

SECTION KEY

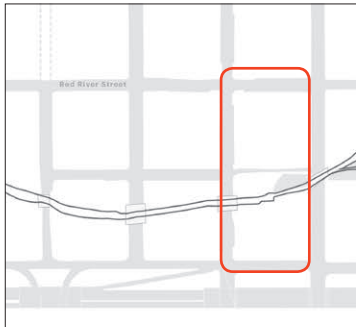
PROJECT TYPE
Do Nothing
Preservation
Restoration
Reconstruction

VEGETATION CLASS
I Problem Species Removal/Reseed
II Removal/Reseed/Replant
III Rescue and Salvage Plant/Seed
IV Significant Removal/Reseed/Replant
V Complete Replacement

GRADING
Grade Transition
Existing Grade
Slope Reinforcement

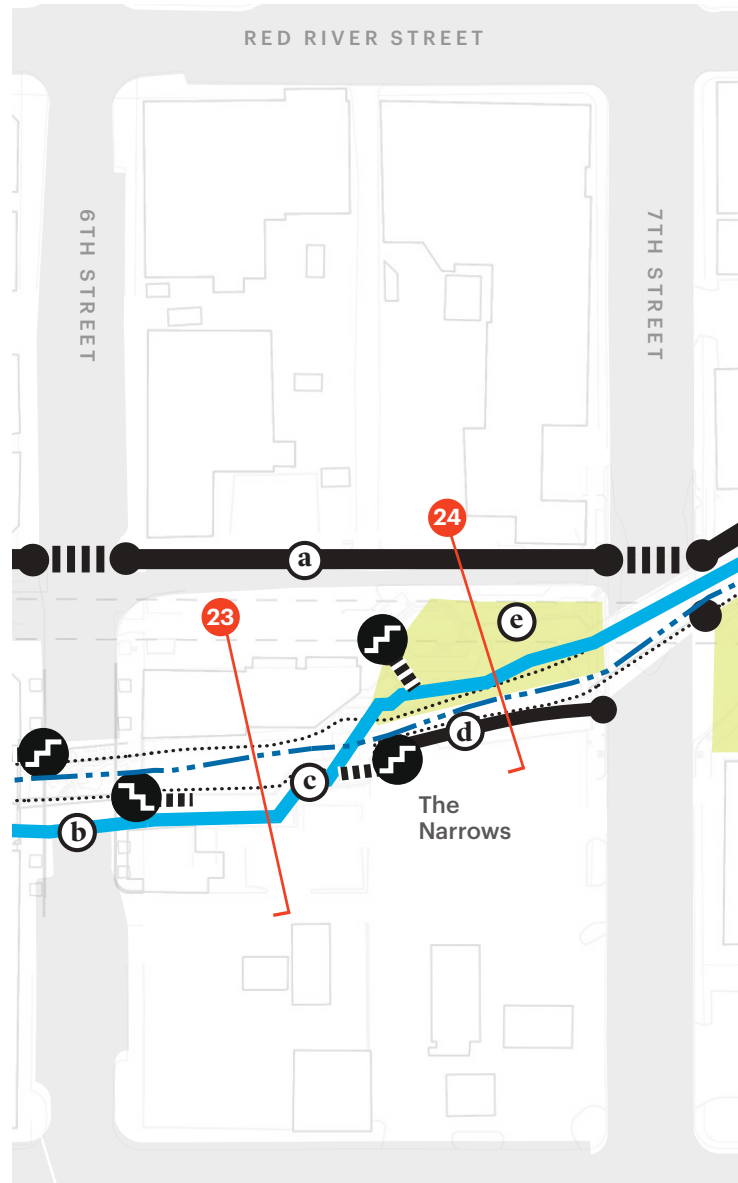
WATER SURFACE ELEVATION
100-YR WSE
2-YR WSE
5-11 CFS WSE

7TH TO 8TH STREETS



MAP KEY

- Creek Centerline
- 8' wide Creek Trail
- 10' wide Creek Trail
- 14' wide Creek Trail
- 8' wide Street Trail
- 10' wide Street Trail
- 14' wide Street Trail
- Elevated Trail
- Stair Connection to Street
- Trail Junction
- Trail Connection
- Section Line



TRAIL ALIGNMENT

- a. The Sabine Street Promenade between 6th and 7th Streets will be the primary north-south bicycle connection in The Narrows. At 7th Street, cyclists may travel one block to the bikeway at Red River Street.
- b. Existing tunnel under 6th Street Bridge is re-opened and modified for safe public passage
- c. The existing creekside trail is to remain, preserving the general character of the relationship of the creek to the city on this block. Some modifications may be made to the low-water-crossing “dominos” to improve safety and accessibility.
- d. A proposed street-level connection may require modification of an existing vertical retaining wall.
- e. Existing parkland reconfigured to support an ADA/TAS accessible trail from creekside to Sabine Street Promenade

HYDRAULICS & HYDROLOGY

- In this block the channel is constrained on all sides by concrete and bedrock.
- The existing trail crossing at the middle of this block creates a flow restriction and will continue to require regular maintenance cleanings.
- The flow restriction caused by the existing trail crossing will also continue to cause localized flooding during storm events if excessive debris is allowed to accumulate.
- The proposed metal grating along the foot bridge will need to be removable for regular maintenance cleanings.

FUNCTIONAL ASSESSMENT

- Zone 3 Assessment performed along Waller Creek from Red River to 3rd Streets on June 3, 2014.
- Overall assessed condition is FAIR. (Riparian Zone = POOR, Geomorphology = FAIR, Aquatic Habitat = FAIR)
- Improvements should increase the overall assessed condition to GOOD or EXCELLENT.
- Consider increasing the vegetation coverage within the riparian area and structural diversity of canopy and understory trees, providing a range of age classes of canopy tree species, shade along the channel, and providing floodplain connectivity to improve stream function.

RIPARIAN SLOPES

- This block is characterized by a highly constrained channel formed by the sides of existing buildings. Creative alternatives to standard riparian restoration techniques should be encouraged.
- The west bank is formed by an existing building downstream of the alley and will not be modified. Upstream of the alley, existing PARD land will be reconstructed to allow for an ADA/TAS accessible path and some laying back of slopes.
- The east bank is channelized by existing structures and will not be modified at creek level. Reconstruction of the top of bank may be required to allow for a new ADA/TAS accessible path.

AQUATIC HABITATS

- There is existing bedrock close to the 6th Street Bridge that is to remain and be protected.
- An aquatic organism passage is proposed just downstream of the existing weir at 7th Street.

HERITAGE TREES & EXISTING VEGETATION

- One heritage tree exists on this block, at street-level on the PARD land at the west bank.
- The existing character of vegetation spilling over the tops of existing walls is to be preserved.

UTILITIES

- Overhead utilities cross the creek at the mid-block alley. These have moderate to high potential for removal and relocation.
- Existing electrical vault below PARD deck will require coordination with Sabine Street Promenade project and Austin Energy if bank is to be reconfigured.

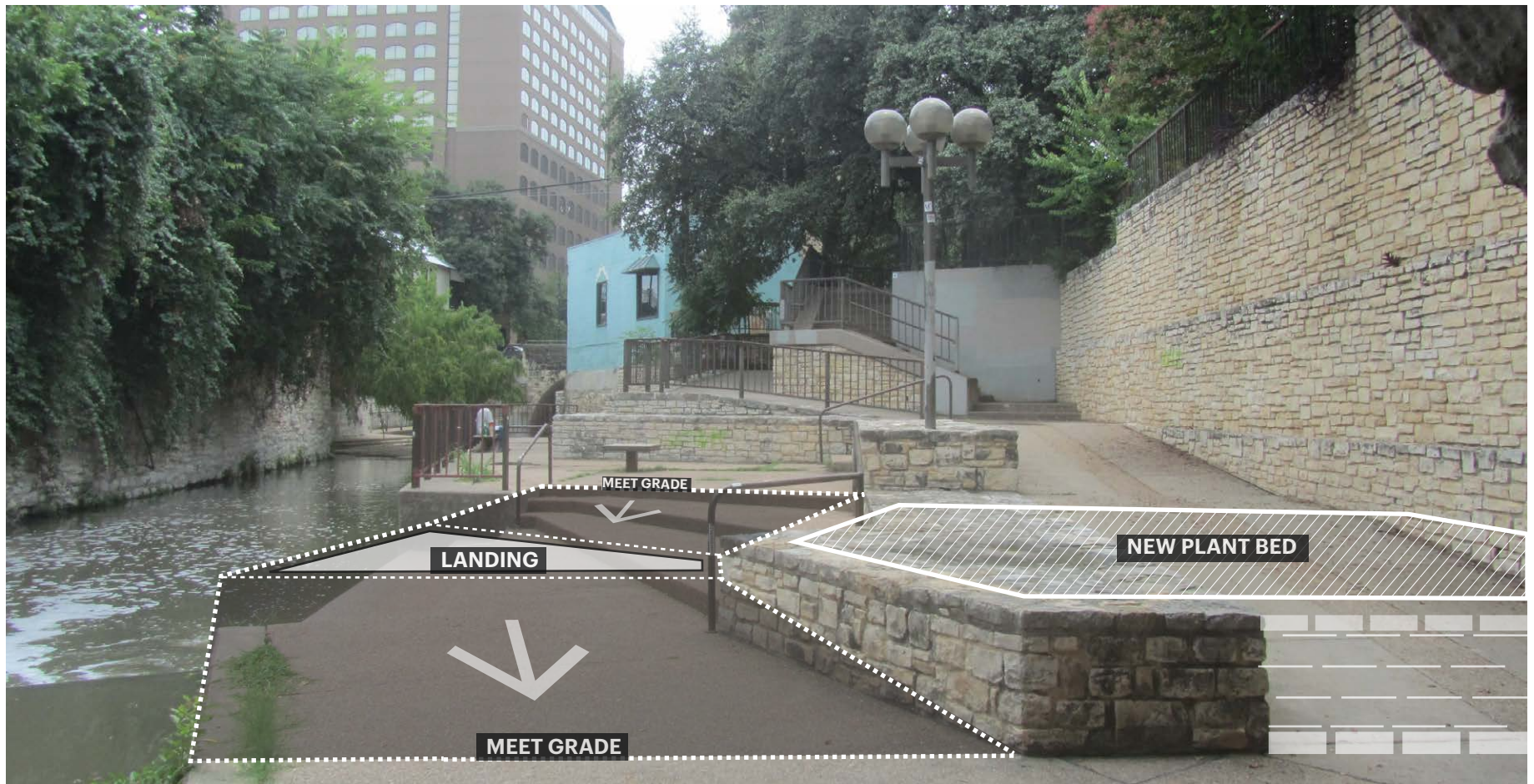
STORMWATER RETROFITS

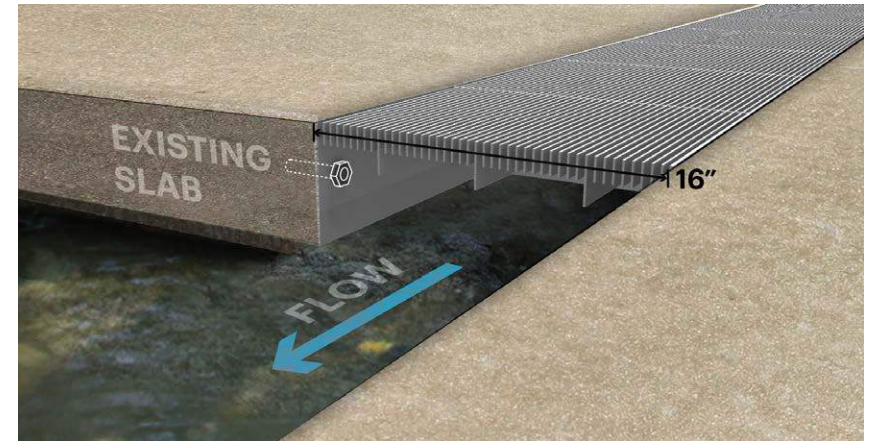
- Two outfalls are best suited for sewershed treatment. #60605 is embedded in the east bank retaining wall near 7th Street;. #60842 is embedded in the 6th Street Bridge structure.
- The origin of outfall #225202 is unconfirmed, but it likely connects to the roadway.

MAINTENANCE & OPERATIONS

- This block has creek-level trail access on both sides, which facilitates maintenance activity.
- Proximity to the heavily used 6th Street may result in additional debris.

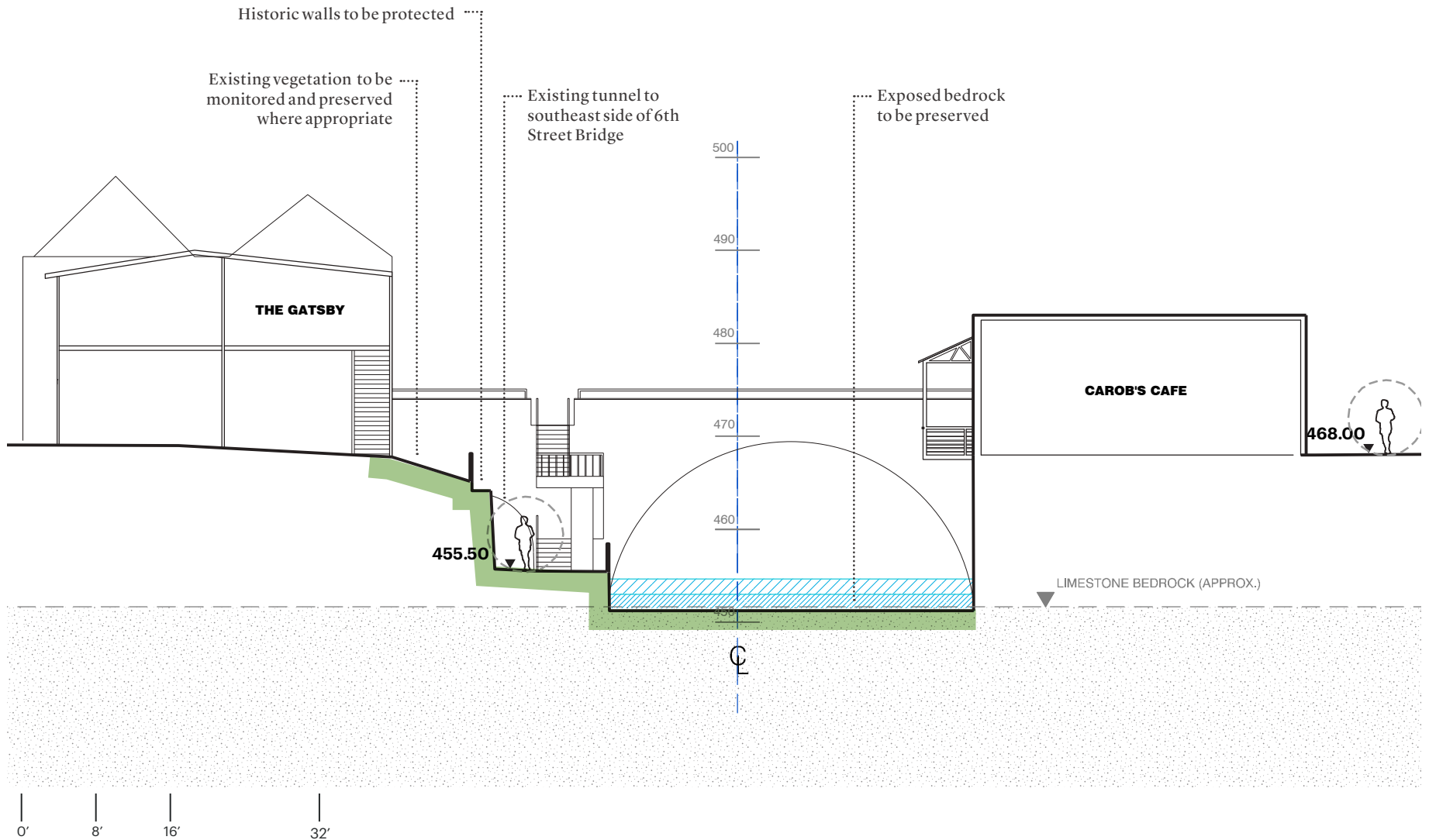
7TH TO 8TH STREETS

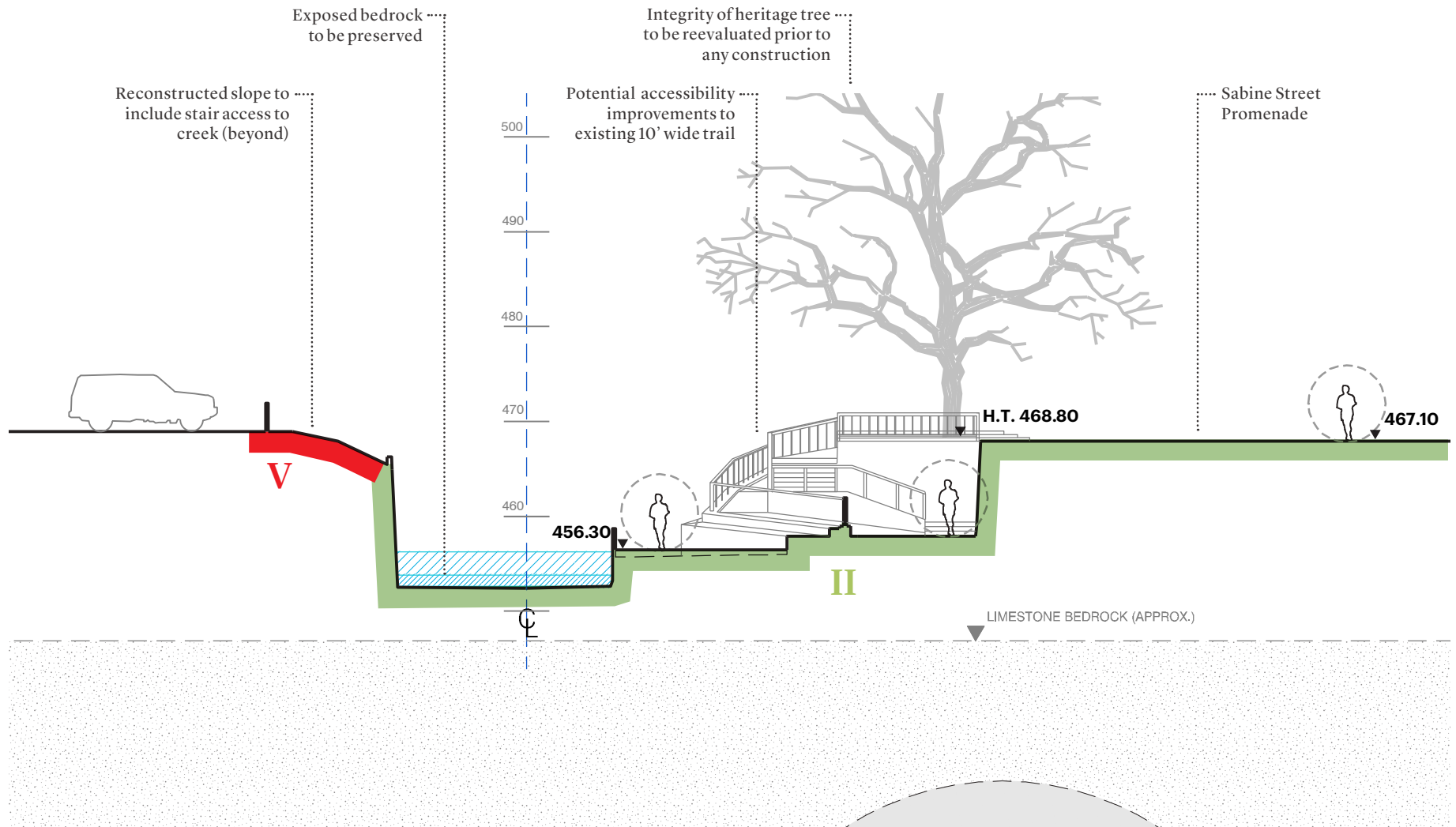




ACCESSIBILITY RETROFITS

The existing creek trail between 6th and 7th Streets is perhaps one of the most architecturally significant. It is also one of the parkland areas most associated with an image for Waller Creek. While the trail itself is non-compliant within any universal design standard, strategic retrofits and additions could remedy this while maintaining the character of the trail architecture.





SECTION KEY

PROJECT TYPE
Do Nothing
Preservation
Restoration
Reconstruction

VEGETATION CLASS
I Problem Species Removal/Re seed
II Removal/Re seed/Re plant
III Rescue and Salvage Plant/Seed
IV Significant Removal/Re seed/Re plant
V Complete Replacement

GRADING
Grade Transition
Existing Grade
Slope Reinforcement

WATER SURFACE ELEVATION
100-YR WSE
2-YR WSE
5-11 CFS WSE

Segment IV

7th to 10th Streets

Segment IV

7th to 10th Streets



SEGMENT IV: 7TH TO 10TH STREETS



THE REFUGE

In the full vision for Waller Creek, one of the parks within the chain of parks concept is only realized with the relocation of the City of Austin police headquarters — a facility that is currently looking to be relocated because of the inadequacies of its current location. This full proposal needs to be understood in the context of two phases of work: the first, which focuses on the existing creek alignment and its severely eroded slopes; and the second, which creates a braided flow condition and a creek-level island park.

The island park design takes advantage of downstream adjacency to the 8th Street Inlet (which minimizes water level changes during rain events) by accommodating creekside educational programs and playful interfaces with the water. The park is charged with a program referred to as “The Refuge,” which means it is the infrastructure for seeding or recharging the creek bed material that is transported by creek flow and supports marine habitat, and facilitates an aquatic pool for marine life when the tunnel is dewatered and the creek is essentially dry.

PHASE 1: SEVERELY ERODED SLOPES

Some of the most eroded slopes caused by overbank flow in the creek district exist within this segment. In this case, the construction of the trail at the toe of the failed slope acts as a slump block for geotechnical stability and would be built as a stone key that would anchor the reconstruction of the slope and the restoration of the riparian landscape. In this segment, there will also need to be an extensive use of boundary fences at the top of slope for separation of land uses. This construction at the boundary of creek bank should also be paired with measures to mitigate overbank stormwater flow.



SEGMENT IV: 7TH TO 10TH STREETS



Much of this segment has been heavily impacted by bank erosion and the effects of flash flooding; existing infrastructure creates discontinuities in the trail system. However, between 9th and 10th Streets, this segment also hosts intact riparian slopes and a number of healthy Heritage Trees. The phased reconstruction of slopes must be coordinated with key urban access points and anticipate the future renewal of the Austin Police Department Headquarters site.

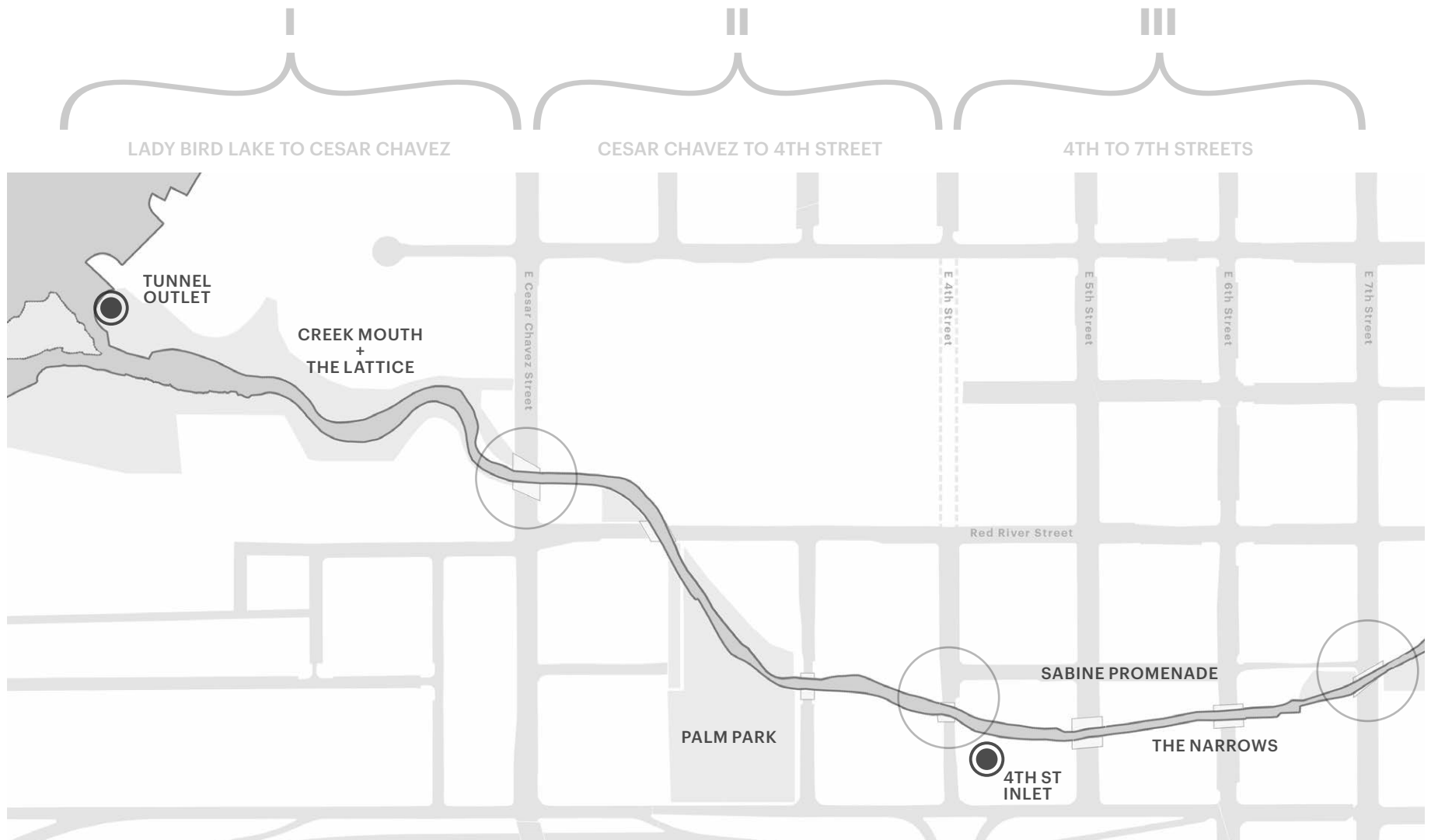
The design of Segment IV should be guided by the following objectives:

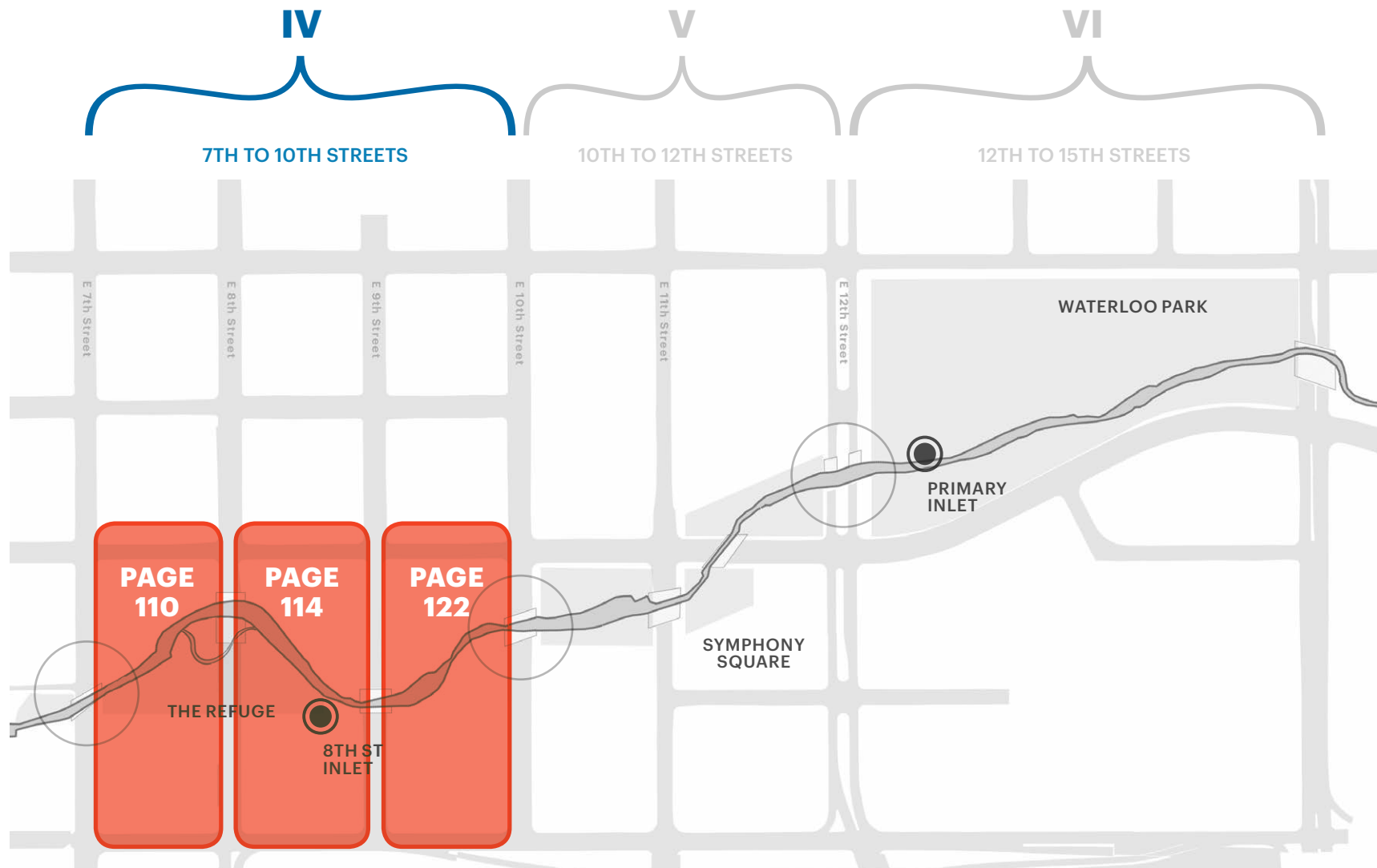
1. Establish a key connection between the northern terminus of the Sabine Promenade and the Hike and Bike Trail at 7th Street
2. Protect the program for a major park at creek level at the Austin Police Department Headquarters site. This is consistent with the Chain of Parks concept approved by Council in 2013.



