should not impact it. The road segment is small and relatively inaccessible and it is unlikely that construction equipment would use it. Such equipment should avoid the road. No further recommendations are made with regard to this feature.

P-07-003086 (CA-CCO-819), a prehistoric lithic scatter

The sparse surface cultural materials found at this site were generally recovered from rodent burrow dirt. In order to determine if a subsurface prehistoric component exists in this area and to properly evaluate the site for the National Register and California Register, it is recommended that an Extended Archaeological Survey be conducted. This would consist of subsurface test excavations. Because of the fragility of this small site, we recommend that two to four excavation units be hand excavated. The total number of excavation units would depend on the depth of the potential cultural materials, but it is likely that no more than 2 cubic meters of earth would need to be excavated to determine the types of materials contained in the site (if any) and their data potential A combination of 1m x 1m and 0.5m x 1m units would be used, as well as hand augering. A more detailed research design should be prepared prior to any excavation.

In response to the discovery of prehistoric lithic scatter a second more thorough field mitigation was conducted to properly evaluate the site for the National Register and California Register. A second investigation was conducted in November of 2012 by Pacific Legacy, Inc. as a subconsultant to Archaeological/Historical Consultants. They prepared a report titled **"California Register of Historical Resources and National Register of Historical Places Evaluation of CA-CCO-819 (P-07-03086), James Donlon Extension Project, Contra Costa County, California"**, prepared by Pacific Legacy, Inc. and Archaeological/Historical Consultants dated November 2012.

The management summary of their report is as follows:

The City of Pittsburg proposes to extend James Donlon Boulevard westward to Kirker Pass Road through a portion of unincorporated Contra Costa County. The proposed James Donlon Extension Project (Project) is a roadway extension designed to link cities in central Contra Costa County (Concord and Walnut Creek) and help alleviate traffic congestion.

This project has been in the planning stage for over ten years, and was originally known as the Buchanan Road Bypass. Earlier archaeological investigations (Baker 2002, 2007) were conducted under the California Environmental Quality Act (CEQA). Due to potential federal funding for the Project, archaeological investigation also need to address historic preservation requirements of Section 106 of the National Historic Preservation Act and its implementing regulations found at CFR 800.5.

Archaeological site CA-CCO-819 (P-07-03086) lies within the Area of Potential Effects for the Project. CA-CCO-819 is a sparse prehistoric lithic scatter, first identified in 2012 by Archaeological/Historical Consultants (A/HC) during archaeological inventory survey for the Project (Baker 2012b). Construction activities associated with the Project have the potential to impact archaeological data potentials associated with the resource. As currently proposed, roadway construction would cover CA-CCO-819 with fill material.

Archaeological/Historical Consultants contracted with Pacific Legacy, Inc. to conduct an Extended Phase I Survey at CA-CCO-819. The purpose of this investigation was to confirm the presence or absence of cultural materials and conduct limited subsurface investigations in order to define the nature and extent of the archaeological deposit. Pacific Legacy, Inc. excavated 12 shovel probes and three backhoe trenches within the site boundaries. A total of 1.55 m^3 of soil was manually excavated to investigate the site's geomorphology and investigate the presence of buried archaeological component. The geoarchaeological analysis revealed that the site is in the upper portion of a single stratigraphic layer (A, B, and C horizons) and there is no buried archaeological deposit.

During the course of investigation, Pacific Legacy and A/HC determined that the data collected was sufficient to evaluate whether the site is eligible for listing on the National Register of historic Places and the California Register of Historical Resources. The investigations provided little information with which to address substantive research questions posed in Section 2.3. It is our opinion that CA-CCO-819 is not eligible for listing in the California Register of Historical Resources under Criteria 1 through 4 or the National Register of Historic Places under Criteria A through D.

2. Geotechnical Evaluation and Report

The geotechnical engineer, Kleinfelder, has prepared a series of geotechnical evaluations and reports that gives direction for the design of the project. The number of reports have been necessary to address the changes in alignment and the new bridge components of the project. Additional reports will be necessary to address the geotechnical requirements for the numerous retaining walls required for this project that will mitigation environmental impacts along Kirker Creek and additional studies, and letter reports to refine the final design.

The first report completed by Kleinfelder was as follows: This report was a design level report that addressed the initial alignment described under Section 4 "Technical Studies, Paragraph A Alignment Description" of this Technical Memorandum Report.

Geological and Geotechnical Investigation Report, *Proposed Buchanan Road Bypass Pittsburg, California* dated January 9, 2008*.*

The following is the executive summary presented for the above report:

This report presents the results of Kleinfelder's engineering geology and geotechnical constraints investigation as part of the overall planning process by RBF Consulting, a company of Michael Baker Corporation (RBF), the project civil engineers. The intent of our investigation was to perform an investigation of the subsurface conditions along the alignment selected by the City of Pittsburg, and to identify significant geologic, seismic, and geotechnical constraints that could impact the design of the roadway. Our investigation consisted of geologic reconnaissance, drilling of boring, rock coring, test pits, seismic refraction analysis, laboratory testing, slope stability evaluations, engineering analysis, review of pertinent information presented in reports by us and other geotechnical engineers for nearby projects, and the preparation of this report.

Based on our field investigation and analysis, there are a number of geologic considerations that can impact the design of the roadway. These include, amount others, existing landslides, adverse bedding of rock and formational material, expansive soils, and slope stability. We have discussed these items with representatives of RBF, and they have included in the design aspects to address these considerations. Some of these are discussed as follows:

- It is our understanding that it is desired that most of the cut and fill slopes have inclinations that are at approximately 2:1 (horizontal to vertical). We have evaluated the major slopes at these inclinations. In most cases, the 2:1 inclination is acceptable. In cut areas at this inclinations. In cut areas at this inclination, most of the slopes will need a buttress fill to address adverse bedding of the exposed rock and formational material. For a few slopes, inclinations gentler than 2:1 will be needed because the planned cuts are extremely high, and the soils generally weaker. A summary of the slopes evaluated, along with the steepest inclination recommended, and whether a buttress fill is needed, is presented on Table 7.1.4-1 with the locations of the identified slopes shown on Plates 2A and 2B.

- There is an existing landslide designated as Landslide 4 on Plate 2B. This landslide is an ancient one with some minor movement of the surficial material. It is extremely deep. Our evaluation indicates that the landslide can be left in place provided that it is re-shaped, and that a debris encatchment be provided near the base of the landslide. Most of this encatchment is already included as a fill embankment to support the road. An additional embankment may be needed at the western portion of this area. The portion of the landslide beneath the planned filled for the roadway will need to be removed. This excavation will require special methods as discussed in Section 7.4, "Slope Stability Results" of this report. Even with these special methods, there is a distinct possibility that movement of the landslide may occur. As a result, additional excavation of the landslide material may be needed.

- Fill slope can be placed at an inclination no steeper than 2:1 (horizontal to vertical). Where fills are greater than 5 feet in height, keys at the toe of the fills will be required. Where existing colluvium or landslide debris exists, it will need to be removed. Specially, the landslide debris will need to be removed at all fill locations. We estimate that there will be about 10 to 20 feet of colluvum material that will need to be in non-landslide areas where fill to be placed.

- The on-site soils can be reused as fill material, including landslide material that is excavated. A majority of the soils is clay with medium to high expansive potential. As such, additional effort might be needed to reach the desired moisture content for placement, as well as achieving the appropriate compaction. There is a variety of material at the site, which their locations and designation are approximately on Plates 2A and 2 B. We have discussed the placement characteristics of each of these materials in this report.

- The seismic refraction lines performed in the field indicated shear wave velocities between 900 and 5400 ft/s. These values are within that typically for ripping based on using a D-9 dozer or larger. Blasting is not anticipated Localization hard ripping might be needed.

- As with any hillside development, especially with significant cut and fill slopes as currently envisioned for the project, there will be long term settlement, sloughing of soils on slope, erosion, and downward creep of soils on slopes, all of which will require future maintenance. Aspects can be included in the design to reduce the impact of such items, but will not eliminate them. As such, maintenance of the road will need to be anticipated.

The next reports prepared by Kleinfelder were:

- ***Engineering Geological and Geotechnical Feasibility Report, Four Proposed James Donlon Boulevard Alignment Extension Alternative, Pittsburg, California*** dated March 7, 2012.

- ***Limited Geological and Geotechnical Feasibility Study for Proposed Stream Crossing Alternative Alignment C1 Low James Donlon Boulevard Extension Project, Pittsburg, California*** dated May 31, 2012.

The results and recommendations on these reports were presented in Section B "Environmental Mitigation", Paragraph 6 Sub-Alternative Alignment Analysis.

The Sub-Alternative Alignment Analysis concluded that Alignment Alternative C2-Low was the preferred alignment.

As a result of the above analysis Kleinfelder prepared the following final design level geotechnical report for the preferred alignment:

- ***Supplemental Engineering Geologic and Geotechnical Report James Donlon Boulevard Alignment Extension Middle Alignment (C2-Low) Alternative, Pittsburg, California*** dated November 30, 2012.

The summary based on the above report is:

Based on our findings, it is our opinion that the proposed Middle Alignment (C2-Low) is suitable for construction provided that the conclusions and recommendations presented in this report and our January 9, 2008 report are incorporated into the design and construction of the project. In summary, the proposed south-facing cut slopes extending from approximately Stations 18+00 to 29+00 may be steepened form the proposed 2H:1V 9horizontal to vertical) to a 1.75H:1V gradient and the south-facing cut slopes extending from approximately Stations 46+50 to 61+00 may be steepened from the proposed 2H:1V to a 1.5H:1V gradient. We are not recommending that the south-facing cut slopes along the selected alignment be overexcavated and rebuilt as fill buttresses. However, we are recommending that nearly all north-facing cut slopes be overexcavated and rebuilt as fill slopes that are supported on subdrained base keyways. Our attached remedial grading plans delineate the limits of the recommended remedial grading where cut slopes are to be overexcavated and rebuilt. Depending on the height of fill and cut slopes, we are recommending that 6- to 12-foot wide benches be constructed and concrete V-ditches be installed along the inboard side of the noted drainage benches.

In addition, the proposed slope gradient of the fill embankment planned from approximately Stations 60+00 to 70+00 may be steepened to 1H:1V if the fill is supported by a mechanically stabilized earth geosynthetic system similar to that described in this report. All the remaining proposed fill slopes be supported on base keyways that are subdrained and extended into bedrock or unyielding form soils.

We are not including remedial grading recommendations for the planned cut slopes between approximately Stations 70+00 and 78+00 because of several factors that we identify in this report. We are however recommending that further subsurface investigation and characterization of the subsurface geologic conditions of these proposed cut slopes. Additional discussions and specific recommendations regarding these and other aspects of the project are contained in the report.

On a preliminary basis, the proposed retaining walls planned near the western end of the roadway alignment are considered feasible. We recommend performing additional site-specific field exploration and laboratory testing to characterize the subsurface conditions anticipated in our preliminary evaluation of the walls, evaluate depth to bedrock, and provide retaining wall design parameters and recommendations.

Kleinfelder prepared two additional reports which are:

- ***Foundation Report James Donlon Boulevard Bridge James Donlon Boulevard Extension, Pittsburg, California*** dated July 20, 2012.

- ***Final Foundation Report Ramp Bridge James Donlon Boulevard Extension, Pittsburg, California*** dated May 22, 2012.

The recommendations of the reports are presented in Section 4 – Technical Studies Paragraph E "Bridge Planning Studies."

3. Biological Evaluation and Report

The assessments of potential impacts presented in H.T. Harvey's report titled, **"*James Donlon Boulevard Extension Project Alternative Alignment Assessment*"**, dated May 24, 2012, were based upon preliminary grading and alignment plans prepared by RBF Consulting. These alternative plans, as discussed in Sub-Alternative Alignment Analysis were developed in a similar fashion for purposes of comparing the degree of impacts of alternative alignments against one another. As noted in H.T. Harvey's report as the design of the selected alignment was advanced additional environmental impacts would be expected and would be assessed at the appropriate time. The City of Pittsburg has selected C2-Low Profile alignment as the preferred alignment as it minimized the environmental impacts amongst the various alternative alignments analyzed.

The C2-Low Profile alignment has been subsequently advanced in design for final geotechnical and biological impacts evaluations for the CEQA document. The advancements in the design would have been common to all alternatives evaluated and would not have impacted the alternative selected as the preferred alignment. The design advancements include the following:

- Expanded earthwork bench mid-point on all cut and fill slopes from 6 feet to 12 feet.

- The placement of 4 feet wide concrete interceptor ditches at the top and toe of each slope.

- The placement of 6 feet wide concrete terrace drains on all earthwork benches.

- 30 feet wide earthwork buttress excavation limits on all north facing cut slopes.

- 20 feet wide clearing limits beyond the earthwork daylight line to provide access and movement at the top and toe of slopes. (10 feet along Kirker Pass Road and ramp)

- The placement of rip-rap at the beginning and end of all culverts to control erosion at the entrance and exits of all culverts.

- 100 feet wide by 50 feet long grading limits at the beginning and end of each culvert to complete all remedial grading that is normally anticipated along streams.

- The identification of potential earthwork borrow sites.

- The identification of staging areas for construction equipment.

The environmental impacts of the preferred alignment will be evaluated with all the design elements indicated above. H.T. Harvey reported their finding in two documents. They are:

- ***Application Form and Planning Survey Report to Comply with and Receive Permit Coverage under the East Contra Costa County Habitat Conservation Plan and Natural Community Conservation Plan*** dated November 2012;

- ***Update to Section 4.6 Biological Resources for the Administrative Draft EIR*** dated November 2012.

A selected synopsis of their finding taken directly from these two reports are:

Land Cover Types

H.T. Harvey & associates identified nine distinct land cover types within the Project Area as part of the planning survey report: annual grassland, native grassland, ruderal, oak savannah, oak woodland, intermittent stream, ephemeral stream, rock outcrop, and urban (H.T. Harvey & Associates 2012b). These land cover types were surveyed and mapped pursuant to HCP/NCCP planning survey requirements. Table 12 (Summary of Land Cover Types) provides the total acreage of each identified land cover type within the Project Area.

TABLE 12

Summary of Land Cover Types

Biotic Habitat/Land Use Type	Total Acreage within Project Area (acres)
Annual Grassland	51.2
Rock Outcrop	20.7
Oak Savanna	11.2
Urban	5.8
Intermittent Stream	1.3
Ephemeral Stream	0.6
Ruderal	1.2
Oak Woodland	0.1
Native Grassland	<0.1
TOTAL:	**92.2**

Source: H.T. Harvey & Associates, 2012b

SPECIAL STATUS PLANT SPECIES

HCP/NCCP-Covered and No-Take Plant Species

The HCP/NCCP determines the potential for occurrence of covered and no-take plant species based on the presence of land cover types within the Project Area. Based on the land cover mapping, eleven special-status plant species plant species and six no take species covered under the HCP/NCCP could potentially occur within the Project Area.

Two of these 17 special-status plant species, the large-flowered fiddleneck and Mount Diablo manzanita, are not expected to occur in the Project Area. These species occur within an elevation range that is hundreds of feet higher (in the upper portions of the Mt. Diablo Range) than the maximum elevation range of the Project Area. In addition, the Mount Diablo manzanita occurs in chaparral or coast live oak woodland habitats, which do not occur on the site. Protocol-level surveys were performed for the remaining 15 species, including summer and fall-blooming species in 2007 and for the remaining spring-blooming species in spring 2008 within the original survey area. Table 13 (Covered and No Take Plant Species) summarizes the results of these surveys.

Table 13

Covered and No-Take Plant Species

Common Name	Species Name	Legal Status	Survey Outcome
Alkali-milk-vetch	*Astragalus tener var. tener*	HCP/NCCP No-Take, CNPS 1B.2	Not observed during focused survey. Determined to be absent.
Brittlescale	*Atriplex depressa*	HCP/NCCP No-Take, CNPS 1B.2	Not observed during focused survey. Determined to be absent.
San Joaquim spearscale	*Atriplex joaquiniana*	HCP/NCCP No-Take, CNPS 1B.2	Not observed during focused survey. Determined to be absent.
Big tarweed	*Blepharizonia plumose*	HCP/NCCP No-Take, CNPS 1B.1	Not observed during focused survey. Determined to be absent.
Round-leaved filaree	*California macrophylla*	HCP/NCCP No-Take, CNPS 1B.2	Not observed during focused survey. Determined to be absent.
Recurved larkspur	*Delphinium recurvatum*	HCP/NCCP No-Take, CNPS 1B.2	Not observed during focused survey. Determined to be absent.
Mt. Diablo buckwheat	*Eriognum truncatum*	HCP/NCCP No-Take, CNPS 1B.1	Not observed during focused survey. Determined to be absent.
Diamond-pelted California poppy	*Eschscholzia rhombipetala*	HCP/NCCP No-Take, CNPS 1B.1	Not observed during focused survey. Determined to be absent.
Diablo helianthella	*Helianthella castanea*	HCP/NCCP No-Take, CNPS 1B.2	Not observed during focused survey. Determined to be absent.
Brewer's western flax	*Hesperolinon breweri*	HCP/NCCP No-Take, CNPS 1B.2	Not observed during focused survey. Determined to be absent.
Contra Costa goldfields	*Lasthenia conjugens*	HCP/NCCP No-Take, CNPS 1B.1	Not observed during focused survey. Determined to be absent.
Showy madia	*Madia radiata*	HCP/NCCP No-Take, CNPS 1B.1	Not observed during focused survey. Determined to be absent.
Adobe navarretia	*Navarretia nigelliformis ssp. nigellifornis*	HCP/NCCP No-Take, CNPS 4.2	Not observed during focused survey. Determined to be absent.
Caper-fruited tropidocarpum	*Tropidocarpum cappardeum*	HCP/NCCP No-Take, CNPS 1B.1	Not observed during focused survey. Determined to be absent.

Based on the results of the field surveys, there are no unknown occurrences of HCP/NCCP covered or no-take plant species in the original survey area. Thus, HCP/NCCP-covered or no-take plant species are not expected to occur within the original survey area.

Special-status Plant Species Not Covered under the HCP/NCCP

Background research, conducted as described in Methods above, identified 73 special-status plant species not covered under the HCP/NCCP that could potentially occur in the Project region. Fifty-five of these species were easily eliminated from consideration due to one or more of the following reasons:

- the Project Area does not support suitable habitat or land cover types, such as coastal salt marsh, lower montane coniferous forest, or cismontane woodland, that are pine-oak or pine-dominated
- the species' elevation range does not include elevations found within the Project Area
- the species' elevation range overlaps with the site's elevations, but only at very low or very high areas of the site; in these areas, suitable habitat or land cover types for these species do not occur
- the species requires specific edaphic features not found within the Project Area, such as strongly alkaline soils, serpentine soils, or dune sands
- the species has a highly endemic range which does not include the Project Area

The remaining 18 special-status plant species were initially considered to have potential to occur in the Project Area because necessary edaphic conditions (i.e., moderately alkaline soils, clay soils, and/or rocky soils) are present within the Project Area, and either:

1. known populations of the species are, or were in the past, located in similar habitats in the vicinity of the Project Area and/or within the same or an adjacent quadrangle; or
2. known populations of the species exhibit a wide range that could reasonably include the Project Area, even though no populations are known to occur within the Project Area vicinity.

Table 14 lists these 18 special-status plant species, with the results of the protocol-level field surveys of the original survey area.

Table 14

HCP/NCCP Non-Covered Plants

Common Name	Species Name	Legal Status	Survey Outcome
Heartscale	*Atriplex cordulata*	CNPS 1B.2	Not observed during focused survey. Determined to be absent.
Bristly sedge	*Carex comosa*	CNPS 2.1	Not observed during focused survey. Determined to be absent.
Congdon's tarplant	*Centromadia parryi ssp. congdonii*	CNPS 4.3	Not observed during focused survey. Determined to be absent.
Small Spikerush	*Eleocharis parvula*	CNPS 4.3	Not observed during focused survey. Determined to be absent.
Hall's bush mallow	*Malacothamnus hallii*	CNPS 1B.1	Not observed during focused survey. Determined to be absent.
Robust monardella	*Monardella villosa ssp. globosa*	CNPS 4.2	Not observed during focused survey. Determined to be absent.
Gairdner's yampah	*Perideridia gairdneri ssp. gairdneri*	CNPS 4.2	Not observed during focused survey. Determined to be absent.
Eel-grass pondweed	*Potamogeton zosteriformis*	CNPS 2.2	Not observed during focused survey. Determined to be absent.
Mad-dog skullcap	*Scutellaria lateriflora*	CNPS 2.2	Not observed during focused survey. Determined to be absent.
Bent-flowered fiddleneck	*Amsinckia lunaris*	CNPS 1B.1	Not observed during focused survey. Determined to be absent.
California androsace	*Androsace elongate ssp. acuta*	CNPS 4.2	Not observed during focused survey. Determined to be absent.
Coast rock cress	*Arabis blepharophylla*	CNPS 4.3	Not observed during focused survey. Determined to be absent.
Dwarf downingia	*Downingia pusilla*	CNPS 2.2	Not observed during focused survey. Determined to be absent.
Hogwallow starfish	*Hesperevax caulescens*	CNPS 4.2	Not observed during focused survey. Determined to be absent.
Coast iris	*Iris longipetala*	CNPS 4.2	Not observed during focused survey. Determined to be absent.
Mt. Diablo cottonweed	*Micrpus amphibolus*	CNPS 3.2	Not observed during focused survey. Determined to be absent.
Lobb's aquatic buttercup	*Ranunculus lobbii*	CNPS 4.2	Not observed during focused survey. Determined to be absent.
Rayless ragwort	*Senecio aphanactis*	CNPS 2.2	Not observed during focused survey. Determined to be absent.
Source: H. T. Harvey & Associates, June 2008b			

None of the 18 special-status species listed above were observed during the field surveys. Therefore, these species are considered absent from the original survey area.

SPECIAL-STATUS WIDLIFE SPECIES

HCP/NCCP-covered and No-take Wildlife Species

Per the requirements of the HCP/NCCP, the potential for occurrence of covered and no-take species is determined based on the presence of mapped land cover types in which suitable habitat for the species may occur (e.g., the HCP/NCCP assumes that all areas of the annual grassland and oak savanna land cover types provide suitable habitat for the San Joaquin kit fox). Alternatively, habitat for some covered species is assumed to occur where suitable habitat elements are present (e.g., large trees provide suitable nesting habitat for golden eagles). Thus, per the HCP/NCCP, the presence of the land cover types and habitat elements mapped within the Project Area indicate that 20 covered and no-take wildlife species could potentially occur there.

For the purposes of CEQA, determinations of whether HCP/NCCP-covered and no-take species potentially occur in the Project Area is based on specific habitat requirements, the locations of known occurrences of the species in the Project vicinity, and the suitability of habitat on the site to support these species as determined by field surveys. Thus, several species covered under the HCP/NCCP are not included in the CEQA analysis because the site lacks suitable habitat and/or is outside the known distributions of the species. These species include the foothill yellow-legged frog, silvery legless lizard (*Anniella pulchra pulchra*), Alameda whipsnake (*Masticophis lateralis euryxanthus*), giant garter snake, and ringtail. These species are determined to be absent from the site, and are not discussed further.

The tricolored blackbird (*Agelaius tricolor*), an HCP/NCCP-covered species and a California species of special concern when breeding, may occur in the Project Area only as an uncommon to rare visitor, migrant, or transient. No suitable breeding habitat for this species occurs on the site, and tricolored blackbirds are considered species of special concern only when breeding. Thus, this species has no special status when it occurs on the site, and is not expected to be substantially affected by the proposed Project.

The occurrence of the remaining 14 HCP/NCCP-covered species within the Project Area and the results of HCP/NCCP-required planning surveys for these species are discussed below.

Covered Large Branchiopods. Federal Listing Status: Threatened/Endangered/ None; State Listing Status: None; HCP/NCCP Status: Covered.

Potential habitat for these branchiopods is defined as any seasonally inundated depression that, on average, ponds (or gently conveys water) 2 inches or greater in depth for 14 or more consecutive days. Characteristics of potential habitat for these large branchiopods are based on the life history of Central Valley endemics (Eriksen and Belk 1999; Helm 1998, 1999; Helm and Vollmar 2002). Habitats with rapidly flowing water (e.g., creeks and streams) or semi-to-permanently inundated areas, especially those that support predators (e.g., frogs, crayfish, and fish), are not considered suitable habitat for covered large branchiopods. Overall, the steep terrain in the Project Area is not characteristic of vernal pool terrain where the majority of large branchiopods occur. However, some rock outcrops elsewhere in Contra Costa County are known to support populations of the longhorn fairy shrimp.

Planning surveys identified six locations in the rock outcrop land cover type that provide potential habitat for covered branchiopods. No covered branchiopods were observed during site surveys, although no sampling of suitable habitat for branchiopods was conducted as part of the planning surveys.

California Tiger Salamander (*Ambystoma californiense*). Federal Listing Status: Threatened; State Listing Status: Threatened; HCP/NCCP Status: Covered.

