INTERCHANGE MODIFICATION STUDY

Interstate 124 (U.S. 27)
At West Main Street,
Martin Luther King Boulevard,
& East 4th Street
Hamilton County
Chattanooga, Tennessee

PREPARED BY
CLINARD ENGINEERING ASSOCIATES, LLC
BRENTWOOD, TENNESSEE
FOR
THE TENNESSEE DEPARTMENT OF TRANSPORTATION
PLANNING DIVISION

July 2005

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July 2005

U.S. Department
of Transportation
Federal Highway Administration

640 Grassmere Park Rd
Suite 112
Nashville, TN 37211

August 29, 2005

In Reply Refer To: HFO-TN

Tennessee Division Office

Mr. Ed Cole
Chief of Environment and Planning
Suite 900, James K. Polk Building
Nashville, Tennessee 37243-0334

Subject: Interchange Modification Study (IMS), I-124 at W. Main, SR 316 and E. 4th, Hamilton County

Dear Mr. Cole:

Thank you for your letter of August 26, 2005, that requested FHWA's final approval of the subject IMS. We appreciate your staff's work on this project and are pleased to provide this approval.

Sincerely yours,

Walter Boyd, P.E.
Field Operations Team Leader

cc: Jeanne Stevens, TDOT Planning Director
Mike Updike, Roadway Specialist, TDOT Planning Division

BUCKLE UP AMERICA

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CHAPTER 1

Introduction

A. Purpose of Study

The purpose of this study is to evaluate the existing interchanges at Interstate 124 (U.S. 27) / State Route 29 and West Main Street, Martin Luther King Boulevard and East 4th Street, and to request the approval for modifications of these interchanges to improve both operation and safety. Benefits of this project include reduced congestion, reduced conflict points and improved access to downtown Chattanooga. Numerous project alternatives have been evaluated during the project development process with a proposed design developed to maximize public safety through the use of appropriate design standards, while trying to minimize negative impacts to adjacent development and the environment.

While this study section of Interstate 124 is designated as part of the Interstate System, all existing signage refers to the route as U.S. 27 / State Route 29. Throughout this study, the project will be described either as I-124 or U.S. 27 (State Route 29).

U.S. 27 (State Route 29) is currently a four-lane median-divided facility with auxiliary lanes and access control within the vicinity of the West Main Street, Martin Luther King Boulevard and East 4th Street interchanges. This study was conducted to:

- Determine any operational deficiencies in the existing interchanges.
- Develop the needed interchange improvements to provide the desired level of service for the design year.
- Evaluate operational characteristics of the proposed improvements for the current conditions (2008) and the design year (2028).
- Develop construction cost estimates and evaluate the land use impacts of the construction.

B. Project Location and Description of the Area

The I-124 and West Main Street, Martin Luther King Boulevard/East 4th Street interchanges are located west of the Chattanooga central business district south of the Tennessee River, as shown in Figure 1. The interchanges are located along a 1.6 mile stretch north of the I-24/I-124 directional interchange.

Within the vicinity of the subject interchanges, Interstate 124 was constructed in the mid 1960's with geometric design that does not meet the current Federal or State standards. Numerous weave areas are located within the subject area, as well as substandard acceleration and deceleration lengths for most ramp junctions. The existing I-124/West Main Street interchange is a partial cloverleaf design with a one lane loop exit ramp from northbound I-124 (See Photo 1) and a one lane entrance ramp to southbound I-124. These access points are located less than 1,500 feet from the directional interchange of I-24 and I-124.



Photo 1: I-124 (U.S. 27) Northbound Exit Ramp to West Main Street

The existing I-124/Martin Luther King Boulevard interchange is a partial cloverleaf design (See Photo 2) with loop ramps in three of the four quadrants. With this partial cloverleaf design, all southbound exiting and entering traffic from these loops is required to make weaving maneuvers. The posted speed limit for these ramps is 25 miles per hour. Due to this low design speed and configuration, numerous angle and rear-end collisions have occurred within this weave area.



Photo 2: I-124 (U.S. 27) and Martin Luther King Blvd Interchange

The existing I-124/East 4th Street interchange is a trumpet design with one southbound exit loop ramp (See Photo 3). The entrance and exit ramps of this interchange south of East 4th Street are located less than 700 feet from the Martin Luther King Boulevard interchange, thus creating weave sections for both southbound and northbound motorists. In addition to the substandard merge and diverge lengths for the ramps, the mainline of I-124 in this area has a horizontal curve towards the east with a posted warning speed of 45 miles per hour. During the original design of this segment of I-124, the mainline shift towards the east was developed to avoid impacting a large hill (Cameron Hill) and the associated residential developments within the area.



Photo 3: I-124 and East 4th Street Interchange

Considerable congestion occurs throughout the study area on the ramps of all three (3) interchanges and along I-124 for several reasons:

1. Minimal design speed for the mainline of I-124
2. Minimal design speed loop ramps
3. Large traffic volumes (approximately 91,000 ADT in the design year)
4. Multiple weave sections associated with entrance and exit ramps
5. Substandard merge and diverge lengths for the study interchange ramps

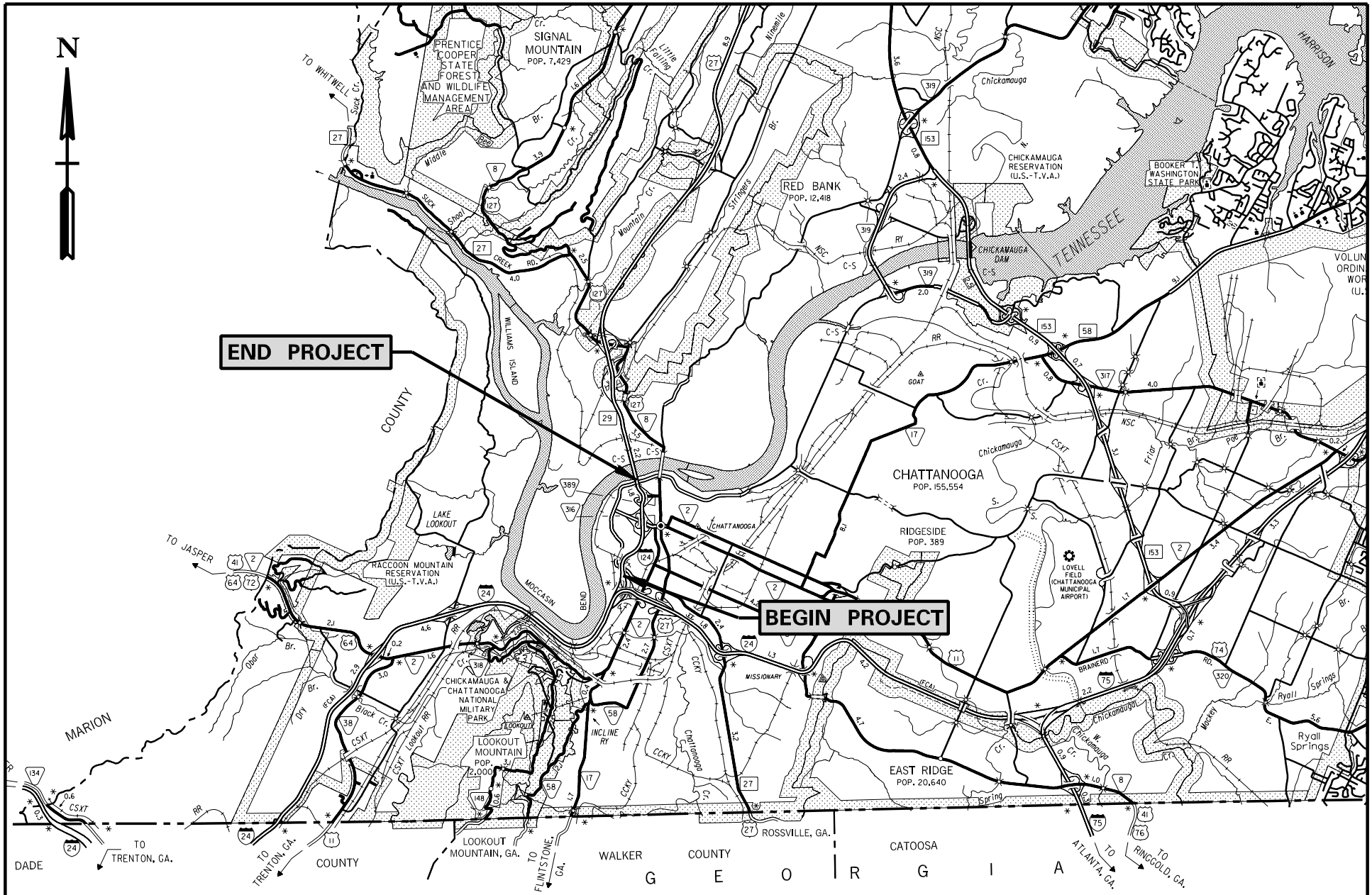

FIGURE 1
VICINITY MAP
I-124 (US 27/SR 29)
INTERCHANGE MODIFICATION STUDY
CHATTANOOGA, HAMILTON COUNTY, TENNESSEE
SCALE 1" = 2 MILES

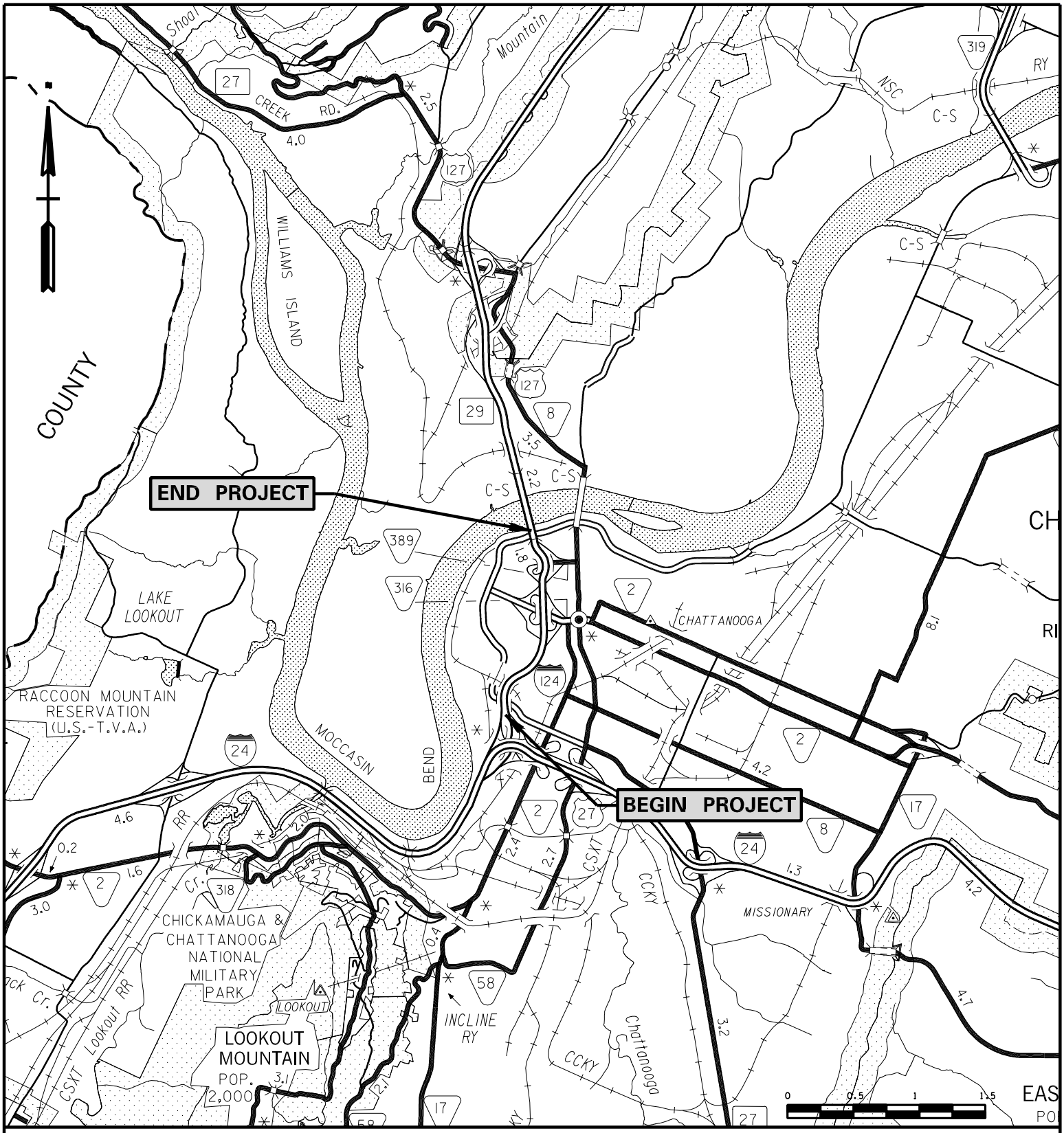

FIGURE 2
I-124 (US 27/SR 29)
INTERCHANGE MODIFICATION STUDY
CHATTANOOGA, HAMILTON COUNTY, TENNESSEE
SCALE 1" = 1 MILE



FIGURE 3
I-124 (US 27/SR 29)
INTERCHANGE MODIFICATION STUDY
CHATTANOOGA, HAMILTON COUNTY, TENNESSEE
SCALE 1" = 2000'

C. Relationship to Other Highway Improvement Programs and Plans

During the development of this study, and which can be seen in the various project photographs contained herein, the existing bridge over the Tennessee River was in the process of being widened as well as some minor ramp modifications to the East 4th Street interchange.

The City of Chattanooga currently has plans underway for significant redevelopment of the riverfront area, which will be accessed primarily via the study interchanges.

CHAPTER 2

Preliminary Planning Data

A. Land Use

The land use in the vicinity of the study area is a mixture of various commercial, industrial and residential developments. It includes hotels, industrial and manufacturing facilities, as well as tourist destinations such as the Tennessee Aquarium, Chattanooga Civic and Convention Center, and the Chattanooga Lookouts baseball stadium. As stated previously, direct access to the central business district is also provided by the study interchanges.

B. Traffic Served

The traffic data for this study was supplied by the Tennessee Department of Transportation (TDOT) and was based on proposed land use and existing conditions. The Design Hourly Volumes (DHV) for the years 2008 and 2028 are shown in Appendix A.

Interstate 124 is currently a four-lane section with additional auxiliary lanes in each direction between the adjacent interchanges. The year 2008 peak hour volumes are over 4,500 vehicles per hour in each direction. In the design year (2028), the peak hour volumes are anticipated to grow to approximately 5,800 vehicles per hour in each direction.

The figures in Appendix A provide a complete breakdown of traffic volumes for the subject interchanges for the base year (2008) and the design year (2028).

C. Proposed Modifications

I-124 and West Main Street

The proposed modifications for the I-124 and West Main Street interchange are highlighted by removal of the existing twenty-five (25) miles per hour loop with a new exit ramp design to terminate at the existing intersection of Carter Street and West 13th Street. As part of the improvements along the northbound side of I-124, the existing mainline will be modified to maintain four (4) travel lanes from the merge points at the directional interchange. Currently, the existing inside travel lane is constructed to merge with the outer three lanes before the exit to West Main Street. In order to provide this additional lane along I-124 on the northbound side of I-124, three existing structures will require replacement, as well as the construction of substantial retaining walls will be needed between these bridges. One (1) commercial establishment will be acquired as well as additional right-of-way near the proposed termini at Carter Street (See Photo 4 on the following page).



Photo 4: Proposed Ramp Termini at Carter Street and West 13th Street

It is important to note that as shown in the functional plans for the proposed improvements, raised concrete islands are to be incorporated into the intersection design at the ramp terminal with Carter Street to prevent wrong-way movements onto this new exit ramp.

I-124 and Martin Luther King Boulevard / East 4th Street

The proposed modifications for the I-124 and Martin Luther King Boulevard / East 4th Street interchanges will improve traffic flow and mobility as well as improve the safety for the motorists which travel this congested interstate area. All of the existing weave movements have been eliminated along I-124 with ramp junctions designed to meet current standards. In addition to these improvements, the mainline of the interstate is proposed to be realigned near the East 4th Street interchange with a design speed of fifty-five (55) miles per hour. Needed capacity has also been provided along I-124, with one additional mainline travel lane both north and southbound in the study area. Mainline improvements also include removal of the raised concrete/grass median located along I-124 and replacement with sixteen foot (16') median barrier separation.

Incorporated into the planned improvements, a new access into the central business district has been created along the proposed southbound frontage road at West 6th Street between East 4th Street and Martin Luther King Boulevard. It is anticipated that this access point will relieve a portion of the traffic congestion along Martin Luther King Boulevard. It is important to note, that at the request of the City of Chattanooga, the use of a roundabout was investigated for the exit ramp junctions at Martin Luther King Boulevard on the east and west side of I-124. As shown in the functional plans contained in the appendix of this study, detailed traffic analysis was performed and concluded that a roundabout along the west side of I-124 on Martin Luther King Boulevard can be accommodated and provide adequate operation with no impacts to the operation of the interstate system. As part of the proposed improvements to this interchange, the existing southbound slip ramp from West 12th Street to I-124 has been eliminated. Retaining this entrance ramp would create unsafe distances for vehicles to merge onto the interstate at this location. Adequate access for southbound motorists exists by utilizing the West Main Street interchange.

During the development of the proposed improvements, it was recommended by the Tennessee Department of Transportation that, due to the structural condition and age of the bridges along I-124 in the study area, replacement in lieu of widening should be planned. As shown in the functional plans contained in this study (Appendix D) and as reflected in the cost estimate for the improvements, the structures which would normally require widening will be replaced.

Important to the development of any major project within a heavily traveled urban corridor, careful attention has been taken to minimize the necessity of additional right-of-way and to avoid relocations of residents or commercial establishments. The proposed improvements in the study area will require some minor additional right-of-way; however, no relocations will be necessary. In order to accomplish this, numerous retaining walls throughout the project area are necessary.

Construction phasing and traffic control will be a major focus of this interchange reconstruction and every effort should be made to provide safe travel during that period of the project. Based upon field observations and the existing roadway

plans available for the study corridor, it appears that the proposed ramps/frontage road and realigned segment of I-124 located west of the existing I-124 mainline could be constructed early in the project, with interstate traffic utilizing these roadways in the later phases of the construction. Detailed and comprehensive signing should be incorporated during the construction phase in order to provide motorists with sufficient warning when approaching the project area.

Below, detailed description of the proposed improvements will be outlined and described for both northbound I-124 and southbound I-124.

Northbound I-124

For motorists traveling northbound I-124, one additional travel lane will be developed immediately north of the Main Street exit ramp. The northbound exit ramp to Martin Luther King Boulevard will be modified by providing two exit lanes. With both north and southbound additional travel lanes in this area, the existing I-124 structure over West 12th Street will be replaced. The existing northbound entrance loop ramp from eastbound Martin Luther King Boulevard will remain with a retaining wall proposed along the outside edge of shoulder to provide width for the widened northbound exit ramp to Martin Luther King Boulevard. The newly widened ramp will be extended to provide maximum storage capacity for the operation of the signalized intersection with Martin Luther King Boulevard.

The existing structure on I-124 over Martin Luther King Boulevard will be replaced to accommodate three (3) south and northbound travel lanes as well as the required taper length for the northbound entrance loop ramp from eastbound Martin Luther King Boulevard. In order to eliminate the current weave section along northbound I-124 between Martin Luther King Boulevard and East 4th Street, it is proposed to modify the existing northbound entrance ramp from westbound Martin Luther King Boulevard to a “fly-over” design, with a new structure over West 6th Street and the I-124 northbound exit ramp to East 4th Street. Substantial retaining walls will be utilized between this new “fly-over” ramp and the mainline of I-124 as well as along the outside of this ramp to eliminate the need for additional right-of-way and avoid impacting the historic St. Paul’s Episcopal Church or the apartments located directly adjacent to the interstate. The I-124 mainline structure over West 6th Street will also be replaced to provide for the proposed laneage and shoulders required for improvement.

The I-124 northbound exit ramp to East 4th Street will widen to two (2) travel lanes at the intersection of East 4th Street. As described previously, I-124 in this area will be realigned to meet a design speed of fifty-five (55) miles per hour. A new structure over East 4th Street will be constructed with a raise in vertical alignment of I-124 of approximately four to five feet.

The northbound entrance ramp from East 4th Street will require only minor modifications, with the majority of construction encompassing completing the partial widening (superstructure and decking) of the Olgiotti Bridge along both the south and northbound sides on the southern end. As shown in Photo 5 on the

following page, the piers/bents are in place for the recommended widening contained as part of these planned improvements.



Photo 5: I-124 Bridge over Riverfront Parkway / Tennessee River

Southbound I-124

With three (3) southbound travel lanes crossing the Tennessee River bridge, a taper will be created for the exiting traffic for both East 4th Street and Martin Luther King Boulevard. A two (2) lane exit will be provided with completion of the partial bridge widening described previously. It is important to note, while the planned improvements will end at the bridge, advanced signage should be incorporated northward as part of this construction project to advise motorists well in advance that the exit which they are approaching is for both East 4th Street and Martin Luther King Boulevard. This new two lane exit will provide an exit only lane and option lane to these two local streets. It is the development of this new southbound exit ramp to East 4th Street that will eliminate the need for the existing substandard loop ramp.

In order to construct the new southbound exit from I-124 to East 4th Street and Martin Luther King Boulevard, it is anticipated that approximately two acres of additional right-of-way will be required along the west side of I-124. Plans also include a retaining wall be located along the outside of this ramp to minimize the right-of-way needed. Wall heights in this area could range from ten to twenty-five feet. It is also planned that a retaining wall be constructed along the outside of southbound I-124 between this new exit ramp. A proposed traffic signal will be located at the intersection of the I-124 southbound exit ramp and East 4th Street.

The I-124 southbound entrance ramp from East 4th Street will remain as a two (2) lane ramp with additional taper length provided as these lanes merge to one lane before becoming an add lane to southbound I-124.

As described previously, a southbound frontage road will be created along the west side of I-124 connecting East 4th Street, West 6th Street and Martin Luther King Boulevard. Signalized intersections will be created at both East 4th Street and West 6th Street. Retaining walls ranging from five to fifteen feet in height will be required between East 4th Street and West 6th Street to avoid impacting the First Baptist Church as well as encroachment into the embankment of I-124.

I-124 will contain three (3) southbound travel lanes over Martin Luther King Boulevard, with both existing loop ramps along the west side of I-124 eliminated. Traffic operation on Martin Luther King Boulevard at the frontage road and entrance ramp terminals will be controlled by the use of a two-lane roundabout. The southbound entrance ramp to I-124 from Martin Luther King Boulevard will merge to one lane at the junction of I-124 before tapering to the mainline of I-124 south of West 12th Street. As mentioned earlier, the I-124 structure over West 12th Street will be replaced to accommodate the mainline lanes and ramp tapers as required.

The following photographs are photo-simulations created during the project development process showing the concepts of the proposed improvements for the interchanges of I-124 and Martin Luther King Boulevard and East 4th Street.



Photo 6: I-124 and East 4th Street Photo-Simulation



Photo 7: I-124 and Martin Luther King Boulevard Photo-Simulation

Martin Luther King Boulevard

Two of the three existing loop ramps to/from I-124 are to be removed as part of the planned improvements, with a majority of the existing raised grass median along Martin Luther King Boulevard to remain. Two east and westbound travel lanes will exist with additional storage capacity provided along the eastbound and northbound approaches to the intersection of Martin Luther King Boulevard and Pine Street / northbound exit ramp from I-124.

On the west side of I-124, a proposed roundabout will be constructed as part of these planned improvements. This two-lane roundabout will incorporate right turn by-pass ramps to reduce circulating traffic within the roundabout. The diameter of the roundabout (180 feet) has been determined based upon operational design parameters to maximize the level of service for this intersection.

It will be important that adequate signing and public service announcements or other means of educating the driving public be undertaken, to ensure drivers become familiar with the rules and procedures for traversing a roundabout.

East 4th Street / West 6th Street

The improvements to East 4th Street include the installation of a traffic signal at the southbound exit ramp terminal as well as the addition of one eastbound travel lane along East 4th Street from the intersection to the I-124 northbound exit ramp terminal.

West 6th Street improvements include the proposed traffic signal at the southbound frontage road as well as the associated signage and striping for this signal.

D. Discussion of Initial Concepts

Several alternatives to improve the safety and operational inadequacies of the existing I-124 and West Main Street, Martin Luther King Boulevard / East 4th Street interchanges were assessed.

The following is a brief description of each of the alternates as well as the determination of further development. Functional plans showing the various alternates are contained in Appendix E of this study.

I-124 and West Main Street

Northbound Alternate A

This alternate would carry four (4) travel lanes northbound from the directional interchange through the West Main Street interchange with only minor modifications to the existing loop exit ramp. While this alternate eliminated the inside mainline lane merge along I-124, sufficient right-of-way does not exist to provide a loop ramp to meet current design standards. Due to the proximity of the directional interchange, an exit ramp before West Main Street could not be constructed without creating an unsafe weave situation.

Northbound Alternate B

As with Alternate A, four mainline travel lanes are to be provided with a new exit ramp designed to tie to Carter Street is proposed. This alternate would eliminate the existing loop ramp and provide a longer decision time for motorists desiring to exit at this first interchange along I-124. This improvement concept was carried forward as part of the recommended modifications for the project.

Southbound Alternate A

Southbound Alternate A would create a new exit ramp to Riverfront Parkway and would modify the existing southbound entrance ramp to I-124. Some structure widening and new structures would be required to construct these improvements as well as retaining walls in various locations. Due to the close proximity of the College Hill Courts Historic District and the southbound entrance ramp from Martin Luther King Boulevard, a new exit ramp to West Main Street is not feasible. After further review of geometry and grades, it was determined that a new southbound exit ramp connection could not be made to Riverfront Parkway.

I-124 and Martin Luther King Boulevard / East 4th Street

Alternate A

Alternate A was developed to provide three travel lanes throughout the study area both north and southbound. Improvements included eliminating the southbound entrance loop ramp from westbound Martin Luther King Boulevard with the introduction of a traffic signal on the west side of I-124. A proposed slip ramp from the northbound I-124 exit to Martin Luther King Boulevard to Carter Street was also proposed. This slip ramp would have helped divert traffic from the Pine Street intersection; however would have required acquisition of a parking lot and potential commercial relocation.

The weave area located along the northbound section of I-124 between Martin Luther King Boulevard and East 4th Street was to remain, with additional weave length provided by relocating the gore areas of both ramp junctions.

The exit ramp from southbound I-124 to East 4th Street would be developed north of the interchange and thus eliminating the existing exit loop ramp. The southbound exit to Martin Luther King Boulevardwould be relocated north of East 4th Street and "fly-over" the new East 4th Street exit ramp. It was proposed to continue the southbound Martin Luther King Boulevard exit ramp over West 6th Street and tie to the existing westbound tangent ramp and eastbound loop ramp at Martin Luther King Boulevard. Improvements also included the removal of the West 12th Street slip ramp to I-124 southbound.

Portions of these improvements were found to be viable, but elimination of the West 12th Street ramp was determined to be a loss of interstate access that was critical to maintain. It was also agreed that the improvements should attempt remove the existing northbound weave area. It was also determined that previously desired access to Carter Street via a new slip ramp may be too costly and may create additional operational problems along I-124.

Alternate B

Alternate B was developed to provide all the improvements as described in Alternate A; however, included the realignment of the mainline of I-124 near the East 4th Street interchange. It was determined that the realignment of the mainline be carried further into additional alternates of investigation.

Alternate C

Alternate C was developed to provide all the improvements as described in Alternate B; however, included the removal of the previously proposed slip ramp to Carter Street. This alternate also included eliminating the northbound weave section between Martin Luther King Boulevard and East 4th Street.

It was determined that Alternate C be carried forward with additional study of the southbound ramp configuration at East 4th Street as well as investigating the removal of the loop ramps at Martin Luther King Boulevard.

Alternate C (modified)

Alternate C (modified) carried the improvements as outlined in Alternate C, with modification of the southbound exit ramp configuration at East 4th Street and Martin Luther King Boulevard. A two-lane exit ramp was proposed north of East 4th Street for both local streets, with the removal of the "fly-over" concept as developed previously.

Alternate D

Alternate D was developed early on in the project study phase and included barrier separated exits northbound for both Martin Luther King Boulevard and East 4th Street. This proposed improvement would have eliminated the weave section on the mainline of I-124, however, would have simply moved it to the barrier separated ramp network. It was agreed that this solution would not be acceptable.

Alternate E

Alternate E has been included for reference and was developed by the City of Chattanooga Planning Department. This concept would create dual roundabouts on both the east and west side of I-124 on Martin Luther King Boulevard. These proposed improvements also created frontage roads on both the east and west side of I-124, between Martin Luther King Boulevard and East 4th Street. It was agreed that a frontage road concept would be investigated for possible incorporation into the previously selected Alternate C (modified) for further study. It was also agreed that investigation into the use of roundabouts would be performed along Martin Luther King Boulevard.

Alternate F

Alternate F has also been included for reference and was developed by the City of Chattanooga Planning Department. This concept would create one large roundabout underneath I-124 on Martin Luther King Boulevard. These proposed improvements also created frontage roads on both the east and west side of I-124, between Martin Luther King Boulevard and East 4th Street. After further study, it was determined that traffic volumes were too great to provide adequate operation of a single roundabout concept at this location as shown.

Alternate G

Alternate G is the compilation of Alternate C (modified) as well as a southbound frontage road and roundabout concept. It is this alternate that has since become the proposed improvements in this area as presented in the study.

Alternate H

Alternate H has also been included for reference and was developed as a single-line sketch. This alternate investigated creating an inner street system for local access with mainline traffic carried along the outside of this local system. There were several reasons this concept was not carried further in the study including: left hand entrances and exits would have been required, costly excavation of the existing mainline of I-124 would have to be performed as well as the difficulty in constructing this concept while maintaining traffic.

E. Environmental Concerns

The Tennessee Department of Transportation will perform all necessary studies including ecological and historical studies. At the current time, the proposed design does not appear to impact any areas of environmental or historical significance. The proposed improvements have been planned to avoid impacting the College Hill Courts neighborhood located south of the Martin Luther King Boulevard interchange.

CHAPTER 3

Engineering Investigations

A. Traffic Operations

An initial analysis was made which determined that the existing interchange configurations were inadequate to handle design year volumes. Appendix B contains figures summarizing the levels-of-service under the existing conditions for 2008 and 2028 traffic. The levels-of-service were determined using the peak hour volumes which represent the worst case condition for each location.

Existing Roadway Network

The capacity analysis of the existing ramp junctions within the study area are summarized below in Table 1 for the base year and design year (2028).

TABLE 1

CAPACITY ANALYSES OF RAMP JUNCTIONS WITHIN THE STUDY AREA

Ramp Junctions	Year 2008	Year 2028
NB SR 29 Exit to West Main Street (AM)	E	F
NB SR 29 Exit to West Main Street (PM)	C	D
NB SR 29 Exit to MLK Blvd. (AM)	see note	see note
NB SR 29 Exit to MLK Blvd. (PM)	see note	see note
NB SR 29 Entrance from EB MLK Blvd. (AM)	C	D
NB SR 29 Entrance from EB MLK Blvd. (PM)	D	F
NB SR 29 Entrance from WB MLK Blvd. (AM)	see note	see note
NB SR 29 Entrance from WB MLK Blvd. (PM)	see note	see note
NB SR 29 Exit to East 4th St. (AM)	see note	see note
NB SR 29 Exit to East 4th St. (PM)	see note	see note
NB SR 29 Entrance from East 4th St. (AM)	see note	see note
NB SR 29 Entrance from East 4th St. (PM)	see note	see note
SB SR 29 Entrance from West Main Street (AM)	see note	see note
SB SR 29 Entrance from West Main Street (PM)	see note	see note
SB SR 29 Exit to East 4th St. (AM)	see note	see note
SB SR 29 Exit to East 4th St. (PM)	see note	see note
SB SR 29 Entrance from East 4th St. (AM)	see note	see note
SB SR 29 Entrance from East 4th St. (PM)	see note	see note
SB SR 29 Exit to WB MLK Blvd. (AM)	see note	see note
SB SR 29 Exit to WB MLK Blvd. (PM)	see note	see note
SB SR 29 Exit to EB MLK Blvd. (AM)	see note	see note
SB SR 29 Exit to EB MLK Blvd. (PM)	see note	see note

SB SR 29 Entrance from WB MLK Blvd. (AM)	see note	see note
SB SR 29 Entrance from WB MLK Blvd. (PM)	see note	see note
SB SR 29 Entrance from EB MLK Blvd. (AM)	B	C
SB SR 29 Entrance from EB MLK Blvd. (PM)	C	D

Note: Some ramp junctions within the study area result in a lane addition or lane drop. Analyses for these locations are shown in Table 2.

In addition to the ramp junctions shown in Table 1, several locations within the study area include an interchange ramp that is associated with a lane addition or a lane drop on I-124.

The Highway Capacity Manual (HCM) states the following about lane additions and lane drops:

> "Sometimes on-ramps are associated with lane additions and off-ramps with lane drops. Where a single-lane ramp results in a lane addition or deletion, the capacity of the ramp is governed by its geometry, as indicated in Table 5-6."

The information in Table 5-6 of the HCM indicates that a free-flow single-lane ramp has a capacity of 2,000 vehicles per hour. Table 2 includes the projected traffic volumes on each ramp which results in a lane addition or lane drop on I-124 at the interchanges within the study area.

TABLE 2

CAPACITY ANALYSES AT RAMP JUNCTIONS
WHICH RESULT IN A LANE ADDITION OR LANE DROP

Location	# of lanes	capacity (vph)	Year 2008	Year 2028
NB SR 29 Exit to MLK Blvd. (AM)	1	2,000	1,754	2,280
NB SR 29 Exit to MLK Blvd. (PM)	1	2,000	526	684
NB SR 29 Entrance from WB MLK Blvd. (AM)	1	2,000	209	272
NB SR 29 Entrance from WB MLK Blvd. (PM)	1	2,000	1,507	1,958
NB SR 29 Exit to East 4th St. (AM)	1	2,000	1,273	1,655
NB SR 29 Exit to East 4th St. (PM)	1	2,000	456	593
NB SR 29 Entrance from East 4th St. (AM)	1	2,000	116	151
NB SR 29 Entrance from East 4th St. (PM)	1	2,000	484	629
SB SR 29 Entrance from West Main Street (AM)	1	2,000	247	321
SB SR 29 Entrance from West Main Street (PM)	1	2,000	578	752
SB SR 29 Exit to East 4th St. (AM)	1	2,000	793	1,032

SB SR 29 Exit to East 4th St. (PM)	1	2,000	288	374
SB SR 29 Entrance from East 4th St. (AM)	1	2,000	253	329
SB SR 29 Entrance from East 4th St. (PM)	1	2,000	988	1,285
SB SR 29 Exit to WB MLK Blvd. (AM)	1	2,000	324	421
SB SR 29 Exit to WB MLK Blvd. (PM)	1	2,000	103	134
SB SR 29 Exit to EB MLK Blvd. (AM)	1	2,000	989	1,285
SB SR 29 Exit to EB MLK Blvd. (PM)	1	2,000	207	269
SB SR 29 Entrance from WB MLK Blvd. (AM)	1	2,000	374	486
SB SR 29 Entrance from WB MLK Blvd. (PM)	1	2,000	913	1,187

The results of these analyses indicate that, with the existing roadway network, the traffic projected to use the northbound exit ramp to Martin Luther King Boulevard will exceed the capacity of the ramp by the year 2028. All of the other ramps which currently result in a lane addition or a lane drop on I-124 have adequate capacity to accommodate the traffic volumes projected on the existing roadway network in the Years 2008 and 2028.

Capacity analyses were conducted for the existing weaving movements within the study area, and these results are shown in Table 3. The analyses show that two of the four existing weaving sections will operate at poor LOS during both the AM and PM peak hours in the Year 2008, as well as the Year 2028.

TABLE 3

CAPACITY ANALYSES AT WEAVING AREAS

Weaving Section	Year 2008	Year 2028
NB SR 29 Between MLK Blvd. & East 4th St. (AM)	F	F
NB SR 29 Between MLK Blvd. & East 4th St. (PM)	F	F
SB SR 29 Between West Main Street & I-24 (AM)	C	D
SB SR 29 Between West Main Street & I-24 (PM)	F	F
SB SR 29 Between East 4th St. & MLK Blvd. (AM)	C	C
SB SR 29 Between East 4th St. & MLK Blvd. (PM)	C	D
SB SR 29 Between MLK Blvd. Exit/Entrance (AM)	E	F
SB SR 29 Between MLK Blvd. Exit/Entrance (PM)	E	F

The results of the capacity analyses for the freeway segments within the study area are shown in Table 4. These results indicate that three of the six freeway segments are projected to operate at an unacceptable LOS in the Year 2028, based on the existing roadway network.

TABLE 4

CAPACITY ANALYSES OF FREEWAY SEGMENTS WITHIN THE STUDY AREA

Freeway Segments	Year 2008	Year 2028
NB SR 29 South of West Main Street (AM)	E	F
NB SR 29 South of West Main Street (PM)	C	D
SB SR 29 South of West Main Street (AM)	B	C
SB SR 29 South of West Main Street (PM)	D	D
NB SR 29 South of MLK Blvd. (AM)	D	E
NB SR 29 South of MLK Blvd. (PM)	C	D
SB SR 29 South of MLK Blvd. (AM)	C	D
SB SR 29 South of MLK Blvd. (PM)	D	E
NB SR 29 Between MLK Blvd. & East 4th St. (AM)	C	D
NB SR 29 Between MLK Blvd. & East 4th St (PM)	D	F
SB SR 29 Between MLK Blvd. & East 4th St (AM)	C	D
SB SR 29 Between MLK Blvd. & East 4th St (PM)	C	C
NB SR 29 North of East 4th St. (AM)	B	B
NB SR 29 North of East 4th St. (PM)	D	F
SB SR 29 North of East 4th St. (AM)	D	E
SB SR 29 North of East 4th St. (PM)	C	C

The results of the capacity analyses for the signalized intersection of the northbound exit ramp from I-124 and Martin Luther King Boulevard / Pine Street is projected to operate at an unacceptable LOS in the Year 2008 and 2028 during the AM peak hour, based on the existing roadway network. Based upon this analysis, average delays are expected in the AM peak hour for 2008 of 111.9 seconds per vehicle and in the Year 2028 delays of 231 seconds per vehicle.

TABLE 5

CAPACITY ANALYSES AT SURFACE STREET INTERSECTIONS WITHIN THE STUDY AREA

INTERSECTION	Year 2008	Year 2028
I-124 NB Exit Ramp & Martin Luther King Boulevard / Pine Street (AM)	F	F
I-124 NB Exit Ramp & Martin Luther King Boulevard / Pine Street (PM)	B	D

PROPOSED ROADWAY NETWORK

The results of the capacity analyses conducted for the proposed roadway network are shown in the following tables. Specifically, as shown in Table 6, the ramp junction below is projected to operate at poor LOS in the Year 2028. It is also projected that a service life of at least sixteen years will be provided.

TABLE 6

CAPACITY ANALYSES OF RAMP JUNCTIONS WITHIN THE STUDY AREA

Ramp Junctions	Year 2008	Year 2028	Service Life
NB SR 29 Exit to MLK Blvd. (AM)	C	F	2024
NB SR 29 Exit to MLK Blvd. (PM)	C	F	2026

It is important to note that these ramp junction failures could be eliminated with the addition of one mainline lane in the northbound direction.

Also, as with the existing roadway network, several locations within the study area will include an interchange ramp that is associated with a lane addition or a lane drop on I-124. The results of these analyses indicate that the traffic projected to use the ramps which result in a lane addition or a lane drop on I-124 have adequate capacity to accommodate the traffic volumes projected on the proposed roadway network in the Years 2008 and 2028.

TABLE 7

CAPACITY ANALYSES AT RAMP JUNCTIONS WHICH RESULT IN A LANE ADDITION OR LANE DROP

Location	# of lanes	capacity (vph)	Year 2008	Year 2028
NB SR 29 Exit to Carter Street (AM)	1	2,000	1,004	1,306
NB SR 29 Exit to Carter Street (PM)	1	2,000	299	388

NB SR 29 Exit to East 4th St. (AM)	1	2,000	1,273	1,655
NB SR 29 Exit to East 4th St. (PM)	1	2,000	456	593
SB SR 29 Exit to Riverfront Parkway (AM)	1	2,000	439	571
SB SR 29 Exit to Riverfront Parkway (PM)	1	2,000	146	190
SB SR 29 Entrance from West Main Street (AM)	1	2,000	247	321
SB SR 29 Entrance from West Main Street (PM)	1	2,000	578	752
SB SR 29 Exit to East 4th St./MLK Blvd. (AM)	2	3,800	2,106	2,738
SB SR 29 Exit to East 4th St./MLK Blvd. (PM)	2	3,800	598	777
SB SR 29 Entrance from East 4th St. (AM)	2	3,800	228	296
SB SR 29 Entrance from East 4th St. (PM)	2	3,800	889	1,157
SB SR 29 Entrance from MLK Blvd. (AM)	1	2,000	601	781
SB SR 29 Entrance from MLK Blvd. (PM)	1	2,000	1,348	1,752

The results of the capacity analyses for the freeway segments within the study area are shown in Table 8.

Many of the freeway segments within the study area are projected to operate at poor LOS in the Year 2028, based on the proposed roadway network. Analysis shows that freeway capacity operation is directly related to the number of travel lanes along the mainline of I-124. In order for all segments to operate in the design year, one additional travel lane in the north and southbound along I-124 would be required.