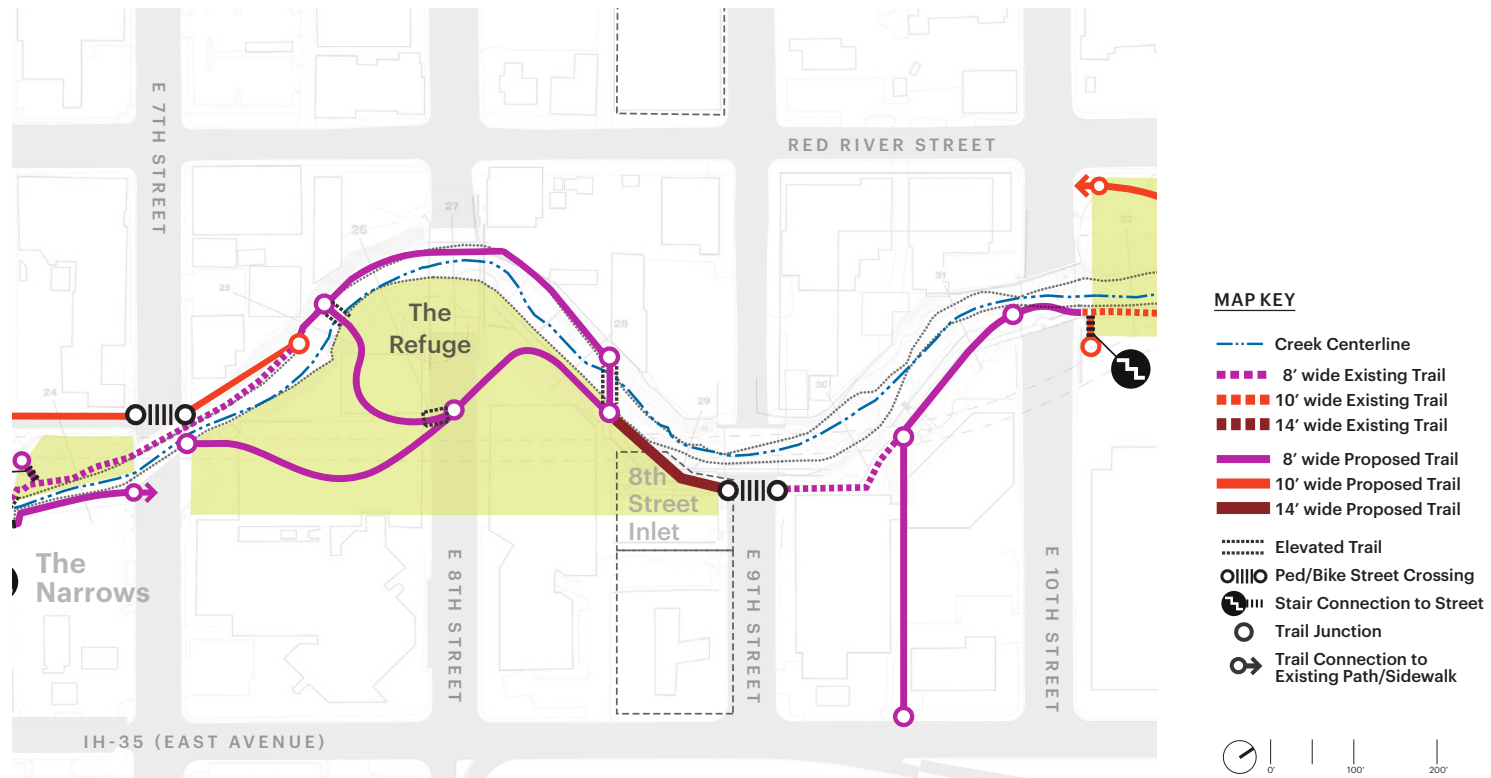
3. Maximize long views from the trail and disallow blind corners where the creek makes “dogleg” turns (particularly between 7th and 9th Streets)
4. Increase visibility between trail and street
5. Celebrate the integration of the 8th Street Inlet into the trail and open space system
6. Integrate reconstruction of failing riparian slopes with upland program (Red River Music District) and water quality improvements

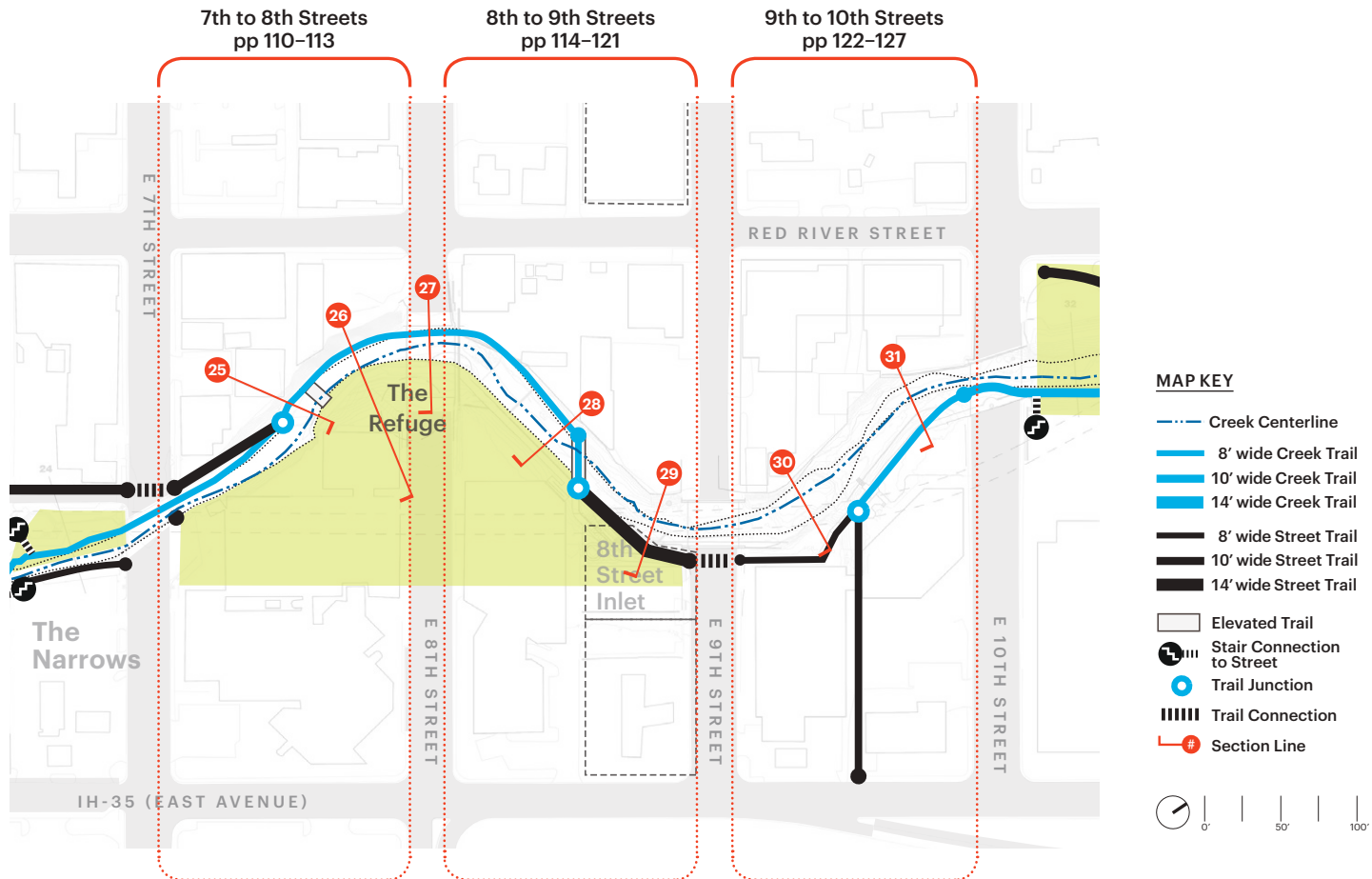
SEGMENT IV: 7TH TO 10TH STREETS



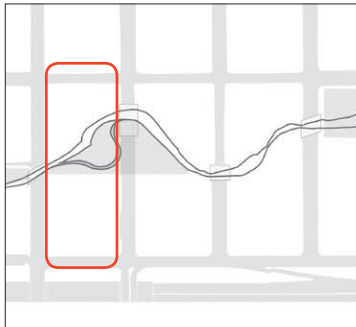


SEGMENT IV: 7TH TO 10TH STREETS



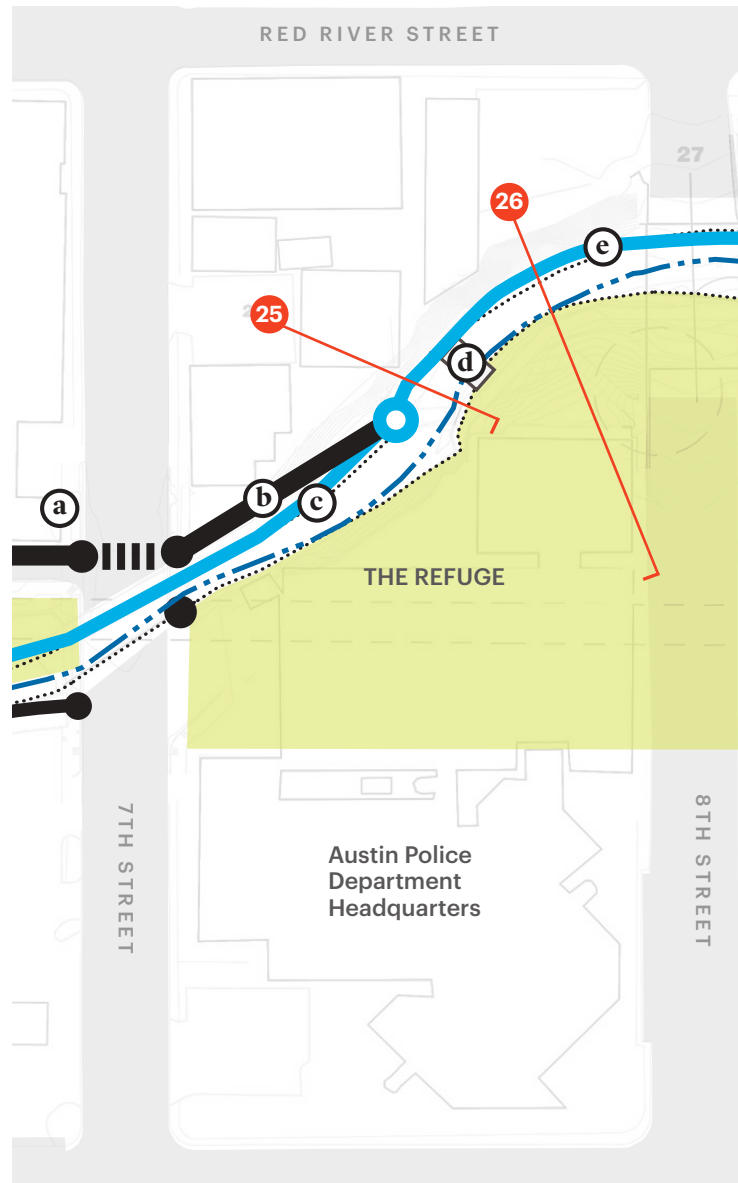


7TH TO 8TH STREETS



MAP KEY

- Creek Centerline
- 8' wide Creek Trail
- 10' wide Creek Trail
- 14' wide Creek Trail
- 8' wide Street Trail
- 10' wide Street Trail
- 14' wide Street Trail
- Elevated Trail
- Stair Connection to Street
- Trail Junction
- Trail Connection
- Section Line



TRAIL ALIGNMENT

- a. Terminus of Sabine Street Promenade. Mid-block crossing creates connection to Red River bikeway (via 7th Street)
- b. Proposed trail connects Sabine Street Promenade at street level to creek level trail system. Requires coordination with private property owner and 7th Street Bridge abutments.
- c. Existing creekside trail to remain.
- d. Low-water crossing to be relocated upstream to allow for grading at the convergence of (b) and (c).
- e. Severe erosion downstream of 8th Street. Proposed creekside trail to be integrated with bank improvements. Bank condition limits width of trail.

HYDRAULICS & HYDROLOGY

- Reconstruction of the west bank will constrict flood flows and may increase water surface elevations. Upon future redevelopment of the APD headquarters site into “The Refuge” island, this increase may be partially offset.
- In the future condition with “The Refuge” island, the west branch of the split channel (the existing creek channel) will provide the primary flow conveyance. The east branch of the split channel will be designed to provide demonstrational and educational benefits.
- A new weir is proposed downstream of the confluence of the split channels and will be associated with the island.

FUNCTIONAL ASSESSMENT

- Zone 3 Assessment performed along Waller Creek from Red River to 3rd Streets on June 3, 2014.
- Overall assessed condition is FAIR. (Riparian Zone = FAIR, Geomorphology = GOOD, Aquatic Habitat = FAIR)
- Improvements should increase the overall assessed condition to GOOD or EXCELLENT.
- Consider increasing the vegetation coverage within the riparian area, increasing the number of wetland trees, using natural materials such as native vegetation and rock to provide a stable channel form, and providing floodplain connectivity to improve stream function.

RIPARIAN SLOPES

- The west bank is severely eroded and requires reconstruction. The failure of this bank, particularly at mid-block, threatens the stability of top-of-bank structures. Runoff from unpaved mid-block alley may be contributing sediment loads to creek.
- Near 8th Street, overbank runoff from an existing parking lot may be contributing to bank failure. Slope reconstruction should integrate stormwater management facilities.
- The east bank is currently supported by limestone retaining walls and in stable condition. Until the APD headquarters are redeveloped, this slope should be preserved, with potential reseeding/replanting to augment the existing mown lawn.

AQUATIC HABITATS

- Reconstruction of the channel near 7th Street will occur when the APD headquarters are redeveloped.
- Closer to 8th Street, the channel will be restored with the construction of new trails. Coordination with restoration of severely eroded slopes is desired.
- There are several opportunities for aquatic habitat enhancement and channel protection, including boulder clusters, riffles, a pool, and bank vanes.

HERITAGE TREES & EXISTING VEGETATION

- One existing Heritage Tree on east bank, at Austin Police Department Headquarters
- One existing Heritage Tree on west bank in poor condition. Construction of new trail may require removal at (b).

UTILITIES

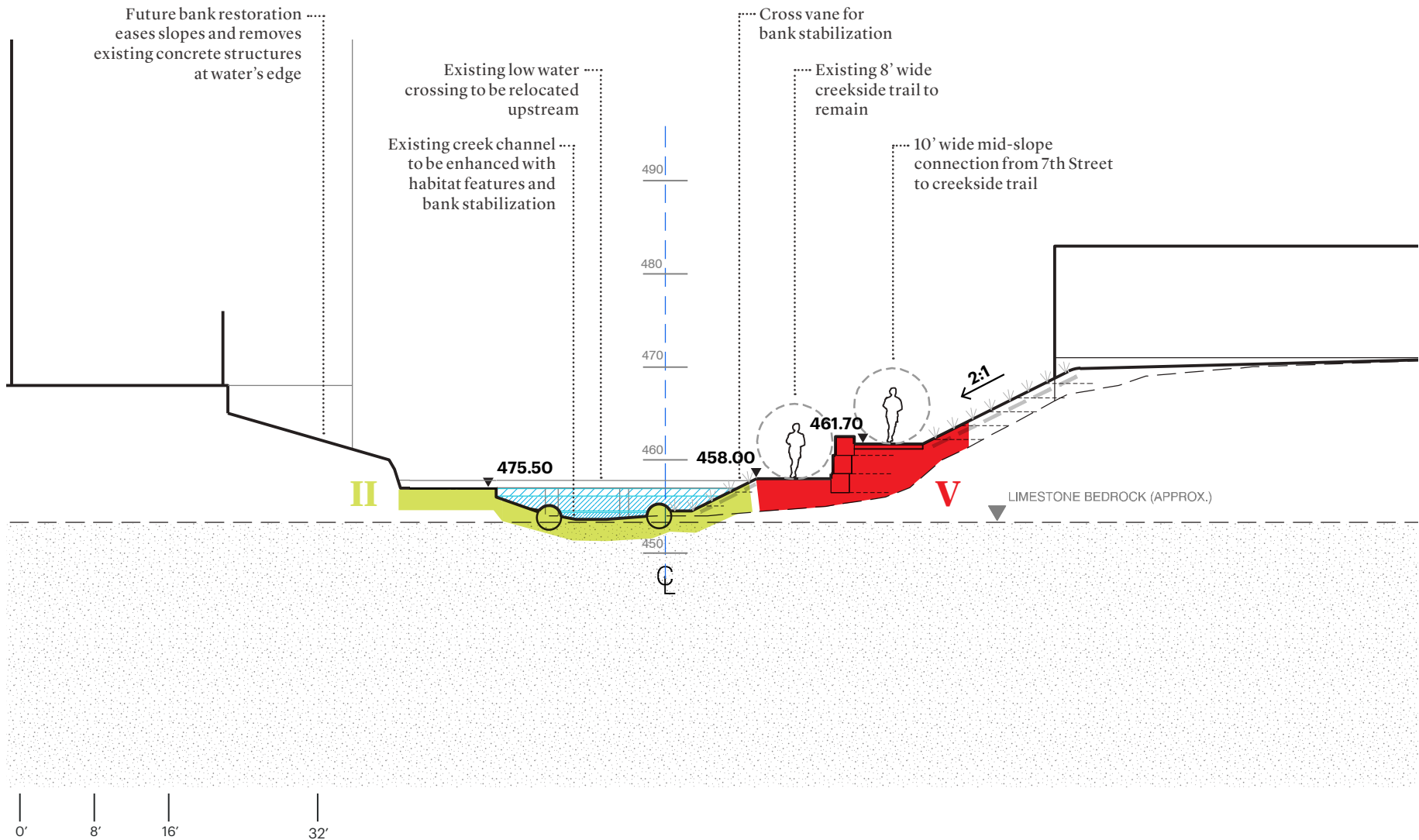
- Existing gas and wastewater line within 7th Street ROW. Coordinate with regrading on west bank to for new trail.
- Overhead utility crosses Waller Creek at the mid-block alley and terminates at the existing Austin Police Department (APD) headquarters. Wood poles have multiple connections; potential for relocation and burial contingent on redevelopment plans for east bank.

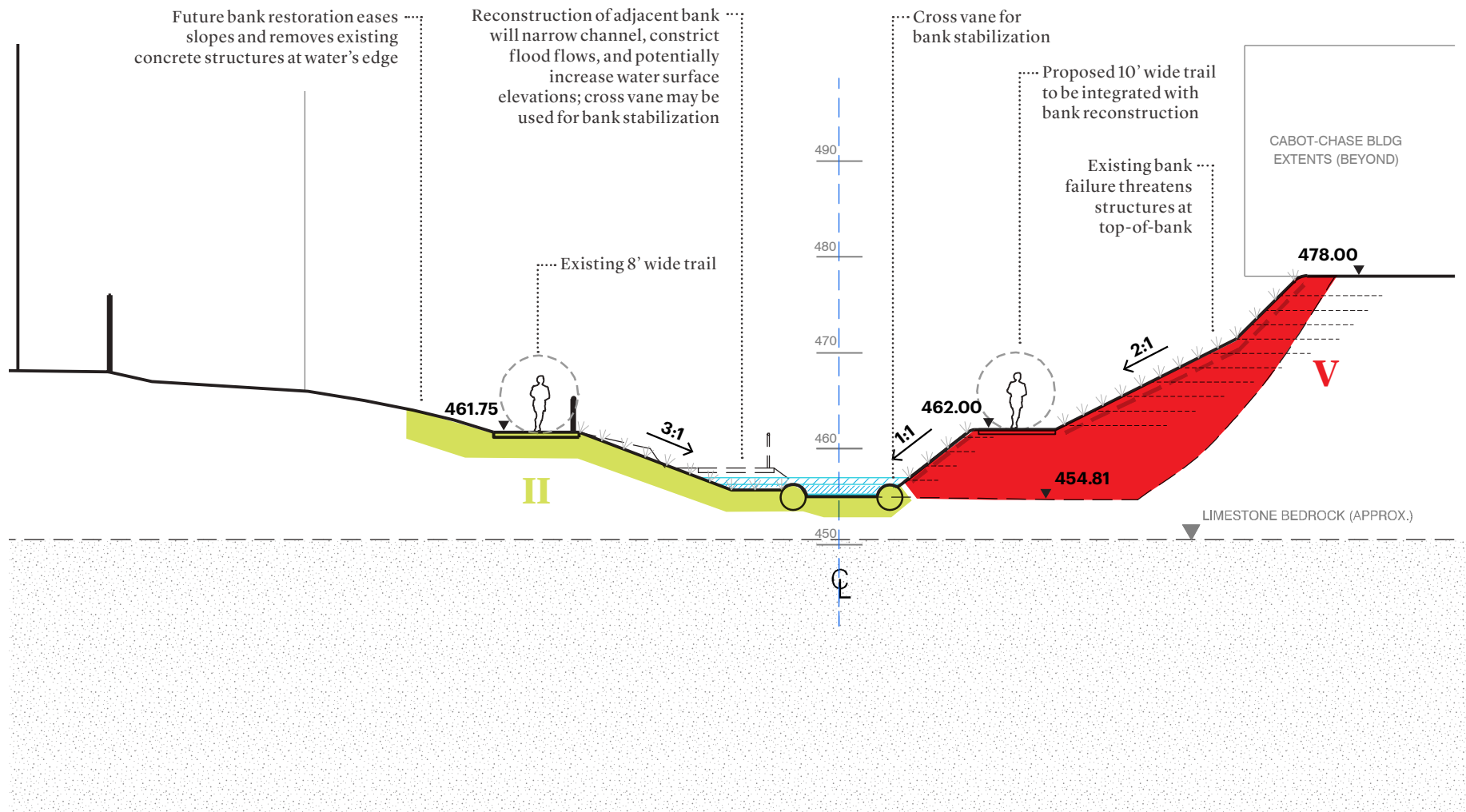
STORMWATER RETROFITS

- Two outfalls discharge into the creek (#60664 and 60663). Both enter from the east bank and appear to serve the Austin Police Department Headquarters site.
- In their current configuration, outfalls #60662 and #60663 present no trail conflicts and do not carry volumes of water sufficient to warrant retrofit treatment; no action is recommended.

MAINTENANCE & OPERATIONS

- Existing outdoor music venues and bars on the west bank will require attention to upland edges for litter and maintenance of boundary plantings/fences/screens.
- The trail network has good connectivity to creek and street level without reliance on stairs, offering ease of access for maintenance activities.





