

PROJECT DEVELOPMENT REPORT



Location Drainage Study

PREPARED BY:



Vol. 3

CDOT No. E-5-482
Section No. 16-E5482-00-BT
Cook County, Illinois



**Illinois Department
of Transportation**

Location Drainage Study

PROJECT ROUTE: 59th Street Line
LIMITS: East of Hoyne Avenue to east of Lowe Avenue

MUNICIPALITY/COUNTY: Chicago/Cook
JOB NUMBER:

PREPARED FOR: CDOT/District One
Bureau of Programming
Hydraulics Section

DATE: 08/11/17

PREPARED BY: Infrastructure Engineering, Inc.

DATE: 08/11/17

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LOCATION DRAINAGE STUDY CHECKLIST

Project Route: 59th Street Line

Limits: East of Hoyne Avenue to east of Lowe Avenue

Municipality/County: Chicago/Cook

Job Number:

0-00 OVERALL PROJECT SCOPE

The 59th Street Line Trail is a proposed 1.7-mile trail construction on an abandoned rail line that will provide recreation, transportation and connectivity to residents from Lowe Avenue on the east to Hoyne Avenue on the west encompassing 30 city blocks. Proposed access paths will provide access to the trail from Hoyne Avenue, Damen Avenue, Wood Street, Hermitage Avenue, Ashland Avenue, Loomis Blvd, Racine Avenue, Morgan Street, Halsted Street and Lowe Avenue. The trail will link several vital projects in Chicago's Urban Agricultural District and fulfill the community's aspirations for a safe, inviting, and peaceful space for all to enjoy. The City of Chicago transferred the rail line from Norfolk Southern Railway Company in 2014, and it has been recommended in multiple planning processes to convert the rail line to a nature trail. The project includes plans for objectives including: 1) Community Redevelopment, 2) Transportation, 3) Recreation and Healthy Lifestyle, 4) Arts and Microbusiness and 5) Safety.

1-00 EXISTING DRAINAGE SYSTEM (see Exhibit 1-00a, General Location Drainage Map;

Exhibit 1-00b, Existing Drainage Plan)

The existing site is an abandoned railroad corridor on embankment. The existing embankment has soil and overgrown vegetation and trees. Soil borings show the top surface of the embankment is either topsoil, slag, or gravel. This is typically on the top of a minimum of 8 feet of porous black slag. The corridor drains by infiltration. However, a small amount of runoff sheet flows into city sewers. Bridges drain through existing underdrains located behind the abutment which outflow to the city sewers. It seems they are no longer functional.

1-01 IDENTIFIED DRAINAGE PROBLEMS

Yes No

1-02 IDENTIFIED BASE FLOODPLAINS (see Exhibit 1-02a Flood Boundary and Floodway Map or Flood Insurance Rate Map and Section 3-00)

The Flood Insurance Rate Map for County of Cook was examined for identified base floodplains which were either traversed by or adjacent to the 59th Street Line Trail which were either:

Floodplains Yes No

Floodways Yes No

1-03 MAJOR DRAINAGE FEATURES

1-03.1 Bridges

N/A

1-03.2 Major Culvert Crossings

N/A

1-03.3 Pump Stations
N/A

1-03.4 Reservoirs/Detention Facilities
N/A

1-03.5 Depressed Road
N/A

1-03.6 Channels and Zone A Floodplains
N/A

2-00 PROPOSED DRAINAGE SYSTEM (Exhibit 2-00a, Proposed Drainage Plan)

2-01 DESIGN CRITERIA (Exhibit 2-01a - Typical Existing Cross Section.
 Exhibit 2-01b - Typical Proposed Cross Sections)

Trail Path

The proposed 12 foot wide asphalt paved trail has been provided with 5 foot wide pervious grass strips adjacent to both north and south edges to capture the stormwater runoff. 12" of soil media mix consisting of 40% sand, 30% compost and 30% top soil has been provided in the 5 feet wide grass strips. CA-7 stone base wrapped in non-woven filter fabric has been placed under the grass strips and the trail for structural support and detention purposes. The CA-7 stone base with 38% voids provides adequate detention storage for rainfall events up to a 100-Year storm event to meet the requirements of the City of Chicago Stormwater Management Ordinance (stormwater ordinance). The stormwater detained in CA-7 stone will drain by percolation into existing embankment consisting primarily of slag and no storm sewer connections are required to the city sewers. See Exhibit 2-01b for the proposed trail typical sections.

Trail Access Point Paths

In addition to the access from Hoyne Avenue on the west and Lowe Avenue on the east, the proposed trail has also been provided with access points at a few intermittent locations. The access points are connected by 8 to 12 foot wide paths from street level to the trail. Retaining walls have been provided at a few locations to support the walkways and minimize the right of way requirements.

Access points are located at the following streets:

- Hoyne Ave
- Damen Ave
- Wood St
- Hermitage Ave
- Ashland Ave
- Loomis Blvd
- Racine Ave
- Morgan St
- Halsted St
- Lowe Ave

Underdrains and drainage structures have been provided to capture the rain water runoff from each of the access point areas. Underdrains have also been provided to mitigate water pressure on the retaining walls.

The captured stormwater from each of the access point area is routed to a dedicated stormwater detention system and eventually releases to city sewers. The proposed detention system makes use of Best Management Practices (BMP's) through the use of natural landscaping on prepared soils. The detention areas consists of CA-7 sStone

wrapped in non-woven filter fabric and topped with minimum of 12" of soil media mix consisting of 40% sand, 30% compost and 30% top soil for landscaping. The stormwater detention has been provided to meet the stormwater ordinance requirements for 100-Year storm event. A drainage structure with a restrictor has been provided to release the detained water at a controlled rate to the city sewer.

Check all that apply:

- New Construction Reconstruction 3R Projects (Non-Freeways)
 3R Projects (Freeways)

1. Proposed storm sewer conveyance systems will be designed for a 100 year storm frequency.

Yes No N/A

Justification for non-compliance: N/A

2. Proposed ditches will be designed for a 50 year storm frequency and desirable ditch grades will be no less than 0.5%.

Yes No N/A

Justification for non-compliance: N/A

3. The roadway edge of pavement at the low grade point in a floodplain area for highways with a Design Hourly Volume (DHV) of 100 or more shall be a minimum of three feet above design headwater elevation.

Yes No N/A

Justification for non-compliance: N/A

4. It is required that a minimum clearance of two (2) feet be established between the design high water and the low beam elevation of bridge structures. The bottom of the bridge super structure shall not be below the all-time high water elevation for the new freeway and expressway construction.

Yes No N/A

Justification for non-compliance: N/A

5. The waterway openings of bridges and culverts will be designed for a (50) year storm frequency.

Yes No N/A

Justification for non-compliance: N/A

6. The vertical alignment for curbed pavements will have a minimum grade of 0.3% and a drainage maximum "K" value of 51 (167 English Unit).

Yes No N/A

Justification for non-compliance: N/A

7. Minimum Pavement cross slopes will be 1.5% to 2% per BDE Manual Section 34.2.01 (b).

Yes No N/A

Justification for non-compliance: N/A

2-02 OUTLET EVALUATION

Unless otherwise noted below, the various outlets within the limits of the subject improvement were determined to be suitable for continued use under proposed conditions without modifications or the provision of storm water detention.

Unsuitable outlets: Yes No

Sensitive (receptor to rate, volume, and/or water quality) outlets:

Yes No

Project includes connections to the existing city storm sewers at the proposed access points. Flow is restricted to the city sewer through use of a vortex restrictor.

2-03 STORM WATER DETENTION ANALYSIS

The project is in City of Chicago jurisdiction and will meet the City of Chicago Stormwater Ordinance requirements. Per stormwater ordinance any construction activity that disturbs a contiguous land area of 15,000 or more square feet shall be considered as a Regulated Development. With respect to a project located both on the public right-of-way and on private property at the conclusion of development, that portion of the project located on the public right-of-way will not be included in calculating the square footage for Regulated Development. Per coordination with City of Chicago Department of Buildings (DOB), each city block between bridges has been treated as a separate drainage area. The existing bridges fall within City right-of-way and have therefore not been considered as part of drainage areas for storm water detention. Stormwater management for trail and access point drainage areas have been designed in accordance with the stormwater ordinance.

2-03.1 Evaluation

No storm water detention required

Comments:

Per stormwater ordinance, stormwater detention is not required for the proposed trail at locations where the disturbed area is less than 15,000 SF. These locations are listed below. At these locations, 8" CA-7 stone base wrapped in non-woven filter fabric has been placed under the grass strips and the trail for structural support and drainage purposes. The stormwater gets captured in CA-7 stone base with 38% voids. The stormwater thus captured percolates into the ground below and no storm sewer connection is required to the city sewer. See Exhibit 2-01b for the proposed trail typical sections.

1. Winchester Ave to Wolcott Ave – Sta 17+29 to Sta 19+94 (Trail)
See Exhibit 2-00a Sheet No. 3
2. Wolcott Ave to Honore St – Sta 20+60 to Sta 23+25 (Trail)
See Exhibit 2-00a Sheet No. 4
3. Honore St to Wood St – Sta 23+91 to Sta 26+56 (Trail)
See Exhibit 2-00a Sheet No. 5
4. Justine St to Laflin St – Sta 43+80 to Sta 46+44 (Trail)
See Exhibit 2-00a Sheet No. 11
5. Laflin St to Bishop St – Sta 47+10 to Sta 49+72 (Trail)
See Exhibit 2-00a Sheet No. 12
6. Bishop St to Loomis Blvd – Sta 50+38 to Sta 53+03 (Trail)
See Exhibit 2-00a Sheet No. 13
7. Ada St to Throop St – Sta 57+00 to Sta 59+66 (Trail)
See Exhibit 2-00a Sheet No. 15
8. Throop St to Elizabeth St – Sta 60+31 to Sta 62+97 (Trail)

- See Exhibit 2-00a Sheet No. 16
9. Racine Ave to May St – Sta 66+94 to Sta 69+59 (Trail)
See Exhibit 2-00a Sheet No. 18
 10. May St to Aberdeen St – Sta 70+25 to Sta 72+91 (Trail)
See Exhibit 2-00a Sheet No. 19
 11. Aberdeen St to Carpenter St – Sta 73+57 to Sta 76+22 (Trail)
See Exhibit 2-00a Sheet No. 20
 12. Carpenter St to Morgan St – Sta 76+88 to Sta 79+53 (Trail)
See Exhibit 2-00a Sheet No. 21
 13. Sangamon St to Peoria St – Sta 83+51 to Sta 86+16 (Trail)
See Exhibit 2-00a Sheet No. 23
 14. Peoria St to Green St – Sta 86+82 to Sta 89+48 (Trail)
See Exhibit 2-00a Sheet No. 24
 15. Halsted St to Emerald Ave – Sta 93+45 to Sta 96+11 (Trail)
See Exhibit 2-00a Sheet No. 26
 16. Emerald Ave to Union Ave – Sta 96+77 to Sta 99+43 (Trail)
See Exhibit 2-00a Sheet No. 27
 17. Union Ave to Lowe Ave – Sta 100+09 to Sta 102+69 (Trail)
See Exhibit 2-00a Sheet No. 28

Storm water detention required

Per stormwater ordinance, stormwater detention is required for the proposed trail and access points where the disturbed area is equal or more than 15,000 SF. Detention has been provided for both the trail path and access points as described below.

Trail Path:

12" CA-7 stone base wrapped in non-woven filter fabric has been placed under the grass strips and the trail for structural support and drainage purposes. The stormwater captured in CA-7 stone base with 38% voids provides adequate detention storage for rainfall events up to a 100-Year storm event to meet the requirements of the stormwater ordinance. The stormwater detained in CA-7 stone will drain by percolation into porous embankment slag and no storm sewer connection is required to the city sewer. See Exhibit 2-01b for the proposed trail typical sections.

Access Points:

Underdrains and drainage structures have been provided to capture the rain water runoff from each of the access point areas. Underdrains have also been provided to mitigate water pressure on the retaining walls.

The captured stormwater from each of the access point area is routed to a dedicated stormwater detention system. The proposed detention system makes use of Best Management Practices (BMP's) through the use of natural landscaping on prepared soils. The detention areas consists of CA-7 Stone wrapped in non-woven filter fabric and topped with minimum of 12" of soil media mix consisting of 40% sand, 30% compost and 30% top soil for landscaping. The stormwater detention has been provided to meet the stormwater ordinance requirements for 100-Year storm event. A drainage structure with a restrictor has been provided to release the detained water at a controlled rate to the city sewer.

Stormwater detention is provided at the following locations:

1. Hoyne Ave to Damen Ave – Sta 6+78 to Sta 13+32 (Trail + Access Point)
See Exhibit 2-00a Sheet No. 1-2
2. Damen Ave to Winchester Ave – Sta 13+98 to Sta 16+63 (Trail + Access Point)
See Exhibit 2-00a Sheet No. 2
3. Wood St to Paulina St – Sta 27+22 to Sta 33+18 (Trail + Access Point)
See Exhibit 2-00a Sheet No. 6-7
4. Paulina St to Ashland Ave – Sta 33+80 to 39+62 (Trail)
See Exhibit 2-00a Sheet No. 8-9
5. Ashland Ave to Justine St – Sta 40+62 to Sta 43+14 (Trail + Access Point)

- See Exhibit 2-00a Sheet No. 10
6. Loomis Blvd to Ada St – Sta 53+69 to Sta 56+34 (Trail + Access Point)
See Exhibit 2-00a Sheet No. 14
 7. Elizabeth St to Racine Ave – Sta 63+63 to Sta 66+28 (Trail + Access Point)
See Exhibit 2-00a Sheet No. 17
 8. Morgan St to Sangamon St – Sta 80+19 to Sta 82+85 (Trail + Access Point)
See Exhibit 2-00a Sheet No. 22
 9. Green St to Halsted St – Sta 90+14 to Sta 92+74 (Trail + Access Point)
See Exhibit 2-00a Sheet No. 25
 10. Lowe Ave to Project End – Sta 103+40 to Sta 107+44 (Trail + Access Point)
See Exhibit 2-00a Sheet No. 28

Diversion

Location: N/A

Comments: N/A

Unsuitable outlets (see Section 2-02)

Location: N/A

Sensitive outlets (see Section 2-02)

Location: Sewer connections to the existing city sewer will be made at the following locations:

- One sewer connection at Hoyne Ave - See Exhibit 2-00a Sheet No. 1
- One sewer connection at Damen Ave - See Exhibit 2-00a Sheet No. 2
- One sewer connection at Wood St - See Exhibit 2-00a Sheet No. 6
- One sewer connection at Hermitage Ave - See Exhibit 2-00a Sheet No. 6
- One sewer connection at Ashland Ave - See Exhibit 2-00a Sheet No. 10
- One sewer connection at Loomis Blvd - See Exhibit 2-00a Sheet No. 14
- One sewer connection at Racine Ave - See Exhibit 2-00a Sheet No. 17
- One sewer connection at Morgan St - See Exhibit 2-00a Sheet No. 22
- Two sewer connections at Halsted St - See Exhibit 2-00a Sheet No. 25
- One sewer connection at Lowe Ave - See Exhibit 2-00a Sheet No. 28

2-.03.2 Recommendation

See above section 2-03 for description of recommendation.

2-04 RIGHT OF WAY ANALYSIS

Yes No Additional right of way is required to accommodate a few of the proposed access points.

The following locations need additional right of way:

1. Hoyne Ave to Damen Ave – Sta 6+78 to Sta 8+66
See Exhibit 2-00a Sheet No. 1
2. Damen Ave to Winchester Ave – Sta 13+98 to Sta 15+22
See Exhibit 2-00a Sheet No. 2
3. Wood St to Paulina St – Sta 27+22 to Sta 31+24
See Exhibit 2-00a Sheet No. 6
4. Ashland Ave to Justine St – Sta 40+62 to Sta 43+14
See Exhibit 2-00a Sheet No. 10

Yes No A drainage easement(s) is required to accommodate the proposed drainage system

- The following location needs drainage easement:
 1. Wood St to Paulina St – Sta 29+7 to Sta 31+24
 See Exhibit 2-00a Sheet No. 6

2-05 DRAINAGE ALTERNATIVES (Briefly describe each alternative and justify the selection)
 N/A

2-06 LOCAL AND OTHER AGENCY COORDINATION (see Appendix C)

- | | | |
|---|--|---|
| <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No | Local ordinances considered |
| <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No | Joint participation |
| <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No | Sewer separation |
| <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No | Jurisdictional transfer |
| <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No | Letter of intent required/processed/approved |
| <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No | Coordination completed and comments provided. |

Comments:

The drainage design has been developed in accordance with the City of Chicago Stormwater Ordinance.

2-07 PROPOSED DRAINAGE PLAN

2-07.1 Roadway Drainage

Ditches and Swales

- Yes No Regrade/reestablish existing ditches/swales

Limits: N/A

Comments: N/A

- Yes No Construct new ditches/swales

Limits: N/A

Storm Sewers

- Yes No Utilize existing storm sewers with minor extensions and/or adjustment of existing drainage structures

Limits: N/A

Comments: N/A

- Yes No Replace/relocate/upsized existing storm sewers

Limits: N/A

Comments: N/A

- Yes No Abandon existing storm sewers

Limits: N/A

Comments: N/A

Yes No

Construct new storm sewers (e.g. converting from an open drainage system to closed drainage system)

Limits: N/A

Combined Sewers

Yes No

Utilize existing combined sewers with minor extensions and/or adjustment of existing drainage structures

Limits: N/A

Yes No

Comments: N/A
Replace/relocate existing combined sewers

Limits and sizes: N/A

Comments: N/A

Outlets

Yes No

Maintain existing outlets

New underdrains are provided to capture the stormwater runoff from the access point areas and route it to the detention system. A drainage structure with a restrictor and connecting storm sewer have been provided to release the detained water at a controlled rate to the existing city sewer.

Limits:

1. Hoyne Ave to Damen Ave – Sta 6+78 to Sta 13+32
See Exhibit 2-00a Sheet No. 1
2. Damen Ave to Winchester Ave – Sta 13+98 to Sta 16+63
See Exhibit 2-00a Sheet No. 2
3. Wood St to Paulina St – Sta 27+22 to Sta 33+18
See Exhibit 2-00a Sheet No. 6
4. Ashland Ave to Justine St – Sta 40+62 to Sta 43+14
See Exhibit 2-00a Sheet No. 10
5. Loomis Blvd to Ada St – Sta 53+69 to Sta 56+34
See Exhibit 2-00a Sheet No. 14
6. Elizabeth St to Racine Ave – Sta 63+63 to Sta 66+28
See Exhibit 2-00a Sheet No. 17
7. Morgan St to Sangamon St – Sta 80+19 to Sta 82+85
See Exhibit 2-00a Sheet No. 22
8. Green St to Halsted St – Sta 90+14 to Sta 92+74
See Exhibit 2-00a Sheet No. 25
9. Lowe Ave to Project End – Sta 103+40 to Sta 107+44
See Exhibit 2-00a Sheet No. 28

Yes No

Construct new outlets

Locations and types: N/A

Comments: N/A

Cross Road Culverts

Yes No Maintain/replace/extend existing cross road culverts

Locations: N/A

Comments: N/A

Yes No Construct new cross road culverts

Locations: N/A

Comments: N/A

Other Items

Yes No Construct/modify special drainage structures/sewers

Locations/Limits and types: N/A

Comments: N/A

2-07.2 Proposed Action for all Major Drainage Features (include all Major Drainage Features listed in Section 1-03 and any additional Major Drainage Features proposed)

2-07.2.1 Bridges

N/A

2-07.2.2 Major Culvert Crossings

N/A

2-07.2.3 Pump Stations

N/A

2-07.2.4 Reservoirs/Detention Facilities

N/A

2-07.2.5 Depressed Road

N/A

2-07.2.6 Channel and Zone A Floodplain

N/A

2-08 WATER QUALITY BEST MANAGEMENT PRACTICES (BMP) PERMANENT MEASURES

Yes N/A Identification of USACE and other Federal/State BMP Requirements
Comments: N/A

Yes N/A Coordination with Project & Environmental Studies
Comments: N/A

Yes No Did you coordinate with other agencies? If yes, list them here
Comments: City of Chicago Department of Buildings – for stormwater management

Yes N/A Green Infrastructure BMP Alternatives

Comments:

Limits: N/A

- | | | |
|---|---|--|
| <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> N/A | Improve existing vegetated drainage facilities (ditches, swales, etc.) |
| <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No | Establish new BMP measures (see below) |
| <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No | Consideration of open drainage system ("daylight" storm sewer) |
| <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No | Bioretention or rain garden (separate facility) |
| <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No | Constructed wetland detention or naturalized detention (multi-purpose storage) |
| <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No | Bioswale or vegetated swale (multi-purpose conveyance) |
| <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No | Bank/shoreline stabilization, native buffers, invasive species control, etc. |
| <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No | Lengthened overland flow paths |
| <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No | Riffle/Pool Conveyance |
| <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No | Permanent Ditch Checks |
| <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No | Permanent Sediment Traps |
| <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No | Other |

Limits:

A: In areas where no stormwater detention is required

8" CA-7 stone base wrapped in non-woven filter fabric has been placed under the grass strips and the trail for structural support and drainage purposes. The stormwater gets captured in CA-7 stone base with 38% voids. The stormwater thus captured percolates into the ground below and no storm sewer connection is required to the city sewer. See Exhibit 2-01b for the proposed trail typical sections.

See section 2-03.1 for list of locations where stormwater detention is not required.

B: In areas where stormwater detention is required

Trail Path

12" CA-7 stone base wrapped in non-woven filter fabric has been placed under the grass strips and the trail for structural support and drainage purposes. The stormwater captured in CA-7 stone base with 38% voids provides adequate detention storage for rainfall events up to a 100-Year storm event to meet the requirements of the stormwater ordinance. The stormwater detained in CA-7 stone will drain by percolation into porous embankment slag and no storm sewer connection is required to the city sewer. See Exhibit 2-01b for the proposed trail typical sections.

Access Points:

Underdrains and drainage structures have been provided to capture the rain water runoff from each of the access point areas. Underdrains have also been provided to mitigate water pressure on the retaining walls.

The captured stormwater from each of the access point area is routed to a dedicated stormwater detention system. The proposed detention system makes use of Best Management Practices (BMP's) through the use of natural landscaping on prepared soils. The detention areas consists of CA-7 Stone wrapped in non-woven filter fabric and topped with minimum of 12" of soil media mix consisting of 40% sand, 30% compost and 30% top soil for landscaping. The stormwater detention has been provided to meet the stormwater ordinance requirements for 100-Year storm event. A drainage structure with a restrictor has been provided to release the detained water at a controlled rate to the city sewer.

See section 2-03.1 for list of locations where stormwater detention is required.

Yes N/A Grey Infrastructure BMP Alternatives

Comments: N/A

Limits: N/A

Yes N/A Improve existing non-vegetated drainage facilities (paved or lined ditches, riprap, etc.)

Yes No Establish new BMP measures (see below)

Yes No Oversized pipes for detention

Yes No Manufactured vaults or cisterns (underground detention)

Yes No Wet pond or turf grass dry detention (traditional above ground storage)

Yes No Manufactured water quality unit or oil/grit separator

Yes No Riprap erosion protection

Other

Yes N/A Sufficient Right-of-Way Allocated for Recommended BMP Alternatives

Comments: N/A

Limits: N/A

Yes N/A Sufficient Permanent Easement Allocated for Recommended BMP Alternatives

Comments: N/A

Limits: N/A

Yes N/A Identify BMP Locations on the Proposed Drainage Plans

Comments: See Exhibit 2-00a sheets 1 through 28

Limits: N/A

Yes N/A Identify Right-of-Way/Permanent Easement on the Proposed Drainage Plans

Comments: See Exhibit 2-00a sheets 1, 2, 6, 10

Limits:

The following locations need additional right of way:

1. Hoyne Ave to Damen Ave – Sta 6+78 to Sta 8+66
See Exhibit 2-00a Sheet No. 1
2. Damen Ave to Winchester Ave – Sta 13+98 to Sta 15+22
See Exhibit 2-00a Sheet No. 2
3. Wood St to Paulina St – Sta 27+22 to Sta 31+24
See Exhibit 2-00a Sheet No. 6
4. Ashland Ave to Justine St – Sta 40+62 to Sta 43+14
See Exhibit 2-00a Sheet No. 10

The following location needs drainage easement:

1. Wood St to Paulina St – Sta 29+7 to Sta 31+24
See Exhibit 2-00a Sheet No. 6

Yes N/A Adequate BMP Guidelines provided for Phase II Designer to Comply with NPDES Requirements

Comments: N/A

Limits: N/A

Yes N/A

Adequate BMP Guidelines provided for Phase II Designer to Comply with USACE Requirements

Comments: N/A

Limits: N/A

3-00 FLOODPLAIN ENCROACHMENT EVALUATION

The proposed project has been reviewed in accordance with Executive Order 11988 "Floodplain Management"; Section 26-7.05(d) "Assessment and Documentation of Floodplain Encroachments" as contained in the Illinois Department of Transportation, Bureau of Design and Environment Manual; Drainage Manual; and 17 Illinois Administration Code 3708 "Floodway Construction in Northeastern Illinois."

No Potential Floodplain Encroachment

4-00 ILLINOIS DEPARTMENT OF NATURAL RESOURCES OFFICE OF WATER RESOURCES (IDNR-OWR) PERMIT

Required Not Required

5-00 Appendix A: Source Data Reviewed

USGS Maps - Quadrangle Map and/or Hydrologic Atlas

City of Chicago Department of Water Management Sewer Atlas

5-00 Appendix B: Exhibits

General Location Drainage Map, Exhibit 1-00a

Existing Drainage Plan, Exhibit 1-00b

FEMA Floodplain Map, Exhibit 1-02a

Proposed Drainage Plan, Exhibit 2-00a

Typical Existing Cross Sections, Exhibit 2-01a

Typical Proposed Cross Sections, Exhibit 2-01b

Control Structure Detail, Exhibit 2-04.2a

5-00 Appendix C: Correspondence

Minutes of Meeting held with Chicago Department of Buildings, Chicago Department of Water Management

Email correspondence with Chicago Department of Water Management with sample detention calculations

5-0 Appendix D: Supporting Documents

Stormwater detention calculations in accordance with the City of Chicago Stormwater Ordinance requirements

Drainage Area Exhibits

5-00 Appendix C: Correspondence

Minutes of Meeting held with Chicago Department of Buildings, Chicago Department of Water Management

Email correspondence with Chicago Department of Water Management with sample detention calculations

5-0 Appendix D: Supporting Documents

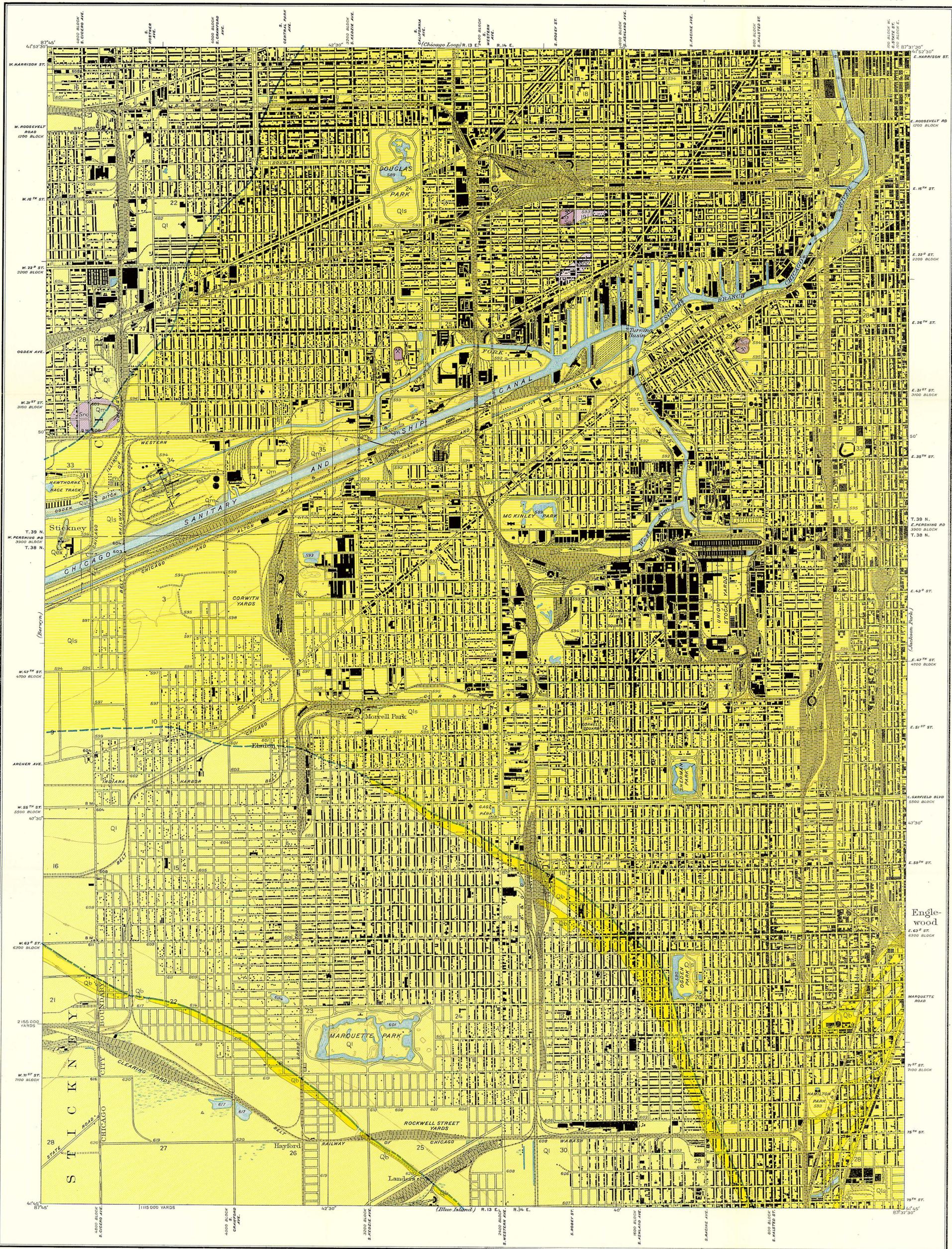
Stormwater detention calculations in accordance with the City of Chicago Stormwater Ordinance requirements

Drainage Area Exhibits

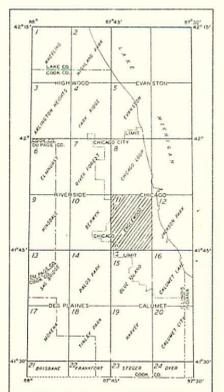
Appendix A: Source Data Reviewed

USGS Maps

City of Chicago Department of Water Management Sewer Atlas



- LEGEND**
- Recent**
 - Qm Made land (Artificial fills, spoil banks, dumps, etc.)
 - Qex Excavations in unconsolidated material
 - Qa1 Alluvium (Silt, mud, and gravel deposited by present stream)
 - Qb Beach ridges and related deposits of sand and gravel (Made during and since the various stages of Lake Chicago)
 - Wisconsin**
 - Q1 Glacial lake bottom (Commonly without lacustrine deposits)
 - Q1s Glacial lake bottom (Covered by lacustrine silt and sand)
 - Silurian**
 - Sn Niagara series of undifferentiated dolomitic formations, exposed
 - Snc Niagara formations, thinly covered
 - Shoreline of Tolleston stage of Lake Chicago (Where defined by beach deposits or wave-cut cliffs)
 - Shoreline of Calumet stage of Lake Chicago (Where defined by beach deposits or wave-cut cliffs)
 - Approximate position of shorelines of Lake Chicago (Where not defined by above features but generated with reference to contour lines)
 - Definitely determined boundary between deposits
 - Indefinite boundary between deposits
 - Boundaries between deposits determined in 1896-98, but now largely or completely destroyed or obscured. (W. C. Alden, U. S. Geol. Survey Geol. Atlas, Chicago folio 11, p. 21, 1902)
 - Glacial striae, oriented in direction
 - Rock quarry
 - Clay pit

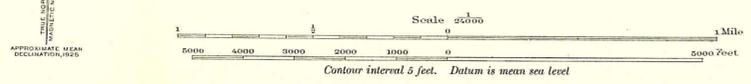


Topographic base surveyed in cooperation with the U. S. Geological Survey, 1926

SURFICIAL GEOLOGY OF THE ENGLEWOOD QUADRANGLE
 BY
 J HARLEN BRETZ

A. Hoan & Co.

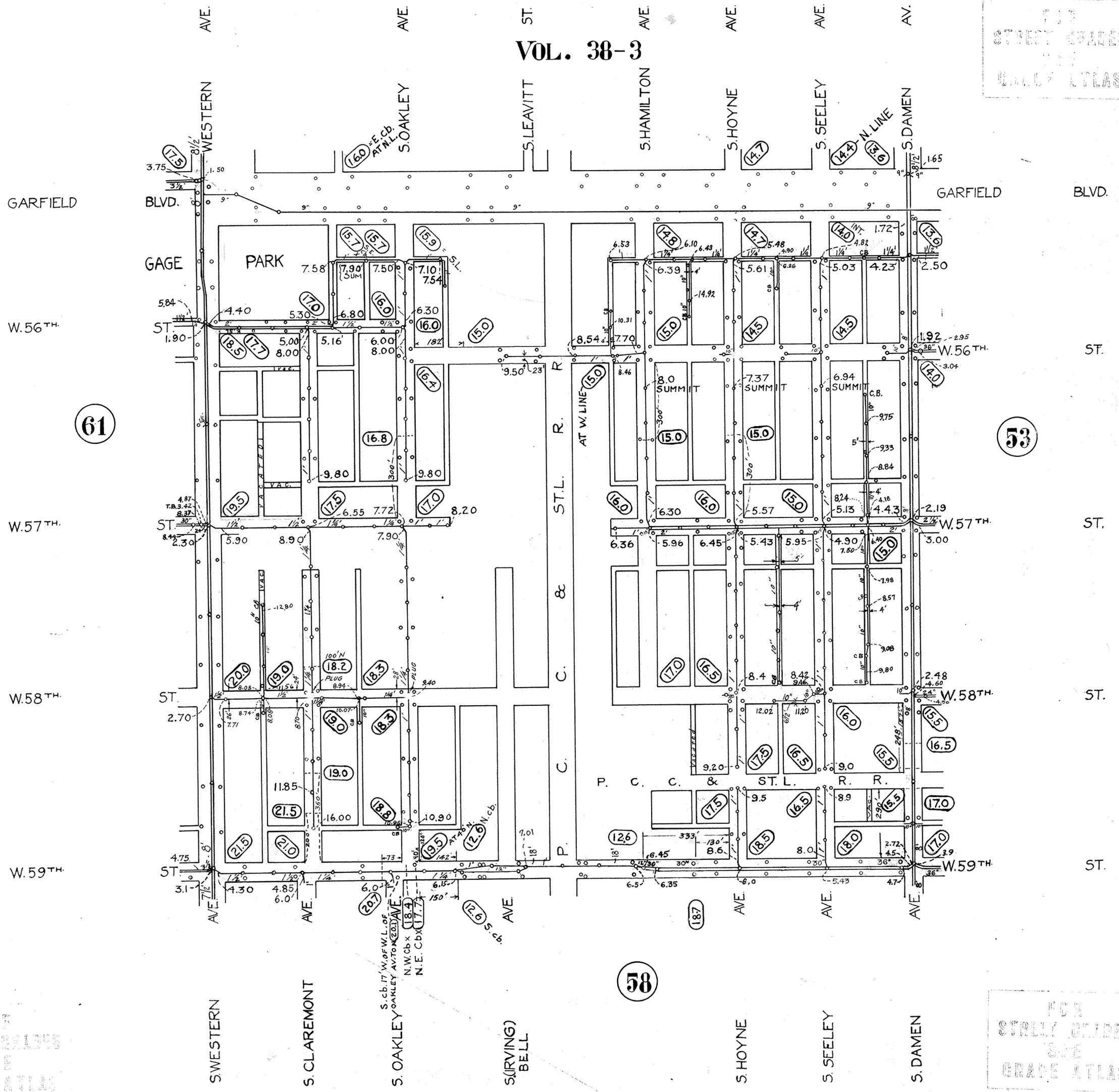
Geologically surveyed in 1930-1932. In connection with other quadrangles of the Chicago area.



NW 1/4 Sec. 18.38-14

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FOR STREET GRADES SEE GRADE ATLAS



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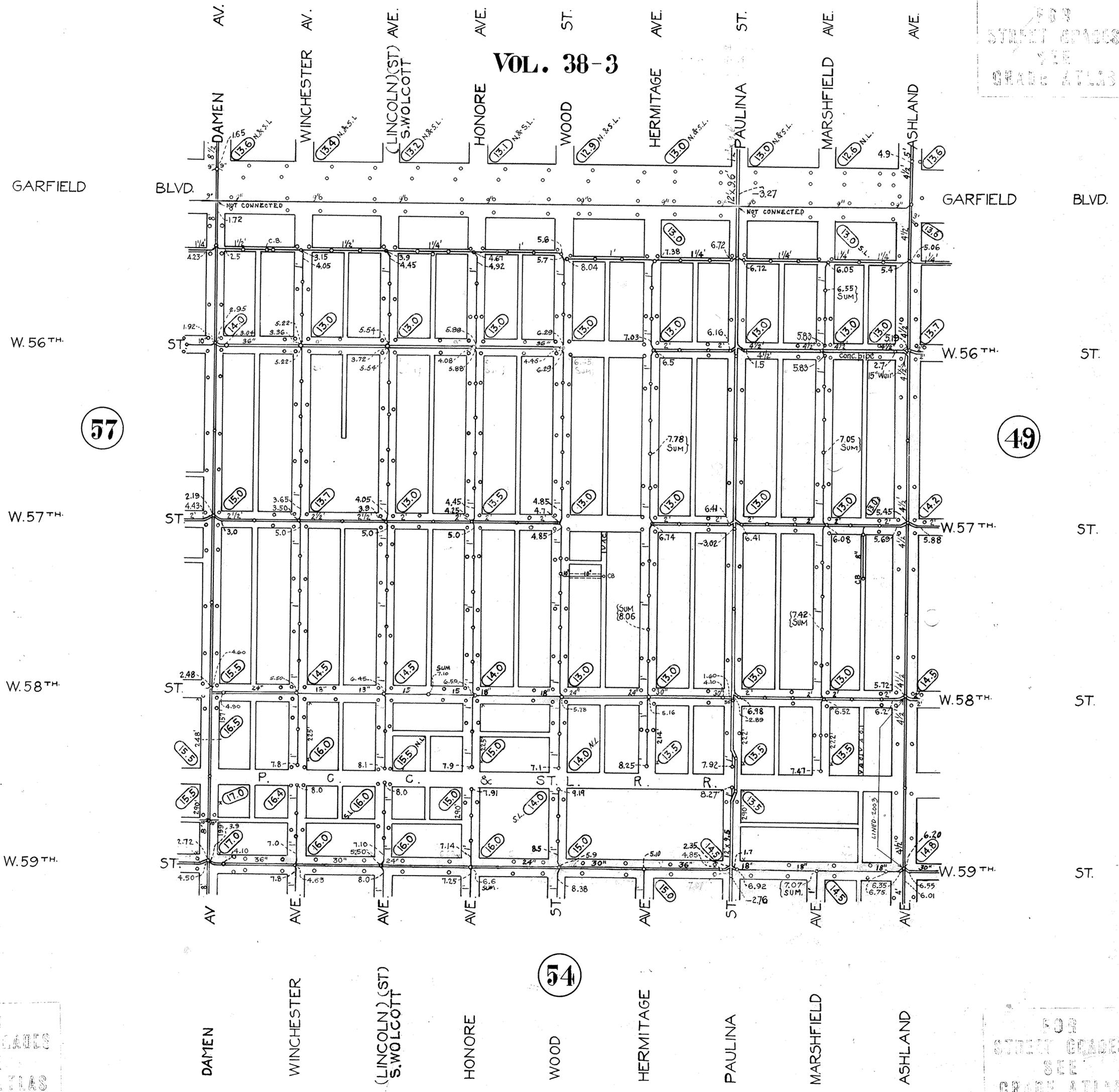
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FOR STREET GRADES SEE GRADE ATLAS

N.E. 1/4 Sec. 18. 38-14

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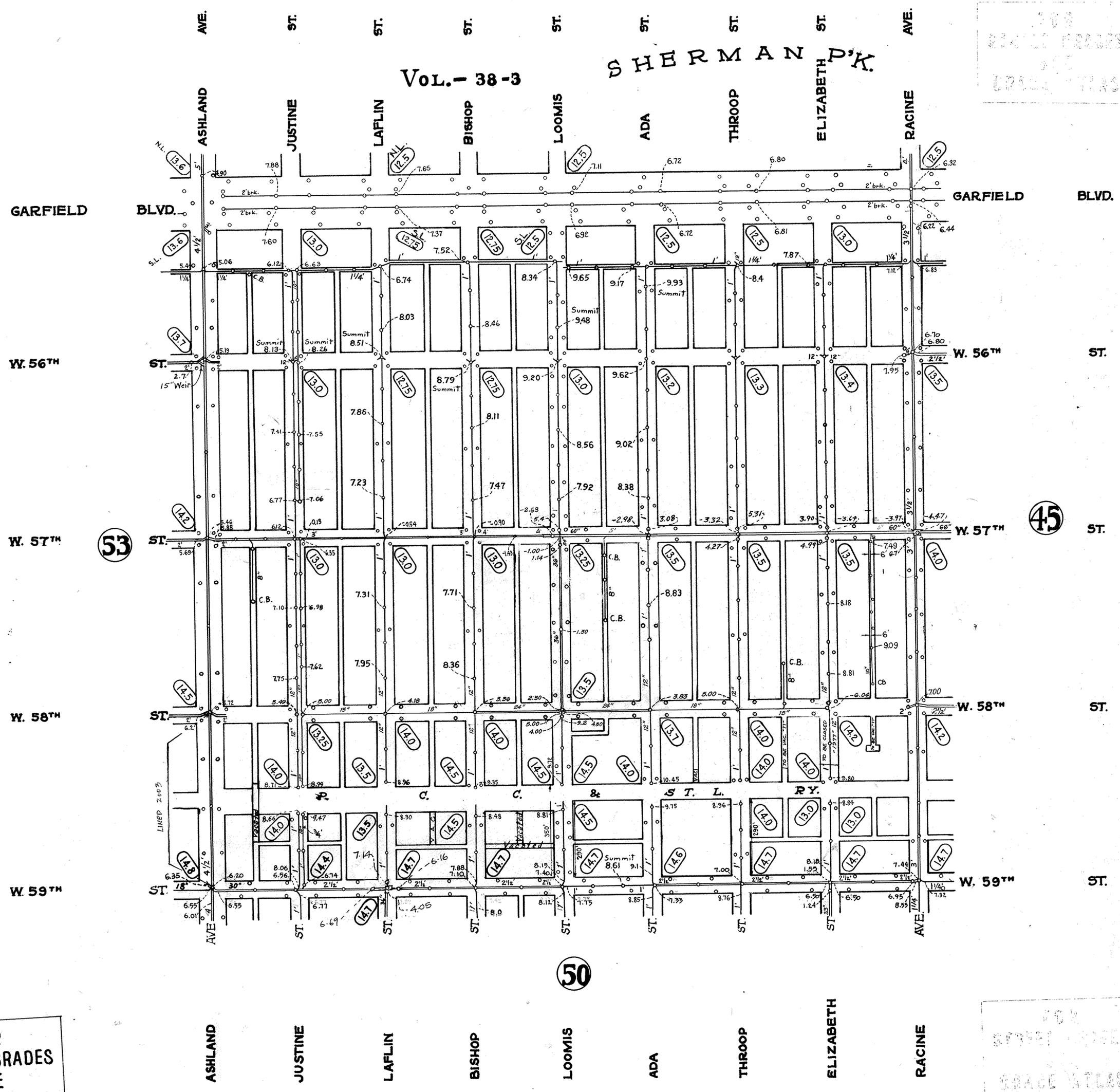
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STREET GRADES
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N.W. 1/4 Sec. 17 38-14

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FOR
STREET GRADES
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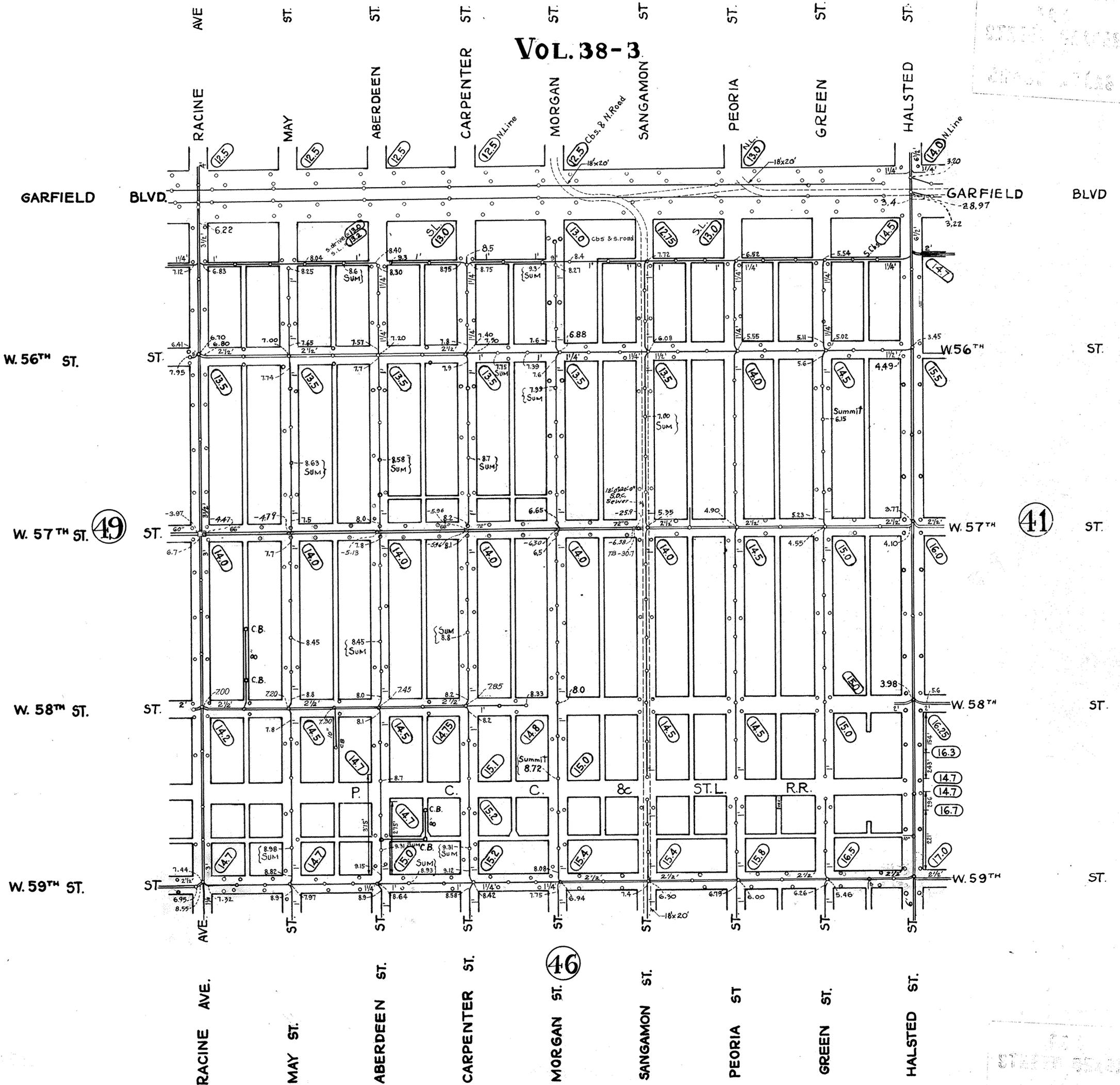
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NE 1/4 Sec 17 38-14

45

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Appendix B: Exhibits

Exhibit 1-00a: General Location Drainage Map

Exhibit 1-00b: Existing Drainage Plan

Exhibit 1-02a: FEMA Floodplain Map

Exhibit 2-00a: Proposed Drainage Plan

Exhibit 2-01a: Typical Existing Cross Sections

Exhibit 2-01b: Typical Proposed Cross Sections

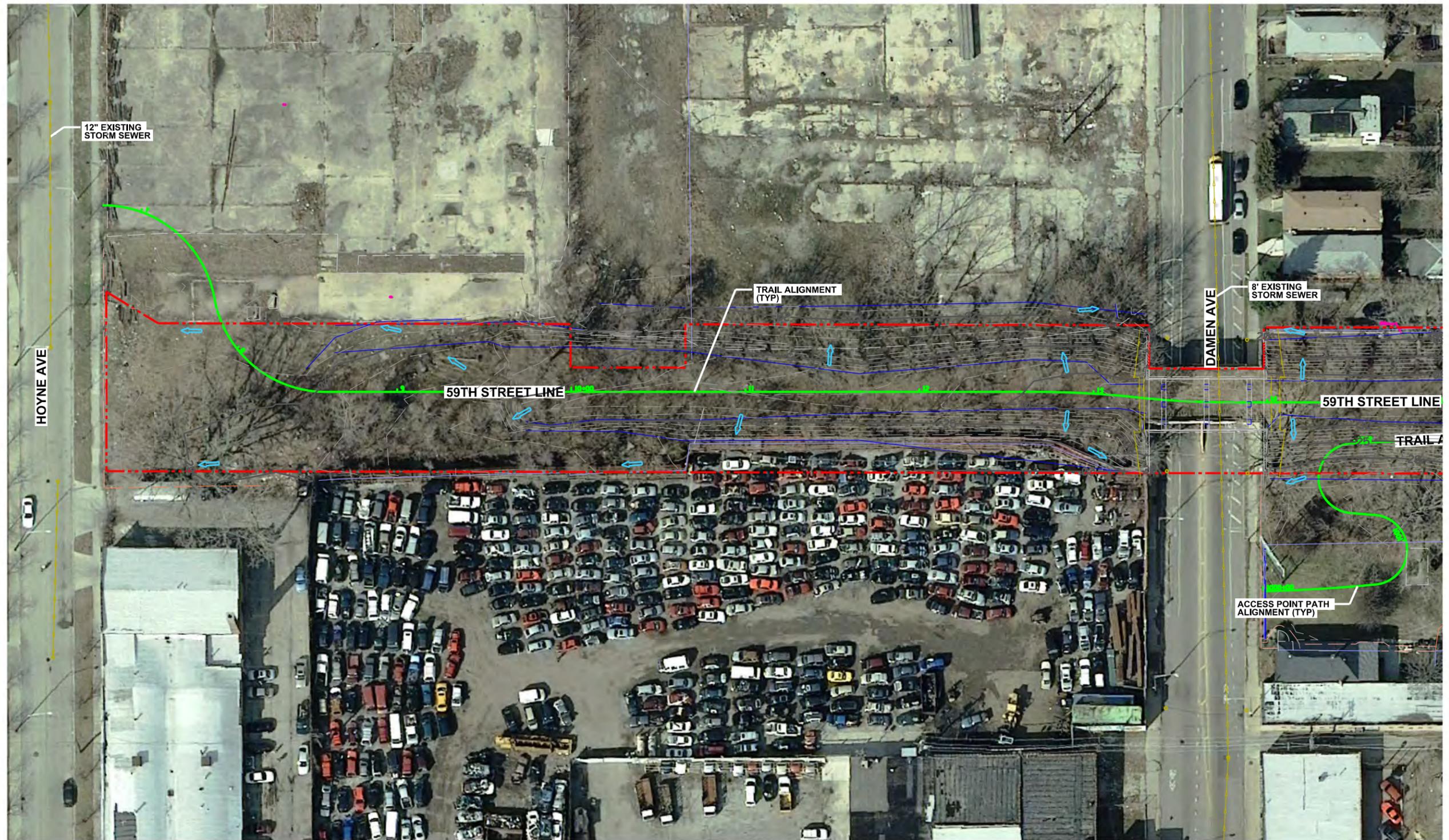
Exhibit 2-03.2a: Control Structure Schematic



Exhibit 1-00a

General Location Drainage Map

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LEGEND

- ➔ FLOW DIRECTION
- - - EXISTING RIGHT OF WAY
- ▶ EXISTING STORM SEWER
- ▶ EXISTING BRIDGE UNDERDRAIN

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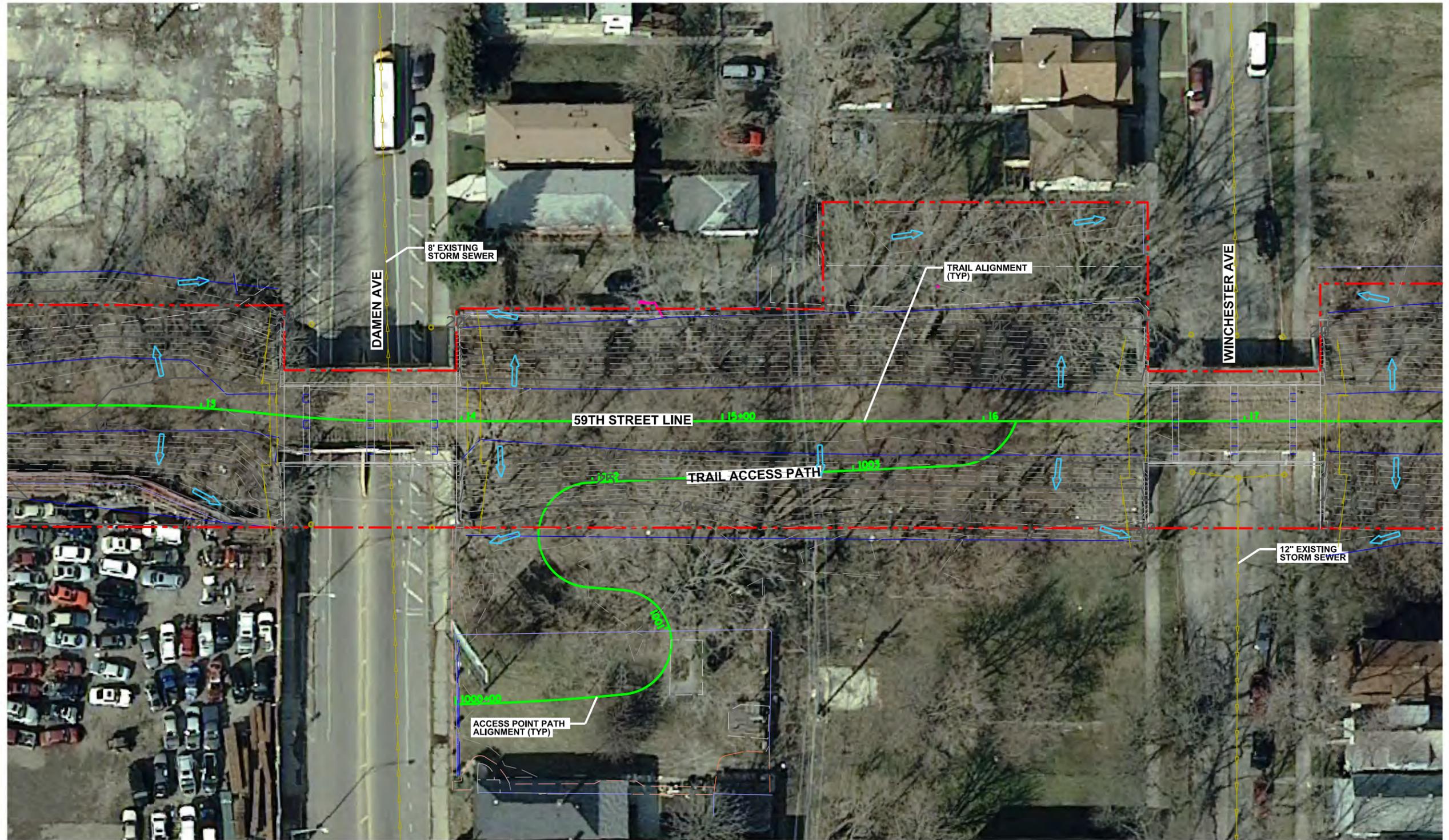
CHICAGO DEPARTMENT OF TRANSPORTATION

EXHIBIT 1-00b: EXISTING DRAINAGE PLAN
HOYNE AVE TO DAMEN AVE

SCALE: 1" = 30' SHEET EX-1 OF 26 SHEETS STA. TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
	16-E5482-00-BT	COOK	26	1
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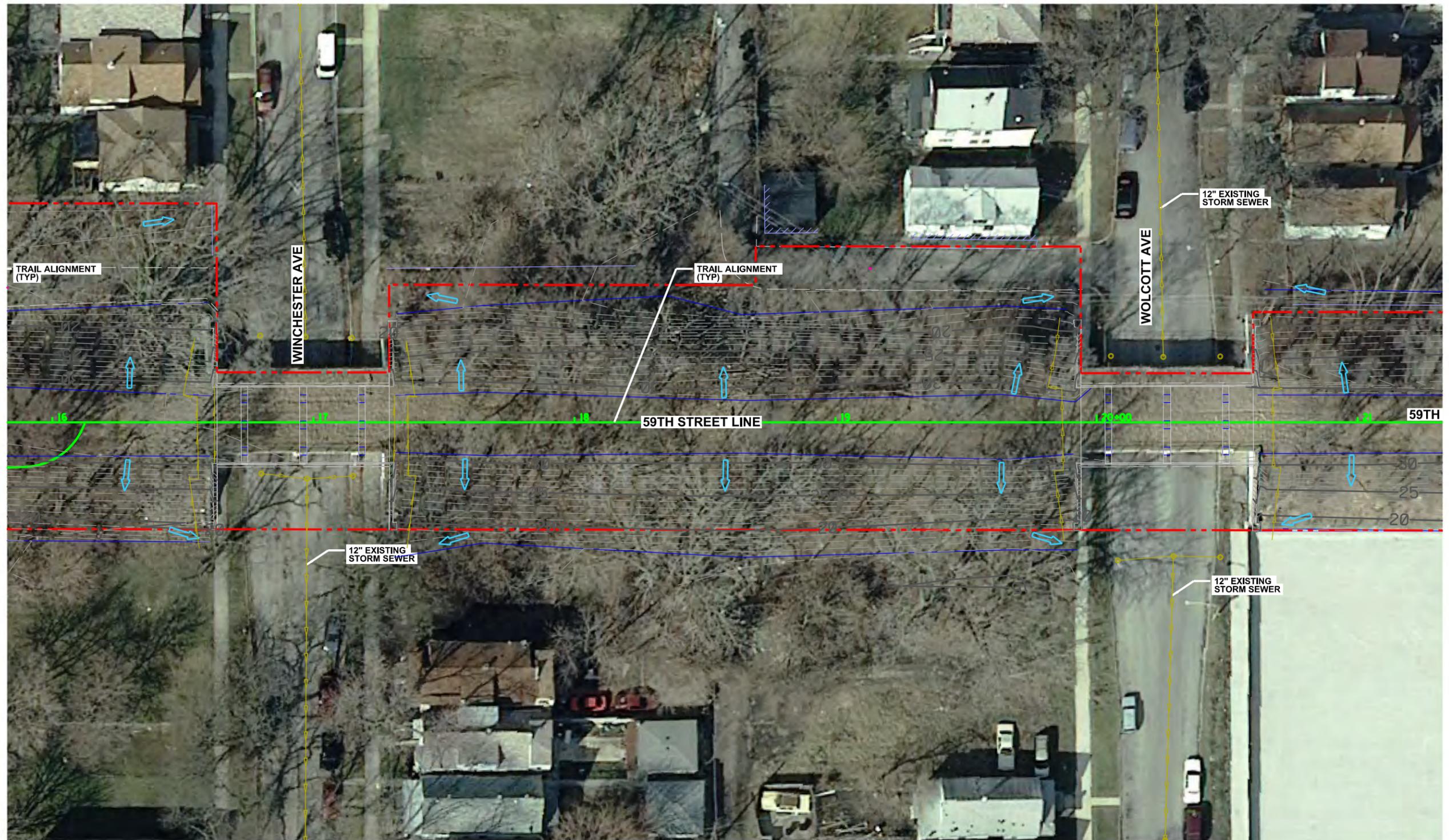
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**EXHIBIT 1-00b: EXISTING DRAINAGE PLAN
 DAMEN AVE TO WINCHESTER AVE**
 SCALE: 1" = 30' SHEET EX-2 OF 26 SHEETS STA. TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
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LEGEND

- ➡ FLOW DIRECTION
- EXISTING RIGHT OF WAY
- EXISTING STORM SEWER
- EXISTING BRIDGE UNDERDRAIN

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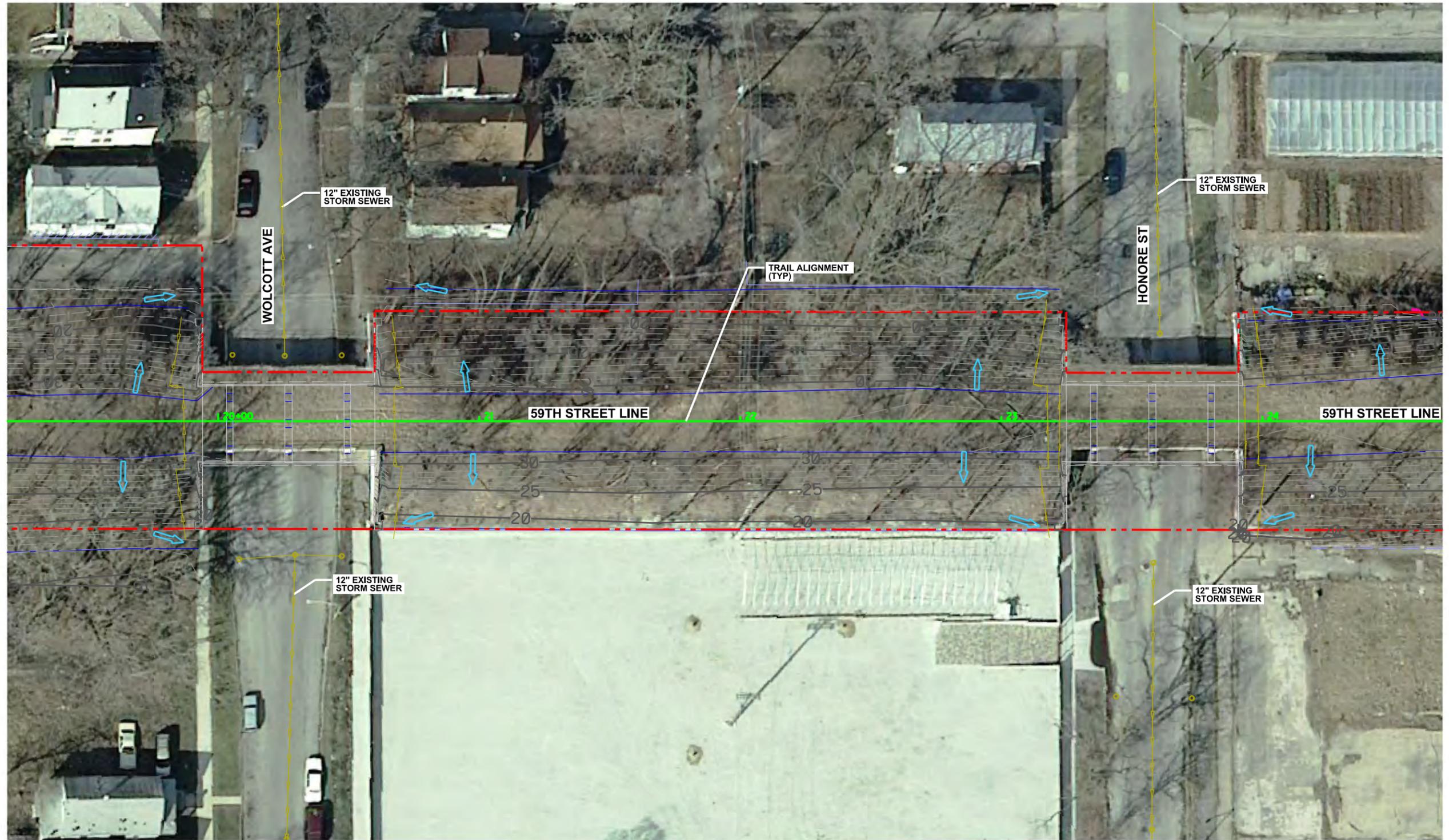
CHICAGO DEPARTMENT OF TRANSPORTATION

**EXHIBIT 1-00b: EXISTING DRAINAGE PLAN
WINCHESTER AVE TO WOLCOTT AVE**

SCALE: 1" = 30' SHEET EX-3 OF 26 SHEETS STA. TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
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LEGEND

- ➡ FLOW DIRECTION
- - - EXISTING RIGHT OF WAY
- ▶ EXISTING STORM SEWER
- ▶ EXISTING BRIDGE UNDERDRAIN

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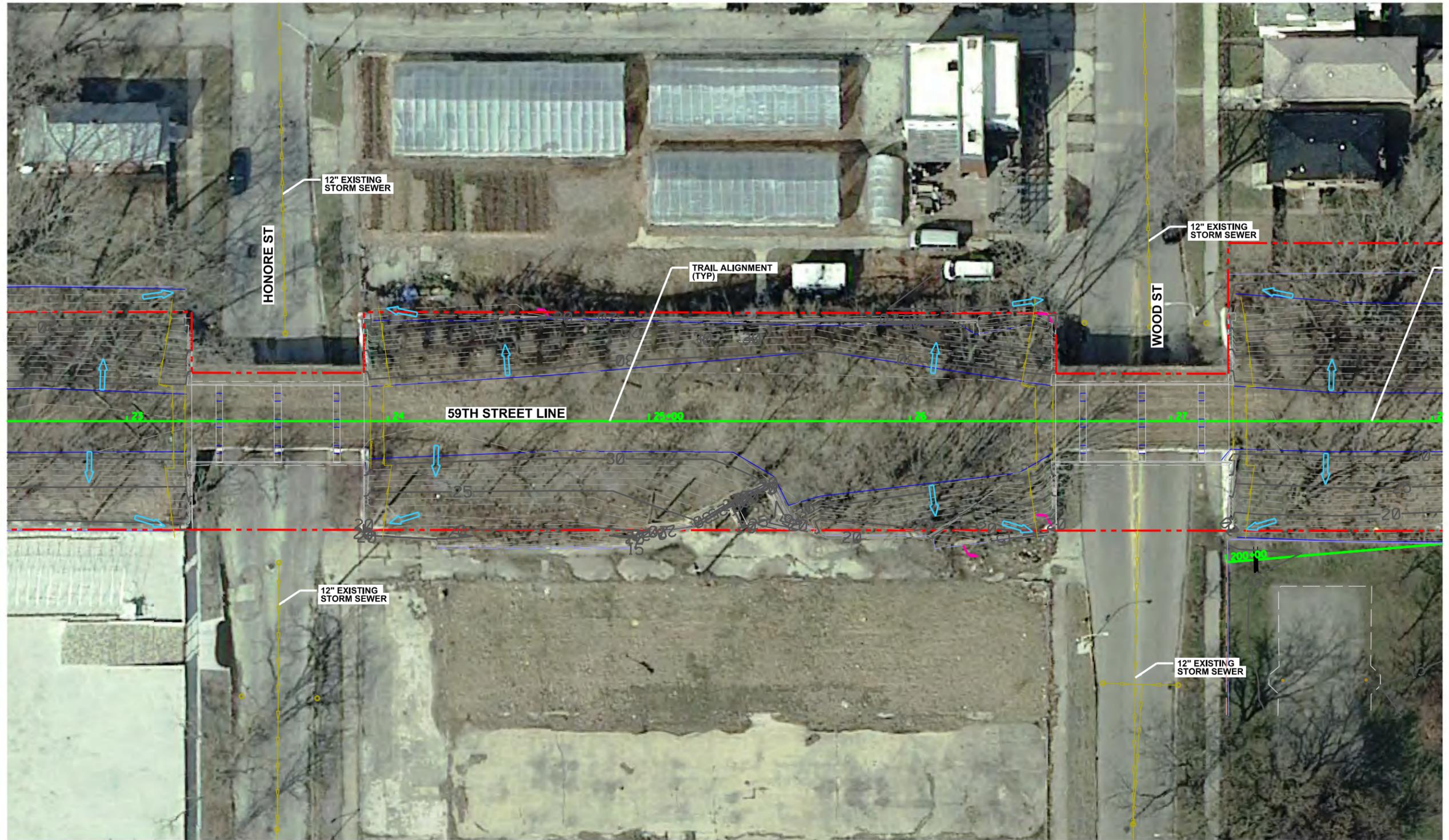


**EXHIBIT 1-00b: EXISTING DRAINAGE PLAN
 WOLCOTT AVE TO HONORE ST**

SCALE: 1" = 30' SHEET EX-4 OF 26 SHEETS STA. TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
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LEGEND

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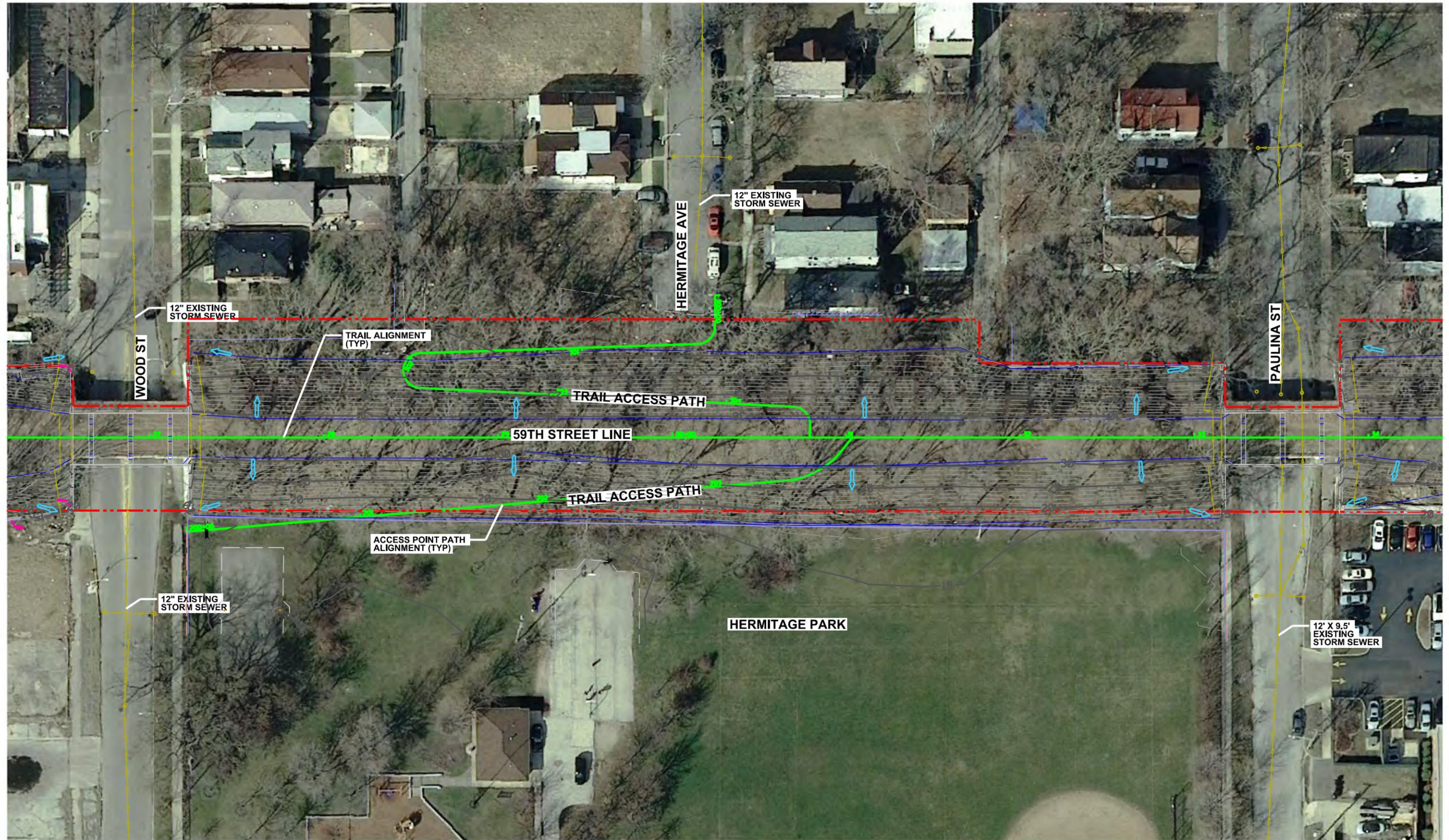
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EXHIBIT 1-00b: EXISTING DRAINAGE PLAN
HONORE ST TO WOOD ST
 SCALE: 1" = 30' SHEET EX-5 OF 26 SHEETS STA. TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
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LEGEND

- ➡ FLOW DIRECTION
- - - EXISTING RIGHT OF WAY
- EXISTING STORM SEWER
- EXISTING BRIDGE UNDERDRAIN

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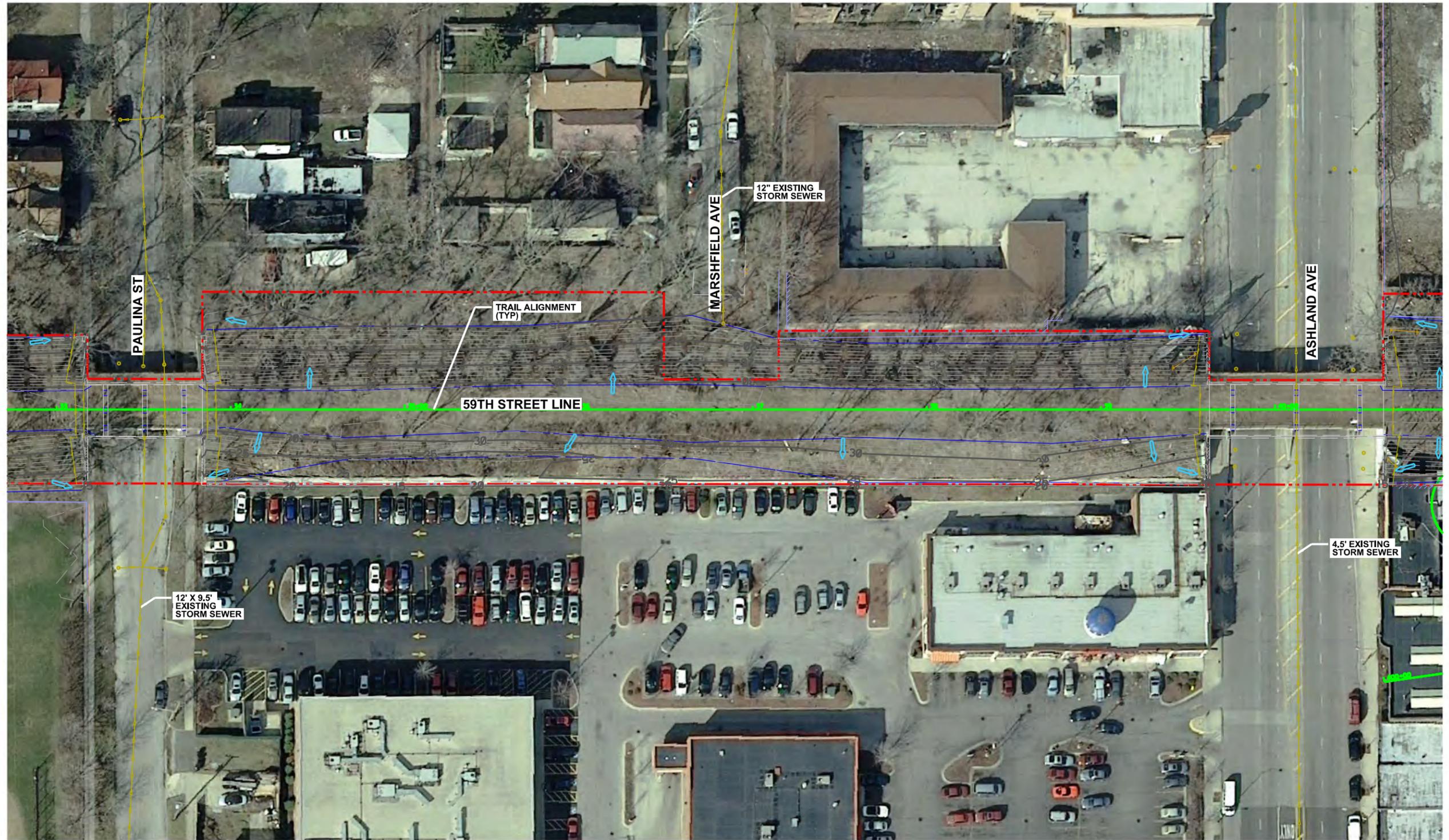
CDOT CHICAGO DEPARTMENT OF TRANSPORTATION

**EXHIBIT 1-00b: EXISTING DRAINAGE PLAN
 WOOD ST TO PAULINA ST**

SCALE: 1" = 30' SHEET EX-6 OF 26 SHEETS STA. TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
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LEGEND

- ➔ FLOW DIRECTION
- - - EXISTING RIGHT OF WAY
- ▶ EXISTING STORM SEWER
- ▶ EXISTING BRIDGE UNDERDRAIN

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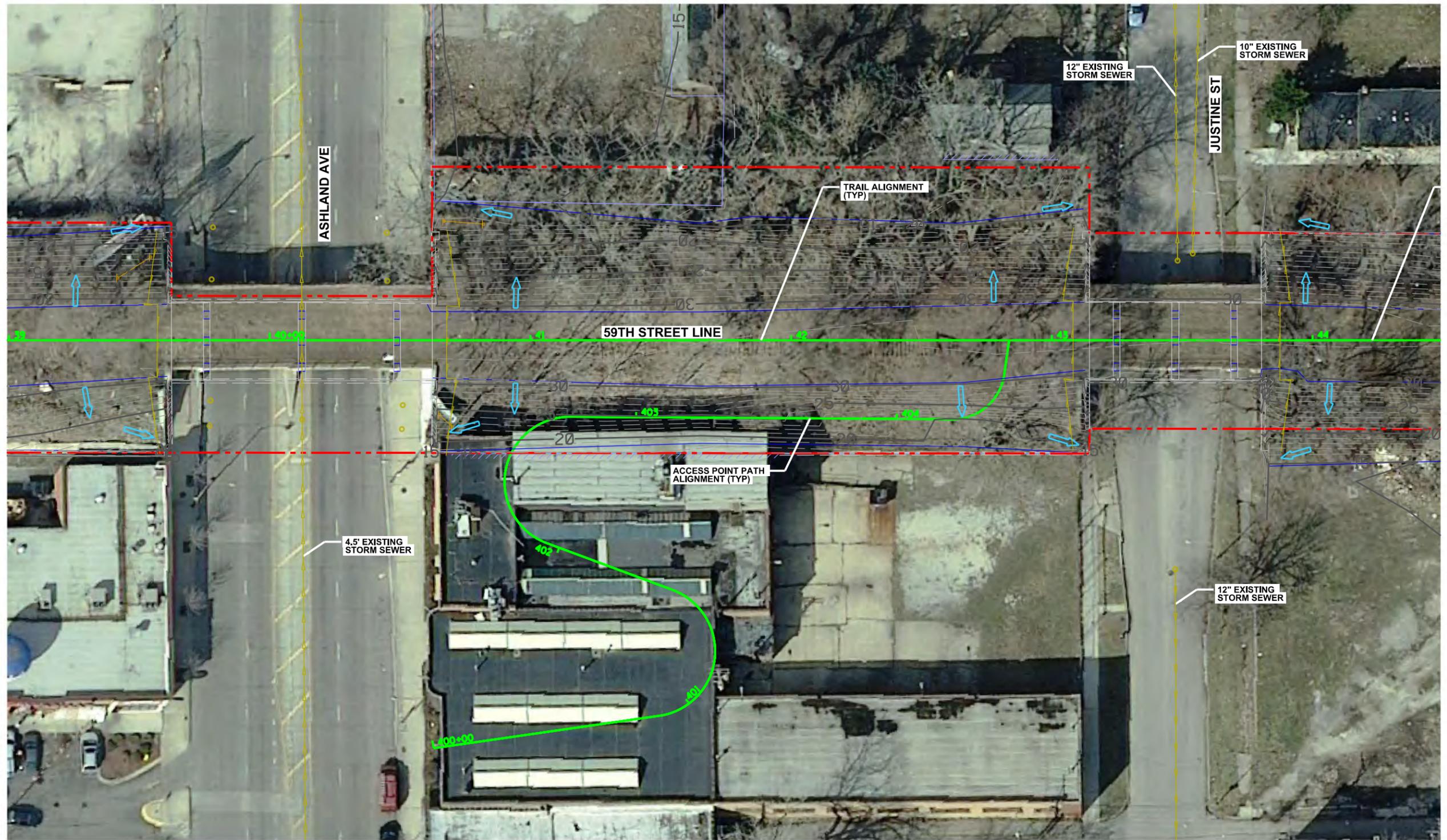
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**EXHIBIT 1-00b: EXISTING DRAINAGE PLAN
 PAULINA ST TO ASHLAND AVE**

SCALE: 1" = 30' SHEET EX-7 OF 26 SHEETS STA. TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
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- - - EXISTING RIGHT OF WAY
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- |— EXISTING BRIDGE UNDERDRAIN

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EXHIBIT 1-00b: EXISTING DRAINAGE PLAN
ASHLAND AVE TO JUSTINE ST
 SCALE: 1" = 30' SHEET EX-8 OF 26 SHEETS STA. TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
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- ➡ FLOW DIRECTION
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EXHIBIT 1-00b: EXISTING DRAINAGE PLAN
JUSTINE ST TO LAFLIN ST
 SCALE: 1" = 30' SHEET EX-9 OF 26 SHEETS STA. TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
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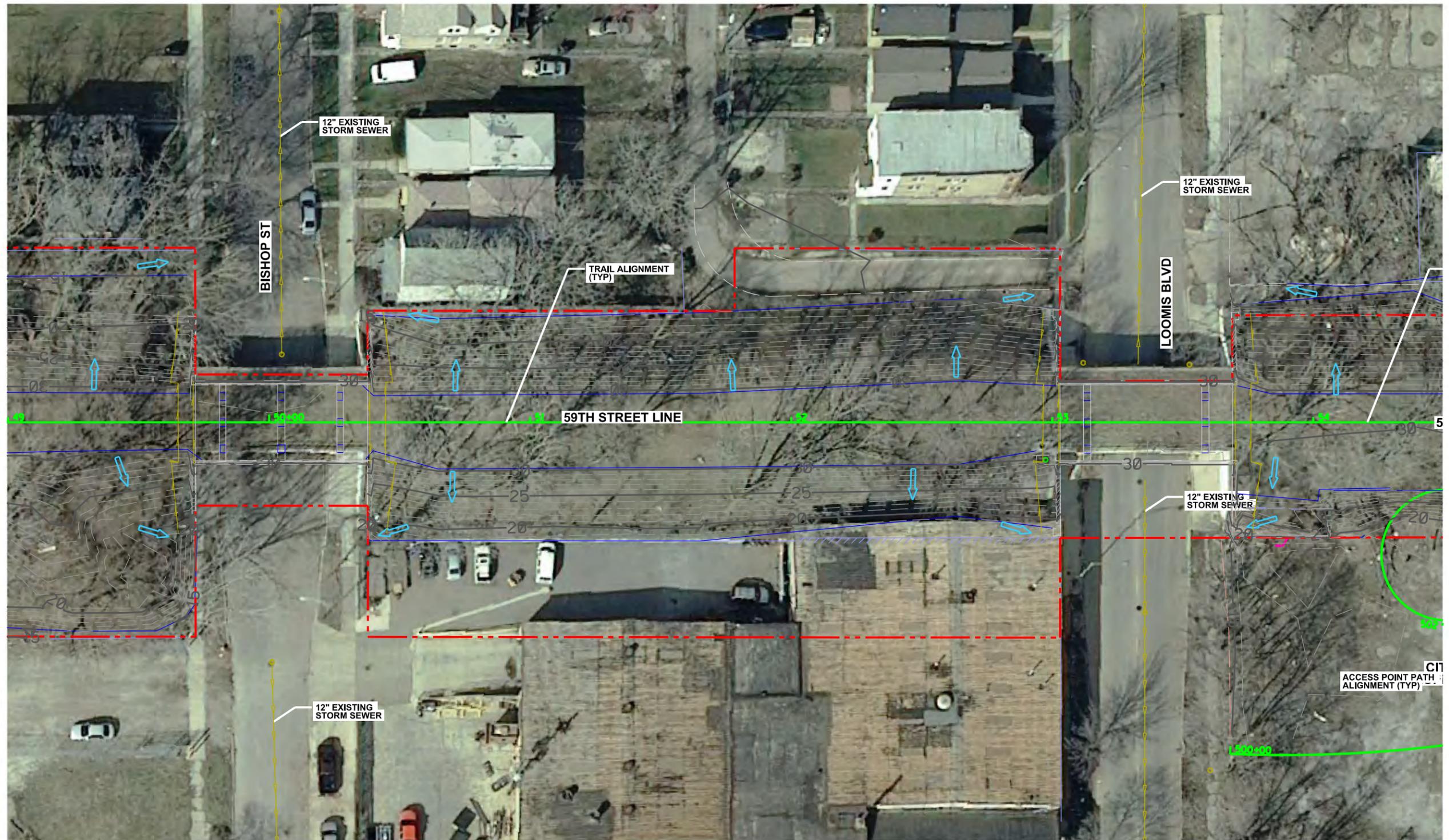
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EXHIBIT 1-00b: EXISTING DRAINAGE PLAN
LAFLIN ST TO BISHOP ST
 SCALE: 1" = 30' SHEET EX-10 OF 26 SHEETS STA. TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
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LEGEND

- ➡ FLOW DIRECTION
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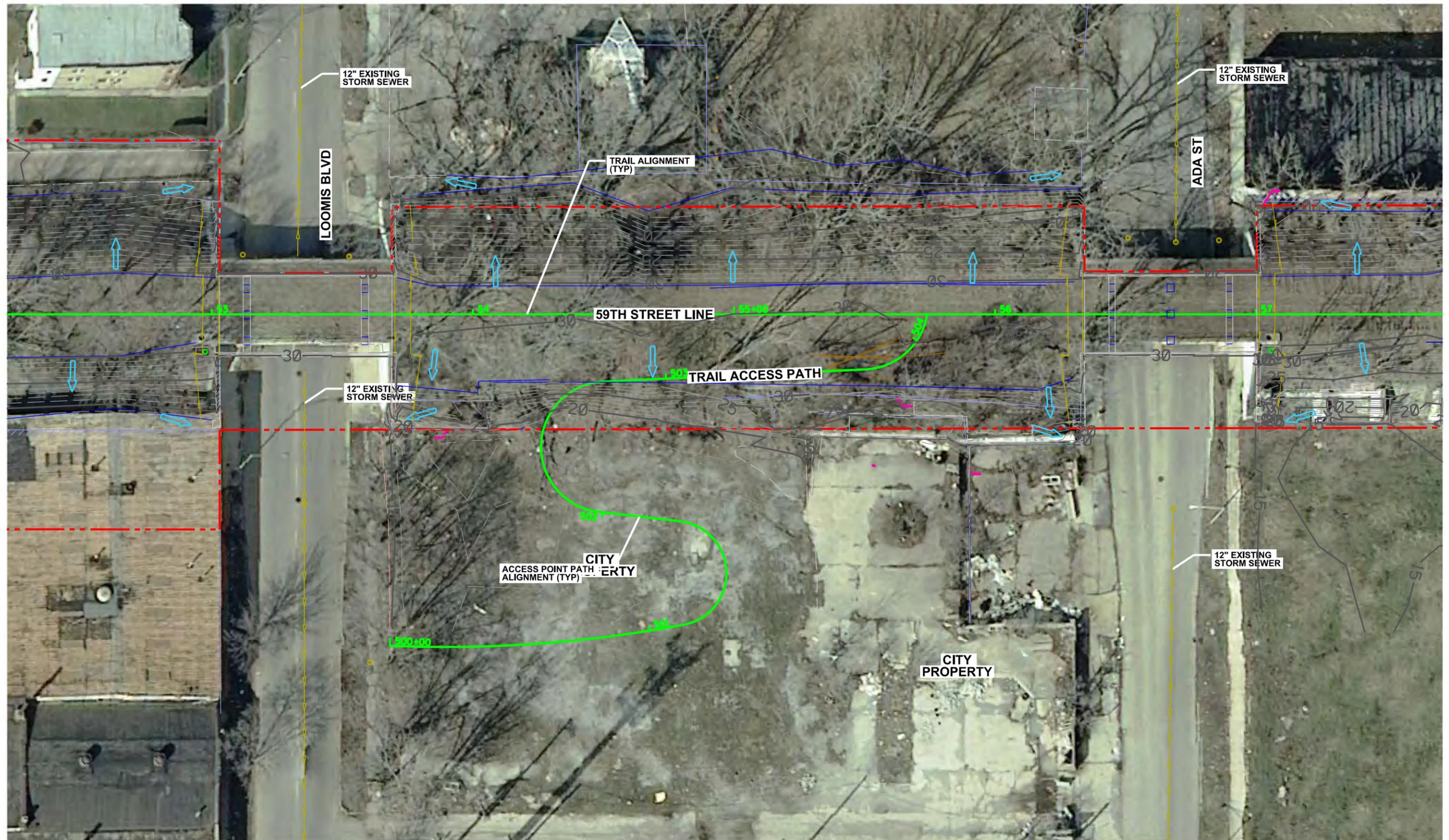
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EXHIBIT 1-00b: EXISTING DRAINAGE PLAN
BISHOP ST TO LOOMIS BLVD
 SCALE: 1" = 30' SHEET EX-11 OF 26 SHEETS STA. TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
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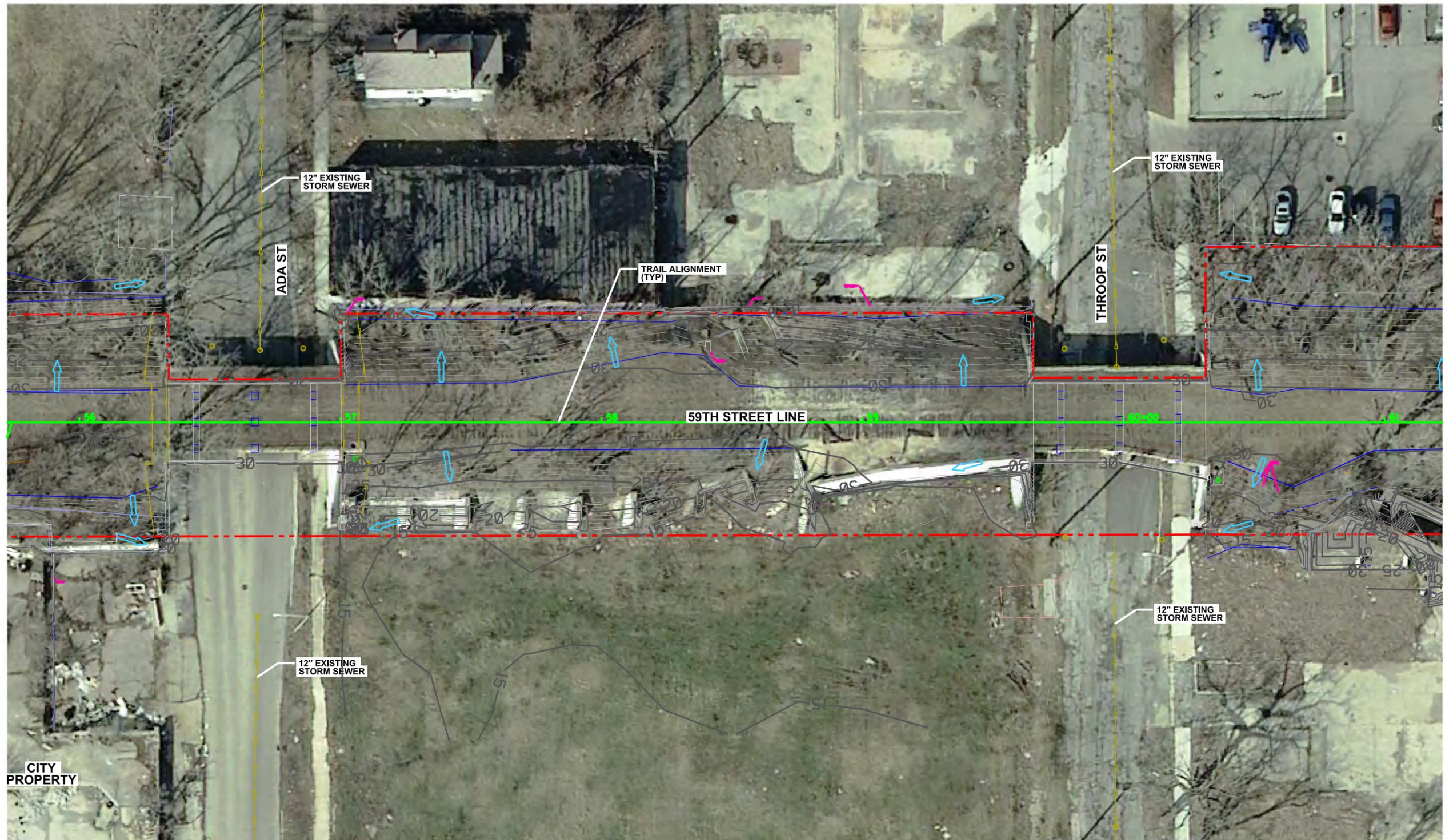
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EXHIBIT 1-00b: EXISTING DRAINAGE PLAN
LOOMIS BLVD TO ADA ST

