

# Elgin O'Hare – West Bypass: Stormwater Detention Analysis

PREPARED FOR: Illinois Department of Transportation  
PREPARED BY: Christopher B. Burke Engineering, Ltd.  
DATE: June 10, 2009

## Purpose

Stormwater detention requirements will be analyzed in accordance with Drainage Manual, Section 1-302.03 "Storm Water Storage". Additionally, local stormwater management ordinances will be considered. The purpose is to suggest viable land sizes and locations of possible storm water detention sites based on the local ordinances of Cook and DuPage Counties.

## Drainage Criteria

- Required detention volume for a 100-year storm frequency in DuPage County was calculated by multiplying 0.56 ac-ft/ac by the increased impervious area, according to DuPage County Ordinance.
- Required detention volume for a 100-year storm frequency in Cook County was calculated using an allowable release rate equivalent to  $0.15 * i_3 * A$ , as outlined by Cook County Metropolitan Water Reclamation District of Greater Chicago Ordinance.

## Typical Parameters

- Aerial photography was used to aid in the estimation of existing impervious area.
- A straight line along the centerline of each proposed roadway segment served as the "Segment Length."
- Typical cross sections were used to determine quantity of lanes, shoulders and other features inside of the proposed footprints.
- A 12' lane width has been assumed for all lanes, existing and proposed.
- Barrier walls separating mainline expressways and arterials were assumed to be 3' wide.
- All medians were assumed to be paved.
- All shoulders were assumed to be paved and 12' wide.
- Bike paths and sidewalks were included in the increased impervious area and assumed to be 6' wide.

## Preliminary Calculations

During the preliminary calculation of required detention, proposed roadways were divided by county, Cook and DuPage, so as to apply the correct local detention ordinance to each. DuPage County is bounded on the north side by Devon Avenue and on the east side by County Line Road, all other project areas are inside Cook County.

The required detention volume for DuPage County was calculated by multiplying only the increased impervious area by the DuPage County Ordinance value for 100% Impervious Detention Volume: 0.56 ac-ft/ac. The required detention volume for Cook County was found by using the Rational Method to find an “Allowable Release Rate” equivalent to 0.15 times the 3 year rainfall intensity for each area. Tables 1 and 2 below show the results of these preliminary calculations and are divided into the component roadway segments for each of the seven finalist alternatives based on the typical parameters previously stated.

Due to a reconfiguration of the proposed layouts for Alternatives 203 and 402, detention volumes of these two alternatives were not calculated to include the bypass to I-294 south of Green Street. Also, both South Connection A and South Connection D, that begin at Green Street and continue to I-294 is to be used in conjunction with Alternatives 203 and 402.

Table 1 shows the required detention amounts for roadways in DuPage County.

