City of Austin

MoPac Bicycle Bridge at Barton Creek

Alternatives Comparison and Recommendations

Febuary 2, 2012

DRAFT

City of Austin

MoPac Bicycle Bridge at Barton Creek

Alternatives Comparison and Recommendations

Prepared for

City of Austin

Prepared by

HDR Engineering, Inc.

4401 West Gate Blvd., Suite 400
Austin, Texas 78745
TBPE Firm Registration No. F-754

Febuary 2, 2012

DRAFT

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ACRONYMS AND ABBREVIATIONS

BCCP	Balcones Canyonlands Conservation Plan
BCP	Balcones Canyonlands Preserve
CE	Categorical Exclusion
CEF	Critical Environmental Feature
COA	City of Austin
CSJ	Control-Section-Job
CWA	Clean Water Act
CWQZ	Critical Water Quality Zones
EA	Environmental Assessment
ESA	Endangered Species Act
ESRP	Endangered Species Recovery Plan
FHWA	Federal Highway Administration
GA	Geologic Assessment
HCP	Habitat Conservation Plan
HDR	HDR Engineering, Inc.
LDC	Chapter 25, Austin City Code, Land Development
Loop 1	MoPac Expressway
Loop 360	Capital of Texas Highway
MoPac	MoPac Expressway
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
NWP	USACE General Nationwide Permit
OHWM	Ordinary High Water Mark

SCE	Programmatic Categorical Exclusion
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users
SAL	State Archeological Landmark
SBCA	Save Barton Creek Association
SCE	State Categorical Exclusion
SCP	Salamander Conservation Program
SHPO	State Historic Preservation Officer
Sierra Club	Lone Star Chapter of the Sierra Club
SOS	Save Our Springs
SOSA	Save Our Springs Alliance
SOU	Standards of Uniformity
SW3P	Storm Water Pollution Prevention Plan
TAC	Texas Administrative Code
TCEQ	Texas Commission on Environmental Quality
THC	Texas Historical Commission
TPWD	Texas Parks and Wildlife Department
TTI	Texas Transportation Institute
TxDOT	Texas Department of Transportation
TxDOT-ENV	TxDOT Environmental Affairs Division
U.S.	United States
USACE	U.S. Army Corps of Engineers
USDOT	U.S. Department of Transportation
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
WPAP	Water Pollution Abatement Plan

INTRODUCTION

Project Description

In 1986, the State of Texas constructed twin freeway bridges across Barton Creek as a part of the MoPac Expressway (MoPac; Loop 1) in Austin, Texas. The design of the structures included shoulders, which provided a means for recreational and commuter bicycle traffic to cross Barton Creek. Over time, increased traffic demands required the conversion of the shoulder on the northbound bridge to a dedicated exit lane for Capital of Texas Highway (Loop 360), eliminating the bicycle facility. The southbound shoulder continues to act as a bicycle facility. Due to the high volume and speed of traffic on MoPac, only Type A (experienced and adult) cyclists can use the MoPac bridges.

MoPac is a primary route for both recreational and commuter bicycle traffic. A recent Texas Transportation Institute (TTI) study of bicycle traffic shows over 100 bicycles per day on a typical weekend crossing Barton Creek on MoPac. Less than 2% of the bicyclists travel northbound. This disparity demonstrates the demand for a dedicated bicycle facility along the MoPac corridor. Anecdotal evidence further supports the demand for a bicycle facility at this location. Currently, no reasonable alternative route is available for bicycle traffic to cross Barton Creek. Additionally, this project ranked very high in the City's recently completed Strategic Mobility Plan (SMP), further indicating the project's importance to the transportation network as a whole.

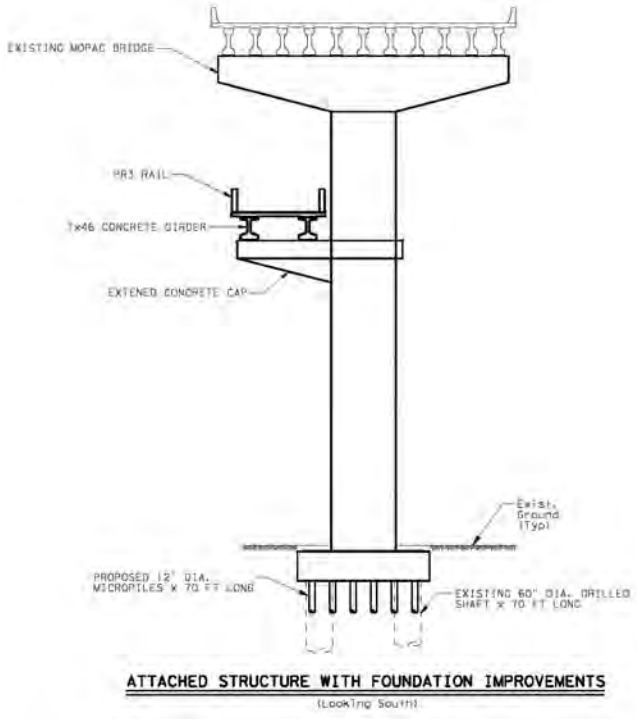
This phase of the Project being designed by HDR Engineering, Inc. (HDR) includes the preliminary design and investigations necessary to analyze the alternatives, whether attaching the new bridge to the existing MoPac bridges, or to develop a new structure adjacent to the existing bridge. The proposed structure will be designed to minimize the need for substructure units and minimize impacts to the environmentally sensitive Barton Creek greenbelt. In addition, minimally intrusive approaches from the existing frontage roads to the bicycle bridge are desired. The alternatives considered bicycle traffic patterns in the development of possible alignments and approaches, options for separating bicycles from the main lanes, merging bicycles with vehicular traffic on the frontage roads without creating a safety hazard, and possible safety improvements to the frontage roads to accommodate the merges. While the primary function of the structure is bicycle use, pedestrian use will be considered. The alternatives presented in this report all include pedestrian access.

The study limits extend from the MoPac Frontage Road turnaround south of Barton Creek to the intersection of Tuscan Terrace and Tamarron Boulevard north of Loop 360. The Texas

Department of Transportation (TxDOT) has constructed an 8-foot sidewalk along the northbound frontage road north of Tuscan Terrace, and is planning the construction of an 8-foot sidewalk along the southbound frontage road north of Tamarron Boulevard. The project will include connectivity from the bicycle bridge to these sidewalks, creating a seamless, separated bicycle facility along the MoPac corridor.

Following results of the preliminary structural analysis of the existing MoPac Bridge at Barton Creek, as well as discussions with the Lone Star Chapter of the Sierra Club (Sierra Club), Save Barton Creek Association (SBCA), and the Save Our Springs Alliance (SOSA), bridge alternatives were identified. Three alternatives have been developed and are presented in detail in Appendix A – Executive Summary of Preliminary Structural Analysis. The alternatives studied include:

- Attached Structure with Foundation Improvements



ATTACHED STRUCTURE WITH FOUNDATION IMPROVEMENTS
(Looking South)

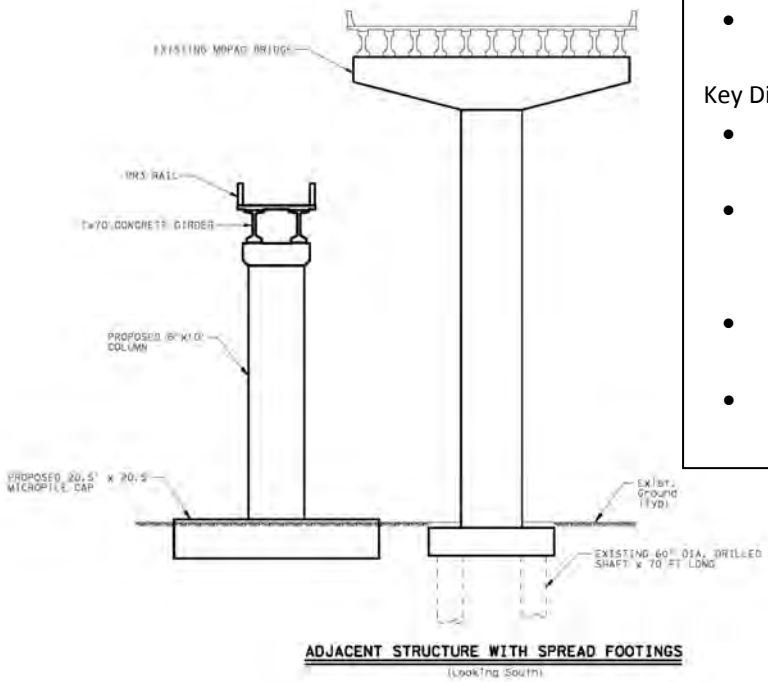
Key Advantage:

- Requires improvements to only 2 foundations.

Key Disadvantage:

- Requires construction operations within the creek
- Requires deep drilling below ground water

- Adjacent Structure with Spread (Gravity) Footings

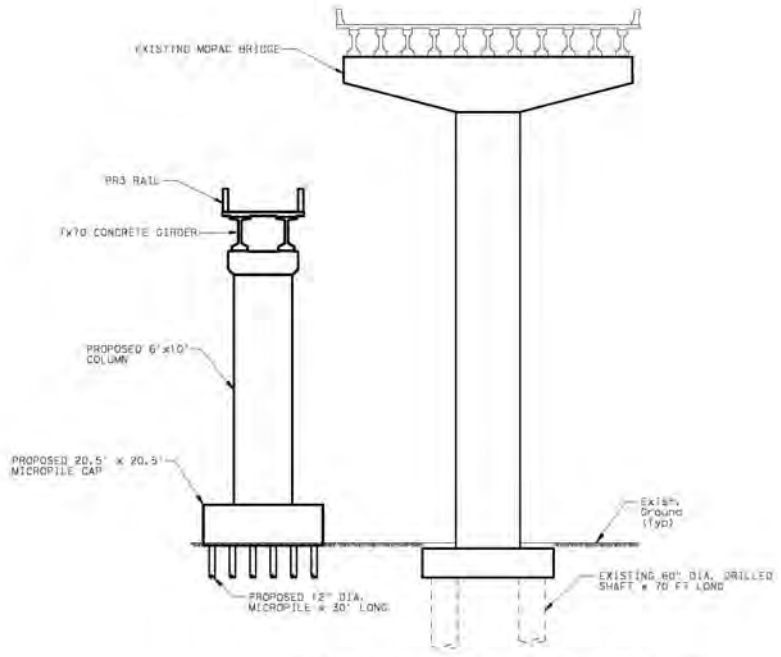


ADJACENT STRUCTURE WITH SPREAD FOOTINGS
(Looking South)

Key Advantage:
- No drilling with no impact to ground water.

Key Disadvantage:
- Requires construction of 6 foundations
- Requires largest area of disturbance with substantial excavation.
- Requires access for heavy construction equipment.
- Potential sediment run-off during construction.

- Adjacent Structure with Shallow Micropiles



ADJACENT STRUCTURE WITH SHALLOW MICROPILES
(Looking South)

Key Advantage:
- Shallow drilling with no impact to ground water.
- Minimal excavation required
- Reduced impact for construction equipment.

Key Disadvantage:
- Requires construction of 6 foundations
- Does require shallow drilling.

The environmental impacts, both regulatory and non-regulatory, of each of these alternatives has been studied and are presented below in Table 1. A complete discussion of the environmental features of the project site and the impacts of these alternatives can be found in Appendix B – Environmental Constraints Preliminary Report.

In addition, since the project site is located within the Edwards Aquifer an analysis of the effects of the alternatives on ground water flows has been conducted and is presented in Appendix C - Technical Memorandum on Assessment of Ground Water Flows.

Lastly, Appendix D- Technical Memorandum on Stormwater Management discusses the impacts and requirements for surface drainage of the project.

COMPARISON OF ENVIRONMENT IMPACTS

Environmental Issue	Attached Structure with Foundation Improvements	Adjacent Structure with Spread Footings	Adjacent Structure with Shallow Micropiles
Salamander Conservation Program **Possible large spills of hazardous materials after construction and/or catastrophic failure of erosion controls during construction**	**▼ Drilling operation will be located within the OHWM.**	**▼ Large excavation (7' to 8' depth) will require best management practices and construction oversight. Large excavation volumes and heavy construction equipment required increase risk of erosion during extreme rain events.**	**▲ Minimal excavation (0 to 2' depth) required with all drilling operations located outside of OHWM minimizing potential impacts.**
BCP & BCCP **Protection of caves**	**(N/A) Maps and BCP coordination indicate no protected caves will be affected.**	**(N/A) Maps and BCP coordination indicate no protected caves will be affected**	**(N/A) Maps and BCP coordination indicate no protected caves will be affected**
Protection of surface or subterranean karst features during construction	**▲Only two bent locations are affected minimizing potential impacts. USFWS and BCCP guidelines strictly followed.**	**▼ Large area excavation increases potential impacts. USFWS and BCCP guidelines strictly followed.**	**◄USFWS and BCCP guidelines strictly followed.**
Possible presence of nesting endangered songbirds March 1 to Sept. 1	**(N/A) Limited construction during nesting season.**	**(N/A) Limited construction during nesting season**	**(N/A) Limited construction during nesting season.**
TCEQ's Edwards Aquifer Protection Program **1st Feature: on isolated portion of rock created during the construction of MoPac and Loop 360**	**(N/A) No impacts. Feature considered not sensitive per TCEQ guidelines and Sylvia Pope.**	**(N/A) No impacts. Feature considered not sensitive per TCEQ guidelines and Sylvia Pope**	**(N/A) No impacts. feature considered not sensitive per TCEQ guidelines and Sylvia Pope.**
2nd Feature: sinkhole just downstream of the northbound lanes of MoPac	**▼Drilling operation inside OHWM will increase potential impacts. Feature outside limits of construction, but will be protected as necessary.**	**▼ Large excavations will increase potential impacts. Feature outside limits of construction, but will be protected as necessary.**	**▲Minimal excavations will decrease potential impacts. Feature outside limits of construction, but will be protected as necessary.**
Section 404, CWA **Barton Creek is subject to CWA regulation under Section 404 with Project affecting areas within OHWM**	**▼Drilling operation inside OHWM increases impacts. Obtain NWP 14 permit coverage as necessary.**	**▲ All activities are outside of OHWM. Obtain NWP 14 permit coverage as necessary.**	**▲ All activities are outside of OHWM. Obtain NWP 14 permit coverage as necessary.**
Storm Water Discharge **TPDES storm water general permit as applicable**	**▼Drilling operation inside OHWM will increase potential impacts. SW3P preparation in accordance with the TCEQ general storm water permit and COA requirements.**	**▼ Large area excavation increase potential impacts. SW3P preparation in accordance with the TCEQ general storm water permit, and COA requirements**	**▲Minimal excavations will decrease potential impacts. SW3P preparation in accordance with the TCEQ general storm water permit and COA requirements.**
National Environmental Policy Act/Section 4(f) **Project subject to NEPA requirements per TxDOT SCE required.**	**◄ NEPA document will be developed under TxDOT direction.**	**◄ NEPA document will be developed under TxDOT direction.**	**◄NEPA document will be developed under TxDOT direction.**
Cultural Resources **NHPA and Texas Antiquities Code requirements, known archaeological sites will be affected**	**◄ Current resources identified by records search not considered eligible for NRHP; coordination process with THC will be followed.**	**◄ Current resources identified by records search not considered eligible for NRHP; coordination process with THC will be followed.**	**◄Current resources identified by records search not considered eligible for NRHP; coordination process with THC will be followed.**
City of Austin Land Development Code **Three CEFs and associated buffer zones may be affected**	**◄Site plan processes and buffer zones around features precluding construction within zones may require variances.**	**◄Site plan processes and buffer zones around features precluding construction within zones may require variances.**	**◄ Site plan processes and buffer zones around features precluding construction within zones may require variances.**
Project site subject to COA-Barton Springs Zone CQQZ Requirements	**◄Approval of setback reduction by COA.**	**◄Approval of setback reduction by COA.**	**◄Approval of setback reduction by COA.**
SOS Ordinance	**◄Project would not be subject to the SOS Ordinance as a trail.**	**◄Project would not be subject to the SOS Ordinance as a trail.**	**◄Project would not be subject to the SOS Ordinance as a trail.**
Ground Water	**▼Drilling operation will require deep foundations. Narrow micropiles are used to minimize potential effects.**	**▲Shallow spread footing foundations will eliminate potential effects.**	**▲Shallow micropile foundations will eliminate potential effects.**

▲Indicates reduced impact ◄Indicates neutral impact ▼Indicates increased Impact **N/A** Indicates no impact

CONCLUSION

The attached structure with foundation improvements, detached structure on spread footings, and detached structure with shallow micropiles have all been found to be feasible options for the proposed bicycle bridge; however, the adjacent structure with shallow micropiles is the recommended preferred alternative for development of the project. Based on the studies presented, the adjacent structure with shallow micropiles offers the following advantages when compared with the other alternatives studied:

- Minimal excavation requirements will reduce potential effects of erosion during construction.
- Shallow micropile cap will reduce scour potential reducing long term erosion.
- Bridge foundations are located outside of OHWM, reducing potential to impact downstream endangered species and karst features.
- Shallow micropiles will not affect ground water flows.
- Small construction equipment for installation of micropiles will reduce effects to the greenbelt.
- Majority of construction activities can be conducted from top of existing Mopac northbound structure.

For these reasons the adjacent structure is the recommended preferred alternative for the construction of the Mopac Bridge at Barton Creek. A detailed description of this alternative as well as recommended construction sequencing can be found in Appendix A – Executive Summary of the Preliminary Structural Analysis.

APPENDIX A

City of Austin MoPac Bicycle Bridge at Barton Creek
Executive Summary
Preliminary Structural Analysis

November 23, 2011

City of Austin MoPac Bicycle Bridge at Barton Creek
Executive Summary
Preliminary Structural Analysis

Prepared for

City of Austin

Prepared by

HDR Engineering, Inc.
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PRELIMINARY

FOR INTERIM REVIEW ONLY. NOT FOR PERMITTING, BIDDING, OR CONSTRUCTION.

Prepared by or under the
Direct Supervision of
CURTIS M. ROKICKI, P.E. 97270
11/23/2011

November 23, 2011

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Attachment 6- Phase 2: Substructure Construction
Attachment 7- Phase 3: Superstructure Construction

INTRODUCTION

Currently, no reasonable alternate route to the existing MoPac Northbound Bridge is available for bicycle traffic to cross Barton Creek. This report includes discussion for both attached to the existing Northbound MoPac Bridge and detached stand-alone bicycle bridge options.

ATTACHED STRUCTURE

To minimize impacts to the environmentally sensitive region of the Barton Creek Green Belt, attaching the proposed MoPac Bicycle Bridge to the existing Northbound MoPac Bridge was considered. Various options were considered and can be seen in Attachment 1.

- Option 1: Consists of a 14' wide lightweight concrete deck supported via a steel truss system cantilevered from one side of the existing Northbound MoPac columns.
- Option 2: Consists of a 14' wide lightweight fiber-reinforced polymer (FRP) deck supported via a steel truss system cantilevered from one side of the existing Northbound MoPac columns.
- Option 3: Consists of dual 8' wide FRP deck supported via steel trusses, cantilevered on each side of the existing Northbound MoPac columns.
- Option 4: Consists of a 12' wide FRP deck supported via a steel truss system cantilevered from one side of the existing Northbound MoPac columns while also using hangers that provide midspan support for the truss system by attaching to the existing Northbound MoPac superstructure.
- Option 5: Consists of a 12' wide FRP deck supported via an aluminum truss system cantilevered from one side of the existing Northbound MoPac columns while also using hangers that provide midspan support for the truss system by attaching to the existing Northbound MoPac superstructure.

In order to understand the effects of attaching the proposed bicycle bridge to the existing structure, an analysis was performed to evaluate the existing condition demand vs. capacity. In addition, an analysis was conducted in which each of the options above was investigated for the effects on the existing structure. Further discussion on those findings is discussed in the following subsection, "Foundation Improvements to Existing Structure."

To complete the attached structure option, connection details were developed as seen in Attachment 2. The connection will be done through the use of post-tensioned bars placed outside of the existing column. It should be noted that through some preliminary cost analysis, it was decided that a prefab structural truss system was not the preferred bridge superstructure type. Cost savings could be found by changing the superstructure type from the prefab steel truss to concrete deck on TX46 prestressed concrete girders, which is exhibited in Attachment 2. The effects on the existing structure for this superstructure type were not investigated, however the results of this analysis are not expected to vary greatly from the envelope that is shown in Table 1 which shows the different options and their effects on the existing foundations. It should

be noted that the Bents for the existing structure increase numerically going from North to South with Bent 3 being just North of Barton Creek and Bent 4 just South of Barton Creek. Abutments 1 and 11 are not shown in Table 1as the proposed structure would have no effect on the existing abutments.

TABLE 1 - DRILLED SHAFT REACTIONS

	Calculated					
	Existing DS Axial Load	Option 1 DS Axial Load	Option 2 DS Axial Load	Option 3 DS Axial Load	Option 4 DS Axial Load	Option 5 DS Axial Load
Bent	(Ton/DS)					
2	801	1096	954	891	914	916
3	879	1096	1047	970	1000	991
4	818	1028	980	862	938	929
5	743	940	895	787	858	850
6	733	919	875	772	839	832
7	731	917	873	770	837	830
8	726	909	866	765	832	825
9	713	891	852	752	819	812
10	678	856	816	717	783	776

FOUNDATION IMPROVEMENTS TO EXISTING STRUCTURE

In reviewing Table 1, it can be seen that attaching the proposed bicycle bridge to the existing structure will increase reactions in the existing drilled shaft foundation. The owner, TxDOT, of the existing structure has advised that any additional load added to the bents adjacent to Barton Creek itself (Bent 3 and 4) will need to be accommodated through the use of additional foundation work (ie any added load will need to be taken by new foundation measures). Although this is feasible, any work done to increase the capacity of the existing footings to carry the additional load would be done in the normal high water for the creek and would require approval through further discussions with TxDOT.

ADJACENT STRUCTURE WITH SPREAD FOOTINGS

To avoid any work in the normal high water of Barton Creek, a second alignment was developed leading to a detached stand-alone structure.

To minimize ground impacts typically associated with deep foundations, a spread footing was looked at. However, due to the bents closest to Barton Creek that approach 65' in height,

overturning forces on the proposed stand-alone structure forced the spread footings to reach upwards of 37' x 37'.

Attachment 3 shows a plan and elevation of the proposed spread footing alternative.

ADJACENT STRUCTURE WITH MICROPILES

Using the adjacent structure alignment, a second choice of foundation was investigated which is the use of micropiles in place of the standard drilled shaft foundation. These piles are smaller in diameter and are designed to remain at shallow depth. Through analysis, these piles were found to obtain the resistance necessary in the upper limestone layers, not requiring penetration into the sand seams that are found at greater depths and used by the aquifer.

Attachment 4 shows a plan and elevation of the proposed micropile footing alternative.

PRELIMINARY CONSTRUCTION SEQUENCE

To advance one viable alternative, we have looked at the sequencing of construction for the detached structure with micropiles as the foundation system. View Attachments 5 through 7 for plan views.

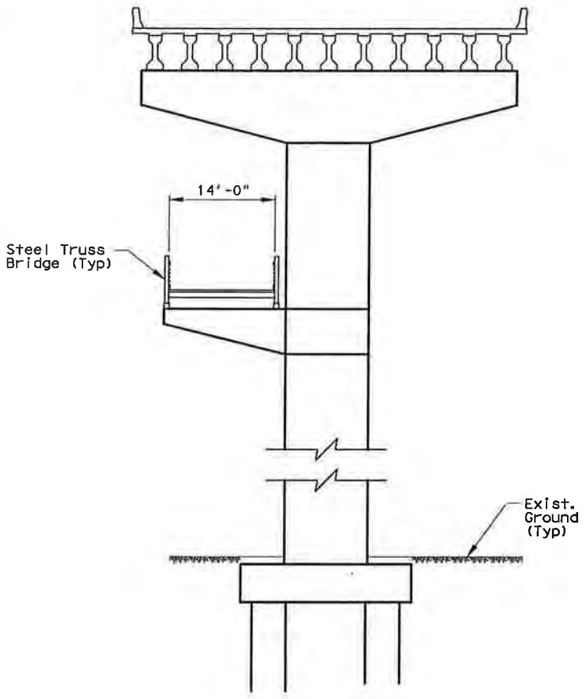
- Phase 1: Shown in Attachment 5, this phase illustrates the use of the existing access trail for construction equipment associated with the installation of the micropiles. Only minor clearing will be necessary for access. The installation of the micropiles north of Barton Creek will be accessed through the use of temporary timber planking to cross the creek that when installation of the micropiles completes is easily removed in its entirety. There will be some further clearing needed in the area directly around each of the columns, however, no heritage trees will be removed or damaged.
- Phase 2: Shown in Attachment 6, this phase illustrates the need for a nightly two lane closure on the Northbound MoPac Bridge for construction equipment located on the bridge deck, ie concrete trucks for the proposed bridge footings and columns(concrete will be pumped down to construction on ground). Foot traffic will be necessary along the ground for set up of formwork, etc.
- Phase 3: Shown in Attachment 7, this phase illustrates that once the substructure is complete, there will be no need for further equipment or foot traffic on the ground. Erection of the proposed TX70 girders will be done through cranes located on the existing Northbound MoPac Bridge and may require full nightly closures of the bridge.

CONCLUSION

The attached structure, detached structure on spread footings and detached structure on micropiles are all feasible options for the proposed bicycle bridge. The following should be considered when considering each:

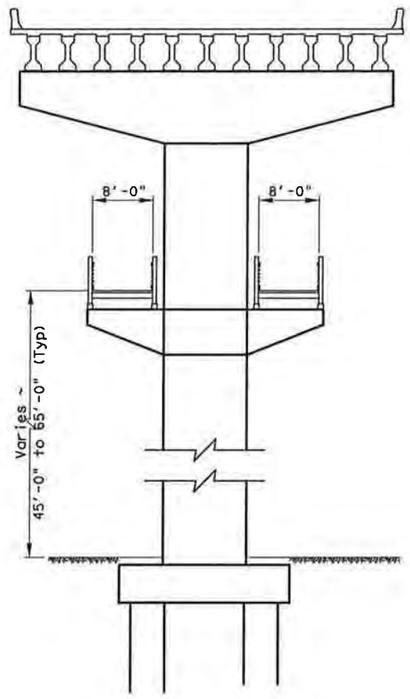
- The attached structure does create additional load on the existing structure will need to be accounted for with additional foundation work that would need to occur in the normal high water of Barton Creek.
- The detached structure on spread footings option should note the overall size of the footings from a global stability standpoint. A footing this size will require large amounts of excavation to sufficiently bury the footing as well as accommodate its length and width.
- The detached structure on micropiles does require excavation and foundation work near Barton Creek, however all work needed for this proposed option is limited on the ground and is outside the normal high water.

Forthcoming submittals entitled Technical Memorandum to Groundwater Impacts and Technical Memorandum to Environmental Impacts should be reviewed to gain better insight to the impacts on the Barton Creek region that are not covered in this summary.

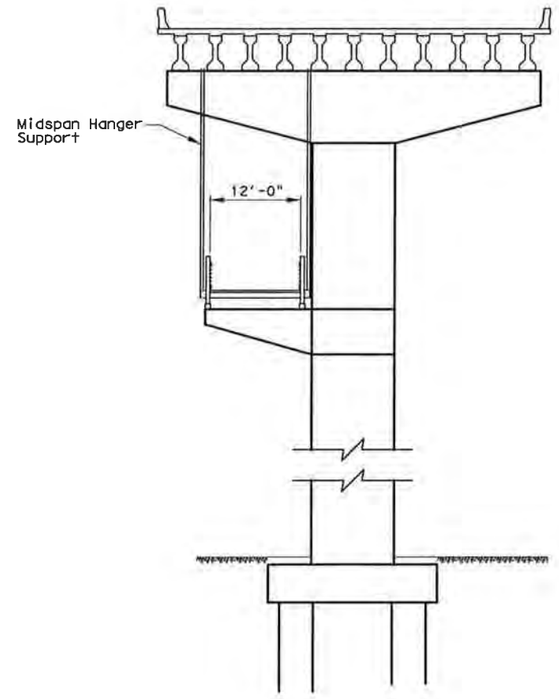


OPTION 1 (OPTION 2 SIMILAR)

(Looking South)



OPTION 3



OPTION 4 (OPTION 5 SIMILAR)

(Looking South)

Option	Description
1	14' wide, Steel Truss Bridge, Lightweight Concrete Deck
2	14' wide, Steel Truss Bridge, Fiber-Reinforced Polymer (FRP) Deck
3	2 ~ 8' wide, Steel Truss Bridge, FRP Deck (Dual Structures)
4	12' wide, Steel Truss Bridge, FRP Deck
5	12' wide, Aluminum Truss Bridge, FRP Deck

* All options require foundation improvements to existing bents 3 and 4.

Scale: 1:20

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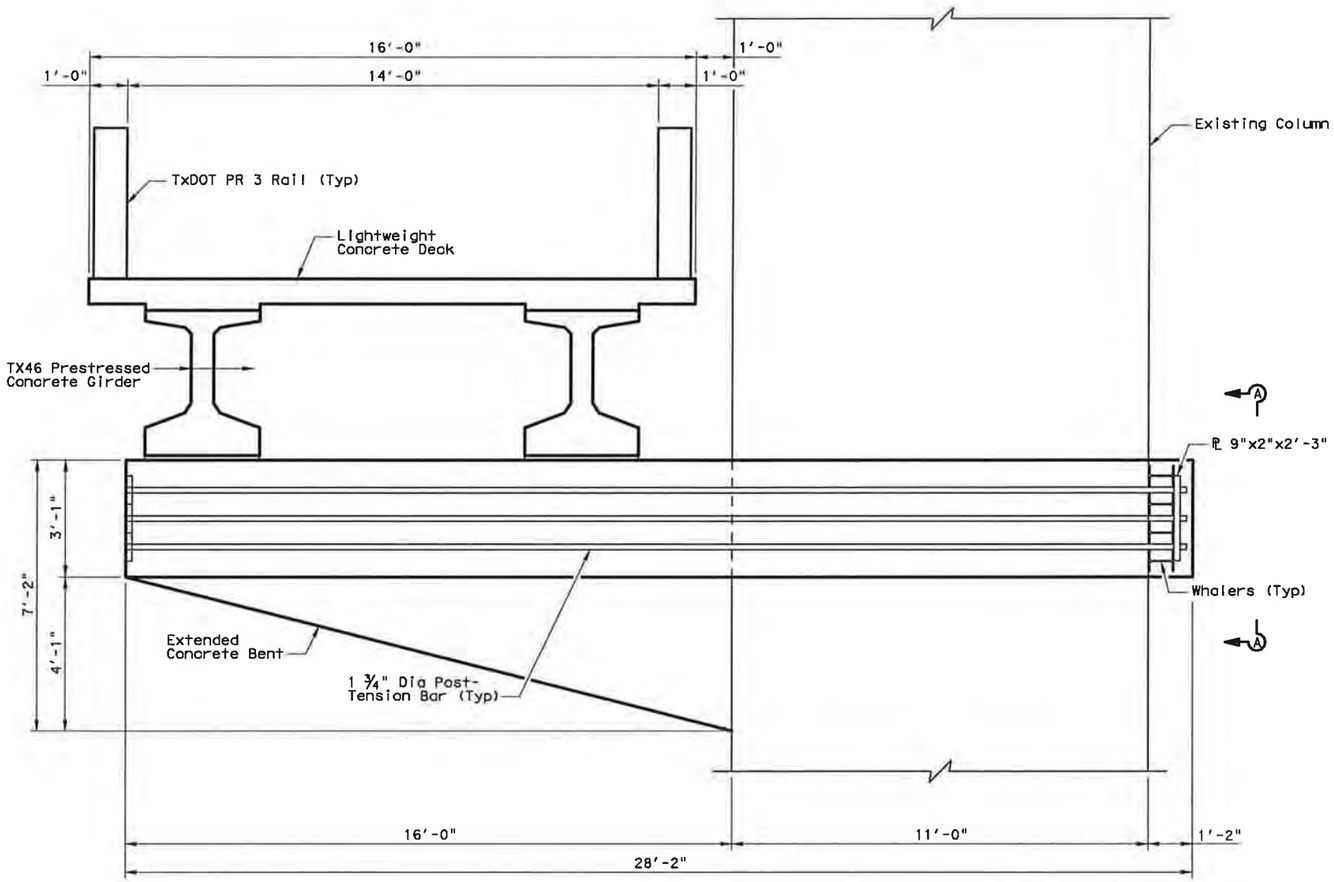
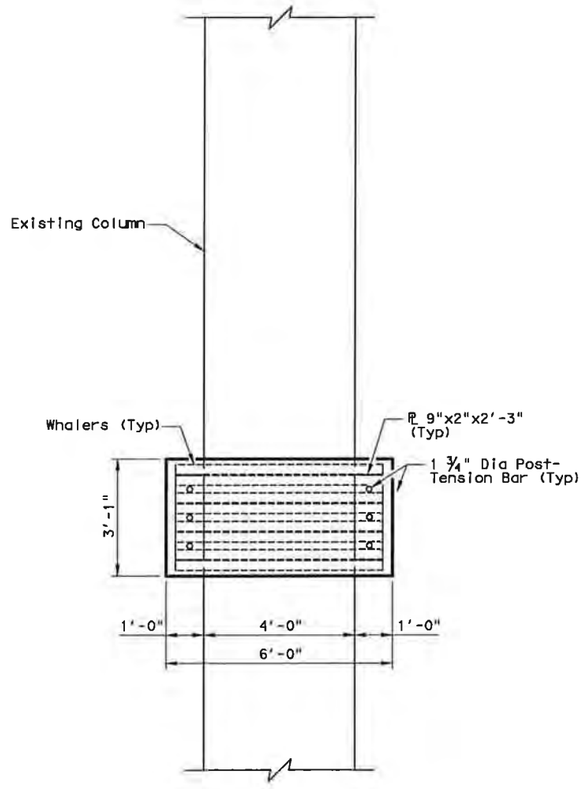
ATTACHMENT 1-
ATTACHED STRUCTURE OPTIONS



ELEVATION

(Looking South)



