Sheridan City Planning Commission
Meeting Agenda
March 11, 2024
7:00 PM, City Council Chamber, City Hall

1. Call to Order and Roll Call of Members

2. Election of Chairman

   Nominations:

   Vote:

3. Election of Vice-Chairman

   Nominations:

   Vote:

4. Approval of Agenda as Presented

   Motion by:

   Second:

   Vote:

5. Review, correction, and approval of minutes of the February 12, 2024 meeting.

   Motion by:

   Second:

   Vote:

   Old Business

   New Business

6. Consideration of PL-24-2, Ordinance 2280. City initiated annexation of various parcels located at; 447 Canfield, 1872 Fairway Ln, 1305 Leopard St, 1814 KROE Ln and 1738 KROE Ln. PIN 56841531300120, 56842820000433, 56843310001233, 56842530100333, 56842530100433.

   Motion by:

   Second:

Vote:

7. Recommendation of PL-24-6, ORD 2278. The applicant, Story House Property Company, LLC. is requesting to rezone 44.86 acres from B-2 Business District to a Planned Unit Development, PUD. Located at 2323 E 5th St. PIN 568410000333.

   Motion by:

   Second:

   Vote:

8. Comments from commissioners and staff.

9. Adjourn

MEMO

TO: Planning Commission
FROM: Thomas Morneau, City Engineer
RE: Review, correction, and approval of minutes of the February 12, 2024 meeting.

Motion by:

Second:

Vote:

Attachments

minutes

CITY OF SHERIDAN

MINUTES OF PLANNING COMMISSION MEETING

CITY HALL COUNCIL CHAMBERS

FEBRUARY 12, 2024

---

1. Commissioner Chair Todd Windsor called the meeting to order at 7:00 PM with a quorum as follows: James Schrodt, Margaret Morneau, Bev Leichtnam, Daniel Kerbs and Brandy Campbell. Commissioner Ryan Franklin was absent.

2. The agenda was approved by unanimous consent.

3. The minutes of the January 8, 2024 Planning Commission meeting were approved by unanimous consent.

4. Comments from Commissioners and staff.

5. Discussion of Ordinances 2275 Board of Appeals and 2277 amendments to approved Master Plans.
   City Attorney Brendon Kerns summarized the issue. City Attorney Brendon Kerns also updated the Commission on the Story House Project.

6. The meeting was adjourned at 8:06 PM.

_____
Tod Windsor, Planning Commission Chairperson

Attest: _____
Cecilia Good, City Clerk

MEMO

TO: Planning Commission

FROM: Thomas Morneau, City Engineer

RE: Consideration of PL-24-2, Ordinance 2280. City initiated annexation of various parcels located at; 447 Canfield, 1872 Fairway Ln, 1305 Leopard St, 1814 KROE Ln and 1738 KROE Ln. PIN 56841531300120, 56842820000433, 56843310001233, 56842530100333, 56842530100433.

Staff Recommendation

Staff recommends the Planning Commission provide a recommendation of approval to the City Council for PL-24-2, Ordinance 2280, city initiated annexations.

Background

The following described tracts of land are proposed to be annexed into the City:

- Addressed as 447 Canfield Street, Sheridan, WY - To be zoned B-1
- Addressed as 1305 Leopard Street, Sheridan, WY - To be zoned R-1
- A tract of land adjacent to property addressed as 1872 Fairway Lane, Sheridan, WY - To be zoned R-1
- Addressed as 1738 KROE Lane, Sheridan, WY - To be zoned M-1
- Addressed as 1814 KROE Lane, Sheridan, WY - To be zoned M-1

Staff Comments

Staff sent out 54 nearest neighbor notifications to property owners within 300 feet as part of this application. In addition, a legal ad was placed in the Sheridan Press, and signs were posted on the the property. Staff has no further comments at this time.

Attachments

exhibits

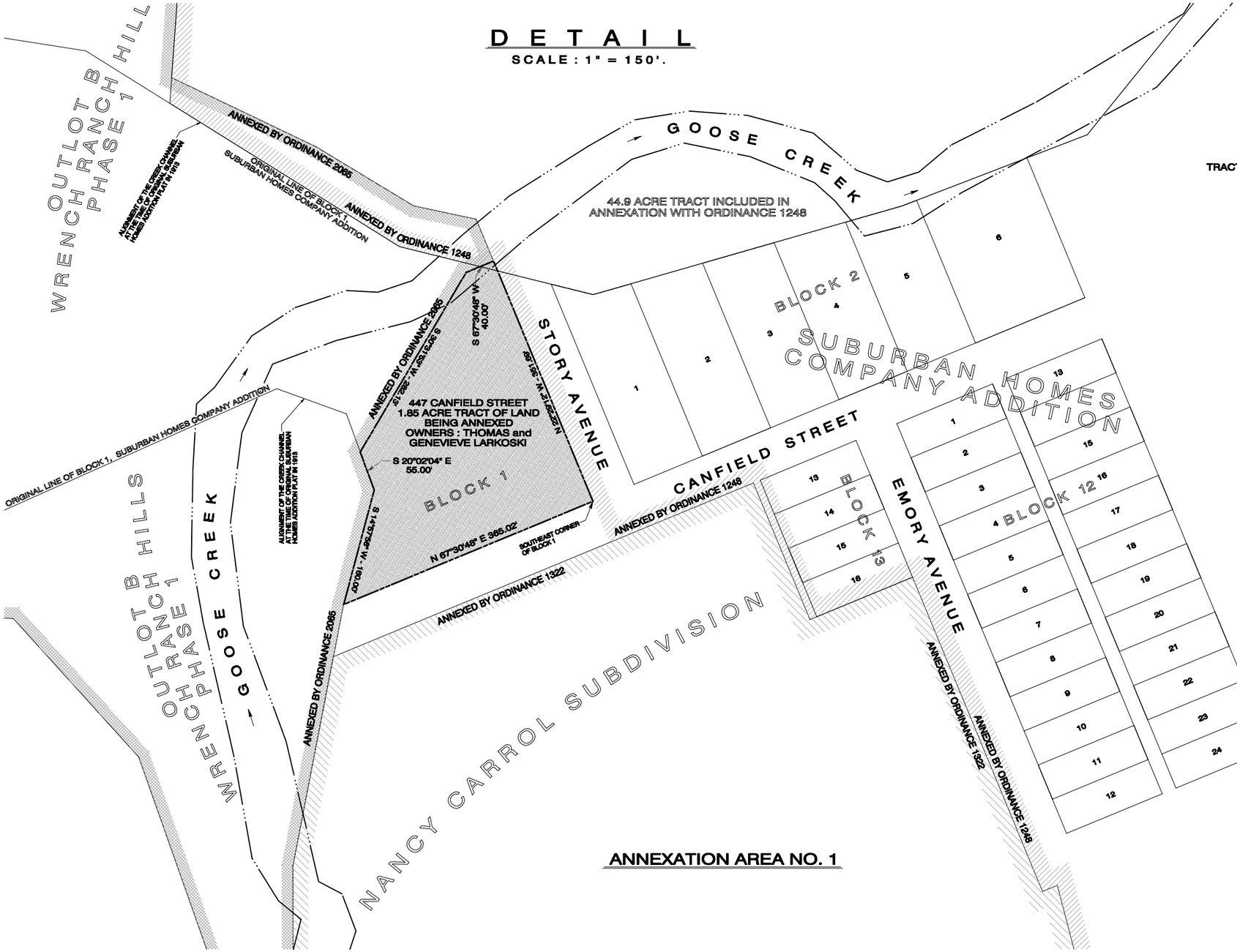
aerial maps

ORD 2280

annexation report

DETAIL

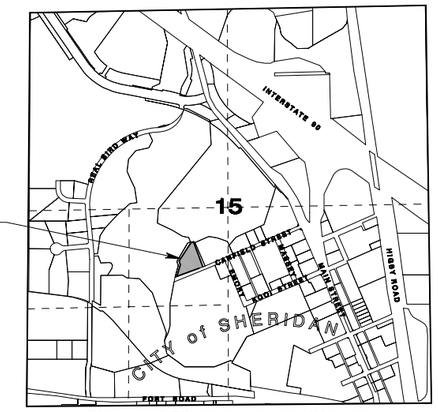
SCALE : 1" = 150'.



ANNEXATION AREA NO. 1

LOCATION

SCALE : 1" = 2000'.



TOWNSHIP 56 NORTH RANGE 84 WEST

N

MAP

showing

AREA PROPOSED TO BE ANNEXED

to the

CITY of SHERIDAN
SHERIDAN COUNTY, WYOMING

being a

TRACT of LAND

situated in

BLOCK 1

of the

SUBURBAN HOMES COMPANY ADDITION

to the

CITY of SHERIDAN, WYOMING

for the

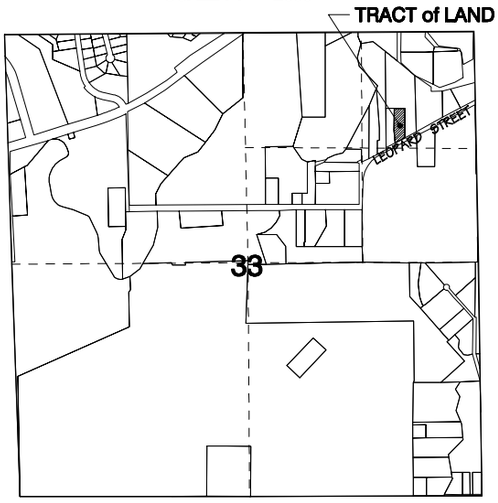
CITY of SHERIDAN

55 GRINNELL PLAZA
SHERIDAN, WYOMING 82801

DRAWN BY REX RANDALL - JANUARY 16, 2024
RANDALL ENGINEERING SURVEYS - SHERIDAN, WYOMING

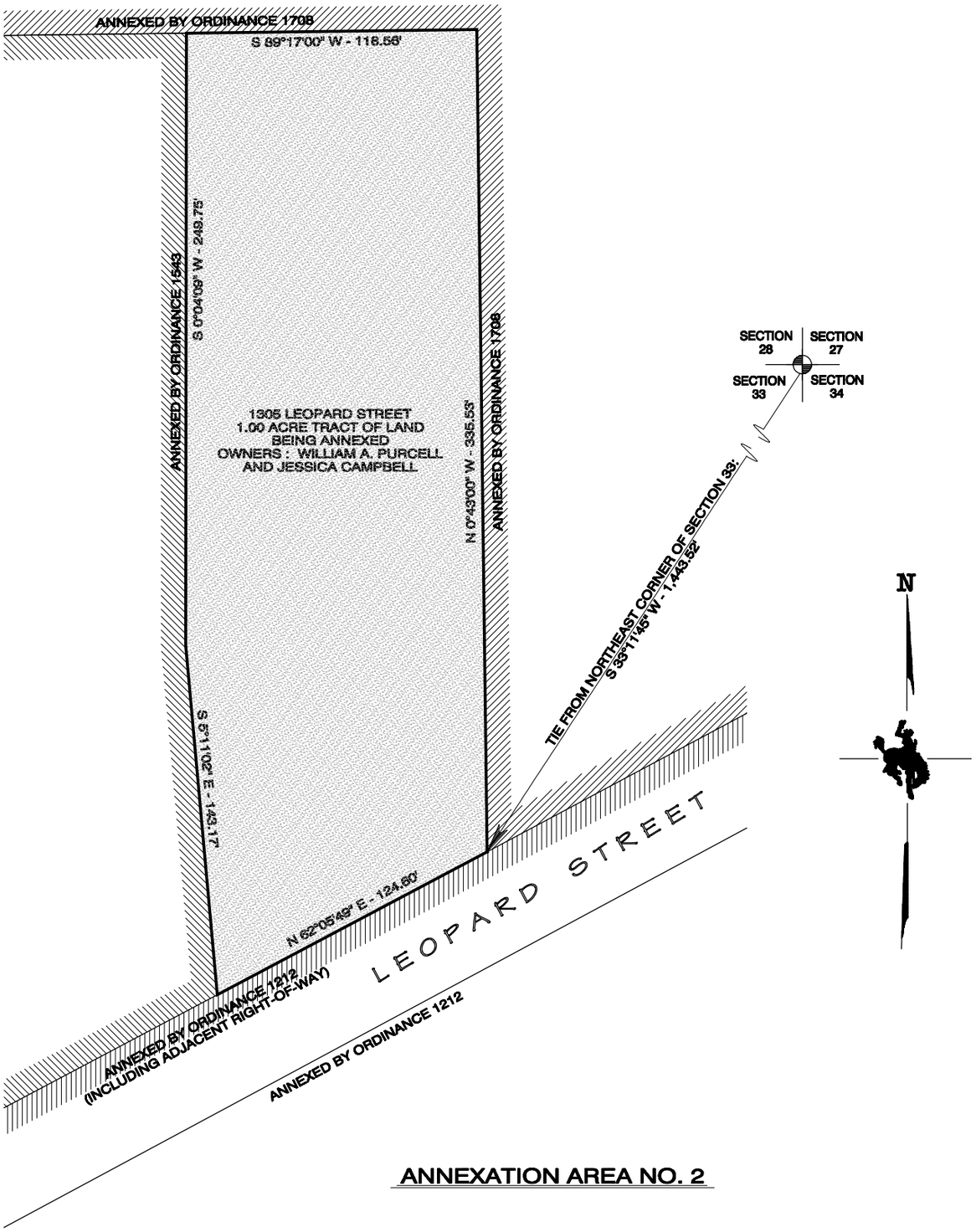
MAP
showing
AREA PROPOSED TO BE ANNEXED
to
the CITY of SHERIDAN
SHERIDAN COUNTY, WYOMING
being a
TRACT of LAND
situated in
NE¼NE¼ of SECTION 33,
TOWNSHIP 56 NORTH, RANGE 84 WEST
of the
SIXTH PRINCIPAL MERIDIAN
SHERIDAN COUNTY, WYOMING
for the
CITY of SHERIDAN
55 GRINNELL PLAZA
SHERIDAN, WYOMING 82801

LOCATION
SCALE : 1" = 2000'



TOWNSHIP 56 NORTH, RANGE 84 WEST

DETAIL
SCALE : 1" = 60'



ANNEXATION AREA NO. 2

DRAWN BY REX RANDALL - JANUARY 16, 2024
RANDALL ENGINEERING SURVEYS - SHERIDAN, WYOMING

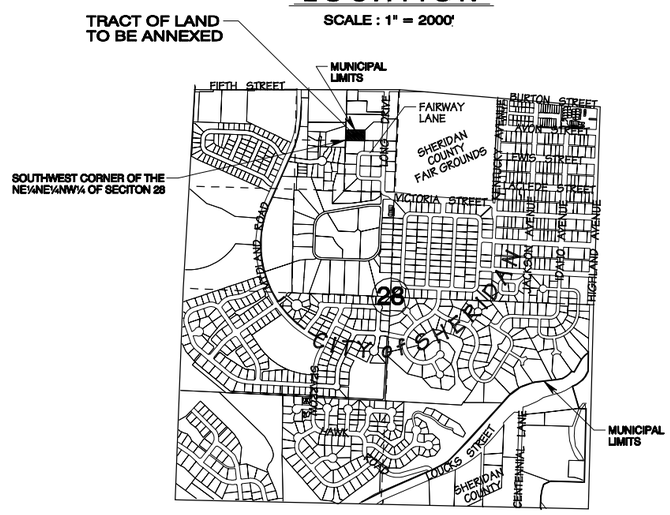
DETAIL

SCALE : 1" = 80'

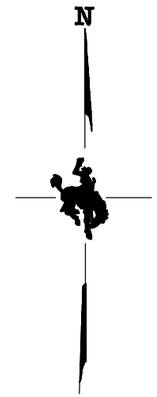


LOCATION

SCALE : 1" = 2000'



TOWNSHIP 56 NORTH, RANGE 84 WEST



MAP

showing

AREA PROPOSED TO BE ANNEXED

to the

CITY of SHERIDAN
SHERIDAN COUNTY, WYOMING

being a

TRACT of LAND

situated in the

NE¼NE¼NW¼ of SECTION 28, TOWNSHIP 56 NORTH, RANGE 84 WEST

of the

SIXTH PRINCIPAL MERIDIAN
SHERIDAN COUNTY, WYOMING

for the

CITY of SHERIDAN

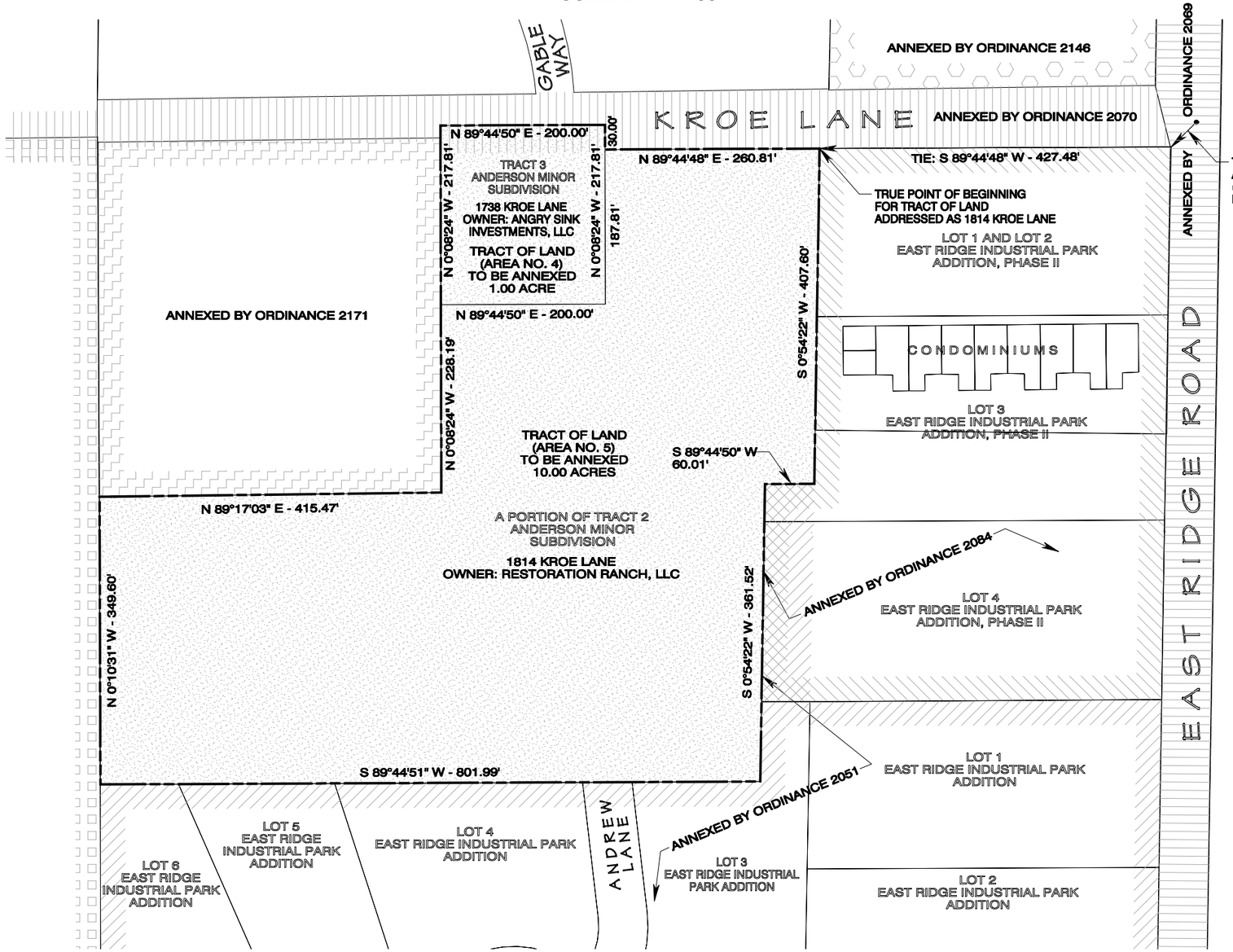
55 GRINNELL PLAZA
SHERIDAN, WYOMING 82801

ANNEXATION AREA NO. 3

DRAWN BY REX RANDALL - JANUARY 16, 2024
RANDALL ENGINEERING SURVEYS - SHERIDAN, WYOMING

DETAIL

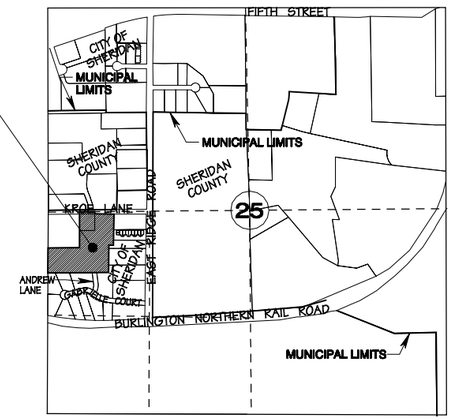
SCALE : 1" = 150'



TIE FROM NORTHEAST CORNER OF ANDERSON MINOR SUBDIVISION (WEST 1/16TH CORNER OF SECTION 15, PER PE LS 537): S 45°19'36" W - 42.86'

LOCATION

SCALE : 1" = 2000'



TOWNSHIP 56 NORTH, RANGE 84 WEST

N

MAP

showing

AREA PROPOSED TO BE ANNEXED

to the

CITY of SHERIDAN
SHERIDAN COUNTY, WYOMING

being

TRACT 3

and a PORTION of

TRACT 2
ANDERSON MINOR SUBDIVISION

situated in the

NW¼SW¼ of SECTION 25,
TOWNSHIP 56 NORTH, RANGE 84 WEST

of the

SIXTH PRINCIPAL MERIDIAN
SHERIDAN COUNTY, WYOMING

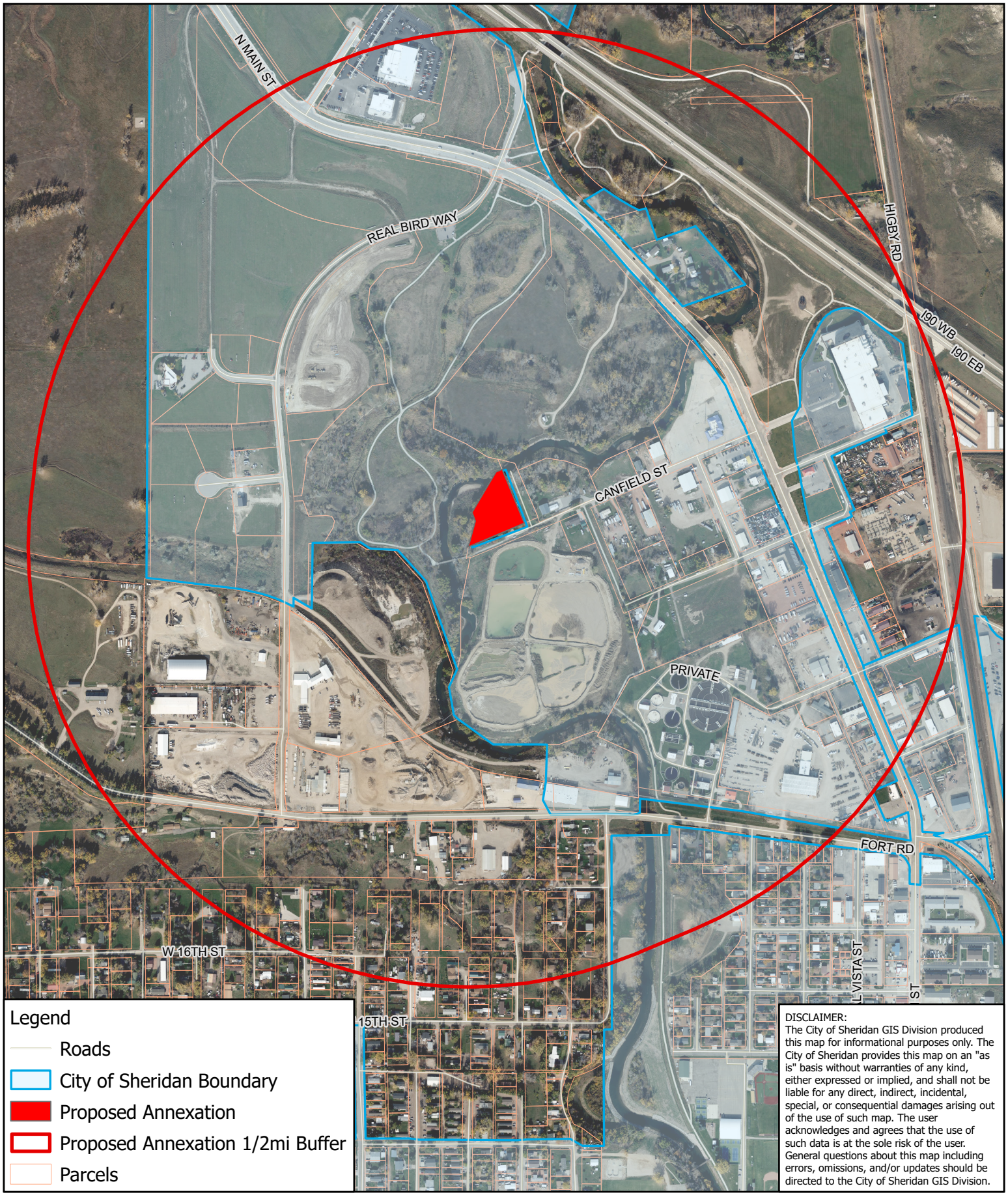
for the

CITY of SHERIDAN

55 GRINNELL PLAZA
SHERIDAN, WYOMING 82801

ANNEXATION AREA NO. 4 and NO. 5

DRAWN BY REX RANDALL - JANUARY 17, 2024
RANDALL ENGINEERING SURVEYS - SHERIDAN, WYOMING



Legend

- Roads
- City of Sheridan Boundary
- Proposed Annexation
- Proposed Annexation 1/2mi Buffer
- Parcels

DISCLAIMER:
The City of Sheridan GIS Division produced this map for informational purposes only. The City of Sheridan provides this map on an "as is" basis without warranties of any kind, either expressed or implied, and shall not be liable for any direct, indirect, incidental, special, or consequential damages arising out of the use of such map. The user acknowledges and agrees that the use of such data is at the sole risk of the user. General questions about this map including errors, omissions, and/or updates should be directed to the City of Sheridan GIS Division.

CITY OF Sheridan WYOMING

Proposed Annexation

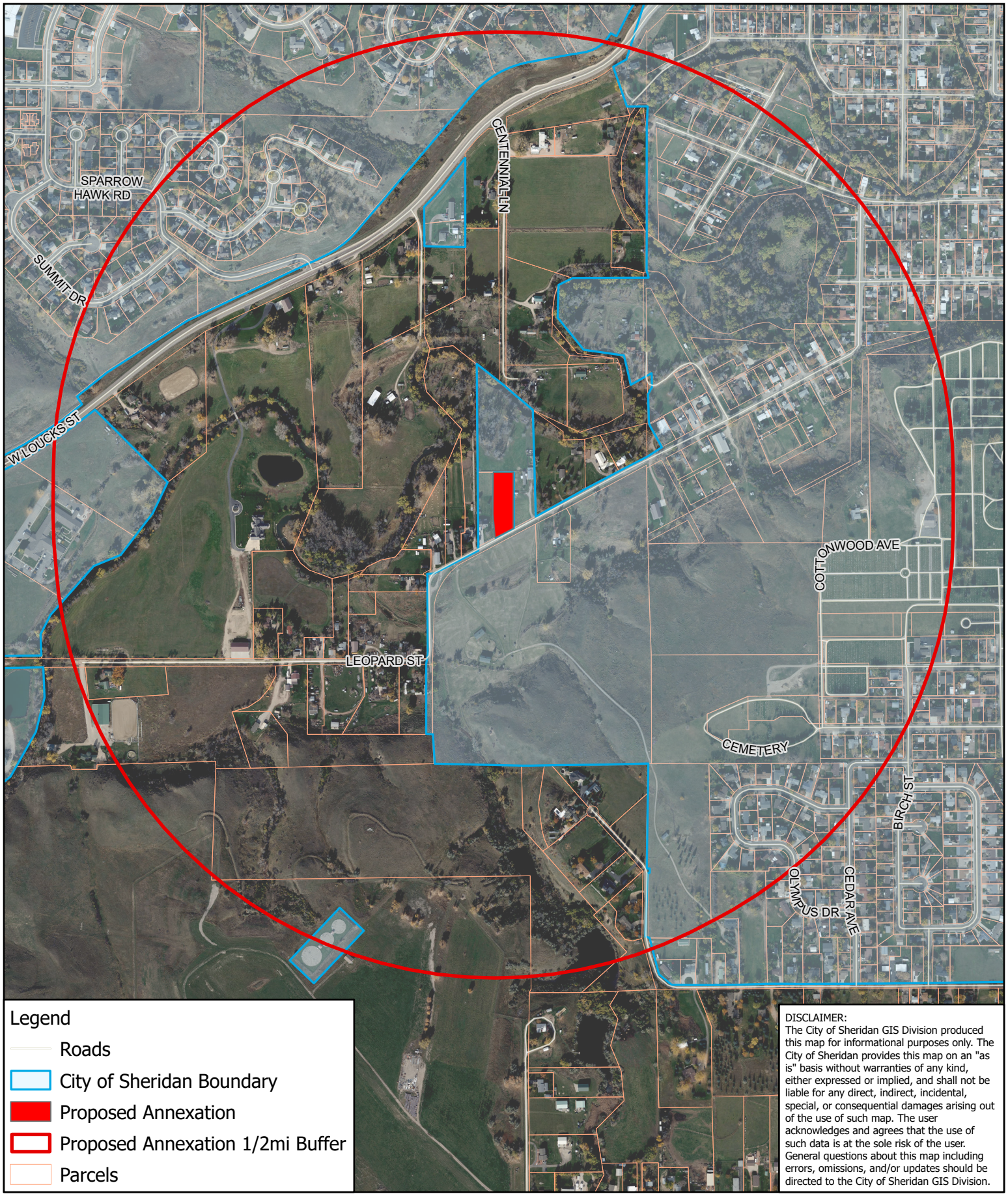
Annexation Area No. 1

Miles 0 0.1 0.2

N

Date: 1/23/2024 10:11 AM

User: mross



Legend

- Roads
- City of Sheridan Boundary
- Proposed Annexation
- Proposed Annexation 1/2mi Buffer
- Parcels

DISCLAIMER:
The City of Sheridan GIS Division produced this map for informational purposes only. The City of Sheridan provides this map on an "as is" basis without warranties of any kind, either expressed or implied, and shall not be liable for any direct, indirect, incidental, special, or consequential damages arising out of the use of such map. The user acknowledges and agrees that the use of such data is at the sole risk of the user. General questions about this map including errors, omissions, and/or updates should be directed to the City of Sheridan GIS Division.

CITY OF Sheridan WYOMING

Proposed Annexation

Annexation Area No. 2

Miles 0 0.1 0.2

N

Date: 1/23/2024 9:53 AM

User: mross



Legend

- Roads
- City of Sheridan Boundary
- Proposed Annexation
- Proposed Annexation 1/2mi Buffer
- Parcels

DISCLAIMER:
The City of Sheridan GIS Division produced this map for informational purposes only. The City of Sheridan provides this map on an "as is" basis without warranties of any kind, either expressed or implied, and shall not be liable for any direct, indirect, incidental, special, or consequential damages arising out of the use of such map. The user acknowledges and agrees that the use of such data is at the sole risk of the user. General questions about this map including errors, omissions, and/or updates should be directed to the City of Sheridan GIS Division.

CITY OF Sheridan WYOMING

Proposed Annexation

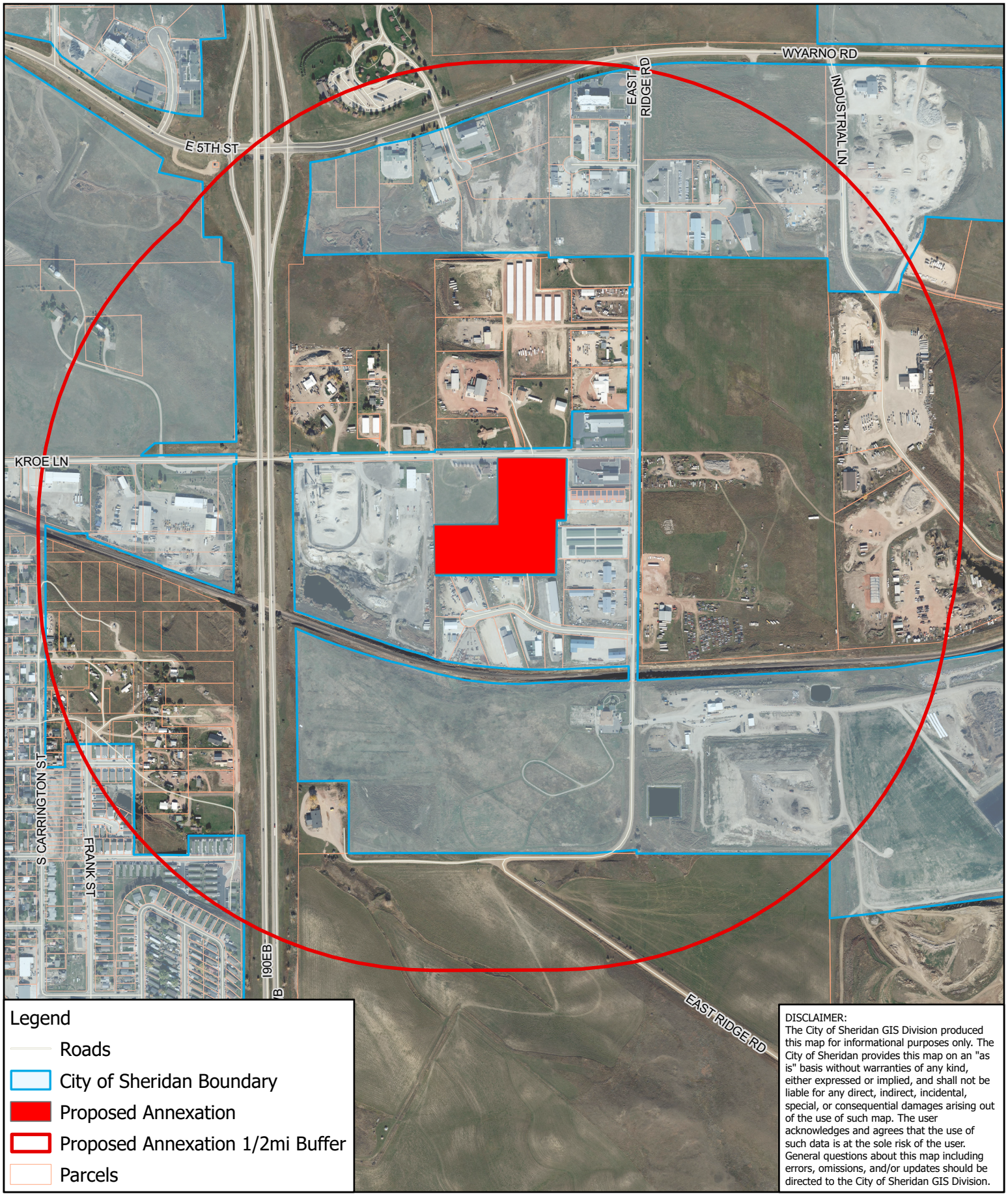
Annexation Area No. 3

Miles 0 0.1 0.2

N

Date: 1/23/2024 9:51 AM

User: mross



Legend

- Roads
- City of Sheridan Boundary
- Proposed Annexation
- Proposed Annexation 1/2mi Buffer
- Parcels

DISCLAIMER:
The City of Sheridan GIS Division produced this map for informational purposes only. The City of Sheridan provides this map on an "as is" basis without warranties of any kind, either expressed or implied, and shall not be liable for any direct, indirect, incidental, special, or consequential damages arising out of the use of such map. The user acknowledges and agrees that the use of such data is at the sole risk of the user. General questions about this map including errors, omissions, and/or updates should be directed to the City of Sheridan GIS Division.

CITY OF Sheridan WYOMING

Proposed Annexation

Annexation Area No. 4 and No. 5

Miles 0 0.1 0.2

N

Date: 1/23/2024 9:49 AM

User: mross

ORDINANCE NO. 2280

AN ORDINANCE annexing and zoning certain specific areas, the perimeters of which are adjacent to and contiguous to the corporate limits of the City of Sheridan, Wyoming.

WHEREAS , by Resolution 05-24, duly adopted by the City Governing Body on on the 5th day of February 2024, following a request by the Sheridan County Clerk and the Sheridan County Commissioners to annex six specific properties into the corporate boundary of the City; and

WHEREAS, Wyoming Statute allows the City Governing Body to annex properties into the City of Sheridan corporate boundary; and

WHEREAS, the Planning Commission of the City of Sheridan has recommended to the City Council that said tracts of land be annexed to the City; THEREFORE,

BE IT ORDAINED BY THE E CITY OF SHERIDAN GOVERNING BODY:

FINDINGS

1. The City Governing Body approved Resolution 05-24 on February 5th, 2024, in accordance with W.S. 15-1-404(a)(i), finding that reasonable indicates that the specific areas defined below meets the conditions and limitations of W.S. 15-1-402.

2. The City Planning Commission held a public hearing on _____, being at least 15 days after publication in accordance with City Ordinance Appendix A(6),

   A. The City Planning Commission recommended to the City that said tracks be annexed into the City.

3. The City Governing Body approved Resolution 05-24 on February 5, 2024 in accordance with W.S. 15-1-405, certifying compliance with W.S 15-1-402, being held at least 30 days after the approval of Resolution 05-24.

4. The perimeter of real properties identified below are surrounded by 75% or more of the City corporate limits.

Section 1. ANNEXATION.

That the following described tracts of land are hereby annexed into the City of Sheridan, to wit:

AREA NO. 1 : (Addressed as 447 Canfield Street, Sheridan, Wyoming)

A tract of land situated in Block 1 of the Suburban Homes Company Addition to the City of Sheridan, Wyoming; more particularly described as follows: Beginning at the Southeast Corner of said Block 1; thence N 22°29'12" W for a distance of 351.69 feet; thence S 67°30'48" W for a distance of 40.00 feet; thence S 30°31'53" W for a distance of 282.13 feet; thence S 20°02'04" E for a distance of 55.00 feet; thence S 14°57'56" W for a distance of 160.00 feet; thence N 67°30'48" E for a distance of 365.02 feet to the point of beginning.

Said tract of land contains 1.85 Acres and is delineated on an accompanying map.

AREA NO. 2 : (Addressed as 1305 Leopard Street, Sheridan, Wyoming)

A tract of land situated in the NE¼NE¼ of Section 33, Township 56 North, Range 84 West of the Sixth Principal Meridian, Sheridan County, Wyoming, described as follows:

Beginning at a point on the North line of Leopard Street, said point being S 33°11'45" W a distance of 1,443.52 feet from the Northeast Corner of said Section 33; thence N 0°43'00" W for a distance of 335.53 feet; thence S 89°17'00" W for a distance of 118.56 feet; thence

S 0°04’09” W for a distance of 249.75 feet; thence S 5°11’02” E for a distance of 143.17 feet to a point on the North Right of Way of Leopard Street; thence along said Right of Way N 62°05’49” E for a distance of 124.60 feet the point of beginning.

Said tract of land contains 1.00 Acre and is delineated on an accompanying map.

AREA NO. 3 : (A Tract of Land Adjacent to Property Addressed as 1872 Fairway Lane)

A tract of land situated in NE¼NE¼NW¼ of Section 28, Township 56 North, Range 84 West of the Sixth Principal Meridian, Sheridan County, Wyoming, more particularly described as follows: Beginning at the Southwest Corner of the said NE¼NE¼NW¼ of said Section 28 (said point also being the Northwest Corner of the Fairway Acres Addition to the City of Sheridan, Wyoming); thence N 1°51’ E along the West boundary of said NE¼NE¼NW¼ for a distance of 134 feet to a point: thence S 89°49’ E for a distance of 247.9 feet to a point; thence S 0°52’ W for a distance of 137 feet to a point, (said point being the Northeast Corner of Lot 3, Block 1 of said Fairway Acres Addition); thence N 89°08’ W along the North boundary of said Fairway Acres Addition, a distance of 250.3 feet to the point of beginning.

Said tract of land contains 0.77 of an Acre and is delineated on an accompanying map.

AREA NO. 4 : (Addressed as 1738 Kroe Lane, Sheridan, Wyoming)

A tract of land being Tract 3 of the Anderson Minor Subdivision, a subdivision in Sheridan County, Wyoming, as recorded in Book 1 of Plats, Page 262.

Said tract of land contains 1.00 Acre and is delineated on an accompanying map.

AREA NO. 5 (Addressed as 1814 Kroe Lane, Sheridan, Wyoming)

A tract of land being a portion of Tract Two (2), Anderson Minor Subdivision, Sheridan County, Wyoming, located in the NW¼ of the SW¼ of Section 25, Township 56 North, Range 84 West of the Sixth Principal Meridian; being more particularly described as follows:

Commencing at the Northeast Corner of said Anderson Minor Subdivision, also accepted as the West 1/16 Corner of said Section 25, (per L.S. 567); thence S 45°19’36” W for a distance of 42.86 feet to a point on the South Right-of-Way of Kroe Lane; thence along said South Right-of-Way and parallel to the North line of said Subdivision, S 89°44’50” W for a distance of 427.48 feet to the True Point of Beginning of this survey; thence parallel to the East line of said Subdivision, S 0°54’22” W for a distance of 407.60 feet; thence S 89°44’50”W for a distance of 60.01 feet; thence S 0°54’22” W for a distance of 361.52 feet; thence S 89°44’51” W for a distance of 801.99 feet to a point on the West boundary of said Subdivision; thence along said West line, N 0°10’31” W for a distance of 349.60 feet; thence N 89°17’03” E for a distance of 415.47 feet; thence N 0°08’24” W for a distance of 228.19 feet; thence N 89°44’50” E for a distance of 200.00 feet; thence N 0°08’24” W for a distance of 187.81 feet to a point on the South Right-of-Way line of Kroe Lane; thence along said Right-of-Way and parallel to the North line of said Subdivision, N 89°44’50” E for a distance of 260.81 feet to the True Point of Beginning of this survey.

Said tract of land contains 10.00 Acres and is delineated on an accompanying map.

Section 2. ZONING.

The zoning being assigned to the aforementioned properties is as follows:

AREA NO. 1 : To be zoned B-1.

AREA NO. 2 : To be zoned R-1.

AREA NO. 3 : To be zoned R -1.

AREA NO. 4 : To be zoned M-1.

AREA NO. 5 : To be zoned M-1.

Section 4. SEVERABILITY.

If any provision or portion of this ordinance is declared by any court of competent jurisdiction to be void, unconstitutional, or unenforceable, then all remaining provisions and portions of this ordinance shall remain in full force and effect.

Section 5. EFFECTIVE DATE.

That this ordinance shall be in full force on _____ _____, 2024.

PASSED, APPROVED, AND ADOPTED this _____ day of _____ , 2024.

Richard Bridger, Mayor

ATTEST:

Cecilia Good, City Clerk

State of Wyoming }
} SS
County of Sheridan}

Subscribed and sworn to (or affirmed) before me this _____ day of _____ , 2024.

Notary Public

My commission expires _____ .

Annexation Report

CITY INITIATED ANNEXATION
OF FIVE AREAS AS
REQUEST BY SHERIDAN COUNTY

Prepared by:

City of Sheridan Public Works Department
FEBRUARY 2024

PURPOSE

This report is an analysis of the costs and impacts associated with the proposed annexation of the following parcels of land:

1. A tract of land situated in Block 1 of the Suburban Homes Company Addition to the City of Sheridan, Wyoming; more particularly described as follows: Beginning at the Southeast Corner of said Block 1; thence N 22°29'12" W for a distance of 351.69 feet; thence S 67°30'48" W for a distance of 40.00 feet; thence S 30°31'53" W for a distance of 282.13 feet; thence S 20°02'04" E for a distance of 55.00 feet; thence S 14°57'56" W for a distance of 160.00 feet; thence N 67°30'48" E for a distance of 365.02 feet to the point of beginning. Said tract of land contains 1.85 Acres and is delineated on an accompanying Figure 1.

2. A tract of land situated in the NE¼NE¼ of Section 33, Township 56 North, Range 84 West of the Sixth Principal Meridian, Sheridan County, Wyoming, described as follows: Beginning at a point on the North line of Leopard Street, said point being S 33°11'45" W a distance of 1,443.52 feet from the Northeast Corner of said Section 33; thence N 0°43'00" W for a distance of 335.53 feet; thence S 89°17'00" W for a distance of 118.56 feet; thence S 0°04'09" W for a distance of 249.75 feet; thence S 5°11'02" E for a distance of 143.17 feet to a point on the North Right of Way of Leopard Street; thence along said Right of Way N 62°05'49" E for a distance of 124.60 feet the point of beginning. Said tract of land contains 1.00 Acre and is delineated on Figure 2.

3. A tract of land situated in NE¼NE¼NW¼ of Section 28, Township 56 North, Range 84 West of the Sixth Principal Meridian, Sheridan County, Wyoming, more particularly described as follows: Beginning at the Southwest Corner of the said NE¼NE¼NW¼ of said Section 28 (said point also being the Northwest Corner of the Fairway Acres Addition to the City of Sheridan, Wyoming); thence N 1°51' E along the West boundary of said NE¼NE¼NW¼ for a distance of 134 feet to a point: thence S 89°49' E for a distance of 247.9 feet to a point; thence S 0°52' W for a distance of 137 feet to a point, (said point being the Northeast Corner of Lot 3, Block 1 of said Fairway Acres Addition); thence N 89°08' W along the North boundary of said Fairway Acres Addition, a distance of 250.3 feet to the point of beginning. Said tract of land contains 0.77 of an Acre and is delineated on Figure 3.

4. A tract of land being Tract 3 of the Anderson Minor Subdivision, a subdivision in Sheridan County, Wyoming, as recorded in Book 1 of Plats, Page 262. Said tract of land contains 1.00 Acre and is delineated on Figure 4.

5. A tract of land being a portion of Tract Two (2), Anderson Minor Subdivision, Sheridan County, Wyoming, located in the NW¼ of the SW¼ of Section 25, Township 56 North, Range 84 West of the Sixth Principal Meridian; being more particularly described as follows: Commencing at the Northeast Corner of said Anderson Minor Subdivision, also accepted as the West 1/16 Corner of said Section 25, (per L.S. 567); thence S 45°19'36" W for a distance of 42.86 feet to a point on the South Right-of-Way of Kroe Lane; thence along said South Right-of-Way and parallel to the North line of said Subdivision, S 89°44'50" W for a distance of 427.48 feet to the True Point of Beginning of this survey; thence parallel to the East line of said Subdivision, S 0°54'22" W for a distance of 407.60 feet; thence S 89°44'50"W for a distance of 60.01 feet; thence S 0°54'22" W for a distance of 361.52 feet; thence S 89°44'51" W for a distance of 801.99 feet to a point on the West boundary of said Subdivision; thence along said West line, N 0°10'31" W for a distance of 349.60 feet; thence N 89°17'03" E for a distance of 415.47 feet; thence N 0°08'24" W for a distance of 228.19 feet; thence N 89°44'50" E for a distance of 200.00 feet; thence N 0°08'24" W for a distance of 187.81 feet to a point on the South Right-of-Way line of Kroe Lane; thence along said Right-of-Way and parallel to the North line of said Subdivision, N 89°44'50" E for a distance of 260.81 feet to the True Point of Beginning of this survey. Said tract of land contains 10.00 Acres and is delineated on Figure 4.

This report meets the requirements of Wyoming Statutes 15-1-402 detailed on page 10 of this report. This information is available for review by the residents of the City of Sheridan, and will also be used by the Sheridan City Planning Commission and City Council in considering the annexation request.

ANNEXATION CHARACTERISTICS & PROPOSED ZONING

The proposed annexation areas are shown on the maps featured on the pages that follow (See Figures 1-5 Maps). The zoning being assigned to the aforementioned properties is as follows:

- AREA NO. 1 : To be zoned B-1.
- AREA NO. 2 : To be zoned R-1.
- AREA NO. 3 : To be zoned R -1.
- AREA NO. 4 : To be zoned M-1.
- AREA NO. 5 : To be zoned M-1.

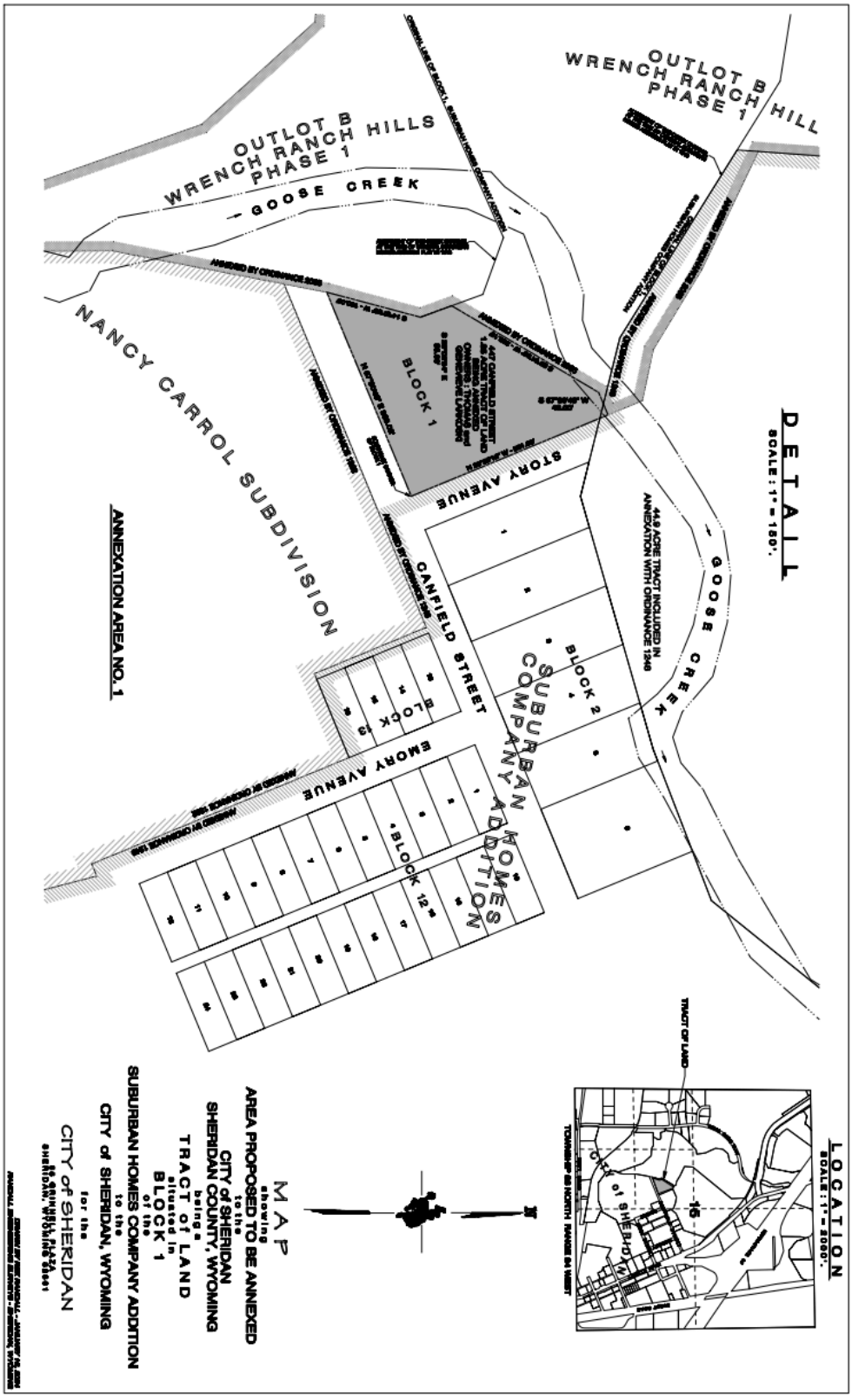


Figure 1 - Annexation Area No. 1 – 447 Canfield Street

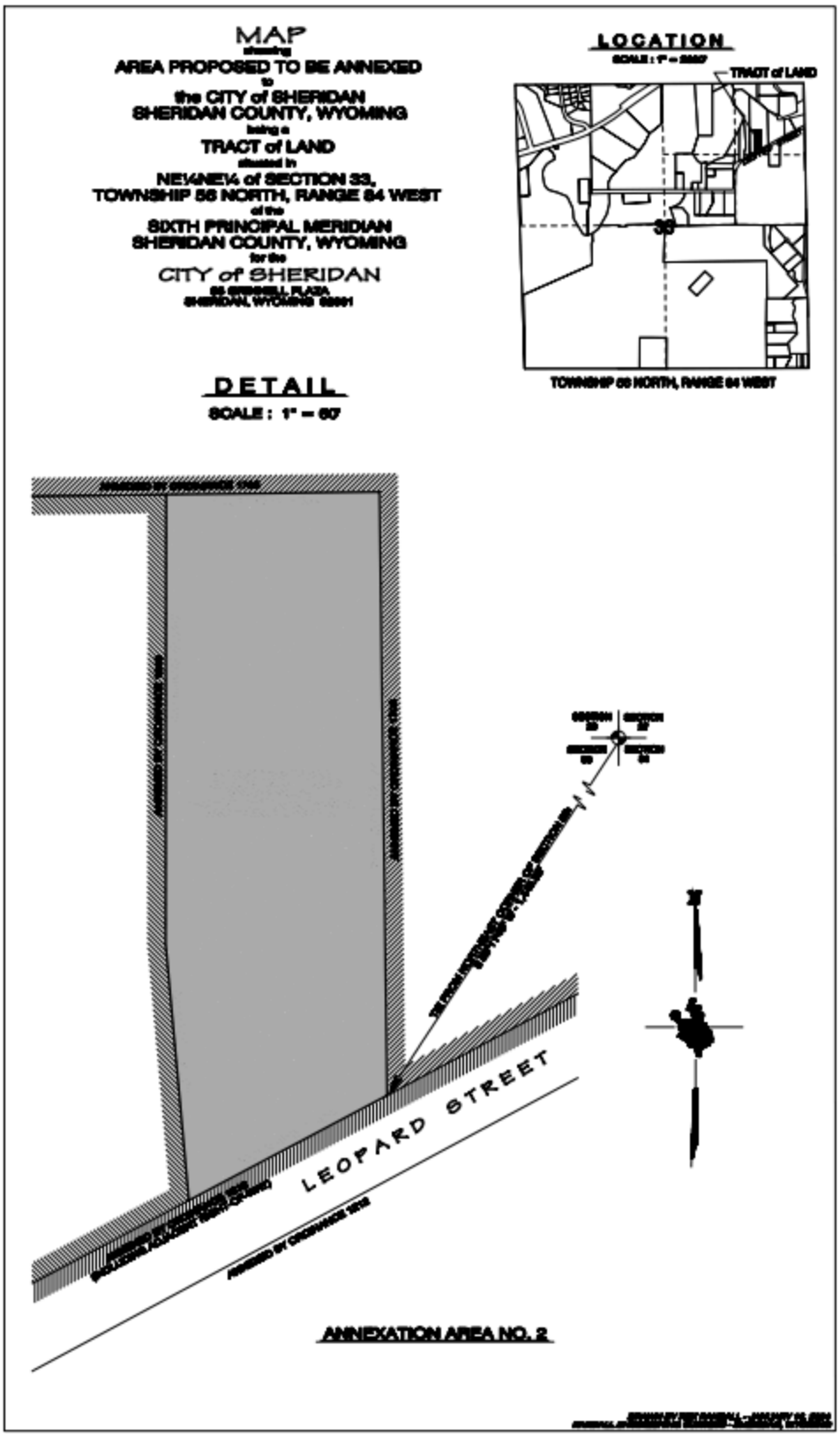


Figure 2 - Annexation Area No. 2 – 1305 Leopard Street

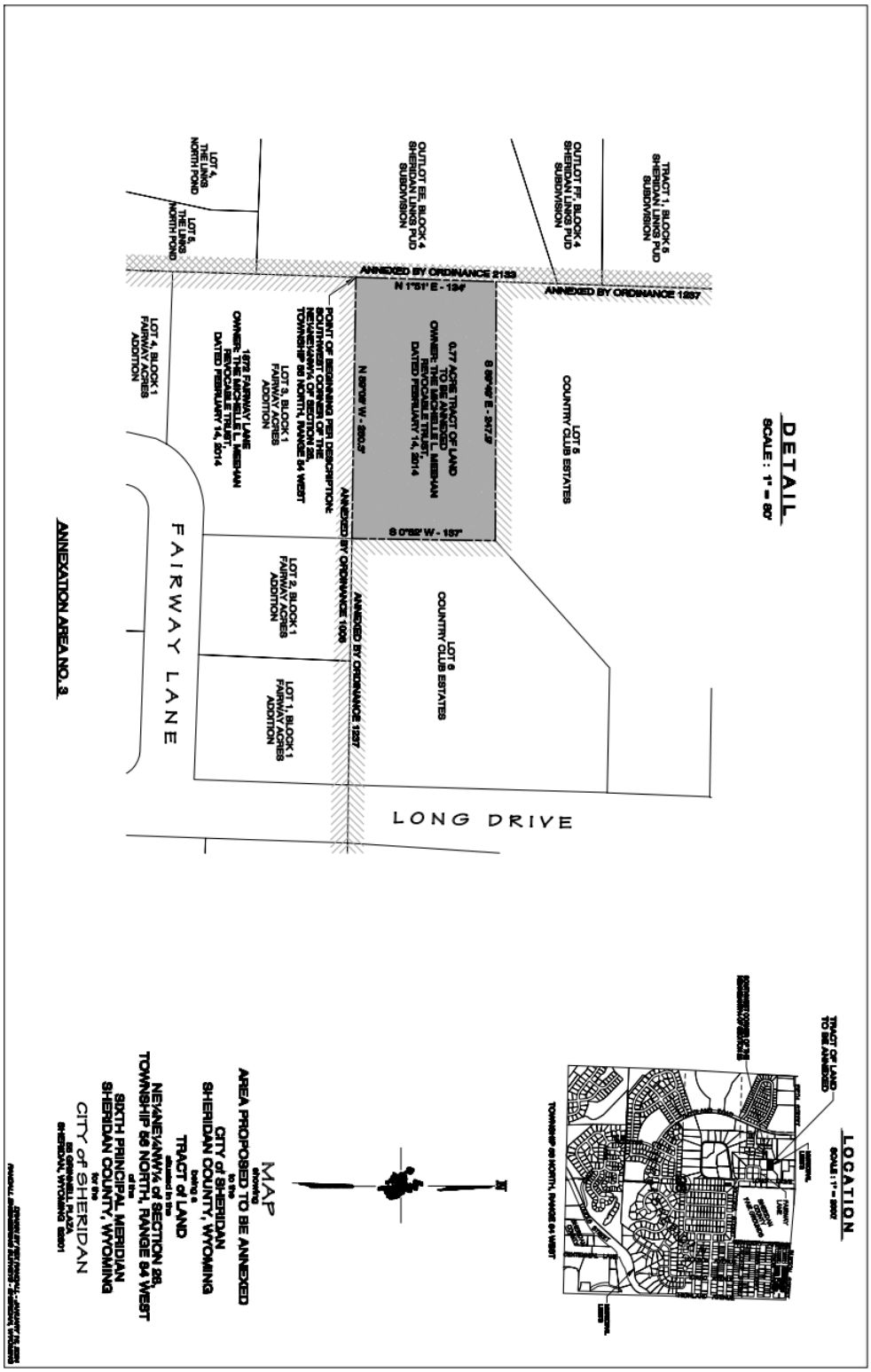


Figure 3 - Annexation Area No. 3 – Tract of Land Adjacent to 1872 Fairway Lane

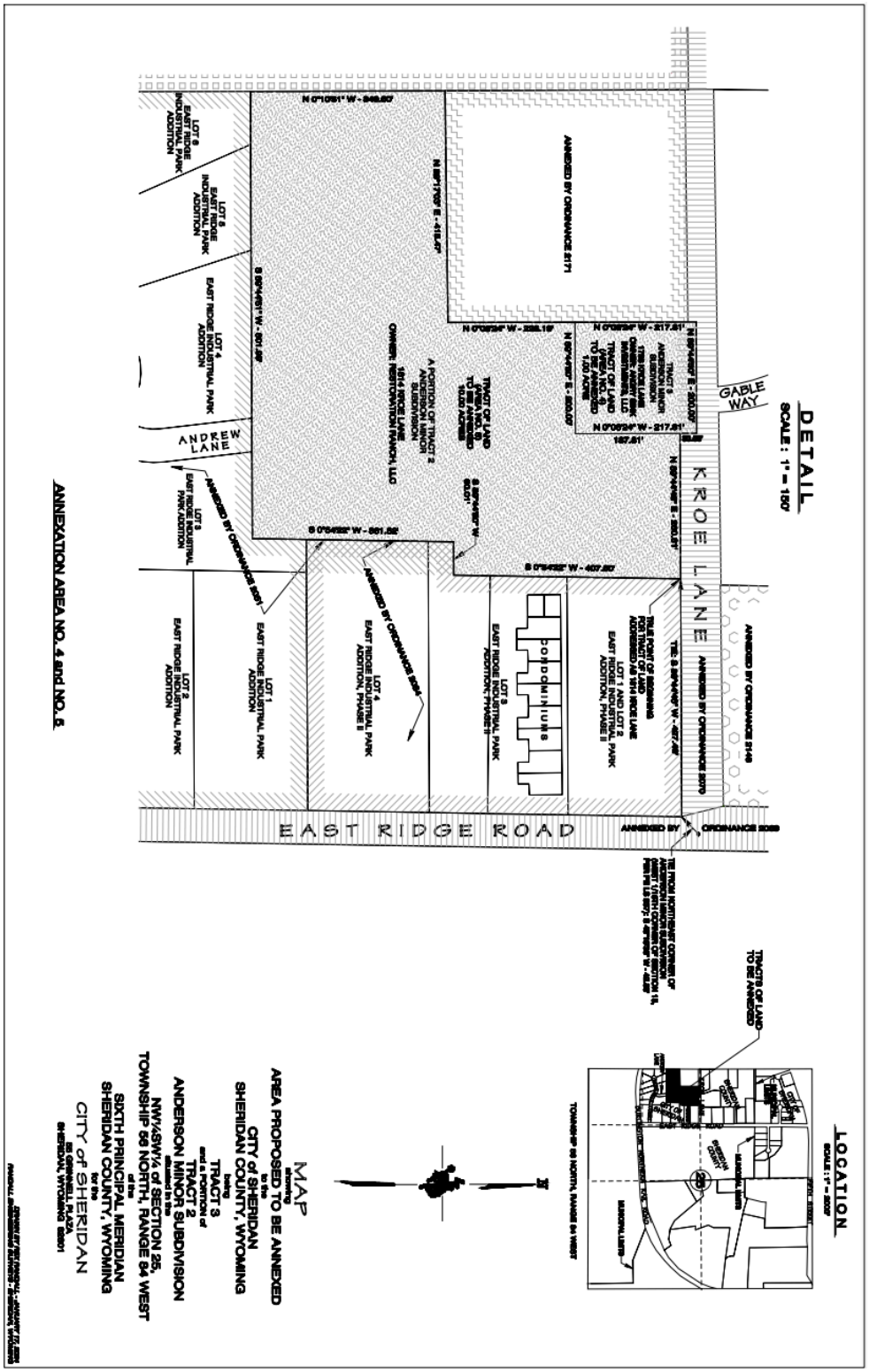


Figure 4 - Annexation Area No. 4 & 5 – 1738 & 1814 Kroe Lane

STATUTORY REQUIREMENTS

Wyoming Statute 15-1-402 sets specific requirements for annexation documentation. Section 15-1-402(a) requires that the annexation report contain, at a minimum, the following information:

(i) A map of the area to be annexed showing identifiable landmarks and boundaries and the area which will, as a result of the annexation, then be brought within one-half (1/2) mile of the new corporate limits of the city, if it has exercised the authority granted under W.S. 15-3-202(b)(ii);

(ii) The total estimated cost of infrastructure improvements required of all landowners by the annexing municipality related to the annexation;

(iii) A list of basic and other services customarily available to residents of the city or town and a timetable when those services will reasonably be available to the area proposed to be annexed;

(iv) A projected annual fee or service cost for services described in paragraph (iii);

(v) The current and projected property tax mill levies imposed by the municipality;

(vi) The cost of infrastructure improvements required within the existing boundaries of the municipality to accommodate the proposed annexation.

Additionally, WS 15-1-402 requires that the City Council be able to make the following findings as part of the adoption of the annexation ordinance:

(i) An annexation of the area is for the protection of the health, safety and welfare of the persons residing in the area and in the city or town;

(ii) The urban development of the area sought to be annexed would constitute a natural, geographical, economical and social part of the annexing city or town;

(iii) The area sought to be annexed is a logical and feasible addition to the annexing city or town and the extension of basic and other services customarily available to residents of the city or town shall, within reason, be available to the area proposed to be annexed;

(iv) The area sought to be annexed is contiguous with or adjacent to the annexing city or town, or the area meets the requirements of W.S. 15-1-407;

(v) If the city or town does not own or operate its own electric utility, its governing body is prepared to issue one (1) or more franchises as necessary to serve the annexed area pursuant to W.S. 15-1-410; and

(vi) The annexing city or town, not less than twenty (20) business days prior to the public hearing required by W.S. 15-1-405(a), has sent by certified mail to all landowners and affected public utilities within the territory a summary of the proposed annexation report as required under subsection (c) of this section and notice of the time, date and location of the public hearing required by W.S. 15-1-405(a).

TOTAL ESTIMATED COST OF INFRASTRUCTURE IMPROVEMENTS

All of the private properties in the proposed annexation areas already have access to City or Sheridan Area Water System (SAWS) transmission mains. Properties 447 Canfield, 1738 and 1814 Kroe Lane currently are not connected to City sewer and may remain on their existing septic system until such a time when the septic system has failed and/or the property becomes within 400 ft of a City sanitary sewer main. No further improvements will be necessary at this time to provide services.

SERVICES CUSTOMARILY AVAILABLE TO RESIDENTS OF THE CITY OR TOWN AND SCHEDULE OF AVAILABILITY

The City of Sheridan typically provides the following services for all residents:

- Centralized Water and Sewer Distribution and Disposal
- Solid Waste Collection
- Street Maintenance
- Police Protection
- Fire and Ambulance (EMS)
- Maintenance of Parks and Open Areas

Water and Sewer Service

As stated above, all of the properties have access to existing water mains. 1738 Kroe and 447 Canfield are over 400 ft from a City sanitary sewer main. Other properties have access to existing sewer mains.

Solid Waste Collection

The City of Sheridan Solid Waste Division will be able to service all of the properties subject to the standard collection fees assessed to all city customers.

Street Maintenance

The City already maintains the roads surrounding the properties.

Police Protection/Fire and Ambulance EMS

At present it is not anticipated that any additional funding will be necessary for police or emergency services to serve these areas.

Maintenance of Parks and Open Areas

No additional public park land or open space is anticipated as an immediate result of these annexations.

THE CURRENT AND PROJECTED PROPERTY TAX MILL LEVIES IMPOSED BY THE MUNICIPALITY

Present and future property owners will be subject to additional municipal mill levy based on use of the property and County assessment. The current mill levy from the county for each property is listed below:

- 447 Canfield Street - 66.5 mill levy
- 1305 Leopard Street - 66.5 mill levy
- Tract of Land Adjacent to 1872 Fairway Lane - 63.5 mill levy
- 1738 Kroe Lane - 66.5 mill levy
- 1814 Kroe Lane - 66.5 mill levy

The projected mill levy for all the properties is 71.5.

THE COST OF INFRASTRUCTURE IMPROVEMENTS REQUIRED WITHIN THE EXISTING BOUNDARIES OF THE MUNICIPALITY TO ACCOMMODATE THE PROPOSED ANNEXATIONS.

No further improvements are anticipated as being necessary for the proposed annexation area to meet the present uses.

REVIEW OF FINDINGS REQUIRED UNDER WS 15-1-402

The City Council is required to make specific findings regarding the annexation proposal per state law. The following is staff commentary on these particular requirements.

An annexation of the area is for the protection of the health, safety and welfare of the persons residing in the area and in the city or town.

The private properties already benefit from access to water mains. New structures built within these areas will be thoroughly inspected for compliance with International Building Code Standards, reducing risk of fire or other adverse damage.

The urban development of the area sought to be annexed would constitute a natural, geographical, economical and social part of the annexing city or town.

All of the proposed annexations represent logical extensions that fill towards the existing corporate limits.

The area sought to be annexed is a logical and feasible addition to the annexing city or town and the extension of basic and other services customarily available to residents of the city or town shall, within reason, be available to the area proposed to be annexed.

All of the private properties in question already receive some City services. Providing the remainder of City services to these property owners will be straightforward.

The area sought to be annexed is contiguous with or adjacent to the annexing city or town, or the area meets the requirements of W.S. 15-1-407.

The proposed annexations all abut the corporate limits of the City, and in some cases are surrounded by the corporate limits.

If the city or town does not own or operate its own electric utility, its governing body is prepared to issue one (1) or more franchises as necessary to serve the annexed area pursuant to W.S. 15-1-410.

The City will honor its franchise agreements with existing electrical utilities.

The annexing city or town, not less than twenty (20) business days prior to the public hearing required by W.S. 15-1-405(a), has sent by certified mail to all landowners and affected public utilities within the territory a summary of the proposed annexation report as required under subsection (c) of this section and notice of the time, date and location of the public hearing required by W.S. 15-1-405(a).

At the date of the preparation of this annexation report, the city staff has, and will continue to abide by the state notification requirements.

CONCLUSIONS

Upon review of the proposed annexations, City Staff believes they meet the requirements of state law, and overall would be to the benefit of current and future residents.

MEMO

TO: Planning Commission

FROM: Thomas Morneau, City Engineer

RE: Recommendation of PL-24-6, ORD 2278. The applicant, Story House Property Company, LLC. is requesting to rezone 44.86 acres from B-2 Business District to a Planned Unit Development, PUD. Located at 2323 E 5th St. PIN 568410000333.

Background

The City Council has requested the Planning Commission review the updated information for the Story House Village Planned Unit Development and provide a recommendation to the City Council.

Attachments

aerial
preliminary plat
Variance requests
Revision summary
Drainage report
Geotech report
Traffic report
Design report
Water and Sewer report
ORD 2278
Development Agreement

Story House Village PUD



DISCLAIMER:
The City of Sheridan GIS Division produced this map for informational purposes only. The City of Sheridan provides this map on an "as is" basis without warranties of any kind, either expressed or implied, and shall not be liable for any direct, indirect, incidental, special or consequential damages arising out of the use of such map. The user acknowledges and agrees that the use of such data is at the sole risk of the user. General questions about this map including errors, omissions, and/or updates should be directed to the City of Sheridan GIS Division.

CITY OF Sheridan WYOMING

Legend

Roads
- County Road
- Forest Service Road
- Private Road
- PUBLIC ROAD
- City of Sheridan Road
- Sheridan College Road
- Sheridan County Airport
- State of Wyoming Road
- VA Road
- Parcels

Zoning City
- MA - Medical Arts District
- R1 - Residence District
- R2 - Residence District
- R3 - Residence District
- R4 - Residence District

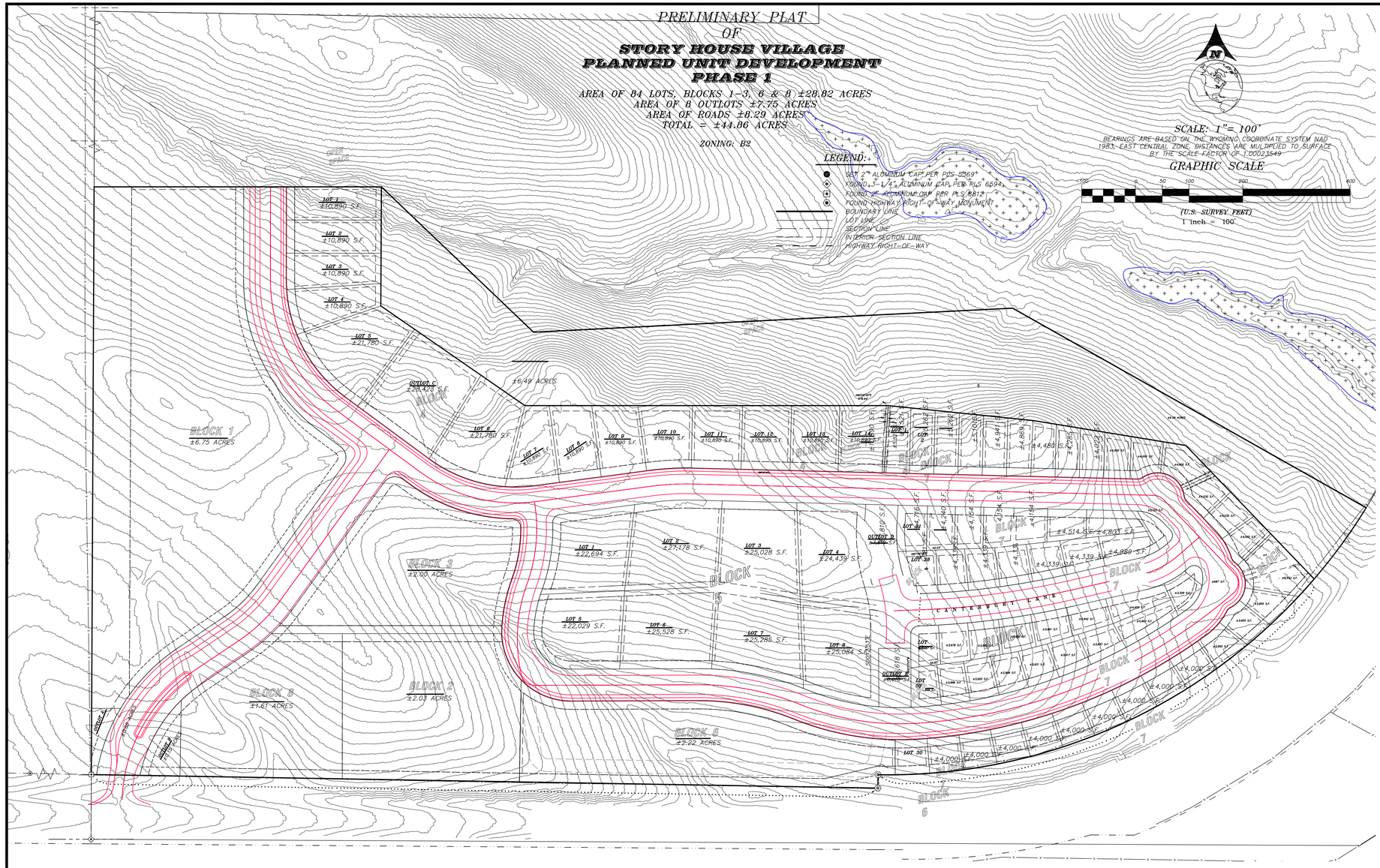
Miles 0 ¾ 1½

Date: 12/27/2023 3:41 PM User: sgoodman

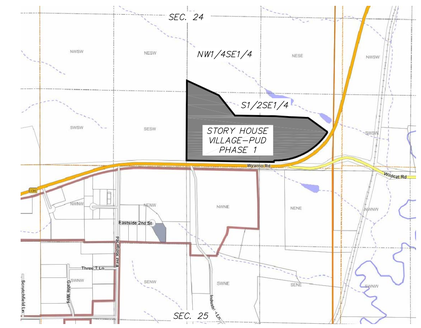
PRELIMINARY PLAT
OF
STORY HOUSE VILLAGE
PLANNED UNIT DEVELOPMENT
PHASE 1

AREA OF 84 LOTS, BLOCKS 1-3, 6 & 8 ±28.82 ACRES
AREA OF 8 OUTLOTS ±7.75 ACRES
AREA OF ROADS ±8.29 ACRES
TOTAL = ±44.86 ACRES

ZONING: B2



LOCATION MAP



NO TRUE SCALE

CERTIFICATE OF DEDICATION

KNOWN ALL MEN BY THESE PRESENTS THAT THE UNDERSIGNED STORY HOUSE PROPERTY COMPANY LLC BEING THE OWNER(S), PROPRIETORS OR PARTIES OF INTEREST IN THE LAND SHOWN ON THIS PLAT, DO HEREBY STATE:

THAT THE FOREGOING PLAT DESIGNATED AS **STORY HOUSE VILLAGE PLANNED UNIT DEVELOPMENT PHASE 1** IS A SUBDIVISION OF THE NW1/4SE1/4 and the S1/2SE1/4, SECTION 24, TOWNSHIP 56 NORTH, RANGE 84 WEST 6TH PRINCIPAL MERIDIAN, CITY OF SHERIDAN, SHERIDAN COUNTY, WYOMING MORE PARTICULARLY DESCRIBED AS FOLLOWS:

Commencing at the quarter corner of said Section 24 (monumented with a 3¼" Aluminum Cap per PLS 6594); thence N00°16'03"E, 120.65 feet along the west line of said S½SE¼ to a 2" Aluminum Cap per PLS 6812 being the POINT OF BEGINNING this tract;
thence N00°16'03"E, 1320.34 feet along said west line to a 2" Aluminum Cap per PLS 5369;
thence S67°06'27"E, 579.60 feet to a 2" Aluminum Cap per PLS 5369;
thence S44°49'33"E, 398.03 feet to a 2" Aluminum Cap per PLS 5369;
thence S87°48'06"E, 773.47 feet to a 2" Aluminum Cap per PLS 5369;
thence S79°47'33"E, 454.02 feet to a 2" Aluminum Cap per PLS 5369;
thence S58°22'51"E, 391.82 feet to a 2" Aluminum Cap per PLS 5369, lying on the north right of way line of Wyarno Road (AKA State Highway No. 336);
thence along said north right of way line, through a curve to the right, having a central angle of 59°23'00", a radius of 1045.92 feet, an arc length of 1084.03 feet, a chord bearing of S61°18'38"W and a chord distance of 1036.15 feet to a standard WYDOT right of way monument at the end of said curve to the right;
thence along said north right of way line S01°14'12"W, 24.84 feet to a standard WYDOT right of way monument;
thence N89°00'45"W, 1464.83 feet along said north right of way line to the POINT OF BEGINNING.

SAID SUBDIVISION CONTAINS **±44.86 ACRES** OF LAND, MORE OR LESS.

STORY HOUSE VILLAGE PLANNED UNIT DEVELOPMENT PHASE 1, AS IT IS DESCRIBED AND AS IT APPEARS ON THIS PLAT, IS MADE WITH THE FREE CONSENT AND IN ACCORDANCE WITH THE DESIRES OF THE UNDERSIGNED OWNER(S) AND PROPRIETORS; AND THAT THIS IS A CORRECT PLAT OF THE AREA AS IT IS DIVIDED INTO LOTS, OUTLOTS, STREETS AND EASEMENTS.

THE UNDERSIGNED OWNER(S) OF THE LAND SHOWN AND DESCRIBED ON THIS PLAT DO HEREBY DEDICATE TO THE CITY OF SHERIDAN AND ITS LICENSEES FOR PUBLIC USE FOR THE INDICATED PURPOSES, ALL STREETS, EASEMENTS AND OTHER PUBLIC LANDS, AS INDICATED, AND NOT ALREADY OTHERWISE DEDICATED FOR PUBLIC USE.

UTILITY EASEMENTS, AS DESIGNATED ON THE PLAT, ARE HEREBY GRANTED TO THE CITY OF SHERIDAN AND IT'S LICENSEES FOR PUBLIC USE FOR THE PURPOSE OF INSTALLING, REPAIRING, REINSTALLING, REPLACING AND MAINTAINING SANITARY SEWERS, STORM SEWERS, WATER LINES, GAS LINES, ELECTRIC LINES, TELEPHONE LINES, CABLE TV LINE, AND OTHER FORMS AND TYPES OF PUBLIC UTILITIES NOW OR HEREAFTER GENERALLY UTILIZED BY THE PUBLIC.

OUTLOTS ARE DRAINAGE EASEMENTS, OTHER EASEMENTS (AS SHOWN & DEFINED), AND OPEN SPACES WHICH ARE OWNED & MAINTAINED BY THE HOMEOWNER'S ASSOCIATION.

SURVEYOR'S CERTIFICATE

STATE OF WYOMING :ss
COUNTY OF SHERIDAN:

I, THONE STEWART, DO HEREBY STATE THAT I AM A REGISTERED LAND SURVEYOR, LICENSED UNDER THE LAWS OF THE STATE OF WYOMING, THAT THIS PLAT IS A TRUE, CORRECT AND COMPLETE PLAT OF **STORY HOUSE VILLAGE PLANNED UNIT DEVELOPMENT PHASE 1**, AS LAID OUT, PLATTED, DEDICATED AND SHOWN HEREON, THAT THIS PLAT WAS MADE FROM AN ACCURATE SURVEY OF SAID PROPERTY CONDUCTED BY ME OR UNDER MY DIRECT SUPERVISION AND CORRECTLY SHOWS THE LOCATION AND DIMENSIONS OF ALL LOTS, EASEMENTS AND STREETS OF SAID SUBDIVISION IN COMPLIANCE WITH THE CITY OF SHERIDAN REGULATIONS GOVERNING THE SUBDIVISION OF LAND.

Professional Land Surveyor
THONE STEWART
Date:
WYOMING

PRELIMINARY DRAFT

"PLAT IS VALID ONLY IF PRINT HAS ORIGINAL SIGNATURE OF SURVEYOR SIGNED AND DATED"

DECLARATION EXTINGUISHING PREVIOUS EASEMENTS

1) ALL EARLIER EASEMENTS OR PORTIONS THEREOF ENCOMPASSED BY THE BOUNDARY OF THIS PLAT ARE HEREBY EXTINGUISHED UNLESS NOTED OTHERWISE.

2) EXISTING UTILITIES PLACED IN PREVIOUS RECORDED EASEMENTS WITHIN THE BOUNDARY OF THIS PLAT HAVE SENIOR RIGHTS AND ARE NOW PROTECTED BY EASEMENTS OR ROADS AS SHOWN ON THIS PLAT.

CITY OF SHERIDAN CERTIFICATES OF APPROVAL

REVIEWED BY THE CITY OF SHERIDAN PLANNING COMMISSION THIS _____ DAY OF _____ , _____ .

_____ _____
ATTEST: VICE-CHAIRMAN CHAIRMAN

_____ _____ _____
DIRECTOR OF PUBLIC WORKS

APPROVED BY THE CITY COUNCIL OF THE CITY OF SHERIDAN, WYOMING, THIS___DAY OF_____, ____.

_____ _____
ATTEST: CITY CLERK MAYOR

NOTES

1. All areas requiring placement of compacted fill must be constructed in accordance with the construction drawings and Section 01750 – Special Provisions of the Story House Village PUD Phase 1.
2. A geotechnical evaluation and foundation design must be performed by a Wyoming Licensed Professional Engineer for permanent structures constructed on Lots containing compacted fill. This includes the following:
   a. Block 3
   b. Block 4: Lots 1, 2, 3, 4, 5, 6, 13, 14, and Outlot C
   c. Block 5: Lots 1, 5, and 6
   d. Block 6
   e. Block 7: Lots 1, 2, 3, 10, 11, 12, 13, 14, 15, 16, 20, 29, and 30
   f. Block 8
   g. Outlot B

(See Sheets 2 and 3 for Lot and Block locations).

CERTIFICATE OF RECORDER

STATE OF WYOMING :ss
COUNTY OF SHERIDAN

THIS PLAT WAS FILED FOR RECORD IN THE OFFICE OF THE CLERK AND RECORDER AT_____ O'CLOCK ___.M.,

THIS _____, DAY OF _____ , 20 _____, AND IS RECORDED IN PLAT BOOK _____, PAGE _____

_____ STAMP RECEIVING NUMBER _____
COUNTY CLERK

IN TESTIMONY WHEREOF:

ALL RIGHTS UNDER AND BY VIRTUE OF THE HOMESTEAD EXEMPTION LAWS OF THE STATE OF WYOMING ARE HEREBY WAIVED AND RELEASED.

THE UNDERSIGNED HAVE CAUSED THESE PRESENTS TO BE SIGNED THIS _____ DAY OF _____

FP STORY HOUSE PROPERTY COMPANY, LLC

BY: _____
, MEMBER

STATE OF WYOMING
COUNTY OF SHERIDAN :ss

THE FOREGOING INSTRUMENT WAS ACKNOWLEDGED BY xxxxxxxxxxxx BEFORE ME THIS DAY OF _____ , _____ .

WITNESS MY HAND AND OFFICIAL SEAL. MY COMMISSION EXPIRES _____

_____
NOTARY PUBLIC

SIGNED BY AFFIDAVIT

BY: SECURITY STATE BANK ("LIEN HOLDER"), SEE AFFIDAVIT FILED AT THE SHERIDAN COUNTY COURTHOUSE.
DOCUMENT NUMBER: _____

PRELIMINARY PLAT
OF
STORY HOUSE VILLAGE
PLANNED UNIT DEVELOPMENT
PHASE 1

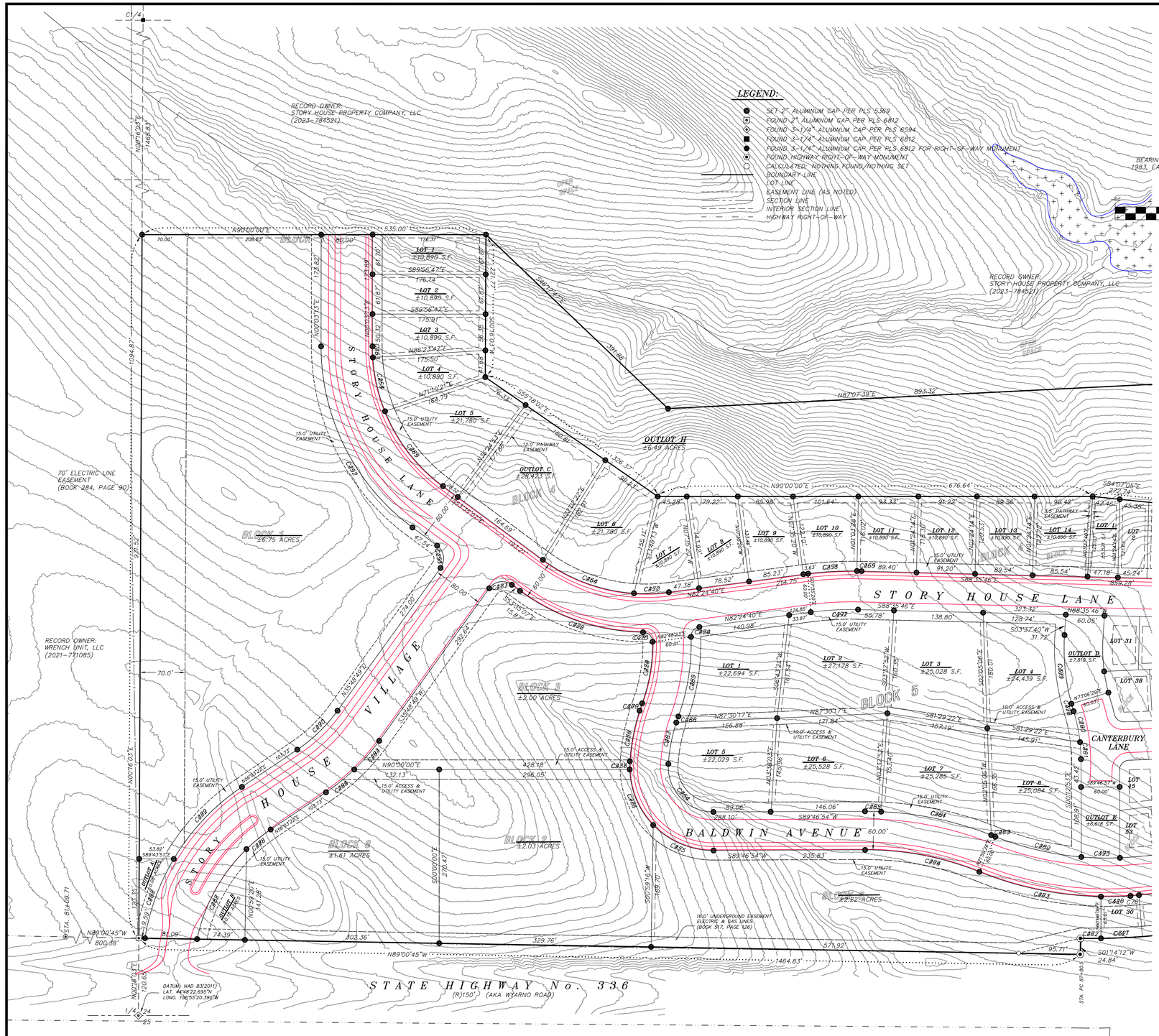
SITUATED IN THE S/2SE1/4 OF SECTION 24, TOWNSHIP 56 NORTH, RANGE 84 WEST, 6TH PRINCIPAL MERIDIAN, SHERIDAN COUNTY, WYOMING

DEVELOPER: STORY HOUSE PROPERTY COMPANY, LLC
40 EAST WORKS STREET, SUITE 18
SHERIDAN WY, 82801

PRESTFELDT SURVEYING
2340 WETLANDS DR., SUITE 100
PO BOX 3082
SHERIDAN, WY 82801
307-672-7415

CLIENT: WWC ENGINEERING
1849 TERRA AVENUE
SHERIDAN, WY 82801

JN: 2023-058
DN: 2023-058-PUD-2-20
PF: T2023-058
REVIEWED BY: JSP
FEBRUARY 23, 2024



CURVE TABLE

CURVE	DELTA	RADIUS	LENGTH	CHORD BEARING	CHORD LENGTH
C454	94°08'19"	70.00'	115.01'	S43°08'56"E	102.50'
C455	46°08'30"	130.00'	104.69'	S67°08'51"E	101.89'
C456	5°39'33"	130.00'	12.84'	S01°05'26"W	12.84'
C457	53°38'20"	350.00'	327.66'	S26°45'57"E	315.83'
C458	89°23'56"	25.00'	39.01'	N08°53'09"W	35.17'
C459	13°56'56"	330.00'	80.34'	S10°53'41"W	80.14'
C460	2°06'21"	330.00'	12.13'	S18°55'20"W	12.13'
C461	42°20'16"	130.00'	96.06'	S22°54'28"E	93.89'
C462	1°44'42"	1045.92'	31.86'	S89°52'13"E	31.85'
C463	3°39'25"	270.00'	17.23'	S01°46'30"E	17.23'
C464	32°26'57"	270.00'	152.91'	S69°48'36"E	150.88'
C465	0°20'46"	530.00'	3.20'	S88°46'09"E	3.20'
C466	22°12'32"	470.00'	182.18'	N79°06'50"W	181.04'
C467	20°59'06"	530.00'	194.12'	S78°30'07"E	193.03'
C468	18°19'08"	270.00'	86.33'	S12°45'47"E	85.96'
C469	31°39'47"	270.00'	149.21'	S37°45'14"E	147.32'
C470	11°33'16"	270.00'	54.45'	N88°11'18"E	54.36'
C471	8°38'49"	530.00'	79.99'	N86°44'04"E	79.91'
C472	25°20'46"	352.00'	155.72'	S43°22'59"W	154.45'
C473	20°14'33"	248.00'	87.62'	N45°56'05"E	87.16'
C474	20°44'18"	270.00'	97.73'	N09°36'21"E	97.19'
C475	88°27'13"	15.00'	23.16'	N44°59'24"W	20.93'
C476	35°37'54"	330.00'	205.22'	S71°24'04"E	201.93'
C477	90°36'04"	25.00'	39.53'	S81°06'51"W	35.54'
C478	10°13'50"	272.00'	48.57'	S50°56'27"W	48.50'
C479	0°28'37"	530.00'	4.41'	N68°14'52"W	4.41'
C480	17°08'08"	469.98'	140.56'	S76°34'37"E	140.03'
C481	19°00'43"	530.00'	175.87'	N77°59'33"W	175.06'
C482	2°43'11"	530.00'	25.16'	N88°51'30"W	25.16'
C483	13°56'56"	270.00'	65.73'	S10°53'41"W	65.57'
C484	84°20'49"	15.00'	22.08'	S40°14'15"W	20.14'
C485	21°54'40"	330.00'	126.20'	N09°01'10"E	125.43'
C486	2°06'21"	270.00'	9.92'	S18°55'20"W	9.92'
C487	21°28'22"	352.00'	131.92'	S19°58'25"W	131.15'
C488	34°08'12"	272.00'	162.06'	S28°45'26"W	159.67'
C489	20°53'28"	329.56'	120.17'	S06°49'04"E	119.50'
C490	17°02'45"	254.21'	75.63'	N08°44'25"W	75.35'
C491	17°02'45"	254.21'	75.63'	N08°44'25"W	75.35'
C492	8°59'34"	470.00'	73.77'	S86°54'27"W	73.69'
C493	20°14'33"	328.00'	115.88'	N45°56'05"E	115.28'
C494	20°14'33"	328.00'	115.88'	N45°56'05"E	115.28'
C495	7°19'18"	470.00'	60.06'	S88°48'16"E	60.02'
C496	2°06'35"	329.56'	12.14'	S16°12'30"E	12.13'

PRELIMINARY PLAT
OF

STORY HOUSE VILLAGE PLANNED UNIT DEVELOPMENT PHASE 1

SITUATED IN THE S/2SE1/4 OF SECTION 24, TOWNSHIP 56 NORTH, RANGE 84 WEST, 6TH PRINCIPAL MERIDIAN, SHERIDAN COUNTY, WYOMING

DEVELOPER: STORY HOUSE PROPERTY COMPANY, LLC
40 EAST WORKS STREET, SUITE 18
SHERIDAN WY, 82801

PRESTFELDT SURVEYING
2340 WETLANDS DR., SUITE 100
PO BOX 3082
SHERIDAN, WY 82801
307-672-7415

CLIENT: WWC ENGINEERING
1849 TERRA AVENUE
SHERIDAN, WY 82801

JN: 2023-058
DN: 2023-058-PUD-2-20
PF: T2023-058
REVIEWED BY: JSP
FEBRUARY 23, 2024

RECORD OWNER
STORY HOUSE PROPERTY COMPANY, LLC
(2023-784521)

STORY HOUSE LANE

CANTERBURY LANE

BALDWIN AVENUE

STATE HIGHWAY No 336 (ALSO KNOWN AS WYARNO ROAD)

OUTLOT H ±6.49 ACRES

OUTLOT D ±7,810 S.F.

OUTLOT E ±6,618 S.F.

OUTLOT F ±2,103 S.F.

OUTLOT G ±687 S.F.

LOT 1 ±5,521 S.F.
LOT 2 ±5,262 S.F.
LOT 3 ±5,262 S.F.
LOT 4 ±5,101 S.F.
LOT 5 ±4,941 S.F.
LOT 6 ±4,869 S.F.
LOT 7 ±4,480 S.F.
LOT 8 ±4,285 S.F.
LOT 9 ±4,082 S.F.
LOT 10 ±4,000 S.F.
LOT 11 ±4,000 S.F.
LOT 12 ±4,900 S.F.
LOT 13 ±4,032 S.F.
LOT 14 ±4,032 S.F.
LOT 15 ±4,032 S.F.
LOT 16 ±4,032 S.F.
LOT 17 ±5,443 S.F.
LOT 18 ±3,955 S.F.
LOT 19 ±3,955 S.F.
LOT 20 ±3,955 S.F.
LOT 21 ±4,000 S.F.
LOT 22 ±4,000 S.F.
LOT 23 ±4,000 S.F.
LOT 24 ±4,000 S.F.
LOT 25 ±4,000 S.F.
LOT 26 ±4,000 S.F.
LOT 27 ±4,000 S.F.
LOT 28 ±4,000 S.F.
LOT 29 ±4,000 S.F.
LOT 30 ±4,000 S.F.
LOT 31 ±4,716 S.F.
LOT 32 ±4,240 S.F.
LOT 33 ±4,154 S.F.
LOT 34 ±4,154 S.F.
LOT 35 ±4,154 S.F.
LOT 36 ±4,514 S.F.
LOT 37 ±4,803 S.F.
LOT 38 ±5,081 S.F.
LOT 39 ±4,339 S.F.
LOT 40 ±4,339 S.F.
LOT 41 ±4,339 S.F.
LOT 42 ±4,339 S.F.
LOT 43 ±4,339 S.F.
LOT 44 ±4,989 S.F.
LOT 45 ±3,987 S.F.
LOT 46 ±3,978 S.F.
LOT 47 ±3,959 S.F.
LOT 48 ±3,954 S.F.
LOT 49 ±3,961 S.F.
LOT 50 ±3,942 S.F.
LOT 51 ±4,452 S.F.
LOT 52 ±3,949 S.F.
LOT 53 ±3,896 S.F.
LOT 54 ±3,920 S.F.
LOT 55 ±3,909 S.F.
LOT 56 ±3,931 S.F.
LOT 57 ±3,917 S.F.
LOT 58 ±3,937 S.F.
LOT 59 ±4,903 S.F.
LOT 60 ±3,329 S.F.
LOT 61 ±4,452 S.F.

BLOCK 6
BLOCK 7

15.0' UTILITY EASEMENT
5.0' PATHWAY EASEMENT
6.0' PATHWAY EASEMENT
10' SANITARY SEWER EASEMENT
16.0' UNDERGROUND ELECTRIC & GAS LINE EASEMENT (BOOK 517, PAGE 126)

STA. PT 103+19.2

Δ=17°29'12"
R=1045.92'
L=319.21'
CB=N22°46'45"E
CL=317.98'

Δ=59°23'00"
R=1045.92'
L=1084.03'
CB=S61°18'38"W
CL=1036.15'

STA. PC 87+80.5

CURVE TABLE

CURVE	DELTA	RADIUS	LENGTH	CHORD BEARING	CHORD LENGTH
C375	11°19'58"	180.00'	35.60'	N71°34'56"E	35.54'
C376	1°23'16"	1530.00'	37.06'	N87°27'10"E	37.05'
C377	88°21'58"	15.00'	23.13'	S44°57'52"W	20.91'
C378	29°41'04"	15.00'	7.92'	N70°06'35"E	7.73'
C379	17°19'27"	50.00'	15.12'	N16°17'42"W	15.06'
C380	36°16'09"	15.00'	9.50'	S25°46'28"E	9.34'
C381	17°50'54"	130.00'	40.49'	N26°16'27"W	40.33'
C382	35°59'59"	15.00'	9.42'	S35°21'02"E	9.27'
C383	24°49'06"	50.00'	21.66'	N51°09'45"E	21.49'
C384	35°59'59"	15.00'	9.42'	S45°34'19"W	9.27'
C385	15°20'19"	130.00'	34.80'	N46°24'15"E	34.70'
C386	44°44'59"	70.00'	54.67'	N66°13'27"W	53.29'
C387	120°26'38"	15.00'	31.53'	N70°38'17"W	26.04'
C388	14°21'13"	180.15'	45.13'	N58°44'14"E	45.01'
C389	11°52'28"	970.00'	20.73'	N54°41'09"E	20.73'
C390	44°01'31"	70.04'	53.81'	N32°03'19"E	52.50'
C391	3°53'36"	900.30'	56.99'	N85°09'37"E	56.98'
C392	40°38'14"	50.00'	35.46'	S75°29'45"W	34.72'
C393	59°13'45"	50.00'	51.69'	N54°34'17"W	49.42'
C394	8°46'58"	130.00'	19.93'	N39°35'21"W	19.91'
C395	9°32'09"	50.00'	8.32'	N48°34'57"W	8.31'
C396	27°37'16"	50.00'	23.67'	N30°15'14"W	23.45'
C397	25°48'49"	50.00'	22.53'	N03°47'11"W	22.34'
C398	29°37'56"	50.00'	25.86'	N23°56'12"E	25.57'
C399	11°09'47"	130.00'	25.33'	N33°09'13"E	25.29'
C400	2°02'11"	1530.00'	54.38'	N85°44'26"E	54.38'
C401	2°09'23"	1530.00'	57.58'	N83°38'39"E	57.58'
C402	2°17'10"	1530.00'	61.05'	N81°25'23"E	61.05'
C403	2°31'44"	1530.00'	67.53'	N79°00'55"E	67.53'
C404	0°30'09"	1530.00'	13.42'	N77°29'59"E	13.42'
C405	3°11'25"	970.00'	54.01'	N81°47'54"E	54.00'
C406	3°15'06"	970.00'	55.05'	N78°34'39"E	55.04'
C407	3°20'57"	970.00'	56.70'	N75°16'37"E	56.69'
C408	3°32'42"	970.00'	60.02'	N71°49'48"E	60.01'
C409	3°45'19"	970.00'	63.57'	N68°10'47"E	63.56'
C410	4°15'55"	970.00'	72.21'	N64°10'10"E	72.19'
C411	6°44'20"	970.00'	114.09'	N58°40'03"E	114.02'
C412	1°04'57"	1030.00'	19.46'	N54°36'53"E	19.46'
C413	3°19'32"	1030.00'	59.78'	N83°38'02"E	59.78'
C414	3°18'36"	1030.00'	59.50'	N80°18'58"E	59.49'

CURVE TABLE

CURVE	DELTA	RADIUS	LENGTH	CHORD BEARING	CHORD LENGTH
C415	3°18'12"	1030.00'	59.38'	N77°00'34"E	59.38'
C416	3°18'21"	1030.00'	59.43'	N73°42'18"E	59.42'
C417	3°19'02"	1030.00'	59.63'	N70°23'36"E	59.62'
C418	3°20'17"	1030.00'	60.01'	N67°03'57"E	60.00'
C419	3°22'07"	1030.00'	60.56'	N63°42'45"E	60.55'
C420	3°24'35"	1030.00'	61.30'	N60°19'24"E	61.29'
C421	3°27'45"	1030.00'	62.24'	N56°53'14"E	62.24'
C422	3°28'53"	1045.92'	63.55'	N83°58'54"E	63.54'
C423	3°27'57"	1045.92'	63.27'	N80°30'29"E	63.26'
C424	3°27'33"	1045.92'	63.15'	N77°02'44"E	63.14'
C425	3°27'42"	1045.92'	63.19'	N73°35'06"E	63.18'
C426	3°28'23"	1045.92'	63.40'	N70°07'04"E	63.39'
C427	3°29'37"	1045.92'	63.77'	N66°38'04"E	63.76'
C428	3°31'26"	1045.92'	64.33'	N63°07'33"E	64.32'
C429	3°33'52"	1045.92'	65.07'	N59°34'54"E	65.06'
C430	3°37'00"	1045.92'	66.02'	N55°59'28"E	66.01'
C431	3°40'55"	1045.92'	67.21'	N52°20'30"E	67.20'
C432	4°05'08"	1045.92'	74.58'	N48°27'29"E	74.56'
C433	5°47'25"	1045.92'	105.70'	N43°31'12"E	105.66'
C434	5°47'25"	1045.92'	105.70'	N43°31'12"E	105.66'
C435	2°12'36"	1470.00'	56.70'	N85°32'16"E	56.70'
C436	2°18'08"	1470.00'	59.06'	N83°16'54"E	59.06'
C437	2°24'13"	1470.00'	61.67'	N80°55'43"E	61.66'
C438	2°33'07"	1472.67'	65.59'	N78°26'59"E	65.58'
C439	7°25'21"	120.00'	15.55'	N60°16'00"E	15.53'
C440	92°59'21"	15.00'	24.34'	N02°38'33"E	21.76'
C441	13°16'15"	120.00'	27.79'	N70°36'47"E	27.73'
C442	7°10'35"	269.56'	33.76'	S11°10'41"E	33.74'
C443	1°16'45"	1470.00'	32.82'	N87°16'56"E	32.82'
C444	11°13'04"	269.56'	52.78'	S01°58'52"E	52.69'
C445	0°44'07"	1030.00'	13.22'	N85°39'51"E	13.22'
C446	4°58'26"	530.00'	46.01'	N88°31'07"E	45.99'
C447	3°32'06"	1045.92'	64.53'	N87°29'23"E	64.52'
C448	4°17'29"	314.32'	23.54'	N15°07'02"W	23.54'
C449	79°06'29"	14.89'	20.56'	S52°31'26"E	18.97'
C450	7°22'56"	120.59'	15.54'	N52°50'08"E	15.53'
C451	20°26'24"	70.00'	24.97'	N00°11'37"W	24.84'
C452	2°24'49"	179.98'	7.58'	N50°20'37"E	7.58'
C453	2°29'49"	269.56'	11.75'	S16°00'53"E	11.75'

SCALE: 1"= 40'

BEARINGS ARE BASED ON THE WYOMING COORDINATE SYSTEM NAD 1983, EAST CENTRAL ZONE. DISTANCES ARE MULTIPLIED TO SURFACE BY THE SCALE FACTOR OF 1.0002354

GRAPHIC SCALE

-40 0 20 40 80 160

(U.S. SURVEY FEET)
1 inch = 40'

LEGEND:

- SET 2" ALUMINUM CAP PER PLS 5369
- FOUND 2" ALUMINUM CAP PER PLS 6812
- FOUND 3-1/4" ALUMINUM CAP PER PLS 6594
- FOUND 3-1/4" ALUMINUM CAP PER PLS 6812
- FOUND 3-1/4" ALUMINUM CAP PER PLS 6812 FOR RIGHT-OF-WAY MONUMENT
- FOUND HIGHWAY RIGHT-OF-WAY MONUMENT
- CALCULATED: NOTHING FOUND/NOTHING SET
- BOUNDARY LINE
- LOT LINE
- EASEMENT LINE (AS NOTED)
- SECTION LINE
- INTERIOR SECTION LINE
- RIGHT-OF-WAY

PRELIMINARY PLAT
OF
STORY HOUSE VILLAGE, PLANNED UNIT DEVELOPMENT PHASE 1

SITUATED IN THE S/2SE1/4 OF SECTION 24, TOWNSHIP 56 NORTH, RANGE 84 WEST, 6TH PRINCIPAL MERIDIAN, SHERIDAN COUNTY, WYOMING

DEVELOPER: STORY HOUSE PROPERTY COMPANY, LLC
40 EAST WORKS STREET, SUITE 18
SHERIDAN WY, 82801

PS RESTFELDT SURVEYING
2340 WETLANDS DR., SUITE 100
PO BOX 3082
SHERIDAN, WY 82801
307-672-7415

CLIENT: WWC ENGINEERING
1849 TERRA AVENUE
SHERIDAN, WY 82801

JN: 2023-058
DN: 2023-058-PUD-2-20
PF: T2023-058
REVIEWED BY: JSP
FEBRUARY 23, 2024

WWC ENGINEERING

1849 TERRA AVE, SHERIDAN, WY 82801 | 307.672.0761

March 1, 2024

City of Sheridan
Planning Department
55 Grinnell Street
Sheridan, WY 82801

Re: Variance Request – Depth to Front Ratio

Planning Department:

On behalf of the applicant, Story House Property Company, LLC, WWC Engineering is formally requesting a variance for the Story House Village Phase 1 planned unit development (PUD), specifically related to the depth to front ratio for Block 4 – Lots 1-3; Block 7 - Lots 1-4; and Block 7 – Lots 16-18. In accordance with the existing regulations outlined in Appendix B Section 505(C)(1) of the City of Sheridan Municipal Code, the permitted depth to front ratio is limited to 2.5 to 1. However, due to characteristics of the property and the proposed development plan, we are seeking approval for Block 4 – Lots 1-3; Block 7 - Lots 1-4; and Block 7 – Lots 16-18 to have a depth to front ratio greater than 2.5 to 1 as detailed below.

	Lot Depth (ft)	Lot Frontage (ft)	Depth to Front Ratio
Block 4 - Lot 1	176.37’	61.70’	2.86 to 1
Block 4 - Lot 2	176.14’	61.87’	2.85 to 1
Block 4 - Lot 3	175.91’	67.55’	2.60 to 1
Block 7 - Lot 1	125.03’	47.18’	2.65 to 1
Block 7 - Lot 2	121.63’	45.24’	2.69 to 1
Block 7 - Lot 3	118.08’	45.24’	2.61 to 1
Block 7 - Lot 4	114.54’	45.24’	2.53 to 1
Block 7 - Lot 16	100.99’	23.67	4.27 to 1
Block 7 - Lot 17	100.99’	22.53	4.48 to 1
Block 7 - Lot 18	100.63’	25.86	3.89 to 1

Thank you for your time and consideration. We look forward to working collaboratively with the City of Sheridan to achieve a successful outcome for all parties involved.

Sincerely,

Sarah Rohrer

Sarah Rohrer, P.E.
Project Manager

WWC ENGINEERING

1849 TERRA AVE, SHERIDAN, WY 82801 | 307.672.0761

March 1, 2024

City of Sheridan
Planning Department
55 Grinnell Street
Sheridan, WY 82801

Re: Variance Request – Lot Frontage

Planning Department:

On behalf of the applicant, Story House Property Company, LLC, WWC Engineering is formally requesting a variance for the Story House Village Phase 1 planned unit development (PUD), specifically related to the frontage for Block 7 – Lots 16-17. In accordance with the existing regulations outlined in Appendix B Section 505(C)(5) of the City of Sheridan Municipal Code, every lot shall consist of frontage of at least twenty-five feet on a public street. However, due to characteristics of the property and the proposed development plan, we are seeking approval for Block 7 – Lots 16-17 to have a frontage less than 25' as detailed below.

	Lot Frontage (ft)
Block 7 - Lot 16	23.67
Block 7 - Lot 17	22.53

Thank you for your time and consideration. We look forward to working collaboratively with the City of Sheridan to achieve a successful outcome for all parties involved.

Sincerely,

Sarah Rohrer

Sarah Rohrer, P.E.
Project Manager

WWC ENGINEERING

1849 TERRA AVE, SHERIDAN, WY 82801 | 307.672.0761

March 1, 2024

City of Sheridan
55 Grinnell Street
Sheridan, WY 82801

Re: Variance Request – Radius

Engineering Department:

On behalf of the applicant, Story House Property Company, LLC, WWC Engineering is formally requesting a variance for the Story House Village Phase 1 planned unit development (PUD), specifically related to the centerline curve radius for the roads along Baldwin Ave. The variance being sought is for a 100’ radius, as opposed to the required 150’ radius outlined in Appendix B Section 505(D) of the City of Sheridan Municipal Code.

This request is grounded in the fact that Baldwin Ave is designated for residential use only, and all commercial traffic in Block 1, 2, 3, and 8 will be accessed from Story House Village Road. The proposed 100' radius aligns with the specifications outlined in Appendix B for a 36' road within a 60' right of way. Additionally, we have taken proactive measures to address concerns related to parking and road width. Specifically, 50' bulb outs have been incorporated to facilitate parking for corner lots and to widen the road in the areas adjacent to the radius.

These adjustments aim to enhance safety and convenience within the development, catering to the specific needs of a residential area. The 36’ streets, coupled with on-street parking, are designed not only to accommodate residents but also to naturally reduce traffic speed. As a further measure, the proposed speed limit within the development is set at 25 mph, contributing to a safer and more controlled traffic environment.

In summary, the requested variance for a 100' radius along Baldwin Ave aligns with the nature of the area designated for residential use. The proposed modifications, including bulb outs, are intended to mitigate any potential concerns while ensuring the overall functionality and safety of Story House Village Phase 1.

Thank you for your time and consideration. We look forward to working collaboratively with the City of Sheridan to achieve a successful outcome for all parties involved.

Sincerely,

Sarah Rohrer

Sarah Rohrer, P.E.
Project Manager

WWC ENGINEERING

1849 TERRA AVE, SHERIDAN, WY 82801 | 307.672.0761

March 1, 2024

City of Sheridan
55 Grinnell Street
Sheridan, WY 82801

Re: Variance Request – Roadway Widths

Engineering Department:

On behalf of the applicant, Story House Property Company, LLC, WWC Engineering is formally requesting a variance for the Story House Village Phase 1 planned unit development (PUD), specifically related to the roadway widths along Story House Lane and Baldwin Ave. The variance being sought is for a thirty-six foot (36') roadway width along the entirety of Baldwin Ave and for portions of Story House Lane east of Story House Village.

- Section 503.2.1 of the City of Sheridan Public Infrastructure Design Standards outlines the required roadway widths for single family local roads as 36' roadways with an ADT of less than 2000.

- Section 503.2.1 of the City of Sheridan Public Infrastructure Design Standards outlines the required roadway widths for commercial, industrial, multi-family roads as 39' roadways with an ADT of less than 2500.

- Appendix B Section 504(D) of the City of Sheridan Municipal Code outlines the required roadway widths for local streets, high- and low-density residential areas as 36' roadways with an ADT of less than 250.

- Appendix B Section 504(D) of the City of Sheridan Municipal Code outlines the required roadway widths for local streets, commercial, and industrial areas as 39' roadways with an ADT of less than 500.

The estimated ADT for the development blocks along the requested 36' roadways are detailed in Table 1 below:

Table 1. Estimated ADT

	Total ADT	Story House Lane ADT	Baldwin Ave ADT
Block 4	85	85	--
Block 5	432	216	216
Block 6	346	--	346
Block 7	542	271	271
Total	1405	572	833

This roadway width variance request is grounded in the fact that east Story House Lane and Baldwin Ave are designated for residential use only, and all commercial traffic in Block 1, 2, 3, and 8 will be accessed from Story House Village Road. Additionally, the applicant has implemented supplementary parking measures to accommodate smaller roadway widths. The proposed allowable parking for Phase 1 is described in Table 2 below and depicted on the attached Figures 1 and 2.

Table 2. Allowable Parking

Story House Village (SHV)	No On-Street Parking
Story House Lane	
• West of SHV	No On-Street Parking
• East of SHV – Block 4	No On-Street Parking
• East of SHV – Block 7	2 Sided On-Street Parking
Baldwin Avenue	
• East – Block 7	2 Sided On-Street Parking
• Central – Blocks 5/6	1 Side On-Street Parking
• West – Blocks 2/3	No On-Street Parking
Canterbury Lane	2 Sided On-Street Parking

To further reduce parking concerns, Table 3 below details the estimated parking availability for Block 7, as this is the only area with parking allowed on both sides of the proposed 36' roads. The table below presents the conservative estimates of parking availability, with the understanding that the actual parking capacity could be augmented by the inclusion of driveways, thereby further alleviating on-road parking congestion and enhancing the overall accessibility of the neighborhood.

Table 3. Estimated Parking Availability

	Lots	On-Street Parking	Parking to Lot Ratio
Block 7 - Total	60	173	2.9 to 1
• Story House Lane & Baldwin Ave	45	123	2.7 to 1
• Canterbury Lane	15	50	3.3 to 1

An alternate side parking strategy along Story House Lane and Baldwin Avenue within Block 7 will be utilized to allow snowplows to have sufficient roadway width to be efficient with snow removal. This strategy will be implemented using street signs designating parking days. Table 4 below demonstrates the ability to do alternate side parking.

Table 4. Alternate Side Parking

Story House Lane & Baldwin Ave	45 Lots – 123 On-Street Parking Spots
• Outside Curve of Road	67
• Inside Curve of Road	56

In summary, the requested variance for 36’ roadway width along the entirety of Baldwin Ave and for portions of Story House Lane east of Story House Village aligns with the intended use by accommodating restricted on-street parking in most areas. Where parking is permitted on both sides, an alternate side parking strategy will be employed during snow removal, ensuring efficient maintenance of roadways while optimizing available parking space.

Thank you for your time and consideration. We look forward to working collaboratively with the City of Sheridan to achieve a successful outcome for all parties involved.

Sincerely,

Sarah Rohrer

Sarah Rohrer, P.E.
Project Manager

K:\Sheridan\Story House Management\2023137 Story House Village\05CAD\Sheets\WORK\23137_VILG_PRKNG.dwg PARKING 2/19/2024 9:03:58 AM

NO PARKING

PARKING SPOTS	
INTENDED BLOCK	*NUMBER*
BLOCK 6	35
BLOCK 7 (60 LOTS)	173
TOTAL	208

NO PARKING THIS SIDE OF STREET

NO PARKING THIS SIDE OF STREET

NO PARKING THIS SIDE OF STREET

STORY HOUSE LANE

STORY HOUSE VILLAGE

BALDWIN AVENUE

MOCKINGBIRD DRIVE

CANTERBURY LANE

WY HWY 336

WILDCAT ROAD

N

0 75' 150'

SCALE: 1" = 150'
11" x 17" PAPER SIZE

DRAFT

NO.	REVISION	BY	DATE

PROJECT NO. 2023-137

PREPARED BY
WWC ENGINEERING
1849 TERRA AVE.
SHERIDAN, WY 82801
(307) 672-0761
www.wwcengineering.com

STORY HOUSE PROPERTY COMPANY, LLC

STORY HOUSE VILLAGE PUD - PHASE 1

PARKING CONCEPT FIGURE

SHERIDAN COUNTY, WYOMING

DESIGNED BY: *SER*
DRAWN BY: *CIM*
CHECKED BY: *CDR*
DATE: *02/14/2024*

FIGURE
1

K:\Sheridan\Story House Management\2023137 Story House Village\05CAD\Sheets\WORK\23137_VILG_PRKNG_LOT.dwg PARKING 2/19/2024 9:06:23 AM

NO PARKING

PARKING SPOTS

TYPE	NUMBER
BLOCK 6 - STREET	35
BLOCK 7 (60 LOTS)	233
BLOCK 7 - STREET	*113*
BLOCK 7 - DRIVEWAY	*120*
TOTAL	268

FUTURE DRIVEWAY (TYP)
(2 PARKING SPOTS
ADDED PER DRIVEWAY)

NO PARKING
THIS SIDE
OF STREET

NO PARKING
THIS SIDE
OF STREET

NO PARKING
THIS SIDE
OF STREET

STORY HOUSE LANE

STORY HOUSE VILLAGE

BALDWIN AVENUE

MOCKINGBIRD DRIVE

CANTERBURY LANE

WY HWY 336

WILDCAT ROAD

N

0 75' 150'

SCALE: 1" = 150'
11" x 17" PAPER SIZE

DRAFT

NO.	REVISION	BY	DATE

PROJECT NO. 2023-137

PREPARED BY
WWC ENGINEERING
1849 TERRA AVE.
SHERIDAN, WY 82801
(307) 672-0761
www.wwcengineering.com

STORY HOUSE PROPERTY COMPANY, LLC

STORY HOUSE VILLAGE PUD - PHASE 1

PARKING CONCEPT FIGURE ON LOT

SHERIDAN COUNTY, WYOMING

DESIGNED BY: *SER*
DRAWN BY: *CIM*
CHECKED BY: *CDR*
DATE: *02/14/2024*

FIGURE
2

WWC ENGINEERING

1849 TERRA AVE, SHERIDAN, WY 82801 | 307.672.0761

March 1, 2024

City of Sheridan
Utilities Department
55 Grinnell Street
Sheridan, WY 82801

Re: Variance Request – 20' Sewer Easement

City of Sheridan Utilities Department:

On behalf of the applicant, Story House Property Company, LLC, WWC Engineering is formally requesting a variance for the Story House Village Phase 1 planned unit development (PUD), specifically related to the sewer easements abutting Block 5, Lots 1 – 8 and Block 7, Lots 16 and 17. In accordance with the existing regulations outlined in Section 401 of the City of Sheridan Public Infrastructure Design Standards, subsection 9-g, the minimum width of an easement or right-of-way for City use in which a sewer will be installed is twenty (20) feet. If the final depth as measured from finished grade to the top of the sewer main exceeds 6.0 feet, the following table shall be used to determine the minimum width of right-of-way or easement required:

Depth of sewer main measured from finished grade to top of pipe (feet).	Minimum distance (feet) from center of proposed sewer main to edge of building or established R-O-W.
6.0 and less	10.0 (20.0 feet total width)
6.0 to 10.0	15.0 (30.0 feet total width)
Greater than 10.0 feet	At least 20.0 feet (40.0 ft total), and function of soil type.

The design depth of sewer main measured from finished grade to top of pipe varies from 8.0' to 10.8' for the sewer easement abutting Block 5, Lots 1 – 8 and varies from 6.1' to 10.5' for the sewer easement abutting Block 7, Lots 16 & 17. We believe that the sewer infrastructure can be effectively operated and maintained within a 20' easement without imposing additional easement widths on the lots. We are requesting approval for the sewer easements adjacent to Block 5 – Lots 1 - 8 and Block 7, Lots 16 and 17 to have the minimum width of 20'.

Thank you for your time and consideration. We look forward to working collaboratively with the City of Sheridan to achieve a successful outcome for all parties involved.

Sincerely,

Sarah Rohrer

Sarah Rohrer, P.E.
Project Manager

WWC ENGINEERING

1849 TERRA AVE, SHERIDAN, WY 82801 | 307.672.0761

March 1, 2024

City of Sheridan
55 Grinnell Street
Sheridan, WY 82801

Re: Revision Summary – Story House Village PUD

Water and Sewer Report:

- Revised to reflect changes in the sewer system.
- Additional water hydrants and valves were added to meet spacing requirements. Report and model were updated to reflect these changes.

Drainage Report:

- Grading design was revised, particularly in Block 7 and Block 5.
- Curb calculations were added.
- Drainage swales, curb cuts, and a detention pond were added.
- Flows from the sewer discharge were evaluated.

PUD Design Report:

- Revised to define parking, snow storage, and lighting descriptions.
- Open space was added.
- Area calculations were updated.

Plat

- Revised outlots, designated open space.
- Revised pathway easements.
- Rear yard setbacks.

Design Drawings:

- Revised secondary access.
- Sewer design revisions were incorporated.
- Valve and hydrant spacing were adjusted.
- Additional COS details were added.

Traffic Impact Study/Geotech Report - No Revisions

Sincerely,

Sarah Rohrer

Sarah Rohrer, P.E.
Project Manager

STORY HOUSE VILLAGE PUD
PHASE 1

DRAINAGE REPORT

PREPARED FOR:

CITY OF SHERIDAN

ON BEHALF OF:

STORY HOUSE PROPERTY COMPANY, LLC

WWC ENGINEERING

March 2024

STORY HOUSE VILLAGE PUD – PHASE 1
DRAINAGE REPORT

Prepared for:	City of Sheridan 55 Grinnell Plaza Sheridan, WY 82801
On Behalf of:	Story House Property Company, LLC 40 E Works Street #1B Sheridan, WY 82801
Prepared by:	WWC Engineering 1849 Terra Avenue Sheridan, WY 82801 (307) 672-0761
Principal Authors:	Kenneth Markley, E.I.
Reviewed by:	Sarah Rohrer, P.E. Jeffrey Barron, P.E.

TABLE OF CONTENTS

Project Description 1
Location 1
Site Conditions 1
Pre-development 1
Soils 1
Post-development 1
Hydrologic Analysis and Results 4
Pre-Development Drainage Area 4
Post-Development System 4
Post-Development Runoff Control 10
Conclusions and Recommendations 10
References 11

LIST OF FIGURES

Figure 1. General Location 2
Figure 2. Project Site Plan 3
Figure 3. Pre-Development Drainage Areas 5
Figure 4. Post-Development Drainage Areas 6
Figure 5. Typical Lot Sections 8

LIST OF TABLES

Table 1. Pre-Development Drainage Basins 4
Table 2. Post-Development Drainage Basins 7
Table 3. Post-Development Street Outlets 7
Table 4. Runoff Summary 9
Table 5. Outfall B Ponding Summary 9
Table 6. Pond C Summary 9

LIST OF APPENDICES

Appendix A Stormwater Hydrology
Appendix B Stormwater Hydraulics
Appendix C Soil Data
Appendix D FEMA Information

PROJECT DESCRIPTION

The purpose of this preliminary drainage report is to provide runoff control recommendations resulting from the hydrologic effects of the proposed Story House Village – Phase 1 (Project). Phase 1 of the development includes commercial and residential development. Future development may occur on the property at which time hydrologic effects will be assessed and reported as required. Hydrology and hydraulic calculations provided hereafter will detail the comparison of pre-development and post-development runoff from the proposed Project and provide recommendations on best management practices for any increased runoff post-development in accordance with the 2016 City of Sheridan Storm Drainage Manual (City, 2016); hereafter referred to as the Manual. Stormwater hydrology design calculations are included in Appendix A and stormwater hydraulic design calculations are included in Appendix B.

Location

The Project is located on State Highway 336, also known as Wyarno Road, in Sheridan, Wyoming. The property is bound by Highway 336 to the south and private property to the north, west, and east. The Project encompasses approximately 44.86 acres within the southern half of the southeast quarter of Section 24, T56N, R84W. Figure 1 provides the general location of the Project.

SITE CONDITIONS

Pre-development

Pre-development conditions of the area include an existing two-track road that enters the Project and unimproved grazing land with a minor gully bisecting portions of the project running northwest to southeast. Stormwater runoff from the adjacent property to the west drains onto the Project area. The general topography east of the Project slopes to the east flowing into Prairie Dog Creek. Stormwater runoff on the Project currently drains north and east.

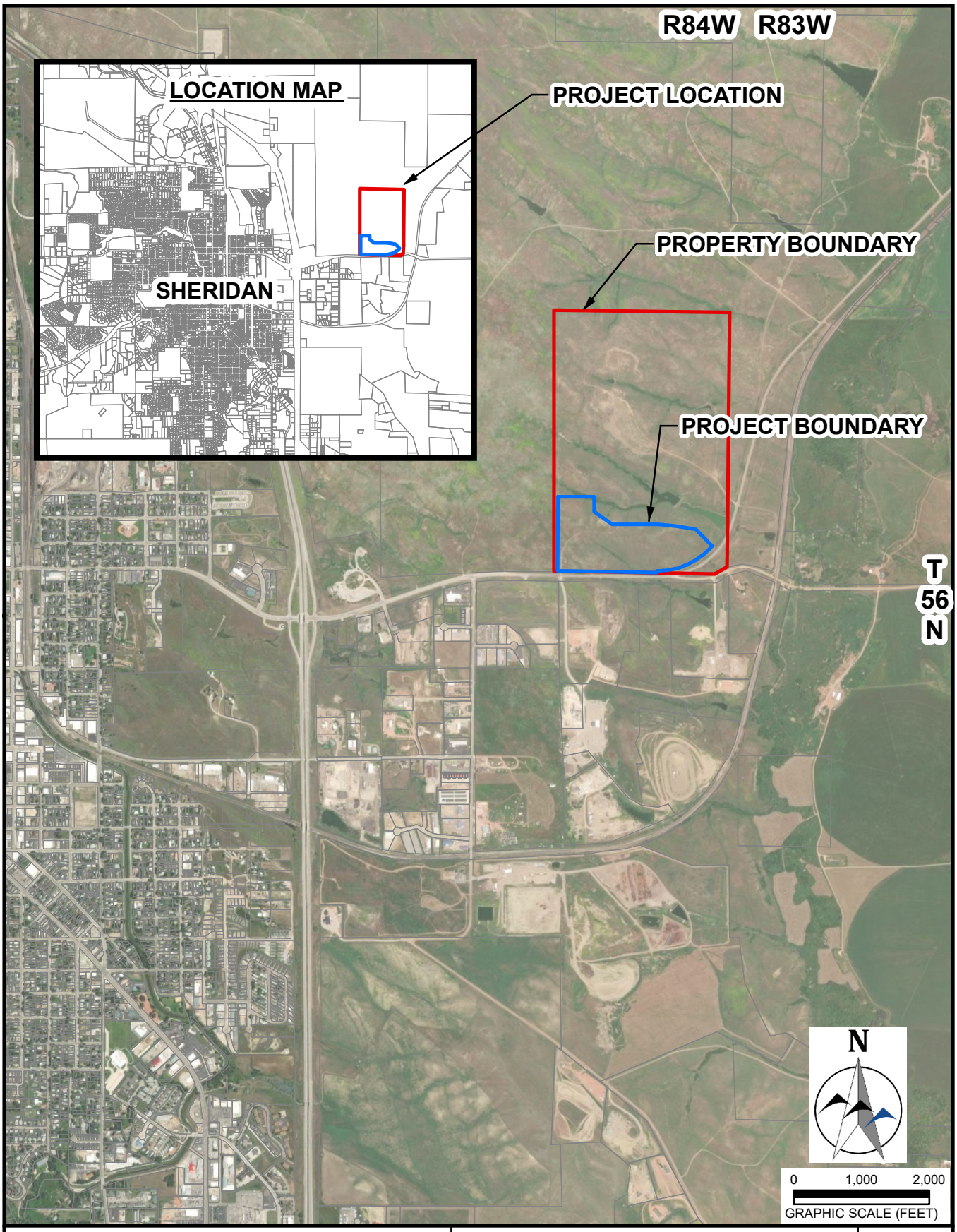
Soils

The soils found near the surface are generally composed of lean clay or clayey sand alluvial soils with claystone bedrock underneath based on a geotechnical investigation of the Project area prepared by American Engineering Testing (AET). The ground cover in the area is native herbaceous land with grass and shrubs with some exposed areas of soil. The geotechnical report is available upon request and the NRCS soil survey for the Project area is included in Appendix C. There are no apparent previous drainage reports for this area. The Project area is classified as Zone X, an area of minimal flood hazard, and is not within the 100-year flood elevation of the published FIS report. FEMA flood information is included in Appendix D.

Post-development

The Project is a combined commercial and residential planned unit development (PUD) with proposed commercial and residential development. Roads, curbs, gutters, and sidewalks will be constructed as part of the Project. The layout of the proposed Project is depicted in Figure 2. The PUD drainage will utilize curb and gutter flow and sheet flow to route runoff to existing

K:\Sheridan\Story House Management\2023137 Story House Village\06GIS\Figure 1 Site Location.mxd



PRELIMINARY DRAINAGE PLAN

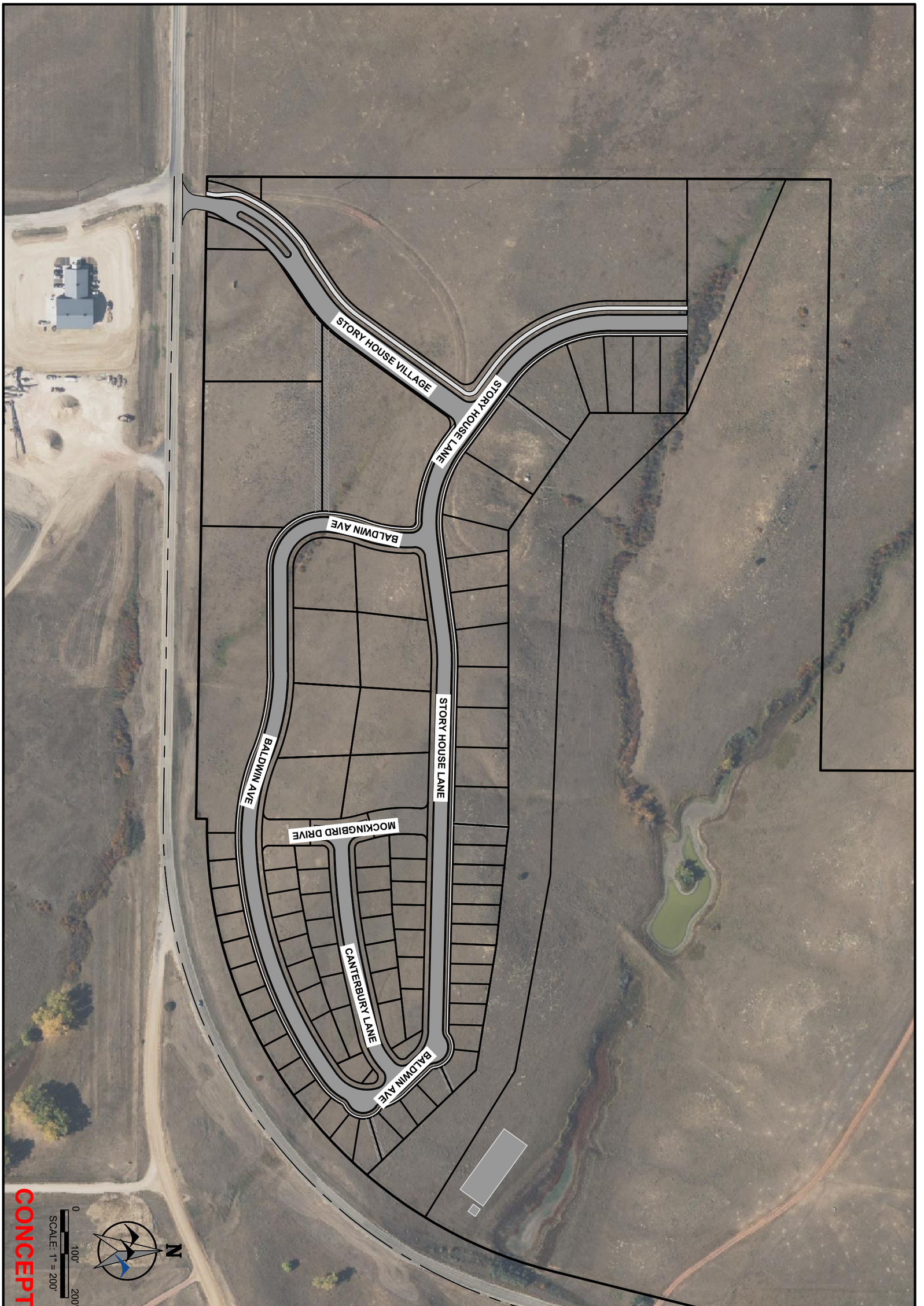
GENERAL LOCATION

STORY HOUSE VILLAGE - PHASE 1

DESIGNED BY: SER
DRAWN BY: RAV
CHECKED BY: SER
DATE: 10/02/2023

WWC ENGINEERING
1849 TERRA AVENUE
SHERIDAN, WY 82801
307-672-0761

FIGURE
1



CONCEPT

STORY HOUSE PROPERTY COMPANY, LLC

STORY HOUSE VILLAGE - PHASE 1

SITE LAYOUT

SHERIDAN COUNTY, WY

FIGURE 2

DESIGNED BY: SEP
DRAWN BY: CIM
CHECKED BY: JGB
DATE: 10/20/2023

PREPARED BY
WWC ENGINEERING
1849 TERRA AVE.
SHERIDAN, WY 82801
(307) 672-0761
www.wwcengineering.com

NO.	REVISION	BY	DATE

PROJECT NO. 2023-137

ponds to the north and an existing road drainage ditch and culverts to the south. The drainage area to the west will drain to the Project and ultimately to the road drainage ditch to the south.

Hydrologic Analysis and Results

The Manual was used for the hydrologic and hydraulic analysis of the Project. The land use was conservatively estimated as general commercial and or central business. WYDOT classifies Wyarno Road as a collector street. The 10-year and 100-year design storms were used for this analysis. The storm recurrence interval of the 10-year and 100-year storms with 24-hour rainfall amounts of 2.35 and 3.46 inches were used. The NRCS Method was selected to analyze runoff events based on the size of drainage areas exceeding five acres; WinTR-55 computer modelling was utilized in the analyzation. The NRCS procedure in HEC-22 was used to estimate preliminary detention volume needs. Detention calculations are detailed in Appendix B.

Pre-Development Drainage Area

A hydrologic analysis for the pre-development drainage areas was performed and the following drainage basins were delineated: East, Center, West, Off-Site West, and North. The drainage basins used for the analysis are shown in Figure 3. Currently, runoff from these basins is routed to four existing outfalls as described in Table 1.

Appendix A shows the weighted curve numbers used for the pre-development basins. The curve numbers were used to predict stormwater runoff peak flows. NRCS soils data was used to determine the hydrologic groups in determination of the curve number. NRCS data is included in Appendix C.

Table 1. Pre-Development Drainage Basins

Outfall	Pre-Development Basins
A	Off-Site West West
B	Central
C	East
Reservoir	North

Post-Development System

Post-developed proposed conditions include paved roads, curbs and gutters, sidewalks, and buildings with drainage planned to follow gutter flow to the existing pond areas to the north and to the existing road drainage ditch and culverts to the south. New post development drainage basins were delineated based on the planned grading of the PUD and are depicted in Figure 4. The boundaries of these areas were determined based on flow paths that will continue to be routed onto the Project and the proposed development from the PUD itself. Each post-development basin flows towards an existing outfall as summarized in Table 2. The design calculations for post-development drainage basins are provided in Appendix A.

