

FEASIBILITY STUDY

Little Miami Scenic Trail Extension Alternatives
Spring Hill Extension (PID 114496)
And Pocahontas Extension (PID 114497)

ATTACHMENTS



FEASIBILITY STUDY

Little Miami Scenic Trail Extension Alternatives
Spring Hill Extension (PID 114496)
And Pocahontas Extension (PID 114497)

ATTACHMENT A

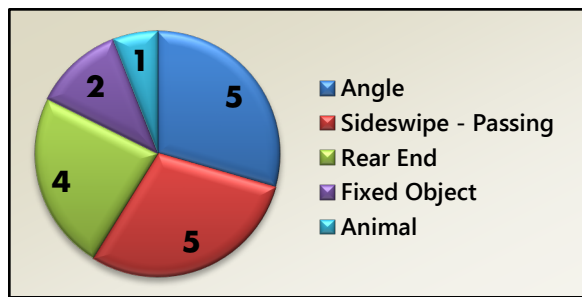
Excerpts from the *Transportation Needs Analysis*



**EASTERN CORRIDOR SEGMENTS II AND III
(PID 86462)
TRANSPORTATION NEEDS ANALYSIS**

- Any proposed rail transit should stop in Mariemont to help support existing businesses/residents. (1 comment)
- Need an accessible transit stop (1 comment)
- Need more bus service and a bus stop shelter (2 comments)
- The street car should be extended here, with routes to UC, Xavier, the hospitals, etc.
- Rail should be provided (2 comments)

Crash Data: The western part of the Mariemont Square intersection was identified as a high hazard location through ODOT's crash screening of the Segments II and III roadway network. Considering the complexity of the entire square, all four intersections were evaluated. As illustrated in [Figure](#)



**Figure 48: Frequency of Crashes by Crash Type
Mariemont Square Intersections**

[48](#), there were 17 total crashes in the square during the three-year period between 2013 and 2015. Angle and sideswipe passing crashes represent 60% of the total crashes. There were two crashes at the US 50/Miami Road intersection (NE corner), 10 crashes at the US 50/Madisonville Road intersection (NW corner), four crashes at the US 50/Miami Road intersection (SW corner), and one crash at the US 50/Crystal Springs Road intersection (SE corner).

The sideswipe passing crashes in the square appear to be, in part, due to driver confusion with the complicated nature of the four closely spaced intersections and parking around the square. At the US 50/Madisonville Road intersection, where the highest number of crashes occurred, all of them occurred in the daylight, 90% occurred in dry conditions, and 60% occurred between the hours of noon to 3:00 PM. For a plot of all 17 crashes, please refer to [Attachment A-2](#).

LOS Analysis: The HCS analysis indicates that the intersection currently operates at an acceptable LOS and will continue to operate at an acceptable LOS for the No Build opening year (2022) and No Build design year (2042) conditions. No intersection improvements are required.

Geometric Data: Intersection sight distance is limited on several approaches to Mariemont Square, due primarily to building obstruction. The intersection of Wooster Pike/Crystal Springs Road has deficient intersection sight distance; vehicles on northbound Crystal Springs Road have a limited sight distance to vehicles traveling eastbound on Wooster Pike due parallel parked cars. The intersection sight distance is 120 feet and the required sight distance is 335 feet. The remainder of the intersections are either signalized or have adequate sight distances.

Pedestrian Data: A significant number of pedestrians were observed in the square. There were 298 pedestrians observed at the US 50/Miami Road intersection (NE corner), 510 pedestrians observed at the US 50/Madisonville Road intersection (NW corner), 110 pedestrians observed at the US 50/Miami Road intersection (SW corner), and 67 pedestrians observed at the US 50/Crystal Springs Road intersection (SE corner) during a 24-hour period recorded on December 1, 2015.

2.6.3.7 US 50: Mariemont Square to Walton Creek Road

The section of US 50 from Mariemont Square to Walton Creek Road is approximately 0.8 miles in length. From the Mariemont Square to East Avenue US 50 is a four-lane divided roadway with on

**EASTERN CORRIDOR SEGMENTS II AND III
(PID 86462)
TRANSPORTATION NEEDS ANALYSIS**

street parking and a posted speed of 35 mph. From East Avenue to Petoskey Avenue, US 50 is a two-lane undivided roadway. From Petoskey Avenue to Walton Creek Road, US 50 is a four-lane undivided roadway. The posted speed from East Avenue to Walton Creek Road is 40 mph.

Stakeholder Input: Thirty-one comments address issues for the section of US 50 between Mariemont Square and Walton Creek. Of these comments the majority identify congestion as the primary transportation issue. Representative comments include:

- The reduction of lanes from two to one (in each direction) causes traffic back-ups (10 comments)
- Multiple traffic lights in this area also contribute to congestion (4 comments)
- Better striping of roads can reduce congestion (1 comment)
- Better lighting is needed along the roads (1 comment)
- There are frequent accidents in this area (3 comments)
- Speed is a concern in this area (1 comment)

Thirty comments address bikeway issues. Representative comments include:

- Safety of bikes in this area is a concern (2 comment)
- There is a need for a bike trail/path in this area (16 comments)
- A dedicated bike lane is needed all along US 50 through Fairfax and Mariemont and into Newtown. (8 comments)
- Connect Wasson Way and Little Miami Trail (1 comment)
- Extend Murray Bike Trail east to Avoca Trail (1 comment)
- Connect the Murray Avenue path thru Mariemont to Newtown (2 comments)
- Need a bike path to connect to the Little Miami Trail; the optimum route would follow the old inter-urban line, cross over at the light at Kroger, then follow the Pennsylvania tracks owned by the Park District (1 comment)

Ten comments concerning pedestrian access were provided. Representative comments include:

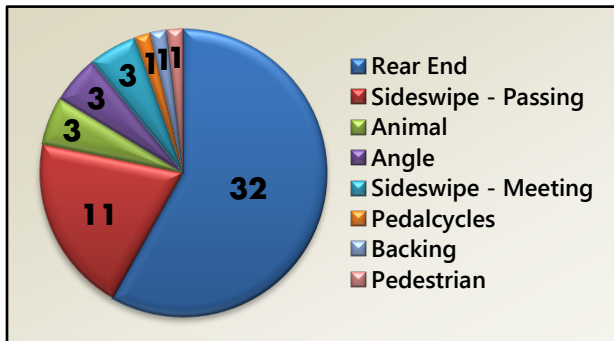
- A signalized crosswalk is needed at Wooster Pike at Bell Tower Park. (1 comment)
- Pedestrian access is needed between Mariemont and the businesses in Columbia Township (and between Columbia Township and the Mariemont High School and Village) to make this a more extended vibrant community. (1 comment)
- The sidewalk on both sides is too close to the road and raised curbs are lacking in several places, which are safety concerns. (1 comment)

The public transit comments include:

- Need more frequent bus service (1 comment)
- Need a park and ride and bus/light rail service to downtown (1 comment)
- Need more buses or light rail service along US 50 to Milford (1 comment)

**EASTERN CORRIDOR SEGMENTS II AND III
(PID 86462)
TRANSPORTATION NEEDS ANALYSIS**

Crash Data: An ODOT crash screening identified the approximate 0.15 stretch of US 50 at the Mariemont Promenade shopping center as a high-hazard area. Therefore, a detailed crash analysis of the entire segment from the Mariemont Square to Walton Creek Road was completed.



**Figure 49: Frequency of Crashes by Crash Type
Mariemont Square to Walton Creek Road**

As illustrated in [Figure 49](#), there were 55 total crashes on this segment during a three-year period (2013-2015). Rear-end crashes represent almost 60% of the total crashes. Of the 55 total crashes on the segment, 15 (30%) occurred in the high-hazard segment. All but one crash on this high-hazard segment was a rear-end crash. See [Attachment A-2](#) for a plot of all 55 crashes.

There is a cluster of five sideswipe crashes in the area where westbound US 50 merges from two lanes to one lane near the Indian View Avenue intersection. There are three other clusters of crashes at the Pocahontas Avenue signalized intersection (7 crashes), the Mariemont Promenade shopping center signalized intersection (15 crashes), and the Spring Hill Drive signalized intersection (14 crashes). Most crashes at signalized intersections on this segment are rear-end crashes.

Rear-end crashes were the most prevalent type of crash. Of the 32 rear-end crashes along the entire segment from the Mariemont Square to Walton Creek Road, 24 occurred during daylight hours, 20 occurred in the westbound direction, 10 occurred in wet conditions, and two resulted in injury.

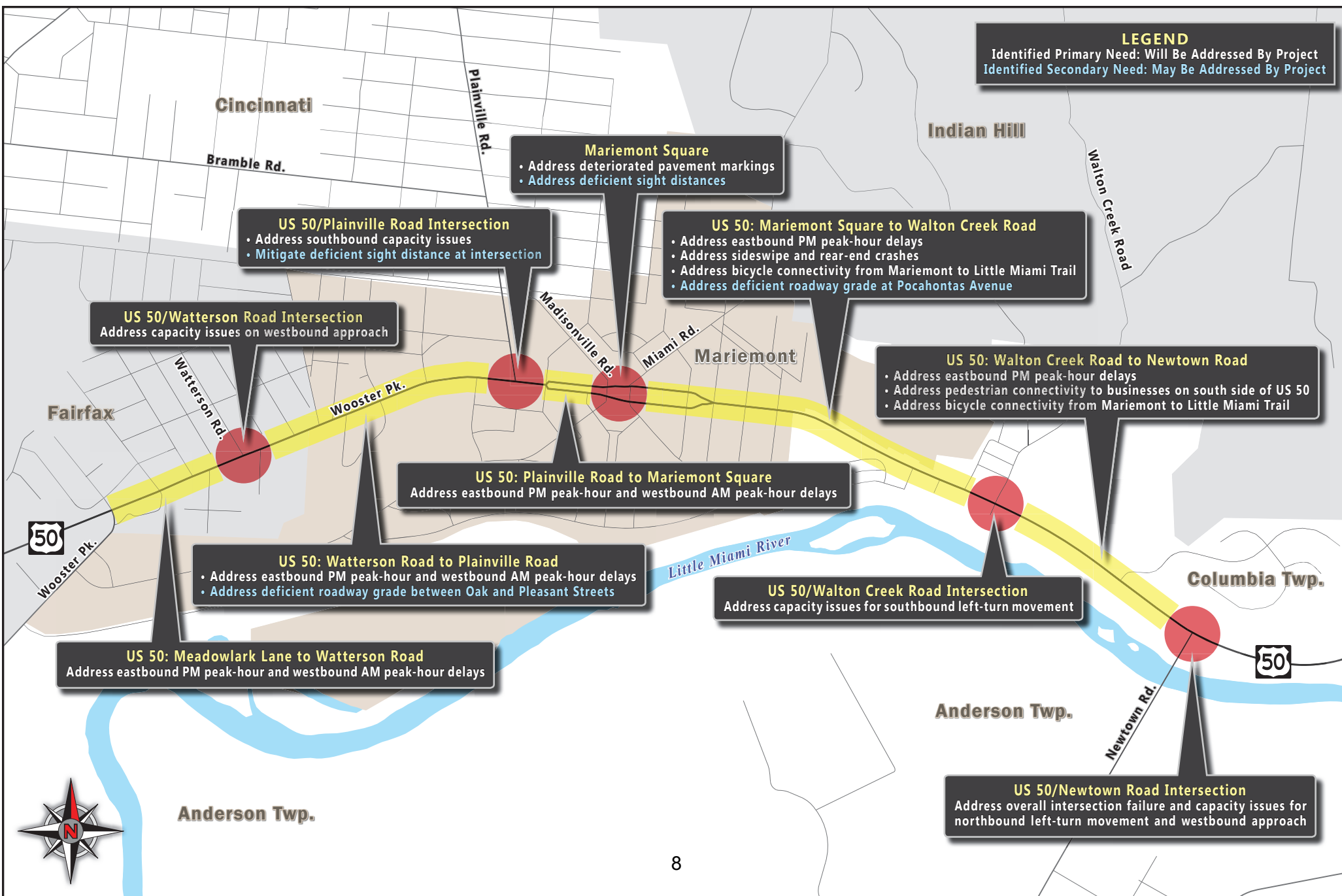
LOS Analysis: No level of service analysis was conducted for this segment; however, the travel time data indicates a 30% increase in the eastbound travel time during the PM peak-hour compared to the off-peak travel time indicating congestion during the PM peak-hour.

Geometric Data: There is one deficient vertical curve in this segment. Additionally, the maximum superelevation on US 50 on the curve just east of Pocahontas Avenue exceeds the current standard maximum superelevation. The deficient crest vertical curve is located on US 50 at the intersection of Pocahontas Ave. The existing k-value for this curve is 54 and the minimum required k-value is 61 for a design speed of 45 mph.

Pedestrian Data: No pedestrian data is available for this segment.

Eastern Corridor Segments II and III

US 50 Corridor Focus Area



FEASIBILITY STUDY

Little Miami Scenic Trail Extension Alternatives
Spring Hill Extension (PID 114496)
And Pocahontas Extension (PID 114497)

ATTACHMENT B

Excerpts from the *Conceptual Alternatives
Implementation Plan*



Concept drawings are presented on the following pages.

DESCRIPTION

- Use old railroad bed for bicycle connectivity to Little Miami Trail.

NEEDS ADDRESSED

- P9) Address bicycle connectivity from Mariemont to Little Miami Trail.

5/18 MEETING DISCUSSION AND COMMENTS

Great Parks of Hamilton County, Columbia Township and their consultant, IBI, are currently studying options to connect bicyclists and pedestrians with the Little Miami Trail. ODOT will wait until their study is completed to further develop concepts for bike/pedestrian connections within this portion of the US 50 Corridor. However, bike/pedestrian concepts suggested at the first Advisory Committee meeting were briefly reviewed in more detail with Great Parks and Columbia Township representatives and other Advisory Committee members during the May 18 meeting.

In addition, Columbia Township stated that trail connectivity would likely be done in phases:

- The first 1,000 feet of a new path, from west of Newtown Road to the western edge of Fifty West Brewing Company, is currently funded. (Columbia Township is paying to pave an extension to the edge of the Fifty West Production Works lot.)
- The next phase would likely bring the bike/ped path behind Kroger up to US 50 between the Kroger Fuel Center and McDonald’s. There, IBI has looked at routes on the south side of US 50 to Pocahontas Avenue, crossing US 50 at the Mariemont Branch Library and at Spring Hill Drive.

- Further development of bike/pedestrian concepts are on hold, pending completion of Great Parks, Columbia Township and IBI study.

Comments Submitted Following the 5/18 Meeting
(Comments are presented as submitted by Committee members; no edits to content were made.)

- ODOT has not provided information to Mariemont regarding proposed bike paths. US 50 focus area was only area where no bike plans were provided to date. Any proposed bike path(s) through Mariemont requires Mariemont approval.

9/7 MEETING DISCUSSION AND COMMENTS

- Great Parks and Columbia Township are moving forward with the initial phase of this project, which creates the first 1,000 feet of a new path from west of Newtown Road to the western edge of Fifty West Brewing Company. This first phase should be under construction by spring 2019.
- No funding is available yet for the second phase of the project.
- If a roundabout is built at the US 50/Newtown Road intersection, bicyclist safety may be improved since vehicles would be traveling at lower speeds.
- It is likely that a crosswalk would be established near the entrance of 50 West Brewing Company (see Concept 50-10).
- ODOT has secured funding for Rectangular Rapid Flash Beacons (RRFB) so they will be installed. See Concept 50-10 for more related information.

Comments Submitted Following the 9/7 Meeting

- No additional comments were received following the 9/7 meeting.

12/12 MEETING DISCUSSION AND COMMENTS

This concept was presented as F7 at the October Open House meetings.

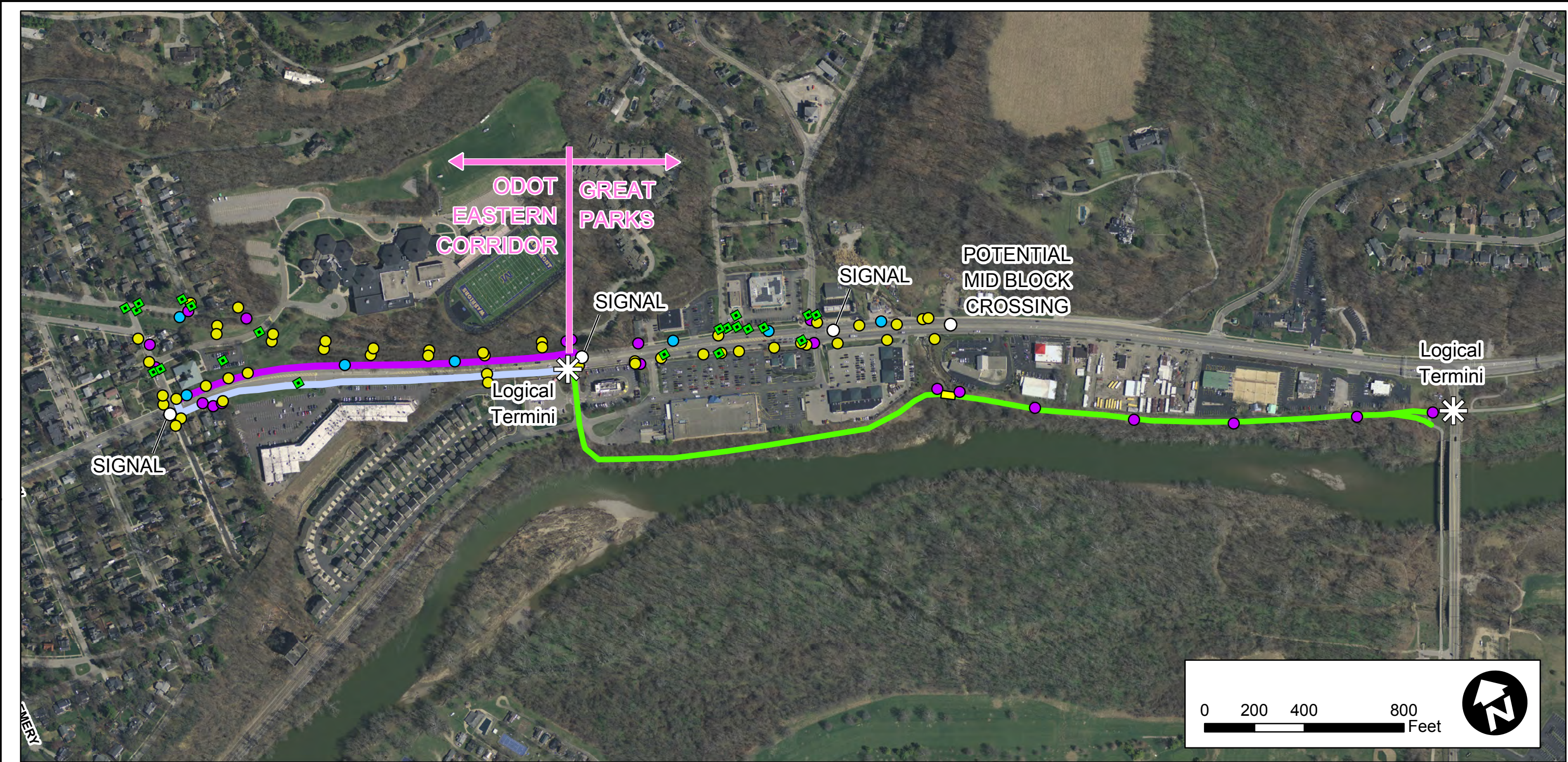
- This concept received overwhelming support from the public - the highest for all concepts presented. See Public Feedback Ratings Summary, next page.
- There is still a plan to build a trail to 50 West in 2019. Great Parks of Hamilton County is currently requesting funding assistance from local businesses.

NEXT STEPS/RECOMMENDATION

- Include this concept in the Implementation Plan as a high priority.
- This alternative is being advanced by Great Parks/Columbia Township.

Safety ECAT Benefit/Cost Ratio	Traffic Operations							Construction Cost	R/W Impacts		Environmental Impacts		Support and/or Facilitate Multi-Modal	Improve Regional Connectivity	Improve Local Access
	Time Period	HCS Results			TransModeler Results				Number of Relocations	R/W Cost	Anticipated Environmental Document	Red Flag Triggers			
		2042 Delay (seconds)	2042 LOS	% Reduction from No Build	2042 Delay (seconds)	2042 LOS	% Reduction from No Build								
													Improves	Improves	Improves

RECOMMENDATION: HIGH | ADVANCED BY GREAT PARKS/COLUMBIA TOWNSHIP



Legend

PROBABLE ALIGNMENT (GREAT PARKS)

PROBABLE ALIGNMENT OPTION A (ODOT)

PROBABLE ALIGNMENT OPTION B (ODOT)

PROPOSED BRIDGE

STORM INLETS

UTILITY POLES

MSD MANHOLE

GCWW FIRE HYDRANT



For further information please contact:
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513-942-3141 ext. 232 | jeff.koehn@ibigroup.com
www.ibigroup.com

**LITTLE MIAMI SCENIC TRAIL
LIBRARY CONNECTOR**
Probable Alignment Options
Sheet 1 of 1

Figure BIKE-5

Concept drawing was presented at the October 24 & 25 Open House meetings.



