Project Summary Report

CSAH 23/TH 97 at I-35 in Columbus

July 2015

SRF

Anoka County
TRANSPORTATION DIVISION
Respectful, Innovative, Fiscally Responsible

Contents

Introduction

In 2011, Anoka County identified the need to coordinate future transportation improvements in consultation with the City of Columbus, with commercial land development planned in proximity to the Interstate 35 (I-35) interchange at County State Aid Highway (CSAH) 23 (Lake Drive) and Trunk Highway (TH) 97 in the cities of Columbus and Forest Lake.

The County had recognized the need to address operational and safety concerns associated with CSAH 23 and TH 97 near the interchange, as well as CSAH 54 that intersects CSAH 23 in close proximity to the I-35 interchange. Operational delays on TH 97 during the morning peak for westbound to southbound traffic, and the evening peak for northbound to eastbound traffic had been addressed to a minor degree through small geometric/restriping improvements in the interchange area. However, delays and driver frustration continue to be of concern, as traffic turning left onto southbound I-35 from westbound TH 97/CSAH 23 experiences significant queuing on the bridge crossing I-35 and along TH 97. The highly-utilized, full-access intersection of CSAH 54 at CSAH 23 is currently located less than 350 feet from the western ramp terminals, which further exacerbates the problem and does not meet the County's access spacing guidelines. The County anticipated that these operational issues as well as numerous private property access points on CSAH 23 could become significantly greater as the land in proximity to the interchange developed, and as background growth in the region continues.

The City had also received a number of development inquiries in regards to the area around the interchange, but efforts to redevelop the area were challenged by the amount of land held by a single owner who desired to transfer the land in a single transaction. The City had acquired the land to facilitate subdivision and subsequent transfer of the land to potential developers in manageable parcel sizes; however, the City also wanted to understand future right of way needs and access management controls to facilitate a future transportation system (state, county, and local) that would support the intensity of land development desired by the City.

By considering these transportation issues in parallel with future land use plans, the County and City intended to develop a comprehensive vision for a roadway network, including a new interchange, and access plan that would address existing and future needs, allow right of way to be set aside for roadways prior to development, and identify a phasing and funding plan that provided for efficient investment of public funds in the area.

Study Goals and Process

Determining the appropriate design of a future interchange and adjacent city and county roads required a creative approach to balance the needs of the community with the needs of transportation function. Support from a wide range of stakeholders, including area residents and business owners, the cities of Columbus and Forest Lake, Anoka and Washington Counties, the Minnesota Department of Transportation (MnDOT), the Federal Highway Administration (FHWA), and other permitting agencies was key to achieving a successful future concept that meets regional transportation demands while allowing flexibility for future development needs.

The study began with conversations with the above stakeholders based on the following key questions. These questions helped shape the scope of the study with the goal of identifying sound but flexible solutions to be implemented in phases.

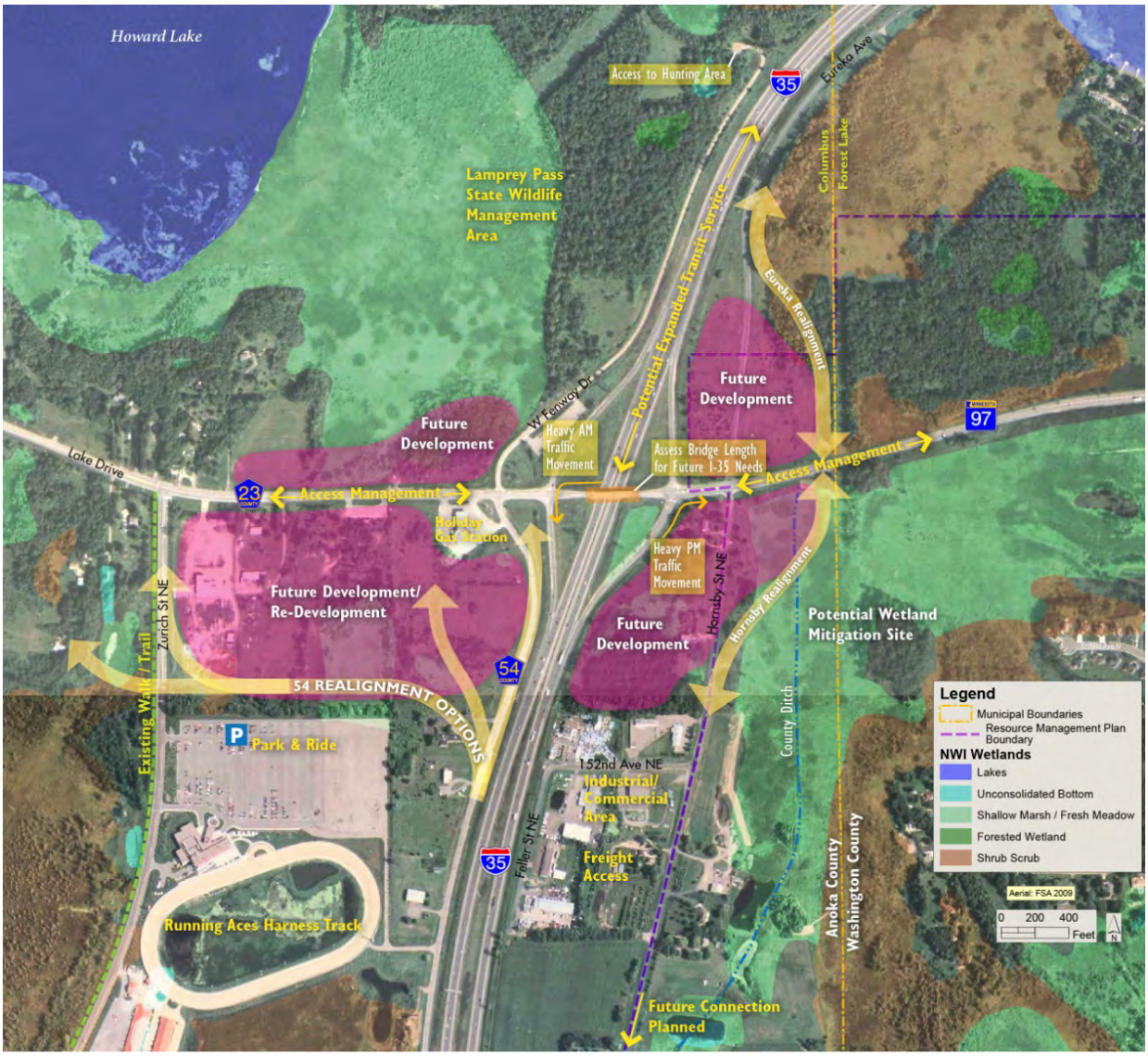
- What is the optimal future roadway system to improve traffic safety and efficiency while providing needed access?
- How do future land use and transportation issues fit together?
- Are there any issues (natural resource concerns, etc.) not yet identified that will shape project decisions?
- What improvements should occur at what time to optimize what is needed to support redevelopment?

After initial stakeholder consultation, the following study goals emerged:

- Analyze interrelated land development and transportation needs and concerns.
- Identify an interchange configuration that will meet future capacity needs and improve safety while minimizing impacts to adjacent properties.
- Analyze the realignment of existing roadways, and proposed locations of new roadways to best balance operational, safety and land development interests, with the participation of project partners and key stakeholders.
- Obtain preliminary approvals by developing a roadway layout and conducting early environmental screening to identify potential permitting issues.
- Plan for future implementation of project phases.
- Consider other modes of transportation, including transit, freight, trails, and sidewalks.

Figure 1 below illustrates early identified issues and constraints.

Figure 1: Issues Map



Organizational Structure

The project partners established a Technical Advisory Committee (TAC) consisting of staff from Anoka County, Washington County, City of Columbus, City of Forest Lake, MnDOT, FHWA, Metropolitan Council, and Rice Creek Watershed District to guide technical decisions in the process and provide input on key project decisions. The TAC met many times over a period of five years.

Anoka County was the lead agency for the study; however, other agencies served as decision making authorities for various aspects of the study recommendations:

- MnDOT: Highway 97; I-35 Interchange concept
- FHWA: I-35 Interchange approval; Operational impacts to I-35
- Anoka County: CSAH 23; CSAH 54

- Washington County: County facility recommendations
- City of Columbus: Local roads and trails; land use; public utilities
- City of Forest Lake: Local roads and trails; land use
- Rice Creek Watershed District: Water resources design criteria and permitting
- Metropolitan Council: land use, traffic forecasts, and interchange concepts

Stakeholder Involvement

A Public Involvement Plan (PIP) was prepared at the outset of the study and updated as the project progressed. The PIP is included as an attachment in Appendix A. Stakeholder outreach included several public meetings, City Council workshops (with Columbus and Forest Lake), a project website, and a newsletter. The following is a list of public meetings held:

- Public Open houses: September 2011; May 2012
- Business owner meeting: March 2011
- Property owner meeting: May 2012
- Joint Council Presentations (cities of Columbus and Forest Lake): July 2011; February 2015

The purpose of these meetings was to inform the project goals, identify issues, keep stakeholders informed, and gather input on concept development. Key concerns identified in those meetings included the following:

Running Aces: Concerns with signage displacement, visibility of signage, disruption to racing activities with moving road activities closer to raceway and disturbing horses, service and emergency access, customer wayfinding to the facility, and room for future expansions.

Holiday station: Change in access and large truck movements.

Existing properties along CSAH 54: Property takings, access changes, and changing primary access to rear of buildings.

Owners of undeveloped parcels: Locations of local roads relating to splits of long narrow properties, potential access and circulation, project timing, and easy connections to Running Aces.

Project Area Characteristics

Existing and Future Land Use

The City of Columbus 2030 Comprehensive Plan (2009) identifies the corridor along I-35 as a "freeway corridor" with municipal sewer and water service and Community Retail, Commercial Showroom, Light Industry, and Horse Racing zoning designations. Existing land uses are illustrated in Figure 1 above, and Figure 2 and Figure 3 below. Existing land uses include a gas station, single story office/retail buildings, single family residential, a Metro Transit Park and Ride facility and the "Running Aces" harness track (horse) racing facility. Running Aces Harness Park is a year-round, "24-7" facility that includes a Las Vegas style card room, live summer harness racing, a full-service restaurant and banquet facilities and year-round Simulcast wagering.

Figure 2: Metropolitan County Generalized Existing Land Use (2010)

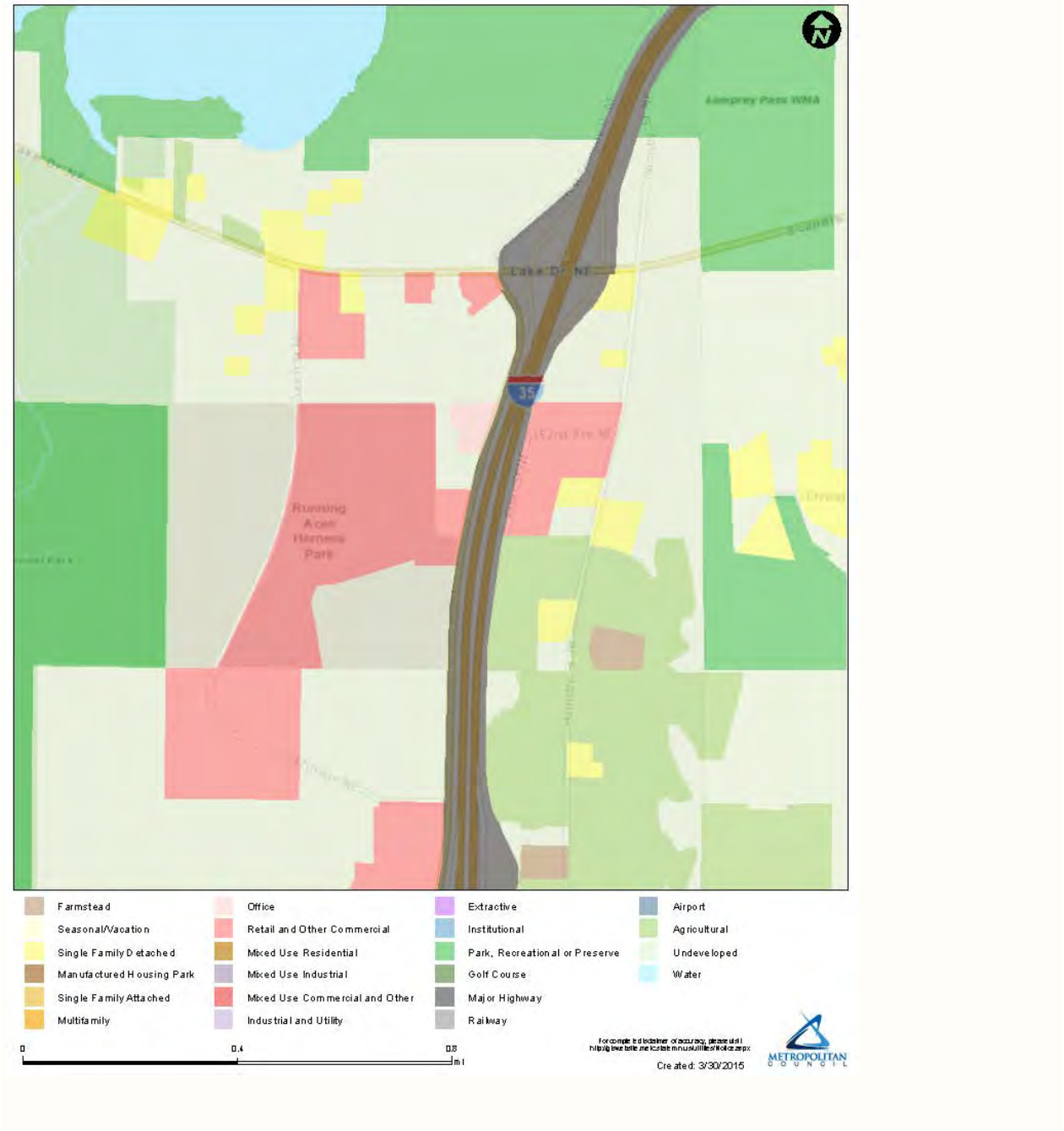
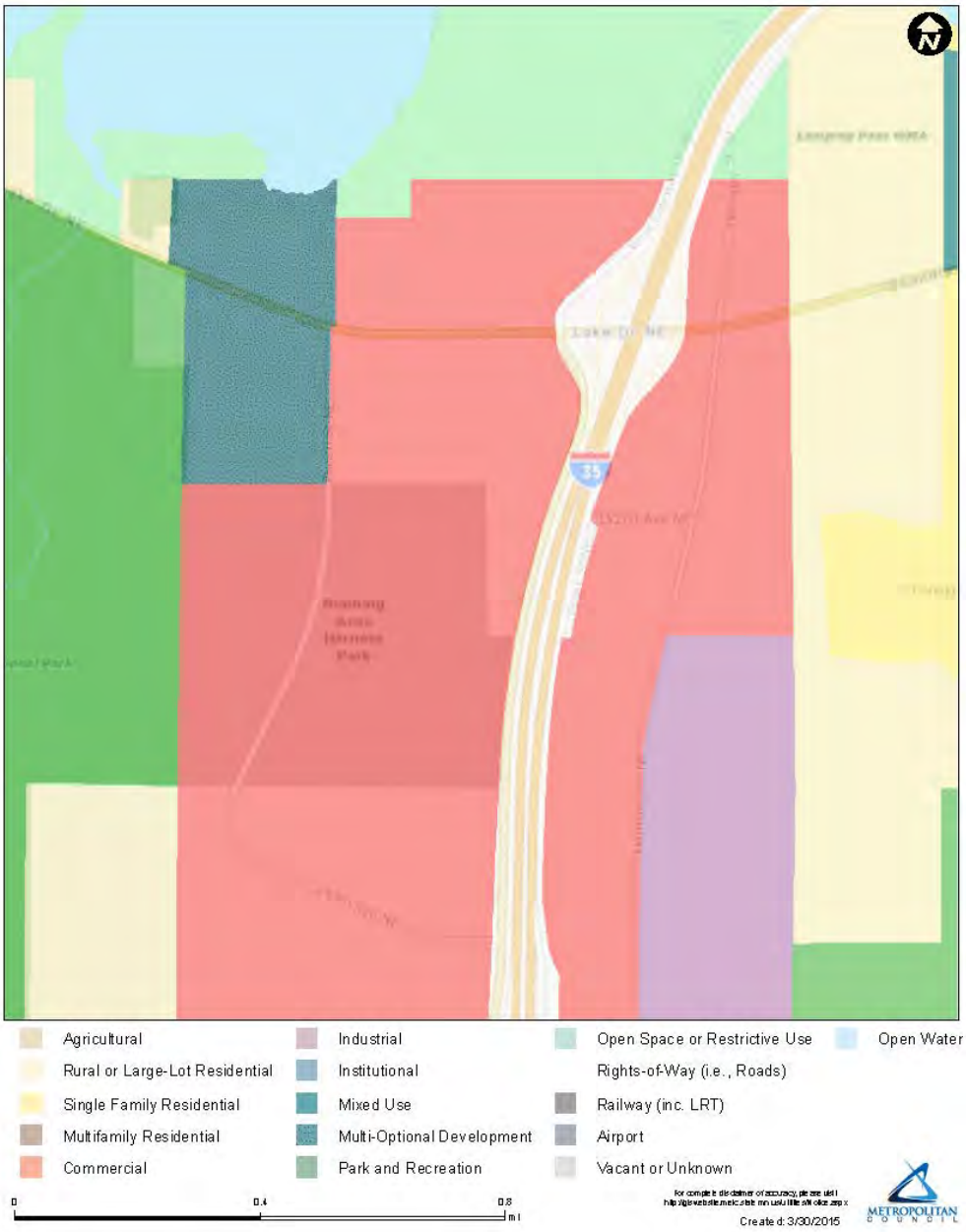


Figure 3: Metropolitan County Generalized Future Land Use



Future land uses within the study area are identified as Commercial, with the highest intensity uses planned for near the interchange. Potential future uses include hotels, restaurants, auto-oriented commercial, retail and office. The Comprehensive Plan identifies the following goals related to the study area:

- Maintain adequate lot sizes and minimum buildable areas to allow for site buffering and landscaping.
- Promote a pedestrian friendly environment within the Freeway Corridor to provide internal circulation for pedestrians.

- Encourage shared access locations and frontage/backage roads to implement access spacing in accordance with appropriate County and City guidelines.
- Upgrade the CSAH 23/I-35/TH 97 interchange due to capacity needs.
- Evaluate long range transportation system improvements to preserve long range right of way needs.

Transportation Plans

The Metropolitan Council 2030 Regional Transportation Policy Plan and MnDOT Metro District 20-year Highway Investment Plan 2001-2030 indicate no additional regional roadway expansion is planned in the study area by 2030. The Anoka and Washington County Transportation Plans also indicate limited roadway improvements in the area; the most significant improvement is the anticipated completion of a north-south roadway paralleling I-35/I-35E to the east and serving planned development in that corridor.

The Met Council 2030 Travel Demand Model anticipates development of the area served by the through the year 2030, with an estimated 6,400 additional households and 4,700 additional jobs in the CSAH 23 and TH 97 areas between 2005 and 2030.

Roadway Characteristics

Roadways in proximity to the I-35/TH97/CSAH 23 Interchange serve two primary functions – providing regional mobility to travelers and proving access to land uses. The Anoka County 2030 Transportation Plan designates for each of these roadways a functional classification, describing how each roadway should balance mobility and access depending on its role in the County's roadway network.

This functional classification system is summarized below:

Principal arterials (includes interstate freeways): Provides the greatest speed for the longest uninterrupted distance, with access control.

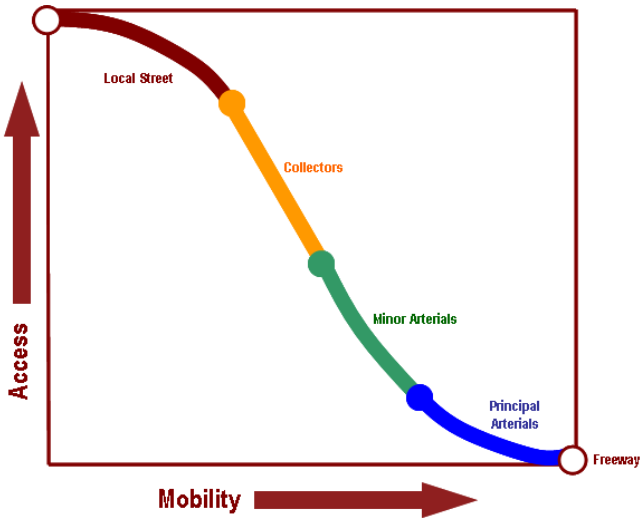
Minor arterials (A Minor and B Minor): Provides a combination of mobility and access with reasonable speed for some extended distance, with some access control.

Collector streets: Collects traffic from local roads and connects them with arterials; usually lower speed for shorter distances.

Local streets: Consists of all roads not defined as arterials or collectors; primarily provides access to land with little or no through movement.

The general relationship between mobility and access is shown in Figure 4 below. Principal arterials primarily move traffic, thus providing the highest level of mobility. Local streets, on the other hand, primarily provide access. Collectors and minor arterials generally serve some combination of both providing access and mobility.

