PORTILLO'S – ORLAND PARK

20 ORLAND SQUARE DRIVE

ORLAND PARK, IL

STORMWATER MANAGEMENT REPORT

MAY 8, 2024

PREPARED FOR:
Portillo's Hot Dogs, LLC
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Oak Brook, IL 60523

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NARRATIVE

1.0 INTRODUCTION

The proposed development consists of the demolition and redevelopment of an existing restaurant on a 1.28-acre parcel located at 20 Orland Square Drive in Orland Park, Illinois. This site is a part of the larger Orland Square Mall development and is currently occupied by a commercial restaurant and associated asphalt parking lot. The project will include clearing the existing site as necessary to construct a new Portillo's Pick-Up Restaurant with a perimeter drive-thru lane, parking lot, and associated stormwater management improvements as required per local ordinances. The intent of this report is to provide supporting information that demonstrates the proposed improvements are in conformance with the local requirements of both the Village of Orland Park (Village) and Metropolitan Water Reclamation District of Greater Chicago (MWRD).

2.0 EXISTING CONDITIONS

The proposed development is expected to result in a redevelopment area approximately 0.962 acres (41,921 SF) of the 1.28-acre total area of the subject property, as per the definitions contained in MWRD Watershed Management Ordinance (WMO). In the existing condition, the project site is occupied by a 1-story restaurant and associated parking lot. Impervious surfaces (i.e., buildings and site hardscape areas) occupy a total of 0.825 acres (35,965 SF) of the existing site, or approximately 85.8% of the 0.962-acre disturbed area. The property is bounded to the north by the northwest entrance to the Orland Square Mall, to the east by the Orland Square Mall inner ring road, to the south by an adjacent commercial restaurant, and to the west by the South La Grange Road (96th Avenue/US-45) right-of-way. The existing runoff coefficient (C) for the 0.962-acre redevelopment site is 0.84. Soil conditions are identified to be hydrologic group D soils. The site is not understood to include other special management areas (i.e., wetlands or regulatory floodplain/floodway).

The site is graded in such a way that it primarily drains from west to east, with site drainage being captured primarily by existing storm structures and routed to the east of the site into a 54"-diameter storm sewer that ultimately outlets to the Orland Square Mall regional detention facility. This regional detention basin, constructed in c. 1974 as part of MWRD Legacy Sewer Permit Ordinance (SPO) permit 1974-488, was designed to provide the required 100-year stormwater detention for a total design service area of 227.0 acres at an allowable release rate of 60.35 cubic feet per second (cfs), or 0.266 cfs/acre. Using a design runoff coefficient (C) value of 0.77, a required detention volume of 39.52 acre-ft was determined. Per record information provided within the Legacy SPO permit, it is understood that the facility was constructed with 42.9 acre-ft of storage volume with an actual release rate of 57.77 cfs, thereby meeting the requirements. The 42.9 acre-ft storage volume corresponds to a pro-rated existing volume of 0.189 acre-ft/acre provided for the 227-acre basin design service area.

Please refer to the civil engineering drawings, map resources, and Legacy SPO permit excerpts provided in this report for additional detail regarding the existing land use and drainage patterns.

3.0 PROPOSED CONDITIONS

As previously noted, the proposed improvements will include the construction of a new restaurant building along with associated drive-thru and parking lot areas. The 0.962-acre redevelopment will result in a post-development impervious area of approximately 0.799 acres (34,795 SF), which is a 0.03-acre (1,170 SF) reduction from the existing conditions. The proposed runoff coefficient "C" for the redevelopment area is 0.824.

Despite the reduction in proposed imperviousness coverage, however, it is noted that the site's stormwater management parameters were not originally designed/constructed in line with present-day standards. Per Village and MWRD standards, it is expected that the redevelopment must provide additional stormwater management infrastructure as determined by the increase in what would be required per present-day regulations as compared to what was originally constructed, namely infiltration-based volume control practices and additional detention volume as necessitated by increases in regulatory rainfall/release rate standards. Both components will be accounted for by a proposed underground StormTech SC-740 chamber system, which will be constructed on the east side of the site beneath the new parking lot pavement.

MWRD volume control requirements state that a total storage volume equivalent to 1" of runoff from all proposed impervious areas (without abstraction) shall be provided in a retention-based practice. Based on the 0.799 acres of impervious area that will be created by the proposed improvements, the resulting volume control requirement is 2,900 CF (0.067 acre-ft) of storage. This volume will be provided by combining a 6"-deep layer of open-graded CA-7 aggregate beneath the proposed StormTech chamber system (between elevations 705.00 and 705.50) along with the lowest 15" of storage within the chamber itself below the detention outlet pipe (between elevations 705.50 and 706.75), for a total 21" depth of volume control storage. In accordance with MWRD requirements, the chamber system will be installed with 4"-diameter perforated underdrain, the invert of which will be set 12" above the bottom of the CA-7 aggregate at an invert elevation of 706.00. Per MWRD calculation methodologies, which note that any storage provided above the invert of the underdrain is only attributable towards volume control at a reduced 50% ratio, a total volume control storage of 3,128 CF (0.072 acre-ft) is provided in the system, thereby exceeding the requirement.

In addition to volume control, the development is required to provide additional detention storage as necessary to reflect the increase in rainfall/allowable release rate standards compared to the site's allocated existing volume which was provided in the Orland Square Mall regional detention basin. The Village's allowable release rate of 0.15 cfs/acre is more restrictive than both the pro-rated Legacy allowable release rate of 0.266 cfs/acre and the MWRD's present-day allowable release rate of 0.30 cfs/acre. Therefore, the Village's release rate of 0.15 cfs/acre will be used: for the 0.962-acre redevelopment area, the site's allowable release rate is thereby determined to be 0.144 cfs. The required detention storage for the redevelopment is therefore calculated by using the MWRD's Bulletin 75 modified rational method, which reflects present-day rainfall standards: utilizing the 0.962-acre detained area, runoff coefficient of 0.824, and allowable release rate of 0.144 cfs, a WMO-required detention volume of 0.358 acre-ft is determined. This represents the total detention volume required for the site, which can be reduced by the pro-rated existing volume provided for the site in the regional basin to determine the amount of additional required volume: at 0.189 acre-ft/acre, an existing storage volume of 0.182 acre-ft is already provided for the site, thereby resulting in a total additional required detention volume of 0.176 acre-ft. Between the proposed StormTech facility (designed to provide 0.171 acre-ft of storage volume) and new storm sewer pipes (designed to provide 0.005 acre-ft of storage volume), a total additional volume of 0.176 acre-ft is provided, thereby meeting the requirement.

Supporting stormwater exhibits and calculations are provided for reference in the Appendix, and a summary of the design requirements is listed below:

Portillo's Orland Park – Stormwater Management Summary

	Required	Provided
Volume Control	0.067 acre-ft	**0.072 acre-ft**
MWRD Legacy Detention Volume	0.154 acre-ft*	**0.182 acre-ft***
MWRD WMO Detention Volume	0.358 acre-ft	**0.358 acre-ft**
Additional Required Detention Volume	0.176 acre-ft	**0.176 acre-ft**

** Pro-rated from 227-acre regional basin service area, per Legacy permit.*

Stormwater runoff will be routed to the proposed StormTech facility via a network of new storm sewers. All proposed storm sewers have been designed to accommodate the peak 10-year runoff for their respective catchment areas via gravity conveyance (i.e., below the crown of the pipe) and the peak 100-year runoff via hydraulic grade line / pressurized flow (i.e., below the rim of the associated catch basin structures) without requiring surface ponding. The grate capacities of the catch basin structures have also been analyzed and found to have sufficient capacity to accommodate the peak 100-year inflow without surcharging off-site.

Lastly, the proposed development is required to comply with MWRD runoff control requirements, which state that the proposed stormwater management facility shall include a major stormwater system that can convey the peak 100-year design runoff rate for the development. This major conveyance system must be designed in accordance with the assumption that storm sewers are not available to convey flow and that the provided detention volume is similarly unavailable. For this redevelopment, the design runoff rate will be addressed based on the total upstream 1.26-acre area which is tributary to the proposed drainage system (including any upstream bypass areas which are not considered as part of 0.962-acre development area). Utilizing a 10-minute storm intensity of 10.80 inches per hour in accordance with Bulletin 75 rainfall data, the peak 100-year runoff rate is calculated to be 9.55 cfs. This runoff rate will be accommodated at the proposed ridge line in the new access driveway connection to the Orland Square Mall ring road. Utilizing the proposed driveway width of 28' and maximum flow depth of 6" (corresponding to the height of the curb), a total weir capacity of 26.61 cfs is determined, which significantly exceeds the peak design rate and therefore complies with MWRD runoff control requirements. The capacity of the existing 10"-diameter storm sewer which will serve as the discharge pipe from the proposed stormwater management facility to the existing Village public sewer in the Orland Square Mall ring road was also analyzed and found to have sufficient capacity (6.52 cfs, given an existing slope of 8.8%) to achieve the full 10-year peak runoff rate for the upstream tributary area (5.73 cfs utilizing a 10-minute storm intensity of 6.48 inches per hour), which is understood to be sufficient for the design of a minor conveyance system.

4.0 SUMMARY

In our professional opinion, the proposed improvements are in accordance with municipal stormwater management requirements of both the Village of Orland Park and MWRD. Should you have any questions regarding the proposed improvements, please do not hesitate to contact me via telephone at 847.849.7726 or at abruder@cagecivil.com.