**Shared-Use Path from
Little Miami Trail to Spring
Hill**

- This alternative is being advanced by Great Parks of Hamilton County and Columbia Township
- Phase 1 from Newtown Road to the west edge of 50 West Brewing Company will be constructed in 2019

PUBLIC FEEDBACK RATINGS SUMMARY

Strongly Oppose	Dislike	Neutral	Like	Strongly Support
3%	0%	17%	17%	63%

(percentages have been rounded)

Concept not drawn.

DESCRIPTION

- Create shared use path along the south side of US 50, between Kroger and the Mariemont Promenade, then cross the street to continue on north side of US 50 to Pocahontas.

NEEDS MET

- P9) Address bicycle connectivity from Mariemont to Little Miami Trail.
- P10) Address pedestrian connectivity to businesses on south side of US 50.

--NOTE--

Great Parks of Hamilton County, Columbia Township and their consultant, IBI, are currently studying options to connect bicyclists and pedestrians with the Little Miami Trail. ODOT will wait until their study is completed to further develop concepts for bike/pedestrian connections within this portion of the US 50 Corridor. However, bike/pedestrian concepts suggested at the first Advisory Committee meeting were briefly reviewed in more detail with Great Parks and Columbia Township representatives and other Advisory Committee members during the May 18 meeting.

MEETING DISCUSSION AND COMMENTS

- There is a steep drop-off between the Mariemont Promenade and the Kroger gas station; if used as a bike path, the hillside would need to be stabilized with a retaining wall, making this concept expensive.
- A current project to replace a culvert at US 50 and Spring Hill will also widen the existing sidewalk here as much as possible at this time (to approx. 7 ft). Columbia Township would like this widening project to continue up the hill.

NEXT STEPS/RECOMMENDATION

- On hold, pending completion of Great Parks, Columbia Township and IBI study.

COMMENTS SUBMITTED
FOLLOWING THE 5/18 MEETING

- (Comments are presented as submitted by Committee members; no edits to content were made.)
- ODOT has not provided information to Mariemont regarding proposed bike paths. US 50 focus area was only area where no bike plans were provided to date. Any proposed bike path(s) through Mariemont requires Mariemont approval.

Safety	Traffic Operations	Constructability Issues	Construction Cost	R/W Impacts	Environmental / Community Impacts	Supports and/or Facilitates Multi-Modal	Improve Regional Connectivity	Improve Local Access	RECOMMENDATION
		On hold pending completion of studies by others.							ON HOLD

Concept drawings are presented on the following pages.

DESCRIPTION

- Create shared-use path along the south side of US 50, between Kroger and the Mariemont Promenade, then cross the street to continue on north side of US 50 to Pocahontas.

NEEDS ADDRESSED

P9) Address bicycle connectivity from Mariemont to Little Miami Trail.

5/18 MEETING DISCUSSION AND COMMENTS

(in the 5/18 Notes, this concept was 50-7)

Great Parks of Hamilton County, Columbia Township and their consultant, IBI, are currently studying options to connect bicyclists and pedestrians with the Little Miami Trail. ODOT will wait until their study is completed to further develop concepts for bike/pedestrian connections within this portion of the US 50 Corridor. However, bike/pedestrian concepts suggested at the first Advisory Committee meeting were briefly reviewed in more detail with Great Parks and Columbia Township representatives and other Advisory Committee members during the May 18 meeting.

- There is a steep drop-off between the Mariemont Promenade and the Kroger gas station; if used as a bike path, the hillside would need to be stabilized with a retaining wall, making this concept expensive.
- A current project to replace a culvert at US 50 and Spring Hill will also widen the existing sidewalk here as much as possible at this time (to approx. 7 ft). Columbia Township would like this widening project to continue up the hill.

Comments Submitted Following the 5/18 Meeting

(Comments are presented as submitted by Committee members; no edits to content were made.)

- ODOT has not provided information to Mariemont regarding proposed bike paths. US 50 focus area was only area where no bike plans were provided to date. Any proposed bike path(s) through Mariemont requires Mariemont approval.

9/7 MEETING DISCUSSION AND COMMENTS

- This concept is an alternative to concept 50-7b.
- Restriping a portion of pavement on US 50 would allow lanes to shift slightly, minimizing the retaining wall needed for this concept, as well as the impacts.
- The stairway behind Kroger that currently connects to the Miami Run development (marked with a red “X” on the drawing) would be eliminated in this alternative. However, the shared-use path is minimally farther and more accessible/ADA compliant.
- If Mariemont High School were to move forward with a secondary access point at the Promenade signal, this path would cross that drive.
- The committee also discussed establishing a bike trail from east Mariemont to Murray:
 - A Committee member asked about the possibility of connecting the shared-use path to the Murray Trail using the old trolley corridor. However, Mariemont prefers a bike route through the village. Property owners generally do not want a bike path established in front of their homes, in the medians of side streets or in its small parks.
 - Another Committee member asked about connecting to Wasson Way via a private drive along railroad property (Clare Yard). Establishing a bike path through Mariemont’s Lower 80 would be

welcomed by Mariemont, but this would need to be coordinated with the railroads. Mariemont would be the lead on this effort and would like assistance with this process if possible.

Comments Submitted Following the 9/7 Meeting

- No additional comments were received following the 9/7 meeting.

12/12 MEETING DISCUSSION AND COMMENTS

This concept was presented as F8 at the October Open House meetings.

- The concept would be Phase 3 of Great Parks’ project.
- A 375-foot retaining wall would be needed between Miami Run and the Mariemont Promenade.
- Shifting the lanes on the south side of US 50 reduces the length and height of the retaining wall required.
- This project would need to be coordinated with Mariemont High School’s proposed new access project (concept I-32b), which would be located across from the Mariemont Promenade shopping center.

NEXT STEPS/RECOMMENDATION

- Include concept in the Implementation Plan as a high priority.

Safety ECAT Benefit/Cost Ratio	Traffic Operations							Construction Cost	R/W Impacts		Environmental Impacts		Support and/or Facilitate Multi-Modal	Improve Regional Connectivity	Improve Local Access
	Time Period	HCS Results			TransModeler Results				Number of Relocations	R/W Cost	Anticipated Environmental Document	Red Flag Triggers			
		2042 Delay (seconds)	2042 LOS	% Reduction from No Build	2042 Delay (seconds)	2042 LOS	% Reduction from No Build								
								\$850K to \$1.3M	0	\$100K to \$200K	C2	R/W Impacts, Potential T&E, ESA Issues	Improves	Improves	Improves



0 75 150 300
FEET
September 2018

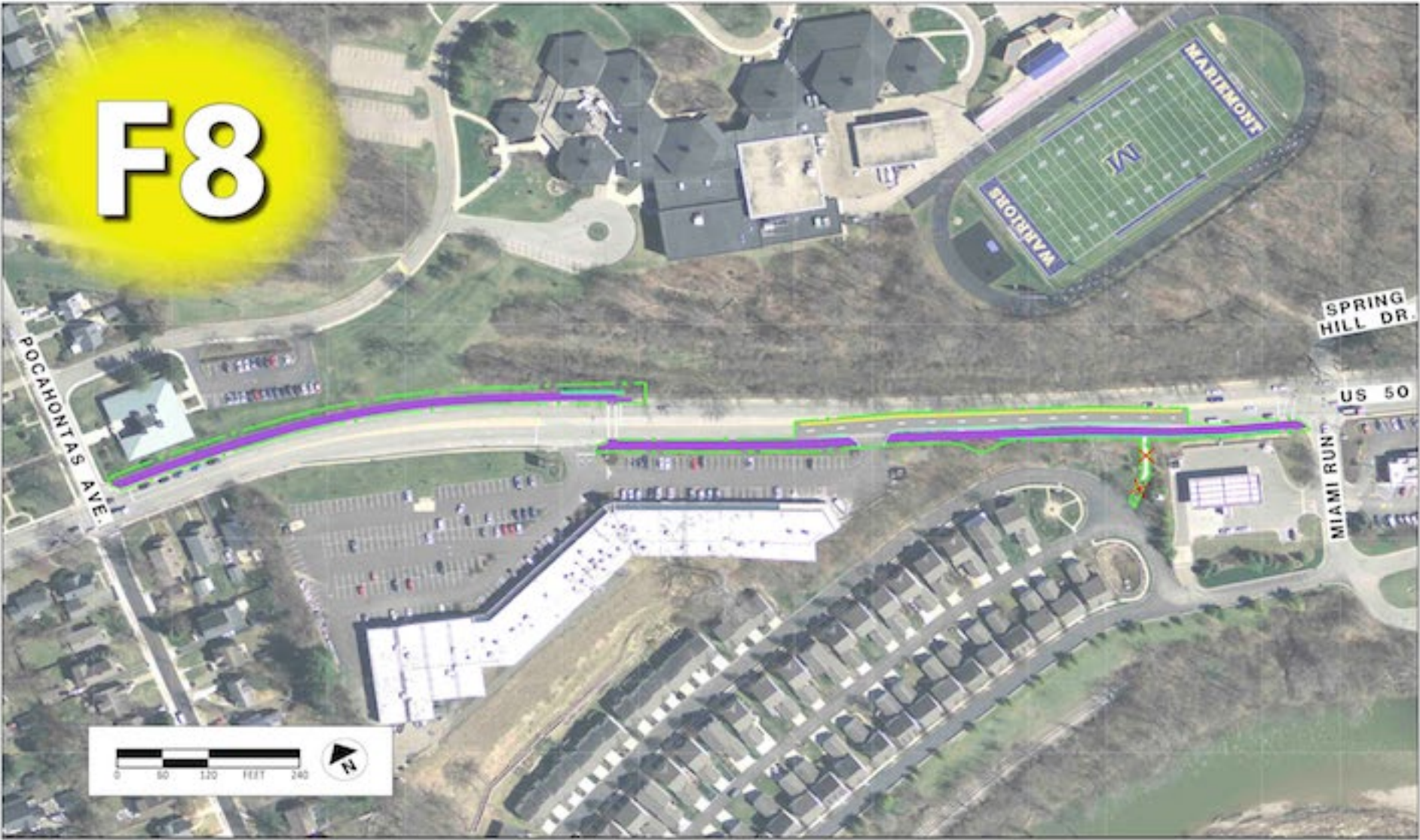


Concept Drawing
Eastern Corridor Projects
Segment II-III (SR 32 Corridor)
HAM-32F-0.00; PID 86462

Figure 50-7A

SHARED USE PATH ALONG THE SOUTH SIDE OF
U.S. 50 TO PROMINADE INTERSECTION, THEN
CONTINUE ON NORTH SIDE OF U.S. 50 TO
POCAHONTAS

Concept drawing was presented at the October 24 & 25 Open House meetings.



**Shared-Use Path Along
US 50 from Spring Hill to
Pocahontas**

- \$850,000 to \$1.3M construction cost
- New R/W needed from 7 parcels; no buildings impacted
- Eastbound lanes shifted to reduce R/W impacts
- Requires 375 foot long retaining wall
- Stairs to Mariemont Landing removed; access provided using new path along Miami Run (see alt F7)

PUBLIC FEEDBACK RATINGS SUMMARY

Strongly Oppose	Dislike	Neutral	Like	Strongly Support
4%	6%	25%	21%	44%

(percentages have been rounded)

Focus Area	PI Mtg Identifier	Identifier	Website Link	Conceptual Project Description	Priority	Maintaining Agency	Phasing Recommendations	Next Steps	Construction Cost Range	Right-of-Way Cost Range
Ancor-SR 32 Hill	C3	32-9	Link	Add center turn lane from Little Dry Run to East Corp Limit. Includes sidewalk from Little Dry Run to east corp. limit (originally part of B6).	High Priority	The Village of Newtown		<ul style="list-style-type: none"> Meet with Newtown to develop funding strategy Possibly advance with planned ODOT resurfacing projects (PID 105215 in FY22 and PID 105214 in FY24) 	\$1,300,000 to \$1,950,000	\$130,000 to \$260,000
Linwood-Eastern_US-50_Red_Bank	E1	I-25b	Link	Improve signal timing, lengthen storage lanes, add dual WB right turn lanes and dual NB thru lanes at Red Bank/Colbank intersection. Also includes new coordinated traffic signal at Colbank & WB US 50 ramps, that allows ramp traffic to US 50 EB to bypass.	High Priority	The Village of Fairfax		Meet with Fairfax to develop funding strategy	\$675,000 to \$1,000,000	\$17,000 to \$34,000
SR 32 / SR 125	A5 A6	125-3a 125-3b	Link	<p>Concept A5 would connect SR 125 walk at Elstun Rd to Little Miami Trail with shared use path along SR 125 utilizing new bridge over Clough Creek and passing behind UDF.</p> <p>Concept A6 would connect SR 125 walk at Elstun Rd to Little Miami Trail with shared use path on new alignment south from SR 32 ramps, on new bridge over Clough Creek, and tying to Elstun Road. Concept A6 modified to provide shared use path along Elstun Road to SR 125 switching from west to east at Spindlehill Dr. {This concept eliminates need for Concept A3 (Elstun-1)}</p>	High Priority	Anderson Township		Evaluate possible slope stability issues on A5 alignment.	\$770,000 to \$1,450,000	\$65,000 to \$180,000
SR 32 / SR 125	A4	125-5	Link	Add shared use path along south side of SR 125 between Elstun Rd and Ranchvale Dr.	High Priority	The City of Cincinnati	Build with or after A5/A6	Work with City of Cincinnati to prioritize bike/ped projects and discuss funding strategy.	\$140,000 to \$200,000	\$200,000 to \$400,000
Linwood-Eastern_US-50_Red_Bank	D5	X-2b-2 X-2b-2a	Link	Create grade separated interchange to connect Wilmer and Wooster.	High Priority	The City of Cincinnati		Engage with Linwood Community Council to further evaluate D5. Next step will consist of developing alternatives before arriving at a recommended preferred alternative.	\$7,000,000 to \$12,100,000	\$875,000 to \$2,500,000
SR 32 / SR 125		X-1b		Install friction pavement to address crashes on ramps between SR 32 and SR 125 in wet conditions.	High Priority	ODOT		<ul style="list-style-type: none"> Prepare 2019 HSIP Safety Fund Application. Possibly advance with planned ODOT resurfacing projects (PID 105215 in FY22 and PID 105214 in FY24) 	\$140,000 to \$210,000	\$0
Ancor-SR 32 Hill	C9	I-9	Link	Improve Broadwell Road and Round Bottom Road intersection to accommodate turning movements of large trucks.	High Priority	Hamilton County		Meet with HCEO to in spring of 2019 to discuss abbreviated safety fund application	\$110,000 to \$170,000	\$15,000 to \$30,000
Newtown	B1	I-6a	Link	Lengthen turn lanes at the Church/Main intersection and add a westbound through lane on SR 32.	High Priority	The Village of Newtown	Evaluate after B2 is constructed	Meet with Newtown to develop funding strategy	\$1,200,000 to \$1,800,000	\$250,000 to \$500,000
US 50 Corridor	F7	BIKE-5	Link	Use old RR bed for bicycle connectivity to Little Miami Trail.	High Priority	Columbia Township		This alternative is being advanced by Great Parks / Columbia Township.	Getting info from Great Parks	Getting info from Great Parks
US 50 Corridor	F8	50-7a	Link	Create shared use path along the south side of US 50 to Promenade intersection, then continue on north side of US 50 to Pocahontas.	High Priority	Columbia Township		Meet with Great Parks to coordinate next steps	\$850,000 to \$1,300,000	\$100,000 to \$200,000
SR 32 / SR 125		X-1c		Extend merge length on ramp from westbound SR 32 to westbound SR 125.	High Priority	The City of Cincinnati		Need to meet with ODOT PM to determine if this work can be added to PID 107295	\$47,000 to \$71,000	\$0

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Little Miami Scenic Trail Extension Alternatives
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ATTACHMENT C

Build Alternatives & Typical Sections





Great Parks
of Hamilton County

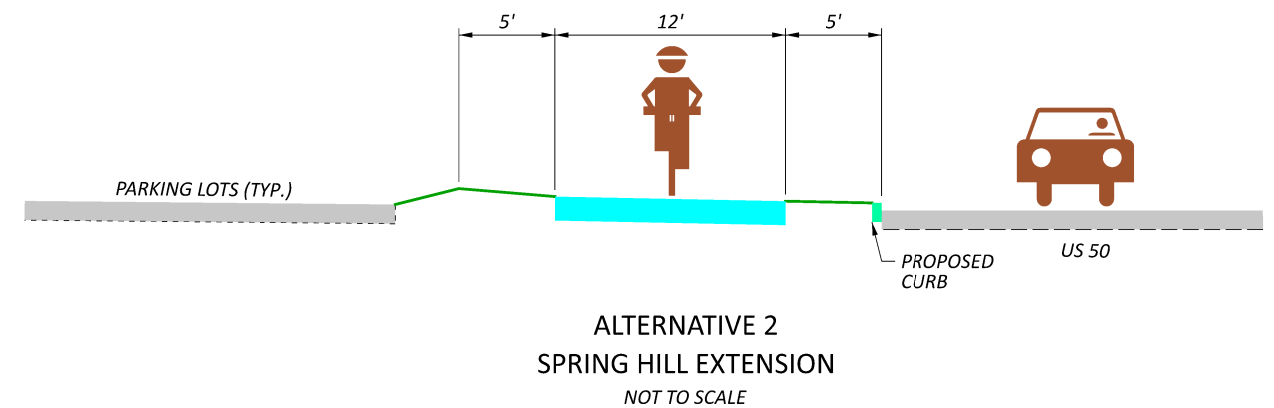
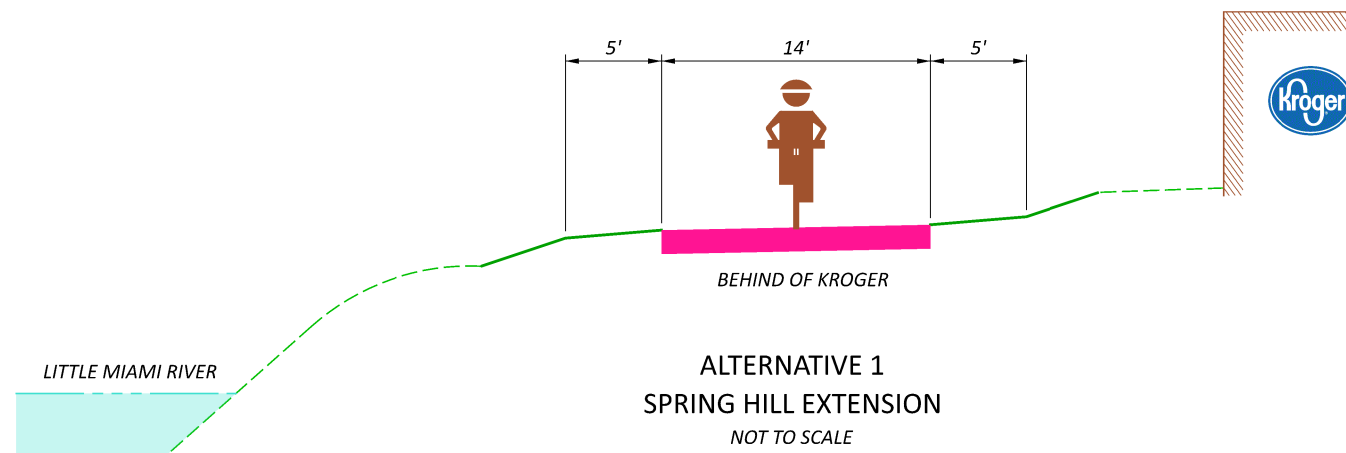
COLUMBIA
TOWNSHIP
GROWING TOGETHER

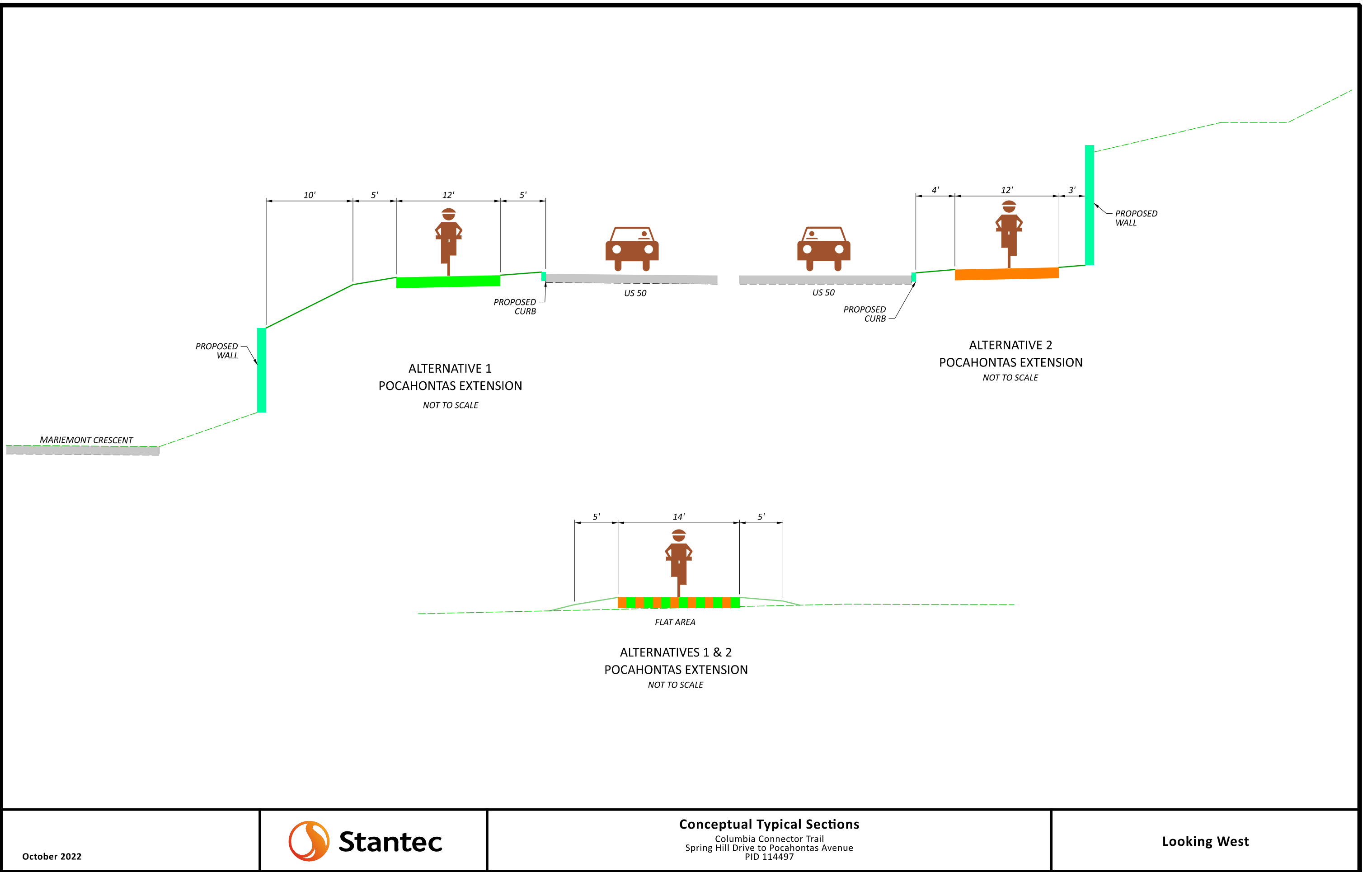


Columbia Connector Trail Alternatives

Spring Hill Connection (PID 114496) and Pocahontas Connection (PID 114497)







FEASIBILITY STUDY

Little Miami Scenic Trail Extension Alternatives
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And Pocahontas Extension (PID 114497)

ATTACHMENT D

Structures Type Study





LITTLE MIAMI SCENIC TRAIL EXTENSION

Structure Type Study for Bridge over Walton Creek

January 13, 2023

Prepared for:
Ohio Department of Transportation
District 8
505 South Sr 741
Lebanon, Ohio 45036

Prepared by:
Stantec Consulting Services Inc.