VIEW A-A

Scale: ¼" = 1'-0"

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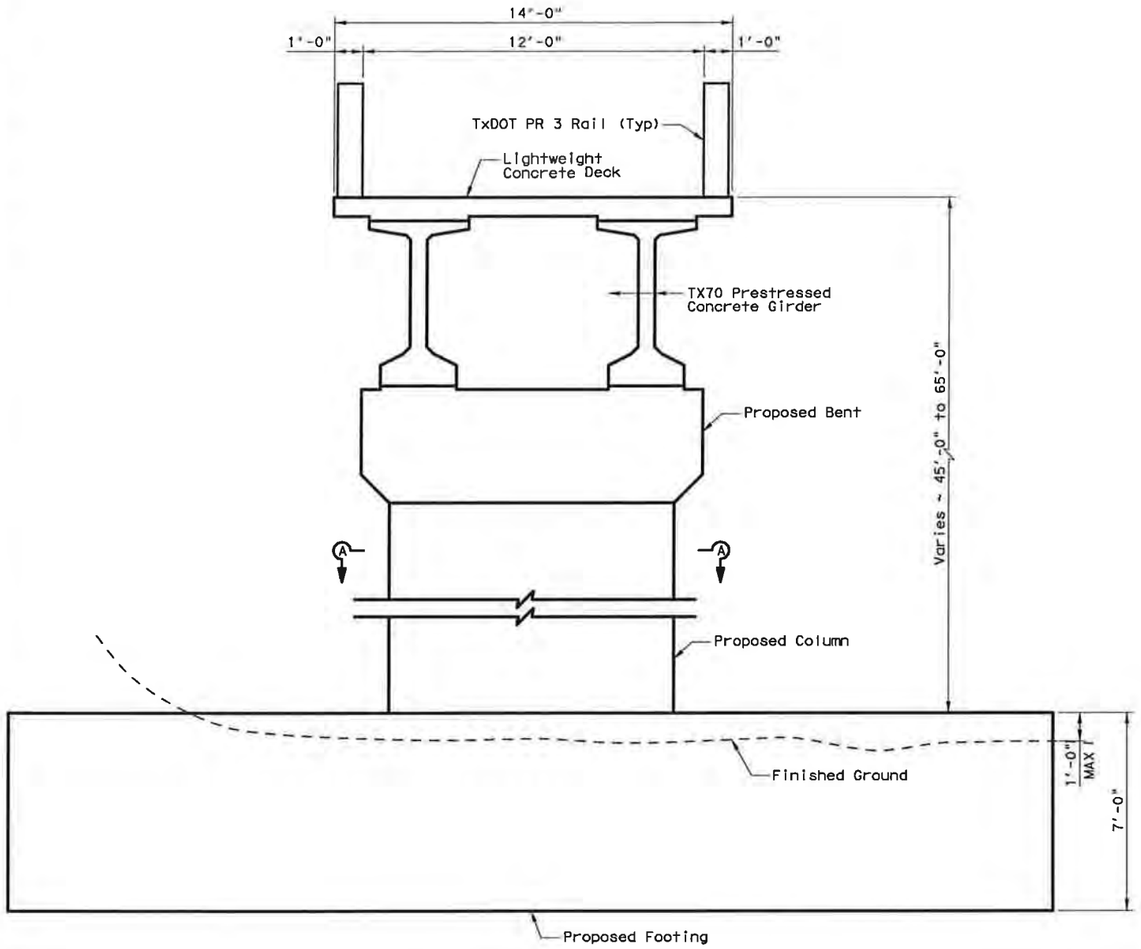
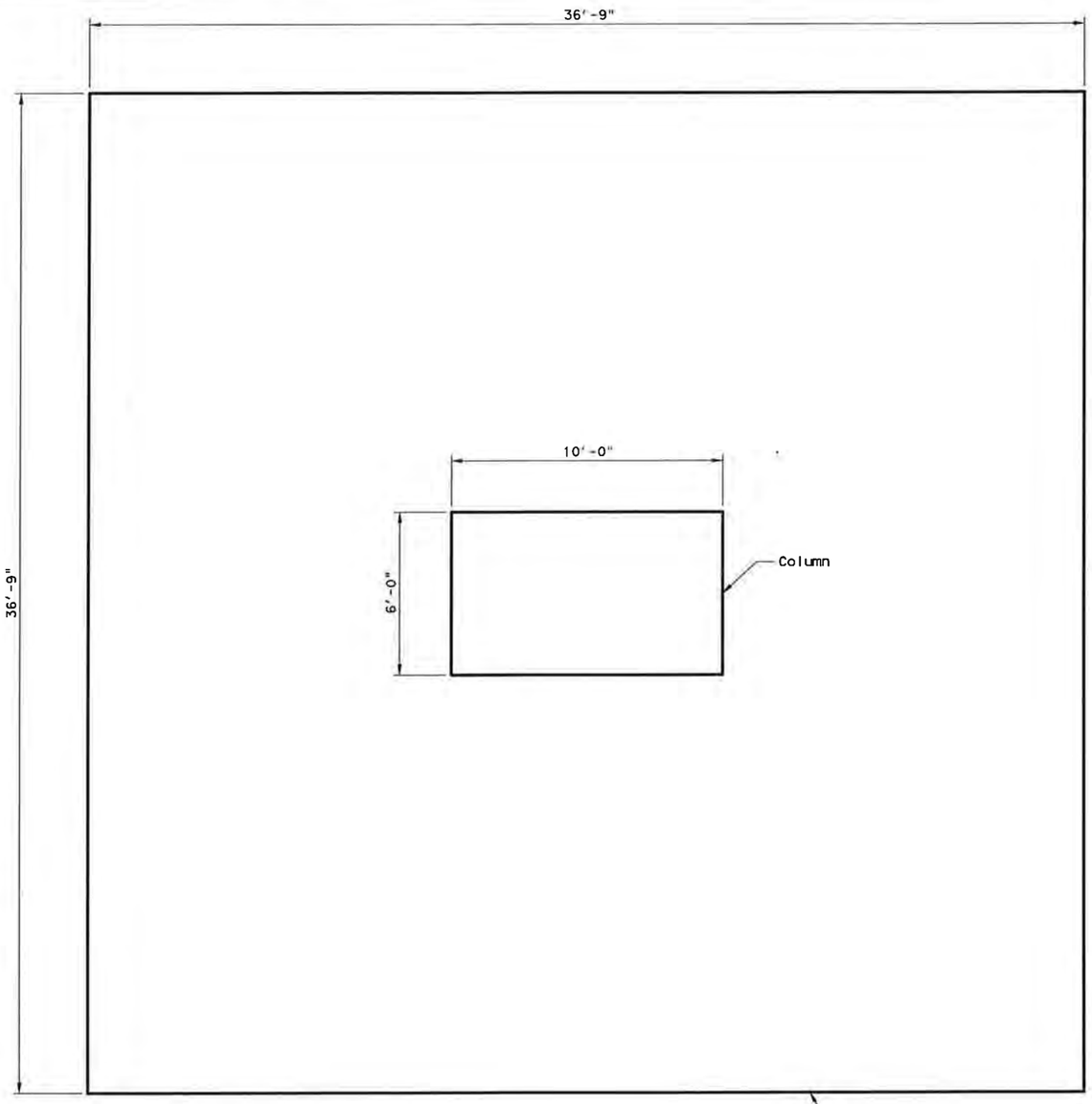
CITY OF AUSTIN

ATTACHMENT 2-
ATTACHED STRUCTURE OPTIONS CONNECTION DETAILS



ELEVATION



SECTION A-A

Scale: 3/16" = 1'-0"

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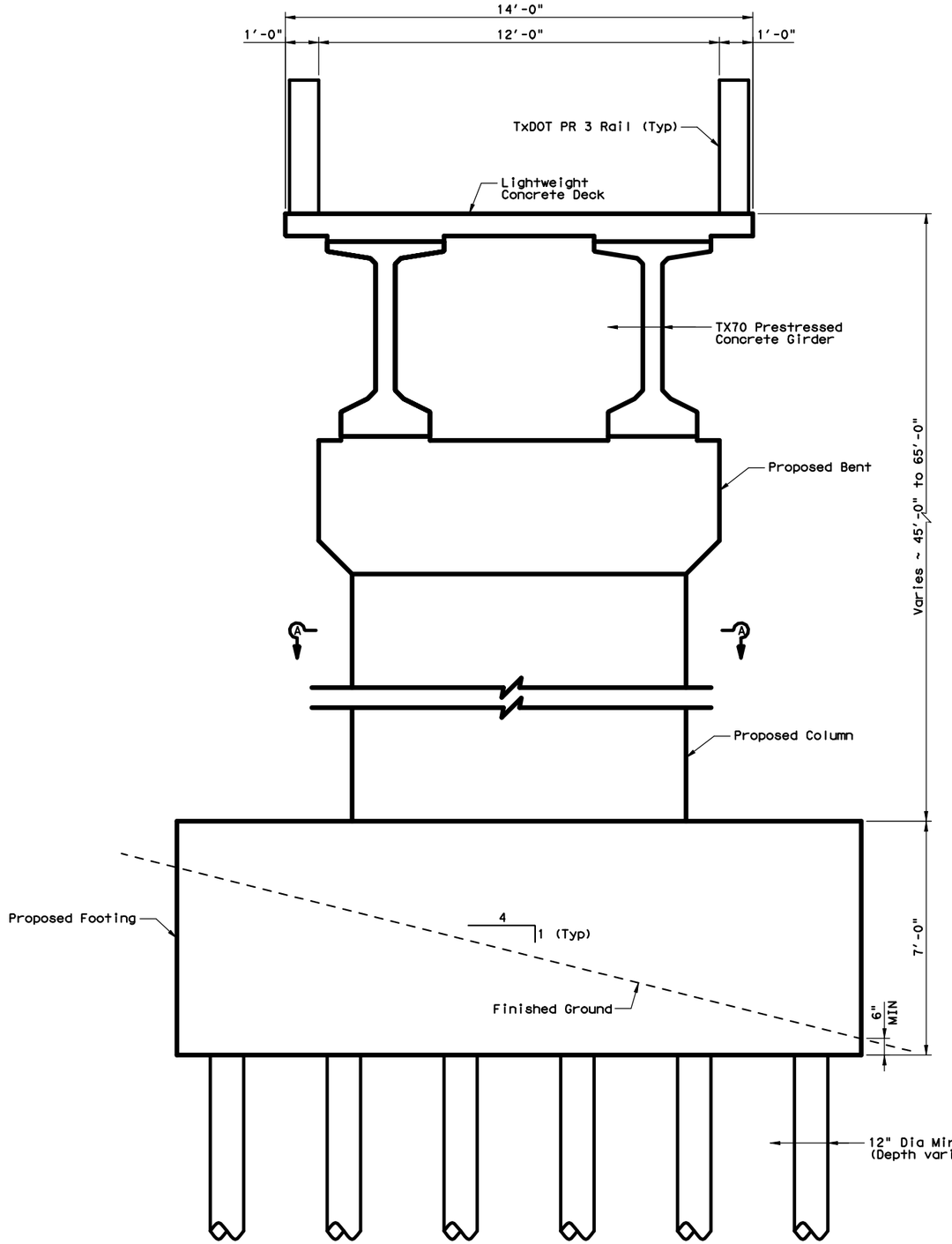
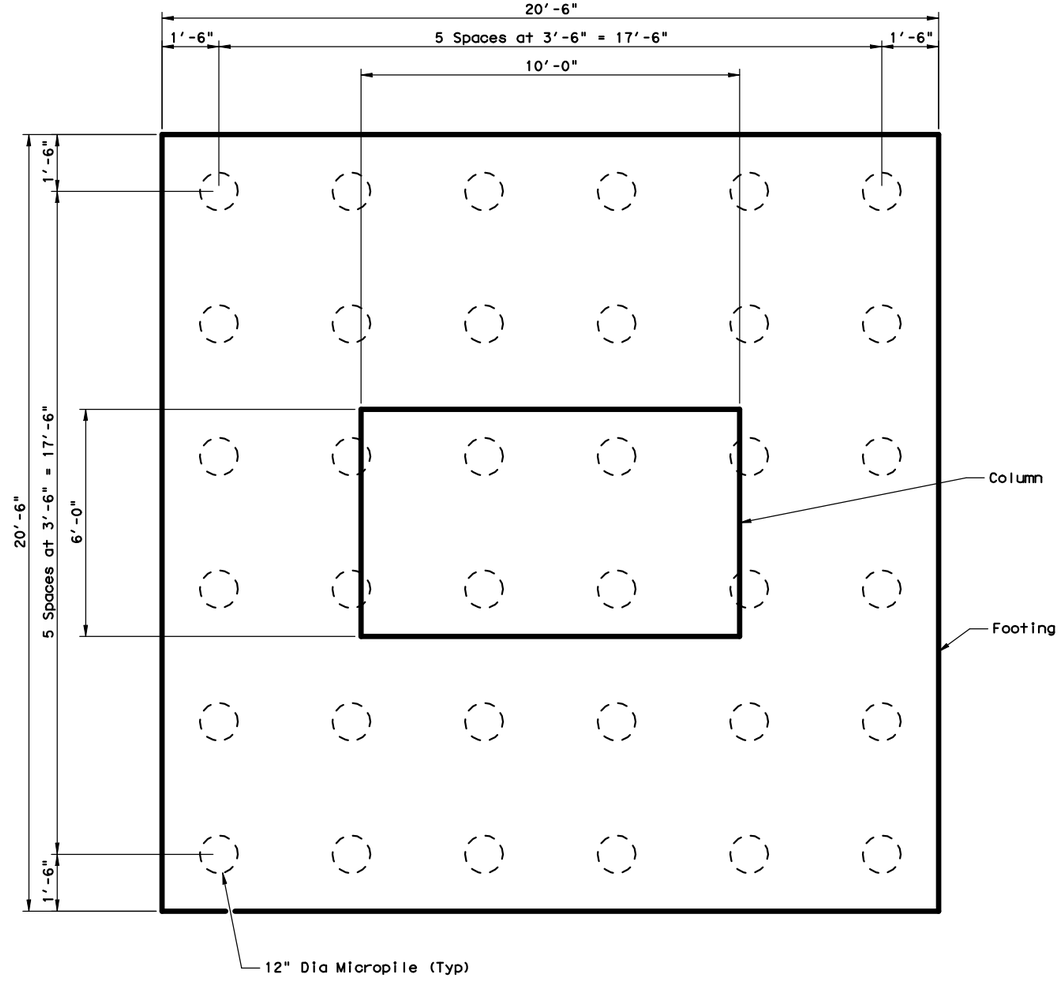
ATTACHMENT 3-
DETACHED STRUCTURE OPTION WITH SPREAD FOOTING



ELEVATION



SECTION A-A

Scale: 1/4" = 1'-0"

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CITY OF AUSTIN

**ATTACHMENT 4-
DETACHED STRUCTURE OPTION
WITH MICROPILES**

Date and Time Plotted: 2/2/2012 9:43:28 AM

User Name: mborenst
File Name: ...\Mopac Bridge Bent Schematic Alternative02.dgn

LEGEND

- EXISTING TEMPORARY ACCESS TRAIL- MINOR CLEARING AND TRIMMING REQUIRED
- CONSTRUCTION EQUIPMENT CROSSING-CLEARING REQUIRED
- CLEARING AND EXCAVATION FOR FOOTING AND MIRCROPILES- CLEARING REQUIRED
- TEMPORARY WOOD PLANKING

HDR Engineering, Inc.
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CITY OF AUSTIN

ATTACHMENT 5- PHASE 1: CLEARING, EXCAVATION, AND MICROPILE INSTALLATION

LEGEND

- TEMPORARY TWO LANE CLOSURE
- EXISTING TEMPORARY ACCESS TRAIL
- FOOT TRAFFIC CROSSING
- CLEARING FOR COLUMN CONSTRUCTION
- TEMPORARY WOOD PLANKING

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CITY OF AUSTIN

ATTACHMENT 6-
PHASE 2:
SUBSTRUCTURE CONSTRUCTION

LEGEND

NORTHBOUND MOPAC NIGHTLY LANE CLOSURE

HDR Engineering, Inc.
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CITY OF AUSTIN

ATTACHMENT 7-
PHASE 3:
SUPERSTRUCTURE CONSTRUCTION

Date and Time Plotted: 11/22/2011 5:57:14 PM

User Name: kberger
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APPENDIX B

City of Austin MoPac Bicycle Bridge at Barton Creek Environmental Constraints Preliminary Report

September 21, 2011

City of Austin MoPac Bicycle Bridge at Barton Creek
Environmental Constraints Preliminary Report

Prepared for

City of Austin

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September 21, 2011

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APPENDICES

FIGURES

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TABLES

ACRONYMS AND ABBREVIATIONS

BCCP	Balcones Canyonlands Conservation Plan
BCP	Balcones Canyonlands Preserve
CE	Categorical Exclusion
CEF	Critical Environmental Feature
COA	City of Austin
CSJ	Control-Section-Job
CWA	Clean Water Act
CWQZ	Critical Water Quality Zones
EA	Environmental Assessment
ESA	Endangered Species Act
ESRP	Endangered Species Recovery Plan
FHWA	Federal Highway Administration
GA	Geologic Assessment
HCP	Habitat Conservation Plan
HDR	HDR Engineering, Inc.
LDC	Chapter 25, Austin City Code, Land Development
Loop 1	MoPac Expressway
Loop 360	Capital of Texas Highway
MoPac	MoPac Expressway
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
NWP	USACE General Nationwide Permit
OHWM	Ordinary High Water Mark
SCE	Programmatic Categorical Exclusion
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users
SAL	State Archeological Landmark

SBCA	Save Barton Creek Association
SCE	State Categorical Exclusion
SCP	Salamander Conservation Program
SHPO	State Historic Preservation Officer
Sierra Club	Lone Star Chapter of the Sierra Club
SOS	Save Our Springs
SOSA	Save Our Springs Alliance
SOU	Standards of Uniformity
SW3P	Storm Water Pollution Prevention Plan
TAC	Texas Administrative Code
TCEQ	Texas Commission on Environmental Quality
THC	Texas Historical Commission
TPWD	Texas Parks and Wildlife Department
TTI	Texas Transportation Institute
TxDOT	Texas Department of Transportation
TxDOT-ENV	TxDOT Environmental Affairs Division
U.S.	United States
USACE	U.S. Army Corps of Engineers
USDOT	U.S. Department of Transportation
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
WPAP	Water Pollution Abatement Plan

CHAPTER 1

INTRODUCTION AND ENVIRONMENTAL BACKGROUND

1.1 PROJECT DESCRIPTION

In 1986, the State of Texas constructed twin freeway bridges across Barton Creek as a part of the MoPac Expressway (MoPac; Loop 1) in Austin, Texas. The design of the structures included shoulders, which provided a means for recreational and commuter bicycle traffic to cross Barton Creek. Over time, increased traffic demands required the conversion of the shoulder on the northbound bridge to a dedicated exit lane for Capital of Texas Highway (Loop 360), eliminating the bicycle facility. The southbound shoulder continues to act as a bicycle facility. Due to the high volume and speed of traffic on MoPac, only Type A (experienced and adult) cyclists can use the MoPac bridges.

MoPac is a primary route for both recreational and commuter bicycle traffic. A recent Texas Transportation Institute (TTI) study of bicycle traffic shows over 100 bicycles per day on a typical weekend crossing Barton Creek on MoPac. Less than 2% of the bicyclists travel northbound. This disparity demonstrates the demand for a dedicated bicycle facility along the MoPac corridor. Anecdotal evidence further supports the demand for a bicycle facility at this location. Currently, no reasonable alternative route is available for bicycle traffic to cross Barton Creek. Additionally, this project ranked very high in the City's recently completed Strategic Mobility Plan (SMP), further indicating the project's importance to the transportation network as a whole.

The Project being designed by HDR Engineering, Inc. (HDR) includes the preliminary design and investigations necessary to determine the best alternatives, whether attaching the new bridge to the existing MoPac bridges, or to develop a new structure adjacent to the existing bridge. The proposed structure will be designed to minimize the need for substructure units and minimize impacts to the environmentally sensitive Barton Creek greenbelt. In addition, minimally intrusive approaches from the existing frontage roads to the bicycle bridge are desired. The plan will consider bicycle traffic patterns in the development of possible alignments and approaches, options for separating bicycles from the main lanes, merging bicycles with vehicular traffic on the frontage roads without creating a safety hazard, and possible safety improvements to the frontage roads to accommodate the merges. While the primary function of the structure is intended for bicycles, pedestrian use will be considered. The preferred alternatives presented in this report all include pedestrian access.

The study limits extend from the Mopac Frontage Road turn around south of Barton Creek to the intersections of Tuscan Terrace and Tamarron Boulevard located north of Loop 360. The Texas Department of Transportation (TxDOT) has constructed an 8 foot

sidewalk along the northbound frontage road north of Tuscan Terrace and is planning for the construction of an 8 foot sidewalk along the southbound frontage road north of Tamarron Boulevard. The project will include connectivity of the bicycle bridge to these sidewalks, creating a seamless, separated bicycle facility along the MoPac corridor.

Currently, the Project is planned for implementation in three segments, all within the existing right- of- way (ROW) of MoPac as shown in the figure in Appendix A:

- Segment I - New bicycle bridge over Loop 360 with shared- use path along the northbound MoPac frontage roads from the north side of the northbound MoPac bridge over Loop 360 to Tuscan Terrace to connect to the new 8-foot sidewalk which was completed by TxDOT in spring 2010;
- Segment II - New bicycle bridge over Barton Creek with a shared- use path connecting the north side of the new bridge to the MoPac south to north frontage road loop under the north side of the MoPac bridges, and a new bicycle path from the first overpass south of the MoPac bridges (providing access to Gaines Ranch Loop) overland to the south side of the new bicycle bridge; and
- Segment III – Shared- use path along the southbound frontage road across Loop 360 at grade to Tamarron Boulevard to connect with a future 8-foot sidewalk that will be constructed by TxDOT from Tamarron Boulevard to Barton Springs Drive.

Following results of the preliminary structural analysis of the existing MoPac Bridge at Barton Creek, as well as discussions with the Lone Star Chapter of the Sierra Club (Sierra Club), Save Barton Creek Association (SBCA), and the Save Our Springs Alliance (SOSA), additional tasks were identified. The additional tasks are being developed to study and compare the environmental impacts of two (2) additional options for the development of the project. The first option is to improve the existing Bent 3 and 4 foundations to support the addition of the cantilever structure originally proposed to hang from the existing bridge columns. The second option is to construct an adjacent structure using construction techniques to minimize the environmental impacts of the construction. These techniques will include the use of “mini-pile” foundations or spread footings for the construction of the new foundations. This report indentifies these additional tasks.

1.2 ENVIRONMENTAL BACKGROUND

The Project is located in the unique and sensitive Barton Creek watershed in the recharge zone of the Edwards Aquifer. As such, it is subject to a number of environmental regulations which constitute project constraints. The main regulatory drivers are highlighted below.

The Endangered Species Act (ESA) provides a program for the conservation of threatened and endangered plants and animals and the habitats in which they are found. The lead federal agencies for implementing ESA are the U.S. Fish and Wildlife Service (USFWS) and the U.S. National Oceanic and Atmospheric Administration (NOAA) Fisheries Service. The USFWS maintains a worldwide list of endangered species. The Texas Parks and Wildlife Department implements state policies regarding threatened and

endangered species, and maintains a combined state and federal list by county as included in Appendix F.

A Habitat Conservation Plan (HCP) is an endangered species management plan, developed under the federal ESA. The main objectives of a HCP are to delineate, assess, and minimize adverse effects and to mitigate and offset negative impacts of a particular action, from a range or set of actions considered, on a federally-listed endangered species, while allowing incidental harm, or "taking", of a species by an otherwise lawful and legitimate activity. The HCP works in concert with an Endangered Species Recovery Plan (ESRP) under ESA to assure, to the maximum extent practicable, the survival and recovery of the species of concern in the wild. A responsive HCP is a prerequisite to the issuance of a permit from the US Fish and Wildlife Service (a so-called Section 10(a) permit) for those actions and activities with the potential for incidental take.

Relative to the Project, two primary HCPs are in effect and discussed further under relevant sections in Chapter 2:

- City of Austin/Barton Springs Pool for the Barton Springs Salamander; and
- Balcones Canyonlands for 9 listed and 24 non-listed species, including vertebrate, invertebrate, and avian species.

Recognizing the importance of the water quality of the Edwards Aquifer, the Texas legislature mandated the protection of the aquifer through the Texas Commission on Environmental Quality (TCEQ) under Title 30 Texas Administrative Code (TAC), Chapter 213. Three protection zones have been established, including the Contributing, Recharge, and Transition zones. The most stringent protections are required in the Recharge Zone where surface water can directly enter surface outcrops of the Edwards Aquifer formation. The Project is located in the Recharge Zone.

Among various regulated activities as defined by TCEQ rules, projects involving road construction must have a Geologic Assessment (GA) prepared describing the site-specific geology and identifying all potential pathways for contaminant movement to the Edwards Aquifer. Based on the GA, a Water Pollution Abatement Plan (WPAP) must be prepared and approved by TCEQ. The WPAP identifies measures that will be implemented to protect the water quality of the aquifer.

Section 404 of the Clean Water Act (CWA) established a program to regulate the discharge of dredged or fill material into waters of the United States (U.S.). The Rivers and Harbors Act of 1899 defined navigable waters of the United States as "those waters that are subject to the ebb and flow of the tides and/or are presently used, or have been used in the past, or maybe susceptible to use to transport interstate or foreign commerce." The CWA built on this definition and defined waters of the United States to include tributaries to navigable waters, interstate wetlands, wetlands which could affect interstate or foreign commerce, and wetlands adjacent to other waters of the United States. The program is jointly administered by the U.S. Army Corps of Engineers (USACE) and the U.S. Environmental Protection Agency (USEPA). The Corps is responsible for the day-to-day administration and permit review and EPA provides program oversight. The

Project will affect waters of the U.S., and thus will be subject to permitting under Section 404 of the CWA.

The CWA also established the National Pollutant Discharge Elimination System (NPDES) under the USEPA to regulate the discharge of pollutants to waters of the U.S., a separate program from Section 404 which addresses discharge of dredged or fill material. Among the activities regulated by the NPDES program are storm water discharges from construction activities. The USEPA has delegated the NPDES storm water permitting program to Texas under the Texas Pollutant Discharge Elimination System (TPDES) administered by TCEQ. The TCEQ has issued a general permit that provides for coverage of construction activities through preparation of a Storm Water Pollution Prevention Plan (SW3P) and meeting notice requirements based on the area disturbed by the project.

The Project will use existing TxDOT ROW acquired through federal funds, and the COA is applying for federal funding. The National Environmental Policy Act (NEPA) would be applicable, requiring consideration of the environmental effects of the project. TxDOT has indicated the project would likely require either a State Categorical Exclusion (SCE) or a Programmatic Categorical Exclusion (PCE) which would require approximately 18 months to complete. As funding sources are identified, coordination with the TxDOT Austin District will clarify whether a SCE or PCE is required.

Section 4(f) of the U.S. Department of Transportation Act of 1966 states that the Federal Highway Administration (FHWA) may not approve the use of land from a significant publicly owned park, recreation area, wildlife or waterfowl refuge, or historic site. However, if a determination is made that there is no feasible and prudent alternative to the use of land from the property and the action includes all possible planning to minimize harm to the property resulting from such use, then the taking may be approved. Section 6009(a) of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU), Pub. L. 109-59, amended existing Section 4(f) legislation to simplify the processing and approval of projects that have only de minimis impacts on lands protected by Section 4(f). This revision provides that once the U.S. Department of Transportation (USDOT) determines that a transportation use of Section 4(f) property, after consideration of any impact avoidance, minimization, and mitigation or enhancement measures, results in a de minimis impact on that property, an analysis of avoidance alternatives is not required and the Section 4(f) evaluation process is complete. Section 4(f) requirements will be addressed in parallel with NEPA, and also are processed through TxDOT.

Section 106 of the National Historic Preservation Act (NHPA) mandates federal agencies undergo a review process for all federally-funded and permitted projects that will impact sites listed on, or eligible for listing on, the National Register of Historic Places (NRHP). The NHPA is administered in Texas through the State Historic Preservation Officer (SHPO), who is the Executive Director of the Texas Historical Commission (THC). The Texas Antiquities Code provides state protection for cultural resources. The requirements of the NHPA will be applicable for the Project given the use of TxDOT ROW and anticipated application for federal funding.

In order to provide protection for significant environmental features of the COA, the Chapter 25 of the Austin City Code, Land Development (LDC), protects Critical Environmental Features (CEF) which include:

- springs,
- bluffs,
- canyon rimrocks,
- caves,
- sinkholes and recharge features, and
- wetlands.

Protection of CEFs is primarily accomplished through buffer zones around the features that preclude construction within the zones.

In addition to CEFs, the LDC establishes Critical Water Quality Zones (CWQZ) which also provide buffers along COA waterways. The Barton Creek CWQZ boundaries are 400 feet from the centerline of the creek. Finally, the Project is also subject to the provisions of the Save Our Springs (SOS) Initiative, The primary chapters in the Austin LDC relative to these issues include, Chapter 25-8, Article 11 (Barton Springs Zone Requirements) and Article 12 (Save Our Springs Initiative).

The SOS Ordinance was adopted in 1992 and differed from its predecessors because it became law by citizen initiative. Based on discussions with City staff, construction of a trail would not trigger requirements under the SOS Ordinance.

Additionally, preliminary discussions with City staff indicated that a general permit may be applicable to the project.

On February 24, 2010, the Austin City Council approved a Heritage Tree ordinance protecting certain tree species greater than 24-inches in diameter. Depending on the specific circumstances, removal of a Heritage Tree could require approval by the City Council with higher mitigation rates than other tree removals.

Table 1-1 Summary of Environmental Project Issues and Solutions

Issue	Solution
Salamander Conservation Program	
Possible large spills of hazardous materials after construction and/or catastrophic failure of erosion controls during construction	Required best management practices and construction oversight
BCP & BCCP	
Protection of caves	Maps and BCP coordination indicate no protected caves will be affected
Protection of surface or subterranean karst features during construction	Geologist or hydrogeologist on site at all times. USFWS and BCCP guidelines strictly followed
Possible presence of nesting endangered songbirds March 1 to September 1	No construction during nesting season
TCEQ's Edwards Aquifer Protection Program	
1st Feature: on isolated portion of rock created during the construction of MoPac and Loop 360	Feature considered not sensitive per TCEQ guidelines and Sylvia Pope
2nd Feature: sinkhole just downstream of the northbound lanes of MoPac	Outside limits of construction, but will be protected as necessary
Section 404, CWA	
Barton Creek is subject to CWA regulation under Section 404 with Project affecting areas within OHWM	Obtain NWP 14 permit coverage as necessary
Storm Water Discharge	
TPDES storm water general permit as applicable	SW3P preparation in accordance with the TCEQ general storm water permit, and COA requirements
National Environmental Policy Act/Section 4(f)	
Project subject to NEPA requirements per TxDOT, PCE or SCE required, and Section 4(f) evaluation may be required	As project design proceeds, prepare PCE or SCE under TxDOT direction, applicability of Section 4(f) requirements will be assessed, and level of required evaluation determined
Cultural Resources	
NHPA and Texas Antiquities Code requirements, known archaeological sites will be affected	Current resources identified by records search not considered eligible for NRHP; coordination process with THC through TxDOT will be followed.
City of Austin Land Development Code	
Three CEFs and associated buffer zones may be affected	Site plan processes and buffer zones around features precluding construction within zones may require variances or Project alternatives that avoid buffer zones. A general permit may be applicable.
Project site subject to COA-defined Barton Springs Zone Requirements, including CWQZ	Approval of setback reduction or modification by COA during the site plan review process.
SOS Ordinance	Project would not be subject to the SOS Ordinance as a trail.

CHAPTER 2

ENVIRONMENTAL CONSTRAINTS

2.1 SALAMANDER CONSERVATION PROGRAM

Three salamander species of concern are present in Austin, including:

- Austin Blind Salamander (*Eurycea waterlooensis*), candidate species for protection under the ESA;
- Barton Springs Salamander (*Eurycea sosorum*), listed endangered species under the ESA; and
- Jollyville Plateau Salamander (*Eurycea tonkawae*), candidate species for protection under the ESA.

Their protected status as of April 13, 2011, is shown in Appendix B on the list of special federal and state species maintained by the Texas Parks and Wildlife Department (TPWD). As noted in Chapter 1, the COA is implementing the City of Austin/Barton Springs Pool HCP for protection of the Barton Springs Salamander through the Salamander Conservation Program (SCP).

Laurie Dries manages the COA's SCP under the Watershed Protection Department. On January 27, 2011, members of the HDR team met with her to discuss the project as reflected in meeting minutes included in Appendix C. Ms. Dries indicated that the proposed work was sufficiently far upstream from the Barton Springs pool that she believed there would be no effect on protected salamanders. Required best management practices and construction oversight should address the erosion control potential. The following items should be considered as the project is designed:

- possible large spills of hazardous materials after construction,
- catastrophic failure of erosion controls during construction. and
- site plan processes where CEFs will be addressed.

2.2 BALCONES CANYONLANDS CONSERVATION PLAN

In 1996, the USFWS issued a federal permit jointly to the COA and Travis County authorizing the Balcones Canyonlands Conservation Plan (BCCP) and creating the Balcones Canyonlands Preserve (BCP). The BCP goal is to conserve 30,428 acres of endangered species habitat as mitigation for "take" of avian species under the ESA, and 62 karst features for the other species. The BCP provides habitat for nine endangered species, including:

- Golden-cheeked warbler,
- Black-capped vireo,
- Tooth Cave pseudoscorpion,
- Tooth Cave spider,
- Tooth Cave ground beetle,
- Bee Creek harvestman,
- Bond Cave harvestman,
- Kretschmarr Cave mold beetle, and
- Barton Springs salamander.

William Conrad is the Secretary, BCCP Coordinating Committee, and Manager, COA Wildland Conservation Division. The HDR team met with Mr. Conrad on several occasions to provide background on the Project and determine requirements relative to the BCCP and BCP system.