SCALE: 1" = 30' SHEET EX-12 OF 26 SHEETS STA. TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
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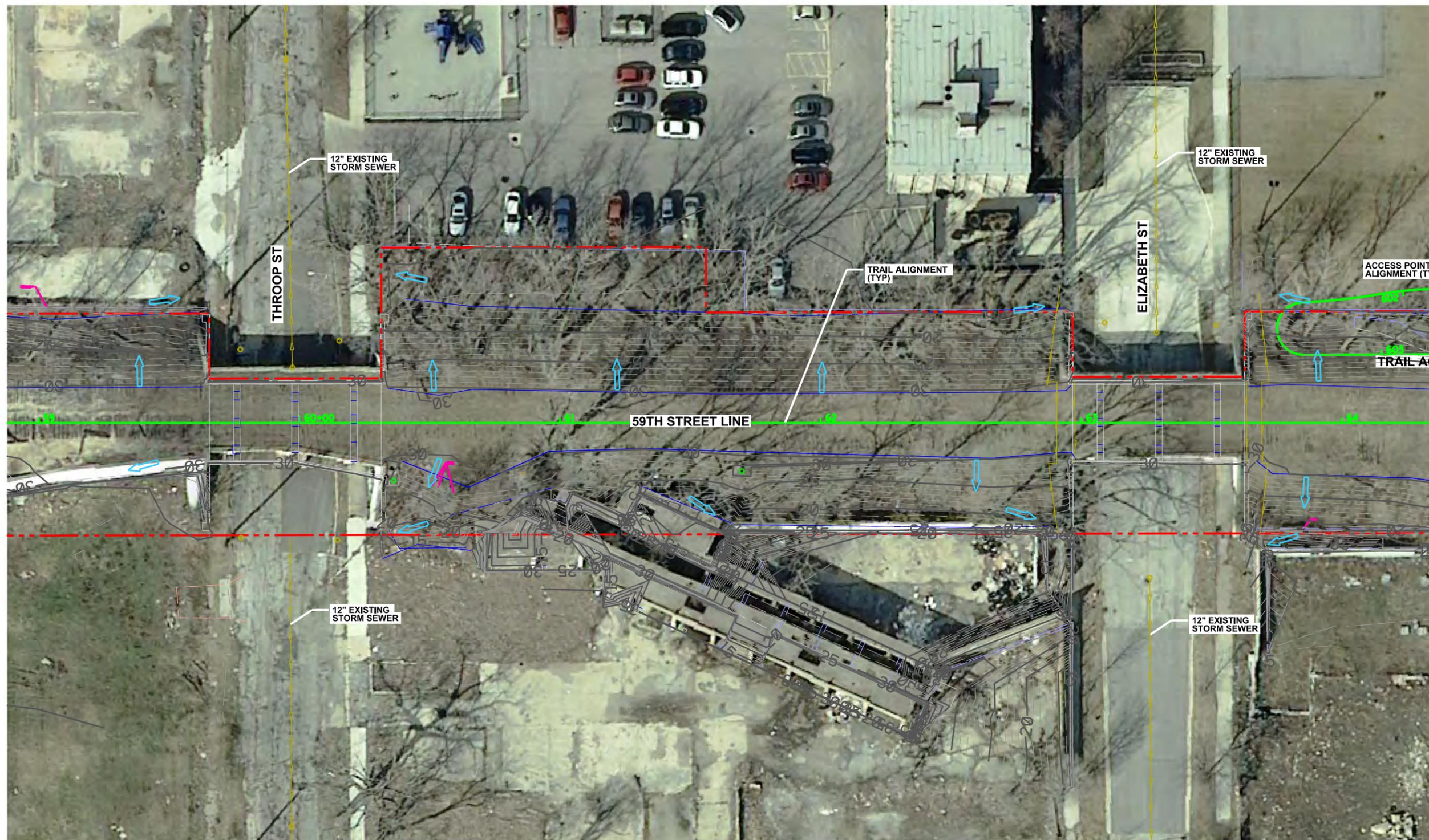
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EXHIBIT 1-00b: EXISTING DRAINAGE PLAN
ADA ST TO THROOP ST
 SCALE: 1" = 30' SHEET EX-13 OF 26 SHEETS STA. TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
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- FLOW DIRECTION
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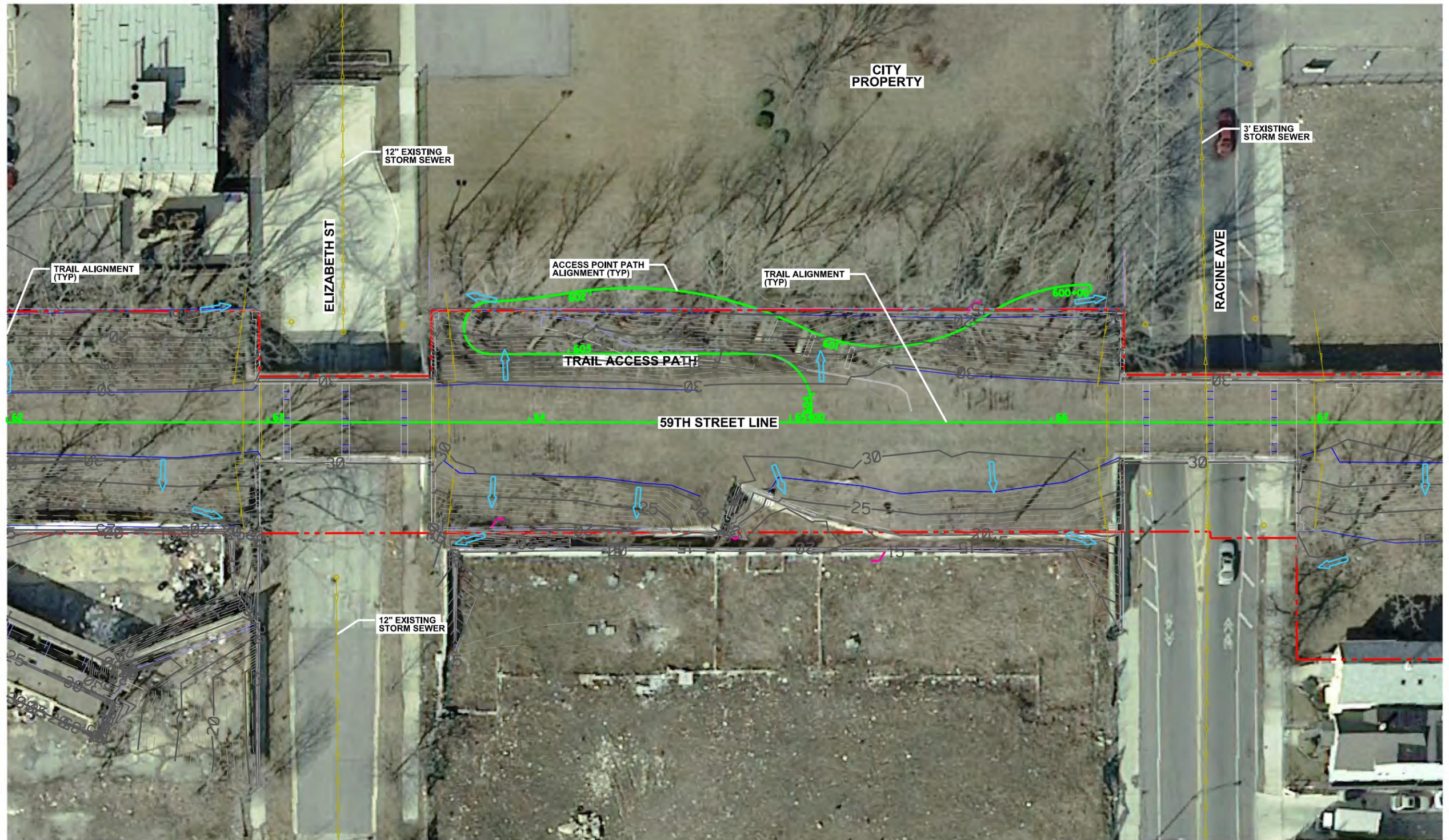
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EXHIBIT 1-00b: EXISTING DRAINAGE PLAN THROOP ST TO ELIZABETH ST

SCALE: 1" = 30' SHEET EX-14 OF 26 SHEETS STA. TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
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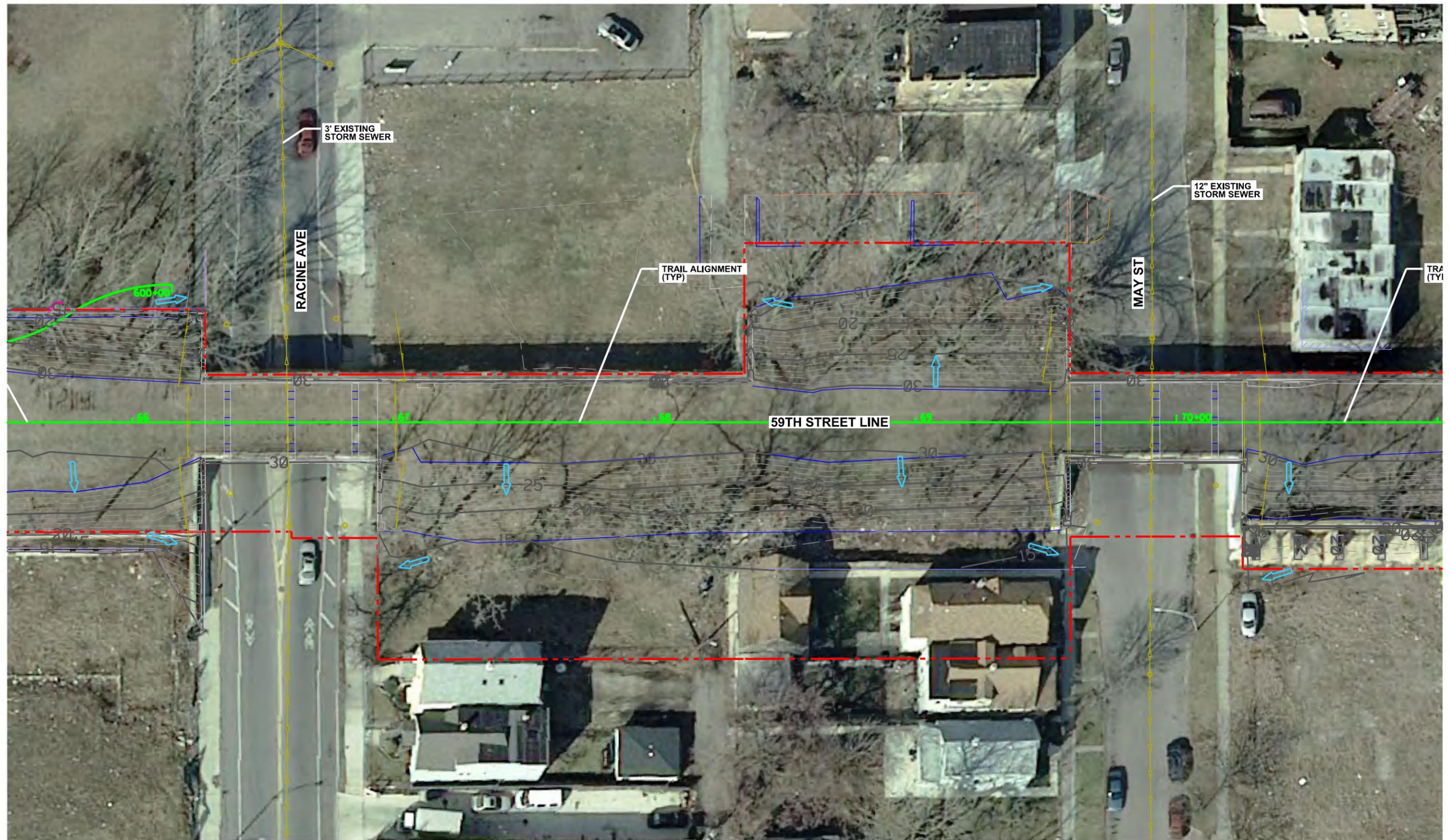
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EXHIBIT 1-00b: EXISTING DRAINAGE PLAN
ELIZABETH ST TO RACINE AVE
 SCALE: 1" = 30' SHEET EX-15 OF 26 SHEETS STA. TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
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CONTRACT NO.				
ILLINOIS FED. AID PROJECT				

8/14/2017 10:45:23 AM P:\P-14\2866-02 CDOT Bridge Design Eng Services\Patrick\Task_004-Engineered_Trail_LDS\CDN\CADD_Sheets\Existing_Drainage_Sheets\E-5-482_Sht_DRN_EX-16.dgn



LEGEND

- ➔ FLOW DIRECTION
- - - EXISTING RIGHT OF WAY
- ➔ EXISTING STORM SEWER
- ➔ EXISTING BRIDGE UNDERDRAIN

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PLOT DATE =		DATE - 08/11/2017	REVISED -

CDOT

CHICAGO DEPARTMENT OF TRANSPORTATION

EXHIBIT 1-00b: EXISTING DRAINAGE PLAN
RACINE AVE TO MAY ST

SCALE: 1" = 30' SHEET EX-16 OF 26 SHEETS STA. TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
	16-E5482-00-BT	COOK	26	16
CONTRACT NO.				
<small>ILLINOIS FED. AID PROJECT</small>				

8/14/2017 10:45:26 AM P:\P-14\2866-02_CDOT_Bridge_Design_Eng_Services_Patrick\Task_004-Engineered_Trail_LDS\CDN\CADD_Sheets\Existing_Drainage_Sheets\E-5482_Std_DRN_EX-17.dgn



LEGEND

- ➔ FLOW DIRECTION
- - - EXISTING RIGHT OF WAY
- ▶ EXISTING STORM SEWER
- ▶ EXISTING BRIDGE UNDERDRAIN

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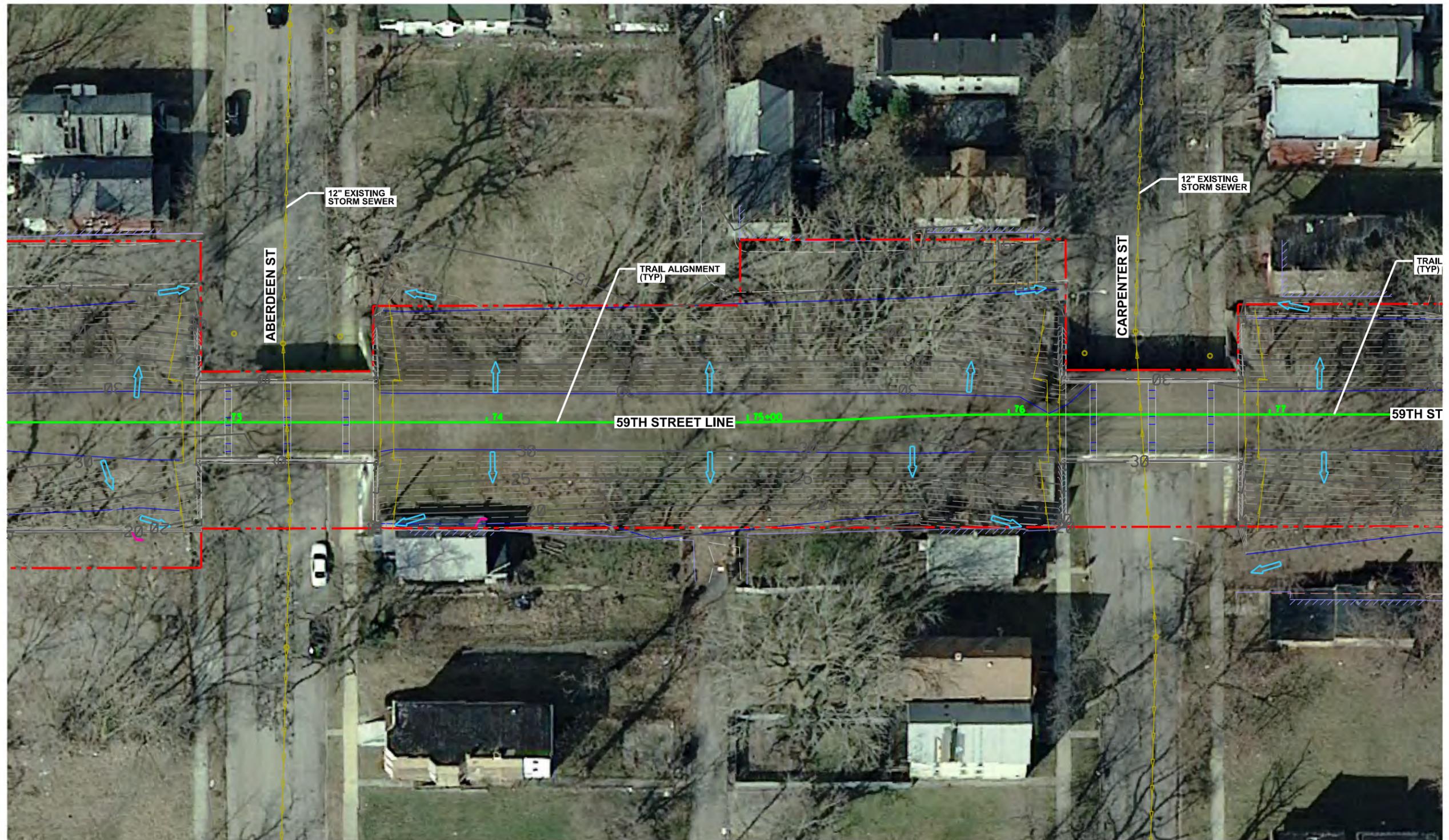
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	DATE - 08/11/2017	REVISED -

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EXHIBIT 1-00b: EXISTING DRAINAGE PLAN
MAY ST TO ABERDEEN ST
 SCALE: 1" = 30' SHEET EX-17 OF 26 SHEETS STA. TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
	16-E5482-00-BT	COOK	26	17
CONTRACT NO.				
ILLINOIS FED. AID PROJECT				

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LEGEND

- ➡ FLOW DIRECTION
- - - EXISTING RIGHT OF WAY
- ➡ EXISTING STORM SEWER
- ➡ EXISTING BRIDGE UNDERDRAIN

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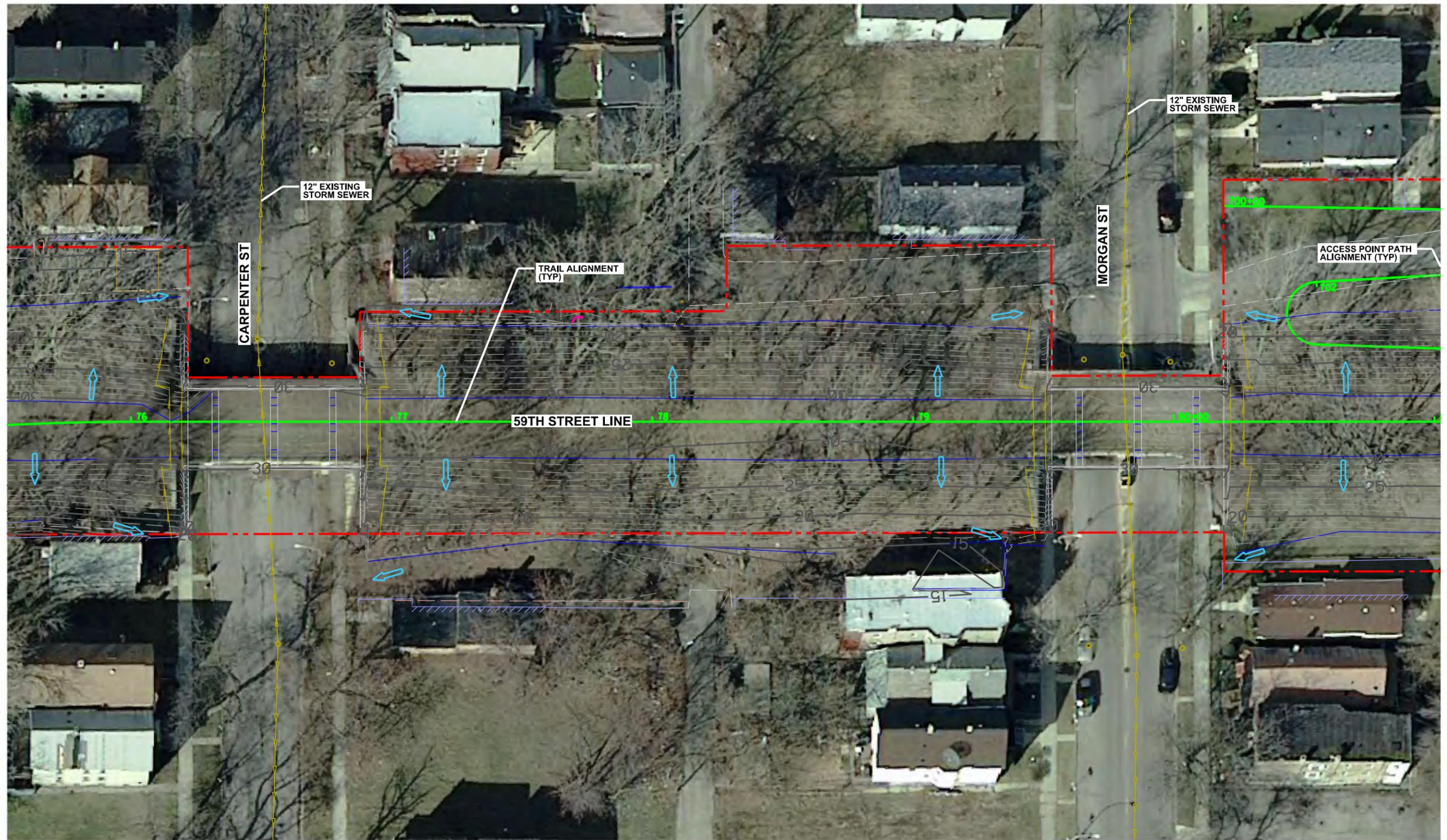
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**EXHIBIT 1-00b: EXISTING DRAINAGE PLAN
 ABERDEEN ST TO CARPENTER ST**

SCALE: 1" = 30' SHEET EX-18 OF 26 SHEETS STA. TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
	16-E5482-00-BT	COOK	26	18
CONTRACT NO.				
ILLINOIS FED. AID PROJECT				

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LEGEND

- ➡ FLOW DIRECTION
- - - EXISTING RIGHT OF WAY
- - - EXISTING STORM SEWER
- - - EXISTING BRIDGE UNDERDRAIN

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EXHIBIT 1-00b: EXISTING DRAINAGE PLAN
CARPENTER ST TO MORGAN ST
 SCALE: 1" = 30' SHEET EX-19 OF 26 SHEETS STA. TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
	16-E5482-00-BT	COOK	26	19
CONTRACT NO.				
ILLINOIS FED. AID PROJECT				

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LEGEND

- ➡ FLOW DIRECTION
- - - EXISTING RIGHT OF WAY
- ➡ EXISTING STORM SEWER
- ➡ EXISTING BRIDGE UNDERDRAIN

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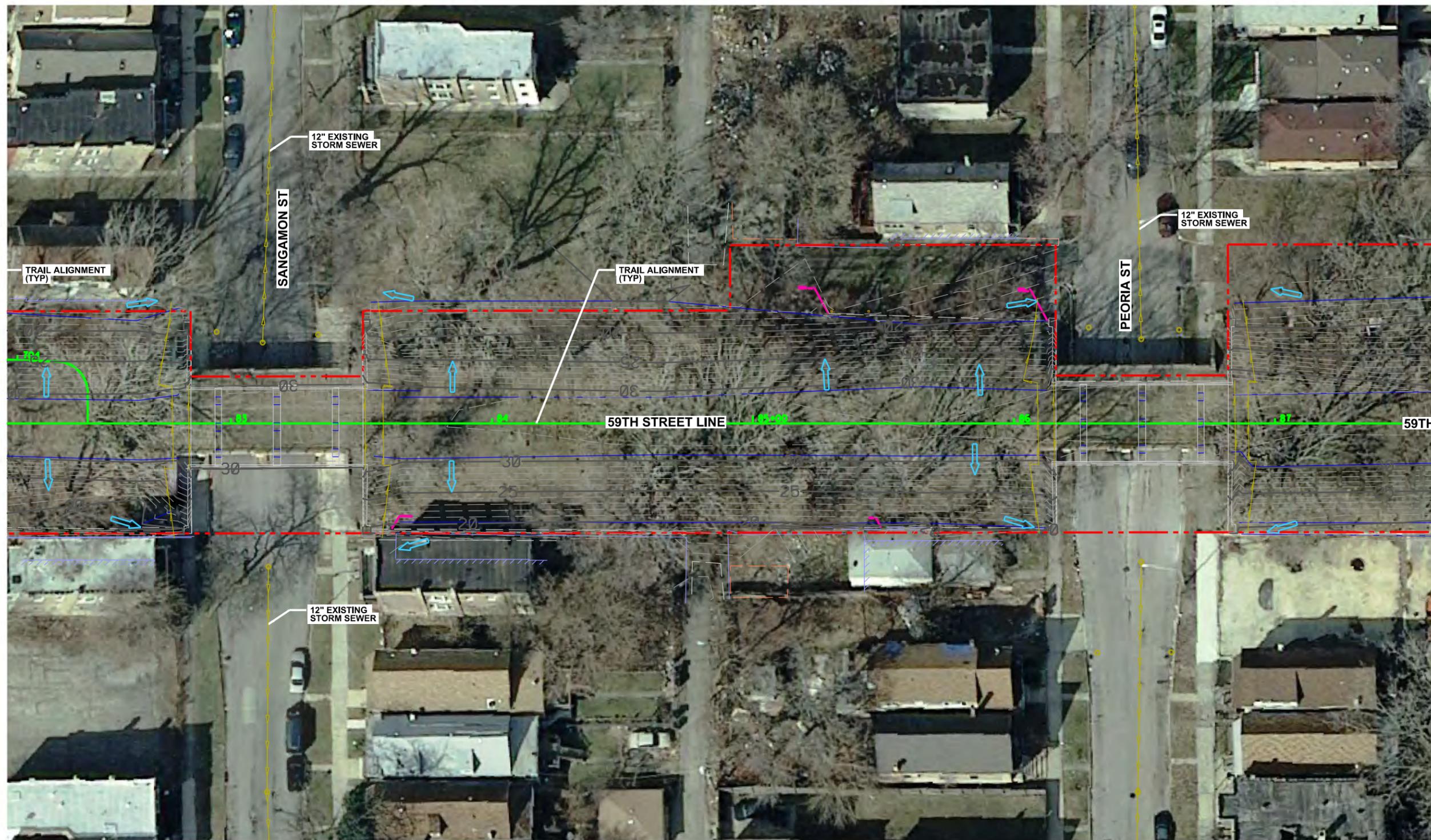
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**EXHIBIT 1-00b: EXISTING DRAINAGE PLAN
 MORGAN ST TO SANGAMON ST**

SCALE: 1" = 30' SHEET EX-20 OF 26 SHEETS STA. TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
	16-E5482-00-BT	COOK	26	20
CONTRACT NO.				
ILLINOIS FED. AID PROJECT				

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LEGEND

- ➡ FLOW DIRECTION
- - - EXISTING RIGHT OF WAY
- - - EXISTING STORM SEWER
- EXISTING BRIDGE UNDERDRAIN

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 DATE - 08/11/2017

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EXHIBIT 1-00b: EXISTING DRAINAGE PLAN SANGAMON ST TO PEORIA ST
 SCALE: 1" = 30' SHEET EX-21 OF 26 SHEETS STA. TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
	16-E5482-00-BT	COOK	26	21
CONTRACT NO.				
ILLINOIS FED. AID PROJECT				

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LEGEND

- FLOW DIRECTION
- - - EXISTING RIGHT OF WAY
- EXISTING STORM SEWER
- EXISTING BRIDGE UNDERDRAIN

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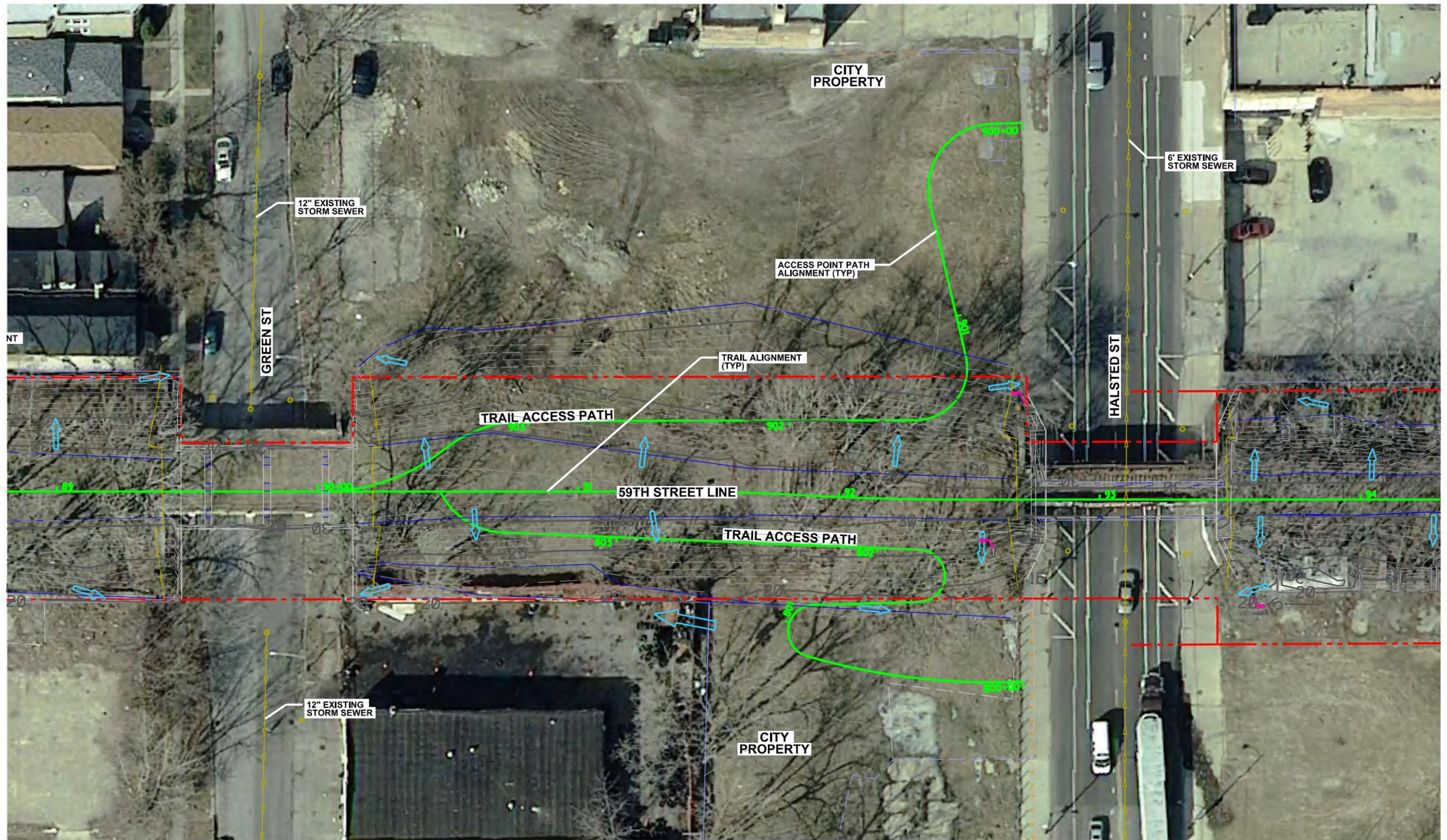
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**EXHIBIT 1-00b: EXISTING DRAINAGE PLAN
 PEORIA ST TO GREEN ST**

SCALE: 1" = 30' SHEET EX-22 OF 26 SHEETS STA. TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
	16-E5482-00-BT	COOK	26	22
CONTRACT NO.				
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LEGEND

- ➔ FLOW DIRECTION
- - - EXISTING RIGHT OF WAY
- EXISTING STORM SEWER
- EXISTING BRIDGE UNDERDRAIN

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EXHIBIT 1-00b: EXISTING DRAINAGE PLAN
GREEN ST TO HALSTED ST
 SCALE: 1" = 30' SHEET EX-23 OF 26 SHEETS STA. TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
	16-E5482-00-BT	COOK	26	23
CONTRACT NO.				
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LEGEND

- ➔ FLOW DIRECTION
- - - EXISTING RIGHT OF WAY
- > EXISTING STORM SEWER
- > EXISTING BRIDGE UNDERDRAIN

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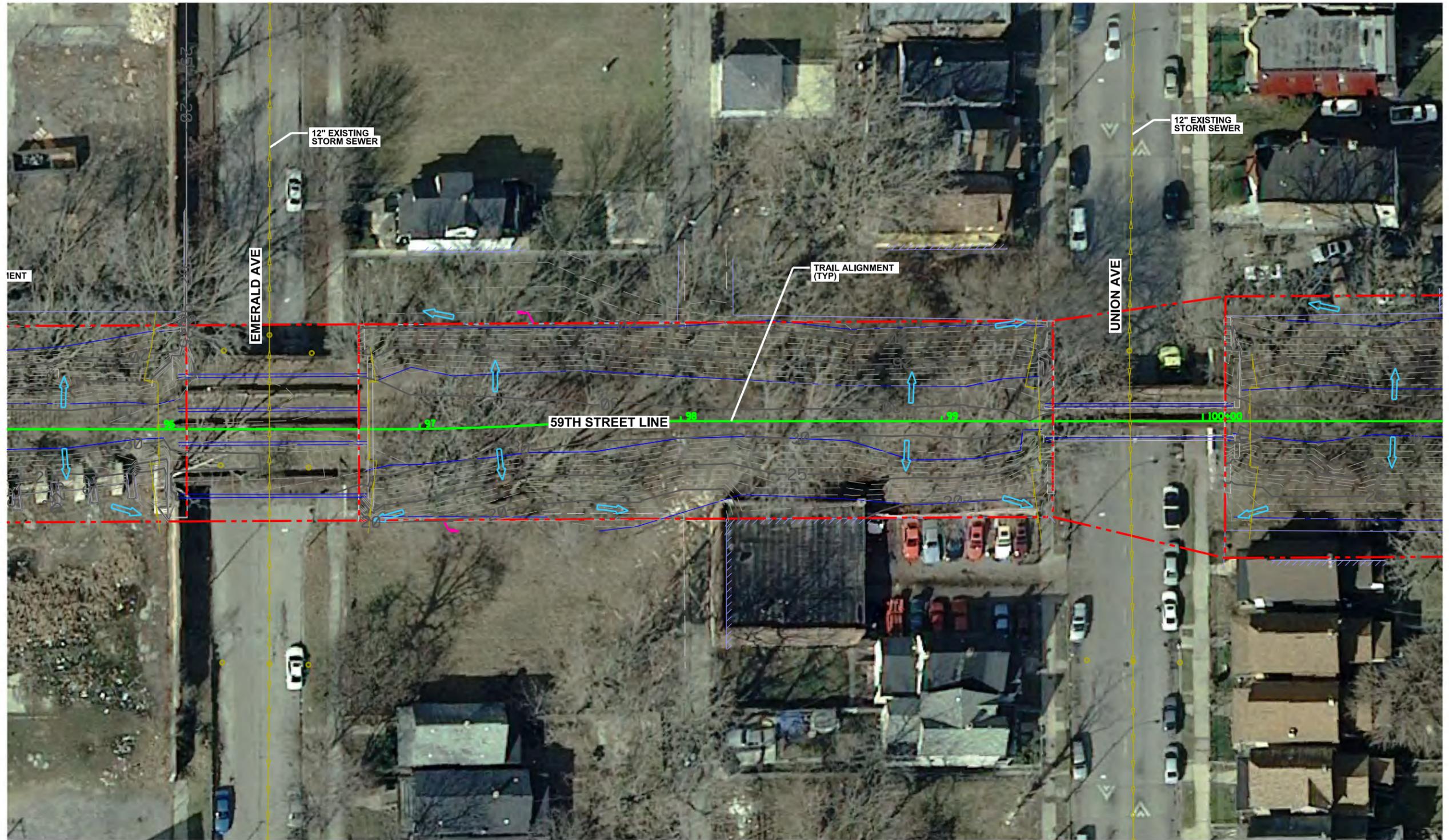


**EXHIBIT 1-00b: EXISTING DRAINAGE PLAN
 HALSTED ST TO EMERALD AVE**

SCALE: 1" = 30' SHEET EX-24 OF 26 SHEETS STA. TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
	16-E5482-00-BT	COOK	26	24
CONTRACT NO.				
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LEGEND

- ➡ FLOW DIRECTION
- - - EXISTING RIGHT OF WAY
- ➡ EXISTING STORM SEWER
- ➡ EXISTING BRIDGE UNDERDRAIN

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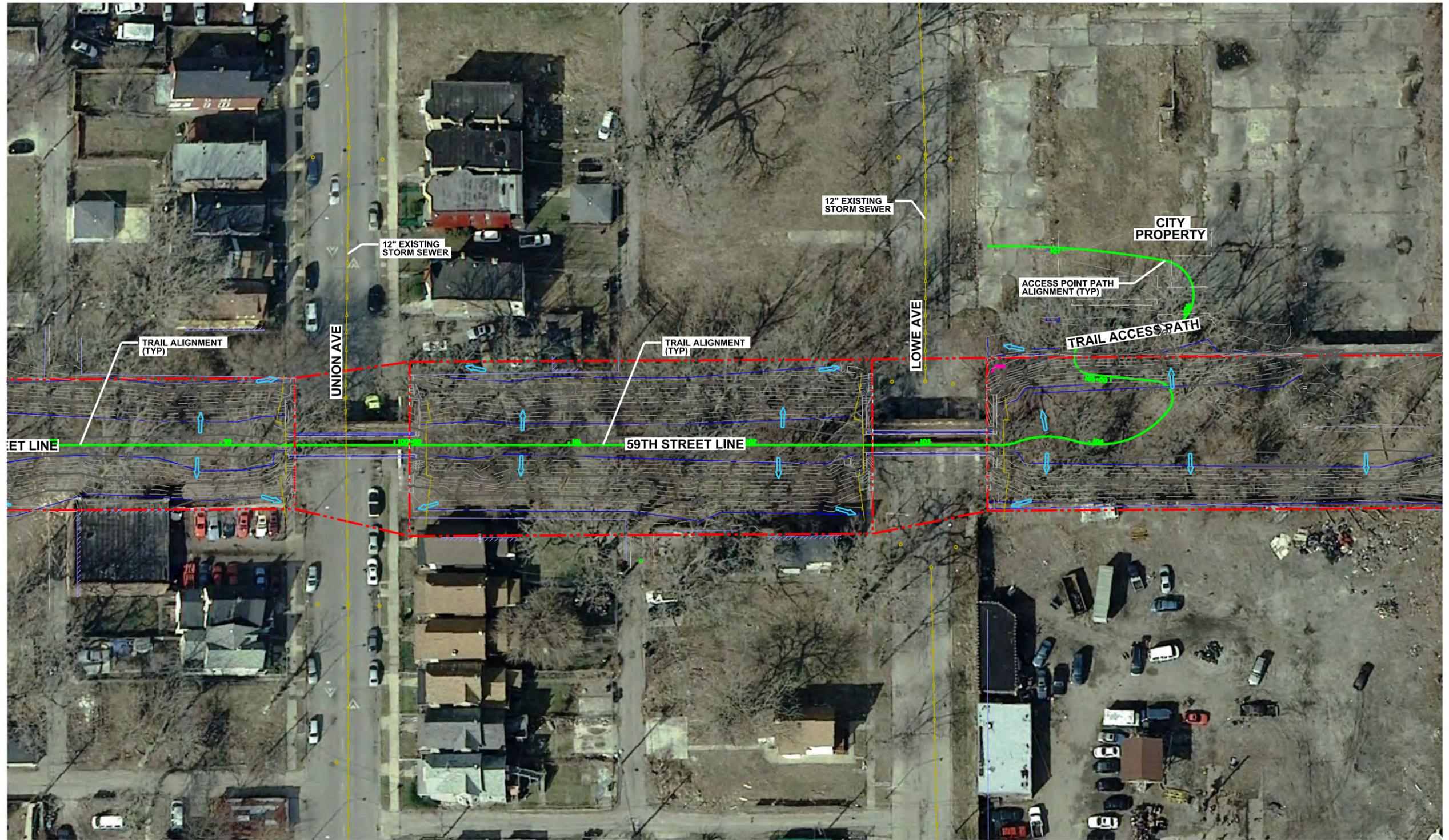
CDOT CHICAGO DEPARTMENT OF TRANSPORTATION

**EXHIBIT 1-00b: EXISTING DRAINAGE PLAN
 EMERALD AVE TO UNION AVE**

SCALE: 1" = 30' SHEET EX-25 OF 26 SHEETS STA. TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
	16-E5482-00-BT	COOK	26	25
CONTRACT NO.				
ILLINOIS FED. AID PROJECT				

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LEGEND

- ➡ FLOW DIRECTION
- - - EXISTING RIGHT OF WAY
- EXISTING STORM SEWER
- EXISTING BRIDGE UNDERDRAIN

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**EXHIBIT 1-00b: EXISTING DRAINAGE PLAN
 UNION AVE TO LOWE AVE**

SCALE: 1" = 30' SHEET EX-26 OF 26 SHEETS STA. TO STA.

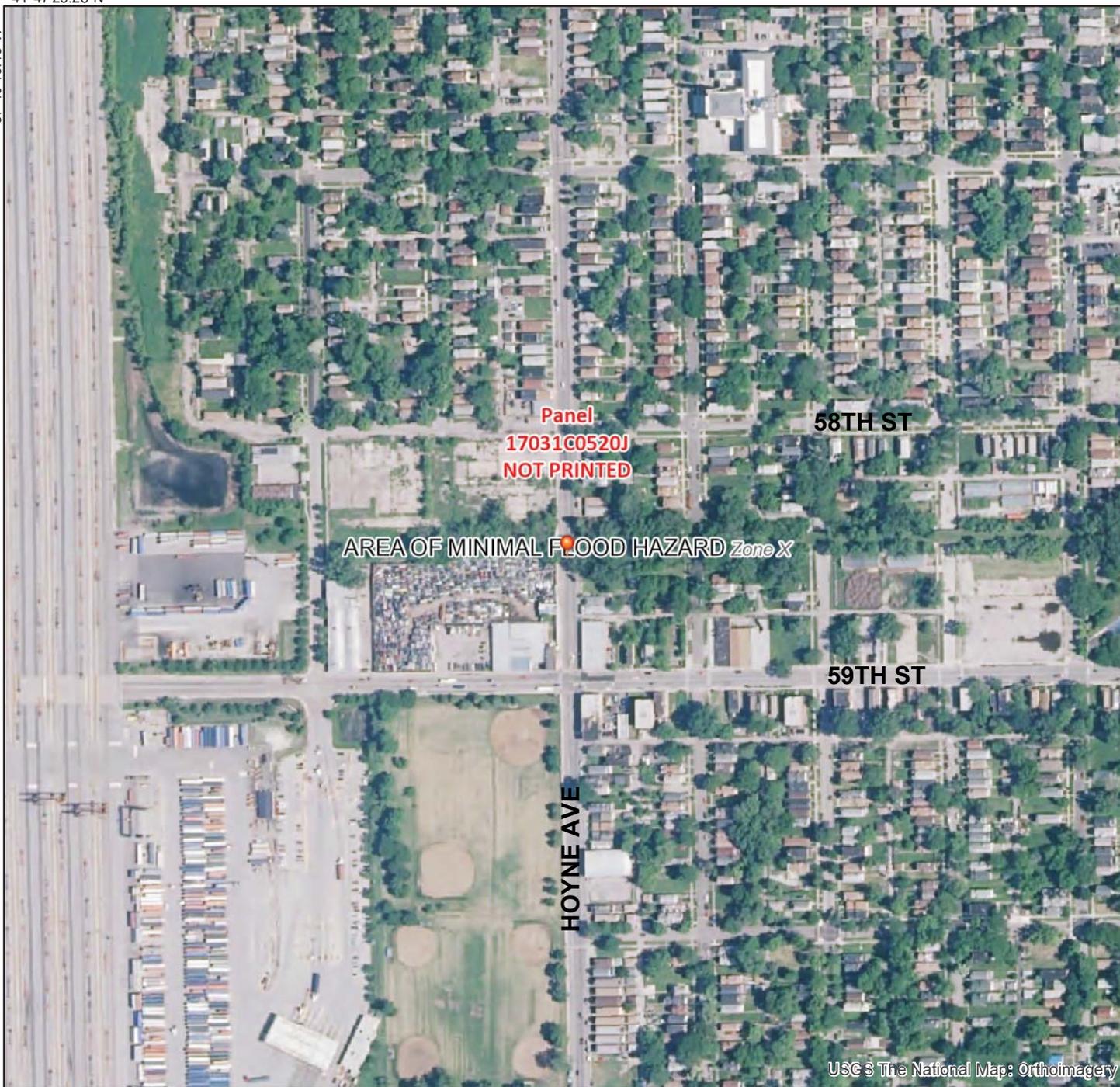
F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
	16-E5482-00-BT	COOK	26	26
CONTRACT NO.				
ILLINOIS FED. AID PROJECT				

National Flood Hazard Layer FIRMette

EXHIBIT 1-02a

41°47'29.28"N

87°40'46.43"W



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

41°47'1.38"N

87°40'7.46"W

USCS The National Map: Orthoimagery

Legend

- Cross-Sections
- Base Flood Elevations
- Flood Hazard Zones**
- 1% Annual Chance Flood
- Regulatory Floodway
- Special Floodway
- Area of Undetermined Flood Hazard
- 0.2% Annual Chance Flood
- Future Conditions 1% Annual Chance Flood Hazard
- Area with Reduced Risk Due to Levee



LOMRs

- Effective

Map Panels

- Digital Data
- Unmodernized Maps
- Unmapped

This map complies with FEMA's standards for the use of digital flood maps. The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. The base map shown complies with FEMA's base map accuracy standards.

The NFHL is a living database, updated daily, and this map represents a snapshot of information at a specific time.

Flood risks are dynamic and can change frequently due to a variety of factors, including weather patterns, erosion, and new development. FEMA flood maps are continually updated through a variety of processes. Users should always verify through the Map Service Center (<http://msc.fema.gov>) or the Community Map Repository that they have the current effective information.

NFHL maps should not be created for unmapped or unmodernized areas.



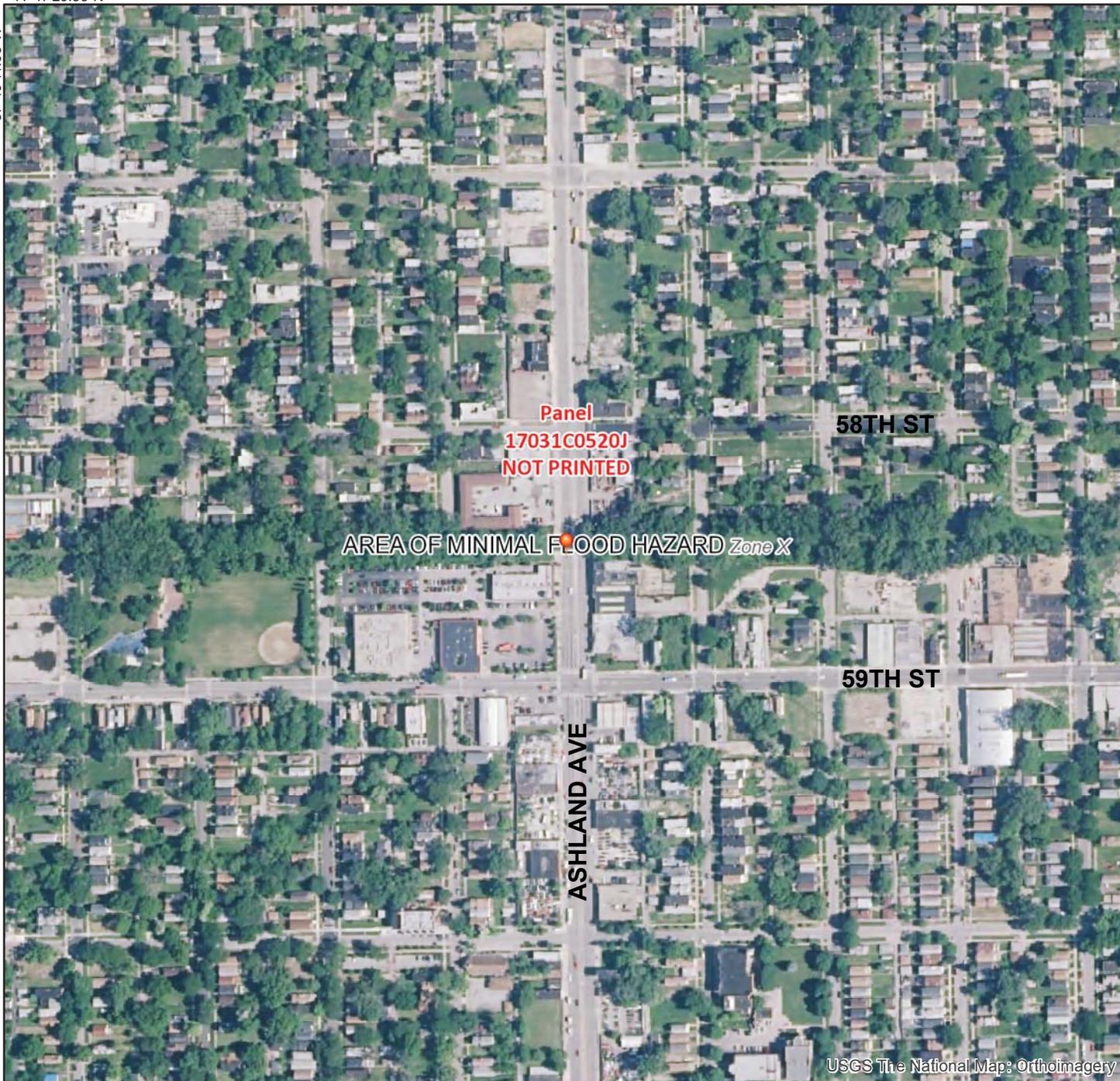
FEMA

National Flood Hazard Layer FIRMette

EXHIBIT 1-02a

41°47'29.85"N

87°40'11.68"W



Legend

- Cross-Sections
- Base Flood Elevations
- Flood Hazard Zones**
- 1% Annual Chance Flood
- Regulatory Floodway
- Special Floodway
- Area of Undetermined Flood Hazard
- 0.2% Annual Chance Flood
- Future Conditions 1% Annual Chance Flood Hazard
- Area with Reduced Risk Due to Levee



LOMRs

- Effective

Map Panels

- Digital Data
- Unmodernized Maps
- Unmapped

This map complies with FEMA's standards for the use of digital flood maps. The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. The base map shown complies with FEMA's base map accuracy standards.

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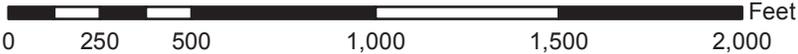
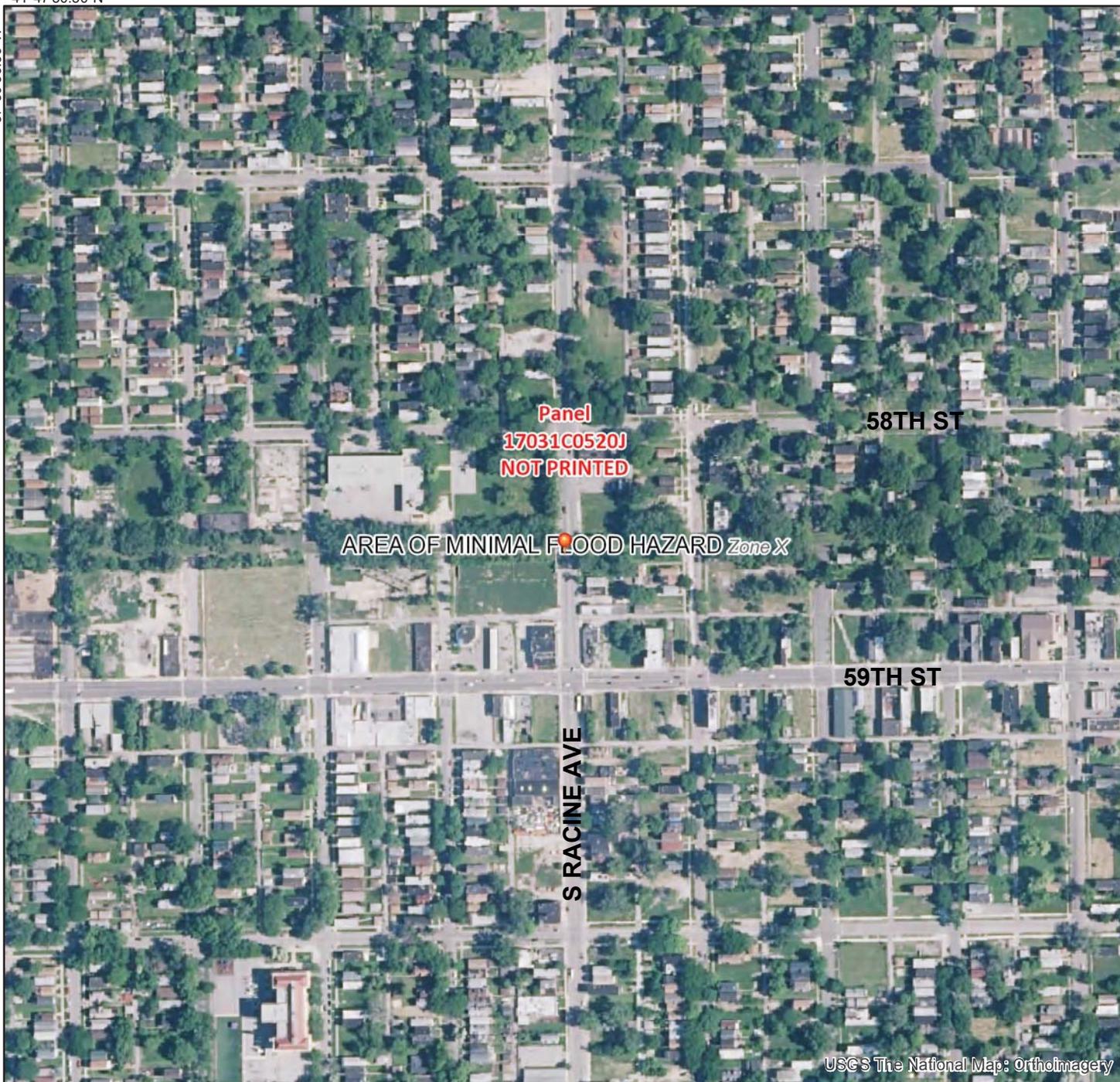
FEMA

National Flood Hazard Layer FIRMette

EXHIBIT 1-02a

41°47'30.30"N

87°39'36.59"W



41°47'2.39"N

87°38'57.62"W

Legend

- Cross-Sections
- Base Flood Elevations
- Flood Hazard Zones**
- 1% Annual Chance Flood
- Regulatory Floodway
- Special Floodway
- Area of Undetermined Flood Hazard
- 0.2% Annual Chance Flood
- Future Conditions 1% Annual Chance Flood Hazard
- Area with Reduced Risk Due to Levee



LOMRs

- Effective

Map Panels

- Digital Data
- Unmodernized Maps
- Unmapped

This map complies with FEMA's standards for the use of digital flood maps. The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. The base map shown complies with FEMA's base map accuracy standards.

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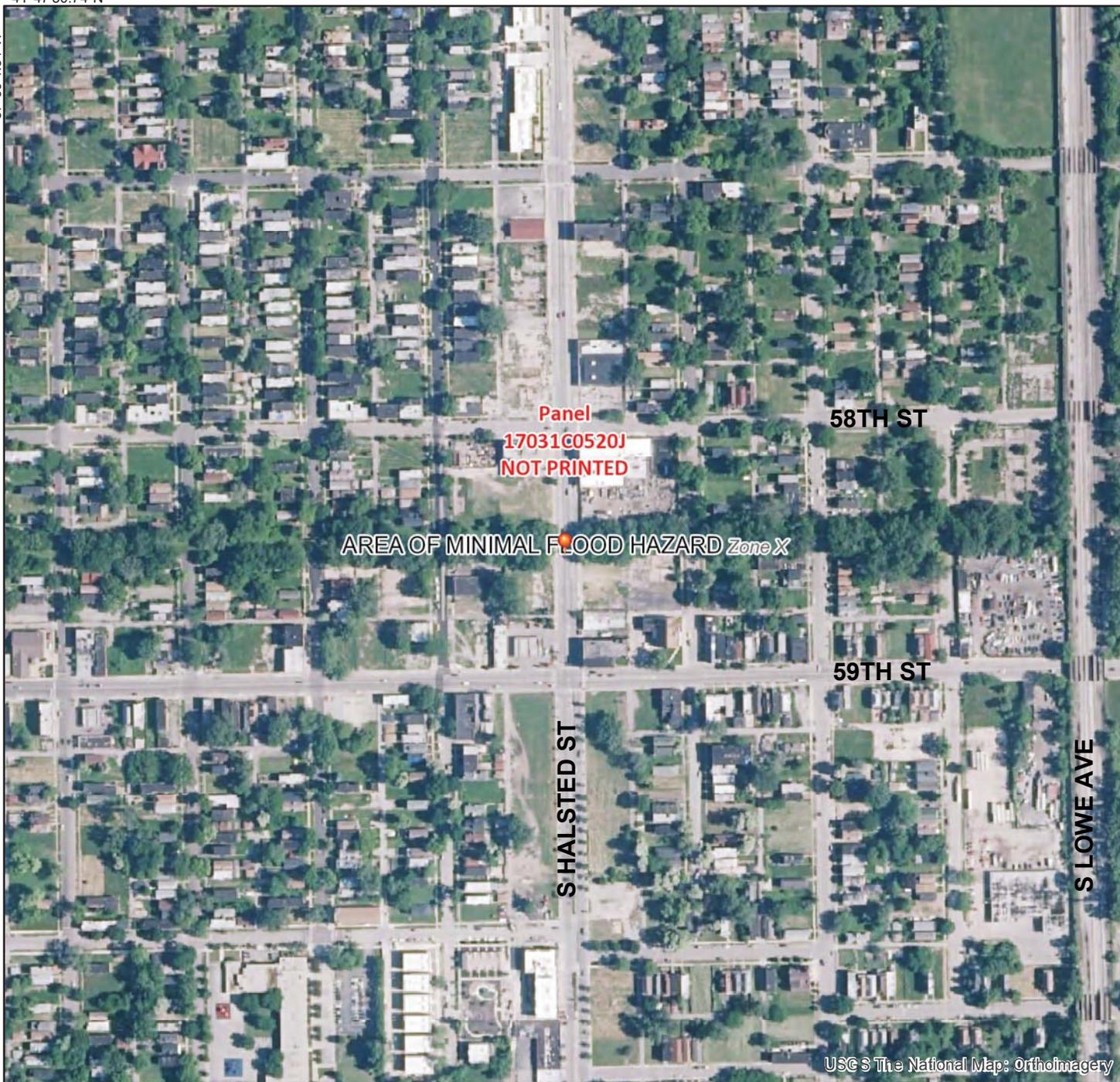
FEMA

National Flood Hazard Layer FIRMette

EXHIBIT 1-02a

41°47'30.74"N

87°39'1.54"W



41°47'2.83"N

87°38'22.57"W

Legend

- Cross-Sections
- Base Flood Elevations
- Flood Hazard Zones**
- 1% Annual Chance Flood
- Regulatory Floodway
- Special Floodway
- Area of Undetermined Flood Hazard
- 0.2% Annual Chance Flood
- Future Conditions 1% Annual Chance Flood Hazard
- Area with Reduced Risk Due to Levee



LOMRs

- Effective

Map Panels

- Digital Data
- Unmodernized Maps
- Unmapped

This map complies with FEMA's standards for the use of digital flood maps. The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. The base map shown complies with FEMA's base map accuracy standards.

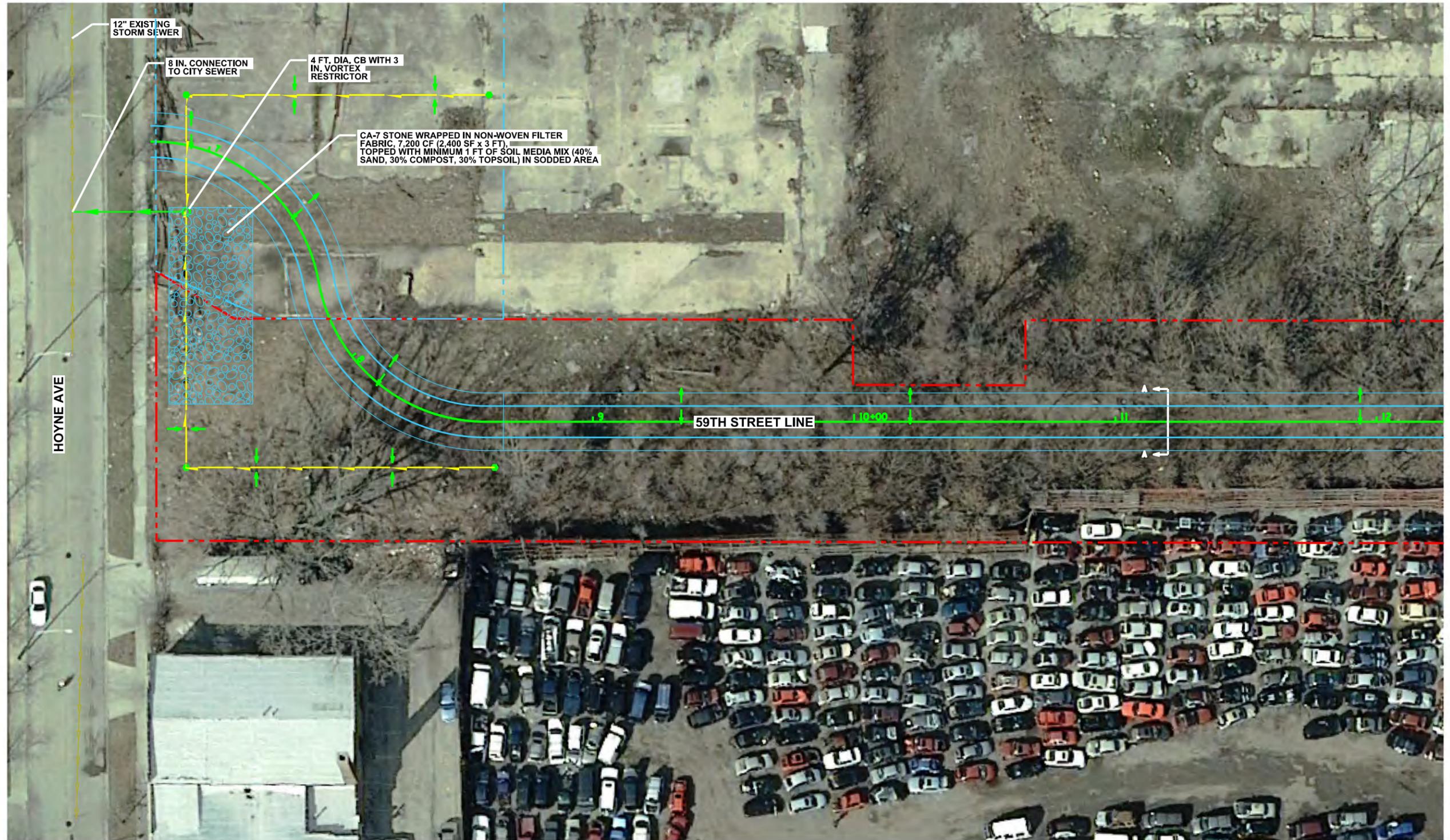
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NFHL maps should not be created for unmapped or unmodernized areas.



FEMA



NOTES:
 1) FOR SECTION A-A AND B-B SEE EXHIBIT 2-01b SHEET 1
 2) FOR SECTION C-C SEE EXHIBIT 2-01b SHEET 2

LEGEND

	UNDERDRAIN		CATCH BASIN (CB)
	EXISTING STORM SEWER		CLEANOUT
	PROPOSED STORM SEWER		STORMWATER DETENTION FOR TRAIL ACCESS PATH
	TRENCH DRAIN		PROPOSED CURB
	FLOW DIRECTION		PROPOSED RETAINING WALL
			EXISTING RIGHT OF WAY
			PROPOSED RIGHT OF WAY

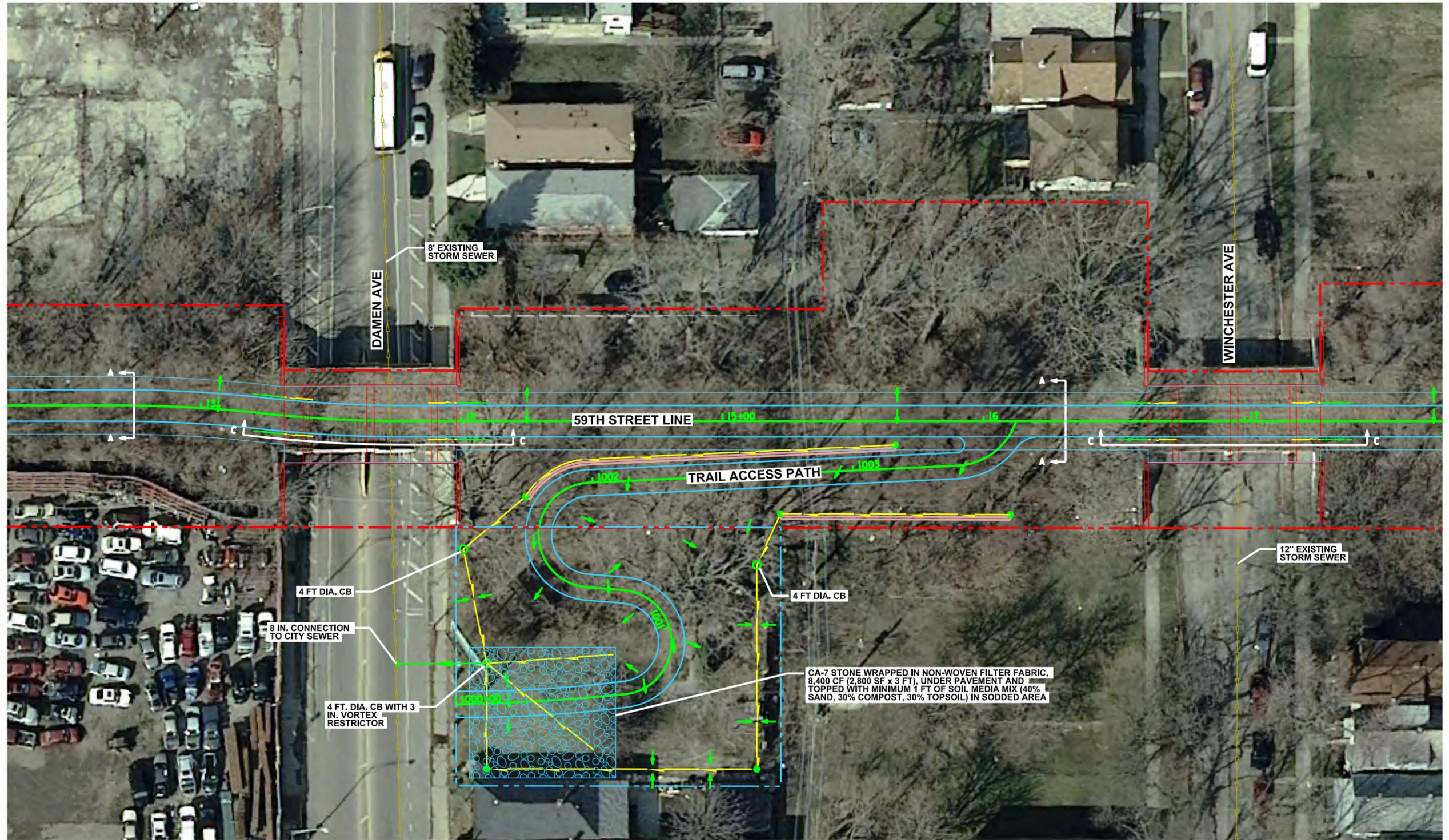
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CDOT CHICAGO DEPARTMENT OF TRANSPORTATION

**EXHIBIT 2-00a: PROPOSED DRAINAGE PLAN
 HOYNE AVE TO DAMEN AVE**

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
	16-E5482-00-BT	COOK	28	1
FED. ROAD DIST. NO. ILLINOIS FED. AID PROJECT				



NOTES:
 1) FOR SECTION A-A AND B-B SEE EXHIBIT 2-01b SHEET 1
 2) FOR SECTION C-C SEE EXHIBIT 2-01b SHEET 2

LEGEND

	UNDERDRAIN		CATCH BASIN (CB)
	EXISTING STORM SEWER		CLEANOUT
	PROPOSED STORM SEWER		STORMWATER DETENTION FOR TRAIL ACCESS PATH
	TRENCH DRAIN		PROPOSED CURB
	FLOW DIRECTION		PROPOSED RETAINING WALL
			EXISTING RIGHT OF WAY
			PROPOSED RIGHT OF WAY

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PLOT SCALE =	CHECKED - HG	REVISED -
PLOT DATE =	DATE - 08/11/2017	REVISED -

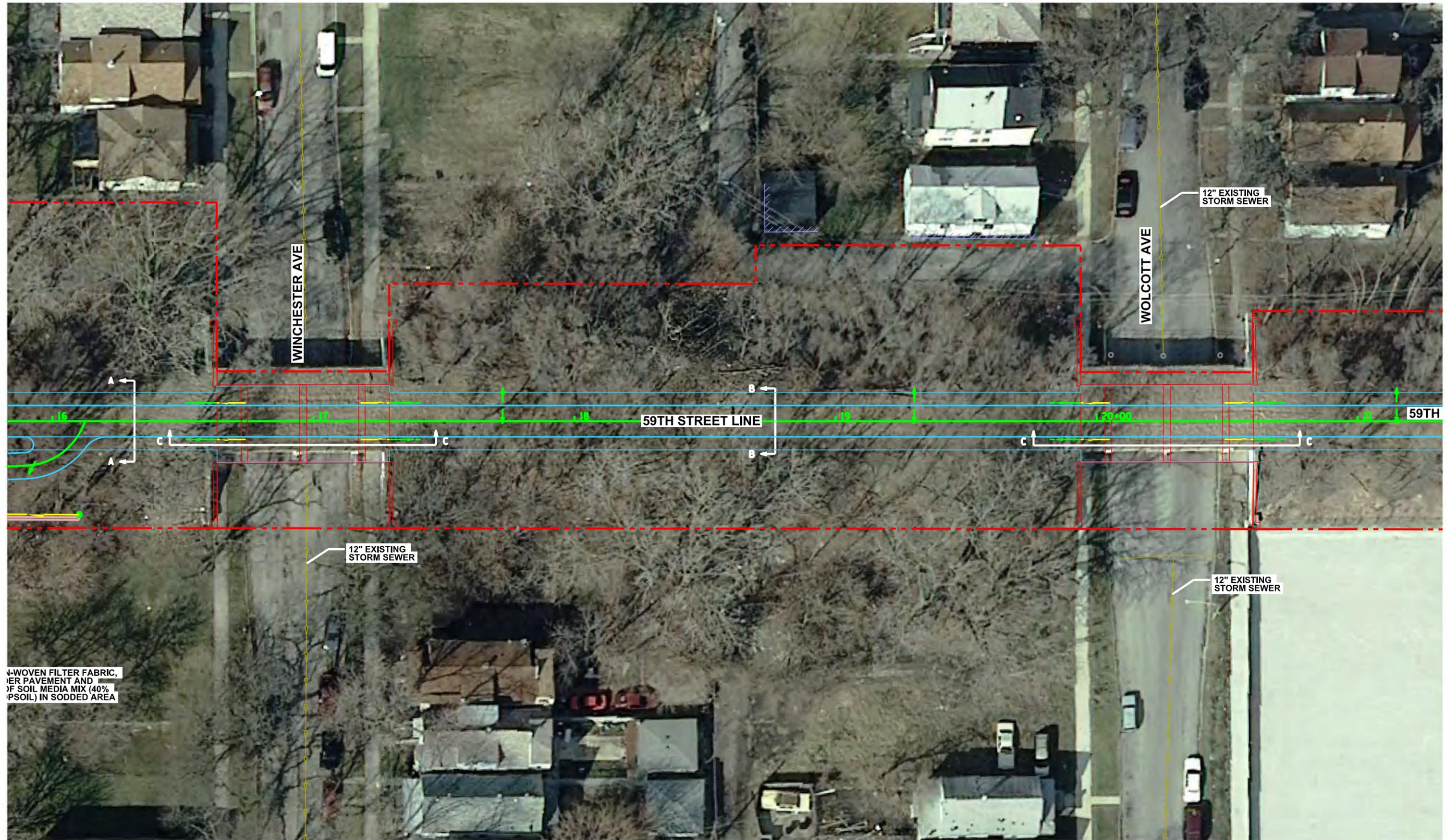
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**EXHIBIT 2-00a: PROPOSED DRAINAGE PLAN
 DAMEN AVE TO WINCHESTER AVE**

SCALE: 1" = 20' SHEET PR-2 OF 28

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
	16-E5482-00-BT	COOK	28	2

FED. ROAD DIST. NO. ILLINOIS FED. AID PROJECT



4-WOVEN FILTER FABRIC,
OVER PAVEMENT AND
OF SOIL MEDIA MIX (40%
PSOIL) IN SODDED AREA

- NOTES:
 1) FOR SECTION A-A AND B-B SEE EXHIBIT 2-01b SHEET 1
 2) FOR SECTION C-C SEE EXHIBIT 2-01b SHEET 2

LEGEND

-  UNDERDRAIN
-  EXISTING STORM SEWER
-  PROPOSED STORM SEWER
-  TRENCH DRAIN
-  FLOW DIRECTION
-  CATCH BASIN (CB)
-  CLEANOUT
-  STORMWATER DETENTION FOR TRAIL ACCESS PATH
-  PROPOSED CURB
-  PROPOSED RETAINING WALL
-  EXISTING RIGHT OF WAY
-  PROPOSED RIGHT OF WAY

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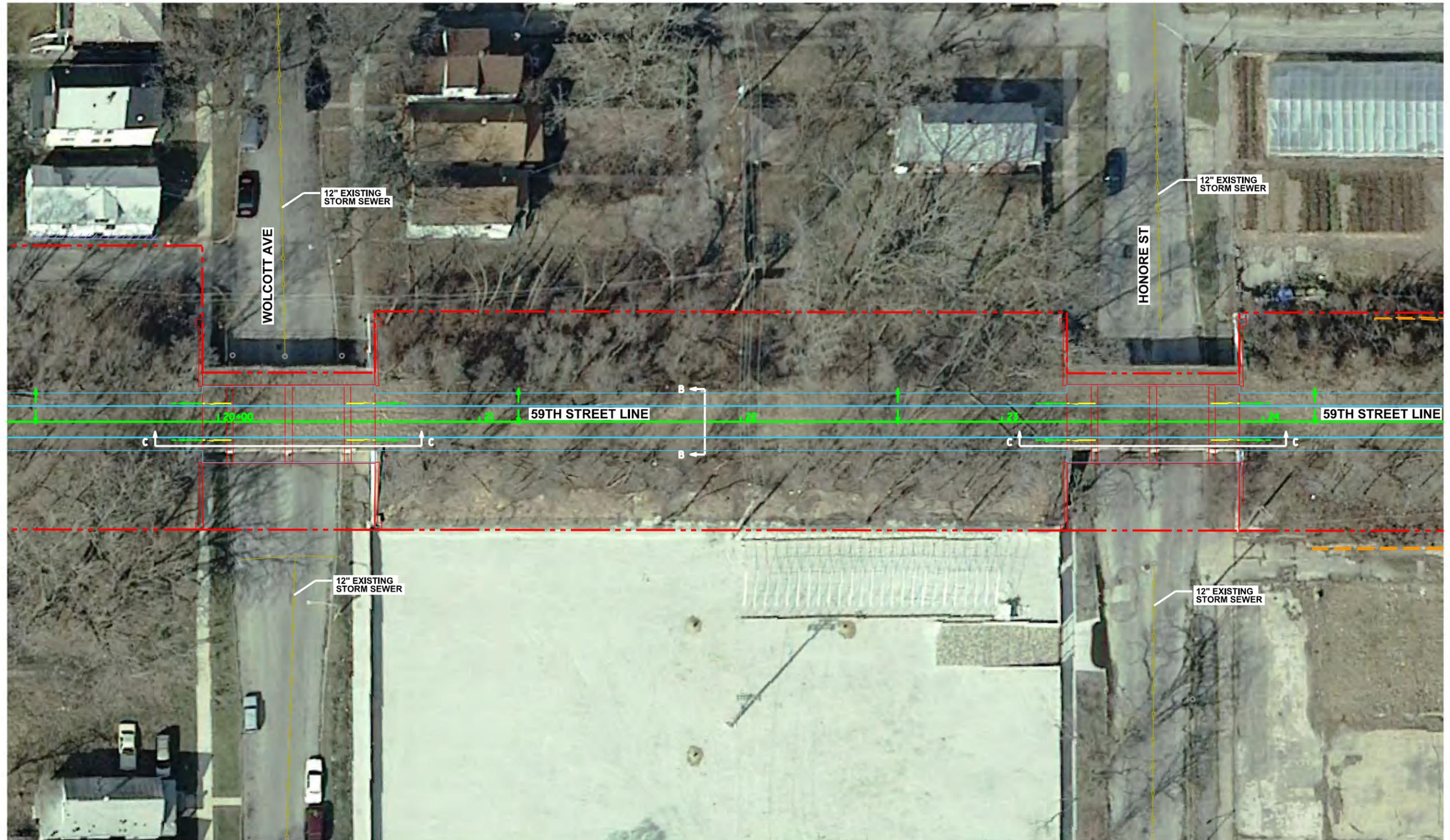
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**EXHIBIT 2-00a: PROPOSED DRAINAGE PLAN
 WINCHESTER AVE TO WOLCOTT AVE**

SCALE: 1" = 20' SHEET PR-3 OF 28

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
	16-E5482-00-BT	COOK	28	3

FED. ROAD DIST. NO. ILLINOIS FED. AID PROJECT



NOTES:
 1) FOR SECTION A-A AND B-B SEE EXHIBIT 2-01b SHEET 1
 2) FOR SECTION C-C SEE EXHIBIT 2-01b SHEET 2

LEGEND

	UNDERDRAIN		CATCH BASIN (CB)
	EXISTING STORM SEWER		CLEANOUT
	PROPOSED STORM SEWER		STORMWATER DETENTION FOR TRAIL ACCESS PATH
	TRENCH DRAIN		PROPOSED CURB
	FLOW DIRECTION		PROPOSED RETAINING WALL
			EXISTING RIGHT OF WAY
			PROPOSED RIGHT OF WAY

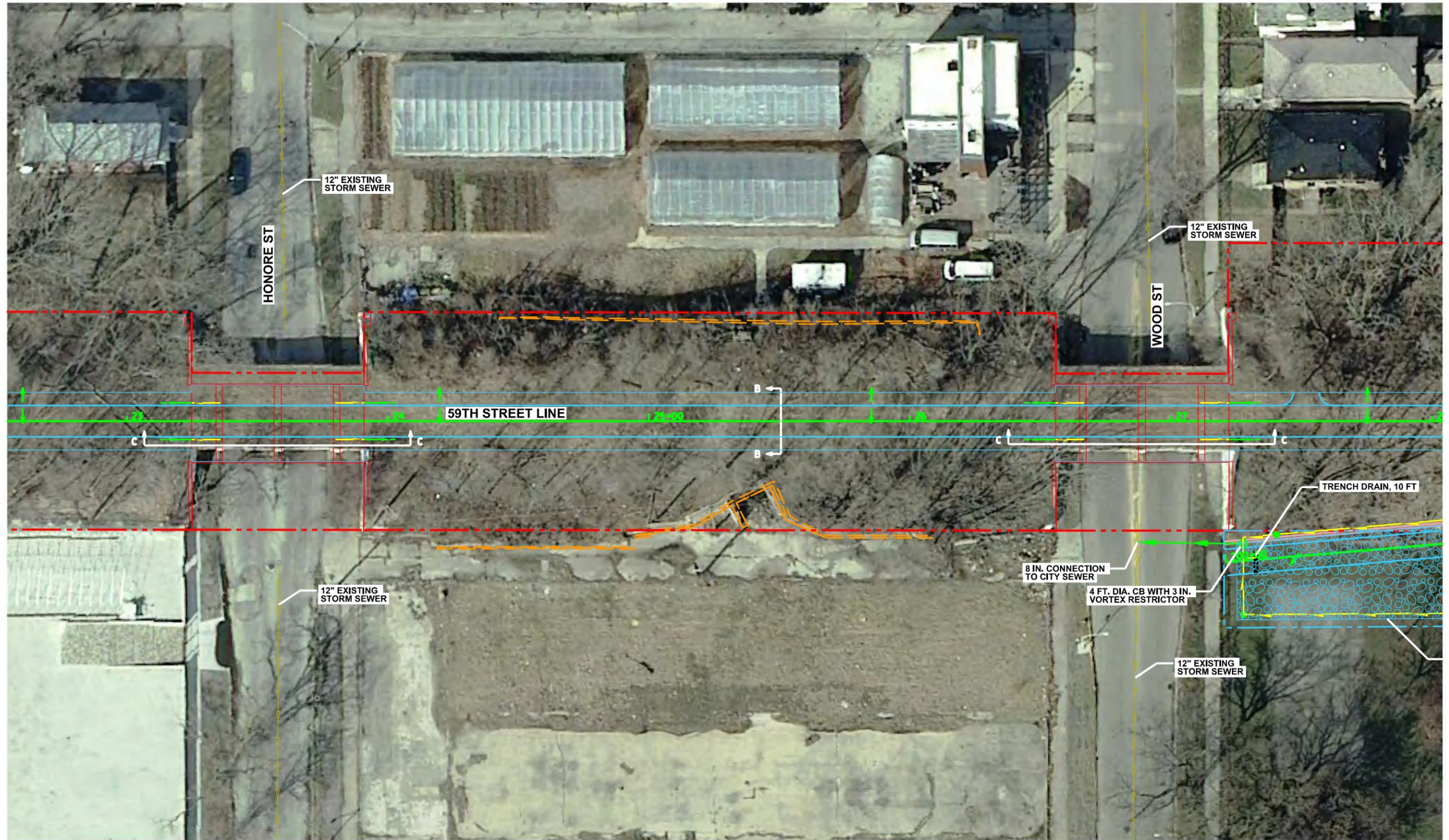
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EXHIBIT 2-00a: PROPOSED DRAINAGE PLAN
WOLCOTT AVE TO HONORE ST
 SCALE: 1" = 20' SHEET PR-4 OF 28

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
	16-E5482-00-BT	COOK	28	4

FED. ROAD DIST. NO. ILLINOIS FED. AID PROJECT



NOTES:
 1) FOR SECTION A-A AND B-B SEE EXHIBIT 2-01b SHEET 1
 2) FOR SECTION C-C SEE EXHIBIT 2-01b SHEET 2

LEGEND

	UNDERDRAIN		CATCH BASIN (CB)
	EXISTING STORM SEWER		CLEANOUT
	PROPOSED STORM SEWER		STORMWATER DETENTION FOR TRAIL ACCESS PATH
	TRENCH DRAIN		PROPOSED CURB
	FLOW DIRECTION		PROPOSED RETAINING WALL
			EXISTING RIGHT OF WAY
			PROPOSED RIGHT OF WAY

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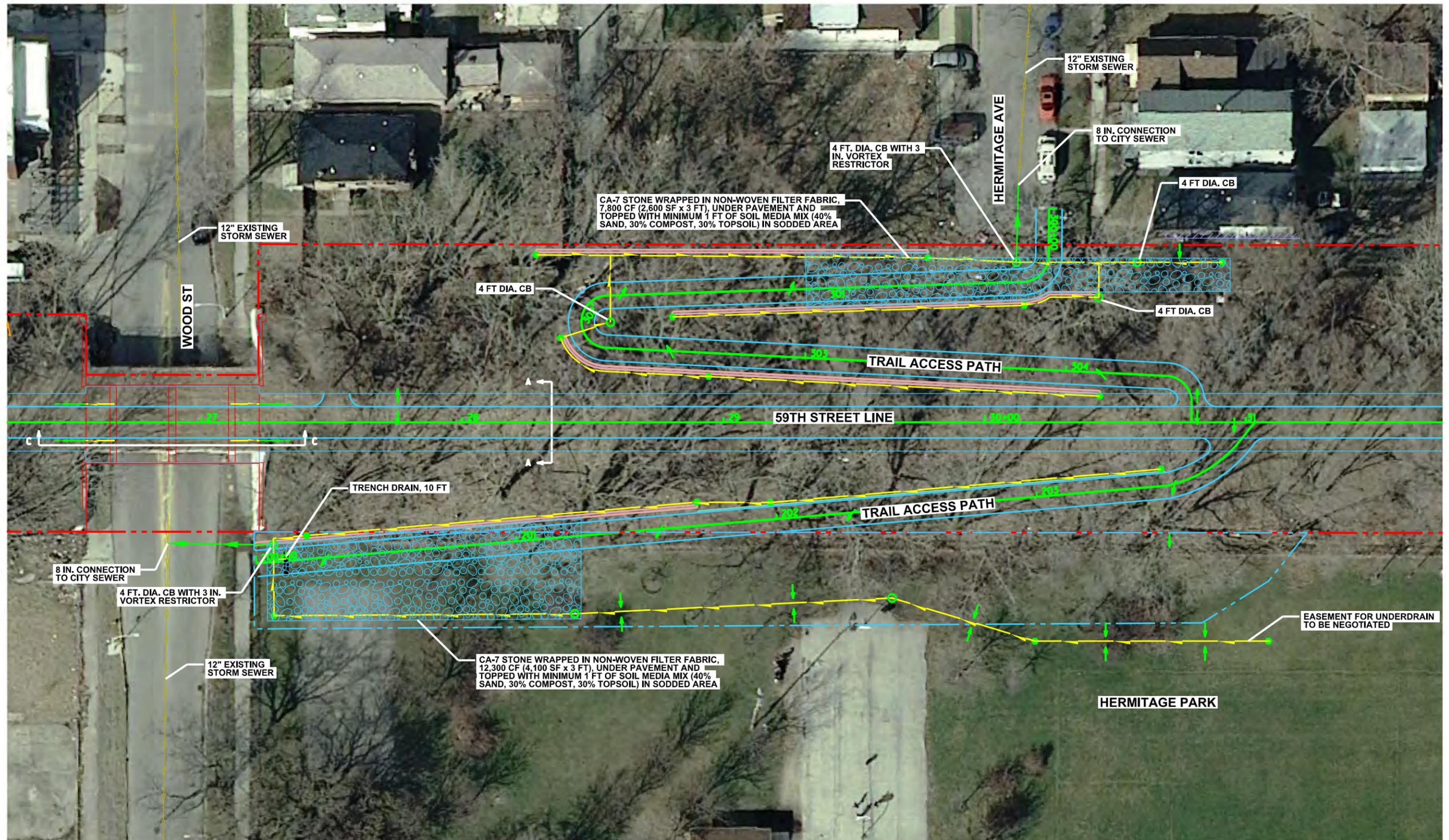
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EXHIBIT 2-00a: PROPOSED DRAINAGE PLAN
HONORE ST TO WOOD ST
 SCALE: 1" = 20' SHEET PR-5 OF 28

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
	16-E5482-00-BT	COOK	28	5

FED. ROAD DIST. NO. ILLINOIS FED. AID PROJECT



NOTES:
 1) FOR SECTION A-A AND B-B SEE EXHIBIT 2-01b SHEET 1
 2) FOR SECTION C-C SEE EXHIBIT 2-01b SHEET 2

LEGEND

	UNDERDRAIN		CATCH BASIN (CB)
	EXISTING STORM SEWER		CLEANOUT
	PROPOSED STORM SEWER		STORMWATER DETENTION FOR TRAIL ACCESS PATH
	TRENCH DRAIN		PROPOSED CURB
	FLOW DIRECTION		PROPOSED RETAINING WALL
			EXISTING RIGHT OF WAY
			PROPOSED RIGHT OF WAY