TABLE 8

CAPACITY ANALYSES OF FREEWAY SEGMENTS

Freeway Segments	Year 2008	Year 2028
NB SR 29 South of West Main Street (AM)	B	E
NB SR 29 South of West Main Street (PM)	C	C
SB SR 29 South of West Main Street (AM)	B	C
SB SR 29 South of West Main Street (PM)	C	D
NB SR 29 South of MLK Blvd. (AM)	D	E
NB SR 29 South of MLK Blvd. (PM)	C	D
SB SR 29 South of MLK Blvd. (AM)	C	D
SB SR 29 South of MLK Blvd. (PM)	D	E
NB SR 29 Between MLK Blvd. & East 4th St. (AM)	C	C
NB SR 29 Between MLK Blvd. & East 4th St (PM)	C	D
SB SR 29 Between MLK Blvd. & East 4th St (AM)	B	C
SB SR 29 Between MLK Blvd. & East 4th St (PM)	C	D

NB SR 29 North of East 4th St. (AM)	B	B
NB SR 29 North of East 4th St. (PM) *	D	F
SB SR 29 North of East 4th St. (AM) *	D	E
SB SR 29 North of East 4th St. (PM)	C	C

** Service life of this freeway segment is 2026.*

Capacity analyses were conducted for the two new surface street intersections that are included within the proposed roadway network, and these results are shown in Table 9. The analyses show that the two new surface street intersections will operate at acceptable LOS during the AM and the PM peak hours in the Year 2008, as well as the Year 2028. The analysis shows the NB exit ramp from SR-29 and MLK Blvd / Pine Street will operate at an unacceptable LOS in the design year for the AM peak hour. It is important to note that the average delay during this time period will be reduced by 50%, with adequate storage for queue lengths provided on the northbound approach. In order for this intersection to operate adequately in the design year for the AM peak hour, additional laneage would be required along the local street network.

As shown in Table 9, the proposed roundabout will operate in the base and design year for both the AM and PM peak hour.

TABLE 9

CAPACITY ANALYSES AT NEW SURFACE STREET INTERSECTIONS

INTERSECTION	Year 2008	Year 2028
NB SR 29 Exit & MLK Blvd. / Pine Street (AM)	E	F
NB SR 29 Exit & MLK Blvd. / Pine Street (PM)	B	C
SB SR 29 Exit & East 4th Street (AM)	A	B
SB SR 29 Exit & East 4th Street (PM)	B	B
SB SR 29 Exit & West 6th Street (AM)	B	C
SB SR 29 Exit & West 6th Street (PM)	B	B
MLK Boulevard Roundabout (AM)	A	B
MLK Boulevard Roundabout (PM)	A	B

B. Access Analysis

This study has been undertaken in accordance with the Federal Highway Administration's (FHWA) policy for granting new or revised interchange access. The FHWA policy, as described in FHWA Docket 98-3460, "Additional Interchanges to the Interstate System (Federal Register 63, No. 28, February 11, 1998) is provided in the following paragraphs accompanied by comments for consideration.

It is in the national interest to maintain the Interstate System to provide the highest level of service in terms of safety and mobility. Adequate control of access is critical to providing such service. Therefore, new or revised access points to the existing Interstate System should meet the following requirements.

1. The existing interchanges and/or local roads and streets in the corridor can neither provide the necessary access nor be improved to satisfactorily accommodate the design year traffic demands while at the same time providing the access intended by the proposal.

With the continual increase in traffic volumes along I-124, the merge, diverge and weave movements will continue to diminish the operation of the interstate system in the project area. This degradation will result in increased delay, reduced safety, and reduced air quality within the city of Chattanooga. No minor interchange improvements can be made (other than the recommended improvements) to eliminate the major problems outlined previously in this report.

2. All reasonable alternatives for design options, location and transportation system management type improvements (such as ramp metering, mass transit, and HOV facilities) have been assessed and provided for if currently justified, or provisions are included for accommodating such facilities if a future need is identified.

There were several different design options developed and assessed in this study to improve the operation of the I-124 and West Main Street, Martin Luther King Boulevard and East 4th Street interchanges. However, the proposed design is the only one that produced the desired levels of service and operational characteristics for the interchanges.

The proposed modifications will reduce congestion and improve safety by eliminating many of the merge, diverge and weave movements that currently exist in the project area.

3. The proposed access point does not have a significant adverse impact on the safety and operation of the interstate facility based upon an analysis of current and future traffic. The operational analysis for existing conditions shall, particularly in urbanized areas, include an analysis of sections of interstate to an including at least the first adjacent existing or proposed interchange on either side. Crossroads and other roads and streets shall be included in the analysis to the extent necessary to assure their ability to collect and distribute traffic to and from the interchange with new or revised access points.

The improvements proposed for these three interchanges along I-124 as recommended will improve traffic operations through the study area by reducing and/or eliminating the number of merge/diverge and weave sections. The proposed modifications should not have any adverse impact on the safety and operation of the interstate facility.

4. The proposed access connects to a public road only and will provide for all traffic movements. Less than "full interchanges" for special purpose access for transit vehicles, for HOV's, or into park and ride lots may be considered on a case-by-case basis. The proposed access will be designed to meet or exceed current standards for Federal-Aid projects on the Interstate System.

The proposal is a modification of the existing interchanges at I-124 and West Main Street, Martin Luther King Boulevard and East 4th Street. The proposed modifications will meet the American Association of State Highway and Transportation Officials (AASHTO) criteria.

5. The proposal considers and is consistent with local and regional land use and transportation plans. Prior to final approval, all requests for new or revised access must be consistent with the metropolitan and/or statewide transportation plan, as appropriate, the applicable provisions of 23 CFR part 450 and the transportation conformity requirements of 40 CFR parts 51 and 93.

The study was coordinated with both the Tennessee Department of Transportation and the City of Chattanooga. The proposal is consistent with all local, regional, and statewide land use and transportation plans.

6. In areas where the potential exists for future multiple interchange additions, all requests for new or revised access are supported by a comprehensive interstate network study with recommendations that address all proposed and desired access within the context of a long-term plan.

There are no long-range plans for additional interchanges in this area. The existing interchanges provide adequate access to the subject area.

7. The request for a new or revised access generated by a new or expanded development demonstrates appropriate coordination between the development and related or otherwise required transportation system improvements

The request is not generated by new or expanded development within the vicinity of the interchange. This interchange modification is intended to correct operational inadequacies of the existing interchanges configurations.

8. The request for a new or revised access contains information relative to the planning requirements and the status of environmental processing of the proposal.

The proposed modifications will be submitted to the TDOT Environmental Department to begin environmental studies at the time this report is submitted to the FHWA.

9. Proposed Interchange Cost

The total cost for the improvement to the I-124 and West Main Street, Martin Luther King Boulevard / East 4th Street interchanges is approximately $35,184,000. An estimated cost breakdown is shown in Appendix C.

CHAPTER 4

Summary of Findings and Conclusions

The purpose of this study was to evaluate the existing interchanges of Interstate 124 and West Main Street, Martin Luther King Boulevard / East 4th Street and to request the approval for modifications of these interchanges to improve their operation and safety. Several viable alternatives were initially evaluated and thoroughly investigated.

The traffic analysis indicates that the existing interchanges are inadequate to handle the current and design year traffic volumes. The current configuration and close proximity of adjacent interchanges and the associated weave, merge, and diverge problems severely congest this area. Accident history for the project area shows a high number of angle crashes and rear-end collisions, which are directly attributable to the interchange configurations and heavy traffic volumes.

During this study, numerous alternatives for improvement were developed. All of the alternatives contained both positive and negative aspects in regards to both access and operation. The proposed improvements as recommended in this study, provides the best overall operation and safety benefits.

Throughout the development process of the study, officials with the various divisions within the Tennessee Department of Transportation as well as representatives from the Federal Highway Administration and the City of Chattanooga have shared thoughts and ideas to fashion a proposed plan to provide these needed transportation improvements for the I-124 and West Main Street, Martin Luther King Boulevard / East 4th Street interchanges.

Because these proposed improvements are substantial and will impact motorists and residents within the City of Chattanooga for several years during the construction process, the appropriate level of public involvement should begin early and continue throughout the life of this project.

APPENDIX A

TRAFFIC VOLUME DIAGRAMS: 2008 AND 2028 DHVs

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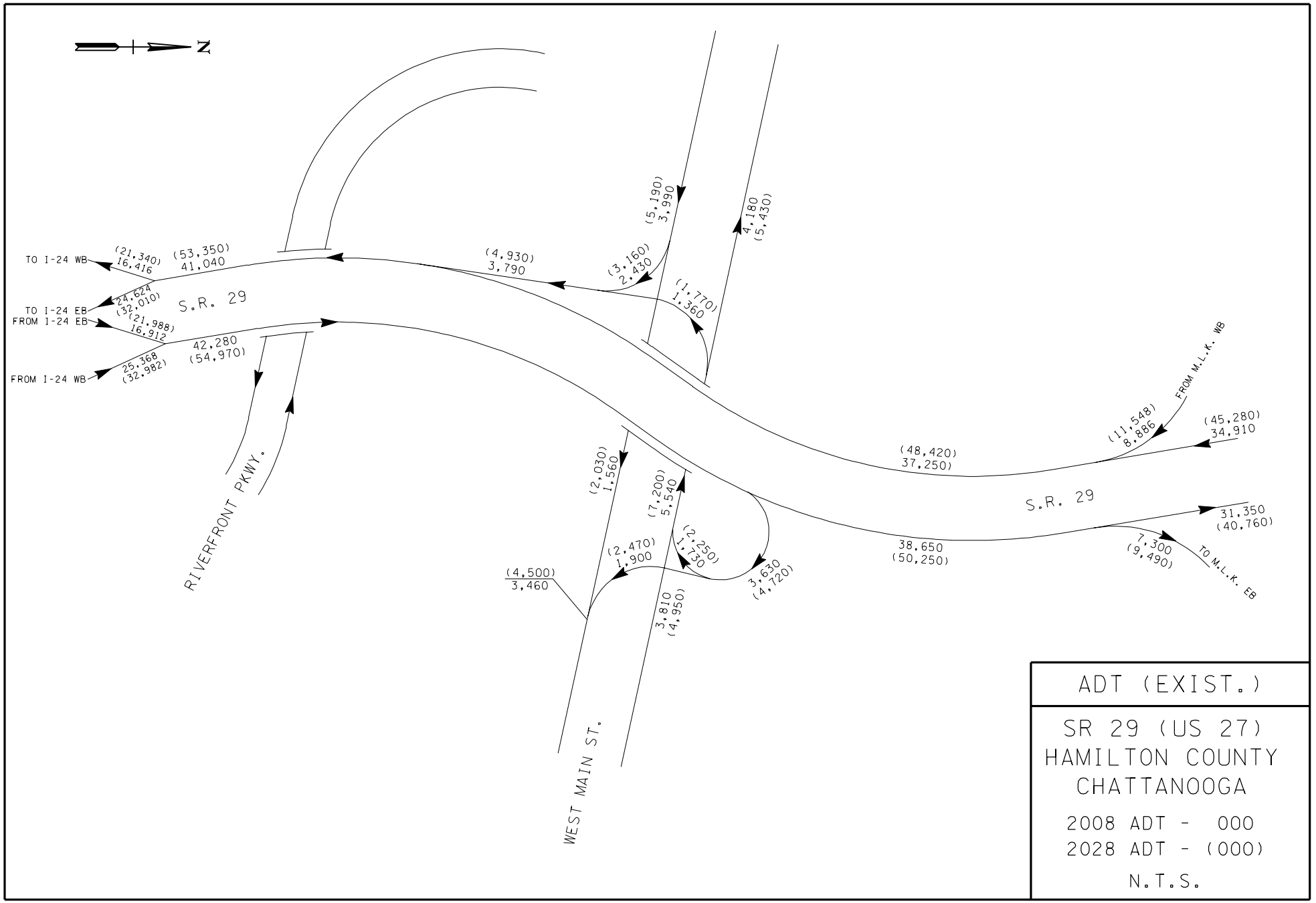

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HAMILTON COUNTY
CHATTANOOGA

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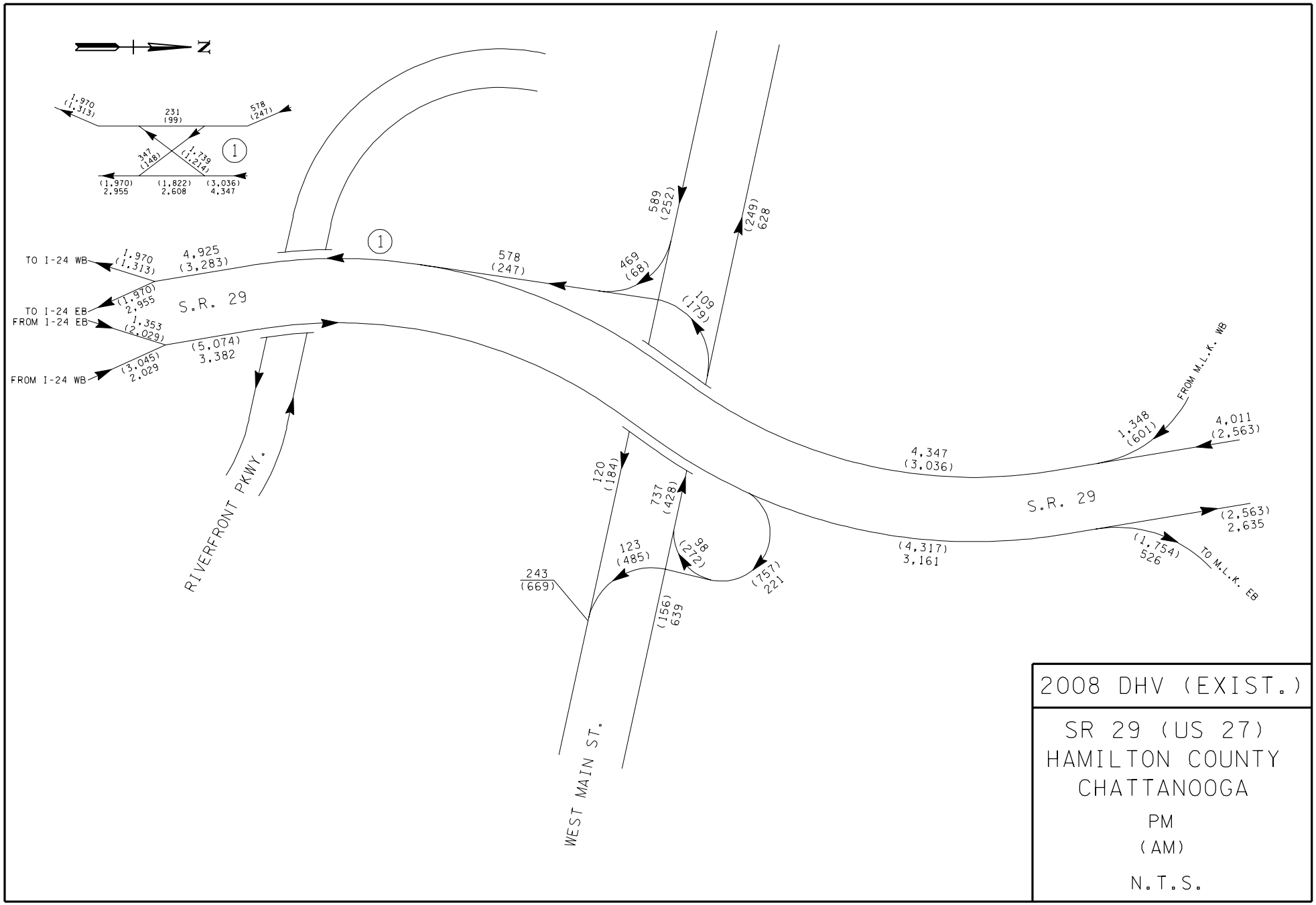

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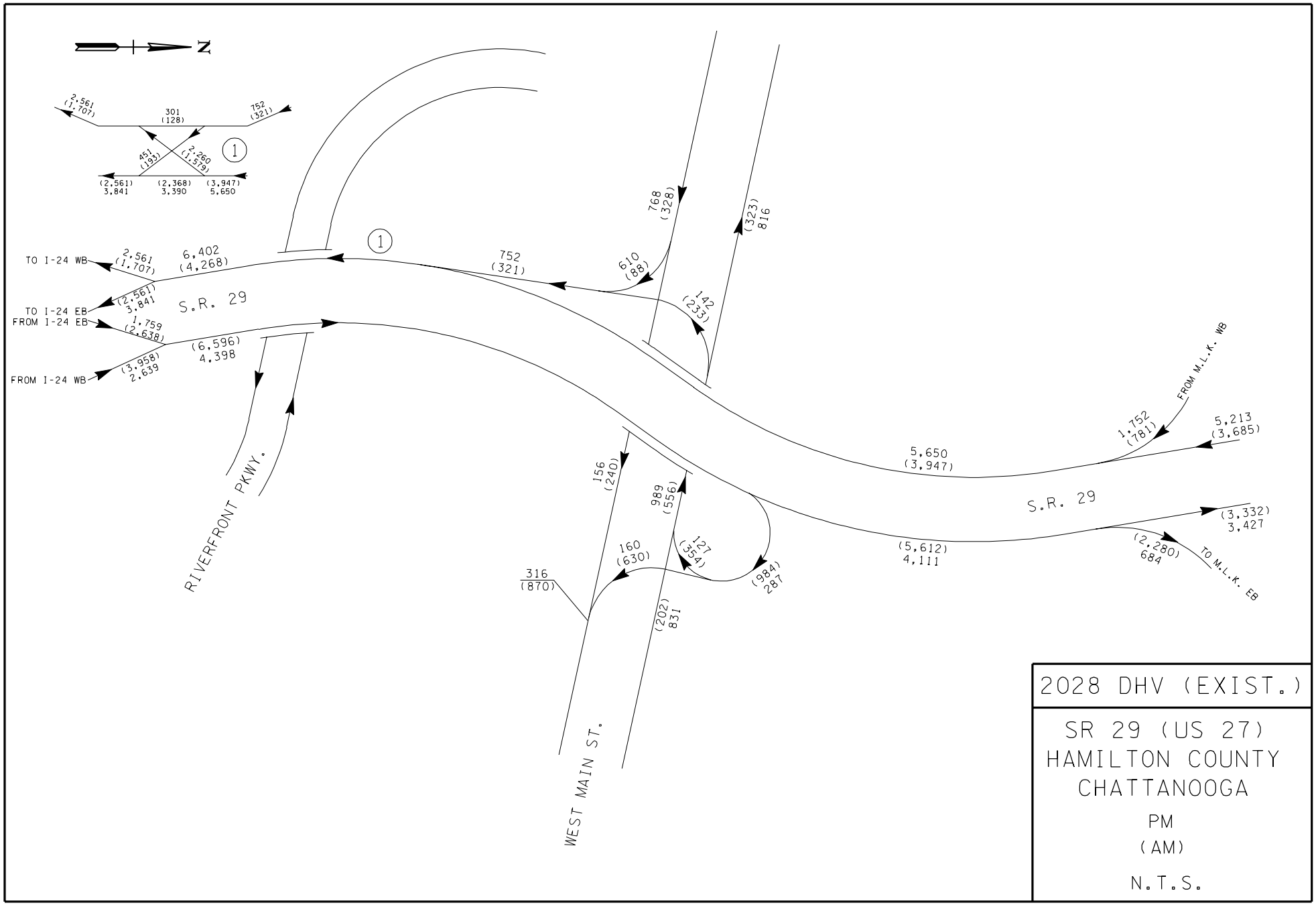

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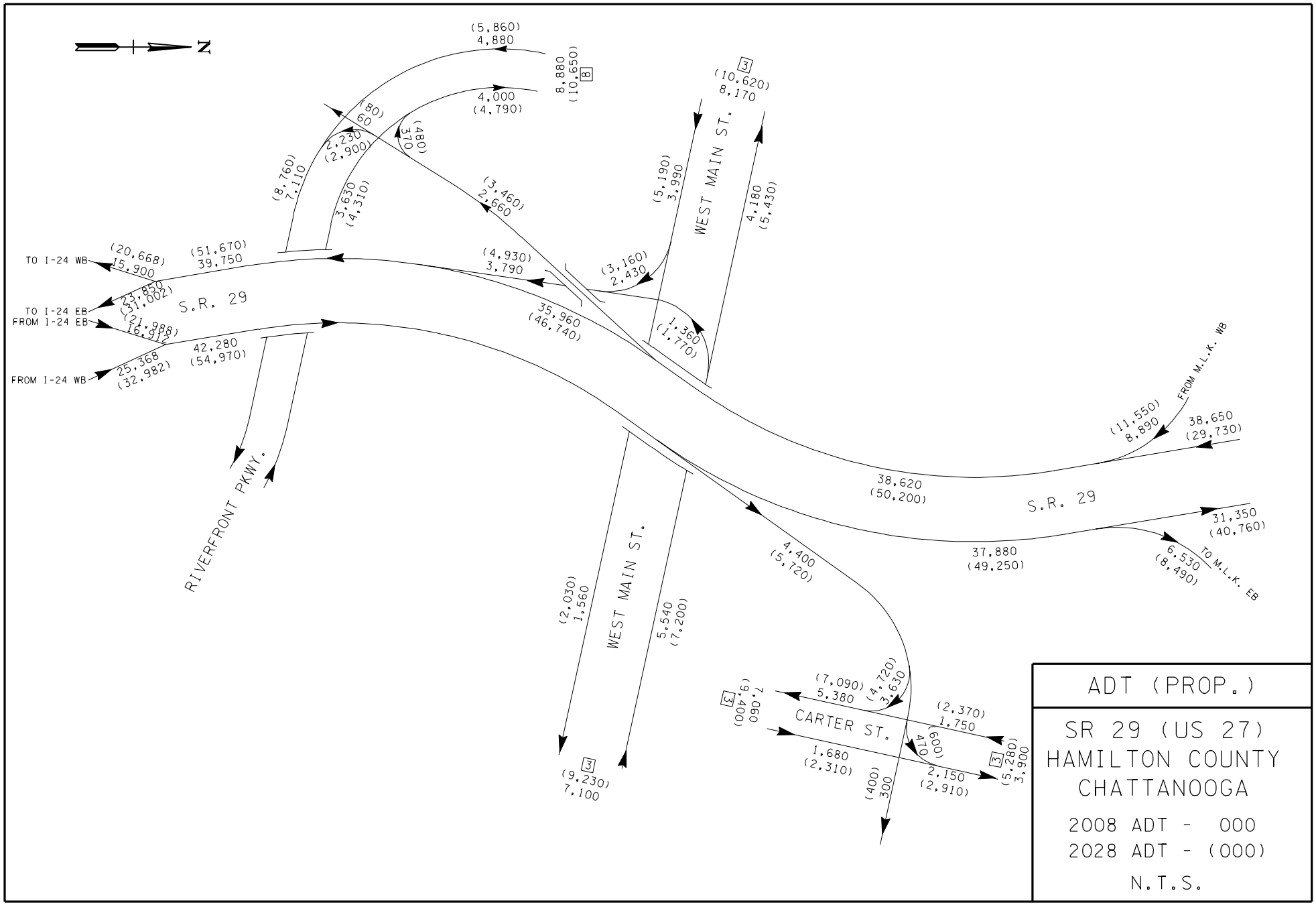

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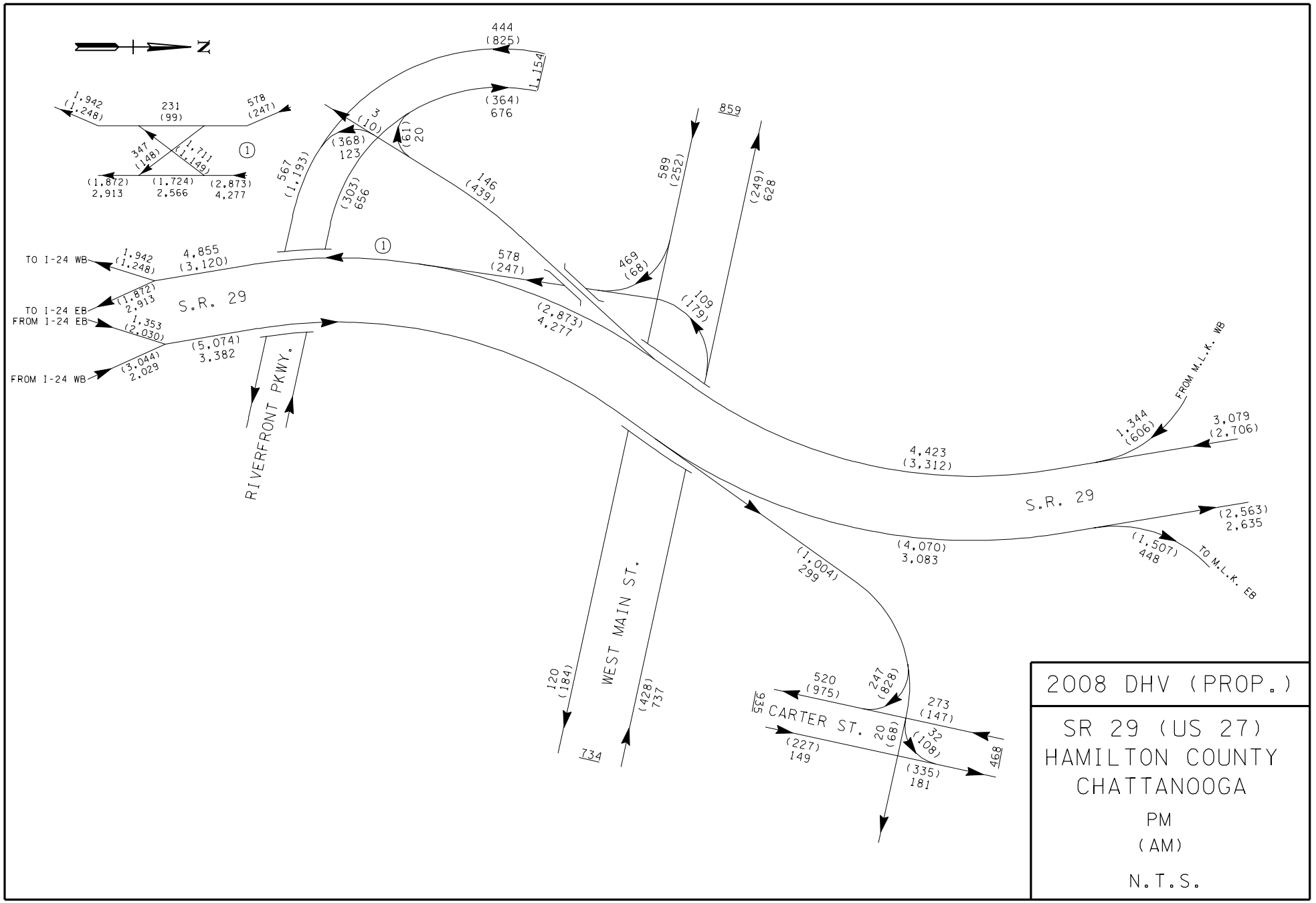

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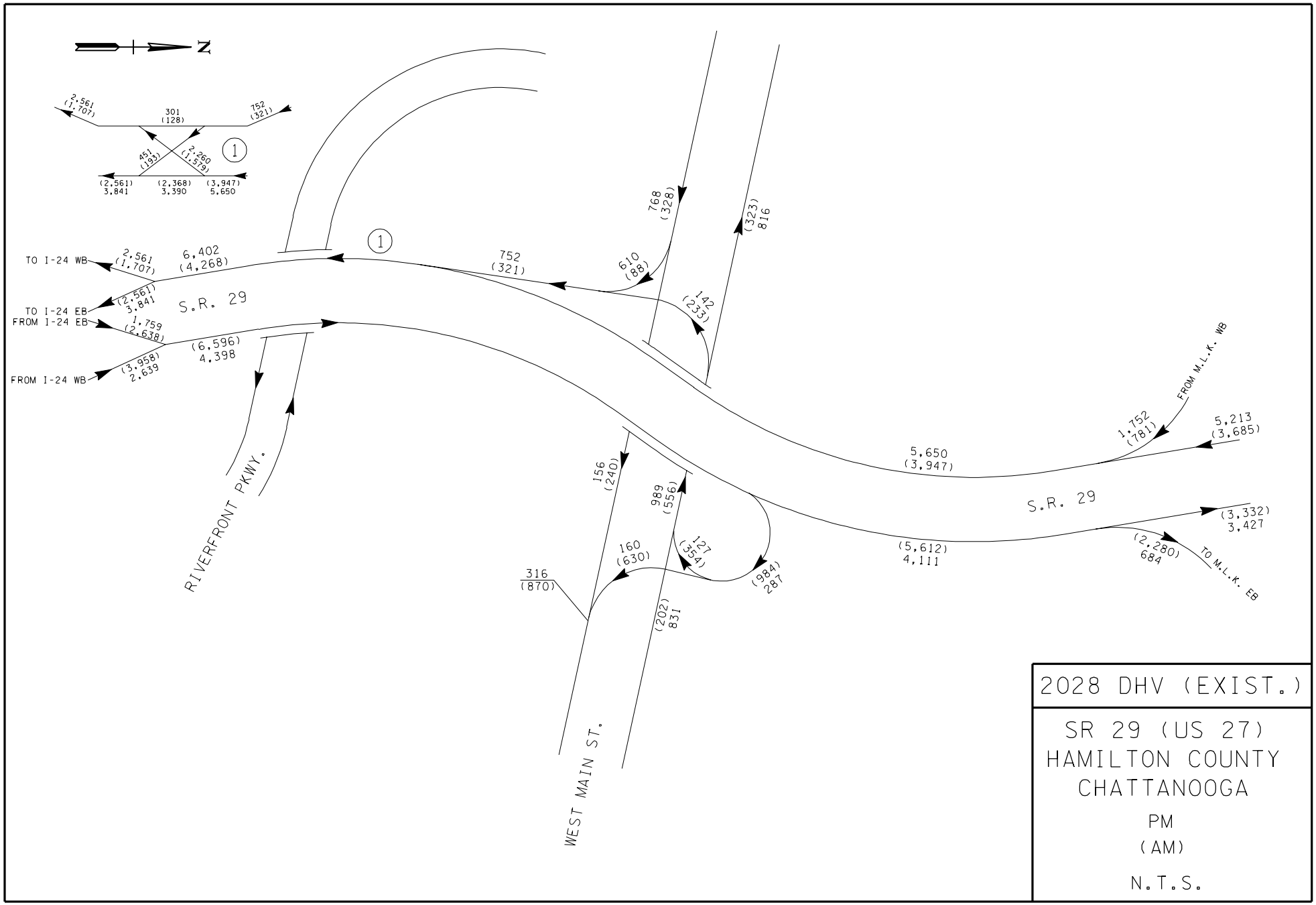

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CHATTANOOGA

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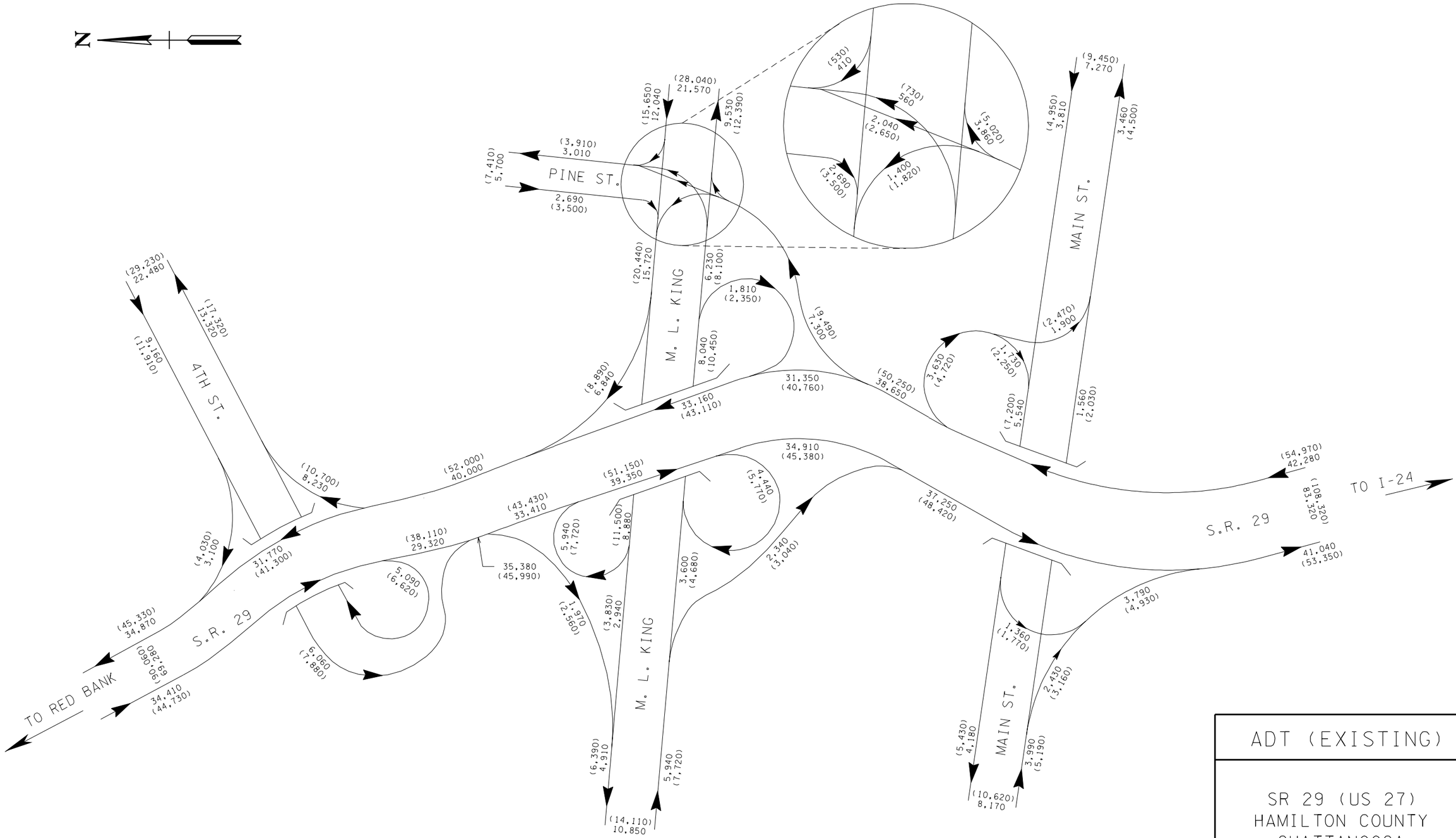

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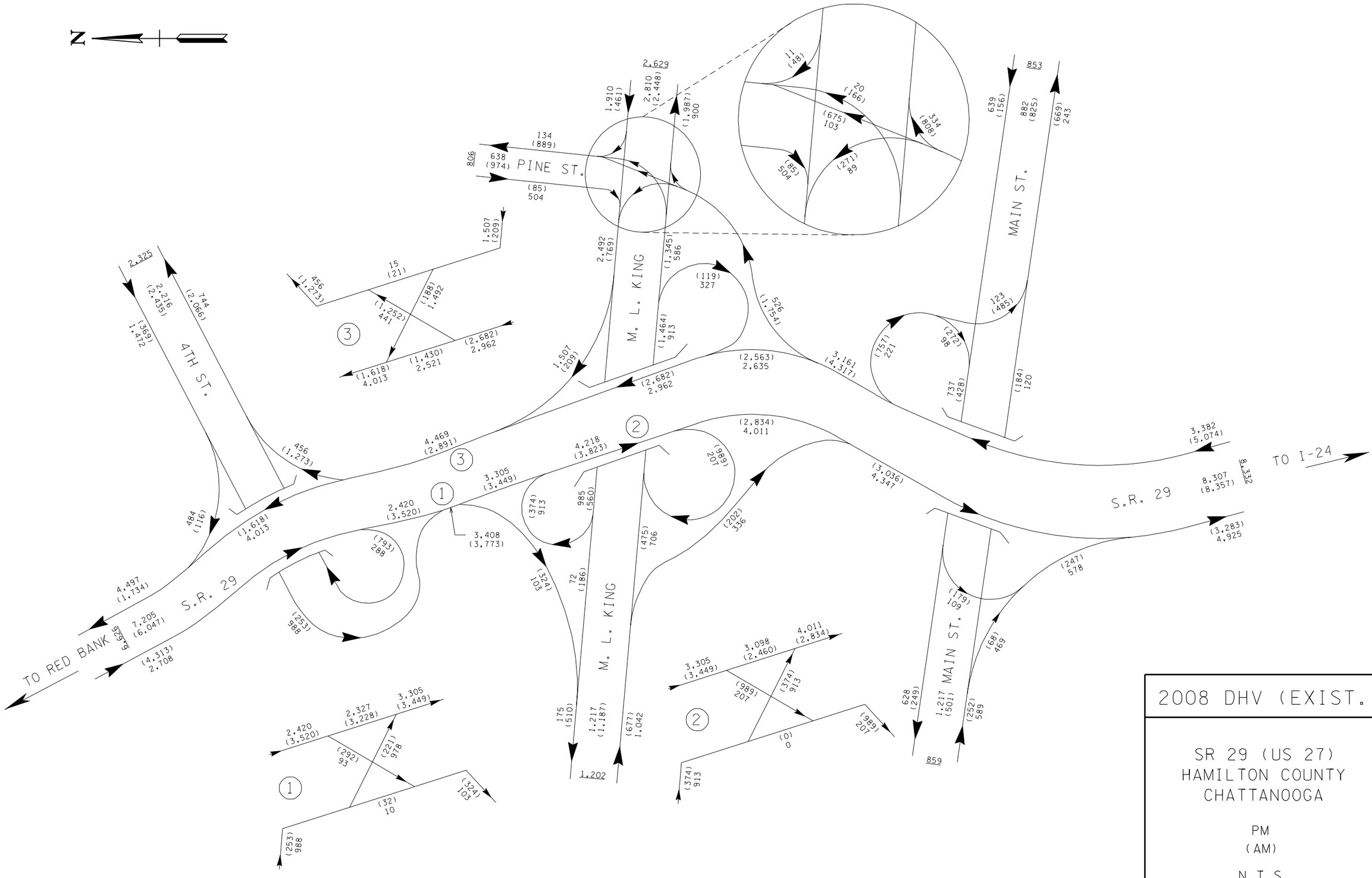
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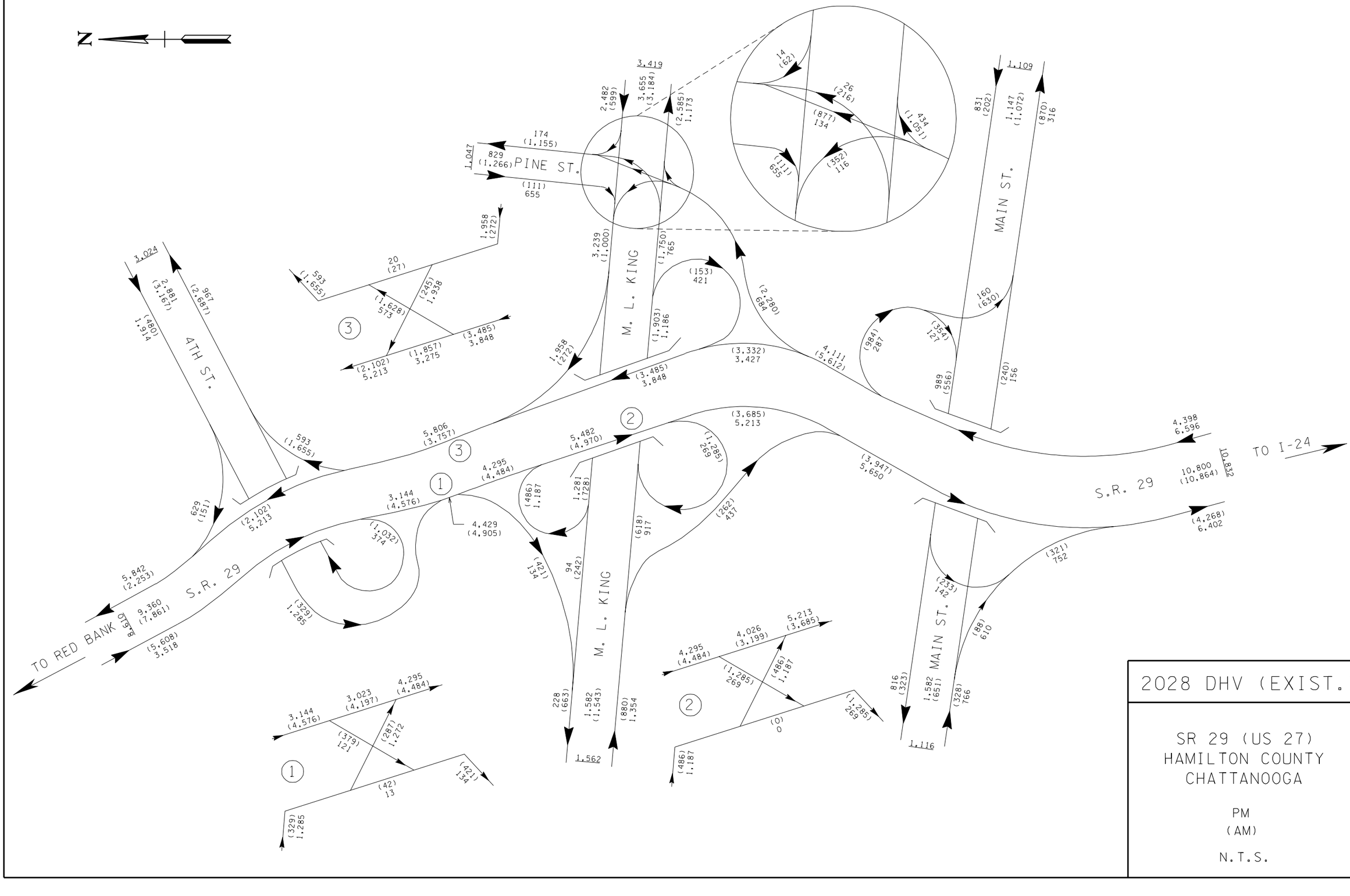