**TABLE 1**  
Required Detention (AC) For Areas in DuPage County

|  | 202   | 203   | 401   | 402   | 403   | 404   | 501 | SC A | SC D |
|--|-------|-------|-------|-------|-------|-------|-----|------|------|
| <b>North Connections</b>                         |       |       |       |       |       |       |     |      |      |
| York Rd Expy                                     |       | 10.6  |       |       |       | 10.6  |     |      |      |
| Auxiliary Lanes along York Rd Expy               |       | 2.7   |       |       |       | 2.7   |     |      |      |
| IL-83 Expy                                       | 5.8   |       |       |       |       |       |     |      |      |
| <b>Elgin O'Hare Extension &amp; Interchange</b>  |       |       |       |       |       |       |     |      |      |
| Elgin-O'Hare Extension w/Interchange at York Rd. | 109.2 | 109.2 | 109.2 | 109.2 | 109.2 | 109.2 | 0   |      |      |
| Auxiliary Lanes along Elgin -O'Hare              | 6.3   | 6.3   | 6.3   | 6.3   | 6.3   | 6.3   | 6.3 |      |      |
| <b>South Connections</b>                         |       |       |       |       |       |       |     |      |      |
| West Bypass (Thorndale to I-294)                 | 20.0  | 20.0  | 20.0  |       | 20.0  |       |     |      |      |
| Auxiliary Lanes along Bypass to I-294            | 6.0   | 6.0   | 6.0   |       | 6.0   |       |     |      |      |
| South Connector (E-O to Green St.) 203 & 402     |       | 11.7  |       | 11.7  |       |       |     |      |      |
| Auxiliary Lanes along South Connector            |       | 3.9   |       | 3.9   |       |       |     |      |      |
| West Bypass (Green St. to I-294) SC A            |       |       |       |       |       |       |     | 6.9  |      |
| West Bypass (Green St. to I-294) SC D            |       |       |       |       |       |       |     |      | 6.8  |
| Auxiliary Lanes along South Connections A & D    |       |       |       |       |       |       |     | 1.3  | 1.3  |
| <b>Other Connection Options</b>                  |       |       |       |       |       |       |     |      |      |
| IL-83 Arterial (S of Thorndale Rd)               |       |       |       |       |       | 3.4   |     |      |      |
| IL-83 Arterial (N of Thorndale Rd)               |       |       | 4.4   |       |       |       |     |      |      |

**TABLE 1**  
Required Detention (AC) For Areas in DuPage County

|  | 202          | 203          | 401          | 402          | 403          | 404          | 501         | SC A       | SC D       |
|--|--------------|--------------|--------------|--------------|--------------|--------------|-------------|------------|------------|
| IL-83 Arterial (Full)                            |              |              |              |              | 30.0         |              | 30.0        |            |            |
| Irving Park Arterial (E of York Rd)              |              |              |              |              |              |              | 3.9         |            |            |
| York Rd Arterial                                 |              |              |              | 2.8          |              |              |             |            |            |
| I-294 Between North Avenue and Bypass            |              |              |              |              |              |              |             |            |            |
| I-294 Between North Avenue and Bypass<br>SC A    |              |              |              |              |              |              |             |            |            |
| I-294 Between North Avenue and Bypass<br>SC D    |              |              |              |              |              |              |             |            |            |
| I-294 Between Bypass and Eastern Extent          |              |              |              |              |              |              |             |            |            |
| I-90 for Alternative 402                         |              |              |              |              |              |              |             |            |            |
| I-90 Between Arlington Heights Rd and<br>York Rd |              |              |              |              |              |              |             |            |            |
| I-90 Between York Rd and Des Plaines<br>Oasis    |              |              |              |              |              |              |             |            |            |
| I-90 Between Des Plaines Oasis and Wolf<br>Rd    |              |              |              |              |              |              |             |            |            |
| <b>Total</b>                                     | <b>147.4</b> | <b>170.4</b> | <b>145.9</b> | <b>133.8</b> | <b>171.5</b> | <b>132.2</b> | <b>40.3</b> | <b>8.2</b> | <b>8.1</b> |

Table 2 shows the required detention for roadways in Cook County.

**TABLE 2**  
Required Detention (AC) For Areas in Cook County

|   | 202 | 203  | 401 | 402 | 403 | 404  | 501 | SC A | SC D |
|---|-----|------|-----|-----|-----|------|-----|------|------|
| <b>North Connections</b>                            |     |      |     |     |     |      |     |      |      |
| York Rd Expy  |     | 10.0 |     |     |     | 10.0 |     |      |      |
| Auxiliary Lanes along York Rd Expy                  |     | 3.4  |     |     |     | 3.4  |     |      |      |
| IL-83 Expy  | 9.5 |      |     |     |     |      |     |      |      |
| <b>Elgin O'Hare Extension &amp; Interchange</b>     |     |      |     |     |     |      |     |      |      |
| Elgin-O'Hare Extension w/Interchange at<br>York Rd. |     |      |     |     |     |      |     |      |      |
| Auxiliary Lanes along Elgin -O'Hare                 |     |      |     |     |     |      |     |      |      |
| <b>South Connections</b>                            |     |      |     |     |     |      |     |      |      |
| West Bypass (Thorndale to I-294)                    | 6.2 | 6.2  | 6.2 |     | 6.2 |      |     |      |      |
| Auxiliary Lanes along Bypass to I-294               | 4.6 | 4.6  | 4.6 |     | 4.6 |      |     |      |      |
| South Connector (E-O to Green St.) 203 &<br>402     |     |      |     |     |     |      |     |      |      |