Mr. Conrad indicated that the MoPac ROW is an infrastructure corridor that has already been mitigated under the BCCP through the BCP system. After reviewing the project location and specifics, Mr. Conrad also indicated that the Project would not affect any protected caves. Correspondence regarding these discussions is included in Appendix D.

The Project may involve drilling in the MoPac ROW to install bents for the new bicycle bridge, which could expose additional surface or subterranean karst features. As described in more detail in Appendix D, the Project plans would include notes requiring the presence of a qualified geologist or hydrogeologist to detect and evaluate any karst caves, karst features, or subterranean voices detected during construction if drilling is to occur. If a feature is discovered, work will immediately stop, the feature will be evaluated, required notifications and process will be performed, and USFWS and BCCP guidelines will be strictly followed.

In order to protect the two endangered songbird species, avoidance of disturbance during the nesting season is critical (March 1 through September 1). Mr. Conrad indicated construction can proceed during nesting season if a qualified biologist monitors the surrounding area of the project to ensure no nesting birds are present.

2.3 EDWARDS AQUIFER

As discussed in Chapter 1, the Project lies in the Edwards Aquifer Recharge Zone and is subject to protection under the TCEQ's Edwards Aquifer Protection Program. TCEQ requires preparation of a GA to identify all contaminant pathways into the Edwards Aquifer. Appendix E contains the GA prepared for the Project, considering all three segments. Only two features were identified that could be affected by the Project, as shown on the figure in Appendix A.

The first feature is on an isolated portion of rock created during the construction of MoPac and Loop 360 between the eastbound and westbound lanes of Loop 360 as shown

on the picture below. As discussed in the GA, according to TCEQ guidelines and confirmed with Sylvia Pope, COA Watershed Protection Department, this feature is considered not sensitive, and thus not an issue for construction of the Project aside from installation and maintenance of temporary erosion and sediment controls.

The second feature is a sinkhole just downstream of the northbound lanes of MoPac as shown in Appendix A. This feature is outside the anticipated limits of construction, but will be protected in the course of Project design, as appropriate.

2.4 SECTION 404, CLEAN WATER ACT

Barton Creek is considered "waters of the U.S." under the CWA and subject to permitting requirements under the CWA. Waters of the U.S. include, but are not limited to, lakes, rivers, streams, creeks, ponds, and other special aquatic features, such as wetlands. Construction activities within the jurisdictional boundary of Barton Creek are subject to USACE regulation. The USACE jurisdiction over Barton Creek lies within the Ordinary High Water Mark (OHWM) of the channel. The OHWM is defined by the USACE as:

> …that line on the shore established by the fluctuations of water and indicated by physical characteristics, such as clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas.

The HDR team conducted a cursory site visit to approximate the OHWM near the existing MoPac bridges. The figure in Appendix A shows the approximate location of the OHWM for Barton Creek. If the final design of the Project will include work within the OHWM boundaries of Barton Creek, these activities may require permitting under USACE General Nationwide Permit (NWP) 14, Linear Transportation for "dredge and fill" activities under Section 404 of the CWA. Notification to the USACE for permitting under NWP 14 is required if the project will result in the loss of greater than one-tenth of an acre of waters of the U.S., or if there is a discharge in a special aquatic site, including

wetlands. During the cursory site visit, no wetlands or other special aquatic sites, as defined by the USACE, were observed.

2.5 STORM WATER DISCHARGE

During construction, the project must implement a SW3P to satisfy Section 26.040 of the Texas Water Code, which establishes the requirements for the TPDES storm water general permit. Depending on the final design, permit coverage may not be required. Small construction activities which disturb at least one but less than five acres, or are part of a larger common plan of development that will disturb at least one but less than five acres, are regulated under this general permit. Construction activities that disturb less than one acre, and are not part of a larger common plan of development that would disturb one or more acres, are not required to obtain coverage under this general permit.

The COA also requires SW3Ps for most construction projects. The SW3P must be submitted with the Site Development Permit Application for review and approval.

Results of the cursory site visit are included in Appendix F.

2.6 NATIONAL ENVIRONMENTAL POLICY ACT / SECTION 4(F)

TxDOT has indicated that the Project will be subject to NEPA requirements since TxDOT ROW will be used, and federal funding may be sought. Either a SCE or PCE document will be required, depending on whether or not federal funding is involved, and TxDOT will address approval of the required document. Based on further discussion with TxDOT as the project design proceeds, the applicability of Section 4(f) requirements will be assessed, and the level of required evaluation determined, if any. As funding is identified, further coordination with TxDOT should be undertaken.

2.7 CULTURAL RESOURCES

TxDOT has indicated that the Project will be subject to the higher level of requirements associated with the NHPA, in addition to the cultural resources requirements of the Texas Antiquities Code.

In order to identify the potential cultural resources constraints for the Project, the HDR team prepared a technical memorandum, included in Appendix G, identifying known NRHP and State Archeological Landmarks (SAL) sites near the Project limits. There are no NRHP or SAL sites within 1,000 feet of the Project. However, there are seven archaeological sites within 1,000 feet of the Project that have not had determinations of NRHP or SAL eligibility. Two of them stretch across the Project ROW. A figure showing the location of these sites is not included within the report to protect the integrity of these sites.

Thus, the Project will likely impact archeological resources. However, none of the resources identified within the project vicinity, or in the existing ROW, are considered eligible for listing in the NRHP, or as SALs. As such, these resources would not require preservation or data recovery.

2.8 CITY OF AUSTIN LAND DEVELOPMENT CODE

A detailed discussion of COA LDC issues is included in Appendix F. The COA LDC Chapter 25-8, Article 7, Division 2, Protection of Special Features, establishes protective buffers around CEFs. These protective buffers are provided for each CEF and include the following requirements and prohibitions:

> Natural vegetative cover must be retained to the maximum extent practicable; Construction is prohibited; and wastewater disposal or irrigation is prohibited.

During a cursory site visit, the HDR team located three CEFs as shown on the figure in Appendix A (one sinkhole and two canyon rimrock locations); and as described in the GA in Appendix E and the Preliminary Permitting Analysis Report in Appendix F. Depending on the final Project alignment, the limits of construction may encroach upon the protective buffer established for these features. The radial buffer for sinkholes is, at minimum, 150 feet and could be up to 300 feet. Rimrock buffers extend 150 feet upslope from the feature and 50-feet downslope and on either side. If the Project will encroach upon the protective CEF buffers described above, then a setback reduction must be approved by COA staff. This type of LDC variance may be approved administratively during the site plan review process. A bluff on the upstream side of the MoPac bridges is shown on the Appendix A figure, but the CEF buffer zone is not anticipated to encroach into the limits of construction for the Project.

The project site is located in the COA-defined Barton Springs Zone, and will be subject to COA LDC, Chapter 25-8, Article 11 (Barton Springs Zone Requirements) and Article 12 (Save Our Springs Initiative). These regulations prohibit most development within a CWQZ (400 feet from the centerline of Barton Creek), except for those allowances outlined in COA LDC, Chapter 25-8, Article 7, Division 1, Critical Water Quality Zone Restrictions, which states:

> In the Barton Springs Zone, a boat dock, pier, wharf, or marina and necessary access and appurtenances, or a pedestrian bridge, or bicycle or golf cart path, is permitted in a critical water quality zone.

If the COA determines the Project meets the above condition, then a variance from LDC requirements for CWQZs will not be required. If a variance from the LDC is required, then the variance request must be reviewed by the COA Environmental Board and approved by City Council. City staff have indicated that the SOS Ordinance may not be applicable as a trail.

In addition, no Heritage Trees were noted during the site visit in the vicinity of the Project.

2.9 ADDITIONAL INFORMATION

While gathering data, an attendee at a Save Barton Creek Association (SBCA) meeting indicated that a butterfly colony could use the existing MoPac bridges as a site. No concentrations of butterflies were observed at the bridges on multiple site visits. Butterflies are not known to establish permanent colonies or nesting areas in Central Texas in a fashion similar to bats or avian species.

CHAPTER 3

NEXT STEPS

This chapter outlines the next steps in the environmental permitting and approval process for the Project once an alternative has been selected.

Salamander Conservation Program

No further action is required, but periodic notification of project status to Laurie Dries is recommended.

Balcones Canyonlands Conservation Plan

Continued coordination with the BCP as the design progresses, with approval anticipated at the 90% design level. HDR will ensure that the required plan notes are included, approvals obtained, and that a qualified geologist or hydrogeologist will be available during construction. HDR also recommends that construction not occur during the critical nesting season for the two endangered songbirds (March 1 through September 1).

Edwards Aquifer

As the Project design progresses, a WPAP will be developed for approval by the TCEQ.

Section 404, Clean Water Act

As the Project design progresses, a delineation of the OHWM will be surveyed and the disturbed area within the OHWM boundaries will be determined. If the disturbed area exceeds 0.1 acres, coverage under NWP 14 will be obtained.

Storm Water Discharge

As the Project design progresses, a SW3P will be prepared in accordance with the TCEQ general storm water permit, and COA requirements.

National Environmental Policy Act / Section 4(f)

Coordination with TxDOT will require assignment by TxDOT of a Control-Section-Job (CSJ) which is used by TxDOT to track all projects. Either a CE or EA will be required, and a Section 4(f) evaluation will be prepared.

During the NEPA process, state and federal agency coordination will occur including, but not limited to:

- TxDOT ENV
- TPWD

- USFWS
- USACE Fort Worth District

Cultural Resources

Agency consultation for cultural resources would be required once a design for the bicycle bridge has been selected. All agency coordination would take place through TxDOT-Austin District and TxDOT's Environmental Affairs Division (TxDOT-ENV). With respect to archeological resources, a background study should be prepared that conforms to TxDOT-ENV's protocols and Standards of Uniformity (SOU) for archeological background studies.

The Project area and adjacent areas have been previously surveyed for archeological resources and many sites have been recorded as a result of those surveys. However all previous surveys took place more than 25 years ago. A field revisit could be required under the Texas Antiquities Code (and potentially under Section 106 of the NHPA should there be federal involvement, which is anticipated) to re-assess the condition of those existing sites and to re-evaluate them with respect to the current Project.

Additionally, coordination of effects to historic structures (if any) would likely be required through TxDOT, according to their SOUs for non-archeological historic resources.

City of Austin Land Development Code

A COA environmental assessment report will be prepared in accordance with the COA LDC to support a site development permit application. Tree surveys will also be required, and tree mitigation incorporated in the Project design as required. No further action relative to Heritage Trees is anticipated.

At this point, and depending on the final alignment, four variance requests under the LDC may be required for CEF setback reductions, and work within the Barton Creek CWQZ. The CEF variances could be administratively obtained through COA staff, but the CWQC variance would require approval by the COA Environmental Board and City Council. An analysis of Figure A-1 indicates that an alignment that avoids impacts to the CEFs is feasible.

CHAPTER 4

SIGNIFICANT REFERENCES

City of Austin, 2011. *Land Development Code, Technical Critera Manuals*, *http://www.amlegal.com/austin_tx/*.

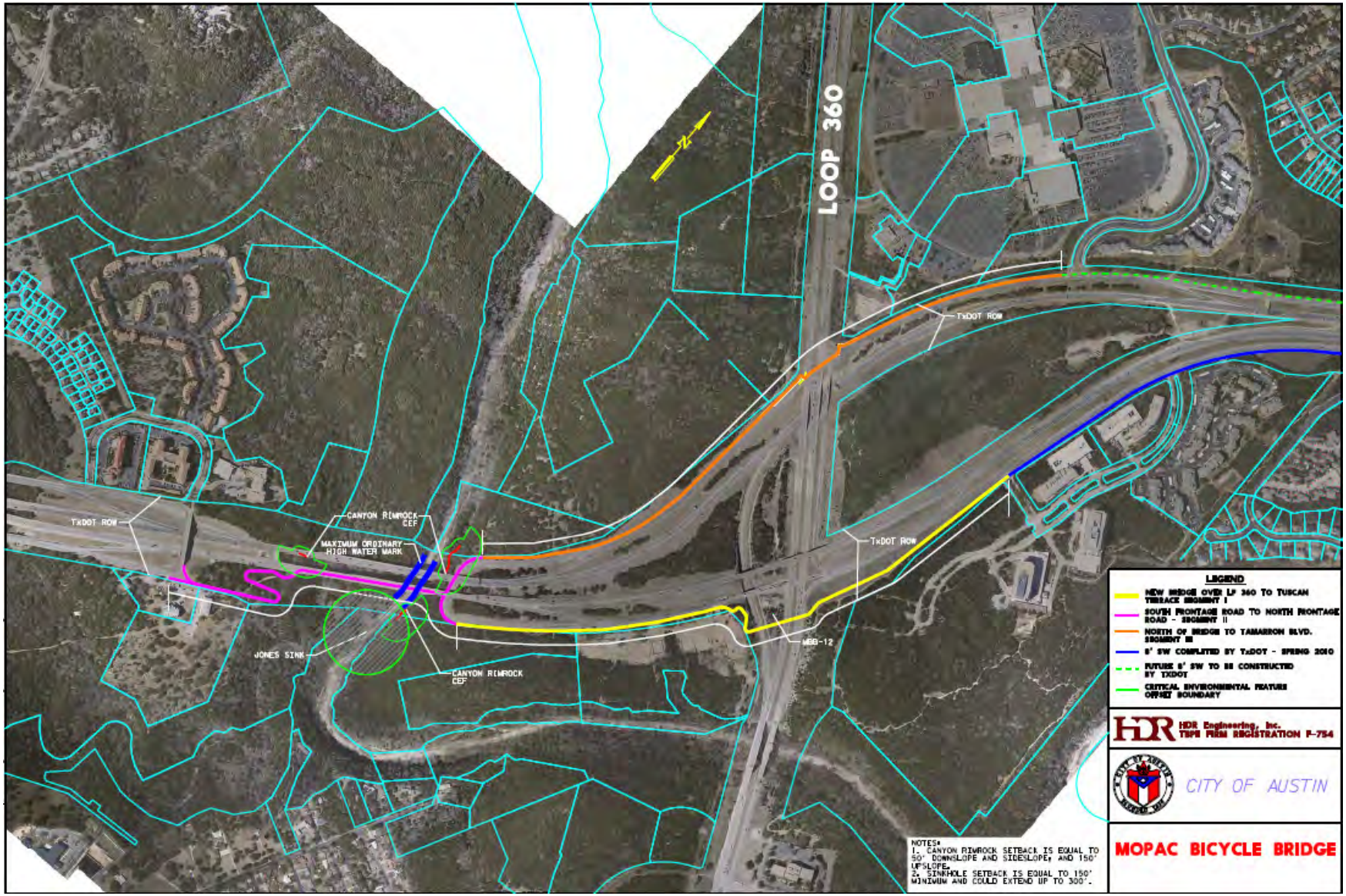
USFWS, 2011. Conservation Plans and Agreements Database, *Balcones Canyonlands (BCCP)*, http://ecos.fws.gov/conserv_plans/servlet/gov.doi.hcp.servlets.PlanReport?plan_id=261&region=2&type=HCP&rtype=1, April 13, 2011.

USFWS, 2011. Conservation Plans and Agreements Database, *City of Austin/Barton Springs Pool*, http://ecos.fws.gov/conserv_plans/servlet/gov.doi.hcp.servlets.PlanReport?plan_id=229&region=2&type=HCP&rtype=1, April 13, 2011.

APPENDIX A

MOPAC BICYCLE BRIDGE ENVIRONMENTAL CONSTRAINTS MAP

Figure A-1 MoPac Bicycle Bridge Environmental Constraints Map



APPENDIX B

TEXAS PARKS AND WILDLIFE DEPARTMENT SPECIAL SPECIES LIST FOR TRAVIS COUNTY

Notes for
County Lists of Texas' Special Species

The Texas Parks and Wildlife (TPWD) county lists **include**:

Vertebrates, Invertebrates, and Vascular Plants identified as being of conservation concern by TPWD within Texas. These special species lists are comprised of species, subspecies, and varieties that are federally listed; proposed to be federally listed; have federal candidate status; are state listed; or carry a global conservation status indicating a species is critically imperiled, very rare, vulnerable to extirpation, or uncommon.

The TPWD county lists **do not include**:

Natural Plant Communities such as Little Bluestem-Indiangrass Series (native prairie remnant), Water Oak-Willow Oak Series (bottomland hardwood community), Saltgrass-Cordgrass Series (salt or brackish marsh), Sphagnum-Beakrush Series (seepage bog).

Other Significant Features such as bird rookeries, migratory songbird fallout areas, comprehensive migratory bird information, bat roosts, bat caves, invertebrate caves, and prairie dog towns.

These lists are not all inclusive for all rare species distributions. The lists were compiled, developed, and are updated based on field guides, staff expertise, scientific publications, and the TPWD Texas Natural Diversity Database (TXNDD) (formerly the Biological and Conservation Data System) occurrence data. Historic ranges for some state extirpated species, full historic distributions for some extant species, accidentals and irregularly appearing species, and portions of migratory routes for particular species are not necessarily included. Species that appear on county lists do not all share the same probability of occurrence within a county. Some species are migrants or wintering residents only. Additionally, a few species may be historic or considered extirpated within a county.

TPWD includes the Federal listing status for your convenience and makes every attempt to keep the information current and correct. However, the US Fish and Wildlife Service (FWS) is the responsible authority for Federal listing status. The TPWD lists do not substitute for contact with the FWS and federally listed species county ranges may vary from the FWS county level species lists because of the inexact nature of range map development and use.

Status Key:

LE, LT -	Federally Listed Endangered/Threatened
PE, PT -	Federally Proposed Endangered/Threatened
SAE, SAT -	Federally Listed Endangered/Threatened by Similarity of Appearance
C -	Federal Candidate for Listing; formerly Category 1 Candidate
DL, PDL -	Federally Delisted/Proposed for Delisting
NL -	Not Federally Listed
E, T -	State Listed Endangered/Threatened
NT -	Not tracked or no longer tracked by the State
“blank” -	Rare, but with no regulatory listing status

This information is specifically for your assistance only; due to continuing data updates, **please do not redistribute the lists**, instead refer all requesters to the web site at: http://www.tpwd.state.tx.us/landwater/land/maps/gis/ris/endangered_species/ or to our office for the most current information available. For questions regarding county lists, please call (512) 389-4571.

Please use the following citation to credit the source for this county level information:

Texas Parks and Wildlife Department, Wildlife Division, Diversity and Habitat Assessment Programs. County Lists of Texas' Special Species. [county name(s) and revised date(s)].

TRAVIS COUNTY

AMPHIBIANS

		Federal Status	State Status
Austin blind salamander	*Eurycea waterlooensis*	C	

mostly restricted to subterranean cavities of the Edwards Aquifer; dependent upon water flow/quality from the Barton Springs segment of the Edwards Aquifer; only known from the outlets of Barton Springs (Sunken Gardens (Old Mill) Spring, Eliza Spring, and Parthenia (Main) Spring which forms Barton Springs Pool); feeds on amphipods, ostracods, copepods, plant material, and (in captivity) a wide variety of small aquatic invertebrates

Barton Springs salamander	*Eurycea sosorum*	LE	E

dependent upon water flow/quality from the Barton Springs pool of the Edwards Aquifer; known from the outlets of Barton Springs and subterranean water-filled caverns; found under rocks, in gravel, or among aquatic vascular plants and algae, as available; feeds primarily on amphipods

Jollyville Plateau salamander	*Eurycea tonkawae*	C	

known from springs and waters of some caves north of the Colorado River

Pedernales River springs salamander	*Eurycea sp 6*		

endemic; known only from springs

ARACHNIDS

		Federal Status	State Status
Bandit Cave spider	*Cicurina bandida*		

very small, subterrestrial, subterranean obligate

Bone Cave harvestman	*Texella reyesi*	LE	

small, blind, cave-adapted harvestman endemic to a few caves in Travis and Williamson counties; weakly differentiated from Texella reddelli

Reddell harvestman	*Texella reddelli*	LE	

small, blind, cave-adapted harvestman endemic to a few caves in Travis and Williamson counties

Tooth Cave pseudoscorpion	*Tartarocreagris texana*	LE	

small, cave-adapted pseudoscorpion known from small limestone caves of the Edwards Plateau

Tooth Cave spider	*Neoleptoneta myopica*	LE	

very small, cave-adapted, sedentary spider

Warton's cave meshweaver	*Cicurina wartoni*	C	

very small, cave-adapted spider

BIRDS

		Federal Status	State Status
American Peregrine Falcon	*Falco peregrinus anatum*	DL	T

TRAVIS COUNTY

BIRDS

Federal Status State Status

year-round resident and local breeder in west Texas, nests in tall cliff eyries; also, migrant across state from more northern breeding areas in US and Canada, winters along coast and farther south; occupies wide range of habitats during migration, including urban, concentrations along coast and barrier islands; low-altitude migrant, stopovers at leading landscape edges such as lake shores, coastlines, and barrier islands.

Arctic Peregrine Falcon *Falco peregrinus tundrius* DL

migrant throughout state from subspecies' far northern breeding range, winters along coast and farther south; occupies wide range of habitats during migration, including urban, concentrations along coast and barrier islands; low-altitude migrant, stopovers at leading landscape edges such as lake shores, coastlines, and barrier islands.

Bald Eagle *Haliaeetus leucocephalus* DL T

found primarily near rivers and large lakes; nests in tall trees or on cliffs near water; communally roosts, especially in winter; hunts live prey, scavenges, and pirates food from other birds

Black-capped Vireo *Vireo atricapilla* LE E

oak-juniper woodlands with distinctive patchy, two-layered aspect; shrub and tree layer with open, grassy spaces; requires foliage reaching to ground level for nesting cover; return to same territory, or one nearby, year after year; deciduous and broad-leaved shrubs and trees provide insects for feeding; species composition less important than presence of adequate broad-leaved shrubs, foliage to ground level, and required structure; nesting season March-late summer

Golden-cheeked Warbler *Dendroica chrysoparia* LE E

juniper-oak woodlands; dependent on Ashe juniper (also known as cedar) for long fine bark strips, only available from mature trees, used in nest construction; nests are placed in various trees other than Ashe juniper; only a few mature junipers or nearby cedar brakes can provide the necessary nest material; forage for insects in broad-leaved trees and shrubs; nesting late March-early summer

Interior Least Tern *Sterna antillarum athalassos* LE E

subspecies is listed only when inland (more than 50 miles from a coastline); nests along sand and gravel bars within braided streams, rivers; also know to nest on man-made structures (inland beaches, wastewater treatment plants, gravel mines, etc); eats small fish and crustaceans, when breeding forages within a few hundred feet of colony

Mountain Plover *Charadrius montanus* PT

breeding: nests on high plains or shortgrass prairie, on ground in shallow depression; nonbreeding: shortgrass plains and bare, dirt (plowed) fields; primarily insectivorous

Peregrine Falcon *Falco peregrinus* DL T

both subspecies migrate across the state from more northern breeding areas in US and Canada to winter along coast and farther south; subspecies (F. p. anatum) is also a resident breeder in west Texas; the two subspecies' listing statuses differ, F.p. tundrius is no longer listed in Texas; but because the subspecies are not easily distinguishable at a distance, reference is generally made only to the species level; see subspecies for habitat.

Sprague's Pipit *Anthus spragueii* C

TRAVIS COUNTY

BIRDS

Federal Status State Status

only in Texas during migration and winter, mid September to early April; short to medium distance, diurnal migrant; strongly tied to native upland prairie, can be locally common in coastal grasslands, uncommon to rare further west; sensitive to patch size and avoids edges.

Western Burrowing Owl *Athene cunicularia hypugaea*

open grasslands, especially prairie, plains, and savanna, sometimes in open areas such as vacant lots near human habitation or airports; nests and roosts in abandoned burrows

Whooping Crane *Grus americana* LE E

potential migrant via plains throughout most of state to coast; winters in coastal marshes of Aransas, Calhoun, and Refugio counties

CRUSTACEANS

Federal Status State Status

An amphipod *Stygobromus russelli*

subterranean waters, usually in caves and limestone aquifers; resident of numerous caves in ca. 10 counties of the Edwards Plateau

Balcones Cave amphipod *Stygobromus balconis*

subaquatic, subterranean obligate amphipod

Bifurcated cave amphipod *Stygobromus bifurcatus*

found in cave pools

FISHES

Federal Status State Status

Guadalupe bass *Micropterus treculii*

endemic to perennial streams of the Edward's Plateau region; introduced in Nueces River system

Smalleye shiner *Notropis buccula* C

endemic to upper Brazos River system and its tributaries (Clear Fork and Bosque); apparently introduced into adjacent Colorado River drainage; medium to large prairie streams with sandy substrate and turbid to clear warm water; presumably eats small aquatic invertebrates

INSECTS

Federal Status State Status

Kretschmarr Cave mold beetle *Texamaurops reddelli* LE

small, cave-adapted beetle found under rocks buried in silt; small, Edwards Limestone caves in of the Jollyville Plateau, a division of the Edwards Plateau

Leonora's dancer damselfly *Argia leonorae*

south central and western Texas; small streams and seepages

Rawson's metalmark *Calephelis rawsoni*

TRAVIS COUNTY

INSECTS

Federal Status State Status

moist areas in shaded limestone outcrops in central Texas, desert scrub or oak woodland in foothills, or along rivers elsehwere; larval hosts are Eupatorium havanense, E. greggii.

Tooth Cave blind rove beetle *Cylindropsis sp 1*

one specimen collected from Tooth Cave; only known North American collection of this genus

Tooth Cave ground beetle *Rhadine persephone* LE

resident, small, cave-adapted beetle found in small Edwards Limestone caves in Travis and Williamson counties

MAMMALS

Federal Status State Status

Cave myotis bat *Myotis velifer*

colonial and cave-dwelling; also roosts in rock crevices, old buildings, carports, under bridges, and even in abandoned Cliff Swallow (Hirundo pyrrhonota) nests; roosts in clusters of up to thousands of individuals; hibernates in limestone caves of Edwards Plateau and gypsum cave of Panhandle during winter; opportunistic insectivore

Plains spotted skunk *Spilogale putorius interrupta*

catholic; open fields, prairies, croplands, fence rows, farmyards, forest edges, and woodlands; prefers wooded, brushy areas and tallgrass prairie

Red wolf *Canis rufus* LE E

extirpated; formerly known throughout eastern half of Texas in brushy and forested areas, as well as coastal prairies

MOLLUSKS

Federal Status State Status

Creeper (squawfoot) *Strophitus undulatus*

small to large streams, prefers gravel or gravel and mud in flowing water; Colorado, Guadalupe, San Antonio, Neches (historic), and Trinity (historic) River basins

False spike mussel *Quadrula mitchelli* T

possibly extirpated in Texas; probably medium to large rivers; substrates varying from mud through mixtures of sand, gravel and cobble; one study indicated water lilies were present at the site; Rio Grande, Brazos, Colorado, and Guadalupe (historic) river basins

Smooth pimpleback *Quadrula houstonensis* T

small to moderate streams and rivers as well as moderate size reservoirs; mixed mud, sand, and fine gravel, tolerates very slow to moderate flow rates, appears not to tolerate dramatic water level fluctuations, scoured bedrock substrates, or shifting sand bottoms, lower Trinity (questionable), Brazos, and Colorado River basins

Texas fatmucket *Lampsilis bracteata* T

streams and rivers on sand, mud, and gravel substrates; intolerant of impoundment; broken bedrock and course gravel or sand in moderately flowing water; Colorado and Guadalupe River basins

TRAVIS COUNTY

MOLLUSKS

Federal Status State Status

Texas fawnsfoot *Truncilla macrodon* T

little known; possibly rivers and larger streams, and intolerant of impoundment; flowing rice irrigation canals, possibly sand, gravel, and perhaps sandy-mud bottoms in moderate flows; Brazos and Colorado River basins

Texas pimpleback *Quadrula petrina* T

mud, gravel and sand substrates, generally in areas with slow flow rates; Colorado and Guadalupe river basins

REPTILES

Federal Status State Status

Spot-tailed earless lizard *Holbrookia lacerata*

central and southern Texas and adjacent Mexico; moderately open prairie-brushland; fairly flat areas free of vegetation or other obstructions, including disturbed areas; eats small invertebrates; eggs laid underground

Texas garter snake *Thamnophis sirtalis annectens*

wet or moist microhabitats are conducive to the species occurrence, but is not necessarily restricted to them; hibernates underground or in or under surface cover; breeds March-August

Texas horned lizard *Phrynosoma cornutum* T

open, arid and semi-arid regions with sparse vegetation, including grass, cactus, scattered brush or scrubby trees; soil may vary in texture from sandy to rocky; burrows into soil, enters rodent burrows, or hides under rock when inactive; breeds March-September

PLANTS

Federal Status State Status

Basin bellflower *Campanula reverchonii*

Texas endemic; among scattered vegetation on loose gravel, gravelly sand, and rock outcrops on open slopes with exposures of igneous and metamorphic rocks; may also occur on sandbars and other alluvial deposits along major rivers; flowering May-July

Bracted twistflower *Streptanthus bracteatus*

Texas endemic; shallow, well-drained gravelly clays and clay loams over limestone in oak juniper woodlands and associated openings, on steep to moderate slopes and in canyon bottoms; several known soils include Tarrant, Brackett, or Speck over Edwards, Glen Rose, and Walnut geologic formations; populations fluctuate widely from year to year, depending on winter rainfall; flowering mid April-late May, fruit matures and foliage withers by early summer

Canyon mock-orange *Philadelphus ernestii*

Texas endemic; usually found growing from honeycomb pits on outcrops of Cretaceous limestone exposed as rimrock along mesic canyons, usually in the shade of mixed evergreen-deciduous canyon woodland; flowering April-June, fruit dehiscing September-October

Correll's false dragon-head *Physostegia correllii*

TRAVIS COUNTY

PLANTS

Federal Status State Status

wet, silty clay loams on streamsides, in creek beds, irrigation channels and roadside drainage ditches; or seepy, mucky, sometimes gravelly soils along riverbanks or small islands in the Rio Grande; or underlain by Austin Chalk limestone along gently flowing spring-fed creek in central Texas; flowering May-September

Texabama croton *Croton alabamensis var texensis*

Texas endemic; in duff-covered loamy clay soils on rocky slopes in forested, mesic limestone canyons; locally abundant on deeper soils on small terraces in canyon bottoms, often forming large colonies and dominating the shrub layer; scattered individuals are occasionally on sunny margins of such forests; also found in contrasting habitat of deep, friable soils of limestone uplands, mostly in the shade of evergreen woodland mottes; flowering late February-March; fruit maturing and dehiscing by early June

Warnock's coral-root *Hexalectris warnockii*

in leaf litter and humus in oak-juniper woodlands on shaded slopes and intermittent, rocky creekbeds in canyons; in the Trans Pecos in oak-pinyon-juniper woodlands in higher mesic canyons (to 2000 m [6550 ft]), primarily on igneous substrates; in Terrell County under Quercus fusiformis mottes on terrraces of spring-fed perennial streams, draining an otherwise rather xeric limestone landscape; on the Callahan Divide (Taylor County), the White Rock Escarpment (Dallas County), and the Edwards Plateau in oak-juniper woodlands on limestone slopes; in Gillespie County on igneous substrates of the Llano Uplift; flowering June-September; individual plants do not usually bloom in successive years

APPENDIX C

MEETING MINUTES, SALAMANDER CONSERVATION PROGRAM

Meeting Minutes

Mopac Bicycle Bridge
One Texas Center, 11th Floor
January 27, 2011

Attendees:

HDR:
Mark Borenstein, Mark.Borenstein@hdrinc.com, 912-5130
Craig McColloch, Craig.McColloch@hdrinc.com, 912-5178

Ciry of Austin:
Laurie Dries, Laurie.Dries@ci.austin.tx.us, 974-6340

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1. The purpose of the meeting was to brief Laurie Dries on the conceptual alternatives, including the bridging of Barton Creek in the existing TxDOT ROW, associated trails along Mopac, and an aerial bicycle bridge crossing at Loop 360. Laurie Dries is responsible for the salamander protection program for the City.

2. Laurie indicated the proposed work was sufficiently far upstream from the Barton Springs pool that she believed there would be no effect on protected salamanders. Items to consider as the project moves forward:

   2.1. Possible large spills of hazardous materials after construction.

   2.2. Catastrophic failure of erosion controls during construction.

   2.3. Site plan process where CEFs will be addressed.

3. Since the project is bicycle/pedestrian, there should be no hazardous materials associated with use of the trail system that could involve contamination.

4. Laurie indicated that required best management practices and construction oversight should address the erosion control potential.

5. Laurie indicated that now that she is aware of the project, she will be able to respond to those members of the public she comes into contact with in her work with salamander and Barton Springs protection who may have concerns.

APPENDIX D

CORRESPONDENCE, BALCONES CANYONLANDS CONSERVATION PROGRAM

MINUTES

Mopac Bike Bridge Meeting with Willy Conrad

January 14, 2011

9:00 a.m. – 10:00 a.m.

