CHAPTER 2

PLAN POLICIES, STRATEGIES & IMPLEMENTATION

VISION, GOALS & STRATEGIES

This section establishes goals and strategies that will guide the development of the South Stoner Prairie Neighborhood. These supplement the design guidelines and implementation plan found in this chapter.

VISION STATEMENT

The South Stoner Prairie Neighborhood will develop as a complete neighborhood that creates diverse and affordable housing options, expands job opportunities, facilitates sustainable design and development practices, and promotes social equity.

Neighborhood goals are divided into the following categorites and further explained on the following pages:

Housing: *Integrate a diversity of housing types to accommodate a variety of lifestyles, age groups, and income levels.*

Mobility: *Implement safe, convenient and attractive streets that are accessible for all ages, abilities, and modes of transportation (pedestrian, bicycle, vehicle, and mass transit).*

Economy: *Locate employment options near residential areas, supporting the local and regional economy and providing job opportunities.*

Quality of Life: *Maintain streetscapes and open spaces that are accessible to all residents for recreation and enhanced neighborhood character.*

Sustainability: *Create an economically and environmentally sustainable development pattern, protecting existing natural features.*

1. HOUSING GOAL & STRATEGIES

Goal 1 – Integrate a diversity of housing types to accommodate a variety of lifestyles, age groups, and income levels.

Strategy #1.1

Encourage a variety of housing types, forms, price points, and tenures are included in the neighborhood.

Subdivisions should include a mix of unit types that will support varying household sizes and incomes. Subdivisions of 20 lots or more may be required to provide at least two housing types/forms.

Strategy #1.2

Encourage building and site design to facilitate transitions between low-intensity residential development and more intensive multi-unit residential, office and mixed-use developments.

Building forms and neighborhood patterns should be compatible with the design guidelines established in this Plan.

What is "Intensive" Development?

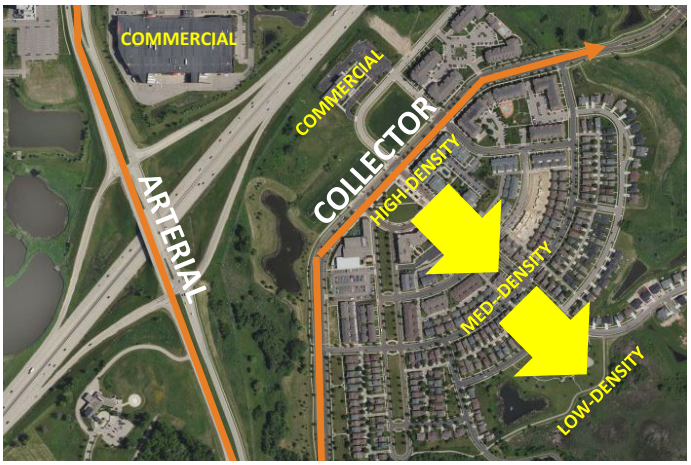
It refers to utilizing a piece of land to its maximum potential by building structures close together and/or larger in size and scale. Intensive developments provide a wider range of businesses and activiites for higher numbers of people in a community.

For the purposes of this Plan, low-intensity residential development indicates single-family, duplex, townhomes, and small multi-unit buildings.

This neighborhood incorporates varied housing types, using building orientation to mitigate compatibility issues.

This apartment building steps down the building adjacent to a neighboring lower-density residential use.

1. HOUSING GOAL & STRATEGIES (cont.)



The first bus route in Sun Prairie serviced this neighborhood due to its concentration of high-density housing inclusive of home-ownership and rental units.

Strategy #1.3

Concentrate higher-density residential and mixed-use developments along primary corridors to support future sustainable public transit route(s).

Public transit provides social, environmental, and economic benefits to communities. The most sustainable transit routes will be located along higher-density residential and commercial corridors (increased ridership). In South Stoner Prairie, these corridors would include Lacy Road, a proposed extension of Commerce Park Drive, and the addition of Collector Road "A."

Strategy #1.4

Encourage Traditional Neighborhood Design (TND) developments that allow for 'missing middle' and small-lot housing.

Traditional Neighborhood Design (TND) promotes "compact, pedestrian-oriented neighborhoods with a mix of commercial and residential uses, a variety of housing types, and public places where people can socialize and engage in civic life" (Capitol Region Council of Governments). TND also improves land use efficiency and opportunities for alternative modes of transportation.

The above development includes reduced setbacks and porches that provides a welcoming frontage. The building types also fit the "missing middle" housing formats as illustrated below.

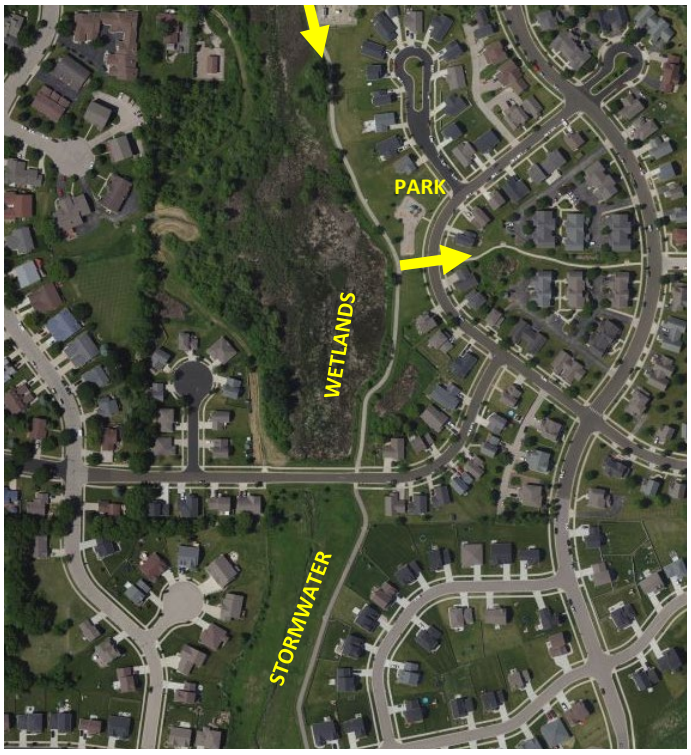
2. MOBILITY GOAL & STRATEGIES

Goal 2 – Implement safe, convenient and attractive streets that are accessible for all ages, abilities, and modes of transportation (pedestrian, bicycle, vehicle, and mass transit).

Strategy #2.1

Develop a convenient and connected multi-modal transportation system that links the neighborhood to the City and greater Dane County area.

Trails provide opportunities for passive and active recreation, support healthy living, increase the value of adjacent neighborhoods, and provide alternatives to motorized transportation connecting people to civic and employment areas. These benefits are multiplied when local trails are linked together and to regional trail systems.



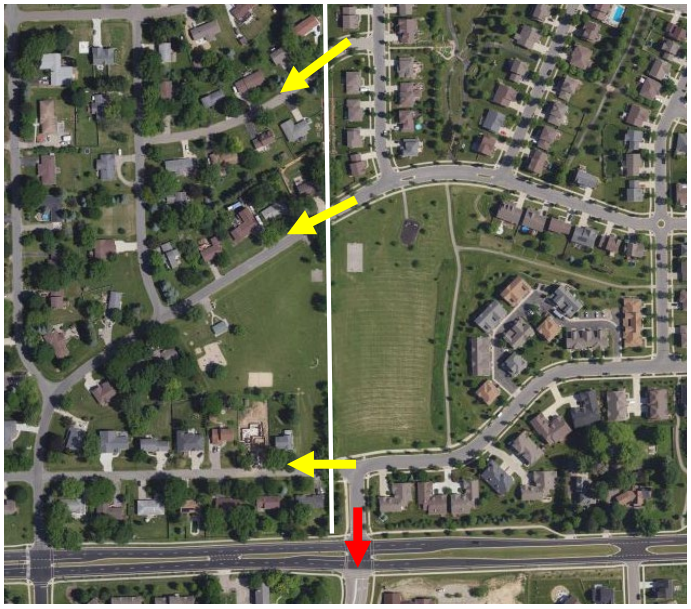
This trail connects a major roadways to a neighborhood park to several local neighborhood streets.

Strategy #2.2

Require proposed streets to connect to existing streets and intersections, wherever practical.

Dead-end streets and non-continuous trail networks limit options when moving throughout a community. This reduced mobility increases travel distance and traffic on primary roadways, can frustrate drivers/ pedestrians, and discourages non-mortorized travel. Development shall make every effort to connect to existing facilities (trails, roadways and intersections).

This Plan anticipates neighborhood development to occur in fragments over time; future development should anticipate and provide necessary connections between developments.



New neighborhoods making road and pedestrian connections that were established in older subdivisions.

2. MOBILITY GOAL & STRATEGIES (cont.)

Strategy #2.3

Discourage cul-de-sac and dead-end streets in favor of connected streets that provide transportation flexibility.

Where cul-de-sacs are necessary due to terrain or natural features, development should install multi-use paths connecting dead-ends to the street network.

Strategy #2.4

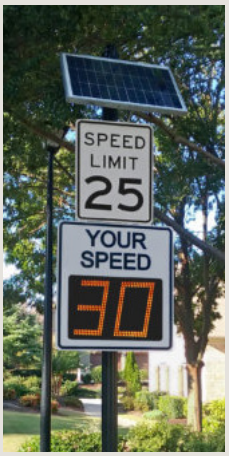
Design complete streets and utilize traffic calming and safety measures where appropriate to create a better street environment for pedestrians and cyclists.

The frequency and speed of vehicles can greatly impact road safety, especially for pedestrians/bicyclists. Various "traffic calming" measures can be designed or retrofitted to a roadway to reduce vehicle speeds and discourage vehicle usage (cut-through traffic). Traffic calming measures in South Stoner Prairie can include bump-outs, traffic circles, and high-visibility, and raised pedestrian crossings.

Streets shall include adequate lighting, especially on major collector roads and at significant intersections, to ensure safety of all users.

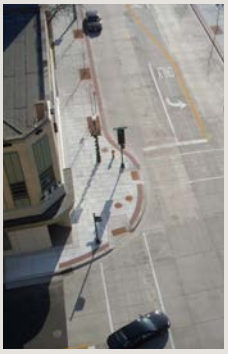
Traffic Calming Measures reduce traffic speeds and/or cut-through traffic with the goal of increasing safety for motorists, bicyclists, and pedestrians.

- **Striping Drive Lane Edge:** Painted solid line to reduce the perceived lane width and separate it from parking or biking space.
- **Tree-lined Streets:** Streets with landscaped center medians and/or perimeter trees can affect driver perceptions of lane width, inducing lower speeds.
- **Speed Display Sign:** Street sign with radar that displays actual speed and prompts motorists to slow down (via blinking or flashing lights).



Speed Display Sign

- **Bump-out (bulb-out, neck-downs):** Curb extensions into the road section (outside travel lanes) that narrows the road and length of pedestrian crossings.
- **Raised Crossing / Intersection:** Speed table across the entire crossing / intersection that reduces vehicle speed and creates level crossings for pedestrians.


Bump-out

- **Raised Median / Crossing Refuge**: Placement of a raised island in the middle of the roadway to narrow the vehicle travel lanes.
- **Chicanes and Traffic Circles:** Features that shift the path of traffic horizontally within the right-of-way. Chicanes do this mid-block and traffic circles do this within intersections.


Raised Median / Crossing Refuge, Plus Speed Table


Chicane

3. ECONOMY GOAL & STRATEGIES

Goal 3 – Locate employment options near residential areas, supporting the local and regional economy and providing job opportunities.

Strategy #3.1

Attract businesses that will meet local and regional needs, provide quality job opportunities, create a diverse mix of uses, and expand the property tax base.

Balanced neighborhoods include commercial areas within walking distance of residental areas; businesses and building forms will enhance the neighborhood's character and provide employment options in close proximity to where residents live.

This example ties the business park to the neighborhood along a minor street, as well as by an off-street trail. Building scale in the business park is smaller closer to the residential area.

Strategy #3.2

Promote commercial / business park areas that are compatible with the density and scale of surrounding development or screened to the extent practical.

Building forms should follow design and compatibility guidelines as described in this Plan. Scale, massing, and uses in employment areas shall consider design solutions that minimize impact to residential areas. Pedestrian and vehicle connections shall be provided between residential and employment areas.

This two-story mixed use building has a pitched roof and gables compatible with single-story ranch homes in the surrounding well-established neighborhood.

Strategy #3.3

Incorporate safe and convenient pedestrian, bicycle, and motor vehicle connections within and through commercial, mixed-use, and business park developments.

Balanced neighborhoods includes walkable access to jobs and services. Business entrances should connect to the street. Parking areas should include dedicated pathways and crossings to increase safe travel between businesses and parked vehicles.

4. QUALITY OF LIFE GOAL & STRATEGIES

Goal 4 – Maintain streetscapes and open spaces that are accessible to all residents for recreation and enhanced neighborhood character.

Strategy #4.1

Design residential areas around community gathering places (e.g., parks, schools, churches, community gardens, and other community facilities).

Public / community facilities are activity hubs within a neighborhood, historically placed on the premiere site within a neighborhood, district, or community. These facilities should be planned for and located in areas that are accessible and visible within the neighborhood.

Strategy #4.2

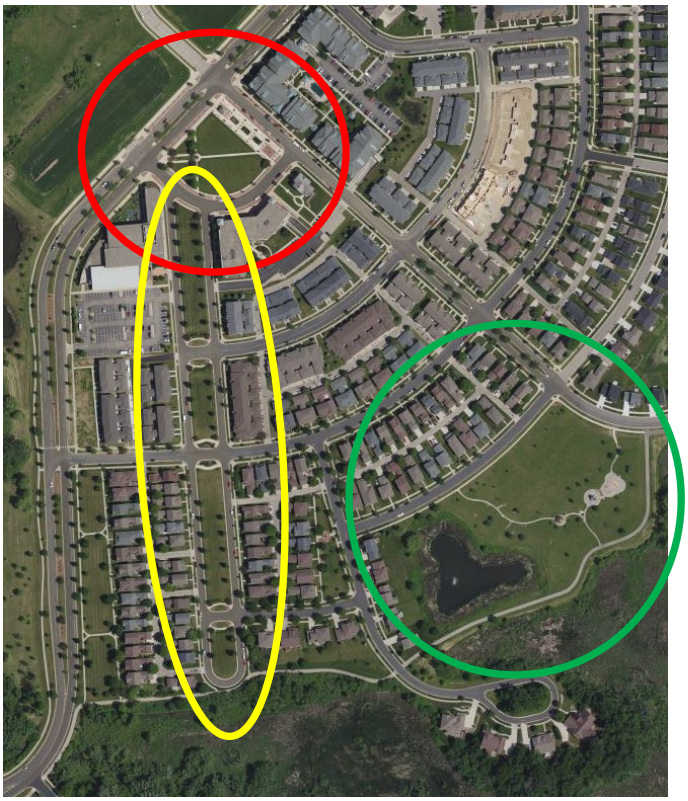
Plan for parks that vary in size and facilities to fulfill ranging neighborhood recreation interests consistent with the Fitchburg Parks and Open Space Plan.

Parks should be within 1/4- to 1/3-mile from residents with at least one neighborhood park within a 10-minute walk. Larger subdivisions should consider more than one park with varying programs, where practical.

Strategy #4.3

Make intentional multi-modal connections between local and regional park/open space areas.

Environmental features offer a break from the urbanized environments we live in. Trails and/or park amenities should take advantage of these features. Tying together several park and open space destinations provides a benefit to all neighborhoods residing along the route(s). Locally, the South Stoner Prairie neighborhood has the opportunity to connect to the Quarry Ridge Recreation Area and the Badger State Trail.



This Sun Prairie neighborhood includes a variety of open spaces that provides for diversity of uses and amenities, including a plaza (red circle), boulevard street (yellow circle), and traditional neighborhood park (green circle).

4. QUALITY OF LIFE GOAL & STRATEGIES (cont.)

Strategy #4.4

Design attractive streetscapes with street trees, lighting, and/or low maintenance landscaping clusters along major roadways.

Effective streetscape design can improve pedestrian experience and safety, address stormwater management, and minimize necessary landscaping efforts. Elements including median or terrace treatments, landscaping, and paving design along primary roadways can also establish / enhance the community 's identity.

Strategy #4.5

Plan and design public infrastructure that is sustainable and low maintenance.

Species of street trees should be selected for qualities including low maintenance requirements, canopy size, climate survivability, and pollution tolerance. Road medians must be sized appropriately for the health of trees and plantings. Planting beds should utilize native plant species such as prairie grasses and require as little mowing as possible.

Attractive streetscapes enhance the pedestrian experience with strategies including median and terrace plantings, paved sidewalks and paths, street trees, and pedestrian-scale lighting.

5. SUSTAINABILITY GOAL & STRATEGIES

Goal 5 – Create an economically and environmentally sustainable development pattern.

Strategy #5.1

Protect and restore the environment by integrating natural features into common open spaces for active / passive recreation, public gathering, or flood protection and stormwater management.

Strategy #5.2

Preserve the existing tree canopy to the extent possible, to include woodlands that are not intended to be quarried.

Preservation efforts will especially prioritize high-quality woodlands containing heritage or old growth trees. Woodlands will help to create a buffer between natural areas and development, ensuring wetland and stormater collection areas remain undisturbed. The existing woodlands will also provide the neighborhood with an essential tree canopy while young trees grow within the new development.

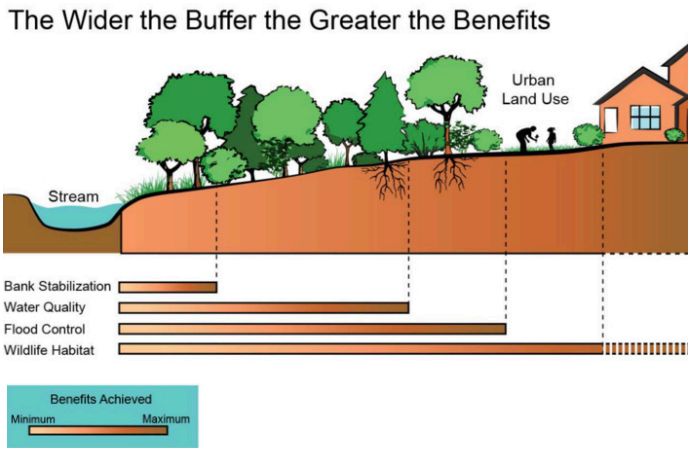
Strategy #5.3

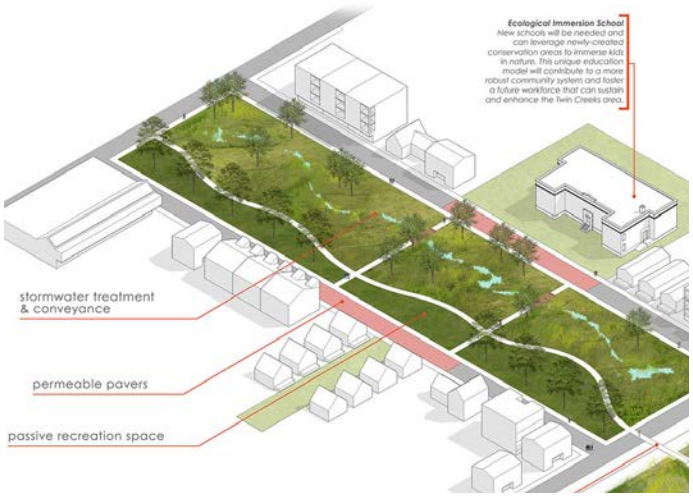
Encourage high-density residential development along collector and arterial roadways.

This allow for greater preservation of open space in the middle and edges of subdivisions.