K:\Sheridan\Story House Management\20231137 Story House Village\06GIS\23137_Story_House.aprx 12/7/2023 10:21 AM

LEGEND

- PARCEL
- PROJECT BOUNDARY
- PRE-DEVELOPMENT BASIN
- FLOW DIRECTION
- EXISTING CONTOURS
- SITE ROAD
- Outfalls

3880 3870 3860 3900 3880 3860 3930 3920 3910 3900 3940 3930 3920 3910 3930 3920 3880 3870 3860 3850 3840 3850 3860 3850 3910 3860 3850 3910

NORTH

OFF-SITE WEST

WEST

CENTRAL

EAST

Reservoir

A B C

WYARNO ROAD (WY HWY 336)

WILDCAT ROAD

INDUSTRIAL LANE

N

0 125 250 500

GRAPHIC SCALE: FEET

NO.	REVISION	BY	DATE

PROJECT NO. 2023-137

PREPARED BY
WWC ENGINEERING
1849 TERRA AVENUE
SHERIDAN, WY 82801
(307) 672-0761
www.wwcengineering.com

STORY HOUSE PROPERTY COMPANY, LLC

STORY HOUSE VILLAGE - PHASE 1

PRE-DEVELOPMENT DRAINAGE PLAN

SHERIDAN COUNTY, WYOMING

DESIGNED BY: SER
DRAWN BY: CIG
CHECKED BY: SER
DATE: 10/19/2023

FIGURE
3

K:\Sheridan\Story House Management\2023137 Story House Village\06GIS\23137_Story_House.aprx 2/20/2024 7:19 AM

LEGEND

- PARCEL
- PROJECT BOUNDARY
- POST-DEVELOPMENT BASIN
- FLOW DIRECTION
- EXISTING CONTOURS
- PROPOSED CONTOURS
- SITE ROADS
- OUTFALL
- 1 OUTLET
- POND C

3880 3900 3890 3860 3850 3850 3860 3850 3840 3830 3920 3910 3880 3870 3900 3890 3870

N1A N1B N1C N1D N2 W1A W1B W2A W2B C1A C1B C2A C2B C2C C2D C4A C4B S1 S2

C1A C1B C2B C2C C1A, C1B, C2A C2D C4A C4B

1 2 3 4

A B C

Reservoir

WYARNO ROAD (WY HWY 336)

WILDCAT ROAD

INDUSTRIAL LANE

N

0 125 250 500

GRAPHIC SCALE: FEET

NO.	REVISION	BY	DATE

PROJECT NO. 2023-137

PREPARED BY
WWC ENGINEERING
1849 TERRA AVENUE
SHERIDAN, WY 82801
(307) 672-0761
www.wwcengineering.com

STORY HOUSE PROPERTY COMPANY, LLC

STORY HOUSE VILLAGE - PHASE 1

POST-DEVELOPMENT DRAINAGE PLAN

SHERIDAN COUNTY, WYOMING

DESIGNED BY: SER
DRAWN BY: CIG
CHECKED BY: SER
DATE: 10/19/2023

FIGURE 4

Appendix A shows the weighted curve numbers, estimated peak flows for each storm event and given frequency, and the time of concentration for the post-development basins. The curve numbers calculated were used to determine peak discharge flow rates at the basin outlets. NRCS soils data was used to determine the hydrologic groups and determine curve numbers. NRCS data is included in Appendix C.

Table 2. Post-Development Drainage Basins

Outfall	Post-Development Basins
A	Off-Site West W1 A & B W2 A & B
B	C1 A & B C2 A & D S-1
C	C4 A & B S-2
Reservoir	N1 A, B, C, & D N2 C2 B & C

Swales between lot lines are graded to route stormwater away from the buildable areas and to minimize flow across lot lines. Figure 5 portrays cross sections for typical grading slopes for lots. Prior to runoff reaching the designated outfalls, the planned finished grade topography of the roads and curb and gutter create areas that require outlets for the flows to reach the intended outfalls. Table 3 summarizes the outlet locations by post-development basins contributing to the flow arriving at these locations, and Figure 4 shows locations of the outlets. Each outlet location will have a double gutter to allow runoff to cross the crown of the streets, access a curb, and then flow through drainage swales to the prescribed outfall. Calculations for the curb cuts are included in Appendix B.

Table 3. Post-Development Street Outlets

Street Outlet Location	Contributing Basins
1	C1A, C1B
2	C2B, C2C
3	C1A, C1B, C2A, C2D
4	C4A, C4B

The pre-development and post-development conditions of the Project area were compared to determine potential stormwater impacts due to the proposed development. Table 4 depicts post-development drainage flows and demonstrates a decreased flow rate for the culvert at outfall A, and flows increased for the runoff at outfalls B and C.

\\wwc.local\work\Sheridan\Story House Management\2023137 Story House Village\05CAD\Reference\Blocks\TYP_LOT_SECTIONS.dwg 11X17 PP 2/16/2024 2:24:59 PM

BLOCK 7 TYPICAL SWALE PROFILE

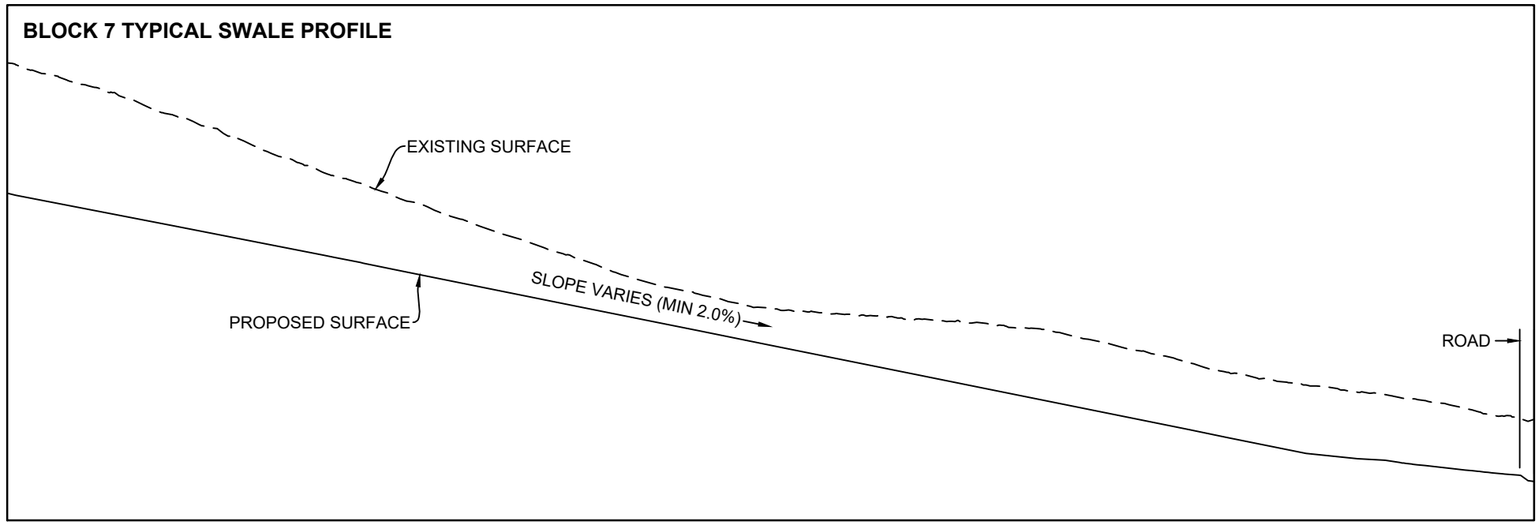
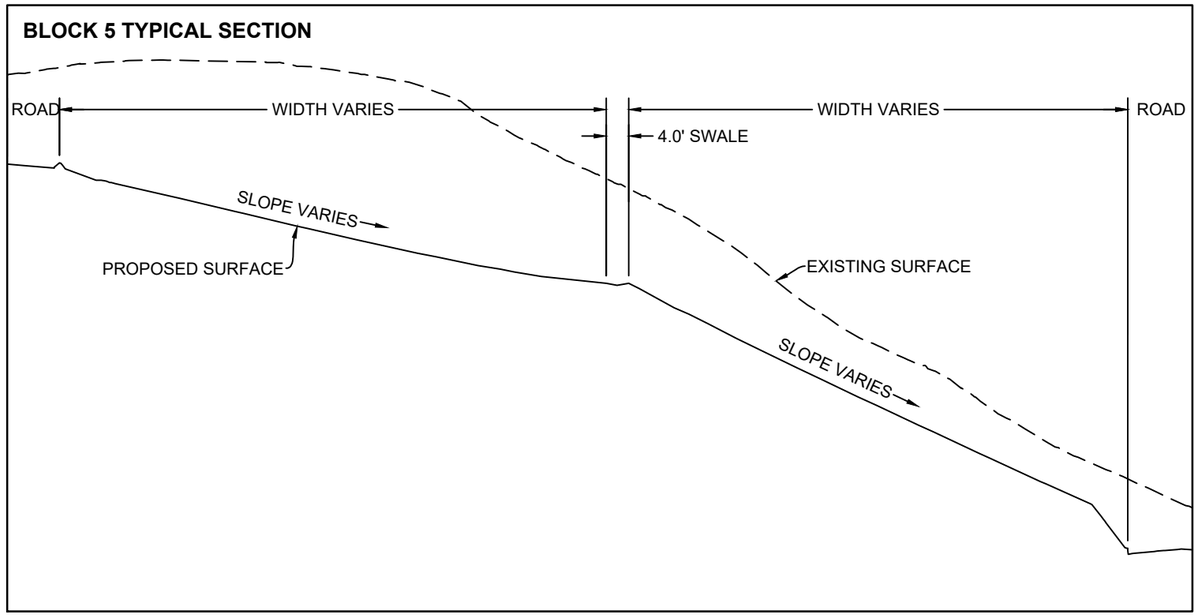
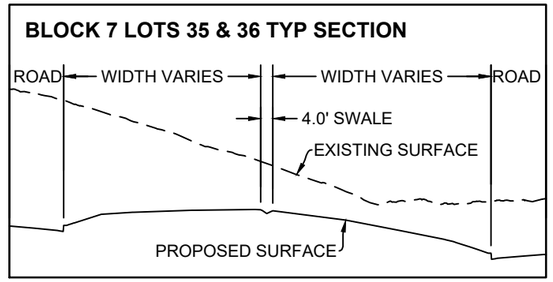


FIGURE NOT TO SCALE

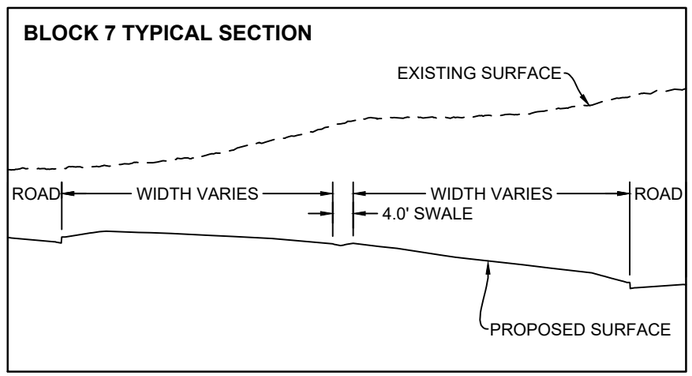
BLOCK 5 TYPICAL SECTION



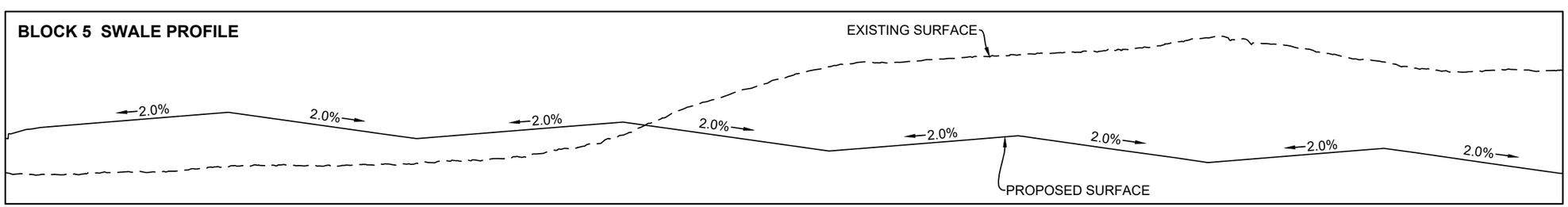
BLOCK 7 LOTS 35 & 36 TYP SECTION



BLOCK 7 TYPICAL SECTION



BLOCK 5 SWALE PROFILE



NO.	REVISION	BY	DATE

PROJECT NO. 2023-137

PREPARED BY
WWC ENGINEERING
1849 TERRA AVE.
SHERIDAN, WY 82801
(307) 672-0761
www.wwcengineering.com

STORY HOUSE MANAGEMENT
STORY HOUSE VILLAGE

TYPICAL LOT GRADING SECTION

SHERIDAN COUNTY, WYOMING

DESIGNED BY: *KMM*
DRAWN BY: *CIG*
CHECKED BY: *SER*
DATE: *2/16/2024*

FIGURE
1

Table 4. Runoff Summary

Outfall	Recurrence Interval	Timeframe	Total Q (cfs)	Difference (cfs)	*Attenuated Flows (cfs)	Percent Difference
A	10-Year	Pre-developed	20.9	-4.1		
		Post-developed	16.8			
	100-Year	Pre-developed	39.8	-8.0		
		Post-developed	31.8			
B	10-Year	Pre-developed	23.6	7.9		
		Post-developed	31.5			
	100-Year	Pre-developed	42.4	6.4	19.3	-0.5%
		Post-developed	48.8		19.2	
C	10-Year	Pre-developed	8.1	7.5		
		Post-developed	15.6			
	100-Year	Pre-developed	14.8	9.9	14.8	-5.4%
		Post-developed	24.7		14.0	
Reservoir	10-Year	Pre-developed	12.8	15.9		
		Post-developed	28.7			
	100-Year	Pre-developed	26.6	20.1		
		Post-developed	46.7			

*Attenuated flows are based on the 100-yr storm.

With the increase of flows at outfall B, a ponding assessment was performed to analyze the ponding depth that occurs with pre-developed and post-developed runoff conditions. Table 5 shows the ponding depth at culvert outfall B shows no change resulting from the additional runoff from development improvements.

Table 5. Outfall B Ponding Summary

Outfall	Recurrence Interval	Timeframe	Ponding Depth (in)	Difference (in)
B	10-Year	Pre-developed	23.5	0
		Post-developed	23.5	
	100-Year	Pre-developed	35.0	0
		Post-developed	35.0	

With the increase of flows at outfall C, a detention pond is planned to attenuate the additional flows due to post-developed runoff conditions. The detention pond would be located on the developer's property southeast of Wyarno Road as shown in Figure 4. Table 6 summarizes the detention pond, Pond C, and detailed calculations for detention are shown in Appendix B.

Table 6. Pond C Summary

Control Volume	Top Area (sq ft)	Storage Volume (acre-ft)	100-yr Inflow (cfs)	100-yr Outflow (cfs)	Historic 100-yr Outflow (cfs)
Pond C	6400	0.54	24.7	14	14.8
WQV	3600	0.20	3.7		

In addition to the storm runoff, the site will also have a decentralized sewer treatment system. A Wyoming Pollutant Discharge Elimination System (WYPDES) discharge permit will be obtained from Wyoming Department of Environmental Quality (WDEQ). Treated effluent will be discharged into adjacent wetlands and the existing on-site reservoir. Effluent flows contributing to the reservoir have been accounted for and are detailed in the WYPDES permit application. This information can be provided upon request.

Post-Development Runoff Control

During construction, excelsior logs, silt fence or other best management practices (BMPs) will be implemented to prevent runoff to adjacent streets or properties. These erosion control measures will remain in place throughout construction to minimize erosion and sedimentation. Should the lots be further developed beyond the description in the report, the hydrologic effects should be reevaluated for post-development flows.

Post-construction BMPs will be properly installed and maintained until vegetation is reestablished. All structures will be constructed at proper elevation to facilitate positive drainage away from the structures and allow stormwater to drain to the roadways.

Conclusions and Recommendations

This drainage report for the Story House Village PUD Phase 1 development indicates that with a combination of the proposed grading; drainage routing and control measures of swales, double gutters, and curb cuts; and the addition of the detention Pond C, drainage from the proposed development can be contained by gutter flow and surface sheet flows. The comparison between pre-development and post-development conditions shows a comprehensive understanding of the hydrological effect of the Project, with careful consideration given to managing increased runoff. Overall, the report concludes that the implementation of these controls will adequately address stormwater management needs, support the sustainable development of the PUD while safeguarding the surround environment.

REFERENCES

City of Sheridan Public Works Dept. (2016) "Storm Drainage Design Criteria". City of Sheridan, 55 Grinnell Plaza, Sheridan, WY. Available on the Internet as of October 2023: https://www.sheridanwy.gov.

US Department of Transportation, FHWA. (2013) "Urban Drainage Design Manual". Hydraulic Engineering Circular No. 22, Third Edition. Publication No. FHWA-NHI-10-009, Rev. August 2013. Available on the Internet as of October 2023: https://www.fhwa.dot.gov/engineering/hydraulics/library_listing.cfm

APPENDIX A

Stormwater Hydrology

Table A. Pre-Development Curve Numbers for the SCS Method

Curve Number (SCS Peak Flow Method)						
Basin	**Total Area (acres)**	**Surface**	**Subarea (acres)**	**Hydrologic Group**	**Curve Number**	
Off-Site West	8.32	Pasture	5.12	B	71	77
			0.64	C	81	
			2.56	D	89	
West	8.45	Pasture	0.13	C	81	89
			7.93	D	89	
		Dirt	0.20	D	89	
		Paved with open ditches	0.20	D	93	
North	11.7	Pasture	5.98	D	89	80
			5.68	B	71	
		Dirt	0.02	D	89	
			0.02	B	82	
Central	16.69	Pasture	14.63	D	89	87
			1.66	B	71	
		Dirt	0.13	D	89	
			0.02	B	93	
		Paved with open ditches	0.25	D	93	
East	5.8	Pasture	2.57	C	81	86
			3.10	D	89	
		Paved with open ditches	0.03	C	92	
			0.10	D	93	

Table B. Post-Development Curve Numbers for the SCS Method

Curve Number (SCS Peak Flow Method)						
Basin	**Total Area (acres)**	**Surface**	**Subarea (acres)**	**Hydrologic Group**	**Curve Number**	
Off-Site West	8.32	Pasture	5.12	B	71	77
			0.64	C	81	
			2.56	D	89	
C1A	0.40	Paved parking lots, roofs, driveways	0.40	D	98	98
C1B	0.17	Paved parking lots, roofs, driveways	0.17	D	98	98
C2A	4.4	Paved parking lots, roofs, driveways	3.30	D	98	96
		Poor Condition Lawns	1.10		89	
C2B	1.93	Paved parking lots, roofs, driveways	0.40	B	98	89
			0.60	D	98	
		Poor Condition Lawns	0.85	B	79	
			0.08	D	89	
C2C	0.2	Paved parking lots, roofs, driveways	0.10	B	98	98
			0.10	D	98	
C2D	5.48	Paved parking lots, roofs, driveways	1.37	B	98	95
			2.74	D	98	
		Poor Condition Lawns	0.46	B	79	
			0.91	D	89	
C4A	5.11	Paved parking lots, roofs, driveways	2.56	B	98	94
			1.28	D	98	
		Poor Condition Lawns	0.85	B	79	
			0.43	D	89	
C4B	1.29	Paved parking lots, roofs, driveways	0.77	B	98	96
			0.39	D	98	
		Poor Condition Lawns	0.13	B	79	
N1A	4.35	Paved parking lots, roofs, driveways	2.00	D	98	93
		Poor Condition Lawns	2.35		89	
N1B	0.48	Paved parking lots, roofs, driveways	0.48	D	98	98
N1C	0.32	Paved parking lots, roofs, driveways	0.32	D	98	98
N1D	2.19	Paved parking lots, roofs, driveways	0.01	B	98	93
			0.90	D	98	
		Poor Condition Lawns	0.03	B	79	
			1.25	D	89	
N-2	2.8	Paved parking lots, roofs, driveways	1.25	B	98	87
		Poor Condition Lawns	1.55		79	
W1A	2.13	Paved parking lots, roofs, driveways	1.28	D	98	94
		Poor Condition Lawns	0.85		89	
W1B	1.05	Paved parking lots, roofs, driveways	0.53	D	98	94
		Poor Condition Lawns	0.53		89	
W2A	0.29	Paved parking lots, roofs, driveways	0.29	D	98	98
W2B	1.43	Poor Condition Lawns	1.43	D	89	89
S1	3.20	Paved parking lots, roofs, driveways	1.60	D	98	94
		Poor Condition Lawns	1.60	D	89	
S2	1.16	Paved parking lots, roofs, driveways	0.50	D	98	91
		Poor Condition Lawns	0.19	B	79	
			0.47	D	89	

Table C. Pre-Development Time of Concentration Calculations

Time of Concentration (SCS Peak Flow Method)						
Basin	**Flow Type**	**Flow Length (ft)**	**Slope (ft/ft)**	**Velocity (ft/s)**	**tc (min)**	**tc (min)**
Off-Site West	Sheet Flow	100	0.0852	- -	7.7	**11.2**
	Shallow Concentrated Flow	717	0.0460	1.21	3.5	
West	Sheet Flow	100	0.0513	- -	9.5	**14.8**
	Shallow Concentrated Flow	983	0.0364	1.22	5.3	
North	Sheet Flow	100	0.0988	- -	7.3	**8.9**
	Shallow Concentrated Flow	483	0.1042	1.09	1.6	
Central	Sheet Flow	100	0.0338	- -	11.2	**16.8**
	Shallow Concentrated Flow	1247	0.0534	1.34	5.6	
East	Sheet Flow	100	0.0222	- -	13.3	**14.9**
	Shallow Concentrated Flow	500	0.0961	0.67	1.7	

Table D. Post-Development Time of Concentration Calculations

Time of Concentration (SCS Peak Flow Method)						
Basin	**Flow Type**	**Flow Length (ft)**	**Slope (ft/ft)**	**Velocity (ft/s)**	**tc (min)**	**tc (min)**
Off-Site West	Sheet Flow	100	0.0852	- -	7.7	**11.2**
	Shallow Concentrated Flow	717	0.0460	1.21	3.5	
W1A	Sheet Flow	100	0.0292	- -	1.4	**6.0**
	Shallow Concentrated Flow	315	0.0163	1.99	2.0	
W1B	Sheet Flow	100	0.0437	- -	1.3	**6.0**
	Shallow Concentrated Flow	414	0.0218	2.42	2.3	
W2A	Sheet Flow	19	0.0200	- -	0.5	**6.0**
	Shallow Concentrated Flow	417	0.0218	3.00	2.9	
W2B	Sheet Flow	100	0.0726	- -	8.2	**12.7**
	Shallow Concentrated Flow	288	0.0679	- -	1.1	
		150	0.0022	0.71	3.3	
N1A	Sheet Flow	100	0.0568	- -	1.1	**6.4**
	Shallow Concentrated Flow	749	0.0134	2.20	5.3	
N1B	Sheet Flow	19	0.0200	- -	0.5	**6.0**
	Shallow Concentrated Flow	419	0.0200	2.53	2.4	
N1C	Sheet Flow	19	0.0200	- -	0.5	**6.0**
	Shallow Concentrated Flow	419	0.0200	2.53	2.4	
N1D	Sheet Flow	100	0.0872	- -	7.7	**7.9**
	Shallow Concentrated Flow	80	0.1035	0.38	0.2	
N2	Sheet Flow	100	0.0537	- -	1.1	**6.0**
	Shallow Concentrated Flow	150	0.0438	- -	0.7	
		180	0.0367	2.54	1.0	
C1A	Sheet Flow	19	0.0200	--	0.5	**6.0**
	Shallow Concentrated Flow	93	0.0215	1.83	0.5	
C1B	Sheet Flow	19	0.0200	- -	0.5	**6.0**
	Shallow Concentrated Flow	93	0.0215	1.83	0.5	
C2A	Sheet Flow	100	0.0366	- -	10.9	**13.9**
	Shallow Concentrated Flow	350	0.0583	- -	1.5	
		402	0.0500	1.02	1.5	

Table D. Post-Development Time of Concentration Calculations (Cont.)

Time of Concentration (SCS Peak Flow Method)						
Basin	**Flow Type**	**Flow Length (ft)**	**Slope (ft/ft)**	**Velocity (ft/s)**	**tc (min)**	**tc (min)**
C2B	Sheet Flow	100	0.0160	- -	1.9	**6.0**
	Shallow Concentrated Flow	372	0.0300	2.18	1.7	
C2C	Sheet Flow	19	0.0200	- -	0.5	**6.0**
	Shallow Concentrated Flow	272	0.0232	2.53	1.4	
C2D	Sheet Flow	100	0.0500	- -	9.6	**11.6**
	Shallow Concentrated Flow	230	0.0924	- -	0.8	
		231	0.0231	0.80	1.3	
C4A	Sheet Flow	100	0.0327	- -	11.3	**15.2**
	Shallow Concentrated Flow	600	0.0489	- -	2.8	
		185	0.0231	0.97	1.0	
C4B	Sheet Flow	19	0.0200	- -	0.5	**6.0**
	Shallow Concentrated Flow	750	0.0500	- -	2.8	
		360	0.0200	3.52	2.1	
S1	Sheet Flow	100	0.0350	- -	8.6	**10.1**
	Shallow Concentrated Flow	290	0.0632	0.74	1.5	
S2	Sheet Flow	100	0.0474	- -	9.8	**11.0**
	Shallow Concentrated Flow	197	0.0266	3.02	1.3	

Table E. Runoff Summary

Pre-Development Flow Rates			
Basin	**Total Area (acres)**	**10-Year Event (cfs)**	**100-Year Event (cfs)**
Off-Site West	8.32	6.95	15.68
West	7.51	13.95	24.12
North	11.7	12.75	26.64
Central	16.7	23.55	42.40
East	5.8	8.08	14.83
Total	50.94	64.20	121.01
Post Development Flow Rates			
Basin	**Total Area (acres)**	**10-Year Event (cfs)**	**100-Year Event (cfs)**
W1A	2.13	5.94	9.08
W1B	1.05	2.71	4.28
W2A	0.29	0.85	1.26
W2B	1.43	2.47	4.28
N1A	4.35	11.99	18.33
N1B	0.48	1.41	2.11
N1C	0.32	0.94	1.40
N1D	2.19	5.78	8.85
N2	2.8	5.72	9.89
C1A	0.4	1.19	1.77
C1B	0.17	0.51	0.76
C2A	4.4	10.15	15.53
C2B	1.93	5.00	7.89
C2C	0.2	0.58	0.87
C2D	5.48	12.76	19.84
C4A	5.11	10.59	16.74
C4B	1.29	3.60	5.51
S1	3.2	8.00	12.23
Total*	45.54	87.2	142.73

*Total includes acreage and runoff from Off-Project West basin

PRE-DEVELOPMENT BASIN HYDROLOGY

WinTR-55 Current Data Description

--- Identification Data ---

User: kmarkley
Project: Story House
SubTitle: Pre-Development
State: Wyoming
County: Sheridan
Filename: K:\Sheridan\Story House Management\2023137 Story House Village\07Calc\Drainage Calcs\Story House Pre-Development.w55

Date: 10/19/2023
Units: English
Areal Units: Acres

--- Sub-Area Data ---

Name	Description	Reach	Area(ac)	RCN	Tc
East		Outlet	5.8	86	.249
Central		Outlet	16.69	87	.28
West		Outlet	8.45	89	.247
Off-Site_W		Outlet	8.32	77	.187
North		Outlet	11.7	80	.148

Total area: 50.96 (ac)

--- Storm Data --

Rainfall Depth by Rainfall Return Period

2-Yr (in)	5-Yr (in)	10-Yr (in)	25-Yr (in)	50-Yr (in)	100-Yr (in)	1-Yr (in)
1.61	2.05	2.35	2.78	3.12	3.46	.0

Storm Data Source: User-provided custom storm data
Rainfall Distribution Type: Type II
Dimensionless Unit Hydrograph: <standard>

kmarkley
Story House
Pre-Development
Sheridan County, Wyoming

Storm Data

Rainfall Depth by Rainfall Return Period

2-Yr (in)	5-Yr (in)	10-Yr (in)	25-Yr (in)	50-Yr (in)	100-Yr (in)	1-Yr (in)
1.61	2.05	2.35	2.78	3.12	3.46	.0

Storm Data Source: User-provided custom storm data
Rainfall Distribution Type: Type II
Dimensionless Unit Hydrograph: <standard>

kmarkley Story House
Pre-Development
Sheridan County, Wyoming

Watershed Peak Table

Sub-Area or Reach Identifier	Peak Flow by Rainfall Return Period 10-Yr (cfs)	100-Yr (cfs)
SUBAREAS		
East	8.08	14.83
Central	23.55	42.40
West	13.95	24.12
Off-Site_W	6.95	15.68
North	12.75	26.64
REACHES		
OUTLET	64.20	121.01

_
_
_
kmarkley Story House
Pre-Development
Sheridan County, Wyoming

Hydrograph Peak/Peak Time Table

Sub-Area or Reach Identifier	Peak Flow and Peak Time (hr) by Rainfall Return Period 10-Yr (cfs)	(hr)	100-Yr (cfs)	(hr)
SUBAREAS				
East	8.08	12.04	14.83	12.04
Central	23.55	12.07	42.40	12.06
West	13.95	12.05	24.12	12.03
Off-Site_W	6.95	12.03	15.68	12.01
North	12.75	11.99	26.64	11.98
REACHES				
OUTLET	64.20		121.01	

_
_
_
kmarkley Story House
Pre-Development

Sheridan County, Wyoming

Sub-Area Summary Table

Sub-Area Identifier	Drainage Area (ac)	Time of Concentration (hr)	Curve Number	Receiving Reach	Sub-Area Description
East	5.80	0.249	86	Outlet	
Central	16.69	0.280	87	Outlet	
West	8.45	0.247	89	Outlet	
Off-Site_W	8.32	0.187	77	Outlet	
North	11.70	0.148	80	Outlet	

Total Area: 50.96 (ac)

kmarkley

Story House
Pre-Development
Sheridan County, Wyoming

Sub-Area Time of Concentration Details

Sub-Area Identifier/	Flow Length (ft)	Slope (ft/ft)	Mannings's n	End Area (sq ft)	Wetted Perimeter (ft)	Velocity (ft/sec)	Travel Time (hr)
East							
SHEET	100	0.0222	0.150				0.221
SHALLOW	500	0.0961	0.050				0.028
						Time of Concentration	.249
Central							
SHEET	100	0.0338	0.150				0.187
SHALLOW	1247	0.0534	0.050				0.093
						Time of Concentration	.28
West							
SHEET	100	0.0513	0.150				0.158
SHALLOW	983	0.0364	0.050				0.089
						Time of Concentration	.247
Off-Site_W							
SHEET	100	0.0852	0.150				0.129
SHALLOW	717	0.0460	0.050				0.058
						Time of Concentration	.187
North							
SHEET	100	0.0988	0.150				0.122
SHALLOW	483	0.1042	0.050				0.026
						Time of Concentration	.148

kmarkley

Story House
Pre-Development
Sheridan County, Wyoming

Sub-Area Land Use and Curve Number Details

Sub-Area Identifier	Land Use		Hydrologic Soil Group	Sub-Area Area (ac)	Curve Number
East	Paved; open ditches (w/right-of-way)		C	.03	92
	Paved; open ditches (w/right-of-way)		D	.1	93
	Herbaceous	(fair)	C	2.57	81
	Herbaceous	(fair)	D	3.1	89
	Total Area / Weighted Curve Number			5.8	86
Central	Paved; open ditches (w/right-of-way)		D	.25	93
	Dirt (w/ right-of-way)		B	.02	82
	Dirt (w/ right-of-way)		D	.13	89
	Herbaceous	(fair)	B	1.66	71
	Herbaceous	(fair)	D	14.63	89
	Total Area / Weighted Curve Number			16.69	87
West	Paved; open ditches (w/right-of-way)		D	.2	93
	Dirt (w/ right-of-way)		D	.2	89
	Herbaceous	(fair)	C	.125	81
	Herbaceous	(fair)	D	7.925	89
	Total Area / Weighted Curve Number			8.45	89
Off-Site_W	Herbaceous	(fair)	B	5.12	71
	Herbaceous	(fair)	C	.64	81
	Herbaceous	(fair)	D	2.56	89
	Total Area / Weighted Curve Number			8.32	77
North	Dirt (w/ right-of-way)		B	.02	82
	Dirt (w/ right-of-way)		D	.02	89
	Herbaceous	(fair)	B	5.68	71
	Herbaceous	(fair)	D	5.98	89
	Total Area / Weighted Curve Number			11.7	80

_
_
_

POST-DEVELOPMENT BASIN HYDROLOGY

WinTR-55 Current Data Description

--- Identification Data ---

User: kmarkley
Project: Story House
SubTitle: Post-Development
State: Wyoming
County: Sheridan
Filename: K:\Sheridan\Story House Management\2023137 Story House Village\07Calc\Drainage Calcs\Story House Post-Development.w55

Date: 2/16/2024
Units: English
Areal Units: Acres

--- Sub-Area Data ---

Name	Description	Reach	Area(ac)	RCN	Tc
C-S		Outlet	23.34	95	0.253
N-W		Outlet	15.04	92	0.211
OS-WEST		Outlet	8.32	77	0.187

Total area: 46.70 (ac)

--- Storm Data --

Rainfall Depth by Rainfall Return Period

2-Yr (in)	5-Yr (in)	10-Yr (in)	25-Yr (in)	50-Yr (in)	100-Yr (in)	1-Yr (in)
1.61	2.05	2.35	2.78	3.12	3.46	.0

Storm Data Source: User-provided custom storm data
Rainfall Distribution Type: Type II
Dimensionless Unit Hydrograph: <standard>

kmarkley Story House
Post-Development
Sheridan County, Wyoming

Storm Data

Rainfall Depth by Rainfall Return Period

2-Yr (in)	5-Yr (in)	10-Yr (in)	25-Yr (in)	50-Yr (in)	100-Yr (in)	1-Yr (in)
1.61	2.05	2.35	2.78	3.12	3.46	.0

Storm Data Source: User-provided custom storm data
Rainfall Distribution Type: Type II
Dimensionless Unit Hydrograph: <standard>

Sheridan County, Wyoming

Watershed Peak Table

Sub-Area or Reach Identifier	Peak Flow by Rainfall Return Period 10-Yr (cfs)	100-Yr (cfs)
SUBAREAS		
C-S	50.37	78.31
N-W	30.23	49.42
OS-WEST	6.95	15.68
REACHES		
OUTLET	87.20	142.73

_
_
_
kmarkley

Story House
Post-Development
Sheridan County, Wyoming

Hydrograph Peak/Peak Time Table

Sub-Area or Reach Identifier	Peak Flow and Peak Time (hr) by Rainfall Return Period 10-Yr (cfs)	(hr)	100-Yr (cfs)	(hr)
SUBAREAS				
C-S	50.37	12.03	78.31	12.03
N-W	30.23	12.02	49.42	12.01
OS-WEST	6.95	12.03	15.68	12.01
REACHES				
OUTLET	87.20		142.73	

_
_
_
kmarkley

Story House
Post-Development
Sheridan County, Wyoming

Sub-Area Summary Table

Sub-Area Identifier	Drainage Area (ac)	Time of Concentration (hr)	Curve Number	Receiving Reach	Sub-Area Description
C-S	23.34	0.253	95	Outlet	
N-W	15.04	0.211	92	Outlet	
OS-WEST	8.32	0.187	77	Outlet	

Total Area: 46.70 (ac)

kmarkley

Story House
Post-Development
Sheridan County, Wyoming

Sub-Area Time of Concentration Details

Sub-Area Identifier/	Flow Length (ft)	Slope (ft/ft)	Mannings's n	End Area (sq ft)	Wetted Perimeter (ft)	Velocity (ft/sec)	Travel Time (hr)
C-S							
User-provided							0.253
					Time of Concentration		0.253
N-W							
User-provided							0.211
					Time of Concentration		0.211
OS-WEST							
User-provided							0.187
					Time of Concentration		0.187

kmarkley

Story House
Post-Development
Sheridan County, Wyoming

Sub-Area Land Use and Curve Number Details

Sub-Area Identifier	Land Use	Hydrologic Soil Group	Sub-Area Area (ac)	Curve Number
C-S	CN directly entered by user	-	23.34	95
	Total Area / Weighted Curve Number		23.34	95
N-W	CN directly entered by user	-	15.04	92
	Total Area / Weighted Curve Number		15.04	92
OS-WEST	CN directly entered by user	-	8.32	77
	Total Area / Weighted Curve Number		8.32	77

POST-DEVELOPMENT SUBBASIN HYDROLOGY

WinTR-55 Current Data Description

--- Identification Data ---

User: kmarkley
Project: Story House
SubTitle: Post-Development
State: Wyoming
County: Sheridan
Filename: K:\Sheridan\Story House Management\2023137 Story House Village\07Calc\Drainage Calcs\Story House Post-Development N-W.w55

Date: 2/16/2024
Units: English
Areal Units: Acres

--- Sub-Area Data ---

Name	Description	Reach	Area(ac)	RCN	Tc
N-1A		Outlet	4.35	93	0.107
N-1B		Outlet	0.48	98	0.1
N-1C		Outlet	0.32	98	0.1
N-1D		Outlet	2.19	93	0.132
N-2		Outlet	2.8	87	0.100
W-1A		Outlet	2.13	94	0.100
W-1B		Outlet	1.05	94	0.100
W-2A		Outlet	0.29	98	0.1
W-2B		Outlet	1.43	89	.211

Total area: 15.04 (ac)

--- Storm Data --

Rainfall Depth by Rainfall Return Period

2-Yr (in)	5-Yr (in)	10-Yr (in)	25-Yr (in)	50-Yr (in)	100-Yr (in)	1-Yr (in)
1.61	2.05	2.35	2.78	3.12	3.46	.0

Storm Data Source: User-provided custom storm data
Rainfall Distribution Type: Type II
Dimensionless Unit Hydrograph: <standard>

_
_
_

kmarkley
Story House
Post-Development
Sheridan County, Wyoming

Storm Data

Rainfall Depth by Rainfall Return Period

2-Yr (in)	5-Yr (in)	10-Yr (in)	25-Yr (in)	50-Yr (in)	100-Yr (in)	1-Yr (in)
1.61	2.05	2.35	2.78	3.12	3.46	.0

Storm Data Source: User-provided custom storm data
Rainfall Distribution Type: Type II

Dimensionless Unit Hydrograph: <standard>

_
_
_
kmarkley

Story House
Post-Development
Sheridan County, Wyoming

Watershed Peak Table

Sub-Area or Reach Identifier	Peak Flow by Rainfall Return Period 10-Yr (cfs)	100-Yr (cfs)
SUBAREAS		
N-1A	10.65	17.12
N-1B	1.41	2.11
N-1C	0.94	1.40
N-1D	5.14	8.25
N-2	5.13	9.22
W-1A	5.51	8.70
W-1B	2.71	4.28
W-2A	0.85	1.26
W-2B	2.47	4.28
REACHES		
OUTLET	34.23	55.71

_
_
_
kmarkley

Story House
Post-Development
Sheridan County, Wyoming

Hydrograph Peak/Peak Time Table

Sub-Area or Reach Identifier	Peak Flow and Peak Time (hr) by Rainfall Return Period 10-Yr (cfs)	(hr)	100-Yr (cfs)	(hr)
SUBAREAS				
N-1A	10.65	11.93	17.12	11.93
N-1B	1.41	11.93	2.11	11.92
N-1C	0.94	11.93	1.40	11.92
N-1D	5.14	11.95	8.25	11.95
N-2	5.13		9.22	

```
           11.94     11.93

W-1A            5.51      8.70
           11.93     11.93

W-1B            2.71      4.28
           11.93     11.93

W-2A            0.85      1.26
           11.93     11.92

W-2B            2.47      4.28
           12.02     12.01


REACHES

OUTLET         34.23     55.71

_
_
_
kmarkley                          Story House
                                Post-Development
                            Sheridan County, Wyoming

                              Sub-Area Summary Table

 Sub-Area   Drainage     Time of     Curve   Receiving     Sub-Area
Identifier    Area    Concentration Number    Reach      Description
               (ac)        (hr)
-------------------------------------------------------------------------------
N-1A             4.35     0.107        93     Outlet
N-1B              .48     0.100        98     Outlet
N-1C              .32     0.100        98     Outlet
N-1D             2.19     0.132        93     Outlet
N-2              2.80     0.100        87     Outlet
W-1A             2.13     0.100        94     Outlet
W-1B             1.05     0.100        94     Outlet
W-2A              .29     0.100        98     Outlet
W-2B             1.43     0.211        89     Outlet

Total Area:   15.04 (ac)
_
_
_
kmarkley                          Story House
                                Post-Development
                            Sheridan County, Wyoming

                  Sub-Area Time of Concentration Details

 Sub-Area      Flow            Mannings's    End     Wetted               Travel
Identifier/   Length    Slope      n        Area    Perimeter   Velocity   Time
               (ft)    (ft/ft)            (sq ft)     (ft)      (ft/sec)  (hr)
-------------------------------------------------------------------------------
N-1A
  SHEET          100   0.0568     0.011                                    0.019
  SHALLOW        749   0.0134     0.025                                    0.088

                                                Time of Concentration     0.107
                                                                        ========

N-1B
  SHEET           19   0.0200     0.011                                    0.008
  SHALLOW        419   0.0200     0.025                                    0.040
```

				Time of Concentration	0.1

N-1C

SHEET	19	0.0200	0.011		0.008
SHALLOW	419	0.0200	0.025		0.040
				Time of Concentration	0.1

N-1D

SHEET	100	0.0872	0.150		0.128
SHALLOW	80	0.1035	0.050		0.004
				Time of Concentration	0.132

N-2

SHEET	100	0.0537	0.011		0.019
SHALLOW	150	0.0438	0.050		0.012
SHALLOW	180	0.0367	0.050		0.016
				Time of Concentration	0.100

W-1A

SHEET	100	0.0292	0.011		0.024
SHALLOW	315	0.0163	0.025		0.034
				Time of Concentration	0.100

W-1B

SHEET	100	0.0437	0.011		0.021
SHALLOW	414	0.0218	0.025		0.038
				Time of Concentration	0.100

W-2A

SHEET	19	0.0200	0.011		0.008
SHALLOW	417	0.0218	0.050		0.049
				Time of Concentration	0.1

W-2B

SHEET	100	0.0726	0.150		0.137
SHALLOW	288	0.0679	0.050		0.019
SHALLOW	150	0.0022	0.050		0.055
				Time of Concentration	.211

kmarkley

Story House
Post-Development
Sheridan County, Wyoming

Sub-Area Land Use and Curve Number Details

Sub-Area Identifier	Land Use	Hydrologic Soil	Sub-Area Area	Curve Number

			Group	(ac)	
N-1A	CN directly entered by user		-	4.35	93
	Total Area / Weighted Curve Number			4.35	93
N-1B	Paved parking lots, roofs, driveways		D	.48	98
	Total Area / Weighted Curve Number			.48	98
N-1C	Paved parking lots, roofs, driveways		D	.32	98
	Total Area / Weighted Curve Number			.32	98
N-1D	CN directly entered by user		-	2.19	93
	Total Area / Weighted Curve Number			2.19	93
N-2	CN directly entered by user		-	2.8	87
	Total Area / Weighted Curve Number			2.8	87
W-1A	CN directly entered by user		-	2.13	94
	Total Area / Weighted Curve Number			2.13	94
W-1B	Open space; grass cover < 50%	(poor)	D	.525	89
	Paved parking lots, roofs, driveways		D	.525	98
	Total Area / Weighted Curve Number			1.05	94
W-2A	Paved parking lots, roofs, driveways		D	.29	98
	Total Area / Weighted Curve Number			.29	98
W-2B	Open space; grass cover < 50%	(poor)	D	1.43	89
	Total Area / Weighted Curve Number			1.43	89

WinTR-55 Current Data Description

--- Identification Data ---

User: kmarkley
Project: Story House
SubTitle: Post-Development
State: Wyoming
County: Sheridan
Filename: K:\Sheridan\Story House Management\2023137 Story House Village\07Calc\Drainage Calcs\est CN's Post-Development C-S.w55

Date: 2/16/2024
Units: English
Areal Units: Acres

--- Sub-Area Data ---

Name	Description	Reach	Area(ac)	RCN	Tc
C-1A		Outlet	0.4	98	0.1
C-1B		Outlet	0.17	98	0.1
C-2A		Outlet	4.4	89	0.231
C-2B		Outlet	1.93	89	0.100
C-2C		Outlet	0.2	98	0.1
C-2D		Outlet	5.48	89	0.194
C-4A		Outlet	5.11	94	.253
C-4B		Outlet	1.29	96	0.1
S1		Outlet	3.2	94	0.169
S2		Outlet	1.16	91	0.184

Total area: 23.34 (ac)

--- Storm Data --

Rainfall Depth by Rainfall Return Period

2-Yr (in)	5-Yr (in)	10-Yr (in)	25-Yr (in)	50-Yr (in)	100-Yr (in)	1-Yr (in)
1.61	2.05	2.35	2.78	3.12	3.46	.0

Storm Data Source: User-provided custom storm data
Rainfall Distribution Type: Type II
Dimensionless Unit Hydrograph: <standard>

kmarkley
Story House
Post-Development
Sheridan County, Wyoming

Storm Data

Rainfall Depth by Rainfall Return Period

2-Yr (in)	5-Yr (in)	10-Yr (in)	25-Yr (in)	50-Yr (in)	100-Yr (in)	1-Yr (in)
1.61	2.05	2.35	2.78	3.12	3.46	.0

Storm Data Source: User-provided custom storm data

Rainfall Distribution Type: Type II
Dimensionless Unit Hydrograph: <standard>

_
_
_
kmarkley Story House
Post-Development
Sheridan County, Wyoming

Watershed Peak Table

Sub-Area or Reach Identifier	Peak Flow by Rainfall Return Period 10-Yr (cfs)	100-Yr (cfs)
SUBAREAS		
C-1A	1.19	1.77
C-1B	0.51	0.76
C-2A	7.44	12.83
C-2B	3.94	6.82
C-2C	0.58	0.87
C-2D	9.71	16.76
C-4A	10.59	16.74
C-4B	3.60	5.51
S1	7.41	11.70
S2	2.30	3.82
REACHES		
OUTLET	45.10	74.07

_
_
_
kmarkley Story House
Post-Development
Sheridan County, Wyoming

Hydrograph Peak/Peak Time Table

Sub-Area or Reach Identifier	Peak Flow and Peak Time (hr) by Rainfall Return Period 10-Yr (cfs)	(hr)	100-Yr (cfs)	(hr)
SUBAREAS				
C-1A	1.19	11.93	1.77	11.92
C-1B	0.51	11.93	0.76	11.92
C-2A	7.44	12.03	12.83	12.03
C-2B	3.94		6.82	

```
           11.93     11.93

C-2C            0.58      0.87
           11.93     11.92

C-2D            9.71     16.76
           12.01     12.01

C-4A           10.59     16.74
           12.04     12.04

C-4B            3.60      5.51
           11.93     11.92

S1              7.41     11.70
           11.97     11.98

S2              2.30      3.82
           11.99     11.99


REACHES

OUTLET         45.10     74.07

_
_
_
kmarkley                          Story House
                                Post-Development
                            Sheridan County, Wyoming

                              Sub-Area Summary Table

 Sub-Area   Drainage     Time of     Curve   Receiving     Sub-Area
Identifier    Area    Concentration  Number    Reach      Description
              (ac)        (hr)
-------------------------------------------------------------------------------
C-1A             .40     0.100        98     Outlet
C-1B             .17     0.100        98     Outlet
C-2A            4.40     0.231        89     Outlet
C-2B            1.93     0.100        89     Outlet
C-2C             .20     0.100        98     Outlet
C-2D            5.48     0.194        89     Outlet
C-4A            5.11     0.253        94     Outlet
C-4B            1.29     0.100        96     Outlet
S1              3.20     0.169        94     Outlet
S2              1.16     0.184        91     Outlet

Total Area:   23.34 (ac)
_
_
_
kmarkley                          Story House
                                Post-Development
                            Sheridan County, Wyoming

                    Sub-Area Time of Concentration Details

 Sub-Area      Flow            Mannings's    End     Wetted                Travel
Identifier/   Length    Slope      n        Area    Perimeter   Velocity    Time
               (ft)    (ft/ft)            (sq ft)     (ft)      (ft/sec)   (hr)
-------------------------------------------------------------------------------
C-1A
  SHEET          19   0.0200     0.011                                      0.008
  SHALLOW        93   0.0215     0.025                                      0.009
```

				Time of Concentration	0.1
C-1B					
SHEET	19	0.0200	0.011		0.008
SHALLOW	93	0.0215	0.025		0.009
				Time of Concentration	0.1
C-2A					
SHEET	100	0.0366	0.150		0.181
SHALLOW	350	0.0583	0.050		0.025
SHALLOW	402	0.0500	0.025		0.025
				Time of Concentration	0.231
C-2B					
SHEET	100	0.0160	0.011		0.031
SHALLOW	372	0.0300	0.025		0.029
				Time of Concentration	0.100
C-2C					
SHEET	19	0.0200	0.011		0.008
SHALLOW	272	0.0232	0.025		0.024
				Time of Concentration	0.1
C-2D					
SHEET	100	0.0500	0.150		0.160
SHALLOW	230	0.0924	0.050		0.013
SHALLOW	231	0.0231	0.025		0.021
				Time of Concentration	0.194
C-4A					
SHEET	100	0.0327	0.150		0.189
SHALLOW	600	0.0489	0.050		0.047
SHALLOW	185	0.0231	0.025		0.017
				Time of Concentration	.253
C-4B					
SHEET	19	0.0200	0.011		0.008
SHALLOW	750	0.0500	0.025		0.046
SHALLOW	360	0.0200	0.025		0.035
				Time of Concentration	0.1
S1					
SHEET	100	0.0645	0.150		0.144
SHALLOW	290	0.0403	0.050		0.025
				Time of Concentration	0.169
S2					
SHEET	100	0.0474	0.150		0.163
SHALLOW	197	0.0266	0.050		0.021

Time of Concentration 0.184

kmarkley

Story House
Post-Development
Sheridan County, Wyoming

Sub-Area Land Use and Curve Number Details

Sub-Area Identifier	Land Use		Hydrologic Soil Group	Sub-Area Area (ac)	Curve Number
C-1A	Paved parking lots, roofs, driveways		D	.4	98
	Total Area / Weighted Curve Number			.4	98
C-1B	Paved parking lots, roofs, driveways		D	.17	98
	Total Area / Weighted Curve Number			.17	98
C-2A	CN directly entered by user		-	4.4	89
	Total Area / Weighted Curve Number			4.4	89
C-2B	CN directly entered by user		-	1.93	89
	Total Area / Weighted Curve Number			1.93	89
C-2C	Paved parking lots, roofs, driveways		B	.1	98
	Paved parking lots, roofs, driveways		D	.1	98
	Total Area / Weighted Curve Number			.2	98
C-2D	CN directly entered by user		-	5.48	89
	Total Area / Weighted Curve Number			5.48	89
C-4A	Open space; grass cover < 50%	(poor)	B	.852	79
	Open space; grass cover < 50%	(poor)	D	.426	89
	Paved parking lots, roofs, driveways		B	2.555	98
	Paved parking lots, roofs, driveways		D	1.277	98
	Total Area / Weighted Curve Number			5.11	94
C-4B	Open space; grass cover < 50%	(poor)	B	.129	79
	Paved parking lots, roofs, driveways		B	.774	98
	Paved parking lots, roofs, driveways		D	.387	98
	Total Area / Weighted Curve Number			1.29	96
S1	CN directly entered by user		-	3.2	94
	Total Area / Weighted Curve Number			3.2	94

			===	==
S2	CN directly entered by user	-	1.16	91
	Total Area / Weighted Curve Number		1.16	91
			====	==

—
—
—

OUTFALL HYDROLOGY

WinTR-55 Current Data Description

--- Identification Data ---

User: kmarkley
Project: Story House
SubTitle: Post-Development
State: Wyoming
County: Sheridan
Filename: K:\Sheridan\Story House Management\2023137 Story House Village\07Calc\Drainage Calcs\Story House Post-Development A OUTLET.w55

Date: 2/16/2024
Units: English
Areal Units: Acres

--- Sub-Area Data ---

Name	Description	Reach	Area(ac)	RCN	Tc
W-1A		Outlet	2.13	94	0.100
W-1B		Outlet	1.05	94	0.100
W-2A		Outlet	0.29	98	0.1
W-2B		Outlet	1.43	89	.211
OS-WEST		Outlet	8.32	77	0.187

Total area: 13.22 (ac)

--- Storm Data --

Rainfall Depth by Rainfall Return Period

2-Yr (in)	5-Yr (in)	10-Yr (in)	25-Yr (in)	50-Yr (in)	100-Yr (in)	1-Yr (in)
1.61	2.05	2.35	2.78	3.12	3.46	.0

Storm Data Source: User-provided custom storm data
Rainfall Distribution Type: Type II
Dimensionless Unit Hydrograph: <standard>

kmarkley
Story House
Post-Development
Sheridan County, Wyoming

Storm Data

Rainfall Depth by Rainfall Return Period

2-Yr (in)	5-Yr (in)	10-Yr (in)	25-Yr (in)	50-Yr (in)	100-Yr (in)	1-Yr (in)
1.61	2.05	2.35	2.78	3.12	3.46	.0

Storm Data Source: User-provided custom storm data
Rainfall Distribution Type: Type II
Dimensionless Unit Hydrograph: <standard>

kmarkley

Story House
Post-Development
Sheridan County, Wyoming

Watershed Peak Table

Sub-Area or Reach Identifier	Peak Flow by Rainfall Return Period 10-Yr (cfs)	100-Yr (cfs)
SUBAREAS		
W-1A	5.51	8.70
W-1B	2.71	4.28
W-2A	0.85	1.26
W-2B	2.47	4.28
OS-WEST	6.95	15.68
REACHES		
OUTLET	16.81	31.76

_
_
_

kmarkley

Story House
Post-Development
Sheridan County, Wyoming

Hydrograph Peak/Peak Time Table

Sub-Area or Reach Identifier	Peak Flow and Peak Time (hr) by Rainfall Return Period 10-Yr (cfs)	(hr)	100-Yr (cfs)	(hr)
SUBAREAS				
W-1A	5.51	11.93	8.70	11.93
W-1B	2.71	11.93	4.28	11.93
W-2A	0.85	11.93	1.26	11.92
W-2B	2.47	12.02	4.28	12.01
OS-WEST	6.95	12.03	15.68	12.01
REACHES				
OUTLET	16.81		31.76	

_
_
_

kmarkley

Story House
Post-Development

Sheridan County, Wyoming

Sub-Area Summary Table

Sub-Area Identifier	Drainage Area (ac)	Time of Concentration (hr)	Curve Number	Receiving Reach	Sub-Area Description
W-1A	2.13	0.100	94	Outlet	
W-1B	1.05	0.100	94	Outlet	
W-2A	.29	0.100	98	Outlet	
W-2B	1.43	0.211	89	Outlet	
OS-WEST	8.32	0.187	77	Outlet	

Total Area: 13.22 (ac)

kmarkley

Story House
Post-Development
Sheridan County, Wyoming

Sub-Area Time of Concentration Details

Sub-Area Identifier/	Flow Length (ft)	Slope (ft/ft)	Mannings's n	End Area (sq ft)	Wetted Perimeter (ft)	Velocity (ft/sec)	Travel Time (hr)
W-1A							
SHEET	100	0.0292	0.011				0.024
SHALLOW	315	0.0163	0.025				0.034
					Time of Concentration		0.100
W-1B							
SHEET	100	0.0437	0.011				0.021
SHALLOW	414	0.0218	0.025				0.038
					Time of Concentration		0.100
W-2A							
SHEET	19	0.0200	0.011				0.008
SHALLOW	417	0.0218	0.050				0.049
					Time of Concentration		0.1
W-2B							
SHEET	100	0.0726	0.150				0.137
SHALLOW	288	0.0679	0.050				0.019
SHALLOW	150	0.0022	0.050				0.055
					Time of Concentration		.211
OS-WEST							
User-provided							0.187
					Time of Concentration		0.187

kmarkley

Story House
Post-Development
Sheridan County, Wyoming

Sub-Area Land Use and Curve Number Details

Sub-Area Identifier	Land Use	Hydrologic Soil Group	Sub-Area Area (ac)	Curve Number
W-1A	CN directly entered by user	-	2.13	94
	Total Area / Weighted Curve Number		2.13	94
W-1B	Open space; grass cover < 50% (poor)	D	.525	89
	Paved parking lots, roofs, driveways	D	.525	98
	Total Area / Weighted Curve Number		1.05	94
W-2A	Paved parking lots, roofs, driveways	D	.29	98
	Total Area / Weighted Curve Number		.29	98
W-2B	Open space; grass cover < 50% (poor)	D	1.43	89
	Total Area / Weighted Curve Number		1.43	89
OS-WEST	CN directly entered by user	-	8.32	77
	Total Area / Weighted Curve Number		8.32	77

WinTR-55 Current Data Description

--- Identification Data ---

User: kmarkley
Project: Story House
SubTitle: Post-Development
State: Wyoming
County: Sheridan
Filename: K:\Sheridan\Story House Management\2023137 Story House Village\07Calc\Drainage Calcs\Story House Post-Development B OUTLET.w55

Date: 2/16/2024
Units: English
Areal Units: Acres

--- Sub-Area Data ---

Name	Description	Reach	Area(ac)	RCN	Tc
C-1A		Outlet	0.4	98	0.1
C-1B		Outlet	0.17	98	0.1
C-2A		Outlet	4.4	96	.231
C-2D		Outlet	5.48	95	.194
S1		Outlet	3.2	94	0.169

Total area: 13.65 (ac)

--- Storm Data --

Rainfall Depth by Rainfall Return Period

2-Yr (in)	5-Yr (in)	10-Yr (in)	25-Yr (in)	50-Yr (in)	100-Yr (in)	1-Yr (in)
1.61	2.05	2.35	2.78	3.12	3.46	.0

Storm Data Source: User-provided custom storm data
Rainfall Distribution Type: Type II
Dimensionless Unit Hydrograph: <standard>

kmarkley
Story House
Post-Development
Sheridan County, Wyoming

Storm Data

Rainfall Depth by Rainfall Return Period

2-Yr (in)	5-Yr (in)	10-Yr (in)	25-Yr (in)	50-Yr (in)	100-Yr (in)	1-Yr (in)
1.61	2.05	2.35	2.78	3.12	3.46	.0

Storm Data Source: User-provided custom storm data
Rainfall Distribution Type: Type II
Dimensionless Unit Hydrograph: <standard>

kmarkley

Story House
Post-Development
Sheridan County, Wyoming

Watershed Peak Table

Sub-Area or Reach Identifier	Peak Flow by Rainfall Return Period 10-Yr (cfs)	100-Yr (cfs)
SUBAREAS		
C-1A	1.19	1.77
C-1B	0.51	0.76
C-2A	10.15	15.53
C-2D	12.76	19.84
S1	7.41	11.70
REACHES		
OUTLET	31.50	48.78

_
_
_

kmarkley

Story House
Post-Development
Sheridan County, Wyoming

Hydrograph Peak/Peak Time Table

Sub-Area or Reach Identifier	Peak Flow and Peak Time (hr) by Rainfall Return Period 10-Yr (cfs)	(hr)	100-Yr (cfs)	(hr)
SUBAREAS				
C-1A	1.19	11.93	1.77	11.92
C-1B	0.51	11.93	0.76	11.92
C-2A	10.15	12.02	15.53	12.02
C-2D	12.76	12.00	19.84	11.99
S1	7.41	11.97	11.70	11.98
REACHES				
OUTLET	31.50		48.78	

_
_
_

kmarkley

Story House
Post-Development

Sheridan County, Wyoming

Sub-Area Summary Table

Sub-Area Identifier	Drainage Area (ac)	Time of Concentration (hr)	Curve Number	Receiving Reach	Sub-Area Description
C-1A	.40	0.100	98	Outlet	
C-1B	.17	0.100	98	Outlet	
C-2A	4.40	0.231	96	Outlet	
C-2D	5.48	0.194	95	Outlet	
S1	3.20	0.169	94	Outlet	

Total Area: 13.65 (ac)

kmarkley

Story House
Post-Development
Sheridan County, Wyoming

Sub-Area Time of Concentration Details

Sub-Area Identifier/	Flow Length (ft)	Slope (ft/ft)	Mannings's n	End Area (sq ft)	Wetted Perimeter (ft)	Velocity (ft/sec)	Travel Time (hr)
C-1A							
SHEET	19	0.0200	0.011				0.008
SHALLOW	93	0.0215	0.025				0.009
					Time of Concentration		0.1
C-1B							
SHEET	19	0.0200	0.011				0.008
SHALLOW	93	0.0215	0.025				0.009
					Time of Concentration		0.1
C-2A							
SHEET	100	0.0366	0.150				0.181
SHALLOW	350	0.0583	0.050				0.025
SHALLOW	402	0.0500	0.025				0.025
					Time of Concentration		.231
C-2D							
SHEET	100	0.0500	0.150				0.160
SHALLOW	230	0.0924	0.050				0.013
SHALLOW	231	0.0231	0.025				0.021
					Time of Concentration		.194
S1							
SHEET	100	0.0645	0.150				0.144
SHALLOW	290	0.0403	0.050				0.025
					Time of Concentration		0.169

kmarkley

Story House
Post-Development
Sheridan County, Wyoming

Sub-Area Land Use and Curve Number Details

Sub-Area Identifier	Land Use		Hydrologic Soil Group	Sub-Area Area (ac)	Curve Number
C-1A	Paved parking lots, roofs, driveways		D	.4	98
	Total Area / Weighted Curve Number			.4	98
				==	==
C-1B	Paved parking lots, roofs, driveways		D	.17	98
	Total Area / Weighted Curve Number			.17	98
				===	==
C-2A	Open space; grass cover < 50%	(poor)	D	1.1	89
	Paved; curbs and storm sewers		D	3.3	98
	Total Area / Weighted Curve Number			4.4	96
				===	==
C-2D	Open space; grass cover < 50%	(poor)	B	.457	79
	Open space; grass cover < 50%	(poor)	D	.913	89
	Paved parking lots, roofs, driveways		B	1.37	98
	Paved parking lots, roofs, driveways		D	2.74	98
	Total Area / Weighted Curve Number			5.48	95
				====	==
S1	CN directly entered by user		-	3.2	94
	Total Area / Weighted Curve Number			3.2	94
				===	==

WinTR-55 Current Data Description

--- Identification Data ---

User: kmarkley
Project: Story House
SubTitle: Post-Development
State: Wyoming
County: Sheridan
Filename: K:\Sheridan\Story House Management\2023137 Story House Village\07Calc\Drainage Calcs\Story House Post-Development C OUTLET.w55

Date: 2/16/2024
Units: English
Areal Units: Acres

--- Sub-Area Data ---

Name	Description	Reach	Area(ac)	RCN	Tc
C-4A		Outlet	5.11	94	.253
C-4B		Outlet	1.29	96	0.1
S2		Outlet	1.16	91	0.184

Total area: 7.56 (ac)

--- Storm Data --

Rainfall Depth by Rainfall Return Period

2-Yr (in)	5-Yr (in)	10-Yr (in)	25-Yr (in)	50-Yr (in)	100-Yr (in)	1-Yr (in)
1.61	2.05	2.35	2.78	3.12	3.46	.0

Storm Data Source: User-provided custom storm data
Rainfall Distribution Type: Type II
Dimensionless Unit Hydrograph: <standard>

kmarkley Story House
Post-Development
Sheridan County, Wyoming

Storm Data

Rainfall Depth by Rainfall Return Period

2-Yr (in)	5-Yr (in)	10-Yr (in)	25-Yr (in)	50-Yr (in)	100-Yr (in)	1-Yr (in)
1.61	2.05	2.35	2.78	3.12	3.46	.0

Storm Data Source: User-provided custom storm data
Rainfall Distribution Type: Type II
Dimensionless Unit Hydrograph: <standard>

kmarkley Story House
Post-Development

Sheridan County, Wyoming

Watershed Peak Table

Sub-Area or Reach Identifier	Peak Flow by Rainfall Return Period 10-Yr (cfs)	100-Yr (cfs)
SUBAREAS		
C-4A	10.59	16.74
C-4B	3.60	5.51
S2	2.30	3.82
REACHES		
OUTLET	15.62	24.72

Story House
Post-Development
Sheridan County, Wyoming

Hydrograph Peak/Peak Time Table

Sub-Area or Reach Identifier	Peak Flow and Peak Time (hr) by Rainfall Return Period 10-Yr (cfs)	(hr)	100-Yr (cfs)	(hr)
SUBAREAS				
C-4A	10.59	12.04	16.74	12.04
C-4B	3.60	11.93	5.51	11.92
S2	2.30	11.99	3.82	11.99
REACHES				
OUTLET	15.62		24.72	

Story House
Post-Development
Sheridan County, Wyoming

Sub-Area Summary Table

Sub-Area Identifier	Drainage Area (ac)	Time of Concentration (hr)	Curve Number	Receiving Reach	Sub-Area Description
C-4A	5.11	0.253	94	Outlet	
C-4B	1.29	0.100	96	Outlet	
S2	1.16	0.184	91	Outlet	

Total Area: 7.56 (ac)

kmarkley

Story House
Post-Development
Sheridan County, Wyoming

Sub-Area Time of Concentration Details

Sub-Area Identifier/	Flow Length (ft)	Slope (ft/ft)	Mannings's n	End Area (sq ft)	Wetted Perimeter (ft)	Velocity (ft/sec)	Travel Time (hr)
C-4A							
SHEET	100	0.0327	0.150				0.189
SHALLOW	600	0.0489	0.050				0.047
SHALLOW	185	0.0231	0.025				0.017
						Time of Concentration	.253
C-4B							
SHEET	19	0.0200	0.011				0.008
SHALLOW	750	0.0500	0.025				0.046
SHALLOW	360	0.0200	0.025				0.035
						Time of Concentration	0.1
S2							
SHEET	100	0.0474	0.150				0.163
SHALLOW	197	0.0266	0.050				0.021
						Time of Concentration	0.184

kmarkley

Story House
Post-Development
Sheridan County, Wyoming

Sub-Area Land Use and Curve Number Details

Sub-Area Identifier	Land Use		Hydrologic Soil Group	Sub-Area Area (ac)	Curve Number
C-4A	Open space; grass cover < 50%	(poor)	B	.852	79
	Open space; grass cover < 50%	(poor)	D	.426	89
	Paved parking lots, roofs, driveways		B	2.555	98
	Paved parking lots, roofs, driveways		D	1.277	98
	Total Area / Weighted Curve Number			5.11	94
C-4B	Open space; grass cover < 50%	(poor)	B	.129	79
	Paved parking lots, roofs, driveways		B	.774	98
	Paved parking lots, roofs, driveways		D	.387	98
	Total Area / Weighted Curve Number			1.29	96

S2	CN directly entered by user	-	1.16	91
	Total Area / Weighted Curve Number		1.16	91
			====	==

—
—
—

APPENDIX B

Stormwater Hydraulics

GUTTER HYDRAULICS

10 yr Storm

O:\References\..\2016 City of Sheridan Storm Drainage Manual.pdf

https://www.fhwa.dot.gov/engineering/hydraulics/pubs/10009/10009.pdf

			Gutter Flow (CFS)	Cross slope (ft/ft)	Long. Slope (ft/ft)	Manning's coef.	0.56	Width (ft)	Depth (in)
BASIN	Basin Flow (CFS)	Road Name	Q	Sx	Sl	n	Ku	T	D
N1A	11.99	SHV-S W1B	2.71	**0.02**	**0.006**	**0.016**	**0.56**	11.6	2.8
N1B	1.41	SHV-S W2A	0.85					7.6	1.9
N1C	0.94	SHV-N C1A	1.19					8.6	2.1
N1D	5.78	SHV-N C1B	0.51					6.2	1.5
N2	5.72	Story House Ln N1B	1.41					9.1	2.2
W1A	5.94	Story House Ln N1C	0.94					7.8	1.9
W1B	2.71	Story House Ln C2B	5					14.6	3.6
W2A	0.85	Story House Ln C2C	0.58					6.5	1.6
W2B	2.47	Story House Ln C4B	3.6					12.9	3.1
C1A	1.19	Baldwin Ave C4B	3.6					12.9	3.1
C1B	0.51	Baldwin Ave C4A	10.59					19.4	4.7
C2A	10.15	Baldwin Ave C2D	12.76					20.8	5.0
C2B	5	Baldwin Ave C1A C1B C2A	11.85					20.2	4.9
C2C	0.58	Canterbury Ln C4A	10.59					19.4	4.7
C2D	12.76								
C4A	10.59								
C4B	3.6								
S1	8								
S2	2.74								

[Round[T=((D4*G4)/(H4*E4^1.67*F4^0.5))^0.375; D=I4*E4*12],1]

$$Q = (K_u/n)\, S_x^{1.67}\, S_L^{0.5}\, T^{2.67} \qquad (4\text{-}2)$$

or in terms of T

$$T = [(Qn) / (K_u\, S_x^{1.67}\, S_L^{0.5})]^{0.375} \qquad (4\text{-}2)$$

where:

- K_u = 0.376 (0.56 in English units)
- n = Manning's coefficient (Table 4-3)
- Q = Flow rate, m^3/s (ft^3/s)
- T = Width of flow (spread), m (ft)
- S_x = Cross slope, m/m (ft/ft)
- S_L = Longitudinal slope, m/m (ft/ft)

Equation 4-2 neglects the resistance of the curb face since this resistance is negligible.

Spread on the pavement and flow depth at the curb are often used as criteria for spacing pavement drainage inlets. Design Chart 1 in Appendix A is a nomograph for solving Equation 4-2. The chart can be used for either criterion with the relationship:

$$d = T\, S_x \qquad (4\text{-}3)$$

where:

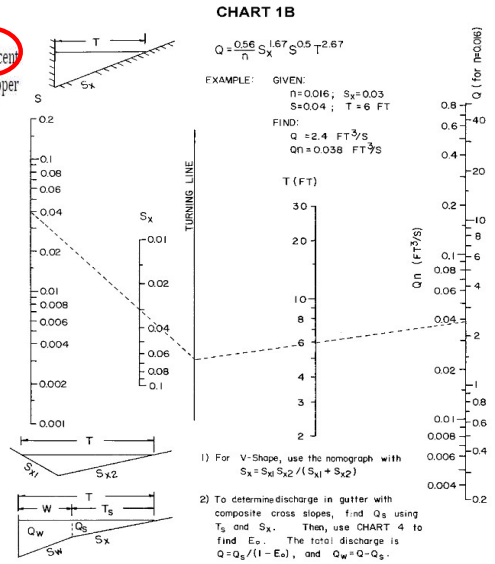
- d = Depth of flow, m (ft)

6.2.2 Minimum Gutter Slope

Gutters shall be constructed at slopes no flatter than 0.4 percent for retrofit conditions and 0.6 percent for new construction. Gutter sections must be tested by applying a flow of water to verify proper drainage.

Table 4-3. Manning's n for Street and Pavement Gutters.

Type of Gutter or Pavement	Manning's n
Concrete gutter, troweled finish	0.012
Asphalt Pavement:	
Smooth texture	0.013
Rough texture	0.016
Concrete gutter-asphalt pavement:	
Smooth	0.013
Rough	0.015
Concrete pavement:	
Float finish	0.014
Broom finish	0.016
For gutters with small slope, where sediment may accumulate, increase above values of "n" by	0.002
Reference: USDOT, FHWA, HDS-3[36]	



Flow in Triangular Gutter Sections - English Units

6.2 GUTTER FLOW

The primary purpose of streets is to carry traffic and the use of streets for storm runoff must therefore be restricted. However, streets are also an integral part of the urban drainage system and may be used for transporting a limited amount of storm runoff. The City allows the use of streets for drainage within the limitations specified in Tables 6.1 and 6.2. Street classifications are specified on the Functional Classification Map developed by the City of Sheridan.

Table 6.1 - Allowable Use Of Streets For Minor Storm Runoff

Street Classification	Maximum Street Encroachment
Local	No curb overtopping. Flow may spread to crown of street.[1]
Collectors	No curb overtopping. Flow spread must leave at least one, ten-foot lane free of water, five feet either side of the street crown.[1]
Arterials	No curb overtopping. Flow spread must leave at least two ten-foot lanes free of water, ten feet each side of the street crown or median.[1]
Arterials (6 or more lanes)	No curb overtopping. Flow spread must leave at least four ten-foot lanes free of water, twenty feet each side of the street crown or median.[1]

[1]Where no curbing exists, encroachment shall not extend beyond property lines, except at drainage easements

Table 6.2 - Allowable Use Of Streets For Major Storm Runoff

Street Classification	Maximum Depth
Local and Collectors	The depth of water at the gutter flowline shall not exceed 18 inches. Residential dwellings and public, commercial, and industrial buildings shall not be inundated at the ground line unless flood-proofed.
Arterials	To allow for emergency vehicles, the depth of flow at the street crown shall be no more than six inches. Residential dwellings and public, commercial, and industrial buildings shall not be inundated at the ground line unless flood-proofed.

6.2.1 Hydraulics

Gutter flow encroachment and hydraulics shall be evaluated using the methods presented in Section 4.3 of the HEC-22 Manual:

http://www.fhwa.dot.gov/engineering/hydraulics/pubs/10009/10009.pdf

100 yr Storm

O:\References\..\2016 City of Sheridan Storm Drainage Manual.pdf

https://www.fhwa.dot.gov/engineering/hydraulics/pubs/10009/10009.pdf

			Gutter Flow (CFS)	Cross slope (ft/ft)	Long. Slope (ft/ft)	Manning's coef.	0.56	Width (ft)	Depth (in)
BASIN	Basin Flow (CFS)	Road Name	Q	Sx	Sl	n	Ku	T	D
N1A	18.33	SHV-S W1B	4.28	**0.02**	**0.006**	**0.016**	**0.56**	13.8	3.3
N1B	2.11	SHV-S W2A	1.26					8.7	2.1
N1C	1.4	SHV-N C1A	1.77					9.9	2.4
N1D	8.85	SHV-N C1B	0.76					7.2	1.7
N2	9.89	Story House Ln N1B	2.11					10.5	2.5
W1A	9.08	Story House Ln N1C	1.4					9.0	2.2
W1B	4.28	Story House Ln C2B	7.89					17.3	4.2
W2A	1.26	Story House Ln C2C	0.87					7.6	1.8
W2B	4.28	Story House Ln C4B	5.51					15.1	3.6
C1A	1.77	Baldwin Ave C4B	5.51					15.1	3.6
C1B	0.76	Baldwin Ave C4A	16.74					22.9	5.5
C2A	15.53	Baldwin Ave C2D	19.84					24.4	5.9
C2B	7.89	Baldwin Ave C1A C1B C2A	18.06					23.6	5.7
C2C	0.87	Canterbury Ln C4A	16.74					22.9	5.5
C2D	19.84								
C4A	16.74								
C4B	5.51								
S1	12.23								
S2	4.25								

[Round[T=((D4*G4)/(H4*E4^1.67*F4^0.5))^0.375; D=I4*E4*12],1]

$$Q = (K_u/n)\, S_x^{1.67}\, S_L^{0.5}\, T^{2.67} \qquad (4\text{-}2)$$

or in terms of T

$$T = [(Qn) / (K_u\, S_x^{1.67}\, S_L^{0.5})]^{0.375} \qquad (4\text{-}2)$$

where:

K_u = 0.376 (0.56 in English units)
n = Manning's coefficient (Table 4-3)
Q = Flow rate, m^3/s (ft^3/s)
T = Width of flow (spread), m (ft)
S_x = Cross slope, m/m (ft/ft)
S_L = Longitudinal slope, m/m (ft/ft)

Equation 4-2 neglects the resistance of the curb face since this resistance is negligible.

Spread on the pavement and flow depth at the curb are often used as criteria for spacing pavement drainage inlets. Design Chart 1 in Appendix A is a nomograph for solving Equation 4-2. The chart can be used for either criterion with the relationship:

$$d = T\, S_x \qquad (4\text{-}3)$$

where:

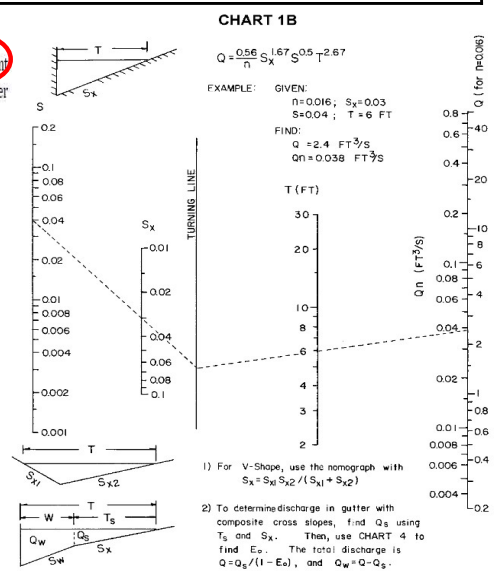
d = Depth of flow, m (ft)

6.2.2 Minimum Gutter Slope

Gutters shall be constructed at slopes no flatter than 0.4 percent for retrofit conditions and 0.6 percent for new construction. Gutter sections must be tested by applying a flow of water to verify proper drainage.

Table 4-3. Manning's n for Street and Pavement Gutters.

Type of Gutter or Pavement	Manning's n
Concrete gutter, troweled finish	0.012
Asphalt Pavement:	
Smooth texture	0.013
Rough texture	0.016
Concrete gutter-asphalt pavement:	
Smooth	0.013
Rough	0.015
Concrete pavement:	
Float finish	0.014
Broom finish	0.016
For gutters with small slope, where sediment may accumulate, increase above values of "n" by	0.002
Reference: USDOT, FHWA, HDS-3[36]	



Flow in Triangular Gutter Sections - English Units

6.2 GUTTER FLOW

The primary purpose of streets is to carry traffic and the use of streets for storm runoff must therefore be restricted. However, streets are also an integral part of the urban drainage system and may be used for transporting a limited amount of storm runoff. The City allows the use of streets for drainage within the limitations specified in Tables 6.1 and 6.2. Street classifications are specified on the Functional Classification Map developed by the City of Sheridan.

Table 6.1 - Allowable Use Of Streets For Minor Storm Runoff

Street Classification	Maximum Street Encroachment
Local	No curb overtopping. Flow may spread to crown of street.[1]
Collectors	No curb overtopping. Flow spread must leave at least one, ten-foot lane free of water, five feet either side of the street crown.[1]
Arterials	No curb overtopping. Flow spread must leave at least two ten-foot lanes free of water, ten feet each side of the street crown or median.[1]
Arterials (6 or more lanes)	No curb overtopping. Flow spread must leave at least four ten-foot lanes free of water, twenty feet each side of the street crown or median.[1]

[1]Where no curbing exists, encroachment shall not extend beyond property lines, except at drainage easements

Table 6.2 - Allowable Use Of Streets For Major Storm Runoff

Street Classification	Maximum Depth
Local and Collectors	The depth of water at the gutter flowline shall not exceed 18 inches. Residential dwellings and public, commercial, and industrial buildings shall not be inundated at the ground line unless flood-proofed.
Arterials	To allow for emergency vehicles, the depth of flow at the street crown shall be no more than six inches. Residential dwellings and public, commercial, and industrial buildings shall not be inundated at the ground line unless flood-proofed.

6.2.1 Hydraulics

Gutter flow encroachment and hydraulics shall be evaluated using the methods presented in Section 4.3 of the HEC-22 Manual:

http://www.fhwa.dot.gov/engineering/hydraulics/pubs/10009/10009.pdf

CURB CUT HYDRAULICS

Worksheet for OUTLET 1

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.012
Channel Slope	0.020 ft/ft
Bottom Width	0.66 ft
Discharge	1.70 cfs

Results	
Normal Depth	5.3 in
Flow Area	0.3 ft²
Wetted Perimeter	1.6 ft
Hydraulic Radius	2.3 in
Top Width	0.66 ft
Critical Depth	7.1 in
Critical Slope	0.010 ft/ft
Velocity	5.78 ft/s
Velocity Head	0.52 ft
Specific Energy	0.96 ft
Froude Number	1.526
Flow Type	Supercritical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	5.3 in
Critical Depth	7.1 in
Channel Slope	0.020 ft/ft
Critical Slope	0.010 ft/ft

Worksheet for OUTLET 2

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.012
Channel Slope	0.020 ft/ft
Bottom Width	1.25 ft
Discharge	4.53 cfs

Results	
Normal Depth	5.9 in
Flow Area	0.6 ft²
Wetted Perimeter	2.2 ft
Hydraulic Radius	3.3 in
Top Width	1.25 ft
Critical Depth	8.9 in
Critical Slope	0.007 ft/ft
Velocity	7.40 ft/s
Velocity Head	0.85 ft
Specific Energy	1.34 ft
Froude Number	1.864
Flow Type	Supercritical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	5.9 in
Critical Depth	8.9 in
Channel Slope	0.020 ft/ft
Critical Slope	0.007 ft/ft

Worksheet for OUTLET 3

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.012
Channel Slope	0.020 ft/ft
Bottom Width	5.00 ft
Discharge	24.21 cfs

Results	
Normal Depth	6.0 in
Flow Area	2.5 ft²
Wetted Perimeter	6.0 ft
Hydraulic Radius	5.0 in
Top Width	5.00 ft
Critical Depth	10.8 in
Critical Slope	0.003 ft/ft
Velocity	9.74 ft/s
Velocity Head	1.47 ft
Specific Energy	1.97 ft
Froude Number	2.435
Flow Type	Supercritical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	6.0 in
Critical Depth	10.8 in
Channel Slope	0.020 ft/ft
Critical Slope	0.003 ft/ft

Worksheet for OUTLET 4

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.012
Channel Slope	0.020 ft/ft
Bottom Width	4.50 ft
Discharge	20.96 cfs

Results	
Normal Depth	5.9 in
Flow Area	2.2 ft²
Wetted Perimeter	5.5 ft
Hydraulic Radius	4.8 in
Top Width	4.50 ft
Critical Depth	10.5 in
Critical Slope	0.003 ft/ft
Velocity	9.54 ft/s
Velocity Head	1.41 ft
Specific Energy	1.90 ft
Froude Number	2.405
Flow Type	Supercritical

GVF Input Data	
Downstream Depth	0.0 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.0 in
Profile Description	N/A
Profile Headloss	0.00 ft
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	5.9 in
Critical Depth	10.5 in
Channel Slope	0.020 ft/ft
Critical Slope	0.003 ft/ft

OUTFALL PONDING

	Hydrologic element	Drainage area (mi^2)	Q peak (cfs)	Time of peak	Volume (in)	Ponding depth (in)
Pre 10	Central	0.026	18.6	22Mar2023, 00:00	1.18	
	Culvert ponding hist	0.026	15.5	22Mar2023, 00:10	1.17	23.5
Pre 100	Central	0.026	34	22Mar2023, 00:00	2.14	
	Culvert ponding hist	0.026	19.3	22Mar2023, 00:20	2.11	35
Post 10	C1B	0.0005	0.8	22Mar2023, 00:00	2.12	
	C1A	0.0005	0.8	22Mar2023, 00:00	2.12	
	C2D	0.0086	8.4	22Mar2023, 00:00	1.32	
	C2A	0.0069	6.2	22Mar2023, 00:00	1.32	
	C1-C2	0.001	1.4	22Mar2023, 00:00	2.12	
	C2-Culvert	0.0165	14.2	22Mar2023, 00:10	1.37	
	S1	0.0043	6	22Mar2023, 00:00	1.91	
	Culvert ponding	0.0208	15.5	22Mar2023, 00:10	1.47	23.5
Post 100	C1B	0.0005	1.1	22Mar2023, 00:00	3.22	
	C1A	0.0005	1.1	22Mar2023, 00:00	3.22	
	C2D	0.0086	14.5	22Mar2023, 00:00	2.31	
	C2A	0.0069	10.8	22Mar2023, 00:00	2.31	
	C1-C2	0.001	2	22Mar2023, 00:00	3.22	
	C2-Culvert	0.0165	24.2	22Mar2023, 00:10	2.36	
	S1	0.0043	9.1	22Mar2023, 00:00	3	
	Culvert ponding	0.0208	19.2	22Mar2023, 00:20	2.46	35

Culvert of interest is Outfall B shown in the pre and post drainage plans

Area Capacity Table

Pre-developed		
Elevation (ft)	Area (acres)	Flow (cfs)
0	0.007	0
1	0.034	2.93
2	0.091	10
3	0.154	20
4	0.269	22
5	0.385	23.78
Post developed		
0	0.007	0
1	0.034	2.93
2	0.069	10
3	0.114	20
4	0.220	22
5	0.341	23.78

ponding depth (ft)	Q (cfs)	ponding depth (in)
0.00	0	0.0
0.08	1.223260918	1.0
0.17	4.468759494	2.0
0.25	5.546344068	3.0
0.33	6.404366481	4.0
0.42	7.160299402	5.0
0.50	7.843715002	6.0
0.58	8.472180507	7.0
0.67	9.057141936	8.0
0.75	3.765264506	9.0
0.83	4.738892961	10.0
0.92	5.734122862	11.0
1.00	6.843643443	12.0
1.08	7.983069617	13.0
1.17	9.160546452	14.0
1.25	10.4323354	15.0
1.33	11.80349101	16.0
1.42	13.20293973	17.0
1.50	13.5857129	18.0
1.58	13.95799314	19.0
1.67	14.3205988	20.0
1.75	14.67424709	21.0
1.83	15.01957074	22.0
1.92	15.35713133	23.0
2.00	15.68743	24.0
2.08	16.0109162	25.0
2.17	16.32799483	26.0
2.25	16.6390322	27.0
2.33	16.94436101	28.0
2.42	17.24428449	29.0
2.50	17.53907994	30.0
2.58	17.82900173	31.0
2.67	18.11428387	32.0
2.75	18.39514223	33.0
2.83	18.81274835	34.0
2.92	19.4461821	35.0
3.00	20.08589815	36.0
3.08	20.5177492	37.0
3.17	20.6702969	38.0
3.25	20.82172701	39.0
3.33	20.97206373	40.0
3.42	21.12133042	41.0
3.50	21.26954961	42.0
3.58	21.41674303	43.0
3.67	21.56293171	44.0
3.75	21.70813593	45.0
3.83	21.85237532	46.0
3.92	21.99566887	47.0
4.00	22.13803493	48.0
4.08	22.27949129	49.0
4.17	22.42005517	50.0
4.25	22.55974325	51.0
4.33	22.6985717	52.0
4.42	22.8365562	53.0
4.50	22.97371195	54.0
4.58	23.1100537	55.0
4.67	23.2455958	56.0
4.75	23.38035213	57.0
4.83	23.51433621	58.0
4.92	23.64756116	59.0
5.00	23.78003975	60.0

DETENTION CALCULATIONS

	P (in)		
	3.46		Formula
Basin	CN	Q_D (in)	Q_D=(B2-0.2*(1000/B4-10)^2/(B2+0.8(1000/B4-10)))
N1A	93	3.432	
N1B	98	3.458	
N1C	98	3.458	
N1D	93	3.432	
N2	87	3.364	
W1A	94	3.439	
W1B	94	3.439	
W2A	98	3.458	
W2B	89	3.391	
C1A	98	3.458	
C1B	98	3.458	
C2A	96	3.451	
C2B	89	3.391	
C2C	98	3.458	
C2D	95	3.446	
C4A	94	3.439	
C4B	96	3.451	
S1	94	3.439	
S2	91	3.414	

Basin	**CN**	**Q_D (in)**	**Q_i**	**Q_o**	**A**	**K_r**		
Total	91	3.414	142.73	121.01	50.96	53.33		
		Qo/Qi	V_r (ac*ft)		Vs		Vs/Vr	
		0.85	14.50		**2.25**		0.155	

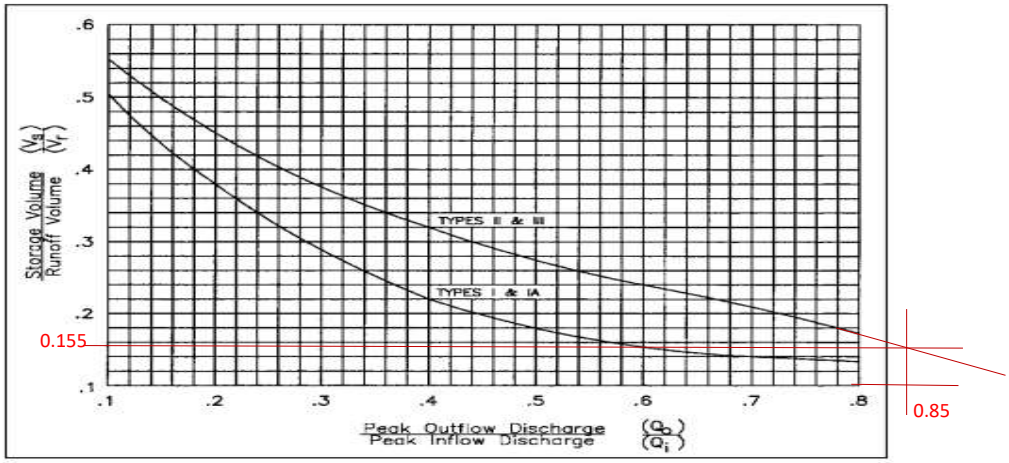


Figure 8-5. SCS detention basin routing curves.[13]

The procedure for using Figure 8-5 in estimating the detention storage required is described as follows:[13]

1. Determine the inflow and outflow discharges Q_i and Q_o
2. Compute the ratio Q_o/Q_i
3. Compute the inflow runoff volume, V_r, for the design storm

$$V_r = K_r Q_D A_m \qquad (8\text{-}2)$$

where:

V_r = Inflow volume of runoff, ha-mm (ac-ft)
K_r = 1.00 (53.33 for English units)
Q_D = Depth of direct runoff, mm (in)
A_m = Area of watershed, ha (mi^2)

4. Using Figure 8-5, determine the ratio V_s/V_r
5. Determine the storage volume, V_s, as

$$V_s = V_r (V_s / V_r) \qquad (8\text{-}3)$$

SCS Method Detention Calculation

	P (in)		
	3.46		Formula
Basin	CN	Q_D (in)	$Q_D=(\$B\$2-0.2*(1000/B4-10)^2/(\$B\$2+0.8(1000/B4-10)))$
C4A	94	3.439	
C4B	96	3.451	
S2	91	3.414	

Basin	**CN**	**Q_D (in)**	**Q_i**	**Q_o**	**A**	**K_r**		
Total	94	3.439	24.72	14	7.56	53.33		
		Qo/Qi	V_r (ac*ft)		Vs		Vs/Vr	
		0.57	2.17		**0.54**		0.25	



Figure 8-5. SCS detention basin routing curves.[13]

The procedure for using Figure 8-5 in estimating the detention storage required is described as follows:[13]

1. Determine the inflow and outflow discharges Q_i and Q_o
2. Compute the ratio Q_o/Q_i
3. Compute the inflow runoff volume, V_r, for the design storm

$$V_r = K_r Q_D A_m \quad (8\text{-}2)$$

where:

V_r = Inflow volume of runoff, ha-mm (ac-ft)
K_r = 1.00 (53.33 for English units)
Q_D = Depth of direct runoff, mm (in)
A_m = Area of watershed, ha (mi^2)

4. Using Figure 8-5, determine the ratio V_s/V_r
5. Determine the storage volume, V_s, as

$$V_s = V_r (V_s / V_r) \quad (8\text{-}3)$$

$$WQV = \frac{(P)(Rv)(A)}{12}$$

WQV (acre-feet)	P (in)	A (acres)	Rv	% imp (decimal)
0.20	0.5	7.56	0.64	0.65
WQF (cfs)	qu (cfs/mi^2/in)			
3.72	991			

$$WQF = \frac{12(q_u)(WQV)}{640}$$

Table 8.2 – NRCS Unit Peak Discharge

Time of Concentration (minutes)*	q_u (cfs/mi²/inch)
6	991
12	796
18	658
24	558
30	496
45	388
60	316

*Either round down to the nearest time of concentration or interpolate for intermediate times of concentration

For circular orifices with C_o set equal to 0.6, the following equation results:

$Q = K_{or} D^2 H_o^{0.50}$ (8-18)

where:

K_{or} = 2.09 in SI units (3.78 in English units)
D = Orifice diameter, m (ft)

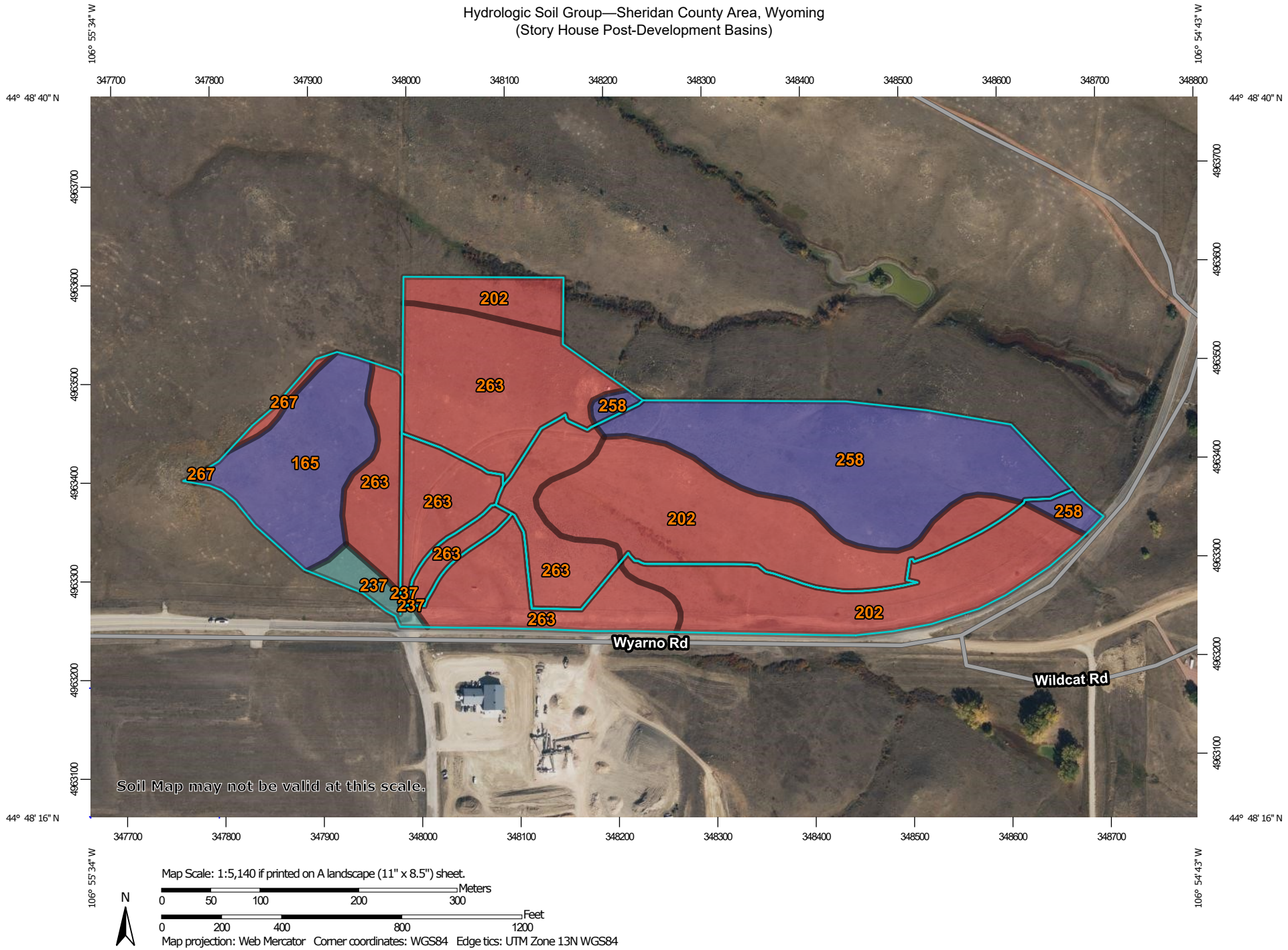
Detention Pond C						
storage volume af	SV cf	L (ft)	A sqft	Elevation (ft)	V cf	af
0.52	22651.2	80	6400	3849		
		76	5776	3848	6088	0.139761
		72	5184	3847	11568	0.265565
		68	4624	3846	16472	0.378145
		64	4096	3845	20832	0.478237
		60	3600	3844	24680	**0.566575**
		56	3136	3843	28048	0.643893
		52	2704	3842	30968	0.710927
		48	2304	3841	33472	0.768411

WQV						
storage volume af	SV cf	L (ft)	A sqft	Elevation (ft)	V cf	af
0.2	8712	48	2304	3841		
		52	2704	3842	2504	0.057484
		56	3136	3843	5424	0.124518
		60	3600	3844	8792	**0.201837**
		64	4096	3845	12640	0.290174
		68	4624	3846	17000	0.390266
		72	5184	3847	21904	0.502847
		76	5776	3848	27384	0.62865
		80	6400	3849	33472	0.768411

APPENDIX C

Soil Data

Hydrologic Soil Group—Sheridan County Area, Wyoming
(Story House Post-Development Basins)



MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Sheridan County Area, Wyoming
Survey Area Data: Version 24, Sep 6, 2023

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Sep 21, 2021—Sep 27, 2021

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
165	Hiland-Bowbac association, moist, 3 to 15 percent slopes	B	5.1	10.1%
202	Parmleed-Bidman association, moist, 3 to 9 percent slopes	D	16.4	32.1%
237	Renohill, moist-Ulm association, 3 to 10 percent slopes	C	0.8	1.5%
258	Shingle-Nihill complex, moist, 3 to 80 percent slopes	B	10.7	21.0%
263	Shingle-Samday clay loams, moist, 3 to 55 percent slopes	D	17.7	34.7%
267	Shingle-Theedle loams, moist, 45 to 75 percent slopes	D	0.3	0.6%
Totals for Area of Interest			**51.0**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

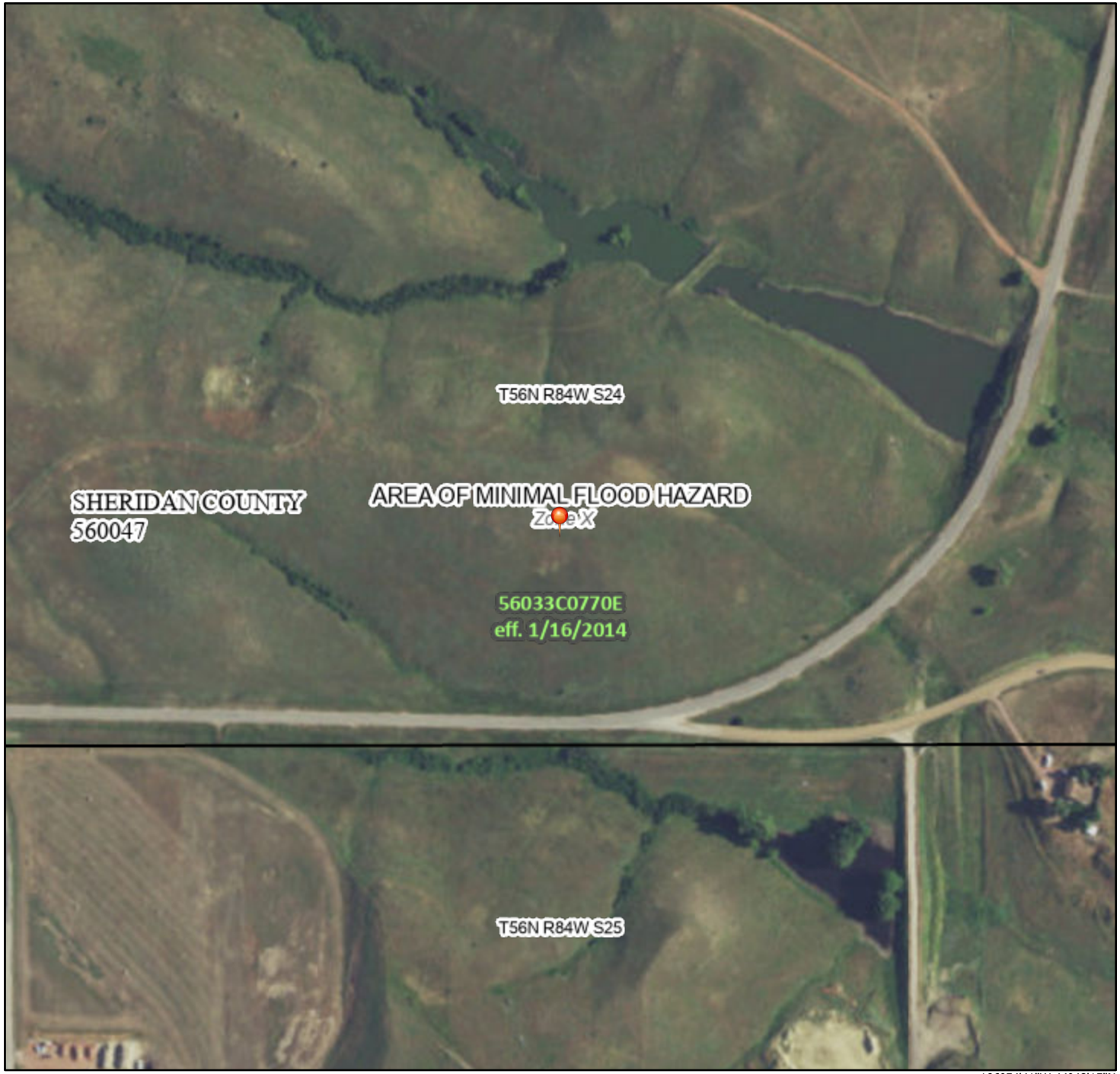
APPENDIX D

FEMA Information

National Flood Hazard Layer FIRMette

FEMA

106°55'19"W 44°48'40"N



106°54'41"W 44°48'15"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Basemap Imagery Source: USGS National Map 2023

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- 513 Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 10/18/2023 at 9:31 AM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

Report of Geotechnical Exploration
Proposed Story House Village
Phase I Development

Wyarno Road
Sheridan, Wyoming

AET Project No. P-0022564

Date:
September 11, 2023
Revised December 15, 2023

Prepared for:
WWC Engineering
1849 Terra Avenue
Sheridan, Wyoming 82801

Geotechnical • Materials
Forensic • Environmental
Building Technology
Petrography/Chemistry

American Engineering Testing
72 E. Ridge Road, Unit D
Sheridan, Wyoming 82801
TeamAET.com • 307.675.1862

September 11, 2023
Revised December 15, 2023

WWC Engineering
1849 Terra Avenue
Sheridan, Wyoming 82801

Attn: Ms. Sarah Rohrer
srohrer@wwcengineering.com

RE: Report of Geotechnical Exploration
Proposed Story House Village
Phase I Development
Wyarno Road
Sheridan, Wyoming
AET Project No. P-0022564

Dear Ms. Rohrer:

American Engineering Testing, Inc. (AET) is pleased to present the results of our subsurface exploration program and geotechnical engineering review for the above referenced site on the northeast side of Sheridan Wyoming. These services were performed in general accordance with our proposal to you dated June 28, 2023 and WWC's written authorization to proceed provided on June 29, 2023. We are submitting one (1) electronic copy of the report to you.

Please contact me if you have any questions about the report. I can also be contacted for arranging observation and testing services during construction of the project. We highly recommend testing and observations be performed during construction at this site.

Sincerely,
American Engineering Testing, Inc.



Robert Temme PE
VP West Division Business Development
rtemme@teamaet.com
Phone: (605-391-5018)

72 E. Ridge Road, Unit D | Sheridan, WY 82801
Phone (307) 675-1862 | (800) 972-6364 | Fax (605) 388-0064 | teamAET.com | AA/EEO
This document shall not be reproduced, except in full, without written approval from American Engineering Testing, Inc.

AMERICAN ENGINEERING TESTING

SIGNATURE PAGE

Prepared for:

WWC Engineering
1849 Terra Avenue
Sheridan, Wyoming 82801

Attn: Ms. Sarah Rohrer

Prepared by:

American Engineering Testing, Inc.
7 Gable Way
Sheridan, Wyoming 82801
(307) 675-1862
www.teamAET.com

Authored by:

Robert Temme, PE
VP - West Division Business Development

Reviewed by:

Walt Feeger
Principal Engineer – West Division



Copyright 2023 American Engineering Testing, Inc.
All Rights Reserved

Unauthorized use or copying of this document is strictly prohibited by anyone other than the client for the specific project.

TABLE OF CONTENTS

Transmittal Letter i
Signature Page ii

1.0 INTRODUCTION 1
2.0 SCOPE OF SERVICES 1
3.0 PROJECT INFORMATION 1
4.0 SUBSURFACE EXPLORATION AND TESTING 2
4.1 Field Exploration Program 2
4.2 Laboratory Testing 2
5.0 SITE CONDITIONS 4
5.1 Surface Observations 4
5.2 Subsurface Soils/Geology 4
5.3 Groundwater 4
6.0 RECOMMENDATIONS 5
6.1 Discussion 5
6.3 Site Preparation 6
6.4 Foundation Design 8
6.5 Basement Wall Design Considerations 8
6.6 Floor Slab Design 8
6.7 Utility Trench and Exterior Backfill Considerations 9
6.8 Trench Excavation 10
6.9 Pavements 10
6.10 General Site Recommendations 13
7.0 CONSTRUCTION CONSIDERATIONS 14
7.1 Potential Difficulties 14
7.2 Excavation Backsloping 15
7.3 Observation and Testing 15
8.0 LIMITATIONS 15

TABLE OF CONTENTS

STANDARD SHEETS

Freezing Weather Effects on Building Construction
Excavation and Refilling for Structural Support
Floor Slab Moisture/Vapor Protection

APPENDIX A

Geotechnical Field Exploration and Testing
Boring Log Notes
Unified Soil Classification System
Figure 1: Site Location Map
Figure 2: Boring Location Map
Subsurface Boring Logs
Gradation Test Results
Swell-Consolidation Test Results
Unconfined Compression Tests
Moisture-Density Relationships
California Bearing Ratio Test

APPENDIX B

Geotechnical Report Limitations and Guidelines for Use

1.0 INTRODUCTION

We understand the construction of the Story House Village Phase I Development is being proposed along Wyarno Road, on the northeast side of Sheridan Wyoming. Please refer to the Site Location Map included in Appendix A of this report for the location of the project. To assist with the planning and design, American Engineering Testing, Inc. (AET) has been authorized to conduct a subsurface exploration program at the site, conduct soil laboratory testing, and perform a geotechnical engineering review for the project. This report presents the results of the above services and provides our engineering recommendations based on this data.

Note that AET provided a Preliminary Geotechnical Report for this site under AET Project No. P-0010998, dated April 22, 2022. Two of the borings drilled in that study, Borings B-4 and B-5, are located in the area of the current development. These two borings are included in this report and the data gained from them have been used in the preparation of this report.

2.0 SCOPE OF SERVICES

AET's services were performed in general accordance with our proposal dated June 28, 2023. The authorized scope consists of the following:

- Five (5) Standard Penetration Test (SPT) borings across the proposed subdivision project site to depths ranging from approximately 10 -50 feet below existing grade.
- Soil laboratory testing.
- Geotechnical engineering analysis based on the gained data and preparation of this report.

These services are intended for geotechnical purposes only. The scope is not intended to explore for the presence or extent of environmental contamination in the soil or groundwater.

3.0 PROJECT INFORMATION

Based on the information provided, we understand the Site is moving into a development phase. Preliminary plans indicates roads, lots and utilities to be constructed at the Site.

We have assumed cuts and fill depth will be 10 feet or less, roads/street grades will be set based on the final grading of the site, standard utility depths are anticipated and residential structures may contain basement levels and will be constructed on the specific lots.

The purpose of the geotechnical study was to determine the subsurface conditions at the site and to evaluate the suitability of the site soils for their use in the overall grading, construction of streets and residential structures. Our foundation design assumptions include a minimum factor of safety of 3 with respect to the ultimate bearing capacity.

The previously stated information represents our understanding of the proposed construction. This information is an integral part of our engineering review. It is important that you contact us if there are changes from that described so that we can evaluate whether modifications to our recommendations are appropriate.

4.0 SUBSURFACE EXPLORATION AND TESTING

4.1 Field Exploration Program

The subsurface exploration program conducted for the project consisted of five (5) standard penetration test (SPT) borings drilled on August 16, 2023. The borings were drilled at locations selected by WWC Engineering.

The logs of the borings and details of the methods used appear in Appendix A. The logs contain information concerning soil layering, soil classification, geologic origins, and moisture condition. A density description or consistency is also noted for the natural soils, which is based on the standard penetration resistance (N-value).

The approximate boring locations are shown on Figure 2: Boring Location Map, included in Appendix A. Surface elevations were determined from GoogleEarth.

4.2 Laboratory Testing

The laboratory test program included natural moisture content, dry density, Atterberg Limits, sieve analysis, percent passing the No. 200 sieve, swell-consolidation, standard Proctor and California Bearing Ratio (CBR) tests. The test results of the moisture content, dry density, Atterberg Limits and percent passing the No. 200 sieve appear in Appendix A on the individual boring logs adjacent to the samples upon which they were performed.

Results of the sieve analysis, unconfined compression, swell-consolidation, standard Proctor and CBR tests are presented on the data sheets following the logs.

The swell/consolidation test is commonly performed to evaluate the swell or consolidation potential of soils or bedrock for determining foundation and concrete slab-on-grade design criteria. In this test, relatively undisturbed samples obtained directly from the ring-lined barrel sampler are placed in a laboratory device and saturated under a predetermined load. The swell-index is the resulting amount of swell (+) as a percent of the sample's thickness after the saturation period. Conversely, the consolidation index is the amount of consolidation (-) as a percent of the sample's thickness after consolidation under the confining load. Test results are summarized as follows:

Boring	Depth, ft	Soil Type	Swell (+) or Consolidation (-) Potential, %	Swell Pressure, psf
B-7	10	Lean Clay (CL)	+0.4	2,270

The results for the swell-consolidation test is included within Appendix A. Our judgement of the swell test results is that the site clay soils have a low swell potential with corresponding low to moderate swell pressures.

Results of the standard Proctor and CBR tests are summarized below. The CBR test was remolded to approximately 95% of maximum dry density at the optimum moisture content for the specific boring/material.

Boring	Soil Classification	Optimum Moisture Content, % [1]	Maximum Dry Density, pcf [1]	CBR Value[2]
B-6	Lean Clay (CL)	20.4	102.2	-
B-9	Lean Clay (CL)	20.2	101.9	2.2
B-10	Lean Clay with a little Sand (CL)	15.8	107.4	-

[1] Based on ASTM D 698 (standard proctor) [2] Remolded to 95% of maximum dry density

It should be noted the bulk soil samples represents a mixture of the soils encountered within the upper 1 to 5 foot interval of the borehole. As such, the soil classification as presented on the Moisture-Density Relationship (Proctor) and CBR data sheets may differ from the classifications of the individual soil layers identified on the respective Subsurface Boring Log.

5.0 SITE CONDITIONS

5.1 Surface Observations

In general, the site primarily consisted of a ridge used mainly as undeveloped grazing land and bordered on the north by a drainage with a small reservoir and bordered on the south by Wyarno Road. The Site topography slopes from west to east, with relief ranging from approximately 3,922 feet above sea level on the west side to 3,842 feet on the east.

5.2 Subsurface Soils/Geology

In general, below a thin layer of topsoil, the subsurface soils encountered within the borings consisted of native site alluvial soils overlying weathered and weathered claystone bedrock of the Wasatch Formation. The alluvial soils consisted of layers of approximately 5 to as much as 11 feet of firm to very stiff lean clay with sand and/or loose to medium dense clayey to silty sand.

Below the alluvial soils, weathered and unweathered claystone bedrock (silty lean clay) was encountered to the final depths drilled of approximately 51 feet. The bedrock ranged from very stiff to hard in consistency.

The Subsurface Boring Logs included in Appendix A give a more detailed description of the soils encountered within the borings.

5.3 Groundwater

At the time of our field work, ground water was not encountered within boring depths explored during our subsurface exploration. Temporary piezometers were installed in Borings B-6 and B-7. Water levels were checked in the piezometers on September 1, 2023 and as before, groundwater was not measured in any of the borings. The temporary piezometers were plugged and abandoned.

The lack of groundwater noted at the boring locations should not be taken as an accurate representation of the actual groundwater levels. Groundwater levels can fluctuate due to varying seasonal and annual rainfall and snow melt amounts, as well as other factors. A long period of time may be required for groundwater to stabilize in the soils present at the site; this period of time is generally not available during a typical subsurface exploration program.

6.0 RECOMMENDATIONS

6.1 Discussion

Our recommendations in the following sections are intended to minimize, to varying degrees, movement related problems for the proposed foundations and floor slabs of the residential structures. Even if our recommendations are followed, we cannot guarantee that some movement will not occur. The present state of the art is such that the risk of movement cannot be accurately assessed. It depends on a number of uncontrolled variables such as climatic conditions during and after construction, long term fluctuations of the groundwater level, utility line leakage, landscaping, and other similar aspects. The risk of detrimental movement must be assumed by the project owner.

The following recommendations are based on the soil conditions observed, and in the samples collected from the soil borings advanced at the time of the field activities. The location of the borings and the recommendations provided, were based on the information available to AET at the time of our field work. The soils encountered at each boring location and the soils encountered during excavation and site grading may vary due to the surficial geology of the site. Further, changes in climatic conditions between the time of exploration and the time of construction may also affect subsurface conditions, particularly groundwater levels and the moisture content of the soils. Due to the potential variations, we recommend that AET be retained to verify the soil conditions encountered during excavations match the information gained during our field investigation.

Final grading such as cuts and fills made on the site during construction may have a direct impact on the performance of the streets, residential structures and the following recommendations. AET must be allowed to review the final grading plans of the site to verify the following recommendations will remain applicable and/or if additional recommendations apply. Also note that modifications made to the completed structures and site, such as future additions and grade and drainage changes, may result in a direct impact to the performance of the original structures and site and cannot be addressed at this time.

Also, the following recommendations must be verified and observed in the field by the geotechnical engineer during construction. As the cost associated with the construction observations and testing will vary depending on the size and complexity of the structures and site, AET must be allowed to provide a proposal for these services during construction. The costs associated with the observations and testing services need to be included in the overall project construction cost.

To reduce the risk of movement of the bearing strata, good drainage must be maintained during and after construction. We recommend the final site grading be designed with positive drainage away from the buildings for at least a distance of 10 feet. We also recommend the excavations be left open a minimal amount of time to reduce the possible amount of surface water to accumulate in the base of the excavation.

6.2 Surficial Reconnaissance

AET visited the Site on August 16, 2023 to perform a surficial reconnaissance of the Site prior to drilling operations. AET gained access through a gate located along the north side of Wyarno Road. The access gate is located at the high point of the proposed Site development. Two drainages run through the Site from west to east. A small reservoir is located along the north drainage. The site is characterized by short grasses and shrubs and occasional cobbles and boulders. The Site is currently utilized for grazing livestock. Five soil borings were located by WWC engineering and each boring was visited to check access conditions for the drill rig. Access was deemed suitable for drilling operations.

6.3 Site Preparation

We recommend existing topsoil and any organic matter be removed from within the construction limits of the new residential structures, project streets and all areas to receive fill. Topsoil may be stockpiled on site for reuse once grading is complete; however, any organic material, and any old construction debris encountered should be wasted from the site.

We anticipate that cuts and fills of varying depths will be required within the streets and building footprints. Where required, grading should continue to the desired construction elevations. All exposed subgrades need to be scarified to a depth of approximately 8 to 12-inches, the moisture content of the scarified soils adjusted to within ±3% of their optimum moisture content and the scarified soils compacted to at least 95% of the maximum standard Proctor dry density (ASTM D 698).

The excavated soils, cleaned of all unsuitable/organic materials and rocks greater than 3-inches in nominal size, may be used obtain final grades or stockpiled on-site and reused as utility trench backfill and overlot fill. We recommend the soils to be used as fill be moisture conditioned to within ±3% of optimum moisture and compacted to at least 95% of the maximum dry density (ASTM D698). Imported fill material, if required, should be approved by the geotechnical engineer prior to use.

To reduce the potential for movement related distress and to provide a uniform bearing surface, we recommend, the concrete slab-on-grade floors systems for the residential structures, bear on at least 1 foot of compacted granular engineered fill material. placed directly on the recompacted site soils.

The imported granular engineered fill should be pre-approved by the geotechnical engineer prior to its use. The granular engineered fill above the water table, should be a non-expansive material with a maximum size of 2-inches, 40% to 85% passing the #4 sieve, and no more than 20% passing the #200 sieve, with a liquid limit of less than 30. All granular engineered fill to be placed above the water table, whether from on-site or imported, should be placed in 8-inch thick maximum loose lifts; the moisture content should be conditioned to within ±3% of optimum moisture and compacted to at least 95% of maximum standard Proctor (ASTM D 698) dry density.

We recommend all final cut and fill slopes be constructed with 3H:1V slopes or flatter. It is our opinion temporary cut slopes can be cut to slopes of 2H:1V.

As noted, groundwater was not encountered across the site. Temporary dewatering of excavations will be necessary if groundwater is encountered, or surface drainage is allowed to accumulate in the excavations. Contractors working on the project should be prepared to have equipment on-site that will lower and maintain the groundwater level a minimum of two feet below the base of the excavations. We recommend that the groundwater levels be check prior to and during construction operations on site.

For more information on site preparation see the Standard Sheets section of this report.

6.4 Foundation Design

Based on the information obtained from the borings and laboratory testing, as well as our analysis, it is our opinion the residential structures may be founded on conventional spread footing foundation systems placed directly on the reconditioned site soils and/or claystone bedrock. We anticipate full depth basement levels will be 7 to 8 feet below final grades.

If a basement level is to be constructed, we recommend the placement of a perimeter drain system at the bottom outside edge of the basement footing excavation. The perimeter drain system should be routed to a sump pumping system to remove water from below the basement level.

Footings can be designed for an allowable bearing capacity of 2,000 pounds per square foot (psf). We recommend all footings be placed at least 42-inches below final grades for frost protection. As constructed, the above loading should provide a theoretical safety factor of three or more with respect to a general shear or base failure of the footings.

6.5 Basement Wall Design Considerations

If basement levels are constructed, the basement or lower-level walls will be subject to lateral earth pressure from the backfill. These types of walls are normally designed for the “at-rest” earth pressure condition because the walls are restrained from rotating. If the site soils are used as backfill, a value of 75 pounds per square foot, per foot of depth, should be used for the at-rest lateral earth pressure against the basement walls. The lateral earth pressure does not include any factor of safety and it not applicable for submerged conditions or hydrostatic loading

6.6 Floor Slab Design

Due to the presence of clay soils at the site, floor slabs should be placed on at least 1 foot of compacted granular engineered fill. Prior to placement we recommend the exposed subgrade be scarified to a depth of one foot and moisture conditioned to within ±3% of the optimum moisture content and compacted to at least 95% of maximum standard Proctor (ASTM D 698) dry density. We also recommend the floor slabs be constructed independent of the foundations in the event some movement does occur.

We also recommend providing a 6-inch thick continuous sand and/or gravel cushion layer directly below the floor slab to prevent capillary moisture rise to the slab. This free-draining granular fill should contain less than 12% by weight passing the #200 sieve, and less than 40% passing the #40 sieve. This 6-inch thick sand and/or gravel cushion layer can be incorporated into the 1 feet of engineered fill, where appropriate.

Refer to the "Floor Slab Moisture/Vapor Protection" document in the Standard Sheets section of this report for additional information.

6.7 Utility Trench and Exterior Backfill Considerations

It is our opinion utility trench backfill and exterior backfill around the addition may consist of the excavated alluvial soils. Based on the existing moisture content of the site soils, processing and drying of the material will very likely be required prior to re-use as backfill material.

All recommendations are based on the standard Proctor method (ASTM: D698).

1. All backfill should be free of deleterious/frozen material, and construction debris, and have a maximum aggregate size of 2-inches.
2. Site clays soils should be moisture conditioned to within -1 to +3% of the optimum moisture content. All granular backfill should be moisture conditioned to within ±3% of optimum moisture content prior to being placed.
3. All backfill should be placed in loose lift thicknesses of 8-inches or less. If hand-operated compaction equipment is used, the loose lift thickness should be reduced to 4-inches or less.
4. Each lift should be compacted to at least 95% of maximum proctor density. We recommend the final lift of backfill be compacted to at least 97% of the maximum dry density.
5. Compaction density tests should be performed on alternating lifts to ensure the minimum density is maintained.
6. Utility lines entering or exiting the structures should be leak tested prior to the placement of the slab.

6.8 Trench Excavation

If excavation faces are not retained, the excavations should maintain maximum allowable slopes in accordance with *OSHA Regulations (Standards 29 CFR), Part 1926, Subpart P, "Excavations"* (can be found on www.osha.gov). Even with the required OSHA sloping, water seepage or surface runoff can potentially induce side slope erosion or running which could require slope maintenance. For trench excavations, it is our opinion the site clays and sand soils, can be classified as Type C soils with recommended slope laybacks of 1.5H:1V. For the weathered and unweathered claystone formation, it is our opinion the soils can be classified as Type A soils with recommended slope laybacks of 3/4H:1V.

These classifications should be considered preliminary and should be verified in the field on a daily basis by the contractor and/or geotechnical engineer. Excavations deeper than 20 feet and/or in saturated soils or below the ground water table should be considered on an individual basis. Water levels, due to climatic conditions should be evaluated at the time of construction. If the above trench layback recommendations are not feasible, due to space limitations or other factors, the OSHA rules should be consulted for alternative trench stabilization methods. Trench boxes or shoring in compliance with OSHA rules may be acceptable alternatives.

6.9 Pavements

6.9.1 Considerations

The following pavement section was designed based on the City of Sheridan Standard Specifications and the procedures outlined in the 1993 AASHTO Empirical Equation for Flexible Pavements and Rigid Pavements.

It is anticipated that pavement subgrade soils will consist of sandy lean clay soils. Based on our laboratory results, a California Bearing Ratio (CBR) value of 2.2 was used in the pavement design analysis utilizing the site lean clay soils as the subgrade material. We have used a correlation of 1500 x CBR value to estimate the resilient modulus (MR).

A Traffic Impact Study report, prepared by Sustainable Traffic Solutions, was provided by WWC Engineering. Based on our review of the data contained in that report, we have assumed the proposed subdivision streets will be utilized by moderate traffic volumes consisting primarily of passenger trucks and cars with a smaller amount of truck related traffic such as seen from garbage and general delivery/service vehicles. Based on the subdivision layout, we have assumed the east half of the subdivision will be exposed to lighter traffic loads (residential) as the portion of the subdivision will be residential housing.

The west half of the subdivision, which will provide apartment and commercial space, will experience the higher traffic and truck related traffic. Therefore, an equivalent 20-year design 18-kip single axle load (ESAL) of 45,000 was utilized for the Phase I subdivision residential streets and an equivalent 20-year design 18-kip single axle load (ESAL) of 125,000 was utilized for the multi-family housing and commercial lots within the subdivision streets.

The 20-year design period is considered to be the interval over which, with proper maintenance, the pavement will not require major repairs. A continuing regular maintenance program should be implemented to maintain satisfactory serviceability over the design life. The maintenance program should include sealing cracks and repairing minor deficiencies. Please notify us if any of the parameters used in the pavement design do not adequately define the anticipated conditions.

6.9.2 Subgrade Preparation

Prior to placement of base course or any fill to obtain final subgrade elevations, the exposed subgrade soils should be scarified to a depth of 8-inches, the moisture content of the scarified soils adjusted to near optimum moisture content and the material compacted to at least 95% of maximum standard Proctor dry density (ASTM: D 698).

All prepared subgrades should be proof rolled to verify a firm and unyielding subgrade has been obtained prior to the placement of new fill and/or base course materials. To obtain a firm and unyielding subgrade, on which to construct the new pavement section, scarification and drying of the subgrade soils should be anticipated. If project schedules do not allow for sufficient time to dry the soil back to acceptable levels, use of a geo-textile stabilization/separation material can be incorporated in the design. The geo-textile should be placed on top of the graded subgrade and below the aggregate base course layer. Please note the pavement section, including base course thickness, may be subject to change if incorporating a geo-textile stabilization material into the design.

Prior to placement of the base course, an observed proof roll should be performed to confirm a firm and unyielding subgrade. Any areas that "pump" under the loaded dump truck should be evaluated by a geotechnical engineer, or their representative, to determine whether additional excavation and replacement with a coarse, clean rock or the use of a geo-textile fabric should be used to stabilize the subgrade. Once the subgrade has been proof rolled and approved by the engineer, base course may be placed.

6.9.3 Aggregate Base Course

Aggregate base course should be moisture conditioned to within ±3% of optimum and compacted to a minimum of 95% of maximum density as determined by the standard proctor method (ASTM: D698) and should meet the requirements as outlined in the City of Sheridan Standard Specifications.

6.9.4 Pavement Section Recommendations

Based on the above stated information and our analysis, we recommend the following pavement sections be used for this project:

Recommended Pavement Section Thickness (inches)				
Traffic Area	**Flexible (Asphalt), in.**	**Rigid (Concrete), in**	**Aggregate Base Course, in.**	**Total, in.**
Residential – Story House Lane, Baldwin Avenue, Mockingbird Lane, Canterbury Lane	4	--	9	13
	--	6	5	11
Blocks 1,2,3,8 of Story House Lane, Story House Village, Baldwin Lane	5	-	12	17
	-	6.5	5	11.5

Aggregate base course used in the pavement section can typically be reduced by about 25% when utilizing a geotextile separation/stabilization fabric or a geogrid. We recommend the geotextile manufacturer, such as Tensar or Mirafi, be contacted for design parameters and additional considerations for the pavement sections.

The asphalt should be obtained from an approved mix design within the City of Sheridan Standard Specifications. Mix designs should be submitted prior to construction to verify their adequacy. Asphalt material should be placed in maximum 3-inch lifts and compacted to the minimum standards outlined in the City of Sheridan Standard Specifications.

If Portland Cement Concrete (PCC) pavement is selected for use at this site, the concrete pavement should conform to City of Sheridan Standard Specifications. Longitudinal and transverse joints should be provided as needed in concrete pavements for expansion/contraction and isolation. The location and extent of joints should be based

upon the final pavement geometry. Sawed joints should be cut within 24-hours of concrete placement. All joints should be sealed to prevent entry of foreign material and dowelled where necessary for load transfer.

6.10 General Site Recommendations

6.10.1 Surface Water Management

Surface water runoff is important to the long-term performance of the foundation systems and paved surfaces. The site should slope away from all structures constructed on site, directing water away from all foundation elements. All hard surfacing should have a minimum slope of 1% to facilitate the rapid removal of water from these surfaces.
In landscaped areas, a minimum slope of 2% should be maintained, directing water away from any structures on site. Additionally, in landscaped areas, water should not be allowed to pond behind any curb and gutter systems on site. We recommend that a French drain be installed in areas where water would be likely to pond on landscaped areas.

6.10.2 Site Excavations and Deleterious Soils

We anticipate that the soils encountered on site, within the depths explored during our field services, will be able to be excavated using conventional earth moving equipment. If deleterious soils/material is encountered it should be removed from the construction limits, site soils cleaned of all deleterious substances may be used for backfilling, in areas where deleterious substances are encountered. The following are considered deleterious substances/soils; coal, lignite, organic material, construction debris, mud, site soils significantly disturbed by construction traffic, any material greater than 6 inches in diameter, and any site soils with moisture content greater than 6% above the optimum moisture as determined by ASTM D698. If coal or lignite is encountered during site excavations and grading the geotechnical engineer should be contacted to observe and assist in developing a plan for removal and replacement with suitable material.

During construction, operations care should be taken to avoid unnecessary disturbance of the site soils. Disturbance of the site soils may result in additional over excavation and replacement of the disturbed soils. Excessively disturbed soils may occur from construction traffic over unprotected soft or wet subgrades, excessive erosion, deposition and scouring from surface water runoff during construction. To mitigate potential disturbed soils during construction operations, we recommend that construction traffic be limited to the minimum necessary for construction of the project, and in areas where high construction traffic is anticipated we recommend that a temporary gravel/rock surfacing

be used to minimize potential damage to subgrade soils.

6.10.3 Site Landscaping Recommendations

We suggest avoiding the planting of deep rooted trees within 10 feet of the structure to minimize changes in the moisture content of the subsurface soils. We recommend that hard surfacing be placed directly against the structure extending a minimum of 5 feet away from foundation walls, and sloping away from the structure. Additionally, we recommend that any landscape sprinkler systems be designed so that no water from the sprinklers is spread within 5 feet of any structures on site.

7.0 CONSTRUCTION CONSIDERATIONS

7.1 Potential Difficulties

7.1.1 Soft Subgrade Soils

Depending on the time of year in which construction takes place, unstable subgrade soils could be encountered during the site and building grading operations. If encountered, additional conditioning of the soils may be required to obtain moisture contents which allow for firm and unyielding subgrade and/or compaction.

Localized areas of soft wet subgrades can be remedied with additional excavation to expose firmer soils, placement of coarse rock to provide a solid base on which to place additional fill and/or the use of geotextiles between the soft soils and the overlying fill and/or pavement sections. The appropriate means of subgrade stabilization should be evaluated by the geotechnical engineer at the time of construction.

7.1.2 Runoff Water in Excavation

Water can be expected to collect in the excavation bottom during times of inclement weather or snow melt. To allow observation of the excavation bottom, to reduce the potential for soil disturbance, and to facilitate filling operations, we recommend water be removed from within the excavation during construction. Based on the soils encountered, we anticipate the groundwater can be handled with conventional sump pumping.

7.1.3 Disturbance of Soils

The on-site soils can be disturbed under construction traffic, especially if the soils are wet. If soils become disturbed, they should be subcut to the underlying undisturbed soils. The subcut soils can then be dried and recompacted back into place, or they should be removed and replaced with drier imported fill.

7.2 Excavation Backsloping

If excavation faces are not retained, the excavations should maintain maximum allowable slopes in accordance with *OSHA Regulations (Standards 29 CFR), Part 1926, Subpart P, "Excavations"* (can be found on www.osha.gov). Even with the required OSHA sloping, water seepage or surface runoff can potentially induce sideslope erosion or sloughing which could require slope maintenance.

7.3 Observation and Testing

The recommendations in this report are based on the subsurface conditions found at our test boring locations. Since the soil conditions can be expected to vary away from the soil boring locations, we recommend on-site observation by a geotechnical engineer/technician during construction to evaluate these potential changes. Soil density testing should also be performed on new fill placed in order to document that project specifications for compaction have been satisfied.

8.0 LIMITATIONS

Within the limitations of scope, budget, and schedule, we have endeavored to provide our services according to generally accepted geotechnical engineering practices at this time and location. Other than this, no warranty, expressed or implied, is intended. Important information regarding risk management and proper use of this report is given in Appendix B entitled "Geotechnical Report Limitations and Guidelines for Use."

Standard Sheets

EXCAVATION AND REFILLING FOR STRUCTURAL SUPPORT

EXCAVATION

Excavations for structural support at soil boring locations should be taken to depths recommended in the geotechnical report. Since conditions can vary, recommended excavation depths between and beyond the boring location should be evaluated by geotechnical field personnel. If groundwater is present, the excavation should be dewatered to avoid the risk of unobservable poor soils being left in-place. Excavation base soils may become disturbed due to construction traffic, groundwater or other reasons. Such soils should be subcut to underlying undisturbed soils.

Soil stresses under footings spread out with depth. Therefore, the excavation bottom and subsequent fill system should be laterally oversized beyond footing edges to support the footing stresses. A lateral oversize equal to the depth of fill below the footing (i.e., 1:1 oversize) is usually recommended. The lateral oversize is usually increased to 1.5:1 where compressible organic soils are exposed on the excavation sides. Variations in oversize requirements may be recommended in the geotechnical report or can be evaluated by the geotechnical field personnel.

Unless the excavation is retained, the backslopes should be maintained in accordance with OSHA Regulations (Standards-29 CFR), Part 1926, Subpart P, "Excavations" (found on www.osha.gov). Even with the required OSHA sloping, groundwater can induce sideslope raveling or running which could require that flatter slopes or other approaches be used.

FILLING

Filling should proceed only after the excavation bottom has been approved by the geotechnical engineer/technician. Approved fill material should be uniformly compacted in thin lifts to the compaction levels specified in the geotechnical report. The lift thickness should be thin enough to achieve specified compaction through the full lift thickness with the compaction equipment utilized. Fine grained soils are moisture sensitive and are often wet (water content exceeds the "optimum moisture content" defined by a Proctor test). In this case, the soils should be scarified and dried to achieve a water content suitable for compaction. This drying process can be time consuming, labor intensive, and requires favorable weather.

Filling operations for structural support should be closely monitored for fill type and compaction by a geotechnical technician. Monitoring should be on a full-time basis in cases where vertical fill placement is rapid; during freezing weather conditions; where groundwater is present; or where sensitive bottom conditions are present.

EXCAVATION/REFILLING DURING FREEZING TEMPERATURES

Soils that freeze will heave and lose density. Upon thawing, these soils will not regain their original strength and density. The extent of heave and density loss depends on the soil type and moisture condition; and is most pronounced in clays and silts. Foundations, slabs, and other improvements should be protected from frost intrusion during freezing weather. For earthwork during freezing weather, the areas to be filled should be stripped of frozen soil, snow and ice prior to new fill placement. In addition, new fill should not be allowed to freeze during or after placement. For this reason, it may be preferable to do earthwork operations in small plan areas so grade can be quickly attained instead of large areas where much frost stripping may be needed.

FREEZING WEATHER EFFECTS ON BUILDING CONSTRUCTION

GENERAL

Because water expands upon freezing and soils contain water, soils which are allowed to freeze will heave and loose density. Upon thawing, these soils will not regain their original strength and density. The extent of heave and density/strength loss depends on the soil type and moisture condition. Heave is greater in soils with higher percentages of fines (silts/clays). High silt content soils are most susceptible, due to their high capillary rise potential which can create ice lenses. Fine grained soils generally heave about 1/4" to 3/8" for each foot of frost penetration. This can translate to 1" to 2" of total frost heave. This total amount can be significantly greater if ice lensing occurs.

DESIGN CONSIDERATIONS

Clayey and silty soils can be used as perimeter backfill, although the effect of their poor drainage and frost properties should be considered. Basement areas will have special drainage and lateral load requirements which are not discussed here. Frost heave may be critical in doorway areas. Stoops or sidewalks adjacent to doorways could be designed as structural slabs supported on frost footings with void spaces below. With this design, movements may then occur between the structural slab and the adjacent on-grade slabs. Non-frost susceptible granular soils (with less than 12% passing a #200 sieve) can be used below such areas. Depending on the function of surrounding areas, the granular soil layer may need a thickness transition away from the area where movement is critical. With granular soil placement over slower draining soils, subsurface drainage would be needed for the granular layer. High density extruded insulation could be used within the granular soils to reduce frost penetration, thereby reducing the granular soil thickness needed. We caution that insulation placed near the surface can increase the potential for ice glazing of the surface.

The possible effects of adfreezing should be considered if clayey or silty soils are used as backfill. Adfreezing occurs when backfill adheres to rough surfaced foundation walls and lifts the wall as it freezes and heaves. This occurrence is most common with masonry block walls, unheated or poorly heated building situations and clay backfill. The potential is also increased where backfill soils are poorly compacted and become saturated. The risk of adfreezing can be decreased by placing a low friction separating layer between the wall and backfill.

Adfreezing can occur on exterior piers (such as deck, fence or other similar pier footings), even if a smooth surface is provided. This is more likely in poor drainage situations where soils become saturated. Additional footing embedment and/or widened footings below the frost zones (which include tensile reinforcement) can be used to resist uplift forces. Specific designs would require individual analysis.

CONSTRUCTION CONSIDERATIONS

Foundations, slabs, and other improvements which may be affected by frost movements should be insulated from frost penetration during freezing weather. If filling takes place during freezing weather, all frozen soils, snow, and ice should be stripped from areas to be filled prior to new fill placement. The new fill should not be allowed to freeze during transit, placement, or compaction. This should be considered in the project scheduling, budgeting, and quantity estimating. It is usually beneficial to perform cold weather earthwork operations in small areas where grade can be attained quickly rather than working large areas where a greater amount of frost stripping may be needed. If slab subgrade areas freeze, we recommend the subgrade be thawed prior to floor slab placement. The frost action may also require reworking and recompaction of the thawed subgrade.