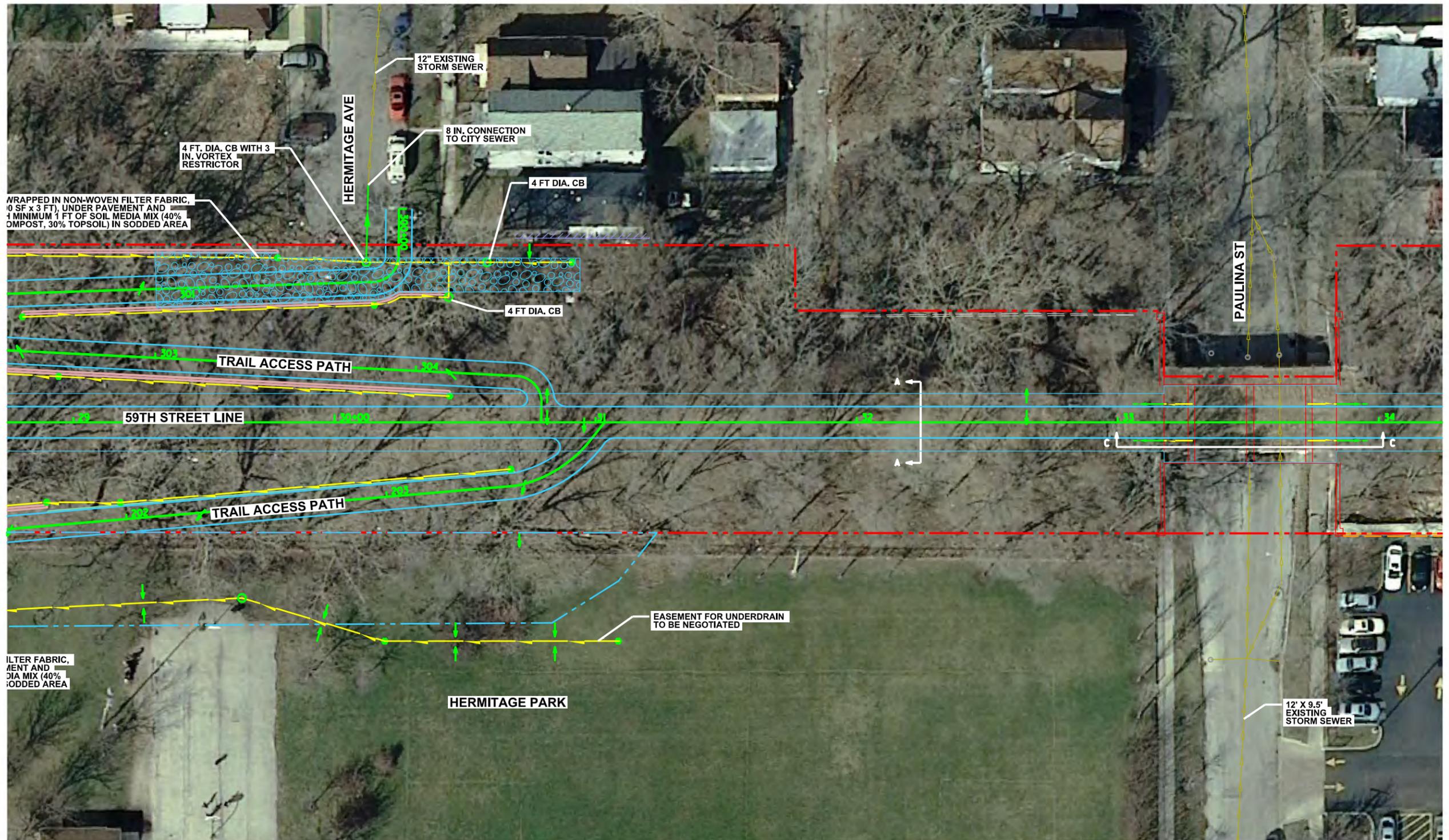
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EXHIBIT 2-00a: PROPOSED DRAINAGE PLAN
WOOD ST TO HERMITAGE AVE
 SCALE: 1" = 20' SHEET PR-6 OF 28

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
	16-E5482-00-BT	COOK	28	6

FED. ROAD DIST. NO. ILLINOIS FED. AID PROJECT



WRAPPED IN NON-WOVEN FILTER FABRIC,
10 SF x 3 FT), UNDER PAVEMENT AND
1 MINIMUM 1 FT OF SOIL MEDIA MIX (40%
COMPOST, 30% TOPSOIL) IN SODDED AREA

FILTER FABRIC,
MENT AND
DIA MIX (40%
SODDED AREA

NOTES:
1) FOR SECTION A-A AND B-B SEE EXHIBIT 2-01b SHEET 1
2) FOR SECTION C-C SEE EXHIBIT 2-01b SHEET 2

LEGEND

- ▶ UNDERDRAIN
- ▶ EXISTING STORM SEWER
- ▶ PROPOSED STORM SEWER
- TRENCH DRAIN
- FLOW DIRECTION
- CATCH BASIN (CB)
- CLEANOUT
- STORMWATER DETENTION FOR TRAIL ACCESS PATH
- PROPOSED CURB
- PROPOSED RETAINING WALL
- EXISTING RIGHT OF WAY
- PROPOSED RIGHT OF WAY

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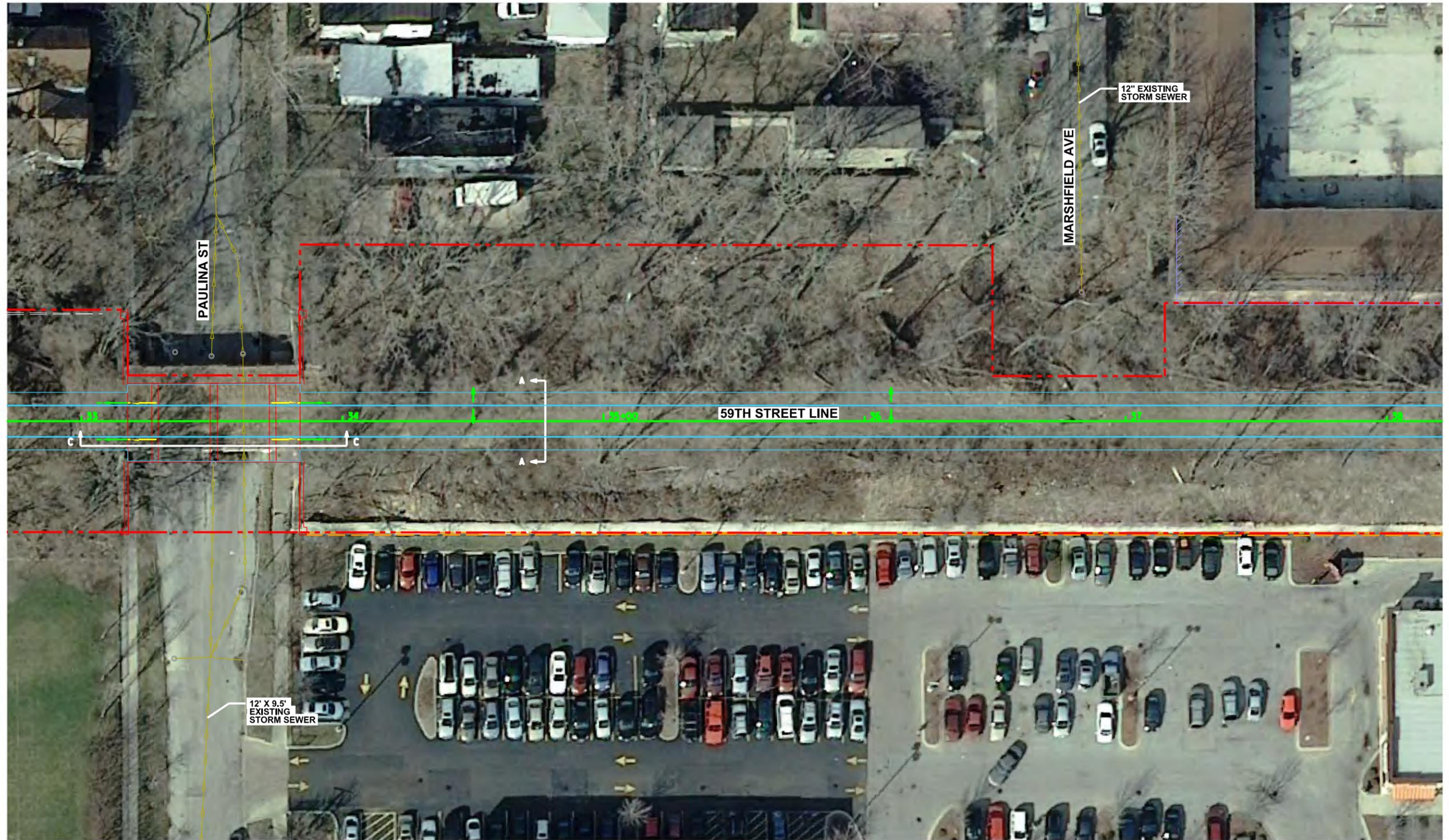
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**EXHIBIT 2-00a: PROPOSED DRAINAGE PLAN
HERMITAGE AVE TO PAULINA ST**
SCALE: 1" = 20' SHEET PR-7 OF 28

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
	16-E5482-00-BT	COOK	28	7

FED. ROAD DIST. NO. ILLINOIS FED. AID PROJECT



NOTES:
 1) FOR SECTION A-A AND B-B SEE EXHIBIT 2-01b SHEET 1
 2) FOR SECTION C-C SEE EXHIBIT 2-01b SHEET 2

LEGEND

- UNDERDRAIN
- EXISTING STORM SEWER
- PROPOSED STORM SEWER
- TRENCH DRAIN
- FLOW DIRECTION
- CATCH BASIN (CB)
- CLEANOUT
- STORMWATER DETENTION FOR TRAIL ACCESS PATH
- PROPOSED CURB
- PROPOSED RETAINING WALL
- EXISTING RIGHT OF WAY
- PROPOSED RIGHT OF WAY

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**EXHIBIT 2-00a: PROPOSED DRAINAGE PLAN
 PAULINA ST TO MARSHFIELD AVE**

SCALE: 1" = 20' SHEET PR-8 OF 28

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
	16-E5482-00-BT	COOK	28	8

FED. ROAD DIST. NO. ILLINOIS FED. AID PROJECT



NOTES:
 1) FOR SECTION A-A AND B-B SEE EXHIBIT 2-01b SHEET 1
 2) FOR SECTION C-C SEE EXHIBIT 2-01b SHEET 2

LEGEND

	UNDERDRAIN		CATCH BASIN (CB)
	EXISTING STORM SEWER		CLEANOUT
	PROPOSED STORM SEWER		STORMWATER DETENTION FOR TRAIL ACCESS PATH
	TRENCH DRAIN		PROPOSED CURB
	FLOW DIRECTION		PROPOSED RETAINING WALL
			EXISTING RIGHT OF WAY
			PROPOSED RIGHT OF WAY

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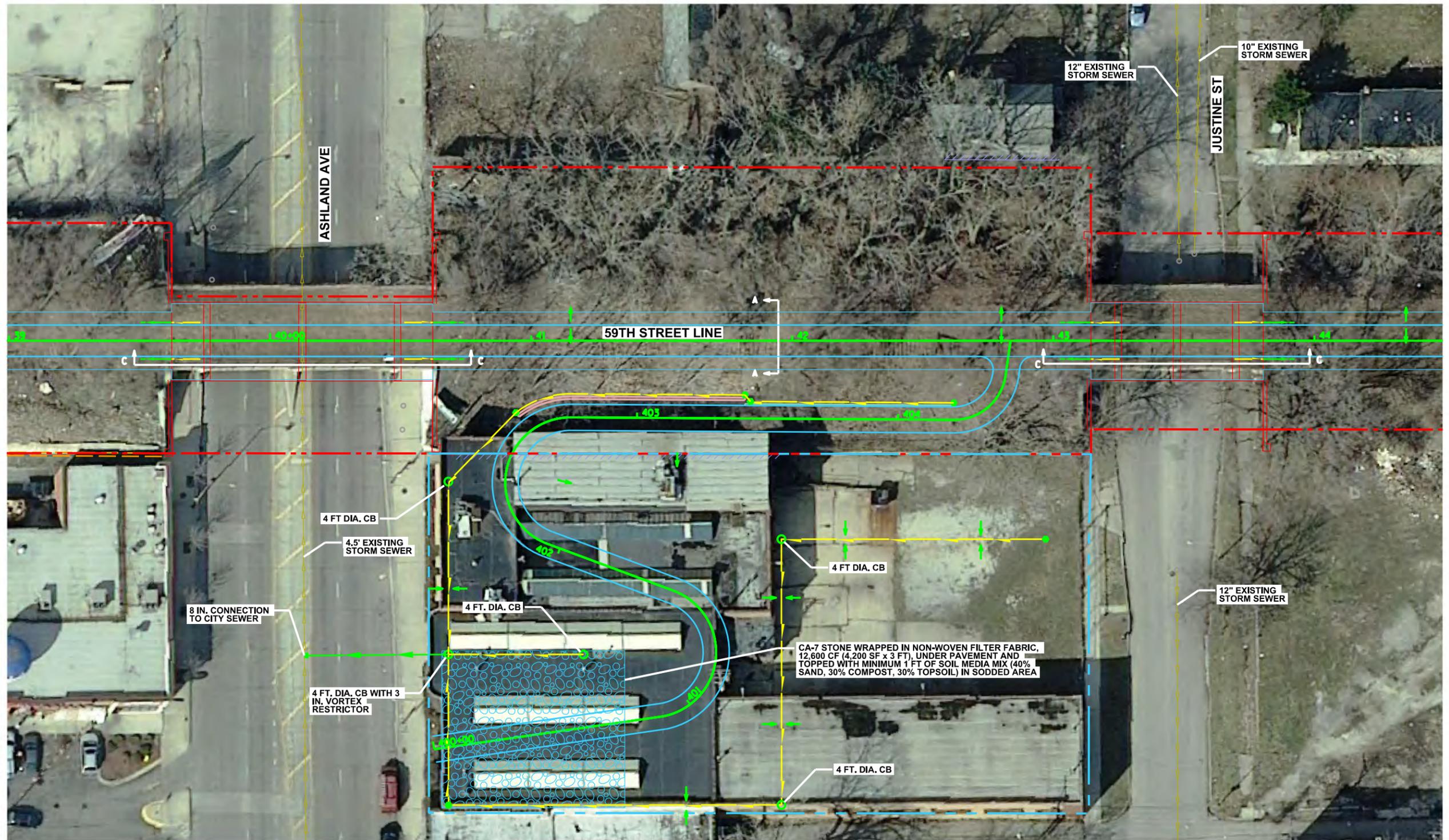
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EXHIBIT 2-00a: PROPOSED DRAINAGE PLAN MARSHFIELD AVE TO ASHLAND AVE
 SCALE: 1" = 20' SHEET PR-9 OF 28

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
	16-E5482-00-BT	COOK	28	9

FED. ROAD DIST. NO. ILLINOIS FED. AID PROJECT



NOTES:
 1) FOR SECTION A-A AND B-B SEE EXHIBIT 2-01b SHEET 1
 2) FOR SECTION C-C SEE EXHIBIT 2-01b SHEET 2

LEGEND

	UNDERDRAIN		CATCH BASIN (CB)
	EXISTING STORM SEWER		CLEANOUT
	PROPOSED STORM SEWER		STORMWATER DETENTION FOR TRAIL ACCESS PATH
	TRENCH DRAIN		PROPOSED CURB
	FLOW DIRECTION		PROPOSED RETAINING WALL
			EXISTING RIGHT OF WAY
			PROPOSED RIGHT OF WAY

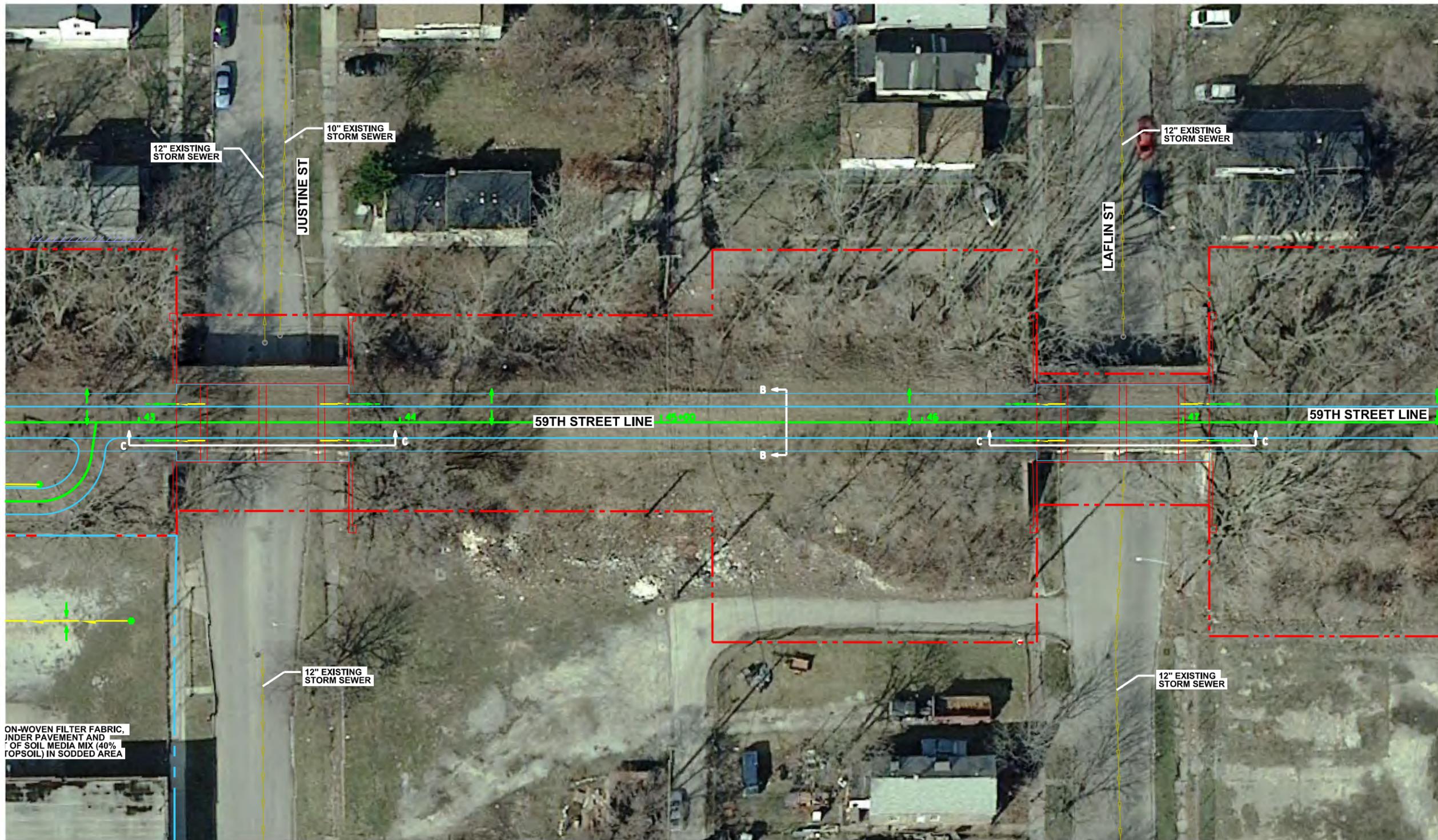
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EXHIBIT 2-00a: PROPOSED DRAINAGE PLAN
ASHLAND AVE TO JUSTINE ST
 SCALE: 1" = 20' SHEET PR-10 OF 28

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
	16-E5482-00-BT	COOK	28	10

FED. ROAD DIST. NO. ILLINOIS FED. AID PROJECT



ON-WOVEN FILTER FABRIC,
UNDER PAVEMENT AND
OF SOIL MEDIA MIX (40%
TOPSOIL) IN SODDED AREA

- NOTES:
 1) FOR SECTION A-A AND B-B SEE EXHIBIT 2-01b SHEET 1
 2) FOR SECTION C-C SEE EXHIBIT 2-01b SHEET 2

LEGEND

- UNDERDRAIN
- EXISTING STORM SEWER
- PROPOSED STORM SEWER
- TRENCH DRAIN
- FLOW DIRECTION
- CATCH BASIN (CB)
- CLEANOUT
- STORMWATER DETENTION FOR TRAIL ACCESS PATH
- PROPOSED CURB
- PROPOSED RETAINING WALL
- EXISTING RIGHT OF WAY
- PROPOSED RIGHT OF WAY

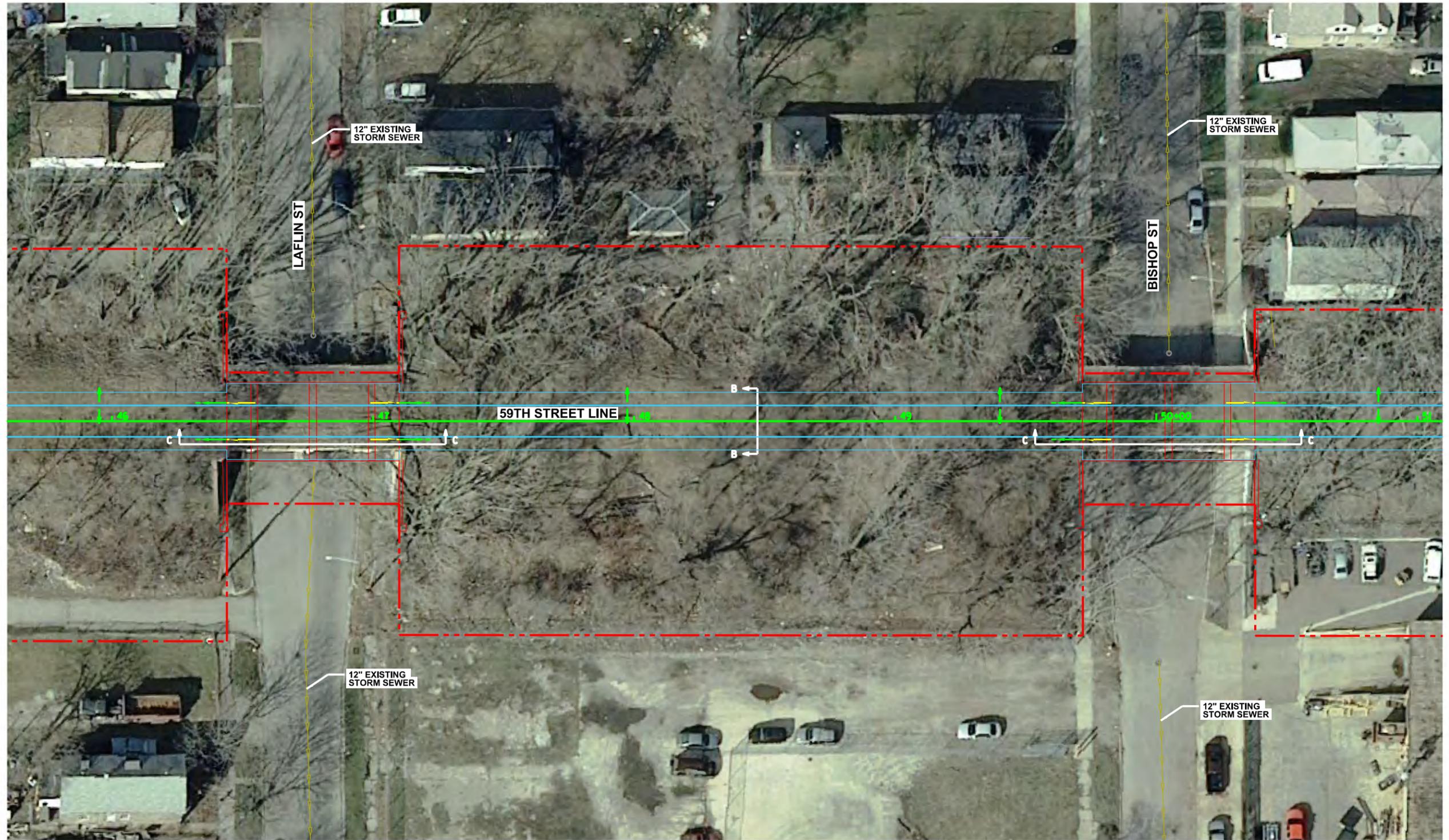
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**EXHIBIT 2-00a: PROPOSED DRAINAGE PLAN
JUSTINE ST TO LAFLIN ST**

SCALE: 1" = 20' SHEET PR-11 OF 28

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
	16-E5482-00-BT	COOK	28	11
FED. ROAD DIST. NO. ILLINOIS FED. AID PROJECT				



NOTES:
 1) FOR SECTION A-A AND B-B SEE EXHIBIT 2-01b SHEET 1
 2) FOR SECTION C-C SEE EXHIBIT 2-01b SHEET 2

LEGEND

	UNDERDRAIN		CATCH BASIN (CB)
	EXISTING STORM SEWER		CLEANOUT
	PROPOSED STORM SEWER		STORMWATER DETENTION FOR TRAIL ACCESS PATH
	TRENCH DRAIN		PROPOSED CURB
	FLOW DIRECTION		PROPOSED RETAINING WALL
			EXISTING RIGHT OF WAY
			PROPOSED RIGHT OF WAY

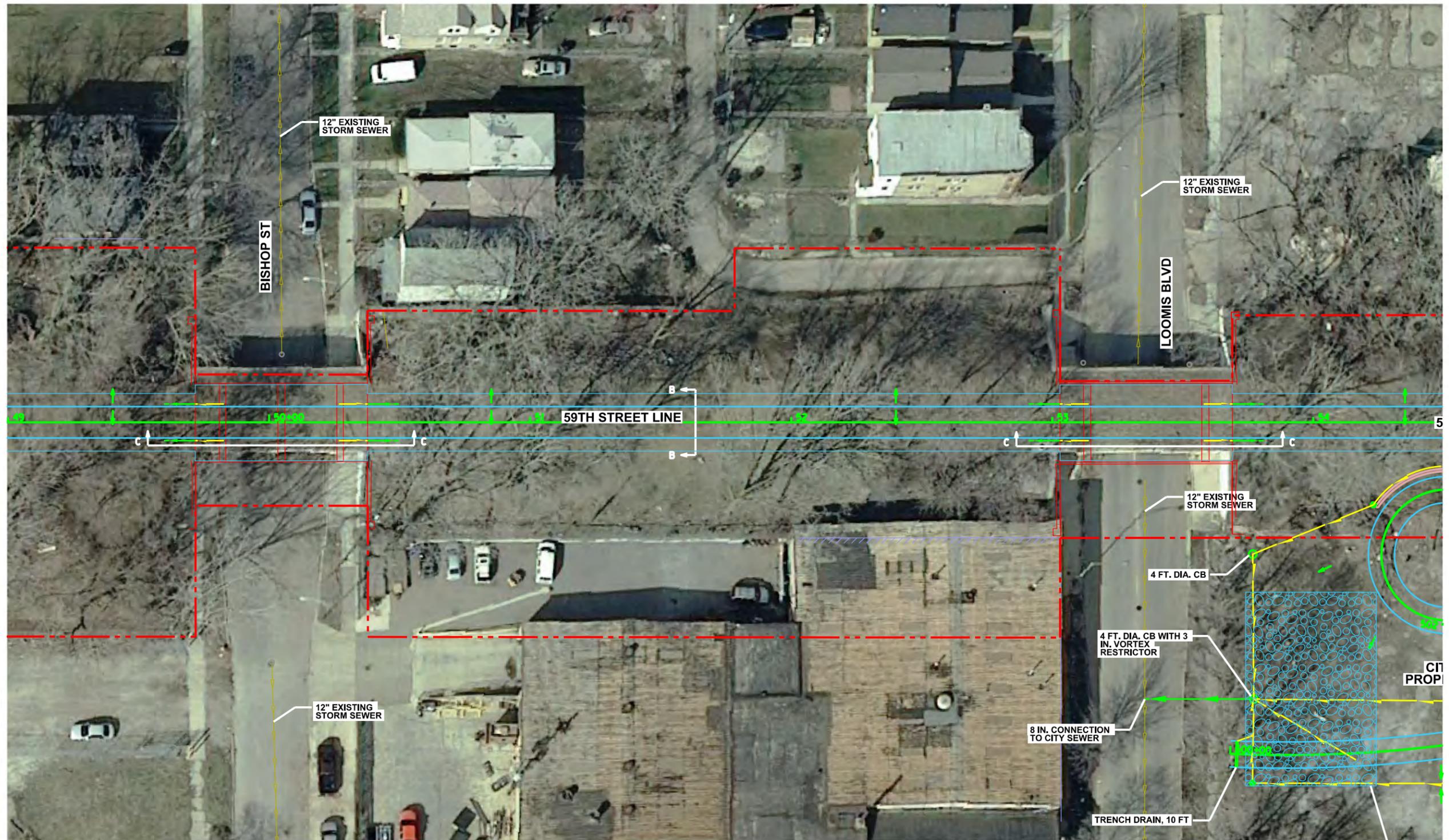
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EXHIBIT 2-00a: PROPOSED DRAINAGE PLAN
LAFLIN ST TO BISHOP ST
 SCALE: 1" = 20' SHEET PR-12 OF 28

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
	16-E5482-00-BT	COOK	28	12

FED. ROAD DIST. NO. ILLINOIS FED. AID PROJECT



NOTES:
 1) FOR SECTION A-A AND B-B SEE EXHIBIT 2-01b SHEET 1
 2) FOR SECTION C-C SEE EXHIBIT 2-01b SHEET 2

LEGEND

	UNDERDRAIN		CATCH BASIN (CB)
	EXISTING STORM SEWER		CLEANOUT
	PROPOSED STORM SEWER		STORMWATER DETENTION FOR TRAIL ACCESS PATH
	TRENCH DRAIN		PROPOSED CURB
	FLOW DIRECTION		PROPOSED RETAINING WALL
			EXISTING RIGHT OF WAY
			PROPOSED RIGHT OF WAY

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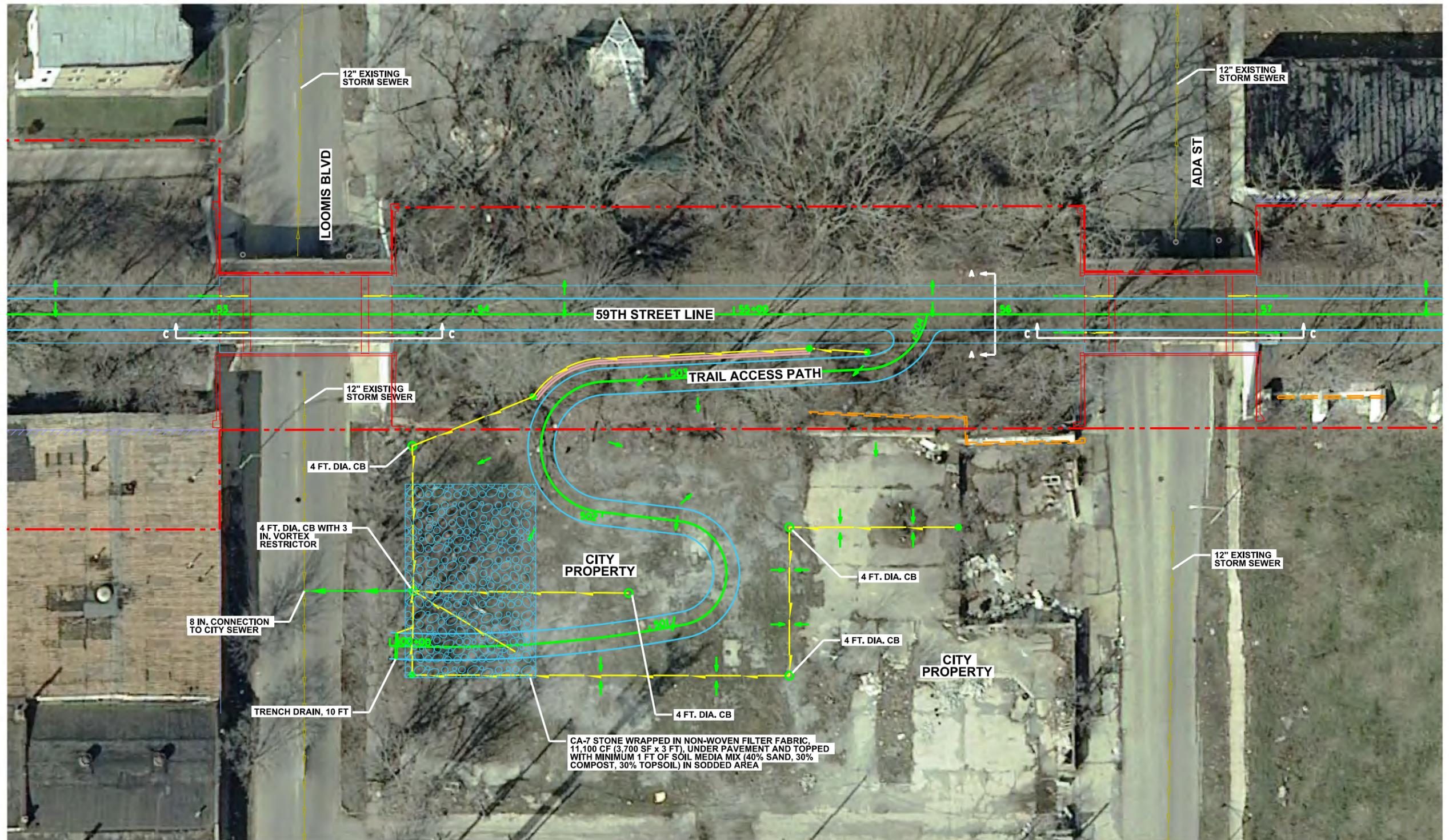
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EXHIBIT 2-00a: PROPOSED DRAINAGE PLAN
BISHOP ST TO LOOMIS BLVD
 SCALE: 1" = 20' SHEET PR-13 OF 28

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
	16-E5482-00-BT	COOK	28	13

FED. ROAD DIST. NO. ILLINOIS FED. AID PROJECT



NOTES:
 1) FOR SECTION A-A AND B-B SEE EXHIBIT 2-01b SHEET 1
 2) FOR SECTION C-C SEE EXHIBIT 2-01b SHEET 2

LEGEND	
	UNDERDRAIN
	EXISTING STORM SEWER
	PROPOSED STORM SEWER
	TRENCH DRAIN
	FLOW DIRECTION
	CATCH BASIN (CB)
	CLEANOUT
	STORMWATER DETENTION FOR TRAIL ACCESS PATH
	PROPOSED CURB
	PROPOSED RETAINING WALL
	EXISTING RIGHT OF WAY
	PROPOSED RIGHT OF WAY

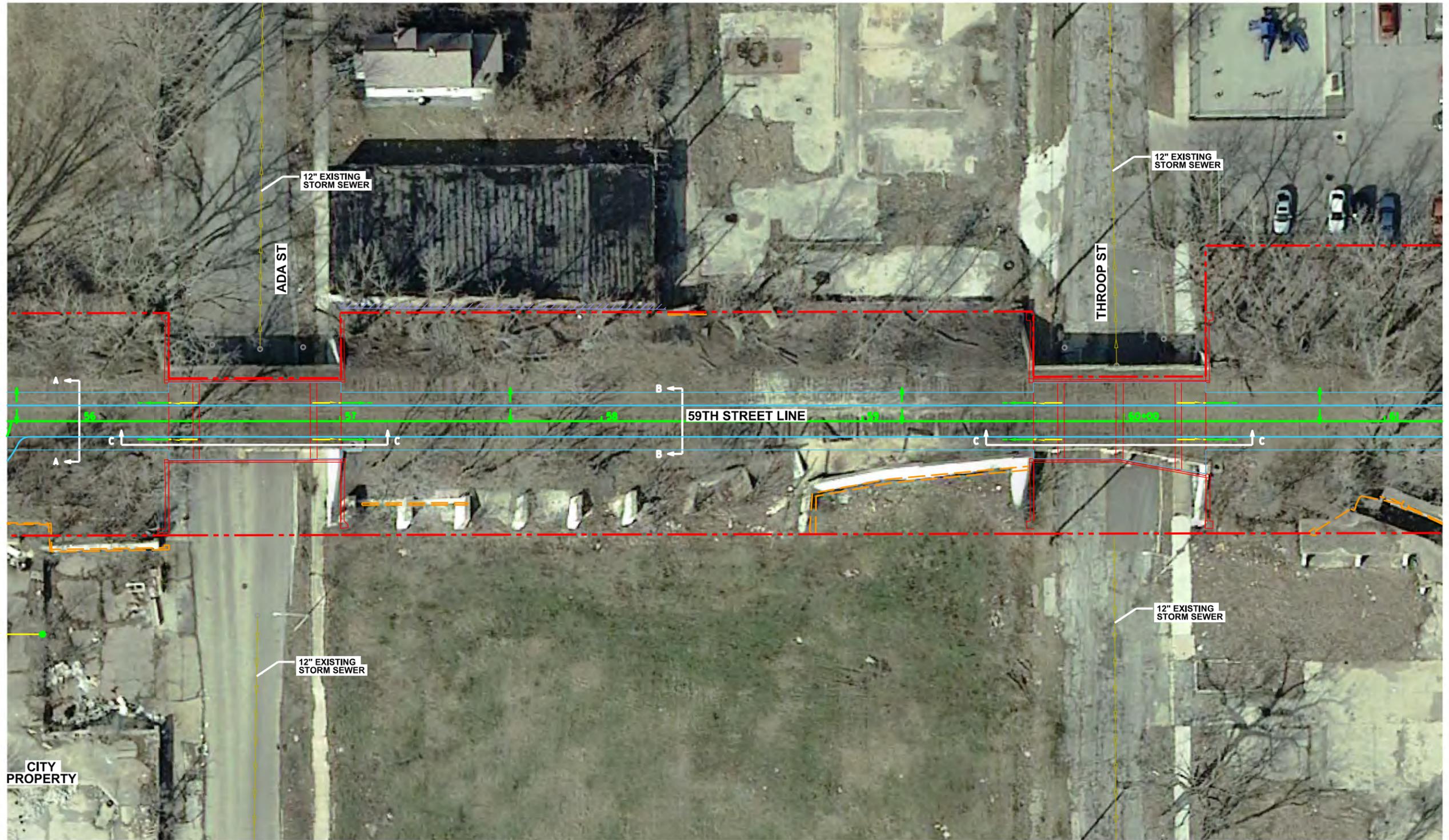
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EXHIBIT 2-00a: PROPOSED DRAINAGE PLAN
LOOMIS BLVD TO ADA ST
 SCALE: 1" = 20' SHEET PR-14 OF 28

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
	16-E5482-00-BT	COOK	28	14

FED. ROAD DIST. NO. ILLINOIS FED. AID PROJECT



NOTES:
 1) FOR SECTION A-A AND B-B SEE EXHIBIT 2-01b SHEET 1
 2) FOR SECTION C-C SEE EXHIBIT 2-01b SHEET 2

LEGEND

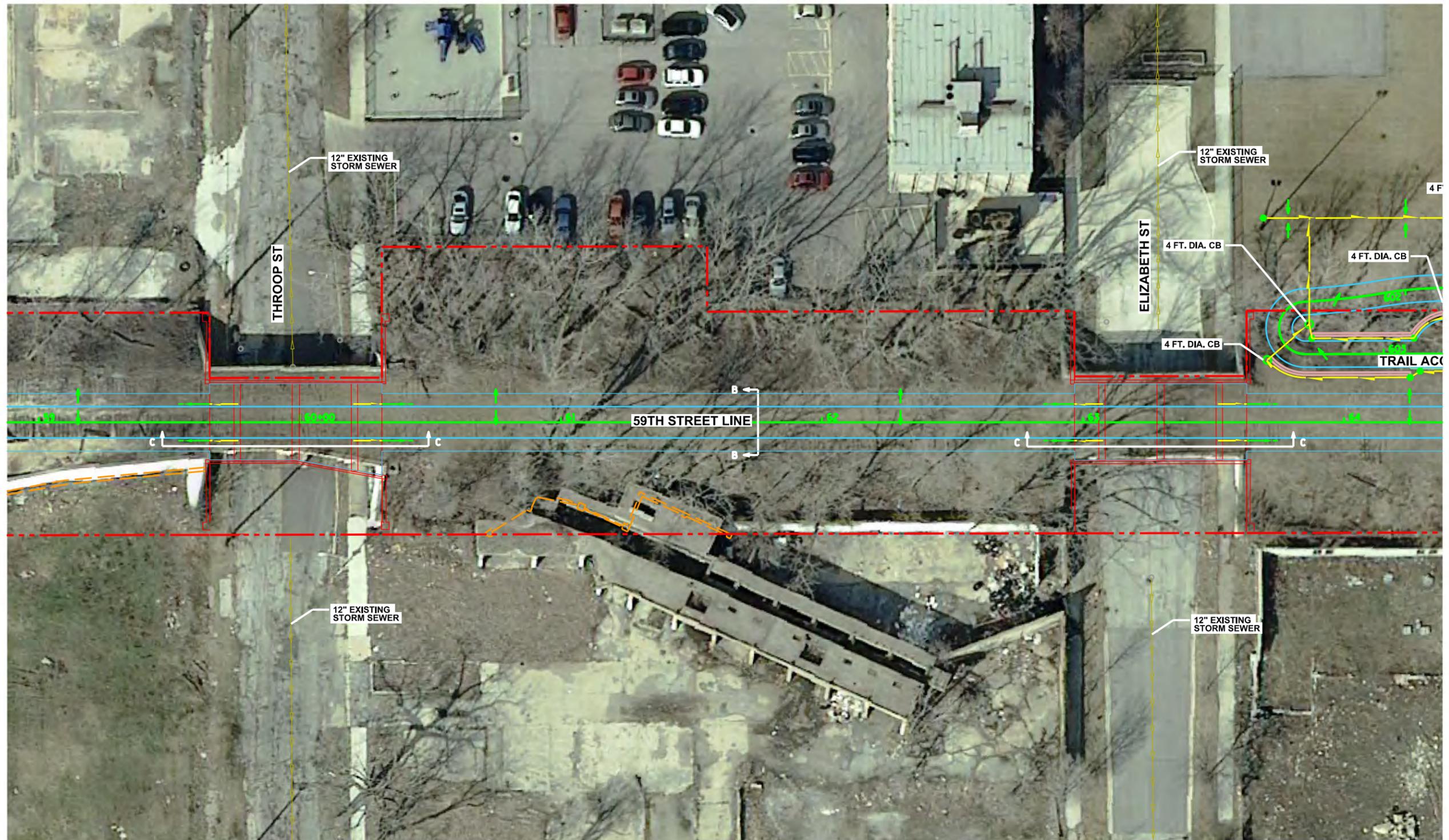
UNDERDRAIN	CATCH BASIN (CB)
EXISTING STORM SEWER	CLEANOUT
PROPOSED STORM SEWER	STORMWATER DETENTION FOR TRAIL ACCESS PATH
TRENCH DRAIN	PROPOSED CURB
FLOW DIRECTION	PROPOSED RETAINING WALL
	EXISTING RIGHT OF WAY
	PROPOSED RIGHT OF WAY

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**EXHIBIT 2-00a: PROPOSED DRAINAGE PLAN
 ADA ST TO THROOP ST**
 SCALE: 1" = 20' SHEET PR-15 OF 28

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
	16-E5482-00-BT	COOK	28	15
FED. ROAD DIST. NO. ILLINOIS FED. AID PROJECT				



NOTES:
 1) FOR SECTION A-A AND B-B SEE EXHIBIT 2-01b SHEET 1
 2) FOR SECTION C-C SEE EXHIBIT 2-01b SHEET 2

LEGEND

- UNDERDRAIN
- EXISTING STORM SEWER
- PROPOSED STORM SEWER
- TRENCH DRAIN
- FLOW DIRECTION
- CATCH BASIN (CB)
- CLEANOUT
- STORMWATER DETENTION FOR TRAIL ACCESS PATH
- PROPOSED CURB
- PROPOSED RETAINING WALL
- EXISTING RIGHT OF WAY
- PROPOSED RIGHT OF WAY

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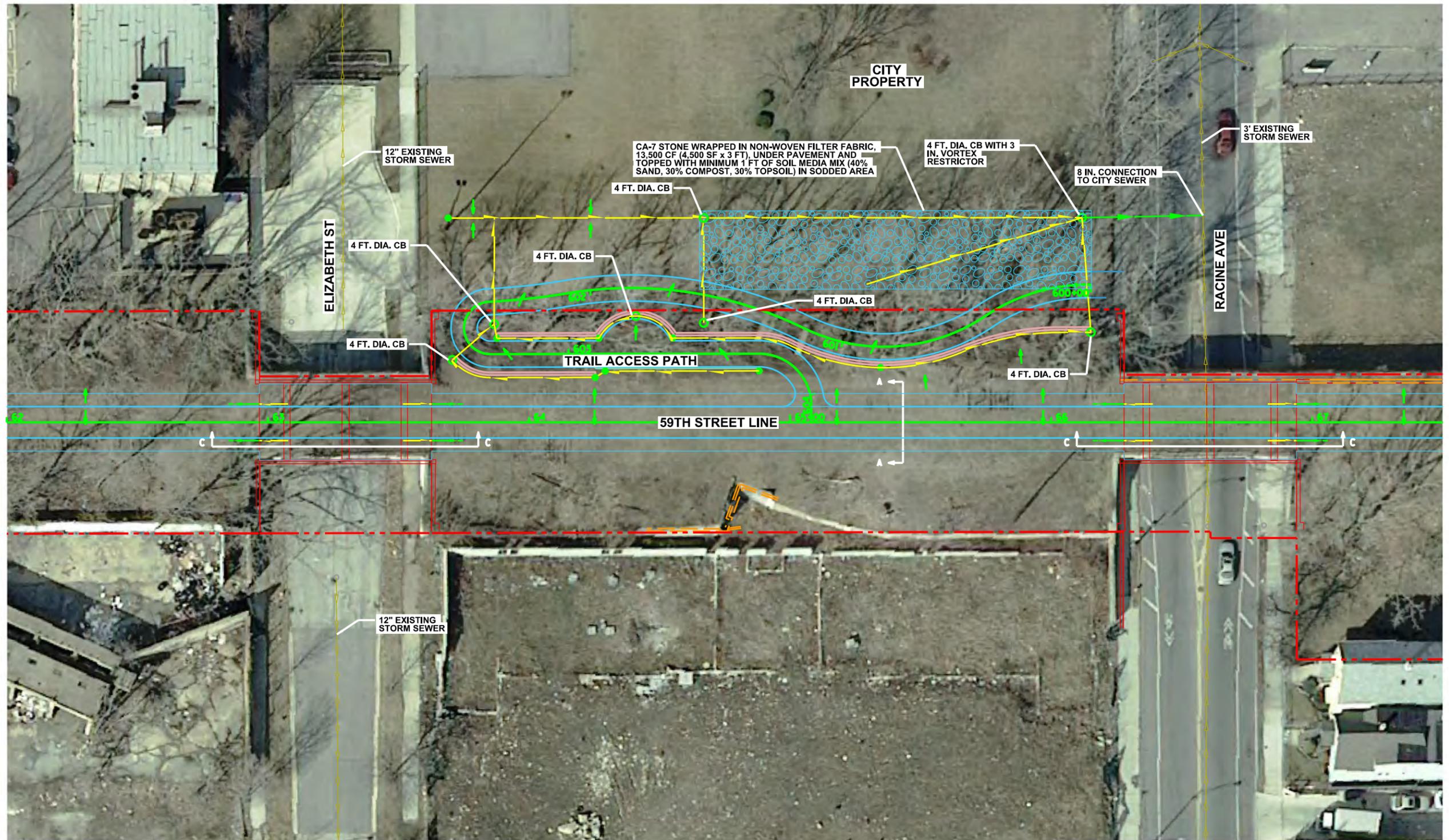


EXHIBIT 2-00a: PROPOSED DRAINAGE PLAN
THROOP ST TO ELIZABETH ST

SCALE: 1" = 20' SHEET PR-16 OF 28

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
	16-E5482-00-BT	COOK	28	16

FED. ROAD DIST. NO. ILLINOIS FED. AID PROJECT



NOTES:
 1) FOR SECTION A-A AND B-B SEE EXHIBIT 2-01b SHEET 1
 2) FOR SECTION C-C SEE EXHIBIT 2-01b SHEET 2

LEGEND

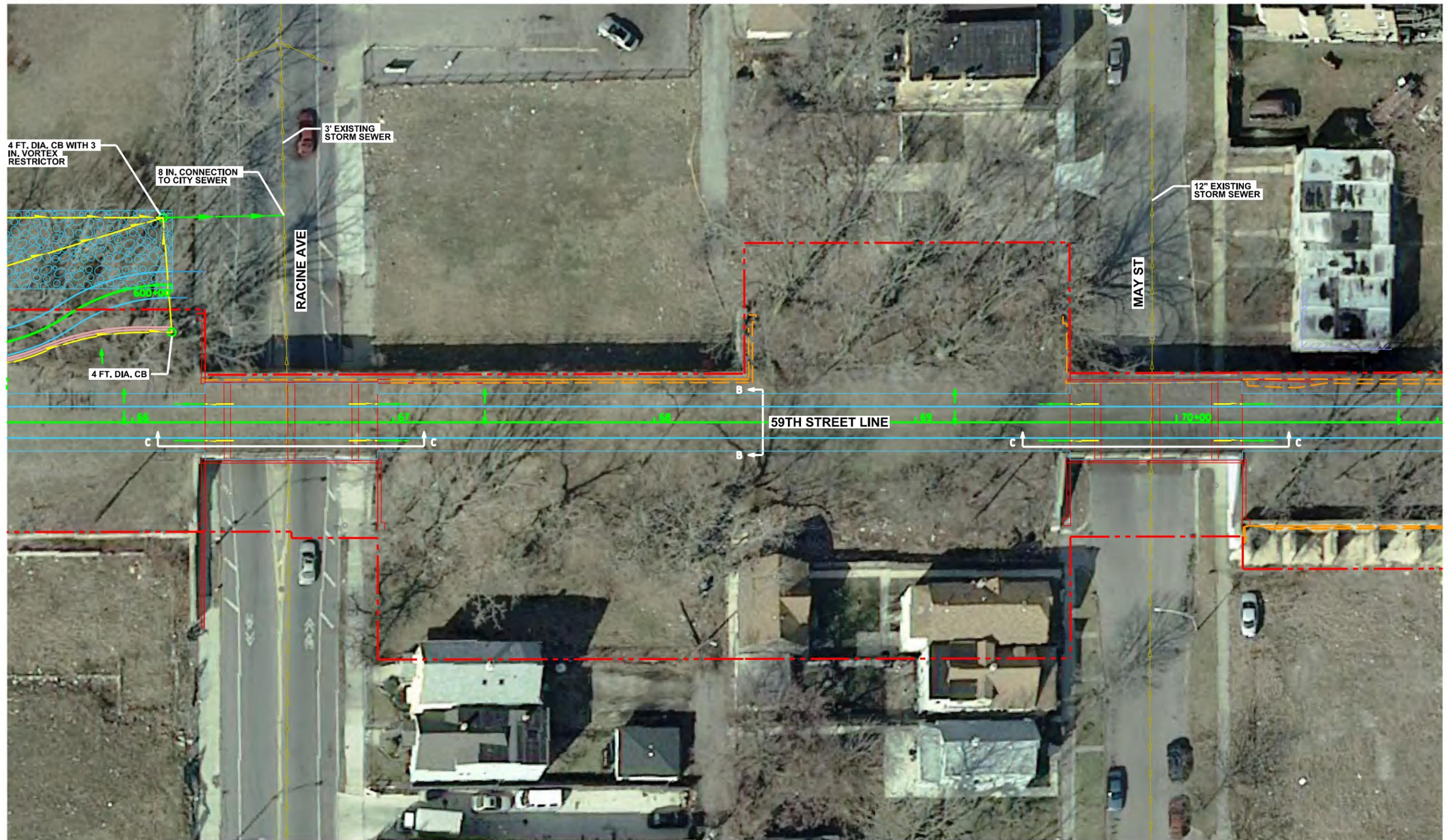
	UNDERDRAIN		CATCH BASIN (CB)
	EXISTING STORM SEWER		CLEANOUT
	PROPOSED STORM SEWER		STORMWATER DETENTION FOR TRAIL ACCESS PATH
	TRENCH DRAIN		PROPOSED CURB
	FLOW DIRECTION		PROPOSED RETAINING WALL
			EXISTING RIGHT OF WAY
			PROPOSED RIGHT OF WAY

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EXHIBIT 2-00a: PROPOSED DRAINAGE PLAN
ELIZABETH ST TO RACINE AVE
 SCALE: 1" = 20' SHEET PR-17 OF 28

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
	16-E5482-00-BT	COOK	28	17
FED. ROAD DIST. NO. ILLINOIS FED. AID PROJECT				



NOTES:
 1) FOR SECTION A-A AND B-B SEE EXHIBIT 2-01b SHEET 1
 2) FOR SECTION C-C SEE EXHIBIT 2-01b SHEET 2

LEGEND	
	UNDERDRAIN
	EXISTING STORM SEWER
	PROPOSED STORM SEWER
	TRENCH DRAIN
	FLOW DIRECTION
	CATCH BASIN (CB)
	CLEANOUT
	STORMWATER DETENTION FOR TRAIL ACCESS PATH
	PROPOSED CURB
	PROPOSED RETAINING WALL
	EXISTING RIGHT OF WAY
	PROPOSED RIGHT OF WAY

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EXHIBIT 2-00a: PROPOSED DRAINAGE PLAN
RACINE AVE TO MAY ST
 SCALE: 1" = 20' SHEET PR-18 OF 28

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
	16-E5482-00-BT	COOK	28	18

FED. ROAD DIST. NO. ILLINOIS FED. AID PROJECT



NOTES:
 1) FOR SECTION A-A AND B-B SEE EXHIBIT 2-01b SHEET 1
 2) FOR SECTION C-C SEE EXHIBIT 2-01b SHEET 2

LEGEND

	UNDERDRAIN		CATCH BASIN (CB)
	EXISTING STORM SEWER		CLEANOUT
	PROPOSED STORM SEWER		STORMWATER DETENTION FOR TRAIL ACCESS PATH
	TRENCH DRAIN		PROPOSED CURB
	FLOW DIRECTION		PROPOSED RETAINING WALL
			EXISTING RIGHT OF WAY
			PROPOSED RIGHT OF WAY

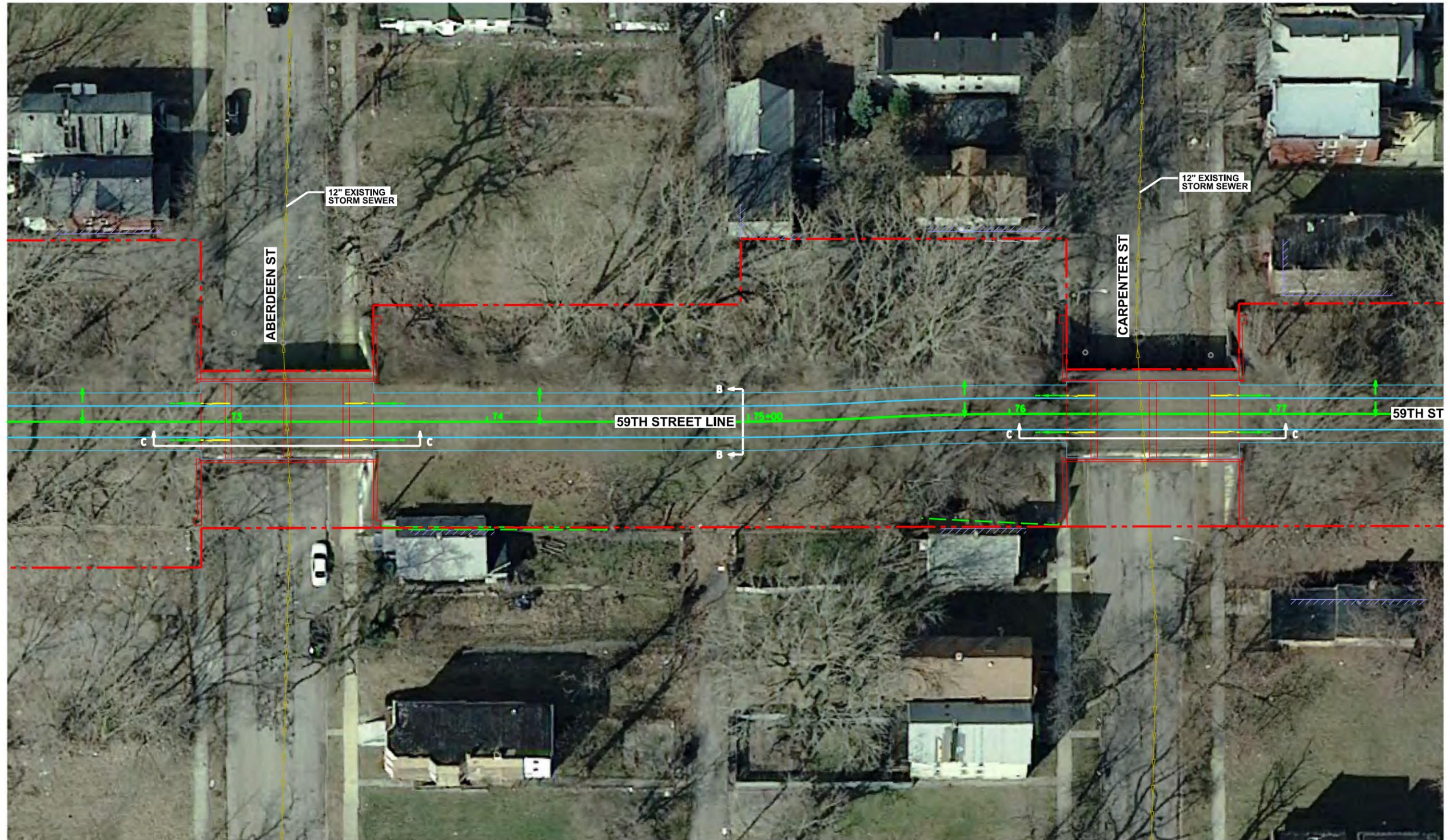
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**EXHIBIT 2-00a: PROPOSED DRAINAGE PLAN
 MAY ST TO ABERDEEN ST**
 SCALE: 1" = 20' SHEET PR-19 OF 28

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
	16-E5482-00-BT	COOK	28	19

FED. ROAD DIST. NO. ILLINOIS FED. AID PROJECT



NOTES:
 1) FOR SECTION A-A AND B-B SEE EXHIBIT 2-01b SHEET 1
 2) FOR SECTION C-C SEE EXHIBIT 2-01b SHEET 2

LEGEND	
	UNDERDRAIN
	EXISTING STORM SEWER
	PROPOSED STORM SEWER
	TRENCH DRAIN
	FLOW DIRECTION
	CATCH BASIN (CB)
	CLEANOUT
	STORMWATER DETENTION FOR TRAIL ACCESS PATH
	PROPOSED CURB
	PROPOSED RETAINING WALL
	EXISTING RIGHT OF WAY
	PROPOSED RIGHT OF WAY

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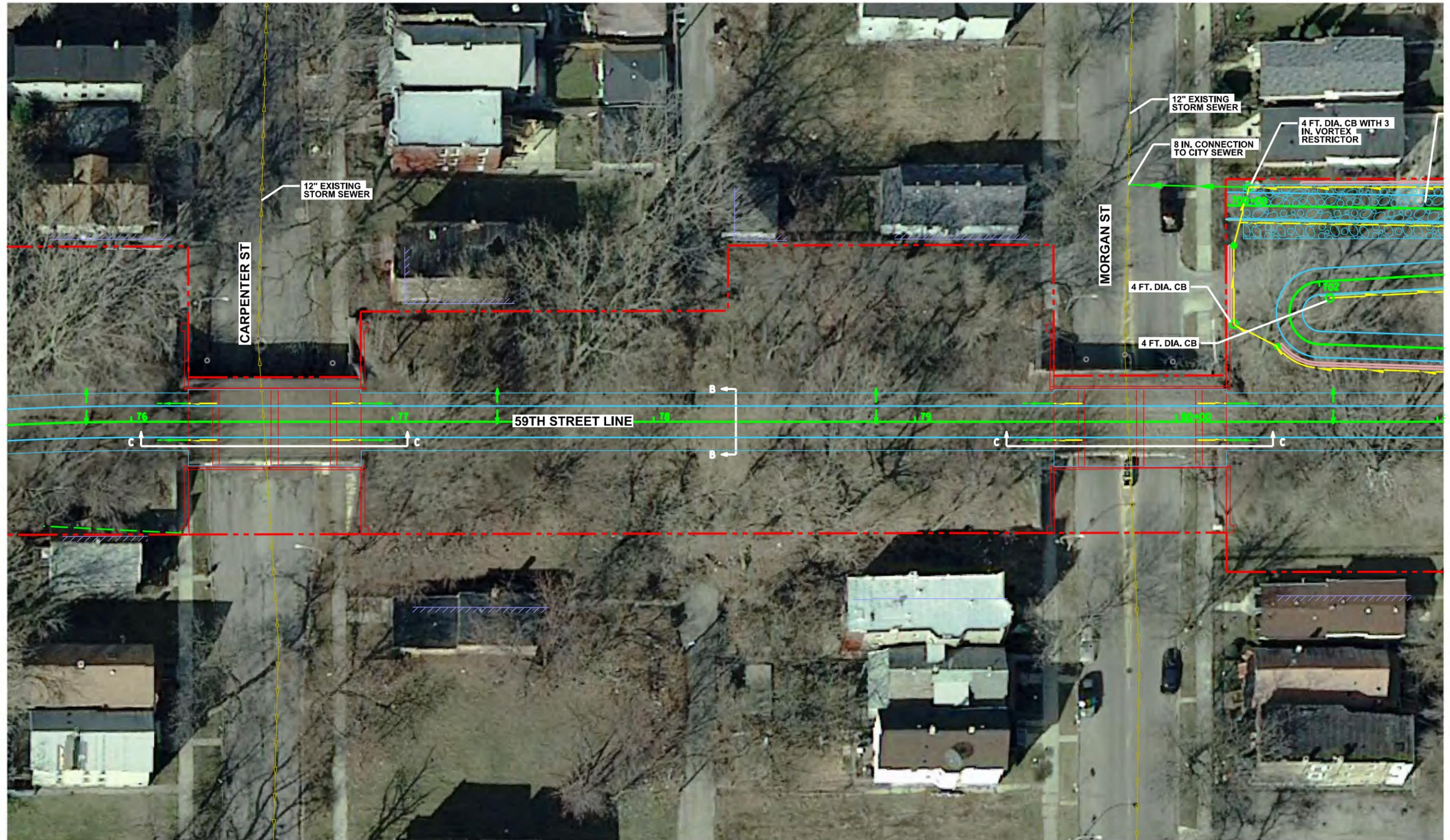
REVISOR	REVISION

CDOT CHICAGO DEPARTMENT OF TRANSPORTATION

EXHIBIT 2-00a: PROPOSED DRAINAGE PLAN
ABERDEEN ST TO CARPENTER ST
 SCALE: 1" = 20' SHEET PR-20 OF 28

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
	16-E5482-00-BT	COOK	28	20

FED. ROAD DIST. NO. ILLINOIS FED. AID PROJECT



NOTES:
 1) FOR SECTION A-A AND B-B SEE EXHIBIT 2-01b SHEET 1
 2) FOR SECTION C-C SEE EXHIBIT 2-01b SHEET 2

LEGEND

UNDERDRAIN	CATCH BASIN (CB)
EXISTING STORM SEWER	CLEANOUT
PROPOSED STORM SEWER	STORMWATER DETENTION FOR TRAIL ACCESS PATH
TRENCH DRAIN	PROPOSED CURB
FLOW DIRECTION	PROPOSED RETAINING WALL
	EXISTING RIGHT OF WAY
	PROPOSED RIGHT OF WAY

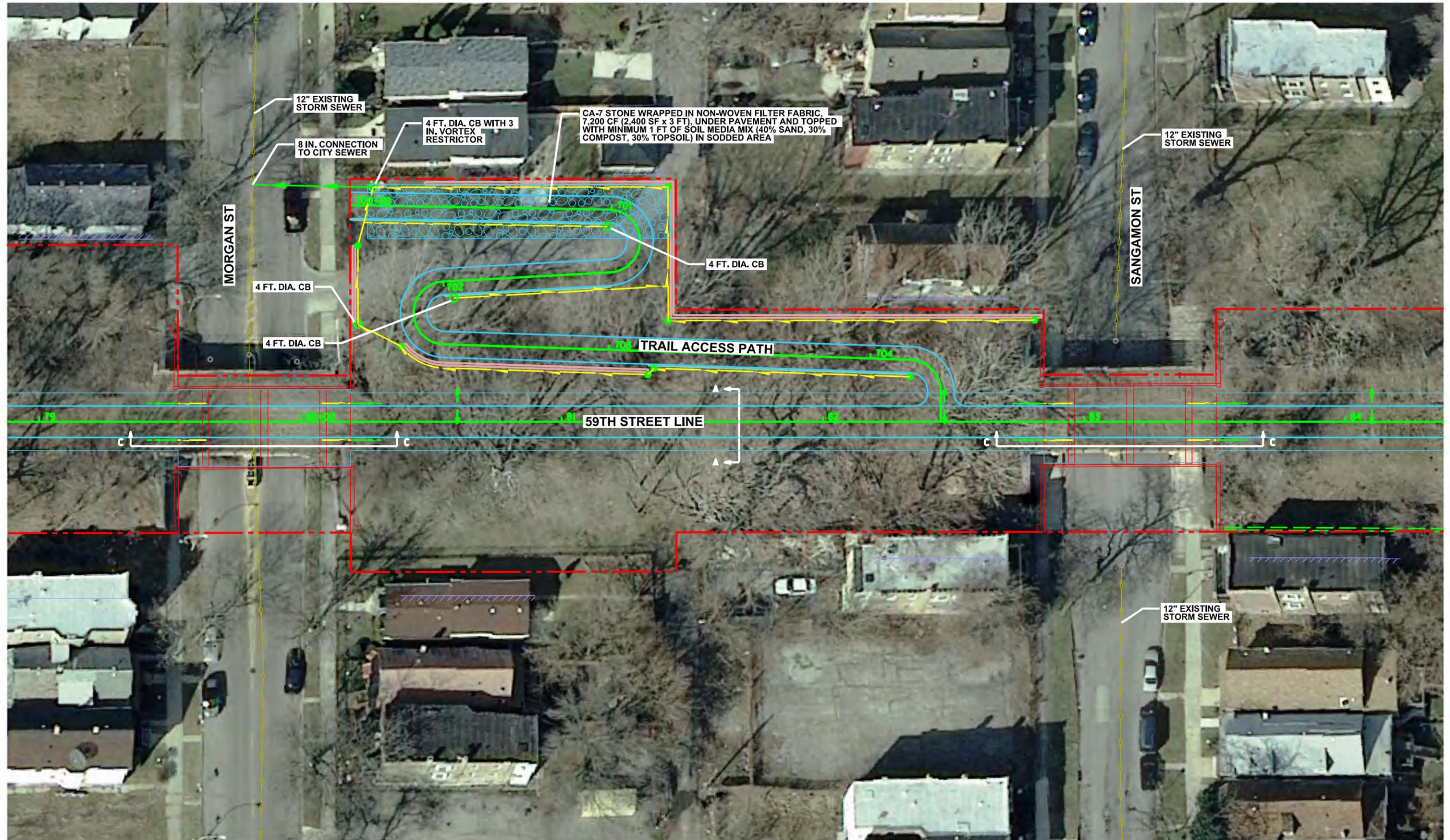
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**EXHIBIT 2-00a: PROPOSED DRAINAGE PLAN
 CARPENTER ST TO MORGAN ST**
 SCALE: 1" = 20' SHEET PR-21 OF 28

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
	16-E5482-00-BT	COOK	28	21

FED. ROAD DIST. NO. ILLINOIS FED. AID PROJECT



NOTES:
 1) FOR SECTION A-A AND B-B SEE EXHIBIT 2-01b SHEET 1
 2) FOR SECTION C-C SEE EXHIBIT 2-01b SHEET 2

LEGEND

	UNDERDRAIN		CATCH BASIN (CB)
	EXISTING STORM SEWER		CLEANOUT
	PROPOSED STORM SEWER		STORMWATER DETENTION FOR TRAIL ACCESS PATH
	TRENCH DRAIN		PROPOSED CURB
	FLOW DIRECTION		PROPOSED RETAINING WALL
			EXISTING RIGHT OF WAY
			PROPOSED RIGHT OF WAY

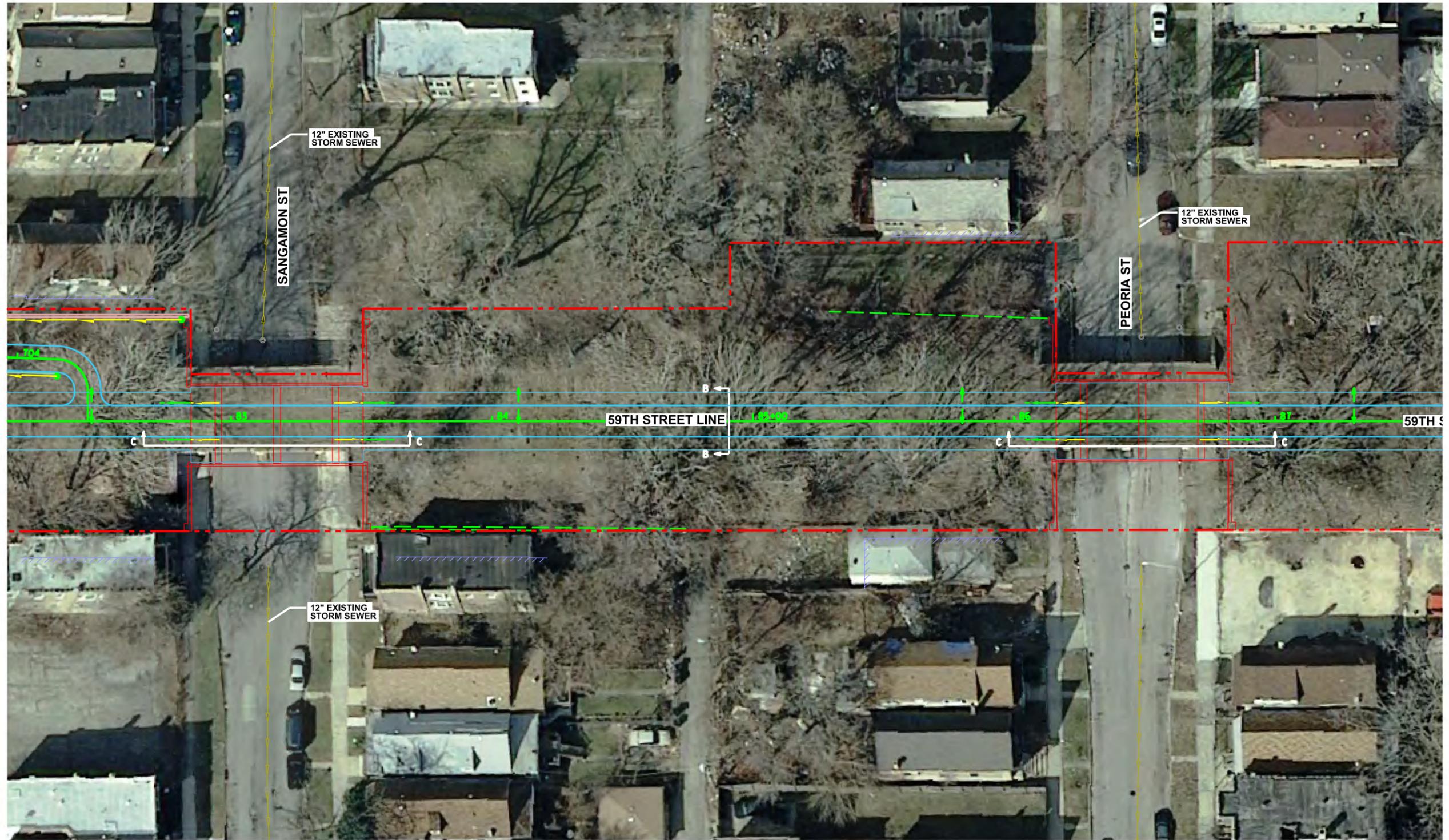
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EXHIBIT 2-00a: PROPOSED DRAINAGE PLAN
MORGAN ST TO SANGAMON ST
 SCALE: 1" = 20' SHEET PR-22 OF 28

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
	16-E5482-00-BT	COOK	28	22

FED. ROAD DIST. NO. ILLINOIS FED. AID PROJECT



NOTES:
 1) FOR SECTION A-A AND B-B SEE EXHIBIT 2-01b SHEET 1
 2) FOR SECTION C-C SEE EXHIBIT 2-01b SHEET 2

LEGEND

- UNDERDRAIN
- EXISTING STORM SEWER
- PROPOSED STORM SEWER
- TRENCH DRAIN
- FLOW DIRECTION
- CATCH BASIN (CB)
- CLEANOUT
- STORMWATER DETENTION FOR TRAIL ACCESS PATH
- PROPOSED CURB
- PROPOSED RETAINING WALL
- EXISTING RIGHT OF WAY
- PROPOSED RIGHT OF WAY

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	PLOT DATE =	DATE - 08/11/2017	REVISED -	REVISED -



**EXHIBIT 2-00a: PROPOSED DRAINAGE PLAN
 SANGAMON ST TO PEORIA ST**

SCALE: 1" = 20' SHEET PR-23 OF 28

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
	16-E5482-00-BT	COOK	28	23
FED. ROAD DIST. NO. ILLINOIS FED. AID PROJECT				



4 FT.

12" EXISTING STORM SEWER

12" EXISTING STORM SEWER

PEORIA ST

GREEN ST

59TH STREET LINE

TRAIL ACCESS

CA-7 STONE WRAPPED IN 5,400 CF (1,800 SF X 3 FT), TOPPED WITH MINIMUM 1" SAND, 30% COMPOST, 30%

12" EXISTING STORM SEWER

NOTES:
 1) FOR SECTION A-A AND B-B SEE EXHIBIT 2-01b SHEET 1
 2) FOR SECTION C-C SEE EXHIBIT 2-01b SHEET 2

LEGEND

- UNDERDRAIN
- EXISTING STORM SEWER
- PROPOSED STORM SEWER
- TRENCH DRAIN
- FLOW DIRECTION
- CATCH BASIN (CB)
- CLEANOUT
- STORMWATER DETENTION FOR TRAIL ACCESS PATH
- PROPOSED CURB
- PROPOSED RETAINING WALL
- EXISTING RIGHT OF WAY
- PROPOSED RIGHT OF WAY

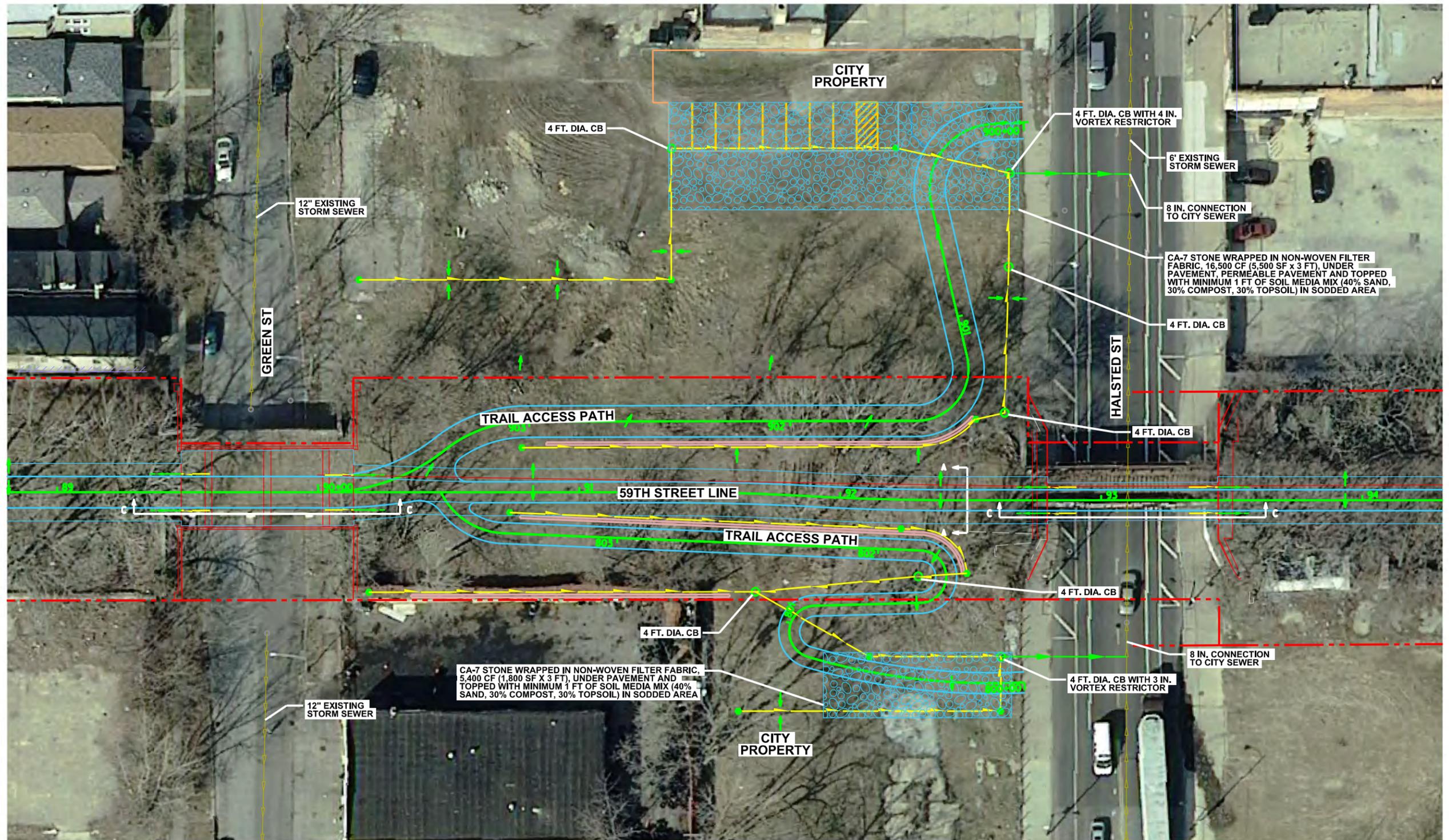
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EXHIBIT 2-00a: PROPOSED DRAINAGE PLAN
PEORIA ST TO GREEN ST
 SCALE: 1" = 20' SHEET PR-24 OF 28

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
	16-E5482-00-BT	COOK	28	24

FED. ROAD DIST. NO. ILLINOIS FED. AID PROJECT



NOTES:
 1) FOR SECTION A-A AND B-B SEE EXHIBIT 2-01b SHEET 1
 2) FOR SECTION C-C SEE EXHIBIT 2-01b SHEET 2

LEGEND

	UNDERDRAIN		CATCH BASIN (CB)
	EXISTING STORM SEWER		CLEANOUT
	PROPOSED STORM SEWER		STORMWATER DETENTION FOR TRAIL ACCESS PATH
	TRENCH DRAIN		PROPOSED CURB
	FLOW DIRECTION		PROPOSED RETAINING WALL
			EXISTING RIGHT OF WAY
			PROPOSED RIGHT OF WAY

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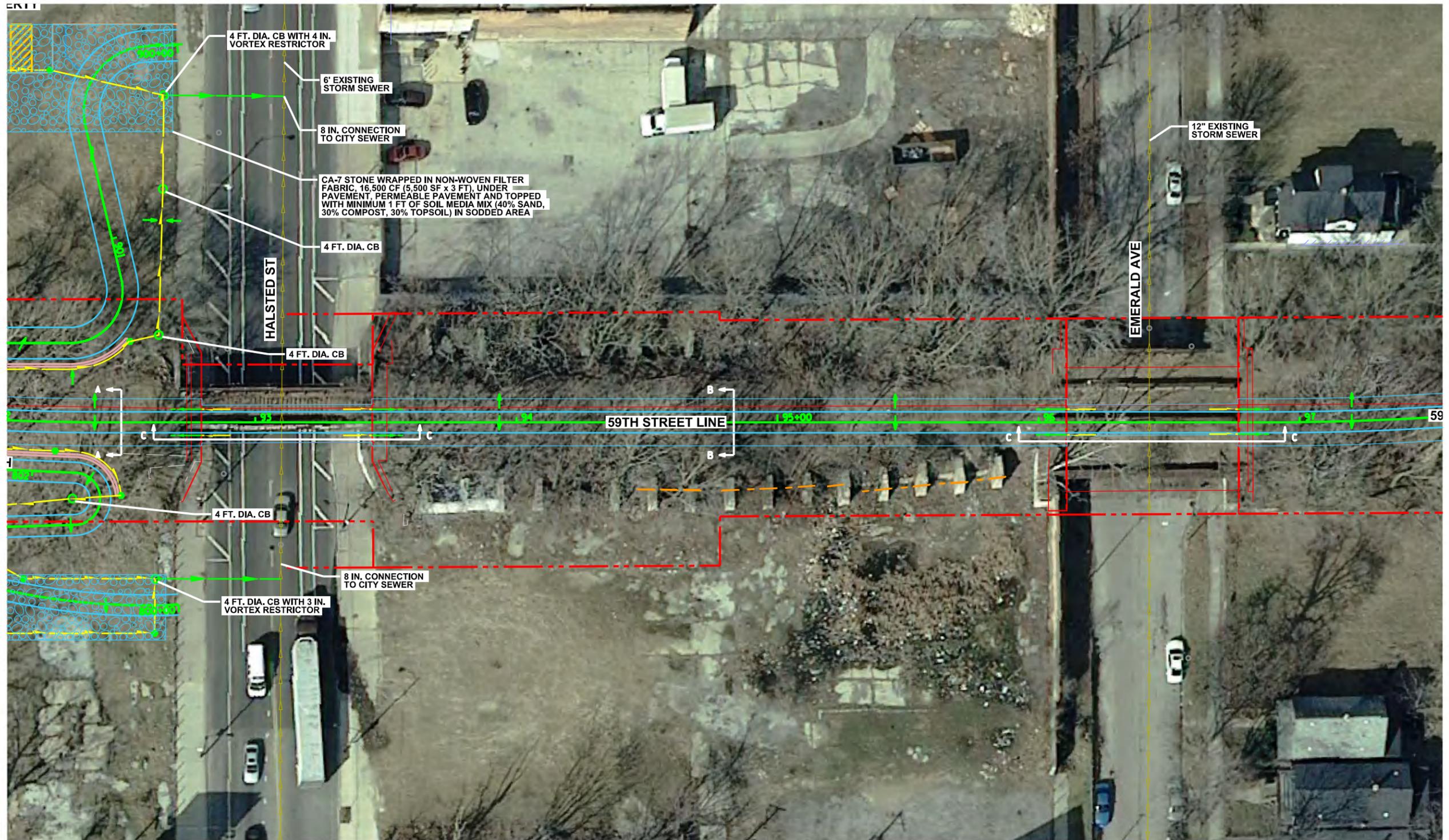
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PLOT DATE =	DATE - 08/11/2017	REVISED -

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EXHIBIT 2-00a: PROPOSED DRAINAGE PLAN
GREEN ST TO HALSTED ST
 SCALE: 1" = 20' SHEET PR-25 OF 28

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
	16-E5482-00-BT	COOK	28	25

FED. ROAD DIST. NO. ILLINOIS FED. AID PROJECT



NOTES:
 1) FOR SECTION A-A AND B-B SEE EXHIBIT 2-01b SHEET 1
 2) FOR SECTION C-C SEE EXHIBIT 2-01b SHEET 2

LEGEND

	UNDERDRAIN		CATCH BASIN (CB)
	EXISTING STORM SEWER		CLEANOUT
	PROPOSED STORM SEWER		STORMWATER DETENTION FOR TRAIL ACCESS PATH
	TRENCH DRAIN		PROPOSED CURB
	FLOW DIRECTION		PROPOSED RETAINING WALL
			EXISTING RIGHT OF WAY
			PROPOSED RIGHT OF WAY

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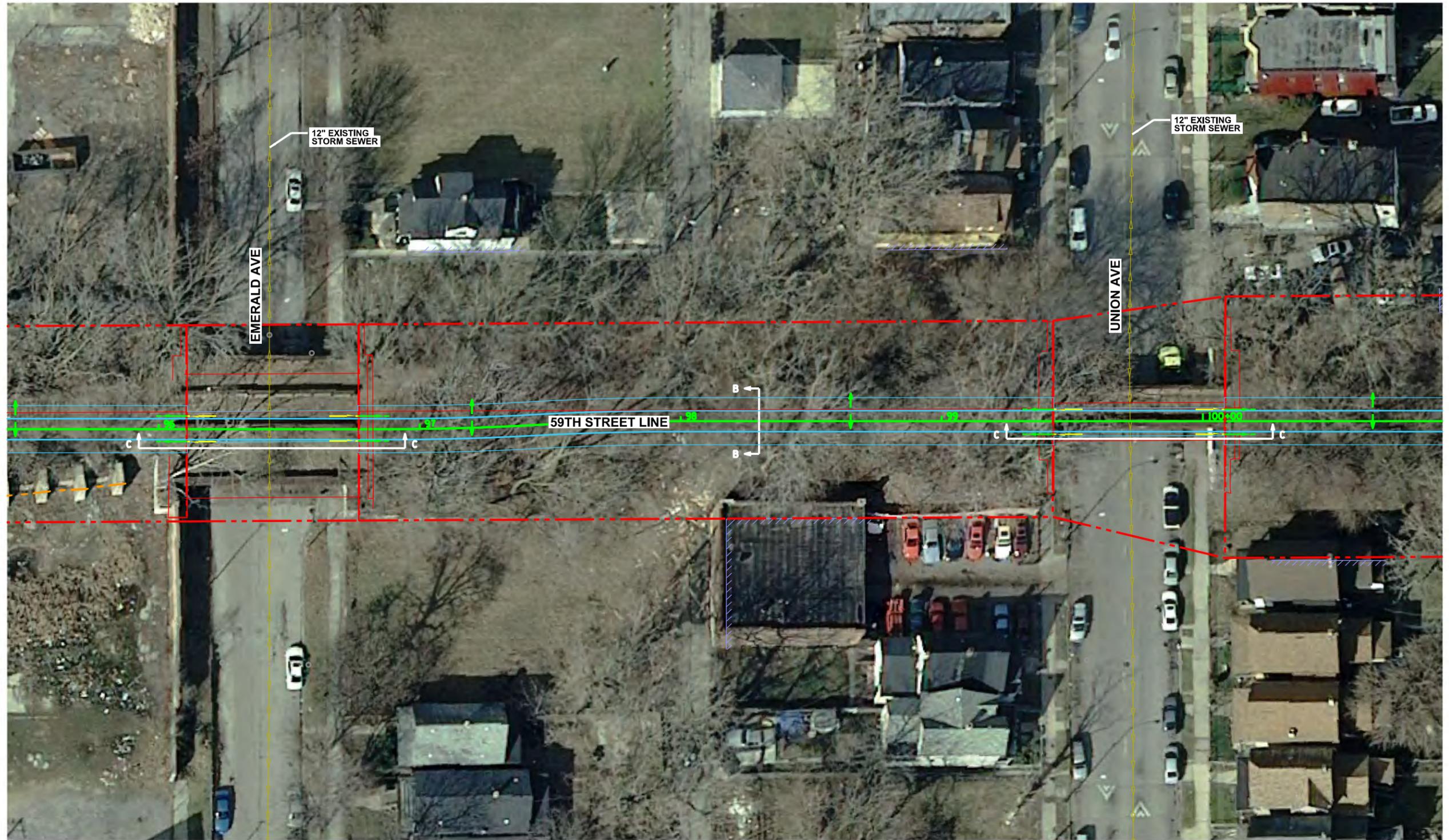
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PLOT SCALE =	CHECKED - HG	REVISED -
PLOT DATE =	DATE - 08/11/2017	REVISED -

CDOT CHICAGO DEPARTMENT OF TRANSPORTATION

**EXHIBIT 2-00a: PROPOSED DRAINAGE PLAN
 HALSTED ST TO EMERALD AVE**
 SCALE: 1" = 20' SHEET PR-26 OF 28

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
	16-E5482-00-BT	COOK	28	26

FED. ROAD DIST. NO. ILLINOIS FED. AID PROJECT



NOTES:
 1) FOR SECTION A-A AND B-B SEE EXHIBIT 2-01b SHEET 1
 2) FOR SECTION C-C SEE EXHIBIT 2-01b SHEET 2

LEGEND

	UNDERDRAIN		CATCH BASIN (CB)
	EXISTING STORM SEWER		CLEANOUT
	PROPOSED STORM SEWER		STORMWATER DETENTION FOR TRAIL ACCESS PATH
	TRENCH DRAIN		PROPOSED CURB
	FLOW DIRECTION		PROPOSED RETAINING WALL
			EXISTING RIGHT OF WAY
			PROPOSED RIGHT OF WAY

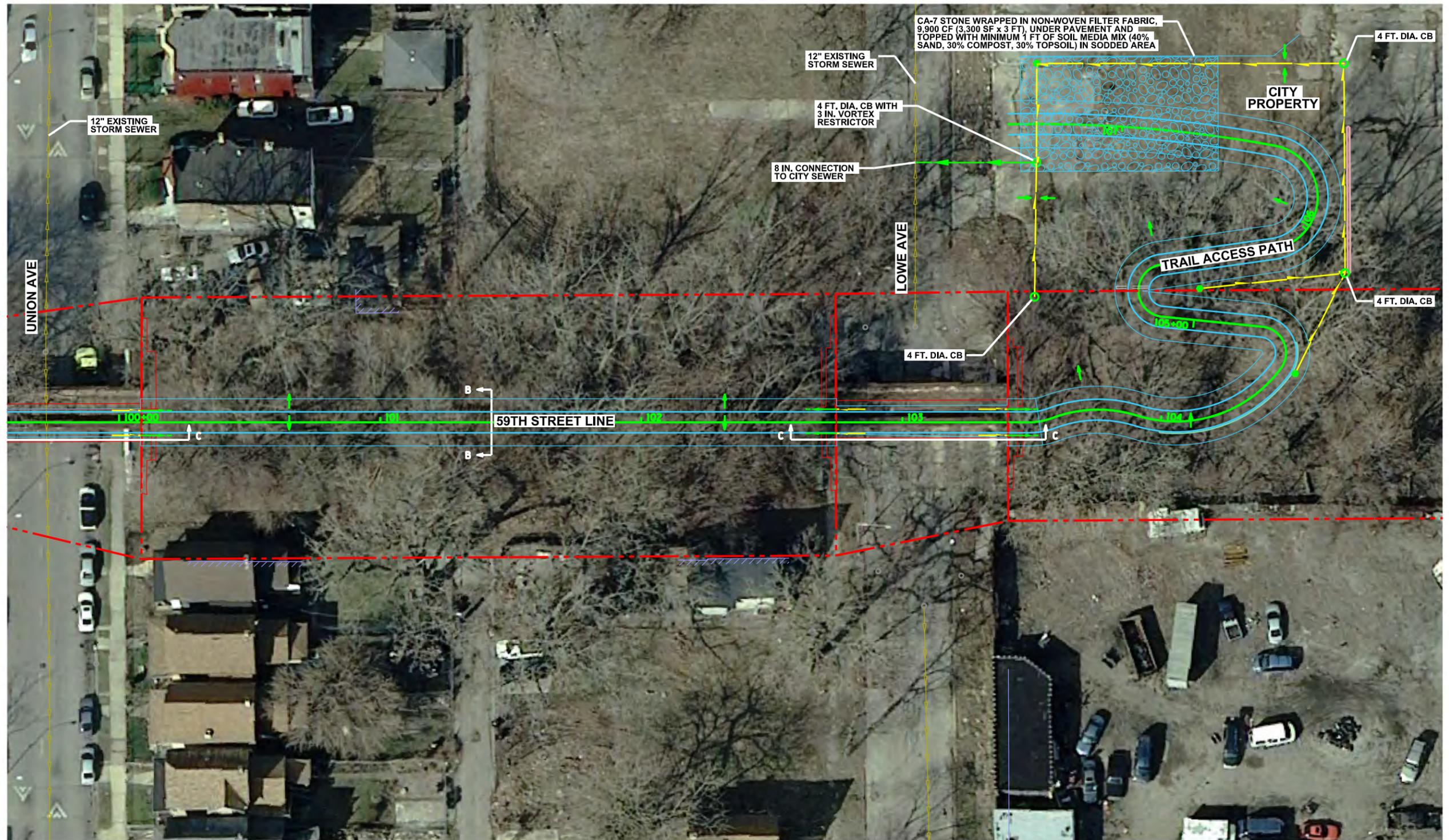
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	PLOT CONFIG =	DRAWN - AR	REVISED -
	PLOT SCALE =	CHECKED - HG	REVISED -
	PLOT DATE =	DATE - 08/11/2017	REVISED -