Sincerely,
CAGE ENGINEERING, INC.

Aaron J. Bruder, PE
Director of Engineering – Illinois

MAPS

FEMA FIRM MAP

NATIONAL WETLANDS INVENTORY MAP

NRCS HYDROLOGIC SOILS GROUP MAP

NRCS SATURATED HYDRAULIC CONDUCTIVITY MAP

National Flood Hazard Layer FIRMette

FEMA

87°51'29"W 41°37'29"N

87°50'52"W 41°37'2"N

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

1:6,000

Basemap Imagery Source: USGS National Map 2023

Legend

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

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

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

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

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

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

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

N

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

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

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 2/22/2024 at 9:24 AM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

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

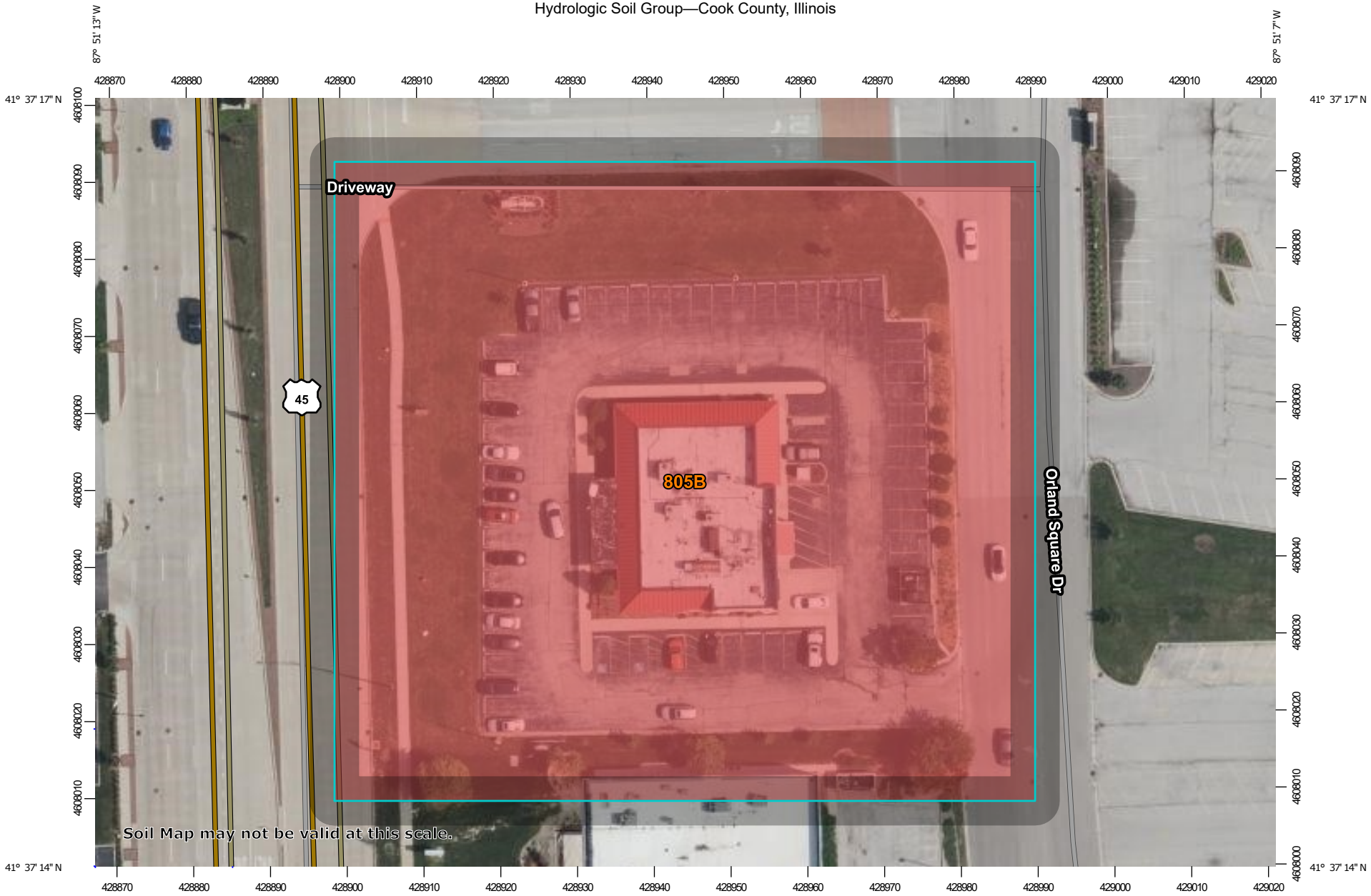
U.S. Fish and Wildlife Service
National Wetlands Inventory

Wetlands

February 22, 2024

Wetlands

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Other
- Riverine



Map Scale: 1:703 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 10 20 40 60

Feet
0 30 60 120 180

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 16N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Lines

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Points

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

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

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

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

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

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

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

Soil Survey Area: Cook County, Illinois
Survey Area Data: Version 17, Aug 28, 2023

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

Date(s) aerial images were photographed: Jul 7, 2020—Oct 13, 2020

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

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
805B	Orthents, clayey, undulating	D	1.9	100.0%
Totals for Area of Interest			**1.9**	**100.0%**

Description

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

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

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

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

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

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

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

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Saturated Hydraulic Conductivity (Ksat), Standard Classes—Cook County, Illinois

Map Scale: 1:703 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 10 20 40 60

Feet: 0 30 60 120 180

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 16N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils

Soil Rating Polygons
- Very Low (0.0 - 0.01)
- Low (0.01 - 0.1)
- Moderately Low (0.1 - 1)
- Moderately High (1 - 10)
- High (10 - 100)
- Very High (100 - 705)
- Not rated or not available

Soil Rating Lines
- Very Low (0.0 - 0.01)
- Low (0.01 - 0.1)
- Moderately Low (0.1 - 1)
- Moderately High (1 - 10)
- High (10 - 100)
- Very High (100 - 705)
- Not rated or not available

Soil Rating Points
- Very Low (0.0 - 0.01)
- Low (0.01 - 0.1)
- Moderately Low (0.1 - 1)
- Moderately High (1 - 10)
- High (10 - 100)
- Very High (100 - 705)
- Not rated or not available

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

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

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

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

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

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

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Date(s) aerial images were photographed: Jul 7, 2020—Oct 13, 2020

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

Saturated Hydraulic Conductivity (Ksat), Standard Classes

Map unit symbol	Map unit name	Rating (micrometers per second)	Acres in AOI	Percent of AOI
805B	Orthents, clayey, undulating	0.3376	1.9	100.0%
Totals for Area of Interest			**1.9**	**100.0%**

Description

Saturated hydraulic conductivity (Ksat) refers to the ease with which pores in a saturated soil transmit water. The estimates are expressed in terms of micrometers per second. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Saturated hydraulic conductivity is considered in the design of soil drainage systems and septic tank absorption fields.

For each soil layer, this attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

The numeric Ksat values have been grouped according to standard Ksat class limits. The classes are:

Very low: 0.00 to 0.01

Low: 0.01 to 0.1

Moderately low: 0.1 to 1.0

Moderately high: 1 to 10

High: 10 to 100

Very high: 100 to 705

Rating Options

Units of Measure: micrometers per second

Aggregation Method: Dominant Component

Component Percent Cutoff: None Specified

Tie-break Rule: Fastest

Interpret Nulls as Zero: No

Layer Options (Horizon Aggregation Method): All Layers (Weighted Average)

APPENDIX

LEGACY SPO PERMIT 1974-0488 EXCERPTS

DEVELOPMENT AREA EXHIBITS

STORMWATER MANAGEMENT CALCULATIONS

MSDGC Permit No. 74-488
IEPA Log No. _____

SCHEDULE D DETENTION

I. Project Information

Name of Project as shown on plans ORLAND PARK CENTER

Location Northeast corner of 151st and Route 45

II. Determination of Allowable Release Rate - Undeveloped Site: East Area

1.	Area of site	151.7	acres
2.	Average ground slope	.012	foot/foot
3.	Overland flow distance	3000	feet
4.	Overland flow time of concentration	60	minutes
5.	Average slope of channelized flow (See Note a)		foot/foot
6.	Channelized flow distance (See Note a)		feet
7.	Channelized flow time of concentration		minutes
8.	Total time of concentration (Line 4 + Line 7)	60	minutes
9.	Rainfall intensity for three-year storm	2.0	inches/hr.
10.	Runoff coefficient (Use c=0.15 as maximum, see Article 6-4b(2) of the MSDGC Manual),	.015	
11.	Allowable release rate, (line 1 x line 9 x line 10: Q=ciA)	46	cfs.

Note a: For flow in a well defined channel determine time of concentration from measured lengths, cross-sections and slopes and submit necessary calculations and drawings.