SECTION KEY

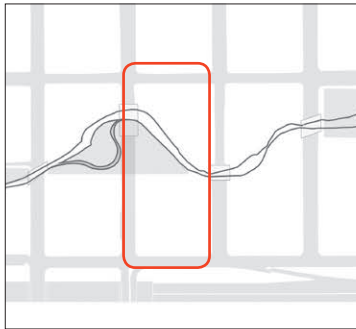
PROJECT TYPE
Do Nothing
Preservation
Restoration
Reconstruction

VEGETATION CLASS
I Problem Species Removal/Reseed
II Removal/Reseed/Replant
III Rescue and Salvage Plant/Seed
IV Significant Removal/Reseed/Replant
V Complete Replacement

GRADING
Grade Transition
Existing Grade
Slope Reinforcement

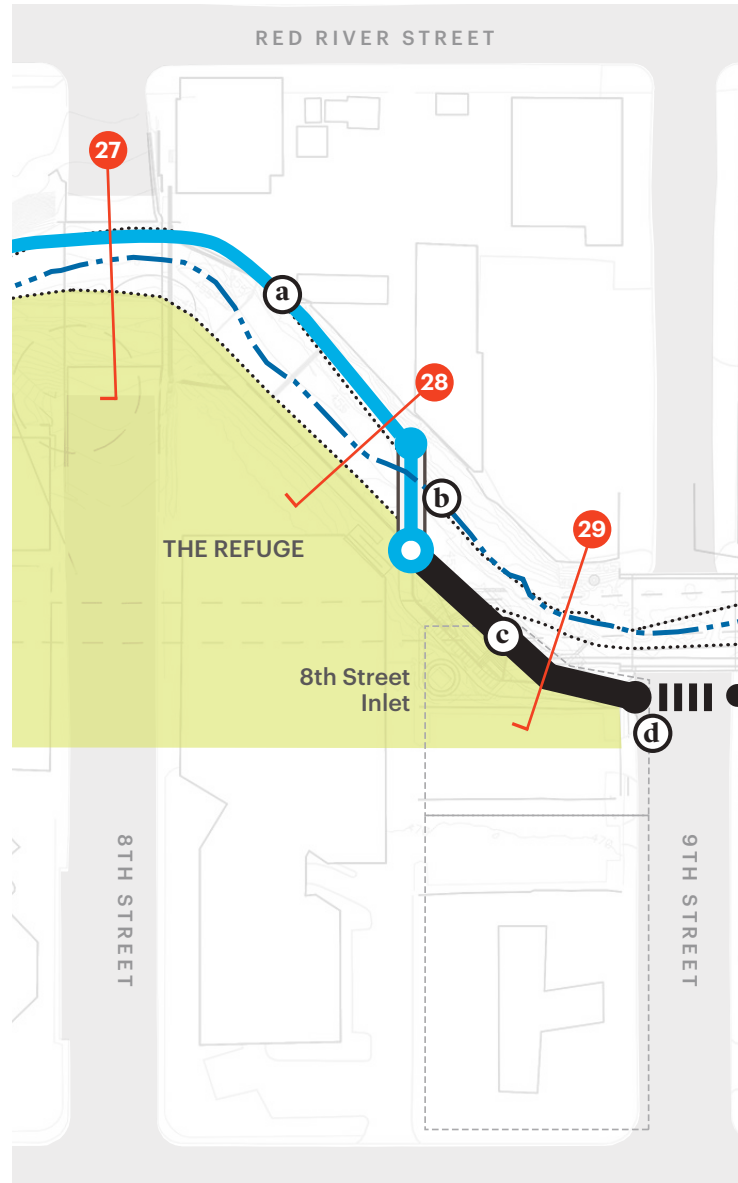
WATER SURFACE ELEVATION
100-YR WSE
2-YR WSE
5-11 CFS WSE

8TH TO 9TH STREETS



MAP KEY

- Creek Centerline
- 8' wide Creek Trail
- 10' wide Creek Trail
- 14' wide Creek Trail
- 8' wide Street Trail
- 10' wide Street Trail
- 14' wide Street Trail
- Elevated Trail
- Stair Connection to Street
- Trail Junction
- Trail Connection
- Section Line



TRAIL NETWORK

- a. Creekside trail, elevations and alignment to be coordinated with adjacent program.
- b. A proposed creek crossing just downstream of the 8th Street Inlet weir allows continuous north-south connectivity before redevelopment of Austin Police Headquarters site.
- c. Proposed trail on 8th Street Inlet site. Inlet requires regular truck access for maintenance; timing and available area for public thoroughfare must be coordinated.
- d. No vertical clearance for trail under 9th Street Bridge; mid-block crossing connects to street-level trail.

HYDRAULICS & HYDROLOGY

- Waller Creek in this section is largely a pool that is controlled by the 8th Street Inlet and weir.
- The 8th Street Inlet diverts about 40% to 65% of the peak storm discharge to the tunnel, but only diverts about 15% to 25% of the total storm runoff volume. The leading and trailing tails of the hydrograph are not significantly altered by the inlet, but the peak discharges are significantly reduced.
- The channel split for the future 8th Street island (“The Refuge”) will be located downstream of the 8th Street weir so that it does not influence the operation of the inlet itself.
- Existing weir to be rebuilt/replaced by 8th Street Inlet weir.

FUNCTIONAL ASSESSMENT

- Zone 3 Assessment performed along Waller Creek from Red River to 3rd Street on April 2, 2015.
- Overall assessed condition is FAIR. (Riparian Zone = FAIR, Geomorphology = FAIR, Aquatic Habitat = FAIR)
- Improvements should increase the overall assessed condition to GOOD or EXCELLENT.
- Consider increasing the riparian zone width, vegetation coverage within the riparian area, the number of wetland trees, using natural materials such as native vegetation and rock to provide a stable channel form, and providing floodplain connectivity to improve stream function.

RIPARIAN SLOPES

- The west bank is severely eroded. Upper slopes require restoration and coordination with adjacent private property owners, as overbank runoff may be contributing to slope failure.
- The east bank will be completely reconstructed by the 8th Street Inlet structure.

AQUATIC HABITATS

- The 8th Street Inlet includes a stemwall backwater structure that creates a permanent pool at elevation 457.00.
- A fish run integrated into the downstream side of the backwater structure is intended to provide an aquatic organism passage.
- The 8th Street weir will create a pool habitat just upstream of the weir.
- A cooling pool is proposed beneath the 8th Street Bridge.

HERITAGE TREES & EXISTING VEGETATION

- An existing American elm on the west bank is in fair to good condition. It is nearing a size that makes it eligible for classification as a Heritage Tree.
- Highly disturbed slopes due to erosion have encouraged invasive species, such as giant cane.
- Bank restoration may require significant removal of existing invasive or compromised vegetation, followed by replanting.

UTILITIES

- Overhead utility crosses mid-block from alley. Wooden pole has few connections; feasibility of relocation and burial is high.
- New aerial water line to run just downstream of the 9th Street Bridge. Water line is not attached to bridge.

STORMWATER RETROFITS

- On the west bank, there is one outfall (#373296) that discharges directly above the trail. It is a poor candidate for a water-quality retrofit; water will be conveyed below the trail, potentially in coordination with future 8th Street Bridge modifications.
- On the east bank, outfall #63740 will be diverted directly into the 8th Street Inlet.

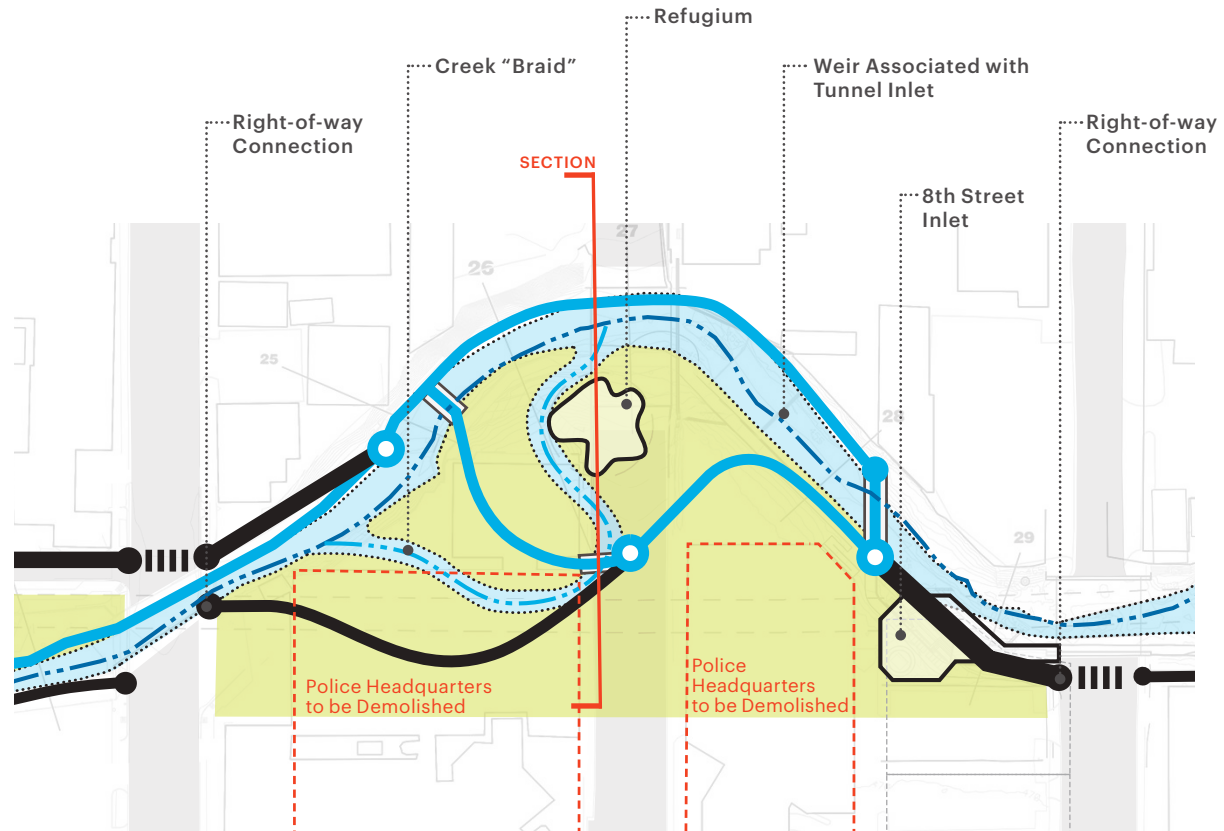
MAINTENANCE & OPERATIONS

- Maintenance for the debris removal facility for the 8th Street Inlet will require truck access from 9th Street.
- Access hatches for the 8th Street Inlet are integrated into the shared maintenance drive and trail.
- The trail network has good connectivity to creek and street level without reliance on stairs, offering ease of access for maintenance activities.

8TH TO 9TH STREETS

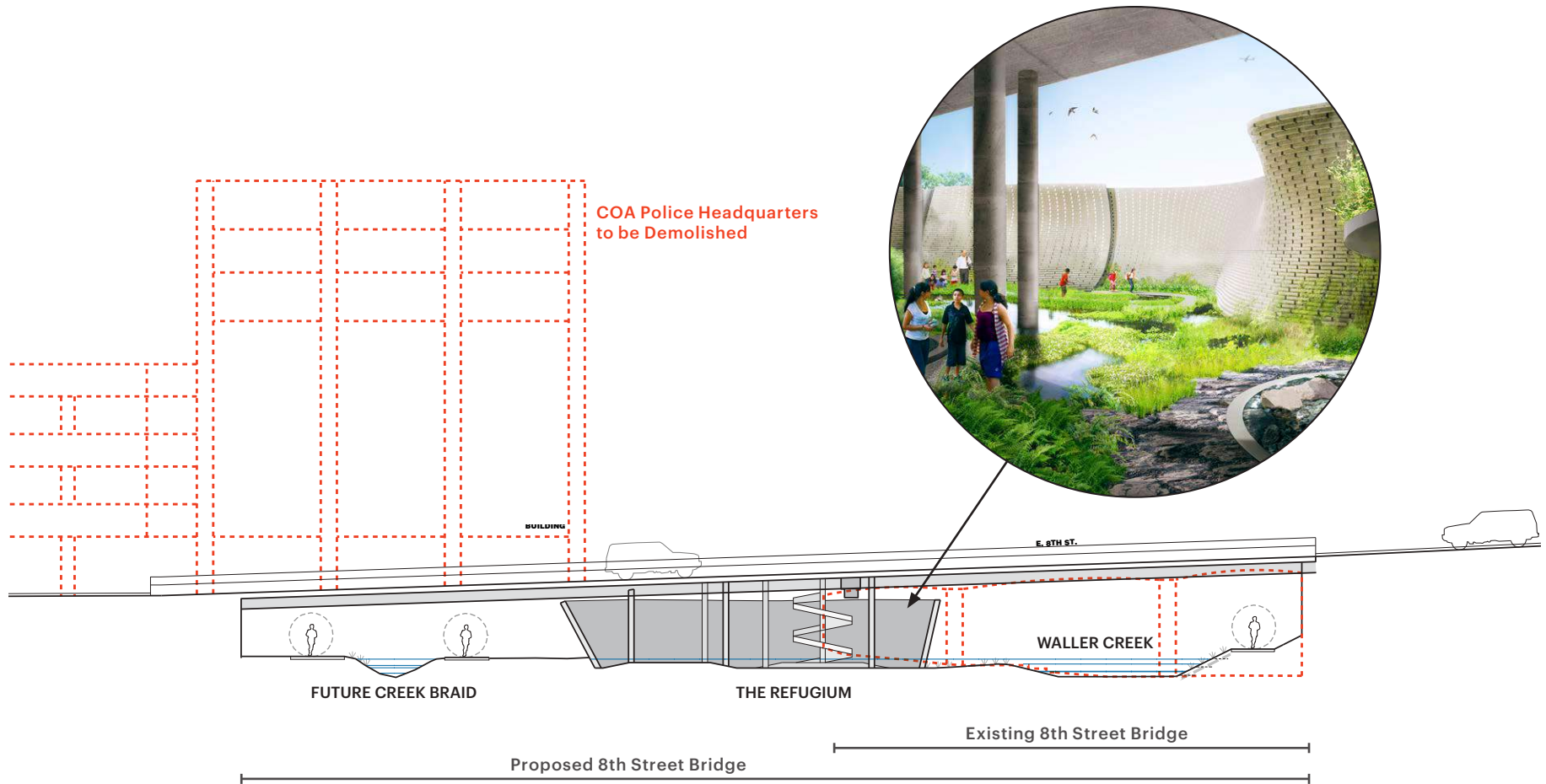
MAP KEY

- Existing Creek Centerline
- Proposed Creek Centerline
- Creek Trail
- Street Trail



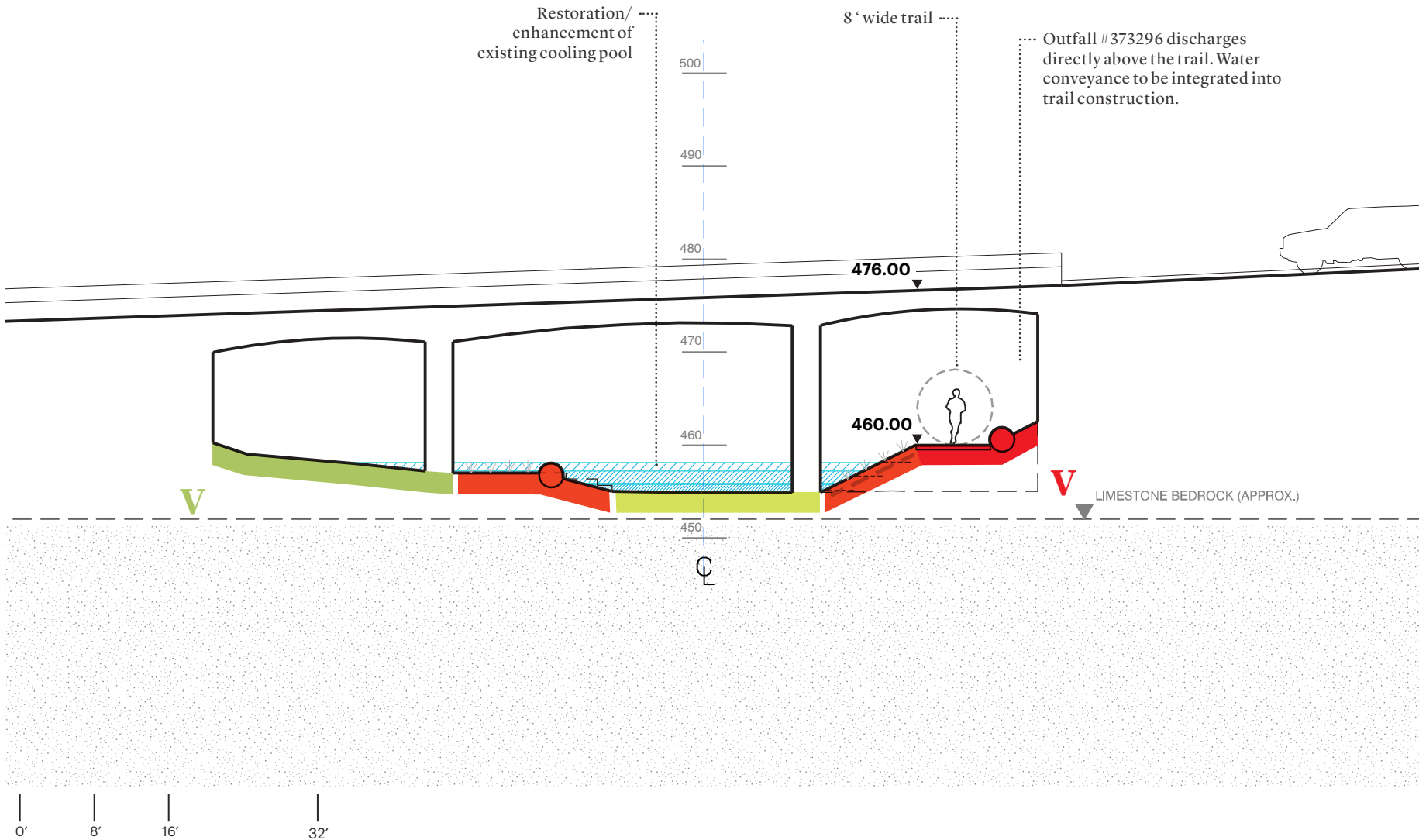
PHASE 2: THE ISLAND PARK

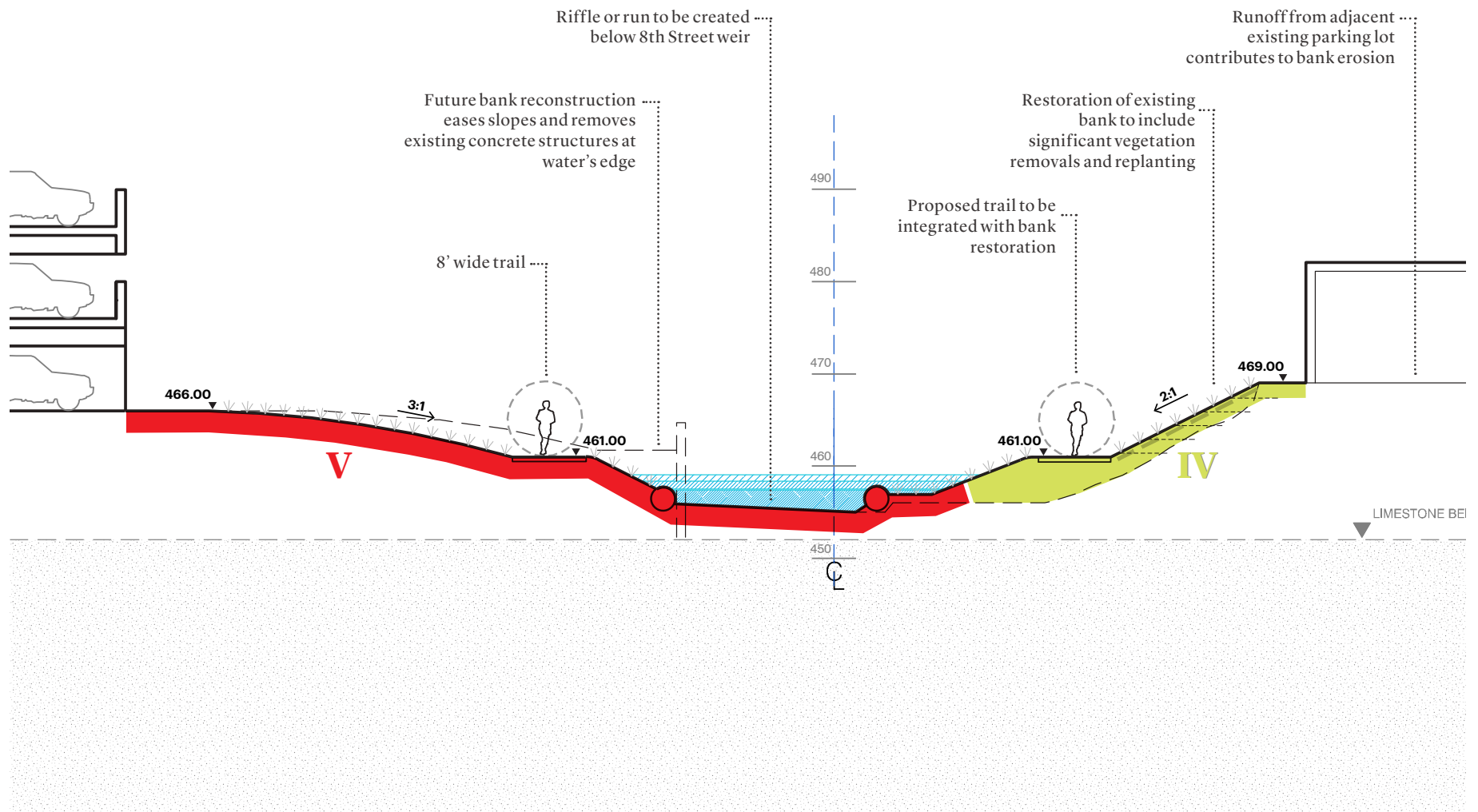
With the inevitable relocation of the City of Austin police headquarters, the demolition of the existing buildings opens up the opportunity to reconstruct the east bank into a new park site. The expanded trail network associated with this re-shaping of the channel allows for universally accessible connections between 7th Street, 9th Street, and the Island Park at creek level. The island itself would be approximately 20,000 sf, with an additional of 30,000 sf of reconstructed creek bank.



PHASE 2: 8TH STREET BRIDGE

The extended 8th Street Bridge is a model for how new urban infrastructure can sustain rather than weaken the natural environment it sits in. Local school groups will be encouraged to become “Waller Creek Stewards,” collecting seeds and even fish eggs to hatch and rear in the classroom.





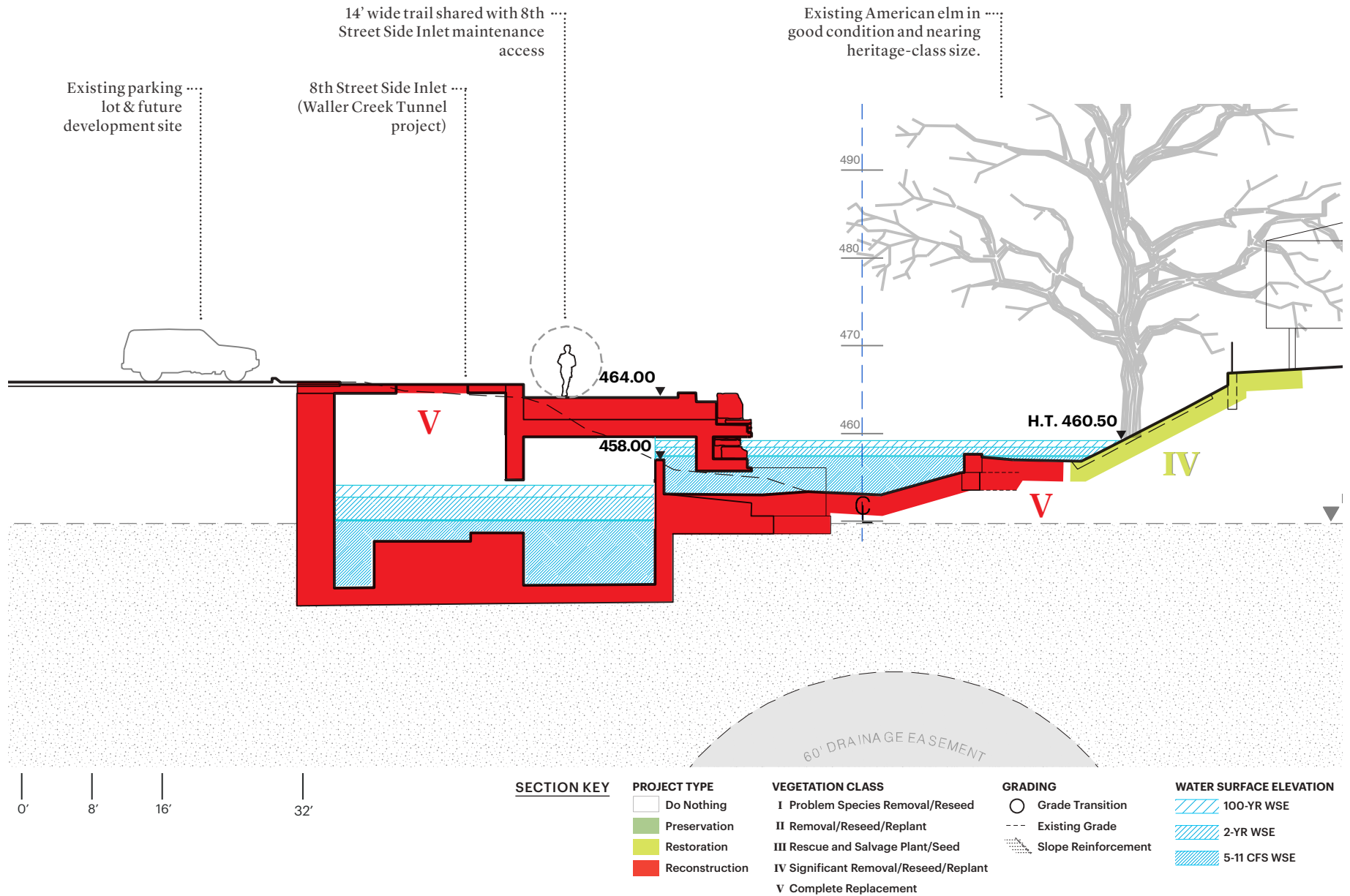
SECTION KEY

PROJECT TYPE
Do Nothing
Preservation
Restoration
Reconstruction

VEGETATION CLASS
I Problem Species Removal/Reseed
II Removal/Reseed/Replant
III Rescue and Salvage Plant/Seed
IV Significant Removal/Reseed/Replant
V Complete Replacement

GRADING
Grade Transition
Existing Grade
Slope Reinforcement

WATER SURFACE ELEVATION
100-YR WSE
2-YR WSE
5-11 CFS WSE





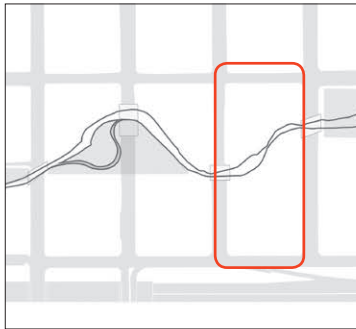
PROPOSED IMPROVEMENTS

1. Existing trail to be removed
2. Modify east bank for tree planting
3. Reconfigure stone block wall for planting and bridge abutment
4. Drilled pile footings for bridge to be coordinated with tunnel construction
5. Future overbank stormwater treatment modifications
6. Expand landscape area and reduce width of pavement
7. Reconfigure limestone blocks (add or adjust)
8. Remove limestone blocks
9. Public works/watershed to confirm feasibility to change access for inlet debris removal operations
10. Remove parking & widen sidewalks on 9th Street Bridge