Strategy #5.4

Explore options to recycle quarry byproducts through site development to reduce waste and allow for more economical development.





This diagram illustrates how stormwater management areas could also serve as a buffer between different uses, and provide passive recreational activities if connected to trails.

5. SUSTAINABILITY GOAL & STRATEGIES (cont.)

Strategy #5.5

Encourage energy-efficient buildings consistent with the city's existing energy targets.

Energy targets are available in the Fitchburg Sustainability Plan and the Clean Energy Resolution.

Strategy #5.6

Consider opportunities for alternative energy use within neighborhood design.

Future neighborhood development can support alternative forms of energy through solar-friendly urban design techniques and EV ready development. Aligning roadways east-west has roof planes facing north-south, allowing for maximum surface for solar panels.

The photo above presents an example of design strategies to maximize infiltration through pervious materials.

Solar panels can be integrated into residential areas while preserving neighborhood character.

PLACEMAKING

QUALITY PLACES

Placemaking is the *process* of creating ***quality places*** that attract people. Quality places can and should be unique and memorable, but there is a set of general physical characteristics that all good places share.

Project for Public Spaces (PPS) has found that Quality Places share four qualities:

1) they are ***accessible***;

2) people are engaged in ***activities*** there;

3) the space is ***comfortable*** and has a good image; and

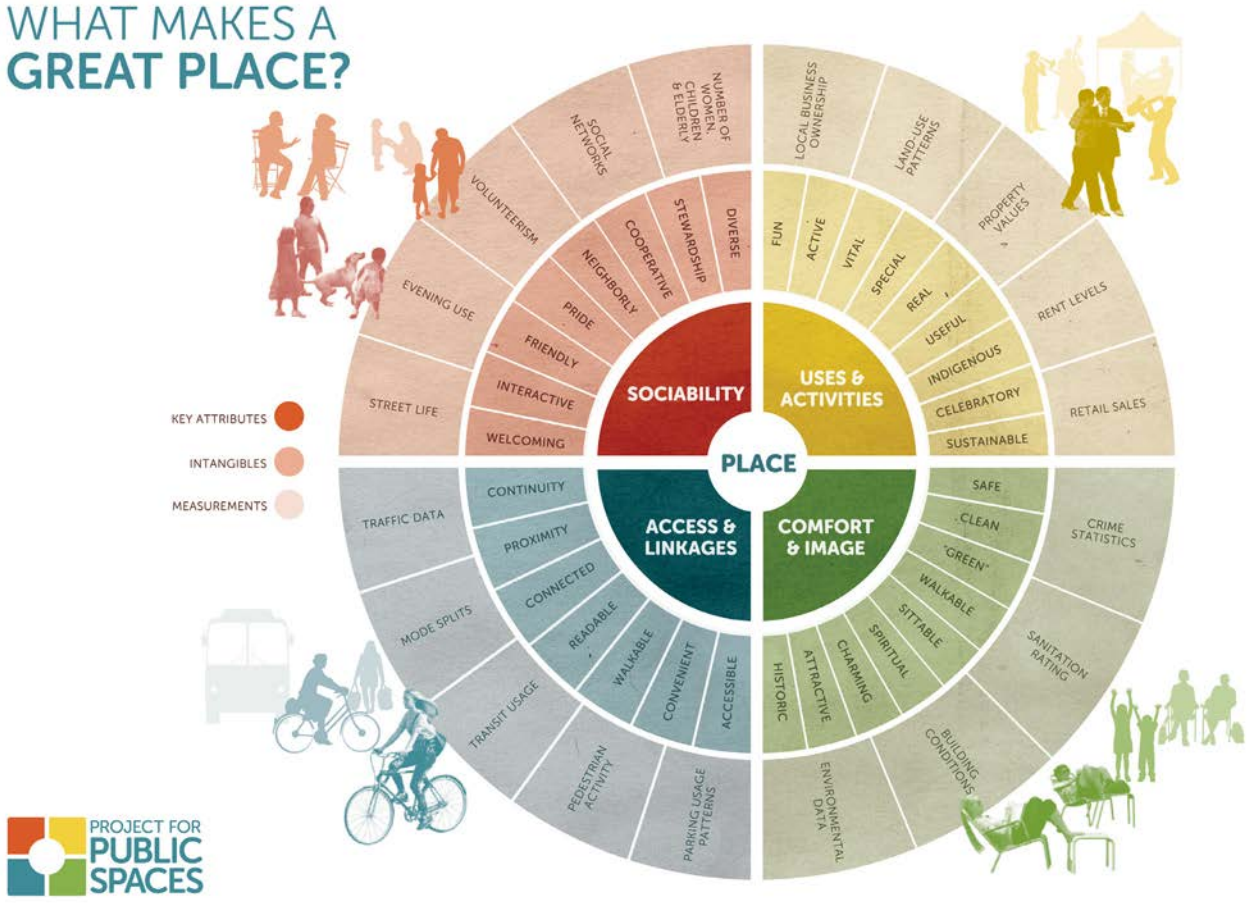
4) it is a ***sociable*** place - one where people meet each other and take people when they come to visit.

The Place Diagram (created by PPS) is shown below, and describes the many facets that make a place "great".

The Vision for this Plan is to make South Stoner Prairie a distinctive place. This section describes guidelines to work towards this goal; however, these guidelines are not intended as strict requirements.

PLACEMAKING STRATEGIES

The following guidelines, and the map on the next page, describe some placemaking strategies to enhance the neighborhood's capacity to attract people and investment and generate positive feelings about this area.



DESIGN GUIDELINES

Design guidelines are set to create memorable, desirable buildings and spaces, fostering a unique neighborhood character that residents will love and continue to invest in for many decades. Nonresidential and multifamily developments are encouraged to meet these guidelines.

1. ECO / SUSTAINABLE DESIGN

A. Orient buildings on the site to maximize natural light, ventilation, and solar energy opportunities.

B. Consider using green roof technologies.

C. Use "dark sky" friendly exterior lighting and LED technologies. "Dark sky" certified outdoor lighting is required by the City of Fitchburg ordinances.

D. Consider using mechanical systems that utilize renewable energy (solar, wind, geothermal) and minimize greenhouse emissions.

E. Utilize rain water collection, storage and distribution for irrigation systems.

F. Consider reusing "grey" water (wastewater generated from domestic activities such as laundry, dishwashing, and bathing) for irrigation and other non-potable uses.

G. Include bio-filtration basins and swales as a part of the stormwater systems on site to promote infiltration and groundwater recharge and reduce sediment runoff.

H. Include oil, grease, and sediment traps for parking lots.

I. Consider using porous paving materials (asphalt, concrete and pavers) in parking areas, walkways, etc.

J. Use drought tolerant landscaping materials to limit water use.

K. Incorporate Level 1 or 2 electric vehicle charging stations within exterior and covered parking areas.








2. ARCHITECTURE & DESIGN

A. Buildings should utilize details or changes in materials to create a discernible base, middle and top. Multi-storied buildings should have a horizontal expression line between the first and upper floors.

B. Buildings should establish vertical proportions for the street facade (e.g., expression of structural bays, variation in material, and/or variation in building plane), and for the elements within that facade (e.g., windows, doors, structural expressions, etc).

C. Avoid large, undifferentiated building walls and roof lines. Desired design features include variation in materials and colors, projecting and recessed bays, and variation in building heights.

D. Street-facing facades should use durable and high-quality building materials. All sides of the building should include materials and design characteristics consistent with the front facade. Use of lesser quality materials for the sides and rear facades should be minimized. Vulnerable materials, such as EIFS, should not be used.

Examples of various techniques in use to break down the apparent mass of a large building, including canopies, recessed decks, recessed top story, and variations in materials and wall plane.

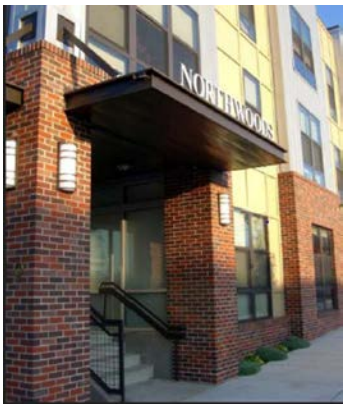
2. ARCHITECTURE & DESIGN (CONT.)

E. Awnings and canopies are strongly encouraged on ground floor facades of commercial, mixed use and apartment buildings. Awning colors should relate to and complement the primary colors of the building facade. Glowing awnings (backlit, light shows through the material) are discouraged.

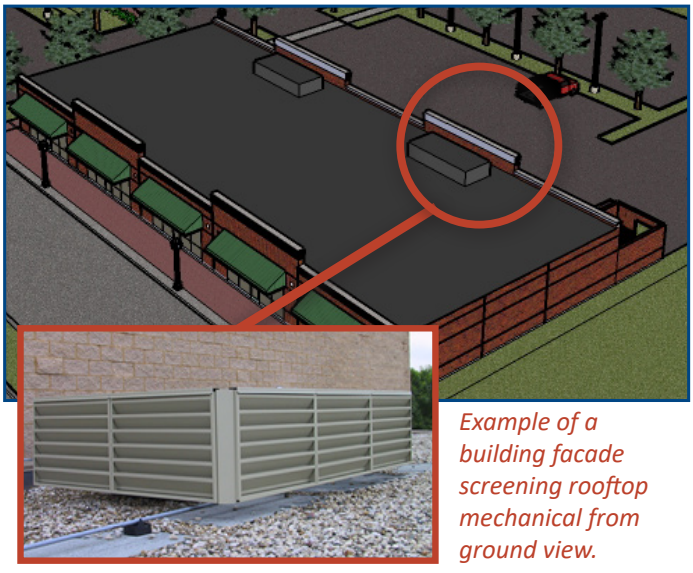
F. All buildings should have clearly-defined and welcoming entrances. Canopies, awnings, covered porches, and/or gable roof projections should be provided along facades that give access to the building to accentuate entrances and give shelter to visitors.

G. All service, refuse, garage doors, mechanical equipment and loading dock areas should be screened from public view through strategic placement, landscaping, and/or architectural design integration. For sites with dual frontage configurations, these features should generally be located along a side yard, and not prominently visible from either the collector/arterial road or the local street.

H. While all buildings should be close to the street, most residential buildings should use a first floor elevation at least three feet higher than the adjacent public sidewalk to maintain comfort and privacy for residents. Look for opportunities to use grade changes across the site to also provide accessible entrances to the building.



This example shows the use of a recessed entry to identify its location, and changes in material and wall plane to break up the side facade.



Example of a building facade screening rooftop mechanical from ground view.

3. PARKING, SCREENING & LANDSCAPING

A. Shared parking between uses is encouraged, to make more efficient use of land for parking.

B. Parking is encouraged to be located in the side yard and rear yard, or beneath buildings.

C. Parking and loading areas visible from the public street should be screened with berming, landscaping, fencing or a combination of these three.

D. Construct pedestrian walkways between the public sidewalk and primary building entries. On-site walkways should be separated from traffic and designed to safely connect the building to parking lots and other destinations on the site.

E. Parking lots should be landscaped along their edges and within each parking island. The incorporation of required stormwater detention and infiltration devices into the design of the parking area is encouraged.

F. All parking areas should have concrete curbs to protect landscaping areas, excluding those areas dedicated for snow storage. The curbs may contain gaps to allow stormwater flow into infiltration basins.

G. Fencing and screening should be of similar materials as primary building(s).

H. Landscape design should use native plant species to the region, especially buffering wetlands and other significant natural features.

This illustration shows two developments on adjoining lots sharing parking and an access drive. A sidewalk connects the two developments through the parking area.

Example of well landscaped parking edges.

Examples of desired stormwater management designs within parking lots.

4. COMPATIBILITY GUIDELINES (ADJACENT TO LOW-INTENSITY RESIDENTIAL)

These compatibility guidelines should apply to all new multi-unit residential, office and/or mixed use development of three-stories or larger and/or any development requiring a Planned Development (PD) zoning approval located on land abutting or across a street or alley from low-intensity residential. For purposes of this section, low-intensity residential development should mean single-family, duplex, townhomes (6 or less units), and small multi-unit buildings (8 or less units).

A. ***Use Intensity.*** In developments with multiple buildings with varying intensities, the development should locate buildings with the least intense character (e.g., lower heights, fewer units) nearest to the abutting low-intensity residential development.

B. ***Building Height.*** To ensure that new buildings are compatible in scale with surrounding properties, building height of any proposed structure(s) should not exceed thirty-five (35) feet in height in the following locations:

1. Portion of the structure within sixty (60) feet of a single-family or duplex lot.

2. Portion of the structure within thirty (30) feet of any other low-intensity residential lot (i.e., structures with 3+ units).

C. ***Bulk and Mass.*** Primary facades abutting or across a street or alley from low-intensity residential development should be in scale with that housing by employing the following strategies:

1. Varying the building plane setback a minimum of two (2) feet at an interval equal or less than the average lot width of the applicable low-intensity residential uses. For example, if a block of single-family lots is across the street from the development with an average lot width of 50 feet, the applicable facade shall vary its building plane, at a minimum, every 50 feet.

2. Providing a gable, dormer, or other change in roof plane at an interval equal or less than the average lot width of the applicable low-intensity residential uses. For example, if a block of single-family lots is across the street from the development with an average lot width of 50 feet, the applicable roofline shall vary, at a minimum, every 50 feet (measured at the roof eave).

D. ***Roof Pitch.*** The roof pitch of new residential buildings should range between 6:12 and 12:12. The roof pitch of porches shall not exceed that of the residential building to which it is attached.

E. ***Architectural Features.*** Encourage all the following categories of architectural features, with preference for at least two, to be incorporated into street-facing facades:

1. Porches or porticos

2. Balconies

3. Dormers and Gables

4. Bay Windows

5. Door and Window Ornamentation which may include surrounds, pediments, lintels and sills, hoods, and/or shutters.

F. ***Entrances.*** Street-facing facades providing direct access to first story dwelling units through individual entrances are encouraged. Preference is at least twenty-five (25) percent of ground units having direct access.

G. ***Garages.*** Attached garages shall not face or open towards the street. If this is not attainable, garages shall be sufficiently screened and face the street with the highest intensity of adjacent uses.

H. ***Parking.*** Parking areas that are visible from the street and located in the building front lot setback should provide buffering at a minimum height of thirty-six (36) inches above the parking surface. Buffering can consist of landscaping, berms, fences/walls, or a combination of these.

I. ***Refuse Areas.*** Dumpsters should be placed either in the underground garage or behind the building with opaque screening (constructed of the same materials as the prmary building). If the refuse area cannot be placed behind the building, a wood fence or wall, at least six (6) feet in height, with landscaping around trash enclosures is encouraged.

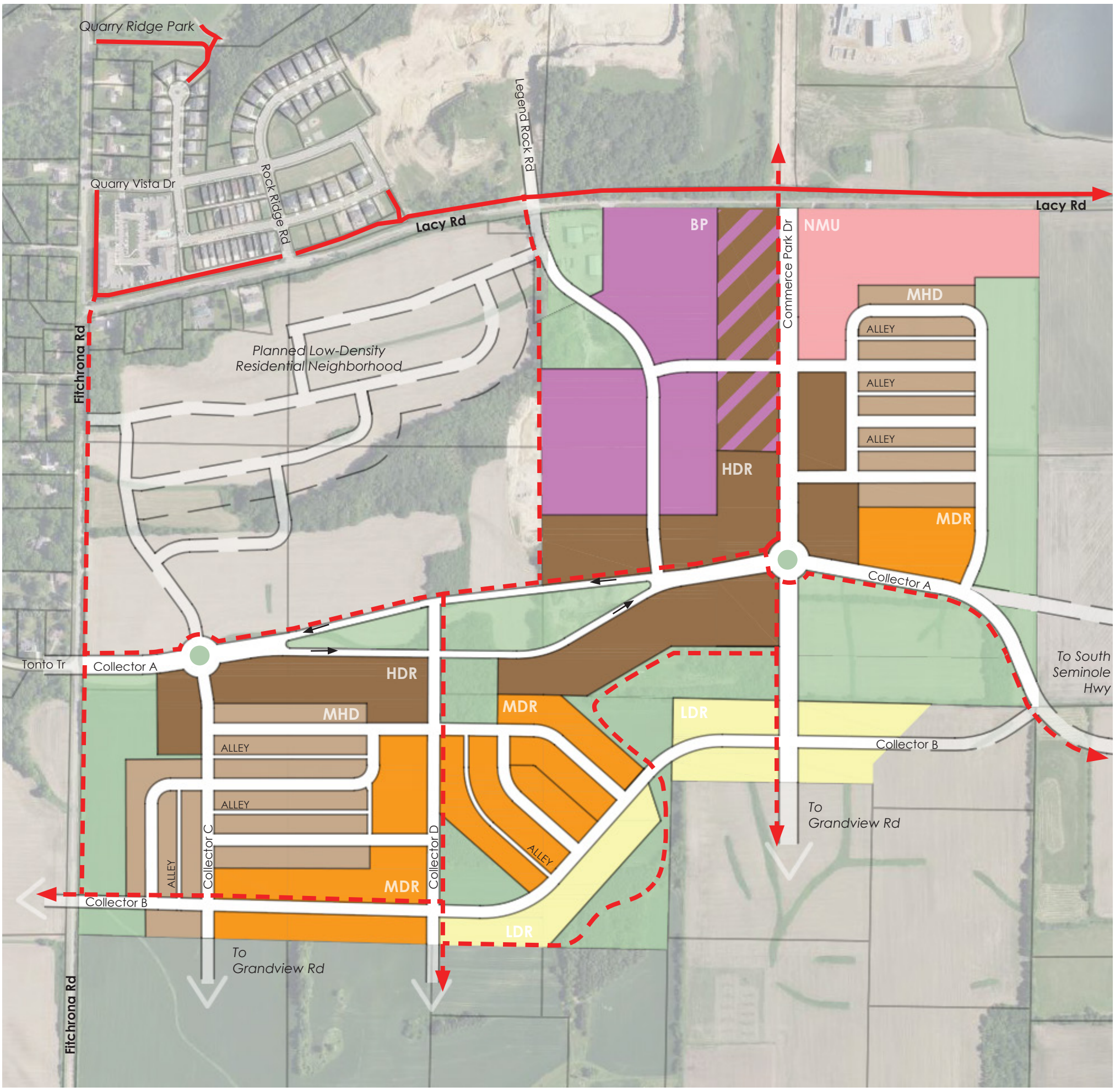
THE CITY OF Fitchburg

SOUTH STONER DEVELOPMENT

DRAFT

LAND USE CONCEPT

December 5, 2024



LEGEND

- 25 - 34 A. — Business Park (BP) *(Range to include hatched areas)*
- 35 - 44 A. — High Density Residential (HDR) *(Range to include hatched areas)*
- 29 ACRES — Medium-High Density Residential (MHD)
- 29 ACRES — Medium Density Residential (MDR)
- 14 ACRES — Low Density Residential (LDR)
- 14 ACRES — Neighborhood Mixed Use (NMU)
- 68 ACRES — Parks, Open Space, & Stormwater Management
- Roundabout
- Existing Trails
- Proposed Trails

0 mi 1/12 mi 1/6 mi 1/3 mi

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THE CITY OF Fitchburg

SOUTH STONER DEVELOPMENT

DRAFT

FUTURE LAND USE MAP

December 5, 2024

LEGEND

- 33 - 43 A. — Business Park (BP) *(Range to include hatched areas)*
- 43 - 52 A. — High Density Residential (HDR) *(Range to include hatched areas)*
- 41 ACRES — Medium-High Density Residential (MHD)
- 41 ACRES — Medium Density Residential (MDR)
- 17 ACRES — Low Density Residential (LDR)
- 14 ACRES — Neighborhood Mixed Use (NMU)
- 47 ACRES — Parks, Open Space, & Stormwater Management
- Roundabout

