STUDY SESSION
WINNETKA VILLAGE COUNCIL
Police Department
410 Green Bay Road
Winnetka, Illinois 60093
Tuesday, July 12, 2011
7:30 p.m.

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AGENDA

1) Call to Order
2) Christopher Burke Stormwater Study Follow-up (Continued from the June 21st Council Meeting).....2
3) Executive Session
4) Adjournment

NOTICE

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Agenda Report

Subject: **Supplemental Flood Risk Reduction Assessment – Northern and Eastern Winnetka**

Prepared By: Steven M. Saunders, Director of Public Works/Village Engineer

Date: June 13, 2011

Background.

During the weekend of September 13-14, 2008, the Village received nearly 9 inches of rainfall, most of it falling during an 18-hour period on Saturday. This extreme rainfall produced significant flooding throughout the Village, and particularly in low-lying areas in the west and southwest portions of town. As a result of this flooding, and the public expressions of concern that followed, the Village engaged Christopher B. Burke Engineering, Ltd. to perform a Flood Risk Reduction Study of the areas that experienced the most severe flooding. The study was completed during the summer of 2009, and in September, 2009, was presented to the Village Council for initial discussions.

The Burke study identified and evaluated several possible stormwater drainage improvements, and recommended two major projects to provide some relief from the conditions experienced in September 2008. One set of improvements would provide flood risk reduction for the area south of Willow Road and east of Crow Island Woods, and the second set of improvements would provide flood risk reduction for areas east of Hibbard Road along Pine and Spruce Streets, and also along Ash, Cherry, and Oak Streets. These improvements are shown in **Attachment 1**.

During preparation of the FY 2010-11 Budget, the Council discussed at some length how to develop an effective strategy to move forward with engineering, construction, and financing these stormwater drainage improvements, which would require a significant investment of about $8 million. The Council wrestled with the desire to improve stormwater drainage, while engaging the Village in the necessary public education and discussions about the scope, reach, and effect of improvements; funding priorities; funding mechanisms; and timing.

As a follow-up to these discussions, staff and the Council developed the plan shown in **Attachment 2**, which provides the Village with a way to advance the proposed improvements, while having the necessary community discussions about funding, financing, and the scope, nature, and timing of any stormwater drainage improvements that may be constructed. One aspect of that strategy is to expand the Flood Risk Reduction Study to other areas of the Village, so that the resulting action plan can be considered on a Village-wide basis. The Village commissioned this study in November, 2010.

Supplemental Flood Risk Reduction Study.
The scope of this study consisted of evaluating six additional drainage basins, identified by resident feedback and staff input, and developing possible improvement alternatives for each area. These supplemental areas, and associated flooding observations, are described in Section 3.2 of the Study (pp. 7-17), and summarized below.

Underpass Study Area. This 293-acre watershed stretching from North Shore Country Day School to Lake Michigan, south of Willow Road and Ash Street, exhibits flooding along Green Bay Road at Sunset Road and at Winnetka Road, and east in the Winnetka Avenue underpass. This watershed ultimately discharges to Lake Michigan at Elder Lane beach.

Cherry Street Outlet Study Area. This 93-acre watershed is bounded by the Union Pacific Railroad on the west, Lake Michigan on the east, Elm Street on the north, and Willow Road on the south, exhibits flooding along Sheridan Road at Elm Street, and Oak Street. The watershed drains to Lake Michigan via the narrow right of way east of the intersection of Cherry and Sheridan.