EXHIBIT 2-00a: PROPOSED DRAINAGE PLAN
EMERALD AVE TO UNION AVE
 SCALE: 1" = 20' SHEET PR-27 OF 28

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
	16-E5482-00-BT	COOK	28	27

FED. ROAD DIST. NO. ILLINOIS FED. AID PROJECT



NOTES:
 1) FOR SECTION A-A AND B-B SEE EXHIBIT 2-01b SHEET 1
 2) FOR SECTION C-C SEE EXHIBIT 2-01b SHEET 2

LEGEND

	UNDERDRAIN		CATCH BASIN (CB)
	EXISTING STORM SEWER		CLEANOUT
	PROPOSED STORM SEWER		STORMWATER DETENTION FOR TRAIL ACCESS PATH
	TRENCH DRAIN		PROPOSED CURB
	FLOW DIRECTION		PROPOSED RETAINING WALL
			EXISTING RIGHT OF WAY
			PROPOSED RIGHT OF WAY

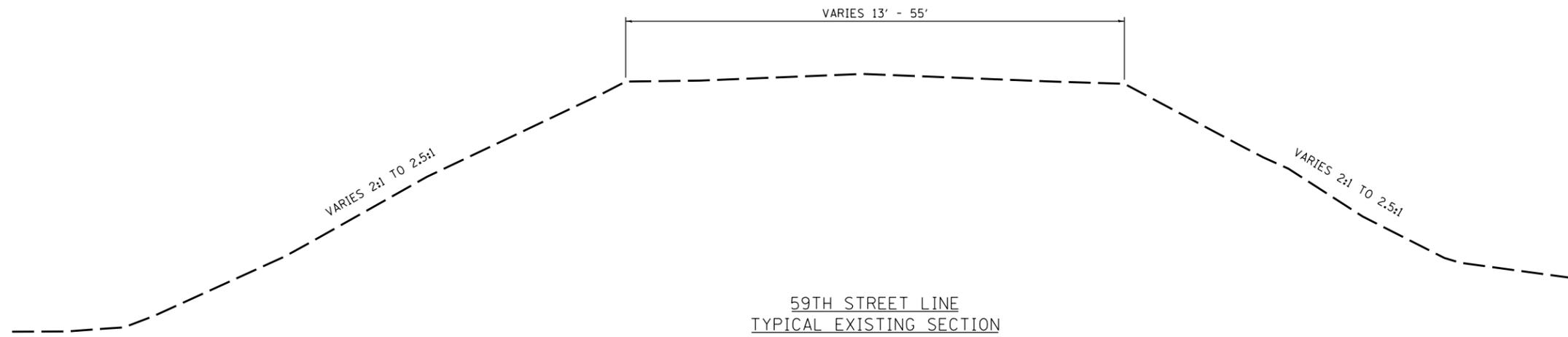
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	PLOT SCALE =	CHECKED - HG	REVISED -
	PLOT DATE =	DATE - 08/11/2017	REVISED -

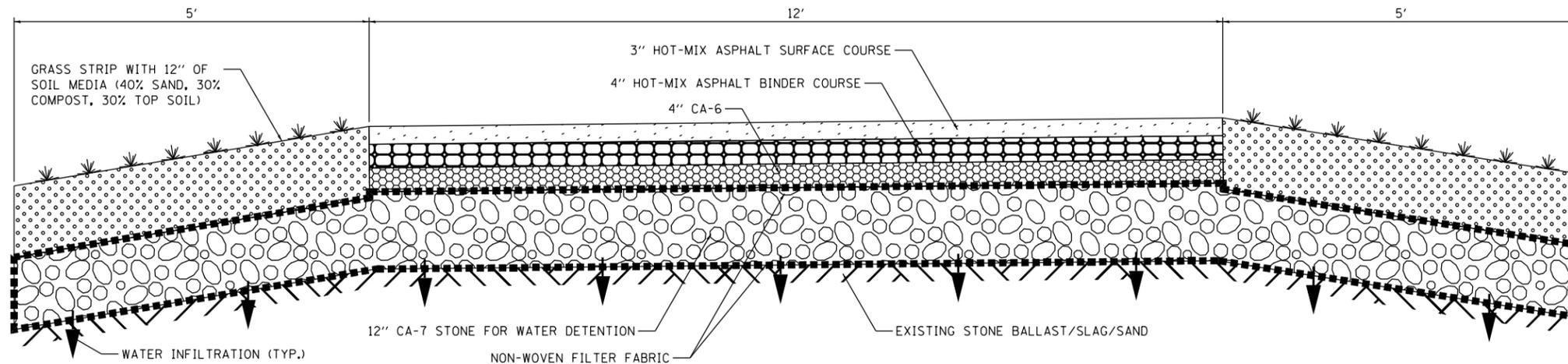


EXHIBIT 2-00a: PROPOSED DRAINAGE PLAN
UNION AVE TO LOWE AVE
 SCALE: 1" = 20' SHEET PR-28 OF 28

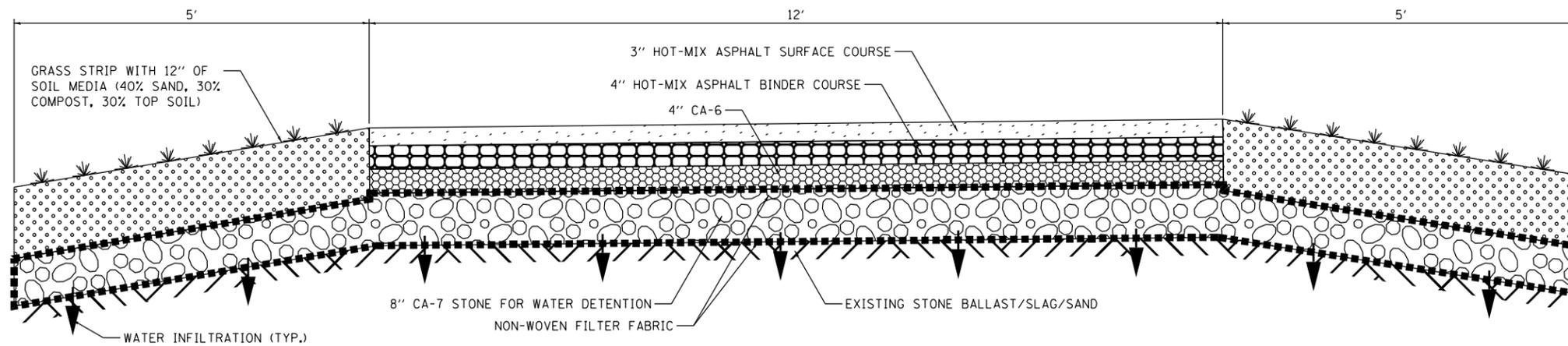
F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
	16-E5482-00-BT	COOK	28	28

FED. ROAD DIST. NO. ILLINOIS FED. AID PROJECT



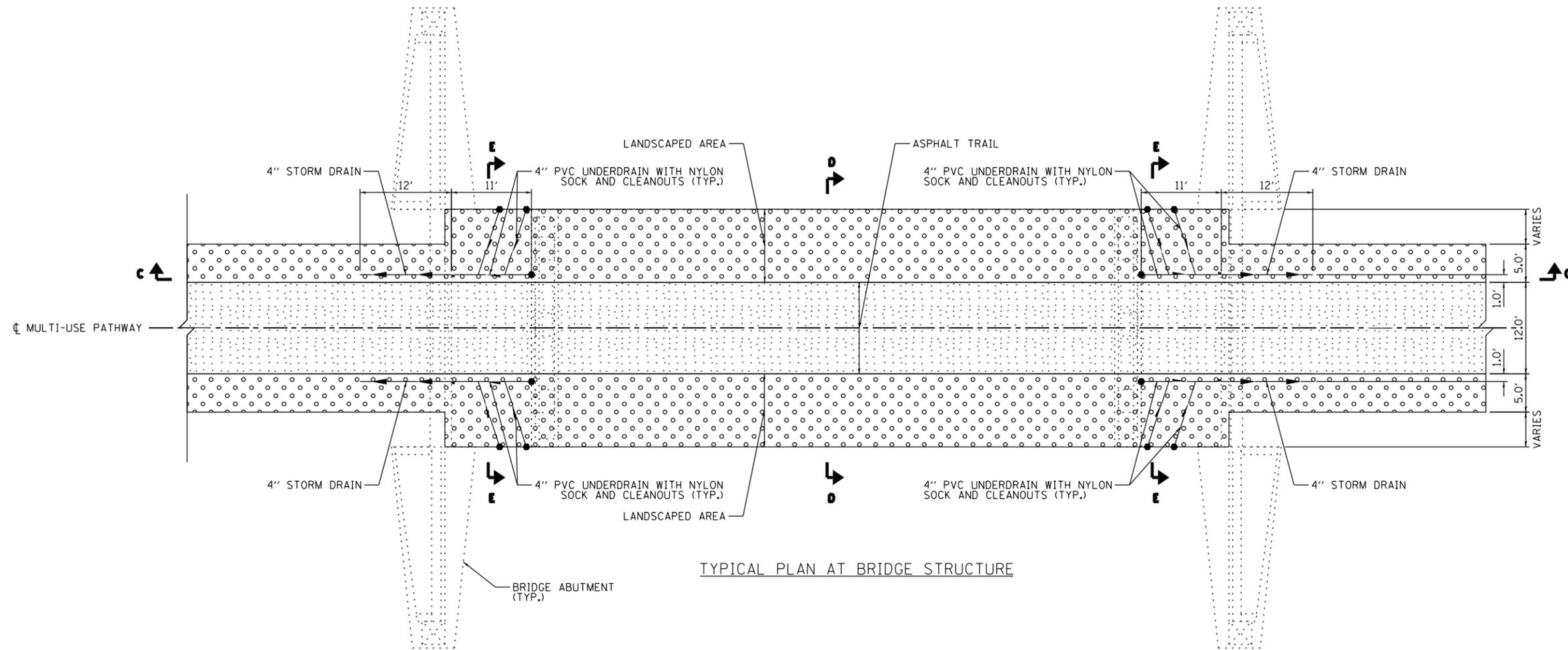


59TH STREET LINE - TYPICAL TRAIL SECTION A-A
(BEYOND BRIDGE)

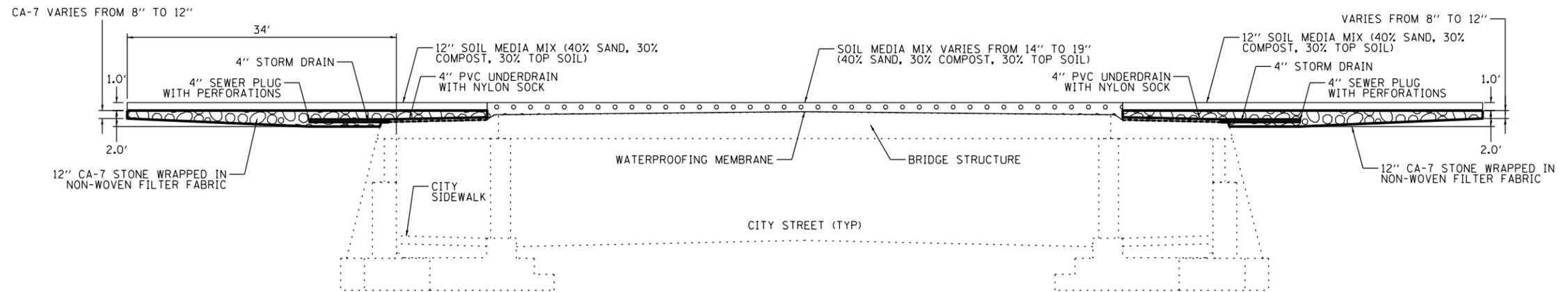


59TH STREET LINE - TYPICAL TRAIL SECTION B-B
(BEYOND BRIDGE)

- NOTES:
- FOR LOCATION OF SECTION A-A AND SECTION B-B SEE PLAN SHEETS 1 THROUGH 28 FOR EXHIBIT 2-00a: PROPOSED DRAINAGE PLANS



TYPICAL PLAN AT BRIDGE STRUCTURE

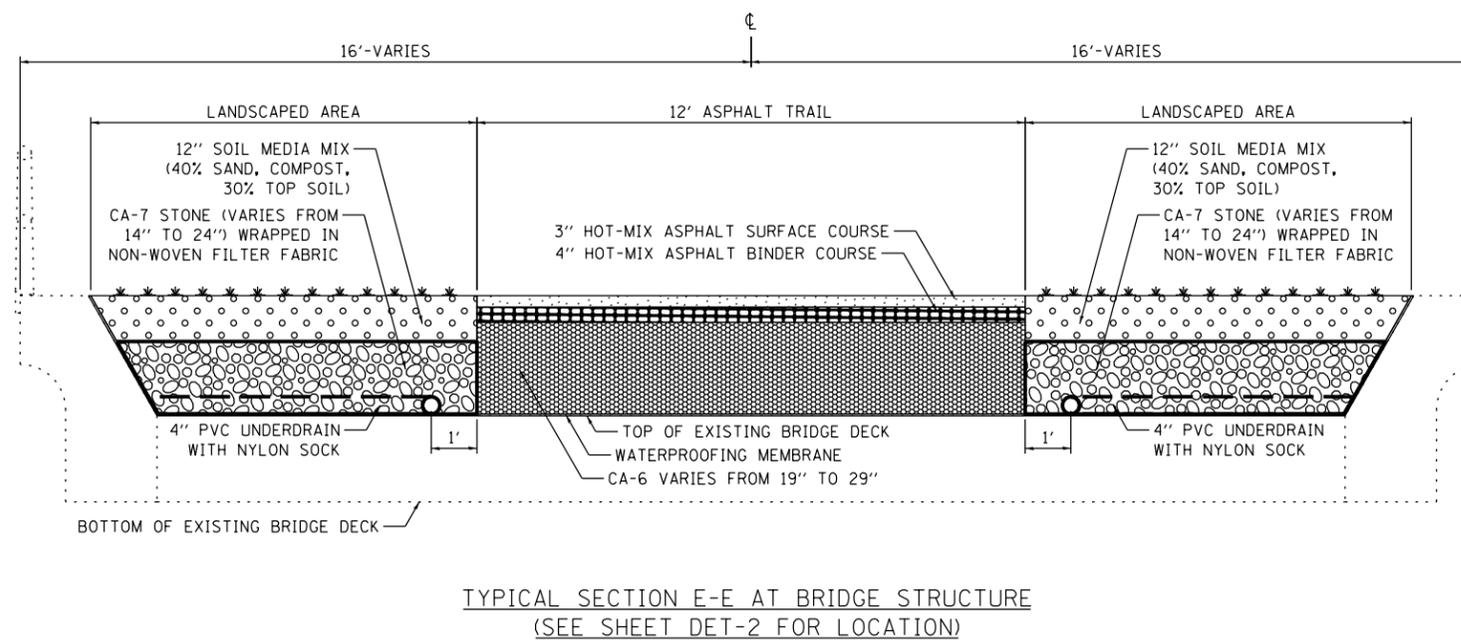
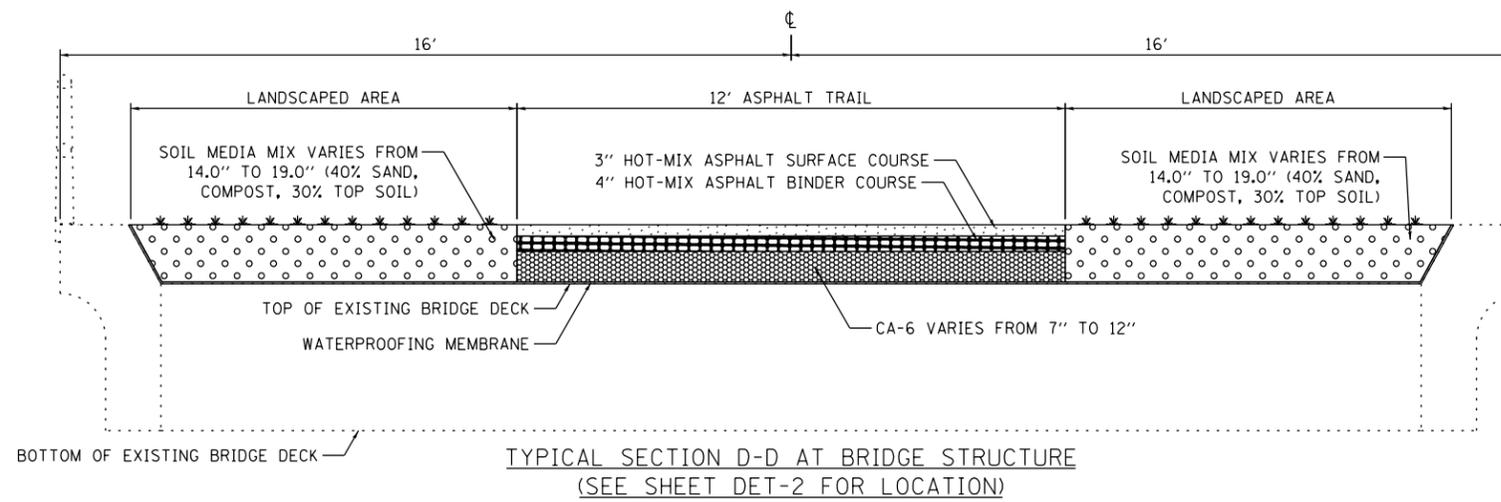


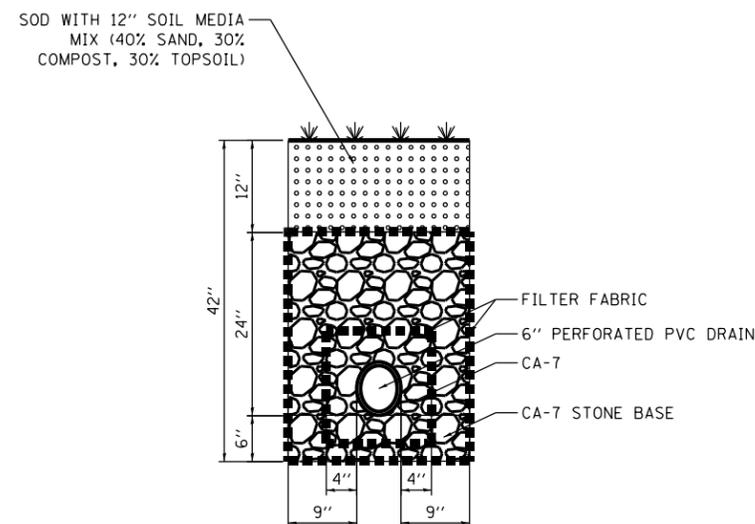
TYPICAL SECTION C-C AT BRIDGE STRUCTURE

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PLOT DATE =	DATE - 08/11/2017	REVISED -

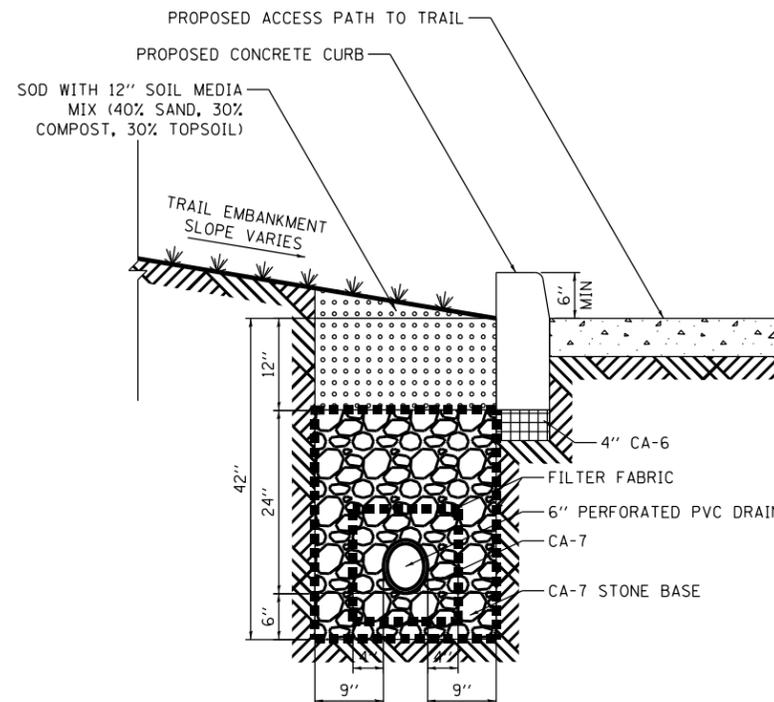
F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
	16-E5482-00-BT	COOK	4	2

FED. ROAD DIST. NO. ILLINOIS FED. AID PROJECT

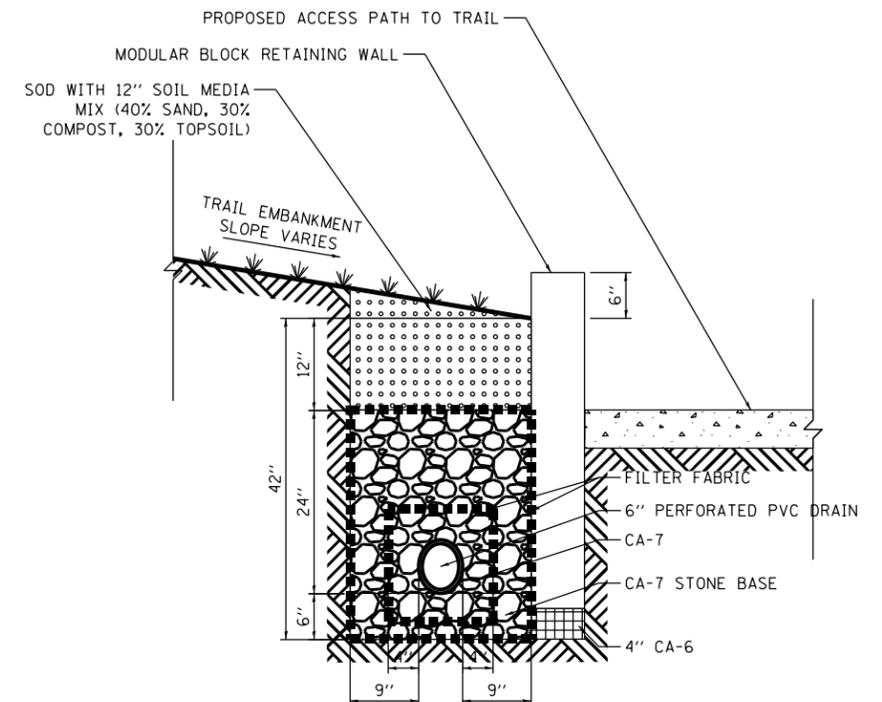




UNDERDRAIN FOR PROPOSED ACCESS PATH TO TRAIL



UNDERDRAIN AT CURB FOR PROPOSED ACCESS PATH TO TRAIL

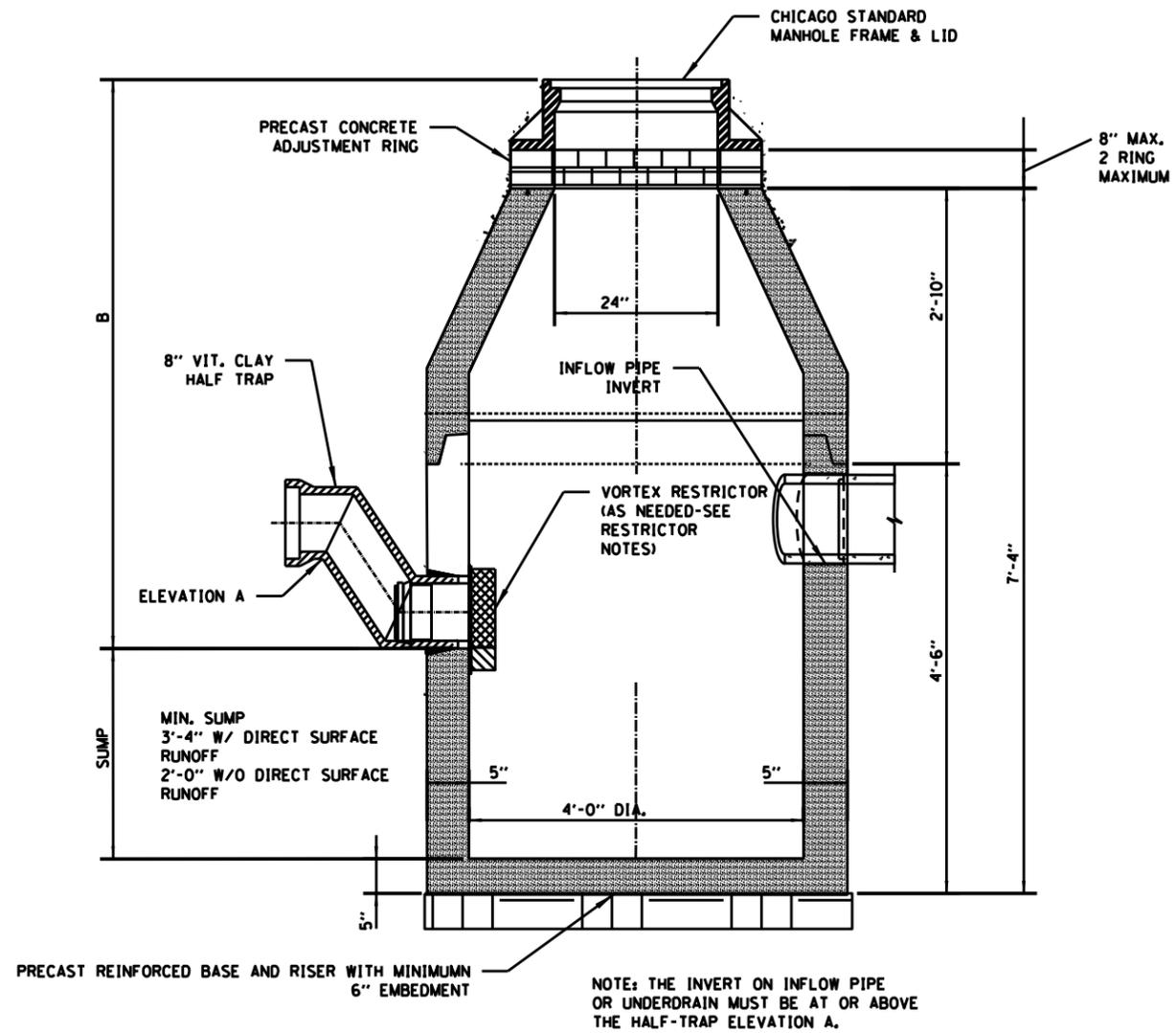


UNDERDRAIN AT RETAINING WALL FOR PROPOSED ACCESS PATH TO TRAIL

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F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
	16-E5482-00-BT	COOK	4	4

FED. ROAD DIST. NO. ILLINOIS FED. AID PROJECT



VORTEX RESTRICTOR CATCH BASIN
CONICAL SECTION
N.T.S.

- NOTES:
- 1) THE INVERT ON INFLOW PIPE OR UNDERDRAIN MUST BE AT OR ABOVE THE HALF-TRAP ELEVATION A.
 - 2) PULL ON RESTRICTOR TO VERIFY THAT A TIGHT FIT IS MADE. INSERT THE RESTRICTOR WITH THE OPENING DOWN. UPON TIGHTENING OF THE 2 BOLTS ON THE FACE OF THE RESTRICTOR, THE RUBBER O-RINGS WILL PROVIDE A WATER-TIGHT SEAL.

USER NAME =	DESIGNED -	REVISED -
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PLOT SCALE =	CHECKED -	REVISED -
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F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
	16-E5482-00-BT	COOK	1	1

FED. ROAD DIST. NO. ILLINOIS FED. AID PROJECT

Appendix C: Correspondence

Minutes of Meeting held with Chicago Department of Buildings and Chicago Department of Water Management

Email correspondence with Chicago Department of Water Management with sample detention calculations



MEETING NOTES

Date: March 28, 2017
Regarding: Project Introduction and Coordination Meeting
Englewood Line Trail Project
Time: 10:30 AM
Project #: P-16-3431-01

Participants: Andrew Billing (DOB)
Ben Stammis (DOB) – part time
Nelson Chueng (DPD) – part time
Ken Smorynski (IEI)
Harish Goyal (IEI)
Adam Ralph (IEI)
Steve Lynch (Patrick)
Copies: Participants
Teska - S. Goldstein
Teska - J. Mariano
CDOT- M. Kent
Prepared By: Ken Smorynski

1. This meeting was held to introduce the Englewood Line Trail Project to the Chicago Department of Buildings (DOB) and discuss drainage design and permitting requirements for the project.
2. The project is located in the Englewood and West Englewood neighborhoods. The City of Chicago proposes to convert the Englewood Connecting Line (Englewood Line) right-of-way into a multi-use trail. The City is in the process of acquiring the property from the Norfolk Southern Corporation as part of a land exchange.
3. There are two (2) related and concurrent projects that are ongoing. One involves development of a concept plan for the project with the Chicago Department of Planning and Development (DPD) as the lead agency. The consultant team being led by Teska Associates, Inc. (Teska) and Infrastructure Engineering, Inc. (IEI) is the civil engineering subconsultant. The second project is being led by the Chicago Department of Transportation (CDOT) and involves Phase I Engineering for the trail and includes assessment of the existing bridges and preparation of a Project Development Report (PDR) and Location Drainage Study (LDS). Patrick Engineering, Inc. (Patrick) is the lead consultant and IEI is their subconsultant and responsible for the LDS.
4. IEI presented a proposed trail cross section 16 feet wide (12 feet wide impermeable asphalt surface with 2 foot wide soft surface shoulders on each side) with two foot wide infiltration areas on each side consisting of 20% sand, 40% compost and 40% topsoil to capture and infiltrate the surface water runoff to the CA-7 stone base below (see attached). There is a possibility of narrowing the asphalt surface to 10 feet wide. If the trail cross section is not finalized soon, IEI will base its drainage calculations on the wider, worst-case scenario.
5. Existing boring information was presented and participants discussed the embankment material which consisted of mostly slag, sand and stone ballast. Existing borings were completed for the purposes of evaluating potential environmental concerns with the existing materials and not for the purposes of determining infiltration rates; the Phase I project does not include any additional borings.
6. IEI presented some preliminary drainage calculations for a typical block related to the release rate and stormwater detention in the CA-7 stone base. DOB agreed with the proposed stormwater detention in the CA-7 stone base. However, they advised that conservative design assumptions for the infiltration rate of 0.5 inches/hour should be used in the absence of percolation test information. Percolation testing can be performed during Phase II of the project if desired.
7. Since the project involves current railroad right-of-way (ROW) it is considered to be a private development and will be reviewed by the DOB. The existing bridges fall within City ROW and will be reviewed by the Chicago Department of Water Management – Sewer Design Section (DWM).



MEETING ATTENDANCE SIGN-IN SHEET

LOCATION: City Hall Room 906 **DATE:** 3/28/17

PURPOSE / REASON: Englewood Trail Drainage Coordination **TIME:** 10:30 AM

NAME	AFFILIATION	PHONE	Initial If Present	EMAIL
Ken Smorynski	Infrastructure Engineering, Inc.	312-960-1260	KS	ksmorynski@infrastructure-eng.com
Harish Goyal	Infrastructure Engineering, Inc.	312-960-1240	HG	hgoyal@infrastructure-eng.com
Adam Ralph	Infrastructure Engineering, Inc.	312-960-1238	AR	aralph@infrastructure-eng.com
Steve Lynch	Patrick Engineering, Inc.	(312) 201-7951	SRL	slynch@patrickco.com
Scott Goldstein	Teska Associates, Inc.			SGoldstein@TeskaAssociates.Com
Jodi Mariano	Teska Associates, Inc.			JMariano@TeskaAssociates.Com
Nelson Chueng	Chicago Dept. of Planning & Development		N	Nelson.Chueng@cityofchicago.org
Maira Kent	Chicago Dept. of Transportation			Maira.Kent@cityofchicago.org
Andrew Billing	Chicago Dept. of Water Management		AB	abilling@mackieconsult.com
Ben Stammis	Chicago Dept. of Water Management	630-200-9480	BS	bstammis@v3co.com

8. The LDS shall be submitted to both DOB and DWM (to the attention of Sid Osakada).
9. DOB stated that each block (i.e. between bridges) should be treated as a separate drainage area. Access areas should also be treated as individual areas. The trail and access areas shall be designed in accordance with the City of Chicago Stormwater Management Ordinance (stormwater ordinance). Temporary, "Pilot" access ramp locations being built by Green Corps in the near future will not require stormwater detention.
10. Participants discussed the drainage requirements for the bridges themselves. DOB stated that the bridges are exempt from the stormwater ordinance and can continue to drain to the city storm sewer system without restrictors. It is likely that the existing bridge drainage systems will need to be replaced for the project considering their age and likely deterioration. If any portions of the existing drainage systems are to be reused, DOB stated that sewer televising would be required.
11. Participants discussed drainage requirements for potential new retaining walls along the existing embankment. The wall drainage systems will likely connect to the city sewer system and shall be designed in accordance with the stormwater ordinance. Where there are connections to the city sewer system, restrictors need to be included.
12. Participants discussed how to use DWM's spreadsheets for the project. DWM stated to use the "Permeable Pavement" Tab Sheet 2.1.6 and to provide a "Yes" callout for permeable paving on the "Rate Control" Tab Sheet 1.2. IEI will present a sample of the calculations to DWM for their review.
13. Clay "dams" were discussed as a possible method to cut off and/or control underdrain drainage at the trail ends and access ramps.
14. A hard copy of the LDS shall be submitted to DOB for review. DOB stated that the review will require a \$3,000 fee. Patrick will discuss the fee with CDOT. DOB stated that reviews are usually completed within 10 business days.

This communication constitutes our understanding of the items discussed and any conclusions reached. If there are any clarifications or corrections, please advise this author, in writing within four (4) working days of receipt.

Submitted by:



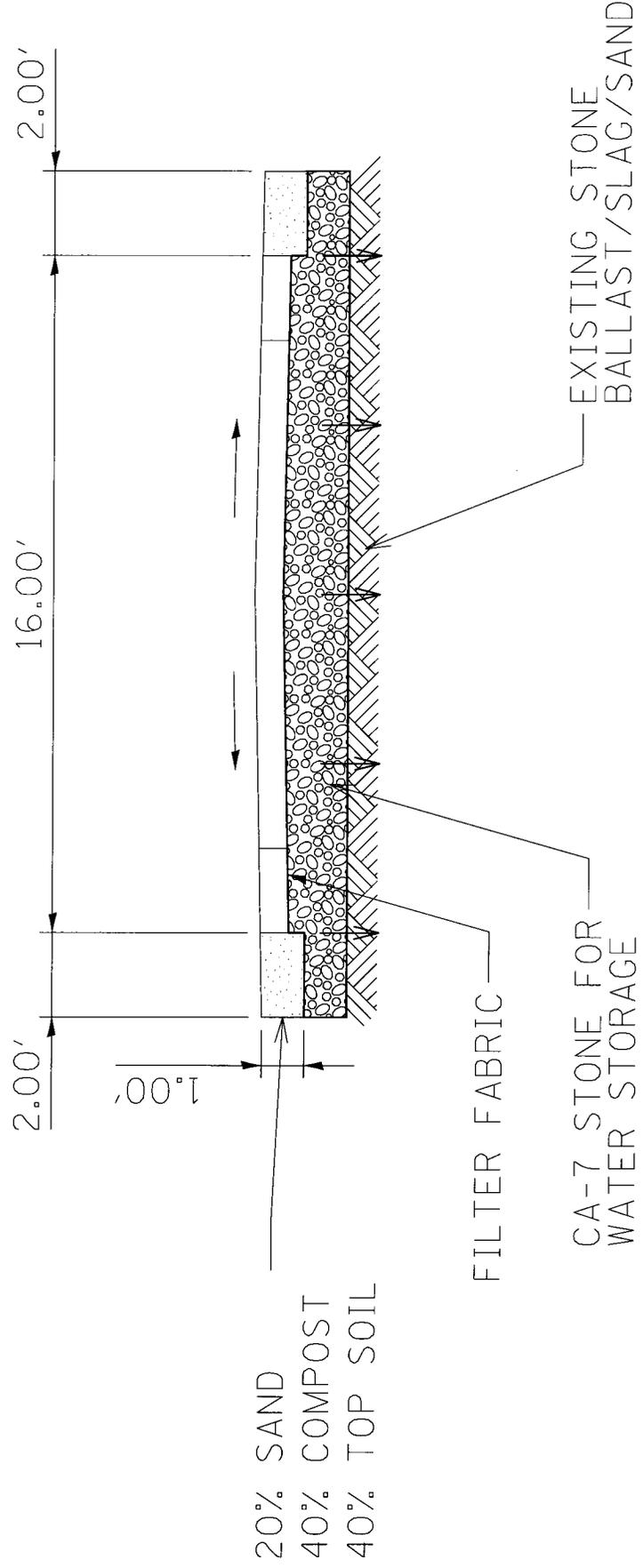
Ken Smorynski, PE, SE
Design Group Manager

Infrastructure Engineering, Inc.

Attachments: Meeting Roster
Proposed preliminary trail cross section

p:\p-16\16-3434-01 englewood line trail (teska)\documents\minutes\meeting notes_dob 20170328.doc\

3/28/17



PRELIMINARY

From: [Ben Stammis](#)
To: [Harish Goyal](#)
Cc: abilling@mackiconsult.com; [Adam Ralph](#)
Subject: RE: Englewood Line Trail - Request for review of Detention Calculations for one block
Date: Thursday, May 18, 2017 12:57:53 PM

Harish,

a) No.

b) As long as you can demonstrate infiltration on the other 25 blocks, runoff can drain across trail into engineered soil mix and infiltrate into the ground. So if you want to reduce the stone base to meet the minimum structural requirement, that is fine.

Benjamin Stammis, PE
Project Engineer II
Stormwater Consultant to City of Chicago

V3 Companies
Office: 630.200.9430
bstammis@v3co.com | www.v3co.com | Facebook | LinkedIn

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-----Original Message-----

From: Harish Goyal [<mailto:HGoyal@infrastructure-eng.com>]
Sent: Wednesday, May 17, 2017 4:09 PM
To: Ben Stammis
Cc: abilling@mackiconsult.com; Adam Ralph
Subject: RE: Englewood Line Trail - Request for review of Detention Calculations for one block

Ben,

Thanks for the review comments. We will revise the engineered soil mix to match the City standard. I have the following questions in regards to the Comment # 2 in the e-mail below:

1) This Trail consists of 27 blocks. As per the meeting minutes each block (between bridges) will be treated as a separate drainage area. Area details for each of 27 blocks are attached. As per attached area details only two blocks namely #6 and #7 are regulated (as it exceeds 7,500 SF paved area and/or 15,000 SF area threshold). CA-7 stone detention calculations under the trail for two Blocks namely #6 and #7 will be provided as required.

Questions

- a) Do we need to provide detention calculations for remaining 25 blocks (Blocks 1 to 5 and 5 to 27) as these are not regulated?
- b) If answer to above question is "No" then do we still need to provide CA-7 stone under trail to capture the drainage from the proposed trail? If yes, then for what rainfall event?

Sincerely,

Harish Goyal | P.E. , LEED A.P.

Project Manager
Infrastructure Engineering, Inc.
Integrity | Excellence | Innovation

33 West Monroe | Suite 1540 | Chicago, IL 60603-5322
p: 312.425.9560 ext. 1249 | f: 312.425.9564 www.infrastructure-eng.com

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-----Original Message-----

From: Ben Stammis [<mailto:bstammis@v3co.com>]

Sent: Monday, May 15, 2017 3:01 PM

To: Harish Goyal

Cc: abilling@mackiconsult.com; Adam Ralph

Subject: Re: Englewood Line Trail - Request for review of Detention Calculations for one block

Harish,

Calculations look good. There are two items I did notice.

1. The engineered soil mix shown does not match city standard.
2. Project area shown is not regulated since it is below 7,500 sq ft.

Ben

Sent from my iPhone

> On May 11, 2017, at 5:38 PM, Harish Goyal <HGoyal@infrastructure-eng.com> wrote:

>

> Ben,

>

> Please refer to the attached meeting minutes. Also attached are the detention calculations with exhibit and detention summary for one block of the Englewood trail. The release rate is basically the infiltration rate @0.5 inch/hour. Detention is provided in CA-7 stone below the trail. We will appreciate if you can please review the calculations and provide comments. Accordingly we will perform the detention calculations for the remaining 25 blocks along the trail. If required we can come for a quick meeting.

>

> Sincerely,

>

>

> Harish Goyal | P.E. , LEED A.P.
> Project Manager
> Infrastructure Engineering, Inc.
> Integrity | Excellence | Innovation
>
> 33 West Monroe | Suite 1540 | Chicago, IL 60603-5322
> p: 312.425.9560 ext. 1249 | f: 312.425.9564
> www.infrastructure-eng.com<<http://www.infrastructure-eng.com/>>
>
> [cid:image010.jpg@01CEF7F8.C4E3B310]
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> abuse@infrastructure-eng.com<blocked:mailto:abuse@infrastructure-eng.
> com>
>
>
>
>
>
> From: Ben Stammis [<mailto:bstammis@v3co.com>]
> Sent: Monday, May 1, 2017 3:07 PM
> To: Ken Smorynski; abilling@mackiconsult.com
> Cc: Harish Goyal
> Subject: RE: Englewood Line Trail - 3/28/17 Meeting Notes
>
> Ken,
>
> I do not have any comments on the minutes.
>
> Benjamin Stammis, PE
> Project Engineer II
> Stormwater Consultant to City of Chicago
> V3 Companies
> Office: 630.200.9430
> bstammis@v3co.com<<mailto:bstammis@v3co.com>> |
> www.v3co.com<<http://www.v3co.com/>> |
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> 1
>
> STOP BY AND CHECK OUT V3'S NEW WEBSITE
>
> V3 | THE VISION TO TRANSFORM WITH EXCELLENCE
>
> From: Ken Smorynski [<mailto:KSmorynski@infrastructure-eng.com>]

> Sent: Friday, April 28, 2017 2:06 PM
> To: abilling@mackiconsult.com<<mailto:abilling@mackiconsult.com>>; Ben
> Stammis
> Cc: Harish Goyal
> Subject: Englewood Line Trail - 3/28/17 Meeting Notes
>
> Andrew/Ben, attached for your review are meeting notes from our meeting to discuss the Englewood Line project. Please advise if you have any comments. The other attendees already had a chance to review them.
>
> Thanks,
>
> Ken Smorynski, PE, SE | Design Group Manager Infrastructure
> Engineering, Inc.
> Integrity | Excellence | Innovation
>
> 33 West Monroe | Suite 1540 | Chicago, IL 60603-5322
> p: 312.960.1260 | cell: 773.562.0945 |
> www.infrastructure-eng.com<<http://www.infrastructure-eng.com/>>
>
> ü Please consider the environment before printing this e-mail.
>
> [cid:image010.jpg@01CEF7F8.C4E3B310]
>
> <image002.jpg>
> <image003.jpg>
> <Meeting Notes_DOB 20170328.pdf>
> <Exhibit.pdf>
> <Detention Calculations.pdf>
> <Detention Summary.pdf>

Detention Summary

Required Detention

Rate Control = 1,589 cubic feet

Volume Control = 221 cubic feet

Total Detention Required = 1,810 cubic feet

Detention Provided

CA-7 stone under trail

Length = 265.5 feet

Width = 20 feet

Porosity = 0.38

Depth of CA-7 Stone = 1 feet

Provided Storage Volume = 2,018 cubic feet

Date: 5/11/17
Rev. Date: _____

City of Chicago
Department of Water Management

Stormwater Spreadsheet Tool

Release 3.1 effective January 1, 2016

1. DOB Tracking/Permit Number:	_____
2. Name of Project:	<u>Englewood Trail</u>
3. Address of Site:	<u>Sangamon-Peoria</u>
Architect / Engineer of Record:	<u>Infrastructure Engineering, Inc</u>
Phone No.:	<u>312-425-9560</u>
4. Description of Proposed Work:	_____ _____ _____ _____
5. Use of Building (if applicable):	_____ _____
6. Sewer Altas & Drain Atlas Referenced:	_____
7. Area of Site:	<u>6,365</u> square feet (Square Feet = Acres * 43560) <u>0.146</u> acres (Acres = Square Feet / 43560)

This spreadsheet tool has been prepared to assist the applicant in preparing calculations for simple sites. The applicant is responsible for ensuring that submitted calculations are correct. If necessary, supporting hand calculations should be prepared and submitted.

Color Coding

-  - Cell Contents Computed by Spreadsheet
-  - Cell for User Entry
-  - Cell Includes Comment (when cursor is over it)

**City of Chicago
Department of Water Management**

Stormwater Spreadsheet Tool

INDEX OF SPREADSHEETS

Required>>	<input checked="" type="checkbox"/>	COVER
Required>>	<input checked="" type="checkbox"/>	INDEX
	<input type="checkbox"/>	0.0 RELEASE RATE
Required>>	<input checked="" type="checkbox"/>	1.0 RATE CONTROL
	<input type="checkbox"/>	1.1 Dry Weather Flow
	<input checked="" type="checkbox"/>	1.2 BMPs-Rate Control Credit
	<input type="checkbox"/>	1.3 Orifice Sizing Calculation
Required>>	<input checked="" type="checkbox"/>	2.0 VOLUME CONTROL
	<input type="checkbox"/>	2.1 BMP Volume Summary
	<input type="checkbox"/>	2.1.1 Bioinfiltration
	<input type="checkbox"/>	2.1.2 Drainage Swales
	<input type="checkbox"/>	2.1.3 Green Roof
	<input type="checkbox"/>	2.1.4 Infiltration Vault
	<input type="checkbox"/>	2.1.5 Trees
	<input checked="" type="checkbox"/>	2.1.6 Permeable Pavement
	<input type="checkbox"/>	2.1.7.1 Roof Runoff BMPs - Planter Boxes
	<input type="checkbox"/>	2.1.7.2 Roof Runoff BMPs - Rain Barrels / Cisterns
	<input type="checkbox"/>	2.1.8 Filter Strips
	<input type="checkbox"/>	2.1.9 Oversized Detention

**City of Chicago
Department of Water Management**

Name of Project: Englewood Trail
Address: Sangamon-Peoria
A/E of Record: Infrastructure Engineering, Inc

1.0 Rate Control (Sheet 1 of 2)

Step 1: Runoff Calculation

		Proposed Area (sq. ft.)	C-Value 100-Year	Storage Volume (cu. ft.)
Pervious Land	Lawns - Sandy soil, flat, 0% to 2%	1,055	0.18	
	Lawns - Sandy soil, avg, 2% to 7%		0.27	
	Lawns - Sandy soil, steep, >7%		0.36	
	Lawns - Heavy soil, flat, 0% to 2%		0.30	
	Lawns - Heavy soil, avg, 2% to 7%		0.42	
	Lawns - Heavy soil, steep, >7%		0.47	
	Woodlands, flat, 2%		0.39	
	Native Vegetation with prepared soils		0.10	
	Dry bottom basins to HWL		0.75	
	Wetland		0.80	
	Green Roof		0.50	
Impervious Land	Gravel		0.70	
	Pavement		0.95	
	Roofs (conventional)		0.95	
	Building sidewalls connected by side gutters (enter 25% of the face of the sidewall)		0.95	
	Wet bottom basins to HWL		1.00	
BMP areas	BMPs providing storage that WILL COUNT toward detention storage (from Worksheet 1.2)	5,310	1.00	
	BMPs providing volume control storage that WILL NOT BE COUNTED toward detention (from Worksheet 1.2)	0	Storage Provided will be used to factor the adjusted C-value in Cell D38	0

Summary	Total pervious area (sq ft)	1,055
	Total impervious area (sq ft)	0
	Total BMP area (sq ft)	5,310
	Total site area (sq ft)	6,365
	Weighted C- value (non BMP areas)	0.18
	Adjusted C-value (accounts for BMPs)	0.86
Notes:	<i>Make note of any adjustments made for purposes of detention calcs here (such as removal of roof area that will discharge directly to Waters)</i>	

Step 2: Allowable Release Rate Assessment

	Type Yes or No for all that apply	Notes
Question 1: Does the site drain directly to Waters?	No	
Question 2: Does the site only include residential land use for detached single-family and two-family dwellings?	No	
Question 3: Is the Regulated Development a Lot to Lot Building (85% or more of site footprint is occupied by buildings)?	No	
Question 4: Do you plan to use the standard maximum release rate (only available to sites less than 1.75 acres)?	No	Complete Tab 0.0 Release Rate to calculate the allowable release rate for the site unless a 1 cfs/ac release rate to waters will be used.
Question 5: Is the site more than 75 percent of substantially contiguous at-grade open space that is conducive to ponding of surface waters (Answer "No" if site discharges to waterway or is a service station)?	Yes	Detention Release Rate must be 0.75 cfs per acre or less unless total release rate is limited to minimum practical rate (0.15 cfs)
Question 6: Does the development involve flow diversions (existing sewer connection to be relocated to a different main) or multiple sewer connections (only available to sites over 1.75 acres)?	No	
Question 7: Are there widespread contaminated soils on the site, high ground water table, or is this development classified as a lot-to-lot building?	No	Oversized detention is not allowed. Do not fill out Tab 2.1.9

**City of Chicago
Department of Water Mangement**

Name of Project: Englewood Trail
 Address: Sangamon-Peoria
 A/E of Record: Infrastructure Engineering, Inc

1.0 Rate Control (Sheet 2 of 2)

Step 3: Achieving Rate Control Measures

Unadjusted Detention Release Rate =	0.000	cfs	Release Rate from Tab 0.0. To override, enter value in the cell to the right ->	0.000
Dry Weather Flow Rate = (From dry weather flow worksheet)	0.000	cfs	Waiting for Dry Weather Flow worksheet to be completed	
Infiltration Facility Release Rate (to be added to eligible release rate when computing required storage)	0.061	cfs		
Release rate for detention storage computations:	0.061	cfs		
Required Storage Volume =	1,589	cubic feet		

Detention Storage Calculations

(Based on Bulletin 70 Rainfall Data)

STORM EVENT (5,10,25,50 or 100) =

Storm Duration (minute)	Runoff Coefficient C	Rainfall Intensity (in/hr)	Drainage Area A (acres)	STORM EVENT (5,10,25,50 or 100) =		Release Rate Q _o (cfs)	Storage Rate (Q _i -Q _o) (cfs)	Storage Volume Rate (Q _i -Q _o)*t*60 (cf)
				100	Allowable release rate 0.061 cfs			
5	0.86	10.920	0.15	1.38	414	0.061	1.32	395
10	0.86	10.020	0.15	1.27	759	0.061	1.20	722
15	0.86	8.200	0.15	1.04	932	0.061	0.97	876
30	0.86	5.600	0.15	0.71	1,273	0.061	0.65	1,162
60	0.86	3.560	0.15	0.45	1,618	0.061	0.39	1,397
120	0.86	2.235	0.15	0.28	2,032	0.061	0.22	1,589
180	0.86	1.617	0.15	0.20	2,204	0.061	0.14	1,541
360	0.86	0.947	0.15	0.12	2,582	0.061	0.06	1,254
720	0.86	0.549	0.15	0.07	2,995	0.061	0.01	340
1080	0.86	0.387	0.15	0.05	3,168	0.061	-0.01	-814
1440	0.86	0.316	0.15	0.04	3,445	0.061	-0.02	-1,865
2880	0.86	0.170	0.15	0.02	3,709	0.061	-0.04	-6,911
4320	0.86	0.122	0.15	0.02	3,991	0.061	-0.05	-11,939
7200	0.86	0.083	0.15	0.01	4,527	0.061	-0.05	-22,023
14400	0.86	0.046	0.15	0.01	5,064	0.061	-0.06	-48,036
							Required Detention Volume (cf)	1,589

Note: 1) the calculation assumes that the rising and recessing limb of inflow and outflow hydrograph are vertical

**City of Chicago
Department of Water Management**

Name of Project: Englewood Trail
 Address: Sangamon-Peoria
 A/E of Record: Infrastructure Engineering, Inc

1.2 BMPs for Rate Control Credit

Volume Control BMP Summary for use in Rate Control Worksheet

Instructions for use:

This summary worksheet provides information for BMPs for use in the Rate Control Spreadsheet.

Storage provided should be from the computation made on the each individual BMP spreadsheet (2.1.1 to 2.1.8).

Total area of BMPs will carry over to Rate Control Worksheet.

Other areas (ie reduce pavement area if permeable pavement implemented) should adjusted such that Line 35 on Rate Control Worksheet equals total site area.

When the option exists, the applicant may decide whether or not to count volume control storage toward detention storage.

n/a = not applicable and indicates when credit is inappropriate or unavailable for a given BMP.

BMP Areas with Storage COUNTED toward Rate Control Volume					
Type "yes" to Select	BMP	BMP Infiltration Area (sq. ft.)	Storage Provided (cu. ft.)	Design Soil Infiltration Rate (in/hr) ³	Allowable Infiltration Release Rate (cfs)
	Bioinfiltration Systems	0	0	0.000	0.000
	Drainage Swales	0	0	0.000	0.000
n/a	Green Roof	n/a	n/a	n/a	n/a
	Infiltration Vault	0	0	0.000	0.000
n/a	Natural Landscaping and Stormwater Trees ¹	n/a	n/a	n/a	n/a
	Roof Runoff BMPs - Planter Boxes	0	0	0.000	0.000
	Roof Runoff BMPs - Rain Barrels and Cisterns	n/a	0	n/a	n/a
Yes	Permeable Paving	5,310	504	0.500	0.061
n/a	Vegetated Filter Strips ²	n/a	n/a	n/a	n/a
Totals		5,310	504	-	0.061

Notes:

1. Natural landscaping areas do not have specific storage, they can simply be entered on Rate Control Spreadsheet as having a C-value of 0.1. Detention Credit is not given for stormwater trees.
2. Vegetated Filter strips also are not given credit for a "volume of storage" and should be entered in the pervious land cover section of the Rate Control Spreadsheet based on their cover type.
3. Infiltration rate must be the design infiltration rate as explained in Stormwater Manual. If the infiltration rate is less than 0.5 in/hr, credit cannot be taken for infiltration and the Allowable Infiltration Release is set to zero. This value is automatically copied from each respective BMP spreadsheet.

BMP Areas with Storage NOT COUNTED toward Rate Control Volume			
Type "yes" to Select	BMP	Area (sq. ft.)	Storage Provided (cu. ft.)
	Bioinfiltration Systems	0	0
	Drainage Swales	0	0
n/a	Green Roof	n/a	n/a
n/a	Natural Landscaping and Stormwater Trees ¹	n/a	n/a
	Roof Runoff BMPs - Planter Boxes	0	0
	Permeable Paving	0	0
n/a	Vegetated Filter Strips ²	n/a	n/a
Totals		0	0

**City of Chicago
Department of Water Management**

Name of Project: Englewood Trail
 Address: Sangamon-Peoria
 A/E of Record: Infrastructure Engineering, Inc

2.0 Volume Control

Step 1:

Runoff Calculation

		Existing Area (sq ft)	Proposed Area (sq ft)
Pervious Surface or Land Cover not Counted as Impervious for Volume Control Calculations	Bare Earth	6,365	1,055
	Lawn or Landscaped Areas		
	Woodlands		
	Wetland		
Impervious Land	Gravel		
	Pavement		
	Roofs (conventional)		
	Water (including Wet Bottom Basin to HWL)		
BMPs	Green Roof	-	
	Permeable Pavement		5,310
	Bioinfiltration	-	
	Swales	-	
	Stormwater Trees	-	
	Roof Runoff Planters	-	
	Filter Strips	-	
	Dry Bottom Basins to HWL	-	
Summary	Total pervious area (sq ft)	6,365	1,055
	Total impervious area (sq ft)	0	0
	Total BMP areas treated as impervious area (sq ft)	-	5,310
	Total BMP areas treated as pervious area (sq ft)	-	0
	Total site area (sq ft)	6,365	6,365
	Imperviousness percentage (%)	0.0	0.0

Please be sure to ans

Please be sure to ans

Step 2:

Volume Control Assessment

		Type Yes or No for all that apply	Note
Question 1:	Does the site drain directly to Waters?	No	
Question 2:	Are infiltration BMPs allowable? (See Chapter III Sections 4.1.2 of the Regulations.)	Yes	
Question 3:	Do you wish to use permeable pavement only as a pervious surface to achieve impervious surface reduction goal?	No	Areas of permeable pavement are included as an impervious surface for the computation made in Cell C48. Storage will be counted toward volume control goal.

Step 3:

Achieving Volume Control Measures

Achieve I. or II. below in accordance with the Ordinance.

I.	Capture 0.5" of runoff from impervious surfaces. Storage required =	221	cubic feet	Go to spreadsheet 2.1 BMP Volume Summary if electing volume control storage option
or, II.	Reduce proposed imperviousness to:	-	percent	

**City of Chicago
Department of Water Management**

Name of Project: Englewood Trail
 Address: Sangamon-Peoria
 A/E of Record: Infrastructure Engineering, Inc

2.1.6 Permeable Pavement

Section 1 Upstream Drainage Area				
1	Upstream impervious area including area of permeable pavement	A_i	6,365	square feet
2	Upstream weighted C-value (C-value=0.95 for permeable pavement areas for nearly direct rainfall)	C	0.95	unitless
3	Volume of upstream runoff from a 1-inch storm = $C * A_t * 1/12$	$V_{upstream}$	504	cubic feet
4	Describe intended function of system (Is it standalone system designed for infiltration, is it integrated as part of the detention storage, is it underdrained to downstream system, will it receive upstream runoff?)			

Section 2 BMP Feasibility				
5	Design soil infiltration rate (must be 0.5 in/hr or greater unless underdrain system is used)	i	0.500	in/hr
6	Allowable depth of storage aggregate without provision of underdrain ($=i/ 12$ inches/ft * 48 hours)	D_{allow}	2.00	feet
7	Elevation of bottom of BMP (the infiltration surface) IF there is no underdrain, OR the lowest underdrain invert elevation	$ELEV_{BMP}$	44.000	feet
8	Groundwater elevation	$ELEV_{GW}$	26.000	feet
9	Depth to seasonal groundwater (Must be 2 feet or greater, or 3.5 feet or greater if draining to combined sewer)	D_{GW}	18.0	feet

Section 3 BMP Specifications				
10	Dimensions of the permeable pavement (length, width, or area)	L	265.5	feet
		W	20.0	feet
		A_{BMP}	5,310	square feet
11	Depth of underlying aggregate (must be less than D_{allow})	D_1	1.0	feet
12	Aggregate porosity (0.38 maximum unless detailed materials report provided)	P_1	0.38	feet
13	Volume of Aggregate storage applicable to volume control = $A_{BMP} * D_1 * P_1$	V_{BMP}	2,018	cubic feet

Section 4 BMP Performance				
14	Volume of upstream runoff (Line 3)	$V_{upstream}$	504	cubic feet
15	Volume Control Storage Provided = V_{BMP}	V_{BMP}	2,018	cubic feet
16	V_{total} (equals lesser of V_{BMP} or $V_{upstream}$)	V_{total}	504	cubic feet



BOTTOM OF EMBANKMENT

TOP OF EMBANKMENT

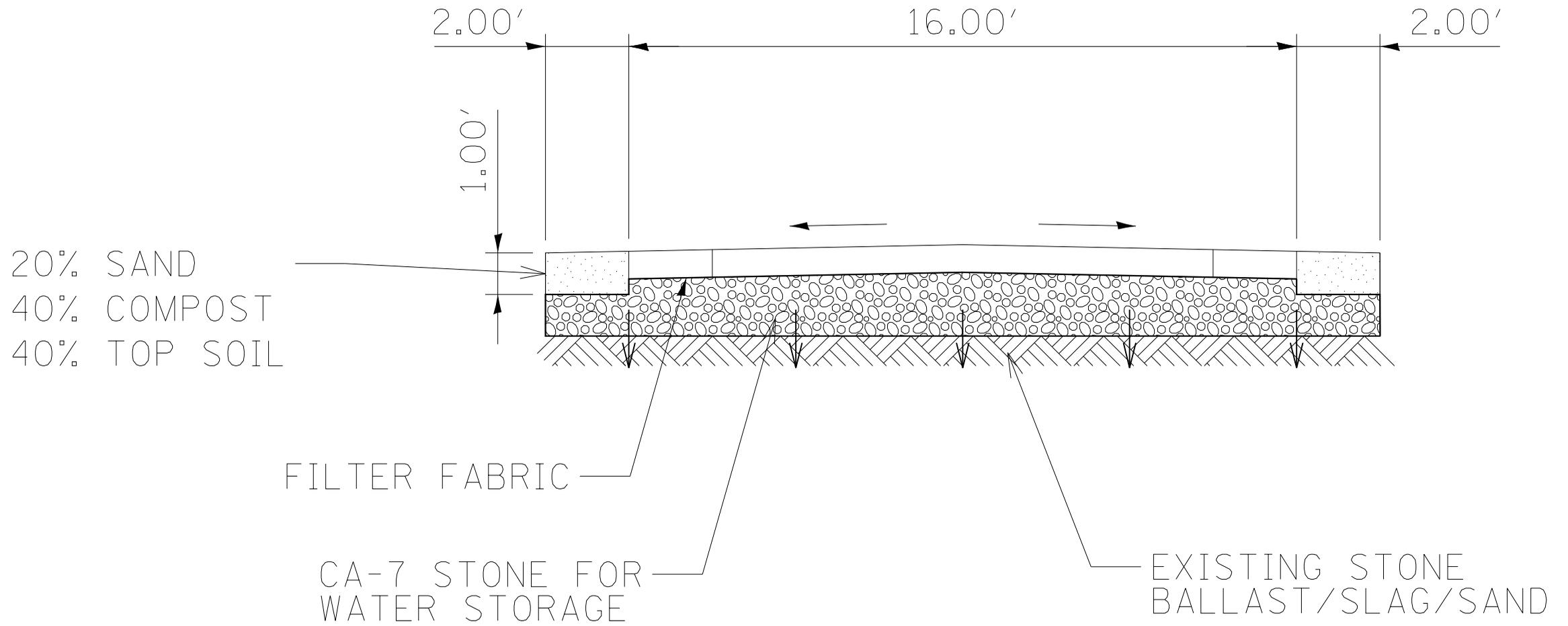
PROPOSED
16' WIDE IMPERVIOUS TRAIL ON TOP OF
20' WIDE CA-7 STONE FOR DETENTION
(5,310 SF DETENTION)

EXISTING AREA = 6,365 SF

BOTTOM OF EMBANKMENT

S. SANGAMON ST.

S. PEORIA ST.



Appendix D: Supporting Documents

Stormwater detention calculations in accordance with the City of Chicago Stormwater Ordinance requirements:

1. Hoyne Ave to Damen Ave – Sta 6+78 to Sta 13+32 (Trail + Access Point)
2. Damen Ave to Winchester Ave – Sta 13+98 to Sta 16+63 (Trail + Access Point)
3. Wood St to Paulina St – Sta 27+22 to Sta 33+18 (Trail + Access Point)
4. Paulina St to Ashland Ave – Sta 33+80 to 39+62 (Trail)
5. Ashland Ave to Justine St – Sta 40+62 to Sta 43+14 (Trail + Access Point)
6. Loomis Blvd to Ada St – Sta 53+69 to Sta 56+34 (Trail + Access Point)
7. Elizabeth St to Racine Ave – Sta 63+63 to Sta 66+28 (Trail + Access Point)
8. Morgan St to Sangamon St – Sta 80+19 to Sta 82+85 (Trail + Access Point)
9. Green St to Halsted St – Sta 90+14 to Sta 92+74 (Trail + Access Point)
10. Lowe Ave to Project End – Sta 103+40 to Sta 107+44 (Trail + Access Point)

Drainage Area Exhibits: 26 sheets

DETENTION CALCULATIONS FOR ENGLEWOOD TRAIL

CITY BLOCK FROM HOYNE AVE TO DAMEN AVE
See Exhibit 2-04a: Drainage Areas Sheet 1

1. Access path to trail from STA 6+78 to STA 8+66
2. Trail from STA 8+66 to STA 13+32

Detention Requirement Summary		
	Main Trail	Access Path
Rate Control (cu ft)	2,490	2,583
Volume Control (cu ft)	427	93
Total Detention Required (cu ft)	2,917	2,676
Detention Provided (cu ft)	3,896	2,736

Date: 8/11/17
Rev. Date: _____

City of Chicago
Department of Water Management

Stormwater Spreadsheet Tool

Release 3.1 effective January 1, 2016

1. DOB Tracking/Permit Number:	_____
2. Name of Project:	<u>59th Street Line</u>
3. Address of Site:	<u>Access Path between Hoyne Ave and Damen Ave</u> <u>Sta 6+78 to Sta 8+66</u>
Architect / Engineer of Record:	<u>Infrastructure Engineering, Inc</u>
Phone No.:	<u>312-425-9560</u>
4. Description of Proposed Work:	_____ _____ _____ _____
5. Use of Building (if applicable):	_____ _____
6. Sewer Altas & Drain Atlas Referenced:	_____
7. Area of Site:	<u>19,616</u> square feet (Square Feet = Acres * 43560) <u>0.450</u> acres (Acres = Square Feet / 43560)

This spreadsheet tool has been prepared to assist the applicant in preparing calculations for simple sites. The applicant is responsible for ensuring that submitted calculations are correct. If necessary, supporting hand calculations should be prepared and submitted.

Color Coding

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**City of Chicago
Department of Water Management**

Stormwater Spreadsheet Tool

INDEX OF SPREADSHEETS

Required>>	<input checked="" type="checkbox"/>	COVER
Required>>	<input checked="" type="checkbox"/>	INDEX
	<input type="checkbox"/>	0.0 RELEASE RATE
Required>>	<input checked="" type="checkbox"/>	1.0 RATE CONTROL
	<input type="checkbox"/>	1.1 Dry Weather Flow
	<input checked="" type="checkbox"/>	1.2 BMPs-Rate Control Credit
	<input type="checkbox"/>	1.3 Orifice Sizing Calculation
Required>>	<input checked="" type="checkbox"/>	2.0 VOLUME CONTROL
	<input type="checkbox"/>	2.1 BMP Volume Summary
	<input checked="" type="checkbox"/>	2.1.1 Bioinfiltration
	<input type="checkbox"/>	2.1.2 Drainage Swales
	<input type="checkbox"/>	2.1.3 Green Roof
	<input type="checkbox"/>	2.1.4 Infiltration Vault
	<input type="checkbox"/>	2.1.5 Trees
	<input type="checkbox"/>	2.1.6 Permeable Pavement
	<input type="checkbox"/>	2.1.7.1 Roof Runoff BMPs - Planter Boxes
	<input type="checkbox"/>	2.1.7.2 Roof Runoff BMPs - Rain Barrels / Cisterns
	<input type="checkbox"/>	2.1.8 Filter Strips
	<input type="checkbox"/>	2.1.9 Oversized Detention

**City of Chicago
Department of Water Management**

8/11/2017

Name of Project: 59th Street Line
 Address: Access Path between Hoyne Ave and Damen Ave
 A/E of Record: Infrastructure Engineering, Inc

1.0 Rate Control (Sheet 1 of 2)

Step 1: Runoff Calculation

		Proposed Area (sq. ft.)	C-Value 100-Year	Storage Volume (cu. ft.)
Pervious Land	Lawns - Sandy soil, flat, 0% to 2%		0.18	
	Lawns - Sandy soil, avg. 2% to 7%		0.27	
	Lawns - Sandy soil, steep, >7%		0.36	
	Lawns - Heavy soil, flat, 0% to 2%	7,492	0.30	
	Lawns - Heavy soil, avg. 2% to 7%	7,492	0.42	
	Lawns - Heavy soil, steep, >7%		0.47	
	Woodlands, flat, 2%		0.39	
	Native Vegetation with prepared soils		0.10	
	Dry bottom basins to HWL		0.75	
	Wetland		0.80	
	Green Roof		0.50	
Impervious Land	Gravel		0.70	
	Pavement	2,232	0.95	
	Roofs (conventional)		0.95	
	Building sidewalls connected by side gutters (enter 25% of the face of the sidewall)		0.95	
	Wet bottom basins to HWL		1.00	
BMP areas	BMPs providing storage that WILL COUNT toward detention storage (from Worksheet 1.2)	2,400	1.00	
	BMPs providing volume control storage that WILL NOT BE COUNTED toward detention (from Worksheet 1.2)	0		0

Summary	Total pervious area (sq ft)	14,984
	Total impervious area (sq ft)	2,232
	Total BMP area (sq ft)	2,400
	Total site area (sq ft)	19,616
	Weighted C-value (non BMP areas)	0.44
	Adjusted C-value (accounts for BMPs)	0.51
Notes:	<i>Make note of any adjustments made for purposes of detention calcs here (such as removal of roof area that will discharge directly to Waters)</i>	

Step 2: Allowable Release Rate Assessment

	Allowable Release Rate Assessment	Type Yes or No for all that apply	Notes
Question 1:	Does the site drain directly to Waters?	No	
Question 2:	Does the site only include residential land use for detached single-family and two-family dwellings?	No	
Question 3:	Is the Regulated Development a Lot to Lot Building (85% or more of site footprint is occupied by buildings)?	No	
Question 4:	Do you plan to use the standard maximum release rate (only available to sites less than 1.75 acres)?	Yes	Standard Detention Release Rate based on total site area (Cell D36) minus any tributary sidewalls
Question 5:	Is the site more than 75 percent of substantially contiguous at-grade open space that is conducive to ponding of surface waters (Answer "No" if site discharges to waterway or is a service station)?	No	
Question 6:	Does the development involve flow diversions (existing sewer connection to be relocated to a different main) or multiple sewer connections (only available to sites over 1.75 acres)?	No	
Question 7:	Are there widespread contaminated soils on the site, high ground water table, or is this development classified as a lot-to-lot building?	No	Oversized detention is not allowed. Do not fill out Tab 2.1.9

**City of Chicago
Department of Water Mangement**

Name of Project: 59th Street Line
 Address: Access Path between Hoyne Ave and Damen Ave
 A/E of Record: Infrastructure Engineering, Inc

1.0 Rate Control (Sheet 2 of 2)

Step 3: Achieving Rate Control Measures

Unadjusted Detention Release Rate =	0.150	cfs	0.150	0.000
Dry Weather Flow Rate = (From dry weather flow worksheet)	0.000	cfs	Waiting for Dry Weather Flow worksheet to be completed	
Infiltration Facility Release Rate (to be added to eligible release rate when computing required storage)	0.000	cfs	No BMPs with infiltration beds entered on BMP Summary Worksheet or soil's infiltration rate is less than 0.5 in/hr	
Release rate for detention storage computations:	0.150	cfs		
Required Storage Volume =	2,583	cubic feet		

Detention Storage Calculations

(Based on Bulletin 70 Rainfall Data)

STORM EVENT (5,10,25,50 or 100) =

Storm Duration (minute)	Runoff Coefficient C	Rainfall Intensity (in/hr)	Drainage Area A (acres)	Allowable release rate 0.150 cfs				
				Inflow Rate Q=CIA	Total Storm Vol (cf)	Release Rate Q _o (cfs)	Storage Rate (Q _i -Q _o) (cfs)	Storage Volume Rate (Q _i -Q _o)*t*60 (cf)
5	0.51	10.920	0.45	2.49	746	0.150	2.34	701
10	0.51	10.020	0.45	2.28	1,368	0.150	2.13	1,278
15	0.51	8.200	0.45	1.87	1,680	0.150	1.72	1,545
30	0.51	5.600	0.45	1.27	2,294	0.150	1.12	2,024
60	0.51	3.560	0.45	0.81	2,917	0.150	0.66	2,377
120	0.51	2.235	0.45	0.51	3,663	0.150	0.36	2,583
180	0.51	1.617	0.45	0.37	3,974	0.150	0.22	2,354
360	0.51	0.947	0.45	0.22	4,654	0.150	0.07	1,414
720	0.51	0.549	0.45	0.12	5,400	0.150	-0.03	-1,080
1080	0.51	0.387	0.45	0.09	5,711	0.150	-0.06	-4,009
1440	0.51	0.316	0.45	0.07	6,211	0.150	-0.08	-6,749
2880	0.51	0.170	0.45	0.04	6,686	0.150	-0.11	-19,234
4320	0.51	0.122	0.45	0.03	7,194	0.150	-0.12	-31,686
7200	0.51	0.083	0.45	0.02	8,161	0.150	-0.13	-56,639
14400	0.51	0.046	0.45	0.01	9,128	0.150	-0.14	-120,472
							Required Detention Volume (cf)	2,583

Note: 1) the calculation assumes that the rising and recessing limb of inflow and outflow hydrograph are vertical

Name of Project: 59th Street Line
Address: Access Path between Hoyne Ave and Damen Ave
A/E of Record: Infrastructure Engineering, Inc

1.2 BMPs for Rate Control Credit

Volume Control BMP Summary for use in Rate Control Worksheet

Instructions for use:

This summary worksheet provides information for BMPs for use in the Rate Control Spreadsheet.

Storage provided should be from the computation made on the each individual BMP spreadsheet (2.1.1 to 2.1.8).

Total area of BMPs will carry over to Rate Control Worksheet.

Other areas (ie reduce pavement area if permeable pavement implemented) should adjusted such that Line 35 on Rate Control Worksheet equals total site area.

When the option exists, the applicant may decide whether or not to count volume control storage toward detention storage.

n/a = not applicable and indicates when credit is inappropriate or unavailable for a given BMP.

BMP Areas with Storage COUNTED toward Rate Control Volume					
Type "yes" to Select	BMP	BMP Infiltration Area (sq. ft.)	Storage Provided (cu. ft.)	Design Soil Infiltration Rate (in/hr) ³	Allowable Infiltration Release Rate (cfs)
yes	Bioinfiltration Systems	2,400	386	0.000	0.000
	Drainage Swales	0	0	0.000	0.000
n/a	Green Roof	n/a	n/a	n/a	n/a
	Infiltration Vault	0	0	0.000	0.000
n/a	Natural Landscaping and Stormwater Trees ¹	n/a	n/a	n/a	n/a
	Roof Runoff BMPs - Planter Boxes	0	0	0.000	0.000
	Roof Runoff BMPs - Rain Barrels and Cisterns	n/a	0	n/a	n/a
no	Permeable Paving	0	0	0.500	0.000
n/a	Vegetated Filter Strips ²	n/a	n/a	n/a	n/a
Totals		2,400	386	-	0.000

Notes:

1. Natural landscaping areas do not have specific storage, they can simply be entered on Rate Control Spreadsheet as having a C-value of 0.1. Detention Credit is not given for stormwater trees.
2. Vegetated Filter strips also are not given credit for a "volume of storage" and should be entered in the pervious land cover section of the Rate Control Spreadsheet based on their cover type.
3. Infiltration rate must be the design infiltration rate as explained in Stormwater Manual. If the infiltration rate is less than 0.5 in/hr, credit cannot be taken for infiltration and the Allowable Infiltration Release is set to zero. This value is automatically copied from each respective BMP spreadsheet.

BMP Areas with Storage NOT COUNTED toward Rate Control Volume			
Type "yes" to Select	BMP	Area (sq. ft.)	Storage Provided (cu. ft.)
	Bioinfiltration Systems	0	0
	Drainage Swales	0	0
n/a	Green Roof	n/a	n/a
n/a	Natural Landscaping and Stormwater Trees ¹	n/a	n/a
	Roof Runoff BMPs - Planter Boxes	0	0
	Permeable Paving	0	0
n/a	Vegetated Filter Strips ²	n/a	n/a
Totals		0	0

**City of Chicago
Department of Water Management**

Name of Project: 59th Street Line
 Address: Access Path between Hoyne Ave and Damen Ave
 A/E of Record: Infrastructure Engineering, Inc

2.0 Volume Control

Step 1:

Runoff Calculation

		Existing Area (sq ft)	Proposed Area (sq ft)
Pervious Surface or Land Cover not Counted as Impervious for Volume Control Calculations	Bare Earth		
	Lawn or Landscaped Areas	19,616	14,984
	Woodlands		
	Wetland		
Impervious Land	Gravel		
	Pavement		2,232
	Roofs (conventional)		
	Water (including Wet Bottom Basin to HWL)		
BMPs	Green Roof	-	
	Permeable Pavement	-	
	Bioinfiltration	-	2,400
	Swales	-	
	Stormwater Trees	-	
	Roof Runoff Planters	-	
	Filter Strips	-	
	Dry Bottom Basins to HWL	-	
Summary	Total pervious area (sq ft)	19,616	14,984
	Total impervious area (sq ft)	0	2,232
	Total BMP areas treated as impervious area (sq ft)	-	0
	Total BMP areas treated as pervious area (sq ft)	-	2,400
	Total site area (sq ft)	19,616	19,616
	Imperviousness percentage (%)	0.0	11.4

Step 2:

Volume Control Assessment

		Type Yes or No for all that apply	Note
Question 1:	Does the site drain directly to Waters?	No	
Question 2:	Are infiltration BMPs allowable? (See Chapter III Sections 4.1.2 of the Regulations.)	Yes	
Question 3:	Do you wish to use permeable pavement only as a pervious surface to achieve impervious surface reduction goal?	No	Areas of permeable pavement are included as an impervious surface for the computation made in Cell C48. Storage will be counted toward volume control goal.

Step 3:

Achieving Volume Control Measures

Achieve I. or II. below in accordance with the Ordinance.

I.	Capture 0.5" of runoff from impervious surfaces. Storage required =	93	cubic feet	Go to spreadsheet 2.1 BMP Volume Summary if electing volume control storage option
or, II.	Reduce proposed imperviousness to:	-	percent	

City of Chicago
Department of Water Management

8/11/2017

Name of Project: 59th Street Line
 Address: Access Path between Hoyne Ave and Damen Ave
 A/E of Record: Infrastructure Engineering, Inc

2.1.1 Bioinfiltration Systems

Section 1 Upstream Drainage Area				
1	Upstream impervious area including BMP area	A_t	4,632	square feet
2	Upstream weighted C-value (C-value=1.0 for bioinfiltration area for direct rainfall)	C	1.00	unitless
3	Volume of upstream runoff from a 1-inch storm = $C * A_t * 1/12$	$V_{upstream}$	386	cubic feet
4	Describe upstream drainage area	Paved access ramp area		
5	Describe upstream pretreatment or integration of pretreatment into BMP			

Section 2 BMP Feasibility				
6	Design soil infiltration rate (must be 0.5 in/hr or greater unless underdrain system is used)	i	0.00	in/hr
7	Elevation of bottom of BMP (the infiltration surface) IF there is no underdrain, OR the lowest underdrain invert elevation	$ELEV_{BMP}$	10.000	feet
8	Groundwater elevation	$ELEV_{GW}$	5.000	feet
9	Depth to seasonal groundwater (Must be 2 feet or greater, or 3.5 feet or greater if draining to combined sewer)	D_{GW}	5.0	feet

Section 3 BMP Specifications				
10	Dimensions of the bioinfiltration facility (length, width, or area)	L		feet
		W		feet
		A_{BMP}	2,400	square feet
11	Depth of prepared soil	D_1	0.0	feet
12	Prepared soil porosity (0.25 maximum unless detailed materials report provided)	P_1	0.25	feet
13	Depth of underlying aggregate (optional)	D_2	3.0	feet
14	Aggregate porosity (0.38 maximum unless detailed materials report provided)	P_2	0.38	feet
15	Surface storage volume (provide supporting calculations, max depth 12 inches)	V_{AIR}	0	cubic feet
16	Soil media storage volume = $A_{BMP} * [(D_1 * P_1) + (D_2 * P_2)]$	V_{SOIL}	2,736	cubic feet

Section 4 BMP Performance				
17	Volume of upstream runoff (Line 4)	$V_{upstream}$	386	cubic feet
18	Storage Provided = $V_{AIR} + V_{SOIL}$	V_{BMP}	2,736	cubic feet
19	V_{total} (equals lesser of V_{BMP} or $V_{upstream}$)	V_{total}	386	cubic feet

Date: 8/11/17
Rev. Date: _____

City of Chicago
Department of Water Management

Stormwater Spreadsheet Tool

Release 3.1 effective January 1, 2016

1. DOB Tracking/Permit Number:	_____
2. Name of Project:	<u>59th Street Line</u>
3. Address of Site:	<u>Main Trail from Hoyne Ave to Damen Ave</u> <u>Sta 8+66 to Sta 13+32</u>
Architect / Engineer of Record:	<u>Infrastructure Engineering, Inc</u>
Phone No.:	<u>312-425-9560</u>
4. Description of Proposed Work:	<u>Proposed 22 feet wide paved trail</u> _____ _____ _____
5. Use of Building (if applicable):	_____ _____
6. Sewer Altas & Drain Atlas Referenced:	_____
7. Area of Site:	<u>15,245</u> square feet (Square Feet = Acres * 43560) <u>0.350</u> acres (Acres = Square Feet / 43560)

This spreadsheet tool has been prepared to assist the applicant in preparing calculations for simple sites. The applicant is responsible for ensuring that submitted calculations are correct. If necessary, supporting hand calculations should be prepared and submitted.

Color Coding

-  - Cell Contents Computed by Spreadsheet
-  - Cell for User Entry
-  - Cell Includes Comment (when cursor is over it)

**City of Chicago
Department of Water Management**

Stormwater Spreadsheet Tool

INDEX OF SPREADSHEETS

Required>>	<input checked="" type="checkbox"/>	COVER
Required>>	<input checked="" type="checkbox"/>	INDEX
	<input type="checkbox"/>	0.0 RELEASE RATE
Required>>	<input checked="" type="checkbox"/>	1.0 RATE CONTROL
	<input type="checkbox"/>	1.1 Dry Weather Flow
	<input checked="" type="checkbox"/>	1.2 BMPs-Rate Control Credit
	<input type="checkbox"/>	1.3 Orifice Sizing Calculation
Required>>	<input checked="" type="checkbox"/>	2.0 VOLUME CONTROL
	<input type="checkbox"/>	2.1 BMP Volume Summary
	<input type="checkbox"/>	2.1.1 Bioinfiltration
	<input type="checkbox"/>	2.1.2 Drainage Swales
	<input type="checkbox"/>	2.1.3 Green Roof
	<input type="checkbox"/>	2.1.4 Infiltration Vault
	<input type="checkbox"/>	2.1.5 Trees
	<input checked="" type="checkbox"/>	2.1.6 Permeable Pavement
	<input type="checkbox"/>	2.1.7.1 Roof Runoff BMPs - Planter Boxes
	<input type="checkbox"/>	2.1.7.2 Roof Runoff BMPs - Rain Barrels / Cisterns
	<input type="checkbox"/>	2.1.8 Filter Strips
	<input type="checkbox"/>	2.1.9 Oversized Detention

**City of Chicago
Department of Water Management**

Name of Project: 59th Street Line
 Address: Main Trail from Hoyne Ave to Damen Ave
 A/E of Record: Infrastructure Engineering, Inc

1.0 Rate Control (Sheet 1 of 2)

Step 1: Runoff Calculation

		Proposed Area (sq. ft.)	C-Value 100-Year	Storage Volume (cu. ft.)
Pervious Land	Lawns - Sandy soil, flat, 0% to 2%		0.18	
	Lawns - Sandy soil, avg, 2% to 7%		0.27	
	Lawns - Sandy soil, steep, >7%		0.36	
	Lawns - Heavy soil, flat, 0% to 2%	4,993	0.30	
	Lawns - Heavy soil, avg, 2% to 7%		0.42	
	Lawns - Heavy soil, steep, >7%		0.47	
	Woodlands, flat, 2%		0.39	
	Native Vegetation with prepared soils		0.10	
	Dry bottom basins to HWL		0.75	
	Wetland		0.80	
Impervious Land	Green Roof		0.50	
	Gravel		0.70	
	Pavement		0.95	
	Roofs (conventional)		0.95	
	Building sidewalls connected by side gutters (enter 25% of the face of the sidewall)		0.95	
	Wet bottom basins to HWL		1.00	
BMP areas	BMPs providing storage that WILL COUNT toward detention storage (from Worksheet 1.2)	10,252	1.00	
	BMPs providing volume control storage that WILL NOT BE COUNTED toward detention (from Worksheet 1.2)	0		0

Summary	Total pervious area (sq ft)	4,993	
	Total impervious area (sq ft)	0	
	Total BMP area (sq ft)	10,252	
	Total site area (sq ft)	15,245	
	Weighted C- value (non BMP areas)	0.30	
	Adjusted C-value (accounts for BMPs)	0.77	
Notes:	Make note of any adjustments made for purposes of detention calcs here (such as removal of roof area that will discharge directly to Waters)		

Step 2: Allowable Release Rate Assessment

	Type Yes or No for all that apply	Notes
Question 1: Does the site drain directly to Waters?	No	
Question 2: Does the site only include residential land use for detached single-family and two-family dwellings?	No	
Question 3: Is the Regulated Development a Lot to Lot Building (85% or more of site footprint is occupied by buildings)?	No	
Question 4: Do you plan to use the standard maximum release rate (only available to sites less than 1.75 acres)?	Yes	Standard Detention Release Rate based on total site area (Cell D36) minus any tributary sidewalls
Question 5: Is the site more than 75 percent of substantially contiguous at-grade open space that is conducive to ponding of surface waters (Answer "No" if site discharges to waterway or is a service station)?	No	
Question 6: Does the development involve flow diversions (existing sewer connection to be relocated to a different main) or multiple sewer connections (only available to sites over 1.75 acres)?	No	
Question 7: Are there widespread contaminated soils on the site, high ground water table, or is this development classified as a lot-to-lot building?	No	Oversized detention is not allowed. Do not fill out Tab 2.1.9

**City of Chicago
Department of Water Management**

Name of Project: 59th Street Line
 Address: Main Trail from Hoyne Ave to Damen Ave
 A/E of Record: Infrastructure Engineering, Inc

1.0 Rate Control (Sheet 2 of 2)

Step 3: Achieving Rate Control Measures

Unadjusted Detention Release Rate =	0.150	cfs	0.150	0.000
Dry Weather Flow Rate = (From dry weather flow worksheet)	0.000	cfs	Waiting for Dry Weather Flow worksheet to be completed	
Infiltration Facility Release Rate (to be added to eligible release rate when computing required storage)	0.119	cfs		
Release rate for detention storage computations:	0.269	cfs		
Required Storage Volume =	2,490	cubic feet		

Detention Storage Calculations

(Based on Bulletin 70 Rainfall Data)

STORM EVENT (5,10,25,50 or 100) =

Storm Duration (minute)	Runoff Coefficient C	Rainfall Intensity (in/hr)	Drainage Area A (acres)	STORM EVENT (5,10,25,50 or 100) =					
				Inflow Rate Q=CIA	Total Storm Vol (cf)	Release Rate Q _o (cfs)	Storage Rate (Q _i -Q _o) (cfs)	Storage Volume Rate (Q _i -Q _o)*t*60 (cf)	
						Allowable release rate	0.269	cfs	
		100							
5	0.77	10.920	0.35	2.95	884	0.269	2.68	803	
10	0.77	10.020	0.35	2.70	1,622	0.269	2.43	1,460	
15	0.77	8.200	0.35	2.21	1,991	0.269	1.94	1,749	
30	0.77	5.600	0.35	1.51	2,719	0.269	1.24	2,235	
60	0.77	3.560	0.35	0.96	3,457	0.269	0.69	2,490	
120	0.77	2.235	0.35	0.60	4,341	0.269	0.33	2,406	
180	0.77	1.617	0.35	0.44	4,710	0.269	0.17	1,808	
360	0.77	0.947	0.35	0.26	5,516	0.269	-0.01	-287	
720	0.77	0.549	0.35	0.15	6,399	0.269	-0.12	-5,207	
1080	0.77	0.387	0.35	0.10	6,768	0.269	-0.16	-10,641	
1440	0.77	0.316	0.35	0.09	7,361	0.269	-0.18	-15,851	
2880	0.77	0.170	0.35	0.05	7,924	0.269	-0.22	-38,500	
4320	0.77	0.122	0.35	0.03	8,526	0.269	-0.24	-61,110	
7200	0.77	0.083	0.35	0.02	9,672	0.269	-0.25	-106,388	
14400	0.77	0.046	0.35	0.01	10,818	0.269	-0.26	-221,302	
							Required Detention Volume (cf)	2,490	

Note: 1) the calculation assumes that the rising and recessing limb of inflow and outflow hydrograph are vertical

City of Chicago
Department of Water Management

Name of Project: 59th Street Line
 Address: Main Trail from Hoyne Ave to Damen Ave
 A/E of Record: Infrastructure Engineering, Inc

1.2 BMPs for Rate Control Credit

Volume Control BMP Summary for use in Rate Control Worksheet

Instructions for use:

This summary worksheet provides information for BMPs for use in the Rate Control Spreadsheet.

Storage provided should be from the computation made on the each individual BMP spreadsheet (2.1.1 to 2.1.8).

Total area of BMPs will carry over to Rate Control Worksheet.

Other areas (ie reduce pavement area if permeable pavement implemented) should adjusted such that Line 35 on Rate Control Worksheet equals total site area.

When the option exists, the applicant may decide whether or not to count volume control storage toward detention storage.

n/a = not applicable and indicates when credit is inappropriate or unavailable for a given BMP.

BMP Areas with Storage COUNTED toward Rate Control Volume					
Type "yes" to Select	BMP	BMP Infiltration Area (sq. ft.)	Storage Provided (cu. ft.)	Design Soil Infiltration Rate (in/hr) ³	Allowable Infiltration Release Rate (cfs)
	Bioinfiltration Systems	0	0	0.000	0.000
	Drainage Swales	0	0	0.000	0.000
n/a	Green Roof	n/a	n/a	n/a	n/a
	Infiltration Vault	0	0	0.000	0.000
n/a	Natural Landscaping and Stormwater Trees ¹	n/a	n/a	n/a	n/a
	Roof Runoff BMPs - Planter Boxes	0	0	0.000	0.000
	Roof Runoff BMPs - Rain Barrels and Cisterns	n/a	0	n/a	n/a
yes	Permeable Paving	10,252	812	0.500	0.119
n/a	Vegetated Filter Strips ²	n/a	n/a	n/a	n/a
Totals		10,252	812	-	0.119

Notes:

1. Natural landscaping areas do not have specific storage, they can simply be entered on Rate Control Spreadsheet as having a C-value of 0.1. Detention Credit is not given for stormwater trees.
2. Vegetated Filter strips also are not given credit for a "volume of storage" and should be entered in the pervious land cover section of the Rate Control Spreadsheet based on their cover type.
3. Infiltration rate must be the design infiltration rate as explained in Stormwater Manual. If the infiltration rate is less than 0.5 in/hr, credit cannot be taken for infiltration and the Allowable Infiltration Release is set to zero. This value is automatically copied from each respective BMP spreadsheet.