No California tiger salamanders were observed on the site during the planning surveys, when the entire site was walked on-foot during diurnal site visits. Land cover types within the Project Area that provide potential upland habitat for California tiger salamanders are annual grassland, ruderal, oak savanna, and oak woodland. In addition, streams within the Project Area provide suitable movement and foraging habitat for tiger salamanders. No land cover types within the Project Area provide breeding habitat for this species, and no breeding habitat for tiger salamanders was observed on the site during the planning surveys. Although wetland seeps occur in the Project Area, these seeps and drainages are associated with streams rather than ponds, and California tiger salamanders require standing water for a minimum of three months for successful larval development. Therefore, no suitable breeding habitat for California tiger salamanders occurs in the Project Area. The closest pond that provides suitable breeding habitat for tiger salamanders is located approximately 0.2 mi south of the Project Area.

California Red-legged Frog (*Rana draytonii*). Federal Listing Status: Threatened; State Listing Status; Species of Special Concern; HCP/NCCP Status: Covered.

No California red-legged frogs were observed on the site during the planning surveys, when the entire site was walked on-foot during diurnal site visits. Stream habitats within the Project Area provide potential movement and foraging habitat for red-legged frogs, especially during the wet season. All streams and drainages within the Study Area were examined to determine whether they provide potential breeding habitat for California red-legged frogs. All streams within the Project Area are ephemeral or intermittent, and lack the slow-moving, longer-lasting stream habitat frequently used by California red-legged frogs for breeding. However, portions of Kirker Creek immediately adjacent to the Project Area provide pools that pond water long enough for successful breeding of red-legged frogs.

Western Pond Turtle (*Actinemys marmorata*). Federal Listing Status: None; State Listing Status: Species of Special Concern; HCP/NCCP Status Covered.

No western pond turtles were observed during planning surveys, when the entire site was covered on foot. The HCP/NCCP includes maps of habitat for the western pond turtle within the HCP/NCCP coverage area based on a modeling exercise. Western pond turtle habitat on the site as mapped by the HCP/NCCP is for movement between suitable off-site core habitats only. Site visits confirmed that streams in the Project Area could be used as movement habitat by western pond turtles, especially during the wet season. No suitable habitat to support populations of western pond turtles (i.e., ponds or long-lived pools in streams with basking sites) occurs in the Project Area.

Golden Eagle (*Aquila chrysaetos*). Federal Listing Status: None; State listing Status: Fully Protected; HCP/NCCP Status: No-take.

No golden eagles or their nests were observed during the field surveys, when all trees and transmission towers on the site were inspected for nests of raptors. There are no high cliffs or suitable large trees within the Project Area to provide breeding habitat for golden eagles, although transmission towers in the Project Area provide potential nesting sites. Suitable foraging habitat for golden eagles occurs throughout the Project Area

Swainson's Hawk (*Buteo swainsoni*). Federal Listing Status: None; State Listing Status: Threatened; HCP/NCCP Status: Covered.

No Swainson's hawks or their nests were observed during planning surveys, when all trees on the site were inspected for nests of raptors. No trees in the Project Area were determined to be suitable for nesting Swainson's hawks; therefore, no suitable breeding habitat for this species occurs in the Project Area. This species is unlikely to breed or occur in the vicinity due to the lack of optimal foraging habitat and the high topographic relief of the area, as well as the low density of occurrence of Swainson's hawks in eastern Contra Costa County. Swainson's hawks may forage occasionally in the Project Area, especially during migration.

White-tailed Kite (*Elanus leucurus*). Federal Listing Status: None; State Listing Status: Fully Protected; HCP/NCCP Status: No-take.

No kites or their nests were observed within the Project Area during the field surveys, when all trees in the Study Area were examined for nests of raptors. Trees within the Project Area provide potentially suitable nesting habitat for white-tailed kites, and surrounding grasslands provide suitable foraging habitat for this species.

American Peregrine Falcon (*Falco peregrinus anatum*). Federal Listing Status: None; State Listing Status: Fully Protected; HCP/NCCP Status: No-take.

No peregrine falcons or their nests were detected during the field surveys. It is highly unlikely that this species would ever occur in the Project Area due to lack of breeding habitat (such as cliffs) in the vicinity and the lack of suitable concentrations of prey. However, peregrine falcons may forage in the Project Area occasionally.

Burrowing Owl (*Athene cunicularia*). Federal Listing Status: None; State Listing Status: Species of Special Concern; HCP/NCCP Status: Covered.

No burrows of California ground squirrels or signs of burrowing owls (e.g., whitewash, pellets, or feathers) were detected in the Project Area during the field surveys, when the entire Project Area was walked on-foot. One group of ground squirrel burrows was detected approximately 2000 ft east of the eastern end of the Project Area, and a single burrow was detected west of the Project Area. These were the only burrows in the Project Area vicinity. Because no burrows occur in the Project Area, suitable roosting or breeding habitat for burrowing owls is absent from the site and the species is not expected to roost or breed there. Further, because few burrows are present in the vicinity, there is limited potential for burrowing owls to occur in nearby areas. Burrowing owls may forage occasionally in grasslands in the Project Area, especially during migration.

Townsend's Big-eared Bat (*Corynorhinus townsendii*). Feral Listing Status: None; State Listing Status: Species of Special Concern; HCP/NCCP Listing: Covered.

No habitat for the Townsend's big-eared bat was observed in the Project Area during the field surveys, when all rock outcrops on the site were examined for suitable cavities and signs of bats (i.e., fecal pellets and urine staining). The Townsend's big-eared bat is a cavernous habitat obligate (i.e., this species roosts only in cave-like situations), and would occur in suitable rock crevices on the site. Although shallow grottoes or indentations in some of the rock outcrops are present, they are not nearly deep enough to provide habitat for Townsend's big-eared bats, and no other suitable roosting habitat is present along the proposed roadway alignment. Furthermore, no mines, caves, buildings, or trees with large enough cavities were present within or adjacent to the Project Area. Thus, no suitable breeding or roosting habitat for Townsend's big-eared bats occurs within the Project Area. Townsend's bats may occur in nearby areas, and could forage occasionally in habitats throughout the Project Area.

San Joaquin Kit Fox (*Vulpes macrotis mutica*). Federal Listing Status: Endangered; State Listing Status: Threatened; HCP/NCCP Status: Covered.

No evidence of kit foxes (e.g., scats, dens, latrines) was observed in the Project Area, when the entire area was covered on foot. Potentially suitable breeding or denning habitat for kit foxes occurs within the flatter areas of the Project Area. Lack of prey base and burrows for den starts, however, limits the suitability of habitats on the site for use by kit foxes for denning or breeding. Potentially suitable movement and foraging habitat for kit foxes occurs throughout the Project Area, though given this species' currently known distribution, it is unlikely that kit foxes are present on the site.

Special-status Species Not Covered under the HCP/NCCP

Of the additional special-status wildlife species considered in this analysis (i.e., those not covered under the HCP/NCCP), two are known to occur in the general vicinity of the Project Area but are not expected to occur on the site due to the absence of suitable habitat. The yellow-breasted chat (Icteria virens) and yellow warbler (Setophaga petechia) are California species of special concern that breed and forage in riparian habitat, which is absent from the site.

Of the special-status species not covered under the HCP/NCCP, four could potentially breed on the site: the loggerhead shrike (Lanius ludovicianus), grasshopper sparrow (Ammodramus savannarum), pallid bat (Antrozous pallidus), and American badger (Taxidea taxus). The potential occurrence of these species in the Project Area is discussed in detail below.

Logger Shrike (*Lanius ludovicianus*). Federal Listing Status: None; State Listing Status: Species of Special Concern; HCP/NCCP Status: Not Covered.

No loggerhead shrikes were observed on the site during the field surveys; however, the species is common in Contra Costa County in areas of grasslands and oak savannas (Glover 2009). The annual grassland and oak savanna habitats within the Project Area provide potential breeding and foraging habitat for several pairs of loggerhead shrikes, with small trees or coyote brush shrubs as potential nesting substrates. In addition, non-breeding loggerhead shrikes may forage within the Project Area during winter and migration.

Grasshopper Sparrow (*Ammodramus savannarum*). Federal Listing Status: None; State Listing Status: Species of Special Concern; HCP/NCCP Status: Not Covered.

No grasshopper sparrows were detected during the field surveys, and the species is not known to breed in the vicinity of the Project Area (Glover 2009). However the grasslands on the site provide potentially suitable breeding habitat for grasshopper sparrows. Only a few pairs, at most, of grasshopper sparrows are expected to nest in the grassland habitat within the Project Area.

Pallid Bat (*Antrozous pallidus*). Federal Listing Status: None; State Listing Status: Species of Special Concern; HCP/NCCP Status: Not Covered.

Potential habitat for pallid bats occurs in scattered locations throughout the Project Area. Mature valley oaks and blue oaks with loose bark and cavities, as well as rocky outcroppings, provide potential day-roosting habitat for pallid bats, and rock grottos provide potential night-roosting habitat. Day-roosting habitat used by females during the breeding season between 1 March and 31 August would be considered maternity colony habitat. These areas were evaluated for their potential as roosting habitat and mapped as having a lower, moderate, or higher potential for being used by pallid bats within the Project Area. No pallid bats or signs of pallid bats (i.e., fecal pellets, urine stating) were detected during the field surveys.

Grasslands within the Project Area provide ostensibly suitable denning, foraging, and dispersal habitat for badgers. Based the high mobility of this species and the suitability of grasslands in the Project Area for denning and foraging, it is our opinion that badgers can occur within the Project Area year-round as breeders, foragers, or dispersers. However, due to the absence of fossorial prey species (i.e., ground squirrels and other small burrowing mammals) in the Project Area, the number of individual badgers that could occur on the site would be very low, and it is likely that the species occurs primarily as an occasional visitor.

Sensitive and Regulated Plant Communities and Habitats

The CDFG ranks certain rare or threatened plant communities, such as wetlands, meadows, and riparian forest and scrub, as ‘threatened’ or ‘very threatened’. These communities are tracked in the CNDDB. Impacts on CDFG sensitive plant communities, or any such community identified in local or regional plans, policies, and regulations, must be considered and evaluated under CEQA (California Code of Regulations: Title 14, Div. 6, Chap. 3, Appendix G). Furthermore, wetland and riparian habitats are also afforded protection under applicable federal, state, or local regulations, and are generally subject to regulation, protection, or consideration by the USACE, RWQCB, CDFG, and/or the USFWS. Essential Fish Habitat is identified and regulated by the National Marine Fisheries Service (NMFS) in collaboration with regional, state and local agencies, and is defined as any habitat that is essential to the long-term survival and health of United States fisheries.

CDFG Sensitive Habitats. The bed and banks of four streams in the Project Area are regulated by the CDFG. Together, these CDFG-regulated habitats comprise approximately 6.0 ac of the Project Area.

Waters of the U.S./State. As discussed under Regulatory Setting below, the aquatic (extending up to the ordinary high water) and wetland habitats in streams in the Project Area are considered waters of the U.S. under the Clean Water Act and waters of the State under the Porter-Cologne Water Quality Control Act. These streams are also important habitats for a variety of animal species. Together, these areas comprise approximately 1.27 ac of jurisdictional wetlands and 0.06 ac of jurisdictional other waters within the Project Area.

Protected Trees

All 40 trees within the Project Area are subject to removal as part of the proposed Project. These trees include one mimosa tree, 14 blue oaks, three buckeyes, five almond trees (Prunus dulcis), five arroyo willows (Salix lasiolepis), one valley oak, one blue elderberry (Sambucus mexicana), and approximately 11 trees of unknown species counted using aerial imagery. Of the previously surveyed trees of known species and diameter, 14 black oaks, two buckeyes, four arroyo willows, and one valley oak are protected by the County’s Tree Protection and Preservation Ordinance (a total of 21 trees). Of the 11 trees of unknown species and diameter, based on empirical observations in the field it is likely that all are protected by the County’s Tree Protection and Preservation Ordinance.

The following represents the mitigation measures identified, their level of significance before and after mitigation: The impact analysis of each of the mitigation measures can be obtained from the Section 4.6 of the EIR and the Planning Survey report prepared by H.T. Harvey, November 2012.

Potential Impacts and Mitigation Measures

The biological assessment identified five potential impacts to the project. They include:

Special-Status Species Impacts

- The proposed project could potentially result in a substantial adverse effect on species identified as candidate, sensitive, or special-status species.

Impacts to Sensitive and Regulated Habitats

- The proposed project could result in a substantial adverse effect on federally protected wetlands as defined by section 404 of the clean water act or habitat protected by the California Department of Fish and Game code 1600 (including steams and associated riparian habitat), through direct removal, filling, and hydrological interruption.

Wildlife Movement Impacts

- The proposed project could interfere substantially with the movement of native resident or migratory wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites.

Local Policy and Ordinance Impacts

- The proposed project could conflict with the contra costa county tree protection and preservation ordinance;

- The proposed project could conflict with provisions of the HCP/NCCP.

A more detailed analysis of the impacts can be obtained from Section 4.6 of the EIR. However, mitigation measures were identified that resulted in a level of significance after mitigation of “Less than Significant Impact”. The mitigation of impacts was also addressed by the payment of the following proposed fees.

Mitigation Fees

The impacts that results in fees are identified below. The total mitigation fee to meet the requirements of HCP is estimated at $3,768,686.

TABLE 15 Summary of Impacts on Biological Resources C2-Low Profile	
	Alignment C2-Low Profile
Land Cover Types/Landscape Features	
Rock Out Crops (ac)	20.70
Oak Savannah (ac)	11.20
Total Streams (ac)	1.90
Oak Woodland (ac)	0.10
Jurisdictional Habitats	
Wetlands (ac)	1.27
Other Waters (ac)	0.60
Total Jurisdictional Waters (ac)	1.35
CDFG Regulated Habitats (ac)	6.00
Linear Feet of Stream Impacts (ft)	3410
Stream Setback Encroachment (ac)	3.82
Certain Covered Wildlife Species	
Branchiopod Breeding Sites (ft^2)	116.60
Protected Trees	
Approx. number of trees	40

G. Annexation

The City proposes to annex seven (7) parcels of land that will be traversed by the selected James Donlon Boulevard Extension alignment within the City Boundary. These APN's are: 089-050-056, 089-020-011, 089-02-009, 089-020-014, 089-020-015, 075-060-007, and 075-070-004. The proposed annexations and the parcels of property are illustrated on Exhibit G-1.

H. Earthwork Analysis and Cost Estimates

The design of the profile for the James Donlon Boulevard Extension was approached in a manner to meet the requirements for a design speed of 60 mph, to balance the earthwork and to minimize the impacts to the environment. As soil decreases in volume when compacted, any given embankment volume on this project will require a larger volume of soil than what is anticipated by the simple volume calculations. The additional volume of material for the project is based upon a shrinkage factor between 6% and 8%. Due to the location of the project exporting surplus material will be expensive. As such the most cost effective approach for the project is to require some amount of borrow that can be obtained from the site. The following represents the results of the earthwork analysis:

TABLE 16 Alignment C2-Low Profile – Revised Earthwork Analysis				
8% Shrinkage				
Earthwork	Cut (CY)	Fill (CY)		
		Fill	8%	Fill (total)
James Donlon Blvd	2,165,002	1,909,026	152,722	2,061,748
Remedial Grading	626,947	626,947	50,156	677,103
Buttress	460,948	460,948	36,876	497,824
Kirker Pass Road	22,269	104,367	8,349	112,716
Total	**3,275,166**			**3,349,391**
Offsite Borrow	**74,225**			**0**
Grand Total	**3,349,391**			**3,349,391**
6% Shrinkage				
Earthwork	Cut (CY)	Fill (CY)		
		Fill	6%	Fill (total)
James Donlon Blvd	2,165,002	1,909,026	114,542	2,023,567
Remedial Grading	626,947	626,947	37,617	664,564
Buttress	460,948	460,948	23,863	488,605
Kirker Pass Road	22,269	104,367	6,262	110,629
Total	**3,275,166**			**3,287,365**
Borrow	**12,199**			**0**
Grand Total	**3,287,365**			**3,287,365**

Depending upon the actual shrinkage of the earthwork excavated on this project once compacted into the embankment areas, a borrow site will be required for this project. Two potential borrow sites were identified and illustrated on Exhibit H-1. The final cost estimate for this project is attached.

I. Recommended Alignment

Alignment Selection and Modifications

The recommended alignment for James Donlon Boulevard continues to be the central alignment as recommended in the original Project Study Report. However, there have been major modifications to the alignment, not only to accommodate the new Montreux Residential Development, but also to mitigate environmental impacts to the greatest extent possible. Those modifications include:

- Squaring the intersection of James Donlon Boulevard with Kirker Pass Road.
- Installing a new high-speed free right turn movement from Kirker Pass Road to James Donlon Boulevard.
- Adjusting the central alignment midpoint through the alignment slightly to the north to mitigate environmental impacts on two stream crossings.
- Installing two new bridges across Kirker Creek.

- Upgrading Kirker Pass Road from a rural highway to an urban divided highway from Nortonville Road to the southerly limits of the City of Pittsburg.

- Installation of retaining walls along Kirker Pass Road to protect the integrity of the roadway structural section and to mitigate environmental impacts to Kirker Creek and its tributaries.

Grading

Project grading would require a substantial amount of cut and fill due to the steep terrain of the project area. Grading activities may require the export of native soils and the import of engineered fill material. Approximately 2,165,002 cubic yards of grading would be required for the roadway. Additionally, landslide deposits have been identified within the project area. Landslide remediation would be required prior to the start of construction activities. Where landslide deposits are found to underlie fill, these areas would be over excavated and replaced as engineered fill. In addition, the project would utilize a buttressing technique to support north facing slopes allowing these slopes to be steepened. Erosion along the slopes will be controlled by the installation of concrete interceptor, terrace and down drains, and hydro seeding all the slopes.

Right of Way Requirements

As previously noted, approximately 75 acres of right-of-way, slope, and construction easements would be required for project implementation. The proposed project would be a public right-of-way constructed through portions of seven privately owned properties (APNs 089-050-056, 089-020-011, 075-060-007, 075-070-004, 089-020-009, 089-020-014 and 089-020-015). The right of way would be acquired from the property owners or through the use of eminent domain.

Storm Water Drainage Characteristics

The proposed project's stormwater drainage system would follow Caltrans Design Manuel procedures and be configured to contain stormwater flow spread width to the roadway shoulder during a 25-year design storm based on a minimum time of concentration of ten minutes. Stormwater inlet spacing would be generally a function of roadway width, longitudinal slope and access to culverts. Storm drainage networks would be configured to discharge toward logical stream crossings to maintain existing drainage patterns and minimize erosion potential. Concrete detention basins will be provided within the roadway to meter drainage flow, and would also serve to meet the project's water quality Best Management Practices (BMPs).

Utilities

There are several large Pacific Gas and Electric (PG&E) electrical transmission lines that traverse the project area. It will be necessary to relocate one or more of the transmission towers in order to implement the proposed project. The proposed project would not require permanent source of water or wastewater facilities and would not include the extension of water or wastewater pipelines within the roadway. However, the project would require a source of electricity for the proposed streetlights. Electricity would be provided by extending PG&E service to the proposed roadway. There is also a 10-inch gas transmission line that traverses the site that will have to be lower in several locations. The gas line is owned by Kinder-Morgan.

Bridges

Two bridges will be constructed across Kirker Creek to mitigate environmental impact to that stream. RBF recommends the selection of Alternative #2 for the James Donlon Boulevard Bridge Crossing. It is the most cost effective and can be constructed without impacts to Kirker

Creek. RBF also recommends the selection of Alternative #2 for the Ramp Bridge. It too is the most cost effective solution and can be constructed without impacts to Kirker Creek.

Construction Staging

As the construction of this project is linear through private property, there are limited areas to provide construction staging of equipment and materials for the project. Three small areas have been identified at the beginning of the project, which will be useful for not only the staging of the entire project, but for the construction of the two bridges. One location, offsite, has been identified at the end of the project. This site is located within the right-of-way of the adjoining property. (See Exhibit H-2)

ENGINEER'S ESTIMATE

City of Pittsburg

James Donlon Boulevard Extension

Central Alignment-Two Lane-C-2 Low Profile-Revised

PRELIMINARY TOTAL PROGRAM COST ESTIMATE

Prepared June 2012 | Prepared by: WJC

BID ITEM	CODE	ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT COST	COST
			GENERAL				
		1	**EARTHWORK**				
1	160101	1.1	Clearing & Grubbing	acre	80.0	$3,000.00	$240,000.00
2	150769	1.2	Remove Asphalt Kirker Pass Road	cyd	5,000.0	$20.00	$100,000.00
3		1.3	James Donlon Excavation	cyd	2,165,002.0	$4.00	$8,660,008.00
4		1.4	Borrow	cyd	0.0	$5.00	$0.00
5		1.5	Buttress Excavation	cyd	460,948.0	$5.00	$2,304,740.00
6		1.6	Remedial & Corrective Grading	cyd	626,947.0	$4.00	$2,507,788.00
7		1.7	Kirker Pass Excavation	cyd	22,269.0	$3.00	$66,807.00
8		1.8	Kirker Pass Borrow	cyd	74,225.0	$4.00	$296,900.00
			SUBTOTAL				**$14,176,243.00**
		2	**STREET IMPROVEMENTS**				
9	390132	2.1	Asphalt Concrete (0.1524 m) (6")	ton	26,425.0	$75.00	$1,981,875.00
10	260201	2.2	Aggregate Base (0.4572 m) (18")	ton	79,235.0	$20.00	$1,584,700.00
11	731504	2.4	Curb & Gutter	lf	5,763.0	$24.00	$138,312.00
12	394070	2.5	AC Dike	lf	18,024.0	$4.00	$72,096.00
13	731501	2.6	Median Curb	lf	8,264.0	$15.00	$123,960.00
14	731505	2.7	Sidewalk	sqft	16,745.0	$6.00	$100,470.00
			SUBTOTAL				**$4,001,413.00**
		3	**SPECIALTY IMPROVEMENTS**				
16	203031	3.1	Slope Landscaping (Hydroseeding with Jute Mesh)	sqft	2,045,944.0	$0.70	$1,432,160.80
17	200001	3.2	Median Landscaping	sqft	42,603.0	$2.00	$85,206.00
18		3.3	Power Pole Relocation (Kirker Pass Road)	ea	10.0	$10,000.00	$100,000.00
19		3.4	Power Pole Relocation (Buchanan Road Bypass)	ea	3.0	$100,000.00	$300,000.00
20		3.5	James Donlon Bridge	ls	1.0	$3,061,830.00	$3,061,830.00
21		3.6	Ramp Bridge	ls	1.0	$1,272,520.00	$1,272,520.00
22		3.7	Retaining Wall	lf	1,238.0	$250.00	$309,500.00
23	510090	3.8	Wildlife Crossing Box Culverts	lf	250.0	$865.00	$216,250.00
24		3.9	Wildlife Fencing	lf	18,000.0	$22.00	$396,000.00
25	832001	3.10	Metal Beam Guardrail	lf	16,871.0	$26.40	$445,394.40
			SUBTOTAL			-	**$7,618,861.20**
		4	**DRAINAGE IMPROVEMENTS**				
26	650018	4.1	24" RCP Culvert	lf	360.0	$120.00	$43,200.00
27	650022	4.2	30" RCP (Drainage & Wildlife Crossings)	lf	2,042.0	$170.00	$347,140.00
28	650026	4.3	36" RCP Culvert	lf	400.0	$170.00	$68,000.00
29	650034	4.4	48" RCP Culvert	lf	460.0	$185.00	$85,100.00
30	650038	4.5	54" RCP Culvert	lf	365.0	$300.00	$109,500.00
31	650042	4.6	60" RCP Culvert	lf	135.0	$300.00	$40,500.00
32		4.7	114" RCP Culvert	lf	770.0	$480.00	$369,600.00
33		4.8	120" RCP Culvert	lf	120.0	$500.00	$60,000.00
34		4.9	132" RCP Culvert	lf	460.0	$540.00	$248,400.00
35	510092	4.1	Headwall (Single Pipe)	cyd	480.0	$895.00	$429,600.00
36	727901	4.11	Terrace Drain	lf	25,978.0	$22.00	$571,516.00