Figure 4: Anoka County Access/Mobility Relationship, Anoka County 2030 Transportation Plan



The roadways under study include:

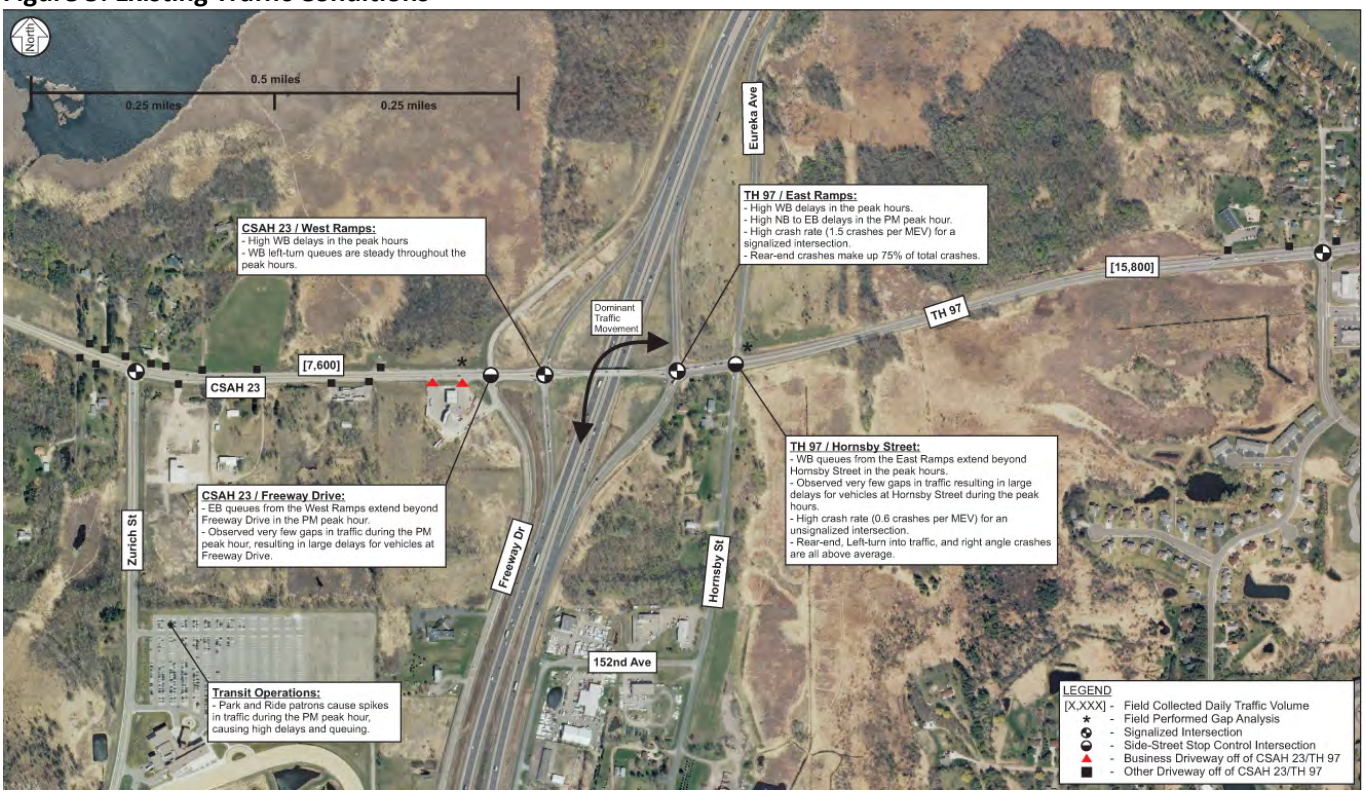
- CSAH 23 (Lake Drive) is an A Minor Arterial extending from I-35 southwest to Lino Lakes.
- TH 97 is an A Minor Arterial that connects to Washington County to the east.
- CSAH 54 is an A Minor Arterial that runs parallel along the west side of I-35 and provides access to Lino Lakes, Centerville, and Ramsey County.
- CSAH 23 and 54 as well as other local roads have numerous closely-spaced (less than 1/8 mile) access points serving private property.

Corridor Issues Identification and Technical Analysis

Traffic Analysis

Traffic forecasts were used to understand existing and future traffic capacity, operations, and safety issues. The continued build-out of the city of Columbus and Forest Lake, with additional growth from surrounding communities in the vicinity of the interchange, will result in increased traffic volumes on CSAH 23 and TH 97. Traffic issues are illustrated in Figure 5. By 2030, traffic volumes on CSAH 23 are expected to grow from 5,900 to 11,000 vehicles per day (vpd) to a range of 12,300 to 20,000 vpd. Daily traffic on TH 97 is forecast to range from 24,000 to 30,000 vpd. Traffic on I-35 is expected to increase from 76,000 vpd to 116,000 vpd south of CSAH 23/TH97. See Figure 6 below.

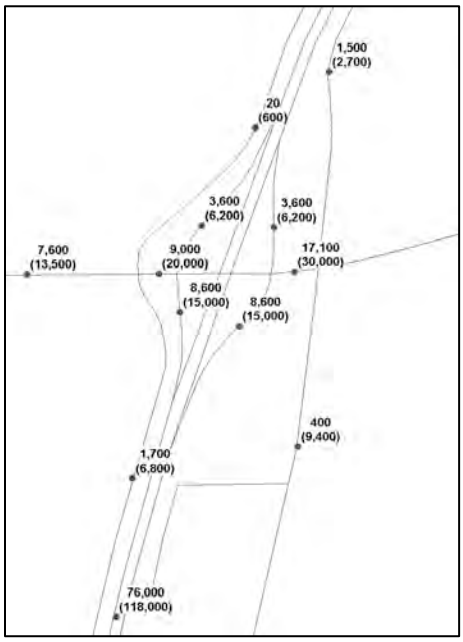
Figure 5: Existing Traffic Conditions



Forecast volumes on the arterial roadways will be highest between the I-35 frontage roads and the freeway, with 20,000 vpd on CSAH 23 and 30,000 vpd on TH 97. These volumes are a result of the continued development of the area land uses along the frontage roads, particularly to the south of the interchange.

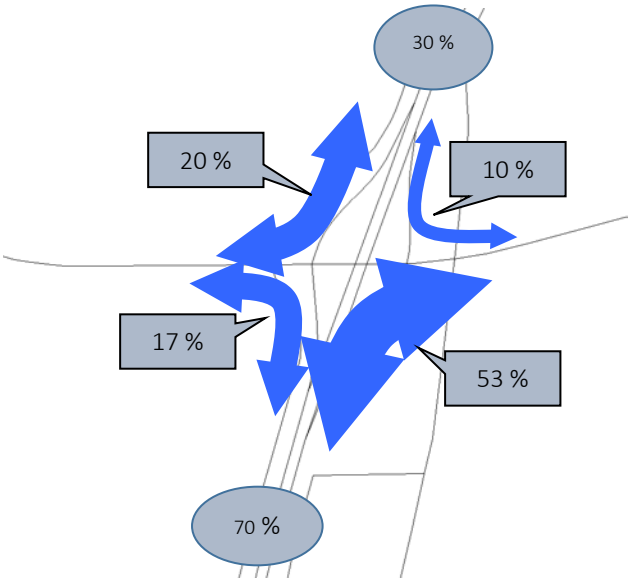
Traffic on I-35 is forecast to increase by 40,000 vpd south of the study interchange, with the growth decreasing to 22,000 north of TH 83. Growth will be limited by the six-lane capacity and the directional peaking characteristics of I-35 between the CSAH 23/TH 97 and I-35W/I-35E split.

Figure 6: Existing and (Future) Traffic Volumes



The Traffic Memorandum (see Appendix B) highlights the existing and forecast peak hour turning movements at the interchange ramps; these are illustrated in Figure 7. The largest movements on the CSAH 23/TH 97 interchange are the northbound-to-eastbound during the evening peak and corresponding westbound to southbound movement during the morning peak. This movement was the key operational issue that defined future project concept development.

Figure 7: Year 2030 Estimated Travel Patterns



Access Management

Access management guidelines aid in the planning, design and implementation of land use and transportation design principles to provide the proper balance of mobility and access for a corridor. Management of roadway access, both in terms of cross-street spacing and driveway placement, is a critical means of preserving and enhancing a roadway's functional classification.

Access management is particularly important along minor arterials such as CSAH 23/TH 97 to improve roadway safety and ensure efficient traffic operations. Anoka County has developed an access management policy and guidelines (see Appendix C) to address private property access, intersection spacing and signal spacing along its roadways.

Under this policy, "full access," meaning the ability to turn both left and right to access or exit a property, is discouraged on minor arterials. Providing access to individual parcels via local streets that connect with A minor arterials is preferred to ensure efficient traffic flow and avoid dangerous turning movements. However, in cases where property access already exists, efforts to relocate driveway access to local roads, move the access to safer locations in regards to roadway curves or intersections, consolidating multiple closely-spaced driveways into a single access point and/or converting driveway to "right-in/right-out access only" are encouraged.

In regards to roadway intersection and signal spacing, the following Anoka County requirements are provided for a 55 mile-per-hour minor arterial roadway such as TH 97 and CSAHs 23 and 54:

- 1/2 mile full access spacing
- 1/4 mile secondary (right-in/right-out) access spacing
- 1/2 mile signalized intersection spacing

Current access points to private property and intersection spacing local roads for all A minor arterials in this area are both too numerous and too closely spaced when compared to County guidelines. In addition, the CSAH 23/CSAH 54 intersection is too close to the interchange for the interchange to operate efficiently. Redevelopment of surrounding parcels introduces the potential to add additional access points in undesirable locations if not managed.

Environmental Issues

In addition to land use, future development and roadway conditions, known information about environmental issues was examined to identify critical resources in the area that would need to be avoided and/or considered in the development of roadway concepts. The attached Environmental Technical Memorandum (Appendix D) identifies area resources and regulatory context and provides information about steps that should occur as part of future environmental review. Permitting requirements are summarized in an attachment in Appendix E. Key resources identified were wetlands and the Lamprey Pass State Wildlife Management Area. Avoidance of the Wildlife Management Area and minimization of wetland impacts was a key consideration in development of roadway concepts.

Concept Alternative Development and Evaluation

Development of a comprehensive roadway network plan began with the evaluation of future potential interchange types, as the interchange concept would be a foundational element in determining appropriate access spacing along the adjoining A minor arterial network and identifying future right of way needs. Interchange types were considered that provided sufficient capacity for forecasted future traffic volumes and also appropriately addressed heavy a.m. and p.m. peak movements. A detailed discussion of the interchange concept evaluation process is documented in the *Interchange Alternatives and Traffic Operations Analysis* memo found in Appendix F.

Four interchange types emerged as the best candidates for consideration:

- Expansion of the current Standard Diamond Interchange
- A Standard Diamond Interchange, including a loop in the Northwest Quadrant
- A Single Point Interchange
- A Diverging Diamond Interchange

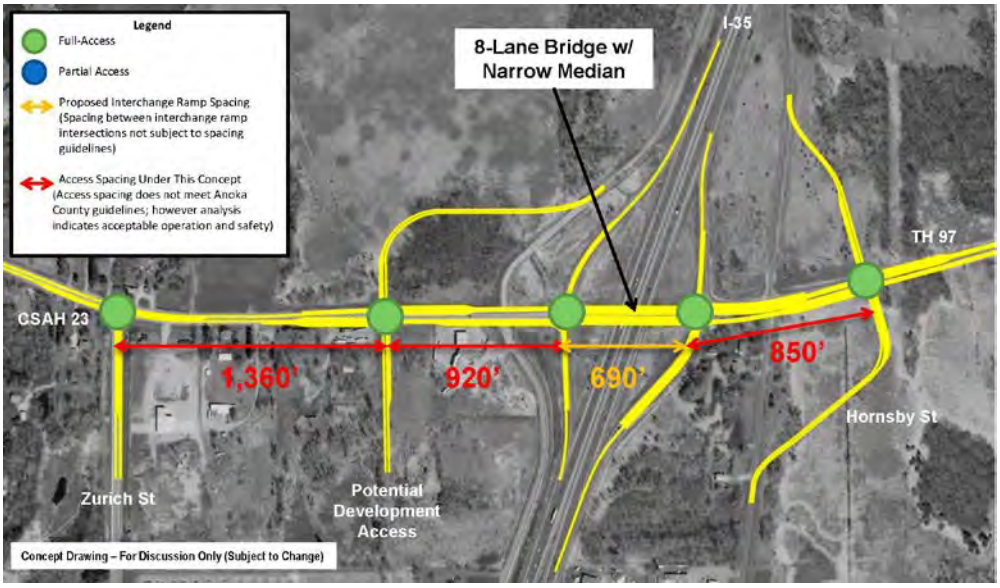
Interchange Concepts

Standard Diamond

The Standard Diamond interchange concept maintained the existing interchange configuration, but expanded the ramps and bridge width to accommodate future traffic volumes. While it is a design that is familiar to drivers and easy for trucks to navigate, traffic analysis determined that the bridge crossing I-35 would need to widened to eight lanes, and multiple left turn lanes would be needed to accommodate the heavy westbound to southbound traffic volumes during the morning peak.

Figure 8 below illustrates the Standard Diamond concept and potential local intersection locations. *(Note that while these intersection locations do not meet Anoka County access management guidelines, traffic analysis demonstrated acceptable operations at these locations provided individual property driveways were relocated.)*

Figure 8: Standard Diamond Concept

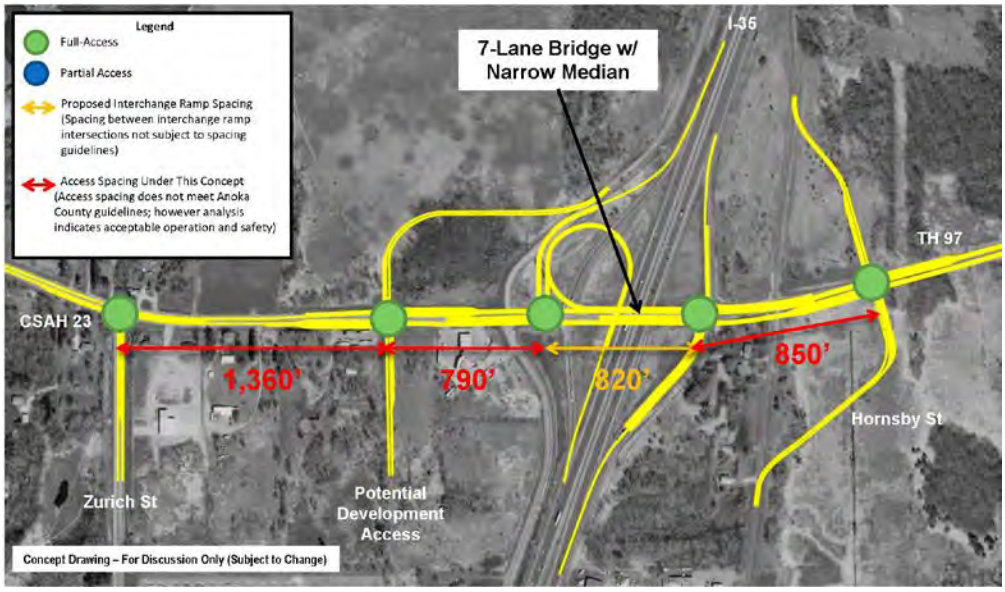


Standard Diamond with Northwest Single Loop

This concept addressed the heavy left turn movements in the morning peak traffic period by adding a loop in the northwest quadrant of the interchange to allow free flow movement of this traffic. While this concept allowed the I-35 Bridge to be reduced from eight to seven lanes, it would have required construction of a collector-distributor lane adjacent to I-35 to facilitate merging of these vehicles into mainline traffic. However, due to the loop, significant additional right of way is needed, potentially resulting in wetland impacts. The loop also requires a left turn for eastbound traffic on CSAH 23 to enter southbound I-35. An additional ramp could be provided in the southwest quadrant for these movements.

Figure 9 illustrates the Standard Diamond with Northwest Loop concept and potential local intersection locations. *(Note that while these intersection locations do not meet Anoka County access management guidelines, traffic analysis demonstrated acceptable operations at these locations provided individual property driveways were relocated.)*

Figure 9: Standard Diamond with Northwest Single Loop Concept

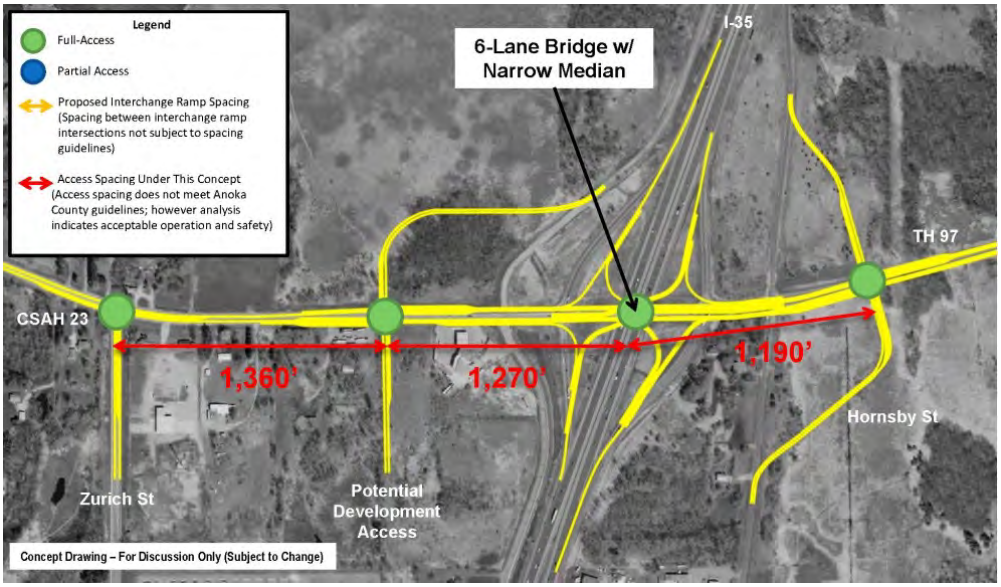


Single Point

A Single Point interchange type that brings all traffic entering and exiting the interstate to a single intersection was evaluated. This type of interchange also provides improved access spacing opportunities for local roads near the interchange. The analysis found that while this type provided better access spacing and minimal impacts to existing roadways and property due to its compact design, a non-standard intersection design was required for traffic operations due to unbalanced existing and projected traffic volumes. Additional disadvantages include a large intersection for pedestrians and bicyclists to navigate and more costly bridge construction due the crossed-diagonal bridge layout.

Figure 10 illustrates the Single Point concept and potential local intersection locations. *(Note that while these intersection locations do not meet Anoka County access management guidelines, traffic analysis demonstrated acceptable operations at these locations provided individual property driveways were relocated.)*

Figure 10: Single Point Concept

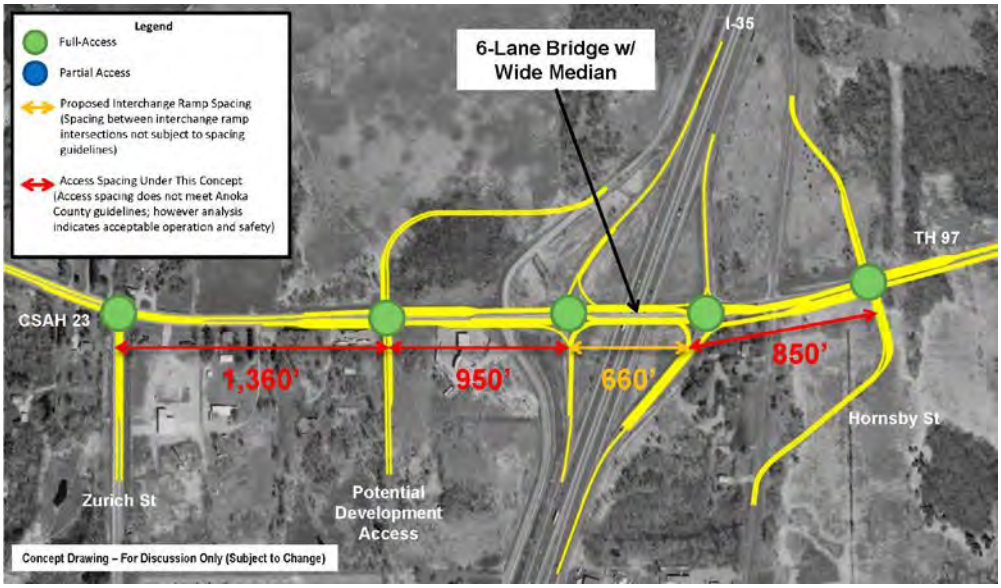


Diverging Diamond

The Diverging Diamond is an innovative interchange concept recently adopted in Minnesota that facilitates heavy left turn movements by crossing the traffic lanes to opposite sides which allows left turning traffic to move unimpeded by vehicles moving across their path. While drivers are less familiar with this type of interchange, implementation of diverging diamonds in other locations in Minnesota has yielded favorable results. Due to the reduction of turning movement conflicts, the diverging diamond efficiently manages traffic patterns through this interchange and of the four interchange types considered, provides the greatest reserve capacity to address development into the future. The diverging diamond also has a smaller footprint and bridge width thereby reducing right of way needs and potential impacts.

Figure 11 illustrates the Diverging Diamond concept and potential local intersection locations. *(Note that while these intersection locations do not meet Anoka County access management guidelines, traffic analysis demonstrated acceptable operations at these locations provided individual property driveways were relocated.)*

Figure 11: Diverging Diamond Concept



Interchange Concept Recommendations

The Standard Diamond and Diverging Diamond were considered to be the leading candidate concepts because they offered the most flexibility for a cost effective interim solution that could be expanded in the future, while providing sufficient capacity and safety benefits.

The Diverging Diamond design was ultimately recommended by the TAC due to its perceived benefits over the Standard Diamond. A Diverging Diamond at this location would:

- Reduce the number of conflict points, thereby improving safety.
- Utilize a two-phase traffic signal system with shorter cycle lengths, thereby significantly reducing delay.

- Increase the capacity of turning movements to and from the ramps (the predominant traffic movement at this location).
- Increase the capacity of the existing overpass, by removing the need for turn lanes.

In addition, the Diverging Diamond would potentially have a cost saving benefit over the Standard Diamond being that the bridge structure would not need to be as wide to accommodate turn lanes. See Appendix G for a more refined concept drawing of the diverging diamond.