III. Determination of Reservoir Size - Developed Site:

12.	Impervious drainage area	111.25	acres
13.	Pervious drainage area	40.45	acres R.C
14.	Composite runoff coefficient (c)	0.75	
15.	Required reservoir capacity (attach calculations)	26.4	acre-feet

IV. Permissible Bypass Rate through Development Site from Upstream Area:

A. Determination of Bypass Rate:

16.	Total area upstream		acres
17.	Future/present impervious area (cross out inappropriate case)		acres
18.	Future/present pervious area (cross out inappropriate case)		acres
19.	Composite runoff coefficient(Must not be less than 0.35 per MSDGC Manual of Procedures Article 6-4b(3)		
20.	Design storm frequency for the upstream area (Design storm frequency shall be as determined by local ordinance; if no local requirement is established, use 5-yr. storm frequency.)		year
21.	Time of concentration for the upstream area at point of entry (upstream area to be considered as undeveloped) (By same method as line 8)		minutes
22.	Design storm intensity for above duration		inches/hour
23.	Permissible bypass rate (line 16 x line 19 x line 22)		cfs.

B. Determination of Required Size of Bypass System: Release

24.	Bypass system will be open channel/closed conduit (cross out inappropriate case),		
25.	Water cross-section area for discharge in line 23	33" dia	sq. ft.
26.	Wetted perimeter for area in line 25		feet
27.	Hydraulic radius (line 25 ÷ line 26)		feet
28.	Line 27 to the 2/3 power		
29.	Invert slope	0.0080	foot/foot
30.	Line 29 to the 1/2 power		
31.	Manning's roughness coefficient (n)	.013	
32.	Bypass capacity {(1.49 x line 25 x line 28 x line 30) ÷ (line 31)}	46	cfs.

Release $Q = \frac{1.49}{n} A R^{2/3} S^{1/2}$

JOSEPH A. SCHUDT, JR. 23865 REGISTERED PROFESSIONAL P.E. ENGINEER SEAL OF ILLINOIS

Engineering Firm Joseph A. Schudt & Associates

Signature _____ Date Corrected 7/22/74

(Name and Title)
Design Engineer

MSDGC Permit No. 74-488
IEPA Log No. _____

SCHEDULE D DETENTION

I. Project Information

Name of Project as shown on plans ORLAND PARK CENTE

Location Northeast corner of 151st and Route 45

II. Determination of Allowable Release Rate - Undeveloped Site: West Area

1.	Area of site	75.3	acres
2.	Average ground slope	.007	foot/foot
3.	Overland flow distance	3000	feet
4.	Overland flow time of concentration	90	minutes
5.	Average slope of channelized flow (See Note a)		foot/foot
6.	Channelized flow distance (See Note a)		feet
7.	Channelized flow time of concentration		minutes
8.	Total time of concentration (Line 4 + Line 7)	90	minutes
9.	Rainfall intensity for three-year storm	1.27	inches/hr.
10.	Runoff coefficient (Use c=0.15 as maximum, see Article 6-4b(2) of the MSDGC Manual)	0.15	
11.	Allowable release rate, (line 1 x line 9 x line 10: Q=ciA)	14.35	cfs.

Note a: For flow in a well defined channel determine time of concentration from measured lengths, cross-sections and slopes and submit necessary calculations and drawings.

III. Determination of Reservoir Size - Developed Site:

12.	Impervious drainage area	60.24	acres
13.	Pervious drainage area	15.06	acres RC
14.	Composite runoff coefficient (c)	0.80	
15.	Required reservoir capacity (attach calculations)	13.10	acre-feet

IV. Permissible Bypass Rate through Development Site from Upstream Area: None

A. Determination of Bypass Rate:

16.	Total area upstream		acres
17.	Future/present impervious area (cross out inappropriate case)		acres
18.	Future/present pervious area (cross out inappropriate case)		acres
19.	Composite runoff coefficient(Must not be less than 0.35 per MSDGC Manual of Procedures Article 6-4b(3)		
20.	Design storm frequency for the upstream area (Design storm frequency shall be as determined by local ordinance; if no local requirement is established, use 5-yr. storm frequency.)		year
21.	Time of concentration for the upstream area at point of entry (upstream area to be considered as undeveloped) (By same method as line 8)		minutes
22.	Design storm intensity for above duration		inches/hour
23.	Permissible bypass rate (line 16 x line 19 x line 22)		cfs.

B. Determination of Required Size of Bypass System: Release rate

24.	Bypass system will be open channel/closed conduit (cross out inappropriate case)	24" round	
25.	Water cross-section area for discharge in line 23	3.14	sq. ft.
26.	Wetted perimeter for area in line 25	6.25	feet
27.	Hydraulic radius (line 25 ÷ line 26)	0.50	feet
28.	Line 27 to the 2/3 power	0.63	
29.	Invert slope	.0034	foot/foot
30.	Line 29 to the 1/2 power	.06325	
31.	Manning's roughness coefficient (n)	.013	
32.	Bypass capacity [(1.49 x line 25 x line 28 x line 30) ÷ (line 31)]	13.5	cfs.

Release $Q = \frac{1.49}{n} A R^{2/3} S^{1/2}$

JOSEPH A. SCHUDT JR. 23865 REGISTERED PROFESSIONAL ENGINEER SEAL OF ILLINOIS

Engineering Firm _____

Signature _____ Date Corrected 7/22/74

(Name and Title)

MWRD LEGACY SPO PERMIT 74-488 EXCERPTS PROVIDED FOR REFERENCE ONLY

LOCAL SEWER SYSTEMS SECTION

DETENTION REVIEW SHEET

LEGACY BASIN DESIGN SERVICE AREA

LEGACY BASIN COMPOSITE RUNOFF COEFFICIENT

A. Project

Permit No. 74-488 Date Received 6-4-74

Name of Project Orland Park Center

Location Northeast corner of Route 45 and 151st Street Orland Park

B. Basic Information

1. Total Area 227.0 Acres 2. Impervious Area 171.5 Acres

3. Runoff Coefficient 0.77 4. Project is Residential ☐; Non-Residential ☒

5. Project is in flood plain area ..... ~~Yes~~/No

6. Building Connections are proposed under this permit ..... Yes/~~No~~

7. Detention is required for the project covered by this permit ..... Yes/~~No~~

8. Detention is provided under this permit ..... Yes/~~No~~

9. Detention data as submitted was adequate to complete review ..... ~~Yes~~/No
If not, date when adequate data was received 7-24-74

C. Non-Applicability

Detention requirements are not applicable for the reason(s) indicated:

1. Project is in combined sewer area ..... _____

2. Area of project is 5 acres or less ..... _____

3. Project is residential, area is less than 10 acres, and the runoff coefficient is less than 0.60 ..... _____

4. Project consists of an outlet sewer only and no connections are proposed. Special condition is placed on permit to preclude future connections unless detention requirements are met ..... _____

5. Buildings existing and currently served by septic system ..... _____

6. Although detention requirements do not apply, retention is provided. . . _____

Detention is based on MSD criteria ..... _____
Detention is based on criteria other than MSD ..... _____

D. Relation with Other Projects

1. Detention required for this project is provided by existing detention facilities ..... _____
Existing facilities are covered by Permit No. _____

2. Detention facilities provided under this permit are intended to serve future areas ..... _____
If so, future contributing area _____ acres.

3. Project covered by permit receives drainage from another area and the flow is bypassed ..... _____
If so, bypassed drainage area _____ acres.

MWRD LEGACY SPO PERMIT 74-488 EXCERPTS PROVIDED FOR REFERENCE ONLY

MSD Permit No. 74-488

4. Project covered by permit does not fall within detention requirements. There is a potential that other areas may be served by the facilities constructed under this permit and the total area so served may fall within the detention requirements. A special condition is placed on the permit to preclude this occurrence . . . . . _____

5. Project is served by facilities constructed under a previous permit issued with a condition that detention shall be provided when the total area served by the permit previously issued exceeds the area limitation of the ordinance. The addition of this project will result in a total area that exceeds the area limitations . . . . . _____

6. Project covered by permit does not fall within the detention requirements. There is no potential that other areas may be served by the facilities constructed under this permit . . . . . _____

a. The project is surrounded by developed areas which are served by other facilities . . . . . _____

b. Sewer covered by permit consists of building connection only that does not lend itself to future extension . . . . . _____

LEGACY BASIN PROVIDED VOLUME

LEGACY BASIN REQUIRED VOLUME

E. Design Summary

		MSD Requirements	Project Design
1.	Drainage area for which detention is provided under this permit	xxxxxxxxx	227.0 acre
2.	Detention requirements for area above	39.52 ac. ft.	42.9 ac. ft.
3.	Detention requirements for this project	39.52 ac. ft.	42.9 ac. ft.
4.	Release rate for area under (1) above	60.35 cfs	57.77 cfs
5.	Bypass rate; if any	_____ cfs	_____ cfs
6.	Total discharge	60.35 cfs	57.77 cfs

LEGACY BASIN ALLOWABLE RELEASE RATE

LEGACY BASIN ACTUAL RELEASE RATE

F. Method of Detention

1. Roof detention with roof restrictors [ ]

2. Detention on Ground [ ], Street [ ], Parking Lot [X]
Diameter of restrictor pipe used Outlet 24@0.34% inch Storage in storm sewers [X]

3. Detention Pond [X], Diameter of outlet pipe 33 inch, slope 0.80%

G. Other Comments

Detention is also being provided in parking lots & storm sewer pipes

There are two (2) outlet pipes from the project. One discharging directly from the pond (a 33" dia. storm sewer) and another discharging from the southwest corner of property (a 24' dia. storm sewer) Bolted down water-tight cover is required on storm manhole as per special condition No. 5.

