Village of Northbrook

Addendum #2
Master Stormwater Management Plan

April 2015

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Civil Engineers ▫ Structural Engineers ▫ Land Surveyors
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Please note that the data and conclusions presented in the addendum are based on the best available information in the form of development plans, Village records, mapping, and visual observation. The recommended plans for the respective projects should be considered as conceptual and preliminary. Prior to implementing an improvement plan for any project, a detailed analysis of existing conditions based on field investigation/surveys should be performed and incorporated into the plan.

Executive Summary

Addendum #2

Master Stormwater Management Plan (April 2015)

for Additional Areas with Flooding Issues

During the discussions and Open House meetings with the public for the 2011 Master Stormwater Management Plan (MSMP) it was noted to Village staff that additional areas throughout the Village have started to experience flooding during high intensity rainfall events since the initial development of the 2011 MSMP. The 2011 MSMP originally included 22 projects. Addendum #1 to the MSMP included six additional projects. It was recommended by staff to study three additional areas consistent with the level of detail for the current 28 projects ranked in the MSMP, with the goal of adding these additional areas as new projects.

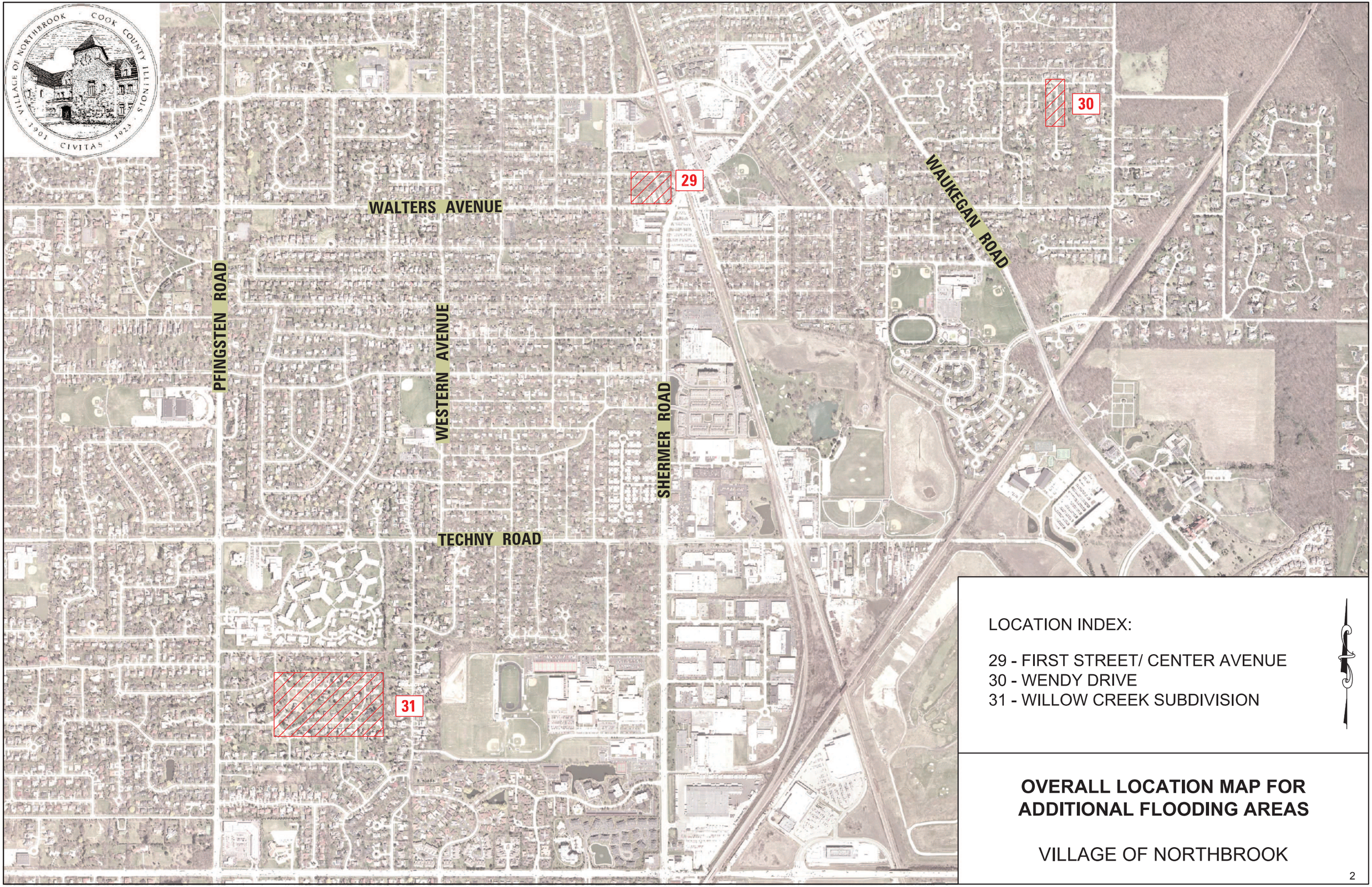
These locations experience localized street and adjacent property flooding, along with some reported structure damage. Typically, each of these three projects is located within a drainage area serviced by an older drainage system that is not capable carrying stormwater runoff from the 10-year storm event, which is the current standard. The flooding in most of these additional areas appears to be caused by the loss of depressional storage and the obstruction of flood overflow routes as a result of ongoing development and redevelopment.