Reference *Interchange Alternatives Traffic Operations Supplement Technical Memorandum* that documented evaluation of four- and five-lane Standard Diamond and DDI concepts as directed by the TAC in fall of 2014. This memo is included in Appendix F.

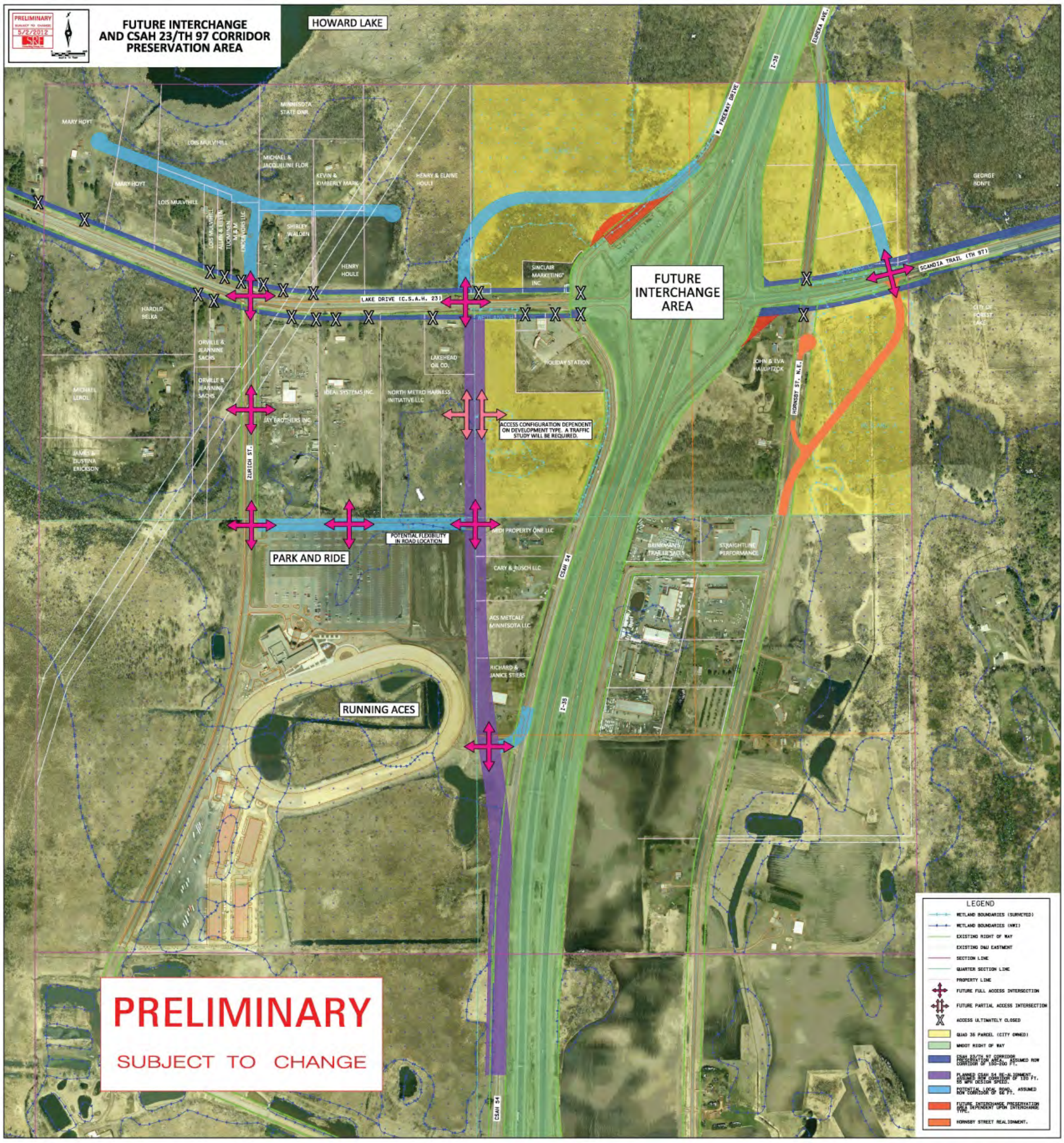
Interchange reconstruction has independent utility, meaning the project has standalone value without triggering other improvements, and does not restrict other improvements if not constructed simultaneously. Reconstructing the interchange would have benefits to traffic operations and safety. Note Freeway Drive (see below) may need to be realigned to accommodate the interchange footprint.

Roadway Concept

The future roadways concept (see Figure 12 below) was developed based on the preservation area needed to implement any one of the future interchange concepts and associated improvements to TH 97 and CSAH 23. Note that improvements to TH 97 will require coordination with MnDOT. It also identifies the approximate alignment and area needed for future roadway improvements as well as how future access can be provided. New developments will need to complete an independent traffic study to determine if need for new local roads is warranted and to ensure the roadway system will function with proposed access.

The study also examined future county and local roadway concepts for the purposes of right of way and access planning. The concept plan provides the framework to help the City and County plan for development while providing a sound (but flexible) solution the balances safety, mobility and access within the local roadway system. This concept can be used as a basis for both right of way preservation and parcel access and should be referenced for any platting or subdivision activity in the area.

Figure 12: Local Roadway Concept



Note: This graphic is dated July 2012 and was developed focusing on access management. This concept was further refined to reach the concept shown in Appendix G

CSAH 23 (West of the I-35 Interchange)

To the west of the interchange area, expansion of CSAH 23 to a four-lane divided roadway at a minimum between Zurich Street and the interchange is recommended to accommodate future forecast volumes. Within this segment, operations analysis indicated that full access intersections could be provided at Zurich Street and at a realigned CSAH 54 as indicated in Figure 12, even though these intersection locations do not meet County access guidelines. Shifting of the CSAH 54 intersection east of this location is not recommended, as it would be too closely spaced with interchange ramps under either the Standard Diamond or Diverging Diamond interchange types. No other local street intersections would be allowed through this segment and all private access would be closed to improve safety and preserve operational capacity.

TH 97 (East of the I-35 Interchange)

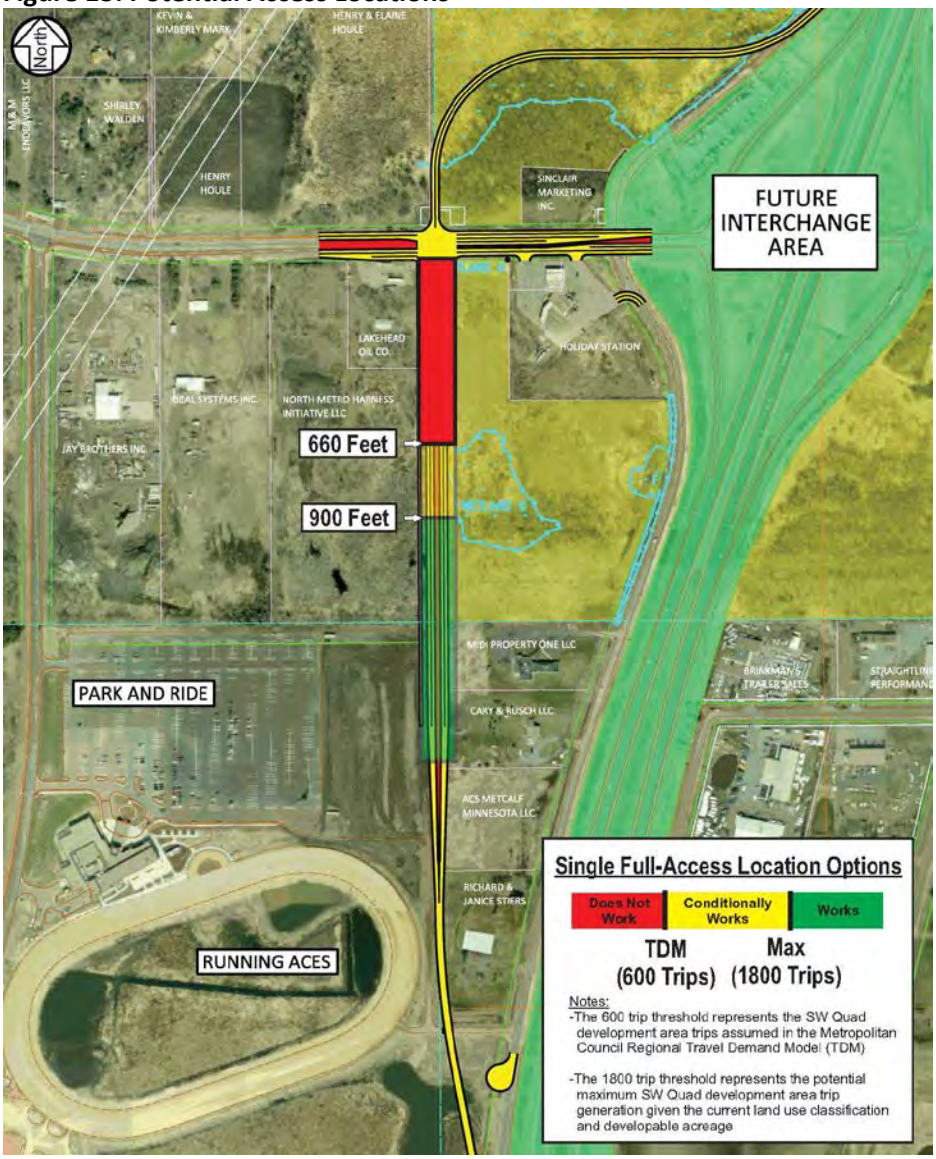
Expansion of TH 97 between the interchange and Hornsby Avenue to a four-lane divided facility is recommended to facilitate interchange operations for either the Diamond or Diverging Diamond interchange concept. To the east of Hornsby, no expansion of TH 97 has been planned or programmed by MnDOT.

CSAH 54

Multiple realignments for CSAH 54 were considered during the study in an effort to improve access spacing along CSAH 23, and to better accommodate future development. CSAH 54 is a heavily utilized roadway that parallels I-35 through the City of Lino Lakes and provides the only access to four commercial parcels near Running Aces. The future concept shows CSAH 54 realigned to the west, creating improved spacing between the CSAH 54/CSAH 23 intersection with the I-35 interchange. The current intersection at CSAH 54 would be closed. Old CSAH 54 would remain as a local road with access from the south near Running Aces. The recommended alignment minimizes impacts to existing commercial properties and endeavors to avoid the large Running Aces signage structure located to the southeast of the track. See Appendix G for a concept drawing of the proposed CSAH 54 realignment.

A full intersection is desired on new CSAH 54 between Running Aces and CSAH 23 to provide access to future developable parcels. The number of locations of both full and partial access points was studied to best optimize access to developable property and traffic operations on both CSAH 54 and CSAH 23. Analysis found that suitable locations varied significantly depending on the types and intensity of future land uses, with regional retail centers causing the highest degree of concern from a traffic generation standpoint. Given the need to remain flexible to a wide range of commercial uses, the study identified a range of locations that would function from a traffic operations perspective, while allowing the specific intersection location to remain flexible. Right in/right out intersections along new CSAH 54 may be considered to allow partial access between the full access intersections. See Figure 13 for an illustration of potential full access intersection options. This concept also recognizes that a service entrance from CSAH 54 to Running Aces may be desired. A limited vehicle access could work from an operational perspective; however, a specific location for this access must be considered in conjunction with the location of other intersections to ensure safe and efficient traffic operations on CSAH 54. More detailed discussion of alternatives analyzed can be found in the *CSAH 54 Local Access Alternatives Analysis Technical Memorandum* in Appendix H.

Figure 13: Potential Access Locations



An alternative alignment that included the same CSAH 23 intersection, but curved east to meet the existing CSAH 54 alignment north of Running Aces was considered, but would be less flexible to full access intersection locations due to the curved alignment, and would also segment developable parcels to the north of the existing commercial properties. Due to these reasons the alternative alignment was eliminated.

CSAH 54 realignment has independent utility because reconstruction would not trigger other improvements, and has standalone value in improving intersection spacing and providing business access.

West Freeway Drive

West Freeway Drive is located north of CSAH 23. The future concept indicates realignment of West Freeway Drive to the west to align with the proposed CSAH 54 intersection location. Alignment of these

two intersections will improve both safety and traffic operations along CSAH 23. The illustrated alignment curves eastward in a manner that preserves developable upland north of CSAH 23 and minimizes wetland impacts while continuing to provide access to the Lamprey Pass Wildlife Management Area. It should be noted that a lift station is located in proximity to this proposed intersection location. The location of the West Freeway Drive/CSAH 54 intersection should take the location of this infrastructure into consideration during Preliminary Engineering.

Zurich Street Extension North of CSAH 23

Due to recommended closures of private access to CSAH 23, an extension of Zurich Street north of CSAH 23 is indicated to provide alternative access to these properties.

Hornsby Street/ Eureka Avenue

The City of Columbus recently reconstructed Hornsby Street south of TH 97 in an effort to improve access spacing near the interchange and to promote future development. The local street concept proposes that Eureka Avenue (located north of TH 97) be realigned with the new Hornsby Street/TH 97 intersection to improve spacing with the interchange and create an improved intersection for both turning and north-south through movements. Platting for development in this area should also take the proposed alignment into consideration and all access should be planned via Eureka Avenue instead of TH 97.

Local Roads

Local road configurations will be considered over time as development occurs; concept alignment design for local roads was limited since location and alignment of local roads depends heavily on development and staging. Access spacing, geometrics, and traffic controls will be considered as roads are reconfigured.

The concept plan provides the framework to help the City and County plan for redevelopment while providing a sound (but flexible) solution that meets the project need of balancing safety, mobility and access. Preliminary designs that have a higher degree of accuracy will be completed as funding is identified. Local road projects could be constructed as separate projects, as they have independent utility so long as the overall project concept is considered so other improvements are neither precluded nor triggered.

Implementation Plan

An analysis was completed to determine what roadways should be built and when depending on the timing of development vs. when funding for a new interchange is identified.

IF DEVELOPMENT COMES FIRST

Phase I – Near Term

This phasing assumes the City-owned parcel in the Southwest Quadrant of CSAH 23 and I-35 develops first and the Holiday Gas Station remains in current location.

Future turn lanes and medians along CSAH 23 could be built to future conditions west of the intersection with new CSAH 54. The lift station could continue operations in its current setting. Installation of signals at the new intersection would be based on signal warrants. Extents of CSAH 23 to the east of the intersection with new CSAH 54 should be built sparingly to prevent limiting access to Holiday and to

avoid reconstruction following the selection of the interchange type and proposed road/bridge profile. New CSAH 54 could be built to the South Access to provide access to the new development. A new route connecting new and old CSAH 54 should stub east from the South Access. Upon completion of this connection, the intersection of old CSAH 54 and CSAH 23 should be closed and the remainder of old CSAH 54 north of the connection jurisdictionally transferred to the City. Current access to Holiday and Freeway Drive from CSAH 23 can remain in place.

Phase II

Assumes City-owned parcel is developed and the properties to the southwest of the intersection of CSAH 23 and new CSAH 54 are developing.

Signals along CSAH 23 and at the South Access would most likely be installed in this phase. Prior to the signal construction at CSAH 23, the existing intersection with Freeway Drive should be closed and the roadway realigned to connect to the new signalized intersection. Establishment of this connection would require a relocation of the lift station. CSAH 54 could continue to run along the stub extending east from the South Access.

Phase III

Assumes parcels to the south of CSAH 23 are developed and the parcels between CSAH 23 and the new Freeway Drive and along old CSAH 54 are developing.

The lower half of the new CSAH 54 alignment could be constructed in this phase. This half tapers from a four-lane section at the South Access to a two-lane rural undivided section that connects to old CSAH 54 at the southern border of the Running Aces property. A connection for emergency access should be extended to the southeast corner of the track. To the east of this access, old CSAH 54 can be terminated by a cul-de-sac. The remainder of old CSAH 54 and the stub extending east from the South Access can be transferred back to the City.

Phase IV

The new interchange will most likely be constructed in this phase along with two signals at the ramps. The permanent connection between the interchange and CSAH 23/CSAH 54 intersection can be constructed to its full build. Access to Holiday would be limited to right in/right out along eastbound CSAH 23 and/or a loop along old CSAH 54.

Phase V – Long Term

The southern half of new CSAH 54 and the next 5 miles south along old CSAH 54 towards Centerville could be reconstructed to a four-lane divided section in this phase.

IF INTERCHANGE COMES FIRST

Construction of a new interchange first simplifies/speeds the realignment of CSAH 54. Construction of CSAH 23/TH 97 can be built to the extent needed for the interchange type selected. Freeway Drive would need to be realigned to the new CSAH 23/54 intersection and the lift station relocated. A full build of the realigned CSAH 54 could proceed southward from this intersection. Old CSAH 54 will be returned to a City street upon connection to new CSAH 54 via the stub extending eastward from the South Access.

Signals atop the interchange ramps would be installed with the new construction. As development fills in and warrants are satisfied, signals can be installed along CSAH 54. Future increases in traffic volume will drive expansion of the southern half of new CSAH 54 to a four lane divided roadway section.

Eureka

Future improvements to Highway 97 will require coordination with MnDOT. Eureka is likely to be realigned with Hornsby as redevelopment occurs.

Zurich

Alternative local access provided north of CSAH 23 will be considered as properties redevelop. Accesses to and from CSAH 23 will remain open until alternative local access roads are constructed.

Future Considerations

Opportunities to implement transportation improvements at the CSAH 23/TH 97 at I-35 interchange are an ongoing goal of the project partners and they are seeking funding as such. Future MnDOT maintenance plans along I-35 in 2017 and 2018 that include resurfacing of the freeway and reconditioning or replacement of the bridge at this location may present an opportunity to implement part (or all) of a new interchange system. While the MnDOT project provides funding for a bridge replacement in-kind, with additional funding, the bridge could be replaced with a structure that would accommodate the future interchange design. Efforts to identify funding of the interchange reconstruction are ongoing, in order to leverage the MnDOT investment to implement the longer term concept.

The County has programmed right of way acquisition for the realignment of CSAH 54 and plans to proceed in 2015.

As future development occurs near the interchange, opportunities to implement all or parts of a local road system that improves transportation mobility while promoting safe and efficient access should be identified.

Cost Estimates

The following table summarizes a planning level cost estimates to fully reconstruct the interchange with a DDI design and realign CSAH 54. Other interchange designs would be more expensive. Note these two projects do not necessarily need to be completed at the same time. These estimates are in 2015 dollars; estimates of future cost should account for inflation.

Cost Component	**I-35 Interchange Reconstruction**	**CSAH 54 Realignment**
Preliminary Engineering and Environmental Documents	$960,000	$480,000
Right of Way	$250,000	$1,200,000
Final Engineering	$1,440,000	$720,000
Construction	$12,000,000	$6,000,000
Construction Administration	$1,350,000	$600,000
Project Total	$16,000,000	$9,000,000
Grand Total	$25,000,000	

Conclusions

This report summarizes the analysis and stakeholder engagement efforts for the CSAH 23 and TH 97 at I-35 Interchange Study that led to the recommended interchange alternative — a Diverging Diamond Interchange — and the realignment of CSAH 54 and other local roads. These concepts were developed to address current traffic operations and capacity issues by applying the appropriate principles and practices of roadway design and access management. The development of the long-term concept provides a solution that will improve quality of life, promote new development, improve safety, reduce congestion, and better manage access.

This report provides the framework necessary to guide agency cooperation to further develop the concepts and serves as a tool to help the City and County evaluate area transportation needs going forward. This will involve ongoing attention to access spacing guidelines, trip generation, traffic operations, and future right of way needs. As properties redevelop and projects are funded, the overall concept should remain at the forefront to ensure these long-term needs are addressed. This concept provides a foundation on which the City and County can build to move towards implementation, while remaining flexible and responsive.

Several issues and constraints were identified during this study that should be revisited as roadway improvements are made and as development continues, including, but not limited to:

- Future plans for Running Aces and location of their large sign
- Access to Metro Transit Park and Ride on the Running Aces property
- Wetland areas that should be avoided
- Location of Sanitary Lift Station on CSAH 23
- Restricted capacity along CSAH 23, TH 97 and the existing TH 97 bridge
- Access for pedestrians and bicyclists as the area continues to develop

This report also contains implementation plans that allow for multiple staging options over time. The County has programmed right of way acquisition for the CSAH 54 realignment to occur in 2015. The City recently implemented the realignment of Hornsby Road, south of TH 97, and is seeking funding for the realignment of Hornsby, north of TH 97. Recently, MnDOT has announced plans to replace the TH 97 Bridge in 2017 as part of a larger maintenance project along I-35. This presents an opportunity to build all or parts of the proposed Diverging Diamond Interchange concept if funding can be identified. If not, perhaps the new bridge could be constructed so as to not preclude a future interchange expansion. In any event, ongoing coordination with the partnering agencies will be necessary to ensure successful implementation.

APPENDIX A

Public Involvement Plan

CSAH 23/ TH 97 Interchange Public Involvement Plan

February 9, 2011 SRF No. 7347

****Draft for Discussion****

The purpose of this Public Involvement Plan is to articulate clearly the goals, objectives and strategies for public involvement; to identify key stakeholders and define the roles of decision-making and advisory bodies; to identify available communication methods; and to set a schedule for public involvement activities.

1.0 Goals, Objectives and Strategies

Public Involvement Goal:

To better understand the transportation and land development needs and concerns of permitting agencies, property owners, business owners, and residents in proximity to the CSAH 23/TH 97 Interchange and to develop consensus between transportation agencies in consultation with these stakeholder around a transportation system concept for the area.

Objectives for Public Involvement

- Assure the public they will be heard, respected and understood.
- Conduct a study process that thoroughly considers options reflecting the broad range of interests and values of project stakeholders.
- Through stakeholder involvement, develop a Preferred Alternative that balances the needs of multiple transportation agencies, permitting agencies, property owners, business owners and residents.
- Build consensus and commitment to the Preferred Alternative through ongoing communication and involvement.