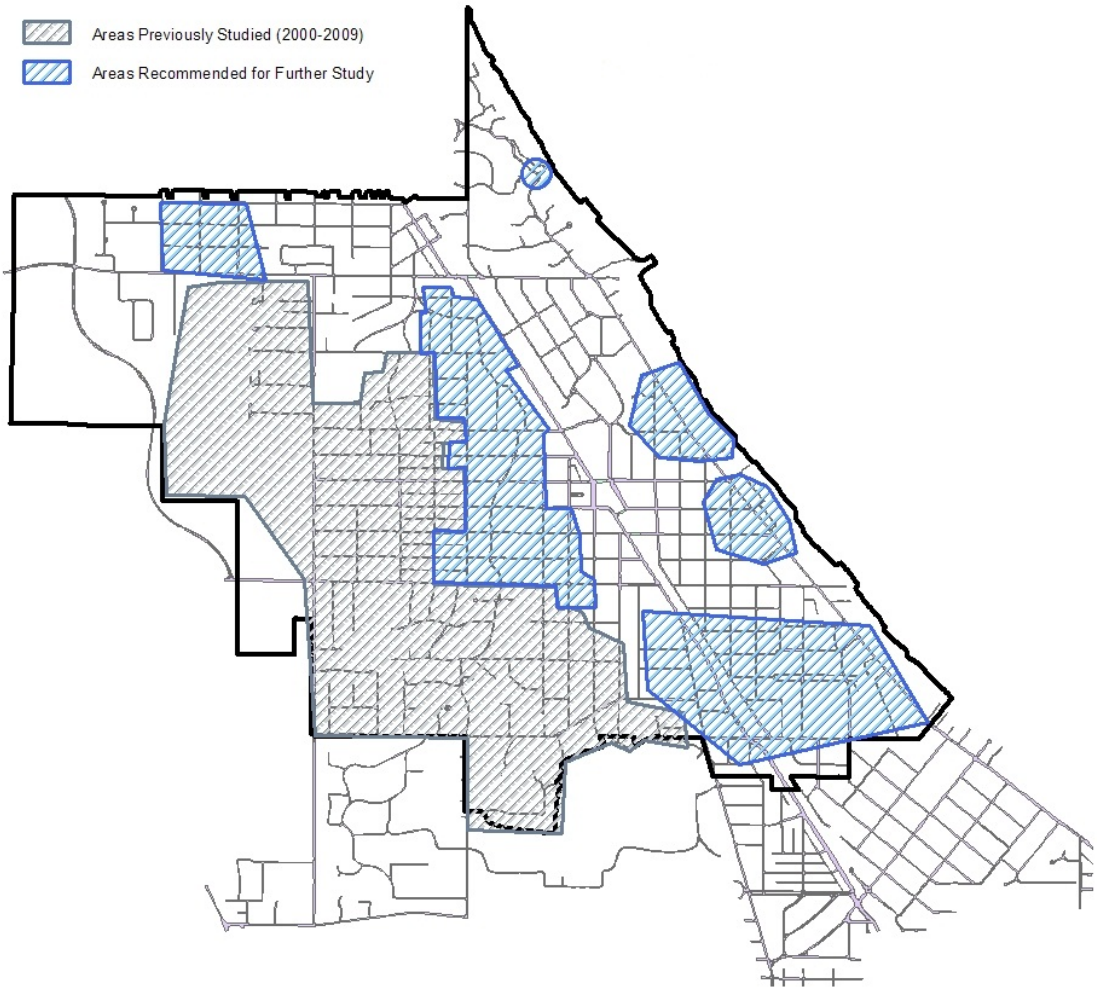
Spruce Street Outlet Study Area. This 176-acre drainage area is bounded by Tower Road on the north, the Union Pacific Railroad on the west, and Elm Street to the south, and drains to Lake Michigan along Spruce Street. This watershed exhibits flooding along Sheridan Road at Maple Street, and in the area of Tower Road and Foxdale Avenue. In larger storms, the overland outlet route is via Spruce Street, and large flows have caused bluff erosion as the water finds its way to the lake.

Provident Avenue Study Area. This 197-acre area is bounded by and discharges to Willow Road on the south, by Green Bay Road on the east, by Rosewood Avenue on the west, and Tower Road on the north. Flooding occurs at several locations in this drainage area, including near Locust and Westmoor, and in low areas east of Locust north of Pine. Street flooding also occurs at isolated low points scattered throughout the drainage area.

Greenwood Avenue Study Area. This 166-acre watershed is bounded by Tower Road on the south, Drexel Avenue (in Glencoe) on the north, Burr Avenue to the east, and discharges to the Forest Preserve's East Diversion Ditch on the west. Flooding occurs along Greenwood Avenue north of Tower Road, and in adjacent low-lying yards, along Edgewood Lane east of Grove Street, on Tower Road east of Vernon, and at some other intersections in the western portion of the drainage area.