BMP Areas with Storage NOT COUNTED toward Rate Control Volume			
Type "yes" to Select	BMP	Area (sq. ft.)	Storage Provided (cu. ft.)
	Bioinfiltration Systems	0	0
	Drainage Swales	0	0
n/a	Green Roof	n/a	n/a
n/a	Natural Landscaping and Stormwater Trees ¹	n/a	n/a
	Roof Runoff BMPs - Planter Boxes	0	0
	Permeable Paving	0	0
n/a	Vegetated Filter Strips ²	n/a	n/a
Totals		0	0

**City of Chicago
Department of Water Management**

Name of Project: 59th Street Line
 Address: Main Trail from Hoyne Ave to Damen Ave
 A/E of Record: Infrastructure Engineering, Inc

2.0 Volume Control

Step 1:

Runoff Calculation

		Existing Area (sq ft)	Proposed Area (sq ft)
Pervious Surface or Land Cover not Counted as Impervious for Volume Control Calculations	Bare Earth		
	Lawn or Landscaped Areas	15,245	4,993
	Woodlands		
	Wetland		
Impervious Land	Gravel		
	Pavement		
	Roofs (conventional)		
	Water (including Wet Bottom Basin to HWL)		
BMPs	Green Roof	-	
	Permeable Pavement	-	10,252
	Bioinfiltration	-	
	Swales	-	
	Stormwater Trees	-	
	Roof Runoff Planters	-	
	Filter Strips	-	
	Dry Bottom Basins to HWL	-	
Summary	Total pervious area (sq ft)	15,245	4,993
	Total impervious area (sq ft)	0	0
	Total BMP areas treated as impervious area (sq ft)	-	10,252
	Total BMP areas treated as pervious area (sq ft)	-	0
	Total site area (sq ft)	15,245	15,245
	Imperviousness percentage (%)	0.0	0.0

Please be sure to ans

Please be sure to ans

Step 2:

Volume Control Assessment

		Type Yes or No for all that apply	Note
Question 1:	Does the site drain directly to Waters?	No	
Question 2:	Are infiltration BMPs allowable? (See Chapter III Sections 4.1.2 of the Regulations.)	Yes	
Question 3:	Do you wish to use permeable pavement only as a pervious surface to achieve impervious surface reduction goal?	No	Areas of permeable pavement are included as an impervious surface for the computation made in Cell C48. Storage will be counted toward volume control goal.

Step 3:

Achieving Volume Control Measures

Achieve I. or II. below in accordance with the Ordinance.

I.	Capture 0.5" of runoff from impervious surfaces. Storage required =	427	cubic feet	Go to spreadsheet 2.1 BMP Volume Summary if electing volume control storage option
or, II.	Reduce proposed imperviousness to:	-	percent	

City of Chicago
Department of Water Management

Name of Project: 59th Street Line
 Address: Main Trail from Hoyne Ave to Damen Ave
 A/E of Record: Infrastructure Engineering, Inc

2.1.6 Permeable Pavement

Section 1 Upstream Drainage Area				
1	Upstream impervious area including area of permeable pavement	A_i	10,252	square feet
2	Upstream weighted C-value (C-value=0.95 for permeable pavement areas for nearly direct rainfall)	C	0.95	unitless
3	Volume of upstream runoff from a 1-inch storm = $C * A_t * 1/12$	$V_{upstream}$	812	cubic feet
4	Describe intended function of system (Is it standalone system designed for infiltration, is it integrated as part of the detention storage, is it underdrained to downstream system, will it receive upstream runoff?)			

Section 2 BMP Feasibility				
5	Design soil infiltration rate (must be 0.5 in/hr or greater unless underdrain system is used)	i	0.500	in/hr
6	Allowable depth of storage aggregate without provision of underdrain (=i/ 12 inches/ft * 48 hours)	D_{allow}	2.00	feet
7	Elevation of bottom of BMP (the infiltration surface) IF there is no underdrain, OR the lowest underdrain invert elevation	$ELEV_{BMP}$	44.000	feet
8	Groundwater elevation	$ELEV_{GW}$	26.000	feet
9	Depth to seasonal groundwater (Must be 2 feet or greater, or 3.5 feet or greater if draining to combined sewer)	D_{GW}	18.0	feet

Section 3 BMP Specifications				
10	Dimensions of the permeable pavement (length, width, or area)	L	466.0	feet
		W	22.0	feet
		A_{BMP}	10,252	square feet
11	Depth of underlying aggregate (must be less than D_{allow})	D_1	1.0	feet
12	Aggregate porosity (0.38 maximum unless detailed materials report provided)	P_1	0.38	feet
13	Volume of Aggregate storage applicable to volume control = $A_{BMP} * D_1 * P_1$	V_{BMP}	3,896	cubic feet

Section 4 BMP Performance				
14	Volume of upstream runoff (Line 3)	$V_{upstream}$	812	cubic feet
15	Volume Control Storage Provided = V_{BMP}	V_{BMP}	3,896	cubic feet
16	V_{total} (equals lesser of V_{BMP} or $V_{upstream}$)	V_{total}	812	cubic feet

DETENTION CALCULATIONS FOR ENGLEWOOD TRAIL

CITY BLOCK FROM DAMEN AVE TO WINCHESTER AVE
See Exhibit 2-04a: Drainage Areas Sheet 2

1. Trail from STA 13+98 to STA 16+63
2. South access path to trail from STA 1000+00 to STA 1003+70

Detention Requirement Summary		
	Main Trail	South Access Path
Rate Control (cu ft)	992	2,994
Volume Control (cu ft)	242	161
Total Detention Required (cu ft)	1,234	3,155
Detention Provided (cu ft)	2,211	3,192

Date: 8/11/17
Rev. Date: _____

City of Chicago
Department of Water Management

Stormwater Spreadsheet Tool

Release 3.1 effective January 1, 2016

1. DOB Tracking/Permit Number:	_____
2. Name of Project:	<u>59th Street Line</u>
3. Address of Site:	<u>Main Trail from Damen Ave to Winchester Ave</u> <u>Sta 13+98 to Sta 16+63</u>
Architect / Engineer of Record:	<u>Infrastructure Engineering, Inc</u>
Phone No.:	<u>312-425-9560</u>
4. Description of Proposed Work:	<u>Proposed 22 feet wide paved trail</u> _____ _____ _____
5. Use of Building (if applicable):	_____ _____
6. Sewer Altas & Drain Atlas Referenced:	_____
7. Area of Site:	<u>6,344</u> square feet (Square Feet = Acres * 43560) <u>0.146</u> acres (Acres = Square Feet / 43560)

This spreadsheet tool has been prepared to assist the applicant in preparing calculations for simple sites. The applicant is responsible for ensuring that submitted calculations are correct. If necessary, supporting hand calculations should be prepared and submitted.

Color Coding

-  - Cell Contents Computed by Spreadsheet
-  - Cell for User Entry
-  - Cell Includes Comment (when cursor is over it)

**City of Chicago
Department of Water Management**

Stormwater Spreadsheet Tool

INDEX OF SPREADSHEETS

Required>>	<input checked="" type="checkbox"/>	COVER
Required>>	<input checked="" type="checkbox"/>	INDEX
	<input type="checkbox"/>	0.0 RELEASE RATE
Required>>	<input checked="" type="checkbox"/>	1.0 RATE CONTROL
	<input type="checkbox"/>	1.1 Dry Weather Flow
	<input checked="" type="checkbox"/>	1.2 BMPs-Rate Control Credit
	<input type="checkbox"/>	1.3 Orifice Sizing Calculation
Required>>	<input checked="" type="checkbox"/>	2.0 VOLUME CONTROL
	<input type="checkbox"/>	2.1 BMP Volume Summary
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	<input checked="" type="checkbox"/>	2.1.6 Permeable Pavement
	<input type="checkbox"/>	2.1.7.1 Roof Runoff BMPs - Planter Boxes
	<input type="checkbox"/>	2.1.7.2 Roof Runoff BMPs - Rain Barrels / Cisterns
	<input type="checkbox"/>	2.1.8 Filter Strips
	<input type="checkbox"/>	2.1.9 Oversized Detention

**City of Chicago
Department of Water Management**

Name of Project: 59th Street Line
 Address: Main Trail from Damen Ave to Winchester Ave
 A/E of Record: Infrastructure Engineering, Inc

1.0 Rate Control (Sheet 1 of 2)

Step 1: Runoff Calculation

		Proposed Area (sq. ft.)	C-Value 100-Year	Storage Volume (cu. ft.)
Pervious Land	Lawns - Sandy soil, flat, 0% to 2%		0.18	
	Lawns - Sandy soil, avg, 2% to 7%		0.27	
	Lawns - Sandy soil, steep, >7%		0.36	
	Lawns - Heavy soil, flat, 0% to 2%	525	0.30	
	Lawns - Heavy soil, avg, 2% to 7%		0.42	
	Lawns - Heavy soil, steep, >7%		0.47	
	Woodlands, flat, 2%		0.39	
	Native Vegetation with prepared soils		0.10	
	Dry bottom basins to HWL		0.75	
	Wetland		0.80	
Impervious Land	Green Roof		0.50	
	Gravel		0.70	
	Pavement		0.95	
	Roofs (conventional)		0.95	
	Building sidewalls connected by side gutters (enter 25% of the face of the sidewall)		0.95	
	Wet bottom basins to HWL		1.00	
BMP areas	BMPs providing storage that WILL COUNT toward detention storage (from Worksheet 1.2)	5,819	1.00	
	BMPs providing volume control storage that WILL NOT BE COUNTED toward detention (from Worksheet 1.2)	0		0

Summary	Total pervious area (sq ft)	525	
	Total impervious area (sq ft)	0	
	Total BMP area (sq ft)	5,819	
	Total site area (sq ft)	6,344	
	Weighted C- value (non BMP areas)	0.30	
	Adjusted C-value (accounts for BMPs)	0.94	
Notes:	Make note of any adjustments made for purposes of detention calcs here (such as removal of roof area that will discharge directly to Waters)		

Step 2: Allowable Release Rate Assessment

	Type Yes or No for all that apply	Notes
Question 1: Does the site drain directly to Waters?	No	
Question 2: Does the site only include residential land use for detached single-family and two-family dwellings?	No	
Question 3: Is the Regulated Development a Lot to Lot Building (85% or more of site footprint is occupied by buildings)?	No	
Question 4: Do you plan to use the standard maximum release rate (only available to sites less than 1.75 acres)?	Yes	Standard Detention Release Rate based on total site area (Cell D36) minus any tributary sidewalls
Question 5: Is the site more than 75 percent of substantially contiguous at-grade open space that is conducive to ponding of surface waters (Answer "No" if site discharges to waterway or is a service station)?	No	
Question 6: Does the development involve flow diversions (existing sewer connection to be relocated to a different main) or multiple sewer connections (only available to sites over 1.75 acres)?	No	
Question 7: Are there widespread contaminated soils on the site, high ground water table, or is this development classified as a lot-to-lot building?	No	Oversized detention is not allowed. Do not fill out Tab 2.1.9

**City of Chicago
Department of Water Management**

Name of Project: 59th Street Line
 Address: Main Trail from Damen Ave to Winchester Ave
 A/E of Record: Infrastructure Engineering, Inc

1.0 Rate Control (Sheet 2 of 2)

Step 3: Achieving Rate Control Measures

Unadjusted Detention Release Rate =	0.150	cfs	0.150	0.000
Dry Weather Flow Rate = (From dry weather flow worksheet)	0.000	cfs	Waiting for Dry Weather Flow worksheet to be completed	
Infiltration Facility Release Rate (to be added to eligible release rate when computing required storage)	0.067	cfs		
Release rate for detention storage computations:	0.217	cfs		
Required Storage Volume =	992	cubic feet		

Detention Storage Calculations

(Based on Bulletin 70 Rainfall Data)

STORM EVENT (5,10,25,50 or 100) =

100

Allowable release rate 0.217 cfs

Storm Duration (minute)	Runoff Coefficient C	Rainfall Intensity (in/hr)	Drainage Area A (acres)	Inflow Rate Q=CIA	Total Storm Vol (cf)	Release Rate Qo (cfs)	Storage Rate (Qi-Qo) (cfs)	Storage Volume Rate (Qi-Qo)*t*60 (cf)
5	0.94	10.920	0.15	1.50	449	0.217	1.28	384
10	0.94	10.020	0.15	1.37	825	0.217	1.16	694
15	0.94	8.200	0.15	1.13	1,013	0.217	0.91	817
30	0.94	5.600	0.15	0.77	1,383	0.217	0.55	992
60	0.94	3.560	0.15	0.49	1,758	0.217	0.27	976
120	0.94	2.235	0.15	0.31	2,208	0.217	0.09	643
180	0.94	1.617	0.15	0.22	2,396	0.217	0.00	48
360	0.94	0.947	0.15	0.13	2,805	0.217	-0.09	-1,889
720	0.94	0.549	0.15	0.08	3,255	0.217	-0.14	-6,135
1080	0.94	0.387	0.15	0.05	3,443	0.217	-0.16	-10,642
1440	0.94	0.316	0.15	0.04	3,744	0.217	-0.17	-15,035
2880	0.94	0.170	0.15	0.02	4,030	0.217	-0.19	-33,528
4320	0.94	0.122	0.15	0.02	4,337	0.217	-0.20	-52,000
7200	0.94	0.083	0.15	0.01	4,919	0.217	-0.21	-88,976
14400	0.94	0.046	0.15	0.01	5,502	0.217	-0.21	-182,288
Required Detention Volume (cf)								992

Note: 1) the calculation assumes that the rising and recessing limb of inflow and outflow hydrograph are vertical

City of Chicago
Department of Water Management

Name of Project: 59th Street Line
 Address: Main Trail from Damen Ave to Winchester Ave
 A/E of Record: Infrastructure Engineering, Inc

1.2 BMPs for Rate Control Credit

Volume Control BMP Summary for use in Rate Control Worksheet

Instructions for use:

This summary worksheet provides information for BMPs for use in the Rate Control Spreadsheet.
 Storage provided should be from the computation made on the each individual BMP spreadsheet (2.1.1 to 2.1.8).
 Total area of BMPs will carry over to Rate Control Worksheet.
 Other areas (ie reduce pavement area if permeable pavement implemented) should adjusted such that Line 35 on Rate Control Worksheet equals total site area.
 When the option exists, the applicant may decide whether or not to count volume control storage toward detention storage.
 n/a = not applicable and indicates when credit is inappropriate or unavailable for a given BMP.

BMP Areas with Storage COUNTED toward Rate Control Volume					
Type "yes" to Select	BMP	BMP Infiltration Area (sq. ft.)	Storage Provided (cu. ft.)	Design Soil Infiltration Rate (in/hr) ³	Allowable Infiltration Release Rate (cfs)
	Bioinfiltration Systems	0	0	0.000	0.000
	Drainage Swales	0	0	0.000	0.000
n/a	Green Roof	n/a	n/a	n/a	n/a
	Infiltration Vault	0	0	0.000	0.000
n/a	Natural Landscaping and Stormwater Trees ¹	n/a	n/a	n/a	n/a
	Roof Runoff BMPs - Planter Boxes	0	0	0.000	0.000
	Roof Runoff BMPs - Rain Barrels and Cisterns	n/a	0	n/a	n/a
yes	Permeable Paving	5,819	461	0.500	0.067
n/a	Vegetated Filter Strips ²	n/a	n/a	n/a	n/a
Totals		5,819	461	-	0.067

Notes:

1. Natural landscaping areas do not have specific storage, they can simply be entered on Rate Control Spreadsheet as having a C-value of 0.1. Detention Credit is not given for stormwater trees.
2. Vegetated Filter strips also are not given credit for a "volume of storage" and should be entered in the pervious land cover section of the Rate Control Spreadsheet based on their cover type.
3. Infiltration rate must be the design infiltration rate as explained in Stormwater Manual. If the infiltration rate is less than 0.5 in/hr, credit cannot be taken for infiltration and the Allowable Infiltration Release is set to zero. This value is automatically copied from each respective BMP spreadsheet.

BMP Areas with Storage NOT COUNTED toward Rate Control Volume			
Type "yes" to Select	BMP	Area (sq. ft.)	Storage Provided (cu. ft.)
	Bioinfiltration Systems	0	0
	Drainage Swales	0	0
n/a	Green Roof	n/a	n/a
n/a	Natural Landscaping and Stormwater Trees ¹	n/a	n/a
	Roof Runoff BMPs - Planter Boxes	0	0
	Permeable Paving	0	0
n/a	Vegetated Filter Strips ²	n/a	n/a
Totals		0	0

**City of Chicago
Department of Water Management**

Name of Project: 59th Street Line
 Address: Main Trail from Damen Ave to Winchester Ave
 A/E of Record: Infrastructure Engineering, Inc

2.0 Volume Control

Step 1:

Runoff Calculation

		Existing Area (sq ft)	Proposed Area (sq ft)
Pervious Surface or Land Cover not Counted as Impervious for Volume Control Calculations	Bare Earth		
	Lawn or Landscaped Areas	6,344	525
	Woodlands		
	Wetland		
Impervious Land	Gravel		
	Pavement		
	Roofs (conventional)		
	Water (including Wet Bottom Basin to HWL)		
BMPs	Green Roof	-	
	Permeable Pavement	-	5,819
	Bioinfiltration	-	
	Swales	-	
	Stormwater Trees	-	
	Roof Runoff Planters	-	
	Filter Strips	-	
	Dry Bottom Basins to HWL	-	
Summary	Total pervious area (sq ft)	6,344	525
	Total impervious area (sq ft)	0	0
	Total BMP areas treated as impervious area (sq ft)	-	5,819
	Total BMP areas treated as pervious area (sq ft)	-	0
	Total site area (sq ft)	6,344	6,344
	Imperviousness percentage (%)	0.0	0.0

Please be sure to ans

Please be sure to ans

Step 2:

Volume Control Assessment

		Type Yes or No for all that apply	Note
Question 1:	Does the site drain directly to Waters?	No	
Question 2:	Are infiltration BMPs allowable? (See Chapter III Sections 4.1.2 of the Regulations.)	Yes	
Question 3:	Do you wish to use permeable pavement only as a pervious surface to achieve impervious surface reduction goal?	No	Areas of permeable pavement are included as an impervious surface for the computation made in Cell C48. Storage will be counted toward volume control goal.

Step 3:

Achieving Volume Control Measures

Achieve I. or II. below in accordance with the Ordinance.

I.	Capture 0.5" of runoff from impervious surfaces. Storage required =	242	cubic feet	Go to spreadsheet 2.1 BMP Volume Summary if electing volume control storage option
or, II.	Reduce proposed imperviousness to:	-	percent	

City of Chicago
Department of Water Management

Name of Project: 59th Street Line
 Address: Main Trail from Damen Ave to Winchester Ave
 A/E of Record: Infrastructure Engineering, Inc

2.1.6 Permeable Pavement

Section 1 Upstream Drainage Area				
1	Upstream impervious area including area of permeable pavement	A_i	5,819	square feet
2	Upstream weighted C-value (C-value=0.95 for permeable pavement areas for nearly direct rainfall)	C	0.95	unitless
3	Volume of upstream runoff from a 1-inch storm = $C * A_t * 1/12$	$V_{upstream}$	461	cubic feet
4	Describe intended function of system (Is it standalone system designed for infiltration, is it integrated as part of the detention storage, is it underdrained to downstream system, will it receive upstream runoff?)			

Section 2 BMP Feasibility				
5	Design soil infiltration rate (must be 0.5 in/hr or greater unless underdrain system is used)	i	0.500	in/hr
6	Allowable depth of storage aggregate without provision of underdrain (=i/ 12 inches/ft * 48 hours)	D_{allow}	2.00	feet
7	Elevation of bottom of BMP (the infiltration surface) IF there is no underdrain, OR the lowest underdrain invert elevation	$ELEV_{BMP}$	44.000	feet
8	Groundwater elevation	$ELEV_{GW}$	26.000	feet
9	Depth to seasonal groundwater (Must be 2 feet or greater, or 3.5 feet or greater if draining to combined sewer)	D_{GW}	18.0	feet

Section 3 BMP Specifications				
10	Dimensions of the permeable pavement (length, width, or area)	L	264.5	feet
		W	22.0	feet
		A_{BMP}	5,819	square feet
11	Depth of underlying aggregate (must be less than D_{allow})	D_1	1.0	feet
12	Aggregate porosity (0.38 maximum unless detailed materials report provided)	P_1	0.38	feet
13	Volume of Aggregate storage applicable to volume control = $A_{BMP} * D_1 * P_1$	V_{BMP}	2,211	cubic feet

Section 4 BMP Performance				
14	Volume of upstream runoff (Line 3)	$V_{upstream}$	461	cubic feet
15	Volume Control Storage Provided = V_{BMP}	V_{BMP}	2,211	cubic feet
16	V_{total} (equals lesser of V_{BMP} or $V_{upstream}$)	V_{total}	461	cubic feet

Date: 8/11/17
Rev. Date: _____

City of Chicago
Department of Water Management

Stormwater Spreadsheet Tool

Release 3.1 effective January 1, 2016

1. DOB Tracking/Permit Number:

2. Name of Project:
Englewood Trail

3. Address of Site:
South Access Path between Damen Ave and Winchester Ave
City block from Sta 13+98 to Sta 16+63

Architect / Engineer of Record: Infrastructure Engineering, Inc
Phone No.: 312-425-9560

4. Description of Proposed Work:

5. Use of Building (if applicable):

6. Sewer Altas & Drain Atlas Referenced:

7. Area of Site:
18,551 square feet (Square Feet = Acres * 43560)
0.426 acres (Acres = Square Feet / 43560)

This spreadsheet tool has been prepared to assist the applicant in preparing calculations for simple sites. The applicant is responsible for ensuring that submitted calculations are correct. If necessary, supporting hand calculations should be prepared and submitted.

Color Coding

-  - Cell Contents Computed by Spreadsheet
-  - Cell for User Entry
-  - Cell Includes Comment (when cursor is over it)

**City of Chicago
Department of Water Management**

Stormwater Spreadsheet Tool

INDEX OF SPREADSHEETS

Required>>	<input checked="" type="checkbox"/>	COVER
Required>>	<input checked="" type="checkbox"/>	INDEX
	<input type="checkbox"/>	0.0 RELEASE RATE
Required>>	<input checked="" type="checkbox"/>	1.0 RATE CONTROL
	<input type="checkbox"/>	1.1 Dry Weather Flow
	<input checked="" type="checkbox"/>	1.2 BMPs-Rate Control Credit
	<input type="checkbox"/>	1.3 Orifice Sizing Calculation
Required>>	<input checked="" type="checkbox"/>	2.0 VOLUME CONTROL
	<input type="checkbox"/>	2.1 BMP Volume Summary
	<input checked="" type="checkbox"/>	2.1.1 Bioinfiltration
	<input type="checkbox"/>	2.1.2 Drainage Swales
	<input type="checkbox"/>	2.1.3 Green Roof
	<input type="checkbox"/>	2.1.4 Infiltration Vault
	<input type="checkbox"/>	2.1.5 Trees
	<input type="checkbox"/>	2.1.6 Permeable Pavement
	<input type="checkbox"/>	2.1.7.1 Roof Runoff BMPs - Planter Boxes
	<input type="checkbox"/>	2.1.7.2 Roof Runoff BMPs - Rain Barrels / Cisterns
	<input type="checkbox"/>	2.1.8 Filter Strips
	<input type="checkbox"/>	2.1.9 Oversized Detention

**City of Chicago
Department of Water Management**

Name of Project: Englewood Trail
 Address: South Access Path between Damen Ave and Winchester Ave
 A/E of Record: Infrastructure Engineering, Inc

1.0 Rate Control (Sheet 1 of 2)

Step 1: Runoff Calculation

		Proposed Area (sq. ft.)	C-Value 100- Year	Storage Volume (cu. ft.)
Pervious Land	Lawns - Sandy soil, flat, 0% to 2%		0.18	
	Lawns - Sandy soil, avg, 2% to 7%		0.27	
	Lawns - Sandy soil, steep, >7%		0.36	
	Lawns - Heavy soil, flat, 0% to 2%	4,756	0.30	
	Lawns - Heavy soil, avg, 2% to 7%	7,131	0.42	
	Lawns - Heavy soil, steep, >7%		0.47	
	Woodlands, flat, 2%		0.39	
	Native Vegetation with prepared soils		0.10	
	Dry bottom basins to HWL		0.75	
	Wetland		0.80	
Impervious Land	Green Roof		0.50	
	Gravel		0.70	
	Pavement	3,864	0.95	
	Roofs (conventional)		0.95	
	Building sidewalls connected by side gutters (enter 25% of the face of the sidewall)		0.95	
	Wet bottom basins to HWL		1.00	
BMP areas	BMPs providing storage that WILL COUNT toward detention storage (from Worksheet 1.2)	2,800	1.00	
	BMPs providing volume control storage that WILL NOT BE COUNTED toward detention (from Worksheet 1.2)	0		0

Summary	Total pervious area (sq ft)	11,887
	Total impervious area (sq ft)	3,864
	Total BMP area (sq ft)	2,800
	Total site area (sq ft)	18,551
	Weighted C- value (non BMP areas)	0.51
	Adjusted C-value (accounts for BMPs)	0.59
Notes:	Make note of any adjustments made for purposes of detention calcs here (such as removal of roof area that will discharge directly to Waters)	

Step 2: Allowable Release Rate Assessment

	Type Yes or No for all that apply	Notes
Question 1: Does the site drain directly to Waters?	No	
Question 2: Does the site only include residential land use for detached single-family and two-family dwellings?	No	
Question 3: Is the Regulated Development a Lot to Lot Building (85% or more of site footprint is occupied by buildings)?	No	
Question 4: Do you plan to use the standard maximum release rate (only available to sites less than 1.75 acres)?	Yes	Standard Detention Release Rate based on total site area (Cell D36) minus any tributary sidewalls
Question 5: Is the site more than 75 percent of substantially contiguous at-grade open space that is conducive to ponding of surface waters (Answer "No" if site discharges to waterway or is a service station)?	No	
Question 6: Does the development involve flow diversions (existing sewer connection to be relocated to a different main) or multiple sewer connections (only available to sites over 1.75 acres)?	No	
Question 7: Are there widespread contaminated soils on the site, high ground water table, or is this development classified as a lot-to-lot building?	No	Oversized detention is not allowed. Do not fill out Tab 2.1.9

**City of Chicago
Department of Water Management**

Name of Project: Englewood Trail
 Address: South Access Path between Damen Ave and Winchester Ave
 A/E of Record: Infrastructure Engineering, Inc

1.0 Rate Control (Sheet 2 of 2)

Step 3: Achieving Rate Control Measures

Unadjusted Detention Release Rate =	0.150	cfs	0.150	0.000
Dry Weather Flow Rate = (From dry weather flow worksheet)	0.000	cfs	Waiting for Dry Weather Flow worksheet to be completed	
Infiltration Facility Release Rate (to be added to eligible release rate when computing required storage)	0.000	cfs	No BMPs with infiltration beds entered on BMP Summary Worksheet or soil's infiltration rate is less than 0.5 in/hr	
Release rate for detention storage computations:	0.150	cfs		
Required Storage Volume =	2,944	cubic feet		

Detention Storage Calculations

(Based on Bulletin 70 Rainfall Data)

STORM EVENT (5,10,25,50 or 100) =

Storm Duration (minute)	Runoff Coefficient C	Rainfall Intensity (in/hr)	Drainage Area A (acres)	Allowable release rate 0.150 cfs				
				Inflow Rate Q=CIA	Total Storm Vol (cf)	Release Rate Q _o (cfs)	Storage Rate (Q _i -Q _o) (cfs)	Storage Volume Rate (Q _i -Q _o)*t*60 (cf)
		100						
5	0.59	10.920	0.43	2.73	819	0.150	2.58	774
10	0.59	10.020	0.43	2.51	1,503	0.150	2.36	1,413
15	0.59	8.200	0.43	2.05	1,845	0.150	1.90	1,710
30	0.59	5.600	0.43	1.40	2,521	0.150	1.25	2,251
60	0.59	3.560	0.43	0.89	3,205	0.150	0.74	2,665
120	0.59	2.235	0.43	0.56	4,024	0.150	0.41	2,944
180	0.59	1.617	0.43	0.40	4,366	0.150	0.25	2,746
360	0.59	0.947	0.43	0.24	5,113	0.150	0.09	1,873
720	0.59	0.549	0.43	0.14	5,932	0.150	-0.01	-548
1080	0.59	0.387	0.43	0.10	6,275	0.150	-0.05	-3,445
1440	0.59	0.316	0.43	0.08	6,824	0.150	-0.07	-6,136
2880	0.59	0.170	0.43	0.04	7,346	0.150	-0.11	-18,574
4320	0.59	0.122	0.43	0.03	7,904	0.150	-0.12	-30,976
7200	0.59	0.083	0.43	0.02	8,966	0.150	-0.13	-55,834
14400	0.59	0.046	0.43	0.01	10,028	0.150	-0.14	-119,572
Required Detention Volume (cf)								2,944

Note: 1) the calculation assumes that the rising and recessing limb of inflow and outflow hydrograph are vertical

City of Chicago
Department of Water Management

Name of Project: Englewood Trail
 Address: South Access Path between Damen Ave and Winchester Ave
 A/E of Record: Infrastructure Engineering, Inc

1.2 BMPs for Rate Control Credit

Volume Control BMP Summary for use in Rate Control Worksheet

Instructions for use:

This summary worksheet provides information for BMPs for use in the Rate Control Spreadsheet.

Storage provided should be from the computation made on the each individual BMP spreadsheet (2.1.1 to 2.1.8).

Total area of BMPs will carry over to Rate Control Worksheet.

Other areas (ie reduce pavement area if permeable pavement implemented) should adjusted such that Line 35 on Rate Control Worksheet equals total site area.

When the option exists, the applicant may decide whether or not to count volume control storage toward detention storage.

n/a = not applicable and indicates when credit is inappropriate or unavailable for a given BMP.

BMP Areas with Storage COUNTED toward Rate Control Volume					
Type "yes" to Select	BMP	BMP Infiltration Area (sq. ft.)	Storage Provided (cu. ft.)	Design Soil Infiltration Rate (in/hr) ³	Allowable Infiltration Release Rate (cfs)
yes	Bioinfiltration Systems	2,800	555	0.000	0.000
	Drainage Swales	0	0	0.000	0.000
n/a	Green Roof	n/a	n/a	n/a	n/a
	Infiltration Vault	0	0	0.000	0.000
n/a	Natural Landscaping and Stormwater Trees ¹	n/a	n/a	n/a	n/a
	Roof Runoff BMPs - Planter Boxes	0	0	0.000	0.000
	Roof Runoff BMPs - Rain Barrels and Cisterns	n/a	0	n/a	n/a
	Permeable Paving	0	0	0.500	0.000
n/a	Vegetated Filter Strips ²	n/a	n/a	n/a	n/a
Totals		2,800	555	-	0.000

Notes:

1. Natural landscaping areas do not have specific storage, they can simply be entered on Rate Control Spreadsheet as having a C-value of 0.1. Detention Credit is not given for stormwater trees.
2. Vegetated Filter strips also are not given credit for a "volume of storage" and should be entered in the pervious land cover section of the Rate Control Spreadsheet based on their cover type.
3. Infiltration rate must be the design infiltration rate as explained in Stormwater Manual. If the infiltration rate is less than 0.5 in/hr, credit cannot be taken for infiltration and the Allowable Infiltration Release is set to zero. This value is automatically copied from each respective BMP spreadsheet.

BMP Areas with Storage NOT COUNTED toward Rate Control Volume			
Type "yes" to Select	BMP	Area (sq. ft.)	Storage Provided (cu. ft.)
	Bioinfiltration Systems	0	0
	Drainage Swales	0	0
n/a	Green Roof	n/a	n/a
n/a	Natural Landscaping and Stormwater Trees ¹	n/a	n/a
	Roof Runoff BMPs - Planter Boxes	0	0
	Permeable Paving	0	0
n/a	Vegetated Filter Strips ²	n/a	n/a
Totals		0	0

**City of Chicago
Department of Water Management**

Name of Project: Englewood Trail
 Address: South Access Path between Damen Ave and Winchester Ave
 A/E of Record: Infrastructure Engineering, Inc

2.0 Volume Control

Step 1:

Runoff Calculation

		Existing Area (sq ft)	Proposed Area (sq ft)
Pervious Surface or Land Cover not Counted as Impervious for Volume Control Calculations	Bare Earth		
	Lawn or Landscaped Areas	18,551	11,887
	Woodlands		
	Wetland		
Impervious Land	Gravel		
	Pavement		3,864
	Roofs (conventional)		
	Water (including Wet Bottom Basin to HWL)		
BMPs	Green Roof	-	
	Permeable Pavement	-	
	Bioinfiltration	-	2,800
	Swales	-	
	Stormwater Trees	-	
	Roof Runoff Planters	-	
	Filter Strips	-	
	Dry Bottom Basins to HWL	-	
Summary	Total pervious area (sq ft)	18,551	11,887
	Total impervious area (sq ft)	0	3,864
	Total BMP areas treated as impervious area (sq ft)	-	0
	Total BMP areas treated as pervious area (sq ft)	-	2,800
	Total site area (sq ft)	18,551	18,551
	Imperviousness percentage (%)	0.0	20.8

Step 2:

Volume Control Assessment

		Type Yes or No for all that apply	Note
Question 1:	Does the site drain directly to Waters?	No	
Question 2:	Are infiltration BMPs allowable? (See Chapter III Sections 4.1.2 of the Regulations.)	Yes	
Question 3:	Do you wish to use permeable pavement only as a pervious surface to achieve impervious surface reduction goal?	No	Areas of permeable pavement are included as an impervious surface for the computation made in Cell C48. Storage will be counted toward volume control goal.

Step 3:

Achieving Volume Control Measures

Achieve I. or II. below in accordance with the Ordinance.

I.	Capture 0.5" of runoff from impervious surfaces. Storage required =	161	cubic feet	Go to spreadsheet 2.1 BMP Volume Summary if electing volume control storage option
or, II.	Reduce proposed imperviousness to:	-	percent	

City of Chicago
Department of Water Management

Name of Project: Englewood Trail
 Address: South Access Path between Damen Ave and Winchester Ave
 A/E of Record: Infrastructure Engineering, Inc

2.1.1 Bioinfiltration Systems

Section 1 Upstream Drainage Area				
1	Upstream impervious area including BMP area	A_t	6,664	square feet
2	Upstream weighted C-value (C-value=1.0 for bioinfiltration area for direct rainfall)	C	1.00	unitless
3	Volume of upstream runoff from a 1-inch storm = $C * A_t * 1/12$	$V_{upstream}$	555	cubic feet
4	Describe upstream drainage area	Paved access ramp area		
5	Describe upstream pretreatment or integration of pretreatment into BMP			

Section 2 BMP Feasibility				
6	Design soil infiltration rate (must be 0.5 in/hr or greater unless underdrain system is used)	i	0.00	in/hr
7	Elevation of bottom of BMP (the infiltration surface) IF there is no underdrain, OR the lowest underdrain invert elevation	$ELEV_{BMP}$	10.000	feet
8	Groundwater elevation	$ELEV_{GW}$	5.000	feet
9	Depth to seasonal groundwater (Must be 2 feet or greater, or 3.5 feet or greater if draining to combined sewer)	D_{GW}	5.0	feet

Section 3 BMP Specifications				
10	Dimensions of the bioinfiltration facility (length, width, or area)	L		feet
		W		feet
		A_{BMP}	2,800	square feet
11	Depth of prepared soil	D_1	0.0	feet
12	Prepared soil porosity (0.25 maximum unless detailed materials report provided)	P_1	0.25	feet
13	Depth of underlying aggregate (optional)	D_2	3.0	feet
14	Aggregate porosity (0.38 maximum unless detailed materials report provided)	P_2	0.38	feet
15	Surface storage volume (provide supporting calculations, max depth 12 inches)	V_{AIR}	0	cubic feet
16	Soil media storage volume = $A_{BMP} * [(D_1 * P_1) + (D_2 * P_2)]$	V_{SOIL}	3,192	cubic feet

Section 4 BMP Performance				
17	Volume of upstream runoff (Line 4)	$V_{upstream}$	555	cubic feet
18	Storage Provided = $V_{AIR} + V_{SOIL}$	V_{BMP}	3,192	cubic feet
19	V_{total} (equals lesser of V_{BMP} or $V_{upstream}$)	V_{total}	555	cubic feet

DETENTION CALCULATIONS FOR ENGLEWOOD TRAIL

CITY BLOCK FROM WOOD ST TO PAULINA ST
See Exhibit 2-04a: Drainage Areas Sheet 6

1. Trail from STA 27+22 to STA 33+18
2. North access path to trail from STA 300+00 to STA 304+62
3. South access path to trail from STA 200+00 to STA 203+93

Detention Requirement Summary			
	Main Trail	North Access Path	South Access Path
Rate Control (cu ft)	2,819	2,708	4,477
Volume Control (cu ft)	546	207	167
Total Detention Required (cu ft)	3,365	2,915	4,644
Detention Provided (cu ft)	4,979	2,964	4,674

City of Chicago
Department of Water Management

Stormwater Spreadsheet Tool

Release 3.1 effective January 1, 2016

1. DOB Tracking/Permit Number:	_____
2. Name of Project:	<u>59th Street Line</u>
3. Address of Site:	<u>Main Trail from Wood St to Paulina St</u> <u>Sta 27+22 to Sta 33+18</u>
Architect / Engineer of Record:	<u>Infrastructure Engineering, Inc</u>
Phone No.:	<u>312-425-9560</u>
4. Description of Proposed Work:	<u>Proposed 22 feet wide paved trail</u> _____ _____ _____
5. Use of Building (if applicable):	_____ _____
6. Sewer Altas & Drain Atlas Referenced:	_____
7. Area of Site:	<u>13,666</u> square feet (Square Feet = Acres * 43560) <u>0.314</u> acres (Acres = Square Feet / 43560)

This spreadsheet tool has been prepared to assist the applicant in preparing calculations for simple sites. The applicant is responsible for ensuring that submitted calculations are correct. If necessary, supporting hand calculations should be prepared and submitted.

Color Coding

-  - Cell Contents Computed by Spreadsheet
-  - Cell for User Entry
-  - Cell Includes Comment (when cursor is over it)

**City of Chicago
Department of Water Management**

Stormwater Spreadsheet Tool

INDEX OF SPREADSHEETS

Required>>	<input checked="" type="checkbox"/>	COVER
Required>>	<input checked="" type="checkbox"/>	INDEX
	<input type="checkbox"/>	0.0 RELEASE RATE
Required>>	<input checked="" type="checkbox"/>	1.0 RATE CONTROL
	<input type="checkbox"/>	1.1 Dry Weather Flow
	<input checked="" type="checkbox"/>	1.2 BMPs-Rate Control Credit
	<input type="checkbox"/>	1.3 Orifice Sizing Calculation
Required>>	<input checked="" type="checkbox"/>	2.0 VOLUME CONTROL
	<input type="checkbox"/>	2.1 BMP Volume Summary
	<input type="checkbox"/>	2.1.1 Bioinfiltration
	<input type="checkbox"/>	2.1.2 Drainage Swales
	<input type="checkbox"/>	2.1.3 Green Roof
	<input type="checkbox"/>	2.1.4 Infiltration Vault
	<input type="checkbox"/>	2.1.5 Trees
	<input checked="" type="checkbox"/>	2.1.6 Permeable Pavement
	<input type="checkbox"/>	2.1.7.1 Roof Runoff BMPs - Planter Boxes
	<input type="checkbox"/>	2.1.7.2 Roof Runoff BMPs - Rain Barrels / Cisterns
	<input type="checkbox"/>	2.1.8 Filter Strips
	<input type="checkbox"/>	2.1.9 Oversized Detention

**City of Chicago
Department of Water Management**

Name of Project: 59th Street Line
 Address: Main Trail from Wood St to Paulina St
 A/E of Record: Infrastructure Engineering, Inc

1.0 Rate Control (Sheet 1 of 2)

Step 1: Runoff Calculation

		Proposed Area (sq. ft.)	C-Value 100-Year	Storage Volume (cu. ft.)
Pervious Land	Lawns - Sandy soil, flat, 0% to 2%		0.18	
	Lawns - Sandy soil, avg, 2% to 7%		0.27	
	Lawns - Sandy soil, steep, >7%		0.36	
	Lawns - Heavy soil, flat, 0% to 2%	563	0.30	
	Lawns - Heavy soil, avg, 2% to 7%		0.42	
	Lawns - Heavy soil, steep, >7%		0.47	
	Woodlands, flat, 2%		0.39	
	Native Vegetation with prepared soils		0.10	
	Dry bottom basins to HWL		0.75	
	Wetland		0.80	
Impervious Land	Green Roof		0.50	
	Gravel		0.70	
	Pavement		0.95	
	Roofs (conventional)		0.95	
	Building sidewalls connected by side gutters (enter 25% of the face of the sidewall)		0.95	
	Wet bottom basins to HWL		1.00	
BMP areas	BMPs providing storage that WILL COUNT toward detention storage (from Worksheet 1.2)	13,103	1.00	
	BMPs providing volume control storage that WILL NOT BE COUNTED toward detention (from Worksheet 1.2)	0		0

Summary	Total pervious area (sq ft)	563	
	Total impervious area (sq ft)	0	
	Total BMP area (sq ft)	13,103	
	Total site area (sq ft)	13,666	
	Weighted C- value (non BMP areas)	0.30	
	Adjusted C-value (accounts for BMPs)	0.97	
Notes:	Make note of any adjustments made for purposes of detention calcs here (such as removal of roof area that will discharge directly to Waters)		

Step 2: Allowable Release Rate Assessment

		Type Yes or No for all that apply	Notes
Question 1:	Does the site drain directly to Waters?	No	
Question 2:	Does the site only include residential land use for detached single-family and two-family dwellings?	No	
Question 3:	Is the Regulated Development a Lot to Lot Building (85% or more of site footprint is occupied by buildings)?	No	
Question 4:	Do you plan to use the standard maximum release rate (only available to sites less than 1.75 acres)?	Yes	Standard Detention Release Rate based on total site area (Cell D36) minus any tributary sidewalls
Question 5:	Is the site more than 75 percent of substantially contiguous at-grade open space that is conducive to ponding of surface waters (Answer "No" if site discharges to waterway or is a service station)?	No	
Question 6:	Does the development involve flow diversions (existing sewer connection to be relocated to a different main) or multiple sewer connections (only available to sites over 1.75 acres)?	No	
Question 7:	Are there widespread contaminated soils on the site, high ground water table, or is this development classified as a lot-to-lot building?	No	Oversized detention is not allowed. Do not fill out Tab 2.1.9

**City of Chicago
Department of Water Management**

Name of Project: 59th Street Line
 Address: Main Trail from Wood St to Paulina St
 A/E of Record: Infrastructure Engineering, Inc

1.0 Rate Control (Sheet 2 of 2)

Step 3: Achieving Rate Control Measures

Unadjusted Detention Release Rate =	0.150	cfs	0.150	0.000
Dry Weather Flow Rate = (From dry weather flow worksheet)	0.000	cfs	Waiting for Dry Weather Flow worksheet to be completed	
Infiltration Facility Release Rate (to be added to eligible release rate when computing required storage)	0.152	cfs		
Release rate for detention storage computations:	0.302	cfs		
Required Storage Volume =	2,819	cubic feet		

Detention Storage Calculations

(Based on Bulletin 70 Rainfall Data)

STORM EVENT (5,10,25,50 or 100) =

100

Allowable release rate 0.302 cfs

Storm Duration (minute)	Runoff Coefficient C	Rainfall Intensity (in/hr)	Drainage Area A (acres)	Inflow Rate Q=CIA	Total Storm Vol (cf)	Release Rate Q _o (cfs)	Storage Rate (Q _i -Q _o) (cfs)	Storage Volume Rate (Q _i -Q _o)*t*60 (cf)
5	0.97	10.920	0.31	3.33	998	0.302	3.03	908
10	0.97	10.020	0.31	3.05	1,832	0.302	2.75	1,651
15	0.97	8.200	0.31	2.50	2,249	0.302	2.20	1,977
30	0.97	5.600	0.31	1.71	3,071	0.302	1.40	2,528
60	0.97	3.560	0.31	1.08	3,905	0.302	0.78	2,819
120	0.97	2.235	0.31	0.68	4,903	0.302	0.38	2,731
180	0.97	1.617	0.31	0.49	5,320	0.302	0.19	2,062
360	0.97	0.947	0.31	0.29	6,230	0.302	-0.01	-286
720	0.97	0.549	0.31	0.17	7,228	0.302	-0.13	-5,803
1080	0.97	0.387	0.31	0.12	7,645	0.302	-0.18	-11,902
1440	0.97	0.316	0.31	0.10	8,314	0.302	-0.21	-17,749
2880	0.97	0.170	0.31	0.05	8,950	0.302	-0.25	-43,176
4320	0.97	0.122	0.31	0.04	9,630	0.302	-0.26	-68,559
7200	0.97	0.083	0.31	0.03	10,925	0.302	-0.28	-119,391
14400	0.97	0.046	0.31	0.01	12,219	0.302	-0.29	-248,413
							Required Detention Volume (cf)	2,819

Note: 1) the calculation assumes that the rising and recessing limb of inflow and outflow hydrograph are vertical

City of Chicago
Department of Water Management

Name of Project: 59th Street Line
 Address: Main Trail from Wood St to Paulina St
 A/E of Record: Infrastructure Engineering, Inc

1.2 BMPs for Rate Control Credit

Volume Control BMP Summary for use in Rate Control Worksheet

Instructions for use:

This summary worksheet provides information for BMPs for use in the Rate Control Spreadsheet.

Storage provided should be from the computation made on the each individual BMP spreadsheet (2.1.1 to 2.1.8).

Total area of BMPs will carry over to Rate Control Worksheet.

Other areas (ie reduce pavement area if permeable pavement implemented) should adjusted such that Line 35 on Rate Control Worksheet equals total site area.

When the option exists, the applicant may decide whether or not to count volume control storage toward detention storage.

n/a = not applicable and indicates when credit is inappropriate or unavailable for a given BMP.

BMP Areas with Storage COUNTED toward Rate Control Volume					
Type "yes" to Select	BMP	BMP Infiltration Area (sq. ft.)	Storage Provided (cu. ft.)	Design Soil Infiltration Rate (in/hr) ³	Allowable Infiltration Release Rate (cfs)
	Bioinfiltration Systems	0	0	0.000	0.000
	Drainage Swales	0	0	0.000	0.000
n/a	Green Roof	n/a	n/a	n/a	n/a
	Infiltration Vault	0	0	0.000	0.000
n/a	Natural Landscaping and Stormwater Trees ¹	n/a	n/a	n/a	n/a
	Roof Runoff BMPs - Planter Boxes	0	0	0.000	0.000
	Roof Runoff BMPs - Rain Barrels and Cisterns	n/a	0	n/a	n/a
yes	Permeable Paving	13,103	1,037	0.500	0.152
n/a	Vegetated Filter Strips ²	n/a	n/a	n/a	n/a
Totals		13,103	1,037	-	0.152

Notes:

1. Natural landscaping areas do not have specific storage, they can simply be entered on Rate Control Spreadsheet as having a C-value of 0.1. Detention Credit is not given for stormwater trees.
2. Vegetated Filter strips also are not given credit for a "volume of storage" and should be entered in the pervious land cover section of the Rate Control Spreadsheet based on their cover type.
3. Infiltration rate must be the design infiltration rate as explained in Stormwater Manual. If the infiltration rate is less than 0.5 in/hr, credit cannot be taken for infiltration and the Allowable Infiltration Release is set to zero. This value is automatically copied from each respective BMP spreadsheet.

BMP Areas with Storage NOT COUNTED toward Rate Control Volume			
Type "yes" to Select	BMP	Area (sq. ft.)	Storage Provided (cu. ft.)
	Bioinfiltration Systems	0	0
	Drainage Swales	0	0
n/a	Green Roof	n/a	n/a
n/a	Natural Landscaping and Stormwater Trees ¹	n/a	n/a
	Roof Runoff BMPs - Planter Boxes	0	0
	Permeable Paving	0	0
n/a	Vegetated Filter Strips ²	n/a	n/a
Totals		0	0

**City of Chicago
Department of Water Management**

Name of Project: 59th Street Line
 Address: Main Trail from Wood St to Paulina St
 A/E of Record: Infrastructure Engineering, Inc

2.0 Volume Control

Step 1:

Runoff Calculation

		Existing Area (sq ft)	Proposed Area (sq ft)
Pervious Surface or Land Cover not Counted as Impervious for Volume Control Calculations	Bare Earth		
	Lawn or Landscaped Areas	13,666	563
	Woodlands		
	Wetland		
Impervious Land	Gravel		
	Pavement		
	Roofs (conventional)		
	Water (including Wet Bottom Basin to HWL)		
BMPs	Green Roof	-	
	Permeable Pavement	-	13,103
	Bioinfiltration	-	
	Swales	-	
	Stormwater Trees	-	
	Roof Runoff Planters	-	
	Filter Strips	-	
	Dry Bottom Basins to HWL	-	
Summary	Total pervious area (sq ft)	13,666	563
	Total impervious area (sq ft)	0	0
	Total BMP areas treated as impervious area (sq ft)	-	13,103
	Total BMP areas treated as pervious area (sq ft)	-	0
	Total site area (sq ft)	13,666	13,666
	Imperviousness percentage (%)	0.0	0.0

Please be sure to ans

Please be sure to ans

Step 2:

Volume Control Assessment

		Type Yes or No for all that apply	Note
Question 1:	Does the site drain directly to Waters?	No	
Question 2:	Are infiltration BMPs allowable? (See Chapter III Sections 4.1.2 of the Regulations.)	Yes	
Question 3:	Do you wish to use permeable pavement only as a pervious surface to achieve impervious surface reduction goal?	No	Areas of permeable pavement are included as an impervious surface for the computation made in Cell C48. Storage will be counted toward volume control goal.

Step 3:

Achieving Volume Control Measures

Achieve I. or II. below in accordance with the Ordinance.

I.	Capture 0.5" of runoff from impervious surfaces. Storage required =	546	cubic feet	Go to spreadsheet 2.1 BMP Volume Summary if electing volume control storage option
or, II.	Reduce proposed imperviousness to:	-	percent	

**City of Chicago
Department of Water Management**

Name of Project: 59th Street Line
 Address: Main Trail from Wood St to Paulina St
 A/E of Record: Infrastructure Engineering, Inc

2.1.6 Permeable Pavement

Section 1 Upstream Drainage Area				
1	Upstream impervious area including area of permeable pavement	A_i	13,103	square feet
2	Upstream weighted C-value (C-value=0.95 for permeable pavement areas for nearly direct rainfall)	C	0.95	unitless
3	Volume of upstream runoff from a 1-inch storm = $C * A_t * 1/12$	$V_{upstream}$	1,037	cubic feet
4	Describe intended function of system (Is it standalone system designed for infiltration, is it integrated as part of the detention storage, is it underdrained to downstream system, will it receive upstream runoff?)			

Section 2 BMP Feasibility				
5	Design soil infiltration rate (must be 0.5 in/hr or greater unless underdrain system is used)	i	0.500	in/hr
6	Allowable depth of storage aggregate without provision of underdrain (=i/ 12 inches/ft * 48 hours)	D_{allow}	2.00	feet
7	Elevation of bottom of BMP (the infiltration surface) IF there is no underdrain, OR the lowest underdrain invert elevation	$ELEV_{BMP}$	44.000	feet
8	Groundwater elevation	$ELEV_{GW}$	26.000	feet
9	Depth to seasonal groundwater (Must be 2 feet or greater, or 3.5 feet or greater if draining to combined sewer)	D_{GW}	18.0	feet

Section 3 BMP Specifications				
10	Dimensions of the permeable pavement (length, width, or area)	L	595.6	feet
		W	22.0	feet
		A_{BMP}	13,103	square feet
11	Depth of underlying aggregate (must be less than D_{allow})	D_1	1.0	feet
12	Aggregate porosity (0.38 maximum unless detailed materials report provided)	P_1	0.38	feet
13	Volume of Aggregate storage applicable to volume control = $A_{BMP} * D_1 * P_1$	V_{BMP}	4,979	cubic feet

Section 4 BMP Performance				
14	Volume of upstream runoff (Line 3)	$V_{upstream}$	1,037	cubic feet
15	Volume Control Storage Provided = V_{BMP}	V_{BMP}	4,979	cubic feet
16	V_{total} (equals lesser of V_{BMP} or $V_{upstream}$)	V_{total}	1,037	cubic feet

City of Chicago
Department of Water Management

Stormwater Spreadsheet Tool

Release 3.1 effective January 1, 2016

1. DOB Tracking/Permit Number:

2. Name of Project:
59th Street Line

3. Address of Site:
North Access Ramp between Wood St and Hermitage Ave
City block from sta 27+22 to 33+18

Architect / Engineer of Record: Infrastructure Engineering, Inc
Phone No.: 312-425-9560

4. Description of Proposed Work:
Access ramp to Englewood Trail on the north side of the trail between Wood
and Hermitage.

5. Use of Building (if applicable):

6. Sewer Altas & Drain Atlas Referenced:

7. Area of Site:
15,126 square feet (Square Feet = Acres * 43560)
0.347 acres (Acres = Square Feet / 43560)

This spreadsheet tool has been prepared to assist the applicant in preparing calculations for simple sites. The applicant is responsible for ensuring that submitted calculations are correct. If necessary, supporting hand calculations should be prepared and submitted.

Color Coding

-  - Cell Contents Computed by Spreadsheet
-  - Cell for User Entry
-  - Cell Includes Comment (when cursor is over it)

**City of Chicago
Department of Water Management**

Stormwater Spreadsheet Tool

INDEX OF SPREADSHEETS

Required>>	<input checked="" type="checkbox"/>	COVER
Required>>	<input checked="" type="checkbox"/>	INDEX
	<input type="checkbox"/>	0.0 RELEASE RATE
Required>>	<input checked="" type="checkbox"/>	1.0 RATE CONTROL
	<input type="checkbox"/>	1.1 Dry Weather Flow
	<input checked="" type="checkbox"/>	1.2 BMPs-Rate Control Credit
	<input type="checkbox"/>	1.3 Orifice Sizing Calculation
Required>>	<input checked="" type="checkbox"/>	2.0 VOLUME CONTROL
	<input type="checkbox"/>	2.1 BMP Volume Summary
	<input checked="" type="checkbox"/>	2.1.1 Bioinfiltration
	<input type="checkbox"/>	2.1.2 Drainage Swales
	<input type="checkbox"/>	2.1.3 Green Roof
	<input type="checkbox"/>	2.1.4 Infiltration Vault
	<input type="checkbox"/>	2.1.5 Trees
	<input type="checkbox"/>	2.1.6 Permeable Pavement
	<input type="checkbox"/>	2.1.7.1 Roof Runoff BMPs - Planter Boxes
	<input type="checkbox"/>	2.1.7.2 Roof Runoff BMPs - Rain Barrels / Cisterns
	<input type="checkbox"/>	2.1.8 Filter Strips
	<input type="checkbox"/>	2.1.9 Oversized Detention

**City of Chicago
Department of Water Management**

8/11/2017

Name of Project: 59th Street Line
 Address: North Access Ramp between Wood St and Hermitage Ave
 A/E of Record: Infrastructure Engineering, Inc

1.0 Rate Control (Sheet 1 of 2)

Step 1: Runoff Calculation

		Proposed Area (sq. ft.)	C-Value 100-Year	Storage Volume (cu. ft.)
Pervious Land	Lawns - Sandy soil, flat, 0% to 2%		0.18	
	Lawns - Sandy soil, avg. 2% to 7%		0.27	
	Lawns - Sandy soil, steep, >7%		0.36	
	Lawns - Heavy soil, flat, 0% to 2%	1,947	0.30	
	Lawns - Heavy soil, avg. 2% to 7%	5,621	0.42	
	Lawns - Heavy soil, steep, >7%		0.47	
	Woodlands, flat, 2%		0.39	
	Native Vegetation with prepared soils		0.10	
	Dry bottom basins to HWL		0.75	
	Wetland		0.80	
Impervious Land	Green Roof		0.50	
	Gravel		0.70	
	Pavement	4,958	0.95	
	Roofs (conventional)		0.95	
	Building sidewalls connected by side gutters (enter 25% of the face of the sidewall)		0.95	
	Wet bottom basins to HWL		1.00	
BMP areas	BMPs providing storage that WILL COUNT toward detention storage (from Worksheet 1.2)	2,600	1.00	
	BMPs providing volume control storage that WILL NOT BE COUNTED toward detention (from Worksheet 1.2)	0		0

Summary	Total pervious area (sq ft)	7,568
	Total impervious area (sq ft)	4,958
	Total BMP area (sq ft)	2,600
	Total site area (sq ft)	15,126
	Weighted C- value (non BMP areas)	0.61
	Adjusted C-value (accounts for BMPs)	0.68
Notes:	<i>Make note of any adjustments made for purposes of detention calcs here (such as removal of roof area that will discharge directly to Waters)</i>	

Step 2: Allowable Release Rate Assessment

	Type Yes or No for all that apply	Notes
Question 1: Does the site drain directly to Waters?	No	
Question 2: Does the site only include residential land use for detached single-family and two-family dwellings?	No	
Question 3: Is the Regulated Development a Lot to Lot Building (85% or more of site footprint is occupied by buildings)?	No	
Question 4: Do you plan to use the standard maximum release rate (only available to sites less than 1.75 acres)?	Yes	Standard Detention Release Rate based on total site area (Cell D36) minus any tributary sidewalls
Question 5: Is the site more than 75 percent of substantially contiguous at-grade open space that is conducive to ponding of surface waters (Answer "No" if site discharges to waterway or is a service station)?	No	
Question 6: Does the development involve flow diversions (existing sewer connection to be relocated to a different main) or multiple sewer connections (only available to sites over 1.75 acres)?	No	
Question 7: Are there widespread contaminated soils on the site, high ground water table, or is this development classified as a lot-to-lot building?	No	Oversized detention is not allowed. Do not fill out Tab 2.1.9

**City of Chicago
Department of Water Management**

Name of Project: 59th Street Line
 Address: North Access Ramp between Wood St and Hermitage Ave
 A/E of Record: Infrastructure Engineering, Inc

1.0 Rate Control (Sheet 2 of 2)

Step 3: Achieving Rate Control Measures

Unadjusted Detention Release Rate =	0.150	cfs	0.150	0.000
Dry Weather Flow Rate = (From dry weather flow worksheet)	0.000	cfs	Waiting for Dry Weather Flow worksheet to be completed	
Infiltration Facility Release Rate (to be added to eligible release rate when computing required storage)	0.000	cfs	No BMPs with infiltration beds entered on BMP Summary Worksheet or soil's infiltration rate is less than 0.5 in/hr	
Release rate for detention storage computations:	0.150	cfs		
Required Storage Volume =	2,708	cubic feet		

Detention Storage Calculations

(Based on Bulletin 70 Rainfall Data)

STORM EVENT (5,10,25,50 or 100) =

Storm Duration (minute)	Runoff Coefficient C	Rainfall Intensity (in/hr)	Drainage Area A (acres)	Allowable release rate 0.150 cfs					Storage Rate (Qi-Qo) (cfs)	Storage Volume Rate (Qi-Qo)*t*60 (cf)
				Inflow Rate Q=CIA	Total Storm Vol (cf)	Release Rate Qo (cfs)	Storage Rate (Qi-Qo) (cfs)	Storage Volume Rate (Qi-Qo)*t*60 (cf)		
5	0.68	10.920	0.35	2.57	771	0.150	2.42	726		
10	0.68	10.020	0.35	2.36	1,415	0.150	2.21	1,325		
15	0.68	8.200	0.35	1.93	1,737	0.150	1.78	1,602		
30	0.68	5.600	0.35	1.32	2,373	0.150	1.17	2,103		
60	0.68	3.560	0.35	0.84	3,017	0.150	0.69	2,477		
120	0.68	2.235	0.35	0.53	3,788	0.150	0.38	2,708		
180	0.68	1.617	0.35	0.38	4,110	0.150	0.23	2,490		
360	0.68	0.947	0.35	0.22	4,814	0.150	0.07	1,574		
720	0.68	0.549	0.35	0.13	5,585	0.150	-0.02	-895		
1080	0.68	0.387	0.35	0.09	5,907	0.150	-0.06	-3,813		
1440	0.68	0.316	0.35	0.07	6,424	0.150	-0.08	-6,536		
2880	0.68	0.170	0.35	0.04	6,916	0.150	-0.11	-19,004		
4320	0.68	0.122	0.35	0.03	7,441	0.150	-0.12	-31,439		
7200	0.68	0.083	0.35	0.02	8,441	0.150	-0.13	-56,359		
14400	0.68	0.046	0.35	0.01	9,441	0.150	-0.14	-120,159		
								Required Detention Volume (cf)	2,708	

Note: 1) the calculation assumes that the rising and recessing limb of inflow and outflow hydrograph are vertical

Name of Project: 59th Street Line
Address: North Access Ramp between Wood St and Hermitage Ave
A/E of Record: Infrastructure Engineering, Inc

1.2 BMPs for Rate Control Credit

Volume Control BMP Summary for use in Rate Control Worksheet

Instructions for use:

This summary worksheet provides information for BMPs for use in the Rate Control Spreadsheet.

Storage provided should be from the computation made on the each individual BMP spreadsheet (2.1.1 to 2.1.8).

Total area of BMPs will carry over to Rate Control Worksheet.

Other areas (ie reduce pavement area if permeable pavement implemented) should adjusted such that Line 35 on Rate Control Worksheet equals total site area.

When the option exists, the applicant may decide whether or not to count volume control storage toward detention storage.

n/a = not applicable and indicates when credit is inappropriate or unavailable for a given BMP.

BMP Areas with Storage COUNTED toward Rate Control Volume					
Type "yes" to Select	BMP	BMP Infiltration Area (sq. ft.)	Storage Provided (cu. ft.)	Design Soil Infiltration Rate (in/hr) ³	Allowable Infiltration Release Rate (cfs)
yes	Bioinfiltration Systems	2,600	630	0.000	0.000
	Drainage Swales	0	0	0.000	0.000
n/a	Green Roof	n/a	n/a	n/a	n/a
	Infiltration Vault	0	0	0.000	0.000
n/a	Natural Landscaping and Stormwater Trees ¹	n/a	n/a	n/a	n/a
	Roof Runoff BMPs - Planter Boxes	0	0	0.000	0.000
	Roof Runoff BMPs - Rain Barrels and Cisterns	n/a	0	n/a	n/a
no	Permeable Paving	0	0	0.500	0.000
n/a	Vegetated Filter Strips ²	n/a	n/a	n/a	n/a
Totals		2,600	630	-	0.000

Notes:

1. Natural landscaping areas do not have specific storage, they can simply be entered on Rate Control Spreadsheet as having a C-value of 0.1. Detention Credit is not given for stormwater trees.
2. Vegetated Filter strips also are not given credit for a "volume of storage" and should be entered in the pervious land cover section of the Rate Control Spreadsheet based on their cover type.
3. Infiltration rate must be the design infiltration rate as explained in Stormwater Manual. If the infiltration rate is less than 0.5 in/hr, credit cannot be taken for infiltration and the Allowable Infiltration Release is set to zero. This value is automatically copied from each respective BMP spreadsheet.

BMP Areas with Storage NOT COUNTED toward Rate Control Volume			
Type "yes" to Select	BMP	Area (sq. ft.)	Storage Provided (cu. ft.)
	Bioinfiltration Systems	0	0
	Drainage Swales	0	0
n/a	Green Roof	n/a	n/a
n/a	Natural Landscaping and Stormwater Trees ¹	n/a	n/a
	Roof Runoff BMPs - Planter Boxes	0	0
	Permeable Paving	0	0
n/a	Vegetated Filter Strips ²	n/a	n/a
Totals		0	0

**City of Chicago
Department of Water Management**

Name of Project: 59th Street Line
 Address: North Access Ramp between Wood St and Hermitage Ave
 A/E of Record: Infrastructure Engineering, Inc

2.0 Volume Control

Step 1:

Runoff Calculation

		Existing Area (sq ft)	Proposed Area (sq ft)
Pervious Surface or Land Cover not Counted as Impervious for Volume Control Calculations	Bare Earth		
	Lawn or Landscaped Areas	15,126	7,568
	Woodlands		
	Wetland		
Impervious Land	Gravel		
	Pavement		4,958
	Roofs (conventional)		
	Water (including Wet Bottom Basin to HWL)		
BMPs	Green Roof	-	
	Permeable Pavement	-	
	Bioinfiltration	-	2,600
	Swales	-	
	Stormwater Trees	-	
	Roof Runoff Planters	-	
	Filter Strips	-	
	Dry Bottom Basins to HWL	-	
Summary	Total pervious area (sq ft)	15,126	7,568
	Total impervious area (sq ft)	0	4,958
	Total BMP areas treated as impervious area (sq ft)	-	0
	Total BMP areas treated as pervious area (sq ft)	-	2,600
	Total site area (sq ft)	15,126	15,126
	Imperviousness percentage (%)	0.0	32.8

Step 2:

Volume Control Assessment

		Type Yes or No for all that apply	Note
Question 1:	Does the site drain directly to Waters?	No	
Question 2:	Are infiltration BMPs allowable? (See Chapter III Sections 4.1.2 of the Regulations.)	Yes	
Question 3:	Do you wish to use permeable pavement only as a pervious surface to achieve impervious surface reduction goal?	No	Areas of permeable pavement are included as an impervious surface for the computation made in Cell C48. Storage will be counted toward volume control goal.

Step 3:

Achieving Volume Control Measures

Achieve I. or II. below in accordance with the Ordinance.

I.	Capture 0.5" of runoff from impervious surfaces. Storage required =	207	cubic feet	Go to spreadsheet 2.1 BMP Volume Summary if electing volume control storage option
or, II.	Reduce proposed imperviousness to:	-	percent	

**City of Chicago
Department of Water Management**

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Name of Project: 59th Street Line
 Address: North Access Ramp between Wood St and Hermitage Ave
 A/E of Record: Infrastructure Engineering, Inc

2.1.1 Bioinfiltration Systems

Section 1 Upstream Drainage Area				
1	Upstream impervious area including BMP area	A_t	7,558	square feet
2	Upstream weighted C-value (C-value=1.0 for bioinfiltration area for direct rainfall)	C	1.00	unitless
3	Volume of upstream runoff from a 1-inch storm = $C * A_t * 1/12$	$V_{upstream}$	630	cubic feet
4	Describe upstream drainage area	Paved access ramp area		
5	Describe upstream pretreatment or integration of pretreatment into BMP			

Section 2 BMP Feasibility				
6	Design soil infiltration rate (must be 0.5 in/hr or greater unless underdrain system is used)	i	0.00	in/hr
7	Elevation of bottom of BMP (the infiltration surface) IF there is no underdrain, OR the lowest underdrain invert elevation	$ELEV_{BMP}$	10.000	feet
8	Groundwater elevation	$ELEV_{GW}$	5.000	feet
9	Depth to seasonal groundwater (Must be 2 feet or greater, or 3.5 feet or greater if draining to combined sewer)	D_{GW}	5.0	feet

Section 3 BMP Specifications				
10	Dimensions of the bioinfiltration facility (length, width, or area)	L		feet
		W		feet
		A_{BMP}	2,600	square feet
11	Depth of prepared soil	D_1	0.0	feet
12	Prepared soil porosity (0.25 maximum unless detailed materials report provided)	P_1	0.25	feet
13	Depth of underlying aggregate (optional)	D_2	3.0	feet
14	Aggregate porosity (0.38 maximum unless detailed materials report provided)	P_2	0.38	feet
15	Surface storage volume (provide supporting calculations, max depth 12 inches)	V_{AIR}	0	cubic feet
16	Soil media storage volume = $A_{BMP} * [(D_1 * P_1) + (D_2 * P_2)]$	V_{SOIL}	2,964	cubic feet

Section 4 BMP Performance				
17	Volume of upstream runoff (Line 4)	$V_{upstream}$	630	cubic feet
18	Storage Provided = $V_{AIR} + V_{SOIL}$	V_{BMP}	2,964	cubic feet
19	V_{total} (equals lesser of V_{BMP} or $V_{upstream}$)	V_{total}	630	cubic feet

Date: 8/11/17
Rev. Date: _____

City of Chicago
Department of Water Management

Stormwater Spreadsheet Tool

Release 3.1 effective January 1, 2016

1. DOB Tracking/Permit Number:	_____
2. Name of Project:	<u>59th Street Line</u>
3. Address of Site:	<u>South Access Ramp between Wood St and Hermitage Ave</u> <u>City block from sta 27+22 to 33+18</u>
Architect / Engineer of Record:	<u>Infrastructure Engineering, Inc</u>
Phone No.:	<u>312-425-9560</u>
4. Description of Proposed Work:	<u>Access ramp to Englewood Trail on the south side of the trail between Wood and Hermitage.</u> _____ _____
5. Use of Building (if applicable):	_____ _____
6. Sewer Altas & Drain Atlas Referenced:	_____
7. Area of Site:	<u>27,023</u> square feet (Square Feet = Acres * 43560) <u>0.620</u> acres (Acres = Square Feet / 43560)

This spreadsheet tool has been prepared to assist the applicant in preparing calculations for simple sites. The applicant is responsible for ensuring that submitted calculations are correct. If necessary, supporting hand calculations should be prepared and submitted.

Color Coding

-  - Cell Contents Computed by Spreadsheet
-  - Cell for User Entry
-  - Cell Includes Comment (when cursor is over it)

**City of Chicago
Department of Water Management**

Stormwater Spreadsheet Tool

INDEX OF SPREADSHEETS

Required>>	<input checked="" type="checkbox"/>	COVER
Required>>	<input checked="" type="checkbox"/>	INDEX
	<input type="checkbox"/>	0.0 RELEASE RATE
Required>>	<input checked="" type="checkbox"/>	1.0 RATE CONTROL
	<input type="checkbox"/>	1.1 Dry Weather Flow
	<input checked="" type="checkbox"/>	1.2 BMPs-Rate Control Credit
	<input type="checkbox"/>	1.3 Orifice Sizing Calculation
Required>>	<input checked="" type="checkbox"/>	2.0 VOLUME CONTROL
	<input type="checkbox"/>	2.1 BMP Volume Summary
	<input checked="" type="checkbox"/>	2.1.1 Bioinfiltration
	<input type="checkbox"/>	2.1.2 Drainage Swales
	<input type="checkbox"/>	2.1.3 Green Roof
	<input type="checkbox"/>	2.1.4 Infiltration Vault
	<input type="checkbox"/>	2.1.5 Trees
	<input type="checkbox"/>	2.1.6 Permeable Pavement
	<input type="checkbox"/>	2.1.7.1 Roof Runoff BMPs - Planter Boxes
	<input type="checkbox"/>	2.1.7.2 Roof Runoff BMPs - Rain Barrels / Cisterns
	<input type="checkbox"/>	2.1.8 Filter Strips
	<input type="checkbox"/>	2.1.9 Oversized Detention

**City of Chicago
Department of Water Management**

8/11/2017

Name of Project: 59th Street Line
Address: South Access Ramp between Wood St and Heritage Ave
A/E of Record: Infrastructure Engineering, Inc

1.0 Rate Control (Sheet 1 of 2)

Step 1: Runoff Calculation

		Proposed Area (sq. ft.)	C-Value 100-Year	Storage Volume (cu. ft.)
Pervious Land	Lawns - Sandy soil, flat, 0% to 2%	0	0.18	
	Lawns - Sandy soil, avg. 2% to 7%		0.27	
	Lawns - Sandy soil, steep, >7%		0.36	
	Lawns - Heavy soil, flat, 0% to 2%	2,849	0.30	
	Lawns - Heavy soil, avg. 2% to 7%	16,064	0.42	
	Lawns - Heavy soil, steep, >7%		0.47	
	Woodlands, flat, 2%		0.39	
	Native Vegetation with prepared soils		0.10	
	Dry bottom basins to HWL		0.75	
	Wetland		0.80	
Impervious Land	Green Roof		0.50	
	Gravel		0.70	
	Pavement	4,010	0.95	
	Roofs (conventional)		0.95	
	Building sidewalls connected by side gutters (enter 25% of the face of the sidewall)		0.95	
	Wet bottom basins to HWL		1.00	
BMP areas	BMPs providing storage that WILL COUNT toward detention storage (from Worksheet 1.2)	4,100	1.00	
	BMPs providing volume control storage that WILL NOT BE COUNTED toward detention (from Worksheet 1.2)	0		0

Summary	Total pervious area (sq ft)	18,913	
	Total impervious area (sq ft)	4,010	
	Total BMP area (sq ft)	4,100	
	Total site area (sq ft)	27,023	
	Weighted C- value (non BMP areas)	0.50	
	Adjusted C-value (accounts for BMPs)	0.57	
Notes:	Make note of any adjustments made for purposes of detention calcs here (such as removal of roof area that will discharge directly to Waters)		

Step 2: Allowable Release Rate Assessment

Question	Type Yes or No for all that apply	Notes
Question 1: Does the site drain directly to Waters?	No	
Question 2: Does the site only include residential land use for detached single-family and two-family dwellings?	No	
Question 3: Is the Regulated Development a Lot to Lot Building (85% or more of site footprint is occupied by buildings)?	No	
Question 4: Do you plan to use the standard maximum release rate (only available to sites less than 1.75 acres)?	Yes	Standard Detention Release Rate based on total site area (Cell D36) minus any tributary sidewalls
Question 5: Is the site more than 75 percent of substantially contiguous at-grade open space that is conducive to ponding of surface waters (Answer "No" if site discharges to waterway or is a service station)?	No	
Question 6: Does the development involve flow diversions (existing sewer connection to be relocated to a different main) or multiple sewer connections (only available to sites over 1.75 acres)?	No	
Question 7: Are there widespread contaminated soils on the site, high ground water table, or is this development classified as a lot-to-lot building?	No	Oversized detention is not allowed. Do not fill out Tab 2.1.9

**City of Chicago
Department of Water Management**

Name of Project: 59th Street Line
 Address: South Access Ramp between Wood St and Hermitage Ave
 A/E of Record: Infrastructure Engineering, Inc

1.0 Rate Control (Sheet 2 of 2)

Step 3: Achieving Rate Control Measures

Unadjusted Detention Release Rate =	0.174	cfs	0.174	0.000
Dry Weather Flow Rate = (From dry weather flow worksheet)	0.000	cfs	Waiting for Dry Weather Flow worksheet to be completed	
Infiltration Facility Release Rate (to be added to eligible release rate when computing required storage)	0.000	cfs	No BMPs with infiltration beds entered on BMP Summary Worksheet or soil's infiltration rate is less than 0.5 in/hr	
Release rate for detention storage computations:	0.174	cfs		
Required Storage Volume =	4,477	cubic feet		

Detention Storage Calculations

(Based on Bulletin 70 Rainfall Data)

STORM EVENT (5,10,25,50 or 100) =

100

Allowable release rate 0.174 cfs

Storm Duration (minute)	Runoff Coefficient C	Rainfall Intensity (in/hr)	Drainage Area A (acres)	Inflow Rate Q=CIA	Total Storm Vol (cf)	Release Rate Qo (cfs)	Storage Rate (Qi-Qo) (cfs)	Storage Volume Rate (Qi-Qo)*t*60 (cf)
5	0.57	10.920	0.62	3.89	1,167	0.174	3.71	1,114
10	0.57	10.020	0.62	3.57	2,141	0.174	3.39	2,036
15	0.57	8.200	0.62	2.92	2,628	0.174	2.75	2,471
30	0.57	5.600	0.62	1.99	3,589	0.174	1.82	3,276
60	0.57	3.560	0.62	1.27	4,564	0.174	1.09	3,937
120	0.57	2.235	0.62	0.80	5,730	0.174	0.62	4,477
180	0.57	1.617	0.62	0.58	6,217	0.174	0.40	4,337
360	0.57	0.947	0.62	0.34	7,281	0.174	0.16	3,521
720	0.57	0.549	0.62	0.20	8,448	0.174	0.02	928
1080	0.57	0.387	0.62	0.14	8,935	0.174	-0.04	-2,345
1440	0.57	0.316	0.62	0.11	9,717	0.174	-0.06	-5,323
2880	0.57	0.170	0.62	0.06	10,460	0.174	-0.11	-19,619
4320	0.57	0.122	0.62	0.04	11,255	0.174	-0.13	-33,864
7200	0.57	0.083	0.62	0.03	12,768	0.174	-0.14	-62,432
14400	0.57	0.046	0.62	0.02	14,280	0.174	-0.16	-136,118
							Required Detention Volume (cf)	4,477

Note: 1) the calculation assumes that the rising and recessing limb of inflow and outflow hydrograph are vertical

Name of Project: 59th Street Line
Address: South Access Ramp between Wood St and Hermitage Ave
A/E of Record: Infrastructure Engineering, Inc

1.2 BMPs for Rate Control Credit

Volume Control BMP Summary for use in Rate Control Worksheet

Instructions for use:

This summary worksheet provides information for BMPs for use in the Rate Control Spreadsheet.

Storage provided should be from the computation made on the each individual BMP spreadsheet (2.1.1 to 2.1.8).

Total area of BMPs will carry over to Rate Control Worksheet.

Other areas (ie reduce pavement area if permeable pavement implemented)should adjusted such that Line 35 on Rate Control Worksheet equals total site area.

When the option exists, the applicant may decide whether or not to count volume control storage toward detention storage.

n/a = not applicable and indicates when credit is inappropriate or unavailable for a given BMP.

BMP Areas with Storage COUNTED toward Rate Control Volume					
Type "yes" to Select	BMP	BMP Infiltration Area (sq. ft.)	Storage Provided (cu. ft.)	Design Soil Infiltration Rate (in/hr) ³	Allowable Infiltration Release Rate (cfs)
Yes	Bioinfiltration Systems	4,100	676	0.000	0.000
	Drainage Swales	0	0	0.000	0.000
n/a	Green Roof	n/a	n/a	n/a	n/a
	Infiltration Vault	0	X	0.000	0.000
n/a	Natural Landscaping and Stormwater Trees ¹	n/a	n/a	n/a	n/a
	Roof Runoff BMPs - Planter Boxes	0	0	0.000	0.000
	Roof Runoff BMPs - Rain Barrels and Cisterns	n/a	0	n/a	n/a
no	Permeable Paving	0	0	0.500	0.000
n/a	Vegetated Filter Strips ²	n/a	n/a	n/a	n/a
Totals		4,100	676	-	0.000

Notes:

1. Natural landscaping areas do not have specific storage, they can simply be entered on Rate Control Spreadsheet as having a C-value of 0.1. Detention Credit is not given for stormwater trees.
2. Vegetated Filter strips also are not given credit for a "volume of storage" and should be entered in the pervious land cover section of the Rate Control Spreadsheet based on their cover type.
3. Infiltration rate must be the design infiltration rate as explained in Stormwater Manual. If the infiltration rate is less than 0.5 in/hr, credit cannot be taken for infiltration and the Allowable Infiltration Release is set to zero. This value is automatically copied from each respective BMP spreadsheet.

BMP Areas with Storage NOT COUNTED toward Rate Control Volume			
Type "yes" to Select	BMP	Area (sq. ft.)	Storage Provided (cu. ft.)
	Bioinfiltration Systems	0	0
	Drainage Swales	0	0
n/a	Green Roof	n/a	n/a
n/a	Natural Landscaping and Stormwater Trees ¹	n/a	n/a
	Roof Runoff BMPs - Planter Boxes	0	0
	Permeable Paving	0	0
n/a	Vegetated Filter Strips ²	n/a	n/a
Totals		0	0

**City of Chicago
Department of Water Management**

Name of Project: 59th Street Line
 Address: South Access Ramp between Wood St and Hermitage Ave
 A/E of Record: Infrastructure Engineering, Inc

2.0 Volume Control

Step 1:

<u>Runoff Calculation</u>		Existing Area (sq ft)	Proposed Area (sq ft)
Pervious Surface or Land Cover not Counted as Impervious for Volume Control Calculations	Bare Earth		
	Lawn or Landscaped Areas	27,023	18,913
	Woodlands		
	Wetland		
Impervious Land	Gravel		
	Pavement		4,010
	Roofs (conventional)		
	Water (including Wet Bottom Basin to HWL)		
BMPs	Green Roof	-	
	Permeable Pavement	-	
	Bioinfiltration	-	4,100
	Swales	-	
	Stormwater Trees	-	
	Roof Runoff Planters	-	
	Filter Strips	-	X
	Dry Bottom Basins to HWL	-	
Summary	Total pervious area (sq ft)	27,023	18,913
	Total impervious area (sq ft)	0	4,010
	Total BMP areas treated as impervious area (sq ft)	-	0
	Total BMP areas treated as pervious area (sq ft)	-	4,100
	Total site area (sq ft)	27,023	27,023
	Imperviousness percentage (%)	0.0	14.8

Step 2:

<u>Volume Control Assessment</u>		Type Yes or No for all that apply	Note
Question 1:	Does the site drain directly to Waters?	No	
Question 2:	Are infiltration BMPs allowable? (See Chapter III Sections 4.1.2 of the Regulations.)	Yes	
Question 3:	Do you wish to use permeable pavement only as a pervious surface to achieve impervious surface reduction goal?	No	Areas of permeable pavement are included as an impervious surface for the computation made in Cell C48. Storage will be counted toward volume control goal.

Step 3:

Achieving Volume Control Measures

Achieve I. or II. below in accordance with the Ordinance.

I.	Capture 0.5" of runoff from impervious surfaces. Storage required =	167	cubic feet	Go to spreadsheet 2.1 BMP Volume Summary if electing volume control storage option
or, II.	Reduce proposed imperviousness to:	-	percent	

City of Chicago
Department of Water Management

#####

Name of Project: 59th Street Line
 Address: South Access Ramp between Wood St and Hermitage Ave
 A/E of Record: Infrastructure Engineering, Inc

2.1.1 Bioinfiltration Systems

Section 1 Upstream Drainage Area				
1	Upstream impervious area including BMP area	A_t	8,110	square feet
2	Upstream weighted C-value (C-value=1.0 for bioinfiltration area for direct rainfall)	C	1.00	unitless
3	Volume of upstream runoff from a 1-inch storm = $C * A_t * 1/12$	$V_{upstream}$	676	cubic feet
4	Describe upstream drainage area	Paved access ramp area		
5	Describe upstream pretreatment or integration of pretreatment into BMP			

Section 2 BMP Feasibility				
6	Design soil infiltration rate (must be 0.5 in/hr or greater unless underdrain system is used)	i	0.00	in/hr
7	Elevation of bottom of BMP (the infiltration surface) IF there is no underdrain, OR the lowest underdrain invert elevation	$ELEV_{BMP}$	10.000	feet
8	Groundwater elevation	$ELEV_{GW}$	5.000	feet
9	Depth to seasonal groundwater (Must be 2 feet or greater, or 3.5 feet or greater if draining to combined sewer)	D_{GW}	5.0	feet

Section 3 BMP Specifications				
10	Dimensions of the bioinfiltration facility (length, width, or area)	L		feet
		W		feet
		A_{BMP}	4,100	square feet
11	Depth of prepared soil	D_1	0.0	feet
12	Prepared soil porosity (0.25 maximum unless detailed materials report provided)	P_1	0.25	feet
13	Depth of underlying aggregate (optional)	D_2	3.0	feet
14	Aggregate porosity (0.38 maximum unless detailed materials report provided)	P_2	0.38	feet
15	Surface storage volume (provide supporting calculations, max depth 12 inches)	V_{AIR}	0	cubic feet
16	Soil media storage volume = $A_{BMP} * [(D_1 * P_1) + (D_2 * P_2)]$	V_{SOIL}	4,674	cubic feet

Section 4 BMP Performance				
17	Volume of upstream runoff (Line 4)	$V_{upstream}$	676	cubic feet
18	Storage Provided = $V_{AIR} + V_{SOIL}$	V_{BMP}	4,674	cubic feet
19	V_{total} (equals lesser of V_{BMP} or $V_{upstream}$)	V_{total}	676	cubic feet

DETENTION CALCULATIONS FOR ENGLEWOOD TRAIL

CITY BLOCK FROM PAULINA ST TO ASHLAND AVE
See Exhibit 2-04a: Drainage Areas Sheet 7

1. Trail from STA 33+80 to STA 39+62

Detention Requirement Summary	
	Main Trail
Rate Control (cu ft)	3,005
Volume Control (cu ft)	530
Total Detention Required (cu ft)	3,535
Detention Provided (cu ft)	4,838

City of Chicago
Department of Water Management

Stormwater Spreadsheet Tool

Release 3.1 effective January 1, 2016

1. DOB Tracking/Permit Number:

2. Name of Project:
59th Street Line

3. Address of Site:
Main Trail from Paulina St to Ashland Ave
City block from sta 33+80 to sta 39+62

Architect / Engineer of Record: Infrastructure Engineering, Inc
Phone No.: 312-425-9560

4. Description of Proposed Work:
Proposed 16 feet wide paved trail

5. Use of Building (if applicable):

6. Sewer Altas & Drain Atlas Referenced:

7. Area of Site:
16,467 square feet (Square Feet = Acres * 43560)
0.378 acres (Acres = Square Feet / 43560)

This spreadsheet tool has been prepared to assist the applicant in preparing calculations for simple sites. The applicant is responsible for ensuring that submitted calculations are correct. If necessary, supporting hand calculations should be prepared and submitted.

Color Coding

-  - Cell Contents Computed by Spreadsheet
-  - Cell for User Entry
-  - Cell Includes Comment (when cursor is over it)

**City of Chicago
Department of Water Management**

Stormwater Spreadsheet Tool

INDEX OF SPREADSHEETS

Required>>	<input checked="" type="checkbox"/>	COVER
Required>>	<input checked="" type="checkbox"/>	INDEX
	<input type="checkbox"/>	0.0 RELEASE RATE
Required>>	<input checked="" type="checkbox"/>	1.0 RATE CONTROL
	<input type="checkbox"/>	1.1 Dry Weather Flow
	<input checked="" type="checkbox"/>	1.2 BMPs-Rate Control Credit
	<input type="checkbox"/>	1.3 Orifice Sizing Calculation
Required>>	<input checked="" type="checkbox"/>	2.0 VOLUME CONTROL
	<input type="checkbox"/>	2.1 BMP Volume Summary
	<input type="checkbox"/>	2.1.1 Bioinfiltration
	<input type="checkbox"/>	2.1.2 Drainage Swales
	<input type="checkbox"/>	2.1.3 Green Roof
	<input type="checkbox"/>	2.1.4 Infiltration Vault
	<input type="checkbox"/>	2.1.5 Trees
	<input checked="" type="checkbox"/>	2.1.6 Permeable Pavement
	<input type="checkbox"/>	2.1.7.1 Roof Runoff BMPs - Planter Boxes
	<input type="checkbox"/>	2.1.7.2 Roof Runoff BMPs - Rain Barrels / Cisterns
	<input type="checkbox"/>	2.1.8 Filter Strips
	<input type="checkbox"/>	2.1.9 Oversized Detention

**City of Chicago
Department of Water Management**

Name of Project: 59th Street Line
 Address: Main Trail from Paulina St to Ashland Ave
 A/E of Record: Infrastructure Engineering, Inc

1.0 Rate Control (Sheet 1 of 2)

Step 1: Runoff Calculation

		Proposed Area (sq. ft.)	C-Value 100-Year	Storage Volume (cu. ft.)
Pervious Land	Lawns - Sandy soil, flat, 0% to 2%		0.18	
	Lawns - Sandy soil, avg, 2% to 7%		0.27	
	Lawns - Sandy soil, steep, >7%		0.36	
	Lawns - Heavy soil, flat, 0% to 2%	3,735	0.30	
	Lawns - Heavy soil, avg, 2% to 7%		0.42	
	Lawns - Heavy soil, steep, >7%		0.47	
	Woodlands, flat, 2%		0.39	
	Native Vegetation with prepared soils		0.10	
	Dry bottom basins to HWL		0.75	
	Wetland		0.80	
Impervious Land	Green Roof		0.50	
	Gravel		0.70	
	Pavement		0.95	
	Roofs (conventional)		0.95	
	Building sidewalls connected by side gutters (enter 25% of the face of the sidewall)		0.95	
	Wet bottom basins to HWL		1.00	
BMP areas	BMPs providing storage that WILL COUNT toward detention storage (from Worksheet 1.2)	12,731	1.00	
	BMPs providing volume control storage that WILL NOT BE COUNTED toward detention (from Worksheet 1.2)	0		0

Summary	Total pervious area (sq ft)	3,735	
	Total impervious area (sq ft)	0	
	Total BMP area (sq ft)	12,731	
	Total site area (sq ft)	16,467	
	Weighted C- value (non BMP areas)	0.30	
	Adjusted C-value (accounts for BMPs)	0.84	
Notes:	Make note of any adjustments made for purposes of detention calcs here (such as removal of roof area that will discharge directly to Waters)		

Step 2: Allowable Release Rate Assessment

	Type Yes or No for all that apply	Notes
Question 1: Does the site drain directly to Waters?	No	
Question 2: Does the site only include residential land use for detached single-family and two-family dwellings?	No	
Question 3: Is the Regulated Development a Lot to Lot Building (85% or more of site footprint is occupied by buildings)?	No	
Question 4: Do you plan to use the standard maximum release rate (only available to sites less than 1.75 acres)?	Yes	Standard Detention Release Rate based on total site area (Cell D36) minus any tributary sidewalls
Question 5: Is the site more than 75 percent of substantially contiguous at-grade open space that is conducive to ponding of surface waters (Answer "No" if site discharges to waterway or is a service station)?	No	
Question 6: Does the development involve flow diversions (existing sewer connection to be relocated to a different main) or multiple sewer connections (only available to sites over 1.75 acres)?	No	
Question 7: Are there widespread contaminated soils on the site, high ground water table, or is this development classified as a lot-to-lot building?	No	Oversized detention is not allowed. Do not fill out Tab 2.1.9

**City of Chicago
Department of Water Management**

Name of Project: 59th Street Line
 Address: Main Trail from Paulina St to Ashland Ave
 A/E of Record: Infrastructure Engineering, Inc

1.0 Rate Control (Sheet 2 of 2)

Step 3: Achieving Rate Control Measures

Unadjusted Detention Release Rate =	0.150	cfs	0.150	0.000
Dry Weather Flow Rate = (From dry weather flow worksheet)	0.000	cfs	Waiting for Dry Weather Flow worksheet to be completed	
Infiltration Facility Release Rate (to be added to eligible release rate when computing required storage)	0.147	cfs		
Release rate for detention storage computations:	0.297	cfs		
Required Storage Volume =	3,005	cubic feet		

Detention Storage Calculations

(Based on Bulletin 70 Rainfall Data)

STORM EVENT (5,10,25,50 or 100) =

Storm Duration (minute)	Runoff Coefficient C	Rainfall Intensity (in/hr)	Drainage Area A (acres)	Allowable release rate 0.297 cfs					Storage Volume Rate (Qi-Qo)*t*60 (cf)
				Inflow Rate Q=CIA	Total Storm Vol (cf)	Release Rate Qo (cfs)	Storage Rate (Qi-Qo) (cfs)	Required Detention Volume (cf)	
		100							
5	0.84	10.920	0.38	3.47	1,042	0.297	3.18	953	
10	0.84	10.020	0.38	3.19	1,912	0.297	2.89	1,733	
15	0.84	8.200	0.38	2.61	2,347	0.297	2.31	2,079	
30	0.84	5.600	0.38	1.78	3,205	0.297	1.48	2,670	
60	0.84	3.560	0.38	1.13	4,075	0.297	0.83	3,005	
120	0.84	2.235	0.38	0.71	5,117	0.297	0.41	2,976	
180	0.84	1.617	0.38	0.51	5,552	0.297	0.22	2,341	
360	0.84	0.947	0.38	0.30	6,502	0.297	0.00	80	
720	0.84	0.549	0.38	0.17	7,544	0.297	-0.12	-5,302	
1080	0.84	0.387	0.38	0.12	7,979	0.297	-0.17	-11,289	
1440	0.84	0.316	0.38	0.10	8,678	0.297	-0.20	-17,014	
2880	0.84	0.170	0.38	0.05	9,342	0.297	-0.24	-42,041	
4320	0.84	0.122	0.38	0.04	10,051	0.297	-0.26	-67,023	
7200	0.84	0.083	0.38	0.03	11,402	0.297	-0.27	-117,055	
14400	0.84	0.046	0.38	0.01	12,753	0.297	-0.28	-244,161	
							Required Detention Volume (cf)	3,005	

Note: 1) the calculation assumes that the rising and recessing limb of inflow and outflow hydrograph are vertical

City of Chicago
Department of Water Management

Name of Project: 59th Street Line
 Address: Main Trail from Paulina St to Ashland Ave
 A/E of Record: Infrastructure Engineering, Inc

1.2 BMPs for Rate Control Credit

Volume Control BMP Summary for use in Rate Control Worksheet

Instructions for use:

This summary worksheet provides information for BMPs for use in the Rate Control Spreadsheet.
 Storage provided should be from the computation made on the each individual BMP spreadsheet (2.1.1 to 2.1.8).
 Total area of BMPs will carry over to Rate Control Worksheet.
 Other areas (ie reduce pavement area if permeable pavement implemented) should adjusted such that Line 35 on Rate Control Worksheet equals total site area.
 When the option exists, the applicant may decide whether or not to count volume control storage toward detention storage.
 n/a = not applicable and indicates when credit is inappropriate or unavailable for a given BMP.