PHASE 1: TRAILS AND 8TH STREET INLET

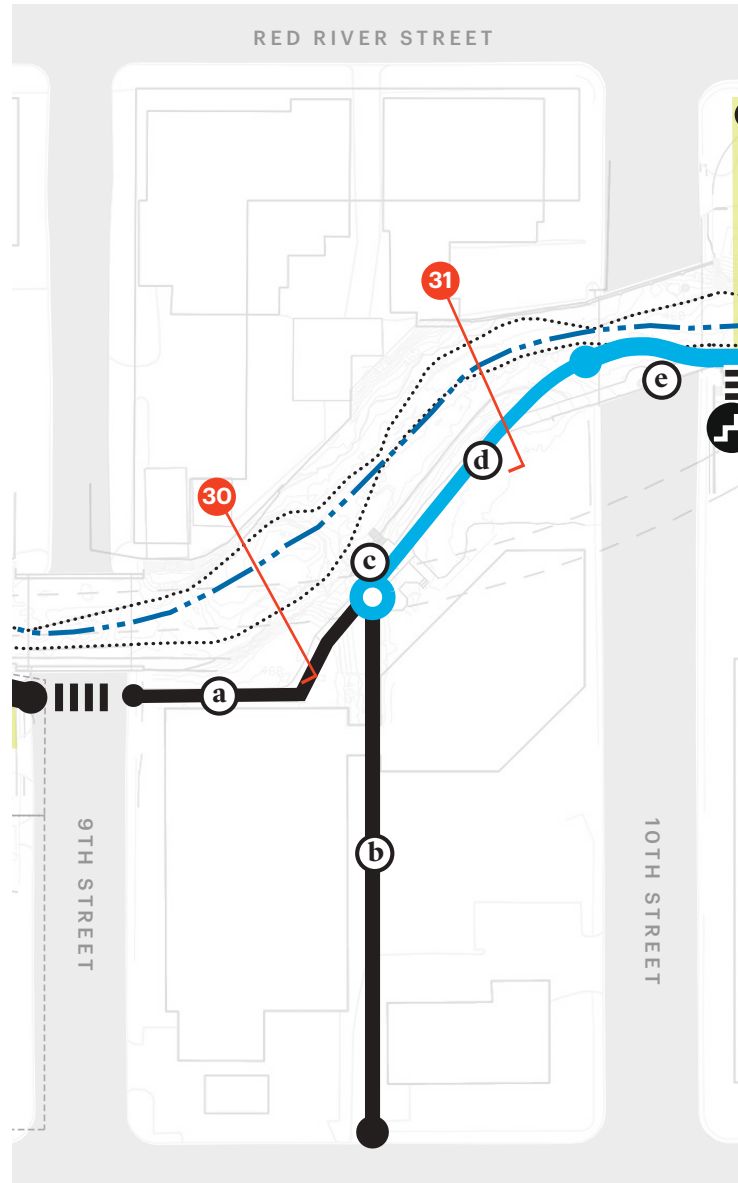
The shift of the trail from the east bank to west bank necessitates several strategic coordination points with the 8th Street Inlet construction and adjacent properties. In addition to the trail redevelopment and creek bank reconstruction, this segment aspires to create many more opportunities to plant shade trees

9TH TO 10TH STREETS



MAP KEY

- Creek Centerline
- 8' wide Creek Trail
- 10' wide Creek Trail
- 14' wide Creek Trail
- 8' wide Street Trail
- 10' wide Street Trail
- 14' wide Street Trail
- Elevated Trail
- Stair Connection to Street
- Trail Junction
- Trail Connection
- Section Line



TRAIL NETWORK

- a. No vertical clearance under 9th Street Bridge for trail; existing street-level trail to remain.
- b. Existing open stormwater channel to be regraded to build a new trail connection. Future I-35 modifications may open up additional connections to East Austin (see p. 124).
- c. Reconfigured bridge over open stormwater channel connects to new trails (see p. 124).
- d. New trail at <5% slope and rebuilt in ADA/TAS compliant materials.
- e. Low vertical clearance under 10th Street Bridge; path realignment eliminates conflict with existing raised utility manhole (see p. 125).

HYDRAULICS & HYDROLOGY

- The north end of this block consists of fast, shallow baseflow over a bedrock channel.
- The south end of this block is a deep pool. This pool will tend to accumulate sediments of large diameter (> 10 mm), which may reduce the sediment accumulation upstream of the 8th Street weir.
- Existing utility structures (e.g. raised manholes, retaining walls) under the 10th Street Bridge may be eligible for reconfiguration in the post-tunnel floodplain. Reducing the casting elevation and installing gasketed manhole covers may reduce constriction of the channel and remove potential conflicts.
- The breadth and shallowness of the channel in the northern section of this block offers informal opportunities to experience and understand one element of the creek's unique geomorphology.

FUNCTIONAL ASSESSMENT

- Zone 3 Assessment performed along Waller Creek from Red River to 3rd Street on April 2, 2015.
- Overall assessed condition is FAIR. (Riparian Zone = FAIR, Geomorphology = GOOD, Aquatic Habitat = FAIR)
- Improvements should increase the overall assessed condition to GOOD or EXCELLENT.
- Consider increasing the riparian zone width, vegetation coverage within the riparian area, the number of wetland trees, reducing soil compaction, using natural materials such as native vegetation and rock to provide a stable channel form, and providing floodplain connectivity to improve stream function.

RIPARIAN SLOPES

- The west bank consists of exposed bedrock near water level and relatively stable slopes and existing retaining structures.
- Near 10th Street on the west bank, there is evidence of overbank runoff from adjacent development that should be mitigated.
- Near 9th Street on the west bank, new and old retaining walls are affecting the existing slopes. This portion of the bank should be restored, with care taken to protect a large existing cypress tree.
- The east bank is in good condition; most of it should be preserved.
- A portion of the east bank near 10th Street requires reconstruction to allow a trail at <5%, as well as repair of failing gabions.

AQUATIC HABITATS

- The exposed bedrock channel should be preserved and protected.
- The existing deep pool at the south end of this block should be preserved and protected.

HERITAGE TREES & EXISTING VEGETATION

- Four existing Heritage Trees on this block. Two are in good condition, two are in fair condition.
- Generally, the existing vegetation on this block is in good condition, requiring only selective removal of problem species in preservation/restoration areas.

UTILITIES

- Two raised manholes are on either side of the channel beneath the 10th Street Bridge. If possible, these structures are to be re-located or modified to improve trail continuity and potentially hydraulics.
- Flows from the existing stormwater channel that is mid-block on the east bank will be re-directed into the 8th Street Inlet.

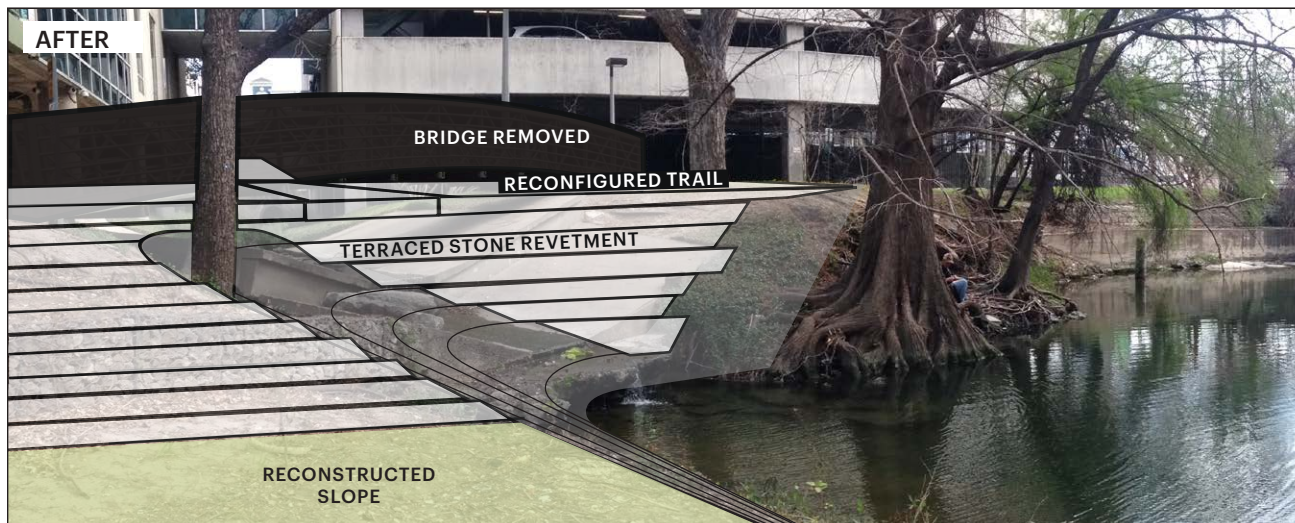
STORMWATER RETROFITS

- Stormwater outfalls on this block have been redirected into the 8th Street Side Inlet.
- On the west abutment of the 10th Street Bridge, one active outfall, #627753, is best suited to sewershed treatment.

MAINTENANCE & OPERATIONS

- Existing private residential development on the west bank will require attention to upland edges for maintenance of boundary plantings/fences/screens.
- The trail network has good connectivity to creek and street level without reliance on stairs, offering ease of access for maintenance activities.
- Creek banks are low and gently sloped on this block, facilitating access for maintenance.

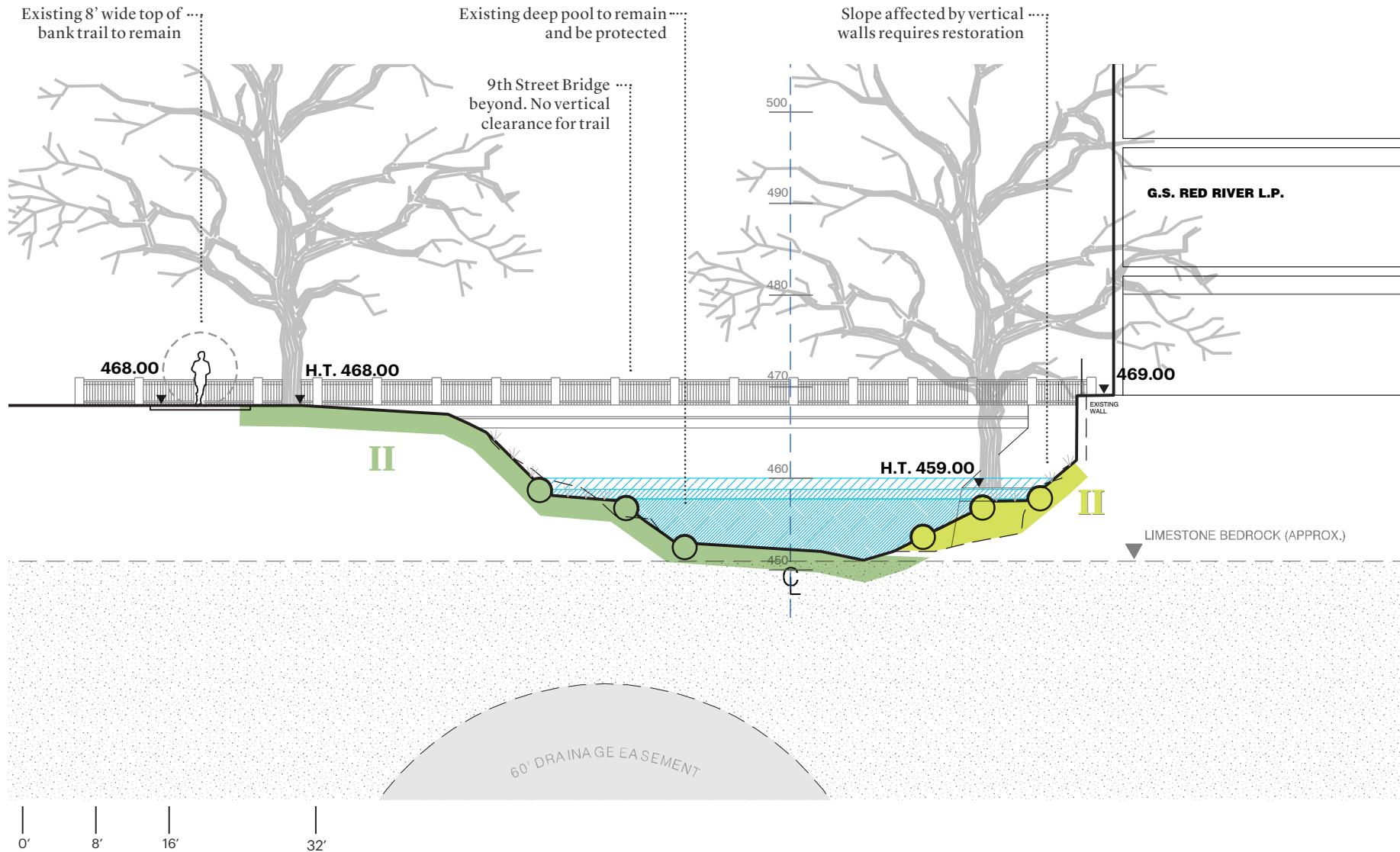
9TH TO 10TH STREETS

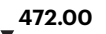
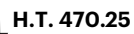
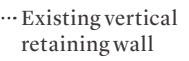
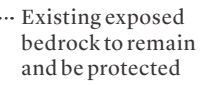
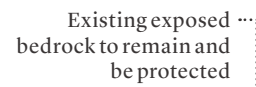
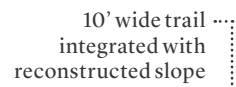




RESOLVING STORMWATER AND TRAIL CONFLICTS





This segment of the creek contains several of the most beautiful moments on the creek. However, they are often paired with the worst conflicts with end of pipe flows and places where pedestrians walk. Strategic adjustments mitigate this conflict but are also shaped to provide numerous other benefits in additional stormwater quality improvements, improved sightlines around bridge structures, new connections to street level, improved head clearance, and habitat creation.





SECTION KEY

PROJECT TYPE

-  Do Nothing
-  Preservation
-  Restoration
-  Reconstruction

VEGETATION CLASS

I Problem Species Removal/Reseed




II Removal/Reseed/Replant

III Rescue and Salvage Plant/Seed


IV Significant Removal/Reseed/Replant


V Complete Replacement


GRADING

-  Grade Transition
-  Existing Grade
-  Slope Reinforcement

WATER SURFACE ELEVATION

 100-YR WSE

 2-YR WSE

 5-11 CFS WSE

Segment V

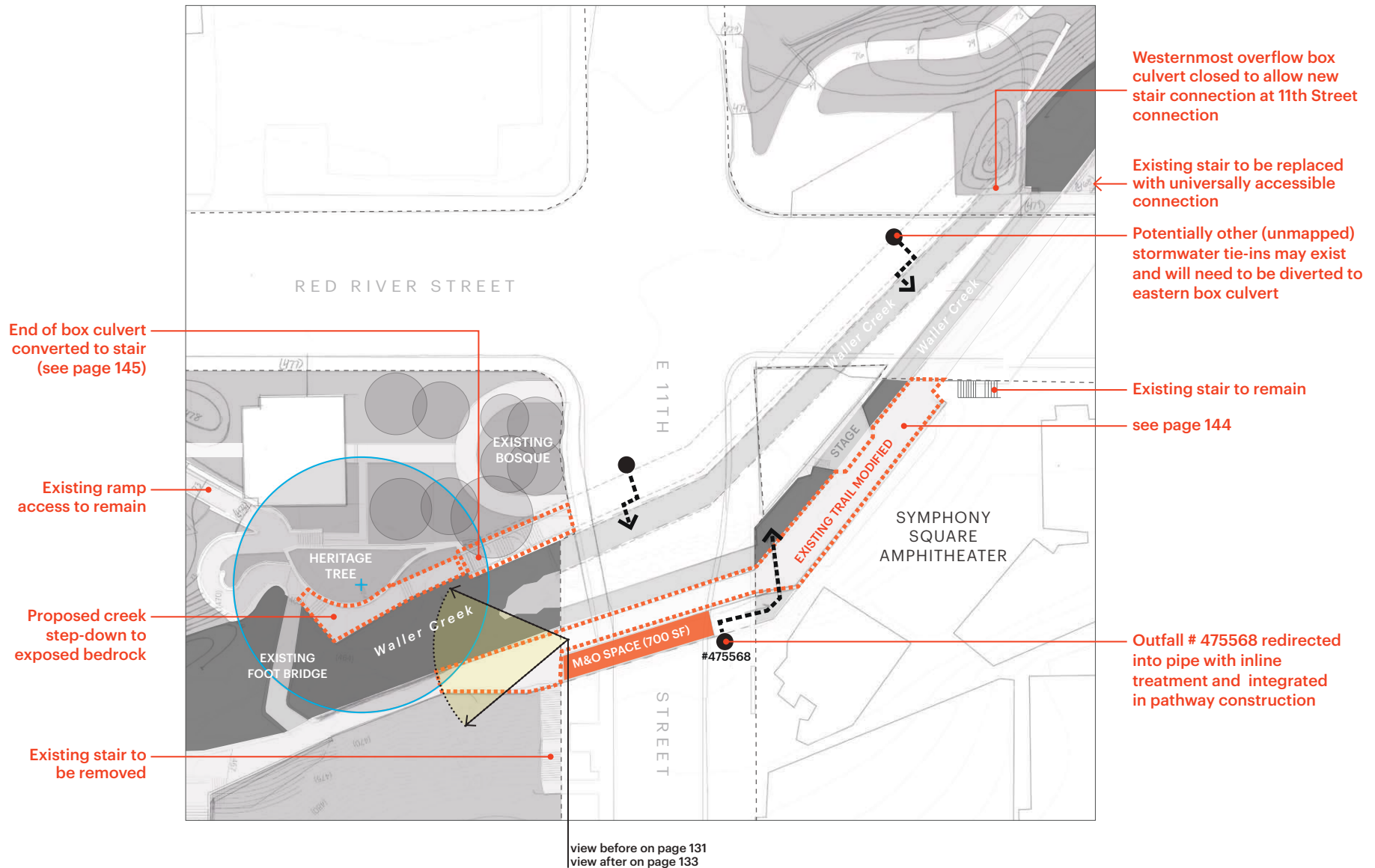
10th to 12th Streets

Segment V

10th to 12th Streets



SEGMENT V: 10TH TO 12TH STREETS





REDISCOVERING BEAUTY IN WALLER CREEK

Immediately downstream of the 11th Street Bridge, a massive heritage live oak tree, a limestone pedestrian bridge, intact stone-paved trails, and an exposed bedrock channel offer an iconic experience of Waller Creek. However, this moment of calm and beauty is short-lived in the context of adjacent areas, which are characterized by poor connectivity to the street, incompatible land uses, and the heavy presence of stormwater overflow infrastructure that will be obsolete in the post-tunnel creek hydrology.

By redeveloping the open space character of the adjacent city-owned properties and selectively modifying the circulation and stormwater infrastructure, moments like this can be elevated significantly in terms of their overall experience of place by evolving into a park-like environment. An alteration to the 11th Street Bridge will also produce a more inviting threshold to Symphony Square, better sightlines, a much-needed maintenance store, and an important new stair connection to Red River. This sort of strategic improvement along the entirety of the creek will add up to a substantive transformation of place from a stormwater spillway into an urban park system.

SEGMENT V: 10TH TO 12TH STREETS



Existing trails in this segment are in fair physical condition, but their relationship to sidewalks and public space above at street level is unclear and unintuitive. A portion of the channel in this segment at Symphony Square is entirely defined by vertical structures – retaining walls and building walls; existing riparian slopes are generally stable, and only reconstructed when warranted by trail improvements.

The design of Segment IV should be guided by the following objectives:

- Clarify the relationship of the creek to the urban grid through new, intuitive, and welcoming connections between street level and creekside trails
- Improve sightlines for public safety and ease of navigation
- Unify the character of street-level parkland and other publicly accessible open



space near Symphony Square to serve as recognizable access points to the trail system.

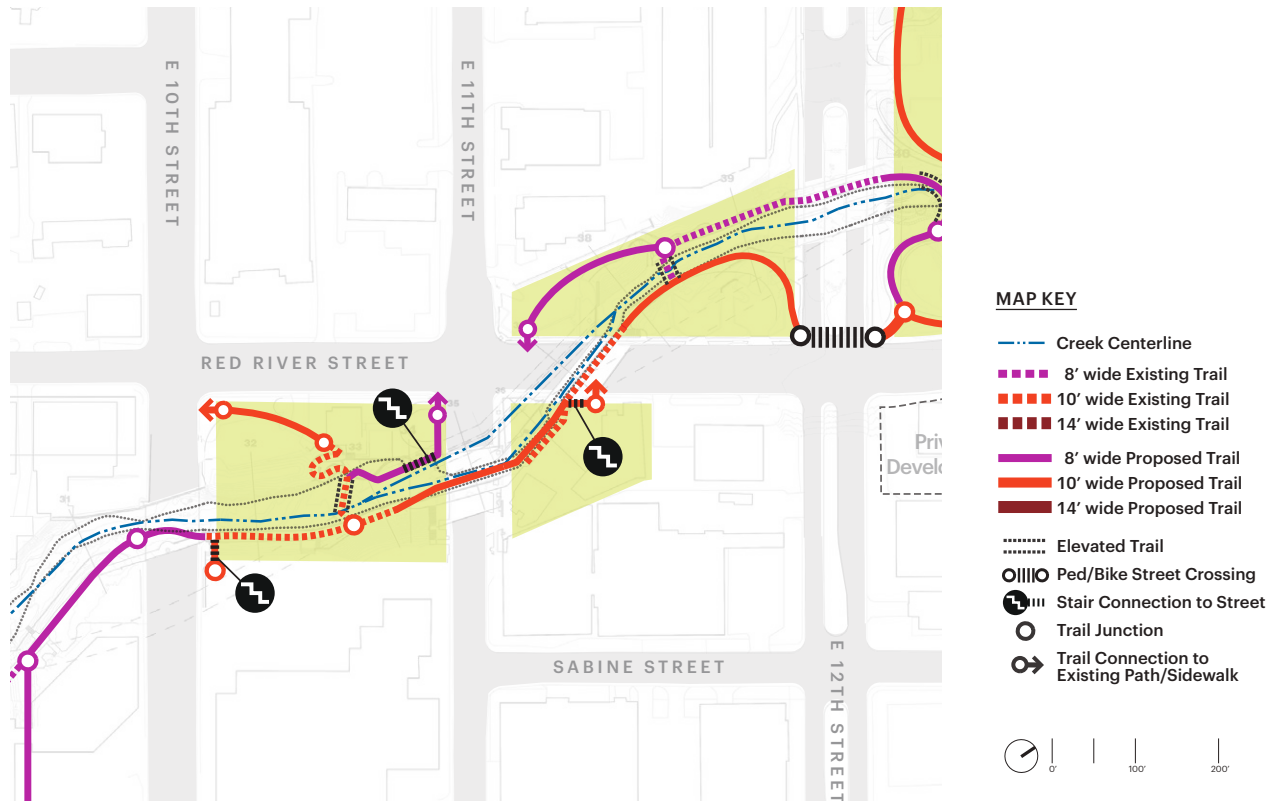
- Repurpose non-essential stormwater overflow culverts to enable new connections to Symphony Square
- Encourage public appreciation of exposed bedrock and in-channel habitat features

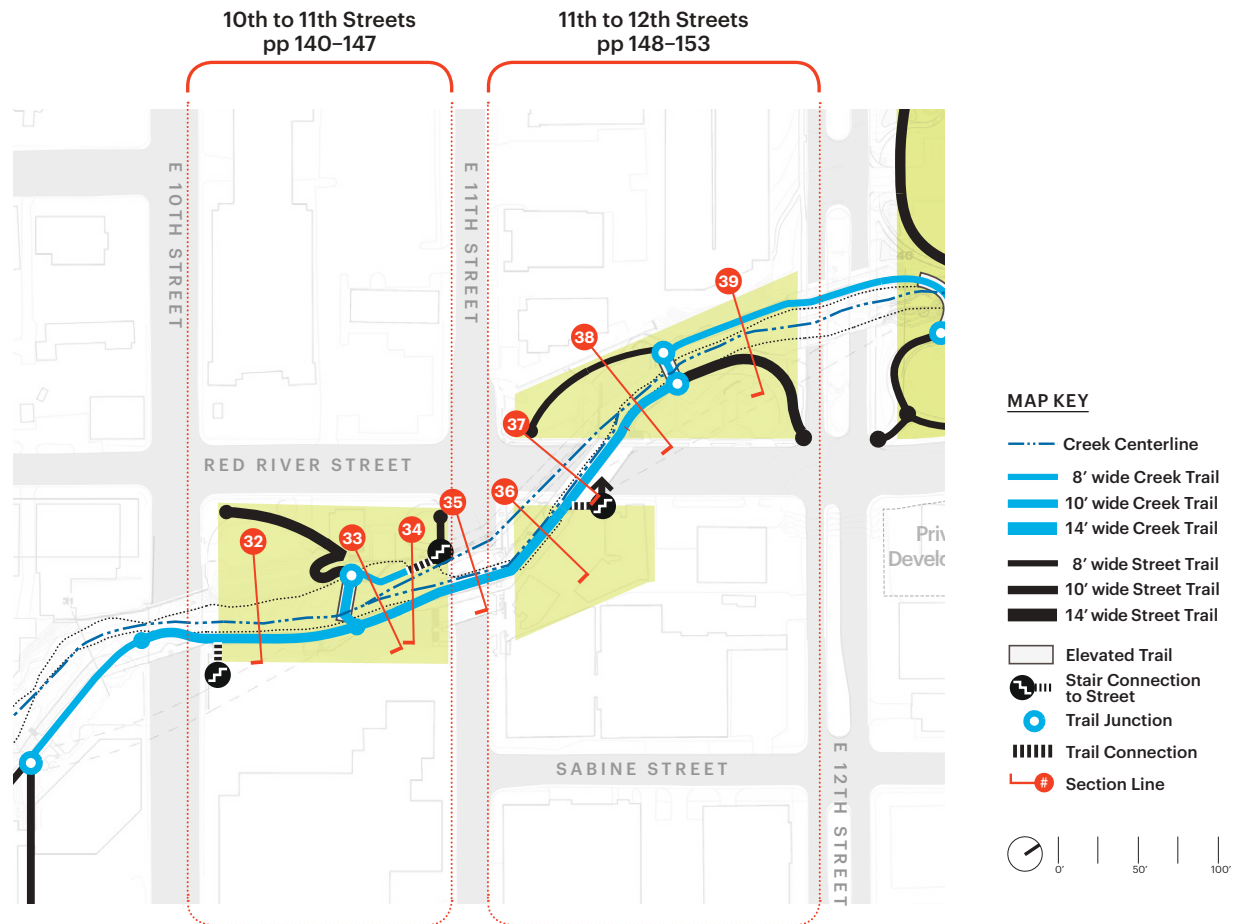
SEGMENT V: 10TH TO 12TH STREETS





SEGMENT V: 10TH TO 12TH STREETS



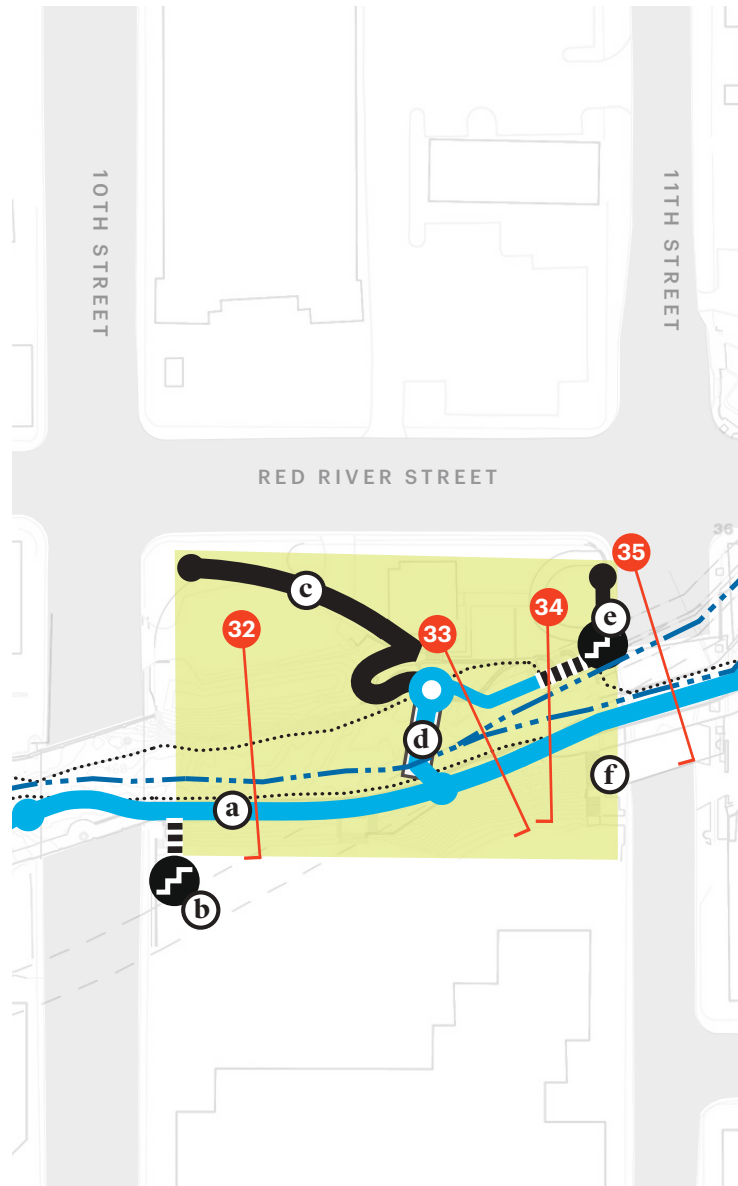


10TH TO 11TH STREETS



MAP KEY

- Creek Centerline
- 8' wide Creek Trail
- 10' wide Creek Trail
- 14' wide Creek Trail
- 8' wide Street Trail
- 10' wide Street Trail
- 14' wide Street Trail
- Elevated Trail
- Stair Connection to Street
- Trail Junction
- Trail Connection
- Section Line



TRAIL ALIGNMENT

- a. Existing creekside trail to remain. Existing stone paving is not ADA/TAS compliant; any work on this trail would potentially trigger surface replacement to bring up to current accessibility standards.
- b. Re-opened stair connection to 10th Street (currently locked off from public access). Regrading of adjacent slope needed to improve sightlines.
- c. Proposed accessible trail connection to 10th Street via reconfiguration of existing COA parking lot
- d. Existing low-water crossing to remain.
- e. Proposed connection from existing street-level plaza at 11th Street to creek level.
- f. Removal of existing stair with poor sightlines. See (b) and (e) for proposed street-level connections.