These additional areas are listed below in alphabetical order with a brief description (Please refer to the Overall Location Map for Additional Flooding Areas Exhibit):

1. **(Project 29) First Street/ Center Avenue.**
   The drainage system in this area is undersized and very old, which causes flooding during even small rainfall intensities. Residents near the intersection of First St. and Center Ave. experience backyard flooding. An undersized rear yard drainage system, back-up from the mainline storm sewer system, and lack of a positive overland drainage route were initially identified as causes of the flooding.

2. **(Project 30) Wendy Drive.**
   Drainage of the low area on Wendy Drive is dependent upon an older, existing drainage system. This system, coupled with increased runoff from more recent development and overflow from Caryn Terrace, leads to flooding on Wendy Drive during moderate to high rainfall intensities. When flooding occurs, access to the southern portion of Wendy Drive is limited. The recent completion of MSMP Project 13 on Ridge Road/Lee Road can serve as an improved outlet for this area and improve the drainage of Wendy Drive.

3. **(Project 31) Willow Creek Subdivision.**
   The drainage system for this subdivision is dependent upon a small storm sewer conveyance and collection system that is over 50 years old. Property redevelopment has increased runoff and the system cannot effectively convey the runoff of the subdivision tributary area during low intensity storm events. As a result, residents experience front and backyard flooding as well as street flooding. The South Fork Techny Drain flows through the Willow Creek Subdivision and serves as an outlet for the drainage system. MSMP Project 3 Techny Drain Phase IV included flood reduction benefits for properties along the South Fork of Techny Drain and provides an opportunity to improve the drainage system in the area of this subdivision.



LOCATION INDEX:

29 - FIRST STREET/ CENTER AVENUE
30 - WENDY DRIVE
31 - WILLOW CREEK SUBDIVISION

OVERALL LOCATION MAP FOR ADDITIONAL FLOODING AREAS

VILLAGE OF NORTHBROOK

	RANK[1,2]	SCORE	PROJECT NUMBER	PROJECT	OPTIMUM LEVEL OF PROTECTION (YEARS)[3]	BENEFIT-COST RATIO (B/C)	RANK BY BENEFIT-COST RATIO (B/C)	ESTIMATED NUMBER OF STRUCTURES BENEFITED[4]	RANK BY ESTIMATED NUMBER OF DAMAGED STRUCTURES BENEFITED[4]	ESTIMATED NUMBER OF PROPERTIES BENEFITED[4]	RANK BY ESTIMATED NUMBER OF PROPERTIES BENEFITED[4]	ESTIMATED TOTAL COST (2014 DOLLARS)[5,6]	AVERAGE COST PER DAMAGED STRUCTURE BENEFITED[6]	AVERAGE COST PER PROPERTY BENEFITED[6]
PROJECT RANKING TABLE	1	1.33	29	First Street / Center Avenue	10	2.41	1	1	1	10	2	$374,000	$374,000	$37,400
	3	2.00	30	Wendy Drive	10	0.28	2	0	2	10	2	$229,000		$22,900
	2	2.00	31	Willow Creek Subdivision	10	0.14	3	0	2	24	1	$1,215,000		$50,600
									TOTAL COST OF ALL PROJECTS			**$1,818,000**		