BMP Areas with Storage COUNTED toward Rate Control Volume					
Type "yes" to Select	BMP	BMP Infiltration Area (sq. ft.)	Storage Provided (cu. ft.)	Design Soil Infiltration Rate (in/hr) ³	Allowable Infiltration Release Rate (cfs)
	Bioinfiltration Systems	0	0	0.000	0.000
	Drainage Swales	0	0	0.000	0.000
n/a	Green Roof	n/a	n/a	n/a	n/a
	Infiltration Vault	0	0	0.000	0.000
n/a	Natural Landscaping and Stormwater Trees ¹	n/a	n/a	n/a	n/a
	Roof Runoff BMPs - Planter Boxes	0	0	0.000	0.000
	Roof Runoff BMPs - Rain Barrels and Cisterns	n/a	0	n/a	n/a
yes	Permeable Paving	12,731	1,008	0.500	0.147
n/a	Vegetated Filter Strips ²	n/a	n/a	n/a	n/a
Totals		12,731	1,008	-	0.147

Notes:

1. Natural landscaping areas do not have specific storage, they can simply be entered on Rate Control Spreadsheet as having a C-value of 0.1. Detention Credit is not given for stormwater trees.
2. Vegetated Filter strips also are not given credit for a "volume of storage" and should be entered in the pervious land cover section of the Rate Control Spreadsheet based on their cover type.
3. Infiltration rate must be the design infiltration rate as explained in Stormwater Manual. If the infiltration rate is less than 0.5 in/hr, credit cannot be taken for infiltration and the Allowable Infiltration Release is set to zero. This value is automatically copied from each respective BMP spreadsheet.

BMP Areas with Storage NOT COUNTED toward Rate Control Volume			
Type "yes" to Select	BMP	Area (sq. ft.)	Storage Provided (cu. ft.)
	Bioinfiltration Systems	0	0
	Drainage Swales	0	0
n/a	Green Roof	n/a	n/a
n/a	Natural Landscaping and Stormwater Trees ¹	n/a	n/a
	Roof Runoff BMPs - Planter Boxes	0	0
	Permeable Paving	0	0
n/a	Vegetated Filter Strips ²	n/a	n/a
Totals		0	0

**City of Chicago
Department of Water Management**

Name of Project: 59th Street Line
 Address: Main Trail from Paulina St to Ashland Ave
 A/E of Record: Infrastructure Engineering, Inc

2.0 Volume Control

Step 1:

Runoff Calculation

		Existing Area (sq ft)	Proposed Area (sq ft)
Pervious Surface or Land Cover not Counted as Impervious for Volume Control Calculations	Bare Earth		
	Lawn or Landscaped Areas	16,467	3,735
	Woodlands		
	Wetland		
Impervious Land	Gravel		
	Pavement		
	Roofs (conventional)		
	Water (including Wet Bottom Basin to HWL)		
BMPs	Green Roof	-	
	Permeable Pavement	-	12,731
	Bioinfiltration	-	
	Swales	-	
	Stormwater Trees	-	
	Roof Runoff Planters	-	
	Filter Strips	-	
	Dry Bottom Basins to HWL	-	
Summary	Total pervious area (sq ft)	16,467	3,735
	Total impervious area (sq ft)	0	0
	Total BMP areas treated as impervious area (sq ft)	-	12,731
	Total BMP areas treated as pervious area (sq ft)	-	0
	Total site area (sq ft)	16,467	16,467
	Imperviousness percentage (%)	0.0	0.0

Please be sure to ans

Please be sure to ans

Step 2:

Volume Control Assessment

		Type Yes or No for all that apply	Note
Question 1:	Does the site drain directly to Waters?	No	
Question 2:	Are infiltration BMPs allowable? (See Chapter III Sections 4.1.2 of the Regulations.)	Yes	
Question 3:	Do you wish to use permeable pavement only as a pervious surface to achieve impervious surface reduction goal?	No	Areas of permeable pavement are included as an impervious surface for the computation made in Cell C48. Storage will be counted toward volume control goal.

Step 3:

Achieving Volume Control Measures

Achieve I. or II. below in accordance with the Ordinance.

I.	Capture 0.5" of runoff from impervious surfaces. Storage required =	530	cubic feet	Go to spreadsheet 2.1 BMP Volume Summary if electing volume control storage option
or, II.	Reduce proposed imperviousness to:	-	percent	

**City of Chicago
Department of Water Management**

Name of Project: 59th Street Line
 Address: Main Trail from Paulina St to Ashland Ave
 A/E of Record: Infrastructure Engineering, Inc

2.1.6 Permeable Pavement

Section 1 Upstream Drainage Area				
1	Upstream impervious area including area of permeable pavement	A_i	12,731	square feet
2	Upstream weighted C-value (C-value=0.95 for permeable pavement areas for nearly direct rainfall)	C	0.95	unitless
3	Volume of upstream runoff from a 1-inch storm = $C * A_t * 1/12$	$V_{upstream}$	1,008	cubic feet
4	Describe intended function of system (Is it standalone system designed for infiltration, is it integrated as part of the detention storage, is it underdrained to downstream system, will it receive upstream runoff?)			

Section 2 BMP Feasibility				
5	Design soil infiltration rate (must be 0.5 in/hr or greater unless underdrain system is used)	i	0.500	in/hr
6	Allowable depth of storage aggregate without provision of underdrain (=i/ 12 inches/ft * 48 hours)	D_{allow}	2.00	feet
7	Elevation of bottom of BMP (the infiltration surface) IF there is no underdrain, OR the lowest underdrain invert elevation	$ELEV_{BMP}$	44.000	feet
8	Groundwater elevation	$ELEV_{GW}$	26.000	feet
9	Depth to seasonal groundwater (Must be 2 feet or greater, or 3.5 feet or greater if draining to combined sewer)	D_{GW}	18.0	feet

Section 3 BMP Specifications				
10	Dimensions of the permeable pavement (length, width, or area)	L	578.7	feet
		W	22.0	feet
		A_{BMP}	12,731	square feet
11	Depth of underlying aggregate (must be less than D_{allow})	D_1	1.0	feet
12	Aggregate porosity (0.38 maximum unless detailed materials report provided)	P_1	0.38	feet
13	Volume of Aggregate storage applicable to volume control = $A_{BMP} * D_1 * P_1$	V_{BMP}	4,838	cubic feet

Section 4 BMP Performance				
14	Volume of upstream runoff (Line 3)	$V_{upstream}$	1,008	cubic feet
15	Volume Control Storage Provided = V_{BMP}	V_{BMP}	4,838	cubic feet
16	V_{total} (equals lesser of V_{BMP} or $V_{upstream}$)	V_{total}	1,008	cubic feet

DETENTION CALCULATIONS FOR ENGLEWOOD TRAIL

CITY BLOCK FROM ASHLAND AVE TO JUSTINE ST
See Exhibit 2-04a: Drainage Areas Sheet 8

1. Trail from STA 40+62 to STA 43+14
2. South access path to trail from STA 400+00 to STA 404+63

Detention Requirement Summary		
	Main Trail	South Access Path
Rate Control (cu ft)	915	4,555
Volume Control (cu ft)	231	194
Total Detention Required (cu ft)	1,146	4,749
Detention Provided (cu ft)	2,108	4,788

City of Chicago
Department of Water Management

Stormwater Spreadsheet Tool

Release 3.1 effective January 1, 2016

1. DOB Tracking/Permit Number:

2. Name of Project:
59th Street Line

3. Address of Site:
Main Trail from Ashland Ave to Justine St
Sta 40+62 to Sta 43+14

Architect / Engineer of Record: Infrastructure Engineering, Inc
Phone No.: 312-425-9560

4. Description of Proposed Work:
Proposed 22 feet wide paved trail

5. Use of Building (if applicable):

6. Sewer Altas & Drain Atlas Referenced:

7. Area of Site:
5,800 square feet (Square Feet = Acres * 43560)
0.133 acres (Acres = Square Feet / 43560)

This spreadsheet tool has been prepared to assist the applicant in preparing calculations for simple sites. The applicant is responsible for ensuring that submitted calculations are correct. If necessary, supporting hand calculations should be prepared and submitted.

Color Coding

-  - Cell Contents Computed by Spreadsheet
-  - Cell for User Entry
-  - Cell Includes Comment (when cursor is over it)

**City of Chicago
Department of Water Management**

Stormwater Spreadsheet Tool

INDEX OF SPREADSHEETS

Required>>	<input checked="" type="checkbox"/>	COVER
Required>>	<input checked="" type="checkbox"/>	INDEX
	<input type="checkbox"/>	0.0 RELEASE RATE
Required>>	<input checked="" type="checkbox"/>	1.0 RATE CONTROL
	<input type="checkbox"/>	1.1 Dry Weather Flow
	<input checked="" type="checkbox"/>	1.2 BMPs-Rate Control Credit
	<input type="checkbox"/>	1.3 Orifice Sizing Calculation
Required>>	<input checked="" type="checkbox"/>	2.0 VOLUME CONTROL
	<input type="checkbox"/>	2.1 BMP Volume Summary
	<input type="checkbox"/>	2.1.1 Bioinfiltration
	<input type="checkbox"/>	2.1.2 Drainage Swales
	<input type="checkbox"/>	2.1.3 Green Roof
	<input type="checkbox"/>	2.1.4 Infiltration Vault
	<input type="checkbox"/>	2.1.5 Trees
	<input checked="" type="checkbox"/>	2.1.6 Permeable Pavement
	<input type="checkbox"/>	2.1.7.1 Roof Runoff BMPs - Planter Boxes
	<input type="checkbox"/>	2.1.7.2 Roof Runoff BMPs - Rain Barrels / Cisterns
	<input type="checkbox"/>	2.1.8 Filter Strips
	<input type="checkbox"/>	2.1.9 Oversized Detention

**City of Chicago
Department of Water Management**

Name of Project: 59th Street Line
 Address: Main Trail from Ashland Ave to Justine St
 A/E of Record: Infrastructure Engineering, Inc

1.0 Rate Control (Sheet 1 of 2)

Step 1: Runoff Calculation

		Proposed Area (sq. ft.)	C-Value 100-Year	Storage Volume (cu. ft.)
Pervious Land	Lawns - Sandy soil, flat, 0% to 2%		0.18	
	Lawns - Sandy soil, avg, 2% to 7%		0.27	
	Lawns - Sandy soil, steep, >7%		0.36	
	Lawns - Heavy soil, flat, 0% to 2%	254	0.30	
	Lawns - Heavy soil, avg, 2% to 7%		0.42	
	Lawns - Heavy soil, steep, >7%		0.47	
	Woodlands, flat, 2%		0.39	
	Native Vegetation with prepared soils		0.10	
	Dry bottom basins to HWL		0.75	
	Wetland		0.80	
Impervious Land	Green Roof		0.50	
	Gravel		0.70	
	Pavement		0.95	
	Roofs (conventional)		0.95	
	Building sidewalls connected by side gutters (enter 25% of the face of the sidewall)		0.95	
	Wet bottom basins to HWL		1.00	
BMP areas	BMPs providing storage that WILL COUNT toward detention storage (from Worksheet 1.2)	5,546	1.00	
	BMPs providing volume control storage that WILL NOT BE COUNTED toward detention (from Worksheet 1.2)	0		0

Summary	Total pervious area (sq ft)	254	
	Total impervious area (sq ft)	0	
	Total BMP area (sq ft)	5,546	
	Total site area (sq ft)	5,800	
	Weighted C- value (non BMP areas)	0.30	
	Adjusted C-value (accounts for BMPs)	0.97	
Notes:	Make note of any adjustments made for purposes of detention calcs here (such as removal of roof area that will discharge directly to Waters)		

Step 2: Allowable Release Rate Assessment

	Type Yes or No for all that apply	Notes
Question 1: Does the site drain directly to Waters?	No	
Question 2: Does the site only include residential land use for detached single-family and two-family dwellings?	No	
Question 3: Is the Regulated Development a Lot to Lot Building (85% or more of site footprint is occupied by buildings)?	No	
Question 4: Do you plan to use the standard maximum release rate (only available to sites less than 1.75 acres)?	Yes	Standard Detention Release Rate based on total site area (Cell D36) minus any tributary sidewalls
Question 5: Is the site more than 75 percent of substantially contiguous at-grade open space that is conducive to ponding of surface waters (Answer "No" if site discharges to waterway or is a service station)?	No	
Question 6: Does the development involve flow diversions (existing sewer connection to be relocated to a different main) or multiple sewer connections (only available to sites over 1.75 acres)?	No	
Question 7: Are there widespread contaminated soils on the site, high ground water table, or is this development classified as a lot-to-lot building?	No	Oversized detention is not allowed. Do not fill out Tab 2.1.9

**City of Chicago
Department of Water Management**

Name of Project: 59th Street Line
 Address: Main Trail from Ashland Ave to Justine St
 A/E of Record: Infrastructure Engineering, Inc

1.0 Rate Control (Sheet 2 of 2)

Step 3: Achieving Rate Control Measures

Unadjusted Detention Release Rate =	0.150	cfs	0.150	0.000
Dry Weather Flow Rate = (From dry weather flow worksheet)	0.000	cfs	Waiting for Dry Weather Flow worksheet to be completed	
Infiltration Facility Release Rate (to be added to eligible release rate when computing required storage)	0.064	cfs		
Release rate for detention storage computations:	0.214	cfs		
Required Storage Volume =	915	cubic feet		

Detention Storage Calculations

(Based on Bulletin 70 Rainfall Data)

STORM EVENT (5,10,25,50 or 100) =

Storm Duration (minute)	Runoff Coefficient C	Rainfall Intensity (in/hr)	Drainage Area A (acres)	Allowable release rate 0.214 cfs			Storage Rate (Qi-Qo) (cfs)	Storage Volume Rate (Qi-Qo)*t*60 (cf)
				Inflow Rate Q=CIA	Total Storm Vol (cf)	Release Rate Qo (cfs)		
5	0.97	10.920	0.13	1.41	423	0.214	1.20	359
10	0.97	10.020	0.13	1.29	776	0.214	1.08	647
15	0.97	8.200	0.13	1.06	953	0.214	0.84	760
30	0.97	5.600	0.13	0.72	1,301	0.214	0.51	915
60	0.97	3.560	0.13	0.46	1,654	0.214	0.25	883
120	0.97	2.235	0.13	0.29	2,077	0.214	0.07	535
180	0.97	1.617	0.13	0.21	2,254	0.214	-0.01	-60
360	0.97	0.947	0.13	0.12	2,639	0.214	-0.09	-1,987
720	0.97	0.549	0.13	0.07	3,062	0.214	-0.14	-6,191
1080	0.97	0.387	0.13	0.05	3,239	0.214	-0.16	-10,641
1440	0.97	0.316	0.13	0.04	3,522	0.214	-0.17	-14,984
2880	0.97	0.170	0.13	0.02	3,792	0.214	-0.19	-33,221
4320	0.97	0.122	0.13	0.02	4,080	0.214	-0.20	-51,439
7200	0.97	0.083	0.13	0.01	4,628	0.214	-0.20	-87,903
14400	0.97	0.046	0.13	0.01	5,176	0.214	-0.21	-179,886
							Required Detention Volume (cf)	915

Note: 1) the calculation assumes that the rising and recessing limb of inflow and outflow hydrograph are vertical

City of Chicago
Department of Water Management

Name of Project: 59th Street Line
 Address: Main Trail from Ashland Ave to Justine St
 A/E of Record: Infrastructure Engineering, Inc

1.2 BMPs for Rate Control Credit

Volume Control BMP Summary for use in Rate Control Worksheet

Instructions for use:

This summary worksheet provides information for BMPs for use in the Rate Control Spreadsheet.

Storage provided should be from the computation made on the each individual BMP spreadsheet (2.1.1 to 2.1.8).

Total area of BMPs will carry over to Rate Control Worksheet.

Other areas (ie reduce pavement area if permeable pavement implemented) should adjusted such that Line 35 on Rate Control Worksheet equals total site area.

When the option exists, the applicant may decide whether or not to count volume control storage toward detention storage.

n/a = not applicable and indicates when credit is inappropriate or unavailable for a given BMP.

BMP Areas with Storage COUNTED toward Rate Control Volume					
Type "yes" to Select	BMP	BMP Infiltration Area (sq. ft.)	Storage Provided (cu. ft.)	Design Soil Infiltration Rate (in/hr) ³	Allowable Infiltration Release Rate (cfs)
	Bioinfiltration Systems	0	0	0.000	0.000
	Drainage Swales	0	0	0.000	0.000
n/a	Green Roof	n/a	n/a	n/a	n/a
	Infiltration Vault	0	0	0.000	0.000
n/a	Natural Landscaping and Stormwater Trees ¹	n/a	n/a	n/a	n/a
	Roof Runoff BMPs - Planter Boxes	0	0	0.000	0.000
	Roof Runoff BMPs - Rain Barrels and Cisterns	n/a	0	n/a	n/a
yes	Permeable Paving	5,546	439	0.500	0.064
n/a	Vegetated Filter Strips ²	n/a	n/a	n/a	n/a
Totals		5,546	439	-	0.064

Notes:

1. Natural landscaping areas do not have specific storage, they can simply be entered on Rate Control Spreadsheet as having a C-value of 0.1. Detention Credit is not given for stormwater trees.
2. Vegetated Filter strips also are not given credit for a "volume of storage" and should be entered in the pervious land cover section of the Rate Control Spreadsheet based on their cover type.
3. Infiltration rate must be the design infiltration rate as explained in Stormwater Manual. If the infiltration rate is less than 0.5 in/hr, credit cannot be taken for infiltration and the Allowable Infiltration Release is set to zero. This value is automatically copied from each respective BMP spreadsheet.

BMP Areas with Storage NOT COUNTED toward Rate Control Volume			
Type "yes" to Select	BMP	Area (sq. ft.)	Storage Provided (cu. ft.)
	Bioinfiltration Systems	0	0
	Drainage Swales	0	0
n/a	Green Roof	n/a	n/a
n/a	Natural Landscaping and Stormwater Trees ¹	n/a	n/a
	Roof Runoff BMPs - Planter Boxes	0	0
	Permeable Paving	0	0
n/a	Vegetated Filter Strips ²	n/a	n/a
Totals		0	0

**City of Chicago
Department of Water Management**

Name of Project: 59th Street Line
 Address: Main Trail from Ashland Ave to Justine St
 A/E of Record: Infrastructure Engineering, Inc

2.0 Volume Control

Step 1:

Runoff Calculation

		Existing Area (sq ft)	Proposed Area (sq ft)
Pervious Surface or Land Cover not Counted as Impervious for Volume Control Calculations	Bare Earth		
	Lawn or Landscaped Areas	5,800	254
	Woodlands		
	Wetland		
Impervious Land	Gravel		
	Pavement		
	Roofs (conventional)		
	Water (including Wet Bottom Basin to HWL)		
BMPs	Green Roof	-	
	Permeable Pavement	-	5,546
	Bioinfiltration	-	
	Swales	-	
	Stormwater Trees	-	
	Roof Runoff Planters	-	
	Filter Strips	-	
	Dry Bottom Basins to HWL	-	
Summary	Total pervious area (sq ft)	5,800	254
	Total impervious area (sq ft)	0	0
	Total BMP areas treated as impervious area (sq ft)	-	5,546
	Total BMP areas treated as pervious area (sq ft)	-	0
	Total site area (sq ft)	5,800	5,800
	Imperviousness percentage (%)	0.0	0.0

Please be sure to ans

Please be sure to ans

Step 2:

Volume Control Assessment

Question	Type Yes or No for all that apply	Note
Question 1: Does the site drain directly to Waters?	No	
Question 2: Are infiltration BMPs allowable? (See Chapter III Sections 4.1.2 of the Regulations.)	Yes	
Question 3: Do you wish to use permeable pavement only as a pervious surface to achieve impervious surface reduction goal?	No	Areas of permeable pavement are included as an impervious surface for the computation made in Cell C48. Storage will be counted toward volume control goal.

Step 3:

Achieving Volume Control Measures

Achieve I. or II. below in accordance with the Ordinance.

I.	Capture 0.5" of runoff from impervious surfaces. Storage required =	231	cubic feet	Go to spreadsheet 2.1 BMP Volume Summary if electing volume control storage option
or, II.	Reduce proposed imperviousness to:	-	percent	

City of Chicago
Department of Water Management

Name of Project: 59th Street Line
 Address: Main Trail from Ashland Ave to Justine St
 A/E of Record: Infrastructure Engineering, Inc

2.1.6 Permeable Pavement

Section 1 Upstream Drainage Area				
1	Upstream impervious area including area of permeable pavement	A_i	5,546	square feet
2	Upstream weighted C-value (C-value=0.95 for permeable pavement areas for nearly direct rainfall)	C	0.95	unitless
3	Volume of upstream runoff from a 1-inch storm = $C * A_t * 1/12$	$V_{upstream}$	439	cubic feet
4	Describe intended function of system (Is it standalone system designed for infiltration, is it integrated as part of the detention storage, is it underdrained to downstream system, will it receive upstream runoff?)			

Section 2 BMP Feasibility				
5	Design soil infiltration rate (must be 0.5 in/hr or greater unless underdrain system is used)	i	0.500	in/hr
6	Allowable depth of storage aggregate without provision of underdrain (=i/ 12 inches/ft * 48 hours)	D_{allow}	2.00	feet
7	Elevation of bottom of BMP (the infiltration surface) IF there is no underdrain, OR the lowest underdrain invert elevation	$ELEV_{BMP}$	44.000	feet
8	Groundwater elevation	$ELEV_{GW}$	26.000	feet
9	Depth to seasonal groundwater (Must be 2 feet or greater, or 3.5 feet or greater if draining to combined sewer)	D_{GW}	18.0	feet

Section 3 BMP Specifications				
10	Dimensions of the permeable pavement (length, width, or area)	L	252.1	feet
		W	22.0	feet
		A_{BMP}	5,546	square feet
11	Depth of underlying aggregate (must be less than D_{allow})	D_1	1.0	feet
12	Aggregate porosity (0.38 maximum unless detailed materials report provided)	P_1	0.38	feet
13	Volume of Aggregate storage applicable to volume control = $A_{BMP} * D_1 * P_1$	V_{BMP}	2,108	cubic feet

Section 4 BMP Performance				
14	Volume of upstream runoff (Line 3)	$V_{upstream}$	439	cubic feet
15	Volume Control Storage Provided = V_{BMP}	V_{BMP}	2,108	cubic feet
16	V_{total} (equals lesser of V_{BMP} or $V_{upstream}$)	V_{total}	439	cubic feet

Date: 8/11/17
Rev. Date: _____

City of Chicago
Department of Water Management

Stormwater Spreadsheet Tool

Release 3.1 effective January 1, 2016

1. DOB Tracking/Permit Number:	_____
2. Name of Project:	<u>59th Street Line</u>
3. Address of Site:	<u>South Access Ramp between Ashland Ave and Justine St</u> <u>City block from sta 40+62 to sta 43+14</u>
Architect / Engineer of Record:	<u>Infrastructure Engineering, Inc</u>
Phone No.:	<u>312-425-9560</u>
4. Description of Proposed Work:	_____ _____ _____ _____
5. Use of Building (if applicable):	_____ _____
6. Sewer Altas & Drain Atlas Referenced:	_____
7. Area of Site:	<u>30,190</u> square feet (Square Feet = Acres * 43560) <u>0.693</u> acres (Acres = Square Feet / 43560)

This spreadsheet tool has been prepared to assist the applicant in preparing calculations for simple sites. The applicant is responsible for ensuring that submitted calculations are correct. If necessary, supporting hand calculations should be prepared and submitted.

Color Coding

-  - Cell Contents Computed by Spreadsheet
-  - Cell for User Entry
-  - Cell Includes Comment (when cursor is over it)

**City of Chicago
Department of Water Management**

Stormwater Spreadsheet Tool

INDEX OF SPREADSHEETS

Required>>	<input checked="" type="checkbox"/>	COVER
Required>>	<input checked="" type="checkbox"/>	INDEX
	<input type="checkbox"/>	0.0 RELEASE RATE
Required>>	<input checked="" type="checkbox"/>	1.0 RATE CONTROL
	<input type="checkbox"/>	1.1 Dry Weather Flow
	<input checked="" type="checkbox"/>	1.2 BMPs-Rate Control Credit
	<input type="checkbox"/>	1.3 Orifice Sizing Calculation
Required>>	<input checked="" type="checkbox"/>	2.0 VOLUME CONTROL
	<input type="checkbox"/>	2.1 BMP Volume Summary
	<input checked="" type="checkbox"/>	2.1.1 Bioinfiltration
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	<input type="checkbox"/>	2.1.7.1 Roof Runoff BMPs - Planter Boxes
	<input type="checkbox"/>	2.1.7.2 Roof Runoff BMPs - Rain Barrels / Cisterns
	<input type="checkbox"/>	2.1.8 Filter Strips
	<input type="checkbox"/>	2.1.9 Oversized Detention

**City of Chicago
Department of Water Management**

Name of Project: 59th Street Line
 Address: South Access Ramp between Ashland Ave and Justine St
 A/E of Record: Infrastructure Engineering, Inc

1.0 Rate Control (Sheet 1 of 2)

Step 1: Runoff Calculation

		Proposed Area (sq. ft.)	C-Value 100-Year	Storage Volume (cu. ft.)
Pervious Land	Lawns - Sandy soil, flat, 0% to 2%		0.18	
	Lawns - Sandy soil, avg, 2% to 7%		0.27	
	Lawns - Sandy soil, steep, >7%		0.36	
	Lawns - Heavy soil, flat, 0% to 2%	13,156	0.30	
	Lawns - Heavy soil, avg, 2% to 7%	8,174	0.42	
	Lawns - Heavy soil, steep, >7%		0.47	
	Woodlands, flat, 2%		0.39	
	Native Vegetation with prepared soils		0.10	
	Dry bottom basins to HWL		0.75	
	Wetland		0.80	
Impervious Land	Green Roof		0.50	
	Gravel		0.70	
	Pavement	4,660	0.95	
	Roofs (conventional)		0.95	
	Building sidewalls connected by side gutters (enter 25% of the face of the sidewall)		0.95	
	Wet bottom basins to HWL		1.00	
BMP areas	BMPs providing storage that WILL COUNT toward detention storage (from Worksheet 1.2)	4,200	1.00	
	BMPs providing volume control storage that WILL NOT BE COUNTED toward detention (from Worksheet 1.2)	0		0

Summary	Total pervious area (sq ft)	21,330
	Total impervious area (sq ft)	4,660
	Total BMP area (sq ft)	4,200
	Total site area (sq ft)	30,190
	Weighted C- value (non BMP areas)	0.45
	Adjusted C-value (accounts for BMPs)	0.53
Notes:	<i>Make note of any adjustments made for purposes of detention calcs here (such as removal of roof area that will discharge directly to Waters)</i>	

Step 2: Allowable Release Rate Assessment

	Type Yes or No for all that apply	Notes
Question 1: Does the site drain directly to Waters?	No	
Question 2: Does the site only include residential land use for detached single-family and two-family dwellings?	No	
Question 3: Is the Regulated Development a Lot to Lot Building (85% or more of site footprint is occupied by buildings)?	No	
Question 4: Do you plan to use the standard maximum release rate (only available to sites less than 1.75 acres)?	Yes	Standard Detention Release Rate based on total site area (Cell D36) minus any tributary sidewalls
Question 5: Is the site more than 75 percent of substantially contiguous at-grade open space that is conducive to ponding of surface waters (Answer "No" if site discharges to waterway or is a service station)?	No	
Question 6: Does the development involve flow diversions (existing sewer connection to be relocated to a different main) or multiple sewer connections (only available to sites over 1.75 acres)?	No	
Question 7: Are there widespread contaminated soils on the site, high ground water table, or is this development classified as a lot-to-lot building?	No	Oversized detention is not allowed. Do not fill out Tab 2.1.9

**City of Chicago
Department of Water Management**

Name of Project: 59th Street Line
 Address: South Access Ramp between Ashland Ave and Justine St
 A/E of Record: Infrastructure Engineering, Inc

1.0 Rate Control (Sheet 2 of 2)

Step 3: Achieving Rate Control Measures

Unadjusted Detention Release Rate =	0.189	cfs	0.189	0.000
Dry Weather Flow Rate = (From dry weather flow worksheet)	0.000	cfs	Waiting for Dry Weather Flow worksheet to be completed	
Infiltration Facility Release Rate (to be added to eligible release rate when computing required storage)	0.000	cfs	No BMPs with infiltration beds entered on BMP Summary Worksheet or soil's infiltration rate is less than 0.5 in/hr	
Release rate for detention storage computations:	0.189	cfs		
Required Storage Volume =	4,555	cubic feet		

Detention Storage Calculations

(Based on Bulletin 70 Rainfall Data)

STORM EVENT (5,10,25,50 or 100) =

Storm Duration (minute)	Runoff Coefficient C	Rainfall Intensity (in/hr)	Drainage Area A (acres)	Allowable release rate 0.189 cfs					Storage Rate (Qi-Qo) (cfs)	Storage Volume Rate (Qi-Qo)*t*60 (cf)
				Inflow Rate Q=CIA	Total Storm Vol (cf)	Release Rate Qo (cfs)	Storage Rate (Qi-Qo) (cfs)	Storage Volume Rate (Qi-Qo)*t*60 (cf)		
5	0.53	10.920	0.69	4.01	1,204	0.189	3.82	1,147		
10	0.53	10.020	0.69	3.68	2,209	0.189	3.49	2,096		
15	0.53	8.200	0.69	3.01	2,712	0.189	2.82	2,542		
30	0.53	5.600	0.69	2.06	3,704	0.189	1.87	3,365		
60	0.53	3.560	0.69	1.31	4,709	0.189	1.12	4,030		
120	0.53	2.235	0.69	0.82	5,913	0.189	0.63	4,555		
180	0.53	1.617	0.69	0.59	6,416	0.189	0.41	4,379		
360	0.53	0.947	0.69	0.35	7,514	0.189	0.16	3,440		
720	0.53	0.549	0.69	0.20	8,718	0.189	0.01	570		
1080	0.53	0.387	0.69	0.14	9,220	0.189	-0.05	-3,002		
1440	0.53	0.316	0.69	0.12	10,027	0.189	-0.07	-6,269		
2880	0.53	0.170	0.69	0.06	10,795	0.189	-0.13	-21,798		
4320	0.53	0.122	0.69	0.04	11,615	0.189	-0.14	-37,274		
7200	0.53	0.083	0.69	0.03	13,176	0.189	-0.16	-68,305		
14400	0.53	0.046	0.69	0.02	14,737	0.189	-0.17	-148,225		
								Required Detention Volume (cf)	4,555	

Note: 1) the calculation assumes that the rising and recessing limb of inflow and outflow hydrograph are vertical

City of Chicago
Department of Water Management

Name of Project: 59th Street Line
 Address: South Access Ramp between Ashland Ave and Justine St
 A/E of Record: Infrastructure Engineering, Inc

1.2 BMPs for Rate Control Credit

Volume Control BMP Summary for use in Rate Control Worksheet

Instructions for use:

This summary worksheet provides information for BMPs for use in the Rate Control Spreadsheet.
 Storage provided should be from the computation made on the each individual BMP spreadsheet (2.1.1 to 2.1.8).
 Total area of BMPs will carry over to Rate Control Worksheet.
 Other areas (ie reduce pavement area if permeable pavement implemented) should adjusted such that Line 35 on Rate Control Worksheet equals total site area.
 When the option exists, the applicant may decide whether or not to count volume control storage toward detention storage.
 n/a = not applicable and indicates when credit is inappropriate or unavailable for a given BMP.

BMP Areas with Storage COUNTED toward Rate Control Volume					
Type "yes" to Select	BMP	BMP Infiltration Area (sq. ft.)	Storage Provided (cu. ft.)	Design Soil Infiltration Rate (in/hr) ³	Allowable Infiltration Release Rate (cfs)
Yes	Bioinfiltration Systems	4,200	738	0.000	0.000
	Drainage Swales	0	0	0.000	0.000
n/a	Green Roof	n/a	n/a	n/a	n/a
	Infiltration Vault	0	0	0.000	0.000
n/a	Natural Landscaping and Stormwater Trees ¹	n/a	n/a	n/a	n/a
	Roof Runoff BMPs - Planter Boxes	0	0	0.000	0.000
	Roof Runoff BMPs - Rain Barrels and Cisterns	n/a	0	n/a	n/a
	Permeable Paving	0	0	0.500	0.000
n/a	Vegetated Filter Strips ²	n/a	n/a	n/a	n/a
Totals		4,200	738	-	0.000

Notes:

1. Natural landscaping areas do not have specific storage, they can simply be entered on Rate Control Spreadsheet as having a C-value of 0.1. Detention Credit is not given for stormwater trees.
2. Vegetated Filter strips also are not given credit for a "volume of storage" and should be entered in the pervious land cover section of the Rate Control Spreadsheet based on their cover type.
3. Infiltration rate must be the design infiltration rate as explained in Stormwater Manual. If the infiltration rate is less than 0.5 in/hr, credit cannot be taken for infiltration and the Allowable Infiltration Release is set to zero. This value is automatically copied from each respective BMP spreadsheet.

BMP Areas with Storage NOT COUNTED toward Rate Control Volume			
Type "yes" to Select	BMP	Area (sq. ft.)	Storage Provided (cu. ft.)
	Bioinfiltration Systems	0	0
	Drainage Swales	0	0
n/a	Green Roof	n/a	n/a
n/a	Natural Landscaping and Stormwater Trees ¹	n/a	n/a
	Roof Runoff BMPs - Planter Boxes	0	0
	Permeable Paving	0	0
n/a	Vegetated Filter Strips ²	n/a	n/a
Totals		0	0

**City of Chicago
Department of Water Management**

Name of Project: 59th Street Line
 Address: South Access Ramp between Ashland Ave and Justine St
 A/E of Record: Infrastructure Engineering, Inc

2.0 Volume Control

Step 1:

<u>Runoff Calculation</u>		Existing Area (sq ft)	Proposed Area (sq ft)
Pervious Surface or Land Cover not Counted as Impervious for Volume Control Calculations	Bare Earth		
	Lawn or Landscaped Areas	30,190	21,330
	Woodlands		
	Wetland		
Impervious Land	Gravel		
	Pavement		4,660
	Roofs (conventional)		
	Water (including Wet Bottom Basin to HWL)		
BMPs	Green Roof	-	
	Permeable Pavement	-	
	Bioinfiltration	-	4,200
	Swales	-	
	Stormwater Trees	-	
	Roof Runoff Planters	-	
	Filter Strips	-	
	Dry Bottom Basins to HWL	-	
Summary	Total pervious area (sq ft)	30,190	21,330
	Total impervious area (sq ft)	0	4,660
	Total BMP areas treated as impervious area (sq ft)	-	0
	Total BMP areas treated as pervious area (sq ft)	-	4,200
	Total site area (sq ft)	30,190	30,190
	Imperviousness percentage (%)	0.0	15.4

Step 2:

<u>Volume Control Assessment</u>		Type Yes or No for all that apply	Note
Question 1:	Does the site drain directly to Waters?	No	
Question 2:	Are infiltration BMPs allowable? (See Chapter III Sections 4.1.2 of the Regulations.)	Yes	
Question 3:	Do you wish to use permeable pavement only as a pervious surface to achieve impervious surface reduction goal?	No	Areas of permeable pavement are included as an impervious surface for the computation made in Cell C48. Storage will be counted toward volume control goal.

Step 3:

Achieving Volume Control Measures

Achieve I. or II. below in accordance with the Ordinance.

I.	Capture 0.5" of runoff from impervious surfaces. Storage required =	194	cubic feet	Go to spreadsheet 2.1 BMP Volume Summary if electing volume control storage option
or, II.	Reduce proposed imperviousness to:	-	percent	

City of Chicago
Department of Water Management

Name of Project: 59th Street Line
 Address: South Access Ramp between Ashland Ave and Justine St
 A/E of Record: Infrastructure Engineering, Inc

2.1.1 Bioinfiltration Systems

Section 1 Upstream Drainage Area				
1	Upstream impervious area including BMP area	A_t	8,860	square feet
2	Upstream weighted C-value (C-value=1.0 for bioinfiltration area for direct rainfall)	C	1.00	unitless
3	Volume of upstream runoff from a 1-inch storm = $C * A_t * 1/12$	$V_{upstream}$	738	cubic feet
4	Describe upstream drainage area	Paved access ramp area		
5	Describe upstream pretreatment or integration of pretreatment into BMP			

Section 2 BMP Feasibility				
6	Design soil infiltration rate (must be 0.5 in/hr or greater unless underdrain system is used)	i	0.00	in/hr
7	Elevation of bottom of BMP (the infiltration surface) IF there is no underdrain, OR the lowest underdrain invert elevation	$ELEV_{BMP}$	10.000	feet
8	Groundwater elevation	$ELEV_{GW}$	5.000	feet
9	Depth to seasonal groundwater (Must be 2 feet or greater, or 3.5 feet or greater if draining to combined sewer)	D_{GW}	5.0	feet

Section 3 BMP Specifications				
10	Dimensions of the bioinfiltration facility (length, width, or area)	L		feet
		W		feet
		A_{BMP}	4,200	square feet
11	Depth of prepared soil	D_1	0.0	feet
12	Prepared soil porosity (0.25 maximum unless detailed materials report provided)	P_1	0.25	feet
13	Depth of underlying aggregate (optional)	D_2	3.0	feet
14	Aggregate porosity (0.38 maximum unless detailed materials report provided)	P_2	0.38	feet
15	Surface storage volume (provide supporting calculations, max depth 12 inches)	V_{AIR}	0	cubic feet
16	Soil media storage volume = $A_{BMP} * [(D_1 * P_1) + (D_2 * P_2)]$	V_{SOIL}	4,788	cubic feet

Section 4 BMP Performance				
17	Volume of upstream runoff (Line 4)	$V_{upstream}$	738	cubic feet
18	Storage Provided = $V_{AIR} + V_{SOIL}$	V_{BMP}	4,788	cubic feet
19	V_{total} (equals lesser of V_{BMP} or $V_{upstream}$)	V_{total}	738	cubic feet

DETENTION CALCULATIONS FOR ENGLEWOOD TRAIL

CITY BLOCK FROM LOOMIS BLVD TO ADA ST
See Exhibit 2-04a: Drainage Areas Sheet 12

1. Trail from STA 53+69 to STA 56+34
2. South access path to trail from STA 500+00 to STA 504+11

Detention Requirement Summary		
	Main Trail	South Access Path
Rate Control (cu ft)	1,020	3,966
Volume Control (cu ft)	243	173
Total Detention Required (cu ft)	1,263	4,139
Detention Provided (cu ft)	2,218	4,218

Date: 8/11/17
Rev. Date: _____

City of Chicago
Department of Water Management

Stormwater Spreadsheet Tool

Release 3.1 effective January 1, 2016

1. DOB Tracking/Permit Number:	_____
2. Name of Project:	<u>59th Street Line</u>
3. Address of Site:	<u>Main Trail from Loomis Blvd to Ada St</u> <u>Sta 53+69 to Sta 56+34</u>
Architect / Engineer of Record:	<u>Infrastructure Engineering, Inc</u>
Phone No.:	<u>312-425-9560</u>
4. Description of Proposed Work:	<u>Proposed 22 feet wide paved trail</u> _____ _____ _____
5. Use of Building (if applicable):	_____ _____
6. Sewer Altas & Drain Atlas Referenced:	_____
7. Area of Site:	<u>6,716</u> square feet (Square Feet = Acres * 43560) <u>0.154</u> acres (Acres = Square Feet / 43560)

This spreadsheet tool has been prepared to assist the applicant in preparing calculations for simple sites. The applicant is responsible for ensuring that submitted calculations are correct. If necessary, supporting hand calculations should be prepared and submitted.

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-  - Cell Contents Computed by Spreadsheet
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**City of Chicago
Department of Water Management**

Stormwater Spreadsheet Tool

INDEX OF SPREADSHEETS

Required>>	<input checked="" type="checkbox"/>	COVER
Required>>	<input checked="" type="checkbox"/>	INDEX
	<input type="checkbox"/>	0.0 RELEASE RATE
Required>>	<input checked="" type="checkbox"/>	1.0 RATE CONTROL
	<input type="checkbox"/>	1.1 Dry Weather Flow
	<input checked="" type="checkbox"/>	1.2 BMPs-Rate Control Credit
	<input type="checkbox"/>	1.3 Orifice Sizing Calculation
Required>>	<input checked="" type="checkbox"/>	2.0 VOLUME CONTROL
	<input type="checkbox"/>	2.1 BMP Volume Summary
	<input type="checkbox"/>	2.1.1 Bioinfiltration
	<input type="checkbox"/>	2.1.2 Drainage Swales
	<input type="checkbox"/>	2.1.3 Green Roof
	<input type="checkbox"/>	2.1.4 Infiltration Vault
	<input type="checkbox"/>	2.1.5 Trees
	<input checked="" type="checkbox"/>	2.1.6 Permeable Pavement
	<input type="checkbox"/>	2.1.7.1 Roof Runoff BMPs - Planter Boxes
	<input type="checkbox"/>	2.1.7.2 Roof Runoff BMPs - Rain Barrels / Cisterns
	<input type="checkbox"/>	2.1.8 Filter Strips
	<input type="checkbox"/>	2.1.9 Oversized Detention

**City of Chicago
Department of Water Management**

Name of Project: 59th Street Line
 Address: Main Trail from Loomis Blvd to Ada St
 A/E of Record: Infrastructure Engineering, Inc

1.0 Rate Control (Sheet 1 of 2)

Step 1: Runoff Calculation

		Proposed Area (sq. ft.)	C-Value 100- Year	Storage Volume (cu. ft.)
Pervious Land	Lawns - Sandy soil, flat, 0% to 2%		0.18	
	Lawns - Sandy soil, avg, 2% to 7%		0.27	
	Lawns - Sandy soil, steep, >7%		0.36	
	Lawns - Heavy soil, flat, 0% to 2%	879	0.30	
	Lawns - Heavy soil, avg, 2% to 7%		0.42	
	Lawns - Heavy soil, steep, >7%		0.47	
	Woodlands, flat, 2%		0.39	
	Native Vegetation with prepared soils		0.10	
	Dry bottom basins to HWL		0.75	
	Wetland		0.80	
Impervious Land	Green Roof		0.50	
	Gravel		0.70	
	Pavement		0.95	
	Roofs (conventional)		0.95	
	Building sidewalls connected by side gutters (enter 25% of the face of the sidewall)		0.95	
	Wet bottom basins to HWL		1.00	
BMP areas	BMPs providing storage that WILL COUNT toward detention storage (from Worksheet 1.2)	5,837	1.00	
	BMPs providing volume control storage that WILL NOT BE COUNTED toward detention (from Worksheet 1.2)	0		Storage Provided will be used to factor the adjusted C-value in Cell D38

Summary	Total pervious area (sq ft)	879
	Total impervious area (sq ft)	0
	Total BMP area (sq ft)	5,837
	Total site area (sq ft)	6,716
	Weighted C- value (non BMP areas)	0.30
	Adjusted C-value (accounts for BMPs)	0.91
Notes:	<i>Make note of any adjustments made for purposes of detention calcs here (such as removal of roof area that will discharge directly to Waters)</i>	

Step 2: Allowable Release Rate Assessment

	Type Yes or No for all that apply	Notes
Question 1: Does the site drain directly to Waters?	No	
Question 2: Does the site only include residential land use for detached single-family and two-family dwellings?	No	
Question 3: Is the Regulated Development a Lot to Lot Building (85% or more of site footprint is occupied by buildings)?	No	
Question 4: Do you plan to use the standard maximum release rate (only available to sites less than 1.75 acres)?	Yes	Standard Detention Release Rate based on total site area (Cell D36) minus any tributary sidewalls
Question 5: Is the site more than 75 percent of substantially contiguous at-grade open space that is conducive to ponding of surface waters (Answer "No" if site discharges to waterway or is a service station)?	No	
Question 6: Does the development involve flow diversions (existing sewer connection to be relocated to a different main) or multiple sewer connections (only available to sites over 1.75 acres)?	No	
Question 7: Are there widespread contaminated soils on the site, high ground water table, or is this development classified as a lot-to-lot building?	No	Oversized detention is not allowed. Do not fill out Tab 2.1.9

**City of Chicago
Department of Water Management**

Name of Project: 59th Street Line
 Address: Main Trail from Loomis Blvd to Ada St
 A/E of Record: Infrastructure Engineering, Inc

1.0 Rate Control (Sheet 2 of 2)

Step 3: Achieving Rate Control Measures

Unadjusted Detention Release Rate =	0.150	cfs	0.150	0.000
Dry Weather Flow Rate = (From dry weather flow worksheet)	0.000	cfs	Waiting for Dry Weather Flow worksheet to be completed	
Infiltration Facility Release Rate (to be added to eligible release rate when computing required storage)	0.068	cfs		
Release rate for detention storage computations:	0.218	cfs		
Required Storage Volume =	1,020	cubic feet		

Detention Storage Calculations

(Based on Bulletin 70 Rainfall Data)

STORM EVENT (5,10,25,50 or 100) =

Storm Duration (minute)	Runoff Coefficient C	Rainfall Intensity (in/hr)	Drainage Area A (acres)	STORM EVENT (5,10,25,50 or 100) =			Storage Rate (Qi-Qo) (cfs)	Storage Volume Rate (Qi-Qo)*t*60 (cf)
				100	Inflow Rate Q=CIA	Total Storm Vol (cf)		
5	0.91	10.920	0.15	1.53	459	0.218	1.31	394
10	0.91	10.020	0.15	1.40	842	0.218	1.19	711
15	0.91	8.200	0.15	1.15	1,034	0.218	0.93	838
30	0.91	5.600	0.15	0.78	1,412	0.218	0.57	1,020
60	0.91	3.560	0.15	0.50	1,795	0.218	0.28	1,012
120	0.91	2.235	0.15	0.31	2,254	0.218	0.10	687
180	0.91	1.617	0.15	0.23	2,445	0.218	0.01	96
360	0.91	0.947	0.15	0.13	2,864	0.218	-0.08	-1,835
720	0.91	0.549	0.15	0.08	3,322	0.218	-0.14	-6,076
1080	0.91	0.387	0.15	0.05	3,514	0.218	-0.16	-10,583
1440	0.91	0.316	0.15	0.04	3,822	0.218	-0.17	-14,975
2880	0.91	0.170	0.15	0.02	4,114	0.218	-0.19	-33,479
4320	0.91	0.122	0.15	0.02	4,427	0.218	-0.20	-51,963
7200	0.91	0.083	0.15	0.01	5,022	0.218	-0.21	-88,961
14400	0.91	0.046	0.15	0.01	5,616	0.218	-0.21	-182,350
							Required Detention Volume (cf)	1,020

Note: 1) the calculation assumes that the rising and recessing limb of inflow and outflow hydrograph are vertical

City of Chicago
Department of Water Management

Name of Project: 59th Street Line
 Address: Main Trail from Loomis Blvd to Ada St
 A/E of Record: Infrastructure Engineering, Inc

1.2 BMPs for Rate Control Credit

Volume Control BMP Summary for use in Rate Control Worksheet

Instructions for use:

This summary worksheet provides information for BMPs for use in the Rate Control Spreadsheet.

Storage provided should be from the computation made on the each individual BMP spreadsheet (2.1.1 to 2.1.8).

Total area of BMPs will carry over to Rate Control Worksheet.

Other areas (ie reduce pavement area if permeable pavement implemented) should adjusted such that Line 35 on Rate Control Worksheet equals total site area.

When the option exists, the applicant may decide whether or not to count volume control storage toward detention storage.

n/a = not applicable and indicates when credit is inappropriate or unavailable for a given BMP.

BMP Areas with Storage COUNTED toward Rate Control Volume					
Type "yes" to Select	BMP	BMP Infiltration Area (sq. ft.)	Storage Provided (cu. ft.)	Design Soil Infiltration Rate (in/hr) ³	Allowable Infiltration Release Rate (cfs)
	Bioinfiltration Systems	0	0	0.000	0.000
	Drainage Swales	0	0	0.000	0.000
n/a	Green Roof	n/a	n/a	n/a	n/a
	Infiltration Vault	0	0	0.000	0.000
n/a	Natural Landscaping and Stormwater Trees ¹	n/a	n/a	n/a	n/a
	Roof Runoff BMPs - Planter Boxes	0	0	0.000	0.000
	Roof Runoff BMPs - Rain Barrels and Cisterns	n/a	0	n/a	n/a
yes	Permeable Paving	5,837	462	0.500	0.068
n/a	Vegetated Filter Strips ²	n/a	n/a	n/a	n/a
Totals		5,837	462	-	0.068

Notes:

1. Natural landscaping areas do not have specific storage, they can simply be entered on Rate Control Spreadsheet as having a C-value of 0.1. Detention Credit is not given for stormwater trees.
2. Vegetated Filter strips also are not given credit for a "volume of storage" and should be entered in the pervious land cover section of the Rate Control Spreadsheet based on their cover type.
3. Infiltration rate must be the design infiltration rate as explained in Stormwater Manual. If the infiltration rate is less than 0.5 in/hr, credit cannot be taken for infiltration and the Allowable Infiltration Release is set to zero. This value is automatically copied from each respective BMP spreadsheet.

BMP Areas with Storage NOT COUNTED toward Rate Control Volume			
Type "yes" to Select	BMP	Area (sq. ft.)	Storage Provided (cu. ft.)
	Bioinfiltration Systems	0	0
	Drainage Swales	0	0
n/a	Green Roof	n/a	n/a
n/a	Natural Landscaping and Stormwater Trees ¹	n/a	n/a
	Roof Runoff BMPs - Planter Boxes	0	0
	Permeable Paving	0	0
n/a	Vegetated Filter Strips ²	n/a	n/a
Totals		0	0

**City of Chicago
Department of Water Management**

Name of Project: 59th Street Line
 Address: Main Trail from Loomis Blvd to Ada St
 A/E of Record: Infrastructure Engineering, Inc

2.0 Volume Control

Step 1:

Runoff Calculation

		Existing Area (sq ft)	Proposed Area (sq ft)
Pervious Surface or Land Cover not Counted as Impervious for Volume Control Calculations	Bare Earth		
	Lawn or Landscaped Areas	6,716	879
	Woodlands		
	Wetland		
Impervious Land	Gravel		
	Pavement		
	Roofs (conventional)		
	Water (including Wet Bottom Basin to HWL)		
BMPs	Green Roof	-	
	Permeable Pavement	-	5,837
	Bioinfiltration	-	
	Swales	-	
	Stormwater Trees	-	
	Roof Runoff Planters	-	
	Filter Strips	-	
	Dry Bottom Basins to HWL	-	
Summary	Total pervious area (sq ft)	6,716	879
	Total impervious area (sq ft)	0	0
	Total BMP areas treated as impervious area (sq ft)	-	5,837
	Total BMP areas treated as pervious area (sq ft)	-	0
	Total site area (sq ft)	6,716	6,716
	Imperviousness percentage (%)	0.0	0.0

Please be sure to ans

Please be sure to ans

Step 2:

Volume Control Assessment

		Type Yes or No for all that apply	Note
Question 1:	Does the site drain directly to Waters?	No	
Question 2:	Are infiltration BMPs allowable? (See Chapter III Sections 4.1.2 of the Regulations.)	Yes	
Question 3:	Do you wish to use permeable pavement only as a pervious surface to achieve impervious surface reduction goal?	No	Areas of permeable pavement are included as an impervious surface for the computation made in Cell C48. Storage will be counted toward volume control goal.

Step 3:

Achieving Volume Control Measures

Achieve I. or II. below in accordance with the Ordinance.

I.	Capture 0.5" of runoff from impervious surfaces. Storage required =	243	cubic feet	Go to spreadsheet 2.1 BMP Volume Summary if electing volume control storage option
or, II.	Reduce proposed imperviousness to:	-	percent	

City of Chicago
Department of Water Management

Name of Project: 59th Street Line
 Address: Main Trail from Loomis Blvd to Ada St
 A/E of Record: Infrastructure Engineering, Inc

2.1.6 Permeable Pavement

Section 1 Upstream Drainage Area				
1	Upstream impervious area including area of permeable pavement	A_i	5,837	square feet
2	Upstream weighted C-value (C-value=0.95 for permeable pavement areas for nearly direct rainfall)	C	0.95	unitless
3	Volume of upstream runoff from a 1-inch storm = $C * A_t * 1/12$	$V_{upstream}$	462	cubic feet
4	Describe intended function of system (Is it standalone system designed for infiltration, is it integrated as part of the detention storage, is it underdrained to downstream system, will it receive upstream runoff?)			

Section 2 BMP Feasibility				
5	Design soil infiltration rate (must be 0.5 in/hr or greater unless underdrain system is used)	i	0.500	in/hr
6	Allowable depth of storage aggregate without provision of underdrain (=i/ 12 inches/ft * 48 hours)	D_{allow}	2.00	feet
7	Elevation of bottom of BMP (the infiltration surface) IF there is no underdrain, OR the lowest underdrain invert elevation	$ELEV_{BMP}$	44.000	feet
8	Groundwater elevation	$ELEV_{GW}$	26.000	feet
9	Depth to seasonal groundwater (Must be 2 feet or greater, or 3.5 feet or greater if draining to combined sewer)	D_{GW}	18.0	feet

Section 3 BMP Specifications				
10	Dimensions of the permeable pavement (length, width, or area)	L	265.3	feet
		W	22.0	feet
		A_{BMP}	5,837	square feet
11	Depth of underlying aggregate (must be less than D_{allow})	D_1	1.0	feet
12	Aggregate porosity (0.38 maximum unless detailed materials report provided)	P_1	0.38	feet
13	Volume of Aggregate storage applicable to volume control = $A_{BMP} * D_1 * P_1$	V_{BMP}	2,218	cubic feet

Section 4 BMP Performance				
14	Volume of upstream runoff (Line 3)	$V_{upstream}$	462	cubic feet
15	Volume Control Storage Provided = V_{BMP}	V_{BMP}	2,218	cubic feet
16	V_{total} (equals lesser of V_{BMP} or $V_{upstream}$)	V_{total}	462	cubic feet

Date: 8/11/17
Rev. Date: _____

City of Chicago
Department of Water Management

Stormwater Spreadsheet Tool

Release 3.1 effective January 1, 2016

1. DOB Tracking/Permit Number:	_____
2. Name of Project:	<u>59th Street Line</u>
3. Address of Site:	<u>South Access Ramp between Loomis Blvd and Ada St</u> <u>City block from sta 53+69 to sta 56+34</u>
Architect / Engineer of Record:	<u>Infrastructure Engineering, Inc</u>
Phone No.:	<u>312-425-9560</u>
4. Description of Proposed Work:	_____ _____ _____ _____
5. Use of Building (if applicable):	_____ _____
6. Sewer Altas & Drain Atlas Referenced:	_____
7. Area of Site:	<u>24,974</u> square feet (Square Feet = Acres * 43560) <u>0.573</u> acres (Acres = Square Feet / 43560)

This spreadsheet tool has been prepared to assist the applicant in preparing calculations for simple sites. The applicant is responsible for ensuring that submitted calculations are correct. If necessary, supporting hand calculations should be prepared and submitted.

Color Coding

-  - Cell Contents Computed by Spreadsheet
-  - Cell for User Entry
-  - Cell Includes Comment (when cursor is over it)

**City of Chicago
Department of Water Management**

Stormwater Spreadsheet Tool

INDEX OF SPREADSHEETS

Required>>	<input checked="" type="checkbox"/>	COVER
Required>>	<input checked="" type="checkbox"/>	INDEX
	<input type="checkbox"/>	0.0 RELEASE RATE
Required>>	<input checked="" type="checkbox"/>	1.0 RATE CONTROL
	<input type="checkbox"/>	1.1 Dry Weather Flow
	<input checked="" type="checkbox"/>	1.2 BMPs-Rate Control Credit
	<input type="checkbox"/>	1.3 Orifice Sizing Calculation
Required>>	<input checked="" type="checkbox"/>	2.0 VOLUME CONTROL
	<input type="checkbox"/>	2.1 BMP Volume Summary
	<input checked="" type="checkbox"/>	2.1.1 Bioinfiltration
	<input type="checkbox"/>	2.1.2 Drainage Swales
	<input type="checkbox"/>	2.1.3 Green Roof
	<input type="checkbox"/>	2.1.4 Infiltration Vault
	<input type="checkbox"/>	2.1.5 Trees
	<input type="checkbox"/>	2.1.6 Permeable Pavement
	<input type="checkbox"/>	2.1.7.1 Roof Runoff BMPs - Planter Boxes
	<input type="checkbox"/>	2.1.7.2 Roof Runoff BMPs - Rain Barrels / Cisterns
	<input type="checkbox"/>	2.1.8 Filter Strips
	<input type="checkbox"/>	2.1.9 Oversized Detention

**City of Chicago
Department of Water Management**

Name of Project: 59th Street Line
 Address: South Access Ramp between Loomis Blvd and Ada St
 A/E of Record: Infrastructure Engineering, Inc

1.0 Rate Control (Sheet 1 of 2)

Step 1: Runoff Calculation

		Proposed Area (sq. ft.)	C-Value 100-Year	Storage Volume (cu. ft.)
Pervious Land	Lawns - Sandy soil, flat, 0% to 2%		0.18	
	Lawns - Sandy soil, avg, 2% to 7%		0.27	
	Lawns - Sandy soil, steep, >7%		0.36	
	Lawns - Heavy soil, flat, 0% to 2%	7,424	0.30	
	Lawns - Heavy soil, avg, 2% to 7%	9,700	0.42	
	Lawns - Heavy soil, steep, >7%		0.47	
	Woodlands, flat, 2%		0.39	
	Native Vegetation with prepared soils		0.10	
	Dry bottom basins to HWL		0.75	
	Wetland		0.80	
Impervious Land	Green Roof		0.50	
	Gravel		0.70	
	Pavement	4,150	0.95	
	Roofs (conventional)		0.95	
	Building sidewalls connected by side gutters (enter 25% of the face of the sidewall)		0.95	
	Wet bottom basins to HWL		1.00	
BMP areas	BMPs providing storage that WILL COUNT toward detention storage (from Worksheet 1.2)	3,700	1.00	
	BMPs providing volume control storage that WILL NOT BE COUNTED toward detention (from Worksheet 1.2)	0		0

Summary	Total pervious area (sq ft)	17,124	
	Total impervious area (sq ft)	4,150	
	Total BMP area (sq ft)	3,700	
	Total site area (sq ft)	24,974	
	Weighted C- value (non BMP areas)	0.48	
	Adjusted C-value (accounts for BMPs)	0.56	
Notes:	Make note of any adjustments made for purposes of detention calcs here (such as removal of roof area that will discharge directly to Waters)		

Step 2: Allowable Release Rate Assessment

	Type Yes or No for all that apply	Notes
Question 1: Does the site drain directly to Waters?	No	
Question 2: Does the site only include residential land use for detached single-family and two-family dwellings?	No	
Question 3: Is the Regulated Development a Lot to Lot Building (85% or more of site footprint is occupied by buildings)?	No	
Question 4: Do you plan to use the standard maximum release rate (only available to sites less than 1.75 acres)?	Yes	Standard Detention Release Rate based on total site area (Cell D36) minus any tributary sidewalls
Question 5: Is the site more than 75 percent of substantially contiguous at-grade open space that is conducive to ponding of surface waters (Answer "No" if site discharges to waterway or is a service station)?	No	
Question 6: Does the development involve flow diversions (existing sewer connection to be relocated to a different main) or multiple sewer connections (only available to sites over 1.75 acres)?	No	
Question 7: Are there widespread contaminated soils on the site, high ground water table, or is this development classified as a lot-to-lot building?	No	Oversized detention is not allowed. Do not fill out Tab 2.1.9

**City of Chicago
Department of Water Management**

Name of Project: 59th Street Line
 Address: South Access Ramp between Loomis Blvd and Ada St
 A/E of Record: Infrastructure Engineering, Inc

1.0 Rate Control (Sheet 2 of 2)

Step 3: Achieving Rate Control Measures

Unadjusted Detention Release Rate =	0.165	cfs	0.165	0.000
Dry Weather Flow Rate = (From dry weather flow worksheet)	0.000	cfs	Waiting for Dry Weather Flow worksheet to be completed	
Infiltration Facility Release Rate (to be added to eligible release rate when computing required storage)	0.000	cfs	No BMPs with infiltration beds entered on BMP Summary Worksheet or soil's infiltration rate is less than 0.5 in/hr	
Release rate for detention storage computations:	0.165	cfs		
Required Storage Volume =	3,966	cubic feet		

Detention Storage Calculations

(Based on Bulletin 70 Rainfall Data)

STORM EVENT (5,10,25,50 or 100) =

Storm Duration (minute)	Runoff Coefficient C	Rainfall Intensity (in/hr)	Drainage Area A (acres)	Allowable release rate 0.165 cfs				
				Inflow Rate Q=CIA	Total Storm Vol (cf)	Release Rate Qo (cfs)	Storage Rate (Qi-Qo) (cfs)	Storage Volume Rate (Qi-Qo)*t*60 (cf)
5	0.56	10.920	0.57	3.50	1,049	0.165	3.33	999
10	0.56	10.020	0.57	3.21	1,924	0.165	3.04	1,826
15	0.56	8.200	0.57	2.62	2,362	0.165	2.46	2,214
30	0.56	5.600	0.57	1.79	3,227	0.165	1.63	2,930
60	0.56	3.560	0.57	1.14	4,102	0.165	0.97	3,510
120	0.56	2.235	0.57	0.72	5,151	0.165	0.55	3,966
180	0.56	1.617	0.57	0.52	5,589	0.165	0.35	3,811
360	0.56	0.947	0.57	0.30	6,545	0.165	0.14	2,989
720	0.56	0.549	0.57	0.18	7,594	0.165	0.01	481
1080	0.56	0.387	0.57	0.12	8,032	0.165	-0.04	-2,638
1440	0.56	0.316	0.57	0.10	8,735	0.165	-0.06	-5,492
2880	0.56	0.170	0.57	0.05	9,403	0.165	-0.11	-19,051
4320	0.56	0.122	0.57	0.04	10,118	0.165	-0.13	-32,563
7200	0.56	0.083	0.57	0.03	11,478	0.165	-0.14	-59,658
14400	0.56	0.046	0.57	0.01	12,837	0.165	-0.15	-129,433
							Required Detention Volume (cf)	3,966

Note: 1) the calculation assumes that the rising and recessing limb of inflow and outflow hydrograph are vertical

City of Chicago
Department of Water Management

Name of Project: 59th Street Line
 Address: South Access Ramp between Loomis Blvd and Ada St
 A/E of Record: Infrastructure Engineering, Inc

1.2 BMPs for Rate Control Credit

Volume Control BMP Summary for use in Rate Control Worksheet

Instructions for use:

This summary worksheet provides information for BMPs for use in the Rate Control Spreadsheet.

Storage provided should be from the computation made on the each individual BMP spreadsheet (2.1.1 to 2.1.8).

Total area of BMPs will carry over to Rate Control Worksheet.

Other areas (ie reduce pavement area if permeable pavement implemented) should adjusted such that Line 35 on Rate Control Worksheet equals total site area.

When the option exists, the applicant may decide whether or not to count volume control storage toward detention storage.

n/a = not applicable and indicates when credit is inappropriate or unavailable for a given BMP.

BMP Areas with Storage COUNTED toward Rate Control Volume					
Type "yes" to Select	BMP	BMP Infiltration Area (sq. ft.)	Storage Provided (cu. ft.)	Design Soil Infiltration Rate (in/hr) ³	Allowable Infiltration Release Rate (cfs)
yes	Bioinfiltration Systems	3,700	654	0.000	0.000
	Drainage Swales	0	0	0.000	0.000
n/a	Green Roof	n/a	n/a	n/a	n/a
	Infiltration Vault	0	0	0.000	0.000
n/a	Natural Landscaping and Stormwater Trees ¹	n/a	n/a	n/a	n/a
	Roof Runoff BMPs - Planter Boxes	0	0	0.000	0.000
	Roof Runoff BMPs - Rain Barrels and Cisterns	n/a	0	n/a	n/a
no	Permeable Paving	0	0	0.500	0.000
n/a	Vegetated Filter Strips ²	n/a	n/a	n/a	n/a
Totals		3,700	654	-	0.000

Notes:

1. Natural landscaping areas do not have specific storage, they can simply be entered on Rate Control Spreadsheet as having a C-value of 0.1. Detention Credit is not given for stormwater trees.
2. Vegetated Filter strips also are not given credit for a "volume of storage" and should be entered in the pervious land cover section of the Rate Control Spreadsheet based on their cover type.
3. Infiltration rate must be the design infiltration rate as explained in Stormwater Manual. If the infiltration rate is less than 0.5 in/hr, credit cannot be taken for infiltration and the Allowable Infiltration Release is set to zero. This value is automatically copied from each respective BMP spreadsheet.

BMP Areas with Storage NOT COUNTED toward Rate Control Volume			
Type "yes" to Select	BMP	Area (sq. ft.)	Storage Provided (cu. ft.)
	Bioinfiltration Systems	0	0
	Drainage Swales	0	0
n/a	Green Roof	n/a	n/a
n/a	Natural Landscaping and Stormwater Trees ¹	n/a	n/a
	Roof Runoff BMPs - Planter Boxes	0	0
	Permeable Paving	0	0
n/a	Vegetated Filter Strips ²	n/a	n/a
Totals		0	0

**City of Chicago
Department of Water Management**

Name of Project: 59th Street Line
 Address: South Access Ramp between Loomis Blvd and Ada St
 A/E of Record: Infrastructure Engineering, Inc

2.0 Volume Control

Step 1:

Runoff Calculation

		Existing Area (sq ft)	Proposed Area (sq ft)
Pervious Surface or Land Cover not Counted as Impervious for Volume Control Calculations	Bare Earth		
	Lawn or Landscaped Areas	24,974	17,124
	Woodlands		
	Wetland		
Impervious Land	Gravel		
	Pavement		4,150
	Roofs (conventional)		
	Water (including Wet Bottom Basin to HWL)		
BMPs	Green Roof	-	
	Permeable Pavement	-	
	Bioinfiltration	-	3,700
	Swales	-	
	Stormwater Trees	-	
	Roof Runoff Planters	-	
	Filter Strips	-	
	Dry Bottom Basins to HWL	-	
Summary	Total pervious area (sq ft)	24,974	17,124
	Total impervious area (sq ft)	0	4,150
	Total BMP areas treated as impervious area (sq ft)	-	0
	Total BMP areas treated as pervious area (sq ft)	-	3,700
	Total site area (sq ft)	24,974	24,974
	Imperviousness percentage (%)	0.0	16.6

Step 2:

Volume Control Assessment

		Type Yes or No for all that apply	Note
Question 1:	Does the site drain directly to Waters?	No	
Question 2:	Are infiltration BMPs allowable? (See Chapter III Sections 4.1.2 of the Regulations.)	Yes	
Question 3:	Do you wish to use permeable pavement only as a pervious surface to achieve impervious surface reduction goal?	No	Areas of permeable pavement are included as an impervious surface for the computation made in Cell C48. Storage will be counted toward volume control goal.

Step 3:

Achieving Volume Control Measures

Achieve I. or II. below in accordance with the Ordinance.

I.	Capture 0.5" of runoff from impervious surfaces. Storage required =	173	cubic feet	Go to spreadsheet 2.1 BMP Volume Summary if electing volume control storage option
or, II.	Reduce proposed imperviousness to:	-	percent	

City of Chicago
Department of Water Management

Name of Project: 59th Street Line
 Address: South Access Ramp between Loomis Blvd and Ada St
 A/E of Record: Infrastructure Engineering, Inc

2.1.1 Bioinfiltration Systems

Section 1 Upstream Drainage Area				
1	Upstream impervious area including BMP area	A_t	7,850	square feet
2	Upstream weighted C-value (C-value=1.0 for bioinfiltration area for direct rainfall)	C	1.00	unitless
3	Volume of upstream runoff from a 1-inch storm = $C * A_t * 1/12$	$V_{upstream}$	654	cubic feet
4	Describe upstream drainage area	Paved access ramp area		
5	Describe upstream pretreatment or integration of pretreatment into BMP			

Section 2 BMP Feasibility				
6	Design soil infiltration rate (must be 0.5 in/hr or greater unless underdrain system is used)	i	0.00	in/hr
7	Elevation of bottom of BMP (the infiltration surface) IF there is no underdrain, OR the lowest underdrain invert elevation	$ELEV_{BMP}$	10.000	feet
8	Groundwater elevation	$ELEV_{GW}$	5.000	feet
9	Depth to seasonal groundwater (Must be 2 feet or greater, or 3.5 feet or greater if draining to combined sewer)	D_{GW}	5.0	feet

Section 3 BMP Specifications				
10	Dimensions of the bioinfiltration facility (length, width, or area)	L		feet
		W		feet
		A_{BMP}	3,700	square feet
11	Depth of prepared soil	D_1	0.0	feet
12	Prepared soil porosity (0.25 maximum unless detailed materials report provided)	P_1	0.25	feet
13	Depth of underlying aggregate (optional)	D_2	3.0	feet
14	Aggregate porosity (0.38 maximum unless detailed materials report provided)	P_2	0.38	feet
15	Surface storage volume (provide supporting calculations, max depth 12 inches)	V_{AIR}	0	cubic feet
16	Soil media storage volume = $A_{BMP} * [(D_1 * P_1) + (D_2 * P_2)]$	V_{SOIL}	4,218	cubic feet

Section 4 BMP Performance				
17	Volume of upstream runoff (Line 4)	$V_{upstream}$	654	cubic feet
18	Storage Provided = $V_{AIR} + V_{SOIL}$	V_{BMP}	4,218	cubic feet
19	V_{total} (equals lesser of V_{BMP} or $V_{upstream}$)	V_{total}	654	cubic feet

DETENTION CALCULATIONS FOR ENGLEWOOD TRAIL

CITY BLOCK FROM ELIZABETH ST TO RACINE AVE
See Exhibit 2-04a: Drainage Areas Sheet 15

1. Trail from STA 63+63 to STA 66+28
2. North access path to trail from STA 600+00 to STA 604+11

Detention Requirement Summary		
	Main Trail	South Access Path
Rate Control (cu ft)	1,217	4,788
Volume Control (cu ft)	243	188
Total Detention Required (cu ft)	1,460	4,976
Detention Provided (cu ft)	2,220	5,130

Date: 8/11/17
Rev. Date: _____

City of Chicago
Department of Water Management

Stormwater Spreadsheet Tool

Release 3.1 effective January 1, 2016

1. DOB Tracking/Permit Number:	_____
2. Name of Project:	<u>59th Street Line</u>
3. Address of Site:	<u>Main Trail from Elizabeth St to Racine Ave</u> <u>Sta 63+63 to Sta 66+28</u>
Architect / Engineer of Record:	<u>Infrastructure Engineering, Inc</u>
Phone No.:	<u>312-425-9560</u>
4. Description of Proposed Work:	<u>Proposed 22 feet wide paved trail</u> _____ _____ _____
5. Use of Building (if applicable):	_____ _____
6. Sewer Altas & Drain Atlas Referenced:	_____
7. Area of Site:	<u>9,033</u> square feet (Square Feet = Acres * 43560) <u>0.207</u> acres (Acres = Square Feet / 43560)

This spreadsheet tool has been prepared to assist the applicant in preparing calculations for simple sites. The applicant is responsible for ensuring that submitted calculations are correct. If necessary, supporting hand calculations should be prepared and submitted.

Color Coding

-  - Cell Contents Computed by Spreadsheet
-  - Cell for User Entry
-  - Cell Includes Comment (when cursor is over it)

**City of Chicago
Department of Water Management**

Stormwater Spreadsheet Tool

INDEX OF SPREADSHEETS

Required>>	<input checked="" type="checkbox"/>	COVER
Required>>	<input checked="" type="checkbox"/>	INDEX
	<input type="checkbox"/>	0.0 RELEASE RATE
Required>>	<input checked="" type="checkbox"/>	1.0 RATE CONTROL
	<input type="checkbox"/>	1.1 Dry Weather Flow
	<input checked="" type="checkbox"/>	1.2 BMPs-Rate Control Credit
	<input type="checkbox"/>	1.3 Orifice Sizing Calculation
Required>>	<input checked="" type="checkbox"/>	2.0 VOLUME CONTROL
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	<input type="checkbox"/>	2.1.1 Bioinfiltration
	<input type="checkbox"/>	2.1.2 Drainage Swales
	<input type="checkbox"/>	2.1.3 Green Roof
	<input type="checkbox"/>	2.1.4 Infiltration Vault
	<input type="checkbox"/>	2.1.5 Trees
	<input checked="" type="checkbox"/>	2.1.6 Permeable Pavement
	<input type="checkbox"/>	2.1.7.1 Roof Runoff BMPs - Planter Boxes
	<input type="checkbox"/>	2.1.7.2 Roof Runoff BMPs - Rain Barrels / Cisterns
	<input type="checkbox"/>	2.1.8 Filter Strips
	<input type="checkbox"/>	2.1.9 Oversized Detention

**City of Chicago
Department of Water Management**

Name of Project: 59th Street Line
 Address: Main Trail from Elizabeth St to Racine Ave
 A/E of Record: Infrastructure Engineering, Inc

1.0 Rate Control (Sheet 1 of 2)

Step 1: Runoff Calculation

		Proposed Area (sq. ft.)	C-Value 100-Year	Storage Volume (cu. ft.)
Pervious Land	Lawns - Sandy soil, flat, 0% to 2%		0.18	
	Lawns - Sandy soil, avg, 2% to 7%		0.27	
	Lawns - Sandy soil, steep, >7%		0.36	
	Lawns - Heavy soil, flat, 0% to 2%	3,190	0.30	
	Lawns - Heavy soil, avg, 2% to 7%		0.42	
	Lawns - Heavy soil, steep, >7%		0.47	
	Woodlands, flat, 2%		0.39	
	Native Vegetation with prepared soils		0.10	
	Dry bottom basins to HWL		0.75	
	Wetland		0.80	
Impervious Land	Green Roof		0.50	
	Gravel		0.70	
	Pavement		0.95	
	Roofs (conventional)		0.95	
	Building sidewalls connected by side gutters (enter 25% of the face of the sidewall)		0.95	
	Wet bottom basins to HWL		1.00	
BMP areas	BMPs providing storage that WILL COUNT toward detention storage (from Worksheet 1.2)	5,843	1.00	
	BMPs providing volume control storage that WILL NOT BE COUNTED toward detention (from Worksheet 1.2)	0		0

Summary	Total pervious area (sq ft)	3,190
	Total impervious area (sq ft)	0
	Total BMP area (sq ft)	5,843
	Total site area (sq ft)	9,033
	Weighted C- value (non BMP areas)	0.30
	Adjusted C-value (accounts for BMPs)	0.75
Notes:	Make note of any adjustments made for purposes of detention calcs here (such as removal of roof area that will discharge directly to Waters)	

Step 2: Allowable Release Rate Assessment

	Type Yes or No for all that apply	Notes
Question 1: Does the site drain directly to Waters?	No	
Question 2: Does the site only include residential land use for detached single-family and two-family dwellings?	No	
Question 3: Is the Regulated Development a Lot to Lot Building (85% or more of site footprint is occupied by buildings)?	No	
Question 4: Do you plan to use the standard maximum release rate (only available to sites less than 1.75 acres)?	Yes	Standard Detention Release Rate based on total site area (Cell D36) minus any tributary sidewalls
Question 5: Is the site more than 75 percent of substantially contiguous at-grade open space that is conducive to ponding of surface waters (Answer "No" if site discharges to waterway or is a service station)?	No	
Question 6: Does the development involve flow diversions (existing sewer connection to be relocated to a different main) or multiple sewer connections (only available to sites over 1.75 acres)?	No	
Question 7: Are there widespread contaminated soils on the site, high ground water table, or is this development classified as a lot-to-lot building?	No	Oversized detention is not allowed. Do not fill out Tab 2.1.9

**City of Chicago
Department of Water Management**

Name of Project: 59th Street Line
 Address: Main Trail from Elizabeth St to Racine Ave
 A/E of Record: Infrastructure Engineering, Inc

1.0 Rate Control (Sheet 2 of 2)

Step 3: Achieving Rate Control Measures

Unadjusted Detention Release Rate =	0.150	cfs	0.150	0.000
Dry Weather Flow Rate = (From dry weather flow worksheet)	0.000	cfs	Waiting for Dry Weather Flow worksheet to be completed	
Infiltration Facility Release Rate (to be added to eligible release rate when computing required storage)	0.068	cfs		
Release rate for detention storage computations:	0.218	cfs		
Required Storage Volume =	1,217	cubic feet		

Detention Storage Calculations

(Based on Bulletin 70 Rainfall Data)

STORM EVENT (5,10,25,50 or 100) =

100

Allowable release rate 0.218 cfs

Storm Duration (minute)	Runoff Coefficient C	Rainfall Intensity (in/hr)	Drainage Area A (acres)	Inflow Rate Q=CIA	Total Storm Vol (cf)	Release Rate Q _o (cfs)	Storage Rate (Q _i -Q _o) (cfs)	Storage Volume Rate (Q _i -Q _o)*t*60 (cf)
5	0.75	10.920	0.21	1.70	511	0.218	1.49	446
10	0.75	10.020	0.21	1.56	939	0.218	1.35	808
15	0.75	8.200	0.21	1.28	1,152	0.218	1.06	956
30	0.75	5.600	0.21	0.87	1,574	0.218	0.66	1,182
60	0.75	3.560	0.21	0.56	2,001	0.218	0.34	1,217
120	0.75	2.235	0.21	0.35	2,512	0.218	0.13	945
180	0.75	1.617	0.21	0.25	2,726	0.218	0.03	375
360	0.75	0.947	0.21	0.15	3,192	0.218	-0.07	-1,509
720	0.75	0.549	0.21	0.09	3,704	0.218	-0.13	-5,698
1080	0.75	0.387	0.21	0.06	3,917	0.218	-0.16	-10,185
1440	0.75	0.316	0.21	0.05	4,260	0.218	-0.17	-14,543
2880	0.75	0.170	0.21	0.03	4,586	0.218	-0.19	-33,021
4320	0.75	0.122	0.21	0.02	4,934	0.218	-0.20	-51,475
7200	0.75	0.083	0.21	0.01	5,597	0.218	-0.20	-88,419
14400	0.75	0.046	0.21	0.01	6,261	0.218	-0.21	-181,771
Required Detention Volume (cf)								1,217

Note: 1) the calculation assumes that the rising and recessing limb of inflow and outflow hydrograph are vertical

City of Chicago
Department of Water Management

Name of Project: 59th Street Line
 Address: Main Trail from Elizabeth St to Racine Ave
 A/E of Record: Infrastructure Engineering, Inc

1.2 BMPs for Rate Control Credit

Volume Control BMP Summary for use in Rate Control Worksheet

Instructions for use:

This summary worksheet provides information for BMPs for use in the Rate Control Spreadsheet.

Storage provided should be from the computation made on the each individual BMP spreadsheet (2.1.1 to 2.1.8).

Total area of BMPs will carry over to Rate Control Worksheet.

Other areas (ie reduce pavement area if permeable pavement implemented) should adjusted such that Line 35 on Rate Control Worksheet equals total site area.

When the option exists, the applicant may decide whether or not to count volume control storage toward detention storage.

n/a = not applicable and indicates when credit is inappropriate or unavailable for a given BMP.

BMP Areas with Storage COUNTED toward Rate Control Volume					
Type "yes" to Select	BMP	BMP Infiltration Area (sq. ft.)	Storage Provided (cu. ft.)	Design Soil Infiltration Rate (in/hr) ³	Allowable Infiltration Release Rate (cfs)
	Bioinfiltration Systems	0	0	0.000	0.000
	Drainage Swales	0	0	0.000	0.000
n/a	Green Roof	n/a	n/a	n/a	n/a
	Infiltration Vault	0	0	0.000	0.000
n/a	Natural Landscaping and Stormwater Trees ¹	n/a	n/a	n/a	n/a
	Roof Runoff BMPs - Planter Boxes	0	0	0.000	0.000
	Roof Runoff BMPs - Rain Barrels and Cisterns	n/a	0	n/a	n/a
yes	Permeable Paving	5,843	463	0.500	0.068
n/a	Vegetated Filter Strips ²	n/a	n/a	n/a	n/a
Totals		5,843	463	-	0.068

Notes:

1. Natural landscaping areas do not have specific storage, they can simply be entered on Rate Control Spreadsheet as having a C-value of 0.1. Detention Credit is not given for stormwater trees.
2. Vegetated Filter strips also are not given credit for a "volume of storage" and should be entered in the pervious land cover section of the Rate Control Spreadsheet based on their cover type.
3. Infiltration rate must be the design infiltration rate as explained in Stormwater Manual. If the infiltration rate is less than 0.5 in/hr, credit cannot be taken for infiltration and the Allowable Infiltration Release is set to zero. This value is automatically copied from each respective BMP spreadsheet.

BMP Areas with Storage NOT COUNTED toward Rate Control Volume			
Type "yes" to Select	BMP	Area (sq. ft.)	Storage Provided (cu. ft.)
	Bioinfiltration Systems	0	0
	Drainage Swales	0	0
n/a	Green Roof	n/a	n/a
n/a	Natural Landscaping and Stormwater Trees ¹	n/a	n/a
	Roof Runoff BMPs - Planter Boxes	0	0
	Permeable Paving	0	0
n/a	Vegetated Filter Strips ²	n/a	n/a
Totals		0	0

**City of Chicago
Department of Water Management**

Name of Project: 59th Street Line
 Address: Main Trail from Elizabeth St to Racine Ave
 A/E of Record: Infrastructure Engineering, Inc

2.0 Volume Control

Step 1:

Runoff Calculation

		Existing Area (sq ft)	Proposed Area (sq ft)
Pervious Surface or Land Cover not Counted as Impervious for Volume Control Calculations	Bare Earth		
	Lawn or Landscaped Areas	9,033	3,190
	Woodlands		
	Wetland		
Impervious Land	Gravel		
	Pavement		
	Roofs (conventional)		
	Water (including Wet Bottom Basin to HWL)		
BMPs	Green Roof	-	
	Permeable Pavement	-	5,843
	Bioinfiltration	-	
	Swales	-	
	Stormwater Trees	-	
	Roof Runoff Planters	-	
	Filter Strips	-	
	Dry Bottom Basins to HWL	-	
Summary	Total pervious area (sq ft)	9,033	3,190
	Total impervious area (sq ft)	0	0
	Total BMP areas treated as impervious area (sq ft)	-	5,843
	Total BMP areas treated as pervious area (sq ft)	-	0
	Total site area (sq ft)	9,033	9,033
	Imperviousness percentage (%)	0.0	0.0

Please be sure to ans

Please be sure to ans

Step 2:

Volume Control Assessment

		Type Yes or No for all that apply	Note
Question 1:	Does the site drain directly to Waters?	No	
Question 2:	Are infiltration BMPs allowable? (See Chapter III Sections 4.1.2 of the Regulations.)	Yes	
Question 3:	Do you wish to use permeable pavement only as a pervious surface to achieve impervious surface reduction goal?	No	Areas of permeable pavement are included as an impervious surface for the computation made in Cell C48. Storage will be counted toward volume control goal.

Step 3:

Achieving Volume Control Measures

Achieve I. or II. below in accordance with the Ordinance.

I.	Capture 0.5" of runoff from impervious surfaces. Storage required =	243	cubic feet	Go to spreadsheet 2.1 BMP Volume Summary if electing volume control storage option
or, II.	Reduce proposed imperviousness to:	-	percent	

City of Chicago
Department of Water Management

Name of Project: 59th Street Line
 Address: Main Trail from Elizabeth St to Racine Ave
 A/E of Record: Infrastructure Engineering, Inc

2.1.6 Permeable Pavement

Section 1 Upstream Drainage Area				
1	Upstream impervious area including area of permeable pavement	A_i	5,843	square feet
2	Upstream weighted C-value (C-value=0.95 for permeable pavement areas for nearly direct rainfall)	C	0.95	unitless
3	Volume of upstream runoff from a 1-inch storm = $C * A_t * 1/12$	$V_{upstream}$	463	cubic feet
4	Describe intended function of system (Is it standalone system designed for infiltration, is it integrated as part of the detention storage, is it underdrained to downstream system, will it receive upstream runoff?)			

Section 2 BMP Feasibility				
5	Design soil infiltration rate (must be 0.5 in/hr or greater unless underdrain system is used)	i	0.500	in/hr
6	Allowable depth of storage aggregate without provision of underdrain (=i/ 12 inches/ft * 48 hours)	D_{allow}	2.00	feet
7	Elevation of bottom of BMP (the infiltration surface) IF there is no underdrain, OR the lowest underdrain invert elevation	$ELEV_{BMP}$	44.000	feet
8	Groundwater elevation	$ELEV_{GW}$	26.000	feet
9	Depth to seasonal groundwater (Must be 2 feet or greater, or 3.5 feet or greater if draining to combined sewer)	D_{GW}	18.0	feet

Section 3 BMP Specifications				
10	Dimensions of the permeable pavement (length, width, or area)	L	265.6	feet
		W	22.0	feet
		A_{BMP}	5,843	square feet
11	Depth of underlying aggregate (must be less than D_{allow})	D_1	1.0	feet
12	Aggregate porosity (0.38 maximum unless detailed materials report provided)	P_1	0.38	feet
13	Volume of Aggregate storage applicable to volume control = $A_{BMP} * D_1 * P_1$	V_{BMP}	2,220	cubic feet

Section 4 BMP Performance				
14	Volume of upstream runoff (Line 3)	$V_{upstream}$	463	cubic feet
15	Volume Control Storage Provided = V_{BMP}	V_{BMP}	2,220	cubic feet
16	V_{total} (equals lesser of V_{BMP} or $V_{upstream}$)	V_{total}	463	cubic feet

City of Chicago
Department of Water Management

Stormwater Spreadsheet Tool

Release 3.1 effective January 1, 2016

1. DOB Tracking/Permit Number:	_____
2. Name of Project:	<u>59th Street Line</u>
3. Address of Site:	<u>North Access Ramp between Elizabeth St and Racine Ave</u> <u>City block from sta 63+63 to sta 66+28</u>
Architect / Engineer of Record:	<u>Infrastructure Engineering, Inc</u>
Phone No.:	<u>312-425-9560</u>
4. Description of Proposed Work:	<u>Access ramp to Englewood Trail on the north side of the trail between Elizabeth and Racine.</u> _____ _____
5. Use of Building (if applicable):	_____ _____
6. Sewer Altas & Drain Atlas Referenced:	_____
7. Area of Site:	<u>37,664</u> square feet (Square Feet = Acres * 43560) <u>0.865</u> acres (Acres = Square Feet / 43560)

This spreadsheet tool has been prepared to assist the applicant in preparing calculations for simple sites. The applicant is responsible for ensuring that submitted calculations are correct. If necessary, supporting hand calculations should be prepared and submitted.

Color Coding

-  - Cell Contents Computed by Spreadsheet
-  - Cell for User Entry
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**City of Chicago
Department of Water Management**

Stormwater Spreadsheet Tool

INDEX OF SPREADSHEETS

Required>>	<input checked="" type="checkbox"/>	COVER
Required>>	<input checked="" type="checkbox"/>	INDEX
	<input type="checkbox"/>	0.0 RELEASE RATE
Required>>	<input checked="" type="checkbox"/>	1.0 RATE CONTROL
	<input type="checkbox"/>	1.1 Dry Weather Flow
	<input checked="" type="checkbox"/>	1.2 BMPs-Rate Control Credit
	<input type="checkbox"/>	1.3 Orifice Sizing Calculation
Required>>	<input checked="" type="checkbox"/>	2.0 VOLUME CONTROL
	<input type="checkbox"/>	2.1 BMP Volume Summary
	<input checked="" type="checkbox"/>	2.1.1 Bioinfiltration
	<input type="checkbox"/>	2.1.2 Drainage Swales
	<input type="checkbox"/>	2.1.3 Green Roof
	<input type="checkbox"/>	2.1.4 Infiltration Vault
	<input type="checkbox"/>	2.1.5 Trees
	<input type="checkbox"/>	2.1.6 Permeable Pavement
	<input type="checkbox"/>	2.1.7.1 Roof Runoff BMPs - Planter Boxes
	<input type="checkbox"/>	2.1.7.2 Roof Runoff BMPs - Rain Barrels / Cisterns
	<input type="checkbox"/>	2.1.8 Filter Strips
	<input type="checkbox"/>	2.1.9 Oversized Detention

**City of Chicago
Department of Water Management**

Name of Project: 59th Street Line
 Address: North Access Ramp between Elizabeth St and Racine Ave
 A/E of Record: Infrastructure Engineering, Inc

1.0 Rate Control (Sheet 1 of 2)

Step 1: Runoff Calculation

		Proposed Area (sq. ft.)	C-Value 100-Year	Storage Volume (cu. ft.)
Pervious Land	Lawns - Sandy soil, flat, 0% to 2%		0.18	
	Lawns - Sandy soil, avg, 2% to 7%	18,651	0.27	
	Lawns - Sandy soil, steep, >7%		0.36	
	Lawns - Heavy soil, flat, 0% to 2%	5,942	0.30	
	Lawns - Heavy soil, avg, 2% to 7%	4,064	0.42	
	Lawns - Heavy soil, steep, >7%		0.47	
	Woodlands, flat, 2%		0.39	
	Native Vegetation with prepared soils		0.10	
	Dry bottom basins to HWL		0.75	
	Wetland		0.80	
Impervious Land	Green Roof		0.50	
	Gravel		0.70	
	Pavement	4,507	0.95	
	Roofs (conventional)		0.95	
	Building sidewalls connected by side gutters (enter 25% of the face of the sidewall)		0.95	
	Wet bottom basins to HWL		1.00	
BMP areas	BMPs providing storage that WILL COUNT toward detention storage (from Worksheet 1.2)	4,500	1.00	
	BMPs providing volume control storage that WILL NOT BE COUNTED toward detention (from Worksheet 1.2)	0		Storage Provided will be used to factor the adjusted C-value in Cell D38

Summary	Total pervious area (sq ft)	28,657
	Total impervious area (sq ft)	4,507
	Total BMP area (sq ft)	4,500
	Total site area (sq ft)	37,664
	Weighted C- value (non BMP areas)	0.39
	Adjusted C-value (accounts for BMPs)	0.46
Notes:	Make note of any adjustments made for purposes of detention calcs here (such as removal of roof area that will discharge directly to Waters)	

Step 2: Allowable Release Rate Assessment

	Type Yes or No for all that apply	Notes
Question 1: Does the site drain directly to Waters?	No	
Question 2: Does the site only include residential land use for detached single-family and two-family dwellings?	No	
Question 3: Is the Regulated Development a Lot to Lot Building (85% or more of site footprint is occupied by buildings)?	No	
Question 4: Do you plan to use the standard maximum release rate (only available to sites less than 1.75 acres)?	Yes	Standard Detention Release Rate based on total site area (Cell D36) minus any tributary sidewalls
Question 5: Is the site more than 75 percent of substantially contiguous at-grade open space that is conducive to ponding of surface waters (Answer "No" if site discharges to waterway or is a service station)?	no	
Question 6: Does the development involve flow diversions (existing sewer connection to be relocated to a different main) or multiple sewer connections (only available to sites over 1.75 acres)?	No	
Question 7: Are there widespread contaminated soils on the site, high ground water table, or is this development classified as a lot-to-lot building?	No	Oversized detention is not allowed. Do not fill out Tab 2.1.9

**City of Chicago
Department of Water Management**

Name of Project: 59th Street Line
 Address: North Access Ramp between Elizabeth St and Racine Ave
 A/E of Record: Infrastructure Engineering, Inc

1.0 Rate Control (Sheet 2 of 2)

Step 3: Achieving Rate Control Measures

Unadjusted Detention Release Rate =	0.223	cfs	0.223	0.000
Dry Weather Flow Rate = (From dry weather flow worksheet)	0.000	cfs	Waiting for Dry Weather Flow worksheet to be completed	
Infiltration Facility Release Rate (to be added to eligible release rate when computing required storage)	0.000	cfs	No BMPs with infiltration beds entered on BMP Summary Worksheet or soil's infiltration rate is less than 0.5 in/hr	
Release rate for detention storage computations:	0.223	cfs		
Required Storage Volume =	4,788	cubic feet		

Detention Storage Calculations

(Based on Bulletin 70 Rainfall Data)

STORM EVENT (5,10,25,50 or 100) =

Storm Duration (minute)	Runoff Coefficient C	Rainfall Intensity (in/hr)	Drainage Area A (acres)	Allowable release rate 0.223 cfs			Storage Rate (Qi-Qo) (cfs)	Storage Volume Rate (Qi-Qo)*t*60 (cf)
				Inflow Rate Q=CIA	Total Storm Vol (cf)	Release Rate Qo (cfs)		
5	0.46	10.920	0.86	4.34	1,302	0.223	4.12	1,235
10	0.46	10.020	0.86	3.98	2,389	0.223	3.76	2,255
15	0.46	8.200	0.86	3.26	2,932	0.223	3.04	2,732
30	0.46	5.600	0.86	2.22	4,005	0.223	2.00	3,604
60	0.46	3.560	0.86	1.41	5,092	0.223	1.19	4,289
120	0.46	2.235	0.86	0.89	6,394	0.223	0.67	4,788
180	0.46	1.617	0.86	0.64	6,937	0.223	0.42	4,529
360	0.46	0.947	0.86	0.38	8,124	0.223	0.15	3,309
720	0.46	0.549	0.86	0.22	9,426	0.223	0.00	-205
1080	0.46	0.387	0.86	0.15	9,969	0.223	-0.07	-4,476
1440	0.46	0.316	0.86	0.13	10,842	0.223	-0.10	-8,419
2880	0.46	0.170	0.86	0.07	11,671	0.223	-0.16	-26,851
4320	0.46	0.122	0.86	0.05	12,558	0.223	-0.17	-45,225
7200	0.46	0.083	0.86	0.03	14,246	0.223	-0.19	-82,059
14400	0.46	0.046	0.86	0.02	15,934	0.223	-0.20	-176,677
							Required Detention Volume (cf)	4,788

Note: 1) the calculation assumes that the rising and recessing limb of inflow and outflow hydrograph are vertical

City of Chicago
Department of Water Management

Name of Project: 59th Street Line
 Address: North Access Ramp between Elizabeth St and Racine Ave
 A/E of Record: Infrastructure Engineering, Inc

1.2 BMPs for Rate Control Credit

Volume Control BMP Summary for use in Rate Control Worksheet

Instructions for use:

This summary worksheet provides information for BMPs for use in the Rate Control Spreadsheet.