ENGINEER'S ESTIMATE

City of Pittsburg

James Donlon Boulevard Extension

Central Alignment-Two Lane-C-2 Low Profile-Revised

PRELIMINARY TOTAL PROGRAM COST ESTIMATE

Prepared June 2012 | Prepared by: WJC

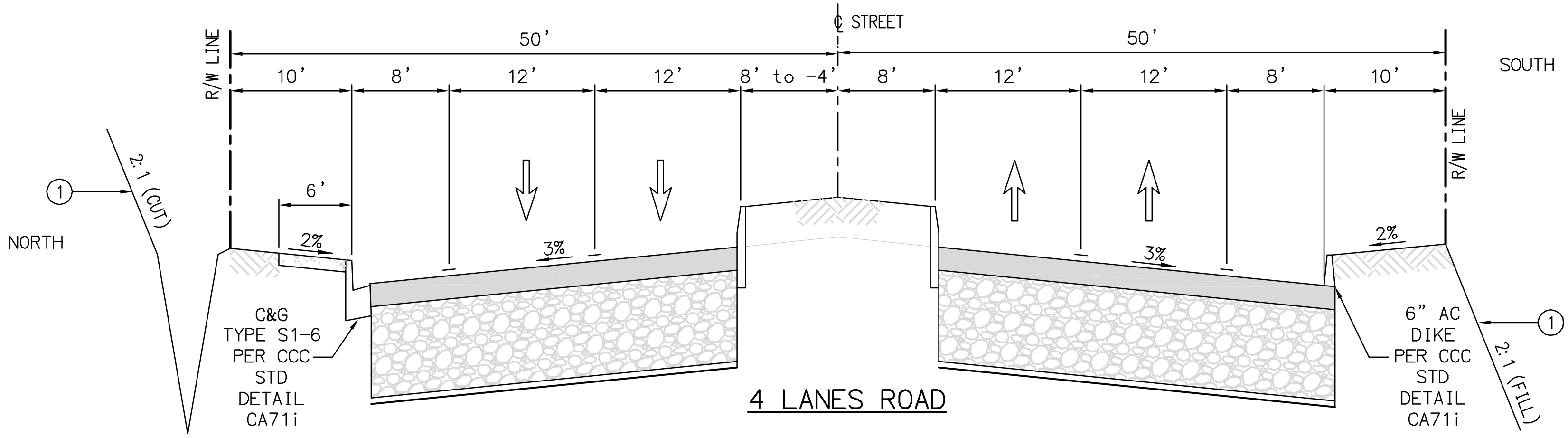
BID ITEM	CODE	ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT COST	COST
37	727901	4.12	Down Drain	lf	8,397.0	$20.00	$167,940.00
38	727901	4.13	Brow/Tow Ditch	lf	19,975.0	$18.00	$359,550.00
39		4.14	Rip Rap	cyd	2,000.0	$250.00	$500,000.00
40		4.15	Catch Basin	ea	60.0	$4,000.00	$240,000.00
41		4.16	Storm Drain MH	ea	30.0	$5,000.00	$150,000.00
42	650012	4.17	15" RCP	lf	3,936.0	$70.00	$275,520.00
43	650014	4.18	18" RCP	lf	10,168.0	$70.00	$711,760.00
44	510090	4.19	3'X5' RCP	lf	4,100.0	$480.00	$1,968,000.00
			SUBTOTAL				**$6,745,326.00**
		5	**TRAFFIC IMPROVMENTS**				
45		5.1	Signing & Striping	lf	13,727.0	$5.00	$68,635.00
46	860301	5.2	Traffic Signal	ea	1.0	$275,000.00	$275,000.00
47	860403	5.3	Highway Lighting	ea	48.0	$6,000.00	$288,000.00
			SUBTOTAL				**$631,635.00**
			SUBTOTAL (ITEMS1-5)				**$33,173,478.20**
		6	**MISCELLANEOUS**				
48		6.1	Traffic Control	ls	1.0	$275,000.00	$275,000.00
49		6.2	Mobilization	ls	10%	$3,317,347.82	$3,317,347.82
			SUBTOTAL				**$3,592,347.82**
			SUBTOTAL (ITEMS1-6)				**$36,765,826.02**
		7	**FEES**				
		7.1	Engineering & Administration		12%	$4,411,899.12	$4,411,899.12
		7.2	HCP Mitigation Fee	ls	1.0	$3,768,686.00	$3,768,686.00
		7.3	Contingencies		20%	$7,353,165.20	$7,353,165.20
			SUBTOTAL				**$15,533,750.33**
		8	**RIGHT-OF-WAY**				
		8.1	Right-of-Way	acre	18.0	$8,000.00	$144,000.00
		8.2	Slope Easement	acre	49.0	$8,000.00	$392,000.00
		8.3	Construction Easements	acre	4.3	$3,500.00	$15,050.00
			SUBTOTAL				**$551,050.00**
			GRAND TOTAL (ITEMS 1-8)				**$52,850,626**

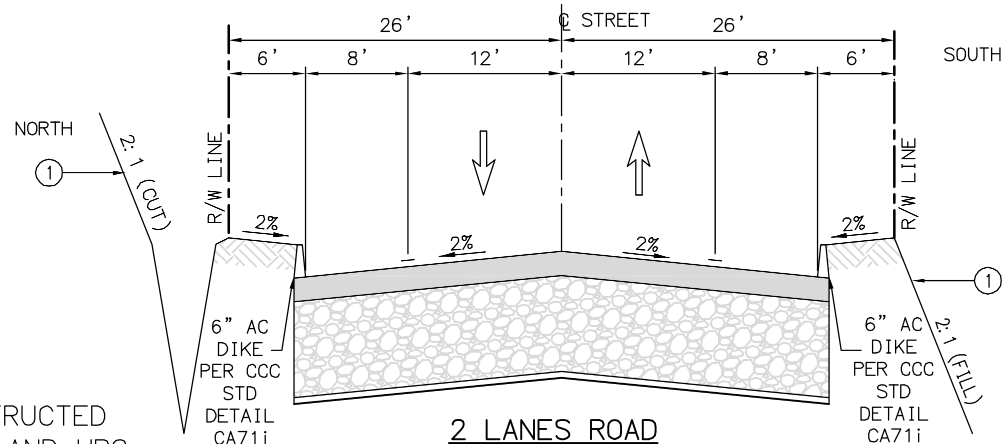
Appendix A

Exhibits

List of Exhibits

Note: The exhibit numbers (H-1) relates to the paragraph in which the exhibit is discussed. (See Index)





NOTE:

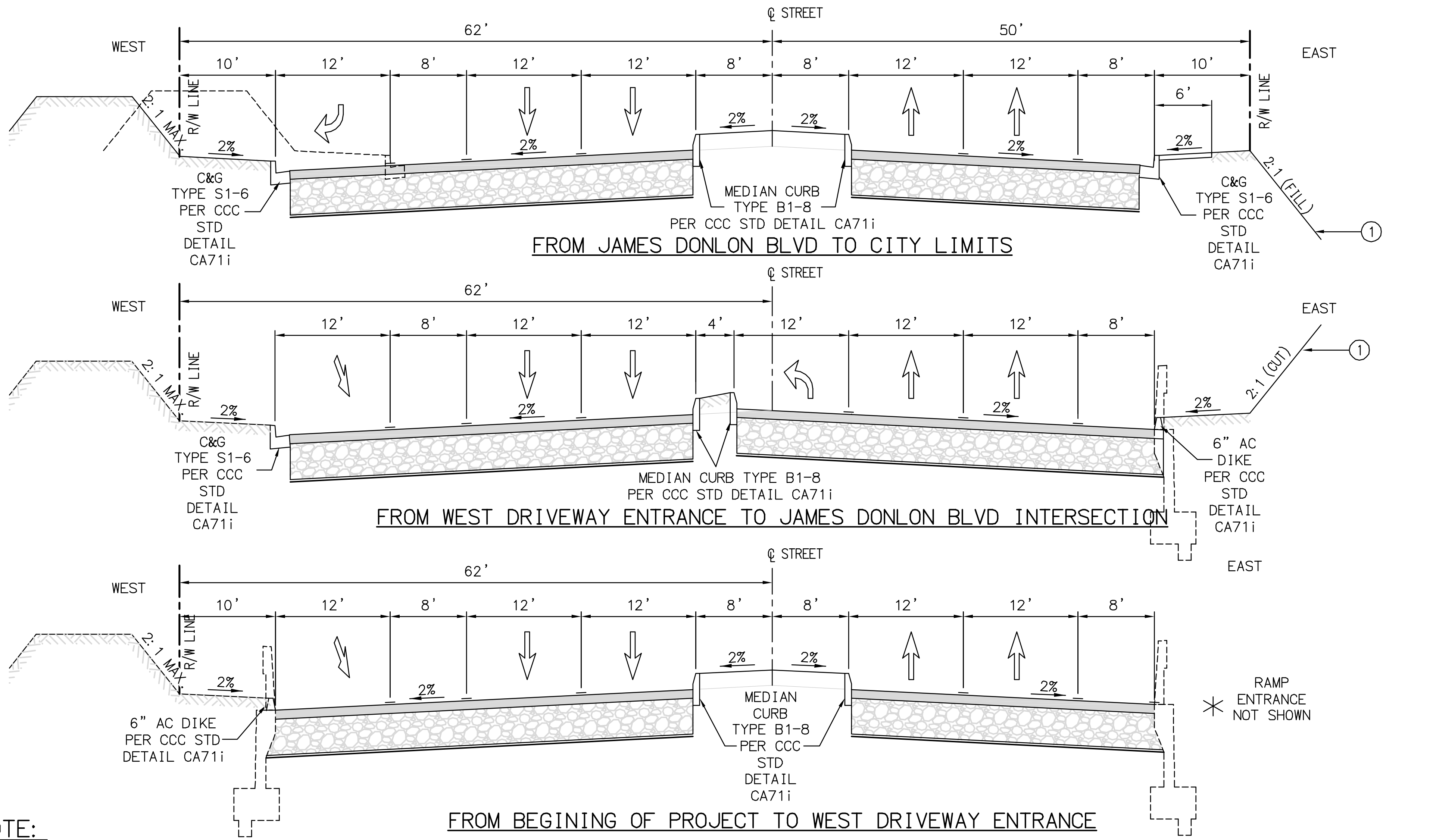
1. SLOPES SHALL BE CONSTRUCTED TO CITY OF PITTSBURG AND UBC GRADING CODE

JAMES DONLON BLVD. TYPICAL CROSS SECTIONS

N.T.S.

RBF
A Baker Company
PLANNING ■ DESIGN ■ CONSTRUCTION
500 YGNACIO VALLEY ROAD, SUITE 300
WALNUT CREEK, CALIFORNIA 94596-3847
PH 925.906.1460 ▪ FAX 925.906.1465 ▪ www.RBF.com

EXHIBIT A-1



NOTE:

1. SLOPES SHALL BE CONSTRUCTED TO CITY OF PITTSBURG AND UBC GRADING CODE

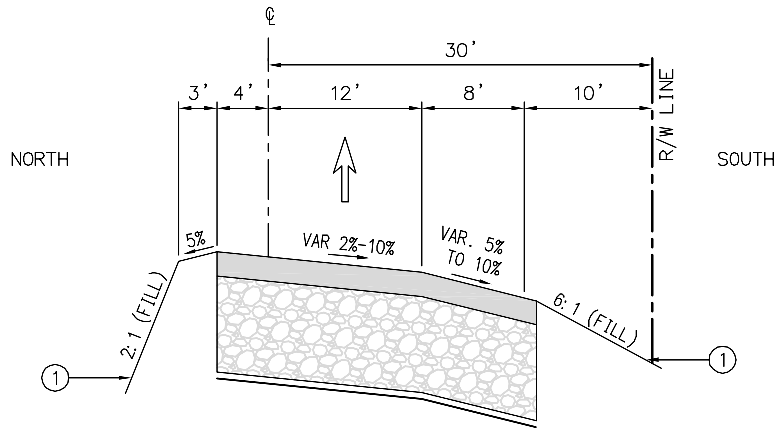
KIRKER PASS ROAD TYPICAL CROSS SECTIONS

N.T.S.

RBF
A Baker Company
PLANNING ■ DESIGN ■ CONSTRUCTION
500 YGNACIO VALLEY ROAD, SUITE 300
WALNUT CREEK, CALIFORNIA 94596-3847
PH 925.906.1460 ▪ FAX 925.906.1465 ▪ www.RBF.com

EXHIBIT A-2

H:\PDATA\35100129\CADD-ENGLISH\TRANSPW\EXHIBITS\MISC\REPORT EXHIBITS\0129-TYPICAL XS.DWG ATORRICA 6/8/12 8:52 am



KIRKER PASS ROAD TO JAMES DONLON BOULEVARD

NOTE:

1. SLOPES SHALL BE CONSTRUCTED TO CITY OF PITTSBURG AND UBC GRADING CODE

RAMP TYPICAL CROSS SECTION

N.T.S.

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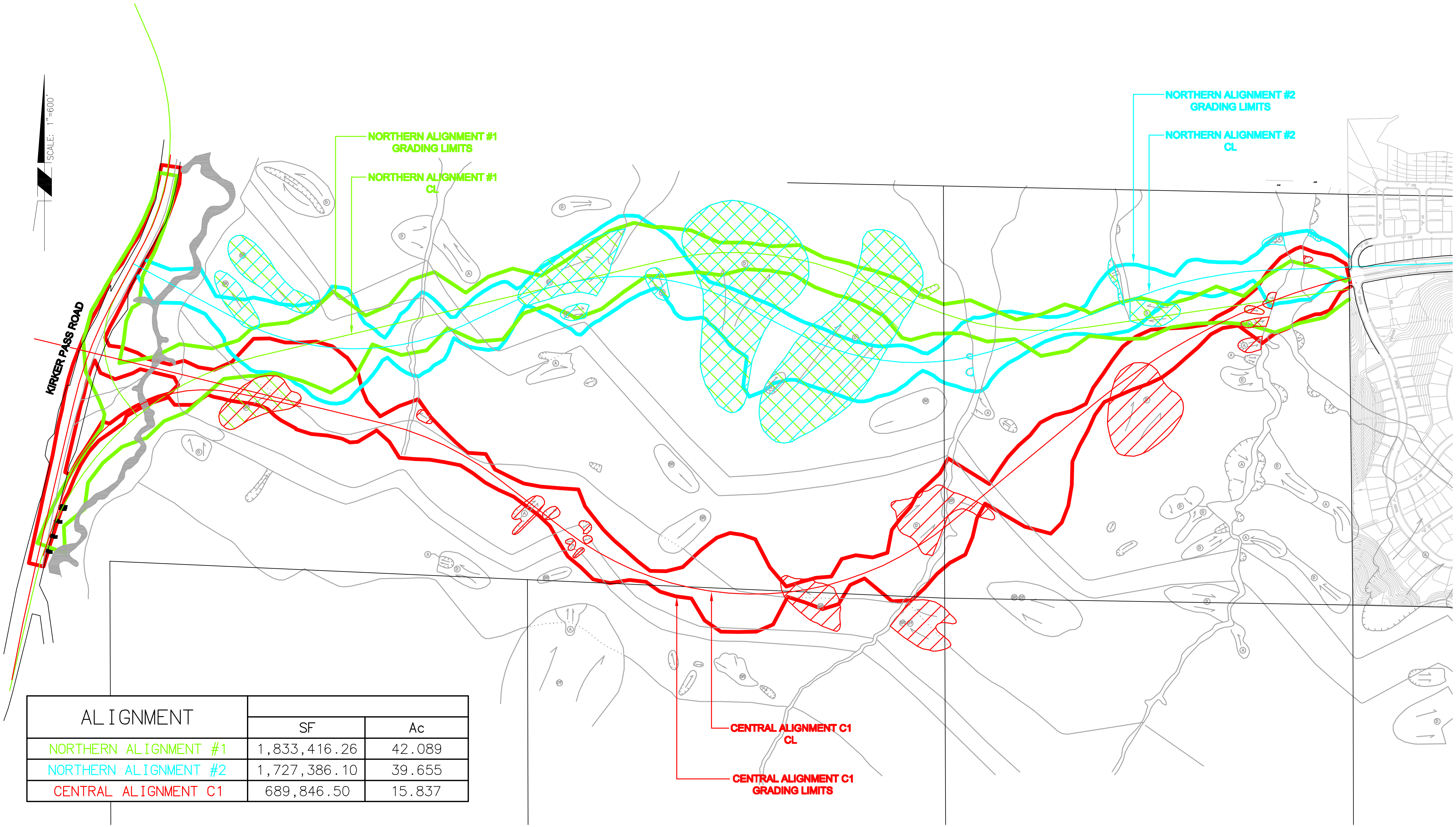
EXHIBIT A-3



ALIGNMENT	SF	Ac
NORTHERN ALIGNMENT #1	1,833,416.26	42.089
NORTHERN ALIGNMENT #2	1,727,386.10	39.655
CENTRAL ALIGNMENT C1	689,846.50	15.837

LANDSLIDE AVOIDANCE

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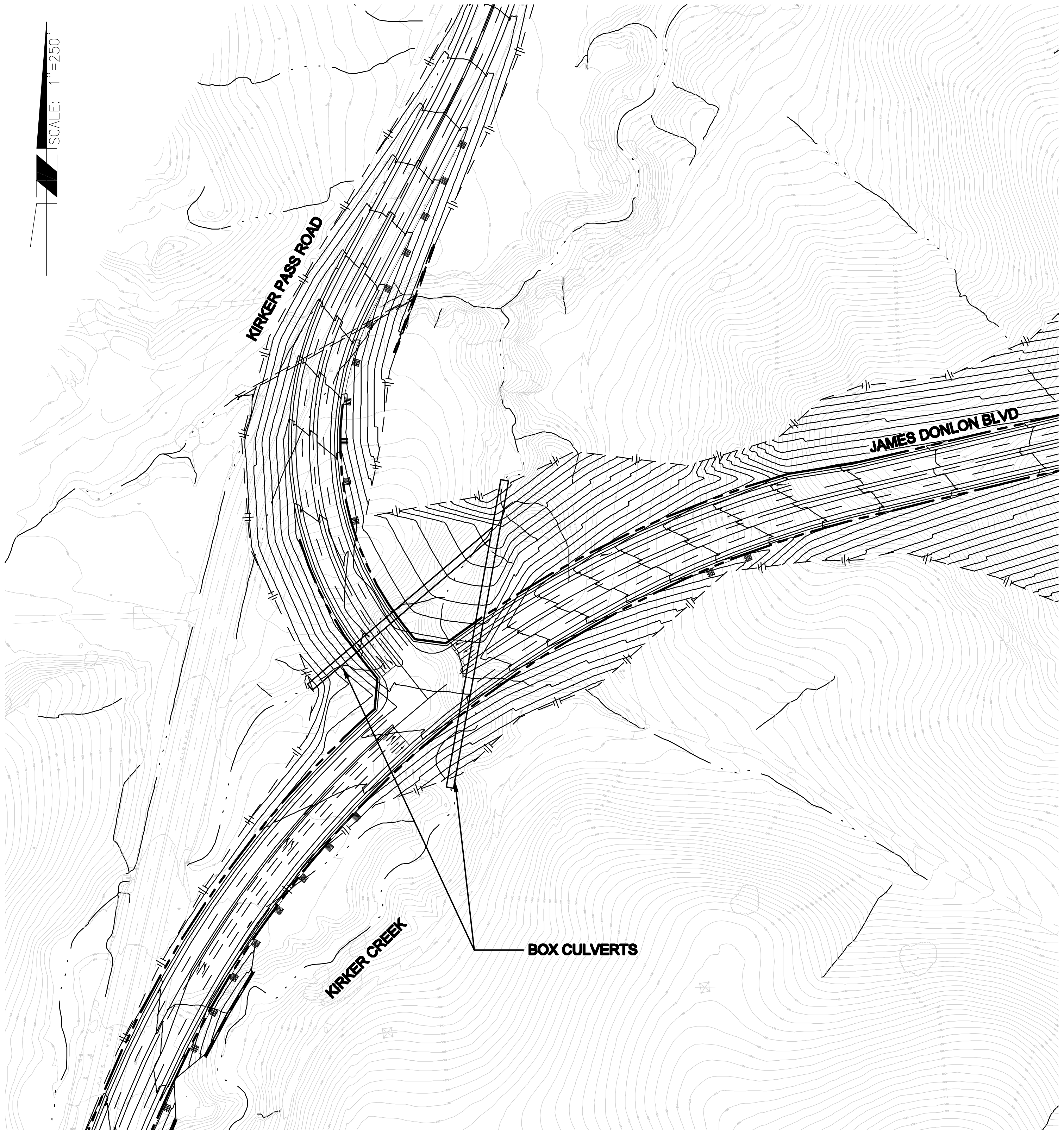
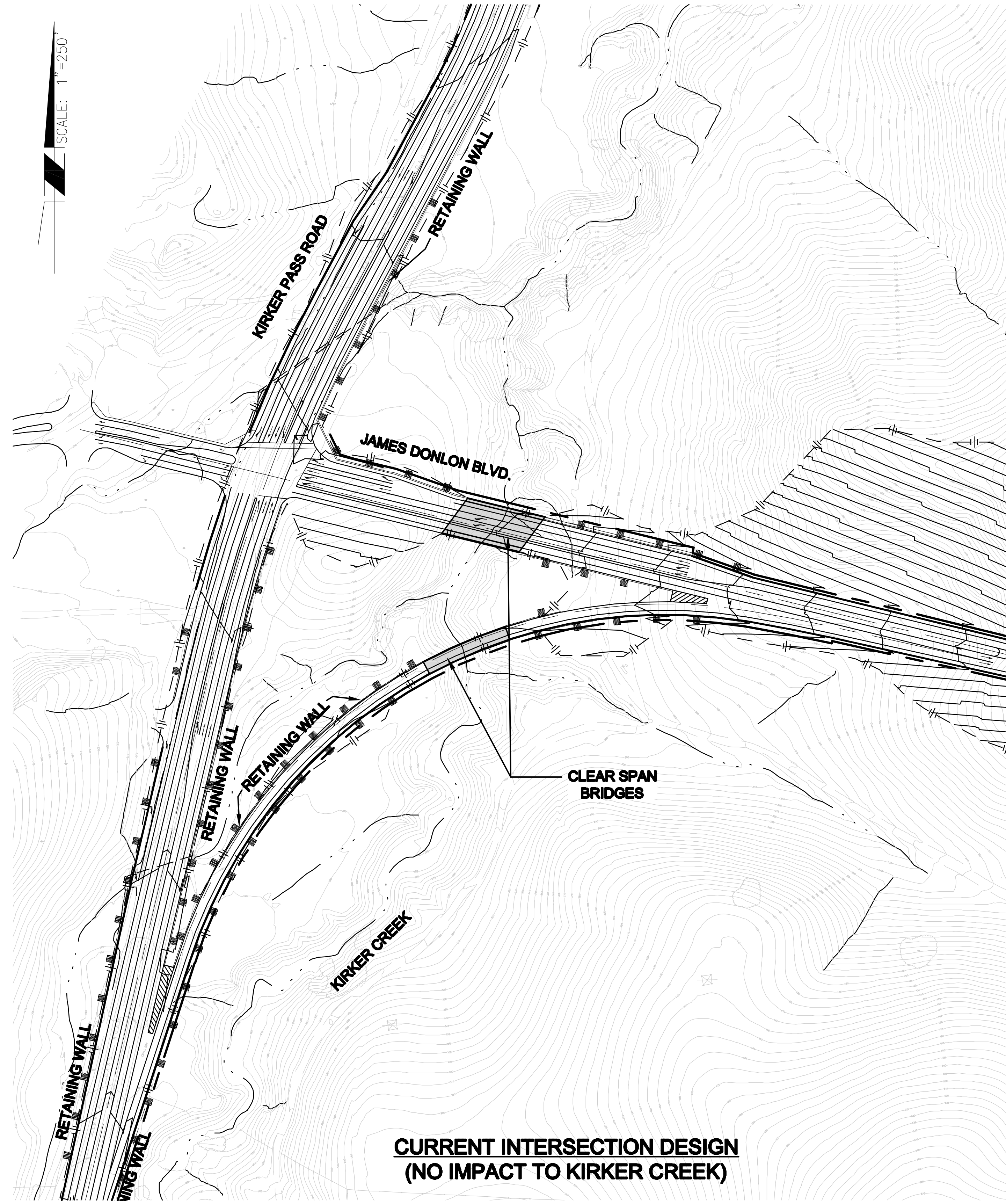
EXHIBIT B-1



ORIGINAL INTERSECTION DESIGN
(SIGNIFICANT IMPACT TO KIRKER CREEK)



CURRENT INTERSECTION DESIGN
(NO IMPACT TO KIRKER CREEK)