Public Involvement Strategies

***Strategy 1*:** Clearly articulate and communicate the project purpose and need.

- Use existing conditions data to explain current safety and operational concerns in the study area.
- Using future transportation forecasts and future land use scenarios, explain anticipated future conditions in the area.

Strategy 2: Provide consistent and clear communications about the project to residents, business and decision-makers to develop trust and confidence in the process.

- Conduct Public Information Meetings at key points during project development.
- Broadly publicize public events through press releases, newsletters and project website.
- Provide frequent and substantive updates to the project website.

- Demonstrate how public input influenced project development.
- Present all study communications—written and verbal—in a direct and forthright manner, clearly articulating issues, concerns and uncertainties in the project.

Strategy 3: Conduct an evaluation of a range of alternatives with equity and include an assessment of potential impacts and benefits.

- Provide opportunities early in the alternatives evaluation process for stakeholders to identify potential alternatives and solicit input regarding issues to be addressed by the project.
- Use "worst-case" construction limits to assess possible impacts to right of way, access, noise and other key issues. Present potential impacts as ranges to convey uncertainty of impact calculations at the concept level.
- Solicit input from the stakeholders as to how benefits/impacts should be weighed in the selection of a preferred alternative.

Strategy 4: Promote technically sound project decisions with early agreements regarding assumptions and methodologies.

- Involve Anoka County, City of Columbus, Washington County, City of Forest Lake, Mn/DOT and FHWA and other appropriate local agencies' staff early in the process to inform alternatives identification, evaluation and assessment methodologies and study assumptions.
- Involve agency staff in review of preliminary analysis results and identify concerns regarding project approvals and/or implementation.

Strategy 5: Work toward broad consensus at every phase of the project: project need, alternative identification, alternative evaluation, and preferred alternative selection:

- Provide opportunities for business, resident and key stakeholder input at every phase of the project.

2.0 Stakeholder Roles and Functions

The following provides a summary of project stakeholders and their functions on the CSAH 23/ TH 97 Interchange Study project.

<u>Decision-Making Authorities</u>

Anoka County is the lead agency for this phase of the project; however, several agencies will potentially serve as decision making authorities for various aspects of the study recommendations:

- Mn/DOT: Highway 97; I-35 Interchange concept
- FHWA: I-35 Interchange approval; Operations impacts to I-35
- Anoka County: CSAH 23; CSAH 54
- Washington County: County facility recommendations
- City of Columbus: Local roads and trails; land use
- City of Forest Lake: Local roads and trails; land use

The study anticipates that after a Preferred Alternative concept is identified, that the concept will be forwarded to each of these entities for concurrence with study recommendations.

Project Advisors
Several groups will serve as project advisors:

- ***Technical Advisory Committee (TAC).*** The project partners have established a Technical Advisory Committee consisting of staff from Anoka County, Washington County, City of Columbus, City of Forest Lake, Mn/DOT and FHWA to guide technical decisions in the process and provide input on key project decisions.

- ***Environmental Agency Workshop.*** Meeting with potential environmental permitting agencies (such as the Rice Creek Watershed District, U.S. Army Corps of Engineers, and Minnesota Department of Natural Resources) will identify issues and address permitting concerns.

3.0 Communications methods

Project web site*:* Meeting summaries, project layouts/graphics, and notices of upcoming meetings will be regularly posted to the project website: (url to be determined)

Public Information Meetings: Up to three Public Information Meetings will be held to gather input and inform the communities and the stakeholders of the study progress. A public hearing may also be held to conclude the environmental document process, if determined appropriate.

Small Group Meetings: Up to ten meetings with small groups of local landowners, business owners, and/or residents will be used to discuss specific issues identified throughout the process.

City Council/ County Board briefings: Project staff will provide briefings to the City Councils and County Boards as needed throughout the project process. At two key milestones in the project process – selection of a Preferred Alternative and approval of the layout and environmental document – formal presentations will be made to the City Council to request a formal recommendation from these bodies. Joint sessions of both City Councils may be coordinated to facilitate communications and balancing of interests between the two communities.

Newspapers: Information regarding public information meetings and key project milestones will be provided to local newspapers.

3.0 Public Involvement Schedule

Date	Event	Location	Goal
Feb 10	TAC Meeting 1	City of Columbus	Review project goals, public involvement plan, transportation forecast assumptions, alternative concept identification, establish project schedule
Late-Feb	Agency Coordination	TBD	Initiate Agency Coordination
Mar 3	City of Columbus Business Event	Running Aces	Introduce study to business community
Mar 10	TAC Meeting 2	City of Columbus	Continue transportation forecast study; alternative concept identification
Apr 14	TAC Meeting 3	City of Columbus	Existing conditions analysis; Traffic operations
May 12	TAC Meeting 4	City of Columbus	Prepare for Public Information Mtg 1
Mid-May	Public Information Mtg 1	TBD	Present outline for study; Seek input regarding issues and identification of alternative concepts
Mid-May	Agency Mtg 2	TBD	Seek input regarding identification and evaluation of alternative concepts
June 9	TAC Meeting 5	City of Columbus	Narrow range of alternatives for evaluation
Jul 14	TAC Meeting 6	City of Columbus	TBD
Aug 11	TAC Meeting 7	City of Columbus	Review alternatives evaluation; Prepare for Public Information Mtg 2

Mid-Aug	Public Information Mtg 2	TBD	Present evaluation of alternatives; seek input regarding Preferred Alternative
Mid-Aug	Agency Meeting 3	TBD	Present evaluation of alternatives; seek input regarding Preferred Alternative
Late-Aug	City Council session(s) 1	TBD	Present evaluation of alternatives; Present Public Info Mtg input; seek input regarding Preferred Alternative
Sept 8	TAC Meeting 8	City of Columbus	Select Preferred Alternative
Oct 13	TAC Meeting 9	City of Columbus	TBD
Dec 8	TAC Meeting 10	City of Columbus	Review draft layout/ environmental document
2012			
Feb 9	TAC Meeting 11	City of Columbus	Finalize layout/ environmental document; Prepare for public hearing
Mid-March	Public Information Mtg/ Public Hearing	TBD	Input regarding environmental document
April	City Council session(s) 2	TBD	Environmental document findings/layout approval
Apr 12	TAC Meeting 12	City of Columbus	Study conclusion

APPENDIX B

Traffic Forecast Memorandum

SRF No. 7305

MEMORANDUM

TO: Matthew Parent, Anoka County
Project Manager

FROM: Steve Wilson, Principal

DATE: May 10, 2011

SUBJECT: QUAD 35 TRANSPORTATION STUDY (CSAH 23/TH 97 AT I-35) -- TRAFFIC FORECASTING METHODOLOGY, ASSUMPTIONS AND RESULTS

INTRODUCTION AND SUMMARY

The purpose of this memorandum is to document the travel demand forecast methodology, assumptions and results for the Quad 35 Transportation Study. The study area generally encompasses the portions of Columbus and Forest Lake served by the CSAH 23/TH 97 interchange with I-35W in eastern Anoka County, Minnesota.

Travel demand modeling is conducted on a broader regional scale to ensure that appropriate patterns and trends in regional development and travel are reflected in the forecasts, with reporting of volumes and impacts limited to the study area as appropriate.

Project forecasts for the horizon year of 2030 were developed for the interchange using regional roadway and development assumptions consistent with the adopted local comprehensive plans, Metropolitan Council Regional Development Framework and regional Transportation Policy Plan (November, 2010). The project area is served by an existing interchange. Roadway improvements in the area are assumed consistent with regional and local policy plans.

The travel forecasts in the study area can be summarized as follows:

- No additional regional roadway expansion is planned in the study area by 2030, and limited county and local improvements are planned; the most significant improvement is the anticipated completion a north-south roadway paralleling I-35/I-35E and serving planned development in that corridor (modeled as Hornsby Avenue in Columbus).

- Development of the area served by the interchange is expected to continue through the year 2030, with an estimated 6400 additional households and 4700 additional jobs in the CSAH 23 and TH 97 areas between 2005 and 2030. For the purposes of this study, it is assumed

that the current downturn in the development market is within the cyclical nature of development patterns, and that the 2030 forecasts are valid within acceptable levels of uncertainty n forecasts.

- As a result of forecast development in and north of the corridor, background traffic volumes on I-35 are expected to increase approximately 2.3 to 2.6 per year percent per year as the areas to the north of the study area develop.

- The largest movements on the CSAH 23/TH 97 interchange are the northbound-to-eastbound pm peak and corresponding westbound to southbound a.m. movement. These will continue to be the dominant movement at the interchange.

- The implications of this growth on traffic operations are addressed in a separate memorandum on traffic operations.

METHODOLOGY

The Anoka County Travel Demand Model (ACTDM) was used to develop traffic forecasts for this study. The ACTDM estimates the amount of travel on transportation facilities by assuming specific development and roadway improvements. The forecasts provide estimates of traffic impacts identified by daily roadway volumes and peak period congestion. Travel demand forecasts are also used as inputs to other areas of study, such as traffic operations analysis and cost-benefit analysis.

Additional detail was added to the highway network in the study area to capture local travel patterns and replicate local conditions as part of this project. Any deviations from Mn/DOT's travel demand forecast model guidelines (*Twin City Travel Demand Forecasts Prepared for Mn/DOT Metro: Model and Parameters for Adjustments to Model Inputs, April 10, 2006*) are noted within the text of this memorandum. Documentation on the Anoka County model is available from Anoka County.

Models provide an estimation of traffic forecasts that include many future year assumptions. However, with lack of certainty regarding future-year conditions, the model results should be considered estimates with some margin of error. Mn/DOT currently considers long-range forecasts to have a precision of +/- 15 percent. Decision-makers and designers should be aware of the uncertainty in long-range forecasts and whether that margin of error would affect outcomes or the recommended improvements. Development inputs to the model are based on an assumption that the current downturn in the development market is a cyclical condition and that 2030 forecasts are supportable in the context of the above-noted lack of certainty.

TAZ and Network Modifications

The ACTDM divides the seven-county Twin Cities region into geographic transportation analysis zones (TAZs). The main exogenous data in these TAZs are population, households, retail employment, and non-retail employment. The TAZs serve as the beginning and ending locations of travel in the region. The ACTDM TAZ refinement process increases the total number of zones in Anoka County from 126 to 436 zones. Additional refinements were made

for this project to 10 zones in the Columbus and Forest Lake areas to create an additional 36 loading points to provide more realistic allocation of traffic area roadways.

Figure 1 (attached) shows the final No Build alternative network configuration with roadway segment and loading zone centroid locations. Note that the ACTDM zones were further subdivided to provide more representative and project-sensitive traffic loadings for the given development levels.

These model adjustments improved the ability of the model to better replicate current travel patterns in the study area as well as realistically forecast future volumes.

MODEL VALIDATION

Model validation was improved by re-orientation of zone access and refinement of the local roadway system detail. The study area is relatively small and undeveloped; consequently broader statistical measure of modeling fit would not provide meaningful results. Future year volumes were adjusted within the standards of NCHRP 255 "Highway Traffic Data for Urbanized Area Project Planning and Design".

YEAR 2030 ASSUMPTIONS

Project forecasts for the horizon year of 2030 were developed using the above-described model and process. The forecasts are based on key assumptions regarding changes to the development and roadway network, summarized below.

Development Assumptions

Land development assumptions in the study area are consistent with the local comprehensive plans for Columbus (accepted by the Metropolitan Council on October 28, 2009) and Forest Lake (accepted by the Metropolitan Council on May 13, 2009). Allocation of development assumptions to model TAZs was made consistent with those plans. See attached Figure 2 and Table 1 for allocation details.

Roadway Assumptions

The 2030 highway network includes programmed roadway improvements, improvements from the 2010 Metropolitan Council Transportation Policy Plan, and select planned improvements to the local roadway system in the study area based on planned land development. In the vicinity of the project area, the most significant improvements include the realignment of Hornsby Avenue west of the TH 97 interchange, and improvements to the TH 61/TH 97 intersection. The Minnesota Department of Transportation intends to conduct a study of I-35W from downtown Minneapolis to the TH 97/CSAH 23 interchange, but that study is not yet underway.

FORECAST RESULTS

Figures 3 through 6 depict the existing and forecast traffic volumes in the study area along with turning movements at the interchange ramp terminals. Existing and forecast I-35 peak volumes are included in Table 2.

The continued buildout of the City of Columbus and Forest Lake, with additional growth from surrounding communities in the vicinity of the interchange, will result in increased on CSAH 23 97. Traffic on CSAH 23 is expected to grow by 5,900 to 11,000 vehicles per day (vpd) to a range of 12,300 to 20,000 vpd depending on the location within the study area. Daily traffic on TH 97 is forecast to range from 24,000 to 30,000 vpd. Traffic on I-35 is expected to increase from 76,000 vpd to 116,000 vpd south of CSAH 23/TH97.

Forecast volumes on the arterial roadways will be highest between the I-35 frontage roads and the freeway, with 20,000 vpd on CSAH 23 and 30,000 vpd on TH 97 (Figure 4). These volumes are a result of the continued development of the areas land uses along the frontage roads, particularly to the south of the interchange.

Traffic on I-35 is forecast to increase by 40,000 vpd south of the study interchange, with the growth decreasing to 22,000 north of TH 8. Growth will be limited by the six-lane capacity and the directional peaking characteristics of I-35 between the CSAH 23/TH 97 and I-35W/I-35E split.

Figures 5 and 6 highlight the existing and forecast peak hour turning movements at the interchange ramps. The largest movements on the CSAH 23/TH 97 interchange are the northbound-to-eastbound pm peak and corresponding westbound to southbound a.m. movement. These will continue to be the dominant movement at the interchange.

Traffic operations analysis, including additional local traffic impacts and volumes, is discussed as part of a separate memorandum on traffic operations.

REASONABLENESS CHECKS

Several previously prepared traffic studies, plans and environmental documents were reviewed for general consistency of results; these include the Anoka County Transportation Plan, Washington County Transportation Plan, CSAH 2 Study and TH 97 Study. Key volumes are comparable given differences in assumptions and recent traffic conditions.

Mn/DOT's Twin City Travel Demand Forecasts Prepared for Mn/DOT Metro: Model Output Checks for Reasonableness and Post Processing Adjustments (April 10, 2006) describes four checks to be made to ensure that traffic forecasts are reasonable. Each of these checks is discussed in detail below. Table 2 (attached) illustrates the volumes analyzed in each of the reasonableness checks.

The first check is the percentage of daily traffic in the peak hours. In most cases, this is expected to decrease as roadways become increasingly congested. The 2030 forecast estimates congestion will increase in the peak periods in the study area; however, as traffic volumes grow towards

year 2030 forecasts, the peak hours will not be able to accommodate the existing peak hour percentages, which are expected to drop slightly (approximately 0.2 percentage points).

The second check is the directional split of peak hour traffic. The directional split is generally expected to decrease into the future as a corridor becomes more developed. Year 2030 No Build alternative forecasts show decreases in directional splits of two to six percentage points.

The third check is to ensure that traffic entering the study area is within the capacity of those roadways. I-35 capacity is reviewed as part of Table 2. The segment of TH 97 has a high forecast (over 20,000 vpd) for a nominally two-lane roadway. However, with controlled access and intersection-specific capacity improvements a higher volume may be reasonable.

The fourth check is a comparison of the daily traffic forecasts to historical traffic volume growth. The forecasts bear a logical relationship to previous trends with consideration given to planned development in the area.