Attendees: Willy Conrad- BCCP; Mark Borenstein, Craig McColloch, Paula Jo Lemonds, Leah Peters - HDR; Brian Cowan, Jean Krejca- Zara Environmental

Location: Wildland Conservation Division - Reicher Ranch; 3621 South FM 620

http://www.ci.austin.tx.us/water/wildland/location.htm

Agenda Items:

1. Update Willy on project status
    a. In preliminary phase now
        1. Extent of the Corridor is defined by the existing ROW
    b. Two Bridge Crossing Alternatives are being considered: Cantilever from existing bridge or a separate structure, outboard of the existing bridge. Both in alternatives are located within existing TxDOT ROW.
        1. Plans require Coordination Secretary's approval (Willy Conrad)
            1. Minor Project- Less than 3,000 sq. ft. and would include Geotech. Casual Approval, 5 day turnaround
            2. Major Project- Over 3000 sq. ft. 90% plans required for approval. Willy has 30 days to review and Deny, Approve, or Approve w/conditions
        2. Consultation throughout project best option for approval
            1. No Separate Coordination. Everything through Willy.
            2. Mark would need to develop qualifications for contractor and list on plans. Also to include notes about Karst disturbance procedures per Willy.
        3. Clarify they are both in existing ROW and established corridor for MoPac
            1. City Project will use existing Mitigation- Regulations are that as long as new project is within existing ROW, no new mitigation necessary.
        4. Explain impacts

Activity (concerns)	Hanging	Outbound
Drill into bedrock (local karst inverts, GW quality)	Y, bent improvements	Y, new bents
Construction siltation (GW quality, local karst inverts, BS salamander)	Y, bent improvements	Y, new bents
Cut trees (warbler)	Y, bridge approach	Y, bridge approach

2. Zara Questions for Willy
    a. What type of environmental document will be required
        1. Willy asked about Drilling Process
            1. Mark explained plan of (20'x20') area to be used per bent (3 bents @ 8" each to depth of 70-80')
            2. All construction will occur in existing TxDOT ROW within designated BCCP infrastructure corridor
            3. Length of construction time TBD
            4. Will need to coordinate any geotechnical with Willy; current plan is to not conduct geotechnical investigations
            5. Karst cavities identified during drill will trigger - U.S. Fish and Wildlife (USFWS) standards
                a. If cavity found in course of drilling, will need to stop work & investigate via video. Close Cavity. Have qualified biologist per USFWS guidelines monitor and study.
                b. If Presence/Absence Survey will be required, baited trap every 7 days at least 3 times in cavity.
                c. Use untreated water for drilling. Write up of work plan with mitigations and best management practices coordinated in course of project development and design
            6. Willy will sign off at the 90% plan set, but will coordinate leading up to the 90%
            7. Karst Biology- USFWS approval for continuation. Willy stated that since it's a mitigated corridor, only scientific data required.
        2. Depending on watershed boundaries for Airman's Cave, hydrogeologic study to determine flow paths/watershed for cave OR that site is already isolated by previous disturbances.
            1. Willy will provide GIS map and email Craig McColloch and Brian Cowan.
        3. Surficial karst survey
            1. Willy- Close attention at clearing vegetation. No clearing permitted during nesting season (3/1-8/31). Possible to clear starting 8/1 with permission. 1st 3 weeks of March typically have high volume of nesting birds.
            2. Construction is permitted during nesting season, (1) if it is begun before the season starts (March 1) and (2) continues without an extend break and (3) there are no birds nesting within 300'.
                a. Noted that this probably will not be an issue based on current traffic in the area.
                b. If Construction is done during nesting season, biologist must be on site.
            3. Geologic Assessment requirements for BCCP.
                a. Pedestrian survey for karst and CEFs can be limited to TxDOT ROW, areas of disturbance.
    b. Surficial survey beyond TxDOT ROW not needed.
    c. Bird surveys (we are assuming occupancy during nesting season) - No bird survey required.
        1. Clarify we will not construct during nesting in plans/specs

d. Questions related to utility corridor
    1. Primary or secondary utility corridor? NO
    2. Project area in a special use tract? NO
    3. Will bridge be considered “new construction in approved corridors?” – approved corridor

3. HDR Questions for Willy
    a. What are the current unit mitigation costs BCCP? – None. Site already mitigated.
    b. What information is needed to determine the amount of mitigation expense? – None, site mitigated
4. Construction Items
    a. Construction is already mitigated. Issue will be if karst void found during drilling,
        1. Bore diameters are 9” which is plenty of room for camera when necessary
        2. Existing logs on holes do not show any karst voids
        3. Permanent casing will be used to contain cement
5. Watershed Issue – Airman’s Cave
    a. Willy will provide plot from deepest part of cave using presumptive watershed contour
    b. If plot shows project is in the watershed of Airman’s Cave, potential options will include:
        1. Use prior Hydrogeology study to show no new effects will be caused by current drilling
        2. Show pre-existing environmental stressors- basin & topography and demonstrate prior impacts already in place
        3. Find another cave for mitigation
        4. Willy said this is a common issue right now. Negotiation timeframe is minimum of 6 months.
        5. Jean mentioned case of distance and size making environmental effects negligible.
        6. Brian mentioned checking into die studies in nearby areas that have already been done and see where they show the flow going.
6. Action items
    a. Zara research to confirm Airman’s Cave is only one potentially affected
    b. Willy (BCCP) to provide plot of Airman’s Cave watershed in PDF and supply GIS data

MINUTES

Mopac Bike Bridge Meeting with Willy Conrad

January 31, 2011

2 pm-3 pm

Attendees: Willy Conrad- BCCP; Mark Borenstein, Craig McColloch, Paula Jo Lemonds, Leah Peters, Greg Kochersperger - HDR; Brian Cowan - Zara Environmental

Location: Wildland Conservation Division - Reicher Ranch; 3621 South FM 620

http://www.ci.austin.tx.us/water/wildland/location.htm

1. Update Willy on project status
    a. Mark brought detailed Aerial and reiterated project limits, scope, sections for both aerial crossings:
        1. Mopac at Barton Creek
        2. Mopac at Loop 360
    b. Airmans's Cave drainage basin elevation is 528' elevation. Existing grade is just above this for Mopac at Barton Creek, well above for Mopac at Loop 360. Plan is to drill down and get below existing cave elevation. Grade climbs, so drilling would be deeper the farther up we go.
    c. HDR's goal is to keep all staging areas at grade and higher.
2. Willy indicated there no reasonable likelihood for our project to impact existing caves/karst.
    a. Project is outside drainage basin for all caves in area.
    b. Other existing projects would interrupt the flow long before it could reach the cave basin.
    c. No hydrogeologic study is necessary.
    d. HDR will be performing as much work as possible outside of nesting season and will incorporate detailed notes on plans.
3. Per Willy, only requirement is that we clearly spell out on the plan sheets and in the general notes the procedure for handling voids encountered during excavation in strict compliance with USFWS requirements.
4. Summary.
    a. Willy has determined the project as currently planned will not affect existing features. Next step from here: Continue to coordinate with Willy on design plans up through 90%. That way when we get to 90%, he can sign off on the plans.
    b. HDR to meet with Sierra Club- discuss drilling and effect, if any, on groundwater flows.
5. Action items
    a. Willy will send Annick (COA advocate) and Allison (COA PM) Memo of Confirmation containing the go ahead to proceed based on BCCP's determination that the project won't affect surface or subsurface flow to caves.
    b. Willy will send Craig and Mark the language compliant with USFWS requirements for the Karst Investigation procedures in the event a void is discovered during drilling.

c. Zara will provide summary confirming that the fracture found at the roadcut does not meet minimum Fish and Wildlife Qualifications for potential habitat. Also, they will check City code to see what procedure is listed to be able to fill fracture with concrete.

McColloch, Craig

From: Conrad, William [William.Conrad@ci.austin.tx.us]
Sent: Monday, January 31, 2011 4:11 PM
To: McColloch, Craig; Borenstein, Mark
Cc: Beaudet, Annick; Dietzel, Allison
Subject: Requested Karst Disturbance Guidelines
Attachments: karst guidelines inside corridors 13111.doc

As requested. I will send a memo confirming that the Mopac Bicycle Bridge project will not affect protected caves later this week under separate cover.

W

Karst Disturbance Guidelines for Infrastructure Construction within BCCP Infrastructure Corridors

During construction in BCCP Karst Habitat Zones 1 and 2, should karst features be discovered or disturbed during excavation or land clearing:

- Maintain a qualified geologist or geohydrologist on-site to ensure detection and evaluation of any caves, karst features, or subterranean voids that may be encountered
- Immediately stop all activities within 500 feet of the discovered feature.
- Evaluate the feature for potential Karst Habitat for karst habitat (US Fish and Wildlife Service, Section 10)a)(1)(a)Karst Invertebrate Survey Requirements, March 8, 2006. Page 7 – 9 of 21)
- If determined not to provide suitable habitat, report to USFWS and BCCP Secretary, receive authorization to resume, seal the void using procedures from TCEQ or other competent jurisdiction, and resume work
- If determined to provide suitable habitat:
    - Excavate the feature as needed to promote further evaluation
    - Evaluate the karst habitat by a qualified sphaeleobiologist, or invertebrate biologist for presence or absence of protected species (US Fish and Wildlife Service, Section 10)a)(1)(a)Karst Invertebrate Survey Requirements, March 8, 2006. Page 9 - 11 of 21)
    - Conduct a karst presence/absence survey:
        - Follow procedures specified by USFWS (US Fish and Wildlife Service, Section 10)a)(1)(a)Karst Invertebrate Survey Requirements, March 8, 2006. Page 11 - 13 of 21)
        - Conduct three (3) separate collection surveys
            - On three separate days
            - Separated by at least one week
            - Collect only during suitable periods and conditions
            - Surveys not conducted during suitable periods require specific US Fish and Wildlife Service Approve or they will not be sufficient to determine presence/absence
        - Report to findings to BCCP Secretary and USFWS
        - If no protected species are collected, seal the feature as specified by TCEQ or other competent jurisdiction and proceed with construction.
        - If protected species are collected, USFWS will provide avoidance or mitigation measures that must be implemented before activities may resume.

APPENDIX E

GEOLOGIC ASSESSMENT

City of Austin MoPac Bicycle Bridge
Geologic Assessment

Prepared for

City of Austin

Prepared by

HDR Engineering, Inc.
4401 West Gate Blvd., Suite 400
Austin, Texas 78734

ZARA Environmental

September 21, 2011

CITY OF AUSTIN MOPAC BICYCLE BRIDGE
GEOLOGIC ASSESSMENT

INTRODUCTION

The purpose of this site investigation and report is to identify any karst features and their recharge potential on the tract identified as MoPac Bicycle Bridge, located within Travis County, Texas. The location of the property is the intersection of MoPac Expressway (MoPac; Loop 1) with Barton Creek in Austin. This report complies with the requirements of Title 30, Texas Administrative Code (TAC) Chapter 213, related to the protection of the Edwards Aquifer Recharge Zone (TCEQ, 2001). The site investigation included a karst feature survey. The location of the property is shown in Figure 1.

SCOPE

This report is intended to satisfy the requirements for a Geologic Assessment, which will be included as a component of a Water Pollution Abatement Plan (WPAP) based on the final design of the Project. The WPAP identifies measures that will be implemented to protect the water quality of the aquifer. The scope of the report consists of a site reconnaissance, field survey, and review of existing data and reports. When a project design is finalized, features identified during the field survey will be ranked utilizing the Texas Commission on Environmental Quality (TCEQ) matrix for Edwards Aquifer Recharge Zone Features as part of the WPAP.

INVESTIGATION METHODS

The following investigation methods and activities were used to develop this report.

- Review of existing files and literature to determine the regional geology and known caves associated with the property;
- Review of past geological field reports, cave studies, and correspondence regarding the existing geologic features on the property;
- Site reconnaissance by registered professional geologists to identify and examine caves, recharge features, and other significant geologic features; and
- Evaluation of collected field data.

PROPOSED SITE USE

This Project will connect to a pair of 8-foot-wide shared-use paths to be located along both MoPac frontage roads north of Loop 360. These paths will be constructed by either the City of Austin or the Texas Department of Transportation (TxDOT), with input from the Project Team. The alignment of the shared use path between Tamarron Boulevard/Tuscan Terrace and Loop 360 will be coordinated through TxDOT. The Project will include connectivity of the bicycle bridge to the shared use paths, creating a seamless, separated bicycle facility along the MoPac corridor.

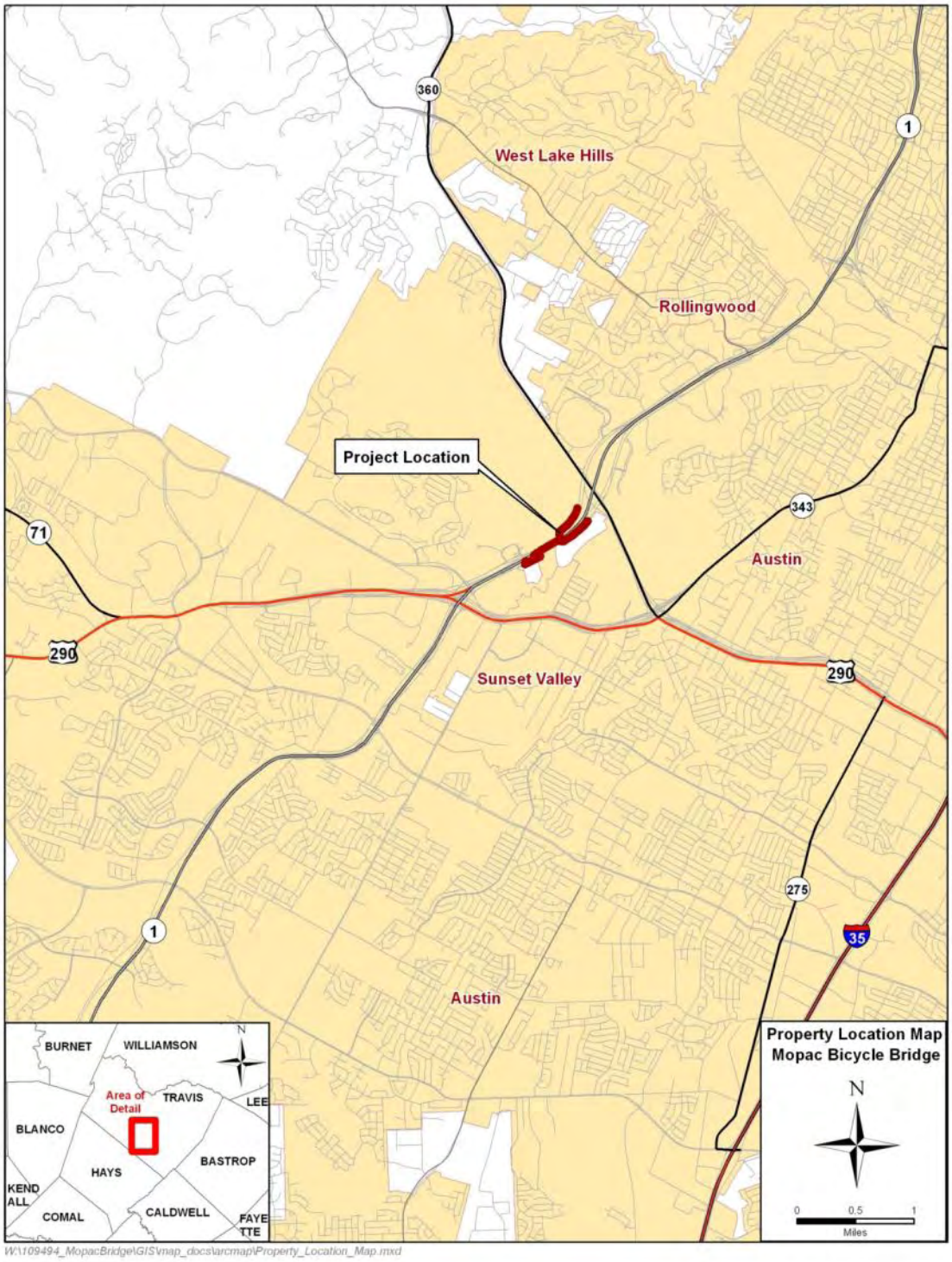


Figure 1. Property location map.

REGIONAL AND SITE GEOLOGY

The site lies within the Edwards Aquifer Recharge Zone as defined by the TCEQ. The geologic formations associated with the Project include the Cretaceous Age Eagle Ford Group and Buda Limestone (Keb), Del Rio Clay and Georgetown Formation (Kdg), and Fredericksburg Group (Kfr). The Fredericksburg Group consists of the Edwards Formation in the project area. These rocks are underlain by the Walnut Formation. The Glen Rose Formation lies below the Walnut Formation.

Figure 2 shows the stratigraphic column for the site based on Spearing (1991). Surface geology in the vicinity of the site includes Cretaceous Age Edwards Limestone of the Fredericksburg Group and the Georgetown Formation (Kgt). Types of rock include limestone, chert, dolomite, and quartz. Figure 3 shows a map of the project area including topography and outcropping geology with the Edwards formation outcrop shown.

As part of the research completed for the Geologic Assessment, the Texas Speleological Survey (TSS) was contacted. Per TSS requirements, maps provided by the TSS cannot be published for public safety reasons. However, the maps and information provided concluded that all known caves are not located in the Project area (TSS, 2011).

A groundwater dye tracing study of the Barton Springs Segment of the Edwards Aquifer completed by Hauwert *et al.* (2004) included a dye injection point at a sinkhole known as Jones Sink. Jones Sink is located in Barton Creek several hundred feet downstream of the current design of the Project.

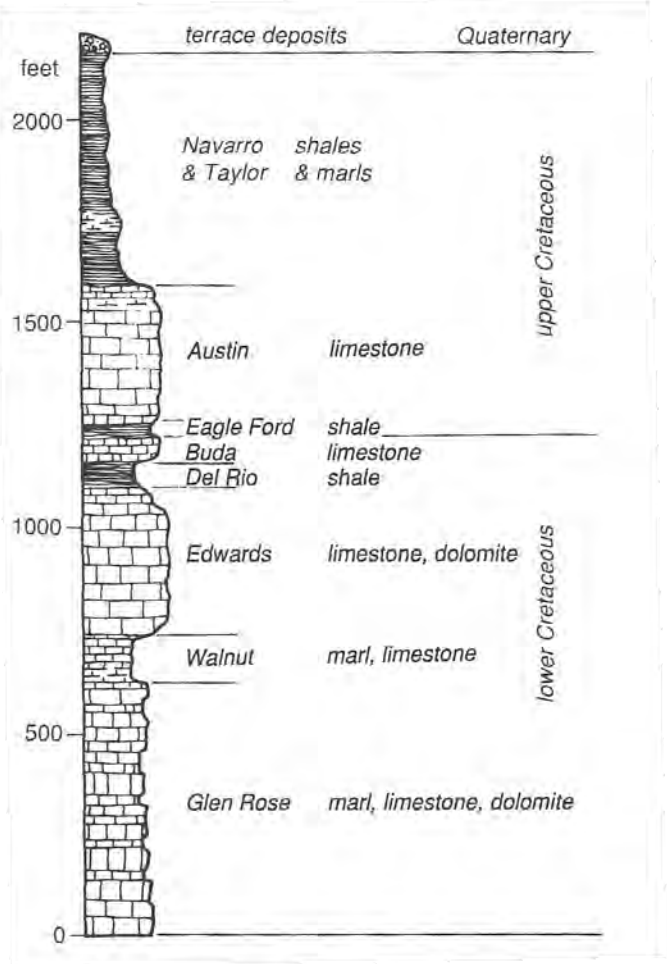


Figure 2. Stratigraphic Column for the site after Spearing (1991).

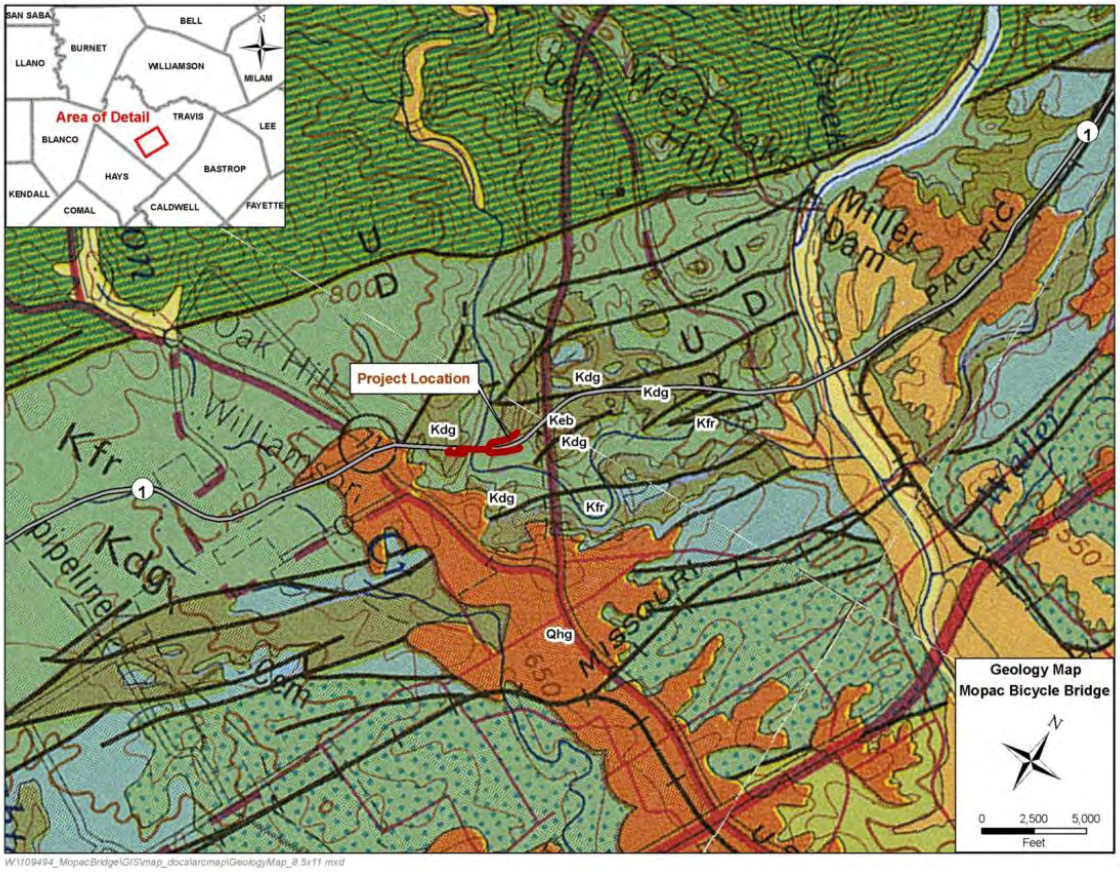


Figure 3. Project area including topography and outcropping geology

Karst terrain is typical of the Edwards Limestone. The karst is defined by voids, sinkholes, and vuggy rocks. The characteristics of the karst in the Edwards Limestone allow the potential for rapid infiltration directly to the Edwards Aquifer. The TCEQ requires protective activities of these areas to ensure protection of recharge and endangered species habitat prior to, during, and after construction is completed.

SITE SOILS

The site soil descriptions are based on two sources, the United States Department of Agriculture's Natural Resources Conservation Service Web Soil Survey (Soil Survey Staff, 2011) and field observations.

Soils present in the project area are shown in Table 1 and Figure 4. The majority of the soils are formed from the residuum of weathered limestone. The soils are shallow throughout most of the property, and have very low (CrB) to high (AgC2, BoF) saturated hydraulic conductivity values.

Table 1. Soil Map Units present in project area

Map Unit Symbol	*Map Unit Name*
AgC2	Altoga silty clay, 3 to 6 percent slopes, moderately eroded
BID Brackett-Ro	ck outcrop complex, 1 to 12 percent slopes
BoF	Brackett-Rock outcrop complex, 12 to 60 percent slopes
CrB	Crawford clay, 1 to 2 percent slopes
Md	Mixed alluvial land, 0 to 1 percent slopes, frequently flooded
SsC	Speck stony clay loam, 1 to 5 percent slopes
TaD	Tarrant soils, 5 to 18 percent slopes
TcA	Tarrant and Speck soils, 0 to 2 percent slopes
TdF	Tarrant-Rock outcrop complex, 18 to 50 percent slopes
VoD	Volente silty clay loam, 1 to 8 percent slopes

Figure 4. Project area soils

DESCRIPTION OF SITE FEATURES

All features listed below were identified by HDR Engineering and ZARA Environmental staff during a site visit on January 25, 2011. Twenty-two geologic features were identified on the site. Figure 5 shows the location of the features within the site boundaries. The features identified during the karst survey are described below and include photos taken of each feature during the site visit.

In addition to the features identified during the site visit, Jones Sink, a CEF, also is located downstream of the Project. Jones Sink is located in Barton Creek 300 to 400 feet downstream of the current design of the Project. A groundwater dye tracing study of the Barton Springs Segment of the Edwards Aquifer completed by Hauwert *et al.* (2004) included a dye injection point at the sinkhole, which is located at 30.241581 N, 97.810830 W. The radial buffer for sinkholes is, at minimum, 150 feet, and could be up to 300 feet. Depending on the final project alignment, the limits of construction may encroach upon the protective buffer established for this CEF.

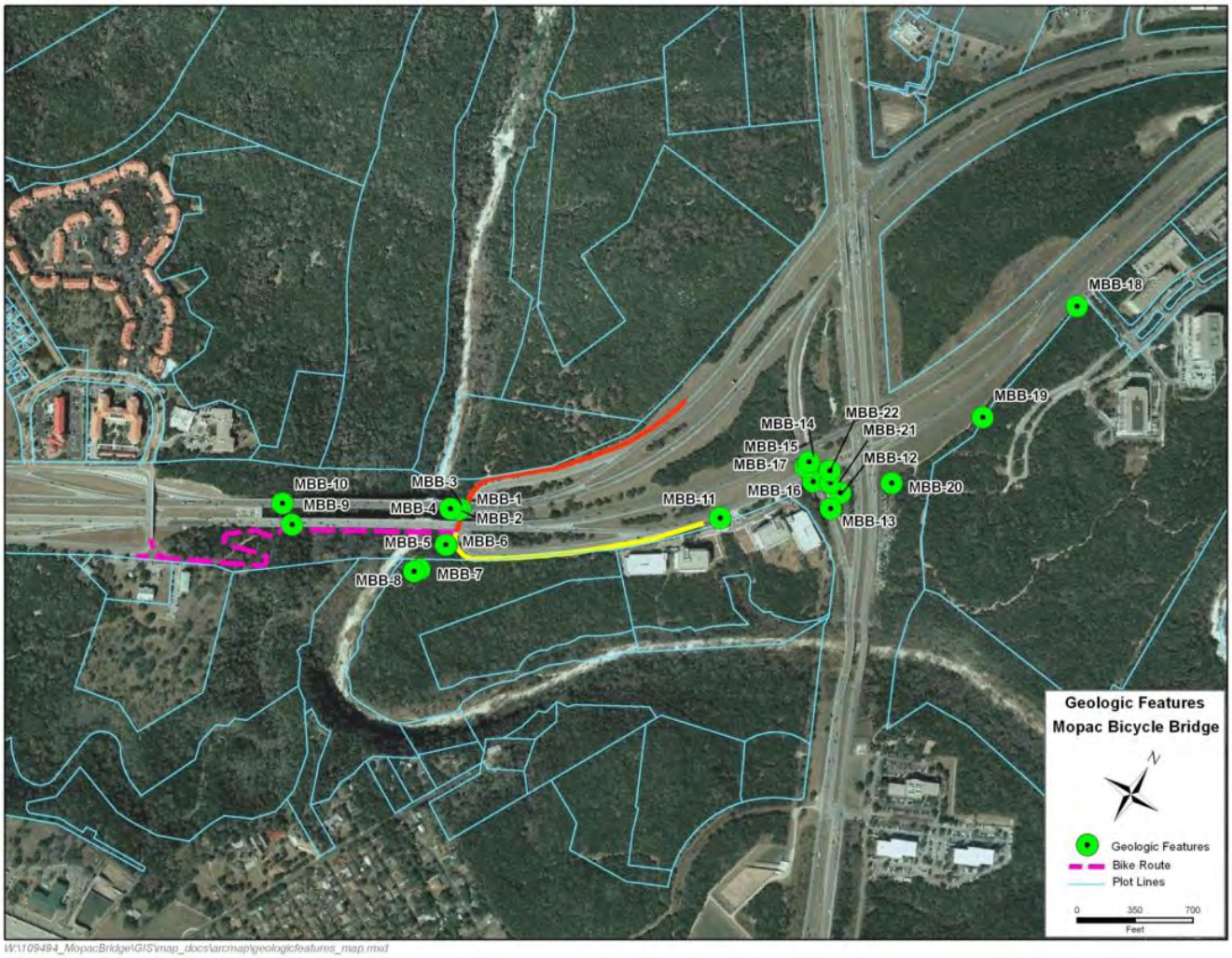


Figure 5. Location of identified geologic features

Feature MBB-1

GPS: N. 30.24339 W. -97.81012

This feature consists of a zone of enlarged bedding planes and enlarged fracture 8 meters (m) in length with a density of approximately one per 2 m. The feature is located on a cliff on the north side of the creek. The infill material is composed of bedrock with some fine calcite deposits. There is moderate relative infiltration potential/recharge potential to this feature. A fault/fracture is associated with this feature bearing at 35°.

Feature MBB-2

GPS: N. 30.24336 W. -97.81016

This feature consisted of a solution-enlarged fracture with a length, width and vertical depth of 2 m, 0.4 m, and 2 m, respectively. The infill material consisted of coarse and fine soils. The feature was located in a cliff under the southbound MoPac lanes. The feature is potentially enterable by humans and there was evidence of moisture or speleothems. Speleothems are crystalline deposits that form in a solution cave after the cave itself has formed. The deposits are typically composed of calcium carbonate dissolved from the surrounding limestone by groundwater. The recharge area was estimated to be approximately 20 to 30 meters squared (m^2) and from sheetwash. The bearing of this fracture is 330°.

Feature MBB-3

GPS: N. 30.24336 W. -97.81016

This feature is a solution-enlarged fracture located in the cliff under the southbound lanes of MoPac. The feature length, width and depth were 1.5 m, 10 cm, and 0.75 m, respectively. Airflow was felt emanating from the feature and there was evidence of moisture or speleothems. Sediment within the feature consisted of modern soils and rocks. The relative infiltration rate for this feature was moderate. The feature was present in a zone or cluster with a density of 3 per 1.5 m with a maximum aperture of 10 cm. The bearing of the fracture was 20°.

Feature MBB-4

GPS: N. 30.24331 W. -97.81029

Feature MBB-4 consisted of a horizontal enlarged bedding plane with vertical fractures. The feature had a length of 8 m and a depth of 10 m. Infill materials consisted of bedrock and some fines. Relative infiltration rate of this feature was moderate. The setting of this feature is on a cliff. A zone of fractures was present that were vertical trending, and had a bearing of 50° that guided the feature. The density of fractures within this zone was approximately 1 per 2 m with a maximum aperture of 3 cm.

Feature MBB-5

GPS: N. 30.24276 W. -97.81000

This feature consisted of a zone of enlarged fractures with a width of 12 m and a depth of 5 m. Slicken lines were present but there was no major offset of bedding. The feature is located on a cliff; infill material included bedrock and fines. Sediments within the feature included modern soils and leaf litter. The relative infiltration rate of this feature was determined to be moderate. The fractures are present at a bearing of 30° which guides the feature. Fractures are present at an approximate density of 1 per 1 m with a maximum aperture of 20 cm.

Feature MBB-6

GPS: N. 30.24276 W. -97.81002

This feature consisted of an enlarged bedding plane and a zone of enlarged fractures which extended into the creekbed. The setting for this feature was in the hillside. Infill materials consisted of fines. Barton Creek provided the upstream recharge area and relative infiltration rate was determined to be moderate. The fractures had a bearing of 45° and trended 40° to the southeast. There was a density of approximately 1 fracture per 0.5 m. Maximum aperture of this feature was 1 mm.

Feature MBB-7

GPS: N. 30.24219 W. -97.81021

This feature included an enlarged bedding plane and a zone of enlarged fractures with a solution cavity. The length of this feature was 15 m and the depth was 8 m. This feature was located in the cliff. Infill material included bedrock and fines and sediments consisting of leaf litter were present. Relative infiltration rate for this feature was moderate. The fractures had a bearing of 40° and trended vertically 55° to the south. Fractures were present at a density of 1 per 1 m and had a maximum aperture of 20 cm.

Feature MBB-8

GPS: N. 30.24211 W. -97.81028

This feature consisted of a solution cavity and enlarged bedding plane and was located east of the bridge in a cliff. The length and depth of this feature were 15 m and 8 m, respectively. Infill materials consisted of bedrock and fines. Sediment included white/crème clays. The relative infiltration rate of the feature was determined to be moderate. The bearing of the fault/fracture was north 35° east and guided the feature. The zone of high angle fractures trended vertically to 80° southeast. Density of the fractures was approximately 1 per 1 m with a maximum aperture of 3 cm.

Feature MBB-9

GPS: N. 30.24175 W. -97.81275

This feature included an enlarged bedding plane and a zone of enlarged fractures. This feature was located under the southbound MoPac Bridge on the south side of the creek within a small tributary. Length and depth of this feature were 10 m and 3 m, respectively. Infill materials consisted of bedrock and calcite; all surfaces were covered with calcite. The relative infiltration rate of this feature was determined to be moderate. The fractures have a bearing of north 40° east and guide the feature. The trend of the feature is 90° to 80° northwest. Density of fractures is approximately 1 per 2 m with a maximum aperture of 4 cm.

Feature MBB-10

GPS: N. 30.24197 W. -97.81311

This feature consists of a zone of enlarged fractures located in a tributary on the south side of Barton Creek. The length of this feature is 20 m. Infill materials included bedrock, fines and calcite and sediment consisted of modern soils. This feature is present on the hillside and streambed and has a bearing of 35° which guides feature and trends vertically to 80° southwest. The relative infiltration rate was determined to be moderate and the recharge area is 50 m2 with fractures in the creek bed. Fractures were at a density of approximately 1 per 1 meter with a maximum aperture of 2 cm.

Feature MBB-11

GPS: N. 30.245456 W. -97.80575

This feature includes a zone of enlarged fractures in a drainage ditch east of MoPac northbound service road. The length and width of this feature are 4 m and 1 m, respectively. Infill materials included bedrock, concrete and calcite; all surfaces were covered with calcite. The area within a manmade channel is drained by an upstream culvert and the recharge area is unknown. Relative infiltration rate was determined to be low for this feature. There is a highly variable bearing and trend for these fractures. The zone of fractures has a density of approximately 3 fractures per square meter with a maximum aperture of 1 cm.