**TABLE 2**  
Required Detention (AC) For Areas in Cook County

|   | 202         | 203         | 401         | 402        | 403         | 404         | 501         | SC A        | SC D        |
|---|-------------|-------------|-------------|------------|-------------|-------------|-------------|-------------|-------------|
| Auxiliary Lanes along South Connector         |             |             |             |            |             |             |             |             |             |
| West Bypass (Green St. to I-294) SC A         |             |             |             |            |             |             |             | 5.1         |             |
| West Bypass (Green St. to I-294) SC D         |             |             |             |            |             |             |             |             | 5.2         |
| Auxiliary Lanes along South Connections A & D |             |             |             |            |             |             |             | 0.2         | 0.2         |
| <b>Other Connection Options</b>               |             |             |             |            |             |             |             |             |             |
| IL-83 Arterial (S of Thorndale Rd)            |             |             |             |            |             |             |             |             |             |
| IL-83 Arterial (N of Thorndale Rd)            |             |             | 9.6         |            |             |             |             |             |             |
| IL-83 Arterial (Full)                         |             |             |             |            | 9.6         |             | 9.6         |             |             |
| Irving Park Arterial (E of York Rd)           |             |             |             |            |             |             | 6.0         |             |             |
| York Rd Arterial                              |             |             |             | 3.2        |             |             |             |             |             |
| I-294 Between North Avenue and Bypass         | 2.8         | 2.8         | 2.8         | 2.8        | 2.8         |             |             |             |             |
| I-294 Between North Avenue and Bypass SC A    |             |             |             |            |             |             |             | 4.7         |             |
| I-294 Between North Avenue and Bypass SC D    |             |             |             |            |             |             |             |             | 5.0         |
| I-294 Between Bypass and Eastern Extent       | 0.3         |             | 0.3         |            | 0.3         |             |             | 0.3         | 0.3         |
| I-90 for Alternative 402                      |             |             |             | 1.7        |             |             |             |             |             |
| I-90 Between Arlington Heights Rd and York Rd | 3.2         | 3.2         |             |            | 3.2         | 3.2         |             |             |             |
| I-90 Between York Rd and Des Plaines Oasis    | 1.7         | 1.7         |             | 1.7        | 1.7         | 1.7         |             |             |             |
| I-90 Between Des Plaines Oasis and Wolf Rd    | 1.2         | 1.2         |             |            | 1.2         | 1.2         |             |             |             |
| <b>Total</b>                                  | <b>29.3</b> | <b>32.9</b> | <b>23.4</b> | <b>9.3</b> | <b>29.4</b> | <b>19.4</b> | <b>15.5</b> | <b>10.4</b> | <b>10.7</b> |

Table 3 below summarizes the required detention for each alternative.