Project Number:
173620147

The conclusions in the Report titled Little Miami Scenic Trail Extension are Stantec's professional opinion, as of the time of the Report, and concerning the scope described in the Report. The opinions in the document are based on conditions and information existing at the time the scope of work was conducted and do not take into account any subsequent changes. The Report relates solely to the specific project for which Stantec was retained and the stated purpose for which the Report was prepared. The Report is not to be used or relied on for any variation or extension of the project, or for any other project or purpose, and any unauthorized use or reliance is at the recipient's own risk.

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Prepared by:



Signature

Michael Sturdevant, PE

Printed Name

Reviewed by:



Signature

Eric Adkins, PE

Printed Name

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APPENDIX B PROPOSED SITE PLAN & TYPICAL SECTION

APPENDIX C PHOTOS OF EXISTING BRIDGE



Executive Summary

This study is to evaluate the concept of incorporating the rehabilitated, remaining portions of the existing abutments from the original railroad bridge over Walton Creek into the proposed bridge for the shared-use path. The abutments were rehabilitated in 2020 to accommodate a future superstructure to carry the Spring Hill Extension to the Columbia Connector shared-use path.

The remains of the existing stone abutments were rehabilitated, and rebuilt where necessary, in 2020. Cast in place concrete walls 8-inches thick with geosynthetic reinforcement were constructed to replace the missing sections of the stone abutments. A formliner was utilized to match the appearance of the stone abutments. A concrete cap was constructed on top of the existing stones and the new geosynthetic reinforced fill to support a future bridge superstructure.

From discussions with Great Parks of Hamilton County, it has been determined the superstructure for the proposed bridge will be a prefabricated steel truss with a concrete deck matching the style of the nearby bridges where the Little Miami Scenic Trail crosses the Little Miami River.

No geotechnical exploration has been performed, however, the stone abutments are deemed to be stable and adequate to support the proposed pedestrian bridge loading. The rehabilitation project stabilized the abutments and provided protection against scour in the future. Based on the fact the abutments were sufficient to support the former railroad loading and are in good condition, it can be extrapolated that the abutments are adequate to support the loads from a shared-use trail bridge.

Stantec has performed a hydraulic flood study of the bridge crossing. The complete report will be submitted under a separate cover, however, the study indicates the 100-year flood elevation on Walton Creek is not impacted by the addition of the superstructure to the existing stone abutments. The superstructure will clear the 100-year flood elevation by over 10 feet.

The bridge is located within the floodplain of the Little Miami River, but outside the floodway. The 100-year backwater flood elevation of the Little Miami River is approximately 5.55 feet above the surface of the bridge. The hydraulic study indicates there is no impact to this 100-year flood elevation with the addition of the bridge superstructure.

Based on the results of the hydraulic study, and evaluation of the existing substructure, Stantec recommends the project proceed by constructing a prefabricated steel truss bridge on the existing rehabilitated stone abutments. The concrete caps on the abutments will require modification to accommodate the prefabricated bridge.



1 INTRODUCTION

This study is to evaluate the concept of incorporating the rehabilitated, remaining portions of the existing abutments from the original railroad bridge over Walton Creek into the proposed bridge for the shared-use path. The abutments were rehabilitated in 2020 to accommodate a future superstructure to carry the Spring Hill Extension to the Columbia Connector shared-use path.

1.1 Existing Structure

The existing structure originally carried the railroad across Walton Creek on a steel beam superstructure. The superstructure had a length of approximately 25 feet and was supported on gravity stone abutments. The abutments are approximately 14 feet high above the creek bed and are supported on timber footings. The elevations of the bottom of footings are not known.

1.2 Proposed Structure

The remains of the existing stone abutments were rehabilitated, and rebuilt where necessary, in 2020. Cast in place concrete walls 8-inches thick with geosynthetic reinforcement were constructed to replace the missing sections of the stone abutments. A formliner was utilized to match the appearance of the stone abutments. A concrete cap was constructed on top of the existing stones and the new geosynthetic reinforced fill to support a future bridge superstructure. Steel sheet piling was driven in front of the new wall sections to a depth of approximately 13 feet below the proposed creek flowline. A 6-inch thick reinforced concrete slab was placed in the creek bed and covered with grouted rock channel protection. See final plans and as-builts from the 2020 rehabilitation project in Appendix B.

From discussions with Great Parks of Hamilton County, it has been determined the superstructure for the proposed bridge will be a prefabricated steel truss with a concrete deck matching the style of the nearby bridges where the Little Miami Scenic Trail crosses the Little Miami River. The truss will provide 12-feet clear width between AASHTO compliant handrails. See site plan and typical section in Appendix A.

2 DESIGN CONSIDERATIONS

2.1 Design Specifications

The proposed structures will be designed in accordance with the ODOT 2020 Bridge Design Manual, the AASHTO LRFD Bridge Design Specifications (9th edition) and the AASHTO LRFD Guide Specifications for the Design of Pedestrian Bridges with 2015 Interim Revisions

2.2 Design Criteria

- Proposed structure width: 12'-0" face-to-face railing



- Live load: 90 psf or H15 truck

2.3 Alignment

The existing horizontal alignment of the original railroad track will be maintained. The section of trail over the bridge is on a tangent alignment, extending the alignment of the Columbia Connector westward. The existing vertical alignment of the original railroad trackbed will be generally maintained. The section of trail over the bridge is on a 0.5% longitudinal grade, extending the profile of the Columbia Connector westward.

2.4 Geotechnical

No geotechnical exploration has been performed for this study. However, historical borings in the local area indicate sandy silty clay soils are found down to approximately El. 475 with stiff to hard clay below. The previous abutment rehabilitation plans indicate the stone abutments are supported on timber mat foundations with the bottom of footing elevations unknown. The flowline of Walton Creek is approximately El. 478.50 with the bottom of footings located below this elevation. Therefore, it is reasonable to assume the footings are founded on the stiff to hard clay material.

Steel sheet piling was driven and left in place in front of the existing abutments in the vicinity of a scour hole in the creek between the abutments. Class QC1 concrete was placed between the sheet piling and the existing abutments. The entire streambed between the abutments to the limits of the wingwalls was excavated and a 6-inch thick reinforced concrete slab was placed in the creek bed and covered with grouted rock channel protection (RCP). The sheet piling and grouted RCP should provide sufficient protection to guard against future scour.

As noted, no geotechnical exploration has been performed, however, the stone abutments are deemed to be stable and adequate to support the proposed pedestrian bridge loading. The rehabilitation project stabilized the abutments and provided protection against scour in the future. Based on the fact the abutments were sufficient to support the former railroad loading and are in good condition, it can be extrapolated that the abutments are adequate to support the loads from a shared-use trail bridge.

2.5 Hydraulics

Stantec has performed a hydraulic flood study of the bridge crossing. The complete report will be submitted under a separate cover. This section summarizes the results of the report.

The 100-year flood elevation on Walton Creek is not impacted by the addition of the superstructure to the existing stone abutments. The low end of the proposed profile grade on the bridge is at El. 496.75 with the low chord on the proposed superstructure at approximately El. 495.25. The 100-year flood elevation on Walton Creek is 485.19 and the 10-year design flood is at El. 482.58. Thus the superstructure will clear the 100-year flood elevation by over 10 feet.

The bridge is located within the floodplain of the Little Miami River, but outside the floodway. The 100-year backwater flood elevation of the Little Miami River is 500.80 which is approximately 5.55 feet above



the surface of the bridge. The hydraulic study indicates there is no impact to this 100-year flood elevation with the addition of the bridge superstructure.

3 RECOMMENDATION

Based on the results of the hydraulic study, and evaluation of the existing substructure, Stantec recommends the project proceed by constructing a prefabricated steel truss bridge on the existing rehabilitated stone abutments. The concrete caps on the abutments will require modification to accommodate the prefabricated bridge.

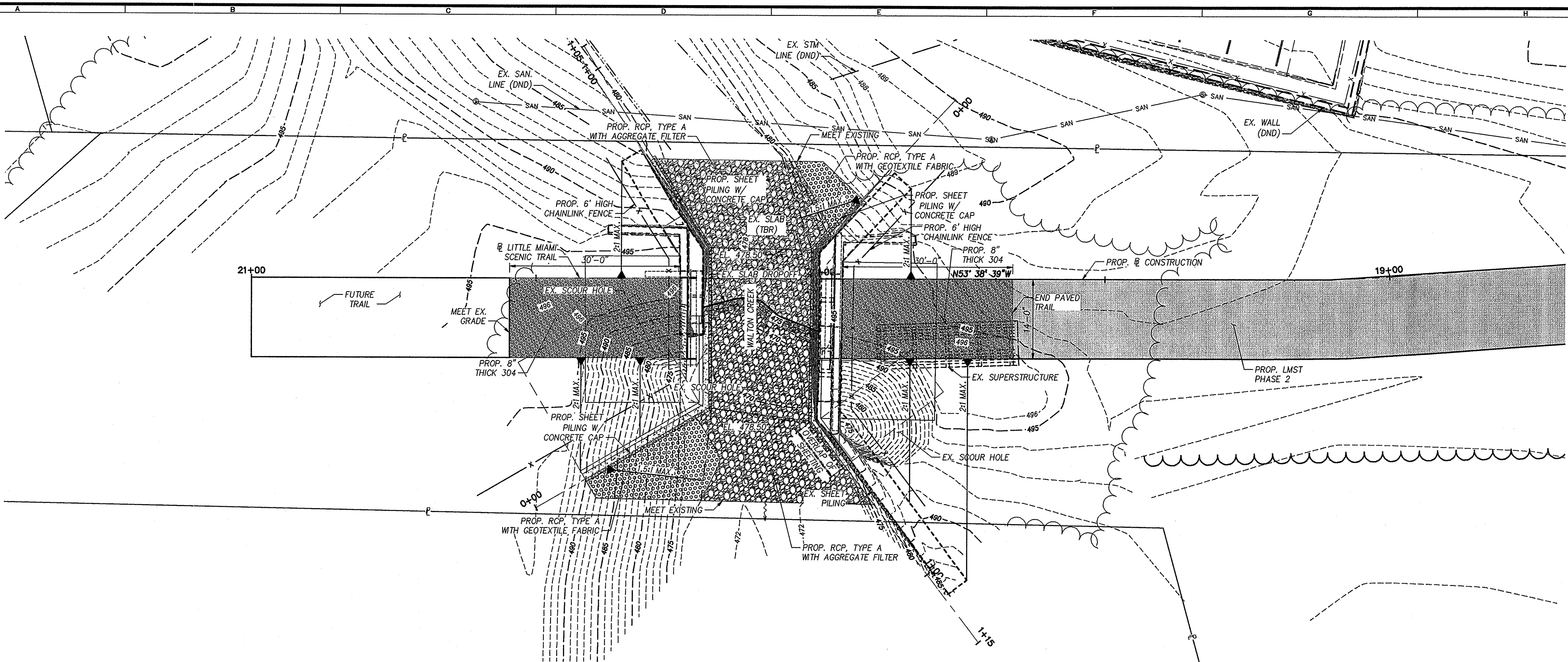


APPENDICES

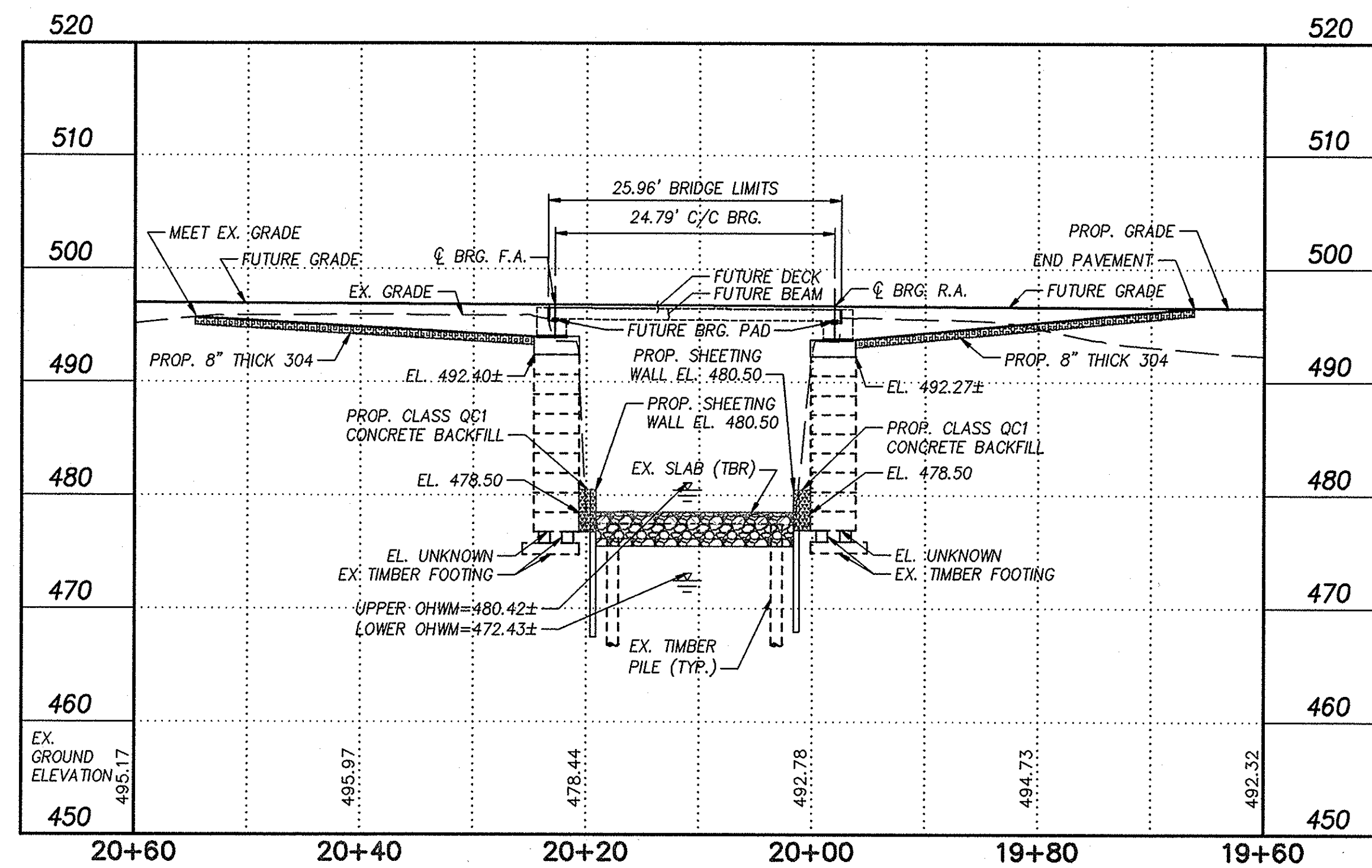


Appendix A Plans for Existing Bridge





PLAN



PROFILE

NOTES:

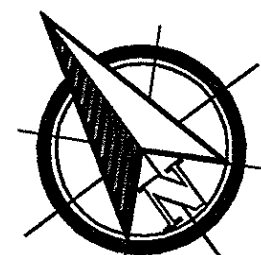
1. UPPER ORDINARY HIGH WATER MARK INDICATES ORDINARY HIGH WATER MARK ON UPSTREAM SIDE PRIOR TO SLAB DROPOFF. LOWER ORDINARY HIGH WATER MARK INDICATES ORDINARY HIGH WATER MARK ON DOWNSTREAM SIDE AFTER SLAB DROPOFF.
2. THE CONTRACTOR SHALL PLACE THE PROPOSED 6' HIGH CHAINLINK FENCE IN A METHOD TO PREVENT PEDESTRIANS TO ACCESS TO THE FRONT FACE OF ABUTMENTS.
3. REMOVE ALL TREES WITHIN CONSTRUCTION LIMITS.

LEGEND:

- PROP. CLASS CQ1 CONCRETE BACKFILL
- PROP. LOW STRENGTH MORTAR BACKFILL
- PROP. LMST PHASE 2
- PROP. ROCK CHANNEL PROTECTION, TYPE A WITH AGGREGATE FILTER
- PROP. ROCK CHANNEL PROTECTION, TYPE A WITH GEOTEXTILE FABRIC
- PROP. 8" THICK 304
- PROP. STORM CROSSING
- EX. SLAB (TO BE REMOVED)

REVISED 9/3/19

41
56



GRAPHIC SCALE



(IN FEET)
1 inch = 10 ft.