Feature MBB-12

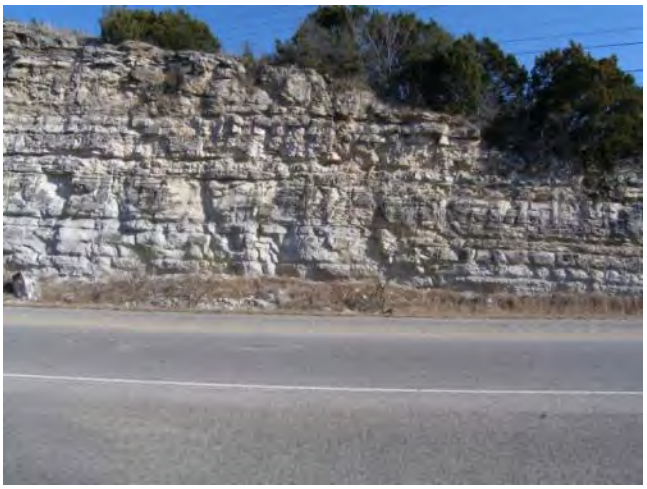
GPS: N. 30.24683 W. -97.80401

This feature consists of an enlarged fracture with a length, width and depth of 3 m, 10 cm and 0.5 m, respectively. This feature is located on an isolated hilltop between Loop 360 and the Loop 360 onramp from MoPac. Infill included coarse materials and vegetation that was greater than 50 cm deep. Modern soils and leaf litter composed the sediments; black sediments were present. Recharge area was estimated to be 10 m^2 contributed to by sheetwash. Relative infiltration rate was determined to be high. The bearing of this feature was 320° and guides the feature. The trend of the fracture is vertical. Maximum aperture of the fracture was 20 cm but the average aperture was 10 cm.

Feature MBB-13

GPS: N. 30.24652 W. -97.80402

This feature consists of a zone of enlarged fractures and a fault. The feature is present along the north side of the roadcut along the ramp to Loop 360 eastbound. The fault has a length of 10 m and a width of 2 mm along a bearing of 20° and trends to the south – southeast. The length and height of the fracture zone is 25 m by 10 m, respectively. The fracture orientation is 10° bearing, trending 80° northwest. Density of fractures in the zone is 1 per 2 m with a maximum aperture of 1 mm. Infill material is bedrock and calcite; all surfaces were covered in calcite. The recharge area for this feature is unknown and the relative infiltration rate was estimated to be moderate.



Feature MBB-14

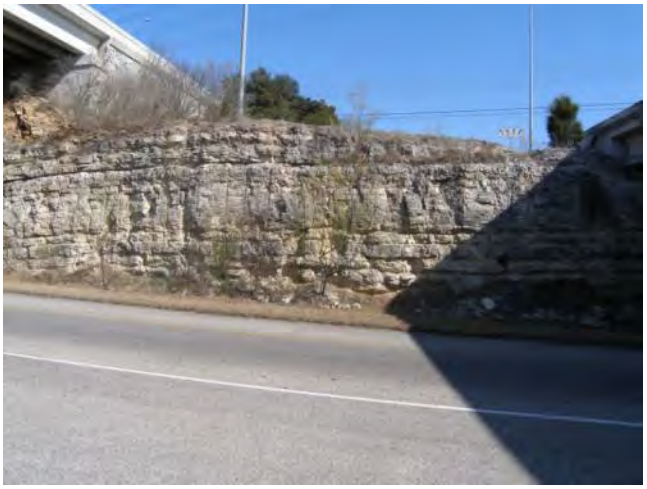
GPS: N. 30.24701 W. -97.80483

This feature is a solution cavity in the north roadcut between the northbound MoPac lanes and the northbound MoPac frontage road. The length and diameter of this feature were 2 m and 0.25 m, respectively. Coarse and fine infill material was present and sediment within the solution cavity consisted of rocks and white/tan clay. All surfaces were covered with calcite. This feature is similar to nearby caves and is potentially enterable by humans. There was evidence of moisture or speleothems at this feature.

Feature MBB-15

GPS: N. 30.24690 W. -97.80484

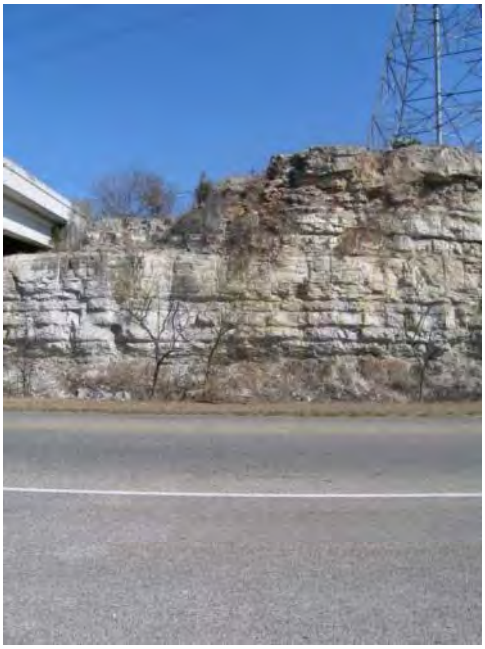
This feature consists of a zone of enlarged fractures present throughout the north side of the roadcut and a fault visible in both sides of the roadcut along the ramp to northbound MoPac. The fault has a bearing of N20°E and trends to the south – southeast and offset of about 0.4 m. The length of the fracture zone is 12 m. Density of fractures in the zone is 1 per 2 m with a maximum aperture of 1 cm. Infill materials are bedrock and calcite. The recharge area for this feature is unknown and the relative infiltration rate was estimated to be low from road runoff but moderate from soils above the feature.



Feature MBB-16

GPS: N. 30.24676 W. -97.80457

This feature consists of a fault that is present along the roadcut of the northbound service road of MoPac that extends across the road into the south roadcut. The fault has an approximate offset of 0.2 m. Infill materials are bedrock and calcite. The recharge area for this feature is unknown and the relative infiltration rate was estimated to be moderate based on recharge from soils above the feature.



Feature MBB-17

GPS: N. 30.24693 W. -97.80480

This feature consists of a zone of vertical fractures and a fault. The feature is present beneath the northbound service road of MoPac. . The fault has a length of 8 m and a width of 2 cm along a bearing of N30°W and trends 60^{o} to the southwest. Density of fractures in the zone is 1 per 3 m with a maximum aperture of 2 cm. Infill materials are bedrock and calcite; all surfaces were covered in calcite. The recharge area for this feature is unknown and the relative infiltration rate was estimated to be moderate from soils above the feature.

Feature MBB-18

GPS: N. 30.25149 W. -97.80192

This feature consists of a drilled hole with casing not in the bedrock. The feature is present near Tuscan Terrace. The recharge area for this feature is about 1 m^{2}and the relative infiltration rate was estimated to be low.

Feature MBB-19

GPS: N. 30.24911 W. -97.80240

This feature consists of a small collapse. Density of the collapse features are 2 per 100 m^2. Infill materials were coarse and fine soils and sediment included leaf litter, rocks, and modern soils. The recharge area for this feature is 5 m^2 from sheetwash and the relative infiltration rate was estimated to be moderate.

Feature MBB-20

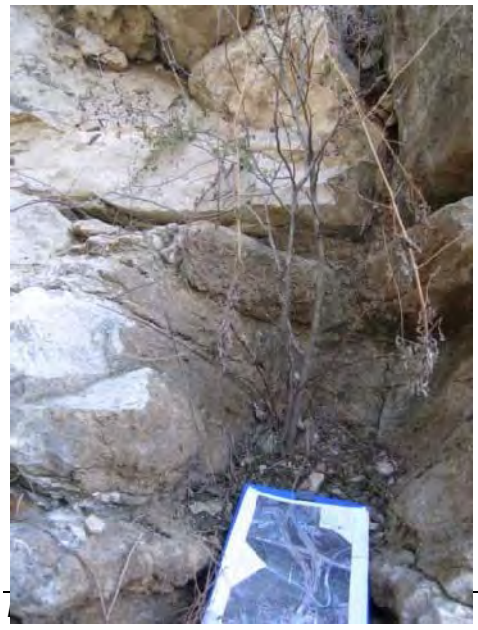
GPS: N. 30.24740 W. -97.80326

This feature consists of a small depression located next to a telephone pole at Loop 360 and MoPac. Density of the collapse features are 2 per 100 m^2. Infill materials were coarse and fine soils and sediment included leaf litter, rocks, and modern soils. The recharge area for this feature is greater than 200 m^2 from a channel and the relative infiltration rate was estimated to be moderate.

Feature MBB-21

GPS: N. 30.24689 W. -97.80428

This feature consisted of a solution cavity and is located on a rock face facing a metal transmission line. The diameter of this feature is 0.4 m with a depth of 1.5 m. Infill materials consisted of calcite and course and fine soils. Sediment included white/crème clays. The relative infiltration rate of the feature was determined to be low.



Feature MBB-22

GPS: N. 30.24706 W. -97.80440

This feature consisted of solution-enlarged fractures with a length and vertical depth of 2.5 m and 2 m, respectively. The feature is located in a road cut for the northbound MoPac ramp to Loop 360. The infill material consisted of calcite. The recharge area was unknown and relative infiltration was determined to be moderate from soils above the feature. The bearing of this zone of vertical fractures is 320°. The zone of fractures has an approximate density of 1 per 5 m with a maximum aperture of 25 cm.

SUMMARY OF FINDINGS

This report documents the findings of a field survey conducted by HDR Engineering and ZARA Environmental staff during a site visit on January 25, 2011. Twenty-two geologic features were identified on the site. All features identified and located within the site boundaries represent typical features for this portion of the Edwards Aquifer Recharge Zone.

One feature, MBB-12, an enlarged fracture with a length, width and depth of 3 m, 10 cm and 0.5 m, was determined to have high recharge potential . This feature is on an isolated portion of rock created during the construction of MoPac and Loop 360 between the eastbound and westbound lanes of Loop 360. According to TCEQ guidelines and confirmed with Sylvia Pope, COA Watershed Protection Department, this feature is considered not sensitive, and thus not an issue for construction of the Project, aside from installation and maintenance of temporary erosion and sediment controls.

RECOMMENDATIONS

At this time, no further activities are recommended for any of the features identified as part of the Geologic Assessment. As the design of the Project is finalized, features could be re-evaluated for recharge potential to the Edwards Aquifer.

REFERENCES

Hauwert, Nico M., David A. Johns, Thomas J. Aley, James W. Sansom, 2004. Groundwater Tracing Study of the Barton Springs Segment of the Edwards Aquifer, Southern Travis and Northern Hays Counties, Texas: Report by the Barton Springs/Edwards Aquifer Conservation District and City of Austin Watershed Protection and Development Review Department. 110 p. and appendices.

Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Web Soil Survey. Available online at http://websoilsurvey.nrcs.usda.gov/ accessed April 14, 2011.

Spearing, Darwin, 1991. Roadside Geology of Texas, Mountain Press Publishing Company, Missoula, MT.

(TCEQ) Texas Commission on Environmental Quality, 2001. "Edwards Aquifer Protection Program, Chapter 213 Rules – Recharge Zone, Transition Zone, Contributing Zone, and Contributing Zone within the Transition Zone." Map. Digital Data. November 28, 2001. Austin, Texas.

(TSS) Texas Speleological Survey, 2011. Personal email communication: David McKenzie and Bill Russell, March 19, 2011.

APPENDIX F

PRELIMINARY PERMITTING ANALYSIS REPORT

PRELIMINARY PERMITTING ANALYSIS REPORT

CITY OF AUSTIN – MOPAC BICYCLE BRIDGE PROJECT

MOPAC EXPRESSWAY (LOOP 1) AT BARTON CREEK, AUSTIN, TEXAS

PREPARED FOR:

HDR | ONE COMPANY *Many Solutions®*

HDR ENGINEERING, INC.
4401 WEST GATE BOULEVARD, SUITE 400
AUSTIN, TEXAS 78745

BAER ENGINEERING DOCUMENT NO. 082065-8I.012
SEPTEMBER 21, 2011

BAER ENGINEERING AND ENVIRONMENTAL CONSULTING, INC.
7756 NORTHCROSS DRIVE, SUITE 211 ● AUSTIN, TEXAS 78757
TELEPHONE: (512) 453-3733 / WEBSITE: WWW.BAERENG.COM

CONTENTS

1.0 INTRODUCTION

The City of Austin (COA) has engaged HDR Engineering, Inc. (HDR) to design a bicycle bridge across Barton Creek in Austin, Texas. The bicycle bridge will be parallel to MOPAC Expressway just south of its intersection with Capitol of Texas Highway 360. There are currently two conceptual designs proposed to accomplish this task, as shown in the figures provided in Appendix A. Baer Engineering and Environmental Consulting, Inc. (Baer Engineering), sub-consultant to HDR, has reviewed the conceptual design, relative to known environmental constraints, for identification of applicable federal, state, and municipal regulatory programs the project must comply with in order to construct a bicycle bridge across Barton Creek. This report includes a summary of requisite agency coordination, clearances, and permit approvals that must be obtained prior to construction. We have based this analysis report on information provided by HDR and preliminary site reconnaissance.

2.0 REGULATORY AGENCY REQUIREMENTS

The following table provides a summary of the applicable regulatory programs with which the proposed project must comply. An explanation of the coordination process for each program is provided in the sub-sections following the table.

PROGRAM	COMMENT	AGENCY	CITATION
City of Austin Land Development Code Chapter 25-5	The project is located within City of Austin full-purpose jurisdiction. A Site Development Permit is required.	City of Austin Planning and Development Review Department	§25-5-1 City of Austin Land Development Code
City of Austin Land Development Code Chapter 25-8	The project involves work within the Critical Water Quality Zone of Barton Creek. An Environmental Assessment Report will be required.	City of Austin Planning and Development Review Department, and Watershed Protection Department	§25-8-121 City of Austin Land Development Code
Rare, Threatened, and Endangered Species Protection	The project has potential to disturb protected biological resources. Regulatory agency coordination is required.	State: Texas Parks and Wildlife Department Federal: United States Fish and Wildlife Department	Endangered Species Act Title 50 CFR 17
Cultural Resources Protection	The project has the potential to disturb protected cultural resources. Regulatory agency coordination is required.	Texas Historical Commission	Antiquities Code of Texas
Protection of Waters of the United States	If the project includes work within or impact to waters of the United States, such as Barton Creek, United States Army Corps of Engineers coordination may be required.	United States Army Corps of Engineers	Section 404 Clean Water Act Title 33 CFR 328
Texas Pollutant Discharge Elimination System	A Storm Water Pollution Prevention Plan is required.	Texas Commission on Environmental Quality	Section 26.040 Texas Water Code
Edwards Aquifer Rules	The project limits are within the Edwards Aquifer Recharge Zone, as mapped by the Texas Commission on Environmental Quality. A Water Pollution Abatement Plan will be required.	Texas Commission on Environmental Quality	30 TAC §213
Save our Springs Initiative	The project site is located in the City of Austin defined Barton Springs Zone. The proposed activities will be subject to City of Austin Land Development Code, Chapter 25-8, Article 11 (Barton Springs Zone Requirements) and Article 12 (Save Our Springs Initiative).	City of Austin Planning and Development Review Department, and Watershed Protection Department	COA LDC Chapter 25-8 Article 12

2.1 MUNICIPAL COORDINATION

The proposed project site is within the COA Full-purpose Jurisdiction. As such, the project must comply with the regulations set forth by the COA Land Development Code (LDC). The following

subsections provide a summary of applicable requirements associated with the proposed activities, as defined in the COA LDC, Title 25, Land Development.

Site Development Permit
COA LDC, Chapter 25-5, requires Site Plan review and approval by the Planning and Development Review Department (PDRD) prior to development of property within the City's jurisdiction. The COA PDRD will issue a Site Development Permit upon approval.

Environmental Assessment
COA LDC, Section 25-8-121 (A) states the following:

An applicant shall file an environmental assessment with the Site Development Permit Application for proposed development located:

1. Over a karst aquifer;
2. Within an area draining to a karst aquifer or reservoir;
3. In a water quality transition zone;
4. In a critical water quality zone;
5. In a flood plain; or
6. On a tract with a gradient of more than 15 percent.

The proposed project site meets criteria 1-6 above. The COA LDC, Section 25-8-121 (B) and (C) state the following:

An environmental assessment must:

1. Identify critical environmental features (CEFs) and propose protection measures for the features;
2. Provide environmental justification for spoil disposal or roadway alignments;
3. Propose methods to achieve overland flow and justify enclosed storm sewers; and
4. Describe proposed industrial uses and the pollution abatement program.

An environmental assessment must include:

1. Hydrogeologic report in accordance with LDC, Section 25-8-122;
2. Vegetation report in accordance with LDC, Section 25-8-123; and
3. Wastewater report in accordance with LDC, Section 25-8-124.

The proposed project must satisfy the above requirements before the COA PDRD will approve a Site Development Permit.

Critical Environmental Features (CEFs)
The COA LDC, Section 25-8-1 defines CEFs as features that are of vital importance to the protection of natural resources. CEFs include bluffs, canyon rimrock, caves, sinkholes, springs, and wetlands. The LDC defines these features as follows:

- Bluff CEF – Bluff with a vertical change in elevation of more than 40 feet and an average gradient greater than 400 percent.
- Canyon rimrock CEF – Rimrock with a rock substrate that has a gradient that exceeds 60 percent for a vertical distance of at least four feet and is exposed for at least 50 feet horizontally along the rim of the canyon.

- Cave and sinkhole CEFs – Caverns or fissures that lie over the Edwards Aquifer Recharge Zone and may transmit a significant amount of surface water into the subsurface strata.
- Spring CEF – Point over an aquifer system where water flows from the aquifer to the ground surface.
- Wetland CEF – Transitional area between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water, and conforms to the Army Corps of Engineers' definition.

LDC Chapter 25-8, Article 7, Division 2, Protection of Special Features, establishes a protective buffer around CEFs. This protective buffer is provided for each CEF and includes the following requirements and prohibitions:

- Natural vegetative cover must be retained to the maximum extent practicable;
- Construction is prohibited; and
- Wastewater disposal or irrigation is prohibited.

During a cursory site visit, the design team located an area meeting the above-definition for canyon rimrock. The edge of the rimrock closest to the proposed project is located at 30.242406 N, 97.810445 W. Depending on the final project alignment, the limits of construction may encroach upon the protective buffer established for this CEF. Rimrock protective buffers extend 150 feet upslope from the feature and 50-feet downslope and on either side.

According to a groundwater dye tracing study of the Barton Springs Segment of the Edwards Aquifer (Hauwert et al. 2004)[1], there is a sinkhole CEF (Jones Sink) located at 30.241581 N, 97.810830 W. The Jones Sink location is between 300-400 feet downstream from the MOPAC Bridge over Barton Creek. The radial buffer for sinkholes is, at minimum, 150 feet, and could be up to 300 feet. Depending on the final project alignment, the limits of construction may encroach upon the protective buffer established for this CEF.

Land Development Code Variances

If the proposed project will encroach upon the protective CEF buffers described above, then a setback reduction must be approved by COA staff. This type of LDC variance may be approved administratively during the Site Development Permit Application review process.

The project site is located in the COA-defined Barton Springs Zone. The proposed activities will be subject to COA LDC, Chapter 25-8, Article 11 (Barton Springs Zone Requirements) and Article 12 (Save Our Springs Initiative). These regulations prohibit most development within a Critical Water Quality Zone, except for those allowances outlined in COA LDC, Chapter 25-8, Article 7, Division 1, Critical Water Quality Zone Restrictions, which states:

> *In the Barton Springs Zone, a boat dock, pier, wharf, or marina and necessary access and appurtenances, **or a pedestrian bridge**, **or bicycle or golf cart path**, is permitted in a critical water quality zone.*

[1] Hauwert, Nico, David Johns, Thomas Aley, and James Sansom, 2004, *Groundwater Tracing Study of the Barton Springs Segment of the Edwards Aquifer, Southern Travis and Northern Hays Counties, Texas:* Report by the Barton Springs/Edwards Aquifer Conservation District and City of Austin Watershed Protection Department. 110p. and appendices.

If the COA determines the proposed structure meets the above, then a variance from LDC requirements for Critical Water Quality Zones will not be required. If a variance from the LDC is required, then the variance request must be reviewed by the COA Environmental Board and approved by City Council.

2.2 STATE COORDINATION

The proposed project will be subject to various state regulations and requisite coordination with associated state agencies. Coordination with the following regulatory entities must be conducted prior to construction:

Texas Department of Transportation (TxDOT)

The MOPAC Expressway is under the purview of the Texas Department of Transportation (TxDOT). Modification of TxDOT right-of-way requires permit approval. Baer Engineering understands that HDR has begun preliminary coordination and will obtain project clearance from TxDOT. This coordination should not delay the project design.

Texas Commission on Environmental Quality (TCEQ)

The project limits are within the Edwards Aquifer Recharge Zone, as mapped by the TCEQ. A Water Pollution Abatement Plan (WPAP) will be required for the project. The WPAP must be reviewed and approved by the TCEQ prior to construction, per Chapter 30, Section 213, of the Texas Administrative Code.

During construction, the project must implement a Storm Water Pollution Prevention Plan (SWPPP) to satisfy Section 26.040 of the Texas Water Code, which establishes the requirements for the Texas Pollutant Discharge Elimination System (TPDES). The COA also requires SWPPPs for most construction projects. The SWPPP must be submitted to the COA PDRD with the Site Development Permit Application for review and approval.

Texas Historical Commission (THC)

Construction projects sponsored by the COA are required to comply with the Antiquities Code of Texas. The Texas Historical Commission (THC) enforces this code. Appropriate project coordination must be submitted to the THC prior to construction. The THC will review project details to determine if the project poses a threat to archeological resources. The THC will provide a formal response that clears the project from further coordination or request additional cultural resources investigations. Baer Engineering understands preliminary coordination with the THC is currently being conducted. The project's cultural resource consultant does not expect the THC will require extensive coordination efforts.

Texas Parks and Wildlife Department (TPWD)

The Texas Parks and Wildlife Department (TPWD) is charged with the protection of state biological resources, such as rare, threatened, and endangered plant and animal species. The proposed project site is near known federally-listed threatened and endangered species habitat. The federal list does not include certain species protected by the state. Project coordination with the TPWD to ensure the protection of rare state biological resources should be conducted prior to construction.

2.3 FEDERAL COORDINATION

Coordination with federal agencies for project clearance will be limited, as the proposed activities do not trigger the regulations set forth by the National Environmental Policy Act (NEPA). If the project were to receive federal funding at any point, then appropriate NEPA coordination with the funding source representative agency would be necessary.

The project will require demonstration of compliance with the Endangered Species Act and the Clean Water Act, as follows:

United States Fish and Wildlife Department (USFWS)
The United States Fish and Wildlife Service (USFWS) is charged with the protection of federally-listed threatened and endangered species. The proposed project site lies within Balcones Canyonlands Preserve permit area, governed by the Balcones Canyonlands Conservation Plan (BCCP) procedures for mitigation of impacts to protected species. The BCCP was approved by the USFWS. It allows for a streamlined mitigation process for COA infrastructure projects, such as the proposed bicycle bridge, involving incidental endangered species take. The COA Wildlands Division processes infrastructure applications to determine mitigation fees for construction projects. Baer Engineering understands the project team has conducted preliminary coordination with the COA Wildlands Division for project clearance. It has been determined that this site was previously mitigated for other construction projects. As such, the proposed project will not be required to pay a mitigation fee, unless new endangered species habitat is encountered during construction.

United States Army Corps of Engineers (USACE)
Barton Creek is a known water of the United States, regulated by the United States Army Corps of Engineers (USACE) through Section 404 of the Clean Water Act. Construction projects involving the discharge of dredged or fill material, such as concrete bridge piers, must comply with USACE regulations.

Under Section 404 of the Clean Water Act, waters of the United States are regulated by the USACE. Waters of the United States include, but are not limited to, lakes, rivers, streams, creeks, ponds, and other special aquatic features, such as wetlands. Construction activities within the jurisdictional boundary of Barton Creek are subject to USACE regulation. The USACE jurisdiction over Barton Creek lies within the Ordinary High Water Mark (OHWM) of the channel. The OHWM is defined by the USACE as:

…that line on the shore established by the fluctuations of water and indicated by physical characteristics, such as clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas.

Baer Engineering conducted a cursory site visit to approximate the OHWM near the existing MOPAC Bridges. A map of the approximate OHWM for Barton Creek at the project site is provided in Appendix A. Construction projects involving the discharge of dredged or fill material into waters of the United States require USACE permit coverage. If the proposed project will include work below the OHWM of Barton Creek, these activities will require coverage under USACE General Nationwide Permit (NWP) 14, Linear Transportation. As such, the proposed project would require compliance with the terms and conditions for use of NWP 14. Notification to the USACE is not required for use of NWP 14, unless the project will result in the loss of greater than one-tenth of an acre of waters of the United States, or if there is a discharge in a special aquatic site, including wetlands. During Baer Engineering's cursory site visit, no wetlands or other special aquatic sites, as defined by the USACE, were observed. A copy of the USACE conditional requirements document for NWP 14 is provided in Appendix B.

3.0 CONCLUSIONS AND RECOMMENDATIONS

Baer Engineering has reviewed project information provided by HDR to analyze potential regulatory requirements associated with the construction of the proposed MOPAC Bicycle Bridge over Barton Creek. Upon review of the provided information and preliminary site reconnaissance, we have determined the project will be subject to various federal, state, and municipal requirements, most of which are routine for this type of construction.

The proposed project will require review and approval of a Site Plan, Site Development Permit Application, and Environmental Assessment Report by the COA PDRD. The project could require administrative and/or City Council approved variances from the COA LDC for encroachment of protective buffers established for CEFs and for work within the Critical Water Quality Zone of Barton Creek, respectively.

A SWPPP and WPAP should be prepared for the project to satisfy COA and TCEQ requirements.

The project must seek permit approval for modification of TxDOT right-of-way. Project coordination should be conducted with the THC and TPWD for project clearance prior to construction of the bicycle bridge.

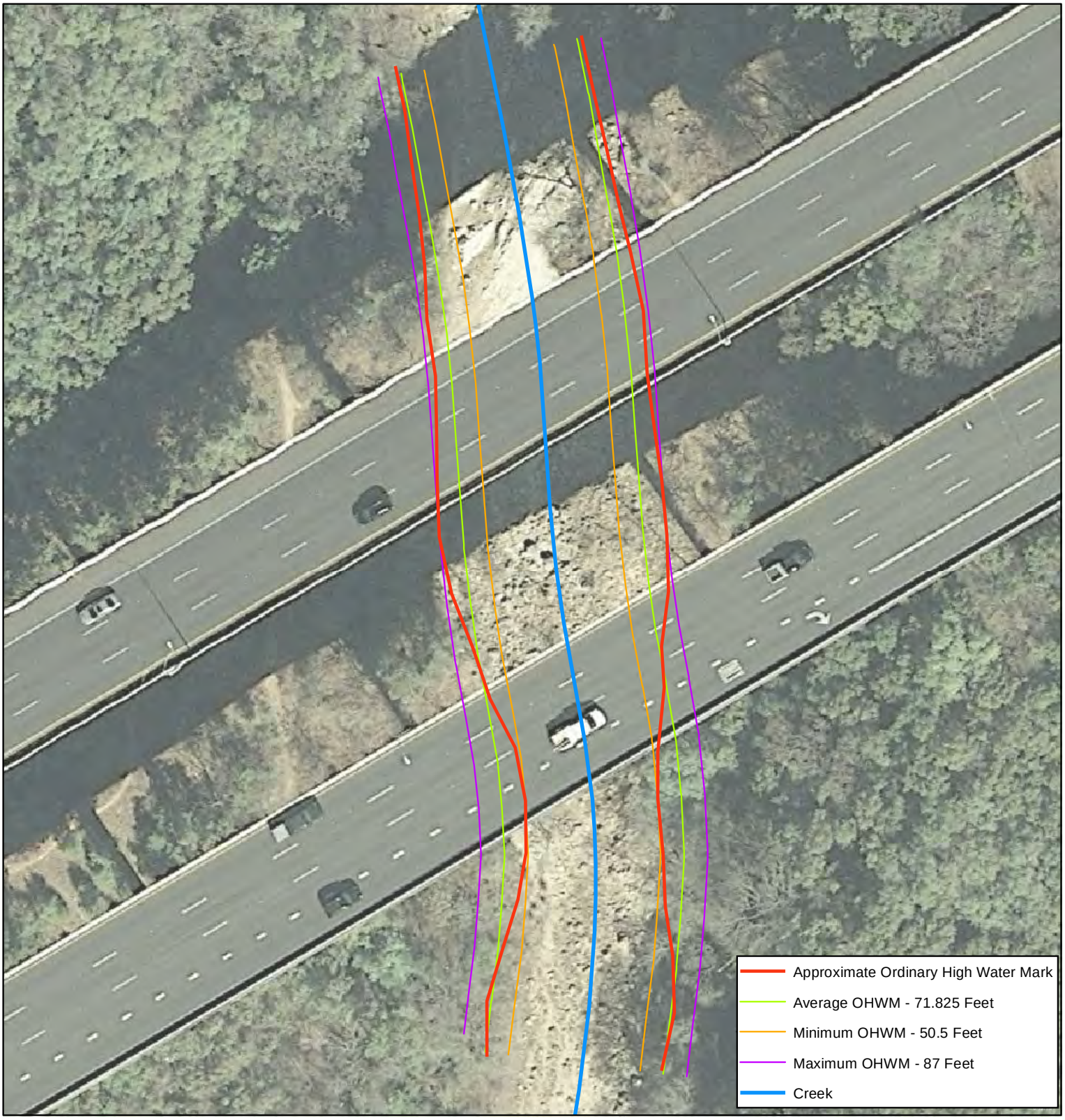
Coordination with the USFWS will not be required if the project does not affect unknown endangered species habitat, such as penetration of subsurface caverns or caves that are not currently known. Project coordination with the USACE will not be required if the proposed activities do not surpass NWP 14 impact thresholds. The proposed project must comply with the general terms and conditions imposed for use of NWP 14, as explained in the guidance document provided in Appendix B.

4.0 QUALIFICATIONS

This information is being provided to HDR to assist with the design of the MOPAC Bicycle Bridge. We have relied upon information provided by HDR to perform this analysis. Changes to the project design or alignment, even slight changes, could result in significant changes to regulatory permitting requirements. Site reconnaissance was performed on February 8 and 25, 2011. Conditions observed during those days may not reflect site conditions during the rest of the year. In addition, certain elements may have been hidden by vegetation or other site features during the field visits. These elements may be observable during a different time of year. Baer Engineering has exercised due diligence and performed appropriate inquiry within the limits of the scope of this specific project. Nonetheless, Baer Engineering cannot and does not guarantee the authenticity or reliability of the information upon which it has relied.

W. Ryan Metz – Project Manager
Wildlife / Conservation Biologist

APPENDIX A – Maps and Figures



Mopac Bicycle Bridge
Ordinary High Water Mark
CIP Project ID: 5771.049 /
FDU No. 8071 6207 5501
City of Austin, Travis County, Texas

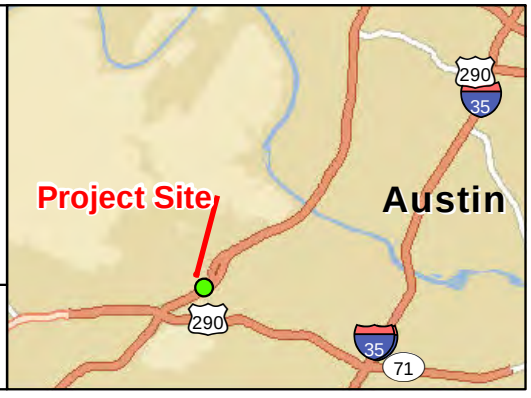
Source: CAPCOG Aerial 2009
Produced by: M. Johnson

N

0 25 50 Feet

Baer Engineering
and Environmental Consulting, Inc.

Baer Engineering
Project No. 082065.01
Date: September 21, 2011



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MOPAC

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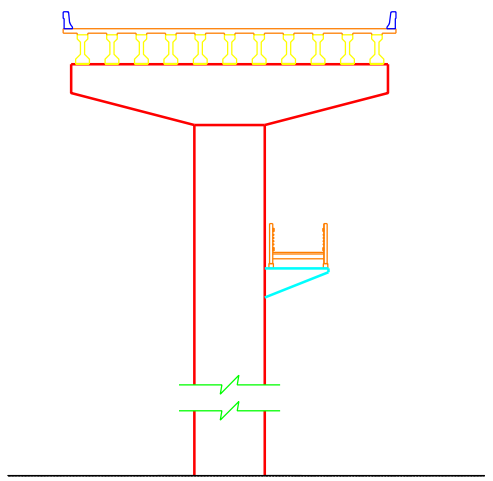


LEGEND

- MULTI-USE TRAIL
- (X) NORTHBOUND MOPAC BRIDGE BENT NUMBER

HDR Engineering, Inc.
FIRM REGISTRATION No. 754

CITY OF AUSTIN

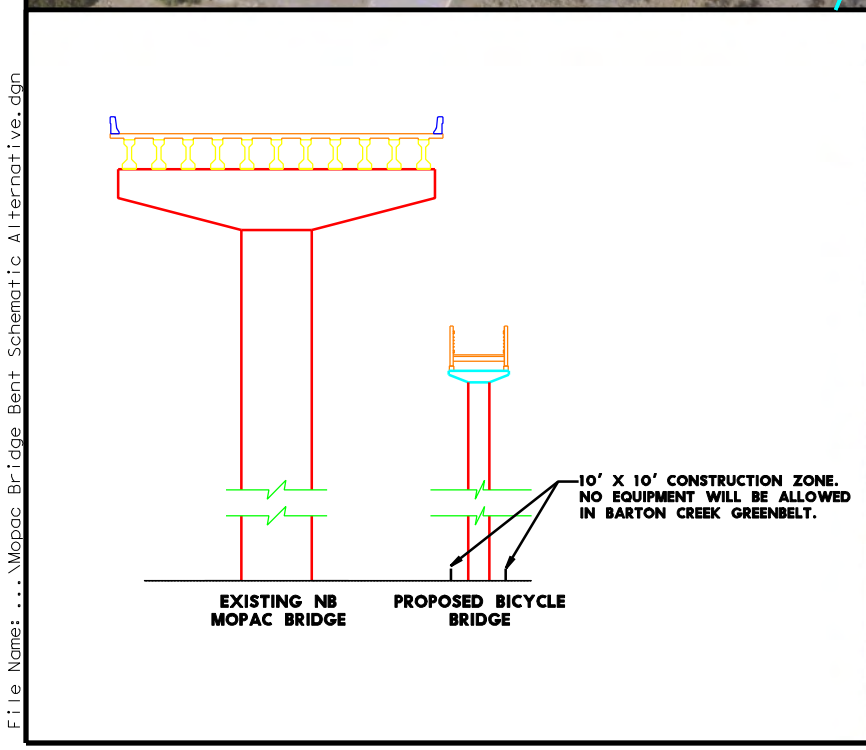
MOPAC BICYCLE BRIDGE

User Name: druybal
File Name: ...\Mopac Bridge Bent Schematic.dgn

Date and Time Plotted: 9/21/2011 11:00:49 AM

MOPAC

PROPOSED ELEVATED BICYCLE BRIDGE
1045' (1 SPAN AT 120', 6 SPANS AT 154'-2")



LEGEND

- MULTI-USE TRAIL
- (X) NORTHBOUND MOPAC BRIDGE BENT NUMBER

HDR Engineering, Inc.
FIRM REGISTRATION No. 754

CITY OF AUSTIN

MOPAC BICYCLE BRIDGE

(NOT ATTACHED TO NB MOPAC BRIDGE)

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APPENDIX B – Supporting Information

NATIONWIDE PERMIT 14
Linear Transportation Projects

Effective Date: March 19, 2007
(NWP Final Notice, 72 FR 11181, para. 3)

Linear Transportation Projects. Activities required for the construction, expansion, modification, or improvement of linear transportation projects (e.g., roads, highways, railways, trails, airport runways, and taxiways) in waters of the United States. For linear transportation projects in non-tidal waters, the discharge cannot cause the loss of greater than 1/2-acre of waters of the United States. For linear transportation projects in tidal waters, the discharge cannot cause the loss of greater than 1/3-acre of waters of the United States. Any stream channel modification, including bank stabilization, is limited to the minimum necessary to construct or protect the linear transportation project; such modifications must be in the immediate vicinity of the project.