Ravine Study Area. This 307-acre watershed, 70% of which is in the Village of Glencoe, drains to Lake Michigan at the bottom of "The Ravines" in the 1000 block of Sheridan Road. Winnetka's contribution to this watershed is the area north of Tower Road and east of the Union Pacific Railroad. The watershed extends north and west in Glencoe to include areas up to South Avenue, and west of Green Bay Road. The primary flooding issues in this watershed occur at the bottom of the Sheridan Road Ravine, which becomes inundated and impassable to vehicles after heavy rains, to a depth where rescue of stranded motorists by emergency personnel is on occasional occurrence.

These areas are shown below.



CBBEL was tasked with evaluating each of these drainage areas for 2-year, 5-year, and 10- year storms and to develop recommended alternatives to reduce the risk of flooding for these smaller events. Before considering these recommendations, it is important to understand this terminology. A “10-year storm” is a storm with a statistical recurrence interval of 10 years, meaning that in any given year, there is a 1-in-10 chance of experiencing a storm of a greater magnitude than a 10-year storm. It is also important to understand that there are two variables in determining the severity of a storm, rainfall intensity, and rainfall duration. For example, in Winnetka 2.10 inches of rain in 60 minutes would be a 10-year storm, however if that same 2.10 inches of rain fell in 15 minutes, that would exceed a 100-year return period, while 2.10 inches of rain over a 24-hour period has recurrence interval of 6-months. Under the principles of hydrologic analysis, the storm duration is selected based on the length of time it takes for water to travel from the most remote point of a watershed to its outlet, and then the rainfall intensity is selected based on statistical data for storms of that length. Rainfall statistical data for the Chicago area is shown in **Attachment 3**.

Recommended Improvements.

Underpass Study Area. CBBEL evaluated 4 possible alternatives to reduce the risk of flooding in this area, focusing on the Winnetka Avenue underpass and the intersection of Sunset Road and Green Bay Road. These alternatives are described in pages 18-20 of the report. The recommended alternative consists of eliminating the bottleneck east of the intersection of Sheridan Road and Elder Lane by installing 5' by 7' reinforced concrete box culvert beneath Elder Lane and across Elder Park, and also constructing an additional, parallel 36" diameter storm sewer from the underpass along Winnetka Avenue and Essex Road up to Elder Lane. A water quality (sediment and bacteria control) structure would also be added beneath Elder Lane Park. This alternative will eliminate backups in the Winnetka Avenue underpass for the 10-year storm, and is estimated to cost approximately $2.4 million.

Cherry Street Outlet Study Area. CBBEL reviewed two alternatives to reduce on-street flooding along Sheridan Road, described on pages 20 and 21 of the report. The recommended alternative consists of adding a 24" diameter outlet sewer to Lake Michigan at Cherry Street, constructing a water quality structure and erosion control measures, and increasing the Sheridan Road storm sewer to 36-inch diameter from Oak Street to Cherry Street. These improvements will eliminate the roughly 5 to 6-inch flooding on Sheridan Road from a 10-year storm, and are estimated to cost approximately $692,000.

Spruce Outlet Study Area. CBBEL evaluated several alternatives to address flooding on Sheridan Road near and south of Maple Street, and also in the area of Tower Road and Foxdale Avenue. These alternatives are discussed on pages 21 to 23 of the report. The recommended alternative consists of constructing a new diversion outlet to the lake across the southern end of Lloyd Park across the existing parking lot and down to the lake. By diverting up to the 10-year flow out of the system, flooding along Sheridan Road to the south will be eliminated for the 10-year storm. These improvements are anticipated to cost $368,000.

Provident Avenue Study Area. CBBEL studied two alternatives to address flooding in the Provident Avenue Study Area, described on pages 23 to 25 of the report. Both alternatives address flooding in the northern part of the watershed by diverting flow down Pine Street westward towards Hibbard Road. The recommended alternative consists of constructing increased storm sewers north of Pine Street, and a new 36" storm sewer down Pine Street to Glendale Avenue, south to Elm Street to possible underground storage between Washburne and Skokie Schools, ultimately to the detention facility identified as a possible improvement at Duke Child Field. These improvements are estimated to cost $6.8 million, including $2.4 million of improvements recommended for Pine Street and Spruce Street during the 2009 Study.