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HAMILTON COUNTY COMMENTS 2019.09.25
ISSUED FOR RE-BID 2019.10.04

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- CONSTRUCTION DOCUMENT SET
- AS-BUILT DOCUMENT SET

STAMP:



HAMILTON COUNTY

LMST PHASE 2

COLUMBIA TOWNSHIP, OHIO

DESIGN	DRAFT	CHECK
MJT	MJT	SRB

IBI NO.: 116492

DATE: JUNE, 2019

SCALE:

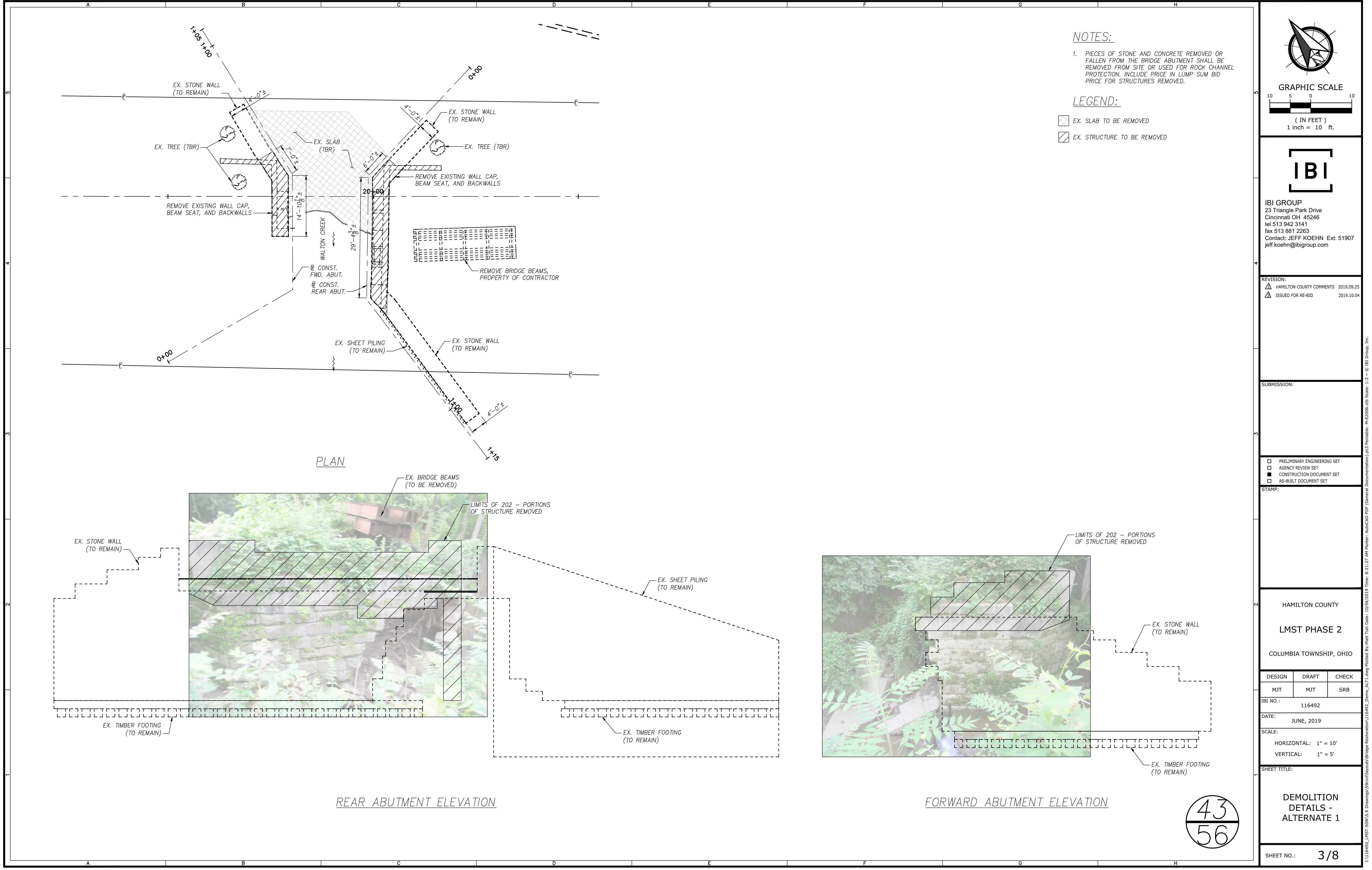
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VERTICAL: 1" = 10'

SHEET TITLE:

SITE PLAN AND
PROFILE -
ALTERNATE 1

SHEET NO.: 1/8



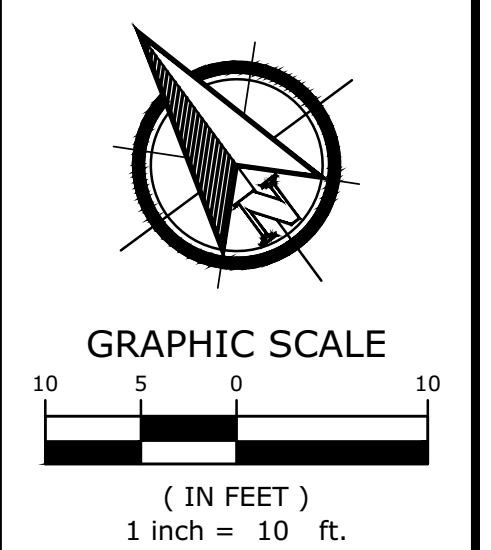
NOTES:

1. PIECES OF STONE AND CONCRETE REMOVED OR FALLEN FROM THE BRIDGE ABUTMENT SHALL BE REMOVED FROM SITE OR USED FOR ROCK CHANNEL PROTECTION. INCLUDE PRICE IN LUMP SUM BID PRICE FOR STRUCTURES REMOVED.

LEGEND:

EX. SLAB TO BE REMOVED

EX. STRUCTURE TO BE REMOVED



[B]

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<input checked="" type="checkbox"/> CONSTRUCTION DOCUMENT SET
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STAMP:

HAMILTON COUNTY

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COLUMBIA TOWNSHIP, OHIO

DESIGN	DRAFT	CHECK
MJT	MJT	SRB

IBI NO.: 116492

DATE: JUNE, 2019

SCALE:

HORIZONTAL: 1" = 10'

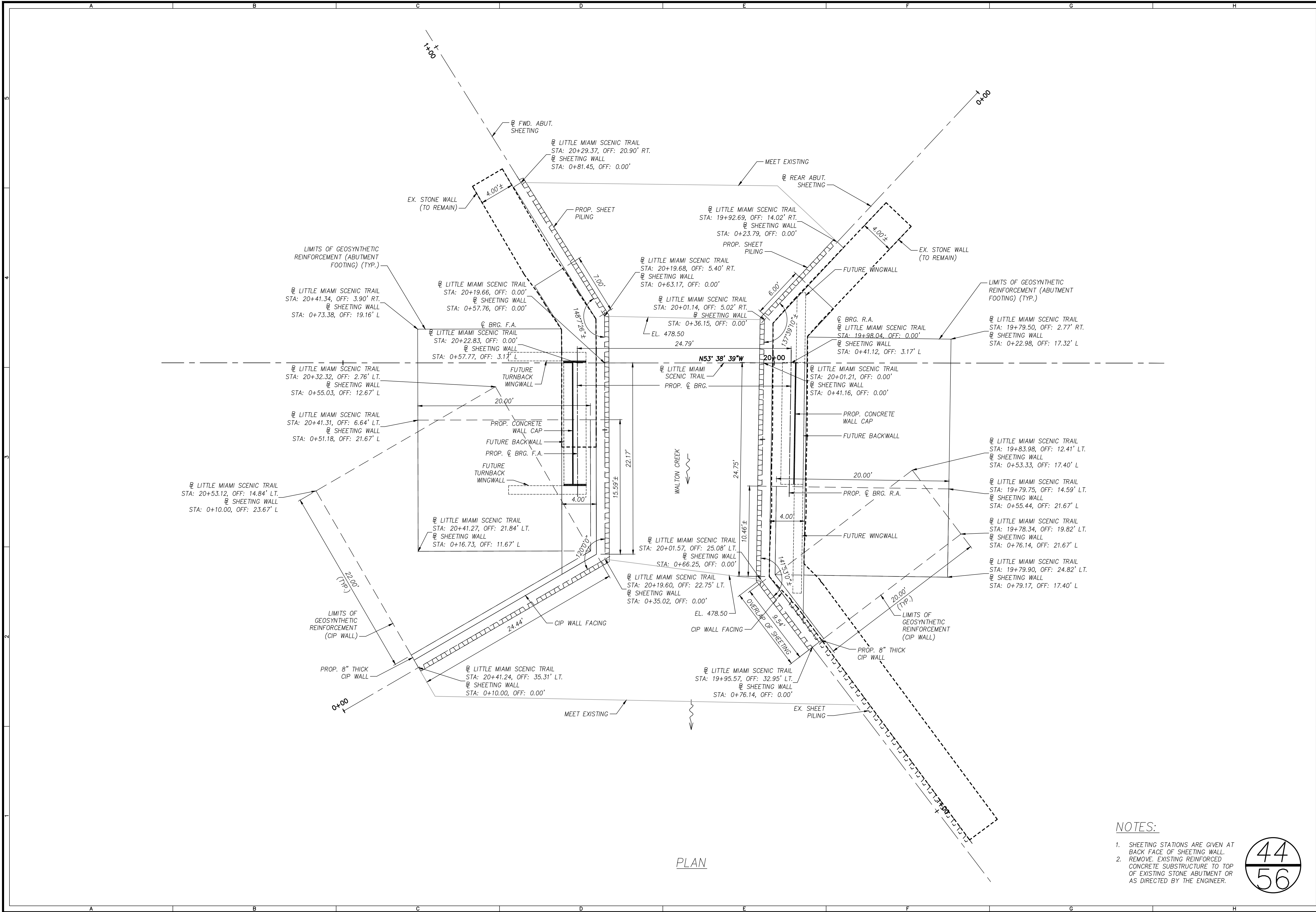
VERTICAL: 1" = 5'

SHEET TITLE:

**DEMOLITION
DETAILS -
ALTERNATE 1**

SHEET NO.: **3/8**

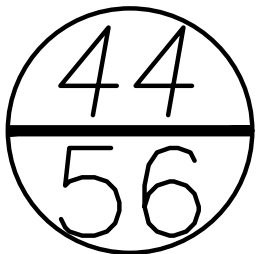
43
56



PLAN

NOTES:

1. SHEETING STATIONS ARE GIVEN AT BACK FACE OF SHEETING WALL.
2. REMOVE EXISTING REINFORCED CONCRETE SUBSTRUCTURE TO TOP OF EXISTING STONE ABUTMENT OR AS DIRECTED BY THE ENGINEER.



GRAPHIC SCALE
(IN FEET)
1 inch = 5 ft.

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MJT	MJT	SRB

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DATE: JUNE, 2019

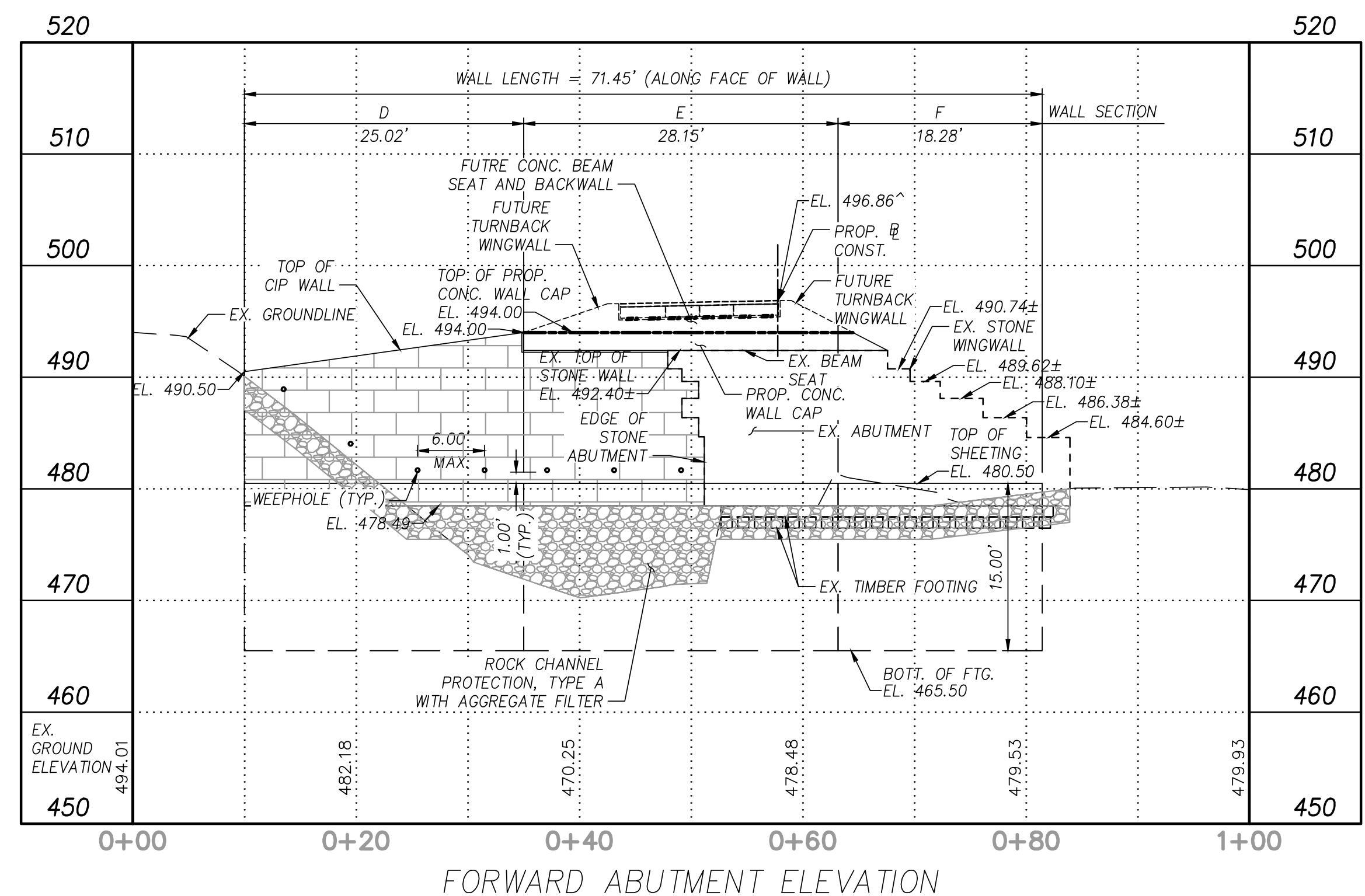
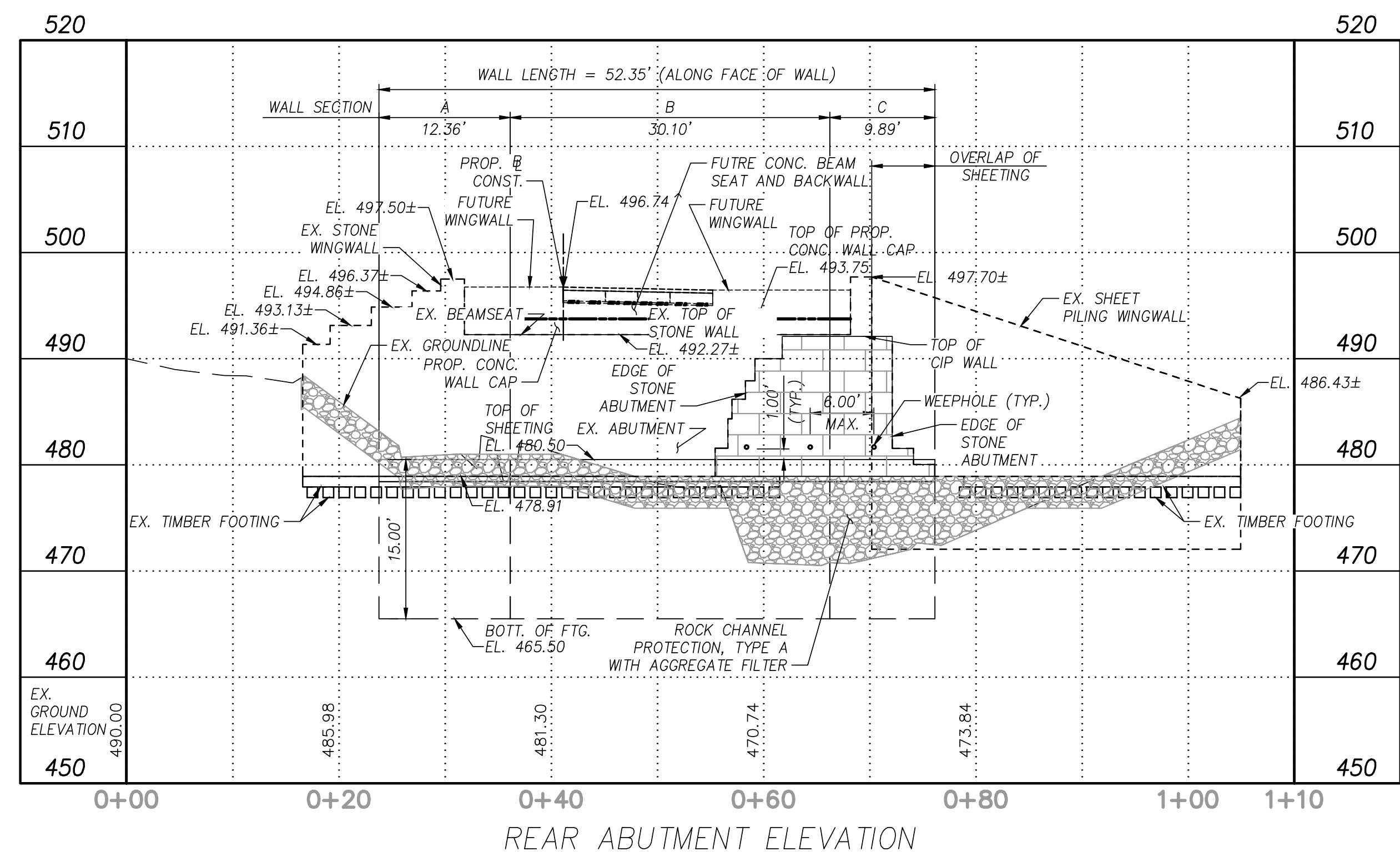
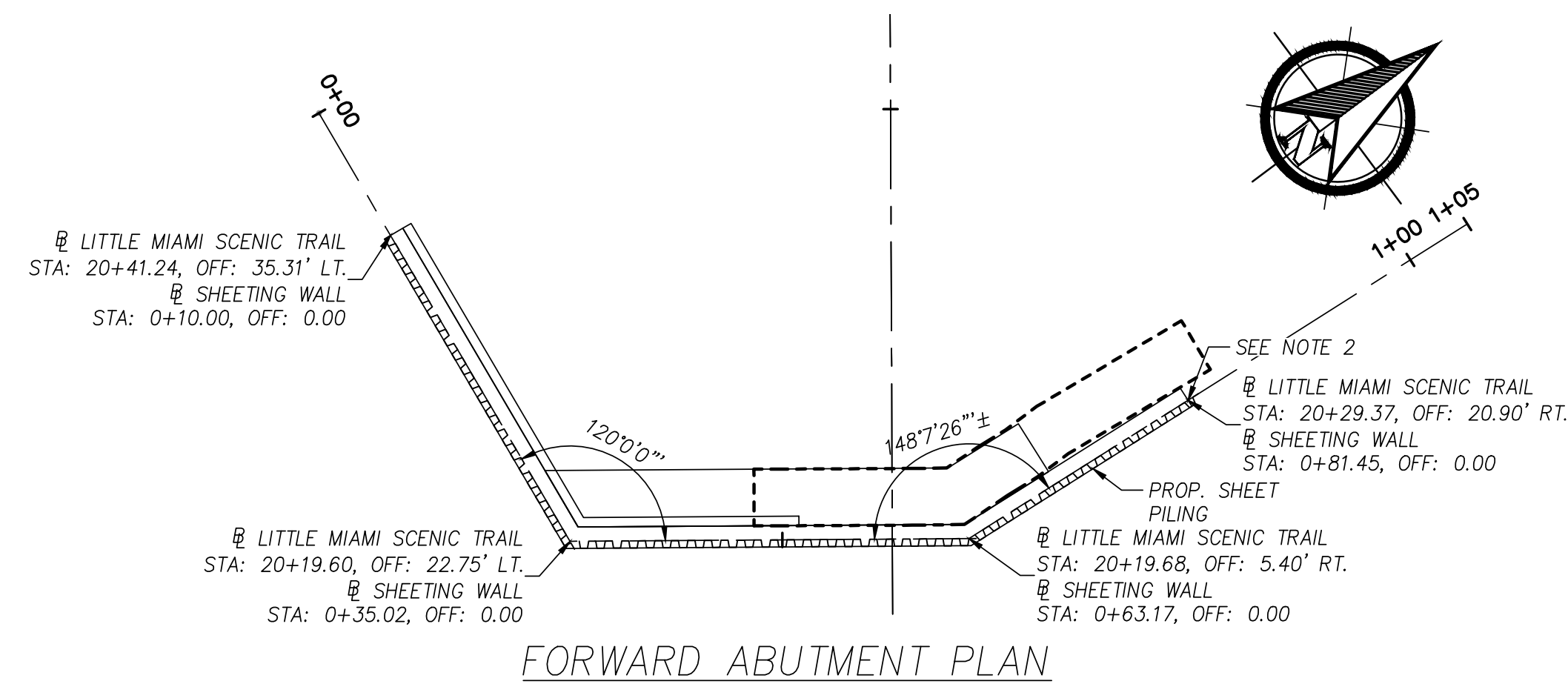
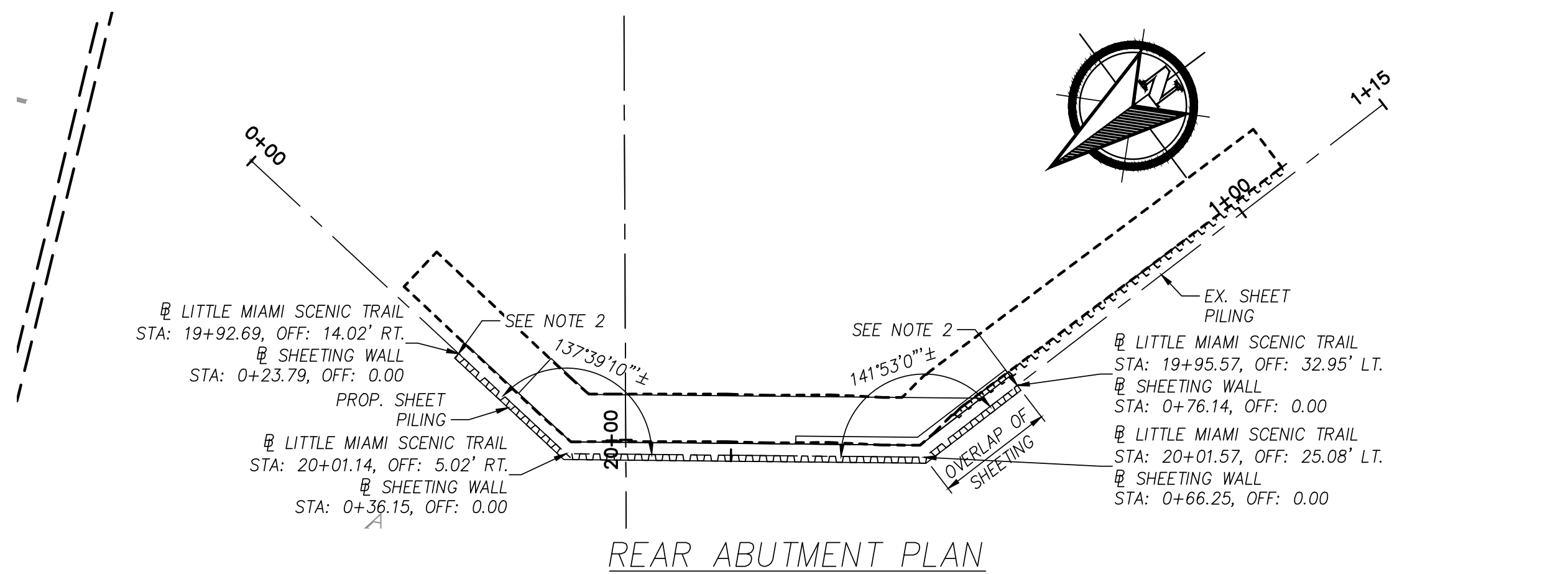
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SHEET TITLE:

FOUNDATION LAYOUT PLAN - ALTERNATE 1

SHEET NO.: 4/8

J:\116492_LMST-50W\5.9 Drawings\50w\layouts\IBI\Drawings\50w\5.9.dwg Plotted By: Matt Tish Date: 10/04/2019 Time: 8:21:37 AM Plotter: Autocad PDF (General Documentation).p33 Penable: M-E2006.ctb Scale: 1:2 ~ © IBI Group, Inc.



