

STORMWATER REPORT AND PERMIT CALCULATIONS/EXHIBITS

FOR

TACO BELL RESTAURANT
REMOVE AND REBUILD
1530 W. ALGONQUIN ROAD
ARLINGTON HEIGHTS, ILLINOIS

May 11, 2018

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PREPARED BY: NORTHWESTERN ENGINEERING CONSULTANTS, P.C.
675 N. NORTH COURT
PALATINE, IL 60067
Illinois Professional Design Firm License No. 184-002695
Expires April 30, 2019



5/11/2018

18-19 Stormwater Report.doc

D.M.H.
5-11-18

LIC. EXP. 11-30-19

MWRD NARRATIVE: NEW BUILDING AND PARKING LOT
TACO BELL RESTAURANT
1530 W. ALGONQUIN ROAD
ARLINGTON HEIGHTS, ILLINOIS

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The project includes the demolition of an existing Taco Bell Restaurant and parking lot, and the construction of a new building, new parking lot, and associated storm water management facilities for a new Taco Bell Restaurant. Existing land cover at the site consists of a building, concrete sidewalks, asphalt pavement, and landscaped areas. The existing impervious surface coverage of the site is 0.44 acres. The proposed impervious surface coverage of the site after the new development is completed will be 0.48 acres.

Total parcel size under Buddy Bells, Inc. ownership is 0.67 acres. Size of area under development for this project is 0.67 acres. The affidavit signed by the co-permittee is page 9 of the WMO Permit Application and page 2 of Schedule K.

Because the project is less than 3.00 acres in size, storm water detention is not required by the MWRD. However, storm water detention for the site is required by the Village of Arlington Heights. The storm water detention volume required by the Village is provided on the parking lot pavement to a maximum depth of 6" over the catch basin rims, in an underground storm sewer system, and in a storm water management facility.

Site volume control required by the MWRD for the new impervious areas created by the project will also be provided in the flat bottom storm water management facility being constructed as part of this project. The bottom portion of the storm water management facility is being designed in accordance with the MWRD requirements for a bioretention facility, in order to provide the required volume control volume.

All the storm water management facilities being constructed for the project will be interconnected, and discharge from the site will be through a 2" diameter restrictor located in a catch basin near the northeast corner of the site. This 2" restrictor will help detain the storm water in the various storm water management facilities on the site, allowing for more percolation into the underlying soils, before the storm water is discharged to the existing Village of Arlington Heights storm sewer system in an easement on the property to the north of the site.

Please note that it is our opinion as an Illinois licensed professional engineering firm that there are no flood protection areas (floodplain, wetland, or riparian environment) on or within 100 feet of the subject project.

See "Narrative for Erosion & Sedimentation Control" (next page) for information relative to erosion control practices in connection with this project.

5/11/2018

1819MWRDNarrative.doc

NARRATIVE FOR EROSION & SEDIMENTATION CONTROL

Existing land cover at the site is building, concrete sidewalks, asphalt parking lot, and landscaping. The project consists of constructing a new building, new parking lot and associated storm water management facilities. Proposed conditions at the site will include a new bioretention facility other storm water management facilities. Storm water runoff from the site currently drains primarily to an existing Village of Arlington Heights storm sewer in an easement on the property north of the Taco Bell site. At the completion of construction, storm water will continue to drain to the existing storm sewer through a new 2" diameter restrictor, installed as part of this project. Detention volume will be provided in a storm water management facility, on the parking lot pavement, and in underground storm sewer storage pipes. The bioretention facility will encourage storm water from the site to percolate into the underlying soils by use of the storm water retention system.

Since site disturbance is less than one acre for this project, an NPDES ILR-10 permit is not required. However, the project will comply with local erosion and sedimentation control requirements.

Proposed temporary erosion and sediment control facilities will consist of silt fencing, a stabilized construction site entrance, catch basin filtration systems installed in all new and existing affected catch basins, a temporary concrete washout facility location, and seeding and silt fencing for temporary construction stockpiles as needed. Details of the soil erosion control plan are shown on civil engineering sheet C-5.

A schedule of construction activities has been prepared and is shown as the Construction Sequence on civil engineering sheet C-5.

Inspections and maintenance of the erosion and sediment control facilities will be provided according to the "Inspection and Maintenance" plan shown on civil engineering sheet C-5.

Permanent erosion and sediment control will be provided by landscaping and ground cover, which must be established before temporary erosion control facilities are removed. During construction, the general contractor will be responsible for erosion control activities. Once the project is completed, the owner or his/her designated representative will be responsible for permanent sediment control and to comply with the "Operations and Maintenance Practices for Storm Water Management System", which is shown on civil engineering sheet C-6.

5/11/2018

1819MWRDErosionControlNarrative.doc

ILLINOIS PROFESSIONAL DESIGN FIRM #184-002695

STORM WATER DETENTION AND VOLUME CONTROL
CALCULATIONS - 1530 W. ALGONQUIN ROAD, ARLINGTON HEIGHTS, IL

LOT AREA OF TACO BELL = 29,298 SF = 0.6727 AC.