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CHATTANOOGA

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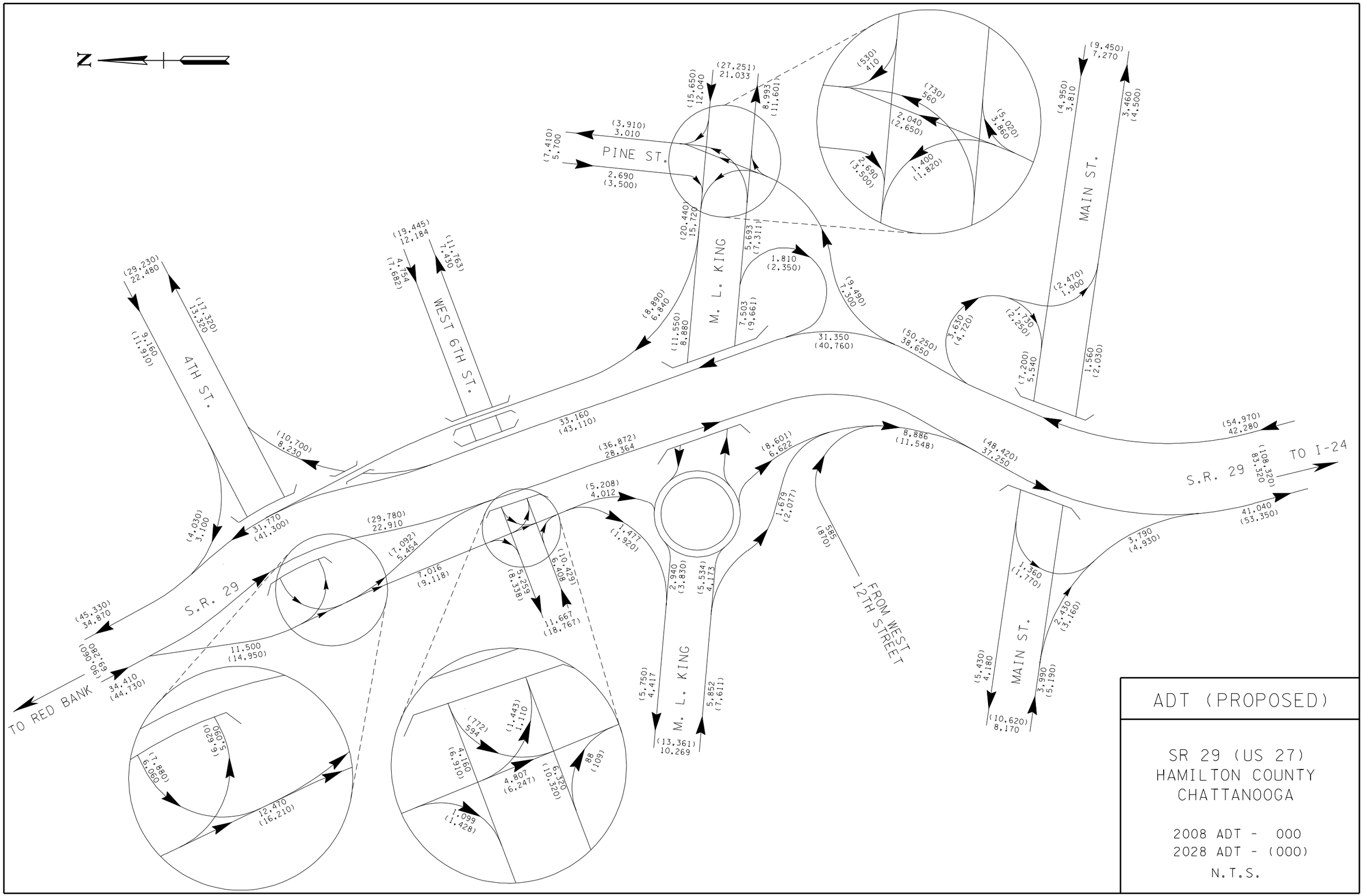
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MAIN ST.
WEST 6TH ST.
4TH ST.
S.R. 29
TO I-24
TO RED BANK
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HAMILTON COUNTY
CHATTANOOGA
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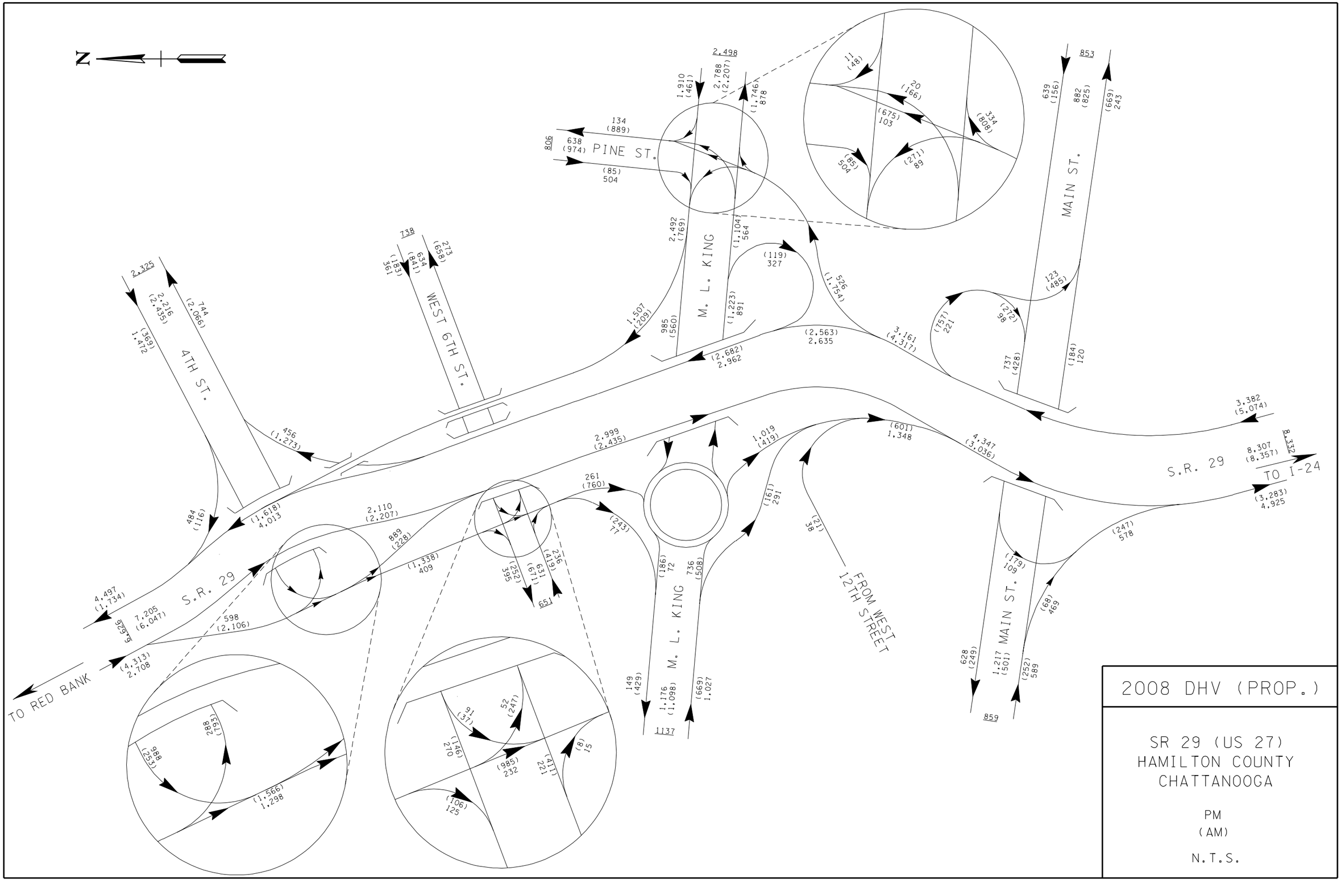
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M. L. KING
MAIN ST.
WEST 6TH ST.
4TH ST.
S.R. 29
TO I-24
TO RED BANK
FROM WEST 12TH STREET
M. L. KING
MAIN ST.
S.R. 29
2008 DHV (PROP.)
SR 29 (US 27)
HAMILTON COUNTY
CHATTANOOGA
PM
(AM)
N.T.S.

N

PINE ST.

M. L. KING

MAIN ST.

WEST 6TH ST.

4TH ST.

S.R. 29

TO I-24

TO RED BANK

FROM WEST 12TH STREET

M. L. KING

MAIN ST.

S.R. 29

2028 DHV (PROP.)

SR 29 (US 27)
HAMILTON COUNTY
CHATTANOOGA

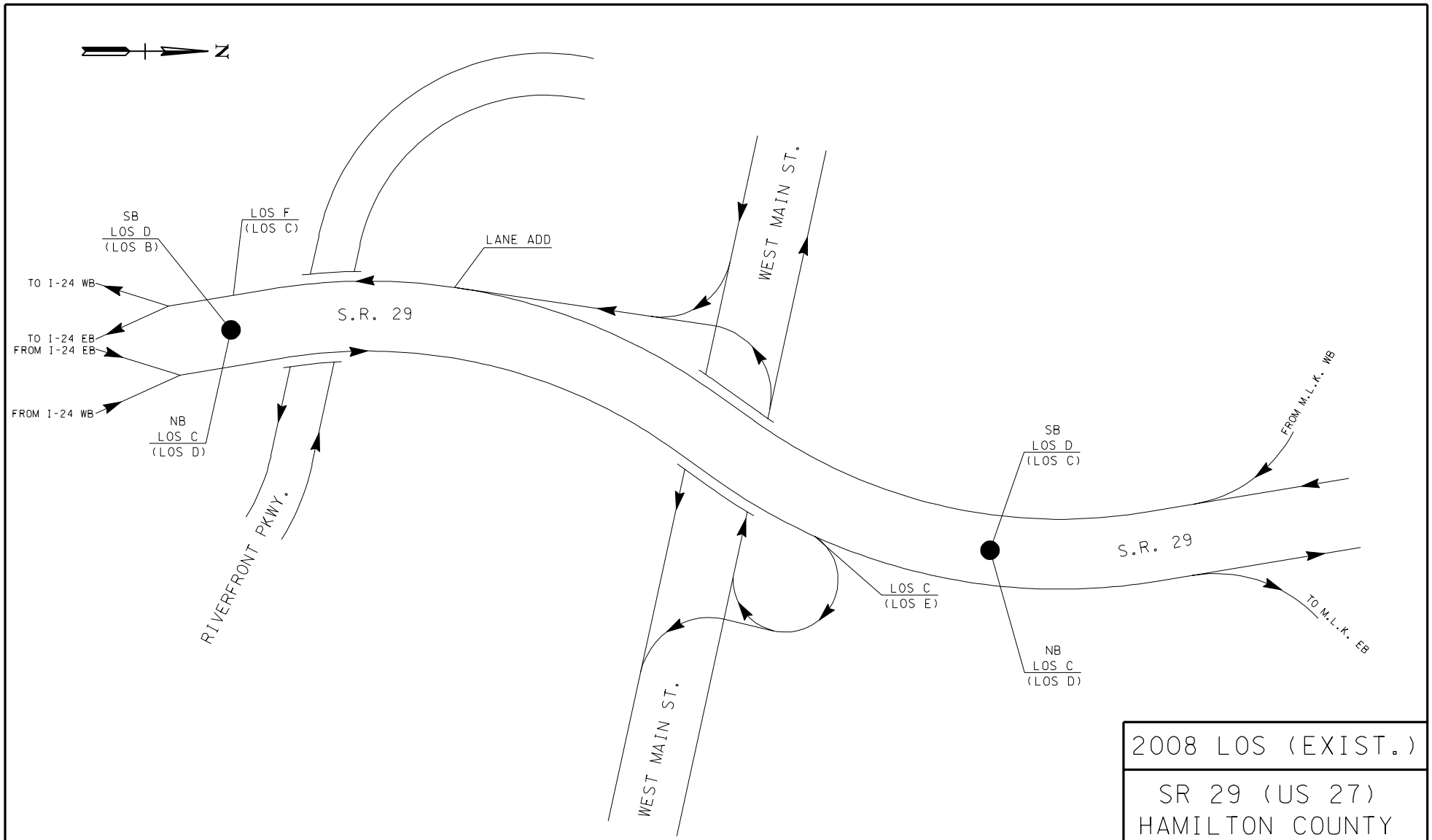
PM
(AM)

N.T.S.

APPENDIX B

LEVEL OF SERVICE DIAGRAMS: EXISTING AND PROPOSED

WEST MAIN STREET

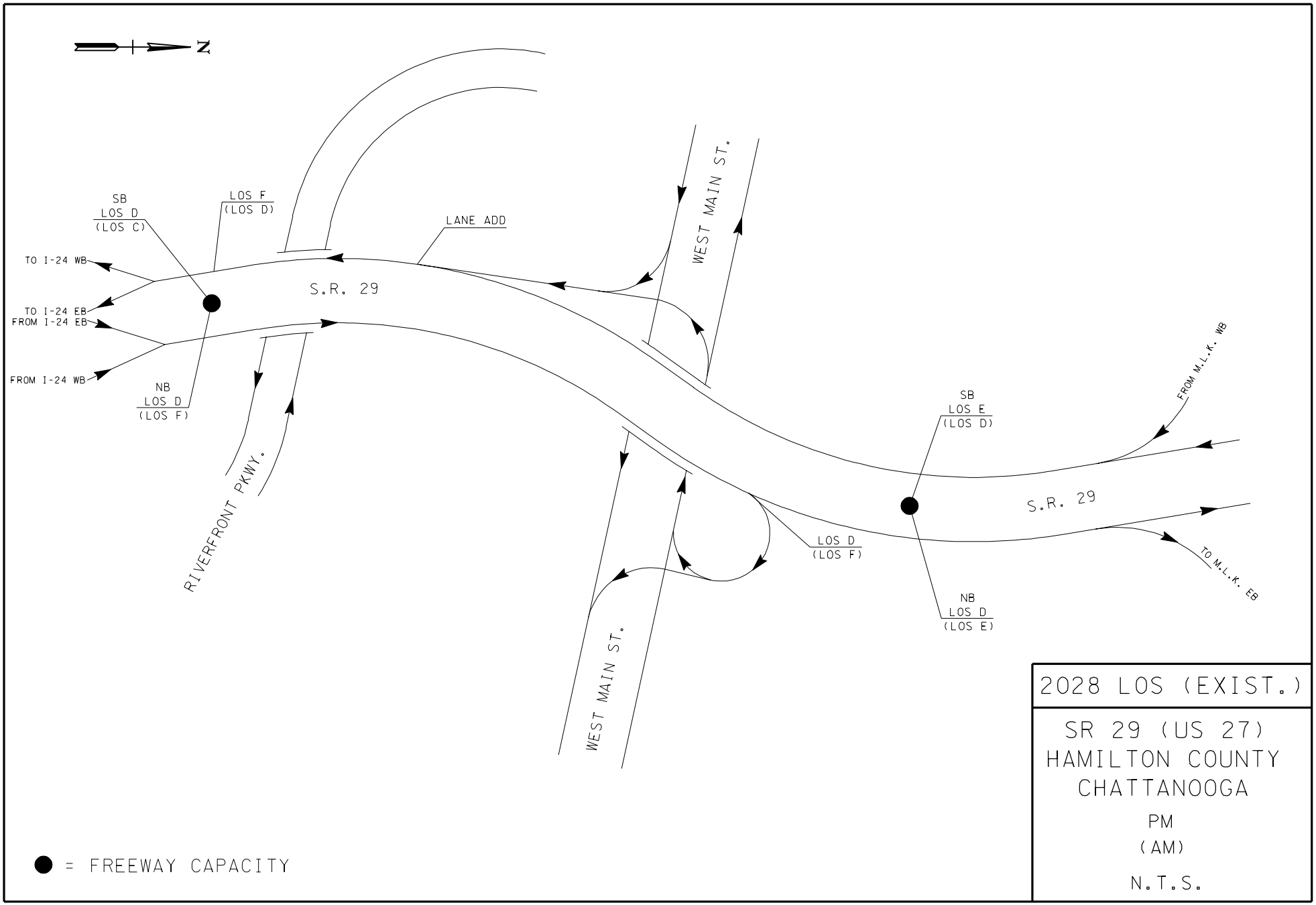


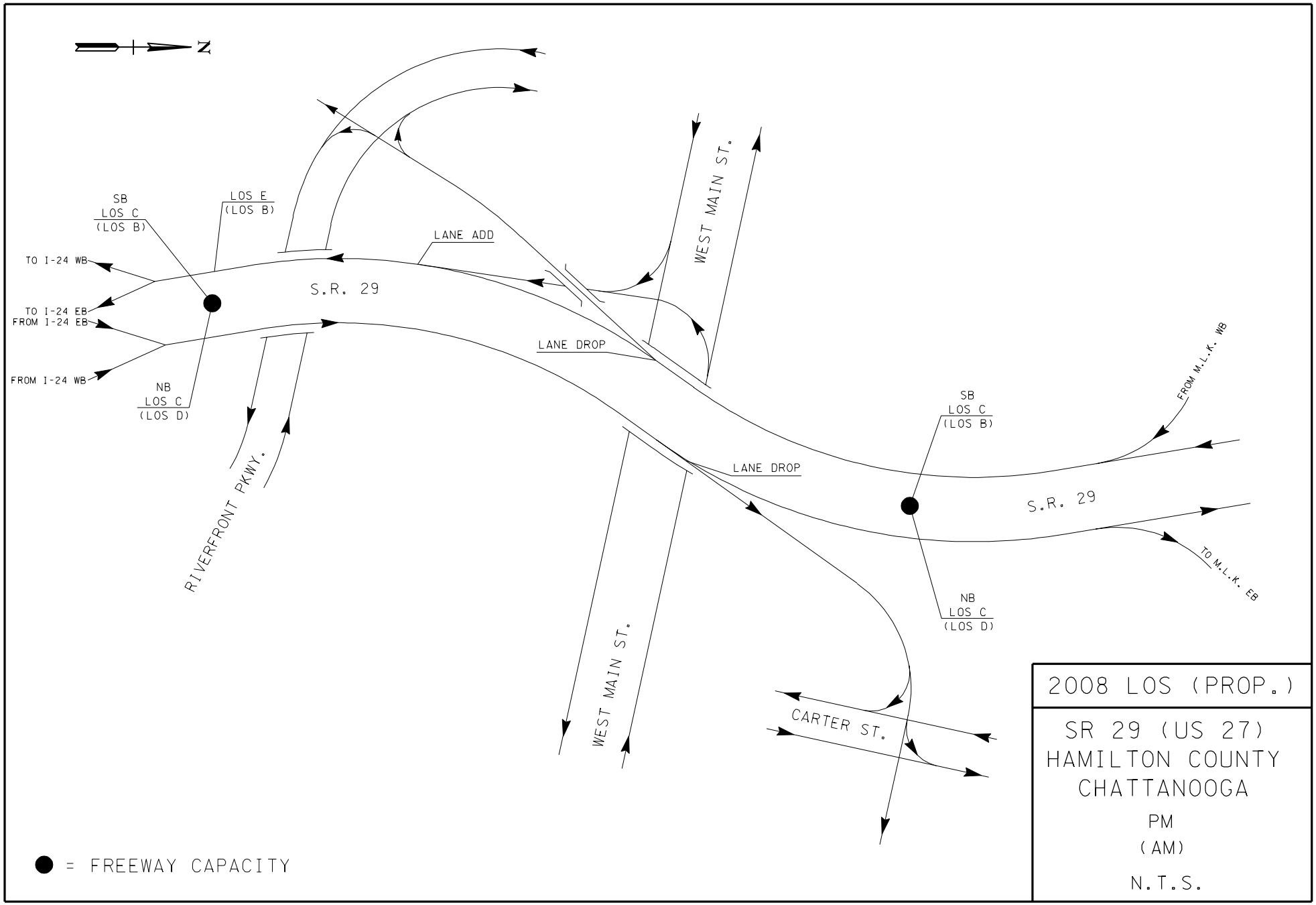
2008 LOS (EXIST.)

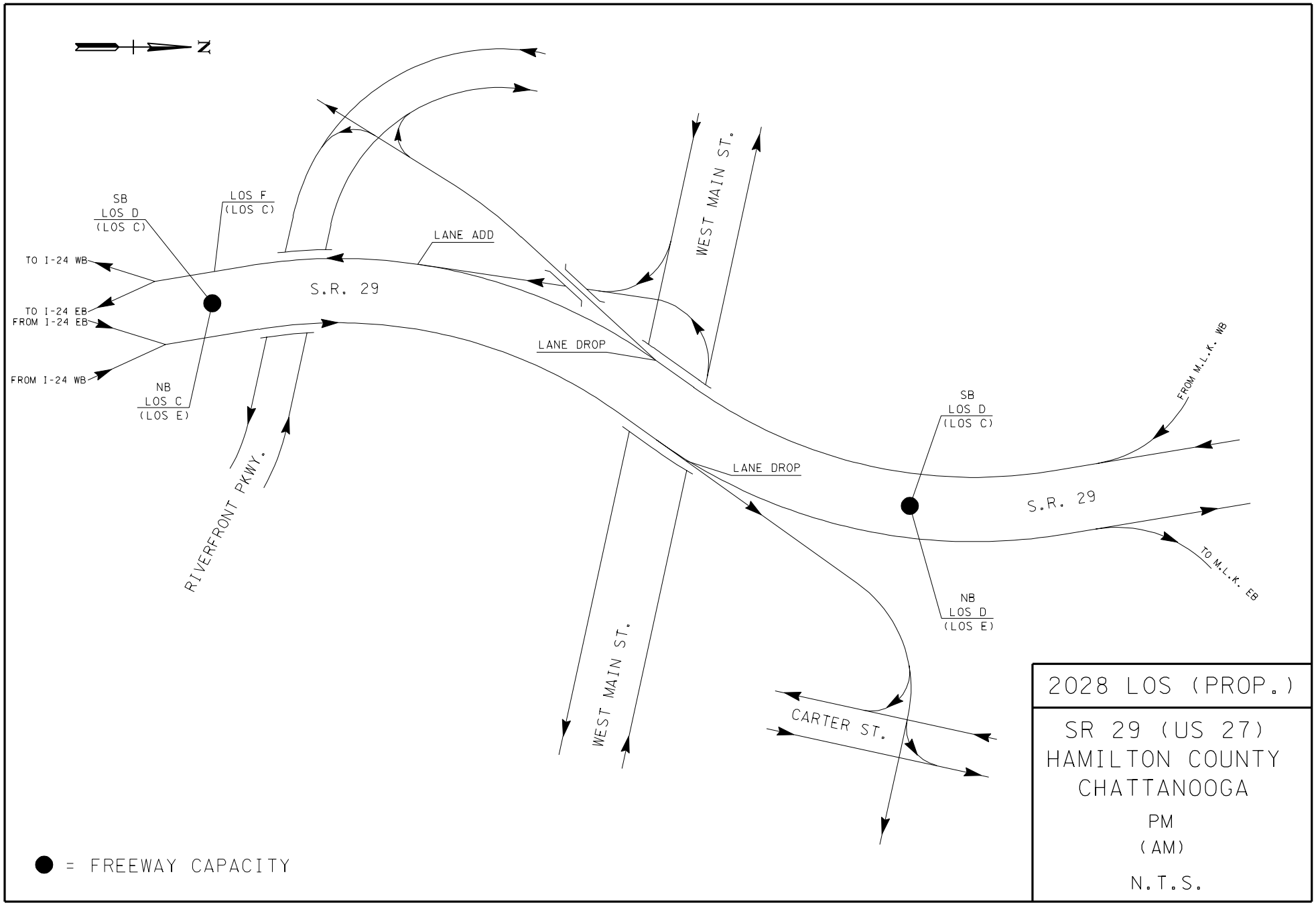
SR 29 (US 27)
HAMILTON COUNTY
CHATTANOOGA

PM
(AM)

N.T.S.


N
SB
LOS D
(LOS C)
LOS F
(LOS D)
LANE ADD
WEST MAIN ST.
TO I-24 WB
S.R. 29
TO I-24 EB
FROM I-24 EB
FROM I-24 WB
NB
LOS D
(LOS F)
RIVERFRONT PKWY.
SB
LOS E
(LOS D)
FROM M.L.K. WB
S.R. 29
LOS D
(LOS F)
TO M.L.K. EB
NB
LOS D
(LOS E)
WEST MAIN ST.
● = FREEWAY CAPACITY
2028 LOS (EXIST.)
SR 29 (US 27)
HAMILTON COUNTY
CHATTANOOGA
PM
(AM)
N.T.S.


N
SB
LOS C
(LOS B)
LOS E
(LOS B)
LANE ADD
WEST MAIN ST.
TO I-24 WB
S.R. 29
TO I-24 EB
FROM I-24 EB
FROM I-24 WB
LANE DROP
NB
LOS C
(LOS D)
FROM M.L.K. WB
SB
LOS C
(LOS B)
RIVERFRONT PKWY.
LANE DROP
S.R. 29
TO M.L.K. EB
NB
LOS C
(LOS D)
WEST MAIN ST.
CARTER ST.
● = FREEWAY CAPACITY
2008 LOS (PROP.)
SR 29 (US 27)
HAMILTON COUNTY
CHATTANOOGA
PM
(AM)
N.T.S.


N
SB
LOS D
(LOS C)
LOS F
(LOS C)
LANE ADD
WEST MAIN ST.
TO I-24 WB
S.R. 29
TO I-24 EB
FROM I-24 EB
FROM I-24 WB
NB
LOS C
(LOS E)
LANE DROP
SB
LOS D
(LOS C)
FROM M.L.K. WB
RIVERFRONT PKWY.
LANE DROP
S.R. 29
TO M.L.K. EB
NB
LOS D
(LOS E)
WEST MAIN ST.
CARTER ST.
● = FREEWAY CAPACITY
2028 LOS (PROP.)
SR 29 (US 27)
HAMILTON COUNTY
CHATTANOOGA
PM
(AM)
N.T.S.

MLK BLVD. & EAST 4TH STREET

N

PINE ST.

SIGNAL
LOS F
(LOS B)

M. L. KING

MAIN ST.

NB
LOS D
(LOS C)

LANE DROP

LOS C
(LOS D)

4TH ST.

NB
LOS C
(LOS D)

LANE ADD

LANE DROP

LOS F
(LOS F)

LOS E
(LOS E)

LANE DROP

LANE DROP

LANE ADD

LANE ADD

LANE DROP

LOS C
(LOS C)

SB
LOS C
(LOS C)

LOS C
(LOS F)

SB
LOS C
(LOS D)

TO I-24

S.R. 29

LANE ADD

NB
LOS B
(LOS D)

S.R. 29

TO RED BANK

SB
LOS D
(LOS C)

M. L. KING

MAIN ST.

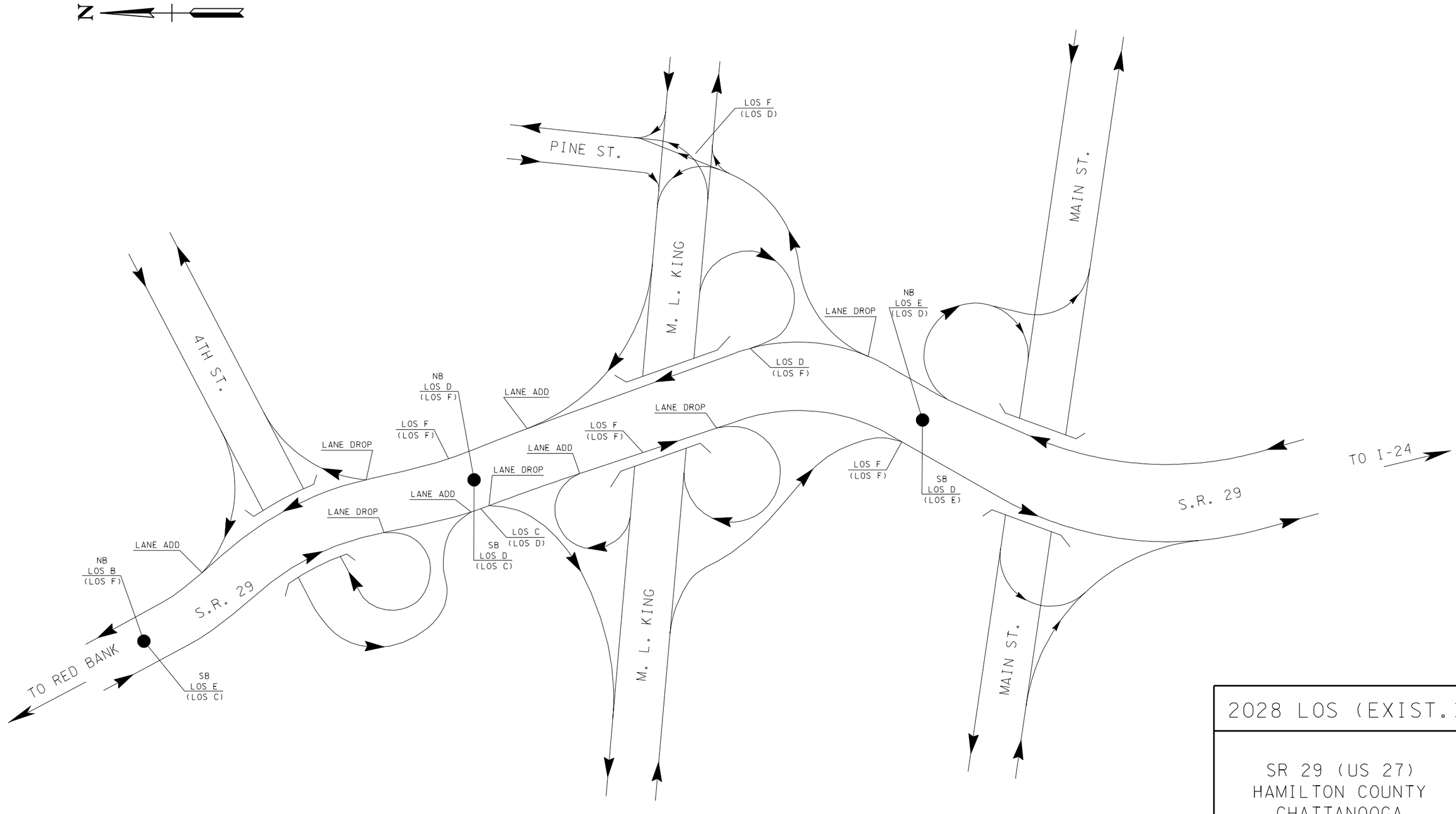
● = FREEWAY CAPACITY

2008 LOS (EXIST.)

SR 29 (US 27)
HAMILTON COUNTY
CHATTANOOGA

AM
(PM)

N.T.S.



2028 LOS (EXIST.)

SR 29 (US 27)
HAMILTON COUNTY
CHATTANOOGA

AM
(PM)

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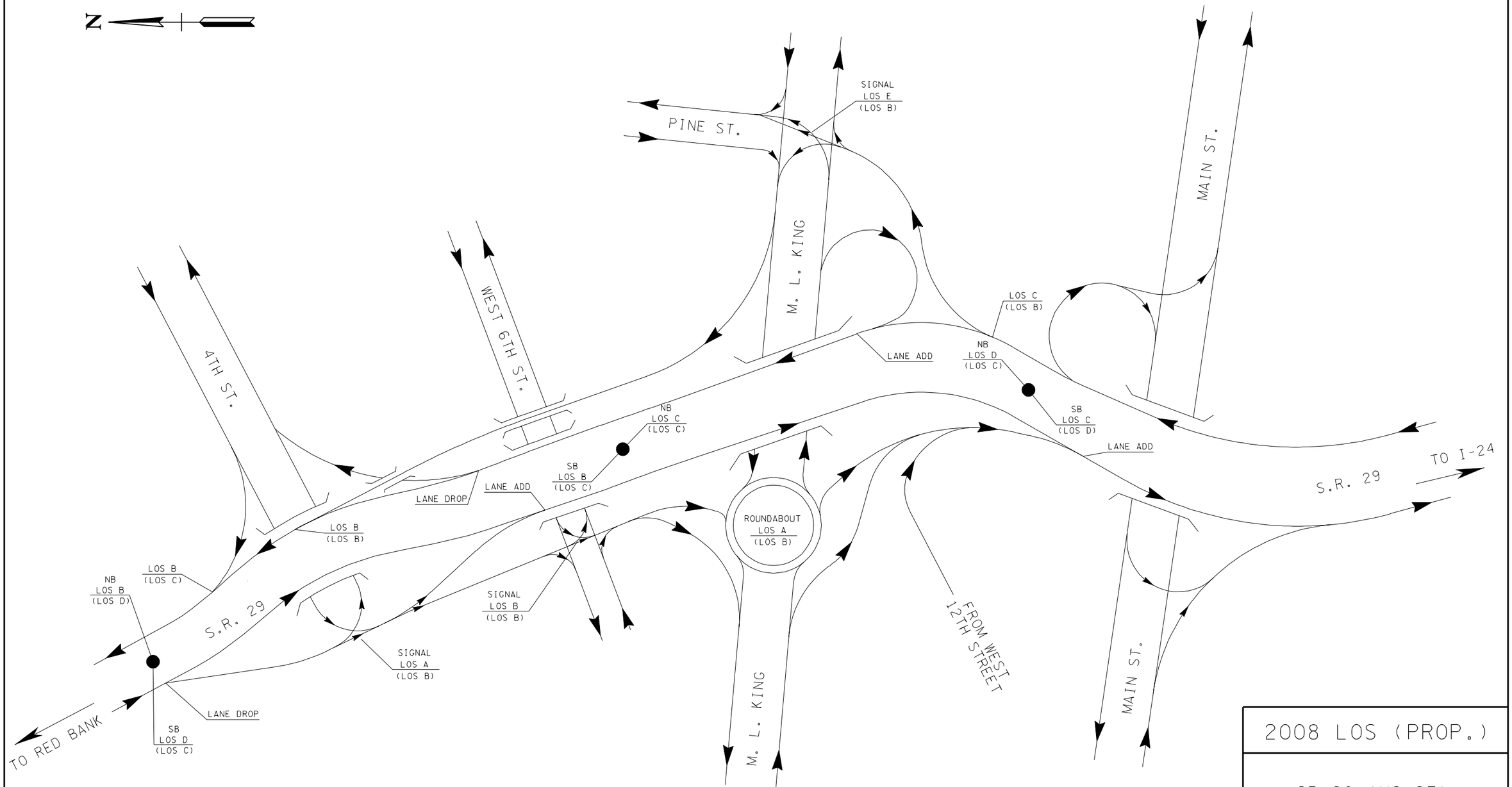

2008 LOS (PROP.)

SR 29 (US 27)
HAMILTON COUNTY
CHATTANOOGA

AM
(PM)

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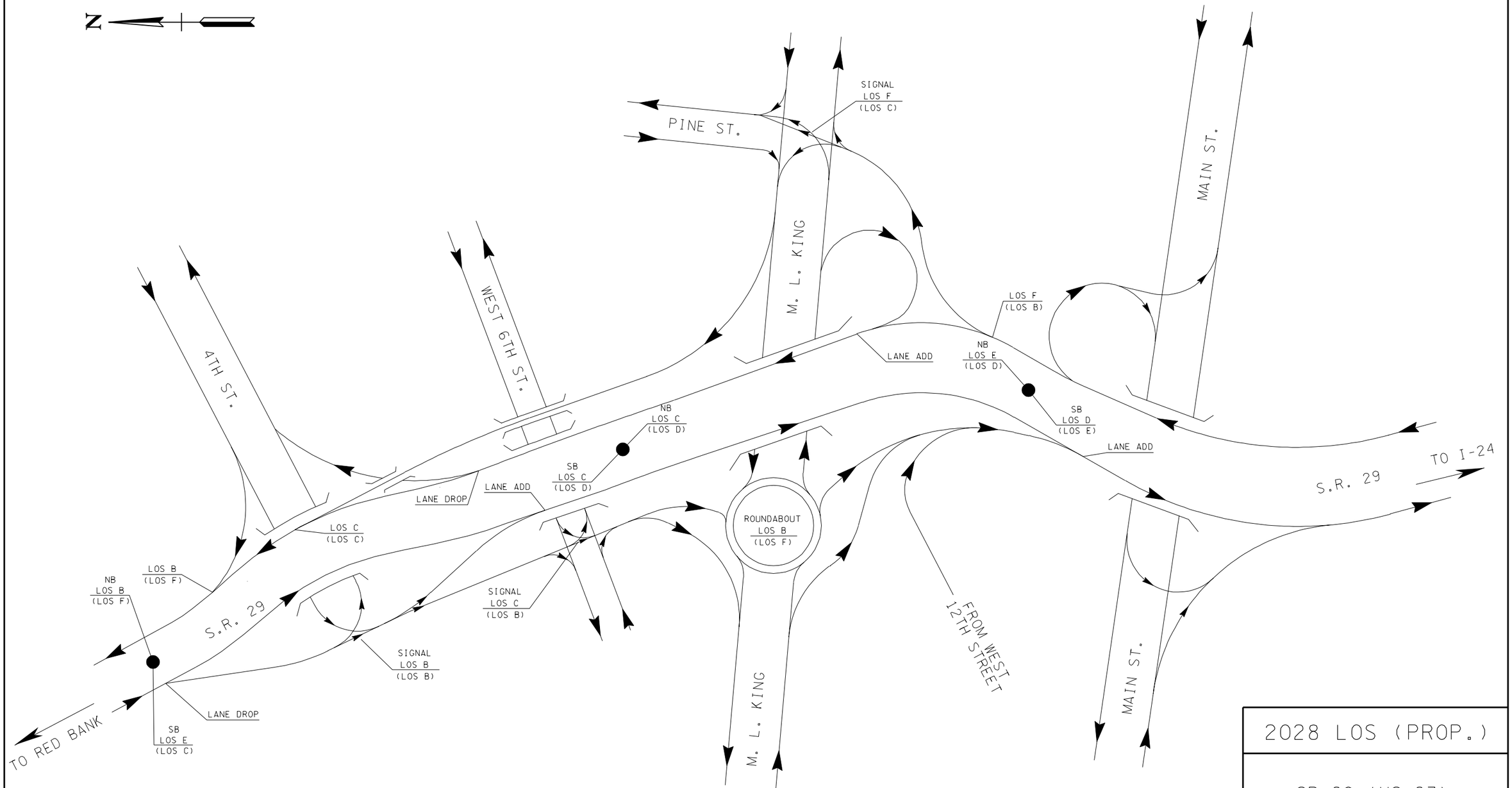


2028 LOS (PROP.)

SR 29 (US 27)
HAMILTON COUNTY
CHATTANOOGA

AM
(PM)

N.T.S.

APPENDIX C

COST ESTIMATES

COST DATA SHEET

PROJECT: I-124 (SR-29) Interchange Modification Study
LOCATION: Chattanooga, Hamilton County, Tennessee
LENGTH: 1.62 miles
CROSS SECTION: N.A.