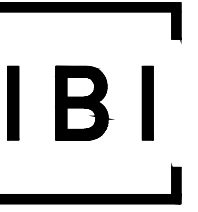
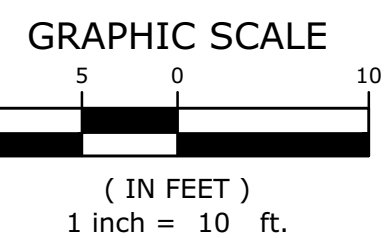
SHORING WALL							
SECTION	LITTLE MIAMI SCENIC TRAIL STATION*		LENGTH	LITTLE MIAMI SCENIC TRAIL OFFSET*		TOTAL SHEETING HEIGHT	SECTION MODULOUS IN/FT
	FROM	TO		FROM	TO		
A	19+92.69	20+01.14 **	12.36'	14.02' RT.	5.02' RT.	15.00	16.00
B	20+01.14 **	20+01.57 **	30.10'	5.02' RT.	25.08' LT.	15.00	16.00
C	20+01.57 **	19+95.57	9.89'	25.08' LT.	32.95' LT.	15.00	16.00
D	20+41.24	20+19.60 **	25.02'	35.31' LT.	22.75' LT.	15.00	16.00
E	20+19.60 **	20+19.68 **	28.15'	22.75' LT.	5.40' RT.	15.00	16.00
F	20+19.68 **	20+29.37	18.28'	5.40' RT.	20.90' RT.	15.00	16.00

* - WALL STATIONS AND OFFSETS ARE GIVEN AT BACK FACE OF WALL.
 ** - INDICATES BEND POINT.
 ^ - ELEVATION GIVEN AT @ BEARING.

NOTES:

- CONTRACTOR SHALL VERIFY SITE CONDITIONS HAVE NOT CHANGED FROM DESIGN DATE PRIOR TO INSTALLING SPECIFIED SHEETING.
- CONTRACTOR SHALL TURN BACK SHEET PILING TO CONTAIN CLASS QCI CONCRETE AS NECESSARY.
- CONTRACTOR SHALL PLACE ROCK CHANNEL PROTECTION, TYPE A WITH AGGREGATE FILTER IN FRONT OF PROPOSED SHEET PILING PRIOR TO BACKFILLING WITH CLASS QCI CONCRETE.
- FUTURE BEAM SEAT, BACKWALL, AND WINGWALLS NOT SHOWN IN PLAN VIEWS FOR CLARITY.
- HORIZONTALLY SPACE CONSTRUCTION JOINTS ARE PERMISSIBLE BUT THERE SHALL BE NO MORE THAN 2 PER ABUTMENT.
- VERTICALLY SPACED CONSTRUCTION JOINTS ARE PERMISSIBLE AS APPROVED BY THE ENGINEER.

45
56



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HAMILTON COUNTY
 LMST PHASE 2
 COLUMBIA TOWNSHIP, OHIO

DESIGN	DRAFT	CHECK
MJT	MJT	SRB

IBI NO.: 116492

DATE: JUNE, 2019

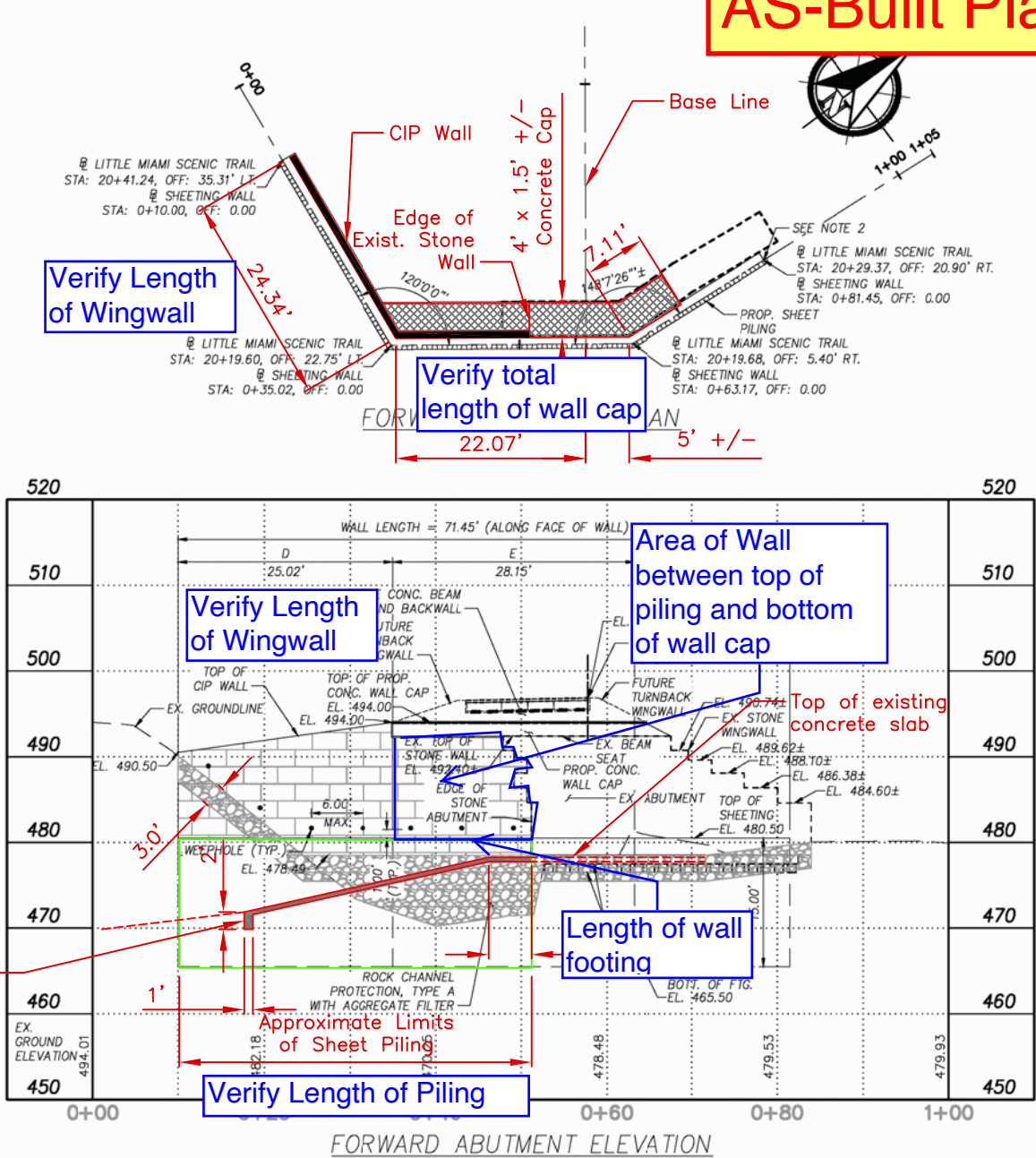
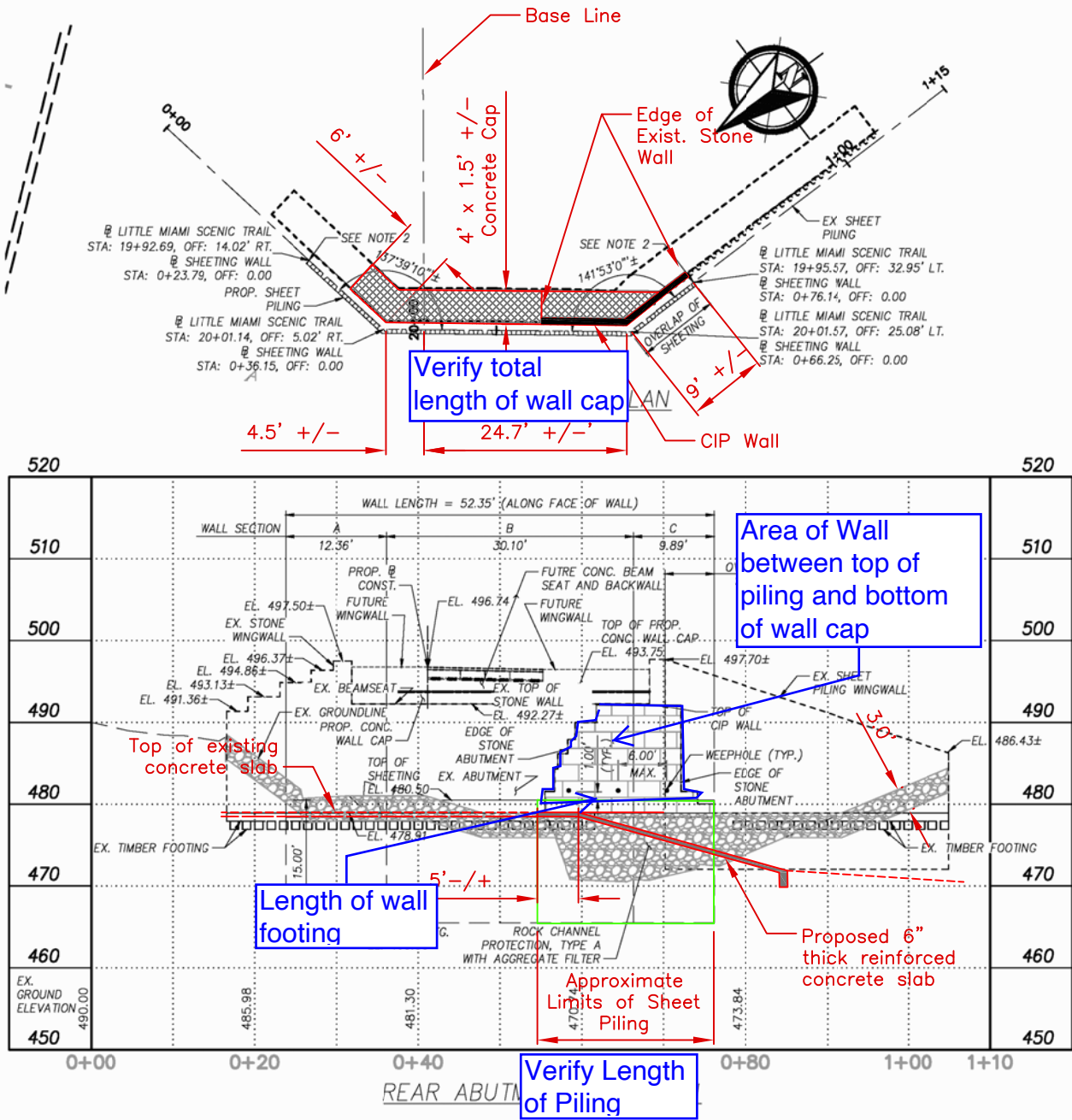
SCALE:
 HORIZONTAL: 1" = 10'
 VERTICAL: 1" = 10'

SHEET TITLE:

SHEETING
 ELEVATION -
 ALTERNATE 1

SHEET NO.: 5/8

AS-Built Plan



FINAL PAY QUANTITIES

REAR ABUTMENT
SHEET PILING – LENGTH X 15'

WALL CAP (ABUTMENT) – LENGTH X 4.0' X 1.5'/27

CONCRETE SHEET PILING BACKFILL – PILE LENGTH X 2.0' X 4.0'/27

CIP WALL (ASSUME WALL THICKNESS AVERAGE IS 12")
SHAFT VOLUME – (AREA X 1.0') + (FOOTING LENGTH X 4.0' X 1.0')

FOOTING VOLUME - FOOTING LENGTH X 2.0' X 1.0'

TOTAL VOLUMES/27=

SHORING WALL							
SECTION	LITTLE MIAMI SCENIC TRAIL STATION*		LENGTH	LITTLE MIAMI SCENIC TRAIL OFFSET*		TOTAL SHEETING HEIGHT	SECTION MODULOUS IN3/FT
	FROM	TO		FROM	TO		
A	19+92.69	20+01.14 **	12.36'	14.02' RT.	5.02' RT.	15.00	16.00
B	20+01.14 **	20+01.57 **	30.10'	5.02' RT.	25.08' LT.	15.00	16.00
C	20+01.57 **	19+95.57	9.89'	25.08' LT.	32.95' LT.	15.00	16.00
D	20+41.24	20+19.60 **	25.02'	35.31' LT.	22.75' LT.	15.00	16.00
E	20+19.60 **	20+19.68 **	28.15'	22.75' LT.	5.40' RT.	15.00	16.00
F	20+19.68 **	20+29.37	18.28'	5.40' RT.	20.90' RT.	15.00	16.00

* – WALL STATIONS AND OFFSETS ARE GIVEN AT BACK FACE OF WALL.
** – INDICATES BEND POINT.
^ – ELEVATION GIVEN AT @ BEARING.

NOTES:

- CONTRACTOR SHALL VERIFY SITE CONDITIONS HAVE NOT CHANGED FROM DESIGN DATE PRIOR TO INSTALLING SPECIFIED SHEETING.
- CONTRACTOR SHALL TURN BACK SHEET PILING TO CONTAIN CLASS QC1 CONCRETE AS NECESSARY.
- CONTRACTOR SHALL PLACE ROCK CHANNEL PROTECTION, TYPE A WITH AGGREGATE FILTER IN FRONT OF PROPOSED SHEET PILING PRIOR TO BACKFILLING WITH CLASS QC1 CONCRETE.
- FUTURE BEAM SEAT, BACKWALL, AND WINGWALLS NOT SHOWN IN PLAN VIEWS FOR CLARITY.
- HORIZONTALLY SPACE CONSTRUCTION JOINTS ARE PERMISSIBLE BUT THERE SHALL BE NO MORE THAN 2 PER ABUTMENT.
- VERTICALLY SPACED CONSTRUCTION JOINTS ARE PERMISSIBLE AS APPROVED BY THE ENGINEER.

FINAL PAY QUANTITIES

FORWARD ABUTMENT
SHEET PILING – LENGTH X 15'

WALL CAP (ABUTMENT) – LENGTH X 4.0' X 1.5'/27

CONCRETE SHEET PILING BACKFILL – PILE LENGTH X 2.0' X 4.0'/27

CIP WALL (ASSUME WALL THICKNESS AVERAGE IS 8")
SHAFT VOLUME – (AREA X 8/12) + (FOOTING LENGTH X 4.0' X 1.0')

FOOTING VOLUME - FOOTING LENGTH X 2.0' X 1.0'

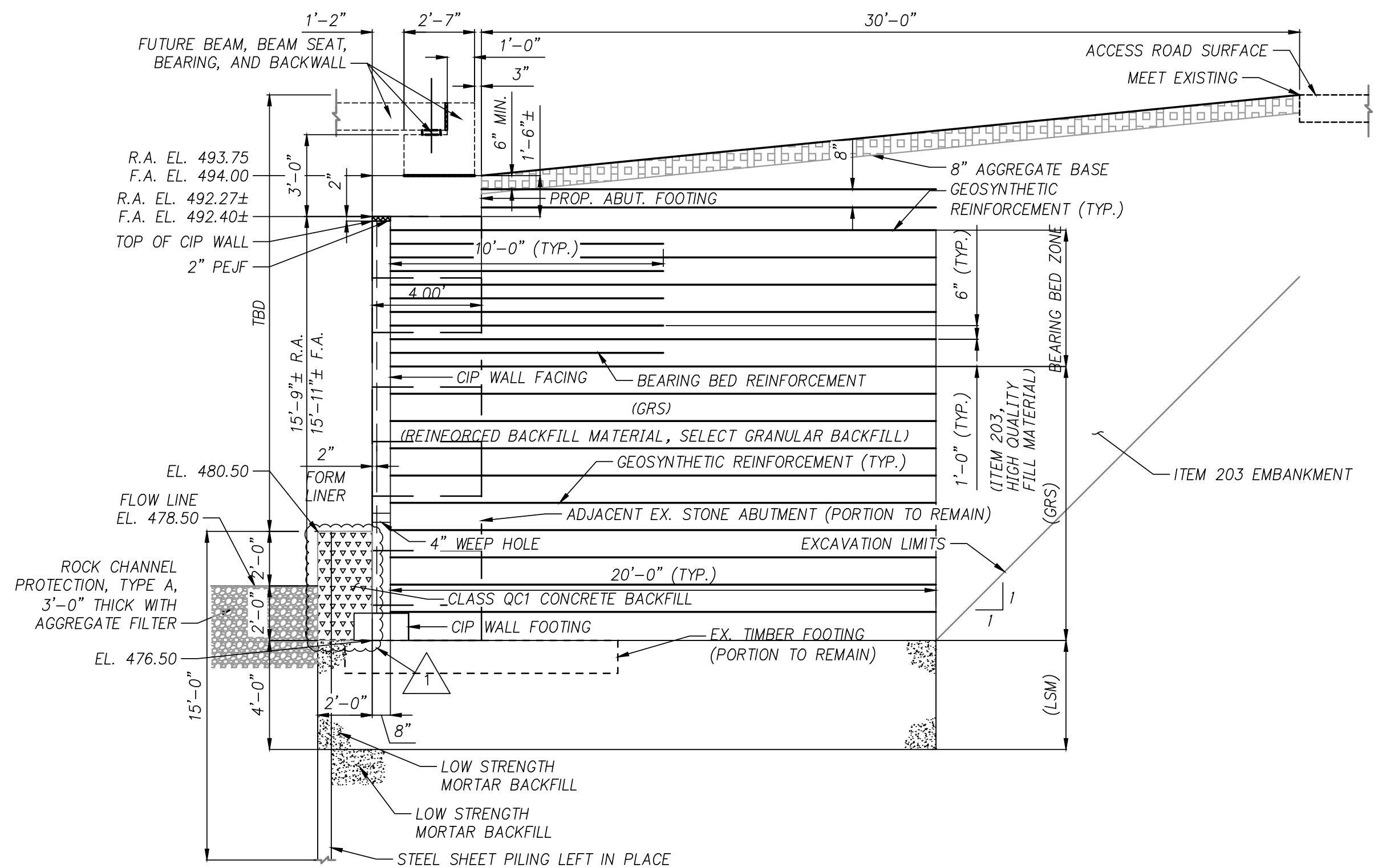
WING WALL SHAFT – (LENGTH X 8/12 X ((490.5+494.0)/2 – 477.5)

WING WALL FOOTING - LENGTH X 1.0' X 2.0'

