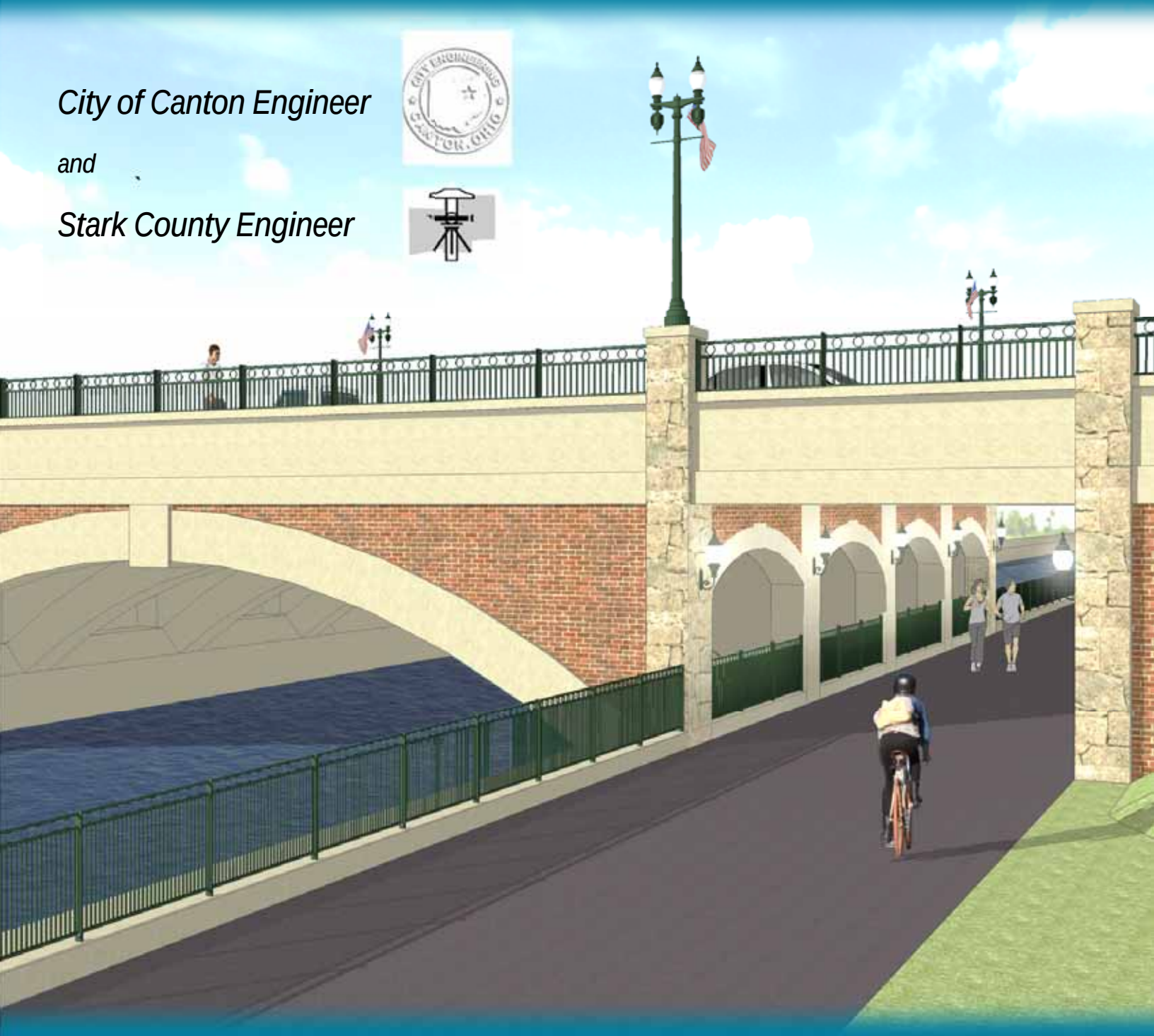
12th Street NW Bridges Replacement Alternatives Evaluation Report PID 90671

July 11, 2013

City of Canton Engineer

and

Stark County Engineer



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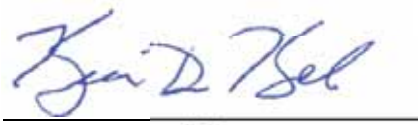

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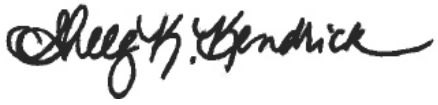

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Alternatives Evaluation Report

12th Street NW Bridges Replacement

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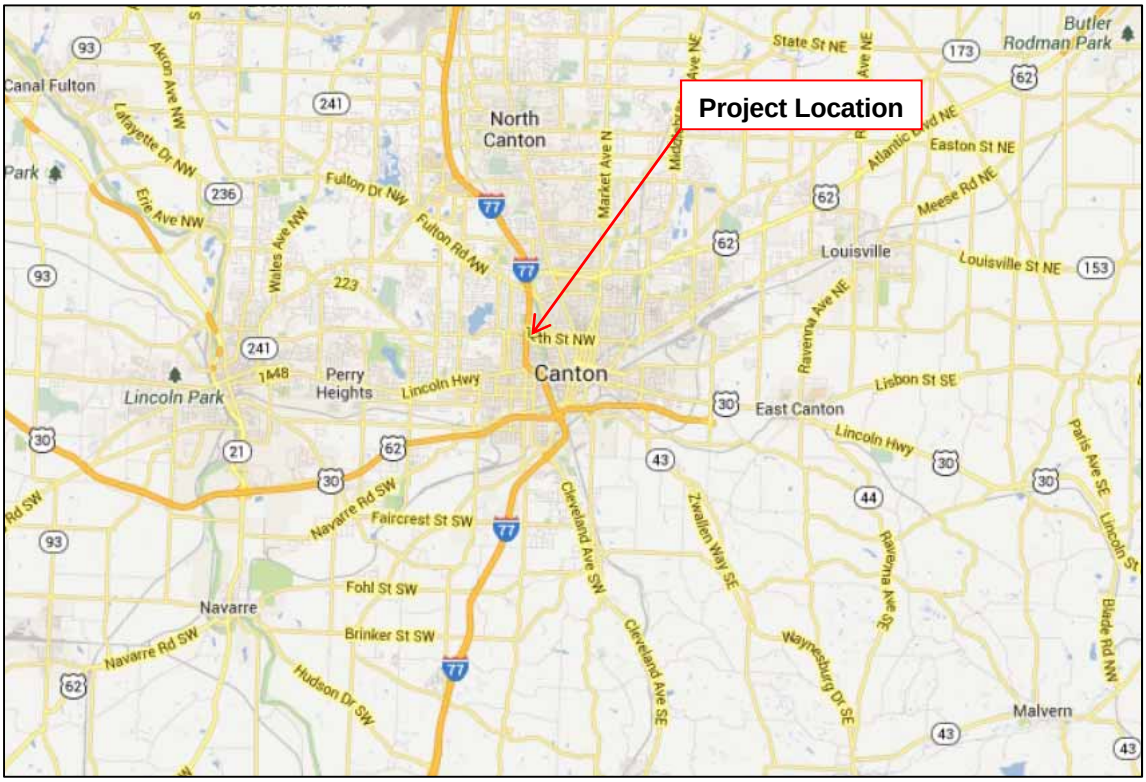
1. Executive Summary

The 12th Street NW Bridges Replacement Project will replace two deteriorating concrete arch bridges along the 12th Street Scenic Byway through the Canton Parks: the Stark County bridge over the West Branch Nimishillen Creek and the City of Canton bridge over the Canton Waterworks Raceway. It will also continue the 12th Street Corridor improvements including full-depth pavement replacement and roadway alignment improvements as well as Complete Streets improvements such as widened sidewalks with Canton City standard streetscaping, improving the multi-use trail at-grade crossing with the addition of an underpass, and other multi-modal enhancements. See below for project location and see Study Area Map on Page 2 for project limits.

The preferred alternative for the Stark County bridge is a three-span continuous concrete slab supported on a closed arch-rib substructure with aesthetic cap and column pier and wall-type abutments. The City of Canton bridge proposed alternative is a single span concrete slab on wall-type abutments with arched fascia walls. The preferred trail alternative includes a trail underpass beneath the Stark County bridge and the relocation of the existing pedestrian truss bridge to the north in order to improve the trail alignment and profile. The total estimated construction cost for this project with the preferred alternatives is *$6,560,280.00.*



2. Study Area Map

3. Project Description

The 12th Street NW Bridges Replacement Project is located within the City of Canton and Stark County, Ohio. The project runs along 12th Street NW, an Ohio & Erie Canalway and America's Byway route, and a major east-west corridor through the City of Canton that connects Interstate 77 on the west to the Mahoning Road Economic District at the east end. The Project Location and Project Components Maps can be found in Appendix A. This project is also a part of the 12th Street / Mahoning Road Corridor Improvement Projects and is adjacent to the STA-12th Street Corridor Improvement Project (Appendix A). Approximately one half mile in length, the 12th Street NW Bridges Replacement project has an eastern terminus at Monument Road NW, and a western terminus at the Mercy Drive / I-77 Ramps, recently ranked by the Stark County Area Transportation Study (SCATS) as the fourth most hazardous intersection in the City of Canton and Stark County (Appendix A). These limits include an intersection with Stadium Park Drive NW, as well as drive entrances to Mercy Medical Center and the City of Canton and Stark County Park System, all on the north side of the road.

The purpose of the project is to replace two structurally deficient bridges, the Stark County bridge over the Nimishillen Creek and the City of Canton bridge over the Canton Waterworks Raceway. The project will improve a deteriorating commonplace road and bridge byway with an aesthetically pleasing, streetscaped corridor with multi-modal improvements for users of all abilities. This project is a continuation of the ongoing upgrade of adjacent facilities on the 12th Street Corridor as well as a connection within Canton's Trail Corridors and Stark Parks Master Greenway Plan (Appendix A). The project's Complete Streets, Livable Community goals provide a safer and more attractive Byway for multi-modal users of all abilities.

4. Proposed Solution

Far more multifaceted than its name would suggest, the 12th Street NW Bridges Replacement Project implements Complete Streets, Livable Community concepts. As part of the proposed improvements, the structurally deficient Stark County bridge over the West Branch Nimishillen Creek and the structurally deficient City of Canton bridge over the Canton Waterworks Raceway will both be replaced with aesthetically pleasing, lower maintenance structures. Benefits of this project include a new multi-use trail underpass for the West Branch Trail beneath the new Stark County bridge, which currently crosses 12th Street NW at-grade just west of the railroad at the east end of the project. Additional benefits include improvements within the parks, the narrow ±4'

sidewalk extending along a portion of the project and providing access for students of Lehman Middle School to and from the school, and hospital employees will be replaced with wider, 10' sidewalks with ADA (Americans with Disabilities Act) details and streetscaping on both sides of the road. The elimination of an unnecessary vehicular lane along a portion of the route will make the addition of wider sidewalks more economical by reducing the grading necessary on the adjacent hillside. Two new SARTA bus stops will be added along the route to both sides of the road at the parks, including benches, signs and shelters. Roadway modifications will also include alignment and profile improvements where possible as well as the full-depth replacement of the existing high maintenance pavement on this steep roadway. In addition, lane improvements will be made at the west end of the project to improve this hazardous intersection and if possible, this project will connect the coordinated inter-connected signal system from the adjacent project to the east, to the traffic signal at the west end of this project. This project provides these notable benefits to local residents, businesses, motorists, pedestrians and bicyclists. Some of these stakeholders include Mercy Medical Center, Canton City Schools (Lehman Middle School), Stark Area Regional Transit Authority (SARTA), Akron Metro Railroad and Cuyahoga Valley Scenic Railway, as well as users of the City of Canton and Stark County Park System. These improvements serve as a catalyst for economic and community redevelopment in Downtown Canton.

5. Roadway

5.1 Description

The limits for this project begin at the intersection of 12th Street NW and Mercy Drive/I-77 Ramps and extend east along 12th Street NW to terminate at the Akron Metro railroad tracks just west of the intersection of 12th Street NW and Monument Road. The roadway is classified as urban principal arterial with a design speed of 35 mph and a projected 2035 ADT of 12,200. The west side of the project is relatively flat and passes between Mercy Medical Center on the north and Westlawn Cemetery on the south. The roadway continues east down a steep, winding grade aptly named "Serpentine Hill" as it enters the McKinley Memorial Park. Once in the park the grades flatten out again as it crosses the Canton Waterworks Raceway and Nimishillen Creek on two separate structures. Existing lane configuration consists of two lanes in each direction near the project start with one eastbound lane dropping at the Mercy Medical Center Drive as you progress down the hill. At the bottom of the hill the third lane becomes a left turn lane onto Stadium Park Drive. This turn lane backs up to a left turn

lane onto Monument Road. The multi-use West Branch Trail crosses 12th Street NW at-grade just west of the Akron Metro railroad tracks.

5.2 Geometry

5.2.1 Existing Geometry

The horizontal alignment of 12th Street NW consists of a tangent at the western end of the project then goes into a tight curve to the right just past Mercy Medical Center at the top of the hill. This curve is severely substandard with a radius of 79' which is adequate for a design speed of less than 20 mph. Following the tight curve is a tangent down the hill which transitions into a curve to the left of with a radius of 385'. This curve is adequate for a design speed of 35 mph. 12th Street NW then crosses the Canton Waterworks Raceway and Nimishillen Creek on a tangent before reaching the project terminus. The vertical alignment consists of relatively flat grades at the western and eastern ends of the project with a steep grade of approximately 8% connecting them. Vertical curves are located at the transitions into and out of the steep grade. There is an isolated dip in the roadway at the tight curve, possibly due to poor soils or the stress of vehicles making the turn, which creates a substandard vertical alignment in this area. Ignoring this anomaly, the remaining vertical curves meet minimum design criteria. The low point of the roadway is located just east of the bridge over the Nimishillen Creek.

The project impacts two intersections within the work limits. The project begins at the signalized intersection of 12th Street NW and Mercy Drive/I-77 Ramps. Existing lane configuration on the east leg consists of a thru lane eastbound, thru lane westbound, a thru/right lane westbound and a painted island. The other legs of the intersection are outside the project limits. 12th Street NW crosses Stadium Park Drive at a stop-controlled intersection between the Canton Waterworks Raceway and the bridge over the Nimishillen Creek at the bottom of the hill. Stadium Park Drive is a two lane roadway with no shoulders that is primarily used as an access road to the park. It has an ADT of 1,560. 12th Street NW has short opposing left turn lanes at this intersection, approximately 150' long. The project terminates at the west R/W line of the Akron-Metro Railroad, just west of the 12th Street NW intersection with Monument Road NW.

5.2.2 Proposed Geometry

The roadway improvements of this project will improve the geometry as much as possible while minimizing impacts to the surrounding properties. The following major parameters were used as constraints to optimize the design:

1. No impacts to the retaining wall and no R/W takes of any kind on the cemetery property.

2. Minimize impacts to the Mercy Medical Center Parking Lot and Hospital entrance.

3. Implement “Complete Streets” concepts including pedestrian friendly features and streetscaping.

4. Raise the profile over the Nimishillen enough to allow the multi use trail to pass beneath it.

5. No impact on the Akron Metro Railroad.

6. Avoid sliver fills on north side embankment of hill.

The tight substandard curve, in conjunction with the steep grade and Mercy Medical Center driveway, makes for a potentially unsafe condition. The best fit horizontal alignment for 12th Street NW shifts the roadway to the east at the top of the hill to improve the radius of the western curve. The proposed roadway along the steep grade is shifted as far east as possible without requiring sliver fills on the north side. The radius of the western curve was improved to 155’, which is acceptable for a 25 mph design speed. This is the greatest possible improvement in radius without impacting the Westlawn Cemetery R/W on the south side of the roadway. Because the radius does not meet 35 mph requirements, a *design exception* will be required for horizontal alignment – Degree of Curve. Preliminary investigations show that improving the alignment and profile to meet current standards would result in unacceptable impacts to the adjacent cemetery and parks. To minimize impacts to the Mercy Medical Center at the west end, interior lane widths were reduced to 11’ and exterior lanes were reduced to 13’.

The improvements to the western curve at the top of the steep grade necessitate changes to the bottom / eastern curve so as to not reduce this curve’s design speed.

The eastern curve was adjusted to minimize Park impacts and to tie back into the existing alignment to the east as quickly as possible to minimize impacts to the bridges. The existing second westbound lane on the steep grade is not warranted by traffic demand or as an independent truck lane and is recommended for elimination with this project. Removing this lane provides additional space for the horizontal alignment improvements, and for the streetscaping and sidewalks, while minimizing the R/W impacts. The curve at the bottom of the hill was adjusted slightly to have a 370' radius which is acceptable for a design speed of 35 mph. Appropriate superelevation will be provided on both of the improved curves.

The 12th Street NW roadway profile was raised nearly two feet near the Nimishillen Creek to provide the necessary clearance for the multi-use trail underpass and smooth out the grade across the railroad tracks. West of the West Branch Nimishillen Creek, the profile transitions back close to existing grade. Minor adjustments were made along the entire profile to smooth out irregularities, minimize earthwork and avoid impacts to the cemetery R/W. All vertical alignment components meet the minimum design criteria for a speed of 35 mph.

The east leg of the intersection of 12th Street NW and Mercy Drive will be reconfigured with this project. The proposed lane configuration will consist of a thru lane eastbound, a thru lane westbound, a dedicated right turn lane westbound and a painted island. The intersection of 12th Street NW and Stadium Park will need to be completely reconstructed due to the change in profile. The proposed profile is over 2 feet higher than the existing at the intersection. Approximately 550' of full depth reconstruction will be required along Stadium Park Drive to tie the roadway back into existing (25 mph design speed utilized for Stadium Park Drive). The existing left turn lanes on 12th Street NW were maintained.

No changes in lane configuration are proposed for the west leg of the 12th Street NW intersection with Monument Street.

5.3 Drives

Only two drives exist within the project limits. The first is at the entrance to Mercy Medical Center located at the western end of the project near the top of the hill. This drive serves as the main entrance to access the visitor/employee parking deck and for patient drop off. The horizontal roadway relocation and streetscaping will require reconstruction of this drive. The following three alternatives were provided to the hospital for their consideration.

1. Maintain existing drive location and width.

2. Relocate drive to the west further away from tight curve while maintaining width.

3. Create two smaller drives, one right in only to the east of the existing drive and one full access to the west of the existing drive.

All three alternatives include the addition of a short westbound right turn lane at the top of the hill to provide access into the drive. Alternative 3 is currently proposed to best suit hospital needs.

The second drive is located near the eastern end of the project just east of the bridge over the Nimishillen Creek. This drive serves the trailhead parking lot for park access. The proposed profile grade is approximately 1.7' higher than existing here, thus requiring reconstruction of the majority of the parking lot. No impact is expected to the sidewalk or restroom facilities located next to the parking lot.

5.4 Transit

The 12th Street NW corridor is also a major bus transit route within the project limits. Two new SARTA bus stops will be provided with this project. They will both be "major" stops, including concrete pad, shelter and bike racks. They are tentatively located in the in both the westbound and eastbound lanes just west of Stadium Park Drive. These locations are approximate and contingent upon approval from SARTA.

5.5 Conceptual Drainage

5.5.1 12th Street NW Storm Sewer west of the West Branch Nimishillen Creek

An existing 18" to 24" trunk sewer is located in the center of the eastbound lane and runs from Timken Mercy Medical Center east to the outlet at the West Branch Nimishillen Creek. Due to the full-depth pavement replacement and roadway shift, as well as the need to increase the pipe size to meet current standards, the existing storm sewer system on 12th Street NW will be replaced with a new storm sewer.

A preliminary analysis determined that the trunk sewer will need to be upsized to approximately 36" for a 10-year frequency storm. The proposed trunk sewer will be located in the middle of the eastbound lane, which is similar to the existing

configuration, but will be in a location north of the existing trunk sewer due to the relocation of the proposed roadway. The drainage area contributing to the proposed trunk line from the Timken Mercy Medical Center was determined based on the Old Timken Drive and Mercy Hall Drainage Study performed by Hammontree & Associates in December of 2010. The trunk sewer draining from the west will outlet into the Canton Waterworks Raceway for low flow conditions to enhance the water quality and be diverted into the West Branch Nimishillen Creek for an overflow during high flows. A structure is shown on the plans west of the Canton Waterworks Raceway to provide a conceptual plan for the low flow and high flow outlets.

5.5.2 12th Street NW Storm Sewer east of the West Branch Nimishillen Creek

The existing 60" reinforced concrete storm sewer drains west from Monument Road and outlets south of the 12th Street NW Bridge into the West Branch Nimishillen Creek. A relocation of the existing outlet, 70 feet to the south, is required to provide proper horizontal and vertical geometries for the proposed multi-use trail. As shown on the plans, a manhole will be added to the existing pipe in the center of the turn lane on 12th Street NW to connect the new outlet storm sewer. A proposed 48"x76" elliptical storm sewer, which is equivalent to the existing 60" storm sewer, is required due to the multi-use trail elevation. The multi-use trail elevation cannot be raised due to the minimum vertical clearance required under the 12th Street NW Bridge. The proposed storm sewer outfall is located as close to the existing outfall as possible while providing cover under the trail and avoiding the large 48" trees located south of the proposed outlet.

5.5.3 Conceptual Post Construction Storm Water Structural Best Management Practices (BMPs)

According to the City of Canton Storm Water Management Manual, the Ohio Department of Transportation (ODOT) Location and Design Manual Volume 2 may be used for the design of the post-construction storm water quality best management practices (BMPs). The project earth disturbing activity (EDA) is greater than 1 acre requiring the use of BMPs on this project. The EDA is approximately 8 acres and the new impervious area created in new Right of Way is 0.6 acres and includes new impervious area due to the proposed roadway and multi-use trail. Therefore, according to the ODOT Location and Design Manual only water quality treatment is required to ensure compliance with Ohio's Water Quality Standards.

One option is to use the existing soccer field north of 12th Street NW between the Canton Waterworks and Stadium Park Drive to provide a bioretention cell or a vegetated biofilter. This area is currently located in a FEMA flood zone which is not an ideal location for a BMP. In addition, the soccer field would no longer be able to be used in this area.

A second option is to use the area located on the south side of 12th Street NW between the Canton Waterworks Raceway and the Stadium Park Drive located just east of the v-shaped walking trail as a bioretention cell. This area is located directly behind the existing building, is approximately 2,000 square feet and may require the removal of a few trees.

A third option is to use exfiltration trenches along the roadway which will capture the roadway drainage at the outside edge of the shoulder through the use of a permeable concrete surface. It is our understanding that the City would prefer to use another method for BMPs if possible, due to maintenance concerns.

A fourth option is to use the Canton Waterworks Raceway as the BMP. It is our understanding that the City recently received a grant from the Muskingum Watershed Conservancy District to re-design the existing raceway into a constructed wetland. The limits of this constructed wetland project will exceed the post-construction storm water quality management requirements for this roadway project. This constructed wetland will likely be built at least one year prior to the 12th St. NW Bridges Replacement Project. Our recommendation is to use the re-designed raceway as the BMP for this project as it will meet the Ohio EPA NPDES permit requirements and eliminates additional City maintenance in the future.

The County Engineer Approval Form (LD-33) and Drainage Criteria Form (LD-35) are located in Appendix C.

5.6 Railroad

The Akron Metro Railroad located at the east end of the project just prior to the intersection of 12th Street NW and Monument Street will not be disturbed as part of this project. The crossing will be improved and new gates installed, likely within one year prior to construction of this project. The sidewalk will be widened near the tracks to accommodate these new gates. Additionally, no trees shall be placed within 280’ of the centerline of the tracks.

5.7 Utilities

In addition to storm sewer, the following utilities exist within the project limits:

1. Sanitary Sewer – City of Canton
   Two major sanitary lines, 54" and 33", cross 12th Street NW at the east end of the project. These lines will not be disturbed during construction of this project but several manholes may need adjusted to grade. An additional sanitary line is located at the west end of the project in the R/W, along the Mercy Medical Center property. This line will also not be disturbed but may require a manhole be reconstructed to grade.

2. Water – City of Canton
   A water line is located within the project limits at the west end of the project on the Mercy Medical Center property. No impacts are expected to the water main itself but appurtenances such as valves and hydrants may need to be relocated or adjusted.

3. Electric – AEP
   The electric lines within the project limits are overhead. A pole line runs along the south side of 12th Street NW for the entire length of the project. These lines are single phase primary conductors from the west end of the project to the tight curve and polyphase secondary conductors from that point to the east end of the project. It is anticipated that this entire line of poles will need to be relocated due to the new sidewalk. Another line of poles runs along the west side of Mercy Drive and will not be impacted by this project.

4. Telecommunications – AT&T, MCI, Time Warner Cable
   MCI underground lines are located west of the Akron Metro Railroad centerline within the railroad right of way. These lines will not be impacted by this project. Time Warner has overhead facilities located on the AEP poles, which will require relocation as noted above for AEP. AT&T also has overhead facilities and shares the AEP poles from the western end of the project east to the tight curve. At this point the line goes underground and feeds Mercy Medical Center. The overhead AT&T lines will require relocation as noted for AEP above. The underground line may also be disturbed by the pole relocation at the drop and potentially by the roadway improvements, depending on the depth of the facility.

5. Gas – Dominion
   Gas lines are located within the project limits on the Mercy Medical Center property and will not be disturbed by the proposed work.

5.8 Traffic

Traffic volume data was gathered at two intersections for the 12th Street NW project. The intersections include Stadium Park drive and Mercy Drive/I-77 Ramps. Additional information gathered included number of lanes, lane assignments, intersection lane configuration, speed limits, and traffic signal timing and phasing. This information was used for the analysis. Certified traffic was received on May 10, 2013, after our traffic analysis was completed, and can be found in Appendix B. The certified traffic will be used for final design.

The annual growth rate in the study area was estimated to be 1.5 percent based on the Ohio Department of Transportation's (ODOT) certified traffic for the Nimishillen Creek Bridge. Design year (2035) traffic projections were developed based on existing traffic volumes and the estimated annual growth rate. Refer to Appendix B for traffic volume diagrams and existing counts.

A capacity analysis is the primary method for evaluating the efficiency of any roadway. LOS is a qualitative measure that describes operational conditions of roadways. The *Highway Capacity Manual 2010* (HCM 2010), published by the Transportation Research Board, outlines capacity analysis procedures and criteria for defining LOS. The traffic analysis was performed using HCS 2010. Traffic flow was analyzed for morning and afternoon peak-hour conditions for the referenced intersections. The analysis resulted in the determination of existing peak-hour delays, measured in terms of average vehicular delay per vehicle, and corresponding levels of service (LOS), which provide a qualitative assessment of traffic conditions based on average delay. These results were used as benchmarks for comparisons with no-build and build future traffic conditions. The HCM 2010 defines six LOS's, designated by the letters A through F. LOS A represents the best operating conditions, and LOS F represents the worst operating conditions.

The existing conditions analysis indicates that all of the study intersections operate at LOS D or better during the morning and afternoon peak hours.

The traffic analysis for the design year was performed based on projected design year traffic. Mercy Drive intersection for the proposed condition was analyzed with one thru

lane and a right turn only lane in the westbound direction, all other approaches remained the same. All of the study intersections operate at LOS D or better during the morning and afternoon peak hours for the design year with the exception of Stadium Park Drive in the PM peak hour. Stadium Park Drive delays result in a LOS E and F for the PM Peak hour. Although this is below the desired LOS, the intersection does not warrant a traffic signal. Based on the certified traffic volumes being lower than the projected volumes, the above analyses would be very conservative and all intersection approaches would operate at a LOS D or better.

6. Bridges

6.1 12th Street NW Bridge over West Branch Nimishillen Creek

6.1.1 Existing Structure Data

The existing Stark County Bridge carries 12th Street NW over the West Branch Nimishillen Creek located just west of the Akron Metro Railroad Tracks. It was built in 1928 and consists of a 50' long single span earth-filled arch supported on spread footings. The spread footings are founded in rock approximately 8' below the bottom of the creek bed. The bridge has a skew angle of approximately 13^0 and an out-to-out deck width of ±50'-0" including three 12'-0" lanes, two 5'-0" sidewalks and two 1'-6" decorative concrete parapets. There is an existing 24" reinforced concrete storm sewer pipe which outlets through the rear spandrel wall. The bridge is in fair to poor condition and deteriorating, and would require extensive rehabilitation to continue supporting existing loads for any significant period of time.

6.1.2 Design Criteria

The purpose of this project is to remove and replace this bridge with a safer and more efficient structure that includes a multi-use trail underpass. Design parameters of the new structure include:

1) HL-93 design loading and design tandem
2) Construction and Maintenance Costs
3) Multi-use trail vertical clearance – 10' preferred
4) Aesthetics
5) Hydraulic capacity
6) Improved Roadway profile
7) Widened Sidewalks

One of the main project goals is to provide an “open” multi-use trail underpass. Due to safety and maintenance concerns, as well as public preferences, the County and City have eliminated the option for a closed tunnel beneath the road. Even with lighting, tunnels are dark and enclosed, while a trail that shares an opening with the creek bridge will see more light and alleviate safety concerns, as well as provide a more desirable “open” feeling to trail users.

An additional desire of the County, City and adjacent Parks is to provide an arched structure in order to replicate the aesthetics of the existing bridge, and to fit in with the scenic park surroundings.

6.1.3 Transverse Section

The proposed bridge transverse section for all alternatives under consideration consists of two 12’-0” thru lanes and one 12’-0” turning lane, with two 2’-0” curbed shoulders totaling 40’-0” roadway width, as well as two 15’-0” sidewalks for a total face to face of parapet distance of 70’-0”. With 1’-0” parapets and 2” deck coping, the total deck width measures 72’-4” out to out. The 15’ walks include a 5’ streetscaping strip for brick pavers and decorative street lighting in accordance with the Canton City standard streetscaping. An aesthetic crash-tested concrete parapet with railing will be provided for all alternatives.

6.1.4 Alternatives

Initial considerations for the structure type alternatives included several alternatives which were evaluated for their ability to meet or exceed the aforementioned design criteria. Five primary options with some sub-options were preliminarily considered and several were eliminated as described below.

1) Single Span Galvanized Rolled Steel Beams on Concrete Substructure
    a. Straight Beams – *As a potential low-cost alternative, this alternative progressed to further analysis as described in 6.1.4.1.*
    b. Haunched Beams – *Eliminated: Haunched beams are not structurally required and the minor aesthetic improvements do not justify the additional cost and fabrication complexity.*
2) Two-Span Superstructure on Concrete Substructure
    a. Steel Beams
        i. Continuous Straight Beams – *Eliminated: When compared to other two-span options, this alternative provides less trail clearance and is not as aesthetically pleasing.*

ii. Continuous Haunched Beams – *Eliminated: Though this option could provide the desired trail clearance, it is not as aesthetically pleasing as the concrete slab option below, which has a comparable cost.*

iii. Non-continuous Simple span – *Eliminated: This option would place a joint at the pier which would create significant future maintenance issues.*

b. Continuous Concrete Slab

i. Haunched Slab – *Eliminated: The haunching of the slab does not offer the desired arch-shape of the bridge, and was eliminated in favor of the Continuous Slab with Arched Fascia Walls.*

ii. Flat Slab with Arched Fascia Walls – *This alternative progressed to further analysis as described in 6.1.4.2.*

3) Three-Span Superstructure on Arched Rib Substructure

a. Continuous Steel Beams – *Eliminated: Though this option provides the desired trail clearance, it is not as aesthetically pleasing as the three-span concrete slab option below, which is of comparable cost.*

b. Continuous Concrete Slab - *This alternative progressed to further analysis as described in 6.1.4.3.*

4) Precast Concrete Arch – *Initial consideration was given to a precast structure such as a Bebo or Conspan arch.*

a. Single Span – *Eliminated: Due to the length required and minimal vertical clearance over the creek and multi-use trail, there are no available precast arches which will fit this geometry.*

b. Two Span – *Eliminated: Because a 'tunnel' is not desired, consideration was given to a two-span combination Bebo/Conspan arch on risers. This might allow for openings in the risers between the trail and creek. However, vertical clearance is so limited that this also is geometrically impossible.*

5) Rehabilitate Existing Structure – *Eliminated: Although the structure is in fair condition, it would require extensive testing and repairs, as well as anticipated strength improvements to improve capacity to current design loading. In addition, the bridge is being widened approximately 22' which would require tying in a new structure to the old arch structure. The anticipated repairs, strengthening and widening are very cost prohibitive, and in addition would not allow for the incorporated multi-use trail underpass.*

The three remaining bridge alternatives were further investigated as described below. For each alternative, the required structure depth was determined and the multi-use

trail elevation was set at the desired 10' below the bottom of superstructure. All options result in lower upstream water surface elevations than existing for the 25 and 100-year storm events as discussed in the Hydraulics section. In addition, as discussed in Section 5 – Maintenance of Traffic, the preferred MOT alternative is a detour. Therefore phased construction is not a consideration for these alternatives. Finally, all alternatives include an improved skew angle of 22^0, to more accurately align with the natural creek banks.

The three alternatives were evaluated and summarized in the matrix provided in Section 6.1.6. This matrix includes five criteria which were determined by the project owners and stakeholders as the most important to meet the purpose and need of the project:

1) Stakeholder Involvement / 4f Compliance – *Due to the adjacent parks and the many public events that take place in this area, stakeholder input is critical. In addition, because the widened structure will necessitate R/W takes from Canton Parks, and affects the multi-use trail owned by Stark Parks, the 4f document includes a De Minimus Determination Letter signed by both Parks requiring that the bridge be similar in appearance to the existing concrete arch structure in order to fit in with the park setting.*
2) Construction Cost – *Construction cost estimates are provided in Appendix D.*
3) Trail Usability – *A shallower superstructure depth allows the bike trail profile to be raised to meet the desired 10' vertical clearance. As the trail elevation beneath the bridge is raised, this reduces the steepness of the profile coming down from the Parks, thereby improving the trail profile. In addition, as the trail elevation increases above the adjacent creek, it reduces the occurrence of trail flooding.*
4) Aesthetics – *Due to the trail underpass and the Scenic Byway classification, it is important that the bridge provide an aesthetic appeal. In order to fairly evaluate aesthetic appeal of each structure type, bridge profiles and some renderings were presented to the bridge owners and stakeholders. Results are described for each alternative below.*
5) Long Term Maintenance Cost – *Maintenance costs for each alternative were evaluated over a 50 year time span, and were generally based on ODOT's "On-line Bridge Maintenance Manual: Preventive Maintenance/Repair Guidelines for Bridges and Culverts". Bridge-specific assumptions regarding future maintenance are described with each alternative below.*

6.1.4.1 Alternative 1-Single Span Galvanized Rolled Steel Beams

Description: Alternative 1 is a single span galvanized rolled steel beam bridge composite with a reinforced concrete deck, supported on wall type abutments and founded on spread footings on rock. The beams are proposed as galvanized, as preferred by Stark County. The structure has a skew angle of 22^0 and span length of 72'-0" c/c bearings. Minimal aesthetic treatments are included such as formlined concrete parapets and wingwalls, though this option offers the most open span for the multi-use trail underpass.

Stakeholder Involvement / 4f Compliance: This structure does not meet the requirements of the 4f *De Minimis* Letter to mimic the existing structure's arch shape. Consideration was given to providing false arch fascia walls on either side of the structure. However, the span length and multi-use trail clearance in this option require an opening that is too long and shallow to provide a single span arch shape.

Construction Cost: This option offers the lowest estimated construction cost, totaling $1,444.123.00. A detailed construction cost estimate can be found in Appendix D.

Trail Usability: As a single span bridge, this option allows for the most open trail. However, because this alternative is a single span structure, it requires a much deeper superstructure depth than the other two alternatives. To provide the desired 10' vertical trail clearance, the trail elevation must be about 2' lower than the other two alternatives, and only about 6" above the ordinary high water mark. This option presents the greatest occurrence of flooding and the steepest trail profile. It is the least desired trail profile of the three alternatives.

Aesthetics: A bridge profile of this alternative was presented to the project owners and some stakeholders early in the evaluation process. All agreed that this is the least aesthetically pleasing option of the three final alternatives considered. As described above, false arch fascia walls were considered and determined not possible due to the long span length and shallow vertical opening. While formlined concrete parapets could be provided, this option has minimal aesthetic advantages and does not meet the desire of providing an aesthetically pleasing structure that fits in with the surrounding Scenic Byway and parks area.

Long Term Maintenance Cost: Assumed major maintenance costs for this single span steel beam structure include sealing the concrete deck every 10 years, patching portions of the deck every 10 years, and repainting the fascia beams every 20 years.

(Abutment work is not included as it is considered to be similar for all three alternatives). Although this alternative has the advantage of not having a pier, it has the major cost of repainting the fascia beams. It is estimated to have a maintenance cost approximately 18% greater than Alternative 3 and 12% less than Alternative 2.

6.1.4.2 Alternative 2-Two Span Continuous Concrete Slab with Arched Fascia Walls

Description: Alternative 2 is a two span continuous reinforced concrete slab bridge on wall type abutments and a cap-and-column pier with arched openings, founded on spread footings on rock. The structure has a skew angle of 22^0 and c/c bearings span lengths of 55'-0" over the Creek and 17'-6" over the proposed trail underpass. Proposed aesthetic treatments include arched walls on the fascia of the Creek spans to mimic the look of the existing arch structure, and arched openings in the pier, as well as formlined parapets, abutments and wingwalls. See Renderings in Appendix D.

A span length of 55' is at the upper limit for a concrete slab superstructure. In addition, the unequal spans cause excessive uplift at the forward abutment which must be accounted for in the slab supports. Initial consideration was given to lengthening the span over the multi-use trail to minimize the span differential. However, it was determined that to offer any reasonable improvement in the load distribution across the spans, the forward span would need to be lengthened by more than 20'. This would unreasonably increase the initial construction cost of the structure as well as future maintenance costs. It was determined that the two spans should remain at 55'-0" and 17'-6".

In order to determine the required slab depth, preliminary finite element analyses were performed. Initial analyses evaluated five different combinations of fixed and expansion conditions at each substructure unit in order to determine which condition would minimize the uplift. These results determined that any bearing condition which would reduce or eliminate the uplift also allowed for a greater moment in the slab. The one condition which minimizes the uplift to within tolerable limits requires an expansion bearing at the rear abutment, likely a strip-type of elastomeric bearing, with a fixed condition at both the pier and forward abutment, creating frame action across the trail span. However, the moment induced into the 55'-0" span is so great that it requires a much deeper slab and either an inefficient amount of reinforcing or some more complicated construction such as post-tensioning or a deeper voided slab. These options increase construction costs, time and difficulty, as well as complicating long-term maintenance.

Stakeholder Involvement / 4f Compliance: This alternative meets the requirements of the 4f *De Minimis* Letter to mimic the existing structure's arch shape. Early stakeholder meetings indicated that the Parks and other stakeholders agreed that this structure meets this requirement.

Construction Cost: The estimated construction cost of this option totals $1,571,550.00, higher than Alternative 1 but less than Alternative 3. The additional cost with this option can largely be attributed to the long-span deep slab which adds both material costs as well as constructability costs due to the difficulty of forming and constructing a long-span concrete slab. Discussions with a contractor assisted with determining some of these costs. A detailed construction cost estimate can be found in Appendix D.

Trail Usability: This alternative provides a better trail profile than Alternative 1, but is still lower than Alternative 3. While the longer span requires a deeper slab, the slab depth could likely be tapered over the trail. However, the taper would be minimal and maintaining the preferred 10' vertical clearance would still lower the trail elevation to within 1 foot of the ordinary high water. Trail profile steepness and flooding occurrence for this alternative are worse than that maintained with Alternative 3.

Aesthetics: The aesthetics of this alternative were evaluated by project owners and stakeholders. This alternative was determined to be a preferred alternative aesthetically, due mainly to the formlined arch fascia wall and arched openings beneath the structure, which allow for an open feel between the creek and trail spans.

Long Term Maintenance Cost: Assumed major maintenance costs for this two-span concrete slab structure include sealing the concrete deck every 10 years, patching portions of the deck every 10 years, sealing and patching the pier every 20 years, and patching the fascia wall every 20 years. (Abutment work is not included as it is considered to be similar for all three alternatives. For this option, it is assumed that a greater portion of the slab will require patching and repair than that for Alternative 1, because the slab is the main superstructure member. In addition, it is assumed that due to the long span and depth of the slab along with construction complexities, it will likely require additional long-term maintenance. It is estimated to have a maintenance cost approximately 12% greater than Alternative 1 and 30% greater than Alternative 3.

6.1.4.3 Alternative 3-Three Span Continuous Concrete Slab on Arch Substructure

Description: Alternative 3 is a three span continuous reinforced concrete slab bridge supported on an arch rib substructure with wall type abutments and cap and column

pier on spread footings. The structure has a skew angle of 22^0 and 3 spans with lengths of 27'-5", 27'-5", and 17'-6" c/c bearings. The slab span over the creek is supported on a cap running transversely between the crowns of an estimated 6 arch ribs. With this cap acting as a support, it allows the slab to function as a 3-span slab. The slab span across the trail is supported on a cap-and-column pier with arched openings and wall type abutment. Proposed aesthetic treatments include the structural arch ribs, arched openings in the pier, as well as formlined parapets, abutments and wingwalls.

The initial alternative included an open arch rib substructure (see Rendering in Appendix D). However, after further consideration, various stakeholders expressed concern for potential vandal and maintenance issues within the openings above the arch ribs. Attempting to maintain the openness of this structure while addressing these concerns, consideration was given to sloping the top of the arch ribs and/or placing some type of fencing or other object on top of the ribs to prevent access on top of the ribs. However, it was determined that any of these methods would either not deter vandals and/or would increase maintenance needs. This caused the determination that the areas above the ribs should be in-filled.

The final Alternative 3 is supported by a *closed* arch rib substructure over the creek, with flat slab superstructure spanning the trail and supported by the cap and column pier, and wall-type abutment (see Rendering in Appendix D). The in-filled portion on top of the arch ribs up to the concrete slab may either be structural or aesthetic only. Further analysis is needed to evaluate whether this additional structural support is necessary. If unnecessary, these areas may be in-filled with concrete that is either hollow or filled with Styrofoam in order to limit the additional weight placed on the substructure. If structurally efficient and economically feasible, these areas may be used as additional support for the slab. This would then provide continuous support along each of the arch ribs, and the slab would then span transversely across the structure with a unique interaction with the slab span across the trail.

Stakeholder Involvement / 4f Compliance: This alternative meets the requirements of the 4f *De Minimis* Letter to mimic the existing structure's arch shape. Early stakeholder meetings indicated that the Parks and other stakeholders agreed that this structure meets this requirement.

Construction Cost: This option has the greatest estimated construction cost, totaling $1,668,552.00. The additional cost with this option can largely be attributed to the precast arch ribs and infilled concrete areas, which add both material costs as well as

constructability cost. Discussions with a contractor as well as a local precasting company were used to assist with determining these costs. A detailed construction cost estimate can be found in Appendix E.

Trail Usability: This alternative provides the most preferred trail profile of all three alternatives. The superstructure depth for this option is at a minimum, therefore allowing the multi-use trail profile to be at a higher elevation while still maintaining the preferred 10' vertical clearance. The profile elevation for this alternative is higher than that of the other two alternatives, approximately 2' above ordinary high water. This alternative provides the least occurrence of flooding and the most preferred trail profile.

Aesthetics: The aesthetics of this alternative were evaluated by project owners and stakeholders. This alternative was determined to be a preferred alternative aesthetically, due mainly to the formlined arch closures and arched openings beneath the structure.

Long Term Maintenance Cost: This alternative has the lowest estimated long term maintenance cost. Assumed major maintenance costs for this three-span concrete slab structure include sealing the concrete deck every 10 years, patching portions of the deck every 10 years, sealing and patching the pier every 20 years, and patching the arch ribs/in-fills every 20 years. (Abutment work is not included as it is considered to be similar for all three alternatives. It is estimated to have a maintenance cost approximately 12% less than Alternative 1 and 30% less than Alternative 2.

6.1.5 Foundation Recommendations

A foundation investigation was not completed for this structure type study. However, the original drawings show that substructure units are supported on spread footings on rock elevation of approximately 21'-0" below the existing roadway grade. Soil borings for the adjacent pedestrian bridge indicate similar information. Based on this information, it is anticipated that spread footings supported on rock will be used for all substructure units for each alternative.

6.1.6 Selection of Preferred Alternative

Based on the above discussions, the Alternatives Matrix below was used to evaluate how well each of the three alternatives satisfied the five criteria. As discussed in the three alternative sections, these five criteria were evaluated as follows:

1. Stakeholder Involvement / 4f Compliance (15 points):
    a. Meets Requirement – 15 points
    b. Does not Meet Requirement – 1 point
2. Construction Cost (50 points):
    a. Lowest Cost Option – 50 points
    b. Other alternatives – points decreased relative to construction cost increase over lowest cost alternative
3. Trail Usability (15 points):
    a. Best alternative – 15 points
    b. Other alternatives – loss of points based on steeper trail profile and greater occurrence of flooding
4. Aesthetics (10 points):
    a. Based on stakeholder feedback
5. Long Term Maintenance Cost (10 points):
    a. Lowest Cost – 10 points
    b. Other alternatives – points decreased relative to maintenance cost increase over lowest cost alternative

Canton 12th Street Bridge Alternatives Matrix

FACTOR \ ALTERNATIVE	No Build	Alternative 1 - Single Span Steel Beam	Alternative 2 - Two Span Continuous Slab with Arched Fascia Walls	Alternative 3 - Three Span Slab on Open Arch Substructure	Total Points Available
Meets Purpose and Need	☐	☑	☑	☑	
Stakeholder Involvement / 4f Compliance	0	1	15	15	15
Construction Cost	0	50	46	43	50
Trail Usability	0	5	12	15	15
Aesthetics	0	2	10	10	10
Long Term Maintenance Cost	0	8.2	7.2	10	10
TOTAL SCORE	0	66	90	93	100

Colors based on percentage per Factor

0-59%
60-89%
90-100%

6.1.7 Retaining Wall

A concrete retaining wall extends south from the southwest corner of the bridge for approximately 260 feet along the west bank of the creek. This wall was inspected to determine existing condition and potential repairs needed (see inspection notes and photos included in Appendix D). The wall is in fair to poor condition, and should be either repaired or replaced. After a field inspection, it appears that many of the spalls and deteriorated areas may be a result of poor drainage behind the wall. If the wall is to be repaired, the unsound concrete areas should be removed and patched or repaired. In addition, to prevent similar issues from occurring in the future, consideration should be given to excavating a portion of the embankment behind the wall and installing appropriate drainage such as porous backfill with perforated pipe to carry drainage away from the wall.

6.1.8 Hydrology

According to the FEMA 2011 Stark County Flood Insurance Study (FIS) and FIRMs (Flood Insurance Rate Maps) the West Branch Nimishillen Creek was studied by approximate methods in the area of our project. However, detailed studies were performed on reaches both upstream and downstream of 12th Street NW and therefore peak discharges have been previously calculated for both of those reaches.

The upstream reach was studied in detail from the confluence of McDowell Ditch (approximately 12,000 feet upstream of East 12th Street) to Hoover Avenue NW by Stantec in 2006. This study found peak flows using the regression equations developed for rural watersheds (USGS WRIR 03-4164). The peak discharge calculated at the most downstream end of this reach, which is closest to our project site, is above the confluence with McDowell Ditch and drains 18.93 square miles.

The downstream reach was studied in detail from the confluence with Nimishillen Creek to about 2,800 feet upstream of Interstate Highway 77 (approximately 8,000 feet downstream of East 12th Street) by ODNR for the original City of Canton FIS in 1977. This study used the method outlined in Bulletin 45, “Floods in Ohio, Magnitude and Frequency”. These procedures involve use of regression equations which incorporate the parameters of drainage area and channel slope. The upstream end of this reach, which is closest to the project site, is at a railroad crossing and drains 45.4 square miles. The published 100-year peak discharge at this location is 4,100 cfs.

At our project site, West Branch Nimishillen Creek at 12th Street NW drains 40.4 square miles. The USGS StreamStats application calculates a 100-year peak discharge at this site to be 2,610 cfs. However, StreamStats is not to be used in urban watersheds; the peak flow for urban watersheds would likely be higher than what is calculated using StreamStats. Calculation using USGS WRIR 93-135, “Estimation of Peak-Frequency Relations at Ungaged Small Urban Streams in Ohio” is not necessary since there are published peak discharges. Section 203.1 of the Bridge Design Manual indicates that “the base discharge (100-year peak discharge) from the (FEMA) National Flood Insurance Program study takes precedence over all other calculated discharges.”

Due to the above, it is reasonable to use the published peak discharges found from the downstream reach, which is in close proximity and has a similar drainage area. The 25-year peak discharge was not calculated as part of the original study, but using the peak

discharge-frequency relationship of the published flows, the 25-year peak discharge was calculated to be 3,099 cfs.

6.1.9 Hydraulics

A hydraulic model was used to determine the water surface elevations along the West Branch Nimishillen Creek within the study limits. The existing model and three alternatives were analyzed using the U.S. Army Corp of Engineer's River Analysis System Software (HEC-RAS) version 4.1.0.

The study limits include 1,000 feet of the West Branch Nimishillen Creek and begin 350 feet north of the 12th Street NW Bridge. The existing model was developed using survey data and existing plan information for the 12th Street NW Bridge and the pedestrian bridge located north of 12th Street NW. The 25 and 100-year storm events were used for the hydraulic analysis of the stream. The 25-year is the design storm event according to the ODOT Location and Design Manual Volume 2 Section 1004.2 and the 100-year is the base flood evaluated in the FEMA Flood Insurance Study.

The existing 12th Street NW arch was modeled as a bridge in HEC-RAS but performs similar to a culvert operating under outlet control. We verified the bridge model performance by modeling it as a culvert as well. The two models gave similar results and because the structure type alternates are all bridges, it was determined to continue with the bridge model in order to provide a better base for comparison between all alternates. The velocity increases significantly as it passes through the bridge due to the efficiency of the inlet. As a result, the water surface elevations inside and downstream of the bridge lower significantly compared to the elevations upstream of the bridge. The existing model was then used to create three proposed models for the 12th Street NW bridge alternatives. Bridge Alternatives 1, and 3 result in lower upstream water surface elevations than existing for the 25 and 100-year storm events, and Alternative 2 results in a higher upstream water surface elevation for the 25-year storm event, and a lower upstream water surface elevation for the 100-year storm event. The results for the analysis can be found in the table below.

HEC-RAS ANALYSIS WATER SURFACE ELEVATION SUMMARY TABLE		
Plan	**25-Year WSEL**	**100-Year WSEL**
Existing	1026.54	1028.18
Alternative 1	1025.89	1026.78
Alternative 2	1026.72	1027.60

Alternative 3	1026.25	1027.43

The existing bridge is in a FEMA Flood Insurance Zone A, which means the floodplains are determined in the Flood Insurance Study (FIS) by approximate methods. Since detailed hydraulic analyses were not performed for the FIS there is no base flood (100-year) elevation or base flood depths determined within this Zone A. There is also no regulatory floodway established for the stream. Therefore, FEMA regulations limit the increase in the base flood elevation to 1 foot due to any fill placed within the special flood hazard area (100-year floodplain). As shown in the table above the upstream 100-year water surface elevations would be decreased by each alternative. For each alternative, immediately downstream of the bridge a 4" water surface elevation increase occurs. However, this is City owned park property so there is no risk associated with the increase.

The recommended alternative is Alternative 3 which is a three span slab supported on an arch substructure including two, 27.5' foot spans over the West Branch Nimishillen Creek and a 17' concrete slab over the multi-use trail. Alternative 3 resulted in a 100-year upstream water surface elevation 0.75 feet lower than the existing model. Therefore, there will be no impact to the FEMA designated floodplains. The 25 and 100-year water surface elevations are shown in profile view, cross section view and in tabular format in Appendix D.

6.2 12th Street NW Bridge over Canton Waterworks Raceway

6.2.1 Existing Structure Data

Built in 1928, the existing bridge is a single span 32'-0" earth-filled concrete arch founded on spread footings on rock. It spans the Canton Waterworks Raceway, and has a skew angle of 42^0, and width of 49'-0" out to out with two 18'-0" lanes and two 5'-0" sidewalks. The bridge is in fair to poor condition and deteriorating, and would require extensive rehabilitation to continue supporting existing loads.

6.2.2 Design Criteria

The purpose of this project is to remove and replace this bridge with a safer and more efficient structure that also mimics the aesthetic of the proposed bridge over the West Branch Nimishillen Creek. Design parameters of the new structure include:

1) HL-93 design loading and design tandem
2) Construction and Maintenance Costs

3) Aesthetics matching Bridge over Nimishillen
4) Hydraulic capacity
5) Improved Roadway profile
6) Widened Sidewalks

A desire of the County, City and adjacent Parks is to provide an arched structure in order to replicate the aesthetics of the adjacent bridge over the West Branch Nimishillen, and to fit in with the scenic park surroundings. Similar to the Nimishillen Creek bridge, because the widened structure will necessitate R/W takes from Canton Parks, the 4f document includes a De Minimis Determination Letter signed by both Parks requiring that the bridge be similar in appearance to the existing concrete arch structure in order to fit in with the park setting.

6.2.3 Transverse Section

The proposed bridge transverse section for all alternatives under consideration consists of two 12'-0" thru lanes with two 2'-0" curbed shoulders totaling 28'-0" roadway width, as well as two 15'-0" sidewalks for a total face to face of parapet distance of 58'-0". With 1'-0" parapets and 2" deck coping, the total deck width measures 60'-4" out to out. The 15' walks include a 5' landscaping strip for brick pavers and decorative street lighting in accordance with the Canton City standard streetscaping. An aesthetic crash-tested concrete parapet with railing will be provided for all alternatives.

6.2.4 Alternatives

Various alternatives were initially considered for this structure type, including precast concrete arch, precast or cast-in-place concrete box and concrete slab structure. However, due to the high skew of this structure, it was determined that the precast options and any of the box options are not feasible. The proposed alternative is a single span reinforced concrete slab bridge on wall type abutments founded on spread footings on rock. The structure has a skew angle of 42^0 and span of length 34'-0" c/c bearing.

In order to mimic the aesthetics of the larger adjacent 12th Street NW bridge over the West Branch Nimishillen Creek, this structure will include false arch fascia walls on either side with the same formlining as that used for the other structure. Similar aesthetic treatments will also be used on the wingwalls and parapets.

The estimated construction cost of this structure is $692,546.00 and a detailed estimate can be found in Appendix D.

6.2.5 Hydrology

Canton Waterworks Raceway is a manmade channel that runs parallel to West Branch Nimishillen Creek on the west side from Harrison Avenue NW to about 450 feet upstream of 7th Street NW. It sits higher than West Branch Nimishillen Creek and is not within the Special Flood Hazard Area at our project site. It is fed from the West Branch Nimishillen Creek just upstream of the dam near the intersection of Stadium Park Drive NW and Harrison Avenue NW. The information used for the inlet calculations was provided from a field check performed by the City. Local runoff also enters Mill Race and contributes to the peak discharge of 160 cfs for the 25-year storm event and 200 cfs for the 100-year storm event.