FLOOR SLAB MOISTURE/VAPOR PROTECTION

Floor slab design relative to moisture/vapor protection should consider the type and location of two elements, a granular layer and a vapor membrane (vapor retarder, water resistant barrier or vapor barrier). In the following sections, the pros and cons of the possible options regarding these elements will be presented, such that you and your specifier can make an engineering decision based on the benefits and costs of the choices.

GRANULAR LAYER

In American Concrete Institute (ACI) 302.1-96, a "base material" is recommended, rather than the conventional cleaner "sand cushion" material. The manual maintains that clean sand (common "cushion" sand) is difficult to compact and maintain until concrete placement is complete. ACI recommends a clean, fine graded material (with at least 10% to 30% of particles passing a #100 sieve) which is not contaminated with clay, silt or organic material. We refer you to ACI 302.1-96 for additional details regarding the requirements for the base material.

In cases where potential static water levels or significant perched water sources appear near or above the floor slab, an underfloor drainage system may be needed wherein a drain tile system is placed within a thicker clean sand or gravel layer. Such a system should be properly engineered depending on subgrade soil types and rate/head of water inflow.

VAPOR MEMBRANE

The need for a vapor membrane depends on whether the floor slab will have a vapor sensitive covering, will have vapor sensitive items stored on the slab, or if the space above the slab will be a humidity controlled area. If the project does not have this vapor sensitivity or moisture control need, placement of a vapor membrane may not be necessary. Your decision will then relate to whether to use the ACI base material or a conventional sand cushion layer. However, if any of the above sensitivity issues apply, placement of a vapor membrane is recommended. Some floor covering systems (adhesives and flooring materials) require a vapor membrane to maintain a specified maximum slab moisture content as a condition of their warranty.

VAPOR MEMBRANE/GRANULAR LAYER PLACEMENT

A number of issues should be considered when deciding whether to place the vapor membrane above or below the granular layer. The benefits of placing the slab on a granular layer, with the vapor membrane placed below the granular layer, include reduction of the following:

- Slab curling during the curing and drying process.
- Time of bleeding, which allows for quicker finishing.
- Vapor membrane puncturing.
- Surface blistering or delamination caused by an extended bleeding period.
- Cracking caused by plastic or drying shrinkage.

The benefits of placing the vapor membrane over the granular layer include the following:

- The moisture emission rate is achieved faster.
- Eliminates a potential water reservoir within the granular layer above the membrane.
- Provides a "slip surface", thereby reducing slab restraint and the associated random cracking.

If a membrane is to be used in conjunction with a granular layer, the approach recommended depends on slab usage and the construction schedule. The vapor membrane should be placed above the granular layer when:

- Vapor sensitive floor covering systems are used or vapor sensitive items will be directly placed on the slab.
- The area will be humidity controlled, but the slab will be placed before the building is enclosed and sealed from rain.
- Required by a floor covering manufacturer's system warranty.

The vapor membrane should be placed below the granular layer when:

- Used in humidity controlled areas (without vapor sensitive coverings/stored items), with the roof membrane in place, and the building enclosed to the point where precipitation will not intrude into the slab area. Consideration should be given to slight sloping of the membrane to edges where draintile or other disposal methods can alleviate potential water sources, such as pipe or roof leaks, foundation wall damp proofing failure, fire sprinkler system activation, etc.

Appendix A

Geotechnical Field Exploration and Testing
Boring Log Notes
Unified Soil Classification System
Figure 1: Site Location Map
Figure 2: Boring Location Map
Subsurface Boring Logs
Sieve Analysis Test Results
Swell-Consolidation Results

A.1 FIELD EXPLORATION

The subsurface conditions at the site were explored by drilling and sampling standard penetration test borings. The locations of the borings appear on Figure 2, preceding the Subsurface Boring Logs in this appendix.

A.2 SAMPLING METHODS

A.2.1 Split-Spoon Samples (SS) - Calibrated to N_{60} Values

Standard penetration (split-spoon) samples were collected in general accordance with ASTM: D1586 with one primary modification. The ASTM test method consists of driving a 2-inch O.D. split-barrel sampler into the in-situ soil with a 140-pound hammer dropped from a height of 30 inches. The sampler is driven a total of 18 inches into the soil. After an initial set of 6 inches, the number of hammer blows to drive the sampler the final 12 inches is known as the standard penetration resistance or N-value. Our method uses a modified hammer weight, which is determined by measuring the system energy using a Pile Driving Analyzer (PDA) and an instrumented rod.

In the past, standard penetration N-value tests were performed using a rope and cathead for the lift and drop system. The energy transferred to the split-spoon sampler was typically limited to about 60% of its potential energy due to the friction inherent in this system. This converted energy then provides what is known as an N_{60} blow count.

The most recent drill rigs incorporate an automatic hammer lift and drop system, which has higher energy efficiency and subsequently results in lower N-values than the traditional N_{60} values. By using the PDA energy measurement equipment, we are able to determine actual energy generated by the drop hammer. With the various hammer systems available, we have found highly variable energies ranging from 55% to over 100%. Therefore, the intent of AET's hammer calibrations is to vary the hammer weight such that hammer energies lie within about 60% to 65% of the theoretical energy of a 140-pound weight falling 30 inches. The current ASTM procedure acknowledges the wide variation in N-values, stating that N-values of 100% or more have been observed. Although we have not yet determined the statistical measurement uncertainty of our calibrated method to date, we can state that the accuracy deviation of the N-values using this method is significantly better than the standard ASTM Method.

A.2.2 Disturbed Samples (DS)/Spin-up Samples (SU)

Sample types described as "DS" or "SU" on the boring logs are disturbed samples, which are taken from the flights of the auger. Because the auger disturbs the samples, possible soil layering and contact depths should be considered approximate.

A.2.3 Sampling Limitations

Unless actually observed in a sample, contacts between soil layers are estimated based on the spacing of samples and the action of drilling tools. Cobbles, boulders, and other large objects generally cannot be recovered from test borings, and they may be present in the ground even if they are not noted on the boring logs.

Determining the thickness of "topsoil" layers is usually limited, due to variations in topsoil definition, sample recovery, and other factors. Visual-manual description often relies on color for determination, and transitioning changes can account for significant variation in thickness judgment. Accordingly, the topsoil thickness presented on the logs should not be the sole basis for calculating topsoil stripping depths and volumes. If more accurate information is needed relating to thickness and topsoil quality definition, alternate methods of sample retrieval and testing should be employed.

A.3 CLASSIFICATION METHODS

Soil descriptions shown on the boring logs are based on the Unified Soil Classification (USC) system. The USC system is described in ASTM: D2487 and D2488. Where laboratory classification tests (sieve analysis or Atterberg Limits) have been performed, accurate classifications per ASTM: D2487 are possible. Otherwise, soil descriptions shown on the boring logs are visual-manual judgments. Charts are attached which provide information on the USC system, the descriptive terminology, and the symbols used on the boring logs.

The boring logs include descriptions of apparent geology. The geologic depositional origin of each soil layer is interpreted primarily by observation of the soil samples, which can be limited. Observations of the surrounding topography, vegetation, and development can sometimes aid this judgment.

A.4 WATER LEVEL MEASUREMENTS

The ground water level measurements are shown at the bottom of the boring logs. The following information appears under "Water Level Measurements" on the logs:

- Date and Time of measurement
- Sampled Depth: lowest depth of soil sampling at the time of measurement
- Casing Depth: depth to bottom of casing or hollow-stem auger at time of measurement
- Cave-in Depth: depth at which measuring tape stops in the borehole
- Water Level: depth in the borehole where free water is encountered
- Drilling Fluid Level: same as Water Level, except that the liquid in the borehole is drilling fluid

The true location of the water table at the boring locations may be different than the water levels measured in the boreholes. This is possible because there are several factors that can affect the water level measurements in the borehole. Some of these factors include: permeability of each soil layer in profile, presence of perched water, amount of time between water level readings, presence of drilling fluid, weather conditions, and use of borehole casing.

A.5 LABORATORY TEST METHODS

A.5.1 Water Content Tests
Conducted per AET Procedure 01-LAB-010, which is performed in general accordance with ASTM: D2216 and AASHTO: T265.

A.5.2 Atterberg Limits Tests
Conducted per AET Procedure 01-LAB-030, which is performed in general accordance with ASTM: D4318 and AASHTO: T89, T90.

A.5.3 Sieve Analysis of Soils (thru #200 Sieve)
Conducted per AET Procedure 01-LAB-040, which is performed in general conformance with ASTM: D6913, Method A.

A.5.4 Particle Size Analysis of Soils (with hydrometer)
Conducted per AET Procedure 01-LAB-050, which is performed in general accordance with ASTM: D422 and AASHTO: T88.

A.5.5 Unconfined Compressive Strength of Cohesive Soil
Conducted per AET Procedure 01-LAB-080, which is performed in general accordance with ASTM: D2166 and AASHTO: T208.

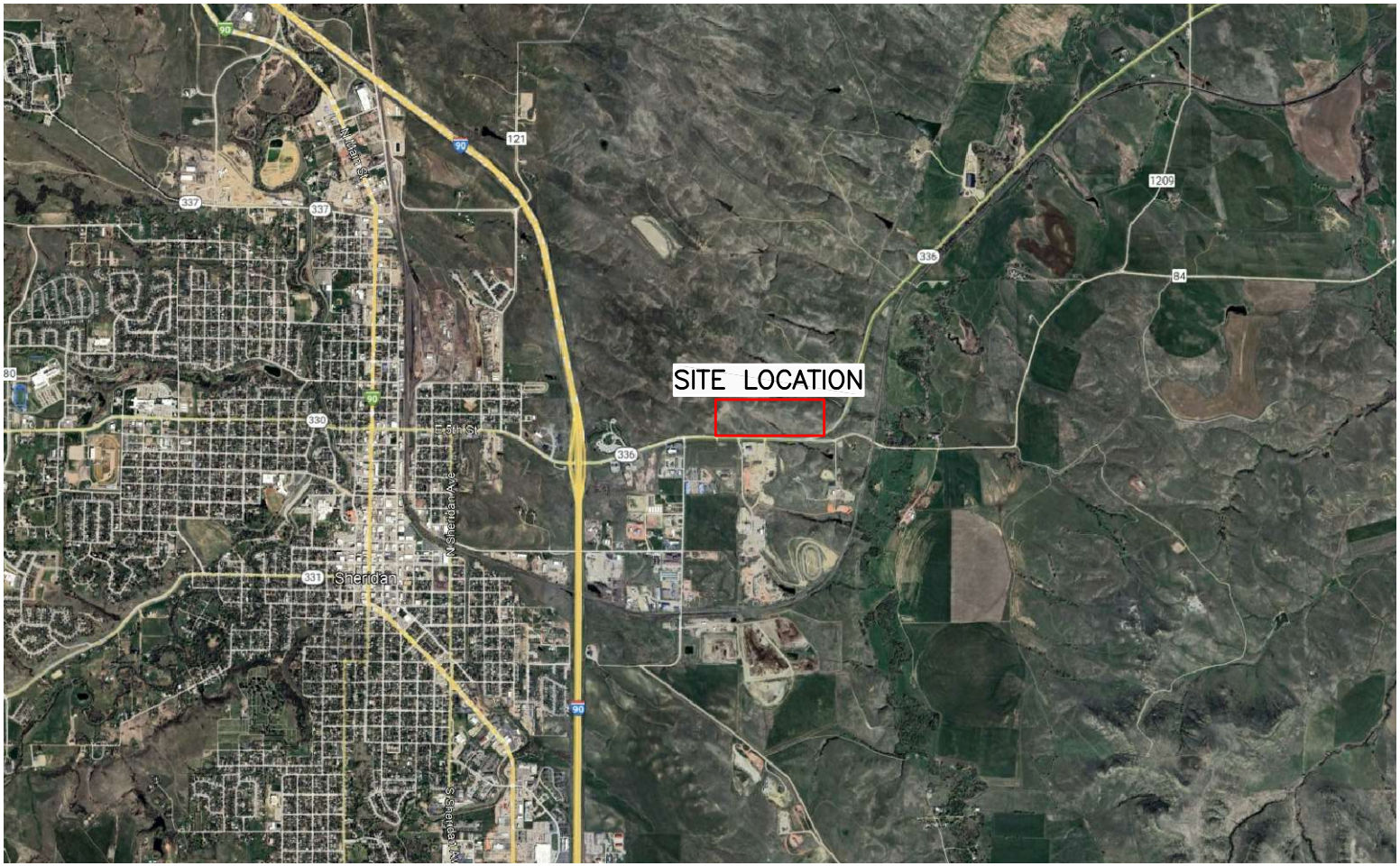
A.5.6 Laboratory Soil Resistivity using the Wenner Four-Electrode Method
Conducted per AET Procedure 01-LAB-090, which is performed using Soil Box apparatus in the laboratory in general accordance with ASTM: G57

A.6 TEST STANDARD LIMITATIONS

Field and laboratory testing is done in general conformance with the described procedures. Compliance with any other standards referenced within the specified standard is neither inferred nor implied.

A.7 SAMPLE STORAGE

Unless notified to do otherwise, we routinely retain representative samples of the soils recovered from the borings for a period of 30 days.

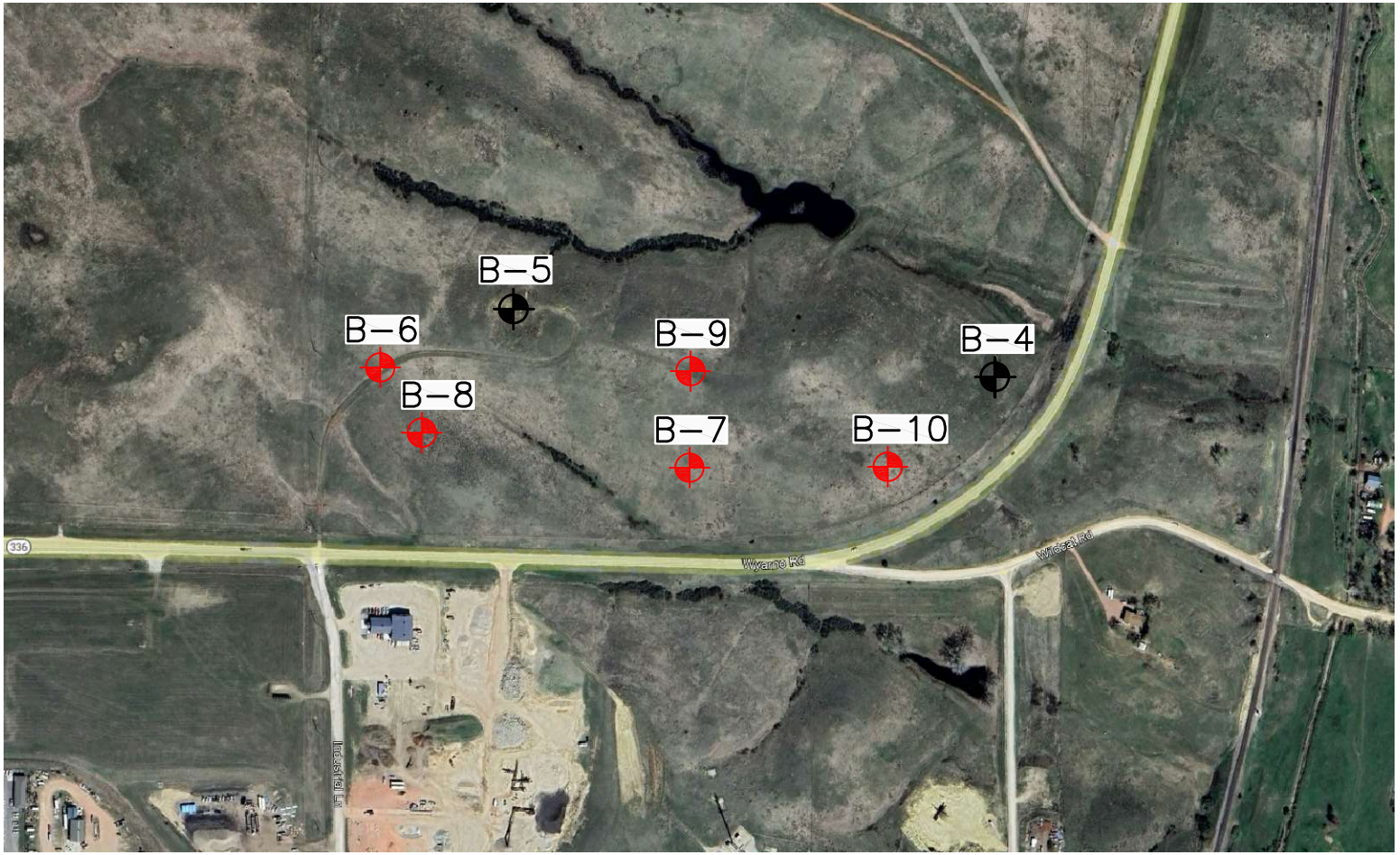


SCALE
(FEET)

0 4000

AMERICAN
ENGINEERING TESTING

PROJECT: STORY HOUSE VILLAGE PHASE I DEVELOPMENT– WYARNO ROAD SHERIDAN, WYOMING		PROJECT NO. P–0022564
SUBJECT: FIGURE 1: SITE LOCATION MAP		DATE: AUGUST 21, 2023
SCALE: 1 INCH = 4000 FEET	DRAWN BY: KK	REVIEWED BY: RT



SCALE (FEET)
0 600

BORINGS DRILLED 8/16/2023

BORINGS DRILLED 3/31/2022

AMERICAN ENGINEERING TESTING

PROJECT: STORY HOUSE VILLAGE PHASE I DEVELOPMENT, WYARNO ROAD SHERIDAN, WYOMING		PROJECT NO. P–0022564
SUBJECT: FIGURE 2: BORING LOCATION MAP		DATE: AUGUST 21, 2023
SCALE: 1 INCH = 600 FEET	DRAWN BY: KK	REVIEWED BY: RT

SUBSURFACE BORING LOG

AET No: **P-0010998** Log of Boring No. **B-4 (p. 1 of 1)**

Project: **Prairie Hills LLC; Wyarno Road - Sheridan, Wyoming**

DEPTH IN FEET	MATERIAL DESCRIPTION (Surface Elevation 3842.0)	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS WC	DEN	LL	PL	%-#200
0	TOPSOIL, cobbles & boulders present										
1	CLAYEY SAND, brown, loose (SC)		10	M	SS						
3	CLAYEY SAND, tan/gray, medium dense, blocky, trace gypsum (SC) (Weathered bedrock)		25	D/M	CAL		9		40	22	44.6
6			37	D/M	SS						
8	CLAYEY SAND, tan, very dense (SC)		50/0.3	M	CAL		6				
10	SILTY SAND, tan, very dense (SM)		54	M	SS		12		29	24	46.3
13			59	M	CAL						
15			82/0.9	M	SS						
20	POORLY-GRADED SAND with clay, brown, very dense (SP)		53	M	CAL		11				
	Bottom of Boring										

DEPTH:	DRILLING METHOD
21.5	**3.25" HSA**

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	WATER LEVEL
3/31/22	**9:00**	**21.5**	**20.0**	**NA**	**NA**	**None**
4/8/22	**8:00**	**21.5**	**20.0**	**NA**	**NA**	**None**

BORING COMPLETED: **3/31/22**

DR: **JS** LG: **CC** Rig: **D-50**

NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG

AET_CORP P-0010998 LOGS.GPJ AET+CPT+WELL.GDT 9/11/23

SUBSURFACE BORING LOG

AET No: **P-0010998** Log of Boring No. **B-5 (p. 1 of 1)**

Project: **Prairie Hills LLC; Wyarno Road - Sheridan, Wyoming**

DEPTH IN FEET	Surface Elevation **3907.0** MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS WC	DEN	LL	PL	%-#200
0	TOPSOIL										
1	CLAYEY SAND, brown, loose (SC)		5	M	SS						
3			9	M	CAL		8				
6			7	M	SS						
8			6	M	CAL						
10	Very dense at 10 feet		3	M	SS		15				16.8
13	CLAYEY SAND, brown, very dense (SC) (Weathered Bedrock)		86	M	CAL						
16			58	M	SS						
21			73	M	CAL		10				
	Bottom of Boring										

DEPTH:	DRILLING METHOD
21.5	**3.25" HSA**

BORING COMPLETED: **3/31/22**

DR: **JS** LG: **CC** Rig: **D-50**

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	WATER LEVEL
3/31/22	**10:45**	**21.5**	**20.0**	**NA**	**NA**	**None**
4/8/22	**8:00**	**21.5**	**20.0**	**NA**	**NA**	**None**

NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG

AET_CORP P-0010998 LOGS.GPJ AET+CPT+WELL.GDT 9/11/23

SUBSURFACE BORING LOG

AET No: **P-0022564** Log of Boring No. **B-6 (p. 1 of 1)**

Project: **Story House Village Phase I Development; Wyarno Road, Sheridan, Wyoming**

Surface Elevation **3922.0**

DEPTH IN FEET	MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS WC	DEN	LL	PL	%-#200
1	**TOPSOIL** with cobblestones	TOPSOIL	7	M	SS	100					
2	**LEAN CLAY** with fine sand, trace organics, brown, firm (CL)	ALLUVIUM									
3			7	M	MC	100					
4											
5	**CLAYEY SAND**, brown and light grey, loose (SC)										
6			14	M	SS	100	14		44	21	
7	**LEAN CLAY** with gypsum, light grey and brown, stiff (CL)	WASATCH FORMATION									
8			58	M	MC	100					
9	**WEATHERED CLAYSTONE**, silty lean clay,										
10											
11	trace gypsum, greyish brown, hard (CL)		42	M	SS	100	11	109	35	19	
12											
13	with red oxidation, trace fine sand, grey		62	M	MC	100					
14											
15											
16			57	M	SS	100	10	117			
17											
18	**CLAYSTONE**, silty lean clay with red										
19	oxidation, grey, hard (CL)										
20											
21			50/.75	M	MC	75					
22											
23											
24											
25											
26	with gypsum		100	M	SS	100	12	113			
27											
28											
29											
30											
31	lense of coal, black		50/.5	M	MC	50					
32											
33											
34											
35											
36			50/.5	M	SS	75					
37											
38											
39											
40											
41	with fine sand, tan		50/.5	M	MC	50					
42											
43											
44											
45											
46	dark brown		50/.5		SS						
47											
48											
49											
50											
51	lense of coal, dark brown		50/.5	M	MC	25					
	Bottom of Boring										

DEPTH:	DRILLING METHOD
50.0	**3.25" HSA**

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	WATER LEVEL
8/16/23	**10:50**	**51.5**	**50.0**	**NA**	**NA**	**None**
9/1/23		**51.5**	**50.0**	**NA**	**NA**	**None**

BORING COMPLETED: **8/16/23**

DR: **JS** LG: **CB** Rig: **99**

NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG

AET_CORP P-0022564 LOGS.GPJ AET+CPT+WELL.GDT 9/11/23

SUBSURFACE BORING LOG

AET No: **P-0022564** Log of Boring No. **B-7 (p. 1 of 1)**

Project: **Story House Village Phase I Development; Wyarno Road, Sheridan, Wyoming**

Surface Elevation **3890.0**

DEPTH IN FEET	MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS WC	DEN	LL	PL	%-#200
1	**TOPSOIL** with cobblestones	TOPSOIL	7	M	SS	100	15		46	27	
2	**LEAN CLAY** with coarse sand, trace organics, dark brown, very stiff (CL)	ALLUVIUM									
3	with red oxidation, light brown		16	M	MC	100					
5	**SILTY SAND**, light tan, loose (SM)		9	M	SS	100	11	91			
8	**SILT**, light tan, stiff (ML)		11	M	MC	100					
10	**WEATHERED CLAYSTONE**, lean clay with trace fine sand, red oxidation, brown to dark brown, very stiff (CL)	WASATCH FORMATION	22	M	SS	100	17	101			
13			22	M	MC	100					
14	**COAL**, black, soft		6	M	SS	100					
17	**CLAYSTONE**, lean clay, dark grey, hard (CL)		50/.75	M	MC	80	14				
25	with red oxidation, grey		70	M	SS	100					
30			50/.5	M	MC	75					
35	light tan		50/.5	M	SS	30					
36	Bottom of Boring										

DEPTH: **35.0** DRILLING METHOD: **3.25" HSA**

BORING COMPLETED: **8/16/23**

DR: **JS** LG: **CB** Rig: **99**

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	WATER LEVEL
8/16/23	**13:55**	**36.5**	**35.0**	**NA**	**NA**	**None**
9/1/23		**36.5**	**35.0**	**NA**	**NA**	**None**

NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG

AET_CORP P-0022564 LOGS.GPJ AET+CPT+WELL.GDT 9/11/23

SUBSURFACE BORING LOG

AET No: **P-0022564** Log of Boring No. **B-8 (p. 1 of 1)**

Project: **Story House Village Phase I Development; Wyarno Road, Sheridan, Wyoming**

Surface Elevation **3920.0**

DEPTH IN FEET	MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS WC	DEN	LL	PL	%-#200
	TOPSOIL with cobblestones	TOPSOIL									
1	**SILTY LEAN CLAY** with trace gypsum, organics, light brown, stiff (CL)	ALLUVIUM	9	M	SS	100					
2	**SILTY SAND**, light brown, medium dense (SM)	WASATCH FORMATION									
3			25	M	MC	100	10	103			
4											
5	**WEATHERED CLAYSTONE**, silty lean clay with trace gypsum, light brown and reddish to greyish brown, very stiff (CL)										
6			22	M	SS	100					
7											
8	**WEATHERED CLAYSTONE**, lean clay with fine sand, light reddish brown, hard (CL)		63	M	MC	100	11	113	38	21	
9											
10											
11			36	M	SS	100					
	Bottom of Boring										

DEPTH:	DRILLING METHOD
10.0	**3.25" HSA**

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	WATER LEVEL
8/16/23	**15:40**	**11.5**	**10.0**	**NA**	**NA**	**None**

BORING COMPLETED: **8/16/23**

DR: **JS** LG: **CB** Rig: **99**

NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG

AET_CORP P-0022564 LOGS.GPJ AET+CPT+WELL.GDT 9/11/23

SUBSURFACE BORING LOG

AET No: **P-0022564** Log of Boring No. **B-9 (p. 1 of 1)**

Project: **Story House Village Phase I Development; Wyarno Road, Sheridan, Wyoming**

Surface Elevation **3915.0**

DEPTH IN FEET	MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS WC	DEN	LL	PL	%-#200
	TOPSOIL with cobblestones	TOPSOIL									
1	**LEAN CLAY** with fine sand, trace gypsum, light brown, stiff (CL)	ALLUVIUM	12	M	SS	100					
2											
3			12	M	MC	100					
4											
5											
6			9	M	SS	100	12	104	44	23	
7	**WEATHERED CLAYSTONE**, silty lean clay with red oxidation, light greyish brown, very stiff (CL)	WASATCH FORMATION									
8			28	M	MC	100					
9											
10											
11			25	M	SS	100	14	113			41.1
	Bottom of Boring										

DEPTH:	DRILLING METHOD
10.0	**3.25" HSA**

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	WATER LEVEL
8/16/23	**16:25**	**11.5**	**10.0**	**NA**	**NA**	**None**

BORING COMPLETED: **8/16/23**

DR: **JS** LG: **CB** Rig: **99**

NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG

AET_CORP P-0022564 LOGS.GPJ AET+CPT+WELL.GDT 9/11/23

SUBSURFACE BORING LOG

AET No: **P-0022564** Log of Boring No. **B-10 (p. 1 of 1)**

Project: **Story House Village Phase I Development; Wyarno Road, Sheridan, Wyoming**

Surface Elevation **3884.0**

DEPTH IN FEET	MATERIAL DESCRIPTION	GEOLOGY	N	MC	SAMPLE TYPE	REC IN.	FIELD & LABORATORY TESTS WC	DEN	LL	PL	%-#200
	TOPSOIL with cobblestones	TOPSOIL									
1	**LEAN CLAY** with trace fine sand, organics, brown to light brown, stiff to very stiff (CL)	ALLUVIUM	10	M	SS	100					
2											
3	trace gypsum		17	M	MC	100	12	108	34	18	
4											
5	**CLAYEY SAND**, light brown, loose to medium dense (SC)										
6			10	M	SS	100					
7											
8			26	M	MC	100	9		29	16	26.8
9											
10											
11			16	M	SS	100					
	Bottom of Boring										

DEPTH:	DRILLING METHOD
10.0	**3.25" HSA**

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	DRILLING FLUID LEVEL	WATER LEVEL
8/16/23	**17:10**	**11.5**	**10.0**	**NA**	**NA**	**None**

BORING COMPLETED: **8/16/23**

DR: **JS** LG: **CB** Rig: **99**

NOTE: REFER TO THE ATTACHED SHEETS FOR AN EXPLANATION OF TERMINOLOGY ON THIS LOG

AET_CORP P-0022564 LOGS.GPJ AET+CPT+WELL.GDT 9/11/23

American Engineering Testing, Inc.
Sheridan
72 E Ridge Rd Unit D
Sheridan, WY 82801
(607) 675-1862
www.teamAET.com

Material Test Report

Report No: MAT:AET-128494-S4

Client: Story House Management, LLC **CC:**

Project: Story House Village PI, Sheridan, WY
GEO-23

Sheridan WY
Job No: P-0022564

Draft Report - Subject to change pending final review

Date of Issue: 8/28/2023

Sample Details

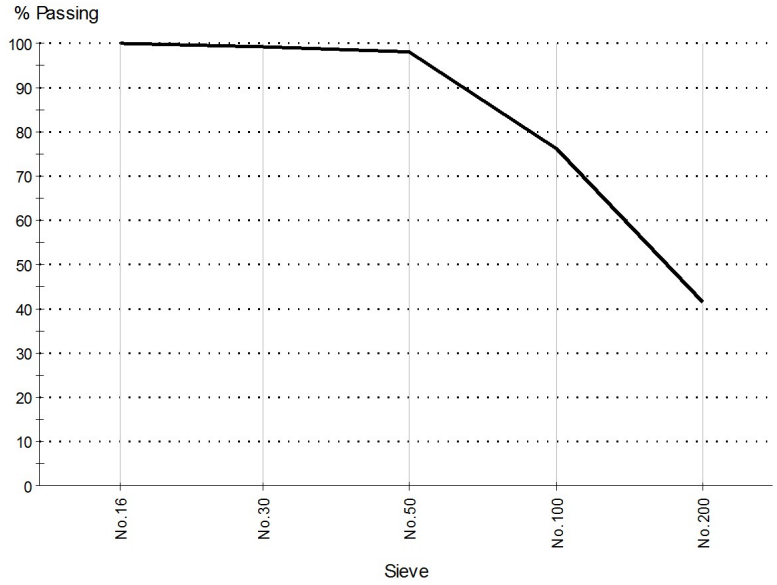
Sample ID	AET-128494-S4
Field Sample ID	
Date Sampled	8/16/2023
Source	
Material	Silty Sand
Specification	Gradation + Hydrometer
Sampling Method	
Location	Boring B-7 5'
Date Submitted	

Other Test Results

Description	Method	Result	Limits
Fineness Modulus	ASTM C 136, ASTM C 117	N/A	
Curvature Coefficient		N/A	
Uniformity Coefficient		N/A	

Particle Size Distribution

ASTM C 136, ASTM C 117



Date Tested:
Tested By:

Sieve Size	% Passing	Limits
No.16	99.9	
No.30	99.1	
No.50	97.9	
No.100	76.0	
No.200	41.6	

Comments

N/A

© 2000-2023 QESTLab by SpectraQEST.com

American Engineering Testing, Inc.
Sheridan
72 E Ridge Rd Unit D
Sheridan, WY 82801
(607) 675-1862
www.teamAET.com

Material Test Report

Report No: MAT:AET-128494-S5

Client: Story House Management, LLC **CC:**

Project: Story House Village PI, Sheridan, WY
GEO-23

Sheridan WY

Job No: P-0022564

Draft Report - Subject to change pending final review

Date of Issue: 8/28/2023

Sample Details

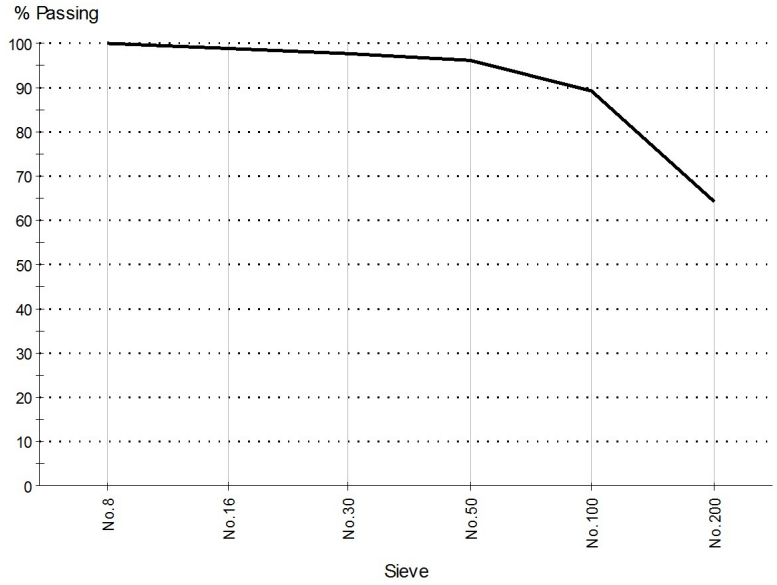
Sample ID	AET-128494-S5
Field Sample ID	B8 2.5'
Date Sampled	8/16/2023
Source	
Material	Sandy Clay
Specification	Gradation + Hydrometer
Sampling Method	
Location	Boring B-8 2.5'
Date Submitted	

Other Test Results

Description	Method	Result	Limits
Fineness Modulus	ASTM C 136, ASTM C 117	N/A	
Curvature Coefficient		N/A	
Uniformity Coefficient		N/A	

Particle Size Distribution

ASTM C 136, ASTM C 117



Date Tested:
Tested By:

Sieve Size	% Passing	Limits
No.8	99.9	
No.16	98.9	
No.30	97.6	
No.50	96.0	
No.100	89.4	
No.200	64.1	

Comments

N/A

© 2000-2023 QESTLab by SpectraQEST.com

American Engineering Testing, Inc.
Sheridan
72 E Ridge Rd Unit D
Sheridan, WY 82801
(607) 675-1862
www.teamAET.com

Material Test Report

Report No: MAT:AET-128494-S6

Client: Story House Management, LLC **CC:**

Project: Story House Village PI, Sheridan, WY
GEO-23

Sheridan WY

Job No: P-0022564

Draft Report - Subject to change pending final review

Date of Issue: 8/28/2023

Sample Details

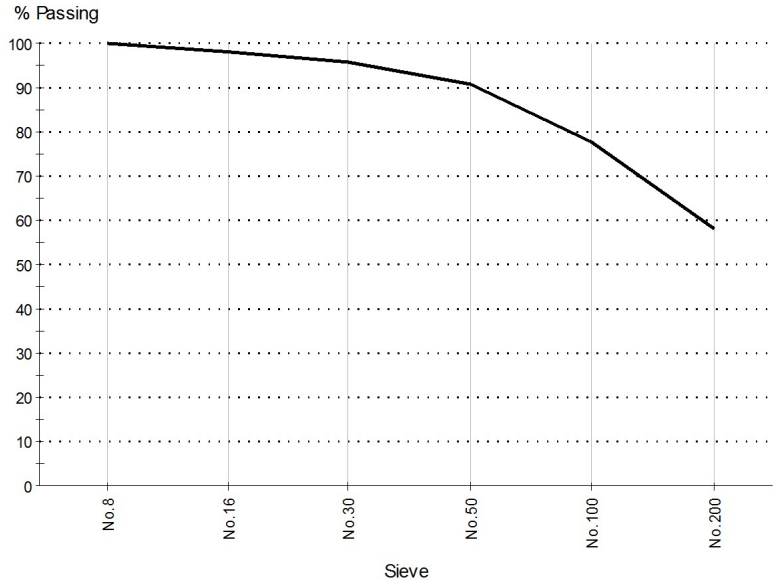
Sample ID	AET-128494-S6
Field Sample ID	
Date Sampled	8/16/2023
Source	
Material	Sandy Clay
Specification	Gradation + Hydrometer
Sampling Method	
Location	Boring B-8 7.5'
Date Submitted	

Other Test Results

Description	Method	Result	Limits
Fineness Modulus	ASTM C 136, ASTM C 117	N/A	
Curvature Coefficient		N/A	
Uniformity Coefficient		N/A	

Particle Size Distribution

ASTM C 136, ASTM C 117



Date Tested:
Tested By:

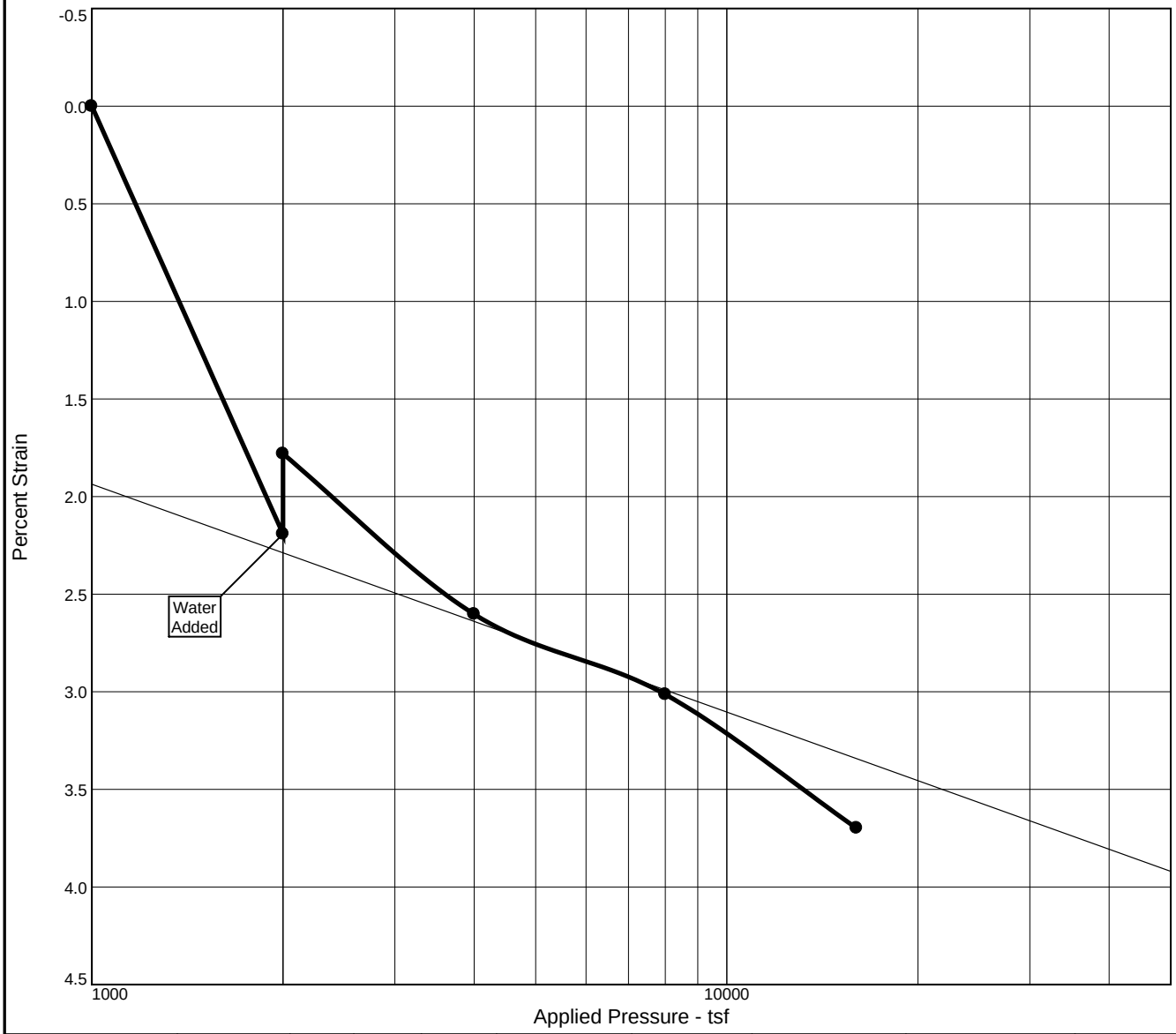
Sieve Size	% Passing	Limits
No.8	99.9	
No.16	98.2	
No.30	95.8	
No.50	90.9	
No.100	77.8	
No.200	58.1	

Comments

N/A

© 2000-2023 QESTLab by SpectraQEST.com

CONSOLIDATION TEST REPORT



Natural Sat.	Natural Moist.	Dry Dens. (pcf)	LL	PI	Sp. Gr.	Overburden (tsf)	e_o	Swell Press. (tsf)	Swell %	C_r
90.9 %	17.0 %	105.6			2.65	1000	0.496	2771.5	0.4	

MATERIAL DESCRIPTION	USCS	AASHTO
LEAN CLAY, TRACE FINE SAND, RED OXIDATION		

Project No. P-0022564 **Client:** WWC ENGINEERING

Project: Story House Village Phase I Development

Location: B7 **Depth:** 10 **Sample Number:** 5

Remarks:
SPLIT SPOON

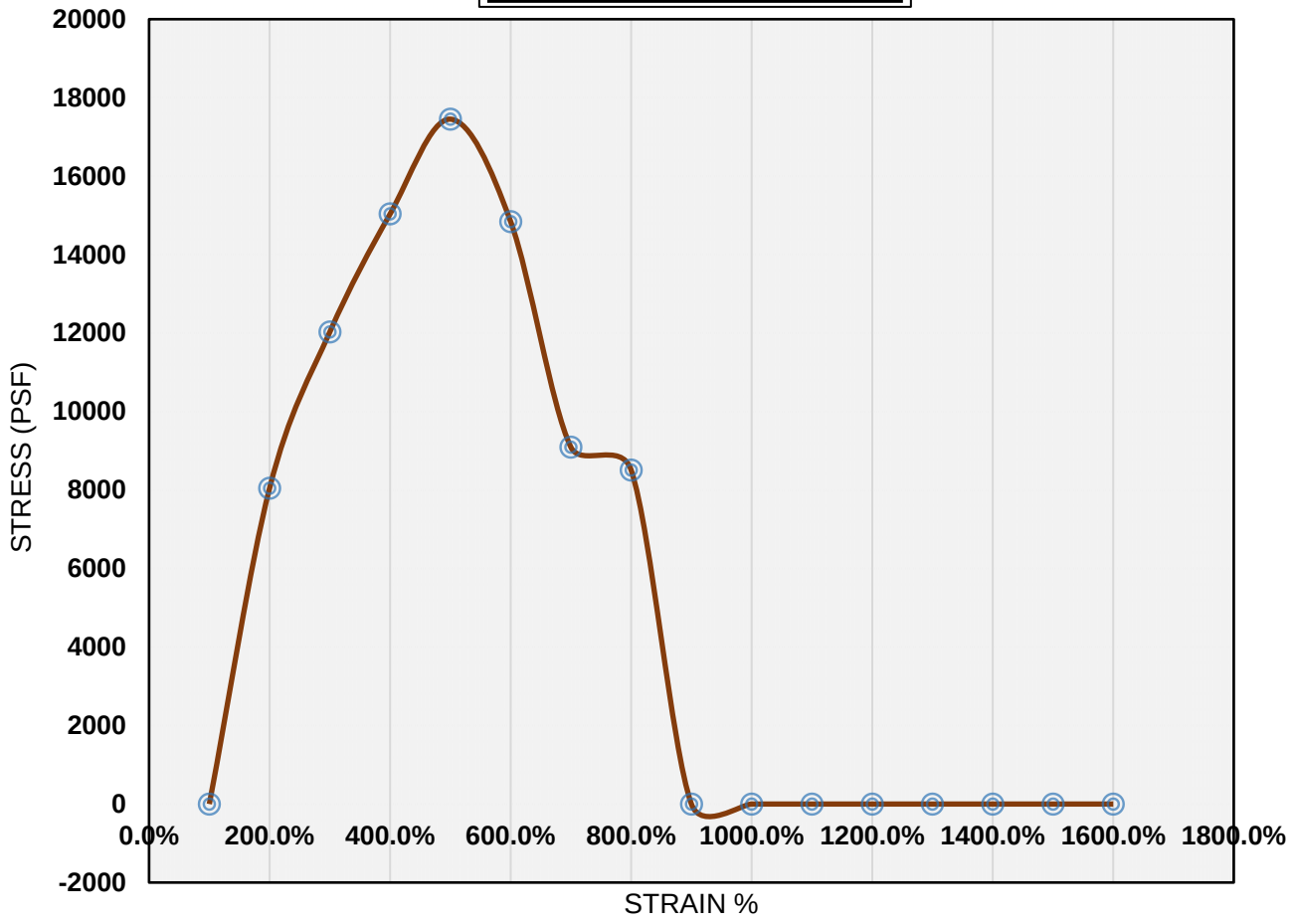
American Engineering Testing, Inc.

Gillette, WY

Figure

Tested By: EC

Stress vs. Strain



Test Results

Boring	Depth	L/D Ratio	Stress At Failure (psf)	Strain At Failure	Strain Rate (in/min)	Strain Rate (%/min)
B6	15'	1.72	17452	8.15%	0.04892	2.04%

Date Sampled	Sample Type	Dry Density (pcf)	Wet Density (pcf)	% Moisture	N Value
8/16/2023	Other	130.1	114.9	13.2%	NA

Sample Description Claystone- Silty Lean Clay (CL)

Notes/Remarks: SPLIT SPOON

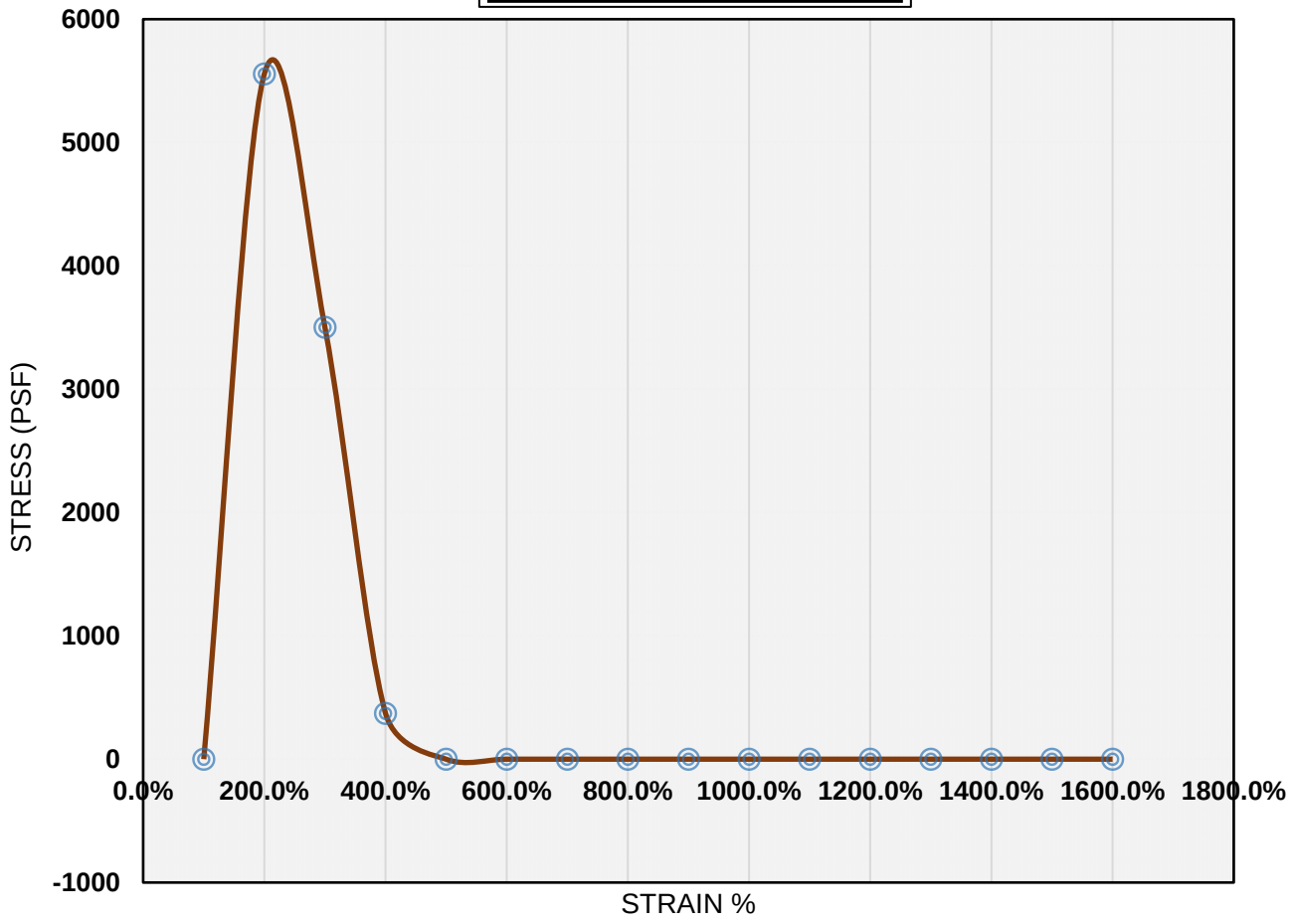
Project Information

Project:	Story House Village Phase I	**Job Number:**	P-0022564
Location:	Wyarno Road, Sheridan, WY	**Date Tested:**	8/22/2023

AMERICAN ENGINEERING TESTING

UNCONFINED COMPRESSION TEST RESULTS
(ASTM D2166)

Stress vs. Strain



Test Results

Boring	Depth	L/D Ratio	Stress At Failure (psf)	Strain At Failure	Strain Rate (in/min)	Strain Rate (%/min)
B7	20'	1.72	5556	1.48%	0.04892	1.48%

Date Sampled	Sample Type	Dry Density (pcf)	Wet Density (pcf)	% Moisture	N Value
8/16/2023	California Tube	128.8	110.2	16.8%	NA

Sample Description Claystone- Lean Clay (CL)

Notes/Remarks: SAMPLE HAD CRACKS PRESENT WHEN EXTRACTED FROM TUBE AND PRIOR TO TESTING

Project Information

Project:	Story House Village Phase I	**Job Number:**	P-0022564
Location:	Wyarno Road, Sheridan, WY	**Date Tested:**	8/22/2023

AMERICAN ENGINEERING TESTING

UNCONFINED COMPRESSION TEST RESULTS

(ASTM D2166)

American Engineering Testing, Inc.
Sheridan
72 E Ridge Rd Unit D
Sheridan, WY 82801
(607) 675-1862
www.teamAET.com

Proctor Report

Report No: PTR:AET-128494-S1

Client: Story House Management, LLC **CC:**

Project: Story House Village PI, Sheridan, WY
GEO-23

Sheridan WY

Job No: P-0022564

Draft Report - Subject to change pending final review

Date of Issue: 8/28/2023

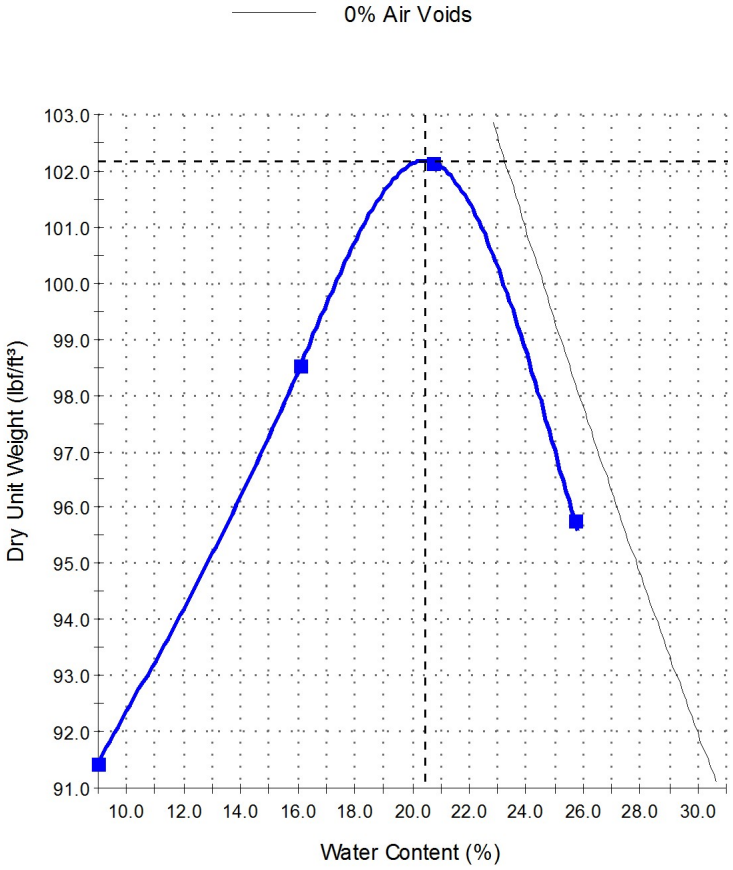
Sample Details

Sample ID: AET-128494-S1 **Field ID:** B6 BULK

Date Sampled: 8/16/2023

Location:

Dry Unit Weight - Water Content Relationship



Test Results

ASTM D 698

Maximum Dry Unit Weight (lbf/ft³):	**102.2**
Optimum Water Content (%):	**20.4**
Method:	A
Preparation Method:	Moist
Specific Gravity (Fines):	2.65
Specific Gravity Method:	ASSUMED
Retained Sieve No 4 (4.75mm) (%):	0
Passing Sieve No 4 (4.75mm) (%):	100
Tested By:	
Date Tested:	

Comments

© 2000-2023 QESTLab by SpectraQEST.com

American Engineering Testing, Inc.
Sheridan
72 E Ridge Rd Unit D
Sheridan, WY 82801
(607) 675-1862
www.teamAET.com

Proctor Report

Report No: PTR:AET-128494-S2

Client: Story House Management, LLC **CC:**

Project: Story House Village PI, Sheridan,WY
GEO-23

Sheridan WY

Job No: P-0022564

Draft Report - Subject to change pending final review

Date of Issue: 8/28/2023

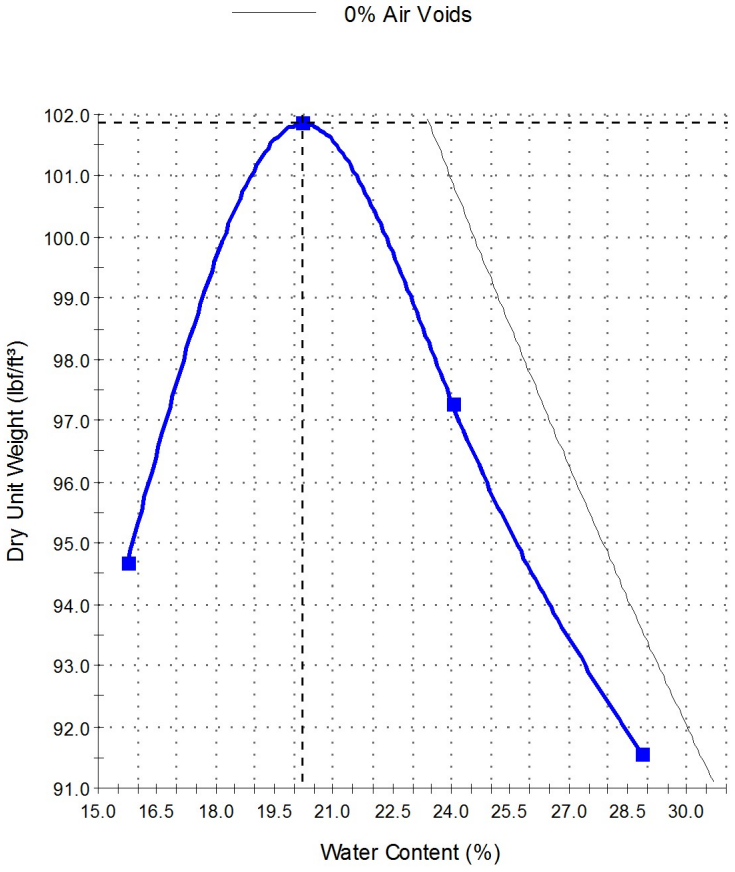
Sample Details

Sample ID: AET-128494-S2 **Field ID:** B9 BULK

Date Sampled: 8/16/2023

Location:

Dry Unit Weight - Water Content Relationship



Test Results

ASTM D 698

Maximum Dry Unit Weight (lbf/ft³):	**101.9**
Optimum Water Content (%):	**20.2**
Method:	A
Preparation Method:	Moist
Specific Gravity (Fines):	2.65
Specific Gravity Method:	ASSUMED
Retained Sieve No 4 (4.75mm) (%):	1
Passing Sieve No 4 (4.75mm) (%):	99
Tested By:	
Date Tested:	

Comments

© 2000-2023 QESTLab by SpectraQEST.com

American Engineering Testing, Inc.
Sheridan
72 E Ridge Rd Unit D
Sheridan, WY 82801
(607) 675-1862
www.teamAET.com

Proctor Report

Report No: PTR:AET-128494-S3

Client: Story House Management, LLC **CC:**

Project: Story House Village PI, Sheridan, WY
GEO-23

Sheridan WY

Job No: P-0022564

Draft Report - Subject to change pending final review

Date of Issue: 8/28/2023

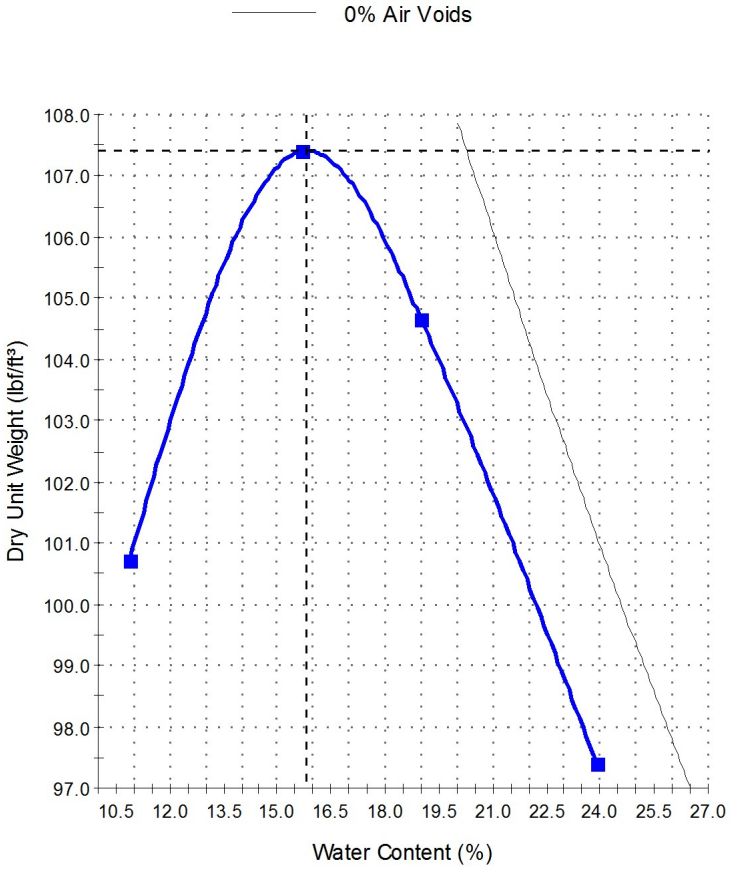
Sample Details

Sample ID: AET-128494-S3 **Field ID:** B10 BULK

Date Sampled: 8/16/2023

Location:

Dry Unit Weight - Water Content Relationship



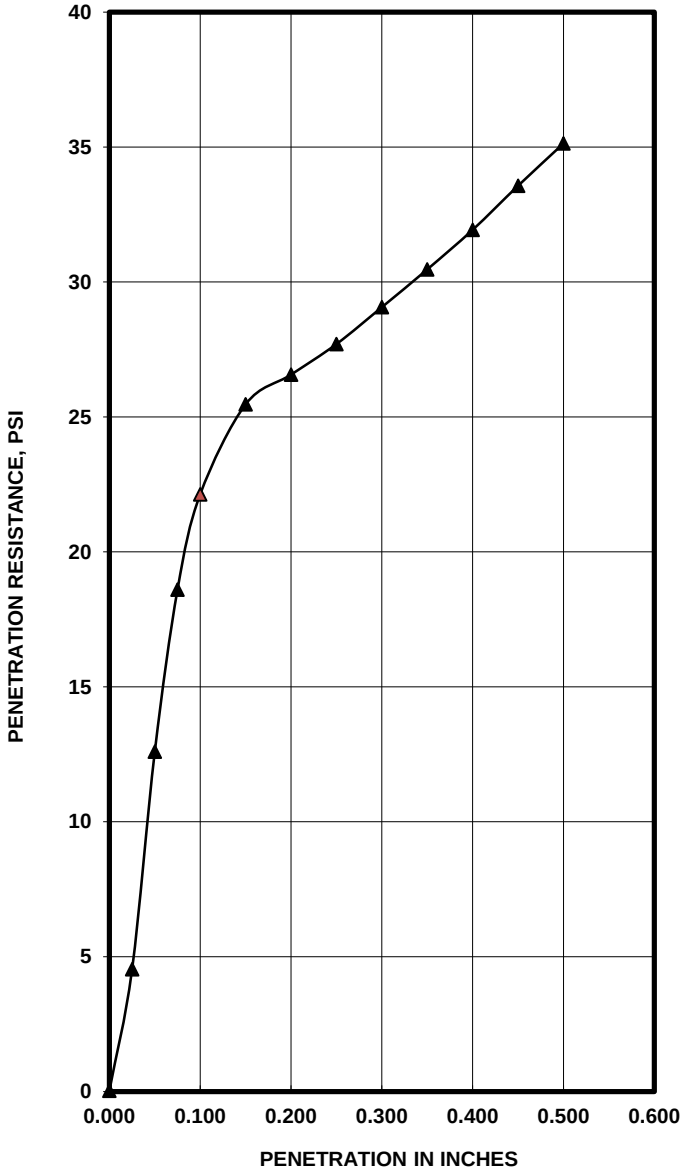
Test Results

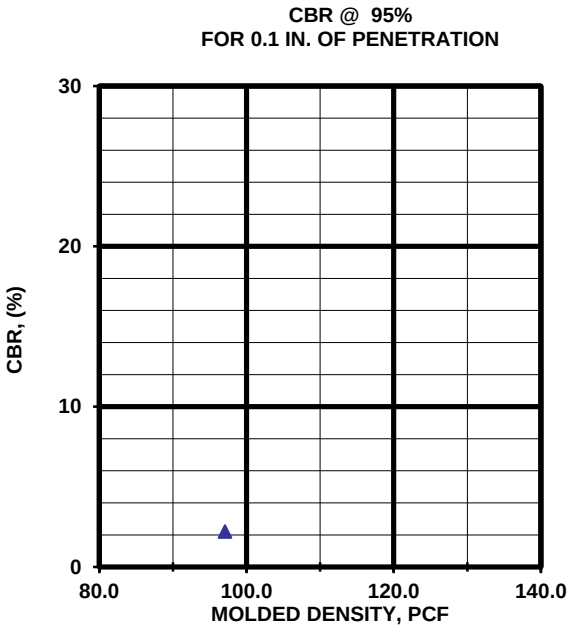
ASTM D 698

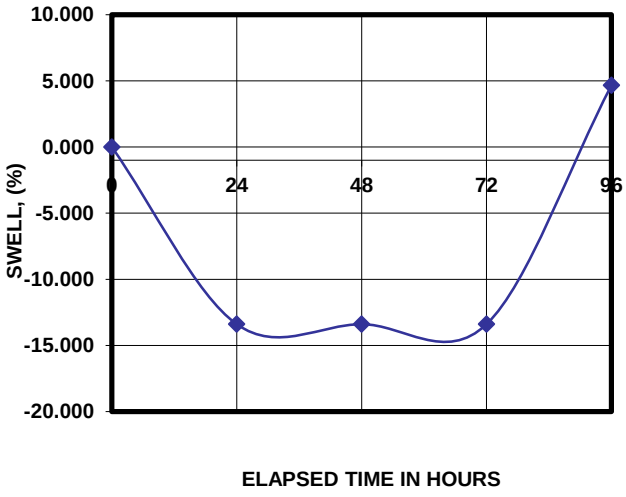
Maximum Dry Unit Weight (lbf/ft³):	**107.4**
Optimum Water Content (%):	**15.8**
Method:	A
Preparation Method:	Moist
Specific Gravity (Fines):	2.65
Specific Gravity Method:	ASSUMED
Retained Sieve No 4 (4.75mm) (%):	0
Passing Sieve No 4 (4.75mm) (%):	100
Tested By:	
Date Tested:	

Comments

© 2000-2023 QESTLab by SpectraQEST.com







MOLDED			SOAKED			CBR	(%)	PEN.	SWELL
DENS.	% MAX	% MOIST.	DENS.	% MAX	% MOIST.	0.1 IN.	0.2 IN.	SURCHG	%
97.1	95.3	20.4	92.6	90.8	28.5	2.2	1.8	10	4.663

MATERIAL DESCRIPTION	USCS	MAX. DEN.	OPT. MOIST.	LL	PI
0	0	101.9	20.2	28	18

PROJECT #: P-0022564 **Boring No.** B9 Bulk

PROJECT: Story House Village PI

DATE: 8/30/2023

Test Descr. / Remarks

CBR PER ASTM D1883

PROCTOR PER ASTM D698

AMERICAN ENGINEERING TESTING

BEARING RATIO TEST REPORT

Appendix B

Geotechnical Report Limitations and Guidelines for Use

Appendix B
Geotechnical Report Limitations and Guidelines for Use
AET Project No. P-0022564

B.1 REFERENCE

This appendix provides information to help you manage your risks relating to subsurface problems which are caused by construction delays, cost overruns, claims, and disputes. This information was developed and provided by GBA[1], of which, we are a member firm.

B.2 RISK MANAGEMENT INFORMATION

B.2.1 Understand the Geotechnical Engineering Services Provided for this Report

Geotechnical engineering services typically include the planning, collection, interpretation, and analysis of exploratory data from widely spaced borings and/or test pits. Field data are combined with results from laboratory tests of soil and rock samples obtained from field exploration (if applicable), observations made during site reconnaissance, and historical information to form one or more models of the expected subsurface conditions beneath the site. Local geology and alterations of the site surface and subsurface by previous and proposed construction are also important considerations. Geotechnical engineers apply their engineering training, experience, and judgment to adapt the requirements of the prospective project to the subsurface model(s). Estimates are made of the subsurface conditions that will likely be exposed during construction as well as the expected performance of foundations and other structures being planned and/or affected by construction activities.

The culmination of these geotechnical engineering services is typically a geotechnical engineering report providing the data obtained, a discussion of the subsurface model(s), the engineering and geologic engineering assessments and analyses made, and the recommendations developed to satisfy the given requirements of the project. These reports may be titled investigations, explorations, studies, assessments, or evaluations. Regardless of the title used, the geotechnical engineering report is an engineering interpretation of the subsurface conditions within the context of the project and does not represent a close examination, systematic inquiry, or thorough investigation of all site and subsurface conditions.

B.2.2 Geotechnical Engineering Services are Performed for Specific Purposes, Persons, and Projects, and At Specific Times

Geotechnical engineers structure their services to meet the specific needs, goals, and risk management preferences of their clients. A geotechnical engineering study conducted for a given civil engineer will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical engineering study is unique, each geotechnical engineering report is unique, prepared solely for the client.

Likewise, geotechnical engineering services are performed for a specific project and purpose. For example, it is unlikely that a geotechnical engineering study for a refrigerated warehouse will be the same as one prepared for a parking garage; and a few borings drilled during a preliminary study to evaluate site feasibility will not be adequate to develop geotechnical design recommendations for the project.

Do not rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project or purpose;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, the reliability of a geotechnical-engineering report can be affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. If you are the least bit uncertain about the continued reliability of this report, contact your geotechnical engineer before applying the recommendations in it. A minor amount of additional testing or analysis after the passage of time – if any is required at all – could prevent major problems.

1 Geoprofessional Business Association, 1300 Piccard Drive, LL14, Rockville, MD 20850
Telephone: 301/565-2733: www.geoprofessional.org, 2019

B.2.3 Read the Full Report

Costly problems have occurred because those relying on a geotechnical-engineering report did not read the report in its entirety. Do not rely on an executive summary. Do not read selective elements only. Read and refer to the report in full.

B.2.4 You Need to Inform Your Geotechnical Engineer About Change

Your geotechnical engineer considered unique, project-specific factors when developing the scope of study behind this report and developing the confirmation-dependent recommendations the report conveys. Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the elevation, configuration, location, orientation, function or weight of the proposed structure and the desired performance criteria;
- the composition of the design team; or
- project ownership.

As a general rule, always inform your geotechnical engineer of project or site changes – even minor ones – and request an assessment of their impact. The geotechnical engineer who prepared this report cannot accept responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.

B.2.5 Most of the "Findings" Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site's subsurface using various sampling and testing procedures. Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing is performed. The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgement to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team through project completion to obtain informed guidance quickly, whenever needed.

B.2.6 This Report's Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, they are not final, because the geotechnical engineer who developed them relied heavily on judgement and opinion to do so. Your geotechnical engineer can finalize the recommendations only after observing actual subsurface conditions exposed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.

B.2.7 This Report Could Be Misinterpreted

Other design professionals' misinterpretation of geotechnical engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a continuing member of the design team, to:

- confer with other design-team members;
- help develop specifications;
- review pertinent elements of other design professionals' plans and specifications; and
- be available whenever geotechnical engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction-phase observations.

B.2.8 Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical engineering report, along with any attachments or appendices, with your contract documents, but be certain to note conspicuously that you've included the material for information purposes only. To avoid misunderstanding, you may also want to note that "informational purposes" means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, only from the design drawings and specifications. Remind constructors that they may perform their own studies if they want to, and be sure to allow enough time to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

B.2.9 Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. This happens in part because soil and rock on project sites are typically heterogeneous and not manufactured materials

with well-defined engineering properties like steel and concrete. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. Read these provisions closely. Ask questions. Your geotechnical engineer should respond fully and frankly.

B.2.10 Geoenvironmental Concerns Are Not Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a "phase-one" or "phase-two" environmental site assessment – differ significantly from those used to perform a geotechnical engineering study. For that reason, a geotechnical engineering report does not usually provide environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. Unanticipated subsurface environmental problems have led to project failures. If you have not obtained your own environmental information about the project site, ask your geotechnical consultant for a recommendation on how to find environmental risk-management guidance.

B.2.11 Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, the engineer's services were not designed, conducted, or intended to prevent migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, proper implementation of the geotechnical engineer's recommendations will not of itself be sufficient to prevent moisture infiltration. Confront the risk of moisture infiltration by including building-envelope or mold specialists on the design team. Geotechnical engineers are not building-envelope or mold specialists.

Story House

Traffic Impact Study

WWC Engineering

Sheridan, Wyoming

October 6, 2023

Prepared By:



Sustainable Traffic Solutions, Inc.
http://www.sustainabletrafficsolutions.com/

Joseph L. Henderson, PE, PTOE
Wyoming PE Number 5814
303.589.6875
joe@sustainabletrafficsolutions.com

Joseph L. Henderson's electronic or digital seal and signature is effective only as to that version of this document as originally published by Joseph L. Henderson. Joseph L. Henderson is not responsible for any subsequent modification, corruption, or unauthorized use of this document. To verify the validity or applicability of the seal and signature, contact Joseph L. Henderson.

Table of Contents

Page

1.0 Introduction 1
2.0 Study Assumptions 1
3.0 Existing Traffic Conditions 2
3.1 Traffic Counts 2
3.2 Existing Peak Hour Level of Service 2
3.3 Crash Data 3
4.0 Trip Generation 3
5.0 Trip Distribution and Assignment 3
6.0 Year 2026 Traffic Conditions 3
7.0 Year 2031 Traffic Conditions 4
8.0 Year 2034 Traffic Conditions 4
9.0 Year 2043 Traffic Conditions 5
10.0 Auxiliary Lane Analysis 6
11.0 Traffic Signal Warrant Study 6
12.0 Speed Study on Wyarno Road 7
13.0 Conclusions and Recommendations 7

List of Appendices

Appendix A Traffic Count Data
Appendix B VISTRO Analysis Results
Appendix C Crash Data
Appendix D Traffic Signal Warrant Study
Appendix E Wyarno Road Speed Data Summary

List of Tables

Table 1 – Estimated Daily Volumes for Key Links in the Study Area
Table 2 – Intersection Operational Summary
Table 3 – Trip Generation Estimate – Phase I
Table 4 – Trip Generation Estimate – Phase I + II
Table 5 – Trip Generation Estimate – Phase I + II + III
Table 6 – Need for Left Turn Lanes on Wyarno Road

Table of Contents (Continued)

List of Figures

Figure 1 – Vicinity Map
Figure 2 – Site Plan
Figure 3 – Laneage and Traffic Control – Existing
Figure 4 – Existing Traffic Volumes – Morning Peak Hour
Figure 5 – Existing Traffic Volumes – Evening Peak Hour
Figure 6 – Trip Distribution
Figure 7 – Phase I Trip Assignment – Morning Peak Hour
Figure 8 – Phase I Trip Assignment – Evening Peak Hour
Figure 9 – Phase I + II Trip Assignment – Morning Peak Hour
Figure 10 – Phase I + II Trip Assignment – Evening Peak Hour
Figure 11 – Phase I + II + III Trip Assignment – Morning Peak Hour
Figure 12 – Phase I + II + III Trip Assignment – Evening Peak Hour
Figure 13 – Year 2026 Background Traffic Volumes – Morning Peak Hour
Figure 14 – Year 2026 Background Traffic Volumes – Evening Peak Hour
Figure 15 – Year 2026 Total Traffic Volumes – Morning Peak Hour
Figure 16 – Year 2026 Total Traffic Volumes – Evening Peak Hour
Figure 17 – Laneage and Traffic Control – Year 2026
Figure 18 – Year 2031 Background Traffic Volumes – Morning Peak Hour
Figure 19 – Year 2031 Background Traffic Volumes – Evening Peak Hour
Figure 20 – Year 2031 Total Traffic Volumes – Morning Peak Hour
Figure 21 – Year 2031 Total Traffic Volumes – Evening Peak Hour
Figure 22 – Laneage and Traffic Control – Year 2031
Figure 23 – Year 2034 Background Traffic Volumes – Morning Peak Hour
Figure 24 – Year 2034 Background Traffic Volumes – Evening Peak Hour
Figure 25 – Year 2034 Total Traffic Volumes – Morning Peak Hour
Figure 26 – Year 2034 Total Traffic Volumes – Evening Peak Hour
Figure 27 – Year 2043 Background Traffic Volumes – Morning Peak Hour
Figure 28 – Year 2043 Background Traffic Volumes – Evening Peak Hour
Figure 29 – Year 2043 Total Traffic Volumes – Morning Peak Hour
Figure 30 – Year 2043 Total Traffic Volumes – Evening Peak Hour
Figure 31 – Need for an Eastbound Right Turn Lane at Industrial Lane
Figure 32 – Need for a Westbound Right Turn Lane at Industrial Lane
Figure 33 – Need for a Westbound Right Turn Lane at the East Access
Figure 34 – Wyarno Road Speed Study

Story House

Traffic Impact Study

1.0 Introduction

The Story House project is a mixed use development that is planned east of I-90 on the north side of Wyarno Road (Wyoming 336). Figure 1 shows the location of the Story House project and a general layout is contained in Figure 2. The development is proposed in three phases as shown in Figure 2. For Phase I, the primary access will be through the west access that aligns with Industrial Lane. The internal street network will be developed in Phase II so that there will be two accesses to the development. The laneage and traffic control at the existing intersections is contained in Figure 3.

This study was completed based on WYDOT and the City of Sheridan requirements for traffic impact studies[1,2].

2.0 Study Assumptions

The following assumptions were utilized for this study.

Short-Term Horizons. The study assumes the following development horizons. Refer to Figure 2 for the portions of the development that are included in each phase.

- Phase I – Year 2026
- Phase II – Year 2031
- Phase III – Year 2034

Long-Term Horizon. The long-term horizon will be Year 2043 because it is 20 years in the future.

Growth in Background Traffic. An annual growth rate of 0.6% was calculated using Sheridan County population estimates that are contained in the Sheridan County Comprehensive Plan[3]. Through volumes on Wyarno Road and the volumes associated with Industrial Lane were inflated for each of the volume scenarios.

Saturation Flow Rate. The saturation flow rate was assumed to be 1,600 passenger cars / hour / lane recognizing Wyoming motorists' driving habits and data collected in Cheyenne during the Yellowstone Road corridor signal timing project.

1 Access Manual, 2014 Edition. Wyoming Department of Transportation, Traffic Program. January 6, 2014.

2 Public Infrastructure Standards. City of Sheridan Public works Department. 2017 Edition.

3 Sheridan County Comprehensive Plan. Sheridan County. Adopted February 4, 2020.

Peak Hour Factor (PHF). The PHF for the existing intersections was based on the data collected for the study. At the site accesses, the PHF was assumed to be 0.85 for all movements.

Truck Percentage. Vehicle classification data were collected with the turning movement count data and are summarized in Appendix A. Little, or no truck traffic was observed for most of the movements at the study area intersections, so the truck percentage was assumed to be 2% for these movements. Movements with higher truck percentages are highlighted in the tables. Those percentages were used in the analysis. Two percent trucks were assumed for all new movements associated with the development.

3.0 Existing Traffic Conditions

3.1 Traffic Counts

Turning movement count data were collected by WWC Engineering on average weekdays in July 2023. A summary of the data is included in Appendix A, and the existing peak hour volumes are contained in Figures 4 and 5. Existing and future daily volumes are summarized in Table 1.

3.2 Existing Peak Hour Level of Service

To evaluate the performance of the intersections within the study area, the level of service (LOS) was calculated using PTV VISTRO software. This software package utilizes criteria described in the Highway Capacity Manual[4]. LOS is a measure used to describe operational conditions at an intersection. LOS categories ranging from A to F are assigned based on the predicted delay in seconds per vehicle for the intersection as a whole, as well as for individual turning movements. LOS A indicates very good operations, and LOS F indicates poor, congested operations. Based on WYDOT standards, acceptable intersection operation is LOS C or better.

The results of the analysis are summarized in the following table. The analysis shows that the existing study area intersections are operating at acceptable levels of service. The level of service for intersections with side-street stop-control is determined by the movement with the highest delay value. Detailed analysis results are summarized in Table 2 and the VISTRO analysis results are contained in Appendix B.

Year 2023 Traffic Volumes

Intersection	Control	Peak Hour	
		AM	PM
1 - Wyarno Road / Industrial Lane / West Site Access	Side-Street Stop	B	A
2 - Wyarno Road / Wildcat Road	Side-Street Stop	A	A

[4] Highway Capacity Manual, 7th Edition. National Academy of Sciences, Engineering, and Medicine. 2022.

3.3 Crash Data

The most recent three years of crash data were requested from WYDOT for the study area intersections and for the sweeping curve along the frontage of the development. The data shows that there was one property damage only crash reported at the Industrial Lane intersection, and no crashes reported at the Wildcat Road intersection. Based on a conversation with Melinda Harmon at WYDOT, the sweeping curve along the frontage of the development begins at approximately MP 2. A review of the crash data shows that there were no crashes reported along the curve. The crash data are contained in Appendix C.

4.0 Trip Generation

In order to estimate the traffic impacts associated with this development, the amount of traffic generated by the project was calculated using trip generation rates contained in the Institute of Transportation Engineers Trip Generation manual[5]. The trip generation for the three phases of development is contained in Tables 3 through 5.

5.0 Trip Distribution and Assignment

The trips that are expected to be generated by the Story House development were distributed based on the existing traffic patterns in the vicinity of the site. These trips were then assigned to the network based on the trip distribution. The trip distribution is contained in Figure 6 and the trip assignment is contained in Figures 7 through 12.

6.0 Year 2026 Traffic Conditions

Phase I as shown in Figure 2 is expected to be completed in Year 2026. Background traffic volumes contained in Figures 13 and 14 were developed by inflating the existing traffic volumes by the annual growth rate that is discussed in Section 2.0. The total traffic volume scenarios were developed by adding the peak hour trip assignment to the background volumes (see Figures 15 and 16).

The results of the analysis of the background and total traffic volume scenarios are summarized in the following table. The analysis shows that both of the intersections are expected to operate at acceptable levels of service. The level of service for intersections with side-street stop-control is determined by the movement with the highest delay value. The laneage and traffic control that were assumed for the analysis are contained in Figure 17.

[5] Trip Generation, 11th Edition. Institute of Transportation Engineers. September 2021.

Year 2026 Traffic Conditions

Intersection	Control	Background		Total	
		AM	PM	AM	PM
1 - Wyarno Road / Industrial Lane / West Site Access	Side-Street Stop	A	A	C	C
2 - Wyarno Road / Wildcat Road	Side-Street Stop	A	A	A	A

Detailed analysis results are summarized in Table 2 and the VISTRO analysis results are contained in Appendix B.

7.0 Year 2031 Traffic Conditions

Phase II is expected to be completed in Year 2031. The volume scenarios for this horizon were completed in the same manner as the Year 2026 traffic volume scenarios (see Section 6.0). The background traffic volume scenarios are contained in Figures 18 and 19, and the total traffic volume scenarios are contained in Figures 20 and 21.

The results of the analysis of the background and total traffic volume scenarios are summarized in the following table. The analysis shows that the intersections are expected to operate at acceptable levels of service except for the Industrial Lane intersection in the total traffic volume scenarios. That intersection is expected to operate at LOS F during the morning and evening peak hours. The level of service for intersections with side-street stop-control is determined by the movement with the highest delay value.

Year 2031 Traffic Conditions

Intersection	Control	Background		Total	
		AM	PM	AM	PM
1 - Wyarno Road / Industrial Lane / West Site Access	Side-Street Stop	C	C	F	F
2 - Wyarno Road / Wildcat Road	Side-Street Stop	A	A	B	B
3 - Wyarno Road / East Access	Side-Street Stop	---		B	B

The detailed analysis results are summarized in Table 2 and the VISTRO analysis results are contained in Appendix B. The laneage and traffic control assumed in the analysis are contained in Figure 22.

8.0 Year 2034 Traffic Conditions

Phase III is expected to be completed in Year 2034. The volume scenarios for this horizon were completed in the same manner as the Year 2026 traffic volume scenarios (see Section 6.0). The background traffic volume scenarios are contained in Figures 23 and 24, and the total traffic volume scenarios are contained in Figures 25 and 26.

The results of the analysis of the background and total traffic volume scenarios are summarized in the following table. The analysis shows that the Industrial Lane intersection is expected to operate at LOS F during both peak hours in the background and total traffic volume scenarios. The other intersections are expected to operate at LOS B. The level of service for intersections with side-street stop-control is determined by the movement with the highest delay value. It isn't unusual for stop controlled approaches on arterial streets to operate poorly.

2034 Traffic Conditions

Intersection	Control	Background		Total	
		AM	PM	AM	PM
1 - Wyarno Road / Industrial Lane / West Site Access	Side-Street Stop	F	F	F	F
2 - Wyarno Road / Wildcat Road	Side-Street Stop	B	B	B	B
3 - Wyarno Road / East Access	Side-Street Stop	B	B	B	B

The detailed analysis results are summarized in Table 2 and the VISTRO analysis results are contained in Appendix B. The laneage and traffic control assumed in the analysis are contained in Figure 22.

9.0 Year 2043 Traffic Conditions

Traffic volume scenarios for the long-term horizon were completed in the same manner as the Year 2026 traffic volume scenarios (see Section 6.0). The background traffic volume scenarios are contained in Figures 27 and 28, and the total traffic volume scenarios are contained in Figures 29 and 30.

The results of the analysis of the background and total traffic volume scenarios are summarized in the following table. The analysis shows that the Industrial Lane intersection is expected to operate at LOS F during both peak hours in the total traffic volume scenarios. The other intersections are expected to operate at LOS A and LOS B. The level of service for intersections with side-street stop-control is determined by the movement with the highest delay value. It isn't unusual for stop controlled approaches on arterial streets to operate poorly.

2043 Traffic Conditions

Intersection	Control	Background		Total	
		AM	PM	AM	PM
1 - Wyarno Road / Industrial Lane / West Site Access	Side-Street Stop	B	A	F	F
2 - Wyarno Road / Wildcat Road	Side-Street Stop	A	A	B	B
3 - Wyarno Road / East Access	Side-Street Stop	---		B	B

The detailed analysis results are summarized in Table 2 and the VISTRO analysis results are contained in Appendix B. The laneage and traffic control assumed in the analysis are contained in Figure 22.

10.0 Auxiliary Lane Analysis

The need for left and right turn deceleration lanes on Wyarno Road was determined based on criteria contained in Chapter 18 of the WYDOT Traffic Studies Manual[6]. Figure 9-36 from A Policy on Geometric Design of Highways and Streets[7] was used to determine the need for left turn deceleration lanes. As shown in Table 6, an eastbound left turn lane will be warranted by development traffic at Industrial Lane and the east access. At Industrial Lane, the traffic from Phase I will warrant the left turn lane. At the east access, the traffic from Phase II will warrant the left turn lane. To review the need for right turn lanes, Figure 18-1 from the WYDOT Traffic Studies Manual was used. Figures 31, 32, and 33 contain a review of the need for right turn lanes. An eastbound right turn lane is currently warranted at Industrial Lane (see Figure 31). Westbound right turn lanes will not be warranted at either access (see Figures 32 and 33).

11.0 Traffic Signal Warrant Study

A traffic signal warrant study was performed to determine if a traffic signal will be warranted at Wyarno Road / Industrial Lane. The study was performed based on the requirements contained in the Manual on Uniform Traffic Control Devices[8]. The peak hour warrants were evaluated.

The following assumptions were used for the analysis.

Speed Limit. The posted speed limit is greater than 40 MPH on Wyarno Road.

Number of Main-Street Lanes. One lane was assumed in each direction on Wyarno Road.

Number of Side-Street Lanes. One side-street lane was assumed on the Industrial Lane approaches.

Side-Street Right Turning Traffic. 50% of the side-street right turning traffic was included in the warrant analysis because some vehicles will be able to turn into gaps in traffic without the aid of a traffic signal.

The analysis shows that a traffic signal is not expected to be warranted by the Year 2043 total traffic volumes. The signal warrant analysis is contained in Appendix D. Refer to the fourth page of the warrant analysis to see the results.

---

6 WYDOT Traffic Studies Manual. Wyoming Department of Transportation. March 2011.

7 A Policy on Geometric Design of Highways and Streets, 7th Edition. American Association of Highways and Streets. 2018.

8 Manual on Uniform Traffic Control Devices. Federal Highway Administration. Revised July 2022.

12.0 Speed Study on Wyarno Road

A speed study was performed on Wyarno Road east of Industrial Lane based on the requirements in Chapter 13 of the WYDOT Traffic Studies Manual. The roadway has posted speed limits of 40 MPH west of Ridge Road and 70 MPH east of Ridge Road. A large radius curve along the frontage of the development has an advisory speed of 50 MPH. Figure 34 summarizes the data collection and the existing speed limits.

Speed data were collected at three locations along the roadway using Jamar radar data collection devices. The data collection locations and results of the data analysis are summarized in the following table. A summary of the speed data is contained in Appendix E.

Location	Data Collection		
	Days	Observations	
		EB	WB
E/O Industrial Lane	10	4,060	4,564
W/O Wildcat Road	2	511	543
E/O Large Radius Curve	2	440	417

While the data were collected with a machine rather than a visual study using a radar gun to only collect the speed of free flowing traffic, the traffic volumes on Wyarno Road are low enough that the majority of the data were collected on vehicles that were free flowing.

The 85th percentile speeds show that speeds are lower near Industrial Lane compared to the data collection locations to the east. The data were processed using the WYDOT Form RT-11 spreadsheet. All of the 85th percentile speeds and recommended speed limits are lower than the 70 MPH speed limit. Considering that the speed limit changes from 70 MPH to 40 MPH at Ridge Road and the 85th percentile speeds and recommended speeds are all lower than 70 MPH, STS recommends that the speed limit be lowered to 60 MPH east of Ridge Road. With the recommended change, the speed change will only be 20 MPH rather than 30 MPH and it will be in line with the 85th percentile speeds and recommended speeds. WYDOT will need to collect additional speed data farther east on Wyarno Road to determine the appropriate speed limit in the foothills.

13.0 Conclusions and Recommendations

The following conclusions were drawn based on the analysis performed for the study.

Intersection Operation.

- **Wyarno Road / Industrial Lane / Site Access.** This intersection is currently operating at LOS A and LOS B. Following the development of Phase I, it is

expected to operate at LOS C. The operation of the intersection is expected to degrade to LOS F following the completion of Phase II. This intersection is assumed to have side-street stop control because it is not expected to warrant signalization. The level of service for intersections with side-street stop-control is determined by the movement with the highest delay value. It isn't unusual for stop controlled approaches on arterial streets to operate poorly.

- **Wyarno Road / Wildcat Road.** This intersection is currently operating at LOS A. The operation of the intersection is expected to transition to LOS B as traffic volumes grow on Wyarno Road.
- **Wyarno Road / East Access.** This intersection is expected to operate at LOS B through the Year 2043 total traffic volume scenarios.

Auxiliary Lane Analysis. The need for auxiliary lanes was reviewed based on criteria contained in Chapter 18 of the WYDOT Traffic Studies Manual. An eastbound left turn lane will be warranted at Industrial Lane and the east access by the development of the Story House project. A right turn lane is currently warranted for eastbound Wyarno Road at Industrial Lane.

Traffic Signal Warrant Study. A traffic signal is not expected to be warranted at Wyarno Road / Industrial Lane through the Year 2043 total traffic volume scenarios.

Speed Study on Wyarno Road. Spot speed data were collected at three locations on Wyarno Road for the purpose of reviewing the 70 MPH speed limit east of Ridge Road. The 85th percentile speeds ranged from 56 MPH to 66 MPH and the recommended speed limits ranged from 55 MPH to 65 MPH. STS recommends that WYDOT lower the speed limit to 60 MPH east of Ridge Road.

Tables

Table 1 – Estimated Daily Volumes for Key Links in the Study Area
Table 2 – Intersection Operational Summary
Table 3 – Trip Generation Estimate – Phase I
Table 4 – Trip Generation Estimate – Phase I + II
Table 5 – Trip Generation Estimate – Phase I + II + III
Table 6 – Need for Left Turn Lanes on Wyarno Road

This table is formatted to be printed on 11" x 17" paper.

Table 1. Estimated Daily Volumes for Key Links in the Study Area

Link	Year 2023 [1]	Phase I Development	Year 2026 Background Traffic	Year 2026 Total Traffic	Phase I + II Development	Year 2031 Background Traffic	Year 2031 Total Traffic	Phase I + II + III Development	Year 2034 Background Traffic	Year 2034 Total Traffic	Year 2043 Background	Year 2043 Total
Wyarno Road west of Industrial Lane	1,970	2,930	2,010	4,940	7,030	2,070	9,100	7,510	2,100	9,610	2,220	9,730
Wyarno Road East of Industrial Lane	1,130	150	1,150	1,300	2,960	1,190	4,150	3,160	1,210	4,370	1,270	4,430
Wyarno Road west of the East Access	1,060	150	1,080	1,230	2,960	1,110	4,070	3,160	1,130	4,290	1,190	4,350
Wyarno Road east of the East Access	800	150	810	960	370	840	1,210	400	850	1,250	900	1,300
West Access north of Wyarno Road	0	3,090	0	3,090	4,440	0	4,440	4,750	0	4,750	0	4,750
East Access north of Wyarno Road	0	0	0	0	2,960	0	2,960	3,160	0	3,160	0	3,160
Industrial Lane south of Wyarno Road	900	0	920	920	0	940	940	0	960	960	1,010	1,010

1. The Year 2023 daily volumes were estimated using the peak hour to daily ratio for the evening peak hour.

Table 2. Intersection Operational Summary

Stop-Controlled Intersections [1]	Year 2021 Factored				Year 2026 Background				Year 2026 Total				Year 2031 Background				Year 2031 Total			
	Morning		Evening		Morning		Evening		Morning		Evening		Morning		Evening		Morning		Evening	
	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1 - Wyarno Road / Industrial Lane / West Site Access	10.20	B	9.80	A	10.00	A	9.70	A	18.40	C	18.10	C	18.50	C	18.30	C	156.50	F	66.00	F
	NBLT		NBLT		NBLT		NBLT		NBLT		NBLT		NBLT		NBLT		NBLT		NBLT	
2 - Wyarno Road / Wildcat Road	9.00	A	9.30	A	9.10	A	9.30	A	9.10	A	9.80	A	9.20	A	9.40	A	11.30	B	12.70	B
	NBLT		NBLT		NBLT		NBLT		NBLT		NBLT		NBLT		NBLT		NBLT		NBLT	
3 - Wyarno Road / East Access	---				---				---				---				12.30	B	11.30	B
																	EBLT		EBLT	

Stop-Controlled Intersections [1]	Year 2034 Background				Year 2034 Total				Year 2043 Background				Year 2043 Total			
	Morning		Evening		Morning		Evening		Morning		Evening		Morning		Evening	
	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
1 - Wyarno Road / Industrial Lane / West Site Access	165.60	F	67.90	F	211.80	F	95.50	F	10.20	B	10.00	A	246.40	F	113.80	F
	NBLT		NBLT		NBLT		NBLT		NBLT		NBLT		NBLT		NBLT	
2 - Wyarno Road / Wildcat Road	11.30	B	12.70	B	11.50	B	13.10	B	9.10	A	9.40	A	11.60	B	13.20	B
	NBLT		NBLT		NBLT		NBLT		NBLT		NBLT		NBLT		NBLT	
3 - Wyarno Road / East Access	12.30	B	11.40	B	12.40	B	11.70	B	---				12.40	B	11.70	B
	EBLT		EBLT		EBLT		EBLT						EBLT		EBLT	

Notes

1. The level of service for intersections with side-street stop-control is determined by the movement with the highest delay value.

This table is formatted to be printed on 11" x 17" paper.

Table 3. Trip Generation Estimate - Phase I

Pad	Land Use	ITE Code [1]	Size	Unit	Average Daily Trips				Morning Peak Hour Trips				Evening Peak Hour Trips			
					Rate	Total	In	Out	Rate	Total	In	Out	Rate	Total	In	Out
1	Multifamily Housing (Mid-Rise)	221	171	DU	4.54	776	388	388	0.37	63	15	48	0.39	67	41	26
	Mini-Warehouse [2]	151	65.3	1,000 ft^2	1.45	94	47	47	0.09	5	3	2	0.15	10	5	5
2	Single-Family Attached Housing [3]	215	17.4	DU	7.2	126	63	63	0.48	8	2	6	0.57	10	6	4
	Strip Retail Plaza (<40k) [3]	822	8.7	1,000 ft^2	54.45	474	237	237	2.36	21	12	9	6.59	58	29	29
	General Office Building [3]	710	8.7	1,000 ft^2	10.84	94	47	47	1.52	13	12	1	1.44	13	2	11
3	Single-Family Attached Housing [3]	215	17.4	DU	7.2	124	62	62	0.48	8	2	6	0.57	10	6	4
	Strip Retail Plaza (<40k) [3]	822	8.7	1,000 ft^2	54.45	474	237	237	2.36	21	12	9	6.59	58	29	29
	General Office Building [3]	710	8.7	1,000 ft^2	10.84	94	47	47	1.52	13	12	1	1.44	13	2	11
4	Single-Family Detached Housing	210	14	DU	9.43	132	66	66	0.7	10	2	8	0.94	13	8	5
5	Single-Family Attached Housing	215	60	DU	7.2	432	216	216	0.48	29	7	22	0.57	34	20	14
6	Single-Family Attached Housing	215	48	DU	7.2	346	173	173	0.48	23	6	17	0.57	27	16	11
7	Single-Family Detached Housing	210	46	DU	9.43	434	217	217	0.7	32	8	24	0.94	43	27	16
	Single-Family Attached Housing	215	15	DU	7.2	108	54	54	0.48	7	2	5	0.57	9	5	4
8	General Office Building [3]	710	7.1	1,000 ft^2	10.84	78	39	39	1.52	11	10	1	1.44	10	2	8
---	Internal Capture [4]	---	---	---	---	-700	-350	-350	---	-26	-13	-13	---	-102	-51	-51
---	**Total**	**---**	**---**	**---**	**---**	**3,086**	**1,543**	**1,543**	**---**	**239**	**92**	**146**	**---**	**273**	**146**	**126**

Notes:

1. The trip generation estimate is based on rates contained in Trip Generation, 11th Edition (Institute of Transportation Engineers, September 2021).
2. A 0.75 FAR was assumed.
3. A 0.2 FAR was assumed. The second floor condos were assumed to be 1,000 ft^2.
4. The internal capture was estimated using the NCHRP 684 Internal Capture Estimation Tool.

Table 4. Trip Generation Estimate - Phase I + Phase II

Land Use	ITE Code [1]	Size	Unit	Average Daily Trips				Morning Peak Hour Trips				Evening Peak Hour Trips			
				Rate	Total	In	Out	Rate	Total	In	Out	Rate	Total	In	Out
Single-Family Detached Housing	210	12	DU	9.43	114	57	57	0.7	8	2	6	0.94	11	7	4
Single-Family Attached Housing	215	48	DU	7.2	346	173	173	0.48	23	6	17	0.57	27	16	11
Single Tenant Office Building	715	60	Employees	3.85	232	116	116	0.54	32	29	3	0.51	31	5	26
Single-Family Attached Housing	215	40	DU	7.2	288	144	144	0.48	19	5	14	0.57	23	13	10
General Light Industrial [2]	110	60.9	1,000 ft^2	4.87	298	149	149	0.74	45	40	5	0.65	40	6	34
Strip Retail Plaza (<40k) [3]	822	21.75	1,000 ft^2	54.45	1,184	592	592	2.36	51	31	20	6.59	144	72	72
General Office Building [3]	710	21.75	1,000 ft^2	10.84	236	118	118	1.52	33	29	4	1.44	31	5	26
Strip Retail Plaza (<40k) [3]	822	29.15	1,000 ft^2	54.45	1,588	794	794	2.36	69	41	28	6.59	192	96	96
Supermarket	850	10	1,000 ft^2	93.84	938	469	469	2.86	29	17	12	8.95	90	45	45
Hotel	320	100	Rooms	3.35	336	168	168	0.35	35	13	22	0.36	36	19	17
General Light Industrial [3]	110	191.4	1,000 ft^2	4.87	932	466	466	0.74	142	125	17	0.65	124	17	107
Phase 1	---	---	---	---	3,786	1,893	1,893	---	265	105	159	---	375	197	177
Internal Capture [4]	---	---	---	---	-2,878	-1,439	-1,439	---	-120	-60	-60	---	-444	-222	-222
Total	**---**	**---**	**---**	**---**	**7,401**	**3,700**	**3,700**	**---**	**631**	**383**	**247**	**---**	**680**	**276**	**403**

Notes:

1. The trip generation estimate is based on rates contained in Trip Generation, 11th Edition (Institute of Transportation Engineers, September 2021).

2. A 0.1 FAR was assumed.

3. A 0.2 FAR was assumed.

4. The internal capture was estimated using the NCHRP 684 Internal Capture Estimation Tool.

Table 5. Trip Generation Estimate - Phase I + Phase II + Phase III

Land Use	ITE Code [1]	Size	Unit	Average Daily Trips				Morning Peak Hour Trips				Evening Peak Hour Trips			
				Rate	Total	In	Out	Rate	Total	In	Out	Rate	Total	In	Out
Single Family Detached Housing	210	54	DU	9.43	510	255	255	0.7	38	9	29	0.94	51	32	19
Phase I + Phase II	---	---	---	---	7,401	3,700	3,700	---	631	383	247	---	680	276	403
Total	---	---	---	---	7,911	3,955	3,955	---	669	392	276	---	731	308	422

Notes:

1. The trip generation estimate is based on rates contained in Trip Generation, 10th Edition (Institute of Transportation Engineers, September 2017).

Table 6. Need for Left Turn Lanes on Wyarno Road

Industrial Lane

Peak Hour	Volume				EBLT Warranted?	WBLT Warranted?
	EBLT	EB Total	WBLT	WB Total		
2026 Total AM	87	230	0	59	Yes	No
2026 Total PM	139	307	0	42	Yes	No
2031 Total AM	218	494	0	158	Yes	No
2031 Total PM	157	192	0	189	Yes	No
2034 Total AM	223	505	0	170	Yes	No
2034 Total PM	176	382	0	202	Yes	No
2043 Total AM	223	516	0	180	Yes	No
2043 Total PM	176	388	0	209	Yes	No

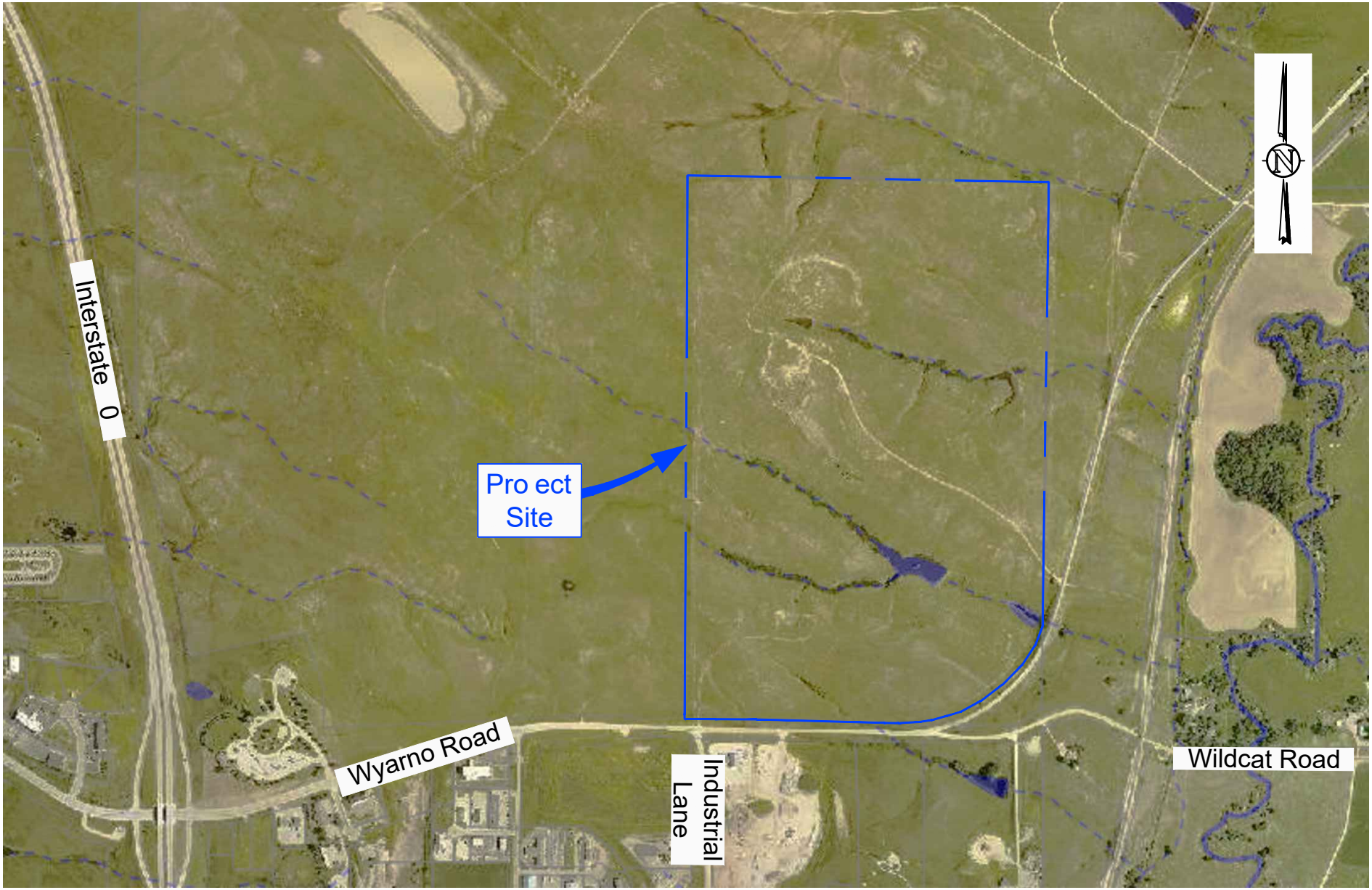
East Access

Peak Hour	Volume		EBLT Warranted?
	EBLT	EB Total	
2031 Total AM	146	174	Yes
2031 Total PM	105	165	Yes
2034 Total AM	149	178	Yes
2034 Total PM	117	178	Yes
2043 Total AM	149	180	Yes
2043 Total PM	117	181	Yes

Figures

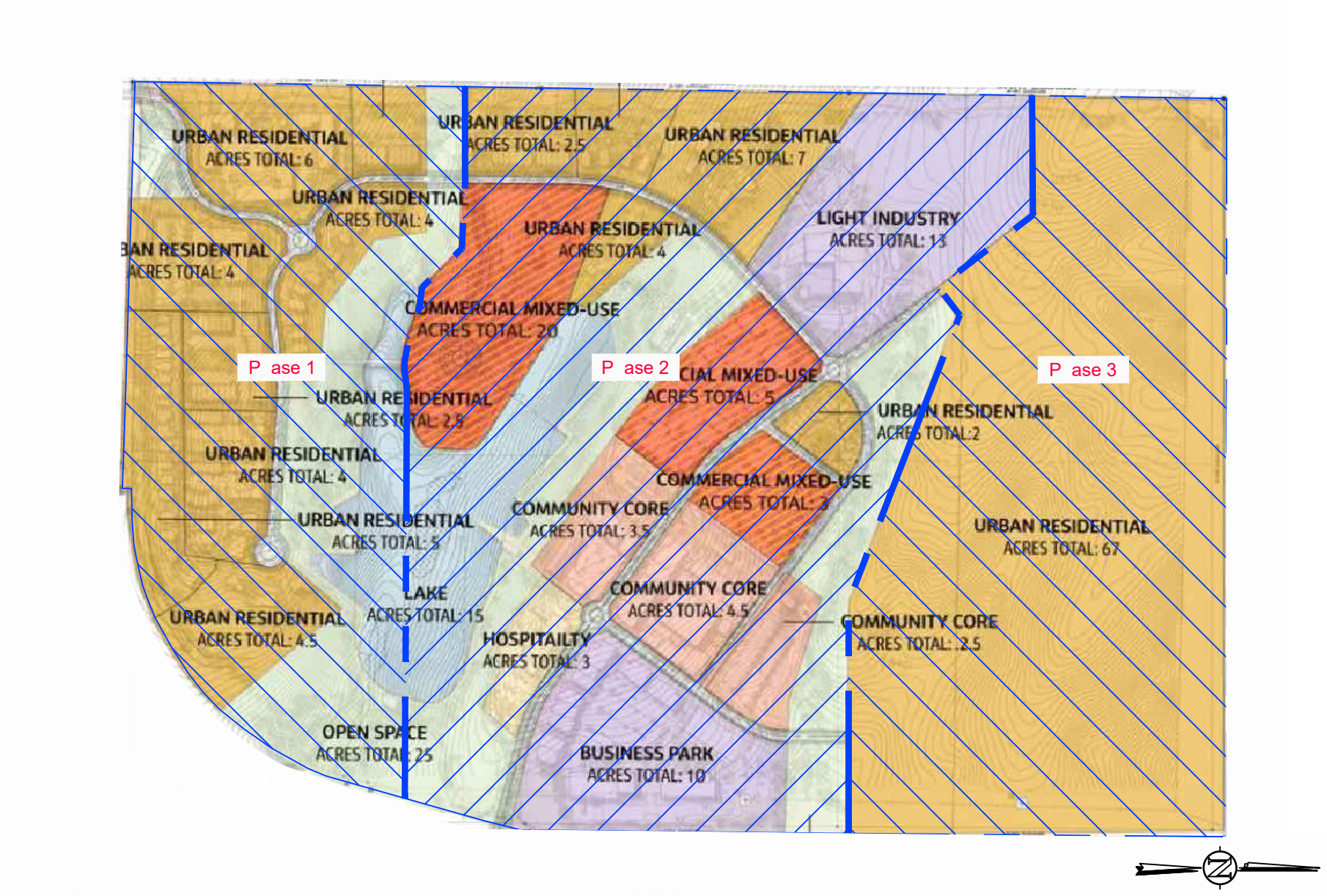
Figure 1 – Vicinity Map
Figure 2 – Site Plan
Figure 3 – Laneage and Traffic Control – Existing
Figure 4 – Existing Traffic Volumes – Morning Peak Hour
Figure 5 – Existing Traffic Volumes – Evening Peak Hour
Figure 6 – Trip Distribution
Figure 7 – Phase I Trip Assignment – Morning Peak Hour
Figure 8 – Phase I Trip Assignment – Evening Peak Hour
Figure 9 – Phase I + II Trip Assignment – Morning Peak Hour
Figure 10 – Phase I + II Trip Assignment – Evening Peak Hour
Figure 11 – Phase I + II + III Trip Assignment – Morning Peak Hour
Figure 12 – Phase I + II + III Trip Assignment – Evening Peak Hour
Figure 13 – Year 2026 Background Traffic Volumes – Morning Peak Hour
Figure 14 – Year 2026 Background Traffic Volumes – Evening Peak Hour
Figure 15 – Year 2026 Total Traffic Volumes – Morning Peak Hour
Figure 16 – Year 2026 Total Traffic Volumes – Evening Peak Hour
Figure 17 – Laneage and Traffic Control – Year 2026
Figure 18 – Year 2031 Background Traffic Volumes – Morning Peak Hour
Figure 19 – Year 2031 Background Traffic Volumes – Evening Peak Hour
Figure 20 – Year 2031 Total Traffic Volumes – Morning Peak Hour
Figure 21 – Year 2031 Total Traffic Volumes – Evening Peak Hour
Figure 22 – Laneage and Traffic Control – Year 2031
Figure 23 – Year 2034 Background Traffic Volumes – Morning Peak Hour
Figure 24 – Year 2034 Background Traffic Volumes – Evening Peak Hour
Figure 25 – Year 2034 Total Traffic Volumes – Morning Peak Hour
Figure 26 – Year 2034 Total Traffic Volumes – Evening Peak Hour
Figure 27 – Year 2043 Background Traffic Volumes – Morning Peak Hour
Figure 28 – Year 2043 Background Traffic Volumes – Evening Peak Hour
Figure 29 – Year 2043 Total Traffic Volumes – Morning Peak Hour
Figure 30 – Year 2043 Total Traffic Volumes – Evening Peak Hour

Figure 31 – Need for an Eastbound Right Turn Lane at Industrial Lane
Figure 32 – Need for a Westbound Right Turn Lane at Industrial Lane
Figure 33 – Need for a Westbound Right Turn Lane at the East Access
Figure 34 – Wyarno Road Speed Study



Story House Traffic Impact Study
VICINITY MAP

Scale	1" = 1,000'	Date	October 6, 2023	Drawn by	JLH	Job #	WWC Engineering	Figure	1



Story House Traffic Impact Study
SITE PLAN

Scale	NTS	Date	October 6, 2023	Drawn by	JLH	Job #	WWC Engineering	Figure	2

Figure 3 – Laneage and Traffic Control – Existing



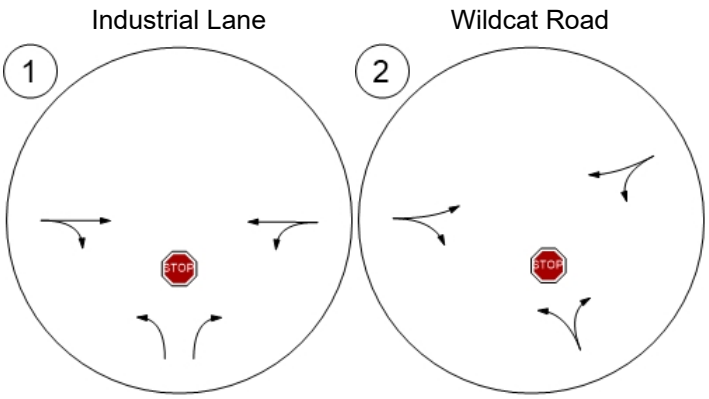


Figure 4 – Existing Traffic Volumes – Morning Peak Hour



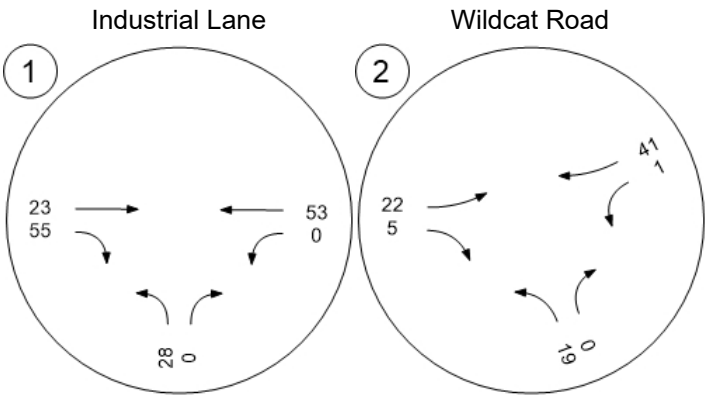
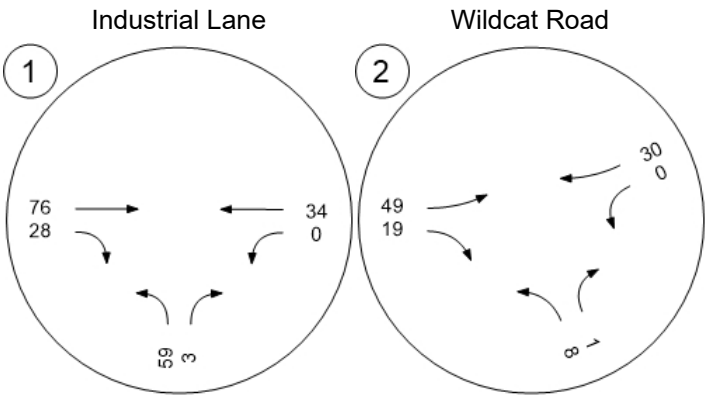
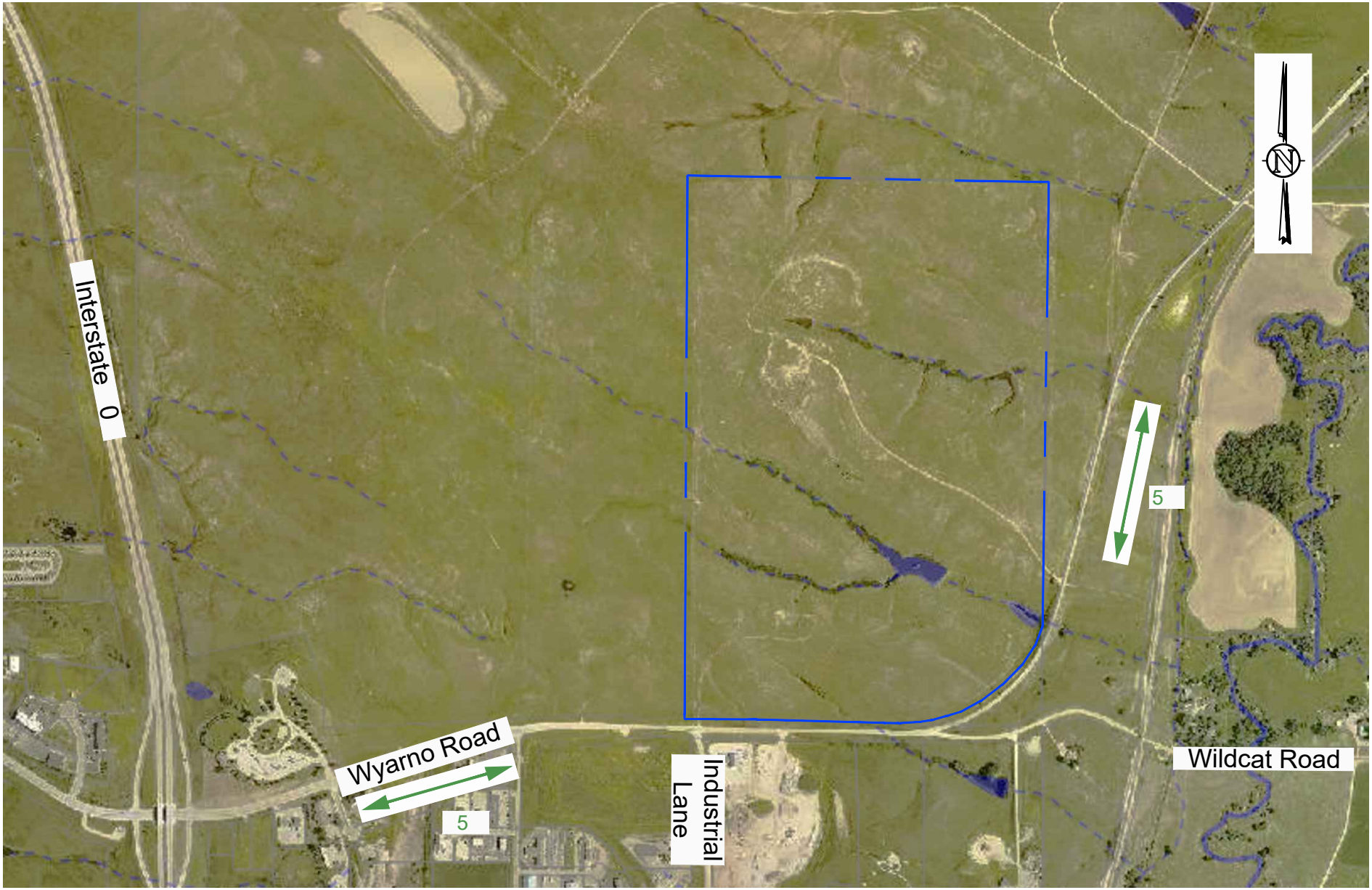


Figure 5 – Existing Traffic Volumes – Evening Peak Hour







Story House Traffic Impact Study
TRIP DISTRIBUTION

Scale	1" = 1,000'	Date	October 6, 2023	Drawn by	JLH	Job #	WWC Engineering	Figure	6

Figure 7 – Phase I Trip Assignment – Morning Peak Hour



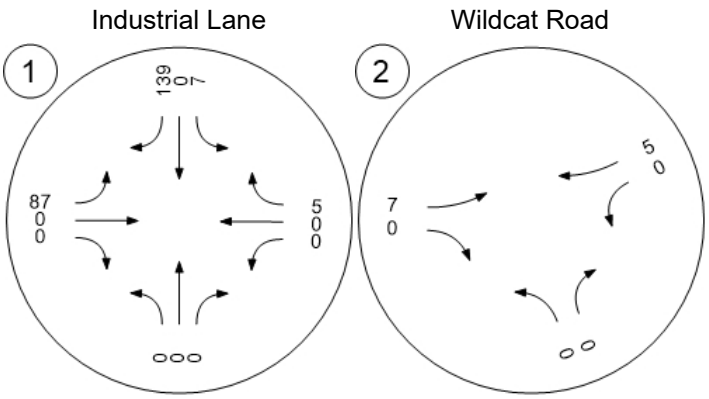


Figure 8 – Phase I Trip Assignment – Evening Peak Hour



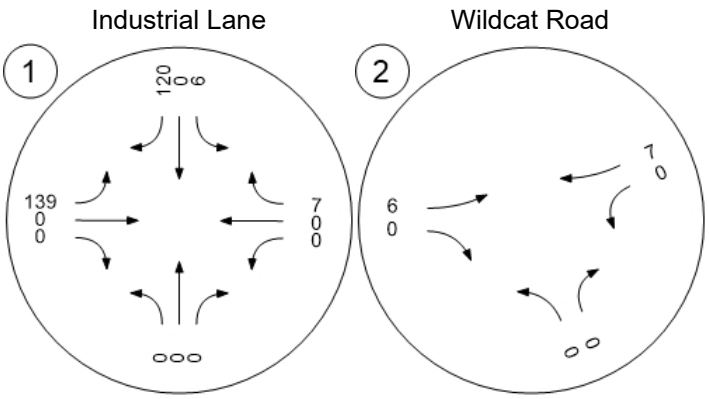
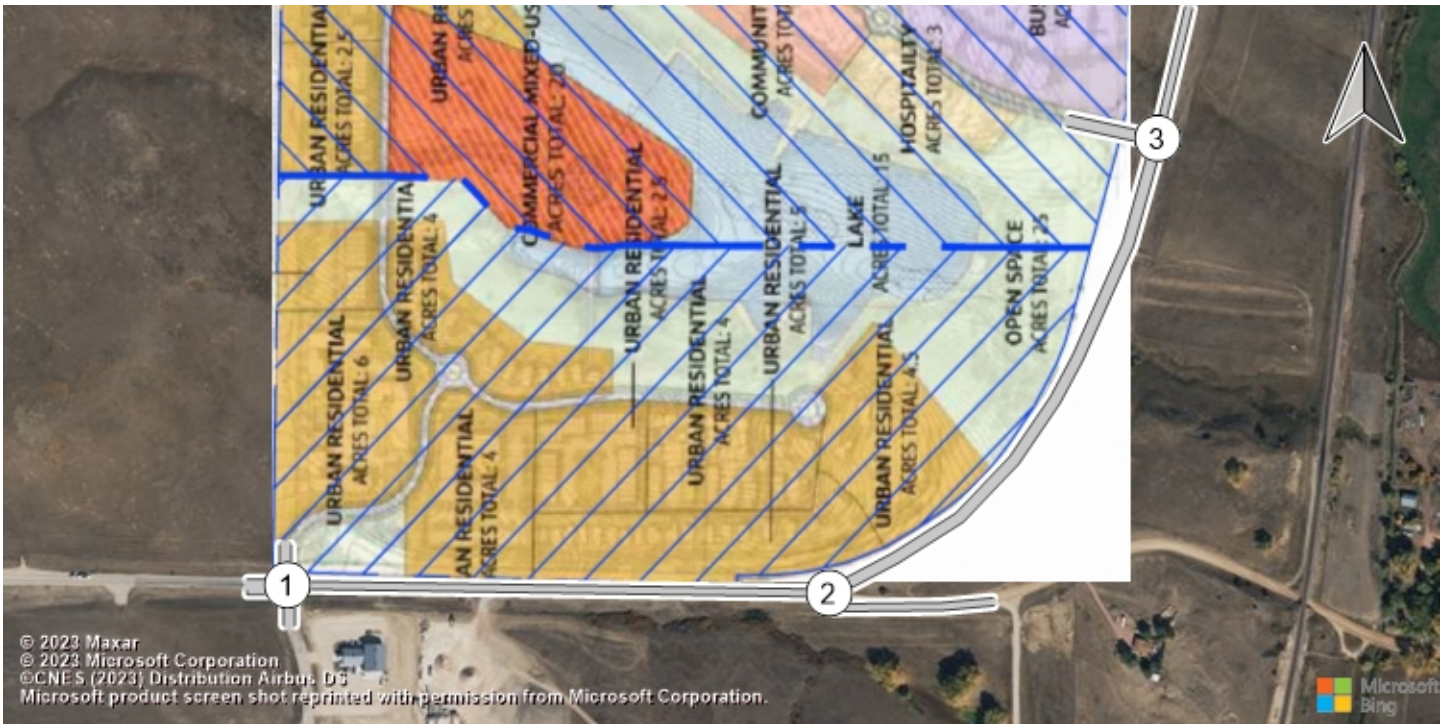


Figure 9 – Phase I + II Trip Assignment – Morning Peak Hour



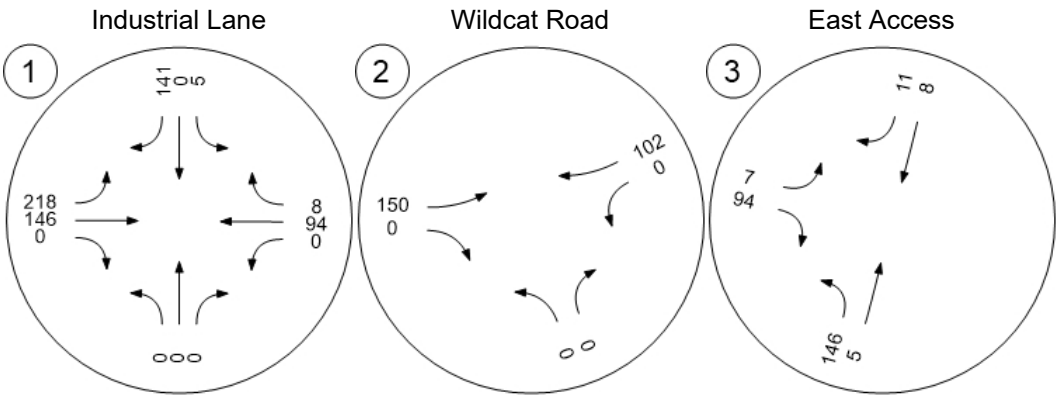


Figure 10 – Phase I + II Trip Assignment – Evening Peak Hour



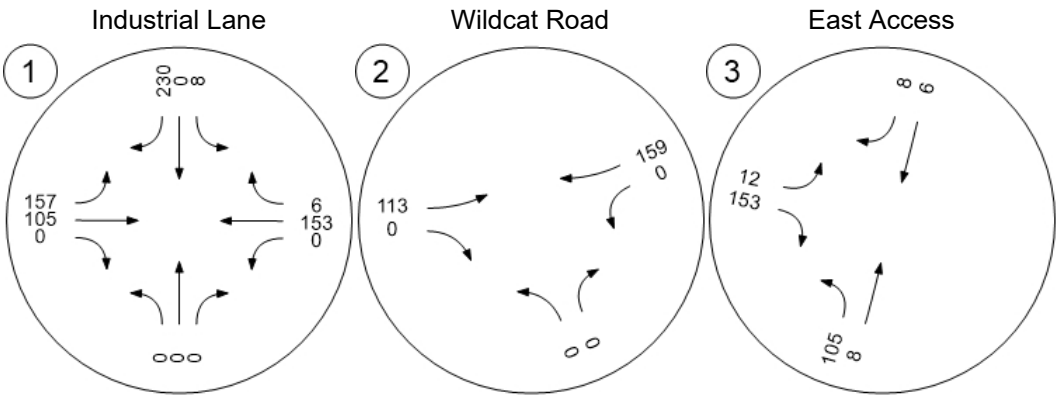
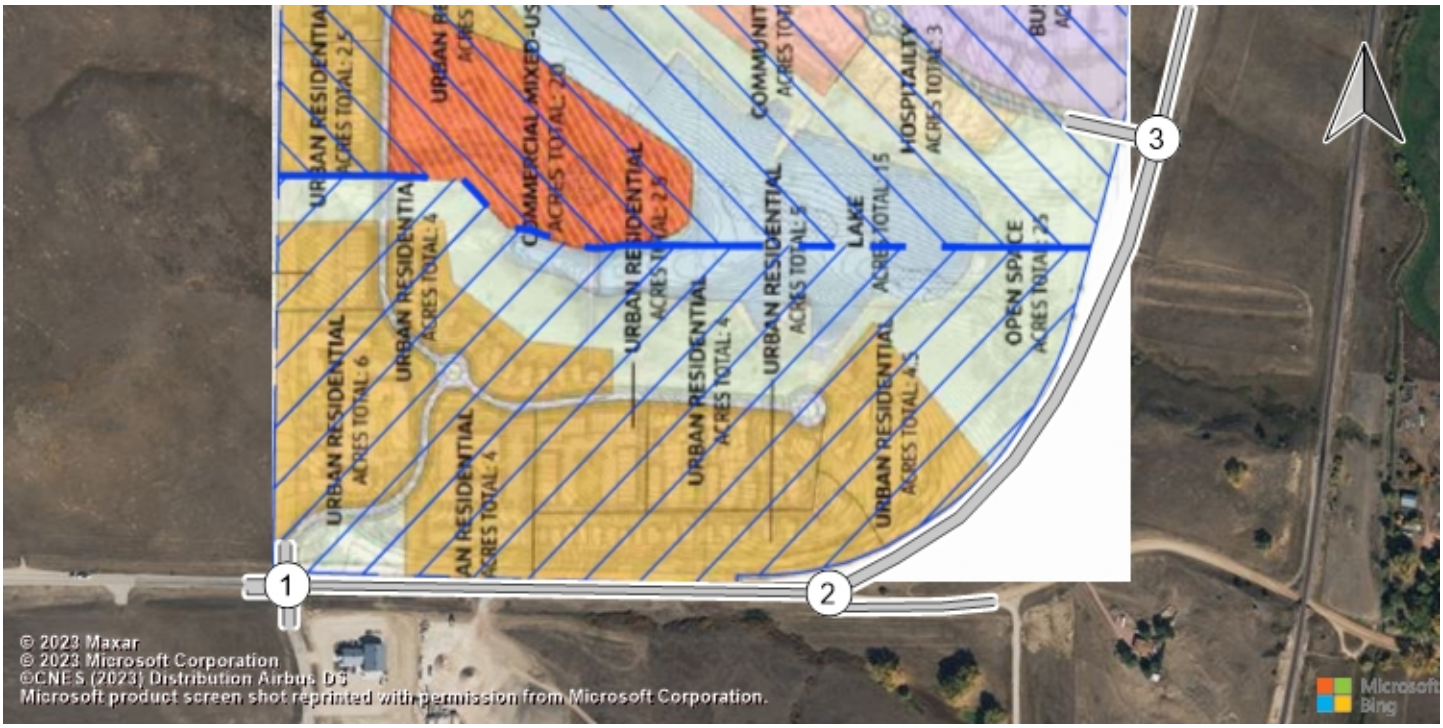


Figure 11 – Phase I + II + III Trip Assignment – Morning Peak Hour



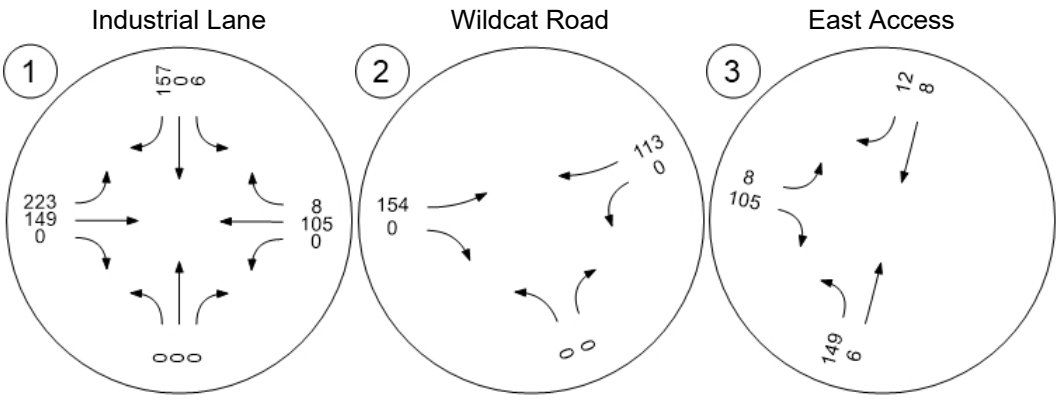


Figure 12 – Phase I + II + III Trip Assignment – Evening Peak Hour



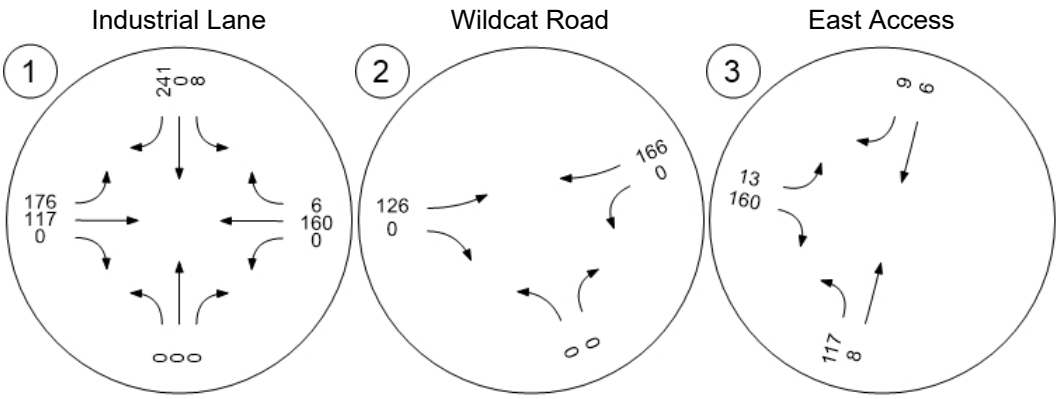


Figure 13 – Year 2026 Background Traffic Volumes – Morning Peak Hour



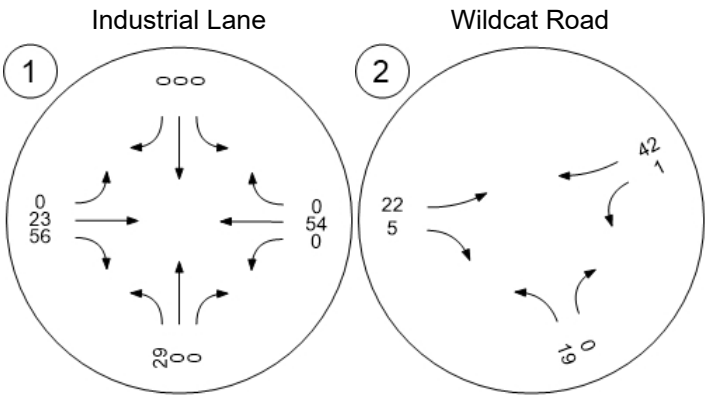


Figure 14 – Year 2026 Background Traffic Volumes – Evening Peak Hour



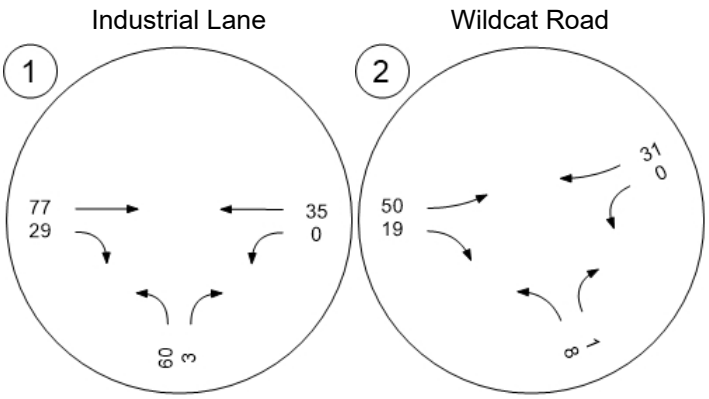


Figure 15 – Year 2026 Total Traffic Volumes – Morning Peak Hour



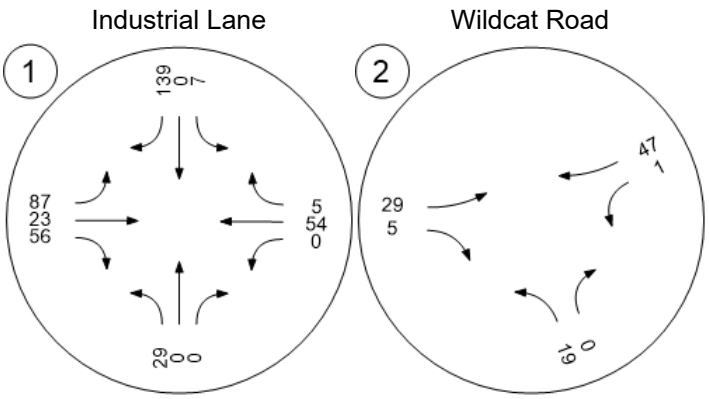


Figure 16 – Year 2026 Total Traffic Volumes – Evening Peak Hour



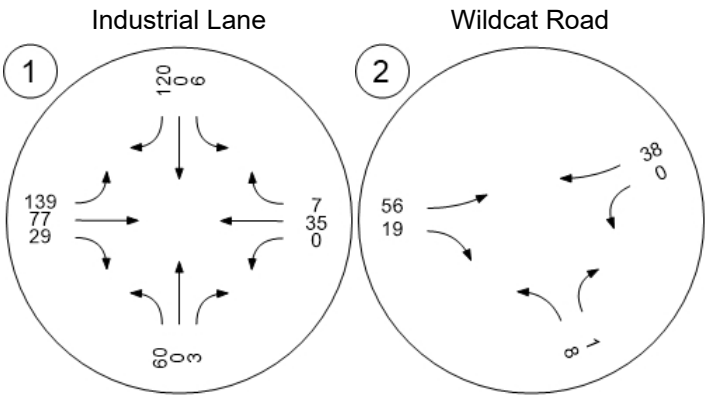


Figure 17 – Laneage and Traffic Control – Year 2026



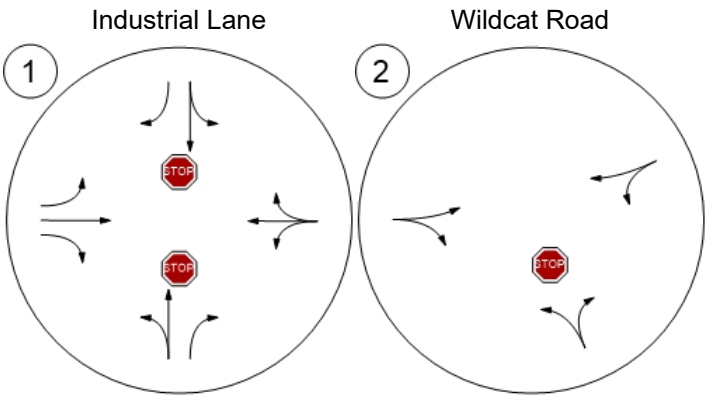


Figure 18 – Year 2031 Background Traffic Volumes – Morning Peak Hour



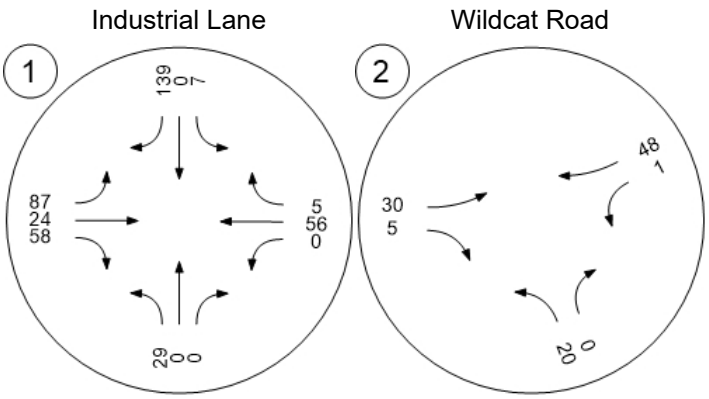


Figure 19 – Year 2031 Background Traffic Volumes – Evening Peak Hour



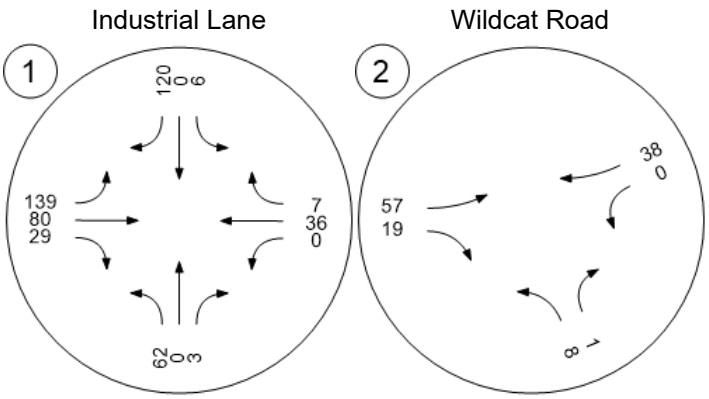
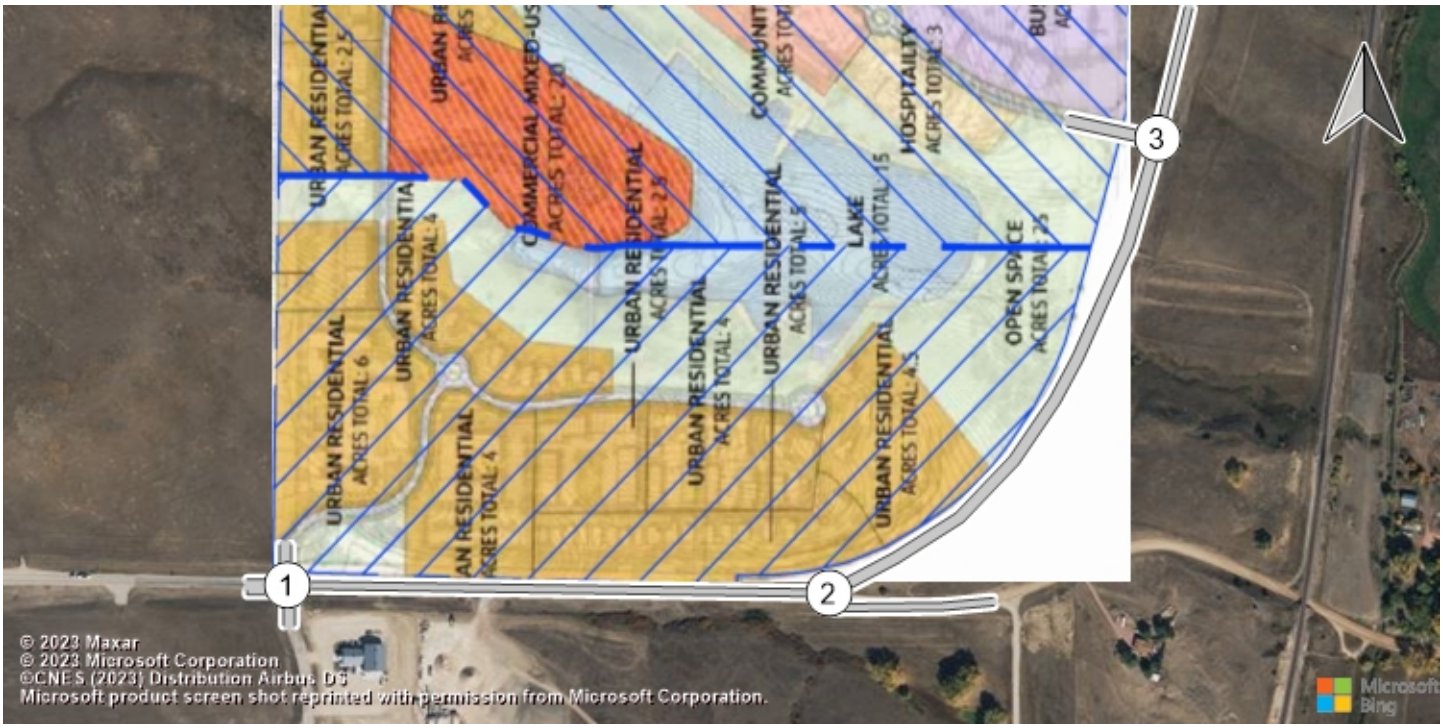