NOTES:

1. This table is a list of projects evaluated in Addendum #2 of the 2011 Master Stormwater Management Plan ordered by ranking. The score is the average of the benefit-cost ratio, number of structures benefited and number of properties benefited. The lower the score, the higher the rank
2. For projects with identical scores, number of damaged structures benefited is the primary tie-breaker, followed by number of properties benefitec
3. The optimum level of protection refers to the storm event for which a project can reliably provide benefits to properties affectec
4. Structures and properties benefited receive flood reduction benefits but are not necessarily removed from flood risk
5. **The estimated total cost does not include stormwater attenuation and mitigation cost if required for the loss of storage due to reduction of pavement flooding volumes (Project 30)**
6. **The estimated total cost does not include the cost of acquiring a local property and providing stormwater detention instead of constructing an oversized sewer (Project 29**
7. Costs are based on 2015 dollars and may not reflect final cost

ACRONYMS

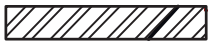
BCR – Benefit - Cost Ratio
BFE – Base Flood Elevation
CCFPD - Cook County Forest Preserve District
CCHD – Cook County Highway Department
CMAP - Chicago Metropolitan Agency for Planning (formerly NIPC)
CRS – Community Rating System
DEC-2 – DuPage Environmental Concerns BCR analysis tool
DWP – Detailed Watershed Plan (Cook County)
FEMA – Federal Emergency Management Agency
FIRM – Flood Insurance Rate Map
GBNHS – Glenbrook North High School
HEC-HMS – Hydraulic Engineering Corps- Hydrologic Modeling System
HEC-RAS – Hydraulic Engineering Corps- River Analysis System
IDNR-OWR – Illinois Department of Natural Resources/Office of Water Resources
IDOT - Illinois Department of Transportation
ICPR – Interconnected Channel and Pond Routing
IEPA – Illinois Environmental Protection Agency
MFNBCR – Middle Fork North Branch of Chicago River
MSMP – 2011 Master Stormwater Management Plan
MWRDGC – Metropolitan Water Reclamation District of Greater Chicago
NCSWCD – North Cook Soil and Water Conservation District
NFIP – National Flood Insurance Program
NIPC–Northeastern Illinois Planning Commission
NPDES – National Pollutant Discharge Elimination System
NRCS – Natural Resource Conservation Service
ROW – Right-of-Way
SWMP – 1993, 1996, and 2002 Stormwater Management Plan
TGM – Cook County Watershed Management Ordinance –Draft Technical Guidance Manual – September 24, 2009
USACOE– US Army Corps of Engineers
WMO – Cook County Watershed Management Ordinance – Public Review Draft – September 24, 2009
WFNBCR – West Fork North Branch of the Chicago River
WPC – Watershed Planning Council
WSEL – Water Surface Elevation