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SOUTH STONER DEVELOPMENT

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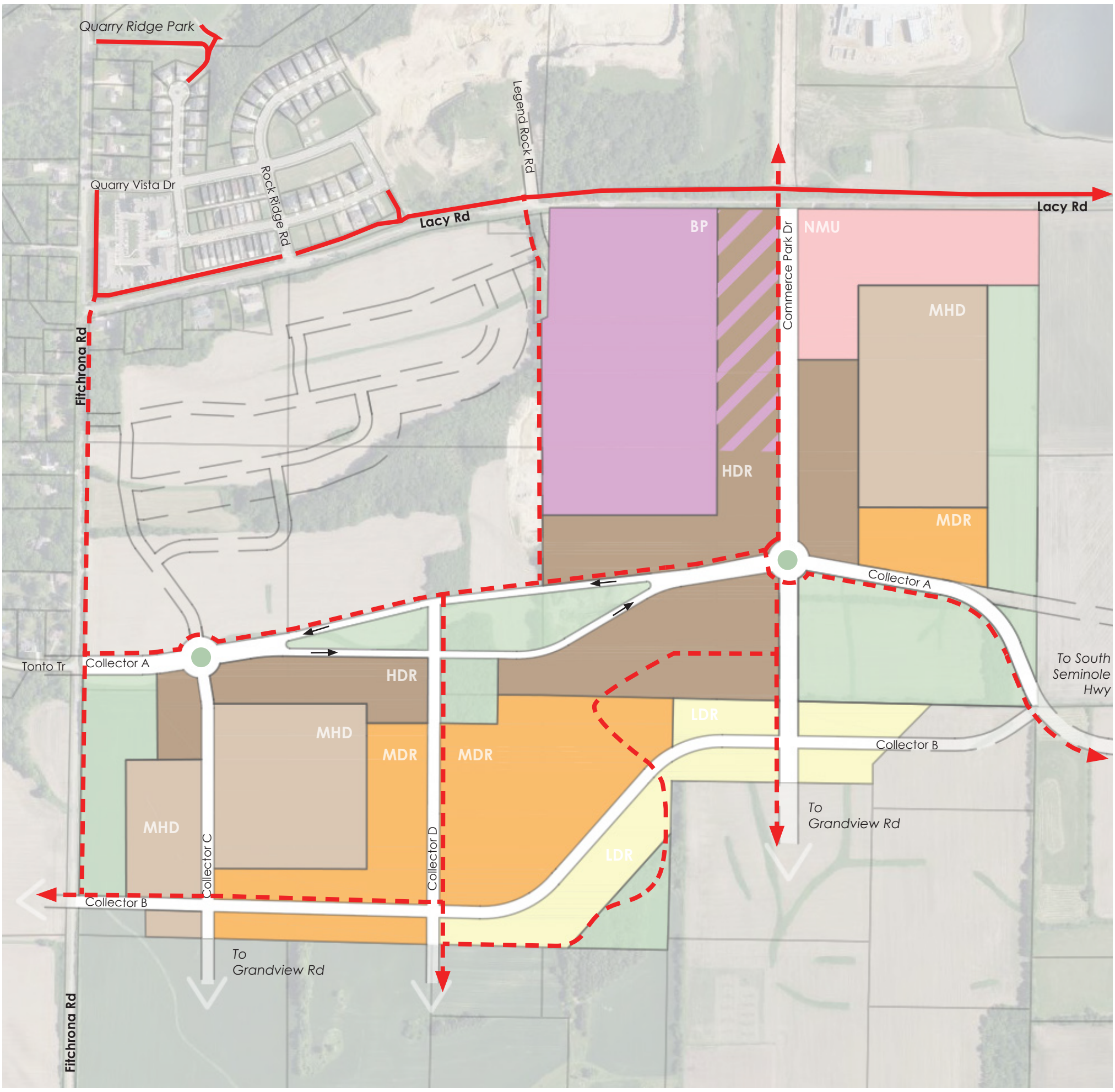
PROPOSED TRAIL NETWORK

December 5, 2024



LEGEND

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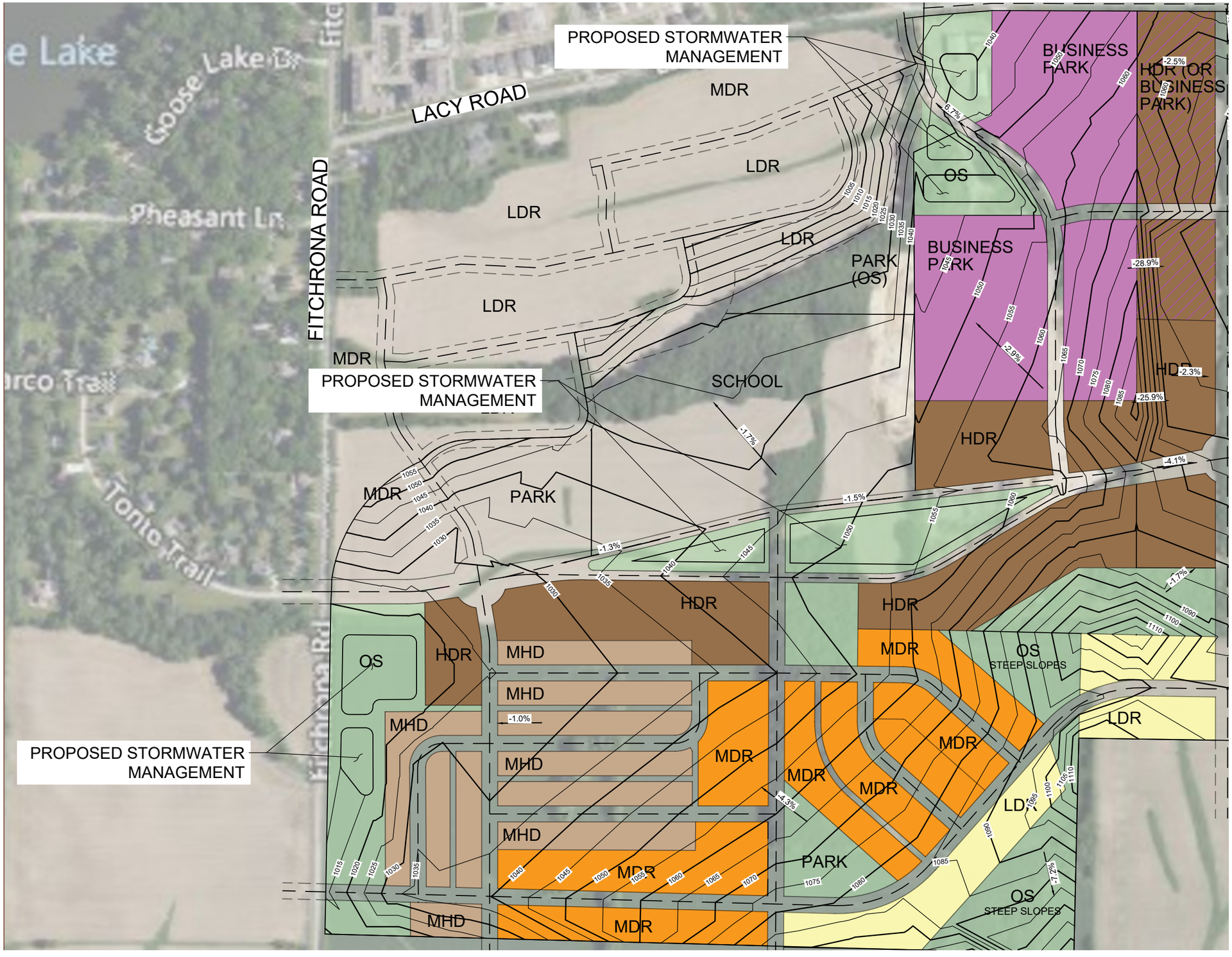

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FITCHBURG SSP PRELIM GRADING
FITCHBURG, DANE COUNTY, WI

PRELIMINARY GRADING EXHIBIT

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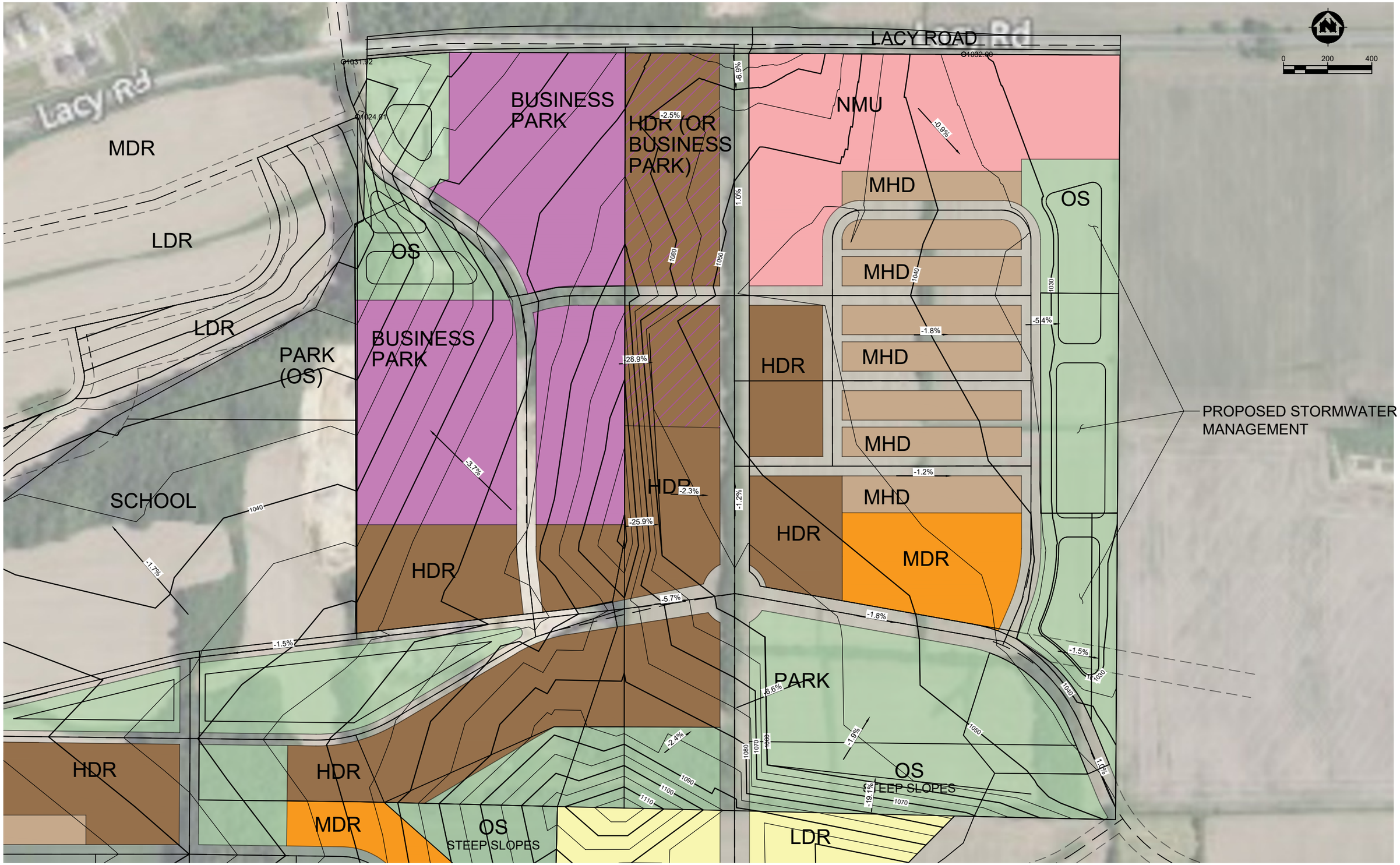

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FITCHBURG SSP PRELIM GRADING
FITCHBURG, DANE COUNTY, WI

PRELIMINARY GRADING EXHIBIT

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South Stoner Prairie Neighborhood Plan

Conceptual Stormwater Management Plan

City of Fitchburg
Dane County, Wisconsin
November 2024

Prepared by:

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Project No. 07729051

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South Stoner Prairie Neighborhood Plan
City of Fitchburg

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1 – INTRODUCTION

1.1 PURPOSE

The conceptual stormwater plan was developed by MSA Professional Services, Inc. (MSA) for the South Stoner Prairie Neighborhood (SSPN) Plan. The conceptual stormwater management plan will discuss key water resource issues and provide a planning-level approach to managing stormwater for the future developed neighborhood.

1.2 BACKGROUND

The SSPN multiple issues related to stormwater management with additional off-site issues that would impact the neighborhood plan. Key issues include the following:

- Surface water runoff drains in two general directions. The runoff draining to the west will travel under Fitchrona Road through two culverts before eventually reaching Badger Mill Creek. The runoff draining to the east will flow into closed depression just outside the SSPN project area. This closed depression is part of a massive internally drained watershed that stretches from the North Stoner Prairie Neighborhood southeast to Brooklyn in the southeast corner of Dane County.
- The larger internally drained watershed consists of multiple closed depressions that have no defined surface overflow routes. Runoff can only leave the closed depressions by infiltrating or if water levels rose high enough, water would discharge south along South Seminole Highway **(Figure 1)**.
- The presence of shallow groundwater is seen on the north side of Lacy Road in the North Stoner Prairie Neighborhood, where water levels in a closed depression have remained consistent. While the closed depression immediately east of the SSPN does not have historic standing water there have been years where standing water has been present for prolonged periods during wet years. Shallow groundwater may limit stormwater infiltration.
- Currently, there are two quarries located on the north side of the SSPN. Two reclamation plans for the quarries have been provided to MSA. The western quarry owned by Fitchburg Minerals, LLC is planned to create an internally drained depression that ranges from 50’ to 150’ deep with an outlet to the west. The eastern quarry owned by Fitchburg Hills LLC is planned to drain by gravity to the east **(Figure 2)**.
- There are no regulatory wetlands located in the SSPN project area, but there are wetland indicator soils located just east of the project area.

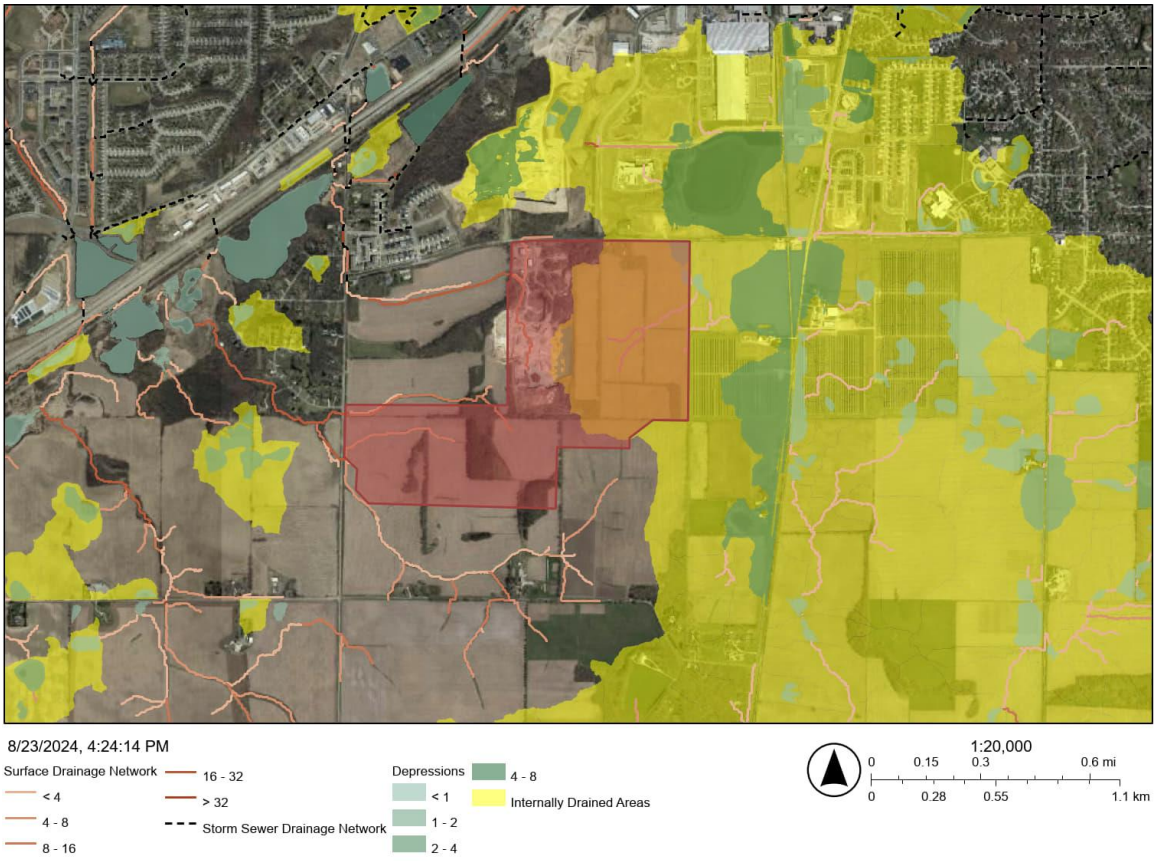

Figure 1. SSPN Internally Drained Watershed and Drainage Routes

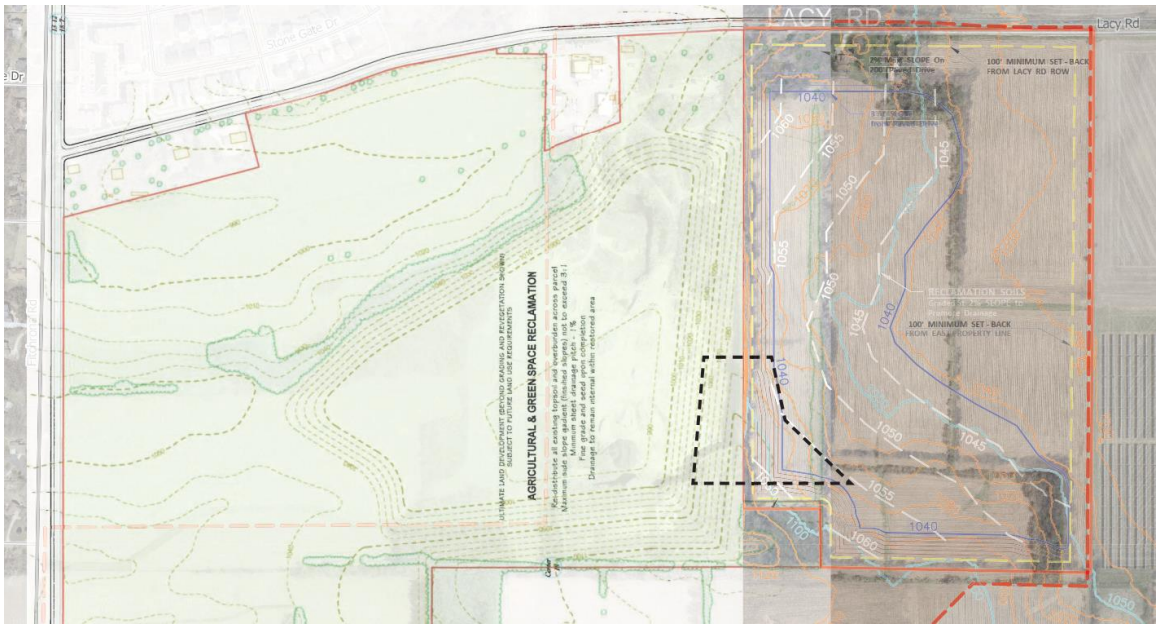

Figure 2. Quarry Reclamation Plan.