Reviewed: RC jr Date: 8-2-74. Checked: JLS Date: 8/2/74

CC: Talhami, Griesbach, Jendzio, Kudrna

LSS-72-09-01

East Area Composite C Calculation

	C	Area	Ac
Center	0.8	78.3	62.64
Future Multi	0.6	39.0	22.4
Future Comm.	0.8	28.0	22.4
Lake	1.0	6.4	6.4
		151.7	113.84

Composite 0.75

Composite C for entire Development

West Area	0.80	75.3	60.24
East Area	0.75	151.7	113.78
		227.0	174.02

C overall = 0.77

DETERMINATION OF REQUIRED DETENTION

DATA: Tributary area - 227 acres, composite C (for developed area) equals 0.77.

Duration (hrs.)	Time (min)	100-yrStorm (in/hr.)	Inflow Rate (cfs)	Stored Rate (cfs)	Reservoir Size (acre-ft)	
0.17	10	7.60	1328.40	1268.40	6.1	
0.33	20	5.50	961.35	901.35	8.5	
0.50	30	4.40	769.08	709.08	10.1	
0.67	40	3.70	646.72	586.72	11.9	
0.83	50	3.20	559.33	499.33	11.9	
1.0	60	2.80	489.41	429.41	35.78	
1.5	90	2.10	367.06	307.06	38.38	
2.0	120	1.70	297.14	237.14	39.52	MAX
3.0	180	1.20	209.75	149.75	37.44	
4.0	240	1.00	174.79	114.79	38.26	
5.0	300	0.84	146.82	86.82	36.18	

RETENTION PROVIDED

Lake
5' rise @ 7.5 ac at mid point — Storage (sc. ft.) 37.5

STORM SEWER

Size	Length	Area	Storage (cu.ft.)
12	810	.785	636
15	3380	1.23	4157
18	2180	1.77	3859
21	2080	2.40	4992
24	530	3.14	1664
27	1000	3.98	3980
30	1750	4.90	8575
36	840	7.07	5939
42	700	9.62	6734
48	1000	12.57	12570
54	540	15.95	8613
60	470	19.64	9231
66	170	23.76	4039
72	1280	28.26	36173

Manhole average 10' deep Min. size 48" 125.6 each 13,439 cu.ft. 2

Onsite Ponding area

1. West strip - south end
   Depth 1.5
   Area 1.34 acres
   V = 1.34/3 X 1.5 = 0.67 ac.ft.

   Center strip
   Depth 0.8
   Area 1.61 acres
   V = 1.61/3 X .8 = 0.43 ac.ft.

2. Upper North level
   Depth 2.0
   Area 2.07 acres.
   V = 2.07/x X 2 = 1.38 ac.ft.

Total Storage

Lake	37.5 ac.ft.
Sewers & M.H.	2.9 ac.ft.
Local ponding	2.5 ac.ft.
Total	42.9 ac.ft.

RETENTION PROVIDED

Lake
5' rise @ 7.5 ac at mid point

Storage
(sc. ft.) 37.5

STORM SEWER

Size	Length	Area	Storage (cu.ft.)
12	810	.785	636
15	3380	1.23	4157
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   Depth 2.0
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East Area Composite C Calculation

	C	Area	Ac
Center	0.8	78.3	62.64
Future Multi	0.6	39.0	22.4
Future Comm.	0.8	28.0	22.4
Lake	1.0	6.4	6.4
		151.7	113.84

Composite 0.75

Composite C for entire Development

West Area	0.80	75.3	60.24
East Area	0.75	151.7	113.78
		227.0	174.02

C overall = 0.77

RETENTION PROVIDED

Lake
5' rise @ 7.5 ac at mid point — Storage (sc. ft.) 37.5

STORM SEWER

Size	Length	Area	Storage (cu.ft.)
12	810	.785	636
15	3380	1.23	4157
18	2180	1.77	3859
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42	700	9.62	6734
48	1000	12.57	12570
54	540	15.95	8613
60	470	19.64	9231
66	170	23.76	4039
72	1280	28.26	36173

Manhole average 10' deep Min. size 48" 125.6 each 13,439 cu.ft. 2.86

Onsite Ponding area

1. West strip - south end
   Depth 1.5
   Area 1.34 acres
   V = 1.34/3 X 1.5 = 0.67 ac.ft.

   Center strip
   Depth 0.8
   Area 1.61 acres
   V = 1.61/3 X .8 = 0.43 ac.ft.

2. Upper North level
   Depth 2.0
   Area 2.07 acres.
   V = 2.07/x X 2 = 1.38 ac.ft.

Total Storage

Lake	37.5 ac.ft.
Sewers & M.H.	2.9 ac.ft.
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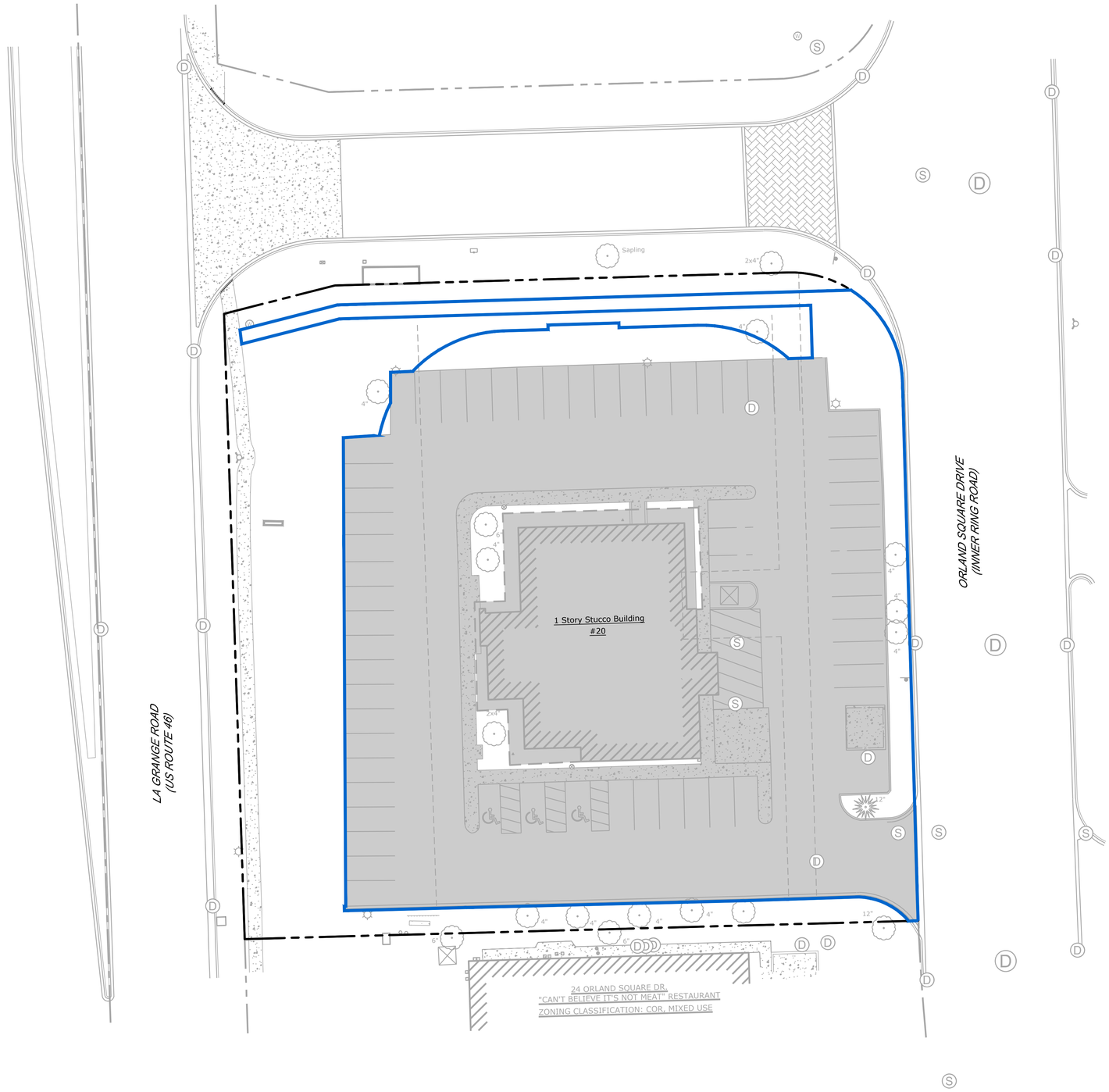
Total	42.9 ac.ft.