The peak discharge from Mill Race was not excluded from the calculated peak discharge for West Branch Nimishillen due to its small relative size.

6.2.6 Hydraulics

The existing Canton Waterworks Raceway bridge is an arch structure with a single span of 32 feet. The existing structure appears hydraulically adequate based on the drainage area and flows calculated. The proposed bridge is an arch structure with a single span of 34 feet and the open area is increased by 15 square feet compared to the existing bridge. Due to the increase in open area, the water surface elevations will not be adversely affected by the replacement of the bridge. No HEC-RAS analysis has been performed for the Canton Waterworks Raceway bridge replacement.

6.3 Phased Construction

Traffic will be detoured for the duration of the project. This is discussed in Section 5 and Appendix F.

7. Multi-Use Trail

7.1 Existing Multi-Use Trail and Walking Loop

The existing multi-use West Branch Trail currently crosses 12th Street NW at-grade just west of the railroad. It travels north into Canton City Stadium Park, where it crosses

an existing steel truss pedestrian bridge over the West Branch Nimishillen Creek and splits into two paths – a pedestrian walking loop trail to the west and a multi-use trail to the north.

7.2 Proposed Multi-Use & Walking Trail Alternatives

The goals of the project related to the multi-use trail and walking loop include:

- A grade-separated crossing for the multi-use trail and 12th Street NW, eliminating the walking loop mid-block crossing on Stadium Drive
- Provide a desired trail alignment meeting stakeholder needs
- Meet the design criteria from the American Association of State Highway and Transportation Officials (AASHTO) Guide for the Development of Bicycle Facilities, 2012, Fourth Edition to the maximum extent possible.

The existing at-grade crossing will remain for all proposed alternatives as a bypass trail for use during times of high water when the underpass is impassable.

The AASHTO guide was used as a reference to design the proposed multi-use trail alternatives. A design speed of 18 mph, chosen from the AASHTO guide, is based on having sustained grades of less than 2%. The multi-use trail paved width is 10 feet with 2 foot graded shoulders. The minimum vertical clearance is 8 feet with 10 feet preferred. The maximum grade preferred is 5% with a minimum of 0.5%. The pavement buildup for the multi-use trail is 6” of aggregate base and 3” of asphalt.

The proposed walking loop is 8 feet wide with a red rubber surface to match the existing walking loop. The pavement buildup for the walking loop is 6” of aggregate base and 3” of asphalt with a rubber surface.

Three alternative multi-use trail configurations were developed and compared. The alignment figures for the three alternatives can be found in Appendix E. Alternative 1 diverges from the existing trail 200’ south of 12th Street NW and travels under the 12th Street NW Bridge into Canton City Stadium Park, where it loops east to tie into the existing path west of the railroad. The trail follows the existing loop to the northern sidewalk on 12th Street NW. A facility change is introduced at this point and the multi-use trail travels west along the sidewalk and over the 12th Street NW bridge to tie back into the existing trail to the north. The proposed pedestrian walking loop diverges from

the existing walking trail 200' west of Stadium Park Drive and connects to the northern 12 Street sidewalk just west of Stadium Park Drive. This eliminates the walking loop mid-block crossing at Stadium Park Drive. The walking loop then continues east along the sidewalk, turns north on the east side of the proposed 12th Street NW bridge and ties into the existing walking loop to the north. The existing pedestrian bridge north of 12th Street NW will be removed for re-use farther north along the realigned trail.

The alignment and profile for Alternative 1 meet the minimum radius criteria, minimum vertical curve length for stopping sight distance criteria and allows the City to use the existing pedestrian bridge in another location. However, this alternative introduces a facility change for bikers requiring them to cross the parking lot drive and use the sidewalk as part of the trail, and creates 90 degree intersections with the 12th Street NW sidewalks which do not meet the horizontal stopping sight distance criteria. Stakeholder input indicated that this trail layout appears irregular and confusing, and would not offer a smooth, continuous ride for the trail user.

Proposed Alternative 2 includes a grade-separated crossing and eliminates the walking loop mid-block crossing at Stadium Park Drive while maintaining the existing multi-use trail and walking loop alignments where possible. The multi-use trail diverges from the existing trail 200' south of 12th Street NW and travels under the 12th Street NW Bridge into Canton City Stadium Park, where it ties into the existing trail intersection. The path then crosses the existing steel truss pedestrian bridge over the West Branch Nimishillen Creek and splits into two paths – a pedestrian walking loop trail to the south and a multi-use trail to the north. The proposed pedestrian loop travels south after crossing the existing pedestrian bridge to meet the sidewalk and continues west to tie into the existing walking trail 200' west of Stadium Park Drive.

The alignment and profile for Alternative 2 meet the minimum radius criteria, minimum vertical curve length for stopping sight distance criteria for the vertical curve south of 12th Street NW and keeps the multi-use trail separate from the 12th Street NW sidewalk. However, this alternative maintains the existing overlap between the multi-use trail and walking loop over the pedestrian bridge, does not meet minimum vertical curve length for stopping sight distance criteria for the vertical curve north of 12th Street NW and does not meet the horizontal stopping sight distance criteria near the 12th Street NW bridge. Stakeholder input for this alternative indicated that this alternative does not meet the desire to minimize the overlap of the walking loop with the multi-use trail, and found the 90-degree stop at the tie-in point undesirable.

Proposed Alternative 3 requires relocating the existing pedestrian bridge 350 feet north to provide a desired multi-use path alignment. The multi-use trail diverges from the existing trail 200' south of 12th Street NW and travels under the 12th Street NW Bridge into Canton City Stadium Park, where it splits into two paths – a multi-use trail to the east to tie the existing trail loop west of the railroad and a multi-use trail north. The multi-use trail travels north and crosses the relocated existing pedestrian bridge over the West Branch Nimishillen Creek then ties into the existing trail. The proposed pedestrian walking loop diverges from the existing walking trail 200' west of Stadium Park Drive and continues to the northern 12th Street NW sidewalk just west of Stadium Park Drive. This eliminates the walking loop mid-block crossing at Stadium Park Drive. The walking loop then continues east along the sidewalk, turns north on the east side of the proposed 12th Street NW bridge and runs along the east side of the proposed multi-use trail to tie into the existing walking loop north of the relocated pedestrian bridge.

The alignment and profile for Alternative 3 meet the minimum radius criteria, minimum vertical curve length for stopping sight distance criteria except for the existing pedestrian bridge, keeps the multi-use trail separate from the sidewalk, allows for continuous connection of the multi-use trail from north to south and creates a walking loop separate from the multi-use trail except at one crossing located north of 12th Street NW. However, this alternative does not meet the horizontal stopping sight distance criteria near the 12th Street NW bridge. Stakeholder input indicated that this trail layout is the most desirable, and appears to offer the most smooth, continuous ride for the trail user, as well as the best separation of the multi-use trail from the walking loop.

Alternative 3 is recommended as the preferred alternative based on safety, user needs and connectivity to the existing trails. The cost difference between Alternative 3 and the other two alternatives is negligible compared to the safety, user needs and overall project cost. The estimated cost for the preferred Alternative 3 trail is $156,746.

The Design Criteria Matrix, Vertical Stopping Sight Distance Calculations and Horizontal Stopping Sight Distance Calculations are located in Appendix E.

8. Maintenance of Traffic (MOT)

Maintaining traffic during construction is a critical factor in the overall success of this project. The safety of the traveling public and the construction workers was given the utmost consideration in selecting an alternative. In addition, consideration must be given

to the actual operations required to accomplish the construction work. Three maintenance of traffic alternatives were initially evaluated for this project. The three alternatives were part-width construction, one- way detour and total detour. After coordination with the City, County and stakeholders it has been determined that the total detour is the best option to minimize MOT cost, minimize construction duration and provide the safest alternative for the traveling public. The anticipated detour route is I-77 north to Fulton Avenue to 12th Street NW. ARCADIS will continue to coordinate with the appropriate stake holders to develop an MOT plan that minimizes traffic disruptions and maintains access to key properties. The preferred MOT alternative will be developed in accordance with the Ohio Manual of Uniform Traffic Control Devices, ODOT, Stark County, and applicable City standards. The design team will prepare MOT plans in future submittals that will control work segments and durations; establish requirements for temporary signs, facilities, and access; identify alternate routes; and specify other aspects of construction control including but not limited to off duty police officers. For the evaluation of the MOT alternatives and their costs refer to Appendix F.

9. Environmental

The 12th Street NW Bridges Replacement Project is located within the City of Canton, Stark County, Ohio. The project runs along 12th Street NW, a major east-west corridor through the City of Canton that connects Interstate 77 on the west to the Mahoning Road Economic District at the east end. This project is approximately one half mile in length with an eastern terminus at Monument Road NW, and a western terminus at the Mercy Drive / I-77 Ramps, which were recently ranked by SCATS (Stark County Area Transportation Study) as the fourth most hazardous intersection in Stark County. See Section 2 for a plan view showing study limits. These limits include an intersection with Stadium Park Drive NW, as well as drive entrances to the hospital and parks, all on the north side of the road. The purpose of the project is to improve a commonplace road and bridge byway with an aesthetically pleasing, streetscaped corridor utilizing multi-modal improvements for users of all abilities. This is a continuation of the ongoing upgrade of adjacent facilities on the 12th Street NW Corridor as well as a connection within Canton's Trail Corridors and Stark Parks Master Greenway Plan. The project's Complete Streets goals provide a safer and more attractive Byway for multi-modal users of all abilities.

As part of the proposed improvements, the structurally deficient Stark County Bridge over the West Branch Nimishillen Creek and the structurally deficient City of Canton Bridge over the Canton Waterworks Raceway will both be replaced with aesthetically pleasing, lower maintenance structures. In addition, the new Stark County bridge will

incorporate a multi-use trail underpass for the West Branch Trail, which currently crosses 12th Street NW at-grade just west of the railroad at the east end of the project. No Historic Properties or National Historic Landmarks were found in the immediate vicinity of the project. The two bridges listed for replacement were found to be not eligible for inclusion on the National Register of Historic Places. ODOT OES determined this project to have a minimum potential to cause effects in regards to Section 106 clearance.

As the project is located in the vicinity of the Canton Park Systems, coordination for Section 4(f) is required. To date, Canton Parks has held a presence at multiple stakeholder meetings with the City of Canton and ARCADIS. Based on coordination to date and support from Canton Parks, the project will seek a Section 4(f) de minimis impact determination.

Construction of the bridges will cause temporary and permanent impacts to both the West Branch Nimishillen Creek and the Canton Waterworks Raceway. Impacts to the streams are limited to the amount of work necessary to construct the new bridges and trail improvements. Three wetlands were identified within the ecological study limits, of which one will likely be unavoidably impacted as a result of the proposed trail improvements. An additional wetland will be constructed prior to this project, and will only be affected for use as a BMP as discussed in Section 5.5.3. Best management practices for soil erosion and sediment control will be employed to minimize impacts to the remaining stream and wetland areas identified in the study limits. Any impacts to the wetlands and streams will be mitigated as required. The pond located south of 12th Street NW and between the two streams, will not be impacted as a result of this project.

As part of the Environmental Site Assessment (ESA) process, a Phase I ESA was completed on the Timken Mercy Medical Center property. The Phase I ESA did not discover evidence of currently used aboveground storage tanks, spills or releases on site. The underground storage tank locations and identified waste handling are located far enough from the project area that further environmental assessment was not recommended for the site. The recommendation of no further environmental site assessment has been forwarded to ODOT for concurrence.

10. Stakeholder / Public Input

In addition to afore-mentioned stakeholders, this project benefits many Canton and Stark County residents and visitors. Many special events are held in this area, some of

which include The Pro Football Hall of Fame's "First Play" event, Canton's annual marathon and the Polar Express on the Cuyahoga Valley Scenic Railroad. The adjacent parks include 68 acres of nature and picnic areas, a large duck pond used for ice skating in the winter, a softball complex, a playground, the Canton Garden Center, the John F. Kennedy Memorial Fountain, a Children's Garden, and the McKinley National Monument. Because of the multitude of facility users and events in this area, the City has already begun efforts to obtain stakeholder input by conducting stakeholder meetings, and plans to conduct multiple public meetings during both preliminary and final design in order to offer the community the opportunity to provide input on the project. This communication is not only an effort to provide information but also to collect information in order to determine what construction season(s) would impact the least number of users. Public information may include an informative brochure and project website which will be continually updated during construction. The economic feasibility of controlled construction schedules and expedited construction methods are being investigated to reduce construction time and minimize impact to the community and emergency services accessing the hospital.

11. Construction Cost Estimate

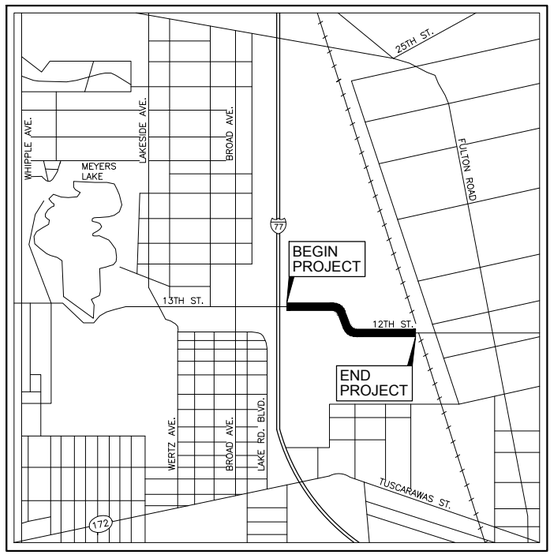
With the preferred alternatives, the estimated construction cost is as shown below. A detailed construction cost estimate can be found in Appendix G.

Construction Cost Estimate Summary	
ROADWAY	$1,340,621
DRAINAGE	$360,931
MULTI-USE TRAIL	$156,746
TRAFFIC CONTROL	$64,000
STRUCTURES	$1,745,509
GENERAL (includes 30% Contingency)	$2,017,011
2013 SUBTOTAL	$5,684,818
2015 GRAND TOTAL	$6,560,280

Plans

12TH STREET NW BRIDGES REPLACEMENT

CITY OF CANTON
STARK COUNTY
OHIO



LOCATION MAP

SCALE IN FEET

0 4000 8000 1200 1600

PORTION TO BE IMPROVED _____

OTHER ROADS _____

INDEX OF SHEETS:

PROJECT DESCRIPTION

ROADWAY IMPROVEMENTS OF 12TH STREET NW FROM THE MERCY DRIVE/I–77 RAMPS TO MONUMENT DRIVE, A DISTANCE OF APPROXIMATELY 2,100 FEET, INCLUDING NEW PAVEMENT, SIDEWALKS, STORM SEWER, AND STREETSCAPING. THE IMPROVEMENTS WILL ALSO INCLUDE THE REPLACEMENT OF THE BRIDGES OVER NIMISHILLEN CREEK AND CANTON PARKS WATERWORKS RACEWAY, AND IMPROVEMENTS TO THE MULTI–USE TRAIL.

MEMBERS OF COUNCIL

(NAME) _____ (POSITION)

CITY OF CANTON CITY OFFICIALS 2013

WILLIAM J. HEALY II — MAYOR
WARREN PRICE — DIRECTOR, PUBLIC SERVICE
KEVIN MONROE — SUPERINTENDENT, STREETS
DAN MOEGLIN, P.E., S.I. — CITY ENGINEER

DESIGN DESIGNATION

CURRENT ADT (2015)	10,320
DESIGN YEAR ADT (2035)	10,690
DESIGN HOURLY VOLUME (2035)	970
DIRECTIONAL DISTRIBUTION	52/48
TRUCK (24 HOUR B AND C)	4%
K VALUE	9.1%
DESIGN SPEED	35 MPH
LEGAL SPEED	35 MPH
DESIGN FUNCTIONAL CLASSIFICATION	URBAN PRINCIPAL ARTERIAL

2013 SPECIFICATIONS

THE STANDARD SPECIFICATIONS OF THE STATE OF OHIO, DEPARTMENT OF TRANSPORTATION, INCLUDING CHANGES AND SUPPLEMENTAL SPECIFICATIONS LISTED IN THE PROPOSAL SHALL GOVERN THIS IMPROVEMENT.

EARTH DISTURBED AREAS

PROJECT EARTH DISTURBED AREA = X.XX AC.
ESTIMATED CONTRACTOR EARTH DISTURBED AREA = X.XX AC.
NOTICE OF INTENT EARTH DISTURBED AREA = X.XX AC.

Engineer's Seal

ENGINEER'S SIGNATURE _____ DATE _____

DESIGN EXCEPTIONS

HORIZONTAL ALIGNMENT

STANDARD CONSTRUCTION DRAWINGS			SUPPLEMENTAL SPECIFICATIONS
			SPECIAL PROVISIONS

PLANS PREPARED BY:

ARCADIS

ARCADIS U.S., Inc.
222 South Main Street, Suite 300
Akron, Ohio 44308
Tel: 330–434–1995 Fax: 330–374–1095
www.arcadis–us.com

UNDERGROUND UTILITIES
2 WORKING DAYS
BEFORE YOU DIG
1–800–362–2764
OHIO UTILITIES PROTECTION SERVICE
NON–MEMBERS MUST BE CALLED DIRECTLY
1–800–925–0988
OIL & GAS PRODUCERS
UNDERGROUND PROTECTION SERVICE

APPROVED _____
DATE _____ DAN MOEGLIN, P.E., S.I.
CITY ENGINEER
CITY OF CANTON, OHIO

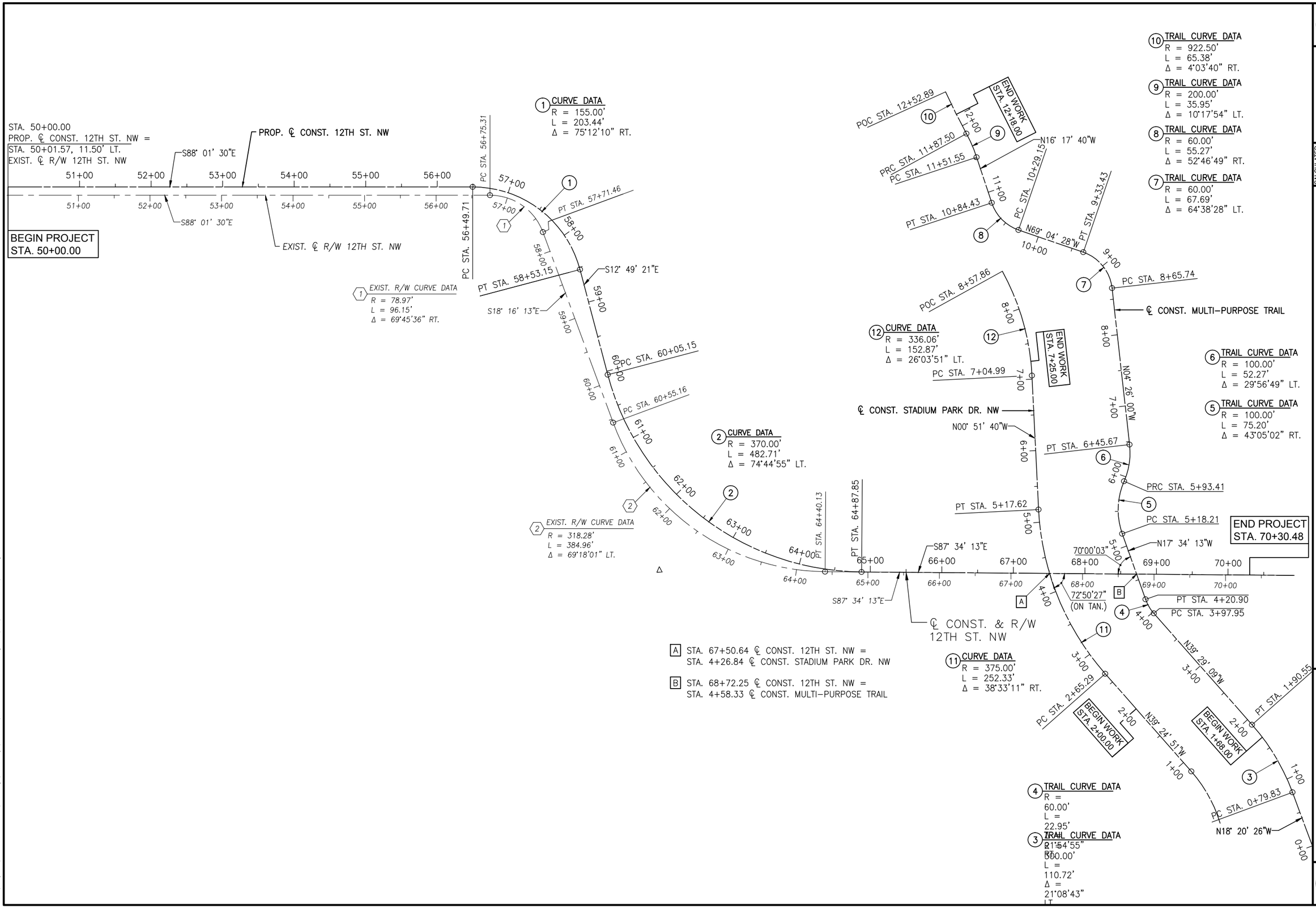
FEDERAL PROJECT NO.

PID NO. 90671

CONSTRUCTION PROJECT NO.

RAILROAD INVOLVEMENT
AKRON METRO

12TH STREET NW
BRIDGES REPLACEMENT



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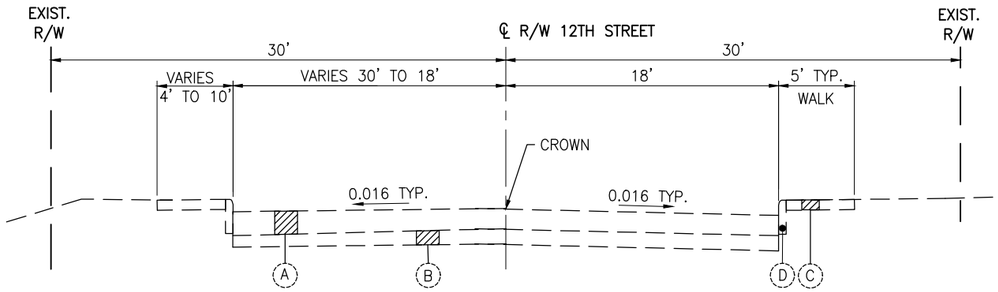
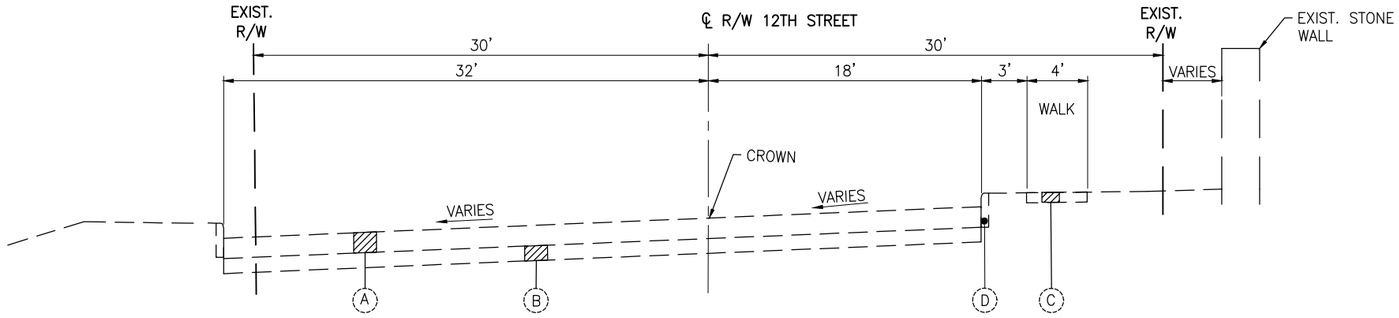


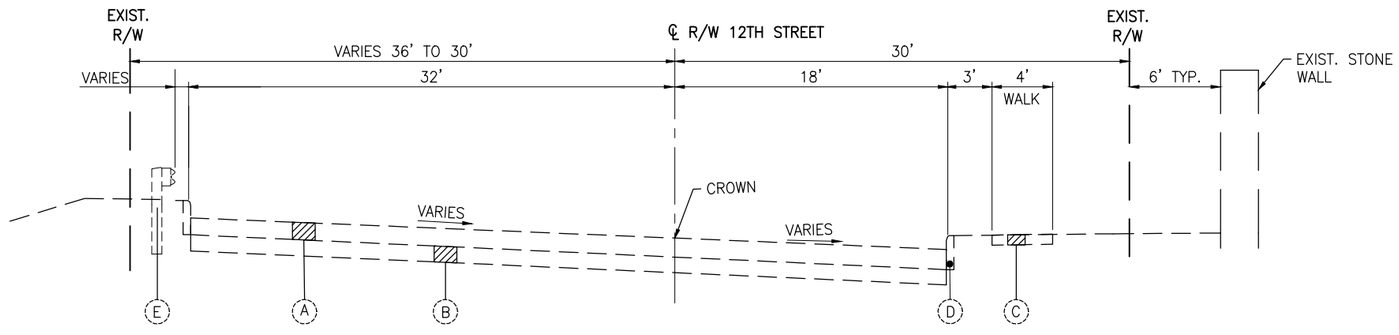
EXISTING TYPICAL SECTION

12TH STREET: STA. 63+00 TO STA. 70+30



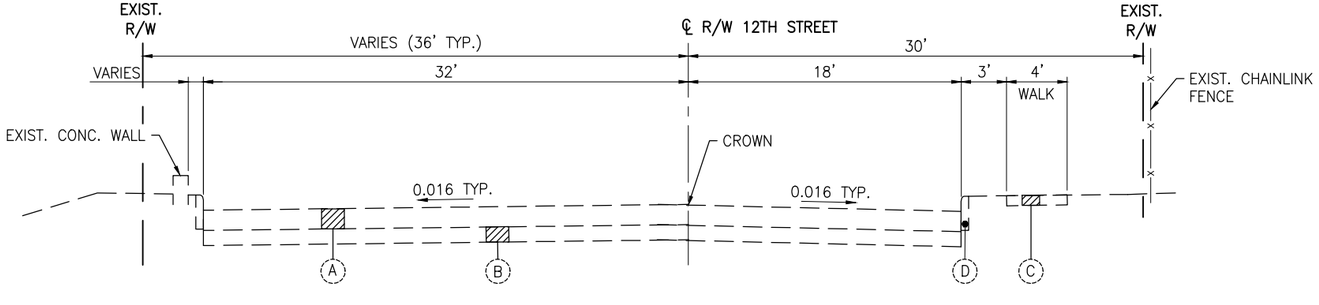
EXISTING TYPICAL SECTION

12TH STREET: STA. 59+50 TO STA. 63+00



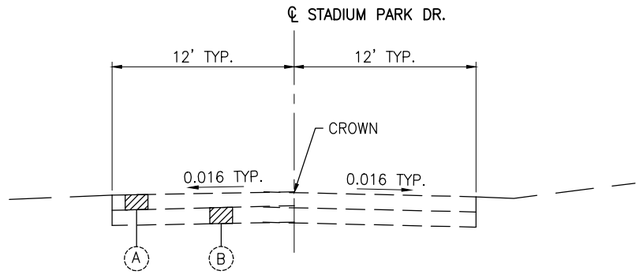
EXISTING TYPICAL SECTION

12TH STREET: STA. 56+00 TO STA. 59+50



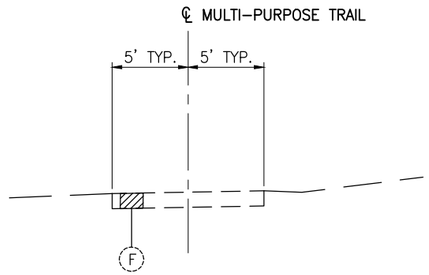
EXISTING TYPICAL SECTION

12TH STREET: STA. 50+00 TO STA. 56+00



EXISTING TYPICAL SECTION

STADIUM PARK DR.: STA. 2+00 TO STA. 7+25



EXISTING TYPICAL SECTION

LEGEND

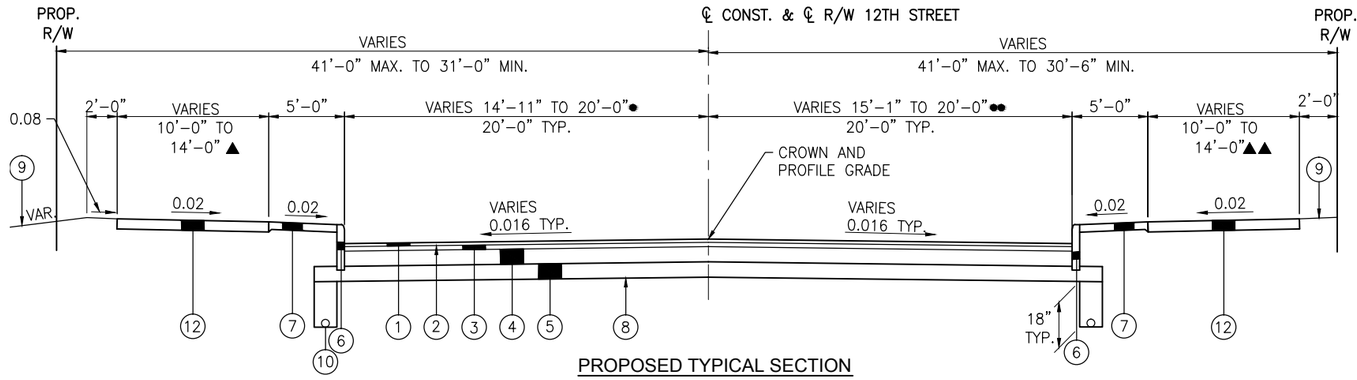
- (A) ASPHALT CONCRETE
- (B) SUBBASE
- (C) SIDEWALK
- (D) CONCRETE CURB
- (E) GUARDRAIL
- (F) ASPHALT

NOTE TO REVIEWER:
- RECORD PLANS AND PAVEMENT BORING INFORMATION WAS NOT USED FOR THE PRELIMINARY REPORT.
- ALL DIMENSIONS ARE APPROXIMATE.

CALCULATED: I CHECKED: I

EXISTING TYPICAL SECTIONS

12TH STREET NW BRIDGES REPLACEMENT



PROPOSED TYPICAL SECTION

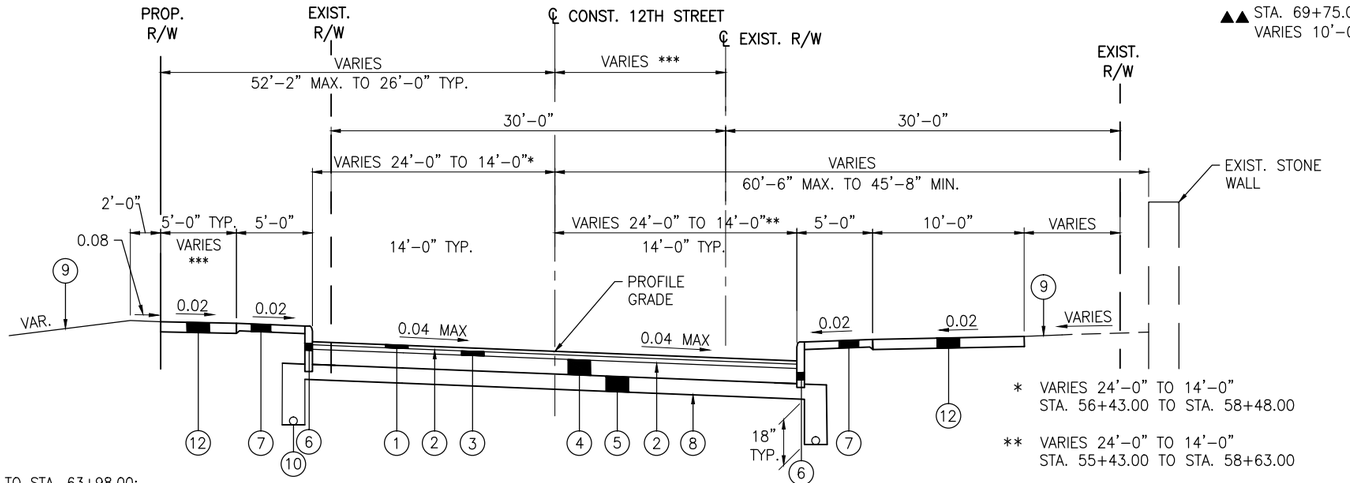
12TH STREET: STA. 65+07.94 TO STA. 67+77.67
12TH STREET: STA. 69+11.83 TO 70+30.48

● STA. 65+07.94 TO STA. 66+25.00
VARIES 14'–11" TO 20'–0"

●● STA. 65+07.94 TO STA. 66+00.00
VARIES 15'–1" TO 20'–0"

▲ STA. 69+75.00 TO STA. 69+90.00
VARIES 10'–0" TO 14'–0"

▲▲ STA. 69+75.00 TO STA. 69+90.00
VARIES 10'–0" TO 14'–0"



* VARIES 24'–0" TO 14'–0"
STA. 56+43.00 TO STA. 58+48.00

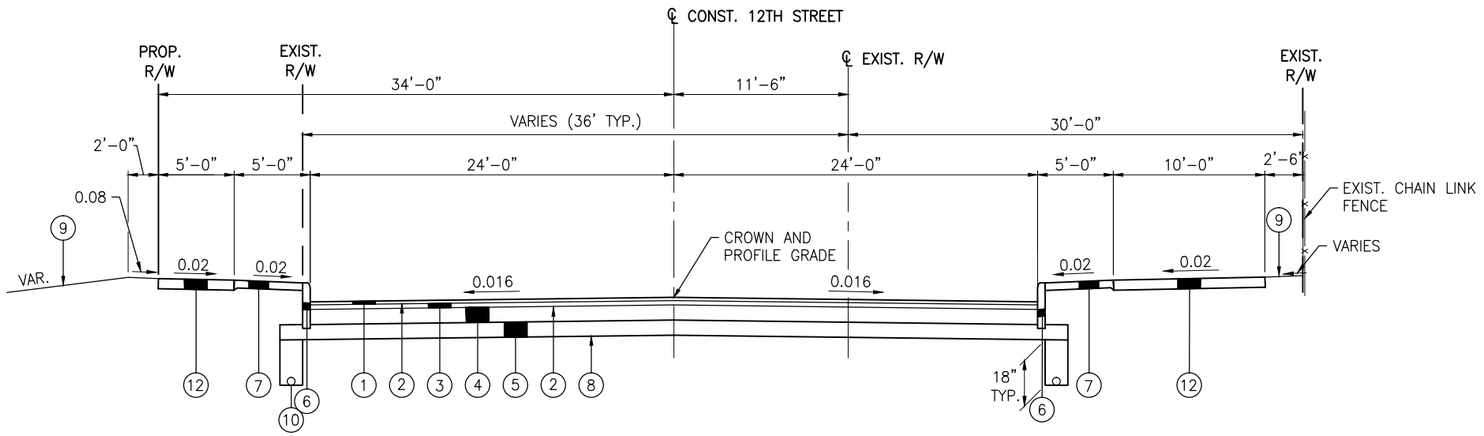
** VARIES 24'–0" TO 14'–0"
STA. 55+43.00 TO STA. 58+63.00

*** VARIES 11'–6" TO 33'–6"
STA. 55+43.00 TO SAT. 59+29.15
23'–0" TO 6'–3"
STA. 59+29.15 TO STA. 64+19.58

*** STA. 63+75.00 TO STA. 63+98.00:
VARIES 5'–0" TO 10'–0"
STA. 63+98.00 TO (APPROACH SLAB): 10'–0"

PROPOSED TYPICAL SECTION

12TH STREET: STA. 55+43 TO STA. 59+29.15 (SUPERELEVATION 0.04 MAX RT.)
12TH STREET: STA. 59+29.15 TO 64+19.58 (SUPERELEVATION 0.04 MAX LT.)



PROPOSED TYPICAL SECTION

12TH STREET: STA. 50+00 TO STA. 55+43

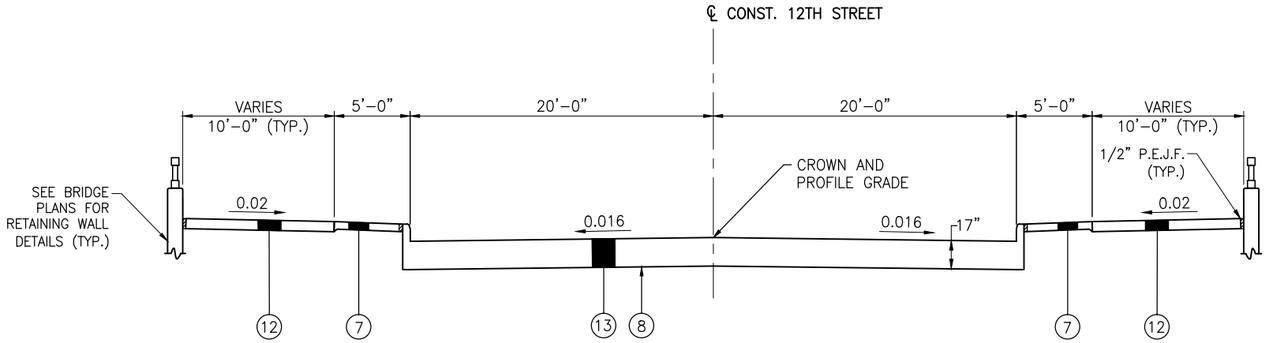
LEGEND

1. ITEM 448 – 1¼" ASPHALT CONCRETE SURFACE COURSE, TYPE 1, PG64–22
2. ITEM 407 – TACK COAT FOR INTERMEDIATE COURSE (0.04 GAL/S.Y.)
3. ITEM 448 – 1¾" ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE 2, PG64–22
4. ITEM 301 – 6" ASPHALT CONCRETE BASE, PG64–22
5. ITEM 304 – 6" AGGREGATE BASE
6. ITEM 609 – CURB, TYPE 6
7. ITEM SPECIAL – STREETSCAPE
8. ITEM 204 – SUBGRADE COMPACTION
9. ITEM 659 – SEEDING AND MULCHING
10. ITEM 605 – 6" BASE PIPE UNDERDRAINS
11. ITEM 609 – GUARDRAIL, TYPE 5
12. ITEM 608 – 4" CONCRETE WALK
13. ITEM 526 – REINFORCED CONCRETE APPROACH SLAB
14. ITEM xxx – TREATED SHOULDER
15. ITEM 301 – 3" ASPHALT CONCRETE BASE, PG64–22
16. ITEM 304 – 6" AGGREGATE BASE
17. ITEM xxx – ROADWAY MISC.: RUBBER WALKING SURFACE (3" THICK)

CALCULATED: I CHECKED: I

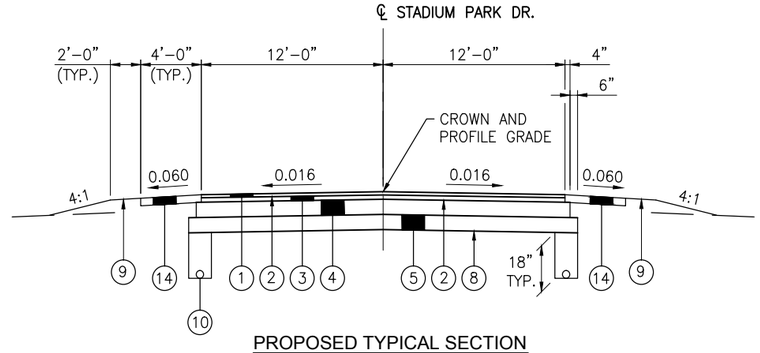
PROPOSED TYPICAL SECTIONS

12TH STREET NW
BRIDGES REPLACEMENT



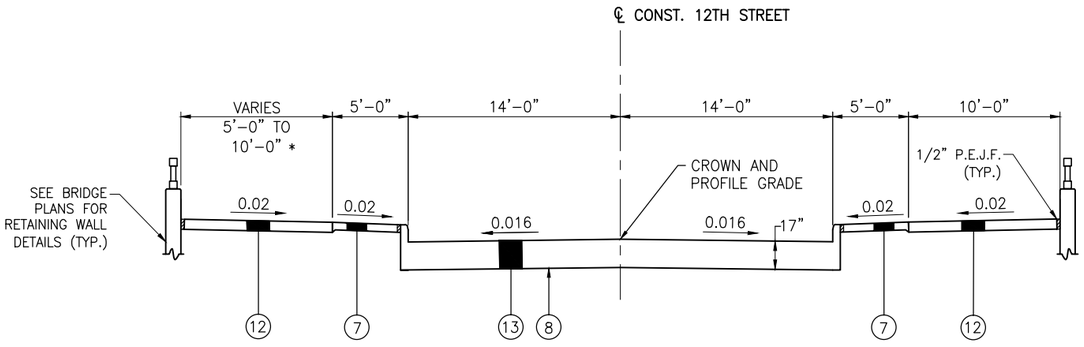
PROPOSED APPROACH SLAB TYPICAL SECTION

12TH STREET: STA. 67+77.83 TO STA. 68+07.83
12TH STREET: STA. 68+81.75 TO STA. 69+11.75



PROPOSED TYPICAL SECTION

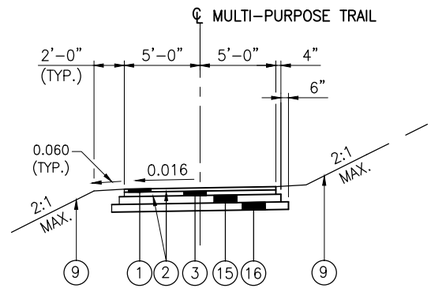
STADIUM PARK DR.: STA. 2+00 TO STA. 7+50



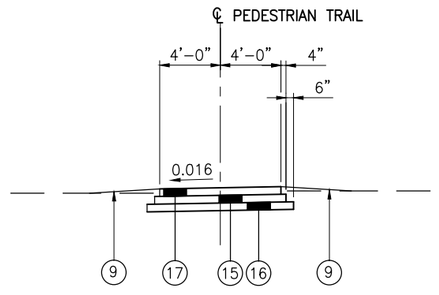
* FROM STA. 63+75.00 TO STA. 64+00.00

PROPOSED APPROACH SLAB TYPICAL SECTION

12TH STREET: STA. 64+14.58 TO STA. 64+44.58
12TH STREET: STA. 64+82.94 TO STA. 65+12.94



PROPOSED TYPICAL SECTION



PROPOSED TYPICAL SECTION

CALCULATED: –
CHECKED: –

PROPOSED TYPICAL SECTIONS

12TH STREET NW
BRIDGES REPLACEMENT

1

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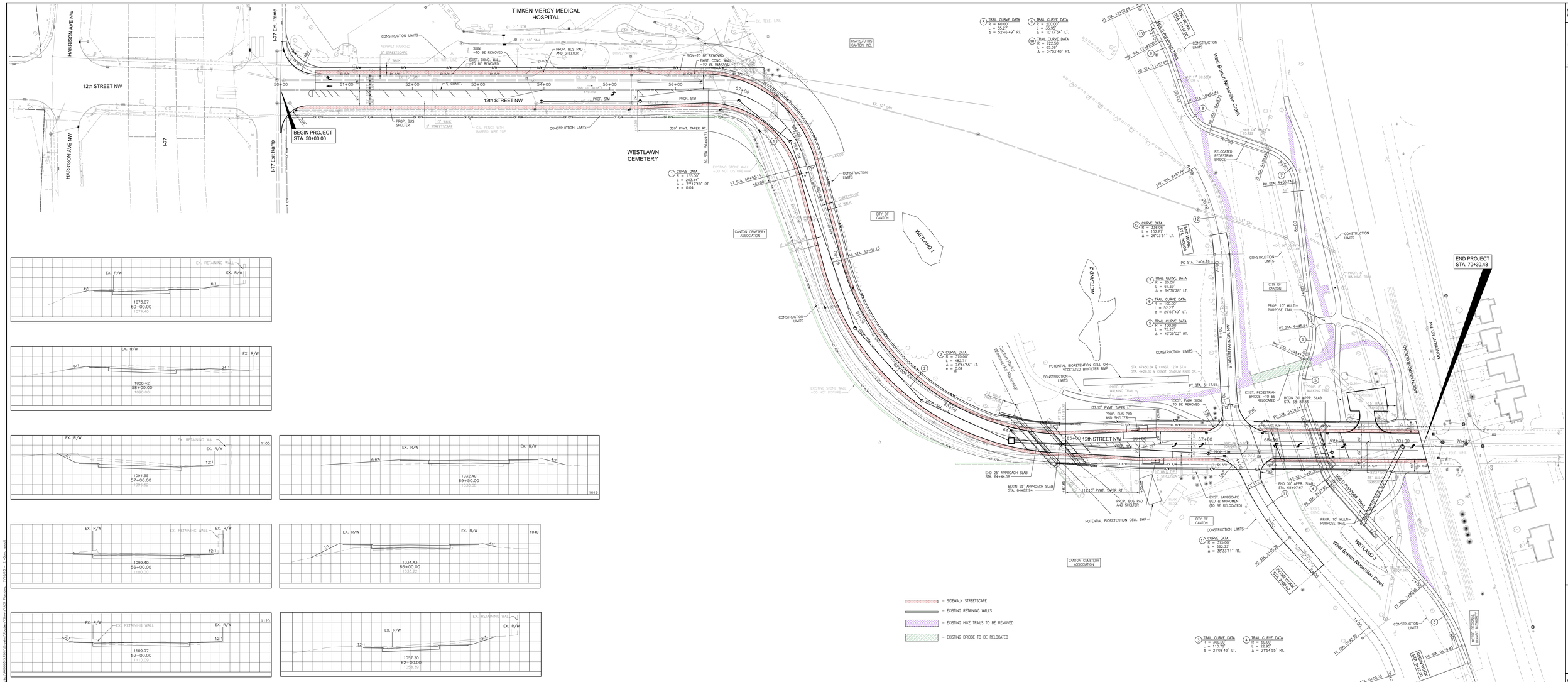
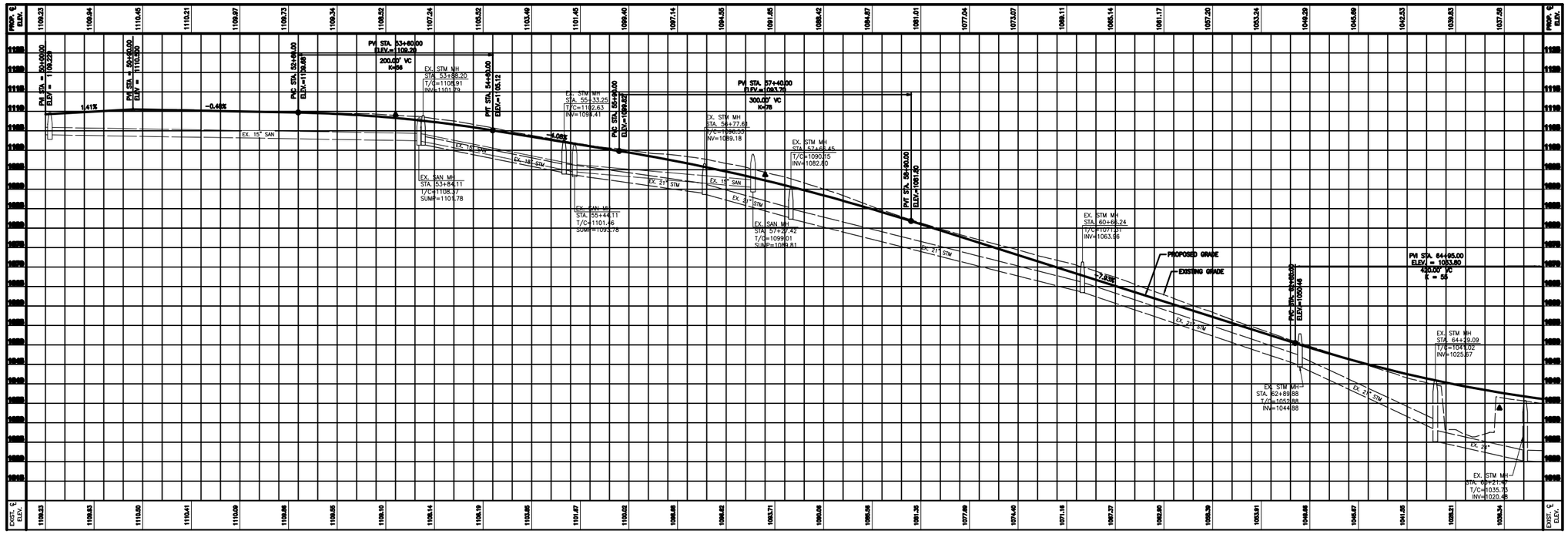
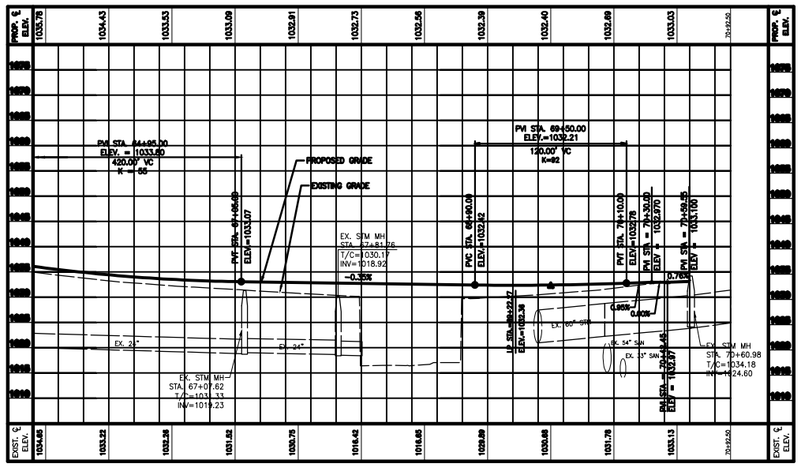

TIMKEN MERCY MEDICAL HOSPITAL
HARRISON AVE NW
12th STREET NW
I-77
I-77 Entr. Ramp
I-77 Exit Ramp
BEGIN PROJECT STA. 50+00.00
WESTLAWN CEMETERY
CANTON CEMETERY ASSOCIATION
CSAHS/UHHS CANTON INC.
CITY OF CANTON
WETLAND 1
WETLAND 2
WETLAND 3
West Branch Nimishillen Creek
Canton Perry Community Roadway
STADIUM PARK DR. NW
MULTI-PURPOSE TRAIL
RELOCATED PEDESTRIAN BRIDGE
EXIST. PEDESTRIAN BRIDGE -TO BE RELOCATED
EXIST. PARK SIGN TO BE REMOVED
EXIST. LANDSCAPE BED & MONUMENT (TO BE RELOCATED)
POTENTIAL BIORETENTION CELL OR VEGETATED BIOFILTER BMP
POTENTIAL BIORETENTION CELL BMP
CONSTRUCTION LIMITS
PROP. BUS PAD AND SHELTER
PROP. BUS SHELTER
PROP. 8' WALKING TRAIL
PROP. 10' MULTI-PURPOSE TRAIL
PROP. STM
EX. STM
EX. SAN
EX. WAT
EX. TELE. LINE
EX. RETAINING WALL
EX. R/W
CONSTRUCTION LIMITS
ASPHALT PARKING
5' STREETSCAPE
5' WALK
10' WALK
C.L. FENCE WITH BARBED WIRE TOP
SIGN -TO BE REMOVED
EXIST. CONC. WALL -TO BE REMOVED
320' PVMT. TAPER RT.
137.15' PVMT. TAPER LT.
112.15' PVMT. TAPER RT.
END 25' APPROACH SLAB STA. 64+44.58
BEGIN 25' APPROACH SLAB STA. 64+82.94
END 30' APPR. SLAB STA. 68+07.63
BEGIN 30' APPR. SLAB STA. 68+81.63
BRIDGE NO. 7600 STA. 7+00.00
BRIDGE NO. 7601 STA. 5+79.83
BRIDGE NO. 7602 STA. 3+65.38
END PROJECT STA. 70+30.48
1 CURVE DATA R = 135.00' L = 203.44' Δ = 76°12'10" RT. e = 0.04
2 CURVE DATA R = 370.00' L = 482.71' Δ = 74°44'55" LT. e = 0.04
3 TRAIL CURVE DATA R = 300.00' L = 110.72' Δ = 21°08'43" LT.
4 TRAIL CURVE DATA R = 60.00' L = 22.95' Δ = 21°54'55" RT.
5 TRAIL CURVE DATA R = 100.00' L = 75.20' Δ = 43°05'02" RT.
6 TRAIL CURVE DATA R = 100.00' L = 52.27' Δ = 29°56'49" LT.
7 TRAIL CURVE DATA R = 60.00' L = 67.69' Δ = 64°38'28" LT.
8 TRAIL CURVE DATA R = 60.00' L = 55.27' Δ = 52°46'49" RT.
9 TRAIL CURVE DATA R = 200.00' L = 35.95' Δ = 10°17'54" LT.
10 TRAIL CURVE DATA R = 922.50' L = 60.38' Δ = 04°03'40" RT.
11 CURVE DATA R = 370.00' L = 252.33' Δ = 38°33'11" RT.
12 CURVE DATA R = 336.00' L = 152.87' Δ = 26°03'51" LT.
1073.07 60+00.00 1078.40
1088.42 58+00.00 1088.00
1094.55 57+00.00 1096.62
1032.40 59+50.00 1030.09
1099.40 56+00.00 1100.00
1034.43 66+00.00 1033.22
1109.97 52+00.00 1110.09
1057.20 62+00.00 1058.39
– SIDEWALK STREETSCAPE
– EXISTING RETAINING WALLS
– EXISTING HIKE TRAILS TO BE REMOVED
– EXISTING BRIDGE TO BE RELOCATED
HORIZONTAL SCALE 1" = 50' (1:600)
PRELIMINARY ROADWAY PLAN
12TH STREET NW BRIDGES REPLACEMENT
1
© Stantec Consulting Services Inc. 2023