INTERSECTION DESIGN

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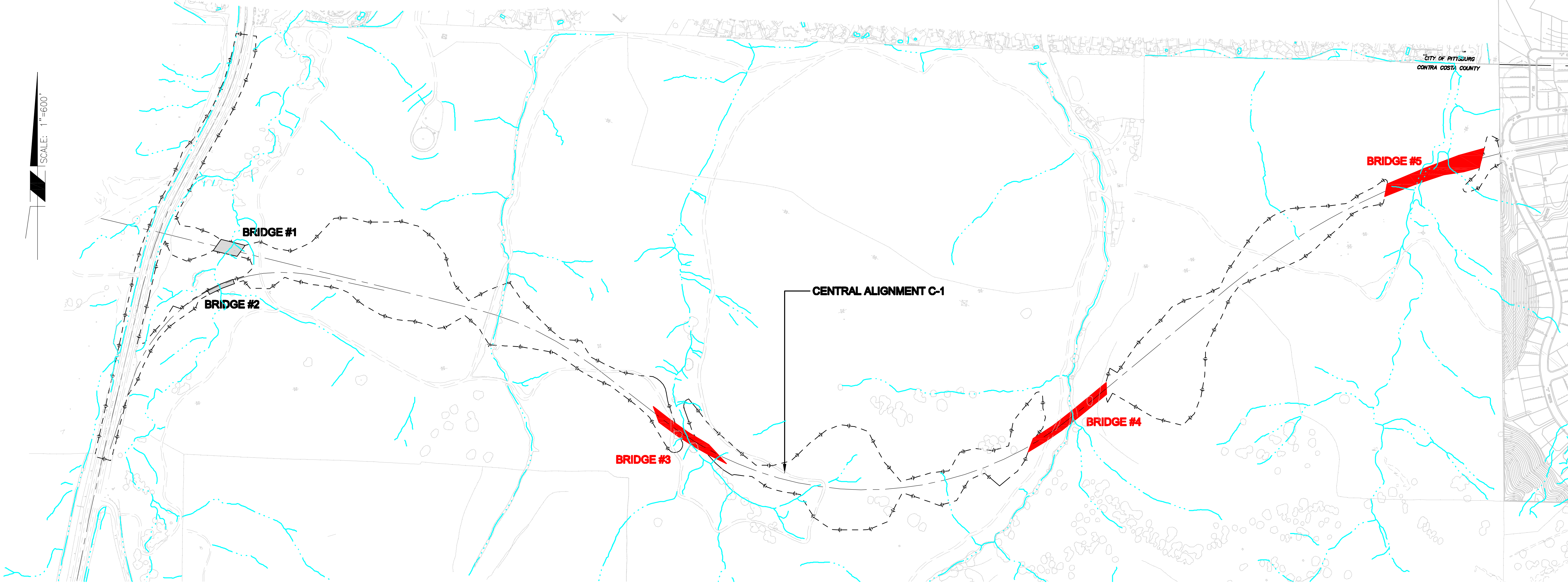
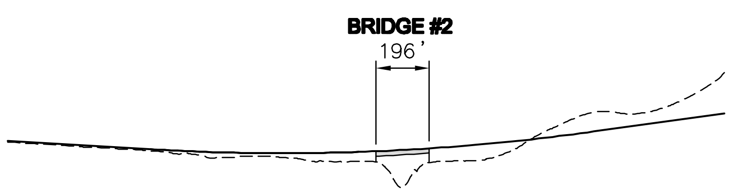
EXHIBIT B-2

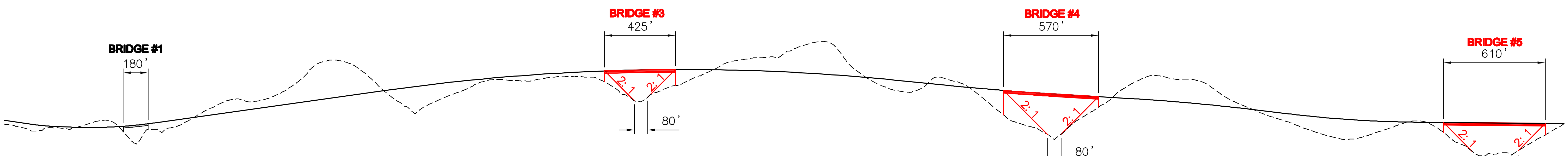


PRELIMINARY RAMP PROFILE



BRIDGE #	W	L	AREA	UNIT COST	COST
#1	76.5'	196'	14,992 SF	*	$3,830,000.00
#2	27'	180.5'	4,834 SF	*	$1,600,000.00
#3	54'	425'	23,846 SF	$350.00/SF	$8,346,100.00
#4	54'	570'	30,747 SF	$350.00/SF	$10,761,450.00
#5	68'-102'	610'	48,680 SF	$350.00/SF	$17,038,000.00

* FROM BRIDGE ADVANCE PLANNING STUDY



PRELIMINARY JAMES DONLON BLVD PROFILE

ADDITIONAL BRIDGES-ALTERNATIVE C1

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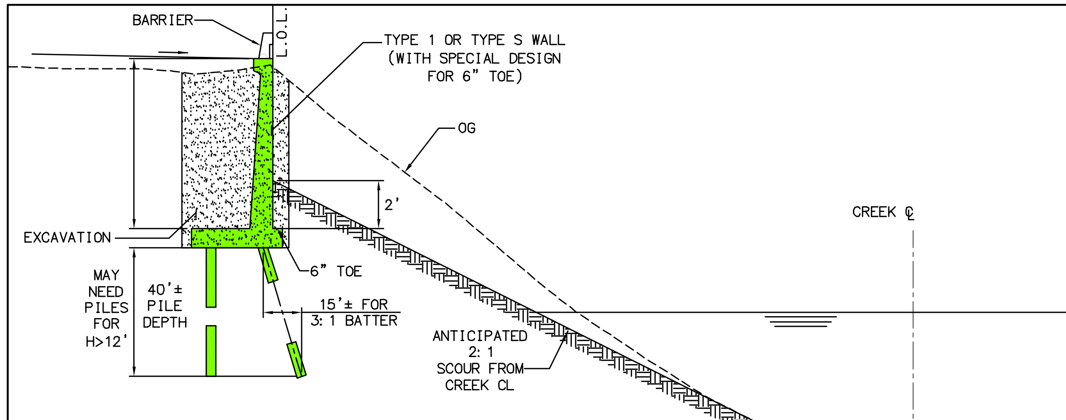
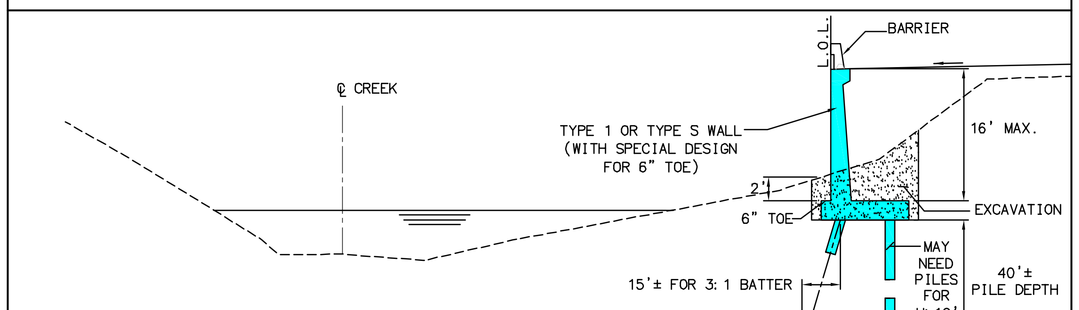
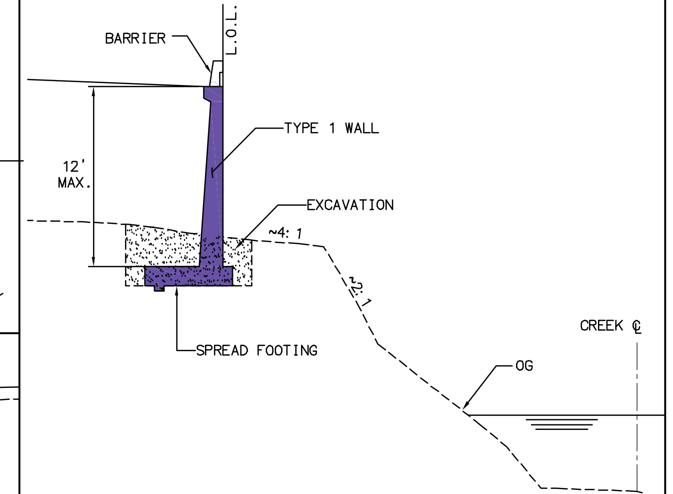
EXHIBIT B-3



RETAINING WALL No. 116
N.T.S.



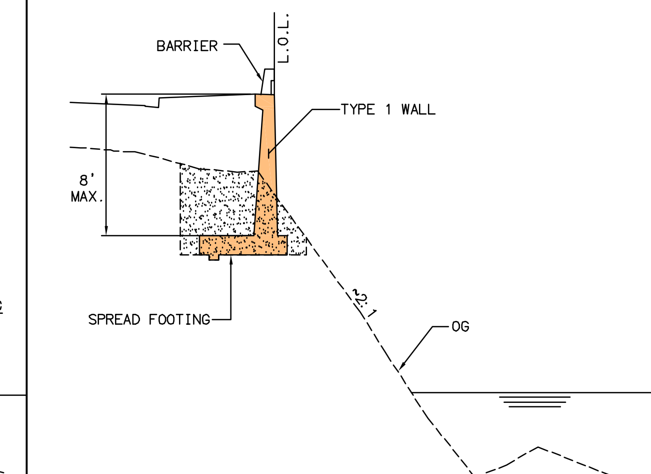
RETAINING WALL No. 17
N.T.S.



RETAINING WALL No. 22
N.T.S.

NOTE:

RETAINING WALL NUMBERS ARE BASED UPON STATION NUMBERS ALONG HIGHWAYS AND RAMP



RETAINING WALL No. 34
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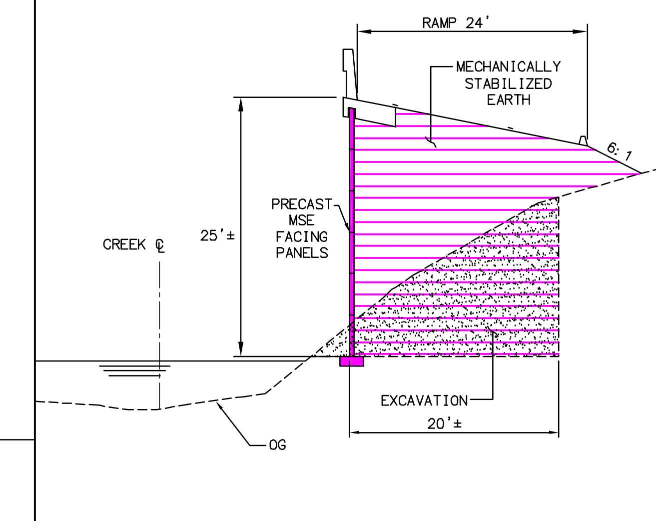
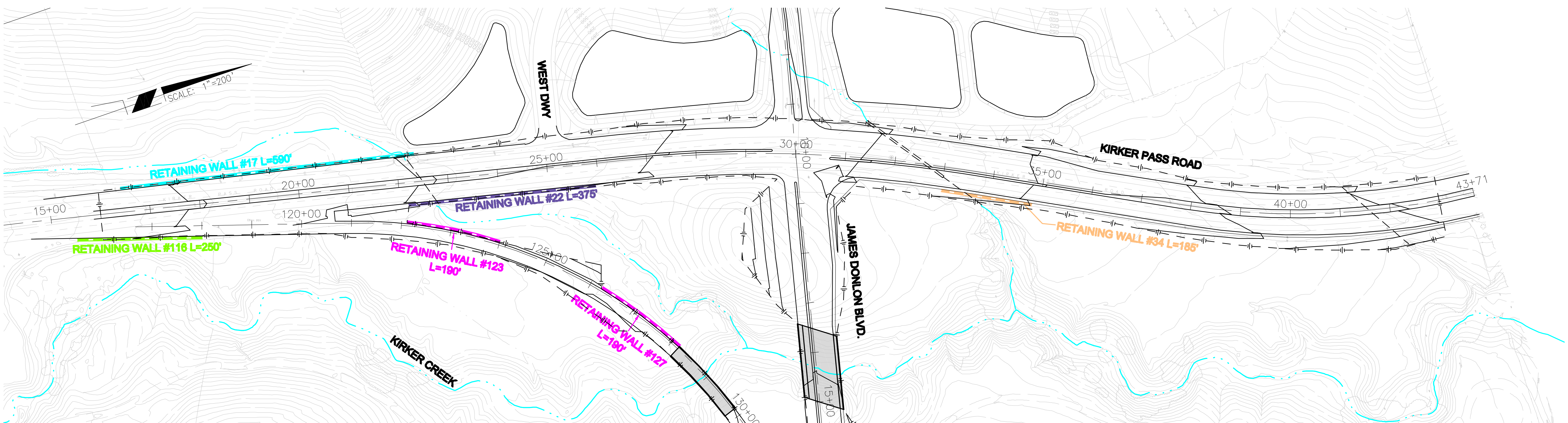


RETAINING WALL No. 123 & 127
N.T.S.



PROPOSED RETAINING WALLS

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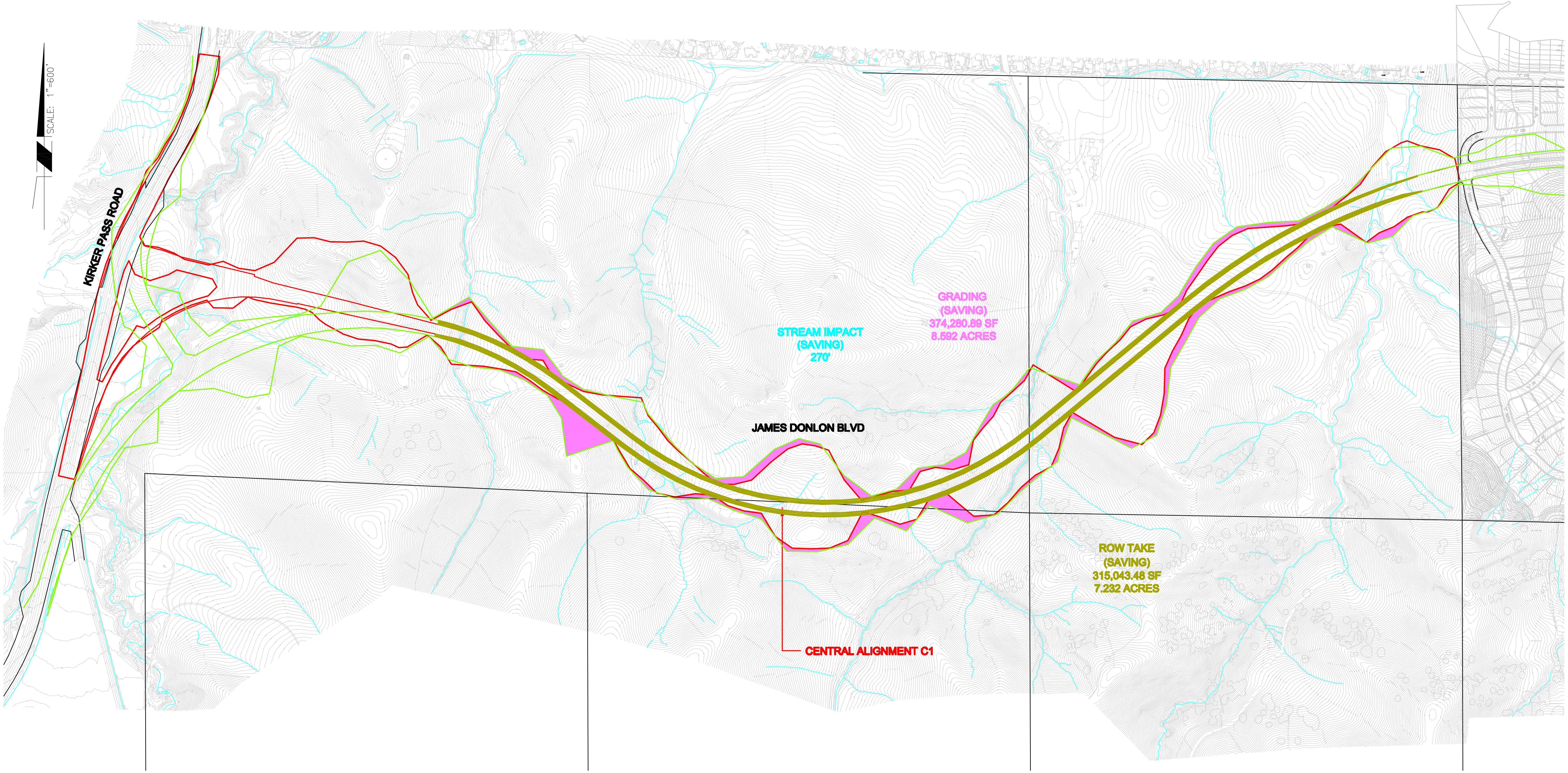
EXHIBIT B-4



4 LANES vs. 2 LANES GRADING IMPACTS

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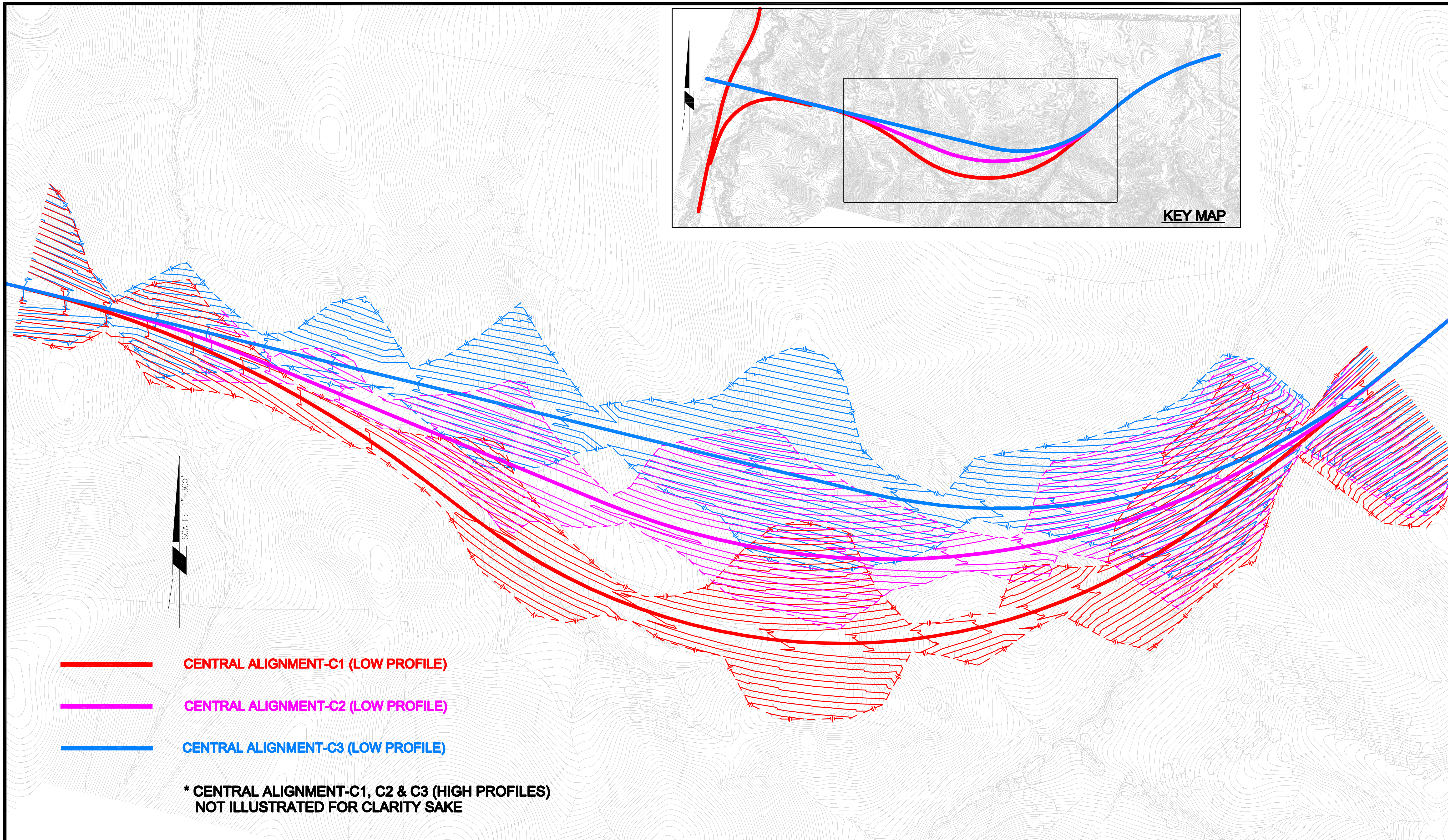
EXHIBIT B-5

H:\PDATA\35100129\CADD-ENGLISH\TRANSPW\EXHIBITS\MISC\REPORT EXHIBITS\0129-4LANES VS 2 LANES.DWG ATORBICA 12/5/12 10:12 am



PROPOSED GRADING FOR ALTERNATIVES C1 (LOW), C2 (LOW) AND C3 (LOW)

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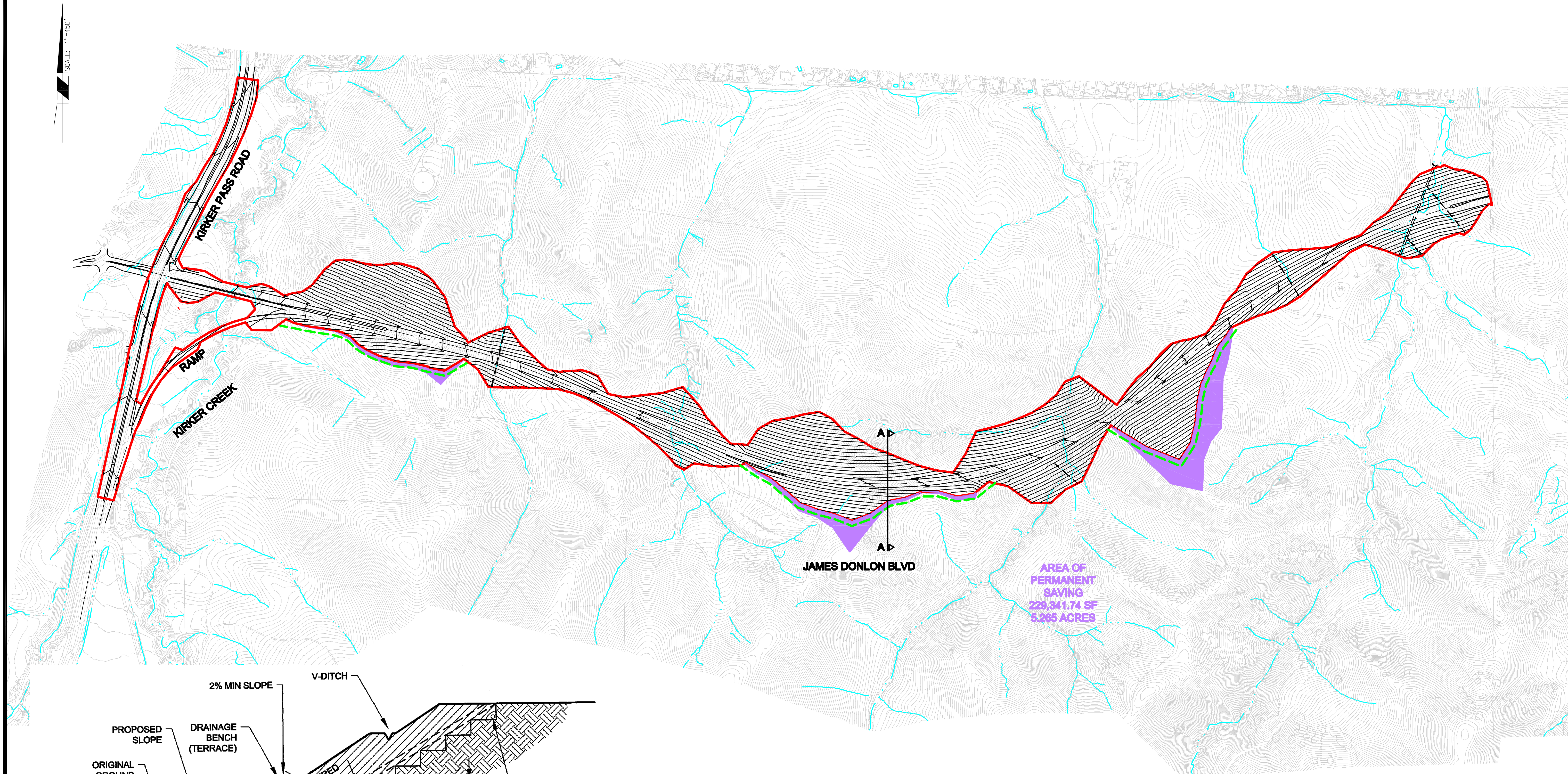
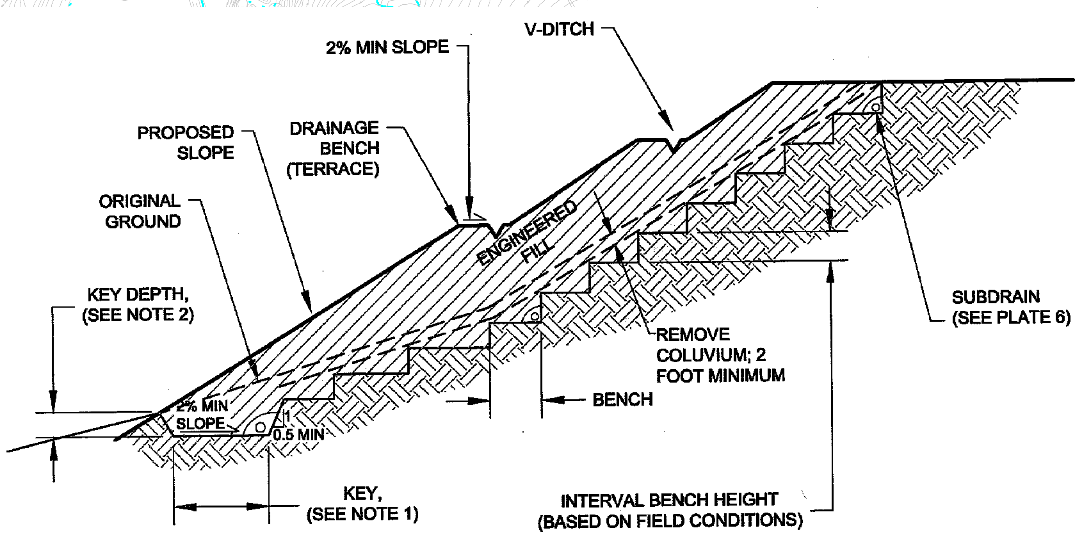
EXHIBIT B-6

H:\PDATA\35100129\CADD-ENGLISH\TRANSPW\EXHIBITS\MISC\REPORT EXHIBITS\0129-GRADING EXHIBIT C1-C2-C3.DWG ATORBICA 6/8/12 8:03 am





SECTION A-A - TYPICAL BUTRESS DETAIL

N.T.S.