This NWP also authorizes temporary structures, fills, and work necessary to construct the linear transportation project. Appropriate measures must be taken to maintain normal downstream flows and minimize flooding to the maximum extent practicable, when temporary structures, work, and discharges, including cofferdams, are necessary for construction activities, access fills, or dewatering of construction sites. Temporary fills must consist of materials, and be placed in a manner, that will not be eroded by expected high flows. Temporary fills must be removed in their entirety and the affected areas returned to pre-construction elevations. The areas affected by temporary fills must be revegetated, as appropriate.

This NWP cannot be used to authorize non-linear features commonly associated with transportation projects, such as vehicle maintenance or storage buildings, parking lots, train stations, or aircraft hangars.

Notification: The permittee must submit a pre-construction notification to the district engineer prior to commencing the activity if: (1) the loss of waters of the United States exceeds 1/10 acre; or (2) there is a discharge in a special aquatic site, including wetlands. (See general condition 27.) (Sections 10 and 404)

Note: Some discharges for the construction of farm roads or forest roads, or temporary roads for moving mining equipment, may qualify for an exemption under Section 404(f) of the Clean Water Act (see 33 CFR 323.4).

NATIONWIDE PERMIT GENERAL CONDITIONS

General Conditions: The following general conditions must be followed in order for any authorization by a NWP to be valid:

1. **Navigation**. (a) No activity may cause more than a minimal adverse effect on navigation.

(b) Any safety lights and signals prescribed by the U.S. Coast Guard, through regulations or otherwise, must be installed and maintained at the permittee's expense on authorized facilities in navigable waters of the United States.

(c) The permittee understands and agrees that, if future operations by the United States require the removal, relocation, or other alteration, of the structure or work herein authorized, or if, in the opinion of the Secretary of the Army or his authorized representative, said structure or work shall cause unreasonable obstruction to the free navigation of the navigable waters, the permittee will be required, upon due notice from the Corps of Engineers, to remove, relocate, or alter the structural work or obstructions caused thereby, without expense to the United States. No claim shall be made against the United States on account of any such removal or alteration.

2. **Aquatic Life Movements**. No activity may substantially disrupt the necessary life cycle movements of those species of aquatic life indigenous to the waterbody, including those species that normally migrate through the area, unless the activity's primary purpose is to impound water. Culverts placed in streams must be installed to maintain low flow conditions.

3. **Spawning Areas**. Activities in spawning areas during spawning seasons must be avoided to the maximum extent practicable. Activities that result in the physical destruction (e.g., through excavation, fill, or downstream smothering by substantial turbidity) of an important spawning area are not authorized.

4. **Migratory Bird Breeding Areas**. Activities in waters of the United States that serve as breeding areas for migratory birds must be avoided to the maximum extent practicable.

5. **Shellfish Beds**. No activity may occur in areas of concentrated shellfish populations, unless the activity is directly related to a shellfish harvesting activity authorized by NWPs 4 and 48.

6. **Suitable Material.** No activity may use unsuitable material (e.g., trash, debris, car bodies, asphalt, etc.). Material used for construction or discharged must be free from toxic pollutants in toxic amounts (see Section 307 of the Clean Water Act).

7. **Water Supply Intakes**. No activity may occur in the proximity of a public water supply intake, except where the activity is for the repair or improvement of public water supply intake structures or adjacent bank stabilization.

8. **Adverse Effects From Impoundments**. If the activity creates an impoundment of water, adverse effects to the aquatic system due to accelerating the passage of water, and/or restricting its flow must be minimized to the maximum extent practicable.

9. **Management of Water Flows**. To the maximum extent practicable, the pre-construction course, condition, capacity, and location of open waters must be maintained for each activity, including stream channelization and storm water management activities, except as provided below. The activity must be constructed to withstand expected high flows. The activity must not restrict or impede the passage of normal or high flows, unless the primary purpose of the activity is to impound water or manage high flows. The activity may alter the pre-construction course, condition, capacity, and location of open waters if it benefits the aquatic environment (e.g., stream restoration or relocation activities).

10. **Fills Within 100-Year Floodplains**. The activity must comply with applicable FEMA-approved state or local floodplain management requirements.

11. **Equipment**. Heavy equipment working in wetlands or mudflats must be placed on mats, or other measures must be taken to minimize soil disturbance.

12. **Soil Erosion and Sediment Controls**. Appropriate soil erosion and sediment controls must be used and maintained in effective operating condition during construction, and all exposed soil and other fills, as well as any work below the ordinary high water mark or high tide line, must be permanently stabilized at the earliest practicable date. Permittees are encouraged to perform work within waters of the United States during periods of low-flow or no-flow.

13. **Removal of Temporary Fills**. Temporary fills must be removed in their entirety and the affected areas returned to pre-construction elevations. The affected areas must be revegetated, as appropriate.

14. **Proper Maintenance**. Any authorized structure or fill shall be properly maintained, including maintenance to ensure public safety.

15. **Wild and Scenic Rivers**. No activity may occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a ``study river'' for possible inclusion in the system while the river is in an official study status, unless the appropriate Federal agency with direct management responsibility for such river, has determined in writing that the proposed activity will not adversely affect the Wild and Scenic River designation or study status. Information on Wild and Scenic Rivers may be obtained from the appropriate Federal land management agency in the area (e.g., National Park Service, U.S. Forest Service, Bureau of Land Management, U.S. Fish and Wildlife Service).

16. **Tribal Rights**. No activity or its operation may impair reserved tribal rights, including, but not limited to, reserved water rights and treaty fishing and hunting rights.

17. **Endangered Species**. (a) No activity is authorized under any NWP which is likely to jeopardize the continued existence of a threatened or endangered species or a species proposed for such designation, as identified under the Federal Endangered Species Act (ESA), or which will destroy or adversely modify the critical habitat of such species. No activity is species or critical habitat, unless Section 7 consultation addressing the effects of the proposed activity has been completed.

(b) Federal agencies should follow their own procedures for complying with the requirements of the ESA. Federal permittees must provide the district engineer with the appropriate documentation to demonstrate compliance with those requirements.

(c) Non-federal permittees shall notify the district engineer if any listed species or designated critical habitat might be affected or is in the vicinity of the project, or if the project is located in designated critical habitat, and shall not begin work on the activity until notified by the district engineer that the requirements of the ESA have been

satisfied and that the activity is authorized. For activities that might affect Federally-listed endangered or threatened species or designated critical habitat, the pre-construction notification must include the name(s) of the endangered or threatened species that may be affected by the proposed work or that utilize the designated critical habitat that may be affected by the proposed work. The district engineer will determine whether the proposed activity ``may affect'' or will have ``no effect'' to listed species and designated critical habitat and will notify the non-Federal applicant of the Corps' determination within 45 days of receipt of a complete pre-construction notification. In cases where the non-Federal applicant has identified listed species or critical habitat that might be affected or is in the vicinity of the project, and has so notified the Corps, the applicant shall not begin work until the Corps has provided notification the proposed activities will have ``no effect'' on listed species or critical habitat, or until Section 7 consultation has been completed.

(d) As a result of formal or informal consultation with the FWS or NMFS the district engineer may add species-specific regional endangered species conditions to the NWPs.

(e) Authorization of an activity by a NWP does not authorize the ``take'' of a threatened or endangered species as defined under the ESA. In the absence of separate authorization (e.g., an ESA Section 10 Permit, a Biological Opinion with ``incidental take'' provisions, etc.) from the U.S. FWS or the NMFS, both lethal and non-lethal ``takes'' of protected species are in violation of the ESA. Information on the location of threatened and endangered species and their critical habitat can be obtained directly from the offices of the U.S. FWS and NMFS or their worldwide Web pages at http://www.fws.gov/ and http://www.noaa.gov/fisheries.html respectively.

18. **Historic Properties**. (a) In cases where the district engineer determines that the activity may affect properties listed, or eligible for listing, in the National Register of Historic Places, the activity is not authorized, until the requirements of Section 106 of the National Historic Preservation Act (NHPA) have been satisfied.

(b) Federal permittees should follow their own procedures for complying with the requirements of Section 106 of the National Historic Preservation Act. Federal permittees must provide the district engineer with the appropriate documentation to demonstrate compliance with those requirements.

(c) Non-federal permittees must submit a pre-construction notification to the district engineer if the authorized activity may have the potential to cause effects to any historic properties listed, determined to be eligible for listing on, or potentially eligible for listing on the National Register of Historic Places, including previously unidentified properties. For such activities, the pre-construction notification must state which historic properties may be affected by the proposed work or include a vicinity map indicating the location of the historic properties or the potential for the presence of historic properties. Assistance regarding information on the location of or potential for the presence of historic resources can be sought from the State Historic Preservation Officer or Tribal Historic Preservation Officer, as appropriate, and the National Register of Historic Places (see 33 CFR 330.4(g)). The district engineer shall make a reasonable and good faith effort to carry out appropriate identification efforts, which may include background research, consultation, oral history interviews, sample field investigation, and field survey. Based on the information submitted and these efforts, the district engineer shall determine whether the proposed activity has the potential to cause an effect on the historic properties. Where the non-Federal applicant has identified historic properties which the activity may have the potential to cause effects and so notified the Corps, the non-Federal applicant shall not begin the activity until notified by the district engineer either that the activity has no potential to cause effects or that consultation under Section 106 of the NHPA has been completed.

(d) The district engineer will notify the prospective permittee within 45 days of receipt of a complete pre-construction notification whether NHPA Section 106 consultation is required. Section 106 consultation is not required when the Corps determines that the activity does not have the potential to cause effects on historic properties (see 36 CFR 800.3(a)). If NHPA section 106 consultation is required and will occur, the district engineer will notify the non-Federal applicant that he or she cannot begin work until Section 106 consultation is completed.

(e) Prospective permittees should be aware that section 110k of the NHPA (16 U.S.C. 470h-2(k)) prevents the Corps from granting a permit or other assistance to an applicant who, with intent to avoid the requirements of Section 106 of the NHPA, has intentionally significantly adversely affected a historic property to which the permit would relate, or having legal power to prevent it, allowed such significant adverse effect to occur, unless the Corps, after consultation with the Advisory Council on Historic Preservation (ACHP), determines that circumstances justify granting such assistance despite the adverse effect created or permitted by the applicant. If circumstances justify granting the assistance, the Corps is required to notify the ACHP and provide documentation specifying the circumstances, explaining the degree of damage to the integrity of any historic properties affected, and proposed mitigation. This documentation must include any views obtained from the applicant, SHPO/THPO, appropriate Indian tribes if the undertaking occurs on or affects historic properties on tribal lands or affects properties of interest to those tribes, and other parties known to have a legitimate interest in the impacts to the permitted activity on historic properties.

19. **Designated Critical Resource Waters**. Critical resource waters include, NOAA-designated marine sanctuaries, National Estuarine Research Reserves, state natural heritage sites, and outstanding national resource waters or other waters officially designated by a state as having particular environmental or ecological significance and identified by the district engineer after notice and opportunity for public comment. The district engineer may also designate additional critical resource waters after notice and opportunity for comment.

(a) Discharges of dredged or fill material into waters of the United States are not authorized by NWPs 7, 12, 14, 16, 17, 21, 29, 31, 35, 39, 40, 42, 43, 44, 49, and 50 for any activity within, or directly affecting, critical resource waters, including wetlands adjacent to such waters.

(b) For NWPs 3, 8, 10, 13, 15, 18, 19, 22, 23, 25, 27, 28, 30, 33, 34, 36, 37, and 38, notification is required in accordance with general condition 27, for any activity proposed in the designated critical resource waters including wetlands adjacent to those waters. The district engineer may authorize activities under these NWPs only after it is determined that the impacts to the critical resource waters will be no more than minimal.

20. **Mitigation**. The district engineer will consider the following factors when determining appropriate and practicable mitigation necessary to ensure that adverse effects on the aquatic environment are minimal:

(a) The activity must be designed and constructed to avoid and minimize adverse effects, both temporary and permanent, to waters of the United States to the maximum extent practicable at the project site (i.e., on site).

(b) Mitigation in all its forms (avoiding, minimizing, rectifying, reducing, or compensating) will be required to the extent necessary to ensure that the adverse effects to the aquatic environment are minimal.

(c) Compensatory mitigation at a minimum one-for-one ratio will be required for all wetland losses that exceed 1/10 acre and require pre-construction notification, unless the district engineer determines in writing that some other form of mitigation would be more environmentally appropriate and provides a project-specific waiver of this requirement. For wetland losses of 1/10 acre or less that require pre-construction notification, the district engineer may determine on a case-by-case basis that compensatory mitigation is required to ensure that the activity results in minimal adverse effects on the aquatic environment. Since the likelihood of success is greater and the impacts to potentially valuable uplands are reduced, wetland restoration should be the first compensatory mitigation option considered.

(d) For losses of streams or other open waters that require pre-construction notification, the district engineer may require compensatory mitigation, such as stream restoration, to ensure that the activity results in minimal adverse effects on the aquatic environment.

(e) Compensatory mitigation will not be used to increase the acreage losses allowed by the acreage limits of the NWPs. For example, if an NWP has an acreage limit of 1/2 acre, it cannot be used to authorize any project resulting in the loss of greater than 1/2 acre of waters of the United States, even if compensatory mitigation is provided that replaces or restores some of the lost waters. However, compensatory mitigation can and should be used, as necessary, to ensure that a project already meeting the established acreage limits also satisfies the minimal impact requirement associated with the NWPs.

(f) Compensatory mitigation plans for projects in or near streams or other open waters will normally include a requirement for the establishment, maintenance, and legal protection (e.g., conservation easements) of riparian areas next to open waters. In some cases, riparian areas may be the only compensatory mitigation required. Riparian areas should consist of native species. The width of the required riparian area will address documented water quality or aquatic habitat loss concerns. Normally, the riparian area will be 25 to 50 feet wide on each side of the stream, but the district engineer may require slightly wider riparian areas to address documented water quality or habitat loss concerns. Where both wetlands and open waters exist on the project site, the district engineer will determine the appropriate compensatory mitigation (e.g., riparian areas and/or wetlands compensation) based on what is best for the aquatic environment on a watershed basis. In cases where riparian areas are determined to be the most appropriate form of compensatory mitigation, the district engineer may waive or reduce the requirement to provide wetland compensatory mitigation for wetland losses.

(g) Permittees may propose the use of mitigation banks, in-lieu fee arrangements or separate activity-specific compensatory mitigation. In all cases, the mitigation provisions will specify the party responsible for accomplishing and/or complying with the mitigation plan.

(h) Where certain functions and services of waters of the United States are permanently adversely affected, such as the conversion of a forested or scrub-shrub wetland to a herbaceous wetland in a permanently maintained utility line right-of-way, mitigation may be required to reduce the adverse effects of the project to the minimal level.

21. **Water Quality**. Where States and authorized Tribes, or EPA where applicable, have not previously certified compliance of an NWP with CWA Section 401, individual 401 Water Quality Certification must be obtained or waived (see 33 CFR 330.4(c)). The district engineer or State or Tribe may require additional water quality

management measures to ensure that the authorized activity does not result in more than minimal degradation of water quality.

22. **Coastal Zone Management**. In coastal states where an NWP has not previously received a state coastal zone management consistency concurrence, an individual state coastal zone management consistency concurrence must be obtained, or a presumption of concurrence must occur (see 33 CFR 330.4(d)). The district engineer or a State may require additional measures to ensure that the authorized activity is consistent with state coastal zone management requirements.

23. **Regional and Case-By-Case Conditions**. The activity must comply with any regional conditions that may have been added by the Division Engineer (see 33 CFR 330.4(e)) and with any case specific conditions added by the Corps or by the state, Indian Tribe, or U.S. EPA in its section 401 Water Quality Certification, or by the state in its Coastal Zone Management Act consistency determination.

24. **Use of Multiple Nationwide Permits**. The use of more than one NWP for a single and complete project is prohibited, except when the acreage loss of waters of the United States authorized by the NWPs does not exceed the acreage limit of the NWP with the highest specified acreage limit. For example, if a road crossing, over tidal waters is constructed under NWP 14, with associated bank stabilization authorized by NWP 13, the maximum acreage loss of waters of the United States for the total project cannot exceed 1/3-acre.

25. **Transfer of Nationwide Permit Verifications**. If the permittee sells the property associated with the nationwide permit verification, the permittee may transfer the nationwide permit verification to the new owner by submitting a letter to the appropriate Corps district office to validate the transfer. A copy of the nationwide permit verification must be attached to the letter, and the letter must contain the following statement and signature: ``When the structures or work authorized by this nationwide permit are still in existence at the time the property is transferred, the terms and conditions of this nationwide permit, including any special conditions, will continue to be binding on the new owner(s) of the property. To validate the transfer of this nationwide permit, and the associated liabilities associated with compliance with its terms and conditions, have the transferee sign and date below."

(Transferee)

(Date)

26. **Compliance Certification**. Each permittee who received the NWP verification from the Corps must submit a signed certification regarding the completed work and any required mitigation. The certification form must be forwarded by the Corps with the NWP verification letter and will include:

(a) A statement that the authorized work was done in accordance with the NWP authorization, including any general or specific conditions;

(b) A statement that any required mitigation was completed in accordance with the permit conditions; and

(c) The signature of the permittee certifying the completion of the work and mitigation.

27. **Pre-Construction Notification**. (a) Timing. Where required by the terms of the NWP, the prospective permittee must notify the district engineer by submitting a pre-construction notification (PCN) as early as possible. The district engineer must determine if the PCN is complete within 30 calendar days of the date of receipt and, as a general rule, will request additional information necessary to make the PCN complete only once. However, if the prospective permittee does not provide all of the requested information, then the district engineer will notify the prospective permittee that the PCN is still incomplete and the PCN review process will not commence until all of the requested information has been received by the district engineer. The prospective permittee shall not begin the activity until either:

(1) He or she is notified in writing by the district engineer that the activity may proceed under the NWP with any special conditions imposed by the district or division engineer; or

(2) Forty-five calendar days have passed from the district engineer's receipt of the complete PCN and the prospective permittee has not received written notice from the district or division engineer. However, if the permittee was required to notify the Corps pursuant to general condition 17 that listed species or critical habitat might affected or in the vicinity of the project, or to notify the Corps pursuant to general condition 18 that the activity may have the potential to cause effects to historic properties, the permittee cannot begin the activity until receiving written notification from the Corps that is "no effect" on listed species or "no potential to cause effects" on historic

properties, or that any consultation required under Section 7 of the Endangered Species Act (see 33 CFR 330.4(f)) and/or Section 106 of the National Historic Preservation (see 33 CFR 330.4(g)) is completed. Also, work cannot begin under NWPs 21, 49, or 50 until the permittee has received written approval from the Corps. If the proposed activity requires a written waiver to exceed specified limits of an NWP, the permittee cannot begin the activity until the district engineer issues the waiver. If the district or division engineer notifies the permittee in writing that an individual permit is required within 45 calendar days of receipt of a complete PCN, the permittee cannot begin the activity until an individual permit has been obtained. Subsequently, the permittee's right to proceed under the NWP may be modified, suspended, or revoked only in accordance with the procedure set forth in 33 CFR 330.5(d)(2).

(b) Contents of Pre-Construction Notification: The PCN must be in writing and include the following information:

(1) Name, address and telephone numbers of the prospective permittee;

(2) Location of the proposed project;

(3) A description of the proposed project; the project's purpose; direct and indirect adverse environmental effects the project would cause; any other NWP(s), regional general permit(s), or individual permit(s) used or intended to be used to authorize any part of the proposed project or any related activity. The description should be sufficiently detailed to allow the district engineer to determine that the adverse effects of the project will be minimal and to determine the need for compensatory mitigation. Sketches should be provided when necessary to show that the activity complies with the terms of the NWP. (Sketches usually clarify the project and when provided result in a quicker decision.);

(4) The PCN must include a delineation of special aquatic sites and other waters of the United States on the project site. Wetland delineations must be prepared in accordance with the current method required by the Corps. The permittee may ask the Corps to delineate the special aquatic sites and other waters of the United States, but there may be a delay if the Corps does the delineation, especially if the project site is large or contains many waters of the United States. Furthermore, the 45 day period will not start until the delineation has been submitted to or completed by the Corps, where appropriate;

(5) If the proposed activity will result in the loss of greater than 1/10 acre of wetlands and a PCN is required, the prospective permittee must submit a statement describing how the mitigation requirement will be satisfied. As an alternative, the prospective permittee may submit a conceptual or detailed mitigation plan.

(6) If any listed species or designated critical habitat might be affected or is in the vicinity of the project, or if the project is located in designated critical habitat, for non-Federal applicants the PCN must include the name(s) of those endangered or threatened species that might be affected by the proposed work or utilize the designated critical habitat that may be affected by the proposed work. Federal applicants must provide documentation demonstrating compliance with the Endangered Species Act; and

(7) For an activity that may affect a historic property listed on, determined to be eligible for listing on, or potentially eligible for listing on, the National Register of Historic Places, for non-Federal applicants the PCN must state which historic property may be affected by the proposed work or include a vicinity map indicating the location of the historic property. Federal applicants must provide documentation demonstrating compliance with Section 106 of the National Historic Preservation Act.

(c) Form of Pre-Construction Notification: The standard individual permit application form (Form ENG 4345) may be used, but the completed application form must clearly indicate that it is a PCN and must include all of the information required in paragraphs (b)(1) through (7) of this general condition. A letter containing the required information may also be used.

(d) Agency Coordination: (1) The district engineer will consider any comments from Federal and state agencies concerning the proposed activity's compliance with the terms and conditions of the NWPs and the need for mitigation to reduce the project's adverse environmental effects to a minimal level.

(2) For all NWP 48 activities requiring pre-construction notification and for other NWP activities requiring pre-construction notification to the district engineer that result in the loss of greater than 1/2-acre of waters of the United States, the district engineer will immediately provide (e.g., via facsimile transmission, overnight mail, or other expeditious manner) a copy of the PCN to the appropriate Federal or state offices (U.S. FWS, state natural resource or water quality agency, EPA, State Historic Preservation Officer (SHPO) or Tribal Historic Preservation Office (THPO), and, if appropriate, the NMFS). With the exception of NWP 37, these agencies will then have 10 calendar days from the date the material is transmitted to telephone or fax the district engineer notice that they intend to provide substantive, site-specific comments. If so contacted by an agency, the district engineer will wait an additional 15 calendar days before making a decision on the pre-construction notification. The district engineer will fully consider agency comments received within the specified time frame, but will provide no response to the resource agency, except as provided below. The district engineer will indicate in the administrative record associated with each pre-construction notification that the resource agencies' concerns were considered. For NWP 37, the emergency watershed protection and rehabilitation activity may proceed immediately in cases where there is an unacceptable hazard to life or a significant loss of property or economic hardship will occur. The district

engineer will consider any comments received to decide whether the NWP 37 authorization should be modified, suspended, or revoked in accordance with the procedures at 33 CFR 330.5.

(3) In cases of where the prospective permittee is not a Federal agency, the district engineer will provide a response to NMFS within 30 calendar days of receipt of any Essential Fish Habitat conservation recommendations, as required by Section 305(b)(4)(B) of the Magnuson-Stevens Fishery Conservation and Management Act.

(4) Applicants are encouraged to provide the Corps multiple copies of pre-construction notifications to expedite agency coordination.

(5) For NWP 48 activities that require reporting, the district engineer will provide a copy of each report within 10 calendar days of receipt to the appropriate regional office of the NMFS.

(e) District Engineer's Decision: In reviewing the PCN for the proposed activity, the district engineer will determine whether the activity authorized by the NWP will result in more than minimal individual or cumulative adverse environmental effects or may be contrary to the public interest. If the proposed activity requires a PCN and will result in a loss of greater than 1/10 acre of wetlands, the prospective permittee should submit a mitigation proposal with the PCN. Applicants may also propose compensatory mitigation for projects with smaller impacts. The district engineer will consider any proposed compensatory mitigation the applicant has included in the proposal in determining whether the net adverse environmental effects to the aquatic environment of the proposed work are minimal. The compensatory mitigation proposal may be either conceptual or detailed. If the district engineer determines that the activity complies with the terms and conditions of the NWP and that the adverse effects on the aquatic environment are minimal, after considering mitigation, the district engineer will notify the permittee and include any conditions the district engineer deems necessary. The district engineer must approve any compensatory mitigation proposal before the permittee commences work. If the prospective permittee elects to submit a compensatory mitigation plan with the PCN, the district engineer will expeditiously review the proposed compensatory mitigation plan. The district engineer must review the plan within 45 calendar days of receiving a complete PCN and determine whether the proposed mitigation would ensure no more than minimal adverse effects on the aquatic environment. If the net adverse effects of the project on the aquatic environment (after consideration of the compensatory mitigation proposal) are determined by the district engineer to be minimal, the district engineer will provide a timely written response to the applicant. The response will state that the project can proceed under the terms and conditions of the NWP. If the district engineer determines that the adverse effects of the proposed work are more than minimal, then the district engineer will notify the applicant either:

(1) That the project does not qualify for authorization under the NWP and instruct the applicant on the procedures to seek authorization under an individual permit;

(2) that the project is authorized under the NWP subject to the applicant's submission of a mitigation plan that would reduce the adverse effects on the aquatic environment to the minimal level; or

(3) that the project is authorized under the NWP with specific modifications or conditions. Where the district engineer determines that mitigation is required to ensure no more than minimal adverse effects occur to the aquatic environment, the activity will be authorized within the 45-day PCN period. The authorization will include the necessary conceptual or specific mitigation or a requirement that the applicant submit a mitigation plan that would reduce the adverse effects on the aquatic environment to the minimal level. When mitigation is required, no work in waters of the United States may occur until the district engineer has approved a specific mitigation plan.

28. **Single and Complete Project**. The activity must be a single and complete project. The same NWP cannot be used more than once for the same single and complete project.

Further Information

1. District Engineers have authority to determine if an activity complies with the terms and conditions of an NWP.
2. NWPs do not obviate the need to obtain other federal, state, or local permits, approvals, or authorizations required by law.
3. NWPs do not grant any property rights or exclusive privileges.
4. NWPs do not authorize any injury to the property or rights of others.
5. NWPs do not authorize interference with any existing or proposed Federal project.

Definitions

Best management practices (BMPs): Policies, practices, procedures, or structures implemented to mitigate the adverse environmental effects on surface water quality resulting from development. BMPs are categorized as structural or non-structural.

Compensatory mitigation: The restoration, establishment (creation), enhancement, or preservation of aquatic resources for the purpose of compensating for unavoidable adverse impacts which remain after all appropriate and practicable avoidance and minimization has been achieved.
Currently serviceable: Useable as is or with some maintenance, but not so degraded as to essentially require reconstruction.
Discharge: The term “discharge” means any discharge of dredged or fill material.
Enhancement: The manipulation of the physical, chemical, or biological characteristics of an aquatic resource to heighten, intensify, or improve a specific aquatic resource function(s). Enhancement results in the gain of selected aquatic resource function(s), but may also lead to a decline in other aquatic resource function(s). Enhancement does not result in a gain in aquatic resource area.
Ephemeral stream: An ephemeral stream has flowing water only during, and for a short duration after, precipitation events in a typical year. Ephemeral stream beds are located above the water table year-round. Groundwater is not a source of water for the stream. Runoff from rainfall is the primary source of water for stream flow.
Establishment (creation): The manipulation of the physical, chemical, or biological characteristics present to develop an aquatic resource that did not previously exist at an upland site. Establishment results in a gain in aquatic resource area.
Historic Property: Any prehistoric or historic district, site (including archaeological site), building, structure, or other object included in, or eligible for inclusion in, the National Register of Historic Places maintained by the Secretary of the Interior. This term includes artifacts, records, and remains that are related to and located within such properties. The term includes properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization and that meet the National Register criteria (36 CFR Part 60).
Independent utility: A test to determine what constitutes a single and complete project in the Corps regulatory program. A project is considered to have independent utility if it would be constructed absent the construction of other projects in the project area. Portions of a multi-phase project that depend upon other phases of the project do not have independent utility. Phases of a project that would be constructed even if the other phases were not built can be considered as separate single and complete projects with independent utility.
Intermittent stream: An intermittent stream has flowing water during certain times of the year, when groundwater provides water for stream flow. During dry periods, intermittent streams may not have flowing water. Runoff from rainfall is a supplemental source of water for stream flow.
Loss of waters of the United States: Waters of the United States that are permanently adversely affected by filling, flooding, excavation, or drainage because of the regulated activity. Permanent adverse effects include permanent discharges of dredged or fill material that change an aquatic area to dry land, increase the bottom elevation of a waterbody, or change the use of a waterbody. The acreage of loss of waters of the United States is a threshold measurement of the impact to jurisdictional waters for determining whether a project may qualify for an NWP; it is not a net threshold that is calculated after considering compensatory mitigation that may be used to offset losses of aquatic functions and services. The loss of stream bed includes the linear feet of stream bed that is filled or excavated. Waters of the United States temporarily filled, flooded, excavated, or drained, but restored to pre-construction contours and elevations after construction, are not included in the measurement of loss of waters of the United States. Impacts resulting from activities eligible for exemptions under Section 404(f) of the Clean Water Act are not considered when calculating the loss of waters of the United States.
Non-tidal wetland: A non-tidal wetland is a wetland that is not subject to the ebb and flow of tidal waters. The definition of a wetland can be found at 33 CFR 328.3(b). Non-tidal wetlands contiguous to tidal waters are located landward of the high tide line (i.e., spring high tide line).
Open water: For purposes of the NWPs, an open-water is any area that in a year with normal patterns of precipitation has water flowing or standing above ground to the extent that an ordinary high water mark can be determined. Aquatic vegetation within the area of standing or flowing water is either non-emergent, sparse, or absent. Vegetated shallows are considered to be open waters. Examples of ``open waters'' include rivers, streams, lakes, and ponds.
Ordinary High Water Mark: An ordinary high water mark is a line on the shore established by the fluctuations of water and indicated by physical characteristics, or by other appropriate means that consider the characteristics of the surrounding areas (see 33 CFR 328.3(e)).
Perennial stream: A perennial stream has flowing water year-round during a typical year. The water table is located above the stream bed for most of the year. Groundwater is the primary source of water for stream flow. Runoff from rainfall is a supplemental source of water for stream flow.
Practicable: Available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes.
Pre-construction notification: A request submitted by the project proponent to the Corps for confirmation that a particular activity is authorized by nationwide permit. The request may be a permit application, letter, or similar document that includes information about the proposed work and its anticipated environmental effects. Pre-

construction notification may be required by the terms and conditions of a nationwide permit, or by regional conditions. A pre-construction notification may be voluntarily submitted in cases where pre-construction notification is not required and the project proponent wants confirmation that the activity is authorized by nationwide permit.
Preservation: The removal of a threat to, or preventing the decline of, aquatic resources by an action in or near those aquatic resources. This term includes activities commonly associated with the protection and maintenance of aquatic resources through the implementation of appropriate legal and physical mechanisms. Preservation does not result in a gain of aquatic resource area or functions.
Re-establishment: The manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural/historic functions to a former aquatic resource. Re-establishment results in rebuilding a former aquatic resource and results in a gain in aquatic resource area.
Rehabilitation: The manipulation of the physical, chemical, or biological characteristics of a site with the goal of repairing natural/historic functions to a degraded aquatic resource. Rehabilitation results in a gain in aquatic resource function, but does not result in a gain in aquatic resource area.
Restoration: The manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural/historic functions to a former or degraded aquatic resource. For the purpose of tracking net gains in aquatic resource area, restoration is divided into two categories: Re-establishment and rehabilitation.
Riffle and pool complex: Riffle and pool complexes are special aquatic sites under the 404(b)(1) Guidelines. Riffle and pool complexes sometimes characterize steep gradient sections of streams. Such stream sections are recognizable by their hydraulic characteristics. The rapid movement of water over a course substrate in riffles results in a rough flow, a turbulent surface, and high dissolved oxygen levels in the water. Pools are deeper areas associated with riffles. A slower stream velocity, a streaming flow, a smooth surface, and a finer substrate characterize pools.
Riparian areas: Riparian areas are lands adjacent to streams, lakes, and estuarine-marine shorelines. Riparian areas are transitional between terrestrial and aquatic ecosystems, through which surface and subsurface hydrology connects waterbodies with their adjacent uplands. Riparian areas provide a variety of ecological functions and services and help improve or maintain local water quality. (See general condition 20.)
Shellfish seeding: The placement of shellfish seed and/or suitable substrate to increase shellfish production. Shellfish seed consists of immature individual shellfish or individual shellfish attached to shells or shell fragments (i.e., spat on shell). Suitable substrate may consist of shellfish shells, shell fragments, or other appropriate materials placed into waters for shellfish habitat.
Single and complete project: The term ``single and complete project'' is defined at 33 CFR 330.2(i) as the total project proposed or accomplished by one owner/developer or partnership or other association of owners/developers. A single and complete project must have independent utility (see definition). For linear projects, a ``single and complete project'' is all crossings of a single water of the United States (i.e., a single waterbody) at a specific location. For linear projects crossing a single waterbody several times at separate and distant locations, each crossing is considered a single and complete project. However, individual channels in a braided stream or river, or individual arms of a large, irregularly shaped wetland or lake, etc., are not separate waterbodies, and crossings of such features cannot be considered separately.
Stormwater management: Stormwater management is the mechanism for controlling stormwater runoff for the purposes of reducing downstream erosion, water quality degradation, and flooding and mitigating the adverse effects of changes in land use on the aquatic environment.
Stormwater management facilities: Stormwater management facilities are those facilities, including but not limited to, stormwater retention and detention ponds and best management practices, which retain water for a period of time to control runoff and/or improve the quality (i.e., by reducing the concentration of nutrients, sediments, hazardous substances and other pollutants) of stormwater runoff.
Stream bed: The substrate of the stream channel between the ordinary high water marks. The substrate may be bedrock or inorganic particles that range in size from clay to boulders. Wetlands contiguous to the stream bed, but outside of the ordinary high water marks, are not considered part of the stream bed.
Stream channelization: The manipulation of a stream's course, condition, capacity, or location that causes more than minimal interruption of normal stream processes. A channelized stream remains a water of the United States.
Structure: An object that is arranged in a definite pattern of organization. Examples of structures include, without limitation, any pier, boat dock, boat ramp, wharf, dolphin, weir, boom, breakwater, bulkhead, revetment, riprap, jetty, artificial island, artificial reef, permanent mooring structure, power transmission line, permanently moored floating vessel, piling, aid to navigation, or any other manmade obstacle or obstruction.
Tidal wetland: A tidal wetland is a wetland (i.e., water of the United States) that is inundated by tidal waters. The definitions of a wetland and tidal waters can be found at 33 CFR 328.3(b) and 33 CFR 328.3(f), respectively. Tidal waters rise and fall in a predictable and measurable rhythm or cycle due to the gravitational pulls of the moon and sun. Tidal waters end where the rise and fall of the water surface can no longer be practically measured in a

predictable rhythm due to masking by other waters, wind, or other effects. Tidal wetlands are located channelward of the high tide line, which is defined at 33 CFR 328.3(d).
Vegetated shallows: Vegetated shallows are special aquatic sites under the 404(b)(1) Guidelines. They are areas that are permanently inundated and under normal circumstances have rooted aquatic vegetation, such as seagrasses in marine and estuarine systems and a variety of vascular rooted plants in freshwater systems.
Waterbody: For purposes of the NWPs, a waterbody is a jurisdictional water of the United States that, during a year with normal patterns of precipitation, has water flowing or standing above ground to the extent that an ordinary high water mark (OHWM) or other indicators of jurisdiction can be determined, as well as any wetland area (see 33 CFR 328.3(b)). If a jurisdictional wetland is adjacent--meaning bordering, contiguous, or neighboring--to a jurisdictional waterbody displaying an OHWM or other indicators of jurisdiction, that waterbody and its adjacent wetlands are considered together as a single aquatic unit (see 33 CFR 328.4(c)(2)). Examples of ``waterbodies'' include streams, rivers, lakes, ponds, and wetlands.