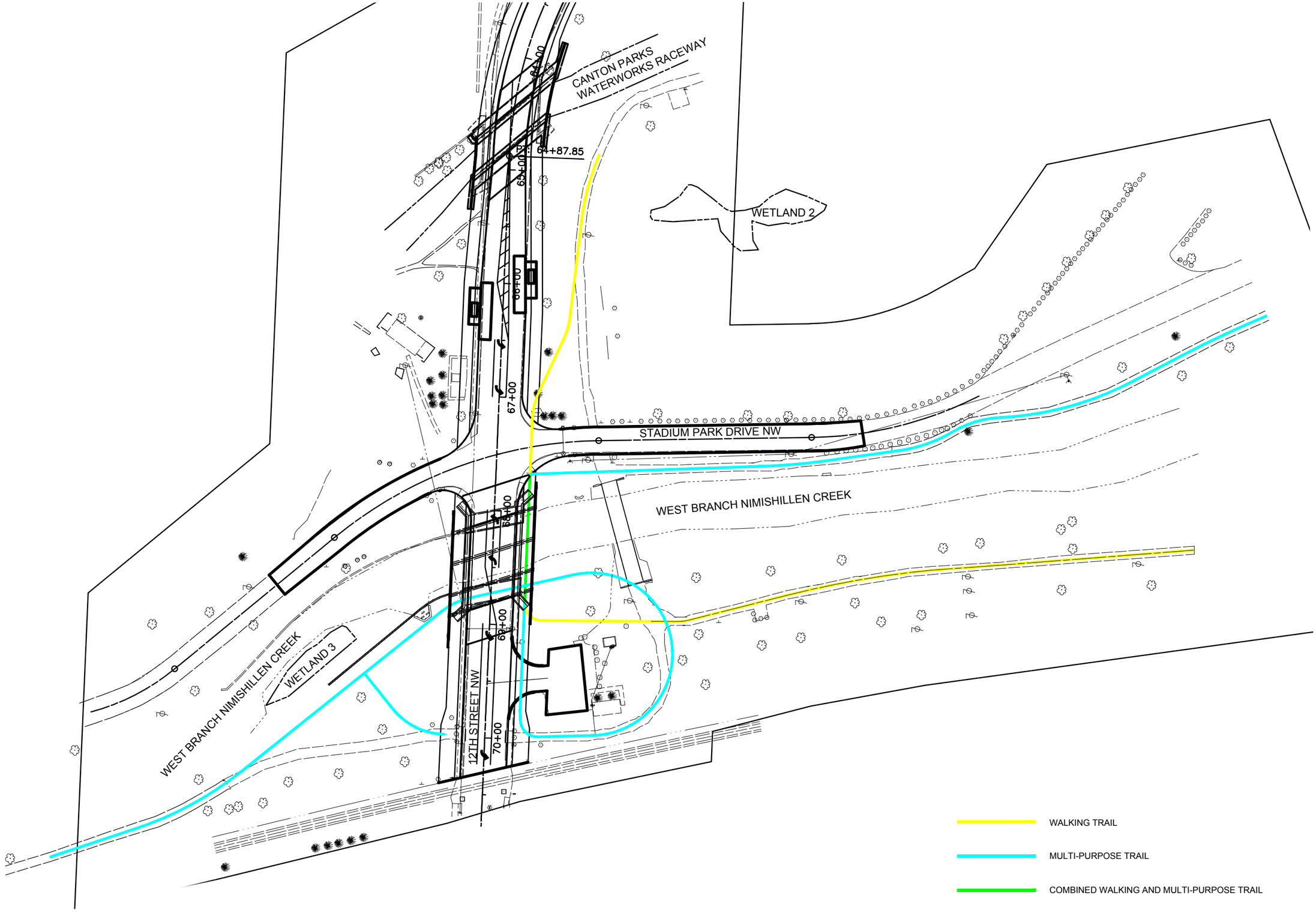
PROFILE ALONG ℄ CONSTRUCTION



PROFILE ALONG ℄ CONSTRUCTION

12TH ST. PROFILE

12TH STREET NW
BRIDGES REPLACEMENT



HORIZONTAL SCALE
1" = 40 FEET

MULTI-PURPOSE TRAIL - ALTERNATE 1

12TH STREET NW
BRIDGES REPLACEMENT

1

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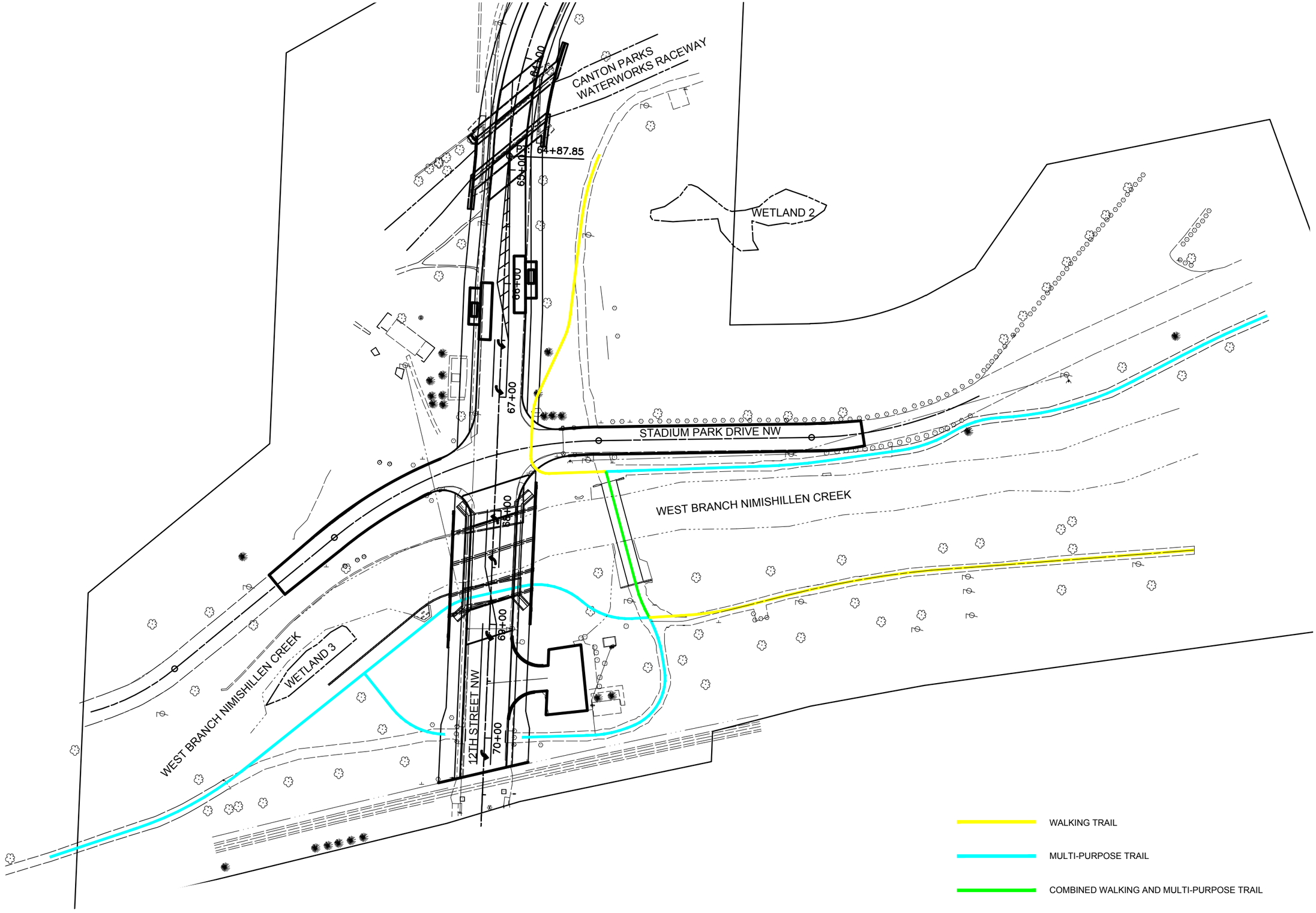

HORIZONTAL SCALE
1" = 40 FEET

MULTI-PURPOSE TRAIL - ALTERNATE 2

12TH STREET NW
BRIDGES REPLACEMENT

1

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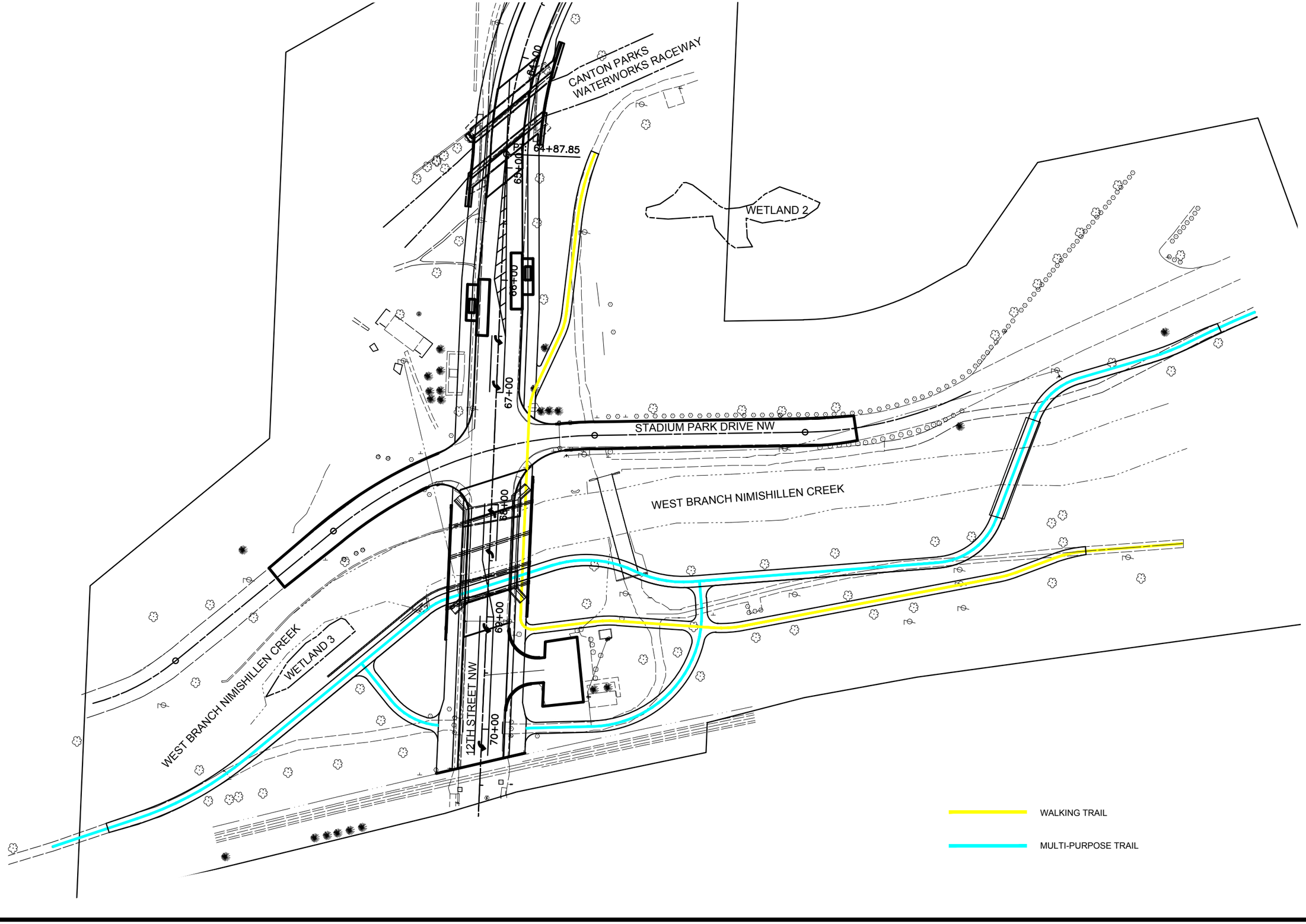


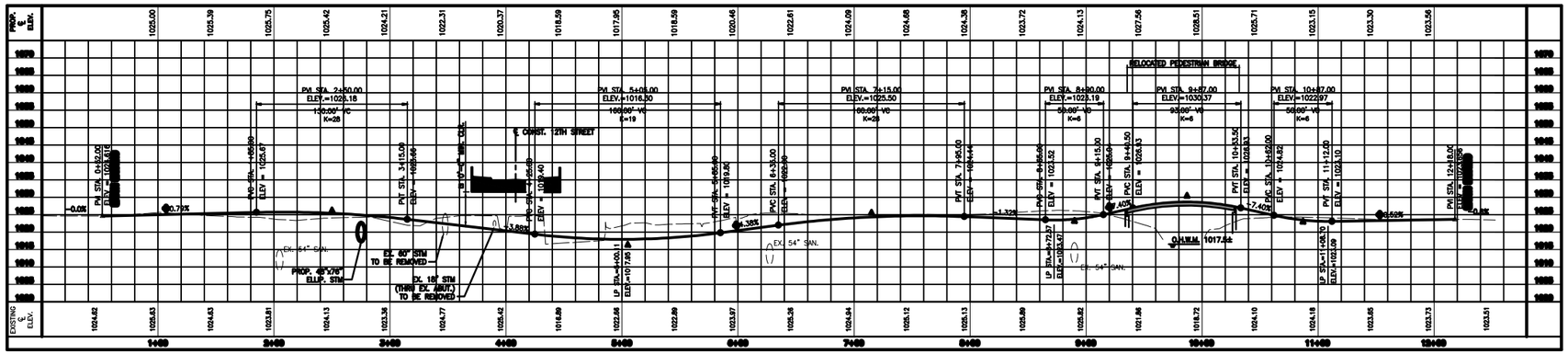
HORIZONTAL SCALE
1" = 40 FEET

MULTI-PURPOSE TRAIL - ALTERNATE 3

12TH STREET NW
BRIDGES REPLACEMENT

1

G:\Project\AK000315.R001\Drawing\Roadway\Sheets\AER Multi-Purpose.dwg; 7/08/13 - 4:07pm; sgault



PROFILE ALONG ℄ CONSTRUCTION

HORIZONTAL SCALE
1" = 50'

ALTERNATE 3 MULTI-PURPOSE TRAIL PROFILE

12TH STREET NW
BRIDGES REPLACEMENT

PLAN

PROFILE ALONG ℄ CONSTRUCTION

NOTES

1. EARTHWORK LIMITS SHOWN ARE APPROXIMATE. ACTUAL SLOPES SHALL CONFORM TO PLAN CROSS SECTIONS.
2. FOR STRUCTURAL GENERAL NOTES SEE SHEETS 00 / 00 AND 00 / 00 .
3. THE BOTTOM OF THE SLAB CLEARS THE DESIGN YEAR WATER SURFACE ELEVATION BY 3.95 FEET.
4. APPROXIMATE TOP OF ROCK ELEVATION TAKEN FROM EXISTING PLANS.

LEGEND

(TBR) = TO BE REMOVED

HYDRAULIC DATA

DRAINAGE AREA = 40.4 SQ. MILES
Q25 = 3,099 CFS
Q100 = 4,100 CFS
EX. : 25 YR. ELEV. = 1026.54, V = 10.11 FPS
EX. : 100 YR. ELEV. = 1028.18, V = 13.05 FPS
PROP. : 25 YR. ELEV. = 1026.25, V = 6.08 FPS
PROP. : 100 YR. ELEV. = 1027.43, V = 7.90 FPS
NORMAL WATER SURFACE ELEV. = 1016.2±

DESIGN DESIGNATION

CURRENT ADT (2015):	10,320
DESIGN ADT (2035):	10,690
DESIGN ADTT (2035):	428

EXISTING STRUCTURE

TYPE : REINFORCED CONCRETE FILLED ARCH ON SPREAD FOOTINGS
SPAN: 50'–0"± F/F ARCH
ROADWAY : 36'–0"± TOE/TOE CURB WITH 5'–0"± SIDEWALKS
ALIGNMENT : TANGENT
SKEW : 13°00'00"± R.F.
WEARING SURFACE : 4"± BITUMINOUS ASPHALT CONCRETE
APPROACH SLABS : NONE
BUILT : JULY 1, 1929
CONDITION : POOR
STRUCTURE FILE NO. : 7631324

PROPOSED STRUCTURE

TYPE: TWO–SPAN CONTINUOUS CONCRETE SLAB ON ARCH SUBSTRUCTURE AND WALL TYPE ABUTMENTS AND CAP AND COLUMN PIER ON SPREAD FOOTINGS

SPANS : 27'–4 5/8", 27'–4 5/6" AND 17'–6 5/8" C/C BRGS.
ROADWAY : 40'–0" TOE/TOE SIDEWALKS WITH TWO 15'–0" SIDEWALKS
ALIGNMENT : TANGENT
SKEW : 20° 00'00" R.F.
WEARING SURFACE : 1" MONOLITHIC CONCRETE
APPROACH SLABS : 30'–0" (AS–1–81)
LOADING: HL–93 AND FWS (60 P.S.F.)
CROWN: 0.016 FT./FT.
LONGITUDE: N 81° 23' 30"
LATITUDE: W 40° 48' 36"

DESIGN AGENCY
ARCADIS
ARCADIS U.S., Inc.
222 South Main Street, Suite 300 Akron, Ohio 44308
Tel. 330-434-1995 Fax: 330-374-1095 www.arcadis-us.com

DESIGNED	DRAWN	REVIEWED	DATE
NPB	CAF	RBB	07/13
CHECKED	REVISED	STRUCTURE FILE NO.	
SKK		7636121	

STARK COUNTY
STATION 68+07.83
STATION 68+81.75

SITE PLAN
BRIDGE NO. STA M12TH CA–05–15
OVER WEST BRANCH OF NIMISHILLEN CREEK

CITY OF CANTON
12TH STREET NW
BRIDGES REPLACEMENT

1 / 2

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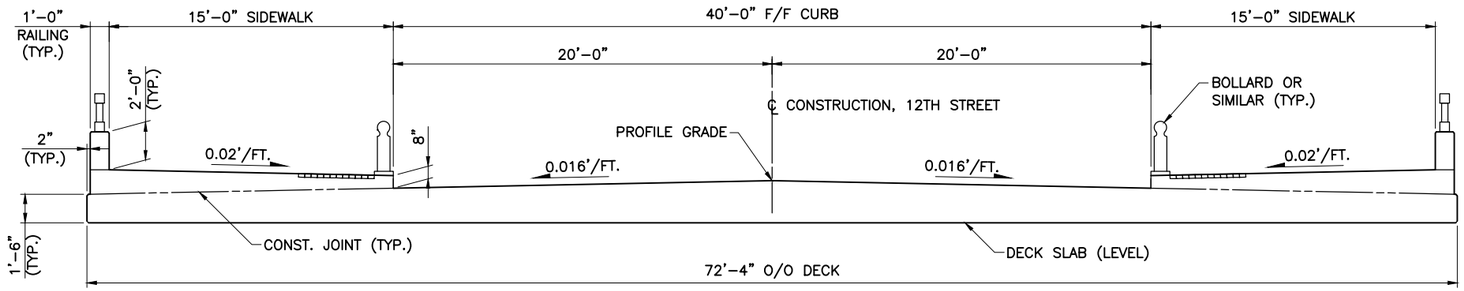
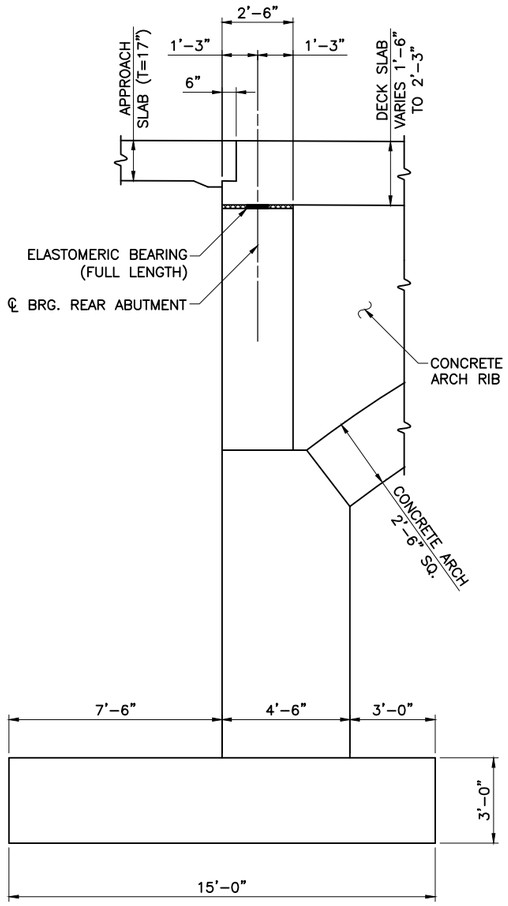
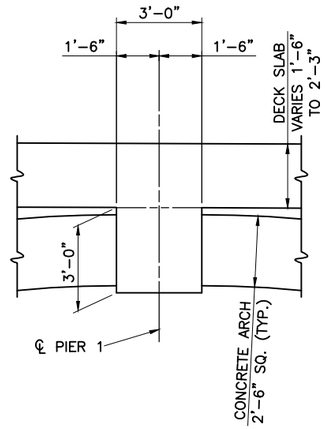


TRANSVERSE SECTION



REAR ABUTMENT SECTION



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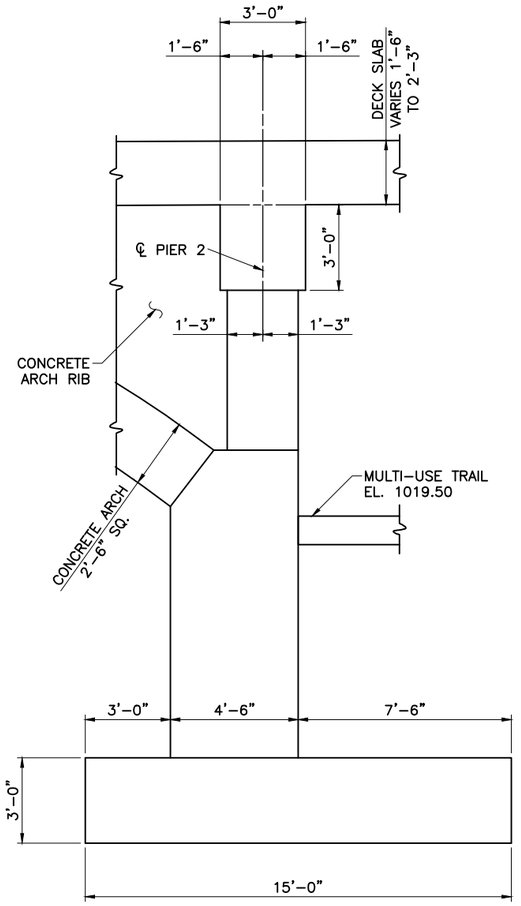

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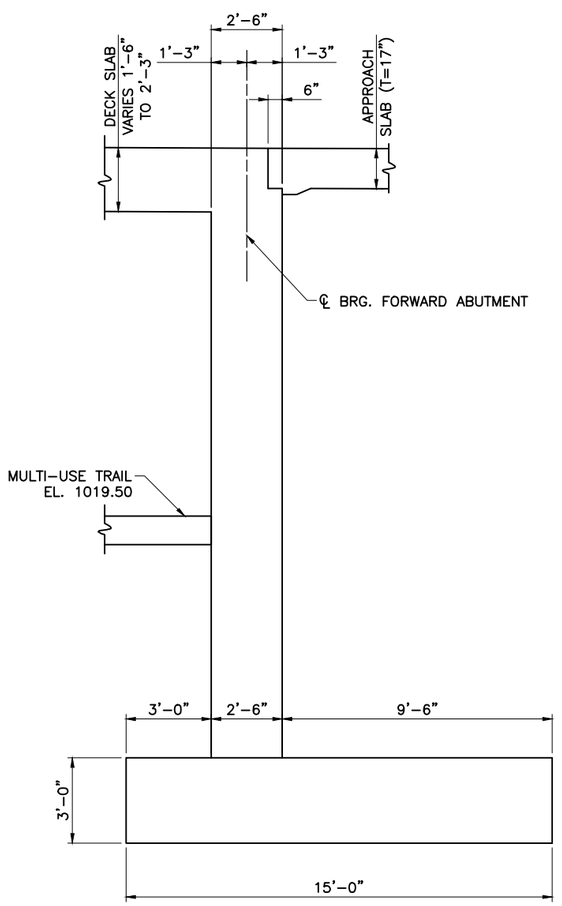


FORWARD ABUTMENT SECTION

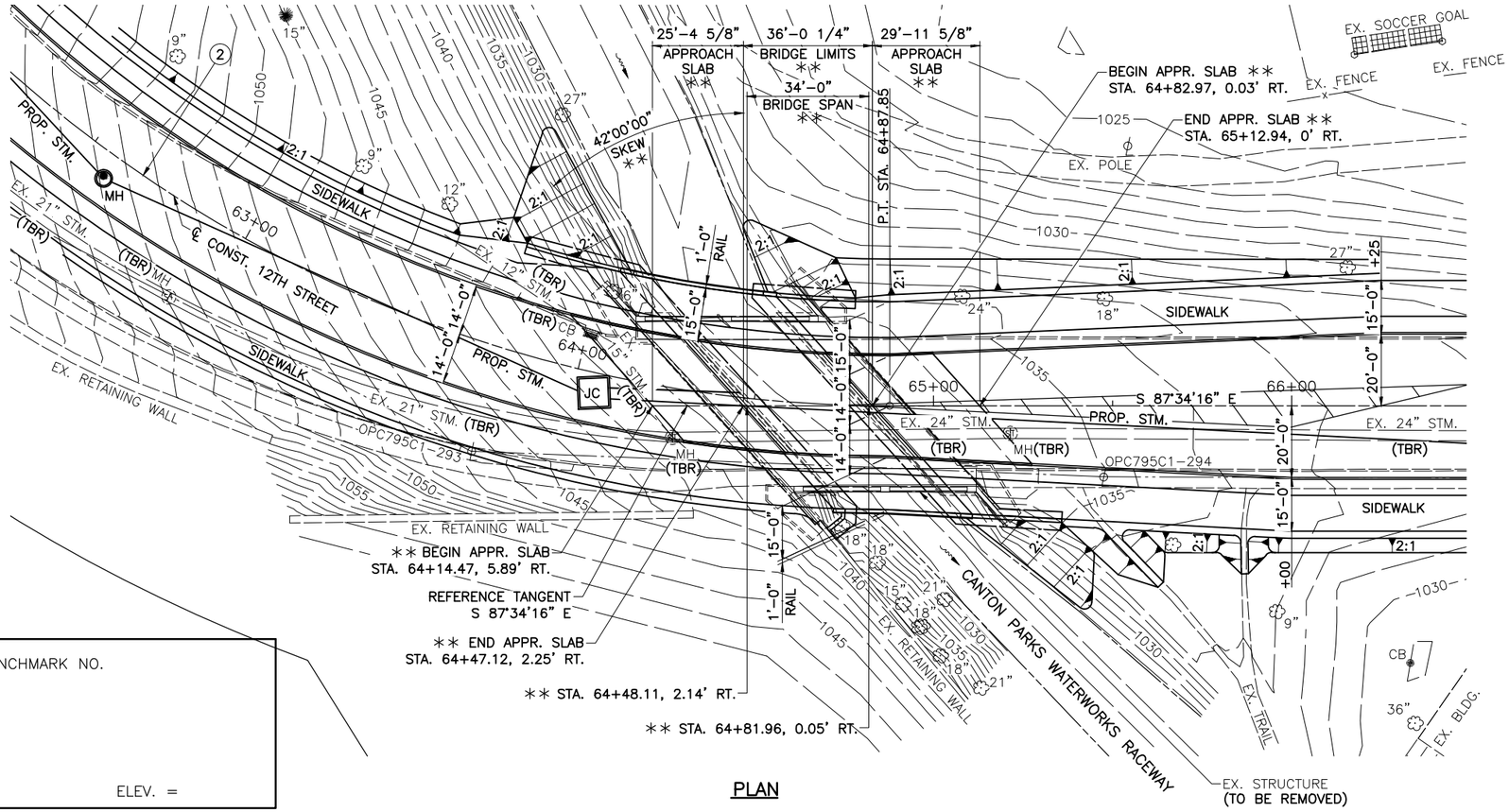
DESIGN AGENCY
ARCADIS
ARCADIS U.S., Inc.
222 South Main Street, Suite 300 Akron, Ohio 44308
Tel: 330-434-1995 Fax: 330-374-1095 www.arcadis-us.com

DESIGNED	DRAWN	REVIEWED	DATE
NPB	MPB	RBB	07/13
CHECKED	REVISED	STRUCTURE FILE NO.	
SKK		7636121	

STRUCTURE DETAILS
BRIDGE NO. STA M12TH CA-05-15
OVER WEST BRANCH OF NIMISHILLEN CREEK

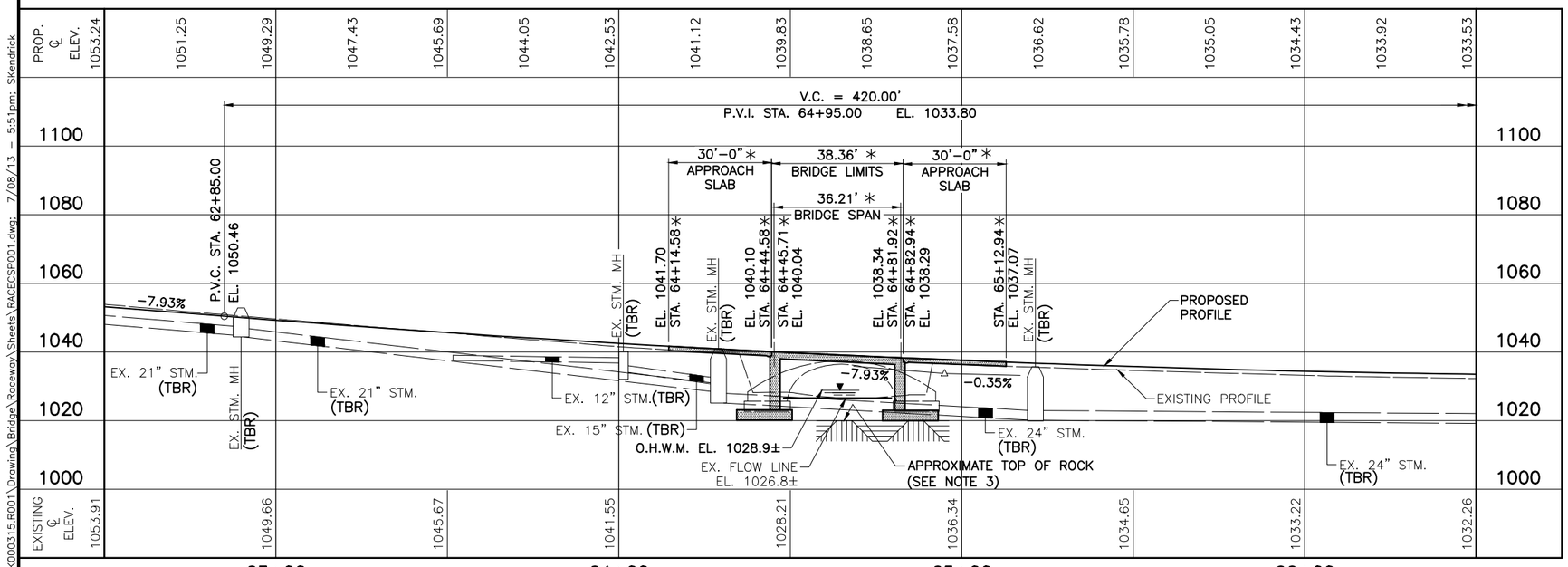
CITY OF CANTON
12TH STREET NW
BRIDGES REPLACEMENT

2 / 2



PLAN

BENCHMARK NO.
X
X
X
X
X
X
X
ELEV. =



PROFILE ALONG ℄ CONSTRUCTION

NOTES

1. EARTHWORK LIMITS SHOWN ARE APPROXIMATE. ACTUAL SLOPES SHALL CONFORM TO PLAN CROSS SECTIONS.
2. FOR STRUCTURAL GENERAL NOTES SEE SHEETS 00 / 00 AND 00 / 00 .
3. APPROXIMATE TOP OF ROCK ELEVATION TAKEN FROM EXISTING PLANS.

LEGEND

(2) CURVE DATA
P.I. = STA. 62+87.77
△ = 74°44'55"
D_C = 69°33'31"
R = 370.00'
T = 282.62'
L = 482.71'
P.C. = STA. 60+05.15
P.T. = STA. 64+87.85

* MEASURED ALONG CENTERLINE CONSTRUCTION

** MEASURED ALONG REFERENCE TANGENT

\# TO BE INCLUDED WITH ROADWAY QUANTITIES FOR PAYMENT

(TBR) = TO BE REMOVED

HYDRAULIC DATA

DRAINAGE AREA = 0.12 SQ. MILES
EX. : 25 YR. = 160 CFS
EX. : 100 YR. = 200 CFS
EXISTING WATERWAY OPENING = 225 SQ. FT.
PROPOSED WATERWAY OPENING = 241 SQ. FT.

DESIGN DESIGNATION

CURRENT ADT (2015):	10,320
DESIGN ADT (2035):	10,690
DESIGN ADTT (2035):	428

EXISTING STRUCTURE

TYPE : REINFORCED CONCRETE ARCH FILLED ON SPREAD FOOTINGS
SPAN: 32'-0"±
ROADWAY : 36'-0"± TOE/TOE SIDEWALKS WITH 5'-0" SIDEWALKS
ALIGNMENT : TANGENT
SKEW : 42°00"00"± R.F.
WEARING SURFACE : 2"± BITUMINOUS ASPHALT CONCRETE
APPROACH SLABS : NONE
BUILT : 1928
CONDITION : FAIR
STRUCTURE FILE NO. : 7661215

PROPOSED STRUCTURE

TYPE: SINGLE SPAN REINFORCED CONCRETE DECK ON REINFORCED CONCRETE ABUTMENTS ON SPREAD FOOTINGS WITH FALSE ARCH FACADE WALL

SPAN : 34'-0" ON TANGENT

ROADWAY : 28'-0" TOE/TOE SIDEWALKS WITH 15'-0" SIDEWALKS
ALIGNMENT : TANGENT
SKEW : 42°00'00" R.F.
WEARING SURFACE : 1" MONOLITHIC CONCRETE
APPROACH SLABS : 30'-0" LONG (AS-1-81)
LOADING: HL-93 AND FWS (60 PSF)

CROWN: SUPERELEVATED
LONGITUDE: 81° 23' 36"
LATITUDE: 40° 48' 36"

DESIGN AGENCY
ARCADIS
ARCADIS U.S., Inc.
222 South Main Street, Suite 300 Akron, Ohio 44311
Tel: 330-434-1995 Fax: 330-374-1095 www.arcadis-us.com

DESIGNED NPB | DRAWN MPB | CHECKED SKK | REVISED | REVIEWED RBB | DATE 07/13 | STRUCTURE FILE NO. 7661223

STARK COUNTY
STATION 64+44.58
STATION 64+82.94

SITE PLAN
BRIDGE NO. STA-12NW-1300
OVER CANTON PARKS WATERWORKS RACEWAY

CITY OF CANTON
12TH STREET NW
BRIDGES REPLACEMENT

1 / 2

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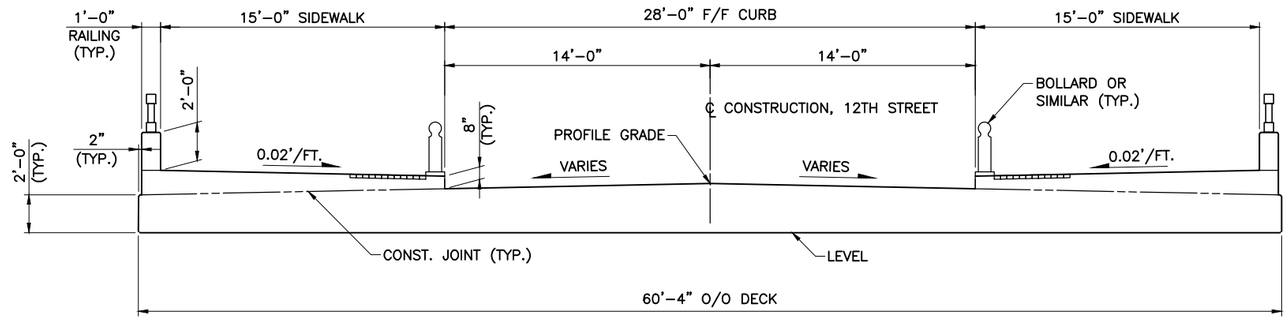
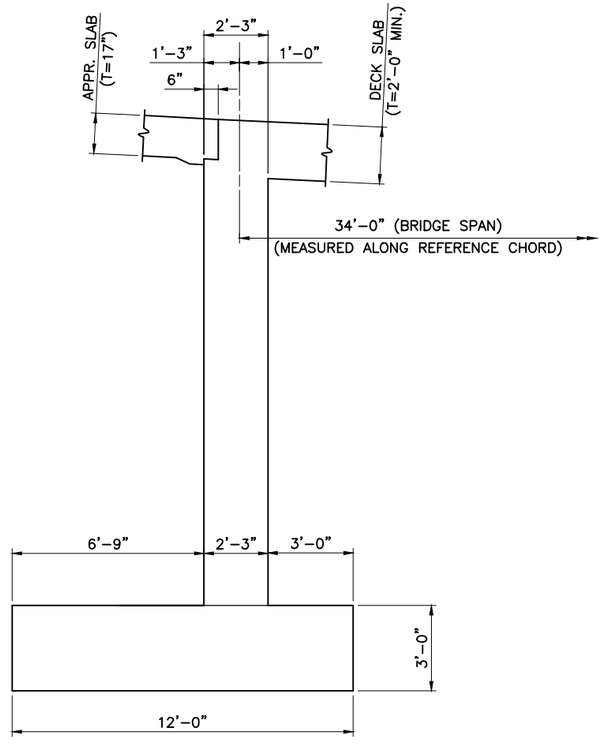


TRANSVERSE SECTION



ABUTMENT SECTION

DESIGN AGENCY
ARCADIS
ARCADIS U.S., Inc.
222 South Main Street, Suite 300 Akron, Ohio 44308
Tel: 330-434-1995 Fax: 330-374-1095 www.arcadis-us.com

DESIGNED	DRAWN	REVIEWED	DATE
NPB	MPB	RBB	07/13
CHECKED	REVISED	STRUCTURE FILE NO.	
SKK		7661223	

STRUCTURE DETAILS
BRIDGE NO. STA-12NW-1300
OVER CANTON PARKS WATERWORKS RACEWAY

CITY OF CANTON
12TH STREET NW
BRIDGES REPLACEMENT

2 / 2

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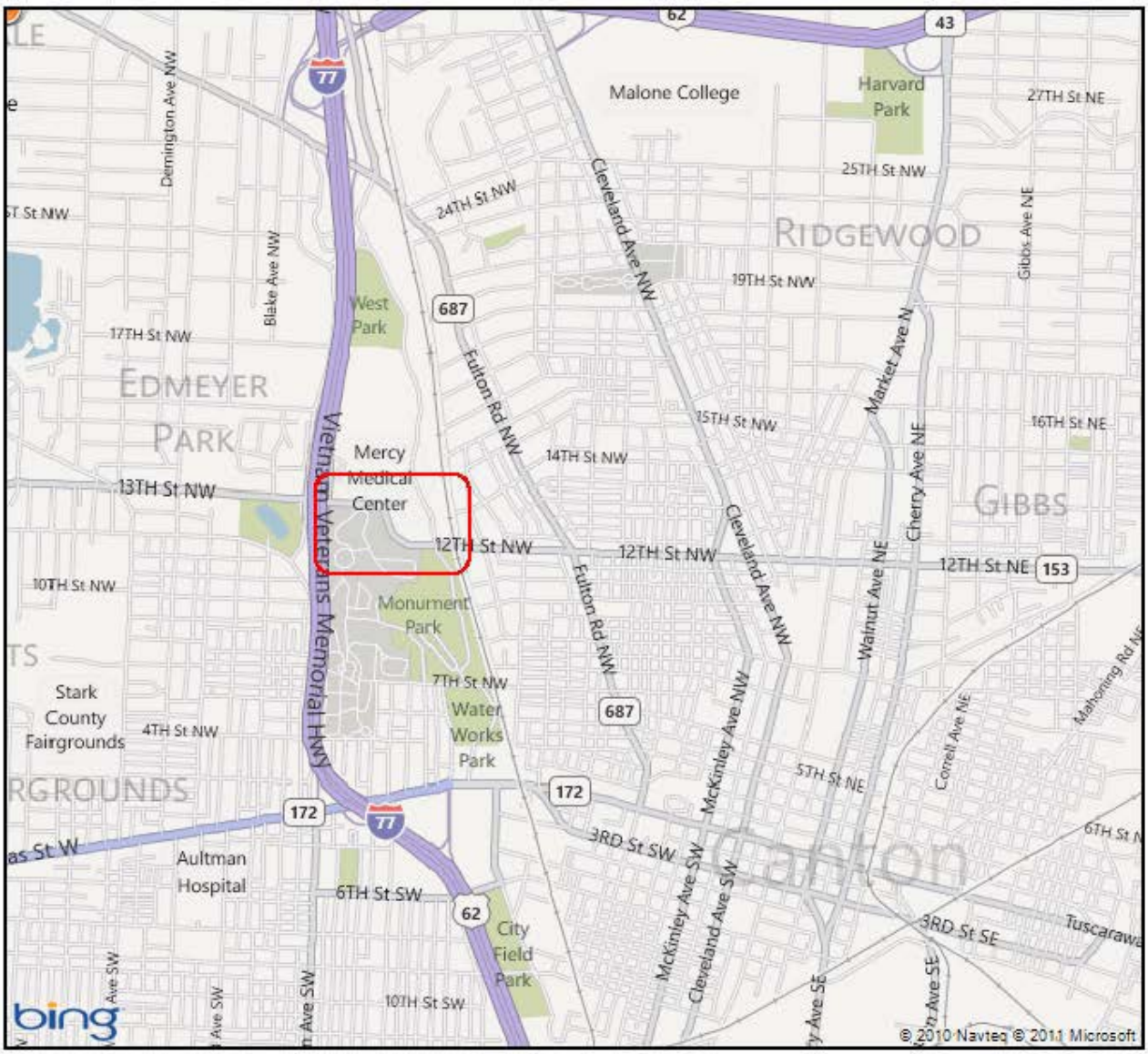
Appendix A

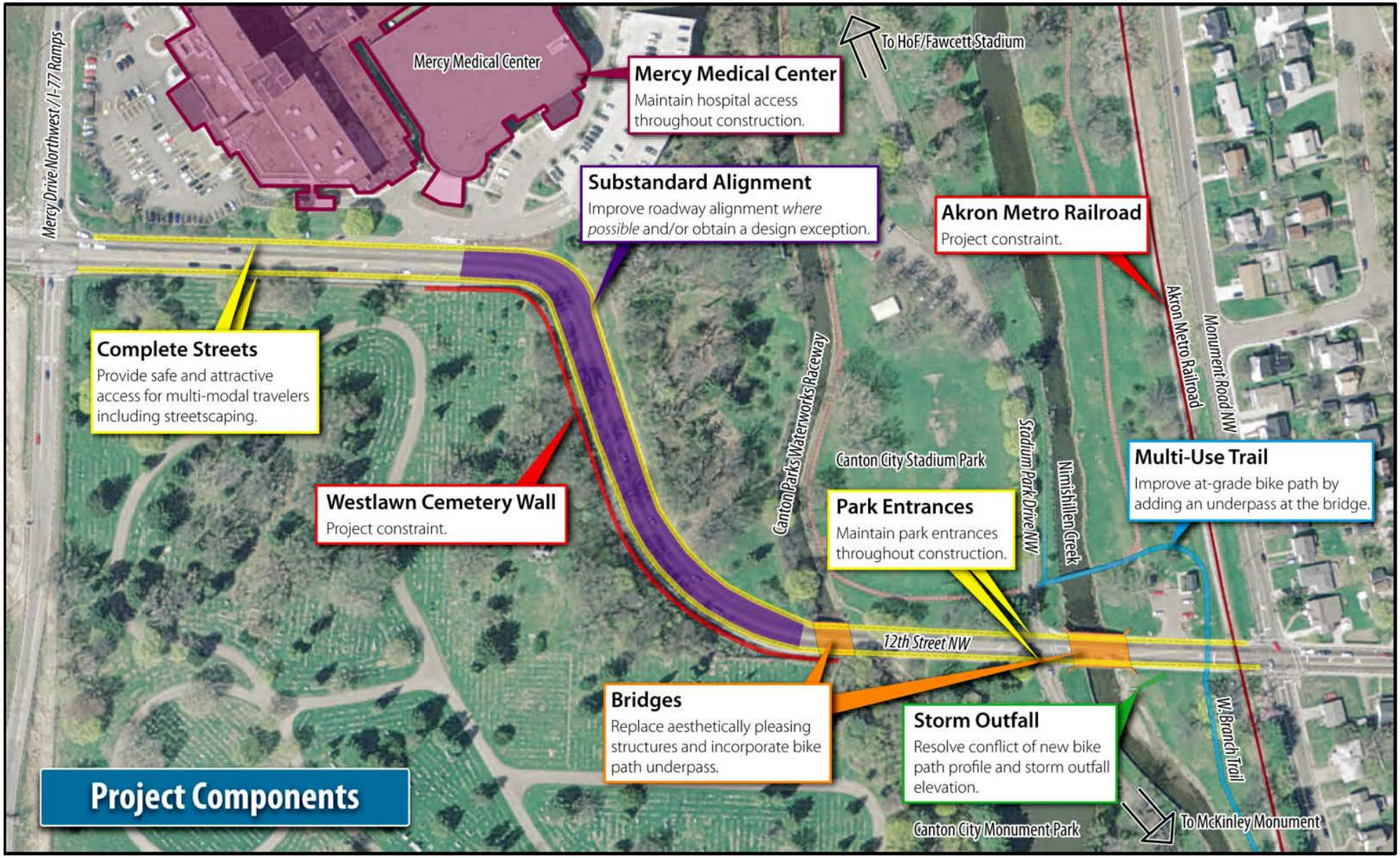
General

Attachment A-1 – Project Location Map

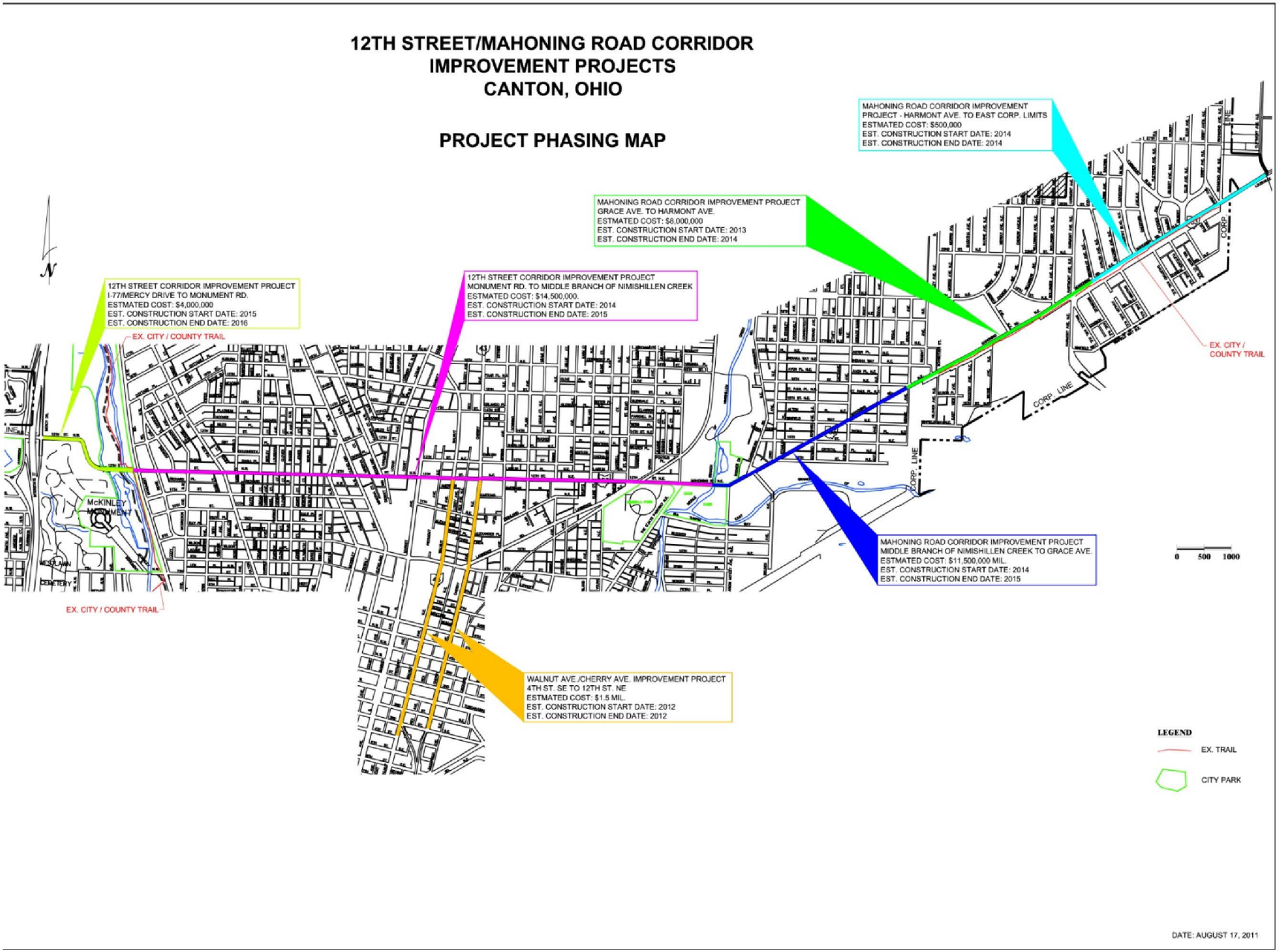
The project is located within the City of Canton, Ohio. The approximate project area is shown in the exhibit below.



