



# TRAFFIC IMPACT ANALYSIS

## RIVER FALLS

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for

The Greens of Rock Hill, LLC

July 2008

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## EXECUTIVE SUMMARY

The Greens of Rock Hill, LLC proposes to re-develop approximately 1,004 acres located on the east and west sides of Cel-River Road south of Cherry Road in Rock Hill, SC (York County). On the east side of Cel-River Road the site is expected to include 400,000 SF of retail, 400,000 SF of office, a 600-student elementary school, and 1,950 attached and detached residential units; on the west side of Cel-River Road the site is expected to contain a 3,600,000 SF industrial park. In 2014, it is expected that 25% of the retail portion, 20% of the office portion, and the complete 600-student elementary school will be constructed, and both of the remaining land uses (industrial and residential) will be 50% constructed. The site is assumed to be developed within a 13-year period with full buildout in 2020.



Cel-River Rd. Facing East Near Site

This report provides analysis of the traffic operations within the area of influence. It provides recommended access management for the site and intersection improvements needed for mitigating traffic impacts. This study evaluates the existing 2007 traffic conditions, 2014 No Build conditions, 2014 Partial Buildout conditions, 2020 No Build conditions, and 2020 Full Buildout traffic conditions.

The area of influence of the study site (as per the South Carolina Department of Transportation (SCDOT) and the City of Rock Hill) includes the following 11 existing intersections:

1. I-77 SB Exit Ramp & Sutton Road (S 46-49) (unsignalized)
2. I-77 NB Exit Ramp & Sutton Road (S 46-49) (unsignalized)
3. Cherry Rd. (US 21) & Sutton Road (S 46-49)/Spratt Street (signalized)
4. Cherry Rd. (US 21) & Celriver Road (SC 161-S46-50) (signalized)
5. Cherry Rd. (US 21) & Grier McGuire Dr./PBI Access (signal to be relocated)
6. Cherry Rd. (US 21) & Home Depot Dr./Celanese Access (signal to be relocated)
7. Celriver Road (S46-50) & Eden Terrace Ext. N (S 46-284) (unsignalized)
8. Celriver Road (S46-50) & Eden Terrace Ext. S (S 46-284) (unsignalized) (to be relocated)
9. Eden Terrace (S46-284) & Riverview Road (S 46-851) (unsignalized)
10. Eden Terrace (S46-284) & Corporate Blvd. (unsignalized)
11. Dave Lyle Blvd (SC 122) & Red River Rd. (S 46-50) (signalized)

According to the current site plan, the development will be served by 8 full movement proposed public streets. Two additional access locations were also recommended by SCDOT to reduce the amount of industrial park traffic on Cel-River Road. The access locations are as follows:



- (5) Proposed Main Street Access is located on Cherry Road approximately 300 feet south of the existing signalized intersection of Grier McGuire Drive/PBI Driveway. The developer intends to eliminate the PBI Driveway and shift the traffic signal 300 feet south along Cherry Road to this Main Street Access.
- (6) Existing Celanese Driveway/Proposed Access "A" (retail) is located on Cherry Road approximately 710 feet north of Celanese Road/Cel-River Road and forms the fourth leg of the signalized intersection with the Home Depot Driveway. This intersection will become an unsignalized intersection, with the traffic signal being shifted 500 feet to the north along Cherry Road to the Faith Boulevard/Proposed Access "B" intersection (see intersection #12 discussed below).
- (7) Existing Eden Terrace Extension N/Proposed Access is the existing fourth leg of the unsignalized intersection of Cel-River Road and Eden Terrace. Eden Terrace Extension will connect to Cherry Road via a proposed major thoroughfare to Proposed Access "C" (see intersection #13 discussed below).
- (8) Realigned Existing Eden Terrace Extension S/Proposed Access is the third leg of the unsignalized intersection of Cel-River Road and Eden Terrace Extension S. The existing roadway is expected to be shifted to the north approximately 450 feet.
- (10) Existing Corporate Boulevard Access is the extension of the existing Corporate Boulevard, located on Eden Terrace approximately 2,350 feet west of Cel-River Road
- (12) Faith Boulevard/Proposed Access "B" is located on Cherry Road, approximately 500 feet north of the Home Depot Driveway/Proposed Access "A" (retail) (intersection #6 discussed above). This intersection will be signalized (the traffic signal from the Home Depot Driveway will be shifted to this intersection).
- (13) Proposed Access "C" is located on Cherry Road, approximately 1,200 feet north of the signalized intersection of Grier McGuire Drive/existing PBI Driveway and will form a major thoroughfare connection with Eden Terrace Extension N between Cherry Road and Celriver Road. This intersection will be signalized.
- (14) Proposed Access "D" is located on Cel-River Road, approximately 1,175 feet south of the realigned Eden Terrace Extension S.
- Galleria Drive is located on Dave Lyle Boulevard (signalized intersection), approximately 0.7 miles west of Red River Road, and terminates approximately 1,600 feet north of Dave Lyle Boulevard. SCDOT recommends that Galleria Drive be extended into the River Falls site (including intersecting with Corporate Drive to the north) in order to reduce the amount of light industrial traffic volume along Cel-River Road. The intersection of Galleria Drive and Dave Lyle Boulevard was not analyzed per SCDOT's and the City of Rock Hill's instructions.
- Corporate Drive is located on Red River Road (unsignalized intersection), approximately 1 mile north of Dave Lyle Boulevard, and terminates approximately 1 mile west of Red River Road. SCDOT recommends that Galleria Drive be extended into the River Falls site (including intersecting with Corporate Drive) in order to reduce the amount of light industrial traffic volume along Cel-River Road. The intersection of Corporate Drive and Red River Road was not analyzed per SCDOT's and the City of Rock Hill's instructions.

The trip generation results indicate that the 2014 partial buildout of the development will generate 1,532 new morning-peak-hour trips and 1,992 new afternoon-peak-hour trips (after passby and internal capture reductions). Also, the trip generation results indicate that the 2020 full buildout of the development will generate 3,482 new morning-peak-hour trips and 4,941 new afternoon-peak-hour trips (after passby and internal capture reductions).

Currently, 10 of the 11 the existing intersections operate under capacity at an acceptable level of service (LOS) of "D" or better during both the morning and afternoon peak hours using the current laneage configuration. The signalized intersection of Cherry Road and Sutton Road/Spratt Street operates at a LOS "E" in the afternoon peak hour. Typically, an intersection is said to be operating at capacity at a volume-to-capacity (v/c) ratio at 1.00.

The results of the capacity analysis indicate that the site, in addition to the growth in the background traffic, will require roadway improvements to the existing street network by the year 2014. The required improvements are discussed below:

### **2014 (Partial Build) Improvements (see Figure 13):**

In analyzing the intersections within the study area, we recommend the following specific improvements for access management in 2014:

#### (3) Cherry Rd. (US 21) & Sutton Road (S 46-49)/Spratt Street

- Modify the existing northbound left turn phasing on Cherry Road from permitted to permitted/protected phasing and coordinate the signal timings/cycle lengths with the remaining traffic signals on Cherry Road.

#### (5) Cherry Road (US 21) & Proposed Main Street Access

- The developer is requesting the existing traffic signal at Cherry Road and Grier McGuire Road/PBI Driveway be shifted approximately 300 feet south to a new access driveway.
- Construct the Proposed Main Street Access with one entry lane and two westbound exit lanes - a westbound through lane that terminates as a left turn exit lane at Cherry Road and a right turn exit lane with a minimum of 150 feet of storage.
- Construct a southbound left turn lane on Cherry Road with a minimum of 150 feet of storage with a 100 foot taper and 450 foot through lane tapers at each end.
- Coordinate the signal timings/cycle lengths with the remaining traffic signals on Cherry Road.

#### (7) Cel-River Road (S-50) & Eden Terrace/Eden Terrace Extension N (Proposed Access)

- Install a traffic signal upon meeting applicable warrants and with SCDOT approval.
- Construct a left turn lane on all four legs of the intersection with a minimum of 150 feet of storage with a 100 foot bay taper and 350 foot through lane tapers on Eden Terrace/Eden Terrace Extension N (450 foot through lane tapers on Cel-River Road). **The recommended westbound left turn lane on Eden Terrace Extension N may or may not be feasible due to the space constraints from the existing substation on the east side of Cel-River Road near the intersection.**

- Coordinate the signal timings/cycle lengths with the recommended traffic signal at Realigned Eden Terrace Ext. S.

(8) Cel-River Road (S-50) & Realigned Eden Terrace Extension S (Proposed Access)

- Install a traffic signal upon meeting applicable warrants and with SCDOT approval.
- Construct a northbound and southbound left turn lane on Cel-River Road with a minimum of 150 feet of storage and a 100 foot bay taper each and 450 foot through lane tapers on both ends.
- Construct the eastbound approach on Proposed Access to include a through lane that terminates as a combined through-right turn lane, a left turn lane with a minimum of 150 feet of storage, and one entry lane.
- Construct the westbound approach on Proposed Access to include a through lane that terminates as a combined through-right turn lane, a left turn lane with 150 feet of storage, and one entry lane.
- Coordinate the signal timings/cycle lengths with the recommended traffic signal at Eden Terrace.

(9) Eden Terrace & Riverview Road

- Re-mark the existing southbound combined left-right lane on Riverview Road to a left turn lane.
- Construct a southbound right turn lane on Riverview Road with a minimum of 150 feet of storage and a 100 foot bay taper.

(10) Eden Terrace & Corporate Boulevard/Access

- Construct a northbound right turn lane on Corporate Boulevard with a minimum of 150 feet of storage with a 100 foot bay taper.

(12) Cherry Road (US 21) & Faith Boulevard/Proposed Access "B"

- The developer is requesting the existing traffic signal at Cherry Road and the Home Depot Driveway/Celanese Driveway be shifted approximately 500 feet north to the intersection of Faith Boulevard/Proposed Access "B".
- Construct a southbound left turn lane on Cherry Road with a minimum of 150 feet of storage and a 100 foot bay taper and through lane taper that terminates at the Main Street Access to the north (a northbound left turn lane is already present on Cherry Road at Faith Boulevard).
- Construct Proposed Access "B" with one entry lane and two westbound exit lanes - a left turn lane with 150 feet of storage and a through lane that terminates as a combined through-right turn exit lane at Cherry Road.
- Coordinate the signal timings/cycle lengths with the remaining traffic signals on Cherry Road.

(13) Cherry Road (US 21) & Proposed Access "C"

- Install a traffic signal upon meeting applicable warrants and with SCDOT approval.
- Construct a southbound left turn lane on Cherry Road with a minimum of 150 feet of storage and a 100 foot bay taper and a 450 foot through lane taper on each end.



- Construct Proposed Access "C" with one entry lane and two westbound exit lanes - a left turn lane with 150 feet of storage and a through lane that terminates as a right turn exit lane at Cherry Road.
- Construct an additional southbound through lane on Cherry Road (2 total) that begins a minimum of 500 feet north of Proposed Access "C" and ties into the existing two southbound that begin to the south near Grier McGuire Road. This will also require 450 feet of beginning taper.
- Coordinate the signal timings/cycle lengths with the remaining traffic signals on Cherry Road.

(14) Cel-River Road (S-50) & Proposed Access "D"

- Construct the east and west legs of Proposed Access "D" with one entry lane and one exit lane each.

These identified roadway/intersection improvements will improve capacity and provide sufficient access management at the site access locations during the critical peak hours of the year 2014 (Partial Build).

**2020 (Full Buildout) Improvements (see Figure 14):**

By 2020 (Full Build), in addition to the improvements described above in 2014, we recommend the following specific improvements:

(3) Cherry Rd. (US 21) & Sutton Road (S 46-49)/Spratt Street

- Construct an additional northbound left turn lane on Cherry Road with a minimum of 400 feet of storage each with a 200 foot bay taper and 450 foot through lane taper. This will also require an additional westbound through lane on Sutton Road from Cherry Road for a minimum of 500 feet with a 350 foot terminating taper in order to receive this additional left turn lane traffic.
- Construct an additional eastbound right turn lane on Sutton Road with a minimum of 300 feet of storage each and a 200 foot bay taper (the 2014 No Build scenario recommends an eastbound right turn lane).

(4) Cherry Road (US 21) & Celanese Road/Cel-River Road (SC 161-S46-50)

**Any improvements at this intersection may or may not be feasible due to right-of-way limitations on the Cel-River Road and the east side of Cherry Road, and space constraints from the existing Steak and Shake restaurant on the northwest corner of the intersection, the Farmers Market on the southwest corner of the intersection, the Texaco gas station on the southeast corner of the intersection, and the InChem site on the northeast corner of the intersection.**

- Re-mark the existing northbound right turn lane on Cel-River Road to a through lane (2 total).
- Construct a northbound right turn lane on Cel-River Road with a minimum of 150 feet of storage and a 100 foot bay taper.

- Construct an additional southbound left turn lane on Cherry Road with a minimum 175 feet of storage each with a 100 foot bay taper and through lane taper that ties into the existing left turn taper at the Home Depot Driveway. This will also require an additional southbound through lane on Cel-River Road from Cherry Road for a minimum of 500 feet with a 450 foot terminating taper in order to receive this additional left turn lane traffic.
- Construct an additional southbound left turn lane on Celanese Road with a minimum 400 feet of storage each with a 200 foot bay taper and 450 foot through lane taper.
  - These left turn lanes and coinciding bay taper will extend beyond the Home Depot Driveway on Celanese Road (located approximately 400 feet north of Cherry Road); however, we recommend leaving the Home Depot Driveway as a “full movement” driveway.
- Coordinate signal timings/cycle lengths with the remaining traffic signals on Cherry Road.

(7) Cel-River Road (S-50) & Eden Terrace/Eden Terrace Extension N (Proposed Access)

- Extend the westbound left turn lane storage on Eden Terrace Extension N to a minimum of 325 feet of storage with a 100 foot bay taper and 350 foot through lane taper.
- Construct a northbound right turn lane on Cel-River Road with a minimum of 150 feet of storage and a 100 foot bay taper.

(8) Cel-River Road (S-50) & Realigned Eden Terrace Extension S (Proposed Access)

- Extend the southbound left turn lane storage on Cel-River Road to a minimum of 400 feet of storage with a 100 foot bay taper and 450 foot through lane taper.
- Construct a southbound right turn lane on Cel-River Road with a minimum of 150 feet of storage and a 100 foot bay taper.
- Construct an additional eastbound left turn lane on the Proposed Access with a minimum of 400 feet of storage each. This will also require an additional northbound through lane on Cel-River Road from Realigned Eden Terrace Extension S for a minimum of 500 feet with a 450 foot terminating taper in order to receive this additional left turn lane traffic.

(9) Eden Terrace & Riverview Road

- Install a traffic signal upon meeting applicable warrants and with SCDOT approval.
- Construct an eastbound left turn lane on Eden Terrace with a minimum of 200 feet of storage with a 100 foot bay taper and 350 foot through lane taper (a short through lane taper on the east side of the intersection will also be necessary but should terminate prior to the bridge deck over Interstate 77).
- Construct a westbound right turn lane on Eden Terrace with 100 feet of storage and a 100 foot bay taper. This roadway improvement should fit within the spacing limitations between Riverview Road and the existing bridge deck on Eden Terrace (located approximately 250 feet east of Riverview Road).
- Coordinate signal timings/cycle lengths with the proposed traffic signal at Corporate Boulevard (see intersection #10 below).

(10) Eden Terrace & Corporate Boulevard/Access

- Install a traffic signal upon meeting applicable warrants and with SCDOT approval.
- Coordinate signal timings/cycle lengths with the proposed traffic signal at Riverview Road (see intersection #9 above).

(12) Cherry Road (US 21) & Faith Boulevard/Proposed Access "B"

- Construct an additional westbound left turn lane on Proposed Access "B" with a minimum of 325 feet of storage each.

(13) Cherry Road (US 21) & Proposed Access "C"

- Modify the southbound left turn phasing on Cherry Road from permitted to protected/permitted phasing.

(14) Cel-River Road (S-50) & Proposed Access "D"

- Construct southbound and northbound left turn lanes on Cel-River Road with a minimum of 150 feet of storage each with a 100 foot bay taper and a 450 through lane taper on both ends.
- Construct eastbound and westbound left turn lanes on Proposed Access "D" with a minimum of 150 feet of storage each.

If the recommended additional access locations by SCDOT are implemented, we also recommend the following improvements (these intersections were not analyzed per SCDOT, the improvements are based entirely on projected River Falls traffic volumes):

Dave Lyle Boulevard (SC 122) and Galleria Boulevard

- Construct an additional eastbound left turn lane on Dave Lyle Boulevard with a minimum of 300 feet of storage each with a 200 foot bay taper.

Red River Road and Commerce Drive

- Construct a northbound left turn lane on Red River Road with a minimum of 150 feet of storage with a 100 foot bay taper and 350 foot through lane tapers.
- Construct an eastbound right turn lane on Commerce Drive with a minimum of 150 feet of storage and a 100 foot bay taper.

These identified roadway/intersection improvements will improve capacity and provide sufficient access management at the site access locations during the critical peak hours of the year 2020.

## PROPOSED DEVELOPMENT

The Greens of Rock Hill, LLC proposes to re-develop approximately 1,004 acres located on the east and west sides of Cel-River Road south of Cherry Road in Rock Hill, SC (York County) (see Figure 1 – Vicinity Map). On the east side of Cel-River Road the site is expected to include 400,000 SF of retail, 400,000 SF of office, a 600-student elementary school, and 1,950 attached and detached residential units; on the west side of Cel-River Road the site is expected to contain a 3,600,000 SF industrial park. In 2014, it is expected that 25% of the retail portion, 20% of the office portion, and the complete 600-student elementary school will be constructed, and both of the remaining land uses (industrial and residential) will be 50% constructed. The site is assumed to be developed within a 13-year period with full buildout in 2020.



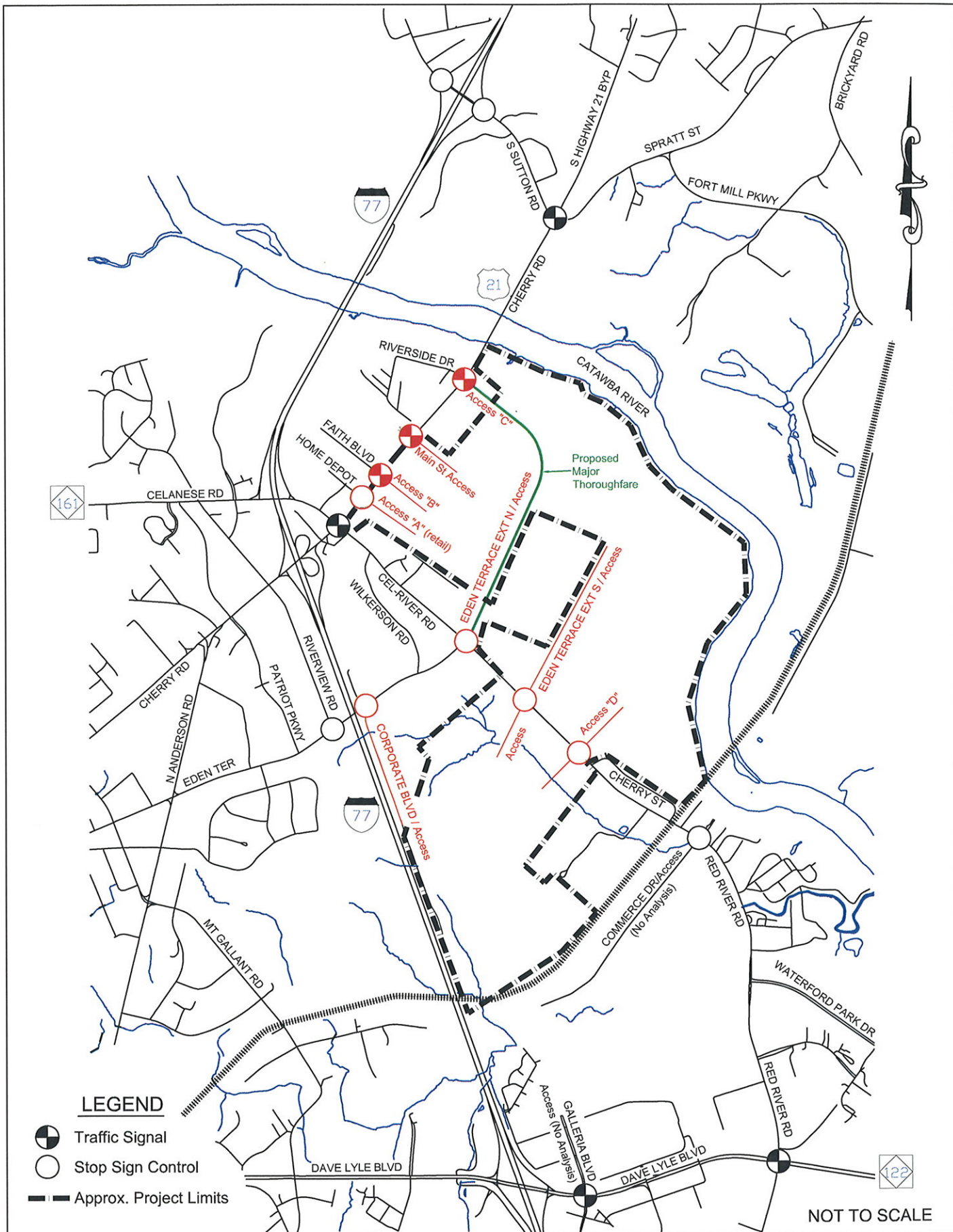
Cel-River Rd. Facing West Near Site

According to the current site plan (see Figure 2 – Site Plan), the development will be served by 8 full movement proposed public streets. Two additional access locations were also recommended by SCDOT to reduce the amount of industrial park traffic on Cel-River Road. The access locations are as follows:

- (5) Proposed Main Street Access is located on Cherry Road approximately 300 feet south of the existing signalized intersection of Grier McGuire Drive/PBI Driveway. The developer intends to eliminate the PBI Driveway and shift the traffic signal 300 feet south along Cherry Road to this Main Street Access.
- (6) Existing Celanese Driveway/Proposed Access “A” (retail) is located on Cherry Road approximately 710 feet north of Celanese Road/Cel-River Road and forms the fourth leg of the signalized intersection with the Home Depot Driveway. This intersection will become an unsignalized intersection, with the traffic signal being shifted 500 feet to the north along Cherry Road to the Faith Boulevard/Proposed Access “B” intersection (see intersection #12 discussed below).
- (7) Existing Eden Terrace Extension N/Proposed Access is the existing fourth leg of the unsignalized intersection of Cel-River Road and Eden Terrace. Eden Terrace Extension will connect to Cherry Road via a proposed major thoroughfare to Proposed Access “C” (see intersection #13 discussed below).
- (8) Realigned Existing Eden Terrace Extension S/Proposed Access is the third leg of the unsignalized intersection of Cel-River Road and Eden Terrace Extension S. The existing roadway is expected to be shifted to the north approximately 450 feet.
- (10) Existing Corporate Boulevard Access is the extension of the existing Corporate Boulevard, located on Eden Terrace approximately 2,350 feet west of Cel-River Road
- (12) Faith Boulevard/Proposed Access “B” is located on Cherry Road, approximately 500 feet north of the Home Depot Driveway/Proposed Access “A” (retail) (intersection #6 discussed above). This intersection will be signalized (the traffic signal from the Home Depot Driveway will be shifted to this intersection).



- (13) Proposed Access "C" is located on Cherry Road, approximately 1,200 feet north of the signalized intersection of Grier McGuire Drive/existing PBI Driveway and will form a major thoroughfare connection with Eden Terrace Extension N between Cherry Road and Celriver Road. This intersection will be signalized.
- (14) Proposed Access "D" is located on Cel-River Road, approximately 1,175 feet south of the realigned Eden Terrace Extension S.
- Galleria Drive is located on Dave Lyle Boulevard (signalized intersection), approximately 0.7 miles west of Red River Road, and terminates approximately 1,600 feet north of Dave Lyle Boulevard. SCDOT recommends that Galleria Drive be extended into the River Falls site (including intersecting with Corporate Drive to the north) in order to reduce the amount of light industrial traffic volume along Cel-River Road. The intersection of Galleria Drive and Dave Lyle Boulevard was not analyzed per SCDOT's and the City of Rock Hill's instructions.
- Corporate Drive is located on Red River Road (unsignalized intersection), approximately 1 mile north of Dave Lyle Boulevard, and terminates approximately 1 mile west of Red River Road. SCDOT recommends that Galleria Drive be extended into the River Falls site (including intersecting with Corporate Drive) in order to reduce the amount of light industrial traffic volume along Cel-River Road. The intersection of Corporate Drive and Red River Road was not analyzed per SCDOT's and the City of Rock Hill's instructions.



**LEGEND**

-  Traffic Signal
-  Stop Sign Control
-  Approx. Project Limits

NOT TO SCALE

**Conceptual Master Plan Notes**

1. The industrial park access road may be extended to the south and connect to Dave Lyle Boulevard in the future.
2. Discussions are in process with the property owner to obtain access to construct the proposed road.
3. A railroad easement currently exists where the proposed road is shown.
4. The +/-2 acre civic site may be converted to residential or flex/office space use.
5. The +/-25 acres located along the north side of Celriver Rd may be converted from residential to commercial/ flex-office.
6. The onsite wastewater treatment plant operations may cease at some point in the future. If this occurs, this area may be converted to residential use.
7. The Conceptual Plan reflects compatible land uses based on environmental conditions known at the time the plan was prepared and is subject to change.

Disclaimer  
 Conceptual Master Plan subject to change based on final planning and design.



## AREA CONDITIONS

The area of influence of the study site (as per the South Carolina Department of Transportation (SCDOT) and the City of Rock Hill) includes the following 11 existing intersections:

1. I-77 SB Exit Ramp & Sutton Road (S 46-49) (unsignalized)
2. I-77 NB Exit Ramp & Sutton Road (S 46-49) (unsignalized)
3. Cherry Rd. (US 21) & Sutton Road (S 46-49)/Spratt Street (signalized)
4. Cherry Rd. (US 21) & Celriver Road (SC 161-S46-50) (signalized)
5. Cherry Rd. (US 21) & Grier McGuire Dr./PBI Access (signal to be relocated)
6. Cherry Rd. (US 21) & Home Depot Dr./Celanese Access (signal to be relocated)
7. Celriver Road (S46-50) & Eden Terrace Ext. N (S 46-284) (unsignalized)
8. Celriver Road (S46-50) & Eden Terrace Ext. S (S 46-284) (unsignalized) (to be relocated)
9. Eden Terrace (S46-284) & Riverview Road (S 46-851) (unsignalized)
10. Eden Terrace (S46-284) & Corporate Blvd. (unsignalized)
11. Dave Lyle Blvd (SC 122) & Red River Rd. (S 46-50) (signalized)



**Cherry Facing North to  
Celanese/Cel-River Roads**



**Cel-River Rd. Facing East to  
Eden Terrace/Eden Ter. Ext. N**



**Eden Terrace Facing South to  
Corporate Blvd. (Note Bridge  
Deck Over I-77)**

Cherry Road (US 21) is a multi-lane, two-way major roadway with turn lanes and a posted speed limit of 45 mph within the area of influence. Cherry Road has occasional curb and gutter and sidewalks on both sides of the road (primarily near Cel-River Road/Celanese Road). Cherry Road fronts the north side of the proposed development.

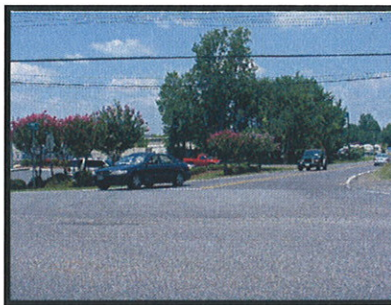
Cel-River Road (S46-50) is a two-lane, two-way minor roadway with occasional turn lanes and a posted speed limit of 45 mph within the area of influence. Cel-River Road forms the fourth leg of the signalized intersection of Cherry Road and Celanese Road in the southwest corner of the proposed development. Cel-River Road is re-named to Red River Road south of the railroad tracks, near Commerce Drive.

Eden Terrace (S46-284) is a two-lane, two-way minor roadway in the area of influence with no posted speed limit. Eden Terrace operates under stop-sign control at its intersection with Cel-River Road.





**Dave Lyle Blvd. Facing East to  
 Red River Road**



**Riverview Road Facing West  
 from Eden Terrace**



**Corporate Boulevard Facing  
 West to Eden Terrace**

Dave Lyle Boulevard (SC 122) is a multi-lane, median-divided, two-way major roadway with turn lanes. Dave Lyle Boulevard has a posted speed limit of 35 mph west of Red River Road and 50 mph east of Red River Road. Dave Lyle Boulevard is located south of the proposed development, where it forms a signalized intersection with Red River Road.

Riverview Road (S 46-851) is a two-lane, two-way minor roadway with a 35 mph posted speed limit within the area of influence. Riverview Road is stop-sign controlled at Eden Terrace, and is relatively close to the Eden Terrace overpass at Interstate 77 (approximately 250 feet).

Corporate Boulevard is a two-way, two-lane roadway with one lane in each direction with no posted speed limit. There are no pavement markings present and the roadway on the north side of Eden Terrace is gravel and serves as a driveway to a grading company. Corporate Boulevard is stop-sign controlled at Eden Terrace, and is relatively close to the Eden Terrace overpass at Interstate 77 (approximately 125 feet).

The remaining roadways within the area of influence are primarily driveways and streets with little vehicular traffic.

7-9 AM morning and 4-6 PM afternoon peak period turning movement counts were conducted at the existing intersections as indicated below:

<u>Intersection</u>	<u>Date</u>
Cherry Rd. & Celanese Rd./Cel-River Rd.	8/23/06
Cherry Rd. & Grier McGuire Dr./PBI Driveway	8/22/06
Cherry Rd. & Home Depot Driveway/Celanese Driveway	8/24/06
Cel-River Rd. & Eden Terrace/Eden Terrace Ext. N	8/23/06
Cel-River Rd. & Eden Terrace Extension S	8/24/06
Eden Terrace & Riverview Rd.	8/24/06
Dave Lyle Blvd. & Red River Rd.	8/15/06
Eden Terrace & Corporate Blvd.	8/15/06
I-77 Northbound Ramps & Sutton Road	12/6/06
I-77 Southbound Ramps & Sutton Road	12/7/07
Cherry Rd. & Sutton Rd./Spratt St.	5/15/07



The traffic volumes collected at the 10 intersections in August and December 2006 listed above were increased by 3% (the growth rate assigned to future background traffic as approved by SCDOT) to represent existing 2007 traffic volumes. Figure 3 shows the 2007 existing traffic volumes for the morning and afternoon peak hours.

Due to the proposed major thoroughfare connection between Cherry Road and Cel-River Road, it is anticipated that a portion of the existing background vehicles will use this new roadway connection in lieu of traveling to the signalized intersection of Cherry Road and Cel-River Road/Celanese Road. The approximate percentages are as follows (approved by the City of Rock Hill personnel):

- 50% of the southbound left turn background volumes from Cherry Road onto Cel-River Road will use the new major thoroughfare (50% reduction in the number of background southbound left turn movements from Cherry Road to Cel-River Road). Once at the intersection of Cel-River Road and Eden Terrace Extension N, 40% will turn left onto Cel-River Road and 10% will travel straight through the intersection onto Eden Terrace.
- 60% of the northbound right turn background volumes from Cel-River Road onto Cherry Road will use the new major thoroughfare (60% reduction in the number of background northbound right turn movements from Cel-River Road to Cherry Road). This volume is split between the eastbound left turn vehicle movements from Eden Terrace and the northbound through vehicle movements from Cel-River Road).

In addition to the background volume modifications described above, the shift of the existing traffic signal to the north from Cherry Road and the Home Depot Driveway/Celanese Driveway to Cherry Road and Faith Boulevard/Proposed Access "B" is expected to modify the travel patterns of the existing background vehicles to/from this new traffic signal location. The approximate percentages are as follows (approved by the City of Rock Hill personnel):

- 85% of the northbound entering left turn background volumes from Cherry Road onto the Home Depot Driveway will now continue north and turn left onto Faith Boulevard (15% will still use the existing unsignalized location).
- 20% of the southbound entering right turn background volumes from Cherry Road onto the Home Depot Driveway will now use Faith Boulevard (80% will still use the existing unsignalized location).
- 95% of the eastbound exiting left turn background volumes onto Cherry Road from the Home Depot Driveway will now use Faith Boulevard (5% will still use the existing unsignalized location).
- 5% of the eastbound exiting right turn background volumes onto Cherry Road from the Home Depot Driveway will now use Faith Boulevard (95% will still use the existing unsignalized location).

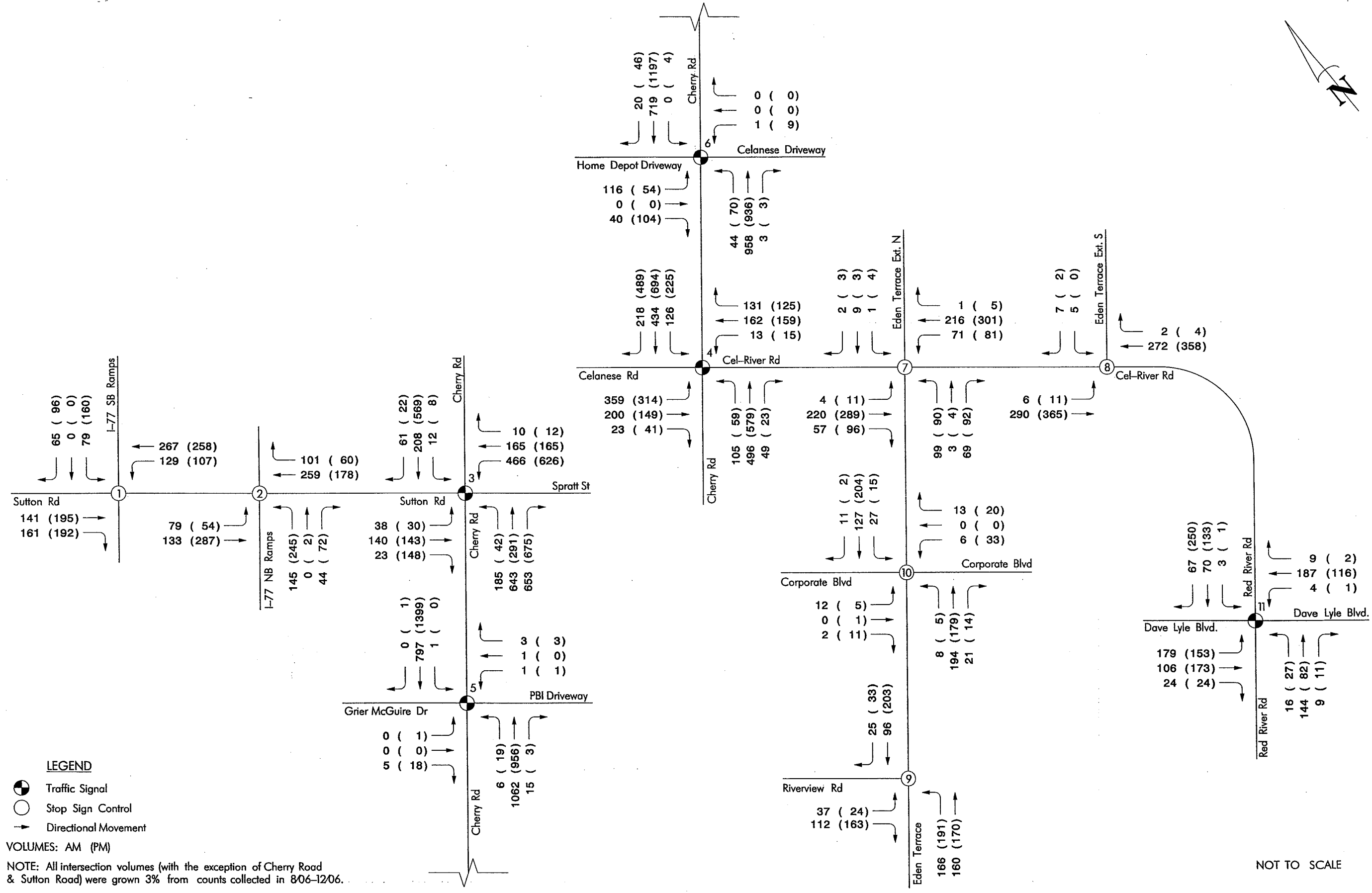


Figure 3

2007 Existing Traffic Volumes

Revised River Falls TIA

## PROJECTED TRAFFIC

The projected background traffic volumes used in the analyses were developed from the existing peak-hour turning-movement count data. The existing intersection turning-movement volumes were increased using a 3 percent growth rate for the area to obtain 2014 and 2020 background volumes (which was approved by SCDOT). The projected traffic volumes used in the buildout years 2014 and 2020 analysis are a compilation of two values: background traffic and site trip generation.

In 2014, it is expected that 25% of the retail portion, 20% of the office portion, and the complete 600-student elementary school will be constructed, and both of the remaining land uses (industrial and residential) will be 50% constructed. The trip generation results indicate that the 2014 partial buildout of the development will generate 19,563 new daily trips, 1,532 new morning-peak-hour trips and 1,992 new afternoon-peak-hour trips (after passby and internal capture reductions). Also, the trip generation results indicate that the 2020 full buildout of the development will generate 46,965 new daily trips, 3,482 new morning-peak-hour trips and 4,941 new afternoon-peak-hour trips (after passby and internal capture reductions).

The daily and peak-hour-trip-generation data for the site developments are presented in Tables 1a and 1b. Trip generation for all the site land uses are estimated from the rates and equations provided in the Institute of Transportation Engineers, Trip Generation Manual, 7<sup>th</sup> Edition, 2003.

Table 1a: 2014 Partial Buildout Trip Generation

Land Use	Daily	AM Peak Hour			PM Peak Hour		
		Enter	Exit	Total	Enter	Exit	Total
Industrial Park * 1,800,000SF	9,302	501	98	599	222	834	1,055
Office 80,000SF	776	100	14	114	18	87	105
Elementary School** 600Stu.	774	118	97	215	0	0	0
Retail 100,000SF	4,181	55	35	90	188	203	391
Apartments 150DUs	977	15	61	76	60	32	92
Townhomes 400DUs	1,880	23	113	136	111	55	166
Single Family 425DUs	3,724	76	227	302	232	136	368
<b>Subtotal</b>	<b>21,614</b>	<b>888</b>	<b>645</b>	<b>1,532</b>	<b>831</b>	<b>1,347</b>	<b>2,178</b>
<b>Internal Capture</b>							
<i>office/ind.</i>	-246	0	0	0	-6	-12	-18
<i>residential</i>	-517	0	0	0	-32	-17	-49
<i>retail</i>	-565	0	0	0	-21	-30	-51
<b>Total Internal Capture</b>	<b>-1,328</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>-59</b>	<b>-59</b>	<b>-118</b>
<i>Pass-By Reduction (retail) 20%</i>	-723	0	0	0	-34	-34	-68
<b>Total New Trips</b>	<b>19,563</b>	<b>888</b>	<b>645</b>	<b>1,532</b>	<b>738</b>	<b>1,254</b>	<b>1,992</b>

Trip Generation, 7th Edition, Institute of Transportation Engineers, Washington, DC. 2003.

\* AM and PM Trip Generation Reduced to 75% Based on (3) 8-Hour Shifts vs. Typical Morning to Afternoon Shift

\*\* ITE Does Not Calculate PM Peak Elem. School Trips (Dismissal Occurs Prior to Typical Peak Hour)

Table 1b: 2020 Full Buildout Trip Generation (Includes 2014 Partial Buildout)

Land Use	Daily	AM Peak Hour			PM Peak Hour		
		Enter	Exit	Total	Enter	Exit	Total
Industrial Park * 3,600,000SF	18,604	1,001	196	1,197	443	1,667	2,110
Office 400,000SF	3,879	500	68	568	90	437	527
Elementary School** 600Stu.	774	118	97	215	0	0	0
Retail 400,000SF	16,722	219	140	359	750	813	1,563
Apartments 300DUs	2,016	30	123	153	120	66	186
Townhomes 800DUs	4,688	56	296	352	280	136	416
Single Family 850DUs	8,135	162	476	638	544	315	859
<b>Subtotal</b>	<b>54,818</b>	<b>2,086</b>	<b>1,396</b>	<b>3,482</b>	<b>2,227</b>	<b>3,434</b>	<b>5,661</b>
<i>Internal Capture</i>							
<i>office/ind.</i>	-808	0	0	0	-24	-34	-58
<i>residential</i>	-1,895	0	0	0	-117	-68	-185
<i>retail</i>	-2,257	0	0	0	-83	-122	-205
<b>Total Internal Capture</b>	<b>-4,960</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>-224</b>	<b>-224</b>	<b>-448</b>
<i>Pass-By Reduction (retail) 20%</i>	-2,893	0	0	0	-136	-136	-272
<b>Total New Trips</b>	<b>46,965</b>	<b>2,086</b>	<b>1,396</b>	<b>3,482</b>	<b>1,867</b>	<b>3,074</b>	<b>4,941</b>

Trip Generation, 7th Edition, Institute of Transportation Engineers, Washington, DC. 2003.

\* AM and PM Trip Generation Reduced to 75% Based on (3) 8-Hour Shifts vs. Typical Morning to Afternoon Shift

\*\* ITE Does Not Calculate PM Peak Elem. School Trips (Dismissal Occurs Prior to Typical Peak Hour)

The directional trip distribution is provided in Figure 4. The trip assignments for the morning and afternoon peak hour traffic volumes under the 2014 No Build scenario are presented in Figure 5. The assignments for the morning and afternoon peak hour traffic volumes under the 2014 Partial Buildout scenario are presented in Figures 6 and 7. The trip assignments for the morning and afternoon peak hour traffic volumes under the 2020 No Build scenario are presented in Figure 8. The assignments for the morning and afternoon peak hour traffic volumes under the 2020 Full Buildout scenario are presented in Figures 9 and 10. The background traffic is indicated to the far left of the movement arrows followed by the site traffic in parentheses. The two volumes are added to obtain the projected total traffic for that movement.

$$\text{Background} + (\text{Site}) = \text{Total}$$



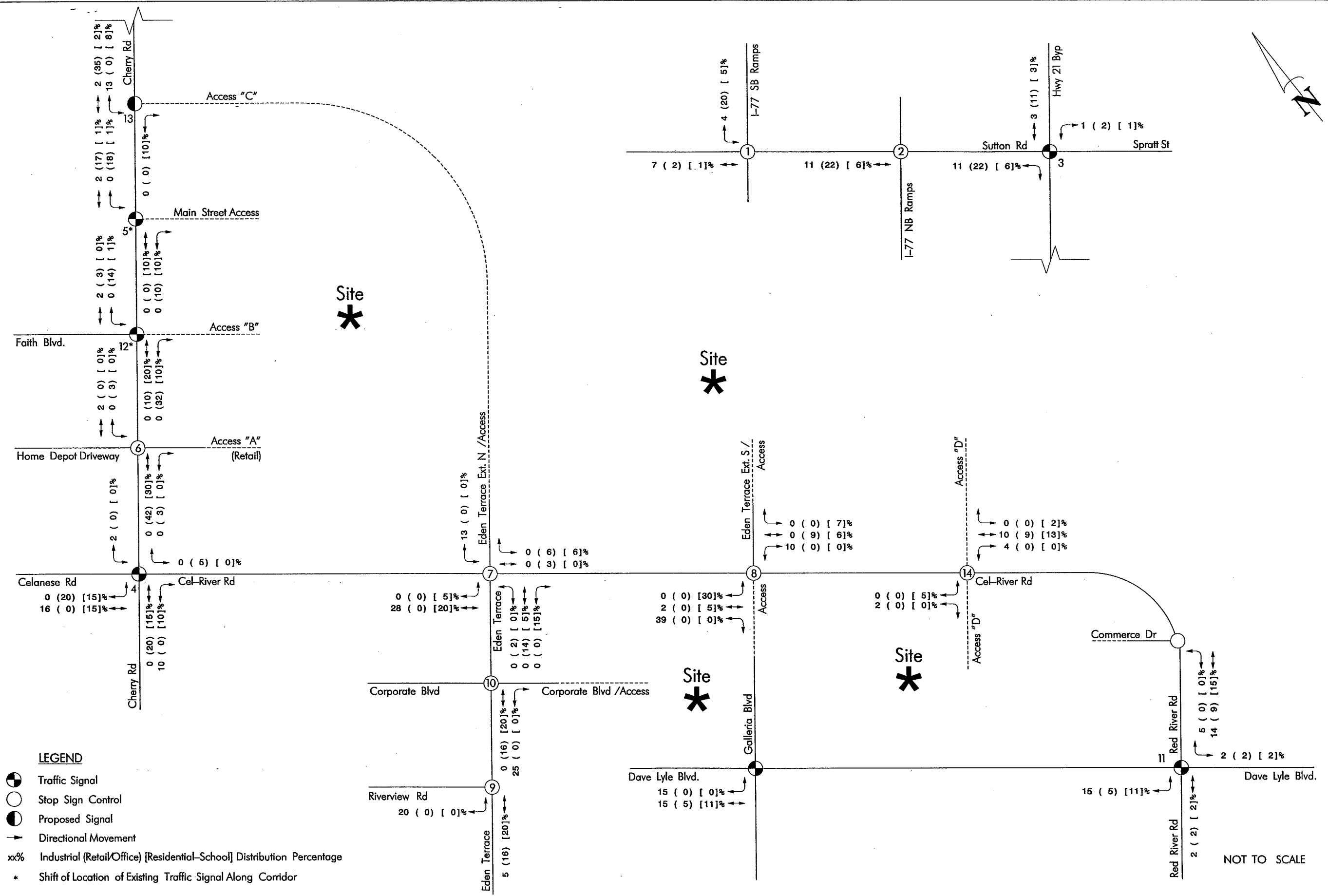


Figure 4

Directional Distribution

Revised River Falls TIA

**LEGEND**  
 ● Traffic Signal  
 ○ Stop Sign Control  
 → Directional Movement  
 VOLUMES: AM (PM)

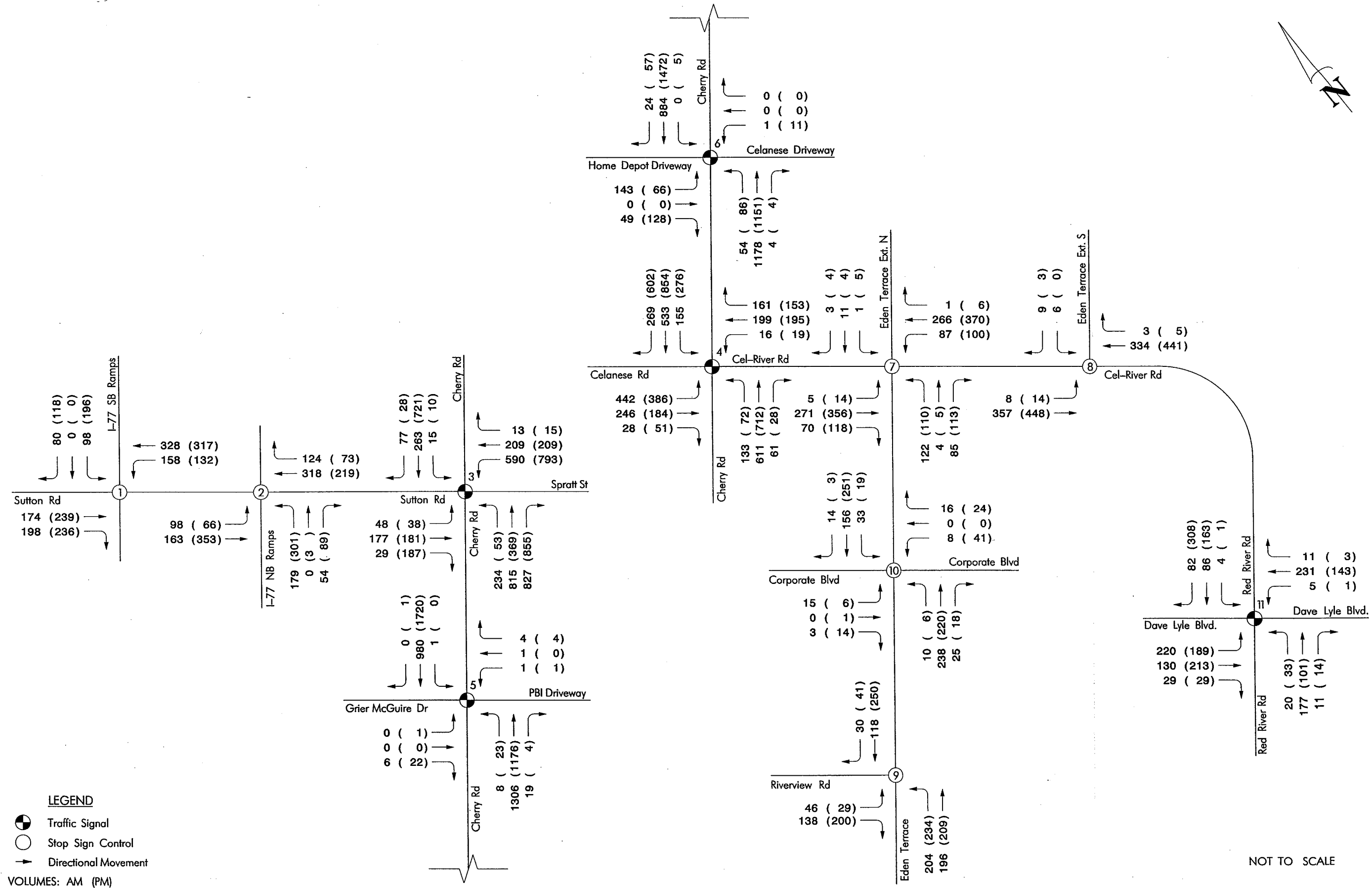
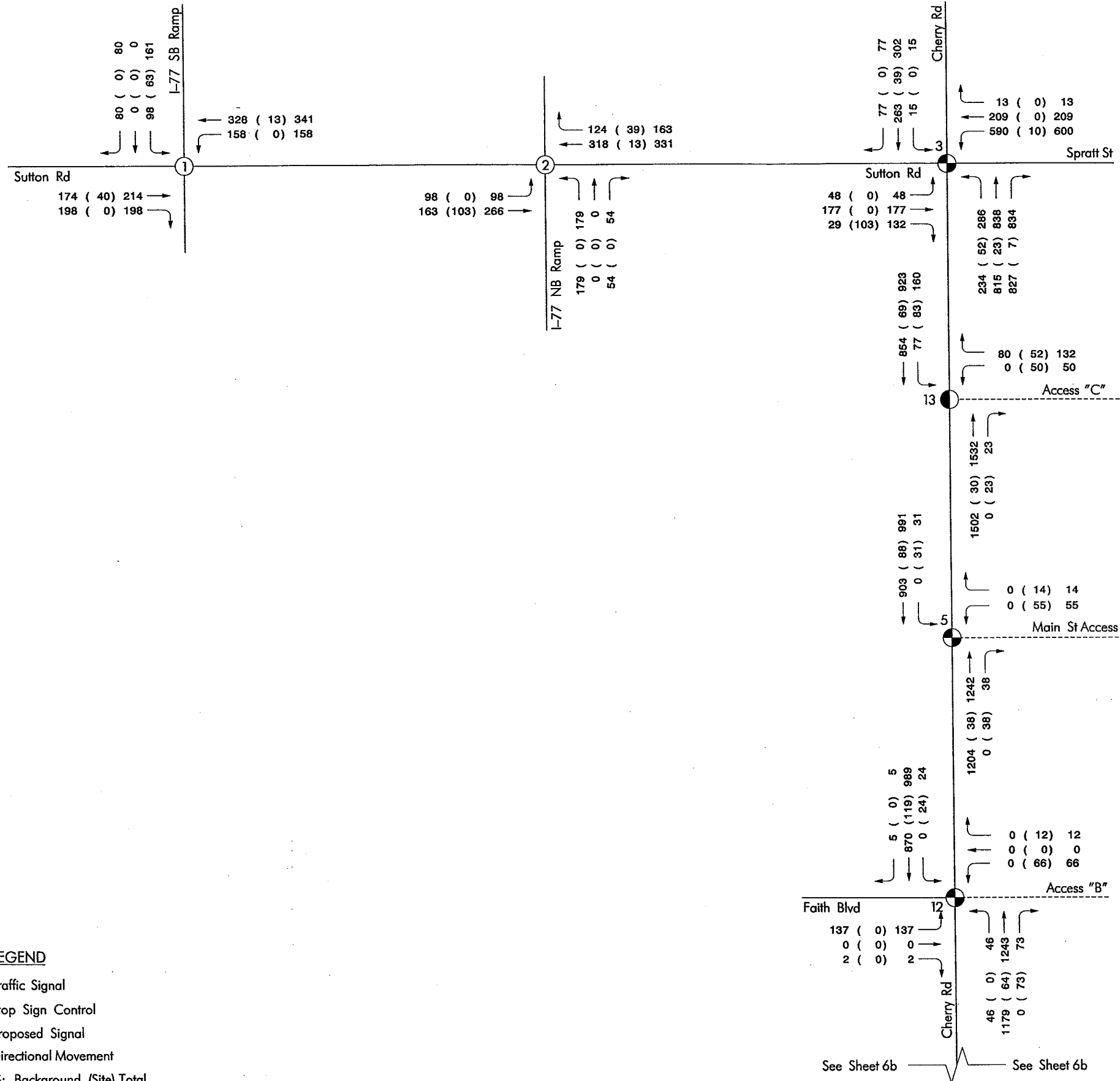
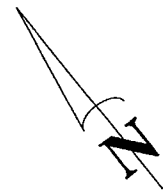


Figure 5

2014 No Build  
Traffic Volumes

Revised River  
Falls TIA



**Site**  
  
 Trips  
 Enter 387  
 Exit 547

See Sheet 6b

NOT TO SCALE

Figure 6a

2014 AM Peak  
 Partial Buildout

Revised River  
 Falls TIA

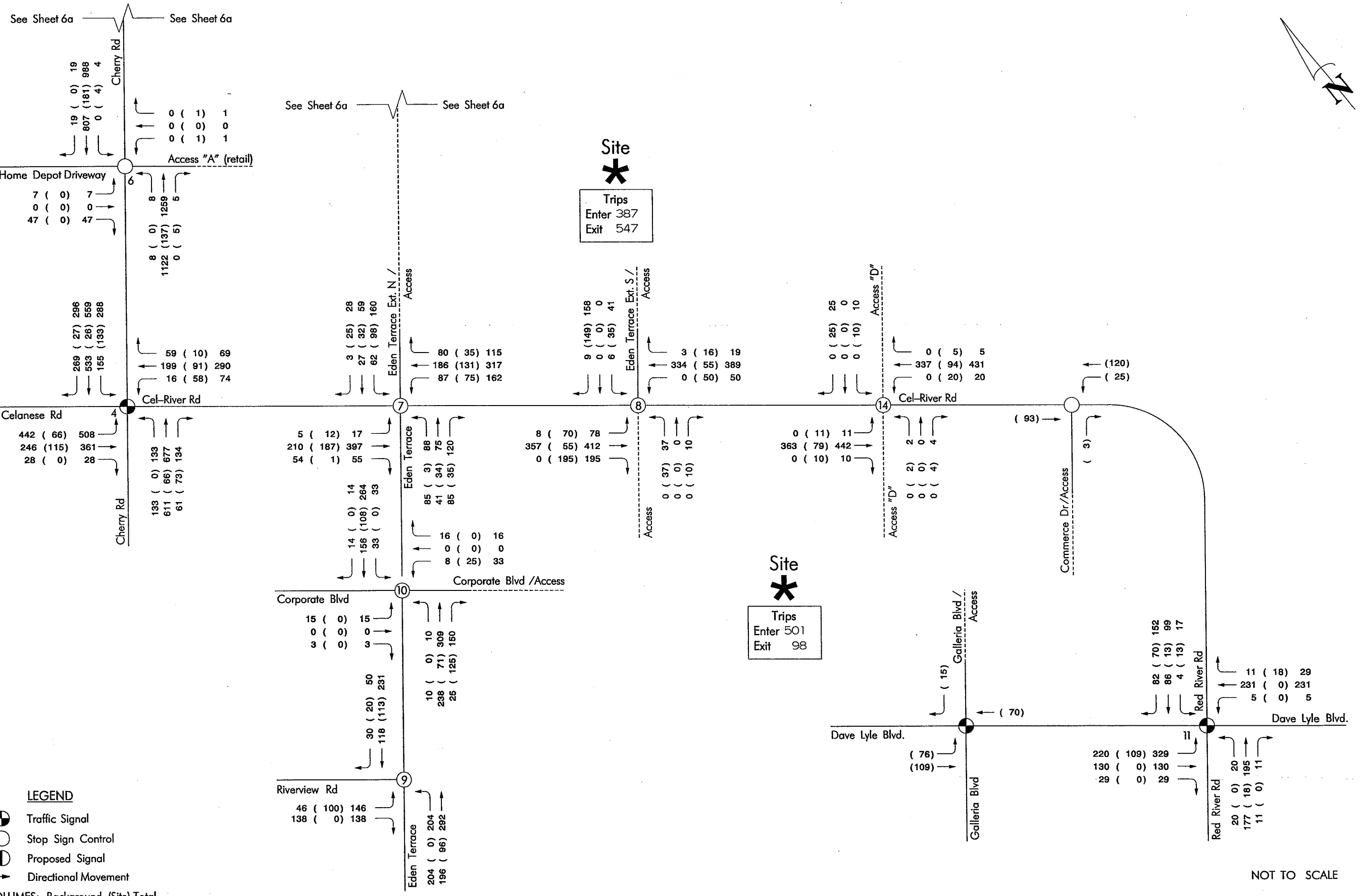


Figure 6b

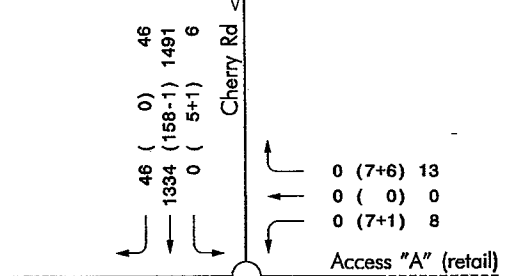
2014 AM Peak  
 Partial Buildout

Revised River  
 Falls TIA



See Sheet 7a

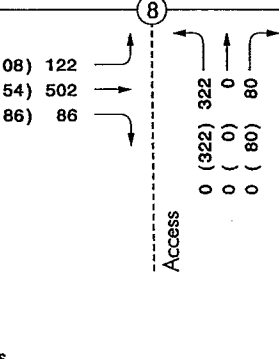
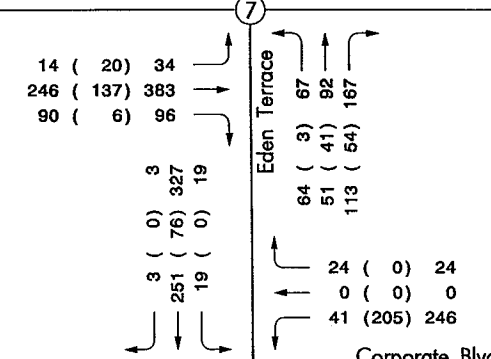
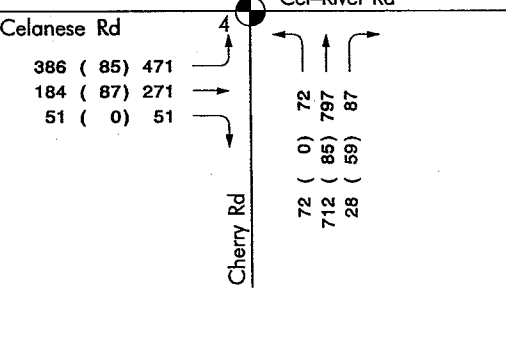
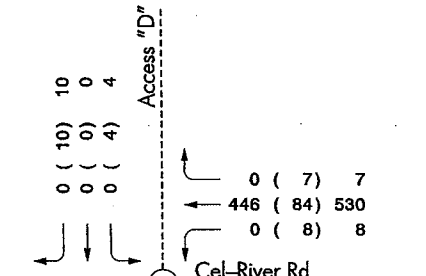
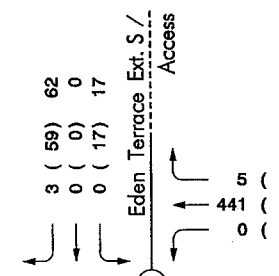
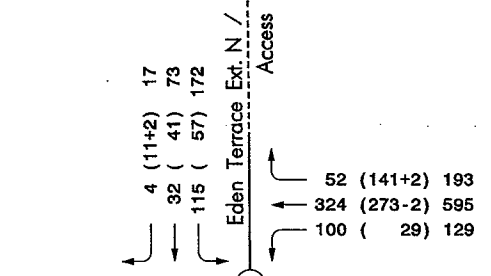
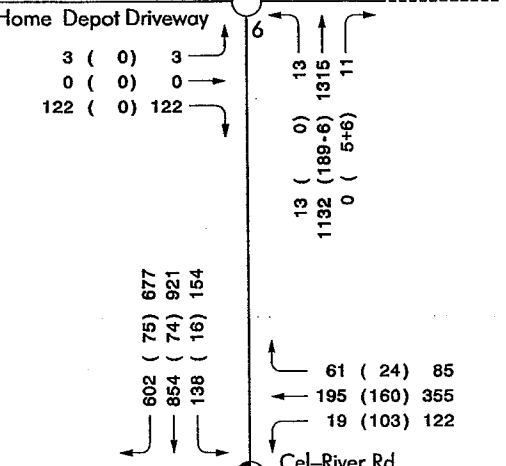
See Sheet 7a



**Site**

Trips New Pass-by

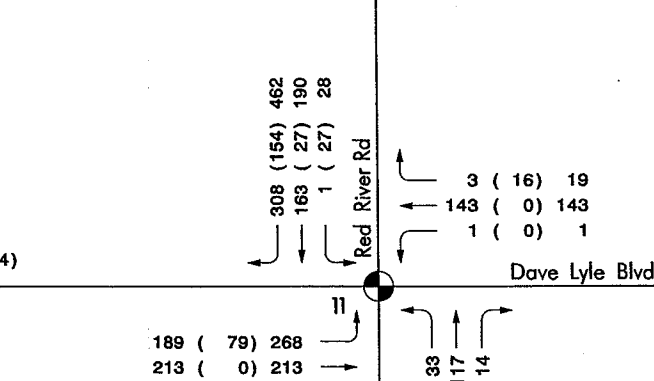
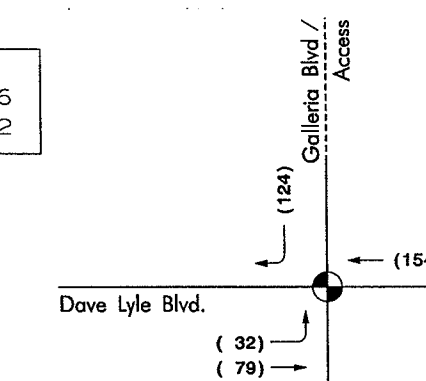
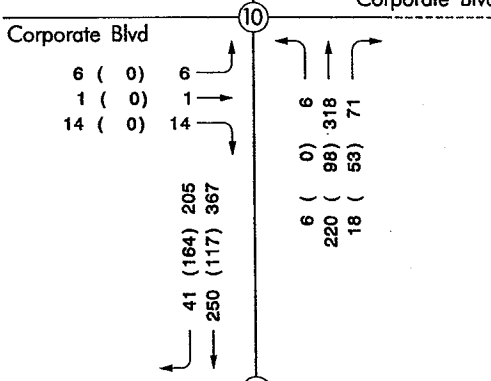
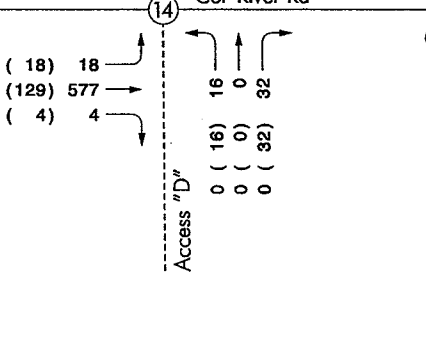
Enter	522	34
Exit	432	34



**Site**

Trips

Enter	216
Exit	822



**LEGEND**

- Traffic Signal
- Stop Sign Control
- Proposed Signal
- Directional Movement

VOLUMES: Background (Site) Total

NOT TO SCALE

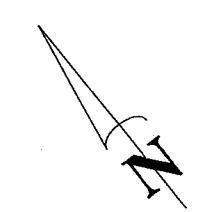
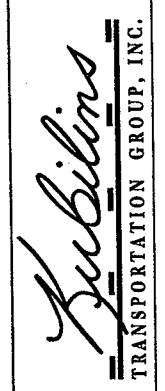





Figure 7b

2014 PM Peak  
Partial Buildout

Revised River  
Falls TIA



**LEGEND**

-  Traffic Signal
-  Stop Sign Control
-  Directional Movement

VOLUMES: AM (PM)

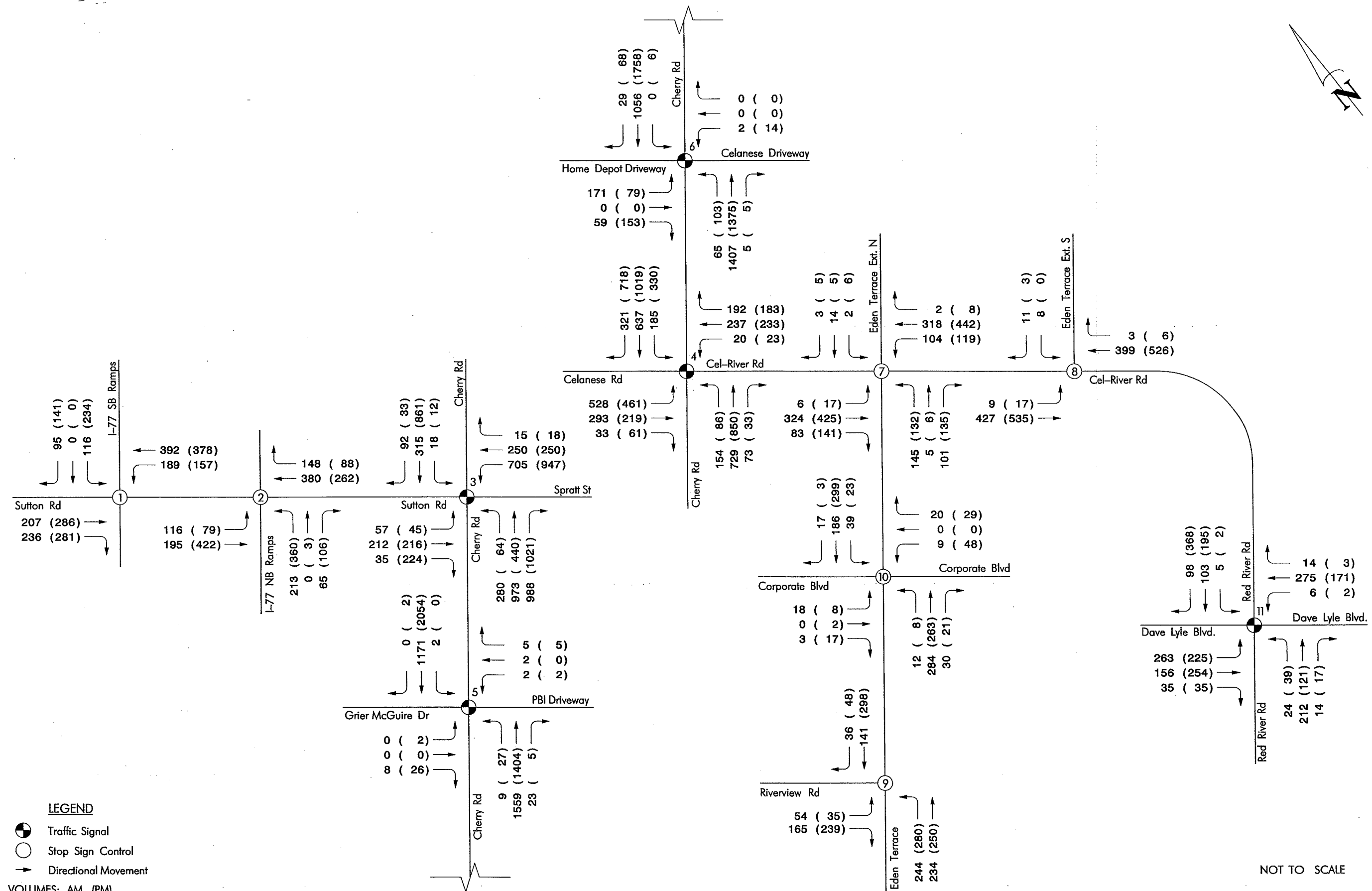
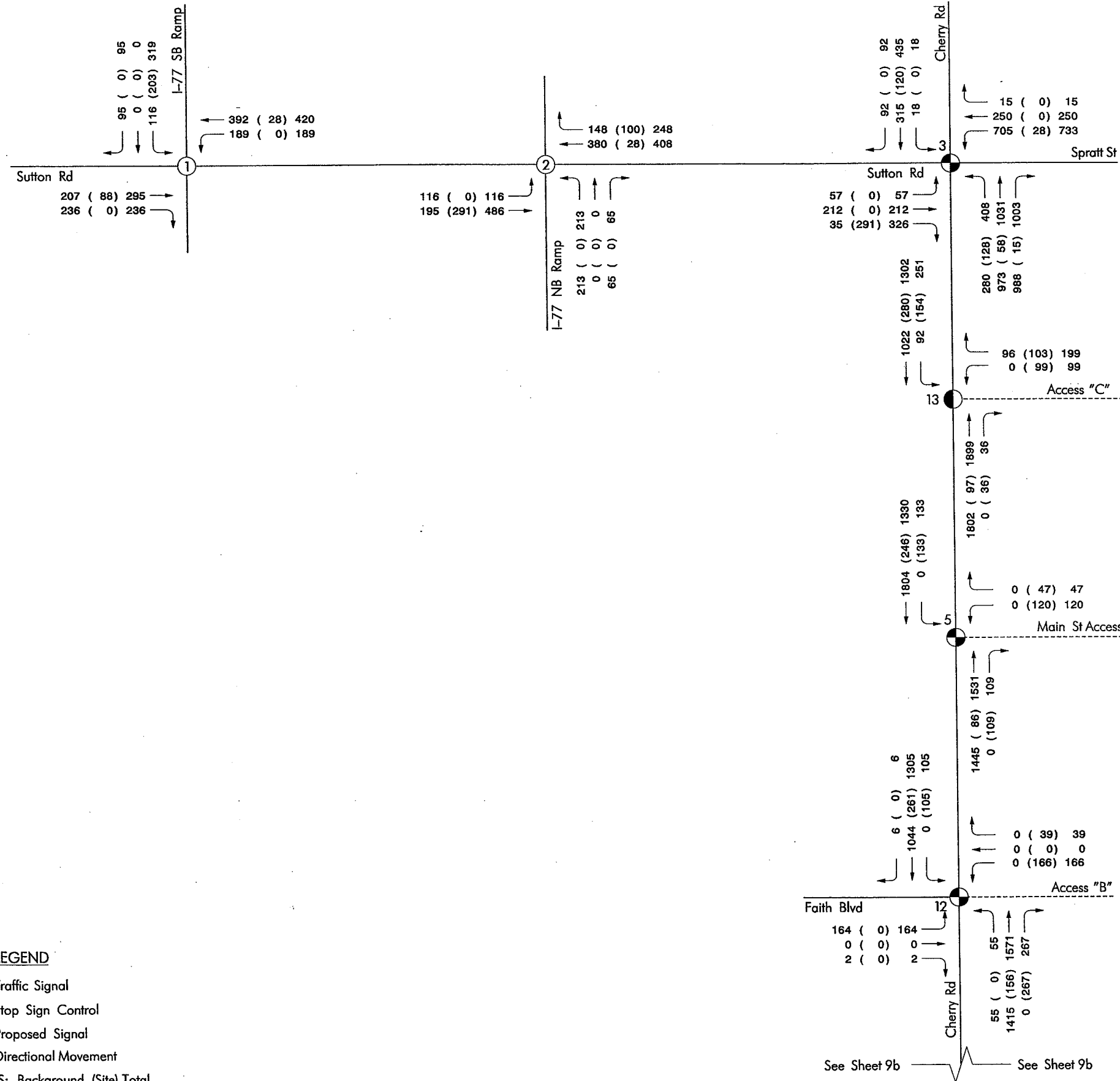
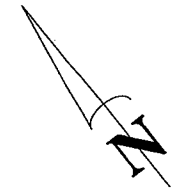


Figure 8

2020 No Build Traffic Volumes

Revised River Falls TIA



See Sheet 9b

See Sheet 9b

NOT TO SCALE

Figure 9a

2020 AM Peak Full Buildout

Revised River Falls TIA

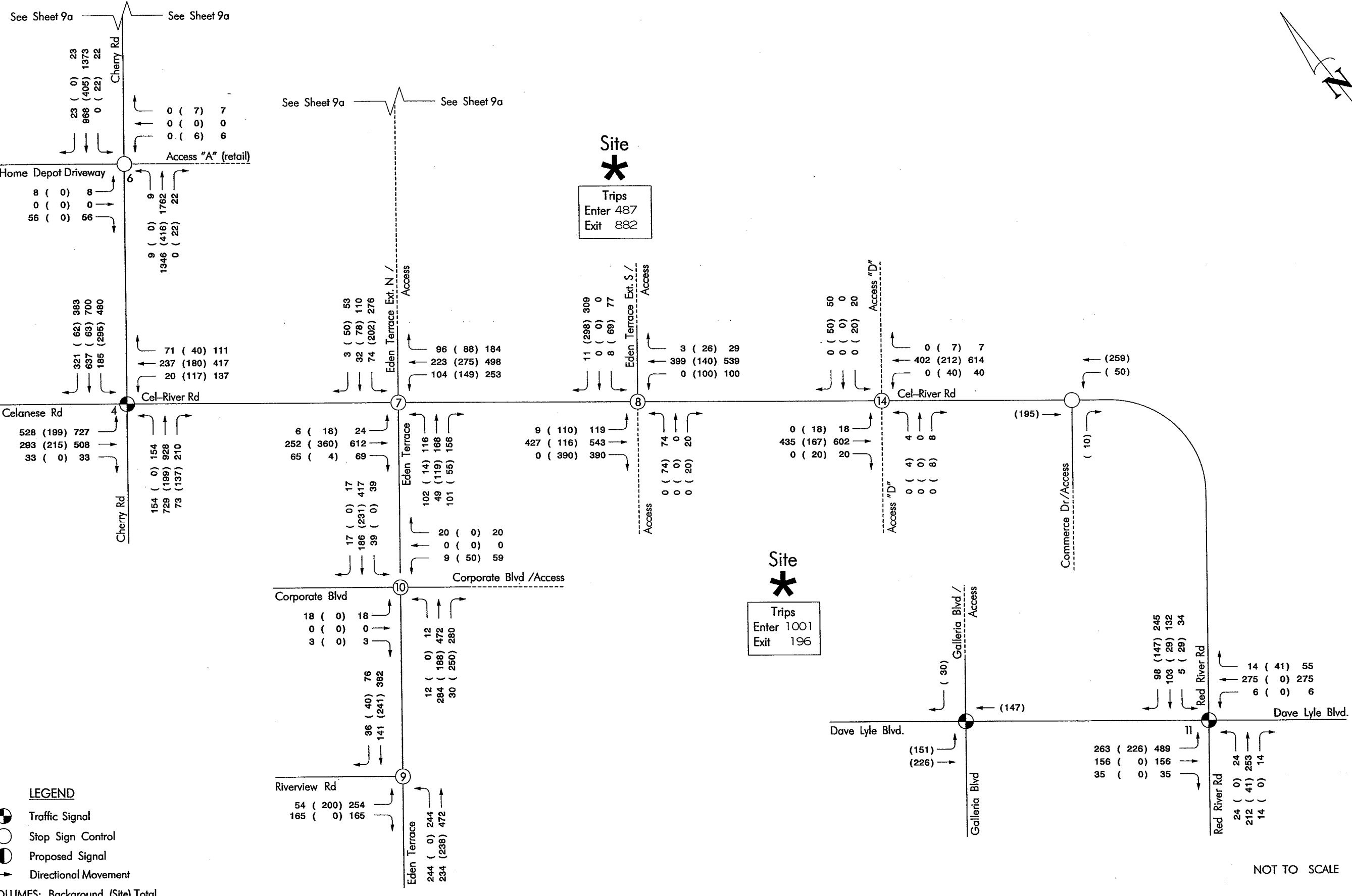
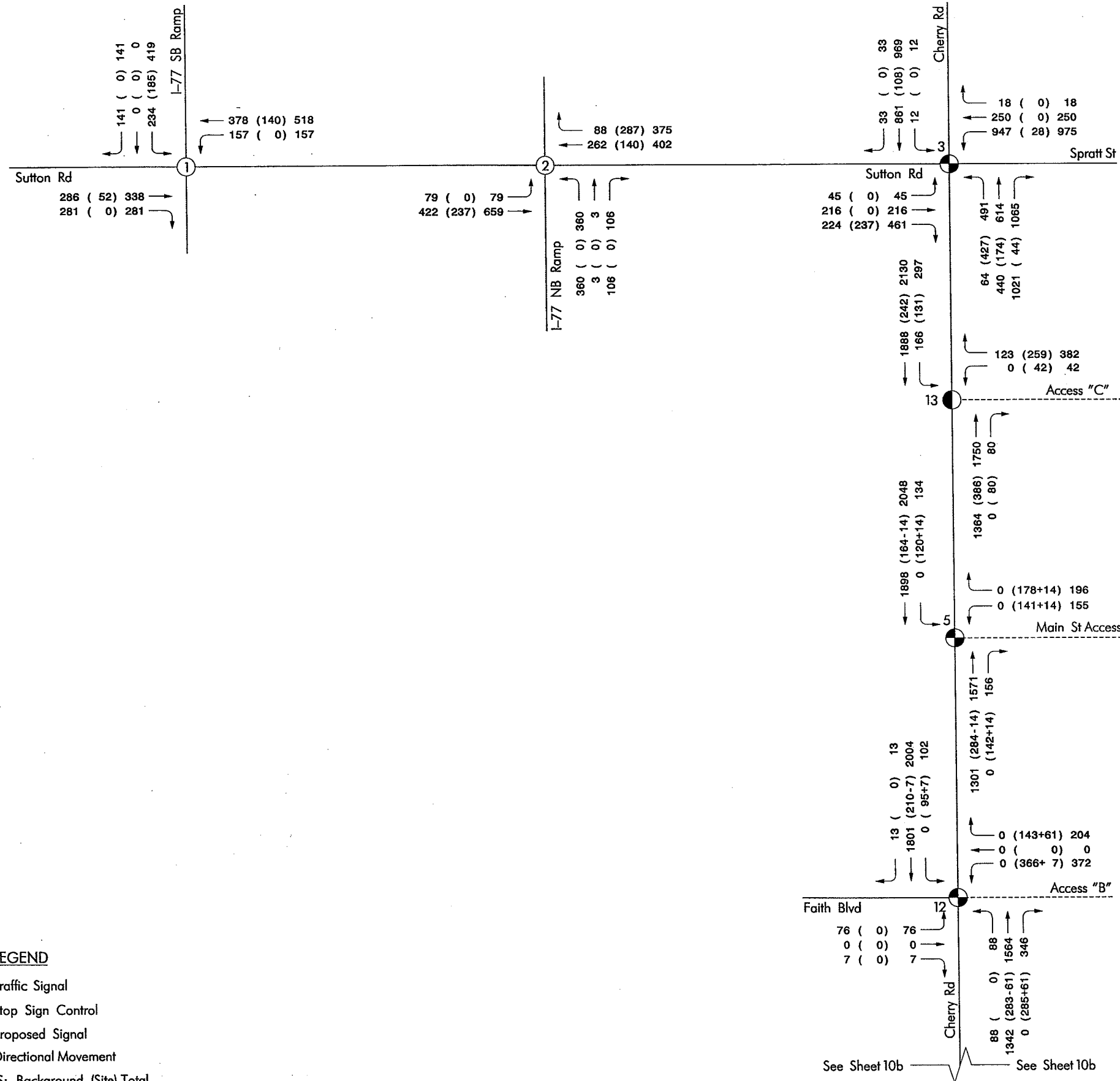
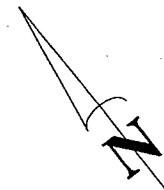


Figure 9b

2020 AM Peak Full Buildout

Revised River Falls TIA



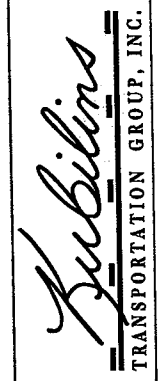
Trips	New	Pass-by
Enter	1448	136
Exit	1441	136

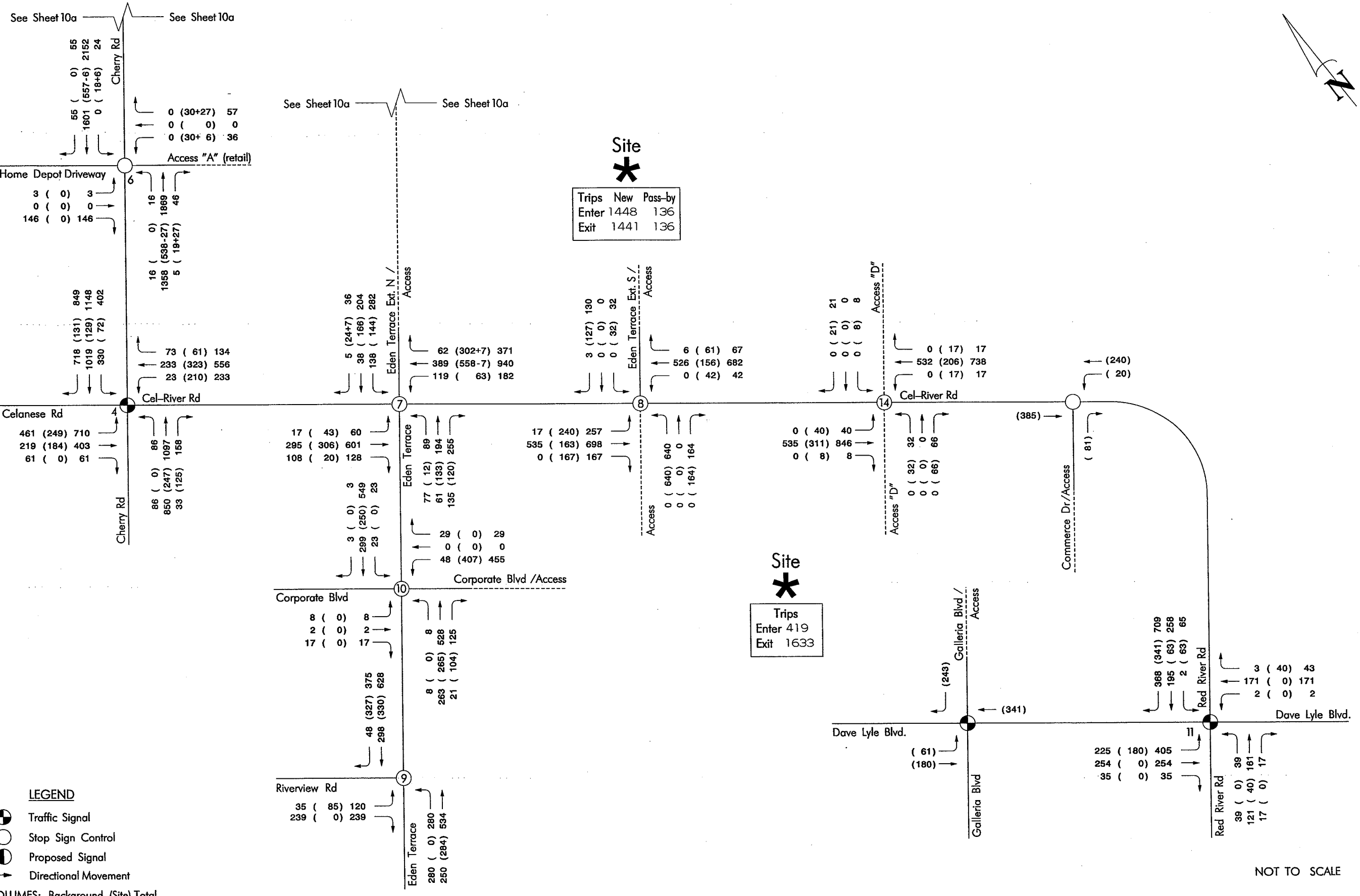
NOT TO SCALE

Figure 10a

2020 PM Peak Full Buildout

Revised River Falls TIA





NOT TO SCALE

Figure 10b

2020 PM Peak Full Buildout

Revised River Falls TIA

## TRAFFIC ANALYSIS

The intersections identified within the area of influence were analyzed to identify the traffic impact that the site development has under the existing and proposed buildout scenarios. Recommendations for roadway improvements to accommodate the traffic are a result of the analysis. The traffic analysis is based on the LOS analysis at the identified intersections. The intersections were analyzed assuming full development of the project in 2020.

The laneage required for each of the intersections within the study area to operate at acceptable levels of service in 2020 with site traffic added to the background volumes were determined by the analysis. In this way, it can be determined what improvements are necessitated by the development of the site.

LOS is a qualitative measurement of traffic operations. It is a measure of delay time. The Transportation Research Board's Highway Capacity Manual<sup>1</sup> (HCM) defines six levels of service for intersections with LOS "A" representing the best operating condition and LOS "F" the worst. Table 16-2 of the HCM gives the criteria for signalized intersections and Table 17-2 gives the criteria for stop sign controlled intersections.

HCM Table 16-2		HCM Table 17-2	
Signalized Level of Service	Signal Delay per Vehicle (sec/veh)	Unsignalized Level of Service	Stopped Delay per Vehicle (sec/veh)
A	≤ 10.0	A	≤ 10.0
B	> 10.0 and ≤ 20.0	B	> 10.0 and ≤ 15.0
C	> 20.0 and ≤ 35.0	C	> 15.0 and ≤ 25.0
D	> 35.0 and ≤ 55.0	D	> 25.0 and ≤ 35.0
E	> 55.0 and ≤ 80.0	E	> 35.0 and ≤ 50.0
F	> 80.0	F	> 50.0

SYNCHRO 7 was the software tool used in determining the delay, capacity and corresponding level of service at the signalized and unsignalized intersections. This software is based on the analysis procedures defined in the Highway Capacity Manual. The analysis optimizes the intersection splits for the approach volumes. The intersection worksheet reports are provided in the Appendix.

Currently, 10 of the 11 the existing intersections operate under capacity at an acceptable level of service (LOS) of "D" or better during both the morning and afternoon peak hours using the current laneage configuration. The signalized intersection of Cherry Road and Sutton Road/Spratt Street operates at a LOS "E" in the afternoon peak hour. Typically, an intersection is said to be operating at capacity at a volume-to-capacity (v/c) ratio at 1.00.

The delay, capacity and LOS results are indicated for each of the intersections under each of the scenarios in the following Tables 2a through 2c.

<sup>1</sup> National Research Council. Transportation Research Board. Highway Capacity Manual, Washington, DC. 2002. Chapters 2, 16, and 17.

Table 2a: 2007 Existing Conditions and 2014/2020 No Build Levels of Service

Intersection	AM Peak			PM Peak		
	Delay (sec/veh)	Capacity (v/c)	Level Of Service	Delay (sec/veh)	Capacity (v/c)	Level Of Service
<b>2007 Existing Conditions</b>						
1. Sutton Rd. & I-77 SB Exit Ramp <sup>1</sup>	16.4	160/560	C	23.4	284/496	C
2. Sutton Rd. & I-77 NB Exit Ramp <sup>1</sup>	18.2	210/501	C	30.4	354/487	D
3. Cherry Rd. & Sutton Rd./Spratt St.	37.7	0.85	D	66.0	1.01	E
4. Cherry Rd. & Celanese Rd./Cel-River Rd.	37.9	0.55	D	39.7	0.60	D
5. Cherry Rd. & Grier McGuire Dr./PBI Driveway	1.3	0.40	A	2.3	0.47	A
6. Cherry Rd. & Home Depot Driveway/Celanese Driveway	5.6	0.45	A	5.0	0.38	A
7. Cel-River Road & Eden Terrace/Eden Terrace Ext. N <sup>1</sup>	19.8	190/431	C	30.4	207/342	D
8. Cel-River Rd. & Eden Terrace Ext. S <sup>1</sup>	11.4	13/574	B	10.6	2/650	B
9. Eden Terrace & Riverview Rd. <sup>1</sup>	12.0	166/676	B	13.1	151/595	B
10. Eden Terrace & Corporate Blvd. <sup>1</sup>	12.1	16/521	B	12.1	59/565	B
11. Dave Lyle Blvd. & Red River Rd.	10.0	0.31	A	10.4	0.27	B
<b>2014 No Build Conditions</b>						
1. Sutton Rd. & I-77 SB Exit Ramp <sup>1</sup>	23.6	198/419	C	59.1	349/373	F
2. Sutton Rd. & I-77 NB Exit Ramp <sup>1</sup>	30.4	259/396	D	103.5	437/386	F
3. Cherry Rd. & Sutton Rd./Spratt St.	73.2	1.09	E	130.4	1.31	F
3a. Cherry Rd. & Sutton Rd./Spratt St. <sup>2</sup>	44.0	0.99	D	35.6	0.92	D
4. Cherry Rd. & Celanese Rd./Cel-River Rd.	42.8	0.69	D	45.2	0.75	D
5. Cherry Rd. & Grier McGuire Dr./PBI Driveway	1.5	0.49	A	2.9	0.58	A
6. Cherry Rd. & Home Depot Driveway/Celanese Driveway	6.3	0.55	A	6.4	0.59	A
7. Cel-River Road & Eden Terrace/Eden Terrace Ext. N <sup>1</sup>	36.1	234/340	E	102.8	253/251	F
8. Cel-River Rd. & Eden Terrace Ext. S <sup>1</sup>	12.5	17/498	B	11.3	3/576	B
9. Eden Terrace & Riverview Rd. <sup>1</sup>	14.3	204/589	B	17.1	254/549	C
10. Eden Terrace & Corporate Blvd. <sup>1</sup>	13.4	20/448	B	13.8	72/482	B
11. Dave Lyle Blvd. & Red River Rd.	12.4	0.39	B	10.8	0.33	B
<b>2020 No Build Conditions (with 2014 No Build Improvements)</b>						
1. Sutton Rd. & I-77 SB Exit Ramp <sup>1</sup>	45.0	234/310	E	*	417/263	F
1a. Sutton Rd. & I-77 SB Exit Ramp <sup>3</sup>	8.2	0.40	A	11.3	0.49	B
2. Sutton Rd. & I-77 NB Exit Ramp <sup>1</sup>	79.6	309/311	F	*	*	F
2a. Sutton Rd. & I-77 NB Exit Ramp <sup>3</sup>	11.0	0.47	B	15.1	0.62	B
3a. Cherry Rd. & Sutton Rd./Spratt St. <sup>2</sup>	71.6	1.10	E	82.0	1.21	F
3b. Cherry Rd. & Sutton Rd./Spratt St. <sup>2,4</sup>	45.8	0.95	D	38.2	0.80	D
4. Cherry Rd. & Celanese Rd./Cel-River Rd.	50.7	0.86	D	53.8	0.91	D
5. Cherry Rd. & Grier McGuire Dr./PBI Driveway	2.3	0.59	A	4.0	0.69	A
6. Cherry Rd. & Home Depot Driveway/Celanese Driveway	7.7	0.66	A	9.9	0.88	A
7. Cel-River Road & Eden Terrace/Eden Terrace Ext. N <sup>1</sup>	116.4	279/261	F	*	303/177	F
7a. Cel-River Road & Eden Terrace/Eden Terrace Ext. N <sup>1,5</sup>	75.2	167/201	F	*	153/121	F
8. Cel-River Rd. & Eden Terrace Ext. S <sup>1</sup>	14.1	21/418	B	12.1	3/510	B
9. Eden Terrace & Riverview Rd. <sup>1</sup>	18.5	243/506	C	27.3	304/456	D
10. Eden Terrace & Corporate Blvd. <sup>1</sup>	15.4	23/370	C	16.1	86/409	C
11. Dave Lyle Blvd. & Red River Rd.	14.0	0.48	B	11.4	0.40	B

<sup>1</sup> Flow Rate/Capacity and LOS correspond to the most critical movement of the unsignalized intersection.

\* The results are not meaningful.

<sup>2</sup> Improvements include a 2<sup>nd</sup> WB left turn lane on Spratt and an EB right turn lane on Sutton (with an add'l. SB collection lane on Cherry)

<sup>3</sup> Improvements include a traffic signal

<sup>4</sup> Improvements include a 2<sup>nd</sup> NB and SB thru lane on Cherry

<sup>5</sup> Improvements include a SB right lane on Cel-River and an EB right lane on Eden Terrace

Based on the analysis results above, we recommend the following additional specific improvements, which are derived from the background volumes (see Figure 12):

(1) I-77 SB Exit Ramp & Sutton Road (S 46-49)

- Install a traffic signal upon meeting applicable warrants and with SCDOT approval (2020 No Build improvement).

(2) I-77 NB Exit Ramp & Sutton Road (S 46-49)

- Install a traffic signal upon meeting applicable warrants and with SCDOT approval (2014 No Build improvement).

(3) Cherry Rd. (US 21) & Sutton Road (S 46-49)/Spratt Street

- Construct a 2<sup>nd</sup> westbound left turn lane on Spratt Street with a minimum of 400 feet of storage with a 100 foot bay taper and 350 foot through lane taper (2014 No Build improvement). This will also require a southbound through lane on Cherry Road south of Sutton Road/Spratt Street a minimum of 500 feet with a 450 foot terminating taper in order to receive this additional left turn lane traffic.
- Construct an eastbound right turn lane on Sutton Road with a minimum of 400 feet of storage and a 100 foot bay taper (2014 No Build improvement).
- Construct an additional northbound (2020 No Build improvement) and southbound (2014 No Build improvement) through lane on Cherry Road that begins and terminates a minimum of 500 feet north and south of Sutton Road/Spratt Street with 450 feet of beginning and terminating tapers each.

(7) Cel-River Road (S-50) & Eden Terrace/Eden Terrace Extension N (Proposed Access)

- Construct a southbound right turn lane on Cel-River Road with a minimum of 150 feet of storage and a 100 foot bay taper (2020 No Build improvement).
- Construct an eastbound right turn lane on Eden Terrace with a minimum of 150 feet of storage and a 100 foot bay taper (2020 No Build improvement).

These improvements are necessary in 2014 or 2020 to produce an acceptable LOS, whether the River Falls site is developed or not.

Table 2b: 2014 Partial Buildout Levels of Service

Intersection	AM Peak			PM Peak		
	Delay (sec/veh)	Capacity (v/c)	Level Of Service	Delay (sec/veh)	Capacity (v/c)	Level Of Service
1. Sutton Rd. & I-77 SB Exit Ramp <sup>1</sup>	55.0	268/314	F	*	413/281	F
1a. Sutton Rd. & I-77 SB Exit Ramp <sup>2</sup>	10.0	0.37	A	12.0	0.60	B
2. Sutton Rd. & I-77 NB Exit Ramp <sup>1</sup>	48.2	259/323	E	*	437/285	F
2a. Sutton Rd. & I-77 NB Exit Ramp <sup>2</sup>	9.8	0.38	A	14.2	0.59	B
3. Cherry Rd. & Sutton Rd./Spratt St.	92.9	1.17	F	*	*	F
3a. Cherry Rd. & Sutton Rd./Spratt St. <sup>3</sup>	44.1	0.97	D	55.9	0.83	E
4. Cherry Rd. & Celanese Rd./Cel-River Rd.	58.2	0.92	E	49.9	0.87	D
5. Cherry Rd. & Main Street Access <sup>4</sup>	5.5	0.49	A	4.8	0.58	A
6. Cherry Rd. & Home Depot/Access "A" (retail) <sup>1</sup>	33.3	1/128	D	16.8	9/315	C
7. Cel-River Road & Eden Terrace/Eden Terrace Ext. N (Access) <sup>1</sup>	*	*	F	*	*	F
7a. Cel-River Road & Eden Terrace/Eden Terrace Ext. N (Access) <sup>5</sup>	11.4	0.54	B	14.5	0.77	B
8. Cel-River Rd. & Eden Terrace Ext. S (Access) <sup>1</sup>	103.6	52/83	F	*	*	F
8a. Cel-River Rd. & Eden Terrace Ext. S (Access) <sup>6</sup>	11.0	0.49	B	22.0	0.77	C
9. Eden Terrace & Riverview Rd. <sup>1</sup>	89.4	316/314	F	126.8	302/273	F
9a. Eden Terrace & Riverview Rd. <sup>7</sup>	69.8	162/202	F	91.1	80/113	F
10. Eden Terrace & Corporate Blvd. <sup>1</sup>	17.9	20/299	C	99.4	300/292	F
10a. Eden Terrace & Corporate Blvd. <sup>8</sup>	17.7	20/303	C	89.5	300/301	F
11. Dave Lyle Blvd. & Red River Rd.	17.4	0.53	B	12.0	0.48	B
12. Cherry Rd. & Faith Blvd./Access "B" <sup>9</sup>	12.6	0.64	B	11.9	0.70	B
13. Cherry Rd. & Access "C" <sup>10</sup>	15.6	1.05	B	78.1	1.25	E
13a. Cherry Rd. & Access "C" <sup>10,11</sup>	16.1	1.16	B	15.1	0.99	B
14. Cel-River Rd. & Proposed Access "D" <sup>1</sup>	16.0	7/335	C	23.0	53/253	C

<sup>1</sup> Flow Rate/Capacity and LOS correspond to the most critical movement of the unsignalized intersection.

\* The results are not meaningful.

<sup>2</sup> Improvements include a traffic signal and signal coordination with other I-77 ramp

<sup>3</sup> Improvements include a 2nd WB left turn lane on Spratt, an EB right turn lane on Sutton with pm/overlap phasing, a 2<sup>nd</sup> SB through lane on Cherry, pm/pt left phasing on NB Cherry, and signal coordination

<sup>4</sup> Intersection includes a traffic signal, separate left and right lanes on Main Street, and a SB left turn lane on Cherry

<sup>5</sup> Improvements include a traffic signal, a left turn lane on all 4 legs of the intersection, a SB right lane on Cel-River, an EB right lane on Eden Terrace, and signal coordination with Eden Terrace S.

<sup>6</sup> Improvements include a traffic signal, a left turn lane on all 4 legs of the intersection, and signal coordination with Eden Terrace

<sup>7</sup> Improvements include a SB right turn lane on Riverview

<sup>8</sup> Improvements include a NB right turn lane on Corporate

<sup>9</sup> Intersection includes a traffic signal (from Home Depot Driveway), a left and combined thru-right lane on Access "B", and a SB left turn lane on Cherry

<sup>10</sup> Intersection includes a traffic signal (from Grier McGuire), separate left and right lanes on Access "C", a SB left turn lane on Cherry, and signal coordination

<sup>11</sup> Improvements include an additional SB thru lane on Cherry

Table 2c: 2020 Full Buildout Levels of Service (with 2014 Partial Build Improvements)

Intersection	AM Peak			PM Peak		
	Delay (sec/veh)	Capacity (v/c)	Level Of Service	Delay (sec/veh)	Capacity (v/c)	Level Of Service
1a. Sutton Rd. & I-77 SB Exit Ramp <sup>2</sup>	13.8	0.56	B	16.9	0.70	B
2a. Sutton Rd. & I-77 NB Exit Ramp <sup>2</sup>	10.8	0.53	B	15.7	0.76	B
3a. Cherry Rd. & Sutton Rd./Spratt St. <sup>3</sup>	78.3	1.12	E	116.0	1.26	F
3b. Cherry Rd. & Sutton Rd./Spratt St. <sup>3,12</sup>	46.9	0.97	D	76.0	1.04	E
4. Cherry Rd. & Celanese Rd./Cel-River Rd.	136.4	1.39	F	148.1	1.41	F
4a. Cherry Rd. & Celanese Rd./Cel-River Rd. <sup>13</sup>	61.5	0.94	E	58.2	0.94	E
5. Cherry Rd. & Main Street Access <sup>4</sup>	10.3	0.93	B	16.7	1.13	B
6. Cherry Rd. & Home Depot/Access "A" (retail) <sup>1</sup>	68.2	7/64	F	26.8	40/204	D
7a. Cel-River Road & Eden Terrace/Eden Terrace Ext. N (Access) <sup>5</sup>	27.8	1.01	C	89.5	1.28	F
7b. Cel-River Road & Eden Terrace/Eden Terrace Ext. N (Access) <sup>5,14</sup>	25.7	0.97	C	26.7	1.01	C
8a. Cel-River Rd. & Eden Terrace Ext. S (Access) <sup>6</sup>	19.4	0.88	B	144.1	*	F
8b. Cel-River Rd. & Eden Terrace Ext. S (Access) <sup>6,15</sup>	26.6	0.47	C	64.5	1.04	E
9a. Eden Terrace & Riverview Rd. <sup>7</sup>	*	*	F	*	*	F
9b. Eden Terrace & Riverview Rd. <sup>7,16</sup>	32.0	0.51	C	12.1	0.63	B
10a. Eden Terrace & Corporate Blvd. <sup>8</sup>	43.2	88/183	E	*	*	F
10b. Eden Terrace & Corporate Blvd. <sup>8,17</sup>	7.7	0.60	A	32.5	0.88	C
11. Dave Lyle Blvd. & Red River Rd.	65.0	0.82	E	20.7	0.79	C
12. Cherry Rd. & Faith Blvd./Access "B" <sup>9</sup>	28.8	1.16	C	54.4	*	D
12a. Cherry Rd. & Faith Blvd./Access "B" <sup>9,18</sup>	29.6	0.93	C	48.3	0.99	D
13a. Cherry Rd. & Access "C" <sup>10,11</sup>	69.5	*	F	110.0	*	F
13b. Cherry Rd. & Access "C" <sup>10,11,19</sup>	21.6	0.90	C	21.3	0.90	C
14. Cel-River Rd. & Proposed Access "D" <sup>1</sup>	35.5	78/194	E	*	*	F
14a. Cel-River Rd. & Proposed Access "D" <sup>1,20</sup>	66.2	22/80	F	*	36/26	F

<sup>1</sup> Flow Rate/Capacity and LOS correspond to the most critical movement of the unsignalized intersection.

\* The results are not meaningful.

<sup>2</sup> Improvements include a traffic signal and signal coordination with other I-77 ramp

<sup>3</sup> Improvements include a 2nd WB left turn lane on Spratt, an EB right turn lane on Sutton with pm/overlap phasing, a 2<sup>nd</sup> NB and SB through lane on Cherry, pm/pt left phasing on NB Cherry, and signal coordination/cycle length optimization

<sup>4</sup> Intersection includes a traffic signal, separate left and right lanes on Main Street, and a SB left turn lane on Cherry

<sup>5</sup> Improvements include a traffic signal, a left turn lane on all 4 legs of the intersection, a SB right lane on Cel-River, an EB right lane on Eden Terrace, and signal coordination with Eden Terrace S.

<sup>6</sup> Improvements include a traffic signal, a left turn lane on all 4 legs of the intersection, and signal coordination with Eden Terrace

<sup>7</sup> Improvements include a SB right turn lane on Riverview

<sup>8</sup> Improvements include a NB right turn lane on Corporate

<sup>9</sup> Intersection includes a traffic signal (Home Depot Drive), a left and combined thru-right lane on Access "B", and a SB left turn lane on Cherry

<sup>10</sup> Intersection includes a traffic signal (from Grier McGuire), separate left and right lanes on Access "C", a SB left turn lane on Cherry, and signal coordination (110 sec AM,

<sup>11</sup> Improvements include an additional SB thru lane on Cherry

<sup>12</sup> Add'l. improvements include a 2<sup>nd</sup> EB right lane on Sutton and a 2<sup>nd</sup> NB left lane on Cherry

<sup>13</sup> Add'l. improvements include a 2<sup>nd</sup> SB left lane on Celanese, re-marking the NB right lane to a thru lane only on Cel-River, a NB right turn lane on Cel-River, a 2<sup>nd</sup> SB left lane on Cherry, and signal coordination/cycle length optimization

<sup>14</sup> Add'l. improvements include a NB right lane on Cel-River

<sup>15</sup> Add'l. improvements include a SB right lane on Cel-River and a 2<sup>nd</sup> EB left lane on Access

<sup>16</sup> Add'l. improvements include a traffic signal and coord. w/Corporate Blvd., an EB left lane on Eden Terrace, and a WB right on Eden Ter.

<sup>17</sup> Add'l. improvements include a traffic signal and coordination w/Riverview

<sup>18</sup> Add'l. improvements include a 2<sup>nd</sup> WB left lane on Access "B"

<sup>19</sup> Add'l. improvements include the SB left to pm/pt phasing on Cherry

<sup>20</sup> Add'l. improvements include a left lane on all 4 legs of the intersection

The existing laneage is shown in Figure 11, the 2020 No Build recommended laneage is shown in Figure 12, the 2014 Partial Buildout recommended laneage is shown on Figure 13, and the 2020 Full Buildout recommended laneage is shown in Figure 14.

#### ELEMENTARY SCHOOL QUEUEING INFORMATION

The proposed elementary school is expected to be located to the east of the retail portion of the River Falls development, along the proposed major thoroughfare connecting Eden Terrace Extension N with Proposed Access "C". This proposed elementary school is expected to have an enrollment of 600 students, with 70-80 full time staff members, and use 8 morning and afternoon buses to pick-up and drop-off students.

Based on the information listed above, we recommend a minimum queue length of 989 feet. This information was derived from the MSTA School Traffic Calculator, Traffic Engineering and Safety Systems Branch, Division of Highways, NCDOT 2004. A copy of the MSTa calculations can be found in the Appendix. Similarly, SCDOT's Guidelines for School Transportation Design recommends 1,200-1,500 feet of storage for elementary schools with a student population of 600-1,400. In addition, we also recommend:

- ❑ Separate left and right turn entrance lanes to eliminate/reduce through travel delays on the proposed major thoroughfare due to stopped vehicles in the roadway.
- ❑ Separate left and right turn exit lanes.
- ❑ To minimize congestion and accident potential, we typically recommend separate pick-up/drop-off entrance and exit driveways with as much separation from one another as possible.
- ❑ Separate bus and vehicle access driveways with a minimum of 600 feet of spacing in order to limit the amount of bus/vehicle intermingling (for safety reasons).
- ❑ Driveways should be designed with radii to accommodate the typical design vehicle (minimum 40-45 foot radius for the bus lot and a minimum 25 foot radius for the vehicle lot).
- ❑ All signing and pavement markings should comply with the Manual on Uniform Traffic Control Devices (MUTCD).
- ❑ Signs must clearly mark direction and type of vehicle allowed in all areas of the school grounds.



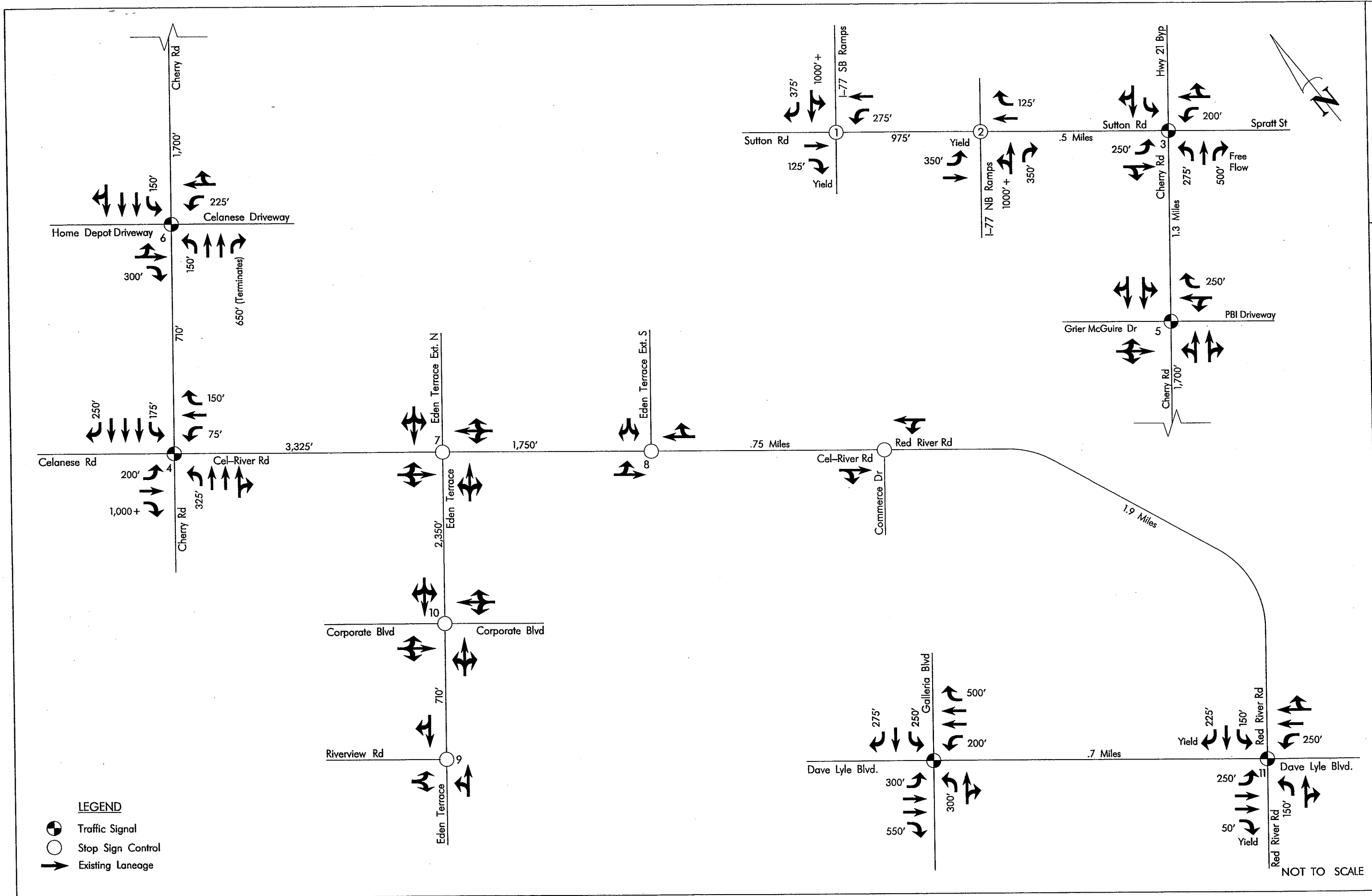


Figure 11

Existing Laneage

Revised River Falls TIA

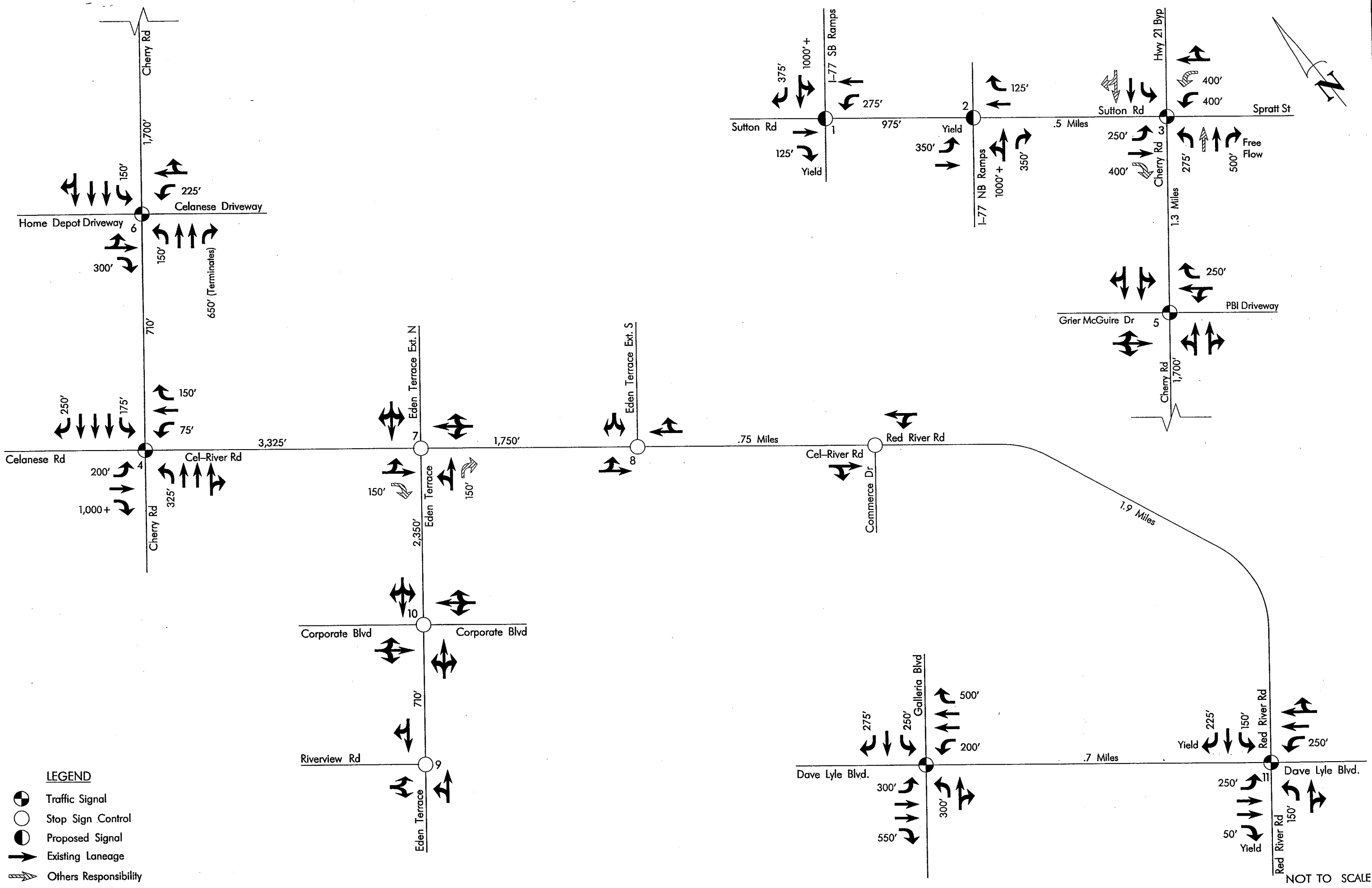
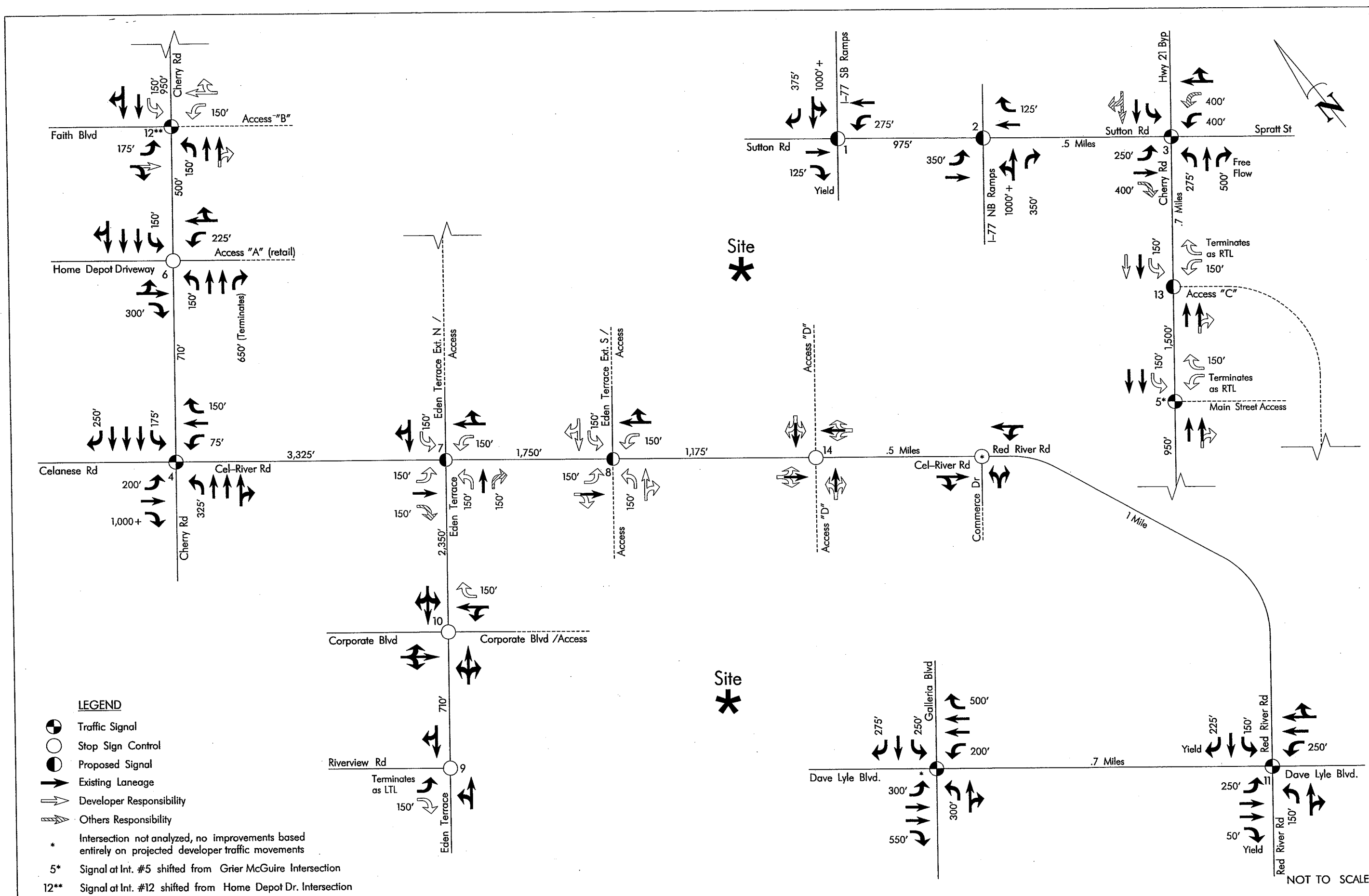


Figure 12

2020 No Build Recommended Laneage

Revised River Falls TIA



- LEGEND**
- Traffic Signal
  - Stop Sign Control
  - Proposed Signal
  - Existing Laneage
  - Developer Responsibility
  - Others Responsibility
  - \* Intersection not analyzed, no improvements based entirely on projected developer traffic movements
  - 5\* Signal at Int. #5 shifted from Grier McGuire Intersection
  - 12\*\* Signal at Int. #12 shifted from Home Depot Dr. Intersection

NOT TO SCALE

Figure 13

2014 Partial Buildout  
Recommended Laneage

Revised River  
Falls TIA

*Kubilins*  
TRANSPORTATION GROUP, INC.

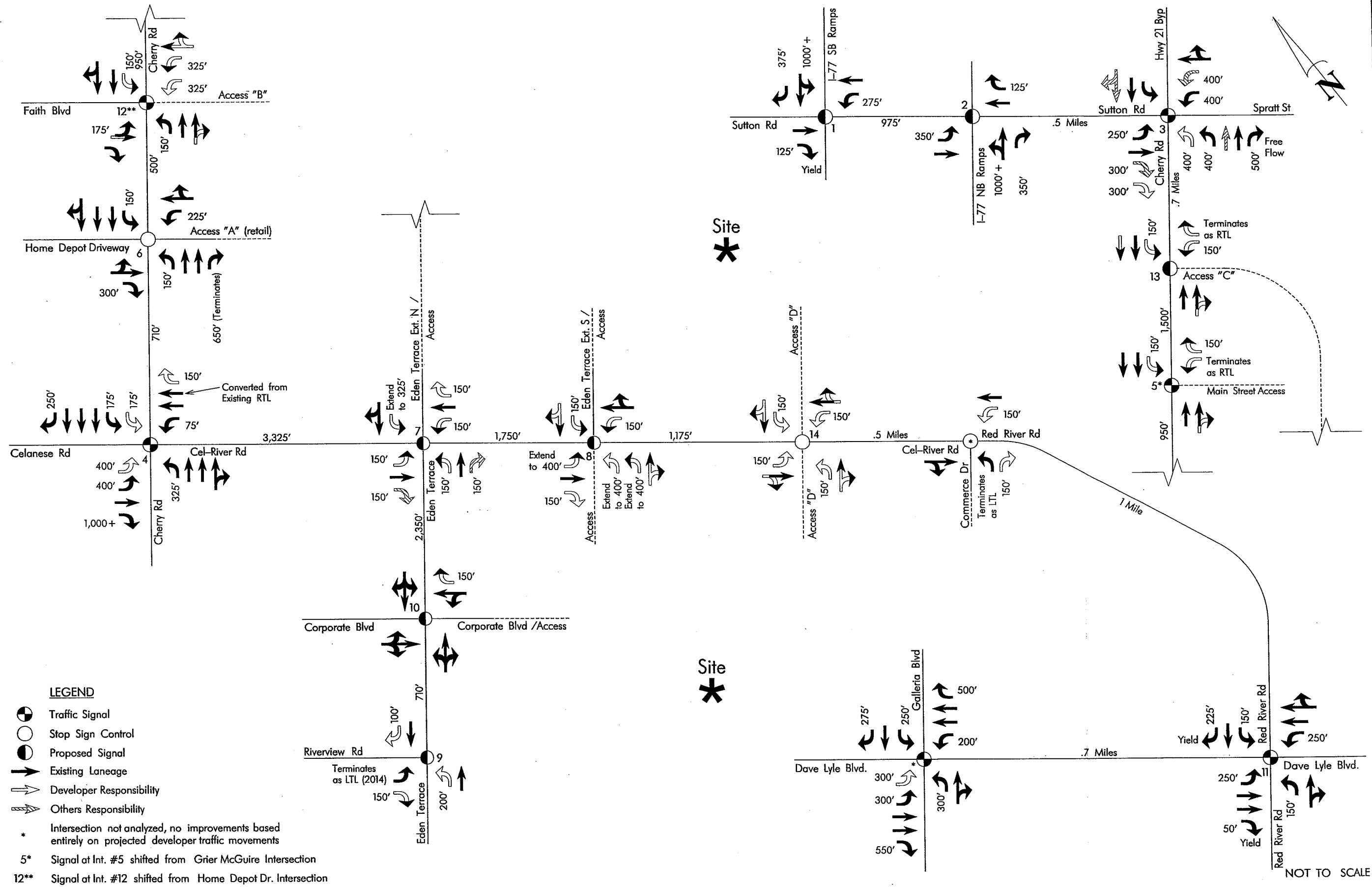


Figure 14

2020 Full Buildout  
Recommended Laneage

Revised River  
Falls TIA

*Kubilins*  
TRANSPORTATION GROUP, INC.

## CONCLUSIONS

The results of the capacity analysis indicate that the site, in addition to the growth in the background traffic, will require roadway improvements to the existing street network by the year 2014. The required improvements are discussed below:

### **2014 (Partial Build) Improvements (see Figure 13):**

In analyzing the intersections within the study area, we recommend the following specific improvements for access management in 2014:

#### (3) Cherry Rd. (US 21) & Sutton Road (S 46-49)/Spratt Street

- Modify the existing northbound left turn phasing on Cherry Road from permitted to permitted/protected phasing and coordinate the signal timings/cycle lengths with the remaining traffic signals on Cherry Road.

#### (5) Cherry Road (US 21) & Proposed Main Street Access

- The developer is requesting the existing traffic signal at Cherry Road and Grier McGuire Road/PBI Driveway be shifted approximately 300 feet south to a new access driveway.
- Construct the Proposed Main Street Access with one entry lane and two westbound exit lanes - a westbound through lane that terminates as a left turn exit lane at Cherry Road and a right turn exit lane with a minimum of 150 feet of storage.
- Construct a southbound left turn lane on Cherry Road with a minimum of 150 feet of storage with a 100 foot taper and 450 foot through lane tapers at each end.
- Coordinate the signal timings/cycle lengths with the remaining traffic signals on Cherry Road.

#### (7) Cel-River Road (S-50) & Eden Terrace/Eden Terrace Extension N (Proposed Access)

- Install a traffic signal upon meeting applicable warrants and with SCDOT approval.
- Construct a left turn lane on all four legs of the intersection with a minimum of 150 feet of storage with a 100 foot bay taper and 350 foot through lane tapers on Eden Terrace/Eden Terrace Extension N (450 foot through lane tapers on Cel-River Road). **The recommended westbound left turn lane on Eden Terrace Extension N may or may not be feasible due to the space constraints from the existing substation on the east side of Cel-River Road near the intersection.**
- Coordinate the signal timings/cycle lengths with the recommended traffic signal at Realigned Eden Terrace Ext. S.

#### (8) Cel-River Road (S-50) & Realigned Eden Terrace Extension S (Proposed Access)

- Install a traffic signal upon meeting applicable warrants and with SCDOT approval.
- Construct a northbound and southbound left turn lane on Cel-River Road with a minimum of 150 feet of storage and a 100 foot bay taper each and 450 foot through lane tapers on both ends.

- Construct the eastbound approach on Proposed Access to include a through lane that terminates as a combined through-right turn lane, a left turn lane with a minimum of 150 feet of storage, and one entry lane.
- Construct the westbound approach on Proposed Access to include a through lane that terminates as a combined through-right turn lane, a left turn lane with 150 feet of storage, and one entry lane.
- Coordinate the signal timings/cycle lengths with the recommended traffic signal at Eden Terrace.

(9) Eden Terrace & Riverview Road

- Re-mark the existing southbound combined left-right lane on Riverview Road to a left turn lane.
- Construct a southbound right turn lane on Riverview Road with a minimum of 150 feet of storage and a 100 foot bay taper.

(10) Eden Terrace & Corporate Boulevard/Access

- Construct a northbound right turn lane on Corporate Boulevard with a minimum of 150 feet of storage with a 100 foot bay taper.

(12) Cherry Road (US 21) & Faith Boulevard/Proposed Access "B"

- The developer is requesting the existing traffic signal at Cherry Road and the Home Depot Driveway/Celanese Driveway be shifted approximately 500 feet north to the intersection of Faith Boulevard/Proposed Access "B".
- Construct a southbound left turn lane on Cherry Road with a minimum of 150 feet of storage and a 100 foot bay taper and through lane taper that terminates at the Main Street Access to the north (a northbound left turn lane is already present on Cherry Road at Faith Boulevard).
- Construct Proposed Access "B" with one entry lane and two westbound exit lanes - a left turn lane with 150 feet of storage and a through lane that terminates as a combined through-right turn exit lane at Cherry Road.
- Coordinate the signal timings/cycle lengths with the remaining traffic signals on Cherry Road.

(13) Cherry Road (US 21) & Proposed Access "C"

- Install a traffic signal upon meeting applicable warrants and with SCDOT approval.
- Construct a southbound left turn lane on Cherry Road with a minimum of 150 feet of storage and a 100 foot bay taper and a 450 foot through lane taper on each end.
- Construct Proposed Access "C" with one entry lane and two westbound exit lanes - a left turn lane with 150 feet of storage and a through lane that terminates as a right turn exit lane at Cherry Road.
- Construct an additional southbound through lane on Cherry Road (2 total) that begins a minimum of 500 feet north of Proposed Access "C" and ties into the existing two southbound that begin to the south near Grier McGuire Road. This will also require 450 feet of beginning taper.
- Coordinate the signal timings/cycle lengths with the remaining traffic signals on Cherry Road.

(14) Cel-River Road (S-50) & Proposed Access "D"

- Construct the east and west legs of Proposed Access "D" with one entry lane and one exit lane each.

These identified roadway/intersection improvements will improve capacity and provide sufficient access management at the site access locations during the critical peak hours of the year 2014 (Partial Build).

**2020 (Full Buildout) Improvements (see Figure 14):**

By 2020 (Full Build), in addition to the improvements described above in 2014, we recommend the following specific improvements:

(3) Cherry Rd. (US 21) & Sutton Road (S 46-49)/Spratt Street

- Construct an additional northbound left turn lane on Cherry Road with a minimum of 400 feet of storage each with a 200 foot bay taper and 450 foot through lane taper. This will also require an additional westbound through lane on Sutton Road from Cherry Road for a minimum of 500 feet with a 350 foot terminating taper in order to receive this additional left turn lane traffic.
- Construct an additional eastbound right turn lane on Sutton Road with a minimum of 300 feet of storage each and a 200 foot bay taper (the 2014 No Build scenario recommends an eastbound right turn lane).

(4) Cherry Road (US 21) & Celanese Road/Cel-River Road (SC 161-S46-50)

**Any improvements at this intersection may or may not be feasible due to right-of-way limitations on the Cel-River Road and the east side of Cherry Road, and space constraints from the existing Steak and Shake restaurant on the northwest corner of the intersection, the Farmers Market on the southwest corner of the intersection, the Texaco gas station on the southeast corner of the intersection, and the InChem site on the northeast corner of the intersection.**

- Re-mark the existing northbound right turn lane on Cel-River Road to a through lane (2 total).
- Construct a northbound right turn lane on Cel-River Road with a minimum of 150 feet of storage and a 100 foot bay taper.
- Construct an additional southbound left turn lane on Cherry Road with a minimum 175 feet of storage each with a 100 foot bay taper and through lane taper that ties into the existing left turn taper at the Home Depot Driveway. This will also require an additional southbound through lane on Cel-River Road from Cherry Road for a minimum of 500 feet with a 450 foot terminating taper in order to receive this additional left turn lane traffic.

- Construct an additional southbound left turn lane on Celanese Road with a minimum 400 feet of storage each with a 200 foot bay taper and 450 foot through lane taper.
  - These left turn lanes and coinciding bay taper will extend beyond the Home Depot Driveway on Celanese Road (located approximately 400 feet north of Cherry Road); however, we recommend leaving the Home Depot Driveway as a “full movement” driveway.
- Coordinate signal timings/cycle lengths with the remaining traffic signals on Cherry Road.

(7) Cel-River Road (S-50) & Eden Terrace/Eden Terrace Extension N (Proposed Access)

- Extend the westbound left turn lane storage on Eden Terrace Extension N to a minimum of 325 feet of storage with a 100 foot bay taper and 350 foot through lane taper.
- Construct a northbound right turn lane on Cel-River Road with a minimum of 150 feet of storage and a 100 foot bay taper.

(8) Cel-River Road (S-50) & Realigned Eden Terrace Extension S (Proposed Access)

- Extend the southbound left turn lane storage on Cel-River Road to a minimum of 400 feet of storage with a 100 foot bay taper and 450 foot through lane taper.
- Construct a southbound right turn lane on Cel-River Road with a minimum of 150 feet of storage and a 100 foot bay taper.
- Construct an additional eastbound left turn lane on the Proposed Access with a minimum of 400 feet of storage each. This will also require an additional northbound through lane on Cel-River Road from Realigned Eden Terrace Extension S for a minimum of 500 feet with a 450 foot terminating taper in order to receive this additional left turn lane traffic.

(9) Eden Terrace & Riverview Road

- Install a traffic signal upon meeting applicable warrants and with SCDOT approval.
- Construct an eastbound left turn lane on Eden Terrace with a minimum of 200 feet of storage with a 100 foot bay taper and 350 foot through lane taper (a short through lane taper on the east side of the intersection will also be necessary but should terminate prior to the bridge deck over Interstate 77).
- Construct a westbound right turn lane on Eden Terrace with 100 feet of storage and a 100 foot bay taper. This roadway improvement should fit within the spacing limitations between Riverview Road and the existing bridge deck on Eden Terrace (located approximately 250 feet east of Riverview Road).
- Coordinate signal timings/cycle lengths with the proposed traffic signal at Corporate Boulevard (see intersection #10 below).

(10) Eden Terrace & Corporate Boulevard/Access

- Install a traffic signal upon meeting applicable warrants and with SCDOT approval.
- Coordinate signal timings/cycle lengths with the proposed traffic signal at Riverview Road (see intersection #9 above).

(12) Cherry Road (US 21) & Faith Boulevard/Proposed Access "B"

- Construct an additional westbound left turn lane on Proposed Access "B" with a minimum of 325 feet of storage each.

(13) Cherry Road (US 21) & Proposed Access "C"

- Modify the southbound left turn phasing on Cherry Road from permitted to protected/permitted phasing.

(14) Cel-River Road (S-50) & Proposed Access "D"

- Construct southbound and northbound left turn lanes on Cel-River Road with a minimum of 150 feet of storage each with a 100 foot bay taper and a 450 through lane taper on both ends.
- Construct eastbound and westbound left turn lanes on Proposed Access "D" with a minimum of 150 feet of storage each.

If the recommended additional access locations by SCDOT are implemented, we also recommend the following improvements (these intersections were not analyzed per SCDOT, the improvements are based entirely on projected River Falls traffic volumes):

Dave Lyle Boulevard (SC 122) and Galleria Boulevard

- Construct an additional eastbound left turn lane on Dave Lyle Boulevard with a minimum of 300 feet of storage each with a 200 foot bay taper.

Red River Road and Commerce Drive

- Construct a northbound left turn lane on Red River Road with a minimum of 150 feet of storage with a 100 foot bay taper and 350 foot through lane tapers.
- Construct an eastbound right turn lane on Commerce Drive with a minimum of 150 feet of storage and a 100 foot bay taper.

These identified roadway/intersection improvements will improve capacity and provide sufficient access management at the site access locations during the critical peak hours of the year 2020.

APPENDIX