Figure 20 – Year 2031 Total Traffic Volumes – Morning Peak Hour



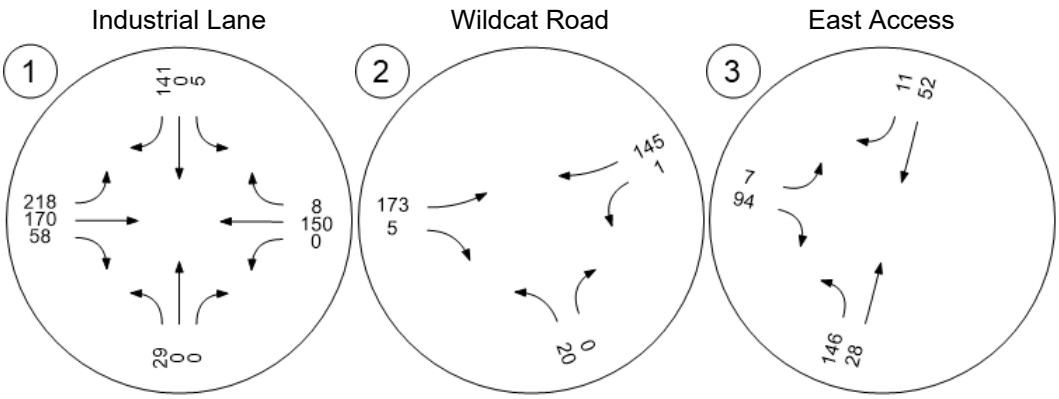


Figure 21 – Year 2031 Total Traffic Volumes – Evening Peak Hour



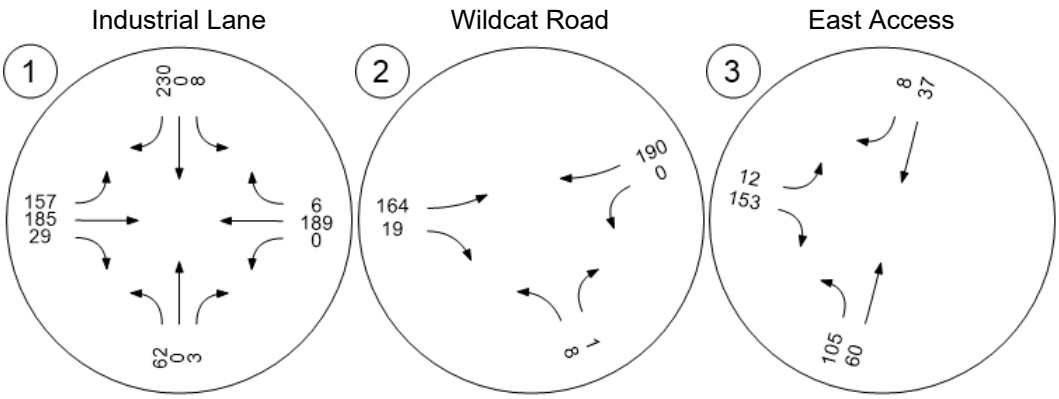
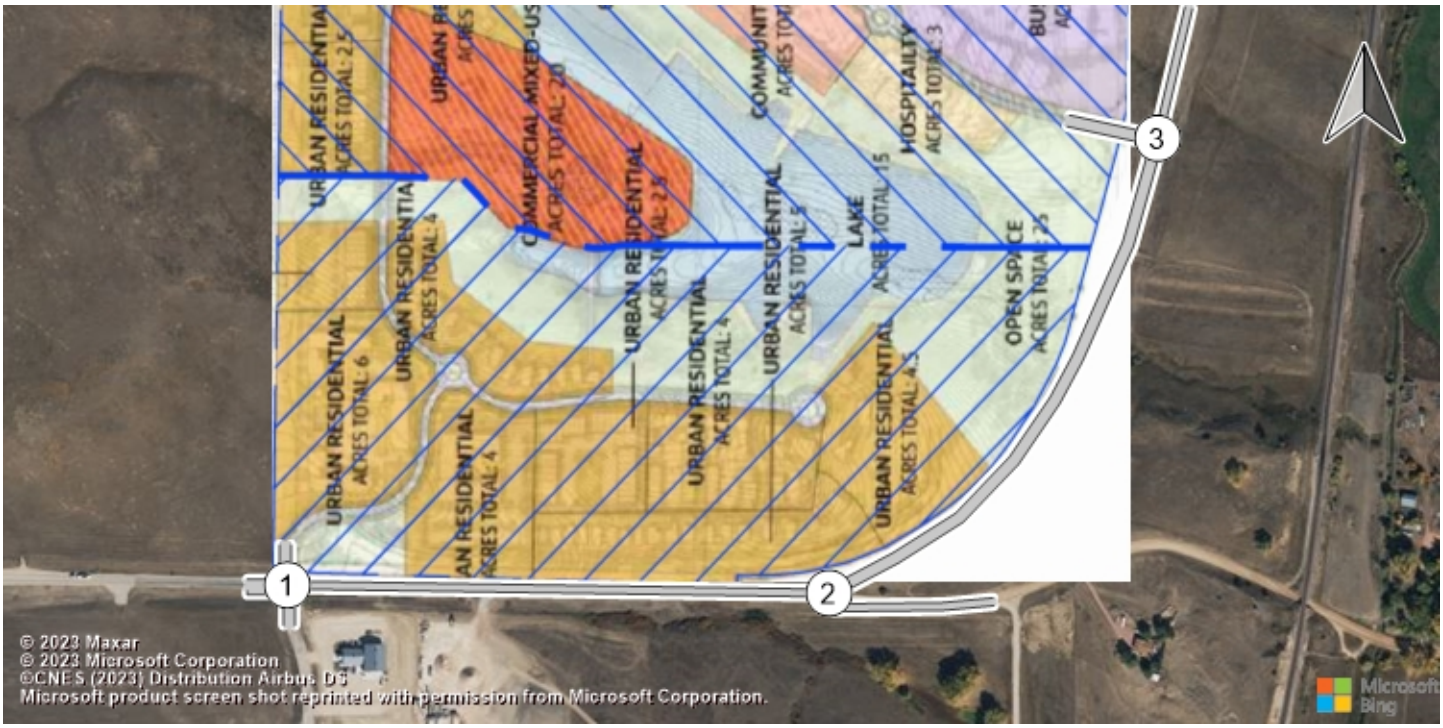


Figure 22 – Laneage and Traffic Control – Year 2031



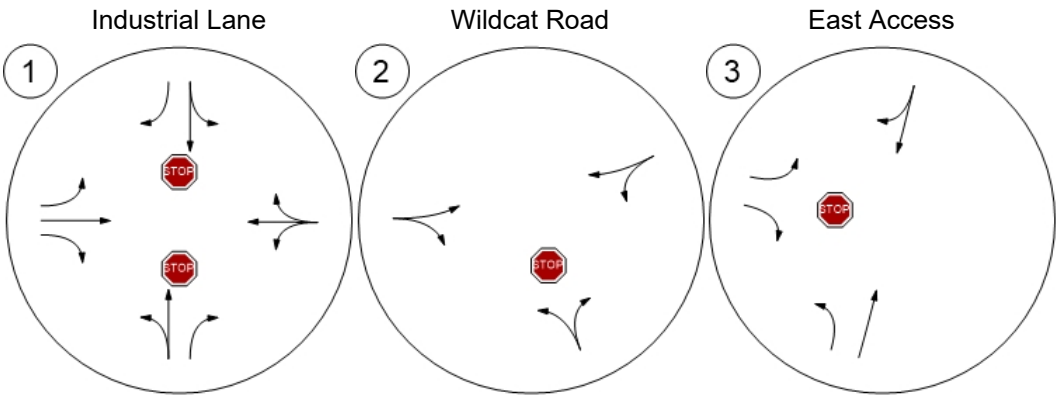
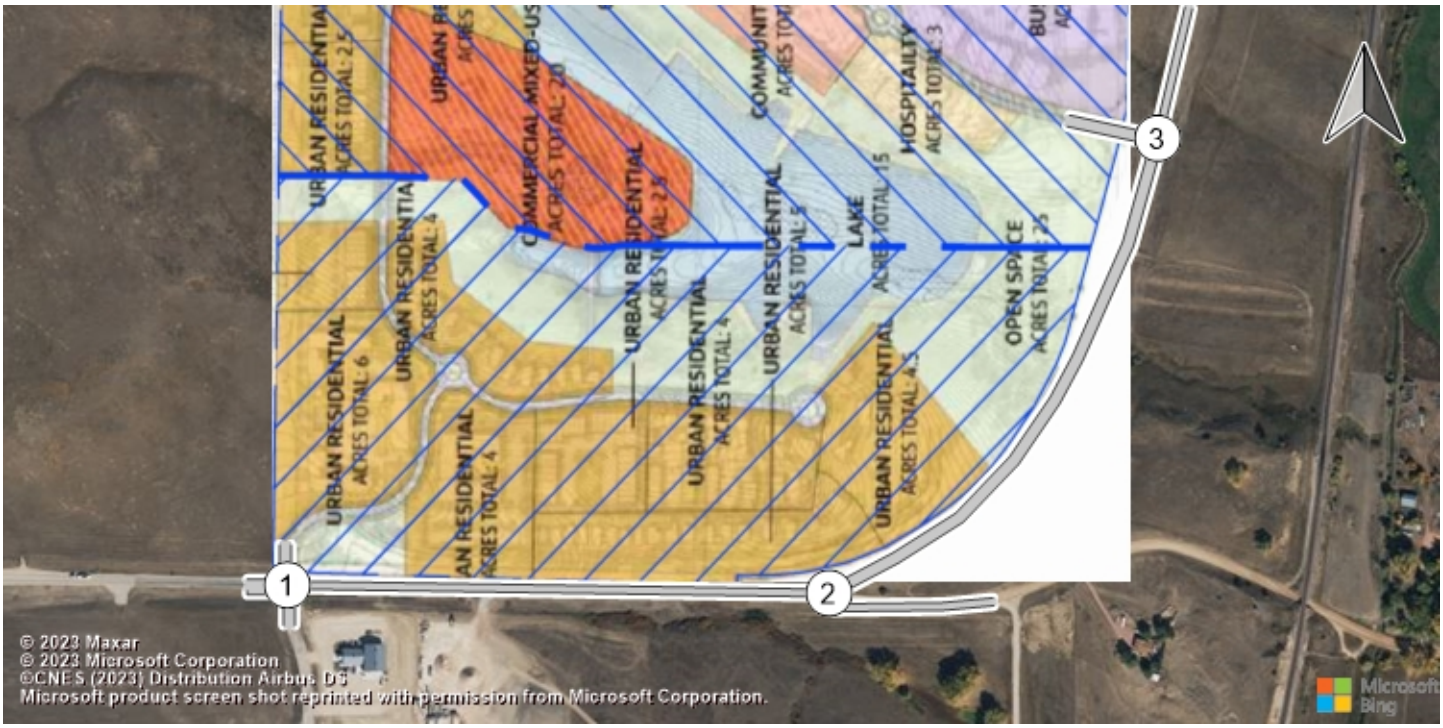


Figure 23 – Year 2034 Background Traffic Volumes – Morning Peak Hour



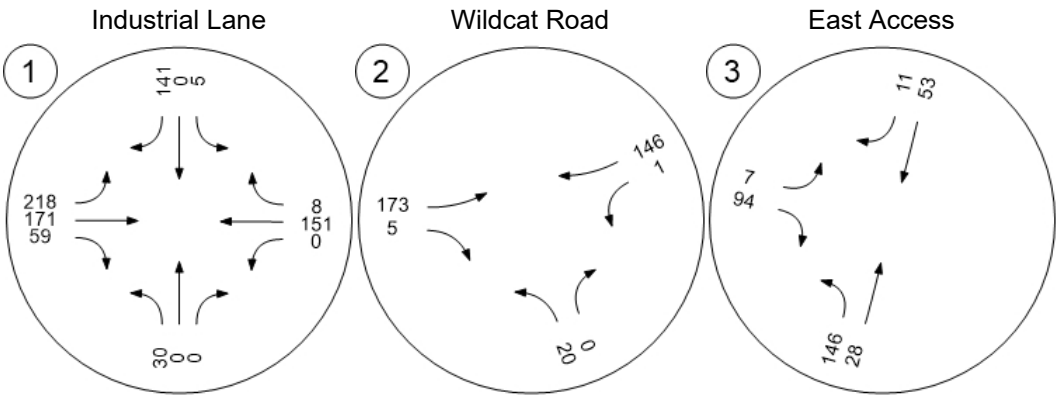


Figure 24 – Year 2034 Background Traffic Volumes – Evening Peak Hour



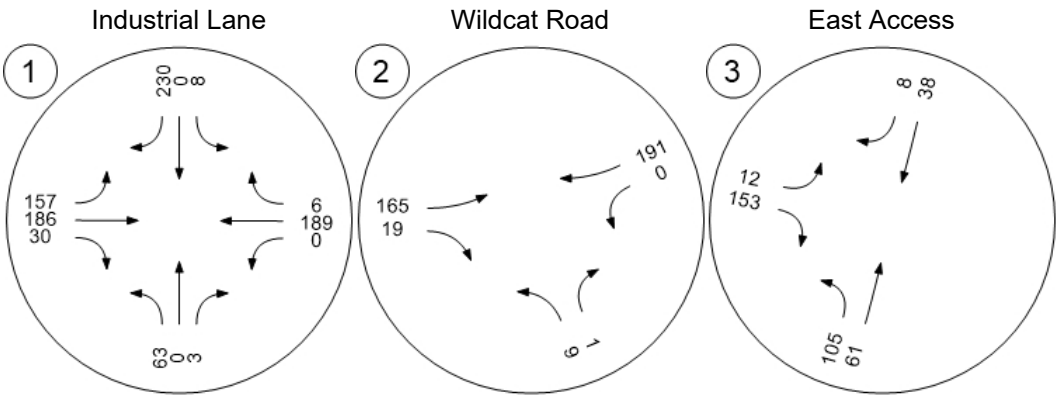
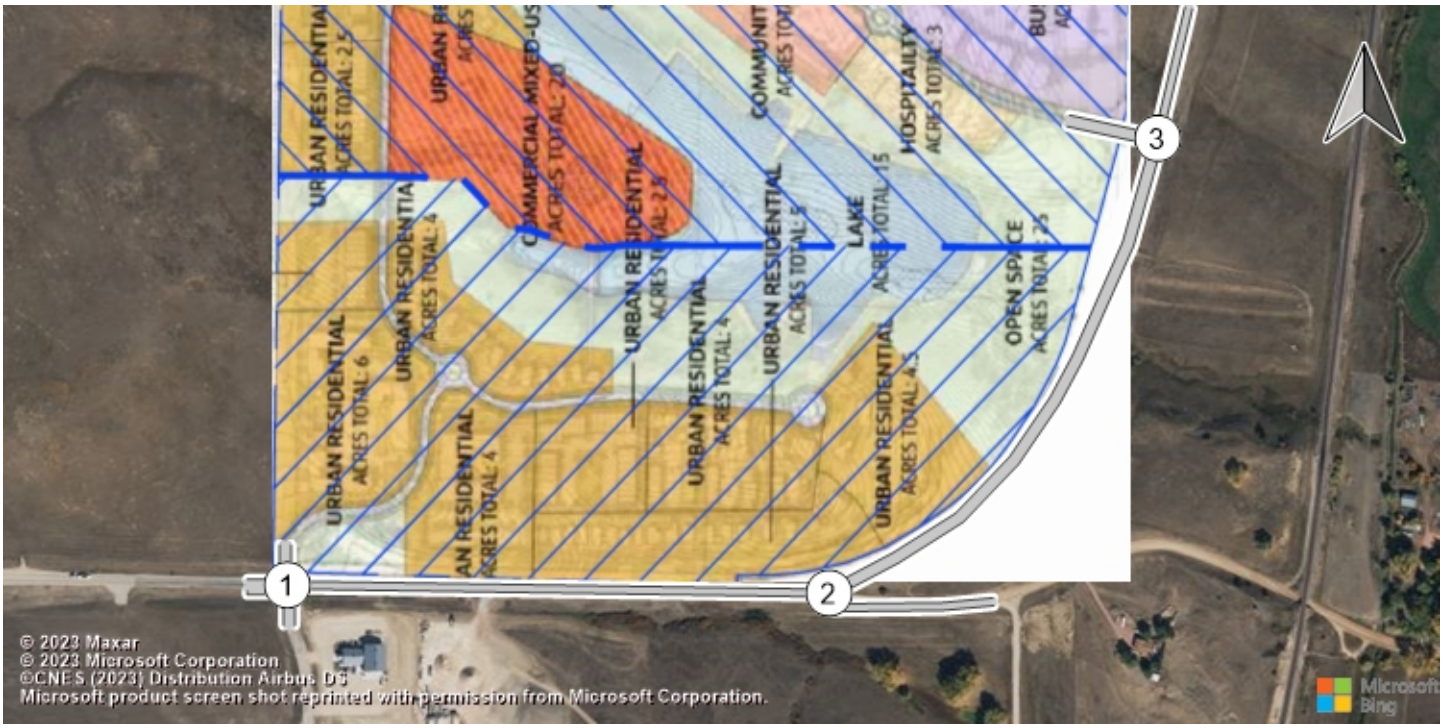


Figure 25 – Year 2034 Total Traffic Volumes – Morning Peak Hour



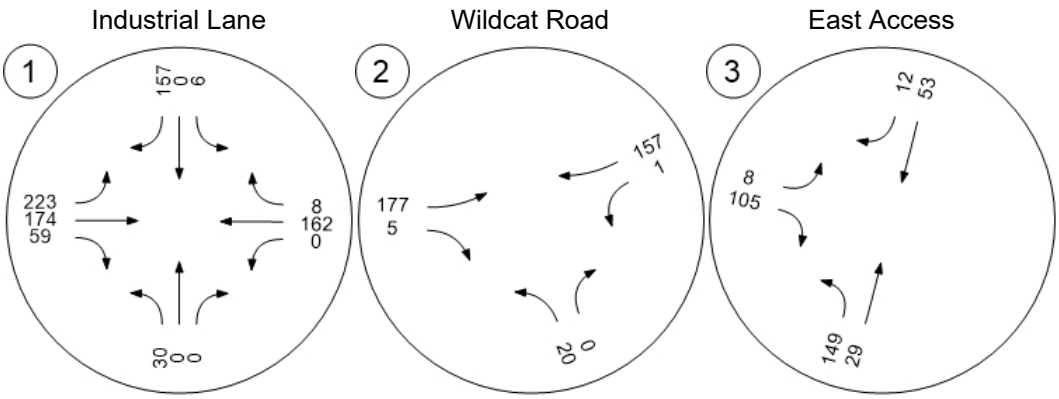


Figure 26 – Year 2034 Total Traffic Volumes – Evening Peak Hour



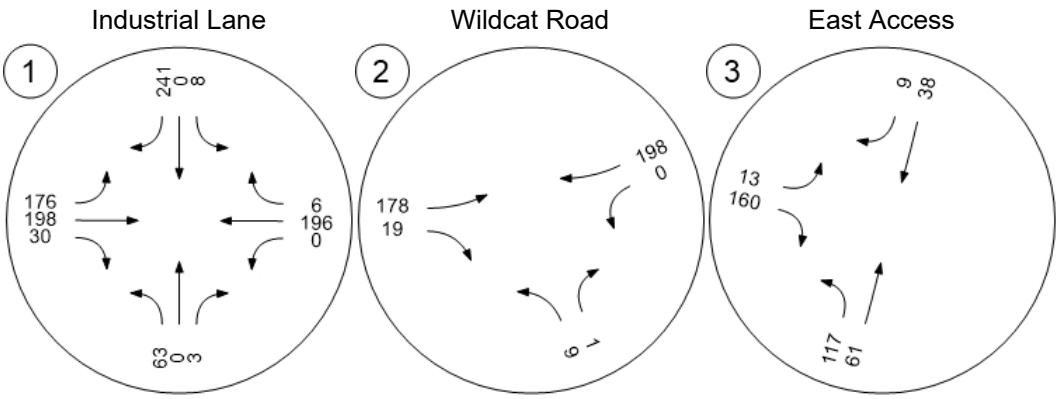


Figure 27 – Year 2043 Background Traffic Volumes – Morning Peak Hour



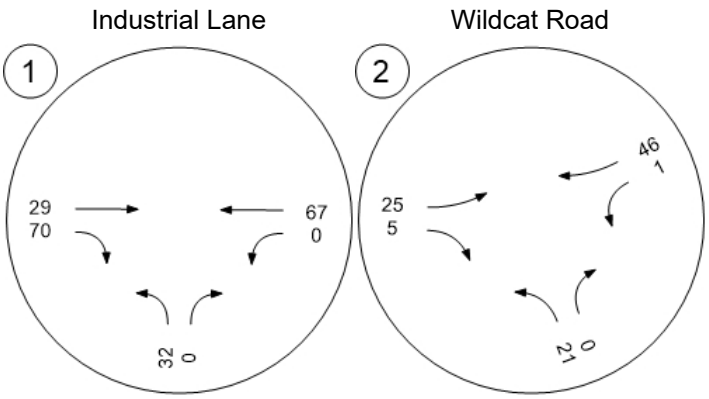


Figure 28 – Year 2043 Background Traffic Volumes – Evening Peak Hour



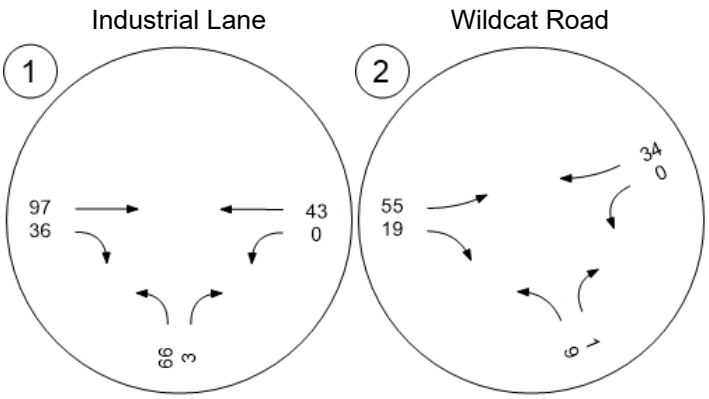
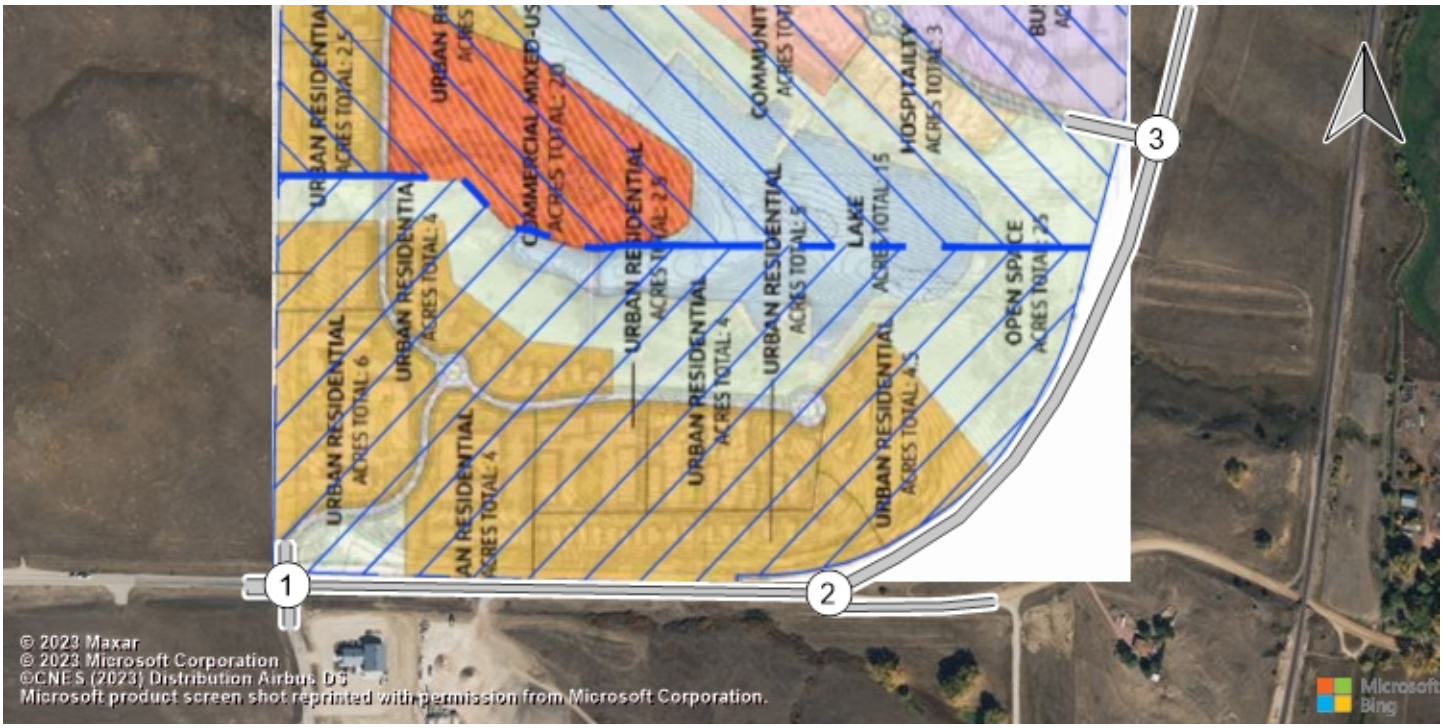


Figure 29 – Year 2043 Total Traffic Volumes – Morning Peak Hour



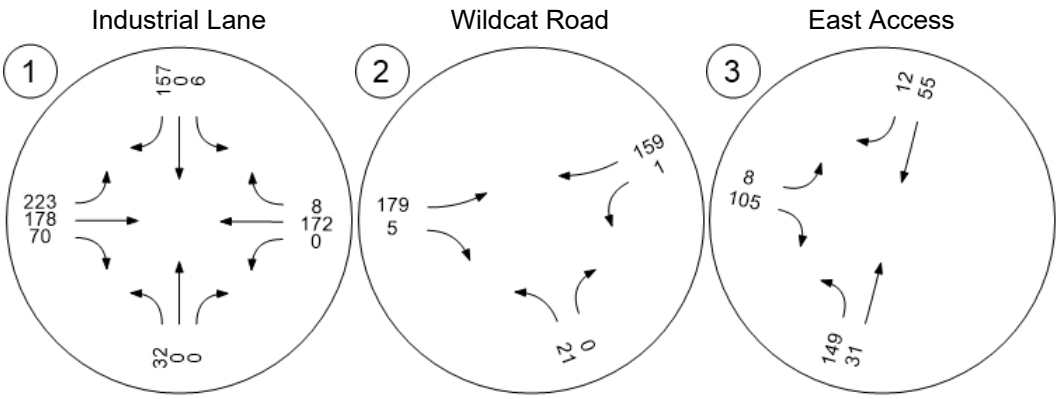


Figure 30 – Year 2043 Total Traffic Volumes – Evening Peak Hour



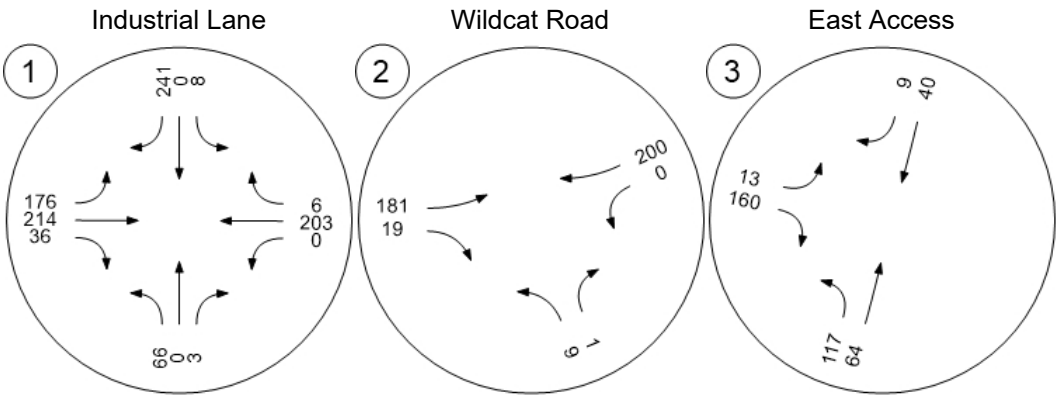
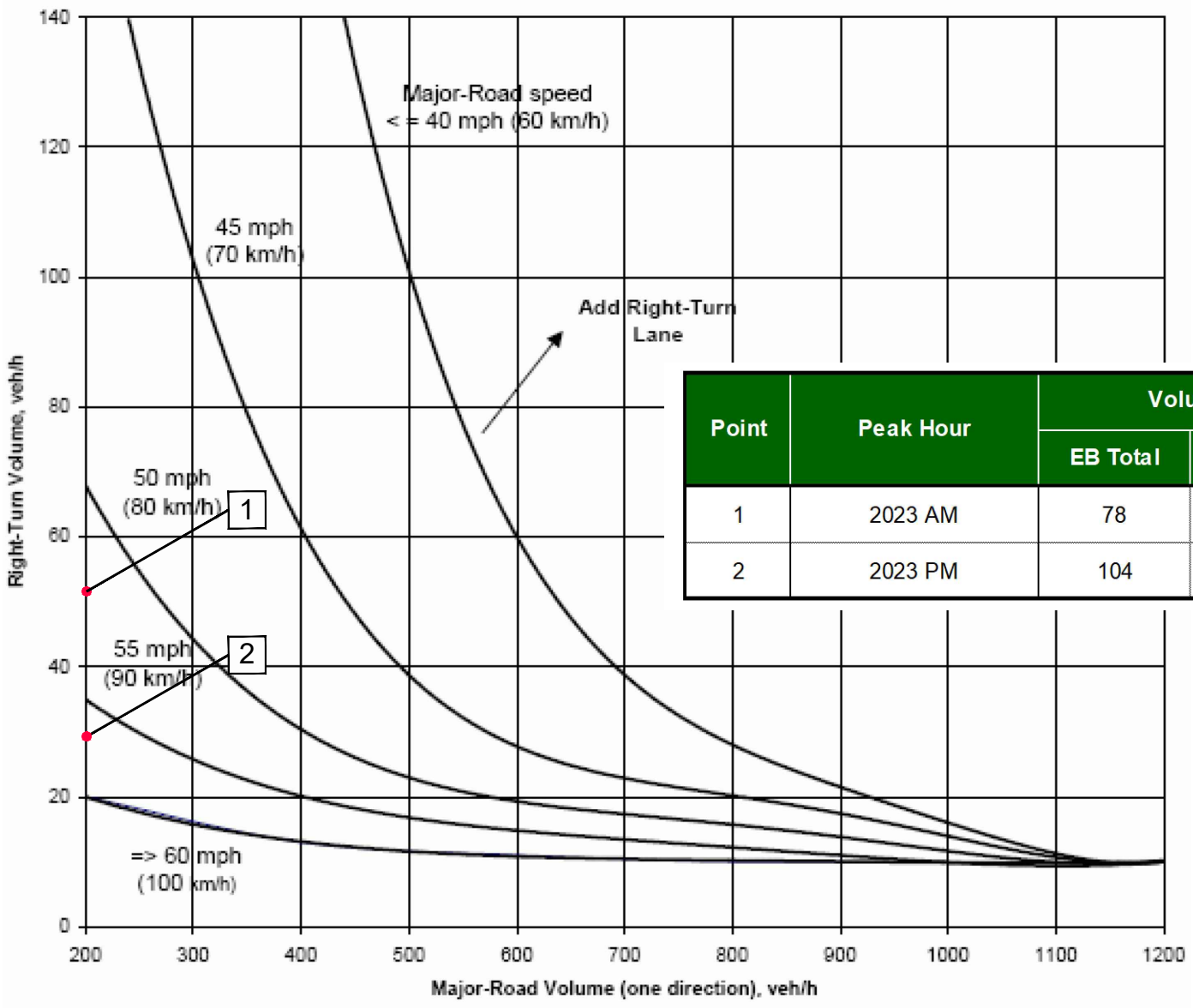


Figure 18-1 Right Turn Lane Guidelines for Two-Lane Highways

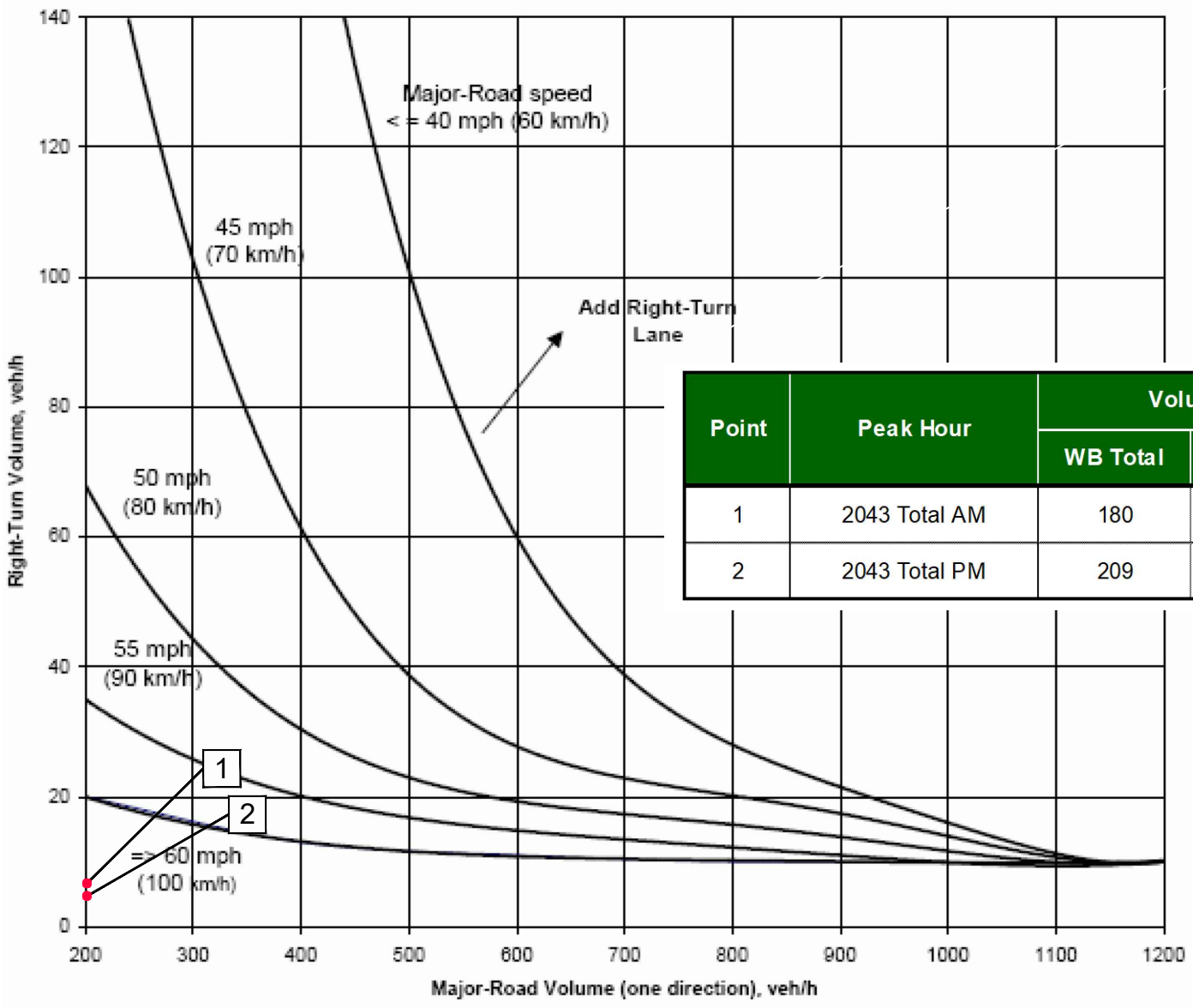


Point	Peak Hour	Volume	
		EB Total	EBRT
1	2023 AM	78	55
2	2023 PM	104	28

Story House Traffic Impact Study
NEED FOR AN EASTBOUND RIGHT TURN LANE AT INDUSTRIAL LANE

Scale	NTS	Date	October 6, 2023	Drawn by	JLH	Job #	WWC Engineering	Figure	31

Figure 18-1 Right Turn Lane Guidelines for Two-Lane Highways

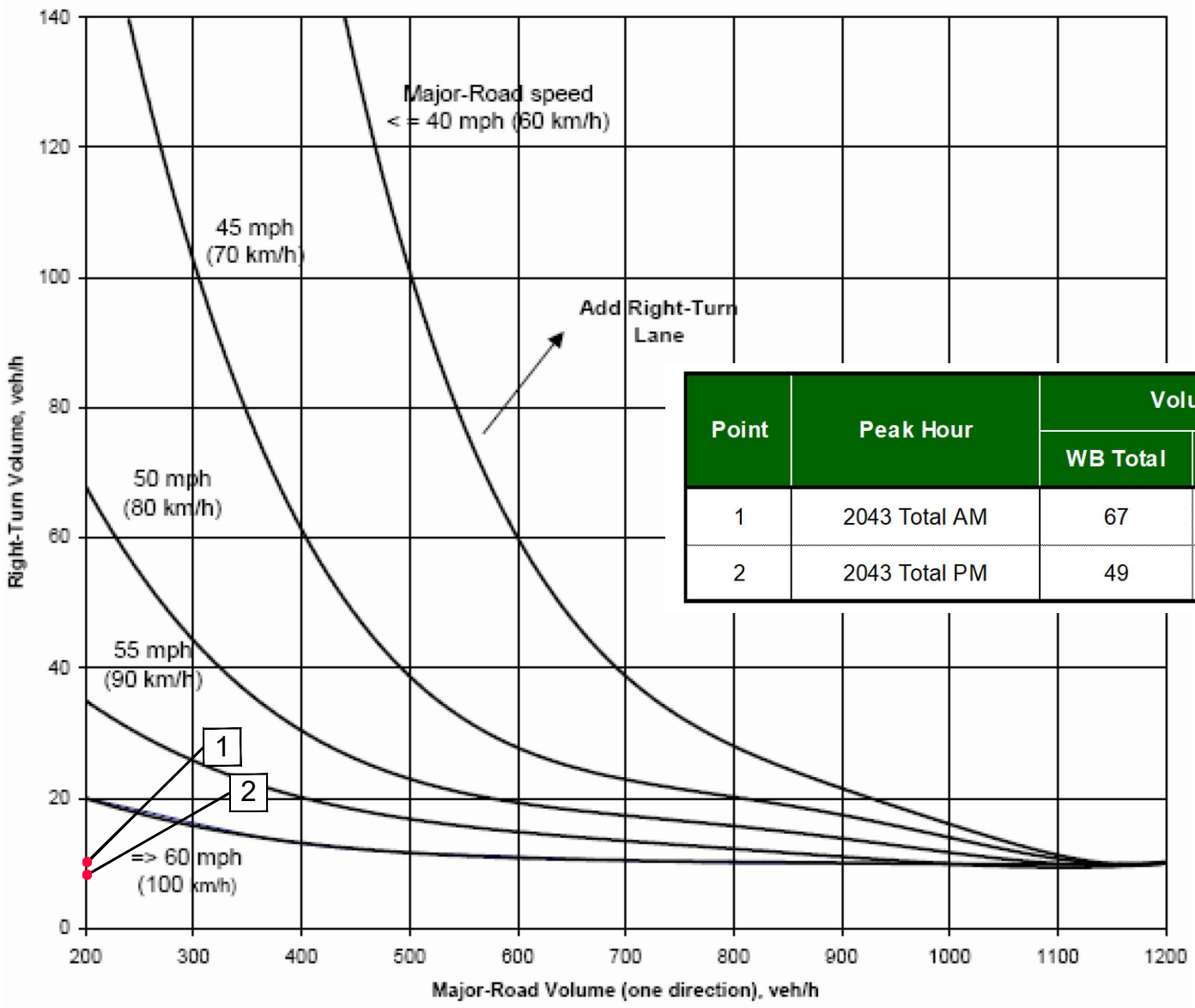


Point	Peak Hour	Volume	
		WB Total	WBRT
1	2043 Total AM	180	8
2	2043 Total PM	209	6

Story House Traffic Impact Study
NEED FOR A WESTBOUND RIGHT TURN LANE AT INDUSTRIAL LANE

Scale	NTS	Date	October 6, 2023	Drawn by	JLH	Job #	WWC Engineering	Figure	32

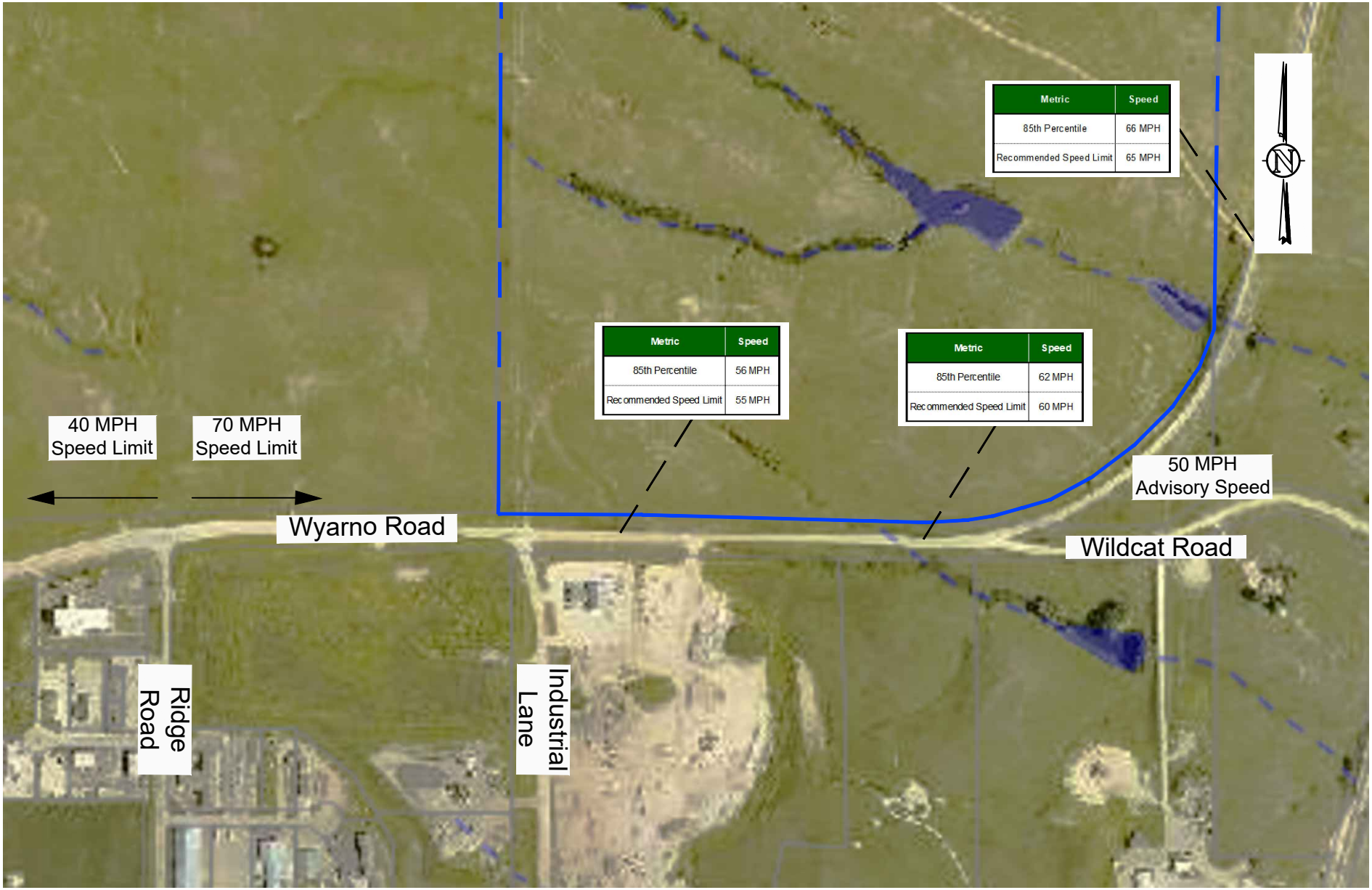
Figure 18-1 Right Turn Lane Guidelines for Two-Lane Highways



Point	Peak Hour	Volume	
		WB Total	WBRT
1	2043 Total AM	67	12
2	2043 Total PM	49	9

Story House Traffic Impact Study
NEED FOR A WESTBOUND RIGHT TURN LANE AT THE EAST ACCESS

Scale	NTS	Date	October 6, 2023	Drawn by	JLH	Job #	WWC Engineering	Figure	33



Story House Traffic Impact Study
WYARNO ROAD SPEED STUDY

Scale	1" = 500'	Date	October 6, 2023	Drawn by	JLH	Job #	WWC Engineering	Figure	34

Appendix A

Traffic Count Data

Industrial Lane

Morning Peak Hour

Date: July 19, 2023 (Wednesday)

Interval Starts	Northbound			Southbound			Eastbound			Westbound		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
6:30	3	0	0	0	0	0	0	8	22	0	9	0
6:45	4	0	0	0	0	0	0	8	24	0	15	0
7:00	8	0	0	0	0	0	0	2	4	0	12	0
7:15	13	0	0	0	0	0	0	5	5	0	17	0
Peak	**28**	**0**	**0**	**0**	**0**	**0**	**0**	**23**	**55**	**0**	**53**	**0**
PHF		**0.54**			**0.00**			**0.61**			**0.78**	

Evening Peak Hour

Date: July 19, 2023 (Wednesday)

Interval Starts	Northbound			Southbound			Eastbound			Westbound		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
16:45	10	0	1	0	0	0	0	18	8	0	7	0
17:00	19	0	1	0	0	0	0	15	12	0	11	0
17:15	20	0	0	0	0	0	0	21	8	0	8	0
17:30	10	0	1	0	0	0	0	22	0	0	8	0
Peak	**59**	**0**	**3**	**0**	**0**	**0**	**0**	**76**	**28**	**0**	**34**	**0**
PHF		**0.78**			**0.00**			**0.90**			**0.77**	

Wildcat Road

Morning Peak Hour

Date: July 20, 2023 (Thursday)

Interval Starts	Northbound			Southbound			Eastbound			Westbound		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
7:00	5	0	0	0	0	0	0	7	1	0	5	0
7:15	5	0	0	0	0	0	0	8	0	0	15	0
7:30	5	0	0	0	0	0	0	5	1	1	8	0
7:45	4	0	0	0	0	0	0	2	3	0	13	0
Peak	**19**	**0**	**0**	**0**	**0**	**0**	**0**	**22**	**5**	**1**	**41**	**0**
PHF		**0.95**			**0.00**			**0.84**			**0.70**	

Evening Peak Hour

Date: July 20, 2023 (Thursday)

Interval Starts	Northbound			Southbound			Eastbound			Westbound		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
16:30	1	0	0	0	0	0	0	8	3	0	9	0
16:45	2	0	1	0	0	0	0	18	5	0	13	0
17:00	0	0	0	0	0	0	0	11	6	0	2	0
17:15	5	0	0	0	0	0	0	12	5	0	6	0
Peak	**8**	**0**	**1**	**0**	**0**	**0**	**0**	**49**	**19**	**0**	**30**	**0**
PHF		**0.45**			**0.00**			**0.74**			**0.58**	

Traffic Count Summary

Industrial Lane Morning Peak Hour

Interval Starts	Northbound			Southbound			Eastbound			Westbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
6:30	3	0	0	0	0	0	0	8	22	0	9	0	42
6:45	4	0	0	0	0	0	0	8	24	0	15	0	51
7:00	8	0	0	0	0	0	0	2	4	0	12	0	26
7:15	13	0	0	0	0	0	0	5	5	0	17	0	40
7:30	15	0	0	0	0	0	0	5	5	0	11	0	36
7:45	12	0	0	0	0	0	0	8	9	0	19	0	48
8:00	8	0	0	0	0	0	0	6	6	0	10	0	30
8:15	8	0	0	0	0	0	0	10	6	0	12	0	36
Light	35	0	0	0	0	0	0	51	64	0	105	0	
Medium	1	0	0	0	0	0	0	1	1	0	0	0	
Heavy	35	0	0	0	0	0	0	0	16	0	0	0	
% Med + Hvy	51%	0%	0%	0%	0%	0%	0%	2%	21%	0%	0%	0%	

Peak Hour Calculator				
6:30-7:15	6:45-7:30	7:00-7:45	7:15-8:00	7:30-8:15
159	153	150	154	150

Industrial Lane Evening Peak Hour

Interval Starts	Northbound			Southbound			Eastbound			Westbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
4:00	7	0	0	0	0	0	0	15	5	0	16	0	43
4:15	1	0	0	0	0	0	0	11	7	0	9	0	28
4:30	8	0	0	0	0	0	0	14	8	0	7	0	37
4:45	10	0	1	0	0	0	0	18	8	0	7	0	44
5:00	19	0	1	0	0	0	0	15	12	0	11	0	58
5:15	20	0	0	0	0	0	0	21	8	0	8	0	57
5:30	10	0	1	0	0	0	0	22	0	0	8	0	41
5:45	2	0	0	0	0	0	0	11	1	0	6	0	20
Light	66	0	3	0	0	0	0	126	22	0	70	0	
Medium	0	0	0	0	0	0	0	0	0	0	1	0	
Heavy	11	0	0	0	0	0	0	1	27	0	1	0	
% Med + Hvy	14%	0%	0%	0%	0%	0%	0%	1%	55%	0%	3%	0%	

Peak Hour Calculator				
4:00-4:45	4:15-5:00	4:30-5:15	4:45-5:30	5:00-5:45
152	167	196	200	176

Traffic Count Summary

Wildcat Road Morning Peak Hour

Interval Starts	Northbound			Southbound			Eastbound			Westbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
6:30	2	0	0	0	0	0	0	4	3	0	6	0	15
6:45	3	0	0	0	0	0	0	3	2	0	10	0	18
7:00	5	0	0	0	0	0	0	7	1	0	5	0	18
7:15	5	0	0	0	0	0	0	8	0	0	15	0	28
7:30	5	0	0	0	0	0	0	5	1	0	8	1	20
7:45	4	0	0	0	0	0	0	2	3	0	13	0	22
8:00	4	0	1	0	0	0	0	6	0	0	6	0	17
8:15	1	0	1	0	0	0	0	6	2	0	7	0	17
Light	29	0	2	0	0	0	0	36	12	0	70	1	
Medium	0	0	0	0	0	0	0	5	0	0	0	0	
Heavy	0	0	0	0	0	0	0	0	0	0	0	0	
% Med + Hvy	0%	0%	0%	0%	0%	0%	0%	12%	0%	0%	0%	0%	

Peak Hour Calculator				
6:30-7:15	6:45-7:30	7:00-7:45	7:15-8:00	7:30-8:15
79	84	88	87	76

Wildcat Road Evening Peak Hour

Interval Starts	Northbound			Southbound			Eastbound			Westbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
4:00	0	0	0	0	0	0	0	10	3	0	7	0	20
4:15	0	0	0	0	0	0	0	3	1	0	4	0	8
4:30	1	0	0	0	0	0	0	8	3	0	9	0	21
4:45	2	0	1	0	0	0	0	18	5	0	13	0	39
5:00	0	0	0	0	0	0	0	11	6	0	2	0	19
5:15	5	0	0	0	0	0	0	12	5	0	6	0	28
5:30	1	0	0	0	0	0	0	7	3	0	8	0	19
5:45	2	0	0	0	0	0	0	7	5	0	6	0	20
Light	11	0	1	0	0	0	0	74	30	0	51	0	
Medium	0	0	0	0	0	0	0	1	0	0	1	0	
Heavy	0	0	0	0	0	0	0	1	1	0	3	0	
% Med + Hvy	0%	0%	0%	0%	0%	0%	0%	3%	3%	0%	7%	0%	

Peak Hour Calculator				
4:00-4:45	4:15-5:00	4:30-5:15	4:45-5:30	5:00-5:45
88	87	107	105	86

Appendix B

VISTRO Analysis Results

Year 2023 Volumes

Story House TIS

Vistro File: C:\...\AM.vistro
Report File: C:\...\2023 AM.pdf

Scenario 1 2023 AM
10/5/2023

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Industrial Lane	Two-way stop	HCM 7th Edition	NB Left	0.070	10.2	B
2	Wildcat Road	Two-way stop	HCM 7th Edition	NB Left	0.022	9.0	A

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: Industrial Lane

Control Type:	Two-way stop	Delay (sec / veh):	10.2
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.070

Intersection Setup

Name	Industrial Lane		Wyarno Road		Wyarno Road	
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		70.00		70.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Industrial Lane		Wyarno Road		Wyarno Road	
Base Volume Input [veh/h]	28	0	23	55	0	53
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	51.00	2.00	2.00	21.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	28	0	23	55	0	53
Peak Hour Factor	0.5400	0.5400	0.6100	0.6100	0.7800	0.7800
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	13	0	9	23	0	17
Total Analysis Volume [veh/h]	52	0	38	90	0	68
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.07	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	10.24	8.69	0.00	0.00	7.47	0.00
Movement LOS	B	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.23	0.00	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	5.67	0.00	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	10.24		0.00		0.00	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	2.15					
Intersection LOS	B					

Intersection Level Of Service Report
Intersection 2: Wildcat Road

Control Type:	Two-way stop	Delay (sec / veh):	9.0
Analysis Method:	HCM 7th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.022

Intersection Setup

Name	Wildcat Road		Wyarno Road		Wyarno Road	
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		70.00		70.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Wildcat Road		Wyarno Road		Wyarno Road	
Base Volume Input [veh/h]	19	0	22	5	1	41
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	12.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	19	0	22	5	1	41
Peak Hour Factor	0.9500	0.9500	0.8400	0.8400	0.7000	0.7000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	5	0	7	1	0	15
Total Analysis Volume [veh/h]	20	0	26	6	1	59
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.02	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	9.05	8.53	0.00	0.00	7.28	0.00
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.07	0.07	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	1.68	1.68	0.00	0.00	0.04	0.04
d_A, Approach Delay [s/veh]	9.05		0.00		0.12	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	1.68					
Intersection LOS	A					

Story House TIS

Vistro File: C:\...\PM.vistro
Report File: C:\...\2023 PM.pdf

Scenario 1 2023 PM
10/5/2023

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Industrial Lane	Two-way stop	HCM 7th Edition	NB Left	0.093	9.8	A
2	Wildcat Road	Two-way stop	HCM 7th Edition	NB Left	0.021	9.3	A

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: Industrial Lane

Control Type:	Two-way stop	Delay (sec / veh):	9.8
Analysis Method:	HCM 7th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.093

Intersection Setup

Name	Industrial Lane		Wyarno Road		Wyarno Road	
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Industrial Lane		Wyarno Road		Wyarno Road	
Base Volume Input [veh/h]	59	3	76	28	0	34
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	14.00	2.00	2.00	55.00	2.00	3.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	59	3	76	28	0	34
Peak Hour Factor	0.7800	0.7800	0.9000	0.9000	0.7700	0.7700
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	19	1	21	8	0	11
Total Analysis Volume [veh/h]	76	4	84	31	0	44
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.09	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	9.83	8.78	0.00	0.00	7.44	0.00
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.30	0.01	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	7.62	0.32	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	9.78		0.00		0.00	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	3.27					
Intersection LOS	A					

Intersection Level Of Service Report
Intersection 2: Wildcat Road

Control Type:	Two-way stop	Delay (sec / veh):	9.3
Analysis Method:	HCM 7th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.021

Intersection Setup

Name	Wildcat Road		Wyarno Road		Wyarno Road	
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Wildcat Road		Wyarno Road		Wyarno Road	
Base Volume Input [veh/h]	8	1	49	19	0	30
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	3.00	3.00	2.00	7.00
Growth Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	8	1	49	19	0	30
Peak Hour Factor	0.4500	0.4500	0.7400	0.7400	0.5800	0.5800
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	4	1	17	6	0	13
Total Analysis Volume [veh/h]	18	2	66	26	0	52
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.02	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	9.27	8.76	0.00	0.00	7.40	0.00
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.07	0.07	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	1.76	1.76	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	9.22		0.00		0.00	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	1.12					
Intersection LOS	A					

Year 2026 Traffic Volume Scenarios

Story House TIS

Vistro File: C:\...\AM.vistro
Report File: C:\...\2026 Back AM.pdf

Scenario 8 2026 Back AM
10/5/2023

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Industrial Lane	Two-way stop	HCM 7th Edition	NB Left	0.070	10.0	B
2	Wildcat Road	Two-way stop	HCM 7th Edition	NB Left	0.022	9.1	A

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: Industrial Lane

Control Type:	Two-way stop	Delay (sec / veh):	10.0
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.070

Intersection Setup

Name	Industrial Lane			West Access			Wyarno Road			Wyarno Road		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0	0	0	1	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			70.00			70.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Industrial Lane			West Access			Wyarno Road			Wyarno Road		
Base Volume Input [veh/h]	28	0	0	0	0	0	0	23	55	0	53	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	51.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	21.00	2.00	2.00	2.00
Growth Factor	1.0180	1.0180	1.0180	1.0000	1.0000	1.0000	1.0000	1.0180	1.0180	1.0180	1.0180	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	29	0	0	0	0	0	0	23	56	0	54	0
Peak Hour Factor	0.5400	0.5400	0.5400	0.8500	0.8500	0.8500	0.6100	0.6100	0.6100	0.7800	0.7800	0.7800
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	13	0	0	0	0	0	0	9	23	0	17	0
Total Analysis Volume [veh/h]	54	0	0	0	0	0	0	38	92	0	69	0
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane				
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No	No		
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.07	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	10.04	9.95	8.48	9.42	10.17	8.62	7.35	0.00	0.00	7.47	0.00	0.00
Movement LOS	B	A	A	A	B	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.23	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	5.65	5.65	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	10.04			9.40			0.00			0.00		
Approach LOS	B			A			A			A		
d_I, Intersection Delay [s/veh]	2.14											
Intersection LOS	B											

Intersection Level Of Service Report
Intersection 2: Wildcat Road

Control Type:	Two-way stop	Delay (sec / veh):	9.1
Analysis Method:	HCM 7th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.022

Intersection Setup

Name	Wildcat Road		Wyarno Road		Wyarno Road	
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		70.00		70.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Wildcat Road		Wyarno Road		Wyarno Road	
Base Volume Input [veh/h]	19	0	22	5	1	41
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	12.00	2.00	2.00	2.00
Growth Factor	1.0180	1.0000	1.0180	1.0000	1.0000	1.0180
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	19	0	22	5	1	42
Peak Hour Factor	0.9500	0.9500	0.8400	0.8400	0.7000	0.7000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	5	0	7	1	0	15
Total Analysis Volume [veh/h]	20	0	26	6	1	60
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.02	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	9.05	8.53	0.00	0.00	7.28	0.00
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.07	0.07	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	1.69	1.69	0.00	0.00	0.04	0.04
d_A, Approach Delay [s/veh]	9.05		0.00		0.12	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	1.67					
Intersection LOS	A					

Story House TIS

Vistro File: C:\...\PM.vistro
Report File: C:\...\2026 Back PM.pdf

Scenario 8 2026 Back PM
10/5/2023

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Industrial Lane	Two-way stop	HCM 7th Edition	NB Left	0.092	9.7	A
2	Wildcat Road	Two-way stop	HCM 7th Edition	NB Left	0.021	9.3	A

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: Industrial Lane

Control Type:	Two-way stop	Delay (sec / veh):	9.7
Analysis Method:	HCM 7th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.092

Intersection Setup

Name	Industrial Lane		Wyarno Road		Wyarno Road	
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	1	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Industrial Lane		Wyarno Road		Wyarno Road	
Base Volume Input [veh/h]	59	3	76	28	0	34
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	14.00	2.00	2.00	55.00	2.00	3.00
Growth Factor	1.0180	1.0180	1.0180	1.0180	1.0180	1.0180
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	60	3	77	29	0	35
Peak Hour Factor	0.7800	0.7800	0.9000	0.9000	0.7700	0.7700
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	19	1	21	8	0	11
Total Analysis Volume [veh/h]	77	4	86	32	0	45
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.09	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	9.75	8.72	0.00	0.00	7.45	0.00
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.30	0.01	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	7.59	0.31	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	9.70		0.00		0.00	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	3.22					
Intersection LOS	A					

Intersection Level Of Service Report
Intersection 2: Wildcat Road

Control Type:	Two-way stop	Delay (sec / veh):	9.3
Analysis Method:	HCM 7th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.021

Intersection Setup

Name	Wildcat Road		Wyarno Road		Wyarno Road	
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Wildcat Road		Wyarno Road		Wyarno Road	
Base Volume Input [veh/h]	8	1	49	19	0	30
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	3.00	3.00	2.00	7.00
Growth Factor	1.0180	1.0000	1.0180	1.0000	1.0000	1.0180
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	8	1	50	19	0	31
Peak Hour Factor	0.4500	0.4500	0.7400	0.7400	0.5800	0.5800
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	4	1	17	6	0	13
Total Analysis Volume [veh/h]	18	2	68	26	0	53
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.02	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	9.28	8.77	0.00	0.00	7.40	0.00
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.07	0.07	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	1.76	1.76	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	9.23		0.00		0.00	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	1.11					
Intersection LOS	A					

Story House TIS

Vistro File: C:\...\AM.vistro
Report File: C:\...\2026 Total AM.pdf

Scenario 3 2026 Total AM
10/5/2023

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Industrial Lane	Two-way stop	HCM 7th Edition	NB Left	0.168	18.4	C
2	Wildcat Road	Two-way stop	HCM 7th Edition	NB Left	0.022	9.1	A

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: Industrial Lane

Control Type:	Two-way stop	Delay (sec / veh):	18.4
Analysis Method:	HCM 7th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.168

Intersection Setup

Name	Industrial Lane			West Access			Wyarno Road			Wyarno Road		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0	1	0	1	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			70.00			70.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Industrial Lane			West Access			Wyarno Road			Wyarno Road		
Base Volume Input [veh/h]	28	0	0	0	0	0	0	23	55	0	53	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	51.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	21.00	2.00	2.00	2.00
Growth Factor	1.0180	1.0180	1.0180	1.0000	1.0000	1.0000	1.0000	1.0180	1.0180	1.0180	1.0180	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	7	0	139	87	0	0	0	0	5
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	29	0	0	7	0	139	87	23	56	0	54	5
Peak Hour Factor	0.5400	0.5400	0.5400	0.8500	0.8500	0.8500	0.6100	0.6100	0.6100	0.7800	0.7800	0.7800
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	13	0	0	2	0	41	36	9	23	0	17	2
Total Analysis Volume [veh/h]	54	0	0	8	0	164	143	38	92	0	69	6
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane				
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No	No		
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.17	0.00	0.00	0.02	0.00	0.17	0.09	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	18.43	14.61	8.48	12.69	13.40	9.36	7.61	0.00	0.00	7.47	0.00	0.00
Movement LOS	C	B	A	B	B	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.59	0.59	0.00	0.05	0.05	0.59	0.31	0.00	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	14.86	14.86	0.00	1.28	1.28	14.80	7.75	0.00	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	18.43			9.51			3.98			0.00		
Approach LOS	C			A			A			A		
d_I, Intersection Delay [s/veh]	6.48											
Intersection LOS	C											

Intersection Level Of Service Report
Intersection 2: Wildcat Road

Control Type:	Two-way stop	Delay (sec / veh):	9.1
Analysis Method:	HCM 7th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.022

Intersection Setup

Name	Wildcat Road		Wyarno Road		Wyarno Road	
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		70.00		70.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Wildcat Road		Wyarno Road		Wyarno Road	
Base Volume Input [veh/h]	19	0	22	5	1	41
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	12.00	2.00	2.00	2.00
Growth Factor	1.0180	1.0000	1.0180	1.0000	1.0000	1.0180
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	7	0	0	5
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	19	0	29	5	1	47
Peak Hour Factor	0.9500	0.9500	0.8400	0.8400	0.7000	0.7000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	5	0	9	1	0	17
Total Analysis Volume [veh/h]	20	0	35	6	1	67
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.02	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	9.14	8.57	0.00	0.00	7.30	0.00
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.07	0.07	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	1.72	1.72	0.00	0.00	0.04	0.04
d_A, Approach Delay [s/veh]	9.14		0.00		0.11	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	1.47					
Intersection LOS	A					

Story House TIS

Vistro File: C:\...\PM.vistro
Report File: C:\...\2026 Total PM.pdf

Scenario 3 2026 Total PM
10/5/2023

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Industrial Lane	Two-way stop	HCM 7th Edition	NB Left	0.219	18.1	C
2	Wildcat Road	Two-way stop	HCM 7th Edition	NB Left	0.022	9.4	A

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: Industrial Lane

Control Type:	Two-way stop	Delay (sec / veh):	18.1
Analysis Method:	HCM 7th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.219

Intersection Setup

Name	Industrial Lane			West Access			Wyarno Road			Wyarno Road		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0	1	0	1	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Industrial Lane			West Access			Wyarno Road			Wyarno Road		
Base Volume Input [veh/h]	59	0	3	0	0	0	0	76	28	0	34	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	14.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	55.00	2.00	3.00	2.00
Growth Factor	1.0180	1.0180	1.0180	1.0000	1.0000	1.0000	1.0000	1.0180	1.0180	1.0180	1.0180	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	6	0	120	139	0	0	0	0	7
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	60	0	3	6	0	120	139	77	29	0	35	7
Peak Hour Factor	0.7800	0.7800	0.7800	0.8500	0.8500	0.8500	0.9000	0.9000	0.9000	0.7700	0.7700	0.7700
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	19	0	1	2	0	35	39	21	8	0	11	2
Total Analysis Volume [veh/h]	77	0	4	7	0	141	154	86	32	0	45	9
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane				
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No	No		
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.22	0.00	0.00	0.02	0.00	0.14	0.10	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	18.11	15.76	8.72	12.99	13.31	9.10	7.58	0.00	0.00	7.45	0.00	0.00
Movement LOS	C	C	A	B	B	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.82	0.82	0.01	0.05	0.05	0.48	0.33	0.00	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	20.57	20.57	0.31	1.16	1.16	11.99	8.25	0.00	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	17.65			9.28			4.29			0.00		
Approach LOS	C			A			A			A		
d_I, Intersection Delay [s/veh]	7.15											
Intersection LOS	C											

Intersection Level Of Service Report
Intersection 2: Wildcat Road

Control Type:	Two-way stop	Delay (sec / veh):	9.4
Analysis Method:	HCM 7th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.022

Intersection Setup

Name	Wildcat Road		Wyarno Road		Wyarno Road	
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Wildcat Road		Wyarno Road		Wyarno Road	
Base Volume Input [veh/h]	8	1	49	19	0	30
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	3.00	3.00	2.00	7.00
Growth Factor	1.0180	1.0000	1.0180	1.0000	1.0000	1.0180
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	6	0	0	7
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	8	1	56	19	0	38
Peak Hour Factor	0.4500	0.4500	0.7400	0.7400	0.5800	0.5800
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	4	1	19	6	0	16
Total Analysis Volume [veh/h]	18	2	76	26	0	66
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.02	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	9.41	8.82	0.00	0.00	7.42	0.00
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.07	0.07	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	1.81	1.81	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	9.35		0.00		0.00	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	0.99					
Intersection LOS	A					

Year 2031 Traffic Volume Scenarios

Story House TIS

Vistro File: C:\...\AM.vistro
Report File: C:\...\2031 Back AM.pdf

Scenario 9 2031 Back AM
10/5/2023

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Industrial Lane	Two-way stop	HCM 7th Edition	NB Left	0.169	18.5	C
2	Wildcat Road	Two-way stop	HCM 7th Edition	NB Left	0.024	9.2	A

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: Industrial Lane

Control Type:	Two-way stop	Delay (sec / veh):	18.5
Analysis Method:	HCM 7th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.169

Intersection Setup

Name	Industrial Lane			West Access			Wyarno Road			Wyarno Road		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0	1	0	1	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			70.00			70.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Industrial Lane			West Access			Wyarno Road			Wyarno Road		
Base Volume Input [veh/h]	28	0	0	0	0	0	0	23	55	0	53	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	51.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	21.00	2.00	2.00	2.00
Growth Factor	1.0490	1.0490	1.0490	1.0000	1.0000	1.0000	1.0000	1.0490	1.0490	1.0490	1.0490	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	7	0	139	87	0	0	0	0	5
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	29	0	0	7	0	139	87	24	58	0	56	5
Peak Hour Factor	0.5400	0.5400	0.5400	0.8500	0.8500	0.8500	0.6100	0.6100	0.6100	0.7800	0.7800	0.7800
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	13	0	0	2	0	41	36	10	24	0	18	2
Total Analysis Volume [veh/h]	54	0	0	8	0	164	143	39	95	0	72	6
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane				
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No	No		
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.17	0.00	0.00	0.02	0.00	0.17	0.09	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	18.55	14.69	8.49	12.75	13.48	9.38	7.61	0.00	0.00	7.48	0.00	0.00
Movement LOS	C	B	A	B	B	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.60	0.60	0.00	0.05	0.05	0.59	0.31	0.00	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	14.99	14.99	0.00	1.29	1.29	14.87	7.77	0.00	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	18.55			9.53			3.93			0.00		
Approach LOS	C			A			A			A		
d_I, Intersection Delay [s/veh]	6.42											
Intersection LOS	C											

Intersection Level Of Service Report
Intersection 2: Wildcat Road

Control Type:	Two-way stop	Delay (sec / veh):	9.2
Analysis Method:	HCM 7th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.024

Intersection Setup

Name	Wildcat Road		Wyarno Road		Wyarno Road	
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		70.00		70.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Wildcat Road		Wyarno Road		Wyarno Road	
Base Volume Input [veh/h]	19	0	22	5	1	41
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	12.00	2.00	2.00	2.00
Growth Factor	1.0490	1.0000	1.0490	1.0000	1.0000	1.0490
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	7	0	0	5
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	20	0	30	5	1	48
Peak Hour Factor	0.9500	0.9500	0.8400	0.8400	0.7000	0.7000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	5	0	9	1	0	17
Total Analysis Volume [veh/h]	21	0	36	6	1	69
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.02	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	9.16	8.58	0.00	0.00	7.30	0.00
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.07	0.07	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	1.82	1.82	0.00	0.00	0.04	0.04
d_A, Approach Delay [s/veh]	9.16		0.00		0.10	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	1.50					
Intersection LOS	A					

Story House TIS

Vistro File: C:\...\PM.vistro
Report File: C:\...\2031 Back PM.pdf

Scenario 9 2031 Back AM
10/5/2023

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Industrial Lane	Two-way stop	HCM 7th Edition	NB Left	0.227	18.3	C
2	Wildcat Road	Two-way stop	HCM 7th Edition	NB Left	0.022	9.4	A

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: Industrial Lane

Control Type:	Two-way stop	Delay (sec / veh):	18.3
Analysis Method:	HCM 7th Edition	Level Of Service:	C
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.227

Intersection Setup

Name	Industrial Lane			West Access			Wyarno Road			Wyarno Road		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0	1	0	1	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Industrial Lane			West Access			Wyarno Road			Wyarno Road		
Base Volume Input [veh/h]	59	0	3	0	0	0	0	76	28	0	34	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	14.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	55.00	2.00	3.00	2.00
Growth Factor	1.0490	1.0490	1.0490	1.0000	1.0000	1.0000	1.0000	1.0490	1.0490	1.0490	1.0490	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	6	0	120	139	0	0	0	0	7
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	62	0	3	6	0	120	139	80	29	0	36	7
Peak Hour Factor	0.7800	0.7800	0.7800	0.8500	0.8500	0.8500	0.9000	0.9000	0.9000	0.7700	0.7700	0.7700
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	20	0	1	2	0	35	39	22	8	0	12	2
Total Analysis Volume [veh/h]	79	0	4	7	0	141	154	89	32	0	47	9
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane				
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No	No		
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.23	0.00	0.00	0.02	0.00	0.14	0.10	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	18.35	15.96	8.73	13.05	13.37	9.11	7.58	0.00	0.00	7.45	0.00	0.00
Movement LOS	C	C	A	B	B	A	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.86	0.86	0.01	0.05	0.05	0.48	0.33	0.00	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	21.46	21.46	0.31	1.17	1.17	12.03	8.27	0.00	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	17.88			9.30			4.25			0.00		
Approach LOS	C			A			A			A		
d_I, Intersection Delay [s/veh]	7.17											
Intersection LOS	C											

Intersection Level Of Service Report
Intersection 2: Wildcat Road

Control Type:	Two-way stop	Delay (sec / veh):	9.4
Analysis Method:	HCM 7th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.022

Intersection Setup

Name	Wildcat Road		Wyarno Road		Wyarno Road	
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Wildcat Road		Wyarno Road		Wyarno Road	
Base Volume Input [veh/h]	8	1	49	19	0	30
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	3.00	3.00	2.00	7.00
Growth Factor	1.0490	1.0000	1.0490	1.0000	1.0000	1.0490
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	6	0	0	7
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	8	1	57	19	0	38
Peak Hour Factor	0.4500	0.4500	0.7400	0.7400	0.5800	0.5800
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	4	1	19	6	0	16
Total Analysis Volume [veh/h]	18	2	77	26	0	66
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.02	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	9.41	8.82	0.00	0.00	7.42	0.00
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.07	0.07	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	1.81	1.81	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	9.35		0.00		0.00	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	0.99					
Intersection LOS	A					

Story House TIS

Vistro File: C:\...\AM.vistro
Report File: C:\...\2031 Total AM.pdf

Scenario 5 2031 Total AM
10/5/2023

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Industrial Lane	Two-way stop	HCM 7th Edition	NB Left	0.793	156.5	F
2	Wildcat Road	Two-way stop	HCM 7th Edition	NB Left	0.036	11.3	B
3	East Access	Two-way stop	HCM 7th Edition	EB Left	0.016	12.3	B

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: Industrial Lane

Control Type:	Two-way stop	Delay (sec / veh):	156.5
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.793

Intersection Setup

Name	Industrial Lane			West Access			Wyarno Road			Wyarno Road		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0	1	0	1	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			70.00			70.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Industrial Lane			West Access			Wyarno Road			Wyarno Road		
Base Volume Input [veh/h]	28	0	0	0	0	0	0	23	55	0	53	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	51.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	21.00	2.00	2.00	2.00
Growth Factor	1.0490	1.0490	1.0490	1.0000	1.0000	1.0000	1.0000	1.0490	1.0490	1.0490	1.0490	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	5	0	141	218	146	0	0	94	8
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	29	0	0	5	0	141	218	170	58	0	150	8
Peak Hour Factor	0.5400	0.5400	0.5400	0.8500	0.8500	0.8500	0.6100	0.6100	0.6100	0.7800	0.7800	0.7800
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	13	0	0	1	0	41	89	70	24	0	48	3
Total Analysis Volume [veh/h]	54	0	0	6	0	166	357	279	95	0	192	10
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane				
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No	No		
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.79	0.00	0.00	0.05	0.00	0.20	0.26	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	156.47	129.71	9.74	38.69	36.37	10.31	8.55	0.00	0.00	8.04	0.00	0.00
Movement LOS	F	F	A	E	E	B	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	3.71	3.71	0.00	0.17	0.17	0.73	1.05	0.00	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	92.65	92.65	0.00	4.16	4.16	18.20	26.22	0.00	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	156.47			11.30			4.18			0.00		
Approach LOS	F			B			A			A		
d_I, Intersection Delay [s/veh]	11.60											
Intersection LOS	F											

Intersection Level Of Service Report
Intersection 2: Wildcat Road

Control Type:	Two-way stop	Delay (sec / veh):	11.3
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.036

Intersection Setup

Name	Wildcat Road		Wyarno Road		Wyarno Road	
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		70.00		70.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Wildcat Road		Wyarno Road		Wyarno Road	
Base Volume Input [veh/h]	19	0	22	5	1	41
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	12.00	2.00	2.00	2.00
Growth Factor	1.0490	1.0000	1.0490	1.0000	1.0000	1.0490
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	150	0	0	102
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	20	0	173	5	1	145
Peak Hour Factor	0.9500	0.9500	0.8400	0.8400	0.7000	0.7000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	5	0	51	1	0	52
Total Analysis Volume [veh/h]	21	0	206	6	1	207
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.04	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	11.32	9.55	0.00	0.00	7.65	0.00
Movement LOS	B	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.11	0.11	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	2.76	2.76	0.00	0.00	0.04	0.04
d_A, Approach Delay [s/veh]	11.32		0.00		0.04	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	0.56					
Intersection LOS	B					

Intersection Level Of Service Report
Intersection 3: East Access

Control Type:	Two-way stop	Delay (sec / veh):	12.3
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.016

Intersection Setup

Name	Wyarno Road		Wyarno Road		East Access	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		70.00		70.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Wyarno Road		Wyarno Road		East Access	
Base Volume Input [veh/h]	0	22	42	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	12.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0490	1.0490	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	146	5	8	11	7	94
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	146	28	52	11	7	94
Peak Hour Factor	0.8500	0.8500	0.8500	0.8500	0.8500	0.8500
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	43	8	15	3	2	28
Total Analysis Volume [veh/h]	172	33	61	13	8	111
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.12	0.00	0.00	0.00	0.02	0.11
d_M, Delay for Movement [s/veh]	7.79	0.00	0.00	0.00	12.26	9.07
Movement LOS	A	A	A	A	B	A
95th-Percentile Queue Length [veh/ln]	0.40	0.00	0.00	0.00	0.05	0.38
95th-Percentile Queue Length [ft/ln]	9.96	0.00	0.00	0.00	1.21	9.38
d_A, Approach Delay [s/veh]	6.53		0.00		9.28	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	6.14					
Intersection LOS	B					

Story House TIS

Vistro File: C:\...\PM.vistro
Report File: C:\...\2031 Total PM.pdf

Scenario 5 2031 Total PM
10/5/2023

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Industrial Lane	Two-way stop	HCM 7th Edition	NB Left	0.596	66.0	F
2	Wildcat Road	Two-way stop	HCM 7th Edition	NB Left	0.037	12.7	B
3	East Access	Two-way stop	HCM 7th Edition	EB Left	0.024	11.3	B

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: Industrial Lane

Control Type:	Two-way stop	Delay (sec / veh):	66.0
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.596

Intersection Setup

Name	Industrial Lane			West Access			Wyarno Road			Wyarno Road		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0	1	0	1	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Industrial Lane			West Access			Wyarno Road			Wyarno Road		
Base Volume Input [veh/h]	59	0	3	0	0	0	0	76	28	0	34	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	14.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	55.00	2.00	3.00	2.00
Growth Factor	1.0490	1.0490	1.0490	1.0000	1.0000	1.0000	1.0000	1.0490	1.0490	1.0490	1.0490	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	8	0	230	157	105	0	0	153	6
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	62	0	3	8	0	230	157	185	29	0	189	6
Peak Hour Factor	0.7800	0.7800	0.7800	0.8500	0.8500	0.8500	0.9000	0.9000	0.9000	0.7700	0.7700	0.7700
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	20	0	1	2	0	68	44	51	8	0	61	2
Total Analysis Volume [veh/h]	79	0	4	9	0	271	174	206	32	0	245	8
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane				
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No	No		
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.60	0.00	0.00	0.04	0.00	0.34	0.13	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	66.04	52.03	9.33	19.74	19.19	11.92	8.16	0.00	0.00	7.71	0.00	0.00
Movement LOS	F	F	A	C	C	B	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	3.05	3.05	0.01	0.11	0.11	1.53	0.46	0.00	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	76.14	76.14	0.36	2.75	2.75	38.28	11.43	0.00	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	63.30			12.17			3.45			0.00		
Approach LOS	F			B			A			A		
d_I, Intersection Delay [s/veh]	9.81											
Intersection LOS	F											

Intersection Level Of Service Report
Intersection 2: Wildcat Road

Control Type:	Two-way stop	Delay (sec / veh):	12.7
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.037

Intersection Setup

Name	Wildcat Road		Wyarno Road		Wyarno Road	
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Wildcat Road		Wyarno Road		Wyarno Road	
Base Volume Input [veh/h]	8	1	49	19	0	30
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	3.00	3.00	2.00	7.00
Growth Factor	1.0490	1.0000	1.0490	1.0000	1.0000	1.0490
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	113	0	0	159
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	8	1	164	19	0	190
Peak Hour Factor	0.4500	0.4500	0.7400	0.7400	0.5800	0.5800
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	4	1	55	6	0	82
Total Analysis Volume [veh/h]	18	2	222	26	0	328
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.04	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	12.68	9.77	0.00	0.00	7.73	0.00
Movement LOS	B	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.12	0.12	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	3.07	3.07	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	12.38		0.00		0.00	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	0.42					
Intersection LOS	B					

Intersection Level Of Service Report
Intersection 3: East Access

Control Type:	Two-way stop	Delay (sec / veh):	11.3
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.024

Intersection Setup

Name	Wyarno Road		Wyarno Road		East Access	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Wyarno Road		Wyarno Road		East Access	
Base Volume Input [veh/h]	0	50	30	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	2.00	7.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0490	1.0490	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	105	8	6	8	12	153
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	105	60	37	8	12	153
Peak Hour Factor	0.8500	0.8500	0.8500	0.8500	0.8500	0.8500
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	31	18	11	2	4	45
Total Analysis Volume [veh/h]	124	71	44	9	14	180
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.08	0.00	0.00	0.00	0.02	0.18
d_M, Delay for Movement [s/veh]	7.53	0.00	0.00	0.00	11.34	9.28
Movement LOS	A	A	A	A	B	A
95th-Percentile Queue Length [veh/ln]	0.26	0.00	0.00	0.00	0.07	0.64
95th-Percentile Queue Length [ft/ln]	6.53	0.00	0.00	0.00	1.85	15.97
d_A, Approach Delay [s/veh]	4.79		0.00		9.43	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	6.25					
Intersection LOS	B					

Year 2034 Traffic Volume Scenarios

Story House TIS

Vistro File: C:\...\AM.vistro
Report File: C:\...\2034 Back AM.pdf

Scenario 10 2034 Back AM
10/5/2023

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Industrial Lane	Two-way stop	HCM 7th Edition	NB Left	0.828	165.6	F
2	Wildcat Road	Two-way stop	HCM 7th Edition	NB Left	0.036	11.3	B
3	East Access	Two-way stop	HCM 7th Edition	EB Left	0.016	12.3	B

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: Industrial Lane

Control Type:	Two-way stop	Delay (sec / veh):	165.6
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.828

Intersection Setup

Name	Industrial Lane			West Access			Wyarno Road			Wyarno Road		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0	1	0	1	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			70.00			70.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Industrial Lane			West Access			Wyarno Road			Wyarno Road		
Base Volume Input [veh/h]	28	0	0	0	0	0	0	23	55	0	53	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	51.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	21.00	2.00	2.00	2.00
Growth Factor	1.0680	1.0680	1.0680	1.0000	1.0000	1.0000	1.0000	1.0680	1.0680	1.0680	1.0680	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	5	0	141	218	146	0	0	94	8
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	30	0	0	5	0	141	218	171	59	0	151	8
Peak Hour Factor	0.5400	0.5400	0.5400	0.8500	0.8500	0.8500	0.6100	0.6100	0.6100	0.7800	0.7800	0.7800
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	14	0	0	1	0	41	89	70	24	0	48	3
Total Analysis Volume [veh/h]	56	0	0	6	0	166	357	280	97	0	194	10
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane				
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No	No		
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.83	0.00	0.00	0.05	0.00	0.20	0.26	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	165.56	138.59	9.74	38.94	36.62	10.32	8.56	0.00	0.00	8.05	0.00	0.00
Movement LOS	F	F	A	E	E	B	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	3.91	3.91	0.00	0.17	0.17	0.73	1.05	0.00	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	97.82	97.82	0.00	4.19	4.19	18.26	26.28	0.00	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	165.56			11.32			4.16			0.00		
Approach LOS	F			B			A			A		
d_I, Intersection Delay [s/veh]	12.24											
Intersection LOS	F											

Intersection Level Of Service Report
Intersection 2: Wildcat Road

Control Type:	Two-way stop	Delay (sec / veh):	11.3
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.036

Intersection Setup

Name	Wildcat Road		Wyarno Road		Wyarno Road	
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		70.00		70.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Wildcat Road		Wyarno Road		Wyarno Road	
Base Volume Input [veh/h]	19	0	22	5	1	41
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	12.00	2.00	2.00	2.00
Growth Factor	1.0680	1.0000	1.0680	1.0000	1.0000	1.0680
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	150	0	0	102
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	20	0	173	5	1	146
Peak Hour Factor	0.9500	0.9500	0.8400	0.8400	0.7000	0.7000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	5	0	51	1	0	52
Total Analysis Volume [veh/h]	21	0	206	6	1	209
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.04	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	11.33	9.56	0.00	0.00	7.65	0.00
Movement LOS	B	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.11	0.11	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	2.77	2.77	0.00	0.00	0.04	0.04
d_A, Approach Delay [s/veh]	11.33		0.00		0.04	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	0.55					
Intersection LOS	B					

Intersection Level Of Service Report
Intersection 3: East Access

Control Type:	Two-way stop	Delay (sec / veh):	12.3
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.016

Intersection Setup

Name	Wyarno Road		Wyarno Road		East Access	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		70.00		70.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Wyarno Road		Wyarno Road		East Access	
Base Volume Input [veh/h]	0	22	42	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	12.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0680	1.0680	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	146	5	8	11	7	94
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	146	28	53	11	7	94
Peak Hour Factor	0.8500	0.8500	0.8500	0.8500	0.8500	0.8500
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	43	8	16	3	2	28
Total Analysis Volume [veh/h]	172	33	62	13	8	111
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.12	0.00	0.00	0.00	0.02	0.11
d_M, Delay for Movement [s/veh]	7.79	0.00	0.00	0.00	12.27	9.07
Movement LOS	A	A	A	A	B	A
95th-Percentile Queue Length [veh/ln]	0.40	0.00	0.00	0.00	0.05	0.38
95th-Percentile Queue Length [ft/ln]	9.97	0.00	0.00	0.00	1.21	9.39
d_A, Approach Delay [s/veh]	6.53		0.00		9.29	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	6.13					
Intersection LOS	B					

Story House TIS

Vistro File: C:\...\PM.vistro
Report File: C:\...\2034 Back PM.pdf

Scenario 10 2034 Back PM
10/5/2023

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Industrial Lane	Two-way stop	HCM 7th Edition	NB Left	0.613	67.9	F
2	Wildcat Road	Two-way stop	HCM 7th Edition	NB Left	0.041	12.7	B
3	East Access	Two-way stop	HCM 7th Edition	EB Left	0.024	11.4	B

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: Industrial Lane

Control Type:	Two-way stop	Delay (sec / veh):	67.9
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.613

Intersection Setup

Name	Industrial Lane			West Access			Wyarno Road			Wyarno Road		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0	1	0	1	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Industrial Lane			West Access			Wyarno Road			Wyarno Road		
Base Volume Input [veh/h]	59	0	3	0	0	0	0	76	28	0	34	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	14.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	55.00	2.00	3.00	2.00
Growth Factor	1.0680	1.0680	1.0680	1.0000	1.0000	1.0000	1.0000	1.0680	1.0680	1.0680	1.0680	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	8	0	230	157	105	0	0	153	6
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	63	0	3	8	0	230	157	186	30	0	189	6
Peak Hour Factor	0.7800	0.7800	0.7800	0.8500	0.8500	0.8500	0.9000	0.9000	0.9000	0.7700	0.7700	0.7700
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	20	0	1	2	0	68	44	52	8	0	61	2
Total Analysis Volume [veh/h]	81	0	4	9	0	271	174	207	33	0	245	8
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane				
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No	No		
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.61	0.00	0.00	0.04	0.00	0.34	0.13	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	67.94	53.90	9.34	19.77	19.23	11.92	8.16	0.00	0.00	7.71	0.00	0.00
Movement LOS	F	F	A	C	C	B	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	3.17	3.17	0.01	0.11	0.11	1.53	0.46	0.00	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	79.29	79.29	0.36	2.76	2.76	38.28	11.43	0.00	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	65.18			12.17			3.43			0.00		
Approach LOS	F			B			A			A		
d_I, Intersection Delay [s/veh]	10.05											
Intersection LOS	F											

Intersection Level Of Service Report
Intersection 2: Wildcat Road

Control Type:	Two-way stop	Delay (sec / veh):	12.7
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.041

Intersection Setup

Name	Wildcat Road		Wyarno Road		Wyarno Road	
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Wildcat Road		Wyarno Road		Wyarno Road	
Base Volume Input [veh/h]	8	1	49	19	0	30
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	3.00	3.00	2.00	7.00
Growth Factor	1.0680	1.0000	1.0680	1.0000	1.0000	1.0680
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	113	0	0	159
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	9	1	165	19	0	191
Peak Hour Factor	0.4500	0.4500	0.7400	0.7400	0.5800	0.5800
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	5	1	56	6	0	82
Total Analysis Volume [veh/h]	20	2	223	26	0	329
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.04	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	12.73	9.81	0.00	0.00	7.73	0.00
Movement LOS	B	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.14	0.14	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	3.41	3.41	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	12.46		0.00		0.00	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	0.46					
Intersection LOS	B					

Intersection Level Of Service Report
Intersection 3: East Access

Control Type:	Two-way stop	Delay (sec / veh):	11.4
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.024

Intersection Setup

Name	Wyarno Road		Wyarno Road		East Access	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Wyarno Road		Wyarno Road		East Access	
Base Volume Input [veh/h]	0	50	30	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	2.00	7.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0680	1.0680	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	105	8	6	8	12	153
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	105	61	38	8	12	153
Peak Hour Factor	0.8500	0.8500	0.8500	0.8500	0.8500	0.8500
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	31	18	11	2	4	45
Total Analysis Volume [veh/h]	124	72	45	9	14	180
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.08	0.00	0.00	0.00	0.02	0.18
d_M, Delay for Movement [s/veh]	7.53	0.00	0.00	0.00	11.36	9.29
Movement LOS	A	A	A	A	B	A
95th-Percentile Queue Length [veh/ln]	0.26	0.00	0.00	0.00	0.07	0.64
95th-Percentile Queue Length [ft/ln]	6.54	0.00	0.00	0.00	1.85	15.99
d_A, Approach Delay [s/veh]	4.77		0.00		9.44	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	6.23					
Intersection LOS	B					

Story House TIS

Vistro File: C:\...\AM.vistro
Report File: C:\...\2034 Total AM.pdf

Scenario 6 2034 Total AM
10/5/2023

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Industrial Lane	Two-way stop	HCM 7th Edition	NB Left	0.939	211.8	F
2	Wildcat Road	Two-way stop	HCM 7th Edition	NB Left	0.037	11.5	B
3	East Access	Two-way stop	HCM 7th Edition	EB Left	0.018	12.4	B

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: Industrial Lane

Control Type:	Two-way stop	Delay (sec / veh):	211.8
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.939

Intersection Setup

Name	Industrial Lane			West Access			Wyarno Road			Wyarno Road		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0	1	0	1	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			70.00			70.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Industrial Lane			West Access			Wyarno Road			Wyarno Road		
Base Volume Input [veh/h]	28	0	0	0	0	0	0	23	55	0	53	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	51.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	21.00	2.00	2.00	2.00
Growth Factor	1.0680	1.0680	1.0680	1.0000	1.0000	1.0000	1.0000	1.0680	1.0680	1.0680	1.0680	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	6	0	157	223	149	0	0	105	8
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	30	0	0	6	0	157	223	174	59	0	162	8
Peak Hour Factor	0.5400	0.5400	0.5400	0.8500	0.8500	0.8500	0.6100	0.6100	0.6100	0.7800	0.7800	0.7800
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	14	0	0	2	0	46	91	71	24	0	52	3
Total Analysis Volume [veh/h]	56	0	0	7	0	185	366	285	97	0	208	10
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane				
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No	No		
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.94	0.00	0.00	0.07	0.00	0.22	0.27	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	211.80	179.45	9.77	42.00	39.26	10.60	8.65	0.00	0.00	8.06	0.00	0.00
Movement LOS	F	F	A	E	E	B	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	4.36	4.36	0.00	0.21	0.21	0.86	1.10	0.00	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	108.99	108.99	0.00	5.31	5.31	21.38	27.61	0.00	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	211.80			11.75			4.23			0.00		
Approach LOS	F			B			A			A		
d_I, Intersection Delay [s/veh]	14.24											
Intersection LOS	F											

Intersection Level Of Service Report
Intersection 2: Wildcat Road

Control Type:	Two-way stop	Delay (sec / veh):	11.5
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.037

Intersection Setup

Name	Wildcat Road		Wyarno Road		Wyarno Road	
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		70.00		70.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Wildcat Road		Wyarno Road		Wyarno Road	
Base Volume Input [veh/h]	19	0	22	5	1	41
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	12.00	2.00	2.00	2.00
Growth Factor	1.0680	1.0000	1.0680	1.0000	1.0000	1.0680
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	154	0	0	113
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	20	0	177	5	1	157
Peak Hour Factor	0.9500	0.9500	0.8400	0.8400	0.7000	0.7000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	5	0	53	1	0	56
Total Analysis Volume [veh/h]	21	0	211	6	1	224
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.04	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	11.51	9.60	0.00	0.00	7.66	0.00
Movement LOS	B	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.11	0.11	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	2.84	2.84	0.00	0.00	0.04	0.04
d_A, Approach Delay [s/veh]	11.51		0.00		0.03	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	0.54					
Intersection LOS	B					

Intersection Level Of Service Report
Intersection 3: East Access

Control Type:	Two-way stop	Delay (sec / veh):	12.4
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.018

Intersection Setup

Name	Wyarno Road		Wyarno Road		East Access	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		70.00		70.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Wyarno Road		Wyarno Road		East Access	
Base Volume Input [veh/h]	0	22	42	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	12.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0680	1.0680	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	149	6	8	12	8	105
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	149	29	53	12	8	105
Peak Hour Factor	0.8500	0.8500	0.8500	0.8500	0.8500	0.8500
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	44	9	16	4	2	31
Total Analysis Volume [veh/h]	175	34	62	14	9	124
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.12	0.00	0.00	0.00	0.02	0.12
d_M, Delay for Movement [s/veh]	7.80	0.00	0.00	0.00	12.38	9.14
Movement LOS	A	A	A	A	B	A
95th-Percentile Queue Length [veh/ln]	0.41	0.00	0.00	0.00	0.06	0.43
95th-Percentile Queue Length [ft/ln]	10.17	0.00	0.00	0.00	1.38	10.65
d_A, Approach Delay [s/veh]	6.53		0.00		9.36	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	6.24					
Intersection LOS	B					

Story House TIS

Vistro File: C:\...\PM.vistro
Report File: C:\...\2034 Total PM.pdf

Scenario 6 2034 Total PM
10/5/2023

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Industrial Lane	Two-way stop	HCM 7th Edition	NB Left	0.726	95.5	F
2	Wildcat Road	Two-way stop	HCM 7th Edition	NB Left	0.043	13.1	B
3	East Access	Two-way stop	HCM 7th Edition	EB Left	0.027	11.7	B

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: Industrial Lane

Control Type:	Two-way stop	Delay (sec / veh):	95.5
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.726

Intersection Setup

Name	Industrial Lane			West Access			Wyarno Road			Wyarno Road		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0	1	0	1	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Industrial Lane			West Access			Wyarno Road			Wyarno Road		
Base Volume Input [veh/h]	59	0	3	0	0	0	0	76	28	0	34	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	14.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	55.00	2.00	3.00	2.00
Growth Factor	1.0680	1.0680	1.0680	1.0000	1.0000	1.0000	1.0000	1.0680	1.0680	1.0680	1.0680	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	8	0	241	176	117	0	0	160	6
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	63	0	3	8	0	241	176	198	30	0	196	6
Peak Hour Factor	0.7800	0.7800	0.7800	0.8500	0.8500	0.8500	0.9000	0.9000	0.9000	0.7700	0.7700	0.7700
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	20	0	1	2	0	71	49	55	8	0	64	2
Total Analysis Volume [veh/h]	81	0	4	9	0	284	196	220	33	0	255	8
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane				
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No	No		
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.73	0.00	0.00	0.04	0.00	0.36	0.15	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	95.47	77.92	9.41	21.83	20.99	12.24	8.26	0.00	0.00	7.74	0.00	0.00
Movement LOS	F	F	A	C	C	B	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	3.92	3.92	0.01	0.13	0.13	1.67	0.53	0.00	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	98.12	98.12	0.37	3.14	3.14	41.85	13.25	0.00	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	91.42			12.53			3.60			0.00		
Approach LOS	F			B			A			A		
d_I, Intersection Delay [s/veh]	11.98											
Intersection LOS	F											

Intersection Level Of Service Report
Intersection 2: Wildcat Road

Control Type:	Two-way stop	Delay (sec / veh):	13.1
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.043

Intersection Setup

Name	Wildcat Road		Wyarno Road		Wyarno Road	
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Wildcat Road		Wyarno Road		Wyarno Road	
Base Volume Input [veh/h]	8	1	49	19	0	30
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	3.00	3.00	2.00	7.00
Growth Factor	1.0680	1.0000	1.0680	1.0000	1.0000	1.0680
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	126	0	0	166
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	9	1	178	19	0	198
Peak Hour Factor	0.4500	0.4500	0.7400	0.7400	0.5800	0.5800
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	5	1	60	6	0	85
Total Analysis Volume [veh/h]	20	2	241	26	0	341
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.04	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	13.06	9.94	0.00	0.00	7.78	0.00
Movement LOS	B	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.14	0.14	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	3.56	3.56	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	12.78		0.00		0.00	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	0.45					
Intersection LOS	B					

Intersection Level Of Service Report
Intersection 3: East Access

Control Type:	Two-way stop	Delay (sec / veh):	11.7
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.027

Intersection Setup

Name	Wyarno Road		Wyarno Road		East Access	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Wyarno Road		Wyarno Road		East Access	
Base Volume Input [veh/h]	0	50	30	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	2.00	7.00	2.00	2.00	2.00
Growth Factor	1.0000	1.0680	1.0680	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	117	8	6	9	13	160
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	117	61	38	9	13	160
Peak Hour Factor	0.8500	0.8500	0.8500	0.8500	0.8500	0.8500
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	34	18	11	3	4	47
Total Analysis Volume [veh/h]	138	72	45	11	15	188
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.09	0.00	0.00	0.00	0.03	0.18
d_M, Delay for Movement [s/veh]	7.56	0.00	0.00	0.00	11.70	9.34
Movement LOS	A	A	A	A	B	A
95th-Percentile Queue Length [veh/ln]	0.29	0.00	0.00	0.00	0.08	0.68
95th-Percentile Queue Length [ft/ln]	7.36	0.00	0.00	0.00	2.09	16.89
d_A, Approach Delay [s/veh]	4.97		0.00		9.51	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	6.34					
Intersection LOS	B					

Year 2043 Traffic Volume Scenarios

Story House TIS

Vistro File: C:\...\AM.vistro
Report File: C:\...\2043 Back AM.pdf

Scenario 11 2043 Back AM
10/5/2023

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Industrial Lane	Two-way stop	HCM 7th Edition	NB Left	0.078	10.2	B
2	Wildcat Road	Two-way stop	HCM 7th Edition	NB Left	0.025	9.1	A

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: Industrial Lane

Control Type:	Two-way stop	Delay (sec / veh):	10.2
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.078

Intersection Setup

Name	Industrial Lane		Wyarno Road		Wyarno Road	
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	1	1	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		70.00		70.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Industrial Lane		Wyarno Road		Wyarno Road	
Base Volume Input [veh/h]	28	0	23	55	0	53
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	51.00	2.00	2.00	21.00	2.00	2.00
Growth Factor	1.1270	1.1270	1.2700	1.2700	1.2700	1.2700
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	32	0	29	70	0	67
Peak Hour Factor	0.5400	0.5400	0.6100	0.6100	0.7800	0.7800
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	15	0	12	29	0	21
Total Analysis Volume [veh/h]	59	0	48	115	0	86
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.08	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	10.16	8.53	0.00	0.00	7.54	0.00
Movement LOS	B	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.25	0.00	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	6.33	0.00	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	10.16		0.00		0.00	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	1.95					
Intersection LOS	B					

Intersection Level Of Service Report
Intersection 2: Wildcat Road

Control Type:	Two-way stop	Delay (sec / veh):	9.1
Analysis Method:	HCM 7th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.025

Intersection Setup

Name	Wildcat Road		Wyarno Road		Wyarno Road	
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		70.00		70.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Wildcat Road		Wyarno Road		Wyarno Road	
Base Volume Input [veh/h]	19	0	22	5	1	41
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	12.00	2.00	2.00	2.00
Growth Factor	1.1270	1.0000	1.1270	1.0000	1.0000	1.1270
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	21	0	25	5	1	46
Peak Hour Factor	0.9500	0.9500	0.8400	0.8400	0.7000	0.7000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	6	0	7	1	0	16
Total Analysis Volume [veh/h]	22	0	30	6	1	66
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.02	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	9.11	8.56	0.00	0.00	7.29	0.00
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.08	0.08	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	1.88	1.88	0.00	0.00	0.04	0.04
d_A, Approach Delay [s/veh]	9.11		0.00		0.11	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	1.66					
Intersection LOS	A					

Story House TIS

Vistro File: C:\...\PM.vistro
Report File: C:\...\2043 Back PM.pdf

Scenario 11 2043 Back PM
10/5/2023

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Industrial Lane	Two-way stop	HCM 7th Edition	NB Left	0.106	10.0	B
2	Wildcat Road	Two-way stop	HCM 7th Edition	NB Left	0.024	9.4	A

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: Industrial Lane

Control Type:	Two-way stop	Delay (sec / veh):	10.0
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.106

Intersection Setup

Name	Industrial Lane		Wyarno Road		Wyarno Road	
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	1	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Industrial Lane		Wyarno Road		Wyarno Road	
Base Volume Input [veh/h]	59	3	76	28	0	34
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	14.00	2.00	2.00	55.00	2.00	3.00
Growth Factor	1.1270	1.1270	1.2700	1.2700	1.2700	1.2700
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	66	3	97	36	0	43
Peak Hour Factor	0.7800	0.7800	0.9000	0.9000	0.7700	0.7700
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	21	1	27	10	0	14
Total Analysis Volume [veh/h]	85	4	108	40	0	56
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.11	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	10.04	8.82	0.00	0.00	7.51	0.00
Movement LOS	B	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.36	0.01	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	8.89	0.32	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	9.98		0.00		0.00	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	3.03					
Intersection LOS	B					

Intersection Level Of Service Report
Intersection 2: Wildcat Road

Control Type:	Two-way stop	Delay (sec / veh):	9.4
Analysis Method:	HCM 7th Edition	Level Of Service:	A
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.024

Intersection Setup

Name	Wildcat Road		Wyarno Road		Wyarno Road	
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Wildcat Road		Wyarno Road		Wyarno Road	
Base Volume Input [veh/h]	8	1	49	19	0	30
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	3.00	3.00	2.00	7.00
Growth Factor	1.1270	1.0000	1.1270	1.0000	1.0000	1.1270
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	0	0	0
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	9	1	55	19	0	34
Peak Hour Factor	0.4500	0.4500	0.7400	0.7400	0.5800	0.5800
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	5	1	19	6	0	15
Total Analysis Volume [veh/h]	20	2	74	26	0	59
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.02	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	9.36	8.82	0.00	0.00	7.41	0.00
Movement LOS	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.08	0.08	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	1.98	1.98	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	9.31		0.00		0.00	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	1.13					
Intersection LOS	A					

Story House TIS

Vistro File: C:\...\AM.vistro
Report File: C:\...\2043 Total AM.pdf

Scenario 7 2043 Total AM
10/5/2023

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Industrial Lane	Two-way stop	HCM 7th Edition	NB Left	1.032	246.4	F
2	Wildcat Road	Two-way stop	HCM 7th Edition	NB Left	0.039	11.6	B
3	East Access	Two-way stop	HCM 7th Edition	EB Left	0.018	12.4	B

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: Industrial Lane

Control Type:	Two-way stop	Delay (sec / veh):	246.4
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	1.032

Intersection Setup

Name	Industrial Lane			West Access			Wyarno Road			Wyarno Road		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0	1	0	1	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			70.00			70.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Industrial Lane			West Access			Wyarno Road			Wyarno Road		
Base Volume Input [veh/h]	28	0	0	0	0	0	0	23	55	0	53	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	51.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	21.00	2.00	2.00	2.00
Growth Factor	1.1270	1.1270	1.1270	1.0000	1.0000	1.0000	1.0000	1.2700	1.2700	1.2700	1.2700	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	6	0	157	223	149	0	0	105	8
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	32	0	0	6	0	157	223	178	70	0	172	8
Peak Hour Factor	0.5400	0.5400	0.5400	0.8500	0.8500	0.8500	0.6100	0.6100	0.6100	0.7800	0.7800	0.7800
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	15	0	0	2	0	46	91	73	29	0	55	3
Total Analysis Volume [veh/h]	59	0	0	7	0	185	366	292	115	0	221	10
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane				
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No	No		
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	1.03	0.00	0.00	0.07	0.00	0.23	0.27	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	246.44	212.36	9.82	44.05	41.39	10.72	8.71	0.00	0.00	8.13	0.00	0.00
Movement LOS	F	F	A	E	E	B	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	4.82	4.82	0.00	0.22	0.22	0.87	1.12	0.00	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	120.51	120.51	0.00	5.59	5.59	21.84	28.02	0.00	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	246.44			11.94			4.12			0.00		
Approach LOS	F			B			A			A		
d_I, Intersection Delay [s/veh]	15.95											
Intersection LOS	F											

Intersection Level Of Service Report
Intersection 2: Wildcat Road

Control Type:	Two-way stop	Delay (sec / veh):	11.6
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.039

Intersection Setup

Name	Wildcat Road		Wyarno Road		Wyarno Road	
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		70.00		70.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Wildcat Road		Wyarno Road		Wyarno Road	
Base Volume Input [veh/h]	19	0	22	5	1	41
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	12.00	2.00	2.00	2.00
Growth Factor	1.1270	1.0000	1.1270	1.0000	1.0000	1.1270
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	154	0	0	113
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	21	0	179	5	1	159
Peak Hour Factor	0.9500	0.9500	0.8400	0.8400	0.7000	0.7000
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	6	0	53	1	0	57
Total Analysis Volume [veh/h]	22	0	213	6	1	227
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.04	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	11.57	9.62	0.00	0.00	7.67	0.00
Movement LOS	B	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.12	0.12	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	3.00	3.00	0.00	0.00	0.04	0.04
d_A, Approach Delay [s/veh]	11.57		0.00		0.03	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	0.56					
Intersection LOS	B					

Intersection Level Of Service Report
Intersection 3: East Access

Control Type:	Two-way stop	Delay (sec / veh):	12.4
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.018

Intersection Setup

Name	Wyarno Road		Wyarno Road		East Access	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		70.00		70.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Wyarno Road		Wyarno Road		East Access	
Base Volume Input [veh/h]	0	22	42	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	12.00	2.00	2.00	2.00	2.00	2.00
Growth Factor	1.0000	1.1270	1.1270	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	149	6	8	12	8	105
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	149	31	55	12	8	105
Peak Hour Factor	0.8500	0.8500	0.8500	0.8500	0.8500	0.8500
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	44	9	16	4	2	31
Total Analysis Volume [veh/h]	175	36	65	14	9	124
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.12	0.00	0.00	0.00	0.02	0.13
d_M, Delay for Movement [s/veh]	7.81	0.00	0.00	0.00	12.43	9.16
Movement LOS	A	A	A	A	B	A
95th-Percentile Queue Length [veh/ln]	0.41	0.00	0.00	0.00	0.06	0.43
95th-Percentile Queue Length [ft/ln]	10.20	0.00	0.00	0.00	1.39	10.69
d_A, Approach Delay [s/veh]	6.47		0.00		9.38	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	6.18					
Intersection LOS	B					

Story House TIS

Vistro File: C:\...\PM.vistro
Report File: C:\...\2043 Total PM.pdf

Scenario 7 2043 Total PM
10/5/2023

Intersection Analysis Summary

ID	Intersection Name	Control Type	Method	Worst Mvmt	V/C	Delay (s/veh)	LOS
1	Industrial Lane	Two-way stop	HCM 7th Edition	NB Left	0.802	113.8	F
2	Wildcat Road	Two-way stop	HCM 7th Edition	NB Left	0.043	13.2	B
3	East Access	Two-way stop	HCM 7th Edition	EB Left	0.027	11.7	B

V/C, Delay, LOS: For two-way stop, these values are taken from the movement with the worst (highest) delay value. For all other control types, they are taken for the whole intersection.

Intersection Level Of Service Report
Intersection 1: Industrial Lane

Control Type:	Two-way stop	Delay (sec / veh):	113.8
Analysis Method:	HCM 7th Edition	Level Of Service:	F
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.802

Intersection Setup

Name	Industrial Lane			West Access			Wyarno Road			Wyarno Road		
Approach	Northbound			Southbound			Eastbound			Westbound		
Lane Configuration												
Turning Movement	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0	1	0	1	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00			30.00			30.00			30.00		
Grade [%]	0.00			0.00			0.00			0.00		
Crosswalk	No			No			No			No		

Volumes

Name	Industrial Lane			West Access			Wyarno Road			Wyarno Road		
Base Volume Input [veh/h]	59	0	3	0	0	0	0	76	28	0	34	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	14.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00	55.00	2.00	3.00	2.00
Growth Factor	1.1270	1.1270	1.1270	1.0000	1.0000	1.0000	1.0000	1.2700	1.2700	1.2700	1.2700	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	0	8	0	241	176	117	0	0	160	6
Diverted Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0	0	0	0	0	0	0
Total Hourly Volume [veh/h]	66	0	3	8	0	241	176	214	36	0	203	6
Peak Hour Factor	0.7800	0.7800	0.7800	0.8500	0.8500	0.8500	0.9000	0.9000	0.9000	0.7700	0.7700	0.7700
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	21	0	1	2	0	71	49	59	10	0	66	2
Total Analysis Volume [veh/h]	85	0	4	9	0	284	196	238	40	0	264	8
Pedestrian Volume [ped/h]	0			0			0			0		

Intersection Settings

Priority Scheme	Stop	Stop	Free	Free
Flared Lane				
Storage Area [veh]	0	0	0	0
Two-Stage Gap Acceptance	No	No		
Number of Storage Spaces in Median	0	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.80	0.00	0.00	0.04	0.00	0.37	0.15	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	113.80	95.12	9.52	22.71	21.80	12.37	8.29	0.00	0.00	7.80	0.00	0.00
Movement LOS	F	F	A	C	C	B	A	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	4.49	4.49	0.02	0.13	0.13	1.70	0.53	0.00	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	112.13	112.13	0.38	3.30	3.30	42.58	13.37	0.00	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	109.11			12.69			3.43			0.00		
Approach LOS	F			B			A			A		
d_I, Intersection Delay [s/veh]	13.34											
Intersection LOS	F											

Intersection Level Of Service Report
Intersection 2: Wildcat Road

Control Type:	Two-way stop	Delay (sec / veh):	13.2
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.043

Intersection Setup

Name	Wildcat Road		Wyarno Road		Wyarno Road	
Approach	Northbound		Eastbound		Westbound	
Lane Configuration						
Turning Movement	Left	Right	Thru	Right	Left	Thru
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	0	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Wildcat Road		Wyarno Road		Wyarno Road	
Base Volume Input [veh/h]	8	1	49	19	0	30
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	2.00	2.00	3.00	3.00	2.00	7.00
Growth Factor	1.1270	1.0000	1.1270	1.0000	1.0000	1.1270
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	0	0	126	0	0	166
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	9	1	181	19	0	200
Peak Hour Factor	0.4500	0.4500	0.7400	0.7400	0.5800	0.5800
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	5	1	61	6	0	86
Total Analysis Volume [veh/h]	20	2	245	26	0	345
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Stop	Free	Free
Flared Lane	No		
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance	No		
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.04	0.00	0.00	0.00	0.00	0.00
d_M, Delay for Movement [s/veh]	13.15	9.97	0.00	0.00	7.79	0.00
Movement LOS	B	A	A	A	A	A
95th-Percentile Queue Length [veh/ln]	0.14	0.14	0.00	0.00	0.00	0.00
95th-Percentile Queue Length [ft/ln]	3.59	3.59	0.00	0.00	0.00	0.00
d_A, Approach Delay [s/veh]	12.86		0.00		0.00	
Approach LOS	B		A		A	
d_I, Intersection Delay [s/veh]	0.44					
Intersection LOS	B					

Intersection Level Of Service Report
Intersection 3: East Access

Control Type:	Two-way stop	Delay (sec / veh):	11.7
Analysis Method:	HCM 7th Edition	Level Of Service:	B
Analysis Period:	15 minutes	Volume to Capacity (v/c):	0.027

Intersection Setup

Name	Wyarno Road		Wyarno Road		East Access	
Approach	Northbound		Southbound		Eastbound	
Lane Configuration						
Turning Movement	Left	Thru	Thru	Right	Left	Right
Lane Width [ft]	12.00	12.00	12.00	12.00	12.00	12.00
No. of Lanes in Entry Pocket	1	0	0	0	0	0
Entry Pocket Length [ft]	100.00	100.00	100.00	100.00	100.00	100.00
No. of Lanes in Exit Pocket	0	0	0	0	0	0
Exit Pocket Length [ft]	0.00	0.00	0.00	0.00	0.00	0.00
Speed [mph]	30.00		30.00		30.00	
Grade [%]	0.00		0.00		0.00	
Crosswalk	No		No		No	

Volumes

Name	Wyarno Road		Wyarno Road		East Access	
Base Volume Input [veh/h]	0	50	30	0	0	0
Base Volume Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Heavy Vehicles Percentage [%]	3.00	2.00	7.00	2.00	2.00	2.00
Growth Factor	1.0000	1.1270	1.1270	1.0000	1.0000	1.0000
In-Process Volume [veh/h]	0	0	0	0	0	0
Site-Generated Trips [veh/h]	117	8	6	9	13	160
Diverted Trips [veh/h]	0	0	0	0	0	0
Pass-by Trips [veh/h]	0	0	0	0	0	0
Existing Site Adjustment Volume [veh/h]	0	0	0	0	0	0
Other Volume [veh/h]	0	0	0	0	0	0
Total Hourly Volume [veh/h]	117	64	40	9	13	160
Peak Hour Factor	0.8500	0.8500	0.8500	0.8500	0.8500	0.8500
Other Adjustment Factor	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
Total 15-Minute Volume [veh/h]	34	19	12	3	4	47
Total Analysis Volume [veh/h]	138	75	47	11	15	188
Pedestrian Volume [ped/h]	0		0		0	

Intersection Settings

Priority Scheme	Free	Free	Stop
Flared Lane			
Storage Area [veh]	0	0	0
Two-Stage Gap Acceptance			No
Number of Storage Spaces in Median	0	0	0

Movement, Approach, & Intersection Results

V/C, Movement V/C Ratio	0.09	0.00	0.00	0.00	0.03	0.19
d_M, Delay for Movement [s/veh]	7.57	0.00	0.00	0.00	11.74	9.35
Movement LOS	A	A	A	A	B	A
95th-Percentile Queue Length [veh/ln]	0.29	0.00	0.00	0.00	0.08	0.68
95th-Percentile Queue Length [ft/ln]	7.37	0.00	0.00	0.00	2.10	16.94
d_A, Approach Delay [s/veh]	4.90		0.00		9.53	
Approach LOS	A		A		A	
d_I, Intersection Delay [s/veh]	6.28					
Intersection LOS	B					

Appendix C

Crash Data

Gmail **Joe Henderson <thetrafficczar@gmail.com>**

Data Request

2 messages

Melinda Harmon <melinda.harmon1@wyo.gov> Thu, Oct 5, 2023 at 1:23 PM
To: Joe Henderson <joe@sustainabletrafficsolutions.com>
Cc: Keri Bohlmann <keri.bohlmann@wyo.gov>, Kari Fictum <kari.fictum1@wyo.gov>

Hello Joe,

Attached are your requested data reports.
Please let me know if you have any questions or concerns.

Thank you
Sincerely,
Melinda Harmon
Records and Data Management Analyst

WYDOT HIGHWAY SAFETY

P (307) 777-3910 F (307) 777--3853
5300 Bishop Blvd. Cheyenne, WY 82009-3340

E-Mail to and from me, in connection with the transaction
of public business, is subject to the Wyoming Public Records
Act and may be disclosed to third parties.

3 attachments

Intersection History Report - 5th St-WY 336 & Wyarno RD (ID104704) 2020-2022.pdf
51K

Intersection History Report - Wildcat Rd & Wyarno RD (ID104316) 2020-2022.pdf
45K

Segment History Report - Wyarno Rd (ML1704B) MP 0-11.52 2020-2022.pdf
58K

Joe Henderson <joe@sustainabletrafficsolutions.com> Thu, Oct 5, 2023 at 1:29 PM
To: Melinda Harmon <melinda.harmon1@wyo.gov>
Cc: Keri Bohlmann <keri.bohlmann@wyo.gov>, Kari Fictum <kari.fictum1@wyo.gov>

Melinda,

The request that I submitted for the big sweeping curve east of Wildcat Road. Are those crashes included in these reports? if so, how would I identify them?

Joe
[Quoted text hidden]
--
Joseph L. Henderson, PE, PTOE
Principal
Sustainable Traffic Solutions, Inc.
823 West 124th Drive
Westminster, CO 80234
303.589.6875
joe@sustainabletrafficsolutions.com

sustainabletrafficsolutions.com

Licensed in CO, WY, and IA



INTERSECTION CRASH HISTORY REPORT FOR 5TH ST/WY 336 & INDUSTRIAL LANE (ID104704) FOR THE YEARS 2020 - 2022

DATE	TIME	ID #	CRASH STEET	CROSS STREET	JUNCTION RELATION	INTERSECTION TYPE	MANNER OF COLLISION	CRASH SEVERITY	FATAL INJURY	FIRST HARMFUL EVENT (FHE)	FHE LOCATION	#	VEHICLE DIRECTION	VEHICLE MANEUVER	DRIVER ACTION	PERSON TYPE	SAFETY EQUIPMENT USED	INJURY STATUS	LIGHTING	WEATHER CONDITION	ROAD CONDITION	ALCOHOL INVOLVED	DRUGS INVOLVED	LATITUDE	LONGITUDE	CRASH CASE #
2021																										
06/08/2021	1812	104704	INDUSTRIAL LN	5TH ST | WY 336	Intersection	T Intersection	Angle (Front to Side), Opposing Direction	PROPERTY DAMAGE ONLY	0	0	Motor Vehicle in Transport on Roadway	On Roadway	1	West	Straight Ahead	1	No Improper Driving	1	Driver	Shoulder and Lap Belt	No Apparent Injury	Daylight	Clear	Dry	N	N	44.806426	-106.922159	21-0006006
													2	West	Turning Left	2	Failed to Yield ROW	2	Driver	Shoulder and Lap Belt	No Apparent Injury							

REPORT SUMMARY

TOTAL CRASHES: 1

FATAL CRASHES: 0 **TOTAL FATALITIES:** 0

INJURY CRASHES: 0 **TOTAL INJURIES:** 0

PDO CRASHES: 1

	CRASH COUNTS				SEVERITY COUNTS			INJURY COUNTS				
YEAR	FATAL CRASHES	INJURY CRASHES	PDO CRASHES	TOTAL CRASHES	CRITICAL CRASHES*	SERIOUS CRASHES*	DAMAGE CRASHES*	FATAL INJURIES	SERIOUS INJURIES	MINOR INJURIES	POSSIBLE INJURIES	NO INJURIES
2021	0	0	1	1	0	0	1	0	0	0	0	2
	0	**0**	**1**	**1**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**2**

* PDO = Property Damage Only Crashes
* Critical Crashes = Fatal & Suspected Serious Injury Crashes
* Serious Crashes = Suspected Minor Injury & Possible Injury Crashes
* Damage Crashes = No Apparent Injury & Unknown Injury Crashes

INTERSECTION CRASH HISTORY REPORT FOR WILDCAT RD & WYARNO RD (ID104316) FOR THE YEARS 2020 - 2022

DATE	TIME	ID #	CRASH STEET	CROSS STREET	JUNCTION RELATION	INTERSECTION TYPE	MANNER OF COLLISION	CRASH SEVERITY	FATAL INJURY	FIRST HARMFUL EVENT (FHE)	FHE LOCATION	#	VEHICLE DIRECTION	VEHICLE MANEUVER	DRIVER ACTION	PERSON TYPE	SAFETY EQUIPMENT USED	INJURY STATUS	LIGHTING	WEATHER CONDITION	ROAD CONDITION	ALCOHOL INVOLVED	DRUGS INVOLVED	LATITUDE	LONGITUDE	CRASH CASE #

REPORT SUMMARY

TOTAL CRASHES: 0

FATAL CRASHES: 0 **TOTAL FATALITIES:**

INJURY CRASHES: 0 **TOTAL INJURIES:**

PDO CRASHES: 0

* PDO = Property Damage Only Crashes
* Critical Crashes = Fatal & Suspected Serious Injury Crashes
* Serious Crashes = Suspected Minor Injury & Possible Injury Crashes
* Damage Crashes = No Apparent Injury & Unknown Injury Crashes

SEGMENT CRASH HISTORY REPORT FOR WYARNO RD (ML1704B) MP 0-11.52 FOR THE YEARS 2020 - 2022

LRS ID	CRASH STREET	MILE POST	CROSS STREET	DATE	TIME	CRASH SEVERITY	FATAL	INJURY	FIRST HARMFUL EVENT (FHE)	FHE LOCATION	MANNER OF COLLISION	JUNCTION RELATION	VEHICLE #	VEHICLE DIRECTION	VEHICLE MANEUVER	DRIVER ACTION	PERSON TYPE	SAFETY EQUIPMENT USED	INJURY STATUS	LIGHTING	WEATHER CONDITION	ROAD CONDITION	ALCOHOL INVOLVED	DRUGS INVOLVED	LATITUDE	LONGITUDE	CRASH CASE #
ML1704B	5TH ST | WY 336	0.012		01/25/2022	647	PROPERTY DAMAGE ONLY	0	0	Motor Vehicle in Transport on Roadway	On Roadway	Rear End (Front to Rear)	Intersection Related	1	West	Straight Ahead	1 Other Improper Action	1 Driver	Unknown	No Apparent Injury	Dawn	Snowing	Ice/Frost	N	N	44.806858	-106.955460	22P000561
													2	West	Stopped in Traffic	2 No Improper Driving	2 Driver	Unknown	No Apparent Injury								
ML1704B	5TH ST | WY 336	0.012		07/06/2021	1540	POSSIBLE INJURY	0	3	Motor Vehicle in Transport on Roadway	On Roadway	Rear End (Front to Rear)	Intersection Related	1	West	Slowing	1 Other Improper Action	1 Driver	Shoulder and Lap Belt	No Apparent Injury	Daylight	Clear	Dry	N	N	44.806858	-106.955460	21P005478
													2	West	Stopped in Traffic	2 No Improper Driving	2 Driver	Shoulder and Lap Belt	Possible Injury								
													3	West	Stopped in Traffic	3 No Improper Driving	2 Passenger	Shoulder and Lap Belt	Possible Injury								
																	3 Driver	Shoulder and Lap Belt	Possible Injury								
ML1704B	5TH ST | WY 336	0.016		03/22/2022	1540	PROPERTY DAMAGE ONLY	0	0	Motor Vehicle in Transport on Roadway	On Roadway	Rear End (Front to Rear)	Intersection Related	1	West	Straight Ahead	1 Following too Close	1 Driver	Unknown	No Apparent Injury	Daylight	Clear	Dry	N	N	44.806884	-106.955376	22P002097
													2	West	Stopped in Traffic	2 No Improper Driving	2 Driver	Unknown	No Apparent Injury								
ML1704B	5TH ST | WY 336	0.124		07/09/2021	1537	SUSPECTED MINOR INJURY	0	1	Motor Vehicle in Transport on Roadway	On Roadway	Sideswipe Opposite Direction (Meeting)	Non-Junction	1	West	Straight Ahead	1 Erratic/Reckless/Careless/Aggressive	1 Driver	None Used	Suspected Minor Injury	Daylight	Clear	Dry	N	N	44.806849	-106.953175	21P005579
													2	East	Straight Ahead	2 No Improper Driving	1 Passenger	None Used	No Apparent Injury								
																	2 Driver	Unknown	No Apparent Injury								
ML1704B	5TH ST | WY 336	0.158		02/04/2020	754	PROPERTY DAMAGE ONLY	0	0	Motor Vehicle in Transport on Roadway	On Roadway	Rear End (Front to Rear)	Intersection Related	1	West	Slowing	1 Drove too Fast for Conditions	1 Driver	Unknown	No Apparent Injury	Daylight	Clear	Ice/Frost	N	N	44.806842	-106.952466	20P000911
													2	West	Straight Ahead	2 No Improper Driving	2 Driver	Unknown	No Apparent Injury								
													3	West	Straight Ahead	3 No Improper Driving	3 Driver	Unknown	No Apparent Injury								
ML1704B	5TH ST | WY 336	0.169		04/09/2021	1437	PROPERTY DAMAGE ONLY	0	0	Motor Vehicle in Transport on Roadway	On Roadway	Rear End (Front to Rear)	Intersection Related	1	East	Straight Ahead	1 Following too Close	1 Driver	Shoulder and Lap Belt	No Apparent Injury	Daylight	Clear	Dry	N	N	44.806838	-106.952225	21P002768
													2	East	Stopped in Traffic	2 No Improper Driving	2 Driver	Shoulder and Lap Belt	No Apparent Injury								
													3	East	Stopped in Traffic	3 No Improper Driving	3 Driver	Shoulder and Lap Belt	No Apparent Injury								
ML1704B	5TH ST | WY 336	0.208		06/29/2022	802	PROPERTY DAMAGE ONLY	0	0	Motor Vehicle in Transport on Roadway	On Roadway	Rear End (Front to Rear)	Intersection Related	1	West	Straight Ahead	1 Following too Close	1 Driver	Shoulder and Lap Belt	No Apparent Injury	Daylight	Clear	Dry	N	N	44.806862	-106.951436	22P005338
													2	West	Slowing	2 No Improper Driving	2 Driver	Shoulder and Lap Belt	No Apparent Injury								
ML1704B	5TH ST | WY 336	0.362		10/07/2021	1448	SUSPECTED MINOR INJURY	0	1	Motor Vehicle in Transport on Roadway	On Roadway	Rear End (Front to Rear)	Intersection Related	1	West	Straight Ahead	1 Failed to Yield ROW	1 Driver	Unknown	No Apparent Injury	Daylight	Clear	Dry	N	N	44.806845	-106.948266	21P008760
													2	West	Stopped in Traffic	2 No Improper Driving	2 Driver	Unknown	No Apparent Injury								
																	2 Passenger	Unknown	Suspected Minor Injury								
ML1704B	5TH ST | WY 336	0.364		07/15/2020	1614	PROPERTY DAMAGE ONLY	0	0	Motor Vehicle in Transport on Roadway	On Roadway	Rear End (Front to Rear)	Intersection Related	1	West	Straight Ahead	1 Following too Close	1 Driver	Shoulder and Lap Belt	No Apparent Injury	Daylight	Clear	Dry	N	N	44.806833	-106.948219	20P005296
													2	West	Stopped in Traffic	2 No Improper Driving	2 Driver	Shoulder and Lap Belt	No Apparent Injury								
																	2 Passenger	Shoulder and Lap Belt	No Apparent Injury								
																	2 Passenger	Shoulder and Lap Belt	No Apparent Injury								
																	2 Passenger	None Used	No Apparent Injury								
ML1704B	5TH ST | WY 336	0.478		01/04/2021	1535	PROPERTY DAMAGE ONLY	0	0	Motor Vehicle in Transport on Roadway	On Roadway	Rear End (Front to Rear)	Intersection Related	1	East	Straight Ahead	1 Following too Close	1 Driver	Unknown	Unknown	Dusk	Clear	Dry	N	N	44.806836	-106.945882	21P000080
													2	East	Stopped in Traffic	2 No Improper Driving	2 Driver	Shoulder and Lap Belt	No Apparent Injury								

LRS ID	CRASH STREET	MILE POST	CROSS STREET	DATE	TIME	CRASH SEVERITY	FATAL	INJURY	FIRST HARMFUL EVENT (FHE)	FHE LOCATION	MANNER OF COLLISION	JUNCTION RELATION	#	VEHICLE DIRECTION	VEHICLE MANEUVER	#	DRIVER ACTION	#	PERSON TYPE	SAFETY EQUIPMENT USED	INJURY STATUS	LIGHTING	WEATHER CONDITION	ROAD CONDITION	ALCOHOL INVOLVED	DRUGS INVOLVED	LATITUDE	LONGITUDE	CRASH CASE #
ML1704B	5TH ST | WY 336	0.492		02/11/2021	1508	PROPERTY DAMAGE ONLY	0	0	Motor Vehicle in Transport on Roadway	On Roadway	Sideswipe Same Direction (Passing)	Intersection Related	1	West	Straight Ahead	1	Drove too Fast for Conditions	1	Driver	Unknown	No Apparent Injury	Daylight	Clear	Ice/Frost	N	N	44.806836	-106.945589	21P001063
													2	West	Slowing	2	No Improper Driving	2	Driver	Unknown	No Apparent Injury								
																		2	Passenger	Unknown	No Apparent Injury								
ML1704B	5TH ST | WY 336	0.546		02/19/2021	1509	PROPERTY DAMAGE ONLY	0	0	Motor Vehicle in Transport on Roadway	On Roadway	Rear End (Front to Rear)	Driveway Related	1	West	Straight Ahead	1	Erratic/Reckless/Careless/Aggressive	1	Driver	Shoulder and Lap Belt	No Apparent Injury	Daylight	Clear	Dry	N	N	44.806868	-106.944466	21P001297
													2	West	Slowing	2	No Improper Driving	2	Driver	Shoulder and Lap Belt	No Apparent Injury								
ML1704B	5TH ST | WY 336	0.552		07/09/2021	2145	SUSPECTED MINOR INJURY	0	1	Parked Motor Vehicle	Shoulder	Rear End (Front to Rear)	Non-Junction	1	West	Straight Ahead	1	Avoiding Non-Motorist	1	Driver	Unknown	Suspected Minor Injury	Darkness Lighted	Clear	Dry	N	N	44.806851	-106.944352	21P005587
													2	West	Parked	1	Failed to Keep Proper Lane												
ML1704B	5TH ST | WY 336	0.749		05/07/2022	2055	PROPERTY DAMAGE ONLY	0	0	Deer	On Roadway			1		Negotiating a Curve	1	No Improper Driving	1	Driver	Shoulder and Lap Belt	No Apparent Injury	Darkness Lighted	Clear	Dry			44.805607	-106.940742	22-00044084
ML1704B	5TH ST | WY 336	0.939		07/20/2020	1630	PROPERTY DAMAGE ONLY	0	0	Motor Vehicle in Transport on Roadway	On Roadway	Rear End (Front to Rear)	Non-Junction	1	East	Straight Ahead	1	Following too Close	1	Driver	Shoulder and Lap Belt	No Apparent Injury	Daylight	Clear	Dry	N	N	44.804694	-106.937145	200720S04
													2	East	Stopped in Traffic	2	No Improper Driving	2	Driver	Shoulder and Lap Belt	No Apparent Injury								
ML1704B	WY 336	3.101		08/31/2020	1710	PROPERTY DAMAGE ONLY	0	0	Deer	On Roadway			1		Straight Ahead	1	No Improper Driving	1	Driver	Shoulder and Lap Belt	No Apparent Injury	Daylight	Clear	Dry			44.819247	-106.903624	P2020118377
ML1704B	WY 336	4.757		08/28/2022	2100	FATAL INJURY	1	0	Other Non-Collision (MC Loss of Control)	Off Roadway	Not a Collision w/2 Vehicles in Transport	Non-Junction	1	East	Negotiating a Curve	1	Ran Off Road	1	Driver	None Used	Fatal Injury	Darkness Unlighted	Clear	Dry	Y	N	44.834898	-106.877954	22-00093766
ML1704B	WY 336	5.344		06/21/2021	1930	PROPERTY DAMAGE ONLY	0	0	Other Traffic Sign Support	Off Roadway	Not a Collision w/2 Vehicles in Transport	Non-Junction	1	Unknown	Straight Ahead	1	Ran Off Road	1	Driver	Unknown	No Apparent Injury	Unknown	Unknown	Unknown	N	N	44.836579	-106.866123	21P004957
ML1704B	WY 336	6.264		12/12/2020	1730	PROPERTY DAMAGE ONLY	0	0	Deer	On Roadway			1		Straight Ahead	1	No Improper Driving	1	Driver	Shoulder and Lap Belt	No Apparent Injury	Darkness Unlighted	Snowing	Ice/Frost			44.838645	-106.847498	20-00168340
ML1704B	WY 336	9.375		11/22/2021	1550	PROPERTY DAMAGE ONLY	0	0	Deer	On Roadway			1		Straight Ahead	1	No Improper Driving	1	Driver	Shoulder and Lap Belt	No Apparent Injury	Daylight	Clear	Dry			44.822381	-106.788802	21-00133806
																		1	Passenger	Shoulder and Lap Belt	No Apparent Injury								
ML1704B	WY 336	9.518		09/22/2022	1946	PROPERTY DAMAGE ONLY	0	0	Deer	On Roadway			1		Straight Ahead	1	No Improper Driving	1	Driver	Unknown	No Apparent Injury	Darkness Unlighted	Clear	Wet			44.821355	-106.786240	220922S06
																		1	Passenger	Unknown	No Apparent Injury								

LRS ID	CRASH STREET	MILE POST	CROSS STREET	DATE	TIME	CRASH SEVERITY	FATAL	INJURY	FIRST HARMFUL EVENT (FHE)	FHE LOCATION	MANNER OF COLLISION	JUNCTION RELATION	#	VEHICLE DIRECTION	MANEUVER	DRIVER ACTION	PERSON TYPE	SAFETY EQUIPMENT USED	INJURY STATUS	LIGHTING	WEATHER CONDITION	ROAD CONDITION	ALCOHOL INVOLVED	DRUGS INVOLVED	LATITUDE	LONGITUDE	CRASH CASE #

REPORT SUMMARY

TOTAL CRASHES:	21		
FATAL CRASHES:	1	**TOTAL FATALITIES:**	1
INJURY CRASHES:	4	**TOTAL INJURIES:**	6
PDO CRASHES:	16		

* PDO = Property Damage Only Crashes
* Critical Crashes = Fatal & Suspected Serious Injury Crashes
* Serious Crashes = Suspected Minor Injury & Possible Injury Crashes
* Damage Crashes = No Apparent Injury & Unknown Injury Crashes

	CRASH COUNTS				SEVERITY COUNTS			INJURY COUNTS				
YEAR	FATAL CRASHES	INJURY CRASHES	PDO CRASHES	TOTAL CRASHES	CRITICAL CRASHES*	SERIOUS CRASHES*	DAMAGE CRASHES*	FATAL INJURIES	SERIOUS INJURIES	MINOR INJURIES	POSSIBLE INJURIES	NO INJURIES
2020	0	0	5	5	0	0	5	0	0	0	0	12
2021	0	4	6	10	0	4	6	0	0	3	3	18
2022	1	0	5	6	1	0	5	1	0	0	0	9
	1	**4**	**16**	**21**	**1**	**4**	**16**	**1**	**0**	**3**	**3**	**39**

Appendix D

Traffic Signal Warrant Study

Traffic Signal Warrant Analysis

Project Name	**Story House**
Project/File #	**WWC Engineering**
Scenario	**Year 2043 Total - AM Peak**

Intersection Information	
Major Street Name	Wyarno Road
North/South or East/West	E/W
Speed Limit	45 mph or greater
# of Approach Lanes	1
% of Right Turn Traffic to Include	100%
Minor Street Name	Industrial Lane
# of Approach Lanes	1
% of Right Turn Traffic to Include	50%
Isolated Community < 10,000 pop	No

What Additional Warrants to Consider?	
Warrant 3, Peak Hour (A - Vol. and Delay)	Yes
Warrant 4, Pedestrian Volume	No
Warrant 5, School Crossing	No
Warrant 6, Coordinated Signal System	No
Warrant 7, Crash Experience	No
Warrant 8, Roadway Network	No
Warrant 9, Intersection Near a Grade Crossing	No
All-Way Stop Warrant	No

Sustainable Traffic Solutions, Inc.