Attachment A-2 – Project Component Map

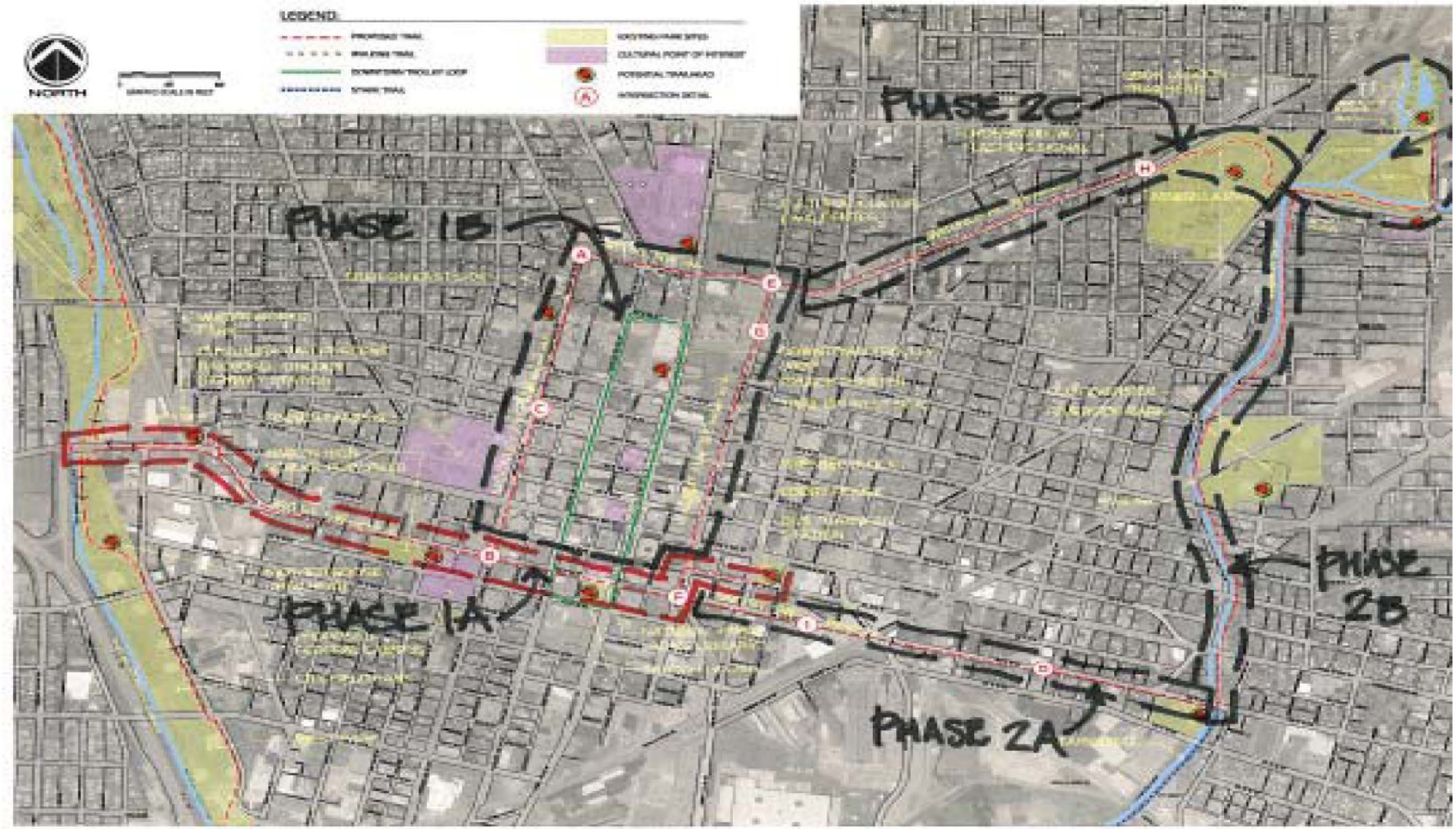


Attachment A-3 – 12th Street / Mahoning Road Corridor Improvement Projects

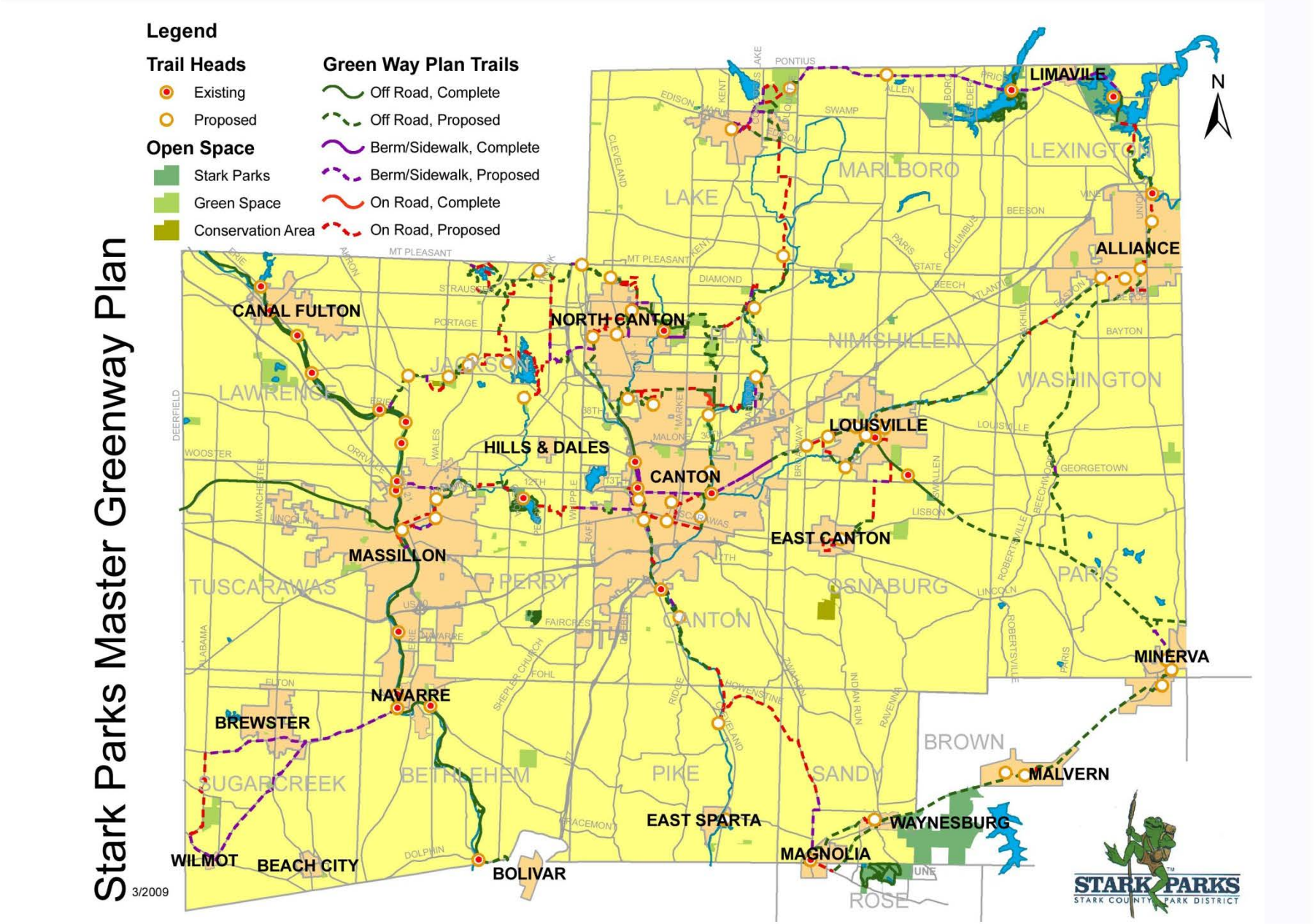


Attachment A-4 - Canton's Proposed Trail Corridors – "Downtown Loop"

CANTON'S TRAIL COORIDORS
"Downtown Loop"



Attachment A-5 – Stark Parks Master Greenway Plan



Attachment A-6 – America's Byway Signs

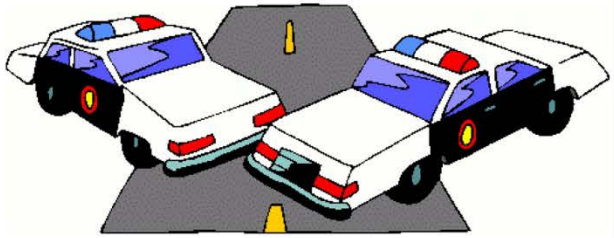
Existing Byway signage along 12th Street NW in Canton, Ohio

Future Byway signage to be placed along 12th Street NW and Ohio & Erie Canalway in Canton, Ohio

Attachment A-7 – 2010 Stark County Crash Report – 1 of 2

Stark County Crash Report

2010



Prepared By:
STARK COUNTY AREA TRANSPORTATION STUDY
201 Third Street NE
Suite 201

Canton

Top-Ranked Intersections

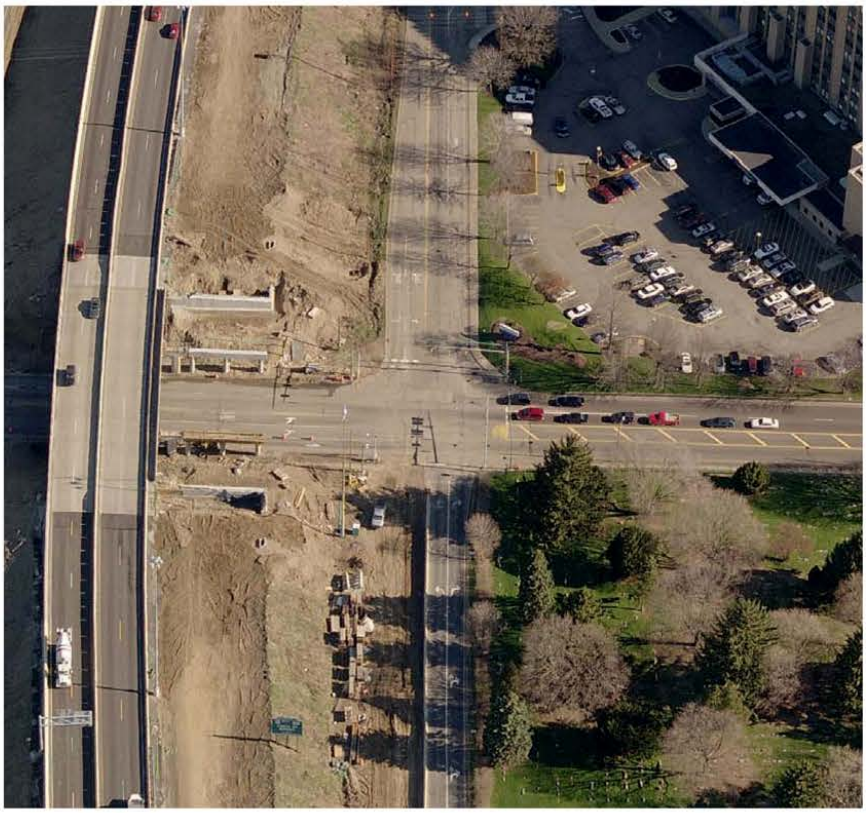
1ST STREET	2ND STREET	2008 Total	2009 Total	2010 Total	3-Year Total	3-Year Injury	3-Year Fatal	2010 ADT	SI	Rate	AVG	HR
12th St N	Market Ave N	18	19	12	49	20	1	22,800	2.04	1.96	16.33	43.59
Central Plaza	Tuscarawas St	18	15	19	52	19	0	23,650	1.73	2.01	17.33	40.13
US62	Harmont Ave/Lesh St	18	24	17	59	18	0	31,905	1.61	1.69	19.67	35.63
13/12th St	I-77 Ramps TM Hospital	12	13	19	44	13	0	19,000	1.59	2.11	14.67	32.88
Clarendon Ave	Navarre Rd	5	5	6	16	8	0	5,300	2.00	2.76	5.33	19.59
Harrison Ave	Tuscarawas St W	12	10	14	36	8	0	19,580	1.44	1.68	12.00	19.39
Tuscarawas E	Walnut Ave	8	8	11	27	13	0	16,505	1.96	1.49	9.00	17.58
Raff Ave SR791	Tuscarawas St W	12	13	13	38	10	0	25,535	1.53	1.36	12.67	17.50
Dueber Ave SW	Tuscarawas St W	9	10	12	31	5	0	17,555	1.32	1.61	10.33	14.68
4th St NE	Cherry Ave SR43	3	5	10	18	8	0	8,760	1.89	1.88	6.00	14.17

Table 1 - Locations with Hazard Ratings over 10

Street	Intersecting Street	Crashes by year			3 Year Totals			Avg Daily Traffic	Severity Index	Crash Rate per Million Vehicles	SCATS Hazard Rating	Jurisdiction
		2008	2009	2010	Crashes	Injury	Fatal					
12th St N	Market Ave N	18	19	12	49	20	1	22,800	2.04	1.96	**43.59**	Canton
Central Plaza	Tuscarawas St	18	15	19	52	19	0	23,650	1.73	2.01	**40.13**	Canton
US 62	Harmont Ave/Lesh St	18	24	17	59	18	0	31,905	1.61	1.69	**35.63**	Canton
13/12th St	I-77 Ramps TM Hospital	12	13	19	44	13	0	19,000	1.59	2.11	**32.88**	Canton
Cleveland Ave	Wright St	15	9	3	27	16	0	10,000	2.19	2.46	**32.31**	County
I-77	Belden Village & Whipple	15	18	18	51	16	0	30,200	1.63	1.54	**28.43**	ODOT
30th St NE	Harrisburg Ave	8	9	9	26	9	0	11,750	1.69	2.02	**19.75**	County
Clarendon Ave	Navarre Rd	5	5	6	16	8	0	5,300	2.00	2.76	**19.59**	Canton
Beech St	Beechwood Ave	3	5	9	17	12	0	7,250	2.41	2.14	**19.50**	County

Attachment A-7 – 2010 Stark County Crash Report – 2 of 2

13th Street & I-77 Ramps at Mercy Hospital – This is a signalized intersection on the east side of I-77 at 13th Street NW in the City of Canton. The configuration of this intersection is unusual. The south leg is the exit ramp from I-77 northbound. The east and west legs are 13th Street. The north leg is both the entrance ramp to I-77 and the main entrance to Timken-Mercy Medical Center. Signal timing and lane use at this intersection is unusual and probably contributes to the crash rate especially since hospitals attract many drivers unfamiliar with the area.



Hazard Rating	Crashes per year			Injury Crashes	Fatal Crashes	ADT	Crash Rate	Severity Index
	2008	2009	2010					
32.88	12	13	19	13	0	19,000	2.11	1.59

Fatalities: 0

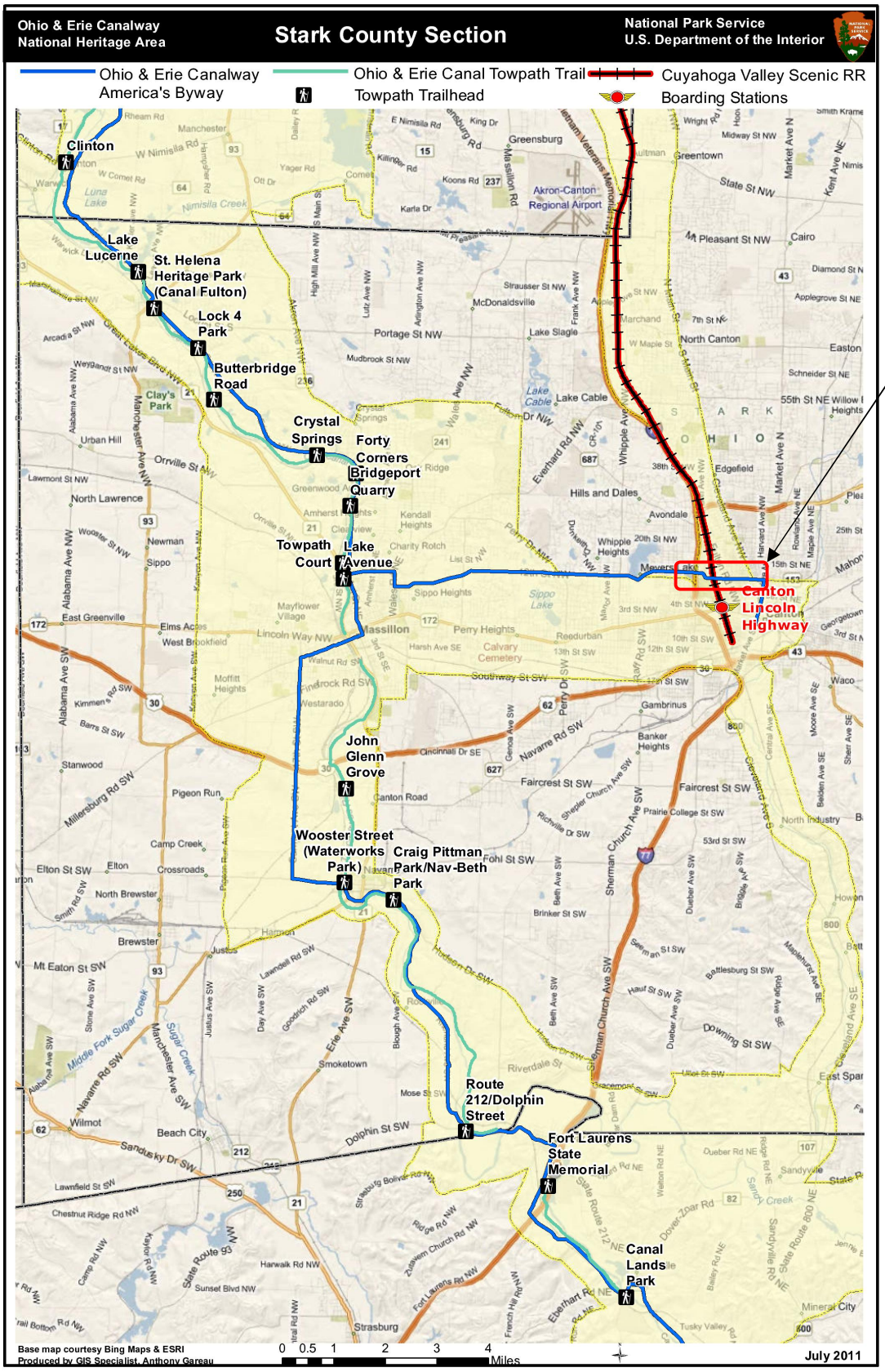
Leading Cause(s): Following too closely

Recent Improvements: This intersection underwent construction in 2007.

Current Plans: None

Recommendation: None at this time. If crashes do not drop back down to 2008/2009 levels, a safety study should be conducted here.

Attachment A-8 – Ohio & Erie Canalway National Heritage Area



City of Canton 12th St. Corridor

Attachment A-9

CANTON CITYSCAPE

Legend:

- Downtown CityScape Sidewalk and Curb Program
  *Street Lights w/Flag Holder only
- Gateway Corridor CityScape Sidewalk and Curb Program
  *Street Lights w/Flag Holder only
- Downtown & Gateway Corridor CityScape Sidewalk and Curb Program
  *Street Lights w/Flag Holder & Banner Arms
- Downtown CityScape Sidewalk and Curb Program
  *Street Lights w/Flag Holder, Banner Arms, & Flower Hangers
- Downtown Special Improvement District (S.I.D.) eligible for CityScape Sidewalk and Curb Program by Ordinance 149/2008 or Resolution

Notes:

CityScape Sidewalk and Curb Program is defined in City Codified Ordinance Chapter 921.

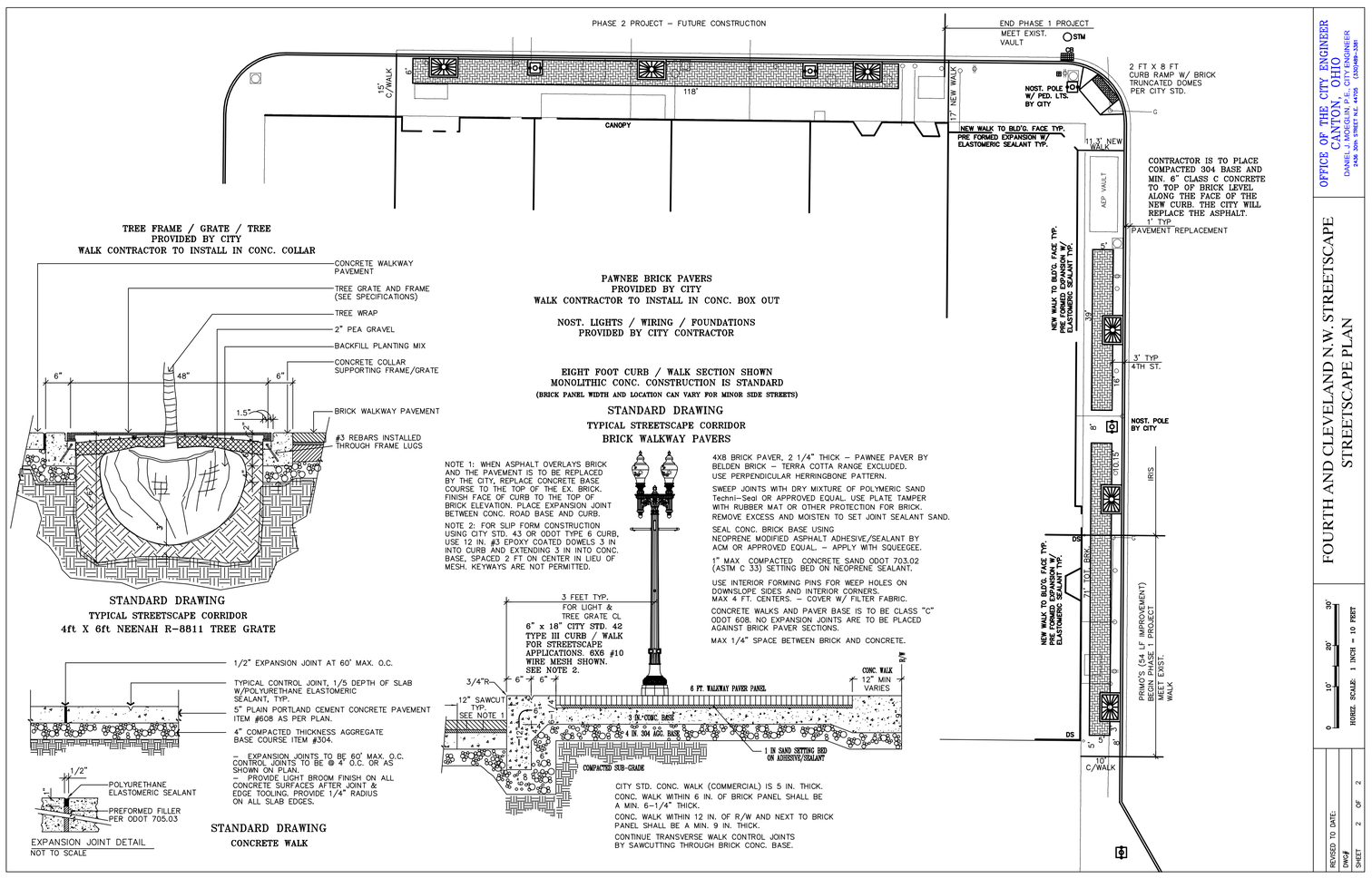
Generally, the program includes concrete or granite curb, concrete and brick sidewalk, decorative streetlights, trees, and tree grates.

Final routes as designated for the Stark County bike and pedestrian trail, not shown; however they are eligible for CityScaping under Ord. 921.

Areas authorized for granite curb are those within the following boundaries:

East - Piedmont Ave. NE
West - Court Ave. NW
North - 5th St. NE & NW
South - Tuscarawast St. E & W

CITYSCAPE SAMPLE



TREE FRAME / GRATE / TREE
PROVIDED BY CITY
WALK CONTRACTOR TO INSTALL IN CONC. COLLAR

STANDARD DRAWING
TYPICAL STREETSCAPE CORRIDOR
4ft X 6ft NEENAH R-8811 TREE GRATE

EXPANSION JOINT DETAIL
NOT TO SCALE

STANDARD DRAWING
CONCRETE WALK

PAWNEE BRICK PAVERS
PROVIDED BY CITY
WALK CONTRACTOR TO INSTALL IN CONC. BOX OUT

NOST. LIGHTS / WIRING / FOUNDATIONS
PROVIDED BY CITY CONTRACTOR

EIGHT FOOT CURB / WALK SECTION SHOWN
MONOLITHIC CONC. CONSTRUCTION IS STANDARD
(BRICK PANEL WIDTH AND LOCATION CAN VARY FOR MINOR SIDE STREETS)

STANDARD DRAWING
TYPICAL STREETSCAPE CORRIDOR
BRICK WALKWAY PAVERS

NOTE 1: WHEN ASPHALT OVERLAYS BRICK AND THE PAVEMENT IS TO BE REPLACED BY THE CITY, REPLACE CONCRETE BASE COURSE TO THE TOP OF THE EX. BRICK. FINISH FACE OF CURB TO THE TOP OF BRICK ELEVATION. PLACE EXPANSION JOINT BETWEEN CONC. ROAD BASE AND CURB.

NOTE 2: FOR SLIP FORM CONSTRUCTION USING CITY STD. #3 OR ODOT TYPE 6 CURB, USE 12 IN. #3 EPOXY COATED DOWELS 3 IN INTO CURB AND EXTENDING 3 IN INTO CONC. BASE, SPACED 2 FT ON CENTER IN LIEU OF MESH. KEYWAYS ARE NOT PERMITTED.

4X8 BRICK PAVER, 2 1/4" THICK – PAWNEE PAVER BY BELDEN BRICK – TERRA COTTA RANGE EXCLUDED. USE PERPENDICULAR HERRINGBONE PATTERN.

SWEEP JOINTS WITH DRY MIXTURE OF POLYMERIC SAND Techni-Seal OR APPROVED EQUAL. USE PLATE TAMPER WITH RUBBER MAT OR OTHER PROTECTION FOR BRICK. REMOVE EXCESS AND MOISTEN TO SET JOINT SEALANT SAND.

SEAL CONC. BRICK BASE USING NEOPRENE MODIFIED ASPHALT ADHESIVE/SEALANT BY ACM OR APPROVED EQUAL. – APPLY WITH SQUEEGEE.

1" MAX. COMPACTED CONCRETE SAND ODOT 703.02 (ASTM C 33) SETTING BED ON NEOPRENE SEALANT.

USE INTERIOR FORMING PINS FOR WEEP HOLES ON DOWNSLOPE SIDES AND INTERIOR CORNERS. MAX 4 FT. CENTERS. – COVER W/ FILTER FABRIC.

CONCRETE WALKS AND PAVER BASE IS TO BE CLASS "C" ODOT 608. NO EXPANSION JOINTS ARE TO BE PLACED AGAINST BRICK PAVER SECTIONS.

MAX 1/4" SPACE BETWEEN BRICK AND CONCRETE.

CITY STD. CONC. WALK (COMMERCIAL) IS 5 IN. THICK.
CONC. WALK WITHIN 6 IN. OF BRICK PANEL SHALL BE A MIN. 6-1/4" THICK.
CONC. WALK WITHIN 12 IN. OF R/W AND NEXT TO BRICK PANEL SHALL BE A MIN. 9 IN. THICK.
CONTINUE TRANSVERSE WALK CONTROL JOINTS BY SAWCUTTING THROUGH BRICK CONC. BASE.

OFFICE OF THE CITY ENGINEER
CANTON, OHIO
DANIEL J. MOEGLIN, P.E., CITY ENGINEER
2436 30th STREET N.E. 44705 (330)489-3381

FOURTH AND CLEVELAND N.W. STREETSCAPE
STREETSCAPE PLAN

REVISED TO DATE:
DWG# 2 OF 2
SHEET 2 OF 2

Civil\Maps-City\Base-Map\dwg\ce_BaseMap.dwg
Date of Last Revision: Sept. 22, 2008

Civil\Maps-City\Ward\dwg\ce_CityScape-Map.dwg
Date of Last Revision: Dec. 19, 2008

OFFICE OF THE CITY ENGINEER
CANTON, OHIO
DANIEL J. MOEGLIN, P.E., CITY ENGINEER
2436 30th STREET N.E. 44705 (330)489-3381

GATEWAY CORRIDORS, CITYSCAPE, & SPECIAL IMPROVEMENT DISTRICT MAP

0 1000' 2000' 3000' 4000' 5280'(1MI)
GRAPHIC SCALE

Consec. No.
DWG# ce_CityScape-Map
SHEET 1 OF 1

Attachment A-10 – Project Site Photographs


BALTIMORE AND OHIO

ARCADIS

Appendix B

Roadway / Traffic

OHIO DEPARTMENT OF TRANSPORTATION
CENTRAL OFFICE • 1980 WEST BROAD STREET • COLUMBUS, OH 43223
JOHN R. KASICH, GOVERNOR • JERRY WRAY, DIRECTOR

May 10, 2013

Daniel Jozity, PE, PTOE
ARCADIS U.S., Inc.
1100 Superior Avenue, Suite 1250
Cleveland, Ohio 44114

RE: STA-12th St, PID 90671 Certified Traffic

Mr. Jozity:

In reply to a request received March 15, 2013, attached are the 2015/2035 ADT, A.M. DHV, and P.M. DHV turning movements for the subject project. Truck factors are shown on a separate plate. K&D factors can be calculated from the plates as needed.

Please send future requests for traffic forecasts through the appropriate district office.

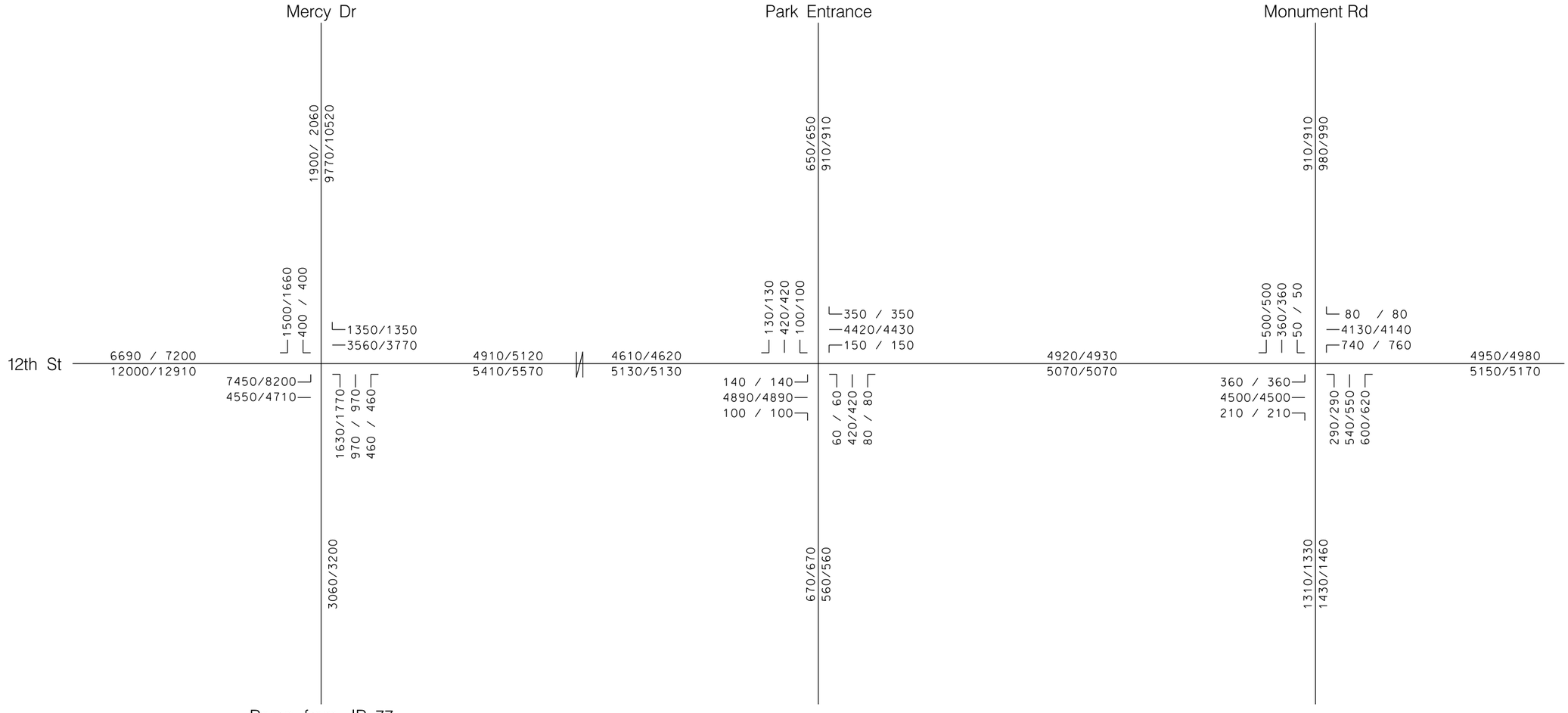
If you have any questions, please contact me at (614) 644-8195 or at becky.salak@dot.state.oh.us.

Sincerely,

Becky Salak
Modeling & Forecasting
Office of Statewide Planning & Research
Ohio Department of Transportation

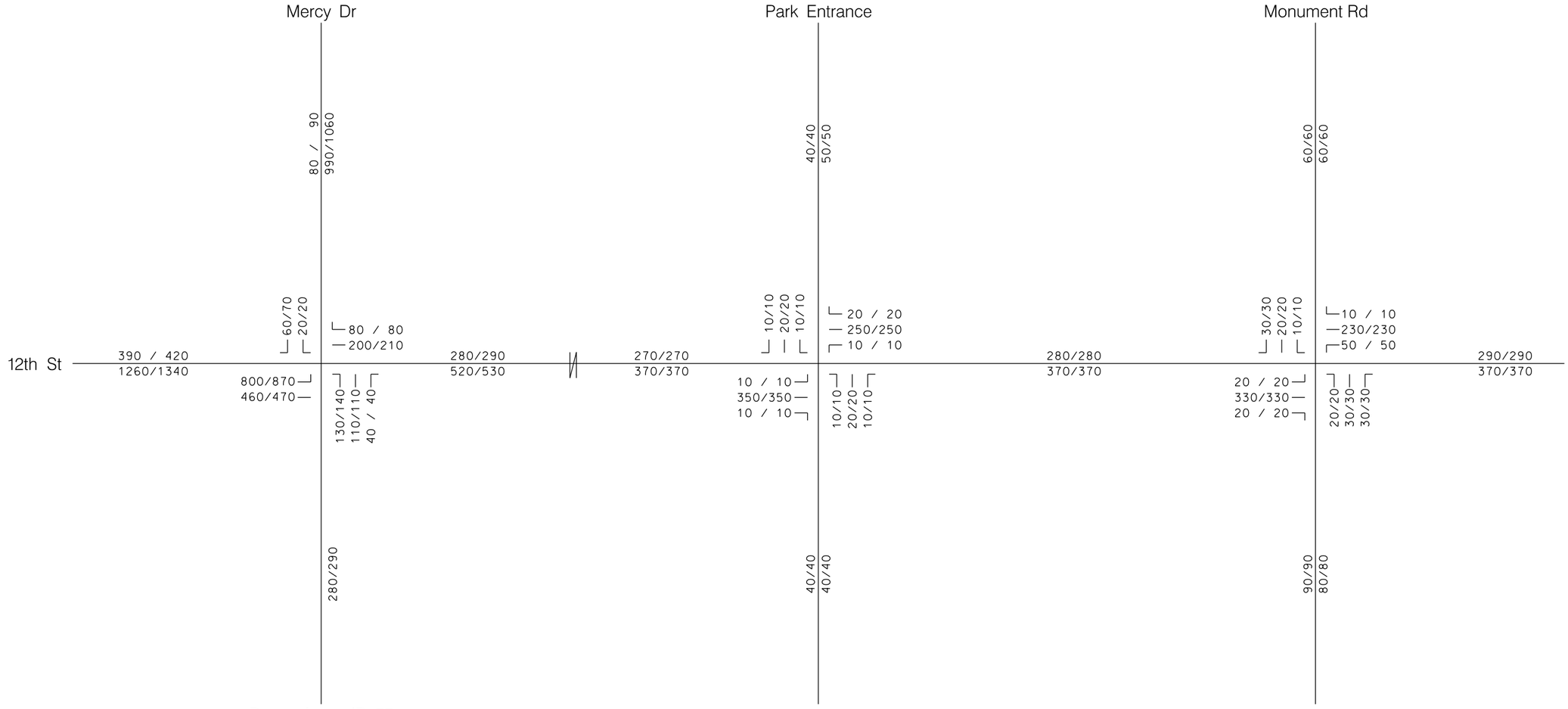
c: L. Feudner, D4 – G. Giaimo, OSPR – M. Byram, OSPR – File

STA–12TH STREET
PID 90671
PLATE 1 OF 4



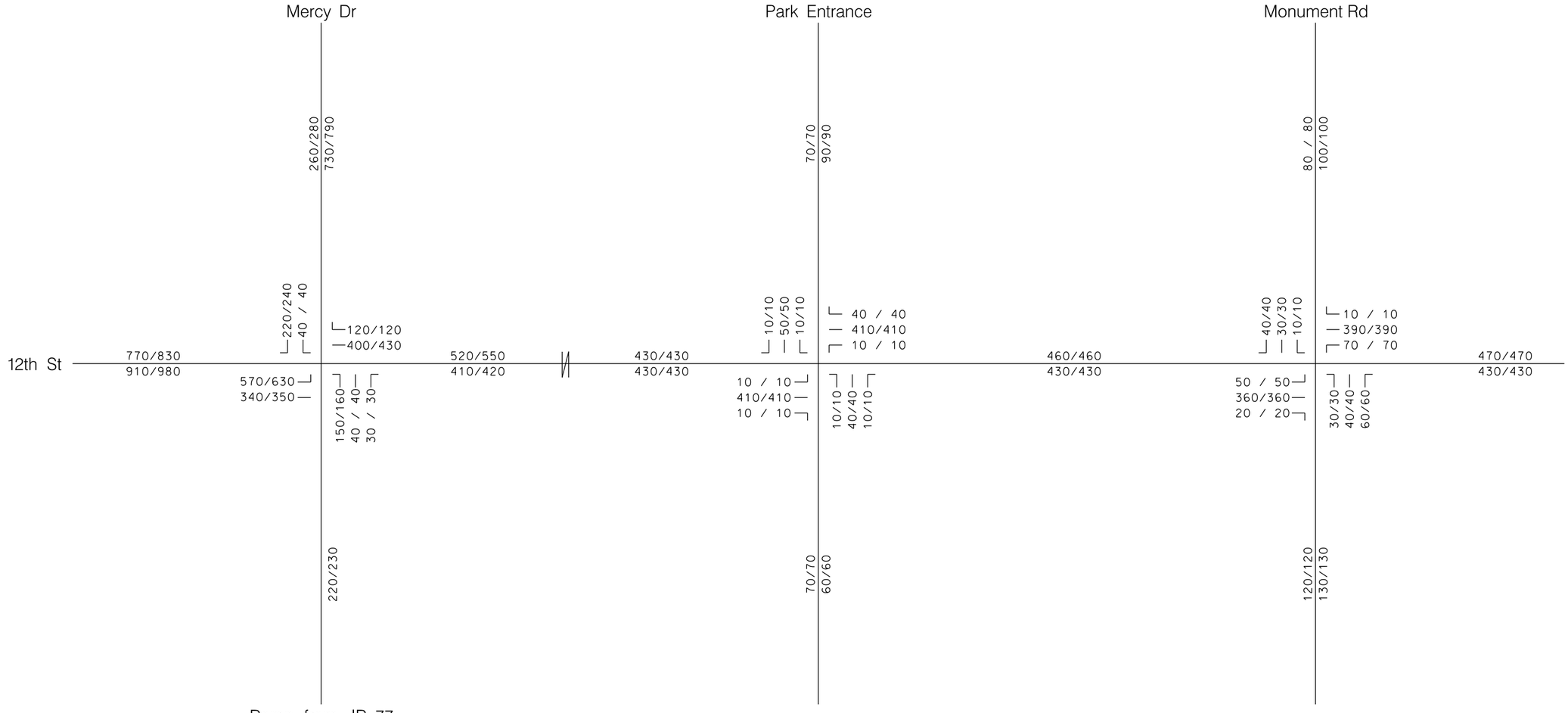
STA–12TH STREET PID 90671	
2015/2035 ADT	
OHIO DEPARTMENT OF TRANSPORTATION	
OFFICE OF STATEWIDE PLANNING & RESEARCH	
MAY 10, 2013	NOT TO SCALE

STA–12TH STREET
PID 90671
PLATE 2 OF 4



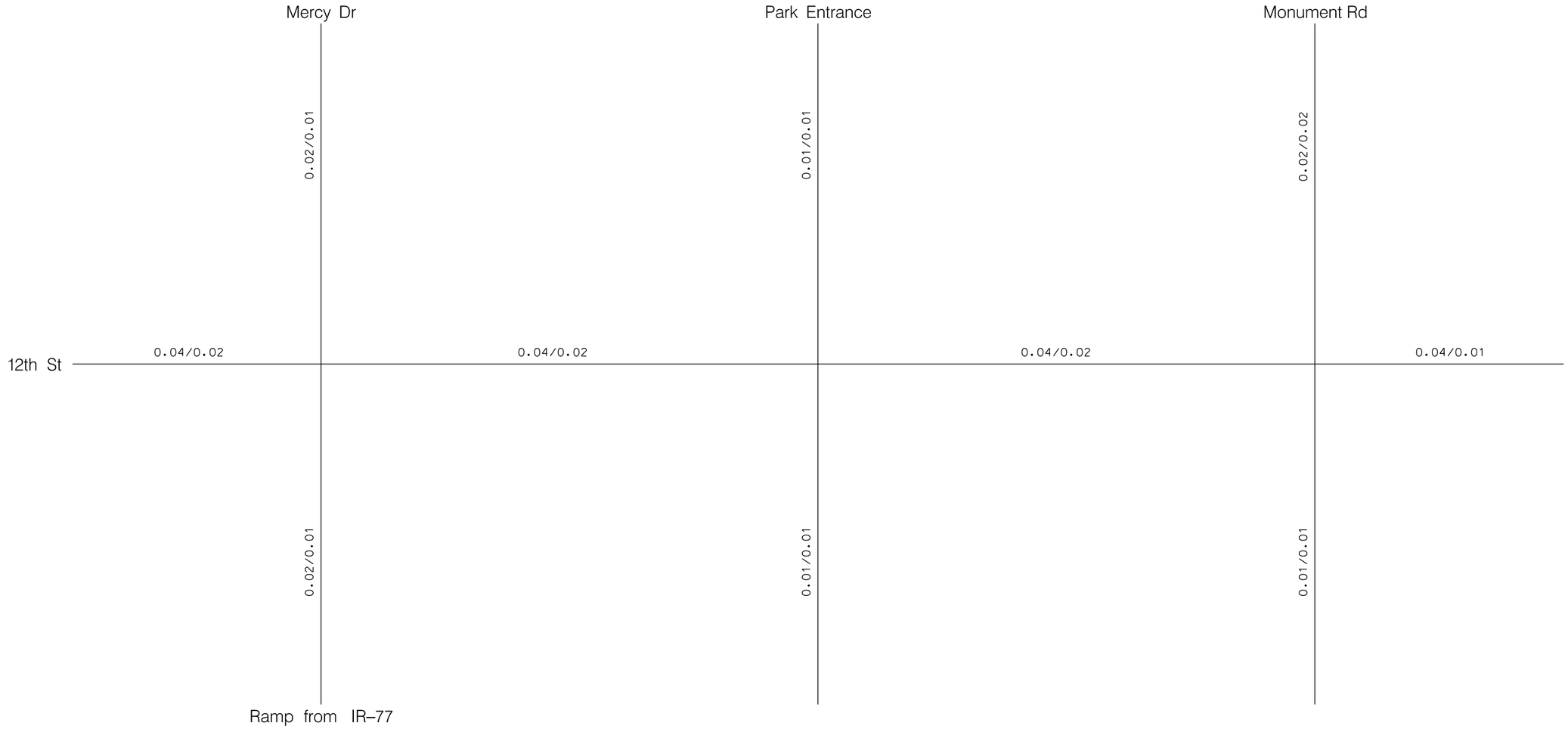
STA–12TH STREET PID 90671	
2015/2035 A.M. DHV	
OHIO DEPARTMENT OF TRANSPORTATION	
OFFICE OF STATEWIDE PLANNING & RESEARCH	
MAY 10, 2013	NOT TO SCALE

STA–12TH STREET
PID 90671
PLATE 3 OF 4



STA–12TH STREET PID 90671	
2015/2035 P.M. DHV	
OHIO DEPARTMENT OF TRANSPORTATION	
OFFICE OF STATEWIDE PLANNING & RESEARCH	
MAY 10, 2013	NOT TO SCALE

STA–12TH STREET
PID 90671
PLATE 4 OF 4



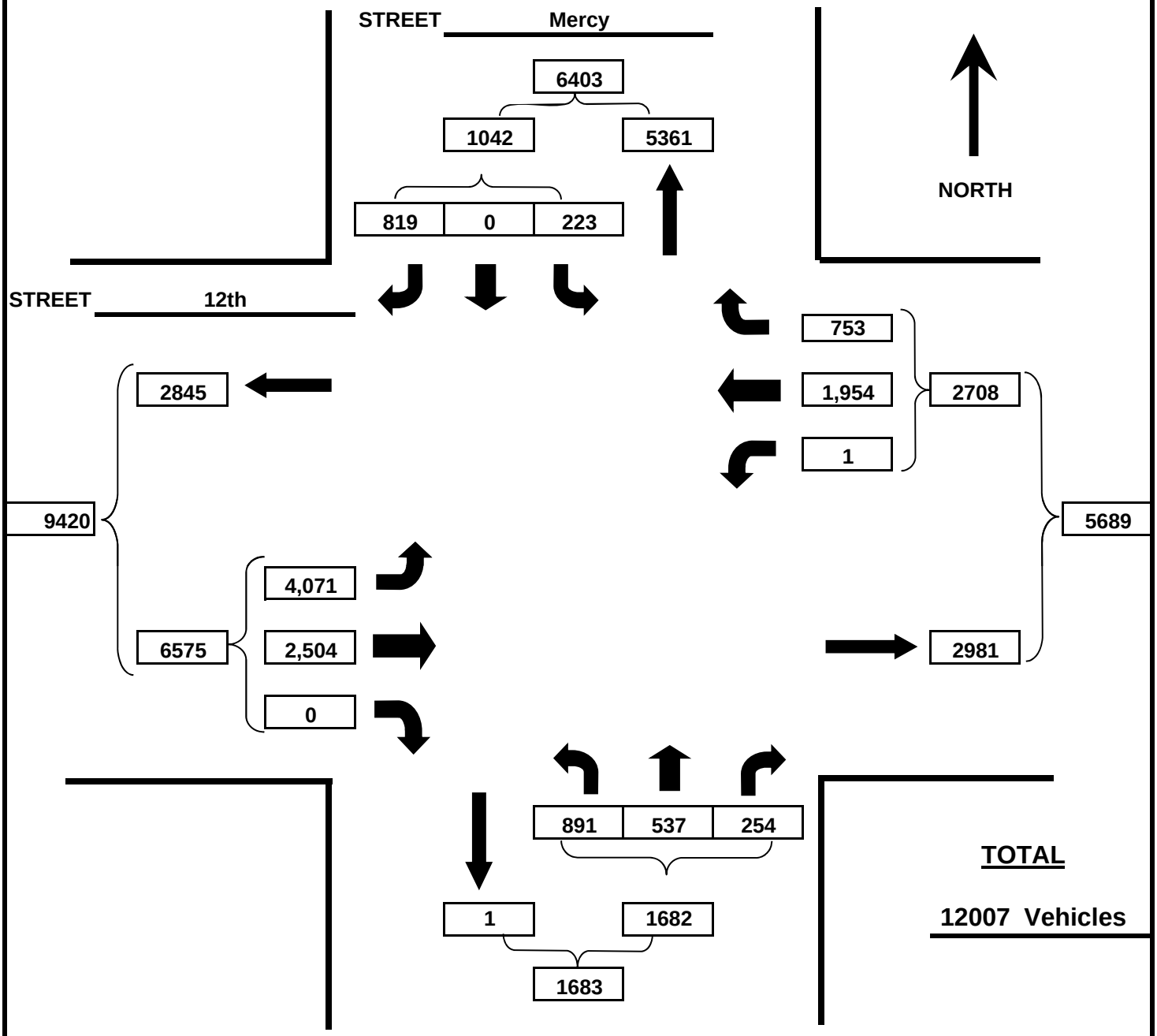
STA–12TH STREET PID 90671	
TRUCK FACTORS: T24/TD TD	
OHIO DEPARTMENT OF TRANSPORTATION	
OFFICE OF STATEWIDE PLANNING & RESEARCH	
MAY 10, 2013	NOT TO SCALE

INTERSECTION SUMMARY

TURNING MOVEMENT COUNT

Project: 12th Street Bridge Replacement **Date:** 12/10/2012

Location: 12th Street and Mercy Drive **Job Number:** AK000315.B001



SURVEY DATE 10/10/2012 DAY OF WEEK Wednesday WEATHER Cloudy

9 HOUR COUNT FROM 6 A.M. TO 6 P.M.

A.A.D.T. = 21750 V.P.D.

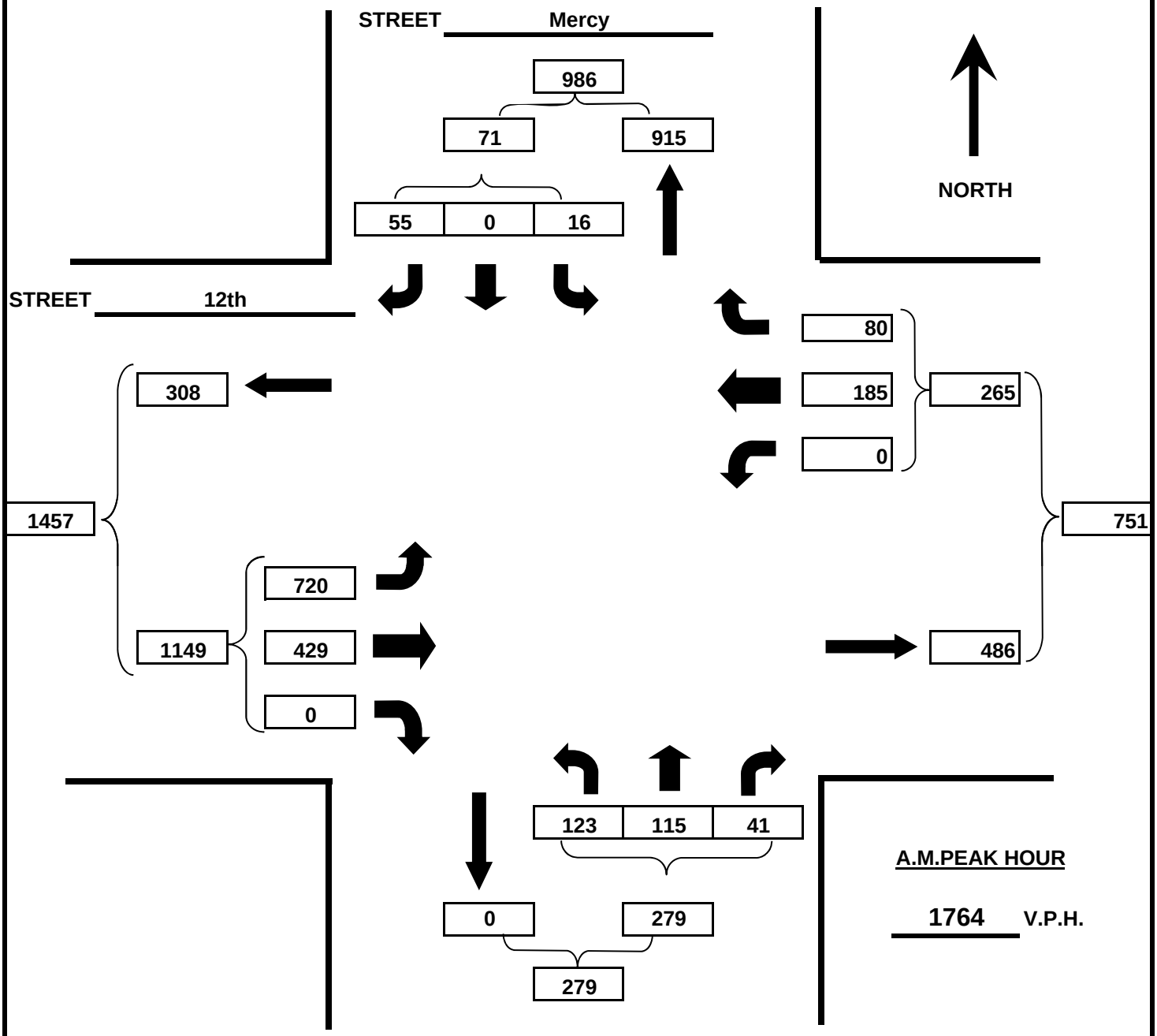
ARCADIS

INTERSECTION SUMMARY

TURNING MOVEMENT COUNT

Project: 12th Street Bridge Replacement **Date:** 12/10/2012

Location: 12th Street and Mercy Drive **Job Number:** AK000315.B001



A.M.PEAK HOUR

1764 V.P.H.

SURVEY DATE 10/10/2012 **DAY OF WEEK** Wednesday **WEATHER** Cloudy

AM PEAK HOUR FROM 7:00 AM **TO** 8:00 AM

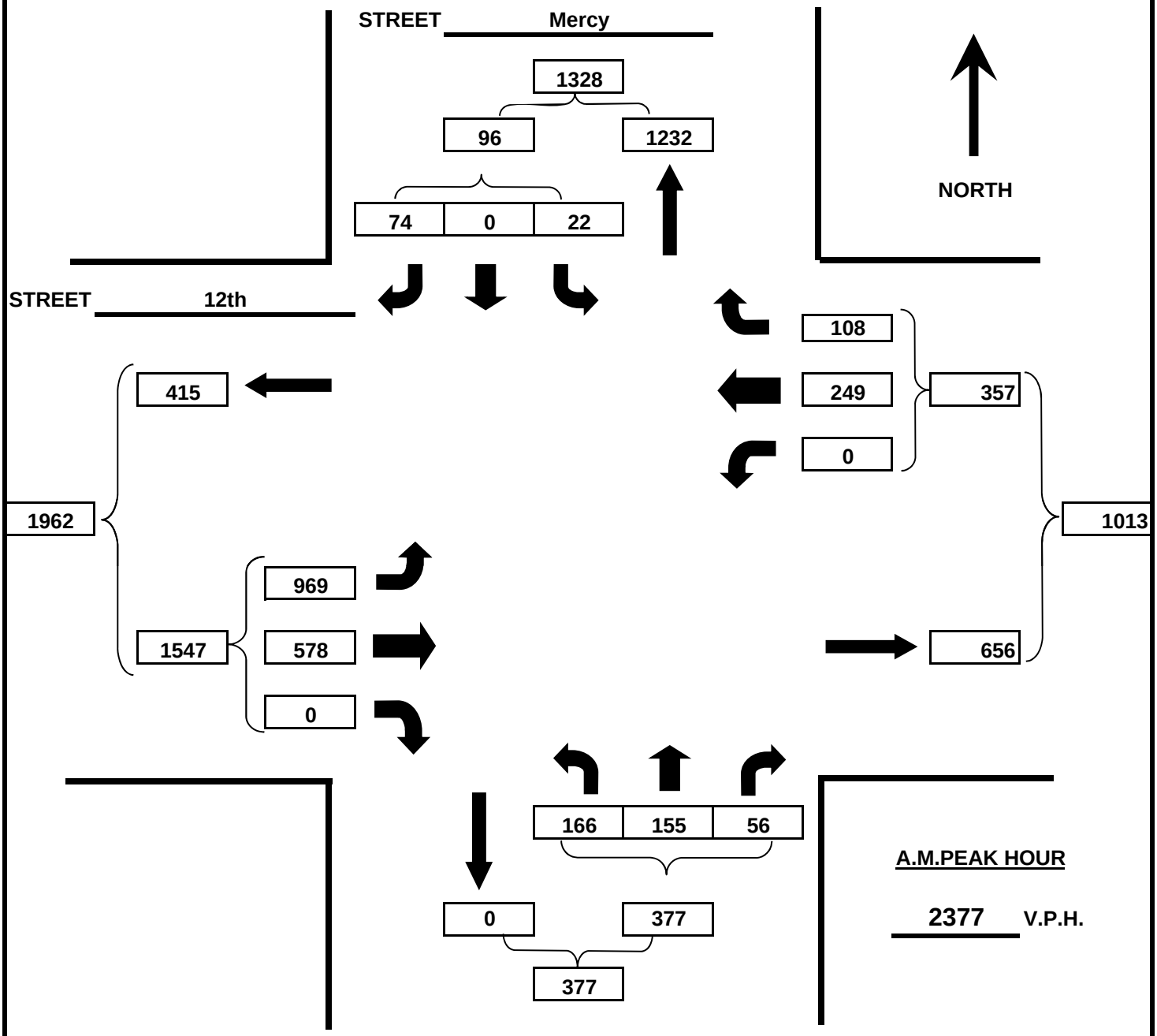
ARCADIS

INTERSECTION SUMMARY

TURNING MOVEMENT COUNT

Project: 12th Street Bridge Replacement **Date:** 12/10/2012

Location: 12th Street and Mercy Drive **Job Number:** AK000315.B001



A.M.PEAK HOUR

2377 V.P.H.

SURVEY DATE 2035 Design Year

AM PEAK HOUR FROM 7:00 AM **TO** 8:00 AM

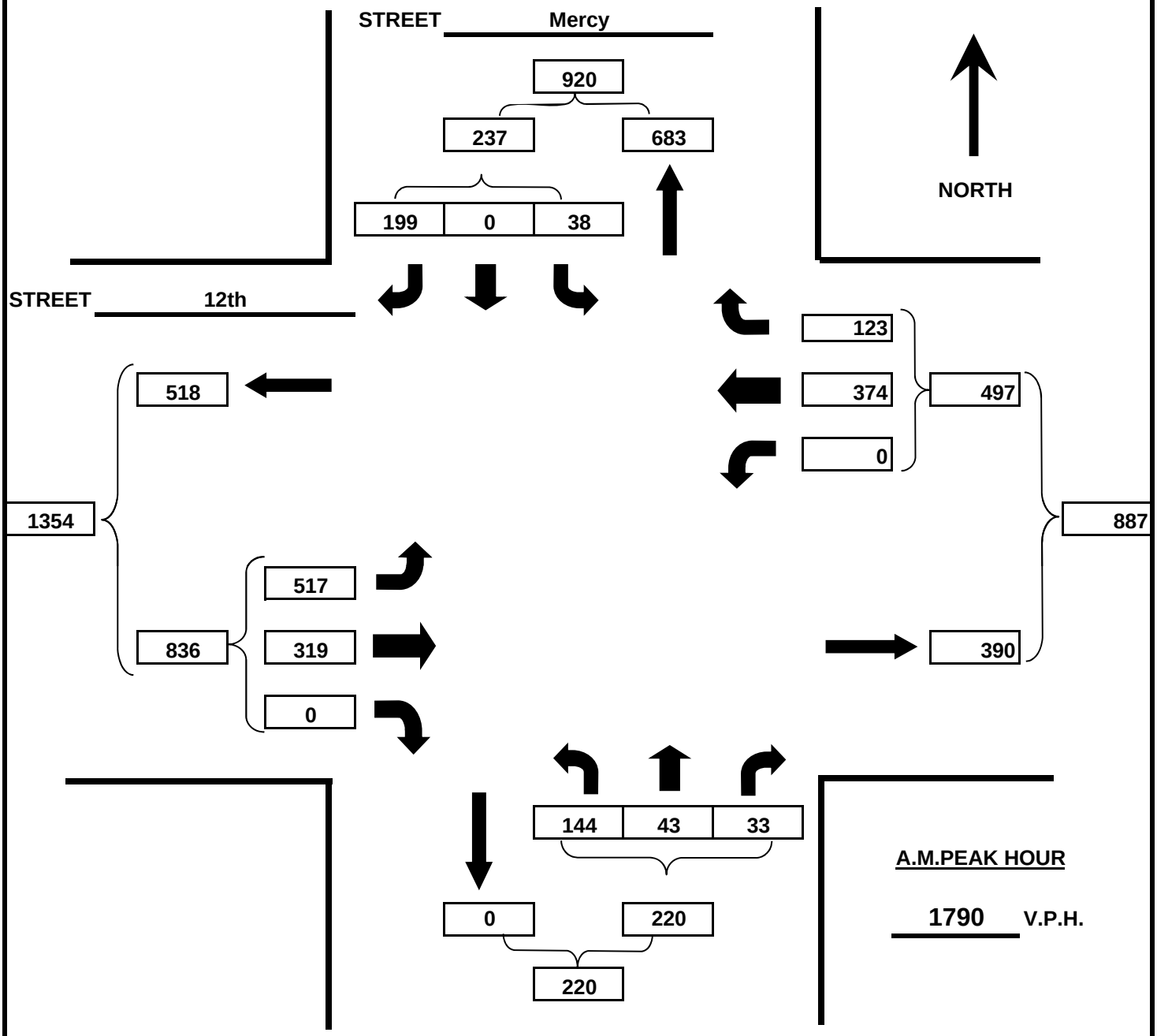
ARCADIS

INTERSECTION SUMMARY

TURNING MOVEMENT COUNT

Project: 12th Street Bridge Replacement **Date:** 12/10/2012

Location: 12th Street and Mercy Drive **Job Number:** AK000315.B001



SURVEY DATE 10/10/2012 **DAY OF WEEK** Wednesday **WEATHER** Cloudy

AM PEAK HOUR FROM 3:15 PM **TO** 4:15 PM

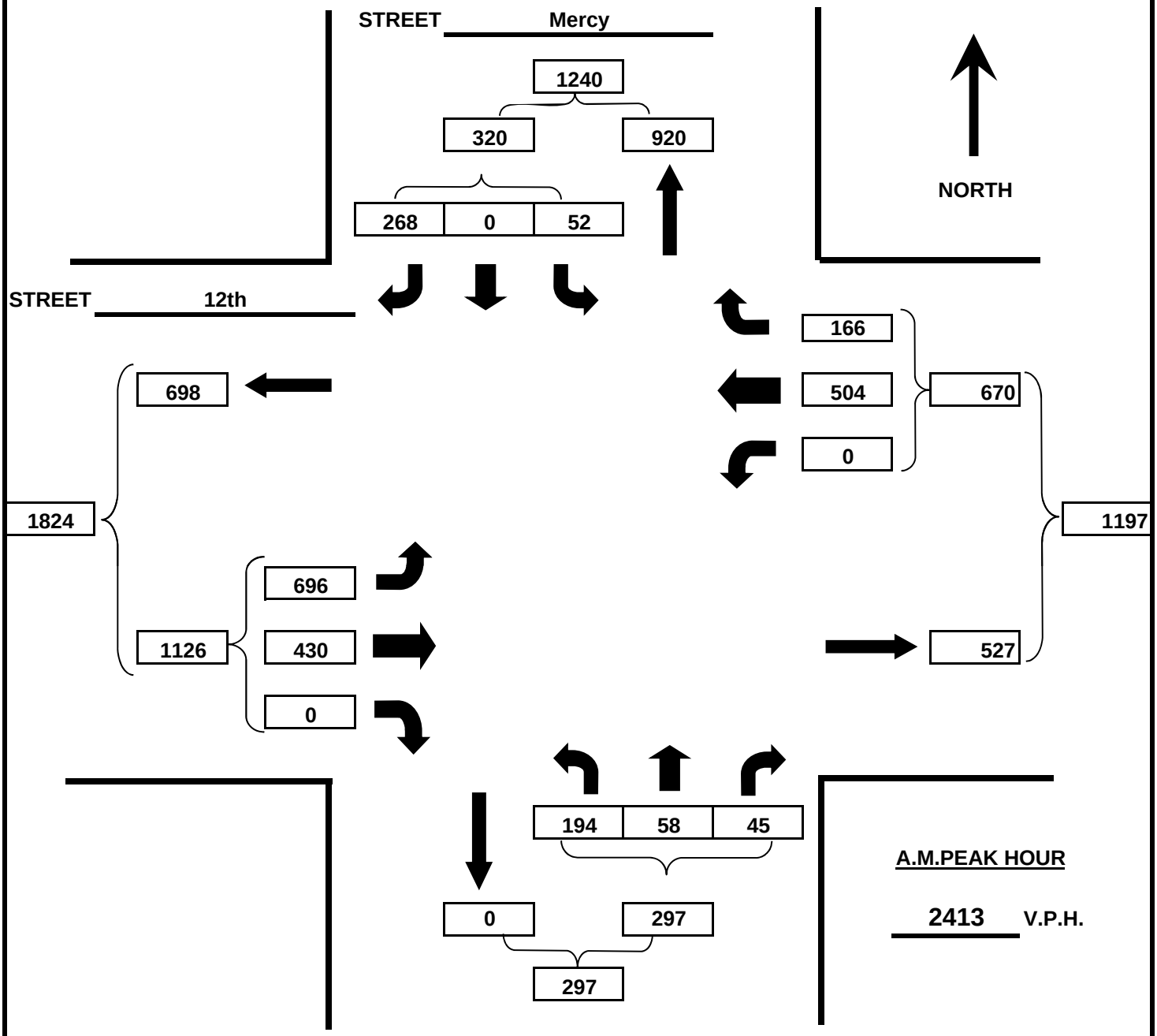
ARCADIS

INTERSECTION SUMMARY

TURNING MOVEMENT COUNT

Project: 12th Street Bridge Replacement **Date:** 12/10/2012

Location: 12th Street and Mercy Drive **Job Number:** AK000315.B001



A.M.PEAK HOUR

2413 V.P.H.

SURVEY DATE 2035 Design Year

PM PEAK HOUR FROM 3:15 PM **TO** 4:15 PM

ARCADIS

Nine Hour Vehicle Count
Date: Wednesday, October 10, 2012
Time: 6-9AM, 11AM-12PM, 3-6PM