Storage provided should be from the computation made on the each individual BMP spreadsheet (2.1.1 to 2.1.8).

Total area of BMPs will carry over to Rate Control Worksheet. **18651**

Other areas (ie reduce pavement area if permeable pavement implemented) should adjusted such that Line 35 on Rate Control Worksheet equals total site area.

When the option exists, the applicant may decide whether or not to count volume control storage toward detention storage.

n/a = not applicable and indicates when credit is inappropriate or unavailable for a given BMP.

Elizabeth-Racine North Ramp

BMP Areas with Storage COUNTED toward Rate Control Volume					
Type "yes" to Select	BMP	BMP Infiltration Area (sq. ft.)	Storage Provided (cu. ft.)	Design Soil Infiltration Rate (in/hr) ³	Allowable Infiltration Release Rate (cfs)
yes	Bioinfiltration Systems	4,500	751	0.000	0.000
	Drainage Swales	0	0	0.000	0.000
n/a	Green Roof	n/a	n/a	n/a	n/a
	Infiltration Vault	0	0	0.000	0.000
n/a	Natural Landscaping and Stormwater Trees ¹	n/a	n/a	n/a	n/a
	Roof Runoff BMPs - Planter Boxes	0	0	0.000	0.000
	Roof Runoff BMPs - Rain Barrels and Cisterns	n/a	0	n/a	n/a
no	Permeable Paving	0	0	0.500	0.000
n/a	Vegetated Filter Strips ²	n/a	n/a	n/a	n/a
Totals		4,500	751	-	0.000

Notes:

1. Natural landscaping areas do not have specific storage, they can simply be entered on Rate Control Spreadsheet as having a C-value of 0.1. Detention Credit is not given for stormwater trees.
2. Vegetated Filter strips also are not given credit for a "volume of storage" and should be entered in the pervious land cover section of the Rate Control Spreadsheet based on their cover type.
3. Infiltration rate must be the design infiltration rate as explained in Stormwater Manual. If the infiltration rate is less than 0.5 in/hr, credit cannot be taken for infiltration and the Allowable Infiltration Release is set to zero. This value is automatically copied from each respective BMP spreadsheet.

BMP Areas with Storage NOT COUNTED toward Rate Control Volume			
Type "yes" to Select	BMP	Area (sq. ft.)	Storage Provided (cu. ft.)
	Bioinfiltration Systems	0	0
	Drainage Swales	0	0
n/a	Green Roof	n/a	n/a
n/a	Natural Landscaping and Stormwater Trees ¹	n/a	n/a
	Roof Runoff BMPs - Planter Boxes	0	0
	Permeable Paving	0	0
n/a	Vegetated Filter Strips ²	n/a	n/a
Totals		0	0

**City of Chicago
Department of Water Management**

Name of Project: 59th Street Line
 Address: North Access Ramp between Elizabeth St and Racine Ave
 A/E of Record: Infrastructure Engineering, Inc

2.0 Volume Control

Step 1:

<u>Runoff Calculation</u>		Existing Area (sq ft)	Proposed Area (sq ft)
Pervious Surface or Land Cover not Counted as Impervious for Volume Control Calculations	Bare Earth		
	Lawn or Landscaped Areas	19,013	10,006
	Woodlands		
	Wetland		
Impervious Land	Gravel		
	Pavement		4,507
	Roofs (conventional)		
	Water (including Wet Bottom Basin to HWL)		
BMPs	Green Roof	-	
	Permeable Pavement	-	
	Bioinfiltration	-	4,500
	Swales	-	
	Stormwater Trees	-	
	Roof Runoff Planters	-	
	Filter Strips	-	
	Dry Bottom Basins to HWL	-	
Summary	Total pervious area (sq ft)	19,013	10,006
	Total impervious area (sq ft)	0	4,507
	Total BMP areas treated as impervious area (sq ft)	-	0
	Total BMP areas treated as pervious area (sq ft)	-	4,500
	Total site area (sq ft)	19,013	19,013
	Imperviousness percentage (%)	0.0	23.7

Step 2:

<u>Volume Control Assessment</u>		Type Yes or No for all that apply	Note
Question 1:	Does the site drain directly to Waters?	No	
Question 2:	Are infiltration BMPs allowable? (See Chapter III Sections 4.1.2 of the Regulations.)	Yes	
Question 3:	Do you wish to use permeable pavement only as a pervious surface to achieve impervious surface reduction goal?	No	Areas of permeable pavement are included as an impervious surface for the computation made in Cell C48. Storage will be counted toward volume control goal.

Step 3:

Achieving Volume Control Measures

Achieve I. or II. below in accordance with the Ordinance.

I.	Capture 0.5" of runoff from impervious surfaces. Storage required =	188	cubic feet	Go to spreadsheet 2.1 BMP Volume Summary if electing volume control storage option
or, II.	Reduce proposed imperviousness to:	-	percent	

City of Chicago
Department of Water Management

Name of Project: 59th Street Line
 Address: North Access Ramp between Elizabeth St and Racine Ave
 A/E of Record: Infrastructure Engineering, Inc

2.1.1 Bioinfiltration Systems

Section 1 Upstream Drainage Area				
1	Upstream impervious area including BMP area	A_t	9,007	square feet
2	Upstream weighted C-value (C-value=1.0 for bioinfiltration area for direct rainfall)	C	1.00	unitless
3	Volume of upstream runoff from a 1-inch storm = $C * A_t * 1/12$	$V_{upstream}$	751	cubic feet
4	Describe upstream drainage area	Paved access ramp area		
5	Describe upstream pretreatment or integration of pretreatment into BMP			

Section 2 BMP Feasibility				
6	Design soil infiltration rate (must be 0.5 in/hr or greater unless underdrain system is used)	i	0.00	in/hr
7	Elevation of bottom of BMP (the infiltration surface) IF there is no underdrain, OR the lowest underdrain invert elevation	$ELEV_{BMP}$	10.000	feet
8	Groundwater elevation	$ELEV_{GW}$	5.000	feet
9	Depth to seasonal groundwater (Must be 2 feet or greater, or 3.5 feet or greater if draining to combined sewer)	D_{GW}	5.0	feet

Section 3 BMP Specifications				
10	Dimensions of the bioinfiltration facility (length, width, or area)	L		feet
		W		feet
		A_{BMP}	4,500	square feet
11	Depth of prepared soil	D_1	0.0	feet
12	Prepared soil porosity (0.25 maximum unless detailed materials report provided)	P_1	0.25	feet
13	Depth of underlying aggregate (optional)	D_2	3.0	feet
14	Aggregate porosity (0.38 maximum unless detailed materials report provided)	P_2	0.38	feet
15	Surface storage volume (provide supporting calculations, max depth 12 inches)	V_{AIR}	0	cubic feet
16	Soil media storage volume = $A_{BMP} * [(D_1 * P_1) + (D_2 * P_2)]$	V_{SOIL}	5,130	cubic feet

Section 4 BMP Performance				
17	Volume of upstream runoff (Line 4)	$V_{upstream}$	751	cubic feet
18	Storage Provided = $V_{AIR} + V_{SOIL}$	V_{BMP}	5,130	cubic feet
19	V_{total} (equals lesser of V_{BMP} or $V_{upstream}$)	V_{total}	751	cubic feet

DETENTION CALCULATIONS FOR ENGLEWOOD TRAIL

CITY BLOCK FROM MORGAN ST TO SANGAMON ST
See Exhibit 2-04a: Drainage Areas Sheet 20

1. Trail from STA 80+19 to STA 82+85
2. North access path to trail from STA 700+00 to STA 704+46

Detention Requirement Summary		
	Main Trail	South Access Path
Rate Control (cu ft)	989	2,400
Volume Control (cu ft)	243	201
Total Detention Required (cu ft)	1,232	2,601
Detention Provided (cu ft)	2,220	2,736

Date: 8/11/17
Rev. Date: _____

City of Chicago
Department of Water Management

Stormwater Spreadsheet Tool

Release 3.1 effective January 1, 2016

1. DOB Tracking/Permit Number:	_____
2. Name of Project:	<u>59th Street Line</u>
3. Address of Site:	<u>Main Trail from Morgan St to Sangamon St</u> <u>Sta 80+19 to Sta 82+85</u>
Architect / Engineer of Record:	<u>Infrastructure Engineering, Inc</u>
Phone No.:	<u>312-425-9560</u>
4. Description of Proposed Work:	<u>Proposed 22 feet wide paved trail</u> _____ _____ _____
5. Use of Building (if applicable):	_____ _____
6. Sewer Altas & Drain Atlas Referenced:	_____
7. Area of Site:	<u>6,263</u> square feet (Square Feet = Acres * 43560) <u>0.144</u> acres (Acres = Square Feet / 43560)

This spreadsheet tool has been prepared to assist the applicant in preparing calculations for simple sites. The applicant is responsible for ensuring that submitted calculations are correct. If necessary, supporting hand calculations should be prepared and submitted.

Color Coding

-  - Cell Contents Computed by Spreadsheet
-  - Cell for User Entry
-  - Cell Includes Comment (when cursor is over it)

**City of Chicago
Department of Water Management**

Stormwater Spreadsheet Tool

INDEX OF SPREADSHEETS

Required>>	<input checked="" type="checkbox"/>	COVER
Required>>	<input checked="" type="checkbox"/>	INDEX
	<input type="checkbox"/>	0.0 RELEASE RATE
Required>>	<input checked="" type="checkbox"/>	1.0 RATE CONTROL
	<input type="checkbox"/>	1.1 Dry Weather Flow
	<input checked="" type="checkbox"/>	1.2 BMPs-Rate Control Credit
	<input type="checkbox"/>	1.3 Orifice Sizing Calculation
Required>>	<input checked="" type="checkbox"/>	2.0 VOLUME CONTROL
	<input type="checkbox"/>	2.1 BMP Volume Summary
	<input type="checkbox"/>	2.1.1 Bioinfiltration
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	<input type="checkbox"/>	2.1.5 Trees
	<input checked="" type="checkbox"/>	2.1.6 Permeable Pavement
	<input type="checkbox"/>	2.1.7.1 Roof Runoff BMPs - Planter Boxes
	<input type="checkbox"/>	2.1.7.2 Roof Runoff BMPs - Rain Barrels / Cisterns
	<input type="checkbox"/>	2.1.8 Filter Strips
	<input type="checkbox"/>	2.1.9 Oversized Detention

**City of Chicago
Department of Water Management**

Name of Project: 59th Street Line
 Address: Main Trail from Morgan St to Sangamon St
 A/E of Record: Infrastructure Engineering, Inc

1.0 Rate Control (Sheet 1 of 2)

Step 1: Runoff Calculation

		Proposed Area (sq. ft.)	C-Value 100-Year	Storage Volume (cu. ft.)
Pervious Land	Lawns - Sandy soil, flat, 0% to 2%		0.18	
	Lawns - Sandy soil, avg, 2% to 7%		0.27	
	Lawns - Sandy soil, steep, >7%		0.36	
	Lawns - Heavy soil, flat, 0% to 2%	422	0.30	
	Lawns - Heavy soil, avg, 2% to 7%		0.42	
	Lawns - Heavy soil, steep, >7%		0.47	
	Woodlands, flat, 2%		0.39	
	Native Vegetation with prepared soils		0.10	
	Dry bottom basins to HWL		0.75	
	Wetland		0.80	
Impervious Land	Green Roof		0.50	
	Gravel		0.70	
	Pavement		0.95	
	Roofs (conventional)		0.95	
	Building sidewalls connected by side gutters (enter 25% of the face of the sidewall)		0.95	
	Wet bottom basins to HWL		1.00	
BMP areas	BMPs providing storage that WILL COUNT toward detention storage (from Worksheet 1.2)	5,841	1.00	
	BMPs providing volume control storage that WILL NOT BE COUNTED toward detention (from Worksheet 1.2)	0		0

Summary	Total pervious area (sq ft)	422	
	Total impervious area (sq ft)	0	
	Total BMP area (sq ft)	5,841	
	Total site area (sq ft)	6,263	
	Weighted C- value (non BMP areas)	0.30	
	Adjusted C-value (accounts for BMPs)	0.95	
Notes:	Make note of any adjustments made for purposes of detention calcs here (such as removal of roof area that will discharge directly to Waters)		

Step 2: Allowable Release Rate Assessment

	Type Yes or No for all that apply	Notes
Question 1: Does the site drain directly to Waters?	No	
Question 2: Does the site only include residential land use for detached single-family and two-family dwellings?	No	
Question 3: Is the Regulated Development a Lot to Lot Building (85% or more of site footprint is occupied by buildings)?	No	
Question 4: Do you plan to use the standard maximum release rate (only available to sites less than 1.75 acres)?	Yes	Standard Detention Release Rate based on total site area (Cell D36) minus any tributary sidewalls
Question 5: Is the site more than 75 percent of substantially contiguous at-grade open space that is conducive to ponding of surface waters (Answer "No" if site discharges to waterway or is a service station)?	No	
Question 6: Does the development involve flow diversions (existing sewer connection to be relocated to a different main) or multiple sewer connections (only available to sites over 1.75 acres)?	No	
Question 7: Are there widespread contaminated soils on the site, high ground water table, or is this development classified as a lot-to-lot building?	No	Oversized detention is not allowed. Do not fill out Tab 2.1.9

**City of Chicago
Department of Water Management**

Name of Project: 59th Street Line
 Address: Main Trail from Morgan St to Sangamon St
 A/E of Record: Infrastructure Engineering, Inc

1.0 Rate Control (Sheet 2 of 2)

Step 3: Achieving Rate Control Measures

Unadjusted Detention Release Rate =	0.150	cfs	0.150	0.000
Dry Weather Flow Rate = (From dry weather flow worksheet)	0.000	cfs	Waiting for Dry Weather Flow worksheet to be completed	
Infiltration Facility Release Rate (to be added to eligible release rate when computing required storage)	0.068	cfs		
Release rate for detention storage computations:	0.218	cfs		
Required Storage Volume =	989	cubic feet		

Detention Storage Calculations

(Based on Bulletin 70 Rainfall Data)

STORM EVENT (5,10,25,50 or 100) =

100

Allowable release rate 0.218 cfs

Storm Duration (minute)	Runoff Coefficient C	Rainfall Intensity (in/hr)	Drainage Area A (acres)	Inflow Rate Q=CIA	Total Storm Vol (cf)	Release Rate Q _o (cfs)	Storage Rate (Q _i -Q _o) (cfs)	Storage Volume Rate (Q _i -Q _o)*t*60 (cf)
5	0.95	10.920	0.14	1.50	449	0.218	1.28	384
10	0.95	10.020	0.14	1.37	824	0.218	1.16	693
15	0.95	8.200	0.14	1.12	1,011	0.218	0.91	815
30	0.95	5.600	0.14	0.77	1,381	0.218	0.55	989
60	0.95	3.560	0.14	0.49	1,756	0.218	0.27	972
120	0.95	2.235	0.14	0.31	2,205	0.218	0.09	638
180	0.95	1.617	0.14	0.22	2,392	0.218	0.00	42
360	0.95	0.947	0.14	0.13	2,801	0.218	-0.09	-1,899
720	0.95	0.549	0.14	0.08	3,250	0.218	-0.14	-6,150
1080	0.95	0.387	0.14	0.05	3,438	0.218	-0.16	-10,663
1440	0.95	0.316	0.14	0.04	3,738	0.218	-0.17	-15,063
2880	0.95	0.170	0.14	0.02	4,024	0.218	-0.19	-33,578
4320	0.95	0.122	0.14	0.02	4,330	0.218	-0.20	-52,073
7200	0.95	0.083	0.14	0.01	4,912	0.218	-0.21	-89,093
14400	0.95	0.046	0.14	0.01	5,494	0.218	-0.21	-182,516
Required Detention Volume (cf)								989

Note: 1) the calculation assumes that the rising and recessing limb of inflow and outflow hydrograph are vertical

City of Chicago
Department of Water Management

Name of Project: 59th Street Line
 Address: Main Trail from Morgan St to Sangamon St
 A/E of Record: Infrastructure Engineering, Inc

1.2 BMPs for Rate Control Credit

Volume Control BMP Summary for use in Rate Control Worksheet

Instructions for use:

This summary worksheet provides information for BMPs for use in the Rate Control Spreadsheet.

Storage provided should be from the computation made on the each individual BMP spreadsheet (2.1.1 to 2.1.8).

Total area of BMPs will carry over to Rate Control Worksheet.

Other areas (ie reduce pavement area if permeable pavement implemented) should adjusted such that Line 35 on Rate Control Worksheet equals total site area.

When the option exists, the applicant may decide whether or not to count volume control storage toward detention storage.

n/a = not applicable and indicates when credit is inappropriate or unavailable for a given BMP.

BMP Areas with Storage COUNTED toward Rate Control Volume					
Type "yes" to Select	BMP	BMP Infiltration Area (sq. ft.)	Storage Provided (cu. ft.)	Design Soil Infiltration Rate (in/hr) ³	Allowable Infiltration Release Rate (cfs)
	Bioinfiltration Systems	0	0	0.000	0.000
	Drainage Swales	0	0	0.000	0.000
n/a	Green Roof	n/a	n/a	n/a	n/a
	Infiltration Vault	0	0	0.000	0.000
n/a	Natural Landscaping and Stormwater Trees ¹	n/a	n/a	n/a	n/a
	Roof Runoff BMPs - Planter Boxes	0	0	0.000	0.000
	Roof Runoff BMPs - Rain Barrels and Cisterns	n/a	0	n/a	n/a
yes	Permeable Paving	5,841	462	0.500	0.068
n/a	Vegetated Filter Strips ²	n/a	n/a	n/a	n/a
Totals		5,841	462	-	0.068

Notes:

1. Natural landscaping areas do not have specific storage, they can simply be entered on Rate Control Spreadsheet as having a C-value of 0.1. Detention Credit is not given for stormwater trees.
2. Vegetated Filter strips also are not given credit for a "volume of storage" and should be entered in the pervious land cover section of the Rate Control Spreadsheet based on their cover type.
3. Infiltration rate must be the design infiltration rate as explained in Stormwater Manual. If the infiltration rate is less than 0.5 in/hr, credit cannot be taken for infiltration and the Allowable Infiltration Release is set to zero. This value is automatically copied from each respective BMP spreadsheet.

BMP Areas with Storage NOT COUNTED toward Rate Control Volume			
Type "yes" to Select	BMP	Area (sq. ft.)	Storage Provided (cu. ft.)
	Bioinfiltration Systems	0	0
	Drainage Swales	0	0
n/a	Green Roof	n/a	n/a
n/a	Natural Landscaping and Stormwater Trees ¹	n/a	n/a
	Roof Runoff BMPs - Planter Boxes	0	0
	Permeable Paving	0	0
n/a	Vegetated Filter Strips ²	n/a	n/a
Totals		0	0

**City of Chicago
Department of Water Management**

Name of Project: 59th Street Line
 Address: Main Trail from Morgan St to Sangamon St
 A/E of Record: Infrastructure Engineering, Inc

2.0 Volume Control

Step 1:

Runoff Calculation

		Existing Area (sq ft)	Proposed Area (sq ft)
Pervious Surface or Land Cover not Counted as Impervious for Volume Control Calculations	Bare Earth		
	Lawn or Landscaped Areas	6,263	422
	Woodlands		
	Wetland		
Impervious Land	Gravel		
	Pavement		
	Roofs (conventional)		
	Water (including Wet Bottom Basin to HWL)		
BMPs	Green Roof	-	
	Permeable Pavement	-	5,841
	Bioinfiltration	-	
	Swales	-	
	Stormwater Trees	-	
	Roof Runoff Planters	-	
	Filter Strips	-	
	Dry Bottom Basins to HWL	-	
Summary	Total pervious area (sq ft)	6,263	422
	Total impervious area (sq ft)	0	0
	Total BMP areas treated as impervious area (sq ft)	-	5,841
	Total BMP areas treated as pervious area (sq ft)	-	0
	Total site area (sq ft)	6,263	6,263
	Imperviousness percentage (%)	0.0	0.0

Please be sure to ans

Please be sure to ans

Step 2:

Volume Control Assessment

		Type Yes or No for all that apply	Note
Question 1:	Does the site drain directly to Waters?	No	
Question 2:	Are infiltration BMPs allowable? (See Chapter III Sections 4.1.2 of the Regulations.)	Yes	
Question 3:	Do you wish to use permeable pavement only as a pervious surface to achieve impervious surface reduction goal?	No	Areas of permeable pavement are included as an impervious surface for the computation made in Cell C48. Storage will be counted toward volume control goal.

Step 3:

Achieving Volume Control Measures

Achieve I. or II. below in accordance with the Ordinance.

I.	Capture 0.5" of runoff from impervious surfaces. Storage required =	243	cubic feet	Go to spreadsheet 2.1 BMP Volume Summary if electing volume control storage option
or, II.	Reduce proposed imperviousness to:	-	percent	

City of Chicago
Department of Water Management

Name of Project: 59th Street Line
 Address: Main Trail from Morgan St to Sangamon St
 A/E of Record: Infrastructure Engineering, Inc

2.1.6 Permeable Pavement

Section 1 Upstream Drainage Area				
1	Upstream impervious area including area of permeable pavement	A_i	5,841	square feet
2	Upstream weighted C-value (C-value=0.95 for permeable pavement areas for nearly direct rainfall)	C	0.95	unitless
3	Volume of upstream runoff from a 1-inch storm = $C * A_t * 1/12$	$V_{upstream}$	462	cubic feet
4	Describe intended function of system (Is it standalone system designed for infiltration, is it integrated as part of the detention storage, is it underdrained to downstream system, will it receive upstream runoff?)			

Section 2 BMP Feasibility				
5	Design soil infiltration rate (must be 0.5 in/hr or greater unless underdrain system is used)	i	0.500	in/hr
6	Allowable depth of storage aggregate without provision of underdrain (=i/ 12 inches/ft * 48 hours)	D_{allow}	2.00	feet
7	Elevation of bottom of BMP (the infiltration surface) IF there is no underdrain, OR the lowest underdrain invert elevation	$ELEV_{BMP}$	44.000	feet
8	Groundwater elevation	$ELEV_{GW}$	26.000	feet
9	Depth to seasonal groundwater (Must be 2 feet or greater, or 3.5 feet or greater if draining to combined sewer)	D_{GW}	18.0	feet

Section 3 BMP Specifications				
10	Dimensions of the permeable pavement (length, width, or area)	L	265.5	feet
		W	22.0	feet
		A_{BMP}	5,841	square feet
11	Depth of underlying aggregate (must be less than D_{allow})	D_1	1.0	feet
12	Aggregate porosity (0.38 maximum unless detailed materials report provided)	P_1	0.38	feet
13	Volume of Aggregate storage applicable to volume control = $A_{BMP} * D_1 * P_1$	V_{BMP}	2,220	cubic feet

Section 4 BMP Performance				
14	Volume of upstream runoff (Line 3)	$V_{upstream}$	462	cubic feet
15	Volume Control Storage Provided = V_{BMP}	V_{BMP}	2,220	cubic feet
16	V_{total} (equals lesser of V_{BMP} or $V_{upstream}$)	V_{total}	462	cubic feet

Date: 8/11/17
Rev. Date: _____

City of Chicago
Department of Water Management

Stormwater Spreadsheet Tool

Release 3.1 effective January 1, 2016

1. DOB Tracking/Permit Number:

2. Name of Project:
59th Street Line

3. Address of Site:
North Access Ramp between Morgan St and Sangamon St
City block from sta 80+19 to sta 82+85

Architect / Engineer of Record: Infrastructure Engineering, Inc
Phone No.: 312-425-9560

4. Description of Proposed Work:

5. Use of Building (if applicable):

6. Sewer Altas & Drain Atlas Referenced:

7. Area of Site:
13,467 square feet (Square Feet = Acres * 43560)
0.309 acres (Acres = Square Feet / 43560)

This spreadsheet tool has been prepared to assist the applicant in preparing calculations for simple sites. The applicant is responsible for ensuring that submitted calculations are correct. If necessary, supporting hand calculations should be prepared and submitted.

Color Coding

-  - Cell Contents Computed by Spreadsheet
-  - Cell for User Entry
-  - Cell Includes Comment (when cursor is over it)

**City of Chicago
Department of Water Management**

Stormwater Spreadsheet Tool

INDEX OF SPREADSHEETS

Required>>	<input checked="" type="checkbox"/>	COVER
Required>>	<input checked="" type="checkbox"/>	INDEX
	<input type="checkbox"/>	0.0 RELEASE RATE
Required>>	<input checked="" type="checkbox"/>	1.0 RATE CONTROL
	<input type="checkbox"/>	1.1 Dry Weather Flow
	<input checked="" type="checkbox"/>	1.2 BMPs-Rate Control Credit
	<input type="checkbox"/>	1.3 Orifice Sizing Calculation
Required>>	<input checked="" type="checkbox"/>	2.0 VOLUME CONTROL
	<input type="checkbox"/>	2.1 BMP Volume Summary
	<input checked="" type="checkbox"/>	2.1.1 Bioinfiltration
	<input type="checkbox"/>	2.1.2 Drainage Swales
	<input type="checkbox"/>	2.1.3 Green Roof
	<input type="checkbox"/>	2.1.4 Infiltration Vault
	<input type="checkbox"/>	2.1.5 Trees
	<input type="checkbox"/>	2.1.6 Permeable Pavement
	<input type="checkbox"/>	2.1.7.1 Roof Runoff BMPs - Planter Boxes
	<input type="checkbox"/>	2.1.7.2 Roof Runoff BMPs - Rain Barrels / Cisterns
	<input type="checkbox"/>	2.1.8 Filter Strips
	<input type="checkbox"/>	2.1.9 Oversized Detention

**City of Chicago
Department of Water Management**

Name of Project: 59th Street Line
 Address: North Access Ramp between Morgan St and Sangamon St
 A/E of Record: Infrastructure Engineering, Inc

1.0 Rate Control (Sheet 1 of 2)

Step 1: Runoff Calculation

		Proposed Area (sq. ft.)	C-Value 100- Year	Storage Volume (cu. ft.)
Pervious Land	Lawns - Sandy soil, flat, 0% to 2%		0.18	
	Lawns - Sandy soil, avg, 2% to 7%		0.27	
	Lawns - Sandy soil, steep, >7%		0.36	
	Lawns - Heavy soil, flat, 0% to 2%	1,491	0.30	
	Lawns - Heavy soil, avg, 2% to 7%	4,762	0.42	
	Lawns - Heavy soil, steep, >7%		0.47	
	Woodlands, flat, 2%		0.39	
	Native Vegetation with prepared soils		0.10	
	Dry bottom basins to HWL		0.75	
	Wetland		0.80	
Impervious Land	Green Roof		0.50	
	Gravel		0.70	
	Pavement	4,814	0.95	
	Roofs (conventional)		0.95	
	Building sidewalls connected by side gutters (enter 25% of the face of the sidewall)		0.95	
	Wet bottom basins to HWL		1.00	
BMP areas	BMPs providing storage that WILL COUNT toward detention storage (from Worksheet 1.2)	2,400	1.00	
	BMPs providing volume control storage that WILL NOT BE COUNTED toward detention (from Worksheet 1.2)	0		0

Summary	Total pervious area (sq ft)	6,253
	Total impervious area (sq ft)	4,814
	Total BMP area (sq ft)	2,400
	Total site area (sq ft)	13,467
	Weighted C- value (non BMP areas)	0.63
	Adjusted C-value (accounts for BMPs)	0.70
Notes:	Make note of any adjustments made for purposes of detention calcs here (such as removal of roof area that will discharge directly to Waters)	

Step 2: Allowable Release Rate Assessment

	Type Yes or No for all that apply	Notes
Question 1: Does the site drain directly to Waters?	No	
Question 2: Does the site only include residential land use for detached single-family and two-family dwellings?	No	
Question 3: Is the Regulated Development a Lot to Lot Building (85% or more of site footprint is occupied by buildings)?	No	
Question 4: Do you plan to use the standard maximum release rate (only available to sites less than 1.75 acres)?	Yes	Standard Detention Release Rate based on total site area (Cell D36) minus any tributary sidewalls
Question 5: Is the site more than 75 percent of substantially contiguous at-grade open space that is conducive to ponding of surface waters (Answer "No" if site discharges to waterway or is a service station)?	No	
Question 6: Does the development involve flow diversions (existing sewer connection to be relocated to a different main) or multiple sewer connections (only available to sites over 1.75 acres)?	No	
Question 7: Are there widespread contaminated soils on the site, high ground water table, or is this development classified as a lot-to-lot building?	No	Oversized detention is not allowed. Do not fill out Tab 2.1.9

**City of Chicago
Department of Water Management**

Name of Project: 59th Street Line
 Address: North Access Ramp between Morgan St and Sangamon St
 A/E of Record: Infrastructure Engineering, Inc

1.0 Rate Control (Sheet 2 of 2)

Step 3: Achieving Rate Control Measures

Unadjusted Detention Release Rate =	0.150	cfs	0.150	0.000
Dry Weather Flow Rate = (From dry weather flow worksheet)	0.000	cfs	Waiting for Dry Weather Flow worksheet to be completed	
Infiltration Facility Release Rate (to be added to eligible release rate when computing required storage)	0.000	cfs	No BMPs with infiltration beds entered on BMP Summary Worksheet or soil's infiltration rate is less than 0.5 in/hr	
Release rate for detention storage computations:	0.150	cfs		
Required Storage Volume =	2,400	cubic feet		

Detention Storage Calculations

(Based on Bulletin 70 Rainfall Data)

STORM EVENT (5,10,25,50 or 100) =

100

Allowable release rate 0.150 cfs

Storm Duration (minute)	Runoff Coefficient C	Rainfall Intensity (in/hr)	Drainage Area A (acres)	Inflow Rate Q=CIA	Total Storm Vol (cf)	Release Rate Q _o (cfs)	Storage Rate (Q _i -Q _o) (cfs)	Storage Volume Rate (Q _i -Q _o)*t*60 (cf)
5	0.70	10.920	0.31	2.36	708	0.150	2.21	663
10	0.70	10.020	0.31	2.17	1,300	0.150	2.02	1,210
15	0.70	8.200	0.31	1.77	1,596	0.150	1.62	1,461
30	0.70	5.600	0.31	1.21	2,180	0.150	1.06	1,910
60	0.70	3.560	0.31	0.77	2,772	0.150	0.62	2,232
120	0.70	2.235	0.31	0.48	3,480	0.150	0.33	2,400
180	0.70	1.617	0.31	0.35	3,776	0.150	0.20	2,156
360	0.70	0.947	0.31	0.20	4,422	0.150	0.05	1,182
720	0.70	0.549	0.31	0.12	5,131	0.150	-0.03	-1,349
1080	0.70	0.387	0.31	0.08	5,427	0.150	-0.07	-4,293
1440	0.70	0.316	0.31	0.07	5,902	0.150	-0.08	-7,058
2880	0.70	0.170	0.31	0.04	6,353	0.150	-0.11	-19,567
4320	0.70	0.122	0.31	0.03	6,836	0.150	-0.12	-32,044
7200	0.70	0.083	0.31	0.02	7,755	0.150	-0.13	-57,045
14400	0.70	0.046	0.31	0.01	8,673	0.150	-0.14	-120,927
							Required Detention Volume (cf)	2,400

Note: 1) the calculation assumes that the rising and recessing limb of inflow and outflow hydrograph are vertical

City of Chicago
Department of Water Management

Name of Project: 59th Street Line
 Address: North Access Ramp between Morgan St and Sangamon St
 A/E of Record: Infrastructure Engineering, Inc

1.2 BMPs for Rate Control Credit

Volume Control BMP Summary for use in Rate Control Worksheet

Instructions for use:

This summary worksheet provides information for BMPs for use in the Rate Control Spreadsheet.
 Storage provided should be from the computation made on the each individual BMP spreadsheet (2.1.1 to 2.1.8).
 Total area of BMPs will carry over to Rate Control Worksheet.
 Other areas (ie reduce pavement area if permeable pavement implemented) should adjusted such that Line 35 on Rate Control Worksheet equals total site area.
 When the option exists, the applicant may decide whether or not to count volume control storage toward detention storage.
 n/a = not applicable and indicates when credit is inappropriate or unavailable for a given BMP.

BMP Areas with Storage COUNTED toward Rate Control Volume					
Type "yes" to Select	BMP	BMP Infiltration Area (sq. ft.)	Storage Provided (cu. ft.)	Design Soil Infiltration Rate (in/hr) ³	Allowable Infiltration Release Rate (cfs)
yes	Bioinfiltration Systems	2,400	601	0.000	0.000
	Drainage Swales	0	0	0.000	0.000
n/a	Green Roof	n/a	n/a	n/a	n/a
	Infiltration Vault	0	0	0.000	0.000
n/a	Natural Landscaping and Stormwater Trees ¹	n/a	n/a	n/a	n/a
	Roof Runoff BMPs - Planter Boxes	0	0	0.000	0.000
	Roof Runoff BMPs - Rain Barrels and Cisterns	n/a	0	n/a	n/a
no	Permeable Paving	0	0	0.500	0.000
n/a	Vegetated Filter Strips ²	n/a	n/a	n/a	n/a
Totals		2,400	601	-	0.000

Notes:

1. Natural landscaping areas do not have specific storage, they can simply be entered on Rate Control Spreadsheet as having a C-value of 0.1. Detention Credit is not given for stormwater trees.
2. Vegetated Filter strips also are not given credit for a "volume of storage" and should be entered in the pervious land cover section of the Rate Control Spreadsheet based on their cover type.
3. Infiltration rate must be the design infiltration rate as explained in Stormwater Manual. If the infiltration rate is less than 0.5 in/hr, credit cannot be taken for infiltration and the Allowable Infiltration Release is set to zero. This value is automatically copied from each respective BMP spreadsheet.

BMP Areas with Storage NOT COUNTED toward Rate Control Volume			
Type "yes" to Select	BMP	Area (sq. ft.)	Storage Provided (cu. ft.)
	Bioinfiltration Systems	0	0
	Drainage Swales	0	0
n/a	Green Roof	n/a	n/a
n/a	Natural Landscaping and Stormwater Trees ¹	n/a	n/a
	Roof Runoff BMPs - Planter Boxes	0	0
	Permeable Paving	0	0
n/a	Vegetated Filter Strips ²	n/a	n/a
Totals		0	0

**City of Chicago
Department of Water Management**

Name of Project: 59th Street Line
 Address: North Access Ramp between Morgan St and Sangamon St
 A/E of Record: Infrastructure Engineering, Inc

2.0 Volume Control

Step 1:

Runoff Calculation

		Existing Area (sq ft)	Proposed Area (sq ft)
Pervious Surface or Land Cover not Counted as Impervious for Volume Control Calculations	Bare Earth		
	Lawn or Landscaped Areas	13,467	6,253
	Woodlands		
	Wetland		
Impervious Land	Gravel		
	Pavement		4,814
	Roofs (conventional)		
	Water (including Wet Bottom Basin to HWL)		
BMPs	Green Roof	-	
	Permeable Pavement	-	
	Bioinfiltration	-	2,400
	Swales	-	
	Stormwater Trees	-	
	Roof Runoff Planters	-	
	Filter Strips	-	
	Dry Bottom Basins to HWL	-	
Summary	Total pervious area (sq ft)	13,467	6,253
	Total impervious area (sq ft)	0	4,814
	Total BMP areas treated as impervious area (sq ft)	-	0
	Total BMP areas treated as pervious area (sq ft)	-	2,400
	Total site area (sq ft)	13,467	13,467
	Imperviousness percentage (%)	0.0	35.7

Step 2:

Volume Control Assessment

		Type Yes or No for all that apply	Note
Question 1:	Does the site drain directly to Waters?	No	
Question 2:	Are infiltration BMPs allowable? (See Chapter III Sections 4.1.2 of the Regulations.)	Yes	
Question 3:	Do you wish to use permeable pavement only as a pervious surface to achieve impervious surface reduction goal?	No	Areas of permeable pavement are included as an impervious surface for the computation made in Cell C48. Storage will be counted toward volume control goal.

Step 3:

Achieving Volume Control Measures

Achieve I. or II. below in accordance with the Ordinance.

I.	Capture 0.5" of runoff from impervious surfaces. Storage required =	201	cubic feet	Go to spreadsheet 2.1 BMP Volume Summary if electing volume control storage option
or, II.	Reduce proposed imperviousness to:	-	percent	

City of Chicago
Department of Water Management

Name of Project: 59th Street Line
 Address: North Access Ramp between Morgan St and Sangamon St
 A/E of Record: Infrastructure Engineering, Inc

2.1.1 Bioinfiltration Systems

Section 1 Upstream Drainage Area				
1	Upstream impervious area including BMP area	A_t	7,214	square feet
2	Upstream weighted C-value (C-value=1.0 for bioinfiltration area for direct rainfall)	C	1.00	unitless
3	Volume of upstream runoff from a 1-inch storm = $C * A_t * 1/12$	$V_{upstream}$	601	cubic feet
4	Describe upstream drainage area	Paved access ramp area		
5	Describe upstream pretreatment or integration of pretreatment into BMP			

Section 2 BMP Feasibility				
6	Design soil infiltration rate (must be 0.5 in/hr or greater unless underdrain system is used)	i	0.00	in/hr
7	Elevation of bottom of BMP (the infiltration surface) IF there is no underdrain, OR the lowest underdrain invert elevation	$ELEV_{BMP}$	10.000	feet
8	Groundwater elevation	$ELEV_{GW}$	5.000	feet
9	Depth to seasonal groundwater (Must be 2 feet or greater, or 3.5 feet or greater if draining to combined sewer)	D_{GW}	5.0	feet

Section 3 BMP Specifications				
10	Dimensions of the bioinfiltration facility (length, width, or area)	L		feet
		W		feet
		A_{BMP}	2,400	square feet
11	Depth of prepared soil	D_1	0.0	feet
12	Prepared soil porosity (0.25 maximum unless detailed materials report provided)	P_1	0.25	feet
13	Depth of underlying aggregate (optional)	D_2	3.0	feet
14	Aggregate porosity (0.38 maximum unless detailed materials report provided)	P_2	0.38	feet
15	Surface storage volume (provide supporting calculations, max depth 12 inches)	V_{AIR}	0	cubic feet
16	Soil media storage volume = $A_{BMP} * [(D_1 * P_1) + (D_2 * P_2)]$	V_{SOIL}	2,736	cubic feet

Section 4 BMP Performance				
17	Volume of upstream runoff (Line 4)	$V_{upstream}$	601	cubic feet
18	Storage Provided = $V_{AIR} + V_{SOIL}$	V_{BMP}	2,736	cubic feet
19	V_{total} (equals lesser of V_{BMP} or $V_{upstream}$)	V_{total}	601	cubic feet

DETENTION CALCULATIONS FOR ENGLEWOOD TRAIL

CITY BLOCK FROM GREEN ST TO HALSTED ST
See Exhibit 2-04a: Drainage Areas Sheet 23

1. Trail from STA 90+14 to STA 92+74
2. North access path to trail from STA 900+00 to STA 903+95
3. South access path to trail from STA 800+00 to STA 803+73

Detention Requirement Summary			
	Main Trail	North Access Path	South Access Path
Rate Control (cu ft)	881	5,845	1,875
Volume Control (cu ft)	243	304	136
Total Detention Required (cu ft)	1,124	6,149	2,011
Detention Provided (cu ft)	2,220	6,270	2,052

City of Chicago
Department of Water Management

Stormwater Spreadsheet Tool

Release 3.1 effective January 1, 2016

1. DOB Tracking/Permit Number:	_____
2. Name of Project:	<u>59th Street Line</u>
3. Address of Site:	<u>Main Trail from Green St to Halsted St</u> <u>Sta 90+14 to Sta 92+74</u>
Architect / Engineer of Record:	<u>Infrastructure Engineering, Inc</u>
Phone No.:	<u>312-425-9560</u>
4. Description of Proposed Work:	<u>Proposed 22 feet wide paved trail</u> _____ _____ _____
5. Use of Building (if applicable):	_____ _____
6. Sewer Altas & Drain Atlas Referenced:	_____
7. Area of Site:	<u>4,695</u> square feet (Square Feet = Acres * 43560) <u>0.108</u> acres (Acres = Square Feet / 43560)

This spreadsheet tool has been prepared to assist the applicant in preparing calculations for simple sites. The applicant is responsible for ensuring that submitted calculations are correct. If necessary, supporting hand calculations should be prepared and submitted.

Color Coding

-  - Cell Contents Computed by Spreadsheet
-  - Cell for User Entry
-  - Cell Includes Comment (when cursor is over it)

**City of Chicago
Department of Water Management**

Stormwater Spreadsheet Tool

INDEX OF SPREADSHEETS

Required>>	<input checked="" type="checkbox"/>	COVER
Required>>	<input checked="" type="checkbox"/>	INDEX
	<input type="checkbox"/>	0.0 RELEASE RATE
Required>>	<input checked="" type="checkbox"/>	1.0 RATE CONTROL
	<input type="checkbox"/>	1.1 Dry Weather Flow
	<input checked="" type="checkbox"/>	1.2 BMPs-Rate Control Credit
	<input type="checkbox"/>	1.3 Orifice Sizing Calculation
Required>>	<input checked="" type="checkbox"/>	2.0 VOLUME CONTROL
	<input type="checkbox"/>	2.1 BMP Volume Summary
	<input type="checkbox"/>	2.1.1 Bioinfiltration
	<input type="checkbox"/>	2.1.2 Drainage Swales
	<input type="checkbox"/>	2.1.3 Green Roof
	<input type="checkbox"/>	2.1.4 Infiltration Vault
	<input type="checkbox"/>	2.1.5 Trees
	<input checked="" type="checkbox"/>	2.1.6 Permeable Pavement
	<input type="checkbox"/>	2.1.7.1 Roof Runoff BMPs - Planter Boxes
	<input type="checkbox"/>	2.1.7.2 Roof Runoff BMPs - Rain Barrels / Cisterns
	<input type="checkbox"/>	2.1.8 Filter Strips
	<input type="checkbox"/>	2.1.9 Oversized Detention

**City of Chicago
Department of Water Management**

Name of Project: 59th Street Line
 Address: Main Trail from Green St to Halsted St
 A/E of Record: Infrastructure Engineering, Inc

1.0 Rate Control (Sheet 1 of 2)

Step 1: Runoff Calculation

		Proposed Area (sq. ft.)	C-Value 100-Year	Storage Volume (cu. ft.)
Pervious Land	Lawns - Sandy soil, flat, 0% to 2%		0.18	
	Lawns - Sandy soil, avg, 2% to 7%		0.27	
	Lawns - Sandy soil, steep, >7%		0.36	
	Lawns - Heavy soil, flat, 0% to 2%	-1,148	0.30	
	Lawns - Heavy soil, avg, 2% to 7%		0.42	
	Lawns - Heavy soil, steep, >7%		0.47	
	Woodlands, flat, 2%		0.39	
	Native Vegetation with prepared soils		0.10	
	Dry bottom basins to HWL		0.75	
	Wetland		0.80	
Impervious Land	Green Roof		0.50	
	Gravel		0.70	
	Pavement		0.95	
	Roofs (conventional)		0.95	
	Building sidewalls connected by side gutters (enter 25% of the face of the sidewall)		0.95	
BMP areas	Wet bottom basins to HWL		1.00	
	BMPs providing storage that WILL COUNT toward detention storage (from Worksheet 1.2)	5,843	1.00	
	BMPs providing volume control storage that WILL NOT BE COUNTED toward detention (from Worksheet 1.2)	0		Storage Provided will be used to factor the adjusted C-value in Cell D38

Summary	Total pervious area (sq ft)	-1,148
	Total impervious area (sq ft)	0
	Total BMP area (sq ft)	5,843
	Total site area (sq ft)	4,695
	Weighted C- value (non BMP areas)	0.30
	Adjusted C-value (accounts for BMPs)	1.17
Notes:	Make note of any adjustments made for purposes of detention calcs here (such as removal of roof area that will discharge directly to Waters)	

Step 2: Allowable Release Rate Assessment

	Allowable Release Rate Assessment	Type Yes or No for all that apply	Notes
Question 1:	Does the site drain directly to Waters?	No	
Question 2:	Does the site only include residential land use for detached single-family and two-family dwellings?	No	
Question 3:	Is the Regulated Development a Lot to Lot Building (85% or more of site footprint is occupied by buildings)?	No	
Question 4:	Do you plan to use the standard maximum release rate (only available to sites less than 1.75 acres)?	Yes	Standard Detention Release Rate based on total site area (Cell D36) minus any tributary sidewalls
Question 5:	Is the site more than 75 percent of substantially contiguous at-grade open space that is conducive to ponding of surface waters (Answer "No" if site discharges to waterway or is a service station)?	No	
Question 6:	Does the development involve flow diversions (existing sewer connection to be relocated to a different main) or multiple sewer connections (only available to sites over 1.75 acres)?	No	
Question 7:	Are there widespread contaminated soils on the site, high ground water table, or is this development classified as a lot-to-lot building?	No	Oversized detention is not allowed. Do not fill out Tab 2.1.9

**City of Chicago
Department of Water Management**

Name of Project: 59th Street Line
 Address: Main Trail from Green St to Halsted St
 A/E of Record: Infrastructure Engineering, Inc

1.0 Rate Control (Sheet 2 of 2)

Step 3: Achieving Rate Control Measures

Unadjusted Detention Release Rate =	0.150	cfs	0.150	0.000
Dry Weather Flow Rate = (From dry weather flow worksheet)	0.000	cfs	Waiting for Dry Weather Flow worksheet to be completed	
Infiltration Facility Release Rate (to be added to eligible release rate when computing required storage)	0.068	cfs		
Release rate for detention storage computations:	0.218	cfs		
Required Storage Volume =	881	cubic feet		

Detention Storage Calculations

(Based on Bulletin 70 Rainfall Data)

STORM EVENT (5,10,25,50 or 100) =

100

Allowable release rate 0.218 cfs

Storm Duration (minute)	Runoff Coefficient C	Rainfall Intensity (in/hr)	Drainage Area A (acres)	Inflow Rate Q=CIA	Total Storm Vol (cf)	Release Rate Q _o (cfs)	Storage Rate (Q _i -Q _o) (cfs)	Storage Volume Rate (Q _i -Q _o)*t*60 (cf)
5	1.17	10.920	0.11	1.38	414	0.218	1.16	348
10	1.17	10.020	0.11	1.26	759	0.218	1.05	628
15	1.17	8.200	0.11	1.04	932	0.218	0.82	736
30	1.17	5.600	0.11	0.71	1,272	0.218	0.49	881
60	1.17	3.560	0.11	0.45	1,618	0.218	0.23	834
120	1.17	2.235	0.11	0.28	2,031	0.218	0.06	464
180	1.17	1.617	0.11	0.20	2,204	0.218	-0.01	-146
360	1.17	0.947	0.11	0.12	2,581	0.218	-0.10	-2,120
720	1.17	0.549	0.11	0.07	2,995	0.218	-0.15	-6,407
1080	1.17	0.387	0.11	0.05	3,167	0.218	-0.17	-10,935
1440	1.17	0.316	0.11	0.04	3,445	0.218	-0.18	-15,359
2880	1.17	0.170	0.11	0.02	3,708	0.218	-0.20	-33,898
4320	1.17	0.122	0.11	0.02	3,990	0.218	-0.20	-52,420
7200	1.17	0.083	0.11	0.01	4,526	0.218	-0.21	-89,490
14400	1.17	0.046	0.11	0.01	5,062	0.218	-0.21	-182,970
Required Detention Volume (cf)								881

Note: 1) the calculation assumes that the rising and recessing limb of inflow and outflow hydrograph are vertical

City of Chicago
Department of Water Management

Name of Project: 59th Street Line
 Address: Main Trail from Green St to Halsted St
 A/E of Record: Infrastructure Engineering, Inc

1.2 BMPs for Rate Control Credit

Volume Control BMP Summary for use in Rate Control Worksheet

Instructions for use:

This summary worksheet provides information for BMPs for use in the Rate Control Spreadsheet.

Storage provided should be from the computation made on the each individual BMP spreadsheet (2.1.1 to 2.1.8).

Total area of BMPs will carry over to Rate Control Worksheet.

Other areas (ie reduce pavement area if permeable pavement implemented) should adjusted such that Line 35 on Rate Control Worksheet equals total site area.

When the option exists, the applicant may decide whether or not to count volume control storage toward detention storage.

n/a = not applicable and indicates when credit is inappropriate or unavailable for a given BMP.

BMP Areas with Storage COUNTED toward Rate Control Volume					
Type "yes" to Select	BMP	BMP Infiltration Area (sq. ft.)	Storage Provided (cu. ft.)	Design Soil Infiltration Rate (in/hr) ³	Allowable Infiltration Release Rate (cfs)
	Bioinfiltration Systems	0	0	0.000	0.000
	Drainage Swales	0	0	0.000	0.000
n/a	Green Roof	n/a	n/a	n/a	n/a
	Infiltration Vault	0	0	0.000	0.000
n/a	Natural Landscaping and Stormwater Trees ¹	n/a	n/a	n/a	n/a
	Roof Runoff BMPs - Planter Boxes	0	0	0.000	0.000
	Roof Runoff BMPs - Rain Barrels and Cisterns	n/a	0	n/a	n/a
yes	Permeable Paving	5,843	463	0.500	0.068
n/a	Vegetated Filter Strips ²	n/a	n/a	n/a	n/a
Totals		5,843	463	-	0.068

Notes:

1. Natural landscaping areas do not have specific storage, they can simply be entered on Rate Control Spreadsheet as having a C-value of 0.1. Detention Credit is not given for stormwater trees.
2. Vegetated Filter strips also are not given credit for a "volume of storage" and should be entered in the pervious land cover section of the Rate Control Spreadsheet based on their cover type.
3. Infiltration rate must be the design infiltration rate as explained in Stormwater Manual. If the infiltration rate is less than 0.5 in/hr, credit cannot be taken for infiltration and the Allowable Infiltration Release is set to zero. This value is automatically copied from each respective BMP spreadsheet.

BMP Areas with Storage NOT COUNTED toward Rate Control Volume			
Type "yes" to Select	BMP	Area (sq. ft.)	Storage Provided (cu. ft.)
	Bioinfiltration Systems	0	0
	Drainage Swales	0	0
n/a	Green Roof	n/a	n/a
n/a	Natural Landscaping and Stormwater Trees ¹	n/a	n/a
	Roof Runoff BMPs - Planter Boxes	0	0
	Permeable Paving	0	0
n/a	Vegetated Filter Strips ²	n/a	n/a
Totals		0	0

**City of Chicago
Department of Water Management**

Name of Project: 59th Street Line
 Address: Main Trail from Green St to Halsted St
 A/E of Record: Infrastructure Engineering, Inc

2.0 Volume Control

Step 1:

Runoff Calculation

		Existing Area (sq ft)	Proposed Area (sq ft)
Pervious Surface or Land Cover not Counted as Impervious for Volume Control Calculations	Bare Earth		
	Lawn or Landscaped Areas	4,695	-1,148
	Woodlands		
	Wetland		
Impervious Land	Gravel		
	Pavement		
	Roofs (conventional)		
	Water (including Wet Bottom Basin to HWL)		
BMPs	Green Roof	-	
	Permeable Pavement	-	5,843
	Bioinfiltration	-	
	Swales	-	
	Stormwater Trees	-	
	Roof Runoff Planters	-	
	Filter Strips	-	
	Dry Bottom Basins to HWL	-	
Summary	Total pervious area (sq ft)	4,695	-1,148
	Total impervious area (sq ft)	0	0
	Total BMP areas treated as impervious area (sq ft)	-	5,843
	Total BMP areas treated as pervious area (sq ft)	-	0
	Total site area (sq ft)	4,695	4,695
	Imperviousness percentage (%)	0.0	0.0

Please be sure to ans

Please be sure to ans

Step 2:

Volume Control Assessment

		Type Yes or No for all that apply	Note
Question 1:	Does the site drain directly to Waters?	No	
Question 2:	Are infiltration BMPs allowable? (See Chapter III Sections 4.1.2 of the Regulations.)	Yes	
Question 3:	Do you wish to use permeable pavement only as a pervious surface to achieve impervious surface reduction goal?	No	Areas of permeable pavement are included as an impervious surface for the computation made in Cell C48. Storage will be counted toward volume control goal.

Step 3:

Achieving Volume Control Measures

Achieve I. or II. below in accordance with the Ordinance.

I.	Capture 0.5" of runoff from impervious surfaces. Storage required =	243	cubic feet	Go to spreadsheet 2.1 BMP Volume Summary if electing volume control storage option
or, II.	Reduce proposed imperviousness to:	-	percent	

City of Chicago
Department of Water Management

Name of Project: 59th Street Line
 Address: Main Trail from Green St to Halsted St
 A/E of Record: Infrastructure Engineering, Inc

2.1.6 Permeable Pavement

Section 1 Upstream Drainage Area				
1	Upstream impervious area including area of permeable pavement	A_i	5,843	square feet
2	Upstream weighted C-value (C-value=0.95 for permeable pavement areas for nearly direct rainfall)	C	0.95	unitless
3	Volume of upstream runoff from a 1-inch storm = $C * A_t * 1/12$	$V_{upstream}$	463	cubic feet
4	Describe intended function of system (Is it standalone system designed for infiltration, is it integrated as part of the detention storage, is it underdrained to downstream system, will it receive upstream runoff?)			

Section 2 BMP Feasibility				
5	Design soil infiltration rate (must be 0.5 in/hr or greater unless underdrain system is used)	i	0.500	in/hr
6	Allowable depth of storage aggregate without provision of underdrain (=i/ 12 inches/ft * 48 hours)	D_{allow}	2.00	feet
7	Elevation of bottom of BMP (the infiltration surface) IF there is no underdrain, OR the lowest underdrain invert elevation	$ELEV_{BMP}$	44.000	feet
8	Groundwater elevation	$ELEV_{GW}$	26.000	feet
9	Depth to seasonal groundwater (Must be 2 feet or greater, or 3.5 feet or greater if draining to combined sewer)	D_{GW}	18.0	feet

Section 3 BMP Specifications				
10	Dimensions of the permeable pavement (length, width, or area)	L	265.6	feet
		W	22.0	feet
		A_{BMP}	5,843	square feet
11	Depth of underlying aggregate (must be less than D_{allow})	D_1	1.0	feet
12	Aggregate porosity (0.38 maximum unless detailed materials report provided)	P_1	0.38	feet
13	Volume of Aggregate storage applicable to volume control = $A_{BMP} * D_1 * P_1$	V_{BMP}	2,220	cubic feet

Section 4 BMP Performance				
14	Volume of upstream runoff (Line 3)	$V_{upstream}$	463	cubic feet
15	Volume Control Storage Provided = V_{BMP}	V_{BMP}	2,220	cubic feet
16	V_{total} (equals lesser of V_{BMP} or $V_{upstream}$)	V_{total}	463	cubic feet

City of Chicago
Department of Water Management

Stormwater Spreadsheet Tool

Release 3.1 effective January 1, 2016

1. DOB Tracking/Permit Number:

2. Name of Project:
59th Street Line

3. Address of Site:
North Access Ramp between Green St and Halsted St
City block from sta 90+14 to 92+74

Architect / Engineer of Record: Infrastructure Engineering, Inc
Phone No.: 312-425-9560

4. Description of Proposed Work:
Access ramp to Englewood Trail on the north side of the trail between Green
and Halsted.

5. Use of Building (if applicable):

6. Sewer Altas & Drain Atlas Referenced:

7. Area of Site: X
33,769 square feet (Square Feet = Acres * 43560)
0.775 acres (Acres = Square Feet / 43560)

This spreadsheet tool has been prepared to assist the applicant in preparing calculations for simple sites. The applicant is responsible for ensuring that submitted calculations are correct. If necessary, supporting hand calculations should be prepared and submitted.

Color Coding

-  - Cell Contents Computed by Spreadsheet
-  - Cell for User Entry
-  - Cell Includes Comment (when cursor is over it)

**City of Chicago
Department of Water Management**

Stormwater Spreadsheet Tool

INDEX OF SPREADSHEETS

Required>>	<input checked="" type="checkbox"/>	COVER
Required>>	<input checked="" type="checkbox"/>	INDEX
	<input type="checkbox"/>	0.0 RELEASE RATE
Required>>	<input checked="" type="checkbox"/>	1.0 RATE CONTROL
	<input type="checkbox"/>	1.1 Dry Weather Flow
	<input checked="" type="checkbox"/>	1.2 BMPs-Rate Control Credit
	<input type="checkbox"/>	1.3 Orifice Sizing Calculation
Required>>	<input checked="" type="checkbox"/>	2.0 VOLUME CONTROL
	<input type="checkbox"/>	2.1 BMP Volume Summary
	<input checked="" type="checkbox"/>	2.1.1 Bioinfiltration
	<input type="checkbox"/>	2.1.2 Drainage Swales
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	<input type="checkbox"/>	2.1.4 Infiltration Vault
	<input type="checkbox"/>	2.1.5 Trees
	<input checked="" type="checkbox"/>	2.1.6 Permeable Pavement
	<input type="checkbox"/>	2.1.7.1 Roof Runoff BMPs - Planter Boxes
	<input type="checkbox"/>	2.1.7.2 Roof Runoff BMPs - Rain Barrels / Cisterns
	<input type="checkbox"/>	2.1.8 Filter Strips
	<input type="checkbox"/>	2.1.9 Oversized Detention

**City of Chicago
Department of Water Management**

Name of Project: 59th Street Line
 Address: North Access Ramp between Green St and Halsted St
 A/E of Record: Infrastructure Engineering, Inc

1.0 Rate Control (Sheet 1 of 2)

Step 1: Runoff Calculation

		Proposed Area (sq. ft.)	C-Value 100- Year	Storage Volume (cu. ft.)
Pervious Land	Lawns - Sandy soil, flat, 0% to 2%		0.18	
	Lawns - Sandy soil, avg, 2% to 7%		0.27	
	Lawns - Sandy soil, steep, >7%		0.36	
	Lawns - Heavy soil, flat, 0% to 2%	8,794	0.30	
	Lawns - Heavy soil, avg, 2% to 7%	12,175	0.42	
	Lawns - Heavy soil, steep, >7%		0.47	
	Woodlands, flat, 2%		0.39	
	Native Vegetation with prepared soils		0.10	
	Dry bottom basins to HWL		0.75	
	Wetland		0.80	
Impervious Land	Green Roof		0.50	
	Gravel		0.70	
	Pavement	7,300	0.95	
	Roofs (conventional)		0.95	
	Building sidewalls connected by side gutters (enter 25% of the face of the sidewall)		0.95	
	Wet bottom basins to HWL		1.00	
BMP areas	BMPs providing storage that WILL COUNT toward detention storage (from Worksheet 1.2)	5,500	1.00	
	BMPs providing volume control storage that WILL NOT BE COUNTED toward detention (from Worksheet 1.2)	0		0

Summary	Total pervious area (sq ft)	20,969	
	Total impervious area (sq ft)	7,300	
	Total BMP area (sq ft)	5,500	
	Total site area (sq ft)	33,769	
	Weighted C- value (non BMP areas)	0.52	X
	Adjusted C-value (accounts for BMPs)	0.60	
Notes:	Make note of any adjustments made for purposes of detention calcs here (such as removal of roof area that will discharge directly to Waters)		

Step 2: Allowable Release Rate Assessment

	Type Yes or No for all that apply	Notes
Question 1: Does the site drain directly to Waters?	No	
Question 2: Does the site only include residential land use for detached single-family and two-family dwellings?	No	
Question 3: Is the Regulated Development a Lot to Lot Building (85% or more of site footprint is occupied by buildings)?	No	
Question 4: Do you plan to use the standard maximum release rate (only available to sites less than 1.75 acres)?	Yes	Standard Detention Release Rate based on total site area (Cell D36) minus any tributary sidewalls
Question 5: Is the site more than 75 percent of substantially contiguous at-grade open space that is conducive to ponding of surface waters (Answer "No" if site discharges to waterway or is a service station)?	No	
Question 6: Does the development involve flow diversions (existing sewer connection to be relocated to a different main) or multiple sewer connections (only available to sites over 1.75 acres)?	No	
Question 7: Are there widespread contaminated soils on the site, high ground water table, or is this development classified as a lot-to-lot building?	No	Oversized detention is not allowed. Do not fill out Tab 2.1.9

**City of Chicago
Department of Water Management**

Name of Project: 59th Street Line
 Address: North Access Ramp between Green St and Halsted St
 A/E of Record: Infrastructure Engineering, Inc

1.0 Rate Control (Sheet 2 of 2)

Step 3: Achieving Rate Control Measures

Unadjusted Detention Release Rate =	0.205	cfs	0.205	0.000
Dry Weather Flow Rate = (From dry weather flow worksheet)	0.000	cfs	Waiting for Dry Weather Flow worksheet to be completed	
Infiltration Facility Release Rate (to be added to eligible release rate when computing required storage)	0.019	cfs		
Release rate for detention storage computations:	0.224	cfs		
Required Storage Volume =	5,845	cubic feet		

Detention Storage Calculations

(Based on Bulletin 70 Rainfall Data)

STORM EVENT (5,10,25,50 or 100) =

100

Allowable release rate 0.224 cfs

Storm Duration (minute)	Runoff Coefficient C	Rainfall Intensity (in/hr)	Drainage Area A (acres)	Inflow Rate Q=CIA	Total Storm Vol (cf)	Release Rate Q _o (cfs)	Storage Rate (Q _i -Q _o) (cfs)	Storage Volume Rate (Q _i -Q _o)*t*60 (cf)
5	0.60	10.920	0.78	5.06	1,518	0.224	4.84	1,451
10	0.60	10.020	0.78	4.64	2,786	0.224	4.42	2,652
15	0.60	8.200	0.78	3.80	3,420	0.224	3.58	3,219
30	0.60	5.600	0.78	2.60	4,671	0.224	2.37	4,268
60	0.60	3.560	0.78	1.65	5,939	0.224	1.43	5,133
120	0.60	2.235	0.78	1.04	7,457	0.224	0.81	5,845
180	0.60	1.617	0.78	0.75	8,091	0.224	0.53	5,673
360	0.60	0.947	0.78	0.44	9,476	0.224	0.21	4,640
720	0.60	0.549	0.78	0.25	10,994	0.224	0.03	1,322
1080	0.60	0.387	0.78	0.18	11,628	0.224	-0.04	-2,880
1440	0.60	0.316	0.78	0.15	12,646	0.224	-0.08	-6,698
2880	0.60	0.170	0.78	0.08	13,614	0.224	-0.15	-25,074
4320	0.60	0.122	0.78	0.06	14,648	0.224	-0.17	-43,384
7200	0.60	0.083	0.78	0.04	16,616	0.224	-0.19	-80,103
14400	0.60	0.046	0.78	0.02	18,585	0.224	-0.20	-174,855
							Required Detention Volume (cf)	5,845

Note: 1) the calculation assumes that the rising and recessing limb of inflow and outflow hydrograph are vertical

City of Chicago
Department of Water Management

Name of Project: 59th Street Line
 Address: North Access Ramp between Green St and Halsted St
 A/E of Record: Infrastructure Engineering, Inc

1.2 BMPs for Rate Control Credit

Volume Control BMP Summary for use in Rate Control Worksheet

Instructions for use:

This summary worksheet provides information for BMPs for use in the Rate Control Spreadsheet.
 Storage provided should be from the computation made on the each individual BMP spreadsheet (2.1.1 to 2.1.8).
 Total area of BMPs will carry over to Rate Control Worksheet.
 Other areas (ie reduce pavement area if permeable pavement implemented) should adjusted such that Line 35 on Rate Control Worksheet equals total site area.
 When the option exists, the applicant may decide whether or not to count volume control storage toward detention storage.
 n/a = not applicable and indicates when credit is inappropriate or unavailable for a given BMP.

BMP Areas with Storage COUNTED toward Rate Control Volume					
Type "yes" to Select	BMP	BMP Infiltration Area (sq. ft.)	Storage Provided (cu. ft.)	Design Soil Infiltration Rate (in/hr) ³	Allowable Infiltration Release Rate (cfs)
Yes	Bioinfiltration Systems	3,872	X	0.000	0.000
	Drainage Swales	0	0	0.000	0.000
n/a	Green Roof	n/a	n/a	n/a	n/a
	Infiltration Vault	0	0	0.000	0.000
n/a	Natural Landscaping and Stormwater Trees ¹	n/a	n/a	n/a	n/a
	Roof Runoff BMPs - Planter Boxes	0	0	0.000	0.000
	Roof Runoff BMPs - Rain Barrels and Cisterns	n/a	0	n/a	n/a
Yes	Permeable Paving	1,628	707	0.500	0.019
n/a	Vegetated Filter Strips ²	n/a	n/a	n/a	n/a
Totals		5,500	707	-	0.019

Notes:

1. Natural landscaping areas do not have specific storage, they can simply be entered on Rate Control Spreadsheet as having a C-value of 0.1. Detention Credit is not given for stormwater trees.
2. Vegetated Filter strips also are not given credit for a "volume of storage" and should be entered in the pervious land cover section of the Rate Control Spreadsheet based on their cover type.
3. Infiltration rate must be the design infiltration rate as explained in Stormwater Manual. If the infiltration rate is less than 0.5 in/hr, credit cannot be taken for infiltration and the Allowable Infiltration Release is set to zero. This value is automatically copied from each respective BMP spreadsheet.

BMP Areas with Storage NOT COUNTED toward Rate Control Volume			
Type "yes" to Select	BMP	Area (sq. ft.)	Storage Provided (cu. ft.)
	Bioinfiltration Systems	0	0
	Drainage Swales	0	0
n/a	Green Roof	n/a	n/a
n/a	Natural Landscaping and Stormwater Trees ¹	n/a	n/a
	Roof Runoff BMPs - Planter Boxes	0	0
	Permeable Paving	0	0
n/a	Vegetated Filter Strips ²	n/a	n/a
Totals		0	0

**City of Chicago
Department of Water Management**

Name of Project: 59th Street Line
 Address: North Access Ramp between Green St and Halsted St
 A/E of Record: Infrastructure Engineering, Inc

2.0 Volume Control

Step 1:

Runoff Calculation

		Existing Area (sq ft)	Proposed Area (sq ft)
Pervious Surface or Land Cover not Counted as Impervious for Volume Control Calculations	Bare Earth		
	Lawn or Landscaped Areas	32,141	20,969
	Woodlands		
	Wetland		
Impervious Land	Gravel		
	Pavement		7,300
	Roofs (conventional)		
	Water (including Wet Bottom Basin to HWL)		
BMPs	Green Roof	-	
	Permeable Pavement	-	
	Bioinfiltration	-	3,872
	Swales	-	
	Stormwater Trees	-	
	Roof Runoff Planters	-	
	Filter Strips	-	
	Dry Bottom Basins to HWL	-	
Summary	Total pervious area (sq ft)	32,141	20,969
	Total impervious area (sq ft)	0	7,300
	Total BMP areas treated as impervious area (sq ft)	-	0
	Total BMP areas treated as pervious area (sq ft)	-	3,872
	Total site area (sq ft)	32,141	32,141
	Imperviousness percentage (%)	0.0	22.7

Step 2:

Volume Control Assessment

X

		Type Yes or No for all that apply	Note
Question 1:	Does the site drain directly to Waters?	No	
Question 2:	Are infiltration BMPs allowable? (See Chapter III Sections 4.1.2 of the Regulations.)	Yes	
Question 3:	Do you wish to use permeable pavement only as a pervious surface to achieve impervious surface reduction goal?	No	Areas of permeable pavement are included as an impervious surface for the computation made in Cell C48. Storage will be counted toward volume control goal.

Step 3:

Achieving Volume Control Measures

Achieve I. or II. below in accordance with the Ordinance.

I.	Capture 0.5" of runoff from impervious surfaces. Storage required =	304	cubic feet	Go to spreadsheet 2.1 BMP Volume Summary if electing volume control storage option
or, II.	Reduce proposed imperviousness to:	-	percent	

City of Chicago
Department of Water Management

Name of Project: 59th Street Line
 Address: North Access Ramp between Green St and Halsted St
 A/E of Record: Infrastructure Engineering, Inc

2.1.1 Bioinfiltration Systems

Section 1 Upstream Drainage Area				
1	Upstream impervious area including BMP area	A_t	11,172	square feet
2	Upstream weighted C-value (C-value=1.0 for bioinfiltration area for direct rainfall)	C	1.00	unitless
3	Volume of upstream runoff from a 1-inch storm = $C * A_t * 1/12$	$V_{upstream}$	931	cubic feet
4	Describe upstream drainage area	Paved access ramp area		
5	Describe upstream pretreatment or integration of pretreatment into BMP			

Section 2 BMP Feasibility				
6	Design soil infiltration rate (must be 0.5 in/hr or greater unless underdrain system is used)	i	0.00	in/hr
7	Elevation of bottom of BMP (the infiltration surface) IF there is no underdrain, OR the lowest underdrain invert elevation	$ELEV_{BMP}$	10.000	feet
8	Groundwater elevation	$ELEV_{GW}$	5.000	feet
9	Depth to seasonal groundwater (Must be 2 feet or greater, or 3.5 feet or greater if draining to combined sewer)	D_{GW}	5.0	feet

Section 3 BMP Specifications				
10	Dimensions of the bioinfiltration facility (length, width, or area)	L		feet
		W		feet
		A_{BMP}	3,872	square feet
11	Depth of prepared soil	D_1	0.0	feet
12	Prepared soil porosity (0.25 maximum unless detailed materials report provided)	P_1	0.25	feet
13	Depth of underlying aggregate (optional)	D_2	3.0	feet
14	Aggregate porosity (0.38 maximum unless detailed materials report provided)	P_2	0.38	feet
15	Surface storage volume (provide supporting calculations, max depth 12 inches)	V_{AIR}	0	cubic feet
16	Soil media storage volume = $A_{BMP} * [(D_1 * P_1) + (D_2 * P_2)]$	V_{SOIL}	4,414	cubic feet

Section 4 BMP Performance				
17	Volume of upstream runoff (Line 4)	$V_{upstream}$	931	cubic feet
18	Storage Provided = $V_{AIR} + V_{SOIL}$	V_{BMP}	4,414	cubic feet
19	V_{total} (equals lesser of V_{BMP} or $V_{upstream}$)	V_{total}	X	cubic feet

City of Chicago
Department of Water Management

Stormwater Spreadsheet Tool

Release 3.1 effective January 1, 2016

1. DOB Tracking/Permit Number:

2. Name of Project:
59th Street Line

3. Address of Site:
South Access Ramp between Green St and Halsted St
City block from sta 90+14 to sta 92+74

Architect / Engineer of Record: Infrastructure Engineering, Inc
Phone No.: 312-425-9560

4. Description of Proposed Work:
Access ramp to Englewood Trail on the south side of the trail between Green
and Halsted.

5. Use of Building (if applicable):

6. Sewer Altas & Drain Atlas Referenced:

7. Area of Site:
13,301 square feet (Square Feet = Acres * 43560)
0.305 acres (Acres = Square Feet / 43560)

This spreadsheet tool has been prepared to assist the applicant in preparing calculations for simple sites. The applicant is responsible for ensuring that submitted calculations are correct. If necessary, supporting hand calculations should be prepared and submitted.

Color Coding

-  - Cell Contents Computed by Spreadsheet
-  - Cell for User Entry
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**City of Chicago
Department of Water Management**

Stormwater Spreadsheet Tool

INDEX OF SPREADSHEETS

Required>>	<input checked="" type="checkbox"/>	COVER
Required>>	<input checked="" type="checkbox"/>	INDEX
	<input type="checkbox"/>	0.0 RELEASE RATE
Required>>	<input checked="" type="checkbox"/>	1.0 RATE CONTROL
	<input type="checkbox"/>	1.1 Dry Weather Flow
	<input checked="" type="checkbox"/>	1.2 BMPs-Rate Control Credit
	<input type="checkbox"/>	1.3 Orifice Sizing Calculation
Required>>	<input checked="" type="checkbox"/>	2.0 VOLUME CONTROL
	<input type="checkbox"/>	2.1 BMP Volume Summary
	<input checked="" type="checkbox"/>	2.1.1 Bioinfiltration
	<input type="checkbox"/>	2.1.2 Drainage Swales
	<input type="checkbox"/>	2.1.3 Green Roof
	<input type="checkbox"/>	2.1.4 Infiltration Vault
	<input type="checkbox"/>	2.1.5 Trees
	<input type="checkbox"/>	2.1.6 Permeable Pavement
	<input type="checkbox"/>	2.1.7.1 Roof Runoff BMPs - Planter Boxes
	<input type="checkbox"/>	2.1.7.2 Roof Runoff BMPs - Rain Barrels / Cisterns
	<input type="checkbox"/>	2.1.8 Filter Strips
	<input type="checkbox"/>	2.1.9 Oversized Detention

**City of Chicago
Department of Water Management**

Name of Project: 59th Street Line
 Address: South Access Ramp between Green St and Halsted St
 A/E of Record: Infrastructure Engineering, Inc

1.0 Rate Control (Sheet 1 of 2)

Step 1: Runoff Calculation

		Proposed Area (sq. ft.)	C-Value 100-Year	Storage Volume (cu. ft.)
Pervious Land	Lawns - Sandy soil, flat, 0% to 2%		0.18	
	Lawns - Sandy soil, avg, 2% to 7%		0.27	
	Lawns - Sandy soil, steep, >7%		0.36	
	Lawns - Heavy soil, flat, 0% to 2%	3,010	0.30	
	Lawns - Heavy soil, avg, 2% to 7%	5,229	0.42	
	Lawns - Heavy soil, steep, >7%		0.47	
	Woodlands, flat, 2%		0.39	
	Native Vegetation with prepared soils		0.10	
	Dry bottom basins to HWL		0.75	
	Wetland		0.80	
Impervious Land	Green Roof		0.50	
	Gravel		0.70	
	Pavement	3,262	0.95	
	Roofs (conventional)		0.95	
	Building sidewalls connected by side gutters (enter 25% of the face of the sidewall)		0.95	
	Wet bottom basins to HWL		1.00	
BMP areas	BMPs providing storage that WILL COUNT toward detention storage (from Worksheet 1.2)	1,800	1.00	
	BMPs providing volume control storage that WILL NOT BE COUNTED toward detention (from Worksheet 1.2)	0		0

1250+950 are areas on each side of tr

Summary	Total pervious area (sq ft)	8,239
	Total impervious area (sq ft)	3,262
	Total BMP area (sq ft)	1,800
	Total site area (sq ft)	13,301
	Weighted C- value (non BMP areas)	0.54
	Adjusted C-value (accounts for BMPs)	0.60
Notes:	Make note of any adjustments made for purposes of detention calcs here (such as removal of roof area that will discharge directly to Waters)	

Step 2: Allowable Release Rate Assessment

	Type Yes or No for all that apply	Notes
Question 1: Does the site drain directly to Waters?	No	
Question 2: Does the site only include residential land use for detached single-family and two-family dwellings?	No	
Question 3: Is the Regulated Development a Lot to Lot Building (85% or more of site footprint is occupied by buildings)?	No	
Question 4: Do you plan to use the standard maximum release rate (only available to sites less than 1.75 acres)?	Yes	Standard Detention Release Rate based on total site area (Cell D36) minus any tributary sidewalls
Question 5: Is the site more than 75 percent of substantially contiguous at-grade open space that is conducive to ponding of surface waters (Answer "No" if site discharges to waterway or is a service station)?	No	
Question 6: Does the development involve flow diversions (existing sewer connection to be relocated to a different main) or multiple sewer connections (only available to sites over 1.75 acres)?	No	
Question 7: Are there widespread contaminated soils on the site, high ground water table, or is this development classified as a lot-to-lot building?	No	Oversized detention is not allowed. Do not fill out Tab 2.1.9

**City of Chicago
Department of Water Management**

Name of Project: 59th Street Line
 Address: South Access Ramp between Green St and Halsted St
 A/E of Record: Infrastructure Engineering, Inc

1.0 Rate Control (Sheet 2 of 2)

Step 3: Achieving Rate Control Measures

Unadjusted Detention Release Rate =	0.150	cfs	0.150	0.000
Dry Weather Flow Rate = (From dry weather flow worksheet)	0.000	cfs	Waiting for Dry Weather Flow worksheet to be completed	
Infiltration Facility Release Rate (to be added to eligible release rate when computing required storage)	0.000	cfs	No BMPs with infiltration beds entered on BMP Summary Worksheet or soil's infiltration rate is less than 0.5 in/hr	
Release rate for detention storage computations:	0.150	cfs		
Required Storage Volume =	1,875	cubic feet		

Detention Storage Calculations

(Based on Bulletin 70 Rainfall Data)

STORM EVENT (5,10,25,50 or 100) =

Storm Duration (minute)	Runoff Coefficient C	Rainfall Intensity (in/hr)	Drainage Area A (acres)	STORM EVENT (5,10,25,50 or 100) =			Storage Rate (Qi-Qo) (cfs)	Storage Volume Rate (Qi-Qo)*t*60 (cf)
				100	Inflow Rate Q=CIA	Total Storm Vol (cf)		
						0.150	cfs	
5	0.60	10.920	0.31	2.01	602	0.150	1.86	557
10	0.60	10.020	0.31	1.84	1,104	0.150	1.69	1,014
15	0.60	8.200	0.31	1.51	1,355	0.150	1.36	1,220
30	0.60	5.600	0.31	1.03	1,851	0.150	0.88	1,581
60	0.60	3.560	0.31	0.65	2,353	0.150	0.50	1,813
120	0.60	2.235	0.31	0.41	2,955	0.150	0.26	1,875
180	0.60	1.617	0.31	0.30	3,206	0.150	0.15	1,586
360	0.60	0.947	0.31	0.17	3,754	0.150	0.02	514
720	0.60	0.549	0.31	0.10	4,356	0.150	-0.05	-2,124
1080	0.60	0.387	0.31	0.07	4,607	0.150	-0.08	-5,113
1440	0.60	0.316	0.31	0.06	5,010	0.150	-0.09	-7,950
2880	0.60	0.170	0.31	0.03	5,394	0.150	-0.12	-20,526
4320	0.60	0.122	0.31	0.02	5,804	0.150	-0.13	-33,076
7200	0.60	0.083	0.31	0.02	6,584	0.150	-0.13	-58,216
14400	0.60	0.046	0.31	0.01	7,364	0.150	-0.14	-122,236
							Required Detention Volume (cf)	1,875

Note: 1) the calculation assumes that the rising and recessing limb of inflow and outflow hydrograph are vertical

City of Chicago
Department of Water Management

Name of Project: 59th Street Line
 Address: South Access Ramp between Green St and Halsted St
 A/E of Record: Infrastructure Engineering, Inc

1.2 BMPs for Rate Control Credit

Volume Control BMP Summary for use in Rate Control Worksheet

Instructions for use:

This summary worksheet provides information for BMPs for use in the Rate Control Spreadsheet.

Storage provided should be from the computation made on the each individual BMP spreadsheet (2.1.1 to 2.1.8).

Total area of BMPs will carry over to Rate Control Worksheet.

Other areas (ie reduce pavement area if permeable pavement implemented) should adjusted such that Line 35 on Rate Control Worksheet equals total site area.

When the option exists, the applicant may decide whether or not to count volume control storage toward detention storage.

n/a = not applicable and indicates when credit is inappropriate or unavailable for a given BMP.

Green-Halsted South Ramp

BMP Areas with Storage COUNTED toward Rate Control Volume					
Type "yes" to Select	BMP	BMP Infiltration Area (sq. ft.)	Storage Provided (cu. ft.)	Design Soil Infiltration Rate (in/hr) ³	Allowable Infiltration Release Rate (cfs)
yes	Bioinfiltration Systems	1,800	422	0.000	0.000
	Drainage Swales	Access ramp to Englewood Trail on the south side of the trail between			0.000
n/a	Green Roof	and Halsted.			n/a
	Infiltration Vault	0	0	0.000	0.000
n/a	Natural Landscaping and Stormwater Trees ¹	n/a	n/a	n/a	n/a
	Roof Runoff BMPs - Planter Boxes	0	0	0.000	0.000
	Roof Runoff BMPs - Rain Barrels and Cisterns	n/a	0	n/a	n/a
no	Permeable Paving	0	0	0.500	0.000
n/a	Vegetated Filter Strips ²	n/a	n/a	n/a	n/a
Totals		1,800	422	-	0.000

Notes:

1. Natural landscaping areas do not have specific storage, they can simply be entered on Rate Control Spreadsheet as having a C-value of 0.1. Detention Credit is not given for stormwater trees.
2. Vegetated Filter strips also are not given credit for a "volume of storage" and should be entered in the pervious land cover section of the Rate Control Spreadsheet based on their cover type.
3. Infiltration rate must be the design infiltration rate as explained in Stormwater Manual. If the infiltration rate is less than 0.5 in/hr, credit cannot be taken for infiltration and the Allowable Infiltration Release is set to zero. This value is automatically copied from each respective BMP spreadsheet.

BMP Areas with Storage NOT COUNTED toward Rate Control Volume			
Type "yes" to Select	BMP	Area (sq. ft.)	Storage Provided (cu. ft.)
	Bioinfiltration Systems	0	0
	Drainage Swales	0	0
n/a	Green Roof	n/a	n/a
n/a	Natural Landscaping and Stormwater Trees ¹	n/a	n/a
	Roof Runoff BMPs - Planter Boxes	0	0
	Permeable Paving	0	0
n/a	Vegetated Filter Strips ²	n/a	n/a
Totals		0	0

**City of Chicago
Department of Water Management**

Name of Project: 59th Street Line
 Address: South Access Ramp between Green St and Halsted St
 A/E of Record: Infrastructure Engineering, Inc

2.0 Volume Control

Step 1:

Runoff Calculation

		Existing Area (sq ft)	Proposed Area (sq ft)
Pervious Surface or Land Cover not Counted as Impervious for Volume Control Calculations	Bare Earth		
	Lawn or Landscaped Areas	13,301	8,239
	Woodlands		
	Wetland		
Impervious Land	Gravel		
	Pavement		3,262
	Roofs (conventional)		
	Water (including Wet Bottom Basin to HWL)		
BMPs	Green Roof	-	
	Permeable Pavement	-	
	Bioinfiltration	-	1,800
	Swales	-	
	Stormwater Trees	-	
	Roof Runoff Planters	-	
	Filter Strips	-	
	Dry Bottom Basins to HWL	-	
Summary	Total pervious area (sq ft)	13,301	8,239
	Total impervious area (sq ft)	0	3,262
	Total BMP areas treated as impervious area (sq ft)	-	0
	Total BMP areas treated as pervious area (sq ft)	-	1,800
	Total site area (sq ft)	13,301	13,301
	Imperviousness percentage (%)	0.0	24.5

Step 2:

Volume Control Assessment

		Type Yes or No for all that apply	Note
Question 1:	Does the site drain directly to Waters?	No	
Question 2:	Are infiltration BMPs allowable? (See Chapter III Sections 4.1.2 of the Regulations.)	Yes	
Question 3:	Do you wish to use permeable pavement only as a pervious surface to achieve impervious surface reduction goal?	No	Areas of permeable pavement are included as an impervious surface for the computation made in Cell C48. Storage will be counted toward volume control goal.

Step 3:

Achieving Volume Control Measures

Achieve I. or II. below in accordance with the Ordinance.

I.	Capture 0.5" of runoff from impervious surfaces. Storage required =	136	cubic feet	Go to spreadsheet 2.1 BMP Volume Summary if electing volume control storage option
or, II.	Reduce proposed imperviousness to:	-	percent	

City of Chicago
Department of Water Management

Name of Project: 59th Street Line
 Address: South Access Ramp between Green St and Halsted St
 A/E of Record: Infrastructure Engineering, Inc

2.1.1 Bioinfiltration Systems

Section 1 Upstream Drainage Area				
1	Upstream impervious area including BMP area	A_t	5,062	square feet
2	Upstream weighted C-value (C-value=1.0 for bioinfiltration area for direct rainfall)	C	1.00	unitless
3	Volume of upstream runoff from a 1-inch storm = $C * A_t * 1/12$	$V_{upstream}$	422	cubic feet
4	Describe upstream drainage area	Paved access ramp area		
5	Describe upstream pretreatment or integration of pretreatment into BMP			

Section 2 BMP Feasibility				
6	Design soil infiltration rate (must be 0.5 in/hr or greater unless underdrain system is used)	n-Halsted South F	0.00	in/hr
7	Elevation of bottom of BMP (the infiltration surface) IF there is no underdrain, OR the lowest underdrain invert elevation	$ELEV_{BMP}$	10.000	feet
8	Groundwater elevation	$ELEV_{GW}$	5.000	feet
9	Depth to seasonal groundwater (Must be 2 feet or greater, or 3.5 feet or greater if draining to combined sewer)	D_{GW}	5.0	feet

Section 3 BMP Specifications				
10	Dimensions of the bioinfiltration facility (length, width, or area)	L		feet
		W		feet
		A_{BMP}	1,800	square feet
11	Depth of prepared soil	D_1	0.0	feet
12	Prepared soil porosity (0.25 maximum unless detailed materials report provided)	P_1	0.25	feet
13	Depth of underlying aggregate (optional)	D_2	3.0	feet
14	Aggregate porosity (0.38 maximum unless detailed materials report provided)	P_2	0.38	feet
15	Surface storage volume (provide supporting calculations, max depth 12 inches)	V_{AIR}	0	cubic feet
16	Soil media storage volume = $A_{BMP} * [(D_1 * P_1) + (D_2 * P_2)]$	V_{SOIL}	2,052	cubic feet

Section 4 BMP Performance				
17	Volume of upstream runoff (Line 4)	$V_{upstream}$	422	cubic feet
18	Storage Provided = $V_{AIR} + V_{SOIL}$	V_{BMP}	2,052	cubic feet
19	V_{total} (equals lesser of V_{BMP} or $V_{upstream}$)	V_{total}	422	cubic feet

DETENTION CALCULATIONS FOR ENGLEWOOD TRAIL

CITY BLOCK FROM LOWE AVE TO END OF TRAIL
See Exhibit 2-04a: Drainage Areas Sheet 26

1. Trail connection at Lowe Ave from STA 103+40 to STA 107+44

Detention Requirement Summary	
	Main Trail
Rate Control (cu ft)	3,567
Volume Control (cu ft)	133
Total Detention Required (cu ft)	3,700
Detention Provided (cu ft)	3,762

Date: 8/11/17
Rev. Date: _____

City of Chicago
Department of Water Management

Stormwater Spreadsheet Tool

Release 3.1 effective January 1, 2016

1. DOB Tracking/Permit Number:

2. Name of Project:
59th Street Line

3. Address of Site:
Access Path at Lowe St
From sta 103+40 to sta 107+44

Architect / Engineer of Record: Infrastructure Engineering, Inc
Phone No.: 312-425-9560

4. Description of Proposed Work:

5. Use of Building (if applicable):

6. Sewer Atlas & Drain Atlas Referenced:

7. Area of Site:
23,268 square feet (Square Feet = Acres * 43560)
0.534 acres (Acres = Square Feet / 43560)

This spreadsheet tool has been prepared to assist the applicant in preparing calculations for simple sites. The applicant is responsible for ensuring that submitted calculations are correct. If necessary, supporting hand calculations should be prepared and submitted.