Traffic Signal Warrant Analysis

Wyarno Road (Major Street) Volume

Eastbound Volume by Hour				
Time	Left Turns	Through	Right Turns	Peds/Bikes
12 - 1 AM				
1 - 2 AM				
2 - 3 AM				
3 - 4 AM				
4 - 5 AM				
5 - 6 AM				
6 - 7 AM				
7 - 8 AM	223	178	70	
8 - 9 AM				
9 - 10 AM				
10 - 11 AM				
11 - 12 PM				
12 - 1 PM				
1 - 2 PM				
2 - 3 PM				
3 - 4 PM				
4 - 5 PM				
5 - 6 PM				
6 - 7 PM				
7 - 8 PM				
8 - 9 PM				
9 - 10 PM				
10 - 11 PM				
11 - 12 AM				
Total Vehicles (unadjusted)			471	0

Westbound Volume by Hour				
Time	Left Turns	Through	Right Turns	Peds/Bikes
12 - 1 AM				
1 - 2 AM				
2 - 3 AM				
3 - 4 AM				
4 - 5 AM				
5 - 6 AM				
6 - 7 AM				
7 - 8 AM	0	172	8	
8 - 9 AM				
9 - 10 AM				
10 - 11 AM				
11 - 12 PM				
12 - 1 PM				
1 - 2 PM				
2 - 3 PM				
3 - 4 PM				
4 - 5 PM				
5 - 6 PM				
6 - 7 PM				
7 - 8 PM				
8 - 9 PM				
9 - 10 PM				
10 - 11 PM				
11 - 12 AM				
Total Vehicles (unadjusted)			180	0

Industrial Lane (Minor Street) Volume

Northbound Volume by Hour				
Time	Left Turns	Through	Right Turns	Peds/Bikes
12 - 1 AM				
1 - 2 AM				
2 - 3 AM				
3 - 4 AM				
4 - 5 AM				
5 - 6 AM				
6 - 7 AM				
7 - 8 AM	32	0	0	
8 - 9 AM				
9 - 10 AM				
10 - 11 AM				
11 - 12 PM				
12 - 1 PM				
1 - 2 PM				
2 - 3 PM				
3 - 4 PM				
4 - 5 PM				
5 - 6 PM				
6 - 7 PM				
7 - 8 PM				
8 - 9 PM				
9 - 10 PM				
10 - 11 PM				
11 - 12 AM				
Total Vehicles (unadjusted)			32	0

Southbound Volume by Hour				
Time	Left Turns	Through	Right Turns	Peds/Bikes
12 - 1 AM				
1 - 2 AM				
2 - 3 AM				
3 - 4 AM				
4 - 5 AM				
5 - 6 AM				
6 - 7 AM				
7 - 8 AM	6	0	157	
8 - 9 AM				
9 - 10 AM				
10 - 11 AM				
11 - 12 PM				
12 - 1 PM				
1 - 2 PM				
2 - 3 PM				
3 - 4 PM				
4 - 5 PM				
5 - 6 PM				
6 - 7 PM				
7 - 8 PM				
8 - 9 PM				
9 - 10 PM				
10 - 11 PM				
11 - 12 AM				
Total Vehicles (unadjusted)			163	0

Traffic Signal Warrant Analysis

Additional Inputs for Warrants 3 to 9 and the Multi-Way Stop Warrants

Warrant 3: Peak Hour Delay Additional Information	
T-intersection or 4-legged?	4
Peak Hour Reviewed?	PM Peak
Wyarno Road (Major Street) Data	
Combined Approach Volume	651
Industrial Lane (Minor Street) Data	
High Volume Side Volume	163
High Volume Side Average Delay (Sec.)	11.49
High Volume Side # of Approach Lanes	1
Low Volume Side Volume (leave blank if T)	0

Warrant 4: Pedestrian Volume Additional Information	
Include Right Turn Reduction for Vehicular Volume?	No
300 feet or more to nearest traffic control signal or STOP sign controlling the street that pedestrians desire to cross?	No
If no, will a traffic control signal restrict the progressive movement of traffic?*	N/A
15th-percentile crossing speed of pedestrians less than 3.5 feet per second?**	No
If yes, then percent reduction to apply to crossing volume? (up to 50%)	N/A

* Include supporting documentation of no progressive movement impact.

** Not common. Include supporting documentation of low crossing speed.

Warrant 5: School Crossing	
Schoolchildren (elementary through high school) crossing the major street (Wyarno	No
Consideration given to other remedial measures (warning signs/flashers, school speed zones, school crossing guards, or a grade-separated crossing)?	No
300 feet or more to nearest traffic control signal or STOP sign controlling the street that pedestrians desire to cross?	No
If no, will a traffic control signal restrict the progressive movement of traffic?*	N/A
Minimum of 20 schoolchildren crossing during the highest crossing hour?	No
Engineering study completed showing the number of adequate gaps in the traffic stream during the period when schoolchildren are using the crossing is less than the number of minutes in the same period?**	No

* Include supporting documentation of no progressive movement impact.

** May need to include supporting documentation of inadequate gaps in traffic.

Warrant 6: Coordinated Signal System	
One-way or Two-way Street?	Two-Way
Adjacent traffic control signals do not provide the necessary degree of platooning, but will collectively provide a progressive operation with the proposed traffic control signal?	No
Resultant spacing of traffic control signals 1,000 feet or more?	No

Warrant 7: Crash Experience	
Number of reportable crashes (*types susceptible to correction by a traffic control signal*) within a 12-month period?*	4 or less
Adequate trial of alternatives with satisfactory observance and enforcement failed to reduce crash frequency?**	No
Include Right Turn Reduction for Vehicular Volume?	No

* May need to include supporting documentation of crash details.

** May need to include supporting documentation of alternative trail(s) and results.

Warrant 8: Roadway Network	
Common intersection of two major routes?*	No
Projected entering volume of at least 1,000 vehicles per hour during the peak hour of a typical weekday?	No
5-Year projected traffic volumes meet one or more of Warrants 1, 2, and 3 during an average weekday?	No
Total existing or immediately projected entering volume of at least 1,000 vehicles per hour for each of any 5 hours of a non-normal business day (Saturday or Sunday)?	No

* Major Route defined as:

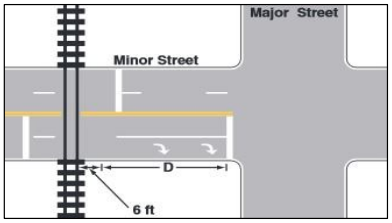
- Part of the street or highway system that serves as the principal roadway network for through traffic flow.
- Rural or suburban highways outside, entering, or traversing a city.
- Appears as a major route on an official plan, such as a major street plan in an urban area traffic and transportation study.

Warrant 9: Intersection Near a Grade Crossing	
Tracks cross which Industrial Lane approach?	Southbound
Consideration given to other alternatives/trial of alternative failed to alleviate the safety concerns?*	No
Distance between STOP or YIELD controlled approach and center of track nearest to the intersection within 140 feet?	No
Clear storage distance (Distance D) between the tracks and the intersection? (See Below)	70 feet
Number of approach lanes at the crossing?	2 or more
Rail traffic per day?	3-5
Percentage of high-occupancy buses?**	0%
Percentage of Tractor-Trailer Trucks?	7.6%-12.5%

* Alternatives to consider or try should include:

- Providing additional pavement that would enable vehicles to clear the track or provide space for an evasive maneuver.
- Reassigning the stop controls at the intersection to make the approach across the track non-stopping.

** High-occupancy is defined as a bus occupied by at least 20 people.



Multi-Way Stop Warrant Additional Information	
Traffic control signal warranted & justified with existing traffic?	No
Number of *correctable* crashes* in 12-month period?	4
Peak Hour high volume approach average delay (Sec.)	11.49

* Crashes include right-turn and left-turn collisions as well as right-angle collisions.

Traffic Signal Warrant Analysis

Warrants 1 - 3 (Volume Warrants)

Project Name	Story House
Project/File #	WWC Engineering
Scenario	Year 2043 Total - AM Peak

Intersection Information			
Major Street (E/W Road)	Wyarno Road	Minor Street (N/S Road)	Industrial Lane
Analyzed with	1 approach lane	Analyzed with	1 Approach Lane
Total Approach Volume	651 vehicles	Total Approach Volume	195 vehicles
Total Ped/Bike Volume	0 crossings	Total Ped/Bike Volume	0 crossings
Right turn reduction of	0 percent applied	Right turn reduction of	50 percent applied

No high speed or isolated community reduction applied to the Volume Warrant thresholds.

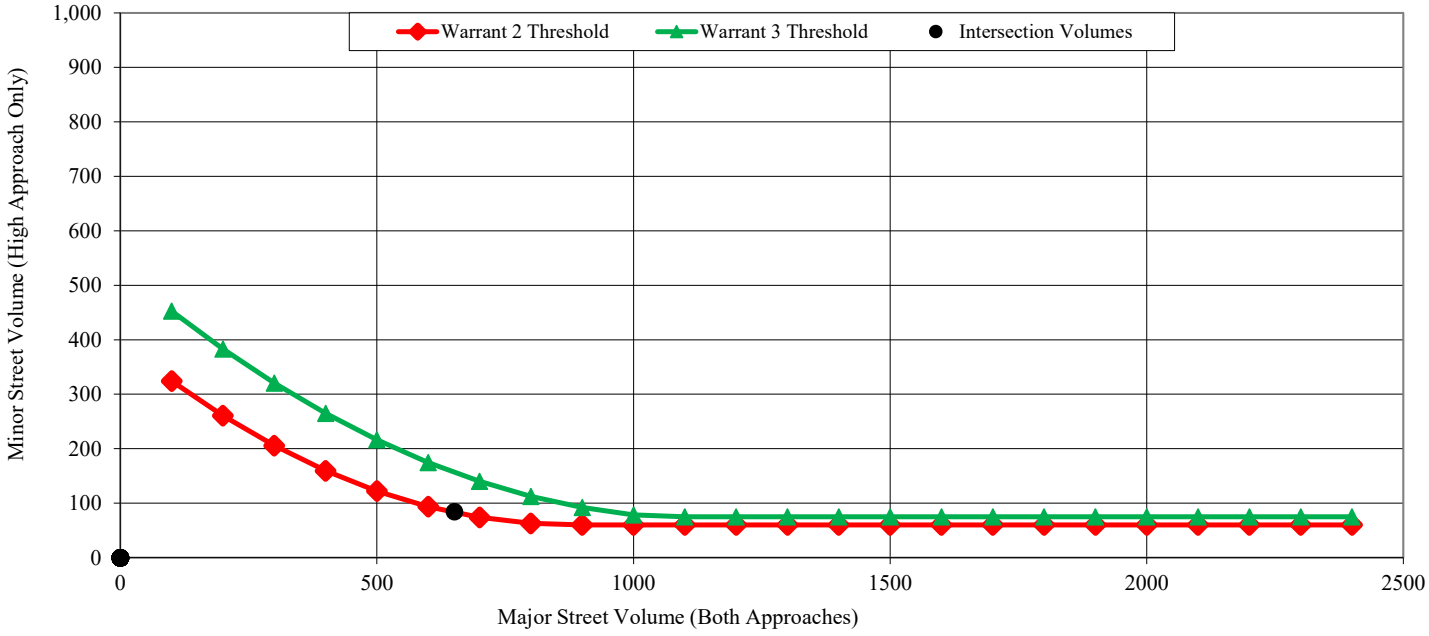
Warrant 1, Eight Hour Vehicular Volume			
	Condition A	**Condition B**	**Condition A+B***
Condition Satisfied?	**Not Satisfied**	**Not Satisfied**	**Not Satisfied**
Required values reached for	0 hours	1 hour	1 (Cond. A) & 1 (Cond. B)
Criteria - Major Street (veh/hr)	350	525	280 (Cond. A) & 420 (Cond. B)
Criteria - Minor Street (veh/hr)	105	53	84 (Cond. A) & 42 (Cond. B)

* Should be applied only after an adequate trial of other alternatives that could cause less delay and inconvenience to traffic has failed to solve the traffic problems.

Warrant 2, Four Hour Vehicular Volume	
Condition Satisfied?	**Not Satisfied**
Required values reached for	1 hour
Criteria	See Figure Below

Warrant 3, Peak Hour Vehicular Volume		
	Condition A	**Condition B**
Condition Satisfied?	**Not Satisfied**	**Not Satisfied**
Required values reached for	814 total, 163 minor, 0.5 delay	0 hours
Criteria - Total Approach Volume (veh in one hour)	800	See Figure Below
Criteria - Minor Street High Side Volume (veh in one hour)	100	
Criteria - Minor Street High Side Delay (veh-hrs)	4	

Figure 4C-2 (Warrant 2 - 70% Factor) & Figure 4C-4 (Warrant 3 - 70% Factor)



Pedestrian Crossing Volume

Traffic Signal Warrant Analysis

Project Name	**Story House**
Project/File #	**WWC Engineering**
Scenario	**Year 2043 Total - PM Peak**

Intersection Information	
Major Street Name	Wyarno Road
North/South or East/West	E/W
Speed Limit	45 mph or greater
# of Approach Lanes	1
% of Right Turn Traffic to Include	100%
Minor Street Name	Industrial Lane
# of Approach Lanes	1
% of Right Turn Traffic to Include	50%
Isolated Community < 10,000 pop	No

What Additional Warrants to Consider?	
Warrant 3, Peak Hour (A - Vol. and Delay)	Yes
Warrant 4, Pedestrian Volume	No
Warrant 5, School Crossing	No
Warrant 6, Coordinated Signal System	No
Warrant 7, Crash Experience	No
Warrant 8, Roadway Network	No
Warrant 9, Intersection Near a Grade Crossing	No
All-Way Stop Warrant	No

Sustainable Traffic Solutions, Inc.

Traffic Signal Warrant Analysis

Wyarno Road (Major Street) Volume

Eastbound Volume by Hour				
Time	Left Turns	Through	Right Turns	Peds/Bikes
12 - 1 AM				
1 - 2 AM				
2 - 3 AM				
3 - 4 AM				
4 - 5 AM				
5 - 6 AM				
6 - 7 AM				
7 - 8 AM				
8 - 9 AM				
9 - 10 AM				
10 - 11 AM				
11 - 12 PM				
12 - 1 PM				
1 - 2 PM				
2 - 3 PM				
3 - 4 PM				
4 - 5 PM				
5 - 6 PM	176	214	36	
6 - 7 PM				
7 - 8 PM				
8 - 9 PM				
9 - 10 PM				
10 - 11 PM				
11 - 12 AM				
Total Vehicles (unadjusted)			426	0

Westbound Volume by Hour				
Time	Left Turns	Through	Right Turns	Peds/Bikes
12 - 1 AM				
1 - 2 AM				
2 - 3 AM				
3 - 4 AM				
4 - 5 AM				
5 - 6 AM				
6 - 7 AM				
7 - 8 AM				
8 - 9 AM				
9 - 10 AM				
10 - 11 AM				
11 - 12 PM				
12 - 1 PM				
1 - 2 PM				
2 - 3 PM				
3 - 4 PM				
4 - 5 PM				
5 - 6 PM	0	203	6	
6 - 7 PM				
7 - 8 PM				
8 - 9 PM				
9 - 10 PM				
10 - 11 PM				
11 - 12 AM				
Total Vehicles (unadjusted)			209	0

Industrial Lane (Minor Street) Volume

Northbound Volume by Hour				
Time	Left Turns	Through	Right Turns	Peds/Bikes
12 - 1 AM				
1 - 2 AM				
2 - 3 AM				
3 - 4 AM				
4 - 5 AM				
5 - 6 AM				
6 - 7 AM				
7 - 8 AM				
8 - 9 AM				
9 - 10 AM				
10 - 11 AM				
11 - 12 PM				
12 - 1 PM				
1 - 2 PM				
2 - 3 PM				
3 - 4 PM				
4 - 5 PM				
5 - 6 PM	66	0	3	
6 - 7 PM				
7 - 8 PM				
8 - 9 PM				
9 - 10 PM				
10 - 11 PM				
11 - 12 AM				
Total Vehicles (unadjusted)			69	0

Southbound Volume by Hour				
Time	Left Turns	Through	Right Turns	Peds/Bikes
12 - 1 AM				
1 - 2 AM				
2 - 3 AM				
3 - 4 AM				
4 - 5 AM				
5 - 6 AM				
6 - 7 AM				
7 - 8 AM				
8 - 9 AM				
9 - 10 AM				
10 - 11 AM				
11 - 12 PM				
12 - 1 PM				
1 - 2 PM				
2 - 3 PM				
3 - 4 PM				
4 - 5 PM				
5 - 6 PM	8	0	241	
6 - 7 PM				
7 - 8 PM				
8 - 9 PM				
9 - 10 PM				
10 - 11 PM				
11 - 12 AM				
Total Vehicles (unadjusted)			249	0

Traffic Signal Warrant Analysis

Additional Inputs for Warrants 3 to 9 and the Multi-Way Stop Warrants

Warrant 3: Peak Hour Delay Additional Information	
T-intersection or 4-legged?	4
Peak Hour Reviewed?	PM Peak
Wyarno Road (Major Street) Data	
Combined Approach Volume	635
Industrial Lane (Minor Street) Data	
High Volume Side Volume	249
High Volume Side Average Delay (Sec.)	12.69
High Volume Side # of Approach Lanes	1
Low Volume Side Volume (leave blank if T)	69

Warrant 4: Pedestrian Volume Additional Information	
Include Right Turn Reduction for Vehicular Volume?	No
300 feet or more to nearest traffic control signal or STOP sign controlling the street that pedestrians desire to cross?	No
If no, will a traffic control signal restrict the progressive movement of traffic?*	N/A
15th-percentile crossing speed of pedestrians less than 3.5 feet per second?**	No
If yes, then percent reduction to apply to crossing volume? (up to 50%)	N/A

* Include supporting documentation of no progressive movement impact.

** Not common. Include supporting documentation of low crossing speed.

Warrant 5: School Crossing	
Schoolchildren (elementary through high school) crossing the major street (Wyarno	No
Consideration given to other remedial measures (warning signs/flashers, school speed zones, school crossing guards, or a grade-separated crossing)?	No
300 feet or more to nearest traffic control signal or STOP sign controlling the street that pedestrians desire to cross?	No
If no, will a traffic control signal restrict the progressive movement of traffic?*	N/A
Minimum of 20 schoolchildren crossing during the highest crossing hour?	No
Engineering study completed showing the number of adequate gaps in the traffic stream during the period when schoolchildren are using the crossing is less than the number of minutes in the same period?**	No

* Include supporting documentation of no progressive movement impact.

** May need to include supporting documentation of inadequate gaps in traffic.

Warrant 6: Coordinated Signal System	
One-way or Two-way Street?	Two-Way
Adjacent traffic control signals do not provide the necessary degree of platooning, but will collectively provide a progressive operation with the proposed traffic control signal?	No
Resultant spacing of traffic control signals 1,000 feet or more?	No

Warrant 7: Crash Experience	
Number of reportable crashes (*types susceptible to correction by a traffic control signal*) within a 12-month period?*	4 or less
Adequate trial of alternatives with satisfactory observance and enforcement failed to reduce crash frequency?**	No
Include Right Turn Reduction for Vehicular Volume?	No

* May need to include supporting documentation of crash details.

** May need to include supporting documentation of alternative trail(s) and results.

Warrant 8: Roadway Network	
Common intersection of two major routes?*	No
Projected entering volume of at least 1,000 vehicles per hour during the peak hour of a typical weekday?	No
5-Year projected traffic volumes meet one or more of Warrants 1, 2, and 3 during an average weekday?	No
Total existing or immediately projected entering volume of at least 1,000 vehicles per hour for each of any 5 hours of a non-normal business day (Saturday or Sunday)?	No

* Major Route defined as:

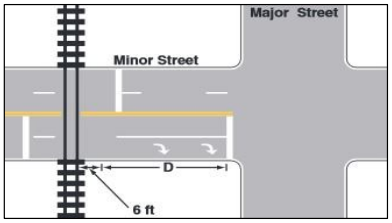
- Part of the street or highway system that serves as the principal roadway network for through traffic flow.
- Rural or suburban highways outside, entering, or traversing a city.
- Appears as a major route on an official plan, such as a major street plan in an urban area traffic and transportation study.

Warrant 9: Intersection Near a Grade Crossing	
Tracks cross which Industrial Lane approach?	Southbound
Consideration given to other alternatives/trial of alternative failed to alleviate the safety concerns?*	No
Distance between STOP or YIELD controlled approach and center of track nearest to the intersection within 140 feet?	No
Clear storage distance (Distance D) between the tracks and the intersection? (See Below)	70 feet
Number of approach lanes at the crossing?	2 or more
Rail traffic per day?	3-5
Percentage of high-occupancy buses?**	0%
Percentage of Tractor-Trailer Trucks?	7.6%-12.5%

* Alternatives to consider or try should include:

- Providing additional pavement that would enable vehicles to clear the track or provide space for an evasive maneuver.
- Reassigning the stop controls at the intersection to make the approach across the track non-stopping.

** High-occupancy is defined as a bus occupied by at least 20 people.



Multi-Way Stop Warrant Additional Information	
Traffic control signal warranted & justified with existing traffic?	No
Number of *correctable* crashes* in 12-month period?	4
Peak Hour high volume approach average delay (Sec.)	12.69

* Crashes include right-turn and left-turn collisions as well as right-angle collisions.

Traffic Signal Warrant Analysis

Warrants 1 - 3 (Volume Warrants)

Project Name	Story House
Project/File #	WWC Engineering
Scenario	Year 2043 Total - PM Peak

Intersection Information			
Major Street (E/W Road)	Wyarno Road	Minor Street (N/S Road)	Industrial Lane
Analyzed with	1 approach lane	Analyzed with	1 Approach Lane
Total Approach Volume	635 vehicles	Total Approach Volume	318 vehicles
Total Ped/Bike Volume	0 crossings	Total Ped/Bike Volume	0 crossings
Right turn reduction of	0 percent applied	Right turn reduction of	50 percent applied

No high speed or isolated community reduction applied to the Volume Warrant thresholds.

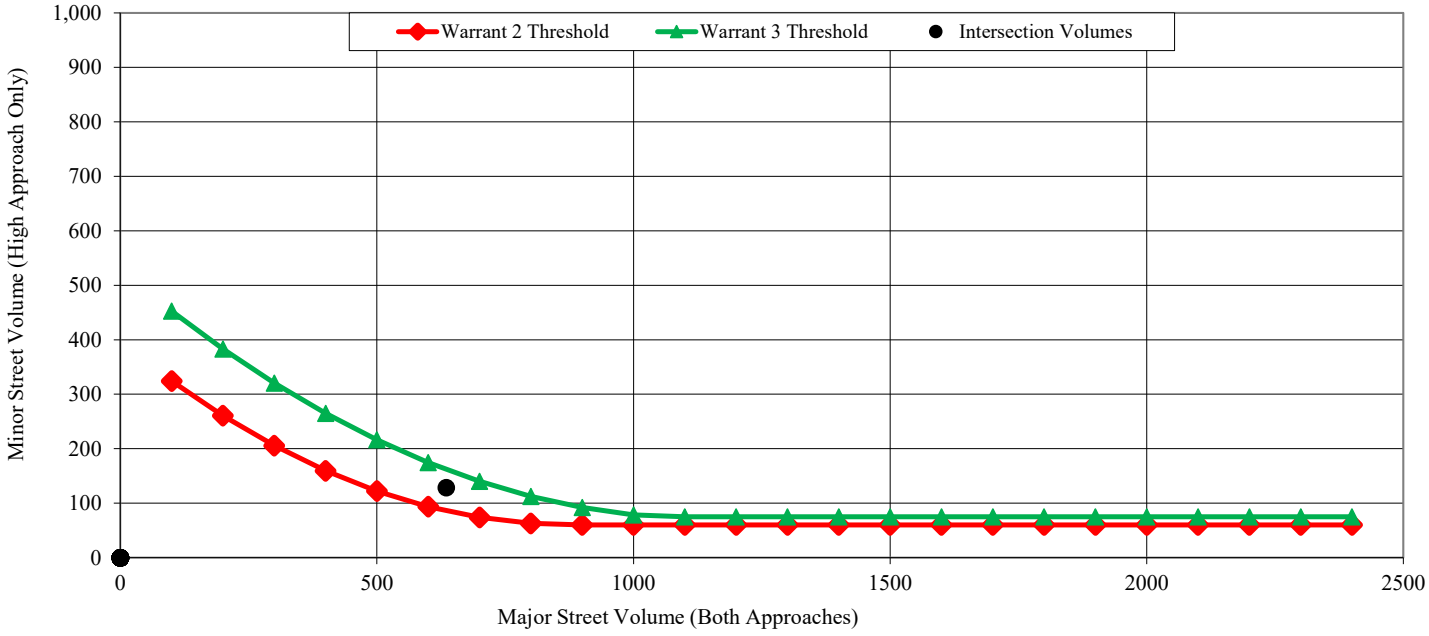
Warrant 1, Eight Hour Vehicular Volume			
	Condition A	**Condition B**	**Condition A+B***
Condition Satisfied?	**Not Satisfied**	**Not Satisfied**	**Not Satisfied**
Required values reached for	1 hour	1 hour	1 (Cond. A) & 1 (Cond. B)
Criteria - Major Street (veh/hr)	350	525	280 (Cond. A) & 420 (Cond. B)
Criteria - Minor Street (veh/hr)	105	53	84 (Cond. A) & 42 (Cond. B)

* Should be applied only after an adequate trial of other alternatives that could cause less delay and inconvenience to traffic has failed to solve the traffic problems.

Warrant 2, Four Hour Vehicular Volume	
Condition Satisfied?	**Not Satisfied**
Required values reached for	1 hour
Criteria	See Figure Below

Warrant 3, Peak Hour Vehicular Volume		
	Condition A	**Condition B**
Condition Satisfied?	**Not Satisfied**	**Not Satisfied**
Required values reached for	953 total, 249 minor, 0.9 delay	0 hours
Criteria - Total Approach Volume (veh in one hour)	800	See Figure Below
Criteria - Minor Street High Side Volume (veh in one hour)	100	
Criteria - Minor Street High Side Delay (veh-hrs)	4	

Figure 4C-2 (Warrant 2 - 70% Factor) & Figure 4C-4 (Warrant 3 - 70% Factor)



Appendix E

Wyarno Road Speed Data Summary

Form TR-11

Revised 3/4/11

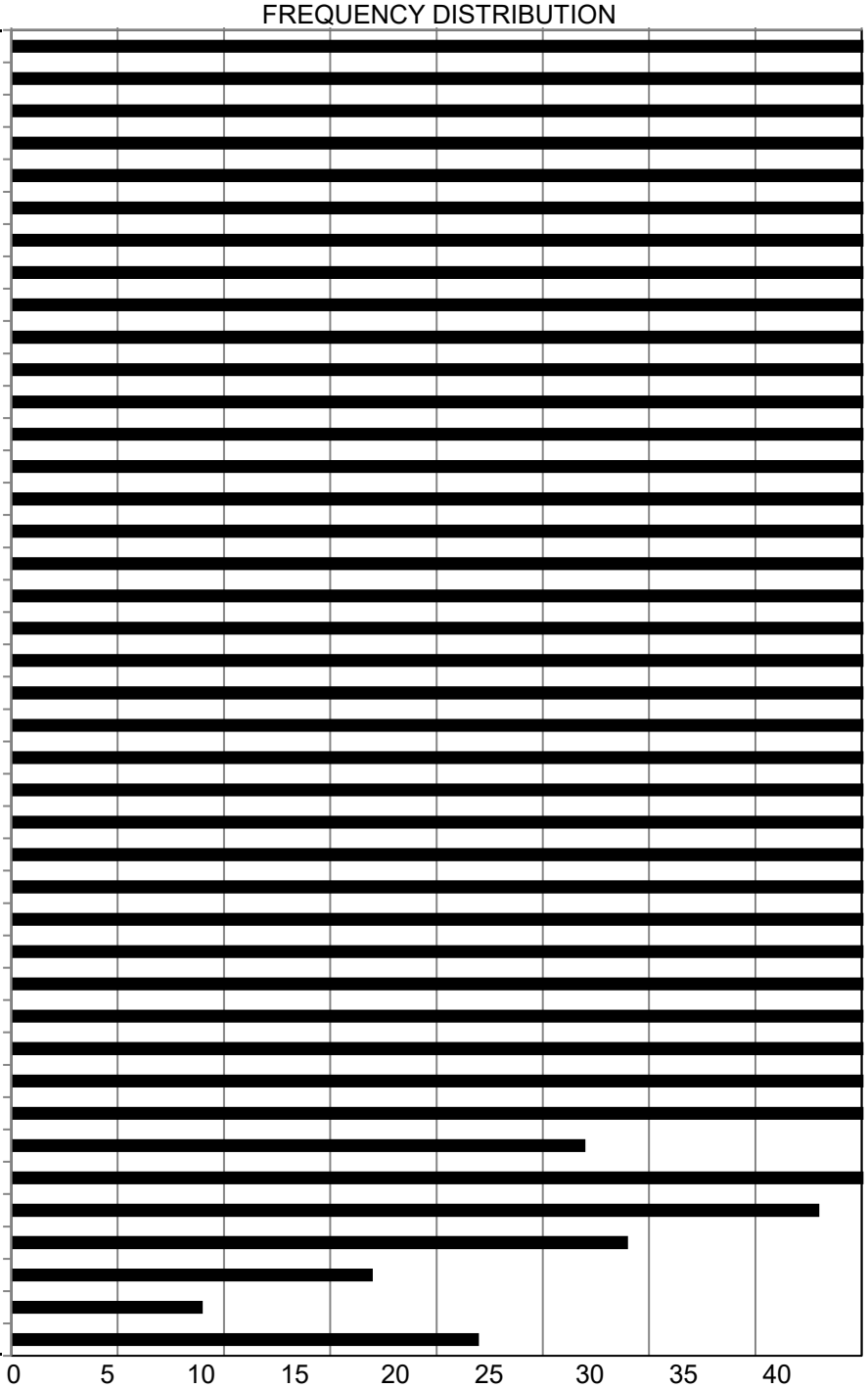
SPEED STUDY

Wyoming Department of Transportation

CITY: Sheridan
COUNTY: Sheridan
ROUTE: Wyarno Road
SPEED LIMIT: 70 MPH
DIRECTION: EB/WB Comb.
LOCATION: E/O Industrial Lane
OBSERVER: JAMAR Radar Device
START TIME: 0
WEATHER: Summer
######
END TIME: 0
COMMENTS: Location 1

SPEED	FREQUENCY	ACUM TOTAL	ACUM %
30	122	122	1.4
31	47	169	2.0
32	111	280	3.2
33	53	333	3.9
34	145	478	5.5
35	212	690	8.0
36	127	817	9.5
37	272	1089	12.6
38	125	1214	14.1
39	311	1525	17.7
40	394	1919	22.3
41	211	2130	24.7
42	497	2627	30.5
43	464	3091	35.8
44	237	3328	38.6
45	538	3866	44.8
46	277	4143	48.0
47	566	4709	54.6
48	504	5213	60.4
49	217	5430	63.0
50	431	5861	68.0
51	226	6087	70.6
52	396	6483	75.2
53	371	6854	79.5
54	167	7021	81.4
55	284	7305	84.7
56	145	7450	86.4
57	240	7690	89.2
58	236	7926	91.9
59	83	8009	92.9
60	161	8170	94.7
61	60	8230	95.4
62	96	8326	96.5
63	93	8419	97.6
64	27	8446	97.9
65	63	8509	98.7
66	38	8547	99.1
67	29	8576	99.4
68	17	8593	99.6
69	9	8602	99.7
70	22	8624	100

FREQUENCY DISTRIBUTION



AVERAGE SPEED = 47.0
50th PERCENTILE = 47
67th PERCENTILE = 50
85th PERCENTILE = 56
95th PERCENTILE = 61

PACE SPEED = 39 to 48
VEHICLES IN PACE = 3999
% IN PACE = 46
% BELOW PACE = 14
% ABOVE PACE = 40

STANDARD DEVIATION = 8.04
% EXCEEDING POSTED LIMIT = 0

RECOMMENDED SPEED LIMIT = 55

Form TR-11

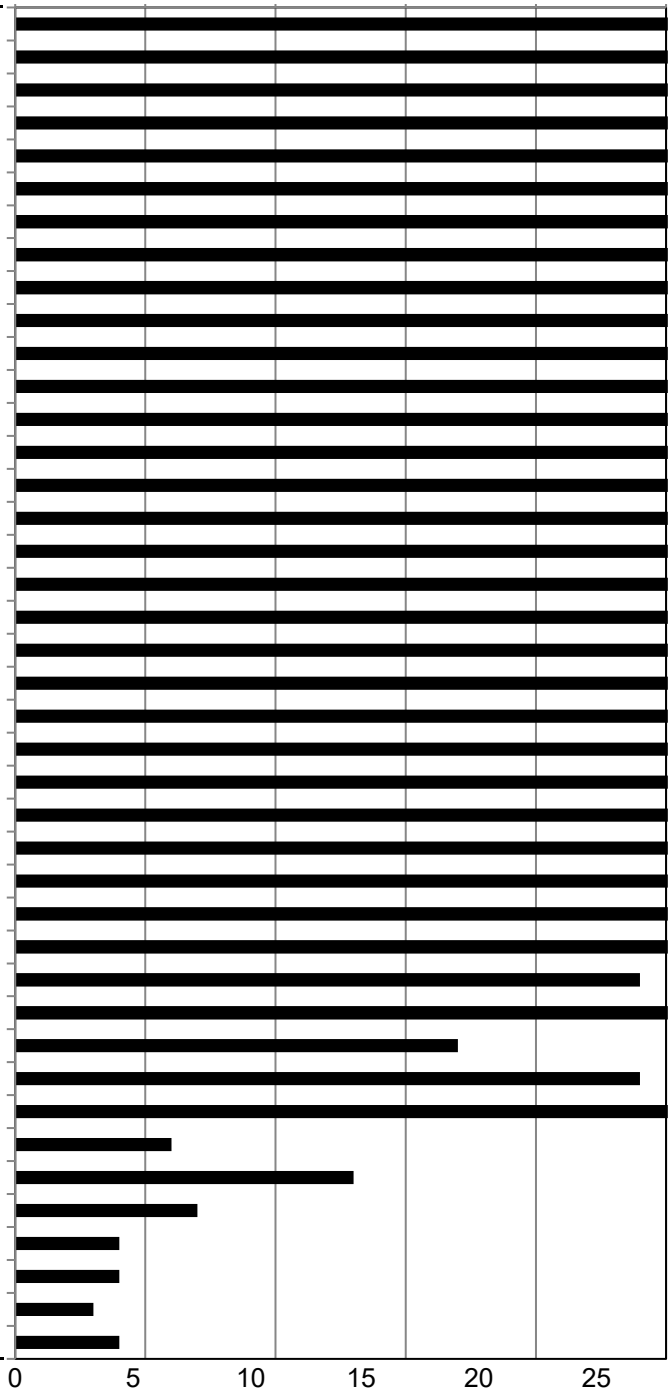
Revised 3/4/11

SPEED STUDY

Wyoming Department of Transportation

CITY: Sheridan
COUNTY: Sheridan
ROUTE: Wyarno Road
SPEED LIMIT: 70 MPH
DIRECTION: Eastbound
LOCATION: E/O Industrial Lane
OBSERVER: JAMAR Radar Device
START TIME:
WEATHER: Summer
DATE: 7/16/23-7/25/23
END TIME:
COMMENTS: Location 1

SPEED	FREQUENCY	ACUM TOTAL	ACUM %
30	88	88	2.2
31	36	124	3.1
32	79	203	5.0
33	34	237	5.8
34	97	334	8.2
35	147	481	11.8
36	82	563	13.9
37	183	746	18.4
38	76	822	20.2
39	192	1014	25.0
40	231	1245	30.7
41	124	1369	33.7
42	285	1654	40.7
43	253	1907	47.0
44	122	2029	50.0
45	276	2305	56.8
46	117	2422	59.7
47	257	2679	66.0
48	218	2897	71.4
49	97	2994	73.7
50	171	3165	78.0
51	91	3256	80.2
52	153	3409	84.0
53	120	3529	86.9
54	48	3577	88.1
55	89	3666	90.3
56	48	3714	91.5
57	79	3793	93.4
58	83	3876	95.5
59	24	3900	96.1
60	46	3946	97.2
61	17	3963	97.6
62	24	3987	98.2
63	32	4019	99.0
64	6	4025	99.1
65	13	4038	99.5
66	7	4045	99.6
67	4	4049	99.7
68	4	4053	99.8
69	3	4056	99.9
70	4	4060	100



AVERAGE SPEED = 44.8
50th PERCENTILE = 45
67th PERCENTILE = 48
85th PERCENTILE = 53
95th PERCENTILE = 58

PACE SPEED = 39 to 48
VEHICLES IN PACE = 2075
% IN PACE = 51
% BELOW PACE = 20
% ABOVE PACE = 29

STANDARD DEVIATION = 7.67
% EXCEEDING POSTED LIMIT = 0

RECOMMENDED SPEED LIMIT = 55

Form TR-11

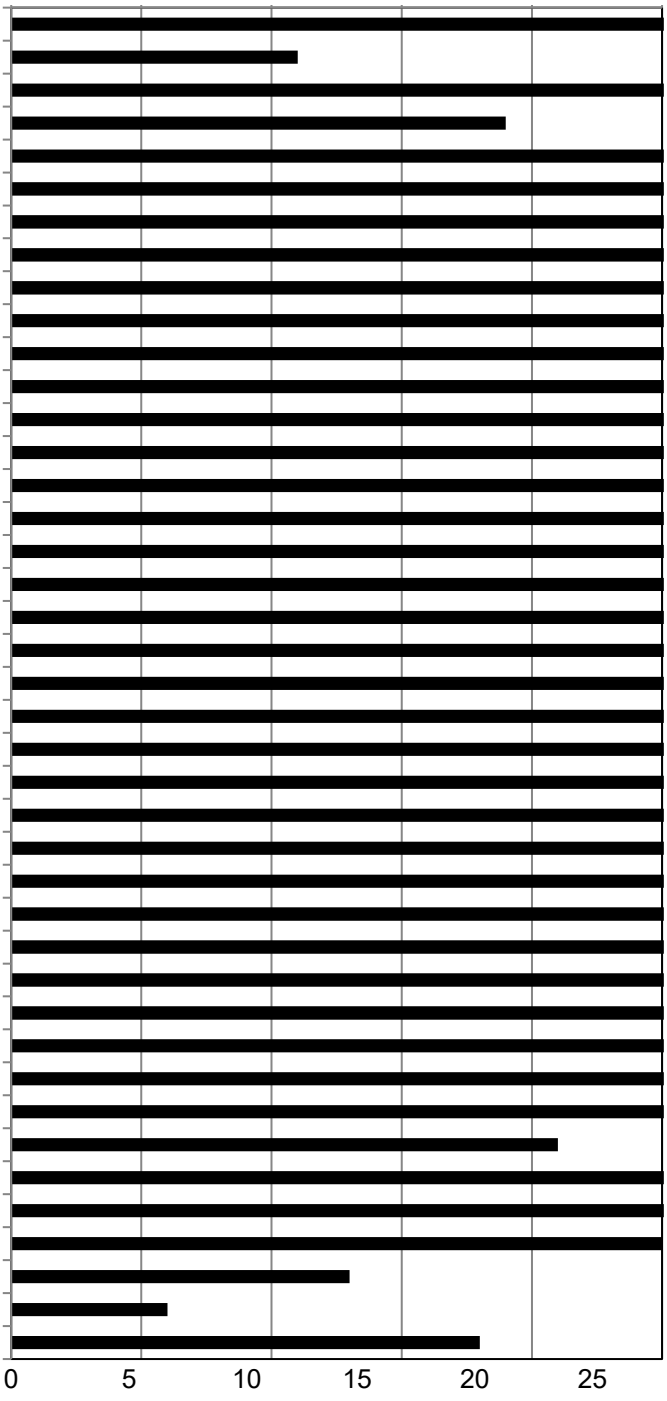
Revised 3/4/11

SPEED STUDY

Wyoming Department of Transportation

CITY: Sheridan
COUNTY: Sheridan
ROUTE: Wyarno Road
SPEED LIMIT: 70 MPH
DIRECTION: Westbound
LOCATION: E/O Industrial Lane
OBSERVER: JAMAR Radar Device
START TIME:
WEATHER: Summer
DATE: 7/16/23-7/25/23
END TIME:
COMMENTS: Location 1

SPEED	FREQUENCY	ACUM TOTAL	ACUM %
30	34	34	0.7
31	11	45	1.0
32	32	77	1.7
33	19	96	2.1
34	48	144	3.2
35	65	209	4.6
36	45	254	5.6
37	89	343	7.5
38	49	392	8.6
39	119	511	11.2
40	163	674	14.8
41	87	761	16.7
42	212	973	21.3
43	211	1184	25.9
44	115	1299	28.5
45	262	1561	34.2
46	160	1721	37.7
47	309	2030	44.5
48	286	2316	50.7
49	120	2436	53.4
50	260	2696	59.1
51	135	2831	62.0
52	243	3074	67.4
53	251	3325	72.9
54	119	3444	75.5
55	195	3639	79.7
56	97	3736	81.9
57	161	3897	85.4
58	153	4050	88.7
59	59	4109	90.0
60	115	4224	92.6
61	43	4267	93.5
62	72	4339	95.1
63	61	4400	96.4
64	21	4421	96.9
65	50	4471	98.0
66	31	4502	98.6
67	25	4527	99.2
68	13	4540	99.5
69	6	4546	99.6
70	18	4564	100



AVERAGE SPEED = 48.9
50th PERCENTILE = 48
67th PERCENTILE = 52
85th PERCENTILE = 57
95th PERCENTILE = 62

PACE SPEED = 45 to 54
VEHICLES IN PACE = 2145
% IN PACE = 47
% BELOW PACE = 28
% ABOVE PACE = 25

STANDARD DEVIATION = 7.87
% EXCEEDING POSTED LIMIT = 0

RECOMMENDED SPEED LIMIT = 55

Sheridan Police Department
JAMAR Speed Study

Volume Sorted by Speed for 7/16/2023 to 7/25/2023

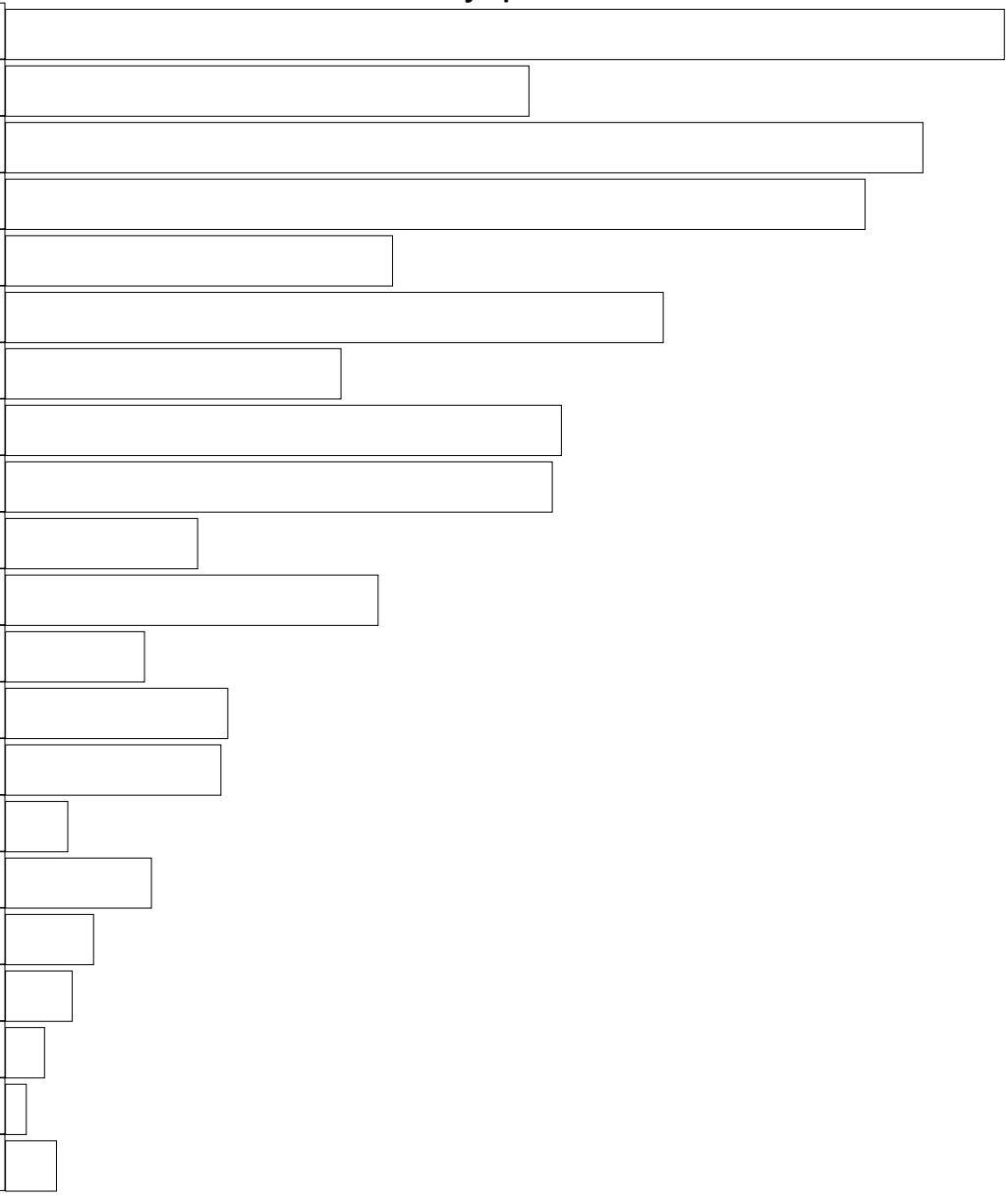
Combined

Speed (MPH)	Volume
20	13
21	30
22	24
23	19
24	40
25	67
26	35
27	57
28	31
29	74
30	122
31	47
32	111
33	53
34	145
35	212
36	127
37	272
38	125
39	311
40	394
41	211
42	497
43	464
44	237
45	538
46	277
47	566
48	504
49	217

Sheridan Police Department
JAMAR Speed Study

Volume Sorted by Speed for 7/16/2023 to 7/25/2023

50	431
51	226
52	396
53	371
54	167
55	284
56	145
57	240
58	236
59	83
60	161
61	60
62	96
63	93
64	27
65	63
66	38
67	29
68	17
69	9
70	22



Sheridan Police Department
JAMAR Speed Study

Eastbound

Volume Sorted by Speed for 7/16/2023 to 7/25/2023

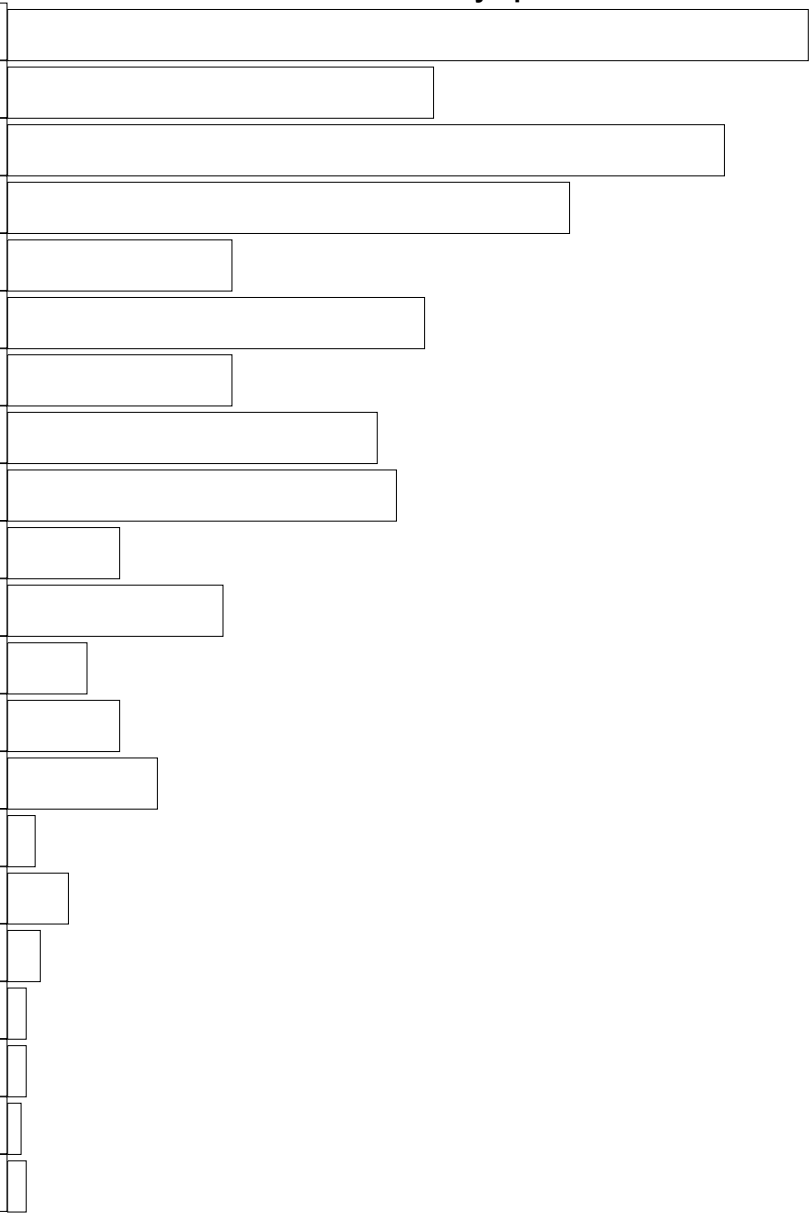
Direction X, Lane 1

Speed (MPH)	Volume
20	3
21	7
22	12
23	7
24	20
25	27
26	21
27	35
28	27
29	59
30	88
31	36
32	79
33	34
34	97
35	147
36	82
37	183
38	76
39	192
40	231
41	124
42	285
43	253
44	122
45	276
46	117
47	257
48	218
49	97

Sheridan Police Department
JAMAR Speed Study

Volume Sorted by Speed for 7/16/2023 to 7/25/2023

50	171
51	91
52	153
53	120
54	48
55	89
56	48
57	79
58	83
59	24
60	46
61	17
62	24
63	32
64	6
65	13
66	7
67	4
68	4
69	3
70	4



Sheridan Police Department
JAMAR Speed Study

Westbound

Volume Sorted by Speed for 7/16/2023 to 7/25/2023

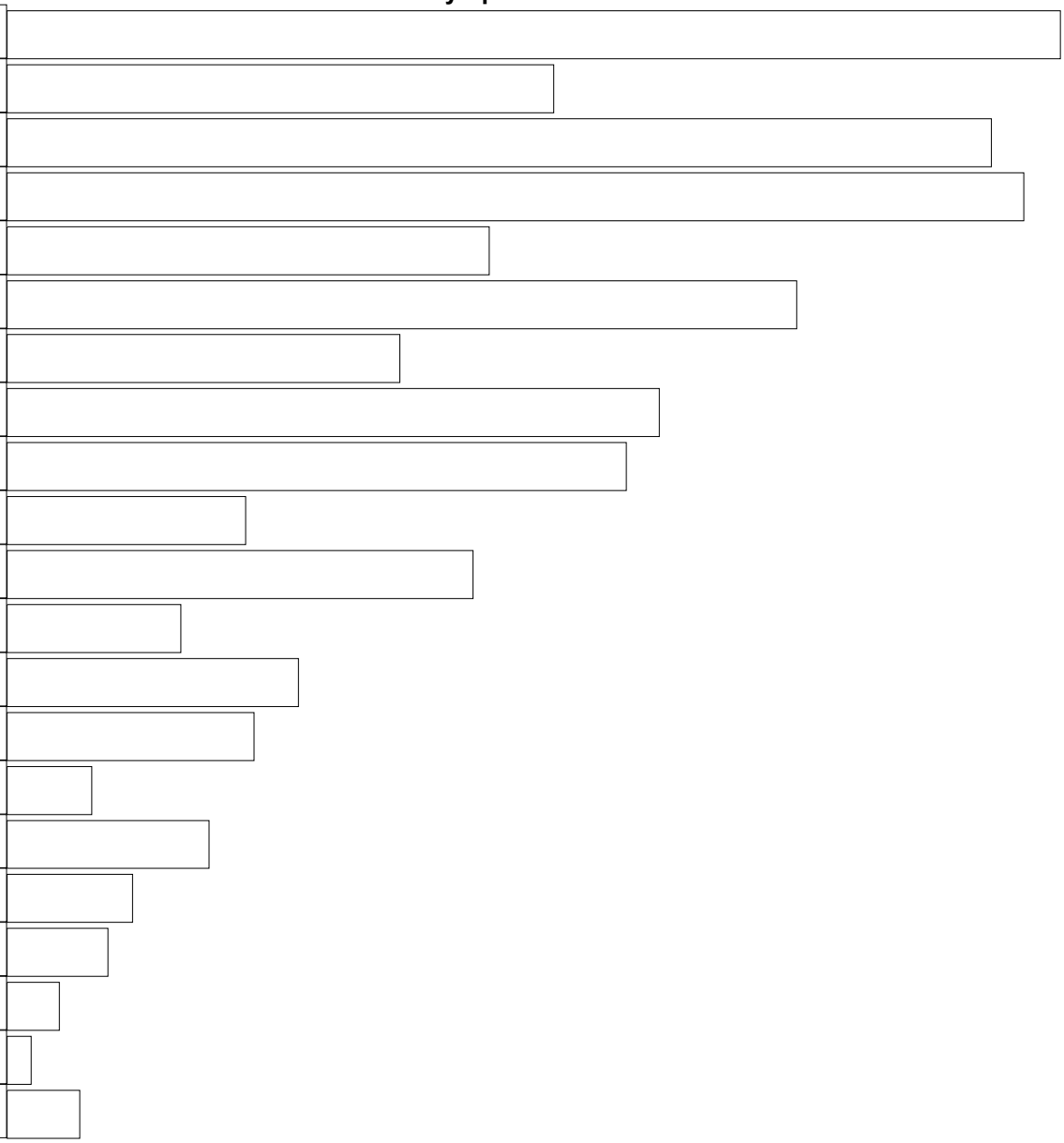
Direction X, Lane 2

Speed (MPH)	Volume
20	10
21	23
22	12
23	12
24	20
25	40
26	14
27	22
28	4
29	15
30	34
31	11
32	32
33	19
34	48
35	65
36	45
37	89
38	49
39	119
40	163
41	87
42	212
43	211
44	115
45	262
46	160
47	309
48	286
49	120

Sheridan Police Department
JAMAR Speed Study

Volume Sorted by Speed for 7/16/2023 to 7/25/2023

50	260
51	135
52	243
53	251
54	119
55	195
56	97
57	161
58	153
59	59
60	115
61	43
62	72
63	61
64	21
65	50
66	31
67	25
68	13
69	6
70	18



Form TR-11

Revised 3/4/11

SPEED STUDY

Wyoming Department of Transportation

CITY: Sheridan
SPEED LIMIT: 70 MPH
OBSERVER: 0
######

COUNTY: Sheridan
DIRECTION: EB/WB Comb.
START TIME: 0
END TIME: 0

ROUTE: Wyarno Road
LOCATION: W/O Wildcat Road
WEATHER: Summer
COMMENTS: Location 2

SPEED	FREQUENCY	ACUM TOTAL	ACUM %
30	5	5	0.5
31	1	6	0.6
32	3	9	0.9
33	2	11	1.0
34	3	14	1.3
35	3	17	1.6
36	4	21	2.0
37	10	31	2.9
38	2	33	3.1
39	9	42	4.0
40	12	54	5.1
41	5	59	5.6
42	26	85	8.1
43	29	114	10.8
44	16	130	12.3
45	33	163	15.5
46	15	178	16.9
47	56	234	22.2
48	51	285	27.0
49	24	309	29.3
50	57	366	34.7
51	31	397	37.7
52	70	467	44.3
53	81	548	52.0
54	35	583	55.3
55	61	644	61.1
56	25	669	63.5
57	62	731	69.4
58	55	786	74.6
59	29	815	77.3
60	47	862	81.8
61	14	876	83.1
62	61	937	88.9
63	35	972	92.2
64	13	985	93.5
65	20	1005	95.4
66	20	1025	97.2
67	7	1032	97.9
68	8	1040	98.7
69	6	1046	99.2
70	8	1054	100

FREQUENCY DISTRIBUTION



AVERAGE SPEED = 53.3
50th PERCENTILE = 53
67th PERCENTILE = 57
85th PERCENTILE = 62
95th PERCENTILE = 65

PACE SPEED = 50 to 59
VEHICLES IN PACE = 506
% IN PACE = 48
% BELOW PACE = 29
% ABOVE PACE = 23

STANDARD DEVIATION = 7.60
% EXCEEDING POSTED LIMIT = 0

RECOMMENDED SPEED LIMIT = 60

Form TR-11

Revised 3/4/11

SPEED STUDY

Wyoming Department of Transportation

CITY: Sheridan
COUNTY: Sheridan
ROUTE: Wyarno Road
SPEED LIMIT: 70 MPH
DIRECTION: Eastbound
LOCATION: W/O Wildcat Road
OBSERVER:
START TIME:
WEATHER: Summer
DATE: 8/8/23-8/9/23
END TIME:
COMMENTS: Location 2

SPEED	FREQUENCY	ACUM TOTAL	ACUM %
30	4	4	0.8
31	1	5	1.0
32	2	7	1.4
33	2	9	1.8
34	0	9	1.8
35	2	11	2.2
36	3	14	2.7
37	4	18	3.5
38	1	19	3.7
39	6	25	4.9
40	8	33	6.5
41	3	36	7.0
42	13	49	9.6
43	12	61	11.9
44	8	69	13.5
45	17	86	16.8
46	5	91	17.8
47	37	128	25.0
48	26	154	30.1
49	13	167	32.7
50	35	202	39.5
51	16	218	42.7
52	35	253	49.5
53	45	298	58.3
54	14	312	61.1
55	31	343	67.1
56	14	357	69.9
57	28	385	75.3
58	27	412	80.6
59	11	423	82.8
60	17	440	86.1
61	7	447	87.5
62	25	472	92.4
63	14	486	95.1
64	4	490	95.9
65	7	497	97.3
66	6	503	98.4
67	2	505	98.8
68	2	507	99.2
69	3	510	99.8
70	1	511	100



AVERAGE SPEED = 52.3
50th PERCENTILE = 53
67th PERCENTILE = 55
85th PERCENTILE = 60
95th PERCENTILE = 63

PACE SPEED = 47 to 56
VEHICLES IN PACE = 266
% IN PACE = 52
% BELOW PACE = 18
% ABOVE PACE = 30

STANDARD DEVIATION = 7.41
% EXCEEDING POSTED LIMIT = 0

RECOMMENDED SPEED LIMIT = 60

Form TR-11

Revised 3/4/11

SPEED STUDY

Wyoming Department of Transportation

CITY: Sheridan
COUNTY: Sheridan
ROUTE: Wyarno Road
SPEED LIMIT: 70 MPH
DIRECTION: Westbound
LOCATION: W/O Wildcat Road
OBSERVER:
START TIME:
WEATHER: Summer
DATE: 8/8/23-8/9/23
END TIME:
COMMENTS: Location 2

SPEED	FREQUENCY	ACUM TOTAL	ACUM %
30	1	1	0.2
31	0	1	0.2
32	1	2	0.4
33	0	2	0.4
34	3	5	0.9
35	1	6	1.1
36	1	7	1.3
37	6	13	2.4
38	1	14	2.6
39	3	17	3.1
40	4	21	3.9
41	2	23	4.2
42	13	36	6.6
43	17	53	9.8
44	8	61	11.2
45	16	77	14.2
46	10	87	16.0
47	19	106	19.5
48	25	131	24.1
49	11	142	26.2
50	22	164	30.2
51	15	179	33.0
52	35	214	39.4
53	36	250	46.0
54	21	271	49.9
55	30	301	55.4
56	11	312	57.5
57	34	346	63.7
58	28	374	68.9
59	18	392	72.2
60	30	422	77.7
61	7	429	79.0
62	36	465	85.6
63	21	486	89.5
64	9	495	91.2
65	13	508	93.6
66	14	522	96.1
67	5	527	97.1
68	6	533	98.2
69	3	536	98.7
70	7	543	100



AVERAGE SPEED = 54.3
50th PERCENTILE = 55
67th PERCENTILE = 58
85th PERCENTILE = 62
95th PERCENTILE = 66

PACE SPEED = 51 to 60
VEHICLES IN PACE = 258
% IN PACE = 48
% BELOW PACE = 30
% ABOVE PACE = 22

STANDARD DEVIATION = 7.66
% EXCEEDING POSTED LIMIT = 0

RECOMMENDED SPEED LIMIT = 60

Sheridan Police Department
JAMAR Speed Study

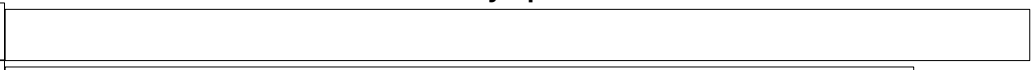
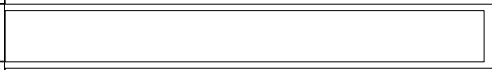
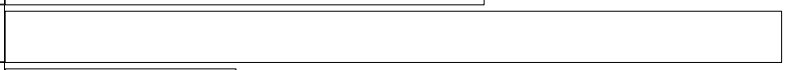
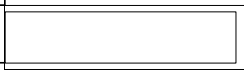
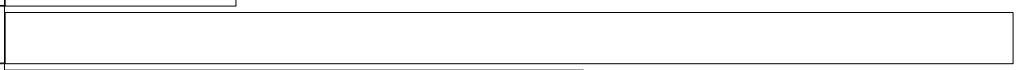
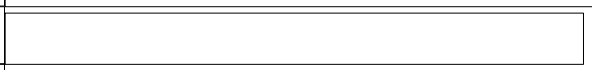
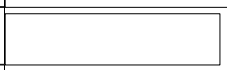
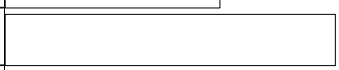
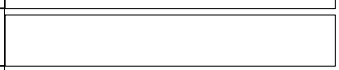
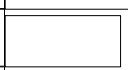
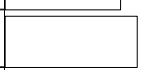
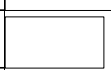
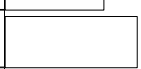
Volume Sorted by Speed for 8/8/2023 to 8/9/2023

Combined

Speed MPH	Volume
27	1
2	0
2	3
30	5
31	1
32	3
33	2
34	3
35	3
36	4
37	10
3	2
3	
40	12
41	5
42	26
43	2
44	16
45	33
46	15
47	56
4	51
4	24
50	57
51	31
52	70
53	1
54	35
55	61
56	25

Sheridan Police Department
JAMAR Speed Study

Volume Sorted by Speed for 8/8/2023 to 8/9/2023

57	62	
5	55	
5	2	
60	47	
61	14	
62	61	
63	35	
64	13	
65	20	
66	20	
67	7	
6		
6	6	
70		
71	4	
72	3	
73	5	
74	1	
75	1	
76	3	
77	1	

Sheridan Police Department
JAMAR Speed Study

Eastbound

Volume Sorted by Speed for 8/8/2023 to 8/9/2023

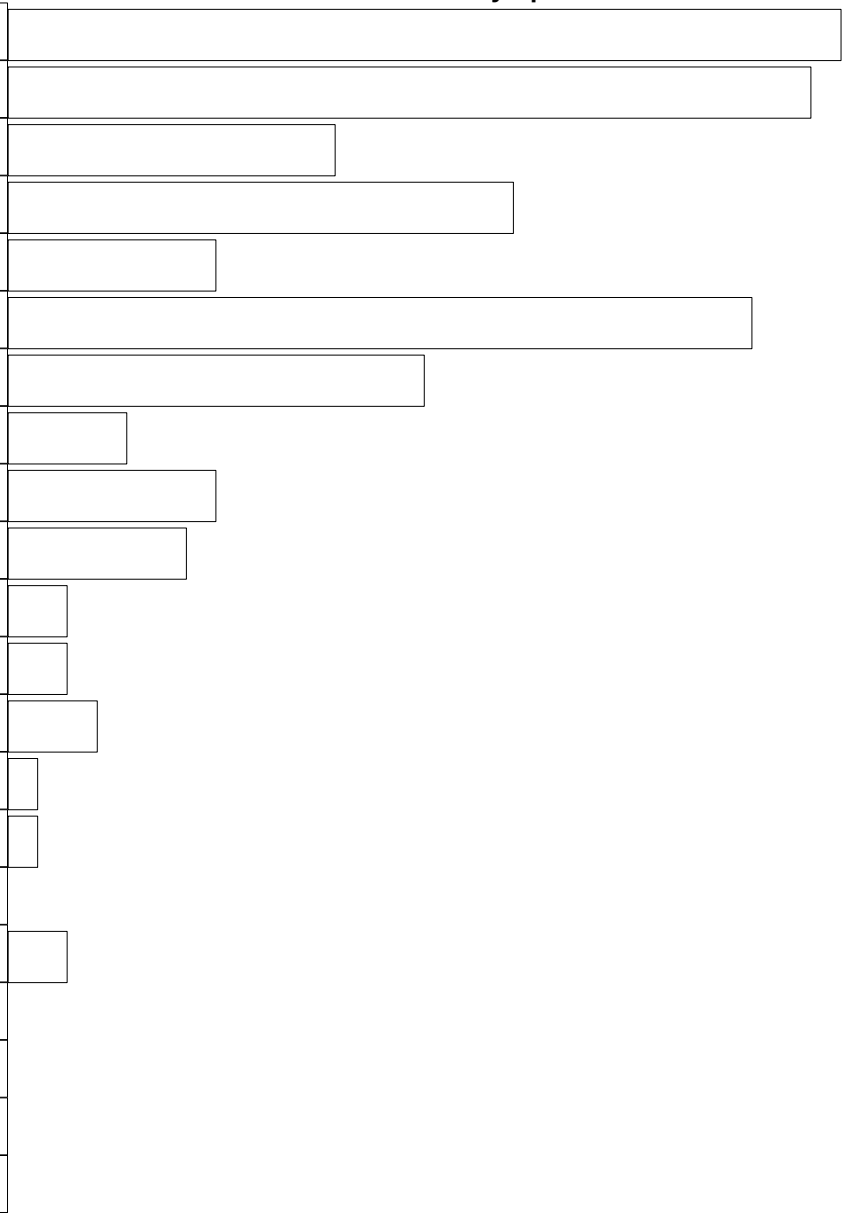
Direction X, Lane 1

Speed MPH	Volume
27	1
2	0
2	2
30	4
31	1
32	2
33	2
34	0
35	2
36	3
37	4
3	1
3	6
40	
41	3
42	13
43	12
44	
45	17
46	5
47	37
4	26
4	13
50	35
51	16
52	35
53	45
54	14
55	31
56	14

Sheridan Police Department
JAMAR Speed Study

Volume Sorted by Speed for 8/8/2023 to 8/9/2023

57	2
5	27
5	11
60	17
61	7
62	25
63	14
64	4
65	7
66	6
67	2
6	2
6	3
70	1
71	1
72	0
73	2
74	0
75	0
76	0
77	0



Sheridan Police Department
JAMAR Speed Study

Westbound

Volume Sorted by Speed for 8/8/2023 to 8/9/2023

Direction X, Lane 2

Speed MPH	Volume
27	0
2	0
2	1
30	1
31	0
32	1
33	0
34	3
35	1
36	1
37	6
3	1
3	3
40	4
41	2
42	13
43	17
44	
45	16
46	10
47	1
4	25
4	11
50	22
51	15
52	35
53	36
54	21
55	30
56	11

Sheridan Police Department
JAMAR Speed Study

Volume Sorted by Speed for 8/8/2023 to 8/9/2023

57	34
5	2
5	1
60	30
61	7
62	36
63	21
64	
65	13
66	14
67	5
6	6
6	3
70	7
71	3
72	3
73	3
74	1
75	1
76	3
77	1

Form TR-11

Revised 3/4/11

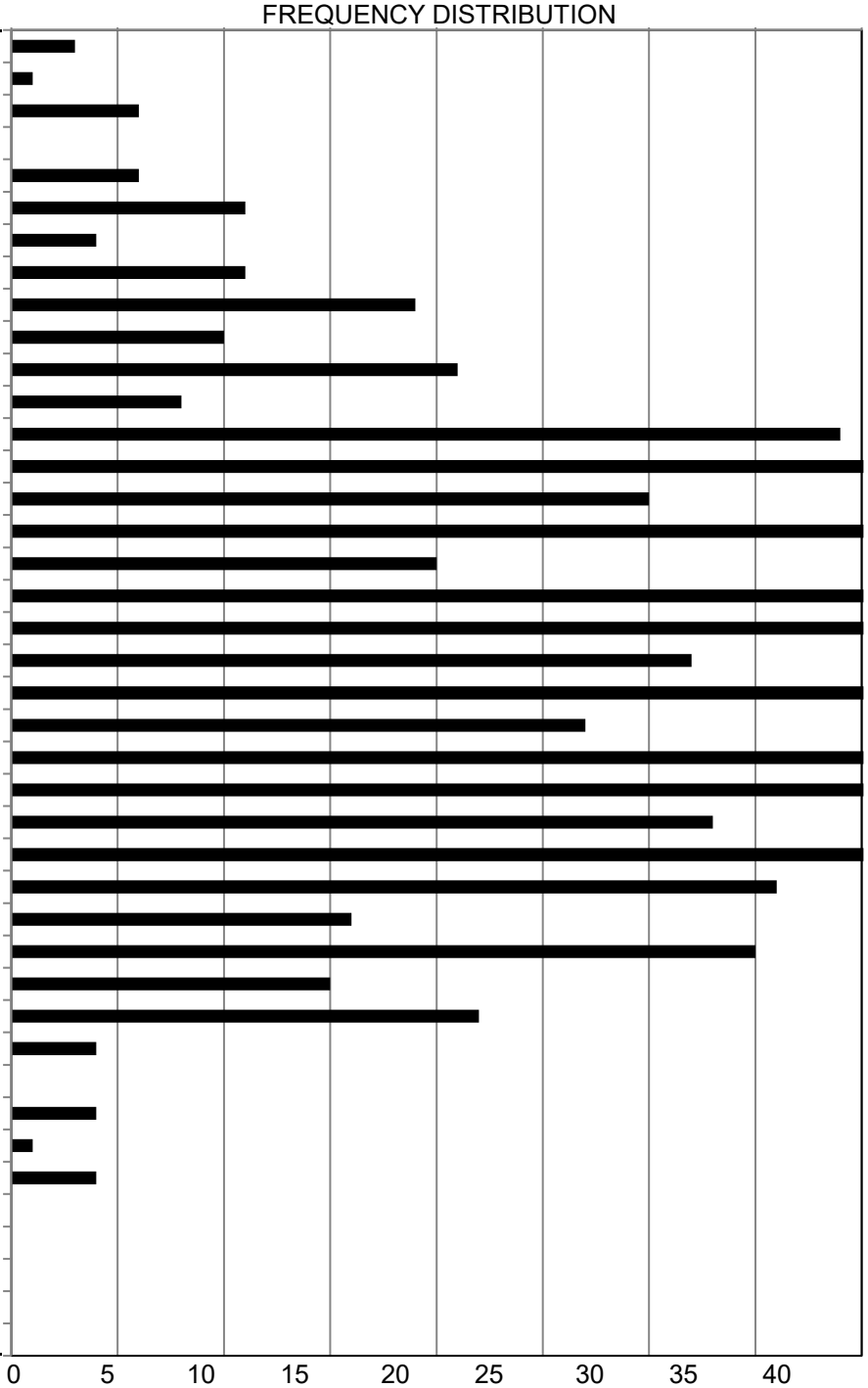
SPEED STUDY

Wyoming Department of Transportation

CITY: Sheridan
COUNTY: Sheridan
ROUTE: Wyarno Road
SPEED LIMIT: 70 MPH
DIRECTION: WB/EB Comb.
LOCATION: E/O Wildcat Road
OBSERVER: JAMAR Radar Device
START TIME: 0
WEATHER: Summer
######
END TIME: 0
COMMENTS: Location 3

SPEED	FREQUENCY	ACUM TOTAL	ACUM %
40	3	3	0.4
41	1	4	0.5
42	6	10	1.2
43	0	10	1.2
44	6	16	1.9
45	11	27	3.2
46	4	31	3.6
47	11	42	4.9
48	19	61	7.1
49	10	71	8.3
50	21	92	10.7
51	8	100	11.7
52	39	139	16.2
53	46	185	21.6
54	30	215	25.1
55	49	264	30.8
56	20	284	33.1
57	45	329	38.4
58	81	410	47.8
59	32	442	51.6
60	64	506	59.0
61	27	533	62.2
62	53	586	68.4
63	57	643	75.0
64	33	676	78.9
65	44	720	84.0
66	36	756	88.2
67	16	772	90.1
68	35	807	94.2
69	15	822	95.9
70	22	844	98.5
71	4	848	98.9
72	0	848	98.9
73	4	852	99.4
74	1	853	99.5
75	4	857	100.0
76	0	857	100.0
77	0	857	100.0
78	0	857	100.0
79	0	857	100.0
80	0	857	100

FREQUENCY DISTRIBUTION



AVERAGE SPEED = 58.9
50th PERCENTILE = 59
67th PERCENTILE = 62
85th PERCENTILE = 66
95th PERCENTILE = 69

PACE SPEED = 57 to 66
VEHICLES IN PACE = 472
% IN PACE = 55
% BELOW PACE = 33
% ABOVE PACE = 12

STANDARD DEVIATION = 6.51
% EXCEEDING POSTED LIMIT = 2

RECOMMENDED SPEED LIMIT = 65

Form TR-11

Revised 3/4/11

SPEED STUDY

Wyoming Department of Transportation

CITY: Sheridan
COUNTY: Sheridan
ROUTE: Wyarno Road
SPEED LIMIT: 70 MPH
DIRECTION: Westbound
LOCATION: E/O Wildcat Road
OBSERVER: JAMAR Radar Device
START TIME:
WEATHER: Summer
DATE: 8/9/23-8/10/23
END TIME:
COMMENTS: Location 3

SPEED	FREQUENCY	ACUM TOTAL	ACUM %
40	1	1	0.2
41	0	1	0.2
42	2	3	0.7
43	0	3	0.7
44	2	5	1.2
45	6	11	2.6
46	1	12	2.9
47	7	19	4.6
48	7	26	6.2
49	6	32	7.7
50	7	39	9.4
51	3	42	10.1
52	14	56	13.4
53	20	76	18.2
54	12	88	21.1
55	21	109	26.1
56	6	115	27.6
57	23	138	33.1
58	41	179	42.9
59	13	192	46.0
60	27	219	52.5
61	11	230	55.2
62	28	258	61.9
63	31	289	69.3
64	20	309	74.1
65	22	331	79.4
66	22	353	84.7
67	9	362	86.8
68	25	387	92.8
69	8	395	94.7
70	16	411	98.6
71	1	412	98.8
72	0	412	98.8
73	3	415	99.5
74	0	415	99.5
75	2	417	100.0
76	0	417	100.0
77	0	417	100.0
78	0	417	100.0
79	0	417	100.0
80	0	417	100



AVERAGE SPEED = 59.8
50th PERCENTILE = 60
67th PERCENTILE = 63
85th PERCENTILE = 67
95th PERCENTILE = 70

PACE SPEED = 57 to 66
VEHICLES IN PACE = 238
% IN PACE = 57
% BELOW PACE = 28
% ABOVE PACE = 15

STANDARD DEVIATION = 6.52
% EXCEEDING POSTED LIMIT = 1

RECOMMENDED SPEED LIMIT = 65

Form TR-11

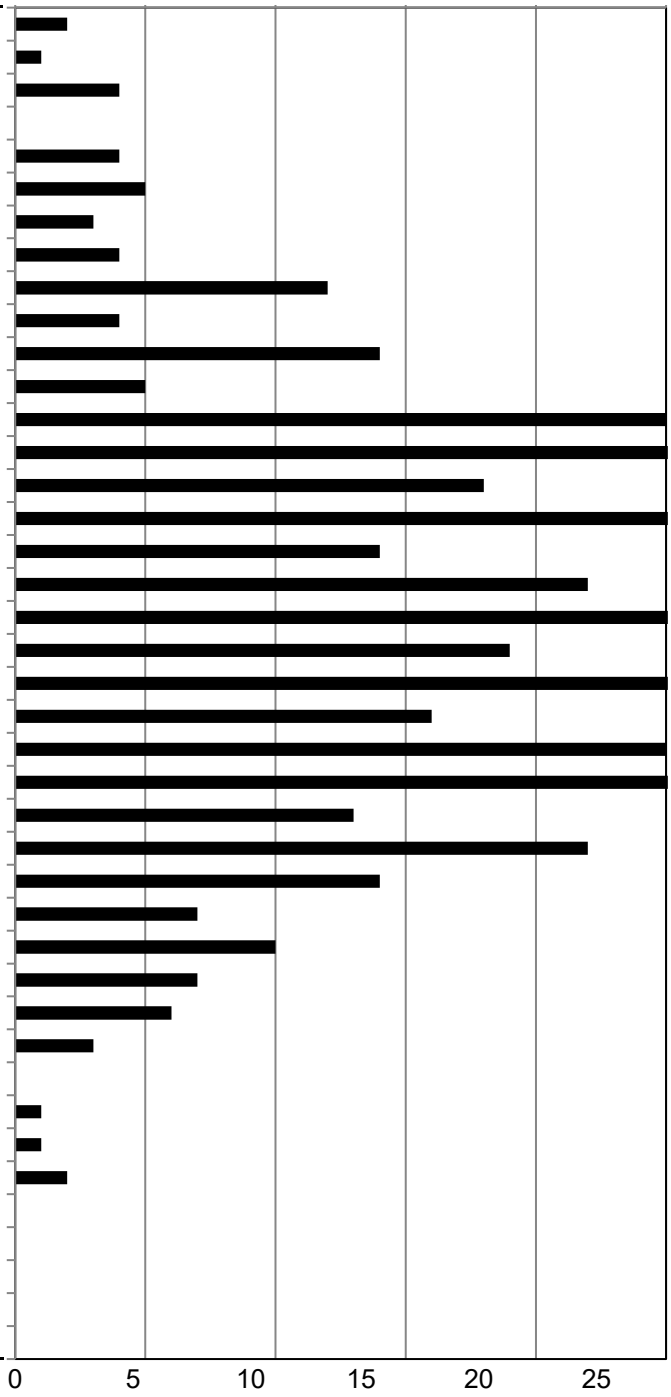
Revised 3/4/11

SPEED STUDY

Wyoming Department of Transportation

CITY: Sheridan
COUNTY: Sheridan
ROUTE: Wyarno Road
SPEED LIMIT: 70 MPH
DIRECTION: Eastbound
LOCATION: E/O Wildcat Road
OBSERVER: JAMAR Radar Device
START TIME:
WEATHER: Summer
DATE: 8/9/23-8/10/23
END TIME:
COMMENTS: Location 3

SPEED	FREQUENCY	ACUM TOTAL	ACUM %
40	2	2	0.5
41	1	3	0.7
42	4	7	1.6
43	0	7	1.6
44	4	11	2.5
45	5	16	3.6
46	3	19	4.3
47	4	23	5.2
48	12	35	8.0
49	4	39	8.9
50	14	53	12.0
51	5	58	13.2
52	25	83	18.9
53	26	109	24.8
54	18	127	28.9
55	28	155	35.2
56	14	169	38.4
57	22	191	43.4
58	40	231	52.5
59	19	250	56.8
60	37	287	65.2
61	16	303	68.9
62	25	328	74.5
63	26	354	80.5
64	13	367	83.4
65	22	389	88.4
66	14	403	91.6
67	7	410	93.2
68	10	420	95.5
69	7	427	97.0
70	6	433	98.4
71	3	436	99.1
72	0	436	99.1
73	1	437	99.3
74	1	438	99.5
75	2	440	100.0
76	0	440	100.0
77	0	440	100.0
78	0	440	100.0
79	0	440	100.0
80	0	440	100



AVERAGE SPEED = 58.1
50th PERCENTILE = 58
67th PERCENTILE = 61
85th PERCENTILE = 65
95th PERCENTILE = 68

PACE SPEED = 52 to 61
VEHICLES IN PACE = 245
% IN PACE = 56
% BELOW PACE = 13
% ABOVE PACE = 31

STANDARD DEVIATION = 6.40
% EXCEEDING POSTED LIMIT = 2

RECOMMENDED SPEED LIMIT = 65

Sheridan Police Department
JAMAR Speed Study

Volume Sorted by Speed for 8/9/2023 to 8/10/2023

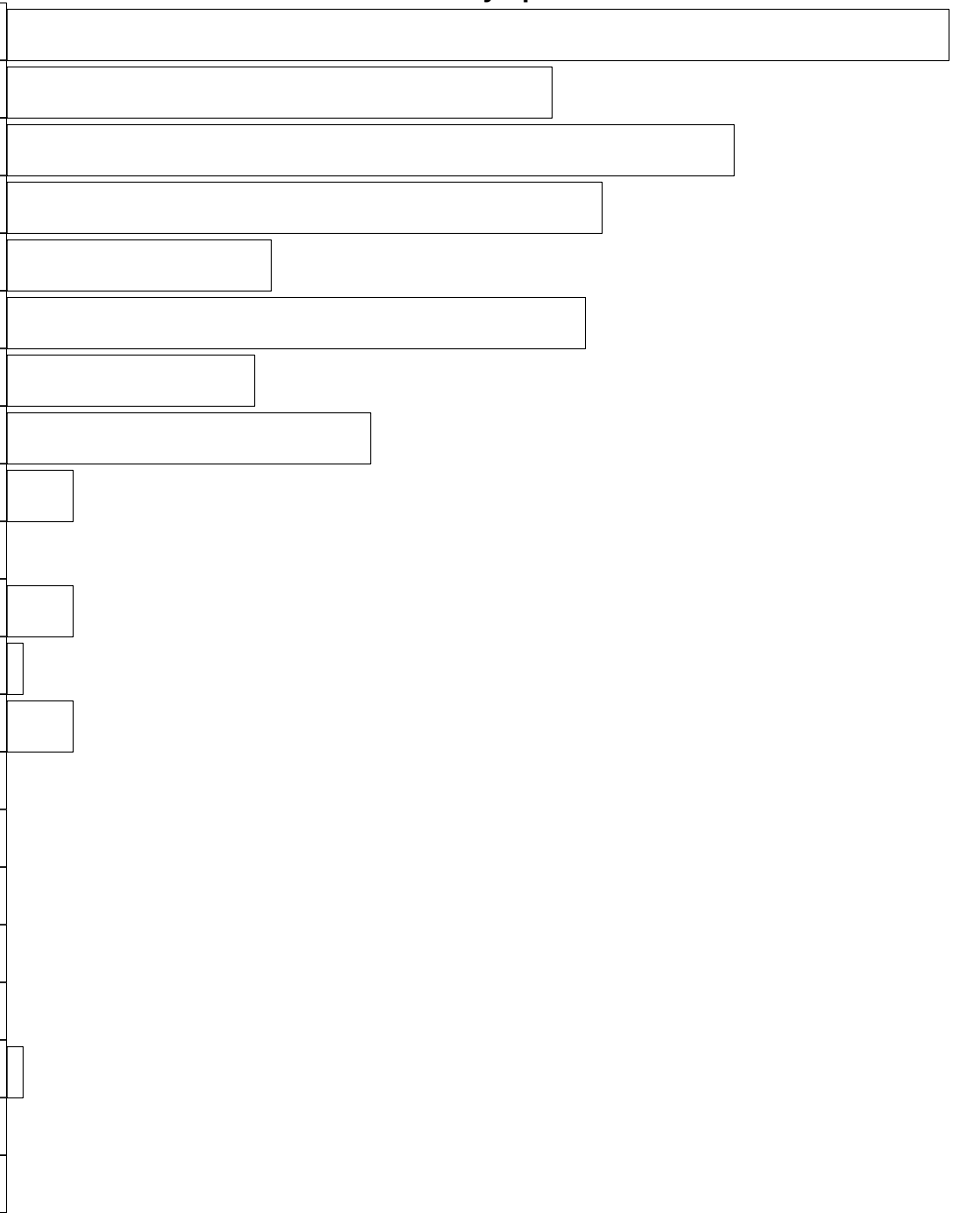
Combined

Speed MPH	Volume
33	0
34	0
35	1
36	0
37	2
3	0
3	0
40	3
41	1
42	6
43	0
44	6
45	11
46	4
47	11
4	1
4	10
50	21
51	
52	3
53	46
54	30
55	4
56	20
57	45
5	1
5	32
60	64
61	27
62	53

Sheridan Police Department
JAMAR Speed Study

Volume Sorted by Speed for 8/9/2023 to 8/10/2023

63	57
64	33
65	44
66	36
67	16
6	35
6	15
70	22
71	4
72	0
73	4
74	1
75	4
76	0
77	0
7	0
7	0
0	0
1	1
2	0
3	0



Sheridan Police Department
JAMAR Speed Study

Westbound

Volume Sorted by Speed for 8/9/2023 to 8/10/2023

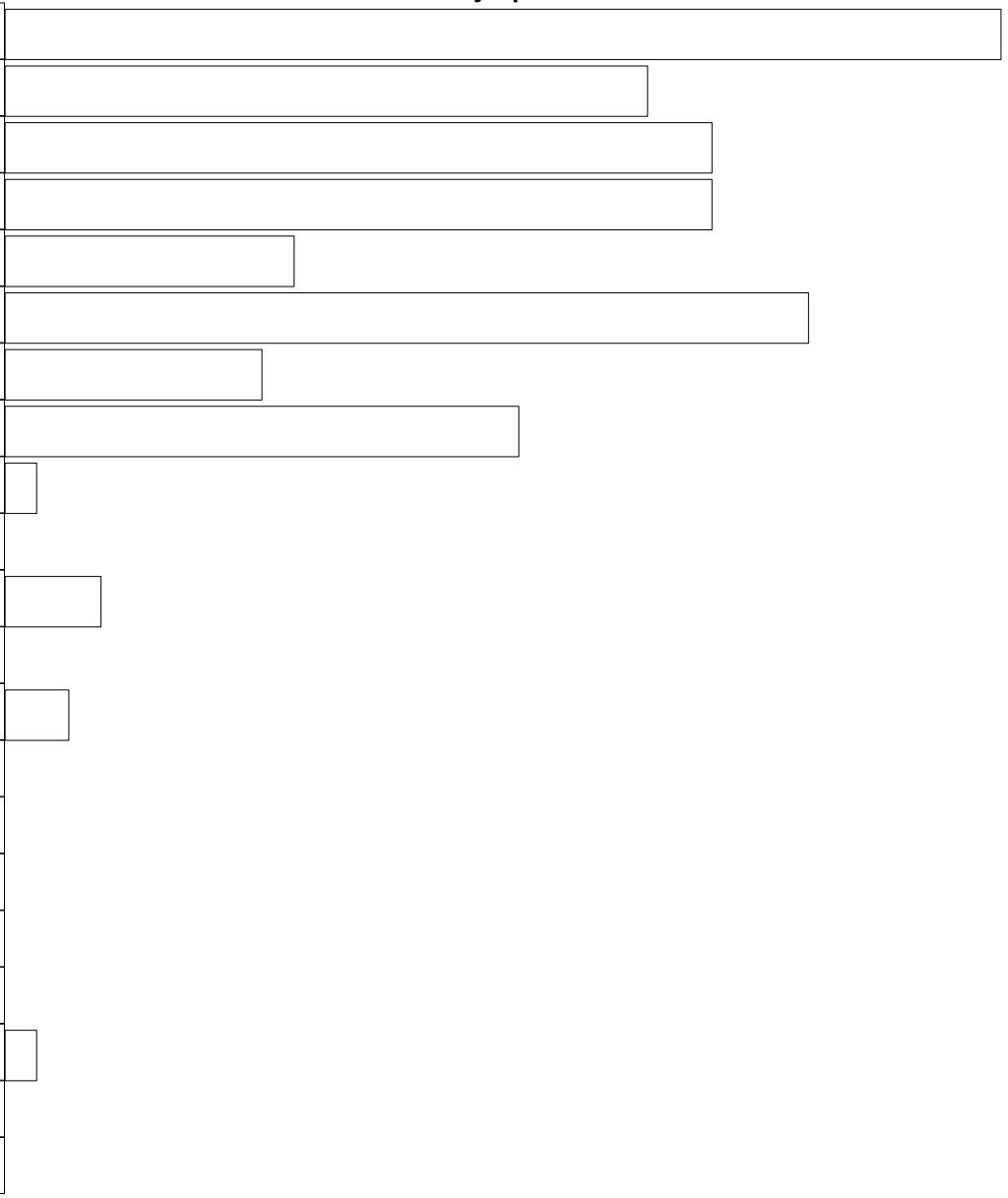
Direction X, Lane 1

Speed MPH	Volume
33	0
34	0
35	0
36	0
37	1
3	0
3	0
40	1
41	0
42	2
43	0
44	2
45	6
46	1
47	7
4	7
4	6
50	7
51	3
52	14
53	20
54	12
55	21
56	6
57	23
5	41
5	13
60	27
61	11
62	2

Sheridan Police Department
JAMAR Speed Study

Volume Sorted by Speed for 8/9/2023 to 8/10/2023

63	31
64	20
65	22
66	22
67	
6	25
6	
70	16
71	1
72	0
73	3
74	0
75	2
76	0
77	0
7	0
7	0
0	0
1	1
2	0
3	0



Sheridan Police Department
JAMAR Speed Study

Eastbound

Volume Sorted by Speed for 8/9/2023 to 8/10/2023

Direction X, Lane 2

Speed MPH	Volume
33	0
34	0
35	1
36	0
37	1
3	0
3	0
40	2
41	1
42	4
43	0
44	4
45	5
46	3
47	4
4	12
4	4
50	14
51	5
52	25
53	26
54	1
55	2
56	14
57	22
5	40
5	1
60	37
61	16
62	25

Sheridan Police Department
JAMAR Speed Study

Volume Sorted by Speed for 8/9/2023 to 8/10/2023

63	26
64	13
65	22
66	14
67	7
6	10
6	7
70	6
71	3
72	0
73	1
74	1
75	2
76	0
77	0
7	0
7	0
0	0
1	0
2	0
3	0

STORY HOUSE VILLAGE PUD PHASE 1

PUD DESIGN REPORT

PREPARED FOR:

CITY OF SHERIDAN

ON BEHALF OF:

STORY HOUSE PROPERTY COMPANY, LLC

WWC ENGINEERING

March 1, 2024

STORY HOUSE VILLAGE PUD – PHASE 1
PUD DESIGN REPORT

Prepared for:	City of Sheridan 55 Grinnell Plaza Sheridan, WY 82801
On Behalf of:	Story House Property Company, LLC 40 E Works Street #1B Sheridan, WY 82801
Prepared by:	WWC Engineering 1849 Terra Avenue Sheridan, WY 82801 (307) 672-0761
Reviewed by:	Sarah Rohrer, P.E., Project Manager Jeff Barron, P.E., Civil Department Manager

TABLE OF CONTENTS

Introduction 2
PUD Layout 2
- Objective 2
- Right-of-Way & Road Widths 2
- Secondary Access 2
- Open Space/Parks 2
- Natural Hazards 3

PUD Design Report 3
- Uses and Building Types 3
- Density 3
- Parking 4
- Setbacks 4
- Height 5
- Snow Storage 5
- Construction and Maintenance 5
- Project Schedule 5
- Lighting 5
- Landscaping 6

LIST OF APPENDICES

Appendix A Plat

Appendix B Design Drawings

Appendix C Water and Sewer Design Report

Appendix D Drainage Design Report

Appendix E Geotech Report

Appendix F Traffic Report

INTRODUCTION

This report provides information regarding the master plan for the Story House Village Planned Unit Development (PUD) Phase 1 (Project) located in Sheridan, WY. The proposed PUD is located east of Interstate 90 north of State Highway 336, also known as Wyarno Road. Phase 1 of the Project encompasses a subdivision of approximately 44.86 acres within the southern half of the southeast quarter of Section 24, T56N, R84W as shown on the plat and construction drawings included in Appendix A and B respectively. This report encompasses only Phase 1 of the Development. Future phases of the PUD would encompass the remainder of the 169.47-acre property and will be evaluated at that time.

PUD LAYOUT

OBJECTIVE

The objective of Phase 1 of the PUD is to encourage a thoroughly planned development while integrating a balance of residential, commercial, retail, offices, open space, and parks. The intent is to achieve a mixed-use development that integrates a way to best serve and support future business development as well as the housing market. The business development is targeted to be a mixture of retail and professional services and the housing marketing is targeted to be a mixture of single family and multifamily development. The mixture and ratio of these uses will be primarily driven by the market. The intent of the PUD is to allow for flexibility and the ability to adapt to the changing needs of the market. Open space with a pathway system and large designated open space.

RIGHT-OF-WAY & ROAD WIDTHS

- 80’ Right-of-Way/36’-56’ Road along Story House Village Road
- 80’ Right-of-Way/39’ Road along Story House Lane (west of Story House Village Road)
- 60’ Right-of-Way/36’ Road along Story House Lane (east of Story House Village Road)
- 60’ Right-of-Way/36’ Road along Baldwin Avenue
- 60’ Right-of-Way/36’ Road along Canterbury Drive

SECONDARY ACCESS

A secondary access route will provide Phase 1 of the PUD access to Wyarno Road as shown on Sheet 33 in Appendix B. The access will be owned and maintained by the HOA and built per the International Fire Code (IFC) requirements.

OPEN SPACE/PARKS

Phase 1 of the PUD contains 8.10 acres of open space integrated throughout 8 outlots and a pathway system, with additional open space earmarked for future phases. With the initial 38.38-acre development, 6.49 acres of additional open space was delineated into the Phase 1 boundary augmenting the total Phase 1 acreage to 44.86 acres. All open space areas will have access from public streets and a pathway system enhancing accessibility and utility. Consisting

of 21% of the developed area, the 8+ acres surpass the City's 20% requirement. As part of the Story House Village PUD, the entire development will dedicate over 35 acres of open space to be addressed in a developer's agreement with the City. Ownership and maintenance is as described in the developer's agreement.

Natural Hazards

The proposed PUD property has been assessed, and no natural hazards were identified, requiring no proposed mitigation measures.

PUD Design Report

Uses and Building Types

Phase 1 of the PUD will be defined by two different zoning areas, B-1 and R-3. The Proposed Site drawing on Sheet 6 in Appendix B distinguishes the location for each.

The B-1 zoning area will include a mixture of housing, businesses, and commercial uses. Architectural themes, types, and sizes of units will follow permitted uses within the City of Sheridan's B-1 regulations. This includes a mixture of single-family dwellings, multifamily dwellings, townhouses, condominiums, and commercial structures. Sizes of units in the B-1 zoning area will be within the proposed setbacks and height requirements.

The R-3 zoning area will include residential housing. Architectural themes, types, and sizes of units will follow permitted uses within the City of Sheridan's R-3 regulations. This includes a mixture of single-family dwellings, multifamily dwellings, townhouses, and condominiums. Sizes of dwelling units in the R-3 zoning area will be within the proposed setbacks and height requirements.

Density

The proposed development for Phase 1 of the PUD includes both commercial and residential development. The density for Phase 1 of the PUD includes 8 platted blocks that includes 83 R-3 lots, 4 B-1 lots, and 8 greenspace outlots. The density for Phase 1 in the B-1 and R-3 zoning areas will follow permitted uses within the City of Sheridan's B-1 and R-3 regulations respectively. It will include the installation of a potable water system, a gravity sewer system, and a decentralized on-site treatment system. Roadways will include curb and gutter, sidewalks, and pathways. All infrastructure will be designed and constructed in accordance with current City of Sheridan specifications.

	Percentage (%)	Area (ac)	Area (ft^2)	Number of Lots/Outlots
B-1	27.62 %	12.39	539,781	4
R-3	37.08 %	16.63	724,526	83
Open Space	18.06 %	8.10	352,826	8
Pathway	0.85 %	0.38	16,528	
Right-of-Way	18.00 %	8.08	351,886	--
Roadways	9.47 %	4.25	184,966	--
Easements	8.94 %	4.01	174,676	--

PARKING

Parking for the B-1 and R-3 zoning areas of Phase 1 will conform to the parking requirements designated by the City of Sheridan's B-1 and R-3 uses respectively except as designated below. Street parking within Phase 1 of the development will be as follows:

Story House Village (SHV)	No On-Street Parking
Story House Lane	
• West of SHV	No On-Street Parking
• East of SHV – Block 4	No On-Street Parking
• East of SHV – Block 7	2 Sided On-Street Parking
Baldwin Avenue	
• East – Block 7	2 Sided On-Street Parking
• Central – Blocks 5/6	1 Side On-Street Parking
• West – Blocks 2/3	No On-Street Parking
Canterbury Lane	2 Sided On-Street Parking

Block 4 shall provide one (1) off-street parking space per dwelling unit.

Block 5 shall provide two (2) off-street parking spaces per dwelling unit.

Block 7 shall provide an alternate side parking plan during snow removal.

SETBACKS

All setbacks are measured from the property line. Setbacks for the B-1 zoning areas will conform to the following requirements:

Front yard. No front yard is required for any building.

Rear yard. No rear yard is required for any building other than a dwelling, in which case, a rear yard of not less than ten (10) feet shall be provided.

Side yard. No side yard is required for any building other than a dwelling, in which case side yards of not less than five (5) feet shall be provided.

B-1 Zoning Area Setbacks		
	Dwellings	All Other Buildings
Front Yard	N/A	N/A
Rear Yard	10'	N/A
Side Yard	5'	N/A

Setbacks for the R-3 zoning areas will conform to the following requirements:

Front yard. The minimum front yard depth shall be fifteen (15) feet. In the case of a corner lot, the primary front yard shall be the yard in which the principal entrance to the building faces as established per the building permit, and the depth shall be at least fifteen (15) feet.

Rear yard. The minimum rear yard depth shall be ten (10) feet.

Side yard. The minimum side yard depth shall be five (5) feet.

Driveway. The minimum driveway depth shall be twenty (20) feet.

R-3 Zoning Area Setbacks	
Front Yard	15’
Rear Yard	10’
Side Yard	5’
Driveway	20’

HEIGHT

Maximum height of structures for the R-3 zoning areas will conform to the height requirements designated by the City of Sheridan’s R-3 requirements. Height requirements for the B-1 zoning areas will conform to the following requirements:

Maximum height. The maximum height of a building in the B-1 zone is equal to the width of the right-of-way on which the building has frontage, except, the maximum height may be no less than forty feet (40′).

Setback exception. A portion of a building may exceed the maximum height if such portion is set back from all lot lines a distance of one (1) foot for each foot of such additional height.

SNOW STORAGE

An approximate area of 0.5 acres has been dedicated north of Phase 1 for the City of Sheridan to utilize as snow storage. As future phases are developed, this location will be reevaluated and relocated as needed.

CONSTRUCTION AND MAINTENANCE

A contractor will be hired to construct the physical improvements for Phase 1 of the PUD. All streets and utilities will become the property of the City of Sheridan upon final acceptance of the improvements. Open space will be owned and maintained by the HOA for the use and benefit of residents within the Story House Village PUD.

PROJECT SCHEDULE

Phase 1 of the Story House Village PUD is anticipated to be completed within 5 years.

LIGHTING

Lighting within Phase 1 of the PUD will meet minimum City of Sheridan lighting requirements to ensure safety and visibility within the development are maintained. The development plans to strategically place lighting to minimize light pollution for the surrounding areas including adjacent Sheridan County residents.

LANDSCAPING

Landscaping will include appropriate landscaping to soften the built environment, assist with stormwater, augment buffers, and help create an aesthetically pleasing development. Landscaping shall be suitable for the climate in Sheridan, shall not include any plants considered noxious or invasive, and planted in such a way to ensure maximum success and health.

APPENDIX A

Plat

APPENDIX B

Design Drawings

APPENDIX C

Water and Sewer Design Report

APPENDIX D

Drainage Design Report

APPENDIX E

Geotech Report

APPENDIX F

Traffic Report

STORY HOUSE VILLAGE PUD PHASE 1

WATER AND SEWER REPORT

PREPARED FOR:

CITY OF SHERIDAN

ON BEHALF OF:

STORY HOUSE PROPERTY COMPANY, LLC

WWC ENGINEERING

March 2024

STORY HOUSE VILLAGE PUD – PHASE 1
WATER AND SEWER REPORT

Prepared for: City of Sheridan
55 Grinnell Plaza
Sheridan, WY 82801

On Behalf of: Story House Property Company, LLC
40 E Works Street #1B
Sheridan, WY 82801

Prepared by: WWC Engineering
1849 Terra Avenue
Sheridan, WY 82801
(307) 672-0761

Principal Authors: Tristan Greve, E.I.
Sarah Rohrer, P.E.
Marcus Dufort, P.E.

Reviewed by: Jeff Barron, P.E., Civil Department Manager
Chad Reed, P.E., Sheridan Branch Manager

TABLE OF CONTENTS

INTRODUCTION 1
LOCATION 1
EXISTING WATER DISTRIBUTION & SANITARY SEWER SYSTEM 1
POTABLE WATER SYSTEM 1
SANITARY SEWER SYSTEM 1
PROPOSED DEVELOPMENT 1
PROPOSED POTABLE WATER SYSTEM IMPROVEMENTS 4
DEMAND CRITERIA 4
WATER SYSTEM HYDRAULICS 4
POTABLE WATER MAIN f6
PROPOSED SANITARY SEWER SYSTEM IMPROVEMENTS 15
SANITARY SEWER MAIN & SERVICES 15
ON-SITE WASTEWATER TREATMENT PLANT 15
DESIGN CRITERIA 15
SANITARY SEWER SYSTEM HYDRAULICS 15
REFERENCES 33

LIST OF TABLES

Table 1. PUD Proposed Density 3
Table 2. Demand Criteria 4
Table 3. System Hydraulics 5
Table 4. Fire Flow Data 6
Table 5. Water Main WDEQ Design 7
Table 6. Water Main TSS Design 13
Table 7. Sanitary Sewer Design Criteria 16
Table 8. Sanitary Sewer System Buildout 16
Table 9. Sanitary Sewer System Design 17
Table 10. On-site Wastewater Treatment Plant Design 24
Table 11. Primary Treatment Design 30

LIST OF FIGURES

Figure 1. General Location Map 2

LIST OF APPENDICES

Appendix A Construction Drawings
Appendix B Water Calculations
Appendix C Sanitary Sewer Calculations
Appendix D Product Data Sheets

INTRODUCTION

This report provides information regarding water and sanitary sewer design for the Story House Village Planned Unit Development (PUD) Phase 1 (Project) located in Sheridan, WY. The Project includes the expansion of a water system within the development connecting to the City of Sheridan's (City) existing water system adjacent to the Project. The Project also includes the installation of a sanitary sewer system that involves a gravity sanitary sewer system and an on-site treatment system. This report encompasses only Phase 1 of the overall PUD. Future phases of development may occur on the remainder of the property and will be evaluated at that time. The water and sanitary sewer system described herein were designed in accordance with Sections 301 and 401 of the City's Public Infrastructure Design Standards, 2017 Edition (City, 2017), herein referred to as the City Design Standards, and current WDEQ Water Quality Rules and Regulations Chapters 11 and 12 (WDEQ, 2018 and WDEQ, 2023. This report includes a comparison of the proposed system improvements with City and WDEQ requirements and appendices containing supporting information.

LOCATION

The Project is located east of Interstate 90 north of State Highway 336, also known as Wyarno Road. It is bound by Wyarno Road to the south and private property to the north, west, and east. The Project encompasses approximately 44.86 acres within the southern half of the southeast quarter of Section 24, T56N, R84W as shown on Figure 1. The Project and proposed improvements are provided in the PUD construction drawings included in Appendix A.

EXISTING WATER DISTRIBUTION & SANITARY SEWER SYSTEM

POTABLE WATER SYSTEM

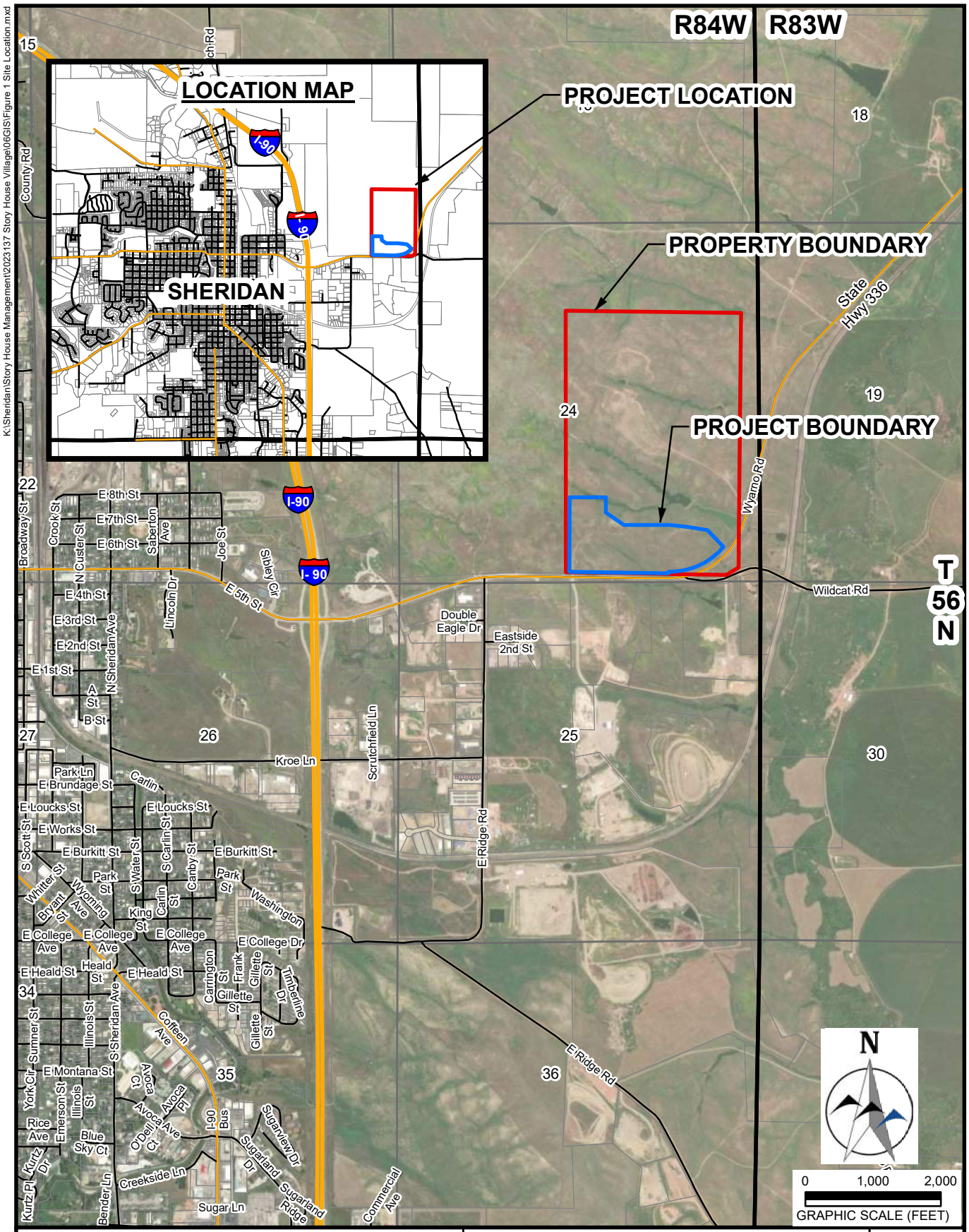
The City's existing water distribution system adjacent to the proposed development consists of a 12-inch PVC water main on Wyarno Road that terminates with a cap just east of Industrial Lane beyond a fire hydrant.

SANITARY SEWER SYSTEM

Connection to the City's existing sanitary sewer infrastructure will not occur during Phase 1 of the PUD, as such an analysis of the City's system was not completed. Rather the sanitary sewer infrastructure within the development will connect to an on-site wastewater treatment system.

PROPOSED DEVELOPMENT

The proposed development is a PUD that includes both commercial and residential development. The PUD will include the installation of a potable water system, a gravity sanitary sewer system, and an on-site wastewater treatment system. Roadways will include curb and gutter, sidewalks, and pathways. All infrastructure will be designed and constructed in accordance with the City's Standard Specifications and Details for Street and Utility Construction, 2016 Edition (City, 2016), herein referred to as the City Specifications. The following sections outline the proposed potable water and sanitary sewer system improvements to be constructed as part of the Project. The water and sanitary sewer analysis described herein is based on the land use, area, and density provided in Table 1.



Water and Sewer Plan

GENERAL LOCATION

STORY HOUSE VILLAGE PUD - PHASE 1

DESIGNED BY: SER
DRAWN BY: RAV
CHECKED BY: SER
DATE: 10/02/2023

WWC ENGINEERING
1849 TERRA AVENUE
SHERIDAN, WY 82801
307-672-0761

FIGURE 1

Table 1. PUD Proposed Density

Block	*Acreage*	*Land Use*	*Density*
1*	6.75	Multifamily Housing	171 Units
2	2.03	Single Family Housing	17 Units
		Commercial Building	2000 ft^2
3	2.00	Single Family Housing	17 Units
		Commercial Building	2000 ft^2
4	4.65	Single Family Housing	15 Units
5	4.53	Single Family Housing	60 Units
6	2.22	Single Family Housing	48 Units
7	5.95	Single Family Housing	62 Units
8	1.61	Single Family	17 Units
		Commercial Building	2000 ft^2

*Zoned B-1 but multifamily use anticipated

Proposed Potable Water System Improvements

Demand Criteria

The following table presents the system demands and the water system's design criteria used in estimating demand for Phase 1 of the proposed PUD only.

Table 2. Demand Criteria

Demand	**Per Capital Usage Rates (gpcd)**
Average Day	210
Peak *Day*	555
Peak Hour	882
Peaking Factors	
Ave. Day/Peak Day	2.65
Ave. Day/Peak Hour	4.20
Average Day Demand (gpcd) for Future Population	
Residential	125
Other Design Criteria (gpm for 2 hr)	
Single Family Residential (units less than 3,500 sf)	1,000
All Other Residential	1,500
Commercial	2,500

Water System Hydraulics

The City's current WaterCAD® water system model was supplied to WWC by DOWL. It is assumed the model provided was calibrated and in working order for our analysis. The elevation of the ground served by the proposed water main at the Project varies. The Project falls within the City's pressure zone of 4040. The water model was used to analyze existing and proposed hydraulic conditions for the proposed PUD and immediate surrounding area. The results are shown in Table 3. Results of the WaterCAD® modeling are provided in Appendix B.

Table 3. System Hydraulics

	2023 Peak Day		2023 Peak Hour	
Location	**Flows (gpm)**	**Pressures (psi)**	**Flows (gpm)**	**Pressures (psi)**
STA: 0+50	393	56	621	53
STA: 10+00	0.5	61	.8	57
STA: 15+70	202	50	580	47
STA: 18+68	187	54	556	50
STA: 31+55	36	69	103	66
STA: 46+50	78	61	222	56
STA: 63+00	8.7	66	18	62

The fire flow scenario is the highest flowrate scenario and as required by WDEQ, Chapter 12, the following conditions need to be satisfied:

1. Chapter 12, Section 16.a, TSS 8.2.1, all water mains, including those not designed to provide fire protection, shall be sized after a hydraulic analysis based on flow demands and pressure requirements. The system shall be designed to maintain a minimum pressure of 20 psi at ground level at all points in the distribution system under all conditions of flow. The normal working pressure in the distribution system shall be not less than 35 psi, and

2. According to Chapter 12, Section 16.a, TSS 8.2.3, when fire protection is to be provided, system design shall be such that fire flows can be served.

Fire flows were modeled under a peak day demand condition using peak day demand plus fire flow demand. The resulting pressures at representative points for fire flows are shown in Table 4. Commercial development, requiring a minimum of 2,500 gpm for fire flow, is proposed within Blocks 1, 2, 3, and 8 of the PUD. Single family and multi-family residential dwellings are proposed within Blocks 4, 5, 6, and 7 of the PUD, as such the “All Other Residential” fire flow requirement of 1,500 gpm was used. As shown in Table 4, the available fire flows meet or exceed 2,500 gpm and 1,500 gpm for commercial and residential requirements, respectively, with acceptable pressure drops within the system.

The WaterCAD® model analysis was performed by iteratively increasing the flow rate at the proposed fire hydrant until the pressure dropped to 20 psi anywhere within the pressure zone. The maximum available fire flow and residual pressures at each of the pressure zone fire hydrants are summarized in Table 4 below and provided in Appendix B.

Table 4. Fire Flow Data

Location	2023 Pressure (psi)	2023 Fire Flow (gpm)
STA: 3+98*	22	2836
STA: 7+57*	20	2681
STA: 10+75*	20	2580
STA: 14+17*	20	2579
STA: 23+49	30	1921
STA: 28+31	25	2021
STA: 32+83	29	2009
STA: 37+03	21	2090
STA: 41+15	22	2141
STA: 45+20	22	2181
STA: 49+10	20	2124
STA: 59+97	20	1545
STA: 64+28	24	1848

*Commercial fire flow of 2,500 gpm required

POTABLE WATER MAIN

The proposed water main will be 8-inch and 12-inch C900 DR18 PVC bell and spigot pipe meeting the requirements of the City's specifications and details. Water service lines will be properly sized depending on the type of structure and in accordance with the latest edition of International Plumbing Code requirements (ICC, 2021). A summary of the WDEQ Chapter 12 requirements and the design parameters for the potable water main is provided in Table 5. As are the few instances where City Design Standards are more stringent than WDEQs.

Table 5. Water Main WDEQ Design

WDEQ Chapter 12	*Requirement*	*Design Parameter*
16.a	2018 TSS, parts 8.2-8.2.4(b), system design; 8.3, valves; 8.4-8.4.4(d), hydrants; 8.5-8.5.2(c), air relief valves; 8.6, valve, meter, and blow-off chambers; 8.7.3, installation of water mains, cover; 8.7.4, installation of water mains, blocking; 8.7.6, installation of water mains, pressure and leakage testing; 8.7.7, installation of water mains, disinfection; 8.7.8, installation of water mains, external corrosion; 8.7.9, installation of water mains, separation from other utilities; 8.8.2-8.8.2(b), separation distances from contamination sources, parallel installation; 8.8.3-8.8.3(b), separation distances from contamination sources, crossings; 8.8.6, separation distances from contamination sources, sewer manholes, inlets, and structures; 8.9- 8.9.1, surface water crossings, above-water crossings; 8.9.2-8.9.2(c); surface water crossings, under water crossings; 8.11.1, water services and plumbing, plumbing; 8.12, service meters; are herein incorporated by reference.	See Table 6 that addresses these additional requirements.
16.b.i	Distribution systems shall be constructed of commercial pipe that conforms to the following standards: PVC Pipe: ASTM D2241, less than 4" diameter (10 cm); AWWA C900: 4" (10 cm) and larger diameter.	Buried water distribution pipe will be PVC meeting AWWA C900 standards and City Specification Section 02710.
16.d	New water mains shall be sized after the hydraulic analysis required by Section 9(l)(i) of this Chapter and the design shall demonstrate that at maximum day demand plus current State of Wyoming-required fire flow, or the fire flow of an authority having jurisdiction, the pressure in the municipal distribution system will not fall below 20 pounds per square inch (psi); and the normal system working pressure shall be greater than 35 psi.	Refer to the hydraulic calculations in this report. The calculations show all applicable flow scenarios and associated pressures and flow rates at fire hydrants are met.
16.f.i	Hydrants shall have hydrant leads that are a minimum of six inches in diameter.	Hydrant leads are six inches or eight inches in diameter.
16.f.ii	Hydrants shall have valves installed.	All hydrants have a valve installed on the lead.
16.f.iii	Hydrants shall be protected from freezing at hydrant leads and barrels.	All hydrant leads and barrels will be protected from freezing. Leads will be installed with a minimum of 6 feet of cover to the top of the pipe as required by City Specification Section 02644.
16.f.iv	Where groundwater levels are above the gravel drain area, hydrants shall be pumped dry or otherwise dewatered and hydrant weep holes shall not be used	All hydrant gravel drains are above groundwater.

Table 5. Water Main WDEQ Design (con't)

WDEQ Chapter 12	*Requirement*	*Design Parameter*
COS Section 301 modification to 14.2.vi	All waterlines shall be looped. Permanent dead-end lines are prohibited with the exception of lines extending into cul-de-sacs serving no more than twenty (20) single family residential units or equivalent demand. For those dead-end lines that are allowed as describe above shall be terminated with a fire hydrant or other flushing device.	Waterlines are looped where possible, and the permanent dead-end on Canterbury services less than 20 residential units and terminates with a fire hydrant. There is a temporary dead-end on Story House Lane pending future construction that terminates with a flushing hydrant.
COS Section 301 modification to 14.2.vii	Services. The International Plumbing Code, latest adopted edition shall be generally used as the basis of design for water service lines. There shall be only one tap and water service line from the main to the property line for each lot. Multiple services on one lot may be divided at the property line with each individual service having a meter and a curb stop. Where multiple structures are on one lot which could be subdivided in the future, one tap and water service line from the main to the property line for each main structure will be allowed only upon approval by the Public Utilities Director. Services larger than 2" must be approved by the Public Utilities Director and will require a "Permit to Construct." That portion of the service line between the main and the property line shall be one continuous length of Type K copper pipe or HDPE pipe, installed perpendicular from the main to a meter pit or curb stop and box at the property line. Service lines shall be installed at least ten (10) feet laterally, from any foreign nonpotable conduit and a minimum of five (5) feet from the side property line of the lot being served. In accordance with the International Plumbing Code, water and sewer services can be installed within the same trench provided the sewer service piping system is constructed using Sch. 40 PVC. When serving lots at the end of a cul-de-sac, the length of the service line between the main and the property line shall not exceed seventy (70) feet. Under no circumstances shall any tap be made on a fire hydrant lateral line.	All water service lines shall be installed per City Specification Section 02645.

Table 5. Water Main WDEQ Design (con't)

WDEQ Chapter 12	*Requirement*	*Design Parameter*
COS Section 301 modification to 14.2.vii (cont.)	Service lines shall be adequate to supply the requirements of the property being served. The minimum size allowed for a water service line is 1 inch with a 3/4-inch meter. The corporation stop, the meter, and that portion of the service pipe between the meter and the corporation stop on the main, shall all be of the same size for services larger than one (1) inch in the City of Sheridan. For individual service lines, larger than one (1) inch, used for (a) domestic flows and (b) fire suppression system supply, the meter(s) used to record domestic and irrigation flows (non-fire suppression supply) may be of a different size than the shared service pipe as long as the meter is sized appropriately for the anticipated flows. The size for a service line from the City water main to any unit being served shall be selected such that the following design criteria are not exceeded during total peak demand flow: A. Eighty (80) percent of the manufacturer's maximum meter capacity B. Service line pipe flow velocity does not exceed fifteen (15) feet per second (fps). C. The pressure drop from the City water main to any unit being served shall not be greater than thirty (30) psi and the minimum residual pressure at the finish floor elevation to any unit shall not be less than twenty (20) psi. The water requirements of the property being served shall be defined as "total peak demand flow." Peak domestic water requirements shall be calculated in accordance with the latest edition of the International Plumbing Code and the American Water Works Association M22 Standard. The irrigation demand flow and continuous load demands (when applicable) shall be added to the peak designed flow to get the total peak demand flow. Meter pits are required on all water service connections in areas served by the SAWSJPB and DNISD. For areas served by the City of Sheridan, meters will be installed accordingly: 1. All meters shall be installed within a full-depth basement, or in a location within 3 feet of the access if in a crawl space. 2. The service line between the curb-stop and the meter shall be a single, continuous (un-spliced) section and will be buried to prevent future connections prior to the meter.	All water service lines shall be installed per City Specification Section 02645.

Table 5. Water Main WDEQ Design (con't)

WDEQ Chapter 12	*Requirement*	*Design Parameter*
COS Section 301 modification to 14.2.vii (cont.)	3. If the aforementioned requirements of 1. and 2. cannot be met, a meter pit to be located immediately after the curb stop will be allowed, provided the meter pit conforms to other requirements within adopted City Standard Specifications. 4. Depending on the hazard classification of the building, an appropriate backflow prevention device may be installed in the meter pit; however, for high-hazard installations, the required backflow prevention device might need to be installed within the mechanical room of the new building provided appropriate floor drains exist to dispense water discharged from the device during a back-pressure situation.	
COS Section 301 modification to 14.b.x	Water main shall be designed to minimize the number of fittings. All fittings shall be in conformance with the City Standard Specifications.	The water main has been designed to minimize fittings and all fittings shall be installed per City Specification Section 02710.
COS Section 301 modification to 14.c	Valves shall be provided on water mains so inconvenience and sanitary hazards will be minimized during repairs. Valves shall be located at not more than five hundred (500) foot intervals on distribution and lateral mains and one thousand (1000) foot intervals on transmission mains. Valves will be placed at all pipe junctions so that the total number of valves at the junction is one less than the number of branches, except as otherwise approved by the Public Utilities Director. Line valves shall also be placed: Such that no more than one (1) fire hydrant is isolated at any one time. At each end of a line running through an easement on private property. On each side of a creek, channel crossing, or Arterial Street/Highway crossing. On fire hydrant laterals.	The valve spacing meets these requirements and all valves shall be installed per City Specification Section 02641.
COS Section 301 modification to 14.f.i	Excavation. Shall be in conformance with the City Standard Specifications and O.S.H.A. Regulations.	The water main trench shall be installed per City Specification Sections 02221 and 02401.
COS Section 301 modification to 14.f.ii	Bedding. Shall be in conformance with the City Standard Specifications	Pipe bedding gradations will adhere to City Specification Section 02221.
COS Section 301 modification to 14.f.v	Water mains shall have a minimum cover of six (6) feet and a maximum cover of seven (7) feet to top of pipe, except as otherwise approved by the Public Utilities Director.	The water main will be installed with a minimum of 6 feet of cover to the top of the pipe as required by City Specification Section 02710.

Table 5. Water Main WDEQ Design (con't)

WDEQ Chapter 12	*Requirement*	*Design Parameter*
COS Section 301 modification to 14.i	Cross Connection Control. All water services connected to the public water system shall comply with the City's "Cross Connection Control Program" as described within City of Sheridan Ordinance No. 1946. (A full copy of Ordinance No. 1946 has been provided at the end of Section 301.)	There will be no connections from the water main until the water enters the existing water distribution network.
16.f.v	Hydrants shall have drains that are not connected to or located within 10 feet of a sanitary sewer or storm drain.	All hydrant gravel drains are greater than 10 feet away from a sanitary sewer or storm drain.
16.g	Fire hydrants or active service taps may be substituted for air relief in 6- and 8-inch lines.	Fire hydrants or active service taps will act as air relief valves at any high points in the system.
16.h	Where excavation is performed for distribution systems: The trench bottom shall be excavated for the bell of the pipe; All rock shall be removed within six inches of the pipe; and The trench shall be dewatered for all work.	The water main trench shall be installed per City Specification Sections 02221 and 02401.
16.i	Distribution system bedding for rigid pipe shall be designed in accordance with ASTM C16 Classes A, B, or C. Flexible pipe bedding shall be designed in accordance with ASTM D2321 Class I, II, or III.	Pipe bedding gradations will adhere to City Specification Section 02221.
16.j.ii	Distribution system pipe shall be joined to ensure a watertight fitting and installed in accordance with the following standards, as applicable: For PVC pipe, AWWA M23	The water main will be installed to the manufacturer's recommendations. Pressure and leakage testing will be performed on all installed pipe in accordance with City Specification Section 02766.
16.k	Backfill for distribution systems shall: Be performed without disturbing pipe alignment; Not contain debris, frozen material, unstable material, or large clods; Not contain rocks or stones that are greater than three inches in diameter within two feet of pipe; and Be compacted to a density equal to or greater than the surrounding soil.	Backfill will be performed to meet City Specification Section 02221 and 02710.
16.l.i	Distribution systems shall meet the following requirements for separation of water mains from sanitary and storm sewers: Where the minimum vertical or horizontal separation distances required by incorporation by reference of 2018 TSS parts 8.8.2 and 8.8.3 of paragraph (a) of this Section cannot be met, the sewer or water line shall be placed in a separate conduit pipe or meet the flow-fill requirements of paragraphs (ii) and (iii) of this Paragraph (l).	Separation with sewers will be maintained as required by City Specification Section 02710. A minimum of 10 feet horizontal separation and 18 inches vertical separation will be maintained, and water main crossings shall be located so both water and sewer line joints are as far as possible from each other. Where 18 inches of separation cannot be met, the pipe will be encased in flowable fill.

Table 5. Water Main WDEQ Design (con't)

WDEQ Chapter 12	*Requirement*	*Design Parameter*
16.h.ii	Underwater crossings. A minimum cover of 2 feet (0.61 m) shall be provided over the pipe. When crossing water courses which are greater than 15 feet (4.6 m) in width additional provisions shall be provided as required.	There are no proposed underwater crossings.
16.m	Cross-connections.	There will be no connections from the water main until the water enters the existing water distribution network.

A summary of the 2018 TSS requirements under WDEQ and the design parameters for the potable water main is provided in Table 6.

Table 6. Water Main TSS Design

TSS 2018 Section	*Requirement*	*Design Parameter*
8.2.4 (b)	Dead end mains shall be equipped with a means to provide adequate flushing. Flushing devices should be sized to provide flows which will give a velocity of at least 2.5 feet per second in the water main being flushed. They may be provided with a fire hydrant if flow and pressure are sufficient. No flushing device shall be directly connected to any sewer.	Dead end mains terminate with a flushing hydrant or a fire hydrant to provide adequate flushing.
8.3	A sufficient number of valves shall be provided on water mains to minimize inconvenience and sanitary hazards during repairs. Valves should be located at not more than 500-foot intervals in commercial districts and at not more than one block or 800-foot intervals in other districts. Where systems serve widely scattered customers and where future development is not expected, the valve spacing should not exceed one mile.	Valves are appropriately located throughout the PUD and are less than 500 feet and 800 feet apart in commercial and residential districts, respectively.
8.5.1	At high points in water mains where air can accumulate provisions shall be made to remove the air by means of air relief valves. Use of manual air relief valves is preferred wherever possible. Automatic air relief valves shall not be used in situations where flooding of the manhole or chamber may occur unless equipped with an inflow preventer conforming to AWWA C 514 and as approved by the reviewing authority.	Fire hydrants and services are located at high points in the water main and act as air relief valves per WDEQ Ch.12 Section 16.g
8.6	Wherever possible, chambers, pits or manholes containing valves, blow-offs, meters, or other such appurtenances to a distribution system, shall not be located in areas subject to flooding or in areas of high groundwater. Such chambers or pits should drain to the ground surface, or to absorption pits underground. The chambers, pits and manholes shall not connect directly to any storm drain or sanitary sewer. Blow-offs shall not connect directly to any storm drain or sanitary sewer.	Chambers, pits, and manholes are located above areas subject to flooding and high groundwater. They are not directly connected to any storm drain or sanitary sewers.
8.7.3	Water mains shall be covered with sufficient earth or other insulation to prevent freezing.	The water main will be installed with a minimum of 6 feet of cover to the top of the pipe as required by City Specification Section 02710.
8.7.4	All tees, bends, plugs and hydrants shall be provided with reaction blocking, tie rods or joints designed to prevent movement.	The water main will be installed with thrust blocking and/or joint restraints as required by City Specification Section 02710.
8.7.6	Installed pipe shall be pressure tested and leakage tested in accordance with the appropriate **AWWA** Standards.	The water main will have pressure and leakage testing as required by City Specification Section 02766.

Table 6. Water Main TSS Design

TSS 2018 Section	*Requirement*	*Design Parameter*
8.7.7	New, cleaned and repaired water mains shall be disinfected in accordance with AWWA Standard C651. The specifications shall include detailed procedures for the adequate flushing, disinfection, and microbiological testing of all water mains. In an emergency or unusual situation, the disinfection procedure shall be discussed with the reviewing authority.	All water mains will have disinfection as required by City Specification Section 02766.
8.9.2	A minimum cover of five feet shall be provided over the pipe unless otherwise approved by the reviewing authority.	The water main will be installed with a minimum of 6 feet of cover to the top of the pipe as required by City Specification Section 02710.
8.11.1	Water services and plumbing shall conform to the applicable local and/or state plumbing codes. Refer to Section 2.21 for information regarding material requirements and restrictions.	Water services and plumbing conforms to City Specification Section 02645.

Proposed Sanitary Sewer System Improvements

The Project will consist of installing a sanitary sewer system that involves a gravity system conveying all flows to an on-site wastewater treatment system. The on-site wastewater treatment plant (WWTP) will consist of a series of primary treatment tanks and a recirculating packed-bed media filtration system. Plan and profile sheets detailing the sanitary sewer system are included in the construction drawings in Appendix A. Calculations to support the design of the system are provided in Appendix C. The following sections describe the proposed improvements.

Sanitary Sewer Main & Services

The proposed gravity sanitary sewer system serving the Phase 1 PUD will consist of 8-inch diameter SDR 35 PVC main lines. Gravity sewer main lines will be constructed on Story House Lane, Canterbury Lane, and Baldwin Avenue flowing east to the proposed on-site WWTP. Sewer service laterals to each lot will be properly sized depending on the type of structure and in accordance with current IPC requirements.