RIGHT-OF-WAY				
Land, Improvements & Damages	(# Acres	4.00)	$938,000	
Incidentals	(# Tracts	4)	$35,000	
Relocation Payments	(Residences	0)	$0	
	(Businesses	1)	$100,000	
	(Non-Profits	0)		
Total Right-Of-Way Cost				**$1,073,000**
UTILITY RELOCATION				
Reimbursable			$0	
Non-Reimbursable			$322,000	
Total Utility Adjustment Cost				**$322,000**
CONSTRUCTION				
Clear and Grubbing			$153,000	
Earthwork			$3,044,000	
Pavement Removal / Median Barrier			$360,000	
Drainage (Erosion Control =	$375,000)		$1,375,000	
Structures			$10,838,000	
Railroad Crossing			$0	
Paving			$2,755,000	
Retaining Walls			$5,030,000	
Maintenance of Traffic			$875,000	
Topsoil			$21,000	
Seeding			$16,000	
Sodding			$146,000	
Signing			$475,000	
Signalization			$575,000	
Fence			$33,000	
Guardrail			$133,000	
Rip-rap or Slope Protection			$54,000	
Other Construction Items (8.5%)			$1,279,000	
Mobilization			$995,000	
10% Engineering and Contigencies			$2,816,000	
Total Construction Cost				**$30,973,000**
Preliminary Engineering (10% of Constr.)				**$2,816,000**

TOTAL ESTIMATE COST **$35,184,000**

Interstate 124 and Martin Luther King Boulevard
Cost Estimate
CEA Project No. 01024.06

							Total Cost
Clearing & Grubbing							**$150,000**
Earthwork	Length (ft)	Factor		Total (yd^3)		Cost / yd^3	
	1,500	81.5		122,250			
	750	91.7		68,775			
	5,800	6.3		36,540			
	1,200	25.11		30,132			
			Total:	257,697			
			Total Earthwork Cost:			$10.0	**$2,576,970**
Pavement Removal	Length			Cost/lf			
	6,200			$9			**$55,800**
Concrete Median Barrier	Length			Cost/lf			
	5,900			$50			**$295,000**
Drainage							**$625,000**
Erosion Control							**$225,000**
Structures	Bridges	Width	Length	Area	Cost/sf		
		0	0	0	$65		$0
	Bridge Rail		0	ft	$100.00	per ft.	$0
	Demolition	Width	Length	Area	Cost/sf		
		0	0	0	$15		$0
				Total Demolition Cost:			**$0**
				* Total Structure Cost:			**$6,395,550**
	* Includes removal of existing bridges as per memo from TDOT Bridge Division						
Fence		Length	Cost				
		2,100	$10				**$21,000**
Paving		Length	Cost				
	Overlay	6,950	$75				$521,250
	1-Lane Ramp	4,400	$85				$374,000
	2-Lane Ramp	5,100	$160				$816,000
	Rebuilt Mainline	1,000	$210				$210,000
				Total Paving Cost:			**$1,921,250**

Retaining Walls

Retaining Wall

Height	Length	Area	Cost/sf	
10	3,150	31,500	$35	$1,102,500
15	300	4,500	$45	$202,500
20	1,600	32,000	$55	$1,760,000
		Total Retaining Wall Cost:		**$3,065,000**

Maintenance of Traffic **$525,000**

Topsoil

Length	Factor	Total	Cost per	
5,000	0.565	0	$4.00	**$11,300**

Seeding

Length	Factor	Total	Cost per	
5,000	0.122	0	$16.00	**$9,760**

Sodding

Length	Factor	Total	Cost per	
2,500	3.389	0	$5.00	**$42,363**

Signing **$475,000**

Signalization & Roundabout Two new & one modified **$575,000**

Guardrail

		Number of Terminals	Cost	
		10	$2,000	$20,000
Length of rail	3,000 ft		$20	$60,000
			Total Guardrail:	**$80,000**

Rip-Rap

Length		Cost	
2,500	Tons	$15	**$37,500**

Right-of-Way

			Cost/acre	Cost			
Total acreage	2.3	acres	$75,000	$172,500			
Slope Easmt.	0.0	acres	$15,000	$0			
Const. Easmt.	0.0	acres	$10,000	$0			
			Total	$172,500	Factor	146%	$251,850
No. of Tracts	1	Cost/tract	$5,000				$5,000
Relocate 0 Businesses			0	@	$100,000		$0
Relocate 0 Residences			0	@	$10,000		$0
				Total Right-of-Way Cost:			**$256,850**

Utilities

Reimbursable

	Length (ft)	Cost/ft		Total Cost
12" Steel Gas	0	$84		$0
16" Water	0	$45		$0
			Total Reimbursable	**$0**

Non-Reimbursable

	Length (ft)		Cost/ft		Total Cost
6" Water	1,800		$22		$39,600
6" Gas	1,800		$40		$72,000
			Cost/each		
Electric	20	Poles	$2,000		$40,000
Telephone	20	Poles	$1,400		$28,000
				Total Non-Reimbursable	**$179,600**
				Total Utility Cost:	**$179,600**

Cost Estimate **Main Street Interchange**
CEA Project No. E01024_06 July 25, 2005

						Total Cost
Clearing & Grubbing		1.7	$2,000			**$3,400**
Earthwork	Length (ft)	Factor	Total (yd^3)		Cost / yd^3	
	2,295	8.889	20,400			
	2,950	4.444	13,110			
	800	8.148	6,518			
	300	14.07	4,221			
	450	5.56	2,502			
			Total:	46,751		
			Total Earthwork Cost:		$10.0	**$467,515**
Pavement Removal	Length		Cost/lf			
	1,050		$9			**$9,450**
Concrete Median Barrier	Length		Cost/lf			
	0		$50			**$0**
Drainage						**$375,000**
Erosion Control						**$150,000**
Structures	Bridges	Width	Length	Area	Cost/sf	
	Riverfront Pkwy (NB)	24	220	5,280	$65	$343,200
	Abandoned RR (NB)	24	200	4,800	$65	$312,000
	W. Main Street (NB)	12	200	2,400	$65	$156,000
	Riverfront Pkwy (SB)	12	220	2,640	$65	$171,600
	Abandoned RR (SB)	29	170	4,930	$65	$320,450
	W. Main Street (SB)	20	200	4,000	$65	$260,000
	FlyOver NB from MLK	29	1,100	31,900	$85	$2,711,500
	Bridge Rail		1680	ft	$100.00 per ft.	$168,000
	Demolition	Width	Length	Area	Cost/sf	
		0	0	0	$15	$0
				Total Demolition Cost:		**$0**
				Total Structure Cost:		**$4,442,750**
Fence	Length	Cost				
	1,155	$10				**$11,550**
Paving	Length	Cost				
	3,650	$85				$310,250
	250	$160				$40,000
	2,300	$210				$483,000
			Total Paving Cost:			**$833,250**

Retaining Walls

Retaining Wall	Height	Length	Area	Cost/sf	
	10	200	2,000	$35	$70,000
	20	945	18,900	$55	$1,039,500
	10	730	7,300	$35	$255,500
	10	200	2,000	$35	$70,000
	20	170	3,400	$55	$187,000
	10	130	1,300	$35	$45,500
	10	850	8,500	$35	$297,500
			Total Retaining Wall Cost:		**$1,965,000**

Maintenance of Traffic **$350,000**

Topsoil

Length	Factor	Total	Cost per	
1,250	0.574	718	$4.00	**$2,870**
300	0.383	115	$4.00	**$460**
3,000	0.565	1,695	$4.00	**$6,780**

Seeding

Length	Factor	Total	Cost per	
2,650	0.062	164	$16.00	**$2,629**
300	0.041	12	$16.00	**$197**
1,600	0.122	195	$16.00	**$3,123**

Sodding

Length	Factor	Total	Cost per	
6,100	3.389	20,673	$5.00	**$103,365**

Signing **$0**

Signalization **$0**

Guardrail

		Number of Terminals		Cost	
		9		$2,000	$18,000
Length of rail	1,750 ft			$20	$35,000
			Total Guardrail:		**$53,000**

Rip-Rap

Length		Cost	
1,100	Tons	$15	**$16,500**

Right-of-Way

			Cost/acre	Cost			
Total acreage	1.7	acres	$100,000	$170,000			
Buildings	1	LS Cost		$300,000			
			Total	$470,000	Factor	146%	$686,200
No. of Tracts	3	Cost/tract	$10,000				$30,000
Relocate 1 Businesses			1	@	$100,000		$100,000

Relocate 0 Residences	0	@	$10,000	$0
		Total Right-of-Way Cost:		**$816,200**

Utilities

Reimbursable

	Length (ft)	Cost/ft	Total Cost
12" Steel Gas	0	$84	$0
16" Water	0	$45	$0
		Total Reimbursable	**$0**

Non-Reimbursable

	Length (ft)		Cost/each	Total Cost
6" Water	1,150		$22	$25,300
6" Gas	1,150		$40	$46,000
			Cost/each	
Electric	21	Poles	$2,000	$42,000
Telephone	21	Poles	$1,400	$29,400
			Total Non-Reimbursable	**$142,700**
			Total Utility Cost:	**$142,700**

APPENDIX D

FUNCTIONAL PLANS

TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

Index Of Sheets

SHEET NO.	DESCRIPTION
1	..... TITLE SHEET
2-2A	..... TYPICAL SECTIONS
3-13	..... FUNCTIONAL LAYOUTS

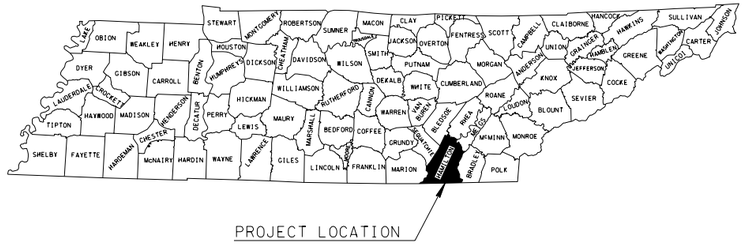
STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
BUREAU OF ENGINEERING

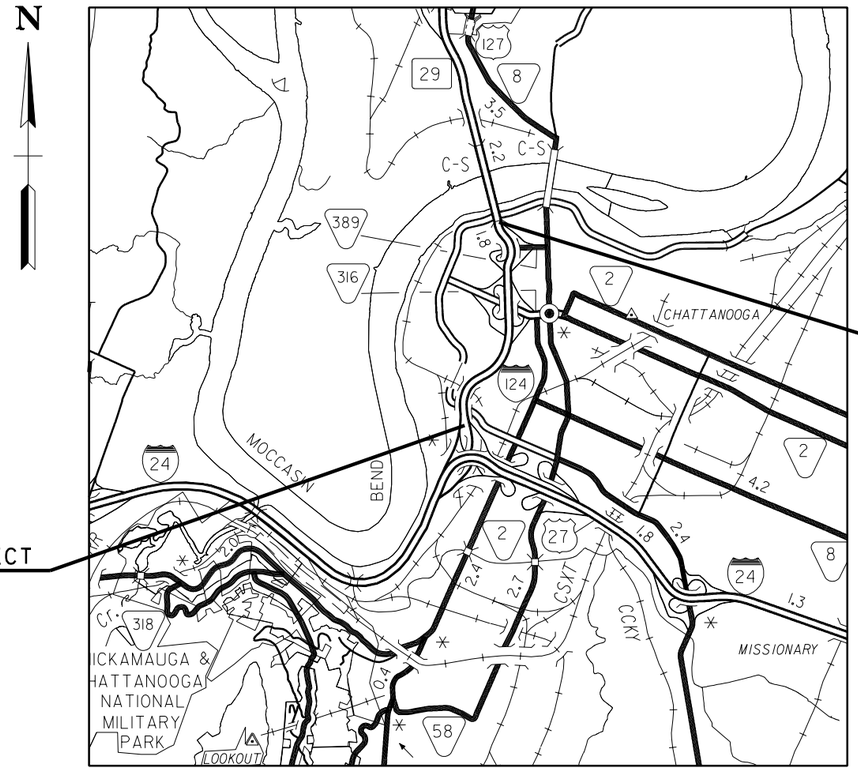
TENN.	YEAR	SHEET NO.
	2005	1
FED. AID PROJ. NO.		
STATE PROJ. NO.		

HAMILTON COUNTY

INTERSTATE 124 (U.S. 27) / SR-29 & WEST MAIN STREET, MARTIN LUTHER KING BLVD. & EAST 4TH STREET INTERCHANGE MODIFICATION STUDY

STATE HIGHWAY NO. 124 F.A.H.S. NO. 124





SCALE: 1"= ½ MILE

SPECIAL NOTES

PROPOSALS MAY BE REJECTED BY THE COMMISSIONER IF ANY OF THE UNIT PRICES CONTAINED THEREIN ARE OBVIOUSLY UNBALANCED, EITHER EXCESSIVE OR BELOW THE REASONABLE COST ANALYSIS VALUE.

THIS PROJECT TO BE CONSTRUCTED UNDER THE STANDARD SPECIFICATIONS OF THE TENNESSEE DEPARTMENT OF TRANSPORTATION DATED MARCH 1, 1995 AND ADDITIONAL SPECIFICATIONS AND SPECIAL PROVISIONS CONTAINED IN THE PLANS AND IN THE PROPOSAL CONTRACT

DESIGNED BY CLINARD ENGINEERING ASSOCIATES, LLC.

DESIGNER THOMAS M. CLINARD, P.E. _____ CHECKED BY _____

P.E. NO. _____

TRAFFIC DATA	
ADT (2008)	79,680
ADT (2028)	93,180
DHV (2028)	9,318
D	65 - 35
T (ADT)	6 %
T (DHV)	4 %
V	55 MPH

APPROVED: _____
DIRECTOR, DESIGN DIVISION

DATE: _____

APPROVED: _____
COMMISSIONER

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION

APPROVED: _____
DIVISION ADMINISTRATOR DATE

Survey & Design Division

7/8/2005
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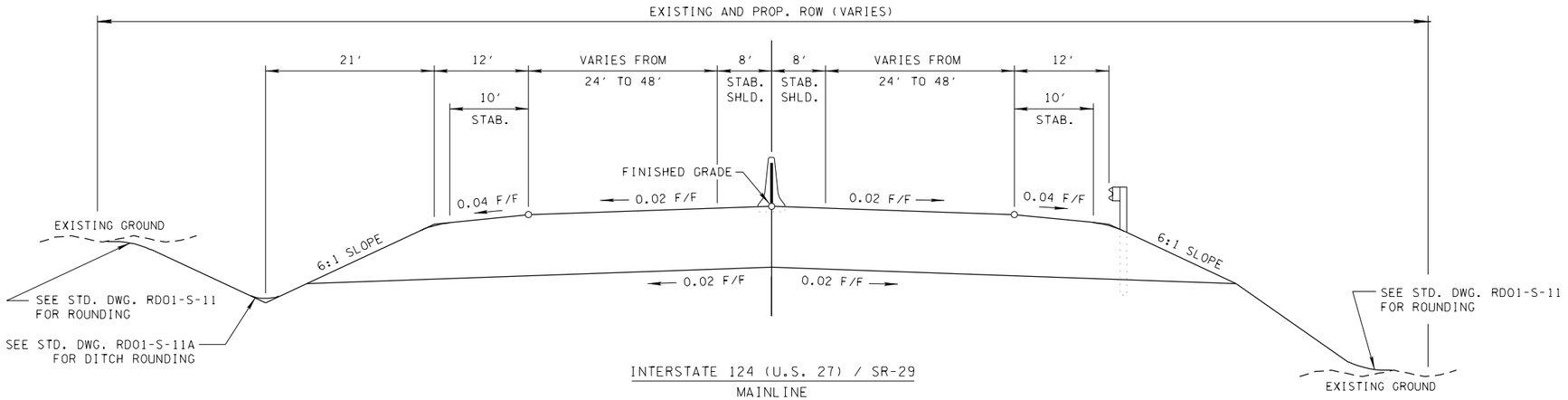
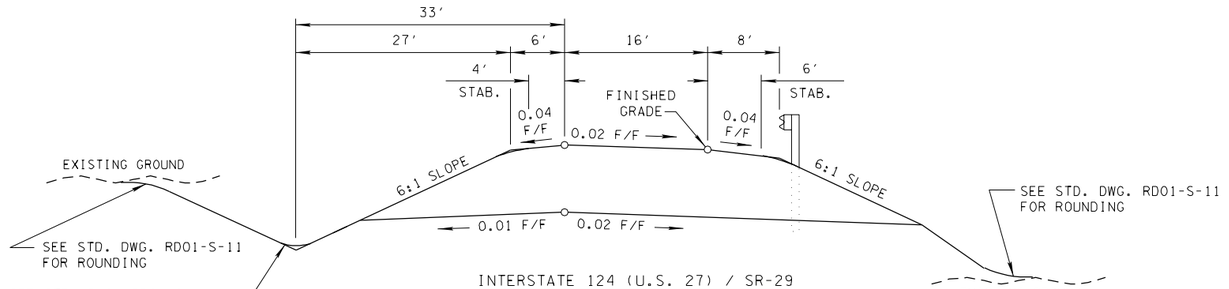
TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

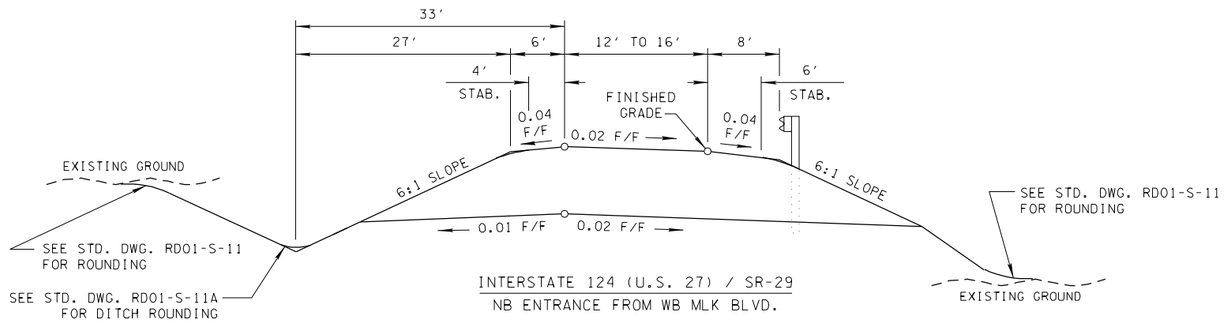
TYPE	YEAR	PROJECT NO.	SHEET NO.
IMS	2005		2



INTERSTATE 124 (U.S. 27) / SR-29
MAINLINE



INTERSTATE 124 (U.S. 27) / SR-29
NB EXIT TO CARTER STREET / W. 13TH STREET
SB EXIT TO RIVERFRONT PARKWAY
SB ENTRANCE FROM W. MAIN STREET TO I-124
NB ENTRANCE FROM EB MLK BLVD.
SB ENTRANCE FROM MLK BLVD.



INTERSTATE 124 (U.S. 27) / SR-29
NB ENTRANCE FROM WB MLK BLVD.

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
BUREAU OF PLANNING & DEVELOPMENT

TYPICAL SECTIONS

7/18/2005
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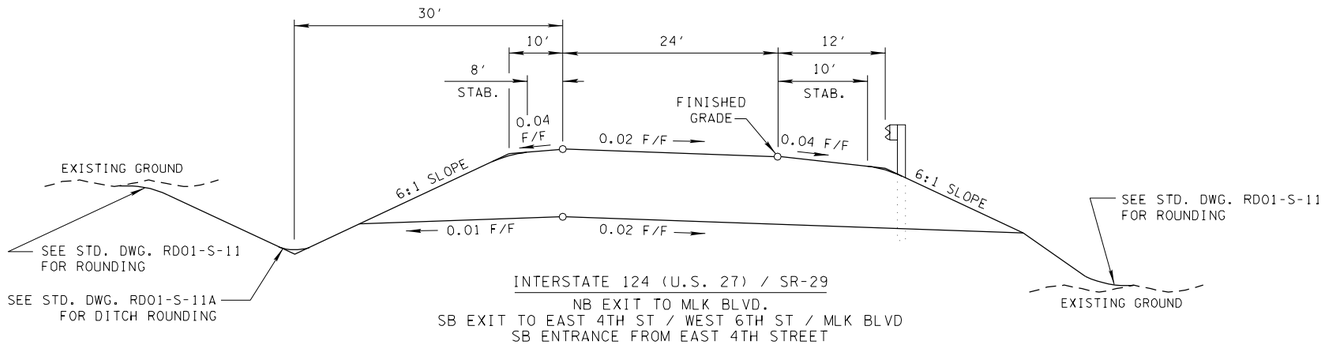
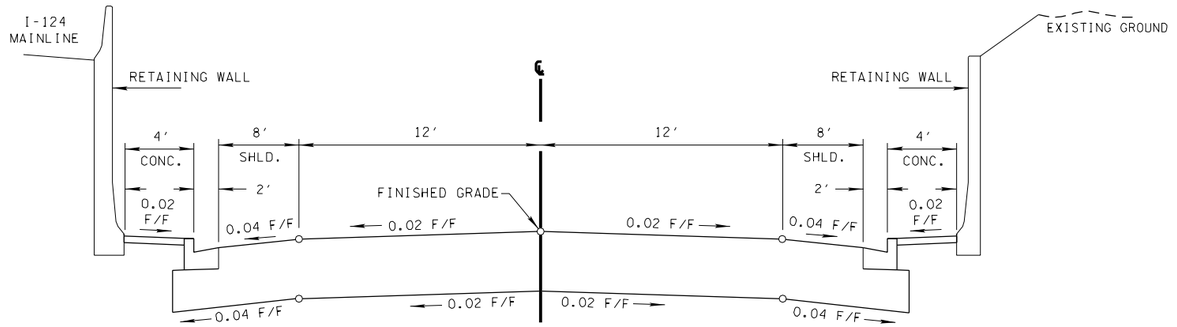
TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

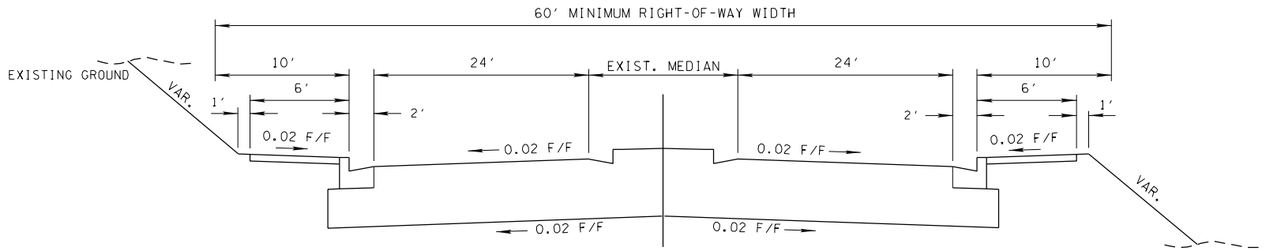
TYPE	YEAR	PROJECT NO.	SHEET NO.
IMS	2005		2A



INTERSTATE 124 (U.S. 27) / SR-29
NB EXIT TO MLK BLVD.
SB EXIT TO EAST 4TH ST / WEST 6TH ST / MLK BLVD
SB ENTRANCE FROM EAST 4TH STREET



FRONTAGE ROAD
BETWEEN MLK BLVD. AND EAST 4TH STREET ON RAMP



MARTIN LUTHER KING BLVD.

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION
BUREAU OF PLANNING & DEVELOPMENT

TYPICAL SECTIONS

7/18/2005
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TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
IMS	2005		3



STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

I-124
SR-29 (U.S. 27)

HAMILTON COUNTY
CHATTANOOGA, TENNESSEE

SCALE: 1" = 50'

7/18/2005
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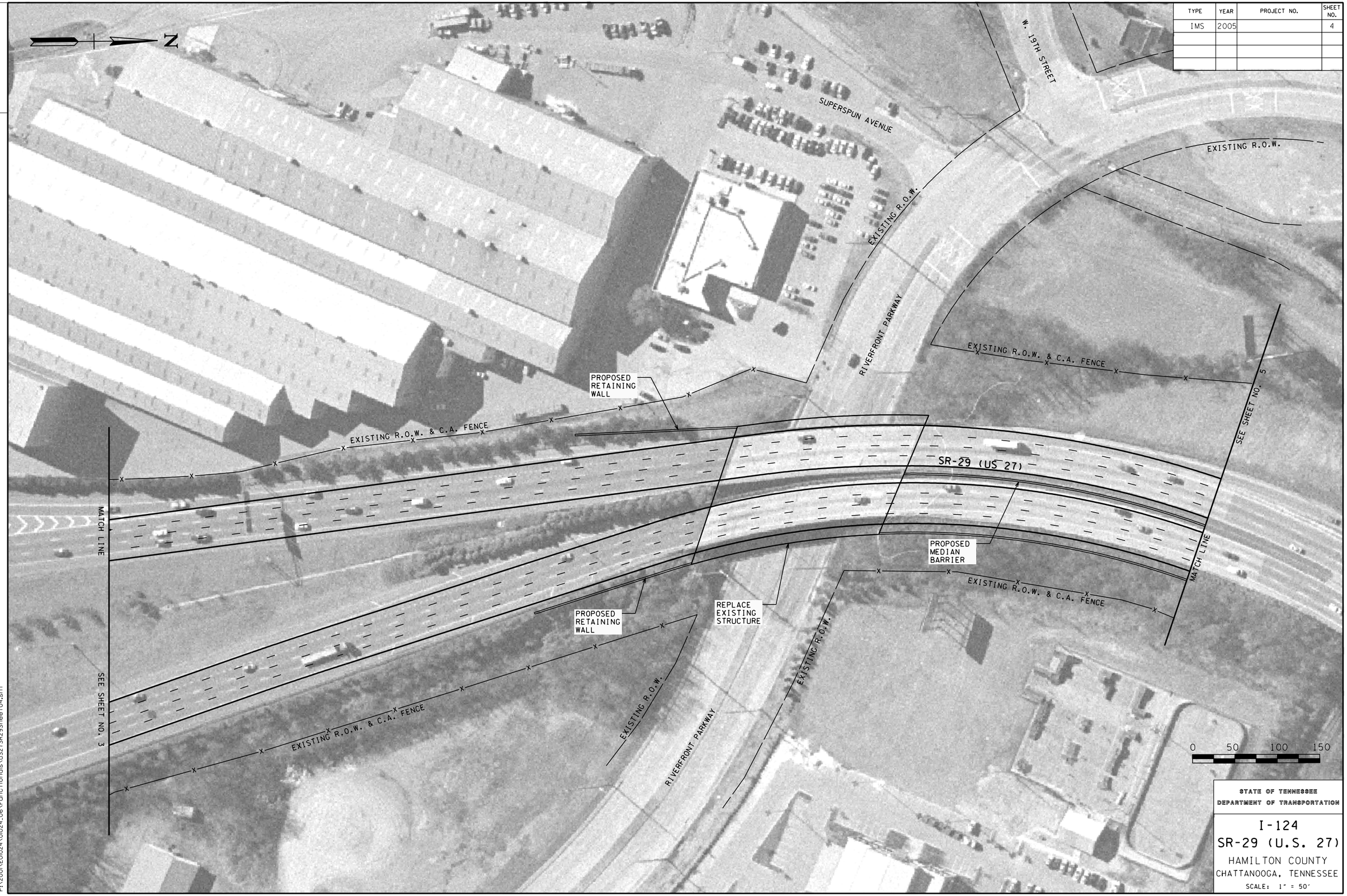
TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
IMS	2005		4



STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

I-124
SR-29 (U.S. 27)

HAMILTON COUNTY
CHATTANOOGA, TENNESSEE

SCALE: 1" = 50'

7/18/2005
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TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
IMS	2005		5

N

RIVERFRONT PARKWAY

MATCH LINE

SEE SHEET NO. 4

EXISTING R.O.W.

W. MAIN STREET

COLLEGE HILL
COURTS
(HISTORIC)

EXISTING R.O.W. & C.A. FENCE

PROPOSED
STRUCTURE

SR-29 (US 27)

SEE SHEET NO. 6

REPLACE
EXISTING
STRUCTURE

PROP. R.O.W AND C.A. FENCE

PROPOSED
MEDIAN
BARRIER

MATCH LINE

0 50 100 150

AREA TO BE
SCARIFIED, TOPSOILED
AND SODDED

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

I-124
SR-29 (U.S. 27)
HAMILTON COUNTY
CHATTANOOGA, TENNESSEE
SCALE: 1" = 50'

7/18/2005
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TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
IMS	2005		6

N

SEE SHEET NO. 5

MATCH LINE & EXISTING R.O.W. & C.A. FENCE

COLLEGE HILL COURTS (HISTORIC)

POPLAR STREET

PROPOSED RETAINING WALL

EXISTING R.O.W. & C.A. FENCE

REPLACE EXISTING STRUCTURE

SR-29 (US 27)

PROPOSED MEDIAN BARRIER

SEE SHEET NO. 7

EXISTING R.O.W.

W. MAIN STREET

CLOSE EXISTING LOOP RAMP

MATCH LINE

EXISTING R.O.W. & C.A. FENCE

THE KICKOFF PUBLISHING CO.

(VACANT)

EXISTING R.O.W.

CARTER STREET

EXISTING R.O.W.

0 50 100 150

AREA TO BE SCARIFIED, TOPSOILED AND SODDED

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

I-124
SR-29 (U.S. 27)
HAMILTON COUNTY
CHATTANOOGA, TENNESSEE
SCALE: 1" = 50'

7/8/2005
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TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
IMS	2005		7

N

COLLEGE HILL COURTS (HISTORIC)

POPLAR STREET

EXISTING R.O.W.

WEST 12th STREET

EXISTING R.O.W. & C.A. FENCE

MATCH LINE

SEE SHEET NO. 6

PROPOSED MEDIAN BARRIER

PROPOSED RETAINING WALL

REPLACE EXISTING STRUCTURE

SR-29 (US 27)

SEE SHEET NO. 8

MATCH LINE

PROPOSED RETAINING WALLS

PROP. R.O.W.

EXISTING R.O.W. & C.A. FENCE

CHARLES E HOLT JR, DDS DENTIST OFFICE

FIRST TITLE INSURANCE CO. (FOR LEASE)

PROP. R.O.W.

SONITROL (FOR LEASE)

EXISTING R.O.W.

RAISED ISLAND

EXISTING R.O.W.

EXISTING R.O.W.

CARTER STREET

EXISTING R.O.W.

W. 13TH STREET

EXISTING R.O.W. & C.A. FENCE

0 50 100 150

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

I-124
SR-29 (U.S. 27)
HAMILTON COUNTY
CHATTANOOGA, TENNESSEE
SCALE: 1" = 50'

7/8/2005
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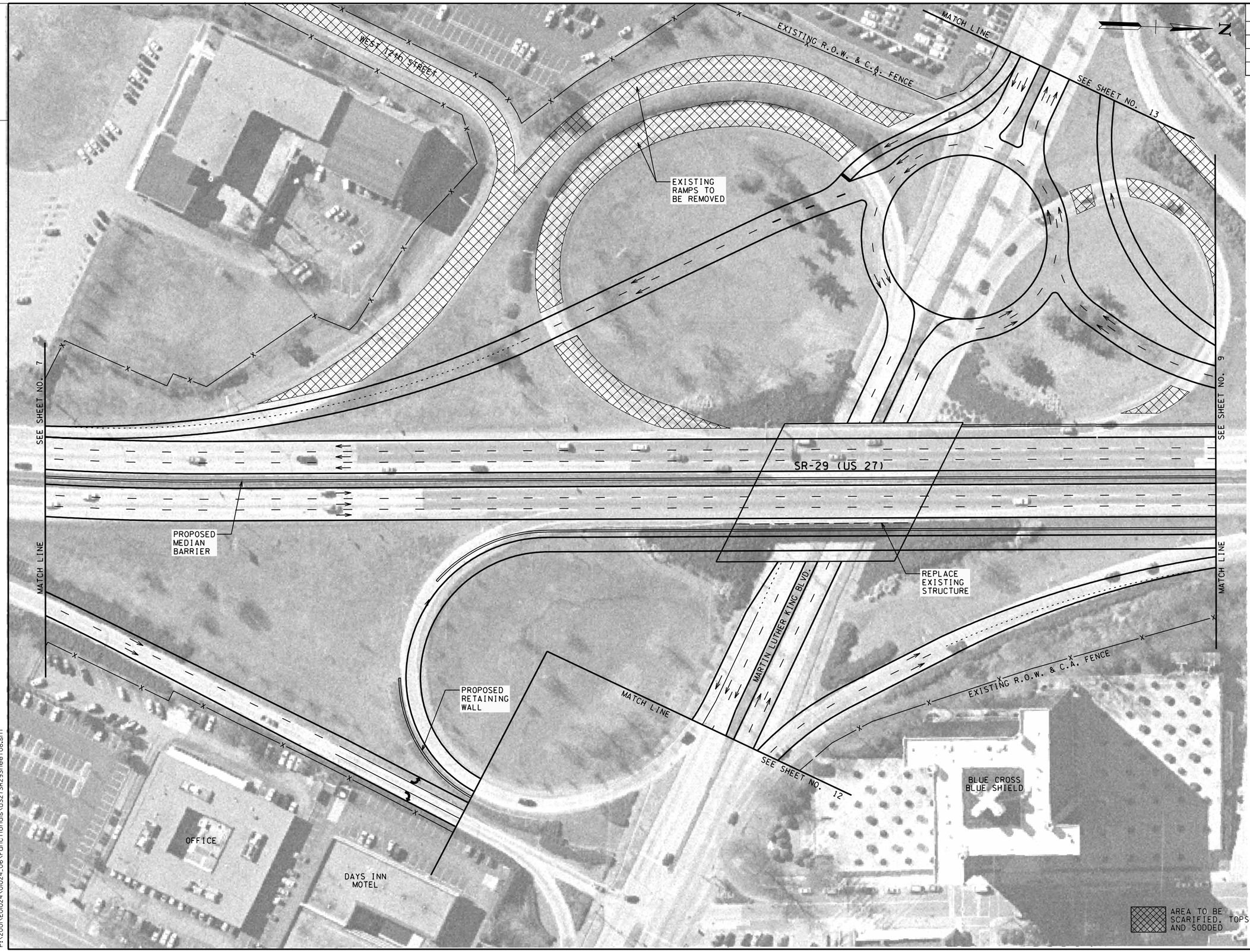
TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
IMS	2005		8



0 50 100 150

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

I-124
SR-29 (U.S. 27)
HAMILTON COUNTY
CHATTANOOGA, TENNESSEE
SCALE: 1" = 50'

7/18/2005
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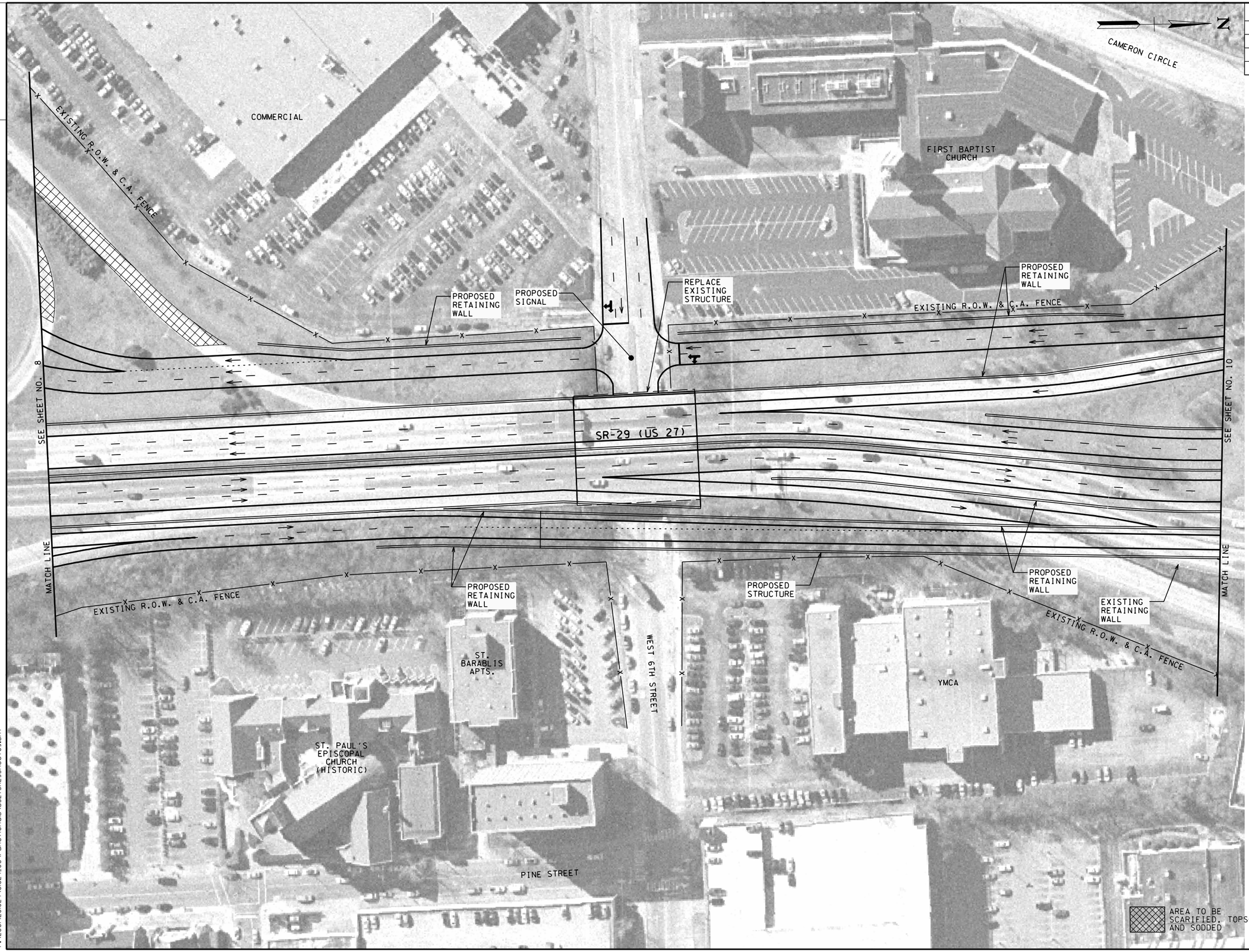
TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
IMS	2005		9



STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

I-124
SR-29 (U.S. 27)
HAMILTON COUNTY
CHATTANOOGA, TENNESSEE
SCALE: 1" = 50'

7/18/2005
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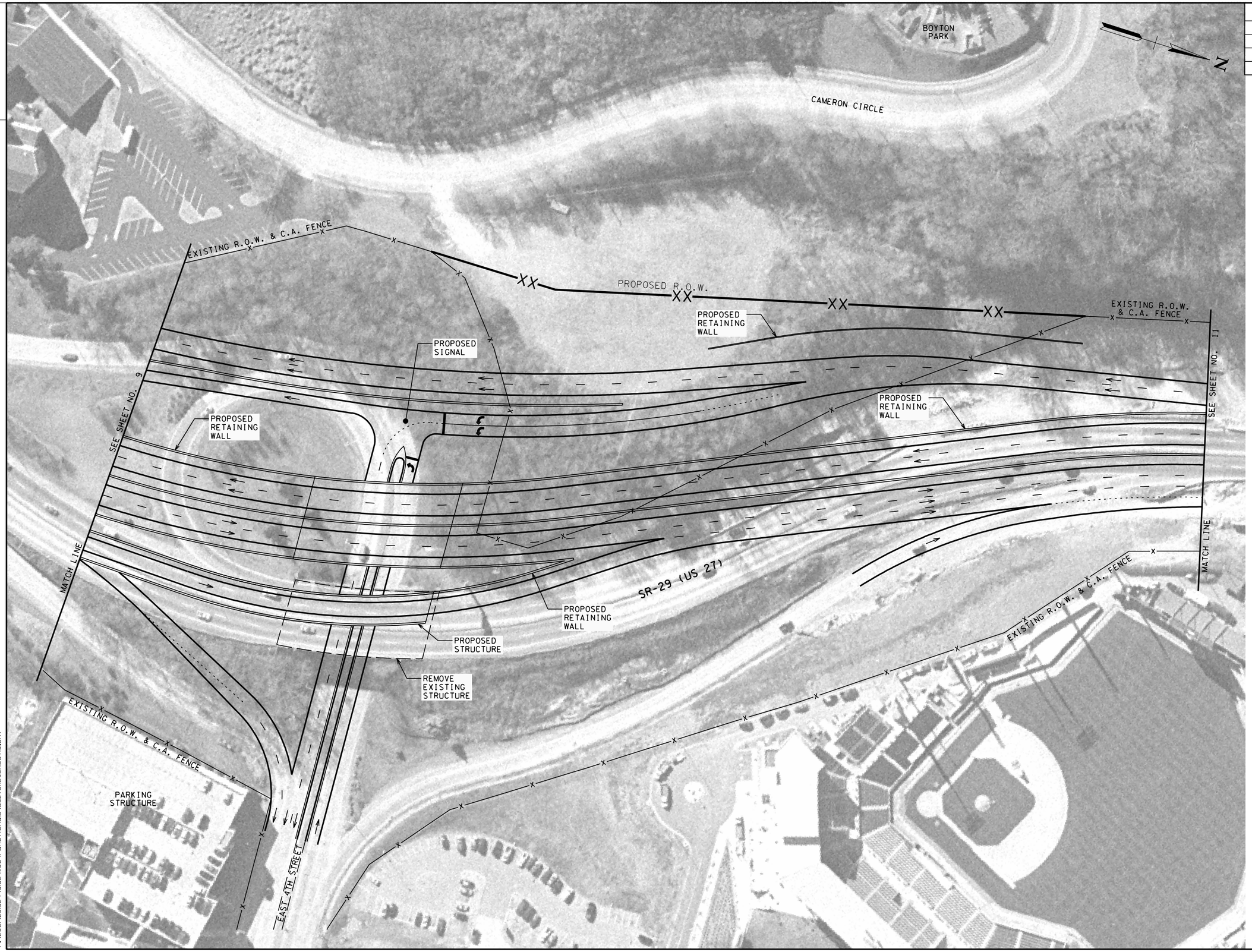
TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
IMS	2005		10



0 50 100 150

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

I-124
SR-29 (U.S. 27)
HAMILTON COUNTY
CHATTANOOGA, TENNESSEE
SCALE: 1" = 50'

7/18/2005
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TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
IMS	2005		11



0 50 100 150

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

I-124
SR-29 (U.S. 27)
HAMILTON COUNTY
CHATTANOOGA, TENNESSEE
SCALE: 1" = 50'

7/18/2005
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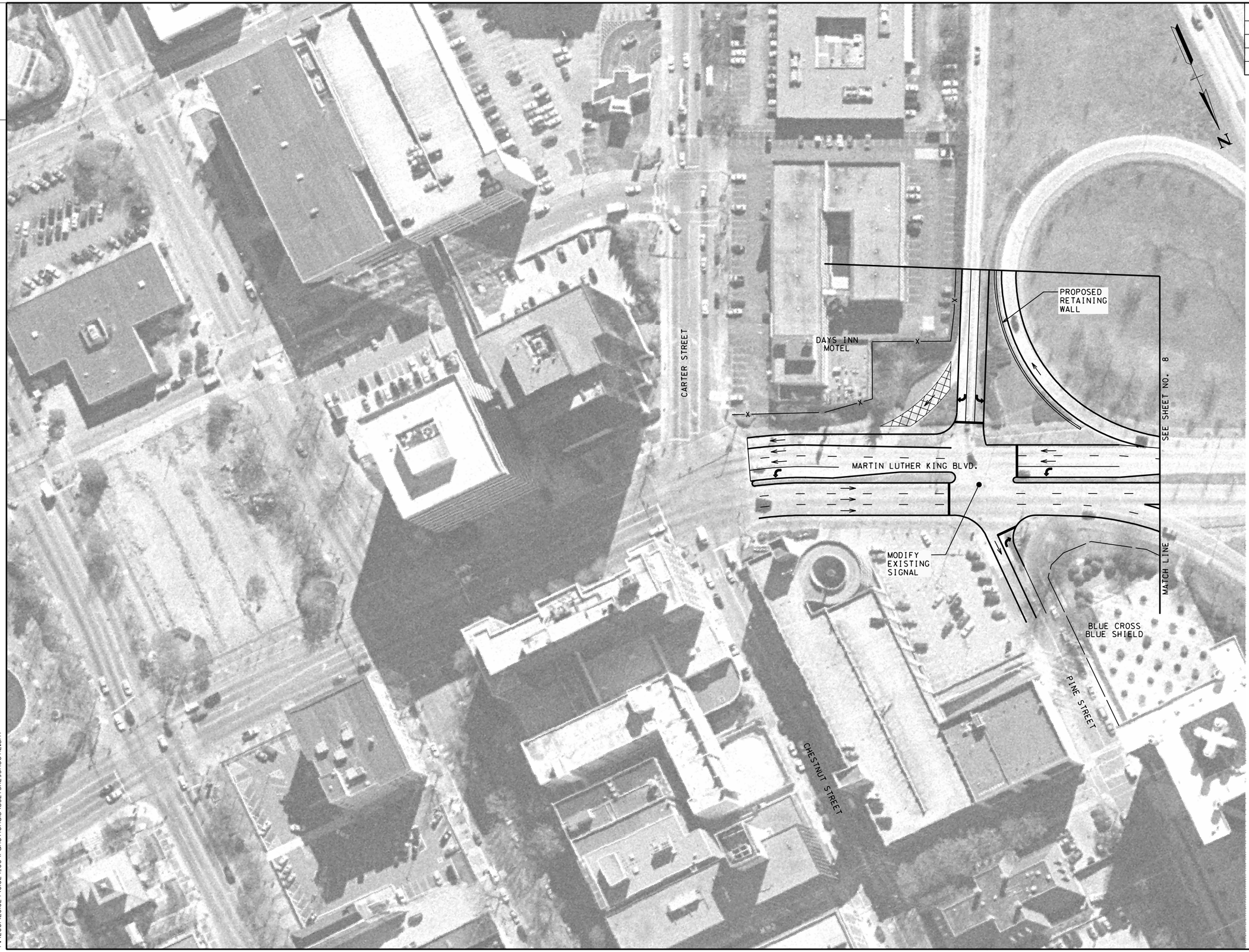
TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
IMS	2005		12



0 50 100 150

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

I-124
SR-29 (U.S. 27)
HAMILTON COUNTY
CHATTANOOGA, TENNESSEE
SCALE: 1" = 50'

7/18/2005
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TENNESSEE D.O.T.
DESIGN DIVISION
FILE NO.