LEGEND

CONTIGUOUS OWNERSHIP AREA
55,768 SF (1.280 AC)

DEVELOPMENT AREA
41,921 SF (0.962 AC)

EXISTING IMPERVIOUS AREA
35,965 SF (0.825 AC)

EXISTING SITE IS DETAINED FOR IN REGIONAL DETENTION FACILITY AS PER MWRD LEGACY SPO PERMIT 1974-0488

LEGACY BASIN DESIGN SERVICE AREA	= 227 ACRES
COMPOSITE RUNOFF COEFFICIENT	= 0.77
LEGACY ALLOWABLE RELEASE RATE	= 60.35 CFS 0.266 CFS/AC
LEGACY ACTUAL RELEASE RATE	= 57.77 CFS 0.254 CFS/AC
LEGACY REQUIRED VOLUME	= 39.52 AC-FT 0.174 AC-FT/AC
LEGACY PROVIDED VOLUME	= 42.9 AC-FT 0.189 AC-FT/AC

0 20' 40'
1" = 20' (HORIZONTAL)

2200 CABOT DRIVE
SUITE 325
LISLE, IL 60532
P: 630.396.0007
WWW.CAGECIVIL.COM

CAGE CIVIL ENGINEERING

REVISIONS

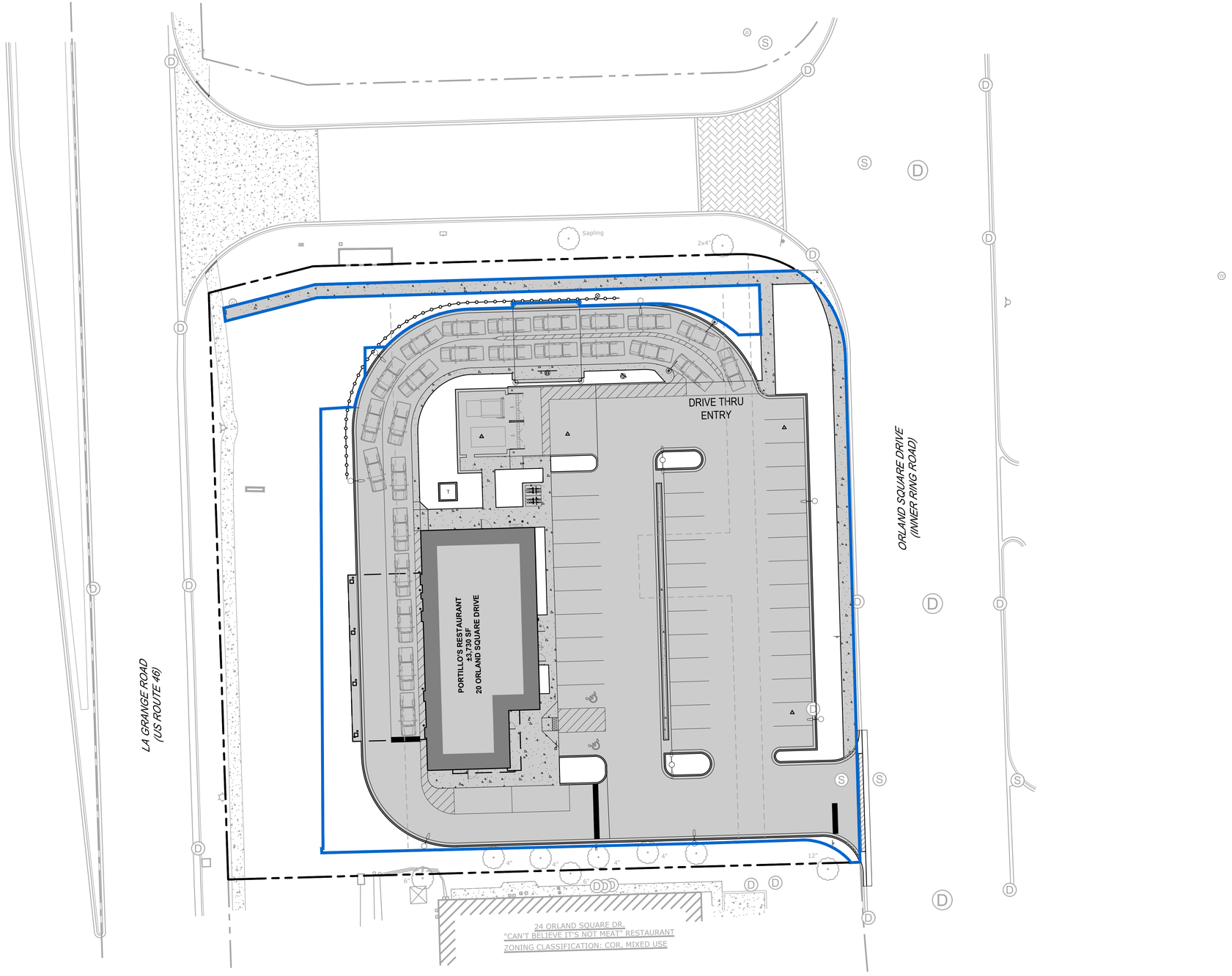
05/08/2024
ISSUE FOR PERMIT

PORTILLO'S HOT DOGS
PORTILLO'S - ORLAND PARK
20 ORLAND SQUARE DR.
ORLAND PARK, IL 60462

PROJ NO. 230210
ENG : SJS
DATE : 02/23/2024

SHEET TITLE
EXISTING CONDITIONS DEVELOPMENT AREA EXHIBIT

SHEET NUMBER
EX-E



LEGEND

CONTIGUOUS OWNERSHIP AREA
55,768 SF (1.280 AC)

DEVELOPMENT AREA
41,921 SF (0.962 AC)

PROPOSED IMPERVIOUS AREA
34,795 SF (0.799 AC)
NET CHANGE = 1,170 SF REDUCTION

EXISTING SITE IS DETAINED FOR IN REGIONAL DETENTION FACILITY AS PER MWRD LEGACY SPO PERMIT 1974-0488

LEGACY BASIN DESIGN SERVICE AREA	= 227 ACRES
COMPOSITE RUNOFF COEFFICIENT	= 0.77
LEGACY ALLOWABLE RELEASE RATE	= 60.35 CFS 0.266 CFS/AC
LEGACY ACTUAL RELEASE RATE	= 57.77 CFS 0.254 CFS/AC
LEGACY REQUIRED VOLUME	= 39.52 AC-FT
LEGACY PROVIDED VOLUME	= 42.9 AC-FT 0.189 AC-FT/AC

REDEVELOPMENT STORMWATER DESIGN PARAMETERS:

REDEVELOPMENT AREA	= 0.962 ACRES
REDEVEL. RUNOFF COEFFICIENT	= 0.824
REDEVEL. IMPERVIOUS AREA	= 0.799 AC
REQUIRED VOLUME CONTROL	= 0.067 AC-FT 2,900 CF
PROVIDED VOLUME CONTROL	= 0.072 AC-FT 3,128 CF
VILLAGE ALLOWABLE RELEASE	= 0.15 CFS/ACRE
(LESS THAN LEGACY ALLOWABLE; USE 0.15 CFS/ACRE)	
REDEVEL. ALLOWABLE RELEASE RATE	= 0.15 CFS/ACRE 0.144 CFS
REQUIRED DETENTION AT ALLOWABLE	= 0.358 AC-FT
(MWRD BULLETIN 75 MODIFIED RATIONAL METHOD)	
PRO-RATED EXISTING DETENTION	= 0.189 AC-FT/AC 0.182 AC-FT
TOTAL ADDITIONAL STORAGE REQ'D	= 0.176 AC-FT
TOTAL ADDITIONAL STORAGE PROV'D	= 0.176 AC-FT*

*(*INCLUDING 0.005 AC-FT OF SEWER PIPE STORAGE AND 0.072 AC-FT OF VOLUME CONTROL STORAGE)*

0 20' 40 '
1" = 20' (HORIZONTAL)

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PROJ NO: 230210
ENG : SJS
DATE : 02/23/2024

SHEET TITLE
PROPOSED CONDITIONS DEVELOPMENT AREA EXHIBIT

SHEET NUMBER
EX-P
2 OF 2

COMPOSITE RUNOFF COEFFICIENT (*C*)

PROJECT: **Portillo's - Orland Park** **PERMIT NUMBER:**

LOCATION: **20 Orland Square Dr. Orland Park, IL** **DATE:** **5/8/2024**

TYPE OF AREA (SELECT WITH DROP-DOWN)

- **X** DETAINED AREA
- ___ UNRESTRICTED AREA
- ___ UPSTREAM AREA
- ___ MAJOR STORMWATER SYSTEM
- ___ OTHER: ___

CONDITION (SELECT WITH DROP-DOWN)

- ___ PROPOSED CONDITION
- **X** EXISTING CONDITION

RUNOFF COEFFICIENT

Surface Description	C	Area (acres)	Product (C)(Area)
Impervious Areas	0.90	0.83	0.74
Pervious Areas	0.45	0.14	0.06
TOTALS:		0.96	0.80

COMPOSITE RUNOFF COEFFICIENT

$$\text{Composite C} = \frac{\text{Total Product}}{\text{Total Area}} = \frac{0.80}{0.96} \rightarrow \text{Composite C} = \mathbf{0.84}$$

COMPOSITE RUNOFF CURVE NUMBER (*CN*)

PROJECT: **Portillo's - Orland Park** **PERMIT NUMBER:**

LOCATION: **20 Orland Square Dr. Orland Park, IL** **DATE:** **5/8/2024**

TYPE OF AREA (SELECT WITH DROP-DOWN)

X DETAINED AREA

___ UNRESTRICTED AREA

___ UPSTREAM AREA

___ MAJOR STORMWATER SYSTEM

___ OTHER:

CONDITION (SELECT WITH DROP-DOWN)

___ PROPOSED CONDITION

X EXISTING CONDITION

RUNOFF CURVE NUMBER

Surface Description	Hydrologic Soil Group (HSG)	CN	Area (acres)	Product (CN)(Area)
Impervious Areas	D	98	0.83	80.85
Pervious Areas	D	80	0.14	10.96
TOTALS:			0.96	91.81