On-Site Wastewater Treatment Plant

All flows collected in the gravity main sanitary sewer system will drain to an on-site WWTP located northeast of Block 7 in the Phase 1 PUD for treatment. The WWTP pre-treatment tanks will consist of a receiving tank, two (2) primary treatment tanks and two (2) pre-anoxic treatment tanks. The wastewater then flows into the recirculating packed-bed media filtration system. The proposed system is an AdvanTex AX-Max Treatment system manufactured by Orenco® Systems, Inc. Final treated effluent from the on-site WWTP will be discharged under the authority of a WYPDES permit. Details of the proposed system are included in Construction Drawing details in Appendix A. Slope stability analysis calculations are included in Appendix C. Additional product data for the AdvanTex system is provided in Appendix D.

Design Criteria

According to WDEQ Rules and Regulations Section 9(C)(i)(A) (WDEQ, 2018), sewers shall be located to protect them from freezing and frost heave as prudently possible provided they meet the requirements outlined in the policy. The City of Sheridan design standards add that wastewater mains shall have a minimum of eight (8) feet of cover so that adjacent lots with basements may have service for floor drains. Table 7 presents the sanitary sewer design criteria used in estimating demand for the proposed PUD from WDEQ Chapter 11 regulations and Section 401 of the City's Public Infrastructure Design Standards.

Sanitary Sewer System Hydraulics

The design criteria in Table 7 were used to analyze, size, and design the sanitary sewer system for the proposed Phase 1 PUD. Assumptions for Phase 1 of the PUD are included in Table 8. As evidenced by the hydraulic calculations in Appendix C, the 8" PVC sanitary sewer mains have more than sufficient capacity to handle sanitary flows from the Phase 1 PUD.

Table 7. Sanitary Sewer Design Criteria

Land Use	*Unit Density (dwellings/acre)*	*Equivalent Population (persons/acre)*
Single Family Residential	3.0	6.6
Multi-family Residential	12.0	26.5
Commercial		18.0
Slope, Flow & Peaking Factors		
Minimum Design Slope = 0.40 ft/100 ft (8" Sewer Pipe)		
Persons per Dwelling Unit = 2.21		
Avg. Daily Per Capita Flow (gpd) = 100		
Avg. Day/Peak Day = 2.43		
Avg. Day/Peak Hour = 2.74		

Table 8. Sanitary Sewer System Buildout

Block	*Land Use*	*Area (acres)*	*Equivalent Population (persons/acre)*	*No. Of Dwellings*	*Persons per Dwelling*
Block 1	Multifamily	6.75	26.5	--	--
Block 2 - Lower	Commercial	2.03	18	--	--
Block 2 - Upper	Residential	2.03	6.6	--	--
Block 3 - Lower	Commercial	2.00	18	--	--
Block 3 - Upper	Residential	2.00	6.6	--	--
Block 4	Single Family	--	--	15	2.21
Block 5	Multifamily	4.53	26.5	--	--
Block 6	Multifamily	2.22	26.5	--	--
Block 7	Single Family	--	--	60	2.21
Block 8 - Lower	Commercial	1.61	18	--	--
Block 8 - Upper	Residential	1.61	6.6	--	--

A summary of the WDEQ Chapter 11 requirements and the design parameters for the sanitary sewer system is provided in Table 9.

A summary of the WDEQ Chapter 11 requirements and the design parameters for the on-site WWTP is provided in Table 10. Technical specifications for the installation of the WWTP are provided in Appendix E.

A summary of the WDEQ Chapter 11 requirements and the design parameters for the primary treatment tanks is provided in Table 11.

Table 9. Sanitary Sewer System Design

WDEQ Chapter 11	*Requirement*	*Design Parameter*
Section 9	Design of Sewers.	The sanitary sewer includes the design of gravity main sewers.
9.a	Separate sewers. Separate sewers shall be provided for collection of stormwater and wastewater. Roof, areaway, drive, or foundation drains shall not be connected to sanitary sewers.	This project includes design of separate sanitary sewer and stormwater conveyance systems that do not connect.
9.b	Pipe materials.	Sanitary sewer gravity system pipes will be 8" SDR 35 PVC pipe meeting City Standard Specifications Section 02712.
9.b.i	Wastewater characteristics. Pipe materials shall resist acid and alkaline solutions, organic solvents and other wastewater constituents and environmental conditions encountered.	The sanitary sewer system pipe shall be SDR 35 PVC AWWA C900 pipe meeting City Standard Specification 02712 which meets these standards.
9.b.ii	Pipe loadings. Pipe materials shall be chosen, and the pipeline shall be designed to withstand all trench and superimposed surface live loads with a minimum factor of safety. Rigid pipes shall have a minimum factor of safety of 1.5, and flexible pipes shall have a minimum factor of safety of 1.25.	Sanitary sewer pipe will be installed in accordance with City Standard Specifications Section 02712.
9.b.iii	Soil characteristics. Pipe materials shall be chosen to resist corrosion due to aggressive soil characteristics by the soil it contacts. Iron or steel pipe shall be protected from corrosion with polyethylene encasement or cathodic protection.	Sanitary sewer pipe will be SDR 35 PVC pipe which is highly corrosion resistant.
9.b.iv	Joints. Pipe joints shall be flexible, durable, and designed to minimize infiltration/exfiltration and exclude roots.	SDR 35 PVC pipe joints are the bell and spigot type joints. These joints are flexible, durable, and designed to minimize infiltration/exfiltration and exclude roots.
9.b.v	Performance tests. Piping shall be subjected to leakage tests. Leakage tests shall be infiltration, exfiltration, or air tests.	All proposed piping will undergo sewer testing as required by City Standard Specifications Section 02712.
9.c	Collection piping design, construction, and testing. A sewage collection line is any conduit that carries wastewater that originates from two (2) or more separate buildings or from a single building that generates more than 2,000 gpd (7.6 m^3/d) of average daily flow.	The proposed sewer system meets this criterion.
9.c.i	Gravity system	The proposed sanitary sewer system is designed as a gravity system.

Table 9. Sanitary Sewer System Design (con't)

WDEQ Chapter 11	*Requirement*	*Design Parameter*
9.c.i.A	Depth. Sewers shall be located to protect them from freezing and frost heave as prudently possible. City Public Infrastructure Design Standards Section 401. Waste water mains shall have a minimum of eight (8) feet of cover so that adjacent lots with basements may have service for floor drains. Waste water mains with less than eight (8) feet of cover will be considered on an individual basis and will be allowed only upon approval by the Public Utilities Director.	All sanitary sewer gravity mains shall have a minimum of eight (8) feet of cover to allow sewer services to adjacent lots with basement floor drains and to protect mains from freezing and frost heave.
9.c.i.B	Size. Sewers to be aligned straight shall be 8-inch (20.3 cm) diameter or larger except 6-inch (15.2 cm) sewers may be used in cul-de-sacs, or other dead-end locations where the sewer cannot be extended in the future. 18-inch (45.7 cm) or larger sewers may be laid on curves. Lines shall be sized for 200 percent of maximum daily flow or more. In the absence of data deriving maximum daily flow, the chart on Figure 1-1 shall be used to determine maximum daily flow. City Public Infrastructure Design Standards Section 401. Waste water lines subject to having service connections thereon and hereafter referred to as laterals and submains shall be sized to flow at a maximum of seventy five (75) percent full at peak hour flow rates with the minimum size no less than eight (8) inches in diameter. City designated collector, trunk, and outfall lines, lines which require specific City approval for service connections, shall be sized to flow at a maximum of ninety (90) percent full at peak hour flow rates. All waste water lines shall be installed in a straight alignment and on a uniform slope between manholes. Curvilinear alignment between manholes will not be allowed.	All sanitary sewer gravity main piping will be 8" SDR 35 PVC pipe. All lines will be installed in a straight alignment and on a uniform slope between manholes. The proposed sanitary sewer system has sufficient capacity to handle well over 200 percent of maximum daily flow and are sized to flow at no more than 75 percent full at peak hour flow rates as provided in the calculations shown in Appendix C.
9.c.i.C	Slope. Sewers shall be laid with uniform slope between manholes. Maximum slopes without the use of concrete anchors shall be 20 percent.	Sewers are designed to have a uniform slope between manholes. Minimum slopes are followed for 8" sewer pipe. No pipe slopes exceed 20 percent, therefore concrete anchors are not proposed in this design.
9.c.i.D	Velocity. Minimum velocities shall be 2 fps (0.6 mps) when flowing full. Velocities greater than 10 fps (3.0 mps) require special design considerations.	Velocity calculations meet the minimum and maximum velocity requirements. Calculations are provided in Appendix C.

Table 9. Sanitary Sewer System Design (con't)

WDEQ Chapter 11	*Requirement*	*Design Parameter*
9.c.i.E	Increasing size. All sewer pipe size changes shall be at manholes. Pipe size shall not be decreased in the direction of flow. The energy gradient line should be maintained when a smaller sewer joins a larger one.	All sewer pipes are designed to be the 8" within the gravity sewer system.
9.c.i.F.I	Excavation. Trench width from the trench bottom to a point one foot above the top of the pipe shall be no less than the outside diameter of the pipe plus eight (8) inches (20.3 cm) but not more than twenty-four (24) inches (61 cm) plus the pipe O.D. The trench bottom shall be excavated for the pipe bell. All rock shall be removed within six (6) inches (15.2 cm) of pipe. The trench shall be dewatered for all work. City Public Infrastructure Design Standards Section 401. Excavation. Excavation shall conform to the City Standard Specifications and O.S.H.A. Regulations	The trench excavation will be installed per City Specifications Section 02221 and OSHA regulations.
9.c.i.F.II	Bedding. Bedding shall be designed in accordance with ASTM C12-81, Rigid Pipe and ASTM D2321-74, Flexible Pipe. City Public Infrastructure Design Standards Section 401. Bedding. Bedding shall conform to the City Standard Specifications.	Pipe bedding will be installed following City Specifications Section 02221.
9.c.i.F.III	Backfill. Backfill shall be performed without disturbing pipe alignment. Backfill shall not contain debris, frozen material, unstable material, or large clods. Stones greater than three (3) inches (7.6 cm) in diameter shall not be placed within two (2) feet (0.6 m) of pipe. Compaction shall be to a density equal to or greater than the surrounding soil. City Public Infrastructure Design Standards Section 401. Backfill. Backfill shall conform to the City Standard Specifications.	Pipe backfill will be installed following City Specifications Section 02221.
9.c.ii	Force mains and pressure sewers.	Force main and pressure sewer systems are not proposed in this design.

Table 9. Sanitary Sewer System Design (con't)

WDEQ Chapter 11	*Requirement*	*Design Parameter*
9.c.iii	Service connections. A service connection is any conduit that carries wastewater that is not defined as a sewage collection line. Service connections shall conform to the requirements for sewage collection lines (Section 9(c)(i) and (ii)) with the following modifications: City Public Infrastructure Design Standards Section 401. Service connections. Service connections shall be designed and installed in accordance with the International Plumbing Codes latest adopted edition. Piping system materials shall be Schedule 40 PVC. A minimum of one sewer service line, from the tap to the property line, shall be required for each lot, zoned lot or building to be served.	Sanitary sewer service connections will be sized in accordance with the current IPC and City Public Infrastructure Design Standards Section 401 requirements. All service connections will be SCH 40 PVC and installed following City Specifications Section 02712. A minimum of one sewer service line will be constructed from the sewer main to the property line at each lot.
9.c.iii.A	Size: minimum size shall be four (4) inches (10.2 cm).	Sanitary sewer service lines will be a minimum of 4 inches. 4-inch services will be provided to normal residential lots and 6-inch services will be provided to commercial lots.
9.c.iii.B	Slope: minimum slope shall be 2 feet/100 feet (2 m/100 m).	Sanitary sewer service lines will be sloped at a minimum 2 feet/100 feet.
9.c.iii.C	Flow: flow shall be determined from a fixture unit count and the sewage size based on flowing full. City Public Infrastructure Design Standards Section 401. Four (4) inch services will be provided for normal residential lots. Commercial and industrial lot sewer services shall be sized according to the latest adopted addition of the International Plumbing Code. Sewer services larger than 6-inches will require a "Permit to Construct." All services eight (8) inch and larger shall enter the public sewer at a manhole. Manholes will be installed at all changes in pipe size, vertical or horizontal alignment, pipe intersections, and the end of lines in accordance with 9.d.i.	Sanitary sewer service lines will be sized in accordance with the latest edition of IPC requirements. 4-inch services will be provided to normal residential lots and 6-inch services will be provided to commercial lots. Sewer services larger than 6-inches are not proposed in this design.

Table 9. Sanitary Sewer System Design (con't)

WDEQ Chapter 11	*Requirement*	*Design Parameter*
9.c.iii.D	Connections: all service connections to sewage collection lines shall be made with a wye or tee for new construction and a tapping saddle for connection to existing collection lines. City Public Infrastructure Design Standards Section 401. Connections: All service connections to waste water collection lines shall be made with wye for new construction, except as identified above, and a tapping saddle or wye for connection to existing collection lines. On vitrified clay mains, tapping saddles shall only be installed by a certified master plumber in accordance with Sheridan City Code. The City discourages the connection of Four-inch or Six inch sewer services directly into manholes; however, these connections will be considered on an individual basis and will be allowed only upon written approval by the Public Utilities Director. In general, sewer services will be extended to a point on each lot, which is ten (10) feet from the lowest (elevation) property corner.	Sanitary sewer service connections will be installed following City Specifications Section 02712. All proposed 4-inch and 6-inch sewer service connections to sewer mains will be made with a wye. Service connections made directly into manholes are not proposed in this design.
9.d.i	Manhole Location. Manholes shall be located at all changes in pipe size, vertical or horizontal alignment, pipe intersections, and the end of lines. Terminal sewer cleanouts may be provided at the end of sewer lines if they are not more than 150 feet (45.7 m) from the nearest downstream manhole. The cleanout shall be constructed using 45-degree bends to the upturned pipe coming to the surface of the ground. The diameter of the cleanout shall be the same as the pipe size. Lampholes shall not be used. City Public Infrastructure Design Standards Section 401. Manholes shall be installed at the end of each main and at changes in direction, size, or slope of the main. The maximum spacing of manholes shall be four hundred (400) feet. Dead-end lateral lines shall terminate in a manhole. Plugged inlets set in the direction of future line expansion shall be provided in the terminating manhole. Upstream terminating manholes shall be located within ten (10) feet of the most distant property line of the lot or building site being served or perimeter line of a new development. In general, sewers that are in the street should be designed so that manholes are located seven (7) feet from the centerline of the streets. Manholes outside the street area must be accessible to City maintenance vehicles. A minimum horizontal spacing of ten (10) feet (clear separation) or a minimum vertical spacing of eighteen (18) inches (clear separation) must be maintained from water mains. Where vertical or horizontal clearances cannot be maintained, the waste water line shall be placed in a separate conduit pipe.	All sanitary sewer gravity main piping will be 8" SDR 35 PVC pipe. All lines will be installed in a straight alignment and on a uniform slope between manholes. Manholes will be located at all changes in vertical and horizontal alignment, and at the end of lines. Manholes will be installed at least every 400 ft and within the street areas wherever possible to allow access by City maintenance vehicles. Horizontal and vertical separation from water mains and water services will be adhered to at all times and installed in accordance with City Specifications Section 02645, 02710, and 02712. Terminal sewer cleanouts and lampholes are not included in this design.

Table 9. Sanitary Sewer System Design (con't)

WDEQ Chapter 11	*Requirement*	*Design Parameter*
9.d.ii	Manhole Size. Minimum manhole interior size is four (4) feet (1.2 m). City Public Infrastructure Design Standards Section 401. Manholes of forty eight (48) inches minimum inside diameter shall be used on eight (8) inch through twenty four (24) inch mains. Larger mains and crowded intersecting mains will have oversized manholes.	The interior size of all proposed manholes is four (4) feet. All sanitary sewer gravity main piping will be 8" SDR 35 PVC pipe.
9.d.iii	Drop manhole. Drop manholes must be constructed where the change in elevation between two lines is greater than twenty-four (24) inches (0.6 m). Concrete encasement shall be provided around the drop pipe.	Drop manholes are not proposed in this design.
9.d.iv	Invert. Manhole inverts shall be constructed to conform to the shape of the sewer. The bench shall drain to the invert. Connections to the manhole shall be watertight and allow differential settlement between the manhole and pipe. Minimum fillet height shall be one half of the pipe diameter. City Public Infrastructure Design Standards Section 401. Flow through inverts in manholes shall provide a minimum of one tenth (0.1) foot drop in a "straight-through" manhole or a manhole angled at ninety (90) degrees to two hundred and seventy (270) degrees; and two tenths (0.2) foot drop in manholes angled less than ninety (90) degrees or greater than two hundred and seventy (270) degrees. In manholes where the downstream sewer line is larger in diameter than the upstream line, the pipe crown elevations of the two pipes shall match.	Manhole inlet and outlet pipe inverts are designed per these requirements.
9.d.v	Cover. The manhole cover shall be suitable to withstand all loads, including impact loading without deformation, slip or rattle. The manhole cover shall be watertight in areas subject to flooding and a bolt-down type in areas subject to unauthorized dumping or vandals.	The manhole cover will be suitable to withstand all loads. No manholes are proposed in areas subject to flooding or unauthorized dumping or vandals.
9.d.vi	Steps. Access to manholes shall be with portable ladders, or with cast iron manhole steps spaced at sixteen (16) inches (40.6 cm) maximum. City Public Infrastructure Design Standards Section 401. Permanent access to manholes (like steps cast into barrel sections) shall not be provided. Access to manholes shall be in accordance with O.S.H.A. confined space entry procedures using portable equipment, under the supervision of a competent person.	Access to manholes will be provided with portable ladders only. Manhole steps are not proposed in this design.

Table 9. Sanitary Sewer System Design (con't)

WDEQ Chapter 11	*Requirement*	*Design Parameter*
9.d.vii	Materials. Manholes shall be constructed watertight and durable using cast-in-place concrete, or precast concrete with gasketed joints. Where precast concrete bases are used, the first twelve (12) inches (30 cm) of wall will be monolithically cast with the base.	Manholes will be constructed as specified.
9.d.viii	Access. A twenty-two (22) inch (56 cm) minimum diameter clear opening shall be provided on all manholes. All manholes shall be located to be accessible by motorized equipment for maintenance.	All proposed manholes will have a twenty-four (24) inch diameter clear opening. All proposed manholes are located in a place accessible by motorized equipment.
9.e	Special structures.	No special structures (i.e. inverted siphons, aerial crossings, stream crossings) will be used in this project, therefore, this criterion does not apply.
9.f	Potable water supply protection.	
9.f.i	Cross connections. There shall be no cross-connections between sewer lines and potable water lines.	No cross connections are included in this design.
9.f.ii	Horizontal and vertical separation from water mains. Minimum horizontal separation shall be ten (10) feet (3 m) where the water main is less than 1.5 feet (0.46 m) above the elevation of the sewer. Minimum vertical separation shall be 1.5 feet (0.46 m) at crossing. Joints in sewers at crossing shall be located at least ten (10) feet (3 m) from water mains. The upper line of a crossing shall be specially supported. Where vertical and/or horizontal clearances cannot be maintained, the sewer shall be placed in a separate conduit pipe.	Horizontal and vertical separation from water mains and water services will be adhered to at all times and installed in accordance with City Specification Section 02645, 02710, and 02712.

Table 10. On-site Wastewater Treatment Plant Design

WDEQ Chapter 11	*Requirement*	*Design Parameter*
Section 11	General Treatment Plant Considerations	An on-site wastewater treatment plant is included in this design. The package plant will consist of a recirculating packed-bed media filtration system.
11.a	Surface water protection. Discharges to surface waters shall meet or exceed quality limitations in the National Pollution Discharge Elimination System permit. Plant configurations and piping shall be arranged to avoid the bypassing of process units that could result in inadequately treated sewage reaching the receiving surface water.	A WYPDES permit will be obtained to discharge to surface waters within or exceeding quality limitations. Piping shall be arranged to avoid bypassing process units.
11.b	Groundwater protection. Seepage and/or discharge to groundwater shall comply with Chapter 8 of the Water Quality Regulations. Plan configurations and piping shall be arranged to avoid the bypass of process units that could result in inadequate treated sewage reaching the groundwater.	Discharge will comply with Chapter 8 and piping shall be arranged to avoid bypassing processing units.
11.c.i	Siting requirements. Isolation. Treatment facilities shall be located to minimize public and private nuisances and health hazards on inhabited areas or residential areas. Where treatment plant siting does potentially affect inhabited areas, appropriate measures to minimize nuisances or hazards shall be incorporated in the design.	The on-site treatment plant will be isolated to minimize public and private nuisances and health hazards.
11.c.ii	Flood protection. All treatment process structures, mechanical equipment, and electrical equipment shall be protected from the 100-year flood. The treatment facilities shall remain fully operational and accessible during the 25-year flood.	The on-site treatment plant will be protected from the 100-year flood and treatment facilities shall remain fully operational and accessible during the 25-year flood.
11.d.i	Hydraulic and treatment reliability. Alternative power source. All treatment plants shall have an alternative source of power to provide reliable pumping and disinfection of sewage if required. The alternative source of power shall be sized to provide the capability to pump design maximum day flow rates through the treatment process and to disinfect the sewage if necessary. Acceptable alternative power sources include: (A) A diesel, natural gas, or propane fueled engine generator. (B) A second independent electrical supply. (C) Storage of sewage and subsequent treatment.	The on-site treatment plant will have a stationary diesel-fueled emergency backup generator to provide an alternative source of power to the plant in the event of a utility service outage. The plant will have an automatic transfer switch to transfer loads between the utility service and the backup generator without human intervention when needed.

Table 10. On-site Wastewater Treatment Plant Design (con't)

WDEQ Chapter 11	*Requirement*	*Design Parameter*
11.d.ii	Bypass treatment units. Complete by-passing of treatment units is prohibited. Provide means to bypass any duplicate process unit or single unit where adequate downstream process capability is provided. Sewage shall be treated in parallel singular units and/or subsequent processes.	The on-site treatment plant will be designed to avoid bypassing process units.
11.d.iii	Multiple units. For average design flows greater than 100,000 gpd, more than one unit of each unit process shall be provided. For average design flows of less than 100,000 gpd, one unit of each unit process may be provided if electrical or mechanical equipment or diffusers can be removed while the unit is in operation, or if the unit can be compartmentalized to permit access. There shall be no provision to bypass the entire plant nor shall bypass provisions be made that will allow inadequately treated sewage to reach the ground or surface waters. Where more than one parallel unit is provided, positive means of dividing the flow proportionally between units shall be included (such as splitter weirs or valves and meters).	Average design flow for the on-site treatment plant (57,000 gpd) will be less than 100,000 gpd, therefore more than one unit of each process is not required. During maintenance, units may be compartmentalized so electrical and mechanical equipment can be removed while the plant is in operation.
11.d.iv	Multiple equipment. Mechanical process equipment shall be provided in multiple units. All pumping functions shall include sufficient pumping capacity that the peak flow can be pumped with the largest single unit not in service. Blowers and mechanical aerators for process aeration shall include sufficient capacity that the maximum day design capacity can be delivered with the largest single unit not in service. Other equipment shall have standby units where their function is critical to the treatment process.	The on-site treatment plant will contain multiple pumping units capable of pumping peak flows. Pumping units will be placed in standby during non-peak flow periods.
11.e.i	Electrical. Equipment location. Service transformers and other critical electrical equipment shall be located above the 100 year flood and above grade. Transformers shall be located in a manner that they are remote from or protected by substantial barriers from traffic. Motor controls shall be located in superstructures and in rooms that do not contain sewage, chemical processes, or corrosive atmospheres.	All on-site treatment plant electrical equipment will be housed in an above-grade controls building protected from traffic and above the 100 year flood.

Table 10. On-site Wastewater Treatment Plant Design (con't)

WDEQ Chapter 11	*Requirement*	*Design Parameter*
11.e.ii	Code requirements. All electrical work shall comply with the National Electrical Code as enacted and amended by the Wyoming Department of Fire Prevention and Electrical Safety. Areas in which the occurrence of explosive concentrations of hazardous gases or flammable fluids can occur Class 1, groups C and D, Division 1 locations shall be designed for hazardous locations in accordance with the National Electrical Code.	All electrical work will comply with the required codes.
11.f.i	Structural. Construction materials. Construction materials shall be selected, apportioned, and/or protected to provide water tightness, corrosion protection, and resistance to weather variations.	Construction materials will be selected to provide water tightness, corrosion resistance, and resistance to weather.
11.f.ii	Structural. Coatings. Coatings used to protect structures, equipment and piping shall be suitable for atmospheres containing hydrogen sulfide and volatile organics. Surfaces exposed in chemical areas shall be protected from chemical attack. Concrete surfaces in confined spaces containing sewage shall be protected. Paints containing lead or mercury shall not be used.	The on-site treatment plant will use aerobic treatment processes without corrosive chemicals, therefore, this criterion does not apply.
11.f.iii	Geological conditions. Structural design shall consider the seismic zone, groundwater and soil support. Soils investigations shall be made, or adequate previous soils investigations shall be available to develop structural design.	The on-site treatment plant consists of prefabricated tanks which will be installed below grade. Geologic conditions have been considered as part of the design. Slope stability analysis calculations are shown in Appendix C.
11.g.i	Safety. Instruction manuals. Instruction manuals shall be provided for all mechanical and electrical equipment describing operation, maintenance, and safety.	Standard O&M instruction manuals will be provided by the manufacturer.
11.g.ii	Safety. Handrails. In addition to all Wyoming OSHA requirements, barriers around treatment basins shall be provided.	Treatment basins will have locking covers; therefore, handrails and barriers are not required for this project.
11.g.iii	Safety. Warning Signs. Provide warning signs for non-potable water, electrical hazards, chemical hazards, or other unsafe features. Warning signs shall be permanently attached to the structure or appropriate equipment.	Warning signs will be attached in accordance with Wyoming Occupational Health and Safety Rules and Regulations and this criterion.
11.g.iv	Safety. Equipment guards. Provide shields to protect from rotating or moving machinery.	The on-site treatment plant will not contain rotating or moving machinery, therefore, this criterion does not apply.

Table 10. On-site Wastewater Treatment Plant Design (con't)

WDEQ Chapter 11	*Requirement*	*Design Parameter*
11.g.v	Safety. Lighting. Provisions shall be made to light walkways, paths, and other accessways around basins, in buildings and on the site. All areas shall be lit in a manner that the failure of one lighting fixture will not cause an area to be dark, or the loss of power will not cause a room or enclosed area to be dark.	Lighting will be installed in the plant controls building. Outdoor lighting for safe operation and maintenance is not required.
11.g.vi	Safety. Climate conditions. Design of facilities such as exposed stairs, walkways, and sidewalks shall include nonskid surfaces.	Walkways will be nonskid surfaces.
11.h	Instrumentation.	
11.h.i	Location. A flow measuring device shall be provided for the plant effluent unless it is a mechanical plant where an influent flow measuring device will be acceptable.	Plant effluent will be measured by a magnetic flow measuring device.
11.h.ii	Type. For plants having an average design flow of 50,000 gpd (189 m3/d) or more, the flow measuring device shall provide recording of instantaneous flow rate, enable calculation of average daily flow rate and have provisions for calibration and correction.	The plant effluent flow measuring device will provide recording of instantaneous and average daily flow rates. The device will have provisions for calibration and correction.
11.h.iii	Controls. Automatic controls shall be designed to permit manual override.	Plant controls will be designed to permit manual override.
11.h.iv	Alarms. Conditions that may affect discharge quality or personnel or public safety shall be alarmed at an attended location.	The plant's stand-alone control system will have both audible and visual alarms to alert plant operators during an upset condition. The control system will also have wireless telemetry capabilities for communicating with the City's sewer SCADA system.
11.i	Sampling. Access shall be provided to sample untreated wastewater ahead of the treatment facilities prior to adding any process return flows, and sampling of the effluent after all treatment process units, but before discharge to the receiving stream. An automatic sampler that composites samples in proportion to the flow rate on the effluent shall be provided if required by the NPDES permit.	Sampling of untreated influent will be taken at the inlet of the primary treatment tanks. Sampling of treated effluent will be taken from a sample port on the discharge line prior to discharging to the receiving stream.

Table 10. On-site Wastewater Treatment Plant Design (con't)

WDEQ Chapter 11	*Requirement*	*Design Parameter*
11.j	Ventilation. All enclosed spaces shall be provided with forced ventilation, excepting pumping station wet wells, scum pits, anaerobic process units, and manholes. In areas where there are open sewage channels, wet pits exposed to the room or process units without gas tight enclosures, ventilation shall be provided to maintain a higher pressure in the room than atmospheric and shall provide twelve (12) air changes per hour. In equipment rooms, ventilation shall be provided to limit the temperature rise in the room to less than 15° F (8° C) above ambient, but not less than six air changes per hour. Rooms housing chlorine storage and/or feeders shall have provisions for exhausting the room contents in two (2) minutes and continuous ventilation to provide twelve (12) air changes per hour.	All treatment tanks and controls building will have vent fans to provide adequate ventilation. All tanks will have removeable covers which can be opened to providing additional ventilation during maintenance activities.
11.k	Dewatering of treatment units. All treatment units, channels, housing screens, or other embedded equipment, and wet wells shall be provided with drains or sumps that facilitate draining the unit for access and maintenance. Drainage shall be to upstream process units. Basin slabs shall be designed to successfully resist the hydrostatic uplift pressure or relief valves shall be provided.	All treatment tanks will be installed below grade in gravel bedding with tile drains to prevent hydrostatic uplift. Treatment tanks will be drained using pumps or vacuum trucks.
11.l	Cold weather protection. All equipment including pumps, bar screens, grit washers, electrical equipment and other equipment not required to be in or on open basins (such as clarifier drives and surface aerators) shall be housed in heated, lighted, and ventilated structures. Structure entrances shall be above grade. Piping shall be buried below frost level, placed in heated structures, or provided with heat and insulated. Walkways shall be located away from areas of spray and/or ice buildup.	All treatment tanks and piping will be installed below grade, insulated, and backfilled with pea gravel. Tanks will have insulated foam-core lids to prevent heat loss. All pumps shall be submersible type pumps. All electrical and chemical feed equipment will be housed in a temperature-controlled building.

Table 10. On-site Wastewater Treatment Plant Design (con't)

WDEQ Chapter 11	*Requirement*	*Design Parameter*
11.m	Chemical storage. All chemical storage shall be housed or buried. Areas designated for storage of specific chemicals shall be separated from areas designated for other reactive chemicals. Liquid storage containers shall be isolated from other portions of the structure by a curb that will contain and/or drain ruptured tank contents. Concrete floors, walls and curbs in chemical storage and feed areas shall be coated to protect the concrete from aggressive chemicals. Floors in polymer feed and storage areas shall be provided with nonslip surfaces. Rooms for chlorine storage and feed equipment shall be gas tight and be provided with entry from outdoors. All toxic chemical storage areas shall be provided with lighting and ventilation that are switched from outside the room, and windows to permit viewing the room from outside.	Soda ash, alkalinity chemical feed tank, and mixing/pumping equipment will be housed in a temperature-controlled building. Floors will be slip resistant and protected against chemical corrosion. Vent fans will provide adequate ventilation.
11.n	Design capacities.	
11.n.i	Flow. In the absence of flow measurement information, the design average daily flow shall be based on a per capita daily flow rate of 100 gallons (378 liters). Allowances shall be made for return flows from digesters, sludge thickeners and the like, and the infiltration and wet weather inflow into older sewer systems. Significant industrial waste flows shall be added to the per capita flow rate.	The proposed treatment plant will be designed in accordance with these specifications. Design average daily flow rate calculations are provided in Appendix C.
11.n.ii	Organic loads. In the absence of wastewater strength data, domestic waste treatment design shall be based on a per capita daily BOD and suspended solids contribution of 0.22 lb (0.10 kg) and 0.25 lb (0.11 kg), respectively. The influence of side-stream return flows and significantly strong industrial wastes shall be considered and included in the design where applicable.	The on-site wastewater treatment plant is designed to these requirements.

Table 11. Primary Treatment Design

WDEQ Chapter 11	*Requirement*	*Design Parameter*
Section 13	Primary Treatment	
13.a	Sedimentation	A primary treatment system consisting of primary and pre-anoxic sedimentation tanks is included in this design.
13.a.i	Number of basins. For plants having an average design capacity greater than 100,000 gpd (378.4 m^3/d) and where primary settling is provided, multiple units capable of independent operation shall be provided.	Average design flow for the on-site treatment plant (57,000 gpd) will be less than 100,000 gpd, therefore multiple primary settling units is not required.
13.a.ii	Design parameters.	
13.a.ii.A	Performance. Unless full-scale data is available, primary settling shall be assumed to remove one third of the influent BOD and 55 percent of the influent suspended solids. It is unacceptable to return waste activated sludge to the primary clarifier.	Full-scale data is unavailable; therefore, primary treatment will be assumed to remove one third of the influent BOD and 55 percent of the influent suspended solids. Return activated sludge will not be returned to the
13.a.ii.B	Water depth. The minimum side water depth shall be seven (7) feet (2.1 m).	Water depth within the primary treatment tanks will be maintained at a constant depth no less than 7 feet.
13.a.ii.C	Surface overflow rates. Surface overflow rates shall not exceed 1,000 gpd/sq ft (41 m3/m^2d) of surface area at the average design flow nor 1,500 gpd/sq ft (61 m3/m^2d) of surface area at the maximum day flow rate. Maximum day flow is the highest flow over a 24 hour period that is projected to occur during the design year.	Primary treatment tanks will be sized to a minimum 24-hour hydraulic retention time (HRT) at maximum day flow.
13.a.ii.D	Weir loading rates. Circular basins (or basins with center inlets) shall be provided with a full periphery weir. Rectangular basins shall be provided with end weirs 11-28 that provide less than 80,000 gpd/ft (9,920 m3/m d) weir hydraulic loading at peak instantaneous flow rates.	Primary treatment tanks will consist of a series of 10’ diameter Duromaxx Steel Reinforced Polyethylene (SRPE) pipes. Outlet pipes will serve as the end weirs.
13.a.iii	Clarifier inlet and outlet.	

Table 11. Primary Treatment Design (con't)

WDEQ Chapter 11	*Requirement*	*Design Parameter*
13.a.iii.A	General. Clarifier inlet structures shall be designed to achieve the following: 1) Dissipate the inlet kinetic energy. 2) Distribute the flow evenly into the tank. 3) Prevent short circuiting. Inlet channels or piping shall be designed for minimum velocities of one (1) fps (0.3 mps). Where minimum velocities are less, mixing, flushing or other means of resuspending solids shall be provided. Circular basins shall be provided with symmetrical baffling to distribute flow equally in all radial directions. Rectangular basins shall be provided with inlet parts uniformly distributed along the entire end of the basin and shall be provided with baffles.	No clarifier inlet structures will be used in this design; therefore, this criterion does not apply.
13.a.iii.B	Weirs. Weir plates shall be adjustable for leveling and sealed against the effluent channel.	No weir plates will be used in this design; therefore, this criterion does not apply.
13.a.iii.C	Baffles. Provide scum baffles at the water surface to intercept all floating materials and scum prior to the weir. Baffles should extend three (3) inches (7.6 cm) above the weir plate elevation and eight (8) inches (20.3 cm) below the water surface.	No scum baffles will be used in this design; therefore, this criterion does not apply.
13.a.iii.D	Clarifier effluent channel.	No effluent channels will be used in this design; therefore, this criterion does not apply.
13.b	Fine screens.	No fine screen will be used in this design; therefore, this criterion does not apply.
13.c	Sludge handling.	
13.c.i	Sludge removal. Mechanical sludge collection equipment is required for all primary settling basins. The sludge collection rake arms or flights and the drive assembly shall be designed to withstand the maximum anticipated loads and move sludge to the hopper.	Sludge removal will occur periodically by pumping or with vacuum truck as determined by routine inspection.
13.c.ii	Scum removal. Provide scum collection and removal facilities for all primary settling basins. Scum shall be removed from the liquid process and not returned.	Scum removal will occur periodically by pumping or by vacuum truck as determined by routine inspection.
13.c.iii	Sludge hopper. The minimum side slope of the hopper shall be 1.7 vertical to 1.0 horizontal. Hopper bottoms shall have a maximum dimension of two feet (0.61 m). The sludge removal pipe shall be flush with the hopper bottom, and have a minimum diameter of six inches (15.2 cm).	No sludge hoppers will be used in this design; therefore, this criterion does not apply.

Table 11. Primary Treatment Design (con't)

WDEQ Chapter 11	*Requirement*	*Design Parameter*
13.c.iv	Scum box. The scum box shall be located outside and immediately adjacent to the scum collection point (beaching plate). The beaching plate shall be located on the 11-30 opposite side of the basin from the prevailing wind. Provide for mixing the contents of the scum box, such as a mechanical mixer or air diffusion. Provide access and wash water for washing the scum box.	No scum boxes will be used in this design; therefore, this criterion does not apply.
13.c.v	Controls.	
13.c.v.A	Primary settling sludge facilities. Primary sludge and scum shall be removed using positive displacement pumps. Each basin shall have a separately activated and controlled pump. (The standby pumps may be shared by more than one basin.) Pumps shall be on timers and the pumps should be designed to initiate sludge removal two (2) or more times per hour. Include devices on the primary sludge piping for sampling the primary sludge flow.	Sludge removal will occur periodically by pumping or with vacuum truck as determined by routine inspection.
13.c.v.B	Primary screen sludge facilities. Where sludge pumping is provided, include a means to shut off the pump when insufficient material is being supplied to the pump suction. The controls for the pump shall be designed to match the pumping rate to quantity of sludge. Where conveyors are used, they shall run continuously and alarm when off.	No sludge pumping systems will be used in this design; therefore, this criterion does not apply.

REFERENCES

City of Sheridan, Public Works Department, 2016, City of Sheridan Standard Specifications & Details for Street and Utility Construction, 2016 Edition. Available on the Internet as of March 2024: https://www.sheridanwy.gov.

_____, 2017, Public Infrastructure Design Standards. Available on the Internet as of March 2024: https://www.sheridanwy.gov.

International Code Council, 2021, 2021 International Plumbing Code. Available on the Internet as of March 2024: https://codes.iccsafe.org/content/IPC2018P3

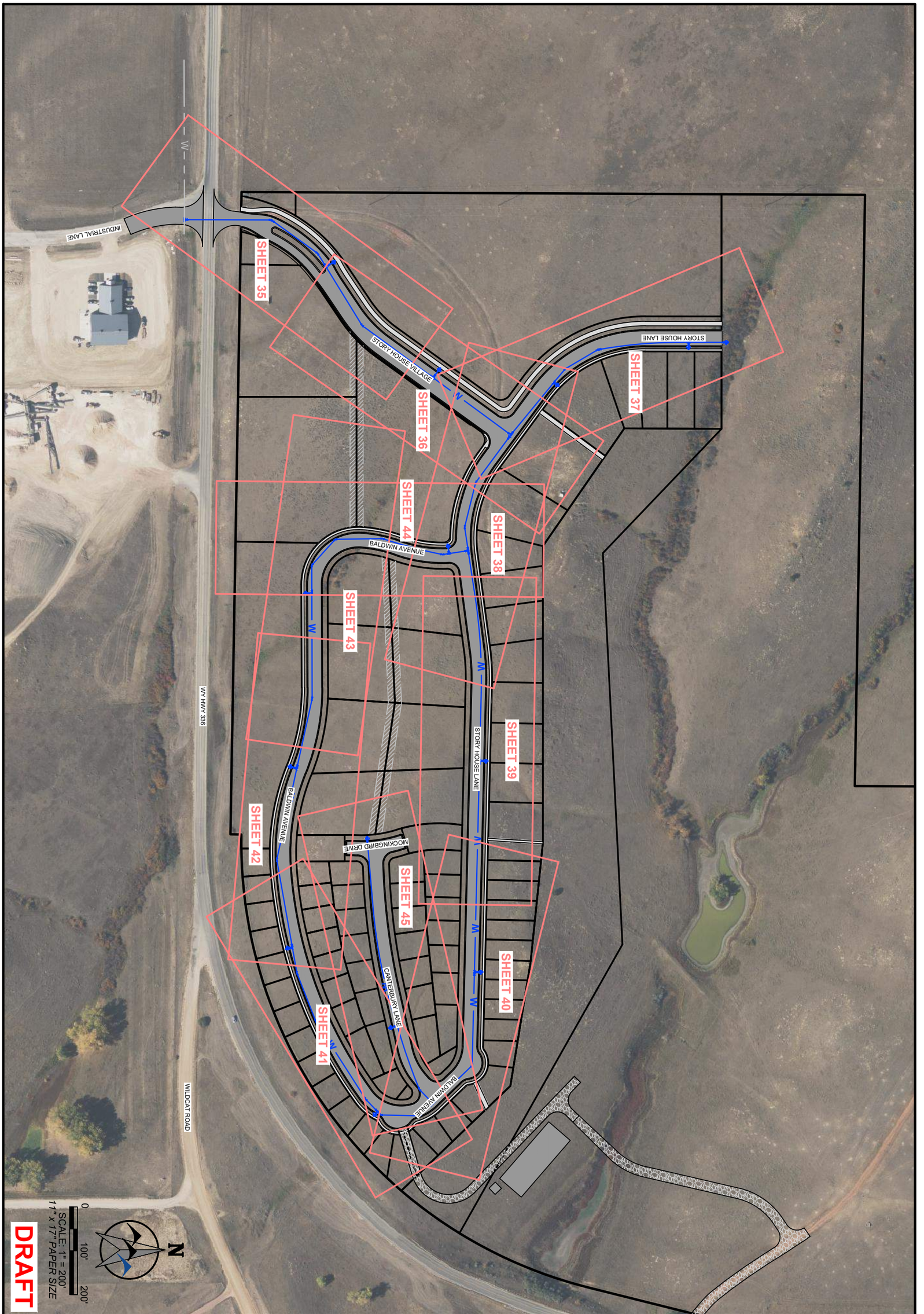
Recommended Standards for Water Works, Great Lakes Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers, (2018), referred to as "2018 TSS," available at on the Internet as of March 2024: https://www.mngovpublications.com/catalog/Default.asp?CatalogID=21656&Provider_ID=1241868

Wyoming Department of Environmental Quality, Water Quality Division, July 2023, Wyoming Water Quality Rules and Regulations, Chapter 12, Design and Construction Standards for Public Water Supplies. Available on the Internet as of March 2024: https://rules.wyo.gov/Search.aspx?mode=1.

_____, June 2018, Wyoming Water Quality Rules and Regulations, Chapter 11, Design and Construction Standards for Sewerage Systems, treatment works, disposal systems or other facilities capable of causing or contributing to pollution and mobile home park and campground sewerage and public water supply distribution systems. Available on the Internet as of March 2024: https://rules.wyo.gov/Search.aspx?mode=1.

APPENDIX A

Construction Drawings



STORY HOUSE PROPERTY COMPANY, LLC

STORY HOUSE VILLAGE PUD - PHASE 1

WATER KEY SHEET

SHERIDAN COUNTY, WYOMING

SHEET 34

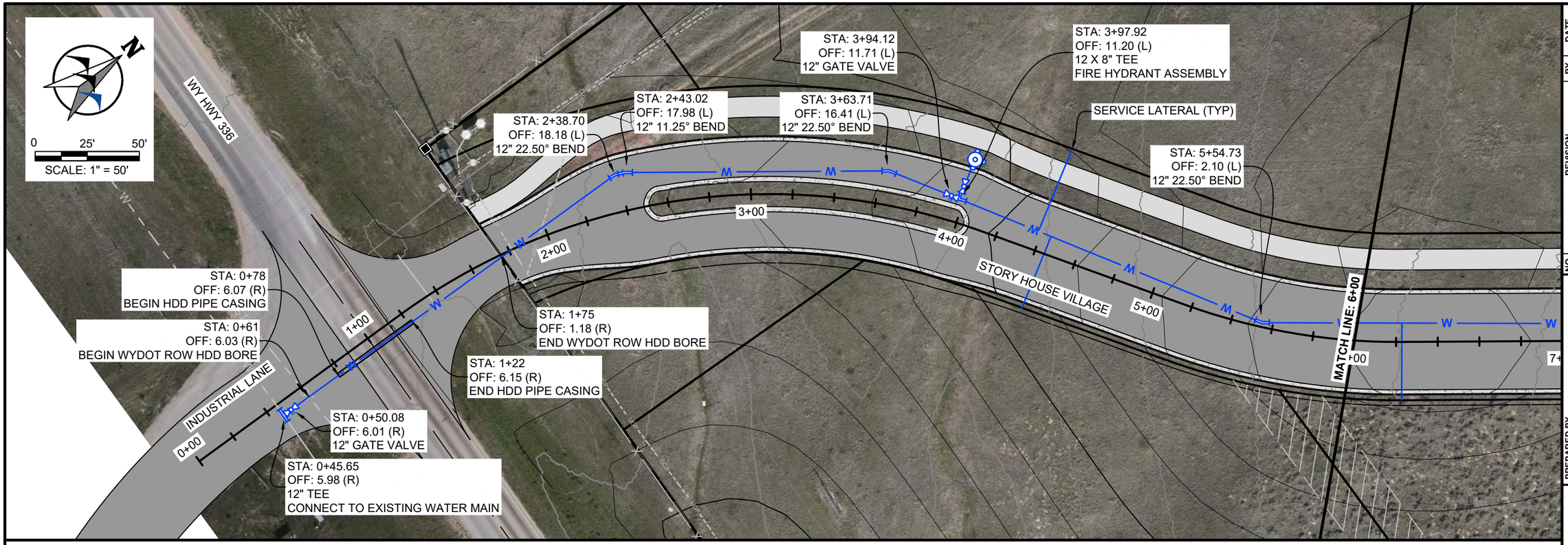
DESIGNED BY: SER
DRAWN BY: CJM
CHECKED BY: CDR
DATE: 02/29/2024

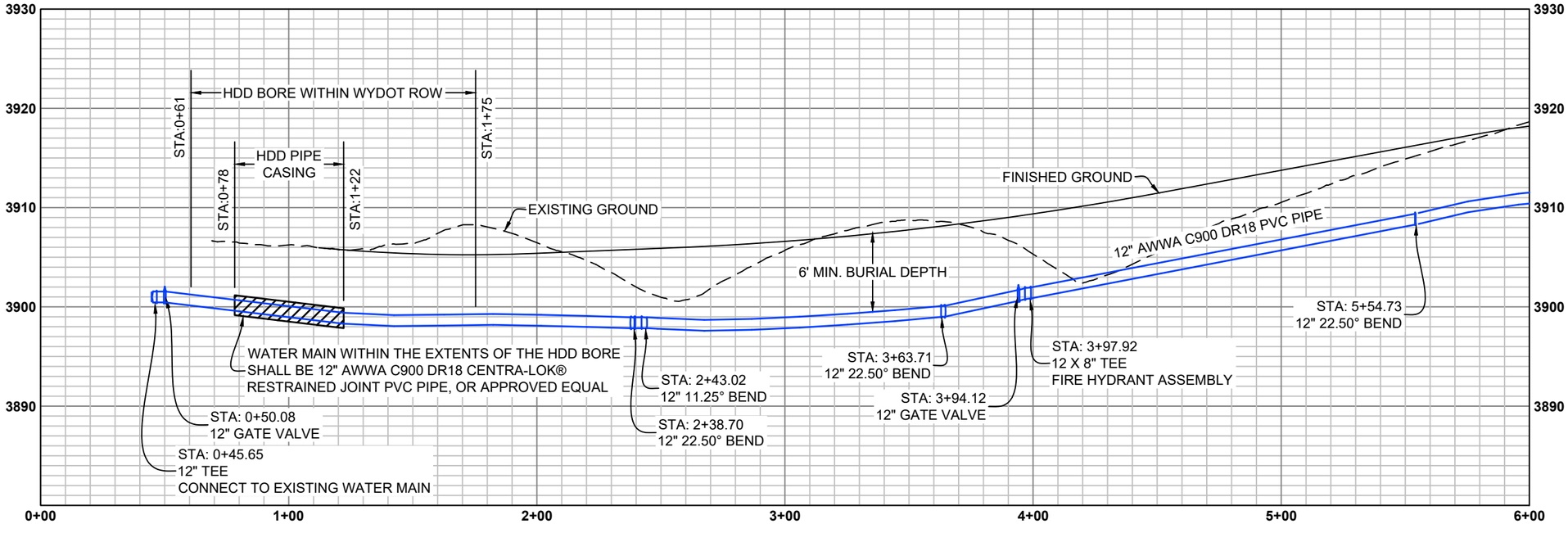
PREPARED BY
WWC ENGINEERING
1849 TERRA AVE.
SHERIDAN, WY 82801
(307) 672-0761
www.wwcengineering.com

NO.	REVISION	BY	DATE

PROJECT NO. 2023-137

k:\Sheridan\story house management\2023137 story house village\05CADSheets\PLAN SET\23137_VILG_PLNST_WATER_PP.dwg WATER_PP (1) 3/1/2024 9:35:44 AM





NOTE: REFER TO THE STORY HOUSE VILLAGE PUD - PHASE 1 SPECIAL PROVISIONS FOR SPECIFIC COMPACTED FILL REQUIREMENTS WHEN INSTALLING WET UTILITIES IN AREAS REQUIRING PLACEMENT OF FILL.

DRAFT

NO.	REVISION	BY	DATE

PROJECT NO. 2023-137

PREPARED BY
WWC ENGINEERING
1849 TERRA AVE.
SHERIDAN, WY 82801
(307) 672-0761
www.wwcengineering.com

STORY HOUSE PROPERTY COMPANY, LLC

STORY HOUSE VILLAGE PUD - PHASE 1

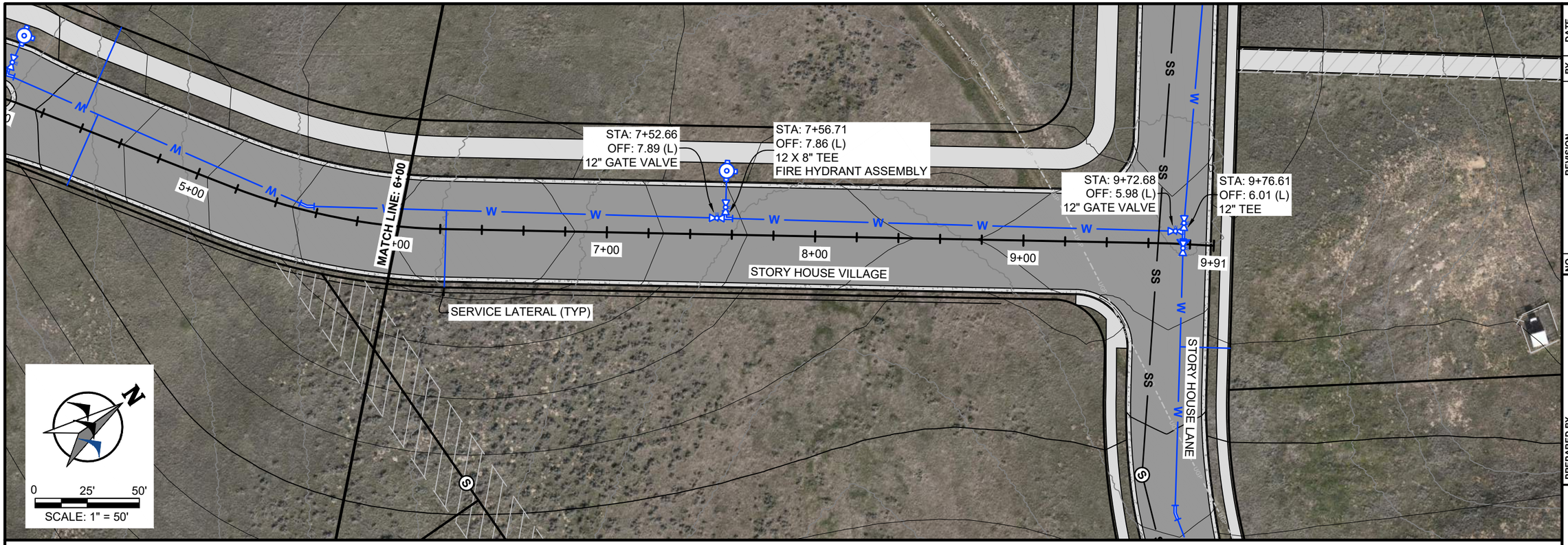
WATER PLAN AND PROFILE SHEET

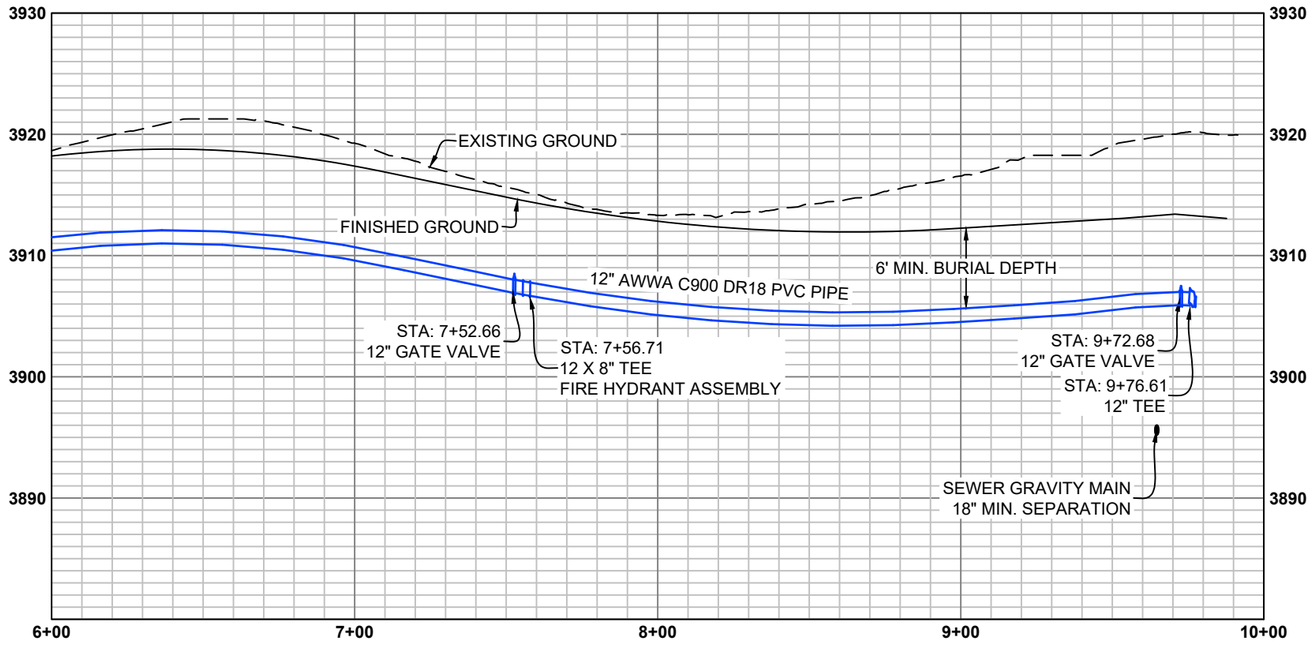
SHERIDAN COUNTY, WYOMING

DESIGNED BY: SER
DRAWN BY: CIM
CHECKED BY: CDR
DATE: 02/29/2024

SHEET
35

k:\Sheridan\story house management\2023137 story house village\05CAD\Sheets\PLAN SET\23137_VILG_PLNST_WATER_PP.dwg WATER_PP (2) 3/1/2024 9:35:44 AM





NOTE: REFER TO THE STORY HOUSE VILLAGE PUD - PHASE 1 SPECIAL PROVISIONS FOR SPECIFIC COMPACTED FILL REQUIREMENTS WHEN INSTALLING WET UTILITIES IN AREAS REQUIRING PLACEMENT OF FILL.

DRAFT

NO.	REVISION	BY	DATE

PROJECT NO. 2023-137

PREPARED BY
WWC ENGINEERING
1849 TERRA AVE.
SHERIDAN, WY 82801
(307) 672-0761
www.wwcengineering.com

STORY HOUSE PROPERTY COMPANY, LLC

STORY HOUSE VILLAGE PUD - PHASE 1

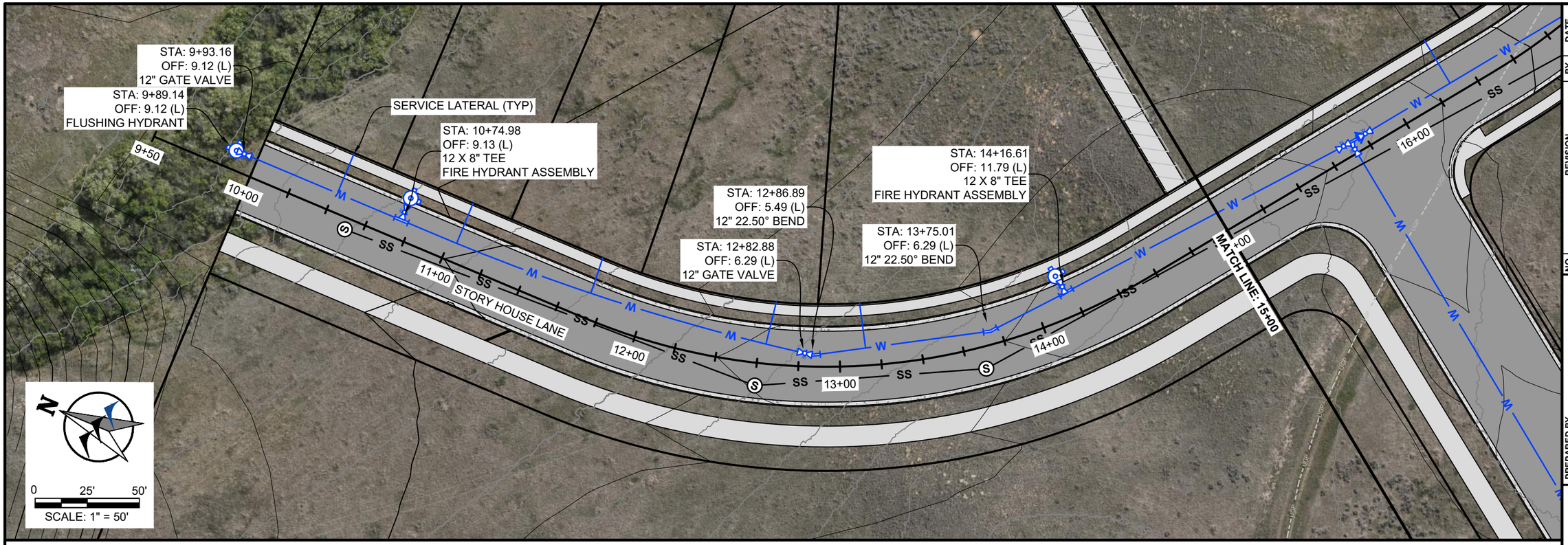
WATER PLAN AND PROFILE SHEET

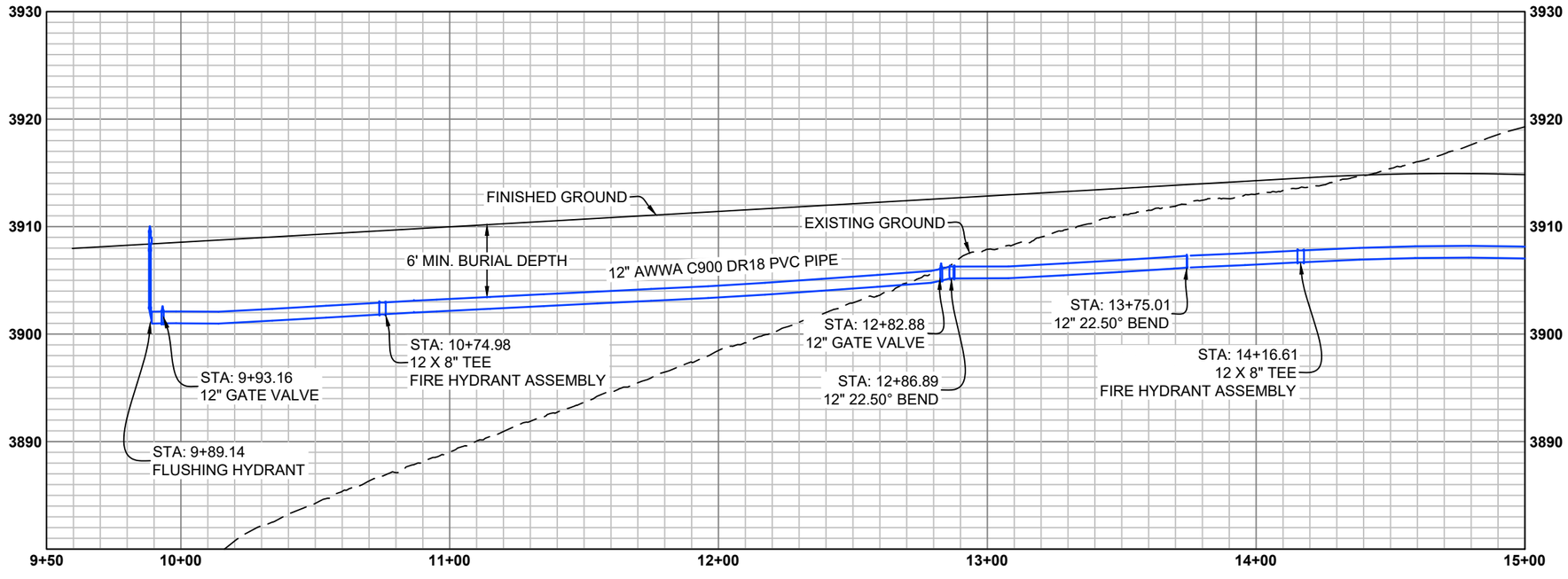
SHERIDAN COUNTY, WYOMING

DESIGNED BY: SER
DRAWN BY: CIM
CHECKED BY: CDR
DATE: 02/29/2024

SHEET
36

k:\Sheridan\story house management\2023137 story house village\05CAD\Sheets\PLAN SET\23137_VILG_PLNST_WATER_PP.dwg WATER_PP (3) 3/1/2024 9:35:44 AM





NOTE: REFER TO THE STORY HOUSE VILLAGE PUD - PHASE 1 SPECIAL PROVISIONS FOR SPECIFIC COMPACTED FILL REQUIREMENTS WHEN INSTALLING WET UTILITIES IN AREAS REQUIRING PLACEMENT OF FILL.

DRAFT

NO.	REVISION	BY	DATE

PROJECT NO. 2023-137

PREPARED BY
WWC ENGINEERING
1849 TERRA AVE.
SHERIDAN, WY 82801
(307) 672-0761
www.wwcengineering.com

STORY HOUSE PROPERTY COMPANY, LLC

STORY HOUSE VILLAGE PUD - PHASE 1

WATER PLAN AND PROFILE SHEET

SHERIDAN COUNTY, WYOMING

DESIGNED BY: SER
DRAWN BY: CIM
CHECKED BY: CDR
DATE: 02/29/2024

SHEET
37

k:\Sheridan\story house management\2023137 story house village\05CAD\Sheets\PLAN SET\23137_VILG_PLNST_WATER_PP.dwg WATER_PP (4) 3/1/2024 9:35:44 AM

STA: 15+68.52
OFF: 6.11 (L)
12" GATE VALVE

STA: 15+72.60
OFF: 6.04 (L)
12" TEE

STA: 15+76.57
OFF: 6.01 (L)
12 x 8" REDUCER

STA: 15+80.57
OFF: 5.98 (L)
8" GATE VALVE

SERVICE LATERAL (TYP)

STA: 17+08.02
OFF: 0.00 ()
8" 22.50° BEND

STA: 18+13.57
OFF: 1.75 (L)
8" 22.50° BEND

STA: 18+64.22
OFF: 9.22 (L)
8" GATE VALVE

STA: 18+68.40
OFF: 9.45 (L)
8" TEE

STA: 18+72.66
OFF: 9.63 (L)
8" GATE VALVE

MATCH LINE: 15+00

MATCH LINE: 20+00

STORY HOUSE LANE

STORY HOUSE VILLAGE

BALDWIN AVENUE

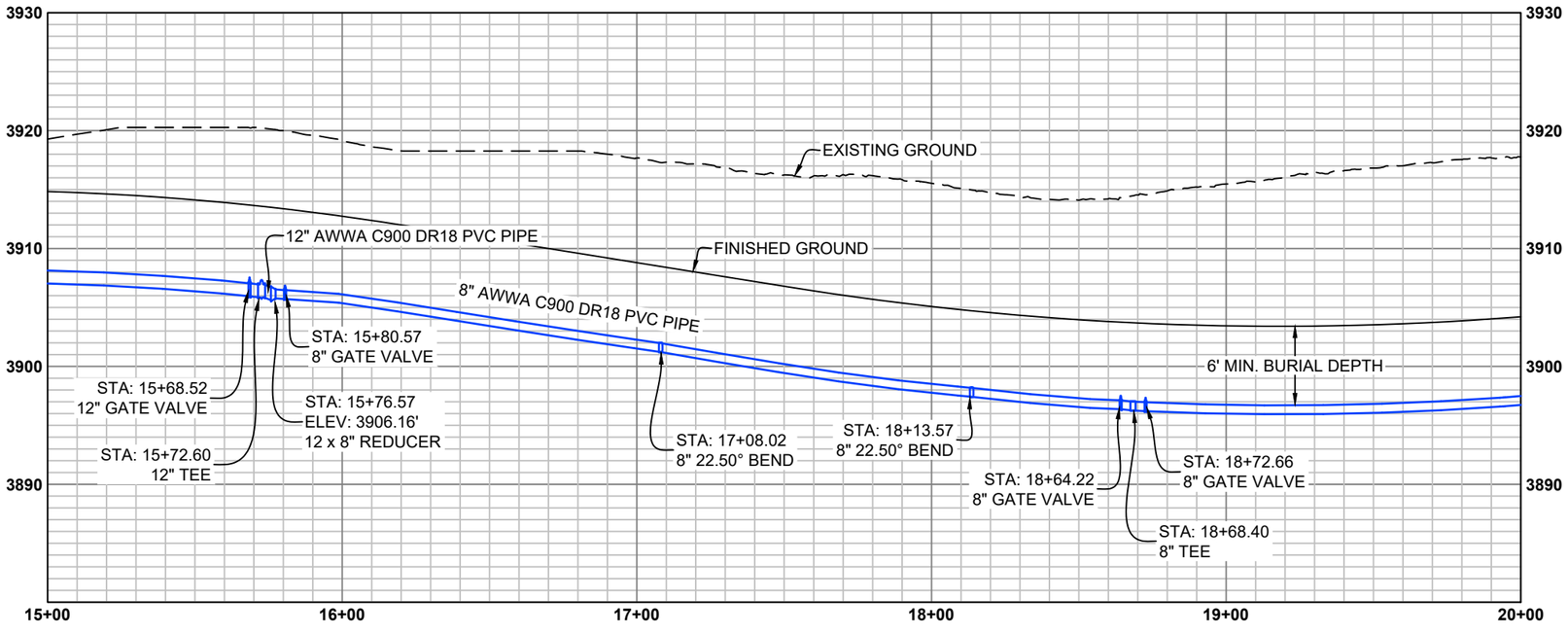
14+00 15+00 16+00 17+00 18+00 19+00 20+00 21+00

W SS S M UGP

N

0 25' 50'

SCALE: 1" = 50'



NOTE: REFER TO THE STORY HOUSE VILLAGE PUD - PHASE 1 SPECIAL PROVISIONS FOR SPECIFIC COMPACTED FILL REQUIREMENTS WHEN INSTALLING WET UTILITIES IN AREAS REQUIRING PLACEMENT OF FILL.

DRAFT

NO.	REVISION	BY	DATE

PROJECT NO. 2023-137

PREPARED BY
WWC ENGINEERING
1849 TERRA AVE.
SHERIDAN, WY 82801
(307) 672-0761
www.wwcengineering.com

STORY HOUSE PROPERTY COMPANY, LLC

STORY HOUSE VILLAGE PUD - PHASE 1

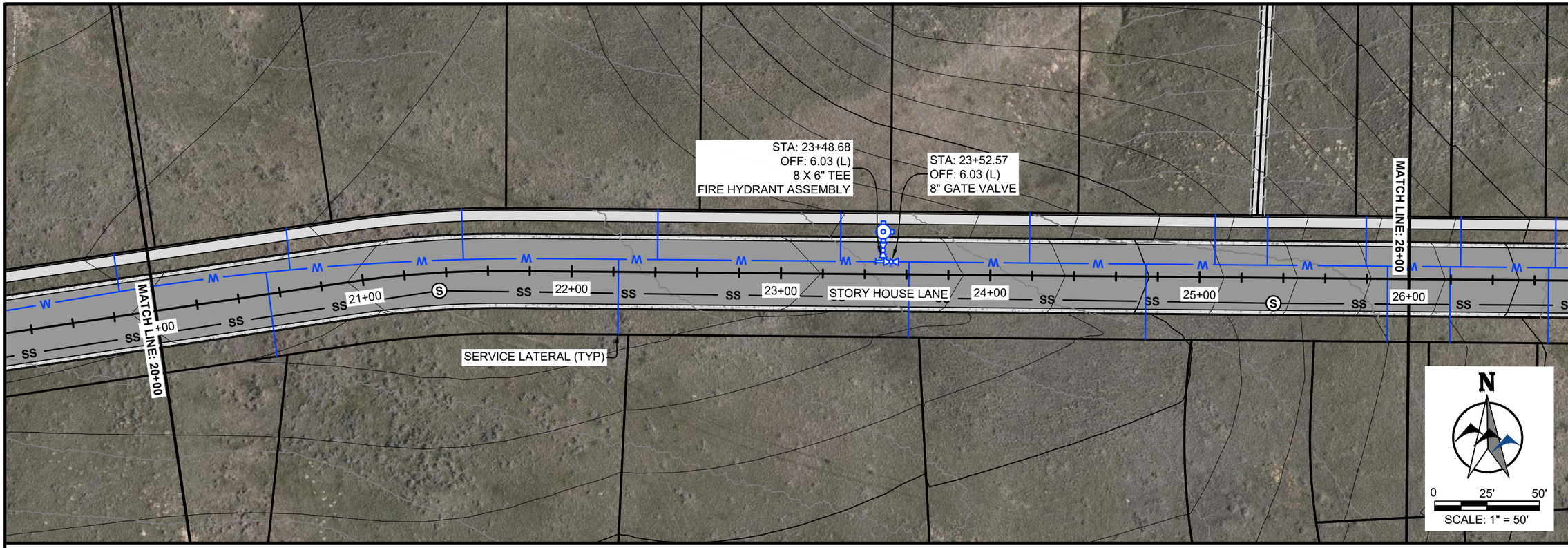
WATER PLAN AND PROFILE SHEET

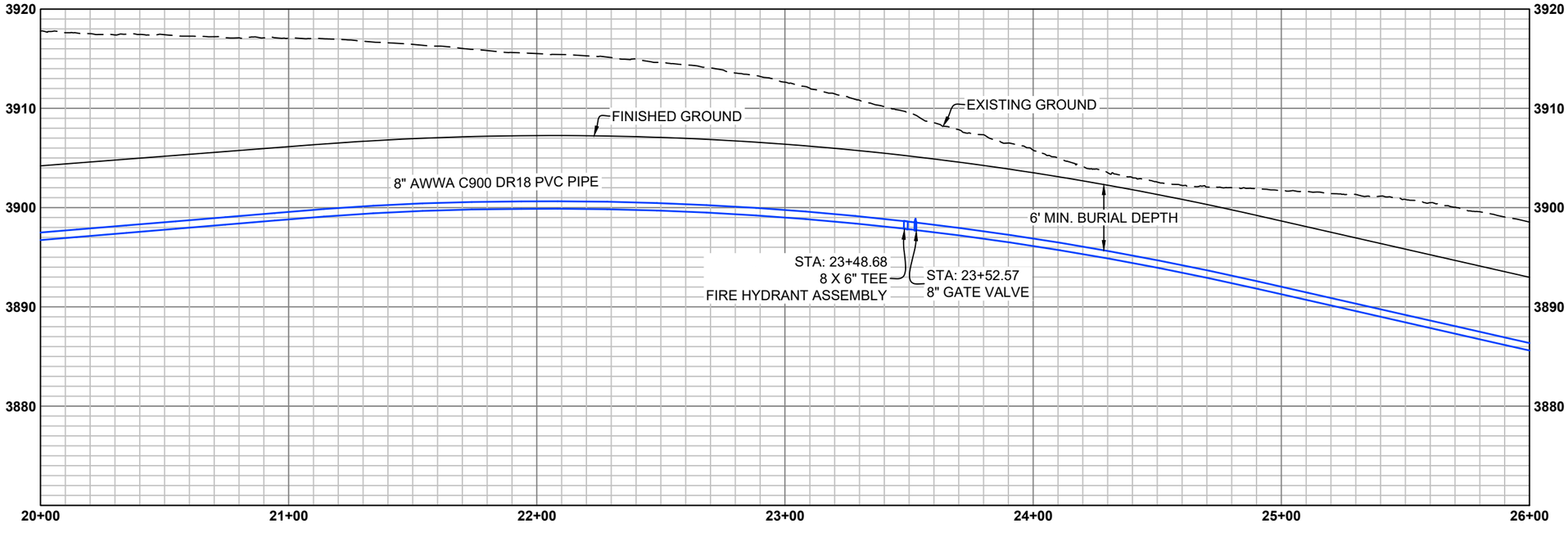
SHERIDAN COUNTY, WYOMING

DESIGNED BY: SER
DRAWN BY: CIM
CHECKED BY: CDR
DATE: 02/29/2024

SHEET
38

k:\Sheridan\story house management\2023137 story house village\05CAD\Sheets\PLAN SET\23137_VILG_PLNST_WATER_PP.dwg WATER_PP (5) 3/1/2024 9:35:44 AM





NOTE: REFER TO THE STORY HOUSE VILLAGE PUD - PHASE 1 SPECIAL PROVISIONS FOR SPECIFIC COMPACTED FILL REQUIREMENTS WHEN INSTALLING WET UTILITIES IN AREAS REQUIRING PLACEMENT OF FILL.

DRAFT

NO.	REVISION	BY	DATE

PROJECT NO. 2023-137

PREPARED BY
WWC ENGINEERING
1849 TERRA AVE.
SHERIDAN, WY 82801
(307) 672-0761
www.wwcengineering.com

STORY HOUSE PROPERTY COMPANY, LLC

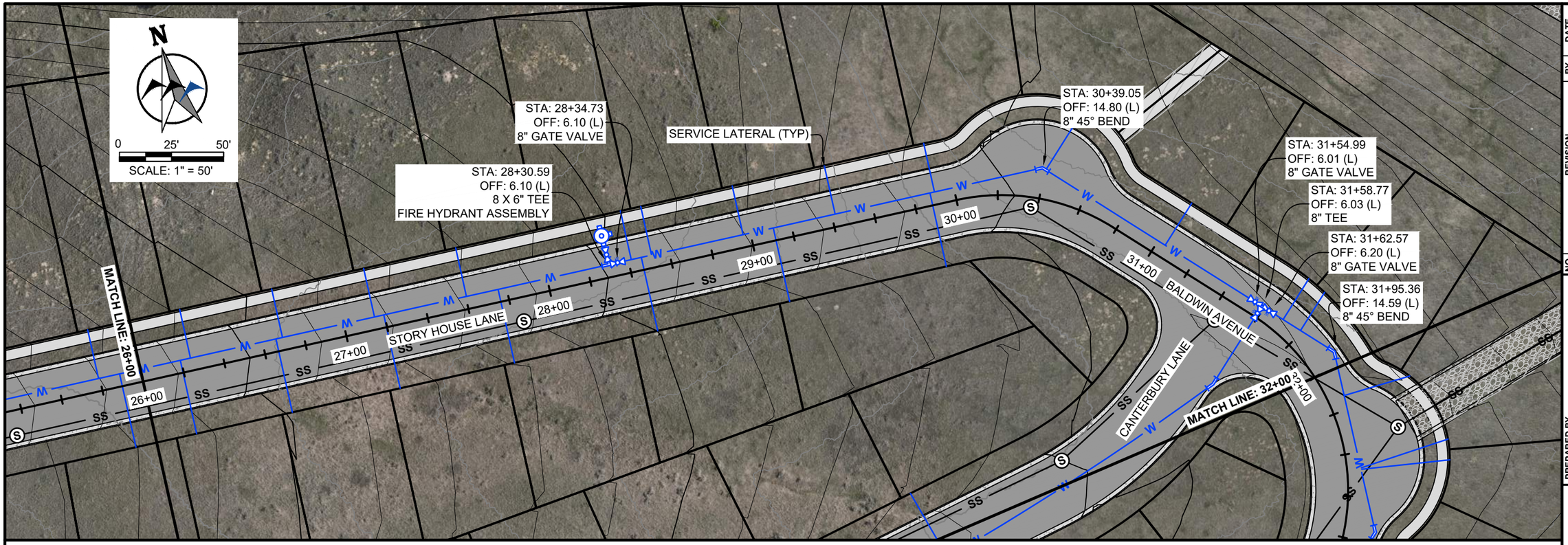
STORY HOUSE VILLAGE PUD - PHASE 1

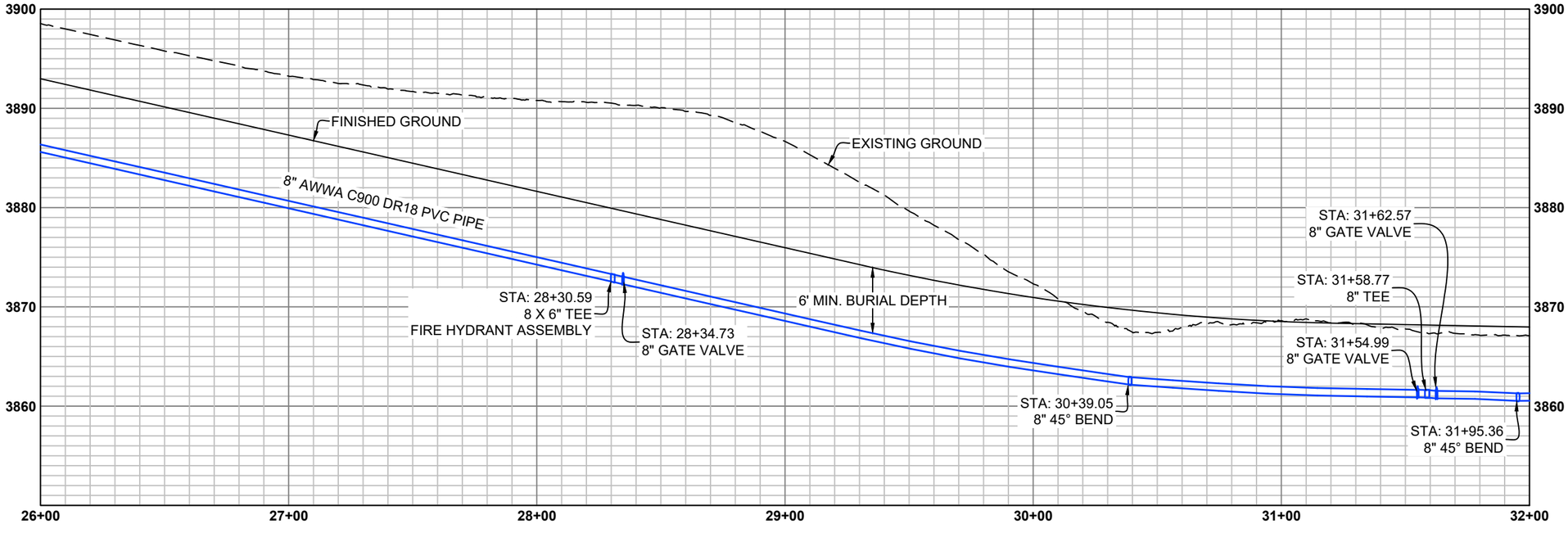
WATER PLAN AND PROFILE SHEET

SHERIDAN COUNTY, WYOMING

DESIGNED BY: SER
DRAWN BY: CIM
CHECKED BY: CDR
DATE: 02/29/2024

SHEET
39





NOTE: REFER TO THE STORY HOUSE VILLAGE PUD - PHASE 1 SPECIAL PROVISIONS FOR SPECIFIC COMPACTED FILL REQUIREMENTS WHEN INSTALLING WET UTILITIES IN AREAS REQUIRING PLACEMENT OF FILL.

DRAFT

NO.	REVISION	BY	DATE

PROJECT NO. 2023-137

PREPARED BY
WWC ENGINEERING
1849 TERRA AVE.
SHERIDAN, WY 82801
(307) 672-0761
www.wwcengineering.com

STORY HOUSE PROPERTY COMPANY, LLC

STORY HOUSE VILLAGE PUD - PHASE 1

WATER PLAN AND PROFILE SHEET

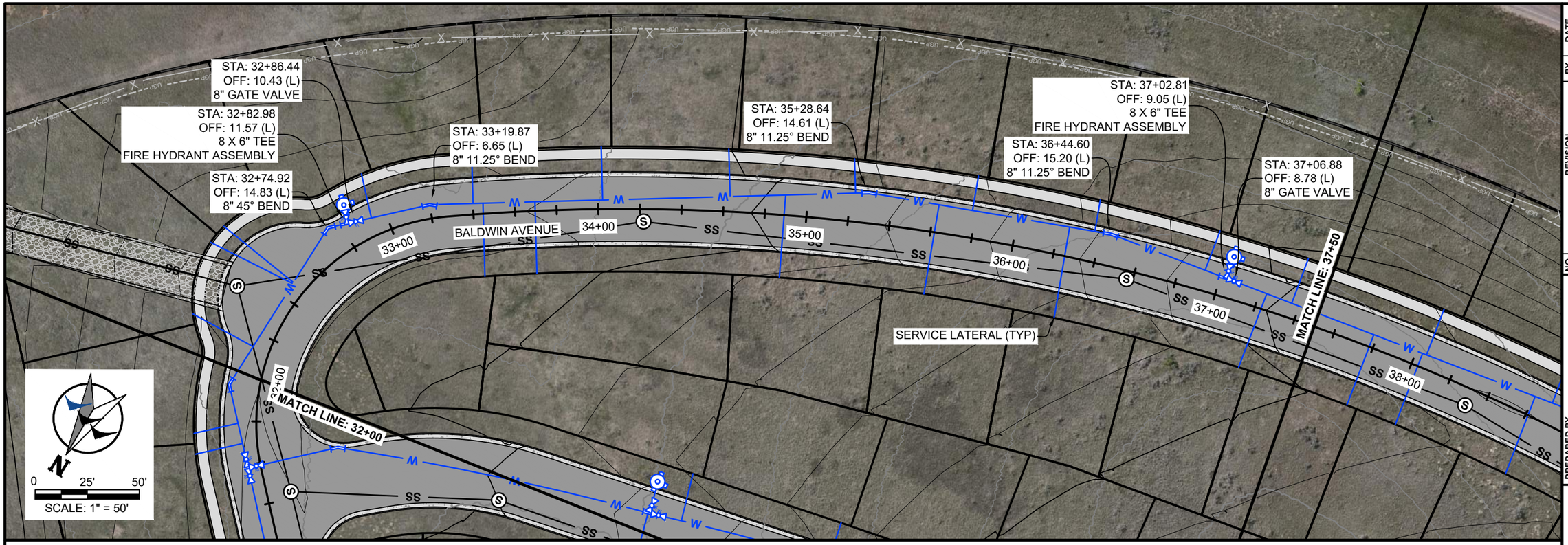
SHERIDAN COUNTY, WYOMING

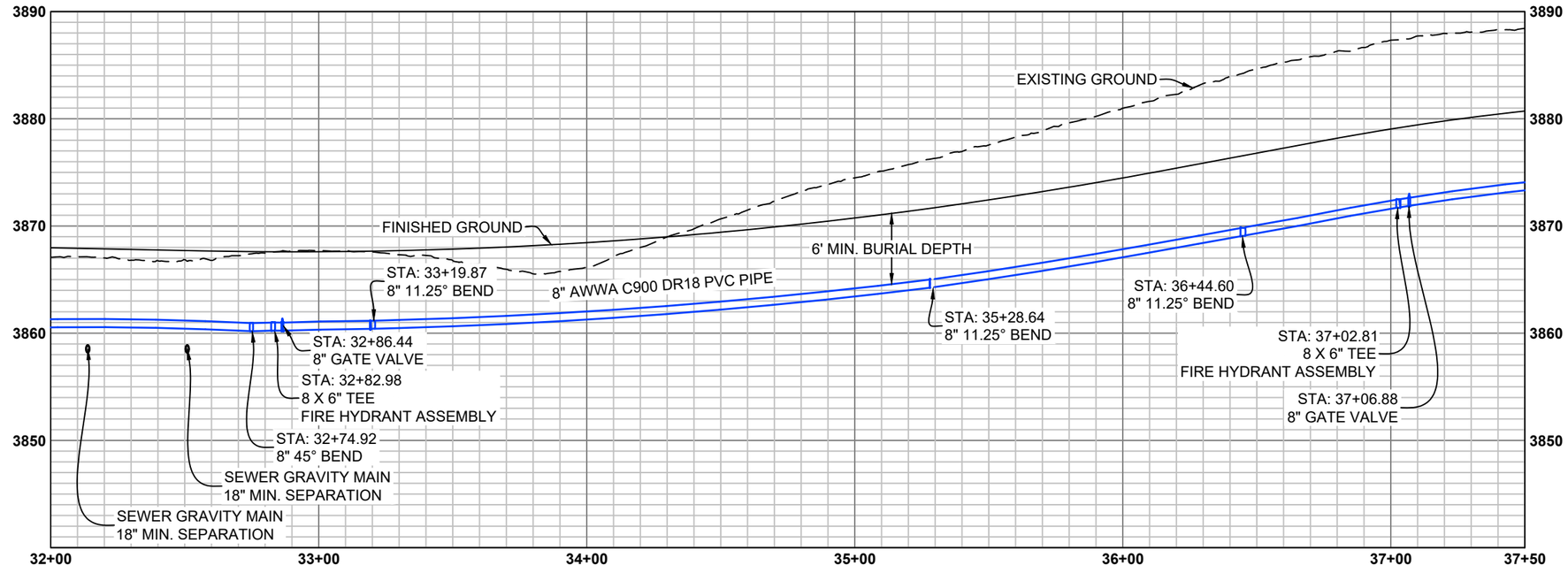
DESIGNED BY: SER
DRAWN BY: CIM
CHECKED BY: CDR
DATE: 02/29/2024

SHEET
40

k:\Sheridan\story house management\2023137 story house village\05CAD\Sheets\PLAN SET\23137_VILG_PLNST_WATER_PP.dwg WATER_PP (6) 3/1/2024 9:35:44 AM

k:\Sheridan\story house management\2023137 story house village\05CAD\Sheets\PLAN SET\23137_VILG_PLNST_WATER_PP.dwg WATER_PP (7) 3/1/2024 9:35:44 AM





NOTE: REFER TO THE STORY HOUSE VILLAGE PUD - PHASE 1 SPECIAL PROVISIONS FOR SPECIFIC COMPACTED FILL REQUIREMENTS WHEN INSTALLING WET UTILITIES IN AREAS REQUIRING PLACEMENT OF FILL.

DRAFT

NO.	REVISION	BY	DATE

PROJECT NO. 2023-137

PREPARED BY
WWC ENGINEERING
1849 TERRA AVE.
SHERIDAN, WY 82801
(307) 672-0761
www.wwcengineering.com

STORY HOUSE PROPERTY COMPANY, LLC

STORY HOUSE VILLAGE PUD - PHASE 1

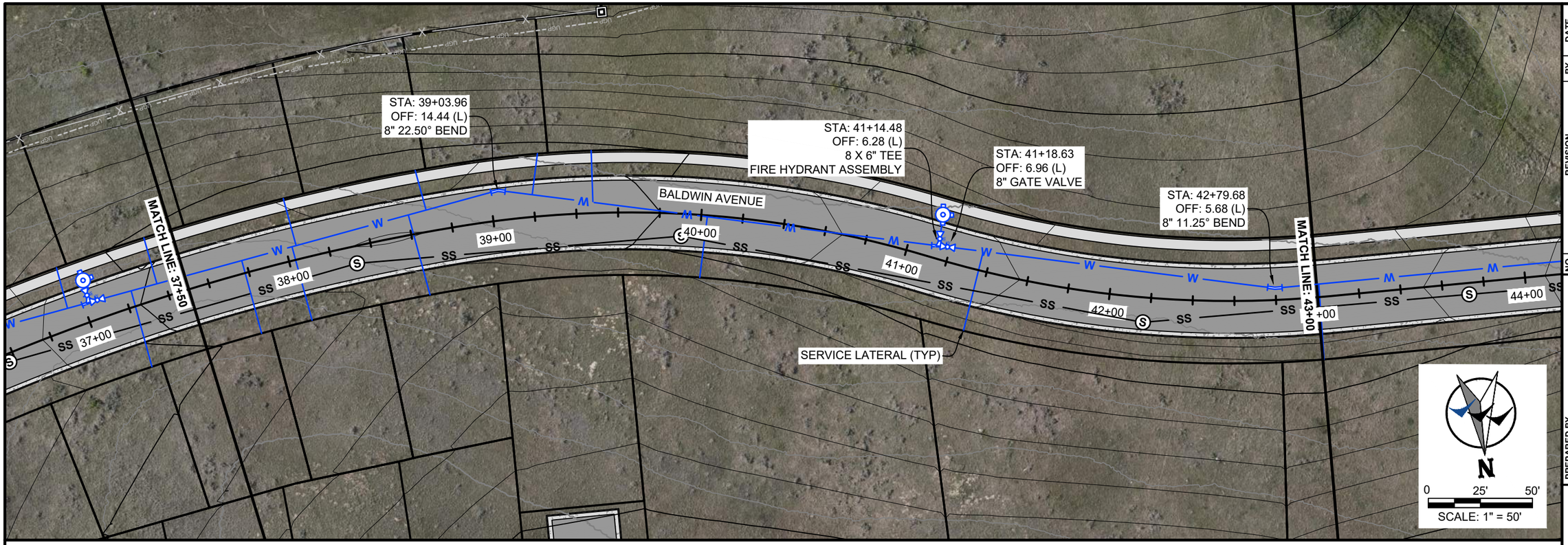
WATER PLAN AND PROFILE SHEET

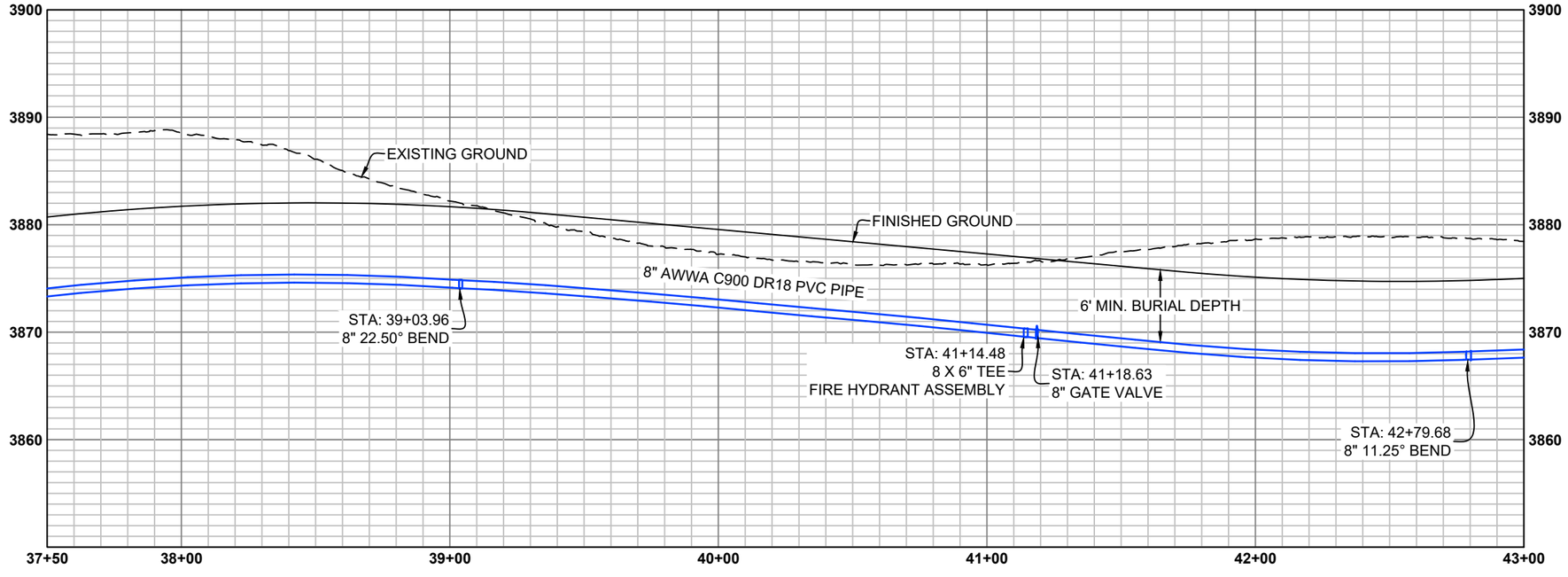
SHERIDAN COUNTY, WYOMING

DESIGNED BY: SER
DRAWN BY: CIM
CHECKED BY: CDR
DATE: 02/29/2024

SHEET
41

k:\Sheridan\story house management\2023137 story house village\05CAD\Sheets\PLAN SET\23137_VILG_PLNST_WATER_PP.dwg WATER_PP (8) 3/1/2024 9:35:44 AM





NOTE: REFER TO THE STORY HOUSE VILLAGE PUD - PHASE 1 SPECIAL PROVISIONS FOR SPECIFIC COMPACTED FILL REQUIREMENTS WHEN INSTALLING WET UTILITIES IN AREAS REQUIRING PLACEMENT OF FILL.

DRAFT

NO.	REVISION	BY	DATE

PROJECT NO. 2023-137

PREPARED BY
WWC ENGINEERING
1849 TERRA AVE.
SHERIDAN, WY 82801
(307) 672-0761
www.wwcengineering.com

STORY HOUSE PROPERTY COMPANY, LLC

STORY HOUSE VILLAGE PUD - PHASE 1

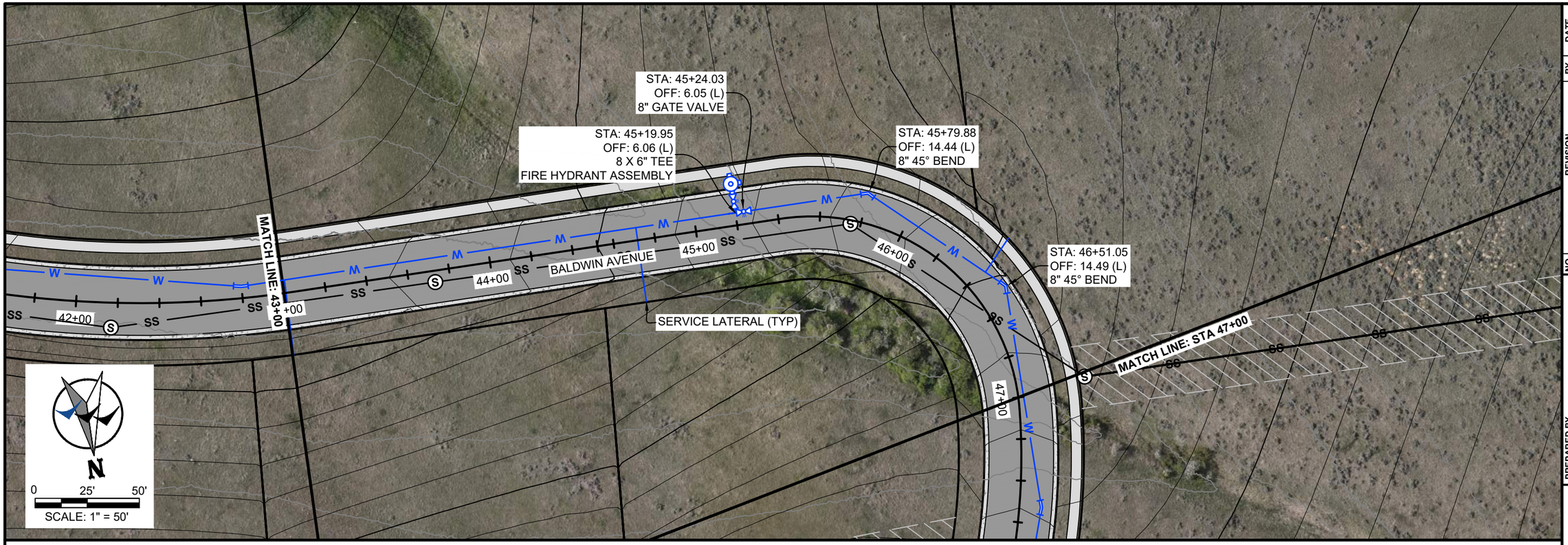
WATER PLAN AND PROFILE SHEET

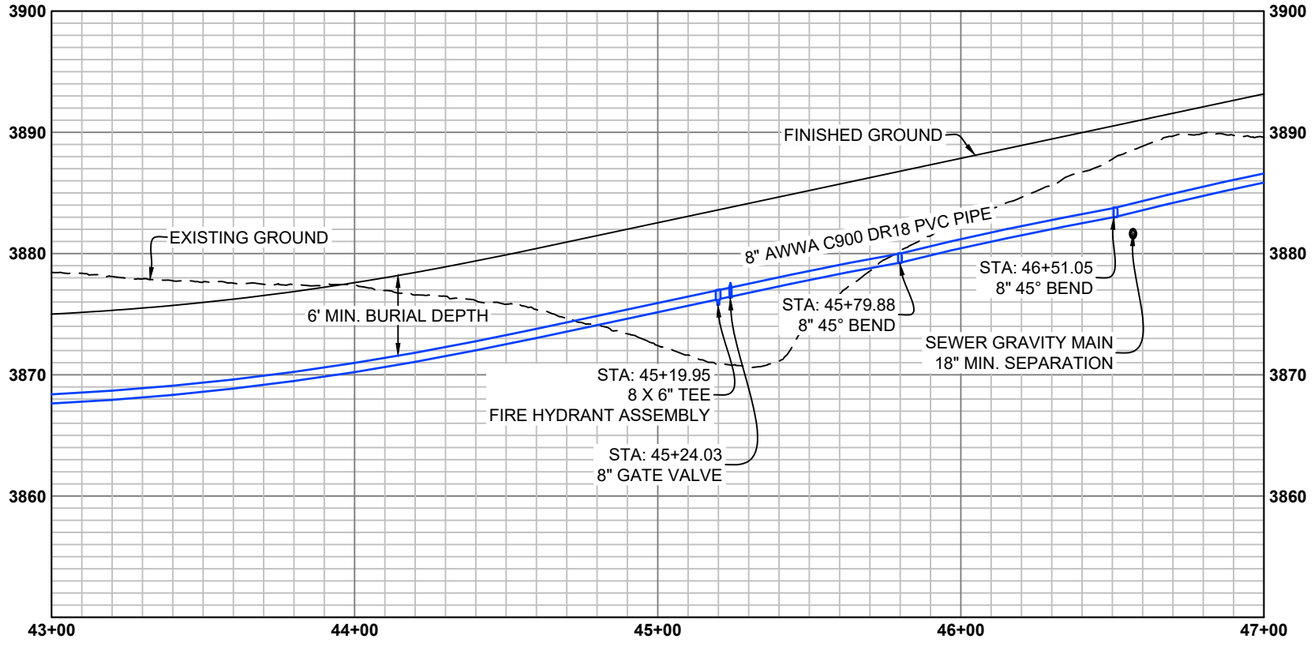
SHERIDAN COUNTY, WYOMING

DESIGNED BY: SER
DRAWN BY: CIM
CHECKED BY: CDR
DATE: 02/29/2024

SHEET
42

k:\Sheridan\story house management\2023137 story house village\05CAD\Sheets\PLAN SET\23137_VILG_PLNST_WATER_PP.dwg WATER_PP (9) 3/1/2024 9:35:44 AM





NOTE: REFER TO THE STORY HOUSE VILLAGE PUD - PHASE 1 SPECIAL PROVISIONS FOR SPECIFIC COMPACTED FILL REQUIREMENTS WHEN INSTALLING WET UTILITIES IN AREAS REQUIRING PLACEMENT OF FILL.

DRAFT

NO.	REVISION	BY	DATE

PROJECT NO. 2023-137

PREPARED BY
WWC ENGINEERING
1849 TERRA AVE.
SHERIDAN, WY 82801
(307) 672-0761
www.wwcengineering.com

STORY HOUSE PROPERTY COMPANY, LLC

STORY HOUSE VILLAGE PUD - PHASE 1

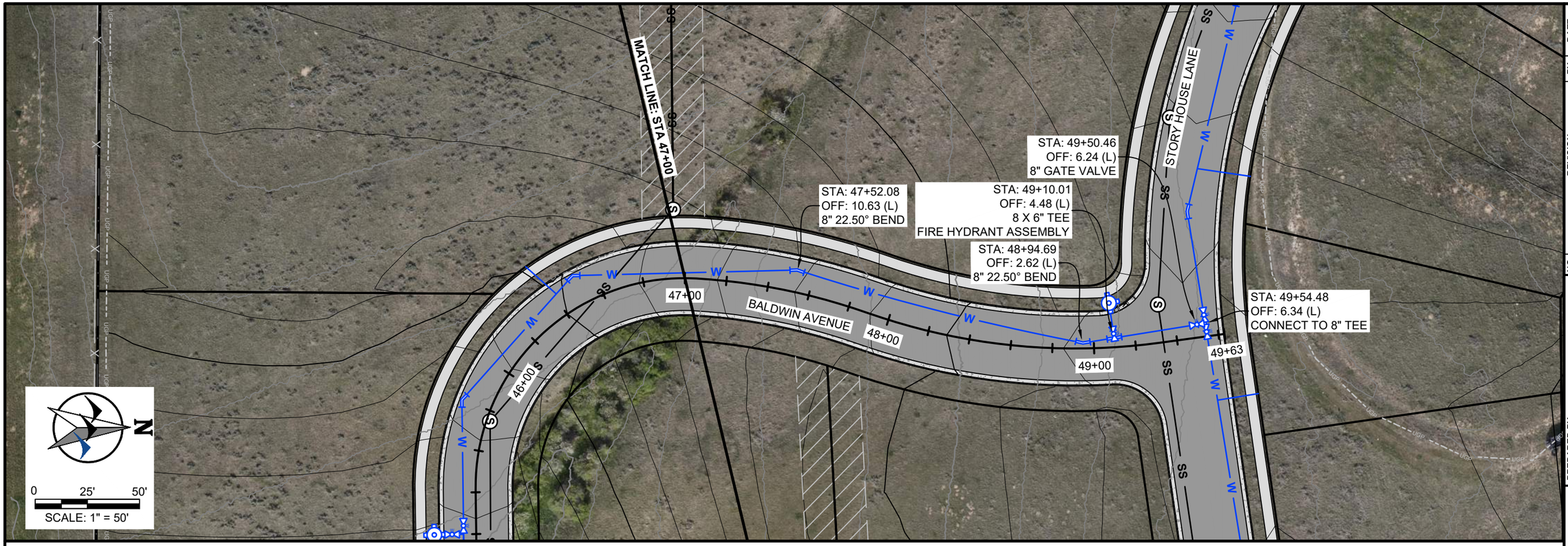
WATER PLAN AND PROFILE SHEET

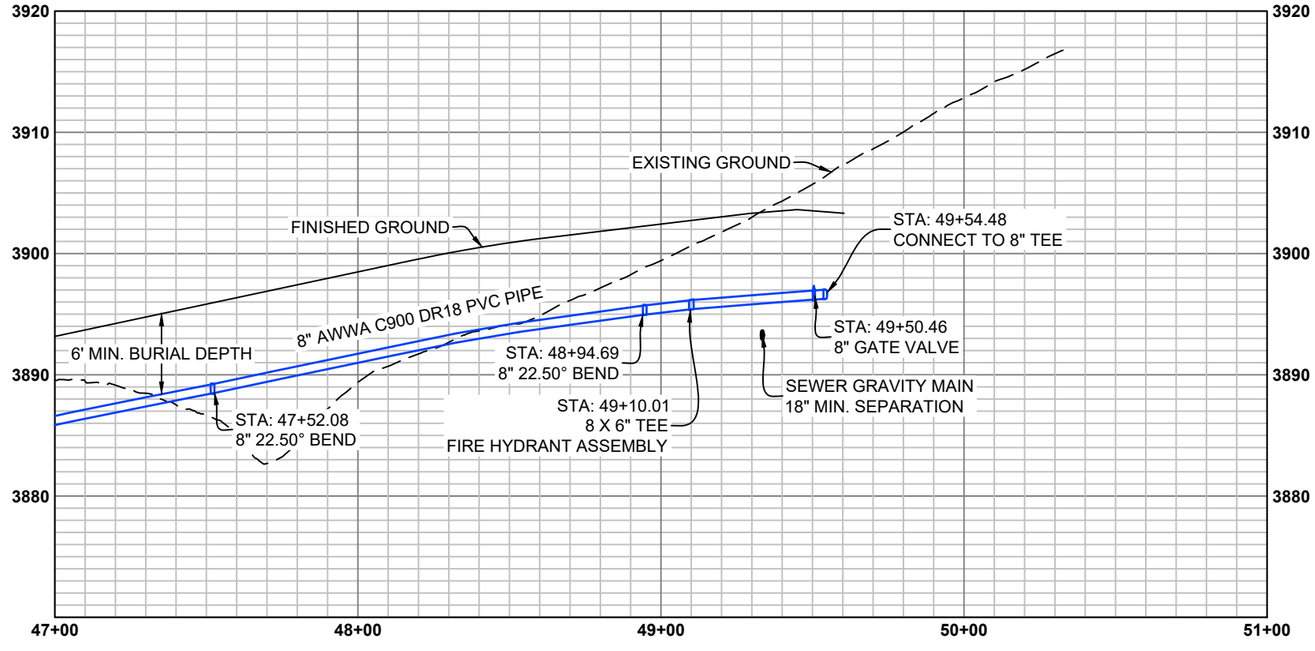
SHERIDAN COUNTY, WYOMING

DESIGNED BY: SER
DRAWN BY: CIM
CHECKED BY: CDR
DATE: 02/29/2024

SHEET
43

k:\Sheridan\story house management\20231137 story house village\05CAD\Sheets\PLAN SET\231137_VILG_PLNST_WATER_PP.dwg WATER_PP (10) 3/1/2024 9:35:44 AM





NOTE: REFER TO THE STORY HOUSE VILLAGE PUD - PHASE 1 SPECIAL PROVISIONS FOR SPECIFIC COMPACTED FILL REQUIREMENTS WHEN INSTALLING WET UTILITIES IN AREAS REQUIRING PLACEMENT OF FILL.

DRAFT

NO.	REVISION	BY	DATE

PROJECT NO. 2023-137

PREPARED BY
WWC ENGINEERING
1849 TERRA AVE.
SHERIDAN, WY 82801
(307) 672-0761
www.wwcengineering.com

STORY HOUSE PROPERTY COMPANY, LLC

STORY HOUSE VILLAGE PUD - PHASE 1

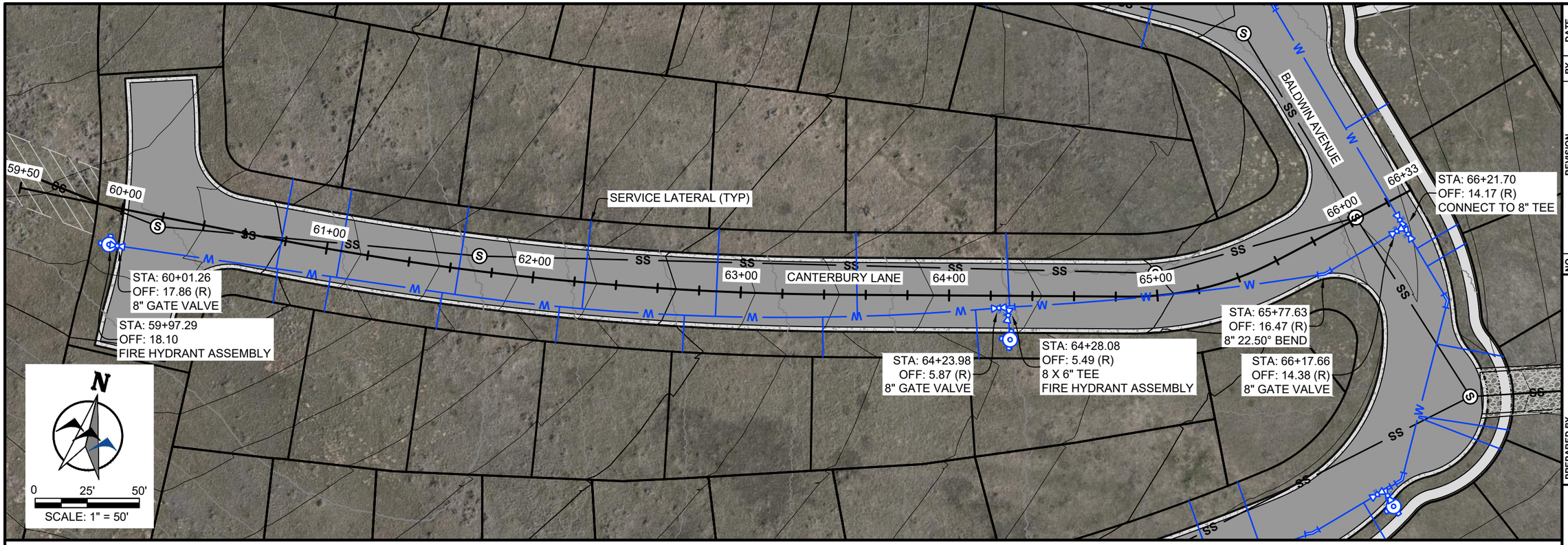
WATER PLAN AND PROFILE SHEET

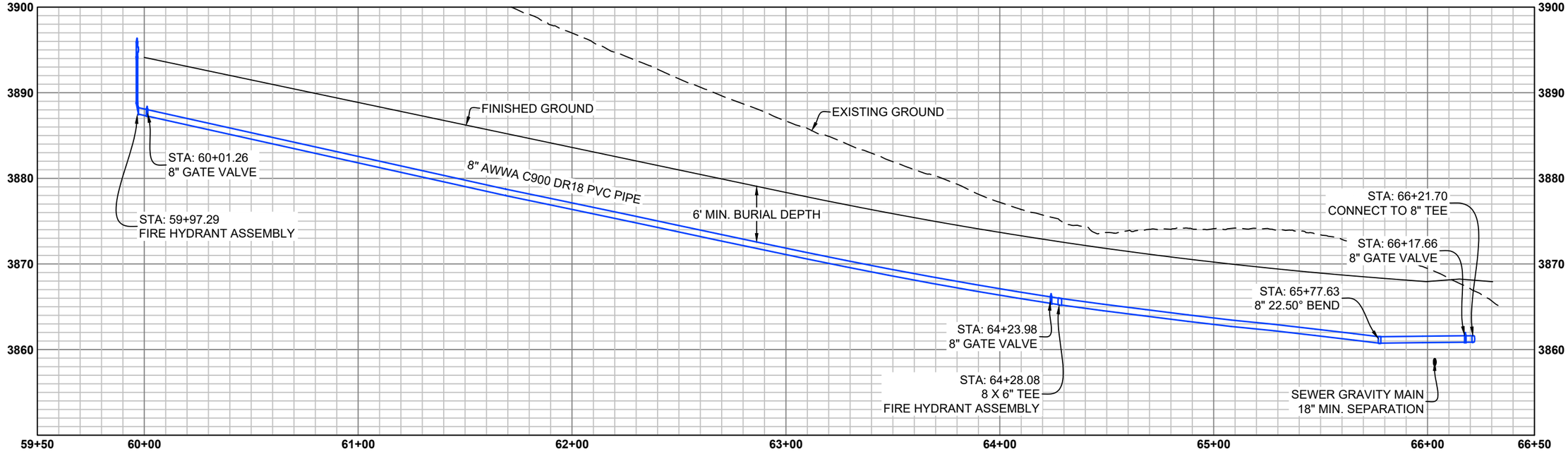
SHERIDAN COUNTY, WYOMING

DESIGNED BY: SER
DRAWN BY: CIM
CHECKED BY: CDR
DATE: 02/29/2024

SHEET
44

k:\Sheridan\story house management\20223137 story house village\05CAD\Sheets\PLAN SET\23137_VILG_PLNST_WATER_PP.dwg WATER_PP (11) 3/1/2024 9:35:44 AM





NOTE: REFER TO THE STORY HOUSE VILLAGE PUD - PHASE 1 SPECIAL PROVISIONS FOR SPECIFIC COMPACTED FILL REQUIREMENTS WHEN INSTALLING WET UTILITIES IN AREAS REQUIRING PLACEMENT OF FILL.

DRAFT

NO.	REVISION	BY	DATE

PROJECT NO. 2023-137

PREPARED BY
WWC ENGINEERING
1849 TERRA AVE.
SHERIDAN, WY 82801
(307) 672-0761
www.wwcengineering.com

STORY HOUSE PROPERTY COMPANY, LLC

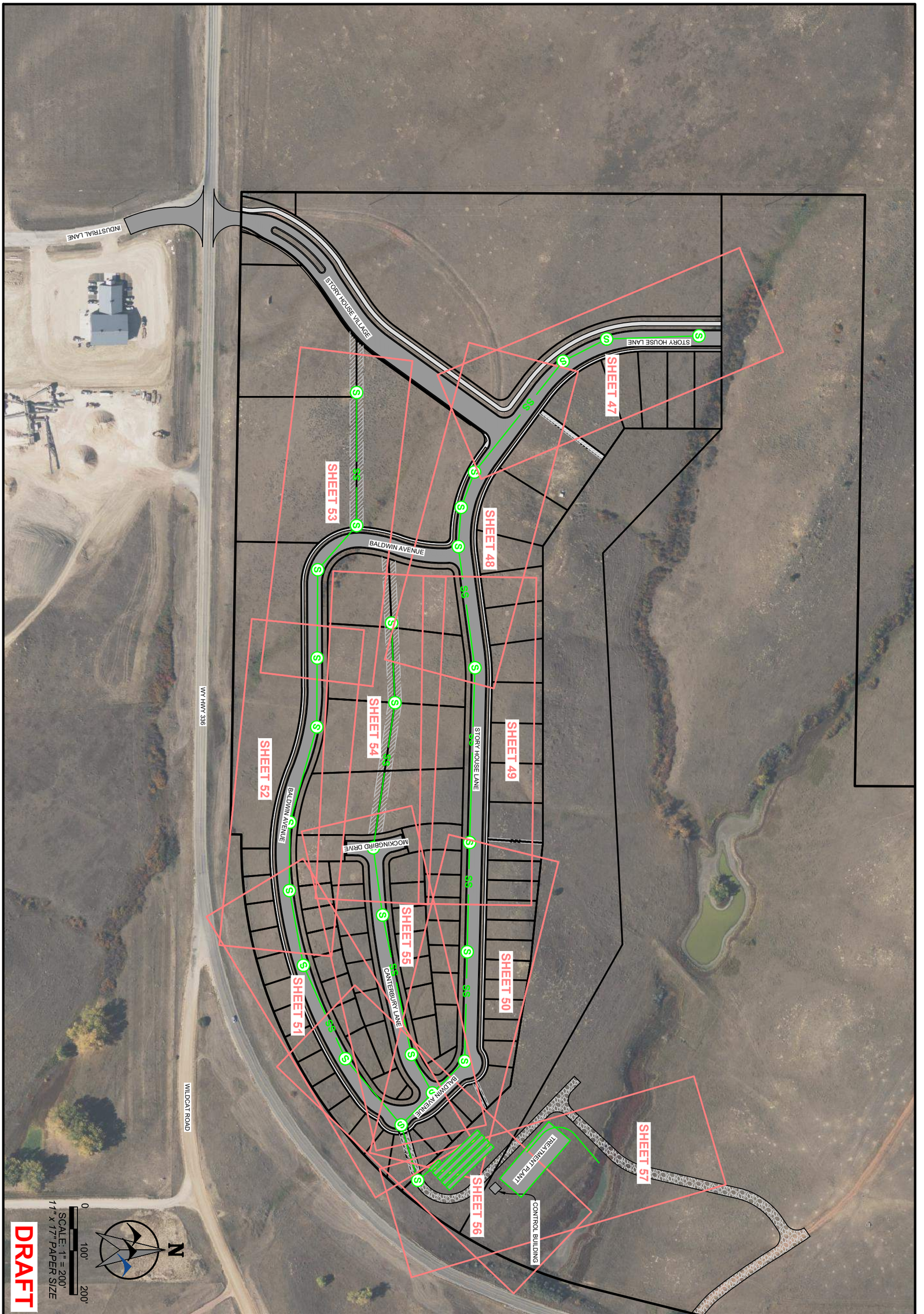
STORY HOUSE VILLAGE PUD - PHASE 1

WATER PLAN AND PROFILE SHEET

SHERIDAN COUNTY, WYOMING

DESIGNED BY: SER
DRAWN BY: CIM
CHECKED BY: CDR
DATE: 02/29/2024

SHEET
45



STORY HOUSE PROPERTY COMPANY, LLC

STORY HOUSE VILLAGE PUD - PHASE 1

GRAVITY SEWER KEY SHEET

SHERIDAN COUNTY, WYOMING

DESIGNED BY: SER
DRAWN BY: CJM
CHECKED BY: CDR
DATE: 02/29/2024

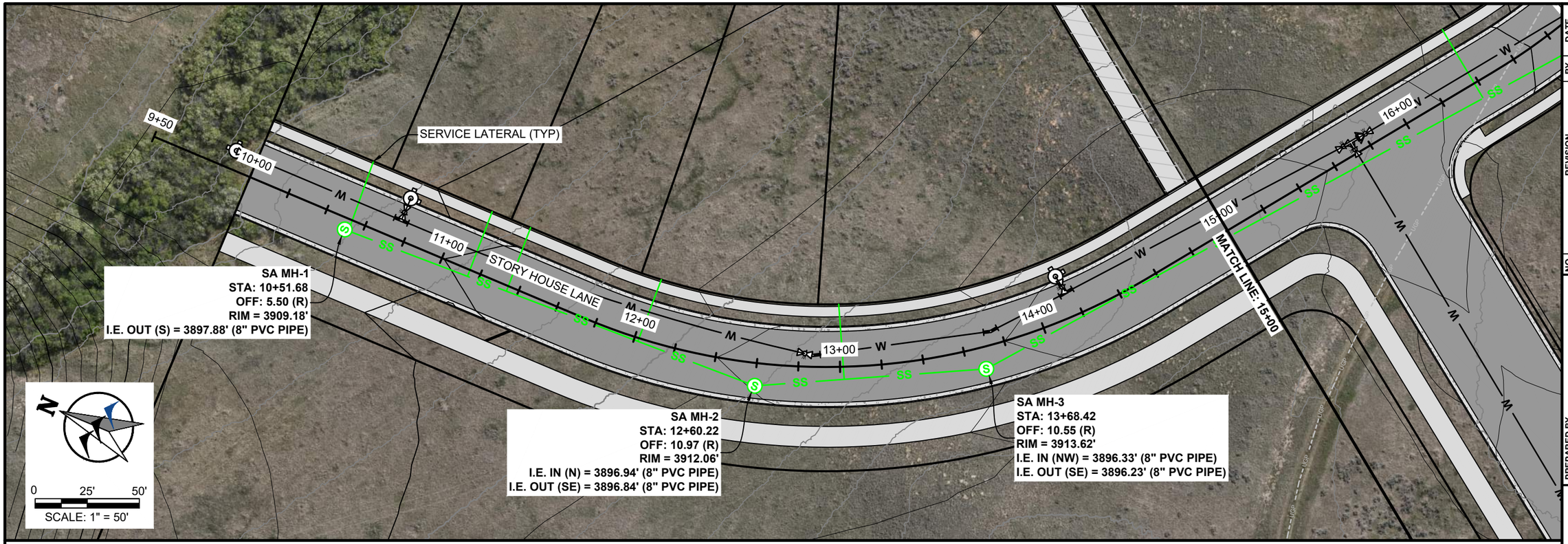
SHEET 46

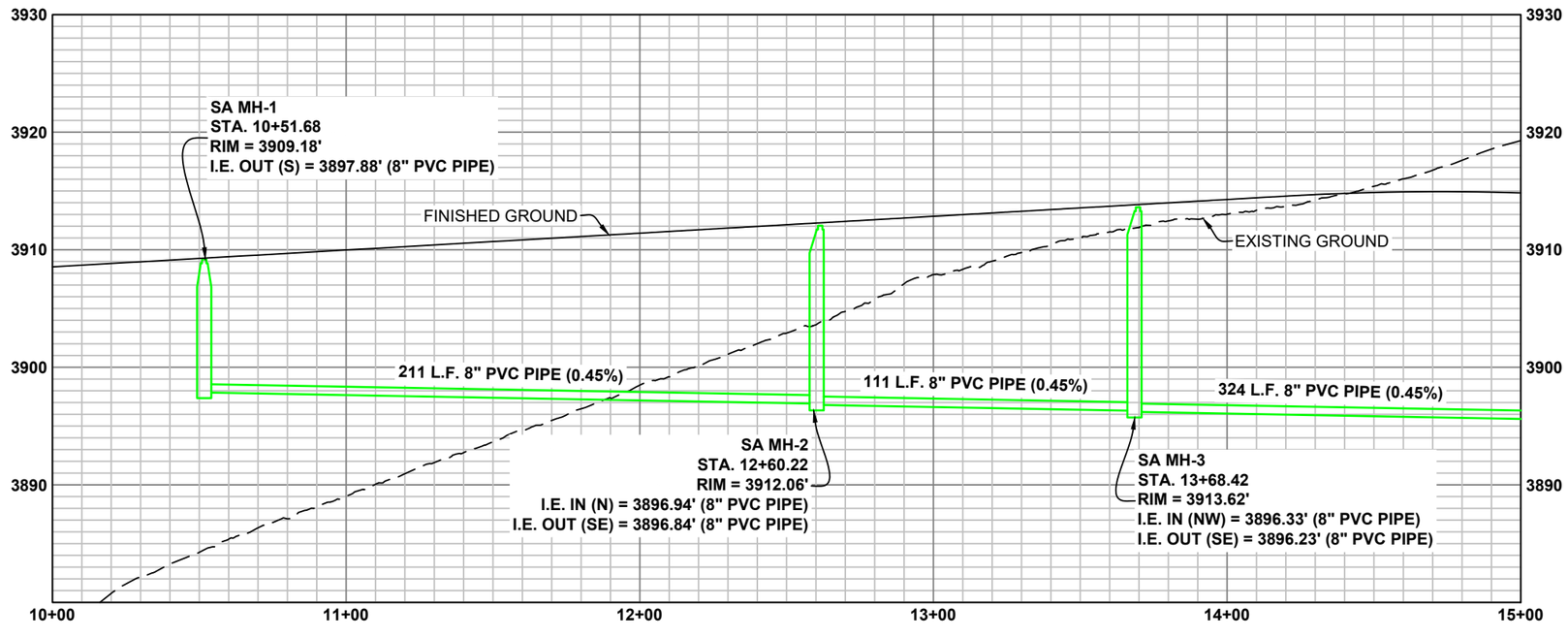
PREPARED BY
WWC ENGINEERING
1849 TERRA AVE.
SHERIDAN, WY 82801
(307) 672-0761
www.wwcengineering.com

NO.	REVISION	BY	DATE

PROJECT NO. 2023-137

K:\Sheridan\story house management\2023137 story house village\05CAD\Sheets\PLAN SET\23137_VILG_PLNST_SSWR_PP.dwg SSWR_PP (3) 3/1/2024 11:25:50 AM





DRAFT

NO.	REVISION	BY	DATE

PROJECT NO. 2023-137

PREPARED BY
WWC ENGINEERING
1849 TERRA AVE.
SHERIDAN, WY 82801
(307) 672-0761
www.wwcengineering.com

STORY HOUSE PROPERTY COMPANY, LLC

STORY HOUSE VILLAGE PUD - PHASE 1

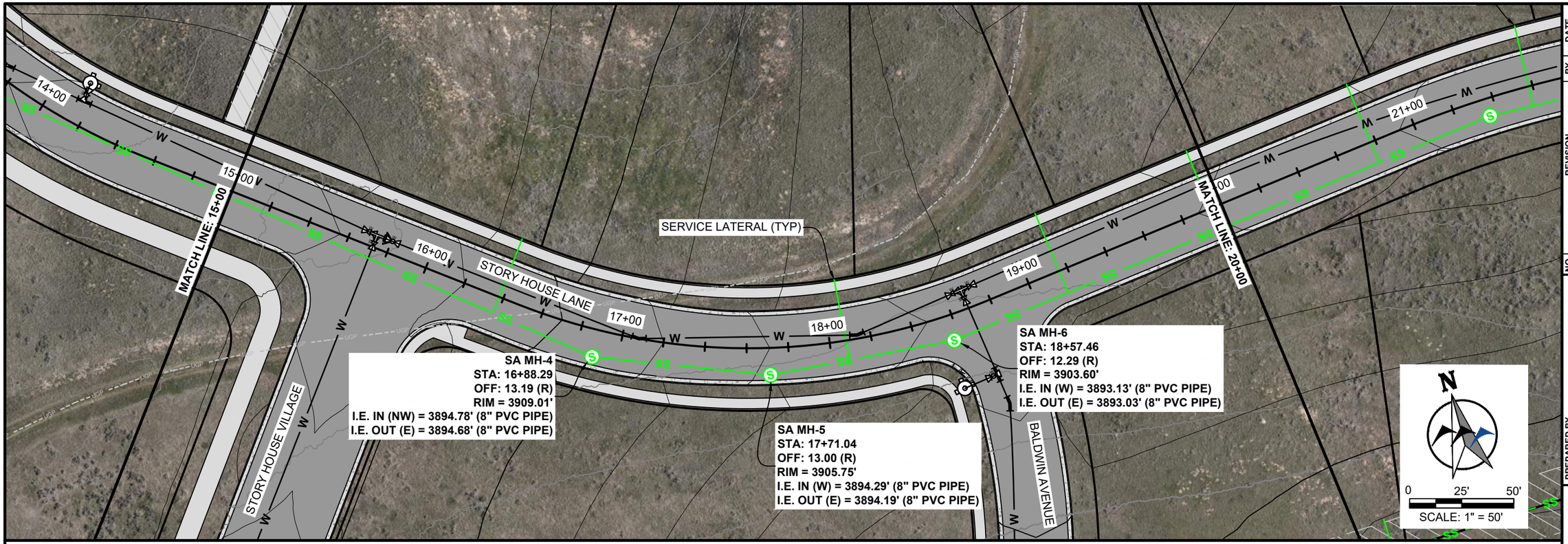
GRAVITY SEWER PLAN AND PROFILE SHEET

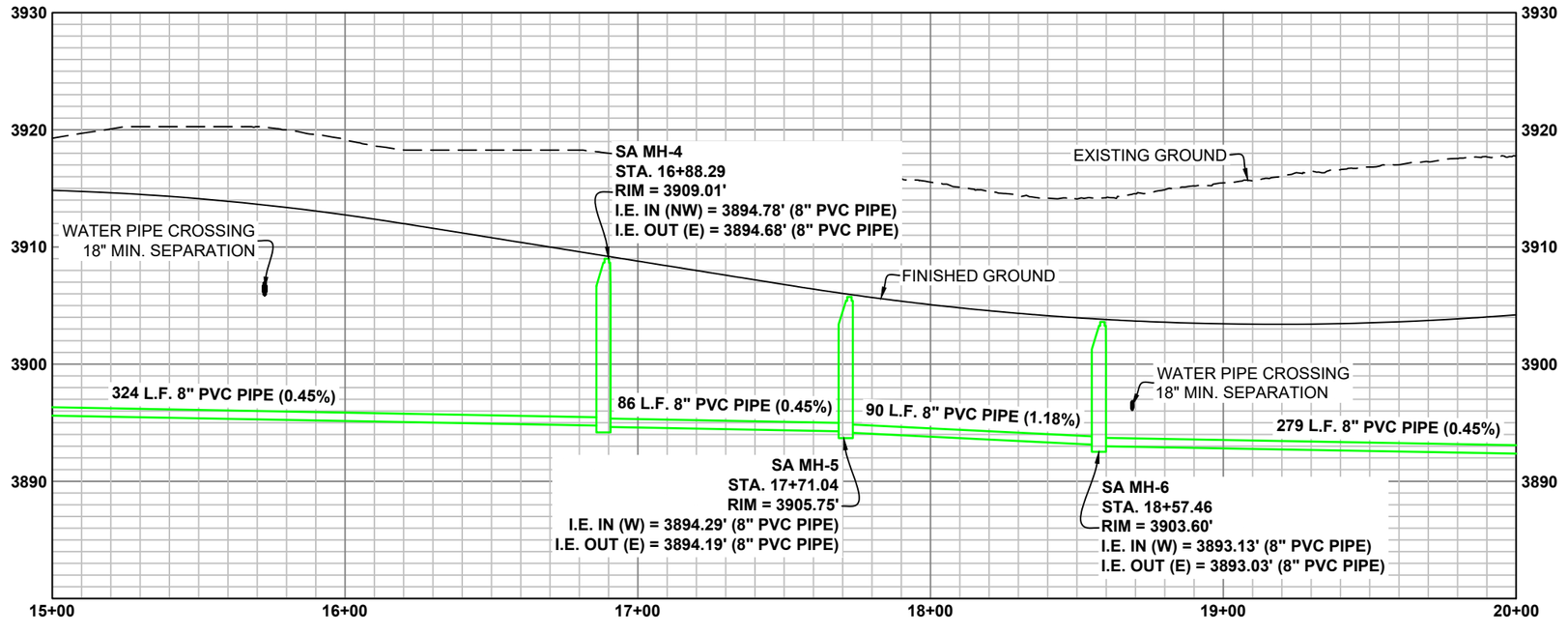
SHERIDAN COUNTY, WYOMING

DESIGNED BY: SER
DRAWN BY: CIM
CHECKED BY: CDR
DATE: 02/29/2024

SHEET
47

K:\Sheridan\story house management\2023137 story house village\05CAD\Sheets\PLAN SET\23137_VILG_PLNST_SSWR_PP.dwg SSWR_PP (4) 3/1/2024 11:25:50 AM





DRAFT

NO.	REVISION	BY	DATE

PROJECT NO. 2023-137

PREPARED BY
WWC ENGINEERING
1849 TERRA AVE.
SHERIDAN, WY 82801
(307) 672-0761
www.wwcengineering.com

STORY HOUSE PROPERTY COMPANY, LLC

STORY HOUSE VILLAGE PUD - PHASE 1

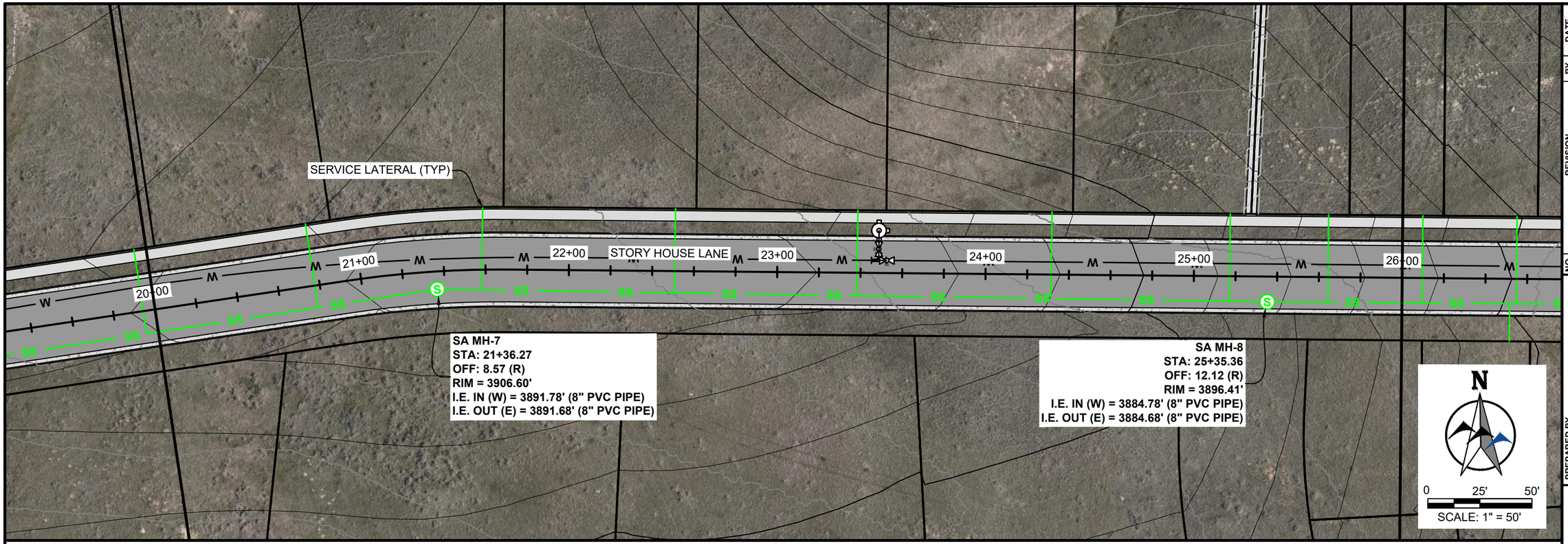
GRAVITY SEWER PLAN AND PROFILE SHEET

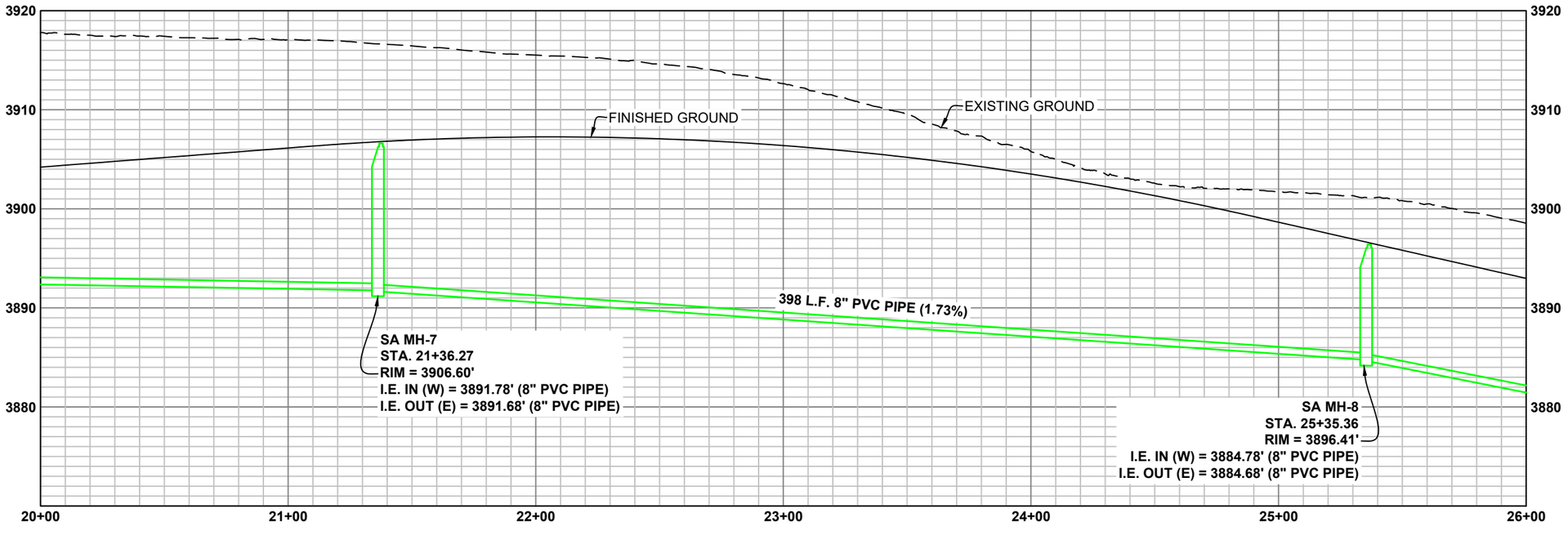
SHERIDAN COUNTY, WYOMING

DESIGNED BY: SER
DRAWN BY: CIM
CHECKED BY: CDR
DATE: 02/29/2024

SHEET
48

k:\Sheridan\story house management\2023137 story house village\05CAD\Sheets\PLAN SET\23137_VILG_PLNST_SSWR_PP.dwg SSWR_PP (5) 3/1/2024 11:25:50 AM