TYPE	YEAR	PROJECT NO.	SHEET NO.
IMS	2005		13



AREA TO BE SCARIFIED, TOPSOILED AND SODDED

0 50 100 150

STATE OF TENNESSEE
DEPARTMENT OF TRANSPORTATION

I-124
SR-29 (U.S. 27)
HAMILTON COUNTY
CHATTANOOGA, TENNESSEE
SCALE: 1" = 50'

7/18/2005
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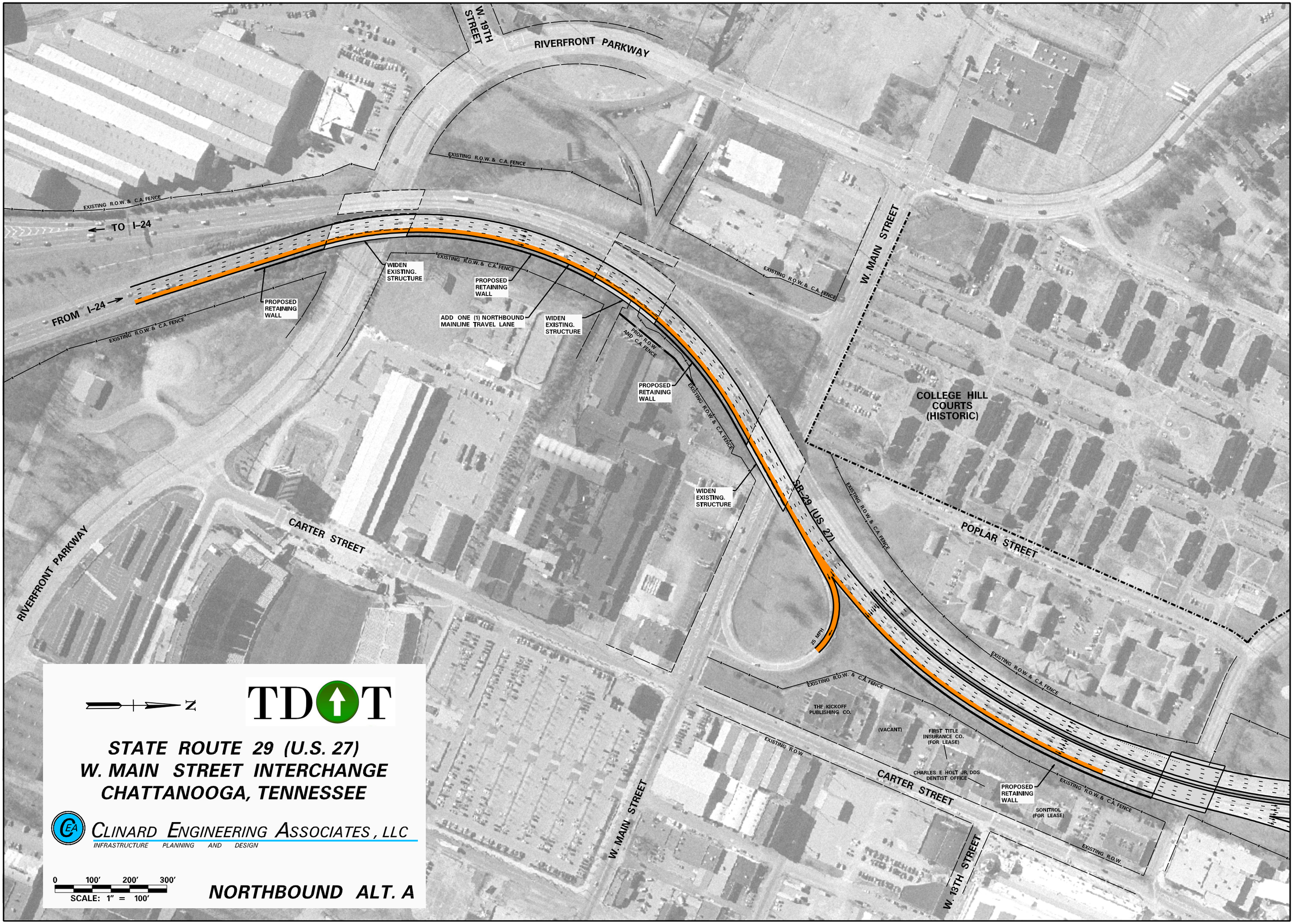
APPENDIX E

ALTERNATES INVESTIGATED



N

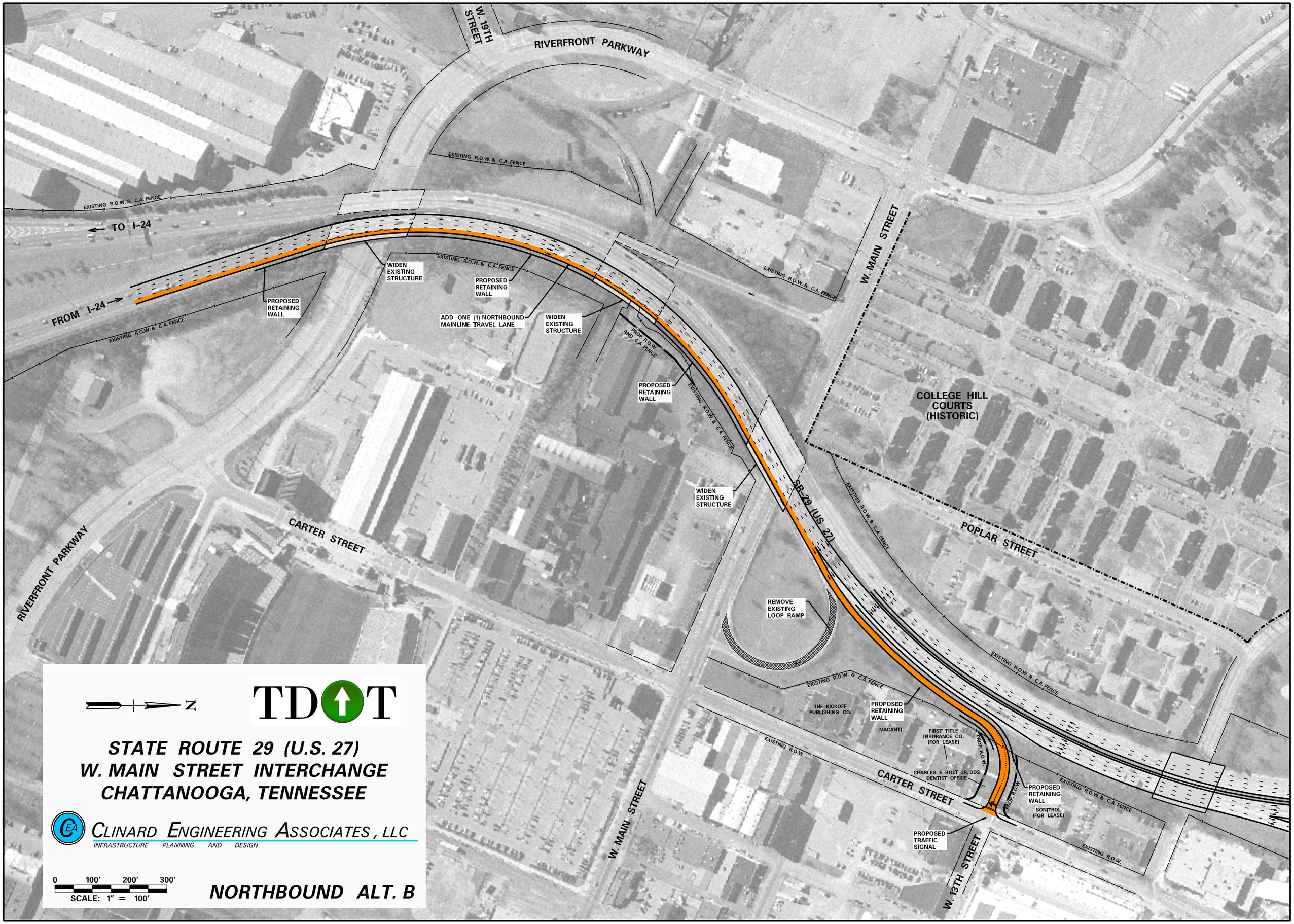
TDOT

STATE ROUTE 29 (U.S. 27)
W. MAIN STREET INTERCHANGE
CHATTANOOGA, TENNESSEE

CLINARD ENGINEERING ASSOCIATES, LLC
INFRASTRUCTURE PLANNING AND DESIGN

0 100′ 200′ 300′
SCALE: 1" = 100′

NORTHBOUND ALT. A



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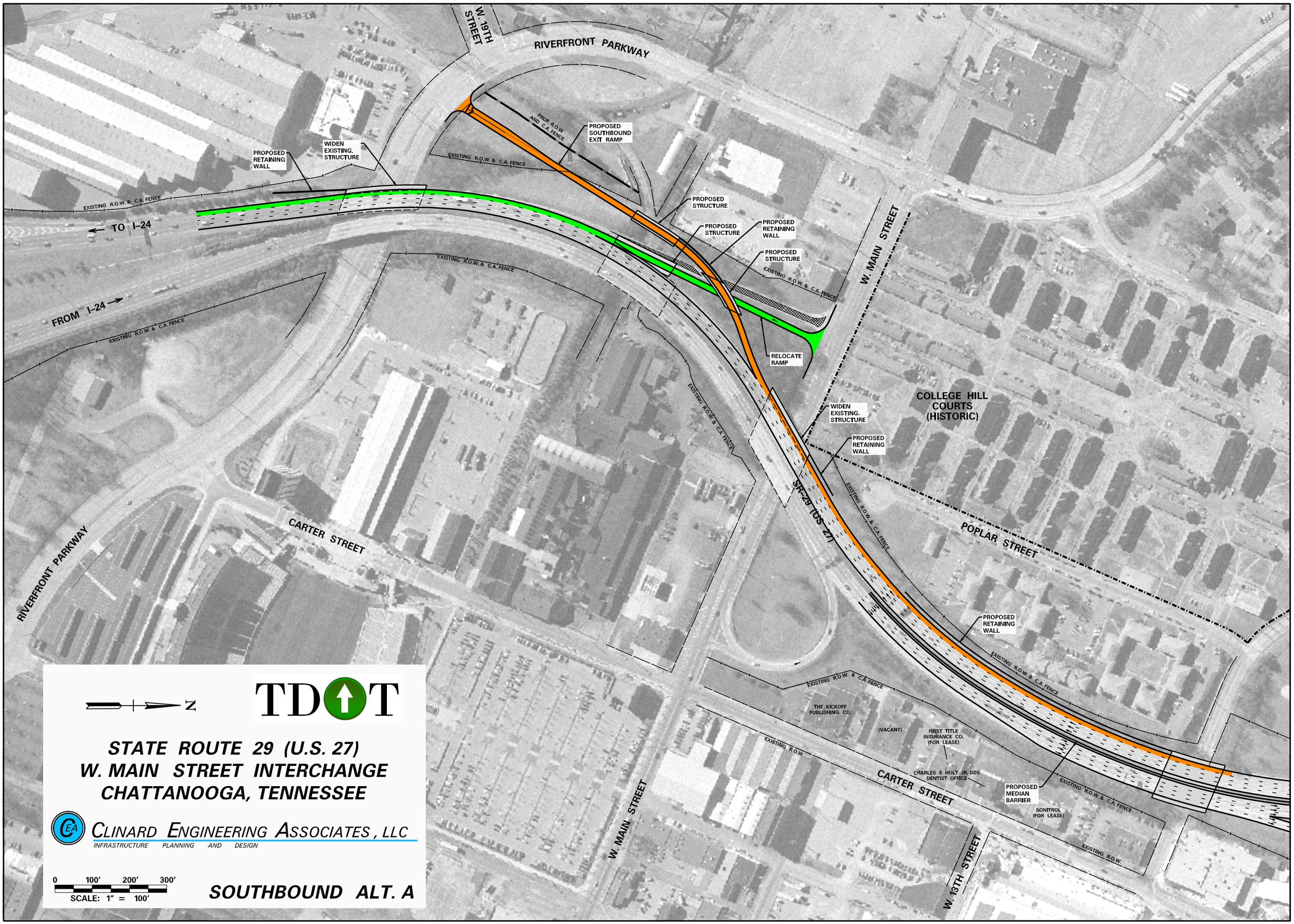
TDOT

STATE ROUTE 29 (U.S. 27)
W. MAIN STREET INTERCHANGE
CHATTANOOGA, TENNESSEE

CLINARD ENGINEERING ASSOCIATES, LLC
INFRASTRUCTURE PLANNING AND DESIGN

0 100′ 200′ 300′
SCALE: 1" = 100′

NORTHBOUND ALT. B



N

TDOT

STATE ROUTE 29 (U.S. 27)
W. MAIN STREET INTERCHANGE
CHATTANOOGA, TENNESSEE

CLINARD ENGINEERING ASSOCIATES, LLC
INFRASTRUCTURE PLANNING AND DESIGN

0 100′ 200′ 300′
SCALE: 1" = 100′

SOUTHBOUND ALT. A

W. 19TH STREET

RIVERFRONT PARKWAY

PROPOSED RETAINING WALL

WIDEN EXISTING. STRUCTURE

EXISTING R.O.W. & C.A. FENCE

TO I-24

FROM I-24

PROPOSED STRUCTURE

PROP. R.O.W.

25 MPH

W. MAIN STREET

COLLEGE HILL COURTS (HISTORIC)

WIDEN EXISTING. STRUCTURE

PROPOSED RETAINING WALL

SR-29 (US 27)

POPLAR STREET

PROPOSED RETAINING WALL

PROPOSED MEDIAN BARRIER

CARTER STREET

W. 13TH STREET

RIVERFRONT PARKWAY

CARTER STREET

W. MAIN STREET

THE KICKOFF PUBLISHING CO.

(VACANT)

FIRST TITLE INSURANCE CO. (FOR LEASE)

CHARLES E HOLT JR, DDS DENTIST OFFICE

SONITROL (FOR LEASE)

N

TDOT

STATE ROUTE 29 (U.S. 27)
W. MAIN STREET INTERCHANGE
CHATTANOOGA, TENNESSEE

CLINARD ENGINEERING ASSOCIATES, LLC

INFRASTRUCTURE PLANNING AND DESIGN

0 100′ 200′ 300′

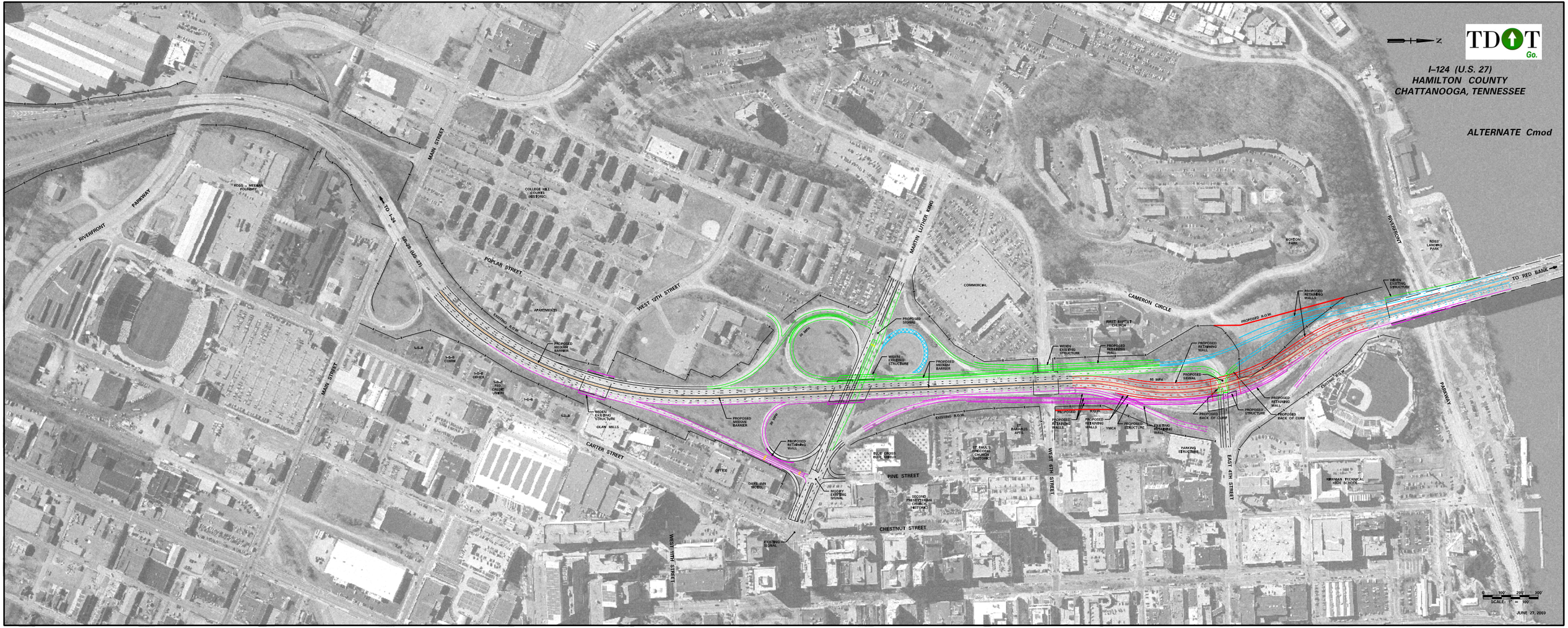
SCALE: 1" = 100′

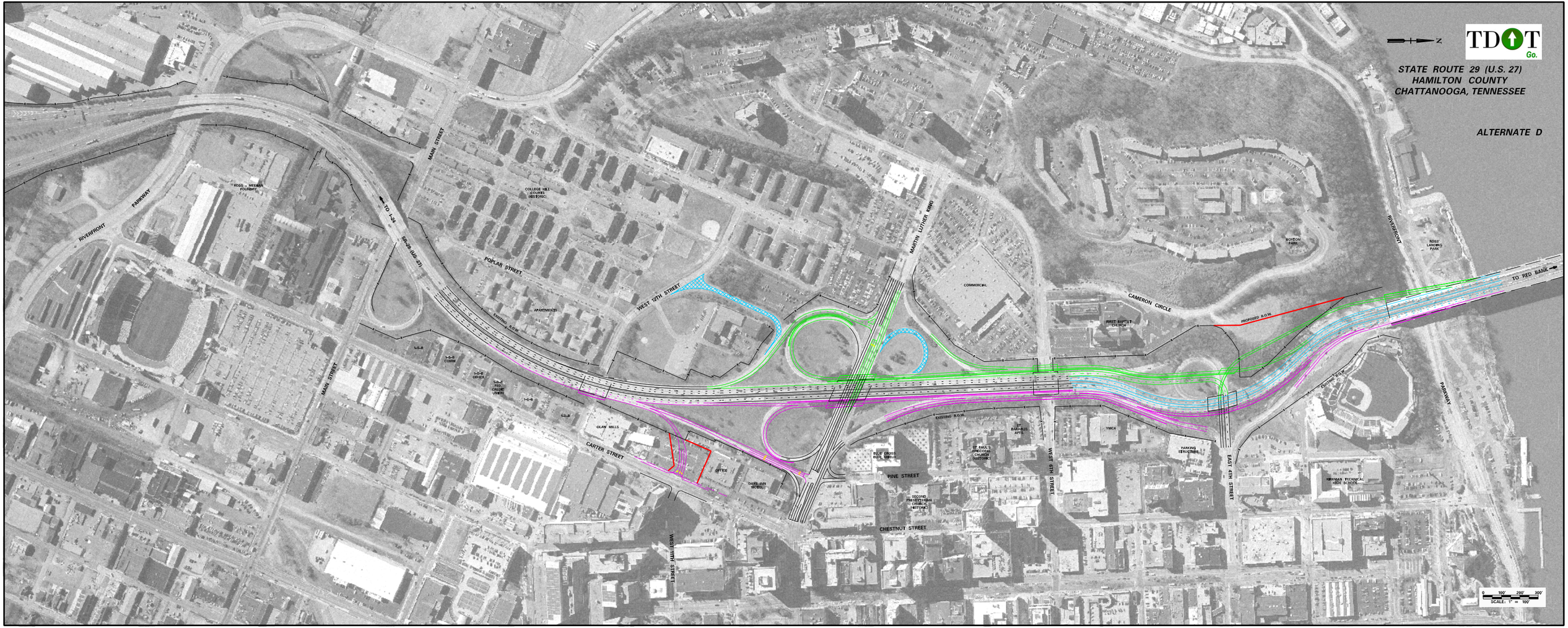
SOUTHBOUND ALT. B

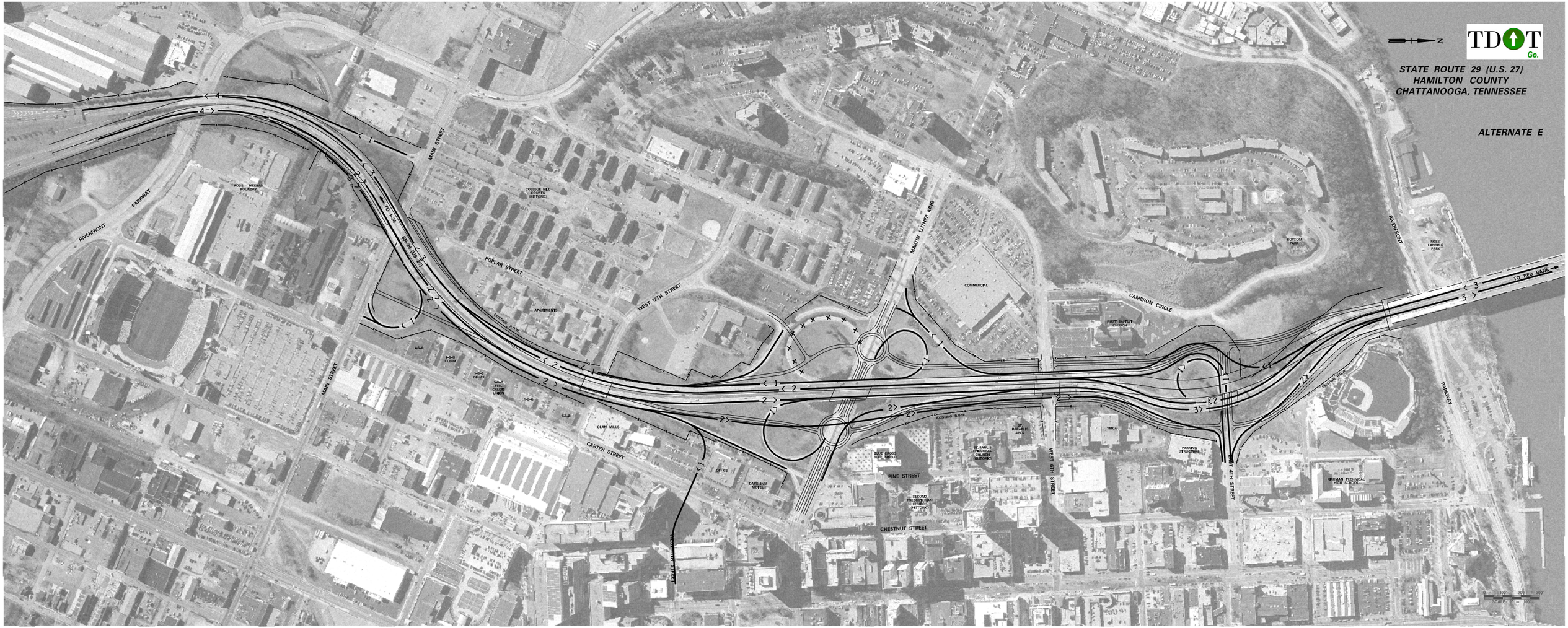

TDOT Go.
STATE ROUTE 29 (U.S. 27)
HAMILTON COUNTY
CHATTANOOGA, TENNESSEE
ALTERNATE A
N
RIVERFRONT PARKWAY
MAIN STREET
POPLAR STREET
WEST 12TH STREET
MARTIN LUTHER KING
CAMERON CIRCLE
TO RED BANK
CARTER STREET
PINE STREET
CHESTNUT STREET
WEST 11TH STREET
WEST 6TH STREET
EAST 4TH STREET
PARKWAY
TO I-24
SR-29 (US 27)
ROSS - MEEMAN FOUNDRY
COLLEGE HILL COURTS (HISTORIC)
APARTMENTS
REMOVE EXISTING SLIP RAMP
COMMERCIAL
WIDEN EXISTING STRUCTURE
PROPOSED MEDIAN BARRIER
PROPOSED SIGNAL
PROPOSED RETAINING WALL
PROPOSED STRUCTURE
PROPOSED R.O.W.
EXISTING R.O.W.
FIRST BAPTIST CHURCH
YMCA
PARKING STRUCTURE
ST. BARABLIS APTS.
ST. PAUL'S EPISCOPAL CHURCH (HISTORIC)
BLUE CROSS BLUE SHIELD
SECOND PRESBYTERIAN CHURCH (HISTORIC)
DARLINN MOTEL
OFFICE
OLAN MILLS
MODIFY EXISTING SIGNAL
EXISTING SIGNAL
KIRKMAN TECHNICAL HIGH SCHOOL
ROSS' LANDING PARK
WOYTON PARK
SCALE: 1" = 100'

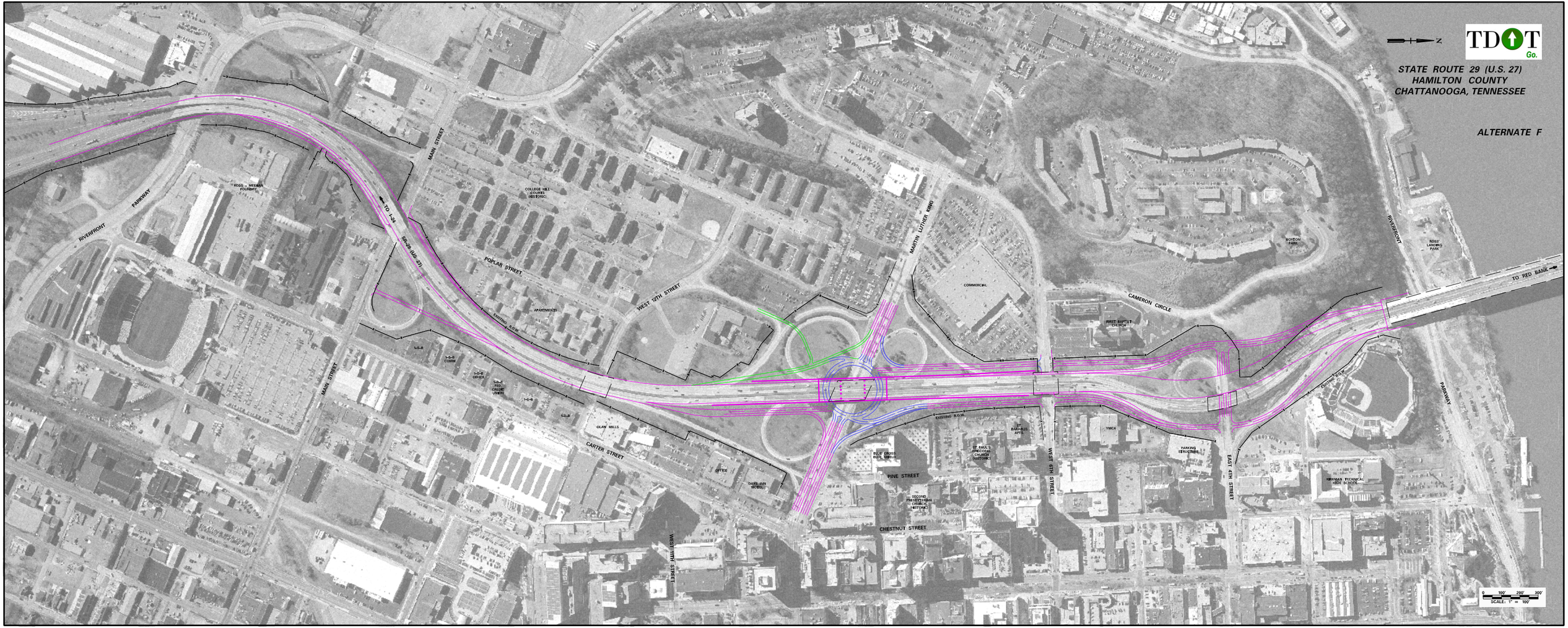

TDOT Go.
STATE ROUTE 29 (U.S. 27)
HAMILTON COUNTY
CHATTANOOGA, TENNESSEE
ALTERNATE B
RIVERFRONT
PARKWAY
MAIN STREET
TO I-24
SR-29 (US-27)
POPLAR STREET
WEST 12TH STREET
MARTIN LUTHER KING
CAMERON CIRCLE
TO RED BANK
CARTER STREET
PINE STREET
CHESTNUT STREET
WEST 6TH STREET
EAST 4TH STREET
WEST 11TH STREET
ROSS - MEEHAN FOUNDRY
COLLEGE HILL COURTS (HISTORIC)
APARTMENTS
OLAN MILLS
FIRST BAPTIST CHURCH
YMCA
BLUE CROSS BLUE SHIELD
ST. PAUL'S PRESCHOOL CHURCH (HISTORIC)
SECOND PRESBYTERIAN CHURCH (HISTORIC)
DAYS INN HOTEL
BOYTON PARK
ROSS' LANDING PARK
KIRKMAN TECHNICAL HIGH SCHOOL
COMMERCIAL
REMOVE EXISTING SLIP RAMP
PROPOSED SIGNAL
WIDEN EXISTING STRUCTURE
PROPOSED MEDIAN BARRIER
PROPOSED RETAINING WALL
PROPOSED STRUCTURE
EXISTING R.O.W.
PROPOSED R.O.W.
55 MPH
45 MPH
MODIFY EXISTING SIGNAL
EXISTING SIGNAL
EXISTING RETAINING WALL
REMOVE EXISTING STRUCTURE
0 100' 200' 300'
SCALE: 1" = 100'

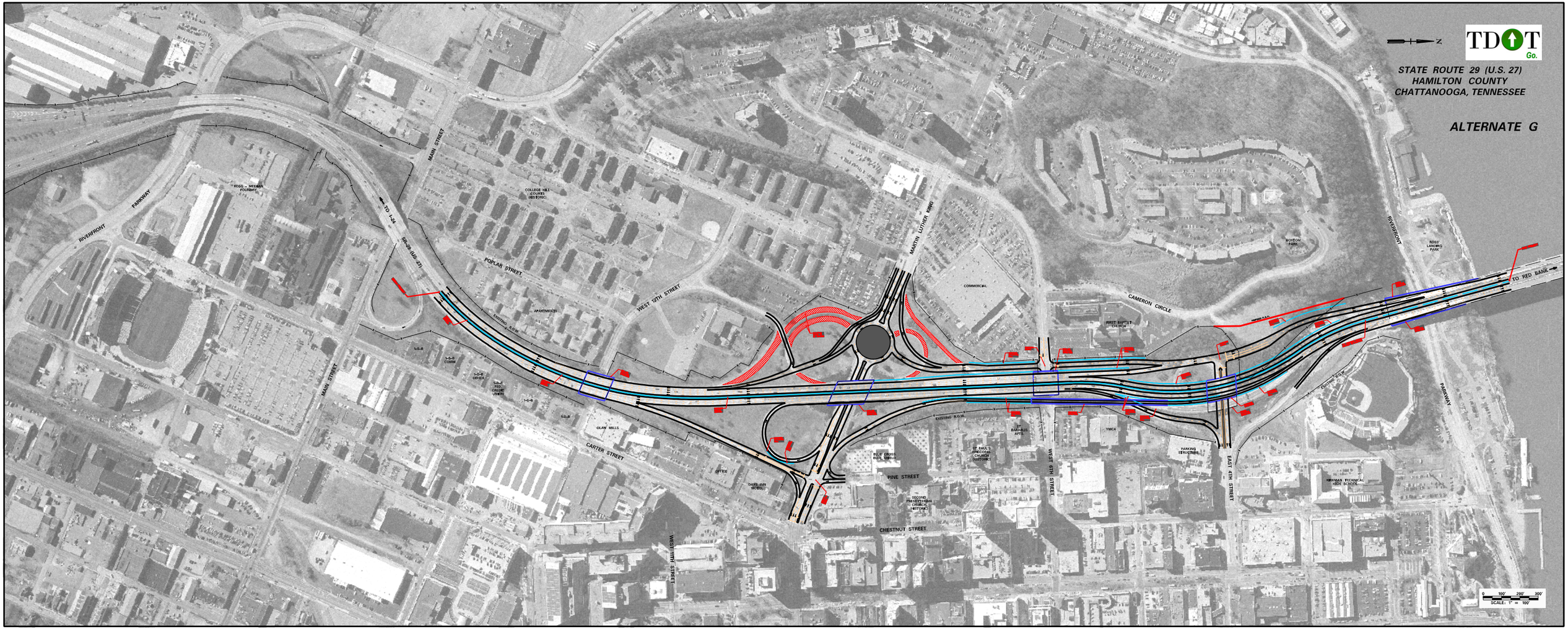

TDOT Go.
I-124 (U.S. 27)
HAMILTON COUNTY
CHATTANOOGA, TENNESSEE
ALTERNATE C
N
RIVERFRONT PARKWAY
MAIN STREET
POPLAR STREET
WEST 12TH STREET
MARTIN LUTHER KING
CAMERON CIRCLE
TO RED BANK
CARTER STREET
PINE STREET
CHESTNUT STREET
WEST 11TH STREET
WEST 6TH STREET
EAST 4TH STREET
PARKWAY
TO I-24
SR-29 (US 27)
COLLEGE HILL COURTS (HISTORIC)
ROSS - MEEHAN FOUNDRY
APARTMENTS
COMMERCIAL
REMOVE EXISTING SLIP RAMP
PROPOSED SIGNAL
WIDEN EXISTING STRUCTURE
PROPOSED MEDIAN BARRIER
PROPOSED RETAINING WALL
PROPOSED STRUCTURE
PROPOSED BACK OF CURB
PROPOSED RETAINING WALLS
EXISTING R.O.W.
OFFICE
DAYS INN HOTEL
MODIFY EXISTING SIGNAL
EXISTING SIGNAL
BLUE CROSS BLUE SHIELD
ST. PAUL'S EPISCOPAL CHURCH (HISTORIC)
SECOND PRESBYTERIAN CHURCH (HISTORIC)
ST. BARABLES APTS.
YMCA
PARKING STRUCTURE
KIRKMAN TECHNICAL HIGH SCHOOL
FIRST BAPTIST CHURCH
WOYTON PARK
ROSS' LANDING PARK
WIDEN EXISTING STRUCTURE
55 MPH
SCALE: 1" = 100'
JUNE 27, 2003


TDOT Go.
I–124 (U.S. 27)
HAMILTON COUNTY
CHATTANOOGA, TENNESSEE
ALTERNATE Cmod
RIVERFRONT
PARKWAY
MAIN STREET
TO I-24
SR-29 (US-27)
POPLAR STREET
WEST 12TH STREET
MARTIN LUTHER KING
CAMERON CIRCLE
TO RED BANK
CARTER STREET
PINE STREET
CHESTNUT STREET
WEST 6TH STREET
EAST 4TH STREET
WEST 11TH STREET
PROPOSED R.O.W.
EXISTING R.O.W.
PROPOSED RETAINING WALLS
PROPOSED BACK OF CURB
PROPOSED MEDIAN BARRIER
PROPOSED SIGNAL
WIDEN EXISTING STRUCTURE
MODIFY EXISTING STRUCTURE
PROPOSED STRUCTURE
EXISTING RETAINING WALL
55 MPH
35 MPH
SCALE: 1" = 100'
JUNE 27, 2003

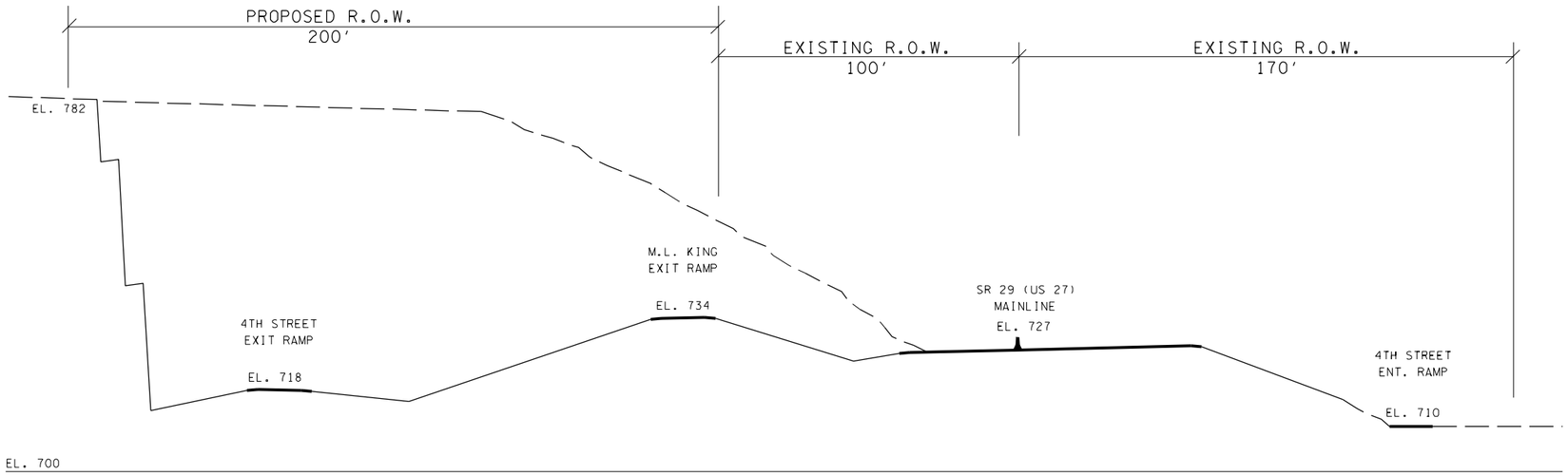

TDOT Go.
STATE ROUTE 29 (U.S. 27)
HAMILTON COUNTY
CHATTANOOGA, TENNESSEE
ALTERNATE D
RIVERFRONT
PARKWAY
MAIN STREET
TO I-24
SR-29 (US-27)
POPLAR STREET
WEST 12TH STREET
MARTIN LUTHER KING
CAMERON CIRCLE
TO RED BANK
PROPOSED R.O.W.
EXISTING R.O.W.
CARTER STREET
PINE STREET
CHESTNUT STREET
WEST 6TH STREET
EAST 4TH STREET
WEST 11TH STREET
ROSS - MEEHAN FOUNDRY
COLLEGE HILL COURTS (HISTORIC)
APARTMENTS
COMMERCIAL
FIRST BAPTIST CHURCH
BOYTON PARK
ROSS' LANDING PARK
OLAN MILLS
OFFICE
DAYS INN HOTEL
BLUE CROSS BLUE SHIELD
ST. PAUL'S EPISCOPAL CHURCH (HISTORIC)
ST. BARNABAS APTS.
YMCA
PARKING STRUCTURE
SECOND PRESBYTERIAN CHURCH (HISTORIC)
KIRKMAN TECHNICAL HIGH SCHOOL
SCALE: 1" = 100'


TDOT Go.
STATE ROUTE 29 (U.S. 27)
HAMILTON COUNTY
CHATTANOOGA, TENNESSEE
ALTERNATE E
RIVERFRONT
PARKWAY
MAIN STREET
POPLAR STREET
WEST 12TH STREET
MARTIN LUTHER KING
CAMERON CIRCLE
RIVERFRONT
PARKWAY
MAIN STREET
CARTER STREET
PINE STREET
CHESTNUT STREET
WEST 6TH STREET
EAST 4TH STREET
TO RED BANK
EXISTING R.O.W.
ROSS - MEEMAN FOUNDRY
COLLEGE HILL COURTS (HISTORIC)
APARTMENTS
BOYTON PARK
ROSS' LANDING PARK
COMMERCIAL
FIRST BAPTIST CHURCH
U.S.B. ZONING
U.S.B. OFFICE
FED. CREDIT UNION
OLAN MILLS
OFFICE
DAYS INN HOTEL
BLUE CROSS BLUE SHIELD
ST. PAUL'S PRESBYTERIAN CHURCH (HISTORIC)
ST. BARNABAS APTS.
YMCA
PARKING STRUCTURE
SECOND PRESBYTERIAN CHURCH (HISTORIC)
KIRKMAN TECHNICAL HIGH SCHOOL
SCALE: 1" = 100'