ADDITIONAL INFORMATION

This nationwide permit is effective March 19, 2007, and expires on March 18, 2012.

Information about the U.S. Army Corps of Engineers regulatory program, including nationwide permits, may also be accessed at http://www.swf.usace.army.mil/pubdata/environ/regulatory/index.asp or http://www.usace.army.mil/cw/cecwo/reg

APPENDIX G

TECHNICAL MEMORANDUM FOR CULTURAL RESOURCES CONSTRAINTS

Technical Memorandum for
Cultural Resources Constraints within the
Proposed Mopac (Loop 1) Bicycle Bridge Project Area

Regulatory Framework

The following is a baseline level analysis of potential cultural resources constraints associated with the proposed Mopac (Loop 1) Bicycle Bridge over Barton Creek in the City of Austin, Texas. Cultural resources are sites, buildings, districts, structures, and objects of local, regional or national significance.

The proposed bicycle bridge would be sponsored by the City of Austin (COA) and would be built within existing Loop1 right-of-way (ROW), controlled by the Texas Department of Transportation (TxDOT), a political subdivision of the State of Texas. Consequently the project is subject to the Antiquities Code of Texas, which protects cultural resources on State owned or controlled land. Though no federal land or involvement is currently part of this undertaking, the COA is seeking federal money to complete the project and therefore Section 106 of the National Historic Preservation Act could apply in the future. Furthermore, if the project requires individual permits or preconstruction notifications under Section 404 of the Clean Water Act, then Section 106 would also apply.

The requirements for satisfying Section 106 roughly parallel those under the Antiquities Code of Texas and the two are often completed simultaneously. However, whereas the Antiquities Code of Texas only considers direct effects a project has on cultural resources, Section 106 also considers indirect and visual effects. Indirect and visual effects generally apply to buildings, structures and objects of the built environment that are greater than 50 years in age, rather than to archeological sites.

Due to the fact that the project would take place in TxDOT ROW, consultation with the Texas Historical Commission (THC) in compliance with state and federal laws would take place through TxDOT, under their Programmatic Agreement (PA) with the THC. All coordination, background studies, and field surveys would therefore follow TxDOT's protocols and *Standards of Uniformity* (SOU) for cultural resources.

Cultural Resources Baseline Constraints

A records search was conducted online through the Texas Archeological Sites Atlas maintained by the Texas Historical Commission. Research focused on the identification of archeological sites, previous surveys, Registered Texas Historic Landmarks (RTHLs) sites listed on the National Register of Historic Places (NRHP) and sites listed as State Archeological Landmarks (SALs). The search revealed that there are no NRHP sites, SALs, or RTHLs within 1,000 feet of the project area. However, there are dozens of recorded archeological sites nearby and seven of those sites are within 1,000 feet of the project area. They include:

- **41TV338.** This site was recorded in 1979 by Espey Huston and Associates (now PBS&J). Its boundaries are not well defined. According to the Atlas it is located approximately 200 feet from the project area, on the southeast side of the Loop 1 bridge, though it could extend into the project area. It is on the west side of Barton Creek, within a flood terrace. It was identified on the basis of two cores and three flakes observed in a rodent burrow. Two test pits were dug to 50 centimeters (1.64 ft) and neither revealed any archeological material. Nonetheless the site recorder felt that there was potential for material to be more deeply buried and recommended avoidance or further testing if impacted.
- **41TV686.** This site was recorded in 1983 during a survey performed by TxDOT in advance of construction of the Loop 1 bridge. It is located on the southeast side of the Loop 1 bridge, roughly within the project area, approximately 700 feet west of Barton Creek. It is described as an late nineteenth or early twentieth century residential complex. The main house had been demolished, leaving only stone foundations and a chimney in place. However, several wooded outbuildings were still standing. A fairly substantial scatter of turn of the century household debris was scattered across the surface. According to the site form, the house was originally built on Lake Travis, then moved to the site in the 1920s and used as a hunting lodge. The site form recommended no further work, since the house itself was not in its original location.
- **41TV685.** This site was recorded in 1983 during a survey performed by TxDOT in advance of construction of the Loop 1 bridge. It is located on the southeast side of the Loop 1 bridge, roughly within the project area, approximately 1,500 feet west of Barton Creek. It was recorded as a 1930s era limestone and cedar ranch house, owned by Jim Gaines. The form recommended preservation at the time, though this house is no longer at this location.
- **41TV649.** This site was recorded in 1983 during a survey performed by TxDOT in advance of construction of the Loop 1 bridge. It is located on the southeast side of the Loop 1 bridge, outside the project area, approximately 1,800 feet west of Barton Creek. The site is recorded as a mixed historic period and prehistoric site characterized by a scatter of early twentieth century household debris, as well as chert flakes, cores, and burned rocks.
- **41TV904.** This site was recorded in 1984 during a survey performed by Espey Huston & Associates. It is located on the southeast side of Loop 1 well outside of the Loop 1 ROW and approximately 1,700 feet west of Barton Creek. It is a shallow prehistoric lithic procurement site. The site form recommended that the site merited no further work.
- **41TV386.** This site was recorded in 1979 during a survey performed by Espey Huston & Associates. It is located on the southeast side of Loop 1, approximately 200 feet from Barton Creek. It was recorded as a geographically extensive shallow prehistoric lithic procurement site containing abundant flakes, cores, biface fragments and other manufacturing debris.
- **41TV991.** Site 41TV991 is located just northeast of SH 360 within and to the east of the Loop 1 ROW**.** This site consists of a large open campsite characterized by a broad surface scatter of lithic flakes and tools. Two projectile points representing the Paleoindian period (6,500-12,000 B.P.) were found on the surface. Investigators dug three shovel tests and encountered bedrock at a depth of 10 centimeters below the surface. For this reason they recommended no further work.

Further Actions

The Mopac Bicycle Bridge project will likely impact archeological resources. However, to date none of the resources identified within the project vicinity, or in the existing Loop 1 ROW are considered eligible for listing in the NRHP, or as SALs.

Agency consultation for cultural resources would be required once a design for the bicycle bridge has been selected. All agency coordination would take place through TxDOT-Austin District and TxDOT's Environmental Affairs Division (ENV). With respect to archeological resources, a background study should be prepared that conforms to TxDOT-ENVs SOUs for archeological background studies. The project area and adjacent areas have been previously surveyed for archeological resources and many sites have been recorded as a result of those surveys. However all previous surveys took place more than 25 years ago. A field revisit could be required under the Antiquities Code of Texas (and potentially under Section 106 should there be federal involvement) to re-assess the condition of those existing sites and to re-evaluate them with respect to the current proposed project.

Additionally, coordination of effects to historic structures (if any) would likely be required through TxDOT, according to their SOUs for non-archeological historic resources.

APPENDIX H

COMPLETE RECORD OF COORDINATION: MEETING MINUTES / EMAIL MESSAGES / MEMORANDA

MINUTES

Mopac Bike Bridge Meeting with Willy Conrad

January 14, 2011

9:00 a.m. – 10:00 a.m.

Attendees: Willy Conrad- BCCP; Mark Borenstein, Craig McColloch, Paula Jo Lemonds, Leah Peters - HDR; Brian Cowan, Jean Krejca- Zara Environmental

Location: Wildland Conservation Division - Reicher Ranch; 3621 South FM 620

http://www.ci.austin.tx.us/water/wildland/location.htm

Agenda Items:

1. Update Willy on project status
    a. In preliminary phase now
        1. Extent of the Corridor is defined by the existing ROW
    b. Two Bridge Crossing Alternatives are being considered: Cantilever from existing bridge or a separate structure, outboard of the existing bridge. Both in alternatives are located within existing TxDOT ROW.
        1. Plans require Coordination Secretary's approval (Willy Conrad)
            1. Minor Project- Less than 3,000 sq. ft. and would include Geotech. Casual Approval, 5 day turnaround
            2. Major Project- Over 3000 sq. ft. 90% plans required for approval. Willy has 30 days to review and Deny, Approve, or Approve w/conditions
        2. Consultation throughout project best option for approval
            1. No Separate Coordination. Everything through Willy.
            2. Mark would need to develop qualifications for contractor and list on plans. Also to include notes about Karst disturbance procedures per Willy.
        3. Clarify they are both in existing ROW and established corridor for MoPac
            1. City Project will use existing Mitigation- Regulations are that as long as new project is within existing ROW, no new mitigation necessary.
        4. Explain impacts

Activity (concerns)	Hanging	Outbound
Drill into bedrock (local karst inverts, GW quality)	Y, bent improvements	Y, new bents
Construction siltation (GW quality, local karst inverts, BS salamander)	Y, bent improvements	Y, new bents
Cut trees (warbler)	Y, bridge approach	Y, bridge approach

2. Zara Questions for Willy
    a. What type of environmental document will be required
        1. Willy asked about Drilling Process
            1. Mark explained plan of (20'x20') area to be used per bent (3 bents @ 8" each to depth of 70-80')
            2. All construction will occur in existing TxDOT ROW within designated BCCP infrastructure corridor
            3. Length of construction time TBD
            4. Will need to coordinate any geotechnical with Willy; current plan is to not conduct geotechnical investigations
            5. Karst cavities identified during drill will trigger - U.S. Fish and Wildlife (USFWS) standards
                a. If cavity found in course of drilling, will need to stop work & investigate via video. Close Cavity. Have qualified biologist per USFWS guidelines monitor and study.
                b. If Presence/Absence Survey will be required, baited trap every 7 days at least 3 times in cavity.
                c. Use untreated water for drilling. Write up of work plan with mitigations and best management practices coordinated in course of project development and design
            6. Willy will sign off at the 90% plan set, but will coordinate leading up to the 90%
            7. Karst Biology- USFWS approval for continuation. Willy stated that since it's a mitigated corridor, only scientific data required.
        2. Depending on watershed boundaries for Airman's Cave, hydrogeologic study to determine flow paths/watershed for cave OR that site is already isolated by previous disturbances.
            1. Willy will provide GIS map and email Craig McColloch and Brian Cowan.
        3. Surficial karst survey
            1. Willy- Close attention at clearing vegetation. No clearing permitted during nesting season (3/1-8/31). Possible to clear starting 8/1 with permission. 1st 3 weeks of March typically have high volume of nesting birds.
            2. Construction is permitted during nesting season, (1) if it is begun before the season starts (March 1) and (2) continues without an extend break and (3) there are no birds nesting within 300'.
                a. Noted that this probably will not be an issue based on current traffic in the area.
                b. If Construction is done during nesting season, biologist must be on site.
            3. Geologic Assessment requirements for BCCP.
                a. Pedestrian survey for karst and CEFs can be limited to TxDOT ROW, areas of disturbance.
    b. Surficial survey beyond TxDOT ROW not needed.
    c. Bird surveys (we are assuming occupancy during nesting season) - No bird survey required.
        1. Clarify we will not construct during nesting in plans/specs

d. Questions related to utility corridor
    1. Primary or secondary utility corridor? NO
    2. Project area in a special use tract? NO
    3. Will bridge be considered “new construction in approved corridors?” – approved corridor

3. HDR Questions for Willy
    a. What are the current unit mitigation costs BCCP? – None. Site already mitigated.
    b. What information is needed to determine the amount of mitigation expense? – None, site mitigated
4. Construction Items
    a. Construction is already mitigated. Issue will be if karst void found during drilling,
        1. Bore diameters are 9” which is plenty of room for camera when necessary
        2. Existing logs on holes do not show any karst voids
        3. Permanent casing will be used to contain cement
5. Watershed Issue – Airman’s Cave
    a. Willy will provide plot from deepest part of cave using presumptive watershed contour
    b. If plot shows project is in the watershed of Airman’s Cave, potential options will include:
        1. Use prior Hydrogeology study to show no new effects will be caused by current drilling
        2. Show pre-existing environmental stressors- basin & topography and demonstrate prior impacts already in place
        3. Find another cave for mitigation
        4. Willy said this is a common issue right now. Negotiation timeframe is minimum of 6 months.
        5. Jean mentioned case of distance and size making environmental effects negligible.
        6. Brian mentioned checking into die studies in nearby areas that have already been done and see where they show the flow going.
6. Action items
    a. Zara research to confirm Airman’s Cave is only one potentially affected
    b. Willy (BCCP) to provide plot of Airman’s Cave watershed in PDF and supply GIS data

Meeting Minutes

Mopac Bicycle Bridge
One Texas Center, 11th Floor
January 27, 2011

Attendees:

HDR:
Mark Borenstein, Mark.Borenstein@hdrinc.com, 912-5130
Craig McColloch, Craig.McColloch@hdrinc.com, 912-5178

Ciry of Austin:
Laurie Dries, Laurie.Dries@ci.austin.tx.us, 974-6340

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1. The purpose of the meeting was to brief Laurie Dries on the conceptual alternatives, including the bridging of Barton Creek in the existing TxDOT ROW, associated trails along Mopac, and an aerial bicycle bridge crossing at Loop 360. Laurie Dries is responsible for the salamander protection program for the City.

2. Laurie indicated the proposed work was sufficiently far upstream from the Barton Springs pool that she believed there would be no effect on protected salamanders. Items to consider as the project moves forward:

   2.1. Possible large spills of hazardous materials after construction.

   2.2. Catastrophic failure of erosion controls during construction.

   2.3. Site plan process where CEFs will be addressed.

3. Since the project is bicycle/pedestrian, there should be no hazardous materials associated with use of the trail system that could involve contamination.

4. Laurie indicated that required best management practices and construction oversight should address the erosion control potential.

5. Laurie indicated that now that she is aware of the project, she will be able to respond to those members of the public she comes into contact with in her work with salamander and Barton Springs protection who may have concerns.

MINUTES

Mopac Bike Bridge Meeting with Willy Conrad

January 31, 2011

2 pm-3 pm

Attendees: Willy Conrad- BCCP; Mark Borenstein, Craig McColloch, Paula Jo Lemonds, Leah Peters, Greg Kochersperger - HDR; Brian Cowan - Zara Environmental

Location: Wildland Conservation Division - Reicher Ranch; 3621 South FM 620

http://www.ci.austin.tx.us/water/wildland/location.htm

1. Update Willy on project status
    a. Mark brought detailed Aerial and reiterated project limits, scope, sections for both aerial crossings:
        1. Mopac at Barton Creek
        2. Mopac at Loop 360
    b. Airmans's Cave drainage basin elevation is 528' elevation. Existing grade is just above this for Mopac at Barton Creek, well above for Mopac at Loop 360. Plan is to drill down and get below existing cave elevation. Grade climbs, so drilling would be deeper the farther up we go.
    c. HDR's goal is to keep all staging areas at grade and higher.
2. Willy indicated there no reasonable likelihood for our project to impact existing caves/karst.
    a. Project is outside drainage basin for all caves in area.
    b. Other existing projects would interrupt the flow long before it could reach the cave basin.
    c. No hydrogeologic study is necessary.
    d. HDR will be performing as much work as possible outside of nesting season and will incorporate detailed notes on plans.
3. Per Willy, only requirement is that we clearly spell out on the plan sheets and in the general notes the procedure for handling voids encountered during excavation in strict compliance with USFWS requirements.
4. Summary.
    a. Willy has determined the project as currently planned will not affect existing features. Next step from here: Continue to coordinate with Willy on design plans up through 90%. That way when we get to 90%, he can sign off on the plans.
    b. HDR to meet with Sierra Club- discuss drilling and effect, if any, on groundwater flows.
5. Action items
    a. Willy will send Annick (COA advocate) and Allison (COA PM) Memo of Confirmation containing the go ahead to proceed based on BCCP's determination that the project won't affect surface or subsurface flow to caves.
    b. Willy will send Craig and Mark the language compliant with USFWS requirements for the Karst Investigation procedures in the event a void is discovered during drilling.

c. Zara will provide summary confirming that the fracture found at the roadcut does not meet minimum Fish and Wildlife Qualifications for potential habitat. Also, they will check City code to see what procedure is listed to be able to fill fracture with concrete.

SITE VISIT

Mopac Bike Bridge Meeting with
COA to observe Environmental Features
02/25/11
10 am

Attendees:

Sylvia Pope- COA

Mark Borenstein, Craig McColloch, Paula Jo Lemonds – HDR

Brian Cowan - Zara Environmental

Ryan Metz- Baer Engineering

Location: Proposed Mopac Bike Bridge Site at Loop 360 and Mopac

1. Site visit was with Sylvia Pope, WPD.
2. Went over project scope and walked site to observe features.
3. SOS applies LDC 25-8-511
4. The project is in a Critical WQ Zone with setback requirements 400 feet from the center line of Barton Creek LDC 25-8-261
    a. A board variance would be required
5. Canyon rim rock is present 1) just east and downstream of the site on the north side of the channel as defined under LDC Section 25-8-281, which covers all CEFs, and 2) up the "TxDOT" tributary up under the south end of the existing bridge
    a. Paula Jo has a GPS point for both locations
    b. CEF buffer is 150' upslope, 50' downslope and sideslope
    c. Can obtain administrative variance
    d. North side rimrock may be near LOC
    e. Tim Jones, an environmental proponent, has mapped a sinkhole near Gaines Ranch, but it was determined that this was not near the LOC or TxDOT ROW
6. No potential heritage trees noted

25-8-92 (A) (1) (d) per Sylvia Pope Email Thursday, March 10, 2011

7. CEF survey must be conducted for all CEFs within 150’ of the LOC (and thus all CEFs within 150’ would need to be identified)
8. Ryan Metz from Baer will expand the CWA 404 report to address all CEF requirements and submit next Friday 3/4
    a. He will also get input from Ingrid McDonald in P&DR
9. The OHW is essentially at the base of the pier at the northbound bridge

Peters, Leah

From: Pope, Sylvia [sylvia.pope@ci.austin.tx.us]
Sent: Thursday, March 10, 2011 2:01 PM
To: Peters, Leah; brian@zaraenvironmental.com; Ryan Metz
Cc: Beaudet, Annick; Dietzel, Allison; Borenstein, Mark; McColloch, Craig; Lemonds, Paula Jo; Pope, Sylvia; Hiers, Scott; McDonald, Ingrid M
Subject: RE: Mopac Bike Bridge Site Visit 02/25/11

Leah,

Thanks for the meeting notes. I just wanted to clarify that the Critical Water Quality Zone for Barton Creek is defined in 25-8-92 (A) (1) (d).

I look forward to the next opportunity to discuss/review the project. Thanks,

Sylvia R. Pope, P.G.
Hydrogeologist

City of Austin
Watershed Protection Department
Environmental Resources Management Division
Water Resources Evaluation Section

512-974-3429 Phone
512-802-7366 Pager
512-974-2846 Fax

From: Peters, Leah [mailto:Leah.Peters@hdrinc.com]
Sent: Wednesday, March 09, 2011 4:00 PM
To: Pope, Sylvia; brian@zaraenvironmental.com; Ryan Metz
Cc: Beaudet, Annick; Dietzel, Allison; Borenstein, Mark; McColloch, Craig; Lemonds, Paula Jo
Subject: Mopac Bike Bridge Site Visit 02/25/11

Good afternoon,

Please see attached minutes as referenced above, for your records.

If you have any questions or require anything further, please do not hesitate to contact us.

Thank you!

Leah Peters
Project Coordinator
HDR ONE COMPANY | *Many Solutions*
Texas P.E. Firm Registration No. F-754
4401 West Gate Blvd., Ste 400 | Austin, TX | 78745
Main: 512.912.5100|Direct 512.912.5189|Fax: 512.912.5158
leah.peters@hdrinc.com
www.hdrinc.com

McColloch, Craig

From: McDonald, Ingrid M [Ingrid.McDonald@austintexas.gov]
Sent: Wednesday, August 24, 2011 2:49 PM
To: McColloch, Craig
Cc: Pope, Sylvia
Subject: RE: Limited Adjustment information

Hi Craig –
Good news! I brought the Mopac Bike bridge issue up at our meeting today and we have determined that a limited adjustment is not needed for construction of a trail for this project.

So you can disregard all the limited adjustment info.
I am checking with our general permits program to see if that is an option as well and will be getting back with you. (You may have already done this,…..)
Thanks,
Ingrid McDonald

From: McColloch, Craig [mailto:Craig.McColloch@hdrinc.com]
Sent: Friday, August 19, 2011 9:42 AM
To: McDonald, Ingrid M
Cc: Pope, Sylvia
Subject: RE: Limited Adjustment information

Thanks, Ingrid. We're waiting on comments on the report from the project team with a target of end of next week, and will modify the report accordingly. I'll wait till we hear back from you. I appreciate the help on this from both you and Sylvia. Have a great weekend!

Craig

From: McDonald, Ingrid M [mailto:Ingrid.McDonald@austintexas.gov]
Sent: Friday, August 19, 2011 9:38 AM
To: McColloch, Craig
Cc: Pope, Sylvia
Subject: RE: Limited Adjustment information

Hi Craig –
Just checking in…I brought up this project at our Wednesday meeting and am checking on it with our legal for verification on the limited adjustment and will get back with you asap.
Thanks,
Ingrid

From: McDonald, Ingrid M
Sent: Friday, August 12, 2011 8:22 AM
To: 'Craig.McColloch@hdrinc.com'
Subject: Limited Adjustment information

Hi Craig –
The procedure for Limited Adjustments is found in LDC Sections 25-1-251, 25-1-252 and 25-8-518:

§ 25-1-251 APPLICATION FOR ADJUSTMENT.

(A) An application for an adjustment under Chapter 25-8, Subchapter A, Article 12 *(Save Our Springs Initiative)* may be considered only in connection with the review of:

(1) a site plan;

(2) a subdivision; or

(3) other specific development project or proposal.

(B) An applicant may file an application for an adjustment with the director.

(C) An application for an adjustment must be on a form prescribed by the director and must include:

(1) the names and addresses of the applicant and the owner;

(2) the address and legal description of the property;

(3) proof that the applicant is either the record owner or the record owner's agent;

(4) identification of the section of Chapter 25-8, Subchapter A, Article 12 *(Save Our Springs Initiative)* that, as applied to the development project or proposal, the applicant claims violates the United States Constitution, the Texas Constitution, or federal or state statute, and the provisions violated;

(5) a statement of the factual basis for applicant's claims;

(6) a legal brief supporting applicant's claims; and

(7) a description of the adjustment requested, and an explanation of how the adjustment is the minimum required to comply with the conflicting law and provides maximum protection of water quality.

Source: Section 13-1-304; Ord. 990225-70; Ord. 031211-11.

§ 25-1-252 CONSIDERATION OF APPLICATION FOR ADJUSTMENT.

This section prescribes the order of process for an application for adjustment.

(1) The Law Department shall review an application for adjustment and advise the city manager.

(2) The city manager shall present the application and the city manager's recommendation to the council.

(3) The council shall determine whether application of Chapter 25-8, Subchapter A, Article 12 *(Save Our Springs Initiative)* to the applicant's development project or proposal violates the United States Constitution, the Texas Constitution, or federal or state statute. An affirmative determination requires a three-quarters vote of the city council. If the council does not make an affirmative determination, the application is denied.

(4) This subsection applies if the council makes an affirmative determination under Subsection (3).

(a) The Watershed Protection and Development Review Department shall review the application and advise the city manager.

(b) The city manager shall present the application and the city manager's recommendation to the council at a public hearing.

(c) After a public hearing, the city council shall:

(i) determine the minimum adjustment required to comply with the conflicting law and provide maximum protection of water quality; and

(ii) grant the adjustment.

Source: Section 13-1-305; Ord. 990225-70; Ord. 010329-18; Ord. 031211-11.

§ 25-8-518 LIMITED ADJUSTMENT TO RESOLVE POSSIBLE CONFLICTS WITH OTHER LAWS.

(A) This article is not intended to conflict with the United States Constitution or the Texas Constitution or to be inconsistent with federal or state statutes that may preempt a municipal ordinance or the Austin City Charter.

(B) The terms of this article shall be applied consistently and uniformly. If a three-quarters majority of the city council concludes, or a court of competent jurisdiction renders a final judgment concluding that this article, as applied to a specific development project or proposal violates a law described in Subsection (A) of this section, the city council may, after a public hearing, adjust the application of this article to that project to the minimum extent required to comply with the conflicting law. Any adjustment shall be structured to provide the maximum protection of water quality.

Source: Section 13-7-36.8; Ord. 990225-70; Ord. 031211-11.

I'll be asking questions about this case on Wednesday, August 17 just to verify and will get back with you. There are no fees associated with this application.
Thanks,

Ingrid McDonald
Environmental Program Coordinator
Land Use Review
City of Austin
512/974-2711

McColloch, Craig

From: McDonald, Ingrid M [Ingrid.McDonald@austintexas.gov]
Sent: Tuesday, August 30, 2011 2:17 PM
To: McDonald, Ingrid M; McColloch, Craig
Cc: Pope, Sylvia; Borenstein, Mark; Dietzel, Allison; Barrera, Nadia; Johns, David; Hiers, Scott
Subject: RE: Walk for a Day Trail Program

From: McDonald, Ingrid M
Sent: Tuesday, August 30, 2011 2:15 PM
To: 'Craig.McCulloch@hdrinc.com'
Cc: Pope, Sylvia; 'Borenstein, Mark'; Dietzel, Allison; Barrera, Nadia; Johns, David; Hiers, Scott
Subject: FW: Walk for a Day Trail Program

Hi Craig –
Good news – the Mo-Pac bike bridge can go under the general permit program (see OB's email below).
Please let me know if you have further questions.
Thanks,
Ingrid McDonald
974-2711

From: McKown, OB
Sent: Tuesday, August 30, 2011 2:00 PM
To: McDonald, Ingrid M
Subject: RE: Walk for a Day Trail Program

Yes

O. B. McKown

Environmental Review Specialist Senior
City of Austin
Planning and Development Review Department
Land Use Review Division, General Permit Program

Certified Arborist, Municipal Specialist, Utility Specialist

TX-0927AMU

Office: 512/ 974-6330
Mobile: 512/ 947-9191
Fax: 512/ 974-2895

From: McDonald, Ingrid M
Sent: Monday, August 29, 2011 12:30 PM

To: McKown, OB
Subject: FW: Walk for a Day Trail Program

Hi OB –
Just checking back with you regarding if the Mo-Pac bike bridge can go under the general permit program……sorry to keep bugging you…..
Thanks,
Ingrid

From: Baker, Mark
Sent: Wednesday, August 24, 2011 2:01 PM
To: McDonald, Ingrid M
Subject: Walk for a Day Trail Program

Ingrid,

OB has been working with this program for some time. I thought they were already discussing potential variances with him. At any rate, OB has permitted other trail projects. He may be able to lend some insight into the Barton Creek crossing question. Here is a link to their website: http://www.ci.austin.tx.us/water/wildland/walkforaday.htm

Thank you,

Mark Baker, Environmental Review Specialist Senior
Office:(512)974-6356 Mobile:(512)751-6396

Certified Arborist TX-0242AM and Texas Oak Wilt Certified TOWC-0070
City of Austin, Planning and Development Review Department
Land Use Review Division, General Permit Program

McColloch, Craig

From: Nichols, Shirley
Sent: Tuesday, September 20, 2011 11:12 AM
To: Borenstein, Mark
Cc: McColloch, Craig
Subject: Mopac

Mike Walker said it can be a PCE or SCE depending upon funding. We'll need USFWS letter concurring on "No Effect" on the salamander to clear it. He thinks 18 mos.

Thank you,

Shirley

APPENDIX C

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Technical Memo

To:	Mark Borenstein, P.E., HDR		
From:	Larry Land, P.E., HDR	Project:	MoPac Bicycle Bridge at Barton Creek
CC:			
Date:	January 26, 2012	Job No:	112356

RE: Assessment of Potential Impact on Groundwater Flow by Bicycle Structure over Barton Creek along Mopac using Adjacent Structure Design with Micropiles

1.0 Background

In March 2009, the City of Austin authorized HDR Engineering, Inc. to perform preliminary engineering and environmental investigations for the Mopac Pedestrian Bridge over Barton Springs. The Project includes the preliminary design and investigations necessary to support the development of a bicycle/pedestrian structure over Barton Creek along the Loop 1/Mopac Right of Way. This Technical Memorandum focuses on a preliminary hydrogeologic investigation on the potential impact of the foundations for the bridge alternatives. The studied alternatives include:

- Attached Structure with Foundation Improvements
- Adjacent Structure with Spread Footings
- Adjacent Structure with Shallow Micropiles

For a complete description of these alternatives, please refer to the Structure Executive Summary.

2.0 Hydrogeologic Setting

The Barton Springs Segment of the Edwards Aquifer- underlies the planned bicycle/pedestrian bridge. This aquifer is comprised of the Lower Cretaceous Kainer and Person Formations of the Edwards Group. It is a dissolution, faulted limestone aquifer. The Barton Springs Segment is the source of water for Barton Springs. Recharge is primarily by water infiltration through caves, sinkholes, fractures, and solution cavities along creeks where the Edwards limestone is exposed at the land surface. Regionally, recharge moves eastward from the recharge zone and then northeast to wells, Barton Springs, Colorado River and Cold Springs.

In the vicinity of the Mopac Bridge and Barton Creek, the rocks of the Edwards Group are highly faulted[1], as indicated in Figure 1. This geologic map indicates that the Edwards is nearly at full thickness, except along the deeply incised Barton Creek channel. Here, the map

[1] Small, T.A., Hanson, J.A., and Hauwert, N.M., 1996, Geologic framework and hydrogeologic characteristics of the Edwards Aquifer outcrop (Barton Springs Segment), Northeastern Hays and Southwestern Travis Counties, Texas: U. S. Geological Survey Water-Resources Investigations 96-4306.

indicates only the Kainer Formation typically is present. About 2 miles northwest of the planned bridge, the Mount Bonnell Fault hydrologically separates the Trinity Aquifer to the west and the Edwards Aquifer to the east. This major fault is the western extent of the Edwards Aquifer.

3.0 Local Groundwater Flow Pattern

The Barton Springs/Edwards Aquifer Conservation District (BSEACD) has conducted more than 20 studies to trace groundwater movement[2,3]. These studies used dye to trace groundwater flow routes and determine groundwater flow rates. The authors defined three groundwater basins, namely, Cold Springs, Sunset Valley and Manchaca basins, each with its own major groundwater flow routes. The Mopac Bridge at Barton Creek is in the Cold Springs basin which covers about 11.8 square miles. Groundwater in the Cold Springs basin discharges primarily to the Cold Springs and possibly to Bee Springs and other unidentified springs along the Colorado River. The inferred groundwater flow routes are shown in Figure 2. As indicated by these studies, groundwater in the Edwards Aquifer in this locale would not discharge to the environmentally sensitive Barton Springs.

4.0 Local Groundwater Levels

The primary interest in studying the local groundwater levels was to estimate the amount of penetration of the proposed bicycle bridge foundation into the part of the Edwards Aquifer that is conveying groundwater.