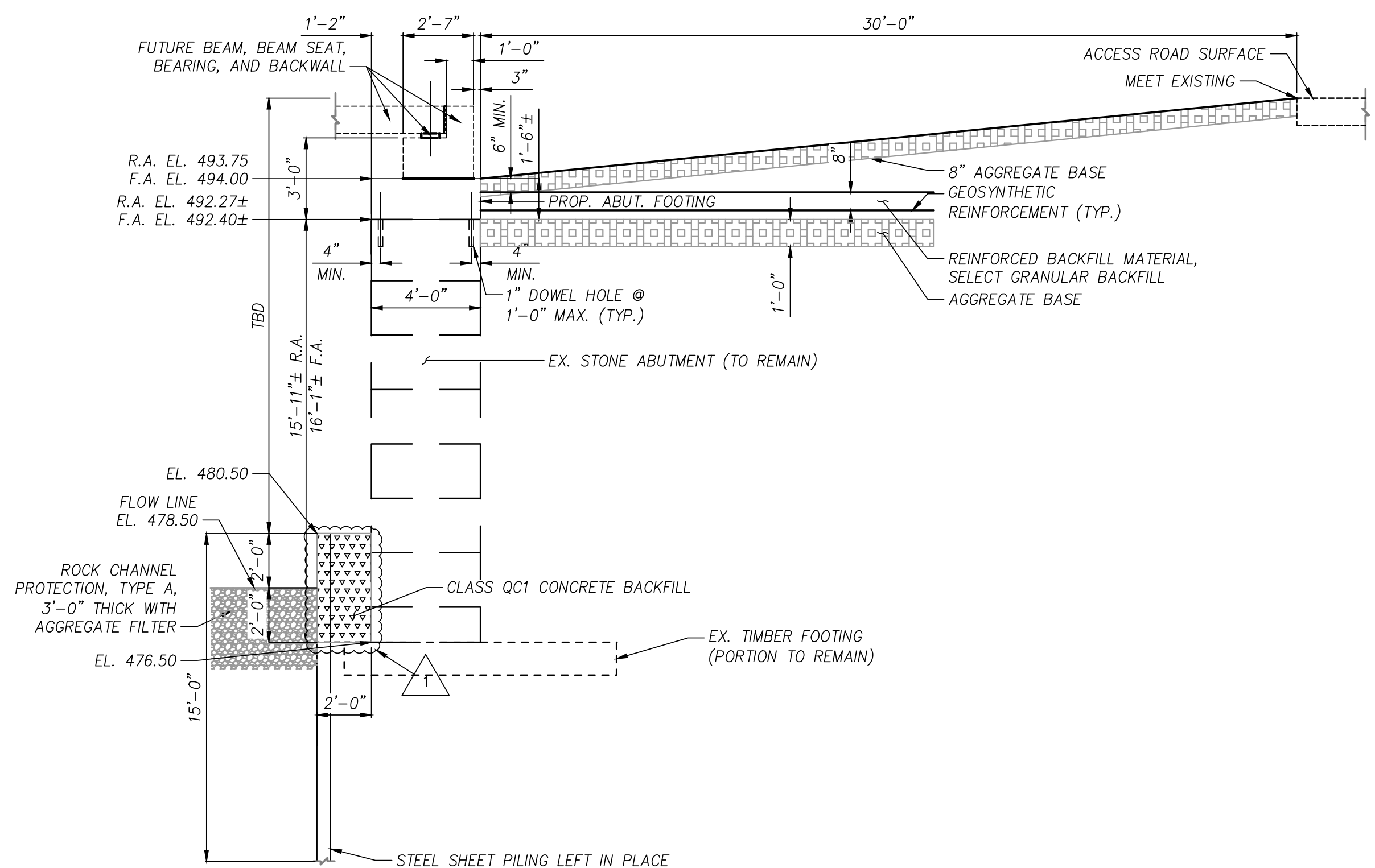
TOTAL VOLUMES/27=

45
56

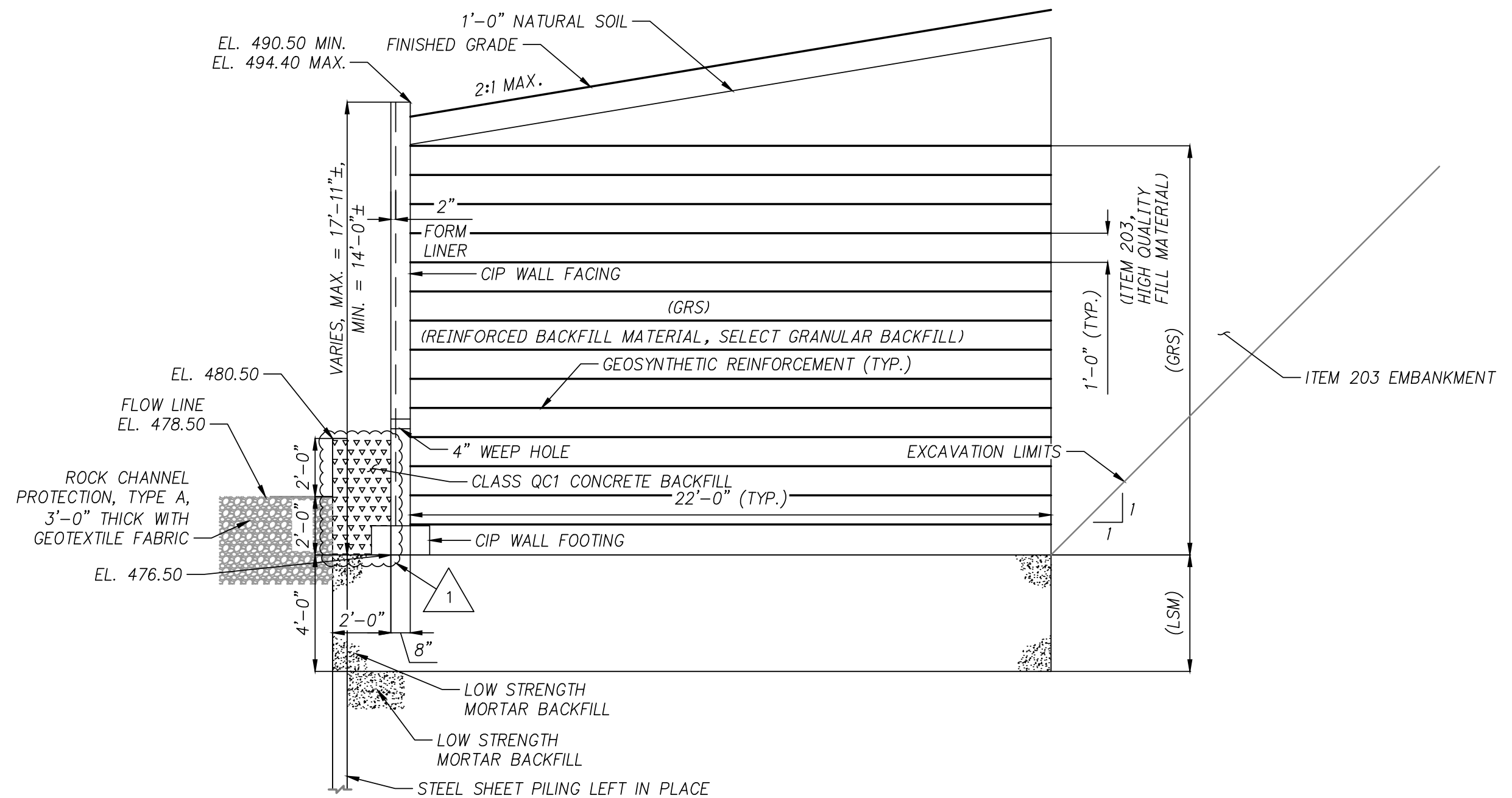
DATE	xx/xx/xx
REVISION	
#	1
GREAT PARKS OF HAMILTON COUNTY	
PLANNING DIVISION	
10245 Winton Road	
Cincinnati, OH 45231	
(513) 521-PARK	
GreatParks.org	
LITTLE MIAMI SCENIC TRAIL	
WALTON CREEK BRIDGE	
PLAN MODIFICATIONS	
DATE : 01/24/20	
2/2	



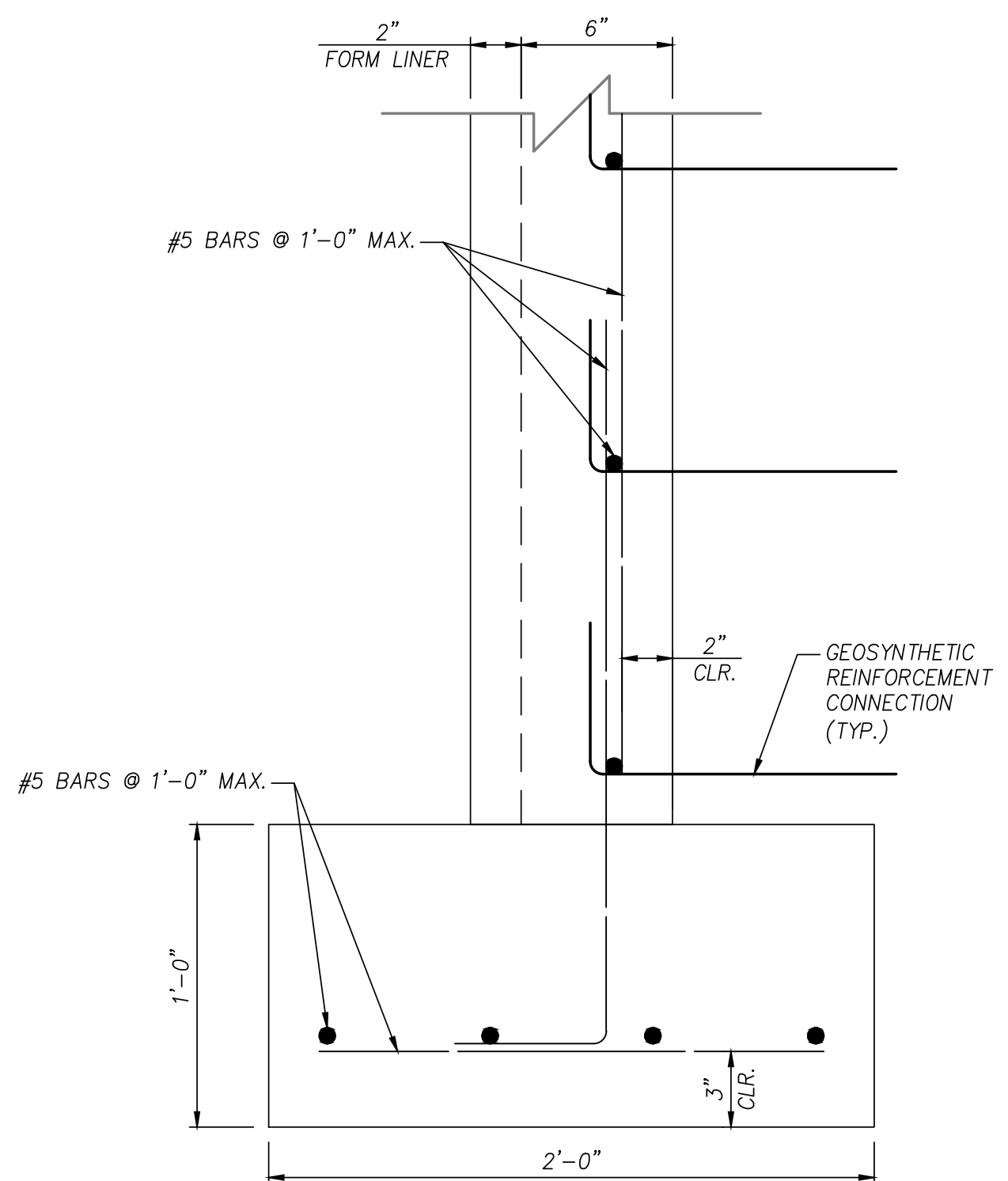
ABUTMENT SECTION
LIMITS OF PROP. 8" THICK CIP WALL



ABUTMENT SECTION
ON EXISTING STONE WALL



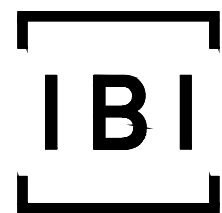
WINGWALL SECTION



CIP WALL FACING DETAIL

NOTES:

- ALL STEEL SHALL BE ASTM A709 GRADE 50.
- CONTRACTOR SHALL VERIFY SITE CONDITIONS HAVE NOT CHANGED FROM DESIGN DATE PRIOR TO INSTALLING SPECIFIED SHEETING.
- SHEETING WALL STATIONS ARE GIVEN AT BACK FACE OF SHEETING WALL.
- AT THE DISCRETION OF THE CONTRACTOR, A CONNECTION SUCH AS A BODKIN BAR MAY BE USED IN LIEU OF FULL LENGTH GRID. ALL CONNECTIONS SHALL BE MADE PER THE MANUFACTURER'S RECOMMENDATIONS.
- GEOSYNTHETIC REINFORCEMENT SHALL BE EMBEDDED IN ABUTMENT FOOTING PER MANUFACTURER'S SPECIFICATIONS.



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HAMILTON COUNTY

LMST PHASE 2

COLUMBIA TOWNSHIP, OHIO

DESIGN	DRAFT	CHECK
MJT	MJT	SRB

IBI NO.: 116492

DATE: JUNE, 2019

SCALE:

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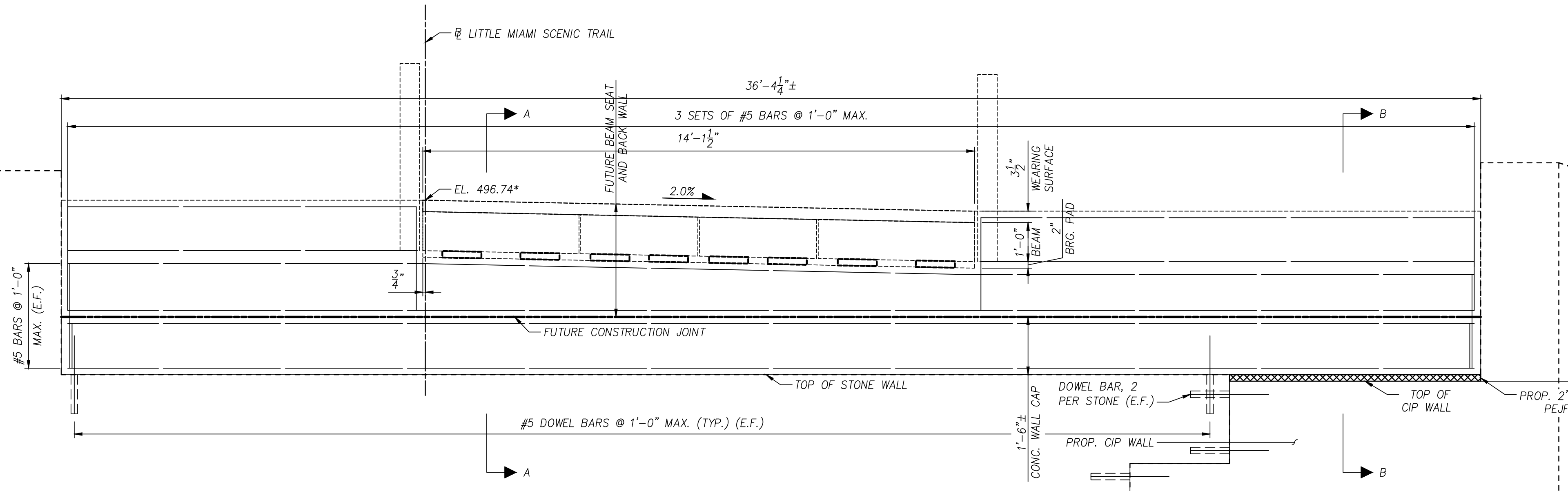
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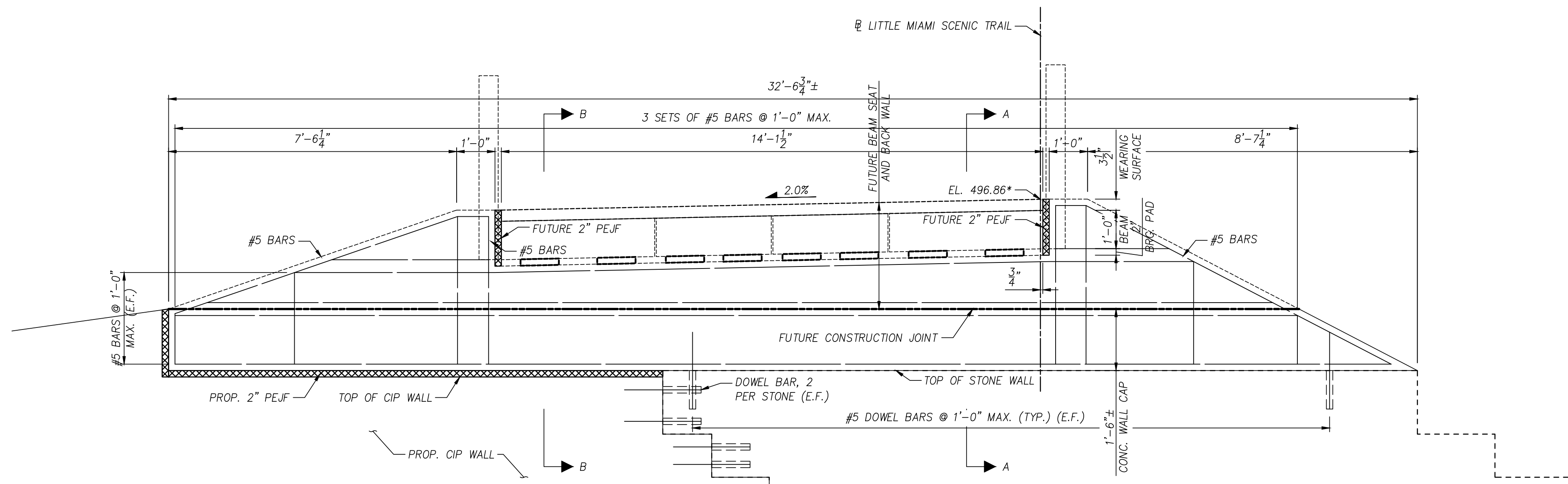
SHEETING WALL
DETAILS -
ALTERNATE 1

SHEET NO.:

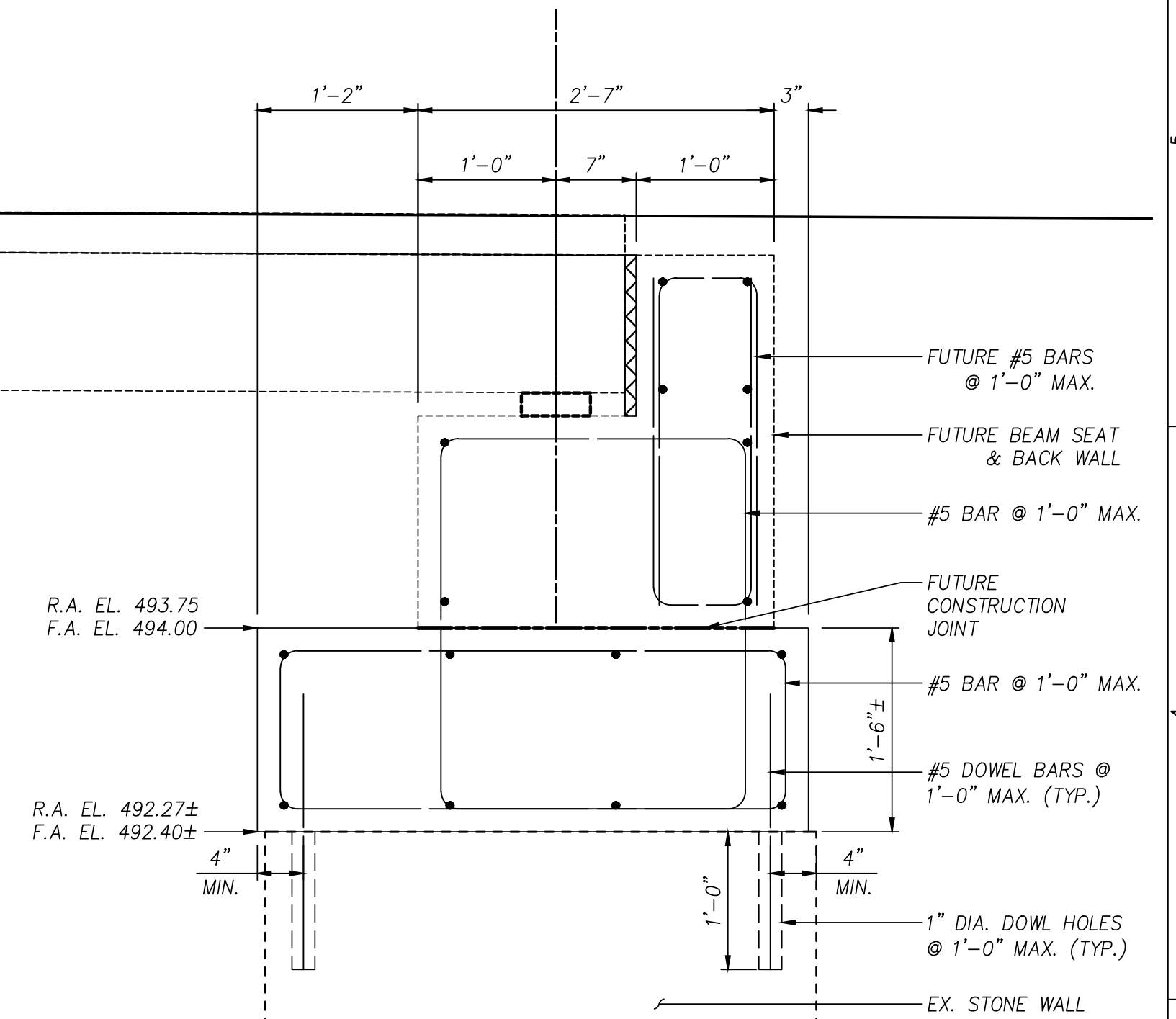
6/8



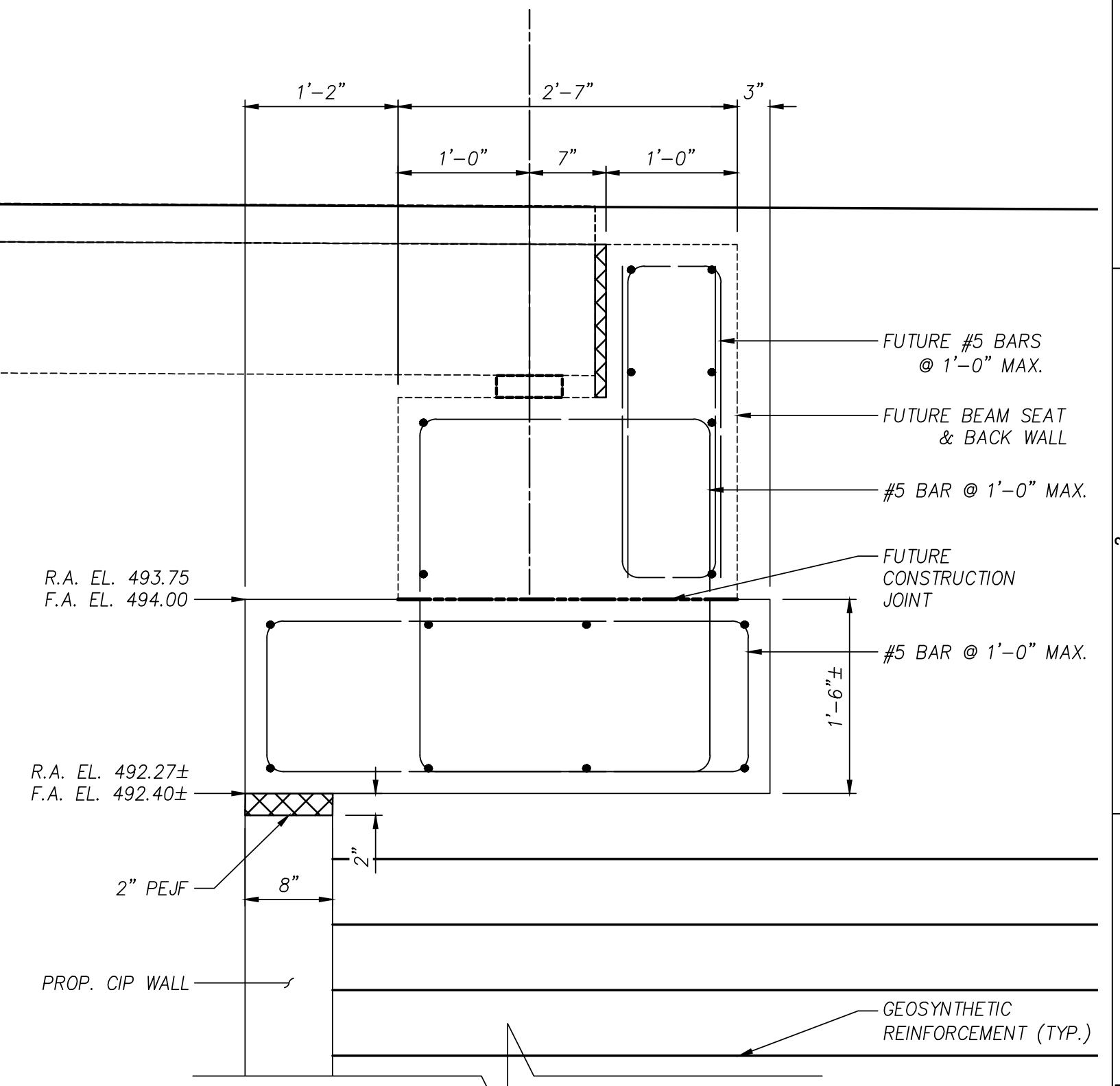
REAR ABUTMENT ELEVATION



FORWARD ABUTMENT ELEVATION



SECTION A-A
(ON EX. STONE WALL)

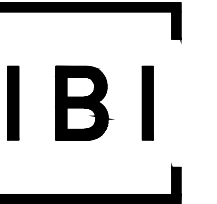


SECTION B-B
(LIMITS OF PROP. 8" THICK CIP WALL)

NOTES:

* ELEVATION GIVEN AT \odot BEARING

47
56



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HAMILTON COUNTY

LMST PHASE 2

COLUMBIA TOWNSHIP, OHIO

DESIGN	DRAFT	CHECK
MJT	MJT	SRB

IBI NO.: 116492

DATE: JUNE, 2019

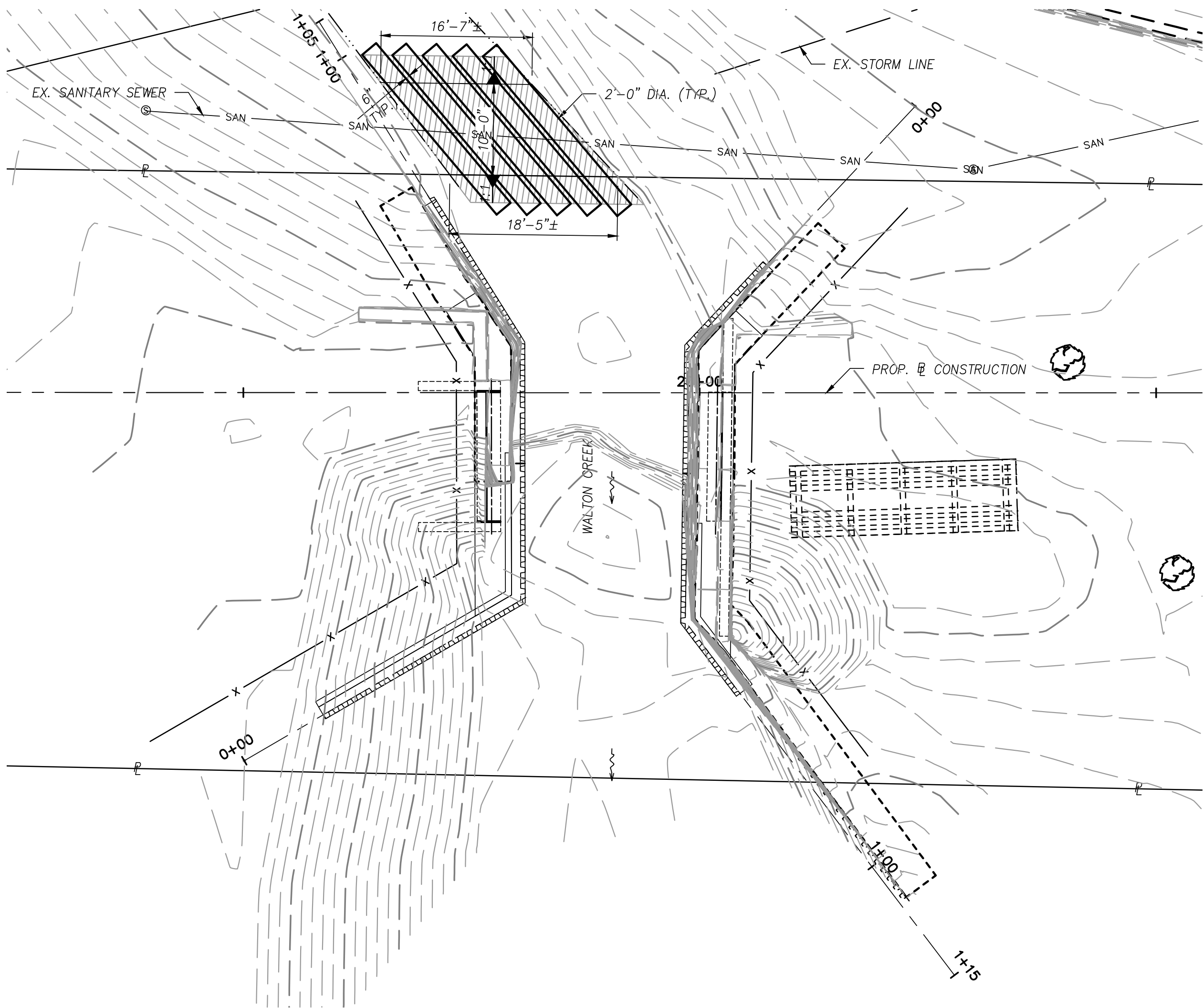
SCALE:
HORIZONTAL: 1" = 2'
VERTICAL: 1" = 2'

SHEET TITLE:

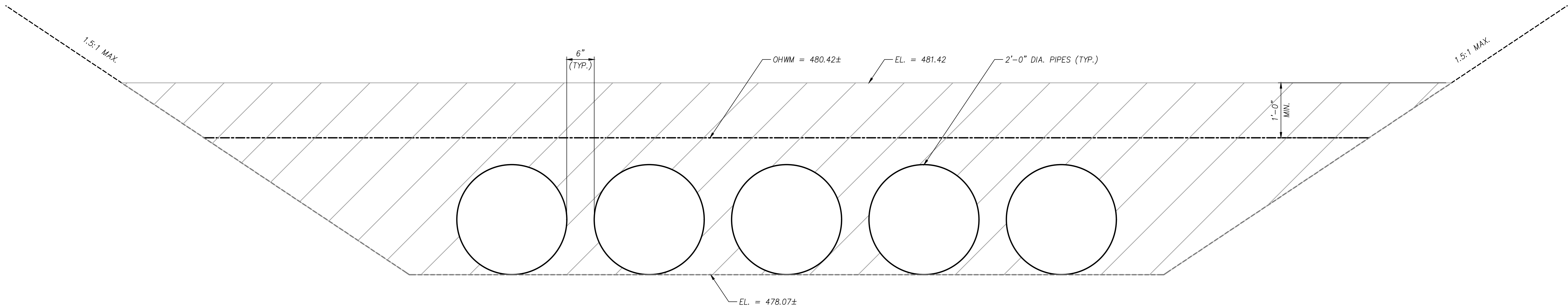
STRUCTURAL
DETAILS -
ALTERNATE 1

SHEET NO.: 7/8

J:\116492_LMST-50W\5.9 Drawings\50w\layouts\Bridg Restoration\116492_Struct\Det_ALT1.dwg Plotted By: Matt Tish Date: 10/04/2019 Time: 8:22:12 AM Plotter: AutoCAD PDF (General Documentation).pc3 Pentable M-E2006.ctb Scale: 1:2 ~ © IBI Group, Inc.



PLAN



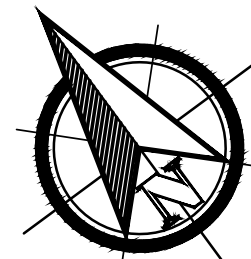
STREAM CROSSING DETAIL

NOTES:

1. FOR ILLUSTRATIVE PURPOSES ONLY.
2. STREAM CROSSING LAYOUT AND APPROACH SHALL NOT IMPEDE ADJACENT STORM OUTLET.
3. ALL DAMAGE TO THE STORM OUTLET OR SANITARY SEWER SHALL BE PAID FOR BY THE CONTRACTOR AT NO EXPENSE TO THE PROJECT.

LEGEND:

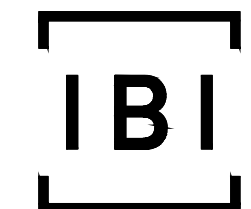
PROP. STREAM CROSSING



GRAPHIC SCALE



(IN FEET)
1 inch = 10 ft.



IBI GROUP
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REVISION:
HAMILTON COUNTY COMMENTS 2019.09.25
ISSUED FOR RE-BID 2019.10.04

SUBMISSION:

- ☐ PRELIMINARY ENGINEERING SET
- ☐ AGENCY REVIEW SET
- ☒ CONSTRUCTION DOCUMENT SET
- ☐ AS-BUILT DOCUMENT SET

STAMP:

HAMILTON COUNTY
LMST PHASE 2
COLUMBIA TOWNSHIP, OHIO

DESIGN	DRAFT	CHECK
EEW	EEW	JBK

IBI NO.: 116492

DATE: JUNE, 2019

SCALE:
HORIZONTAL: 1" = 10'

SHEET TITLE:

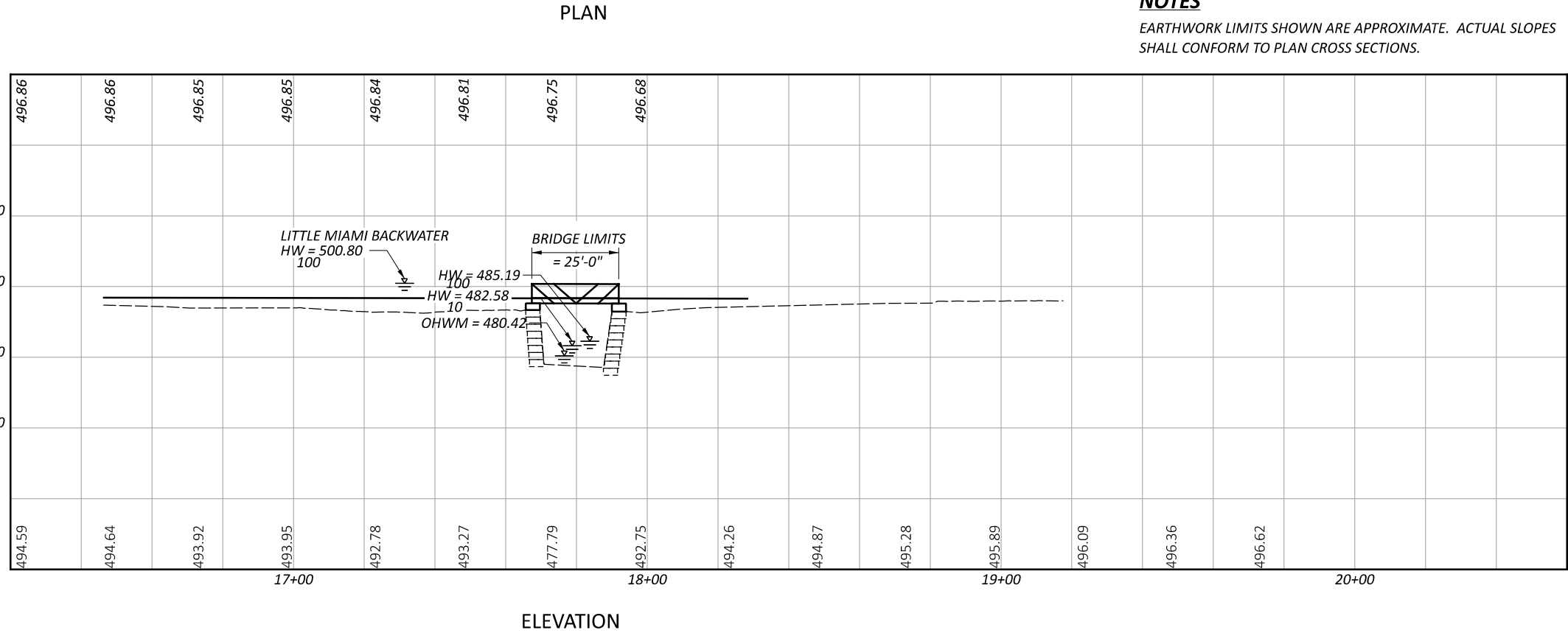
STREAM CROSSING
DETAIL -
ALTERNATE 1

SHEET NO.: 8/8

48
56

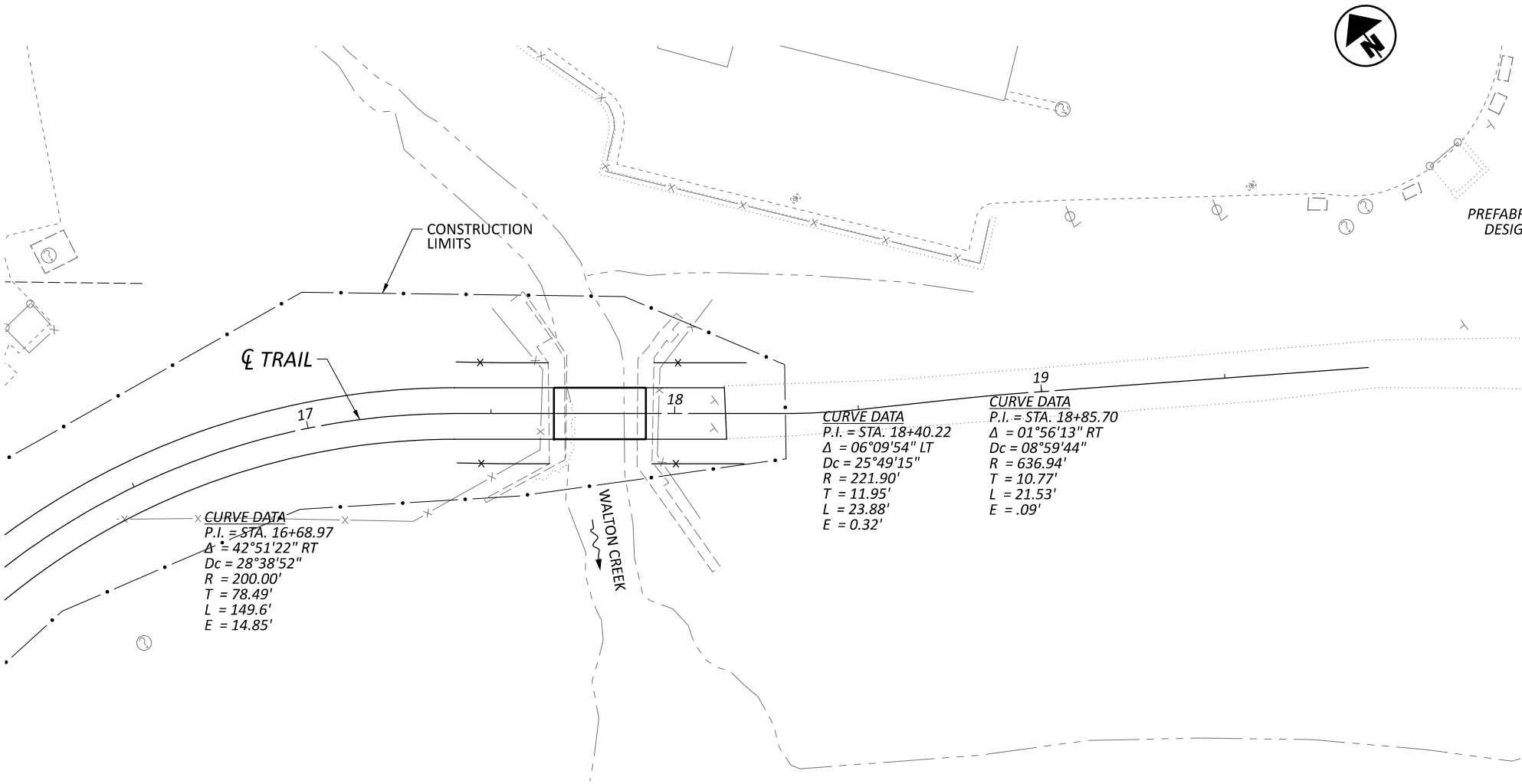
Appendix B Proposed Site Plan & Typical Section





NOTES

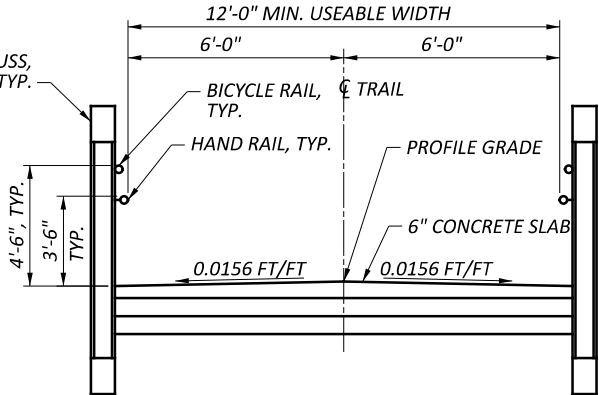
EARTHWORK LIMITS SHOWN ARE APPROXIMATE. ACTUAL SLOPES SHALL CONFORM TO PLAN CROSS SECTIONS.



BENCHMARK DATA

BM #1 STA.	,	ELEV.	,	OFFSET	,
BM #2 STA.	,	ELEV.	,	OFFSET	,
BM #3 STA.	,	ELEV.	,	OFFSET	,
BM #4 STA.	,	ELEV.	,	OFFSET	,

FOR ADDITIONAL BENCHMARK INFORMATION. SEE ROADWAY PLAN SHEET



HYDRAULIC DATA

DRAINAGE AREA = 1.33 SQ. MILES
Q (100) = 1410 CFS V (100) = 9.82 FT/S
Q (10) = 687 CFS V (10) = 7.99 FT/S
STRUCTURE CLEARS THE 10 YEAR
DESIGN HW BY 12.50 FEET.