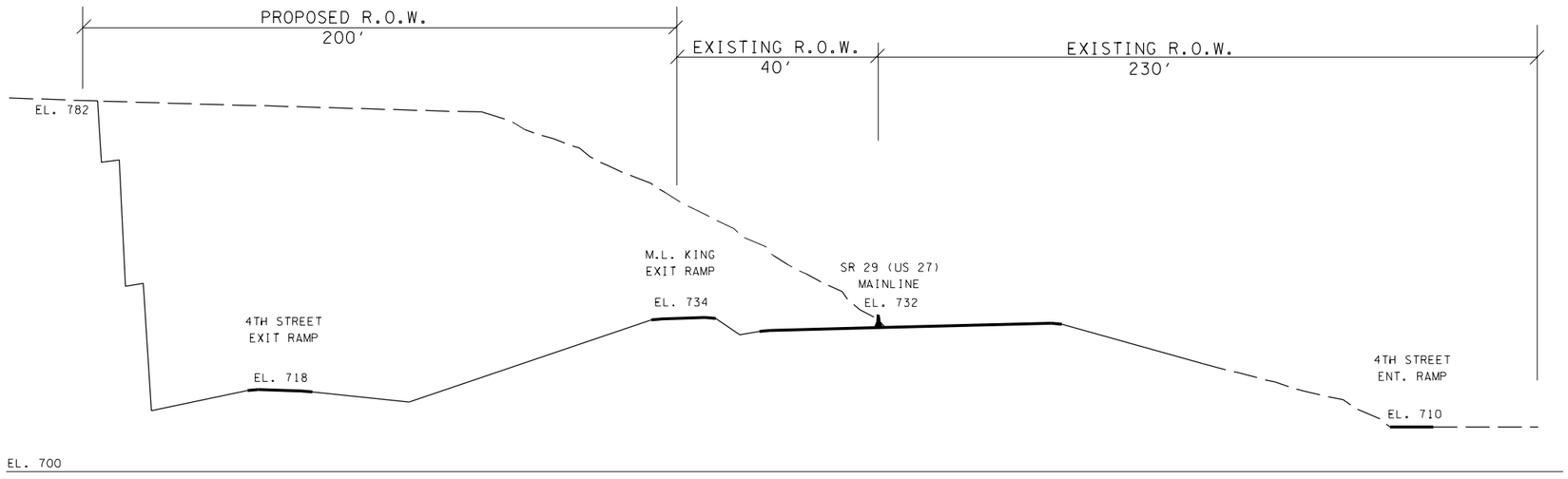

TDOT Go.
STATE ROUTE 29 (U.S. 27)
HAMILTON COUNTY
CHATTANOOGA, TENNESSEE
ALTERNATE F
N
RIVERFRONT PARKWAY
ROSS - MEEMAN FOUNDRY
MAIN STREET
COLLEGE HILL COURTS (HISTORIC)
TO I-24
SR-29 (US 27)
POPLAR STREET
APARTMENTS
EXISTING R.O.W.
WEST 12TH STREET
MARTIN LUTHER KING
COMMERCIAL
CAMERON CIRCLE
FIRST BAPTIST CHURCH
BOYTON PARK
ROSS' LANDING PARK
TO RED BANK
I-S-B
I-S-B COMM
I-S-B OFFICE
I-S-B FED CREDIT UNION
OLAN MILLS
CARTER STREET
OFFICE
DAYS INN MOTEL
WEST 11TH STREET
BLUE CROSS BLUE SHIELD
PINE STREET
SECOND PRESBYTERIAN CHURCH (HISTORIC)
CHESTNUT STREET
ST. BARABLIS APTS.
ST. PAUL'S EPISCOPAL CHURCH (HISTORIC)
WEST 6TH STREET
YMCA
PARKING STRUCTURE
EAST 4TH STREET
KIRKMAN TECHNICAL HIGH SCHOOL
0 100' 200' 300'
SCALE: 1" = 100'


TDOT Go.
STATE ROUTE 29 (U.S. 27)
HAMILTON COUNTY
CHATTANOOGA, TENNESSEE
ALTERNATE G
RIVERFRONT
PARKWAY
MAIN STREET
TO I-24
SR-29 (US-27)
POPLAR STREET
WEST 12TH STREET
MARTIN LUTHER KING
CAMERON CIRCLE
TO RED BANK
CARTER STREET
PINE STREET
CHESTNUT STREET
WEST 11TH STREET
WEST 6TH STREET
EAST 4TH STREET
EXISTING R.O.W.
SCALE: 1" = 100'


TDOT Go.
STATE ROUTE 29 (U.S. 27)
HAMILTON COUNTY
CHATTANOOGA, TENNESSEE
ALTERNATE H
RIVERFRONT
PARKWAY
MAIN STREET
TO I-24
SR-29 (US-27)
POPLAR STREET
WEST 12TH STREET
MARTIN LUTHER KING
CAMERON CIRCLE
TO RED BANK
EXISTING R.O.W.
PROPOSED BRIDGE
RETAINING WALL
ST. JOHN CONNECTION
CARTER STREET
PINE STREET
CHESTNUT STREET
WEST 6TH STREET
EAST 4TH STREET
WEST 11TH STREET
BOYTON PARK
ROSS' LANDING PARK
FIRST BAPTIST CHURCH
COMMERCIAL
APARTMENTS
OLAN MILLS
DAYS INN HOTEL
BLUE CROSS BLUE SHIELD
ST. PAUL'S EPISCOPAL CHURCH (HISTORIC)
SECOND PRESBYTERIAN CHURCH (HISTORIC)
YMCA
PARKING STRUCTURE
KIRKMAN TECHNICAL HIGH SCHOOL
ROSS - MEEHAN FOUNDRY
COLLEGE HILL COURTS (HISTORIC)
SCALE: 1" = 100'



(2) ——ALTERNATE A—— (2)



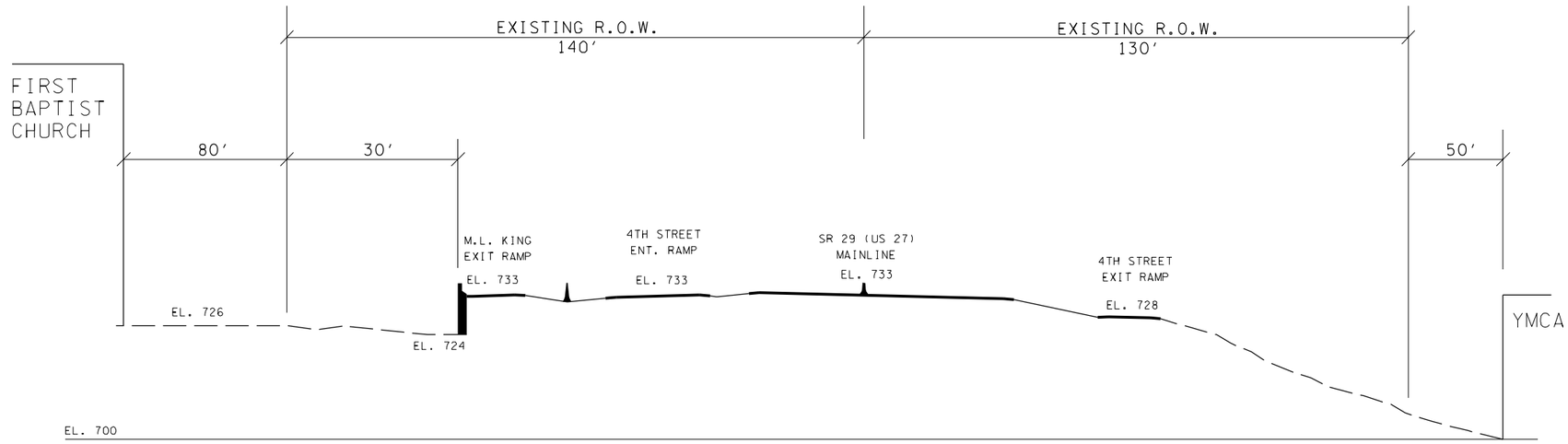
(2) ——ALTERNATE B / C—— (2)

CROSS SECTION

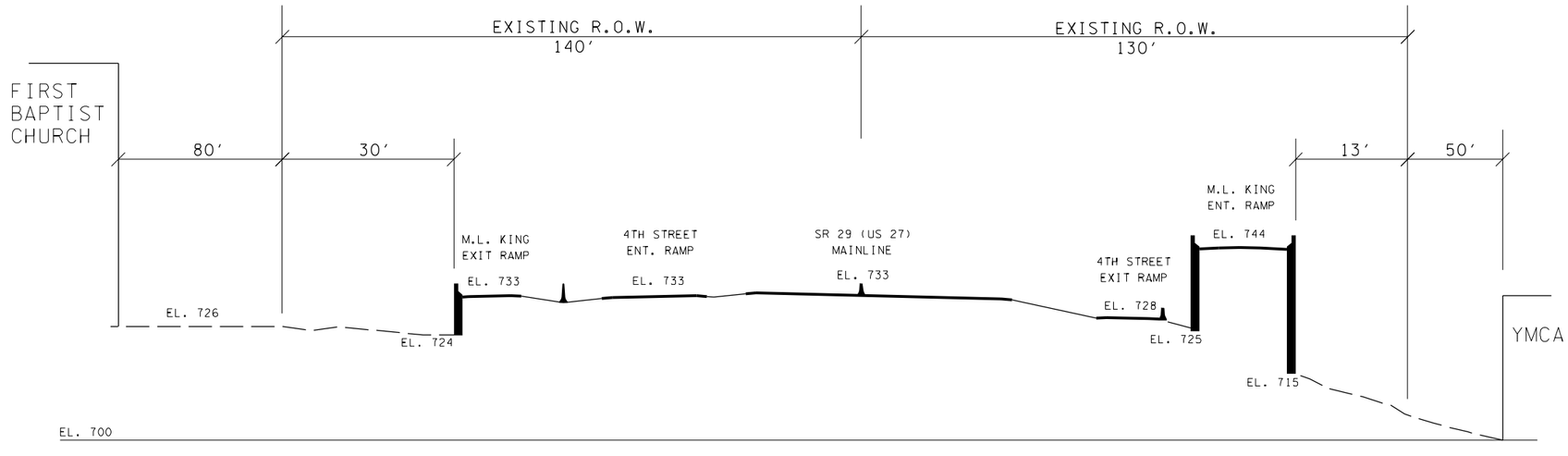
SR 29 (US 27)
HAMILTON COUNTY
CHATTANOOGA

(NORTH OF 4TH STREET)

N.T.S.



(1) ——ALTERNATE A / B—— (1)



(1) ——ALTERNATE C—— (1)

CROSS SECTION

SR 29 (US 27)
HAMILTON COUNTY
CHATTANOOGA

(NORTH OF M.L. KING)

N.T.S.

APPENDIX F

MEETING HAND-OUTS & NOTES / FHWA COMMENTS AND RESPONSES

CLINARD ENGINEERING ASSOCIATES, LLC
INFRASTRUCTURE PLANNING AND DESIGN

June 28, 2005

Mr. Ed Cole
Chief of Environmental and Planning
Tennessee Department of Transportation
James K. Polk Building, Suite 700
505 Deaderick Street
Nashville, TN 37243-0349

RE: I-124 (State Route 29) Interchange Modification Study
Hamilton County
Chattanooga, Tennessee

Dear Mr. Cole:

Clinard Engineering Associates, LLC is submitting this letter as a response to the comments (see attached) provided by the FHWA concerning the subject interchange modification study. Each comment outlined in the FHWA letter will be addressed below with the response indicated in bold italics.

1. The proposal changes the termini of the northbound exit ramp from W. Main Street to Carter Street. While we realize the advantages of eliminating the current loop ramp, we have two concerns with the proposed design: (1) The safety of the proposed horizontal curve (which we understand would not meet AASHTO minimum guidelines) and (2) the potential for wrong-way movements from W. 13" Street. Please evaluate the following:

a. Is it possible to tie the ramp into West 12th Street? We do not have profiles and are therefore unable to make this determination. This would eliminate the horizontal curve and provide additional storage.

b. If there is no alternative to putting the ramp at W. 13th Street, please describe how the safety issues will be mitigated. Some design features that would mitigate the safety issues include (1) providing a clear zone on the north side of the curve and (2) discouraging wrong-way movements by either making W. 13th Street one-way or placing a raised island at W. 13th (eliminating left turn movements from W. 13th Street to Carter Street).

Based upon further study, relocating the proposed ramp termini from Carter Street to West 12th Street would create a situation where the majority of motorists would be required to make a right turn from the ramp to West 12th Street then an immediate left turn to travel northbound into the downtown area. While vertical alignments would be similar at either location, additional impacts to the three commercial establishments would be likely with a 20 to 25 foot retaining wall needed between the mainline of I-124 and the ramp.

109 WESTPARK DRIVE SUITE 440 BRENTWOOD, TN 37027 PHONE: 615.370.6079 FAX: 615.627.4066

In order to mitigate the safety concerns for the proposed ramp connection at Carter Street, island channelization will be utilized on this ramp and the appropriate signing incorporated to minimize the likelihood of any wrong-way movements from West 13th Street. The functional plans have also been revised to provide additional storage capacity and clear zone north of the ramp by extending the retaining wall along the mainline of I-124 instead a placing this wall along the outside of the ramp shoulder. (See attached enlargement for proposed intersection treatment)

Due to the minimal width (20') of West 13th Street, raised islands could not be constructed on this approach (See photo below).

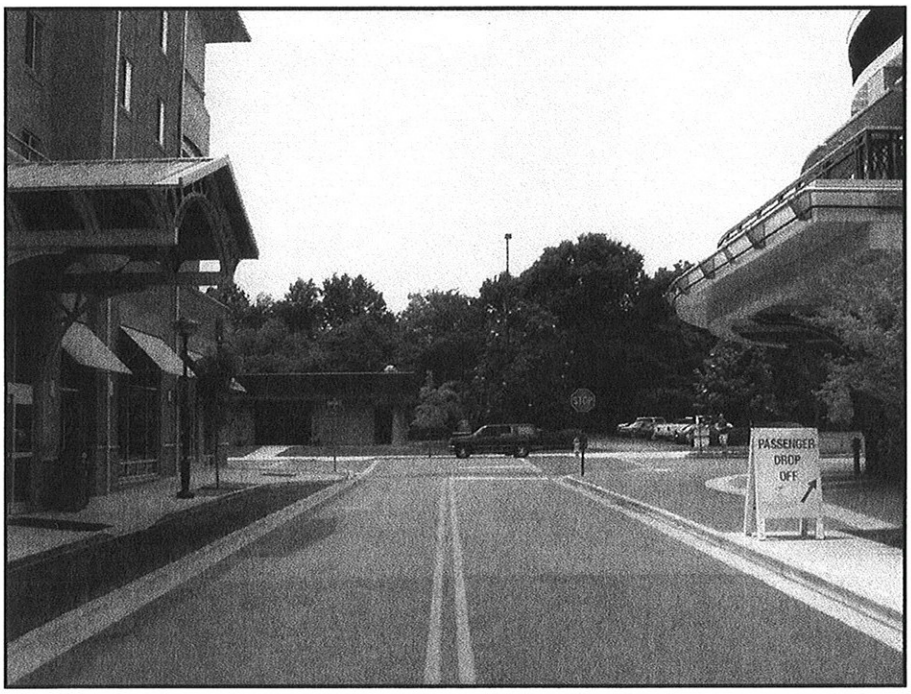


Photo: West 13th Street Across from Proposed Exit Ramp at Carter Street

2. The proposed northbound exit ramp at Martin Luther King (MLK) Boulevard is expected to operate at LOS "F" in the design year. However, a new left-turn is being proposed from southbound Pine Street. This will adversely affect the operations of the intersection by taking away green time from the other movements and would by definition further increase any queuing on the Interstate mainline. Furthermore, this will increase the possibility of a wrong-way movement on the ramp. We know of no reason that this new left-turn movement can be justified.

Based upon this recommendation, the proposed left turn lane on Pine Street will be removed from the functional plans.

3. The loop ramp from eastbound MLK to northbound I-124 has a short acceleration length. In the proposed configuration, the short length is necessary to provide appropriate weaving distance upstream of the subsequent lane drop. The acceleration length could be lengthened and the weave eliminated by tying in the loop ramp to the proposed entrance ramp from westbound MLK. We realize that the radius of the loop would have to be reduced somewhat to make this tie-in. However, speeds will likely be low entering this loop ramp. We believe tying the two ramps together would be preferable in terms of safety and operations to the proposed design. Please examine the geometric and operational feasibility of making this connection.

Upon further study and utilizing the recently completed aerial survey (available 3/31/05) and GEOPAK design software, we can confirm that tying both entrance ramps from Martin Luther King Boulevard can be accomplished with barrier separation from the mainline of I-124. We have established preliminary alignments and grades for these proposed ramps and required vertical clearances can be achieved.

4. The right-turn from southbound Pine Street has been changed from a signal-controlled condition to a yield condition. Because of the short distance from this movement to the decision point for the ramp, we believe this should remain a signal-controlled movement, preferably with no right turn on red. This would allow the movement to operate with no competing traffic.

Based upon this recommendation, the right turn lane from southbound Pine Street to westbound Martin Luther King Boulevard will be changed to signal controlled (ie no longer free-flow turn). Similarly, the free flow right turn lane from the I-124 northbound exit ramp to eastbound Martin Luther King Boulevard will also be modified to operate under signal control.

5. The proposal calls for a "T'" intersection at the southbound exit ramp and W. 4th Street. This reduces storage on the ramp as opposed to having the ramp termini at W. 6th Street. This ramp is expected to serve extremely high volumes, with most traffic proceeding to MLK and Main Street. Providing a free-flow 'T" intersection would provide operational advantages as compared to the proposal. It would allow free-flow movement to 6th Street (reducing delays), eliminate the potential for local traffic to adversely affect ramp operations, and increase ramp storage upstream of the ramp termini. Please examine the feasibility of making the ramp intersection at W. 4th Street a free-flow intersection for the ramp movement to W. 6th Street.

The original design for this ramp intersection location was a free flow design, with West 4th Street traffic prohibited from utilizing the ramp system to access West 6th Street. At the request of the City of Chattanooga, this intersection was redesigned as a "T" intersection to allow local traffic to use the ramp system. Based upon this recommendation, the proposed ramp system has been modified to create a free flow intersection eliminating local traffic influence in the ramp system.

6. The southbound entrance ramp from W. 4th Street would operate with less turbulence on the mainline if it were brought on as a single free-flow entrance, as opposed to a two-lane parallel entrance ramp. The 2028 traffic volumes fall well short of requiring a two-lane ramp. We request that one of the two lanes on the ramp be dropped before it enters the Interstate mainline.

Based upon this recommendation, the southbound entrance ramp from West 6th Street to I-124 will be modified to a one-lane entrance ramp to serve as an add lane to I-124.

7. In our meeting, we discussed the proposed roundabout at the frontage road and MLK. We were told that a roundabout was chosen at the request of the local government. However, we expressed concerns about how the roundabout would operate, particularly the fact that the analysis shows at least one movement operating at LOS "F." From reviewing the traffic projections and the analysis, it appears that the eastbound movement on MLK (869 vehicles per hour) may suffer a disproportionate amount of delay in the morning peak period. This is because that traffic will have to yield to approximately 1500 vehicles per hour, most of which will be in the outside lane. On this roundabout, it may be difficult if not impossible to balance the delays on different lane groups in order to minimize overall delays. Please provide us with the justification for choosing a roundabout at this location. This justification should include a comparison of delays of a properly sized intersection versus the proposed roundabout.

Early in the development of the study, various intersection treatments were investigated for the ramp terminals at I-124 and Martin Luther King Boulevard. Initially, signalized operation was recommended for the I-124 southbound exit to Martin Luther King Boulevard with some minor modifications at the existing signalized intersection with the I-124 northbound exit to Martin Luther King Boulevard. During the development of various alternates for the corridor, the City of Chattanooga requested we evaluate both ramps terminals as roundabout designs versus traditional signalized operation. It was determined that volumes were too great for a roundabout to provide acceptable operation of the I-124 northbound exit ramp to Martin Luther King Boulevard with queue lengths extending along the ramp onto I-124 during the morning peak hour. When evaluating the I-124 southbound exit ramp to Martin Luther King Boulevard, traffic volumes are significantly less allowing for acceptable operation as a roundabout design. Based upon the delay experienced in the design year for the eastbound Martin Luther King Boulevard approach as previously shown in the functional plans, lane modifications have been made for the southbound entrance ramp to I-124. After revising the lane configuration, operation of the roundabout design will operate at a level of service A in the design year.

At your request, we have provided (see attached) a comparison of delays for both a roundabout design versus signalized operation at this location. As shown in the attachment, the roundabout design as proposed will provide an average delay of approximately 13 sec/vehicle versus signalized operation resulting in an average delay of approximately 35 sec/vehicle.

8. The entrance ramp from MLK to I -124 southbound does not have full access control. There is a break in access allowing vehicles to enter the ramp from W. 12th Street. This break in access is highly undesirable from a safety perspective. Furthermore, it only is expected to service a maximum of 57 vehicles per hour in year 2028. We understand that this design was retained because there is similar access on the current ramp. However, the proposed design is even less desirable than the existing design. It places the yield condition right in the middle of a merge on the ramp and does not provide adequate acceleration distance to the mainline. We find it difficult to approve this design when there are other ways to provide non-circuitous access to the Interstate. We are unaware of any reason that this break in access can be justified. If the Department feels strongly that it is necessary to retain this break in access control solely because it currently exists, please provide sufficient justification as to why existing ramps cannot serve the intended movements. Also, please provide a copy of FHWA's original access approval showing this break in access.

In the design year (2028), it is projected that 870 vehicles per day will utilize this slip ramp from West 12th Street to southbound I-124. Traffic capacity is available for southbound motorists to access I-124 at the West Main Street interchange via Grove Street / Riverfront Parkway. The functional plans will be revised to reflect the removal of this slip ramp.

9. The proposal contains a new exit ramp to Riverfront Parkway, which is expected to serve a maximum of only 571 vehicles per hour in year 2028. We have several concerns about this ramp. First, this ramp is not in accordance with Point 4 of FHWA' s policy [Federal Register: February 11, 1998 (Volume 63, Number 28)] because it does not provide for all traffic movements. Second, the ramp introduces additional signing and driver decisions just prior to the I-24/I-124 freeway-to-freeway interchange. Third, the aerial photos show closely spaced signals and a lack of appropriate access control at the ramp termini. This ramp would require approval from our FHWA Headquarters. Because we believe the ramp's undesirable characteristics far outweigh any benefits, we are unable to recommend approval of this ramp.

Based upon the comments as outlined above, the proposed ramp from I-124 southbound to Riverfront Parkway will be eliminated from the functional plans.

10. As we discussed at the meeting, please examine ways to improve the undesirable weave between the southbound entrance ramp from Main Street and the I-24 interchange. In particular, please determine if there is a way to change this weave from a Type "A" weave to a Type "B" weave. In particular, if the ramp mentioned in (9) above were eliminated, the fourth lane could be carried to the ramps at I-24. By changing the entrance ramp from W. Main Street to a normal tapered entrance ramp, vehicles could enter the correct lane for the I-24 exit ramp much further upstream. This would improve signing, merging, and overall operations of the southbound mainline. Please determine if this configuration is feasible, especially with regard to acceleration length of the ramp from W. Main Street.

While removal of the southbound exit ramp as outlined in item (9) has been done, adequate acceleration and merge lengths can not be achieved for the southbound entrance ramp from West Main Street prior to the fully directional interchange at I-24. However, modifications of the ramp gore areas can be accomplished to gain an additional 200 feet of weave area to improve the safety and operation at this location.

Attached to this letter, is a revised layout of the functional plans with the changes as outlined above. If you have any questions concerning the requested modifications made to the proposed improvements, please feel free to call me.

Sincerely,

Thomas M. Clinard, P.E.
Senior Transportation Engineer
Partner

Copy: Jeanne Stevens
Bill Hart
Ron Baker
Mike Updike
File

LOCATION:	Martin Luther King Boulevard & I-124 West Side Frontage Road
INTERSECTION:	Proposed Two (2) Lane Roundabout
MEASURE:	delay per vehicle (sec)

Approach	2008 AM	2008 PM
MLK WB	8.6	11.0
MLK EB	6.8	8.0
I-124 Frontage Rd	11.4	9.6
Overall Intersection:	9.3	9.5

Approach	2018 AM	2018 PM
MLK WB	8.9	11.0
MLK EB	9.1	11.9
I-124 Frontage Rd	12.0	10.2
Overall Intersection:	10.3	11.3

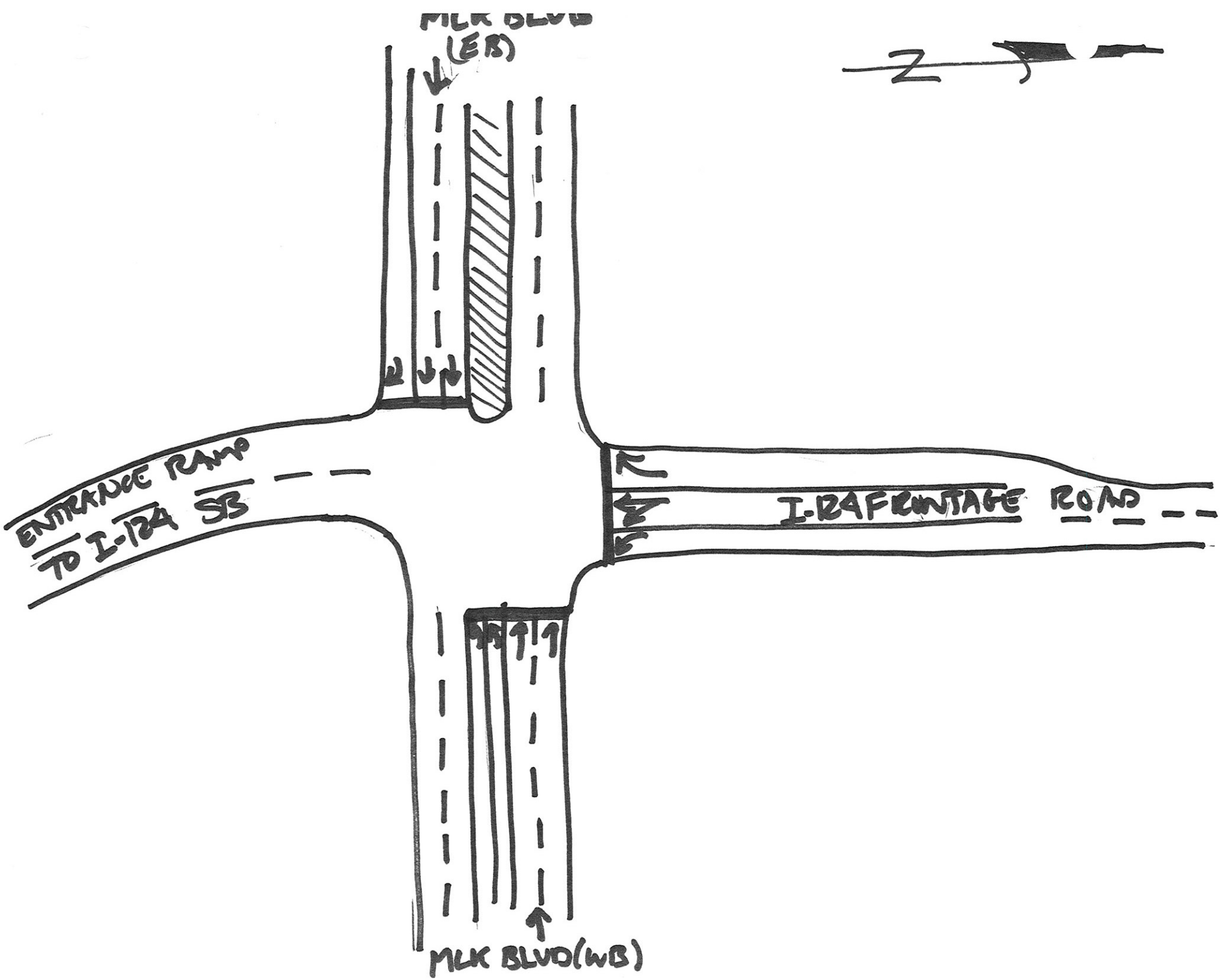
Approach	2028 AM	2028 PM
MLK WB	9.2	11.0
MLK EB	14.1	17.3
I-124 Frontage Rd	12.8	10.7
Overall Intersection:	12.3	13.7

LOCATION:	Martin Luther King Boulevard & I-124 West Side Frontage Road
INTERSECTION:	Signalized Operation
MEASURE:	delay per vehicle (sec)

Approach	2008 AM	2008 PM
MLK WB	9.4	12.8
MLK EB	20.7	18.8
I-124 Frontage Rd	26.9	27.9
Overall Intersection:	20.0	17.3

Approach	2018 AM	2018 PM
MLK WB	10.2	20.1
MLK EB	22.2	21.8
I-124 Frontage Rd	41.2	29.3
Overall Intersection:	27.5	22.0

Approach	2028 AM	2028 PM
MLK WB	13.7	18.8
MLK EB	52.8	38.5
I-124 Frontage Rd	47.4	34.6
Overall Intersection:	40.3	29.3


MLK BLVD
(EB)
ENTRANCE RAMP
TO I-124 SB
I-84 FRONTAGE ROAD
MLK BLVD(WB)

SHORT REPORT

General Information		Site Information	
Analyst	TMC	Intersection	
Agency or Co.	CEA, LLC	Area Type	CBD or Similar
Date Performed	6/21/2005	Jurisdiction	CHATTANOOGA
Time Period	AM	Analysis Year	2008

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	0	2	1	2	2	0	0	0	0	2	1	1
Lane group		T	R	L	T					L	LT	R
Volume (vph)		508	161	374	206					715	45	243
% Heavy veh		0	0	0	0					0	0	0
PHF		0.90	0.90	0.90	0.90					0.90	0.90	0.90
Actuated (P/A)		P	P	P	P					P	P	P
Startup lost time		2.0	2.0	2.0	2.0					2.0	2.0	2.0
Ext. eff. green		2.0	2.0	2.0	2.0					2.0	2.0	2.0
Arrival type		3	3	3	3					3	3	3
Unit Extension		3.0	3.0	3.0	3.0					3.0	3.0	3.0
Ped/Bike/RTOR Volume	0		100				0			0		180
Lane Width		12.0	12.0	12.0	12.0					12.0	12.0	12.0
Parking/Grade/Parking	N	0	N	N	0	N	N		N	N	0	N
Parking/hr												
Bus stops/hr		0	0	0	0					0	0	0
Unit Extension		3.0	3.0	3.0	3.0					3.0	3.0	3.0

Phasing	WB Only	EW Perm	03	04	SB Only	06	07	08
Timing	G = 10.0	G = 20.0	G =	G =	G = 20.0	G =	G =	G =
	Y = 5	Y = 5	Y =	Y =	Y = 5	Y =	Y =	Y =

Duration of Analysis (hrs) = 0.25 — Cycle Length C = 65.0

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Adj. flow rate		564	68	416	229					794	50	70
Lane group cap.		1000	447	914	1749					970	526	447
v/c ratio		0.56	0.15	0.46	0.13					0.82	0.10	0.16
Green ratio		0.31	0.31	0.54	0.54					0.31	0.31	0.31
Unif. delay d1		18.8	16.3	8.8	7.4					20.8	16.0	16.4
Delay factor k		0.50	0.50	0.50	0.50					0.50	0.50	0.50
Increm. delay d2		2.3	0.7	1.6	0.2					7.7	0.4	0.7
PF factor		1.000	1.000	1.000	1.000					1.000	1.000	1.000
Control delay		21.1	17.1	10.4	7.6					28.5	16.4	17.1
Lane group LOS		C	B	B	A					C	B	B
Apprch. delay		20.7			9.4						26.9	
Approach LOS		C			A						C	
Intersec. delay		20.0			Intersection LOS						B	

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SHORT REPORT

General Information		Site Information	
Analyst	TMC	Intersection	
Agency or Co.	CEA, LLC	Area Type	CBD or Similar
Date Performed	6/21/2005	Jurisdiction	CHATTANOOGA
Time Period	PM	Analysis Year	2008

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	0	2	1	2	2	0	0	0	0	2	1	1
Lane group		T	R	L	T					L	LT	R
Volume (vph)		736	291	913	72					155	106	77
% Heavy veh		0	0	0	0					0	0	0
PHF		0.90	0.90	0.90	0.90					0.90	0.90	0.90
Actuated (P/A)		P	P	P	P					P	P	P
Startup lost time		2.0	2.0	2.0	2.0					2.0	2.0	2.0
Ext. eff. green		2.0	2.0	2.0	2.0					2.0	2.0	2.0
Arrival type		3	3	3	3					3	3	3
Unit Extension		3.0	3.0	3.0	3.0					3.0	3.0	3.0
Ped/Bike/RTOR Volume	0		60				0			0		50
Lane Width		12.0	12.0	12.0	12.0					12.0	12.0	12.0
Parking/Grade/Parking	N	0	N	N	0	N	N		N	N	0	N
Parking/hr												
Bus stops/hr		0	0	0	0					0	0	0
Unit Extension		3.0	3.0	3.0	3.0					3.0	3.0	3.0

Phasing	WB Only	EW Perm	03	04	SB Only	06	07	08
Timing	G = 15.0	G = 25.0	G =	G =	G = 10.0	G =	G =	G =
	Y = 5	Y = 5	Y =	Y =	Y = 5	Y =	Y =	Y =

Duration of Analysis (hrs) = 0.25 | Cycle Length C = 65.0

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Adj. flow rate		818	257	1014	80					172	118	30
Lane group cap.		1250	559	1231	2249					485	263	224
v/c ratio		0.65	0.46	0.82	0.04					0.35	0.45	0.13
Green ratio		0.38	0.38	0.69	0.69					0.15	0.15	0.15
Unif. delay d1		16.4	15.0	7.2	3.2					24.6	25.0	23.8
Delay factor k		0.50	0.50	0.50	0.50					0.50	0.50	0.50
Increm. delay d2		2.7	2.7	6.3	0.0					2.0	5.4	1.2
PF factor		1.000	1.000	1.000	1.000					1.000	1.000	1.000
Control delay		19.1	17.7	13.5	3.2					26.6	30.4	25.0
Lane group LOS		B	B	B	A					C	C	C
Apprch. delay		18.8			12.8						27.9	
Approach LOS		B			B						C	
Intersec. delay		17.3			Intersection LOS						B	

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SHORT REPORT

General Information		Site Information	
Analyst	TMC	Intersection	
Agency or Co.	CEA, LLC	Area Type	CBD or Similar
Date Performed	6/21/2005	Jurisdiction	CHATTANOOGA
Time Period	AM	Analysis Year	2018

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	0	2	1	2	2	0	0	0	0	2	1	1
Lane group		T	R	L	T					L	LT	R
Volume (vph)		586	183	447	208					856	36	280
% Heavy veh		0	0	0	0					0	0	0
PHF		0.90	0.90	0.90	0.90					0.90	0.90	0.90
Actuated (P/A)		P	P	P	P					P	P	P
Startup lost time		2.0	2.0	2.0	2.0					2.0	2.0	2.0
Ext. eff. green		2.0	2.0	2.0	2.0					2.0	2.0	2.0
Arrival type		3	3	3	3					3	3	3
Unit Extension		3.0	3.0	3.0	3.0					3.0	3.0	3.0
Ped/Bike/RTOR Volume	0		40				0			0		60
Lane Width		12.0	12.0	12.0	12.0					12.0	12.0	12.0
Parking/Grade/Parking	N	0	N	N	0	N	N		N	N	0	N
Parking/hr												
Bus stops/hr		0	0	0	0					0	0	0
Unit Extension		3.0	3.0	3.0	3.0					3.0	3.0	3.0

Phasing	WB Only	EW Perm	03	04	SB Only	06	07	08
Timing	G = 10.0	G = 20.0	G =	G =	G = 20.0	G =	G =	G =
	Y = 5	Y = 5	Y =	Y =	Y = 5	Y =	Y =	Y =

Duration of Analysis (hrs) = 0.25 | Cycle Length C = 65.0

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Adj. flow rate		651	159	497	231					951	40	244
Lane group cap.		1000	447	943	1749					970	526	447
v/c ratio		0.65	0.36	0.53	0.13					0.98	0.08	0.55
Green ratio		0.31	0.31	0.54	0.54					0.31	0.31	0.31
Unif. delay d1		19.5	17.5	9.4	7.5					22.3	16.0	18.7
Delay factor k		0.50	0.50	0.50	0.50					0.50	0.50	0.50
Increm. delay d2		3.3	2.2	2.1	0.2					24.5	0.3	4.7
PF factor		1.000	1.000	1.000	1.000					1.000	1.000	1.000
Control delay		22.8	19.7	11.5	7.6					46.8	16.2	23.5
Lane group LOS		C	B	B	A					D	B	C
Apprch. delay	22.2			10.2						41.2		
Approach LOS	C			B						D		
Intersec. delay	27.5			Intersection LOS						C		

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SHORT REPORT

General Information		Site Information	
Analyst	TMC	Intersection	
Agency or Co.	CEA, LLC	Area Type	CBD or Similar
Date Performed	6/21/2005	Jurisdiction	CHATTANOOGA
Time Period	PM	Analysis Year	2018

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	0	2	1	2	2	0	0	0	0	2	1	1
Lane group		T	R	L	T					L	LT	R
Volume (vph)		878	340	1084	85					184	126	92
% Heavy veh		0	0	0	0					0	0	0
PHF		0.90	0.90	0.90	0.90					0.90	0.90	0.90
Actuated (P/A)		P	P	P	P					P	P	P
Startup lost time		2.0	2.0	2.0	2.0					2.0	2.0	2.0
Ext. eff. green		2.0	2.0	2.0	2.0					2.0	2.0	2.0
Arrival type		3	3	3	3					3	3	3
Unit Extension		3.0	3.0	3.0	3.0					3.0	3.0	3.0
Ped/Bike/RTOR Volume	0		60				0			0		50
Lane Width		12.0	12.0	12.0	12.0					12.0	12.0	12.0
Parking/Grade/Parking	N	0	N	N	0	N	N		N	N	0	N
Parking/hr												
Bus stops/hr		0	0	0	0					0	0	0
Unit Extension		3.0	3.0	3.0	3.0					3.0	3.0	3.0

Phasing	WB Only	EW Perm	03	04	SB Only	06	07	08
Timing	G = 15.0	G = 25.0	G =	G =	G = 10.0	G =	G =	G =
	Y = 5	Y = 5	Y =	Y =	Y = 5	Y =	Y =	Y =

Duration of Analysis (hrs) = 0.25 | Cycle Length C = 65.0

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Adj. flow rate		976	311	1204	94					204	140	47
Lane group cap.		1250	559	1297	2249					485	263	224
v/c ratio		0.78	0.56	0.93	0.04					0.42	0.53	0.21
Green ratio		0.38	0.38	0.69	0.69					0.15	0.15	0.15
Unif. delay d1		17.6	15.7	8.6	3.2					24.9	25.3	24.0
Delay factor k		0.50	0.50	0.50	0.50					0.50	0.50	0.50
Increm. delay d2		4.9	4.0	12.8	0.0					2.7	7.5	2.1
PF factor		1.000	1.000	1.000	1.000					1.000	1.000	1.000
Control delay		22.5	19.6	21.4	3.2					27.5	32.9	26.2
Lane group LOS		C	B	C	A					C	C	C
Apprch. delay		21.8			20.1						29.3	
Approach LOS		C			C						C	
Intersec. delay		22.0			Intersection LOS						C	

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SHORT REPORT

General Information		Site Information	
Analyst	TMC	Intersection	
Agency or Co.	CEA, LLC	Area Type	CBD or Similar
Date Performed	6/21/2005	Jurisdiction	CHATTANOOGA
Time Period	AM	Analysis Year	2028

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	0	2	1	2	2	0	0	0	0	2	1	1
Lane group		T	R	L	T					L	LT	R
Volume (vph)		664	205	519	209					997	27	316
% Heavy veh		0	0	0	0					0	0	0
PHF		0.90	0.90	0.90	0.90					0.90	0.90	0.90
Actuated (P/A)		P	P	P	P					P	P	P
Startup lost time		2.0	2.0	2.0	2.0					2.0	2.0	2.0
Ext. eff. green		2.0	2.0	2.0	2.0					2.0	2.0	2.0
Arrival type		3	3	3	3					3	3	3
Unit Extension		3.0	3.0	3.0	3.0					3.0	3.0	3.0
Ped/Bike/RTOR Volume	0		40				0			0		60
Lane Width		12.0	12.0	12.0	12.0					12.0	12.0	12.0
Parking/Grade/Parking	N	0	N	N	0	N	N		N	N	0	N
Parking/hr												
Bus stops/hr		0	0	0	0					0	0	0
Unit Extension		3.0	3.0	3.0	3.0					3.0	3.0	3.0

Phasing	WB Only	EW Perm	03	04	SB Only	06	07	08
Timing	G = 20.0	G = 20.0	G =	G =	G = 30.0	G =	G =	G =
	Y = 5	Y = 5	Y =	Y =	Y = 5	Y =	Y =	Y =