PERMANENT IMPACT (2:1 SLOPE)

TEMPORARY IMPACT (BUTTRESSES)

PERMANENT IMPACT (3:1 SLOPE)

GRADING IMPACTS (BUTRESS GRADING vs 3:1 SLOPE)

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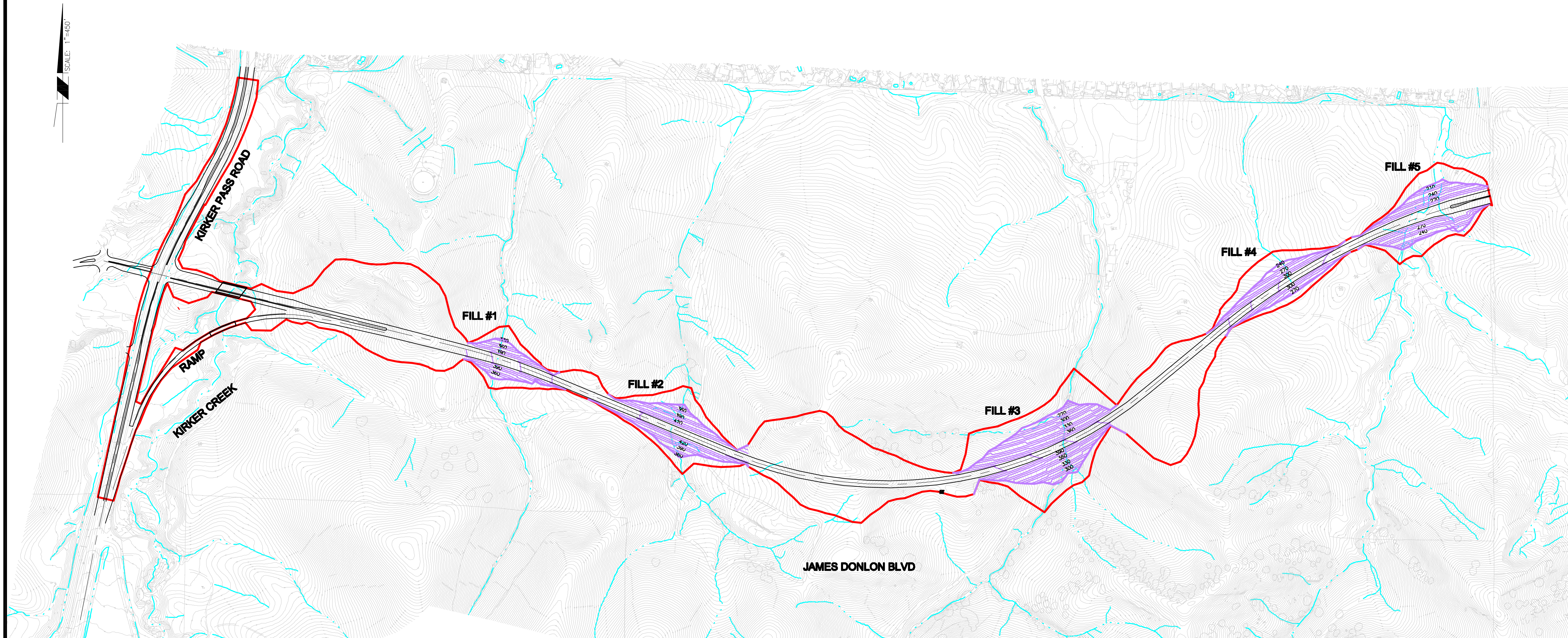
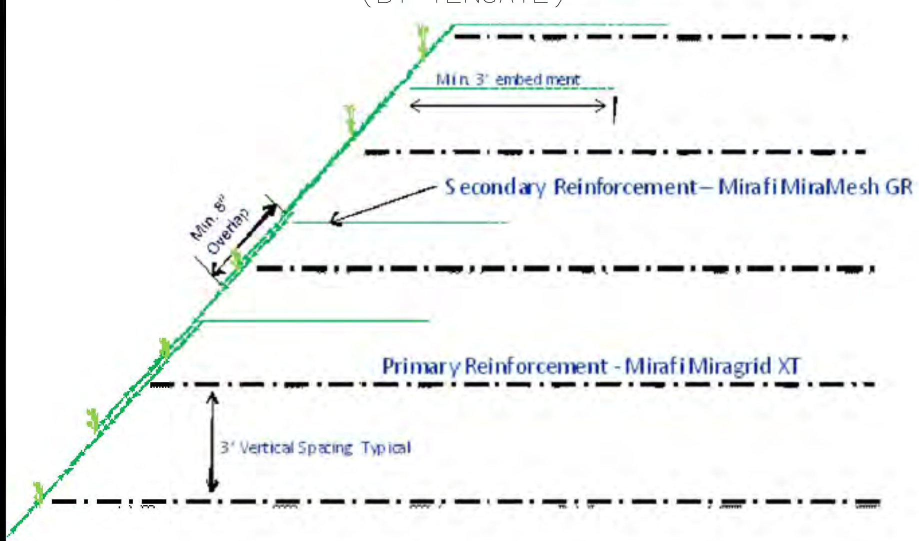
EXHIBIT B-7

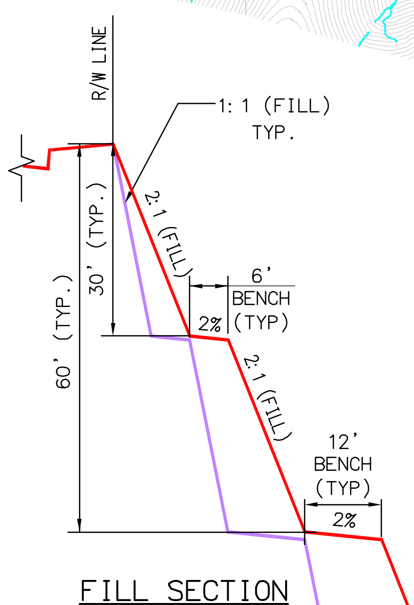


Mirafi Reinforced Slope

Miramesh Secondary Reinforcement and Erosion Control on Face
(BY TENCATE)



Typical Detail Mirafi 1:1 Reinforced Slope



FILL SECTION

	Standard Constrution				Reinforced Slope			Differential
	2:1 Slope Earthwork (CY)	Unit Cost $/CY	Sub-Total		1:1 Slope Area (SF)	Unit Cost $/SF	Sub-Total	
Fill #1	147,934	$4.00	$591,736.00		53,067	$39.00	$2,069,613.00	$1,477,877.00
Fill #2	311,187		$1,244,748.00		100,764		$3,929,796.00	$2,685,048.00
Fill #3	870,987		$3,483,948.00		199,573		$7,783,347.00	$4,299,399.00
Fill #4	182,449		$729,796.00		73,590		$2,870,010.00	$2,140,214.00
Fill #5	429,590		$1,718,360.00		114,059		$4,448,301.00	$2,729,941.00
		Total	$7,768,588.00				$21,101,067.00	$13,332,479.00

ALIGNMENT C2 LOW (2:1 SLOPE)

ALIGNMENT C2 LOW (1:1 SLOPE)

REINFORCED SLOPES WITH GEOGRID - ALTERNATIVE C2 LOW

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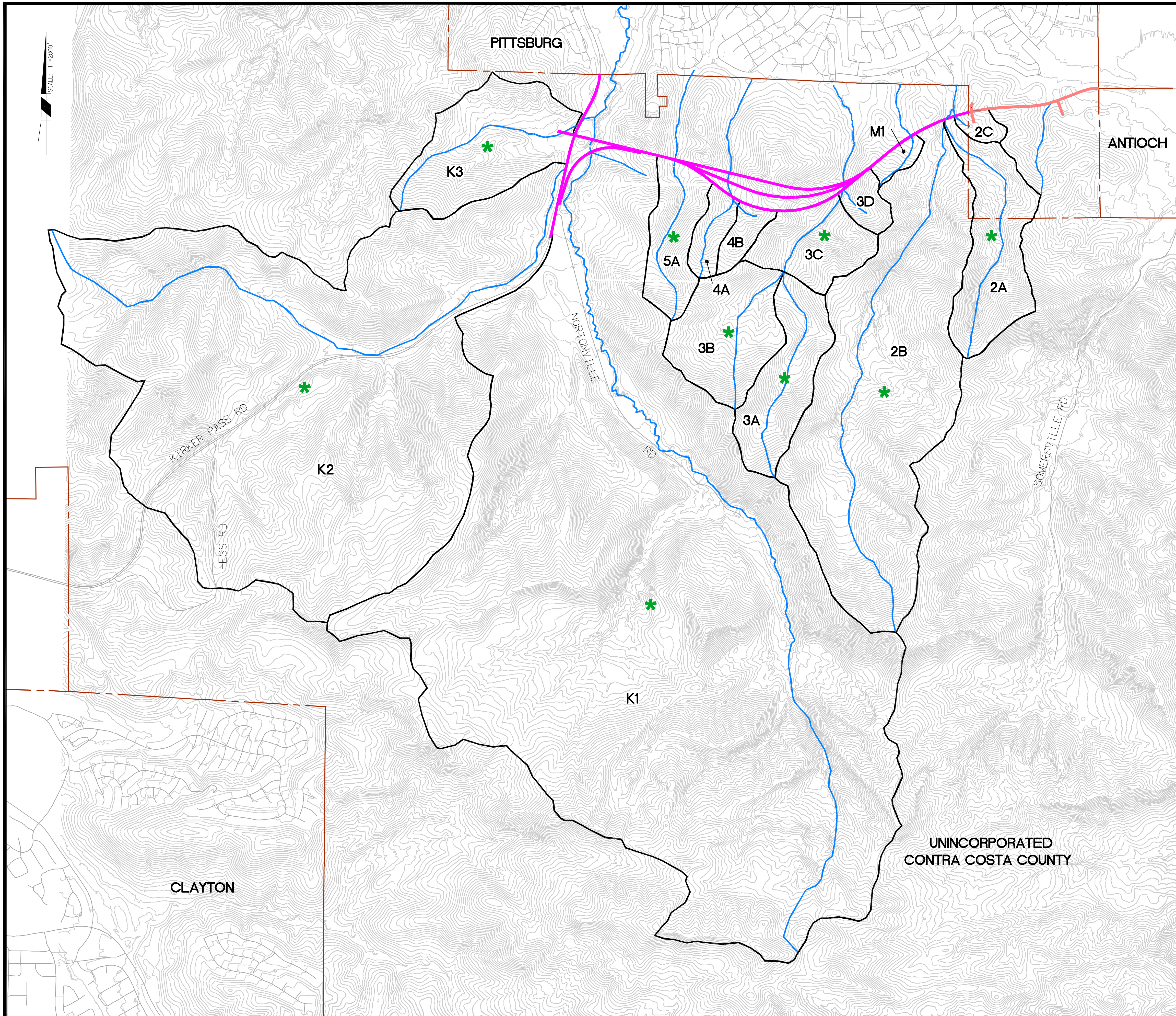
EXHIBIT B-8

H:\PDATA\35100129\CADD-ENGLISH\TRANSPW\EXHIBITS\MISC\REPORT EXHIBITS\0129-REINFORCED SLOPES WITH GEOGRID.DWG ATORBICA 12/5/12 10:03 am



LEGEND:

- K1 DRAINAGE AREA NO.
- WATERSHED DELINEATION
- PROPOSED ROADWAY ALIGNMENTS
- FUTURE ROADWAY
- FLOW LINE
- CITY LIMITS
- * WATERSHED CENTROID

JAMES DONLON BLVD EXTENSION
WATERSHED MAP

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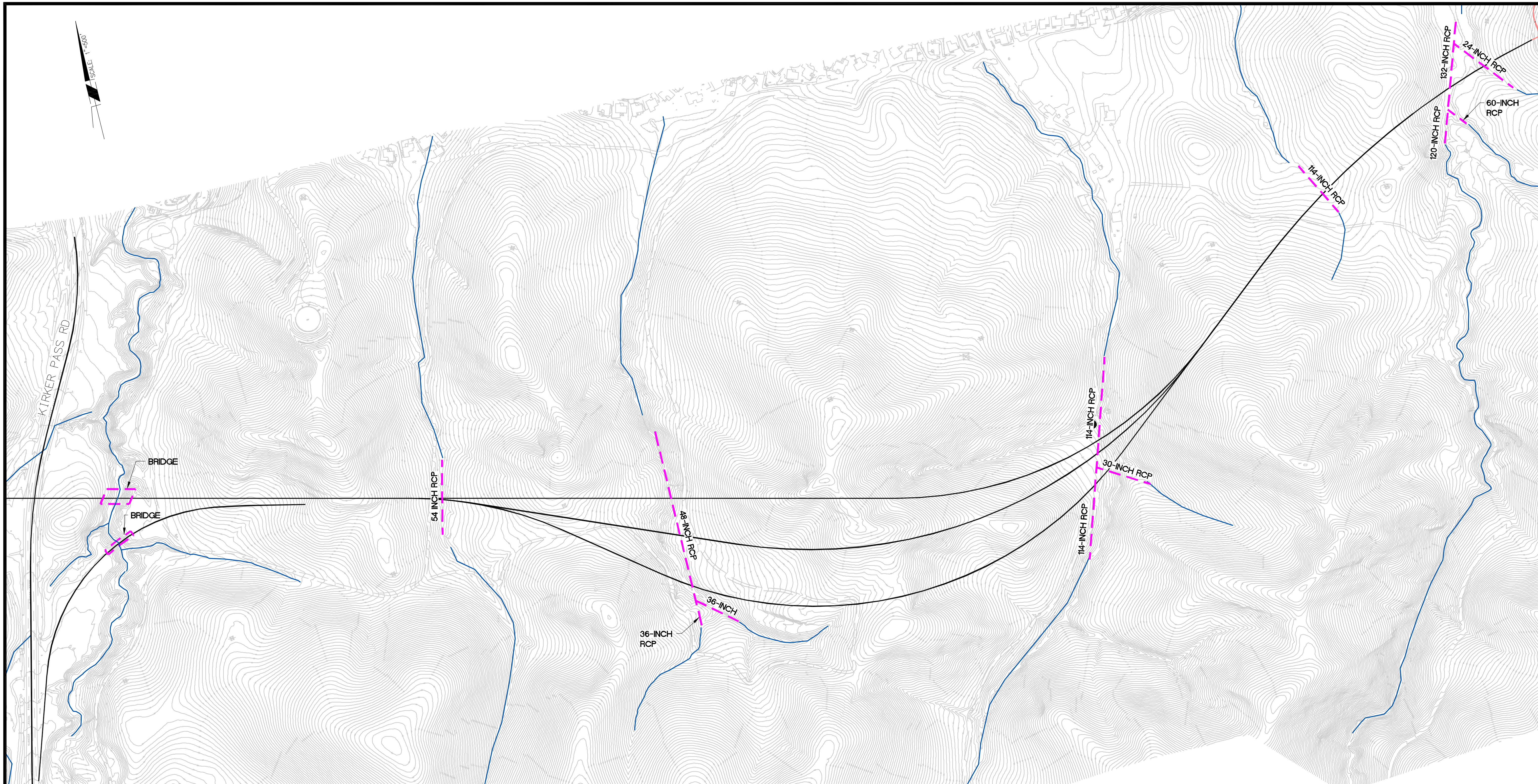
EXHIBIT D-1



LEGEND:

CULVERT/BRIDGE

PROPOSED ROADWAY ALIGNMENTS

FUTURE ROADWAY

FLOW LINE

JAMES DONLON BLVD EXTENSION
CULVERT LOCATION MAP

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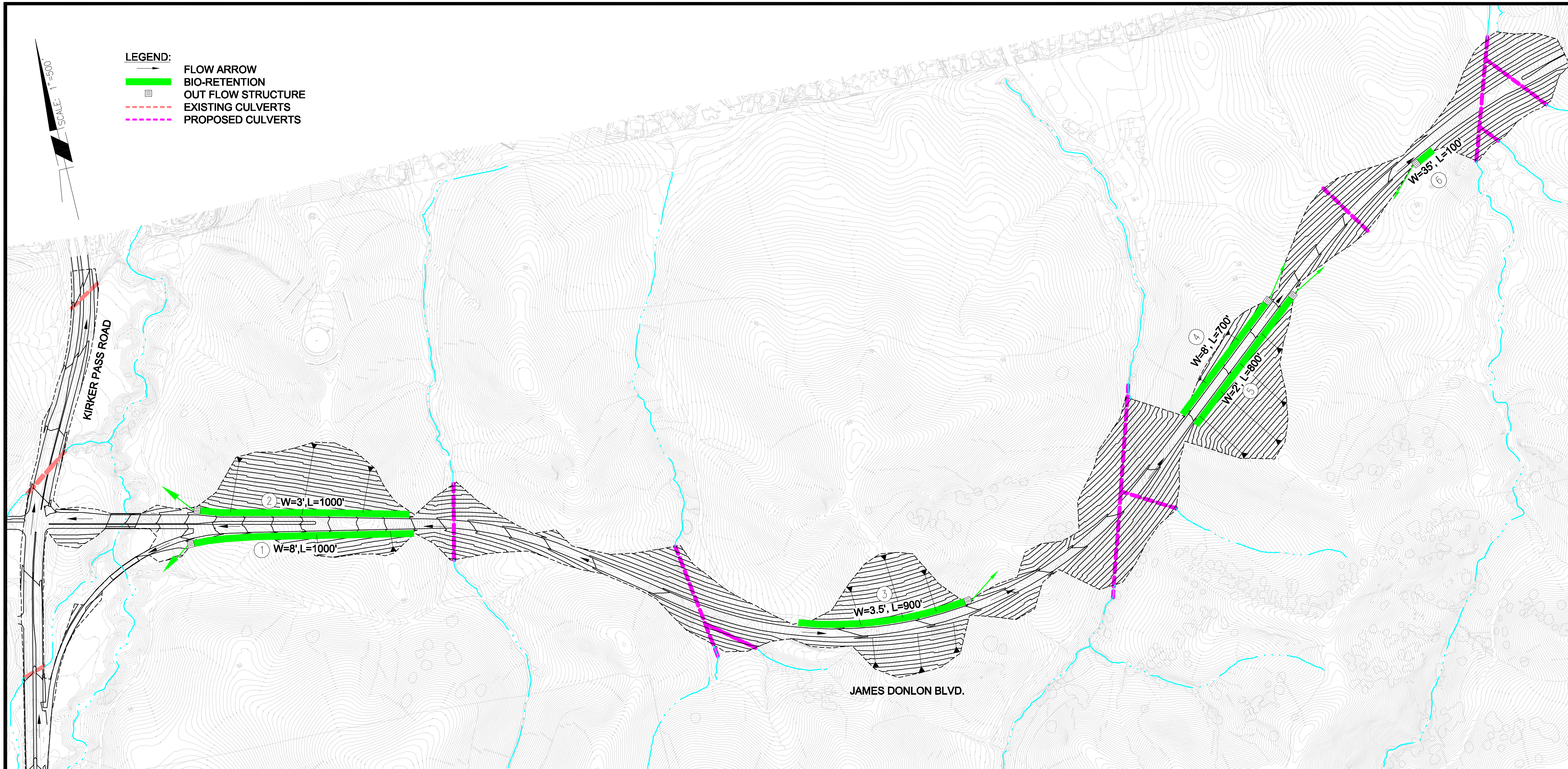
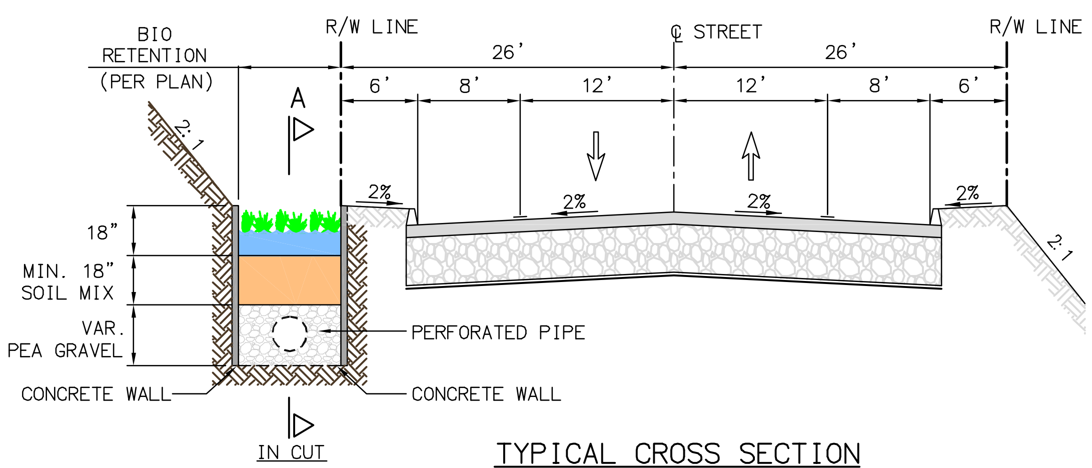
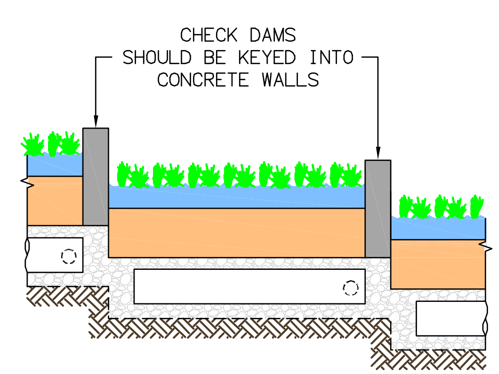
EXHIBIT D-2





TYPICAL CROSS SECTION

N.T.S.



SECTION A-A

N.T.S.

JAMES DONLON BLVD EXTENSION
TREATMENT & FLOW CONTROL
(ALTERNATIVE 1)

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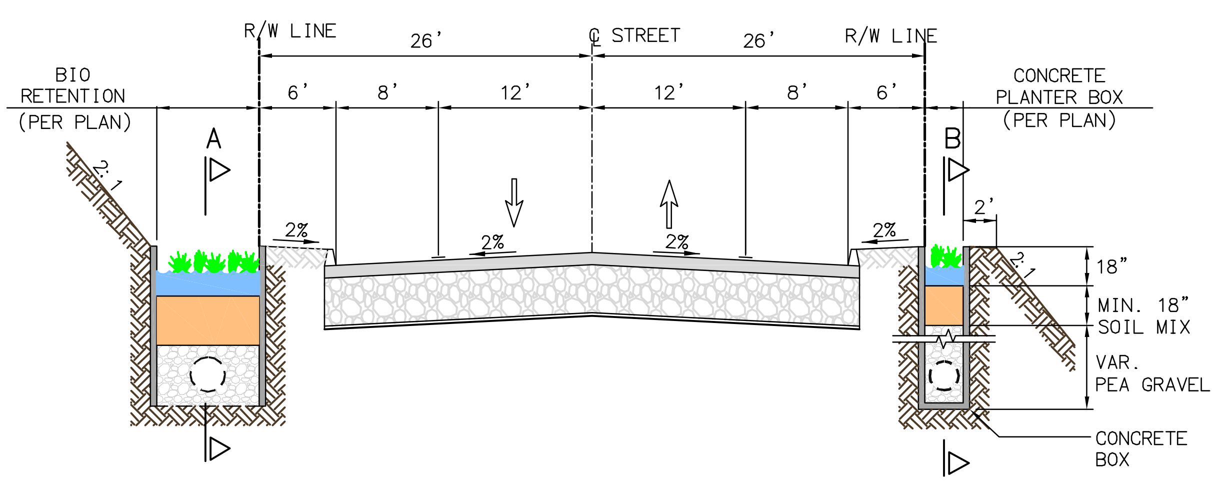
EXHIBIT D-3



TYPICAL CROSS SECTION

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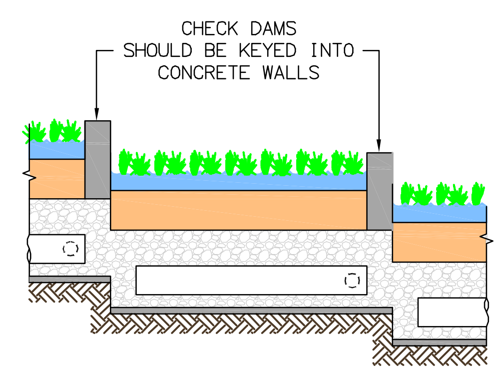

SECTION B-B

N.T.S.