**TABLE 3**  
Required Detention (AC)

|                                    | 202  | 203  | 401 | 402 | 403 | 404  | 501 | SC A | SC D |
|------------------------------------|------|------|-----|-----|-----|------|-----|------|------|
| <b>North Connections</b>           |      |      |     |     |     |      |     |      |      |
| York Rd Expy                       |      | 20.6 |     |     |     | 20.6 |     |      |      |
| Auxiliary Lanes along York Rd Expy |      | 6.1  |     |     |     | 6.1  |     |      |      |
| IL-83 Expy                         | 15.3 |      |     |     |     |      |     |      |      |

**TABLE 3**  
Required Detention (AC)

|  | 202          | 203          | 401          | 402          | 403          | 404          | 501         | SC A        | SC D        |
|--|--------------|--------------|--------------|--------------|--------------|--------------|-------------|-------------|-------------|
| <b>Elgin O'Hare Extension &amp; Interchange</b>  |              |              |              |              |              |              |             |             |             |
| Elgin-O'Hare Extension w/Interchange at York Rd. | 109.2        | 109.2        | 109.2        | 109.2        | 109.2        | 109.2        |             |             |             |
| Auxiliary Lanes along Elgin -O'Hare              | 6.3          | 6.3          | 6.3          | 6.3          | 6.3          | 6.3          | 6.3         |             |             |
| <b>South Connections</b>                         |              |              |              |              |              |              |             |             |             |
| West Bypass (Thorndale to I-294)                 | 26.2         |              | 26.2         | 0.0          | 26.2         |              |             |             |             |
| Auxiliary Lanes along Bypass to I-294            | 10.6         |              | 10.6         | 0.0          | 10.6         |              |             |             |             |
| South Connector (E-O to Green St.) 203 & 402     |              | 11.7         |              | 11.7         |              |              |             |             |             |
| Auxiliary Lanes along South Connector            |              | 3.9          |              | 3.9          |              |              |             |             |             |
| West Bypass (Green St. to I-294) SC A            |              |              |              |              |              |              |             | 12.0        | 0.0         |
| West Bypass (Green St. to I-294) SC D            |              |              |              |              |              |              |             |             | 12.0        |
| Auxiliary Lanes along South Connections A & D    |              |              |              |              |              |              |             | 1.5         | 1.5         |
| <b>Other Connection Options</b>                  |              |              |              |              |              |              |             |             |             |
| IL-83 Arterial (S of Thorndale Rd)               |              |              |              |              |              | 3.4          |             |             |             |
| IL-83 Arterial (N of Thorndale Rd)               |              |              | 14.0         |              |              |              |             |             |             |
| IL-83 Arterial (Full)                            |              |              |              |              | 39.5         |              | 39.5        |             |             |
| Irving Park Arterial (E of York Rd)              |              |              |              |              |              |              | 9.9         |             |             |
| York Rd Arterial                                 |              |              |              | 5.9          |              |              |             |             |             |
| I-294 Between North Avenue and Bypass            | 2.8          |              | 2.8          |              | 2.8          |              |             |             |             |
| I-294 Between North Avenue and Bypass SC A       |              |              |              |              |              |              |             | 4.7         |             |
| I-294 Between North Avenue and Bypass SC D       |              |              |              |              |              |              |             |             | 5.0         |
| I-294 Between Bypass and Eastern Extent          | 0.3          |              | 0.3          |              | 0.3          |              |             | 0.3         | 0.3         |
| I-90 for Alternative 402                         |              |              |              | 1.7          |              |              |             |             |             |
| I-90 Between Arlington Heights Rd and York Rd    | 3.2          | 3.2          |              |              | 3.2          | 3.2          |             |             |             |
| I-90 Between York Rd and Des Plaines Oasis       | 1.7          | 1.7          |              |              | 1.7          | 1.7          |             |             |             |
| I-90 Between Des Plaines Oasis and Wolf Rd       | 1.2          | 1.2          |              |              | 1.2          | 1.2          |             |             |             |
| <b>Total</b>                                     | <b>176.7</b> | <b>163.8</b> | <b>169.3</b> | <b>138.7</b> | <b>200.9</b> | <b>151.6</b> | <b>55.8</b> | <b>18.6</b> | <b>18.8</b> |

## Detention Sites

Potential open detention sites are listed below. Where open detention ponds are not capable of providing required detention volume, in-line detention storage will be supplemented with over-sized roadway ditches and conveyance storm sewers.