1.3 STORMWATER PERFORMANCE STANDARDS

As described above, the eastern side of the SSPN drains to a closed depression and the western side drains to Badger Mill Creek, which is not a closed depression. This leads to the SSPN having two different sets of applicable standards for development of this conceptual stormwater management plan. The standards are summarized below.

1.3.1 EAST CLOSED DEPRESSION WATERSHED

Peak Discharge Control

- Control post-development peak discharge to pre-development rates for the 1-year and 2-year, 24-hour storm events (Wisconsin Administrative Code, Chapter NR 151).
- Control post-development peak discharge to pre-development rates for the 1-year, 2-year, 10-year, 100-year, and 200-year, 24-hour storm events (City of Fitchburg Ordinances, Section 30-28(b)(4)).

Volume Control

- The SSPN will need to be added to the urban service area, so an amendment will need to be submitted to the Capitol Area Regional Planning Commission (CARPC) before development can occur. Typically, CARPC requires post-development runoff volume for the 1-year, 2-year, 10-year, 100-year, and 200-year, 24-hour storm event to reduce the pre-development runoff volumes by 10%.

Infiltration and Flood Protection

- Maintain 100% of the pre-development infiltration (stay-on) volume, with no caps on area required and no exemptions for roads or soil type, based on the 1981 annual rainfall series (City of Fitchburg Ordinances, Section 30-28(b)(6)b).
- Establish a flood protection elevation in the closed depression west of the Badger State Trail equivalent to standing water level that would result from back-to-back 100-year runoff events (Dane County Ordinances, 14.12(2)(g)3).

Water Quality

- Retain 80% of Total Suspended Solis post-development compared to no controls (Section 30-28(b)(1)a of the City ordinance and NR 151).

1.3.2 WEST WATERSHED

Peak Discharge Control

- Control post-development peak discharge to pre-development rates for the 1-year and 2-year, 24-hour storm events (Wisconsin Administrative Code, Chapter NR 151).
- Control post-development peak discharge to pre-development rates for the 1-year, 2-year, 10-year, 100-year, and 200-year, 24-hour storm events (City of Fitchburg Ordinances, Section 30-28(b)(4)).

Infiltration and Flood Protection

- Maintain 90% of the pre-development infiltration (stay-on) volume, with no caps on area required and no exemptions for roads or soil type, based on the 1981 annual rainfall series (City of Fitchburg Ordinances, Section 30-28(b)(6)a and NR 151).

Water Quality

- Retain 80% of Total Suspended Solis post-development compared to no controls (Section 30-28(b)(1)a of the City ordinance and NR 151).

1.4 PROPOSED LAND USE

This conceptual stormwater management plan was developed during the neighborhood planning process. Proposed land use is business park and mixed use on the northern side of the SSPN with varying residential densities throughout the rest of the neighborhood.

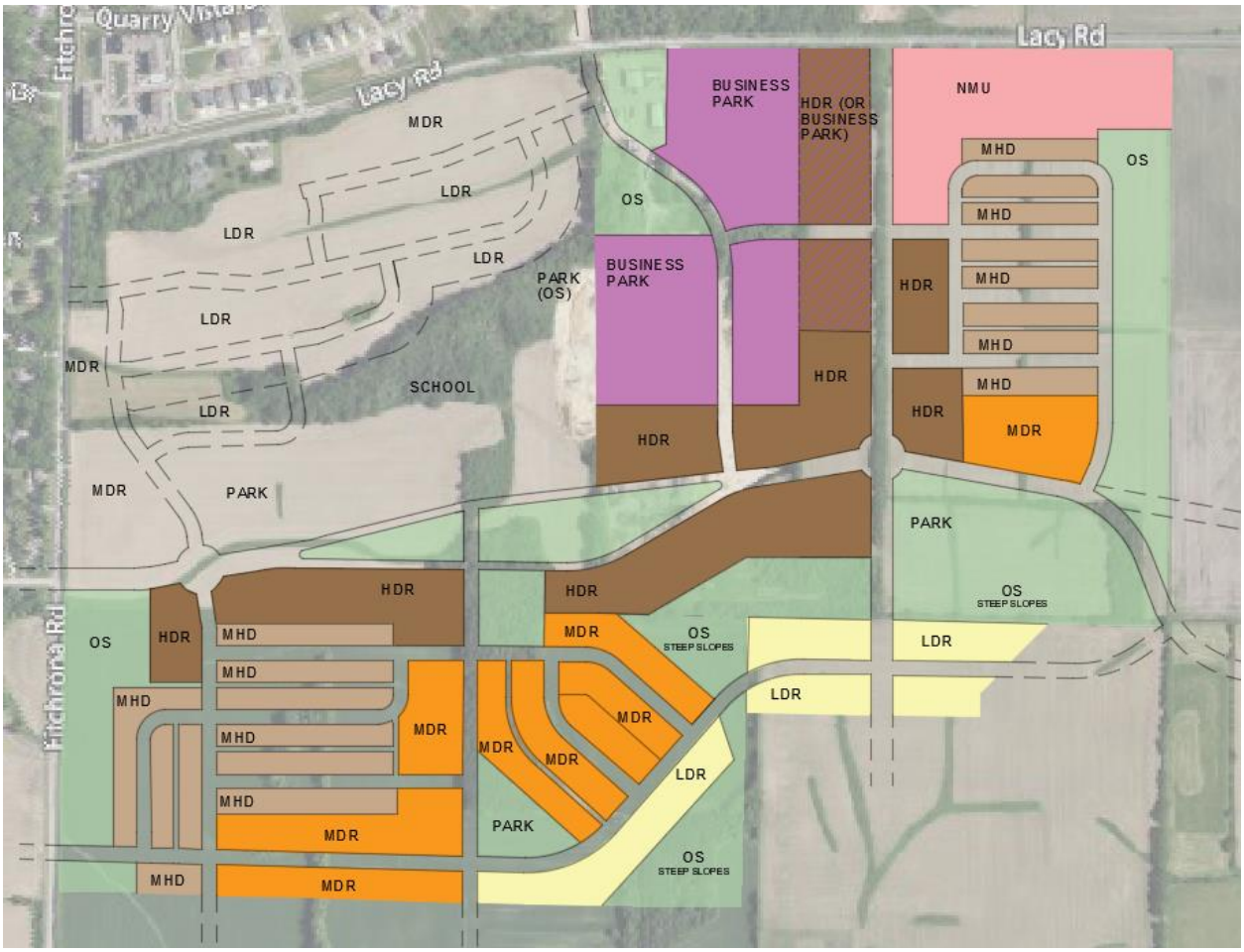

Figure 3. South Stoner Prairie Neighborhood Development Plan.

CHAPTER 2 – METHODS

The performance of the conceptual stormwater management plan was analyzed with multiple models: HydroCAD (Peak Discharge and Runoff Volume). WinSLAMM (Water Quality and Post-Development Infiltration), and Dane County Target Stay-On (Pre-development Infiltration).

2.1 PEAK DISCHARGE

Stormwater peak discharge was evaluated using the HydroCAD-10 model for both pre- and post-development conditions. The model uses standard Soil Conservation Service (SCS) TR-20 runoff hydrograph and curve number procedures, and TR-55 Time of Concentration (Tc) calculations. As required by the ordinance, rainfall events were simulated with the 24-hour MSE4 distribution and rainfall depths from NOAA Atlas 14 (**Table 1**).

Table 1. Dane County 24-hour Rainfall Depths

Recurrence Interval	Rainfall Depth (inches)
1-year	2.49
2-year	2.84
10-year	4.09
100-year	6.66
200-year	7.53

For the purpose of peak discharge ordinance compliance, the pre-development condition was considered to be after the quarries restored to their proposed reclamation plan. Prior to the excavation in the quarries, they were farmed agricultural fields. The proposed reclamation plans for both quarries call for restoration to open grass land, therefore using this land use would be more conservative than using agricultural curve numbers. The neighborhood was divided into pre-development subwatersheds based on existing land surface topography and the proposed reclamation grade of the quarries (**Figure 4**). There are six primary discharge points for the neighborhood:

1. Subwatershed 100, 105, and 110 drain to a culvert crossing Fitchrona Road.
2. Subwatershed 200 and 300 drains to another culvert crossing Fitchrona Road. Subwatershed 300 was delineated based on the quarry reclamation plan.
3. Subwatershed 400 drains northwest along Fitchrona Road into Goose Lake.
4. Subwatersheds 500 and 505 drain to a closed depression west of the Badger Trail.
5. Subwatersheds 600 and 605 drain to the existing stormwater basins that were constructed for the Lacy Road reconstruction project.

Pre-development runoff curve numbers were assigned based on pre-development land use, Hydrologic Soil Group, and the maximum allowable pre-development curve numbers allowed in Dane County and City of Fitchburg ordinances.

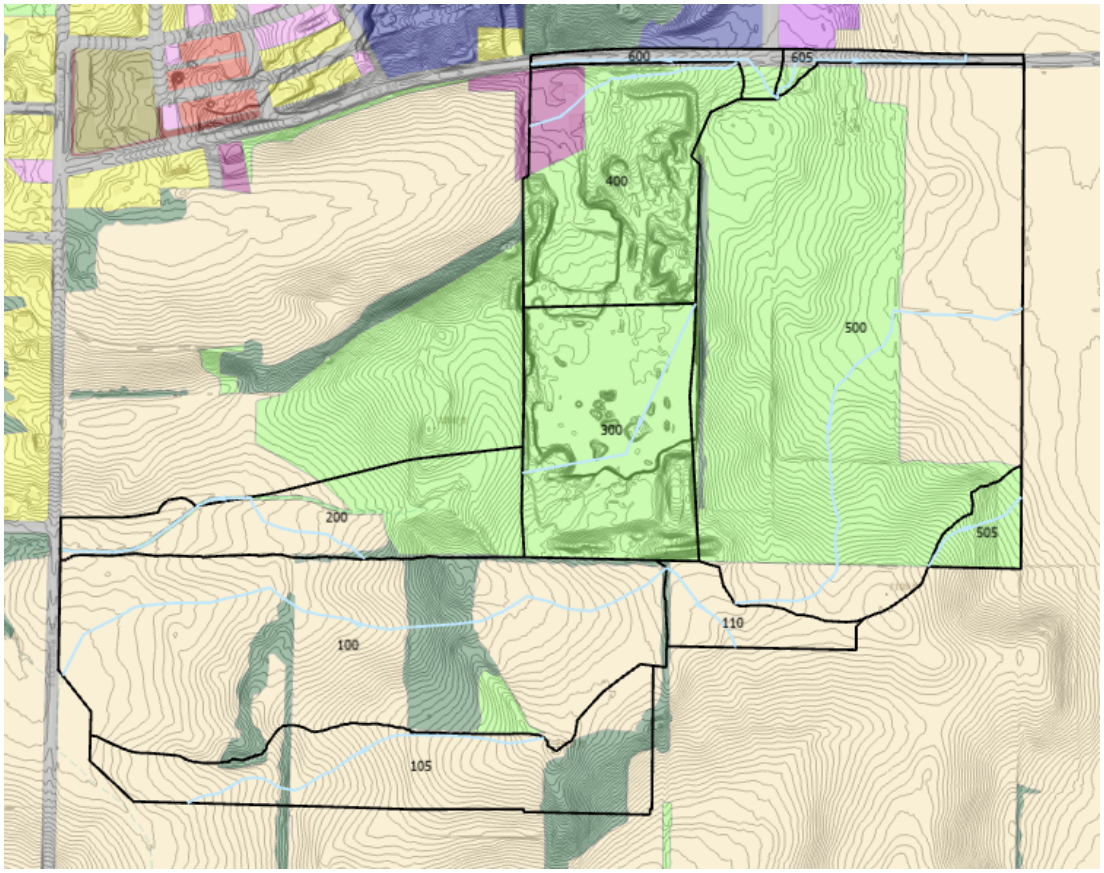

Figure 4. Pre-Development Subwatersheds and Time of Concentration Flow Paths

Post-development subwatersheds and curve numbers are based on the growth model developed during the SSPN planning process (**Figure 5**). For proposed conditions modeling, runoff coefficients were assigned on a lot-by-lot basis assuming impervious areas based on planned land. Runoff Curve Numbers under existing and proposed conditions were completed using weighted average Runoff Curve Numbers based on land use classifications. Runoff Curve Numbers under proposed conditions were evaluated using separate subcatchments for directly connected impervious areas and for pervious areas (this latter subcatchment also includes unconnected impervious areas). Below is a table of impervious areas by land use type and the percentage of impervious areas that are directly connected.

Table 2. Impervious Areas by Land Use Type

Land Use	Street	Driveway	Sidewalk	Roof	Open
HDR	-	10%	10%	35%	45%
MHD	-	10%	7%	30%	53%
MDR	-	10%	3%	25%	62%
LDR	-	10%	3%	12%	75%
NMU	-	25%	10%	55%	10%
BP	-	25%	10%	40%	25%
ROW	51%	5%	7%	-	37%
ROW-Rural	35%	-	-	-	65%
Alley	67%	4%	-	-	29%
Boulevard	50%	-	12%	-	38%

Table 3. Portion of Impervious Areas that are Directly Connected

Land Use	Street	Driveway	Sidewalk	Roof	WinSLAMM Standard Land Use Name
HDR	N/A	100%	50%	50%	High Density Residential (No Alley)
MHD	N/A	100%	100%	30%	Duplex
MDR	N/A	74.67%	50%	30%	Medium Density Residential (No Alley)
LDR	N/A	71.11%	50%	30%	Low Density Residential
NMU	N/A	100%	50%	50%	-
BP	N/A	100%	50%	50%	-
ROW *(All Types Except Rural)*	100%	100%	100%	N/A	-
ROW-Rural	0%	N/A	N/A	N/A	-

The total percentage of impervious area within each lot was identified by MSA's site planner, and the distribution of impervious areas by type were prorated accordingly from WinSLAMM standard land use classifications. Land uses that do not have a standard WinSLAMM land use classification was assumed to have 100% connected impervious for driveways/parking lots and 50% connected impervious for sidewalks and roofs.

Impervious percentages for the proposed ROW areas were calculated from City of Fitchburg typical roadway sections. The three proposed ROW widths on site are 24-foot wide, 40-foot wide, and 66-foot wide. ROW (66' wide) assumed to have a 34-foot wide roadway with two 5-foot wide sidewalks. Alley (ROW 24' wide) assumed to have a 16-foot wide roadway with no sidewalks. Boulevard (ROW 40' wide) assumed to have a 20-foot wide roadway with one 5-foot wide sidewalk.

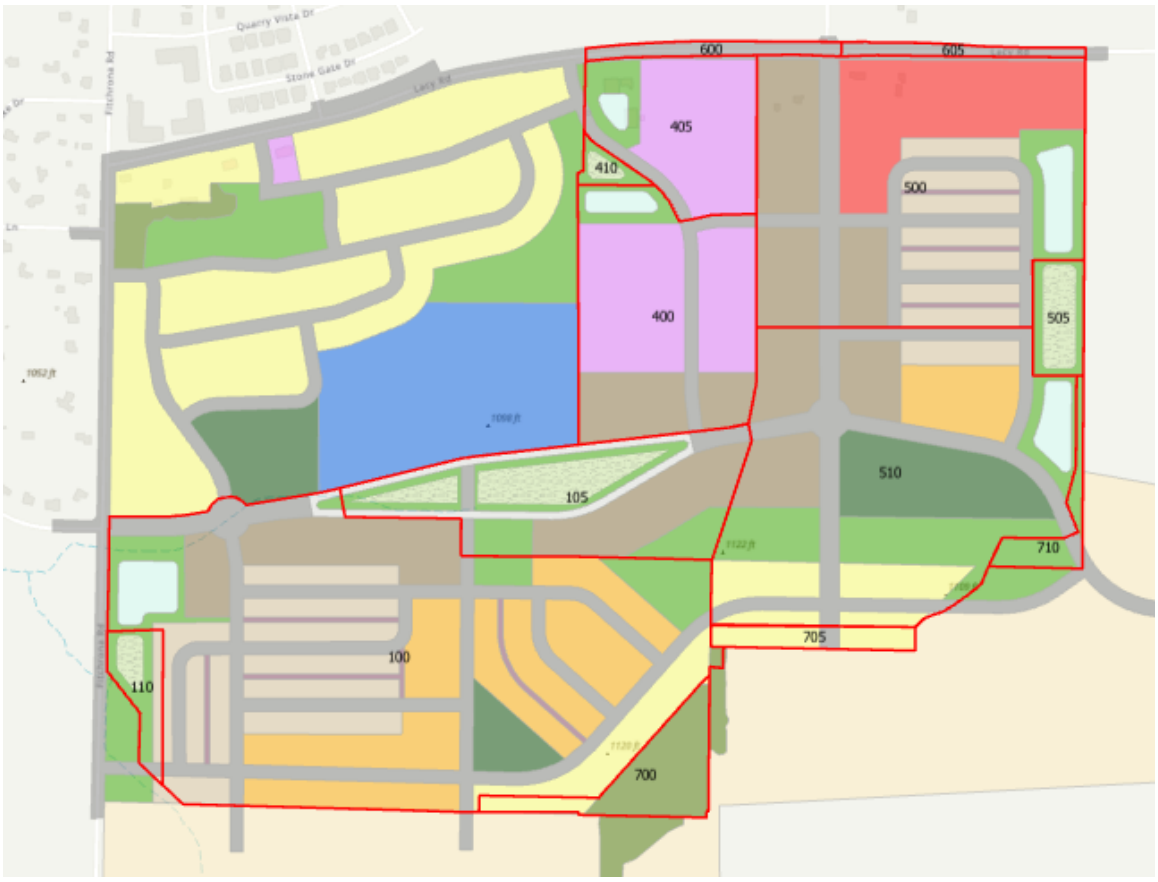

Figure 5. Post-Development Subwatersheds and Time of Concentration Flow Paths

2.2 VOLUME CONTROL

Stormwater volume control was evaluated based on individual events using the HydroCAD-10 model for both pre- and post-development conditions. The model uses standard Soil Conservation Service (SCS) TR-20 runoff hydrograph and curve number procedures, and TR-55 Time of Concentration (Tc) calculations.

2.3 WATER QUALITY

Water quality performance of stormwater control practices was evaluated using the WinSLAMM model version 10.5. The model estimates pollutant loads using a database of monitoring results and performs runoff and hydraulic routing calculations for treatment practices. The model was run continuously using Madison rainfall for the period of March 12, 1981, through December 2, 1981, as specified in NR 151, which had a total rainfall depth of 28.81 inches.

The WinSLAMM standard high density residential (no alley), duplex, medium density residential (no alley), and low-density residential land use files were modified to match the impervious surface ratios for the SSPN. Table 1 and 2 summarize the connected and disconnected impervious surface ratios used in the WinSLAMM analysis.

2.4 INFILTRATION

Pre-development stay-on calculations were completed using the pre-development curve numbers. The infiltration calculations were done using two separate targets, 90% and 100% infiltration, since the east side of the neighborhood drains to a closed depression and the west side of the neighborhood drains to naturally drained watershed. Dane County Stormwater Manual references a graph showing the 90% and 100% stay-on requirement based on the pre-development runoff curve number. Each target stay-on depth was multiplied by the area to get a total target stay-on volume for each watershed area.

Post-development infiltration performance was evaluated using the WinSLAMM model version 10.5. The model was run continuously using Madison rainfall for the period of March 12, 1981 through December 2, 1981, as specified in NR 151, which had a total rainfall depth of 28.81 inches.