HYDRAULICS & HYDROLOGY

- The post-tunnel design discharges can be conveyed within the existing channel with minimal flooding of the existing trails during the 100-year event.
- Modifications to the existing bedrock channel are not required to satisfy hydraulic requirements.

FUNCTIONAL ASSESSMENT

- Zone 3 Assessment performed along Waller Creek from Red River to 3rd Street on April 2, 2015.
- Overall assessed condition is FAIR. (Riparian Zone = FAIR, Geomorphology = FAIR, Aquatic Habitat = FAIR)
- Improvements should increase the overall assessed condition to GOOD or EXCELLENT.
- Consider increasing the riparian zone width, vegetation coverage within the riparian area, the number of wetland trees, reducing soil compaction, using natural materials such as native vegetation and rock to provide a stable channel form, and providing floodplain connectivity to improve stream function.

RIPARIAN SLOPES

- Downstream of the low-water crossing, the west bank is to be restored. Overbank run-off from the existing parking lot may be contributing to bank erosion; replanting is recommended.
- Upstream of the low-water crossing, the lower slope of the west bank is supported by a limestone wall in good condition. This wall also serves to maintain grades around a large Heritage Tree.
- Proposed stair connection to 11th Street (e) requires slope reconstruction/construction just downstream

of 11th Street bridge and closing-off of existing overflow culvert.

- On the east bank, downstream of the low-water crossing, a stone retaining wall supports a lawn on COA-owned land. Future design work will explore opportunities to lay-back this slope, remove/reduce the retaining wall, and open sight lines to the proposed stair connection to 10th Street.
- On the east bank, upstream of the low-water crossing, the slope is stable and only requires some removal of problem species and replacement planting.

AQUATIC HABITATS

- The channel is characterized by shallow baseflow over exposed bedrock.
- An existing gravel bar just downstream of 11th Street and an existing riffle beneath the 10th Street Bridge should be protected to the extent practicable during construction of the Symphony Square trail segment

HERITAGE TREES & EXISTING VEGETATION

- There are seven Heritage Trees on this block. Five are at or near street-level, and offer opportunities for shaded “trailheads.”
- Six heritage-class trees in good condition surround the existing COA parking lot.

UTILITIES

- On the west bank, historic tanks from the 1920s (gasoline, waste oils) are known to have been installed near Red River.
- Wastewater lines run roughly parallel to the creek on the east bank and across the 10th Street Bridge.

There are no known conflicts at this time, but elevations and alignments should be confirmed during design.

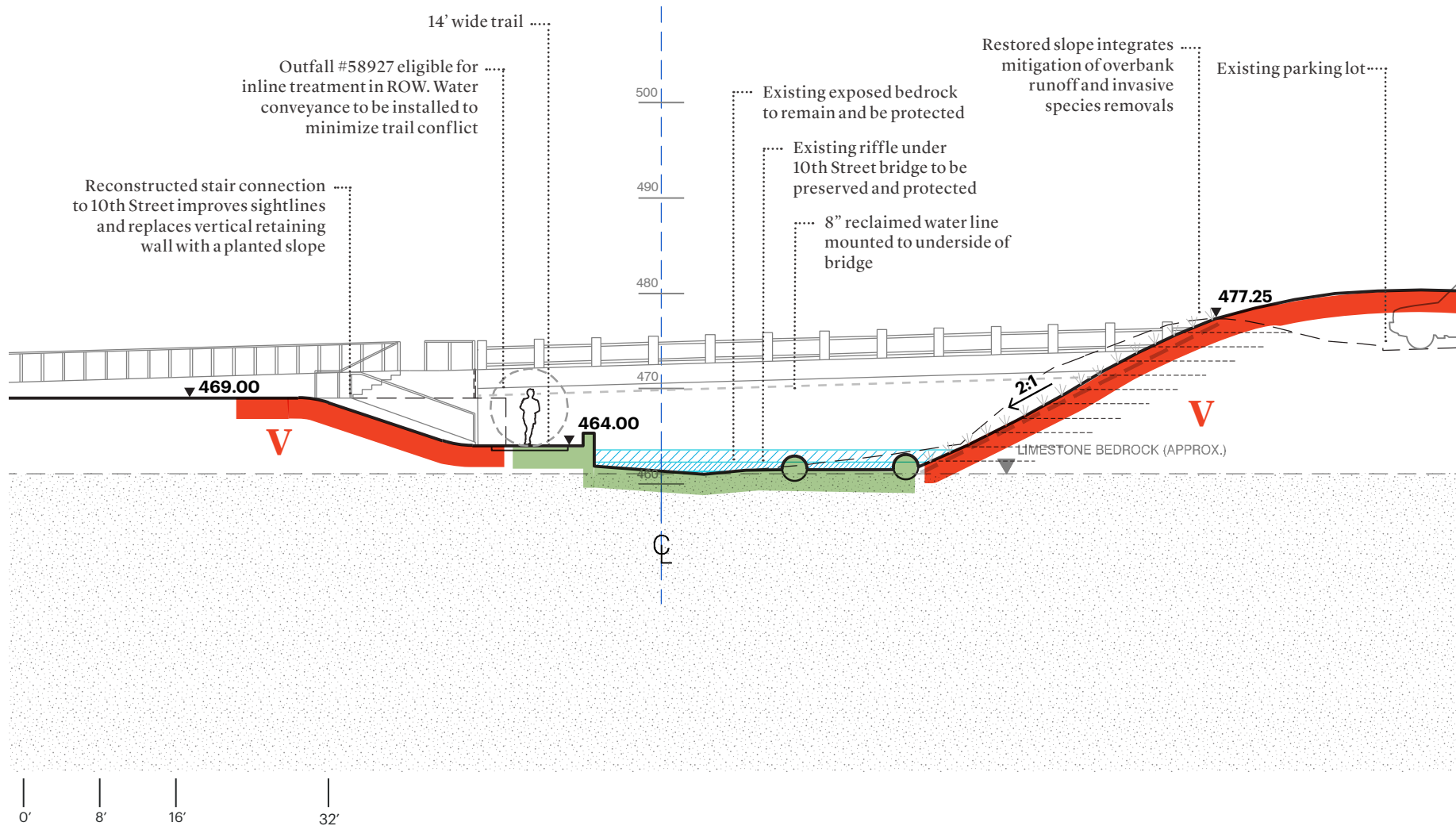
- An 8” reclaimed water line is mounted to underside of 10th Street Bridge with 7.67’ clearance to existing trail.

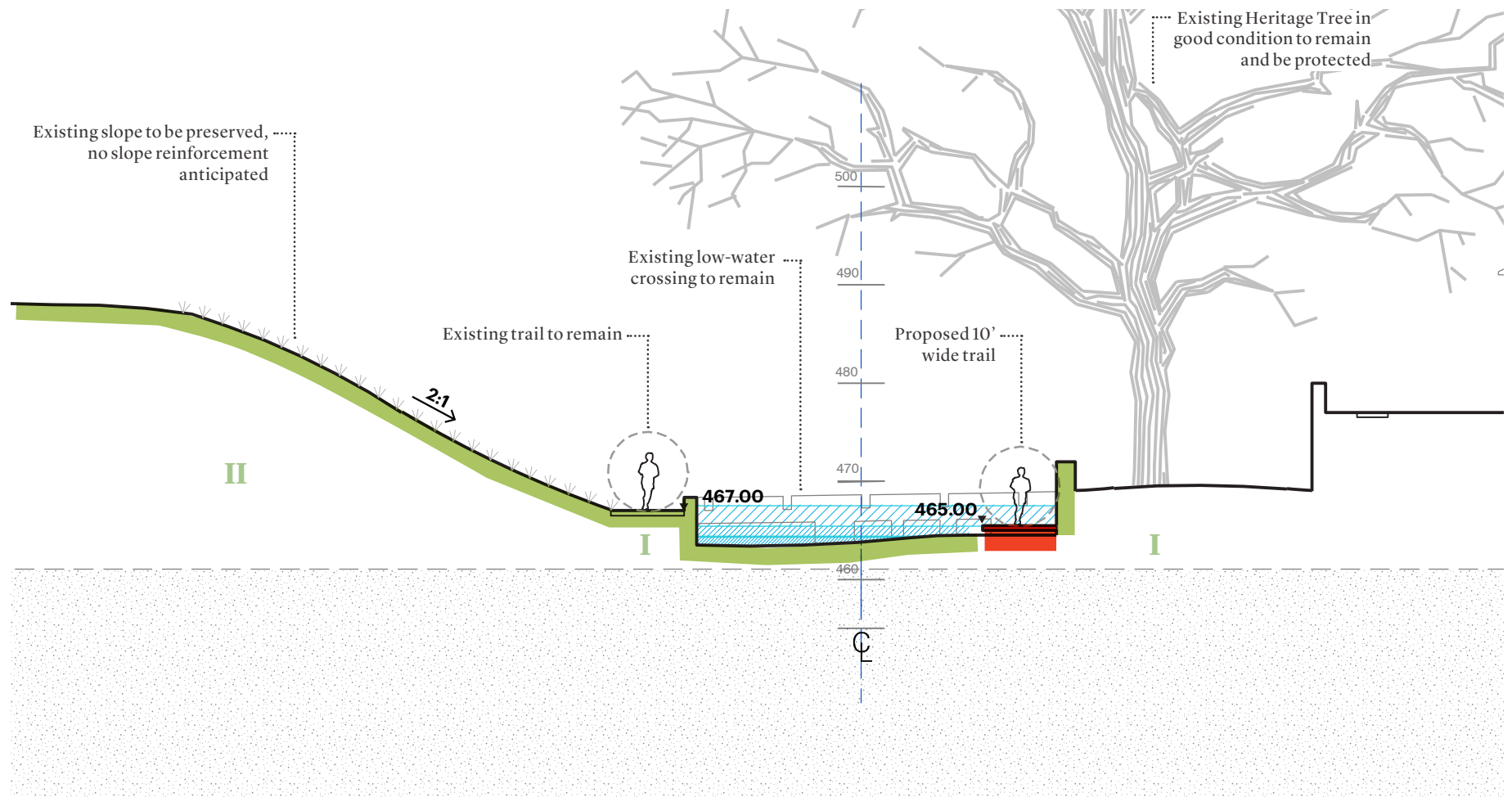
STORMWATER RETROFITS

- This block has two opportunities for landscape-based treatment of stormwater. Outfall #58823, on the west bank, and outfall # 372277, on the east bank, both discharge from existing retaining walls close to water level. Step-pools may be carefully integrated with exposed bedrock.
- Outfall #58927 is located in the east abutment of the 10th Street bridge. It is a good candidate for inline treatment. This outfall also presents a significant trail conflict and requires conveyance of water away from walking surfaces.

MAINTENANCE & OPERATIONS

- Stone paving on existing trails is not ADA/TAS compliant. Small repairs should be performed regularly to avoid triggering a larger reconstruction project.
- Access points (c) and (e) are trailheads, and will require trash pick-up
- Changes to maintenance and operations requirements should be coordinated with Sheraton Hotel on east bank, a participant in WPD’s “Adopt-a-Creek” program





SECTION KEY

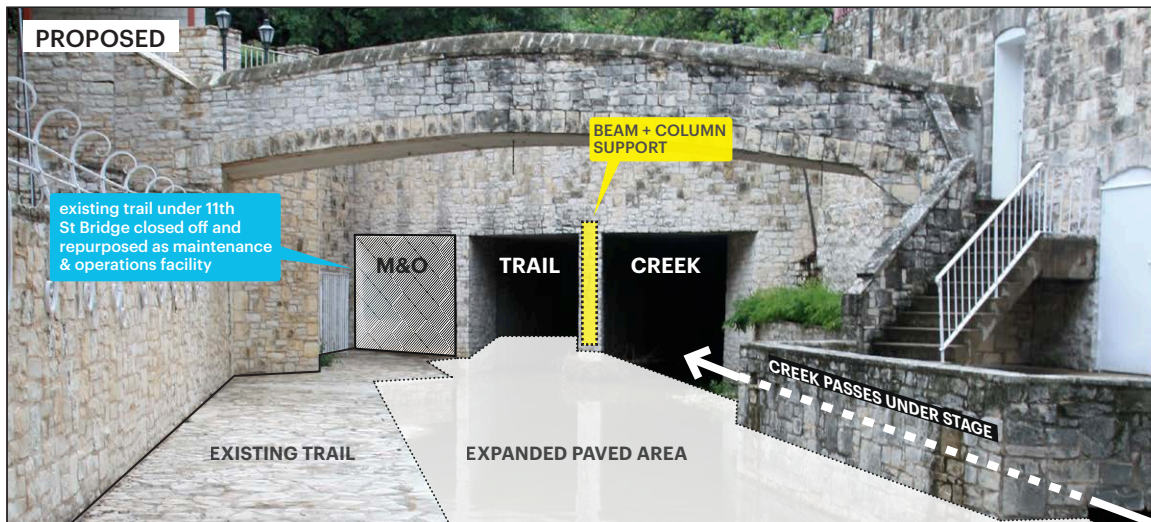
PROJECT TYPE
Do Nothing
Preservation
Restoration
Reconstruction

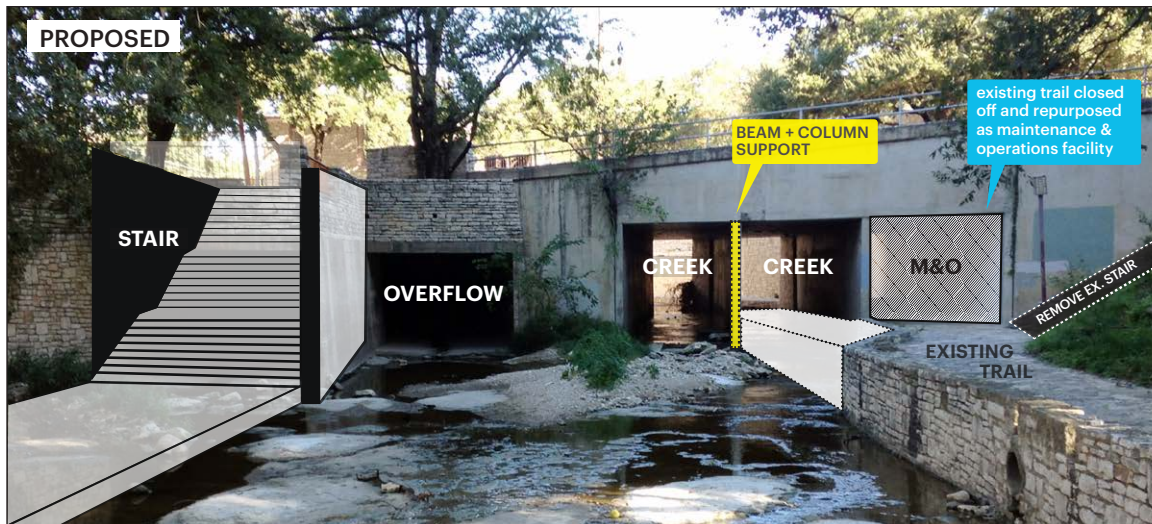
VEGETATION CLASS
I Problem Species Removal/Reseed
II Removal/Reseed/Replant
III Rescue and Salvage Plant/Seed
IV Significant Removal/Reseed/Replant
V Complete Replacement

GRADING
Grade Transition
Existing Grade
Slope Reinforcement

WATER SURFACE ELEVATION
100-YR WSE
2-YR WSE
5-11 CFS WSE

10TH TO 11TH STREETS

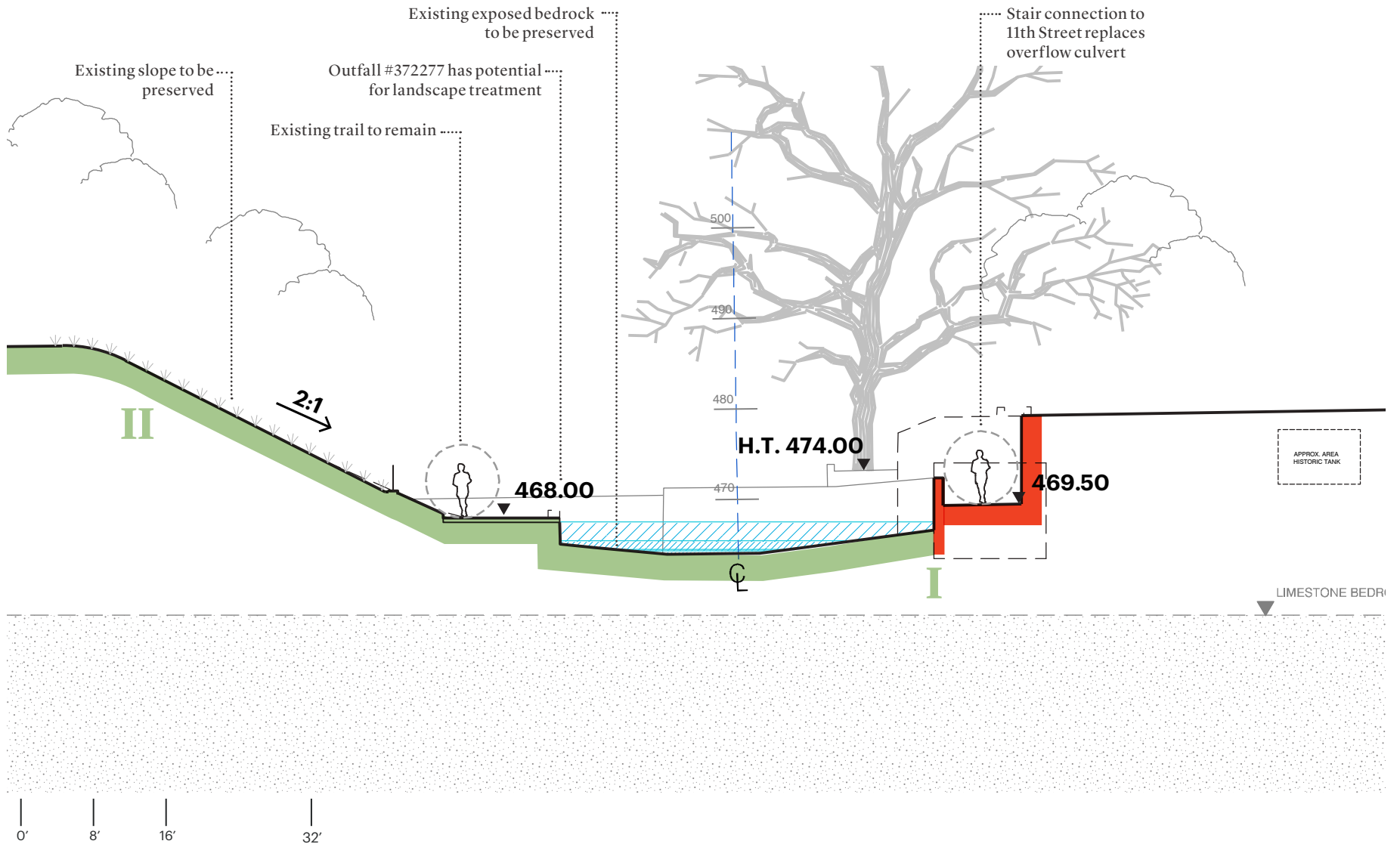


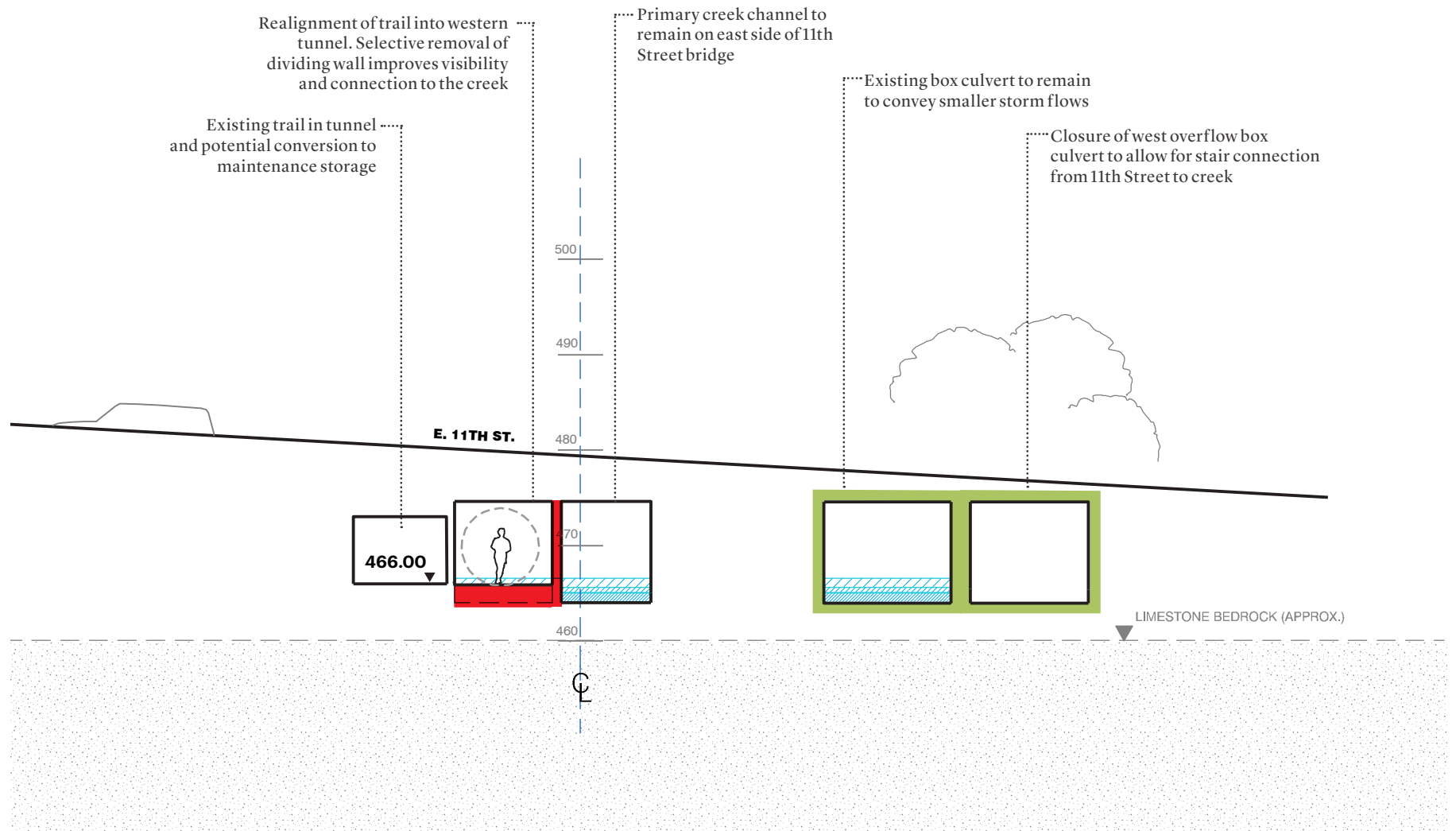


REPURPOSING INFRASTRUCTURE

The existing trails at Symphony Square are of insufficient width to accommodate the future volume of pedestrians, particularly following the redevelopment of Waterloo Park to the north. A more generous paved area also facilitates a welcoming threshold to the park with better sightlines at the connections beneath 11th Street and Red River. This change also opens the door for Symphony Square to have more engagement with the creek in the future.