A search of groundwater level data in the Texas Water Development Board's water well data base indicates several Edwards Aquifer wells in this area with long-term water level data. Fortunately, two of these monitor wells are in the vicinity of the Mopac Bridge at Barton Creek (Figure 2). A summary of information for these wells is provided in Table 1. Water level hydrographs for 1997 through 2006 are shown in Figure 3. A study of potentiometric water level maps drawn by BSEACD hydrogeologists indicate that the groundwater levels in these wells is at approximately the same elevation as groundwater levels at Mopac over Barton Creek[4]. In this vicinity, the base of the Edwards Aquifer is about 200 ft-msl[5], but can be highly variable because of local faulting.

---

[2] Barton Springs/Edwards Aquifer Conservation District, 2002, Summary of groundwater dye tracking studies (1996-2002), Barton Springs Segment of the Edwards Aquifer, Texas: http://www.bseacd.org/uploads/AquiferScience/Dye_BSEACD_report_2002.pdf

[3] Hauwert, Nico M., David A. Johns, Thomas J. Aley, James W. Sansom, 2004. Groundwater Tracing Study of the Barton Springs Segment of the Edwards Aquifer, Southern Travis and Northern Hays Counties, Texas: Report by the Barton Springs/Edwards Aquifer Conservation District and City of Austin Watershed Protection and Development Review Department. 110 p. and appendices

[4] Barton Springs/Edwards Aquifer Conservation District, 2007, Potentiometric maps for low and high flow conditions, Barton Springs Segment of the Edwards Aquifer, Central Texas: BSEACD Report 2007-1201.

[5] Baker, E.T., Jr and others, Geohydrology of the Edwards Aquifer in the Austin Area, Texas: Texas Water Development Board Report 293

Table 1. Data Summary of Selected Wells.

Feature	TWDB ID	
	58-50-212	**58-50-216**
Owner/ID	City of Sunset Valley, Well #2	U.S. Geological Survey
Latitude	30.22555	30.23222
Longitude	-97.806388	-97.792777
Land Surface Elevation (ft-msl)	672	692
Well Depth (ft)	336	582
Period of Water Level Record	1978-2005	1978-2006

From the proposed *Phase 3: Superstructure Construction Plan of the Bicycle/Pedestrian Bridge*, the bent with the lowest elevation appears to be about the same as Bent #3 of the existing Mopac Bridge. At this location the ground elevation for the boring was about 534 ft mean sea level (ft-msl). Figure 4 shows elevation profiles of the foundation alternatives. As estimated in the preliminary designs, the estimated total penetrations into the ground are: 35 ft for the attached structure, 7 ft for the spread footing, and 25 ft for the micropiles. Using a ground elevation of 534 ft-msl at Bent #3, which is the lowest bent, the estimated bottom elevations of foundations are: 499 ft-msl for the attached structure, 527 ft-msl for the spread footing, and 509 ft-msl for the micropiles. Local conditions may cause the actual penetration to be a few feet shallower or deeper.

A comparison of the three foundation alternatives and historic groundwater levels are shown in Figure 5.

5.0 Conclusions

There are two major conclusions from this assessment of the potential impact on groundwater flow by the construction of a bicycle/pedestrian bridge over Barton Creek along the Loop 1/Mopac Right of Way. The first conclusion is that the groundwater flow in the vicinity of the bridge foundations is generally toward Cold Springs and not Barton Springs. Therefore any of the potential impacts would have a minimal effect on the ground water flows.

The second conclusion is that the alternatives for the adjacent structure have penetrations that are either above the Edwards water table or only penetrate the water table during very high groundwater conditions. Thus, any of these designs are expected to cause no more than a very, very slight local obstruction to groundwater flow in the Edwards Aquifer during very high aquifer conditions and have no effect during normal and low aquifer conditions. The penetrations for the alternative for the attached structure with foundation improvements will have penetrations below the Edwards water table under normal conditions

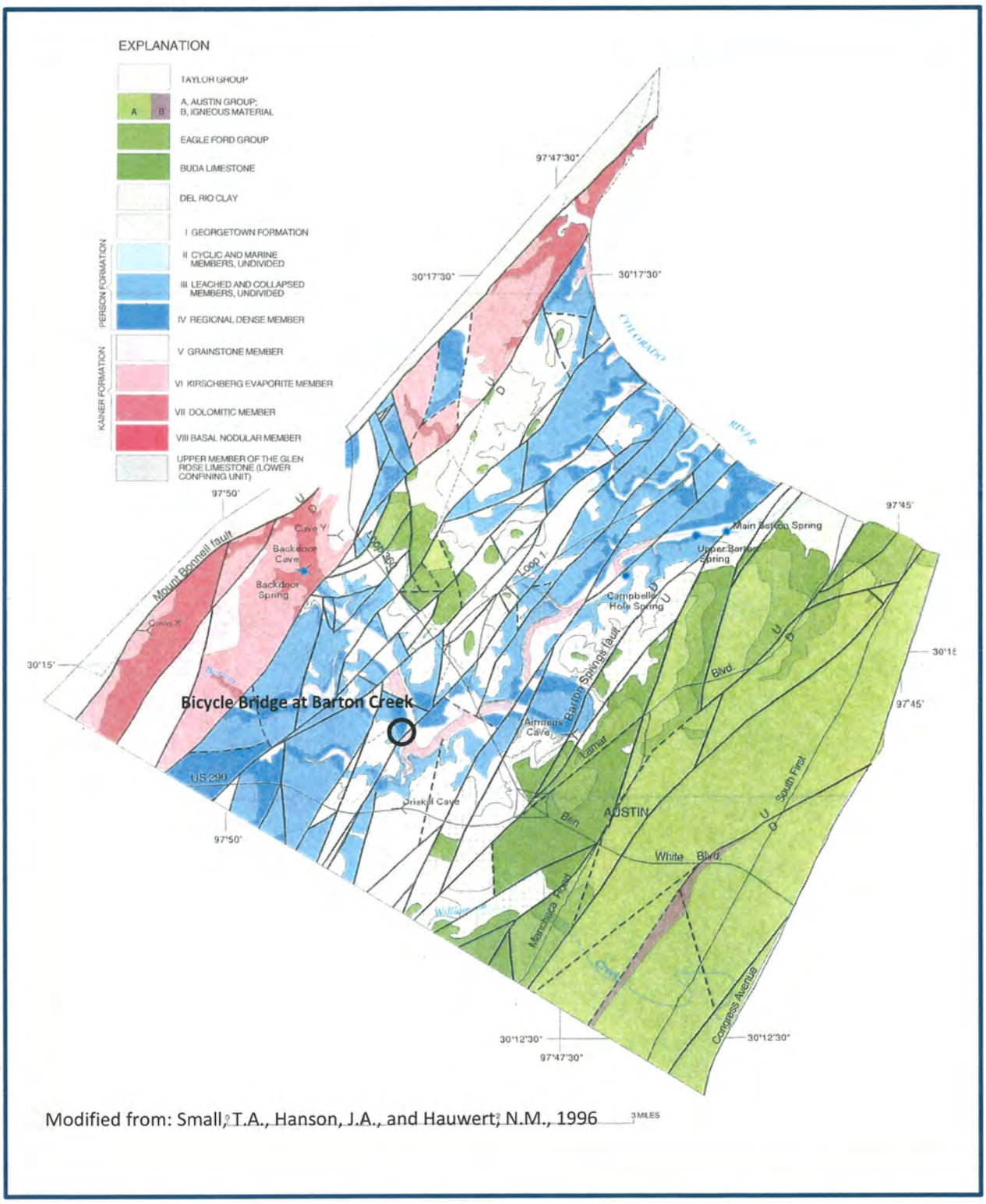


Figure 1. Local surface geology in vicinity of Barton Creek and Mopac (Loop 1).

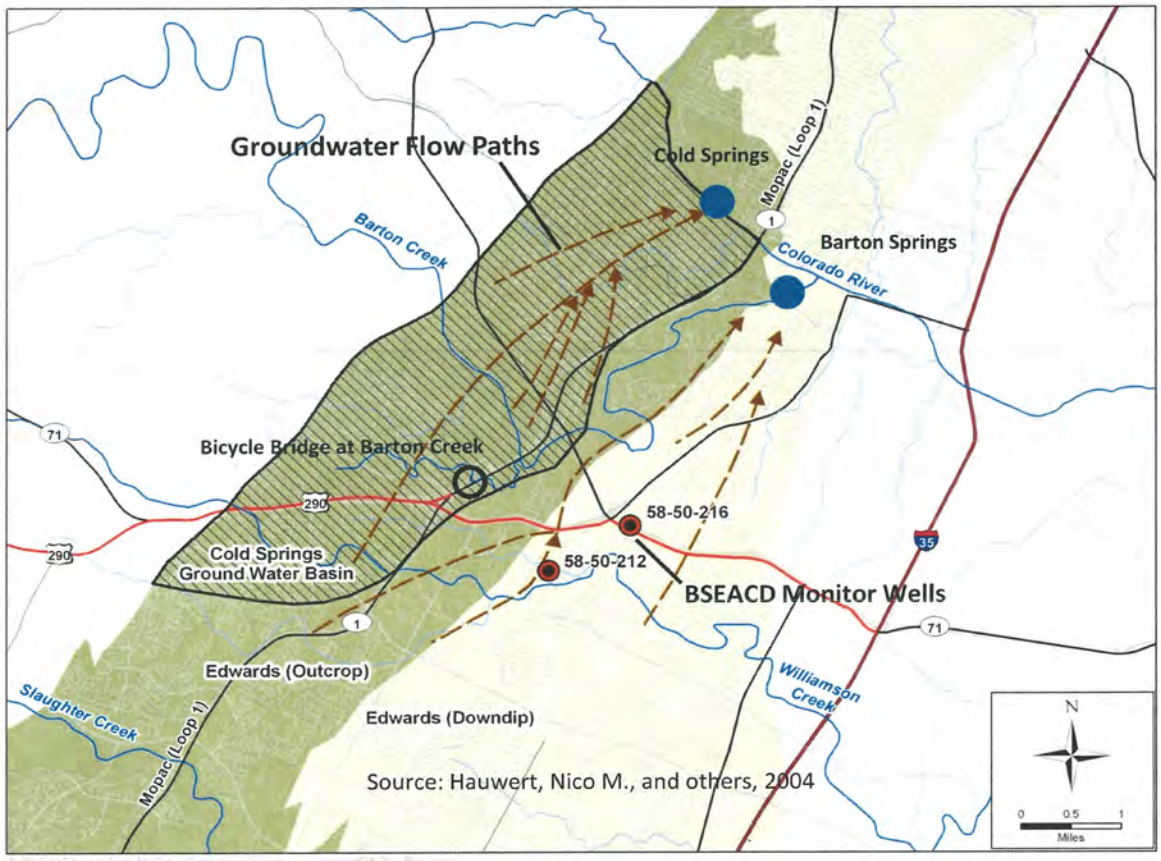


Figure 2. Groundwater flow paths in vicinity of Barton Creek and Mopac (Loop 1).

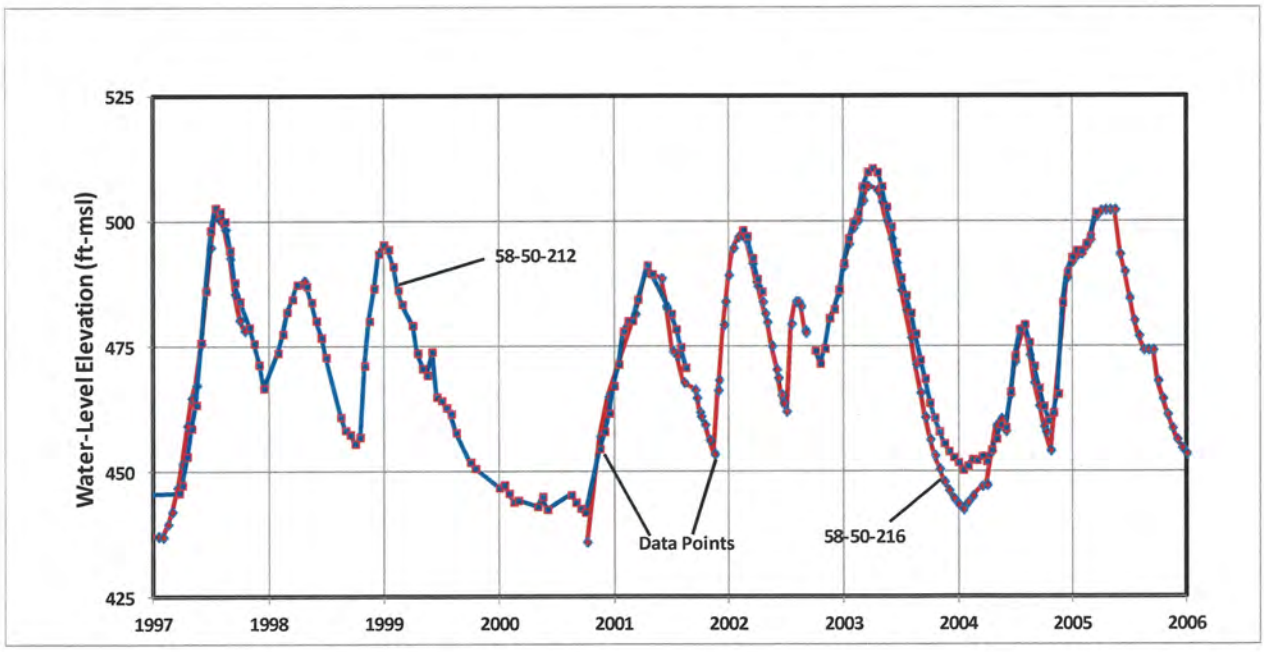
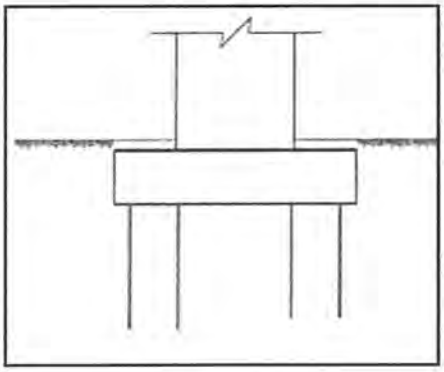
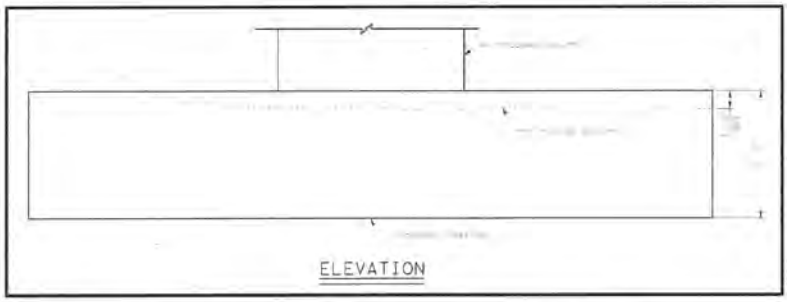


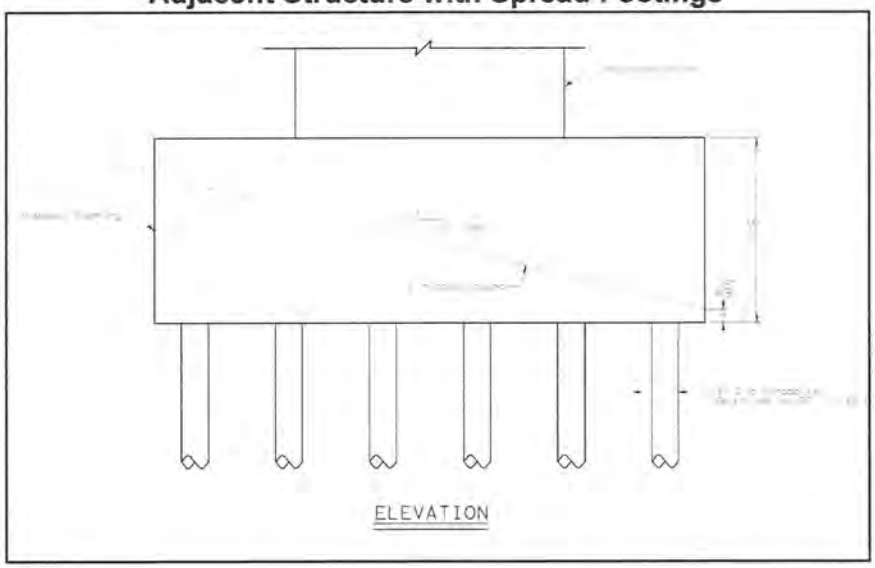
Figure 3. Elevation of groundwater levels.



Attached Structure with Foundation Improvements



Adjacent Structure with Spread Footings



Adjacent Structure with Shallow Micropiles

Figure 4. Schematic elevation drawing of foundation alternatives.

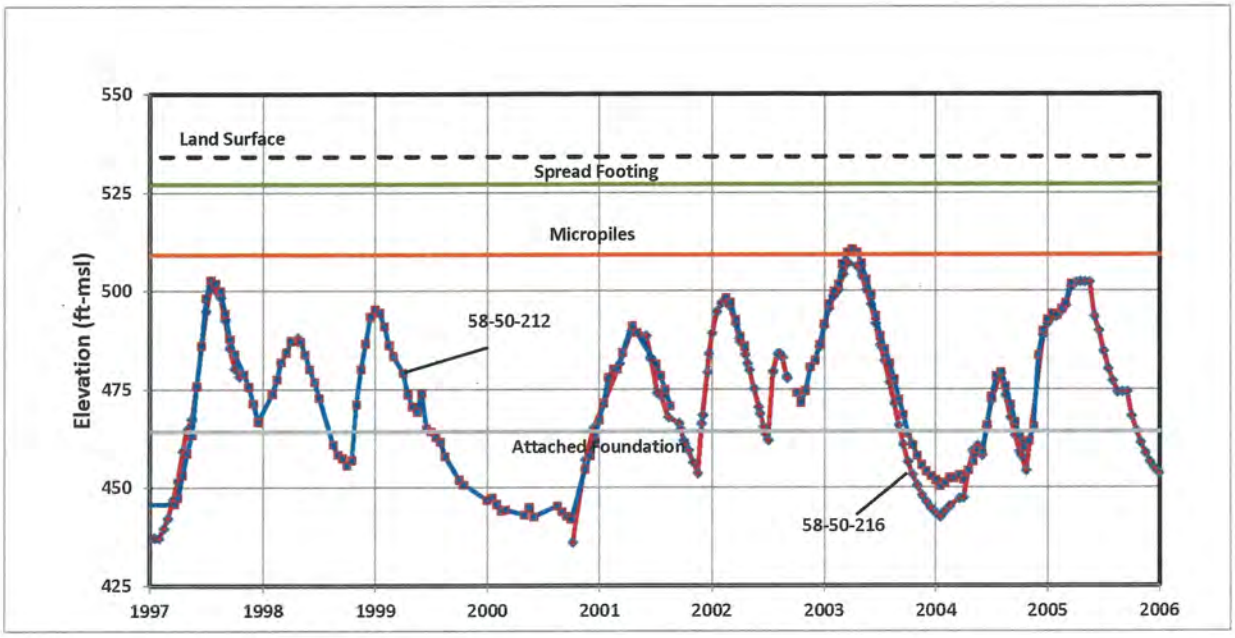


Figure 5. Comparisons of groundwater levels with bottom of penetrations for three foundation alternatives.

APPENDIX D

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Technical Memo

To:	Mark Borenstein, P.E., HDR		
From:	Cris Parker, P.E., CFM, HDR Laura McKay, P.E., CFM, CPESC, HDR	Project:	MoPac Bicycle Bridge at Barton Creek
CC:			
Date:	January 3, 2012	Job No:	112356

RE: Stormwater Management Preliminary Engineering

1.0 Background

In March 2009, The City of Austin authorized HDR Engineering, Inc. to perform preliminary engineering and environmental investigations for the Mopac Pedestrian Bridge over Barton Springs. The Project includes the preliminary design and investigations necessary to support the development of a bicycle/pedestrian structure over Barton Creek along the Loop 1/MoPac Right of Way. This Technical Memorandum focuses on preliminary stormwater management and drainage design requirements.

2.0 Stormwater Regulatory and Permitting Requirements

The following sections provide a brief synopsis of the local, state, and federal stormwater management requirements related to drainage and water quality design for the proposed project improvements.

2.1 City of Austin Water Quality and Drainage Design Requirements

The proposed trail is located within TxDOT Right-Of-Way (ROW); therefore, a City of Austin Site Plan or General Permit is not required. However, due to the sensitive nature of Barton Creek, efforts will be made to design the proposed improvements in accordance with City of Austin stormwater management design criteria.

2.1.1 Barton Springs Watershed Classification

The proposed MoPac Bicycle Bridge at Barton Creek is located approximately 760' upstream of the confluence of Barton Creek with Gaines Creek in the Barton Creek Watershed. The Barton Creek Watershed (BAR) is classified as a Drinking Water Protection Zone – Barton Springs Zone and is in the Recharge Zone of the Barton Springs Edwards Aquifer. Barton Creek drains into Town Lake approximately 5.3 miles downstream of the proposed improvements.

2.1.2 Water Quality Requirements

Section 25-8-63-C-1 of the Land Development Code (LDC) excludes sidewalks in a public right-of-way from impervious cover calculations; therefore, water quality controls are not required for the project given that the pedestrian/bicycle trail and bridge improvements are within the existing TxDOT ROW. Any water quality controls included with the proposed improvements would be in excess of the requirements set forth by the City of Austin. Guidelines for designing water quality controls can be found in the City of Austin Environmental Criteria Manual (ECM). HDR recommends the following measures be taken in the design and construction of the proposed

improvements to limit impacts to water quality within the Barton Springs Zone: preserve natural drainage patterns and limit the amount of impervious cover to prevent erosion, maintain infiltration and recharge of local seeps and springs, and attenuate the harm of contaminants collected and transported by stormwater.

2.1.3 Trail Drainage Design Criteria

Proposed trail drainage elements will be designed in accordance with the City of Austin Drainage Criteria Manual (DCM) and Environmental Criteria Manual (ECM), where applicable. The City's Drainage Criteria Manual does not include culvert hydraulic design criterion for trails. Based on the design of other trail projects for the City, HDR recommends the following design criteria and approach for proposed trail drainage improvements:

- Culvert crossings will be sized to convey the 10-year design storm without overtopping and will be designed with erosion protection for the 100-year design storm to prevent trail crossings from washing out.
- The new crossings will be designed to have no adverse impacts to flooding on adjoining properties.
- The proposed minimum pipe size will be 18 inches in diameter to reduce clogging.
- Bridge Drainage - Discharge to Air: Scuppers in the bridge rails will allow runoff to sheet flow off of the structure into the air for bridge sections higher than 25 feet such that the natural air movement will disperse the water enough not to erode the ground surface (Hydraulic Engineering Circular No. 21). For bridge sections less than 25 feet above the existing ground elevation, the stormwater runoff will be captured and discharged near the bridge abutments using appropriate erosion protection, such as riprap, a paved slab, splash block, or an open basin. Care will be taken so that no erosion or damage occurs underneath the proposed bridge crossing.

2.1.3.1 Stormwater Detention

The DCM does not contain specific detention requirements for hike and bike trails. This was also verified based on discussions with the City of Austin Development Assistance Center (DAC) and Neighborhood Connectivity Division.

2.2 TxDOT Water Quality and Drainage Design Requirements

It is our understanding that TxDOT will be the permitting authority for the proposed project improvements but has chosen to defer to City of Austin water quality and drainage design criteria for the stormwater management elements included in the proposed project improvements. Refer to recommendations provided in Section 2.1 of this Technical Memorandum for City of Austin requirements.

2.3 FEMA Floodplain Management

The proposed MoPac Bicycle Bridge at Barton Creek is located within the current effective FEMA Floodplain Zone AE, according to FIRM Panel 48453C0585H. The effective floodplain is approximately 540 feet wide at the proposed crossing location and has a computed base flood elevation of approximately 558 ft-msl. The proposed lowest chord elevation of the new bridge is 583 ft-msl. The proposed bridge bents will be located outside of the existing normal highwater mark but will encroach the 100-year floodplain. The structure will be designed to cause no adverse impact to the effective 100-year water surface elevation outside of the existing TxDOT ROW if feasible.

3.0 Existing Bank Erosion

Significant bank erosion was observed near the existing north MoPac bridge abutment at the location shown in Figure 1 below. The bank erosion is centered on an existing outfall that drains a portion of the MoPac right-of-way from Barton Creek to Loop 360 and additional offsite runoff from the west, for a total of approximately 21 acres of contributing drainage area. A significant amount of runoff concentrates at this point as indicated by the drainage arrows on Figure 1. A large head cut has developed on the bank of Barton Creek just below this discharge point. The head cut will likely continue to propagate upstream toward the culvert headwall and the MoPac access road. The ongoing erosion of the bank adversely impacts Barton Creek by supplying additional sediment load to the stream. The MoPac bridge column foundations do not appear to be threatened by the erosion at this time. MoPac was constructed without any stormwater controls which have likely contributed to this erosion problem.

Given the severity of the bank erosion (see Figures 2 - 3 for site photos) and its close proximity to the proposed north pedestrian trail bridge abutment, HDR recommends giving consideration to developing erosion mitigation alternatives in conjunction with the trail project. Alternatives might include implementing stormwater controls in the vicinity of the north MoPac abutment area and/or streambank stabilization measures at the discharge point. Stormwater controls may include installing erosion detention basins to control channel forming flows (1- to 2-year design storm) and provide water quality benefits. Bank stabilization measures may include energy dissipation and/or drop structures.

Figure 1. Existing Bank Erosion Vicinity Map

Figure 2. Existing Bank Erosion Site Photo

Figure 3. Existing Bank Erosion Site Photo

APPENDIX E

COST ESTIMATE

COUNTY: TRAVIS **CSJ:**
LOCATION: AUSTIN - Barton Creek Crossing **DATE:** 2/2/2012

Bridge at Barton Creek - from Mopac Turnaround South of Barton Creek to south of Loop 360 (Segment II)

Earthwork						
100 2002	PREPARING ROW	STA	10	$	7,500.00	$75,000.00
110 2003	EXCAVATION (SPECIAL)	CY	718		$12.00	$8,616.00
132 2001	EMBANKMENT (FINAL)(ORD COMP)(TY A)	CY	718		$15.00	$10,770.00
Bridge						
420 2003	CL C CONC (ABUT)	CY	16.6		$750.00	$12,450.00
420 2019	CL C CONC (CAP) (INCLUDES WHALERS)	CY	152.9		$6,000.00	$917,400.00
420 2018	CL C CONC (FOOTING)(MASS PLACEMENT)	CY	110.7		$700.00	$77,518.52
422 2001	REINF CONC SLAB	SF	14,630		$40.00	$585,200.00
425 2067	PRESTR CONC GIRDER (TX46)	LF	2,081.00		$200.00	$416,200.00
426 2001	POST-TENSIONING (GROUTED)	MKF	38.08		$3,000.00	$114,240.00
450 2121	RAIL (PEDESTRIAN RAIL) (TY PR3)	LF	2,090.0		$135.00	$282,150.00
	12" Micropiles	LF	3,920.0		$100.00	$392,000.00
Civil						
531 2024	CONC SIDEWALK (5")	SY	4,050		$40.00	$162,000.00
423 2006	RETAINING WALL (CONC BLOCK)	SF	12,000		$35.00	$420,000.00
	EROSION CONTROL (2%)	LS	1		$67,970.89	$67,970.89
	DRAINAGE	LS	1		$115,000.00	$115,000.00
Misc						
502 2001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	30	$	12,500.00	$375,000.00
500 2001	MOBILIZATION (5%)	LS	1	$	197,825.77	$197,825.77
	LIGHTING (3%)	LS	1	$	104,206.34	$104,206.34
					SUBTOTAL	$4,333,547.52
			E&C		**20%**	$866,709.50
					TOTAL ESTIMATE	$5,200,257.02

Note: Opinion of Probable cost assumes the use of a prestressed concrete superstructure (Tx46). If it is determiend that lightweight steel trusses are required pricing will increase.

COST ESTIMATE

COUNTY: TRAVIS **CSJ:**
LOCATION: AUSTIN - Barton Creek Crossing **DATE:** 2/2/2012

South of Barton Creek to Mopac Turnaround						
Earthwork						
100 2002	PREPARING ROW	ST/	10	$	7,500.00	$75,000.00
110 2003	EXCAVATION (SPECIAL)	CY	718		$12.00	$8,616.00
132 2001	EMBANKMENT (FINAL)(ORD COMP)(TY A)	CY	718		$15.00	$10,770.00
Bridge						
420 2003	CL C CONC (ABUT)	CY	16.6		$750.00	$12,450.00
420 2018	CL C CONC (FOOTING)(MASS PLACEMENT)	CY	2,100.9		$700.00	$1,470,630.00
420 2019	CL C CONC (CAP)	CY	75.7		$850.00	$64,345.00
420 2051	CL C CONC (COLUMN)	CY	632.7		$950.00	$601,065.00
422 2001	REINF CONC SLAB	SF	14,630		$25.00	$365,750.00
425 2070	PRESTR CONC GIRDER (TX70)	LF	2,083.00		$175.00	$364,525.00
450 2121	RAIL (PEDESTRIAN RAIL) (TY PR3)	LF	2,090.0		$135.00	$282,150.00
Civil						
531 2024	CONC SIDEWALK (5")	SY	4,050		$40.00	$162,000.00
423 2006	RETAINING WALL (CONC BLOCK)	SF	12,000		$35.00	$420,000.00
	EROSION CONTROL (5%)	LS	1		$191,865.05	$191,865.05
	DRAINAGE	LS	1		$115,000.00	$115,000.00
Misc						
502 2001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	24	$	10,000.00	$240,000.00
500 2001	MOBILIZATION (5%)	LS	1	$	219,208.30	$219,208.30
	LIGHTING (3%)	LS	1	$	115,119.03	$115,119.03
					SUBTOTAL	$4,718,493.38
			E&C		**20%**	$943,698.68
					TOTAL ESTIMATE	$5,662,192.06

Notes:

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COST ESTIMATE

COUNTY: TRAVIS **CSJ:**
LOCATION: AUSTIN - Barton Creek Crossing **DATE:** 2/2/2012

South of Barton Creek to Mopac Turnaround						
Earthwork						
100 2002	PREPARING ROW	STA	10	$	7,500.00	$75,000.00
110 2003	EXCAVATION (SPECIAL)	CY	718		$12.00	$8,616.00
132 2001	EMBANKMENT (FINAL)(ORD COMP)(TY A)	CY	718		$15.00	$10,770.00
420 2003	CL C CONC (ABUT)	CY	16.6		$750.00	$12,450.00
420 2018	CL C CONC (FOOTING)(MASS PLACEMENT)	CY	653.7		$700.00	$457,590.00
420 2019	CL C CONC (CAP)	CY	75.7		$850.00	$64,345.00
420 2051	CL C CONC (COLUMN)	CY	559.3		$950.00	$531,335.00
422 2001	REINF CONC SLAB	SF	14,630		$25.00	$365,750.00
425 2070	PRESTR CONC GIRDER (TX70)	LF	2,083.00		$175.00	$364,525.00
450 2121	RAIL (PEDESTRIAN RAIL) (TY PR3)	LF	2,090.0		$135.00	$282,150.00
	12" Micropiles	LF	6,960		$100.00	$696,000.00
Civil						
531 2024	CONC SIDEWALK (5")	SY	4,050		$40.00	$162,000.00
423 2006	RETAINING WALL (CONC BLOCK)	SF	12,000		$35.00	$420,000.00
	EROSION CONTROL (4%)	LS	1		$138,021.24	$138,021.24
	DRAINAGE	LS	1		$115,000.00	$115,000.00
Misc						
502 2001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	24	$	10,000.00	$240,000.00
500 2001	MOBILIZATION (5%)	LS	1	$	197,177.61	$197,177.61
	LIGHTING (3%)	LS	1	$	103,515.93	$103,515.93
					SUBTOTAL	$4,244,245.78
			E&C		**20%**	$848,849.16
					TOTAL ESTIMATE	$5,093,094.94

Notes:

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COST ESTIMATE

COUNTY: TRAVIS **CSJ:**
LOCATION: AUSTIN - Loop 360 Crossing **DATE:** 2/2/2012

Loop 360 - from south of Loop 360 (Segment I) to Tuscan Terrace

Earthwork						
100 2002	PREPARING ROW	STA	25	$	5,000.00	$125,000.00
110 2003	EXCAVATION (SPECIAL)	CY	6606		$12.00	$79,272.00
132 2001	EMBANKMENT (FINAL)(ORD COMP)(TY A)	CY	324		$15.00	$4,860.00
420 2003	CL C CONC (ABUT)	CY	28.0		$750.00	$21,000.00
420 2019	CL C CONC (CAP)	CY	6.4		$600.00	$3,811.11
420 2051	CL C CONC (COLUMN)	CY	23.55		$750.00	$17,662.50
422 2001	REINF CONC SLAB	SF	4,620		$25.00	$115,500.00
425 2067	PRESTR CONC GIRDER (TX46)	LF	660.00		$125.00	$82,500.00
450 2121	RAIL (PEDESTRIAN RAIL) (TY PR3)	LF	2,090.0		$115.00	$240,350.00
416 2004	DRILL SHAFT (36 IN)	LF	400		$120.00	$48,000.00
Civil						
531 2024	CONC SIDEWALK (5")	SY	2,411		$40.00	$96,444.44
423 2006	RETAINING WALL (CONC BLOCK)	SF	4,800		$35.00	$168,000.00
	EROSION CONTROL (6%)	LS	1		$60,144.00	$60,144.00
	DRAINAGE (10%)	LS	1		$100,240.01	$100,240.01
450 2121	RAIL (PEDESTRIAN RAIL) (TY PR3)	LF	1,212.0		$115.00	$139,380.00
Misc						
502 2001	BARRICADES, SIGNS AND TRAFFIC HANDLING	MO	12	$	7,500.00	$90,000.00
500 2001	MOBILIZATION (4%)	LS	1	$	55,686.56	$55,686.56
	LIGHTING (8%)	LS	1	$	80,192.00	$80,192.00
	LANDSCAPING (6%)	LS	1	$	56,252.64	$56,252.64

	SUBTOTAL	$1,584,295.26
E&C	**20%**	$316,859.05
	TOTAL ESTIMATE	$1,901,154.31

Notes: