Isle Drive / Elder Drive Area Transportation Study

City of Baxter Crow Wing County, Minnesota

February 26, 2013

Approved Baxter City Council March 5, 2013

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CERTIFICATION

I hereby certify that this plan, specification or report was prepared by me or under my direct supervision and that I am a duly registered professional engineer under the laws of the State of Minnesota.

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Date: February 26, 2013 Reg. No. 26082

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I - INTRODUCTION

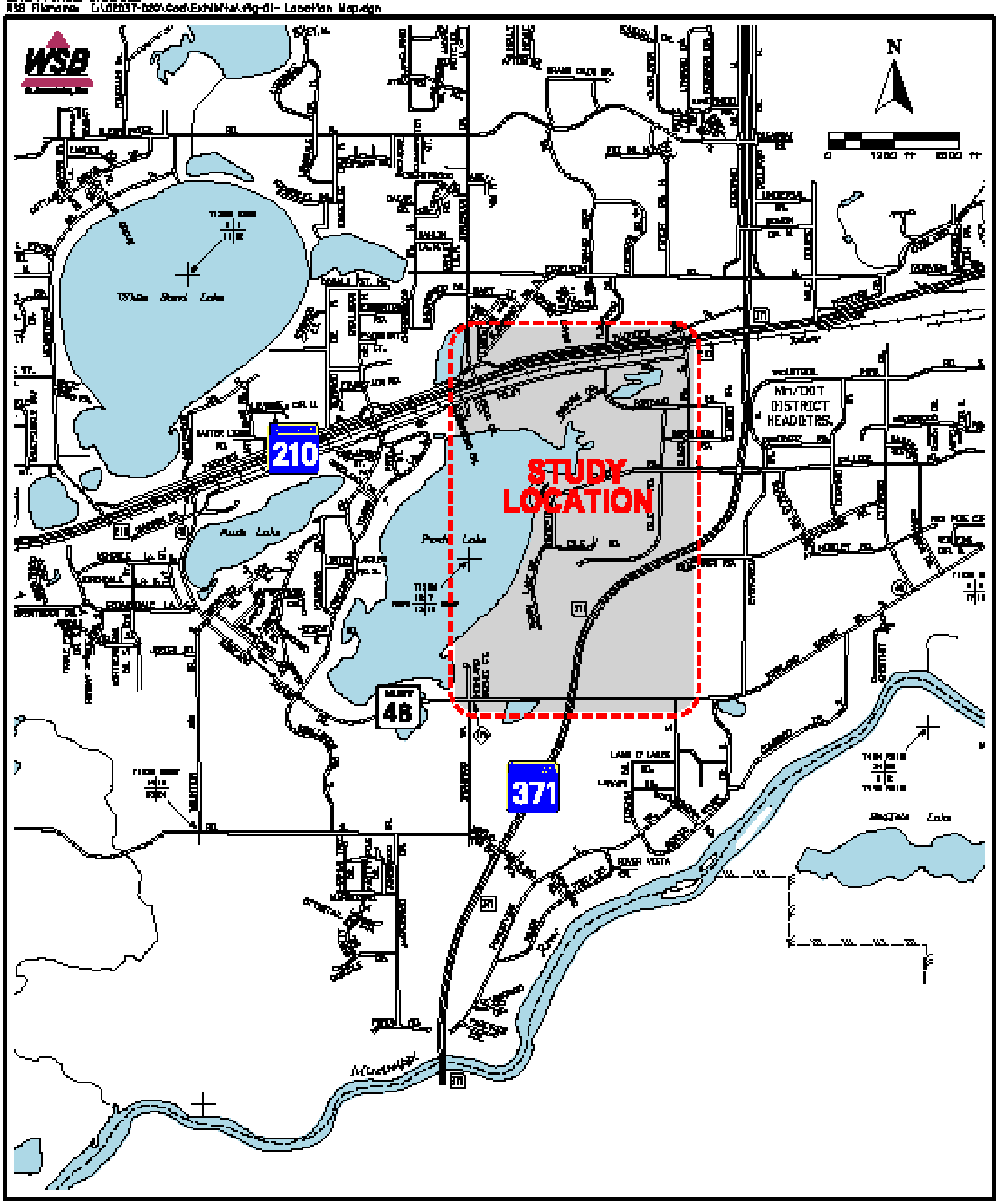
The area south of TH 210 to CSAH 48 and west of TH 371 to Knollwood Drive has been identified by the Baxter City Council as a need for an updated transportation study. ***Figure 1*** shows the study area. Previous studies conducted by the City evaluated potential land use and development impacts on the area transportation system. With the recent development of the Costco site a comprehensive transportation review of the area is again needed.

The purpose of the traffic study will be to evaluate the transportation needs of the future land uses in the study area. This will include:

1. Determining the function and operation of the existing and future area roadway system.
2. Outlining the anticipated traffic levels for the full development of the area.
3. Determining the future alignment and function of Isle Drive from CSAH 48 to TH 210.
4. Documenting / verifying the anticipated future operation and geometry of Elder Drive from Glory Road to TH 210 from previous studies.
5. Determining the future geometry and traffic control at primary intersections along Isle Drive in the study area.

The following sections of this report outline the findings of this study including:

- Documentation of existing traffic conditions in the corridor;
- Projecting proposed land use development traffic on adjacent roadway system;
- Evaluating the transportation needs for the corridor; and,
- Developing conclusions and recommendations for the future roadway configurations in the area.



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Elder Drive / Isle Drive Alternative Study
City of Baxter, Minnesota

Project Location Map

Figure 1

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II - EXISTING CONDITIONS

A. Land Use

The existing land use in the study area consists primarily of commercial industrial, retail, office and some residential. The commercial industrial uses are located on the north end of the study area west of Isle Drive and south of Foley Drive. The office uses are located throughout the study area and include general office uses between Isle Drive and Elder Drive south of Forthun Road and medical office south of Glory Road. The retail uses are also spread out throughout the study area including a Home Depot store west of Elder Drive between Forthun Road and Foley Drive, a Wal-Mart store located south of Glory Road at Elder Drive and a proposed Costco store under construction east of Elder Drive between TH 210 and Forthun Road. The residential uses are located adjacent to Foley Road west of the study area and west of Isle Drive between Glory Road and CSAH 48.

A significant amount of the study area is currently vacant zoned for similar uses as exist today. **Section III** of this study discusses the potential future land uses in the study area.

B. Roadway Characteristics

Elder Drive – is a north/south street extending from Glory Road to TH 210. The street has a primary 44 foot two-lane urban cross section with no turn lanes. It is however proposed that the street will be upgraded with the Costco development to include left turn lanes at Foley Road and Forthun Road. The intersection of TH 210 provides “3/4” access with a right-in/right-out on Elder Drive and a left turn from TH 210. The left turn movement from Elder Drive to TH 210 is not provided. The right turn out movement is controlled with a Stop sign. The intersection of Glory Road is signalized with left and right turn lanes provided on all the approaches. A 30mph speed limit is posted on Elder Drive.

Isle Drive – is a north/south street extending from south of Glory Road where development has currently ended to Forthun Road. South of Glory Road Isle Drive is a 44 foot urban two lane roadway. North of Glory Road Isle Drive is a 36 foot urban roadway. No turn lanes are provided at any intersection or driveway along Isle Drive. Stop sign controlled intersections currently exist at Glory Road and Forthun Road, stopping the Isle Drive approaches. A 30mph speed limit is posted on Isle Drive.

Glory Road – is an east/west street extending from the Homestead Drive near Perch Lake to TH 371. East of TH 371 Glory Road turns into College Road and extends across the river into the City of Brainerd. West of TH 371 Glory Road has a 72 foot to 80 foot cross section with two lanes in each direction and left and right turn lanes at TH 371, Wal-Mart Entrance/Elder Drive and Isle Drive. West of Isle Drive Glory Road narrows to a 44 foot two lane section. Traffic signal control is provided at the Elder Drive/Wal-Mart Entrance and TH 371 intersections. A 30mph speed limit is posted on Glory Road.

CSAH 48 – is an east/west County Road extending from TH 210 in the City of Baxter to College Drive in the City of Brainerd. West of TH 371, CSAH 48 has a two lane 40 foot rural cross section with 8 foot paved shoulders. Left and right turn lanes are provided at TH 371. The intersection of CSAH 48 and TH 371 is traffic signal controlled. A 55 mph speed limit is post on CSAH 48.

Forthun Road – is an east/west street that extends from Foley Road to Elmwood Drive east of Elder Drive. Forthun Road is a 36 foot two lane urban roadway with no turn lanes provided at any intersections or driveways. All intersections are stop sign controlled. At Elder Drive and Foley Road, Forthun Road is stop-controlled approaching the intersections. At Isle Drive, Forthun Road is through and Isle Drive is stop controlled. Forthun Road will be the southern access to the new Costco development. A 30 mph speed limit is posted on Forthun Road.

Foley Road – is an east/west frontage road to TH 210, extending from Elder Drive to CSAH 48. Foley Road has a 30 foot cross section with curb and gutter on the south side and a rural section on the north side. A left and right turn lane is provided approaching Elder Drive. Foley Road is stop sign controlled stopping the Foley Road at Elder Drive and Knollwood Drive. A 40 mph speed limit is posted on Foley Road.

C. Traffic Volumes

Traffic volume data was obtained from the City of Baxter, Crow Wing County, and the Minnesota Department of Transportation (MnDOT).

The ADT volumes consist of the total traffic carried on the identified road in a typical 24-hour period. The existing traffic Average Daily Traffic Volume is illustrated on ***Figure 2*** in the ***Appendix*** and is the most current data available for each volume location identified.

D. Crash Investigation

Crash data was obtained from the MnDOT state crash data base and was used to evaluate the relative safety of the transportation network within the study area. All reported crashes contained within the MnDOT data set between 2007 and 2011 were used in the safety evaluation. The evaluation was used to determine both the frequency and severity of crashes located at intersections. The result indicate that all studied intersections except, Elder Drive at Foley Road exceed the average statewide severity rate for similar intersections. The intersections with the highest severity rates include: TH 210 at TH 371, TH 371 at Glory Road, Elder Drive at Glory Road and Elder Drive at Forthun Road. A summary of the results is shown in ***Table 1*** and ***Figure 3*** in the ***Appendix***.

Table 1 – Crash Summary

Crash Summary (2007-2011)

Location	Description	Total Number of Crashes	Crash Rate*	Severity Rate	Crash Type: 1 Rear End	2+9 Side swipe	3 Left Turn	4+7 ROR Left Right	5 Right Angle	6 Right Turn	8 Head On	0/90/98/99 Other
TH 210 & Knollwood Dr	(signalized, low-volume, high speed)	12	0.52	**0.95**	1	1	3	0	4	0	1	2
					8%	8%	25%	0%	33%	0%	8%	17%
TH 210 & Inglewood Dr	(unsignalized, rural, thru/stop)	13	**0.45**	**0.63**	2	4	2	1	3	0	0	1
					15%	31%	15%	8%	23%	0%	0%	8%
TH 210 & Elder Dr	(unsignalized, rural, thru/stop)	6	0.22	**0.52**	2	0	2	0	2	0	0	0
					33%	0%	33%	0%	33%	0%	0%	0%
TH 210 & TH 371	(signalized, high volume, high speed)	116	**1.56**	**2.31**	89	3	3	1	6	0	1	13
					77%	3%	3%	1%	5%	0%	1%	11%
TH 371 & Glory Rd / College Rd	(signalized, high volume, high speed)	48	**1.14**	**1.76**	16	4	2	2	11	1	2	10
					33%	8%	4%	4%	23%	2%	4%	21%
TH 371 & CSAH 48	(signalized, high volume, high speed)	15	0.54	**0.91**	3	0	1	2	6	0	0	3
					20%	0%	7%	13%	40%	0%	0%	20%
Elder Dr & Glory Rd	(signalized, low volume, low speed)	6	**0.77**	**1.42**	0	0	1	0	5	0	0	0
					0%	0%	17%	0%	83%	0%	0%	0%
Elder Dr & Forthun Rd	(unsignalized, urban/suburban, thru/stop)	5	**1.37**	**2.19**	0	0	1	0	4	0	0	0
					0%	0%	20%	0%	80%	0%	0%	0%
Elder Dr & Foley Rd	(unsignalized, urban/suburban, thru/stop)	0	0.00	0.00	0	0	0	0	0	0	0	0
					0%	0%	0%	0%	0%	0%	0%	0%
Foley Rd & Knollwood Dr	(unsignalized, urban/suburban, thru/stop)	4	**0.84**	**1.05**	0	0	0	0	2	2	0	0
					0%	0%	0%	0%	50%	50%	0%	0%
Statewide Average - Signalized, High Volume, High Speed (>45mph, >15,000 ADT)			0.6	0.9								
Statewide Average - Signalized, Low Volume, Low Speed (<45mph, <15,000 ADT)			0.6	0.8								
Statewide Average - Signalized, Low Volume, High Speed (>=45mph, <15,000 ADT)			0.6	0.9								
Statewide Average - Unsignalized, Rural, Thru/Stop			0.3	0.5								
Statewide Average - Unsignalized, Urban/Suburban, Thru/Stop			0.2	0.4								

*Crashes per Million Entering Vehicles

NOTE: Numbers in **BOLD** exceed Statewide averages

III - FUTURE TRAFFIC DEMAND

In order to determine the future impacts and needs of the area roadway system, it is necessary to estimate the amount of traffic expected to be generated by anticipated development in the study area. The traffic forecasted volumes were determined based on previous studies, approved and proposed land use in the area and the City's current Transportation Plan. The following sections outline the traffic generation from the study area, as well as the traffic distribution and projected traffic volumes.

A. Future Land Use Assumptions

Based on current development proposal, previous studies and input from City Staff future land use in the study area west of TH 371 and south of TH 210 was determined. The anticipated land use areas in the study area are shown in ***Figure 4.***

B. Traffic Generation

Once the future land use for the undeveloped land in the study area was determined trip generation rates were developed to estimate the traffic that will be generated by the new developments.

The estimated trip generation from the proposed future development is shown in ***Table 2.*** The trip generation rates used to estimate the traffic is based on extensive surveys of the trip-generation rates for other similar land uses as documented in the Institute of Transportation Engineers *Trip Generation Manual, 8*th Edition. The table shows the total daily and PM. peak hour trip generation.

C. Traffic Distribution

The direction of approach/departure for the proposed future traffic was based on:

- Previous traffic and transportation studies in the area.
- Anticipated origins and destinations for specific land use (i.e. location of commercial uses in relationship to residential).
- Existing travel patterns and future roadway connections.

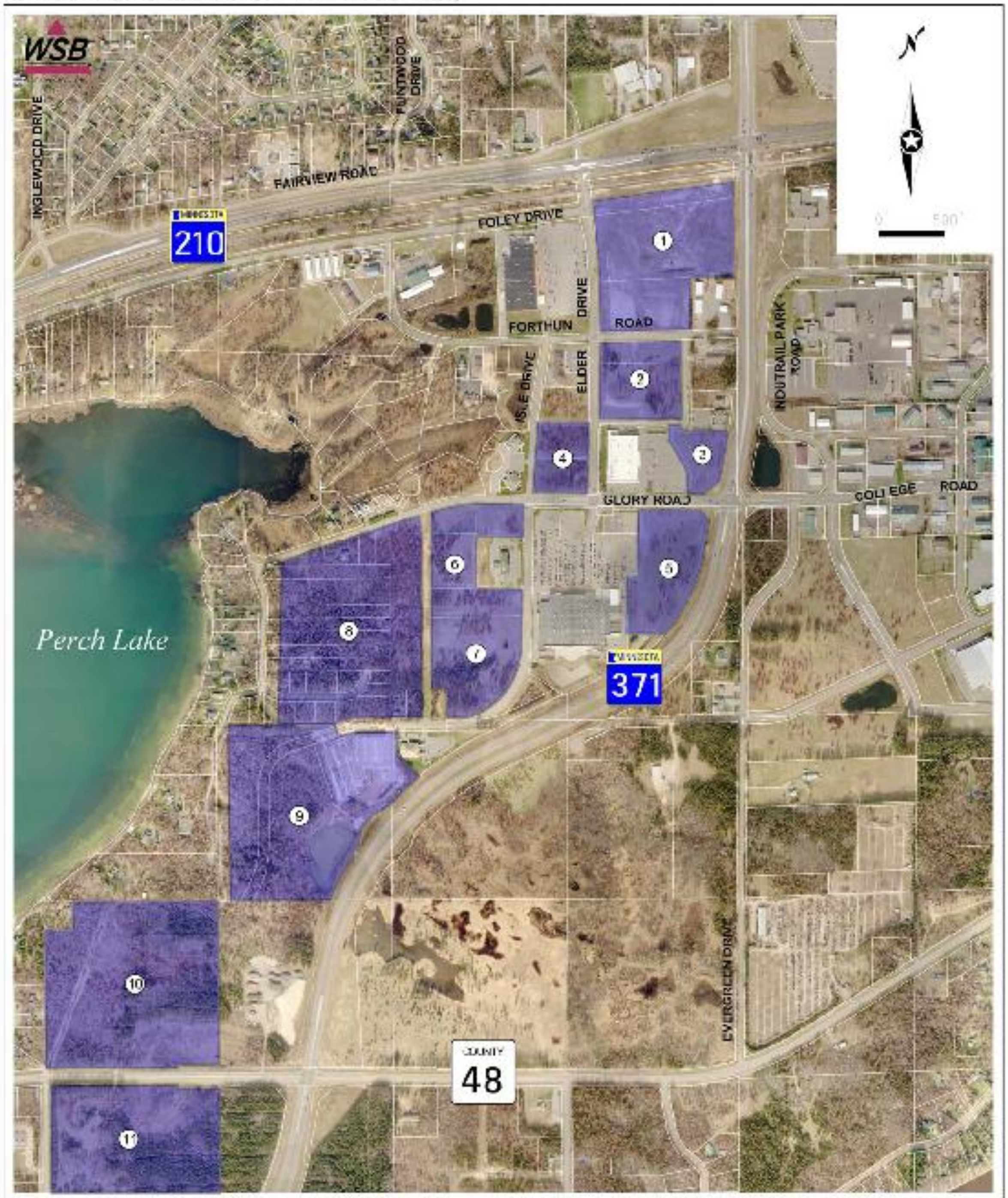
Based on these parameters the following general traffic distribution was used:

- 20% north
- 20% west
- 35% east
- 25% south

D. Projected Traffic Volumes

The projected study area traffic generation was assigned to the street system according to the distribution by direction of approach/departure as discussed above. The total future full build traffic volumes were determined by adding the development site traffic with the existing traffic on the area roadways. ***Figures 5*** in the ***Appendix*** shows the total projected average daily traffic volumes for each impacted roadway.

Based on current development plans it is anticipated that up to 30% of the future full build traffic generation will be realized in the next 3 to 5 years. ***Figure 6*** in the ***Appendix*** shows the total anticipated traffic volumes on the area roadways in the next 3 to 5 years assuming known developments are completed. The projections assume that the Isle Drive connection to CSAH 48 is made and no other Isle Drive improvements completed.



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Traffic Generation Areas

Figure 4

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Table 2 – Future Area Traffic Generation

Area	Planned Use	Size	Unit	ADT			PM Peak		
				Total	In	Out	Total	In	Out
1	Costco Site								
	Costco	148,800	SQ FT	6,220	3,110	3,110	631	315	315
	Gas Station (1)	16	Fueling Stations	1,834	917	917	151	75	75
	Bank	4,000	SQ FT	593	296	296	103	52	52
	Fast Food	6,000	SQ FT	2,977	1,488	1,488	203	106	97
	Retail	17,500	SQ FT	751	376	376	65	32	33
2	Commercial / Retail	100,000	SQ FT	2,200	1,100	1,100	145	91	54
3	Restaurant	245	Seats	701	350	350	64	43	21
4	Commercial / Retail	100,000	SQ FT	4,294	2,147	2,147	373	183	190
5	Commercial / Retail	100,000	SQ FT	4,294	2,147	2,147	373	183	190
6	Office / Service	60,000	SQ FT	661	330	330	89	15	74
7	Medical Office	80,000	SQ FT	2,890	1,445	1,445	277	75	202
8	Residential	120	Lots	1,148	574	574	121	76	45
9	Medical Clinic / Office	250,000	SQ FT	7,863	3,931	3,931	1,295	350	945
10	Office / Service	325,000	SQ FT	3,578	1,789	1,789	484	82	402
11	Commercial / Retail	250,000	SQ FT	10,735	5,368	5,368	933	457	476
Total New Trips				50,738	25,369	25,369	5,307	2,135	3,172

(1) - Includes 32% factor for internal trips

IV - TRANSPORTATION NEEDS / REQUIREMENTS

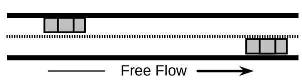
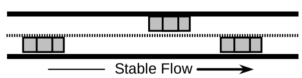
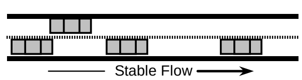
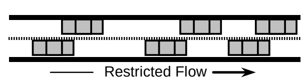
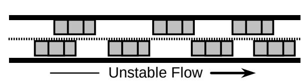
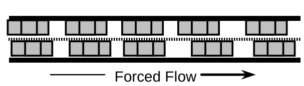
A. Roadway/Intersection Configurations

As a part of this transportation study analysis, an inventory of the roadway system was conducted in order to view certain operation characteristics and to note the number of travel lanes on the roadways. The number of lanes for the primary roadway facilities was discussed in the previous section.

The Level of Service analysis (LOS) of a roadway compares an existing or projected volume of traffic against roadway's capacity. There are two basic types of LOS analysis: segment and intersection. For a long-term planning document such as this, roadway segment LOS analysis is appropriate. Segment LOS takes existing and future Average Daily Traffic (ADT) volumes and compares them with the capacity of a stretch of roadway as determined by its overall design and number of lanes. Intersection LOS analysis is more detailed and is based on peak-hour volume-to-capacity analysis. It is more oriented towards meeting short-term needs at specific locations.

Level of service conditions range from LOS A (free flowing) to LOS F (excessive congestion and delay). ***Table 3*** displays the LOS categories approximate volume-to-capacity ratios and a general description of the congestion conditions at each level. ***Table 4*** shows the typical segment capacity and the associated LOS.

Table 3 - Roadway Segment Level of Service Information

Level of Service	Volume/Capacity (V/C) Ratio	Traffic Flow	Description
A	0.00 to 0.39		**FREE FLOW** Low volumes and no delays.
B	0.40 to 0.59		**STABLE FLOW** Low volumes and speeds dictated by travel conditions.
C	0.60 to 0.79		**STABLE FLOW** Speeds and maneuverability closely controlled due to higher volumes.
D	0.80 to 0.99		**RESTRICTED FLOW** Higher density traffic restricts maneuverability and volumes approaching capacity.
E	1.00 to 1.19		**UNSTABLE FLOW** Low speeds, considerable delays, and volumes at or slightly over capacity.
F	1.20 and above		**FORCED FLOW** Very low speeds, volumes exceed capacity, and long delays with stop-and-go traffic.

SOURCE: Highway Capacity Manual and WSB & Associates, Inc.

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Table 4 – Typical Roadway Level of Service

Roadway Type	Capacity (Vehicles per Day)		
	Un-Congested (LOS A or B)	Approaching Congestion (LOS C)	Congested (LOS D, E, or F)
2-Lane Rural	< 3,000	3,000-6,000	> 6,000
2-Lane Urban	< 6,000	6,000-8,000	> 8,000
3-Lane Urban	< 10,000	10,000-14,000	> 14,000
4-Lane Undivided	< 15,000	15,000-18,000	> 18,000
4-Lane Divided with Turn Lanes	< 30,000	30,000-38,000	> 38,000

Consistent with Minnesota Department of Transportation guidance and general practices, traffic volumes and associated congestion conditions up to LOS D are considered acceptable in urban areas. Once conditions get to LOS E, mitigation requirements in the form of additional lanes, access management, localized intersection improvements, or other measures should be considered to maintain acceptable operating conditions.

Table 5 shows the roadway segment LOS based on the existing and projected traffic volumes and available roadway capacity. Based on this planning level analysis the existing 2-lane urban sections on Elder Drive and Isle Drive would not provide capacity for the anticipated future traffic conditions. A 3-lane urban section will provide sufficient capacity on these roadways.

Table 5 – Study Area Roadway Segment Analysis

Roadway	**Segment**	**Existing**		**Projected Future**	
		ADT	**LOS**	**ADT**	**LOS ***
Elder Drive	South of Forthun Rd	3,300	A/B	12,000	F (D)
Elder Drive	North of Forthun Rd	3,600	A/B	13,000	F (D)
Isle Drive	South of Glory Rd	NA	A/B	7,000 / 7,500	C (A)
Isle Drive	North of Glory Rd	1,200	A/B	7,100 / 9,500	C/D (A)
Glory Road	West of Isle Dr	1,000	A/B	2,200	A
Glory Road	East of Isle Dr	3,000 / 8,750	A/B	9,000 / 18,500	C/D
CSAH 48	West of TH 371	5,300	A/B	18,000	F
Forthun Road	West of Elder Dr	3,500 / 1,100	A/B	1,000 / 5,000	A/C
Foley Road	West of Elder Dr	2,000 / 3,000	A/B	4,000 / 11,000	C/E
*** - F (C) = With existing lanes (With proposed concept plan lanes)**					

In addition to the typical roadway segments configurations, intersection control alternatives should be evaluated as traffic volumes increase in the corridors. Intersection traffic control alternative that can be considered include:

- Two-way Stop Control – This type of control is primarily provided at low volume intersections where the major street volume is significantly higher than the side street volume.

- All-way Stop Control – This type of control is provided at intersections with higher volume balanced flows. The Manual on Uniform Traffic Control Devices has warrants for the installation of all-way stop control.

- Traffic Signal Control – This type of control is provided at high volume intersections where an all-way stop or other traffic control would create extreme delays. The Manual on Uniform Traffic Control Devises also has warrants for the installation of traffic signals.

- Roundabouts – This type of control is an alternative to all-way stop and traffic signal control. In some cases they can handle more vehicles per hour than conventional traffic signals and with greater safety. Roundabouts promote continuous flow of traffic, because motorists only yield before entering the roundabout rather than having to stop at a traffic signal for the full red phase of the signal cycle.

  A study by the Insurance Institute for Highway Safety indicates that roundabouts reduce crashes by 75 percent at intersections where stop signs or traffic signals were previously used. The crashes that do take place are significantly less severe because they typically happen at lower speeds than is the case with signalized intersections.

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B. Access Spacing

A basic traffic engineering approach to improving operational and safety characteristics of a roadway is managing access to it. The spacing of intersections and driveways should be controlled as defined by roadway functional class and traffic volumes. This approach limits the impact of intersections and driveways on average speeds and levels of service on roadways appropriate to the function of those facilities. Some linkage to land uses may become somewhat less direct, but this needs to be balanced against the overall gains in terms of operational and safety conditions. New developments and sites which are being redeveloped may be required to provide internal traffic design so as to limit the number of driveways to the roadway system and/or to provide that access on appropriate roadways.

C. Regional Continuity

As the area west of TH 371 and south of TH 210 continues to grow, a need to accommodate more regional trips is becoming more apparent. Currently there is no connection between CSAH 48 and TH 210 through this commercial area. Elder Drive provides good access to the area north of Glory Road but not south to CSAH 48. Isle Drive has been identified in the City's Transportation plans to continue south from where it currently ends to CSAH 48. Making this connection will complete a connection from CSAH 8 to Forthun Road. Providing an improve connection from Forthun Road via Foley Drive to TH 210 would complete a roadway facility that will not only provide access for regional trips but also provide potential traffic relief to Elder Drive and Glory Road.

D. Bike / Pedestrian

Ensuring pedestrian safety should be a critical goal for the City. Most pedestrian accidents and injuries take place at roadway intersections; thus, intersections must be properly designed to accommodate both vehicular and pedestrian movements. Insuring that pedestrian connections are made and logical crossing are provided will help provide a safe pedestrian / bike system. Local and regional sidewalks and pathways exist in study area. The future connection of these facilities should be included with any planned roadway project.

E. Right of Way

It is very important to preserve adequate right-of-way for roadways in developing areas. This minimizes the potential for having to acquire or otherwise impact developed properties in the future to allow needed transportation improvements. The needed right-of-way widths could vary with topography, need for turn lanes and requirements for sidewalks or off-street pedestrian facilities. In general, in the undeveloped areas 100 feet (50 feet on each side of centerline) of right-of-way should be provided. In the developed areas 80 feet should be sufficient.

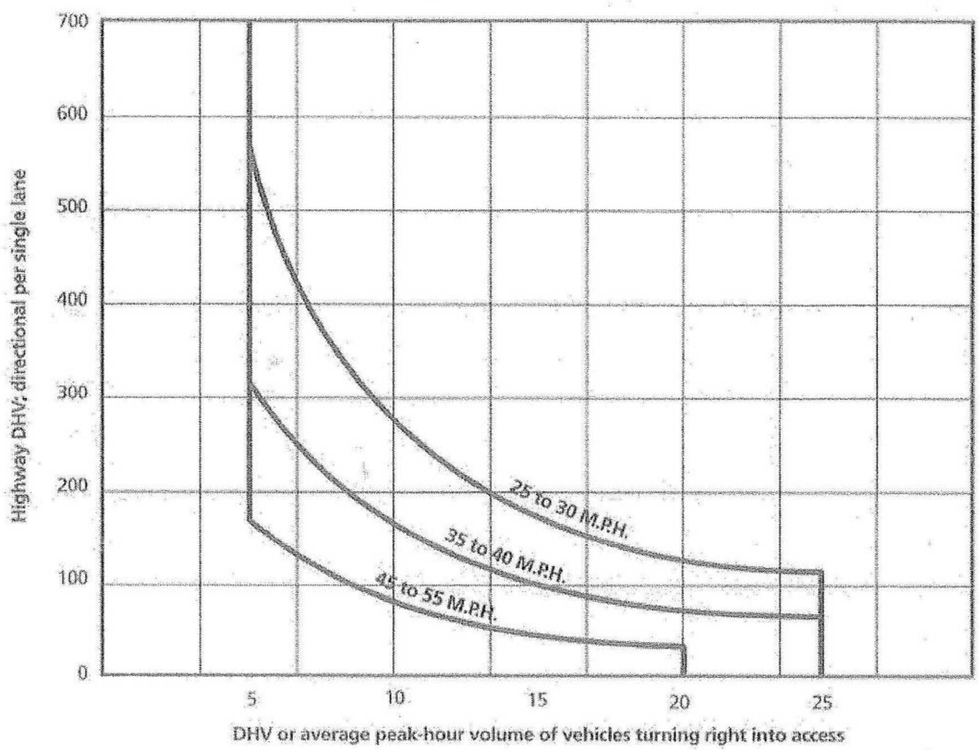
V - ALTERNATIVES / OPTIONS

A. *Alternative Concept Alignment*

Based on the projected traffic volumes and the review of the area transportation needs discussed in the previous section, a typical three (3) lane section (one through lane in each direction with a center left turn lane) would be adequate to accommodate the future traffic on Isle Drive.

Right turn lanes should be provided at primary City streets and major development access locations. These locations will be based on the speed of vehicles on Isle Drive and the design hourly traffic volumes. ***Figure 7*** below illustrates the warrant curves for right turn lanes.

Figure 7 – Right Turn Lane Warrants



Source: Traffic Engineering Handbook, 1999

Figure 8 illustrates the proposed Isle Drive typical section with and without a right turn lane.

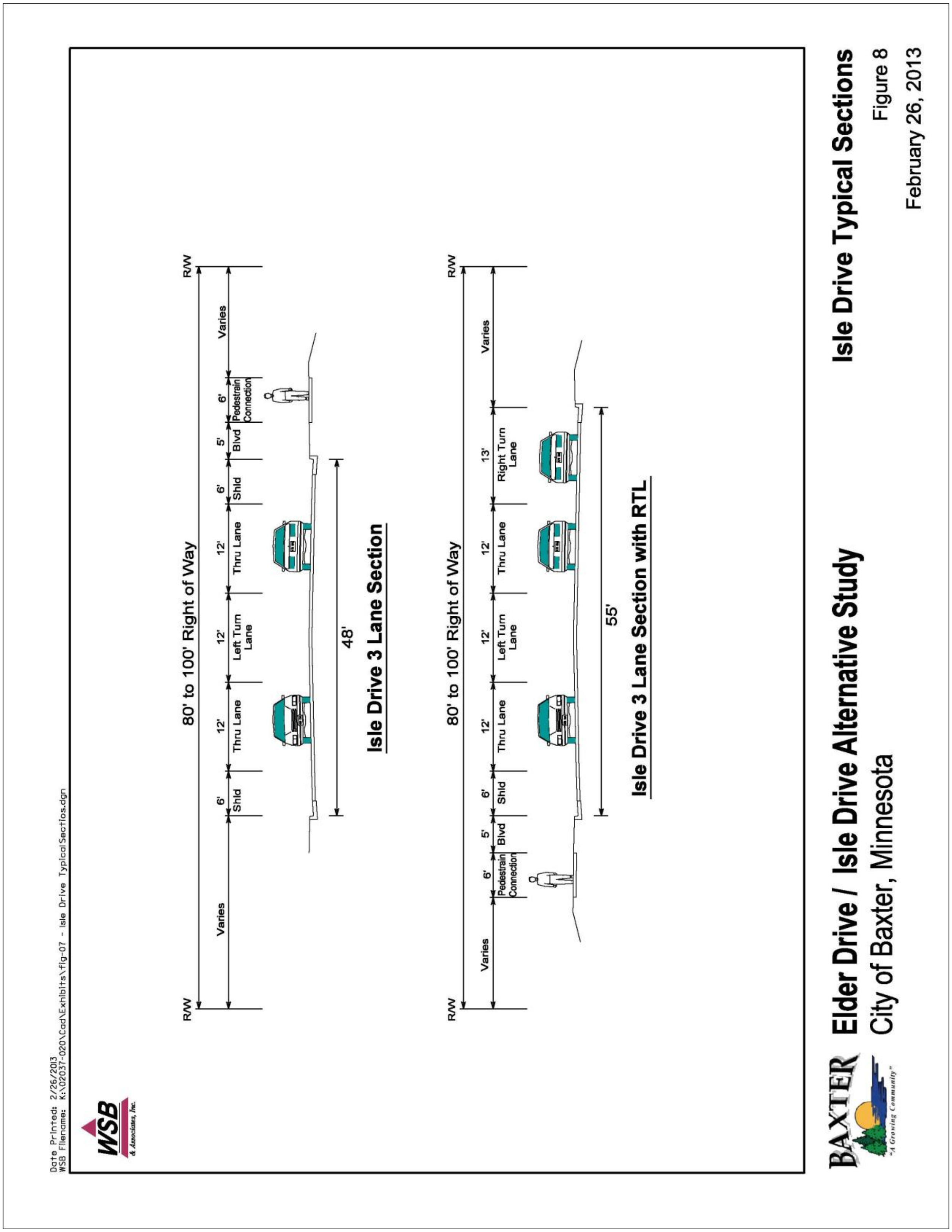
The proposed typical section includes a 48 foot paved surface which provides 6 foot shoulders that can be used for possible on road bike lanes. Assuming the typical three lane section a future roadway alignment was prepared from CSAH 48 to Foley Drive. ***Figure 9*** in the ***Appendix*** illustrates the proposed Isle Drive alignment concept.

B. *Roadway/Intersection Geometry and Traffic Control*

As indicated previously design of each roadway segment should include:

- Intersection and access locations
- Turn lanes
- Traffic control
- Sidewalk or path locations and connections
- Right of way needs

Included in the ***Appendix***, labeled as ***Concept 1, Sheet 1 through 9***, are 100 scale drawings for each segment of the proposed plan beginning at CSAH 48 and ending at TH 210.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WSB & Associates, Inc.
80' to 100' Right of Way
R/W
Varies
6'
Shld
12'
Thru Lane
12'
Left Turn Lane
12'
Thru Lane
6'
Shld
5'
Blvd
6'
Pedestrain Connection
Varies
R/W
48'
Isle Drive 3 Lane Section
80' to 100' Right of Way
R/W
Varies
6'
Pedestrain Connection
5'
Blvd
6'
Shld
12'
Thru Lane
12'
Left Turn Lane
12'
Thru Lane
13'
Right Turn Lane
Varies
R/W
55'
Isle Drive 3 Lane Section with RTL
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"A Growing Community"
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City of Baxter, Minnesota
Isle Drive Typical Sections
Figure 8
February 26, 2013

VI - CONCLUSIONS / RECOMMENDATIONS

Based on the review of existing and future land use and traffic conditions for the study area the following conclusions and recommendations can be made:

1. It is anticipated that at full build out of the area up to 50,000 trips per day could be generated in the area south of TH 210 to CSAH 48 and west of TH 371 to Perch Lake.

2. Based on the future full build traffic volumes, Isle Drive from CSAH 48 to Foley Drive will serve a critical function providing for development access, regional mobility and traffic relief to area roadways.

3. Current approved and expected development is anticipated in the corridor in the next 3 to 5 years. It is estimated that up to 30% of the area full build traffic could be realized in this time frame. Based on this development pressure making the Isle Drive connection to CSAH 48 would provide significant relief to area roadways, especially Glory Road.

4. The future full build traffic volumes on Isle Drive indicate that a 3 lane section (one through lane in each direction with a center left turn lane) with right turn lanes at primary intersections is adequate to provide for traffic growth past the 20 year time frame.

APPENDIX

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Elder Drive / Isle Drive Alternative Study

City of Baxter, Minnesota

Existing Average Daily Traffic Volume

Figure 2

February 26, 2013

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City of Baxter, Minnesota

Crash Locations (2007 - 2011)
Figure 3
March 8, 2013

Date Printed: 2/26/2013
WSB Filename: K:\02037-020\Cad\Exhibits\fig-05 - Traffic - FullBuild.dgn

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Project Area Full Build ADT Traffic Volume

Figure 5

February 26, 2013

Date Printed: 2/26/2013
WSB Filename: K:\02037-020\Cad\Exhibits\fig-06 - Traffic - 3 to 5 Year.dgn

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Project Area 3 to 5 Year Build ADT Traffic Volume

Figure 6

February 26, 2013

Date Printed: 3/14/2013
WSB Filename: K:\02037-020\Cad\Exhibits\fig-08 - Isle Drive Concept 1(500 Scale).dgn

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Alignment Concept 1

Figure 9

March 14, 2013

Date Printed: 3/14/2013
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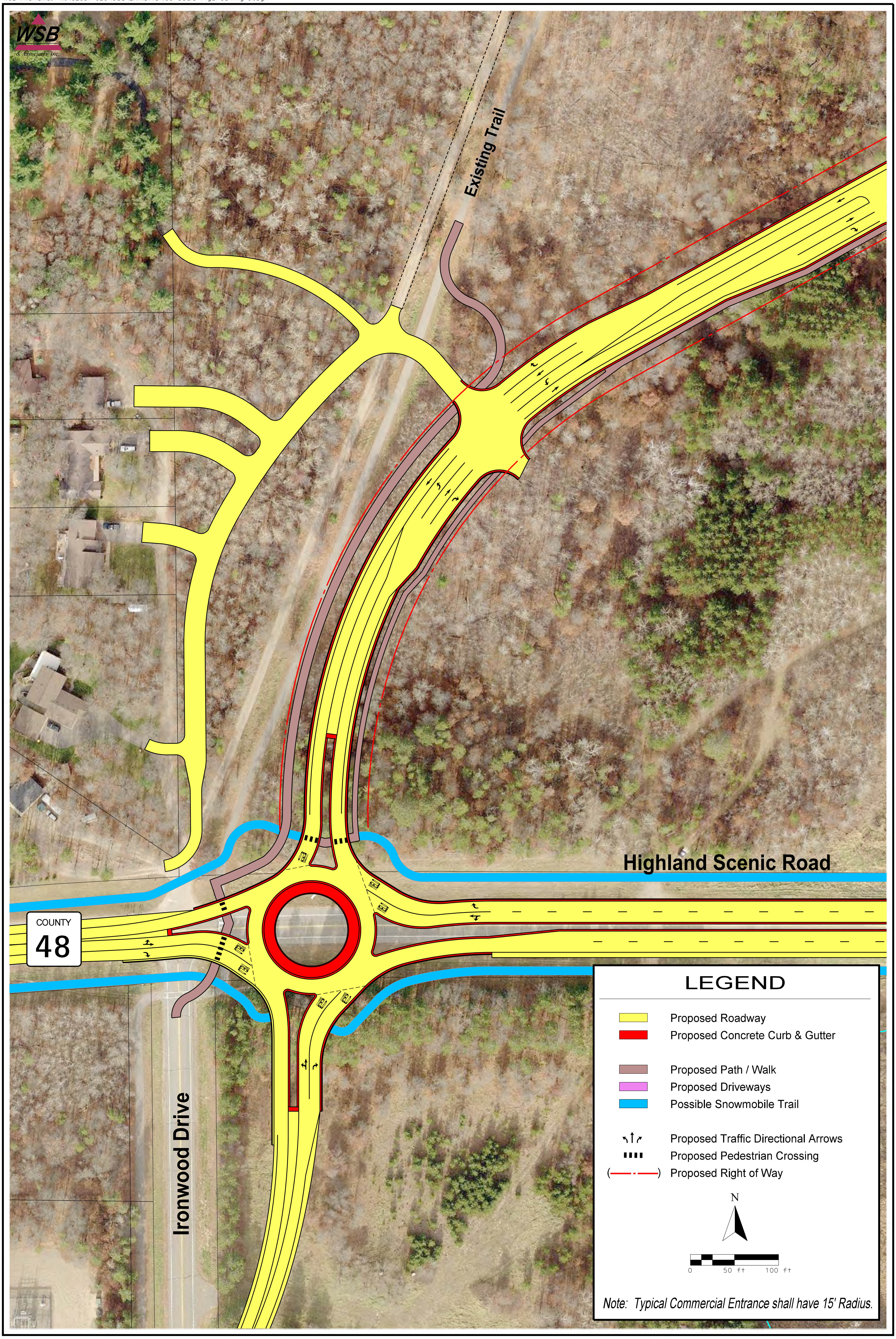

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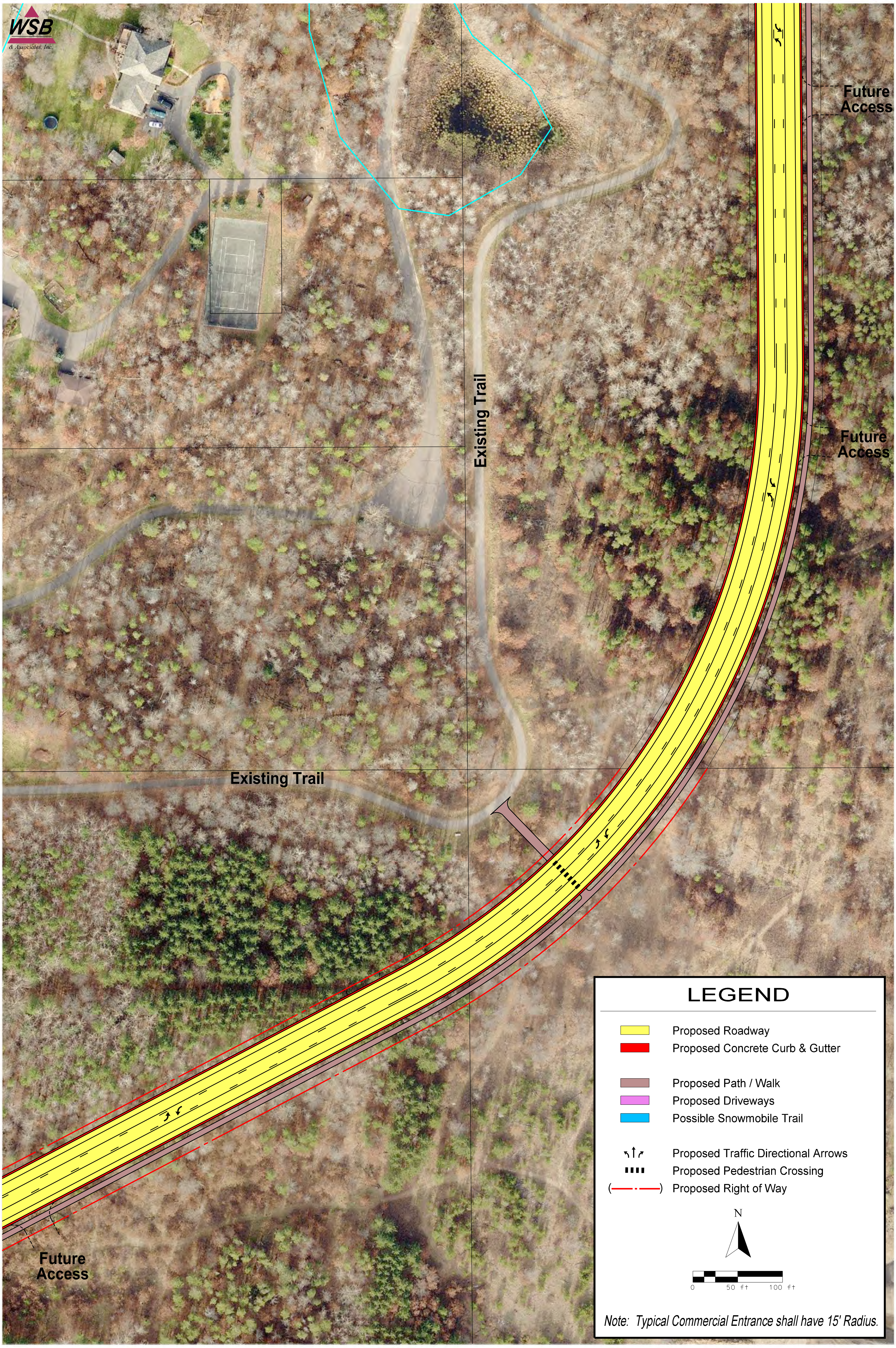

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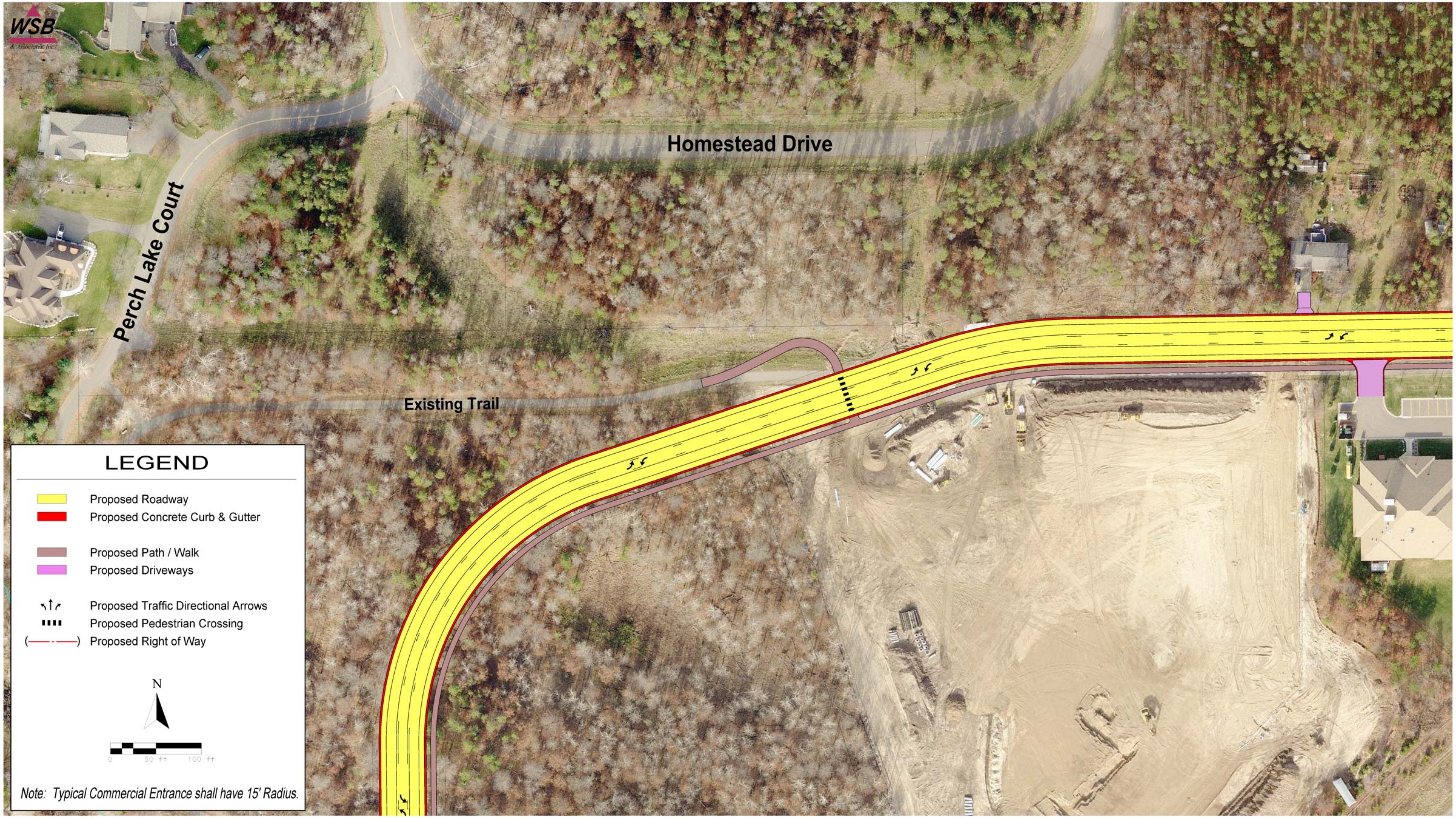

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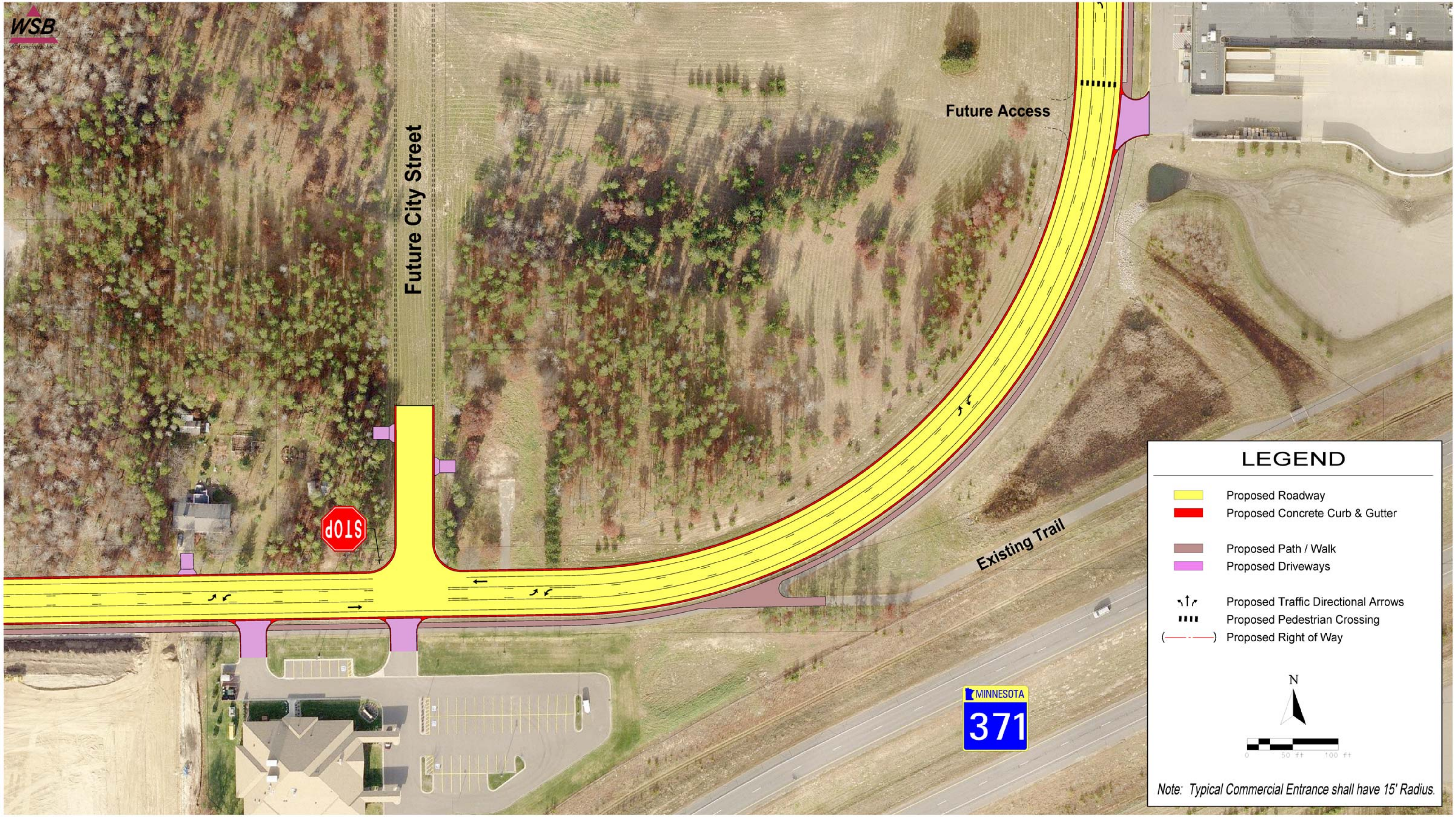
WSB Filename: K:\02037-020\Cad\Exhibits\100 Scale Figures\fig-04.dgn



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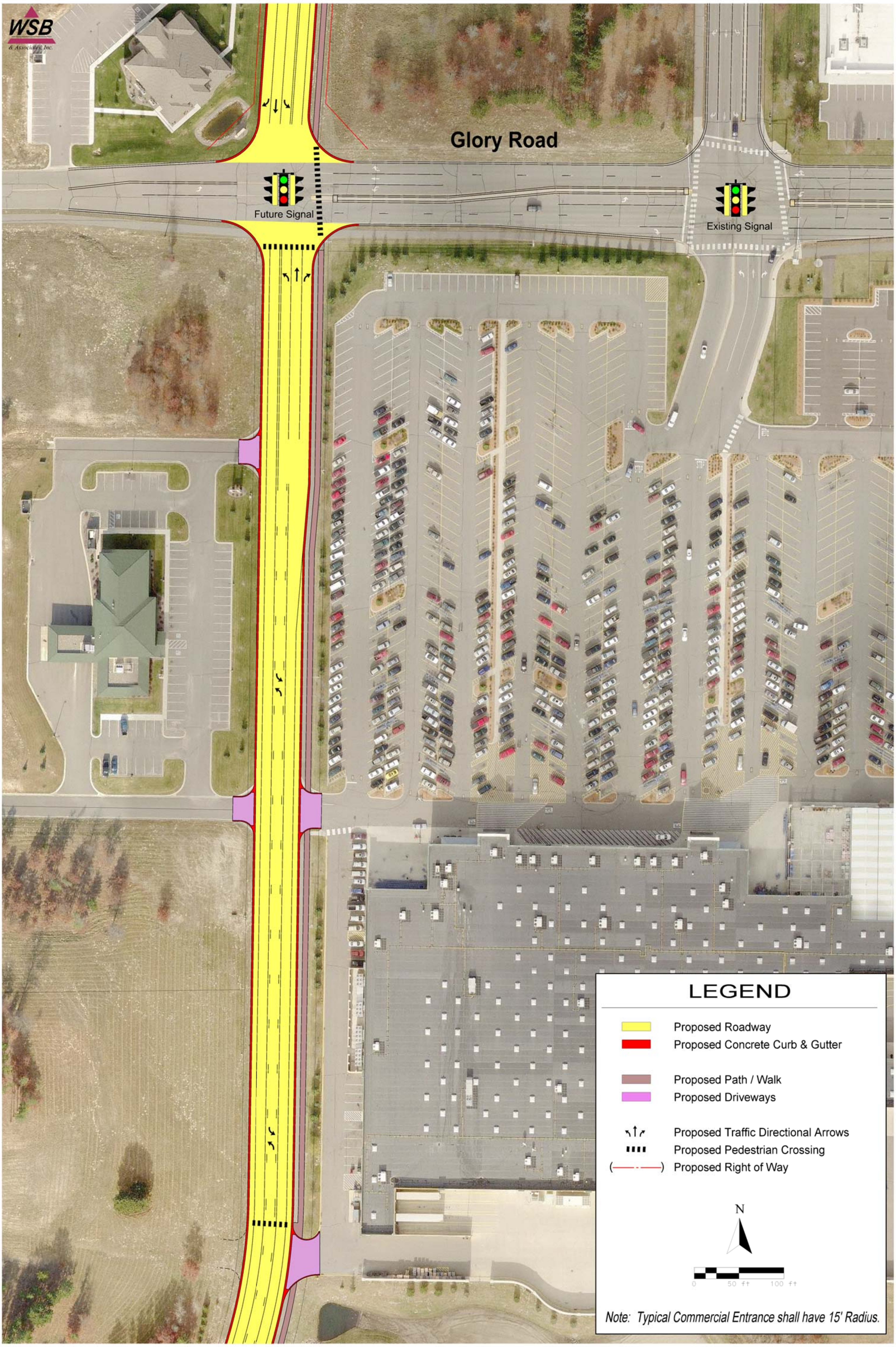

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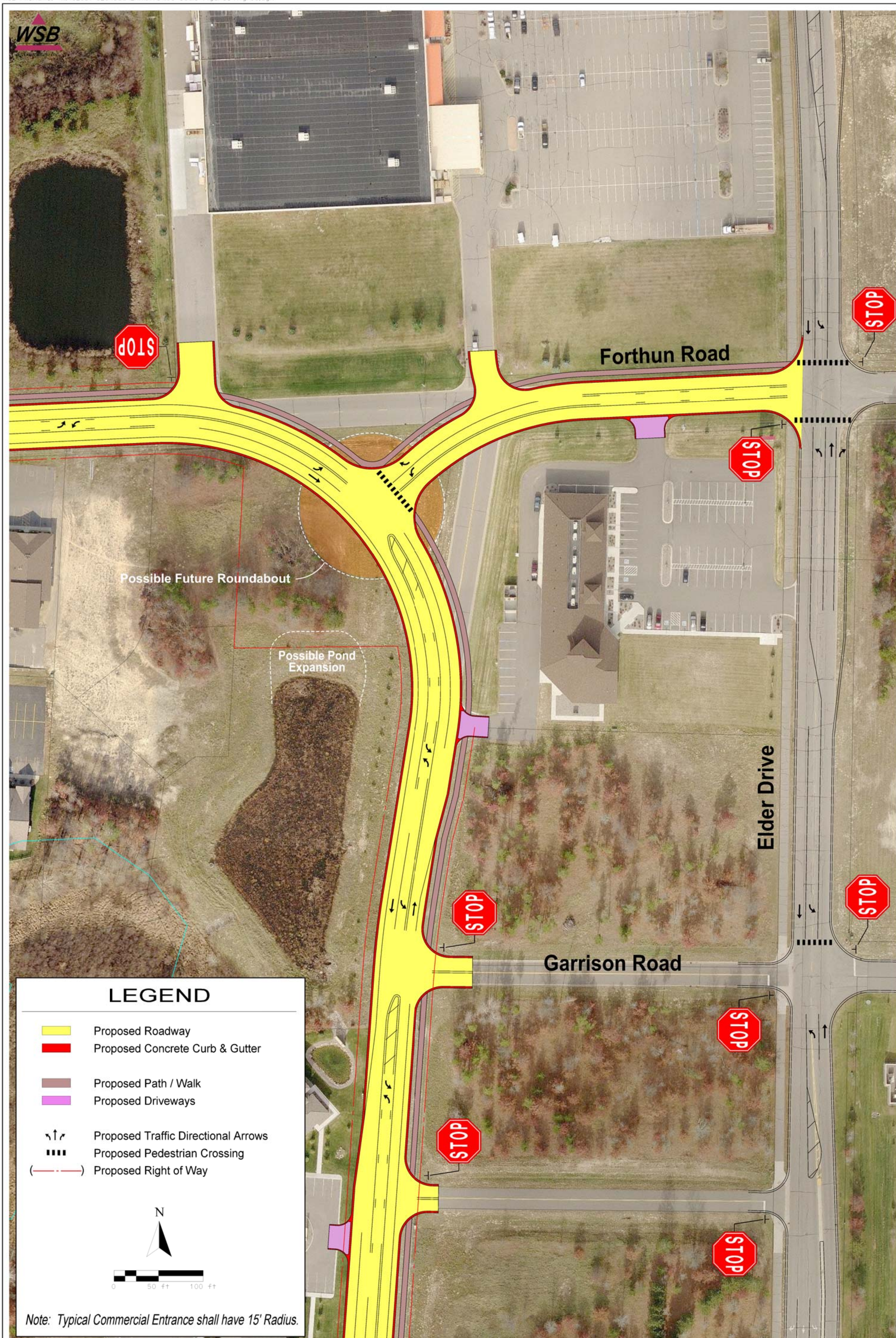

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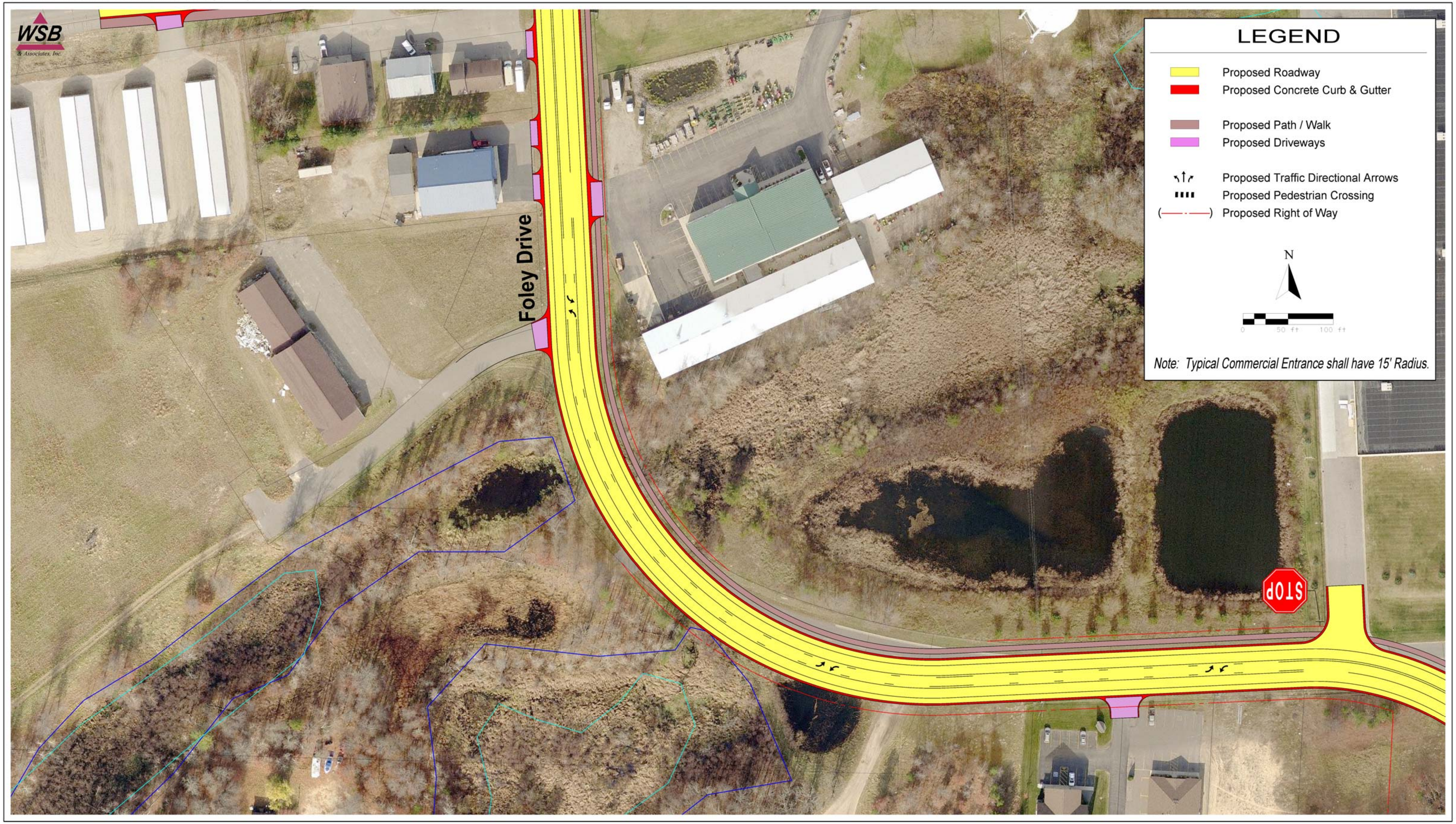