After the completion of the Waller Creek Tunnel, the existing overflow culverts and tunnels that emerge from the 11th Street Bridge will no longer be critical for conveying high volume flood waters. A new stair inserted into the end of the westernmost culvert connects the creek to an underutilized street-level plaza. The easternmost trail tunnel can be used as a much-needed maintenance & operations storage space.





SECTION KEY

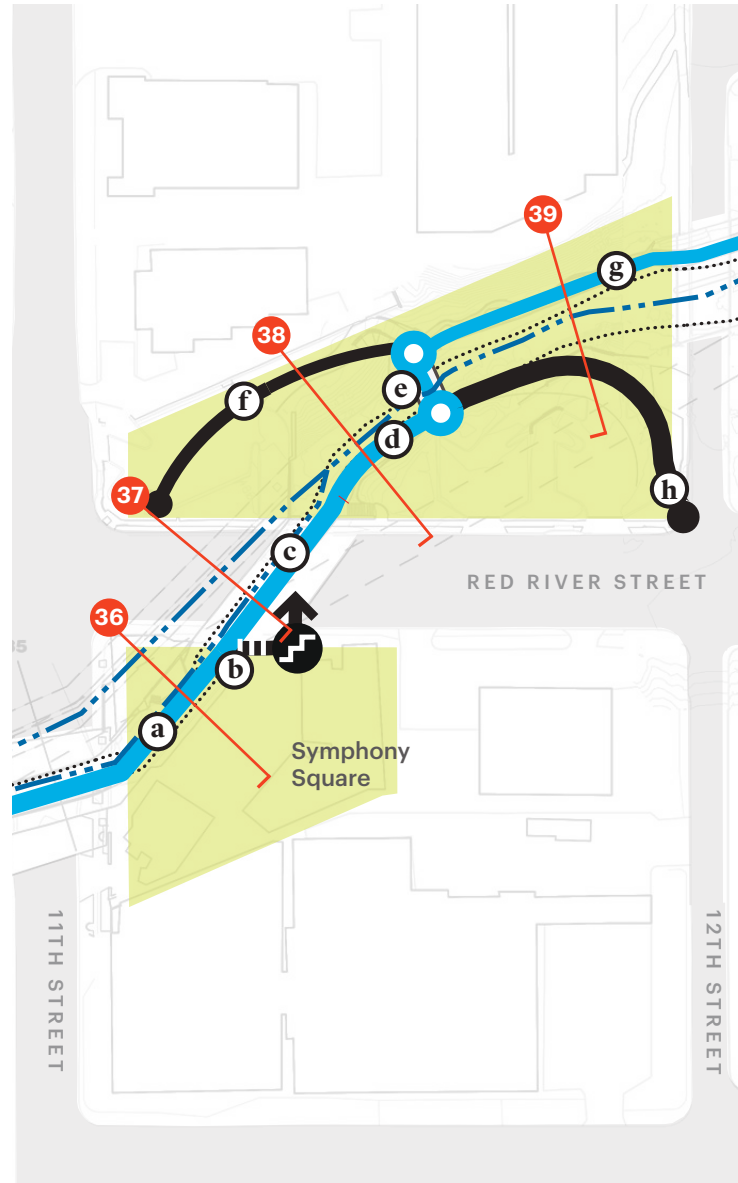
PROJECT TYPE	VEGETATION CLASS	GRADING	WATER SURFACE ELEVATION
Do Nothing	I Problem Species Removal/Re seed	Grade Transition	100-YR WSE
Preservation	II Removal/Re seed/Re plant	Existing Grade	2-YR WSE
Restoration	III Rescue and Salvage Plant/Seed	Slope Reinforcement	5-11 CFS WSE
Reconstruction	IV Significant Removal/Re seed/Re plant		
	V Complete Replacement		

11TH TO 12TH STREETS



MAP KEY

- Creek Centerline
- 8' wide Creek Trail
- 10' wide Creek Trail
- 14' wide Creek Trail
- 8' wide Street Trail
- 10' wide Street Trail
- 14' wide Street Trail
- Elevated Trail
- Stair Connection to Street
- Trail Junction
- Trail Connection
- Section Line



TRAIL ALIGNMENT

- a. Proposed expansion of paved gathering area at Symphony Square
- b. Stair connection to Red River Street
- c. Existing trail to remain under Red River Bridge
- d. Existing trail exceeds 5% slope; trail improvements to be coordinated with slope modifications, including connection to street level at 12th Street
- e. Existing low-water crossing to remain
- f. Proposed trailhead and access to 11th Street may require reconfiguration of existing parking lots and mid-bank stormwater flume
- g. Existing trail to remain
- h. Proposed trailhead and access to 12th Street and Red River may require reconfiguration of existing parking lots

HYDRAULICS & HYDROLOGY

- Smaller storm flows will be conveyed through the box culverts passing under the intersection of 11th Street and Red River.
- Symphony Square is located at a low elevation relative to Waller Creek. Large storm events may create backwater downstream of 11th Street that will cause temporary local flooding in Symphony Square. Very large storm events (>100-year event) may also need to flow through Symphony Square from upstream of Red River.

FUNCTIONAL ASSESSMENT

- Zone 3 Assessment performed along Waller Creek from Red River to 3rd Street on April 2, 2015.
- Overall assessed condition is FAIR. (Riparian Zone = POOR, Geomorphology = FAIR, Aquatic Habitat = FAIR)
- Opportunities to improve stream function are limited. With this in mind, any proposed change should consider improving the overall assessed condition.

RIPARIAN SLOPES

- Between 11th Street and Red River, the channel is composed of the sides of existing buildings.
- The west bank *between* Red River and 12th Street is to be restored. Failing gabions at the toe of slope near Red River should be replaced. Overbank run-off from the existing parking lot may be contributing to bank erosion; replanting is recommended.
- Upstream of Red River, on the east bank, a low retaining wall and steep lawn slopes will be

reconstructed to allow a ADA/TAS compliant path and improved sightlines to and from street level.

AQUATIC HABITATS

- At Symphony Square, the creek bed and overflow box culverts are composed of concrete. Aquatic habitat improvements are limited to boulder clusters, which provide cover to and growth surface for aquatic organisms.
- Upstream of Red River, the existing sand, gravel, and cobble bed is to be restored. An existing pool/riffle sequence is to remain and be protected.

HERITAGE TREES & EXISTING VEGETATION

- There are three Heritage Trees within the creek corridor; several large Heritage Trees above top of bank in adjacent properties contribute shade.
- Several Heritage-class trees in good condition are in the upper terrace levels of Symphony Square, on the east bank.

UTILITIES

- Both banks of Symphony Square are known sites for several historic gasoline tanks (from former filling stations) from the 1920s and 1930s. On the east bank, historical records indicate waste water discharged into Waller Creek from a sand and grease trap.
- West of Red River, there are two records of historic gasoline tanks (from former filling stations) from the 1920s and 1930s.
- Red River carries a number of major utilities; modifications to the bridge for trail improvements

and box-culvert modification must be coordinated with utility work.

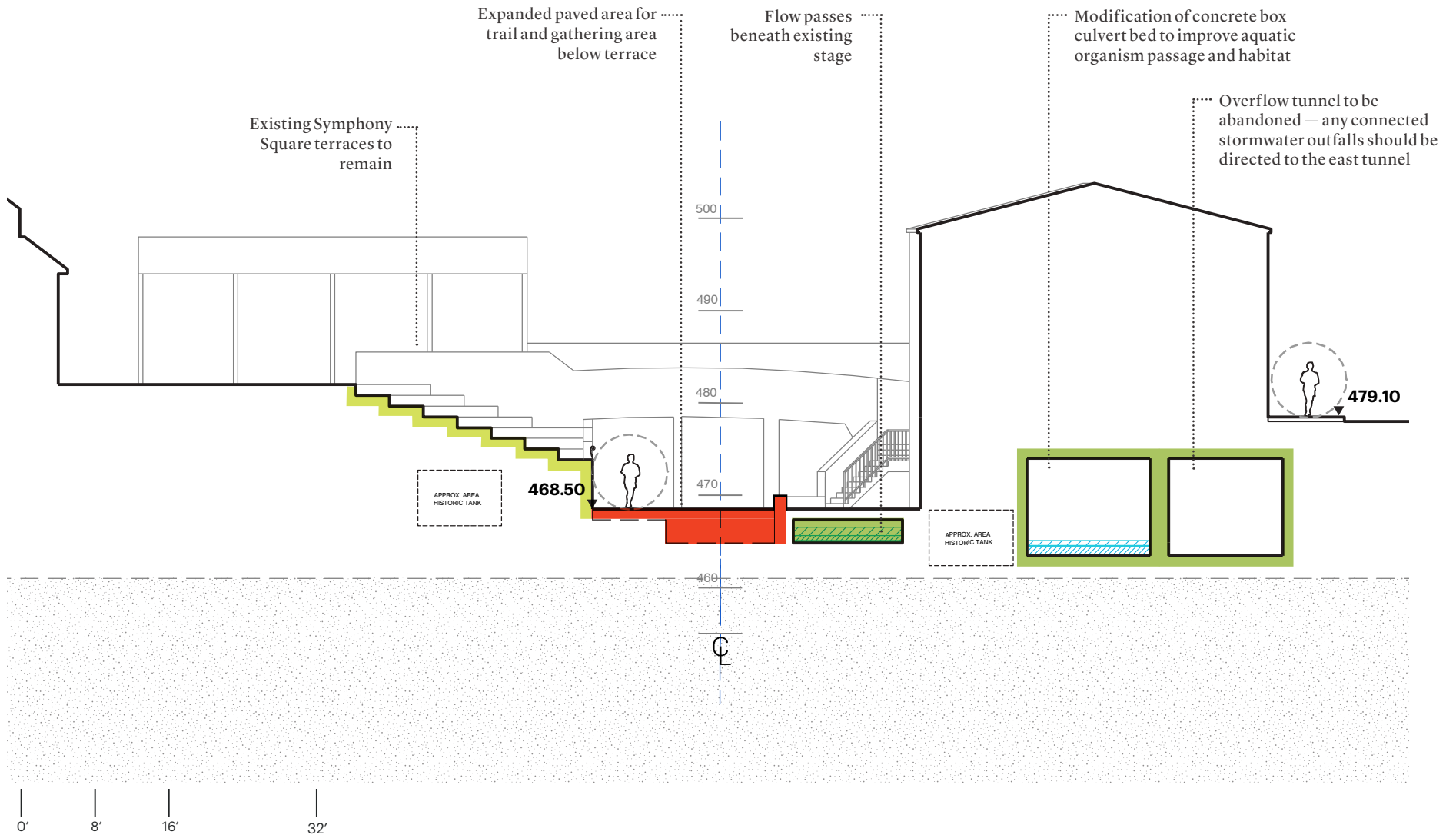
- Overhead utilities cross the creek upstream of Red River. Relocation is moderately feasible, but will likely require a new duct bank from 11th to 12th Streets. (See Appendix)

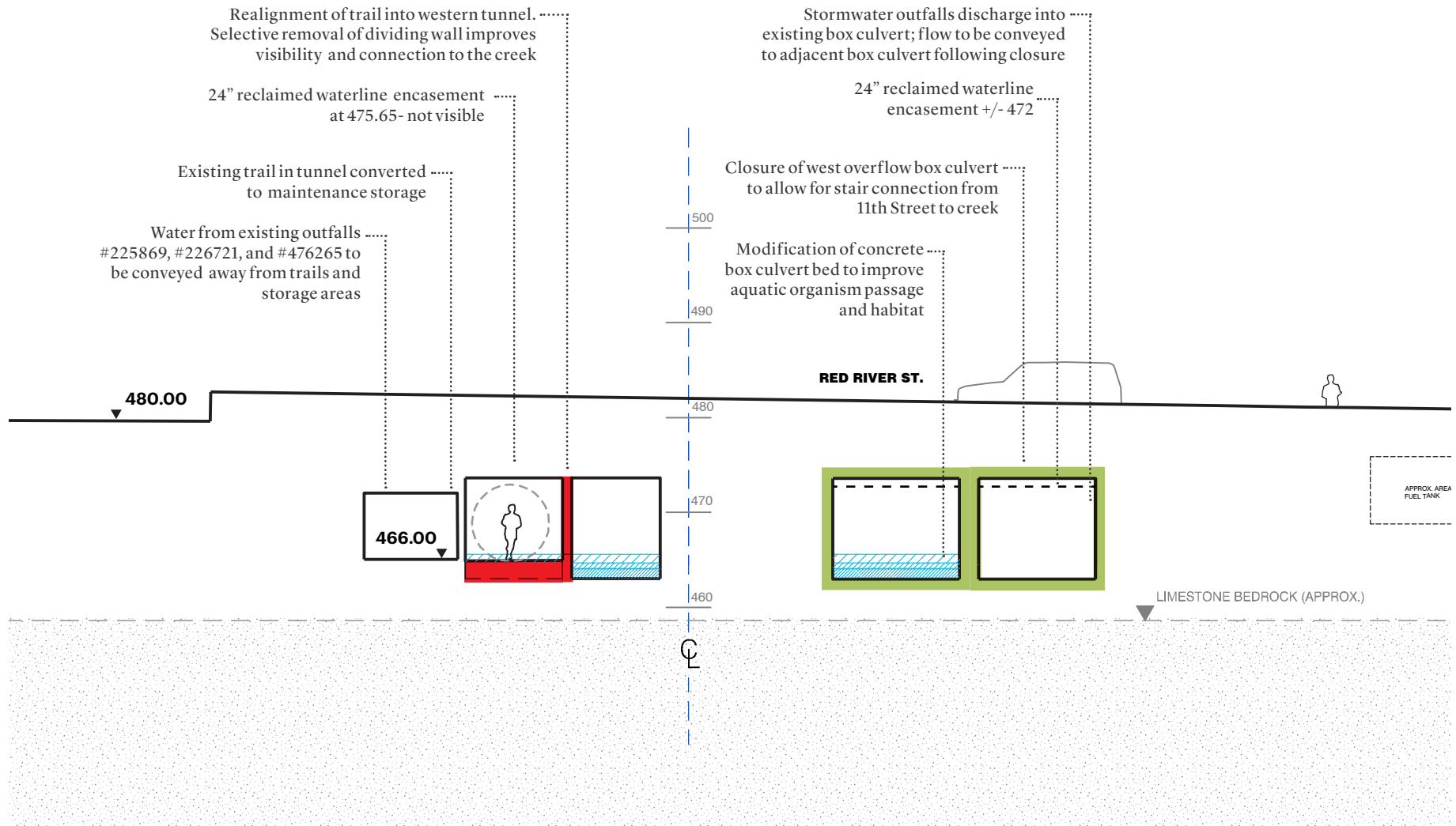
STORMWATER RETROFITS

- This block has three opportunities for inline treatment. Outfalls #58652 and #467195 are good candidates for inline treatment. Outfall #58599 is a fair candidate; available space is limited by existing wastewater infrastructure and Heritage Trees.
- Outfall #459774 is an appropriate candidate for sewershed treatment.
- Outfalls #476265, #226721, and #225869 create trail conflicts beneath the Red River bridge. These outfalls are not good candidates for stormwater retrofits, and discharge should be conveyed away from both existing and proposed trails.
- Stormwater outfall below Red River should be modified with a 4" flap gate.

MAINTENANCE & OPERATIONS

- Stone paving on existing trails is not ADA/TAS compliant. Small repairs should be performed regularly to avoid triggering a larger reconstruction project.
- Access points (f) and (h) are trailheads, and will require trash pick-up.
- Proposed secondary M&O storage area in former trail tunnel beneath 11th Street Bridge.





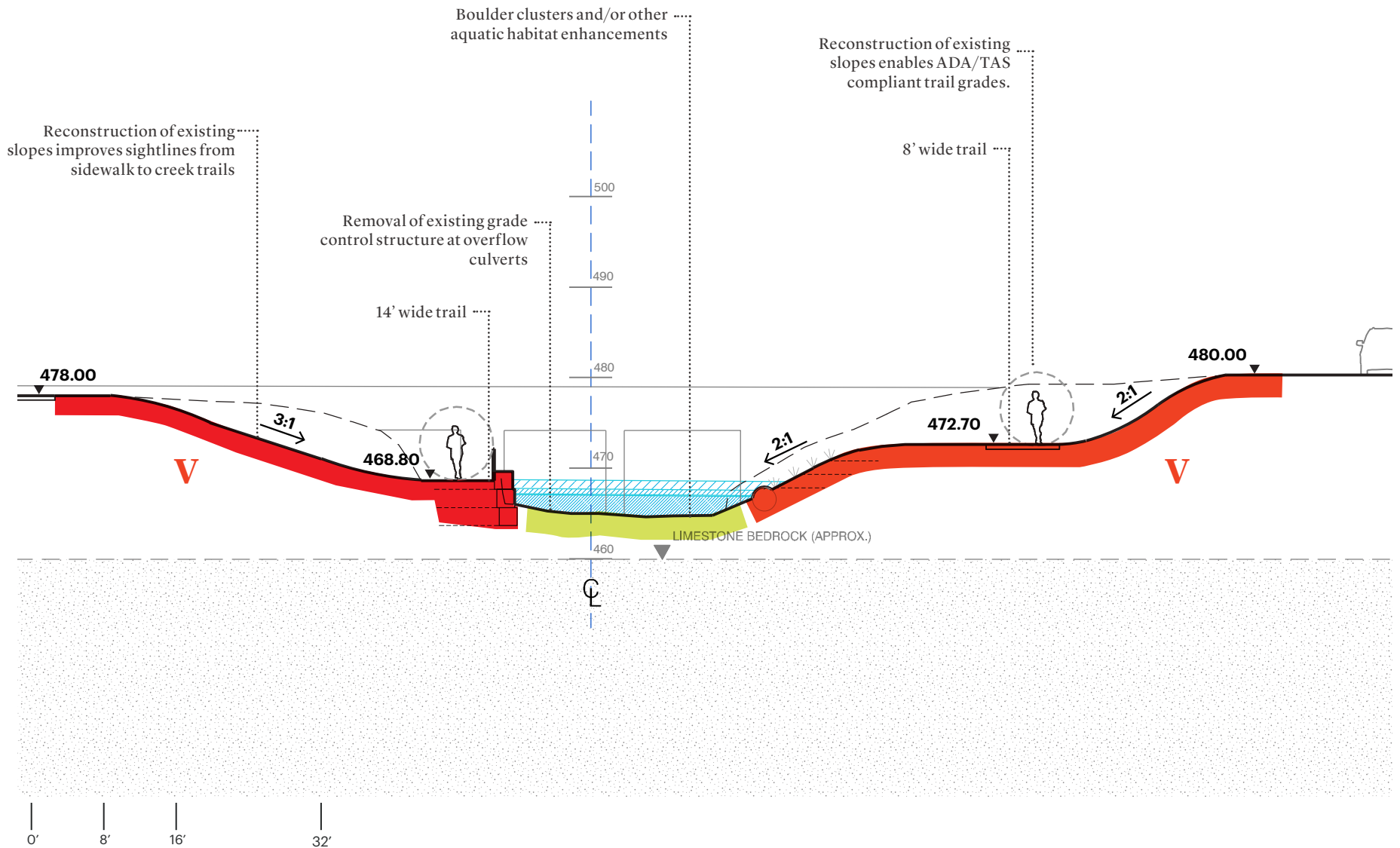
SECTION KEY

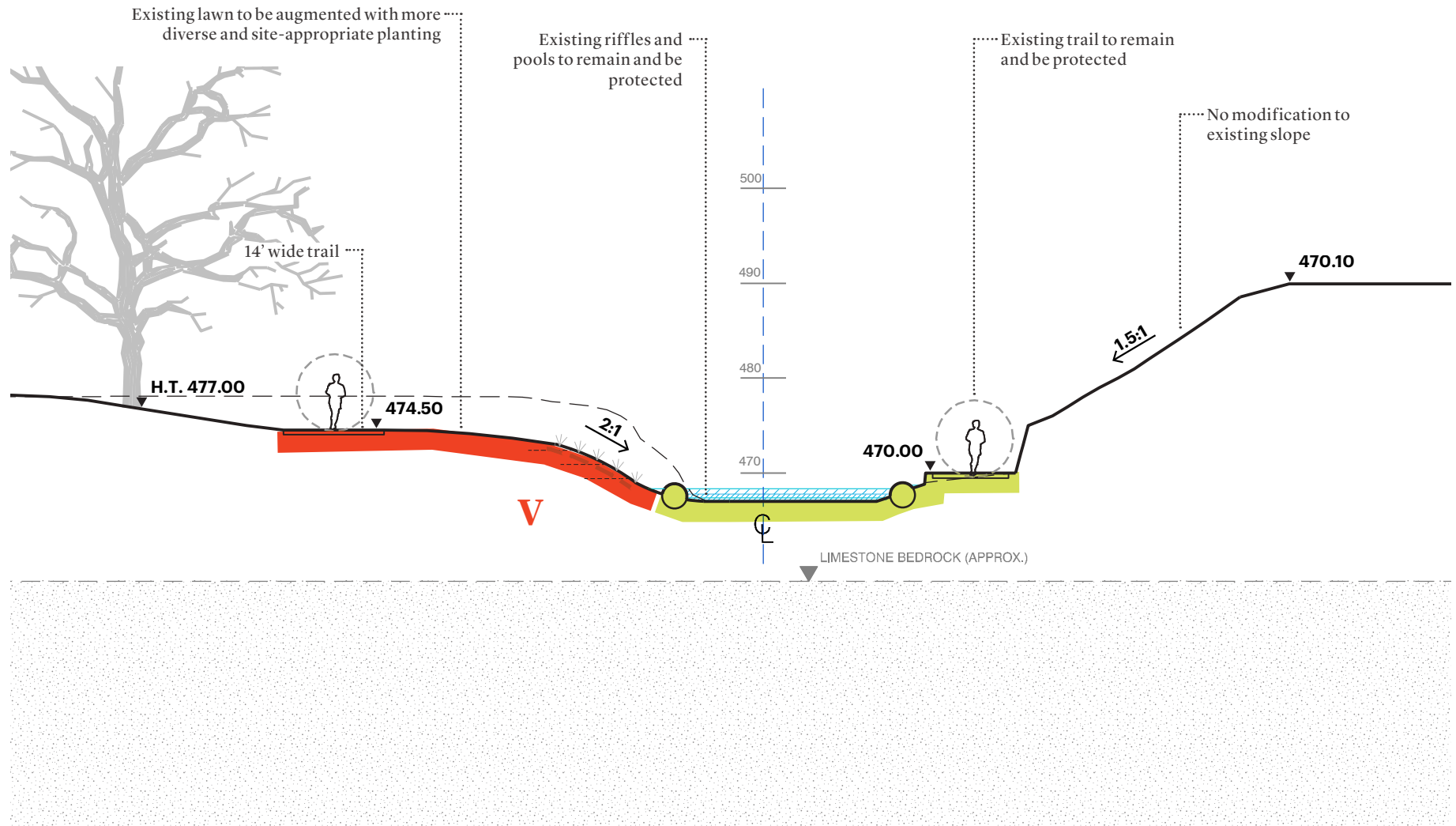
PROJECT TYPE
 Do Nothing
 Preservation
 Restoration
 Reconstruction

VEGETATION CLASS
I Problem Species Removal/Re seed
II Removal/Re seed/Re plant
III Rescue and Salvage Plant/Seed
IV Significant Removal/Re seed/Re plant
V Complete Replacement

GRADING
 Grade Transition
 Existing Grade
 Slope Reinforcement

WATER SURFACE ELEVATION
 100-YR WSE
 2-YR WSE
 5-11 CFS WSE





SECTION KEY

PROJECT TYPE
Do Nothing
Preservation
Restoration
Reconstruction

VEGETATION CLASS
I Problem Species Removal/Reseed
II Removal/Reseed/Replant
III Rescue and Salvage Plant/Seed
IV Significant Removal/Reseed/Replant
V Complete Replacement

GRADING
Grade Transition
Existing Grade
Slope Reinforcement

WATER SURFACE ELEVATION
100-YR WSE
2-YR WSE
5-11 CFS WSE

Segment VI

12th to 15th Streets

Segment VI

12th to 15th Streets



CONSTRUCTION PHOTO: APRIL 2015

SEGMENT VI: 12TH TO 15TH STREETS



CELEBRATING A VESTIGE OF THE UNTAMED WALLER CREEK

Within the scope of this project, the existing riparian banks between 14th and 15th Streets will be the only post-tunnel creek landscapes still subject to significant flash flooding. They are also located within parkland that possesses several dead ends and compromised trail segments including stairs and tunnel passages that lead nowhere — remnants of previous attempts to develop a recreational experience for this reach of the creek.

Despite the poor circulation network in this location, the existing landscape supports a fairly high-functioning riparian ecology. Re-engineering these slopes will simultaneously bolster the resilience of these systems and create informal invitations to explore this still-untamed creek landscape. The primary way to experience this landscape, however, is from the proposed serpentine walk that hovers over the more frequently flooded zones. The meander of this path will also accommodate a much-needed accessible connection to the corner of 15th and Red River Streets.



SEGMENT VI: 12TH TO 15TH STREETS



This entire segment coincides with the boundaries of Waterloo Park, but the conditions of the creek vary dramatically. Between 12th Street and the 14th Street Bridge, the creek has been consumed by the concrete Waller Creek Tunnel inlet pond. Upstream of the 14th Street Bridge to 15th Street, the floodplain of the creek is unaffected by the tunnel, and the banks are fully subject to violent hydraulic forces passing through (and over) the 15th Street Bridge during storms. The urban context for Waterloo Park is expected to change considerably over the next decade, with the transformation of the park itself

as a performance venue, as well as the redevelopment of the UT and Central Health complexes to the north and east.

The design of the creek corridor within Segment VI should be guided by the following objectives:

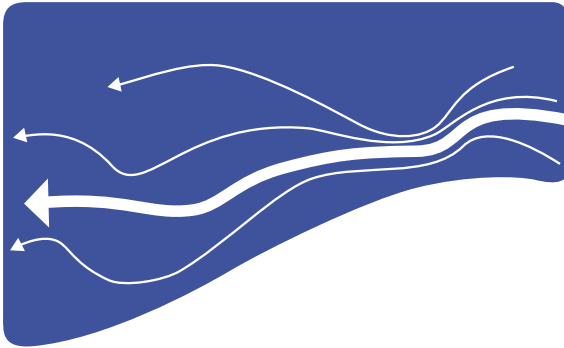
- Clearly define the relationship of circulation routes serving the park, the larger trail system, and Waller Creek Tunnel inlet facility



- Create a trailhead for the creek south of the inlet dam that celebrates reduced flood flows and an enhanced park and trail environment
- Replace park area lost to tunnel infrastructure with open space capable of supporting large events
- Coordinate the planning of several anticipated bike routes (Trinity Street, Red River Street, Waller Creek trail system) as they intersect around Waterloo Park
- Define the new relationship of the creek and adjacent open spaces to the former Red River right-of-way
- Establish a concept for the creek between 14th and 15th Street that is appropriate to its unique hydrological condition and also a successful public space.