DRAFT

NO.	REVISION	BY	DATE

PROJECT NO. 2023-137

PREPARED BY
WWC ENGINEERING
1849 TERRA AVE.
SHERIDAN, WY 82801
(307) 672-0761
www.wwcengineering.com

STORY HOUSE PROPERTY COMPANY, LLC

STORY HOUSE VILLAGE PUD - PHASE 1

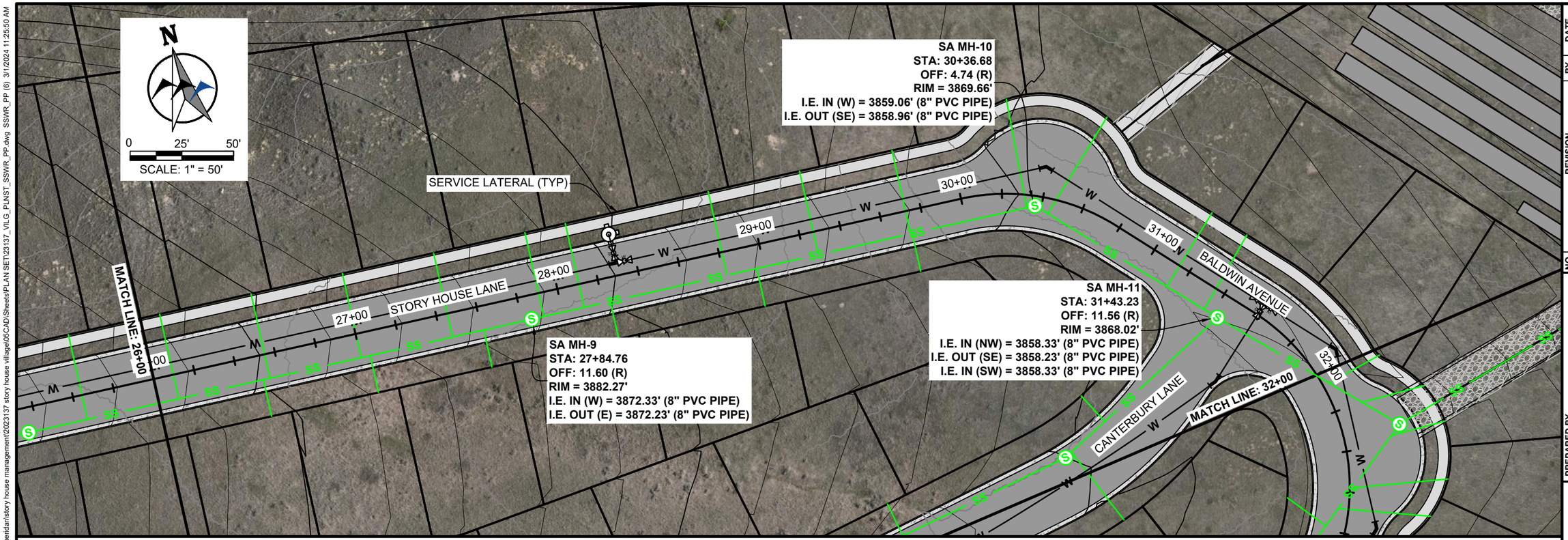
GRAVITY SEWER PLAN AND PROFILE SHEET

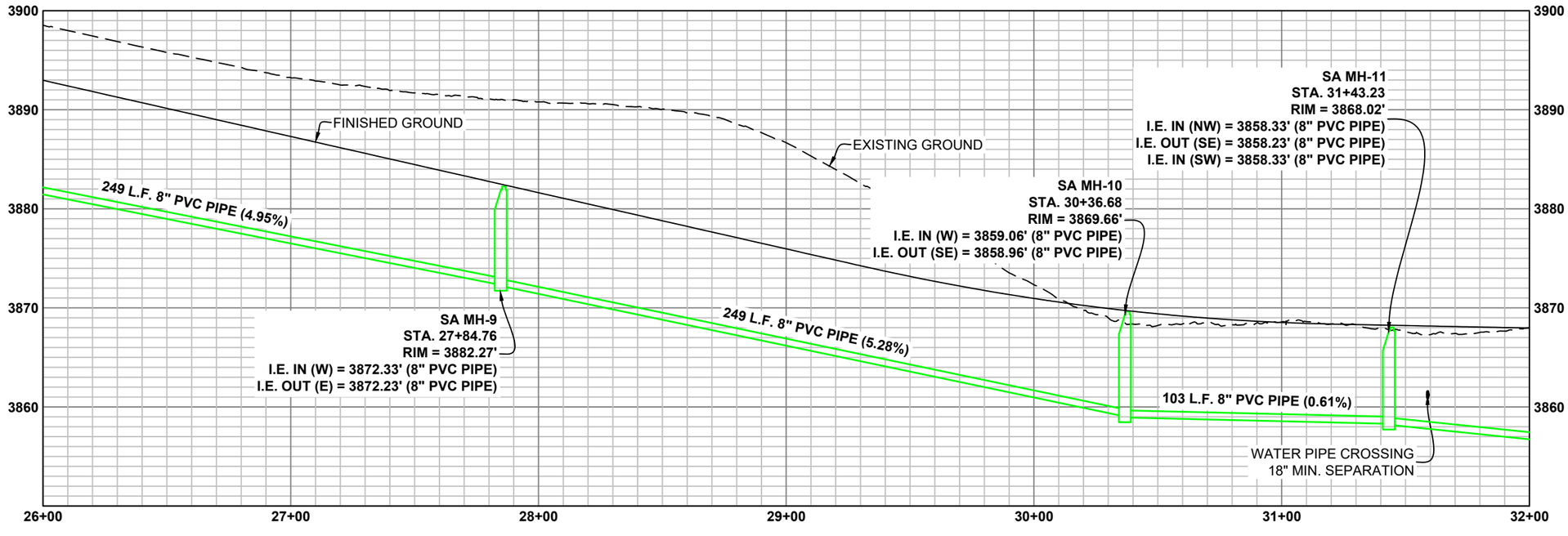
SHERIDAN COUNTY, WYOMING

DESIGNED BY: SER
DRAWN BY: CIM
CHECKED BY: CDR
DATE: 02/29/2024

SHEET
49

k:\Sheridan\story house management\2023137 story house village\05CAD\Sheets\PLAN SET\23137_VILG_PLNST_SSWR_PP.dwg SSWR_PP (6) 3/1/2024 11:25:50 AM





DRAFT

NO.	REVISION	BY	DATE

PROJECT NO. 2023-137

PREPARED BY
WWC ENGINEERING
1849 TERRA AVE.
SHERIDAN, WY 82801
(307) 672-0761
www.wwcengineering.com

STORY HOUSE PROPERTY COMPANY, LLC

STORY HOUSE VILLAGE PUD - PHASE 1

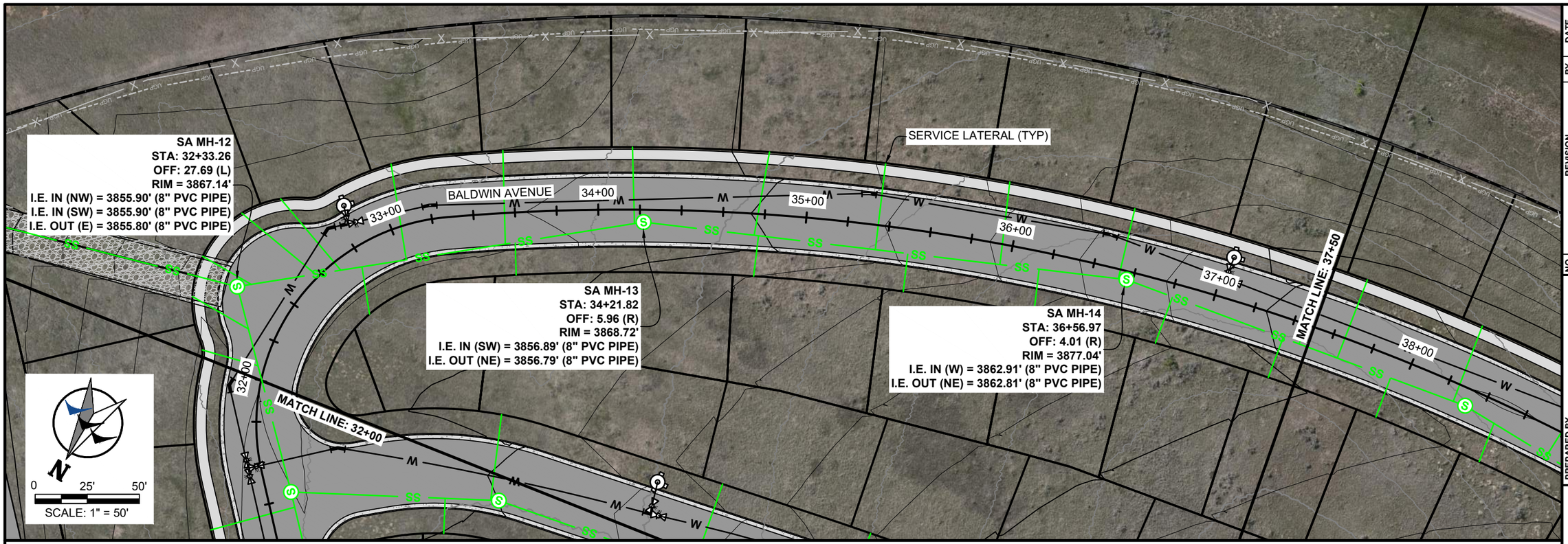
GRAVITY SEWER PLAN AND PROFILE SHEET

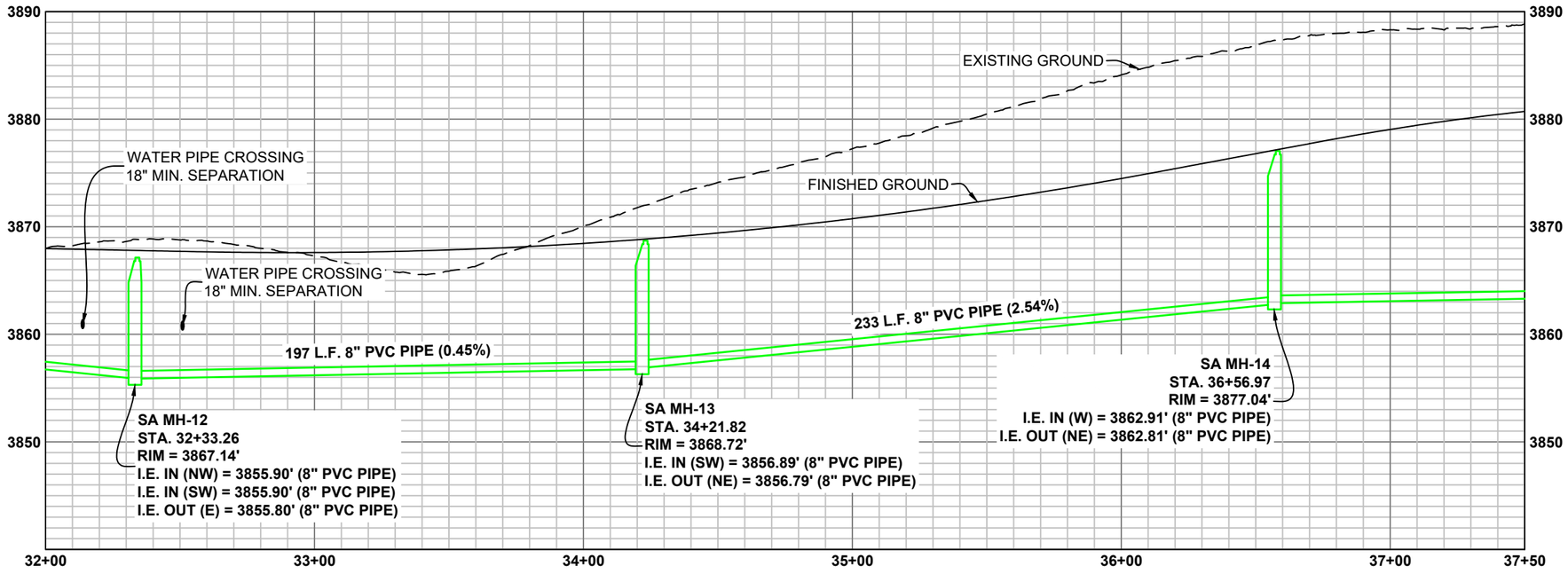
SHERIDAN COUNTY, WYOMING

DESIGNED BY: SER
DRAWN BY: CIM
CHECKED BY: CDR
DATE: 02/29/2024

SHEET
50

k:\Sheridan\story house management\2023137 story house village\05CAD\Sheets\PLAN SET\23137_VILG_PLNST_SSWR_PP.dwg SSWR_PP (7) 3/1/2024 11:25:50 AM





DRAFT

NO.	REVISION	BY	DATE

PROJECT NO. 2023-137

PREPARED BY
WWC ENGINEERING
1849 TERRA AVE.
SHERIDAN, WY 82801
(307) 672-0761
www.wwcengineering.com

STORY HOUSE PROPERTY COMPANY, LLC

STORY HOUSE VILLAGE PUD - PHASE 1

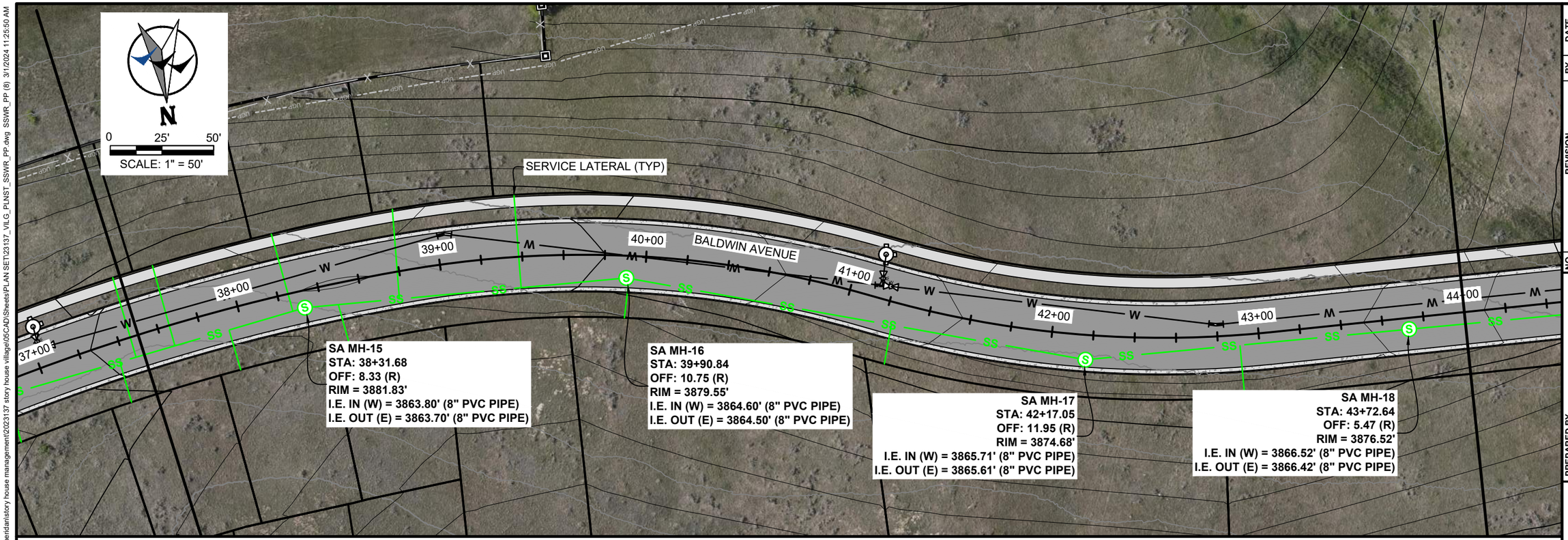
GRAVITY SEWER PLAN AND PROFILE SHEET

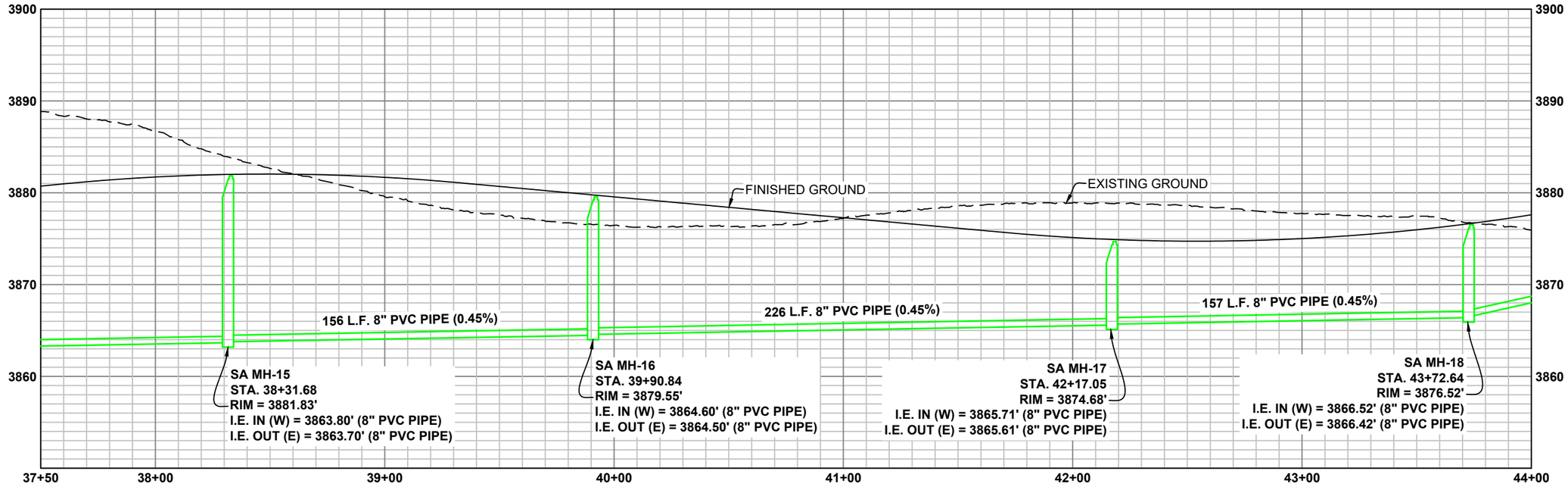
SHERIDAN COUNTY, WYOMING

DESIGNED BY: SER
DRAWN BY: CIM
CHECKED BY: CDR
DATE: 02/29/2024

SHEET
51

k:\Sheridan\story house management\2023\137 story house village\05CAD\Sheets\PLAN SET\23137_VILG_PLNST_SSWR_PP.dwg SSWR_PP (8) 3/1/2024 11:25:50 AM





DRAFT

NO.	REVISION	BY	DATE

PROJECT NO. 2023-137

PREPARED BY
WWC ENGINEERING
1849 TERRA AVE.
SHERIDAN, WY 82801
(307) 672-0761
www.wwcengineering.com

STORY HOUSE PROPERTY COMPANY, LLC

STORY HOUSE VILLAGE PUD - PHASE 1

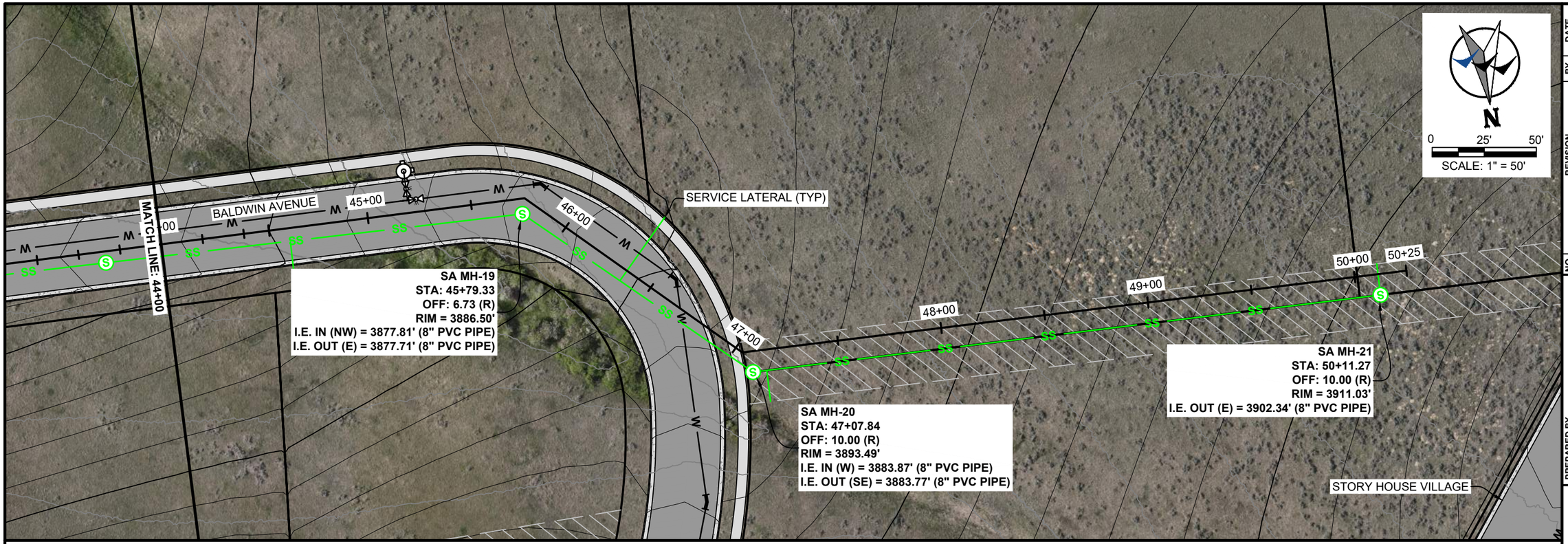
GRAVITY SEWER PLAN AND PROFILE SHEET

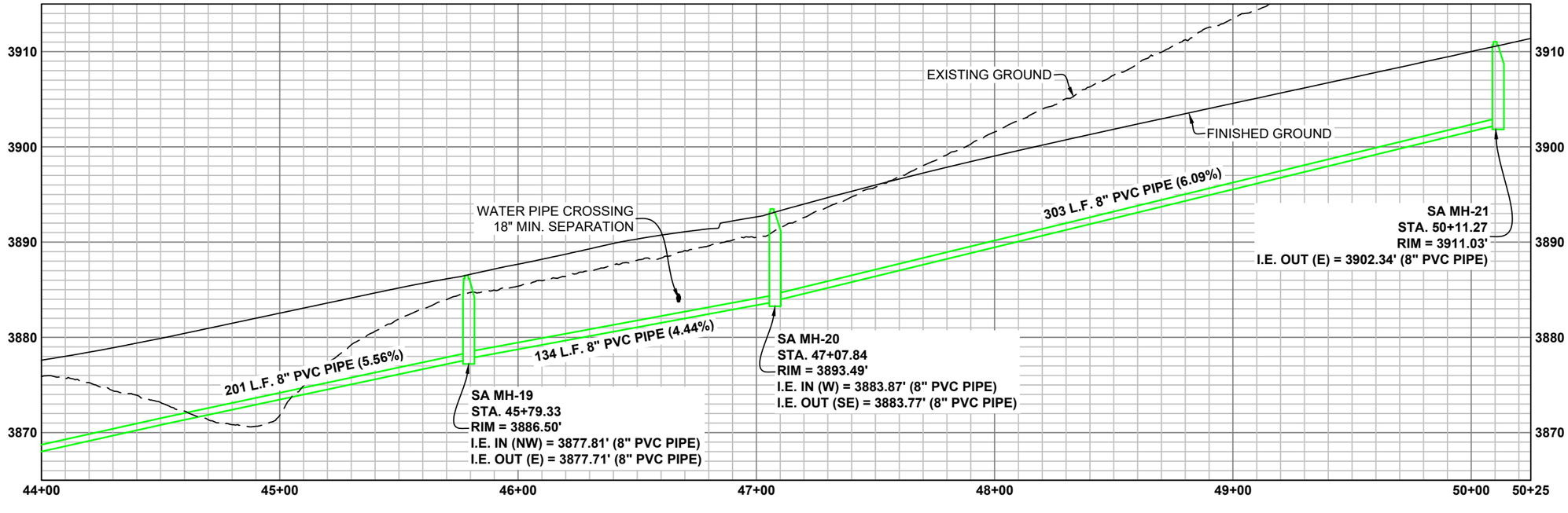
SHERIDAN COUNTY, WYOMING

DESIGNED BY: SER
DRAWN BY: CIM
CHECKED BY: CDR
DATE: 02/29/2024

SHEET
52

K:\Sheridan\story house management\2023137 story house village\05CAD\Sheets\PLAN SET\23137_VILG_PLNST_SSWR_PP.dwg SSWR_PP (9) 3/1/2024 11:25:50 AM





DRAFT

NO.	REVISION	BY	DATE

PROJECT NO. 2023-137

PREPARED BY
WWC ENGINEERING
1849 TERRA AVE.
SHERIDAN, WY 82801
(307) 672-0761
www.wwcengineering.com

STORY HOUSE PROPERTY COMPANY, LLC

STORY HOUSE VILLAGE PUD - PHASE 1

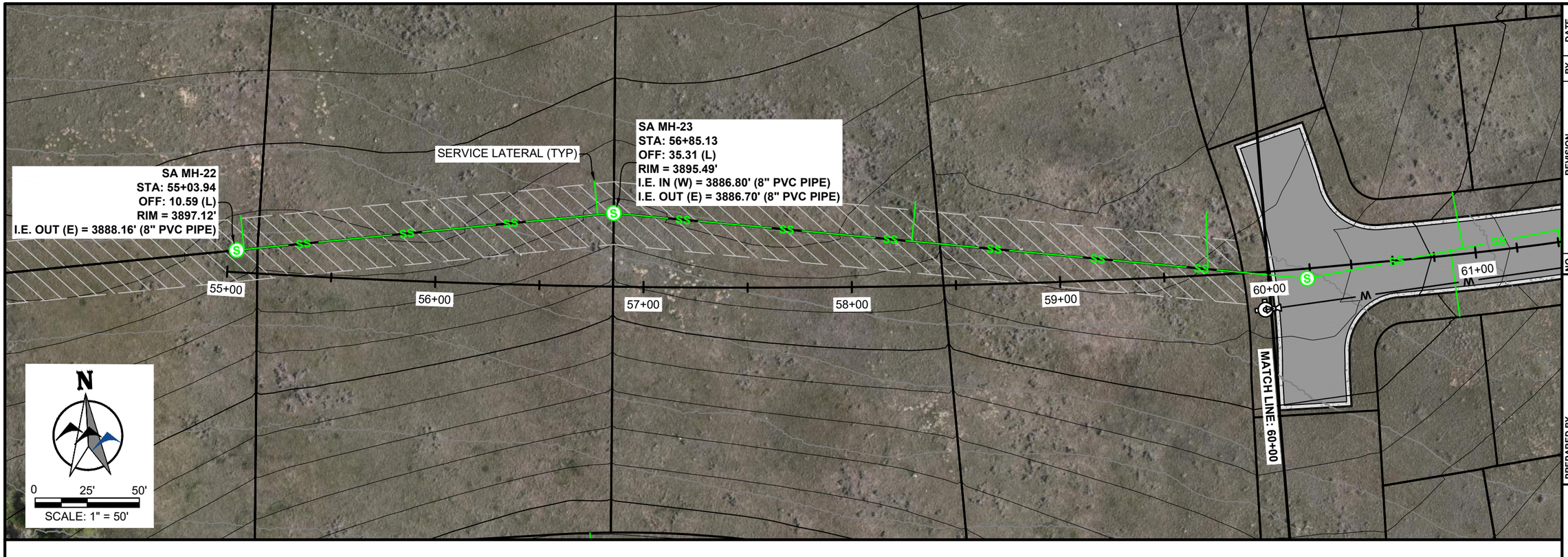
GRAVITY SEWER PLAN AND PROFILE SHEET

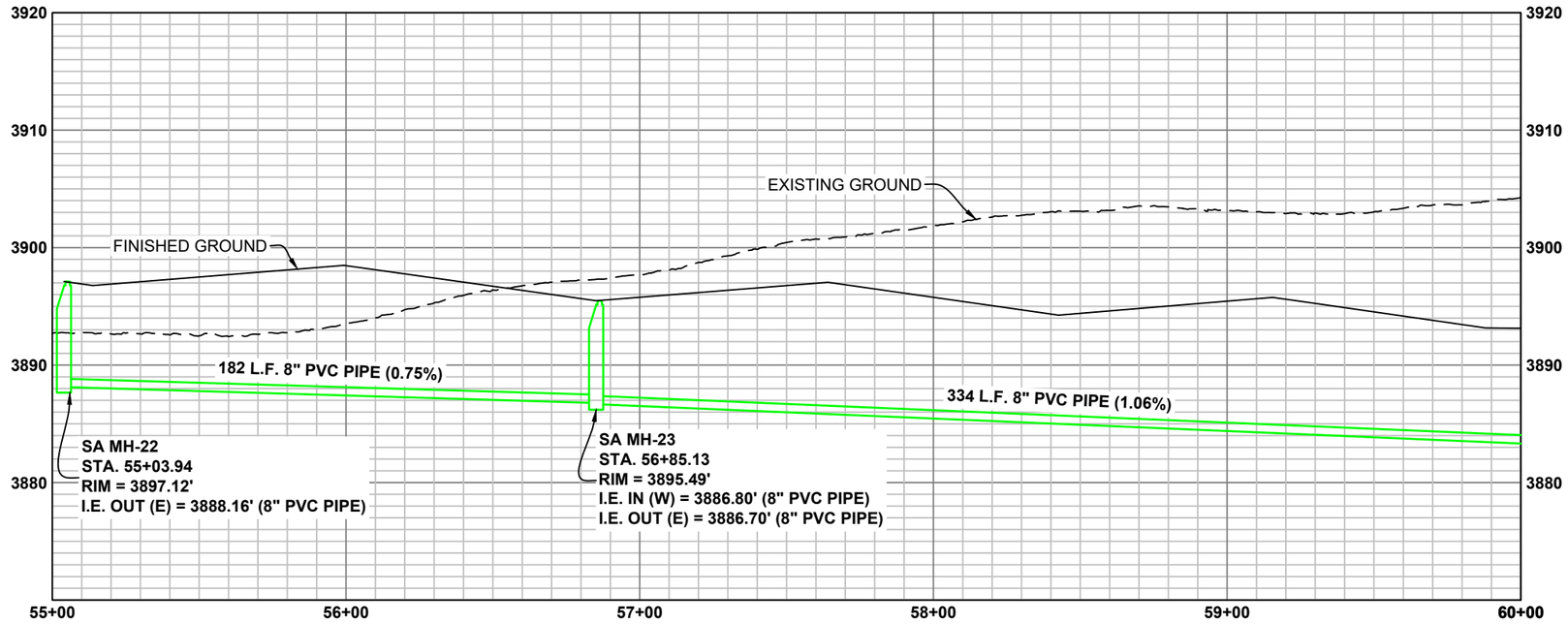
SHERIDAN COUNTY, WYOMING

DESIGNED BY: SER
DRAWN BY: CIM
CHECKED BY: CDR
DATE: 02/29/2024

SHEET
53

k:\Sheridan\story house management\2023\137 story house village\05CAD\Sheets\PLAN SET\23137_VILG_PLNST_SSWR_PP.dwg SSWR_PP (10A) 3/1/2024 11:25:50 AM





DRAFT

NO.	REVISION	BY	DATE

PROJECT NO. 2023-137

PREPARED BY
WWC ENGINEERING
1849 TERRA AVE.
SHERIDAN, WY 82801
(307) 672-0761
www.wwcengineering.com

STORY HOUSE PROPERTY COMPANY, LLC

STORY HOUSE VILLAGE PUD - PHASE 1

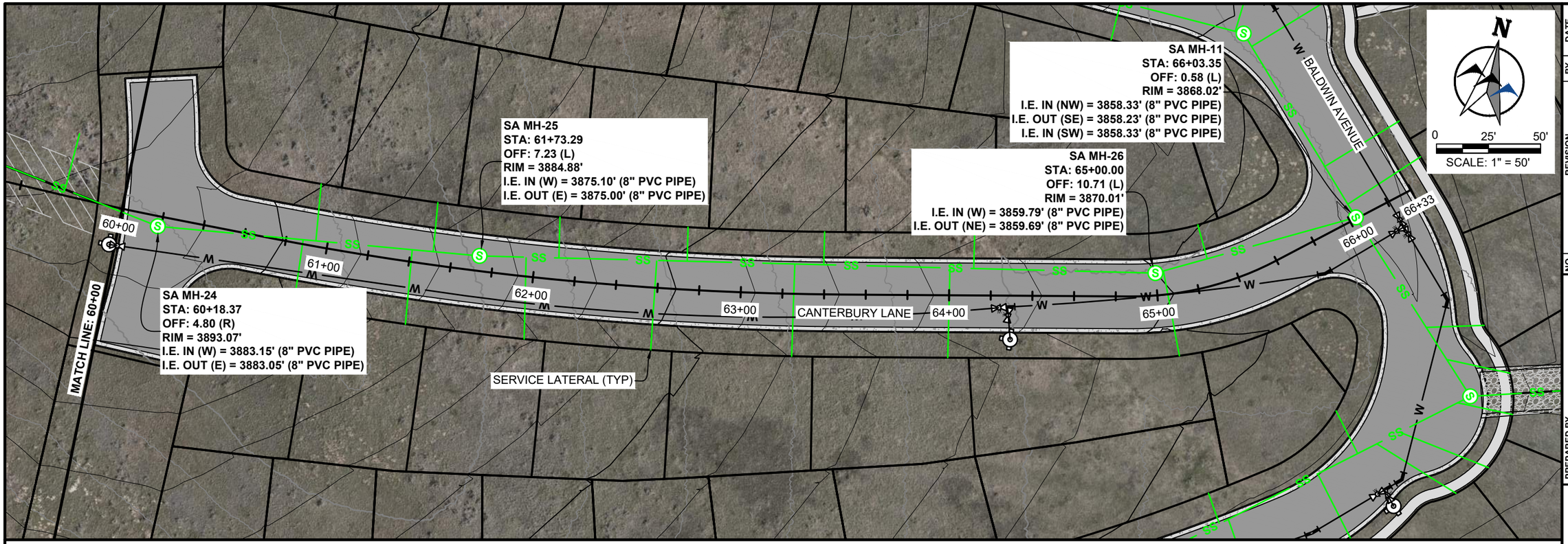
GRAVITY SEWER PLAN AND PROFILE SHEET

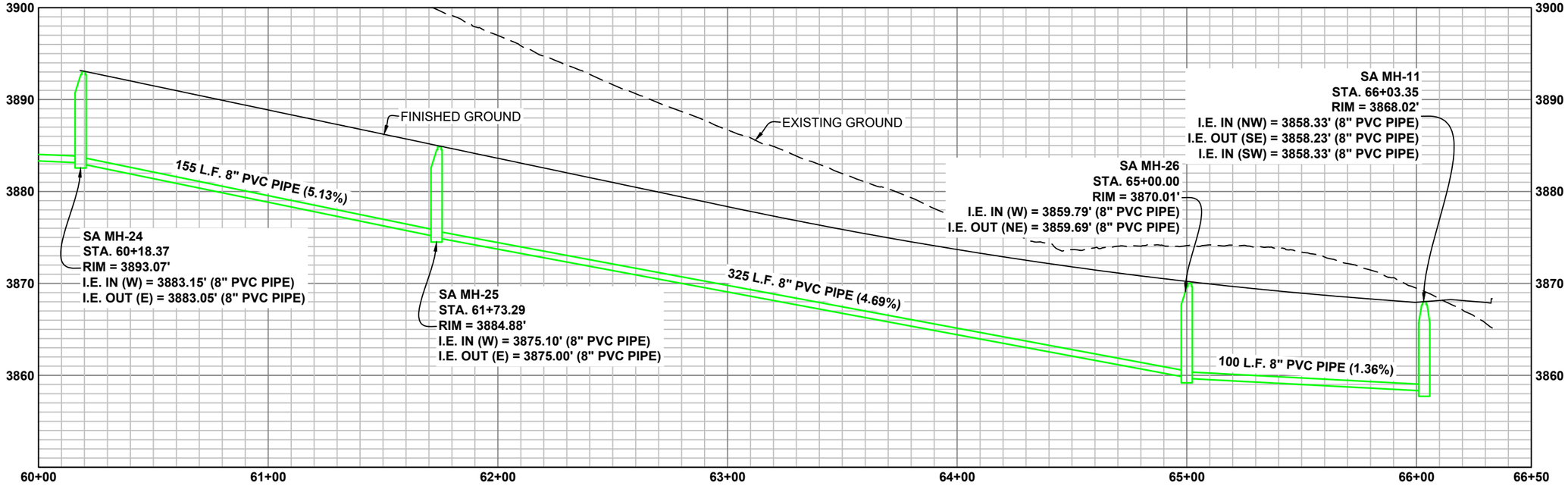
SHERIDAN COUNTY, WYOMING

DESIGNED BY: SER
DRAWN BY: CIM
CHECKED BY: CDR
DATE: 02/29/2024

SHEET
54

k:\Sheridan\story house management\2023137 story house village\05CAD\Sheets\PLAN SET\23137_VILG_PLNST_SSWR_PP.dwg SSWR_PP (11) 3/1/2024 11:25:50 AM





DRAFT

NO.	REVISION	BY	DATE

PROJECT NO. 2023-137

PREPARED BY
WWC ENGINEERING
1849 TERRA AVE.
SHERIDAN, WY 82801
(307) 672-0761
www.wwcengineering.com

STORY HOUSE PROPERTY COMPANY, LLC

STORY HOUSE VILLAGE PUD - PHASE 1

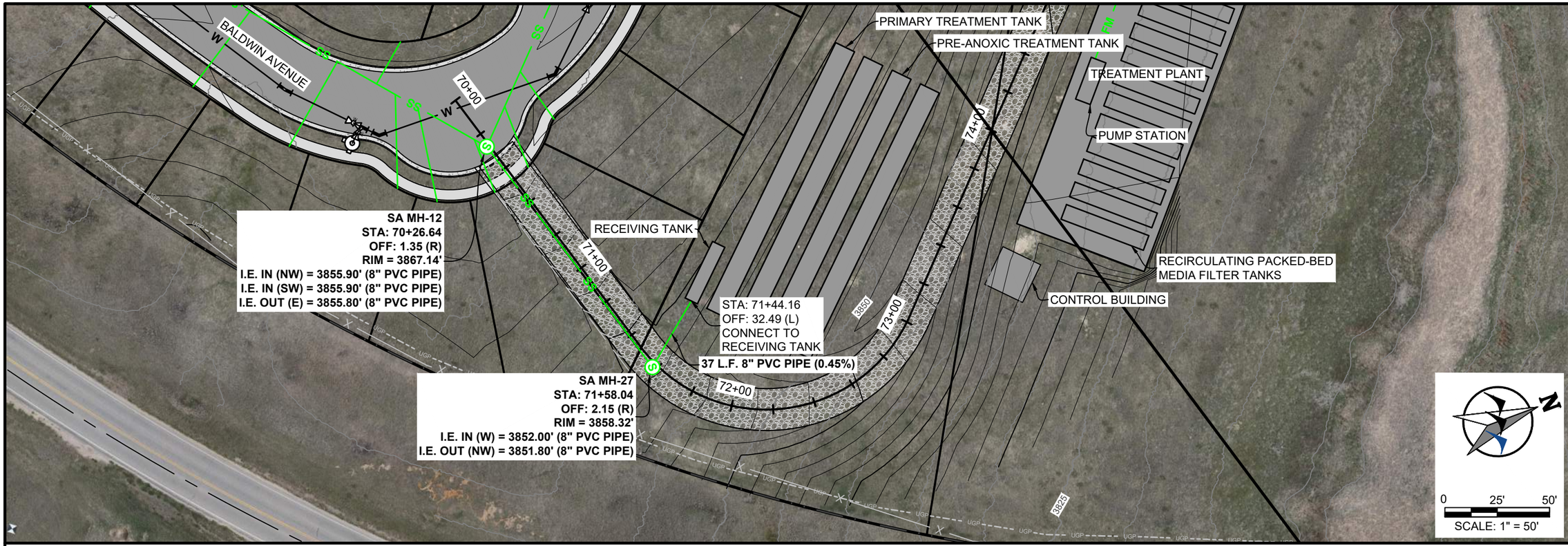
GRAVITY SEWER PLAN AND PROFILE SHEET

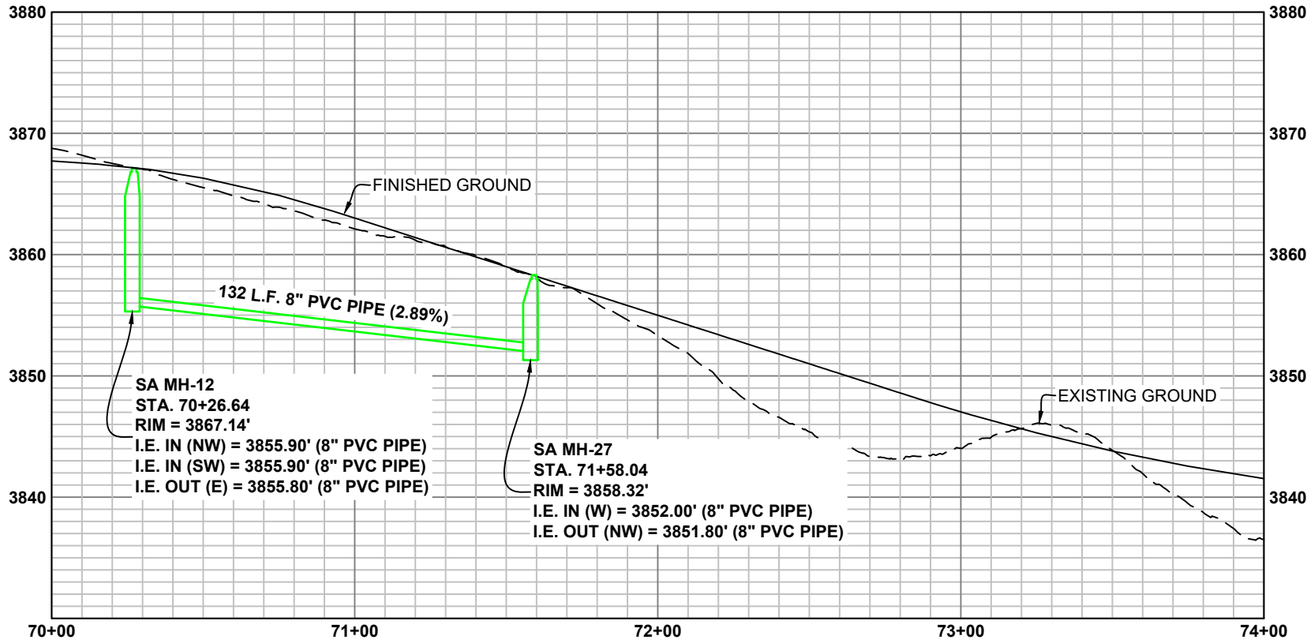
SHERIDAN COUNTY, WYOMING

DESIGNED BY: SER
DRAWN BY: CIM
CHECKED BY: CDR
DATE: 02/29/2024

SHEET
55

k:\Sheridan\story house management\2023137 story house village\05CAD\Sheets\PLAN SET\23137_VILG_PLNST_SSWR_PP.dwg SSWR_PP (12) 3/1/2024 11:25:50 AM





DRAFT

NO.	REVISION	BY	DATE

PROJECT NO. 2023-137

PREPARED BY
WWC ENGINEERING
1849 TERRA AVE.
SHERIDAN, WY 82801
(307) 672-0761
www.wwcengineering.com

STORY HOUSE PROPERTY COMPANY, LLC

STORY HOUSE VILLAGE PUD - PHASE 1

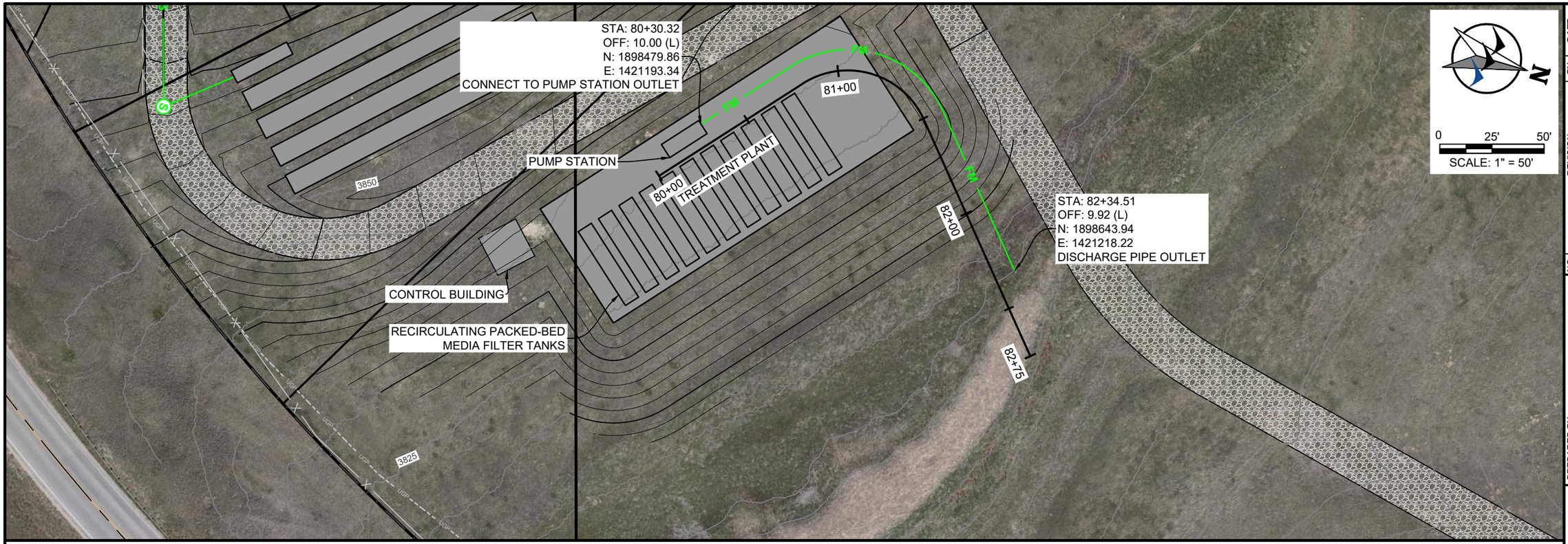
GRAVITY SEWER PLAN AND PROFILE SHEET

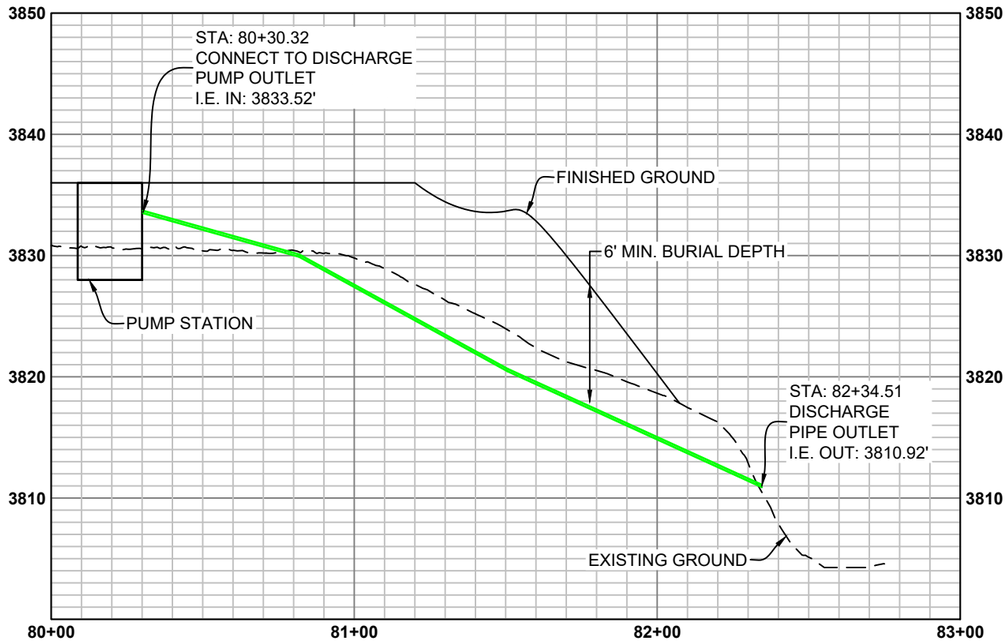
SHERIDAN COUNTY, WYOMING

DESIGNED BY: SER
DRAWN BY: CIM
CHECKED BY: CDR
DATE: 02/29/2024

SHEET
56

k:\Sheridan\story house management\2023137 story house village\05CAD\Sheets\PLAN SET\23137_VILG_PLNST_SSWR_PP.dwg SSWR_PP (13) 3/1/2024 11:25:50 AM





DRAFT

NO.	REVISION	BY	DATE

PROJECT NO. 2023-137

PREPARED BY
WWC ENGINEERING
1849 TERRA AVE.
SHERIDAN, WY 82801
(307) 672-0761
www.wwcengineering.com

STORY HOUSE PROPERTY COMPANY, LLC

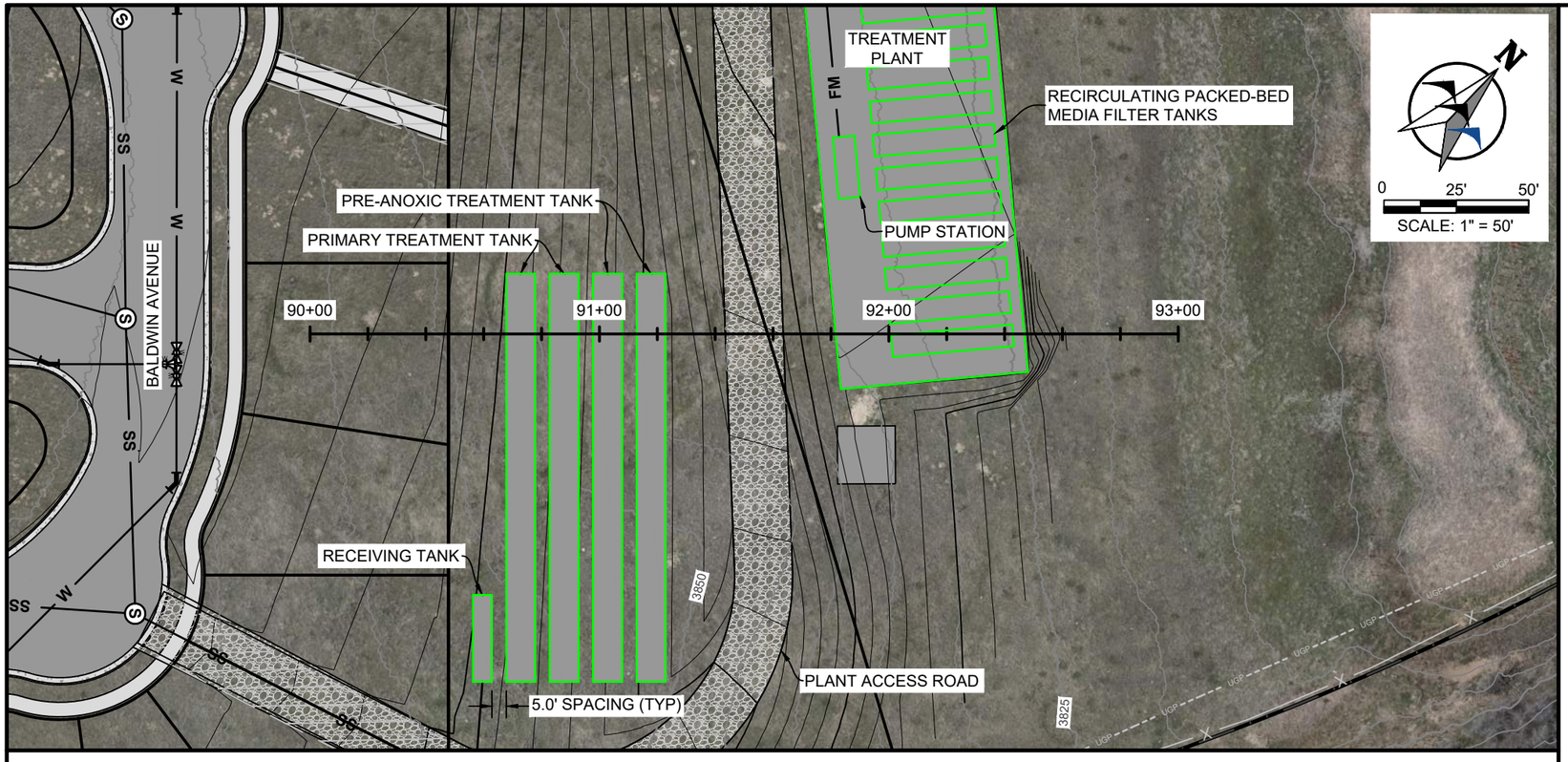
STORY HOUSE VILLAGE PUD - PHASE 1

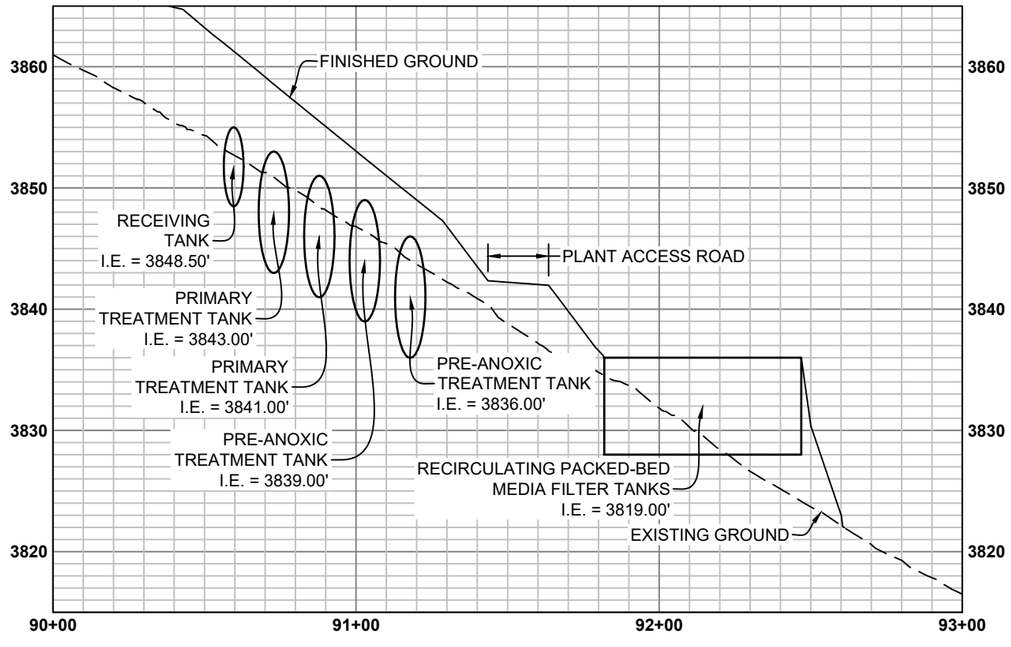
DISCHARGE PIPE PLAN AND PROFILE SHEET

SHERIDAN COUNTY, WYOMING

DESIGNED BY: SER
DRAWN BY: CIM
CHECKED BY: CDR
DATE: 02/29/2024

SHEET
57





DRAFT

NO.	REVISION	BY	DATE

PROJECT NO. 2023-137

PREPARED BY
WWC ENGINEERING
1849 TERRA AVE.
SHERIDAN, WY 82801
(307) 672-0761
www.wwcengineering.com

STORY HOUSE PROPERTY COMPANY, LLC

STORY HOUSE VILLAGE PUD - PHASE 1

SANITARY FACILITIES DETAIL

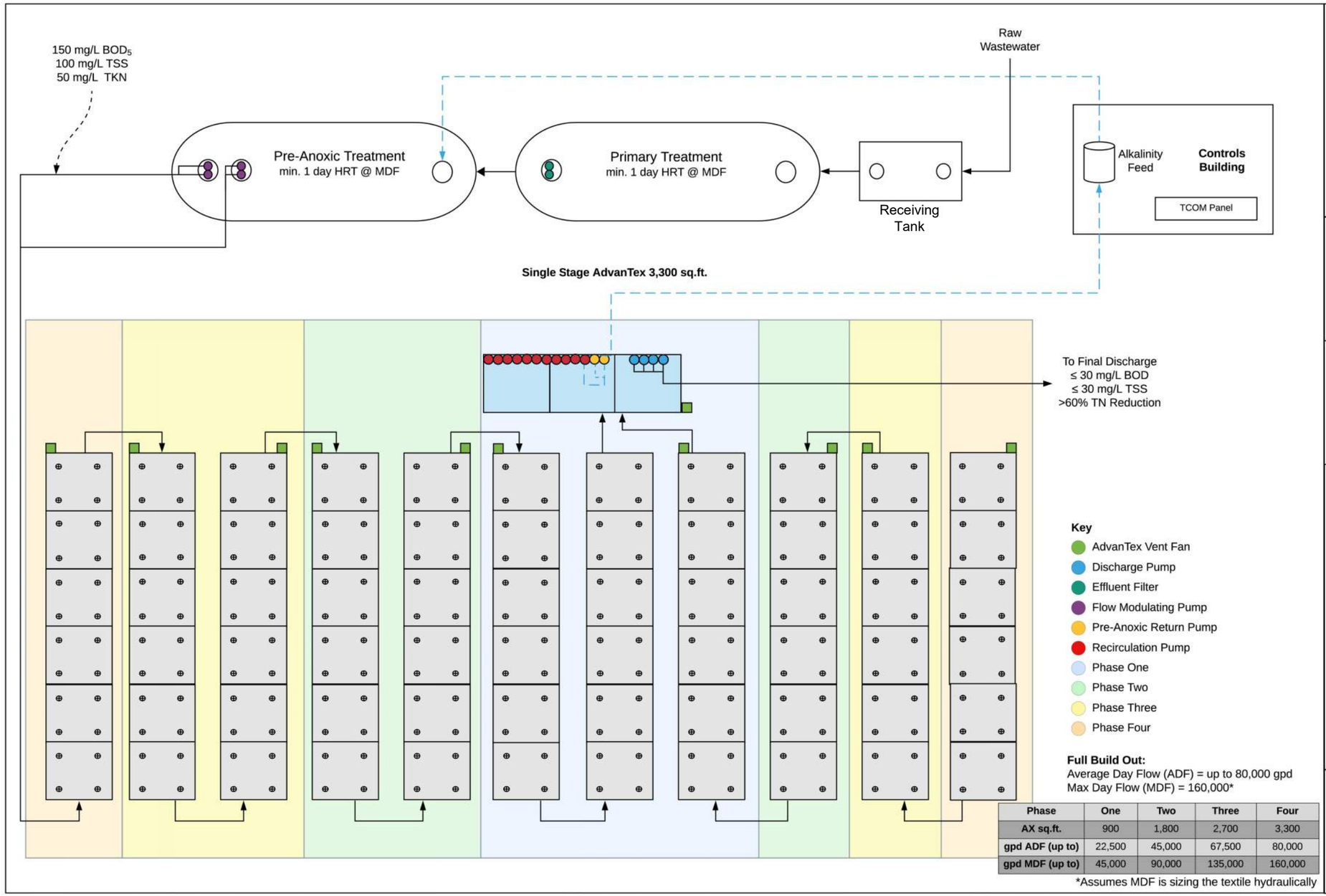
SHERIDAN COUNTY, WYOMING

DESIGNED BY: SER
DRAWN BY: CIM
CHECKED BY: CDR
DATE: 02/29/2024

SHEET
58

k:\Sheridan\story house management\2023137 story house village\05CAD\Sheets\PLAN SET\23137_VILG_PLNST_SSWR_PP.dwg SSWR_PP (15) 3/1/2024 11:25:50 AM

k:\Sheridan\story house management\20223137 story house village\05CAD\Sheets\PLAN SET\23137_VILG_PLNST_DETL.dwg DETL (1) 2/29/2024 3:43:48 PM



Full Build Out:
Average Day Flow (ADF) = up to 80,000 gpd
Max Day Flow (MDF) = 160,000*

Phase	One	Two	Three	Four
AX sq.ft.	900	1,800	2,700	3,300
gpd ADF (up to)	22,500	45,000	67,500	80,000
gpd MDF (up to)	45,000	90,000	135,000	160,000

*Assumes MDF is sizing the textile hydraulically

Project Name: Story House - Gravity & AX

Modified: JT (02/29/24)

Conceptual Layout

This Proposed System Configuration Drawing is provided solely as a design aid and illustrates one possible configuration of system components that may satisfy the requirements under the applicable specifications that have been communicated to Orenco (based on third-party standards testing protocols and performance reports, as applicable). Design decisions, including the actual layout and configuration of the system and its viability for the project, are at the sole discretion of the system's designer.

NO.	REVISION	BY	DATE

PROJECT NO. 2023-137

PREPARED BY
WWC ENGINEERING
1849 TERRA AVE.
SHERIDAN, WY 82801
(307) 672-0761
www.wwcengineering.com

STORY HOUSE PROPERTY COMPANY, LLC

STORY HOUSE VILLAGE PUD - PHASE 1

ORENCO DETAIL SHEET

SHERIDAN COUNTY, WYOMING

DESIGNED BY: SER
DRAWN BY: CIM
CHECKED BY: CDR
DATE: 02/29/2024

SHEET
59

DRAFT

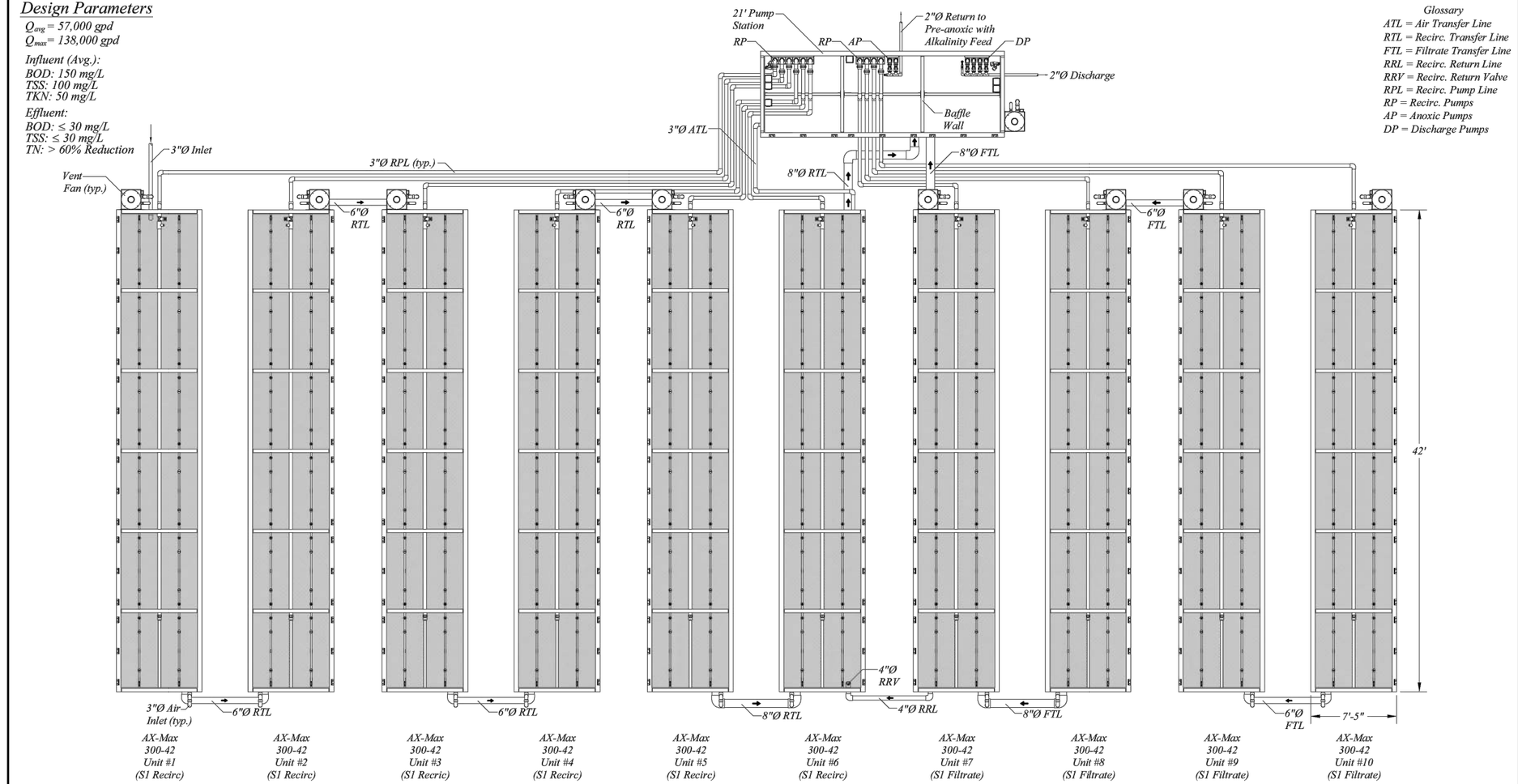
k:\Sheridan\story house management\2023137 story house village\05CAD\Sheets\PLAN SET\23137_VILG_PLNST_DETL.dwg DETL (2) 2/29/2024 3:43:48 PM

Design Parameters

Q_{avg} = 57,000 gpd
Q_{max} = 138,000 gpd

Influent (Avg.):
BOD: 150 mg/L
TSS: 100 mg/L
TKN: 50 mg/L

Effluent:
BOD: ≤ 30 mg/L
TSS: ≤ 30 mg/L
TN: > 60% Reduction



Glossary
ATL = Air Transfer Line
RTL = Recirc. Transfer Line
FTL = Filtrate Transfer Line
RRL = Recirc. Return Line
RRV = Recirc. Return Valve
RPL = Recirc. Pump Line
RP = Recirc. Pumps
AP = Anoxic Pumps
DP = Discharge Pumps

Customer Approval

Signature: _____ Date: _____

Customer Name: _____

By this signature, Customer indicates that they have reviewed this Proposed System Configuration Drawing and found that it meets all of the designer's functional requirements and/or specifications.

Note: Spacing between AX-Max units is dependent on desired bury depth. Consult Orenco Engineering for details.

Orenco SYSTEMS

© Orenco Systems, Inc.
Portions or all of this Proposed System Configuration Drawing, as appropriate, may be reproduced and integrated into the site-specific layout and configuration of a system by its designer.

Disclaimer: This Proposed System Configuration Drawing is provided solely as a design aid and illustrates one possible configuration of a system that would comply with Orenco's design criteria for the requirements and/or specifications that have been communicated to Orenco (based on third-party standards testing protocols and performance reports, as applicable). Design decisions, including the actual layout and configuration of the system and its viability for the project, are at the sole discretion of the systems's designer.

UWY Story House Subdvision
AdvanTEX AX-Max Treatment
System Plan View

Drawn By:	BAS	Scale:	1" = 6'-0"
Reviewed By:	JT	Sheet:	1 OF 1
File Name:	DR5786-1.DWG	Rev: 1.0	Date: 2/21/2024

NO.	REVISION	BY	DATE

PROJECT NO. 2023-137

PREPARED BY
WWC ENGINEERING
1849 TERRA AVE.
SHERIDAN, WY 82801
(307) 672-0761
www.wwcengineering.com

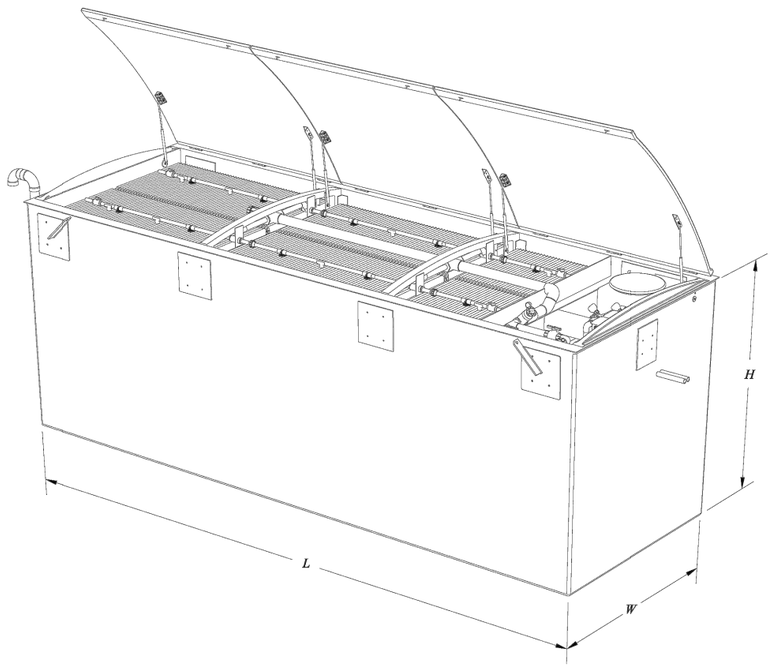
STORY HOUSE PROPERTY COMPANY, LLC
STORY HOUSE VILLAGE PUD - PHASE 1
ORENCO DETAIL SHEET
SHERIDAN COUNTY, WYOMING

DESIGNED BY: SER
DRAWN BY: CIM
CHECKED BY: CDR
DATE: 02/29/2024

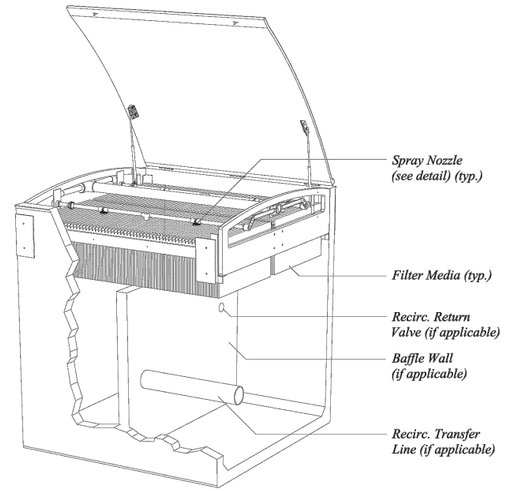
SHEET
60

DRAFT

k:\Sheridan\story house management\20223137 story house village\05CAD\Sheets\PLAN SET\23137_VILG_PLNST_DETL.dwg DETL (3) 2/29/2024 3:43:48 PM



Iso View AX-Max 125-21
Not To Scale



AX-Max Section Iso Detail
Not To Scale

Standard Models	Basic Dimensions L	W	H	Est. Weight
AX-Max075-14	14'	7'-7"	8'	4,000
AX-Max100-14	14'	7'-7"	8'	3,800
AX-Max125-21	21'	7'-7"	8'	6,000
AX-Max150-21	21'	7'-7"	8'	5,800
AX-Max175-28	28'	7'-7"	8'	8,000
AX-Max200-28	28'	7'-7"	8'	7,800
AX-Max225-35	35'	7'-7"	8'	10,000
AX-Max250-35	35'	7'-7"	8'	9,800
AX-Max275-42	42'	7'-7"	8'	12,000
AX-Max300-42	42'	7'-7"	8'	11,800

Copyright © 2012
Orenco Systems , Inc.

UNAUTHORIZED CHANGES & USES
Orenco has prepared these drawings for use by the design engineer. Orenco will not be responsible or liable for unauthorized changes to or uses of these drawings. All changes to these drawings must be made in writing and must be approved by the design engineer.

PRODUCT CONFIGURATION DRAWINGS

Orenco Systems® Incorporated
Changing the Way the World Does Wastewater®

Drawn By: *CHRIS JORDAN*
Drawn For:

Drawing Number: D3

Scale: *AS SHOWN*
Sheet: *1 OF 1*
Rev: *1.0* Date: *5/31/2012*

NO.	REVISION	BY	DATE

PREPARED BY
WWC ENGINEERING
1849 TERRA AVE.
SHERIDAN, WY 82801
(307) 672-0761
www.wwcengineering.com

PROJECT NO. 2023-137

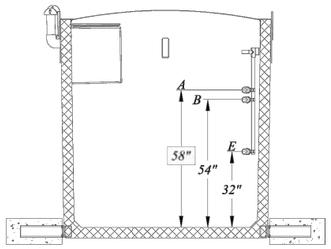
STORY HOUSE PROPERTY COMPANY, LLC
STORY HOUSE VILLAGE PUD - PHASE 1
ORENCO DETAIL SHEET
SHERIDAN COUNTY, WYOMING

DESIGNED BY: *SER*
DRAWN BY: *CIM*
CHECKED BY: *CDR*
DATE: *02/29/2024*

SHEET
61

DRAFT

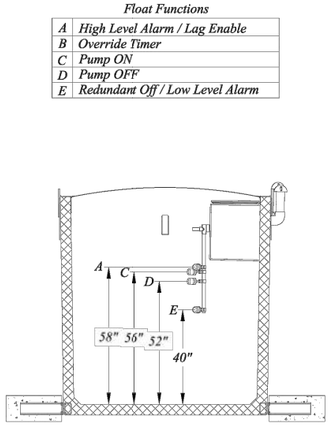
k:\Sheridan\story house management\20223137 story house village\05CAD\Sheets\PLAN SET\23137_VILG_PLNST_DETL.dwg DETL (4) 2/29/2024 3:43:48 PM



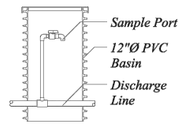
Recirc. Float Settings (Example)
Scale: 1" = 3'-0"

Float Functions

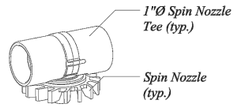
A	High Level Alarm / Lag Enable
B	Override Timer
C	Pump ON
D	Pump OFF
E	Redundant Off / Low Level Alarm



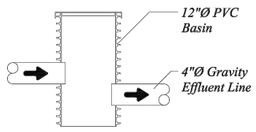
Discharge Float Settings (Example)
Scale: 1" = 3'-0"



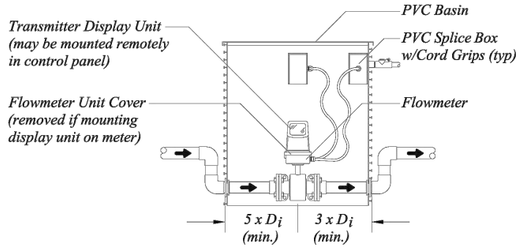
Pressurized Sample Port Detail
Not To Scale



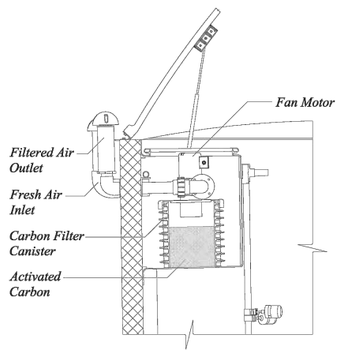
Spin Nozzle Detail
Not To Scale



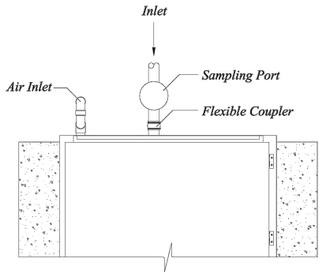
Gravity Sample Port Detail
Not To Scale



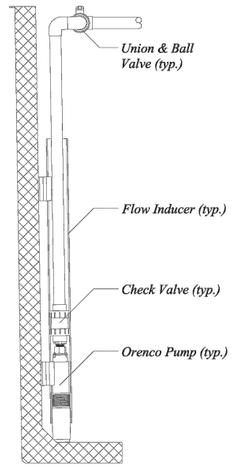
Flowmeter Detail
Not To Scale



Vent Fan Enclosure Detail
Not To Scale



Typical Inlet Connection Detail
Not To Scale



Typical Pump Detail
Not To Scale

Copyright © 2013 Orenco Systems , Inc.

Unauthorized Changes & Uses
Orenco has prepared these drawings for use by the design engineer. Orenco will not be responsible or liable for unauthorized changes to or uses of these drawings. All changes to these drawings must be made in writing and must be approved by the design engineer.

Product Configuration Drawings

Orenco Systems® Incorporated
Changing the Way the World Does Wastewater®

Drawn By: Chris Jordan
Drawn For:
Drawing Number: D1
Scale: As Shown
Sheet: 1 OF 1
Rev: 1.1
Date: 4/25/2013

NO.	REVISION	BY	DATE

PROJECT NO. 2023-137

PREPARED BY
WWC ENGINEERING
1849 TERRA AVE.
SHERIDAN, WY 82801
(307) 672-0761
www.wwcengineering.com

STORY HOUSE PROPERTY COMPANY, LLC
STORY HOUSE VILLAGE PUD - PHASE 1
ORENCO DETAIL SHEET
SHERIDAN COUNTY, WYOMING

DESIGNED BY: SER
DRAWN BY: CIM
CHECKED BY: CDR
DATE: 02/29/2024

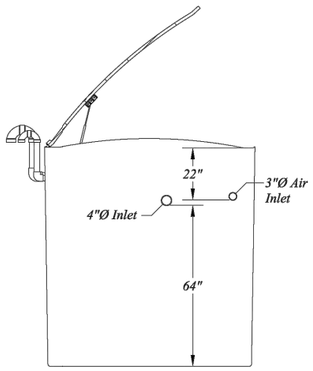
SHEET
62

DRAFT

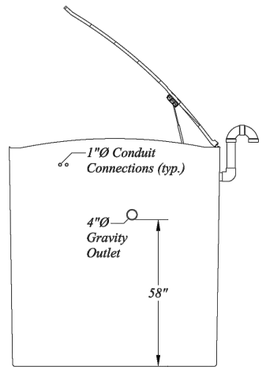
k:\Sheridan\story house management\20223137 story house village\05CAD\Sheets\PLAN SET\23137_VILG_PLNST_DETL.dwg DETL (5) 2/29/2024 3:43:48 PM

Note: All penetrations shown may be mirrored depending on the tank orientation.

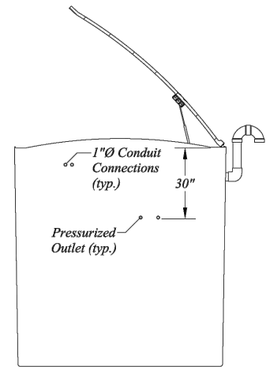
Penetrations shown are typical examples, and may be modified to suit configuration / site requirements.



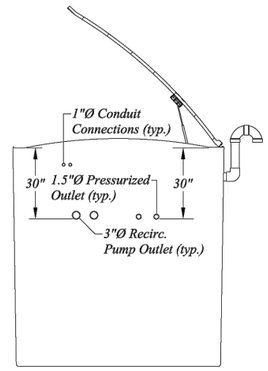
Typical Inlet Elevation
Scale: 1" = 3'-0"



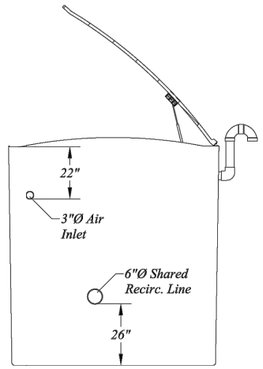
Typical Gravity Outlet Elevation
Scale: 1" = 3'-0"



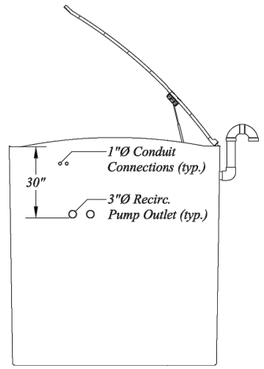
Typical Discharge Pump Outlet Elevation
Scale: 1" = 3'-0"



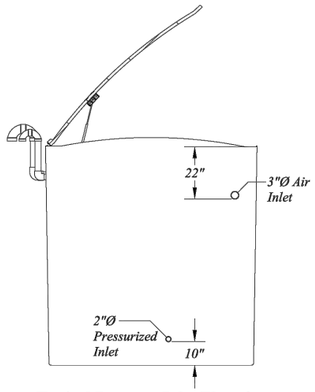
Typical Recirc. & Discharge Pump Combined Outlet Elevations
Scale: 1" = 3'-0"



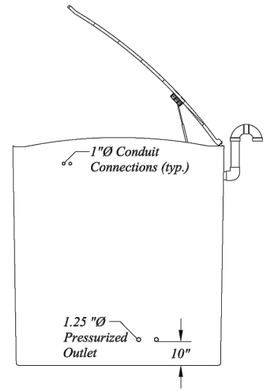
Typical Shared Recirc. Line Elevation
Scale: 1" = 3'-0"



Typical Recirc. Pump Outlet Elevation
Scale: 1" = 3'-0"



Typical Pressure Inlet Elevation (Above Ground Installation)
Scale: 1" = 3'-0"



Typical Pressure Outlet Elevation (Above Ground Installation)
Scale: 1" = 3'-0"

Copyright © 2014 Orenco Systems , Inc.

UNAUTHORIZED CHANGES & USES
Orenco has prepared these drawings for use by the design engineer. Orenco will not be responsible or liable for unauthorized changes to or uses of these drawings. All changes to these drawings must be made in writing and must be approved by the design engineer.

PRODUCT CONFIGURATION DRAWINGS

Orenco Systems® Incorporated
Changing the Way the World Does Wastewater®

Drawn By: BEN SMITH
Drawn For:

Drawing Number: D4

Scale: 1" = 3'-0"
Sheet: 1 OF 1
Rev: 1.1 Date: 05/30/14

DRAFT

NO.	REVISION	BY	DATE

PROJECT NO. 2023-137

PREPARED BY
WWC ENGINEERING
1849 TERRA AVE.
SHERIDAN, WY 82801
(307) 672-0761
www.wwcengineering.com

STORY HOUSE PROPERTY COMPANY, LLC
STORY HOUSE VILLAGE PUD - PHASE 1
ORENCO DETAIL SHEET
SHERIDAN COUNTY, WYOMING

DESIGNED BY: SER
DRAWN BY: CIM
CHECKED BY: CDR
DATE: 02/29/2024

SHEET
63

k:\Sheridan\story house management\20223137 story house village\05CAD\Sheets\PLAN SET\23137_VILG_PLNST_DETL.dwg DETL (6) 2/29/2024 3:43:48 PM

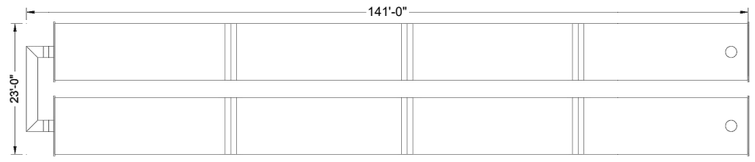
PROJECT SUMMARY

CALCULATION DETAILS
- LOADING = H20
- APPROX. LINEAR FOOTAGE = 282 LF

STORAGE SUMMARY
- STORAGE VOLUME REQUIRED = 21388 CF
- PIPE STORAGE VOLUME = 21452 CF
- BACKFILL STORAGE VOLUME = 0 CF
- TOTAL STORAGE PROVIDED = 21452 CF

PIPE DETAILS
- DIAMETER = 120"
- JOINT TYPE = Soil Tight
- ALL RISERS TO HAVE REINFORCEMENT COLLAR
- WALL TYPE = SOLID
- BARREL SPACING = 36"

BACKFILL DETAILS
- WIDTH AT ENDS = 12"
- ABOVE PIPE = 0"
- WIDTH AT SIDES = 12"
- BELOW PIPE = 0"



NOTE:
THESE DRAWINGS ARE FOR CONCEPTUAL PURPOSES AND DO NOT REFLECT ANY LOCAL PREFERENCES OR REGULATIONS. PLEASE CONTACT YOUR LOCAL CONTECH REP FOR MODIFICATIONS.

NOTES

- ALL RISER AND STUB DIMENSIONS ARE TO CENTERLINE.
- ALL ELEVATIONS, DIMENSIONS, AND LOCATIONS OF RISERS AND INLETS, SHALL BE VERIFIED BY THE ENGINEER OF RECORD PRIOR TO RELEASING FOR FABRICATION.
- ALL RISERS AND STUBS ARE FABRICATED USING HDPE DR32.5 & M294 PIPE UNLESS OTHERWISE NOTED.
- RISERS TO BE FIELD TRIMMED TO GRADE.
- QUANTITY OF PIPE SHOWN DOES NOT PROVIDE EXTRA PIPE FOR CONNECTING THE SYSTEM TO EXISTING PIPE OR DRAINAGE STRUCTURES. OUR SYSTEM AS DETAILED PROVIDES NOMINAL INLET AND/OR OUTLET PIPE STUB FOR CONNECTION TO EXISTING DRAINAGE FACILITIES. IF ADDITIONAL PIPE IS NEEDED IT WILL HAVE TO BE REQUESTED BY THE REVIEWER/APPROVAL AUTHORITY PRIOR TO FABRICATION.

ASSEMBLY
SCALE: 1" = 15'

C:\EXPORTS\TEMPLATES\DUROMAXX.DWG 10/18/2019 10:02 AM

The design and information shown on this drawing is provided as a service to the project owner, engineer and contractor by Contech Engineered Solutions LLC ("Contech"). Neither this drawing, nor any part thereof, may be used, reproduced or modified in any manner without the prior written consent of Contech. Failure to comply is done at the user's own risk and Contech expressly disclaims any liability or responsibility for such use.

If discrepancies between the supplied information upon which the drawing is based and actual field conditions are encountered as site work progresses, these discrepancies must be reported to Contech immediately for re-evaluation of the design. Contech accepts no liability for designs based on missing, incomplete or inaccurate information supplied by others.

MARK	DATE	REVISION DESCRIPTION	BY

CONTECH® ENGINEERED SOLUTIONS LLC
www.ContechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

DuroMaxx® STEEL REINFORCED PE TECHNOLOGY

CONTECH DYODS DRAWING

DYO46344 Story House Village
120"
Sheridan, WY
DETENTION SYSTEM

PROJECT No.:	SEQ. No.:	DATE:
31971	46344	2/21/2024
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.: D1		

NO.	REVISION	BY	DATE

PROJECT NO. 2023-137

PREPARED BY
WWC ENGINEERING
1849 TERRA AVE.
SHERIDAN, WY 82801
(307) 672-0761
www.wwcengineering.com

STORY HOUSE PROPERTY COMPANY, LLC
STORY HOUSE VILLAGE PUD - PHASE 1
ORENCO DETAIL SHEET
SHERIDAN COUNTY, WYOMING

DESIGNED BY: SER
DRAWN BY: CIM
CHECKED BY: CDR
DATE: 02/29/2024

SHEET
64

DRAFT

k:\Sheridan\story house management\20223137 story house village\05CAD\Sheets\PLAN SET\23137_VILG_PLNST_DETL.dwg DETL (7) 2/29/2024 3:43:48 PM

NOTES:

1. ALL ELEVATIONS, DIMENSIONS AND LOCATIONS OF RISERS AND INLETS, SHALL BE VERIFIED BY THE ENGINEER OF RECORD (E.O.R.) OR OWNER DURING DESIGN & CONTRACT PHASE OF PROJECT. IF ELEVATIONS AND DESIGN INFORMATION IS NOT PROVIDED BY E.O.R. OR OWNER, THE PROJECT CANNOT BE RELEASED FOR FABRICATION.
2. THIS PROJECT IS FOR DUROMAXX DIAMETER DESCRIBED IN PROJECT SUMMARY.
3. DESIGN SERVICE LIFE OF TANK IS TO BE SPECIFIED BY E.O.R. OR OWNER DURING DESIGN PHASE OF PROJECT, AND WILL BE REVIEWED BY MANUFACTURER.
4. ANY TESTING OF THE TANK WILL NEED TO BE SPECIFIED BY E.O.R. OR OWNER DURING DESIGN PHASE OF PROJECT.
5. ALL WATER TABLE ELEVATIONS ARE TO BE ACCURATELY PROVIDED BY E.O.R. OR OWNER PRIOR TO CONTRACT/FINAL DESIGN PHASE OF PROJECT.
6. TOTAL HEIGHT OF COVER AND DEPTHS OF THE TYPE OF PAVEMENT TO BE USED ARE TO BE PROVIDED BY E.O.R. OR OWNER DURING PROPOSAL & CONTRACT PHASES.
7. INTERNAL OPERATIONAL DESIGN PRESSURES (IF ANY) ARE TO BE PROVIDED BY E.O.R. OR OWNER TO THE MANUFACTURER DURING INITIAL DESIGN PHASE TO PROVIDE PROPER DESIGN OF THE TANK. (_____ DESIGN PRESSURE)
8. DESIGN INFORMATION FOR SURGE PRESSURES THAT CAN BE SEEN DURING OPERATION OF THE SYSTEM AS REQUIRED BY E.O.R. OR OWNER WILL ALSO NEED TO BE PROVIDED DURING DESIGN PHASE OF THE PROJECT.
9. DESIGN INFORMATION AS TO WATER TEMPERATURE (IF ABOVE NORMAL EFFLUENT TEMPERATURES) WILL NEED TO BE PROVIDED BY E.O.R. OR OWNER DURING DESIGN PHASE OF PROJECT.
10. IF INLET OR OUTLET PIPES NEED TO HAVE GREATER THAN 4PSI JOINTS FOR FIELD PIPE CONNECTIONS, THE USE OF FLANGED ADAPTERS WILL NEED TO BE SPECIFIED BY E.O.R. OR OWNER DURING DESIGN PHASE OF PROJECT.
11. ALL TANK LATERALS (PIPE STUBS), RISERS & VENTS ARE CONSTRUCTED USING HDPE M294, DR32.5 & DR17 UNLESS OTHERWISE NOTED.
12. ALL PIPE DIMENSIONS ARE SUBJECT TO MANUFACTURERS TOLERANCES.
13. SYSTEM IS DESIGNED FOR H20 AND H25 LOADING.
14. CONSIDERATIONS FOR CONSTRUCTION EQUIPMENT LOADS MUST BE TAKEN INTO ACCOUNT. SEE DETAIL ON THIS PAGE.

SCOPE
THIS SPECIFICATION DESCRIBES DUROMAXX PIPE FOR USE IN MULTIPLE APPLICATIONS IN 30" (750 MM) THROUGH 120" (3000 MM) NOMINAL DIAMETERS.

DESCRIPTION
DUROMAXX IS A REINFORCED POLYETHYLENE PIPE WITH A SMOOTH WATERWAY WALL AND EXTERIOR PROFILE THAT IS REINFORCED WITH HIGH STRENGTH GALVANIZED STEEL RIBS. THE CONTINUOUS REINFORCING RIBS ARE COMPLETELY ENCASED WITHIN THE POLYETHYLENE PROFILE. DUROMAXX IS MANUFACTURED USING A HELICAL WINDING PROCESS THAT RESULTS IN A CONTINUOUSLY FUSION WELDED CIRCUMFERENTIAL LAP SEAM. THE PIPE PROFILE IS MANUFACTURED USING A HIGH QUALITY PRESSURE-RATED THERMOPLASTIC MEETING THE REQUIREMENTS OF ASTM F2562 "STANDARD SPECIFICATION FOR STEEL REINFORCED THERMOPLASTIC RIBBED PIPE AND FITTINGS FOR NON-PRESSURE DRAINAGE AND SEWERAGE". FOR THE PURPOSE OF HYDRAULIC DESIGN, THE RECOMMENDED MANNING'S "N" VALUE SHALL BE 0.012 FOR PIPE DIAMETERS INCLUDED WITHIN THIS SPECIFICATION. PIPE LENGTH & ALL DIMENSIONS SHOWN ARE SUBJECT TO MANUFACTURERS TOLERANCES OF ±1% ACCORDING TO ASTM F2562.

MATERIAL PROPERTIES
VIRGIN HIGH DENSITY POLYETHYLENE PRESSURE-RATED RESINS ARE USED TO MANUFACTURE DUROMAXX PIPE. RESINS SHALL CONFORM TO THE MINIMUM REQUIREMENTS OF CELL CLASSIFICATION 345464 C AS DEFINED AND DESCRIBED IN THE LATEST VERSION OF ASTM D3350 "STANDARD SPECIFICATION FOR POLYETHYLENE PLASTICS PIPE AND FITTINGS MATERIALS".

FITTINGS
ALL FITTINGS SHALL BE FABRICATED FROM DUROMAXX PIPE. ANY FITTINGS 30"Ø AND BELOW WILL BE HDPE PIPE.

ALL FABRICATION OF THE PRODUCT SHALL OCCUR WITHIN THE UNITED STATES.

INSTALLATION SPECIFICATION

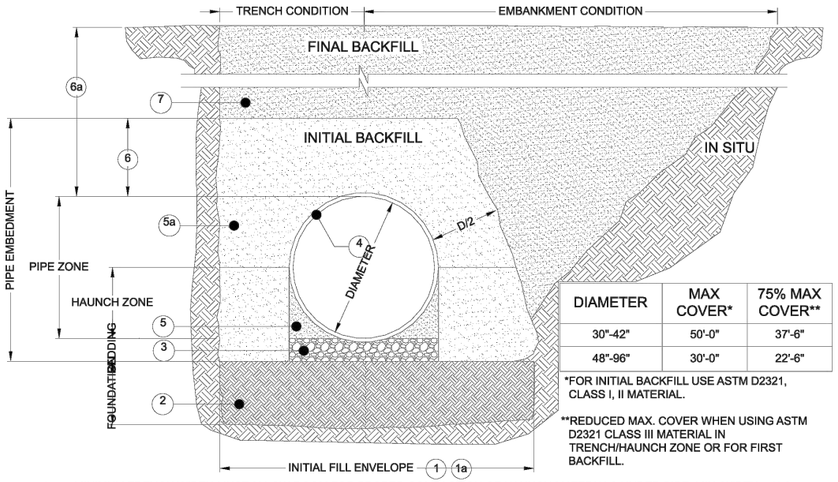
PRE-CONSTRUCTION MEETING

PRIOR TO INSTALLATION OF THE DRAINAGE SYSTEM A PRE-CONSTRUCTION MEETING SHALL BE CONDUCTED. THOSE REQUIRED TO ATTEND ARE THE SUPPLIER OF THE DRAINAGE SYSTEM, THE GENERAL CONTRACTOR, SUB CONTRACTORS AND THE ENGINEER.

INSTALLATION OF PIPE:

IT IS THE RESPONSIBILITY OF THE CONTRACTOR AND/OR PROJECT ENGINEER TO ENSURE THAT ALL QUESTIONS ABOUT INSTALLATION ARE ADDRESSED PRIOR TO APPROVAL OF SYSTEM. ALL DETAILS FOR INSTALLATION ARE LOCATED IN THIS DRAWING PACKAGE ANY QUESTIONS CONCERNING THESE STANDARD DETAILS CAN BE ADDRESSED BY YOUR CONTECH REPRESENTATIVE PRIOR TO APPROVAL.

BACKFILL SHALL BE PLACED TO THE PROPER ELEVATION OVER THE SYSTEM AS OUTLINED IN THE PLANS. MINIMUM COVER FOR CONSTRUCTION LOADING NEEDS TO BE DETERMINED BASED ON THE TYPE OF EQUIPMENT THAT IS PLANNED FOR CONSTRUCTION. PROPER COVER FOR CONSTRUCTION EQUIPMENT IS DETAILED IN THE CONSTRUCTION LOADING DIAGRAM LOCATED ON THIS PAGE.



DIAMETER	MAX COVER*	75% MAX COVER**
30"-42"	50'-0"	37'-6"
48"-96"	30'-0"	22'-6"

*FOR INITIAL BACKFILL USE ASTM D2321, CLASS I, II MATERIAL.

**REDUCED MAX. COVER WHEN USING ASTM D2321 CLASS III MATERIAL IN TRENCH/HAUNCH ZONE OR FOR FIRST BACKFILL.

1. MINIMUM TRENCH WIDTH MUST ALLOW ROOM FOR PROPER COMPACTION OF HAUNCH MATERIALS UNDER PIPE. MIN. WIDTH = (1.25 x DIAMETER) + 12" (FOLLOW ASTM D2321)

1a. MINIMUM EMBANKMENT WIDTH IS 3 PIPE DIAMETERS BUT NO LESS THAN 2' OUTSIDE OF SPRINGLINE.

2. FOUNDATION SHALL BE WELL CONSOLIDATED & STABLE.

3. ENGINEER TO DETERMINE IF BEDDING IS REQUIRED. BEDDING MATERIAL SHALL BE A RELATIVELY LOOSE MATERIAL THAT IS ROUGHLY SHAPED TO FIT THE BOTTOM OF THE PIPE, 4" TO 6" IN DEPTH.

4. DUROMAXX STEEL REINFORCED (SRPE) PIPE.

5. HAUNCH ZONE MATERIAL SHALL BE HAND SHOVELED OR SHOVEL SLICED INTO PLACE TO ALLOW FOR PROPER COMPACTION.

5a. INITIAL BACKFILL FOR PIPE EMBEDMENT MATERIAL TO MEET ASTM D2321 CLASS I, II, III OR APPROVED EQUAL, COMPACTED TO 90% STANDARD PROCTOR (NATIVE MATERIAL CAN BE UTILIZED THAT MEETS ASTM D2321 OR APPROVED EQUAL).
- ALL LIFTS PLACED IN CONTROLLED MANNER. TO PREVENT UNEVEN LOADING, IT IS RECOMMENDED THAT LIFTS NOT EXCEED 8" UNCOMPACTED LIFT HEIGHTS.

6. INITIAL BACKFILL ABOVE PIPE MAY INCLUDE ROAD BASE MATERIAL AND RIGID PAVEMENT (IF APPLICABLE), MINIMUM COVER STILL APPLIES, OTHERWISE:
6" MINIMUM FOR PIPE DIAMETERS 30" - 60"
12" MINIMUM FOR PIPE DIAMETERS 66" - 96"

6a. HEIGHT OF COMPACTED COVER PER DIAMETER FOR CONVENTIONAL HIGHWAY LOADS (DISTANCE MEASURED FROM TOP OF PIPE TO BOTTOM OF FLEXIBLE PAVEMENT OR TOP OF RIGID PAVEMENT):
12" MINIMUM FOR PIPE DIAMETERS 30" - 60"
18" MINIMUM FOR PIPE DIAMETER 66" - 72"
24" MINIMUM FOR PIPE DIAMETERS 84" - 96"

7. FINAL BACKFILL MATERIAL SELECTION AND COMPACTION REQUIREMENTS PER THE PROJECT PLANS, SPECIFICATIONS. ENGINEER OF RECORD.

NOTES:
- ENGINEER TO DETERMINE IF GEOTEXTILE SHOULD BE USED TO PREVENT SOIL MIGRATION.
- FOR MULTIPLE BARREL INSTALLATION THE RECOMMENDED STANDARD SPACING BETWEEN PARALLEL PIPE RUNS SHALL BE = PIPE DIA./2 OR 3' FOR PIPE DIAMETERS 72" AND LARGER. CONTACT YOUR CONTECH REPRESENTATIVE FOR NONSTANDARD SPACING.
- BACKFILL REQUIREMENTS SHALL FOLLOW ASTM D2321. IN THE EVENT OF DISCREPANCIES, ASTM D2321 SHALL SUPERCEDE THIS DETAIL.

INSTALLATION/BACKFILL DETAIL

NOT TO SCALE

C:\EXPORTS\TEMPLATES\DUROMAXX.DWG 10/18/2019 10:02 AM

The design and information shown on this drawing is provided as a service to the project owner, engineer and contractor by Contech Engineered Solutions LLC ("Contech"). Neither this drawing, nor any part thereof, may be used, reproduced or modified in any manner without the prior written consent of Contech. Failure to comply is done at the user's own risk and Contech expressly disclaims any liability or responsibility for such use.

If discrepancies between the supplied information upon which the drawing is based and actual field conditions are encountered as site work progresses, these discrepancies must be reported to Contech immediately for re-evaluation of the design. Contech accepts no liability for designs based on missing, incomplete or inaccurate information supplied by others.

MARK	DATE	REVISION DESCRIPTION	BY

CONTECH ENGINEERED SOLUTIONS LLC
www.ContechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

DuroMaxx® STEEL REINFORCED PE TECHNOLOGY

CONTECH **DYODS** DRAWING

DYO46344 Story House Village
120"
Sheridan, WY
DETENTION SYSTEM

PROJECT No.:	SEQ. No.:	DATE:
31971	46344	2/21/2024
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.: D2		

NO.	REVISION	BY	DATE

PROJECT NO. 2023-137

PREPARED BY
WWC ENGINEERING
1849 TERRA AVE.
SHERIDAN, WY 82801
(307) 672-0761
www.wwcengineering.com

STORY HOUSE PROPERTY COMPANY, LLC

STORY HOUSE VILLAGE PUD - PHASE 1

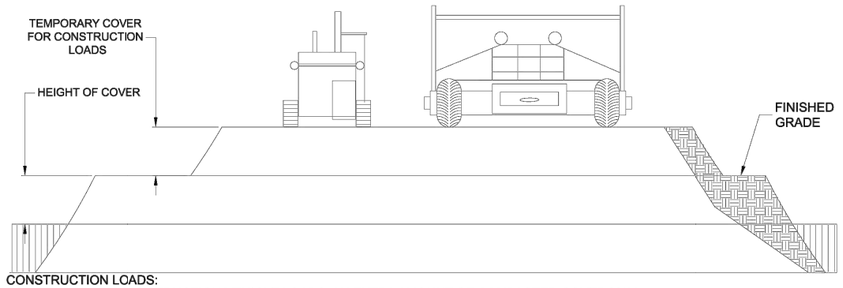
ORENCO DETAIL SHEET

SHERIDAN COUNTY, WYOMING

DESIGNED BY: SER
DRAWN BY: CIM
CHECKED BY: CDR
DATE: 02/29/2024

DRAFT

SHEET 65



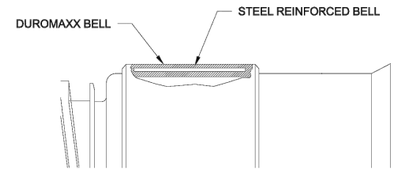
CONSTRUCTION LOADS:
FOR TEMPORARY CONSTRUCTION VEHICLE LOADS, AN EXTRA AMOUNT OF COMPACTED COVER MAY BE REQUIRED OVER THE TOP OF THE PIPE. THE HEIGHT-OF-COVER SHALL MEET THE MINIMUM REQUIREMENTS SHOWN IN THE TABLE BELOW. THE USE OF HEAVY CONSTRUCTION EQUIPMENT NECESSITATES GREATER PROTECTION FOR THE PIPE THAN FINISHED GRADE COVER MINIMUMS FOR NORMAL HIGHWAY TRAFFIC.

DIAMETERS	AXLE LOADS (kips)			
	18-50	50-75	75-110	110-150
	MINIMUM COVER (FT)			
12"-42"	2.0	2.5	3.0	3.0
48"-72"	3.0	3.5	3.5	4.0
84"-96"	3.0	3.5	4.0	4.5
108"-120"	3.5	4.0	4.5	5.0

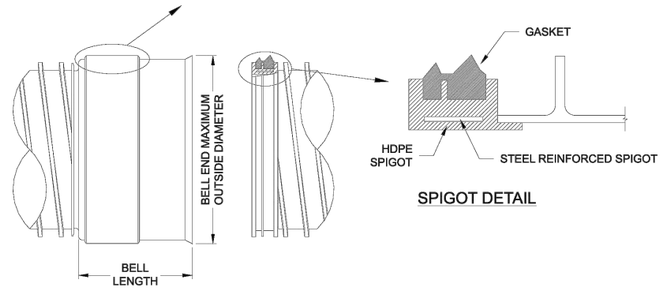
MINIMUM COVER MAY VARY, DEPENDING ON LOCAL CONDITIONS. THE CONTRACTOR MUST PROVIDE THE ADDITIONAL COVER REQUIRED TO AVOID DAMAGE TO THE PIPE. MINIMUM COVER IS MEASURED FROM THE TOP OF THE PIPE TO THE TOP OF THE **MAINTAINED CONSTRUCTION ROADWAY SURFACE.*

CONSTRUCTION LOADING DIAGRAM

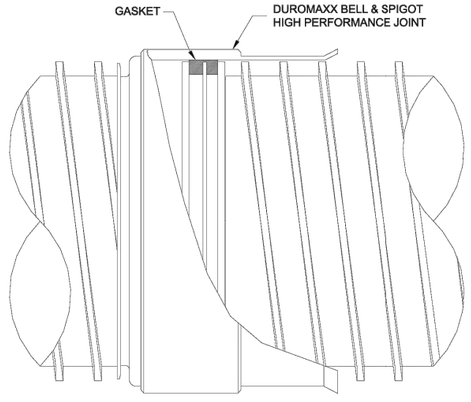
N.T.S



BELL DETAIL



SPIGOT DETAIL



NOMINAL PIPE DIA. (in)	BELL O.D. (in)	BELL LENGTH (in)-MAX
30	34.0	8.90
36	39.9	8.90
42	45.8	8.90
48	52.3	8.90
54	58.2	8.90
60	64.1	8.90
66	71.6	11.15
72	77.6	11.15
ABOVE JOINTS ARE 10.8 psi		
84	88.9	11.15
84" BELL & SPIGOT (SOIL TIGHT ONLY)		

HIGH PERFORMANCE (HP) JOINT DETAIL

NOT TO SCALE

The design and information shown on this drawing is provided as a service to the project owner, engineer and contractor by Contech Engineered Solutions LLC ("Contech"). Neither this drawing, nor any part thereof, may be used, reproduced or modified in any manner without the prior written consent of Contech. Failure to comply is done at the user's own risk and Contech expressly disclaims any liability or responsibility for such use.

If discrepancies between the supplied information upon which the drawing is based and actual field conditions are encountered as site work progresses, these discrepancies must be reported to Contech immediately for re-evaluation of the design. Contech accepts no liability for designs based on missing, incomplete or inaccurate information supplied by others.

MARK	DATE	REVISION DESCRIPTION	BY

CONTECH® ENGINEERED SOLUTIONS LLC
www.ContechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

DuroMaxx® STEEL REINFORCED PE TECHNOLOGY

CONTECH DYODS DRAWING

DYO46344 Story House Village
120"
Sheridan, WY
DETENTION SYSTEM

PROJECT No.:	SEQ. No.:	DATE:
31971	46344	2/21/2024
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.: D3		

C:\EXPORTS\TEMPLATES\DUROMAXX.DWG 10/18/2019 10:02 AM

k:\Sheridan\story house management\20231137 story house village\05CAD\Sheets\PLAN SET\23137_VILG_PLNST_DETL.dwg DETL (8) 2/29/2024 3:43:48 PM

NO.	REVISION	BY	DATE

PROJECT NO. 2023-137

PREPARED BY
WWC ENGINEERING
1849 TERRA AVE.
SHERIDAN, WY 82801
(307) 672-0761
www.wwcengineering.com

STORY HOUSE PROPERTY COMPANY, LLC
STORY HOUSE VILLAGE PUD - PHASE 1
ORENCO DETAIL SHEET
SHERIDAN COUNTY, WYOMING

DESIGNED BY: *SER*
DRAWN BY: *CIM*
CHECKED BY: *CDR*
DATE: *02/29/2024*

SHEET
66

DRAFT

k:\Sheridan\story house management\20223137 story house village\05CAD\Sheets\PLAN SET\23137_VILG_PLNST_DETL.dwg DETL (9) 2/29/2024 3:43:48 PM

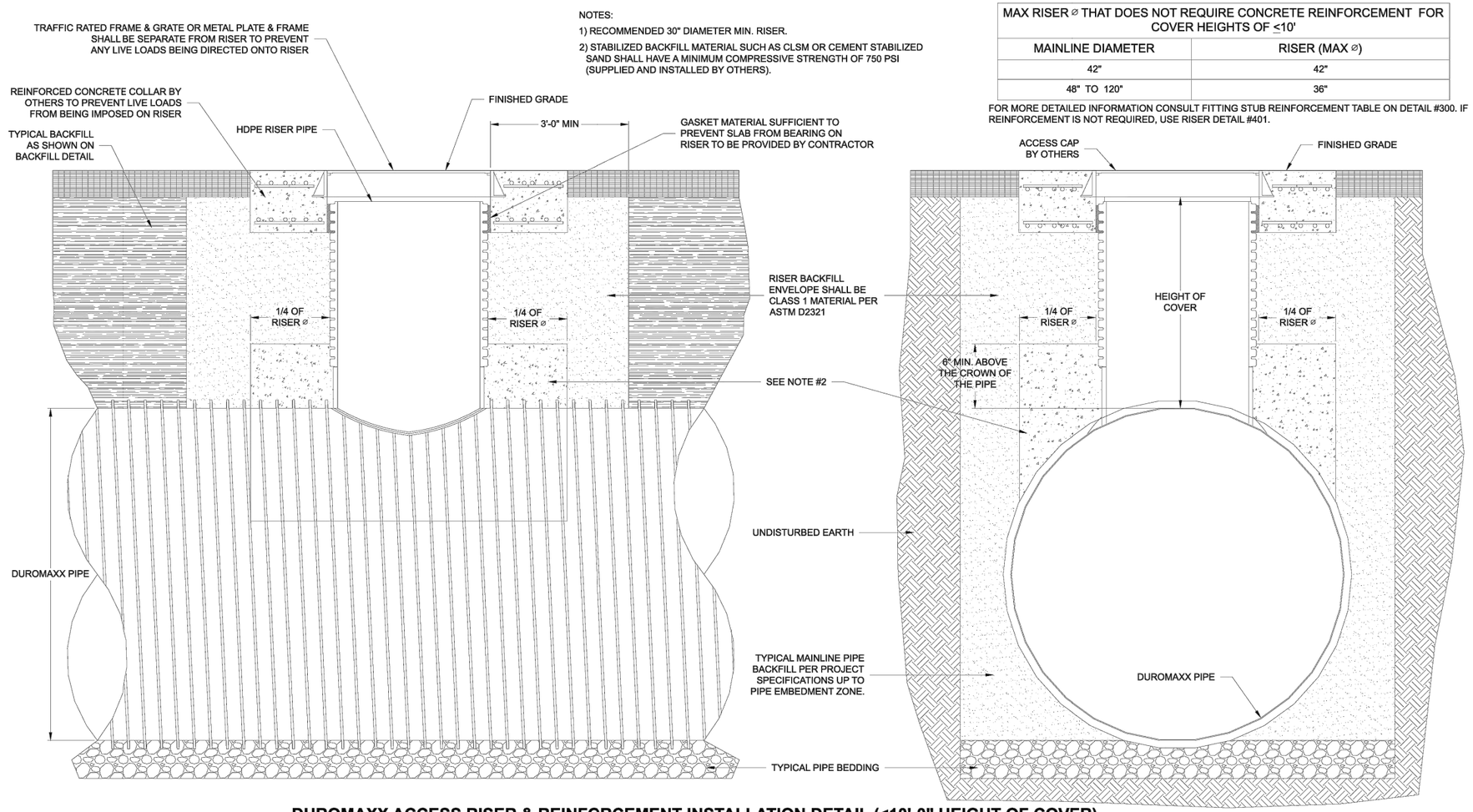
NOTES:

1) RECOMMENDED 30" DIAMETER MIN. RISER.

2) STABILIZED BACKFILL MATERIAL SUCH AS CLSM OR CEMENT STABILIZED SAND SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH OF 750 PSI (SUPPLIED AND INSTALLED BY OTHERS).

MAX RISER ⌀ THAT DOES NOT REQUIRE CONCRETE REINFORCEMENT FOR COVER HEIGHTS OF ≤10'	
MAINLINE DIAMETER	RISER (MAX ⌀)
42"	42"
48" TO 120"	36"

FOR MORE DETAILED INFORMATION CONSULT FITTING STUB REINFORCEMENT TABLE ON DETAIL #300. IF REINFORCEMENT IS NOT REQUIRED, USE RISER DETAIL #401.



DUROMAXX ACCESS RISER & REINFORCEMENT INSTALLATION DETAIL (<10'-0" HEIGHT OF COVER)

NOT TO SCALE

C:\EXPORT\BITEMPLATES\DUROMAXX.DWG 10/18/2019 10:02 AM

The design and information shown on this drawing is provided as a service to the project owner, engineer and contractor by Contech Engineered Solutions LLC ("Contech"). Neither this drawing, nor any part thereof, may be used, reproduced or modified in any manner without the prior written consent of Contech. Failure to comply is done at the user's own risk and Contech expressly disclaims any liability or responsibility for such use.

If discrepancies between the supplied information upon which the drawing is based and actual field conditions are encountered as site work progresses, these discrepancies must be reported to Contech immediately for re-evaluation of the design. Contech accepts no liability for designs based on missing, incomplete or inaccurate information supplied by others.

MARK	DATE	REVISION DESCRIPTION	BY

CONTECH® ENGINEERED SOLUTIONS LLC
www.ContechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

DuroMaxx® STEEL REINFORCED PE TECHNOLOGY

CONTECH DYODS DRAWING

DYO46344 Story House Village
120"
Sheridan, WY
DETENTION SYSTEM

PROJECT No.:	SEQ. No.:	DATE:
31971	46344	2/21/2024
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.: D4		

NO.	REVISION	BY	DATE

PROJECT NO. 2023-137

PREPARED BY
WWC ENGINEERING
1849 TERRA AVE.
SHERIDAN, WY 82801
(307) 672-0761
www.wwcengineering.com

STORY HOUSE PROPERTY COMPANY, LLC

STORY HOUSE VILLAGE PUD - PHASE 1

ORENCO DETAIL SHEET

SHERIDAN COUNTY, WYOMING

DESIGNED BY: SER
DRAWN BY: CIM
CHECKED BY: CDR
DATE: 02/29/2024

SHEET 67

DRAFT

k:\Sheridan\story house management\20223137 story house village\05CAD\Sheets\PLAN SET\23137_VILG_PLNST_DETL.dwg DETL (10) 2/29/2024 3:43:48 PM

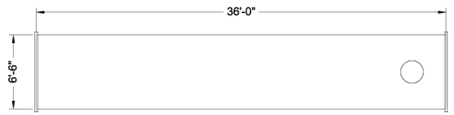
PROJECT SUMMARY

CALCULATION DETAILS
- LOADING = H20
- APPROX. LINEAR FOOTAGE = 36 LF

STORAGE SUMMARY
- STORAGE VOLUME REQUIRED = 1,136.2,846,433,135,664 (
- PIPE STORAGE VOLUME = 1,157 CF
- BACKFILL STORAGE VOLUME = 0 CF
- TOTAL STORAGE PROVIDED = 1,157 CF

PIPE DETAILS
- DIAMETER = 78"
- JOINT TYPE = Soil Tight
- ALL RISERS TO HAVE REINFORCEMENT COLLAR
- WALL TYPE = SOLID
- BARREL SPACING = 36"

BACKFILL DETAILS
- WIDTH AT ENDS = 12"
- ABOVE PIPE = 0"
- WIDTH AT SIDES = 12"
- BELOW PIPE = 0"



NOTE:
THESE DRAWINGS ARE FOR CONCEPTUAL PURPOSES AND DO NOT REFLECT ANY LOCAL PREFERENCES OR REGULATIONS. PLEASE CONTACT YOUR LOCAL CONTECH REP FOR MODIFICATIONS.

NOTES

- ALL RISER AND STUB DIMENSIONS ARE TO CENTERLINE.
- ALL ELEVATIONS, DIMENSIONS, AND LOCATIONS OF RISERS AND INLETS, SHALL BE VERIFIED BY THE ENGINEER OF RECORD PRIOR TO RELEASING FOR FABRICATION.
- ALL RISERS AND STUBS ARE FABRICATED USING HDPE DR32.5 & M294 PIPE UNLESS OTHERWISE NOTED.
- RISERS TO BE FIELD TRIMMED TO GRADE.
- QUANTITY OF PIPE SHOWN DOES NOT PROVIDE EXTRA PIPE FOR CONNECTING THE SYSTEM TO EXISTING PIPE OR DRAINAGE STRUCTURES. OUR SYSTEM AS DETAILED PROVIDES NOMINAL INLET AND/OR OUTLET PIPE STUB FOR CONNECTION TO EXISTING DRAINAGE FACILITIES. IF ADDITIONAL PIPE IS NEEDED IT WILL HAVE TO BE REQUESTED BY THE REVIEWER/APPROVAL AUTHORITY PRIOR TO FABRICATION.

ASSEMBLY
SCALE: 1" = 7.5'

C:\EXPORTS\TEMPLATES\DUROMAXX.DWG 10/15/2019 10:02 AM

The design and information shown on this drawing is provided as a service to the project owner, engineer and contractor by Contech Engineered Solutions LLC ("Contech"). Neither this drawing, nor any part thereof, may be used, reproduced or modified in any manner without the prior written consent of Contech. Failure to comply is done at the user's own risk and Contech expressly disclaims any liability or responsibility for such use.

If discrepancies between the supplied information upon which the drawing is based and actual field conditions are encountered as site work progresses, these discrepancies must be reported to Contech immediately for re-evaluation of the design. Contech accepts no liability for designs based on missing, incomplete or inaccurate information supplied by others.

MARK	DATE	REVISION DESCRIPTION	BY

CONTECH® ENGINEERED SOLUTIONS LLC
www.ContechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

DuroMaxx® STEEL REINFORCED PE TECHNOLOGY

CONTECH DYODS DRAWING

DYO46346 Story House Village
78" Pre-Tank
Sheridan, WY
DETENTION SYSTEM

PROJECT No.:	SEQ. No.:	DATE:
31971	46346	2/21/2024
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.: D1		

NO.	REVISION	BY	DATE

PROJECT NO. 2023-137

PREPARED BY
WWC ENGINEERING
1849 TERRA AVE.
SHERIDAN, WY 82801
(307) 672-0761
www.wwcengineering.com

STORY HOUSE PROPERTY COMPANY, LLC
STORY HOUSE VILLAGE PUD - PHASE 1
ORENCO DETAIL SHEET
SHERIDAN COUNTY, WYOMING

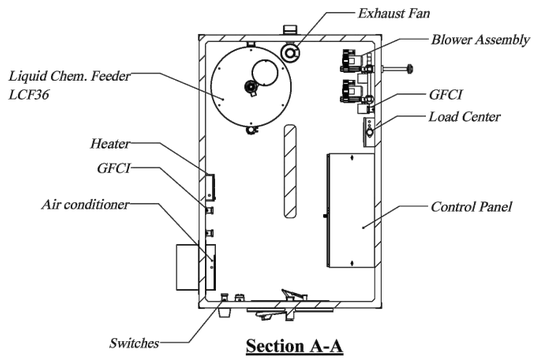
DESIGNED BY: SER
DRAWN BY: CIM
CHECKED BY: CDR
DATE: 02/29/2024

SHEET
68

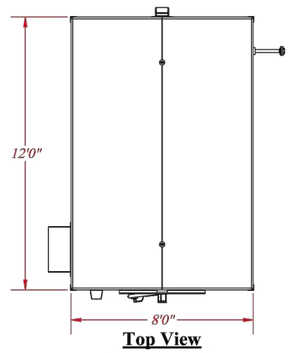
DRAFT

k:\Sheridan\story house management\20223137 story house village\05CAD\Sheets\PLAN SET\23137_VILG_PLNST_DETL.dwg DETL (11) 2/29/2024 3:43:48 PM

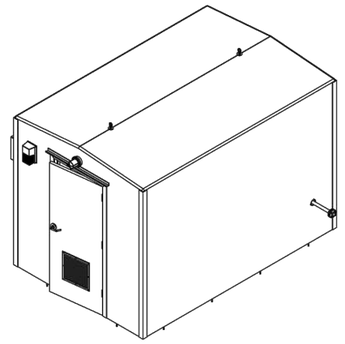
Note:Final heating, ventilation., and cooling systems may be altered based on climate requirements



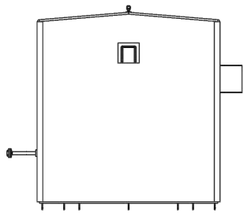
Section A-A
Scale 1" = 3'-9"



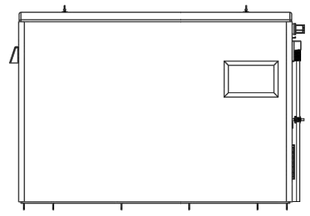
Top View
Scale 1" = 3'-9"



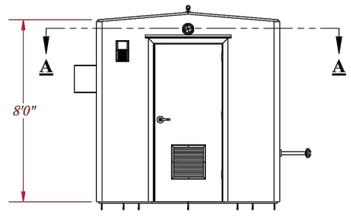
Isometric View



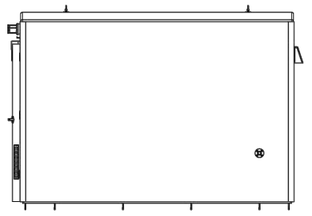
Rear View
Scale 1" = 3'-9"



Left Side View
Scale 1" = 3'-9"



Front View
Scale 1" = 3'-9"



Right Side View
Scale 1" = 3'-9"

Orenco SYSTEMS

© Orenco Systems, Inc.
Portions or all of this Proposed System Configuration Drawing, as appropriate, may be reproduced and integrated into the site-specific layout and configuration of a system by its designer.

Disclaimer: THIS PROPOSED SYSTEM CONFIGURATION DRAWING IS PROVIDED SOLELY AS A DESIGN AID AND ILLUSTRATES ONE POSSIBLE CONFIGURATION OF A SYSTEM THAT WOULD COMPLY WITH ORENCO's DESIGN CRITERIA FOR THE REQUIREMENTS AND/OR SPECIFICATIONS THAT HAVE BEEN COMMUNICATED TO ORENCO (BASED ON THIRD-PARTY STANDARDS TESTING PROTOCOLS AND PERFORMANCE REPORTS, AS APPLICABLE). DESIGN DECISIONS, INCLUDING THE ACTUAL LAYOUT AND CONFIGURATION OF THE SYSTEM AND ITS VIABILITY FOR THE PROJECT, ARE AT THE SOLE DISCRETION OF THE SYSTEMS's DESIGNER.

BUILDING, 12'0" LENGTH X 8'0" WIDTH X 8'0" HEIGHT

DESIGN AID

Drawn By: QA		Scale: 1" = 3'-9"	
Reviewed By:		Sheet: 1 OF 1	
File Name: SE-DFS-EW-RHR-MAX.SLDDRW	Rev: 1.0	Date: 08/19/2022	

DRAFT

NO.	REVISION	BY	DATE

PROJECT NO. 2023-137

PREPARED BY
WWC ENGINEERING
1849 TERRA AVE.
SHERIDAN, WY 82801
(307) 672-0761
www.wwcengineering.com

STORY HOUSE PROPERTY COMPANY, LLC

STORY HOUSE VILLAGE PUD - PHASE 1

ORENCO DETAIL SHEET

SHERIDAN COUNTY, WYOMING

DESIGNED BY: SER
DRAWN BY: CIM
CHECKED BY: CDR
DATE: 02/29/2024

SHEET
69

APPENDIX B

Water Calculations

Peak Day – Pipe Table

ID	Label	Length (Scaled) (ft)	Start Node	Stop Node	Diameter (in)	Material	Hazen-Williams C	Flow (gpm)	Pressure (Stop) (psi)	Velocity (ft/s)
61479	P-1066	26	J-3762	J-3734	12.0	PVC	135.0	393.38	56	1.12
61481	P-1068	35	J-3735	J-3737	12.0	PVC	135.0	375.99	52	1.07
61483	P-1070	219	J-3736	J-3738	12.0	PVC	135.0	202.08	50	0.57
61485	P-1072	141	J-3739	J-3740	12.0	PVC	135.0	3.87	51	0.01
61487	P-1074	134	J-3738	J-3742	8.0	PVC	135.0	188.07	52	1.20
61488	P-1075	105	J-3742	J-3743	8.0	PVC	135.0	187.58	54	1.20
61490	P-1077	233	J-3744	J-3745	8.0	PVC	135.0	89.10	53	0.57
61492	P-1079	124	J-3746	J-3749	8.0	PVC	135.0	35.84	69	0.23
61493	P-1080	74	J-3749	J-3747	8.0	PVC	135.0	19.89	70	0.13
61494	P-1081	56	J-3747	J-3748	8.0	PVC	135.0	18.44	70	0.12
61499	P-1086	80	J-3754	J-3755	8.0	PVC	135.0	-78.68	60	0.50
61500	P-1087	108	J-3755	J-3756	8.0	PVC	135.0	-87.37	57	0.56
61503	P-1089	44	J-3749	J-3763	8.0	PVC	135.0	13.53	69	0.09
61781	P-1069(1)	157	J-3737	J-3764	12.0	PVC	135.0	293.38	49	0.83
61782	P-1069(2)	201	J-3764	J-3736	12.0	PVC	135.0	210.78	50	0.60
61786	P-1071(1)	155	J-3738	J-3765	12.0	PVC	135.0	4.84	50	0.01
61787	P-1071(2)	126	J-3765	J-3739	12.0	PVC	135.0	4.84	50	0.01
61788	P-1093	8	H-1727	J-3765	8.0	PVC	135.0	0.00	50	0.00
61791	P-1073(1)	67	J-3740	J-3766	12.0	PVC	135.0	1.94	52	0.01
61792	P-1073(2)	540	J-3766	J-3741	10.0	PVC	135.0	0.48	61	0.00
61793	P-1094	11	H-1728	J-3766	8.0	PVC	135.0	0.00	52	0.00
61797	P-1084(1)	213	J-3751	J-3767	8.0	PVC	135.0	-33.25	66	0.21
61798	P-1084(2)	165	J-3767	J-3753	8.0	PVC	135.0	-64.18	67	0.41
61799	P-1095	15	H-1730	J-3767	6.0	PVC	135.0	0.00	66	0.00
61802	P-1083(1)	315	J-3757	J-3768	8.0	PVC	135.0	6.37	65	0.04
61803	P-1083(2)	204	J-3768	J-3751	8.0	PVC	135.0	-0.88	64	0.01
61804	P-1096	11	H-1731	J-3768	6.0	PVC	135.0	0.00	65	0.00
61809	P-1078(2)	213	J-3769	J-3746	8.0	PVC	135.0	40.67	69	0.26
61810	P-1097	14	H-1733	J-3769	6.0	PVC	135.0	0.00	64	0.00

Peak Day – Pipe Table (Cont.)

ID	Label	Length (Scaled) (ft)	Start Node	Stop Node	Diameter (in)	Material	Hazen-Williams C	Flow (gpm)	Pressure (Stop) (psi)	Velocity (ft/s)
61812	P-1076(1)	28	J-3743	J-3770	8.0	PVC	135.0	187.58	54	1.20
61813	P-1076(2)	26	J-3770	J-3744	8.0	PVC	135.0	187.10	54	1.19
61817	P-1078(1)(1)	249	J-3745	J-3771	8.0	PVC	135.0	78.95	53	0.50
61818	P-1078(1)(2)	481	J-3771	J-3769	8.0	PVC	135.0	57.15	64	0.36
61819	P-1099	14	H-1734	J-3771	6.0	PVC	135.0	0.00	53	0.00
61823	P-1091(2)	11	J-3772	J-3750	8.0	PVC	135.0	0.00	59	0.00
61827	P-1082(1)	10	J-3748	J-3773	8.0	PVC	135.0	17.48	70	0.11
61828	P-1082(2)	114	J-3773	J-3757	8.0	PVC	135.0	14.58	69	0.09
61829	P-1101	9	H-1732	J-3773	6.0	PVC	135.0	0.00	70	0.00
61839	P-1088(1)	156	J-3756	J-3774	8.0	PVC	135.0	-96.07	55	0.61
61840	P-1088(2)	44	J-3774	J-3744	8.0	PVC	135.0	-96.07	54	0.61
61841	P-1102	29	J-3774	H-1729	6.0	PVC	135.0	0.00	54	0.00
61843	P-1067(1)	171	J-3734	J-3775	12.0	PVC	135.0	384.69	54	1.09
61844	P-1067(2)	132	J-3775	J-3735	12.0	PVC	135.0	375.99	53	1.07
61846	P-1091(1)(1)	159	J-3758	J-3776	8.0	PVC	135.0	7.25	62	0.05
61847	P-1091(1)(2)	143	J-3776	J-3772	8.0	PVC	135.0	2.90	59	0.02
61850	P-1104	24	J-3750	H-1736	6.0	PVC	135.0	0.00	59	0.00
61852	P-1090(1)	153	J-3763	J-3777	8.0	PVC	135.0	11.11	68	0.07
61853	P-1090(2)	98	J-3777	J-3758	8.0	PVC	135.0	8.70	66	0.06
61855	P-1105	16	H-1735	J-3777	6.0	PVC	135.0	0.00	68	0.00
61859	P-1085(1)	238	J-3753	J-3780	8.0	PVC	135.0	-71.43	63	0.46
61860	P-1085(2)	64	J-3780	J-3754	8.0	PVC	135.0	-78.68	61	0.50
61861	P-1106	14	H-1737	J-3780	6.0	PVC	135.0	0.00	63	0.00
61862	P-1107	20	H-1726	J-3737	8.0	PVC	135.0	0.00	52	0.00
61865	P-1108	22	H-1738	J-3736	8.0	PVC	135.0	0.00	50	0.00

Peak Hour – Pipe Table

ID	Label	Length (Scaled) (ft)	Start Node	Stop Node	Diameter (in)	Material	Hazen-Williams C	Flow (gpm)	Pressure (Stop) (psi)	Velocity (ft/s)
61479	P-1066	26	J-3762	J-3734	12.0	PVC	135.0	621.33	53	1.76
61481	P-1068	35	J-3735	J-3737	12.0	PVC	135.0	593.77	49	1.68
61483	P-1070	219	J-3736	J-3738	12.0	PVC	135.0	579.99	47	1.65
61485	P-1072	141	J-3739	J-3740	12.0	PVC	135.0	4.54	48	0.01
61487	P-1074	134	J-3738	J-3742	8.0	PVC	135.0	557.89	49	3.56
61488	P-1075	105	J-3742	J-3743	8.0	PVC	135.0	557.14	50	3.56
61490	P-1077	233	J-3744	J-3745	8.0	PVC	135.0	186.39	49	1.19
61492	P-1079	124	J-3746	J-3749	8.0	PVC	135.0	103.09	66	0.66
61493	P-1080	74	J-3749	J-3747	8.0	PVC	135.0	78.14	66	0.50
61494	P-1081	56	J-3747	J-3748	8.0	PVC	135.0	75.87	66	0.48
61499	P-1086	80	J-3754	J-3755	8.0	PVC	135.0	-77.57	56	0.50
61500	P-1087	108	J-3755	J-3756	8.0	PVC	135.0	-222.27	54	1.42
61503	P-1089	44	J-3749	J-3763	8.0	PVC	135.0	21.17	65	0.14
61781	P-1069(1)	157	J-3737	J-3764	12.0	PVC	135.0	593.77	46	1.68
61782	P-1069(2)	201	J-3764	J-3736	12.0	PVC	135.0	593.77	47	1.68
61786	P-1071(1)	155	J-3738	J-3765	12.0	PVC	135.0	7.56	47	0.02
61787	P-1071(2)	126	J-3765	J-3739	12.0	PVC	135.0	6.80	47	0.02
61788	P-1093	8	H-1727	J-3765	8.0	PVC	135.0	0.00	47	0.00
61791	P-1073(1)	67	J-3740	J-3766	12.0	PVC	135.0	2.27	49	0.01
61792	P-1073(2)	540	J-3766	J-3741	10.0	PVC	135.0	0.76	57	0.00
61793	P-1094	11	H-1728	J-3766	8.0	PVC	135.0	0.00	49	0.00
61797	P-1084(1)	213	J-3751	J-3767	8.0	PVC	135.0	-5.62	62	0.04
61798	P-1084(2)	165	J-3767	J-3753	8.0	PVC	135.0	-54.61	63	0.35
61799	P-1095	15	H-1730	J-3767	6.0	PVC	135.0	0.00	62	0.00
61802	P-1083(1)	315	J-3757	J-3768	8.0	PVC	135.0	56.97	61	0.36
61803	P-1083(2)	204	J-3768	J-3751	8.0	PVC	135.0	45.63	60	0.29
61804	P-1096	11	H-1731	J-3768	6.0	PVC	135.0	0.00	61	0.00
61809	P-1078(2)	213	J-3769	J-3746	8.0	PVC	135.0	110.65	65	0.71
61810	P-1097	14	H-1733	J-3769	6.0	PVC	135.0	0.00	60	0.00

Peak Hour – Pipe Table (Cont.)

ID	Label	Length (Scaled) (ft)	Start Node	Stop Node	Diameter (in)	Material	Hazen-Williams C	Flow (gpm)	Pressure (Stop) (psi)	Velocity (ft/s)
61812	P-1076(1)	28	J-3743	J-3770	8.0	PVC	135.0	557.14	50	3.56
61813	P-1076(2)	26	J-3770	J-3744	8.0	PVC	135.0	556.38	50	3.55
61817	P-1078(1)(1)	249	J-3745	J-3771	8.0	PVC	135.0	170.37	50	1.09
61818	P-1078(1)(2)	481	J-3771	J-3769	8.0	PVC	135.0	136.29	60	0.87
61819	P-1099	14	H-1734	J-3771	6.0	PVC	135.0	0.00	50	0.00
61823	P-1091(2)	11	J-3772	J-3750	8.0	PVC	135.0	0.00	55	0.00
61827	P-1082(1)	10	J-3748	J-3773	8.0	PVC	135.0	74.36	66	0.47
61828	P-1082(2)	114	J-3773	J-3757	8.0	PVC	135.0	69.83	65	0.45
61829	P-1101	9	H-1732	J-3773	6.0	PVC	135.0	0.00	66	0.00
61839	P-1088(1)	156	J-3756	J-3774	8.0	PVC	135.0	-366.97	51	2.34
61840	P-1088(2)	44	J-3774	J-3744	8.0	PVC	135.0	-366.97	50	2.34
61841	P-1102	29	J-3774	H-1729	6.0	PVC	135.0	0.00	50	0.00
61843	P-1067(1)	171	J-3734	J-3775	12.0	PVC	135.0	607.55	51	1.72
61844	P-1067(2)	132	J-3775	J-3735	12.0	PVC	135.0	593.77	50	1.68
61846	P-1091(1)(1)	159	J-3758	J-3776	8.0	PVC	135.0	12.10	58	0.08
61847	P-1091(1)(2)	143	J-3776	J-3772	8.0	PVC	135.0	3.78	55	0.02
61850	P-1104	24	J-3750	H-1736	6.0	PVC	135.0	0.00	55	0.00
61852	P-1090(1)	153	J-3763	J-3777	8.0	PVC	135.0	20.42	64	0.13
61853	P-1090(2)	98	J-3777	J-3758	8.0	PVC	135.0	18.15	62	0.12
61855	P-1105	16	H-1735	J-3777	6.0	PVC	135.0	0.00	64	0.00
61859	P-1085(1)	238	J-3753	J-3780	8.0	PVC	135.0	-66.09	59	0.42
61860	P-1085(2)	64	J-3780	J-3754	8.0	PVC	135.0	-77.57	58	0.50
61861	P-1106	14	H-1737	J-3780	6.0	PVC	135.0	0.00	59	0.00
61862	P-1107	20	H-1726	J-3737	8.0	PVC	135.0	0.00	49	0.00
61865	P-1108	22	H-1738	J-3736	8.0	PVC	135.0	0.00	47	0.00

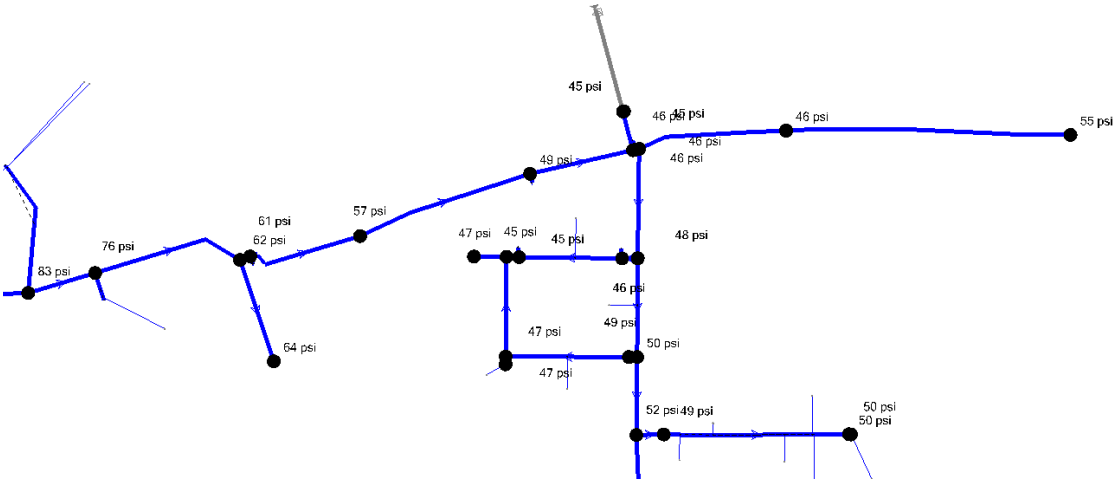
Fire Flow – Pipe Table

ID	Label	Length (Scaled) (ft)	Start Node	Stop Node	Diameter (in)	Material	Hazen-Williams C	Flow (gpm)	Pressure (Stop) (psi)	Velocity (ft/s)
61479	P-1066	26	J-3762	J-3734	12.0	PVC	135.0	393.39	56	1.12
61481	P-1068	35	J-3735	J-3737	12.0	PVC	135.0	376.00	52	1.07
61483	P-1070	219	J-3736	J-3738	12.0	PVC	135.0	202.09	50	0.57
61485	P-1072	141	J-3739	J-3740	12.0	PVC	135.0	3.87	51	0.01
61487	P-1074	134	J-3738	J-3742	8.0	PVC	135.0	188.07	52	1.20
61488	P-1075	105	J-3742	J-3743	8.0	PVC	135.0	187.59	54	1.20
61490	P-1077	233	J-3744	J-3745	8.0	PVC	135.0	89.11	53	0.57
61492	P-1079	124	J-3746	J-3749	8.0	PVC	135.0	35.84	69	0.23
61493	P-1080	74	J-3749	J-3747	8.0	PVC	135.0	19.89	70	0.13
61494	P-1081	56	J-3747	J-3748	8.0	PVC	135.0	18.44	70	0.12
61499	P-1086	80	J-3754	J-3755	8.0	PVC	135.0	-78.68	60	0.50
61500	P-1087	108	J-3755	J-3756	8.0	PVC	135.0	-87.37	57	0.56
61503	P-1089	44	J-3749	J-3763	8.0	PVC	135.0	13.53	69	0.09
61781	P-1069(1)	157	J-3737	J-3764	12.0	PVC	135.0	293.39	49	0.83
61782	P-1069(2)	201	J-3764	J-3736	12.0	PVC	135.0	210.79	50	0.60
61786	P-1071(1)	155	J-3738	J-3765	12.0	PVC	135.0	4.84	50	0.01
61787	P-1071(2)	126	J-3765	J-3739	12.0	PVC	135.0	4.84	50	0.01
61788	P-1093	8	H-1727	J-3765	8.0	PVC	135.0	0.00	50	0.00
61791	P-1073(1)	67	J-3740	J-3766	12.0	PVC	135.0	1.94	52	0.01
61792	P-1073(2)	540	J-3766	J-3741	10.0	PVC	135.0	0.48	61	0.00
61793	P-1094	11	H-1728	J-3766	8.0	PVC	135.0	0.00	52	0.00
61797	P-1084(1)	213	J-3751	J-3767	8.0	PVC	135.0	-33.25	66	0.21
61798	P-1084(2)	165	J-3767	J-3753	8.0	PVC	135.0	-64.18	67	0.41
61799	P-1095	15	H-1730	J-3767	6.0	PVC	135.0	0.00	66	0.00
61802	P-1083(1)	315	J-3757	J-3768	8.0	PVC	135.0	6.36	65	0.04
61803	P-1083(2)	204	J-3768	J-3751	8.0	PVC	135.0	-0.88	64	0.01
61804	P-1096	11	H-1731	J-3768	6.0	PVC	135.0	0.00	65	0.00
61809	P-1078(2)	213	J-3769	J-3746	8.0	PVC	135.0	40.67	69	0.26
61810	P-1097	14	H-1733	J-3769	6.0	PVC	135.0	0.00	64	0.00

Fire Flow – Pipe Table (Cont.)