2.5 EXTREME EVENT FLOODING

As described in Section 1.2, the closed depression west of the Badger State Trail and east of the SSPN is particularly prone to flooding because it has no surface outlet, and flood protection will be established based on back-to-back 100-year storm events. The HydroCAD model was used to compute the 100-year back-to-back storm event. The peak water surface elevation and flood area was estimated with a stage-storage relationship developed from the City of Fitchburg LiDAR survey (**Table 4**).

Table 4. Stage-Storage Relationship for Closed Depression West of Badger Trail

Elevation (ft)	Area (ac)	Storage Volume (ac-ft)
1017.0	9.25	0
1018.0	13.55	11.4
1019.0	23.20	29.8
1020.0	33.50	58.1
1022.0	47.65	139.3

Note: Overflow to the south occurs at approximately 1020.5 ft.

CHAPTER 3 – RESULTS

3.1 RUNOFF PEAK DISCHARGE AND VOLUME CONTROL

The stormwater management system controls peak discharge rates, at each location where discharge currently occurs, to levels less than existing conditions for events ranging from the 1-year, 24-hour storm to the 200-year, 24-hour storm. For the portion of the neighborhood draining east to a closed depression, runoff volumes are also controlled to 10% below existing levels for the 1-year, 24-hour storm to the 200-year, 24-hour storm.

Table 5. Peak Discharge Rates and Runoff Volumes Directed East

Event (yr)	Existing		Proposed	
	Peak Flow (cfs)	Total Volume (ac-ft)	Peak Flow (cfs)	Total Volume (ac-ft)
1	33.84	4.261	1.82	2.748
2	51.02	5.864	2.40	3.304
10	126.34	12.708	4.88	5.140
100	315.20	29.962	98.69	24.626
200	384.30	36.351	186.77	31.755
Area (ac)	104.30		111.47	

Table 6. Peak Discharge Rates Directed West

Event (yr)	Existing	Proposed
	Peak Flow (cfs)	Peak Flow (cfs)
1	67.46	6.71
2	94.74	8.63
10	207.53	24.80
100	478.10	221.15
200	574.64	292.65
Area (ac)	142.93	123.95

Table 7. Peak Discharge Rates Directed Northwest

Event (yr)	Existing	Proposed
	Peak Flow (cfs)	Peak Flow (cfs)
1	15.56	3.91
2	21.06	4.44
10	43.58	6.15
100	97.32	57.84
200	116.48	89.91
Area (ac)	26.87	39.96

3.2 WATER QUALITY

The WinSLAMM simulations of post-development conditions indicate that the stormwater management practices will provide the required 80% Total Suspended Soils control for the three regional watersheds. **Table 8** summarizes the post-development total suspended solids reductions compared to no controls.

Table 8. Post-Development Total Suspended Soils Reduction

Watershed	TSS Load Without Controls (lbs)	TSS Load With Controls (lbs)	% TSS Reduction
East	25,962	336.9	98.70%
West	29.112	1,671.0	94.26%
Northwest	9,932	274.4	97.24%

3.3 INFILTRATION

WinSLAMM modeling completed for this design indicates that the proposed stormwater management systems will achieve infiltration requirements for the east, west, and northwest draining watersheds. **Table 9, 10, and 11** summarize the existing stay-on calculations. **Table 12** summarizes the proposed infiltration meets existing stay-on requirements.

Table 9. East Watershed Existing Stay-On Calculations

	Land Use	CN	100% Stay-On Target (in/yr)	Area	Target Stay-On Volume (ac-ft)
East	Open, HSG B	61	28.5	21.271	50.519
	Open, HSG C	71	27.4	44.069	100.624
	Open, HSG D	78	25.8	1.724	3.707
	Woodland, HSG C	70	27.5	1.255	2.876
	Agriculture, HSG B	68	27.8	29.160	67.554
	Agriculture, HSG C	78	25.9	6.797	14.670
	Agriculture, HSG D	83	24.0	0.023	0.046
			27.61	**104.299**	**239.996**

Table 10. West Watershed Existing Stay-On Calculations

	Land Use	CN	90% Stay-On Target (in/yr)	Area	Target Stay-On Volume (ac-ft)
West	Open, HSG B	61	25.7	2.817	6.033
	Open, HSG C	71	24.7	35.592	73.260
	Open, HSG D	78	23.2	0.008	0.015
	Woodland, HSG B	55	25.9	2.023	4.366
	Woodland, HSG C	70	24.8	12.520	25.875
	Woodland, HSG D	77	23.4	2.561	4.994
	Agriculture, HSG B	68	25.0	21.969	45.769
	Agriculture, HSG C	78	23.3	64.950	126.111
	Agriculture, HSG D	83	21.6	0.491	0.884
			24.121	**142.931**	**287.307**

Table 11. Northwest Watershed Existing Stay-On Calculations

	Land Use	CN	90% Stay-On Target (in/yr)	Area	Target Stay-On Volume (ac-ft)
Northwest	Open, HSG B	61	25.7	1.040	2.227
	Open, HSG C	71	24.7	18.715	38.522
	Open, HSG D	78	23.2	4.522	8.743
	Impervious	98	7.3	2.596	1.579
			22.805	**26.873**	**51.071**

Table 12. Existing vs. Proposed Conditions Stay-On

Watershed	Existing			Proposed		
	Area	Target Stay-On Volume (ac-ft)	Target Runoff Volume (ac-ft)	Area	Stay-On Volume (ac-ft)	Runoff Volume (ac-ft)
East	104.30	239.996	10.409	111.47	263.445	4.180
West	142.93	287.307	55.846	123.95	251.612	45.964
Northwest	26.87	51.071	13.447	39.96	82.555	13.387

3.4 CLOSED DEPRESSION FLOODING

The HydroCAD model indicates that back-to-back 100-year events would result in flooding of approximately 36.3 acres and a flooded stage of approximately 1020.4 ft for the proposed conditions model (**Table 13**). The increased infiltration requirement and flood protection resulted in a flooded stage in the closed depression that was approximately 0.2 ft lower than the existing condition, with approximately 1.2 less flooded acres. Note that the simulations assumed that the closed depression was dry before the storms and a native infiltration rate of 0.04 in/hr was applied as exfiltration in the HydroCAD pond node. The model also does not account for any upstream runoff from other closed depressions.

Table 13. Runoff to Eastern Closed Depression for Back-to-Back 100-year Storm

Scenario	Runoff Volume (ac-ft)	Flood Stage (ft)	Area Flooded (ac)
Existing	84.5	1020.6	37.5
Proposed	78.2	1020.4	36.3

3.5 SUMMARY OF STORMWATER MANAGEMENT SPACE REQUIREMENTS

Table 14 summarizes each watershed's impervious surface cover and space requirements for stormwater controls to meet the performance standards for the SSPN, based on the stormwater analyses described above.

Table 14. Stormwater Area Requirements by Watershed and Impervious Percentage

Watershed	Impervious Percentage	Wet Pond Area	Infiltration Area
East	49.1%	3.4%	1.8%
West	38.5%	1.6%	4.4%
Northwest	64.7%	3.5%	1.1%

CHAPTER 4 – CONCLUSIONS AND RECOMMENDATIONS

4.1 PEAK DISCHARGE AND DRAINAGE

1. Control peak discharge to pre-development levels for the 1-year through 100-year events to meet City, County, and State requirements.
2. Coordinate safe drainageway for runoff flowing through development to the northwest.
3. Maintain capacity of two drainageways in the southwest corner of the SSPN that discharge in Fitchrona Road right-of-way in the proposed open space.

4.2 STORMWATER VOLUME

4. Reduce closed depression flooding by reducing existing runoff volumes by 10% for the proposed conditions. This means requiring runoff volume control practices that achieve 100% of pre-development runoff volume for all development areas, including roads draining to the closed depression, based on the average annual rainfall series. This could be accomplished through regional stormwater controls and integrating stormwater controls into site landscaping.
5. For the rest of the neighborhood (areas not draining to a closed depression), design stormwater controls that reduce runoff volumes to 90% of the pre-development runoff volume for all areas, including roads.
6. Require additional soil borings during the development of the detailed stormwater designs. Shallow groundwater or poor soils could be found in the areas where regional stormwater basins are planned. Smaller infiltration areas may be needed in higher density areas (business park, neighborhood mixed use, high density residential) to compensate for poor infiltration potential in the regional areas.

4.3 WATER QUALITY

7. Volume and peak discharge control practices are likely to also provide the water quality treatment required by ordinances (at least 80% reduction in Total Suspended Soils relative to no controls).

4.4 FLOOD PROTECTION

8. Establish a flood protection elevation of approximately 1020.6 ft for the closed depression east of the neighborhood, based on the predicted water surface elevation for back-to-back 100-year runoff events. This corresponds to an inundation area of approximately 37.5 acres for the existing topography. This extreme weather scenario is recommended for flood protection because there is no surface outlet for the area.

EXISTING WATERSHED MAP

SOUTH STONER PRAIRIE NEIGHBORHOOD PLAN

CITY OF FITCHBURG
DANE COUNTY, WISCONSIN

Existing South Stoner Prairie Watersheds
Agriculture
Duplex
Industrial
MFR
Open Land
Path
Quarry
ROW
SFR
Utilities
Vacant
Water
Woodland
Business
Contours_2ft_Both

Data Sources

MSA

0 250 500 Feet

N

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Print Date: 12/3/2024

PROPOSED WATERSHED MAP

SOUTH STONER PRAIRIE NEIGHBORHOOD PLAN

CITY OF FITCHBURG
DANE COUNTY, WISCONSIN

Summit View Dr
Quarry Vista Dr
Stone Gate Dr
Lacy Rd
Goose Lake Dr
Fitchrona Rd
Pheasant Ln
Tonto Trl
Commerc
1135 ft
1052 ft
1098 ft
1122 ft
1109 ft
1120 ft
1070 ft
600
605
405
410
500
400
505
510
710
105
705
100
110
700

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Proposed South Stoner Prairie Watersheds

Proposed_LandUse_RemovedLU

MSA_LU

- Agriculture
- Alley
- Business Park
- Boulevard
- High Density Residential
- Infiltration
- Low Density Residential
- Medium Density Residential
- Medium High Density Residential
- Neighborhood Mixed Use
- Open
- Park
- ROW
- School
- Water
- Wooded

Data Sources

MSA

0 250 500 Feet

N

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MSA Memo

To:	City of Fitchburg
From:	MSA Professional Services
Subject:	Sanitary Sizing for South Stoner Prairie
Date:	November 26, 2024

South Stoner Preferred Land Use Map (November 2024 draft)

MSA has preliminarily evaluated the sanitary options for the South Stoner Neighborhood Plan. All sizing calculations are based on the draft Neighborhood Preferred Land Use Map shown on the right. The neighborhood plan was split into east and west sanitary drainage areas with lands owned by Fitchburg Hills LLC / Basha LLC properties and in the east area and Fitchburg Minerals LLC / Wolf properties in the west area.

East Area

The Eastern section of land (owned by Yahara Materials and bas) has been laid out to drain to the existing 10" sanitary main in Lacy Road. The capacity of the 10" pipe in Lacy Road is 1.373 cfs. After discussions with Tracy Foss, Assistant Director of Public Works, it was determined that a portion of this pipe capacity shall be reserved for potential future development along the north side of Lacy Road. At this time, the assumption is 30% reservation of the pipe capacity based on serviceable area on the north side of Lacy. ***The result is a capacity of 0.961 cfs for South Stoner Prairie, unless a separate sanitary main is installed.*** *Further conversations with City staff are required to determine if 30% reserve is necessary for areas north of Lacy Road.*

The tables presented on the next page uses the following assumptions:

- The preferred land uses for the neighborhood includes an area that may develop either as high-density residential or business park. MSA calculated sanitary sewer sizing for these two options, A and B.
- The design assumes average water usage of 80 gallons per day per person, based on feedback and internal discussion that 100 gallons per day is out of date with the advent of new efficient

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fixtures and household appliances. The number of people per unit is per City of Fitchburg calculations and has been interpolated to cover the steps between density.

- Pipe sizing requirement per Table 4 below

Table 1. East Proposed Sanitary Peak Flow (Option A)

Option A – High-Density Residential west of Commerce Park Dr.							
Land Use	**Metrics**			**Average Flows (GPD)**	**Average Flows (cfs)**	**Peaking Factor**	**Peak Flow (cfs)**
NMU (Commercial)	1500 GPD/acre	13.7 acres		20,550	0.032	2.5	0.079
Low Density Residential (LDR)	80 GPD/person	31 units	2.8 people/unit	6,944	0.011	4	0.043
Medium Density Res. (MDR)	80 GPD/person	34 units	2.5 people/unit	6,800	0.011	4	0.042
Med-High Density Res. (MHD)	80 GPD/person	136 units	2.3 people/unit	25,024	0.039	4	0.155
High Density Residential (HDR)	80 GPD/person	642 units	2.0 people/unit	102,720	0.159	4	0.636
NMU (High-Density Res)	80 GPD/person	274 units	2.0 people/unit	43,840	0.068	4	0.271
Offsite	80 GPD/person	0 units	2.3 people/unit	0	0.000	4	0.000
Minimum Pipe Size Required = 10”						Total	1.226 cfs

Table 2. East Proposed Sanitary Peak Flow (Option B)

Option B – Business Park west of Commerce Park Dr.							
Land Use	**Metrics**			**Average Flows (GPD)**	**Average Flows (cfs)**	**Peaking Factor**	**Peak Flow (cfs)**
NMU (Commercial) + Business Park	1500 GPD/acre	22.6 acres		33,900	0.052	2.5	0.131
Low Density Residential (LDR)	80 GPD/person	31 units	2.8 people/unit	6,944	0.011	4	0.043
Medium Density Res. (MDR)	80 GPD/person	34 units	2.5 people/unit	6,800	0.011	4	0.042
Med-High Density Res. (MHD)	80 GPD/person	136 units	2.3 people/unit	24,840	0.038	4	0.154
High Density Residential (HDR)	80 GPD/person	375 units	2.0 people/unit	60,000	0.093	4	0.371
NMU (High-Density Res)	80 GPD/person	274 units	2.0 people/unit	43,840	0.068	4	0.271
Offsite	80 GPD/person	0 units	2.3 people/unit	0	0.000	4	0.000
Minimum Pipe Size Required = 10”						Total	1.013 cfs

West Area

The west area will drain north to Fitchrona Road and will be served by a future interceptor extension, or by another connection. MSA also included offsite area located just to the south of the neighborhood plan that will need to drain through the South Stoner Prairie neighborhood. The capacity of the sanitary sewer main in Fitchrona Road is limited by a 10" pipe, which will require upgrading the existing pipe or connecting to another interceptor. The other options for service (i.e., MMSD or Tonto Drive) may be problematic in timing, costs, etc. The City of Fitchburg and MSA are still working to finalize what this other connection will be and how best to optimize the sanitary sewer in this section of the neighborhood.

The tables presented on the next page uses the following assumptions:

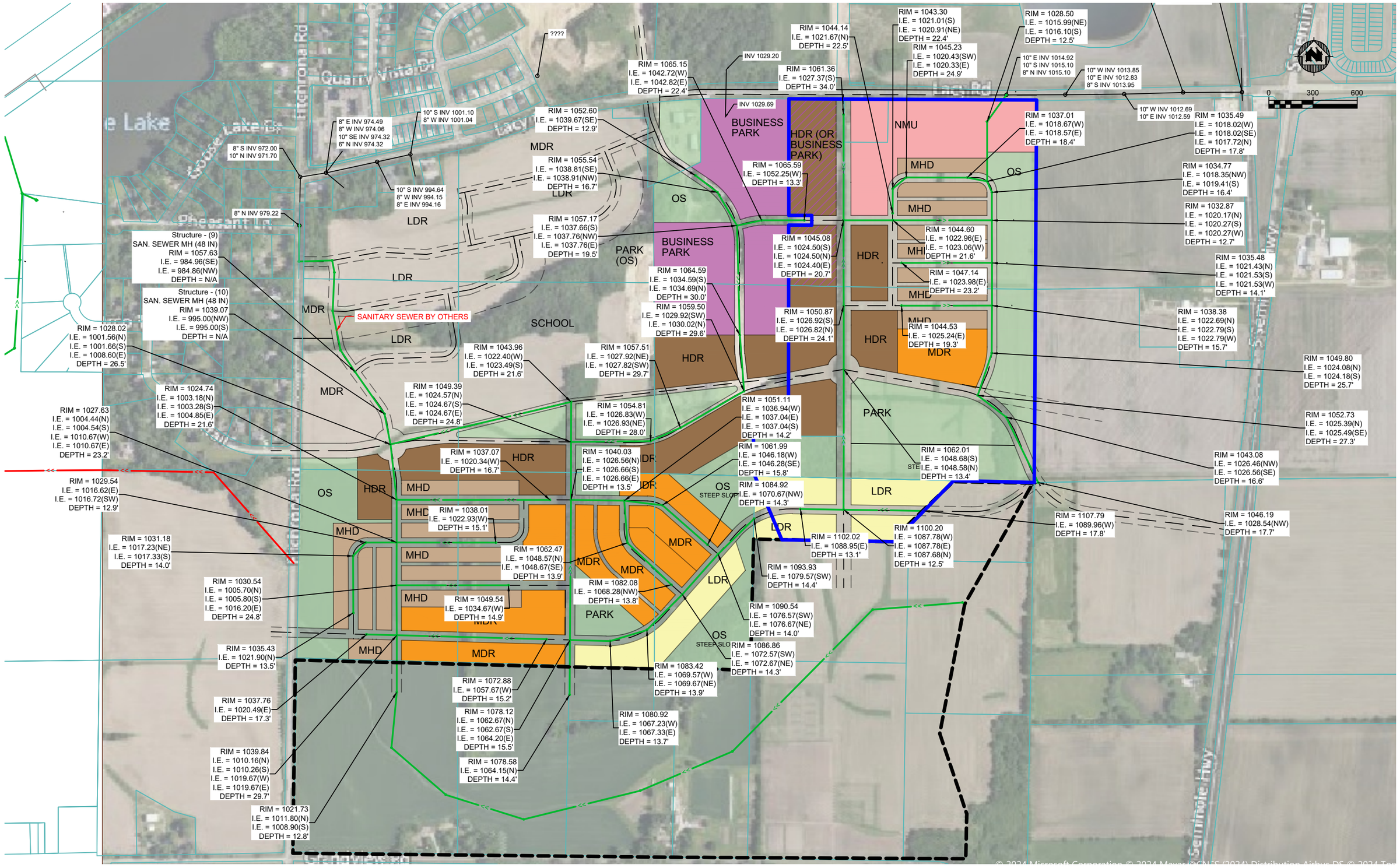
- The design assumes average water usage of 80 gallons per day per person, based on feedback and internal discussion that 100 gallons per day is out of date with the advent of new efficient fixtures and household appliances. The number of people per unit is per City of Fitchburg calculations and has been interpolated to cover the steps between density.
- Pipe sizing requirement per Table 4 below.