CREATING NEW DYNAMICS OF FLOW

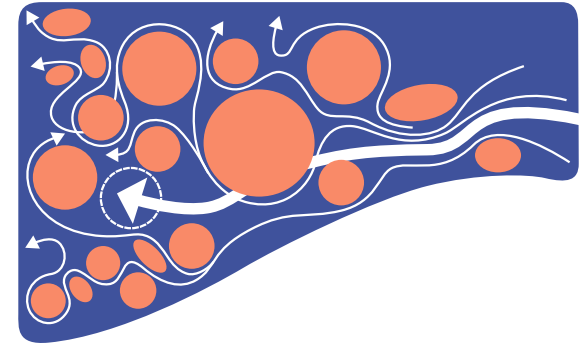
FLOW SHAPED THE LAND



RE-SHAPING THE LAND: POST-TUNNEL FLUIDITY

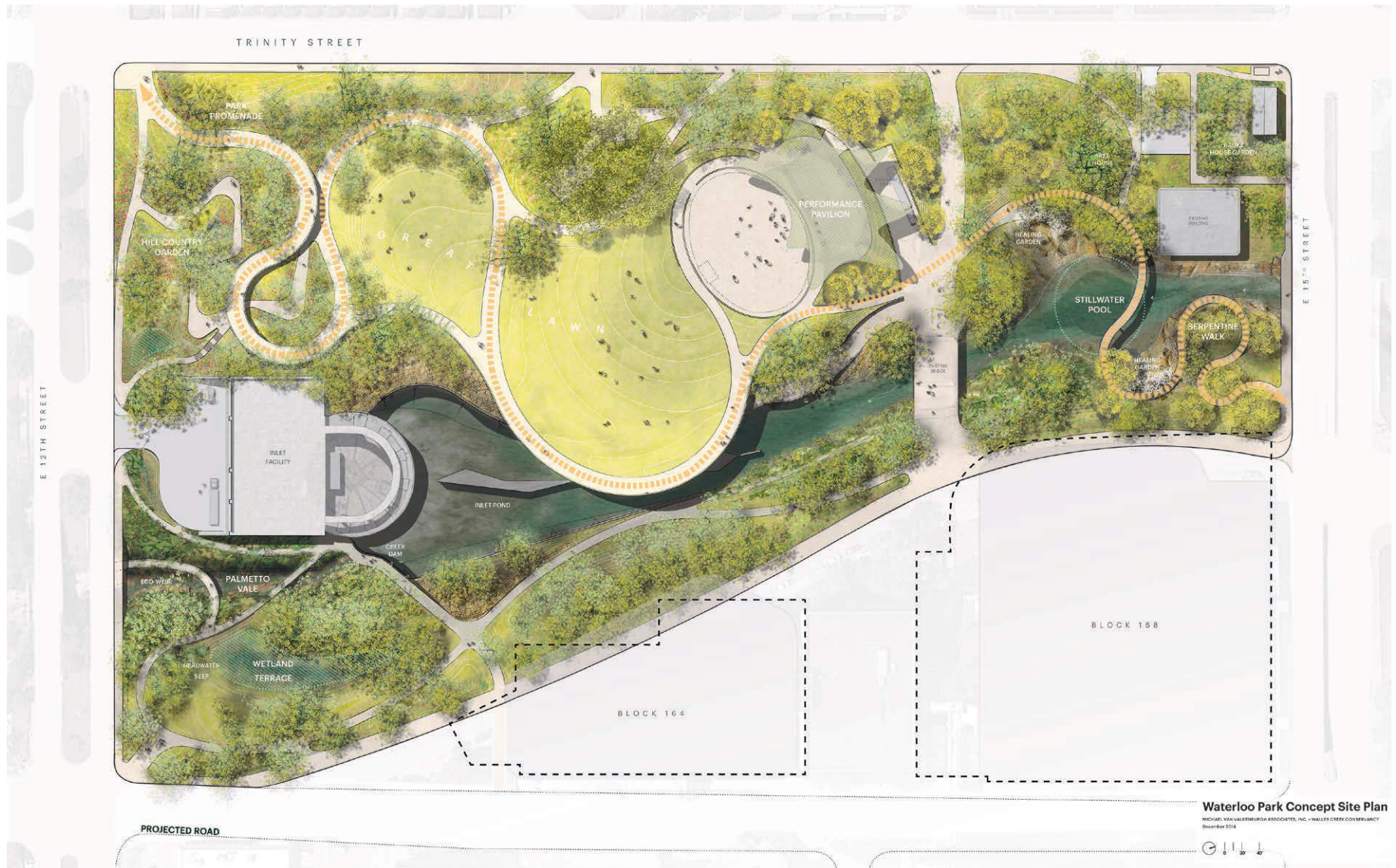


PLACEMAKING: EDDYS AND POOLS



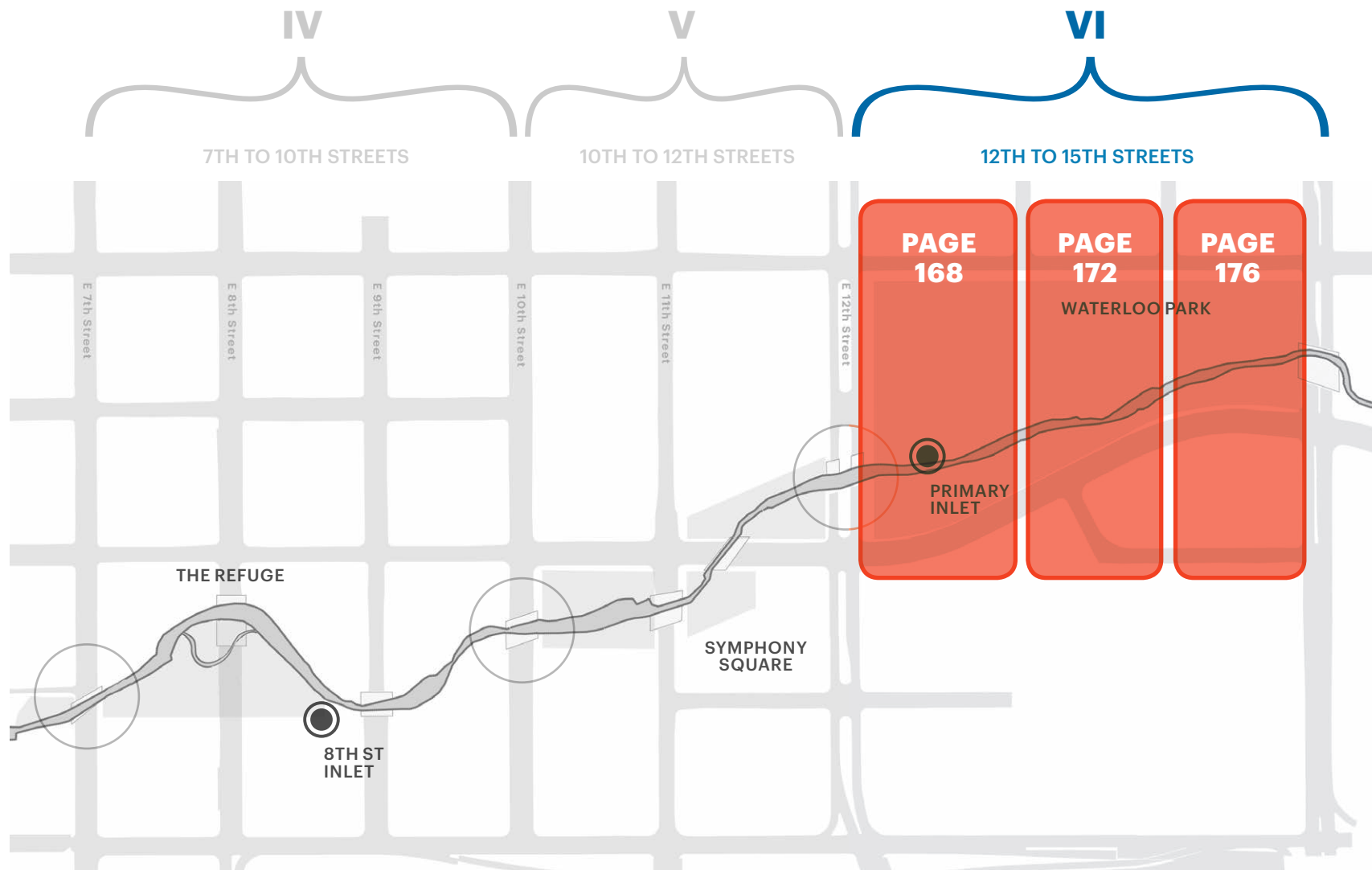
WATERLOO PARK

The design of Waterloo Park, the northernmost park in the chain-of-parks proposal, is especially intertwined with the creek development due to the heavy presence of the tunnel infrastructure at the inlet location. The interruption to natural flow is expressed not only in the concrete superstructure, but in the proposed earthwork for rebuilding the site after construction as well. Using the conceit of flow dynamics, the form language of the park emerges as a way to accomplish several goals at once: (1) to build universal access to as much of the site as possible that has 40 feet of vertical grade change; (2) to preserve as many of the existing trees of value that survived the tunnel construction as possible; and (3) to create a broad variety of spatial niches and eddys to foster diverse park uses.

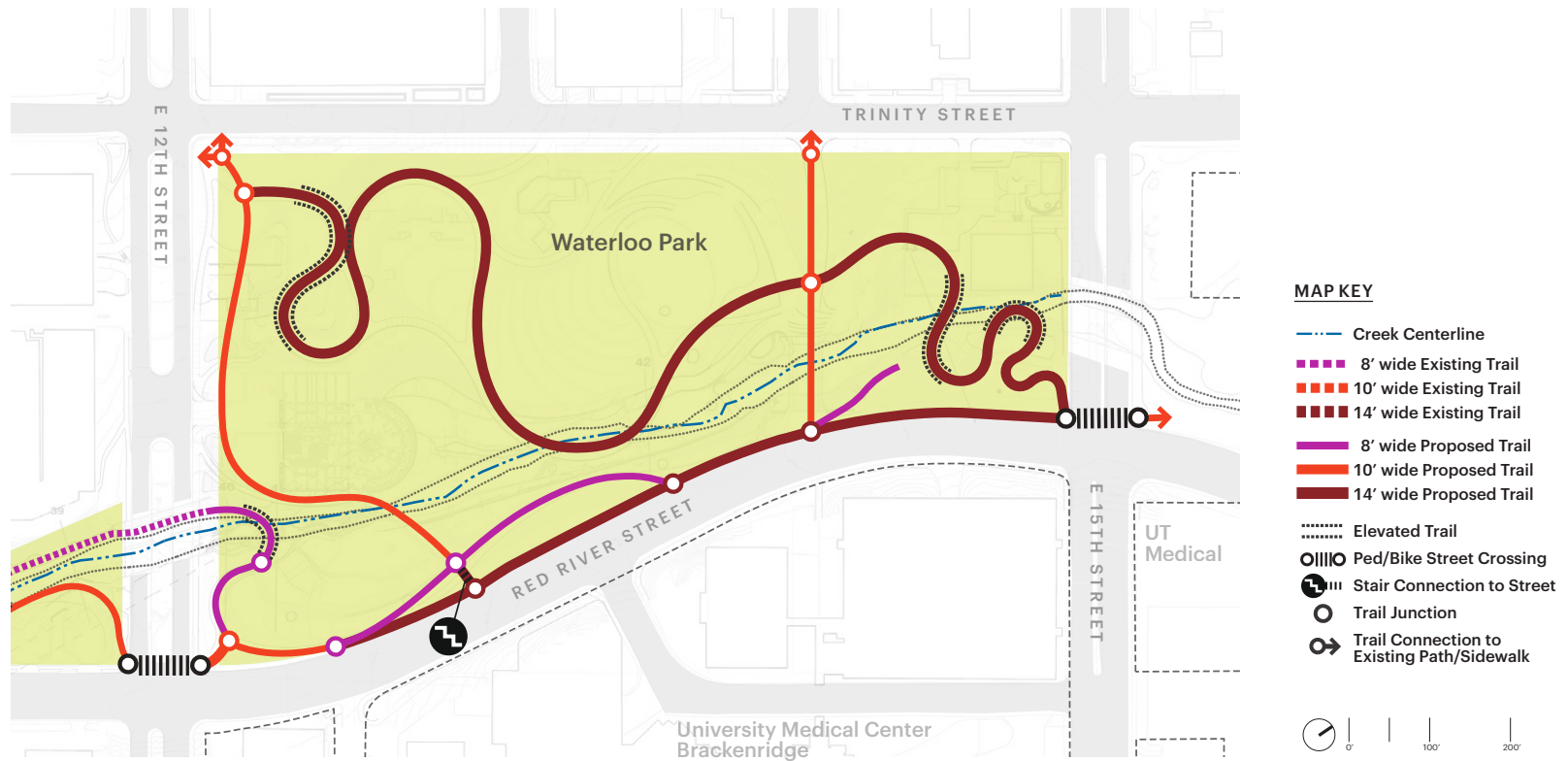


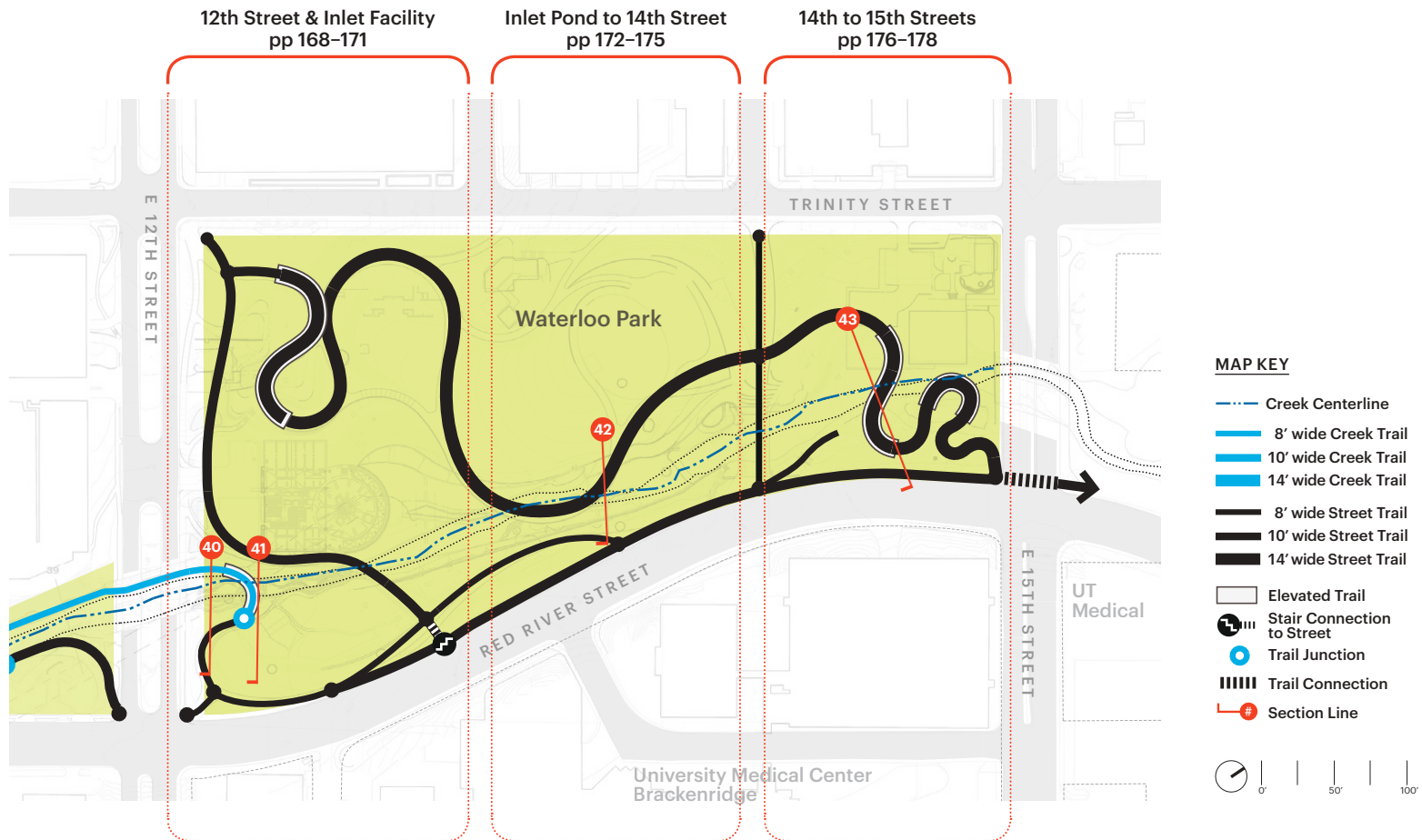
SEGMENT VI: 12TH TO 15TH STREETS



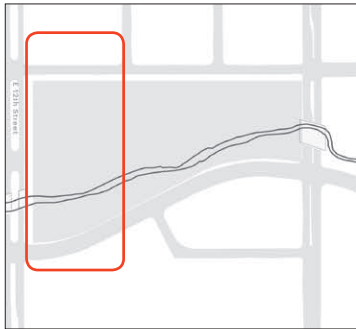


SEGMENT VI: 12TH TO 15TH STREETS



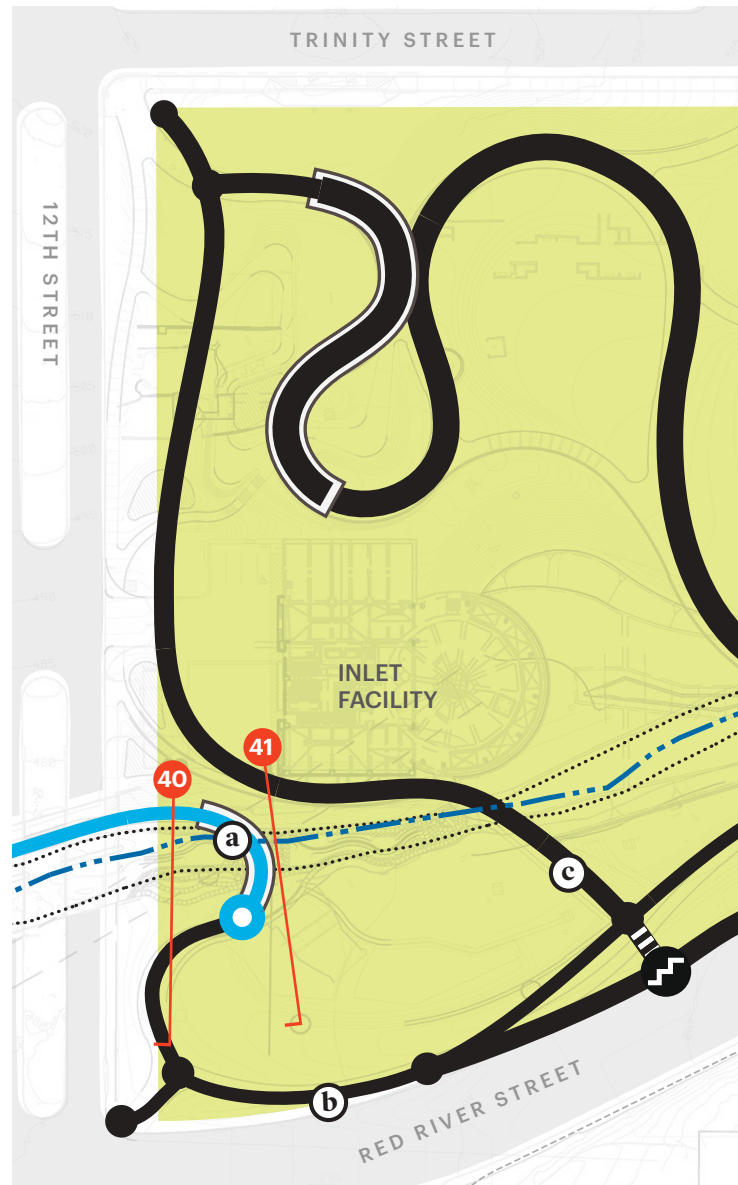


12TH STREET AND INLET FACILITY



MAP KEY

- Creek Centerline
- 8' wide Creek Trail
- 10' wide Creek Trail
- 14' wide Creek Trail
- 8' wide Street Trail
- 10' wide Street Trail
- 14' wide Street Trail
- Elevated Trail
- Stair Connection to Street
- Trail Junction
- Trail Connection
- Section Line



TRAIL ALIGNMENT

- a. Proposed 'Arc Bridge' connects the existing creekside trail beneath the 12th Street Bridge to the Waterloo Park trail system and sidewalks at street level. It passes over the 'Eco-Weir,' the area downstream of the tunnel dam where Waller Creek re-emerges.
- b. Red River Street sidewalk to be integrated into park trails. Future realignment of Red River (as related to Central Health redevelopment) may require redesign of circulation on the east edge of Waterloo Park.
- c. The elevations of the Waller Creek Tunnel dam must be maintained as designed. Trail on top of dam does not propose modifications to engineered grades.

HYDRAULICS & HYDROLOGY

- The hydraulics of this block are dominated by the tunnel inlet and the ecological weir.
- The restrict or plate on the Waterloo pond outlet culvert can be adjusted to pass the baseflow from the upstream reaches without diverting any of the baseflow to the tunnel.

FUNCTIONAL ASSESSMENT

- Zone 3 Assessment performed along Waller Creek from Red River to 3rd Street on April 2, 2015.
- Overall assessed condition is FAIR. (Riparian Zone = FAIR, Geomorphology = FAIR, Aquatic Habitat = POOR)
- Improvements should increase the overall assessed condition to GOOD or EXCELLENT.
- Consider increasing the riparian zone width, structural diversity of canopy and understory trees, reducing soil compaction, using log structures, providing shade along the channel, using natural materials such as native vegetation and rock to provide a stable channel form, and providing floodplain connectivity to improve stream function.

RIPARIAN SLOPES

- Between 12th Street and Waller Creek Tunnel dam (a), the banks are entirely reconstructed by the Waller Creek Tunnel project.

- The reconstructed banks and slopes are comprised of large stone blocks interspersed with plantings. On the west bank, between the ecological weir and the Inlet Facility Building, a planted slope is proposed.

AQUATIC HABITATS

- A boulder-lined ecological weir leads to a culvert within the dam that provides hydrological connectivity.
- The culvert was designed by the tunnel project engineers to allow aquatic organism to passage up and downstream. The ecological weir also provides aeration of creek waters, benefiting downstream habitats.

HERITAGE TREES & EXISTING VEGETATION

- Two Heritage Trees on this block are on the east bank and in fair condition.

UTILITIES

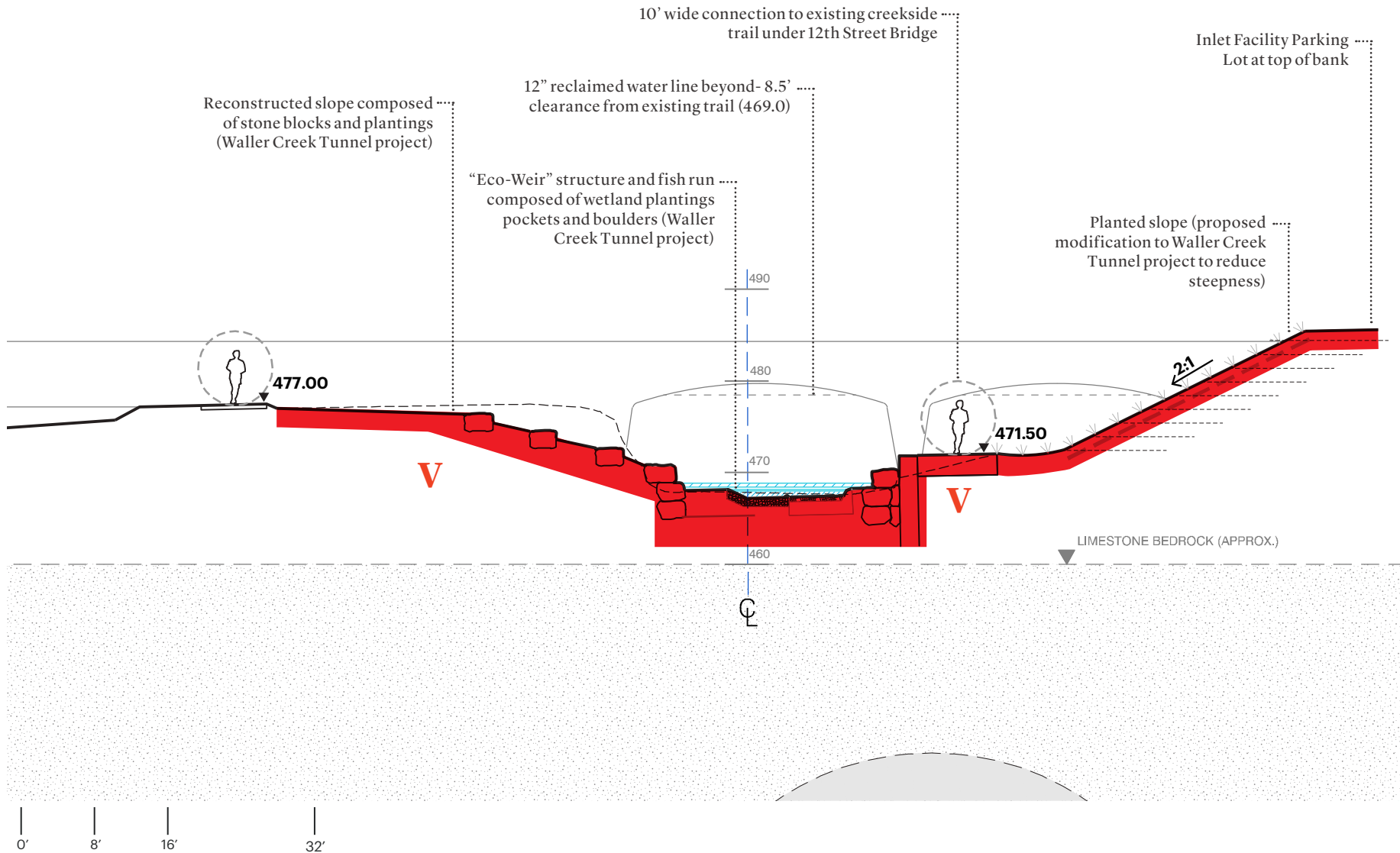
- No major utility conflicts identified on this block.
- A 12" reclaimed water line is attached to the south side of the 12th Street Bridge, and runs southward on Red River Street; bottom of pipe is 477.50, providing 8.5' clearance from existing trail.