VOLUME CONTROL CALCULATIONS (MWRD REQUIREMENTS)

EXISTING PERVIOUS AREAS BY SCALE AND PLANIMETER
 FROM DEMOLITION PLAN:

$$\left(\frac{30+45}{2}\right)(21) - \frac{1}{2} \times 3 \times 3 - \frac{1}{2} \times 7 \times 3 + 1 \times 170 + 8 \times 18 + 7 \times 18 + \frac{1}{2} \times 50 \times 17 +$$

$$\frac{1}{2} \times 50 \times 18 + 20 \times 2.5 + 0.198 \times 20^2 \times 9.84 + 0.272 \times 20^2 \times 9.84 +$$

$$0.229 \times 20^2 \times 9.84 + 1.5 \times 63 + 1.272 \times 20^2 \times 9.84 = 9974 \text{ SF}$$

EXISTING IMPERVIOUS AREAS = 29,298 SF - 9974 = 19,324 SF.

PROPOSED PERVIOUS AREAS BY SCALE AND PLANIMETER
 FROM SITE PLAN:

$9.5 \times 68 = 646$	$0.10 \times 20^2 \times 9.84 = 394$	$8 \times 18 = 344$
$\frac{1}{2}(14 \times 4) = 28$	$5 \times 19.5 = 97.5$	$0.74 \times 20^2 \times 9.84 = 2913$
$5 \times 173 = 865$	$38 \times 22 = 836$	<u>8536 SF</u>
$0.25 \times 20^2 \times 9.84 = 984$	$0.14 \times 20^2 \times 9.84 = 551$	

PROPOSED IMPERVIOUS AREA = 29,298 - 8536 = 20,762 SF

INCREASE IN IMPERVIOUS AREA = 20,762 - 19,324 = 1438 SF.

MWRD VOLUME CONTROL VOLUME REQUIRED = $20,762 \times \frac{1'}{12''} = \underline{1730 \text{ CF}} = 0.0397 \text{ AC-FT}$

ILLINOIS PROFESSIONAL DESIGN FIRM #184-002695

DETENTION CALCULATIONS (VILLAGE REQUIREMENTS)

AREA FOR DETENTION CALCULATIONS = 0.6727

CR = 0.13 CFS/AL X 0.6727 AL = 0.121 CFS

IMPERVIOUS AREA = 20,762 SF = 0.4766 AL

PERVIOUS AREA = 0.6727 - 0.4766 = 0.1961 AL

$C = \frac{0.95 \times 0.4766 + 0.50 \times 0.1961}{0.6727} = 0.819$

VILLAGE OF ARLINGTON HEIGHTS DETENTION REQUIRED 0.1996 AL-FT
 = 8695 CF

(SEE SHEET 3)

100-YR PEAK FLOW RATE = C I A = 0.819 X 820 X 0.67 = 4.5 CFS

CALCULATE VOLUME CONTROL PROVIDED - VOLUME CONTROL

WILL BE PROVIDED BELOW ELEVATION 693.33 IN THE STORM WATER MANAGEMENT BASIN

AREA @ 693.33 = 0.34 X 20² X 9.84 = 1338 SF

AREA @ 692.33 = 0.34 X 20² X 9.84 = 1338 SF

VOLUME CONTROL STORAGE = (1 X 1338) + (1338 X 0.25 X 1.5 X 0.5) +
 (1338 X 0.36 X 0.33 X 0.5) + (1338 X 0.36 X 0.5)
 = 1909 CF REQUIRED = 1780 CF : OK ✓

CALCULATE DETENTION PROVIDED - DETENTION WILL BE PROVIDED
 IN STORM WATER MANAGEMENT BASIN, ON PARKING LOT PAVEMENT,
 AND IN UNDERGROUND STORM SEWER STORAGE SYSTEM.

IN BASIN BELOW 693.33 - 1909 CF (SEE ABOVE)

IN BASIN ABOVE 693.33 AND BELOW HWL = 695.30

$1338 (695.30 - 693.33) = 2636 CF$

ON PARKING LOT - AREA AT 695.30 = (24 X 24) + (22 X 54) +
 (1.22 X 20² X 9.84) + (0.25 X 20² X 9.84) = 7550 SF

AREA AT 694.60 (5 CB'S) = 5 X 3 = 15 SF

VOLUME ON PARKING LOT = $\frac{7550 + 15}{2} \times 0.50 = 1891 CF$

JOB NO. 18--19
 NAME Taco Bell
 DATE 04-May-18
 BY MKS

SHEET 3 OF 4

REQUIRED DETENTION MWRD METHOD BULLETIN 70

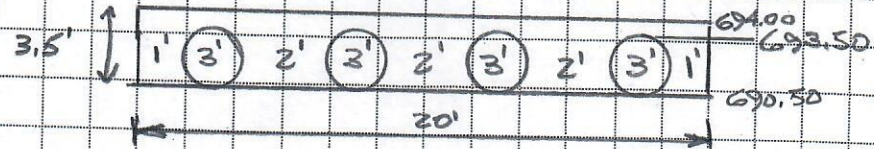
C Avg= 0.819
 Area= 0.673 ACRES
 Qr= 0.121 CFS