Table 3. West Proposed Sanitary Peak Flow

West Area							
Land Use	**Metrics**			**Average Flows (GPD)**	**Average Flows (cfs)**	**Peaking Factor**	**Peak Flow (cfs)**
Commercial / Business Park	1500 GPD/acre	24.6 acres		36,900	0.057	2.5	0.143
Low Density Residential	80 GPD/person	22 units	2.8 people/unit	4,928	0.008	4	0.030
Medium Density Res.	80 GPD/person	172 units	2.5 people/unit	34,400	0.053	4	0.213
Med-high Density Res.	80 GPD/person	211 units	2.3 people/unit	38,824	0.060	4	0.240
High Density Residential	80 GPD/person	684 units	2.0 people/unit	109,440	0.169	4	0.677
Neighborhood Mixed	80 GPD/person	0 units	2.0 people/unit	0	0.000	4	0.000
Offsite	80 GPD/person	1339 units	2.3 people/unit	246,376	0.381	4	1.525
Minimum Pipe Size Required = 15"						Total	2.829 cfs

Table 4. Pipe Capacity Calculations

D	8"	10"	12"	15"	18"	21"	24"
R	0.333	0.417	0.500	0.625	0.75	0.875	1
A	0.349	0.545	0.785	1.227	1.766	2.404	3.140
P	2.093	2.617	3.140	3.925	4.710	5.495	6.280
R	0.167	0.208	0.250	0.313	0.375	0.438	0.500
N	0.011	0.011	0.011	0.011	0.011	0.011	0.011
C	100.485	104.293	107.510	111.584	115.027	118.020	120.676
S	0.004	0.0028	0.0022	0.0015	0.0012	0.001	0.008
Q (cfs)	**0.905**	**1.373**	**1.979**	**2.963**	**4.310**	**5.935**	**23.965**



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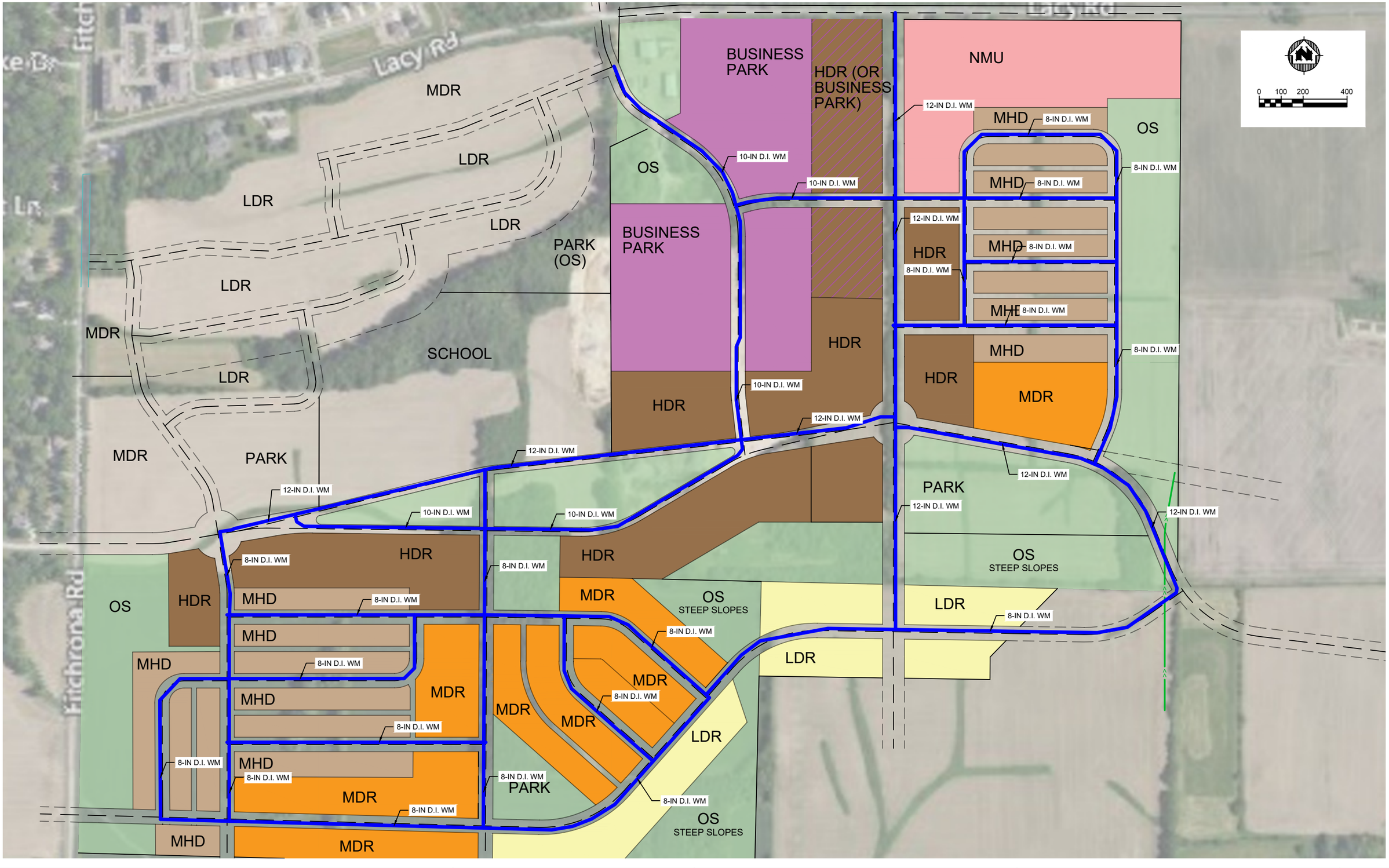
GREENFIELD NEIGHBORHOOD
CITY OF FITCHBURG
DANE COUNTY, WI

PRELIMINARY SANITARY LAYOUT - NORTH CONNECTION

PROJECT NO. 07729051
SHEET EX1



PRELIMINARY

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GREENFIELD NEIGHBORHOOD
CITY OF FITCHBURG
DANE COUNTY, WI

PRELIMINARY WATERMAIN LAYOUT

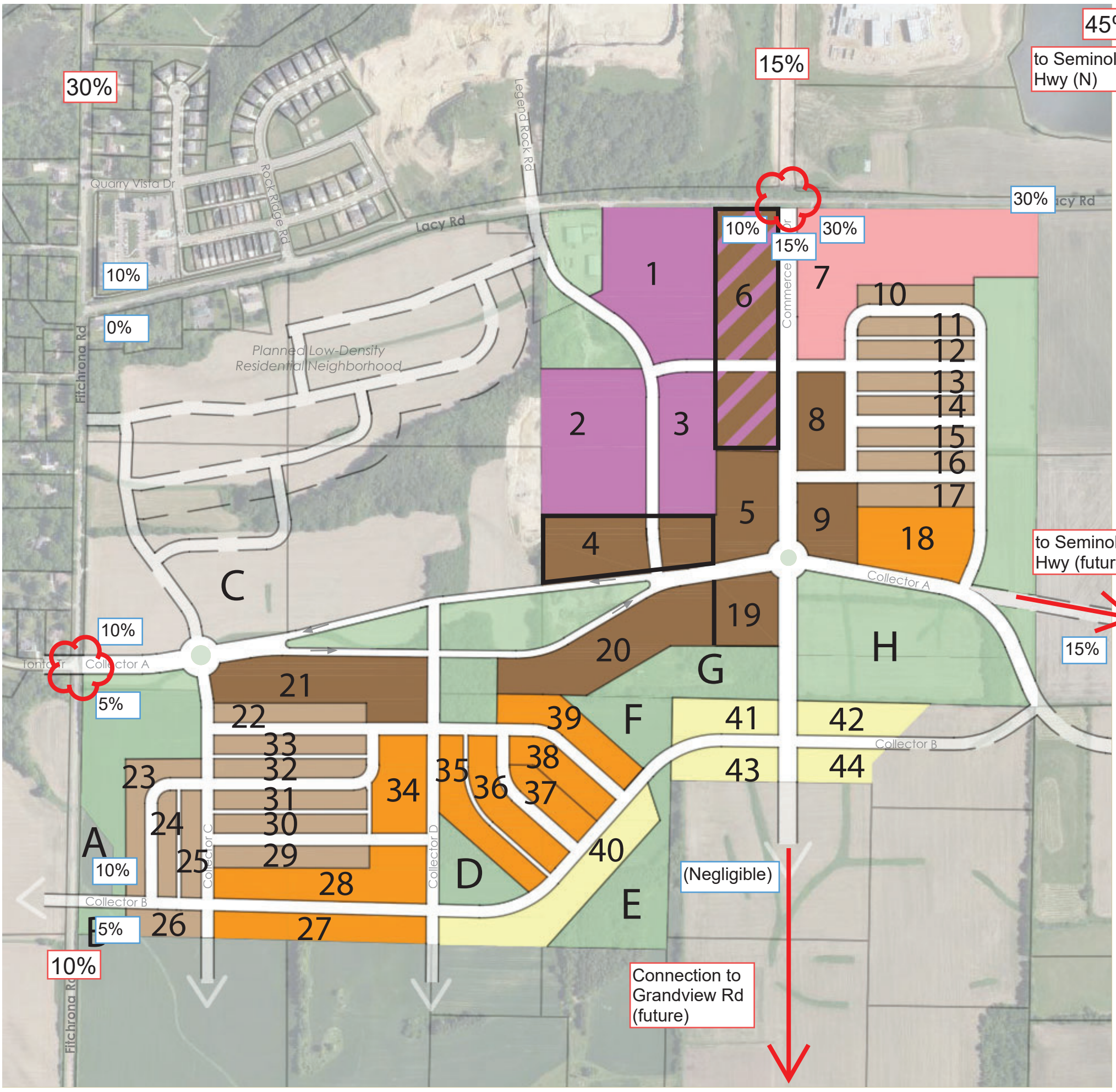
PROJECT NO. 07729051
SHEET EX3

SOUTH STONER DEVELOPMENT

DRAFT TRIP GENERATION - LOT NUMBERS

November 20, 2024

South Stoner Development Trip Distributions
City of Fitchburg, WI



LEGEND

- 25 - 34 A. — Business Park (BP) *(Range to include hatched areas)*
- 33 - 42 A. — High Density Residential (HDR) *(Range to include hatched areas)*
- 29 ACRES — Medium-High Density Residential (MHD)
- 29 ACRES — Medium Density Residential (MDR)
- 14 ACRES — Low Density Residential (LDR)
- 14 ACRES — Neighborhood Mixed Use (NMU)
- 69 ACRES — Parks, Open Space, & Stormwater Management
- Roundabout
- Existing Trails
- Proposed Trails
- Study Intersection
- --% — Overall Distributions
- --% — Internal Distributions

0 mi 1/12 mi 1/6 mi 1/3 mi

MSA

N

Exhibit 1, Trip Generation Table
Option A

South Stoner Development

ITE Land Use	ITE Land Use Code	Parcel Acres	FAR Density	Size	Units		Weekday Two-way	AM Peak Hour Total	AM Peak Hour In	AM Peak Hour Out	PM Peak Hour Total	PM Peak Hour In	PM Peak Hour Out
Single-Family Detached Housing	210	-	-	704	Dwelling Units	Rate			0.00	0.00		0.00	0.00
						Percentage			25%	75%		63%	37%
						Raw Trips	6,075	440	110	330	620	390	230
	Minus Linked Trips				*0%*	*Trips*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
						Driveway Trips	6,075	440	110	330	620	390	230
	Minus Pass-by Trips				*0%*	*Trips*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
						New Trips	6,075	440	110	330	620	390	230
Multi-Family Housing (Low-Rise)	220	-	-	980	Dwelling Units	Rate			0.00	0.00		0.00	0.00
						Percentage			24%	76%		63%	37%
						Raw Trips	6,350	325	80	245	440	275	165
	Minus Linked Trips				*0%*	*Trips*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
						Driveway Trips	6,350	485	80	245	440	275	165
	Minus Pass-by Trips				*0%*	*Trips*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
						New Trips	6,350	485	80	245	440	275	165
Multi-Family Housing (Mid-Rise)	221	-	-	1056	Dwelling Units	Rate			0.00	0.00		0.00	0.00
						Percentage			23%	77%		61%	39%
						Raw Trips	4,990	455	105	350	410	250	160
	Minus Linked Trips				*0%*	*Trips*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
						Driveway Trips	4,990	455	105	350	410	250	160
	Minus Pass-by Trips				*0%*	*Trips*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
						New Trips	4,990	455	105	350	410	250	160
Coffee/Donut Shop With Drive-Through Window	937	-	-	3.6	1,000 sf	Rate	533.57	85.88	43.80	42.08	38.99	19.50	19.50
						Percentage			51%	49%		50%	50%
						Raw Trips	1,920	310	160	150	140	70	70
	Minus Linked Trips				*20%*	*Trips*	*(385)*	*(60)*	*(30)*	*(30)*	*(30)*	*(15)*	*(15)*
						Driveway Trips	1,535	250	130	120	110	55	55
	Minus Pass-by Trips				*0%*	*Trips*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
						New Trips	1,535	250	130	120	110	55	55
Strip Retail Plaza (<40ksf)	822	-	-	34.0	1,000 sf	Rate	54.45	2.36	1.42	0.94		0.00	0.00
						Percentage			60%	40%		50%	50%
						Raw Trips	1,850	80	50	30	165	80	85
	Minus Linked Trips				*20%*	*Trips*	*(370)*	*(15)*	*(10)*	*(5)*	*(35)*	*(15)*	*(20)*
						Driveway Trips	1,480	65	40	25	130	65	65
	Minus Pass-by Trips				*0%*	*Trips*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
						New Trips	1,480	65	40	25	130	65	65
Strip Retail Plaza (<40ksf)	822	-	-	34.0	1,000 sf	Rate	54.45	2.36	1.42	0.94		0.00	0.00
						Percentage			60%	40%		50%	50%
						Raw Trips	1,850	80	50	30	165	80	85
	Minus Linked Trips				*20%*	*Trips*	*(370)*	*(15)*	*(10)*	*(5)*	*(35)*	*(15)*	*(20)*
						Driveway Trips	1,480	65	40	25	130	65	65
	Minus Pass-by Trips				*0%*	*Trips*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
						New Trips	1,480	65	40	25	130	65	65
General Office Building	710	9.9	0.24	103.5	1,000 sf	Rate			0.00	0.00		0.00	0.00
						Percentage			88%	12%		17%	83%
						Raw Trips	1,195	170	150	20	170	30	140
	Minus Linked Trips				*0%*	*Trips*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
						Driveway Trips	1,195	170	150	20	225	30	140
	Minus Pass-by Trips				*0%*	*Trips*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
						New Trips	1,195	170	150	20	225	30	140
Manufacturing	140	9.6	0.24	100.4	1,000 sf	Rate			0.00	0.00		0.00	0.00
						Percentage			76%	24%		31%	69%
						Raw Trips	580	70	55	15	70	20	50
	Minus Linked Trips				*0%*	*Trips*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
						Driveway Trips	580	70	55	15	70	20	50
	Minus Pass-by Trips				*0%*	*Trips*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
						New Trips	580	70	55	15	70	20	50
General Office Building	710	5.1	0.24	53.3	1,000 sf	Rate			0.00	0.00		0.00	0.00
						Percentage			88%	12%		17%	83%
						Raw Trips	1,065	95	85	10	100	15	85
	Minus Linked Trips				*0%*	*Trips*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
						Driveway Trips	1,065	95	85	10	100	15	85
	Minus Pass-by Trips				*0%*	*Trips*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
						New Trips	1,065	95	85	10	100	15	85

Development Trip Generation Summary	Weekday Two-way	AM Peak Hour Total	AM Peak Hour In	AM Peak Hour Out	PM Peak Hour Total	PM Peak Hour In	PM Peak Hour Out
Raw Trip Generation	25,875	2,025	845	1,180	2,280	1,210	1,070
Linked Trips	(1,125)	(90)	(50)	(40)	(100)	(45)	(55)
Total Driveway Trips	24,750	1,935	795	1,140	2,180	1,165	1,015
Pass-by Trips	0	0	0	0	0	0	0
Total New Trips	24,750	1,935	795	1,140	2,180	1,165	1,015

All land uses shown in this exhibit use trip generation rates from the *ITE Trip Generation Manual, 11th Edition, unless otherwise noted*
Fitted curve equation used when Total Rate is not shown
All trips rounded to the nearest 5

Exhibit 2, Trip Generation Table
Option B

South Stoner Development

ITE Land Use	ITE Land Use Code	Parcel Acres	FAR Density	Size	Units		Weekday Two-way	AM Peak Hour Total	AM Peak Hour In	AM Peak Hour Out	PM Peak Hour Total	PM Peak Hour In	PM Peak Hour Out
Single-Family Detached Housing	210	-	-	704	Dwelling Units	Rate			0.00	0.00		0.00	0.00
						Percentage			25%	75%		63%	37%
						Raw Trips	6,075	440	110	330	620	390	230
	Minus Linked Trips				*0%*	*Trips*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
						Driveway Trips	6,075	440	110	330	620	390	230
	Minus Pass-by Trips				*0%*	*Trips*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
						New Trips	6,075	440	110	330	620	390	230
Multi-Family Housing (Low-Rise)	220	-	-	884	Dwelling Units	Rate			0.00	0.00		0.00	0.00
						Percentage			24%	76%		63%	37%
						Raw Trips	5,740	295	70	225	400	250	150
	Minus Linked Trips				*0%*	*Trips*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
						Driveway Trips	5,740	485	70	225	400	250	150
	Minus Pass-by Trips				*0%*	*Trips*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
						New Trips	5,740	485	70	225	400	250	150
Multi-Family Housing (Mid-Rise)	221	-	-	832	Dwelling Units	Rate			0.00	0.00		0.00	0.00
						Percentage			23%	77%		61%	39%
						Raw Trips	3,920	355	80	275	325	200	125
	Minus Linked Trips				*0%*	*Trips*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
						Driveway Trips	3,920	355	80	275	325	200	125
	Minus Pass-by Trips				*0%*	*Trips*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
						New Trips	3,920	355	80	275	325	200	125
Coffee/Donut Shop With Drive-Through Window	937	-	-	3.6	1,000 sf	Rate	533.57	85.88	43.80	42.08	38.99	19.50	19.50
						Percentage			51%	49%		50%	50%
						Raw Trips	1,920	310	160	150	140	70	70
	Minus Linked Trips				*20%*	*Trips*	*(385)*	*(60)*	*(30)*	*(30)*	*(30)*	*(15)*	*(15)*
						Driveway Trips	1,535	250	130	120	110	55	55
	Minus Pass-by Trips				*0%*	*Trips*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
						New Trips	1,535	250	130	120	110	55	55
Strip Retail Plaza (<40ksf)	822	-	-	34.0	1,000 sf	Rate	54.45	2.36	1.42	0.94		0.00	0.00
						Percentage			60%	40%		50%	50%
						Raw Trips	1,850	80	50	30	165	80	85
	Minus Linked Trips				*20%*	*Trips*	*(370)*	*(15)*	*(10)*	*(5)*	*(35)*	*(15)*	*(20)*
						Driveway Trips	1,480	65	40	25	130	65	65
	Minus Pass-by Trips				*0%*	*Trips*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
						New Trips	1,480	65	40	25	130	65	65
Strip Retail Plaza (<40ksf)	822	-	-	34.0	1,000 sf	Rate	54.45	2.36	1.42	0.94		0.00	0.00
						Percentage			60%	40%		50%	50%
						Raw Trips	1,850	80	50	30	165	80	85
	Minus Linked Trips				*20%*	*Trips*	*(370)*	*(15)*	*(10)*	*(5)*	*(35)*	*(15)*	*(20)*
						Driveway Trips	1,480	65	40	25	130	65	65
	Minus Pass-by Trips				*0%*	*Trips*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
						New Trips	1,480	65	40	25	130	65	65
General Office Building	710	9.9	0.26	113.8	1,000 sf	Rate			0.00	0.00		0.00	0.00
						Percentage			88%	12%		17%	83%
						Raw Trips	1,300	185	165	20	185	30	155
	Minus Linked Trips				*0%*	*Trips*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
						Driveway Trips	1,300	185	165	20	225	30	155
	Minus Pass-by Trips				*0%*	*Trips*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
						New Trips	1,300	185	165	20	225	30	155
Manufacturing	140	9.6	0.26	110.4	1,000 sf	Rate			0.00	0.00		0.00	0.00
						Percentage			76%	24%		31%	69%
						Raw Trips	620	75	55	20	80	25	55
	Minus Linked Trips				*0%*	*Trips*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
						Driveway Trips	620	75	55	20	80	25	55
	Minus Pass-by Trips				*0%*	*Trips*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
						New Trips	620	75	55	20	80	25	55
General Office Building	710	5.1	0.26	58.6	1,000 sf	Rate			0.00	0.00		0.00	0.00
						Percentage			88%	12%		17%	83%
						Raw Trips	730	105	95	10	105	15	90
	Minus Linked Trips				*0%*	*Trips*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
						Driveway Trips	730	105	95	10	105	15	90
	Minus Pass-by Trips				*0%*	*Trips*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
						New Trips	730	105	95	10	105	15	90
General Office Building	710	8.9	0.26	102.3	1,000 sf	Rate			0.00	0.00		0.00	0.00
						Percentage			88%	12%		17%	83%
						Raw Trips	1,185	170	150	20	170	30	140
	Minus Linked Trips				*0%*	*Trips*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
						Driveway Trips	1,185	170	150	20	170	30	140
	Minus Pass-by Trips				*0%*	*Trips*	*0*	*0*	*0*	*0*	*0*	*0*	*0*
						New Trips	1,185	170	150	20	170	30	140