Greenwood Avenue Study Area. CBBEL studied several alternatives to reduce flooding in this area, identified in pages 25 through 27 of the report. The recommended alternative consists of constructing 12" diameter laterals to drain the low areas in the rear yards of

the problem areas to the existing Greenwood and Tower Road storm sewers, and modifying the pump settings in the Tower Road pump station to activate the pump at a lower water level. It must be noted that the pump settings were partially determined by the capacity of the pump structure to avoid short-cycling and burning out the pump. Lowering the elevations may not be feasible with the existing pump. These improvements would reduce the 10-year flood depths to about 8" and are estimated to cost about $67,000.

Ravines Study Area. CBBEL studied two alternatives, described on page 28 of the report. The recommended alternate consists of installing additional, oversized, blockage-resistant grates at the low point of Sheridan Road, and a new storm sewer connecting to the lake outlet. These improvements would eliminate roadway flooding from the 10-year event and are estimated to cost about $146,000.

Staff Recommendations.

1. Complete a cost/benefit analysis for each alternative from both studies. The Village Council should consider engaging CBBEL to calculate economic benefits of each recommended improvement (e.g. avoided flood damage, avoided detour delays, etc.) as a means of determining which projects should be considered for priorities, and as a means for discussing whether the project should be funded on a Village-wide basis, or by a more localized approach where the costs are carried by those properties that receive the benefit. Staff will provide a fee estimate for this work at the Council meeting.

2. Develop details and feasibility for various means of financing improvements. The Council should consider formally evaluating various approaches, singly or in combination, including cash reserves, debt, grant funding (where available), alternate revenue sources such as a stormwater utility, State or Federal roadway funding, and Special Service Areas for various combinations of alternatives. Understanding possible uses of cash reserves, realistic revenue levels from a stormwater utility, where Special Service Areas might be appropriate, and other details will allow the Council to make informed and meaningful decisions on sustainably funding a Flood Risk Reduction program.

3. Engage in formal planning discussions with Park District and New Trier High School District. Many of the alternatives proposed by CBBEL involve use of and alterations to properties owned by the Winnetka Park District, or, in the case of Duke Child Field, New Trier High School District. The Village should enter detailed discussions with the Park District and the High School District to explore cooperative approaches to constructing improvements, including possible cost sharing, land transfers, joint benefits, and shared benefits and priorities for Duke Child Field, Skokie Playfield, Elder Park, and Lloyd Park as they relate to the various alternatives proposed by CBBEL.

4. Initiate preliminary discussions with IDOT about financial participation in improvements affecting Sheridan Road, including possible jurisdictional transfer

of roadway to Village. Recommended improvements to three of the basins, the Cherry Street outlet, the Spruce Street outlet, and the Ravine area, primarily address flooding concerns on Sheridan Road, which is owned by IDOT. The Village should approach IDOT with an eye toward obtaining funding for these stormwater improvements as part of a larger, and very necessary, rehabilitation project. The Village should consider a jurisdictional transfer of the roadway as a possible inducement to IDOT to fund the project in a timely manner.

5. At the October 2011 Study Session, evaluate the above as inputs to a stormwater improvement plan, and develop a recommended plan for implementation in the FY 2012-13 budget and Capital Plan. Each of the above items can be pursued on a parallel track so that the information can be provided for the October, 2011 Study Session for Council discussion and direction, allowing ample time to include first priority projects in the FY 2012-13 budget, and to include the remaining projects in the FY 21012 – 2017 Capital Plan.

Recommendation:

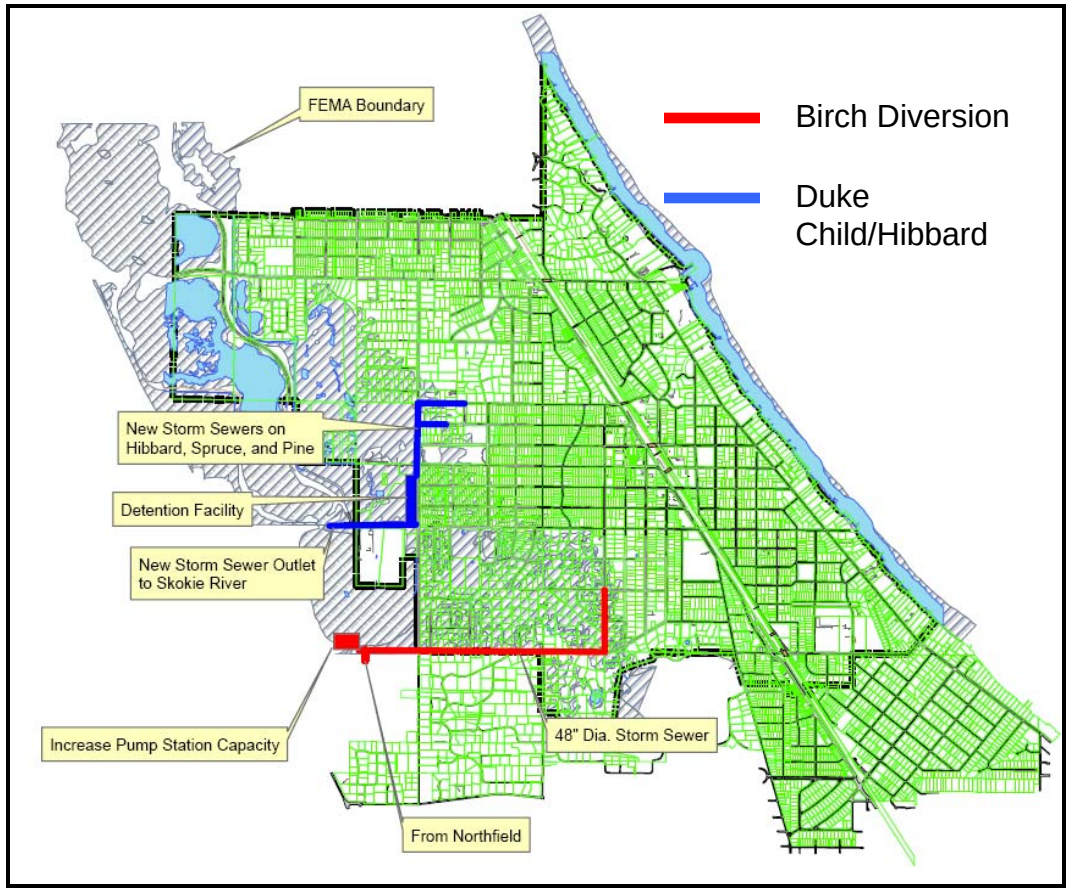
1. Review Supplemental Flood Risk Reduction Assessment
2. Provide Policy Direction

ATTACHMENT 1

2009 RECOMMENDED IMPROVEMENTS

2 Major Stormwater Improvements

- Southern Improvement
  - Construct new storm sewer along Birch and along Hill
  - Increase pumping capacity
  - Overbank storage in FPD
  - Engineering FYE 2011
  - Construction FYE 2012
  - Benefits Birch, Alles, Sunset, Meadow, DeWindt, White Oak (pump also benefits north area)
  - 10 year protection level
  - **Cost $3.5m**
- Northern Improvement
  - Pine, Spruce and Hibbard storm sewer
  - Duke Child detention
  - Ash Street Pump facility
  - New pumped outlet via Willow Road
  - Engineering FYE 2012
  - Construction FYE 2013
  - Benefits Pine-Willow e. of Hibbard, plus south area
  - 5-10 year protection level
  - **Cost $4.5m**



ATTACHMENT 2

STORMWATER MANAGEMENT STRATEGY

Proposed Multifaceted Stormwater Management Strategy – May 2010

Step 1: Skokie River Pump Station Expansion Feasibility Study. The Council should direct staff with help from Christopher B. Burke Engineering, Ltd. (CBBEL) (author of the recent drainage study for southwest Winnetka) to find an engineering and Forest Preserve District licensing solution to enhance the capacity of the storm water pump station at Winnetka Avenue. If expanding the capacity of the pump station is not possible, the Village should **not** invest any additional resources in the southern drainage project (i.e., installing a new drainage pipe from the pump station along Winnetka Avenue to Birch Street and then north to Sunset Road).

Timeline.

1. Staff will obtain a proposal from CBBEL in **May, 2010** to perform the work described above.
2. Staff estimates that CBBEL could complete the technical feasibility work by **July 1, 2010**.
3. It is difficult for staff to determine how long the necessary discussions with the Cook County Forest Preserve District may take, but staff estimates that a report on the Forest Preserve's licensing requirements may be completed by **September, 2010**.

Deliverables.