EXISTING STRUCTURE

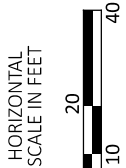
TYPE: STONE AND GEOSYNTHETIC REINFORCED SOIL ABUTMENTS

SPANS: 25'-0"
ROADWAY: NONE F/F SAFETY CURB
LOADING: UNKNOWN
SKEW: 0°
WEARING SURFACE: NONE
APPROACH SLABS: NONE
ALIGNMENT: TANGENT
CROWN: NONE
STRUCTURE FILE NUMBER: NONE
DATE BUILT: UNKNOWN
DISPOSITION: NEW SUPERSTRUCTURE TO BE PLACED ON ABUTMENTS

PROPOSED STRUCTURE

TYPE: PREFABRICATED STEEL TRUSS

SPANS: 25'-0"
ROADWAY: 12'-0" FACE/FACE RAILING
LOADING: 90 PSF OR H15
SKEW: 0°
WEARING SURFACE: 1" MONOLITHIC CONCRETE
APPROACH SLABS: NONE
ALIGNMENT: TANGENT
CROWN: .0156 FT/FT
DECK AREA: 300 SF
COORDINATES: LATITUDE N 39° 23' 49.02"
LONGITUDE W 84° 60' 72.76"



SFN

DESIGN AGENCY



10200 Alliance Road,
Suite 300
Cincinnati, OH 45242
(513) 842-8200

DESIGNER MRS
CHECKER EDA

REVIEWER
BSM 01-13-23

PROJECT ID
114496

SUBSET TOTAL
1 1

SHEET TOTAL
P.O. 0

Appendix C Photos of Existing Bridge



**Little Miami Scenic Trail Extension
Photos of Existing Bridge**



Photo 1: Existing Walton Creek Bridge (looking west)



**Little Miami Scenic Trail Extension
Photos of Existing Bridge**



Photo 2: West Abutment



Photo 3: East Abutment



**Little Miami Scenic Trail Extension
Photos of Existing Bridge**



Photo 4: Walton Creek (looking north)



Photo 5: Walton Creek (looking south)



FEASIBILITY STUDY

Little Miami Scenic Trail Extension Alternatives
Spring Hill Extension (PID 114496)
And Pocahontas Extension (PID 114497)

ATTACHMENT E

Best Management Practices (BMP) Calculations



**Little Miami Scenic Trail Extension
Alternatives**

**Spring Hill Drive Extension
HAM – LMST Spring Hill
(PID# 114496) and
Pocahontas Avenue Extension
HAM US 50 30.17 LMST
(PID# 114497)**

**Conceptual Best Management
Practices (BMP)**



Prepared for:
ODOT District 8

Prepared by:
Stantec Consulting Services Inc.

January 11, 2023

Table of Contents

- 1.0 BMP Summary**
- 2.0 PID 114496 Alternative 1 Conceptual BMP Calculations**
- 3.0 PID 114496 Alternative 2 Conceptual BMP Calculations**
- 4.0 PID 114497 Alternative 1 Conceptual BMP Calculations**
- 5.0 PID 114497 Alternative 2 Conceptual BMP Calculations**
- 6.0 Exhibit**

1.0 BMP Summary

As a part of the feasibility study for the Little Miami Scenic Trail extension to Spring Hill and Pocahontas project, Stantec performed some preliminary post construction stormwater best management practice (BMP) calculations. These calculations we performed to identify challenges associated with BMP installation and ensure construction limits for each alternative incorporated the construction of BMP's. These calculations were conducted in accordance with the Ohio department of Transportation, location and design manual, volume 2. Stantec also utilized several other ODOT BMP resources including the BMP calculation spreadsheet and the ODOT BMP tool.

It is anticipated that several different BMP treatments will be needed for the various alternatives. These include vegetated filter strips, bioretention cells, and manufactured systems.

The calculations shown on subsequent pages are preliminary in nature and may change as the project progresses.

The following information should be kept in mind as the project moves forward:

- Earth disturbed areas where stormwater flows outside of the project right-of-way should not be channelized for the sole purpose of BMP construction. These areas can be eliminated from the calculations.
- Narrow vegetated filter strips may be utilized for areas only draining shared-use path pavement.
- There may be additional untreated roadway areas, not associated with the project earth disturbed area, within the existing right of way that can count towards bmp credit if treated.
- Off-site mitigation could be used as a BMP treatment if there are nearby untreated areas, such as parking lots or trailheads, owned by Great Parks, Columbia Township, or the Village of Mariemont. This may be easier than constructing manufactured systems in some areas.

2.0 PID 114496 Alternative 1 Conceptual BMP Calculations

Post Construction Stormwater BMP Overview

The total project earth disturbed area for post construction storm water BMP is 2.01 acres. Because the earth disturbed area is larger than the 1 acre threshold, BMP will be required and a NOI will need to be submitted to Ohio EPA. 1.77 acres of earth disturbed area sheet flows out of the project area and will therefore not be collected for the sole purposes of stormwater treatment. The overall required treatment percentage for Alternative 1 is 38.42% of the remaining 0.24 acres. It will be required to treat 0.09 acres. This alternative will utilize vegetated filter strips to treat stormwater runoff on the project. Narrow vegetated filter strips will be used since all improvements are pedestrian related. A total of 0.36 acres can be treated with vegetated filters strips. This far exceeds the requirements of this project and the extra credit will be utilized for treatment of the selected PID 114496 alternative. The preliminary BMP calculations are shown on the following pages.



Ohio Department of Transportation - Office of Hydraulic Engineering

Post-Construction BMP Calculation Spreadsheet

Post Construction - PID 114496 Alternative 1

Project Data

		Units
Project EDA	2.01	acres
Sheet Flow Area	1.77	acres
Is the Project Routine Maintenance per L&D Vol. 2, Sec. 1112.2	No	
BMPs Required?	BMPs Required	NA
Ain (New Impervious Area in New Permanent R/W	0.28	acres
Does Entire Site Drain to Large River (>100 sq. miles)?	Yes	
Water Quality Treatment Required	Yes	
Water Quantity Treatment Required	No	

Treatment Percent and Treatment Requirement

Aix (Project EDA that is inside the existing right-of-way)	0.94	acres
Ain (New Impervious Area in New Permanent R/W)	0.28	acres
T% (Treatment Percent)	38.42	%
Treatment Requirement	0.09	acres

BMPs Provided

BMP Name	BMP Type	Contributing Drainage Area (acres)	Contributing Drainage Area in ODOT R/W (acres)
1	Vegetated Filter Strip	0.04	0.04
2	Vegetated Filter Strip	0.057	0.057
3	Vegetated Filter Strip	0.011	0.011
4	Vegetated Filter Strip	0.0877	0.0877
5	Vegetated Filter Strip	0.1287	0.1287
6	Vegetated Filter Strip		0.04

Treatment Provided

Total Area with ODOT R/W Treated (acres)	0.36
Treatment Requirements (acres)	0.09
Treatment Check	Good

BMP Submittal Requirements (Per L&D, Vol. 2, Sec. 1116.2)

1. Estimated Project Earth Disturbed Area	Yes	Good
2. Treatment Percent Calculation	Yes	Good
3. BMP Selected for use	Yes	Good
4. Drainage area mapping for post-construction BMPs that show the total contributing drainage area and the amount of contributing area within ODOT right-of-way	Yes	Good
5. Plan sheets showing locations of post-construction BMP	Yes	Good
6. Calculations for each BMP	Yes	Good
7. Explanation for any area that is not treated	Yes	Good



Ohio Department of Transportation - Office of Hydraulic Engineering

Post-Construction BMP Calculation Spreadsheet

Vegetated Filter Strip

Filter Strip	Route	Begin Station	End Station	Side	Pavement Width (FT)	Filter Strip Width (FT)	Filter Strip Slope (z:1)	Filter Strip Length (FT)	Drainage Area (acres)	Filter Strip Area (SF)	Item 659 Topsoil Volume (CY)	Item 670 Erosion Protection Area (SY)
1	Springhill	04+00	04+50	RT	14	14	3	50	0.04	700	8.6	77.8
2	Springhill	09+45	10+20	RT	14	14	3	75	0.057	1,050	13.0	116.7
2	Springhill	10+70	10+85	RT	14	14	3	15	0.011	210	2.6	23.3
3	Springhill	12+00	13+15	RT	14	14	3	115	0.0877	1,610	19.9	178.9
4	Springhill	15+20	16+90	RT	14	14	3	170	0.1287	2,380	29.4	264.4
5	Springhill	05+50	06+05	RT	14	14	8	55	0.04	770	9.5	85.6
								0			0.0	0.0
								0			0.0	0.0
								0			0.0	0.0
								0			0.0	0.0

Total Treatment Credit Earned from Vegetated Filter Strips **0.3644** acres

(Treatment is for quality only, not quantity)

BMP Design Considerations

	Answer	Design Check
1 Is the min. filter strip width 15-25 ft wide depending on L&D Table 1117-3?	No	CHECK DESIGN
2 Is the slope 3:1 or flatter for 34 ft or narrower pavement drainage width	Yes	Good
3 Is the slope 6:1 or flatter for 35 - 48 ft pavement drainage width	Yes	Good
4 Is the only contributing drainage to the filter strip from the road and shoulder?	Yes	Good
5 Does any concentrated flow or any outlets discharge to the filter strip?	No	CHECK DESIGN
6 Is 4" of Item 659, Topsoil, included for the filter strip?	Yes	Good
7 Is Item 670, Slope Erosion Protection, included for the filter strip?	Yes	Good

3.0 PID 114496 Alternative 2 Conceptual BMP Calculations

Post Construction Stormwater BMP Overview

The total project earth disturbed area for post construction storm water BMP is 1.48 acres. Because the earth disturbed area is larger than the 1 acre threshold, BMP will be required and a NOI will need to be submitted to Ohio EPA. The overall required treatment percentage for Alternative 2 is 34.73%. This will require 0.36 acres of treatment. Due to constraints of the project, specifically the narrow width of earth disturbed area, a manufactured system will need to be installed to treat post construction storm water. This manufactured system will be placed just west of Walton Creek near the Little Miami River. Storm water treated by the manufactured system will need to be isolated from the main trunk line along US 50 to prevent the system from being overloaded. This manufactured system will require regular maintenance and a backflow preventer would need to be installed at the outlet to prevent inundation during flood events. The preliminary BMP calculations are shown on the following pages.



Ohio Department of Transportation - Office of Hydraulic Engineering

Post-Construction BMP Calculation Spreadsheet

Post Construction - PID 114496 Alternative 2

Project Data

		Units
Project EDA	1.48	acres
Sheet Flow Area	0.45	acres
Is the Project Routine Maintenance per L&D Vol. 2, Sec. 1112.2	No	
BMPs Required?	BMPs Required	NA
Ain (New Impervious Area in New Permanent R/W	0.1444	acres
Does Entire Site Drain to Large River (>100 sq. miles)?	Yes	
Water Quality Treatment Required	Yes	
Water Quantity Treatment Required	No	

Treatment Percent and Treatment Requirement

Aix (Project EDA that is inside the existing right-of-way)	0.64	acres
Ain (New Impervious Area in New Permanent R/W)	0.1444	acres
T% (Treatment Percent)	34.73	%
Treatment Requirement	0.36	acres

BMPs Provided

BMP Name	BMP Type	Contributing Drainage Area (acres)	Contributing Drainage Area in ODOT R/W (acres)
1			0.52

Treatment Provided

Total Area with ODOT R/W Treated (acres)	0.52
Treatment Requirements (acres)	0.36
Treatment Check	Good

BMP Submittal Requirements (Per L&D, Vol. 2, Sec. 1116.2)

1. Estimated Project Earth Disturbed Area	Yes	Good
2. Treatment Percent Calculation	Yes	Good
3. BMP Selected for use	Yes	Good
4. Drainage area mapping for post-construction BMPs that show the total contributing drainage area and the amount of contributing area within ODOT right-of-way	Yes	Good
5. Plan sheets showing locations of post-construction BMP	Yes	Good
6. Calculations for each BMP	Yes	Good
7. Explanation for any area that is not treated	Yes	Good

**Manufactured Systems**

Drainage Area #	Total Tributary Area (acres)	Tributary Area within R/W (acres)	WQ _F (cfs)	Required Manufactured System Type	Manufactured System Type Provided
1	0.52	0.52	2.000	2	2

Yellow: Requires Input (See instructions tab)

Total Area Treated by Manufactured Systems (within the right-of-way)

0.52 acres

(Treatment is for quality only, not quantity)

BMP Design Considerations

1. Does the Water Quality flow rate match the system type in L&D Table 1117-1?	Yes	Good
2. Is the Water Quality flow rate greater than 6 cfs including all contributing area?	No	Good
3. Is the manufactured system located under a traffic lane?	No	Good
4. Is the storm sewer draining to the manufactured system deeper than 10 feet?	No	Good
5. Is there clear maintenance access to the manufactured system?	Yes	Good

4.0 PID 114497 Alternative 1 Conceptual BMP Calculations

Post Construction Stormwater BMP Overview

The total project earth disturbed area for post construction storm water BMP is 1.95 acres. Because the earth disturbed area is larger than the 1 acre threshold, BMP will be required and a NOI will need to be submitted to Ohio EPA. The overall required treatment percentage for Alternative 1 is 62.05%. This will require 1.21 acres of treatment. To achieve this, several BMP options will be used to collectively account for the total required treatment acres. BMP options will consist of a bioretention cell and a manufactured system and vegetated filter strips. The bioretention cell and the manufactured system will require regular maintenance. A bioretention cell will be constructed inside the switch backs of the shared use path along Warrior Way. A manufactured system will be constructed north of the shared use path along US 50. Due to project area constraints, it is suggested that additional vegetated filter strip be constructed on PID 114496 Alternative 1 to help satisfy the total required treatment area. The preliminary BMP calculations are shown on the following pages.



Ohio Department of Transportation - Office of Hydraulic Engineering

Post-Construction BMP Calculation Spreadsheet

Post Construction - PID 114497 Alternative 1

Project Data

Project EDA	1.95	acres
Is the Project Routine Maintenance per L&D Vol. 2, Sec. 1112.2	No	
BMPs Required?	BMPs Required	NA
Ain (New Impervious Area in New Permanent R/W	0.41	acres
Does Entire Site Drain to Large River (>100 sq. miles)?	Yes	
Water Quality Treatment Required	Yes	
Water Quantity Treatment Required	No	

Treatment Percent and Treatment Requirement

Aix (Project EDA that is inside the existing right-of-way)	0.37	acres
Ain (New Impervious Area in New Permanent R/W)	0.41	acres
T% (Treatment Percent)	62.05	%
Treatment Requirement	1.21	acres

BMPs Provided

BMP Name	BMP Type	Contributing Drainage Area (acres)	Contributing Drainage Area in ODOT R/W (acres)
1	Bioretention Cell		0.73
2	Vegetated Filter Strip		0.23
3	Manufactured System		0.25

Treatment Provided

Total Area with ODOT R/W Treated (acres)	1.21
Treatment Requirements (acres)	1.21
Treatment Check	Good

BMP Submittal Requirements (Per L&D, Vol. 2, Sec. 1116.2)

1. Estimated Project Earth Disturbed Area	Yes	Good
2. Treatment Percent Calculation	Yes	Good
3. BMP Selected for use	Yes	Good
4. Drainage area mapping for post-construction BMPs that show the total contributing drainage area and the amount of contributing area within ODOT right-of-way	Yes	Good
5. Plan sheets showing locations of post-construction BMP	Yes	Good
6. Calculations for each BMP	Yes	Good
7. Explanation for any area that is not treated	Yes	Good



Bioretention Cell

Drainage Area #	Total Tributary Area (acres)	Tributary Area within the R/W (acres)	Impervious Tributary Area ¹ (acres)
Bio. #1	0.73	0.73	0.21

Total Treatment Credit Earned from Bioretention (within R/W): ²

0.73

acres

(Treatment is for quality and quantity)

Drainage Area #	Minimum Bioretention Cell Surface Area (acres)	Bioretention Cell Surface Area Designed (acres)	Meets Design?
Bio. #1	0.01	0.04	Good
0	0.00		Good
0	0.00		Good
0	0.00		Good
0	0.00		Good

Yellow: Requires Input (See instructions tab)

BMP Design Considerations

BMP Design Considerations	Answer	Design Check
1. Has pretreatment been provided per L&D Vol. 2, Sec. 1117.5?	Yes	Good
2. Is the water quality flow (WQ _F) through the bioretention cell limited to 1 foot per second?	Yes	Good
3. Has an overflow been provided 12 inches above the bioretention cell surface?	Yes	Good
4. Has the overflow been sized to convey the design check storm?	Yes	Good
5. Is the bioretention cell cross section designed per L&D Vol. 2, Sec. 1117.5.3.G and Figure 1117-8?	Yes	Good
6. Is temporary erosion control mat, Item 671 provided over the bioretention cell?	Yes	Good

**Manufactured Systems**

Drainage Area #	Total Tributary Area (acres)	Tributary Area within R/W (acres)	WQ _F (cfs)	Required Manufactured System Type	Manufactured System Type Provided
1	0.25	0.25	1.000	1	1

Yellow: Requires Input (See instructions tab)

Total Area Treated by Manufactured Systems (within the right-of-way)

0.25 acres

(Treatment is for quality only, not quantity)

BMP Design Considerations

1. Does the Water Quality flow rate match the system type in L&D Table 1117-1?	Yes	Good
2. Is the Water Quality flow rate greater than 6 cfs including all contributing area?	No	Good
3. Is the manufactured system located under a traffic lane?	No	Good
4. Is the storm sewer draining to the manufactured system deeper than 10 feet?	No	Good
5. Is there clear maintenance access to the manufactured system?	Yes	Good

5.0 PID 114497 Alternative 2 Conceptual BMP Calculations

Post Construction Stormwater BMP Overview

The total project earth disturbed area for post construction storm water BMP is 1.99 acres. Because the earth disturbed area is larger than the 1 acre threshold, BMP will be required and a NOI will need to be submitted to Ohio EPA. The overall required treatment percentage for Alternative 2 is 41.09%. This will require 0.82 acres of treatment. To achieve this, several BMP options will be used to collectively account for the total required treatment acres. BMP options will consist of a bioretention cell and a manufactured system, both will require annual maintenance. A bioretention cell will be constructed inside the switch backs of the shared use path along Warrior Way. A manufactured system will be constructed north of the shared use path along US 50. Combined these two options satisfy the total required treatment area needed. The preliminary BMP calculations are shown on the following pages.



Ohio Department of Transportation - Office of Hydraulic Engineering

Post-Construction BMP Calculation Spreadsheet

Post Construction - PID 114497 Alternative 2

Project Data

Project EDA	1.99	acres
Is the Project Routine Maintenance per L&D Vol. 2, Sec. 1112.2	No	
BMPs Required?	BMPs Required	NA
Ain (New Impervious Area in New Permanent R/W	0.29	acres
Does Entire Site Drain to Large River (>100 sq. miles)?	Yes	
Water Quality Treatment Required	Yes	
Water Quantity Treatment Required	No	

Treatment Percent and Treatment Requirement

Aix (Project EDA that is inside the existing right-of-way)	0.81	acres
Ain (New Impervious Area in New Permanent R/W)	0.29	acres
T% (Treatment Percent)	41.09	%
Treatment Requirement	0.82	acres

BMPs Provided

BMP Name	BMP Type	Contributing Drainage Area (acres)	Contributing Drainage Area in ODOT R/W (acres)
1	Bioretention Cell		0.73
2	Manufactured System		0.25

Treatment Provided

Total Area with ODOT R/W Treated (acres)	0.98
Treatment Requirements (acres)	0.82
Treatment Check	Good

BMP Submittal Requirements (Per L&D, Vol. 2, Sec. 1116.2)

1. Estimated Project Earth Disturbed Area	Yes	Good
2. Treatment Percent Calculation	Yes	Good
3. BMP Selected for use	Yes	Good
4. Drainage area mapping for post-construction BMPs that show the total contributing drainage area and the amount of contributing area within ODOT right-of-way	Yes	Good
5. Plan sheets showing locations of post-construction BMP	Yes	Good
6. Calculations for each BMP	Yes	Good
7. Explanation for any area that is not treated	Yes	Good



Bioretention Cell

Drainage Area #	Total Tributary Area (acres)	Tributary Area within the R/W (acres)	Impervious Tributary Area ¹ (acres)
Bio. #1	0.73	0.73	0.21

Total Treatment Credit Earned from Bioretention (within R/W): ²

0.73 acres

(Treatment is for quality and quantity)

Drainage Area #	Minimum Bioretention Cell Surface Area (acres)	Bioretention Cell Surface Area Designed (acres)	Meets Design?
Bio. #1	0.01	0.04	Good
0	0.00		Good
0	0.00		Good
0	0.00		Good
0	0.00		Good

Yellow: Requires Input (See instructions tab)

BMP Design Considerations	Answer	Design Check
1. Has pretreatment been provided per L&D Vol. 2, Sec. 1117.5?	Yes	Good
2. Is the water quality flow (WQ _F) through the bioretention cell limited to 1 foot per second?	Yes	Good
3. Has an overflow been provided 12 inches above the bioretention cell surface?	Yes	Good
4. Has the overflow been sized to convey the design check storm?	Yes	Good
5. Is the bioretention cell cross section designed per L&D Vol. 2, Sec. 1117.5.3.G and Figure 1117-8?	Yes	Good
6. Is temporary erosion control mat, Item 671 provided over the bioretention cell?	Yes	Good



Manufactured Systems

Drainage Area #	Total Tributary Area (acres)	Tributary Area within R/W (acres)	WQ _F (cfs)	Required Manufactured System Type	Manufactured System Type Provided
1	0.25	0.25	1.000	1	1

Yellow: Requires Input (See instructions tab)

Total Area Treated by Manufactured Systems (within the right-of-way)

0.25 acres

(Treatment is for quality only, not quantity)

BMP Design Considerations

1. Does the Water Quality flow rate match the system type in L&D Table 1117-1?	Yes	Good
2. Is the Water Quality flow rate greater than 6 cfs including all contributing area?	No	Good
3. Is the manufactured system located under a traffic lane?	No	Good
4. Is the storm sewer draining to the manufactured system deeper than 10 feet?	No	Good
5. Is there clear maintenance access to the manufactured system?	Yes	Good