12th Street and Mercy/I-77

Street Name	ME--From North			12--From East			ME--From South			12--From West				
Start Time	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Total	
6:00 AM	3	0	2	6	7	0	7	30	6	0	29	132	222	1267
6:15 AM	9	0	2	21	24	0	4	54	8	0	51	210	383	1472
6:30 AM	11	0	3	18	34	0	7	48	26	0	55	192	394	1547
6:45 AM	10	0	3	9	22	0	5	23	22	0	56	118	268	1645
7:00 AM	6	0	3	16	54	0	5	27	24	0	99	193	427	1764
7:15 AM	22	0	3	26	46	0	10	33	41	0	100	177	458	1728
7:30 AM	13	0	3	22	47	0	14	37	37	0	135	184	492	1612
7:45 AM	14	0	7	16	38	0	12	18	21	0	95	166	387	1508
8:00 AM	6	0	7	21	57	0	17	14	30	0	100	139	391	1405
8:15 AM	10	0	3	25	61	0	6	15	28	0	71	123	342	1014
8:30 AM	12	0	2	23	66	0	7	15	42	0	84	137	388	672
8:45 AM	13	0	4	19	32	0	10	13	22	0	66	105	284	284
11:00 AM	20	0	3	22	43	0	7	12	20	0	72	82	281	1242
11:15 AM	12	0	11	17	52	0	7	11	18	0	83	99	310	1337
11:30 AM	25	0	8	20	77	0	6	17	17	0	56	98	324	1366
11:45 AM	21	0	7	30	47	1	4	7	24	0	90	96	327	1367
12:00 PM	26	0	9	34	69	0	7	11	25	0	82	113	376	1365
12:15 PM	27	0	15	23	48	0	6	13	19	0	75	113	339	989
12:30 PM	27	0	11	30	47	0	9	13	15	0	70	103	325	650
12:45 PM	31	0	5	21	59	0	6	19	19	0	80	85	325	325
3:00 PM	32	0	8	30	60	0	16	6	47	0	75	98	372	1736
3:15 PM	32	0	11	33	89	0	9	15	26	0	98	133	446	1790
3:30 PM	72	0	7	24	93	0	10	11	42	0	68	137	464	1765
3:45 PM	33	0	12	32	97	0	11	10	43	0	84	132	454	1741
4:00 PM	62	0	8	34	95	0	3	7	33	0	69	115	426	1722
4:15 PM	47	0	8	24	73	0	8	10	43	0	91	117	421	1692
4:30 PM	49	0	12	37	80	0	8	15	40	0	92	107	440	1672
4:45 PM	52	0	12	27	78	0	9	11	30	0	88	128	435	1615
5:00 PM	41	0	11	33	100	0	6	4	34	0	65	102	396	1506
5:15 PM	31	0	4	20	108	0	9	7	33	0	73	116	401	1110
5:30 PM	31	0	12	23	83	0	5	7	35	0	80	107	383	709
5:45 PM	19	0	7	17	68	0	4	4	21	0	72	114	326	326
9 Hr Total	819	0	223	753	1,954	1	254	537	891	0	2,504	4,071	12,007	
24 Hr Total	1,484	0	404	1,364	3,540	2	461	973	1,614	0	4,536	7,375	21,753	
AM PEAK 7:00	55	0	16	80	185	0	41	115	123	0	429	720	1,764	
MID PEAK 11:45	101	0	42	117	211	1	26	44	83	0	317	425	1,367	
PM PEAK 3:15	199	0	38	123	374	0	33	43	144	0	319	517	1,790	

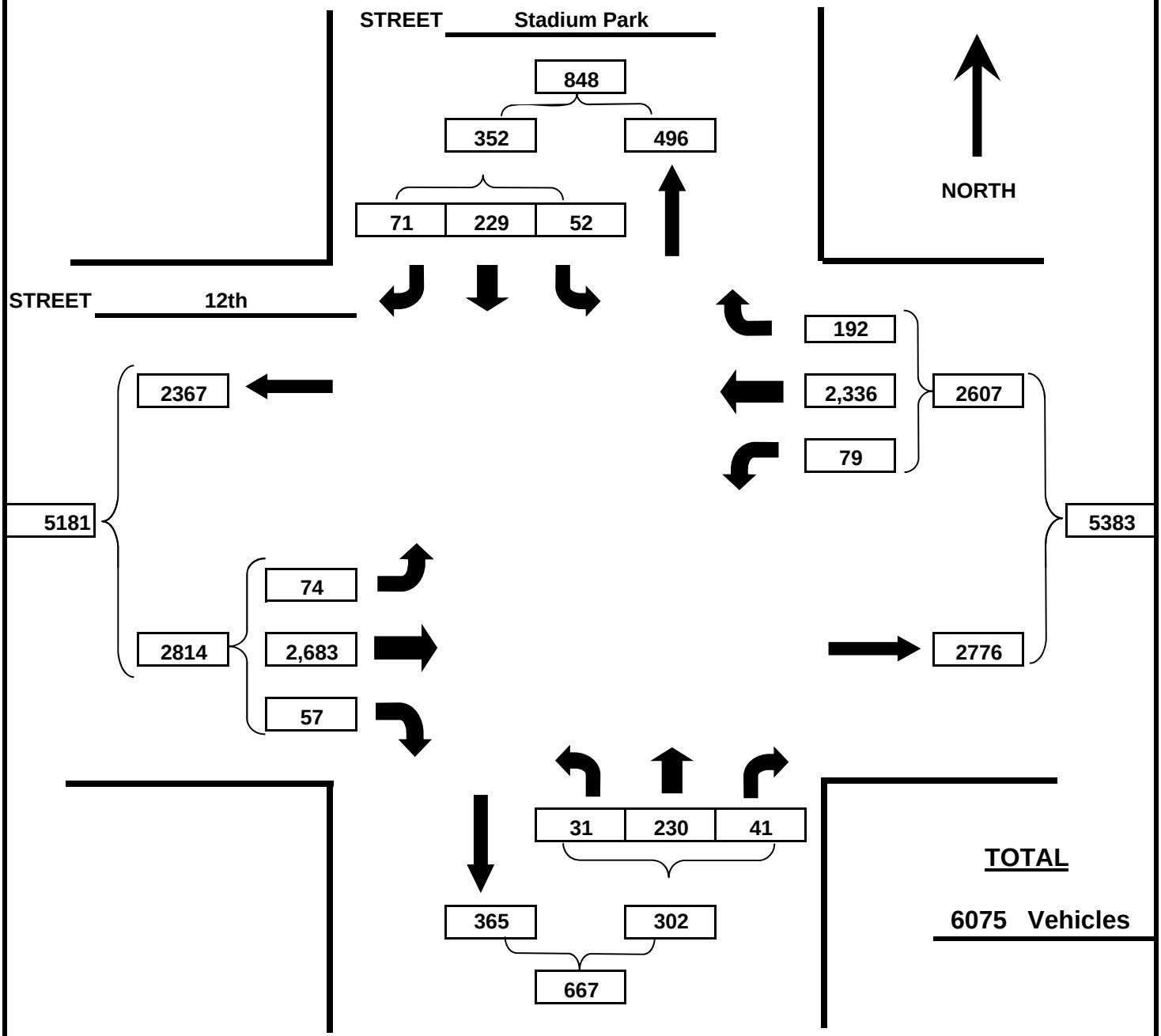
% Trucks	1.29%	Hourly Factor	1.965	Total N/S Counts	2,724	Total E/W Counts	9,283
%Buses	1.71%	Monthly Factor	0.922	Total N/S ADT	4,936	Total E/W ADT	16,817
Total % of Truck and Bus	3.00%	Combined Factor	1.811				

INTERSECTION SUMMARY

TURNING MOVEMENT COUNT

Project: 12th Street Bridge Replacement **Date:** 12/10/2012

Location: 12th Street and Stadium Park Drive **Job Number:** AK000315.B001



SURVEY DATE 10/9/2012 **DAY OF WEEK** Tuesday **WEATHER** Sunny

9 **HOUR COUNT FROM** 6 **A.M.** **TO** 6 **P.M.**

A.A.D.T. = 11076 **V.P.D.**

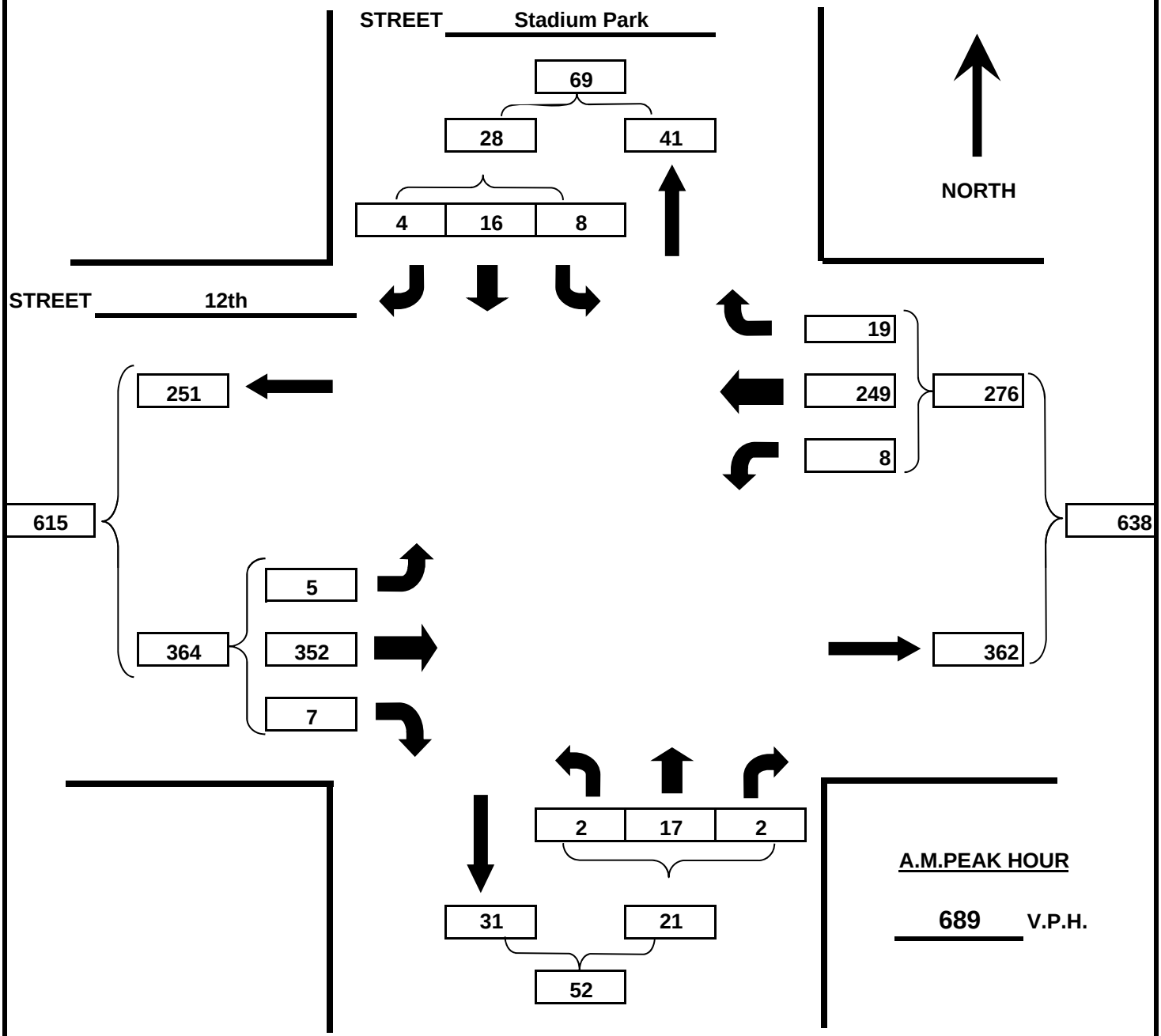
ARCADIS

INTERSECTION SUMMARY

TURNING MOVEMENT COUNT

Project: 12th Street Bridge Replacement **Date:** 12/10/2012

Location: 12th Street and Stadium Park Drive **Job Number:** AK000315.B001



A.M.PEAK HOUR

689 V.P.H.

SURVEY DATE 10/9/2012 **DAY OF WEEK** Tuesday **WEATHER** Sunny

AM PEAK HOUR FROM 7:15 AM **TO** 8:15 AM

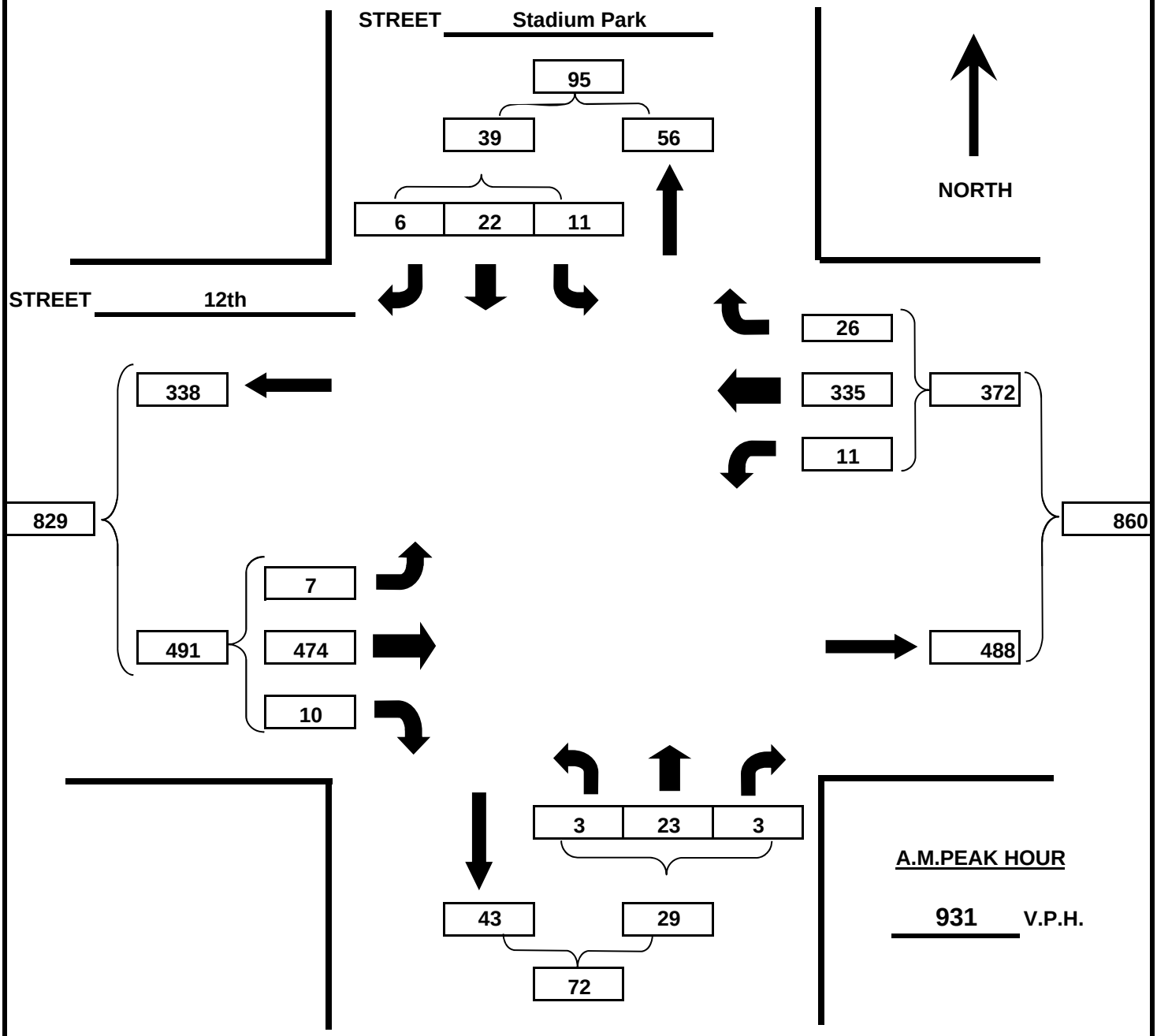
ARCADIS

INTERSECTION SUMMARY

TURNING MOVEMENT COUNT

Project: 12th Street Bridge Replacement **Date:** 12/10/2012

Location: 12th Street and Stadium Park Drive **Job Number:** AK000315.B001



SURVEY DATE 2035 Design Year

AM PEAK HOUR FROM 7:15 AM **TO** 8:15 AM

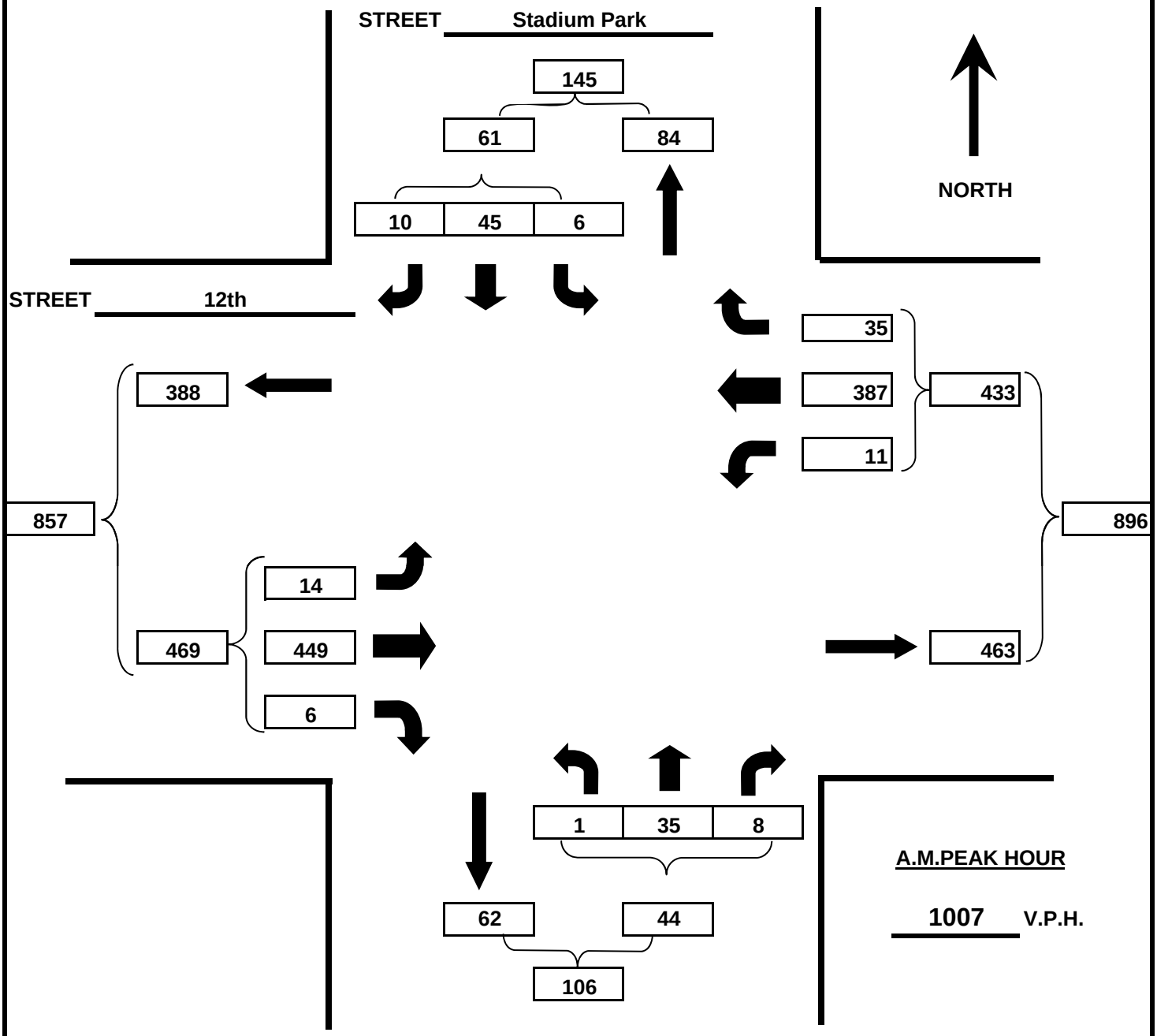
ARCADIS

INTERSECTION SUMMARY

TURNING MOVEMENT COUNT

Project: 12th Street Bridge Replacement **Date:** 12/10/2012

Location: 12th Street and Stadium Park Drive **Job Number:** AK000315.B001



SURVEY DATE 10/9/2012 **DAY OF WEEK** Tuesday **WEATHER** Sunny

AM PEAK HOUR FROM 3:30 PM **TO** 4:30 PM

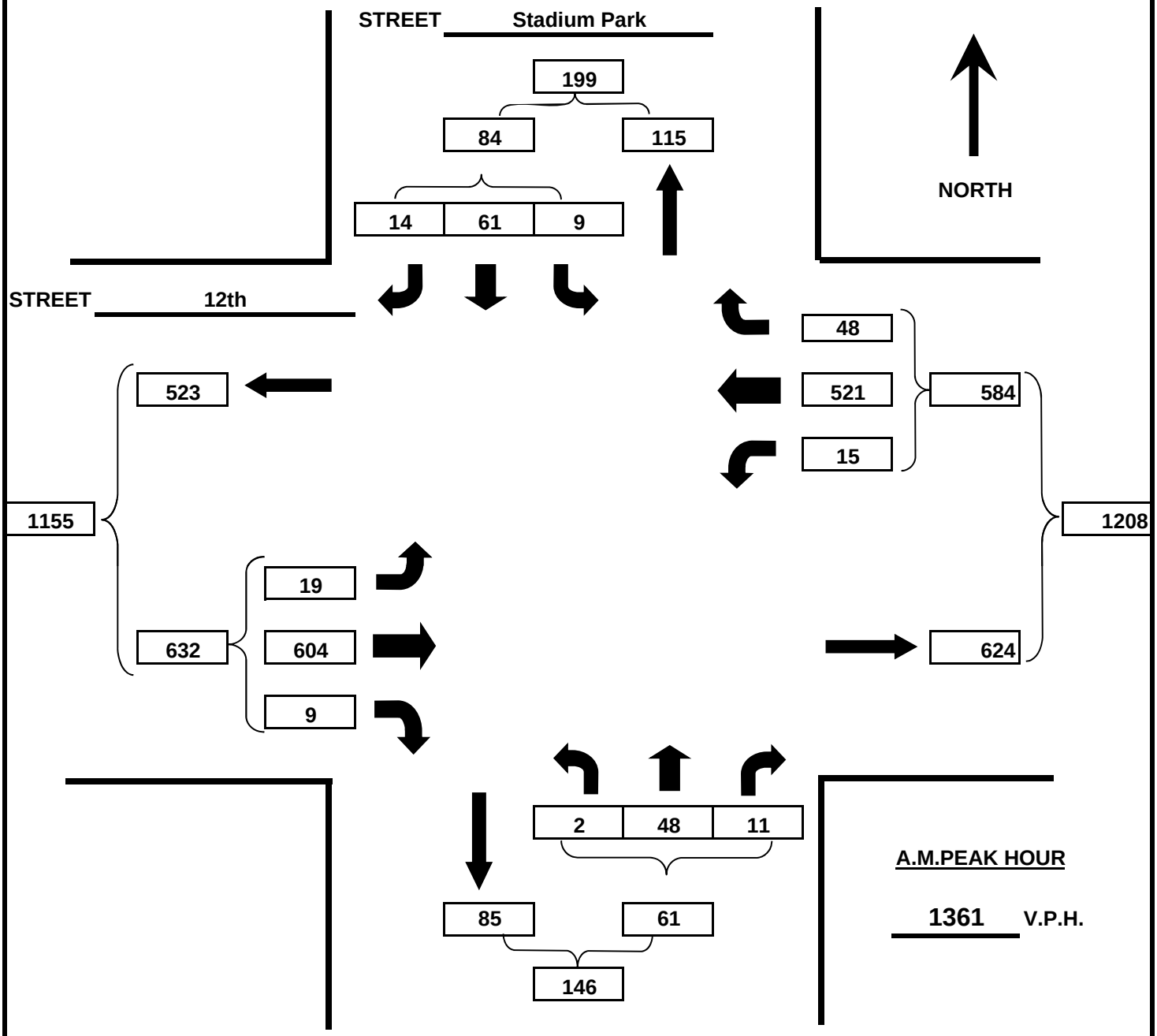
ARCADIS

INTERSECTION SUMMARY

TURNING MOVEMENT COUNT

Project: 12th Street Bridge Replacement **Date:** 12/10/2012

Location: 12th Street and Stadium Park Drive **Job Number:** AK000315.B001



SURVEY DATE 2035 Design Year

PM PEAK HOUR FROM 3:30 PM **TO** 4:30 PM

ARCADIS

Nine Hour Vehicle Count
Date: Tuesday, October 9, 2012
Time: 6-9AM, 11AM-12PM, 3-6PM

12th Street and Park Entrance

Street Name	PE--From North			12--From East			PE--From South			12--From West				
Start Time	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Right	Thru	Left	Total	
6:00 AM	1	0	0	1	25	0	0	0	0	0	21	0	48	288
6:15 AM	1	0	0	1	25	0	0	1	0	1	31	1	61	347
6:30 AM	1	3	0	2	47	2	0	0	0	0	46	0	101	458
6:45 AM	1	3	0	3	35	0	0	1	0	0	35	0	78	544
7:00 AM	1	2	0	5	43	0	0	3	1	2	49	1	107	641
7:15 AM	0	7	1	8	68	3	0	8	0	2	74	1	172	689
7:30 AM	1	5	2	4	75	1	1	1	0	1	94	2	187	688
7:45 AM	2	3	0	6	61	3	0	5	1	1	93	0	175	678
8:00 AM	1	1	5	1	45	1	1	3	1	3	91	2	155	699
8:15 AM	1	5	0	4	65	2	0	4	2	3	84	1	171	544
8:30 AM	2	6	1	2	81	1	0	3	3	1	74	3	177	373
8:45 AM	2	6	1	5	72	3	2	3	2	5	94	1	196	196
11:00 AM	1	9	1	4	69	1	1	10	5	1	74	0	176	741
11:15 AM	1	6	2	5	72	4	2	9	2	0	91	3	197	767
11:30 AM	3	7	2	2	90	2	1	6	0	3	59	2	177	767
11:45 AM	4	8	0	8	71	5	2	12	2	3	73	3	191	778
12:00 AM	5	10	0	4	73	5	0	7	1	5	89	3	202	790
12:15 AM	2	11	1	9	66	0	5	12	2	3	80	6	197	588
12:30 AM	6	9	5	9	61	10	2	9	0	3	72	2	188	391
12:45 AM	4	14	2	7	67	4	1	11	0	2	85	6	203	203
3:00 PM	3	5	3	8	84	1	0	7	1	2	95	3	212	940
3:15 PM	3	7	1	6	82	3	3	14	2	1	97	3	222	975
3:30 PM	4	14	4	5	85	1	2	14	0	3	104	1	237	1007
3:45 PM	2	6	0	8	116	5	1	7	0	2	118	4	269	1005
4:00 PM	1	15	1	8	82	5	4	7	1	0	118	5	247	970
4:15 PM	3	10	1	14	104	0	1	7	0	1	109	4	254	967
4:30 PM	2	8	2	7	95	3	2	9	0	3	100	4	235	995
4:45 PM	3	8	6	4	104	3	3	10	1	2	86	4	234	1003
5:00 PM	6	13	2	9	83	3	1	18	1	1	102	5	244	1006
5:15 PM	1	14	6	17	104	3	4	14	0	1	116	2	282	762
5:30 PM	0	3	0	10	101	1	2	8	2	1	114	1	243	480
5:45 PM	3	11	3	6	85	4	0	7	1	1	115	1	237	237
9 Hr Total	71	229	52	192	2,336	79	41	230	31	57	2,683	74	6,075	
24 Hr Total	130	418	95	351	4,259	145	75	420	57	104	4,892	135	11,081	
AM PEAK 7:15	4	16	8	19	249	8	2	17	2	7	352	5	689	
MID PEAK 12:00	17	44	8	29	267	19	8	39	3	13	326	17	790	
PM PEAK 3:30	10	45	6	35	387	11	8	35	1	6	449	14	1,007	

% Trucks	1.05%	Hourly Factor	1.965	Total N/S Counts	654	Total E/W Counts	5,421
%Buses	1.71%	Monthly Factor	0.928	Total N/S ADT	1,195	Total E/W ADT	9,886
Total % of Truck and Bus	2.77%	Combined Factor	1.823				

Name: LKF
Date: 3/15/2013

BRIDGE PROJECT DESIGNATION WORKSHEET

1A	Enter the PID:	90671	1A
1B	Enter the County-Route-Log or other identifier:	STA 12th Street Bridge	1B
2A	Enter the Existing ADT (Total Vehicles):	9000	2A
2B	Enter 24-hour B&C (commercial) volume if available:		2B
2C	Enter the Existing Year:	2011	2C
3	Enter the Opening Year:	2015	3
4	Enter the Design Year:	2035	4
5A	Enter the number of years from the Existing Year to the Opening Year: **(3) - (2C)=**	4	5A
5B	Enter the number of years from the Existing Year to the Design Year: **(4) - (2C)=**	24	5B
6	Select a growth rate from the following range of rates Stable .0025-.0050 Moderate .0100-.0200 Low .0050-.0100 High .0200-.0300	0.015	6
7	Enter the Opening Year Factor: **[(6)x(5A)]+1=**	1.060	7
8	Enter the Design Year Factor: **[(6)x(5B)]+1=**	1.360	8
9	Enter the Opening Year ADT: **(2A)x(7)=** Round to the nearest 100 vehicles (nearest 10 vehicles if < 1000)	9540 9500	9
10	Enter the Design Year ADT: **(2A)x(8)=** Round to the nearest 100 vehicles (nearest 10 vehicles if < 1000)	12240 12200	10
11A	Enter K, selected from the following table of Design Year ADT: < 1000 .12 5001 - 15000 .10 1001 - 5000 .11 15001 < .09	0.10	11A
11B	Enter the DHV: **(10)x(11A)=**	1220	11B
12	Enter the D Factor (for DDHV): within an MPO area: .60 outside an MPO area: .55 any one-way bridge: 1.00	0.60	12
13	Enter the T24 factor (the proportion of B&C vehicles in ADT): **[(2B)/(2A)]** or **.03** if (2B) is blank	0.03	13
14	Enter the TD factor (the proportion of B&C vehicles in the design hour): **(13)x0.6=**	0.02	14

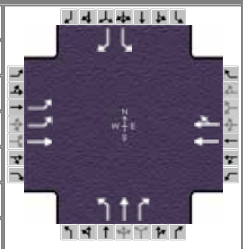
BRIDGE PROJECT DESIGNATION WORKSHEET

15	**COMMENTS** STA 12th Street Bridge	PID 90671	15

DESIGN DESIGNATION (summarized from above)		PID 90671	1A
County-Route-Log =		STA 12th Street Bridge	1B
Existing Year 2011 ADT =		9,000	2A
Opening Year 2015 ADT =		9,500	9
Design Year 2035 ADT =		12,200	10
Peak Hour Factor K =	0.10	10%	11A
Directional Distribution D =	0.60	60%	12
Trucks (24 hour B & C) T24 =	0.03	3%	13
Peak Hour Truck Factor TD =	0.02	2%	14
Design Speed=			
Legal Speed=			
Design Functional Classification=		Local	

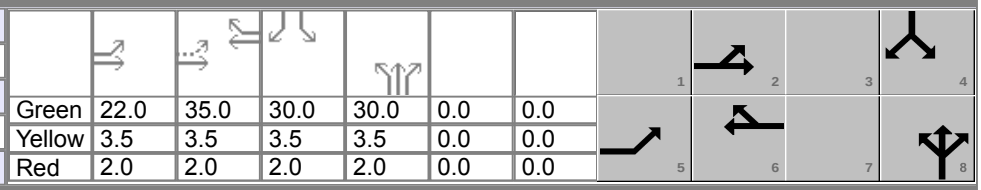
2010 HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Canton			Duration, h	0.25
Analyst	ARCADIS	Analysis Date	Dec 18, 2012	Area Type	Other
Jurisdiction	Canton	Time Period	AM Peak	PHF	0.90
Intersection	Mercy Drive	Analysis Year	2012	Analysis Period	1> 7:00
File Name	Mercy AM Existing.xus				
Project Description	12th Street Bridge Replacement				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	720	429			185	80	123	115	41	16		55

Signal Information			
Cycle, s	150.8	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	22.0	35.0	30.0	30.0	0.0	0.0
Yellow	3.5	3.5	3.5	3.5	0.0	0.0
Red	2.0	2.0	2.0	2.0	0.0	0.0

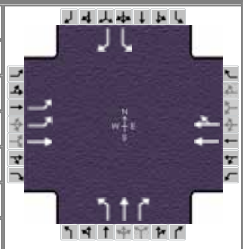
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	8	8	4	4
Case Number	1.0	4.0	0.0	4.0	9.0	9.0	9.0	9.0
Phase Duration, s	39.3	79.8	0.0	40.5	35.5	35.5	35.5	35.5
Change Period, *(Y+Rc)*, s	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
Max Allow Headway *(MAH)*, s	3.1	3.1	0.0	3.1	3.1	3.1	3.3	3.3
Queue Clearance Time *(g_s)*, s	32.3	28.7		13.0	12.2	12.2	32.0	32.0
Green Extension Time *(g_e)*, s	1.5	1.0	0.0	1.4	0.5	0.5	0.0	0.0
Phase Call Probability	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Max Out Probability	0.12	0.23		0.00	0.00	0.00	1.00	1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate *(v)*, veh/h	800	477	0	0	152	143	137	128	46	18	0	61
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1706	1845	0	0	1845	1645	1757	1845	1563	1757	0	1563
Queue Service time *(g_s)*, s	30.3	26.7	0.0	0.0	10.4	11.0	10.2	9.0	3.6	1.2	30.0	4.9
Cycle Queue Clearance Time *(g_c)*, s	30.3	26.7	0.0	0.0	10.4	11.0	10.2	9.0	3.6	1.2	30.0	4.9
Capacity *(c)*, veh/h	860	909			428	382	349	367	311	349	0	311
Volume-to-Capacity Ratio *(X)*	0.930	0.524	0.000	0.000	0.355	0.373	0.391	0.348	0.146	0.051	0.000	0.197
Available Capacity *(c_a)*, veh/h	1000	909			428	382	349	367	311	349	0	311
Back of Queue *(Q)*, veh/ln	14.2	11.7			4.8	4.6	4.5	4.2	1.4	0.5		1.9
Overflow Queue *(Q_3)*, veh/ln	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Queue Storage Ratio *(RQ)*	*1.8*	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.2	0.1	0.0	0.0
Uniform Delay *(d_1)*, s/veh	45.5	26.2			48.5	48.7	52.5	52.0	49.8	48.9	0.0	50.4
Incremental Delay *(d_2)*, s/veh	12.5	0.3	0.0	0.0	0.2	0.2	0.3	0.2	0.1	0.0	0.0	0.1
Initial Queue Delay *(d_3)*, s/veh	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay *(d)*, s/veh	58.1	26.4			48.6	48.9	52.7	52.2	49.9	48.9	0.0	50.5
Level of Service (LOS)	E	C			D	D	D	D	D	D		D
Approach Delay, s/veh / LOS	46.3	D		48.8	D		52.1	D		50.1	D	
Intersection Delay s/veh / LOS	47.7						D					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.9	A	2.3	B	2.3	B	2.9	C
Bicycle LOS Score / LOS	2.6	B	0.7	A	1.0	A		F

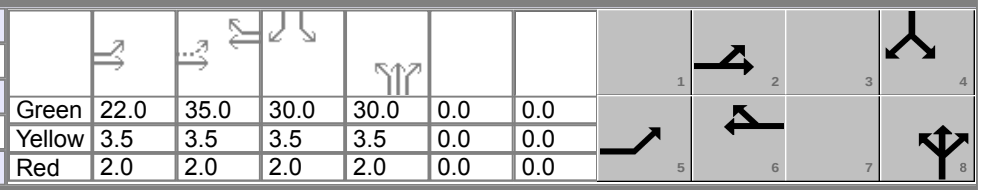
2010 HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Canton			Duration, h	0.25
Analyst	ARCADIS	Analysis Date	Dec 18, 2012	Area Type	Other
Jurisdiction	Canton	Time Period	PM Peak	PHF	0.90
Intersection	Mercy Drive	Analysis Year	2012	Analysis Period	1> 3:00
File Name	Mercy PM Existing.xus				
Project Description	12th Street Bridge Replacement				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	517	319			374	123	144	43	33	199		38

Signal Information			
Cycle, s	139.0	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	22.0	35.0	30.0	30.0	0.0	0.0
Yellow	3.5	3.5	3.5	3.5	0.0	0.0
Red	2.0	2.0	2.0	2.0	0.0	0.0

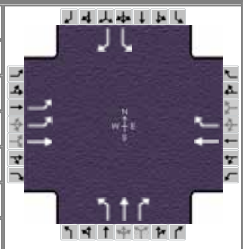
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	8	8	4	4
Case Number	1.0	4.0	0.0	4.0	9.0	9.0	9.0	9.0
Phase Duration, s	27.5	68.0	0.0	40.5	35.5	35.5	35.5	35.5
Change Period, *(Y+Rc)*, s	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
Max Allow Headway *(MAH)*, s	3.1	3.1	0.0	3.1	3.1	3.1	3.2	3.2
Queue Clearance Time *(g_s)*, s	20.6	20.2		21.5	12.9	12.9	32.0	32.0
Green Extension Time *(g_e)*, s	1.4	1.6	0.0	1.6	0.4	0.4	0.0	0.0
Phase Call Probability	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Max Out Probability	0.00	0.01		0.02	0.00	0.00	1.00	1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate *(v)*, veh/h	574	354	0	0	287	265	160	48	37	221	0	42
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1706	1845	0	0	1845	1674	1757	1845	1563	1757	0	1563
Queue Service time *(g_s)*, s	18.6	18.2	0.0	0.0	19.2	19.5	10.9	2.9	2.6	15.7	30.0	3.0
Cycle Queue Clearance Time *(g_c)*, s	18.6	18.2	0.0	0.0	19.2	19.5	10.9	2.9	2.6	15.7	30.0	3.0
Capacity *(c)*, veh/h	643	829			465	422	379	398	337	379	0	337
Volume-to-Capacity Ratio *(X)*	0.893	0.427	0.000	0.000	0.618	0.628	0.422	0.120	0.109	0.583	0.000	0.125
Available Capacity *(c_a)*, veh/h	1085	829			465	422	379	398	337	379	0	337
Back of Queue *(Q)*, veh/ln	8.0	8.0			9.0	8.4	4.8	1.3	1.0	7.0		1.2
Overflow Queue *(Q_3)*, veh/ln	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Queue Storage Ratio *(RQ)*	*1.0*	0.0	0.0	0.0	0.0	0.0	0.7	0.0	0.1	*1.8*	0.0	0.0
Uniform Delay *(d_1)*, s/veh	40.6	26.1			46.1	46.2	47.0	43.9	43.8	48.9	0.0	43.9
Incremental Delay *(d_2)*, s/veh	2.9	0.1	0.0	0.0	1.9	2.3	0.3	0.0	0.1	1.5	0.0	0.1
Initial Queue Delay *(d_3)*, s/veh	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay *(d)*, s/veh	43.6	26.2			47.9	48.5	47.3	43.9	43.8	50.4	0.0	44.0
Level of Service (LOS)	D	C			D	D	D	D	D	D		D
Approach Delay, s/veh / LOS	36.9	D		48.2	D		46.1	D		49.4	D	
Intersection Delay s/veh / LOS	42.8						D					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.9	A	2.3	B	2.3	B	2.9	C
Bicycle LOS Score / LOS	2.0	B	0.9	A	0.9	A		F

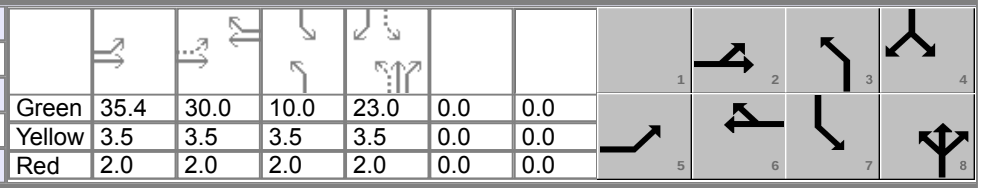
2010 HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Canton			Duration, h	0.25
Analyst	ARCADIS	Analysis Date	Dec 18, 2012	Area Type	Other
Jurisdiction	Canton	Time Period	AM Peak	PHF	0.90
Intersection	Mercy Drive	Analysis Year	2035	Analysis Period	1> 7:00
File Name	Mercy AM Design Year.xus				
Project Description	12th Street Bridge Replacement				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	969	578			249	108	166	155	56	22		74

Signal Information			
Cycle, s	120.4	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	35.4	30.0	10.0	23.0	0.0	0.0
Yellow	3.5	3.5	3.5	3.5	0.0	0.0
Red	2.0	2.0	2.0	2.0	0.0	0.0

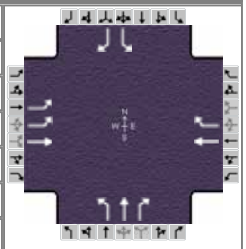
Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	3	8	7	4
Case Number	1.0	4.0	0.0	3.0	1.1	3.0	1.1	3.0
Phase Duration, s	40.9	76.4	0.0	35.5	15.5	28.5	15.5	28.5
Change Period, *(Y+Rc)*, s	5.5	5.5	5.5	5.5	5.5	5.5	5.5	5.5
Max Allow Headway *(MAH)*, s	3.1	3.1	0.0	3.1	3.1	3.2	3.1	3.2
Queue Clearance Time *(g_s)*, s	35.0	28.4		18.0	12.0	12.0	3.2	7.4
Green Extension Time *(g_e)*, s	0.4	2.1	0.0	1.9	0.0	0.5	0.0	0.5
Phase Call Probability	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Max Out Probability	1.00	0.00		0.05	1.00	0.00	0.00	0.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate *(v)*, veh/h	1077	642	0	0	277	120	184	172	62	24	0	82
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1706	1845	0	0	1845	1597	1757	1845	1563	1757	1845	1563
Queue Service time *(g_s)*, s	33.0	26.4	0.0	0.0	16.0	7.3	10.0	10.0	4.0	1.2	0.0	5.4
Cycle Queue Clearance Time *(g_c)*, s	33.0	26.4	0.0	0.0	16.0	7.3	10.0	10.0	4.0	1.2	0.0	5.4
Capacity *(c)*, veh/h	1124	1087			459	398	473	352	299	334	352	299
Volume-to-Capacity Ratio *(X)*	0.958	0.591	0.000	0.000	0.602	0.302	0.390	0.489	0.208	0.073	0.000	0.275
Available Capacity *(c_a)*, veh/h	1139	1087			459	398	473	352	299	334	352	299
Back of Queue *(Q)*, veh/ln	15.9	10.7			7.4	2.9	4.4	4.6	1.6	0.5	0.0	2.1
Overflow Queue *(Q_3)*, veh/ln	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Queue Storage Ratio *(RQ)*	*2.0*	0.0	0.0	0.0	0.0	0.2	0.6	0.0	0.2	0.1	0.0	0.0
Uniform Delay *(d_1)*, s/veh	37.7	15.6			40.0	36.7	35.5	43.5	41.1	32.6	0.0	41.6
Incremental Delay *(d_2)*, s/veh	17.2	0.6	0.0	0.0	1.6	0.2	0.2	0.4	0.1	0.0	0.0	0.2
Initial Queue Delay *(d_3)*, s/veh	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay *(d)*, s/veh	54.9	16.2			41.5	36.9	35.7	43.9	41.2	32.7	0.0	41.8
Level of Service (LOS)	D	B			D	D	D	D	D	C		D
Approach Delay, s/veh / LOS	40.5	D		40.1	D		39.9	D		39.7	D	
Intersection Delay s/veh / LOS	40.3						D					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.9	A	2.3	B	2.3	B	2.5	B
Bicycle LOS Score / LOS	3.3	C	1.1	A	1.2	A		F

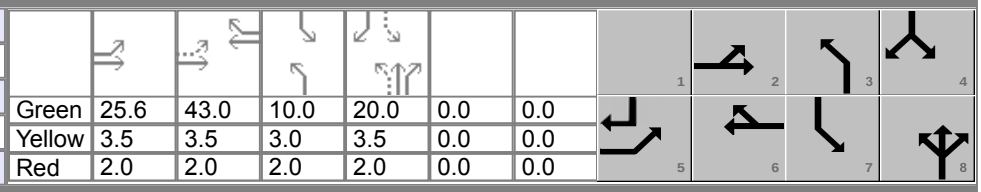
2010 HCS Signalized Intersection Results Summary

General Information				Intersection Information	
Agency	Canton			Duration, h	0.25
Analyst	ARCADIS	Analysis Date	Dec 18, 2012	Area Type	Other
Jurisdiction	Canton	Time Period	PM Peak	PHF	0.90
Intersection	Mercy Drive	Analysis Year	2035	Analysis Period	1> 3:00
File Name	Mercy PM Design Year.xus				
Project Description	12th Street Bridge Replacement				



Demand Information	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Demand (*v*), veh/h	696	430			504	166	194	58	45	52		268

Signal Information			
Cycle, s	120.1	Reference Phase	2
Offset, s	0	Reference Point	End
Uncoordinated	Yes	Simult. Gap E/W	On
Force Mode	Fixed	Simult. Gap N/S	On



Green	25.6	43.0	10.0	20.0	0.0	0.0
Yellow	3.5	3.5	3.0	3.5	0.0	0.0
Red	2.0	2.0	2.0	2.0	0.0	0.0

Timer Results	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Assigned Phase	5	2	1	6	3	8	7	4
Case Number	1.0	4.0	0.0	3.0	1.1	3.0	1.1	3.0
Phase Duration, s	31.1	79.6	0.0	48.5	15.0	25.5	15.0	25.5
Change Period, *(Y+Rc)*, s	5.5	5.5	5.5	5.5	5.0	5.5	5.0	5.5
Max Allow Headway *(MAH)*, s	3.1	3.1	0.0	3.1	3.1	3.3	3.1	3.3
Queue Clearance Time *(g_s)*, s	24.2	18.1		35.6	12.0	5.6	5.1	19.5
Green Extension Time *(g_e)*, s	1.3	2.5	0.0	1.9	0.0	0.8	0.0	0.1
Phase Call Probability	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Max Out Probability	0.18	0.00		0.30	1.00	0.00	0.06	1.00

Movement Group Results	EB			WB			NB			SB		
Approach Movement	L	T	R	L	T	R	L	T	R	L	T	R
Assigned Movement	5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow Rate *(v)*, veh/h	773	478	0	0	560	184	216	64	50	58	0	298
Adjusted Saturation Flow Rate *(s)*, veh/h/ln	1706	1845	0	0	1845	1597	1757	1845	1563	1757	1845	1563
Queue Service time *(g_s)*, s	22.2	16.1	0.0	0.0	33.6	10.1	10.0	3.6	3.3	3.1	0.0	17.5
Cycle Queue Clearance Time *(g_c)*, s	22.2	16.1	0.0	0.0	33.6	10.1	10.0	3.6	3.3	3.1	0.0	17.5
Capacity *(c)*, veh/h	847	1138			661	572	439	307	260	386	307	593
Volume-to-Capacity Ratio *(X)*	0.913	0.420	0.000	0.000	0.848	0.322	0.491	0.210	0.192	0.150	0.000	0.502
Available Capacity *(c_a)*, veh/h	1001	1138			661	572	439	307	260	386	307	593
Back of Queue *(Q)*, veh/ln	10.2	6.3			16.5	3.8	5.4	1.7	1.3	1.3	0.0	6.5
Overflow Queue *(Q_3)*, veh/ln	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Queue Storage Ratio *(RQ)*	*1.3*	0.0	0.0	0.0	0.0	0.2	0.8	0.0	0.2	0.3	0.0	0.0
Uniform Delay *(d_1)*, s/veh	41.0	11.9			35.5	28.0	38.6	43.2	43.1	35.0	0.0	28.5
Incremental Delay *(d_2)*, s/veh	10.3	0.1	0.0	0.0	9.6	0.1	0.3	0.1	0.1	0.1	0.0	0.3
Initial Queue Delay *(d_3)*, s/veh	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Control Delay *(d)*, s/veh	51.3	12.0			45.1	28.1	38.9	43.3	43.2	35.1	0.0	28.8
Level of Service (LOS)	D	B			D	C	D	D	D	D		C
Approach Delay, s/veh / LOS	36.3	D		40.9	D		40.4	D		29.8	C	
Intersection Delay s/veh / LOS	37.2						D					

MultiModal Results	EB		WB		NB		SB	
Pedestrian LOS Score / LOS	1.9	A	2.3	B	2.3	B	2.5	B
Bicycle LOS Score / LOS	2.6	B	1.7	A	1.0	A		F

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: ARCADIS
Agency/Co.: City of Canton
Date Performed: 12/14/2012
Analysis Time Period: AM Peak
Intersection: Stadium Park and 12th
Jurisdiction: Canton
Units: U. S. Customary
Analysis Year: 2012
Project ID: 12th Street Bridge Replacement PID 90671
East/West Street: 12th Street
North/South Street: Stadium Park Drive
Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	5	352	7	8	249	19
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	5	391	7	8	276	21
Percent Heavy Vehicles	0	--	--	0	--	--
Median Type/Storage	Undivided /					
RT Channelized?						
Lanes	1	1	0	1	1	0
Configuration	L	TR		L	TR	
Upstream Signal?		No			No	