1. Technical feasibility report on pump station expansion.
2. Forest Preserve licensing requirement report.

Estimated Cost: $16,000

Step 2: Further Evaluation of Northern Improvements (without detention). The Council should direct staff with help from CBBEL to fine tune the proposed improvements (i.e. new pipe down Hibbard Road, then west on Willow Road to a new pump station that would be located in the vicinity of the Village Yards) for the "northern" drainage basin by analyzing the consequences of **not** storing water on Duke Child's field. Also, the Village should evaluate the feasibility of obtaining a permit from the Illinois Department of Natural Resources to discharge storm water into the river at Willow Road. The Village needs this information soon because as the Village upgrades Willow Road from Hibbard Road to Forest Way Drive in 2012, the Village must coordinate any future drainage improvements with this Willow Road project to avoid tearing up Willow Road twice in short period of time.

Timeline:

1. Staff will obtain a proposal from CBBEL for presentation to the Village Council in **June, 2010** to perform the work described above.
2. Staff estimates that CBBEL could complete the technical feasibility work by **September 1, 2010**.
3. Staff estimates that a report on the cost and feasibility the implications of not storing water in Duke Childs Field, and the probability of obtaining an IDNR

permit for a new outfall to the Skokie River, could be completed by **October, 2010**.

Deliverables:

1. Report on engineering details, cost, ramifications of not storing water on Duke Childs Field, and feasibility of obtaining a discharge permit from the Illinois Department of Natural Resources.

Estimated Cost: $50,000

Step 3: Drainage Survey and Associated Storm Sewer Modeling for drainage areas not surveyed in 2009 Study. The Council should direct staff and CBBEL to survey the remaining drainage areas of the Village to verify that the proposed drainage improvements in the 5-Year Plan (see tab 13 of the Budget) for areas other than southwest Winnetka are warranted and to determine if any other drainage improvements are necessary. If other problem drainage areas are identified, the storm sewer systems serving these areas should be modeled, and improvements should be developed.

Timeline:

1. Staff will obtain a proposal from CBBEL to perform the initial survey work described above for presentation to the Village Council in **June, 2010**.
2. Staff estimates that CBBEL could complete the initial survey work by **September 30, 2010**. Staff and CBBEL would analyze the survey results and determine if additional modeling should take place.
3. Staff would return to the Council in **October, 2010**, with a recommendation of which additional drainage areas should be modeled for proposed improvements, and with a cost proposal for the additional modeling.
4. Staff estimates that a report of the survey results, modeling, and proposed improvements for additional drainage areas could be completed by **March 31, 2011**.

Deliverables:

1. Report of initial survey results.
2. Report of survey results, modeling of selected stormwater drainage basins, and proposed improvements in selected stormwater drainage basins, including estimated costs.

Estimated Cost: $30,000+/- for initial survey, up to $165,000 for full study including initial survey, modeling before & after for all areas.

Step 4: Financing Study. In tandem with the above three steps, the Council should conduct a detailed study of financing options (cash reserves, special service area, storm water utility, or a combination of these options) to finance drainage improvements. This study should include a discussion of allocating costs to the whole Village, the various drainage basins, or some combination thereof. Retain a consultant to complete a

stormwater utility feasibility study and prepare and education and implementation guide for the Village.

Timeline:

1. Staff will develop a Request for Proposals to retain a consultant for a stormwater utility study, and bring a recommendation for a contract award to the Village Council in **June, 2010**.
2. Staff will prepare a report of other financing options (cash reserves, special service area, etc.) by **August 31, 2010**.
3. Staff would return to the Council in **October, 2010**, with a stormwater utility feasibility study.

Deliverables:

1. Financing option study
2. Stormwater utility study.

Estimated Cost: $40,000

Step 5: Public Input/Education. When the above four steps are completed, the Council should seek public input via public hearings and perhaps sending out a citizen survey. Also the Village should continue to provide the Caucus with background information on the drainage issue.

Step 6: Policy Direction. After completing the above steps, the Council should be in a position to provide a comprehensive policy on drainage improvements in 2011.

ATTACHMENT 3

RAINFALL STATISTICS

Table 1. Sectional Mean Frequency Distributions for Storm Periods of 5 Minutes to 10 Days and Recurrence Intervals of 2 Months to 100 Years in Illinois. Units are in inches.