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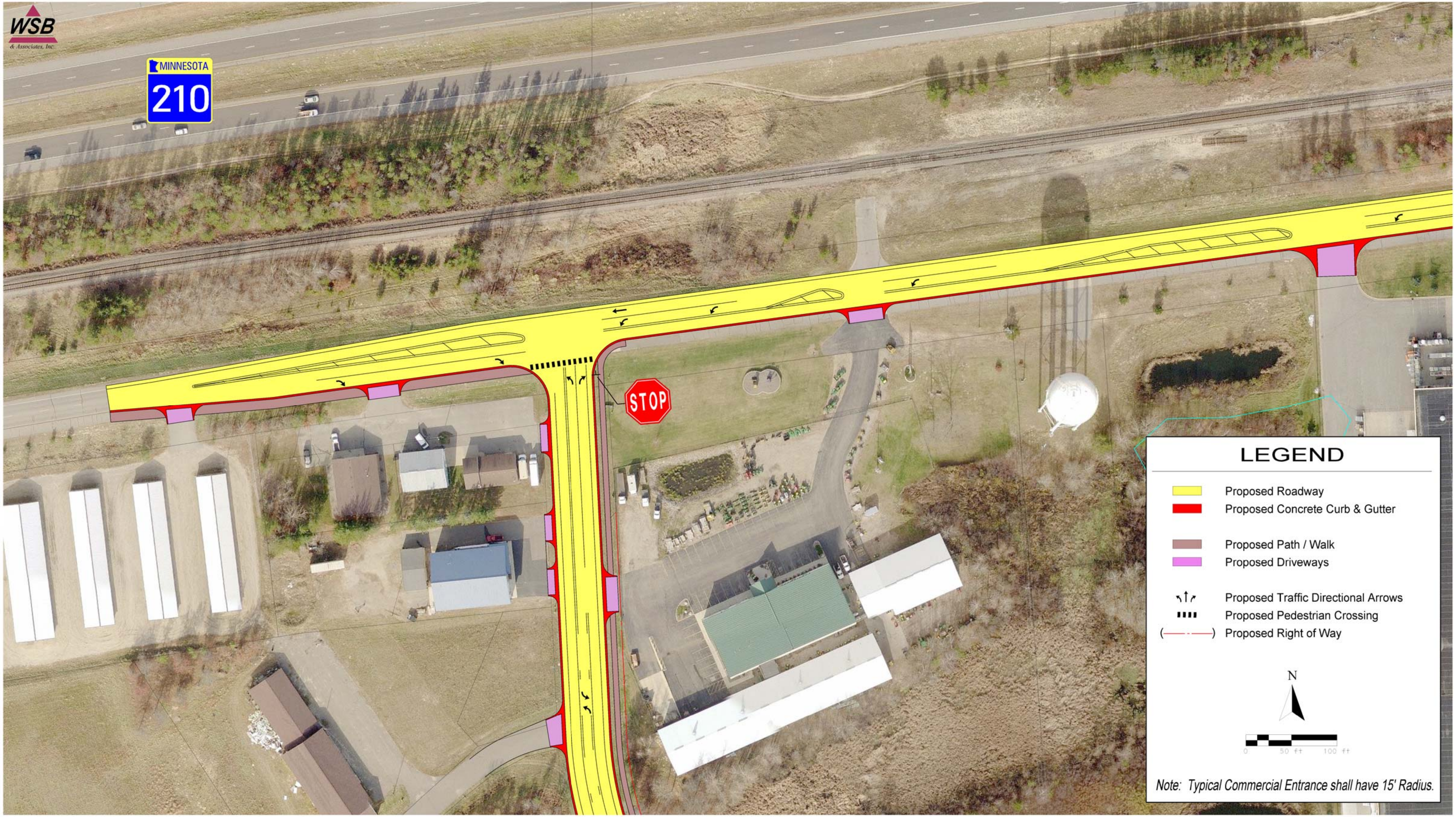

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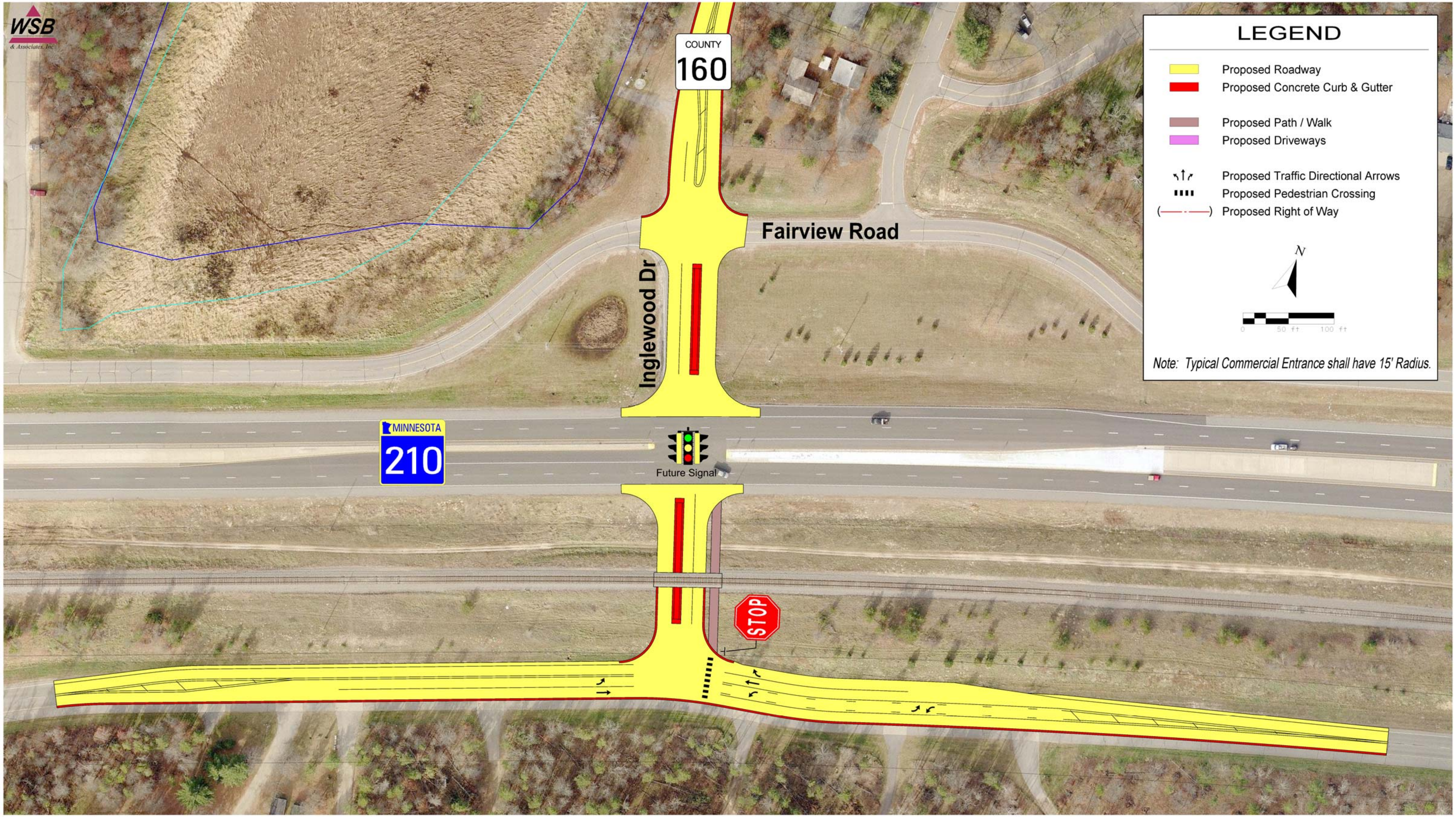

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