### North Connection B – IL-83 (SMA 200)

- Grassy field to the west of the existing open detention, CUP reservoir. The CUP reservoir is located in the southwest quadrant of the intersection of Interstate 90 and Elmhurst Road.

### North Connection D – Elmhurst/York Road (SMA 600)

- Grassy open field in the southeast quadrant of the intersection of Interstate 90 and Elmhurst Road, bordered by the mobile home community on the south.
- Grassy field to the southwest of existing Des Plaines Oasis bordered by the mobile home community on the west and proposed ramps on the east, with Illinois Route 72 on the south.
- Land immediately to the north of existing Des Plaines Oasis and south of the existing industrial park off of Willie Road.
- Land near Palumbo Bros. yard and Rogers Industrial Park between the railroad corridor and Elmhurst Road, south of Coyle Avenue.

### South Connections

South Connections should utilize ramp infields and other available space within interchanges for stormwater detention. Any proposed right-of-way takes near the tie-in with Interstate 294 should also incorporate detention ponds.

### Coordination

The Elgin O'Hare-West Bypass (EO-WB) team met with MWRDGC on October 17, 2008 to discuss MWRDGC storage reservoirs within the EO-WB project footprint at the MWRDGC offices. As documented in the attached meeting minutes, MWRDGC requested that mitigation be required if avoidance of encroaching upon their basins cannot take place.

MWRDGC indicated that their reservoirs generally were oversized and suggested that IDOT follow its Drainage Manual to determine required detention storage for the project. IDOT will not be required to incorporate the Cook County Stormwater Management Ordinance into the Elgin-O'Hare West Bypass project.

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**FINAL MEETING SUMMARY****CH2MHILL**

Elgin O'Hare - West Bypass

**MEETING SUBJECT:** MWRDGC Coordination Meeting **RECORDER:** CH2M HILL/ Larry Martin

**MEETING DATE & TIME:** October 17, 2008, 11:00 AM **PREPARATION DATE:** October 20, 2008

**MEETING LOCATION:** MWRDGC Offices

**ISSUE STATUS:**  Draft for Review  Final

| ATTENDEE NAME        | ORGANIZATION         | E-MAIL   |
|----------------------|----------------------|--|
| Rick Wojcik          | IDOT - Hydraulics    | <a href="mailto:rick.wojcik@illinois.gov">rick.wojcik@illinois.gov</a>             |
| Syed Hussaini        | MWRDGC – M&O         | <a href="mailto:syed.hussaini@mwrdd.org">syed.hussaini@mwrdd.org</a>               |
| Yiping Zhou          | MWRDGC – M&O         | <a href="mailto:yiping.zhou@mwrdd.org">yiping.zhou@mwrdd.org</a>                   |
| Joe Schuessler       | MWRDGC – ENG         | <a href="mailto:joseph.schuessler@mwrdd.org">joseph.schuessler@mwrdd.org</a>       |
| Nick Venuso          | MWRDGC - ENG         | <a href="mailto:nicholos.venuso@mwrdd.org">nicholos.venuso@mwrdd.org</a>           |
| Carlton Lowe         | MWRDGC – LAW         | <a href="mailto:carlton.lowe@mwrdd.org">carlton.lowe@mwrdd.org</a>                 |
| Frederick M. Feldman | MWRDGC – LAW         | <a href="mailto:frederick.feldman@mwrdd.org">frederick.feldman@mwrdd.org</a>       |
| Joseph Sobamski      | MWRDGC – Engineering | <a href="mailto:joseph.sobamski@mwrdd.org">joseph.sobamski@mwrdd.org</a>           |
| Osoth Jamjum         | MWRDGC – M&O         | <a href="mailto:osoth.jamjum@mwrdd.org">osoth.jamjum@mwrdd.org</a>                 |
| Tony Quintanilla     | MWRDGC – M&O         | <a href="mailto:anotonio.quintanilla@mwrdd.org">anotonio.quintanilla@mwrdd.org</a> |
| Larry Martin         | CH2M HILL            | <a href="mailto:larry.martin@ch2.com">larry.martin@ch2.com</a>                     |
| Chinliang Wang       | CBBEL                | <a href="mailto:c.wang@cbbel.com">c.wang@cbbel.com</a>                             |
| Ron Krall            | SEC Group, Inc.      | <a href="mailto:ronald.krall@illinois.gov">ronald.krall@illinois.gov</a>           |
| Pete Harmet          | IDOT                 | <a href="mailto:pete.harmet@illinois.gov">pete.harmet@illinois.gov</a>             |