JAMES DONLON BLVD EXTENSION TREATMENT & FLOW CONTROL (ALTERNATIVE 2)

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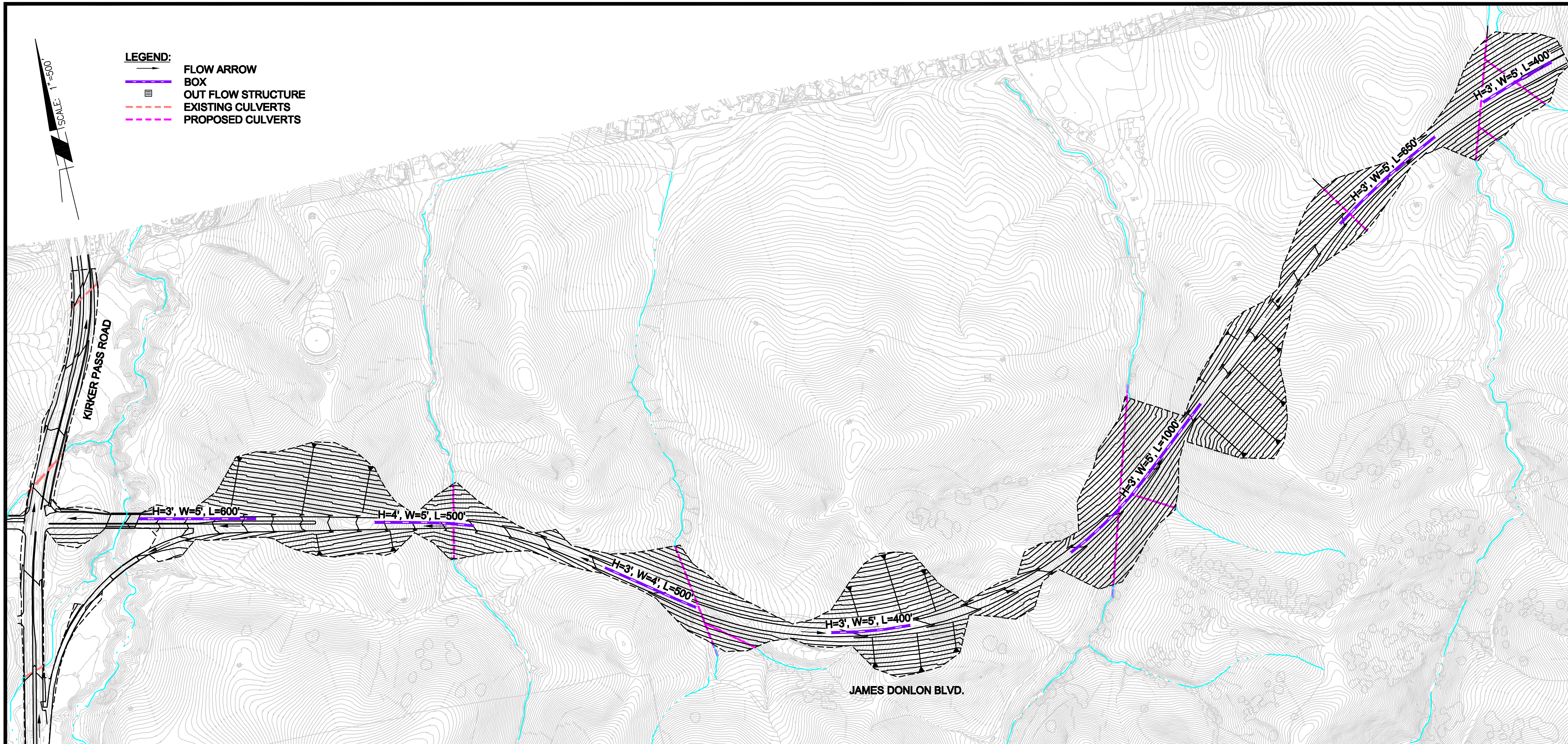
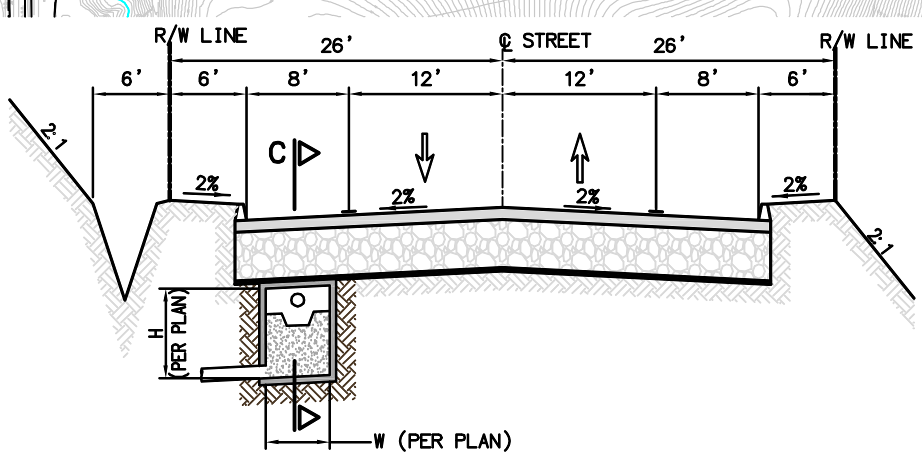
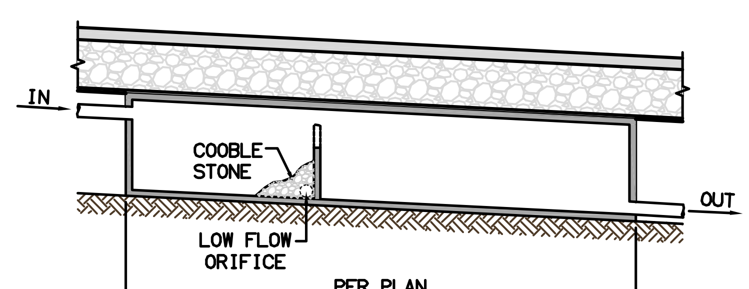
EXHIBIT D-4





TYPICAL CROSS SECTION
N.T.S.



SECTION C-C
N.T.S.

JAMES DONLON BLVD EXTENSION TREATMENT & FLOW CONTROL (ALTERNATIVE 3)

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EXHIBIT D-5

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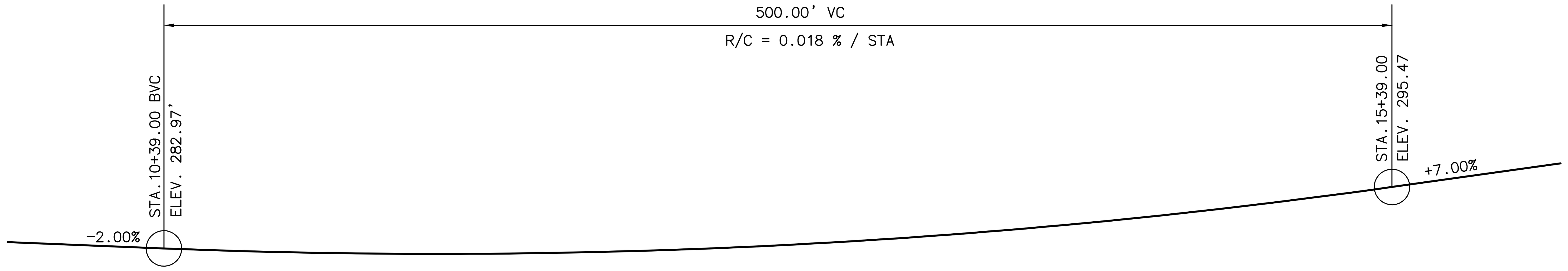
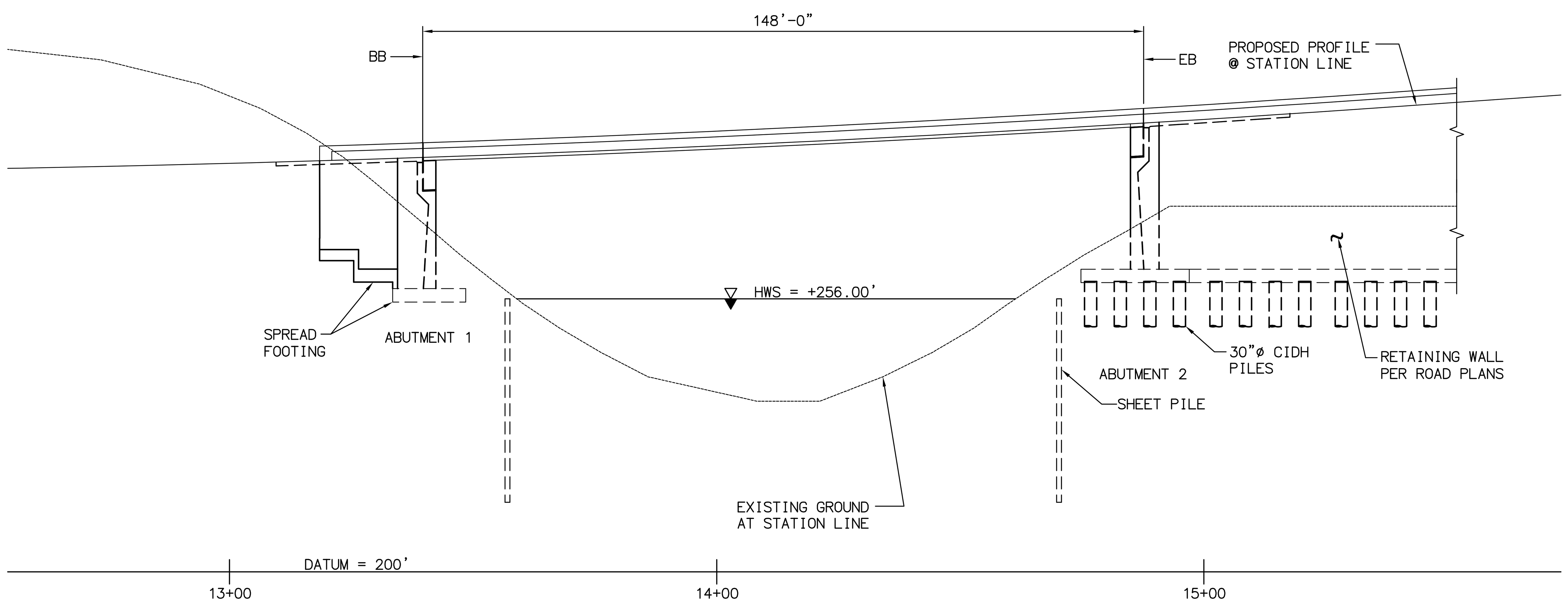
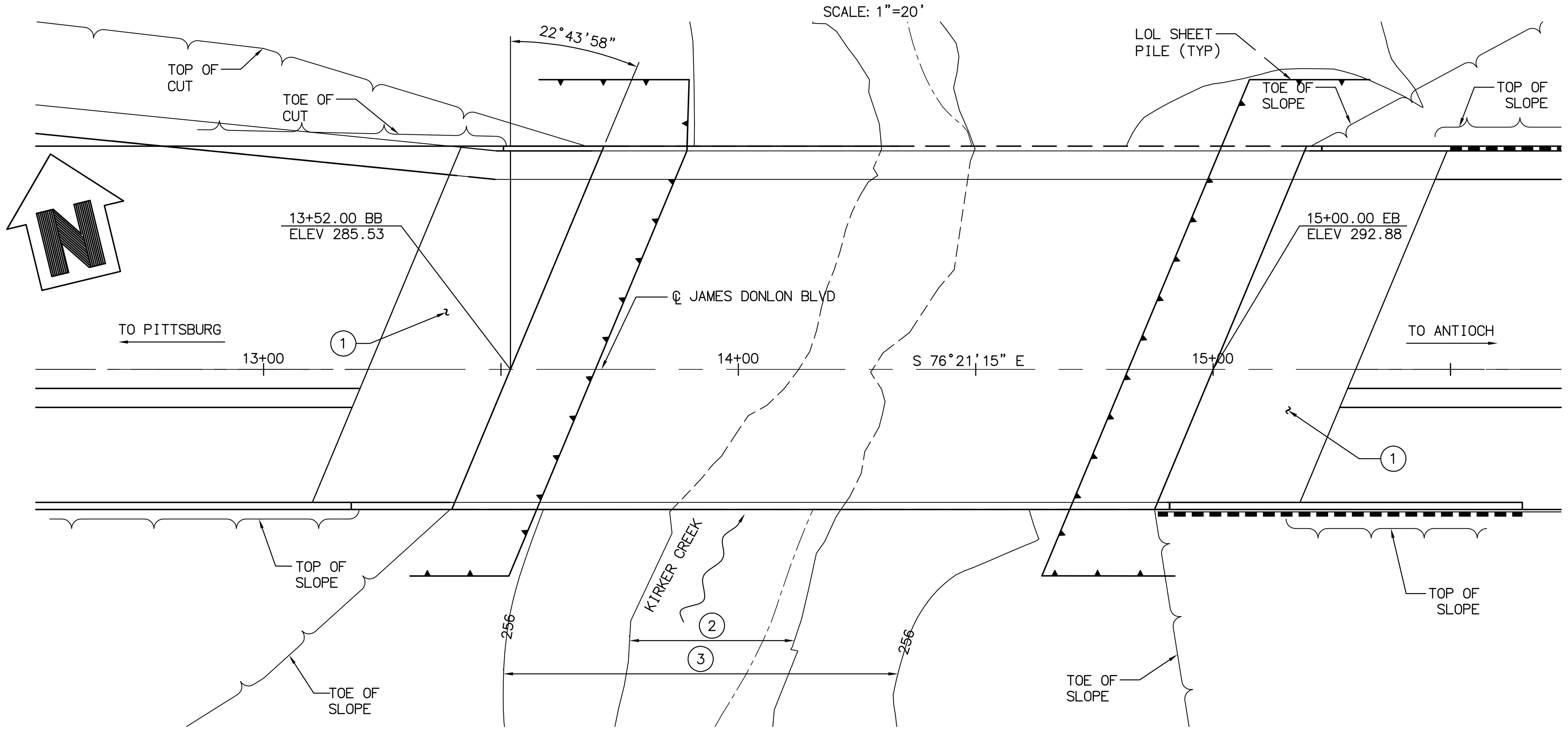


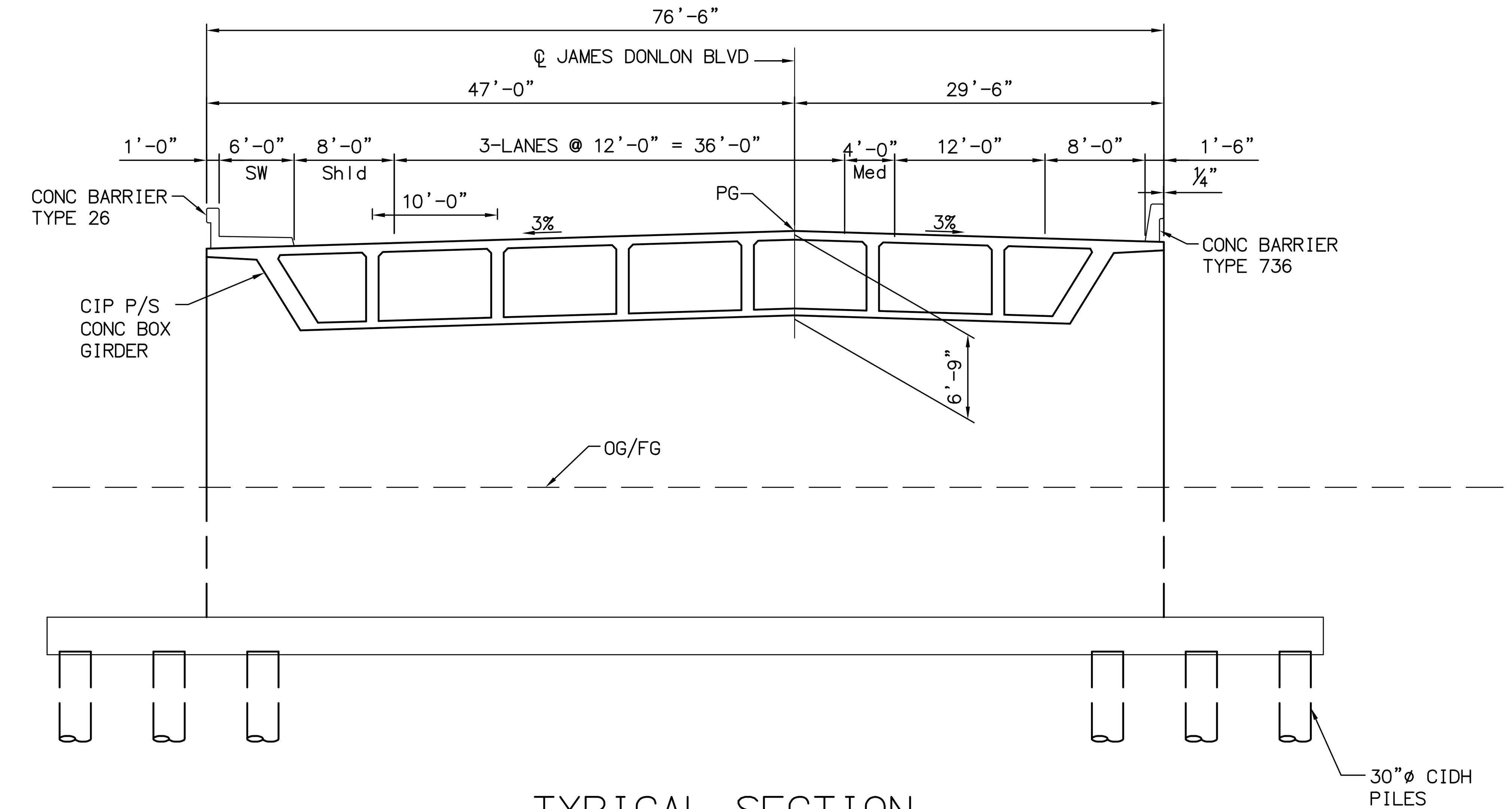
PROFILE GRADE
NO SCALE



ELEVATION
SCALE: 1"=20'



PLAN
SCALE: 1"=20'



TYPICAL SECTION
SCALE: 1"=10'

NOTE:
NOT ALL PILES SHOWN

ESTIMATED QUANTITIES

ALT	ALT 1
DATE OF ESTIMATE	4-9-2012
STRUCTURE DEPTH	6'-9"
LENGTH	148'-0"
WIDTH	76'-6"
AREA	11,322 Sq Ft
COST/SQ FT	$336
COST	$3,808,000
SHEET PILING	$ 640,000
RETAINING WALLS	$ 400,000
TOTAL STRUCTURE COST, INCLUDING 10% MOBILIZATION AND 25% CONTINGENCY	$4,848,00

NOTE:
NEW ALIGNMENT. NO TRAFFIC AT THE SITE.

LEGEND

1. STRUCTURE APPROACH TYPE N (30S)
2. BIOLOGICAL LIMIT NO TEMPORARY OR PERMANENT CONSTRUCTION WITHIN THESE LIMITS
3. LIMIT OF HIGH WATER SURFACE (HWS) NO PERMANENT CONSTRUCTION ALLOWED WITHIN THESE LIMITS

JAMES DONLON BLVD BRIDGE - ALT 1
GENERAL PLAN

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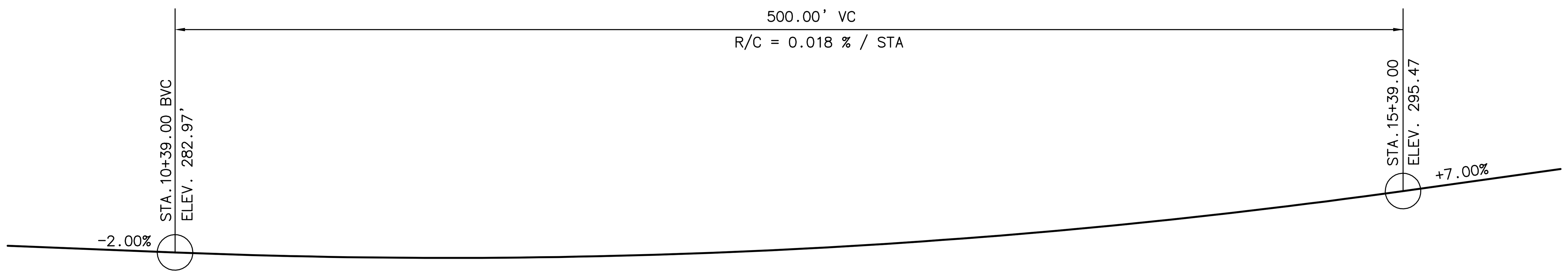
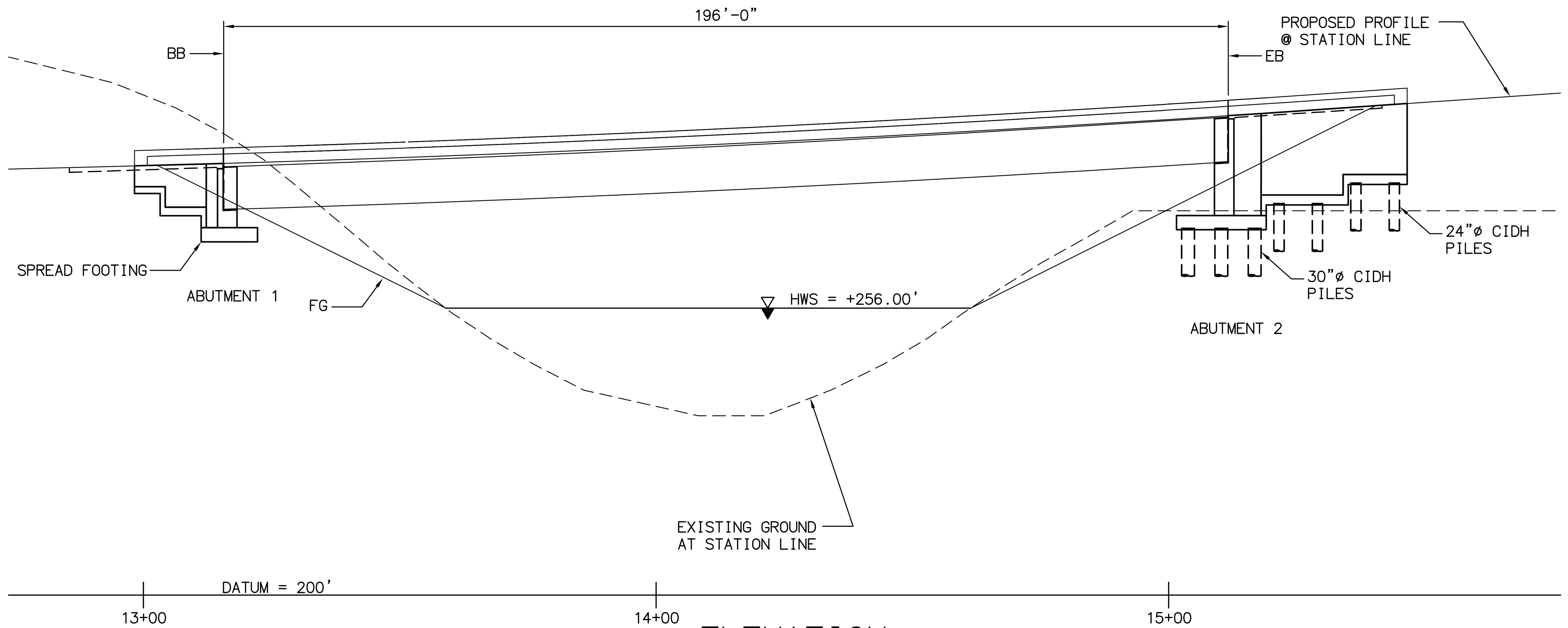
EXHIBIT E-1