COMPOSITE RUNOFF CURVE NUMBER

$$\text{Composite CN} = \frac{\text{Total Product}}{\text{Total Area}} = \frac{91.81}{0.96} \rightarrow \textbf{Composite CN} = \textbf{95.44}$$

COMPOSITE RUNOFF COEFFICIENT (*C*)

PROJECT: **Portillo's - Orland Park** **PERMIT NUMBER:**

LOCATION: **20 Orland Square Dr. Orland Park, IL** **DATE:** **5/8/2024**

TYPE OF AREA (SELECT WITH DROP-DOWN)

X DETAINED AREA

___ UNRESTRICTED AREA

___ UPSTREAM AREA

___ MAJOR STORMWATER SYSTEM

___ OTHER:

CONDITION (SELECT WITH DROP-DOWN)

X PROPOSED CONDITION

___ EXISTING CONDITION

RUNOFF COEFFICIENT

Surface Description	C	Area (acres)	Product (C)(Area)
Impervious Areas	0.90	0.80	0.72
Pervious Areas	0.45	0.16	0.07
TOTALS:		0.96	0.79

COMPOSITE RUNOFF COEFFICIENT

$$\text{Composite C} = \frac{\text{Total Product}}{\text{Total Area}} = \frac{0.79}{0.96} \rightarrow \text{Composite C} = \mathbf{0.82}$$

COMPOSITE RUNOFF CURVE NUMBER (*CN*)

PROJECT: **Portillo's - Orland Park** **PERMIT NUMBER:**

LOCATION: **20 Orland Square Dr. Orland Park, IL** **DATE:** **5/8/2024**

TYPE OF AREA (SELECT WITH DROP-DOWN)

X DETAINED AREA

___ UNRESTRICTED AREA

___ UPSTREAM AREA

___ MAJOR STORMWATER SYSTEM

___ OTHER:

CONDITION (SELECT WITH DROP-DOWN)

X PROPOSED CONDITION

___ EXISTING CONDITION

RUNOFF CURVE NUMBER

Surface Description	Hydrologic Soil Group (HSG)	CN	Area (acres)	Product (CN)(Area)
Impervious Areas	D	98	0.80	78.28
Pervious Areas	D	80	0.16	13.09
TOTALS:			0.96	91.37

COMPOSITE RUNOFF CURVE NUMBER

$$\text{Composite CN} = \frac{\text{Total Product}}{\text{Total Area}} = \frac{91.37}{0.96} \rightarrow \textbf{Composite CN} = \textbf{94.94}$$

MODIFIED RATIONAL METHOD: BULLETIN 75 RAINFALL DATA

PROJECT: Portillo's - Orland Park **PERMIT NUMBER:**

LOCATION: 20 Orland Square Dr. Orland Park, IL **DATE:** 5/8/2024

DEVELOPMENT INFORMTION

1.	Detained Area	0.962	acres
2.	Composite Runoff Coefficient	0.824	
3.	Actual Release Rate	0.144	cfs

REQUIRED DETENTION VOLUME

4.	Required Detention Volume	**0.358**	ac-ft

CALCULATION TABLE

Storm Duration	Rainfall Intensity (in/hr)	Inflow Rate (cfs)	Stored Rate (cfs)	Required Storage (ac-ft)	
5 min	12.36	9.80	9.65	0.066	
10 min	10.80	8.56	8.41	0.116	
15 min	9.28	7.35	7.21	0.149	
20 min	8.04	6.37	6.23	0.172	
30 min	6.34	5.02	4.88	0.202	
40 min	5.28	4.18	4.04	0.223	
50 min	4.55	3.61	3.46	0.238	
1 hr	4.03	3.19	3.05	0.252	
1.5 hr	3.03	2.40	2.26	0.280	
2 hr	2.49	1.97	1.83	0.302	
3 hr	1.83	1.45	1.31	0.324	
4 hr	1.48	1.17	1.03	0.340	
5 hr	1.25	0.99	0.85	0.350	
6 hr	1.07	0.85	0.70	0.349	
7 hr	0.96	0.76	0.62	0.357	
8 hr	0.86	0.68	0.54	0.355	
9 hr	0.79	0.63	0.48	0.358	←
10 hr	0.72	0.57	0.43	0.352	
11 hr	0.67	0.53	0.39	0.351	
12 hr	0.62	0.49	0.35	0.345	
18 hr	0.45	0.35	0.21	0.313	
24 hr	0.36	0.28	0.14	0.275	

Project: **Portillo's Orland Park**

Chamber Model -	SC-740	
Units -	Imperial	
Number of Chambers -	90	
Voids in the stone (porosity) -	36	%
Bottom of stone elevation -	705.00	ft
Amount of Stone Above Chambers -	6	in
Amount of Stone Below Chambers -	6	in
Area of system -	3,801	sf

Provided Volume Control =	**3,128**	**cf**
	0.072	**ac-ft**
Total Storage Provided =	**7,436**	**cf**
	0.171	**ac-ft**

StormTech SC-740 Cumulative Storage Volumes

Height of System *(inches)*	Incremental Single Chamber *(cubic feet)*	Incremental Total Chamber *(cubic feet)*	Incremental Stone *(cubic feet)*	Incremental Ch & St *(cubic feet)*	Cumulative System *(cubic feet)*	VC Ratio *(%)*	Incremental VC Storage *(cubic feet)*	Cumulative VC Storage *(cubic feet)*	Elevation *(feet)*	
42	***0.00***	***0.00***	***114.03***	***114.03***	***7436.03***	0%	***0.00***	***3128.23***	***708.50***	***System HWL***
41	0.00	0.00	114.03	114.03	7322.00	0%	0.00	3128.23	708.42	
40	0.00	0.00	114.03	114.03	7207.97	0%	0.00	3128.23	708.33	
39	0.00	0.00	114.03	114.03	7093.94	0%	0.00	3128.23	708.25	
38	0.00	0.00	114.03	114.03	6979.91	0%	0.00	3128.23	708.17	
37	0.00	0.00	114.03	114.03	6865.88	0%	0.00	3128.23	708.08	
36	0.05	4.95	112.25	117.20	6751.85	0%	0.00	3128.23	708.00	
35	0.16	14.66	108.75	123.41	6634.65	0%	0.00	3128.23	707.92	
34	0.28	25.37	104.90	130.27	6511.24	0%	0.00	3128.23	707.83	
33	0.60	54.36	94.46	148.82	6380.97	0%	0.00	3128.23	707.75	
32	0.80	72.15	88.05	160.21	6232.15	0%	0.00	3128.23	707.67	
31	0.95	85.56	83.23	168.79	6071.94	0%	0.00	3128.23	707.58	
30	1.07	96.71	79.22	175.92	5903.15	0%	0.00	3128.23	707.50	
29	1.18	106.24	75.78	182.03	5727.23	0%	0.00	3128.23	707.42	
28	1.27	113.91	73.02	186.93	5545.20	0%	0.00	3128.23	707.33	
27	1.36	121.95	70.13	192.08	5358.27	0%	0.00	3128.23	707.25	
26	1.45	130.87	66.92	197.79	5166.19	0%	0.00	3128.23	707.17	
25	1.52	137.23	64.63	201.85	4968.41	0%	0.00	3128.23	707.08	
24	1.58	142.41	62.76	205.17	4766.55	0%	0.00	3128.23	707.00	
23	1.64	147.81	60.82	208.63	4561.38	0%	0.00	3128.23	706.92	
22	1.70	152.96	58.97	211.92	4352.75	0%	0.00	3128.23	706.83	
21	***1.75***	***157.76***	***57.24***	***215.00***	***4140.83***	***50%***	***107.50***	***3128.23***	***706.75***	***Detention Outlet***
20	1.80	162.25	55.62	217.87	3925.83	50%	108.94	3020.73	706.67	
19	1.85	166.95	53.93	220.88	3707.96	50%	110.44	2911.79	706.58	
18	1.89	170.38	52.69	223.07	3487.08	50%	111.54	2801.35	706.50	
17	1.93	174.06	51.37	225.43	3264.01	50%	112.71	2689.82	706.42	
16	1.97	177.75	50.04	227.79	3038.58	50%	113.89	2577.10	706.33	
15	2.01	180.89	48.91	229.80	2810.79	50%	114.90	2463.21	706.25	
14	2.04	184.05	47.77	231.82	2580.99	50%	115.91	2348.31	706.17	
13	2.07	186.75	46.80	233.55	2349.17	50%	116.77	2232.40	706.08	
12	***2.10***	***189.44***	***45.83***	***235.27***	***2115.62***	***100%***	***235.27***	***2115.62***	***706.00***	***Underdrain Inv.***
11	2.13	191.86	44.96	236.82	1880.35	100%	236.82	1880.35	705.92	
10	2.15	193.85	44.25	238.09	1643.53	100%	238.09	1643.53	705.83	
9	2.18	195.94	43.49	239.43	1405.44	100%	239.43	1405.44	705.75	
8	2.20	197.85	42.80	240.66	1166.01	100%	240.66	1166.01	705.67	
7	2.21	198.66	42.51	241.17	925.35	100%	241.17	925.35	705.58	
6	0.00	0.00	114.03	114.03	684.18	100%	114.03	684.18	705.50	
5	0.00	0.00	114.03	114.03	570.15	100%	114.03	570.15	705.42	
4	0.00	0.00	114.03	114.03	456.12	100%	114.03	456.12	705.33	
3	0.00	0.00	114.03	114.03	342.09	100%	114.03	342.09	705.25	
2	0.00	0.00	114.03	114.03	228.06	100%	114.03	228.06	705.17	
1	0.00	0.00	114.03	114.03	114.03	100%	114.03	114.03	705.08	