Figure 1
Travel Demand Model Network Detail

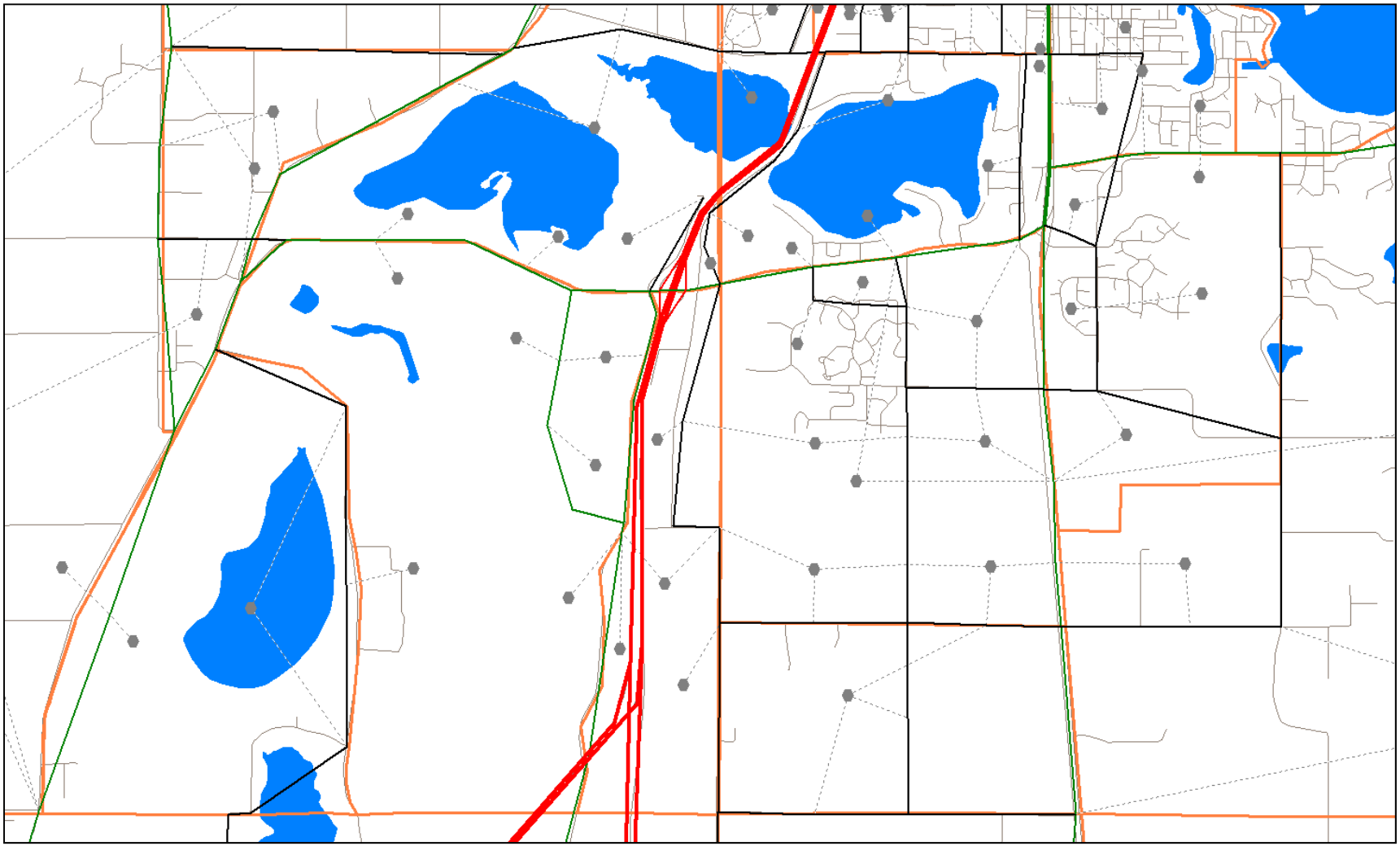


Figure 2
Travel Demand Model Base Zone (TAZ) Zone Structure

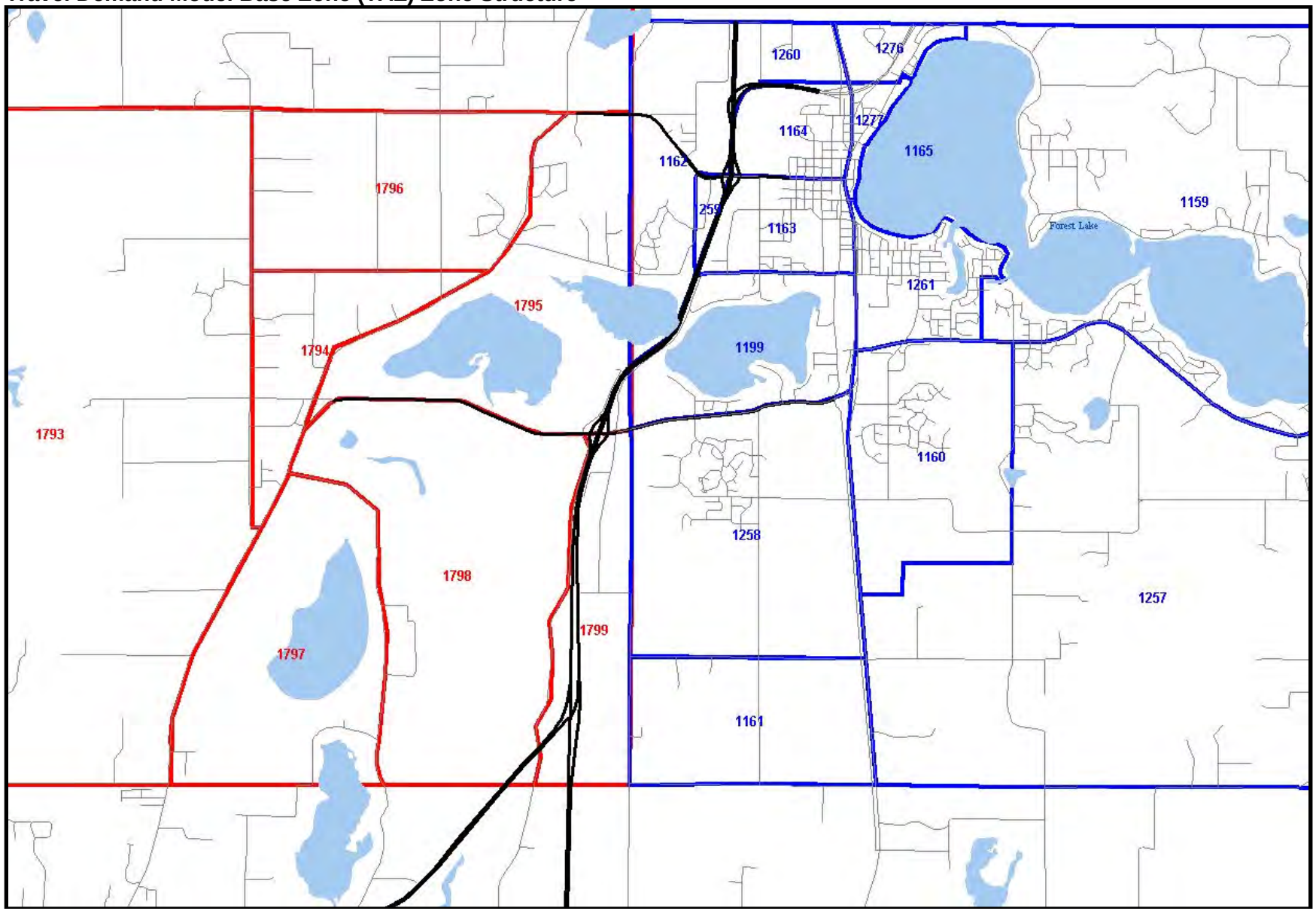
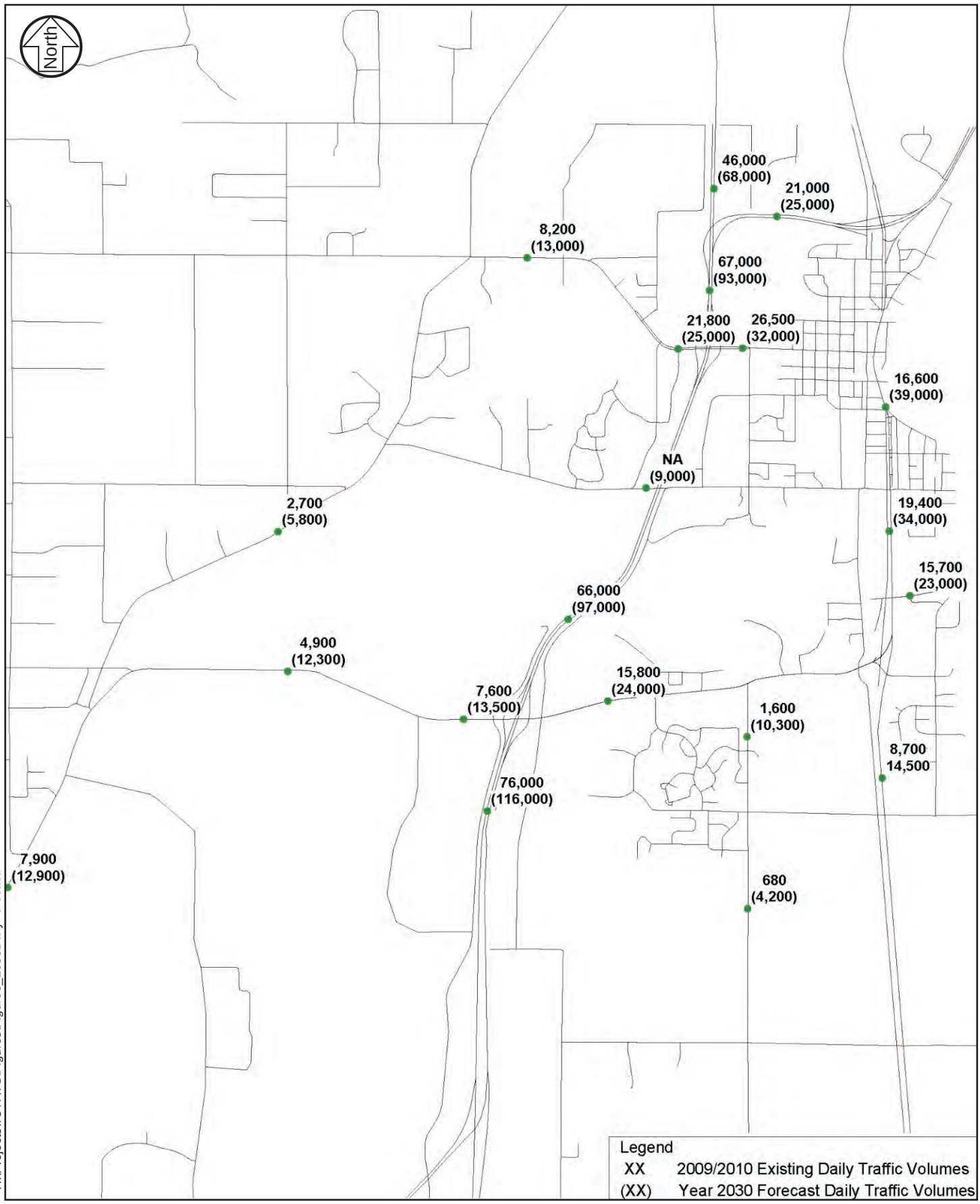


Table 1

Quad 35 Model Development Assumptions

	County Model TAZ	Base Year				2030			
		Population	Households	Retail Employment	Non-Retail Employment	Population	Households	Retail Employment	Non-Retail Employment
Anoka County Model	1792	1289	431	0	43	1466	563	0	70
	1793	1468	489	0	0	1942	704	0	0
	1794	130	44	7	18	309	110	7	40
	1795	317	106	7	14	598	216	107	51
	1796	263	88	7	80	536	191	7	177
	1797	167	58	0	196	427	154	0	416
	1798	242	86	28	45	275	115	428	278
	1799	83	29	15	22	94	39	261	158
Washington Country Model	1159	2994	1148	0	6	3945	1545	0	517
	1160	1529	586	17	145	6410	2511	262	378
	1161	76	29	0	0	99	39	0	242
	1162	917	352	336	57	1457	570	538	57
	1163	2715	1041	1378	1335	7235	2834	1378	1717
	1164	785	301	547	960	1470	576	547	1038
	1199	1148	440	140	740	1124	440	193	848
	1257	1121	430	0	0	1479	579	0	222
	1258	1492	572	0	114	8448	3308	289	1627
	1259	3	1	320	354	3	1	604	354
	1260	62	24	0	1	61	24	0	1
	1261	3095	1187	120	226	5152	2018	120	290
	1276	449	172	0	132	439	172	1	181
	1277	999	383	349	147	978	383	349	147



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SRF Consulting Group, Inc.

Year 2030 Forecast Daily Traffic Volumes

Quad 35 Interchange Study

Anoka County Highway Department

Figure 3

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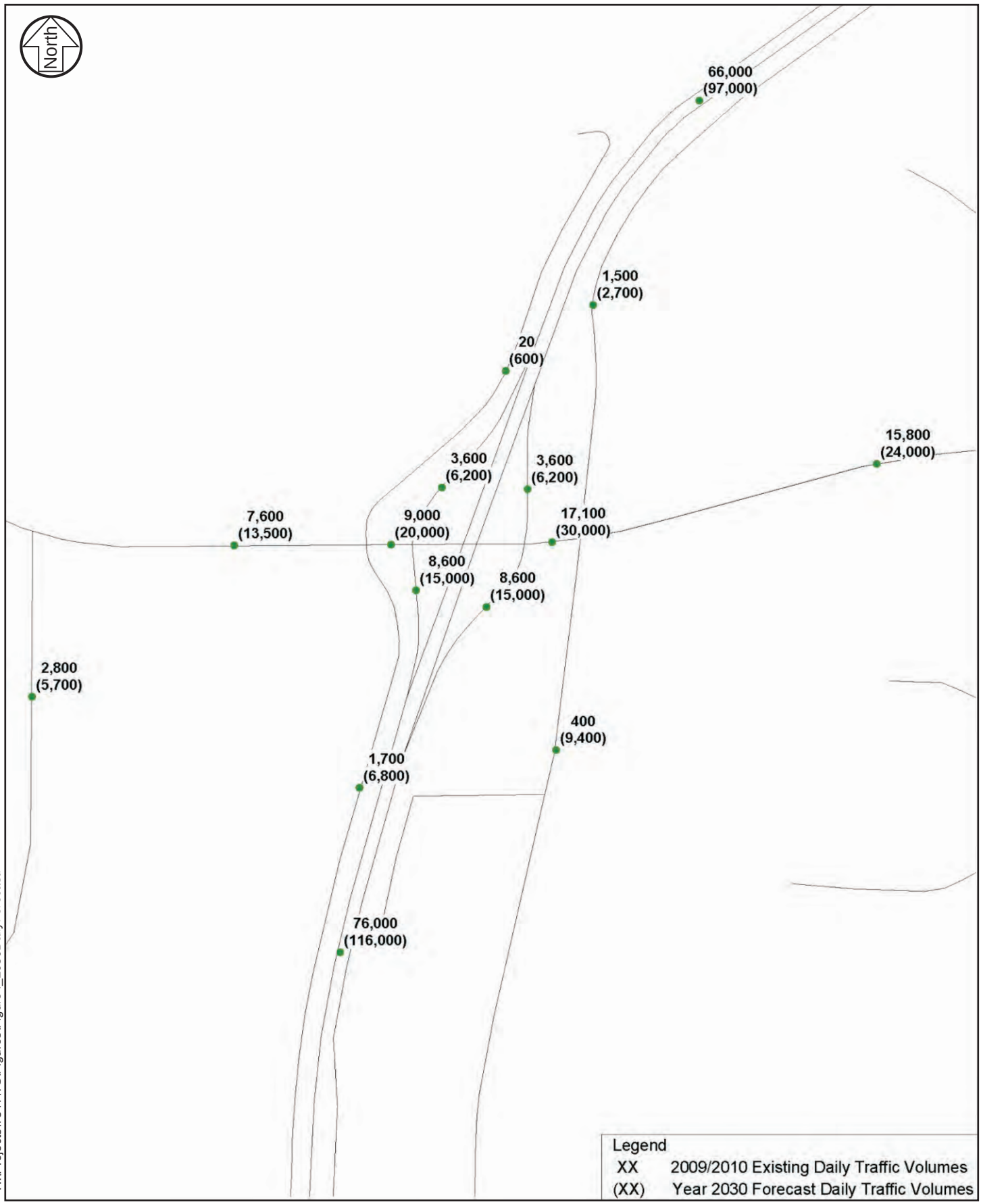
May 2011



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SRF Consulting Group, Inc.

Year 2030 Forecast Daily Traffic Volumes

Quad 35 Interchange Study

Anoka County Highway Department

Figure 4

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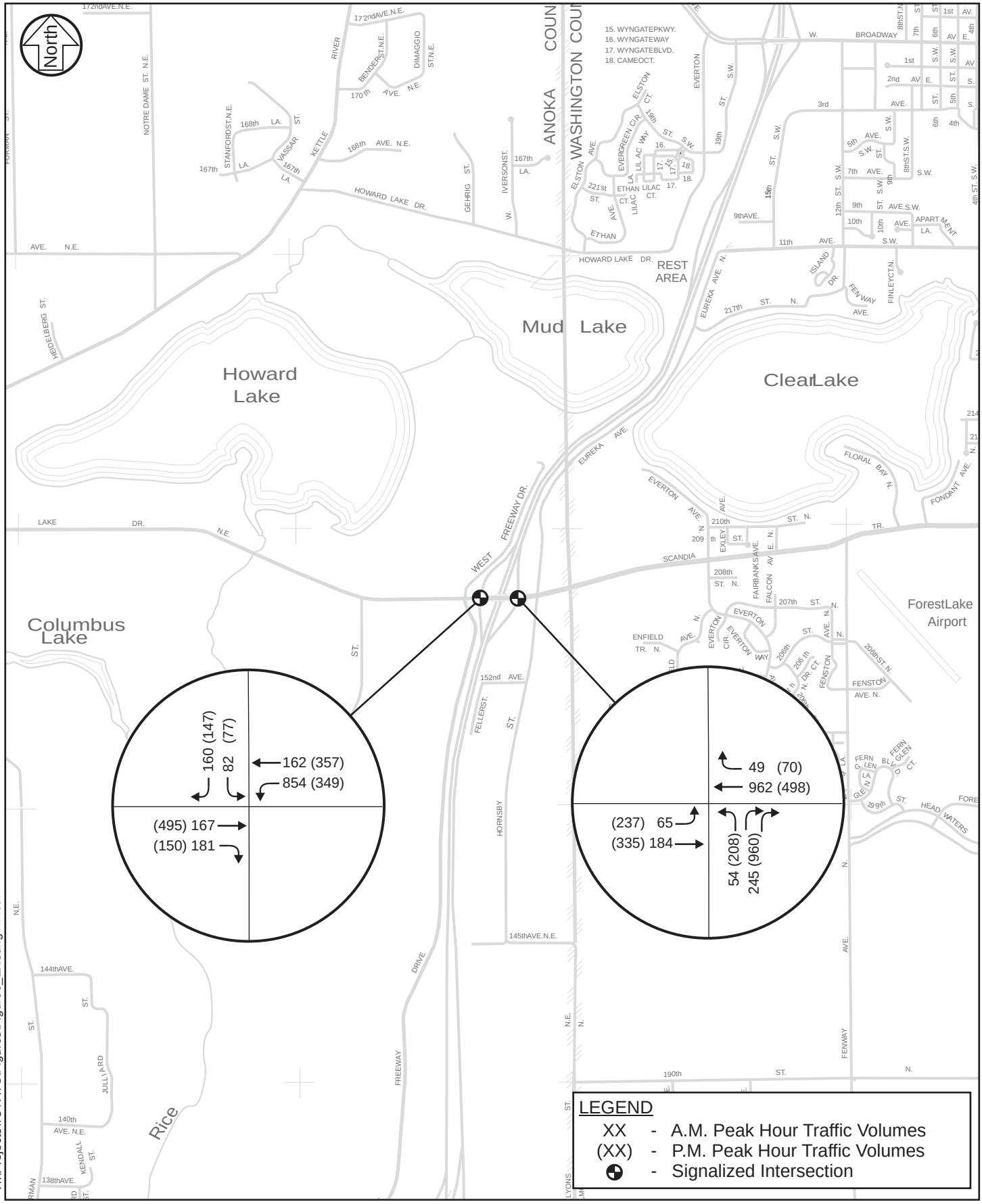
May 2011



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SRF Consulting Group, Inc.

Existing Peak Hour Traffic Volumes

Quad 35 Interchange Study

Anoka County Highway Department

Figure 5

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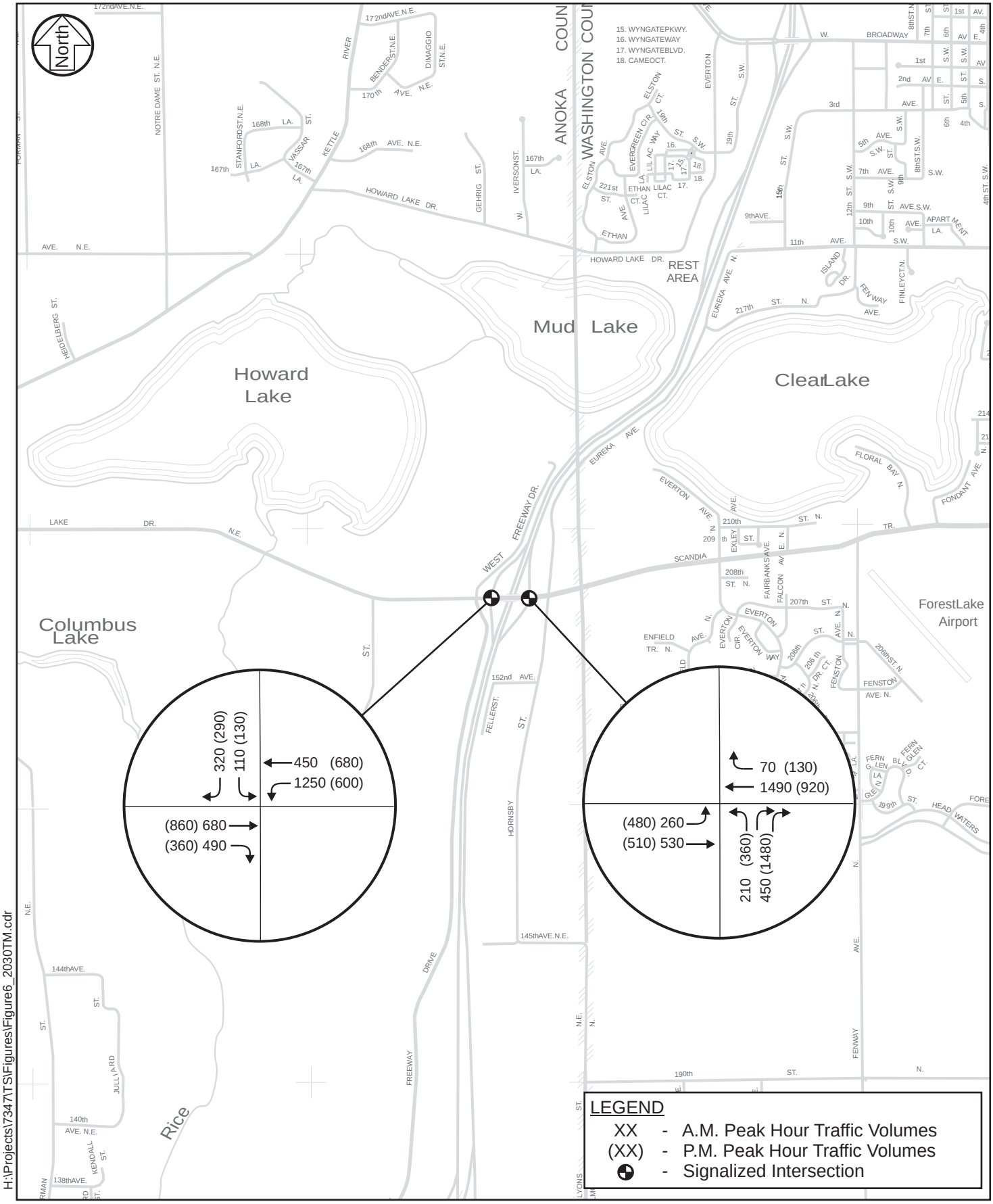
May 2011



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SRF Consulting Group, Inc.

Year 2030 Peak Hour Traffic Volumes

Quad 35 Interchange Study

Anoka County Highway Department

Figure 6

00117347
May 2011

Table 2
Quad 35 Interchange Study
Traffic Forecast Reasonableness Check

AM Peak Hour Percentage and Directional Distribution Comparison

Facility	Segment	Existing (2010)								
		Number of Lanes		Two Way			NB		SB	
		NB/EB	SB/WB	Daily*	Peak	% of Daily	Peak Hour	Dir %	Peak Hour	Dir %
I-35E	South of North Junction I-35W	2	2	41,600	3,368	8.1%	774	23%	2,594	77%
I-35W	South of North Junction I-35E	2	2	40,400	3,254	8.1%	715	22%	2,539	78%
I-35	N. Junction 35E/35W to CSAH 23/TH 97	3	3	82,000	6,621	8.1%	1,489	22%	5,133	78%
	CSAH 23/TH97 to CSAH 2	3	3	72,000	5,724	7.9%	1,362	24%	4,362	76%
	CSAH 2 to TH 8	3	3	71,000	4,838	6.8%	756	16%	4,083	84%

Facility	Segment	Year 2030 Build/No Build									Growth Factor	
		Number of Lanes		Two Way			NB/EB		SB/WB			
		NB/EB	SB/WB	Daily*	Peak	% of Daily	Peak Hour	Dir %	Peak Hour	Dir %	Daily	Peak
I-35E	South of North Junction I-35W	2	2	57,100	4,400	7.7%	1,150	28%	3,250	72%	1.37	1.31
I-35W	South of North Junction I-35E	2	2	58,400	4,500	7.7%	1,150	26%	3,350	74%	1.45	1.38
I-35	N. Junction 35E/35W to CSAH 23/TH 97	3	3	115,500	8,900	7.7%	2,300	26%	6,600	73%	1.41	1.34
	CSAH 23/TH97 to CSAH 2	3	3	97,000	7,300	7.5%	2,125	29%	5,175	71%	1.35	1.28
	CSAH 2 to TH 8	3	3	93,000	6,275	6.8%	1,375	22%	4,900	78%	1.31	1.30

PM Peak Hour Percentage and Directional Distribution Comparison

Facility	Segment	Existing (2010)								
		Number of Lanes		Two Way			NB/EB		SB/WB	
		NB/EB	SB/WB	Daily	Peak	% of Daily	Peak Hour	Dir %	Peak Hour	Dir %
I-35E	South of North Junction I-35W	2	2	41,600	3,604	8.7%	2,475	69%	1,130	31%
I-35W	South of North Junction I-35E	2	2	40,400	3,497	8.7%	2,368	68%	1,128	32%
I-35	N. Junction 35E/35W to CSAH 23/TH 97	3	3	82,000	7,101	8.7%	4,843	68%	2,258	32%
	CSAH 23/TH97 to CSAH 2	3	3	72,400	6,263	8.6%	4,153	66%	2,110	34%
	CSAH 2 to TH 8	3	3	70,700	6,256	8.8%	4,197	67%	2,059	33%

Facility	Segment	Year 2030 Build/No Build									Growth Factor	
		Number of Lanes		Two Way			NB/EB		SB/WB			
		NB/EB	SB/WB	Daily	Peak	% of Daily	Peak Hour	Dir %	Peak Hour	Dir %	Daily	Peak
I-35E	South of North Junction I-35W	2	2	57,100	4,825	8.5%	3,225	64%	1,600	36%	1.37	1.34
I-35W	South of North Junction I-35E	2	2	58,400	5,025	8.6%	3,375	63%	1,650	37%	1.45	1.44
I-35	N. Junction 35E/35W to CSAH 23/TH 97	3	3	115,500	9,850	8.5%	6,600	67%	3,250	33%	1.41	1.39
	CSAH 23/TH97 to CSAH 2	3	3	97,000	8,075	8.3%	5,375	61%	2,700	39%	1.34	1.29
	CSAH 2 to TH 8	3	3	93,000	8,075	8.7%	5,225	62%	2,850	38%	1.32	1.29

APPENDIX C

Anoka County Access Guidelines

Anoka County
Highway Department
1440 Bunker Lake Boulevard
Andover, Minnesota 55304
(763) 862-4200
www.AnokaCounty.us/highways

Anoka County | **Commitment to Public Safety**

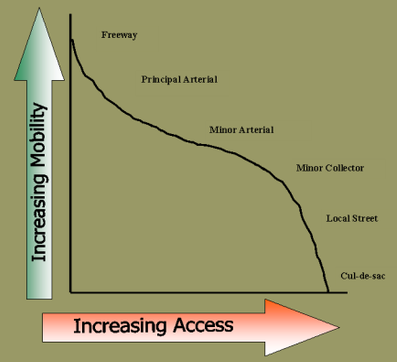
Medians & Access Management

Anoka County
Highway Department
1440 Bunker Lake Boulevard
Andover, Minnesota 55304

(763) 862-4200
www.AnokaCounty.us/highways

Anoka County Highway Department Access Spacing Guidelines

Roadway Type	Route Speed (MPH)	Intersection Spacing (Nominal[4])		Signal Spacing	Private Access [1]
		Full Movement Intersection	Conditional Secondary Intersection [2]		
Principal Arterial	50 - 55	1 mi.	1/2 mi.	1 mi.	Subject to conditions for all roadway types and speeds
	40 - 45	1/2 mi.	1/4 mi.	1/2 mi.	
	< 40	1/8 mi.	300 - 660 feet[3]	1/4 mi.	
Arterial Expressway	50 - 55	1 mi.	1/2 mi.	1 mi.	
Minor Arterial	50 - 55	1/2 mi.	1/4 mi.	1/2 mi.	
	40 - 45	1/4 mi.	1/8 mi.	1/4 mi.	
	<40	1/8 mi.	300 - 660 feet[3]	1/4 mi.	
Collector and Local	50 - 55	1/2 mi.	1/4 mi.	1/2 mi.	
	40 - 45	1/8 mi.	N/A	1/4 mi.	
	<40	1/8 mi.	300 - 660 feet[3]	1/8 mi.	
Specific Access Plan		By adopted plan/agreement/covenant on land			



Function	Services Provided
Arterial	Provides the highest level of service at the greatest speed for the longest uninterrupted distance, with some degree of access control.
Collector	Provides a less highly developed level of service at a lower speed for shorter distances by collecting traffic from local roads and connecting them with arterials.
Local	Consists of all roads not defined as arterials or collectors; primarily provides access to land with little or no through movement.

Have you ever been stopped by one traffic signal, then given the green light only to be stopped by another signal just down the road? Or, has a vehicle in front of you slowed to make a left turn, causing you to stop? These situations are frequently experienced by Anoka County drivers.

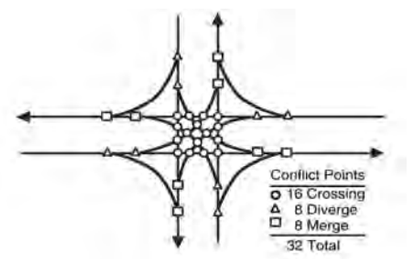
The highways of Anoka County constitute a valuable resource and major public investment. It is essential to operate them safely and efficiently by managing the access to and from adjoining property. Research indicates that medians are an effective way to control access along highways.

Why are medians needed?

Medians improve safety by reducing conflicting traffic movements along roadways while preserving efficient traffic flow. Medians also create safer access points for adjacent property owners and businesses.

According to the Federal Highway Administration, nearly 70% of two vehicle crashes on county roads that occur at driveways involve left turns. Medians are an effective method of reducing crashes and managing the flow of traffic.

Conflicts at a typical intersection



How is access determined?

Anoka County has implemented Access Spacing Guidelines to determine the best location for median openings. Limiting the number of openings is vital to reducing crashes and efficiently controlling traffic flow.

Implementation of the spacing guidelines is a means for consistency in highway design and the development review process for Anoka County. Under most circumstances, to accommodate traffic flow in the most efficient manner, there should be no less than ½ mile between intersections with traffic signals and ¼ mile between intersections without traffic signals. While criteria can vary depending on the speed and type of roadway, these distances are widely accepted as proven engineering practices throughout the industry.

The guidelines minimize delays caused by having too many traffic signals or uncontrolled intersections (intersections where no signal is present). For specifics, see the *Anoka County Highway Department Access Spacing Guidelines* table on the previous page.

How will a median affect access?

A common concern for property owners regarding the raised medians is how vehicles will enter or exit their driveway. With raised medians installed, access to property will be accommodated by a right turn in and right turn out access point. If a driver wishes to travel in the opposite direction, the driver will exit the driveway by making a right turn, followed by a u-turn at the next acceptable intersection. With increased traffic congestion, often a right turn followed by a u-turn will be more efficient than a left turn across multiple lanes of traffic from a through lane. Additionally, u-turns from protected left turn lanes are significantly safer than left turns across multiple lanes.

The Universities of South Florida and Kentucky conducted extensive studies on the safety and efficiency of a right turn movement followed by a u-turn. The studies found that the use of median u-turns increased intersection capacity and decreased the rate of crashes up to 30%.

How will a median impact business?

A study was conducted by Texas A&M University to determine the economic impacts of raised medians. A key finding of the study showed customers rated customer service, product quality and product price above accessibility. The research team asked business owners and managers to indicate whether construction of a median caused elements such as congestion, safety, access, business opportunities, customer satisfaction, and delivery convenience to become better, worse, or remain the same. Overall, the majority of respondents rated any given item either better or the same.

When are medians installed?

Anoka County will usually construct medians in the following circumstances:

- New or reconstructed four lane road corridors with posted speeds of 45 mph and above.
- New or reconstructed six lane roads.
- New or reconstructed two or four lane intersections (any speed limit) with a history of significant crash rates or an expected high crash rate due to increased traffic or changed land use.
- Existing two or four lane county road corridors (any speed limit) with a history of significant crash rates due to direct access issues.

For additional information, visit:
www.AnokaCounty.us/highways

Brochure Produced by:

ANOKA COUNTY TMO *Your Commuting Resource*

*Carpools * Vanpools * Transit*
www.AnokaCountyTMO.com
763-862-4260

APPENDIX D

Environmental Technical Memorandum

SRF No. 7347

MEMORANDUM

TO: Matthew Parent
Anoka County

FROM: Kelcie Campbell
Matt Meyer
SRF Consulting Group

DATE: March 31, 2015

SUBJECT: QUAD 35 TRANSPORTATION STUDY
ENVIRONMENTAL TECHNICAL MEMORANDUM

This environmental resource scan is intended to identify existing resources within the vicinity of the County State Aid Highway (CSAH) 23 and Trunk Highway (TH) 97 future interchange and local roads corridor preservation area (Figure 1).

The National Environmental Policy Act (NEPA) and Minnesota Environmental Policy Act (MEPA) require governmental agencies to examine environmental impacts of their proposed actions. The environmental scan is meant to highlight issues that need further investigation as part of a future formal environmental documentation process. Because the scan information was gathered at a screening level, it does not represent the full extent of data or analysis needed for completion of an environmental document. If an environmental review document is needed in the future, the issues identified in this effort will need to be analyzed in greater detail.

Agency Stakeholders

As the proposed project transitions to a defined project requiring a NEPA review, the following agencies should be consulted throughout the planning and design process:

- MnDOT Office of Environmental Stewardship (MnDOT OES)
- Board of Water and Soil Resources
- U.S. Army Corps of Engineers (USACE)
- Anoka Soil and Water Conservation District
- Rice Creek Watershed District (RCWD)
- Minnesota Department of Natural Resources (MnDNR)
- United States Department of Agriculture (USDA) Natural Resource Conservation Service (NRCS)
- Minnesota Pollution Control Agency (MPCA)
- State Historic Preservation Office (SHPO)

PHYSICAL AND NATURAL ENVIRONMENTAL ISSUES

Wetlands

Wetlands surrounding the project area were assessed through an off-site desktop mapping review and an on-site field review. Potential wetland areas were identified prior to the field review using the U.S. Fish and Wildlife Services (USFWS) National Wetland Inventory (NWI) maps, recent aerial photographs, Natural Resources Conservation Service (NRCS) hydric soils maps, and elevation contours. Following this preliminary off-site analysis, a field review was conducted on July 25th and July 26th, 2011 to identify potential wetlands adjacent to the study area. Approximate wetland boundaries were identified based on topography, vegetation, and visual evidence of wetland hydrology, and were mapped using a combination of digitization in geographic information systems (GIS) and Trimble GeoXH sub-foot global positioning system (GPS) survey.
Wetlands (Figure 2) adjacent to the project area are characterized as primarily Type 2 (wet meadow), Type 3 (shallow marsh) and Type 6 (shrub) wetlands.

Future Environmental Process:

- This review is intended for planning purposes only. A formal wetland delineation would be needed prior to construction in areas with wetland present. Wetland permitting may be required.

Fish, Wildlife, and Ecologically Sensitive Areas

The proposed corridor contains a mixed-mosaic of upland and aquatic environments that provide habitat for many game and non-game species.

SRF Consulting Group evaluated a one-mile buffer surrounding the proposed project for the presence of rare plants, animals, native plant communities, and other rare features using Geographical Information Systems (GIS) in conjunction with the Minnesota Department of Natural Resources' (DNR) Natural Heritage Information System (NHIS)[1]. The Natural Heritage data is provided by the DNR Division of Ecological and Water Resources (License Agreement 625). These data are not based on an exhaustive inventory of the state. The lack of data for any geographic area shall not be construed to mean that no significant features are present. Based on the NHIS review, no known calcareous fens, railroad right-of-way prairies, or MnDNR trout streams exist within one mile of the project. Current data shows seven Central Region Regionally Significant Ecological Areas (CRRSEA) with ecological rankings of moderate to outstanding, and multiple areas mapped as Minnesota County Biological Survey sites or native plant communities within a mile of the proposed project. The shrub swamp native plant community associated with Lamprey Pass Wildlife Management Area (WMA) at the northwest

[1] Copyright 2014 State of Minnesota, Department of Natural Resources

quadrant of the CSAH 23/TH 97/I-35 interchange is likely to be impacted. Other rare species within one mile of the proposed project include:

- American ginseng – special concern
- Bald eagle – special concern
- Blanding's Turtle – threatened species
- Tubercled Rein-orchid – endangered
- Waterwillow – special concern

Future Environmental Process:

- A reevaluation of threatened and endangered species will need to be done as part of future environmental review using the most current data at the time of the evaluation.
- Further coordination with the MnDNR would be needed if a future project impacts the Lamprey Pass WMA.

WATER RESOURCES

Floodplains

The project area contains 100-year floodplain identified on the Federal Emergency Management Agency (FEMA) floodplain maps acquired from the Minnesota DNR. The floodplains are shown on Figure 1. Construction within a designated floodplain will require further evaluation, appropriate permits, and possibly mitigation.

Future Environmental Process:

- A floodplain assessment will need to be completed in association with the future environmental document.

Stormwater

Water Quality

Jurisdictional agencies that regulate surface water quality within the project area include the Rice Creek Watershed District (RCWD), City of Columbus, City of Forest Lake, and the Minnesota Pollution Control Agency (MPCA) through its National Pollutant Discharge Elimination System (NPDES) Construction Activities permitting program. The RCWD requires that the water quality treatment volume of 0.75 inch of runoff from the new and reconstructed impervious surfaces created by the project is treated by an infiltration BMP where feasible. If infiltration is not feasible, the RCWD rules includes design criteria for several other BMPs that could meet the water quality treatment requirement. The NPDES permit requires that the project be designed so that the water quality volume of 1 inch of runoff from the new impervious surfaces created by the project is retained on site through infiltration or other volume reduction practices. The RCWD and NPDES requirements are more stringent than the City requirements.

Water Quantity

The RCWD, City of Columbus and City of Forest Lake require that the proposed peak discharge rates not exceed existing peak discharge rates for the 2-year, 10-year, and 100-year, 24-hour rainfall events. Projects discharging to wetlands must meet bounce and inundation period rules in the RCWD.

Existing Conditions

The existing roadway is a rural section, where runoff from the paved surface flows overland to the surrounding wetlands or roadside ditches. The existing bridge is the high point of CSAH 23/TH-97, and the roadway runoff drains east and west from the bridge. The east side of I-35 generally flows north to Clear Lake. The west side of I-35 generally flows south and west, and eventually discharges to Rice Creek. There are several wetland complexes located in the vicinity of the project area that capture surface water runoff from the local roadways.

Proposed Conditions

The proposed project will result in an increased amount of impervious surface within the project area. Stormwater runoff within the proposed roadway will be contained within an urban drainage system that will be directed to best management practices (BMPs) that meet the requirements of the RCWD and MPCA NPDES Construction General Permit. These practices will likely consist of a system that pretreats runoff to contain larger particles and trash, with a secondary component to encourage infiltration and filtration of stormwater for water quality treatment and volume reduction. Details of the system will be developed and submitted for permit approvals during final design of the facility. It is possible that regional treatment facilities can be constructed in conjunction with future development along this roadway corridor.

Future Environmental Process:

- This information is intended for planning purposes only. A review of the stormwater management regulations will need to take place to ensure the requirements are current. Additional coordination with the jurisdictional agencies and potential development will be necessary to ensure the stormwater management requirements are being met while minimizing impacts to the natural resources.

Wellhead Protection Areas and Drinking Water Supply Management Areas

Community public water supply systems that utilize groundwater are required by the Minnesota Department of Health (MDH) to delineate, inventory, and manage wellhead protection areas around municipal wells in order to prevent contamination of the underlying aquifer. Based on a GIS review of the MDH Wellhead Protection Areas database and the Minnesota Drinking Water Supply Management Areas; currently no Wellhead Protection Areas (WHPA) or Drinking Water Supply Management Areas (DWSMA) exist within one mile of the proposed CSAH 23/TH 97 project area.

Future Environmental Process:

- As part of future environmental reviews the MDH inventory should be reevaluated to verify that no new WHPAs or DWSMAs exist within proximity of the proposed project.

Minnesota Pollution Control Agency Contaminated Sites

The Minnesota Pollution Control Agency's (MPCA) '*What's in My Neighborhood*' database shows multiple activities including hazardous waste facilities and storage tanks for businesses around the area.

Future Environmental Process:

- A revaluation of the MPCA database should be completed as the project proceeds. Further contaminated property studies may be needed depending on future project elements, property acquisitions needed, agency roles, and funding.

SOCIAL AND ECONOMIC RESOURCES

Community Facilities

Community facilities support community cohesion and provide social, recreational and public benefits. NEPA and MEPA require consideration of social and economic impacts of proposed projects on these resources. A search was conducted to determine the locations of schools, worship facilities, cemeteries and parks within a quarter mile of the proposed project. Based on the review, a park-and-ride and Lamprey Pass Wildlife Management Area are the only identified facilities proximate to the project area.

Section 4(f) Properties

Lamprey Pass Wildlife Management Area (WMA) (Figure 1) is a 1291-acre property located north of CSAH 23 and west of I-35. This property is managed for waterfowl and provides access for hunting and other non-hunting activities. The property is dominated by wetlands (76% of the total land area) and contains two bodies of water offering non-motorized boating opportunities.

Section 4(f) of the Department of Transportation Act of 1966 is a federal law which prevents conversion of parks, wildlife and waterfowl refuges, recreation areas, and historic properties to transportation use, unless the U.S. Department of Transportation determines there is no feasible and prudent alternative, and all possible planning has been done to minimize harm. Future environmental review should consider the applicability of Section 4(f) to the Lamprey Pass WMA, and any other existing or planned parks, and conduct further evaluation if any Section 4(f) resources will be impacted.

Historic and Archaeological Resources

State and federal laws establish the protection of historic and archeological properties. Section 106 of the National Historic Preservation Act of 1966, as amended, requires federal agencies to take into account the effects of their actions on historic properties.

Native American burial mounds are located within the Lamprey Pass Wildlife Management Area in the vicinity of Howard Lake[2]. The burial mounds are protected historic sites by the Minnesota Historical Society.

Future Environmental Process:

- Further analysis of historic and archaeological resources may be needed, depending future project elements, agency roles, and funding. If historic properties will be impacted, Section 4(f) evaluation may be needed.

[2] Source: City of Columbus 2030 Comprehsive Plan

Howard Lake
Lamprey Pass WMA
Lake Dr
W Freeway Dr
MINNESOTA
97
Running Aces Park-and-Rode
152nd Ave NE
Feller St NE
Enfield Ct N
Lamprey Pass WMA
35
20th Ave N
Hornsby St NE
145th Ave NE
Houle WMA
Elmcrest Ave N
190th St N
0 400 800
Feet
N
Legend
FEMA - 100-year Flood Plains
MN DNR Wildlife Management Areas
J:\Maps\7347\mxd\envmemo_feb2013_figures\7945_wells.mxd

Future Interchange and CSAH 23/97 Corridor Preservation Area

Future Interchange and CSAH 23/97 Corridor Preservation Area

Client Name

Figure 1

Future Interchange and CSAH 23/97 Corridor Preservation Area - Wetlands

Future Interchange and CSAH 23/97 Corridor Preservation Area

Client Name

Figure 2

Future Interchange and CSAH 23/97 Corridor Preservation Area

Figure 3

Future Interchange and CSAH 23/97 Corridor Preservation Area

Client Name

APPENDIX E

Regulatory Criteria

QUAD 35 TRANSPORTATION STUDY
REGULATORY CRITERIA

SRF No. 7347

ENTITY	SURFACE WATER QUANTITY	SURFACE WATER QUALITY	GROUNDWATER	EROSION AND SEDIMENT CONTROL	COMMENTS
Minnesota Pollution Control Agency NPDES Construction Permit	▪ Stormwater must be discharged in a manner that does not cause nuisance conditions, erosion in receiving channels or on downslope properties, or inundation in wetlands causing significant adverse impacts to the wetlands. ▪ When there is an increase in impervious coverage of > 1 acre, a volume equivalent to 1" of runoff from the new impervious surface must be retained on site. Restrictions on infiltration include: o ≤ 3 ft. separation to seasonally high groundwater elevation or top of bedrock o Where high levels of soil or groundwater contamination that could be mobilized o Where predominantly Hydrologic Soil Group D exists unless allowed by local MS4 o Where Drinking Water Supply Management Area exists unless allowed by local MS4 o Where native soil infiltration rates are ≥ 8.3 inches per hour unless soils are amended to reduce rate or unless allowed by local MS4 ▪ For linear projects with limited right-of-way that cannot obtain easement, the project must maximize the volume that is treated prior to discharge to surface waters using: o Smaller wet ponds and/or o Grassed swales and/or o Filtration systems and/or o Grit chambers. o Must document attempts to obtain right-of-way in the SWPPP.	▪ When there is an increase in impervious coverage of > 1 acre, a volume equivalent to 1" of runoff from the new impervious surface must be retained on site. The preferred treatment is infiltration where site and soil conditions allow. See adjacent column for restrictions on infiltration. ▪ Infiltration/Filtration Design Parameters: o Water quality volume = 1" of runoff from new impervious surfaces (less the volume treated by another BMP onsite) o 48 hours maximum detention time o Filtration design to have a minimum of 80% TSS removal o The specific BMP(s) chosen must have pretreatment that removes to the maximum extent possible: ▪ Settleable solids ▪ Floatable materials ▪ Oils and grease ▪ Wet Sedimentation Basin Criteria: – For pretreatment or when infiltration or filtration is not feasible – Must have a permanent volume of 1,800 cubic feet of storage below the outlet pipe for each acre that drains to the basin. Permanent volume must have a depth greater than 3 ft but no greater than 10 ft. – Water quality volume maximum discharge shall be no more than 5.66 cfs per acre of pond surface area at the water quality volume. – Outlets must prevent short circuiting and the discharge of floating debris, provide stabilized emergency overflow and energy dissipation. ▪ Include access for maintenance of outlet structure and of the facility in general.	▪ The SWPPP must identify additional or different measures necessary (e.g. impervious liner in pond bottom) to assure compliance with surface and groundwater standards in Minn. R. chs. 7050 and 7060 in karst areas and to ensure protection of drinking water supply management areas (see Minn. R 4720.5100, supb. 13).	▪ Contractors must follow the guidelines found in the MPCA document Protecting Water Quality in Urban Areas. ▪ Disturbed areas must be stabilized within 14 days of the end of construction activity in an area (temporary or permanent). In areas within one mile of a special or impaired water and flowing to a special or impaired water, all exposed soil areas must be stabilized as soon as possible to limit soil erosion but in no case later than 7 days after the construction activity in that portion of the site has temporarily or permanently ceased. ▪ Temporary Basins - Because this project has discharge points that are within one mile of a special or impaired water and flows to that special or impaired water, temporary sediment basins must be used for common drainage locations that serve an area with 5 or more acres disturbed at one time. The sediment basin must be provided prior to runoff leaving the construction site and before entering surface waters. When steep slopes and erodible soils are present, even if less than 5 acres drain to one area, temporary sediment basins are encouraged, but not required. ▪ All exposed soil with a continuous positive slope within 200 ft of a surface water (including stormwater conveyance system) must have temporary erosion control or permanent cover for exposed soil areas within 24 hours of connect to surface water. ▪ There shall be no unbroken slope length greater than 75 feet for slopes with a grade of 3:1 or steeper. ▪ Sediment control practices must be established on all down gradient perimeters before any upgradient land disturbing activities begin. These practices shall remain in place until final stabilization has been established. ▪ All storm drain inlets must be protected by appropriate BMP's. ▪ Temporary soil stockpiles must have effective sediment controls and cannot be placed in surface waters, including storm water conveyance systems such as curb and gutter and ditches.	▪ The development and implementation of a SWPPP is required. ▪ The NPDES Permit is required for stormwater discharges identified in Part 1.A. of the permit. – Construction activity that results in land disturbance of equal to or greater than one acre or a common plan of development or sale that disturbs greater than one acre, and authorizes, subject to the terms and conditions of this permit, the discharge of stormwater associated with construction activity. – Construction activity does not include a disturbance to the land of less than five acres for the purpose of routine maintenance that is performed to maintain the original line and grade, hydraulic capacity, or original purpose of the facility. Pavement rehabilitation that does not disturb the underlying soils (e.g., mill and overlay projects) is not considered construction activity. – This permit covers all areas of MN.

ENTITY	SURFACE WATER QUANTITY	SURFACE WATER QUALITY	GROUNDWATER	EROSION AND SEDIMENT CONTROL	COMMENTS
Rice Creek Watershed District General Rules, Adopted December 1, 2014 Rule RMP-2, Adopted June 11, 2008, affecting Anoka/Washington Judicial Ditch 4 Subwatersheds (Generally on the east side of I-35, east of Hornsby Street) Rule RMP-4, Adopted June 9, 2010, affecting the City of Columbus outside of Judicial Ditch 4.	▪ Peak stormwater runoff rates for the proposed project at the project site boundary, in aggregate, must not exceed existing runoff rates for the 2-, 10-year, and 100-year, 24-hour rainfall events, or a different critical even duration at the discretion of the District Engineer. Notwithstanding, peak runoff may be controlled to this standard in a regional facility consistent with requirements. ▪ Any increase in a critical duration flood event rate at a specific point of discharge from the project site must be limited and cause no adverse downstream impact. ▪ Projects discharging to wetlands must meet bounce and inundation period rules, which are based on the wetland's susceptibility class. ▪ In calculating runoff, curve number for pervious areas within construction limits shall be shifted down one hydrologic soil group classification, unless project incorporates soil amendments.	▪ Projects creating impervious surfaces shall address the use of Better Site Design techniques as outlined in the Minnesota Stormwater Manual. ▪ Sediment shall be managed on-site to the maximum extent practicable before runoff resulting from new or reconstructed impervious surface enters the off-site drainage system. ▪ The required water quality treatment volume standard for Public Linear Projects is determined as follows: Required WQ Treatment Vol (ft^3) = New/Reconstructed Impervious Surface Area (ft^2) x 0.75 (in) ÷ 12 (in/ft) ▪ Stormwater runoff treated by the BMP during a rain event will not be credited towards the treatment requirement. ▪ BMPs shall be located either on-site to treat runoff at the point of generation, or regionally within the Resource of Concern Drainage Area. ▪ BMPs must provide infiltration where feasible. If the District concurs that infiltration BMPs are not feasible or directs that infiltration not be used, then any BMP may be chosen. If infiltration is feasible on-site, then a regionally sited BMP must provide equivalent runoff volume reduction. ▪ Off-site and/or regional BMPs must be sited in the following priority order: o In downstream location that intercepts the runoff volume leaving the project site prior to the Resource of Concern o Anywhere within the same Resource of Concern Drainage Area that results in no greater mass of TP reaching the resource of concern than on-site BMPs. ▪ RCWD Rules include specific design criteria for infiltration, water reuse, biofiltration/filtration BMPs, and stormwater ponds. ▪ All stormwater management structures and facilities must be design for maintenance access and be properly operated and maintained in perpetuity to assure that they continue to function as designed.	▪ Follow state law for groundwater management.	▪ Follow MPCA guidance. ▪ RCWD may require additional erosion and sediment control measures for areas near surface waters. ▪ Erosion control measures must be implemented before land altering activities take place. Project should be phased to minimize disturbed areas. ▪ Must protect facilities to be used for post-construction stormwater infiltration.	▪ RCWD also has rules for floodplain alterations: o In areas where a FEMA-defined floodway has been defined and floodplain encroachment is subject to a DNR-approved ordinance, floodway fill is prohibited but flood fringe fill is permitted. o In areas where a floodway is not defined (or DNR-approved ordinance is not in effect), floodplain fill is allowed but fully compensatory storage at the same elevation is required.

City of Columbus City Code Chapter 7D (Storm Water Management)	▪ Limit 2, 10 and 100-year peak runoff rates to the existing condition. ▪ Incorporate natural topography into stormwater management to the degree possible. ▪ Stormwater management practices to be investigated include (in order of preference): o Natural infiltration on-site o Flow attenuation in vegetated swales or natural depressions o Storm water retention facilities o Storm water detention facilities	▪ Follow procedures from the MPCA publication "Protecting Water Quality in Urban Areas" ▪ City-specific design standards for BMPs: o Minimum pond surface area of 2% of impervious area or 1% of total drainage area (whichever is larger) o Average permanent pool depth of 4 to 10 feet. o Permanent pool length-to-width ratio of 3:1 or greater. o Minimum 10-ft safety bench below the pond normal water level. o 16.5-ft minimum buffer strip of vegetation around normal water level o Skimming is required o Sediment forebay is required. ▪ Pretreatment is required before discharging into wetlands. ▪ Minimum 16.5-ft buffer around wetlands. ▪ Catch basins shall be provided with a sump area for collection of coarse-grained material.	▪ Follow state law for groundwater management.	▪ No land disturbing or development activities allowed on slopes of 18 percent or more.	The City of Columbus requires a stormwater management plan. If a stormwater management plan has been approved by "another reviewing governmental agency" that plan shall be utilized by the City in lieu of a duplicate application.
ENTITY	**SURFACE WATER QUANTITY**	**SURFACE WATER QUALITY**	**GROUNDWATER**	**EROSION AND SEDIMENT CONTROL**	**COMMENTS**
City of Forest Lake City Ordinance 151 (Storm Water Management)	▪ Meet requirements of City of Forest Lake Surface Water Management Plan for Water Quantity. ▪ Incorporate natural topography into stormwater management to the degree possible. ▪ Stormwater management practices to be investigated include (in order of preference): o Natural infiltration on-site o Flow attenuation in vegetated swales or natural depressions o Storm water retention facilities o Storm water detention facilities	▪ Meet requirements of City of Forest Lake Surface Water Management Plan for Water Quality. ▪ Pretreatment is required before discharging into wetlands. ▪ A buffer strip around wetlands is required. ▪ Catch basins shall be provided with a sump area for collection of coarse-grained material.	▪ Requires treatment for dewatering activities.	▪ Follow MPCA NPDES permit requirements. ▪ Lists BMPs required for soil stockpiles. ▪ Exposed slopes shall not be steeper in grade than 3H:1V. Slopes steeper than 3H:1V shall be reviewed and approved by the City Engineer and/or Washington Conservation District.	The City of Forest Lake requires submission of a Storm Water Pollution Prevention Plan.

APPENDIX F

Interchange Alternatives Analysis

SRF No. 011 07347

DRAFT MEMORANDUM

TO: Matthew Parent, Anoka County
Project Manager

FROM: Pat Corkle, PE, PTOE, Principal
Leif Garnass, PE, PTOE, Senior Associate

DATE: January 27, 2015

SUBJECT: QUAD 35 TRANSPORTATION STUDY (CSAH 23/TH 97 AT I-35)
INTERCHANGE ALTERNATIVES TRAFFIC OPERATIONS SUPPLEMENTAL ANALYSIS

INTRODUCTION

The purpose of this memorandum is to document the traffic operations analysis conducted to evaluate the potential impacts on the previous traffic operations analysis documented in the *Quad 35 Transportation Study (CSAH 23/TH 97 AT I-35) Interchange Alternatives and Traffic Operations Analysis*, dated September 2014. This supplemental analysis was conducted to consider new information available from the recent adoption of *Thrive MSP 2040* by the Metropolitan Council. Although the details are not currently available to develop new traffic forecasts, the Council anticipates a slowing pace of growth in the region.

The previous year 2030 peak hour traffic forecasts were reevaluated based on an estimate of lower projected growth in the area. New traffic forecast estimates were established by factoring the prior traffic forecasts by 15% to account for the theoretical maximum amount of volume that could access the interchange. This assumes the constraint of a two-lane roadway to the east of the interchange. These "85%" forecasts provided the analysis with turning movement estimates based on the constraints to the east, as well as the potential for reduced development to the west. Existing volumes were also adjusted up to year 2014 based on recent growth identified from reviewing historical ramp volumes obtained from MnDOT.

Based on the reduced traffic forecast estimates, it was determined by the Technical Advisory Committee (TAC) at committee meetings in the fall of 2014, that the standard diamond and diverging diamond interchange (DDI) alternatives offer the most flexibility for building a cost-effective interim solution that could be expanded in the future, while providing sufficient capacity and safety benefits. As a result, this supplemental traffic operations analysis was conducted for these two alternatives to assess operational issues under existing (year 2014) and the estimated future year 2030 a.m. peak and p.m. peak hour conditions.

SUPPLEMENTAL TRAFFIC OPERATIONS ANLAYSIS RESULTS

Based on discussions from the TAC meetings in the fall of 2014, the following concepts represent improvements that would address deficiencies with the existing CSAH 23/TH 97 interchange at I-35, while allowing the bridge to be expanded to an ultimate interchange configuration (see prior Interchange Alternatives and Traffic Operations Analysis Memo) if necessary in the future:

- 4-Lane Bridge Standard Diamond (two eastbound and two westbound lanes)
- 5-Lane Bridge Standard Diamond (two eastbound and three westbound lanes)
- 4-Lane Bride Diverging Diamond (two eastbound and two westbound lanes)

The traffic operations analysis was conducted using PTV Vissim (Version 5.4) software for consistency with previous analyses. The results of the analysis are summarized in Table 1. The detailed results of the microsimulation are attached.

Table 1 - Traffic Operations Results

Interchange Alternative	Year 2014 Worst Ramp LOS A.M. Peak/P.M. Peak	Year 2030 Worst Ramp LOS A.M. Peak/P.M. Peak
2-Lane Existing Bridge	C/C	F/F
4-Lane Bridge Standard Diamond	C/C	D/D
5-Lane Bridge Standard Diamond	C/C	D/C
4-Lane Bridge Diverging Diamond	B/B	C/C

Results of the supplemental operations analysis indicate that the existing two lane bridge operates acceptably from and overall intersection level of service standpoint under existing volumes, but it is expected to operate at an unacceptable LOS F in the year 2030.

The four lane diverging diamond interchange is expected to operate at a LOS B under existing volumes and at LOS C assuming the revised year 2030 volumes.

Both standard diamond alternatives are expected to operate at a LOS C under existing volumes, but both are expected to approach capacity by year 2030. The four lane standard diamond alternative, compared to the diverging diamond, showed a greater westbound queue at the east ramp intersection caused by left-turning traffic queuing through the east ramp intersection. This is a result of the underutilization of the dual left-turn lanes at the west ramp intersection.

CSAH 23/Hwy 97 at I-35 is has highly directional, unbalanced flows between the south and east with high turning percentages and low through traffic on the arterial system. Diverging diamond interchanges are typically ideal for accommodating these traffic patterns.

ATTACHMENT

Year 2014 No Build Conditons - Existing Interchange
Quad 35 Transportation Study (CSAH 23/TH 97 at I-35)
Arterial MOEs - A.M. Peak Hour

SRF Consulting Group, Inc.

I-35 West Ramps (Southbound) at TH 97

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	88	31	164	54.7	**D**	23.6	C	30.3	C
	Right	170	12	132	7.4	A				
Eastbound	Thru	193	4	75	35.3	**D**	44.7	**D**		
	Right	193	3	154	54.1	**D**				
Westbound	Left	895	156	**696**	28.9	C	26.8	C		
	Thru	214	156	**696**	18.2	B				

I-35 East Ramps (Northbound) at TH 97

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	53	17	119	54.0	**D**	15.8	B	32.6	C
	Right	259	19	133	8.0	A				
Eastbound	Left	65	5	120	17.5	B	5.9	A		
	Thru	217	5	121	2.5	A				
Westbound	Thru	1,057	132	**1,181**	44.6	**D**	44.2	**D**		
	Right	41	0	0	33.1	C				

Year 2014 No Build Conditons - Existing Interchange
Quad 35 Transportation Study (CSAH 23/TH 97 at I-35)
Arterial MOEs - P.M. Peak Hour

I-35 West Ramps (Southbound) at TH 97

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	85	17	148	33.9	C	17.7	B	22.6	C
	Right	125	5	117	6.7	A				
Eastbound	Thru	465	24	220	38.7	**D**	36.7	**D**		
	Right	136	0	0	29.9	C				
Westbound	Left	324	20	**392**	15.8	B	11.4	B		
	Thru	345	20	**391**	7.4	A				

I-35 East Ramps (Northbound) at TH 97

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	201	42	234	26.6	C	15.3	B	25.4	C
	Right	978	53	250	13.0	B				
Eastbound	Left	232	18	156	12.0	B	9.1	A		
	Thru	317	18	156	7.0	A				
Westbound	Thru	466	113	**539**	67.8	**E**	62.1	**E**		
	Right	102	0	8	35.6	**D**				

Year 2014 Build Conditons - Four Lane Standard Diamond Interchange
Quad 35 Transportation Study (CSAH 23/TH 97 at I-35)
Arterial MOEs - A.M. Peak Hour

SRF Consulting Group, Inc.

I-35 West Ramps (Southbound) at TH 97

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	88	31	164	54.4	**D**	23.4	C	25.7	C
	Right	170	12	132	7.3	A				
Eastbound	Thru	193	4	75	35.4	**D**	35.0	**D**		
	Right	196	1	52	34.6	C				
Westbound	Left	895	59	**334**	25.8	C	23.0	C		
	Thru	215	59	**335**	11.2	B				

I-35 East Ramps (Northbound) at TH 97

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	54	11	98	34.4	C	11.4	B	26.3	C
	Right	260	13	113	6.6	A				
Eastbound	Left	65	23	160	46.1	**D**	18.0	B		
	Thru	217	23	162	9.6	A				
Westbound	Thru	1,054	69	268	33.2	C	32.6	C		
	Right	40	0	0	17.7	B				

Year 2014 Build Conditons - Four Lane Standard Diamond Interchange
Quad 35 Transportation Study (CSAH 23/TH 97 at I-35)
Arterial MOEs - P.M. Peak Hour

SRF Consulting Group, Inc.

I-35 West Ramps (Southbound) at TH 97

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	85	17	148	34.0	C	17.7	B	21.7	C
	Right	125	5	117	6.7	A				
Eastbound	Thru	464	24	223	38.9	**D**	36.7	**D**		
	Right	136	0	38	29.3	C				
Westbound	Left	328	10	182	12.1	B	9.4	A		
	Thru	341	10	182	6.8	A				

I-35 East Ramps (Northbound) at TH 97

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	200	37	236	23.6	C	13.7	B	24.8	C
	Right	978	47	251	11.7	B				
Eastbound	Left	232	48	217	32.0	C	20.6	C		
	Thru	317	47	219	12.3	B				
Westbound	Thru	468	57	199	56.5	**E**	51.9	**D**		
	Right	101	0	13	30.2	C				

Year 2014 Build Conditons - Five Lane Standard Diamond Interchange
Quad 35 Transportation Study (CSAH 23/TH 97 at I-35)
Arterial MOEs - A.M. Peak Hour

SRF Consulting Group, Inc.

I-35 West Ramps (Southbound) at TH 97

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	88	31	164	54.7	**D**	23.5	C	20.8	C
	Right	170	12	132	7.3	A				
Eastbound	Thru	193	4	62	35.5	**D**	35.2	**D**		
	Right	196	1	50	34.8	C				
Westbound	Left	896	47	214	16.9	B	15.2	B		
	Thru	212	46	211	8.0	A				

I-35 East Ramps (Northbound) at TH 97

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	54	11	98	34.4	C	11.4	B	23.9	C
	Right	260	13	113	6.6	A				
Eastbound	Left	65	22	157	43.3	**D**	17.4	B		
	Thru	217	22	159	9.6	A				
Westbound	Thru	1,053	43	198	29.7	C	29.2	C		
	Right	40	0	0	15.1	B				

Year 2014 Build Conditons - Five Lane Standard Diamond Interchange
Quad 35 Transportation Study (CSAH 23/TH 97 at I-35)
Arterial MOEs - P.M. Peak Hour

SRF Consulting Group, Inc.

I-35 West Ramps (Southbound) at TH 97

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	85	17	148	34.0	C	17.8	B	20.1	C
	Right	125	5	117	6.8	A				
Eastbound	Thru	465	15	139	36.6	**D**	35.1	**D**		
	Right	136	0	41	30.0	C				
Westbound	Left	322	5	147	9.1	A	7.3	A		
	Thru	345	5	147	5.7	A				

I-35 East Ramps (Northbound) at TH 97

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	201	37	234	23.2	C	13.5	B	23.7	C
	Right	978	46	249	11.5	B				
Eastbound	Left	232	32	206	19.3	B	15.1	B		
	Thru	317	32	207	12.0	B				
Westbound	Thru	466	49	181	57.9	**E**	53.2	**D**		
	Right	101	0	6	31.4	C				

Year 2014 Build Conditons - Four Lane Diverging Diamond Interchange
Quad 35 Transportation Study (CSAH 23/TH 97 at I-35)
Arterial MOEs - A.M. Peak Hour

SRF Consulting Group, Inc.

I-35 West Ramps (Southbound) at TH 97

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	90	5	102	9.8	A	5.0	A	14.4	B
	Right	170	0	0	2.5	A				
Eastbound	Thru	192	3	124	35.5	**D**	32.5	C		
	Right	195	0	64	29.5	C				
Westbound	Left	897	19	**315**	8.3	A	10.3	B		
	Thru	212	16	235	19.0	B				

I-35 East Ramps (Northbound) at TH 97

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	54	10	105	31.5	C	8.3	A	17.5	B
	Right	260	2	76	3.5	A				
Eastbound	Left	64	0	0	1.2	A	18.9	B		
	Thru	214	32	198	24.1	C				
Westbound	Thru	1,058	13	92	20.1	C	19.8	B		
	Right	40	0	0	13.0	B				

Year 2014 Build Conditons - Four Lane Diverging Diamond Interchange
Quad 35 Transportation Study (CSAH 23/TH 97 at I-35)
Arterial MOEs - P.M. Peak Hour

SRF Consulting Group, Inc.

I-35 West Ramps (Southbound) at TH 97

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	85	4	100	9.6	A	6.0	A	19.0	B
	Right	125	0	0	3.5	A				
Eastbound	Thru	463	17	219	38.1	**D**	35.9	**D**		
	Right	135	1	83	28.3	C				
Westbound	Left	321	2	155	3.8	A	7.9	A		
	Thru	344	21	239	11.6	B				

I-35 East Ramps (Northbound) at TH 97

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	200	8	139	9.0	A	7.8	A	17.7	B
	Right	978	15	209	7.6	A				
Eastbound	Left	231	0	55	2.1	A	13.2	B		
	Thru	318	39	**301**	21.2	C				
Westbound	Thru	465	38	252	46.7	**D**	42.8	**D**		
	Right	101	0	0	25.0	C				

Year 2030 No Build Conditons 85% - Existing Interchange
Quad 35 Transportation Study (CSAH 23/TH 97 at I-35)
Arterial MOEs - A.M. Peak Hour

SRF Consulting Group, Inc.

I-35 West Ramps (Southbound) at TH 97

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	93	35	175	55.9	E	21.6	C	59.9	E
	Right	269	14	143	9.8	A				
Eastbound	Thru	573	136	894	83.4	F	93.8	F		
	Right	417	147	880	108.2	F				
Westbound	Left	748	360	725	48.2	D	40.8	D		
	Thru	285	360	725	21.6	C				

I-35 East Ramps (Northbound) at TH 97

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	142	700	1,095	608.1	F	194.7	F	211.1	F
	Right	372	714	1,104	36.9	D				
Eastbound	Left	216	36	451	28.2	C	15.1	B		
	Thru	448	36	450	8.7	A				
Westbound	Thru	891	2,102	2,206	360.8	F	359.2	F		
	Right	45	0	0	328.2	F				

Year 2030 No Build Conditons 85% - Existing Interchange
Quad 35 Transportation Study (CSAH 23/TH 97 at I-35)
Arterial MOEs - P.M. Peak Hour

SRF Consulting Group, Inc.

I-35 West Ramps (Southbound) at TH 97

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	112	27	163	43.2	D	20.0	C	160.8	F
	Right	242	10	132	9.3	A				
Eastbound	Thru	580	2,161	3,546	368.8	F	327.1	F		
	Right	256	2	165	232.7	F				
Westbound	Left	399	401	707	72.6	E	51.9	D		
	Thru	419	400	707	32.2	C				

I-35 East Ramps (Northbound) at TH 97

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	207	1,106	1,508	565.1	F	159.6	F	195.8	F
	Right	976	1,113	1,523	73.7	E				
Eastbound	Left	323	334	685	94.0	F	63.0	E		
	Thru	365	334	685	35.5	D				
Westbound	Thru	611	1,740	2,197	394.4	F	387.3	F		
	Right	89	0	0	338.9	F				

Year 2030 Build Conditons 85% - Four Lane Standard Diamond Interchange
Quad 35 Transportation Study (CSAH 23/TH 97 at I-35)
Arterial MOEs - A.M. Peak Hour

SRF Consulting Group, Inc.