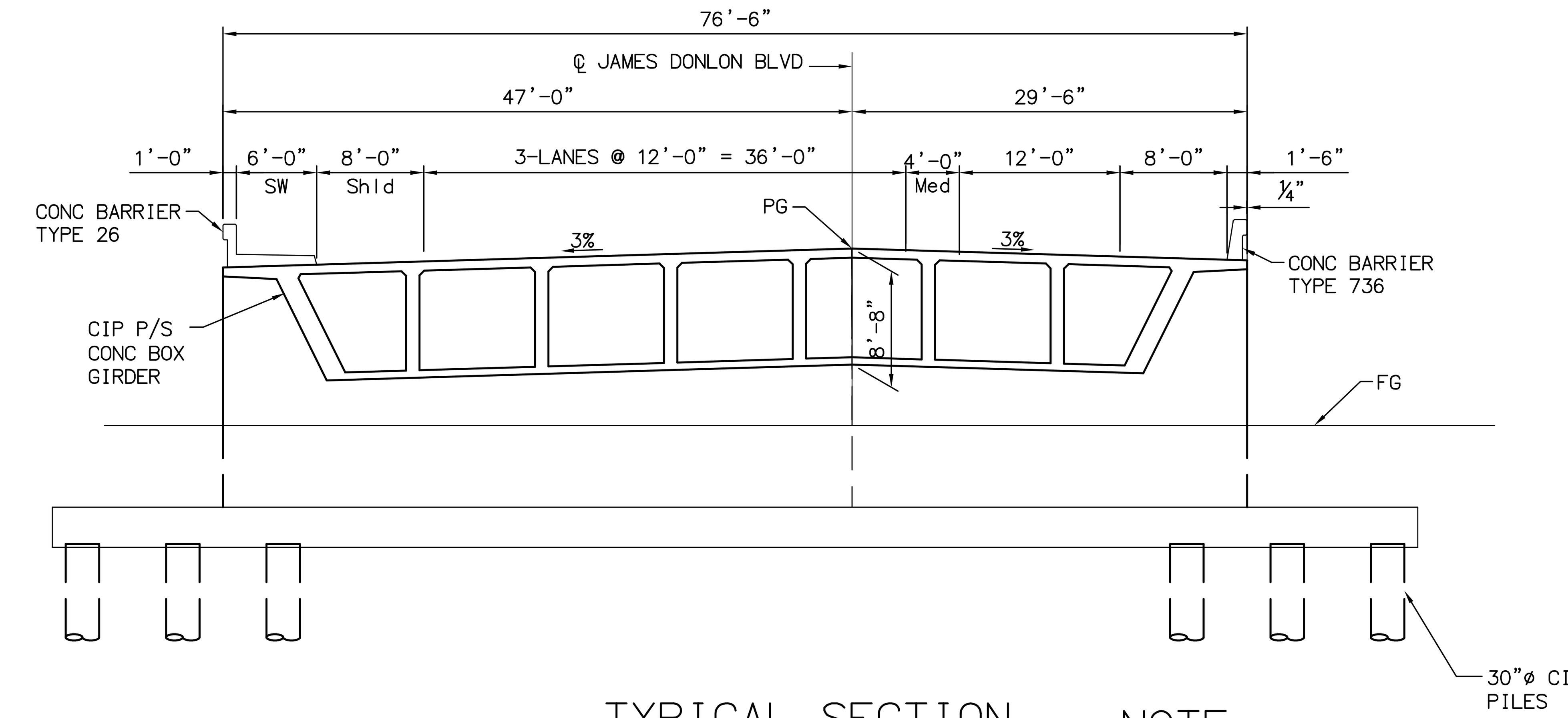
PROFILE GRADE

NO SCALE



ELEVATION

SCALE: 1"=20'

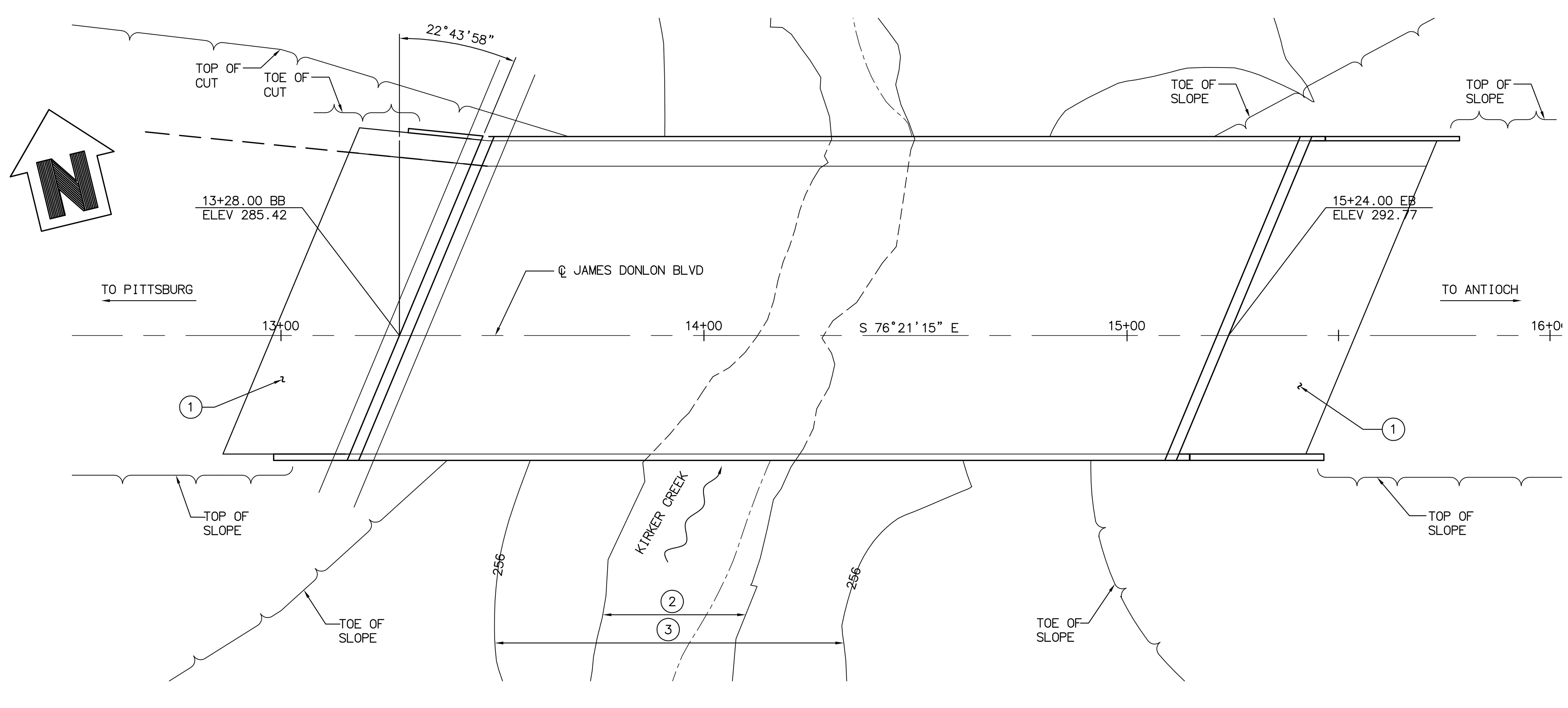


TYPICAL SECTION

SCALE: 1"=10'

NOTE:

NOT ALL PILES SHOWN



PLAN

SCALE: 1"=20'

LEGEND

1. STRUCTURE APPROACH TYPE N (30S)
2. BIOLOGICAL LIMIT NO TEMPORARY OR PERMANENT CONSTRUCTION WITHIN THESE LIMITS
3. LIMIT OF HIGH WATER SURFACE (HWS) NO PERMANENT CONSTRUCTION ALLOWED WITHIN THESE LIMITS

ESTIMATED QUANTITIES

ALT	ALT 2
DATE OF ESTIMATE	4-6-2012
STRUCTURE DEPTH	8'-8"
LENGTH	196'-0"
WIDTH	76'-6"
AREA	14,994 Sq Ft
COST/SQ FT	$255
TOTAL STRUCTURE COST, INCLUDING 10% MOBILIZATION AND 25% CONTINGENCY	$3,830,000

NOTE:

NEW ALIGNMENT. NO TRAFFIC AT THE SITE.

JAMES DONLON BLVD BRIDGE - ALT 2
GENERAL PLAN

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WALNUT CREEK, CALIFORNIA 94596-3847
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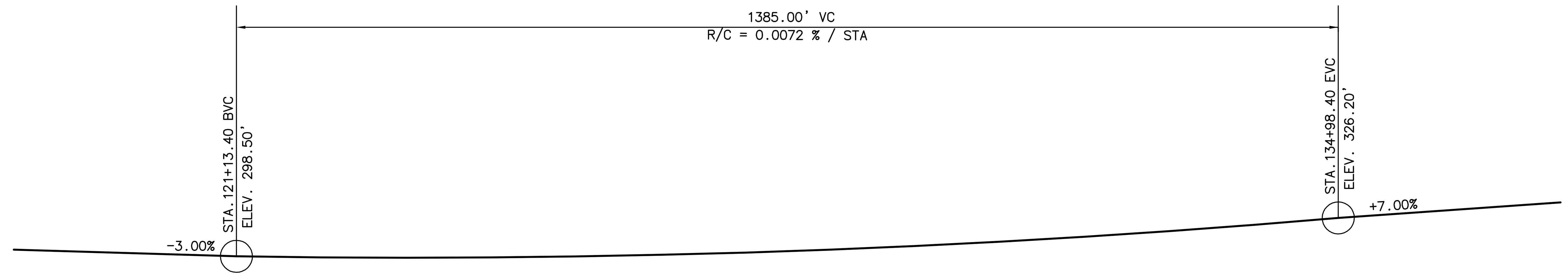
EXHIBIT E-2



PROFILE GRADE
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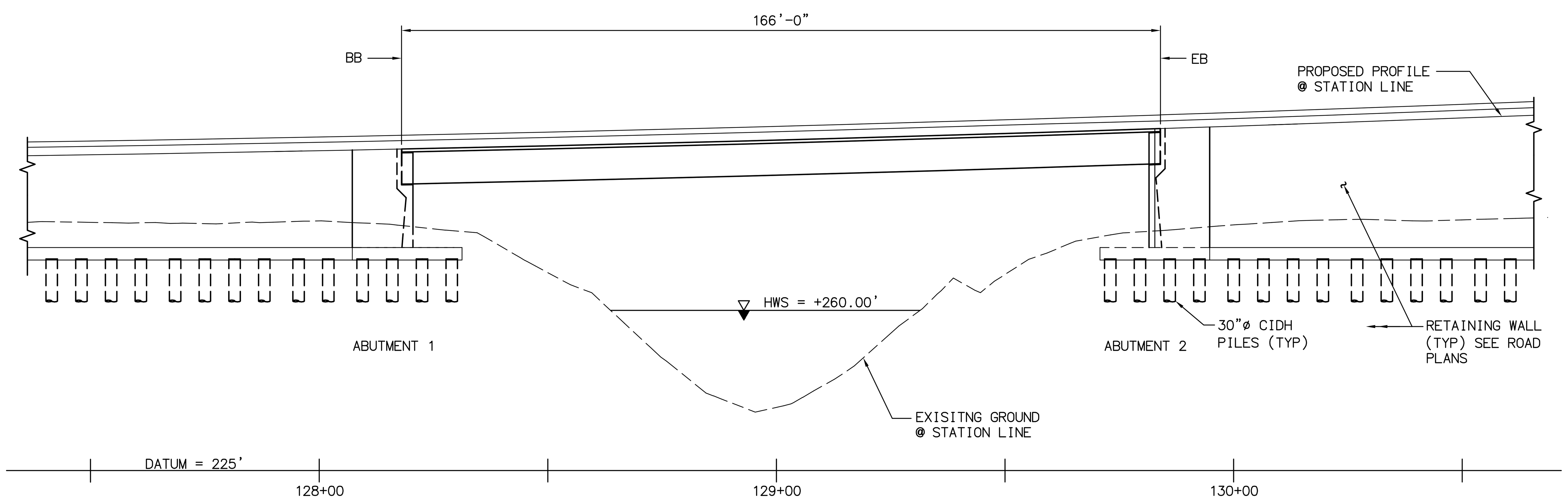
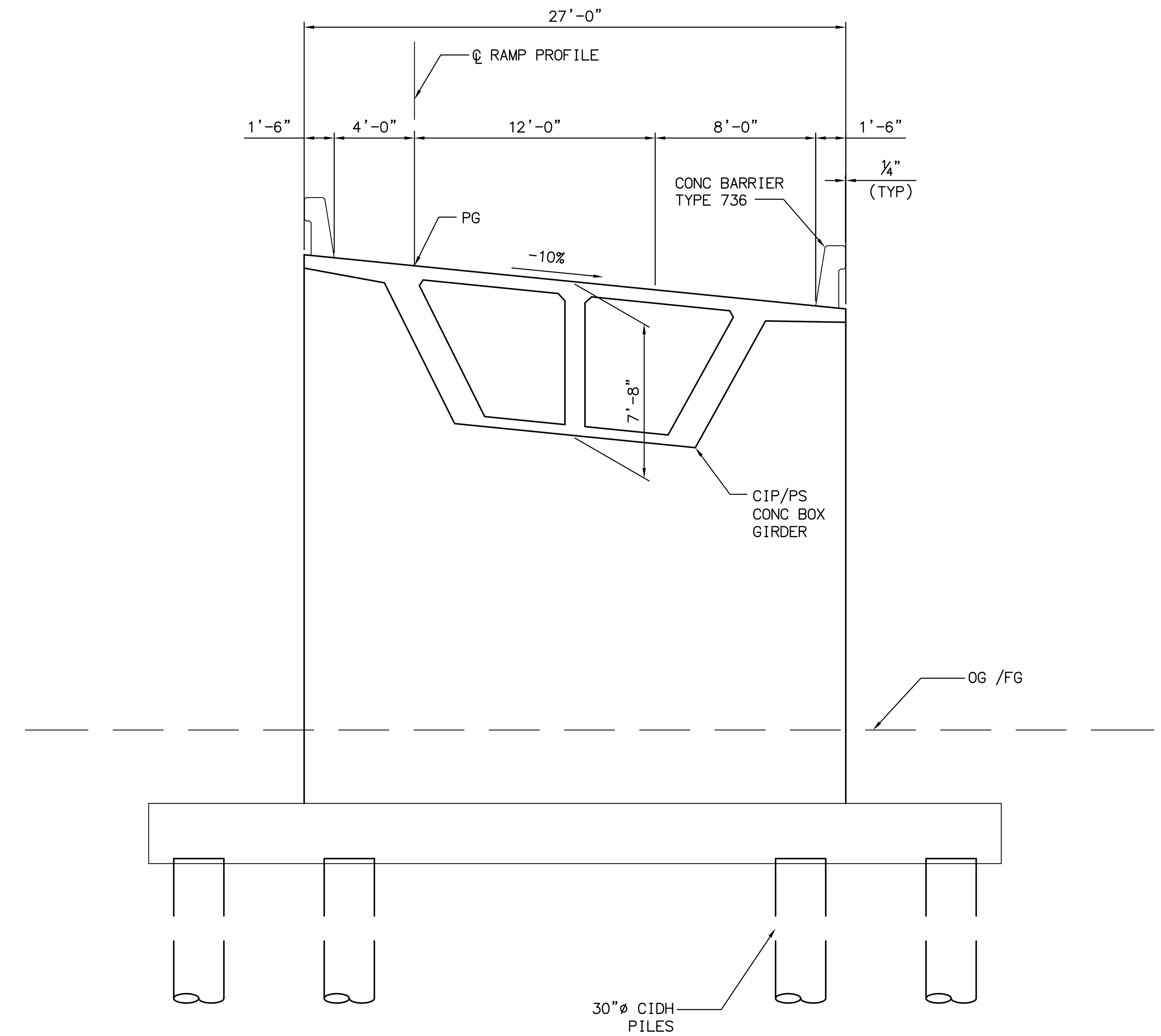


DEVELOPED ELEVATION
SCALE: 1"=20'



TYPICAL SECTION
SCALE: 1"=5'

NOTE:
NOT ALL PILES SHOWN

PLAN
SCALE: 1"=20'

CURVE DATA

⬡	R	Δ	L	T
1	590.00'	81°32'59"	1352.15'	819.29'

LEGEND

1. STRUCTURE APPROACH TYPE N (30S)
2. BIOLOGICAL LIMIT NO TEMPORARY OR PERMANENT CONSTRUCTION WITHIN THESE LIMITS
3. LIMIT OF HIGH WATER SURFACE (HWS) NO PERMANENT CONSTRUCTION ALLOWED WITHIN THESE LIMITS

ESTIMATED QUANTITIES

ALT	ALT 1
DATE OF ESTIMATE	3-15-2012
STRUCTURE DEPTH	7'-8"
LENGTH	166'-0"
WIDTH	27'-0"
AREA	4,482 Sq Ft
COST/SQ FT	$397
COST	$1,780,000
RETAINING WALLS	$ 400,000
TOTAL STRUCTURE COST, INCLUDING 10% MOBILIZATION AND 25% CONTINGENCY	$2,180,000

NOTE:
NEW ALIGNMENT. NO TRAFFIC AT SITE.

RAMP BRIDGE - ALT 1
GENERAL PLAN

RBF
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A Baker Company
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WALNUT CREEK, CALIFORNIA 94596-3847
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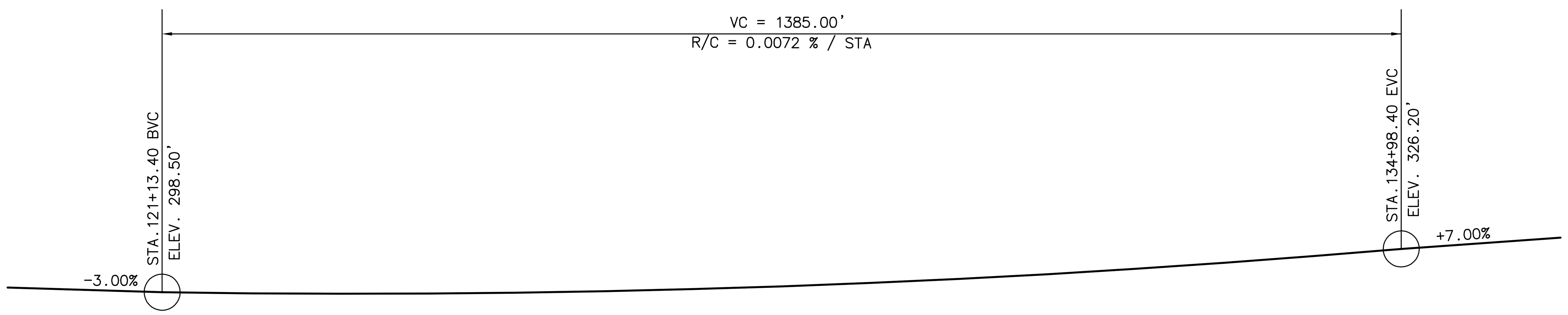
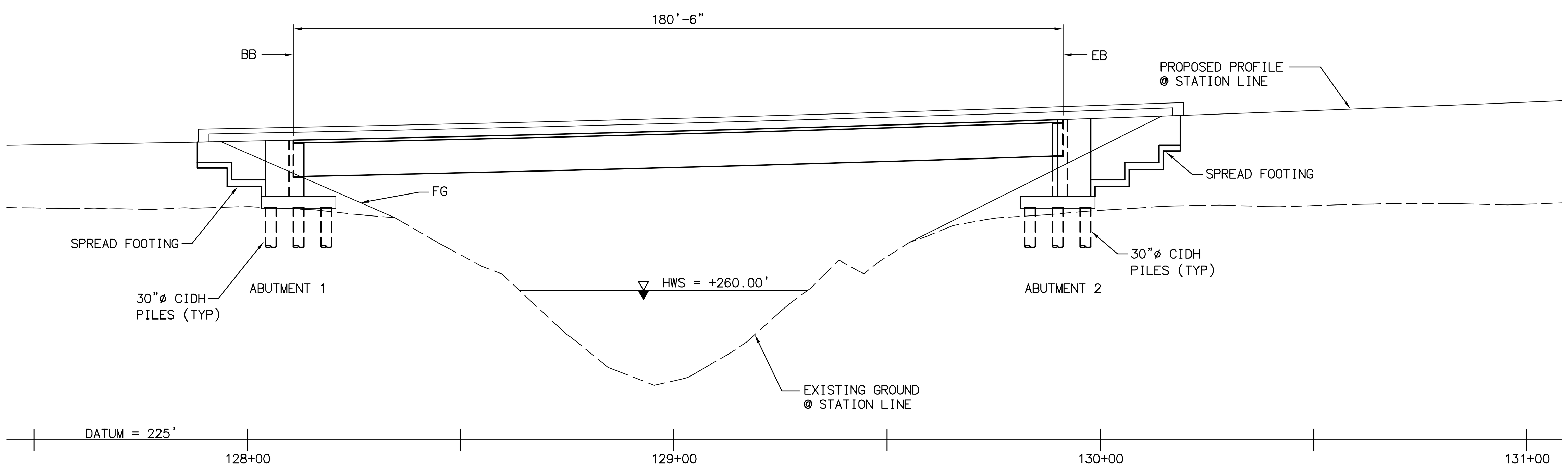
EXHIBIT E-3

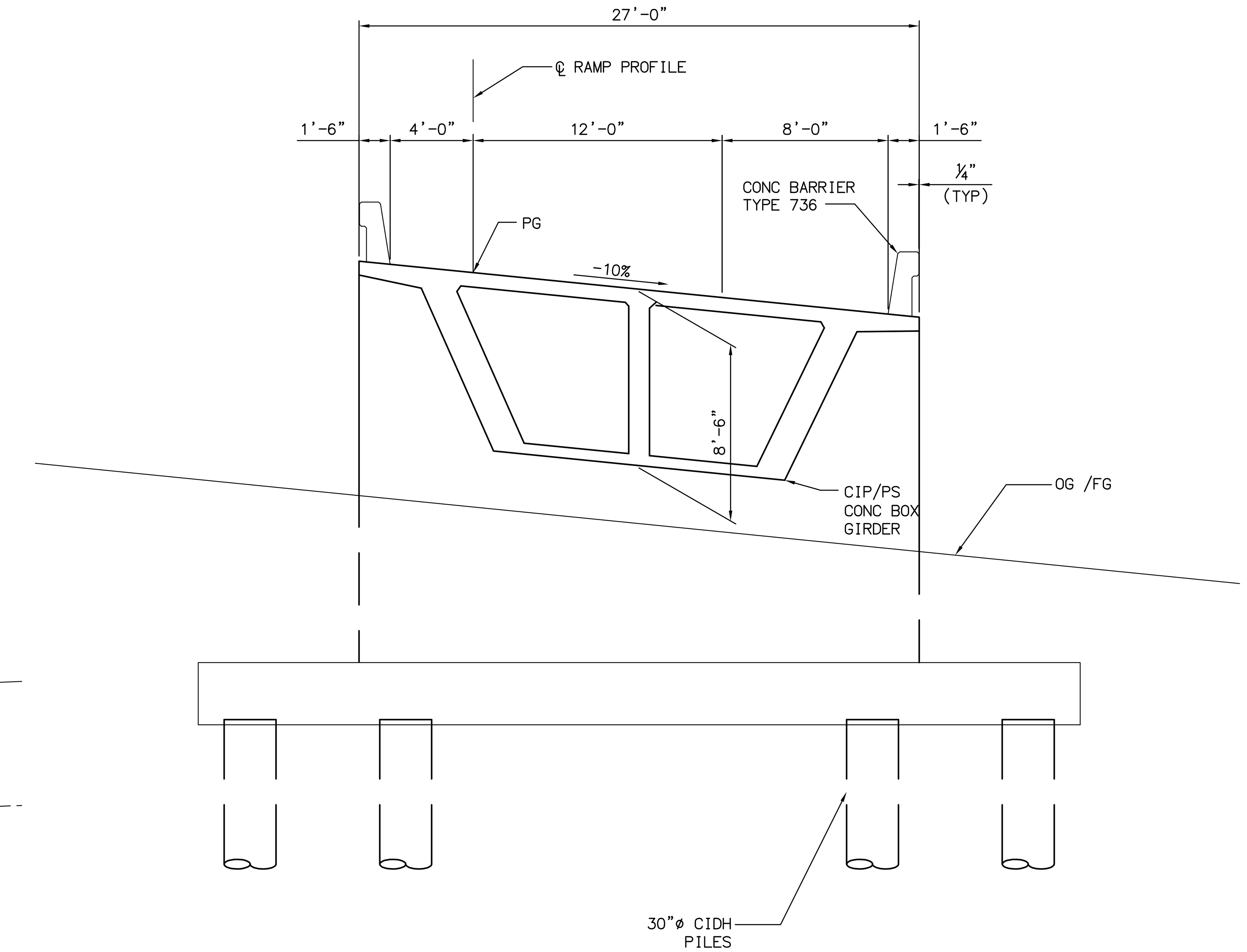
H:\PDATA\35100129\CADD-ENGLISH\STRUC\DLV\0129-BR-02 ALT 01.DWG DOUGMOON 4/11/12 7:29 am