Minor Street: Approach	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	2	17	2	8	16	4
Peak Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	2	18	2	8	17	4
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage		No	/		No	/
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	L	L		LTR			LTR	
v (vph)	5	8		22			29	
C(m) (vph)	1276	1172		367			376	
v/c	0.00	0.01		0.06			0.08	
95% queue length	0.01	0.02		0.19			0.25	
Control Delay	7.8	8.1		15.4			15.4	
LOS	A	A		C			C	
Approach Delay				15.4			15.4	
Approach LOS				C			C	

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: ARCADIS
Agency/Co.: City of Canton
Date Performed: 12/14/2012
Analysis Time Period: PM Peak
Intersection: Stadium Park and 12th
Jurisdiction: Canton
Units: U. S. Customary
Analysis Year: 2012
Project ID: 12th Street Bridge Replacement PID 90671
East/West Street: 12th Street
North/South Street: Stadium Park Drive
Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	14	449	6	11	387	35
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	15	498	6	12	430	38
Percent Heavy Vehicles	1	--	--	1	--	--
Median Type/Storage	Undivided /					
RT Channelized?						
Lanes	1	1	0	1	1	0
Configuration	L	TR		L	TR	
Upstream Signal?		No			No	

Minor Street: Approach	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	1	35	8	6	45	10
Peak Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	1	38	8	6	50	11
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage		No /			No /	
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	L	L		LTR			LTR	
v (vph)	15	12		47			67	
C(m) (vph)	1099	1066		256			256	
v/c	0.01	0.01		0.18			0.26	
95% queue length	0.04	0.03		0.66			1.02	
Control Delay	8.3	8.4		22.2			24.0	
LOS	A	A		C			C	
Approach Delay				22.2			24.0	
Approach LOS				C			C	

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: ARCADIS
Agency/Co.: City of Canton
Date Performed: 12/14/2012
Analysis Time Period: AM Peak
Intersection: Stadium Park and 12th
Jurisdiction: Canton
Units: U. S. Customary
Analysis Year: 2035
Project ID: 12th Street Bridge Replacement PID 90671
East/West Street: 12th Street
North/South Street: Stadium Park Drive
Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	7	474	10	11	335	26
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	7	526	11	12	372	28
Percent Heavy Vehicles	1	--	--	1	--	--
Median Type/Storage	Undivided /					
RT Channelized?						
Lanes	1	1 0		1	1 0	
Configuration	L	TR		L	TR	
Upstream Signal?		No			No	

Minor Street: Approach	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	3	23	3	11	22	6
Peak Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	3	25	3	12	24	6
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage		No /			No /	
Lanes	0	1 0		0	1 0	
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	L	L		LTR			LTR	
v (vph)	7	12		31			42	
C(m) (vph)	1164	1036		260			262	
v/c	0.01	0.01		0.12			0.16	
95% queue length	0.02	0.04		0.40			0.56	
Control Delay	8.1	8.5		20.7			21.3	
LOS	A	A		C			C	
Approach Delay				20.7			21.3	
Approach LOS				C			C	

HCS+: Unsignalized Intersections Release 5.6

TWO-WAY STOP CONTROL SUMMARY

Analyst: ARCADIS
Agency/Co.: City of Canton
Date Performed: 12/14/2012
Analysis Time Period: PM Peak
Intersection: Stadium Park and 12th
Jurisdiction: Canton
Units: U. S. Customary
Analysis Year: 2035
Project ID: 12th Street Bridge Replacement PID 90671
East/West Street: 12th Street
North/South Street: Stadium Park Drive
Intersection Orientation: EW Study period (hrs): 0.25

Vehicle Volumes and Adjustments

Major Street: Approach	Eastbound			Westbound		
Movement	1	2	3	4	5	6
	L	T	R	L	T	R
Volume	19	604	9	15	521	48
Peak-Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	21	671	10	16	578	53
Percent Heavy Vehicles	1	--	--	1	--	--
Median Type/Storage	Undivided /					
RT Channelized?						
Lanes	1	1	0	1	1	0
Configuration	L	TR		L	TR	
Upstream Signal?		No			No	

Minor Street: Approach	Northbound			Southbound		
Movement	7	8	9	10	11	12
	L	T	R	L	T	R
Volume	2	48	11	9	61	14
Peak Hour Factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90
Hourly Flow Rate, HFR	2	53	12	10	67	15
Percent Heavy Vehicles	0	0	0	0	0	0
Percent Grade (%)		0			0	
Flared Approach: Exists?/Storage		No /			No /	
Lanes	0	1	0	0	1	0
Configuration		LTR			LTR	

Delay, Queue Length, and Level of Service

Approach	EB	WB	Northbound			Southbound		
Movement	1	4	7	8	9	10	11	12
Lane Config	L	L		LTR			LTR	
v (vph)	21	16		67			92	
C(m) (vph)	956	916		154			149	
v/c	0.02	0.02		0.44			0.62	
95% queue length	0.07	0.05		1.96			3.31	
Control Delay	8.9	9.0		45.3			61.9	
LOS	A	A		E			F	
Approach Delay				45.3			61.9	
Approach LOS				E			F	

12th Street
TURN LANE CALCULATIONS

Mainline	**12th Street**				
Date	12/12/2012				
Calculated By	DRJ				
Checked By	SMG				
Design Speed	35				
Condition	A	Required =			
Condition	A	Required =	50 '	+Storage Length	

	Seconds	Cycles per Hour
AM Cycle Length	60	60
PM Cycle Length	60	60

Intersecting Street **Stadium Park**
Direction WB

	#		AM	PM	Avg. Vehicles per Cycle (AM)	Avg. Vehicles per Cycle (PM)	Storage Length (AM)	Storage Length (PM)
	1	LT	11	15	1	1	50 '	50 '
Lanes	1	Thru	361	569	7	10	275 '	375 '

Is there thru lane backup N
Required Length including diverging tape 100 '

Direction EB

	#		AM	PM	Avg. Vehicles per Cycle (AM)	Avg. Vehicles per Cycle (PM)	Storage Length (AM)	Storage Length (PM)
	1	LT	7	19	1	1	50 '	50 '
Lanes	1	Thru	484	613	9	11	350 '	400 '

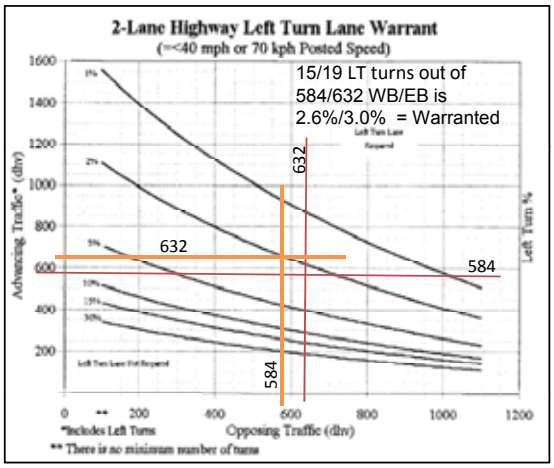
Is there thru lane backup N
Required Length including diverging tape 100 '

Intersecting Street **Mercy**
Direction WB

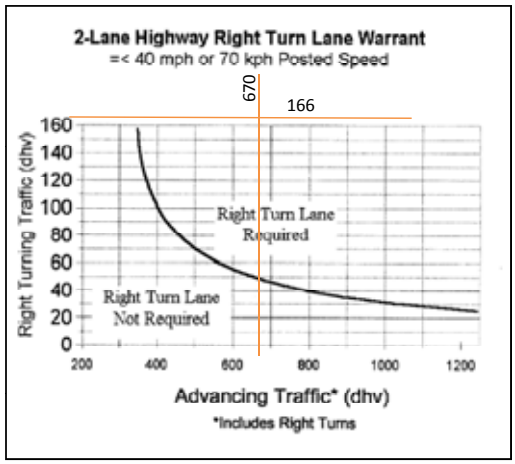
	#		AM	PM	Avg. Vehicles per Cycle (AM)	Avg. Vehicles per Cycle (PM)	Storage Length (AM)	Storage Length (PM)
	1	RT	108	166	2	3	100 '	150 '
Lanes	1	Thru	249	504	5	9	200 '	350 '

Is there thru lane backup Y
Required Length including diverging tape 400 ' ***Needs verified with Capacity Analysis***

Stadium Park



Mercy Westbound



ARCADIS

Appendix C

Drainage

Form LD-33

Revised July 2011

Ohio Department of Transportation
County Engineer
Approval Form

Date Submitted to District:

Date Submitted to County Engineer:

County - Route - Section: **STA-12th Street NW**

PID: **90671**

Station	Size & Type	Culvert Invert Elevation		Existing Channel Elevation		Skew
		Inlet	Outlet	Inlet	Outlet	
64+70	11’-9.5” rise x 32’ span concrete arch			1026.0	1026.8	
68+50	11’ rise x 50’ span concrete arch			1016.7	1015.7	

I have reviewed and hereby approve the drainage proposed for the highway designated hereon in accordance with the provisions of the Ohio Revised Code, Section 6131.631.

County

County Engineer's Signature

Date

Comments:

Form LD-35
Revised January 2012

PROJECT INFORMATION:

Stark	12th Street NW		90671
COUNTY	**ROUTE**	**SECTION**	**PID**

PIPE POLICY:

The Pipe Policy of ODOT will be used for this project.

http://www.dot.state.oh.us/Divisions/Engineering/Hydraulic/LandD/Pages/TableofContents.aspx

(Attach a copy of the written pipe policy or furnish a link to the policy. In lieu of a written policy, documentation of locally funded construction practices may be provided)

POST CONSTRUCTION BMP POLICY:

The Post Construction BMP Policy of ODOT will be used for this project..

If a policy other than ODOT's is being used, the following BMP's are permitted:

DRAINAGE WATERSHED(S):

West Branch Nimishillen Creek was studied by approximate methods in the area of our project. However, detailed studies were performed on reaches both upstream and downstream of 12th Street NW and therefore peak discharges have been previously calculated for both of those reaches. At our project site, West Branch Nimishillen Creek at 12th Street NW drains 40.4 square miles.

Mill Race is a manmade channel that runs parallel to West Branch Nimishillen Creek on the west side from Harrison Avenue NW to about 450 feet upstream of 7th Street NW. It sits higher than West Branch Nimishillen Creek and is not within the Special Flood Hazard Area at our project site. It is fed from the West Branch Nimishillen Creek just upstream of the dam near the intersection of Stadium Park Drive NW and Harrison Avenue NW.

PROJECT SPECIFIC INFORMATION AFFECTING DRAINAGE:

ARCADIS

Appendix D

Bridges / Hydraulics

PID NO.: **90671** **Conceptual Estimate of Probable Construction Cost**

JOB NO.: **AK000315**

STRUCTURE: **12th Street over Nimishillen Creek** **Alternate 1 - Single Span W Shape**

ITEM	EXTENSION	TOTAL	UNIT	DESCRIPTION	Unit Cost	Cost
202	11002	1	LUMP	STRUCTURE REMOVED, OVER 20 FOOT SPAN	-	$ 60,000.00
503	11100	1	LUMP	COFFERDAMS AND EXCAVATION BRACING	-	$ 50,000.00
509	10000	172,552	LB	EPOXY COATED REINFORCING STEEL	$ 0.85	$ 146,668.96
511	34444	302	CU YD	CLASS QC2 CONCRETE, BRIDGE DECK	$ 550.00	$ 166,100.00
511	44100	395	CU YD	CLASS QC1 CONCRETE, ABUTMENT NOT INCLUDING FOOTING	$ 450.00	$ 177,756.20
511	46510	381	CU YD	CLASS QC1 CONCRETE, FOOTING	$ 300.00	$ 114,420.00
513	10221	126,720	LB	STRUCTURAL STEEL MEMBERS, LEVEL 1, AS PER PLAN	$ 1.50	$ 190,080.00
514	27800	1	LUMP	FIELD PAINTING, MISC.: GALVANIZED STEEL, INTERMEDIATE AND FINISH COAT SYSTEM EU	-	$ 50,000.00
526	30000	482	SQ YD	REINFORCED CONCRETE APPROACH SLABS, (T=17")	$ 170.00	$ 81,977.78

Year 2013 Subtotal	**$1,037,002.94**
Contengency @ 30%	**$311,100.88**
Inflation @ 3.5 to 2015	**$1,444,122.52**

12th St. NW o/ W. Branch Nimishillen Creek: Alternative 2 - Two-Span Slab with Arch Fascia Walls

12th St. NW o/ W. Branch Nimishillen Creek: Alternative 2 - Two-Span Slab with Arch Fascia Walls

PID NO.: **90671** **Conceptual Estimate of Probable Construction Cost**

JOB NO.: **AK000315**

STRUCTURE: **12th Street over Nimishillen Creek** **Alternate 2 - Continuous RC Slab**

ITEM	EXTENSION	TOTAL	UNIT	DESCRIPTION	Unit Cost	Cost
202	11002	1	LUMP	STRUCTURE REMOVED, OVER 20 FOOT SPAN	-	$ 60,000.00
503	11100	1	LUMP	COFFERDAMS AND EXCAVATION BRACING	-	$ 75,000.00
509	10000	263,093	LB	EPOXY COATED REINFORCING STEEL	$ 0.85	$ 223,628.99
511	32210	510	CU YD	CLASS QC2 CONCRETE, SUPERSTRUCTURE, CONTINUOUS CONCRETE SLAB	$ 550.00	$ 280,500.00
511	43010	21	CU YD	CLASS QC1 CONCRETE, PIER	$ 600.00	$ 12,600.00
511	44110	385	CU YD	CLASS QC1 CONCRETE, ABUTMENT NOT INCLUDING FOOTING	$ 450.00	$ 173,030.54
511	46011	66	CU YD	CLASS QC1 CONCRETE, AS PER PLAN (RETAINING WALL ABOVE FOOTING)	$ 1,200.00	$ 79,200.00
511	46510	475	CU YD	CLASS QC1 CONCRETE, FOOTING	$ 300.00	$ 142,569.33
526	30000	482	SQ YD	REINFORCED CONCRETE APPROACH SLABS, (T=17")	$ 170.00	$ 81,977.78

Year 2012 Subtotal	**$1,128,506.64**
Contengency @ 30%	**$338,551.99**
Inflation @ 3.5 to 2015	**$1,571,549.89**

12th St. NW o/ W. Branch Nimishillen Creek: Alternative 3 - Three-Span Slab on Open Arch Substructure

12th St. NW o/ W. Branch Nimishillen Creek: Alternative 3 - Three-Span Slab on Open Arch Substructure

PREFERRED: 12th St. NW o/ W. Branch Nimishillen Creek: Alternative 3 - Three-Span Slab on Closed Arch Substructure

PREFERRED: 12th St. NW o/ W. Branch Nimishillen Creek: Alternative 3 - Three-Span Slab on Closed Arch Substructure

PID NO.: **90671** **Conceptual Estimate of Probable Construction Cost**

JOB NO.: **AK000315**

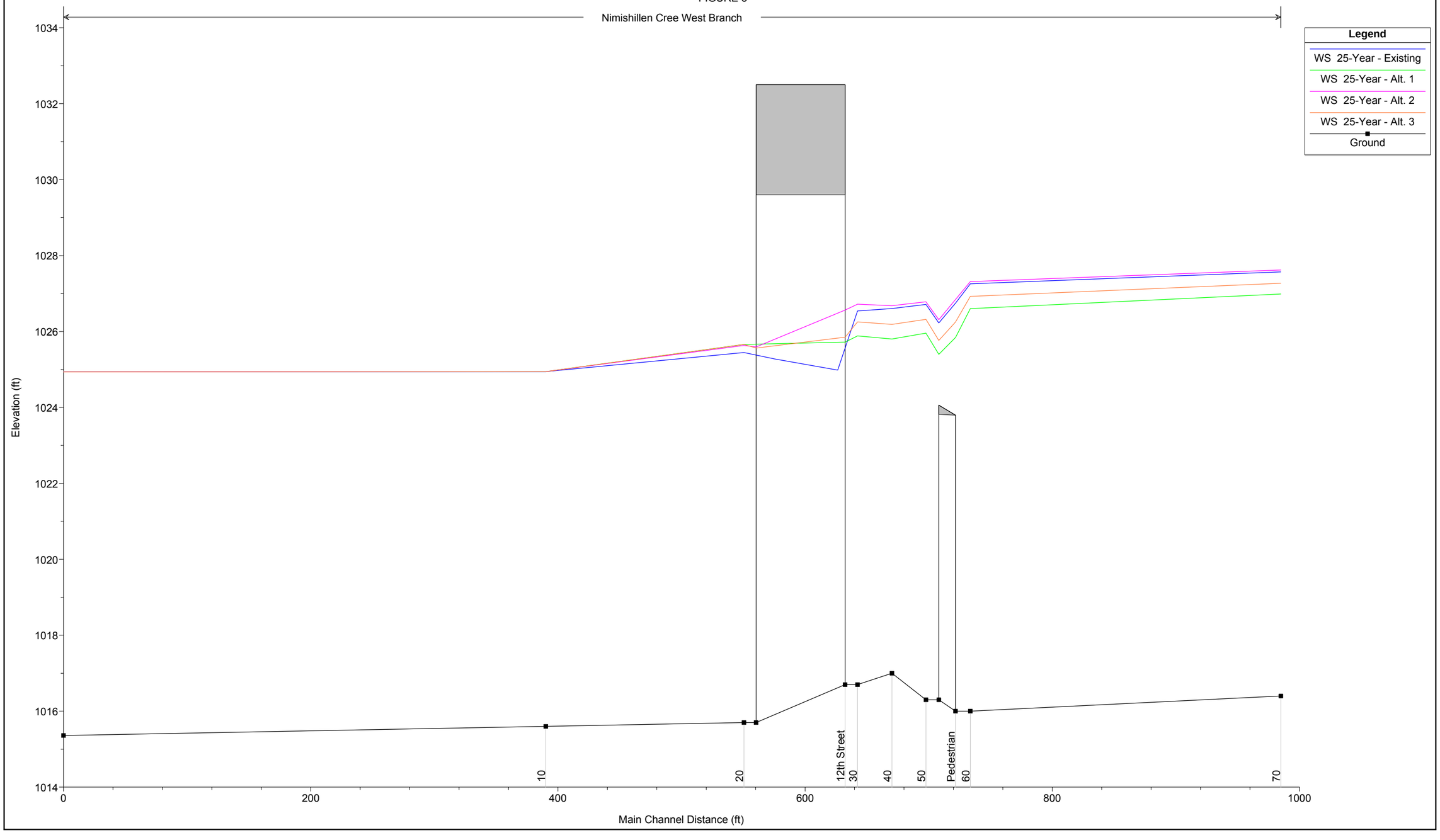
STRUCTURE: **12th Street over Nimishillen Creek** **Alternate 3 - Continuous RC Slab**

ITEM	EXTENSION	TOTAL	UNIT	DESCRIPTION	Unit Cost	Cost
202	11002	1	LUMP	STRUCTURE REMOVED, OVER 20 FOOT SPAN	-	$ 60,000.00
503	11100	1	LUMP	COFFERDAMS AND EXCAVATION BRACING	-	$ 75,000.00
509	10000	232,937	LB	EPOXY COATED REINFORCING STEEL	$ 0.85	$ 197,996.41
511	21521	89	CU YD	CLASS QC2 CONCRETE, SUPERSTRUCTURE, AS PER PLAN (ARCH BEAMS)	$ 650.00	$ 57,850.00
511	32210	420	CU YD	CLASS QC2 CONCRETE, SUPERSTRUCTURE, CONTINUOUS CONCRETE SLAB	$ 450.00	$ 189,000.00
511	43010	79	CU YD	CLASS QC1 CONCRETE, PIER	$ 600.00	$ 47,400.00
511	44110	469	CU YD	CLASS QC1 CONCRETE, ABUTMENT NOT INCLUDING FOOTING	$ 450.00	$ 211,169.03
511	46510	475	CU YD	CLASS QC1 CONCRETE, FOOTING	$ 300.00	$ 142,569.33
ARCH	RIB	14	EACH	PRECAST CONCRETE ARCH RIB	$ 9,657.14	$ 135,200.00
526	30000	482	SQ YD	REINFORCED CONCRETE APPROACH SLABS, (T=17")	$ 170.00	$ 81,977.78

Year 2013 Subtotal	**$1,198,162.55**
Contengency @ 30%	**$359,448.77**
Inflation @ 3.5 to 2015	**$1,668,552.18**

12th Street Bridge Plan: 1) Existing 3/28/2013 2) Alt. 1 3/20/2013 3) Alt. 2 1/8/2013 4) Alt. 3 3/28/2013

FIGURE 5



12th Street Bridge Plan: 1) Existing 3/28/2013 2) Alt. 1 3/20/2013 3) Alt. 2 1/8/2013 4) Alt. 3 3/28/2013

FIGURE 5

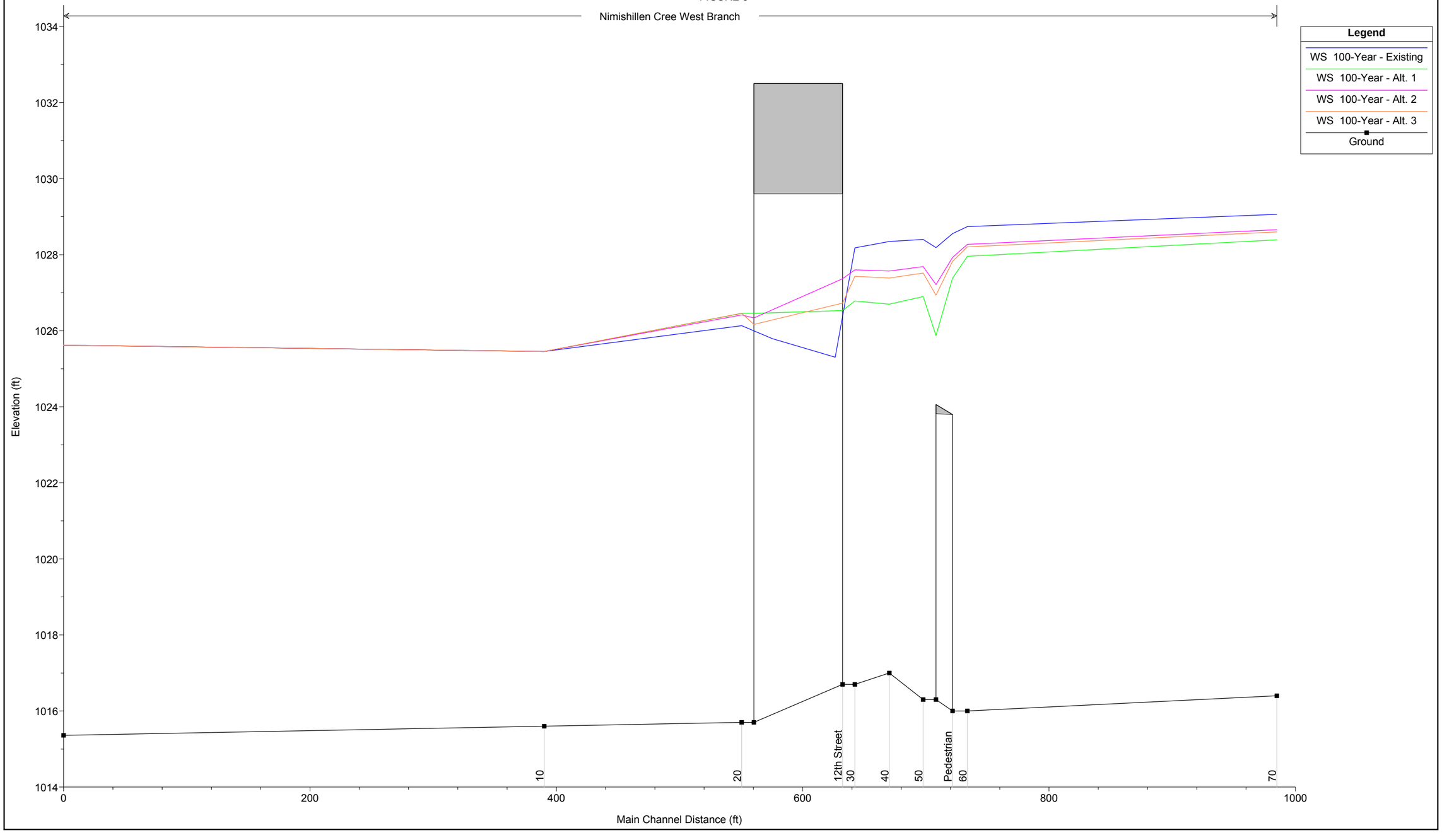


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FIGURE 5

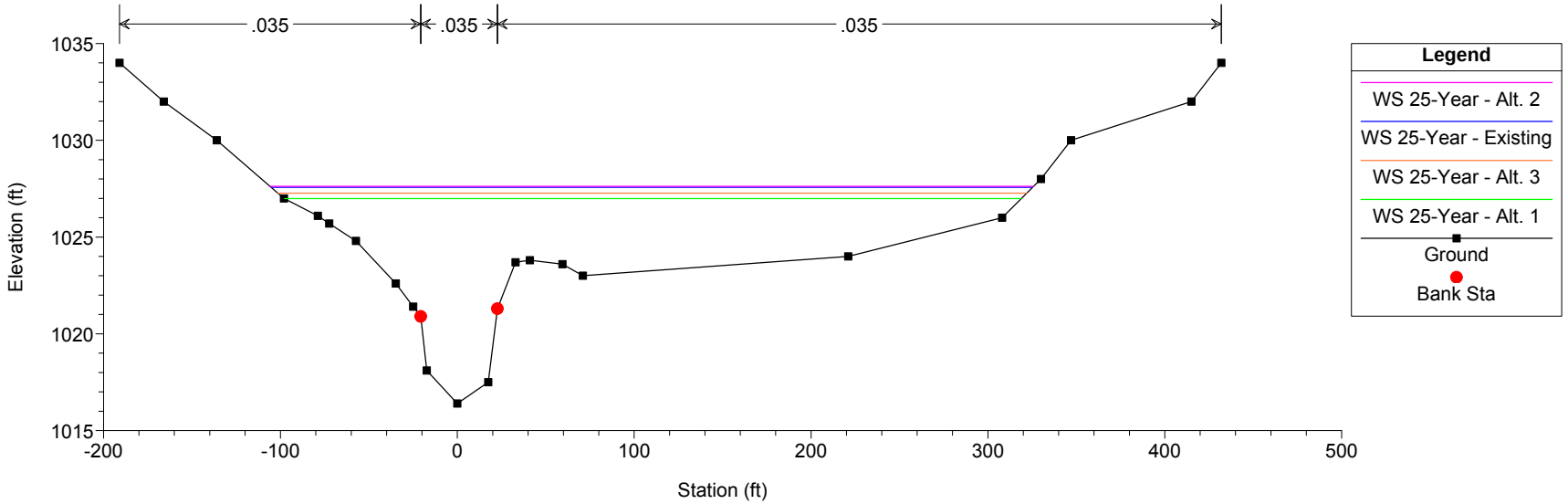

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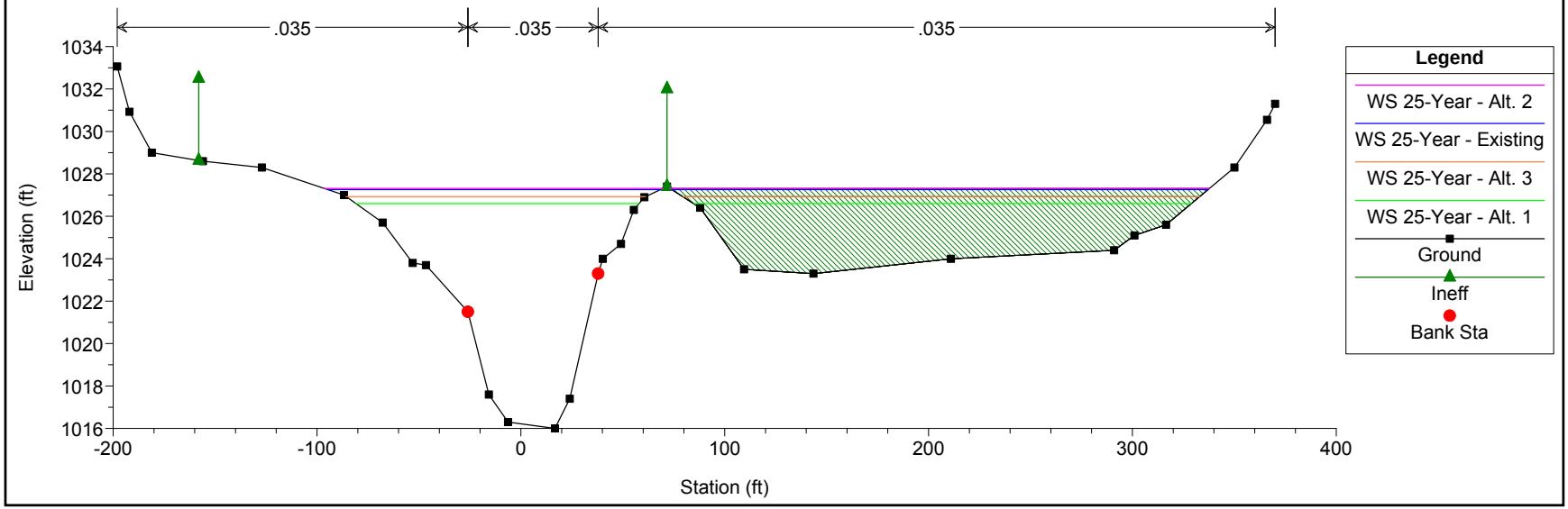
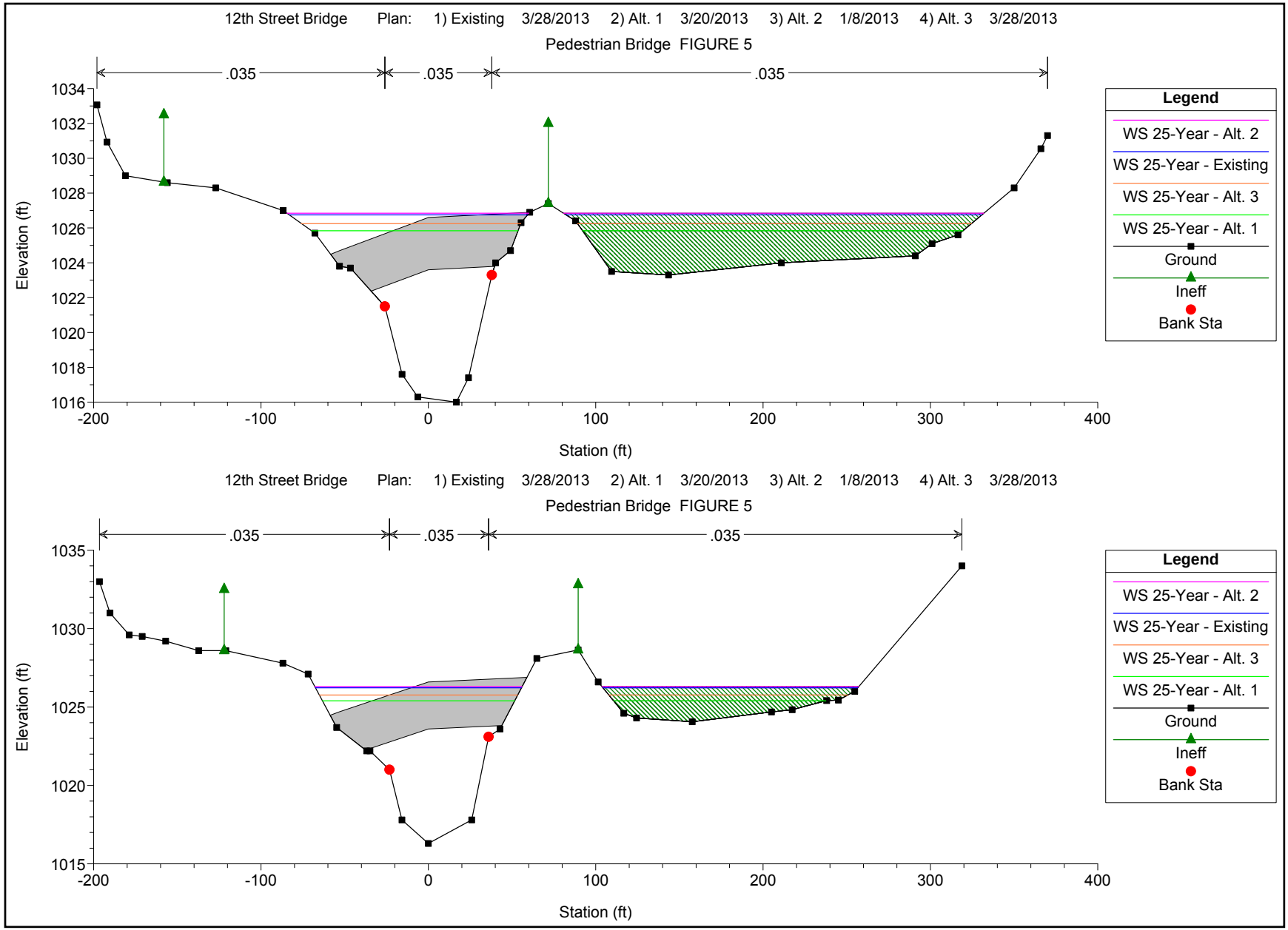
FIGURE 5




12th Street Bridge Plan: 1) Existing 3/28/2013 2) Alt. 1 3/20/2013 3) Alt. 2 1/8/2013 4) Alt. 3 3/28/2013
Pedestrian Bridge FIGURE 5
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Elevation (ft)
Station (ft)
Legend
WS 25-Year - Alt. 2
WS 25-Year - Existing
WS 25-Year - Alt. 3
WS 25-Year - Alt. 1
Ground
Ineff
Bank Sta
12th Street Bridge Plan: 1) Existing 3/28/2013 2) Alt. 1 3/20/2013 3) Alt. 2 1/8/2013 4) Alt. 3 3/28/2013
Pedestrian Bridge FIGURE 5
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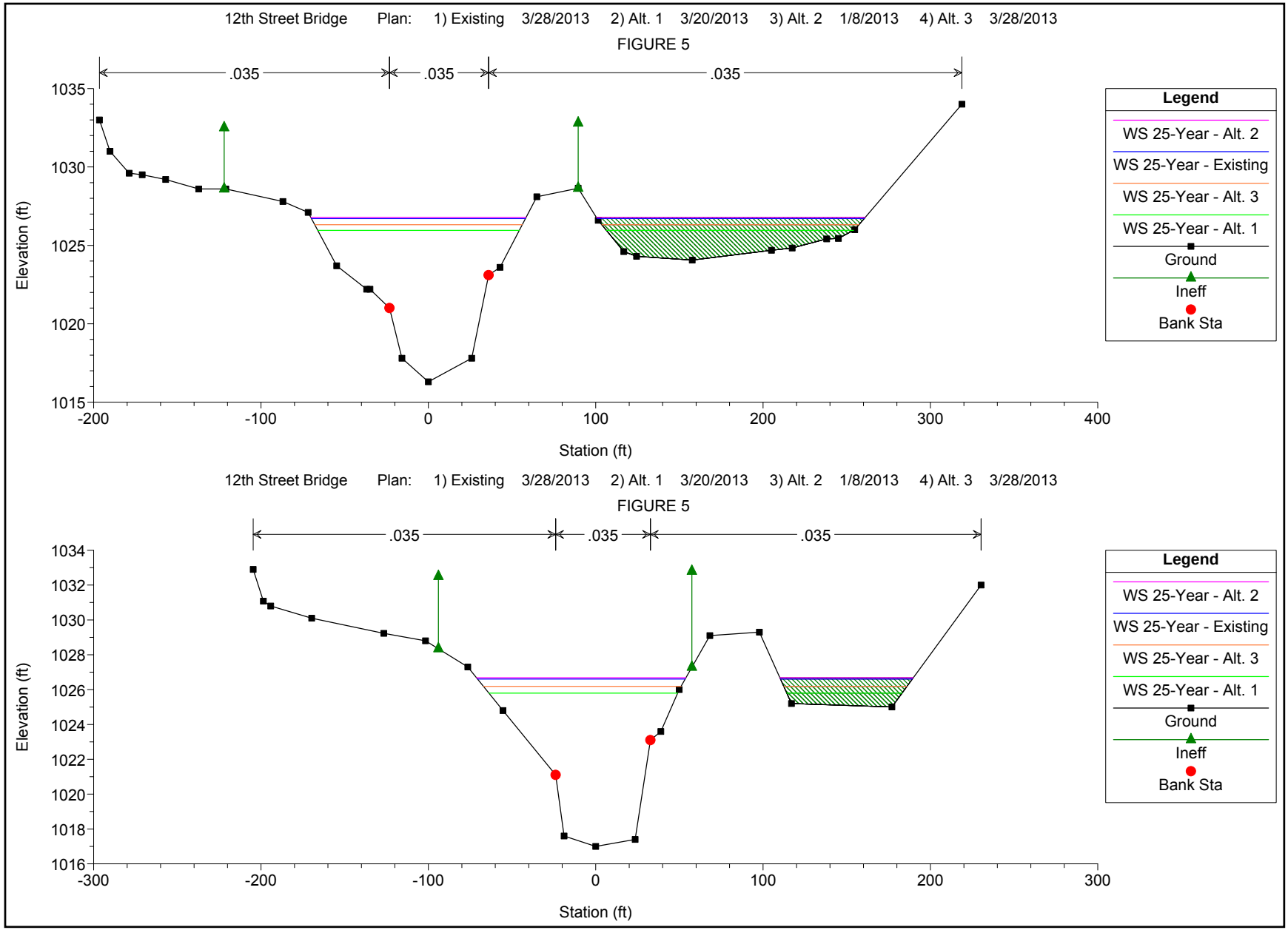
Elevation (ft)
Station (ft)
Legend
WS 25-Year - Alt. 2
WS 25-Year - Existing
WS 25-Year - Alt. 3
WS 25-Year - Alt. 1
Ground
Ineff
Bank Sta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Elevation (ft)
Station (ft)
Legend
WS 25-Year - Alt. 2
WS 25-Year - Existing
WS 25-Year - Alt. 3
WS 25-Year - Alt. 1
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Station (ft)
Legend
WS 25-Year - Alt. 2
WS 25-Year - Existing
WS 25-Year - Alt. 3
WS 25-Year - Alt. 1
Ground
Ineff
Bank Sta

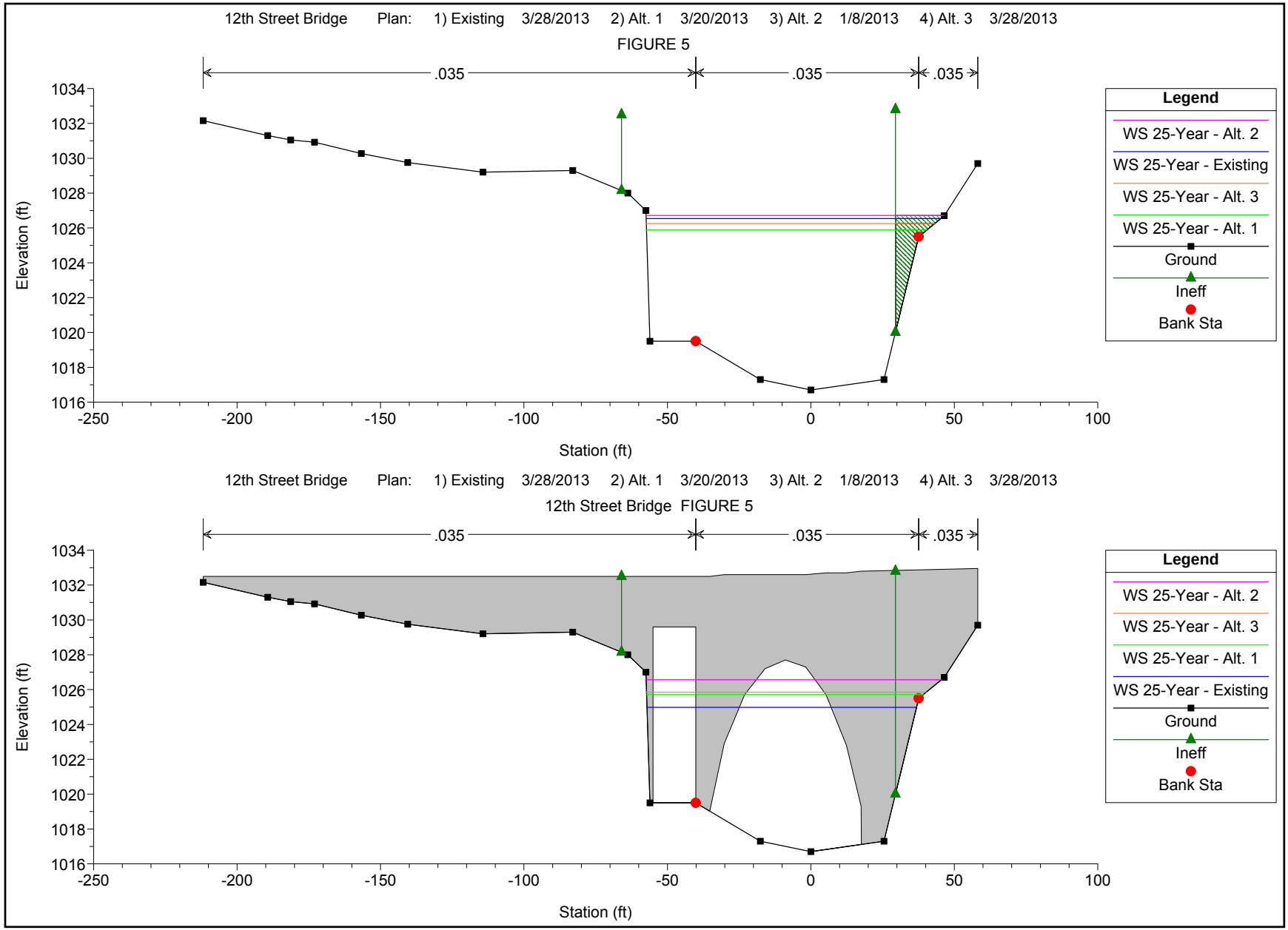
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FIGURE 5
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Elevation (ft)
1034
1032
1030
1028
1026
1024
1022
1020
1018
1016
-250
-200
-150
-100
-50
0
50
100
Station (ft)
Legend
WS 25-Year - Alt. 2
WS 25-Year - Existing
WS 25-Year - Alt. 3
WS 25-Year - Alt. 1
Ground
Ineff
Bank Sta
12th Street Bridge Plan: 1) Existing 3/28/2013 2) Alt. 1 3/20/2013 3) Alt. 2 1/8/2013 4) Alt. 3 3/28/2013
12th Street Bridge FIGURE 5
.035
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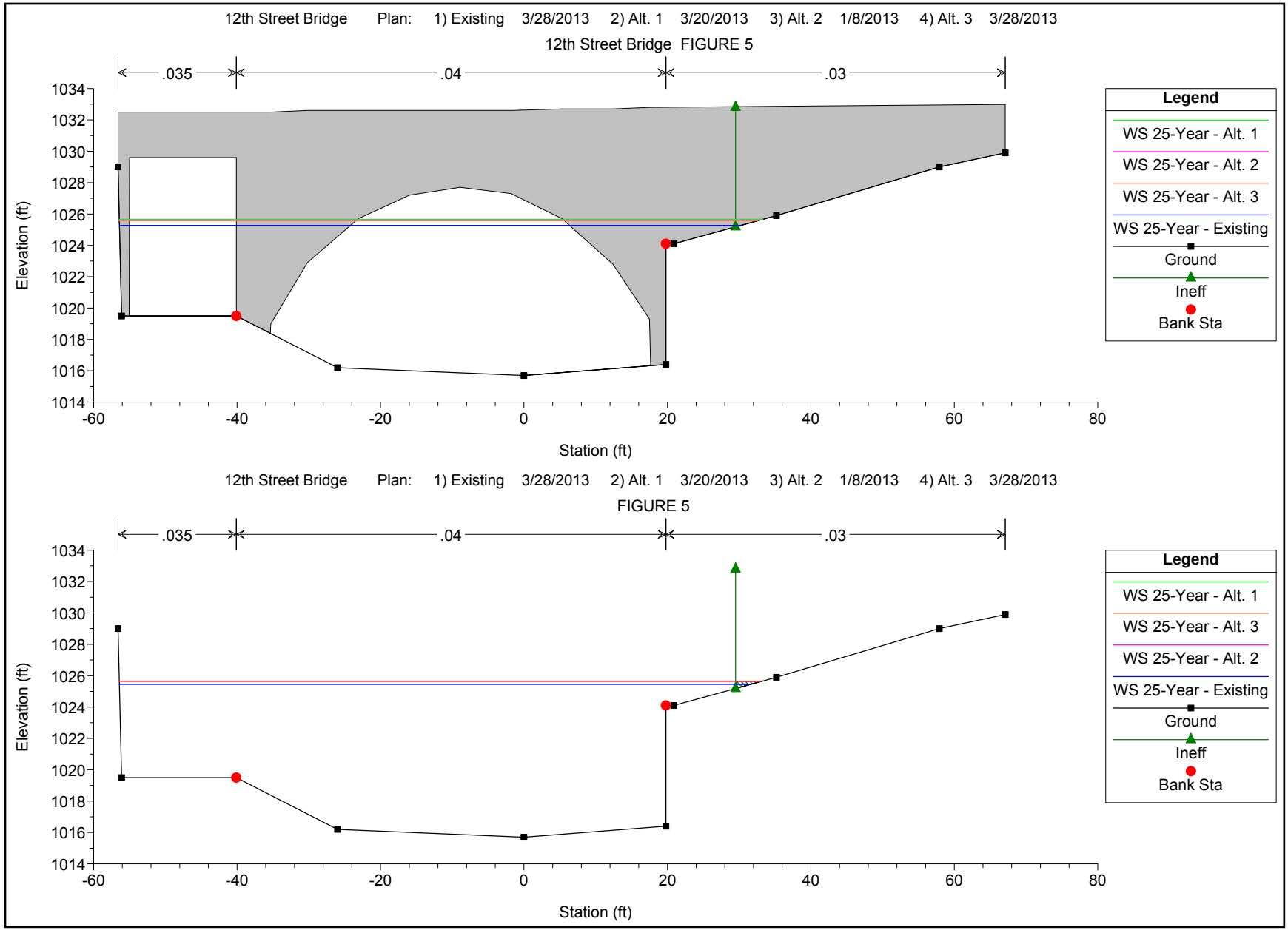
.035
Elevation (ft)
Station (ft)
Legend
WS 25-Year - Alt. 2
WS 25-Year - Alt. 3
WS 25-Year - Alt. 1
WS 25-Year - Existing
Ground
Ineff
Bank Sta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12th Street Bridge FIGURE 5
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Elevation (ft)
Station (ft)
Legend
WS 25-Year - Alt. 1
WS 25-Year - Alt. 2
WS 25-Year - Alt. 3
WS 25-Year - Existing
Ground
Ineff
Bank Sta
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FIGURE 5
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Elevation (ft)
Station (ft)
Legend
WS 25-Year - Alt. 1
WS 25-Year - Alt. 3
WS 25-Year - Alt. 2
WS 25-Year - Existing
Ground
Ineff
Bank Sta

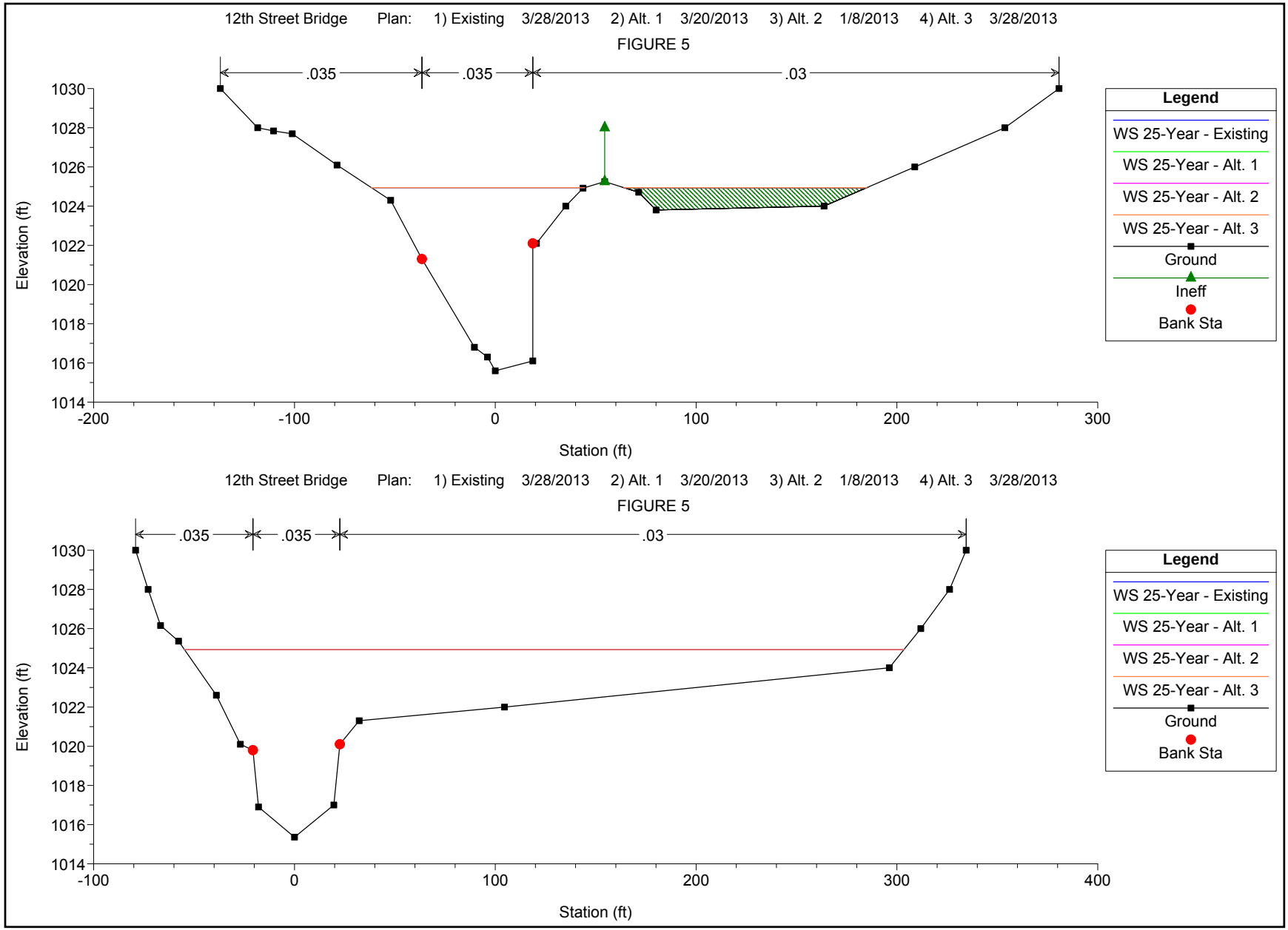
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FIGURE 5
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Elevation (ft)
Station (ft)
Legend
WS 25-Year - Existing
WS 25-Year - Alt. 1
WS 25-Year - Alt. 2
WS 25-Year - Alt. 3
Ground
Ineff
Bank Sta
12th Street Bridge Plan: 1) Existing 3/28/2013 2) Alt. 1 3/20/2013 3) Alt. 2 1/8/2013 4) Alt. 3 3/28/2013
FIGURE 5
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.03
Elevation (ft)
Station (ft)
Legend
WS 25-Year - Existing
WS 25-Year - Alt. 1
WS 25-Year - Alt. 2
WS 25-Year - Alt. 3
Ground
Bank Sta