Sectional code

01 - Northwest
02 - Northeast
03 - West
04 - Central
05 - East
06 - West Southwest
07 - East Southeast
08 - Southwest
09 - Southeast
10 - South

Section	Duration	2-month	3-month	4-month	6-month	9-month	1-year	2-year	5-year	10-year	25-year	50-year	100-year
01	10-day	2.14	2.60	2.97	3.50	4.02	4.37	5.23	6.30	7.14	8.39	9.64	11.09
01	5-day	1.76	2.12	2.38	2.76	3.17	3.45	4.13	5.10	5.91	7.21	8.36	9.97
01	72-hr	1.58	1.90	2.11	2.45	2.82	3.06	3.73	4.67	5.42	6.59	7.64	8.87
01	48-hr	1.47	1.74	1.93	2.24	2.58	2.80	3.42	4.28	4.96	6.07	7.02	8.07
01	24-hr	1.40	1.64	1.80	2.08	2.36	2.57	3.11	3.95	4.63	5.60	6.53	7.36
01	18-hr	1.30	1.52	1.66	1.92	2.18	2.37	2.86	3.63	4.26	5.15	6.01	6.92
01	12-hr	1.23	1.43	1.57	1.81	2.06	2.24	2.71	3.43	4.03	4.88	5.66	6.51
01	6-hr	1.06	1.24	1.37	1.56	1.77	1.93	2.33	2.96	3.48	4.20	4.90	5.69
01	3-hr	0.91	1.06	1.16	1.33	1.52	1.65	1.99	2.53	2.97	3.59	4.18	4.90
01	2-hr	0.84	0.97	1.06	1.23	1.40	1.52	1.83	2.33	2.74	3.31	3.86	4.47
01	1-hr	0.67	0.78	0.86	0.98	1.11	1.21	1.46	1.86	2.18	2.63	3.07	3.51
01	30-min	0.52	0.61	0.68	0.77	0.87	0.95	1.15	1.46	1.71	2.07	2.42	2.77
01	15-min	0.38	0.45	0.50	0.57	0.64	0.70	0.84	1.07	1.25	1.51	1.76	1.99
01	10-min	0.31	0.36	0.40	0.46	0.52	0.57	0.68	0.87	1.02	1.23	1.44	1.62
01	5-min	0.17	0.20	0.22	0.25	0.29	0.31	0.37	0.47	0.56	0.67	0.78	0.89
02	10-day	2.02	2.48	2.80	3.30	3.79	4.12	4.95	6.04	6.89	8.18	9.38	11.14
02	5-day	1.66	1.98	2.24	2.60	2.99	3.25	3.93	4.91	5.70	6.93	8.04	9.96
02	72-hr	1.53	1.83	2.02	2.34	2.70	2.93	3.55	4.44	5.18	6.32	7.41	8.78
02	48-hr	1.44	1.70	1.90	2.18	2.49	2.70	3.30	4.09	4.81	5.88	6.84	8.16
02	24-hr	1.38	1.61	1.76	2.03	2.31	2.51	3.04	3.80	4.47	5.51	6.46	7.58
02	18-hr	1.26	1.47	1.61	1.86	2.12	2.30	2.79	3.50	4.11	5.06	5.95	6.97
02	12-hr	1.20	1.40	1.53	1.77	2.01	2.18	2.64	3.31	3.89	4.79	5.62	6.59
02	6-hr	1.03	1.21	1.32	1.52	1.74	1.88	2.28	2.85	3.35	4.13	4.85	5.68
02	3-hr	0.88	1.02	1.13	1.30	1.47	1.60	1.94	2.43	2.86	3.53	4.14	4.85
02	2-hr	0.81	0.95	1.05	1.20	1.36	1.48	1.79	2.24	2.64	3.25	3.82	4.47
02	1-hr	0.65	0.76	0.84	0.96	1.09	1.18	1.43	1.79	2.10	2.59	3.04	3.56
02	30-min	0.51	0.60	0.65	0.75	0.86	0.93	1.12	1.41	1.65	2.04	2.39	2.80
02	15-min	0.37	0.44	0.48	0.55	0.63	0.68	0.82	1.03	1.21	1.49	1.75	2.05
02	10-min	0.30	0.35	0.39	0.45	0.51	0.55	0.67	0.84	0.98	1.21	1.42	1.67
02	5-min	0.17	0.19	0.21	0.24	0.28	0.30	0.36	0.46	0.54	0.66	0.78	0.91

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