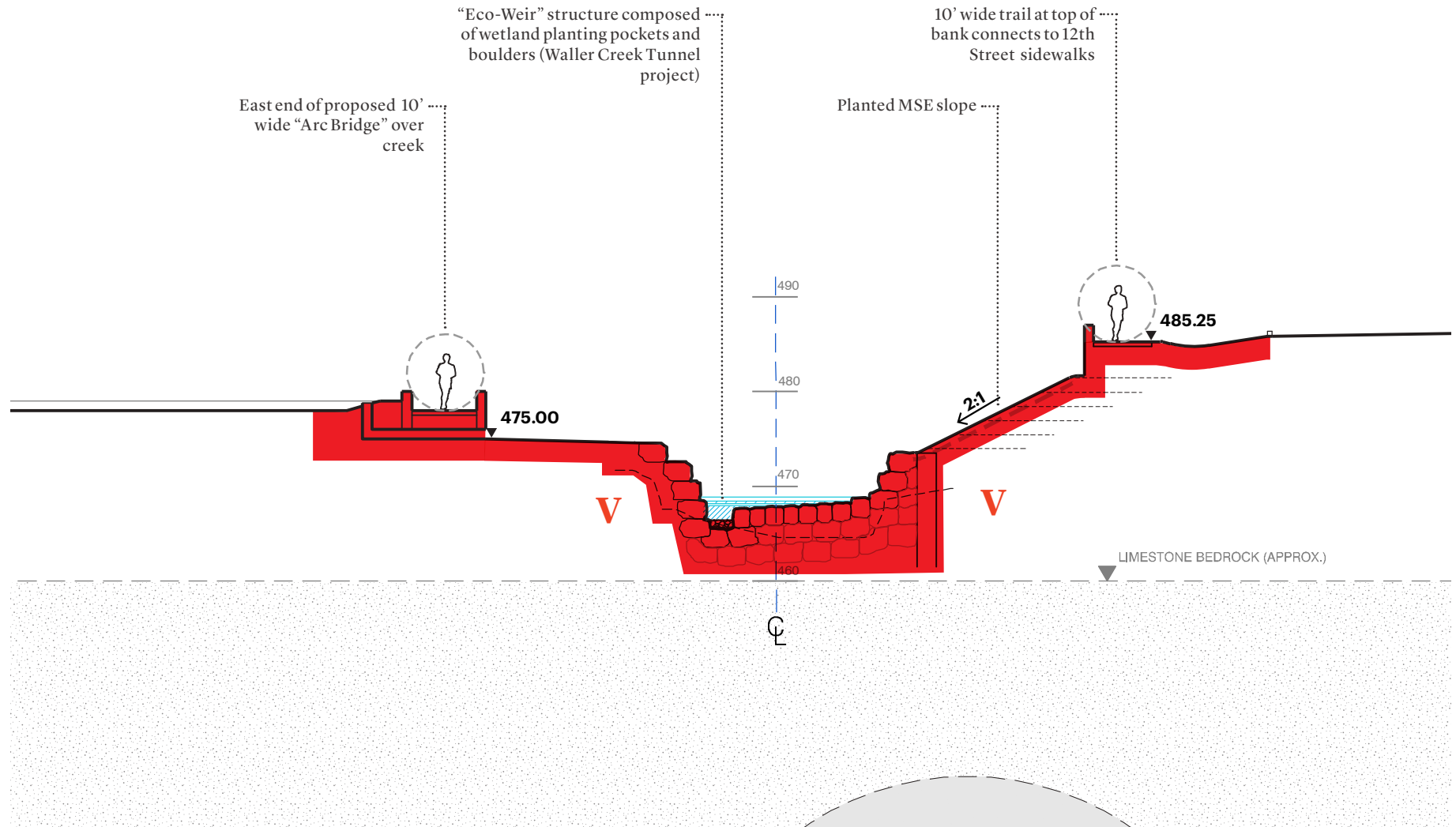
STORMWATER RETROFITS

- Existing outfalls on this block have been diverted into the Waller Creek Tunnel.

MAINTENANCE & OPERATIONS

- This block contains the primary trail connection to Waterloo Park. Heavy use is anticipated, particularly when events are being held at the Waterloo Park event venue.
- There is no direct access to the Eco-Weir, but it should be monitored for litter dropped from the pedestrian bridge above.
- Infrastructure related to the flood control functions of the Waller Creek Tunnel (e.g. the dam, recirculators, etc.) will be maintained separately from parkland and trails.





SECTION KEY

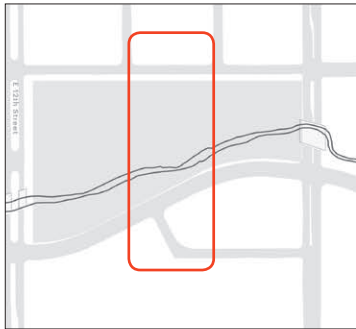
PROJECT TYPE
Do Nothing
Preservation
Restoration
Reconstruction

VEGETATION CLASS
I Problem Species Removal/Reseed
II Removal/Reseed/Replant
III Rescue and Salvage Plant/Seed
IV Significant Removal/Reseed/Replant
V Complete Replacement

GRADING
Grade Transition
Existing Grade
Slope Reinforcement

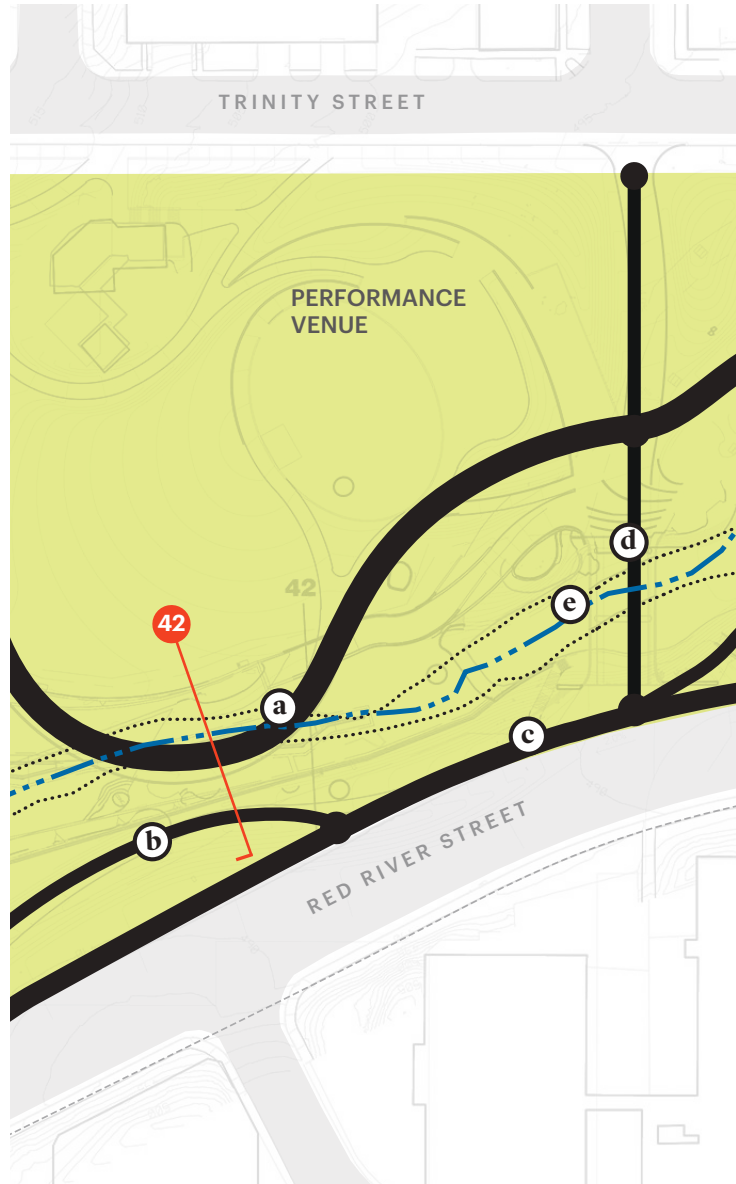
WATER SURFACE ELEVATION
100-YR WSE
2-YR WSE
5-11 CFS WSE

INLET POND TO 14TH STREET BRIDGE



MAP KEY

- Creek Centerline
- 8' wide Creek Trail
- 10' wide Creek Trail
- 14' wide Creek Trail
- 8' wide Street Trail
- 10' wide Street Trail
- 14' wide Street Trail
- Elevated Trail
- Stair Connection to Street
- Trail Junction
- Trail Connection
- Section Line



TRAIL ALIGNMENT

- a. Park circulation on structural lawn above west bank of Inlet Facility Pond
- b. Creekside trail on east bank provides north-south circulation when west bank is being used for events
- c. Future promenade in Red River Street right-of-way is intended to be the primary bicycle route within Waterloo Park. Alignment, width, and layout to be coordinated with Central Health redevelopment
- d. 14th Street Bridge (currently closed to vehicular traffic) to be rehabilitated for limited use related to park and performance venue functions.
- e. An existing low-water-crossing, the “knuckle bridge,” is to be removed as it creates an attractive nuisance by bringing the public close to the tunnel inlet pond.

HYDRAULICS & HYDROLOGY

- The hydraulics in this area are controlled by the 14th Street bridge and the approach structure for the tunnel inlet.
- During the 5-year to 50-year events, the shallow, fast moving water entering Waterloo pond creates conditions conducive for a hydraulic jump or standing wave. The existence of a standing wave is not significantly altered by the presence or removal of the low-water crossing.
- The 14th Street Bridge will be overtopped during floods greater than the 25-year event.

FUNCTIONAL ASSESSMENT

- A Functional Assessment was not performed in this area as it is under construction as the Waller Creek Tunnel approach structure.

RIPARIAN SLOPES

- The west bank of this block is comprised entirely of a vertical concrete retaining wall that forms the side of the Waller Creek Tunnel inlet pond.
- The east bank of this block is an entirely reconstructed earthen slope between the concrete inlet pond edge and Red River Street right-of-way.

AQUATIC HABITATS

- The creation of aquatic habitat on this block is limited by the conditions of the Waller Creek Tunnel inlet pond.
- The pond itself is constructed entirely out of

concrete, and is engineered to convey floodwaters quickly into the Waller Creek Tunnel. As the pond is serviced by infrastructure and maintenance protocols to keep it clear of debris, it is unlikely that robust aquatic habitat will be fostered in this area.

- Water recirculators are built into the east bank wall and the Inlet Facility itself, allowing oxygenation of standing water in the pond.
- The structural lawn proposed on the west bank will provide some shade over the pond water, potentially providing cooling effects.

HERITAGE TREES & EXISTING VEGETATION

- There are three Heritage Trees on this block, all on the west bank, near the 14th Street Bridge. Two are known to be in poor condition.

UTILITIES

- An overhead utility crosses Red River Street, with a wooden pole on the Waterloo Park side of the right-of-way. This pole was not upgraded to steel during tunnel construction in anticipation of future park regrading.
- Future regrading and reconfiguration of the Red River right-of-way should coordinate closely with Austin Energy and telecom providers on upgrades and modifications to this infrastructure.

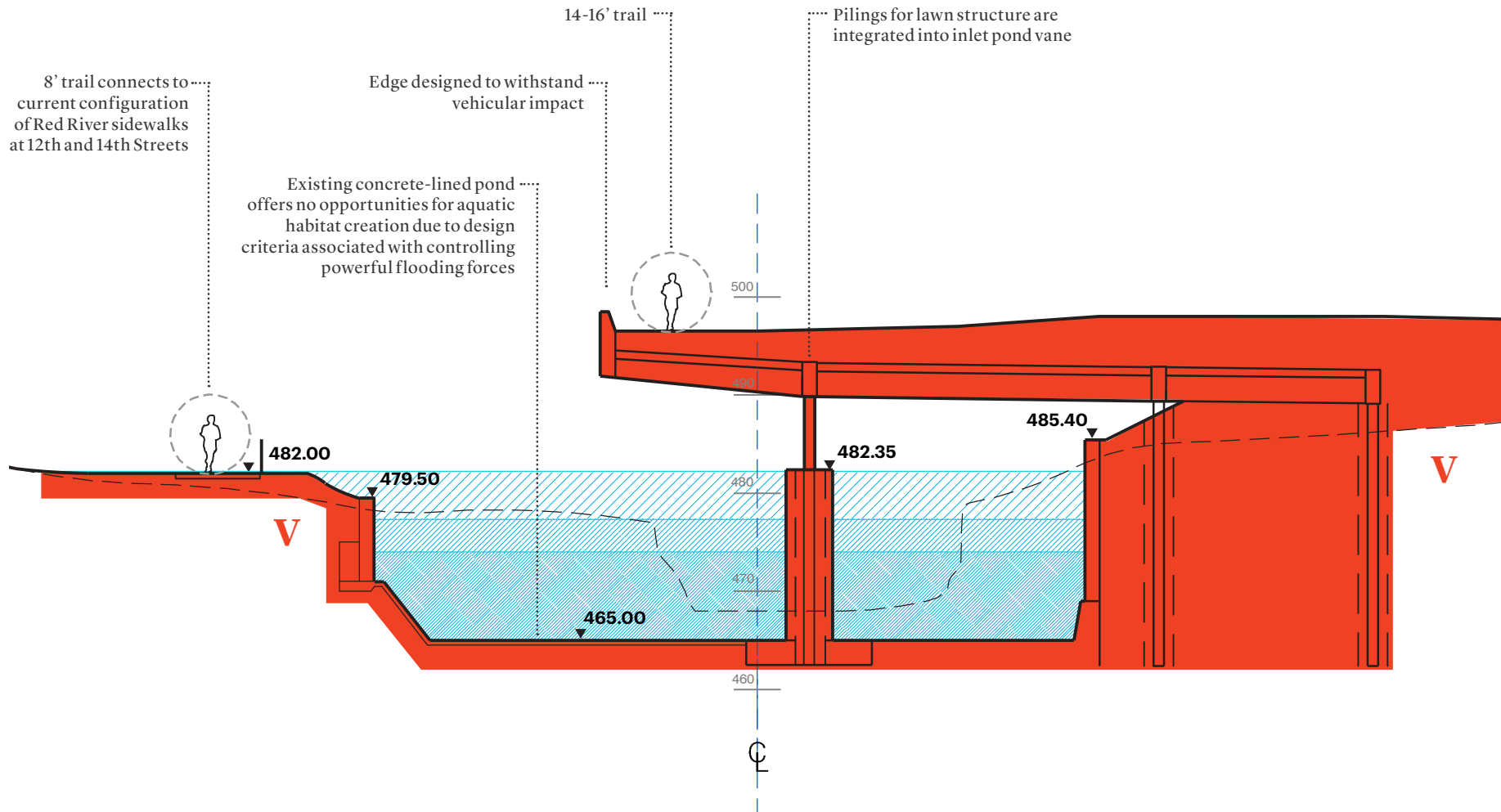
STORMWATER RETROFITS

- Existing outfalls on this block have been diverted into the Waller Creek Tunnel.

MAINTENANCE & OPERATIONS

- Infrastructure related to the flood control functions of the Waller Creek Tunnel (e.g. the dam, recirculators, etc.) will be maintained separately from parkland and trails.
- Waterloo Park is anticipated to undergo heavy use as a park destination and performance venue. This block will require an appropriately high level of maintenance compared to other areas of the trail system.

INLET POND TO 14TH STREET BRIDGE



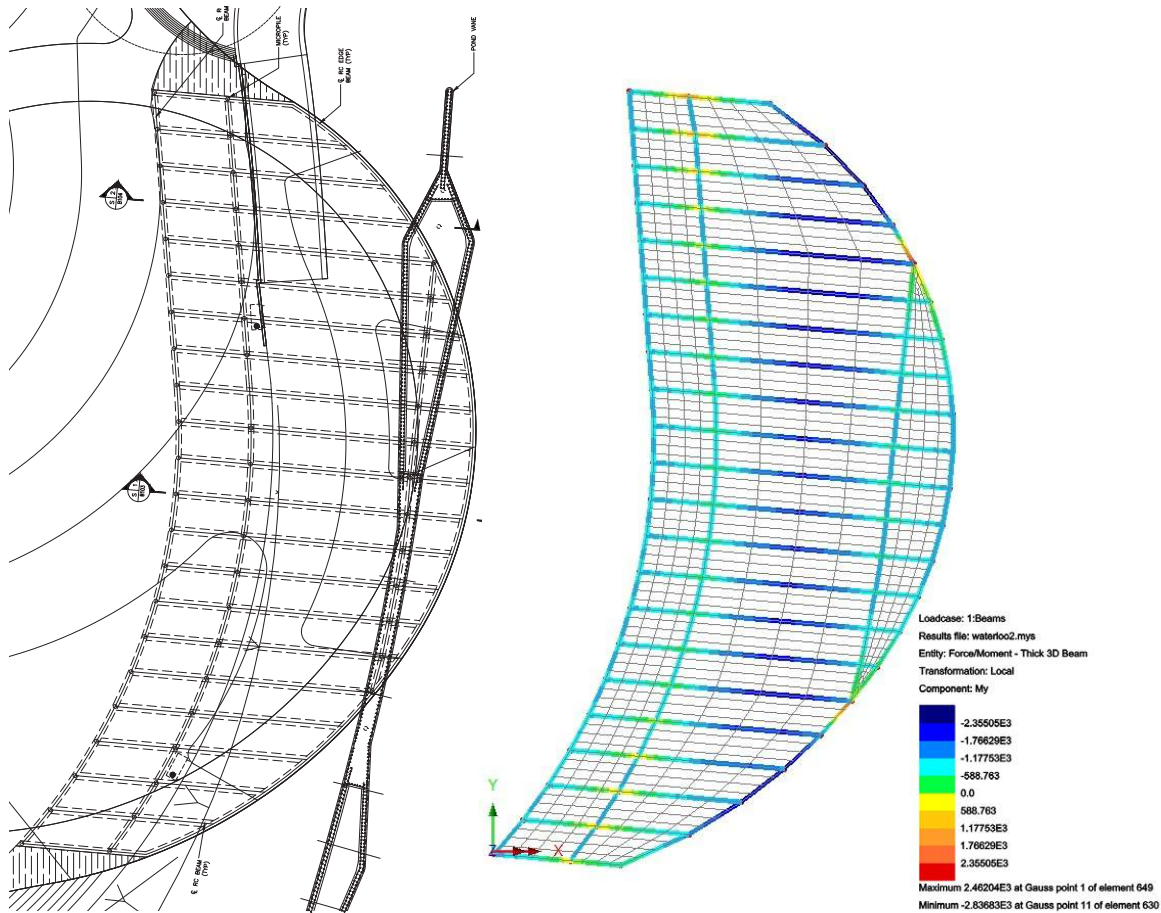
SECTION KEY

PROJECT TYPE
 Do Nothing
 Preservation
 Restoration
 Reconstruction

VEGETATION CLASS
I Problem Species Removal/Reseed
II Removal/Reseed/Replant
III Rescue and Salvage Plant/Seed
IV Significant Removal/Reseed/Replant
V Complete Replacement

GRADING
 Grade Transition
 Existing Grade
 Slope Reinforcement

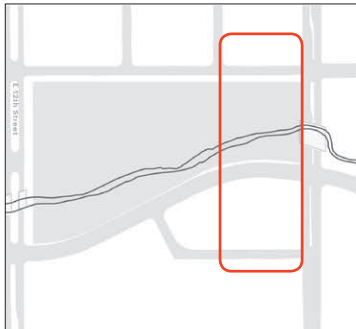
WATER SURFACE ELEVATION
 100-YR WSE
 2-YR WSE
 5-11 CFS WSE



THE LAWN STRUCTURE

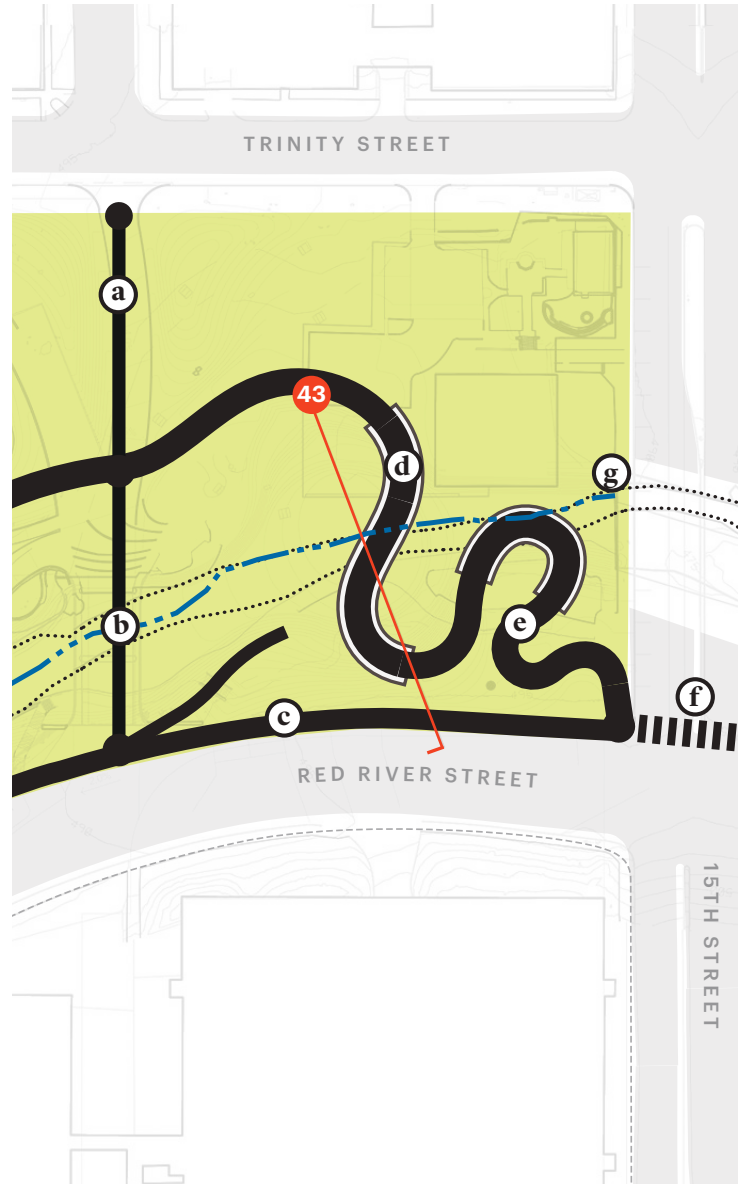
A critical move for the redevelopment of Waterloo Park is coordinating the current construction of the tunnel inlet facility to accommodate future sleeves for piles (pictured on right) that will support 16,000 sf expansion of park area over the inlet pond and hydrological pond vane. This structure helps mitigate the presence of these concrete structures in a park context and makes it feasible once more for Waterloo Park to host performance events and festivals

14TH TO 15TH STREETS



MAP KEY

- Creek Centerline
- 8' wide Creek Trail
- 10' wide Creek Trail
- 14' wide Creek Trail
- 8' wide Street Trail
- 10' wide Street Trail
- 14' wide Street Trail
- Elevated Trail
- Stair Connection to Street
- Trail Junction
- Trail Connection
- Section Line



TRAIL ALIGNMENT

- a. West of Waller Creek, the 14th Street ROW is restored as a park road that provides maintenance access to the Waller Creek Tunnel pond and loading access to the Performance Venue.
- b. The 14th Street bridge that crosses Waller Creek will be re-paved and opened to limited vehicular traffic (Waller Creek Tunnel, performance venue, park operations).
- c. Red River Street is to be re-aligned between 12th and 15th Streets as part of the Central Health redevelopment. A shared promenade within the former Red River ROW serves as the seam between park and hospital development, and is intended to be the primary bicycle route through Waterloo Park.
- d. A serpentine bridge crosses Waller Creek above the Stillwater Pool linking existing north-south Trinity Street bike routes with Red River routes. On this block, upstream of the tunnel inlet facility, the original Waller Creek floodplain is still present.
- e. A pedestrian connection (<5%) to 15th Street works around existing Heritage Trees.
- f. Primary trail pedestrian connection to new medical district occurs on the east bank of Waller Creek. A signalized pedestrian crossing is recommended with the re-alignment of Red River Street.
- g. As this block will experience the effects of flash flooding even after completion of the tunnel, the Framework Plan does not include trail access at creek level as a public safety measure.

HYDRAULICS & HYDROLOGY

- The 15th Street bridge will be overtopped during floods greater than the 25-year event.
- The orientation of the 15th Street bridge relative to the downstream channel creates conditions conducive to high levels of turbulence and bank erosion.

FUNCTIONAL ASSESSMENT

- Zone 3 Assessment performed along Waller Creek from Red River to 3rd Street on April 2, 2015.
- Overall assessed condition is FAIR. (Riparian Zone = FAIR, Geomorphology = FAIR, Aquatic Habitat = POOR)
- Improvements should increase the overall assessed condition to GOOD or EXCELLENT.
- Consider increasing the riparian zone width, structural diversity of canopy and understory trees, reducing soil compaction, using log structures, providing shade along the channel, using natural materials such as native vegetation and rock to provide a stable channel form, and providing floodplain connectivity to improve stream function.

RIPARIAN SLOPES

- Given the extreme hydraulic conditions that will be experienced on this block, the existing configuration of the riparian slopes may not be appropriate to the level of public activity that will occur here once Waterloo Park is redeveloped as a multi-use park and event facility.
- A proposed “Stillwater Pool” is intended as a landscape of stone and appropriate riparian

vegetation that can thrive under high public use and the hydraulic forces described above.

- The regrading of existing banks should respond to the effects of dramatic changes in channel form upstream and downstream of this block.

AQUATIC HABITATS

- The existing aquatic habitat in this area has been impacted by the diversion of Waller Creek for tunnel construction activities
- Improvements to aquatic habitat will need to be coordinated closely with the redesign of upland park areas in future design phases.

HERITAGE TREES & EXISTING VEGETATION

- There are seven Heritage Trees on this block; all but one are in good or fair condition.

UTILITIES

- An overhead utility line crosses the creek mid-block. Removal of this line would require a minimum of 340' of underground conduit to be constructed on Trinity Street between 13th and 15th Streets.

STORMWATER RETROFITS

- Three existing outfalls on this block emerge from the west bank, #58045, #58061, and #676381. These have been assessed as low contributors and not good candidates for landscape, inline or sewershed treatment.
- The reconstruction of riparian slopes and redesign of Waterloo Park will likely require reconfiguration of these outfalls.

MAINTENANCE & OPERATIONS

- Infrastructure related to the flood control functions of the Waller Creek Tunnel (e.g. the dam, recirculators, etc.) will be maintained separately from parkland and trails.
- Waterloo Park is anticipated to undergo heavy use as a park destination and performance venue. The Serpentine Bridge and upland areas will require an appropriately high level of maintenance compared to other areas of the trail system.
- There is no direct creekside trail access, and these areas may be maintained in a manner more consistent with riparian slopes elsewhere in the corridor.
- The lack of creekside trails on this block limits access for maintenance vehicles.