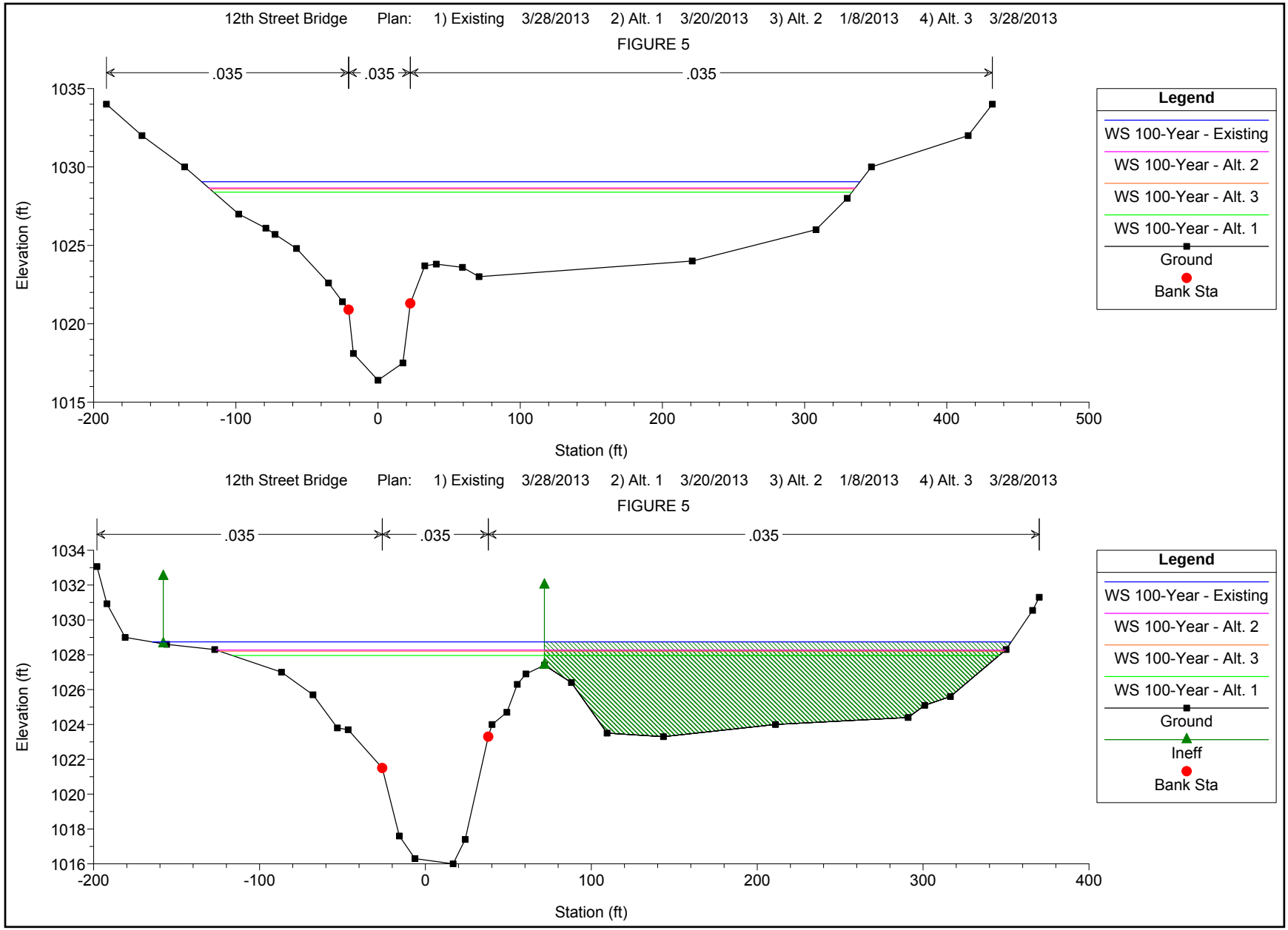
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FIGURE 5
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.035
Elevation (ft)
Station (ft)
Legend
WS 100-Year - Existing
WS 100-Year - Alt. 2
WS 100-Year - Alt. 3
WS 100-Year - Alt. 1
Ground
Bank Sta
12th Street Bridge Plan: 1) Existing 3/28/2013 2) Alt. 1 3/20/2013 3) Alt. 2 1/8/2013 4) Alt. 3 3/28/2013
FIGURE 5
.035
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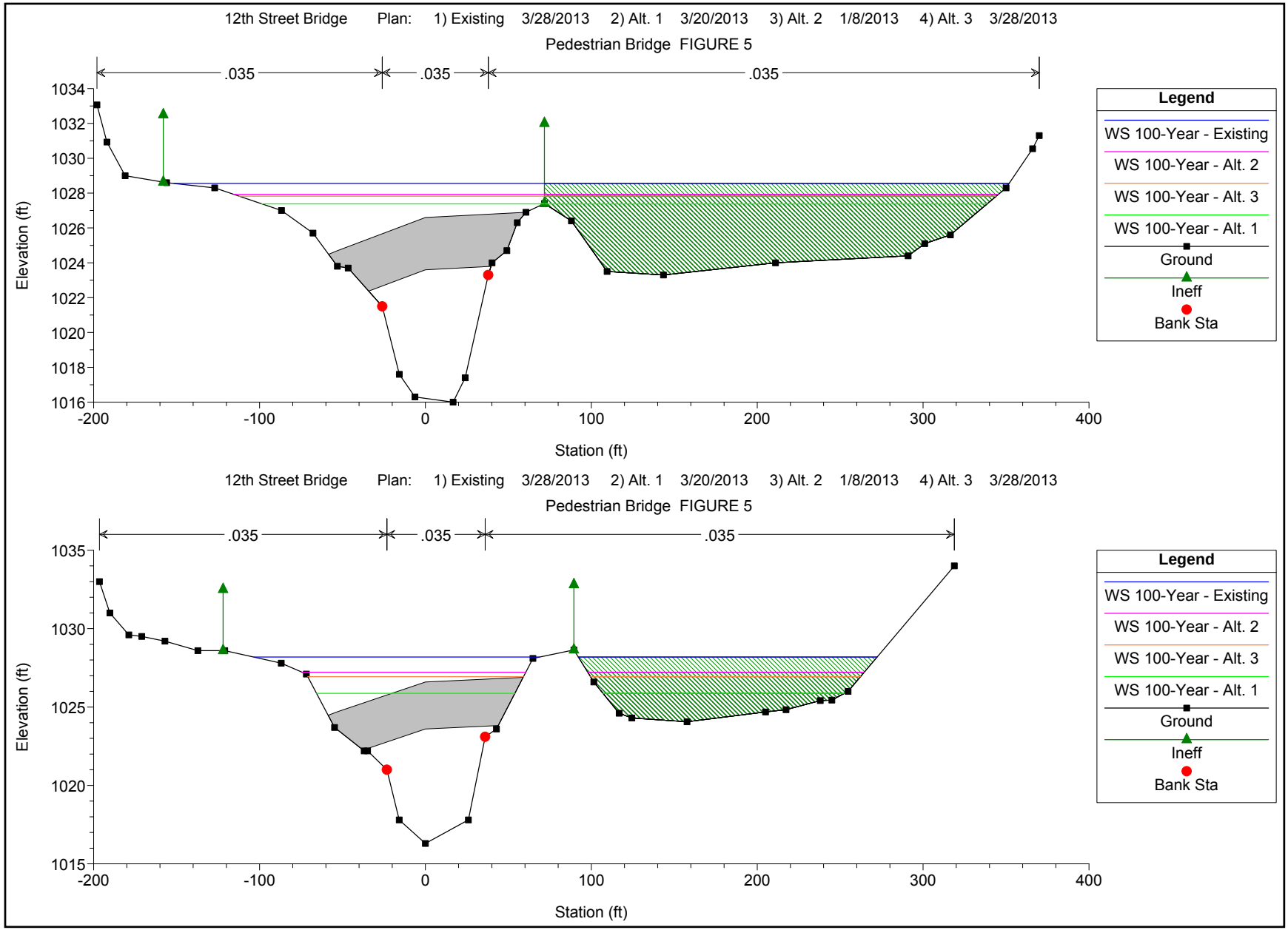
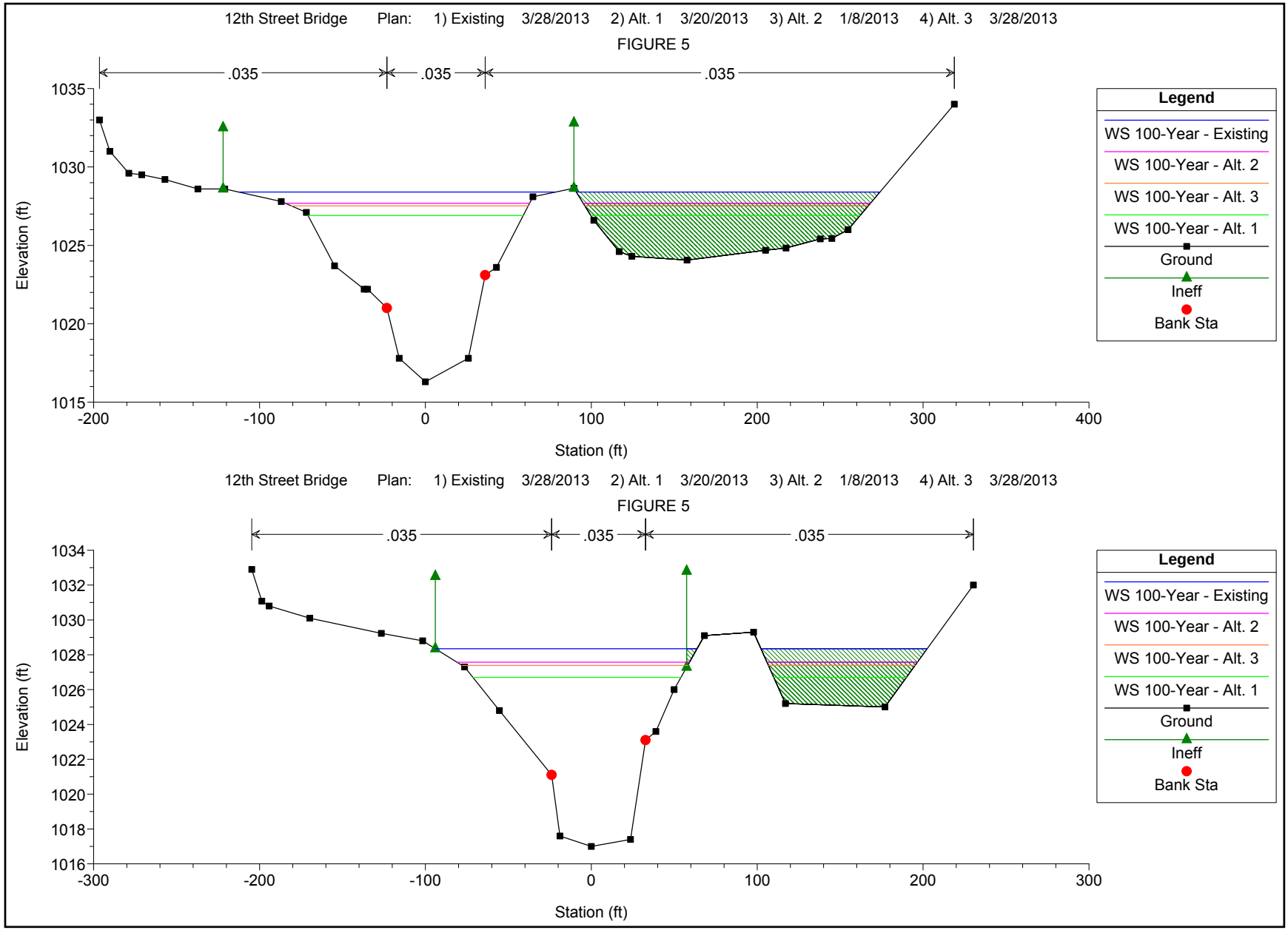
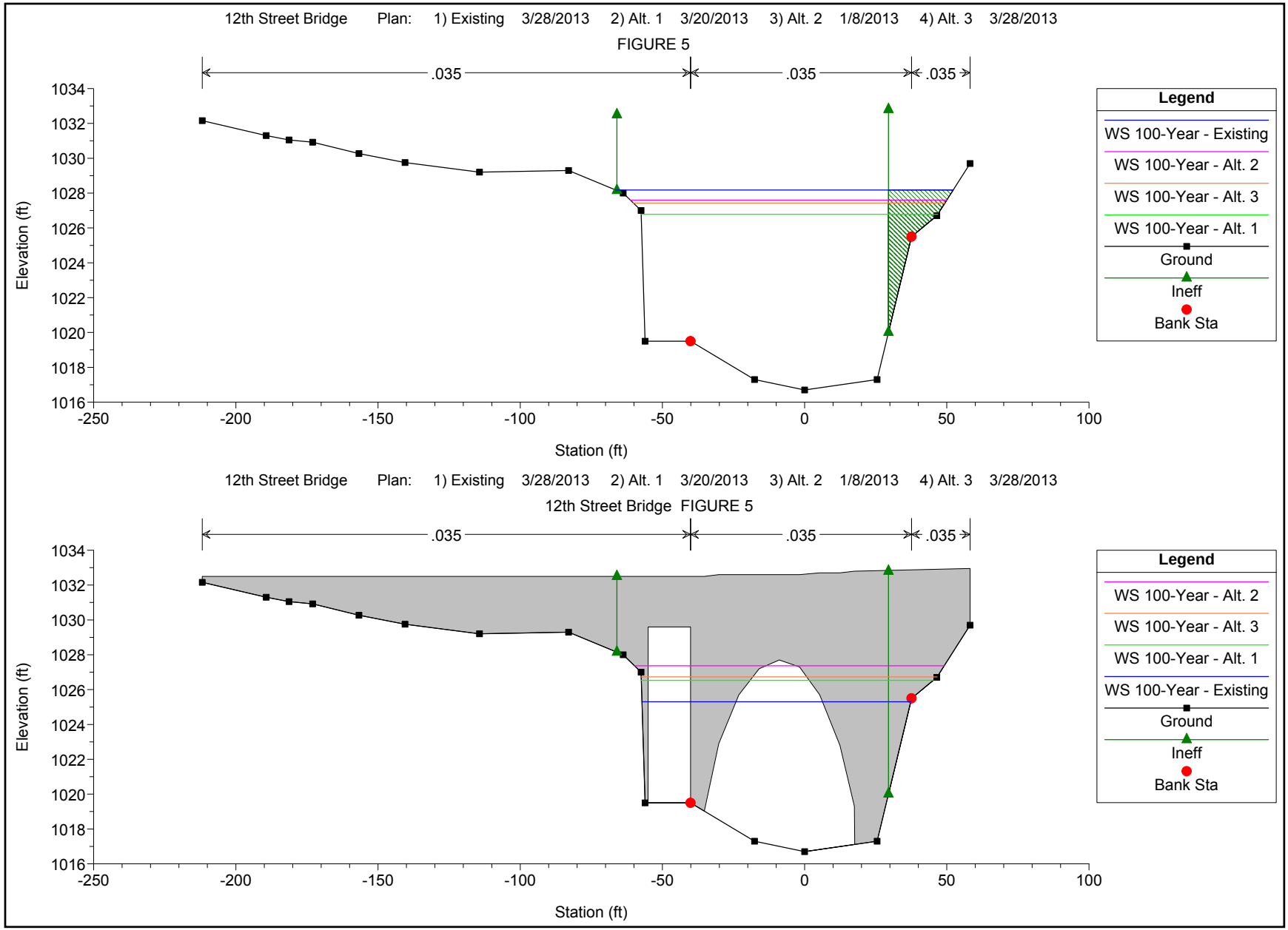
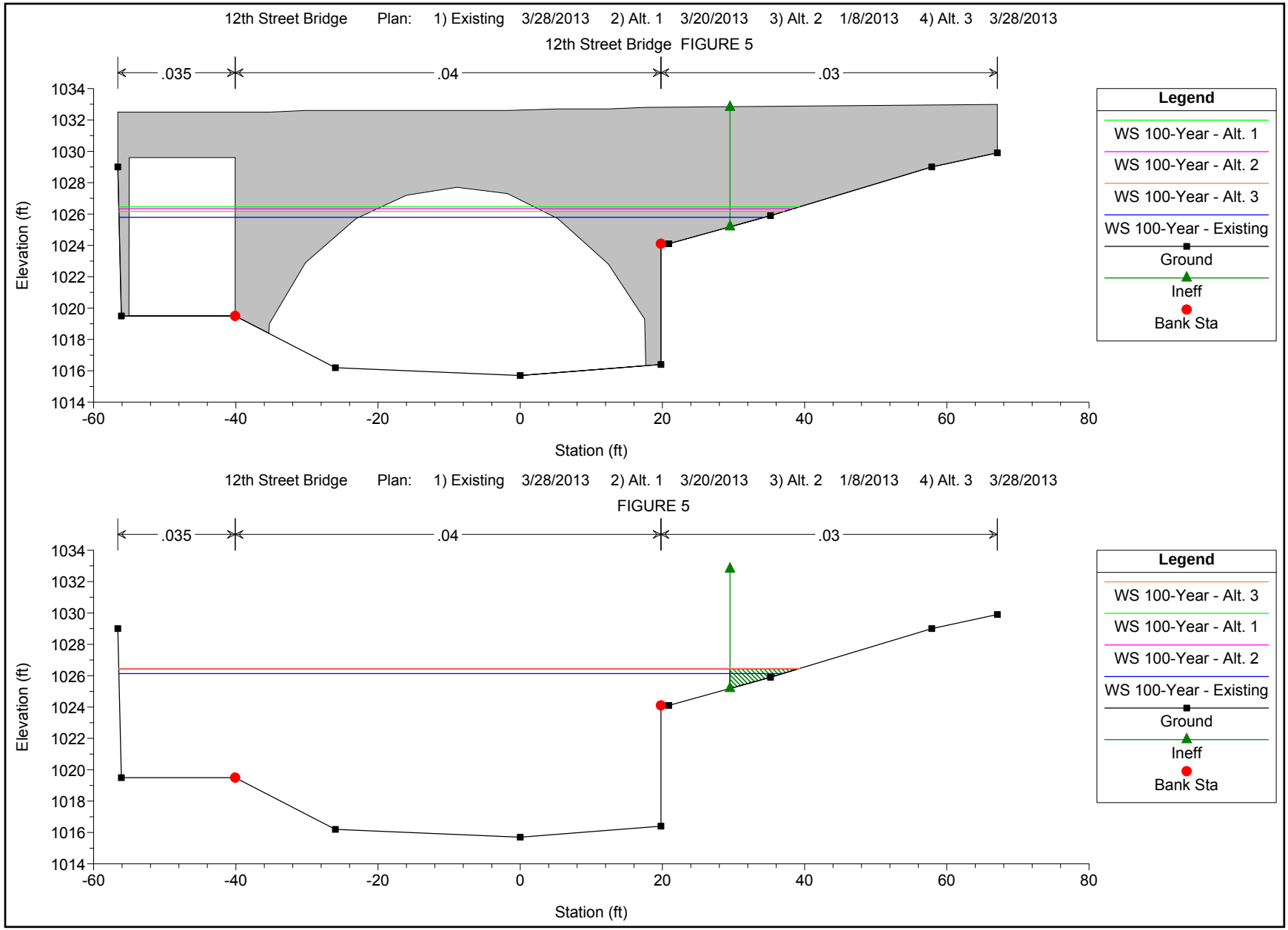
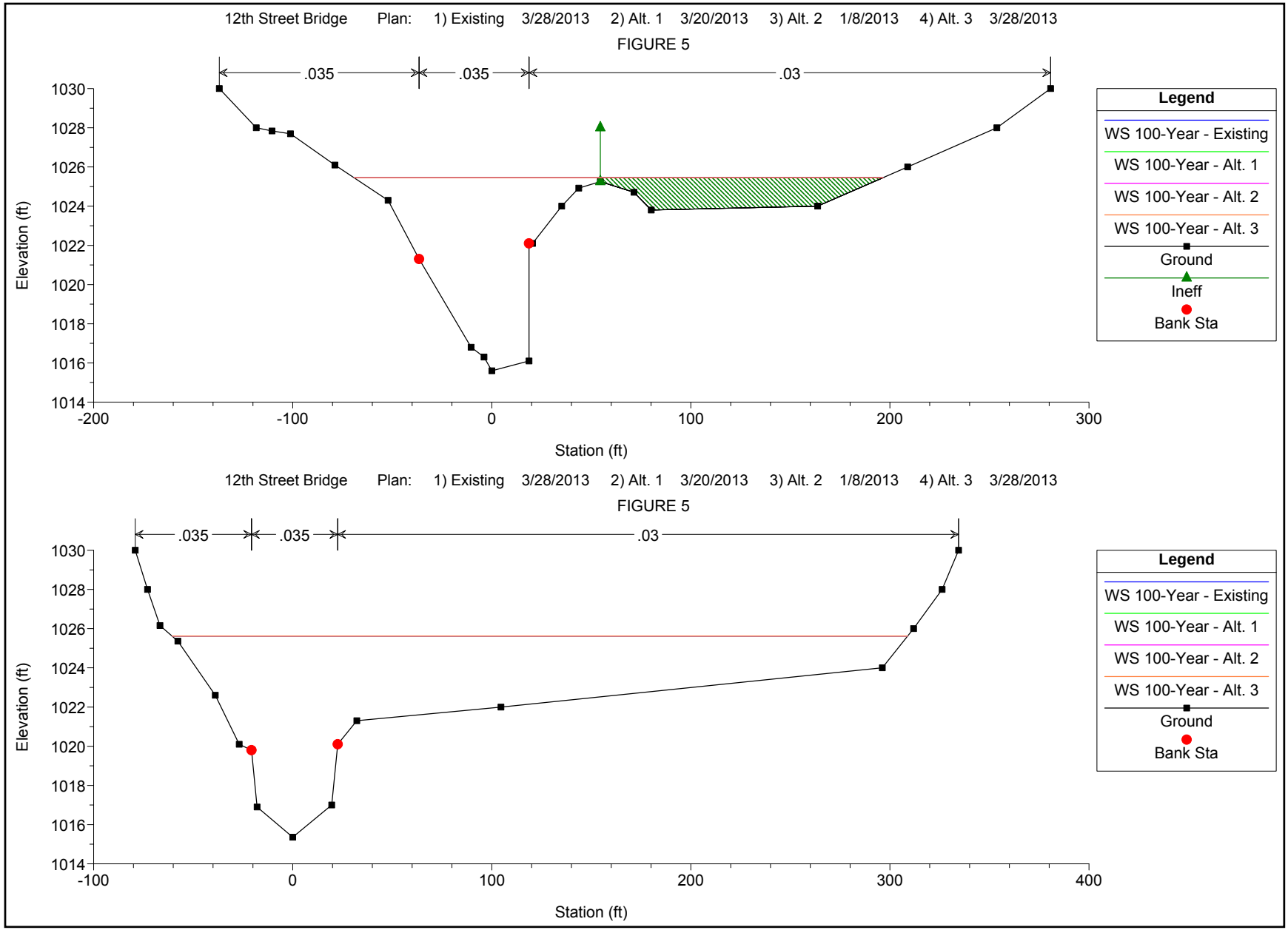
.035
Elevation (ft)
Station (ft)
Legend
WS 100-Year - Existing
WS 100-Year - Alt. 2
WS 100-Year - Alt. 3
WS 100-Year - Alt. 1
Ground
Ineff
Bank Sta


12th Street Bridge Plan: 1) Existing 3/28/2013 2) Alt. 1 3/20/2013 3) Alt. 2 1/8/2013 4) Alt. 3 3/28/2013
Pedestrian Bridge FIGURE 5
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS 100-Year - Existing
WS 100-Year - Alt. 2
WS 100-Year - Alt. 3
WS 100-Year - Alt. 1
Ground
Ineff
Bank Sta
12th Street Bridge Plan: 1) Existing 3/28/2013 2) Alt. 1 3/20/2013 3) Alt. 2 1/8/2013 4) Alt. 3 3/28/2013
Pedestrian Bridge FIGURE 5
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS 100-Year - Existing
WS 100-Year - Alt. 2
WS 100-Year - Alt. 3
WS 100-Year - Alt. 1
Ground
Ineff
Bank Sta


12th Street Bridge Plan: 1) Existing 3/28/2013 2) Alt. 1 3/20/2013 3) Alt. 2 1/8/2013 4) Alt. 3 3/28/2013
FIGURE 5
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS 100-Year - Existing
WS 100-Year - Alt. 2
WS 100-Year - Alt. 3
WS 100-Year - Alt. 1
Ground
Ineff
Bank Sta
12th Street Bridge Plan: 1) Existing 3/28/2013 2) Alt. 1 3/20/2013 3) Alt. 2 1/8/2013 4) Alt. 3 3/28/2013
FIGURE 5
.035
.035
.035
Elevation (ft)
Station (ft)
Legend
WS 100-Year - Existing
WS 100-Year - Alt. 2
WS 100-Year - Alt. 3
WS 100-Year - Alt. 1
Ground
Ineff
Bank Sta


12th Street Bridge Plan: 1) Existing 3/28/2013 2) Alt. 1 3/20/2013 3) Alt. 2 1/8/2013 4) Alt. 3 3/28/2013
FIGURE 5
.035
.035
.035
Elevation (ft)
1034
1032
1030
1028
1026
1024
1022
1020
1018
1016
-250
-200
-150
-100
-50
0
50
100
Station (ft)
Legend
WS 100-Year - Existing
WS 100-Year - Alt. 2
WS 100-Year - Alt. 3
WS 100-Year - Alt. 1
Ground
Ineff
Bank Sta
12th Street Bridge Plan: 1) Existing 3/28/2013 2) Alt. 1 3/20/2013 3) Alt. 2 1/8/2013 4) Alt. 3 3/28/2013
12th Street Bridge FIGURE 5
.035
.035
.035
Elevation (ft)
1034
1032
1030
1028
1026
1024
1022
1020
1018
1016
-250
-200
-150
-100
-50
0
50
100
Station (ft)
Legend
WS 100-Year - Alt. 2
WS 100-Year - Alt. 3
WS 100-Year - Alt. 1
WS 100-Year - Existing
Ground
Ineff
Bank Sta


12th Street Bridge Plan: 1) Existing 3/28/2013 2) Alt. 1 3/20/2013 3) Alt. 2 1/8/2013 4) Alt. 3 3/28/2013
12th Street Bridge FIGURE 5
.035
.04
.03
Elevation (ft)
Station (ft)
Legend
WS 100-Year - Alt. 1
WS 100-Year - Alt. 2
WS 100-Year - Alt. 3
WS 100-Year - Existing
Ground
Ineff
Bank Sta
12th Street Bridge Plan: 1) Existing 3/28/2013 2) Alt. 1 3/20/2013 3) Alt. 2 1/8/2013 4) Alt. 3 3/28/2013
FIGURE 5
.035
.04
.03
Elevation (ft)
Station (ft)
Legend
WS 100-Year - Alt. 3
WS 100-Year - Alt. 1
WS 100-Year - Alt. 2
WS 100-Year - Existing
Ground
Ineff
Bank Sta

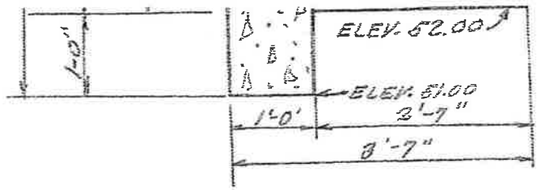

12th Street Bridge Plan: 1) Existing 3/28/2013 2) Alt. 1 3/20/2013 3) Alt. 2 1/8/2013 4) Alt. 3 3/28/2013
FIGURE 5
.035
.035
.03
Elevation (ft)
Station (ft)
Legend
WS 100-Year - Existing
WS 100-Year - Alt. 1
WS 100-Year - Alt. 2
WS 100-Year - Alt. 3
Ground
Ineff
Bank Sta
12th Street Bridge Plan: 1) Existing 3/28/2013 2) Alt. 1 3/20/2013 3) Alt. 2 1/8/2013 4) Alt. 3 3/28/2013
FIGURE 5
.035
.035
.03
Elevation (ft)
Station (ft)
Legend
WS 100-Year - Existing
WS 100-Year - Alt. 1
WS 100-Year - Alt. 2
WS 100-Year - Alt. 3
Ground
Bank Sta

HEC-RAS River: Nimishillen Cree Reach: West Branch Profile: 25-Year

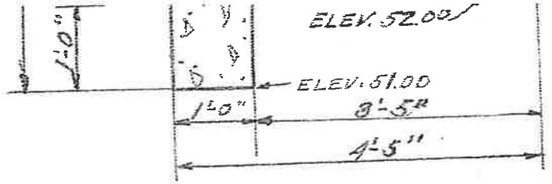
Reach	River Sta	Profile	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
West Branch	70	25-Year	Existing	3099.00	1016.40	1027.57		1027.64	0.000229	2.88	1721.65	430.47	0.16
West Branch	70	25-Year	Alt. 1	3099.00	1016.40	1026.99		1027.09	0.000348	3.41	1475.17	416.59	0.20
West Branch	70	25-Year	Alt. 2	3099.00	1016.40	1027.62		1027.69	0.000221	2.84	1743.86	431.69	0.16
West Branch	70	25-Year	Alt. 3	3099.00	1016.40	1027.27		1027.36	0.000283	3.14	1593.82	423.38	0.18
West Branch	60	25-Year	Existing	3099.00	1016.00	1027.26	1021.86	1027.53	0.000577	4.47	828.64	426.27	0.26
West Branch	60	25-Year	Alt. 1	3099.00	1016.00	1026.60	1021.86	1026.94	0.000764	4.90	731.45	383.29	0.29
West Branch	60	25-Year	Alt. 2	3099.00	1016.00	1027.31	1021.86	1027.59	0.000564	4.43	838.03	430.93	0.25
West Branch	60	25-Year	Alt. 3	3099.00	1016.00	1026.93	1021.86	1027.23	0.000661	4.67	777.39	400.36	0.27
West Branch	55			Bridge									
West Branch	50	25-Year	Existing	3099.00	1016.30	1026.71	1022.39	1027.05	0.000789	4.96	725.70	287.54	0.30
West Branch	50	25-Year	Alt. 1	3099.00	1016.30	1025.96	1022.39	1026.40	0.001139	5.62	631.99	268.06	0.35
West Branch	50	25-Year	Alt. 2	3099.00	1016.30	1026.78	1022.39	1027.11	0.000764	4.91	734.72	289.21	0.29
West Branch	50	25-Year	Alt. 3	3099.00	1016.30	1026.32	1022.39	1026.70	0.000952	5.29	676.11	277.68	0.32
West Branch	40	25-Year	Existing	3099.00	1017.00	1026.61	1022.52	1027.02	0.000980	5.44	661.87	202.84	0.33
West Branch	40	25-Year	Alt. 1	3099.00	1017.00	1025.80	1022.52	1026.35	0.001452	6.21	566.79	181.72	0.39
West Branch	40	25-Year	Alt. 2	3099.00	1017.00	1026.68	1022.52	1027.08	0.000947	5.38	671.07	204.80	0.32
West Branch	40	25-Year	Alt. 3	3099.00	1017.00	1026.19	1022.52	1026.67	0.001198	5.82	611.45	191.76	0.36
West Branch	30	25-Year	Existing	3099.00	1016.70	1026.54	1022.18	1026.98	0.000998	5.48	601.51	100.31	0.33
West Branch	30	25-Year	Alt. 1	3099.00	1016.70	1025.89	1021.05	1026.21	0.000762	4.57	678.31	92.42	0.28
West Branch	30	25-Year	Alt. 2	3099.00	1016.70	1026.72	1021.15	1027.00	0.000581	4.25	730.64	102.53	0.25
West Branch	30	25-Year	Alt. 3	3099.00	1016.70	1026.25	1021.43	1026.56	0.000649	4.54	718.13	100.54	0.27
West Branch	25			Bridge									
West Branch	20	25-Year	Existing	3099.00	1015.70	1025.45	1021.06	1026.04	0.001947	6.17	510.83	75.15	0.37
West Branch	20	25-Year	Alt. 1	3099.00	1015.70	1025.66	1020.51	1026.02	0.001163	4.85	646.11	83.94	0.28
West Branch	20	25-Year	Alt. 2	3099.00	1015.70	1025.63	1020.67	1026.03	0.001280	5.05	619.63	82.77	0.30
West Branch	20	25-Year	Alt. 3	3099.00	1015.70	1025.66	1020.88	1026.01	0.001063	4.90	662.80	89.71	0.28
West Branch	10	25-Year	Existing	3099.00	1015.60	1024.94	1022.11	1025.67	0.002157	7.01	487.04	227.14	0.45
West Branch	10	25-Year	Alt. 1	3099.00	1015.60	1024.94	1022.11	1025.67	0.002157	7.01	487.04	227.14	0.45
West Branch	10	25-Year	Alt. 2	3099.00	1015.60	1024.94	1022.11	1025.67	0.002157	7.01	487.04	227.14	0.45
West Branch	10	25-Year	Alt. 3	3099.00	1015.60	1024.94	1022.11	1025.67	0.002157	7.01	487.04	227.14	0.45
West Branch	1	25-Year	Existing	3099.00	1015.36	1024.94	1022.73	1025.10	0.000601	4.15	1112.12	358.35	0.25
West Branch	1	25-Year	Alt. 1	3099.00	1015.36	1024.94	1022.73	1025.10	0.000601	4.15	1112.12	358.35	0.25
West Branch	1	25-Year	Alt. 2	3099.00	1015.36	1024.94	1022.73	1025.10	0.000601	4.15	1112.12	358.35	0.25
West Branch	1	25-Year	Alt. 3	3099.00	1015.36	1024.94	1022.73	1025.10	0.000601	4.15	1112.12	358.35	0.25

HEC-RAS River: Nimishillen Cree Reach: West Branch Profile: 100-Year

Reach	River Sta	Profile	Plan	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
				(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
West Branch	70	100-Year	Existing	4100.00	1016.40	1029.06		1029.12	0.000160	2.64	2388.99	463.13	0.14
West Branch	70	100-Year	Alt. 1	4100.00	1016.40	1028.39		1028.47	0.000236	3.08	2082.82	448.92	0.17
West Branch	70	100-Year	Alt. 2	4100.00	1016.40	1028.66		1028.73	0.000201	2.89	2203.37	454.57	0.15
West Branch	70	100-Year	Alt. 3	4100.00	1016.40	1028.60		1028.67	0.000208	2.93	2177.27	453.35	0.16
West Branch	60	100-Year	Existing	4100.00	1016.00	1028.74	1022.92	1029.03	0.000531	4.72	1110.48	517.84	0.25
West Branch	60	100-Year	Alt. 1	4100.00	1016.00	1027.96	1022.92	1028.34	0.000748	5.33	952.85	462.20	0.29
West Branch	60	100-Year	Alt. 2	4100.00	1016.00	1028.27	1022.92	1028.62	0.000653	5.08	1013.30	475.77	0.28
West Branch	60	100-Year	Alt. 3	4100.00	1016.00	1028.21	1022.92	1028.56	0.000672	5.13	1000.11	472.87	0.28
West Branch	55			Bridge									
West Branch	50	100-Year	Existing	4100.00	1016.30	1028.40	1023.45	1028.77	0.000706	5.28	974.53	374.34	0.29
West Branch	50	100-Year	Alt. 1	4100.00	1016.30	1026.90	1023.45	1027.45	0.001267	6.38	749.74	291.98	0.38
West Branch	50	100-Year	Alt. 2	4100.00	1016.30	1027.69	1023.45	1028.13	0.000919	5.74	857.96	320.45	0.32
West Branch	50	100-Year	Alt. 3	4100.00	1016.30	1027.52	1023.45	1027.98	0.000982	5.87	833.32	313.60	0.33
West Branch	40	100-Year	Existing	4100.00	1017.00	1028.35	1023.57	1028.74	0.000776	5.47	892.39	258.02	0.30
West Branch	40	100-Year	Alt. 1	4100.00	1017.00	1026.70	1023.57	1027.40	0.001641	7.10	673.67	205.35	0.42
West Branch	40	100-Year	Alt. 2	4100.00	1017.00	1027.57	1023.57	1028.09	0.001111	6.22	788.19	230.77	0.35
West Branch	40	100-Year	Alt. 3	4100.00	1017.00	1027.39	1023.57	1027.94	0.001201	6.38	763.18	224.36	0.37
West Branch	30	100-Year	Existing	4100.00	1016.70	1028.18	1023.18	1028.69	0.000920	5.90	736.16	118.73	0.32
West Branch	30	100-Year	Alt. 1	4100.00	1016.70	1026.78	1021.79	1027.24	0.000949	5.45	753.16	103.13	0.32
West Branch	30	100-Year	Alt. 2	4100.00	1016.70	1027.60	1021.93	1028.01	0.000740	5.11	808.15	111.31	0.29
West Branch	30	100-Year	Alt. 3	4100.00	1016.70	1027.43	1022.14	1027.85	0.000747	5.30	821.33	109.58	0.30
West Branch	25			Bridge									
West Branch	20	100-Year	Existing	4100.00	1015.70	1026.13	1022.08	1026.99	0.002585	7.49	565.18	82.95	0.43
West Branch	20	100-Year	Alt. 1	4100.00	1015.70	1026.46	1021.33	1026.98	0.001532	5.85	710.02	90.04	0.33
West Branch	20	100-Year	Alt. 2	4100.00	1015.70	1026.42	1021.51	1026.99	0.001682	6.09	681.94	89.11	0.35
West Branch	20	100-Year	Alt. 3	4100.00	1015.70	1026.46	1021.66	1026.97	0.001376	5.89	731.61	95.76	0.33
West Branch	10	100-Year	Existing	4100.00	1015.60	1025.45	1023.23	1026.50	0.002905	8.50	546.67	265.79	0.53
West Branch	10	100-Year	Alt. 1	4100.00	1015.60	1025.45	1023.23	1026.50	0.002905	8.50	546.67	265.79	0.53
West Branch	10	100-Year	Alt. 2	4100.00	1015.60	1025.45	1023.23	1026.50	0.002905	8.50	546.67	265.79	0.53
West Branch	10	100-Year	Alt. 3	4100.00	1015.60	1025.45	1023.23	1026.50	0.002905	8.50	546.67	265.79	0.53
West Branch	1	100-Year	Existing	4100.00	1015.36	1025.62	1023.45	1025.80	0.000600	4.37	1360.98	369.54	0.25
West Branch	1	100-Year	Alt. 1	4100.00	1015.36	1025.62	1023.45	1025.80	0.000600	4.37	1360.98	369.54	0.25
West Branch	1	100-Year	Alt. 2	4100.00	1015.36	1025.62	1023.45	1025.80	0.000600	4.37	1360.98	369.54	0.25
West Branch	1	100-Year	Alt. 3	4100.00	1015.36	1025.62	1023.45	1025.80	0.000600	4.37	1360.98	369.54	0.25

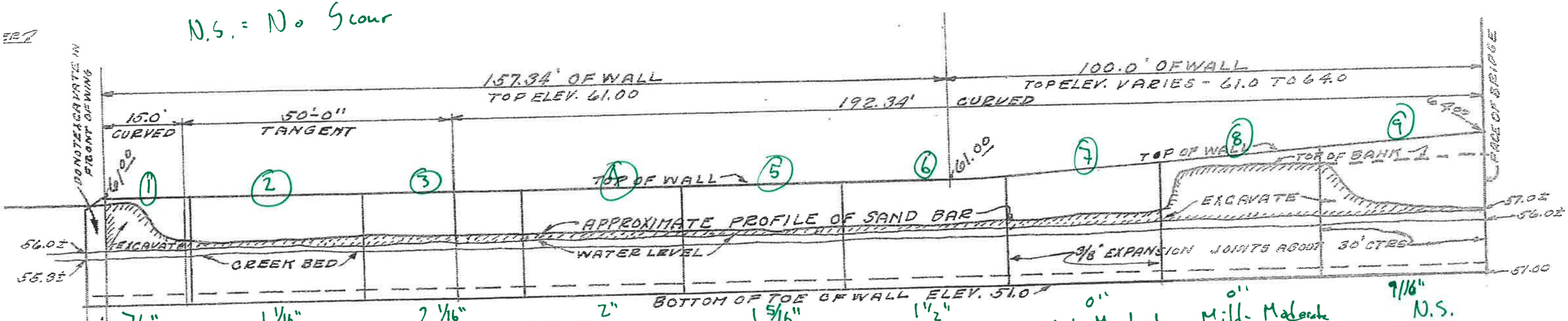


TYPICAL WALL SECTION
FROM - 100.0 SOUTH OF BRIDGE
SOUTH - 157.34± TO END OF WALL.
SCALE 1/2"=1'-0"

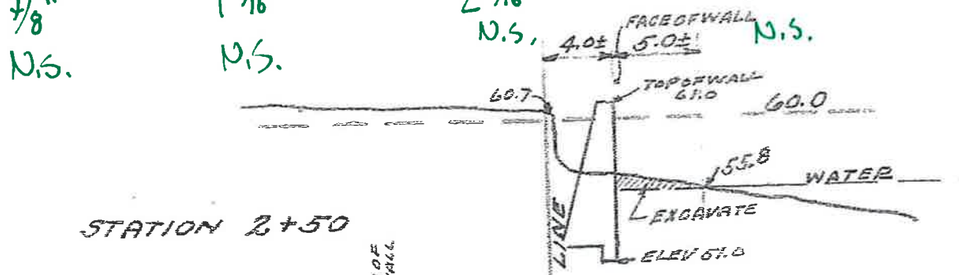


MAXIMUM WALL SECTION
AT FACE OF BRIDGE
WALL SLOPES TO TYPICAL
WALL SECTION - 100.0 SOUTH
SCALE 1/2"=1'-0"

N.S. = No Scour



PROFILE OF WALL
SCALES { HOBZ. 1"=20'-0"
VERT. 1"=10'-0"

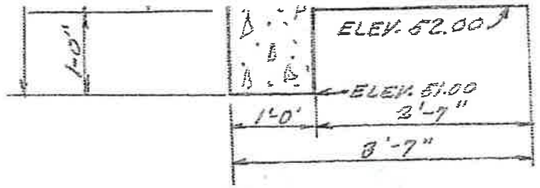


FIELD ENG'RS FILL OUT
BY _____

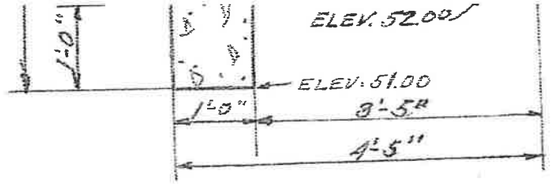
WEST BRANCH NIMISHILLEN CREEK RETAINING WALL SOUTH OF 12TH S.T. N.W. BRIDGE.

WEST BANK OF CREEK
OFFICE OF CITY CIVIL ENGINEER.
CANTON OHIO
SEPT. 9 - 1929
SCALES AS SHOWN.

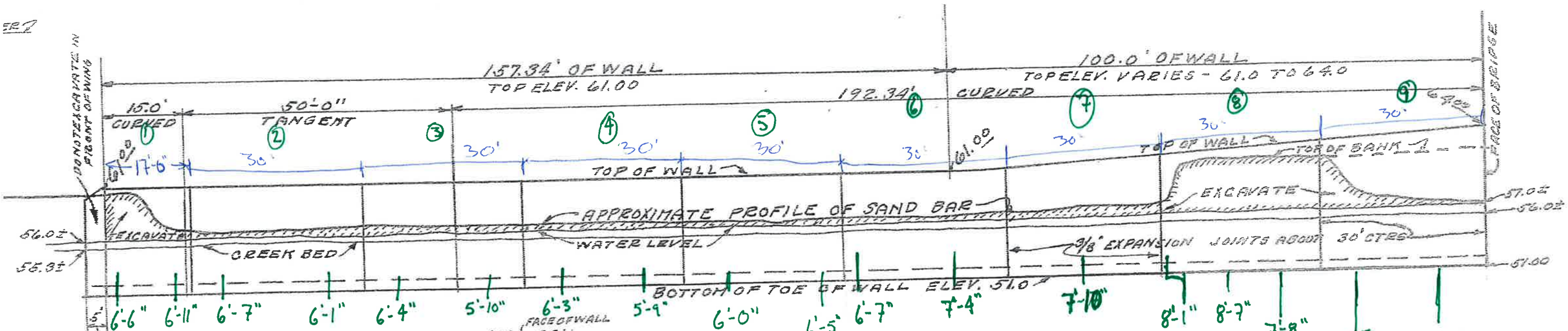
CONSEC. No 287



TYPICAL WALL SECTION
FROM - 100.0 SOUTH OF BRIDGE
SOUTH - 157.34± TO END OF WALL.
SCALE 1/2"=1'-0"

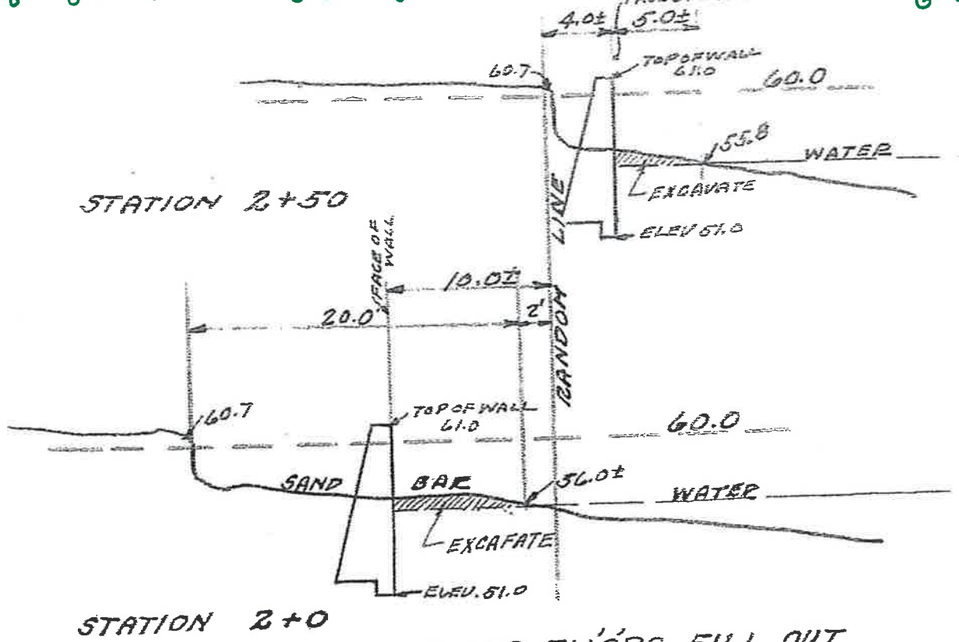


MAXIMUM WALL SECTION
AT FACE OF BRIDGE
WALL SLOPES TO TYPICAL
WALL SECTION - 100.0 SOUTH
SCALE 1/2"=1'-0"



PROFILE OF WALL
SCALES { HORZ. 1"=20'-0"
VERT. 1"=10'-0"

Wall Ht Measured from Flow Line to Top of wall

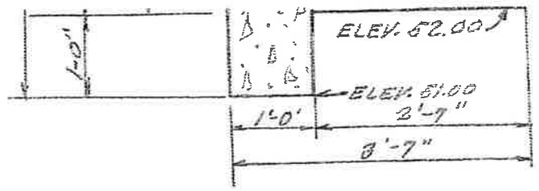


FIELD ENG'RS FILL OUT
BY _____

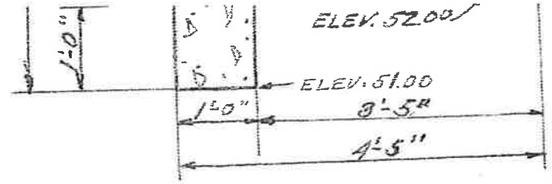
WEST BRANCH NIMISHILLEN CREEK
RETAINING WALL
SOUTH OF 12TH S.T. N.W. BRIDGE.

WEST BANK OF CREEK
OFFICE OF CITY CIVIL ENGINEER.
CANTON OHIO
SEPT. 9 - 1929
SCALES AS SHOWN.

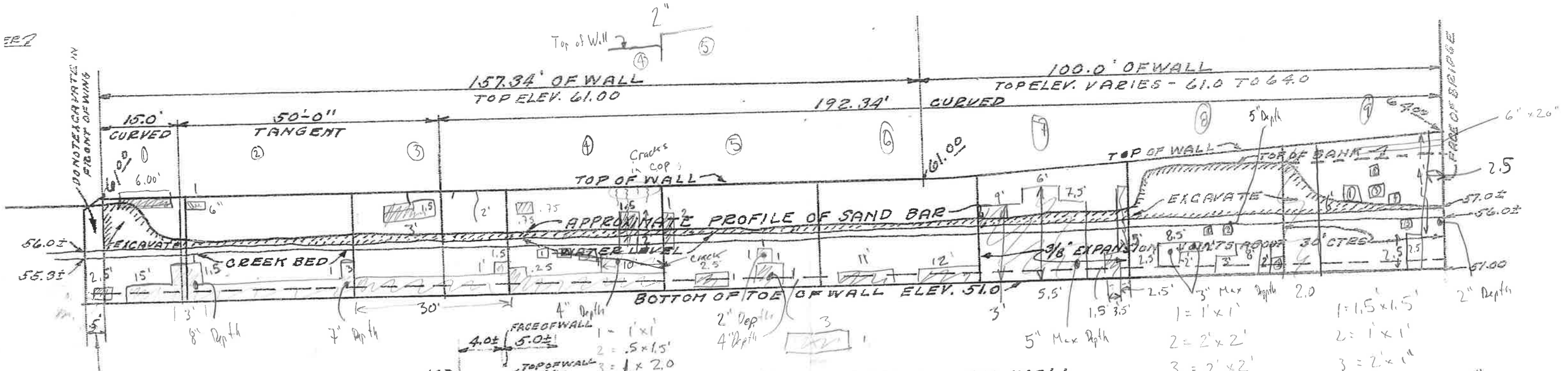
CONSEC. No 287



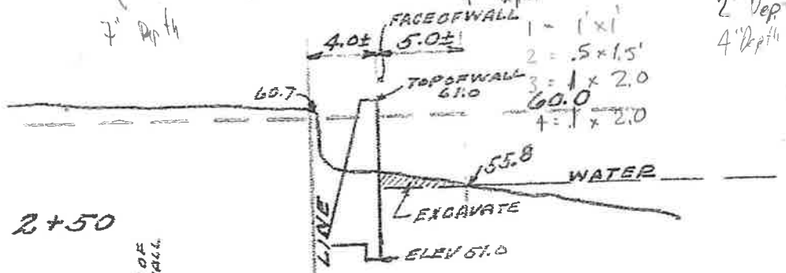
TYPICAL WALL SECTION
FROM - 100.0 SOUTH OF BRIDGE
SOUTH - 157.34'± TO END OF WALL.
SCALE 1/2"=1'-0"



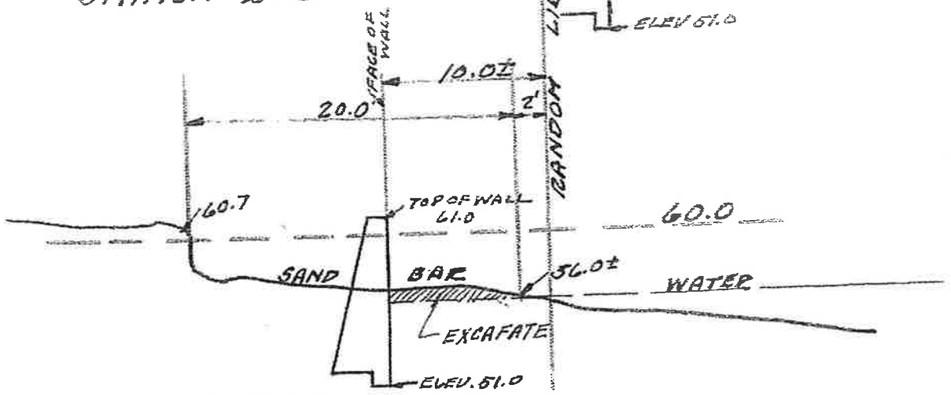
MAXIMUM WALL SECTION
AT FACE OF BRIDGE
WALL SLOPES TO TYPICAL
WALL SECTION - 100.0 SOUTH
SCALE 1/2"=1'-0"



PROFILE OF WALL
SCALES { HORZ. 1" = 20'-0"
VERT. 1" = 10'-0"



STATION 2+50



STATION 2+0

FIELD ENG'RS FILL OUT

DATE _____ BY _____

WEST BRANCH NIMISHILLEN CREEK RETAINING WALL SOUTH OF 12TH S.T. N.W. BRIDGE.

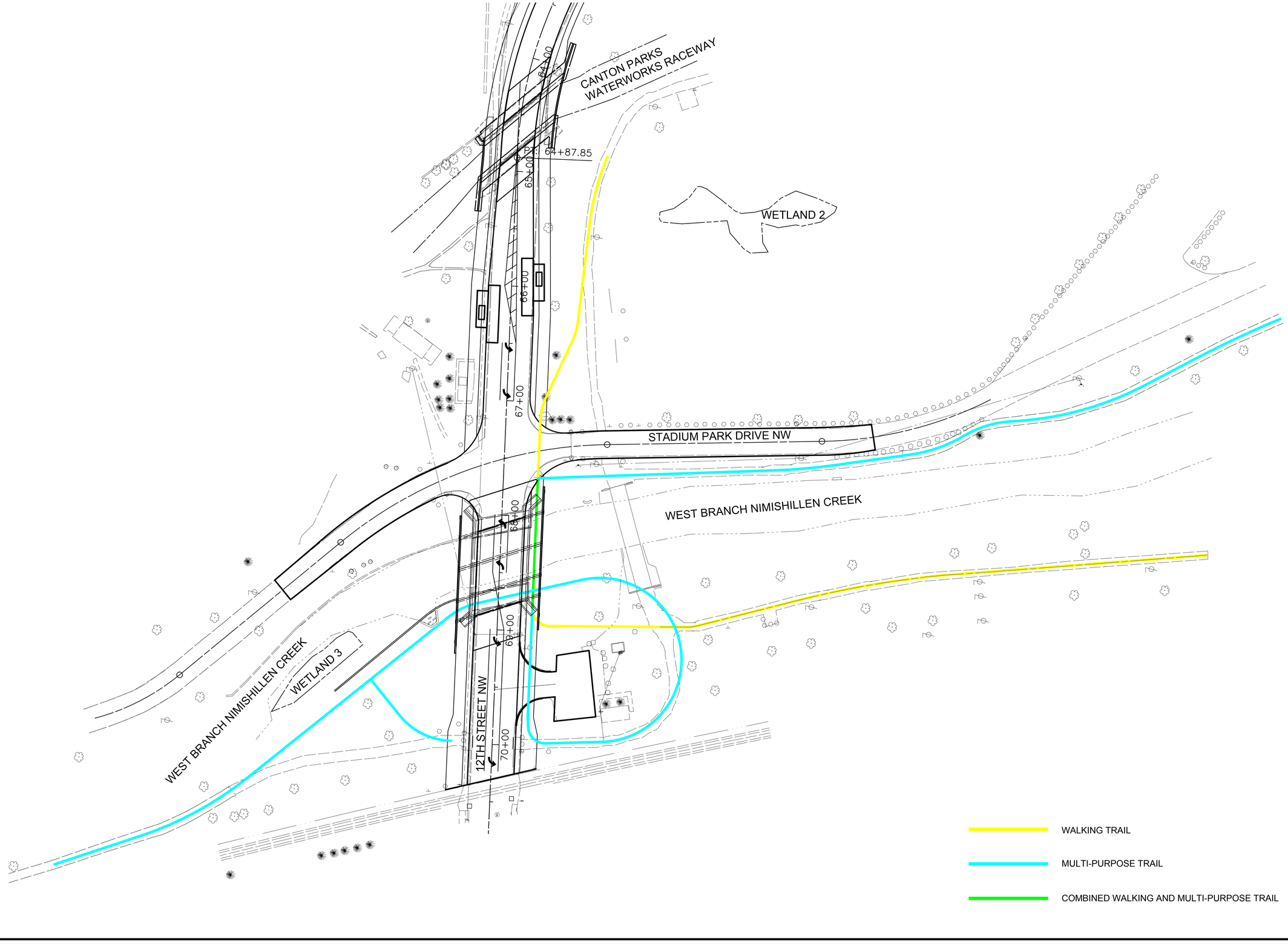
WEST BANK OF CREEK
OFFICE OF CITY CIVIL ENGINEER.
CANTON OHIO
SEPT. 9 - 1929
SCALES AS SHOWN.