Duration of Analysis (hrs) = 0.25 | Cycle Length C = 85.0

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Adj. flow rate		738	183	577	232					1108	30	284
Lane group cap.		764	342	1182	1720					1112	604	513
v/c ratio		0.97	0.54	0.49	0.13					1.00	0.05	0.55
Green ratio		0.24	0.24	0.53	0.53					0.35	0.35	0.35
Unif. delay d1		32.2	28.4	13.6	10.1					27.4	18.1	22.1
Delay factor k		0.50	0.50	0.50	0.50					0.50	0.50	0.50
Increm. delay d2		25.2	5.9	1.4	0.2					26.1	0.2	4.3
PF factor		1.000	1.000	1.000	1.000					1.000	1.000	1.000
Control delay		57.4	34.3	15.1	10.3					53.6	18.3	26.4
Lane group LOS		E	C	B	B					D	B	C
Apprch. delay		52.8			13.7						47.4	
Approach LOS		D			B						D	
Intersec. delay		40.3			Intersection LOS						D	

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SHORT REPORT

General Information		Site Information	
Analyst	TMC	Intersection	
Agency or Co.	CEA, LLC	Area Type	CBD or Similar
Date Performed	6/21/2005	Jurisdiction	CHATTANOOGA
Time Period	PM	Analysis Year	2028

Volume and Timing Input

	EB			WB			NB			SB		
	LT	TH	RT	LT	TH	RT	LT	TH	RT	LT	TH	RT
Num. of Lanes	0	2	1	2	2	0	0	0	0	2	1	1
Lane group		T	R	L	T					L	LT	R
Volume (vph)		965	370	1187	94					201	138	101
% Heavy veh		0	0	0	0					0	0	0
PHF		0.90	0.90	0.90	0.90					0.90	0.90	0.90
Actuated (P/A)		P	P	P	P					P	P	P
Startup lost time		2.0	2.0	2.0	2.0					2.0	2.0	2.0
Ext. eff. green		2.0	2.0	2.0	2.0					2.0	2.0	2.0
Arrival type		3	3	3	3					3	3	3
Unit Extension		3.0	3.0	3.0	3.0					3.0	3.0	3.0
Ped/Bike/RTOR Volume	0		80				0			0		50
Lane Width		12.0	12.0	12.0	12.0					12.0	12.0	12.0
Parking/Grade/Parking	N	0	N	N	0	N	N		N	N	0	N
Parking/hr												
Bus stops/hr		0	0	0	0					0	0	0
Unit Extension		3.0	3.0	3.0	3.0					3.0	3.0	3.0

Phasing	WB Only	EW Perm	03	04	SB Only	06	07	08
Timing	G = 25.0	G = 30.0	G =	G =	G = 15.0	G =	G =	G =
	Y = 5	Y = 5	Y =	Y =	Y = 5	Y =	Y =	Y =

Duration of Analysis (hrs) = 0.25 | Cycle Length C = 85.0

Lane Group Capacity, Control Delay, and LOS Determination

	EB			WB			NB			SB		
Adj. flow rate		1072	322	1319	104					223	153	57
Lane group cap.		1147	513	1480	2293					556	302	257
v/c ratio		0.93	0.63	0.89	0.05					0.40	0.51	0.22
Green ratio		0.35	0.35	0.71	0.71					0.18	0.18	0.18
Unif. delay d1		26.6	22.9	11.5	3.8					31.0	31.7	30.0
Delay factor k		0.50	0.50	0.50	0.50					0.50	0.50	0.50
Increm. delay d2		14.9	5.7	8.5	0.0					2.2	6.0	2.0
PF factor		1.000	1.000	1.000	1.000					1.000	1.000	1.000
Control delay		41.4	28.6	19.9	3.8					33.2	37.6	32.0
Lane group LOS		D	C	B	A					C	D	C
Apprch. delay		38.5			18.8						34.6	
Approach LOS		D			B						C	
Intersec. delay		29.3			Intersection LOS						C	

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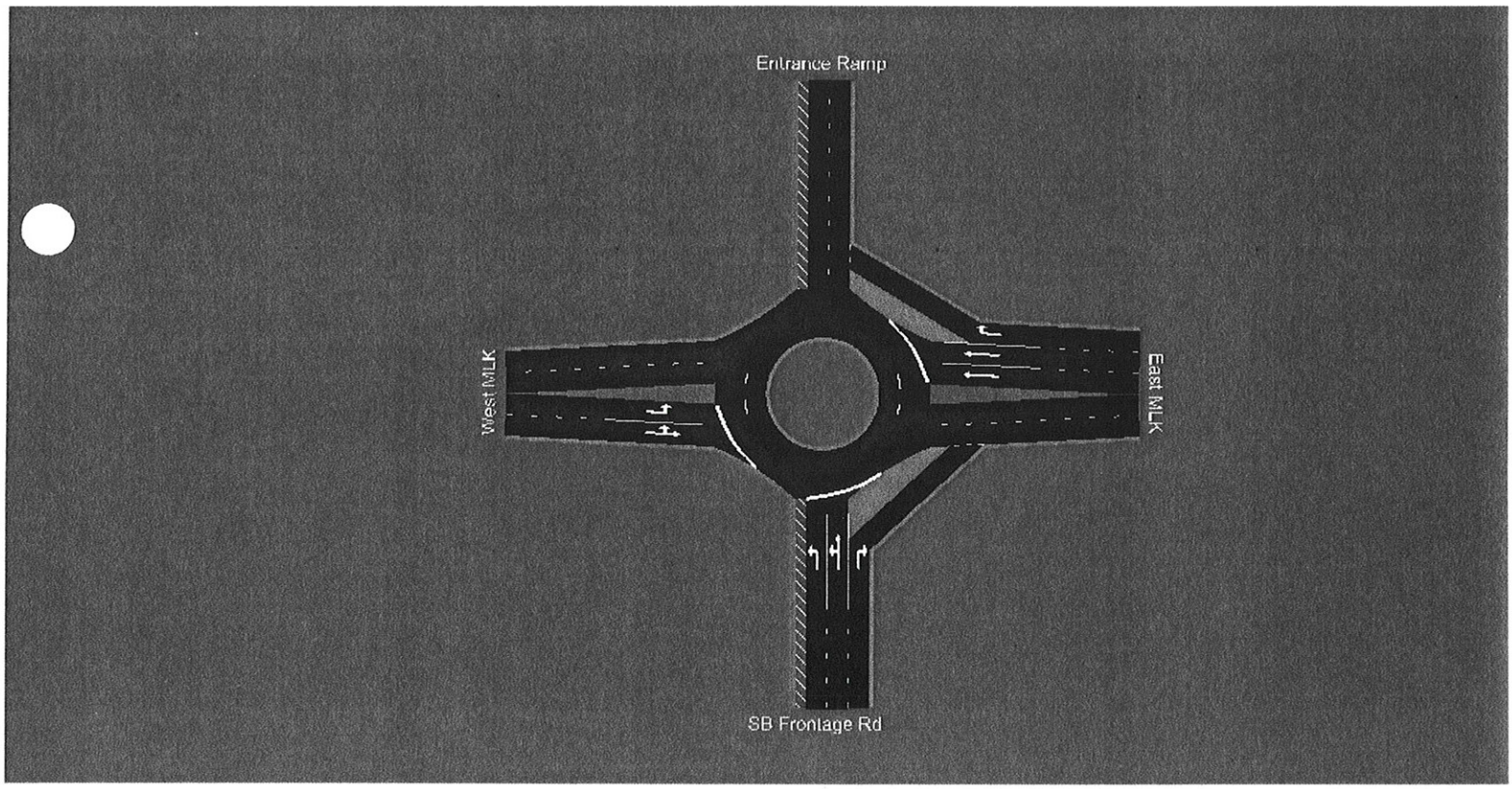
Entrance Ramp
West MLK
East MLK
SB Frontage Rd

Movement Summary

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Title

Roundabout

Vehicle Movements

Mov No	Turn	Dem Flow (veh/h)	Cap (veh/h)	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (ft)	Eff. Stop Rate	Aver Speed (mi/h)	Oper Cost ($/h)
SB Frontage Rd										
32	L	753	2141	0.352	14.4	LOS B	54	0.79	29.2	259
31	T	47	134	0.351	5.4	LOS A	52	0.50	33.6	13
33	R	256	1551	0.165	3.7	LOS A	23	0.34	35.2	68
Approach		**1056**	**3825**	**0.352**	**11.4**	**LOS B**	**54**	**0.67**	**30.6**	**340**
East MLK										
21	T	535	1583	0.338	7.7	LOS A	51	0.70	32.8	153
23	R	169	1561	0.108	3.9	LOS A	14	0.36	34.8	45
Approach		**704**	**3145**	**0.338**	**6.8**	**LOS A**	**51**	**0.62**	**33.2**	**198**
West MLK										
12	L	394	2339	0.168	11.6	LOS B	0	0.66	31.4	130
11	T	217	1288	0.168	3.1	LOS A	0	0.28	37.0	55
Approach		**611**	**3628**	**0.168**	**8.6**	**LOS A**		**0.53**	**33.0**	**185**
All Vehicles		**2371**	**10598**	**0.352**	**9.3**	**LOS A**	**54**	**0.62**	**31.9**	**723**

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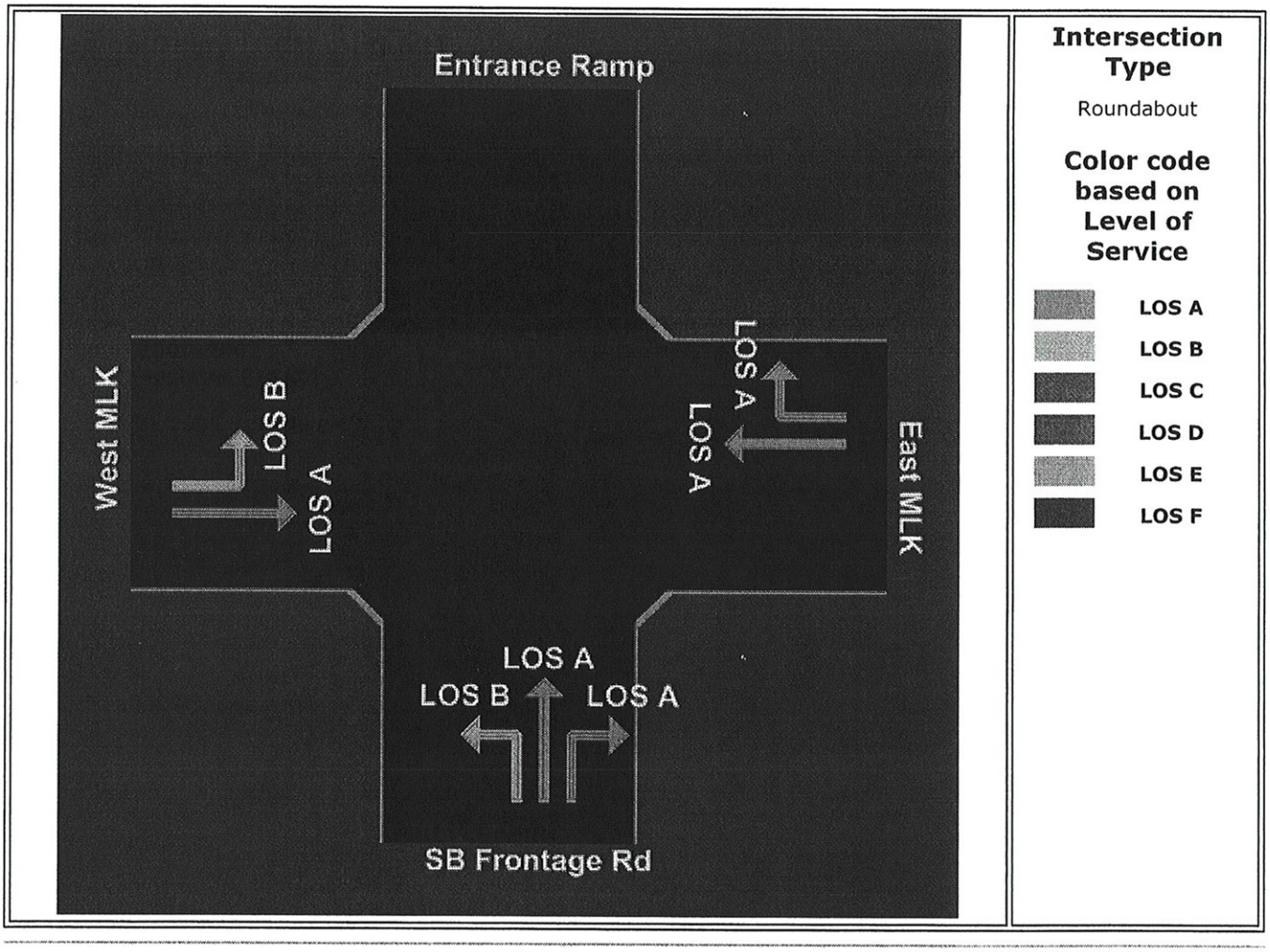
Based on Delay (HCM method)

Title



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Movement Summary

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Title

Roundabout

Vehicle Movements

Mov No	Turn	Dem Flow (veh/h)	Cap (veh/h)	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (ft)	Eff. Stop Rate	Aver Speed (mi/h)	Oper Cost ($/h)
SB Frontage Rd										
32	L	163	1163	0.140	15.0	LOS B	20	0.79	29.0	56
31	T	112	792	0.140	6.4	LOS A	19	0.59	33.4	31
33	R	81	1824	0.044	3.2	LOS A	4	0.29	36.2	21
Approach		**355**	**3779**	**0.140**	**9.6**	**LOS A**	**20**	**0.62**	**31.7**	**108**
East MLK										
21	T	775	1722	0.449	8.7	LOS A	83	0.81	32.4	224
23	R	306	1095	0.279	6.3	LOS A	45	0.58	33.1	86
Approach		**1080**	**2817**	**0.450**	**8.0**	**LOS A**	**83**	**0.74**	**32.6**	**310**
West MLK										
12	L	961	3362	0.286	11.6	LOS B	0	0.66	31.4	318
11	T	76	266	0.286	3.1	LOS A	0	0.28	37.0	19
Approach		**1037**	**3628**	**0.286**	**11.0**	**LOS B**		**0.63**	**31.7**	**337**
All Vehicles		**2472**	**10224**	**0.449**	**9.5**	**LOS A**	**83**	**0.68**	**32.0**	**756**

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Based on Delay (HCM method)

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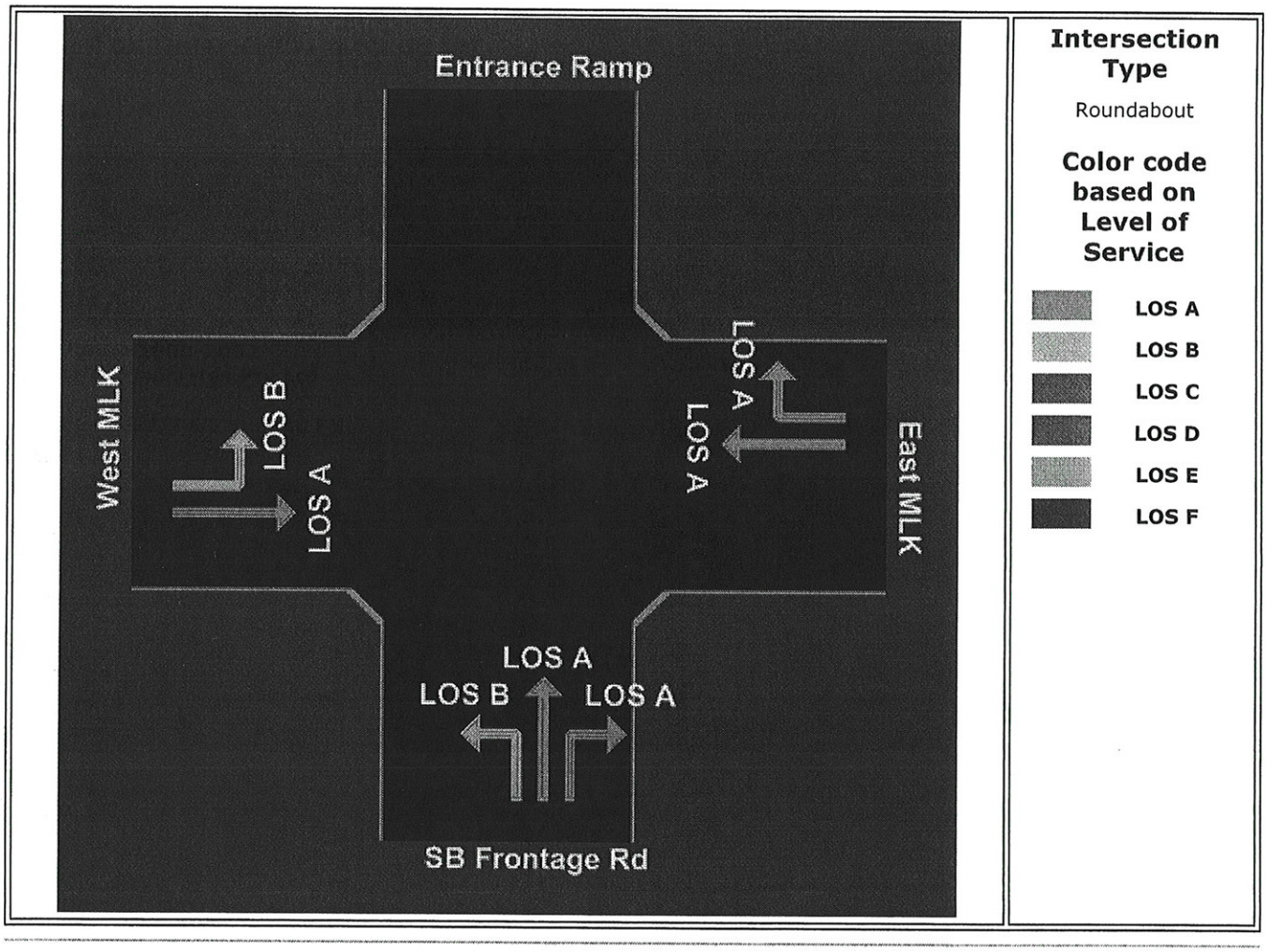

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Movement Summary

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Title

Roundabout

Vehicle Movements

Mov No	Turn	Dem Flow (veh/h)	Cap (veh/h)	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (ft)	Eff. Stop Rate	Aver Speed (mi/h)	Oper Cost ($/h)
SB Frontage Rd										
32	L	901	2117	0.426	14.9	LOS B	69	0.83	29.1	311
31	T	38	89	0.427	6.1	LOS A	69	0.57	33.4	11
33	R	295	1571	0.188	3.7	LOS A	26	0.34	35.2	78
Approach		**1234**	**3777**	**0.426**	**12.0**	**LOS B**	**69**	**0.70**	**30.4**	**400**
East MLK										
21	T	617	1352	0.456	10.7	LOS B	81	0.89	31.2	185
23	R	193	1597	0.121	4.0	LOS A	16	0.37	34.6	52
Approach		**810**	**2949**	**0.456**	**9.1**	**LOS A**	**81**	**0.76**	**32.0**	**237**
West MLK										
12	L	471	2475	0.190	11.6	LOS B	0	0.66	31.4	156
11	T	219	1153	0.190	3.1	LOS A	0	0.28	37.0	55
Approach		**689**	**3628**	**0.190**	**8.9**	**LOS A**		**0.54**	**32.8**	**211**
All Vehicles		**2733**	**10354**	**0.456**	**10.3**	**LOS B**	**81**	**0.68**	**31.4**	**848**

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Level of Service

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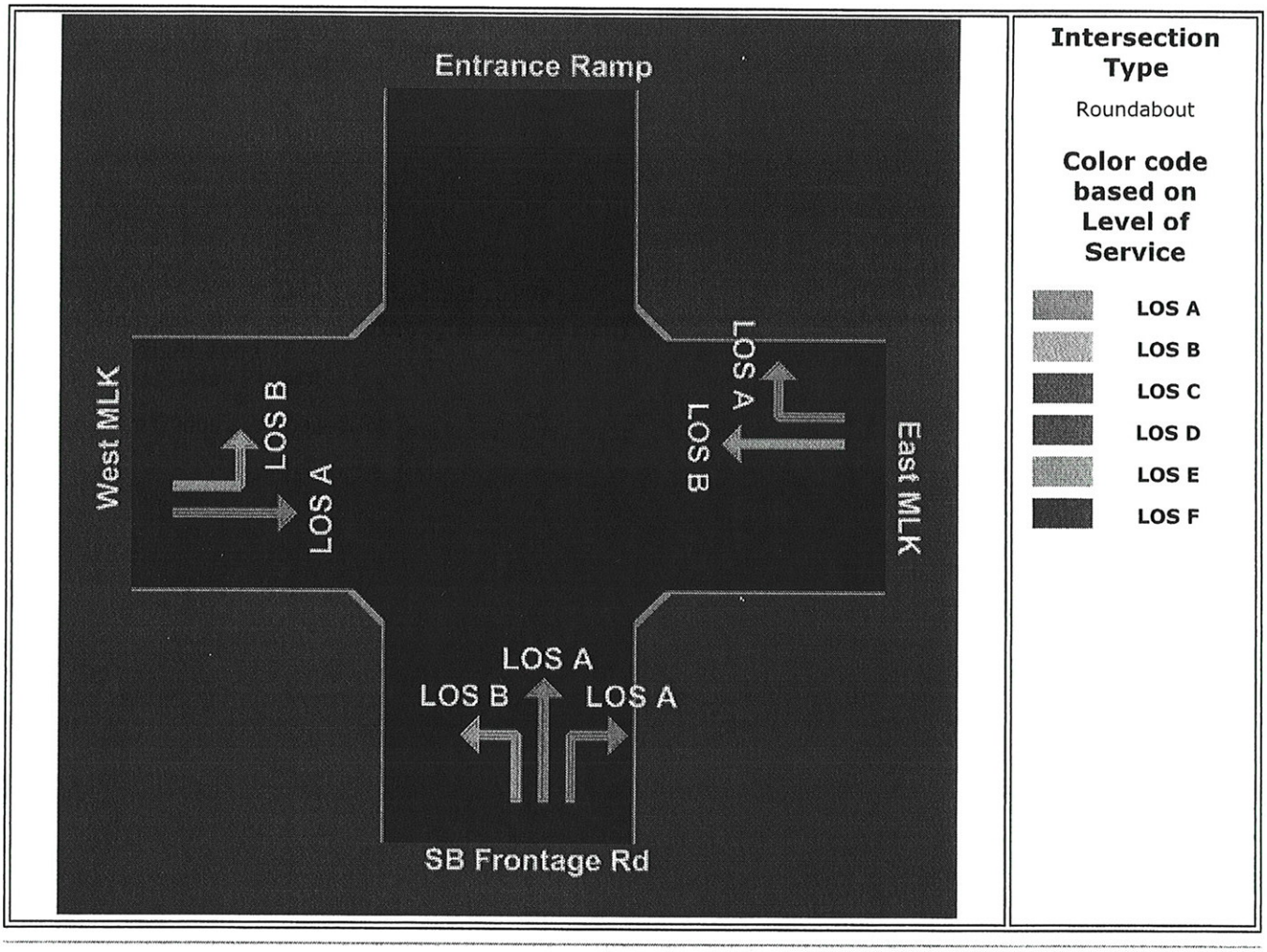
Based on Delay (HCM method)

Title



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Movement Summary

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Title

Roundabout

Vehicle Movements

Mov No	Turn	Dem Flow (veh/h)	Cap (veh/h)	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (ft)	Eff. Stop Rate	Aver Speed (mi/h)	Oper Cost ($/h)
SB Frontage Rd										
32	L	194	1089	0.178	15.7	LOS B	27	0.83	28.9	67
31	T	133	746	0.178	7.3	LOS A	25	0.68	33.1	38
33	R	97	1894	0.051	3.2	LOS A	5	0.29	36.2	25
Approach		**424**	**3729**	**0.178**	**10.2**	**LOS B**	**27**	**0.66**	**31.5**	**130**
East MLK										
21	T	924	1497	0.617	13.6	LOS B	155	1.01	29.4	294
23	R	358	1005	0.356	7.6	LOS A	63	0.70	32.6	103
Approach		**1282**	**2502**	**0.617**	**11.9**	**LOS B**	**155**	**0.93**	**30.2**	**397**
West MLK										
12	L	1141	3363	0.339	11.6	LOS B	0	0.66	31.4	378
11	T	89	265	0.340	3.1	LOS A	0	0.28	37.0	23
Approach		**1231**	**3628**	**0.339**	**11.0**	**LOS B**		**0.63**	**31.7**	**400**
All Vehicles		**2937**	**9859**	**0.617**	**11.3**	**LOS B**	**155**	**0.77**	**31.0**	**927**

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Level of Service

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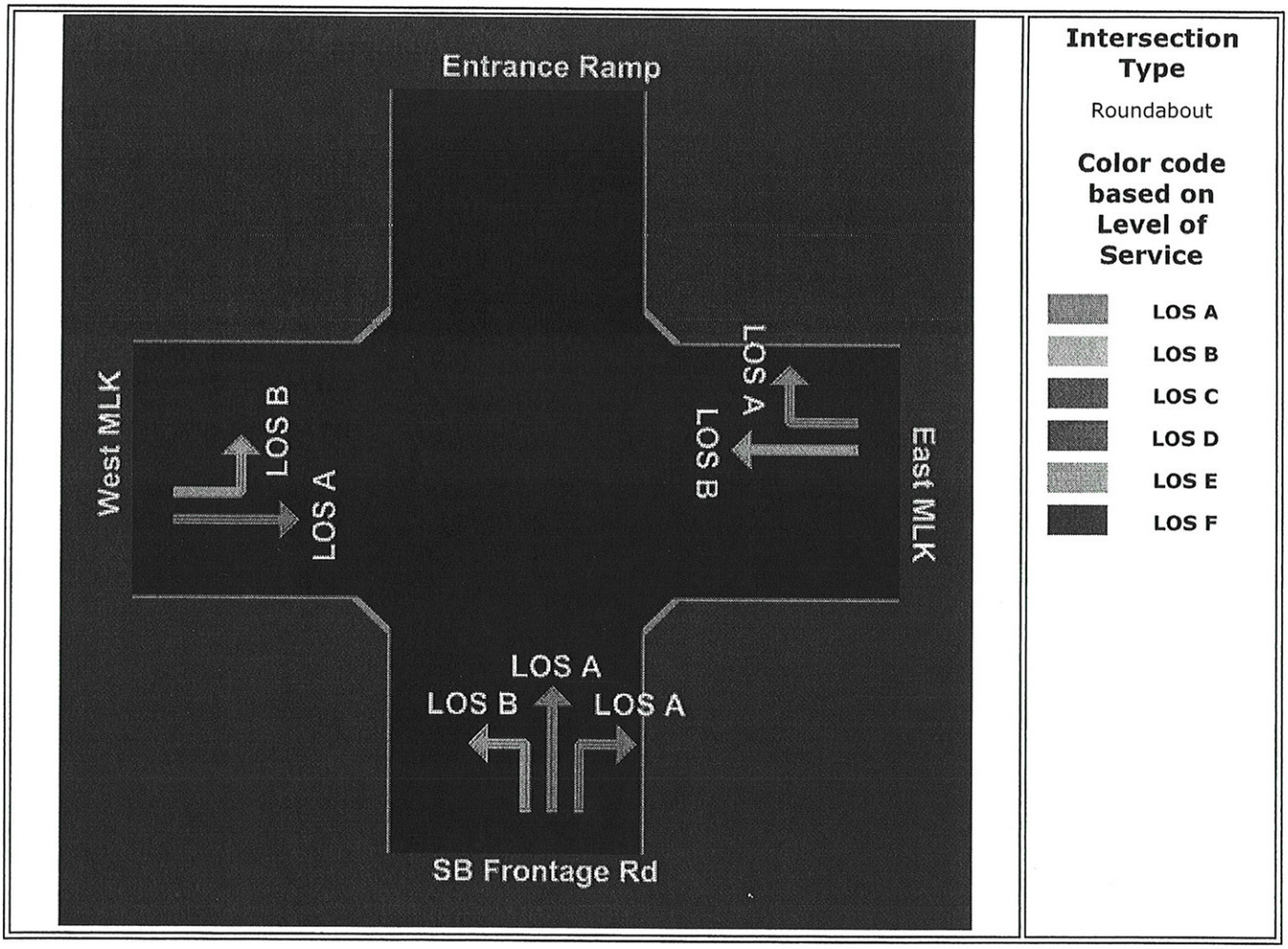
Based on Delay (HCM method)

Title



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Movement Summary

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Title

Roundabout

Vehicle Movements

Mov No	Turn	Dem Flow (veh/h)	Cap (veh/h)	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (ft)	Eff. Stop Rate	Aver Speed (mi/h)	Oper Cost ($/h)
SB Frontage Rd										
32	L	1049	2085	0.503	15.8	LOS B	95	0.89	28.8	366
31	T	28	58	0.500	7.1	LOS A	93	0.69	33.1	8
33	R	333	1592	0.209	3.7	LOS A	29	0.34	35.2	88
Approach		**1411**	**3734**	**0.503**	**12.8**	**LOS B**	**95**	**0.76**	**30.1**	**463**
East MLK										
21	T	699	1120	0.624	17.2	LOS B	138	1.07	27.5	237
23	R	216	1639	0.131	4.1	LOS A	18	0.38	34.4	58
Approach		**914**	**2759**	**0.624**	**14.1**	**LOS B**	**138**	**0.91**	**28.9**	**296**
West MLK										
12	L	546	2586	0.211	11.6	LOS B	0	0.66	31.4	181
11	T	220	1042	0.211	3.1	LOS A	0	0.28	37.0	56
Approach		**766**	**3628**	**0.211**	**9.2**	**LOS A**		**0.55**	**32.7**	**236**
All Vehicles		**3091**	**10121**	**0.624**	**12.3**	**LOS B**	**138**	**0.75**	**30.3**	**995**

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Level of Service

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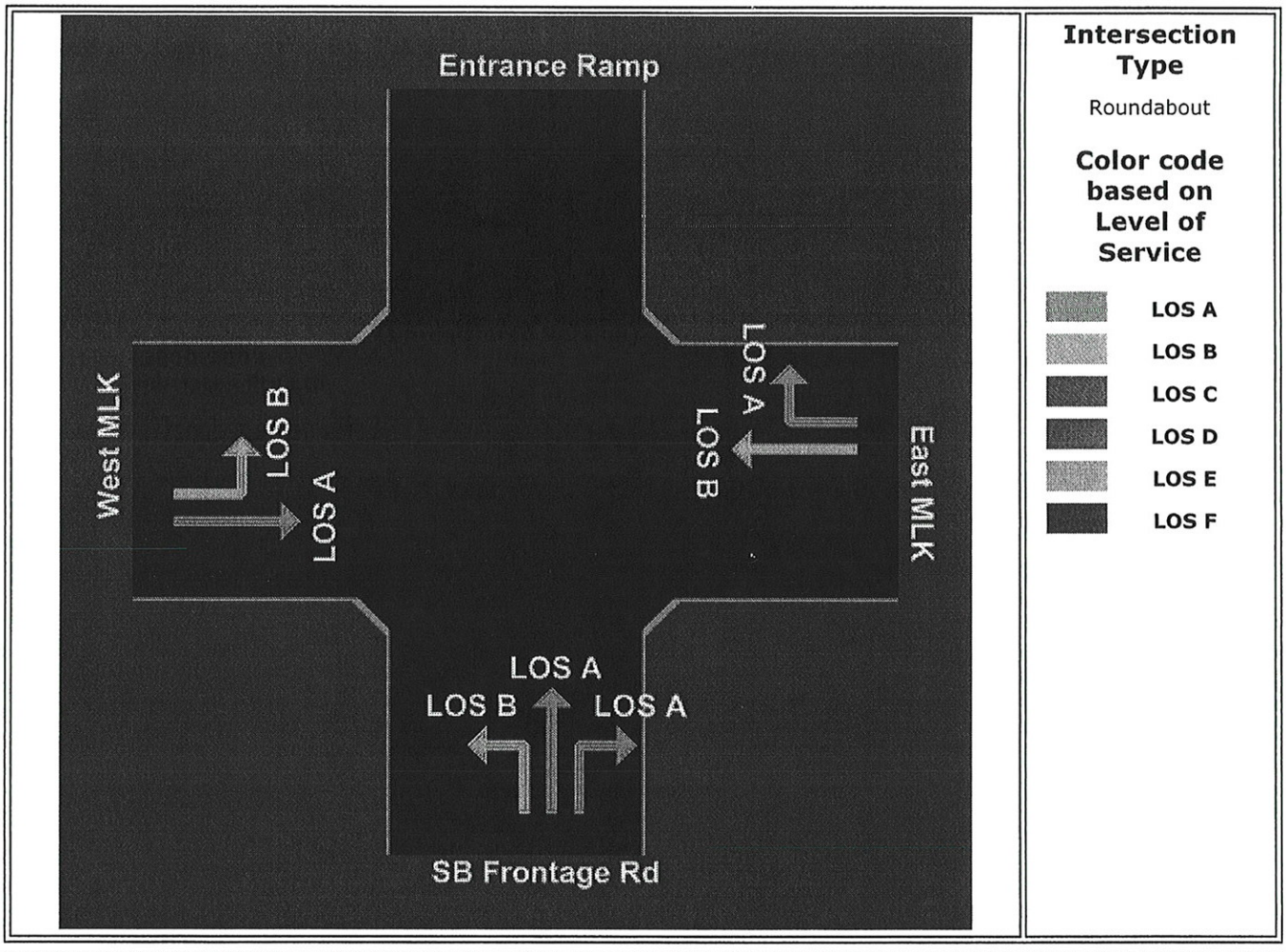
Based on Delay (HCM method)

Title



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Movement Summary

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Title

Roundabout

Vehicle Movements

Mov No	Turn	Dem Flow (veh/h)	Cap (veh/h)	Deg of Satn (v/c)	Aver Delay (sec)	Level of Service	95% Back of Queue (ft)	Eff. Stop Rate	Aver Speed (mi/h)	Oper Cost ($/h)
SB Frontage Rd										
32	L	212	1029	0.205	16.3	LOS B	33	0.86	28.6	74
31	T	145	707	0.205	8.1	LOS A	30	0.75	32.9	41
33	R	106	1937	0.055	3.2	LOS A	5	0.30	36.2	27
Approach		**462**	**3673**	**0.205**	**10.7**	**LOS B**	**33**	**0.69**	**31.3**	**143**
East MLK										
21	T	1016	1357	0.748	20.5	LOS C	242	1.21	25.9	366
23	R	389	946	0.412	9.0	LOS A	82	0.85	32.3	113
Approach		**1405**	**2303**	**0.748**	**17.3**	**LOS B**	**242**	**1.11**	**27.4**	**478**
West MLK										
12	L	1249	3361	0.372	11.6	LOS B	0	0.66	31.4	413
11	T	99	266	0.372	3.1	LOS A	0	0.28	37.0	25
Approach		**1348**	**3628**	**0.372**	**11.0**	**LOS B**		**0.63**	**31.7**	**438**
All Vehicles		**3215**	**9604**	**0.748**	**13.7**	**LOS B**	**242**	**0.85**	**29.7**	**1060**

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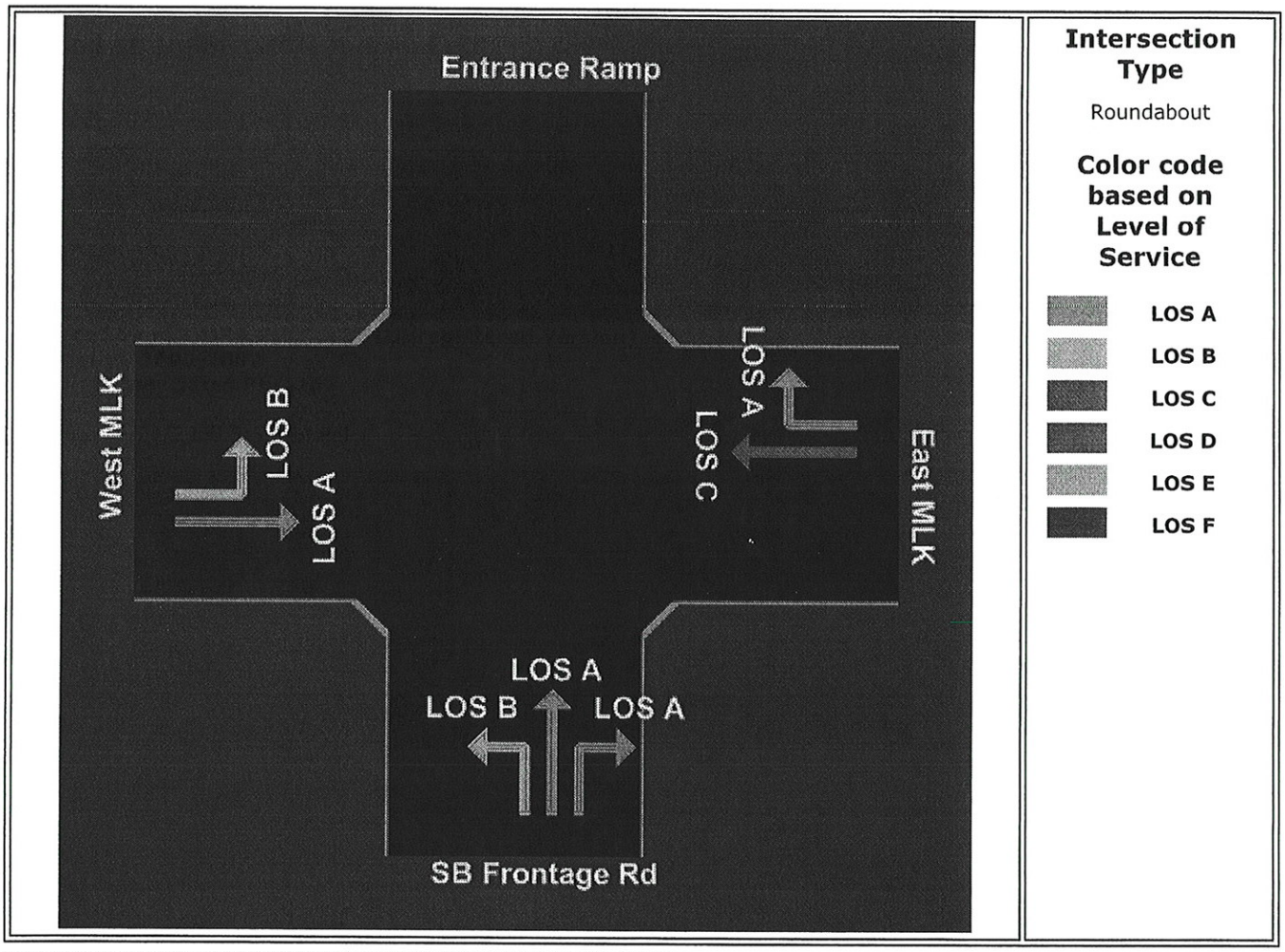
Based on Delay (HCM method)

Title



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MEMO

RE: I-124 Interchange Modification Study
Interchanges of West Main Street, SR-316 (Martin Luther King Blvd) and East 4th Street

Upon review of the initial draft report for the subject project, the Federal Highway Administration provided comments regarding the functional plans and proposed improvements. Below is a response for addressing the concerns raised at the time of this review. The comments are attached for reference.

Route: Interstate 124 is currently signed as State Route 29 (US 27). The interstate designation is not contained as part of the route signage.

Project Location: This study is being undertaken to address the deficiencies of three (3) existing interchanges located within the downtown area of Chattanooga, Tennessee. The project limits extend approximately 1.62 miles from the I-124/I-24 directional interchange located near the beginning of the project with the Tennessee River bridge at the northern limits of the project boundary.

Design Speed: The existing mainline is posted for fifty (50) miles per hour with warning signs posted near the East 4th Street interchange for forty-five (45) miles per hour. The proposed design speed for this facility will be sixty (60) miles per hour with realignment of the mainline in this area to meet this new design speed.

Deficiencies: Numerous unsafe weave segments, sight distance restrictions, inadequate ramp merge and diverges, substandard taper lengths and lack of mainline capacity.

1. For all entrance and exit ramps (where possible) taper design has been incorporated into the functional plans with maximum taper lengths used for ramp to mainline merge/diverges. Due to the close proximity of the MLK northbound entrance ramp and the northbound exit ramp to East 4th Street, a reduced length has been used to provide sufficient weave area. A design exception in this area will be likely during the design phase of the project.

2. The 12th Avenue ramp to Martin Luther King Boulevard southbound entrance ramp has been designed to operate as a yield condition versus a free flow merge.

3. The I-124 northbound entrance ramp shown on previously labeled layout sheet seven, has been extended to the maximum allowable within the space provided between interchanges.

4. The I-124 southbound exit ramp (2 lane) has been extended by relocating the gore location. The inside third lane is to be designed as an optional exit to East 4th Street or for continuing along the mainline of I-124.

5. Access to Martin Luther King Boulevard in the eastbound direction from Pine Street currently is prohibited, but after review and comments from the City of Chattanooga, will now be provided at this location.

Comments on Interchange Modification Study
I-124 (US-27/ SR-29) and SR-316 (M. L. King Blvd) and E. 4 St.
Chattanooga, Hamilton County, TN

I. Through out tapered ramps are shown. TDOT requires and AASHTO recommends parallel ramp designs.

II. See functional layout page 4.
I-124 NB
The 2-lane off-ramp is short. It is shown as 750 feet.
AASHTO p.863 Exh.10-77 shows it should be more than 2100 feet.