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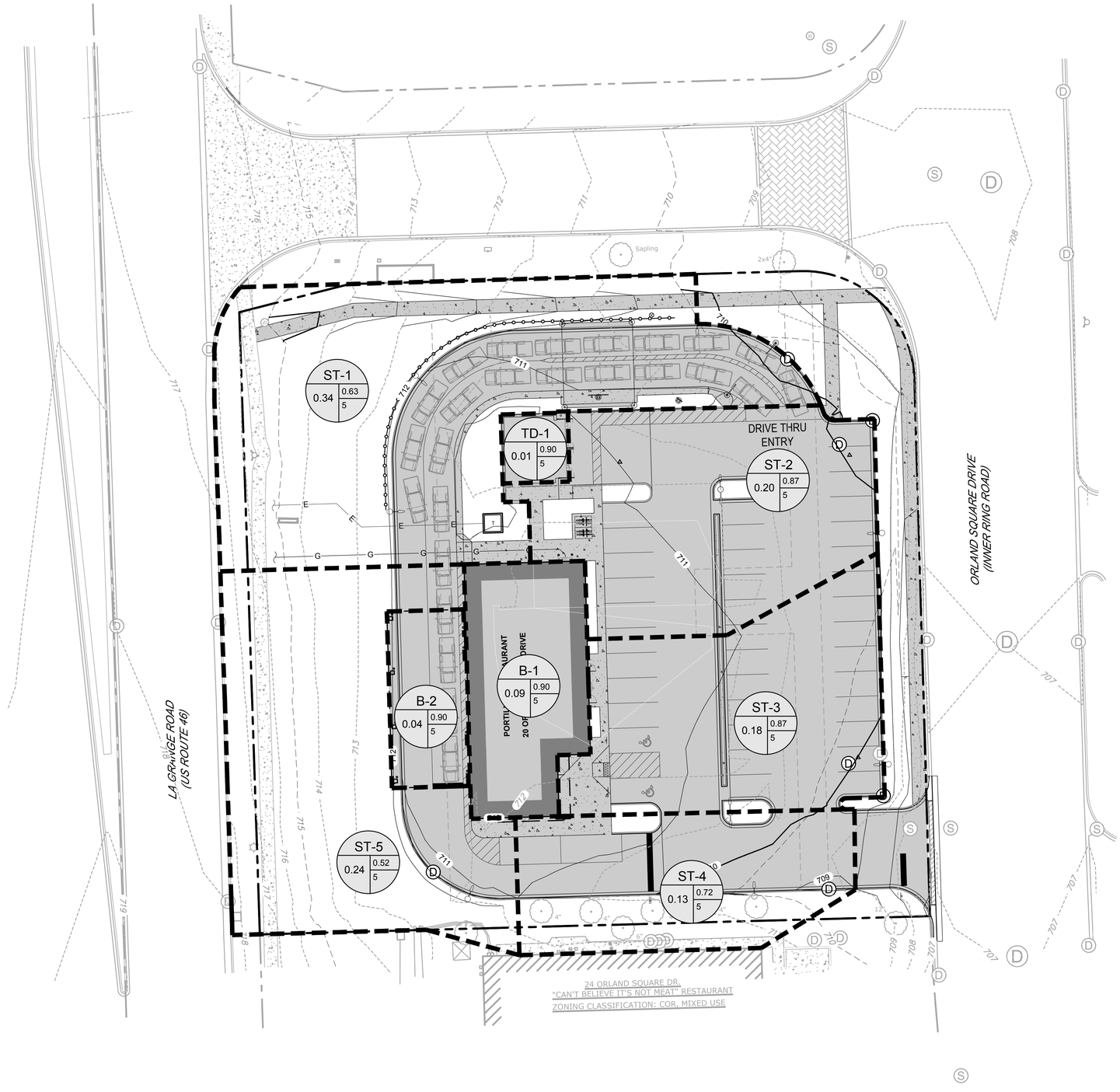
STORM SEWER PIPE STORAGE VOLUME CALCULATIONS

Portillo's Pick-Up 5/8/2024
Orland Park, IL
SJS

UNDERGROUND SEWER PIPE STORAGE

Upstream Storm Structure	Downstream Storm Structure	Sewer Length (ft.)	Sewer Pipe Dia. (inches)	Sewer Pipe Material	Sewer Slope (%)	Sewer Pipe Area (sq. ft.)	Increm. Volume (cu ft.)	Increm. Volume (ac-ft)	Total Volume (ac-ft)
ST-1	ST-6	36	10	HDPE	1.00%	0.55	20	0.0005	0.0005
ST-2	ST-6	15	8	HDPE	1.00%	0.35	5	0.0001	0.0006
ST-5	ST-4	142	10	HDPE	0.75%	0.55	77	0.0018	0.0023
ST-4	ST-7	46	10	HDPE	0.87%	0.55	25	0.0006	0.0029
ST-3	ST-7	17	10	HDPE	1.00%	0.55	9	0.0002	0.0031
B-2	ST-5	36	4	HDPE	2.00%	0.09	3	0.0001	0.0032
B-1	StormTech	67	6	HDPE	3.50%	0.20	13	0.0003	0.0035
TD-1	ST-1	84	6	HDPE	1.76%	0.20	16	0.0004	0.0039
ST-7	StormTech	2	12	HDPE	1.00%	0.79	2	0.0000	0.0039
ST-6	StormTech	2	12	HDPE	1.00%	0.79	2	0.0000	0.0040
Manifold-N	StormTech	39	8	HDPE	0.00%	0.35	14	0.0003	0.0043
Manifold-S	StormTech	39	8	HDPE	0.00%	0.35	14	0.0003	0.0046

Provided Storm Sewer Detention Volume =	**0.005**	**ac-ft**
Provided StormTech Detention Volume =	**0.171**	**ac-ft**
TOTAL PROVIDED DETENTION VOLUME =	**0.176**	**ac-ft**



LEGEND

- CA-X / 2.25 / 0.88 / 10 — CATCHMENT AREA DESIGNATION; RUNOFF COEFFICIENT; TIME OF CONCENTRATION (MINUTES); AREA (ACRES)
- CATCHMENT AREA LIMITS
- CONTIGUOUS OWNERSHIP AREA 55,768 SF (1.280 AC)
- PROPOSED IMPERVIOUS AREA 34,795 SF (0.799 AC)

0 20' 40'
1" = 20' (HORIZONTAL)

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CAGE CIVIL ENGINEERING

REVISIONS △

05/08/2024
ISSUE FOR PERMIT

PORTILLO'S HOT DOGS
PORTILLO'S - ORLAND PARK
20 ORLAND SQUARE DR.
ORLAND PARK, IL 60462

PROJ NO: 230210
ENG : SJS
DATE : 02/23/2024

SHEET TITLE
CATCHMENT AREA EXHIBIT

SHEET NUMBER
EX-C
1 OF 1

Grate Capacity Calculations

Portillo's - Orland Park
20 Orland Square Dr
SJS/AJB

05/08/24

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$C_{impervious}$ = 0.90
$C_{pervious}$ = 0.45

Design Storm = 100-Year

Structure	Drainage Area			Runoff Coeff. C	Tc To Struc. (min.)	Rainfall Intensity i (in/hr)	Total Runoff (Q) (cfs)	Grate		Grate Open Area (SF)	Wetted Perimeter (ft)	Provided Head (ft)	Actual Inflow (cfs)
	Increment (acres)	Impervious (acres)	Pervious (acres)					Type	Neenah #				
ST-1	0.34	0.14	0.21	0.63	5.00	12.36	2.68	**Curb**	**R-3281-A**	1.00	4.30	0.40	2.65
ST-2	0.20	0.18	0.01	0.87	5.00	12.36	2.09	**Curb**	**R-3281-A**	1.00	4.30	0.36	2.38
ST-5	0.24	0.04	0.20	0.52	5.00	12.36	1.54	**Curb**	**R-3281-A**	1.00	4.30	0.25	1.77
ST-4	0.13	0.08	0.05	0.72	5.00	12.36	1.16	**Curb**	**R-3281-A**	1.00	4.30	0.25	1.77
ST-3	0.18	0.17	0.01	0.87	5.00	12.36	1.90	**Curb**	**R-3281-A**	1.00	4.30	0.46	3.27

Storm Sewer Conveyance Calculations

Portillo's - Orland Park 05/08/24
20 Orland Square Dr
SJS/AJB

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$C_{impervious}$ = 0.90 Manning's Roughness Coeff: = 0.013
$C_{pervious}$ = 0.45 Design Storm = 10-Year