CONSEC. No 2873

ARCADIS

Appendix E

Multi-Use Trail



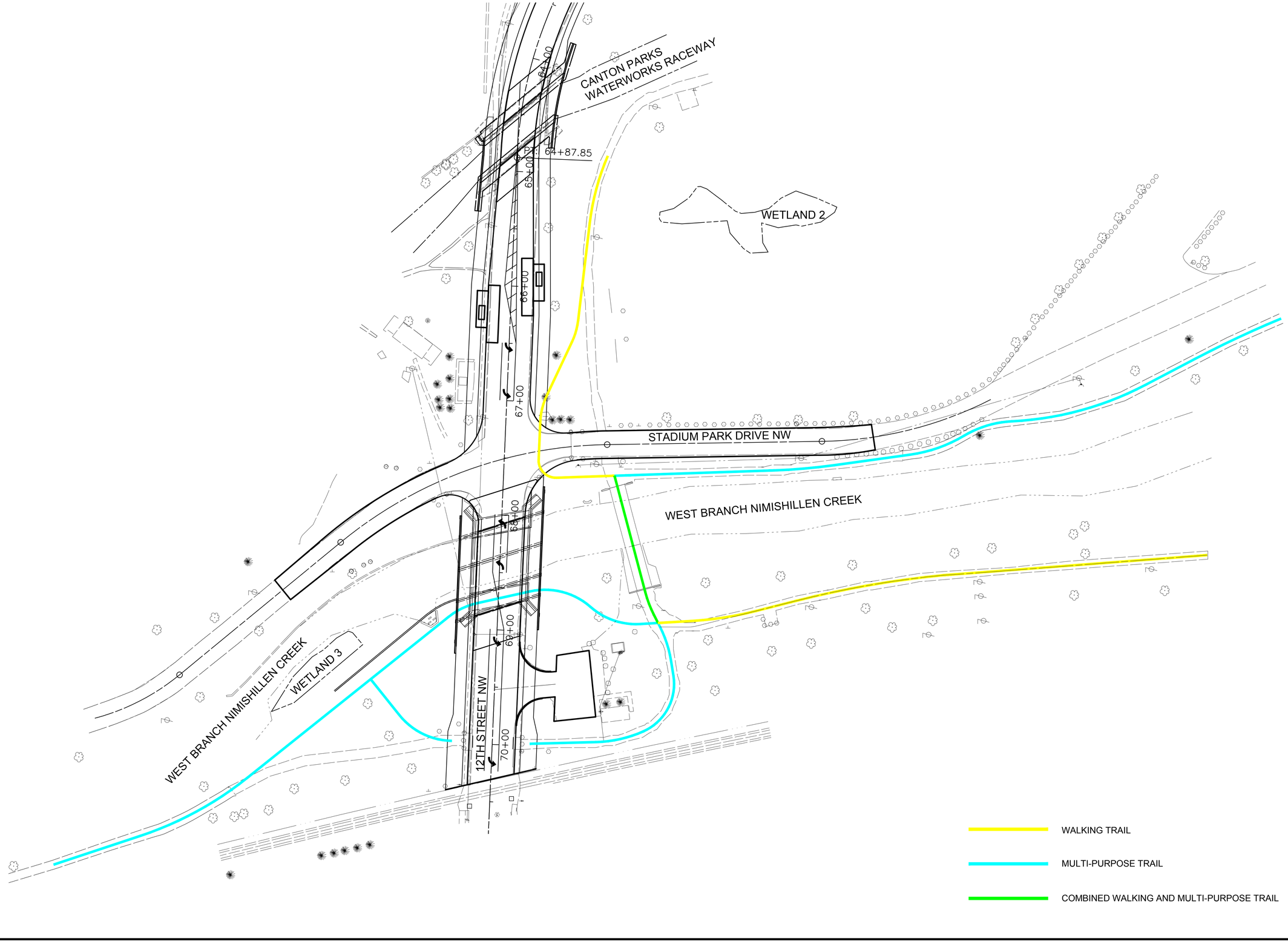
HORIZONTAL SCALE
1" = 40 FEET

MULTI-PURPOSE TRAIL - ALTERNATE 1

12TH ST.
RECONSTRUCTION

1

G:\Project\AK000315.R001\Drawing\Roadway\Sheets\AER Multi-Purpose.dwg; 4/05/13 - 9:19am; mbechter



HORIZONTAL SCALE
1" = 40 FEET

MULTI-PURPOSE TRAIL - ALTERNATE 2

12TH ST.
RECONSTRUCTION

1

G:\Project\AK000315.R001\Drawing\Roadway\Sheets\AER Multi-Purpose.dwg; 4/05/13 - 9:19am; mbechter

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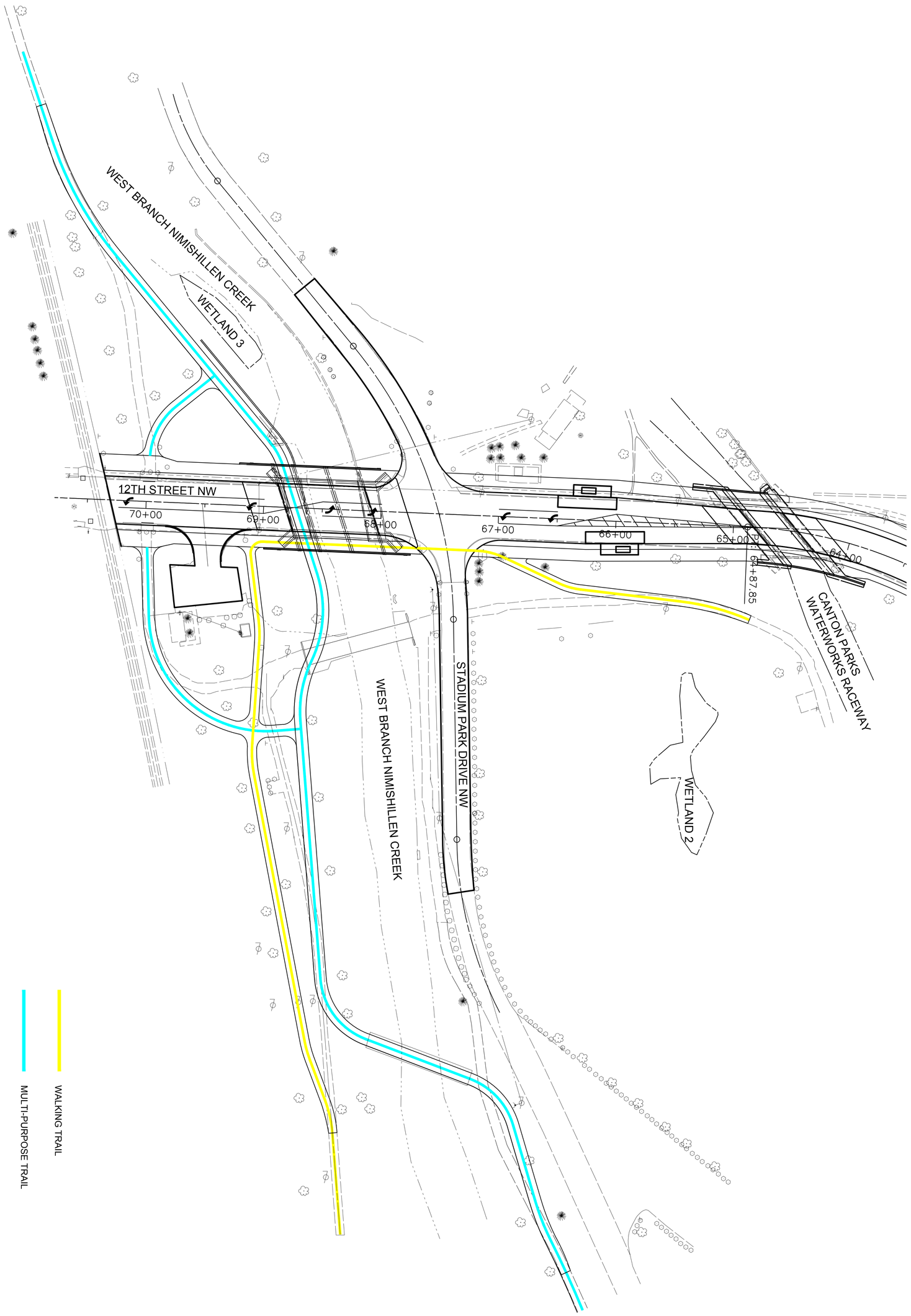


	12TH ST. RECONSTRUCTION	MULTI-PURPOSE TRAIL - ALTERNATE 3	0 20 40 80 HORIZONTAL SCALE 1" = 40 FEET

PID NO.: **90671**
JOB NO.: **AK000315**
STRUCTURE: **12th Street over Nimishillen Creek**

Design Criteria Matrix

PREPARATION DATE: **11/29/2012**
CONSULTANT: **ARCADIS**

Item	Engineering Design Feature	Criteria	Meet Criteria (YES/NO)			Reference
	Design Vehicle		**Alternate 1**	**Alternate 2**	**Alternate 3**	
1	Typical Speed, paved level terrain	8-15 mph	-	-	-	AASHTO 3.2
2	Typical Speed, downhill	20-30 mph	-	-	-	AASHTO 3.2
3	Typical Speed, uphill	5-12 mph	-	-	-	AASHTO 3.2
4	Typical Speed, roads	> 30 mph	-	-	-	AASHTO 3.2
5	Design Speed for grades < 2%	**18 mph**	-	-	-	AASHTO 5.2.4
6	Design Speed for grades > 6%	30 mph	-	-	-	AASHTO 5.2.4
	Shared Use Path					
1	Paved Width	10 ft - 14 ft	YES	YES	YES	AASHTO 5.2.1
2	Graded Shoulder Width	2 ft minimum, ideally 3 ft - 5 ft	YES	YES	YES	AASHTO 5.2.1
3	Graded Shoulder Slope	6H:1V	YES	YES	YES	AASHTO 5.2.1
4	Cross Slope w/o Crown (preferred for drainage and construction)	1% preferred, 2% maximum	YES	YES	YES	AASHTO 5.2.6
5	Center Crown Cross Slope	1% maximum	YES	YES	YES	AASHTO 5.2.6
6	Sign offset	2 ft from edge of graded shoulder	YES	YES	YES	AASHTO 5.2.1, MUTCD
7	"Smooth" features offset (bicycle railing or fence)	1 ft minimum from edge of graded shoulder	YES	YES	YES	AASHTO 5.2.1
8	Body of Water offset	5 ft from path to top of slope	YES, except under bridge	YES, except under bridge	YES, except under bridge	AASHTO 5.2.1
9	Vertical Clearance	8 ft minimum, 10 ft preferred	YES	YES	YES	AASHTO 5.2.1
10	Grade	5% maximum, 0.5% minimum	NO, 6.4%	NO, 7.4%	YES, except at ped. bridge	AASHTO 5.2.7
11	Minimum length of vertical curve for SSD	check for each crest curve	YES	NO, see calcs	YES, except at ped. bridge	AASHTO 5.2.8, Table 5-5
12	Minimum Radius 18 mph(use turn/curve warning sign if can't meet - W1 Series)	**60 ft**	YES	YES	YES	AASHTO Table 5-2
13	Horizontal Sight Distance	check for each curve	NO, see calcs	NO, see calcs	NO, see calcs	AASHTO 5.2.8, Table 5-6
14	Typical Section	6" minimum (surface & base courses)	YES	YES	YES	AASHTO 5.2.9

Design Assumptions:

1. AASHTO Bike Facilities Manual 2012
2. 25 ft. tangent lengths minimum between vertical curves
3. 18 mph design speed (no sustained grades over 5%)
4. sag curves don't affect stopping sight distance
5. Used crest vertical curve length requirements used 1999 AASHTO guide because equations in 2012 book are incorrect and don't match results in Figure 5-8. Note: The Tables in both guides are slightly different and not sure why since formulas are similar except for the typos in the 2012 version.
6. For crest curves the stopping sight distance in the descending direction (where G is negative) controls the design
7. Checked horizontal stopping sight distance graphically using AutoCad instead of using the horizonal sight offset calculations shown in the bike manual

PID NO.: **90671**
JOB NO.: **AK000315**
STRUCTURE: **12th Street over Nimishillen Creek**

Vertical Stopping Sight Distance Calculations

PREPARATION DATE: **12/13/2012**
CONSULTANT: **ARCADIS**

Alternative	PVI Station	V mph	f	G ft/ft	S ft	Grade In % (+/-)	Grade Out % (+/-)	A %	L (S>L) ft	L (S<L) ft	Comments
1	1+75	18	0.16	-0.0443	159	0.65	-4.43	5.08	142	143	Meets criteria
1	5+70	18	0.16	-0.0635	178	-1.81	-6.35	4.54	158	160	Meets criteria
2	1+75	18	0.16	-0.0432	159	0.65	-4.32	4.97	136	139	Meets criteria
2	5+30	18	0.16	-0.0743	192	1.75	-7.43	9.18	286	376	Doesn't meet criteria. Requires additional work to tie into existing trails.
3	2+50	18	0.16	-0.0388	155	0.79	-3.88	4.67	118	125	Meets criteria
3	7+15	18	0.16	-0.0438	159	1.32	-4.38	5.70	160	160	Meets criteria
3	9+87	18	0.16	-0.074	192	7.4	-7.4	14.80	322	604	Doesn't meet criteria because using existing pedestrian bridge.
3	5+05	18			200					273	Meets criteria (looking N&S from low point under bridge)

Minimum Stopping Sight Distance

S = stopping sight distance (ft)
V = velocity (mph)
f = coefficient of friction (use 0.16 for typical bike)
G = grade (ft/ft) (+ascend/-descend)

Length of Crest Vertical Curve to Provide Sight Distance

L = minimum length of vertical curve (ft)
A = algebraic grade difference (percent)
h_1 = eye height (4.5 ft for typical bicyclist)
h_2 = object height (0 ft)

PID NO.: **90671**
JOB NO.: **AK000315**
STRUCTURE: **12th Street over Nimishillen Creek**

Horizontal Stopping Sight Distance Calculations

PREPARATION DATE: **12/13/2012**
CONSULTANT: **ARCADIS**

Alternative	PI Station	V mph	f	G ft/ft	S required ft	*S actual ft	Comments
1	4+09.56	18	0.16	-0.0443	159	43	Doesn't meet criteria. (-4.43% slope heading north on the trail due to bridge)
1	-2+4.66	18	0.16	0.0635	114	136	Meets criteria. (6.35% slope heading north on the trail)
1	-2+4.66	18	0.16	-0.0635	178	100	Doesn't meet criteria. (-6.35% slope heading south on the trail due to bridge and building)
1	-2+4.66	18	0.16	-0.0181	142	96	Doesn't meet criteria. (1.81% slope heading south due to building)
1	4+09.56	18	0.16	0.0443	119	200	Meets criteria. (4.43% slope heading south on the trail)
2	4+09.56	18	0.16	-0.0432	159	43	Doesn't meet criteria. (-4.32% slope heading north on the trail due to bridge)
2	5+16.92	18	0.16	0.0743	112	66	Doesn't meet criteria. (7.43% slope heading north on the trail due to bridge)
2	5+16.92	18	0.16	-0.0743	192	90	Doesn't meet criteria. (-7.43% slope heading south due to bridge)
2	4+09.56	18	0.16	0.0432	119	100	Doesn't meet criteria. (4.32% slope heading south due to bridge)
3	4+09.56	18	0.16	-0.0388	155	60	Doesn't meet criteria. (-3.88% slope heading north on the trail due to bridge)
3	5+57.69	18	0.16	0.0438	119	148	Meets criteria. (4.38% slope heading north on the trail)
3	4+09.56	18	0.16	0.0388	120	110	Doesn't meet criteria. (3.88% slope heading south due to bridge)
3	5+57.69	18	0.16	-0.0438	159	172	Meets criteria. (-4.38% slope heading south on the trail)

S = stopping sight distance (ft)
* S actual is minimum using AutoCad

ARCADIS

Appendix F

Maintenance of Traffic (MOT)

ARCADIS U.S., Inc.
222 South Main Street
Suite 300
Akron
Ohio 44308
Tel 330 434 1995
Fax 330 374 1095

MEMO

To:
Kevin Kehres
Shelly Kendrick

Copies:
S. Gault

From:
Dan Jozity

Date:
January 8, 2013

ARCADIS Project No.:
AK000315.B001

Subject:
12th Street Bridge Rehabilitation
MOT Alternatives

Maintenance of Traffic Assessment

Part-Width Construction Maintaining Two-way Traffic

Maintaining two-way traffic would require 3 phases. The first phase would construct the north side of the roadway. Existing traffic would be pushed to the south side. The phase would construct the westbound lane(s), temporary pavement (in lieu of sidewalk and curb) and embankment. The second phase would construct the eastbound direction pavement while maintaining traffic on the completed permanent and temporary pavement. The last phase would construct the westbound direction curb and sidewalk, while maintaining traffic on the completed eastbound direction pavement. **Total construction duration: 16-18 months.**

- Pros
  - Maintain one lane of vehicular traffic in each direction (same as existing)
  - Maintain emergency vehicle access
  - Maintain some access to park
- Cons
  - Most expensive option due to the need for temporary pavement and embankment
  - Longest duration option
  - Pedestrian traffic would not be allowed during construction

- Temporary shoring costs
- Difficult to avoid the new railroad gates
- Extra phasing required for proposed 2-lane section on the hill

Part-Width Construction Maintaining One-way Traffic with partial Detour

Maintaining one-way traffic would be constructed half the roadway and/or bridge at a time. This concept would require 2 phases. The first phase would construct the north side of the roadway. Existing traffic would be pushed to the south side. The phase would construct the westbound lane(s) and minimal temporary pavement. The second phase would construct the eastbound direction pavement while maintaining traffic on the completed pavement. The other direction of travel would be detoured in each phase. A potential detour route would be I-77 to Fulton Avenue. **Total construction duration: 12-14 months.**

- Pros
  - Maintain partial vehicle access
  - Maintain partial emergency access
  - Maintain some access to park
  - Pedestrian traffic can be maintained
  - Minimal temporary pavement would be needed
  - Having only two phases would speed up construction
  - Less expensive option than maintaining two-way traffic
- Cons
  - Requires detour of one direction of travel
  - Emergency access is cut off from one direction
  - Temporary shoring is still required
  - Small amount of temporary pavement and embankment

Total Detour

Closing the roadway completed would require one phase of construction. A potential detour route would be I-77 to Fulton Avenue. **Total construction duration: 8-10 months.**

- Pros
  - Cheapest maintenance of traffic option
  - Requires no temporary pavement or shoring
  - Shortest duration
- Cons
  - No vehicle or emergency access
  - No pedestrian or park access

PID NO.: **Estimated Quantities**

JOB NO.: **AK000315**

STRUCTURE: **12th Street over Nimishillen Creek** **Part-Width Construction Maintaining Two-way Traffic**

ITEM	EXTENSION	TOTAL	UNIT	DESCRIPTION	Unit Cost	Cost
614			Lump	Maintaing Traffic	-	$ 390,000.00
614			Lump	Temporary Shoring		$ 210,000.00
614			Lump	Detour Signing		$ -
614			Lump	Workzone pavement markings		$ 18,000.00
615			Lump	Roads for Maintaining Traffic		$ 50,000.00
615		3,000	Sq. Yd.	Pavement for Maintaining Traffic, Class A	$ 40.00	$ 120,000.00
622		6,000	FT	Portable Concrete Barrier	$ 15.00	$ 90,000.00
622		400	FT	Portable Concrete Barrier, Bridge Mounted	$ 25.00	$ 10,000.00

Year 2012 Subtotal	**$888,000.00**
Additional Quantities, etc. @ 30%	**$266,400.00**
Inflation @ 3.5 to 2015	**$1,236,622.14**

PID NO.: **Estimated Quantities**

JOB NO.: **AK000315**

STRUCTURE: **12th Street over Nimishillen Creek** **Part-Width Construction Maintaining One-way Traffic**

ITEM	EXTENSION	TOTAL	UNIT	DESCRIPTION	Unit Cost	Cost
614			Lump	Maintaing Traffic	-	$ 234,000.00
614			Lump	Temporary Shoring		$ 200,000.00
614			Lump	Detour Signing		$ 15,000.00
614			Lump	Workzone pavement markings		$ 12,000.00
615			Lump	Roads for Maintaining Traffic		$ 10,000.00
615		300	Sq. Yd.	Pavement for Maintaining Traffic, Class A	$ 40.00	$ 12,000.00
622		4,000	FT	Portable Concrete Barrier	$ 15.00	$ 60,000.00
622		0	FT	Portable Concrete Barrier, Bridge Mounted	$ 25.00	$ -

Year 2012 Subtotal	**$543,000.00**
Additional Quantities, etc. @ 30%	**$162,900.00**
Inflation @ 3.5 to 2015	**$756,177.73**

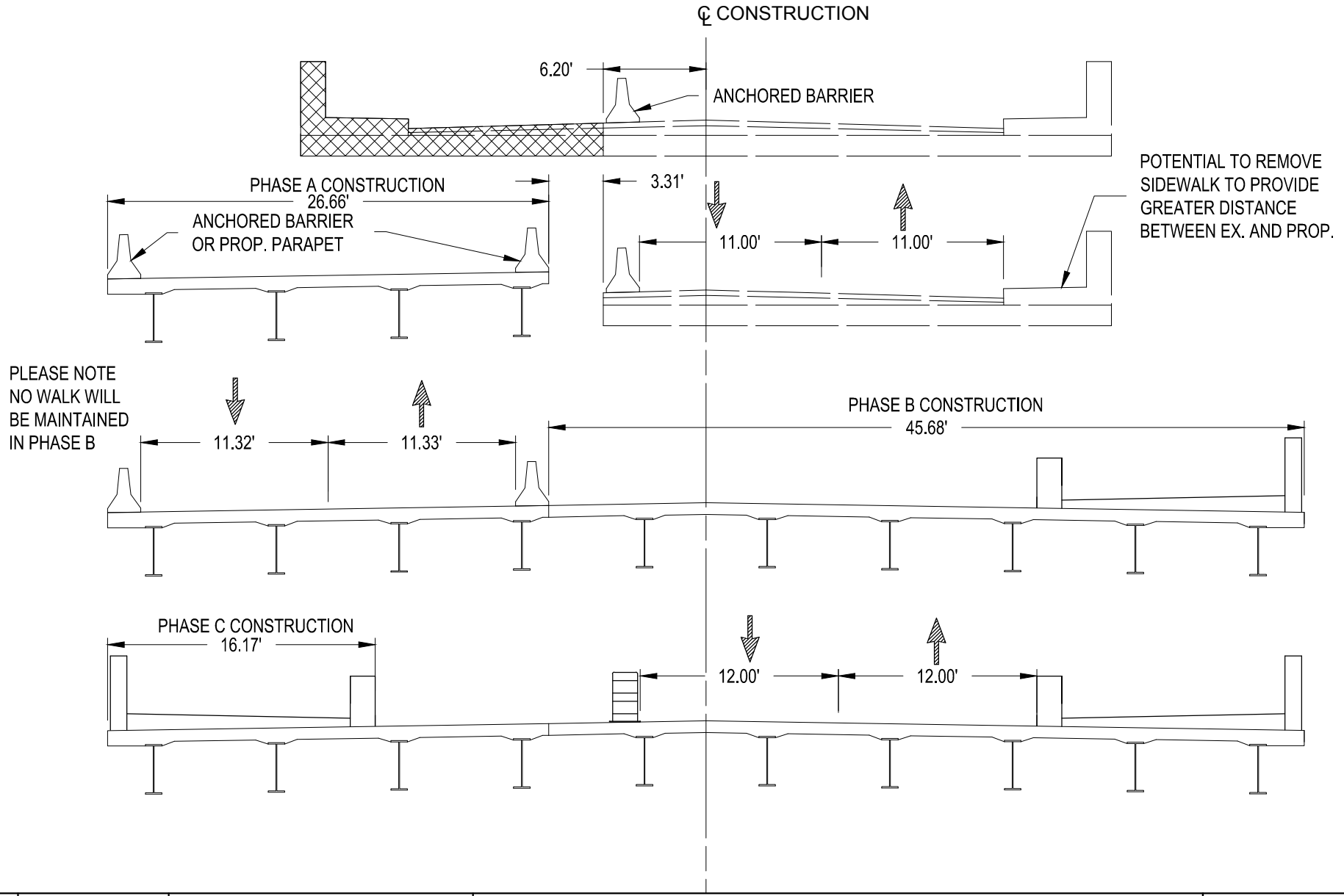
PID NO.: **Estimated Quantities**

JOB NO.: **AK000315**

STRUCTURE: **12th Street over Nimishillen Creek** **Total Detour**

ITEM	EXTENSION	TOTAL	UNIT	DESCRIPTION	Unit Cost	Cost
614			Lump	Maintaing Traffic	-	$ 117,000.00
614			Lump	Temporary Shoring		$ -
614			Lump	Detour Signing		$ 25,000.00
614			Lump	Workzone pavement markings		$ -
615			Lump	Roads for Maintaining Traffic		$ -
615		0	Sq. Yd.	Pavement for Maintaining Traffic, Class A	$ 40.00	$ -
622		0	FT	Portable Concrete Barrier	$ 15.00	$ -
622		0	FT	Portable Concrete Barrier, Bridge Mounted	$ 25.00	$ -

Year 2012 Subtotal	**$142,000.00**
Additional Quantities, etc. @ 30%	**$42,600.00**
Inflation @ 3.5 to 2015	**$197,748.14**



Project Manager	Kevin Kehres
Associate Project Manager	Shelly Kendrick
Task Manager	Dan Jozity
Technical Review	Phil Berdis

ARCADIS
222 South Main Street
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Akron, Ohio 44308
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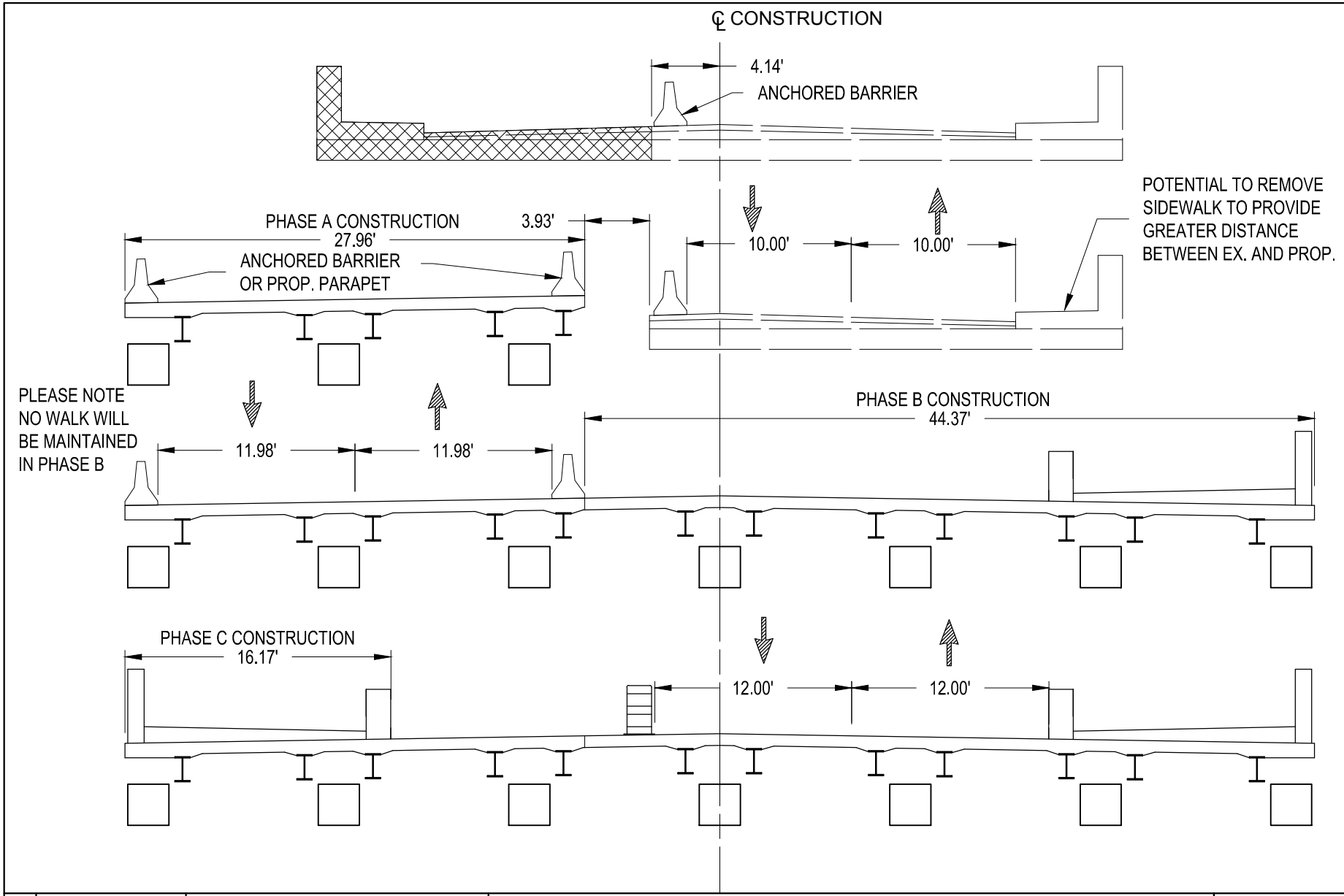
www.arcadis-us.com

City of Canton
12th Street Bridge Replacements

MOT Concept - Alternates 1 & 2
Part-width Construction
Maintaining Two-Way Traffic

Canton, Stark County, Ohio

Project Number	AK000315.B001
Drawing Date	12/20/12
Figure	1



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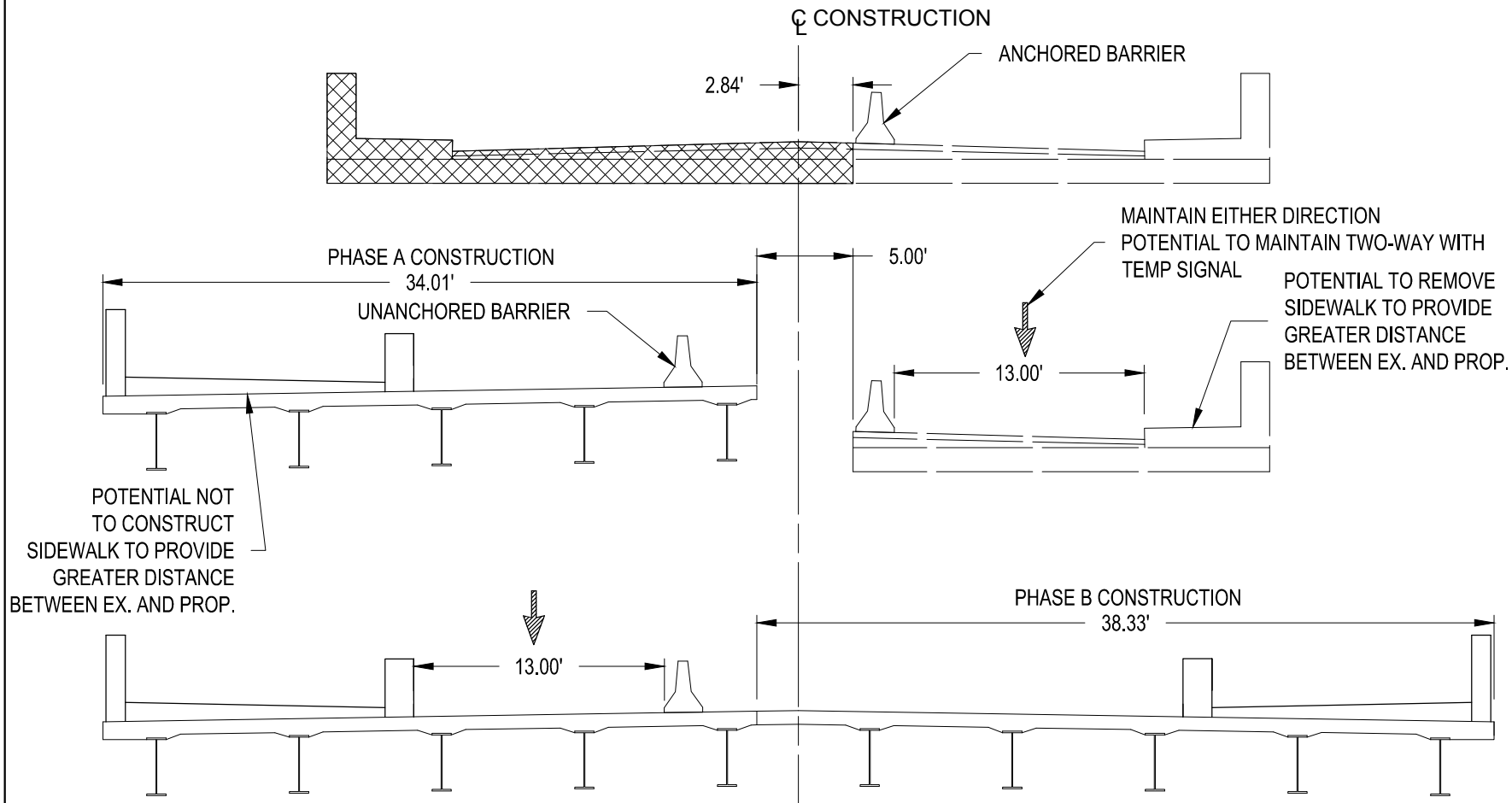
City of Canton
12th Street Bridge Replacements

MOT Concept - Alternate 3
Part-width Construction
Maintaining Two-Way Traffic

Canton, Stark County, Ohio

Project Number	AK000315.B001
Drawing Date	12/20/12
Figure	2



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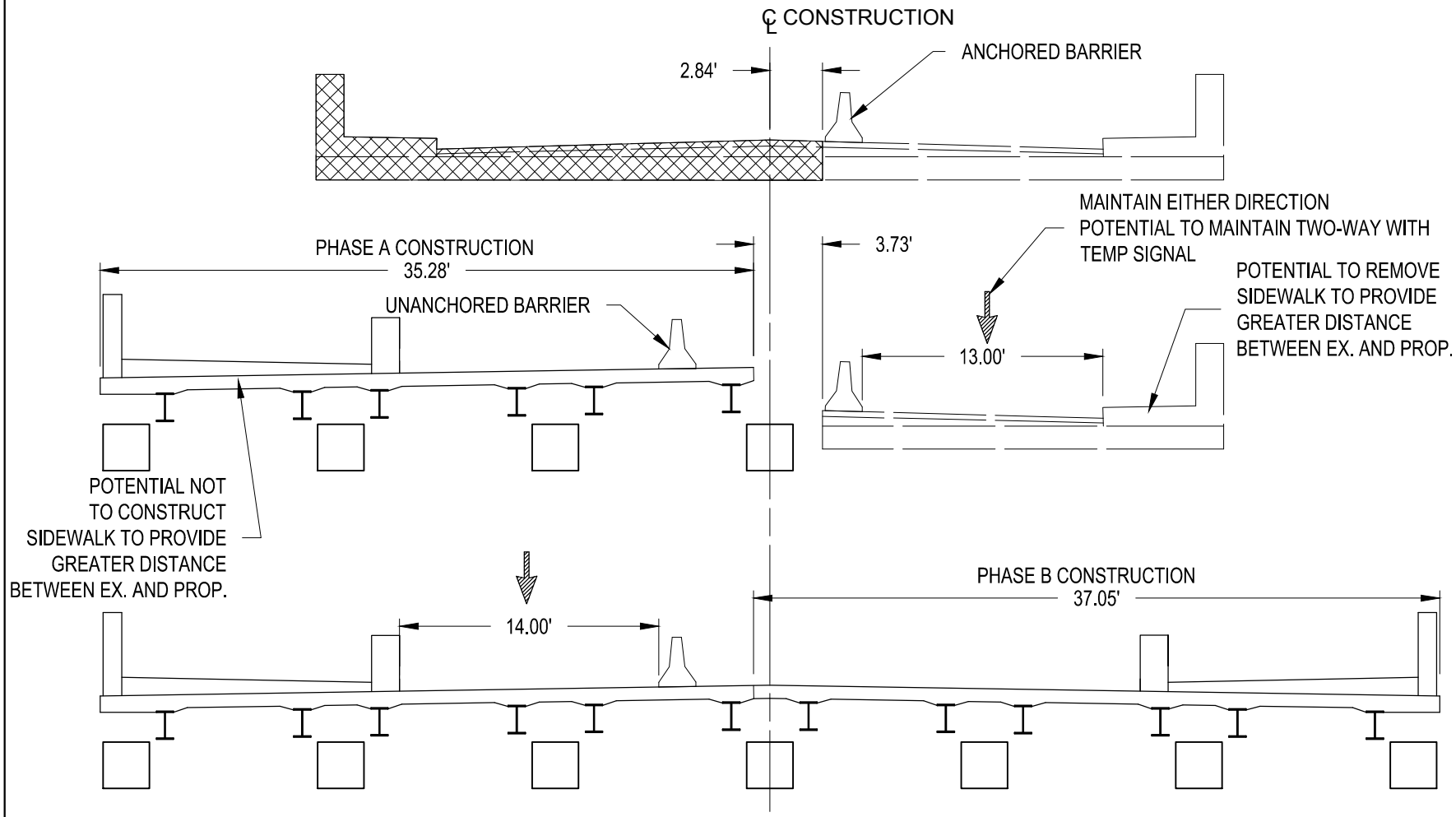
City of Canton
12th Street Bridge Replacements

MOT Concept - Alternates 1 & 2
Part-width Construction
Maintaining One-Way Traffic

Canton, Stark County, Ohio

Project Number	AK000315.B001
Drawing Date	12/20/12
Figure	3



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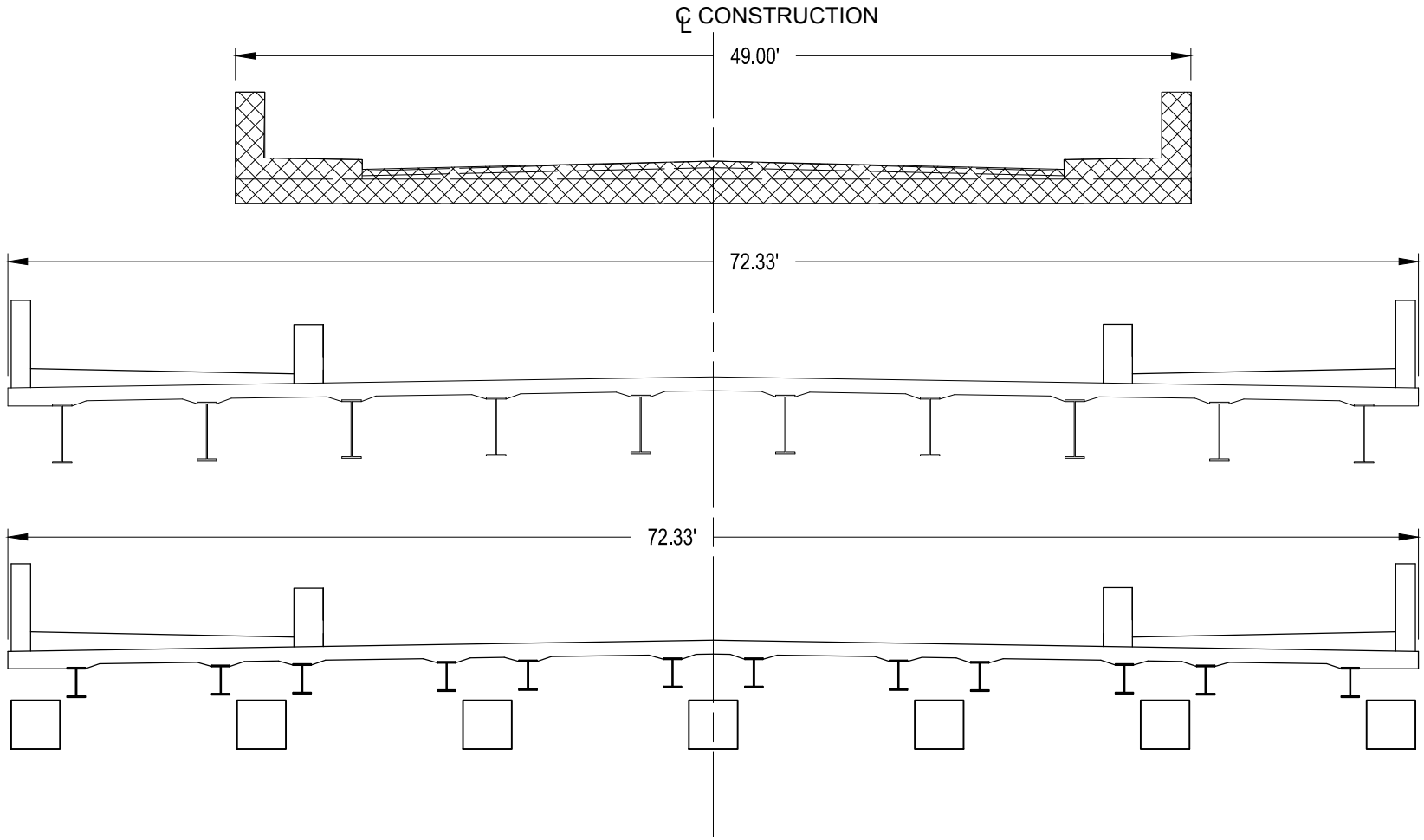
City of Canton
12th Street Bridge Replacements

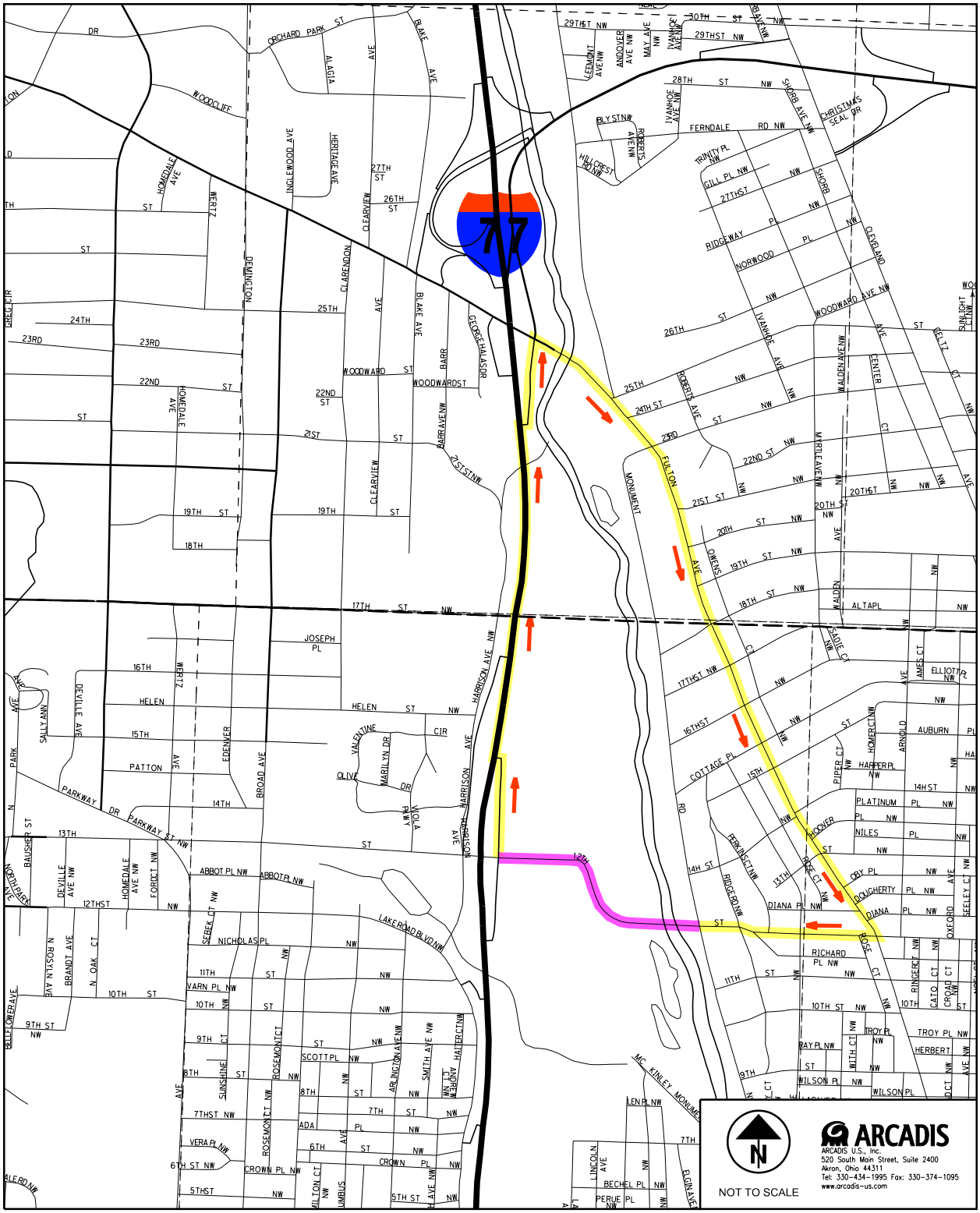
MOT Concept - Alternate 3
Part-width Construction
Maintaining One-Way Traffic

Canton, Stark County, Ohio

Project Number	AK000315.B001
Drawing Date	12/20/12
Figure	4



© 2012 ARCADIS G&M, Inc.	Project Manager: Kevin Kehres Associate Project Manager: Shelly Kendrick Task Manager: Dan Jozity Technical Review: Phil Berdis	ARCADIS 222 South Main Street Suite 300 Akron, Ohio 44308 Tel: 330-434-1995 Fax: 330-374-1095 www.arcadis-us.com	City of Canton 12th Street Bridge Replacements MOT Concept - Alternates 1, 2 & 3 Total Detour Canton, Stark County, Ohio	Project Number: AK000315.B001 Drawing Date: 12/20/12 Figure: 5



IMPROVEMENT AREA

DETOUR ROUTE

DETOUR ROUTE

IR 77 TO FULTON ROAD TO 12TH STREET

12TH STREET
PROPOSED DETOUR ROUTE

ARCADIS

Appendix G

Construction Cost Estimate

Estimate 12th St AER

Estimated Cost:$5,684,817.68

Contingency: 15.40%

Estimated Total: $6,560,279.60

12th St. AER Estimate 15.4% Contingency is for inflation

Base Date: 01/20/11

Spec Year: 10

Unit System: E

Work Type: GEN CONST: INVLVS 2 OR MOR MAJ WRK TYPE

Highway Type: 448 ON 301

Urban/Rural Type: URBAN CLASS

Season: SPRING

County: STARK

Midpoint of Latitude:

Midpoint of Longitude:

District: 04

Federal/State Project Number:

Prepared by Shane Gault on 05/29/13

Line #	Item Number / Description / *Supplemental Description*	Quantity	Units	Unit Price	Extension

Group 0100: ROADWAY

0005	201E11000 CLEARING AND GRUBBING	1.000	LS	$30,000.00000	$30,000.00
0006	202E30000 WALK REMOVED	10,175.000	SF	$1.65292	$16,818.46
0007	202E32000 CURB REMOVED	4,320.000	FT	$4.28080	$18,493.06
0008	203E10000 EXCAVATION	2,500.000	CY	$9.33606	$23,340.15
0009	203E20000 EMBANKMENT	10,000.000	CY	$5.84523	$58,452.30
0010	203E98600 ROADWAY, MISC.: *Major SARTA Bus Stop*	2.000	EACH	$10,000.00000	$20,000.00
0011	204E10000 SUBGRADE COMPACTION	10,740.000	SY	$0.74713	$8,024.18
0012	204E13000 EXCAVATION OF SUBGRADE	2,125.000	CY	$8.24132	$17,512.81
0013	204E30010 GRANULAR MATERIAL, TYPE B	2,125.000	CY	$29.81218	$63,350.88
0014	301E46000 ASPHALT CONCRETE BASE, PG64-22	2,459.000	CY	$94.66264	$232,775.43
0015	304E20000 AGGREGATE BASE	1,886.000	CY	$29.56451	$55,758.67
0016	407E14000 TACK COAT FOR INTERMEDIATE COURSE	860.000	GAL	$1.93446	$1,663.64
0017	411E10000 STABILIZED CRUSHED AGGREGATE	223.000	CY	$45.73870	$10,199.73
0018	448E46050 ASPHALT CONCRETE INTERMEDIATE COURSE, TYPE 2, PG64-22	525.000	CY	$137.00319	$71,926.67
0019	448E47020 ASPHALT CONCRETE SURFACE COURSE, TYPE 1, PG64-22	376.000	CY	$161.52327	$60,732.75
0020	608E10000 4" CONCRETE WALK	30,865.000	SF	$3.00000	$92,595.00
0021	608E98000 WALKWAY, MISC.: *Streetscaping*	20,350.000	SF	$10.00000	$203,500.00
0022	609E26000 CURB, TYPE 6	4,320.000	FT	$10.30723	$44,527.23
0074	659E10000 SEEDING AND MULCHING	13,000.000	SY	$0.56613	$7,359.69
0075	832E15000 STORM WATER POLLUTION PREVENTION PLAN	1.000	LS	$5,000.00000	$5,000.00
0076	832E30000 EROSION CONTROL	70,000.000	EACH	$1.00000	$70,000.00
0077	625E10480 LIGHT POLE, DECORATIVE	42.000	EACH	$5,000.00000	$210,000.00
0080	448E91000 ASPHALT CONCRETE, MISC.: *Parking Lot and Drive Reconstruction*	715.000	SY	$26.00000	$18,590.00

Total for Group 0100:$1,340,620.65

Group 0200: TRAIL

0035	203E10000 EXCAVATION	600.000	CY	$9.33606	$5,601.64
0036	203E98100	720.000	SY	$30.00000	$21,600.00

Line #	Item Number / Description / *Supplemental Description*	Quantity	Units	Unit Price	Extension
	ROADWAY, MISC.: *Rubber Walking Surface*				
0037	204E10000 SUBGRADE COMPACTION	1,780.000	SY	$0.74713	$1,329.89
0038	204E20000 EMBANKMENT	1,800.000	CY	$7.88569	$14,194.24
0039	304E20000 AGGREGATE BASE	360.000	CY	$29.56451	$10,643.22
0040	448E47020 ASPHALT CONCRETE SURFACE COURSE, TYPE 1, PG64-22	210.000	CY	$161.52327	$33,919.89
0041	507E00100 STEEL PILES HP10X42, FURNISHED	250.000	FT	$25.74946	$6,437.37
0042	507E00150 STEEL PILES HP10X42, DRIVEN	250.000	FT	$13.67950	$3,419.88
0043	511E46000 CLASS C CONCRETE	150.000	CY	$80.00000	$12,000.00
0044	511E43500 CLASS C CONCRETE, ABUTMENT INCLUDING FOOTING	22.000	CY	$800.00000	$17,600.00
0045	530E00200 SPECIAL - STRUCTURE, MISC.: *Relocate Pedestrian Bridge*	1.000	LS	$30,000.00000	$30,000.00

Total for Group 0200:$156,746.13

Group 0300: DRAINAGE

0023	202E35100 PIPE REMOVED, 24" AND UNDER	2,050.000	FT	$5.04066	$10,333.35
0024	202E35200 PIPE REMOVED, OVER 24"	120.000	FT	$23.27829	$2,793.39
0025	202E58000 MANHOLE REMOVED	12.000	EACH	$442.04190	$5,304.50
0026	202E58100 CATCH BASIN REMOVED	20.000	EACH	$249.43122	$4,988.62
0027	605E14000 6" BASE PIPE UNDERDRAINS	4,060.000	FT	$7.04490	$28,602.29
0028	603E04400 12" CONDUIT, TYPE B	550.000	FT	$42.56577	$23,411.17
0029	603E16400 36" CONDUIT, TYPE B	1,500.000	FT	$110.00000	$165,000.00
0030	603E53210 48" X 76" CONDUIT, TYPE B, 706.04	120.000	FT	$250.00000	$30,000.00
0031	604E00800 CATCH BASIN, NO. 3A	20.000	EACH	$1,905.66232	$38,113.25
0032	604E31500 MANHOLE, NO. 3	12.000	EACH	$2,303.33861	$27,640.06
0033	604E31610 MANHOLE, NO. 3 WITH 90" BASE I.D. AND 8" WEIR	1.000	EACH	$4,744.42889	$4,744.43
0034	604E37500 JUNCTION CHAMBER	1.000	EACH	$20,000.00000	$20,000.00

Total for Group 0300:$360,931.06

Group 0400: NIMISHILLEN BRIDGE

0046	202E11002 STRUCTURE REMOVED, OVER 20 FOOT SPAN	1.000	LS	$60,000.00000	$60,000.00
0047	503E11100 COFFERDAMS AND EXCAVATION BRACING	1.000	LS	$75,000.00000	$75,000.00
0048	509E10000	232,937.000	LB	$0.85000	$197,996.45

Line #	Item Number / Description / *Supplemental Description*	Quantity	Units	Unit Price	Extension
	EPOXY COATED REINFORCING STEEL				
0049	511E51001 CLASS HP CONCRETE, SUPERSTRUCTURE, AS PER PLAN *Arch Beams*	89.000	CY	$650.00000	$57,850.00
0051	511E51000 CLASS HP CONCRETE, SUPERSTRUCTURE *Continuous Concrete Slab*	420.000	CY	$450.00000	$189,000.00
0052	511E43000 CLASS C CONCRETE, PIER	79.000	CY	$600.00000	$47,400.00
0053	511E44100 CLASS C CONCRETE, ABUTMENT NOT INCLUDING FOOTING	469.000	CY	$450.00000	$211,050.00
0054	511E46500 CLASS C CONCRETE, FOOTING	475.000	CY	$300.00000	$142,500.00
0055	511E81300 CONCRETE, MISC.: *Precast Concrete Arch Rib*	14.000	EACH	$9,657.14000	$135,199.96
0056	526E30000 REINFORCED CONCRETE APPROACH SLABS (T=17")	482.000	SY	$170.00000	$81,940.00

Total for Group 0400:$1,197,936.41

Group 0500: RACEWAY BRIDGE

0057	202E11002 STRUCTURE REMOVED, OVER 20 FOOT SPAN	1.000	LS	$30,000.00000	$30,000.00
0058	503E11100 COFFERDAMS AND EXCAVATION BRACING	1.000	LS	$25,000.00000	$25,000.00
0059	509E10000 EPOXY COATED REINFORCING STEEL	127,726.000	LB	$0.85000	$108,567.10
0060	511E51000 CLASS HP CONCRETE, SUPERSTRUCTURE *Single Span with Sidewalks*	213.000	CY	$425.00000	$90,525.00
0061	511E44100 CLASS C CONCRETE, ABUTMENT NOT INCLUDING FOOTING	315.000	CY	$350.00000	$110,250.00
0062	511E46500 CLASS C CONCRETE, FOOTING	281.000	CY	$240.00000	$67,440.00
0063	511E71100 CONCRETE, MISC.: *False Arch*	36.000	CY	$425.00000	$15,300.00
0064	526E30000 REINFORCED CONCRETE APPROACH SLABS (T=17")	297.000	SY	$170.00000	$50,490.00
0079	610E60000 SPECIAL - RETAINING WALL, MISC.: *Patching, Excavate, Porous Backfill, Drain Pipe*	1.000	LS	$50,000.00000	$50,000.00

Total for Group 0500:$547,572.10

Group 0600: TRAFFIC CONTROL

0066	630E95000 SIGNING, MISC.: *Signs*	1.000	LS	$10,000.00000	$10,000.00
0067	646E99000 SPECIAL - PAVEMENT MARKING *Pavement Marking*	1.000	LS	$4,000.00000	$4,000.00
0068	632E90300 SIGNALIZATION, MISC.: *Signal Fiber and Conduit*	1.000	LS	$50,000.00000	$50,000.00

Line #	Item Number	Quantity	Units	Unit Price	Extension
	Description				
	Supplemental Description				

Total for Group 0600:$64,000.00

Group 9000: INCIDENTALS

0001	103E05000	1.000	LS	$40,000.00000	$40,000.00
	PREMIUM FOR CONTRACT PERFORMANCE BOND AND FOR PAYMENT BOND				
0002	614E11000	1.000	LS	$150,000.00000	$150,000.00
	MAINTAINING TRAFFIC				
0003	624E10000	1.000	LS	$200,000.00000	$200,000.00
	MOBILIZATION				
0004	619E16010	12.000	MNTH	$1,584.27755	$19,011.33
	FIELD OFFICE, TYPE B				
0065	990E25400	1.000	LS	$1,308,000.00000	$1,308,000.00
	LUMP SUM ADJUSTMENT - GENERAL / OTHER ITEMS				
	Contingency				
0069	950E50000	1.000	LS	$200,000.00000	$200,000.00
	SPECIAL - FACILITIES, MISC.:				
	Utility Relocation				
0070	990E10010	1.000	LS	$100,000.00000	$100,000.00
	ESTIMATED COST OF RIGHT OF WAY				

Total for Group 9000:$2,017,011.33