Time	I 100	Q 100	Qr	Q100-Qr	Storage
0.08	10.92	6.02	0.121	5.90	0.472
0.17	10.02	5.52	0.121	5.40	0.918
0.25	8.20	4.52	0.121	4.40	1.100
0.50	5.60	3.09	0.121	2.97	1.483
1.00	3.56	1.96	0.121	1.84	1.841
1.50	2.75	1.52	0.121	1.39	2.092
2.00	2.24	1.23	0.121	1.11	2.227
3.00	1.62	0.89	0.121	0.77	2.315
4.00	1.28	0.71	0.121	0.58	2.338
5.00	1.08	0.60	0.121	0.47	2.371
6.00	0.95	0.52	0.121	0.40	2.415
7.00	0.83	0.46	0.121	0.34	2.354
8.00	0.75	0.41	0.121	0.29	2.338
9.00	0.68	0.37	0.121	0.25	2.283
10.00	0.63	0.35	0.121	0.23	2.261
11.00	0.59	0.33	0.121	0.20	2.245
12.00	0.55	0.30	0.121	0.18	2.184
13.00	0.52	0.29	0.121	0.17	2.151
14.00	0.49	0.27	0.121	0.15	2.085
15.00	0.46	0.25	0.121	0.13	1.986
16.00	0.43	0.24	0.121	0.12	1.854
17.00	0.41	0.23	0.121	0.10	1.782
18.00	0.39	0.21	0.121	0.09	1.689

Maximum Stored = 2.415 CFS-HR

REQUIRED STORAGE = 0.1996 ACRE FEET

VOLUME IN CONTECH UNDERGROUND STORM SEWER STORAGE SYSTEM -
 FIGURE STORAGE IS PROVIDED TO 6" OVER THE PIPES



CROSS SECTIONAL AREA = $20 \times 3.5 = 70'$
 ASSUME 36% VOIDS IN STONE
 PIPE AREA = $1 \times \pi \times 1.5^2 = 28.27$ SF
 STONE AREA = $70 - 28.27 = 41.73$ SF
 VOLUME PER L.F. = $28.27 + (41.73 \times 0.36) = 43.3$ CF/FT.

USE 58 LF OF 20' WIDE (9 PIPES) SECTION
 58×43.3 CF/FT = 2511 CF
 CONTECH DETAIL DRAWINGS SAY 2480 CF
 USE 2480 CF

TOTAL DETENTION VOLUME PROVIDED = $1909 + 2636 + 1891 + 2480$
 = 8916 CF

REQUIRED = 8695 CF ∴ OK ✓

SIZE RESTRICTOR

TRY 2' PROJECTING RESTRICTOR $C_d = 0.52$ PER MWD P. 5-72
 HWL = 695.30 INVERT AT RESTRICTOR = 690.35
 $Q = C_d A \sqrt{2g} \times H$ $H = 695.30 - 690.35 = 4.95'$
 $0.121 = 0.52 \times A \times \sqrt{2 \times 32.2 \times 4.95}$
 $A = 0.0131$ $\pi R^2 = 0.0131$
 $R = 0.0647'$
 $D = 1.55"$

∴ USE 2' PROJECTING RESTRICTOR - MINIMUM PRACTICAL SIZE

CHECK EMERGENCY OVERFLOW CAPACITY $Q = C \times L \times H^{3/2}$ OUT N. DRIVEWAY USE $C = 3.0$
 $Q = 3.0 \times 21 \times 0.2^{3/2} = 6.4$ CFS OK. ✓ 0.2' DEEP

STORM SEWER DESIGN CALCULATIONS
 RACO BELL - ARLINGTON HEIGHTS
 NORTHWESTERN ENGINEERING CONSULTANTS

Designer: DMH
 Date: 5-4-18
 Sheet No. 1 of 1

Job No. 18-19 ILLINOIS PROFESSIONAL DESIGN FIRM #184-002695 EXPIRES 4-30-19

Number	Street	From - MH to MH	Distance	Area Acres	Total Tributary Area, Acres	Coeff. of Runoff	Rainfall Intensity* Inches/Hr.	Flow, Q CFS	Time of Concentration, Minutes	Flow Time in Pipe, Minutes	Pipe Diameter, Inches	Flow Velocity FPS	Sewer Slope Ft./Ft.	Sewer Capacity, CFS	Invert Upstream	Invert Downstream
		CB #1 - BASIN	14	0.12	0.12	0.90	10.0	1.08	10		10	4.8	1.21	2.6	692.50	692.33
		RD - CB #2	91	0.05	0.05			0.45			6	3.1	1.00	0.60	692.91	692.00
		CB #2 - CB #3	72	0.10	0.15			1.35			12	3.2	0.42	2.5	692.00	691.70
		CB #3 - CB #4	104	0.15	0.30			2.70			12	3.5	0.50	2.7	691.70	691.8
		CB #4 - CONTECH	10	0.13	0.43			3.87			12	4.9	1.00	3.9	691.18	691.08

*Intensity for 100 year storm