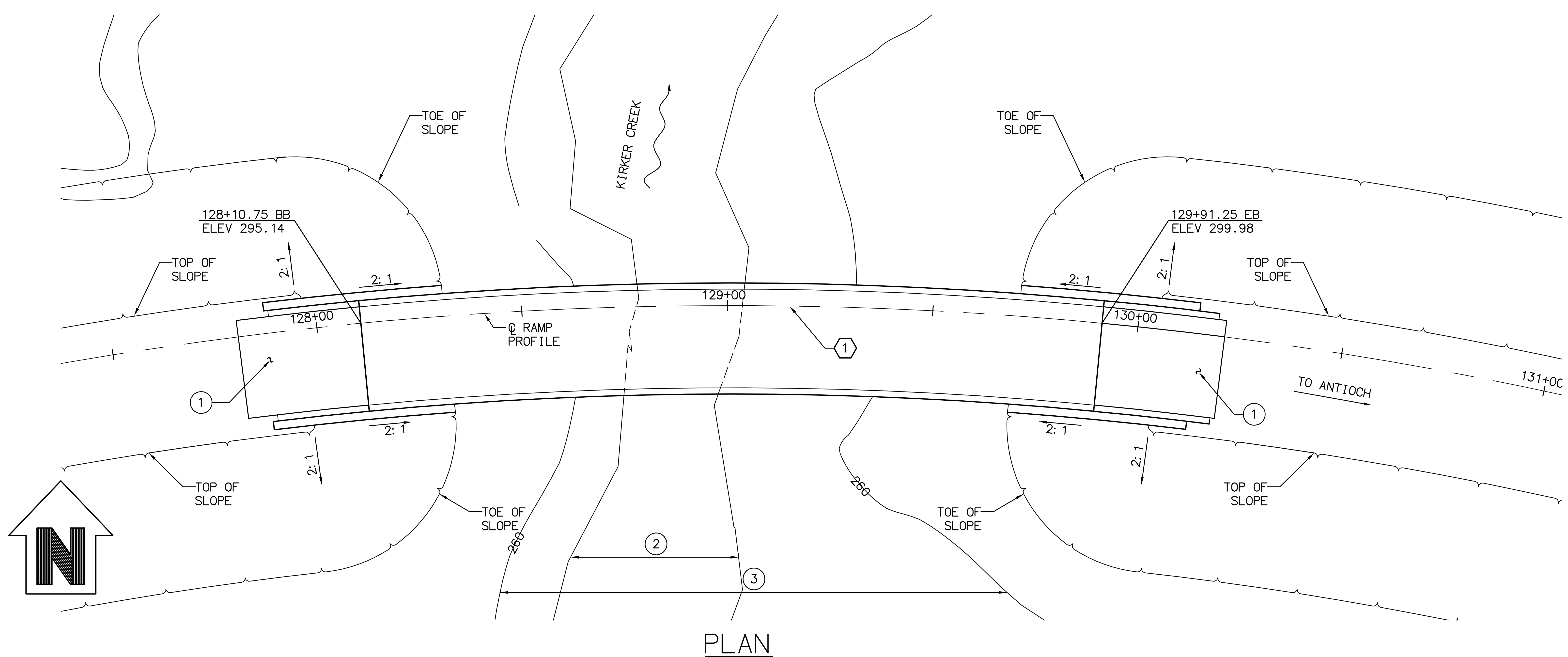
PROFILE GRADE
NO SCALE



DEVELOPED ELEVATION
SCALE: 1"=20'



TYPICAL SECTION
SCALE: 1"=5'



PLAN
SCALE: 1"=20'

CURVE DATA

	R	Δ	L	T
1	590.00'	81°32'59"	1352.15'	819.29'

LEGEND

1. STRUCTURE APPROACH TYPE N (30S)
2. BIOLOGICAL LIMIT NO TEMPORARY OR PERMANENT CONSTRUCTION WITHIN THESE LIMITS
3. LIMIT OF HIGH WATER SURFACE (HWS) NO PERMANENT CONSTRUCTION ALLOWED WITHIN THESE LIMITS

ESTIMATED QUANTITIES

ALT	ALT 2
DATE OF ESTIMATE	3-15-2012
STRUCTURE DEPTH	8'-6"
LENGTH	180'-6"
WIDTH	27'-0"
AREA	4,874 Sq Ft
COST/SQ FT	$328
TOTAL STRUCTURE COST, INCLUDING 10% MOBILIZATION AND 25% CONTINGENCY	$1,600,000

NOTE:

NEW ALIGNMENT. NO TRAFFIC AT THE SITE.

RAMP BRIDGE - ALT 2
GENERAL PLAN

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EXHIBIT E-4

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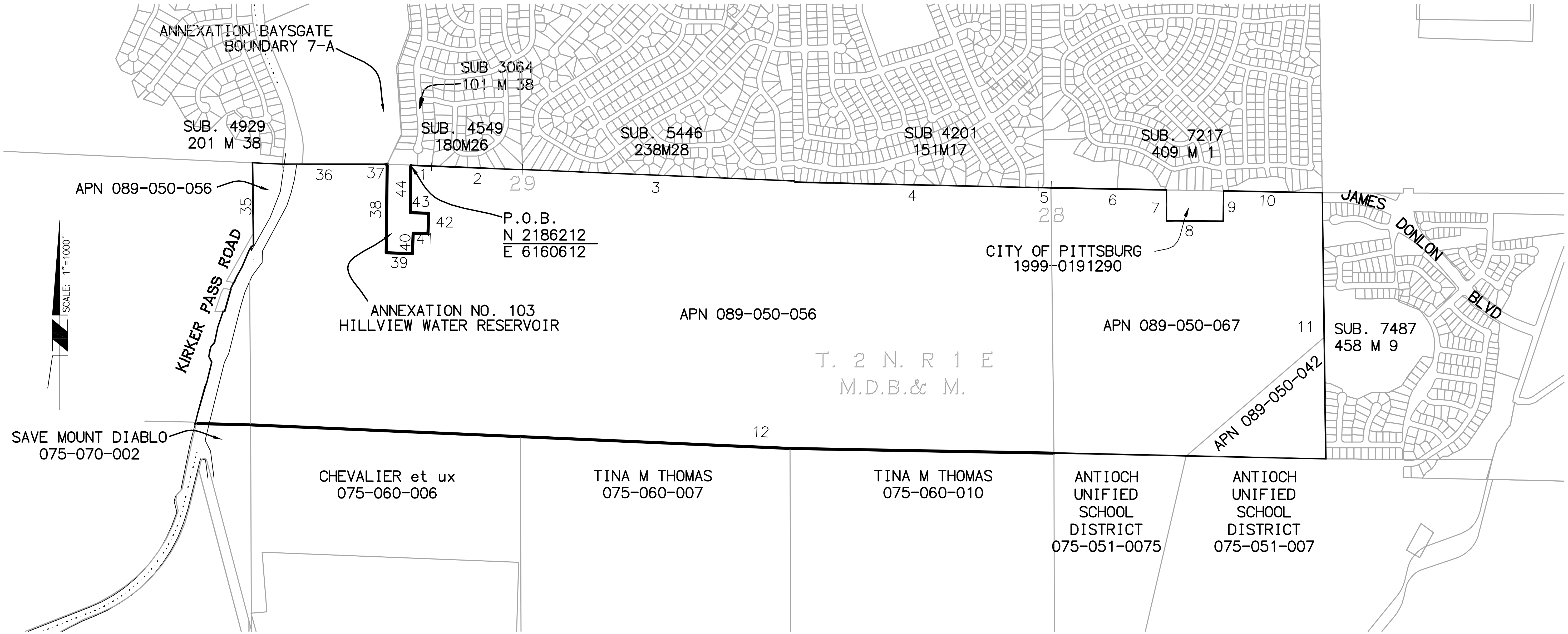

LEGEND

CCC	CONTRA COSTA COUNTY RECORDS	S.	SOUTH
ROW	RIGHT-OF-WAY	E.	EAST
N'LY	NORTHERLY	W.	WEST
S'LY	SOUTHERLY	M.D.B. & M.	MOUNT DIABLO BASE AND MERIDIAN
E'LY	EASTERLY	———	PROPOSED ANNEXATION
W'LY	WESTERLY		
COR	CORNER		
N.	NORTH		

THE ANNEXATION OF A PORTION OF THE COUNTY OF CONTRA COSTA, CA INTO CITY OF PITTSBURG, CA

FEBRAURY 2012

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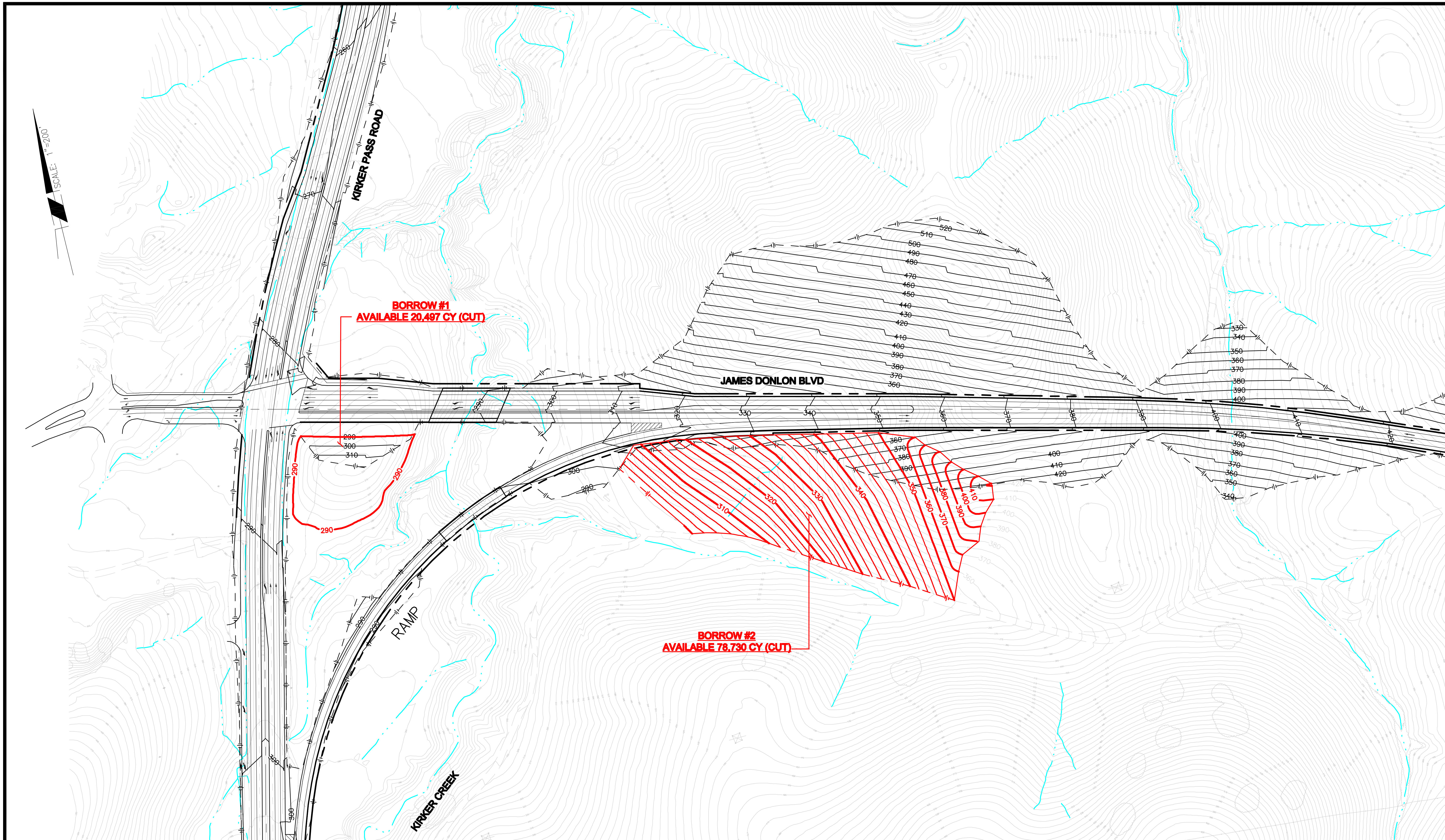
EXHIBIT G-1

H:\PDATA\35100129\CADD-ENGLISH\TRANSPW\EXHIBITS\MISC\REPORT EXHIBITS\0129-ANEXATION.DWG ATORBICA 6/8/12 9:00 am



POTENTIAL BORROW SITES

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EXHIBIT H-1

H:\PDATA\35100129\CADD-ENGLISH\TRANSPW\EXHIBITS\MISC REPORT EXHIBITS\0129-BORROW EXHIBIT.DWG ATORBICA 6/8/12 10:47 am

CONSTRUCTION STAGING SITES

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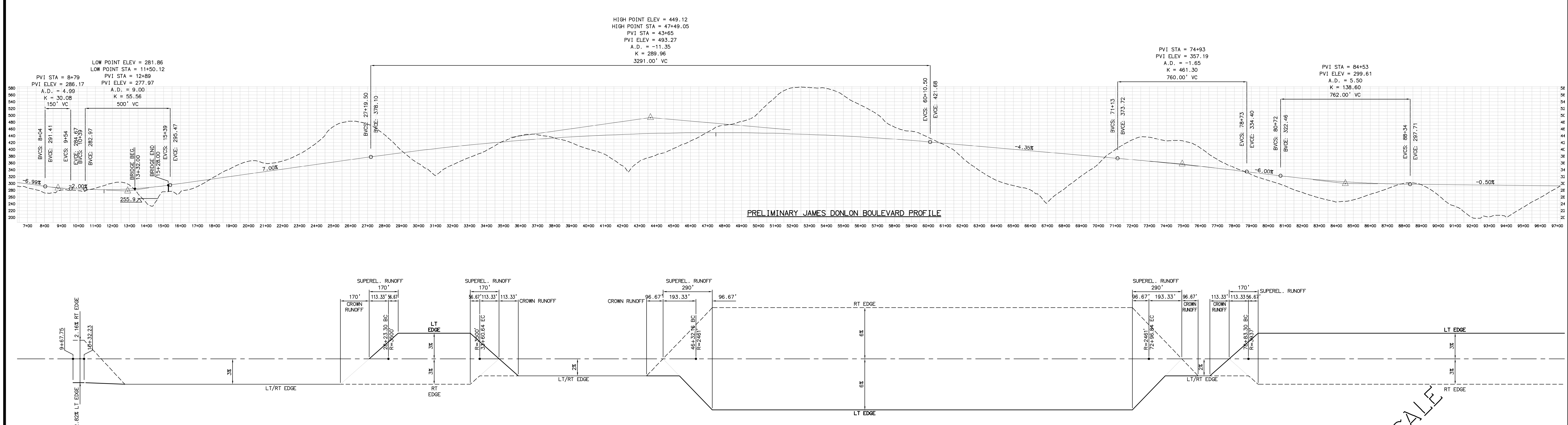
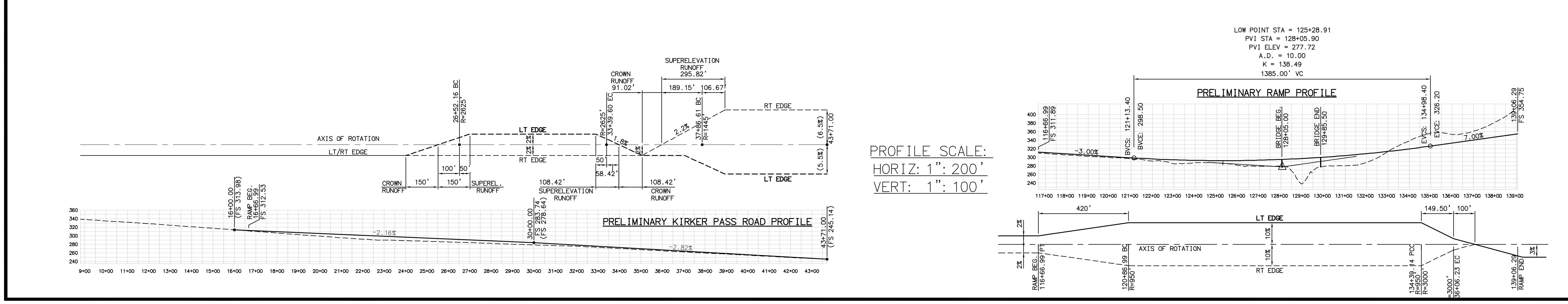
EXHIBIT H-2

H:\PDATA\35100129\CADD-ENGLISH\TRANSPW\EXHIBITS\MISC\REPORT EXHIBITS\0129-CONSTRUCTION STAGING EXHIBIT.DWG ATORBICA 6/8/12 10:01 am



HALF SCALE



KIRKER PASS ROAD / JAMES DONLON BLVD. EXTENSION
FOUR LEG INTERSECTION CONFIGURATION
ALTERNATIVE C2 LOW
PRELIMINARY PROFILE AND GRADING
UPDATED: 03-09-2012

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EXHIBIT I-1

Appendix G.3

Existing Buchanan Road Widening Feasibility Study (2006)

January 16, 2006 JN 35-100129.200

Mr. Paul Reinders
Senior Civil Engineer
CITY OF PITTSBURG
65 Civic Avenue
Pittsburg, CA 94565

Subject: Existing Buchanan Road
Widening Feasibility Study

Dear Mr. Reinders,

In October of 2002, RBF presented a draft Project Study Report on the proposed Buchanan Road Bypass project. Subsequent review comments from Contra Costa County indicated a feasibility study should be conducted for the widening of the existing Buchanan Road as an alternative to the proposed bypass project. As such the City of Pittsburg commissioned RBF to evaluate the feasibility of widening the existing Buchanan Road as an alternative to the Bypass project. The following represents our initial finding and evaluation of the project.

RBF performed an assessment of the proposed improvements required to widen Buchanan Road to four lanes between the intersection of Railroad Avenue and Somersville Road. The assessment included visual review and photographic documentation of existing conditions along the study area and a review of record drawings, but no formal studies were conducted on any aspect of the project.

Traffic Analysis

Fehr & Peers, traffic consultant, in their attached report, studied four different highway improvement projects to determine the most favorable alternative to improve the flow of traffic within the study area of the City of Pittsburg. They included:

- No Build
- Widen Buchanan Road to Four Lanes
- Two Lane Buchanan Road Bypass
- Four Lane Buchanan Road Bypass

Fehr & Peers concluded:

- No Build – "Existing east-west corridors are operating at or near capacity during peak hours; with a "no build" scenario traffic congestion is expected to worsen. "
- Widening of Existing Buchanan – "The widening of Buchanan Road would result in a slight improvement in traffic operations. However, most roadway segments

within the City would continue to operate at LOS E or LOS F in the peak commute direction during peak hours."

- Two Lane Buchanan Road Bypass – "The construction of a two-lane Buchanan Road Bypass would result in similar traffic operations as the widening of Buchanan Road."
- Four Lane Buchanan Road Bypass – "The construction of a four-lane Buchanan Road Bypass would reduce congestion and add additional capacity in the study area more than the other alternatives studied, but would increase congestion on James Donlon Boulevard." Existing Buchanan Road (two lane) would operate at LOS C and Buchanan Road Bypass would operate at LOS D or better during the peak commute hours.

Geometric Drawings

A new ortho-photo was flown of the existing Buchanan Road in October 2005. Centerline monuments of existing road were established by field control and record right of way maps were utilized to establish the existing right of way. With this information established, an evaluation was conducted to determine the least impacting alignment to widen Buchanan Road. It was determined that utilizing the south right of way line as a fix and widen the road to the north would have the least impact on the existing homes.

Widening the road equally about the centerlines or widening the road to the south would have significantly greater impacts to the number of homes. However, as the road approaches the Railroad Avenue intersection, the Buchanan Road widening had to be centered to maintain lane alignment with Buchanan Road on the west side of Railroad Avenue.

The configuration used to develop the geometric drawings was a four lane divided highway in accordance with urban arterial road standards of the City of Pittsburg. This results in a 100' right of way width. See attached exhibit.

The impacts of the widening project are illustrated on the enclosed geometrics as an issue or impact item.

The items listed on the geometric drawings include the following:

Issue Impact List

- New intersection & traffic signal improvements
- Remove 10 homes, no direct access to arterial highway near intersection
- Remove 9 homes, no direct access to arterial highway near intersection
- Remove 1 home
- Kirker Creek, new box culvert
- Deep embankment, impacts to wetland, 401/1602 permits, and mitigation will be required
- Impacts to park
- Maintain access to side street with steep uphill entrance profile
- Protect pump station
- Stabilize failing slope
- Maintain access to side street with steep downhill entrance profile

- New drainage improvements
- New intersection & traffic signal improvements
- Impacts to school
- Relocate school modules
- Remove 4 homes
- Remove wooden retaining wall/replace concrete retaining wall
- New intersection & traffic signal improvements
- New intersection & traffic signal improvements
- Remove 9 homes
- Remove 13 homes
- Remove apartment complex
- New intersection & traffic signal improvements
- Impacts to Starbucks coffee drive thru entrance
- Impacts to parking lot and circulation within parking lot
- Relocate electric transmission tower
- New intersection & traffic signal improvements
- Develop new access to nursery
- New intersection & traffic signal improvements
- Expand drainage basin to accommodate new drainage
- Relocate channel
- Relocate and or lower high risk utilities
- Widen bridge culvert
- Relocate high risk utilities
- Relocate drainage structure and realign course, 401 permit
- New intersection & traffic signal improvements

Items that are not listed on the geometric drawings, but will add significantly to the cost of the project include:

- Complete new storm drain system throughout the length of the project
- Review of down stream facilities to evaluate necessary upgrades
- Significant utility relocation both underground and overhead
- Noise studies may reveal their existing sound walls are inadequate and may have to be removed and replaced with higher walls resulting in necessary repair to back yard improvements and side yard fences.
- Significant traffic issues during construction, which may result in unknown traffic control, and interim improvement costs.

Drainage

Buchanan Road runs east to west through an area where the major drainage features flow from south to north. There are approximately ten locations where drainage facilities convey runoff across the roadway, ranging in size from 18” diameter local storm drainage systems to the triple 10’ by 9’ Kirker Creek culvert. Additional facilities collect runoff along the roadway. The existing roadway has non-uniform drainage improvements ranging from asphalt swales and dikes to concrete curb and gutter. The study are portion of Buchanan Road is parallel to the Contra Costa Canal for approximately 3600’ and crosses it at one point, where there is a gated diversion structure.

The entire roadway within the study area is above the FEMA regulatory floodplain. Kirker Creek is mapped and could be impacted by a roadway widening project. The only other location where a widening project could impact potential flooding areas mapped by FEMA is downstream from the Contra Costa Canal diversion of structure.

The most significant storm drainage issues related to a potential widening of the Buchanan Road involves culverts and storm drains that cross under the road; the most significant of these is at Kirker creek. It is expected that the existing Kirker Creek culvert would need to be lengthened as part of the roadway widening project. Lengthening the culvert would reduce its capacity and additional parallel conveyance, or other means, would likely be required to mitigate for the potential impacts. Other locations where culverts would have to be lengthened as part of a widening project may be subject to similar requirements, but not resulting from FEMA floodway impact regulations.

Design of roadway drainage improvements along the study would require hydrologic analysis to calculate the flow rate at each cross drainage location to size improvements necessary to meet current standards. The results of this analysis would likely show that improvements downstream from the study would also be required to meet current drainage standards for control of runoff along the road. At some locations, downstream improvements may be complicated by existing storm drains being located in narrow easements between structures.

Other issues that would need to be addressed include typical roadway drainage and redevelopment storm water best management practices. Typical roadway drainage and water quality requirements would not be expected to influence the feasibility of the project.

Right of Way

A brief study was conducted by Associated Right-of-Way Services, Inc. to determine preliminary values of properties along Buchanan Road that would have to be obtained for the proposed project. See attached report. The most significant cost would be for the full acquisition of homes along the road. The study indicates 46 homes must be obtained at a value of $500,000 to $600,000 each. This number may be reduced if, as a policy matter, the City allows direct access from a residential lot to an arterial highway. Current subdivision practices do not allow direct access for individual lots to a main arterial highway. The total estimate for right of way acquisition is in excess of $35,000,000.

Cost Estimate

Three engineer’s estimates were prepared as part of the feasibility study; they included an estimate for the widening of the existing Buchanan Road, and the two lane configuration and the four lane configuration for the proposed bypass project.

The widening of the existing Buchanan Road engineer’s estimated was completed at a “concept” level of cost analysis. As no formal studies or engineering concepts were developed, most of the cost estimate is in terms of a “rough order of magnitude”.

The estimated for the four lane configuration was revised from the previous estimate by eliminating all landscaping and irrigation, but substituting hydroseeding for the slopes and median areas, and inserting a more cost-effective structure across Kirker Creek, which will require regulatory agency approval.

Conclusion

The traffic analysis indicated the widening of existing Buchanan Road will not enhance the movement of traffic through the City of Pittsburg, rather the proposed bypass project represents the most favorable solution.

Additionally, the geometric drawings revealed **overwhelming social and monetary impacts**. Forty six homes must be removed to accommodate the widening including the removal of one apartment building and impacts to parking and drive through facilities for a mall area. Also included are impacts to school property and park property. The project also includes high-end construction items including the relocation of a major concrete drainage channel that operates year round, relocation of major utilities, eight new intersection and traffic signal improvements, new storm drain system and box culvert of Kirker Creek, along with the conventional cost of widening a road.

Should you have questions with regards to this letter report, please do not hesitate to contact me.

Sincerely,
RBF Consulting

William Conyers, P.E.
Senior Associate