Structure			Drainage Area			Runoff	Area X C		Tc		Rainfall	Total	Design	Design	Q_{design}	% of	Velocity	
From	To	Length (ft)	Increment (acres)	Impervious (acres)	Pervious (acres)	Coeff. C	Incr.	Total	To Struc. (min.)	Section (min.)	Intensity i (in/hr)	Runoff (Q) (cfs)	Pipe Dia. (in)	Slope (ft/100ft)	Capacity (cfs)	**Capacity (%)**	Full (ft/sec)	Design (ft/sec)
ST-1	**ST-6**	36	0.34	0.14	0.21	0.63	0.22	0.23	5.37	0.14	7.37	1.69	**10**	**0.94**	2.13	**79.2%**	3.91	4.30
ST-2	**ST-6**	15	0.20	0.18	0.01	0.87	0.17	0.17	5.00	0.06	7.44	1.26	**8**	**1.13**	1.29	**97.5%**	3.69	4.21
ST-5	**ST-4**	142	0.24	0.04	0.20	0.52	0.12	0.16	5.13	0.76	7.42	1.20	**10**	**0.50**	1.55	**77.1%**	2.85	3.13
ST-4	**ST-7**	46	0.13	0.08	0.05	0.72	0.09	0.26	5.89	0.19	7.27	1.86	**10**	**0.75**	1.90	**97.5%**	3.49	3.98
ST-3	**ST-7**	17	0.18	0.17	0.01	0.87	0.15	0.15	5.00	0.08	7.44	1.15	**10**	**0.60**	1.70	**67.4%**	3.12	3.43
B-2	**ST-5**	36	0.04	0.04	0.00	0.90	0.04	0.04	5.00	0.13	7.44	0.27	**4**	**3.70**	0.37	**74.5%**	4.21	4.63
B-1	**StormTech**	67	0.09	0.09	0.00	0.90	0.08	0.08	5.00	0.20	7.44	0.57	**6**	**3.24**	1.01	**56.7%**	5.16	5.47
TD-1	**ST-1**	84	0.01	0.01	0.00	0.90	0.01	0.01	5.00	0.37	7.44	0.09	**6**	**3.32**	1.03	**9.0%**	5.22	3.81
ST-7	**StormTech**	2	0.00	0.00	0.00	0.45	0.00	0.41	6.08	0.01	7.23	2.96	**12**	**1.00**	3.57	**82.9%**	4.55	5.19
ST-6	**StormTech**	2	0.00	0.00	0.00	0.45	0.00	0.40	5.51	0.01	7.34	2.92	**12**	**1.00**	3.57	**81.7%**	4.55	5.19

$$\text{HGL Slope} = \frac{Q^2 * n^2}{2.22 * R^{4/3} * A^2}$$

$$Q_{full} = \frac{1.49 * R^{2/3} * S^{1/2} * A}{n}$$

Storm Sewer Hydraulic Grade Line Calculations

Portillo's - Orland Park
20 Orland Square Dr
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05/08/24

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$C_{impervious}$ = 0.90 Manning's Roughness Coeff: = 0.013
$C_{pervious}$ = 0.45 Design Storm = 100-Year

Structure			Drainage Area			Runoff	Area X C		Tc		Rainfall	Total	Design	Design	Q_{design}	**% of**	Velocity		HGL	Total	Upstream	Downstream	Upstream
From	To	Length (ft)	Increment (acres)	Impervious (acres)	Pervious (acres)	Coeff. C	Incr.	Total	To Struc. (min.)	Section (min.)	Intensity i (in/hr)	Runoff (Q) (cfs)	Pipe Dia. (in)	Slope (ft/100ft)	Capacity (cfs)	**Capacity (%)**	Full (ft/sec)	Design (ft/sec)	Slope (%)	Loss (ft)	Rim Elev. (ft)	Inv Elev. (ft)	HGL (elev)
ST-1	**ST-6**	36	0.34	0.00	0.34	0.45	0.15	0.16	5.37	0.13	12.25	1.97	**10**	**0.94**	2.13	**92.6%**	3.91	4.45	0.0081	0.29	709.78	705.62	**708.80**
ST-2	**ST-6**	15	0.20	0.00	0.20	0.45	0.09	0.09	5.00	0.06	12.36	1.08	**8**	**1.13**	1.29	**84.2%**	3.69	4.21	0.0080	0.12	709.82	705.62	**708.63**
ST-5	**ST-4**	142	0.24	0.00	0.24	0.45	0.11	0.13	5.13	0.73	12.32	1.55	**10**	**0.50**	1.55	**100.1%**	2.85	3.25	0.0050	0.71	710.75	705.96	**709.70**
ST-4	**ST-7**	46	0.13	0.00	0.13	0.45	0.06	0.18	5.89	0.19	12.08	2.23	**10**	**0.75**	1.90	**117.2%**	3.49	3.98	0.0103	0.47	710.32	705.62	**708.99**
ST-3	**ST-7**	17	0.18	0.00	0.18	0.45	0.08	0.08	5.00	0.09	12.36	0.98	**10**	**0.60**	1.70	**57.6%**	3.12	3.31	0.0020	0.03	709.15	705.62	**708.55**
B-2	**ST-5**	36	0.04	0.00	0.04	0.45	0.02	0.02	5.00	0.13	12.36	0.23	**4**	**3.70**	0.37	**61.9%**	4.21	4.46	0.0142	0.51	712.00	706.67	**710.21**
B-1	**StormTech**	67	0.09	0.00	0.09	0.45	0.04	0.04	5.00	0.22	12.36	0.48	**6**	**3.24**	1.01	**47.1%**	5.16	5.11	0.0072	0.48	712.00	705.83	**708.98**
TD-1	**ST-1**	84	0.01	0.00	0.01	0.45	0.01	0.01	5.00	0.37	12.36	0.08	**6**	**3.32**	1.03	**7.5%**	5.22	3.81	0.0002	0.02	711.02	705.96	**708.82**
ST-7	**StormTech**	2	0.00	0.00	0.00	0.45	0.00	0.26	6.08	0.01	12.02	3.17	**12**	**1.00**	3.57	**88.8%**	4.55	5.19	0.0079	0.02	709.70	705.60	**708.52**
ST-6	**StormTech**	2	0.00	0.00	0.00	0.45	0.00	0.25	5.51	0.01	12.20	3.04	**12**	**1.00**	3.57	**85.0%**	4.55	5.19	0.0072	0.01	710.05	705.60	**708.51**
StormTech																		***StormTech HWL (Starting Downstream HGL) =***					***708.50***

$$\text{HGL Slope} = \frac{Q^2 * n^2}{2.22 * R^{4/3} * A^2}$$

$$Q_{full} = \frac{1.49 * R^{2/3} * S^{1/2} * A}{n}$$

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OVERFLOW SPILLWAY & OUTLET CAPACITY CALCULATIONS

Portillo's Pick-Up 5/8/2024
Orland Park, IL
SJS

Peak 100-Year Runoff Calculation

Peak Runoff Equation: Q = C*i*A (The Rational Formula)

Total Upstream Tributary Area =	1.225	acres
Total Upstream Tributary Impervious Area =	0.740	acres
Total Composite Runoff Coefficient =	0.722	
Time of Concentration, Tc =	0.17	hour
100-Yr Rainfall Depth (Bulletin 75) =	1.80	inches
100-Yr Rainfall Intensity (Bulletin 75) =	10.80	inches/hour
100-Year Peak Runoff Rate =	**9.55**	**cfs**

Southeast Site Driveway Emergecy Overflow Weir

Driveway Overflow Capacity =**	**26.61**	**cfs**

***Atgrade driveway emergency overflow conveys peak 100-year storm for tributary area; refer to attached Hydraflow model report*

Peak 10-Year Runoff Calculation

Peak Runoff Equation: Q = C*i*A (The Rational Formula)

Total Upstream Tributary Area =	1.225	acres
Total Upstream Tributary Impervious Area =	0.740	acres
Total Composite Runoff Coefficient =	0.722	
Time of Concentration, Tc =	0.17	hour
10-Yr Rainfall Depth (Bulletin 75) =	1.08	inches
10-Yr Rainfall Intensity (Bulletin 75) =	6.48	inches/hour
100-Year Peak Runoff Rate =	**5.73**	**cfs**

Downstream 10"-Dia. Outlet Storm Sewer Capacity Calculation

Manning's Equation: $Q = 1.49/n * A R^{(2/3)} S^{(1/2)}$

Where: Pipe dia. =	0.83	ft	A (pipe area) =	0.55	SF
S (slope) =	0.088	ft/ft	R (hydr. radius) =	0.21	ft
			n (Manning's rougness coefficient) =	0.013	

Downstream 10" Sewer Pipe Capacity* =	**6.52**	**cfs**

**Downstream sewer conveys peak 10-year storm for tributary area*

Channel Report

Hydraflow Express Extension for Autodesk® Civil 3D® by Autodesk, Inc. Friday, Feb 23 2024

Emergency Overflow Spillway

User-defined

Invert Elev (ft)	= 709.01
Slope (%)	= 1.00
N-Value	= 0.013

Calculations

Compute by:	Known Depth
Known Depth (ft)	= 0.50

Highlighted

Depth (ft)	= 0.50
Q (cfs)	= 26.61
Area (sqft)	= 5.94
Velocity (ft/s)	= 4.48
Wetted Perim (ft)	= 24.26
Crit Depth, Yc (ft)	= 0.61
Top Width (ft)	= 23.75
EGL (ft)	= 0.81

(Sta, El, n)-(Sta, El, n)...

(-5.00, 710.11)-(28.50, 709.01, 0.013)-(28.50, 709.51, 0.013)-(35.00, 709.85, 0.013)