Development Trip Generation Summary	Weekday Two-way	AM Peak Hour Total	AM Peak Hour In	AM Peak Hour Out	PM Peak Hour Total	PM Peak Hour In	PM Peak Hour Out
Raw Trip Generation	25,190	2,095	985	1,110	2,355	1,170	1,185
Linked Trips	(1,125)	(90)	(50)	(40)	(100)	(45)	(55)
Total Driveway Trips	24,065	2,005	935	1,070	2,255	1,125	1,130
Pass-by Trips	0	0	0	0	0	0	0
Total New Trips	24,065	2,005	935	1,070	2,255	1,125	1,130

All land uses shown in this exhibit use trip generation rates from the *ITE Trip Generation Manual, 11th Edition, unless otherwise noted*
Fitted curve equation used when Total Rate is not shown
All trips rounded to the nearest 5

Wisconsin Department of Transportation Traffic Signal Warrant Summary Worksheet

70%

The Worksheet(s) attached are provided as an attachment to the Engineering Investigation Study for:

Intersection: Lacy Rd & Commerce Park Dr
County: Dane
City: Fitchburg

Major Street: Lacy Rd
Critical Approach Speed: 45 mph
Lanes: 1 lane

Minor Street: Commerce Park Dr
Critical Approach Speed: 25 mph
Lanes: 1 lane

% Right Turns Included
From North (SB) 100%
From East (WB) 0%
From South (NB) 0%
From West (EB) 0%

In built-up area of isolated community of < 10,000 population? No
Total number of approaches at intersection? 4 or more
If it is a "T" intersection, inflate minor threshold to 150%?
Manually set volume level?

Analysis based on PROJECTED volume data.

Forecast Year	Within 5 Years of Construction?	Time (HH:MM)			
		From	AM / PM	To	AM / PM
2045					

Warrant Evaluation Summary	Warrant Met:
Warrant 1: Eight - Hour Vehicular Volume	No
Condition A: Minimum Vehicular Volume	No
Condition B: Interruption of Continuous Traffic	No
Condition C: Combination: 80% of A and B	No
Warrant 2: Four-Hour Volume	Yes
Warrant 3: Peak Hour Volume	Yes
Warrant 4: Pedestrian Volume	N/A
Criterion A: Four-Hour	
Criterion B: Peak-Hour	
Warrant 5: School Crossing	N/A
Warrant 6: Coordinated Signal System	N/A
Warrant 7: Crash Experience	N/A
Warrant 8: Roadway Network	N/A
Warrant 9: Intersection Near a Grade Crossing	N/A

Warrant Analysis Conducted By:
Name: Matt Roland
Agency: MSA
Date: 11/26/2024

Warrant 1: Eight - Hour Vehicular Volume 70%

Warrant Evaluated? Yes Warrant Satisfied? No Manually Set To:

Condition A : Min. Veh. Volume		
Volume Level	70%	56%
Major Rd. Req	350	280
Minor Rd. Req	105	84
Number of Hours	5	6

Satisfied? No

Condition B: Interruption of Continuous Traffic		
Volume Level	70%	56%
Major Rd. Req	525	420
Minor Rd. Req	53	42
Number of Hours	3	5

Satisfied? No

Condition C: Combination of A & B at 56%

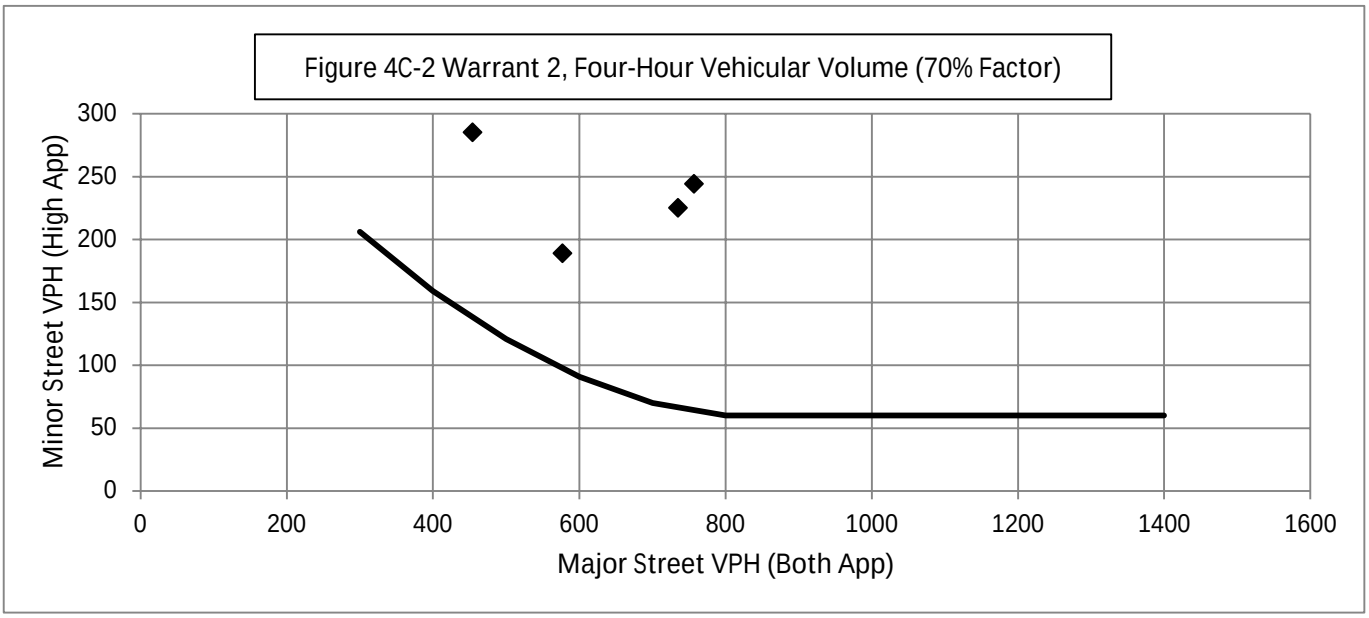
Satisfied? No

6:00 AM	Enter Start Time (Military Time) (HH:MM)				
Time Period	From	To	Major Road: Both App. (VPH)	Minor Road: High App. (VPH)	Total
1	6:00	7:00	164	169	333
2	7:00	8:00	454	285	739
3	8:00	9:00	441	248	689
4	9:00	10:00	137	167	304
5	10:00	11:00	152	161	313
6	11:00	12:00	189	171	360
7	12:00	13:00	219	185	404
8	13:00	14:00	215	176	391
9	14:00	15:00	226	174	400
10	15:00	16:00	577	189	766
11	16:00	17:00	735	225	960
12	17:00	18:00	757	244	1001
13	18:00	19:00	308	179	487
14	19:00	20:00	240	141	381
15	20:00	21:00	214	108	322
16	21:00	22:00	159	79	238

Warrant 2: Four-Hour Volume 70%

Warrant Evaluated? Yes
Warrant Satisfied? Yes
Manually Set To:

Hour Start	17:00	16:00	15:00	7:00
Major Road Vol.	757	735	577	454
Minor Road Vol.	244	225	189	285



Warrant 3: Peak Hour Volume 70%

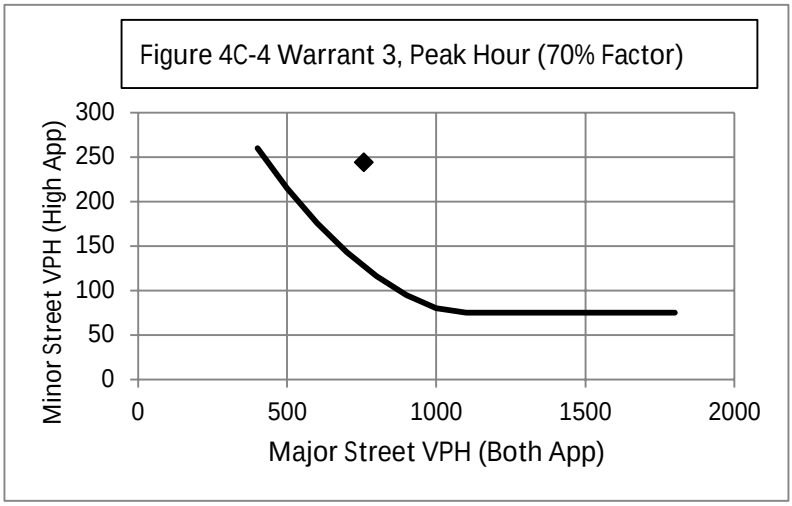
Warrant Evaluated? Yes Warrant Satisfied? Yes Manually Set To:

Condition justifying use of warrant:

Criteria		Met?
Delay on Minor Approach	4	
Volume on Minor Approach	100	Yes
Total Entering Volume (veh/h)	800	

Manually Set Peak Hour?

Peak Hour	Major Road Vol. (Both App.)	Minor Road Vol. (High App.)
17:00	757	244



Warrant 4: Pedestrian Volume 70%

Warrant Evaluated? Warrant Satisfied? N/A Manually Set To:

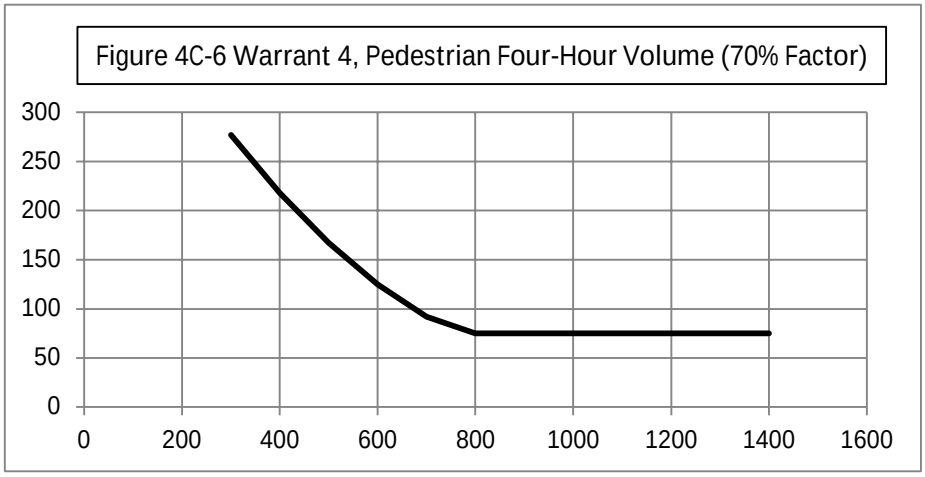
Criterion A: Four Hour

Hour (Start)	Pedestrian Volume	Major Road Vol.
		0
		0
		0
		0

Manually Set Major Rd Vol?

Avg. walk speed less than 3.5 ft/s?

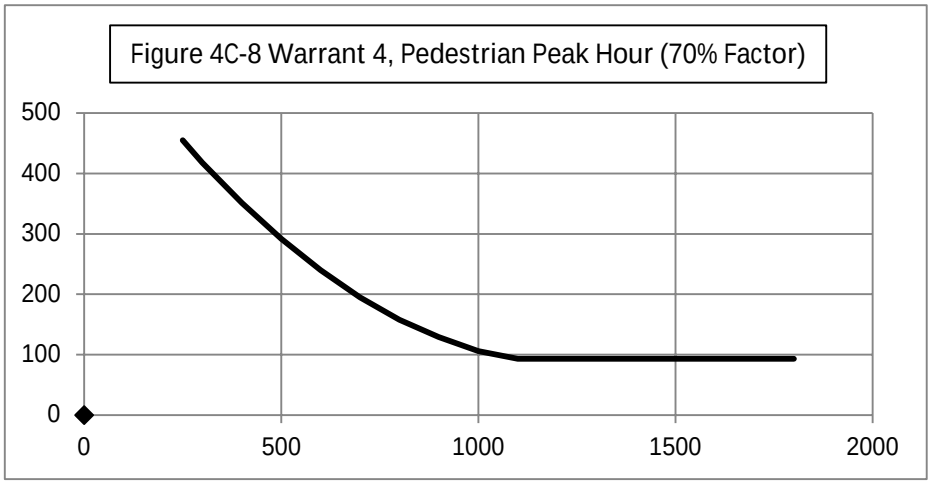
Criterion A Satisfied?



Criterion B: Peak Hour

Peak Hour	Pedestrian Vol.	Major Road Vol.
0:00	0	0

Criterion B Satisfied?



Warrant 5: School Crossing 70%

Warrant Evaluated? Warrant Satisfied? N/A Manually Set To:

Criteria		Fulfilled?
1	There are a MINIMUM of 20 school children during the highest crossing hour.	
2	There are fewer adequate gaps in the major road traffic stream during the period when the school children are using the crossing than the number of minutes in the same period.	
3	The nearest traffic signal along the major road is located more than 300 ft away. Or, the nearest traffic signal is within 300 ft but the proposed traffic signal will not restrict the progressive movement of traffic.	

Warrant 6: Coordinated Signal System 70%

Warrant Evaluated? Warrant Satisfied? N/A Manually Set To:

Criteria		Fulfilled?
1	Signal spacing > 1000 ft	
2	On a one-way road or a road that has traffic predominantly in one direction, the adjacent signals are so far apart that they do not provide the necessary degree of vehicle platooning.	
3	On a two-way road, adjacent signals do not provide the necessary degree of platooning and the proposed and the adjacent signals will collectively provide a progressive operation.	

Warrant 7: Crash Experience 70%

Warrant Evaluated? Warrant Satisfied? N/A Manually Set To:

Criteria			Met?	Fulfilled?
1	Adequate trial of other remedial measures has failed to reduce crash frequency.			
	Measures Tried:			
2	Five or more reported crashes, of types susceptible to correction by signal, have occurred within a 12 month period.	# of crashes per 12 months		
3	Warrant 1, Condition A (80%)		No	No
	Warrant 1, Condition B (80%)		No	
	Warrant 4, Criterion A (80%)		No	
	Warrant 4, Criterion B (80%)		No	

Warrant 8: Roadway Network 70%

Warrant Evaluated? Warrant Satisfied? N/A Manually Set To:

Criteria						Met?	Fulfilled?
1	Total entering volume of at least 1,000 veh/h during typical weekday peak hour				1001	Yes	No
	Five-year projected volumes that satisfy one or more of Warrants 1, 2, or 3.					No	
2	Total entering vol. of at least 1,000 veh/h for each of any 5 hrs of non-normal business day (Sat. or Sun.)						
	Hour						
	Volume						

Characteristics of Major Routes - Select yes if all intersecting routes have characteristic		Fulfilled?
1	Part of the road or highway system that serves as the principal roadway network for through traffic flow	
2	Rural or suburban highway outside of, entering, or traversing a city	
3	Appears as a major route on an official plan	

Warrant 9: Intersection Near a Grade Crossing 70%

Warrant Evaluated? Warrant Satisfied? N/A Manually Set To:

Adjustment Factors			Manually Set Peak Hour?				
Rail Traffic per Day	% High Occupancy Buses on Minor Road	% Tractor-Trailer Trucks on Minor Road	D	Peak Hour	Major Road Vol.	Minor Road Vol.	Adjusted Minor Vol.
1	0	0% to 2.5%	660	17:00	757	244	81.74

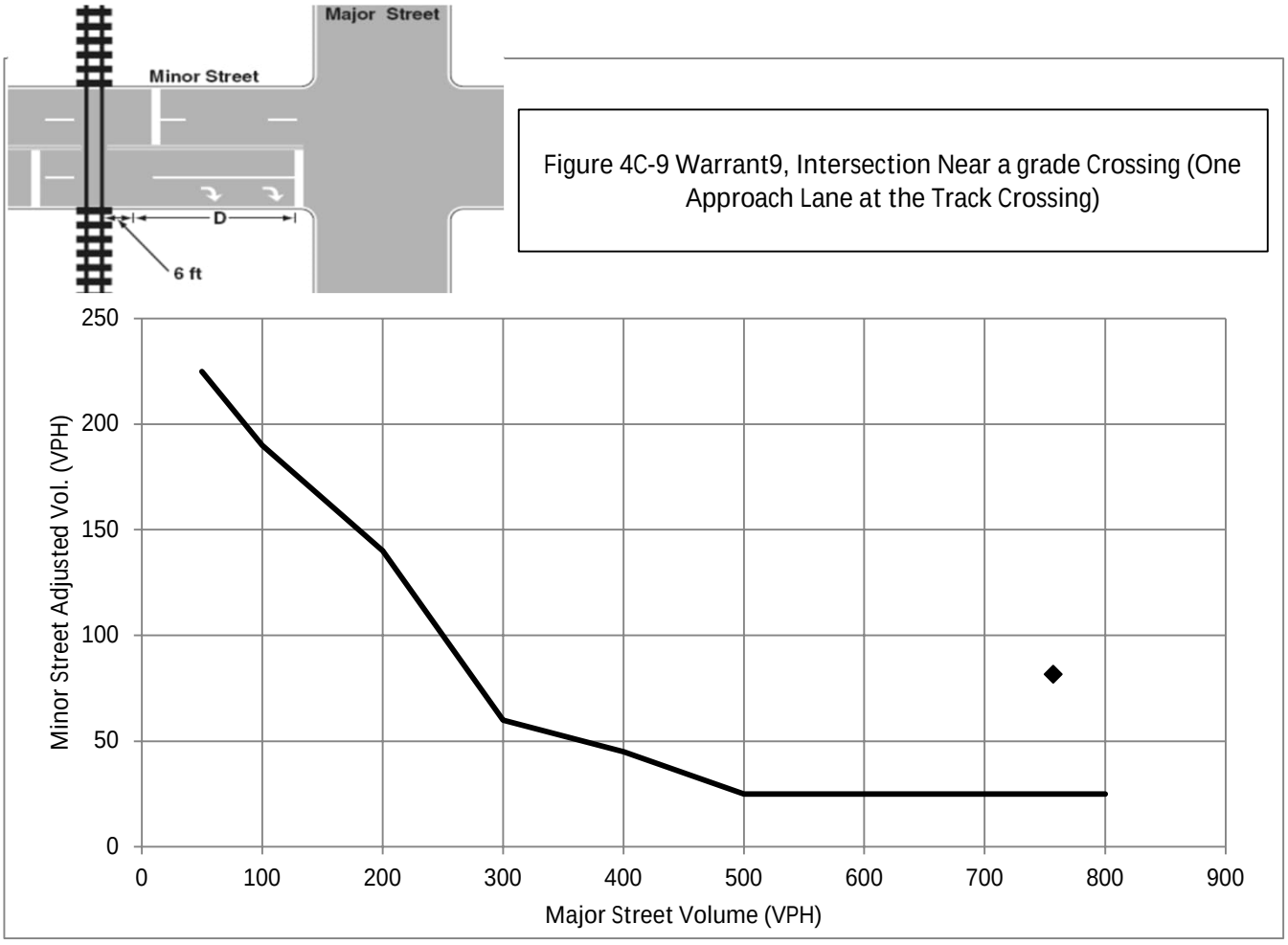


Figure 4C-9 Warrant9, Intersection Near a grade Crossing (One Approach Lane at the Track Crossing)

Conclusions/Comments:

Only 6 hours of peak hour data is available from the adjacent Fitchrona Rd & Lacy Rd Intersection count. Based on peak hour count volumes on Lacy Rd, it is expected that Warrant 1 would be met at this intersection with the additional traffic volumes from missing count hours.