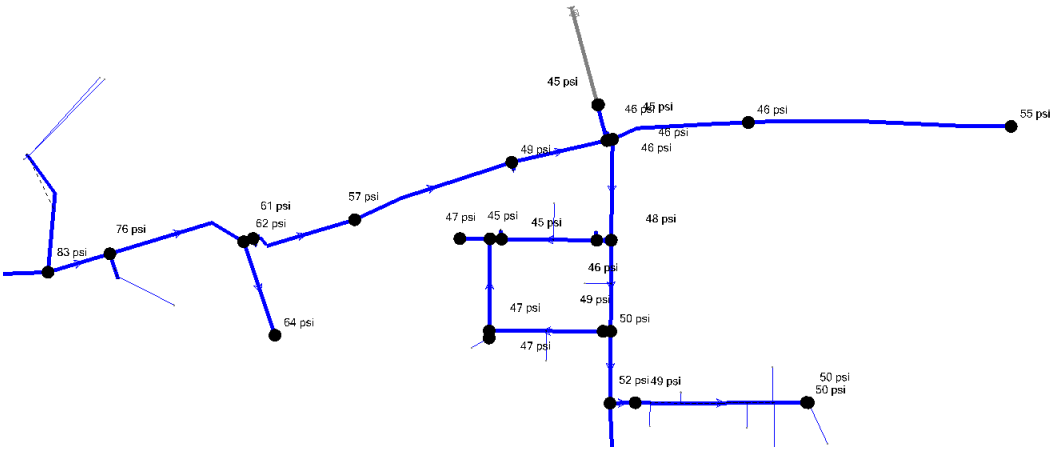
ID	Label	Length (Scaled) (ft)	Start Node	Stop Node	Diameter (in)	Material	Hazen-Williams C	Flow (gpm)	Pressure (Stop) (psi)	Velocity (ft/s)
61812	P-1076(1)	28	J-3743	J-3770	8.0	PVC	135.0	187.59	54	1.20
61813	P-1076(2)	26	J-3770	J-3744	8.0	PVC	135.0	187.11	54	1.19
61817	P-1078(1)(1)	249	J-3745	J-3771	8.0	PVC	135.0	78.96	53	0.50
61818	P-1078(1)(2)	481	J-3771	J-3769	8.0	PVC	135.0	57.15	64	0.36
61819	P-1099	14	H-1734	J-3771	6.0	PVC	135.0	0.00	53	0.00
61823	P-1091(2)	11	J-3772	J-3750	8.0	PVC	135.0	0.00	59	0.00
61827	P-1082(1)	10	J-3748	J-3773	8.0	PVC	135.0	17.48	70	0.11
61828	P-1082(2)	114	J-3773	J-3757	8.0	PVC	135.0	14.58	69	0.09
61829	P-1101	9	H-1732	J-3773	6.0	PVC	135.0	0.00	70	0.00
61839	P-1088(1)	156	J-3756	J-3774	8.0	PVC	135.0	-96.07	55	0.61
61840	P-1088(2)	44	J-3774	J-3744	8.0	PVC	135.0	-96.07	54	0.61
61841	P-1102	29	J-3774	H-1729	6.0	PVC	135.0	0.00	54	0.00
61843	P-1067(1)	171	J-3734	J-3775	12.0	PVC	135.0	384.69	54	1.09
61844	P-1067(2)	132	J-3775	J-3735	12.0	PVC	135.0	376.00	53	1.07
61846	P-1091(1)(1)	159	J-3758	J-3776	8.0	PVC	135.0	7.25	62	0.05
61847	P-1091(1)(2)	143	J-3776	J-3772	8.0	PVC	135.0	2.90	59	0.02
61850	P-1104	24	J-3750	H-1736	6.0	PVC	135.0	0.00	59	0.00
61852	P-1090(1)	153	J-3763	J-3777	8.0	PVC	135.0	11.12	68	0.07
61853	P-1090(2)	98	J-3777	J-3758	8.0	PVC	135.0	8.70	66	0.06
61855	P-1105	16	H-1735	J-3777	6.0	PVC	135.0	0.00	68	0.00
61859	P-1085(1)	238	J-3753	J-3780	8.0	PVC	135.0	-71.43	63	0.46
61860	P-1085(2)	64	J-3780	J-3754	8.0	PVC	135.0	-78.68	61	0.50
61861	P-1106	14	H-1737	J-3780	6.0	PVC	135.0	0.00	63	0.00
61862	P-1107	20	H-1726	J-3737	8.0	PVC	135.0	0.00	52	0.00
61865	P-1108	22	H-1738	J-3736	8.0	PVC	135.0	0.00	50	0.00

Existing Peak Day (City of Sheridan Model):



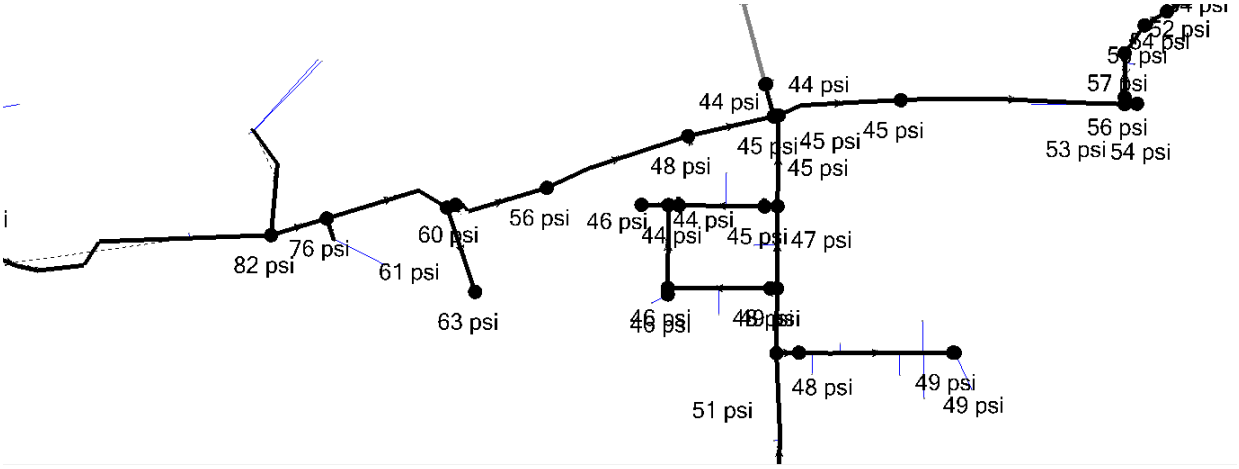
Junction ID (From Water Gems)	Pressure (psi)
3803	55
9144	46
9847	49
9566	47

Existing Peak + Fire Flow (City of Sheridan Model):



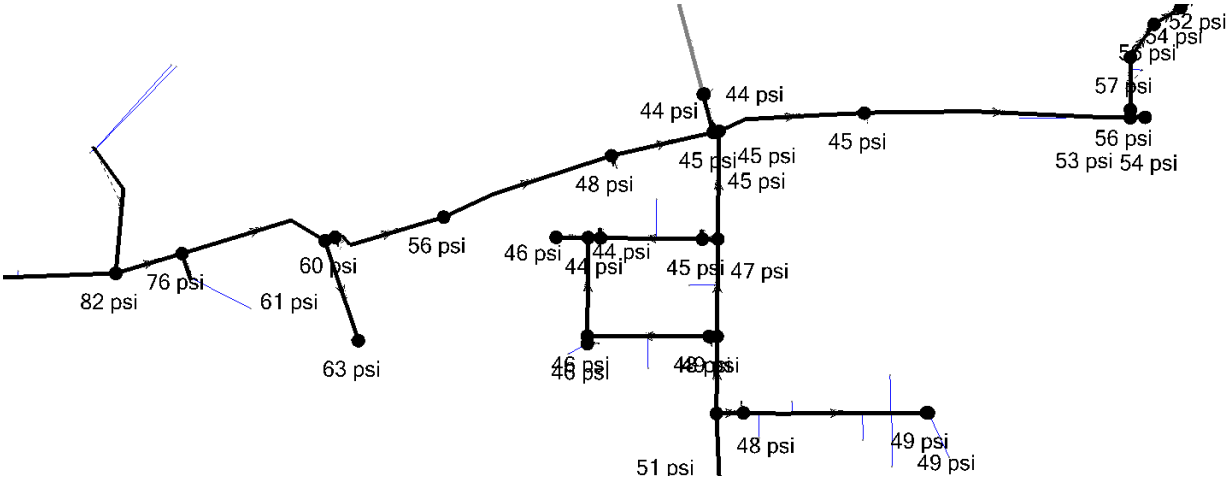
Junction ID (From Water Gems)	Pressure (psi)
3803	55
9144	46
9847	49
9566	47

Existing Peak Day (City of Sheridan Model + Story House):



Junction ID (From Water Gems)	Pressure (psi)
3803	54
9144	45
9847	48
9566	46

Existing Peak + Fire Flow (City of Sheridan Model + Story House):



Junction ID (From Water Gems)	Pressure (psi)
3803	54
9144	45
9847	48
9566	46

APPENDIX C

Sanitary Sewer Calculations

Table 1: Sanitary System Buildout

							Average Day		Peak Day			Peak Hour - 75% Full			200% Peak Day	
	Land Use	Area (acres)	Equivalent Population (persons/acre)	No. of Dwellings	Persons per Dwelling Unit	Average Daily Per Capita Flow (gal/person/day)	Average Daily Flow (gpd)	Totals (gpd)	Average Day to Peak Day Factor	Flow (gpd)	Totals (gpd)	Average Day to Peak Hour Factor	Flow (gpd)	Totals (gpd)	Flow (gpd)	Totals (gpd)
Block 1	Multifamily	6.75	26.5	--	--	100	17888		2.43	43467		2.74	49012		86933	
Block 2 - Lower	Commercial	2.03	18	--	--	100	3660		2.43	8893		2.74	10028		17787	
Block 2 - Upper	Residential	2.03	6.6	--	--	100	1342		2.43	3261		2.74	3677		6522	
Block 3 - Lower	Commercial	2.00	18	--	--	100	3600		2.43	8748		2.74	9864		17496	
Block 3 - Upper	Residential	2.00	6.6	--	--	100	1320		2.43	3208		2.74	3617		6415	
Block 4	Single Family	--	--	15	2.21	100	3315		2.43	8055		2.74	9083		16111	
Block 5 - North	Multifamily	2.28	26.5	--	--	100	6040		2.43	14678		2.74	16551		29356	
Block 5 - South	Multifamily	2.25	26.5	--	--	100	5955	66216	2.43	14471	160905	2.74	16317	182095	28941	321810
Block 6	Multifamily	2.22	26.5	--	--	100	5880		2.43	14288		2.74	16110		28575	
Block 7 - North	Single Family	--	--	21	2.21	100	4641		2.43	11278		2.74	12716		22555	
Block 7 - Central	Single Family	--	--	14	2.21	100	3094		2.43	7518		2.74	8478		15037	
Block 7 - South	Single Family	--	--	22	2.21	100	4862		2.43	11815		2.74	13322		23629	
Block 7 - East	Single Family	--	--	3	2.21	100	663		2.43	1611		3.74	2480		3222	
Block 8 - Lower	Commercial	1.61	18	--	--	100	2895		2.43	7035		2.74	7933		14070	
Block 8 - Upper	Residential	1.61	6.6	--	--	100	1062		2.43	2580		2.74	2909		5159	

Table 2: Story House Lane - 8" Gravity Sewer Main

							Average Day		Peak Day			Peak Hour - 75% Full			200% Peak Day	
	Land Use	Area (acres)	Equivalent Population (persons/acre)	No. of Dwellings	Persons per Dwelling Unit	Average Daily Per Capita Flow (gal/person/day)	Average Daily Flow (gpd)	Totals (gpd)	Average Day to Peak Day Factor	Flow (gpd)	Totals (gpd)	Average Day to Peak Hour Factor	Flow (gpd)	Totals (gpd)	Flow (gpd)	Totals (gpd)
Story House Lane	Block 4	Single Family	--	--	15	2.21	100	3315	25844	2.43	8055	62800	2.74	9083	70811	16111	125599
	Block 1	Multifamily	6.75	26.5	--	--	100	17888		2.43	43467		2.74	49012		86933	
	Block 7 - North	Single Family	--	--	21	2.21	100	4641		2.43	11278		2.74	12716		22555	

Table 3: Baldwin Avenue - 8" Gravity Sewer Main

							Average Day		Peak Day			Peak Hour - 75% Full			200% Peak Day	
	Land Use	Area (acres)	Equivalent Population (persons/acre)	No. of Dwellings	Persons per Dwelling Unit	Average Daily Per Capita Flow (gal/person/day)	Average Daily Flow (gpd)	Totals (gpd)	Average Day to Peak Day Factor	Flow (gpd)	Totals (gpd)	Average Day to Peak Hour Factor	Flow (gpd)	Totals (gpd)	Flow (gpd)	Totals (gpd)
Baldwin Avenue	Block 8 - Lower	Commercial	1.61	18	--	--	100	2895	30575	2.43	7035	74298	2.74	7933	83776	14070	148596
	Block 8 - Upper	Residential	1.61	6.6	--	--	100	1062		2.43	2580		2.74	2909		5159	
	Block 3 - Lower	Commercial	2.00	18	--	--	100	3600		2.43	8748		2.74	9864		17496	
	Block 3 - Upper	Residential	2.00	6.6	--	--	100	1320		2.43	3208		2.74	3617		6415	
	Block 2 - Lower	Commercial	2.03	18	--	--	100	3660		2.43	8893		2.74	10028		17787	
	Block 2 - Upper	Residential	2.03	6.6	--	--	100	1342		2.43	3261		2.74	3677		6522	
	Block 5 - South	Multifamily	2.25	26.5	--	--	100	5955		2.43	14471		2.74	16317		28941	
	Block 6	Multifamily	2.22	26.5	--	--	100	5880		2.43	14288		2.74	16110		28575	
	Block 7 - South	Single Family	--	--	22	2.21	100	4862		2.43	11815		2.74	13322		23629	

Table 4: Canterbury Lane - 8" Gravity Sewer Main

							Average Day		Peak Day			Peak Hour - 75% Full			200% Peak Day	
	Land Use	Area (acres)	Equivalent Population (persons/acre)	No. of Dwellings	Persons per Dwelling Unit	Average Daily Per Capita Flow (gal/person/day)	Average Daily Flow (gpd)	Totals (gpd)	Average Day to Peak Day Factor	Flow (gpd)	Totals (gpd)	Average Day to Peak Hour Factor	Flow (gpd)	Totals (gpd)	Flow (gpd)	Totals (gpd)
Canterbury Lane	Block 5 - North	Multifamily	2.28	26.5	--	--	100	6040	9134	2.43	14678	22197	2.74	16551	25028	29356	44393
	Block 7 - Central	Single Family	--	--	14	2.21	100	3094		2.43	7518		2.74	8478		15037	

Table 5: Story House Lane & Canterbury Lane Confluence - 8" Gravity Sewer Main

							Average Day		Peak Day			Peak Hour - 75% Full			200% Peak Day	
	Land Use	Area (acres)	Equivalent Population (persons/acre)	No. of Dwellings	Persons per Dwelling Unit	Average Daily Per Capita Flow (gal/person/day)	Average Daily Flow (gpd)	Totals (gpd)	Average Day to Peak Day Factor	Flow (gpd)	Totals (gpd)	Average Day to Peak Hour Factor	Flow (gpd)	Totals (gpd)	Flow (gpd)	Totals (gpd)
Story House Lane & Canterbury Lane Confluence	Block 4	Single Family	--	--	15	2.21	100	3315	35641	2.43	8055	86607	2.74	9083	98319	16111	173215
	Block 1	Multifamily	6.75	26.5	--	--	100	17888		2.43	43467		2.74	49012		86933	
	Block 7 - North	Single Family	--	--	21	2.21	100	4641		2.43	11278		2.74	12716		22555	
	Block 5 - North	Multifamily	2.28	26.5	--	--	100	6040		2.43	14678		2.74	16551		29356	
	Block 7 - Central	Single Family	--	--	14	2.21	100	3094		2.43	7518		2.74	8478		15037	
	Block 7 - East	Single Family	--	--	3	2.21	100	663		2.43	1611		3.74	2480		3222	

Table 6: Trunk Line to Treatment Plant - 8" Gravity Sewer Main

							Average Day		Peak Day			Peak Hour - 75% Full			200% Peak Day	
	Land Use	Area (acres)	Equivalent Population (persons/acre)	No. of Dwellings	Persons per Dwelling Unit	Average Daily Per Capita Flow (gal/person/day)	Average Daily Flow (gpd)	Totals (gpd)	Average Day to Peak Day Factor	Flow (gpd)	Totals (gpd)	Average Day to Peak Hour Factor	Flow (gpd)	Totals (gpd)	Flow (gpd)	Totals (gpd)
Trunk Line to Treatment Plant	Block 1	Multifamily	6.75	26.5	--	--	100	17888		2.43	43467		2.74	49012		86933	
	Block 2 - Lower	Commercial	2.03	18	--	--	100	3660		2.43	8893		2.74	10028		17787	
	Block 2 - Upper	Residential	2.03	6.6	--	--	100	1342		2.43	3261		2.74	3677		6522	
	Block 3 - Lower	Commercial	2.00	18	--	--	100	3600		2.43	8748		2.74	9864		17496	
	Block 3 - Upper	Residential	2.00	6.6	--	--	100	1320		2.43	3208		2.74	3617		6415	
	Block 4	Single Family	--	--	15	2.21	100	3315		2.43	8055		2.74	9083		16111	
	Block 5 - North	Multifamily	2.28	26.5	--	--	100	6040		2.43	14678		2.74	16551		29356	
	Block 5 - South	Multifamily	2.25	26.5	--	--	100	5955	66216	2.43	14471	160905	2.74	16317	182095	28941	321810
	Block 6	Multifamily	2.22	26.5	--	--	100	5880		2.43	14288		2.74	16110		28575	
	Block 7 - North	Single Family	--	--	21	2.21	100	4641		2.43	11278		2.74	12716		22555	
	Block 7 - Central	Single Family	--	--	14	2.21	100	3094		2.43	7518		2.74	8478		15037	
	Block 7 - South	Single Family	--	--	22	2.21	100	4862		2.43	11815		2.74	13322		23629	
	Block 7 - East	Single Family	--	--	3	2.21	100	663		2.43	1611		3.74	2480		3222	
	Block 8 - Lower	Commercial	1.61	18	--	--	100	2895		2.43	7035		2.74	7933		14070	
	Block 8 - Upper	Residential	1.61	6.6	--	--	100	1062		2.43	2580		2.74	2909		5159	

Table 7: 8" Gravity Sewer Main Hydraulics

	Story House Lane - 8"	Baldwin Ave - 8"	Canterbury Lane - 8"	Story House Lane & Canterbury Lane Confluence - 8"	Trunk Line to Treatment Plant - 8"
Minimum Slope	0.0045 ft/ft	0.0045 ft/ft	0.0075 ft/ft	0.0228 ft/ft	0.0289 ft/ft
Maximum Slope	0.0528 ft/ft	0.0609 ft/ft	0.0513 ft/ft	0.0228 ft/ft	0.0289 ft/ft
Pipe Diameter	8.000 inch	8.000 inch	8.000 inch	8.000 inch	8.000 inch
Average Day (gpd)	25844 gpd	30575 gpd	9134 gpd	35641 gpd	66216 gpd
Average Day (gpm)	17.95 gpm	21.23 gpm	6.34 gpm	24.75 gpm	45.98 gpm
Average Day (cfs)	0.040 cfs	0.047 cfs	0.014 cfs	0.055 cfs	0.102 cfs
Velocity (min slope)	1.45 ft/sec	1.52 ft/sec	1.25 ft/sec	2.81 ft/sec	3.68 ft/sec
Percent Full (min slope)	13.3 %	14.4 %	7.2 %	10.5 %	13.4 %
Discharge Full (min slope)	1.05 cfs	1.05 cfs	1.36 cfs	2.37 cfs	2.67 cfs
Velocity (max slope)	3.41 ft/sec	3.76 ft/sec	2.47 ft/sec	2.81 ft/sec	3.68 ft/sec
Percent Full (max slope)	7.4 %	7.8 %	4.6 %	10.5 %	13.4 %
Discharge Full (max slope)	3.61 cfs	3.88 cfs	3.56 cfs	2.37 cfs	2.67 cfs
Peak Day (gpd)	62800 gpd	74298 gpd	22197 gpd	86607 gpd	160905 gpd
Peak Day (gpm)	43.61 gpm	51.60 gpm	15.41 gpm	60.14 gpm	111.74 gpm
Peak Day (cfs)	0.097 cfs	0.115 cfs	0.034 cfs	0.134 cfs	0.249 cfs
Velocity (min slope)	1.88 ft/sec	1.98 ft/sec	1.65 ft/sec	3.67 ft/sec	4.79 ft/sec
Percent Full (min slope)	20.5 %	22.3 %	10.9 %	16.1 %	20.6 %
Discharge Full (min slope)	1.05 cfs	1.05 cfs	1.36 cfs	2.37 cfs	2.67 cfs
Velocity (max slope)	4.47 ft/sec	4.95 ft/sec	3.21 ft/sec	3.67 ft/sec	4.79 ft/sec
Percent Full (max slope)	11.3 %	11.8 %	6.9 %	16.1 %	20.6 %
Discharge Full (max slope)	3.61 cfs	3.88 cfs	3.56 cfs	2.37 cfs	2.67 cfs
Peak Hour (gpd)	70811 gpd	83776 gpd	25028 gpd	98319 gpd	182095 gpd
Peak Hour (gpm)	49.17 gpm	58.18 gpm	17.38 gpm	68.28 gpm	126.45 gpm
Peak Hour (cfs)	0.110 cfs	0.130 cfs	0.039 cfs	0.152 cfs	0.282 cfs
Velocity (min slope)	1.96 ft/sec	2.06 ft/sec	1.72 ft/sec	3.81 ft/sec	4.97 ft/sec
Percent Full (min slope)	21.8 %	23.7 %	11.6 %	17.2 %	21.9 %
Discharge Full (min slope)	1.05 cfs	1.05 cfs	1.36 cfs	2.37 cfs	2.67 cfs
Velocity (max slope)	4.66 ft/sec	5.15 ft/sec	3.35 ft/sec	3.81 ft/sec	4.97 ft/sec
Percent Full (max slope)	12.0 %	12.5 %	7.4 %	17.2 %	21.9 %
Discharge Full (max slope)	3.61 cfs	3.88 cfs	3.56 cfs	2.37 cfs	2.67 cfs
200% Peak Day (gpd)	125599 gpd	148596 gpd	44393 gpd	173215 gpd	321810 gpd
200% Peak Day (gpm)	87.22 gpm	103.19 gpm	30.83 gpm	120.29 gpm	223.48 gpm
200% Peak Day (cfs)	0.194 cfs	0.230 cfs	0.069 cfs	0.268 cfs	0.498 cfs
Velocity (min slope)	2.30 ft/sec	2.41 ft/sec	2.04 ft/sec	4.50 ft/sec	5.85 ft/sec
Percent Full (min slope)	29.1 %	31.8 %	15.3 %	22.7 %	29.3 %
Discharge Full (min slope)	1.05 cfs	1.05 cfs	1.36 cfs	2.37 cfs	2.67 cfs
Velocity (max slope)	5.51 ft/sec	6.09 ft/sec	3.99 ft/sec	4.50 ft/sec	5.85 ft/sec
Percent Full (max slope)	15.8 %	16.5 %	9.7 %	22.7 %	29.3 %
Discharge Full (max slope)	3.61 cfs	3.88 cfs	3.56 cfs	2.37 cfs	2.67 cfs

8" PVC Gravity Main (Flowing Full - Minimum Slope)

Project Description	
Friction Method	Manning Formula
Solve For	Discharge

Input Data	
Roughness Coefficient	0.010
Channel Slope	0.0045 ft/ft
Normal Depth	8.000 in
Diameter	8.0 in

Results	
Discharge	1.0538 cfs
Flow Area	0.3 ft²
Wetted Perimeter	2.1 ft
Hydraulic Radius	2.000 in
Top Width	0.00 ft
Critical Depth	5.845 in
Percent Full	100.00 %
Critical Slope	0.0058 ft/ft
Velocity	3.019 ft/s
Velocity Head	0.14 ft
Specific Energy	0.81 ft
Froude Number	(N/A)
Maximum Discharge	1.1335 cfs
Discharge Full	1.0538 cfs
Slope Full	0.0045 ft/ft
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.000 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.000 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.00 %
Normal Depth Over Rise	2.68 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	8.000 in
Critical Depth	5.845 in
Channel Slope	0.0045 ft/ft
Critical Slope	0.0058 ft/ft

8" PVC Gravity Main (Flowing Full - Maximum Slope)

Project Description	
Friction Method	Manning Formula
Solve For	Discharge

Input Data	
Roughness Coefficient	0.010
Channel Slope	0.0609 ft/ft
Normal Depth	8.000 in
Diameter	8.0 in

Results	
Discharge	3.8765 cfs
Flow Area	0.3 ft²
Wetted Perimeter	2.1 ft
Hydraulic Radius	2.000 in
Top Width	0.00 ft
Critical Depth	7.962 in
Percent Full	100.00 %
Critical Slope	0.0575 ft/ft
Velocity	11.105 ft/s
Velocity Head	1.92 ft
Specific Energy	2.58 ft
Froude Number	(N/A)
Maximum Discharge	4.1700 cfs
Discharge Full	3.8765 cfs
Slope Full	0.0609 ft/ft
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.000 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.000 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.00 %
Normal Depth Over Rise	100.00 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	8.000 in
Critical Depth	7.962 in
Channel Slope	0.0609 ft/ft
Critical Slope	0.0575 ft/ft

8" PVC Gravity Main (Maximum Flow - Minimum Slope)

Project Description	
Friction Method	Manning Formula
Solve For	Discharge

Input Data	
Roughness Coefficient	0.010
Channel Slope	0.0045 ft/ft
Normal Depth	7.530 in
Diameter	8.0 in

Results	
Discharge	1.1335 cfs
Flow Area	0.3 ft²
Wetted Perimeter	1.8 ft
Hydraulic Radius	2.313 in
Top Width	0.31 ft
Critical Depth	6.059 in
Percent Full	94.13 %
Critical Slope	0.0061 ft/ft
Velocity	3.326 ft/s
Velocity Head	0.17 ft
Specific Energy	0.80 ft
Froude Number	0.562
Maximum Discharge	1.1335 cfs
Discharge Full	1.0538 cfs
Slope Full	0.0052 ft/ft
Flow Type	Subcritical

GVF Input Data	
Downstream Depth	0.000 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.000 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.00 %
Normal Depth Over Rise	2.68 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	7.530 in
Critical Depth	6.059 in
Channel Slope	0.0045 ft/ft
Critical Slope	0.0061 ft/ft

8" PVC Gravity Main (Maximum Flow - Maximum Slope)

Project Description	
Friction Method	Manning Formula
Solve For	Discharge

Input Data	
Roughness Coefficient	0.010
Channel Slope	0.0609 ft/ft
Normal Depth	7.515 in
Diameter	8.0 in

Results	
Discharge	4.1700 cfs
Flow Area	0.3 ft²
Wetted Perimeter	1.8 ft
Hydraulic Radius	2.317 in
Top Width	0.32 ft
Critical Depth	7.972 in
Percent Full	93.94 %
Critical Slope	0.0670 ft/ft
Velocity	12.251 ft/s
Velocity Head	2.33 ft
Specific Energy	2.96 ft
Froude Number	2.088
Maximum Discharge	4.1700 cfs
Discharge Full	3.8765 cfs
Slope Full	0.0705 ft/ft
Flow Type	Supercritical

GVF Input Data	
Downstream Depth	0.000 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.000 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.00 %
Normal Depth Over Rise	93.94 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	7.515 in
Critical Depth	7.972 in
Channel Slope	0.0609 ft/ft
Critical Slope	0.0670 ft/ft

Story House Lane - 8" Gravity Main (Avg Day - Min Slope)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.010
Channel Slope	0.0045 ft/ft
Diameter	8.0 in
Discharge	0.0400 cfs

Results	
Normal Depth	1.065 in
Flow Area	0.0 ft²
Wetted Perimeter	0.5 ft
Hydraulic Radius	0.665 in
Top Width	0.45 ft
Critical Depth	1.086 in
Percent Full	13.31 %
Critical Slope	0.0041 ft/ft
Velocity	1.450 ft/s
Velocity Head	0.03 ft
Specific Energy	0.12 ft
Froude Number	1.035
Maximum Discharge	1.1335 cfs
Discharge Full	1.0538 cfs
Slope Full	0.0000 ft/ft
Flow Type	Supercritical

GVF Input Data	
Downstream Depth	0.000 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.000 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.00 %
Normal Depth Over Rise	13.31 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	1.065 in
Critical Depth	1.086 in
Channel Slope	0.0045 ft/ft
Critical Slope	0.0041 ft/ft

Story House Lane - 8" Gravity Main (Peak Day - Min Slope)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.010
Channel Slope	0.0045 ft/ft
Diameter	8.0 in
Discharge	0.0970 cfs

Results	
Normal Depth	1.640 in
Flow Area	0.1 ft²
Wetted Perimeter	0.6 ft
Hydraulic Radius	0.986 in
Top Width	0.54 ft
Critical Depth	1.697 in
Percent Full	20.50 %
Critical Slope	0.0039 ft/ft
Velocity	1.884 ft/s
Velocity Head	0.06 ft
Specific Energy	0.19 ft
Froude Number	1.074
Maximum Discharge	1.1335 cfs
Discharge Full	1.0538 cfs
Slope Full	0.0000 ft/ft
Flow Type	Supercritical

GVF Input Data	
Downstream Depth	0.000 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.000 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.00 %
Normal Depth Over Rise	20.50 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	1.640 in
Critical Depth	1.697 in
Channel Slope	0.0045 ft/ft
Critical Slope	0.0039 ft/ft

Story House Lane - 8" Gravity Main (Peak Hour - Min Slope)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.010
Channel Slope	0.0045 ft/ft
Diameter	8.0 in
Discharge	0.1100 cfs

Results	
Normal Depth	1.745 in
Flow Area	0.1 ft²
Wetted Perimeter	0.6 ft
Hydraulic Radius	1.042 in
Top Width	0.55 ft
Critical Depth	1.815 in
Percent Full	21.82 %
Critical Slope	0.0038 ft/ft
Velocity	1.955 ft/s
Velocity Head	0.06 ft
Specific Energy	0.20 ft
Froude Number	1.078
Maximum Discharge	1.1335 cfs
Discharge Full	1.0538 cfs
Slope Full	0.0000 ft/ft
Flow Type	Supercritical

GVF Input Data	
Downstream Depth	0.000 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.000 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.00 %
Normal Depth Over Rise	21.82 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	1.745 in
Critical Depth	1.815 in
Channel Slope	0.0045 ft/ft
Critical Slope	0.0038 ft/ft

Story House Lane - 8" Gravity Main (Peak Day 200% - Min Slope)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.010
Channel Slope	0.0045 ft/ft
Diameter	8.0 in
Discharge	0.1940 cfs

Results	
Normal Depth	2.327 in
Flow Area	0.1 ft²
Wetted Perimeter	0.8 ft
Hydraulic Radius	1.333 in
Top Width	0.61 ft
Critical Depth	2.432 in
Percent Full	29.09 %
Critical Slope	0.0038 ft/ft
Velocity	2.299 ft/s
Velocity Head	0.08 ft
Specific Energy	0.28 ft
Froude Number	1.086
Maximum Discharge	1.1335 cfs
Discharge Full	1.0538 cfs
Slope Full	0.0002 ft/ft
Flow Type	Supercritical

GVF Input Data	
Downstream Depth	0.000 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.000 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.00 %
Normal Depth Over Rise	29.09 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	2.327 in
Critical Depth	2.432 in
Channel Slope	0.0045 ft/ft
Critical Slope	0.0038 ft/ft

Baldwin Avenue - 8" Gravity Main (Avg Day - Min Slope)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Roughness Coefficient	0.010	
Channel Slope	0.0045	ft/ft
Diameter	8.0	in
Discharge	0.0470	cfs

Results		
Normal Depth	1.154	in
Flow Area	0.0	ft²
Wetted Perimeter	0.5	ft
Hydraulic Radius	0.716	in
Top Width	0.47	ft
Critical Depth	1.177	in
Percent Full	14.42	%
Critical Slope	0.0041	ft/ft
Velocity	1.516	ft/s
Velocity Head	0.04	ft
Specific Energy	0.13	ft
Froude Number	1.038	
Maximum Discharge	1.1335	cfs
Discharge Full	1.0538	cfs
Slope Full	0.0000	ft/ft
Flow Type	Supercritical	

GVF Input Data		
Downstream Depth	0.000	in
Length	0.0	ft
Number Of Steps	0	

GVF Output Data		
Upstream Depth	0.000	in
Profile Description	N/A	
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	14.42	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.154	in
Critical Depth	1.177	in
Channel Slope	0.0045	ft/ft
Critical Slope	0.0041	ft/ft

Baldwin Avenue - 8" Gravity Main (Peak Day - Min Slope)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.010
Channel Slope	0.0045 ft/ft
Diameter	8.0 in
Discharge	0.1150 cfs

Results	
Normal Depth	1.784 in
Flow Area	0.1 ft²
Wetted Perimeter	0.7 ft
Hydraulic Radius	1.062 in
Top Width	0.56 ft
Critical Depth	1.856 in
Percent Full	22.31 %
Critical Slope	0.0038 ft/ft
Velocity	1.980 ft/s
Velocity Head	0.06 ft
Specific Energy	0.21 ft
Froude Number	1.079
Maximum Discharge	1.1335 cfs
Discharge Full	1.0538 cfs
Slope Full	0.0001 ft/ft
Flow Type	Supercritical

GVF Input Data	
Downstream Depth	0.000 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.000 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.00 %
Normal Depth Over Rise	22.31 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	1.784 in
Critical Depth	1.856 in
Channel Slope	0.0045 ft/ft
Critical Slope	0.0038 ft/ft

Baldwin Avenue - 8" Gravity Main (Peak Hour - Min Slope)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Roughness Coefficient	0.010	
Channel Slope	0.0045	ft/ft
Diameter	8.0	in
Discharge	0.1300	cfs

Results		
Normal Depth	1.896	in
Flow Area	0.1	ft²
Wetted Perimeter	0.7	ft
Hydraulic Radius	1.120	in
Top Width	0.57	ft
Critical Depth	1.972	in
Percent Full	23.70	%
Critical Slope	0.0039	ft/ft
Velocity	2.055	ft/s
Velocity Head	0.07	ft
Specific Energy	0.22	ft
Froude Number	1.084	
Maximum Discharge	1.1335	cfs
Discharge Full	1.0538	cfs
Slope Full	0.0001	ft/ft
Flow Type	Supercritical	

GVF Input Data		
Downstream Depth	0.000	in
Length	0.0	ft
Number Of Steps	0	

GVF Output Data		
Upstream Depth	0.000	in
Profile Description	N/A	
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	23.70	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	1.896	in
Critical Depth	1.972	in
Channel Slope	0.0045	ft/ft
Critical Slope	0.0039	ft/ft

Baldwin Avenue - 8" Gravity Main (Peak Day 200% - Min Slope)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.010
Channel Slope	0.0045 ft/ft
Diameter	8.0 in
Discharge	0.2300 cfs

Results	
Normal Depth	2.541 in
Flow Area	0.1 ft²
Wetted Perimeter	0.8 ft
Hydraulic Radius	1.433 in
Top Width	0.62 ft
Critical Depth	2.649 in
Percent Full	31.76 %
Critical Slope	0.0038 ft/ft
Velocity	2.413 ft/s
Velocity Head	0.09 ft
Specific Energy	0.30 ft
Froude Number	1.086
Maximum Discharge	1.1335 cfs
Discharge Full	1.0538 cfs
Slope Full	0.0002 ft/ft
Flow Type	Supercritical

GVF Input Data	
Downstream Depth	0.000 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.000 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.00 %
Normal Depth Over Rise	31.76 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	2.541 in
Critical Depth	2.649 in
Channel Slope	0.0045 ft/ft
Critical Slope	0.0038 ft/ft

Canterbury Lane - 8" Gravity Main (Avg Day - Min Slope)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.010
Channel Slope	0.0075 ft/ft
Diameter	8.0 in
Discharge	0.0140 cfs

Results	
Normal Depth	0.575 in
Flow Area	0.0 ft²
Wetted Perimeter	0.4 ft
Hydraulic Radius	0.370 in
Top Width	0.34 ft
Critical Depth	0.636 in
Percent Full	7.18 %
Critical Slope	0.0048 ft/ft
Velocity	1.254 ft/s
Velocity Head	0.02 ft
Specific Energy	0.07 ft
Froude Number	1.228
Maximum Discharge	1.4634 cfs
Discharge Full	1.3604 cfs
Slope Full	0.0000 ft/ft
Flow Type	Supercritical

GVF Input Data	
Downstream Depth	0.000 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.000 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.00 %
Normal Depth Over Rise	7.18 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.575 in
Critical Depth	0.636 in
Channel Slope	0.0075 ft/ft
Critical Slope	0.0048 ft/ft

Canterbury Lane - 8" Gravity Main (Peak Day - Min Slope)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Roughness Coefficient	0.010	
Channel Slope	0.0075	ft/ft
Diameter	8.0	in
Discharge	0.0340	cfs

Results		
Normal Depth	0.872	in
Flow Area	0.0	ft²
Wetted Perimeter	0.4	ft
Hydraulic Radius	0.551	in
Top Width	0.42	ft
Critical Depth	0.999	in
Percent Full	10.90	%
Critical Slope	0.0042	ft/ft
Velocity	1.649	ft/s
Velocity Head	0.04	ft
Specific Energy	0.11	ft
Froude Number	1.306	
Maximum Discharge	1.4634	cfs
Discharge Full	1.3604	cfs
Slope Full	0.0000	ft/ft
Flow Type	Supercritical	

GVF Input Data		
Downstream Depth	0.000	in
Length	0.0	ft
Number Of Steps	0	

GVF Output Data		
Upstream Depth	0.000	in
Profile Description	N/A	
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	10.90	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.872	in
Critical Depth	0.999	in
Channel Slope	0.0075	ft/ft
Critical Slope	0.0042	ft/ft

Canterbury Lane - 8" Gravity Main (Peak Hour - Min Slope)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data		
Roughness Coefficient	0.010	
Channel Slope	0.0075	ft/ft
Diameter	8.0	in
Discharge	0.0390	cfs

Results		
Normal Depth	0.931	in
Flow Area	0.0	ft²
Wetted Perimeter	0.5	ft
Hydraulic Radius	0.587	in
Top Width	0.43	ft
Critical Depth	1.067	in
Percent Full	11.64	%
Critical Slope	0.0042	ft/ft
Velocity	1.719	ft/s
Velocity Head	0.05	ft
Specific Energy	0.12	ft
Froude Number	1.315	
Maximum Discharge	1.4634	cfs
Discharge Full	1.3604	cfs
Slope Full	0.0000	ft/ft
Flow Type	Supercritical	

GVF Input Data		
Downstream Depth	0.000	in
Length	0.0	ft
Number Of Steps	0	

GVF Output Data		
Upstream Depth	0.000	in
Profile Description	N/A	
Profile Headloss	0.00	ft
Average End Depth Over Rise	0.00	%
Normal Depth Over Rise	11.64	%
Downstream Velocity	Infinity	ft/s
Upstream Velocity	Infinity	ft/s
Normal Depth	0.931	in
Critical Depth	1.067	in
Channel Slope	0.0075	ft/ft
Critical Slope	0.0042	ft/ft

Canterbury Lane - 8" Gravity Main (Peak Day 200% - Min Slope)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.010
Channel Slope	0.0075 ft/ft
Diameter	8.0 in
Discharge	0.0690 cfs

Results	
Normal Depth	1.225 in
Flow Area	0.0 ft²
Wetted Perimeter	0.5 ft
Hydraulic Radius	0.757 in
Top Width	0.48 ft
Critical Depth	1.433 in
Percent Full	15.31 %
Critical Slope	0.0039 ft/ft
Velocity	2.039 ft/s
Velocity Head	0.06 ft
Specific Energy	0.17 ft
Froude Number	1.355
Maximum Discharge	1.4634 cfs
Discharge Full	1.3604 cfs
Slope Full	0.0000 ft/ft
Flow Type	Supercritical

GVF Input Data	
Downstream Depth	0.000 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.000 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.00 %
Normal Depth Over Rise	15.31 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	1.225 in
Critical Depth	1.433 in
Channel Slope	0.0075 ft/ft
Critical Slope	0.0039 ft/ft

Confluence - 8" Gravity Main (Avg Day - Min Slope)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.010
Channel Slope	0.0228 ft/ft
Diameter	8.0 in
Discharge	0.0550 cfs

Results	
Normal Depth	0.841 in
Flow Area	0.0 ft²
Wetted Perimeter	0.4 ft
Hydraulic Radius	0.533 in
Top Width	0.41 ft
Critical Depth	1.274 in
Percent Full	10.52 %
Critical Slope	0.0041 ft/ft
Velocity	2.812 ft/s
Velocity Head	0.12 ft
Specific Energy	0.19 ft
Froude Number	2.267
Maximum Discharge	2.5515 cfs
Discharge Full	2.3719 cfs
Slope Full	0.0000 ft/ft
Flow Type	Supercritical

GVF Input Data	
Downstream Depth	0.000 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.000 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.00 %
Normal Depth Over Rise	10.52 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	0.841 in
Critical Depth	1.274 in
Channel Slope	0.0228 ft/ft
Critical Slope	0.0041 ft/ft

Confluence - 8" Gravity Main (Peak Day - Min Slope)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.010
Channel Slope	0.0228 ft/ft
Diameter	8.0 in
Discharge	0.1340 cfs

Results	
Normal Depth	1.291 in
Flow Area	0.0 ft²
Wetted Perimeter	0.6 ft
Hydraulic Radius	0.795 in
Top Width	0.49 ft
Critical Depth	2.007 in
Percent Full	16.14 %
Critical Slope	0.0038 ft/ft
Velocity	3.672 ft/s
Velocity Head	0.21 ft
Specific Energy	0.32 ft
Froude Number	2.373
Maximum Discharge	2.5515 cfs
Discharge Full	2.3719 cfs
Slope Full	0.0001 ft/ft
Flow Type	Supercritical

GVF Input Data	
Downstream Depth	0.000 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.000 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.00 %
Normal Depth Over Rise	16.14 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	1.291 in
Critical Depth	2.007 in
Channel Slope	0.0228 ft/ft
Critical Slope	0.0038 ft/ft

Confluence - 8" Gravity Main (Peak Hour - Min Slope)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.010
Channel Slope	0.0228 ft/ft
Diameter	8.0 in
Discharge	0.1520 cfs

Results	
Normal Depth	1.372 in
Flow Area	0.0 ft²
Wetted Perimeter	0.6 ft
Hydraulic Radius	0.840 in
Top Width	0.50 ft
Critical Depth	2.139 in
Percent Full	17.15 %
Critical Slope	0.0038 ft/ft
Velocity	3.814 ft/s
Velocity Head	0.23 ft
Specific Energy	0.34 ft
Froude Number	2.388
Maximum Discharge	2.5515 cfs
Discharge Full	2.3719 cfs
Slope Full	0.0001 ft/ft
Flow Type	Supercritical

GVF Input Data	
Downstream Depth	0.000 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.000 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.00 %
Normal Depth Over Rise	17.15 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	1.372 in
Critical Depth	2.139 in
Channel Slope	0.0228 ft/ft
Critical Slope	0.0038 ft/ft

Confluence - 8" Gravity Main (Peak Day 200% - Min Slope)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.010
Channel Slope	0.0228 ft/ft
Diameter	8.0 in
Discharge	0.2680 cfs

Results	
Normal Depth	1.817 in
Flow Area	0.1 ft²
Wetted Perimeter	0.7 ft
Hydraulic Radius	1.079 in
Top Width	0.56 ft
Critical Depth	2.870 in
Percent Full	22.71 %
Critical Slope	0.0038 ft/ft
Velocity	4.500 ft/s
Velocity Head	0.31 ft
Specific Energy	0.47 ft
Froude Number	2.429
Maximum Discharge	2.5515 cfs
Discharge Full	2.3719 cfs
Slope Full	0.0003 ft/ft
Flow Type	Supercritical

GVF Input Data	
Downstream Depth	0.000 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.000 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.00 %
Normal Depth Over Rise	22.71 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	1.817 in
Critical Depth	2.870 in
Channel Slope	0.0228 ft/ft
Critical Slope	0.0038 ft/ft

Trunk Line to Treatment Plant - 8" Gravity Main (Avg Day - Min Slope)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.010
Channel Slope	0.0289 ft/ft
Diameter	8.0 in
Discharge	0.1020 cfs

Results	
Normal Depth	1.068 in
Flow Area	0.0 ft²
Wetted Perimeter	0.5 ft
Hydraulic Radius	0.667 in
Top Width	0.45 ft
Critical Depth	1.746 in
Percent Full	13.35 %
Critical Slope	0.0039 ft/ft
Velocity	3.681 ft/s
Velocity Head	0.21 ft
Specific Energy	0.30 ft
Froude Number	2.625
Maximum Discharge	2.8726 cfs
Discharge Full	2.6704 cfs
Slope Full	0.0000 ft/ft
Flow Type	Supercritical

GVF Input Data	
Downstream Depth	0.000 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.000 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.00 %
Normal Depth Over Rise	13.35 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	1.068 in
Critical Depth	1.746 in
Channel Slope	0.0289 ft/ft
Critical Slope	0.0039 ft/ft

Trunk Line to Treatment Plant - 8" Gravity Main (Peak Day - Min Slope)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.010
Channel Slope	0.0289 ft/ft
Diameter	8.0 in
Discharge	0.2490 cfs

Results	
Normal Depth	1.650 in
Flow Area	0.1 ft²
Wetted Perimeter	0.6 ft
Hydraulic Radius	0.992 in
Top Width	0.54 ft
Critical Depth	2.763 in
Percent Full	20.63 %
Critical Slope	0.0038 ft/ft
Velocity	4.793 ft/s
Velocity Head	0.36 ft
Specific Energy	0.49 ft
Froude Number	2.723
Maximum Discharge	2.8726 cfs
Discharge Full	2.6704 cfs
Slope Full	0.0003 ft/ft
Flow Type	Supercritical

GVF Input Data	
Downstream Depth	0.000 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.000 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.00 %
Normal Depth Over Rise	20.63 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	1.650 in
Critical Depth	2.763 in
Channel Slope	0.0289 ft/ft
Critical Slope	0.0038 ft/ft

Trunk Line to Treatment Plant - 8" Gravity Main (Peak Hour - Min Slope)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.010
Channel Slope	0.0289 ft/ft
Diameter	8.0 in
Discharge	0.2820 cfs

Results	
Normal Depth	1.755 in
Flow Area	0.1 ft²
Wetted Perimeter	0.7 ft
Hydraulic Radius	1.047 in
Top Width	0.55 ft
Critical Depth	2.949 in
Percent Full	21.94 %
Critical Slope	0.0038 ft/ft
Velocity	4.971 ft/s
Velocity Head	0.38 ft
Specific Energy	0.53 ft
Froude Number	2.734
Maximum Discharge	2.8726 cfs
Discharge Full	2.6704 cfs
Slope Full	0.0003 ft/ft
Flow Type	Supercritical

GVF Input Data	
Downstream Depth	0.000 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.000 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.00 %
Normal Depth Over Rise	21.94 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	1.755 in
Critical Depth	2.949 in
Channel Slope	0.0289 ft/ft
Critical Slope	0.0038 ft/ft

Trunk Line to Treatment Plant - 8" Gravity (Peak Day 200% - Min Slope)

Project Description	
Friction Method	Manning Formula
Solve For	Normal Depth

Input Data	
Roughness Coefficient	0.010
Channel Slope	0.0289 ft/ft
Diameter	8.0 in
Discharge	0.4980 cfs

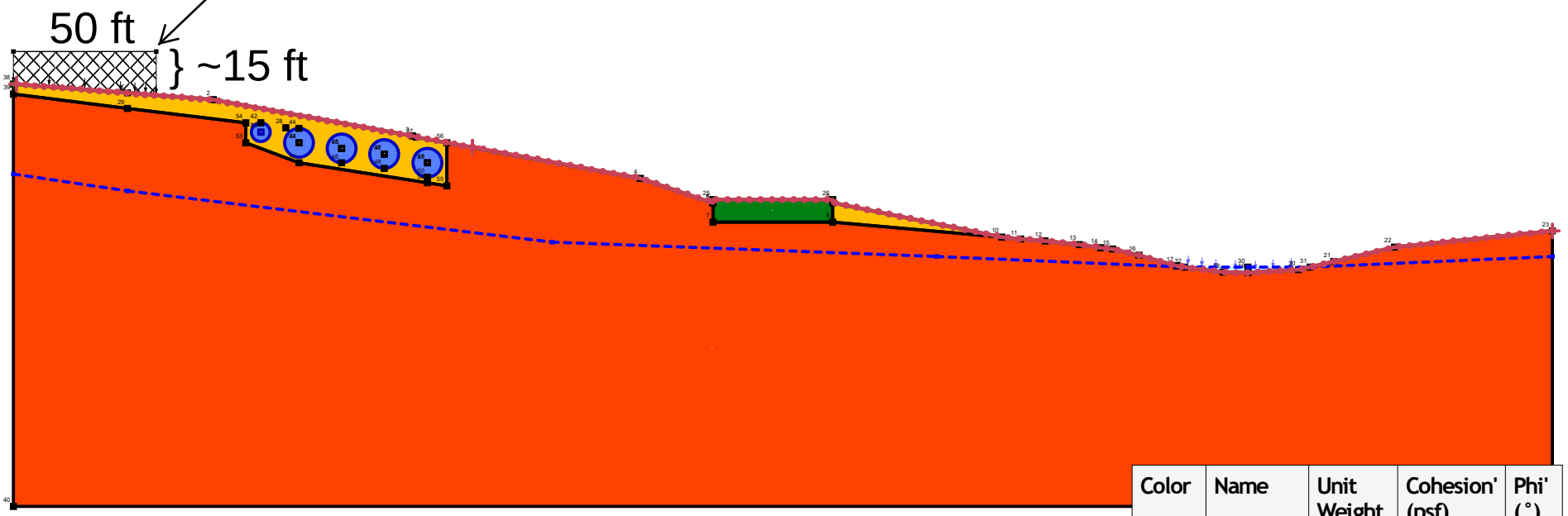
Results	
Normal Depth	2.342 in
Flow Area	0.1 ft²
Wetted Perimeter	0.8 ft
Hydraulic Radius	1.340 in
Top Width	0.61 ft
Critical Depth	3.966 in
Percent Full	29.28 %
Critical Slope	0.0041 ft/ft
Velocity	5.849 ft/s
Velocity Head	0.53 ft
Specific Energy	0.73 ft
Froude Number	2.753
Maximum Discharge	2.8726 cfs
Discharge Full	2.6704 cfs
Slope Full	0.0010 ft/ft
Flow Type	Supercritical

GVF Input Data	
Downstream Depth	0.000 in
Length	0.0 ft
Number Of Steps	0

GVF Output Data	
Upstream Depth	0.000 in
Profile Description	N/A
Profile Headloss	0.00 ft
Average End Depth Over Rise	0.00 %
Normal Depth Over Rise	29.28 %
Downstream Velocity	Infinity ft/s
Upstream Velocity	Infinity ft/s
Normal Depth	2.342 in
Critical Depth	3.966 in
Channel Slope	0.0289 ft/ft
Critical Slope	0.0041 ft/ft

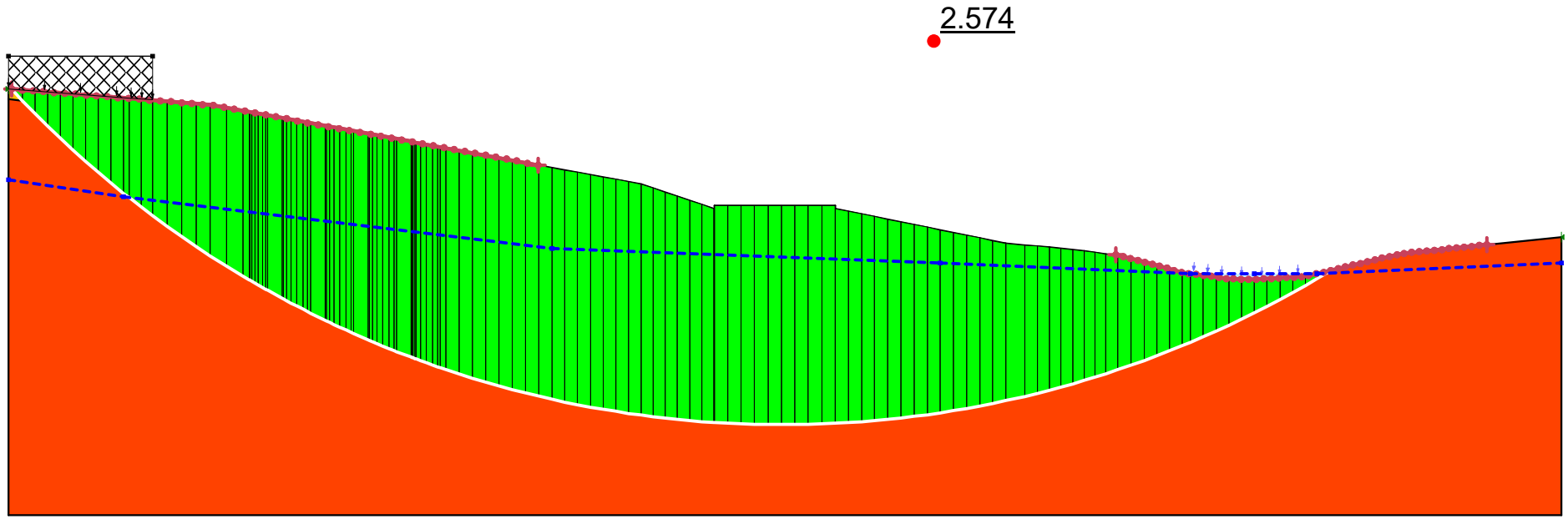
Story House Orenco Wastewater Treatment
Slope Stability Analysis
Finish Grade

400,000 lb house / (50 ft * 50 ft * 15 ft)
= ~11 pcf



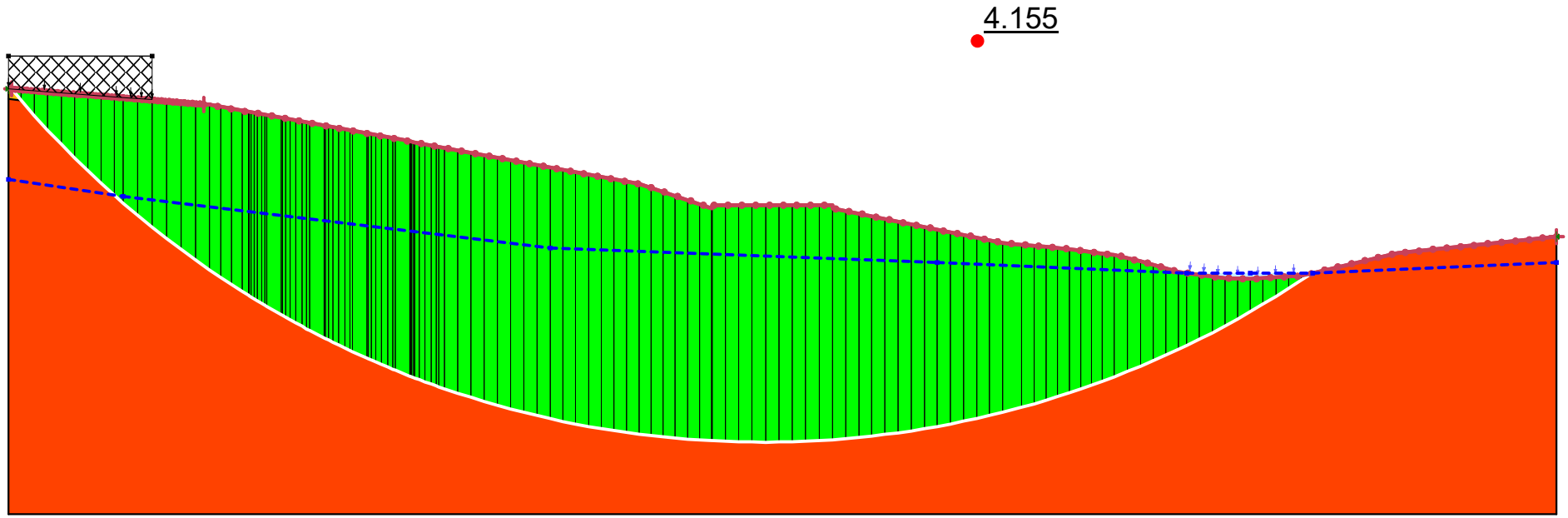
Color	Name	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)
	10 ft Pre-Tanks	171.4		
	6.5 ft Pre-Tanks	128		
	Backfill	104	720	33.9
	SC	115.6	720	33.9
	Tank	87.917		

Story House Orenco Wastewater Treatment
Slope Stability Analysis
Finish Grade



Color	Name	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)
	Backfill	104	100.8	28.4
	Pre-Tanks	62.4		
	SC	104.3	100.8	28.4
	Tank	87.917		

Story House Orenco Wastewater Treatment
Slope Stability Analysis
Finish Grade



Color	Name	Unit Weight (pcf)	Cohesion' (psf)	Phi' (°)
	Backfill	104	720	33.9
	Pre-Tanks	62.4		
	SC	115.6	720	33.9
	Tank	87.917		

APPENDIX D

Product Data Sheets

AdvanTex® Treatment Systems

AX-Max™

Manufactured by Orenco Systems®, Inc.



This full-sized AdvanTex® AX-Max™ wastewater system was installed at a 50-site campground in the LaPine State Park, LaPine, Oregon, to handle design flows of 7,500 gpd (28.4 m³/day).

Decentralized Wastewater Treatment for Commercial Properties and Communities

Applications:

- Municipal systems
- Subdivisions, apartments
- Golf course developments, resorts
- Manufactured home parks
- Parks, RV parks, campgrounds
- Schools, churches, businesses
- Rest areas, truck stops

Orenco® SYSTEMS

814 Airway Avenue, Sutherlin, Oregon, USA 97479
Toll-Free: 800-348-9843 • +1-541-459-4449 • www.orenco.com

AdvanTex® AX-Max™ Treatment System

Reliable, Energy-Efficient Wastewater Treatment Everywhere!



The Yakama Nations Housing Authority in Washington state added five AdvanTex® AX-Max units (background) to its ten AdvanTex AX-100 units, increasing the capacity of its wastewater system by 50%. Photo courtesy of Fextex Systems, Inc.

For more than 15 years, Orenco's AdvanTex® Treatment Systems have been providing reliable, energy-efficient wastewater treatment inside and outside the urban core. AdvanTex textile filter technology has been winning awards and coming out on top in field trials and demo projects, all over the world.

Orenco's newest product in the AdvanTex line is the AX-Max™: a completely-integrated, fully-plumbed, and compact wastewater treatment plant that's ideal for commercial properties and communities. It's also ideal for projects with strict discharge limits, limited budgets, and part-time operators.

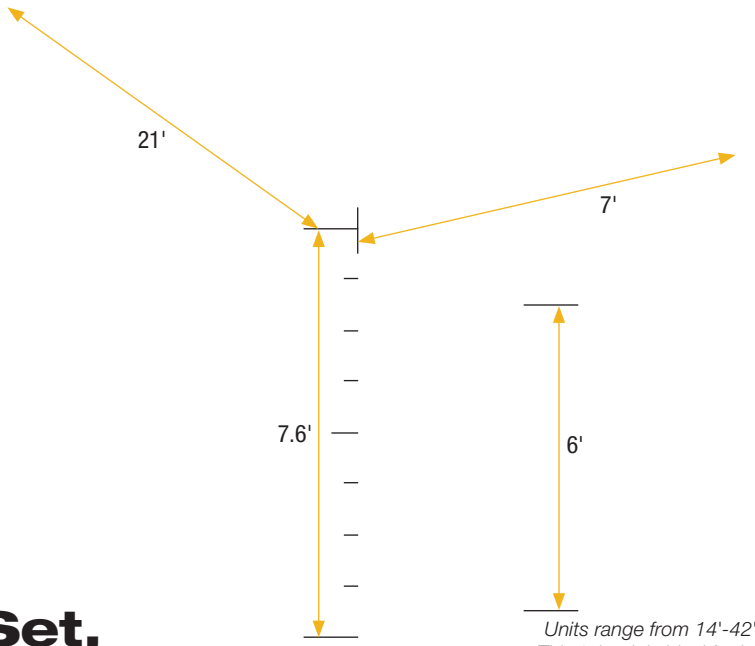
A Sustainable Solution for Wastewater Treatment

Like all AdvanTex Treatment Systems, the AX-Max is a recirculating media filter that produces outstanding effluent quality suitable for reuse, with significant nutrient-removal. AX-Max systems are highly energy-efficient, using less than 2 kWh per 1000 treated gallons (3.785 m^3). And they require minimal O&M compared to conventional technologies. Consequently, AdvanTex can earn LEED credits for your projects.



A full-sized AX-Max unit can be configured as a plug & play wastewater treatment system capable of handling up to 15,000 gpd (56.8 m^3/day) design flow when receiving primary-treated effluent. Alternately, a similar unit can be configured as a 5,000 gpd (18.9 m^3/day) system capable of processing raw sewage.

AdvanTex® AX-Max™ Treatment System



Units range from 14'-42' in length. This 21' unit is ideal for lower flows.

Set, Plumb, Wire, and Go

The AX-Max is pre-plumbed and easy to install, so AX-Max projects can meet the tightest deadlines. The entire system — including treatment, recirculation, and discharge — is built inside an insulated fiberglass tank that ranges from 14-42 feet (4.3-12.8 m) in length. AX-Max units can be installed above-ground — for maximum versatility in temporary or variable-flow situations — or in-ground. They can also be installed individually or in multi-tank arrays, treating up to 1 MGD (3,800 m^3/day).

For Every Climate and Condition

AX-Max systems provide excellent treatment anywhere, and they have been installed all over the world. For example, AX-Max systems have been installed at Malibu's famous beach parks and New Zealand's Glendhu Bay campground. Several more were installed in Soyo, Africa, to serve a new hospital and school. Other AX-Max systems have been installed on top of Alaska's frozen tundra and St. Lucia's volcanic rock. Still more have been installed in mining camps from Alberta to Texas and, in the Midwest, at a U.S. Department of Defense demo site.



Benefits

- Containerized, fully-plumbed
- Capable of meeting stringent permit limits
  - ~ Reuse-quality effluent
  - ~ Significant reductions in ammonia, total nitrogen
- Compact and versatile
- Above-ground or in-ground installation
- Easy to set
- Simple to operate
- Low energy usage: <2 kWh per 1000 treated gal. (<2 kWh per 3.785 m^3)*

  ** When treating domestic waste*



Textile Treatment Media

The treatment medium is a uniform, engineered textile. AdvanTex textile is easy to clean and allows loading rates as high as 50 gpd/ft^2 (2000 L/day/m^2) with primary-treated influent.



Effluent Distribution

High-quality, low-horsepower pumps micro-dose the treatment media at regular intervals, and proprietary spin nozzles efficiently distribute the effluent, optimizing treatment.



Telemetry Controls

Orenco's telemetry-enabled control panels use a dedicated phone line or ethernet connection, ensuring 24/7 monitoring and real-time remote control.

AdvanTex® AX-Max™ Treatment System

Carefully Engineered by Orenco

Orenco Systems has been researching, designing, manufacturing, and selling leading-edge products for small-scale wastewater treatment systems since 1981. The company has grown to become an industry leader, with about 300 employees and 300 points of distribution in North America, Australasia, Europe, Africa, and Southwest Asia. Our systems have been installed in more than 70 countries around the world.

Orenco maintains an environmental lab and employs dozens of civil, electrical, mechanical, and manufacturing engineers, as well as wastewater treatment system operators. Orenco's technologies are based on sound scientific principles of chemistry, biology, mechanical structure, and hydraulics. As a result, our research appears in numerous publications and our engineers are regularly asked to give workshops and trainings.

Powered by Franklin Electric

Orenco SYSTEMS

814 Airway Avenue
Sutherlin, OR 97479 USA

T: 800-348-9843
T: 541-459-4449
F: 541-459-2884

www.orenco.com

ABR-ATX-MAX-1
Rev. 1.5, © 03/17
Orenco Systems®, Inc.

Project Summary



Installation photos courtesy of BioSolutions, Inc.

Point Dume State Beach and Preserve, Southern California

In spring, 2011, Los Angeles County needed to quickly upgrade restrooms at Malibu's Point Dume State Beach in time for the long — and busy — Memorial Day weekend. The county's engineer specified three AX-Max units, one for each restroom, and all three were installed in a matter of days. The small footprint of this configuration saved the county valuable space for visitor parking. After disinfection, the treated effluent is dispersed right into the sand. Point Dume is part of a large-scale upgrade of L.A. County beach parks, virtually all of which include AdvanTex Treatment Systems of various sizes and configurations.





Fully Supported by Orenco

AdvanTex Treatment Systems are part of a comprehensive program that includes ...

- Designer, installer, and operator training
- Design assistance, technical specifications, and plan reviews
- Installation and operation manuals
- Lifetime technical support

Distributed by:

SD275 | 10.3L | 275 kW

INDUSTRIAL DIESEL GENERATOR SET

EPA Certified Stationary Emergency

Standby Power Rating
275 kW, 344 kVA, 60 Hz

Prime Power Rating*
248 kW, 309 kVA, 60 Hz

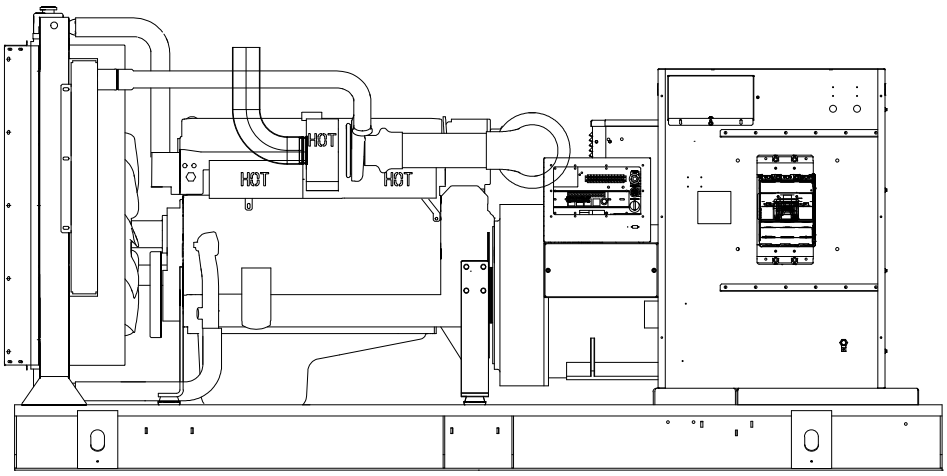


Image used for illustration purposes only

*EPA Certified Prime ratings are not available in the US or its Territories

Codes and Standards

Not all codes and standards apply to all configurations. Contact factory for details.

UL2200, UL6200, UL1236, UL489, UL142

CSA C22.2, ULC S601

BS5514 and DIN 6271

SAE J1349

NFPA 37, 70, 99, 110

NEC700, 701, 702, 708

ISO 3046, 7637, 8528, 9001

NEMA ICS10, MG1, 250, ICS6, AB1

ANSI C62.41

IBC 2009, CBC 2010, IBC 2012, ASCE 7-05, ASCE 7-10, ICC-ES AC-156 (2012)

Powering Ahead

For over 60 years, Generac has provided innovative design and superior manufacturing.

Generac ensures superior quality by designing and manufacturing most of its generator components, including alternators, enclosures and base tanks, control systems and communications software.

Generac gensets utilize a wide variety of options, configurations and arrangements, allowing us to meet the standby power needs of practically every application.

Generac searched globally to ensure the most reliable engines power our generators. We choose only engines that have already been proven in heavy-duty industrial applications under adverse conditions.

Generac is committed to ensuring our customers' service support continues after their generator purchase.

SD275 | 10.3L | 275 kW

INDUSTRIAL DIESEL GENERATOR SET

EPA Certified Stationary Emergency

STANDARD FEATURES

ENGINE SYSTEM

- Oil Drain Extension
- Level 1 Fan and Belt Guards (Open Set Only)
- Stainless Steel Flexible Exhaust Connection
- Factory Filled Oil and Coolant
- Radiator Duct Adapter (Open Set Only)

FUEL SYSTEM

- Fuel Lockoff Solenoid
- Primary Fuel Filter

COOLING SYSTEM

- Closed Coolant Recovery System
- UV/Ozone Resistant Hoses
- Factory-Installed Radiator
- Radiator Drain Extension
- 50/50 Ethylene Glycol Antifreeze
- Engine Coolant Heater

ELECTRICAL SYSTEM

- Battery Charging Alternator
- Battery Cables
- Battery Tray
- Rubber-Booted Engine Electrical Connections
- Solenoid Activated Starter Motor

ALTERNATOR SYSTEM

- UL2200 GENprotect™
- 12 Leads (3-Phase, Non 600V)
- Class H Insulation Material
- Vented Rotor
- 2/3 Pitch
- Skewed Stator
- Auxiliary Voltage Regulator Power Winding
- Permanent Magnet Excitation
- Sealed Bearing
- Automated Manufacturing (Winding, Insertion, Lacing, Varnishing)
- Rotor Dynamically Spin Balanced
- Amortisseur Winding
- Full Load Capacity Alternator
- Protective Thermal Switch

GENERATOR SET

- Internal Genset Vibration Isolation
- Separation of Circuits - High/Low Voltage
- Separation of Circuits - Multiple Breakers
- Wrapped Exhaust Piping
- Standard Factory Testing
- 2 Year Limited Warranty (Standby Rated Units)
- 1 Year Limited Warranty (Prime Rated Units)
- Silencer Mounted in the Discharge Hood (Enclosed Unit Only)

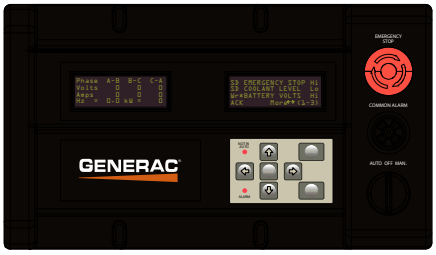
ENCLOSURE (If Selected)

- Rust-Proof Fasteners with Nylon Washers to Protect Finish
- High Performance Sound-Absorbing Material (Sound Attenuated Enclosures)
- Gasketed Doors
- Upward Facing Discharge Hoods (Radiator and Exhaust)
- Stainless Steel Lift Off Door Hinges
- Stainless Steel Lockable Handles
- RhinoCoat™ - Textured Polyester Powder Coat Paint

FUEL TANKS (If Selected)

- UL 142/ULC S601
- Double Wall
- Vents
- Sloped Top
- Sloped Bottom
- Factory Pressure Tested - 2 psi
- Rupture Basin Alarm
- Fuel Level
- Check Valve In Supply and Return Lines
- RhinoCoat™ - Textured Polyester Powder Coat Paint
- Stainless Steel Hardware

CONTROL SYSTEM



Digital H Control Panel- Dual 4x20 Display

Program Functions

- Programmable Crank Limiter
- 7-Day Programmable Exerciser
- Special Applications Programmable Logic Controller
- RS-232/485 Communications
- All Phase Sensing Digital Voltage Regulator
- 2-Wire Start Capability
- Date/Time Fault History (Event Log)
- Isochronous Governor Control
- Waterproof/Sealed Connectors
- Audible Alarms and Shutdowns
- Not in Auto (Flashing Light)
- Auto/Off/Manual Switch
- E-Stop (Red Mushroom-Type)
- NFPA110 Level I and II (Programmable)
- Customizable Alarms, Warnings, and Events
- Modbus® Protocol
- Predictive Maintenance Algorithm
- Sealed Boards
- Password Parameter Adjustment Protection
- Single Point Ground
- 16 Channel Remote Trending
- 0.2 msec High Speed Remote Trending
- Alarm Information Automatically Annunciated on the Display

Full System Status Display

- Power Output (kW)
- Power Factor
- kW Hours, Total, and Last Run
- Real/Reactive/Apparent Power
- All Phase AC Voltage
- All Phase Currents
- Oil Pressure
- Coolant Temperature
- Coolant Level
- Engine Speed
- Battery Voltage
- Frequency

Alarms and Warnings

- Oil Pressure
- Coolant Temperature
- Coolant Level
- Engine Overspeed
- Battery Voltage
- Alarms and Warnings Time and Date Stamped
- Snap Shots of Key Operation Parameters During Alarms and Warnings
- Alarms and Warnings Spelled Out (No Alarm Codes)

SD275 | 10.3L | 275 kW

INDUSTRIAL DIESEL GENERATOR SET

EPA Certified Stationary Emergency

CONFIGURABLE OPTIONS

ENGINE SYSTEM

- Block Heater
- Oil Heater
- Level 1 Fan and Belt Guards (Enclosed Units Only)
- Heavy Duty Air Cleaner
- Radiator Stone Guard
- Air Filter Restriction Indicator

FUEL SYSTEM

- NPT Flexible Fuel Line

ELECTRICAL SYSTEM

- 10A UL Listed Battery Charger
- Battery Warmer

ALTERNATOR SYSTEM

- Alternator Upsizing
- Anti-Condensation Heater
- Tropical Coating

CIRCUIT BREAKER OPTIONS

- Main Line Circuit Breaker
- 2nd Main Line Circuit Breaker
- Shunt Trip and Auxiliary Contact
- Electronic Trip Breakers

GENERATOR SET

- Extended Factory Testing
- IBC Seismic Certification
- 12 Position Load Center
- Spring Vibration Isolators

ENCLOSURE

- Weather Protected Enclosure
- Level 1 Sound Attenuated
- Level 2 Sound Attenuated
- Level 2 Sound Attenuated with Motorized Dampers
- Steel Enclosure
- Aluminum Enclosure
- Door Open Alarm Horn
- Up to 200 MPH Wind Load Rating (Contact Factory for Availability)
- AC/DC Enclosure Lighting Kit
- Enclosure Heater (with Motorized Dampers Only)

FUEL TANKS (Size on Last Page)

- 8 in (203.2 mm) Fill Extension
- 13 in (330.2 mm) Fill Extension
- 19 in (482.6 mm) Fill Extension

CONTROL SYSTEM

- NFPA 110 Compliant 21-Light Remote Annunciator
- Remote Relay Assembly (8 or 16)
- Oil Temperature Sender with Indication Alarm
- Remote E-Stop (Break Glass-Type, Surface Mount)
- Remote E-Stop (Red Mushroom-Type, Surface Mount)
- Remote E-Stop (Red Mushroom-Type, Flush Mount)
- 100 dB Alarm Horn
- Ground Fault Annunciator
- 120 V GFCI and 240 Outlet
- Flush Mount Annunciator Kit
- Remote Communication - Modem
- 10A Engine Run Relay
- Damper Alarm Contacts (with Motorized Dampers Only)

WARRANTY

- 2 Year Extended Limited Warranty
- 5 Year Limited Warranty
- 5 Year Extended Limited Warranty
- 7 Year Extended Limited Warranty
- 10 Year Extended Limited Warranty

ENGINEERED OPTIONS

ENGINE SYSTEM

- Coolant Heater Ball Valves
- Fluid Containment Pan

CONTROL SYSTEM

- Spare Inputs (x4) / Outputs (x4)
- Battery Disconnect Switch

ALTERNATOR SYSTEM

- 3rd Breaker System

GENERATOR SET

- Special Testing

FUEL TANKS

- Overfill Protection Valve
- UL2085 Tank
- Special Fuel Tanks
- Vent Extensions

APPLICATION AND ENGINEERING DATA

ENGINE SPECIFICATIONS

General

Make	Iveco/FPT
EPA Emissions Compliance	Stationary Emergency
EPA Emissions Reference	See Emission Data Sheet
Cylinder #	6
Type	In-Line
Displacement - in^3 (L)	628.54 (10.3)
Bore - in (mm)	4.92 (125)
Stroke - in (mm)	5.51 (140)
Compression Ratio	16.5:1
Intake Air Method	Turbocharged/Aftercooled
Cylinder Head	4-Valve
Piston Type	Aluminum
Crankshaft Type	Dropped Forged Steel

Engine Governing

Governor	Electronic Isochronous
Frequency Regulation (Steady State)	±0.25%

Lubrication System

Oil Pump Type	Gear
Oil Filter Type	Full Flow
Crankcase Capacity - qt (L)	31.68 (30)

Cooling System

Cooling System Type	Closed Recovery
Water Pump Type	Pre-Lubed, Self Sealing
Fan Type	Pusher
Fan Speed - RPM	2,250
Fan Diameter - in (mm)	30 (762)

Fuel System

Fuel Type	Ultra Low Sulfur Diesel Fuel #2
Fuel Specifications	ASTM
Fuel Filtering (Microns)	5
Fuel Inject Pump	Electronic
Fuel Pump Type	Engine Driven Gear
Injector Type	Common Rail
Engine Type	Direct Injection
Fuel Supply Line - in (mm)	0.5 (12.7) NPT
Fuel Return Line - in (mm)	0.5 (12.7) NPT

Engine Electrical System

System Voltage	24 VDC
Battery Charger Alternator	Standard
Battery Size	See Battery Index 0161970SBY
Battery Voltage	(2)-12 VDC
Ground Polarity	Negative

ALTERNATOR SPECIFICATIONS

Standard Model	K0275124Y21
Poles	4
Field Type	Revolving
Insulation Class - Rotor	H
Insulation Class - Stator	H
Total Harmonic Distortion	<5%
Telephone Interference Factor (TIF)	<50

Standard Excitation	Permanent Magnet
Bearings	Single Sealed Cartridge
Coupling	Direct via Flexible Disc
Prototype Short Circuit Test	Yes
Voltage Regulator Type	Digital
Number of Sensed Phases	All
Regulation Accuracy (Steady State)	±0.25%

SD275 | 10.3L | 275 kW

INDUSTRIAL DIESEL GENERATOR SET

EPA Certified Stationary Emergency

OPERATING DATA

POWER RATINGS

		Standby
Three-Phase 120/208 VAC @0.8pf	275 kW	Amps: 954
Three-Phase 120/240 VAC @0.8pf	275 kW	Amps: 827
Three-Phase 277/480 VAC @0.8pf	275 kW	Amps: 414
Three-Phase 346/600 VAC @0.8pf	275 kW	Amps: 331

MOTOR STARTING CAPABILITIES (skVA)

SkVA vs. Voltage Dip

277/480 VAC	30%	208/240 VAC	30%
K0275124Y21	790	K0275124Y21	609
K0350124Y21	1,001	K0350124Y21	801
K0400124Y21	953	K0400124Y21	717

FUEL CONSUMPTION RATES*

Fuel Pump Lift - ft (m)
3 (1)

Total Fuel Pump Flow (Combustion + Return) - gph (Lph)
31 (117)

Diesel - gph (Lph)

Percent Load	Standby
25%	6.8 (25.7)
50%	11.7 (44.2)
75%	15.8 (59.8)
100%	19.6 (74.2)

* Fuel supply installation must accommodate fuel consumption rates at 100% load.

COOLING

		Standby
Coolant Flow	gpm (Lpm)	95 (360)
Coolant System Capacity	gal (L)	13.0 (49.2)
Heat Rejection to Coolant	BTU/hr (kW)	722,612 (211.8)
Inlet Air	cfm (m^3/hr)	14,505 (411)
Maximum Operating Radiator Air Temperature	°F (°C)	110 (43.3)
Maximum Ambient Temperature (Before Derate)		See Bulletin No. 0199280SSD
Maximum Additional Radiator Backpressure	in H_2O (kPa)	0.5 (0.12)

COMBUSTION AIR REQUIREMENTS

	Standby
Flow at Rated Power - cfm (m^3/min)	780 (22.1)

ENGINE

		Standby
Rated Engine Speed	RPM	1,800
Horsepower at Rated kW**	hp	449
Piston Speed	ft/min (m/min)	1,654 (504)
BMEP	psi (kPa)	308 (2,124)

EXHAUST

		Standby
Exhaust Flow (Rated Output)	cfm (m^3/min)	2,050 (58.1)
Maximum Allowable Backpressure	inHg (kPa)	1.5 (5.1)
Exhaust Temperature (Rated Output)	°F (°C)	950 (510)

** Refer to “Emissions Data Sheet” for maximum bHP for EPA and SCAQMD permitting purposes.

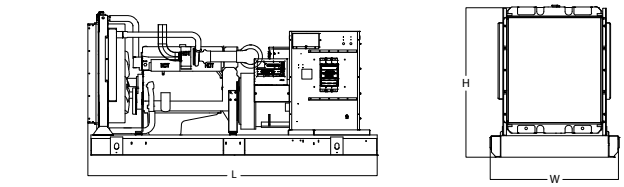
Deration – Operational characteristics consider maximum ambient conditions. Derate factors may apply under atypical site conditions.
Please contact a Generac Power Systems Industrial Dealer for additional details. All performance ratings in accordance with ISO3046, BS5514, ISO8528, and DIN6271 standards.
Standby - See Bulletin 10000018933
Prime - See Bulletin 10000018926

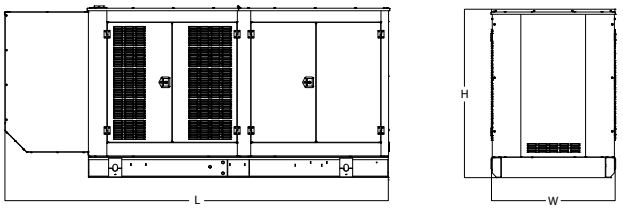
SD275 | 10.3L | 275 kW

INDUSTRIAL DIESEL GENERATOR SET

EPA Certified Stationary Emergency

DIMENSIONS AND WEIGHTS*



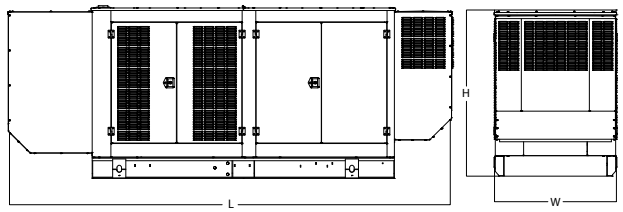


OPEN SET

Run Time - Hours	Usable Capacity - Gal (L)	L x W x H - in (mm)	Weight - lbs (kg)
No Tank	-	137.5 (3,493) x 57.6 (1,463) x 67.8 (1,722)	6,121 - 7,457 (2,776 - 3,382)
9	183 (693)	137.5 (3,493) x 57.6 (1,463) x 80.8 (2,052)	7,069 - 8,405 (3,206 - 3,812)
22	438 (1,659)	137.5 (3,493) x 57.6 (1,463) x 92.8 (2,357)	7,381 - 8,717 (3,348 - 3,954)
35	693 (2,624)	137.5 (3,493) x 57.6 (1,463) x 104.8 (2,662)	7,717 - 9,053 (3,500 - 4,106)
48	946 (3,581)	208.3 (5,220) x 57.6 (1,463) x 122.0 (3,100)	9,146 - 10,482 (4,148 - 4,754)
67	1,325 (5,015)	277.8 (7,055) x 57.6 (1,463) x 120.9 (3,072)	10,161 - 11,497 (4,659 - 5,265)

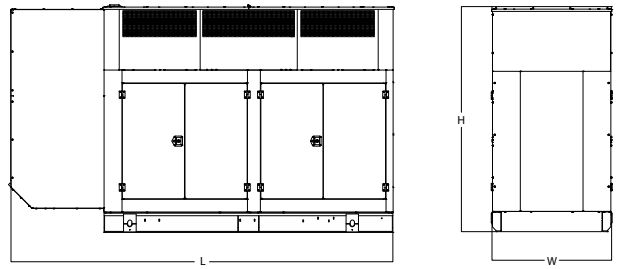
WEATHER PROTECTED ENCLOSURE

Run Time - Hours	Usable Capacity - Gal (L)	L x W x H - in (mm)	Weight - lbs (kg) Enclosure Only	
			Steel	Aluminum
No Tank	-	174.7 (4,437) x 53.0 (1,346) x 77.8 (1,977)	1,521 (690)	727 (330)
9	183 (693)	174.7 (4,437) x 53.0 (1,346) x 90.8 (2,307)		
22	438 (1,659)	174.7 (4,437) x 53.0 (1,346) x 102.8 (2,612)		
35	693 (2,624)	174.7 (4,437) x 53.0 (1,346) x 114.8 (2,917)		
48	946 (3,581)	208.3 (5,220) x 53.0 (1,346) x 132.0 (3,355)		
67	1,325 (5,015)	277.8 (7,055) x 53.0 (1,346) x 130.9 (3,327)		



LEVEL 1 SOUND ATTENUATED ENCLOSURE

Run Time - Hours	Usable Capacity - Gal (L)	L x W x H - in (mm)	Weight - lbs (kg) Enclosure Only	
			Steel	Aluminum
No Tank	-	200.2 (5,084) x 57.5 (1,460) x 90.8 (2,306)	1,984 (900)	926 (421)
9	183 (693)	200.2 (5,084) x 57.5 (1,460) x 90.8 (2,306)		
22	438 (1,659)	200.2 (5,084) x 57.5 (1,460) x 102.8 (2,611)		
35	693 (2,624)	200.2 (5,084) x 57.5 (1,460) x 114.8 (2,916)		
48	946 (3,581)	200.2 (5,084) x 57.5 (1,460) x 132.0 (3,354)		
67	1,325 (5,015)	277.8 (7,055) x 57.5 (1,460) x 130.9 (3,326)		



LEVEL 2 SOUND ATTENUATED ENCLOSURE

Run Time - Hours	Usable Capacity - Gal (L)	L x W x H - in (mm)	Weight - lbs (kg) Enclosure Only	
			Steel	Aluminum
No Tank	-	180.7 (4,588) x 57.5 (1,460) x 107.3 (2,725)	2,557 (1,160)	1,173 (531)
9	183 (693)	180.7 (4,588) x 57.5 (1,460) x 120.3 (3,055)		
22	438 (1,659)	180.7 (4,588) x 57.5 (1,460) x 132.3 (3,360)		
35	693 (2,624)	180.7 (4,588) x 57.5 (1,460) x 144.3 (3,665)		
48	946 (3,581)	180.7 (4,588) x 57.5 (1,460) x 161.5 (4,103)		
67	1,325 (5,015)	277.8 (7,055) x 57.5 (1,460) x 160.4 (4,075)		

* All measurements are approximate and for estimation purposes only. Specification characteristics may change without notice. Please contact a Generac Power Systems Industrial Dealer for detailed installation drawings.

Generac Power Systems, Inc. | P.O.Box 8 | Waukesha, WI 53189
P: (262) 544-4811 ©2021 Generac Power Systems, Inc. All rights reserved. All specifications are subject to change without notice.

Part No. 0185610SBY
Rev. F 07/13/2021

TX301 Series Transfer Switch

100 – 400 Amps

Contactor Type · Open and Delayed Transition · Service Entrance Rated

- Automatic Transfer Switch
- 100 – 400 A, up to 480 VAC, 60 Hz, 100% Current Rated
- Single or Three Phase
- 2, 3, or 4 Poles
- UL Type 1 or Type 3R
- Open and Inphase or Open with Delayed Transition
- ETL Listed to UL 1008
- High Withstand and Closing Ratings



Image used for illustration purposes only

Codes and Standards

ETL Listed

NFPA 70, 99, 110

NEC 700, 701, 702, 708

OSHPD and Seismic Certified CBC 2019, CBC 2016, IBC 2018, IBC 2015, IBC 2012, IBC 2009, ASCE 7-10, ASCE 7-16, ICC-ES AC-156

Description

Generac's patented* contactor is featured in the TX contactor type transfer switch, which is a double-throw robust switch construction with inherent interlocks for safe positive transfer between power sources. Featuring a transition time of less than 20 milliseconds, this high speed transfer is ideal for all applications, including motor load applications. The contacts are silver composite for long life, resisting pitting or burning. The switches are rated for full load transfers in mission critical, emergency, legally required, and optional power systems.

The microprocessor based controller provides the customers with the flexibility to program a comprehensive group of set points to match the application needs. The controller has two programmable inputs and one programmable output as standard and is available with optional expansion boards for up to four programmable inputs and outputs. The LCD displays real time and historical information with time-stamped events. The integrated plant exerciser can be configured in off, daily, day of week, biweekly, and monthly intervals with user selectable run time. Standard features of the controller include three phase sensing on both sources, phase unbalance, phase reversal, load shed, emergency inhibit, and communications.

*Patent Number: US 11,227,728 B2

TX301 Series Transfer Switch

100 – 400 Amps

Contactor Type · Open and Delayed Transition · Service Entrance Rated

STANDARD FEATURES

GENERAL

- Small Footprint, Results in Easy Mounting and Installation for Reduced Time and Costs
- Cable Entry is Top or Bottom (400A Units are Bottom Only)
- Double-Throw, Stored Energy Transfer Mechanism
- Can be Electrically Isolated while Energized
- Graphical LCD-Based Display for Programming, System Diagnostics and Help Menu Display Mimic
- Diagram with Source Available and Connected LED Indicator
- Method of Transfer: Open with Inphase Transition
- Mechanically Interlocked to Prevent Connection of Both Sources
- Modbus® RTU Communications
- TXC 100 Controller
- Operating Temperature -4 ° to 158 °F (-20 ° to 70 °C)
- Removable Top and Bottom Plates for Ease of Entry
- Voltage Agnostic*
- High Withstand and Closing Ratings
- Heater Kit Standard on All 3R Enclosures
- Auxiliary Output Includes: Two Wire Start, Signal Before Transfer, Fault, and a Programmable Relay Output
- Auxiliary Input Includes: Permissive Inputs (24 VDC)
- General Alarm Indication
- 2 Year Standard Warranty
- IBC 2018, 2015, 2012, 2009

VOLTAGE AND FREQUENCY SENSING

- Three Phase Under and Over Voltage Sensing on Normal and Emergency Sources
- Under and Over Frequency Sensing on Normal and Emergency
- Selectable Settings: Single or Three Phase Voltage
- Sensing on Normal, Emergency and Load 60 Hz
- Phase Sequence Sensing for Phase Sensitive Loads

Start Circuit

- 2-Wire Start
- 3-Wire Start From C Contact for Circuit Monitoring

Digital Outputs

- Signal Before Transfer (Elevator)
- General Alarm

Digital Inputs

- Emergency Inhibit (Permissive & Load Shed)
- Go to Emergency (Demand Response)
- Manual Generator Retransfer

CONTROLS

- Front Programmable Control Reduces PPE Needs and Arc Flash Hazard
- Built in Battery Backup - Increases Switch Reliability and Reduces Switch Transition Time to Alternate Source
- Battery Backup Able to Power the Controller for up to 60 Minutes in the Event of No Source Availability
- Accessible USB Port for Easy Data Downloads, Firmware Updates without Requiring PPE, Reducing the Risk of Arc Flash
- All Amp Nodes Offered with Delayed Transition
- Heater Programmable through Control for Desired Temperature and Humidity Settings
- Front Accessible Customer Connections
- Time-Stamped Event History Log
- Programmable Exerciser - Daily, Weekly, Bi-Weekly, Monthly

* 480 V 3-Wire Systems Must be Specified at Time of Ordering for Transformer Kit to be Included

CONFIGRUABLE OPTIONS

- Chicago Code Kit
- 3R Padlockable Cover for Controller (Standard on 3R Enclosure)
- 3R Padlockable Cover for Service Entrance Breaker (Standard on 3R Enclosures)
- CTs for Integrated Metering
- Generator Battery Backup for Controller
- Heater Option for Temperature and Humidity Control (Standard on 3R Enclosure)
- Time Delay in Neutral Transition (TDN), or Inphase with a Default to Time Delay in Neutral Transfer
- Expandable Input/Output Board Module Includes: 4 Relay Outputs and 4 Optically Isolated Inputs
- IBC Seismic Certified/Seismic Rated
- 2 Year Extended Limited Warranty
- 5 Year Basic Limited Warranty
- 5 Year Extended Limited Warranty
- 7 Year Extended Limited Warranty
- 10 Year Extended Limited Warranty

Engineered Options

- Transient Voltage Surge Suppressor (TVSS)
- Manual Generator Retransfer Switch
- Go to Emergency Switch

Conversion Kits

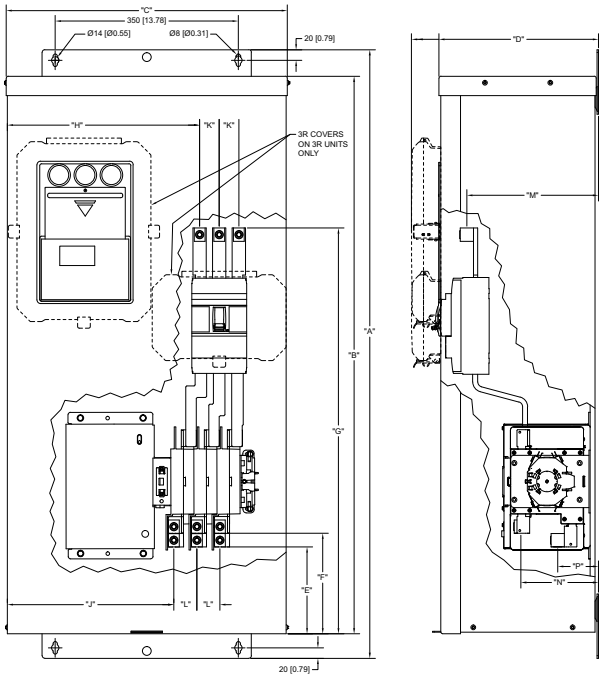
- 480 V Transformer Kit for 3-Wire Systems
- UL Type 1 to Type 3R Kit

TX301 Series Transfer Switch

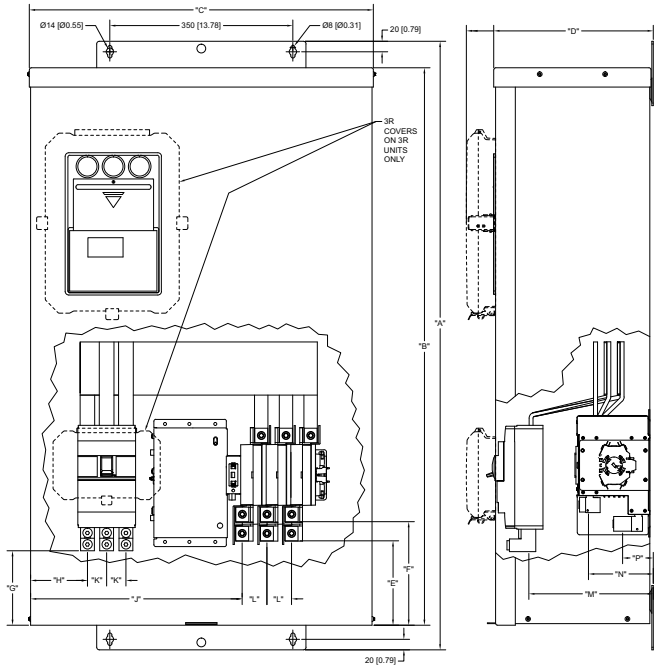
100 – 400 Amps

Contactor Type · Open and Delayed Transition · Service Entrance Rated

UNIT DIMENSIONS*



100 - 200 A



300 - 400 A

Service Entrance Rated, Contactor Type, Open and Delayed Transition, 100 – 400 A

Description	in (mm)														Cu/Al					lbs (kg)
	A (Height)	B (Height)	C (Width)	D (Depth)	E (Dim)	F (Dim)	G (Dim)	H (Dim)	J (Dim)	K† (Dim)	L (Dim)	M (Dim)	N (Dim)	P (Dim)	Normal 75 °C Wire	Standby Source 75 °C Wire	Load 75 °C Wire	Neutral Connection	Ground Connection	Weight
100A SER TYPE 1	51.3 (1,303)	47.5 (1,206)	21.2 (538)	12.0 (305)	9.5 (242)	10.6 (268)	38.3 (973)	14.5 (369)	12.6 (320)	1.5 (38)	1.7 (44)	10.1 (257)	5.8 (148)	3.1 (79)	(1) 3/0 - 6	(1) 2/0 - 14	(1) 2/0 - 14	(5) 2/0 - 14	(6) 2/0 - 14	154.3 (70)
100A SER TYPE 3R	51.3 (1,303)	47.5 (1,206)	21.2 (538)	13.9 (355)	9.5 (242)	10.6 (268)	38.3 (973)	14.5 (369)	12.6 (320)	1.5 (38)	1.7 (44)	10.1 (257)	5.8 (148)	3.1 (79)	(1) 3/0 - 6	(1) 2/0 - 14	(1) 2/0 - 14	(5) 2/0 - 14	(6) 2/0 - 14	158.7 (72)
150A SER TYPE 1	51.3 (1,303)	47.5 (1,206)	21.2 (538)	12.0 (305)	9.9 (253)	10.9 (279)	38.3 (973)	14.5 (369)	12.6 (320)	1.5 (38)	1.7 (44)	10.1 (257)	5.8 (148)	3.3 (84)	(1) 250 - 6	(1) 250 - 6	(1) 250 - 6	(5) 350 - 6	(5) 350 - 6	165.3 (75)
150A SER TYPE 3R	51.3 (1,303)	47.5 (1,206)	21.2 (58)	13.9 (355)	9.9 (253)	10.9 (279)	38.3 (973)	14.5 (369)	12.6 (320)	1.5 (38)	1.7 (44)	10.1 (257)	5.8 (148)	3.3 (84)	(1) 250 - 6	(1) 250 - 6	(1) 250 - 6	(5) 350 - 6	(5) 350 - 6	169.8 (77)
200A SER TYPE 1	51.3 (1,303)	47.5 (1,206)	21.2 (538)	12.0 (305)	9.9 (253)	10.9 (279)	38.3 (973)	14.5 (369)	12.6 (320)	1.5 (38)	1.7 (44)	10.1 (257)	5.8 (148)	3.3 (84)	(1) 250 - 6	(1) 250 - 6	(1) 250 - 6	(5) 350 - 6	(5) 350 - 6	165.3 (75)
200A SER TYPE 3R	51.3 (1,303)	47.5 (1,206)	21.2 (538)	13.9 (355)	9.9 (253)	10.9 (279)	38.3 (973)	14.5 (369)	12.6 (320)	1.5 (38)	1.7 (44)	10.1 (257)	5.8 (148)	3.3 (84)	(1) 250 - 6	(1) 250 - 6	(1) 250 - 6	(5) 350 - 6	(5) 350 - 6	169.8 (77)
300A SER TYPE 1	51.4 (1,305)	47.5 (1,206)	33.9 (860)	12.0 (305)	9.9 (253)	11.7 (297)	9.0 (228)	7.6 (192)	22.1 (562)	1.8 (46)	2.3 (59)	8.7 (222)	6.5 (166)	3.3 (84)	(2) 600 - 2/0	(1) 600 - 4 or (2) 250 - 1/0	(1) 600 - 4 or (2) 250 - 1/0	(5) 600 MCM - 4 or (10) 250 MCM - 1/0	(5) 350 - 6	260.1 (118)
300A SER TYPE 3R	51.4 (1,305)	47.5 (1,206)	33.9 (860)	13.9 (355)	9.9 (253)	11.7 (297)	9.0 (228)	7.6 (192)	22.1 (562)	1.8 (46)	2.3 (59)	8.7 (222)	6.5 (166)	3.3 (84)	(2) 600 - 2/0	(1) 600 - 4 or (2) 250 - 1/0	(1) 600 - 4 or (2) 250 - 1/0	(5) 600 MCM - 4 or (10) 250 MCM - 1/0	(5) 350 - 6	264.6 (120)
400A SER TYPE 1	51.4 (1,305)	47.5 (1,206)	33.9 (860)	12.0 (305)	9.9 (253)	11.7 (297)	9.0 (228)	7.6 (192)	22.1 (562)	1.8 (46)	2.3 (59)	8.7 (222)	6.5 (166)	3.3 (84)	(2) 600 - 2/0	(1) 600 - 4 or (2) 250 - 1/0	(1) 600 - 4 or (2) 250 - 1/0	(5) 600 MCM - 4 or (10) 250 MCM - 1/0	(5) 350 - 6	260.1 (118)
400A SER TYPE 3R	51.4 (1,305)	47.5 (1,206)	33.9 (860)	13.9 (355)	9.9 (253)	11.7 (297)	9.0 (228)	7.6 (192)	22.1 (562)	1.8 (46)	2.3 (59)	8.7 (222)	6.5 (166)	3.3 (84)	(2) 600 - 2/0	(1) 600 - 4 or (2) 250 - 1/0	(1) 600 - 4 or (2) 250 - 1/0	(5) 600 MCM - 4 or (10) 250 MCM - 1/0	(5) 350 - 6	264.6 (120)

† K Dimension for 100-200A 2-Pole Configuration is 3 (75). K Dimension for 300-400A 2-Pole Configuration is 3.6 (92)

UL 1008 Withstand and Closing Ratings

Ampere Rating	Specific Breaker (kA)**	Service Entrance (kA)	Fuse Rating (Class J)	Fuse Size
100	35	35	35 kA	200 A
150	42	42	100 kA	200 A
200	42	42	100 kA	200 A
300	65	65	100 kA	400 A
400	65	65	100 kA	400 A

* All measurements are approximate and for estimation purposes only. Specification characteristics may change without notice. Please contact a Generac Power Systems Industrial Dealer for detailed installation drawings.
** See Specific Breaker List available on GENconnect.

Generac Power Systems, Inc. | P.O. Box 8 | Waukesha, WI 53189
P: (262) 544-4811 ©2022 Generac Power Systems, Inc. All rights reserved. All specifications are subject to change without notice.

Part No. A0000416970
Rev. D 11/21/2022

TX Series Transfer Switch

TXC-100

Automatic Transfer Switch Controller

- Automatic Transfer Switch Controller
- Up to 480 VAC, 50/60 Hz
- Single and Three Phase
- cETLus Recognized Component
- Tested to UL 1008



Image used for illustration purposes only

Codes and Standards

Not all codes and standards apply to all configurations. Contact factory for details.

cETLus Recognized per UL 1008

NFPA 37, 70, 99, 110

NEC 700, 701, 702, 708

Description

Generac's TXC-100 microprocessor based controller provides customers with the flexibility to program a comprehensive group of set points to match the application needs. The controller has 2 programmable inputs and 1 programmable output as standard and is available with an optional expansion board for up to 4 programmable inputs and outputs. The LCD displays real time and historical information with time-stamped events. The integrated plant exerciser can be configured in off, daily, day of week, biweekly, and monthly intervals with user selectable run time. Standard features of the controller include three phase sensing on both sources, phase unbalance, phase reversal, emergency inhibit, and communications.

TX Series Transfer Switch

TXC-100

Automatic Transfer Switch Controller

STANDARD FEATURES

GENERAL

- Graphical LCD-Based Display for Programming, System Diagnostics and Help Menu Display Mimic Diagram with Source Available and Connected LED Indicator
- Time-Stamped Event History Log
- Programmable Exerciser - Daily, Weekly, Bi-Weekly, Monthly
- Methods of Transfer Include: Open with Inphase Transition Only, Time Delay in Neutral Transition, or Inphase with a Default to Time Delay in Neutral Transfer
- Modbus® RTU Communications
- Operating Temperature -4 ° to 158 °F (-20 ° to 70 °C)
- Voltage Agnostic*
- Integrated Anti-condensation Heater Control
- Auxiliary Output Includes: 2WS, SB4T, Fault, and a Programmable Relay Output
- Auxiliary Input Includes: Permissive and Loadshed Inputs (24 VDC)
- Expandable Input/Output Board Module Includes: 4 Relay Outputs and 4 Optically Isolated Inputs
- Front Programmable Control Reduces PPE Needs and Arc Flash Hazard
- Built in Battery Backup - Increases Switch Reliability and Reduces Switch Transition Time to Alternate Source
- Rechargeable Lithium-ion Battery Backup Able to Power the Controller for up to 60 Minutes in the Event of No Source Availability
- Accessible USB Port for Easy Data Downloads, Firmware Updates without Requiring PPE, Reducing the Risk of Arc Flash
- All Amp Nodes Offered with Delayed Transition
- General Alarm Indication
- Heater Programmable through Control for Desired Temperature and Humidity Settings
- Front Accessible Customer Connections and Battery without Arc Flash Exposure
- Auxiliary Generator Battery Backup for Controller

VOLTAGE AND FREQUENCY SENSING

- Three Phase Under and Over Voltage Sensing on Normal and Emergency Sources
- Under and Over Frequency Sensing on Normal and Emergency
- Selectable Settings: Single or Three Phase Voltage
- Sensing on Normal, Emergency and Load 50 or 60 Hz
- Phase Sequence Sensing for Phase Sensitive Loads

PROGRAMMABLE I/O PARAMETERS

Outputs:

- Source 1 – Two Wire Start
- Source 2 – Two Wire Start
- Engine Exercising
- Engine Warmup
- Signal Before Transfer (Elevator Contact)
- General Alarm
- Source 1 Good
- Source 2 Good

Inputs:

- Permissive (Emergency Inhibit)
- Remote Engine Fast Test
- Remote Engine Normal Test
- ATS Timer
- Initiate Demand Response

* 480 V Delta Must be Specified at Time of Ordering for Transformer Kit to be Included

AVAILABLE OPTIONS

- Chicago Code Kit
- 3R Padlockable Cover for Controller (Standard on 3R Enclosure)
- Emergency Inhibit
- Selectable Retransfer
- Manual Generator Retransfer
- Type 1 to 3R Conversion Kit
- Heater Option for Temperature and Humidity Control (Standard on 3R Enclosure)
- Input/Output (I/O) Module
- Current Measurements**
- Power in kW**
- Power Factor**

** When Equipped with Current Transformers

Generac Power Systems, Inc. | P.O. Box 8 | Waukesha, WI 53189
P: (262) 544-4811 ©2020 Generac Power Systems, Inc. All rights reserved. All specifications are subject to change without notice.

Part No. A0000354456
Rev. A 06/18/2020

ORDINANCE NO 2278

AN ORDINANCE amending Ordinance No. 826, the Zoning Ordinance of the City of Sheridan, to zone the entirety of the land more particularly described in Appendix A Section 1., and shown on the attached Exhibit A, from an B-2 Business District to a Planned Unit Development (PUD); for the property designated as Story House Village Planned Unit Development Phase 1 to the City of Sheridan, Wyoming containing +/-44.86 acres.

WHEREAS, the owner of the following described land has petitioned the City Governing Body to rezone the same from an B-2 Business District to PUD, and a public hearing having been held thereon by the City Governing Body;

THEREFORE BE IT ORDAINED BY THE CITY OF SHERIDAN GOVERNING BODY:

Section 1.
The following described land is hereby rezoned from a B-2 Business District to a PUD, to wit:

A tract of land situated in the S½SE¼ of Section 24, Township 56 North, Range 84 West of the Sixth Principal Meridian, City of Sheridan, Sheridan County, Wyoming, as shown on said tract being more particularly described as follows:

Commencing at the south quarter corner of said Section 24 (monumented with a 3¼" Aluminum Cap per PLS 6594); thence N00°15'50"E, 120.65 feet along the west line of said S½SE¼ to a 2" Aluminum Cap per PLS 6812 being the POINT OF BEGINNING this tract;

thence N00°16'03"E, 1094.87 feet along said west line to a 2" Aluminum Cap per PLS 5369;

thence N90°00'00"E, 535.01 feet to a 2" Aluminum Cap per PLS 5369;

thence S46°17'47"E, 391.87 feet to a 2" Aluminum Cap per PLS 5369;

thence N87°07'39"E, 893.32 feet to a 2" Aluminum Cap per PLS 5369;

thence S60°32'45"E, 756.24 feet to a 2" Aluminum Cap per PLS 5369 lying on the north right of way line of Wyarno Road (AKA State Highway No. 336);

thence along said north right of way line, through a curve to the right, having a central angle of 59°23'00", a radius of 1045.92 feet, an arc length of 1084.03 feet, a chord bearing of S61°18'38"W and a chord distance of 1036.15 feet to a standard WYDOT right of way monument at the end of said curve to the right;

thence along said north right of way line S01°14'12"W, 24.84 feet to a standard WYDOT right of way monument;

thence N89°00'40"W, 1464.84 feet along said north right of way line to the POINT OF BEGINNING.

Said tract containing 44.87 Acres of land, more or less. Bearings are based on the Wyoming Coordinate System, NAD 1983, East Central Zone. Distances are multiplied to surface by the Project Adjustment Factor of 1.00023549.

Section 2.
That Ordinance No. 826, The Zoning Ordinance of the City of Sheridan is hereby amended to conform herewith.

Section 3.
From the City of Sheridan Ordinance Appendix B Article 803, the PUD is found to:

1. Be compatible with the goals and policies of the City Master Plan and other applicable adopted plans and policies.
2. Be compatible with the area surrounding the project site.
3. Place no greater demand on existing City facilities and services than can be furnished by the City.

4. Insofar as practicable, preserves the landscape in its natural state by minimizing tree and soil removal.
5. Promotes the efficient use of land by means of more economical arrangement of buildings/lots, circulation systems, land uses, densities, and utilities.
6. Provides for useable and suitably located open space such as, but not limited to, bicycle paths, playground areas, courtyards, tennis courts, swimming pools, planned gardens, outdoor seating areas, outdoor picnic areas, and similar open space.
7. Demonstrates flexibility and quality in design to permit diversification in the location, type, and uses of structures.
8. Combines and coordinates architectural styles, building forms, and building relationships within the development and in concert with adjacent and surrounding land and development.
9. Be designed and controlled as a whole under the control of one (1) owner, partnership, corporation, or agency.
10. Give special attention to vehicular and pedestrian circulation and parking, the location and number of access points to public streets, width of interior drives and access points, general interior circulation, separation of pedestrian and vehicular traffic, and the arrangement of parking areas that are safe and convenient and, insofar as practicable, do not detract from the design of proposed structures and neighboring properties.

Section 3.
If any provision or portion of this ordinance is declared by any court of competent jurisdiction to be void, unconstitutional, or unenforceable, than all remaining provisions and portions of this ordinance shall remain in full force and effect.

Section 4.
The Developer and the City of Sheridan shall enter into a Development Agreement which shall be controlling and binding over the rest of the property owned by the Developer, known as “Story House” and is currently zoned B-2. The City shall not grant or authorize any permit for construction or development of Story House property until such time as both parties have entered into the Development Agreement.

Section 5.
That this ordinance shall be in full force and effect immediately upon its passage and publication as provided by law.

PASSED, APPROVED, AND ADOPTED this _____ day of _____, 2024.

ATTEST: _____
Richard Bridger, Mayor

_____
Cecilia Good, City Clerk
State of Wyoming)
)SS
County of Sheridan)

Subscribed and sworn to (or affirmed) before me this _____day of

_____, 2024 by _____.

_____
Notary Public

My commission expires _____.

DEVELOPMENT AGREEMENT

This Agreement is entered into as of the date executed by the last party, by and among the City of Sheridan, a Wyoming municipal corporation (hereinafter "City"); Story House Property Company, LLC (hereinafter "Developer"), referred to collectively as the "Parties".

RECITALS

WHEREAS, Developer owns undeveloped real property located and described as shown in **Exhibit A**; and

WHEREAS, Developer's real property (referred to as "the Real Property"), is located, as of the date of this Agreement, within both the City jurisdiction and County jurisdiction and this Agreement is intended to be binding on that portion of the Real Property annexed to the City and to contemplate the remainder of the Real Property to be annexed in the future; and

WHEREAS, the parties find it necessary to establish an agreement to memorialize the understanding of the parties and set forth the terms and conditions for the development of the Real Property; and

WHEREAS, the annexations of Story House were done in conformity with City Ordinance and Wyoming Statute; and

THEREFORE, in consideration of the promises and mutual covenants contained in this Agreement, the legal sufficiency of which are hereby expressly acknowledged, the parties agree as follows:

PURPOSE:

The purpose of this Agreement is to establish the terms, conditions and expectations of the parties necessary to ensure an efficient and effective phased development of the Real Property as a Planned Unit Development (PUD) for the benefit of the Developer, the City of Sheridan and the Sheridan community, as the PUD plan is approved by the City of Sheridan simultaneously with this Agreement.

ARTICLE I – HISTORY AND PROPERTY CONDITIONS

1.1 Water Availability. The City's water system currently has limited capacity to serve the Real Property, but is able to serve the lands identified as Phase I, herein, and for any use in B1 zoning or less. The City intends to construct a section of a water transmission line which is planned to loop adjacent to the Real Property and is commonly referred to as the NorthEast Extension project. City will prioritize the construction with the intention that it be completed by the 2025-26 construction season.

As a condition of this Agreement, the City commits that it will keep the North East

Extension Project as a priority in the City's intended use plan for drinking water projects. When the North East Extension Project is completed, it is anticipated the City's water system would be capable of serving the Story House Real Property at its annexed B-2 level.

1.2 Sewer Availability; Alternative On-Site Plant. The City's sanitary sewer system is not adjacent to the Real Property. The City has no plans and does not intend to extend sewer to the Real Property.

As an alternative, the City and Developer agree that Developer may construct a decentralized sewer system on the Real Property in compliance with WDEQ regulations and applicable codes, at its cost. The construction of the system shall be done in a manner which will allow for a future connection to City centralized sewer. The City will assume operation and maintenance of the decentralized sewer system in accordance with the Subdivision Improvement Agreement required by City Ordinance Appendix B Article 7 .

1.3 Jurisdiction. The Real Property subject to this Agreement is located within both the City and County jurisdictions. The term "Real Property" shall include the real property located in both jurisdictions. The term "Real Property in the City" shall only include real property which is located within the City municipal boundary. The term "Real Property in the County" shall only include real property located outside of the City municipal boundary.

1.4 Gravel Pit. The Real Property has a permitted gravel pit which is currently located outside the City jurisdiction. Developer intends to utilize the gravel pit. The City currently lacks sufficient zoning and permitting ordinances to allow for the operation of the gravel pit. The City intends to adopt necessary ordinances to allow for the gravel pit operation within the City jurisdiction . Developer shall meet all permitting requirements of the State. If the City adopts the intended ordinances and the gravel pit is annexed by the City, then Developer agrees to meet the permitting requirements for the City that allow for the development anticipated hereunder.

1.5 Zoning. The Real Property is currently zoned B-2. Developer has submitted a phased PUD Master Plan for the accepted development of the Real Property so that Phase I can be immediately commenced and the remaining Phases constructed thereafter.

1.6 Story House Phase I. The Developer has proposed Phase I of the Story House Development with the plans and uses set forth herein and the City approves the same, subject to the conditions hereof.

ARTICLE II – MASTER PLAN and USE

2.1 Conceptual Plans. Developer has submitted conceptual plans for Phases I, II and III for the immediate development of the Real Property. Phase I is anticipated to be no more dense than 600 residential units and the identified commercial areas. The remaining Real

Property is intended to be developed in accordance with the Conceptual Plan which is attached and incorporated at **Exhibit C**.

Master Plan. Developer has created a Master Plans for Story House Phase I-, which is attached and incorporated at **Exhibit D**. Future property development of Phase I shall substantially conform to the approved Master Plan. In the event that the Developer, or their successor, assign or transferee, requests material changes to the Master Plan, which significantly alters uses and/or density, the City may require a Master Plan amendment which must be approved pursuant to City of Sheridan Ordinance in effect as of the date of this Agreement. Provided, upon substantial completion of infrastructure in each Phase, all amendments to the Master Plan shall comply with the City Ordinance in effect at the time of the requested amendment.

2.2 Open Space. The open space necessary for all Phases shall be met and satisfied in accordance with Article 3.1 below.

2.3 De-annexation. The Developer reserves the right to petition the City for removal of the Real Property from the corporate limits. Any request to remove property from the corporate limits of the City shall be at the owner's cost and in compliance with Wyoming Statute the City will have discretion to approve or deny the request subject to Wyoming Statute.

2.4 Current Use. The parties acknowledge that the Real Property has historically been used in a ranch operation, and that such use is a pre-existing non-conforming use, including but not limited to the keeping and grazing of horses and cattle, that will be allowed to continue. As each lot is developed to a residential or commercial use, the right of non-conforming use of each occupied lot shall expire.

2.5 Gravel Pit. Upon the City adopting ordinances necessary to permit a gravel pit inside the corporate boundary of the City, the City will work with Developer to annex the Real Property in the County and allow for the continuation of gravel quarrying or other development anticipated in Developer's conceptual plans. The Developer, by this agreement, waives all rights to contest the annexation if the gravel pit ordinances allow for the development anticipated in the conceptual plans. Operation of the gravel pit will thereafter be in accordance with a gravel permit approved by the City of Sheridan.

a. Regardless of the annexation, the gravel pit shall be subject to the following conditions:
    i. No residential uses shall be allowed within 300 feet of the active mining area of the permitted gravel pit.
    ii. The active mining area within the gravel pit shall be fenced with fencing which prevents uninvited guests or trespassers from accessing the permitted gravel pit not later than when any residential unit(s) are constructed within 500' of the permitted gravel pit.
    iii. Gravel pit operations shall only occur during daylight hours.
    iv. Gravel trucks and equipment shall only use truck routes designated on the map attached hereto, or along routes otherwise approved by the City.

ARTICLE III – OPEN SPACE

3.1 Open Space.

3.1.1 The Real Property consists of approximately 224.24 acres, of which 176 acres is annexed to the City. . In accordance with Article 805.7, a minimum of twenty percent (20%) of the gross area of Story Houseshall be open space, which may be dedicated as open space as each phase is developed. Once all phases are completed 44.84 acres will be dedicated as open space., The park will consist of not less than 35 acres. with the balance consisting of open space, pathways or other qualified types of open space. As the remainder of the Real Property is annexed and made part of the PUD, additional area shall be committed to open space in proportion to the open space requirements for the Real Property.

a. Phase I has proposed 8.48 acres of open space which is .49 acre less than the required 8.97. The .49 acres shall be added to the required open space in Phase II.

b. The real property located southeast of the property on the other side of State Highway 336 shall not be open space that the City will accept to meet the ordinance requirements.

The required open space is to consist of a City park, pathways and/or other eligible areas allowed by Article 805.7. The City park shall consist of not less than 35 acres and referred herein as "the Story House Park". Story House Park shall be dedicated in three phases. Each phase shall dedicate up to 20% of the phase gross area for the Story House Park, not to exceed a total dedication among all three phases of 35 acres. All other remaining open space requirements shall be dedicated by the Developer as agreed to by the parties. Upon the annexation of the remainder of the Real Property now in the County the Developer and City will identify how any remaining open space is to be utilized. ,

c. Story House Park.

i. Use of Open Space During Construction: The area dedicated for open space shall be available for Developer's use during construction of the infrastructure, which includes but is not limited to Developer retaining the ability to design, excavate/grade, cut/fill areas and develop the water feature(s) in the open space, at the Developer's design, during the construction process of each phase.

ii. City Maintenance: Story House Park will be a public park maintained by the City after the Developer's design and construction noted above is completed. .

iii. Developer Construction of Playground: Developer will construct an improved area in Phase I that includes playground equipment and landscaping. Upon completion of the improvements, the City will assume maintenance of the park.

iv. Construction of Story House Park: After Developer has completed its design, cut/fill and establishment of the water features, Story House Park shall be developed and improved as an active park by Developer. It shall be maintained by the City in accordance with City adopted standards and Ordinances. The City shall be under no obligation to install or construct any building or facility except for those obligations and requirements imposed by local, state or federal law. It is intended that Story House Park will be developed in a similar fashion to other active parks. Prior to the construction of every improvement, building or facility, engineering and construction plans shall be submitted to the City Public Works Director for approval. The City Public Work Director shall evaluate all park improvements for the purpose of ensuring the City's capability of maintenance and the health, safety and welfare of the public. The approval shall not be unreasonably withheld.

v. Irrigation. The Developer and City will coordinate on the use of the reservoir to be constructed on the Real Property for irrigation of the Story House Park, as water is available for such use. Irrigation from the reservoir is subject to adequate water availability. he City agrees to assume all costs associated with the maintenance and operation of the irrigation it uses for the public open space once the system has been constructed by Developer. The City shall be granted the necessary easements to effectuate the Story House Park irrigation.

3.1.2 The Developer shall establish proper easements for use of owners within the Real Property of the pathways located throughout the Real Property, in locations generally shown in **Exhibit A**, with the goal of ensuring adequate pedestrian access to the Story House Park, and a pathway will be dedicated for public access from 5th Street to the Story House Park in the location identified on Exhibit A..

3.2 Application of Open Space.

~~3.2.1~~ The City finds and warrants that the designation of open space by this Agreement meets all terms and conditions of City code, regardless of which use is utilized by the Developer within any phase of the PUD, and no additional open space shall be required to be provided by Developer or subsequent Developer for the Real Property~~.~~

3.3 Lot Requirements. The availability of open space shall not be deemed a variance or waiver of any setback requirements, minimum lot sizes, building heights or other lot or building requirements of the City of Sheridan.

ARTICLE IV – WATER AND SEWER

4.1 Water availability. City water availability is currently limited to the residential and commercial uses described in Phase 1 of the Master Plan. Any commercial water availability shall be strictly limited to B-1 zoned uses. City water shall not be made available for any use which requires a flow rate greater than available at the time of this Agreement. Upon the construction of the water transmission line described in **Exhibit E**, water availability shall be determined by the capacity of the newly constructed line.

4.2 Water Line. Contingent on the funding described above, the City intends to construct a water transmission line located approximately as shown in **Exhibit E**. The North East Water Transmission line shall be planned, designed and constructed in accordance with the Sheridan Area Water System Master Plan, the City of Sheridan Public Infrastructure Design Standards, and the City of Sheridan Standard Specifications and Details for Street and Utility Construction.

a. The City intends to construct the proposed water transmission line as described herein not later than February of 2026. The construction of the water line is not a condition,for this Agreement. Any other water line to be constructed on the Real Property shall be constructed at the cost of the Developer and in accordance with all applicable City code and standards.

b. The availability of funding and financing for the water line construction is solely at the discretion of the City Governing Body.

4.3 Sewage Disposal. It shall be the responsibility of Developer to construct an on-site sewage disposal system to serve all construction in Phase I, which will be subject to the approval of the City and which will include the following: . All sewer lines shall be constructed in accordance with all applicable laws and standards. .

a. The decentralized design will be completed by Developers engineers and subject to approval by the City.

b. After construction, the City will own and operate the on-site sewage plant and associated infrastructure.

c. No plant investment fees will be charged for any connection to the system.

d. For the initial five years after the system is assumed by the City, the City shall charge no more than the standard sewer rates to other property owners on the City's centralized sewer system. Thereafter, the City may undertake a "cost to serve analysis" to determine if the sewer rate of the Story House Development should be adjusted, either up or down, depending if the actual cost of service is more or less than the otherwise-standard sewer rate charged to each property owner for the centralized system.

e.

f. The Sewer plant and all associated pipes shall set in a utility easement in favor of the City.

ARTICLE VI – EASEMENTS, RIGHT OF WAYS and PERMITS

6.1 Future Easements. All necessary easement and rights-of-way associated with any future development of Developer shall be dedicated by Developer, at Developer's expense, with the approval of a final plat or the granting of a building permit. Easements and rights-of-ways for each phase will be laid out and granted to accommodate the development of other properties where deemed necessary by the City at the time of review and approval of each future subdivision or development.

6.2 Existing Easements. Easements currently in place within the Development shall be confirmed and carried over into any future platting of the property so as to protect the infrastructure it is intended to cover unless such infrastructure is relocated or abandoned as provided by law. Developer reserves the right to abandon any easement not occupied for the intended purpose.

6.3 Vacation of Easements. Unless reviewed and approved by the City, easements currently encumbering the Property for municipal utilities and infrastructure shall not be vacated or extinguished by a future platting of the Property or action of Developer.

6.4 WDOT and WDEQ Permits. City agrees that conditional approval of the final plat of Phase I of the Real Property can occur without WDOT access permit or the WDEQ permits n The plat shall not be filed until such permits have been acquired.

ARTICLE VII – SIDEWALKS

7.1 Sidewalks. Sidewalk construction in each phase shall not be required until the construction of a street is required when a Phase commences building construction. All sidewalks shall meet the description approved in the Master Plan, or otherwise meets the building code requirements adopted at the time of construction. All sidewalk maintenance and snow removal shall be the responsibility of the adjacent property owner if required by City of Sheridan Ordinance or adopted Code.

ARTICLE VIII – TRAFFIC

8.1 Traffic Study. The City may request, and Developer shall provide, updated traffic studies needed by the City or State for additional phases or increased densities. The traffic studies must follow the requirements of the most recently-adopted City of Sheridan Public Infrastructure Design Standards.

ARTICLE IX – LIGHTING

9.1 Street Lighting. The City may require street lighting to be installed on roadways in accordance with the Phase I plan . The streetlights shall be decorative and chosen by Developer and shall comply with City Code . Developer shall be responsible for the cost of purchase and installation of the streetlights. The City shall be responsible for the cost of electricity for the streetlights.

ARTICLE X – IMPROVEMENTS & DESIGN REQUIREMENTS

10.1 Improvements. Developer shall develop the property according to any plat approved by the City and shall extend, install or provide at the Developer's cost the following, as described in the PUD Master Plan:

a. Paved Streets, curb, gutter and sidewalks;

b. A drainage study, to be reviewed and approved by the City and WYDOT if applicable. If Developer has already obtained a study, the City may request the Developer update the study as Story House is subdivided. Storm drainage system shall be built in compliance with City Code and the drainage study;

c. A water distribution system adequate to serve the needs of the residents and businesses connected to the water mains of the City or other water utility, including fire hydrants, valves and other required system structures and equipment, for and as each Phase of the PUD is constructed;

d. A non-potable water supply system for irrigation to be extended, where feasible, to each common area, greenbelt, park, or other areas within each Phase of the Real Property that uses irrigation water. Developer agrees to maintain ownership of said non-potable water system or turn said system over to a homeowner's association. The City will not be responsible for operating or maintaining said system. Provided, any non-potable water system utilized for public open space, shall be maintained and operated at the City's cost.

e. A sanitary sewer system adequate to serve the needs of the residents and businesses , which may be connected to a future sanitary sewer mains of the City when City sewer mains are extended to the Real Property, including manholes and other required system structures and equipment;

f. Street signs, traffic control devices and building address numbering system as may be agreed to by the parties;

g. All electrical, telephone and cable television service and any other utility shall be installed underground;

h. Appropriate designs, plans, specifications, engineering studies, or surveys as required by the City for the foregoing improvements.

10.2 Effects of Construction. During any construction, Developer shall be responsible for using proper dust and erosion control, obtaining necessary local and state permits, and be responsible for maintaining the streets in such a manner that they may be traveled upon until dedication. Any damage to streets or public facilities shall be promptly repaired in a manner acceptable to the City. Developer shall not use any chemicals hazardous to the future residents of the area, or which may remain in the soil for more than one growing season.

10.3 Improvement Warranty. Upon completion of any improvements and subsequent dedication to the City, such improvements shall be warranted for a period of one (1) year from the date of final acceptance. Developer shall warrant that the improvements will be free from defects for a period of one (1) year from the date of final acceptance. Record drawings of infrastructure improvements shall be provided to the City upon completion of said improvements.

10.4 Subdivision Improvement Contract. Developer shall be required to enter into the Subdivision Improvement Contract required by City Ordinance Appendix B Article 7 for each Phase, which will include phased financial assurances through the development of each phase.

10.5 Project Phasing. The development of Story House will be constructed in phases, as described in the PUD Master Plan incorporated herein. With the phasing plan approved by the City Governing Body, infrastructure and public improvements shall be completed for each phase prior to the issuance of building permits for that phase, except those that are allowed in the Sheridan City Code. Infrastructure that is not necessary for a particular phase need not be completed prior to the completion of the public improvements for that particular phase. Developer recognizes that each phase must be approved by the City..

10.6 Services. The City and Developer agree that the development shall be entitled to such services as the City currently provides to other residents of the City provided that the services have been extended to the Real Property. Extension of City utilities, which are required, to serve this site will be the responsibility of Developer except and unless agreed to be extended by the City, or unless mutual contracts for services are agreed upon by both the City and Developer.

ARTICLE XI – DEFAULT

11.1 Notice of Default. If either party claims the other is in default or breach of this Agreement, the claiming party shall notify the other of the alleged default in writing. The party who is in default shall cure said default within thirty (30) days of receiving notice.

11.2 Developer Remedies. If the City is in default and fails to cure, Developer shall be entitled to injunctive relief, specific performance or to de-annex from the City , all as provided by law.

11.3 City Remedies. If Developer is in default and fails to cure, the City will be entitled to any remedy allowed which may be cumulative, including injunctive relief, actual damages and allowed by Federal, State or Law.

ARTICLE XII – NOTICE

Any notice required or permitted under this Agreement will be deemed received when delivered personally in writing or five (5) days after notice has been deposited with the U.S. Postal Service, postage prepaid, certified mail, return receipt requested, and addressed as follows:

If to Developer:
_____
_____
_____
_____

If to City:
Attn: Public Works Director
City of Sheridan
55 E. Grinnell Plaza
Sheridan, WY 82801

ARTICLE XIII – MISCELLANEOUS

13.1 Term. All rights and obligations set forth in this Agreement shall continue in perpetuity and shall not be considered complete upon the completion of any portion of any development or upon all available space having been developed in Story House.

13.2 Benefit. The rights and obligations created by this Agreement shall inure to the benefit of the Developers, their successors and assigns unless stated otherwise herein. The parties expressly agree that a "successor" includes, but is not limited to, any person or party who acquires a portion of property from the Developer in fee simple. The obligation of such successor or assign shall extend not only to the lot or parcel acquired by that successor or assign, but shall include all applicable requirements of this Agreement.

13.3 Severability. If any term, condition or provision of this Agreement is held by a Court of competent jurisdiction to be invalid and unenforceable, the remainder of this Agreement shall continue in full force and effect as if the offending term, condition or provision were never a part of this Agreement.

13.4 Future Acts. Following execution of this Agreement, City and Developer agree to do all acts, including the execution of appropriate documents, when requested by the other, where such acts are reasonably required to fulfill the performing party's obligations under this Agreement.

13.5 No Merger. No part of this Agreement shall be considered to have merged or to have been completed upon the approval of a plat or acceptance of an improvement as the Agreement is contemplated to have survived the approval or acceptance.

13.6 Binding Effect. This Agreement shall be recorded with the Clerk and Recorder of the County of Sheridan, State of Wyoming, and shall constitute a covenant running with the land. This Agreement shall be binding on future assigns, Developer, and all persons who may purchase land described herein from the Developer or any persons hereafter having interest in the property.

13.7 Integrated Agreement. This Agreement supersedes any and all prior agreements between the parties, whether written or oral. Any modifications to this Agreement shall be memorialized either in a writing executed by both parties or printed in the minutes of a regular or special meeting of the City of Sheridan Governing Body.

13.8 Vested Rights. Unless otherwise expressly provided herein, this Agreement shall not create detrimental reliance that will stop or prevent the City from modifying its building, zoning, or subdivision ordinances or regulations. The Property shall be subdivided according to a plat or plats or as otherwise allowed by City Ordinance. Except as expressly provided herein, all future development and subdivisions shall be subject to applicable Sheridan City Code or Wyoming Statute at the time of platting or at the time an appropriate development application is filed with the City.

13.9 Captions. The captions for sections used in this Agreement are for convenience of reference only and shall not be considered a material part of this Agreement, nor shall they be used as an aid in interpreting the Agreement.

13.10 Legal Claims. Any legal action taken by either party shall be filed in the proper Court located in the Fourth Judicial District for Sheridan County, State of Wyoming.

13.11 Government Immunity. The City of Sheridan does not waive its governmental immunity by entering into this Agreement and specifically retains all immunities and defenses available to pursuant to W.S. l-39-104(a) and all other state laws.

IN WITNESS WHEREOF, the parties execute this agreement as of the date set forth above.

For the City of Sheridan:

_____

Richard Bridger
Mayor

For the Developer:

_____

Story House Property Company, LLC
By: (Authorized Agent)

Attest:

The above and foregoing Agreement was
Subscribed, Sworn to, and Acknowledged

before me by _____ this_____ day
of _____, 2023.
My commission expires_____

_____
City Clerk

_____
Notary Public