I-35 West Ramps (Southbound) at TH 97

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	93	36	175	56.5	**E**	22.2	C	42.5	**D**
	Right	269	15	143	10.3	B				
Eastbound	Thru	575	97	**772**	74.5	**E**	67.9	**E**		
	Right	423	17	**323**	58.9	**E**				
Westbound	Left	1,060	92	**436**	34.9	C	30.0	C		
	Thru	378	92	**432**	16.3	B				

I-35 East Ramps (Northbound) at TH 97

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	174	41	244	37.9	**D**	17.1	B	36.1	**D**
	Right	384	49	258	7.7	A				
Eastbound	Left	220	130	**547**	72.9	**E**	39.8	**D**		
	Thru	450	130	**549**	23.6	C				
Westbound	Thru	1,257	101	**457**	43.2	**D**	42.2	**D**		
	Right	63	0	0	22.3	C				

Year 2030 Build Conditons 85% - Four Lane Standard Diamond Interchange
Quad 35 Transportation Study (CSAH 23/TH 97 at I-35)
Arterial MOEs - P.M. Peak Hour

I-35 West Ramps (Southbound) at TH 97

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	113	26	170	34.3	C	18.9	B	33.1	C
	Right	242	10	140	11.7	B				
Eastbound	Thru	724	102	**640**	61.6	**E**	56.4	**E**		
	Right	310	4	108	44.2	**D**				
Westbound	Left	508	33	**334**	21.9	C	15.4	B		
	Thru	575	33	**336**	9.6	A				

I-35 East Ramps (Northbound) at TH 97

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	305	65	**398**	27.6	C	18.2	B	35.2	**D**
	Right	1,257	76	**414**	15.9	B				
Eastbound	Left	405	129	**643**	48.1	**D**	31.3	C		
	Thru	434	129	**644**	15.6	B				
Westbound	Thru	778	121	**438**	73.2	**E**	68.8	**E**		
	Right	111	0	11	37.6	**D**				

Year 2030 Build Conditons 85% - Five Lane Standard Diamond Interchange
Quad 35 Transportation Study (CSAH 23/TH 97 at I-35)
Arterial MOEs - A.M. Peak Hour

SRF Consulting Group, Inc.

I-35 West Ramps (Southbound) at TH 97

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	93	36	175	55.7	**E**	22.3	C	36.3	**D**
	Right	269	15	143	10.8	B				
Eastbound	Thru	572	44	277	67.1	**E**	64.2	**E**		
	Right	422	15	277	60.3	**E**				
Westbound	Left	1,065	80	**447**	22.2	C	20.5	C		
	Thru	373	80	**447**	15.6	B				

I-35 East Ramps (Northbound) at TH 97

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	174	41	244	37.5	**D**	16.9	B	28.7	C
	Right	384	48	258	7.6	A				
Eastbound	Left	220	101	**420**	61.2	**E**	31.5	C		
	Thru	449	100	**420**	16.9	B				
Westbound	Thru	1,260	51	247	32.8	C	32.2	C		
	Right	60	0	0	19.1	B				

Year 2030 Build Conditons 85% - Five Lane Standard Diamond Interchange
Quad 35 Transportation Study (CSAH 23/TH 97 at I-35)
Arterial MOEs - P.M. Peak Hour

SRF Consulting Group, Inc.

I-35 West Ramps (Southbound) at TH 97

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	113	27	173	34.4	C	19.3	B	28.0	C
	Right	242	10	142	12.2	B				
Eastbound	Thru	721	29	195	50.0	**D**	48.3	**D**		
	Right	310	3	102	44.3	**D**				
Westbound	Left	502	24	**418**	14.6	B	11.6	B		
	Thru	581	24	**420**	9.1	A				

I-35 East Ramps (Northbound) at TH 97

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	306	65	**375**	26.0	C	17.9	B	31.8	C
	Right	1,257	76	**392**	16.0	B				
Eastbound	Left	403	60	**338**	24.9	C	18.9	B		
	Thru	432	60	**338**	13.3	B				
Westbound	Thru	777	108	**428**	72.5	**E**	68.2	**E**		
	Right	113	0	2	38.5	**D**				

Year 2030 Build Conditons 85% - Four Lane Diverging Diamond Interchange
Quad 35 Transportation Study (CSAH 23/TH 97 at I-35)
Arterial MOEs - A.M. Peak Hour

SRF Consulting Group, Inc.

I-35 West Ramps (Southbound) at TH 97

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	95	6	101	11.9	B	7.3	A	26.8	C
	Right	269	0	4	5.7	A				
Eastbound	Thru	566	37	**313**	56.6	**E**	51.6	**D**		
	Right	421	3	173	44.9	**D**				
Westbound	Left	1,061	70	**494**	10.7	B	14.8	B		
	Thru	375	46	**461**	26.3	C				

I-35 East Ramps (Northbound) at TH 97

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	175	37	240	38.6	**D**	15.1	B	22.8	C
	Right	384	5	96	4.5	A				
Eastbound	Left	214	2	131	3.3	A	20.2	C		
	Thru	441	82	**374**	28.4	C				
Westbound	Thru	1,264	24	172	27.9	C	27.4	C		
	Right	60	0	0	15.9	B				

Year 2030 Build Conditons 85% - Four Lane Diverging Diamond Interchange
Quad 35 Transportation Study (CSAH 23/TH 97 at I-35)
Arterial MOEs - P.M. Peak Hour

SRF Consulting Group, Inc.

I-35 West Ramps (Southbound) at TH 97

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Southbound	Left	113	8	126	12.9	B	10.2	B	27.2	C
	Right	242	0	3	9.0	A				
Eastbound	Thru	721	56	**397**	54.6	**D**	49.8	**D**		
	Right	310	12	255	38.6	**D**				
Westbound	Left	502	23	**373**	5.6	A	11.2	B		
	Thru	581	59	**472**	16.0	B				

I-35 East Ramps (Northbound) at TH 97

Approach	Movement	Volume (vph)	Average Queue (ft)	Maximum Queue (ft)	Movement Delay (sec/veh)	Movement LOS	Approach Delay (sec/veh)	Approach LOS	Overall Delay (sec/veh)	Overall LOS
Northbound	Left	306	21	254	15.9	B	11.5	B	23.8	C
	Right	1,258	29	**309**	10.5	B				
Eastbound	Left	401	6	239	3.9	A	17.7	B		
	Thru	433	86	**483**	30.4	C				
Westbound	Thru	777	65	**380**	54.1	**D**	51.2	**D**		
	Right	112	0	66	31.2	C				

APPENDIX G

Concept Layout

QUAD 35 – DIVERGING DIAMOND INTERCHANGE

LEGEND
- PAVED ROADWAY
- AGGREGATE ROADWAY & SHOULDERS
- BRIDGES & RETAINING WALLS
- RAISED MEDIANS & CURBS
- PAVED SHOULDERS
- CONCRETE TRAILS & SIDEWALKS
- FUTURE CONSTRUCTION "BY OTHERS"
- PROPOSED PONDING LOCATION
- PROPOSED TRAFFIC SIGNAL
- EXISTING TRAFFIC SIGNAL
- PRELIMINARY CONSTRUCTION LIMITS (TOE OF SLOPE)
- WETLANDS
- EXISTING RIGHT OF WAY
- PROPOSED RIGHT OF WAY
- FLOOD PLAIN BOUNDARY

PRELIMINARY
SUBJECT TO CHANGE
7/28/2015
SRF Consulting Group, Inc.

0 100 200
scale in feet

21421-28 PW
7/28/2015
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66,000 ADT – 2010
(97,000 ADT-2030)

℄ SB TH-35

℄ NB TH-35

CLOSED

BRIDGE
DESIGN SPEED = XX MPH
STATE AID DESIGN STANDARDS – RURAL

W. FREEWAY DRIVE

℄ NW RAMP (TH-35)

℄ NE RAMP (TH-35)

EUREKA AVE. N.

℄ WB TH-97

CLOSED

15,800 ADT – 2010
(24,000 ADT-2030)

SCANDIA TRAIL (TH 97)

LAKE DRIVE (CSAH 23)

7,600 ADT – 2010
(13,500 ADT-2030)

℄ WB CSAH 23

CLOSED

℄ EB CSAH 23

CLOSED

℄ EB TH-97

CLOSED

℄ SW RAMP (TH-35)

℄ SE RAMP (TH-35)

HORNSBY ST. N.E.

CSAH 54 REALIGNMENT

W. FREEWAY DRIVE (C.R. 54)

℄ NB TH-35

℄ SB TH-35

76,000 ADT – 2010
(116,000 ADT-2030)

152ND AVE. N.E.

APPENDIX H

Local Access Alternatives Analysis

SRF Consulting Group, Inc. | Engineers Planners Designers

SRF No. 011 07347

DRAFT MEMORANDUM

TO: Matthew Parent, Anoka County
Project Manager

FROM: Matt Pacyna, PE, Senior Associate

DATE: September 22, 2014

SUBJECT: QUAD 35 TRANSPORTATION STUDY (CSAH 23/TH 97 AT I-35)
CSAH 54 LOCAL ACCESS ALTERNATIVES ANALYSIS

INTRODUCTION

This memorandum documents the review of access location alternatives for CSAH 54 south of CSAH 23 as part of the *Quad 35 Transportation Study*, in the City of Columbus, Anoka County, Minnesota (see Figure 1). The purpose of this study is to develop a concept for the CSAH 23/CSAH 54 area southwest of the I-35 interchange that meets the short- and long-term needs of the area with respect to various land use and local access alternatives. The goal of this analysis is to identify an access scenario that best balances the operational, safety, and land use interests of area stakeholders.

CSAH 54 currently serves as the west frontage road along I-35 south of CSAH 23. The CSAH 54 and CSAH 23 intersection is currently less than 300 feet west of the I-35 interchange, which results in an intersection spacing that does not meet Anoka County access management guidelines (i.e. quarter-mile (1,320 feet) spacing is recommended). As part of the *Quad 35 Transportation Study,* CSAH 54 at the CSAH 23 intersection is proposed to be shifted west to improve the intersection spacing between the interchange and CSAH 54. For purposes of this analysis, the Northwest Quadrant Loop interchange alternative documented in the *Quad 35 Transportation Study – Interchange Alternatives and Traffic Operations Analysis* dated September 2014 was assumed. This alternative represents the "worst case" scenario for CSAH 54 as the intersection is only 550 feet west of the I-35 interchange. Other interchange alternatives evaluated for this study provide increased intersection spacing, comparatively.

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Study Area

Quad 35 Interchange Study

Anoka County Highway Department

Figure 1

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August 2014

LAND USE AND DEVELOPMENT ASSUMPTIONS

Year 2030 daily and peak hour traffic forecasts for the I-35 and CSAH 23 area were developed and documented in the *Quad 35 Transportation Study for CSAH 23/TH 97 at I-35* dated May 2011. These forecasts were developed using the Anoka County Travel Demand Model (TDM) to estimate future demand based on expected development and roadway improvements.

As an alternative, a sensitivity analysis was completed to understand the impacts of the realistic maximum development potential based on the available area (acreage) and the comprehensive plan land use guidance. Individual parcel data and wetland areas were identified from their respective databases to compute the percentage of developable land for each land plot in the study area. The floor-area-ratio (FAR) was assumed to be 30 percent, which is consistent with other retail developments in the metro area. The estimated building square footage based on developable acreage is provided in Table 1.

Table 1
Developable Acreage

Land Plots	Land Acres	Developable	FAR	Building SF
City Land	16	75%	30%	160,000
Holiday Station	5	90%	30%	65,000
Lakehead Oil	3	90%	30%	35,000
North Metro Oil	13	40%	30%	65,000
Ideal System	11	85%	30%	120,000
Jay Brothers	11	70%	30%	105,000

To help quantify the difference between the two land use assumptions, trip generation estimates for both land use scenarios were developed and are summarized in Table 2. The results indicate the TDM is expected to generate approximately 600 total area p.m. peak trips while the maximum development land use is expected to generate approximately 1,800 total area p.m. peak trips.

Table 2
Trip Generation Estimates

Land Use Type *(ITE Code)*	Size	A.M. Peak Hour Trips		P.M. Peak Hour Trips	
		In	Out	In	Out
Travel Demand Model					
Assumed in Travel Demand Model		365	255	225	365
Maximum Development Land Use					
Free Standing Discount Superstore – Big Box *(813) – City Land*	100,000 SF	104	81	213	222
Shopping Center *(820) – City Land*	60,000 SF	36	22	107	116
Gas/Service Station *(945) – Holiday Station*	24 FP	122	122	162	162
General Office Building *(710) – Adjacent Land*	175,000 SF	240	33	44	216
Shopping Center *(820) – Adjacent Land*	150,000 SF	89	55	267	289
	Subtotal	**591**	**313**	**793**	**1,005**
	Additional Network Trips	***+226***	***+58***	***+568***	***+640***

LOCAL ACCESS ALTERNATIVES ANALYSIS

As part of the alternatives analysis, two primary local access connections were reviewed. The first alternative assumed two local access connections (one north and one south), while the second alternative assumed only a single local access. The following information summarizes the assumptions and results used in each alternative analysis based on the land use scenario assumptions.

Multiple Local Access Connections (North and South Access)

An analysis was completed for the p.m. peak hour under the Travel Demand model and the Maximum Development land uses. The access would provide a partial access at the north access, and a full access at the south access. The following summarizes the results and recommendations of the analysis.

Travel Demand Model (TDM) Land Use:

- CSAH 54 at CSAH 23
  - Single westbound left-turn lane
  - Yield controlled channelized northbound right-turn lane (increases turning speed)
- CSAH 54
  - Side-to-side northbound/southbound left-turn lanes between CSAH 23 and full-access North Access not recommended
    - Safety and sight distance issues
  - Back-to-back left-turn lanes assumed
- North Access at CSAH 54

  - 3/4 access with side-street stop control recommended
  - Full-access (side-street stop control) works marginally acceptable
    - Northbound/southbound left-turn queue storage at CSAH 23/North Access approaching capacity
  - Full-access traffic signal does not operate acceptably
    - Northbound/southbound left-turn queues at CSAH 23/North Access extend beyond storage
    - Does not meet county signal spacing guidelines
    - Traffic volumes are not expected to meet signal warrants
- South Access at CSAH 54
  - Full-access with side-street stop control recommended

Maximum Development Land Use:

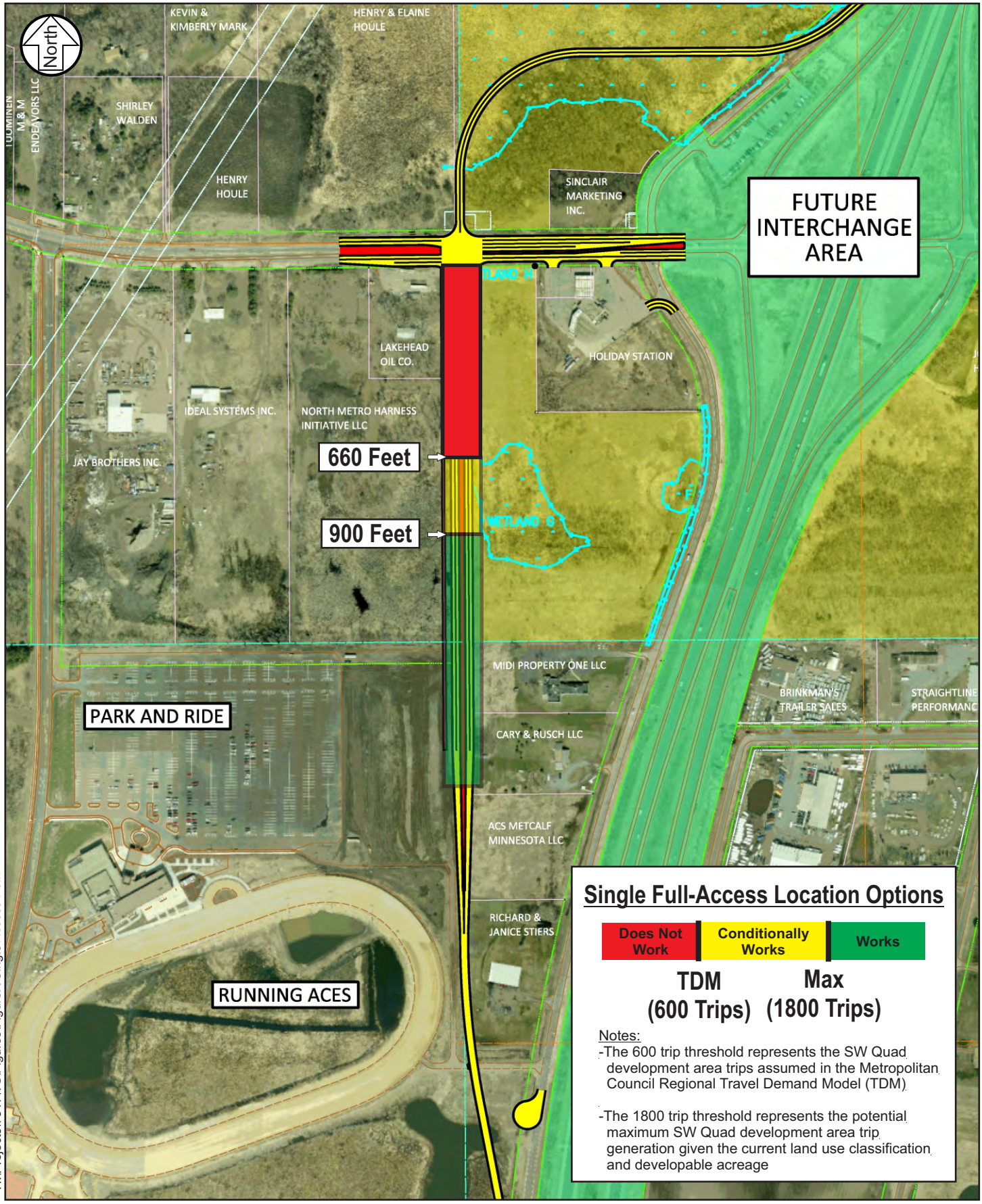
- CSAH 54 at CSAH 23
  - Dual westbound left-turn lanes are needed for acceptable operations along CSAH 23
  - Yield controlled channelized northbound right-turn lane (increases turning speed)
- CSAH 54
  - Side-to-side northbound/southbound left-turn lanes between CSAH 23 and North Access not recommended
    - Safety and sight distance issues
  - Back-to-back left-turn lanes assumed
- North Access at CSAH 54
  - 3/4 access with side-street stop control recommended
  - Full-access (side-street stop control) does not operate acceptably
    - Significant eastbound queues
    - Northbound/southbound left-turn queues at CSAH 23/North Access extend over capacity
  - T-access (side-street stop control) does not operate acceptably
    - Northbound/southbound left-turn queues at CSAH 23/North Access extend over capacity
  - 3/4 access (side-street stop control) does not operate acceptably
    - Northbound/southbound left-turn queues at CSAH 23/North Access extend over capacity
  - Full-access (signalized) access does not operate acceptably
    - Northbound/southbound left-turn queue extend over capacity
    - Does not meet county signal spacing guidelines of 660 feet for < 40 mph
    - Traffic volumes are expected to meet signal warrants

- South Access at CSAH 54
  - Full-access with traffic signal control recommended
    - Traffic volumes are expected to meet a signal warrant if North Access is right-in/right-out controlled

Single Local Access Connection

A single local access connection to CSAH 54 was assumed south of CSAH 23 and an analysis was completed for the p.m. peak hour under both forecasted volume conditions. The Travel Demand model forecasted 600 trips while the Maximum Development land uses forecasted 1,800 trips. This difference in trips creates three locations south of CSAH 23 described below that summarizes where the access works, conditionally works, and does not work. The access would provide single left-turn lanes along CSAH 54 (back-to-back configuration) with protected-only phasing. The following summarizes the results of the analysis (see Figure 2):

- The RED area is within 660 feet south of CSAH 23 and a full-access intersection is not expected to work from an operations perspective. Queuing issues due to lack of turn-lane storage expected and they would not meet design standards.
- The YELLOW area (which is from 660 feet to 900 feet south of CSAH 23) could potentially work, but is dependent on land use assumptions, additional intersection capacity (i.e., dual southbound left-turn lanes), design exceptions (shorter tapers (i.e., 1:10 versus 1:15), split phasing of the traffic signal at the CSAH 23/54 intersection, and wetland impacts.
- The GREEN area is beyond 900 feet south of CSAH 23 and a full-access intersection will work under both the TDM and the maximum developable potential land use scenarios with meeting design standards (except for Anoka County access/signal spacing guidelines); however, this location may still have wetland impacts.



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SRF Consulting Group, Inc.

Single Access Location

Quad 35 Interchange Study

Anoka County Highway Department

Figure 2

0137347
August 2014

SUMMARY OF KEY FINDINGS

As requested, we have completed a review of access location alternatives for CSAH 54 south of CSAH 23 as part of the *Quad 35 Transportation Study* in the City of Columbus, Anoka County, Minnesota. The purpose of this study is to develop a concept for the CSAH 23/CSAH 54 area southwest of the interchange that meets the short- and long-term needs of the area with respect to various land use and local access alternatives. The goal of this analysis is to identify an access scenario that best balances the operational, safety, and land use interests of area stakeholders. Based on the information detailed in this memorandum, the following summarizes the key findings:

Multiple Local Access Connections (North and South Access)

- Based on the Travel Demand Model forecasts developed for the *Quad 35 Transportation Study*, the north access to CSAH 54 should be a partial-access (3/4 access) intersection with side-street stop control and the south access to CSAH 54 should be a full-access intersection with side-street stop control.
- Based on a sensitivity analysis completed to understand the impacts of the realistic maximum development potential based on developable acreage and comprehensive plan land use assumptions, the north access to CSAH 54 should be a partial-access (3/4 access) intersection with side-street stop control and the south access to CSAH 54 should be a full-access intersection with traffic signal control.

Single Local Access Connection

- A single local access connection (full-access intersection) should be spaced at a minimum of 660 feet (preferably 900 feet) south of CSAH 23 along CSAH 54 to provide acceptable operations and accommodate turn lane queues.

- Based on the Travel Demand Model forecasts developed for the *Quad 35 Transportation Study*, the single access to CSAH 54 should be a side-street stop controlled intersection spaced at least 660 feet south of CSAH 23.

- Based on the Maximum Development land uses forecasts developed for the *Quad 35 Transportation Study*, the single access to CSAH 54 should be a signal controlled intersection spaced preferably 900 feet or more south of CSAH 23.