Updated: 12/6/2017

Wisconsin Department of Transportation Traffic Signal Warrant Summary Worksheet

70%

The Worksheet(s) attached are provided as an attachment to the Engineering Investigation Study for:

Intersection: Fitchrona Rd & Collector Rd A/Tonto Trl
County: Dane
City: Fitchburg

Major Street: Fitchrona Rd
Critical Approach Speed: 55 mph
Lanes: 1 lane

Minor Street: Collector Road A/Tonto Trail
Critical Approach Speed: 25 mph
Lanes: 1 lane

% Right Turns Included
From North (SB) 100%
From East (WB) 0%
From South (NB) 100%
From West (EB) 100%

In built-up area of isolated community of < 10,000 population? No
Total number of approaches at intersection? 4 or more
If it is a "T" intersection, inflate minor threshold to 150%?
Manually set volume level?

Analysis based on PROJECTED volume data.

Forecast Year	Within 5 Years of Construction?	Time (HH:MM)			
		From	AM / PM	To	AM / PM
2045					

Warrant Evaluation Summary	Warrant Met:
Warrant 1: Eight - Hour Vehicular Volume	No
Condition A: Minimum Vehicular Volume	No
Condition B: Interruption of Continuous Traffic	No
Condition C: Combination: 80% of A and B	No
Warrant 2: Four-Hour Volume	No
Warrant 3: Peak Hour Volume	No
Warrant 4: Pedestrian Volume	N/A
Criterion A: Four-Hour	
Criterion B: Peak-Hour	
Warrant 5: School Crossing	N/A
Warrant 6: Coordinated Signal System	N/A
Warrant 7: Crash Experience	N/A
Warrant 8: Roadway Network	N/A
Warrant 9: Intersection Near a Grade Crossing	N/A

Warrant Analysis Conducted By:
Name: Matt Roland
Agency: MSA
Date: 11/8/2024

Warrant 1: Eight - Hour Vehicular Volume 70%

Warrant Evaluated? Yes Warrant Satisfied? No Manually Set To:

Condition A : Min. Veh. Volume		
Volume Level	70%	56%
Major Rd. Req	350	280
Minor Rd. Req	105	84
Number of Hours	0	0

Satisfied? No

Condition B: Interruption of Continuous Traffic		
Volume Level	70%	56%
Major Rd. Req	525	420
Minor Rd. Req	53	42
Number of Hours	0	0

Satisfied? No

Condition C: Combination of A & B at 56%

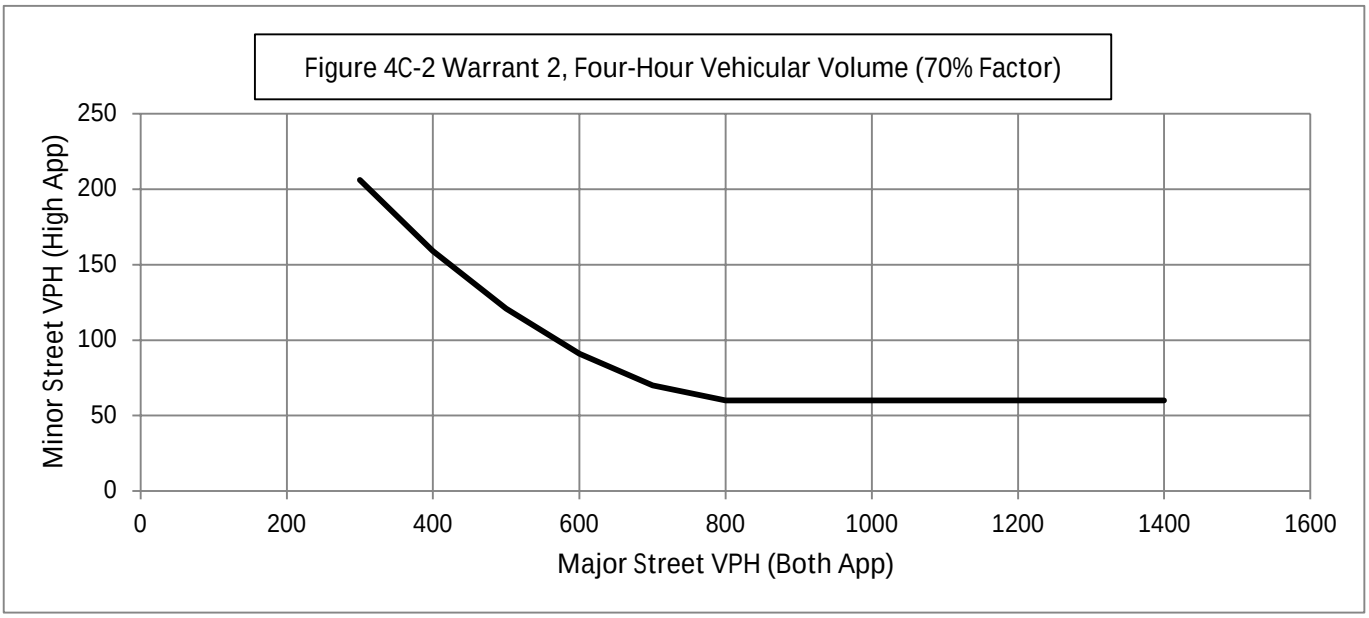
Satisfied? No

6:00 AM	Enter Start Time (Military Time) (HH:MM)				
Time Period	From	To	Major Road: Both App. (VPH)	Minor Road: High App. (VPH)	Total
1	6:00	7:00	44	86	130
2	7:00	8:00	75	230	305
3	8:00	9:00	65	225	290
4	9:00	10:00	42	46	88
5	10:00	11:00	43	51	94
6	11:00	12:00	45	62	107
7	12:00	13:00	47	74	121
8	13:00	14:00	45	71	116
9	14:00	15:00	46	168	214
10	15:00	16:00	49	234	283
11	16:00	17:00	58	304	362
12	17:00	18:00	60	315	375
13	18:00	19:00	47	103	150
14	19:00	20:00	38	81	119
15	20:00	21:00	21	69	90
16	21:00	22:00	14	51	65

Warrant 2: Four-Hour Volume 70%

Warrant Evaluated? Yes
Warrant Satisfied? No
Manually Set To:

Hour Start	#N/A	#N/A	#N/A	#N/A
Major Road Vol.	#N/A	#N/A	#N/A	#N/A
Minor Road Vol.	#N/A	#N/A	#N/A	#N/A



Warrant 3: Peak Hour Volume 70%

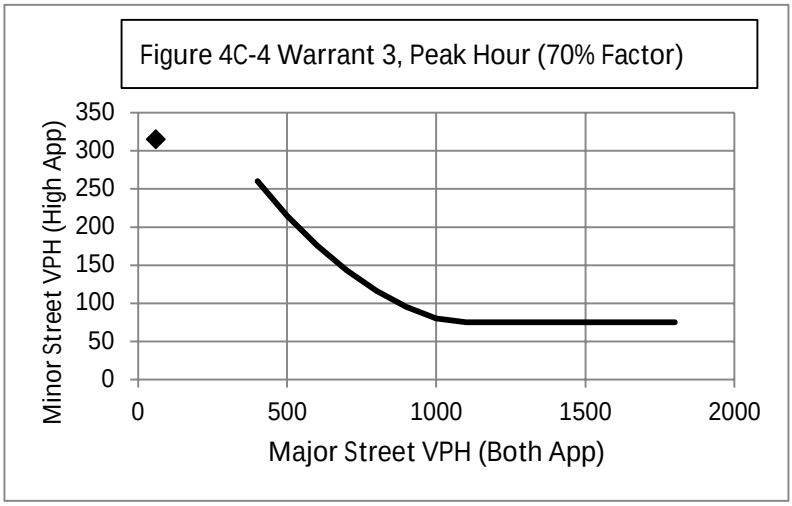
Warrant Evaluated? Yes Warrant Satisfied? No Manually Set To:

Condition justifying use of warrant:

Criteria		Met?
Delay on Minor Approach	4	
Volume on Minor Approach	100	No
Total Entering Volume (veh/h)	800	

Manually Set Peak Hour?

Peak Hour	Major Road Vol. (Both App.)	Minor Road Vol. (High App.)
17:00	60	315



Warrant 4: Pedestrian Volume 70%

Warrant Evaluated? Warrant Satisfied? N/A Manually Set To:

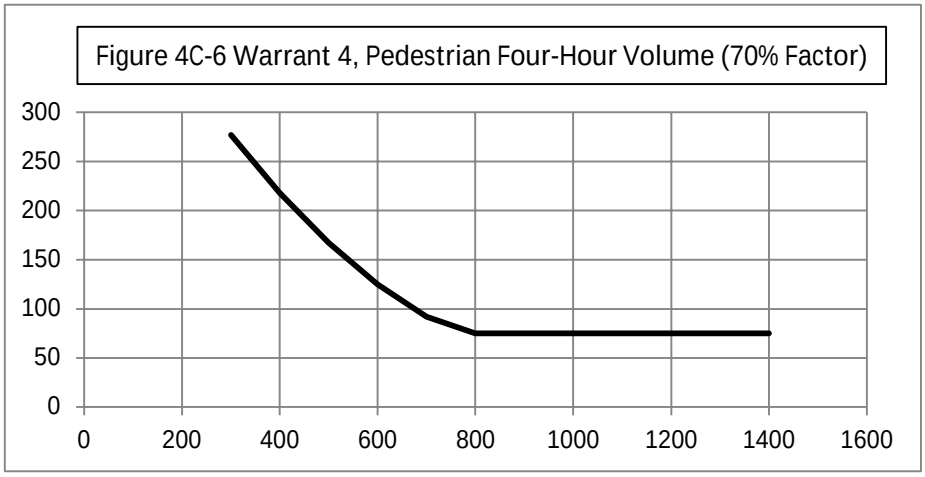
Criterion A: Four Hour

Hour (Start)	Pedestrian Volume	Major Road Vol.
		0
		0
		0
		0

Manually Set Major Rd Vol?

Avg. walk speed less than 3.5 ft/s?

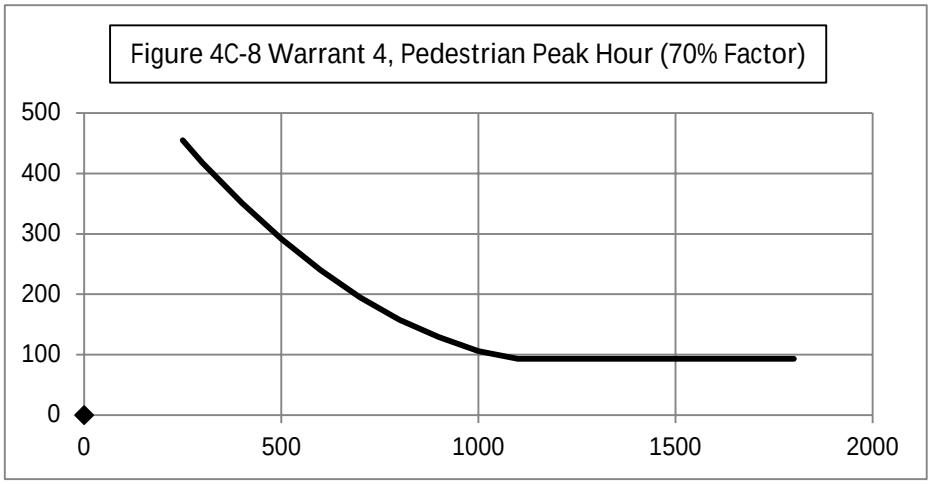
Criterion A Satisfied?



Criterion B: Peak Hour

Peak Hour	Pedestrian Vol.	Major Road Vol.
0:00	0	0

Criterion B Satisfied?



Warrant 5: School Crossing 70%

Warrant Evaluated? Warrant Satisfied? N/A Manually Set To:

Criteria		Fulfilled?
1	There are a MINIMUM of 20 school children during the highest crossing hour.	
2	There are fewer adequate gaps in the major road traffic stream during the period when the school children are using the crossing than the number of minutes in the same period.	
3	The nearest traffic signal along the major road is located more than 300 ft away. Or, the nearest traffic signal is within 300 ft but the proposed traffic signal will not restrict the progressive movement of traffic.	

Warrant 6: Coordinated Signal System 70%

Warrant Evaluated? Warrant Satisfied? N/A Manually Set To:

Criteria		Fulfilled?
1	Signal spacing > 1000 ft	
2	On a one-way road or a road that has traffic predominantly in one direction, the adjacent signals are so far apart that they do not provide the necessary degree of vehicle platooning.	
3	On a two-way road, adjacent signals do not provide the necessary degree of platooning and the proposed and the adjacent signals will collectively provide a progressive operation.	

Warrant 7: Crash Experience 70%

Warrant Evaluated? Warrant Satisfied? N/A Manually Set To:

Criteria			Met?	Fulfilled?
1	Adequate trial of other remedial measures has failed to reduce crash frequency.			
	Measures Tried:			
2	Five or more reported crashes, of types susceptible to correction by signal, have occurred within a 12 month period.	# of crashes per 12 months		
3	Warrant 1, Condition A (80%)		No	No
	Warrant 1, Condition B (80%)		No	
	Warrant 4, Criterion A (80%)		No	
	Warrant 4, Criterion B (80%)		No	

Warrant 8: Roadway Network 70%

Warrant Evaluated? Warrant Satisfied? N/A Manually Set To:

Criteria						Met?	Fulfilled?
1	Total entering volume of at least 1,000 veh/h during typical weekday peak hour				375	No	No
	Five-year projected volumes that satisfy one or more of Warrants 1, 2, or 3.					No	
2	Total entering vol. of at least 1,000 veh/h for each of any 5 hrs of non-normal business day (Sat. or Sun.)						
	Hour						
	Volume						

Characteristics of Major Routes - Select yes if all intersecting routes have characteristic		Fulfilled?
1	Part of the road or highway system that serves as the principal roadway network for through traffic flow	
2	Rural or suburban highway outside of, entering, or traversing a city	
3	Appears as a major route on an official plan	

Warrant 9: Intersection Near a Grade Crossing 70%

Warrant Evaluated? Warrant Satisfied? N/A Manually Set To:

Adjustment Factors			Manually Set Peak Hour?				
Rail Traffic per Day	% High Occupancy Buses on Minor Road	% Tractor-Trailer Trucks on Minor Road	D	Peak Hour	Major Road Vol.	Minor Road Vol.	Adjusted Minor Vol.
1	0	0% to 2.5%	660	17:00	60	315	105.525

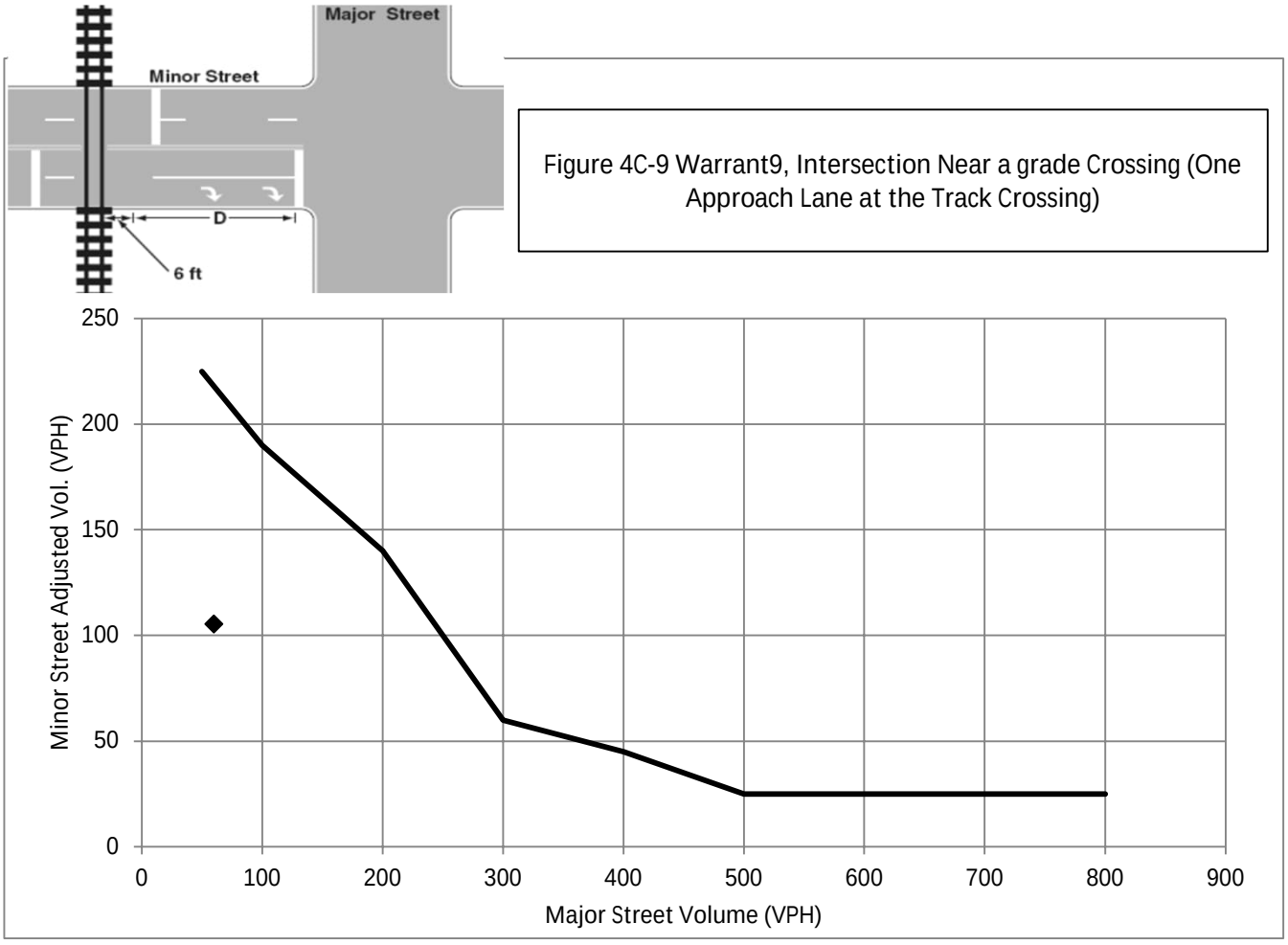


Figure 4C-9 Warrant9, Intersection Near a grade Crossing (One Approach Lane at the Track Crossing)

Conclusions/Comments:

Existing peak hour count data used from adjacent Fitchrona Rd & Lacy Rd traffic count.

Updated: 12/6/2017