III. See functional layout page 5.
I-124 NB
The on-ramp from MLK is short. It is shown as 700'
The 150' radius indicates a 25 mph speed on the ramp. See AASHTO p. 201 Exh. 3-43.
The acceleration length (L) for 25 mph to 60 mph is 1020 feet + 300 feet for the min. taper. See AASHTO p. 851 Exh. 10-70

IV. I-124 SB
At the on-ramp from MLK and 12 Ave, the weave and merge area is inadequate for the three movements.

V. MLK roundabout
The details are not shown properly. This is acceptable for the functional layout. No changes/ response is needed for this comment.
Also see last page: the I-124 & MLK rendering. Some of the plantings rendered would restrict important sight-distance points and they should not be installed. This comment does not need to be addressed in the IMS.
Sight distance for the off-ramp onto the roundabout looks questionable. It should be evaluated in the design phase of the project. The retaining wall may need to be extended to provide a safe design.

VI. See functional layout page 7.
I-124 NB
The on-ramp length is shown somewhat short. This should be corrected.

VII. See functional layout page 8.
I-124 SB
The 2-lane off-ramp is short. The fourth lane appears to be added in 200 feet. It should be added at a minimum of 1000 feet. See AASHTO p. 864, last paragraph. It may be possible to get some length by moving the gore south.

VIII. See functional layout page 9.
I-124 NB off-ramp to MLK
The intersection restricts Pine St access to MLK. Please explain why this is done.

MEMO

DATE: March 14, 2003

FROM: Thomas M. Clinard, P.E.

RE: Field Review for I-124 (State Route 29) @ State Route 316 (Martin Luther King Blvd)
Interchange Modification Study
Chattanooga, Tennessee

A field review will be held for the above project on **March 26th** beginning @ 1:30pm (EDT). We will meet at the address listed below:

Office of the City Engineer
Development Resource Center
1250 Market Street
Chattanooga, Tennessee 37402
Telephone: (423)757-5124

ATTENDEE LIST

TDOT PLANNING	
Matt Ashby	Fax: 615-532-8451
Ron Baker	Fax: 615-532-8451
Bill Hart	Fax: 615-532-8451
Charlie Graves	Fax: 615-532-5995
TDOT Structures	
Henry Pate	Fax: 615-532-7745
Environmental Planning	
Charles Bush	Fax: 615-532-8451
Tom Love	Fax: 615-532-8451
TDOT Region II	
Jim Johnston	Fax: 423-510-1296
Gary Chapman	Fax: 423-510-1296
Alan Wolfe	Fax: 423-899-1636
FHWA	
Mark Doctor	Fax: 615-781-5773
John Steele	Fax: 615-781-5773
City of Chattanooga	
John Van Winkle	Fax: 423-757-0586
Phillip Lynn	Fax: 423-757-0586

INTERSTATE 124 / U.S. 27 (SR-29) AND MARTIN LUTHER KING BOULEVARD

INTERCHANGE MODIFICATION STUDY
HAMILTON COUNTY
CHATTANOOGA, TENNESSEE
March 26, 2003

BACKGROUND

A. Study interchange is Martin Luther King Boulevard with adjacent interchanges of 4th Street and Main Street

B. Various studies have been performed for different agencies to both improve the access and safety of State Route 29 within this area

C. Current construction project underway widening I-124 from 4th Street northward across the Tennessee River

D. Long history of rear end and side swipe accidents north of 4th Street

E. Three (3) existing weave sections exist within the study area along I-124 with various short acceleration and deceleration areas at ramp termini

F. Study interchange is a Partial Cloverleaf design constructed in the early 1960's with two 30mph exit loops and one 25mph entrance loop to southbound SR-29

G. Mainline through the 4th Street interchange is signed for 45 mph speeds

H. Existing geometry of study section includes minimal shoulder widths, with roadway lighting located along the outside edge of shoulder

I. Projected traffic volumes (2008) 76,300 vpd to (2028) 99,200 vpd

EXISTING TRAFFIC ANALYSIS

See Traffic Schematic Diagrams and LOS Diagrams

PROPOSED IMPROVEMENTS

ALTERNATE A

A. Eliminate the existing southbound entrance loop ramp to I-124 from Martin Luther King Blvd

B. Create new signalized intersection at Martin Luther King Boulevard, west of I-124

C. Create new exit ramp diverge points for 4th Street and Martin Luther King Boulevard on I-124

D. Barrier separate the southbound exiting vehicles to Martin Luther King Blvd from the I-124 mainline

E. Widen five (5) existing structures along I-124 and construct one (1) new bridge over the proposed southbound exit ramp to 4th Street

F. Provide a new slip ramp to Carter Street from the northbound exit ramp to Martin Luther King Boulevard

G. Elimination of existing slip ramp from West 12th Street to southbound entrance ramp to I-124

ALTERNATE B

A. Provides similar improvements as shown in Alternate A with realignment of approximately 1,500 feet of I-124 to a design speed of 55mph

B. Would require a new structure over 4th Street along I-124

ALTERNATE C

A. Provides similar improvements as shown in Alternate B

B. Eliminates the northbound weave segment between Martin Luther King Boulevard and the 4th Street interchange (basket-weave)

PROPOSED TRAFFIC ANALYSIS

See Traffic Schematic Diagrams and LOS Diagrams

ESTIMATED CONSTRCUTION COSTS FOR ALTERNATES

See Summaries of Cost for Each Alternate

INTERSTATE 124 / U.S. 27 (SR-29) AND MARTIN LUTHER KING BOULEVARD

INTERCHANGE MODIFICATION STUDY
HAMILTON COUNTY
CHATTANOOGA, TENNESSEE
October 10, 2003

BACKGROUND

A. Study interchange is Martin Luther King Boulevard with adjacent interchanges of 4th Street and Main Street

B. Various studies have been performed for different agencies to both improve the access and safety of State Route 29 within this area

C. Current construction project underway widening I-124 from 4th Street northward across the Tennessee River

D. Long history of rear end and side swipe accidents north of 4th Street

E. Three (3) existing weave sections exist within the study area along I-124 with various short acceleration and deceleration areas at ramp termini

F. Study interchange is a Partial Cloverleaf design constructed in the early 1960's with two 30mph exit loops and one 25mph entrance loop to southbound SR-29

G. Mainline through the 4th Street interchange is signed for 45 mph speeds

H. Existing geometry of study section includes minimal shoulder widths, with roadway lighting located along the outside edge of shoulder

I. Projected traffic volumes (2008) 76,300 vpd to (2028) 99,200 vpd

IMPROVEMENT ALTERNATES PRESENTED AT PHASE I MTG MARCH 26, 2003

ALTERNATE A

A. Eliminate the existing southbound entrance loop ramp to I-124 from Martin Luther King Blvd.

B. Create new signalized intersection at Martin Luther King Boulevard west of I-124.

C. Create new exit ramp diverge points for 4th Street and Martin Luther King Boulevard on I-124.

D. Barrier separate the southbound exiting vehicles to Martin Luther King Blvd from the I-124 mainline.

E. Widen five (5) existing structures along I-124 and construct one (1) new bridge over the proposed southbound exit ramp to 4th Street.

F. Provide a new slip ramp to Carter Street from the northbound exit ramp to Martin Luther King Boulevard.

G. Elimination of existing slip ramp from West 12th Street to southbound entrance ramp to I-124.

ALTERNATE B

A. Provides similar improvements as shown in Alternate A with realignment of approximately 1,500 feet of I-124 to a design speed of 55mph.

B. Would require a new structure over 4th Street along I-124.

ALTERNATE C

A. Provides similar improvements as shown in Alternate B.

B. Eliminates the northbound weave segment between Martin Luther King Boulevard and the 4th Street interchange (basket-weave).

ALTERNATE D

A. Provides similar improvements as shown in Alternate A.

B. Creates barrier separated segment between northbound 4th Street exit traffic and Martin Luther King Boulevard entrance ramp traffic. (Weave now off mainline).

IMPROVEMENT ALTERNATES DEVELOPED FOLLOWING PHASE I MTG

ALTERNATE C (modified)

A. Following the Phase I meeting with the City of Chattanooga, TDOT and the Federal Highway Administration, Alternate C was revised to eliminate one new structure along southbound I-124 to Martin Luther King Boulevard.

B. Traffic count data was also collected for the existing slip ramp from West 12th Street to southbound I-124 and based upon the data it was determined that this access point could remain and provide safe merging in this area.

C. Removal of the proposed slip ramp from the I-124 northbound exit ramp to Carter Street was removed based upon comments provided at the Phase I meeting.

D. On May 15, 2003, TDOT Structures Division performed a detailed cost estimate for all structures within the project limits that were to be widened or that were proposed.

E. The total estimated construction cost for this alternate is $17,500,000.

F. This alternate as developed at that time was the preferred alternative to improvement.

IMPROVEMENT ALTERNATES ROUNDABOUT CONCEPTS AS REQUESTED BY THE CITY OF CHATTANOOGA

At a meeting with the TDOT on June 27, 2003, representatives from the City of Chattanooga met with the department to request additional studies be performed at the ramp terminals of I-124 and Martin Luther King Boulevard to investigate the use of roundabouts.

ALTERNATE E (Dual Roundabouts)

A. This concept would provide a roundabout design at both the northbound and southbound terminals of I-124 and Martin Luther King Boulevard.

B. This alternate would also investigate developing new access points from I-124 to West 6th Street on both the east and west side of I-124 (frontage road concept).

C. The proposed east side roundabout would need to accommodate an entering volume of approximately 43,000 vehicles per day in the design year (2028).

D. The proposed west side roundabout would need to accommodate an entering volume of approximately 22,000 vehicles per day in the design year.

E. Based upon the traffic analysis performed for the east side roundabout, it is anticipated that substantial queues will occur both on the northbound exit ramp from I-124 in the am peak hour and along westbound Martin Luther King Boulevard during the pm peak hour. Both queues as described would impact mainline I-124 operation and local intersection operation (Carter Street).

F. Based upon the traffic analysis performed for the west side roundabout, it is anticipated that short to moderate queues will occur, but will not affect the operation of adjacent intersections or the mainline of I-124.

G. Eastside connection (frontage road) between West 6th Street and 4th Street would create an unsafe short weave section at this location.

H. See handout for operational analysis.

ALTERNATE F (Single Roundabout)

A. This concept would provide a single roundabout which would connect Martin Luther King Boulevard and all four ramps from I-124.

B. This concept was provided by the City and based upon designs performed by the Kansas Department of Transportation.

C. The alternate would require a new three (3) span structure along I124 over Martin Luther King Boulevard and would also necessitate raising the grade along the interstate approximately 2 ½ feet. Estimated construction cost for this new bridge would be approximately $3,700,000.

D. Access to Pine Street would have to be reduced to right-in and right-out only for this type of configuration.

E. See handout for level of service analysis.

ALTERNATE G

A. All elements of Alternate C (modified) are shown with two modifications based upon the investigations performed at the request of the City.

B. The west side roundabout has been added in place of the previously recommended traffic signal at this location. It was also determined that connection to West 6th Street from southbound I-124 can be provided and would likely alleviate some traffic which currently utilizes the interchange of I124 and Martin Luther king Boulevard.

C. Approximate construction costs for this alternate are similar to that of Alternate C (modified) with some additions, but would remain under $20,000,000.

LOCATION: East Side Roundabout
I-124 NB Exit Ramp & MLK Blvd

Delay per vehicle (sec)

Approach	2008 AM	2008 PM
MLK WB	1.8	14.1
MLK EB	1.6	1.8
I-124 NB Exit	72.1	2.3

Delay per vehicle (sec)

Approach	2018 AM	2018 PM
MLK WB	1.9	51.6
MLK EB	1.6	1.9
I-124 NB Exit	211.8	2.7

Delay per vehicle (sec)

Approach	2028 AM	2028 PM
MLK WB	2.1	118.9
MLK EB	1.6	2.1
I-124 NB Exit	399.5	3.2

LOCATION: West Side Roundabout
I-124 SB Exit Ramp & MLK Blvd

Delay per vehicle (sec)

Approach	2008 AM	2008 PM
MLK WB	1.7	2.2
MLK EB	4.7	6.4
I-124 SB Exit	4.9	2.4

Delay per vehicle (sec)

Approach	2018 AM	2018 PM
MLK WB	1.8	2.5
MLK EB	7.6	14.3
I-124 SB Exit	8.1	2.7

Delay per vehicle (sec)

Approach	2028 AM	2028 PM
MLK WB	1.9	2.8
MLK EB	18.2	58.6
I-124 SB Exit	19.1	3.1

Level of Service

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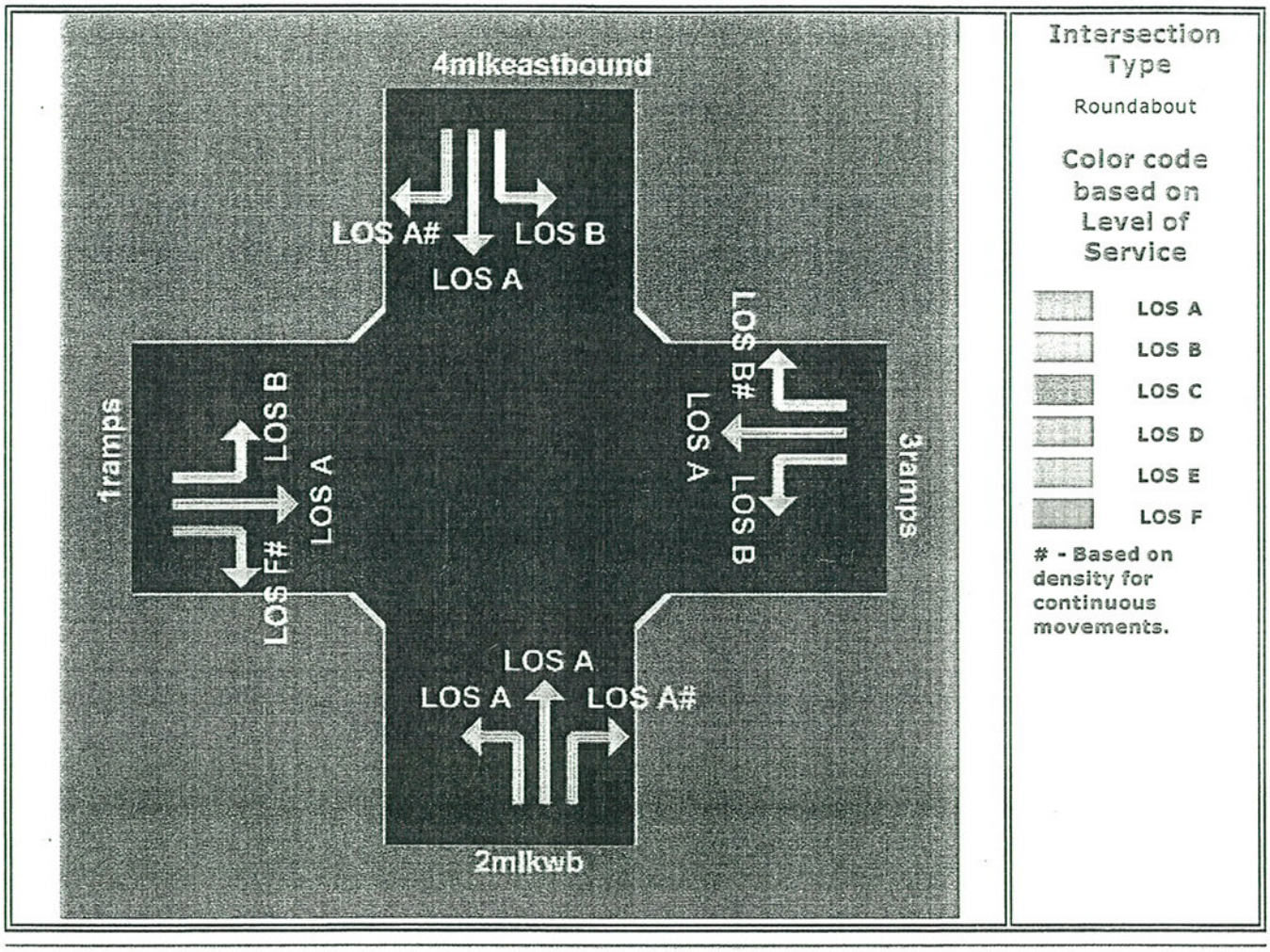
Based on Delay (HCM method)

Single Roundabout Concept



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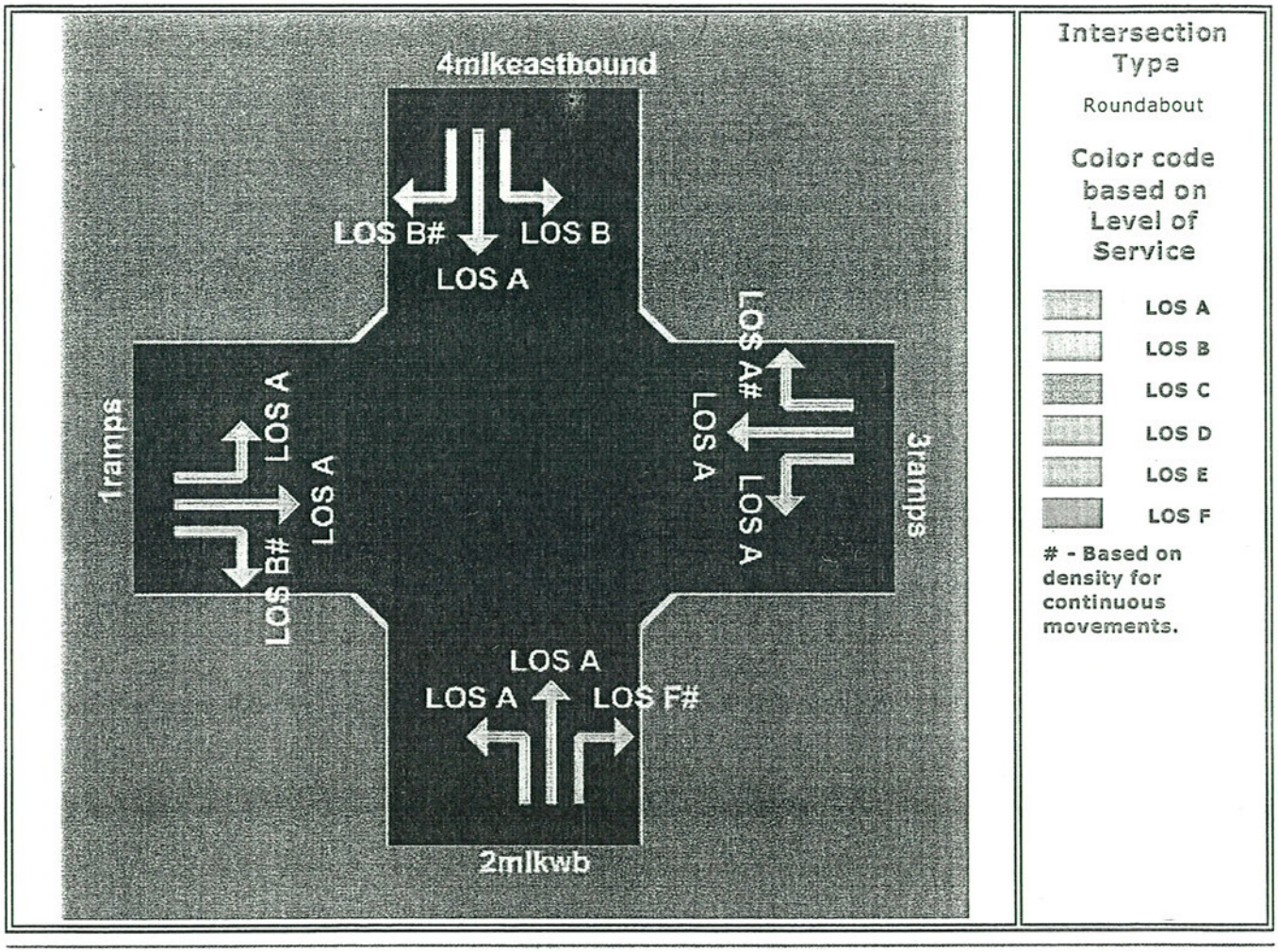
Single Roundabout Concept



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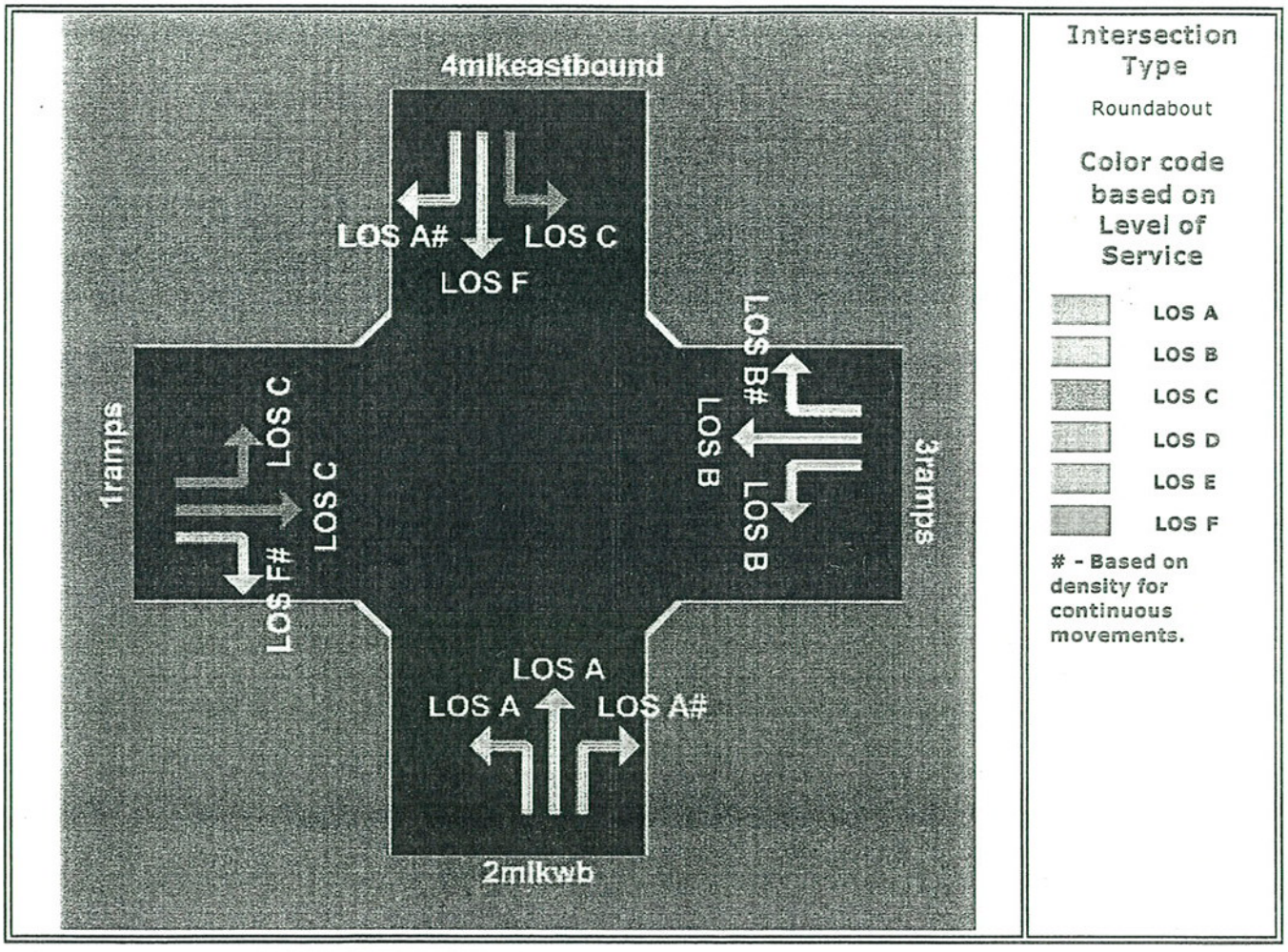
Single Roundabout Concept



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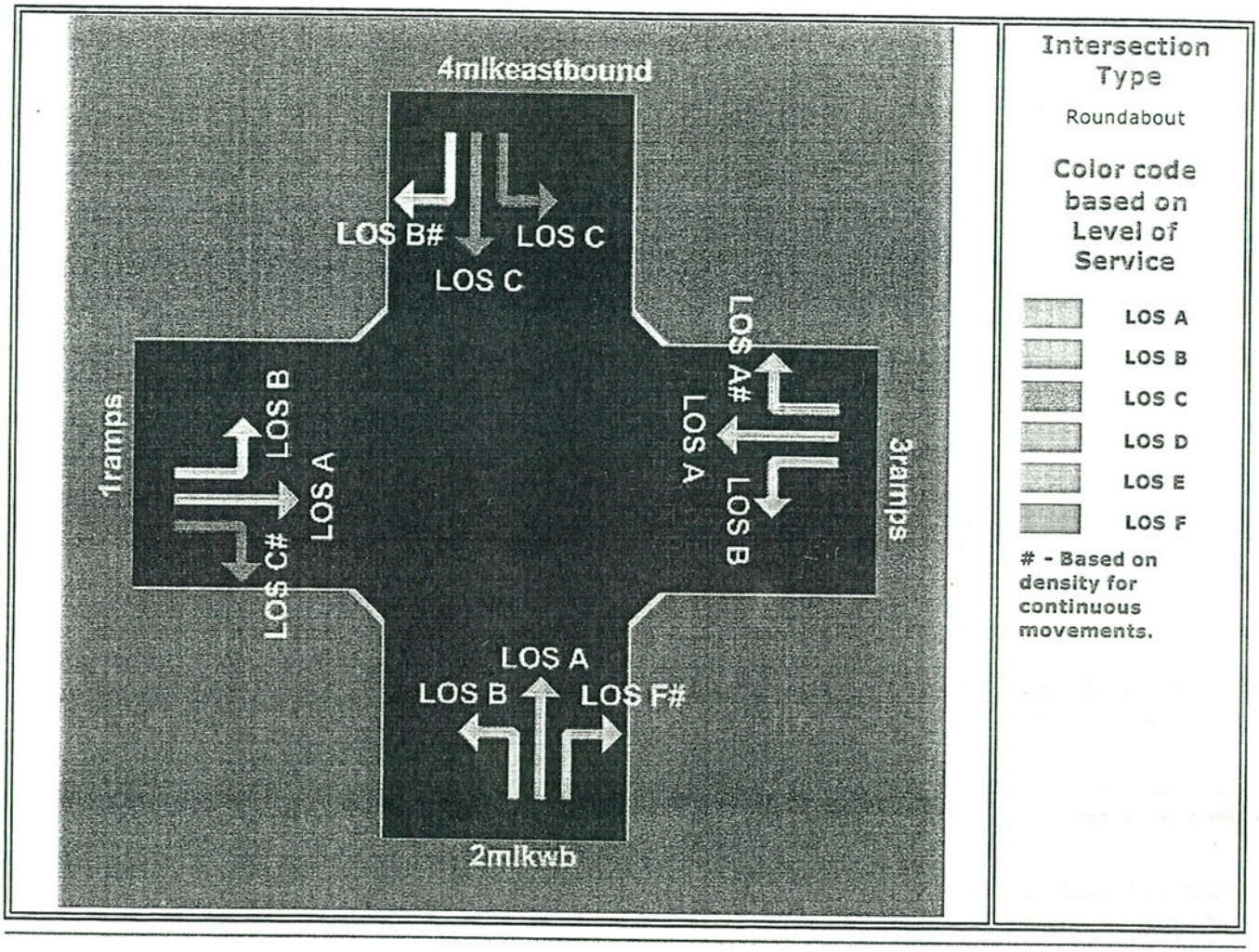
Single Roundabout Concept



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Meeting Notes (File)

I-124 & SR-316 (Martin Luther King Blvd)
Chattanooga, Tennessee

I-81 & I40 Interchange
Jefferson County, Tennessee

A meeting was held on September 5, 2003 at the office of the FHWA at 640 Grassmere Park Blvd, Suite 112. This meeting was held to review the various concepts to improve the safety and operation of both locations and gather any additional comments/input from the FHWA.

Attendees

Ron Baker	TDOT
Charlie Graves	TDOT
Ralph Volpe	FHWA
Gary Fottrell	FHWA
Scott McGuire	FHWA
Tom Clinard	CEA
Phil Clinard	CEA

Discussion (I-124 & MLK Blvd)

1. Reviewed all three alternates that were presented to the City, TDOT and FHWA during the Phase I meeting in Chattanooga in March of 2003.

2. Discussed Alternate Cmod which became the selected alternate by TDOT to move forward. Reviewed cost estimate and traffic analysis.

3. Reviewed Alternate E (dual roundabouts) and Alternate F (single roundabout) as requested by the City.

4. FHWA was receptive to the use of the single roundabout as shown in Alternate F, if no queues would extend onto the mainline of I-124.

5. The FHWA, at the appropriate time, will review the Interchange Modification Study in more detail and have comments at that point in time.

Discussion (I-81 & I-40 Interchange)

1. Reviewed the current configuration of the interchange and discussed volumes on all three legs of the interchange.

2. Reviewed the existing deficient ramp merge and diverge tapers as well as the accident data history at this interchange.

3. Discussed Region I had initiated this study and that TDOT Maintenance had been in the field and attempted to improve some these problems.

4. Reviewed the planned improvements for this interchange: upgrade merge and diverge lengths for 70mph design speed; extending ramp exit and entrance lanes for various movements.

5. FHWA concurred with these improvements and stated that the planned changes to this interchange were safety related in nature and did not rise to the level to justify an Interchange Modification Study.

Prepared By: Tom Clinard, P.E.
Clinard Engineering Associates, LLC

Date: September 8, 2003

Meeting Notes
I-124 & SR-316 (Martin Luther King Blvd)
Interchange Modification Study
Chattanooga, Tennessee

A meeting was held on September 24, 2003 in the 7th Floor conference room at TDOT with the following in attendance to discuss the various alternates developed to date for the project:

Attendees (TDOT)

Jeff Jones	Paul Degges
Winston Gaffron	Jim Zeigler
Dennis Cook	Bill Moore
Nancy Sartor	Charles Graves
Bill Hart	Derrick Tibbs
Ron Baker	Mike Updike

Attendees (Clinard Engineering Associates, LLC)

Phil Clinard
Tom Clinard

History and Discussion

1. CEA reviewed the three alternates (A, B and C) developed and presented to various officials from TDOT, FHWA and the City of Chattanooga on March 26, 2003.

2. Alternate Cmodified was also presented and discussed. This alternate was updated for structure cost purposes by TDOT Structures Division on May 15, 2003.

3. TDOT officials met with various City of Chattanooga representatives on June 27, 2003 at TDOT headquarters to discuss the department's preferred Alternate Cmodified and associated costs as well as to gather their specific comments.

4. During the June 27th meeting, the City provided two additional alternates that they had begun to develop and requested that the department further investigate modifying Alternate Cmodified to incorporate roundabout(s) design at the ramp terminals of I-124 and Martin Luther King Boulevard.

5. CEA reviewed the subsequent analysis of Alternate E (dual roundabouts) and Alternate F (single roundabout). It was determined the due to the large traffic volumes and close intersection spacing along Martin Luther

King Boulevard, a roundabout on the east side of I-124 would not operate at acceptable level of service in comparison to a traditional signalized intersection in the design year 2028. A roundabout at this location would cause a queue length of approximately 3,200 feet along the northbound exit ramp from I-124 and Martin Luther King Boulevard during the morning peak hour. It was also determined that queue length of approximately 700 feet would occur with along westbound Martin Luther King Boulevard during the afternoon peak hour for this alternate (Alternate E).

6. After further investigation and analysis it was determined that a roundabout on the west side of I-124 along MLK Boulevard will provide an adequate level of service during the design year, with minimum queue lengths on all approaches.

7. The single roundabout alternate (Alternate F) would operate based upon traffic, but would require prohibiting movements from MLK to Pine Street. This would force nearly 1,000 additional vehicles through the MLK and X intersection. In order to construct the single roundabout in Alternate F, a costly new structure (approx $3.7 million) would have to be built to span the roundabout. It was also determined that the grade along I-124 would have to be raised two to three feet to provide sufficient vertical clearance along MLK Boulevard underneath. Maintain traffic during construction would also make this option costly and potentially unsafe for motorists traveling through this area.

8. CEA evaluated the possibility of connecting the east and west side ramps to East 4th Street. It was determined that this could be provided along the west side of I-124. This would allow another access point to the City for motorists traveling southbound from I-124 and would also likely relieve some traffic congestion at the interchange of MLK Boulevard.

9. Connection to East 4th Street along the east side of I-124 from the northbound ramps would not be possible due to the planned basket weave configuration contained in Alternate Cmodified which will eliminate the existing weave section between the MLK and East 6th Street interchange.

Additional Items and Comments

1. TDOT will need to provide CEA with updated traffic volumes for the new connection from the I-124 southbound exit ramps to East 6th Street.

2. CEA will then finalize traffic analysis based upon the updated traffic network.

3. TDOT will advise CEA on the appropriateness of developing a signing plan for the preferred Alternate Cmodified (with west side roundabout).

4. CEA was also requested to develop one additional rendering of the MLK interchange which would depict the proposed improvements at this location including the west side roundabout. CEA will also need to revise the previously developed rendering of I-124 near the East 6th Street interchange to reflect the new connection along the west side at East 4th Street.

5. A detailed list of advantages and disadvantages was also requested in preparation for a meeting with TDOT and the City of Chattanooga.

6. TDOT has requested that CEA attempt to have all these items ready and to be in attendance at the meeting with the City to be held in Chattanooga on October 10, 2003.

Prepared By: Tom Clinard, P.E.
Clinard Engineering Associates, LLC

Meeting Notes

I-124 & SR-316 (Martin Luther King Blvd)
Interchange Modification Study
Chattanooga, Tennessee

A meeting was held on December 15, 2003 at the headquarters office of the Tennessee Department of Transportation. This meeting was held at the request of the City of Chattanooga to allow for additional comments/input for the various alternates for improvement developed to date.

Attendees

Jim Zeigler	TDOT
Dennis Cook	TDOT
Jeff Jones	TDOT
Bill Hart	TDOT
Ron Baker	TDOT
Bill McDonald	City of Chattanooga
Jeff Pfitzer	City of Chattanooga
Tom Clinard	CEA
Phil Clinard	CEA

Discussion

1. City is pleased with the overall concept of improvement to the East 4th Street and Martin Luther King Boulevard interchanges as proposed in Alternate G developed by Clinard Engineering Associates, LLC. However, the City has requested some minor modifications be investigated.

2. CEA has been asked to determine if adequate operation of the roundabout proposed for the westside of I-124 could occur with removal of the free-flow right-turns at the approaches of the roundabout. It was also requested that realignment of the southbound ramp approach to the roundabout occur at a ninety (90) degree angle.

3. The City has also requested further engineering and traffic evaluation be done for the proposed southbound exit from I-124 to East 4th Street to incorporate a T-intersection design. The City also would prefer access be provided to West 6th Street via the East 4th Street interchange proposed modifications, if possible.

4. In order to minimize right-of-way acquisition from the YMCA located along the eastside of I-124, the City has requested CEA to review the proposed basket-weave ramp design from Martin Luther King Boulevard to I-124 northbound.

5. To address overall access to downtown Chattanooga and to potentially alleviate traffic from the Martin Luther King Boulevard interchange, the City has requested improving the I-124 and Main Street interchange, including providing a proposed ramp from I-124 southbound to Main Street.

6. CEA has been instructed to address all comments and to provide an update to both the department and the City within four to six weeks.

Prepared By: Tom Clinard, P.E.

Meeting Notes

I-124 & SR-316 (Martin Luther King Blvd)
Interchange Modification Study
Chattanooga, Tennessee

A meeting was held on February 18, 2004 at the City of Chattanooga's office. This meeting was held as a "working session" to develop alternates to improve the access and safety at the interchange of I-124 and West Main Street as well as to follow-up on the comments raised during the meeting with TDOT on December 15, 2003.

Attendees

John VanWinkle	City of Chattanooga
Bill McDonald	City of Chattanooga
Jeff Pfitzer	City of Chattanooga
Phillip Lynn	City of Chattanooga
Tom Clinard	CEA
Phil Clinard	CEA
Sammie McCoy	CEA

Discussion

1. City is pleased with the overall concept of improvement to the East 4th Street and Martin Luther King Boulevard interchanges as proposed in Alternate G developed by Clinard Engineering Associates, LLC. However, the City has requested some additional minor modifications be investigated above those requested on December 15, 2003.

2. The City has requested that an additional left turn lane be provided from the southbound exit to East 4th Street. This additional turn lane would create a four lane/median divided section underneath the new bridge on I-124 over East 4th Street. The City also would prefer if the northbound exit ramp to East 4th Street be relocated towards the west slightly with a tighter radius to reduce the speed of motorists heading into the downtown area via this ramp.

3. In order to minimize/eliminate right-of-way acquisition from the YMCA located along the eastside of I-124, the City has requested CEA to compare the costs of constructing a retaining wall in this locate versus a bridge.

4. The City has also additionally requested the southbound entrance ramp from MLK Boulevard to I-124 (from proposed roundabout) be relocated as close as possible towards the mainline to create additional excess right-of-way.

5. CEA also provided two improvement schemes for both the northbound and southbound side of I-124 near the interchange at West Main Street.

   Scheme A (NB)

   This proposed scheme would provide four (4) travel lanes along northbound I-124 from the I-24 fully directional interchange to north of the West main Street interchange.

Scheme B (NB)

This option evaluated the possibility of providing a new northbound exit ramp from I-124 to West Main Street while eliminating the existing 20 mph loop ramp. This concept also provided a new northbound entrance ramp to I-124 from West Main Street.

Scheme A (SB)

This proposal would create a new southbound exit near West Main Street from I-124 which would fly-over the existing southbound entrance ramp before terminating at Riverfront Parkway.

Scheme B (SB)

This proposal would create a new southbound loop exit to West Main Street from I-124 which would fly-over the existing southbound entrance ramp before terminating at West Main Street.

6. Finally after developing single-line sketches of these four alternates, the City requested carrying both Scheme A (SB) and Scheme A (NB) forward. However, the City did request we evaluate modifying Scheme A (NB) to include the elimination of the existing exit loop ramp and provide a new connection to Carter Street near the West 13th Street intersection. CEA will meet with TDOT and review the alternates developed and move ahead accordingly.

Prepared By: Tom Clinard, P.E.

APPENDIX G

PROJECT PHOTOGRAPHS

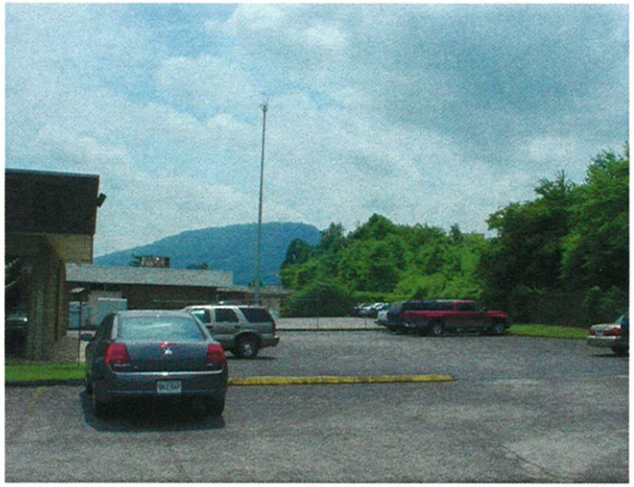
WEST MAIN STREET






FedEx








PASSENGER
DROP
OFF






ONLY














STAYBRIDGE




Open Every Day
ROCK CITY






CLIMB OUT OF THE TRAFFIC!
Open Every Day
ROCK CITY
















EAST 24
Atlanta
Knoxville
WEST 24
Nashville
Birmingham












EXIT 1
EXIT 25

MLK BLVD. & EAST 4TH STREET












CITY
PARK





















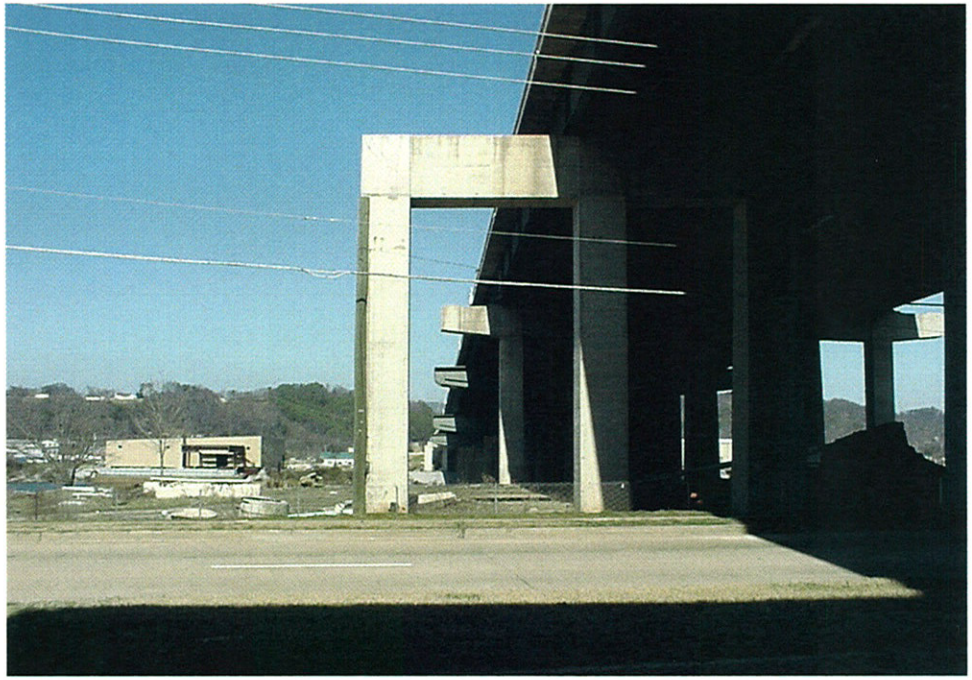














APPENDIX H

PROPOSED INTERCHANGE PHOTO-SIMULATIONS


TDOT
Go.



I-124 AND EAST 4TH STREET INTERCHANGE RENDERING





I-124 AND MARTIN LUTHER KING BLVD INTERCHANGE RENDERING