Color Coding

-  - Cell Contents Computed by Spreadsheet
-  - Cell for User Entry
-  - Cell Includes Comment (when cursor is over it)

**City of Chicago
Department of Water Management**

Stormwater Spreadsheet Tool

INDEX OF SPREADSHEETS

Required>>	<input checked="" type="checkbox"/>	COVER
Required>>	<input checked="" type="checkbox"/>	INDEX
	<input type="checkbox"/>	0.0 RELEASE RATE
Required>>	<input checked="" type="checkbox"/>	1.0 RATE CONTROL
	<input type="checkbox"/>	1.1 Dry Weather Flow
	<input checked="" type="checkbox"/>	1.2 BMPs-Rate Control Credit
	<input type="checkbox"/>	1.3 Orifice Sizing Calculation
Required>>	<input checked="" type="checkbox"/>	2.0 VOLUME CONTROL
	<input type="checkbox"/>	2.1 BMP Volume Summary
	<input checked="" type="checkbox"/>	2.1.1 Bioinfiltration
	<input type="checkbox"/>	2.1.2 Drainage Swales
	<input type="checkbox"/>	2.1.3 Green Roof
	<input type="checkbox"/>	2.1.4 Infiltration Vault
	<input type="checkbox"/>	2.1.5 Trees
	<input type="checkbox"/>	2.1.6 Permeable Pavement
	<input type="checkbox"/>	2.1.7.1 Roof Runoff BMPs - Planter Boxes
	<input type="checkbox"/>	2.1.7.2 Roof Runoff BMPs - Rain Barrels / Cisterns
	<input type="checkbox"/>	2.1.8 Filter Strips
	<input type="checkbox"/>	2.1.9 Oversized Detention

**City of Chicago
Department of Water Management**

Name of Project: 59th Street Line
 Address: Access Path at Lowe St
 A/E of Record: Infrastructure Engineering, Inc

1.0 Rate Control (Sheet 1 of 2)

Step 1: Runoff Calculation

		Proposed Area (sq. ft.)	C-Value 100-Year	Storage Volume (cu. ft.)
Pervious Land	Lawns - Sandy soil, flat, 0% to 2%		0.18	
	Lawns - Sandy soil, avg, 2% to 7%		0.27	
	Lawns - Sandy soil, steep, >7%		0.36	
	Lawns - Heavy soil, flat, 0% to 2%	5,593	0.30	
	Lawns - Heavy soil, avg, 2% to 7%	11,175	0.42	
	Lawns - Heavy soil, steep, >7%		0.47	
	Woodlands, flat, 2%		0.39	
	Native Vegetation with prepared soils		0.10	
	Dry bottom basins to HWL		0.75	
	Wetland		0.80	
Impervious Land	Green Roof		0.50	
	Gravel		0.70	
	Pavement	3,200	0.95	
	Roofs (conventional)		0.95	
	Building sidewalls connected by side gutters (enter 25% of the face of the sidewall)		0.95	
	Wet bottom basins to HWL		1.00	
BMP areas	BMPs providing storage that WILL COUNT toward detention storage (from Worksheet 1.2)	3,300	1.00	
	BMPs providing volume control storage that WILL NOT BE COUNTED toward detention (from Worksheet 1.2)	0		0

Summary	Total pervious area (sq ft)	16,768
	Total impervious area (sq ft)	3,200
	Total BMP area (sq ft)	3,300
	Total site area (sq ft)	23,268
	Weighted C- value (non BMP areas)	0.47
	Adjusted C-value (accounts for BMPs)	0.55
Notes:	Make note of any adjustments made for purposes of detention calcs here (such as removal of roof area that will discharge directly to Waters)	

Step 2: Allowable Release Rate Assessment

	Type Yes or No for all that apply	Notes
Question 1: Does the site drain directly to Waters?	No	
Question 2: Does the site only include residential land use for detached single-family and two-family dwellings?	No	
Question 3: Is the Regulated Development a Lot to Lot Building (85% or more of site footprint is occupied by buildings)?	No	
Question 4: Do you plan to use the standard maximum release rate (only available to sites less than 1.75 acres)?	Yes	Standard Detention Release Rate based on total site area (Cell D36) minus any tributary sidewalls
Question 5: Is the site more than 75 percent of substantially contiguous at-grade open space that is conducive to ponding of surface waters (Answer "No" if site discharges to waterway or is a service station)?	No	
Question 6: Does the development involve flow diversions (existing sewer connection to be relocated to a different main) or multiple sewer connections (only available to sites over 1.75 acres)?	No	
Question 7: Are there widespread contaminated soils on the site, high ground water table, or is this development classified as a lot-to-lot building?	No	Oversized detention is not allowed. Do not fill out Tab 2.1.9

**City of Chicago
Department of Water Management**

Name of Project: 59th Street Line
 Address: Access Path at Lowe St
 A/E of Record: Infrastructure Engineering, Inc

1.0 Rate Control (Sheet 2 of 2)

Step 3: Achieving Rate Control Measures

Unadjusted Detention Release Rate =	0.157	cfs	0.157	0.000
Dry Weather Flow Rate = (From dry weather flow worksheet)	0.000	cfs	Waiting for Dry Weather Flow worksheet to be completed	
Infiltration Facility Release Rate (to be added to eligible release rate when computing required storage)	0.000	cfs	No BMPs with infiltration beds entered on BMP Summary Worksheet or soil's infiltration rate is less than 0.5 in/hr	
Release rate for detention storage computations:	0.157	cfs		
Required Storage Volume =	3,567	cubic feet		

Detention Storage Calculations

(Based on Bulletin 70 Rainfall Data)

STORM EVENT (5,10,25,50 or 100) =

Storm Duration (minute)	Runoff Coefficient C	Rainfall Intensity (in/hr)	Drainage Area A (acres)	Allowable release rate 0.157 cfs					Storage Rate (Qi-Qo) (cfs)	Storage Volume Rate (Qi-Qo)*t*60 (cf)
				Inflow Rate Q=CIA	Total Storm Vol (cf)	Release Rate Qo (cfs)	Storage Rate (Qi-Qo) (cfs)	Storage Volume Rate (Qi-Qo)*t*60 (cf)		
5	0.55	10.920	0.53	3.19	956	0.157	3.03	909		
10	0.55	10.020	0.53	2.92	1,754	0.157	2.77	1,660		
15	0.55	8.200	0.53	2.39	2,154	0.157	2.24	2,012		
30	0.55	5.600	0.53	1.63	2,941	0.157	1.48	2,659		
60	0.55	3.560	0.53	1.04	3,740	0.157	0.88	3,175		
120	0.55	2.235	0.53	0.65	4,696	0.157	0.50	3,567		
180	0.55	1.617	0.53	0.47	5,095	0.157	0.31	3,401		
360	0.55	0.947	0.53	0.28	5,967	0.157	0.12	2,579		
720	0.55	0.549	0.53	0.16	6,923	0.157	0.00	148		
1080	0.55	0.387	0.53	0.11	7,322	0.157	-0.04	-2,841		
1440	0.55	0.316	0.53	0.09	7,963	0.157	-0.06	-5,587		
2880	0.55	0.170	0.53	0.05	8,572	0.157	-0.11	-18,528		
4320	0.55	0.122	0.53	0.04	9,224	0.157	-0.12	-31,427		
7200	0.55	0.083	0.53	0.02	10,463	0.157	-0.13	-57,288		
14400	0.55	0.046	0.53	0.01	11,703	0.157	-0.14	-123,800		
								Required Detention Volume (cf)	3,567	

Note: 1) the calculation assumes that the rising and recessing limb of inflow and outflow hydrograph are vertical

City of Chicago
Department of Water Management

Name of Project: 59th Street Line
 Address: Access Path at Lowe St
 A/E of Record: Infrastructure Engineering, Inc

1.2 BMPs for Rate Control Credit

Volume Control BMP Summary for use in Rate Control Worksheet

Instructions for use:

This summary worksheet provides information for BMPs for use in the Rate Control Spreadsheet.

Storage provided should be from the computation made on the each individual BMP spreadsheet (2.1.1 to 2.1.8).

Total area of BMPs will carry over to Rate Control Worksheet.

Other areas (ie reduce pavement area if permeable pavement implemented) should adjusted such that Line 35 on Rate Control Worksheet equals total site area.

When the option exists, the applicant may decide whether or not to count volume control storage toward detention storage.

n/a = not applicable and indicates when credit is inappropriate or unavailable for a given BMP.

BMP Areas with Storage COUNTED toward Rate Control Volume					
Type "yes" to Select	BMP	BMP Infiltration Area (sq. ft.)	Storage Provided (cu. ft.)	Design Soil Infiltration Rate (in/hr) ³	Allowable Infiltration Release Rate (cfs)
yes	Bioinfiltration Systems	3,300	542	0.000	0.000
	Drainage Swales	0	0	0.000	0.000
n/a	Green Roof	n/a	n/a	n/a	n/a
	Infiltration Vault	0	0	0.000	0.000
n/a	Natural Landscaping and Stormwater Trees ¹	n/a	n/a	n/a	n/a
	Roof Runoff BMPs - Planter Boxes	0	0	0.000	0.000
	Roof Runoff BMPs - Rain Barrels and Cisterns	n/a	0	n/a	n/a
no	Permeable Paving	0	0	0.500	0.000
n/a	Vegetated Filter Strips ²	n/a	n/a	n/a	n/a
Totals		3,300	542	-	0.000

Notes:

1. Natural landscaping areas do not have specific storage, they can simply be entered on Rate Control Spreadsheet as having a C-value of 0.1. Detention Credit is not given for stormwater trees.
2. Vegetated Filter strips also are not given credit for a "volume of storage" and should be entered in the pervious land cover section of the Rate Control Spreadsheet based on their cover type.
3. Infiltration rate must be the design infiltration rate as explained in Stormwater Manual. If the infiltration rate is less than 0.5 in/hr, credit cannot be taken for infiltration and the Allowable Infiltration Release is set to zero. This value is automatically copied from each respective BMP spreadsheet.

BMP Areas with Storage NOT COUNTED toward Rate Control Volume			
Type "yes" to Select	BMP	Area (sq. ft.)	Storage Provided (cu. ft.)
	Bioinfiltration Systems	0	0
	Drainage Swales	0	0
n/a	Green Roof	n/a	n/a
n/a	Natural Landscaping and Stormwater Trees ¹	n/a	n/a
	Roof Runoff BMPs - Planter Boxes	0	0
	Permeable Paving	0	0
n/a	Vegetated Filter Strips ²	n/a	n/a
Totals		0	0

**City of Chicago
Department of Water Management**

Name of Project: 59th Street Line
 Address: Access Path at Lowe St
 A/E of Record: Infrastructure Engineering, Inc

2.0 Volume Control

Step 1:

Runoff Calculation

		Existing Area (sq ft)	Proposed Area (sq ft)
Pervious Surface or Land Cover not Counted as Impervious for Volume Control Calculations	Bare Earth		
	Lawn or Landscaped Areas	23,268	16,768
	Woodlands		
	Wetland		
Impervious Land	Gravel		
	Pavement		3,200
	Roofs (conventional)		
	Water (including Wet Bottom Basin to HWL)		
BMPs	Green Roof	-	
	Permeable Pavement	-	
	Bioinfiltration	-	3,300
	Swales	-	
	Stormwater Trees	-	
	Roof Runoff Planters	-	
	Filter Strips	-	
	Dry Bottom Basins to HWL	-	
Summary	Total pervious area (sq ft)	23,268	16,768
	Total impervious area (sq ft)	0	3,200
	Total BMP areas treated as impervious area (sq ft)	-	0
	Total BMP areas treated as pervious area (sq ft)	-	3,300
	Total site area (sq ft)	23,268	23,268
	Imperviousness percentage (%)	0.0	13.8

Step 2:

Volume Control Assessment

		Type Yes or No for all that apply	Note
Question 1:	Does the site drain directly to Waters?	No	
Question 2:	Are infiltration BMPs allowable? (See Chapter III Sections 4.1.2 of the Regulations.)	Yes	
Question 3:	Do you wish to use permeable pavement only as a pervious surface to achieve impervious surface reduction goal?	No	Areas of permeable pavement are included as an impervious surface for the computation made in Cell C48. Storage will be counted toward volume control goal.

Step 3:

Achieving Volume Control Measures

Achieve I. or II. below in accordance with the Ordinance.

I.	Capture 0.5" of runoff from impervious surfaces. Storage required =	133	cubic feet	Go to spreadsheet 2.1 BMP Volume Summary if electing volume control storage option
or, II.	Reduce proposed imperviousness to:	-	percent	

City of Chicago
Department of Water Management

Name of Project: 59th Street Line
 Address: Access Path at Lowe St
 A/E of Record: Infrastructure Engineering, Inc

2.1.1 Bioinfiltration Systems

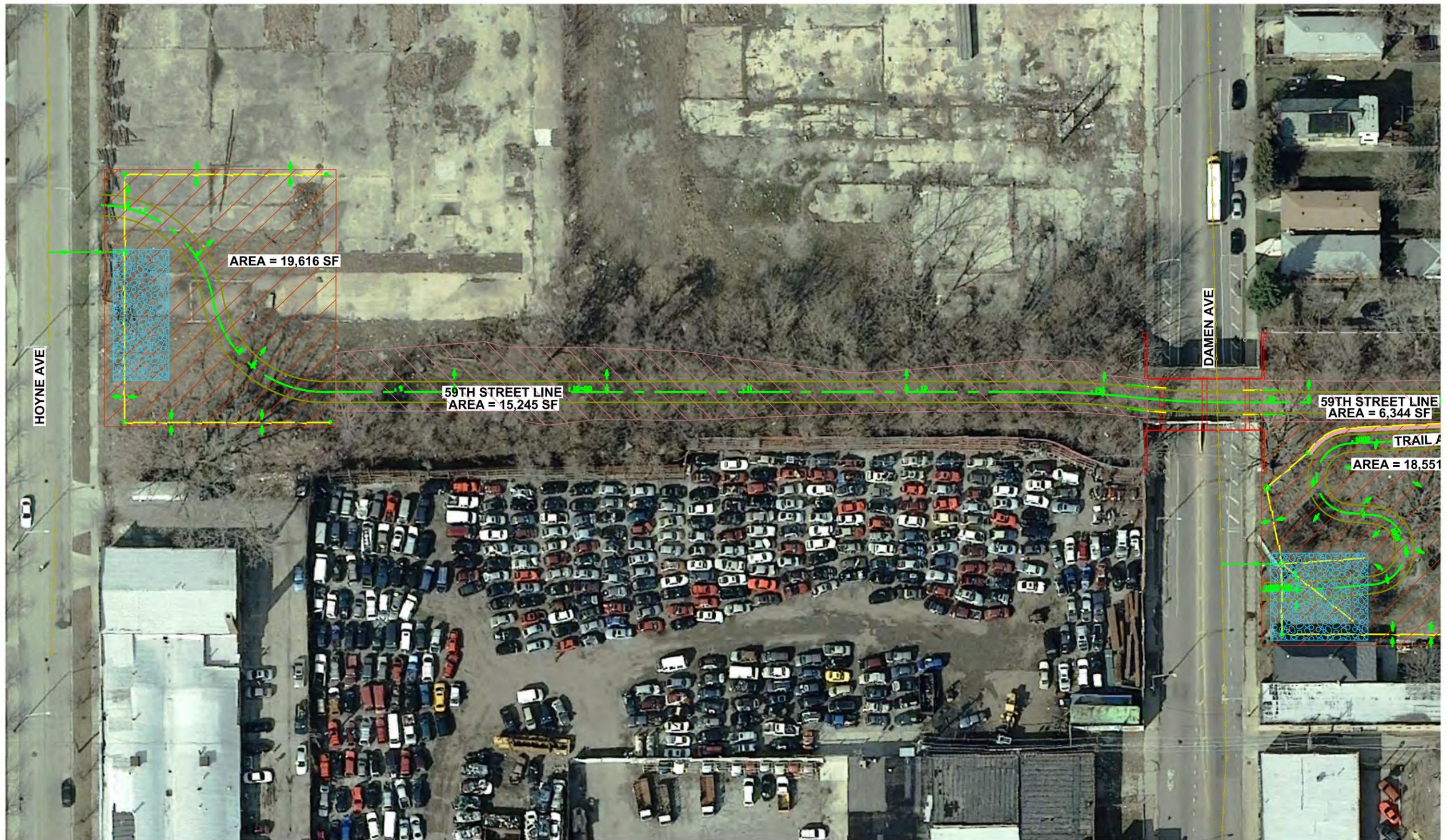
Section 1 Upstream Drainage Area				
1	Upstream impervious area including BMP area	A_t	6,500	square feet
2	Upstream weighted C-value (C-value=1.0 for bioinfiltration area for direct rainfall)	C	1.00	unitless
3	Volume of upstream runoff from a 1-inch storm = $C * A_t * 1/12$	$V_{upstream}$	542	cubic feet
4	Describe upstream drainage area	Paved access ramp area		
5	Describe upstream pretreatment or integration of pretreatment into BMP			

Section 2 BMP Feasibility				
6	Design soil infiltration rate (must be 0.5 in/hr or greater unless underdrain system is used)	i	0.00	in/hr
7	Elevation of bottom of BMP (the infiltration surface) IF there is no underdrain, OR the lowest underdrain invert elevation	$ELEV_{BMP}$	10.000	feet
8	Groundwater elevation	$ELEV_{GW}$	5.000	feet
9	Depth to seasonal groundwater (Must be 2 feet or greater, or 3.5 feet or greater if draining to combined sewer)	D_{GW}	5.0	feet

Section 3 BMP Specifications				
10	Dimensions of the bioinfiltration facility (length, width, or area)	L		feet
		W		feet
		A_{BMP}	3,300	square feet
11	Depth of prepared soil	D_1	0.0	feet
12	Prepared soil porosity (0.25 maximum unless detailed materials report provided)	P_1	0.25	feet
13	Depth of underlying aggregate (optional)	D_2	3.0	feet
14	Aggregate porosity (0.38 maximum unless detailed materials report provided)	P_2	0.38	feet
15	Surface storage volume (provide supporting calculations, max depth 12 inches)	V_{AIR}	0	cubic feet
16	Soil media storage volume = $A_{BMP} * [(D_1 * P_1) + (D_2 * P_2)]$	V_{SOIL}	3,762	cubic feet

Section 4 BMP Performance				
17	Volume of upstream runoff (Line 4)	$V_{upstream}$	542	cubic feet
18	Storage Provided = $V_{AIR} + V_{SOIL}$	V_{BMP}	3,762	cubic feet
19	V_{total} (equals lesser of V_{BMP} or $V_{upstream}$)	V_{total}	542	cubic feet

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LEGEND
 MAIN TRAIL AREA
 ACCESS PATH AREA

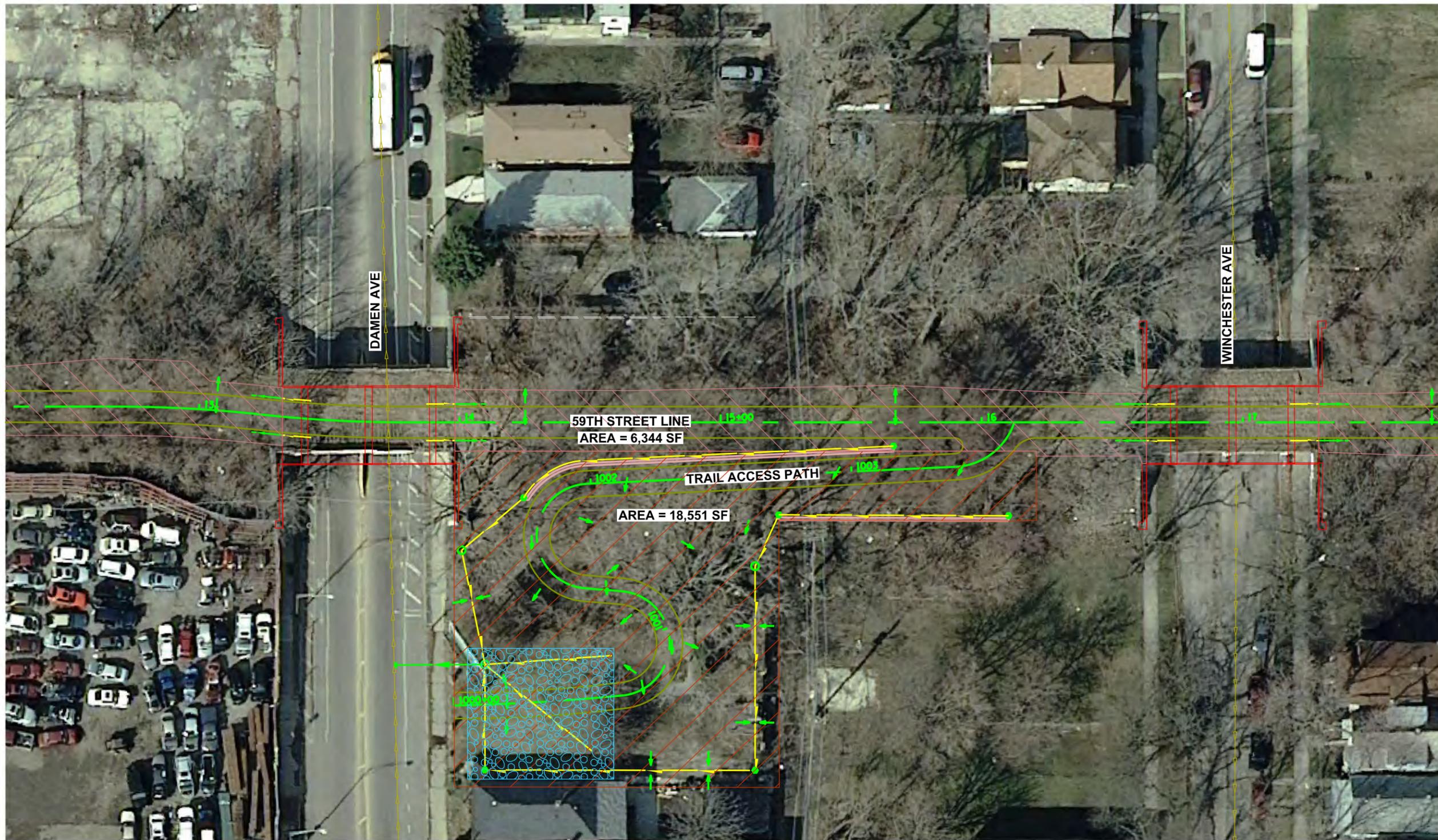
INFRASTRUCTURE ENGINEERING <small>INCORPORATED</small> 33 West Monroe Suite 1540 Chicago, IL 60603 P 312.415.8988 F 312.415.9394 www.infrastructure-eng.com	USER NAME =	DESIGNED - HG	REVISED -
		DRAWN - AR	REVISED -
	PLOT SCALE =	CHECKED - HG	REVISED -
	PLOT DATE =	DATE - 08/11/2017	REVISED -

CDOT CHICAGO DEPARTMENT OF TRANSPORTATION

EXHIBIT 2-04a: DRAINAGE AREAS HOYNE AVE TO DAMEN AVE
 SCALE: 1" = 30' SHEET AREA-1 OF 26 SHEETS STA. TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
	16-E5482-00-BT	COOK	26	1
CONTRACT NO.				
ILLINOIS FED. AID PROJECT				

8/14/2017 10:49:11 AM P:\P-14\2866-02_CDOT_Bridge_Design_Eng_Services_Patrick\Task_004-Engineered_Trail_LDS\CDN\CADD_Sheets\Drainage_Area_Sheets\E-5482_Stt_DRN_AREA-2.dgn



LEGEND
 MAIN TRAIL AREA
 ACCESS PATH AREA

INFRASTRUCTURE ENGINEERING INCORPORATED
 33 West Monroe | Suite 1540 | Chicago, IL 60603
 P 312.415.8988 | F 312.415.9394 | www.infrastructure-eng.com

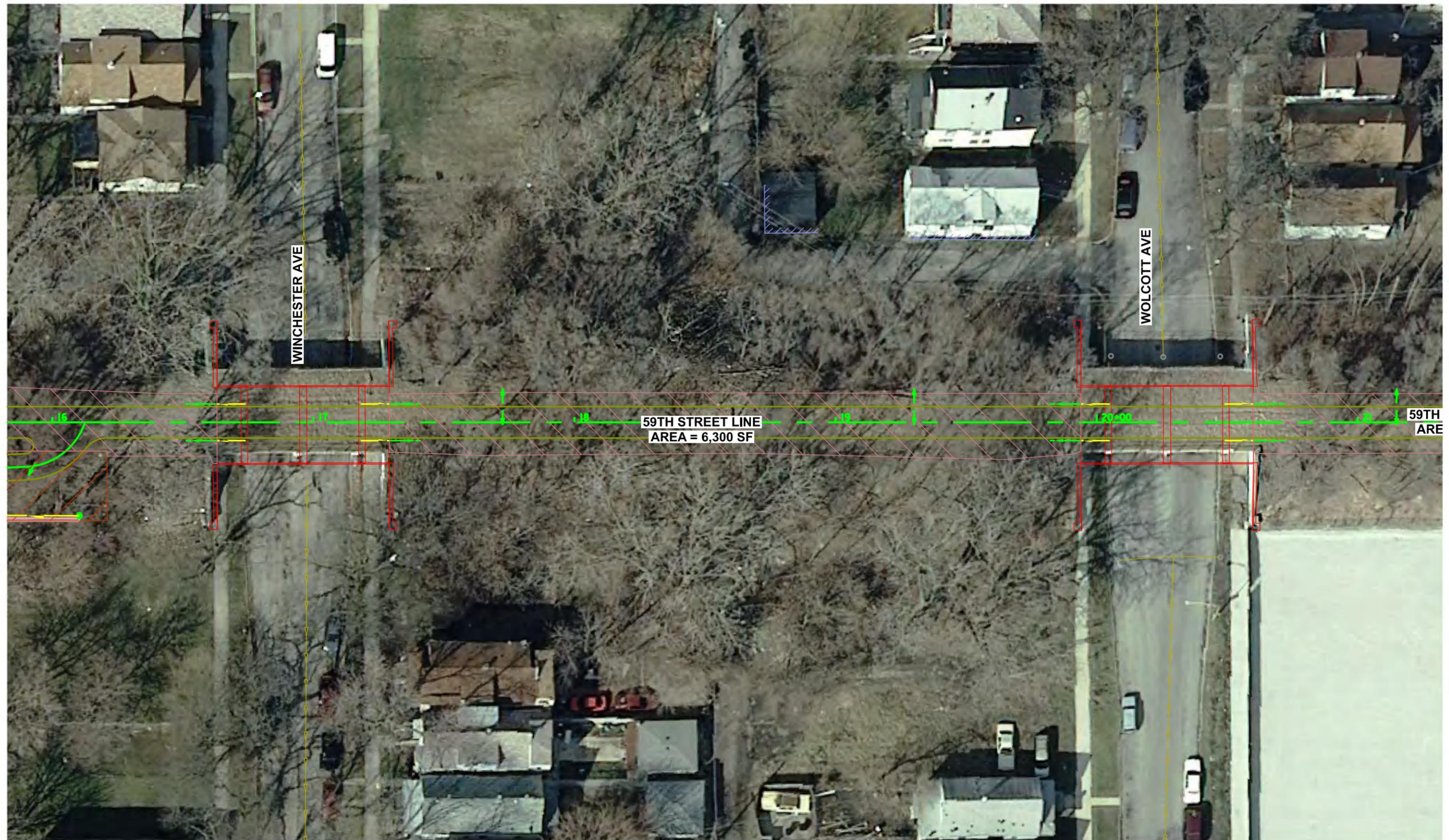
USER NAME =	DESIGNED - HG	REVISED -
PLOT SCALE =	DRAWN - AR	REVISED -
PLOT DATE =	CHECKED - HG	REVISED -
	DATE - 08/11/2017	REVISED -

CDOT CHICAGO DEPARTMENT OF TRANSPORTATION

EXHIBIT 2-04a: DRAINAGE AREAS DAMEN AVE TO WINCHESTER AVE
 SCALE: 1" = 30' SHEET AREA-2 OF 26 SHEETS STA. TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
	16-E5482-00-BT	COOK	26	2
CONTRACT NO.				
ILLINOIS FED. AID PROJECT				

8/14/2017 10:49:13 AM P:\P-14\2866-02_CDOT_Bridge_Design_Eng_Services_Patrick\Task_004-Engineered_Trail_LDS\DCN\CADD_Sheets\Drainage_Area_Sheets\E-5482_Stt_DRN_AREA-3.dgn



LEGEND
 MAIN TRAIL AREA
 ACCESS PATH AREA

 INFRASTRUCTURE ENGINEERING <small>INCORPORATED</small> 33 West Monroe Suite 1540 Chicago, IL 60603 P 312.415.8988 F 312.415.9394 www.infrastructure-eng.com	USER NAME =	DESIGNED - HG	REVISED -
		DRAWN - AR	REVISED -
	PLOT SCALE =	CHECKED - HG	REVISED -
	PLOT DATE =	DATE - 08/11/2017	REVISED -

CDOT CHICAGO DEPARTMENT OF TRANSPORTATION

EXHIBIT 2-04a: DRAINAGE AREAS WINCHESTER AVE TO WOLCOTT AVE
 SCALE: 1" = 30' SHEET AREA-3 OF 26 SHEETS STA. TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
	16-E5482-00-BT	COOK	26	3
CONTRACT NO.				
ILLINOIS FED. AID PROJECT				

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LEGEND

- MAIN TRAIL AREA
- ACCESS PATH AREA

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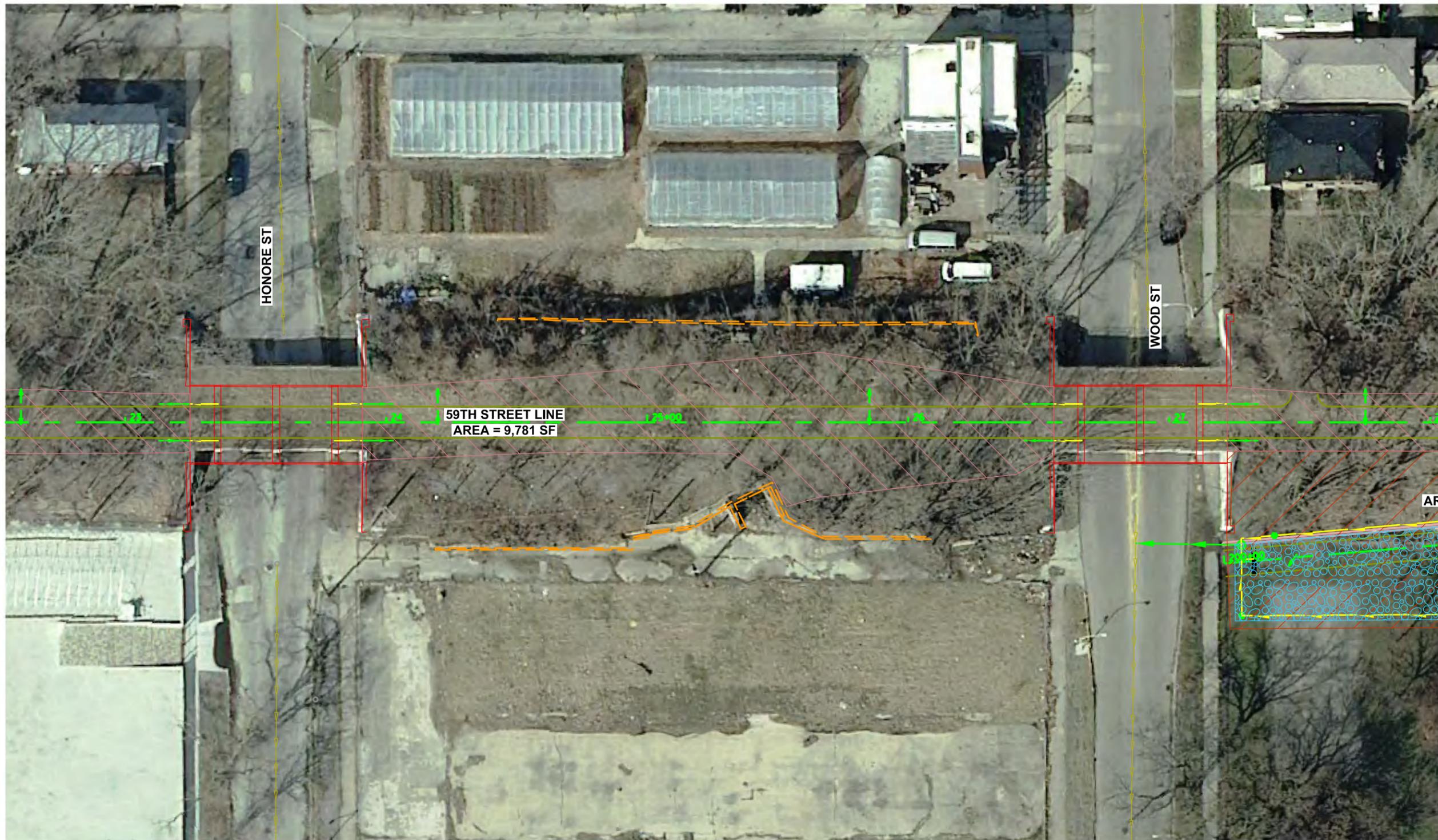
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EXHIBIT 2-04a: DRAINAGE AREAS WOLCOTT AVE TO HONORE ST
 SCALE: 1" = 30' SHEET AREA-4 OF 26 SHEETS STA. TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
	16-E5482-00-BT	COOK	26	4
CONTRACT NO.				
ILLINOIS FED. AID PROJECT				

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LEGEND
 MAIN TRAIL AREA
 ACCESS PATH AREA

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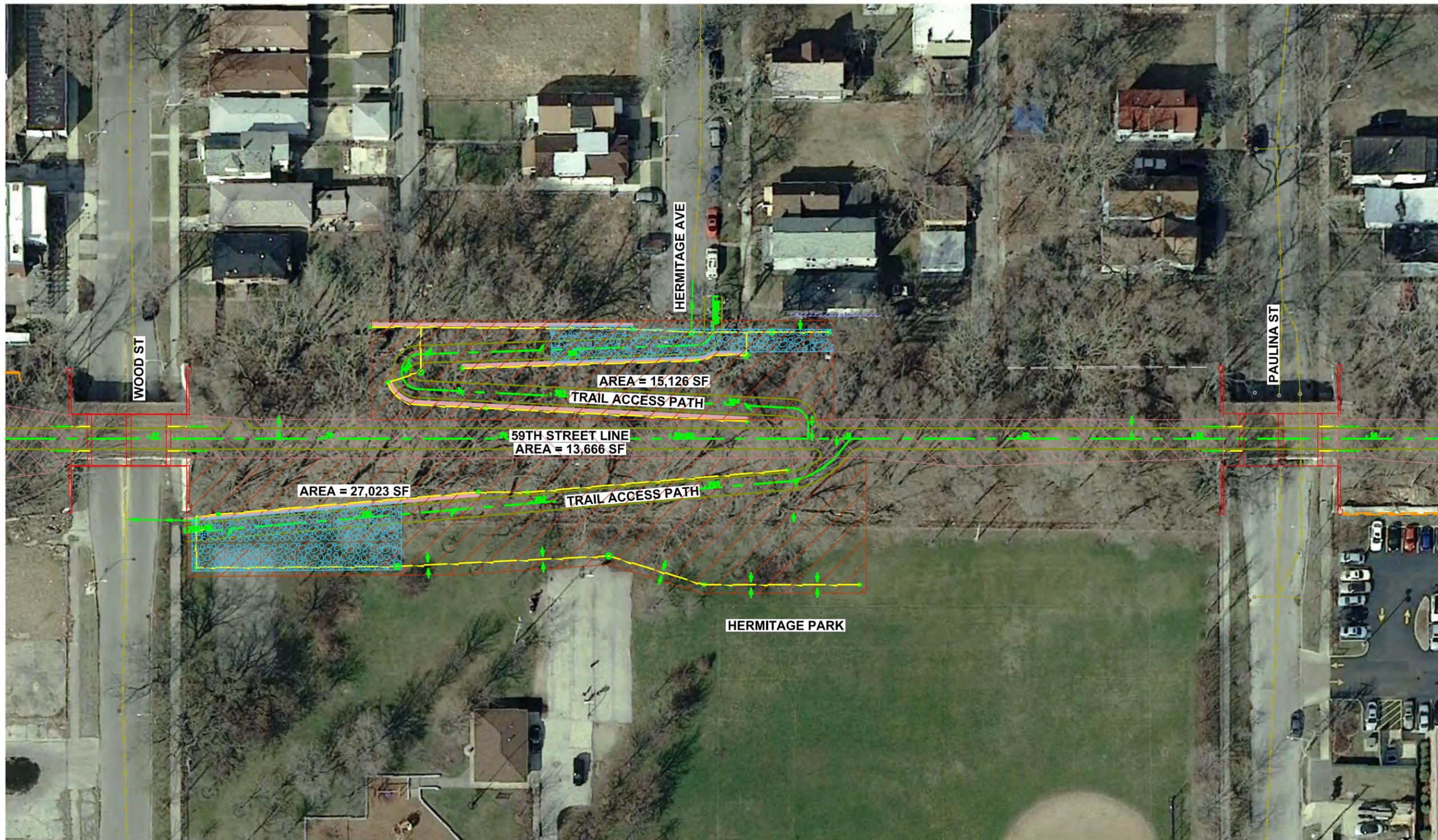
CHICAGO DEPARTMENT OF TRANSPORTATION

**EXHIBIT 2-04a: DRAINAGE AREAS
HONORE ST TO WOOD ST**

SCALE: 1" = 30' SHEET AREA-5 OF 26 SHEETS STA. TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
	16-E5482-00-BT	COOK	26	5
CONTRACT NO.				
<small>ILLINOIS FED. AID PROJECT</small>				

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LEGEND

- MAIN TRAIL AREA
- ACCESS PATH AREA

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CDOT CHICAGO DEPARTMENT OF TRANSPORTATION

EXHIBIT 2-04a: DRAINAGE AREAS WOOD ST TO PAULINA ST
 SCALE: 1" = 30' SHEET AREA-6 OF 26 SHEETS STA. TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
	16-E5482-00-BT	COOK	26	6
CONTRACT NO.				
ILLINOIS FED. AID PROJECT				

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LEGEND
 MAIN TRAIL AREA
 ACCESS PATH AREA

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CDOT CHICAGO DEPARTMENT OF TRANSPORTATION

EXHIBIT 2-04a: DRAINAGE AREAS
PAULINA ST TO ASHLAND AVE
 SCALE: 1" = 30' SHEET AREA-7 OF 26 SHEETS STA. TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
	16-E5482-00-BT	COOK	26	7
CONTRACT NO.				
<small>ILLINOIS FED. AID PROJECT</small>				

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LEGEND
 MAIN TRAIL AREA
 ACCESS PATH AREA

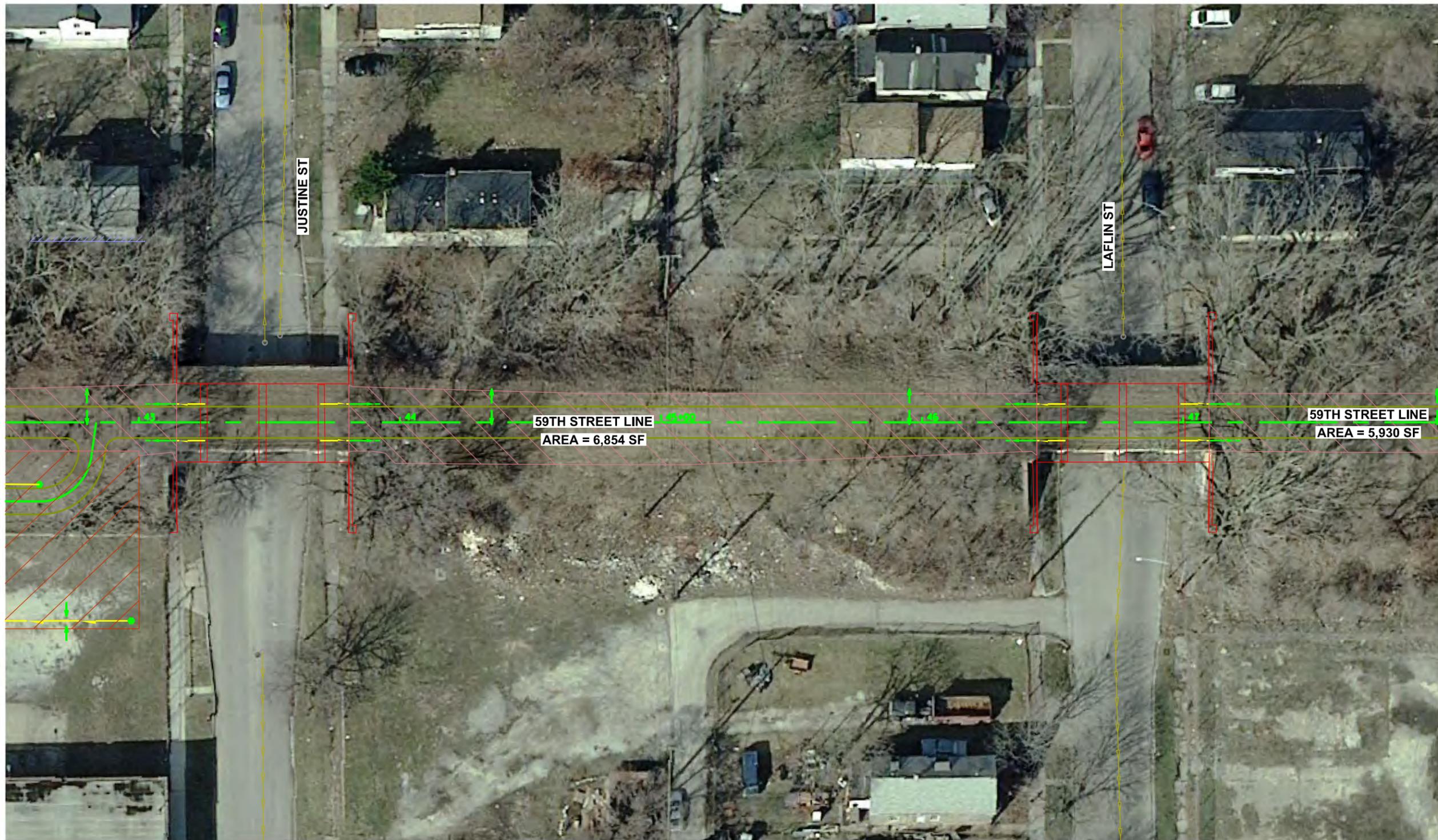
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EXHIBIT 2-04a: DRAINAGE AREAS
ASHLAND AVE TO JUSTINE ST
 SCALE: 1" = 30' SHEET AREA-8 OF 26 SHEETS STA. TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
	16-E5482-00-BT	COOK	26	8
CONTRACT NO.				
<small>ILLINOIS FED. AID PROJECT</small>				

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LEGEND
 MAIN TRAIL AREA
 ACCESS PATH AREA

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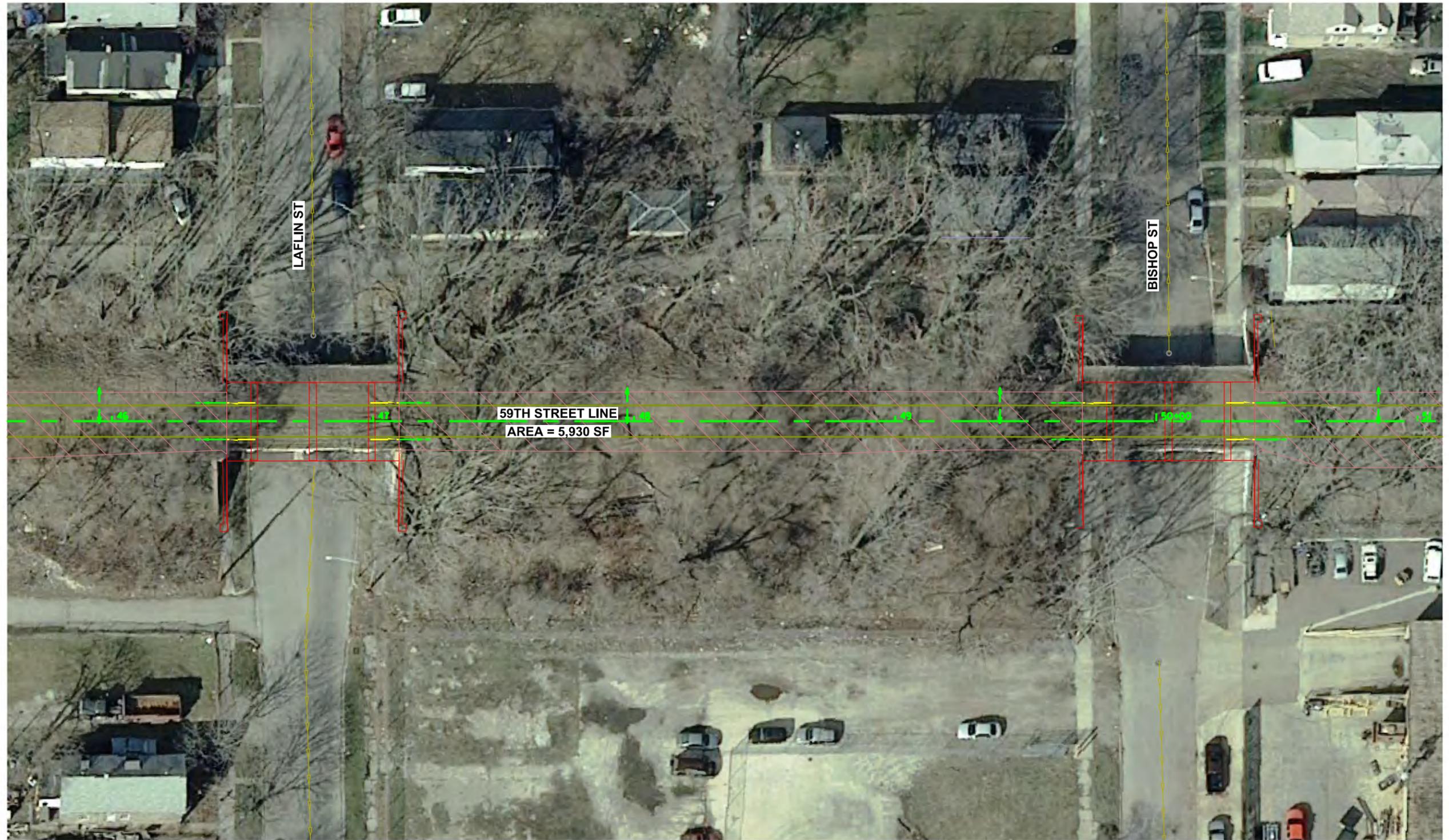
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EXHIBIT 2-04a: DRAINAGE AREAS JUSTINE ST TO LAFLIN ST
 SCALE: 1" = 30' SHEET AREA-9 OF 26 SHEETS STA. TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
	16-E5482-00-BT	COOK	26	9
CONTRACT NO.				
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LEGEND

- MAIN TRAIL AREA
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PLOT DATE =	CHECKED - HG	REVISED -
	DATE - 08/11/2017	REVISED -

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**EXHIBIT 2-04a: DRAINAGE AREAS
 LAFLIN ST TO BISHOP ST**

SCALE: 1" = 30' SHEET AREA-10 OF 26 SHEETS STA. TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
	16-E5482-00-BT	COOK	26	10
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ILLINOIS FED. AID PROJECT				

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LEGEND
 MAIN TRAIL AREA
 ACCESS PATH AREA

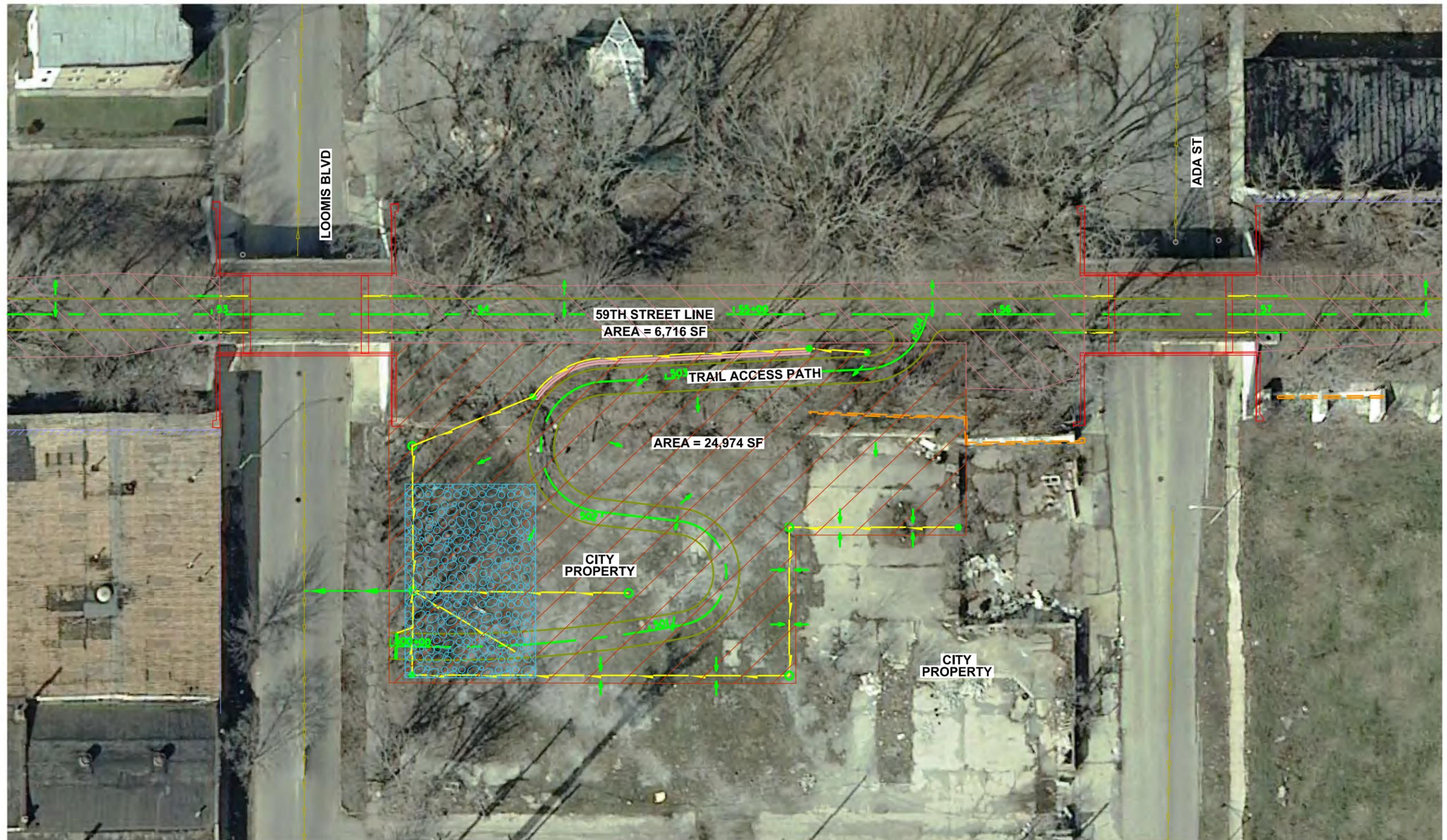
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EXHIBIT 2-04a: DRAINAGE AREAS
BISHOP ST TO LOOMIS BLVD
 SCALE: 1" = 30' SHEET AREA-11 OF 26 SHEETS STA. TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
	16-E5482-00-BT	COOK	26	11
CONTRACT NO.				
ILLINOIS FED. AID PROJECT				

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LEGEND

	MAIN TRAIL AREA
	ACCESS PATH AREA

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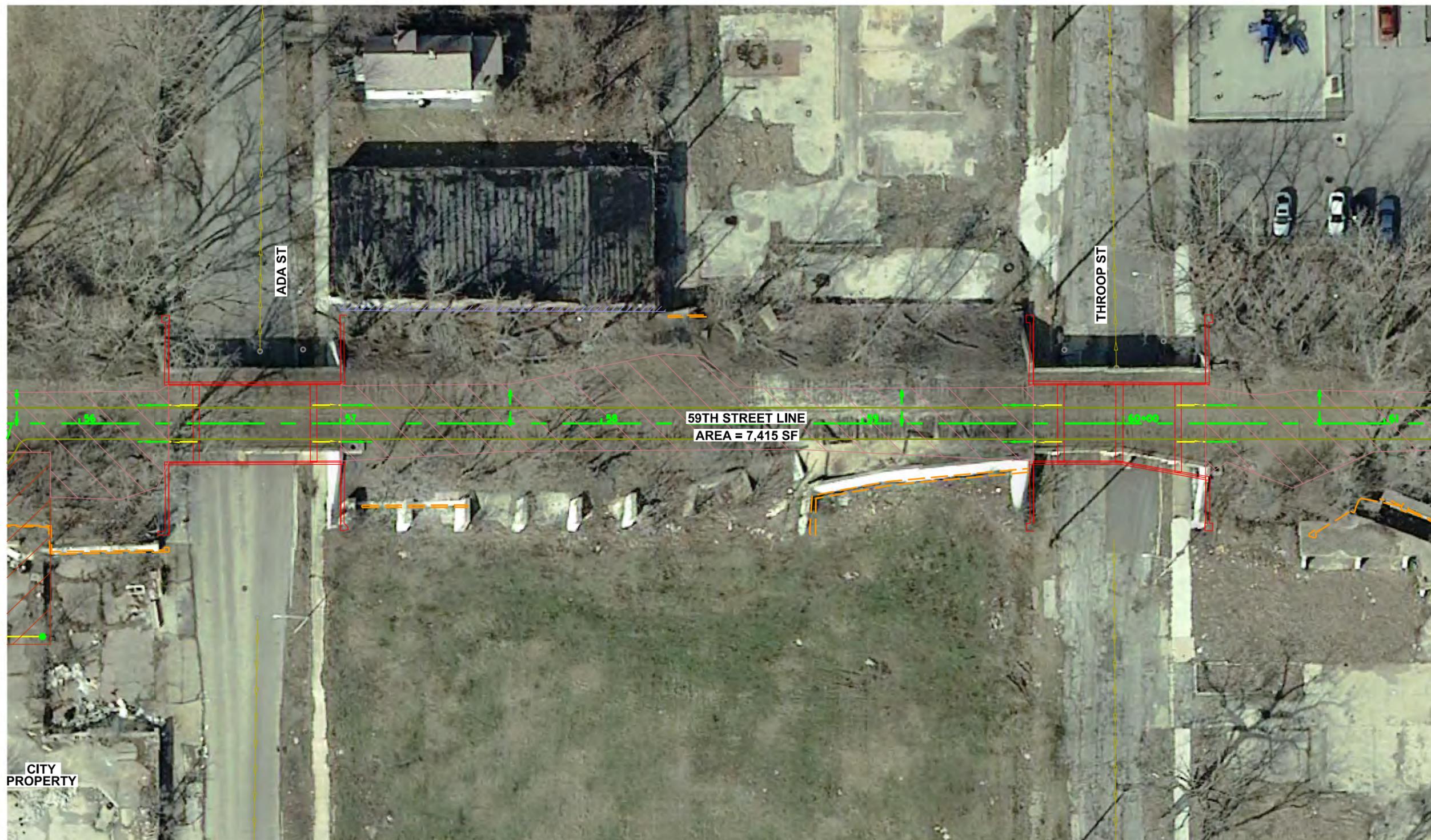
CDOT CHICAGO DEPARTMENT OF TRANSPORTATION

EXHIBIT 2-04a: DRAINAGE AREAS
LOOMIS BLVD TO ADA ST

SCALE: 1" = 30' SHEET AREA-12 OF 26 SHEETS STA. TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
	16-E5482-00-BT	COOK	26	12
CONTRACT NO.				
ILLINOIS FED. AID PROJECT				

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LEGEND

- MAIN TRAIL AREA
- ACCESS PATH AREA

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**EXHIBIT 2-04a: DRAINAGE AREAS
ADA ST TO THROOP ST**

SCALE: 1" = 30' SHEET AREA-13 OF 26 SHEETS STA. TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
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CONTRACT NO.				
ILLINOIS FED. AID PROJECT				

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LEGEND
 MAIN TRAIL AREA
 ACCESS PATH AREA

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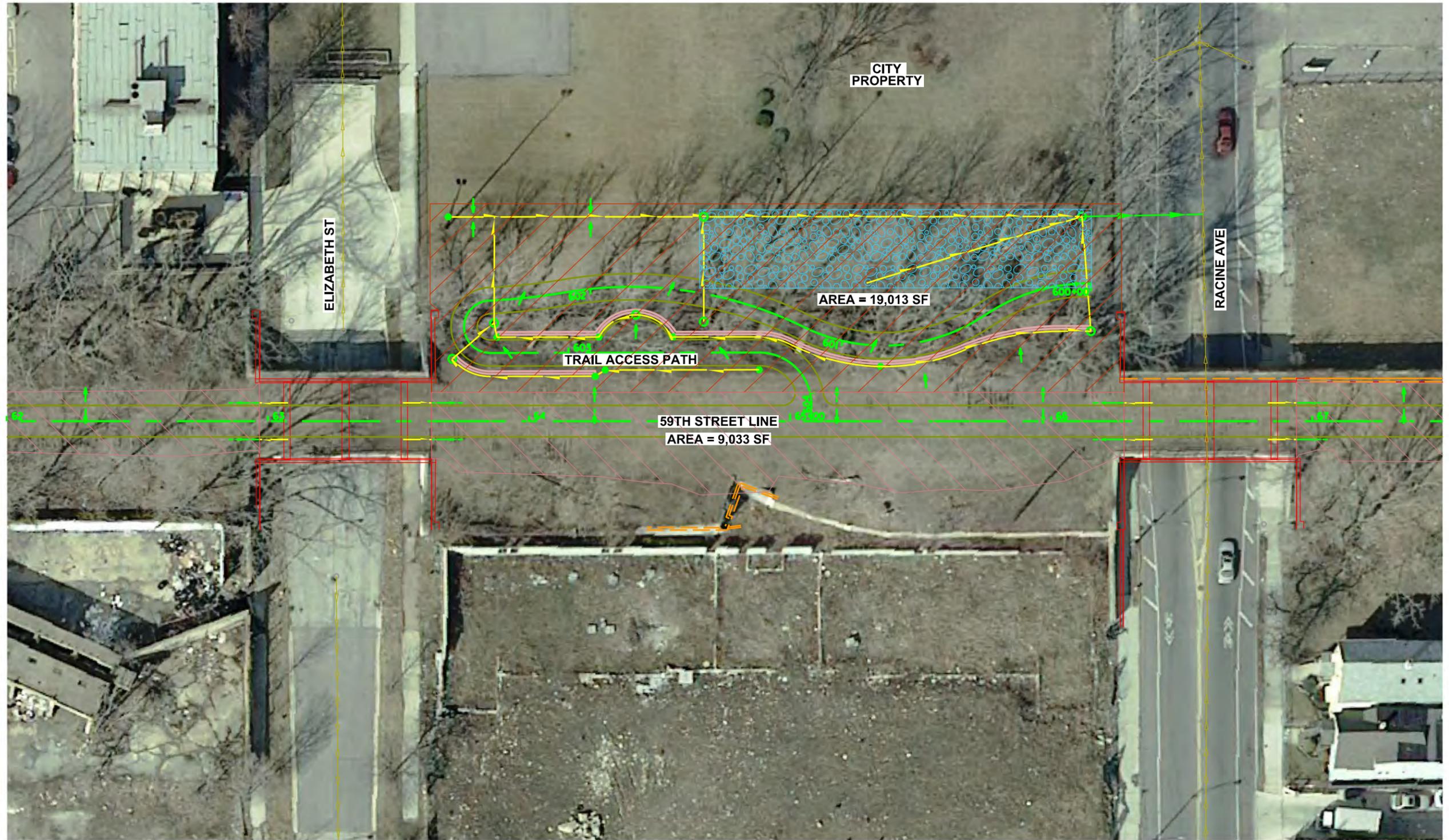
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EXHIBIT 2-04a: DRAINAGE AREAS THROOP ST TO ELIZABETH ST
 SCALE: 1" = 30' SHEET AREA-14 OF 26 SHEETS STA. TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
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CONTRACT NO.				
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LEGEND

- MAIN TRAIL AREA
- ACCESS PATH AREA

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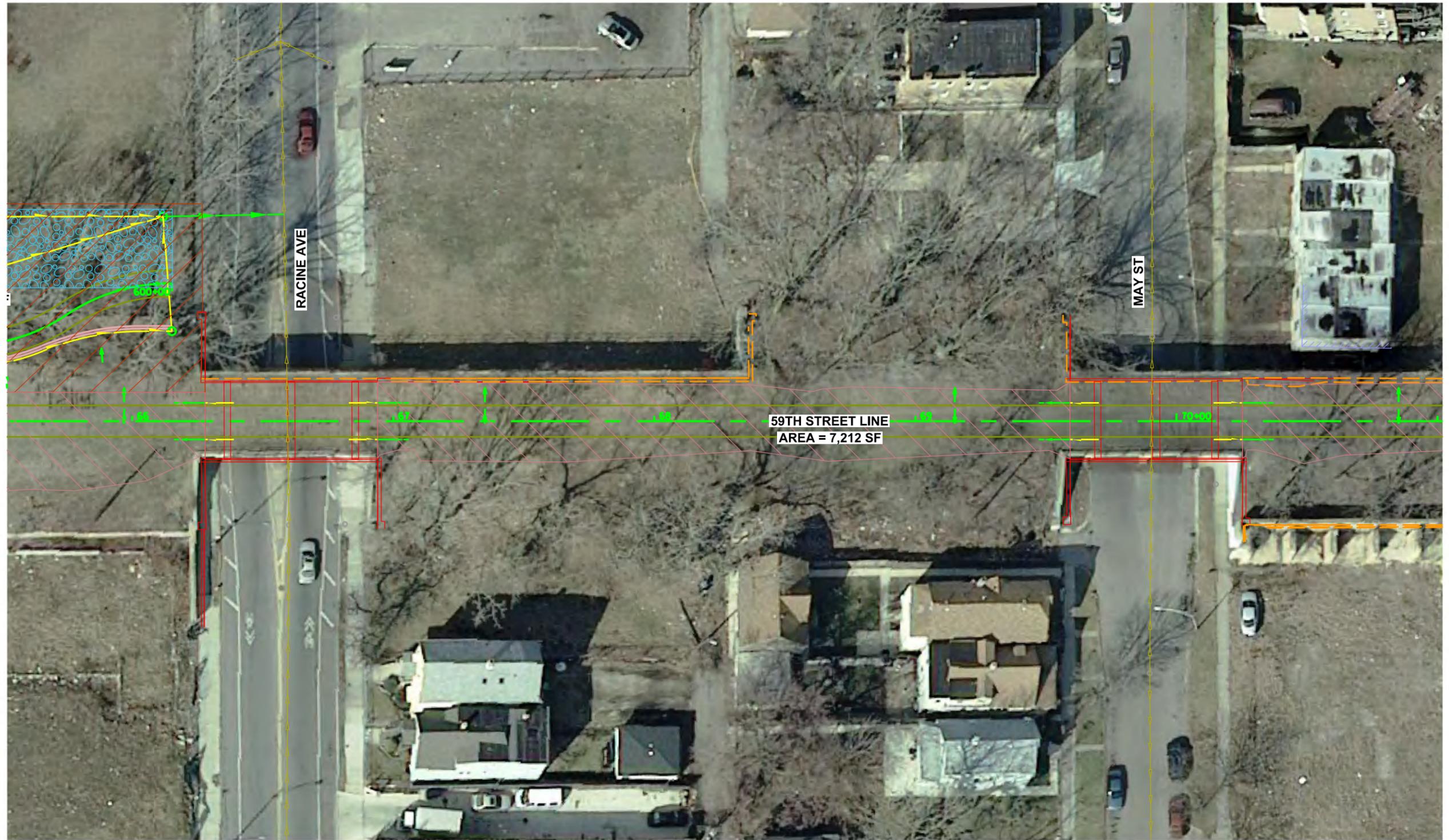
CDOT CHICAGO DEPARTMENT OF TRANSPORTATION

**EXHIBIT 2-04a: DRAINAGE AREAS
 ELIZABETH ST TO RACINE AVE**

SCALE: 1" = 30' SHEET AREA-15 OF 26 SHEETS STA. TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
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CONTRACT NO.				
ILLINOIS FED. AID PROJECT				

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LEGEND

-  MAIN TRAIL AREA
-  ACCESS PATH AREA

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**EXHIBIT 2-04a: DRAINAGE AREAS
 RACINE AVE TO MAY ST**

SCALE: 1" = 30' SHEET AREA-16 OF 26 SHEETS STA. TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
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ILLINOIS FED. AID PROJECT				

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LEGEND

- MAIN TRAIL AREA
- ACCESS PATH AREA

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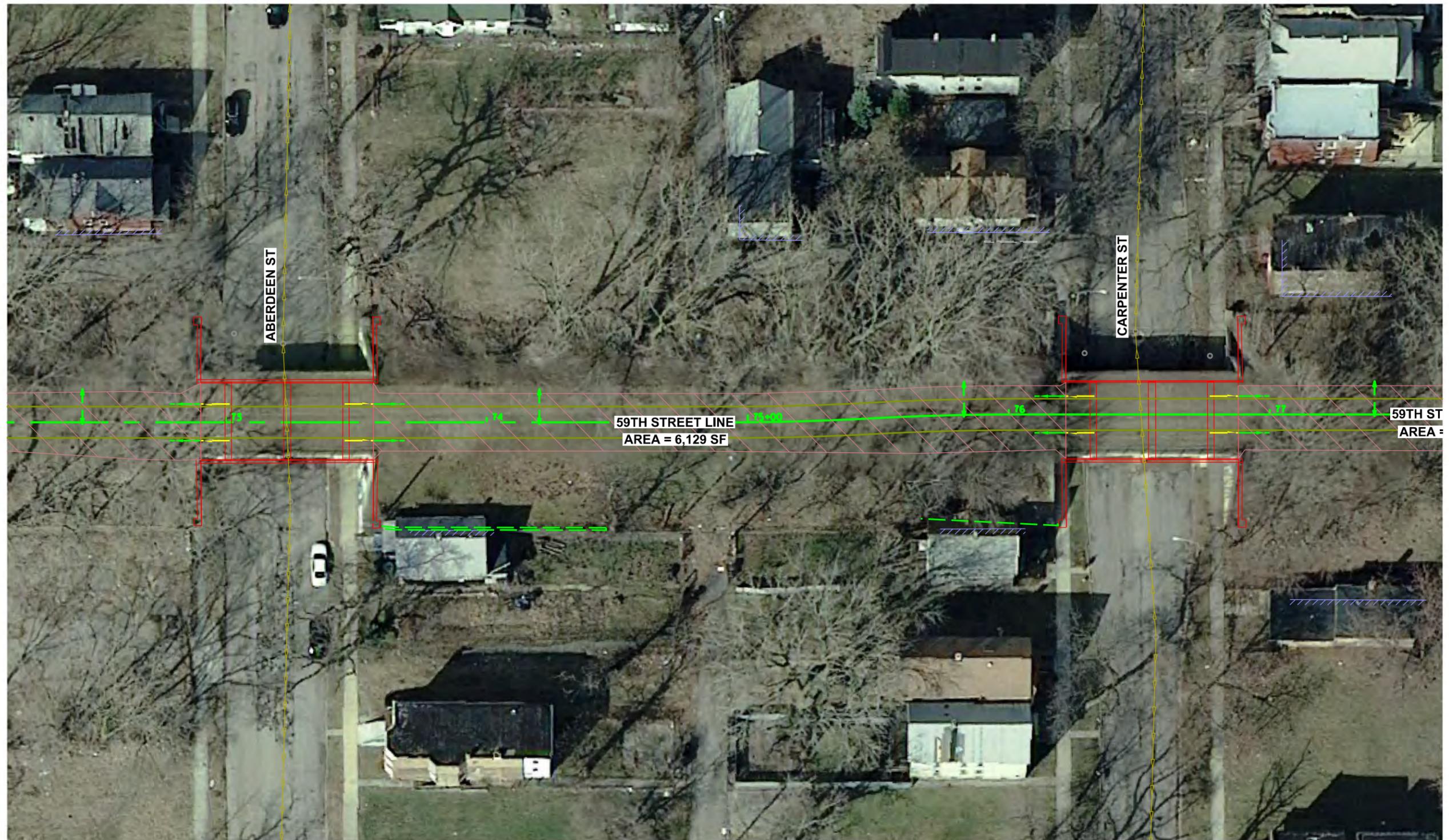
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**EXHIBIT 2-04a: DRAINAGE AREAS
MAY ST TO ABERDEEN ST**

SCALE: 1" = 30' SHEET AREA-17 OF 26 SHEETS STA. TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
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CONTRACT NO.				
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LEGEND
 MAIN TRAIL AREA
 ACCESS PATH AREA

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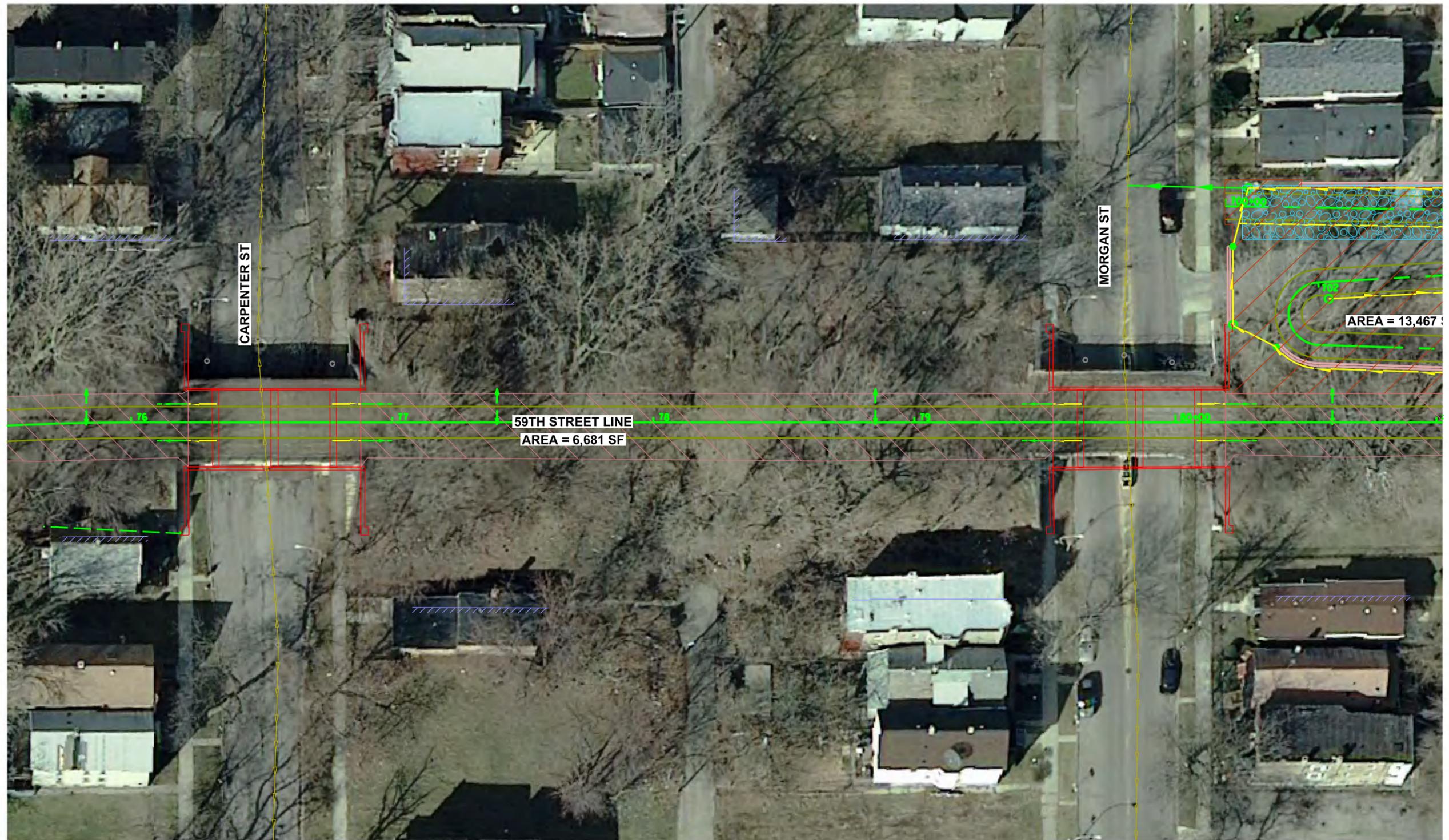
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EXHIBIT 2-04a: DRAINAGE AREAS ABERDEEN ST TO CARPENTER ST
 SCALE: 1" = 30' SHEET AREA-18 OF 26 SHEETS STA. TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
	16-E5482-00-BT	COOK	26	18
CONTRACT NO.				
ILLINOIS FED. AID PROJECT				

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LEGEND

- MAIN TRAIL AREA
- ACCESS PATH AREA

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**EXHIBIT 2-04a: DRAINAGE AREAS
 CARPENTER ST TO MORGAN ST**

SCALE: 1" = 30' SHEET AREA-19 OF 26 SHEETS STA. TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
	16-E5482-00-BT	COOK	26	19
CONTRACT NO.				
ILLINOIS FED. AID PROJECT				

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LEGEND

	MAIN TRAIL AREA
	ACCESS PATH AREA

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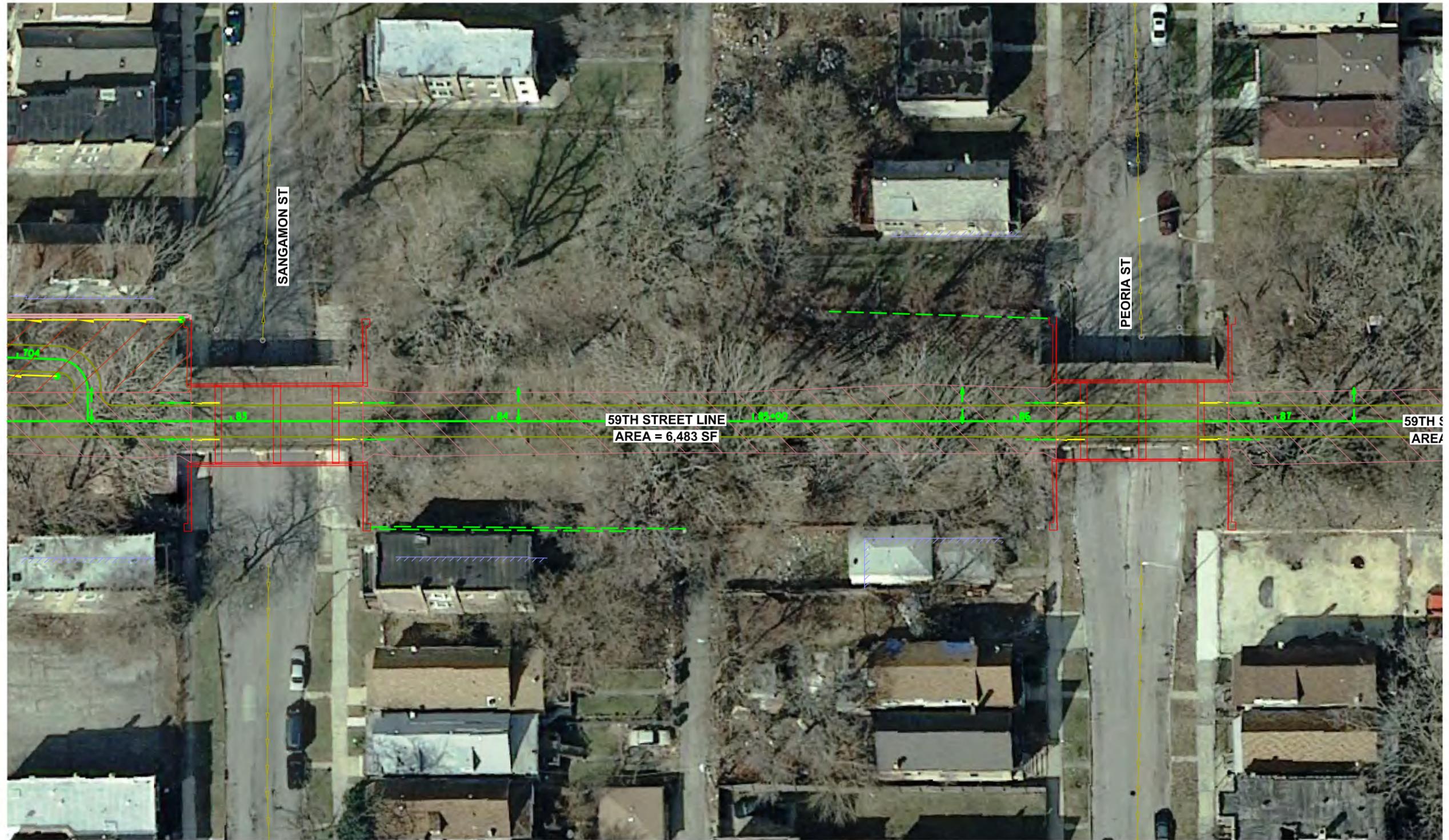
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EXHIBIT 2-04a: DRAINAGE AREAS MORGAN ST TO SANGAMON ST
 SCALE: 1" = 30' SHEET AREA-20 OF 26 SHEETS STA. TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
	16-E5482-00-BT	COOK	26	20
CONTRACT NO.				
ILLINOIS FED. AID PROJECT				

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LEGEND

- MAIN TRAIL AREA
- ACCESS PATH AREA

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EXHIBIT 2-04a: DRAINAGE AREAS SANGAMON ST TO PEORIA ST

SCALE: 1" = 30' SHEET AREA-21 OF 26 SHEETS STA. TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
	16-E5482-00-BT	COOK	26	21
CONTRACT NO.				
ILLINOIS FED. AID PROJECT				

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LEGEND

- MAIN TRAIL AREA
- ACCESS PATH AREA

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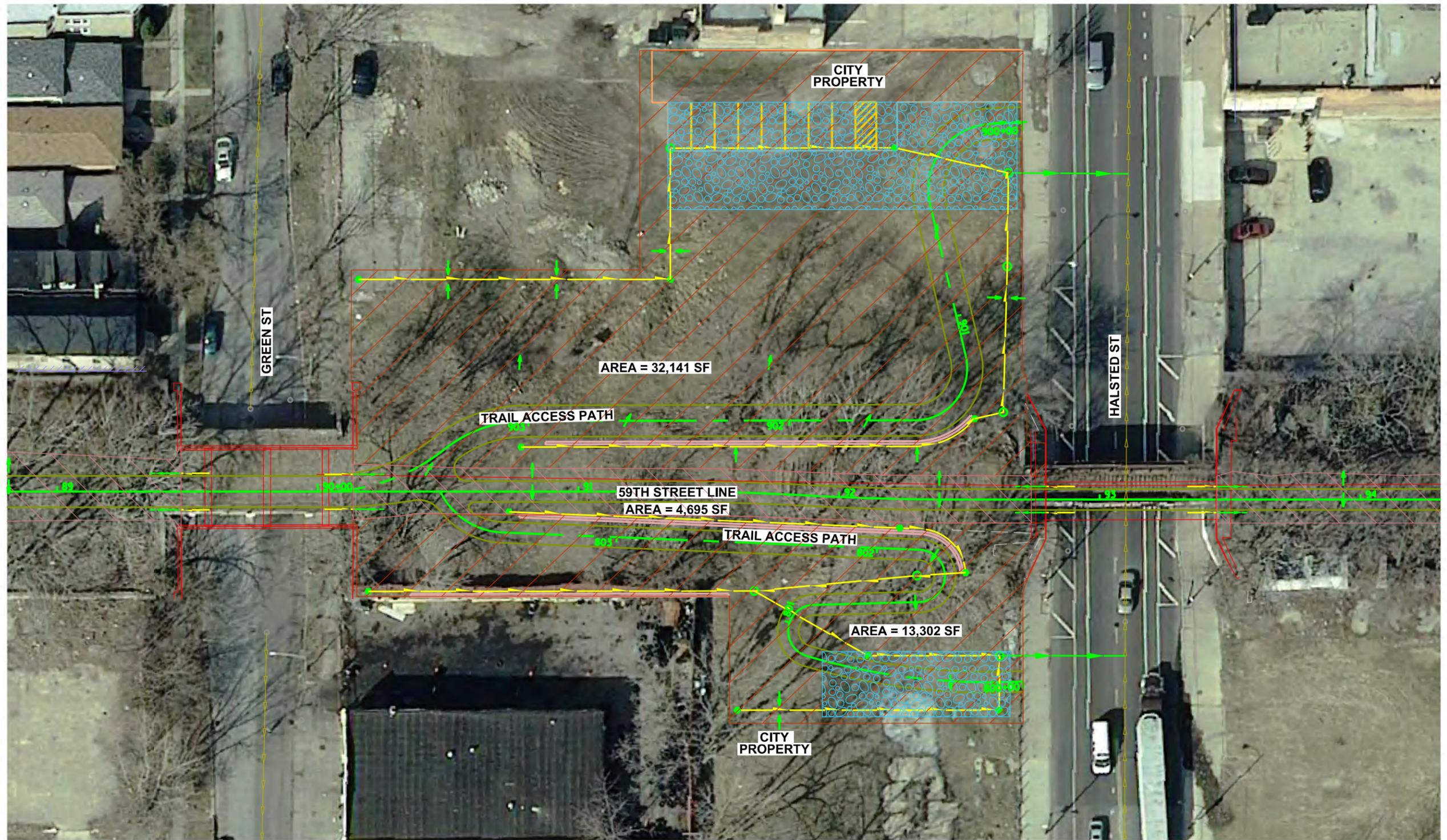
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**EXHIBIT 2-04a: DRAINAGE AREAS
 PEORIA ST TO GREEN ST**

SCALE: 1" = 30' SHEET AREA-22 OF 26 SHEETS STA. TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
	16-E5482-00-BT	COOK	26	22
CONTRACT NO.				
ILLINOIS FED. AID PROJECT				

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LEGEND
 MAIN TRAIL AREA
 ACCESS PATH AREA

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	DATE - 08/11/2017	REVISED -

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EXHIBIT 2-04a: DRAINAGE AREAS GREEN ST TO HALSTED ST

SCALE: 1" = 30' SHEET AREA-23 OF 26 SHEETS STA. TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
	16-E5482-00-BT	COOK	26	23
CONTRACT NO.				
ILLINOIS FED. AID PROJECT				

8/14/2017 10:50:02 AM P:\P-14\2866-02_CDOT_Bridge_Design_Eng_Services_Patrick\Task_004-Engineered_Trail_LDS\CDN\CADD_Sheets\Drainage_Area_Sheets\E-5482_Stt_DRN_AREA-24.dgn



LEGEND
 MAIN TRAIL AREA
 ACCESS PATH AREA

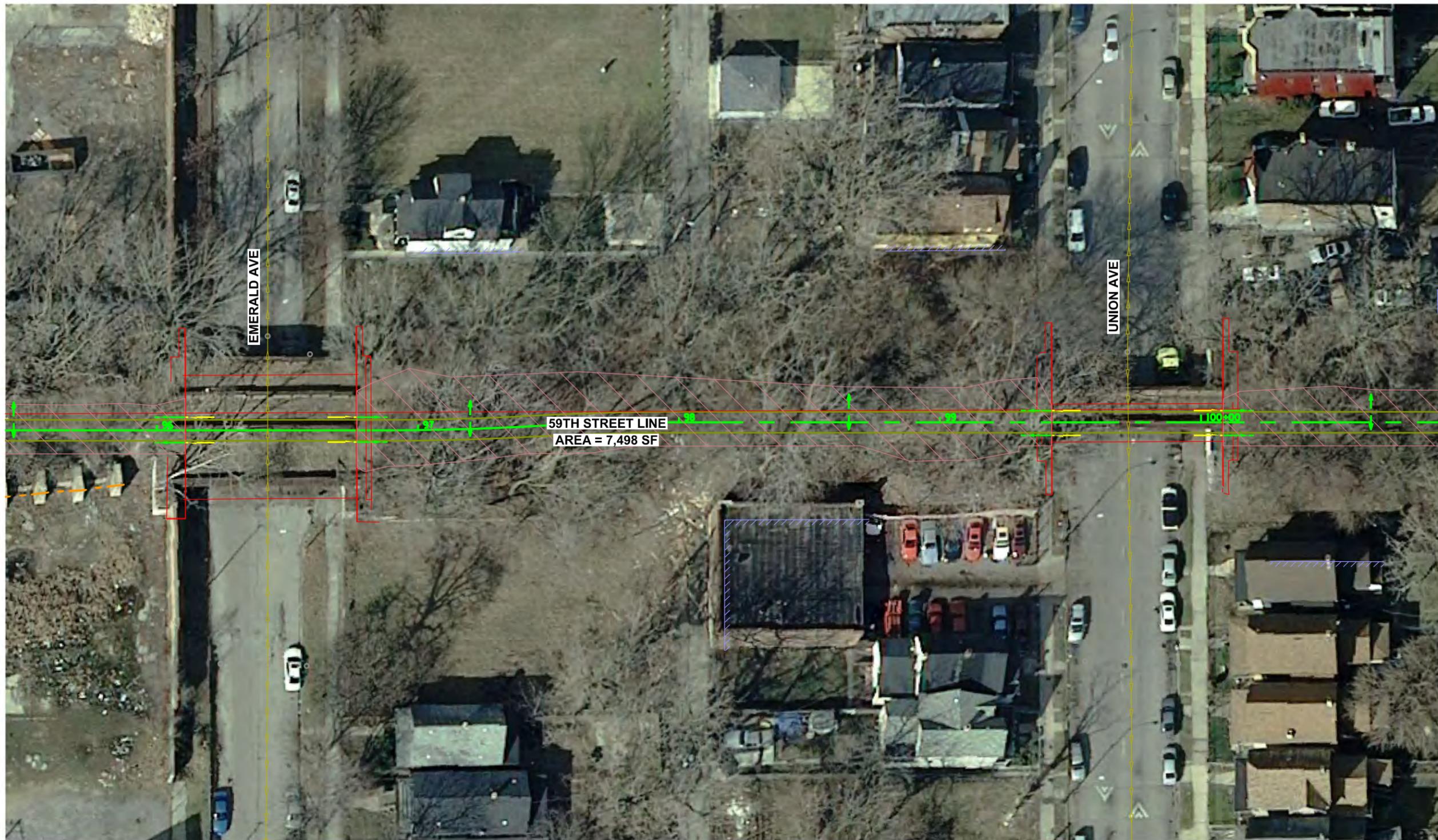
 INFRASTRUCTURE ENGINEERING <small>INCORPORATED</small> 33 West Monroe Suite 1540 Chicago, IL 60603 P 312.415.8988 F 312.415.9394 www.infrastructure-eng.com	USER NAME =	DESIGNED - HG	REVISED -
		DRAWN - AR	REVISED -
	PLOT SCALE =	CHECKED - HG	REVISED -
	PLOT DATE =	DATE - 08/11/2017	REVISED -

CDOT CHICAGO DEPARTMENT OF TRANSPORTATION

EXHIBIT 2-04a: DRAINAGE AREAS HALSTED ST TO EMERALD AVE
 SCALE: 1" = 30' SHEET AREA-24 OF 26 SHEETS STA. TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
	16-E5482-00-BT	COOK	26	24
CONTRACT NO.				
ILLINOIS FED. AID PROJECT				

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LEGEND

- MAIN TRAIL AREA
- ACCESS PATH AREA

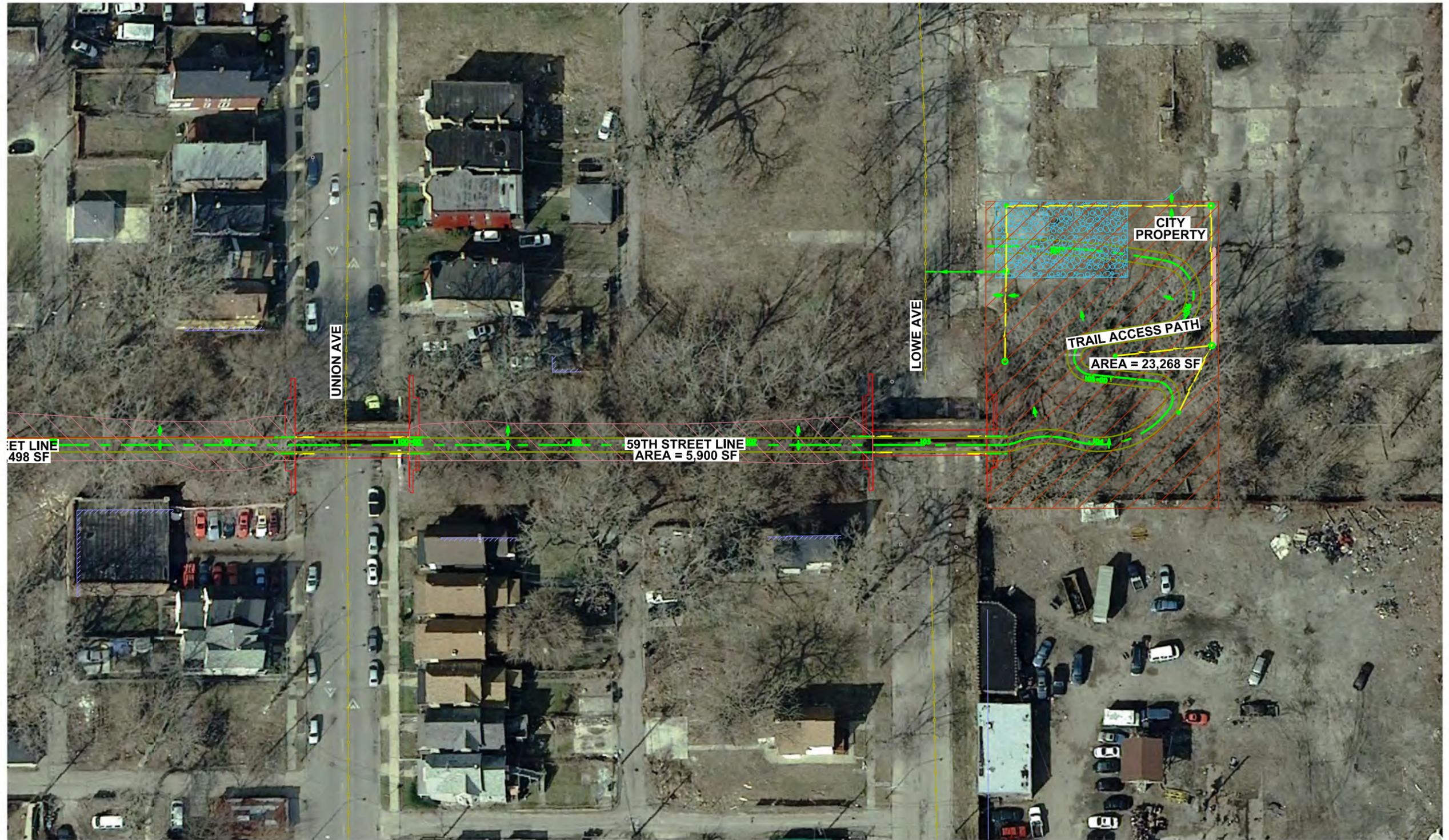
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		DRAWN - AR	REVISED -
	PLOT SCALE =	CHECKED - HG	REVISED -
	PLOT DATE =	DATE - 08/11/2017	REVISED -

CHICAGO DEPARTMENT OF TRANSPORTATION

EXHIBIT 2-04a: DRAINAGE AREAS
EMERALD AVE TO UNION AVE
 SCALE: 1" = 30' SHEET AREA-25 OF 26 SHEETS STA. TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
	16-E5482-00-BT	COOK	26	25
CONTRACT NO.				
ILLINOIS FED. AID PROJECT				

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LEGEND

- MAIN TRAIL AREA
- ACCESS PATH AREA

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 33 West Monroe | Suite 1540 | Chicago, IL 60603
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PLOT SCALE =	DRAWN - AR	REVISED -
PLOT DATE =	CHECKED - HG	REVISED -
	DATE - 08/11/2017	REVISED -

CDOT CHICAGO DEPARTMENT OF TRANSPORTATION

**EXHIBIT 2-04a: DRAINAGE AREAS
 UNION AVE TO LOWE AVE**

SCALE: 1" = 30' SHEET AREA-26 OF 26 SHEETS STA. TO STA.

F.A. RTE.	SECTION	COUNTY	TOTAL SHEETS	SHEET NO.
	16-E5482-00-BT	COOK	26	26
CONTRACT NO.				
ILLINOIS FED. AID PROJECT				