The Elgin O'Hare – West Bypass (EO-WB) team met with MWRDGC on October 17, 2008 to discuss several topics of interest to the District at the MWRDGC offices. The focus of the meeting with MWRDGC was to determine if various north and south connections were in conflict with MWRDGC storage reservoirs. The meeting commenced with brief overview of the project including extent of the study area, transportation issues, status of alternative development evaluation, and Public Involvement activities. The discussion of possible conflicts with District reservoirs began with the Touhy complex, then to the Cup Basin (both adjacent to I-90 on the north end) and concluded with the basins on the south side of the airport.

In regard to the two Touhy basins, questions from the District focused on the height of the structure above the basins and possible interference with access to the basins. The height issue was related to the ability of the District to perform routine inspection and maintenance of the basins under the structure. IDOT staff indicated that the height of the structure was in the range of 20 feet, however, the proposed profiles would be checked and better estimates would be provided. With regard to the access to the basins, the proposed roadway would be on structure over and near the basins; therefore access would be unimpeded under these structures. MWRDGC intended to maintain normal operation of these two reservoirs and accepted the concept of constructing bridges to span the reservoirs. MWRDGC requested mitigation be required if avoidance of encroaching upon the basins cannot take place.

With regard to the Cup Basin, similar issues arose, as well as, land use related issues. The District noted that they have leased areas west of the basin to the Mount Prospect Park District for long term recreational uses (50 year lease that was signed in the year 2000) and requested IDOT to look further into potential conflict. MWRDGC noted that access roads leading to the basin would be interrupted; therefore IDOT indicated that alternatives potentially affecting access to their facility would be refined

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during final design if the preferred West Bypass north connection corridor is associated with the Cup Basin.

The District noted that the ramp geometry on the east side of the basin was close to or overlapping the edge of the basin. Again, the structure height and access to this side of the basin was discussed, particularly as it related to the basins outlet structure. IDOT indicated that the location and height of these ramps would be examined further to address these concerns if this potential corridor emerges from the process as the preferred alignment. It is essential that MWRDGC continues having access to the reservoir and has the same ability to maintain it. Mitigation is required if encroachments on the basin cannot be avoided.

Lastly, Structure 102 (Silver Creek Flood Control Reservoirs) is potentially impacted by the West Bypass south connector proposed corridors F and G, which the District again asked about structure height and possible interference with basin maintenance. The EO-WB staff indicated that these structures are approximately 10 feet above the basins and would verify this later with a response to the District. It was further noted that in this area, the structure height had to be designed lower to the basins due to the fact the basins are located in the RPZ for runway 4R. The District noted that heights of 10 feet and lower are problematic for access required to perform routine inspections and maintenance of the basins.

MWRDGC was not in a position to estimate when the Cook County Stormwater Management Ordinance will be published for application. They indicated that IDOT does not have to incorporate the Cook County Stormwater Management Ordinance into the Elgin O'Hare – West Bypass project. They felt that their reservoirs generally were overdesigned and suggested that IDOT follow its Drainage Manual to determine required detention storage for this project.

Overall, the District noted their concern, but generally agreed that there was a workable solution for all of the issues raised during the meeting.