Project Legend

Existing Storm Sewer, Sewer Size and Drainage Structures

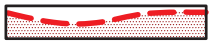

Edge of Pavement


Property Boundaries


FEMA Flood Insurance Rate Map 100-year Floodway


FEMA Flood Insurance Rate Map 100-year Floodplain


FEMA Flood Insurance Rate Map 500-year Boundary


Estimated Existing Flooding Boundary *


Estimated Proposed After Project Flooding Boundary *


Proposed Storm Sewer


Proposed Manhole


Proposed Catch Basin / Inlet


Direction of Flow

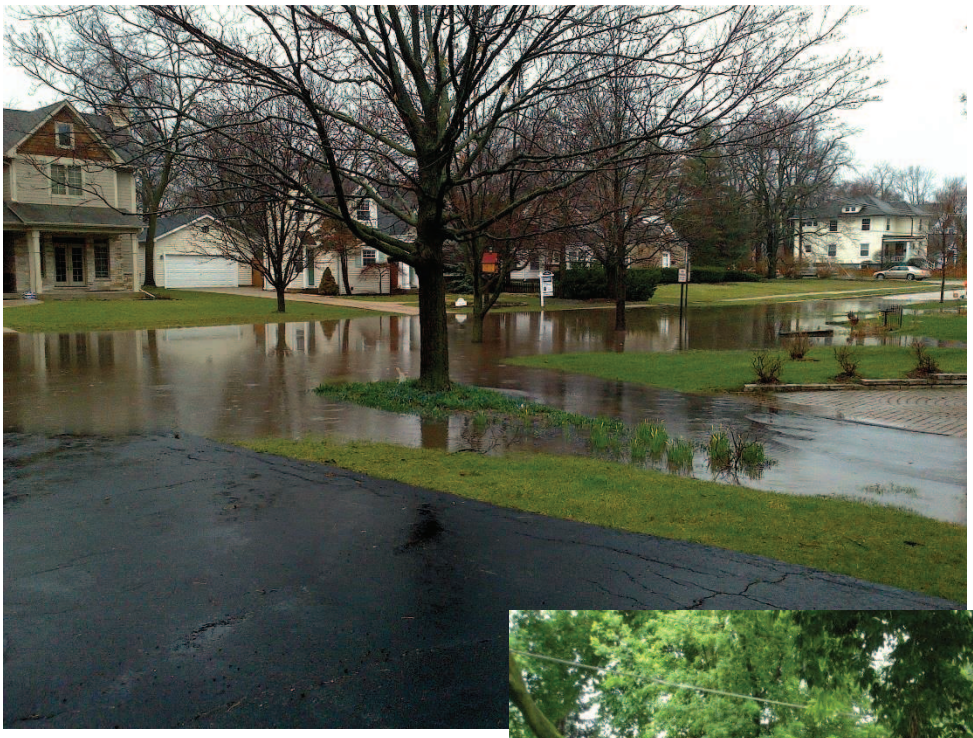

Flood Overflow

*Note: The existing and proposed flooding boundaries are not regulatory and are for informational purposes only.

Neighborhood Projects

Project 29

FIRST STREET – CENTER AVENUE



2018 Center Avenue
looking Southwest

Backyard Flooding at
1340 First Street
looking Southwest

2018 Center Avenue
looking Southeast

PROJECT 29
FIRST STREET/CENTER AVENUE

Statement of Conditions:

The local drainage system is dependent upon small storm sewer conveyance and inlet collection system that is very old. The Walters Resub was platted in 1904. Stormwater runoff conditions have increased due to property redevelopment. The roadway drainage system cannot adequately convey runoff from storms of low rainfall intensities. Flood overflow route conditions result in rear yard flood condition. The cause of the flooding conditions were initially identified as undersized private rear yard drainage system, back-up from the mainline storm sewer system and the absence of a positive overland drainage route. One structure was reported to have had flood damage.

Problem Identification:

Street, front yard, backyard and structure flooding

Recommended Plan:

- Construct relief storm sewer from the First Street/Center Avenue northerly (425 feet) along First Street outletting to the Library Campus storm sewer/storage basin.
- Disconnect Center Avenue storm sewer from First Street southerly outlet
- Improve backyard drainage collection system by constructing a new low flow storm sewer that would connect to the First Street storm sewer within an acquired drainage easement (preferably within the area identified as easement required)
- Mitigate potential downstream drainage impacts by oversizing the relief storm sewer for stormwater storage purposes

  Or,

- Construct stormwater detention facility on an acquired property lot located within the area subject to backyard and/or structure flooding (adjacent properties with back yard flooding conditions-four identified) (Not included in Cost Estimate or Benefit-Cost Ratio)

Estimated Total Cost	Construction Cost	Property Cost	Engineering Cost	B/C Ratio	Optimum Protection
$ 374,000	$ 312,000	$15,000	$ 47,000	2.41	10-yr

LEGEND

EXISTING SEWER

PROPOSED SEWER

CATCH BASIN

MANHOLE

VILLAGE HALL

30"

12"

24"

PROPOSED CONTROL STRUCTURE

1245

1253

1305

1311

1317

1321

48"±

PROPOSED OVERSIZED SEWER

METRA RAILROAD

0 100' 200'

2130 2124 2120 2112 2110 2100

2034 2030 2026 2022 2018 2000

15"

CENTER AVE.

18"

24"

30"±

2137 2131 2125 2121 2117 2111 2107 2103

2033 2025 2021 2015 2013 2009 2005

EASEMENT REQUIRED

PLUG EXISTING SEWER

1ST STREET

APPROXIMATE EXISTING 10-YEAR FLOODING LIMITS

1340

CEDAR LANE

ESTIMATED PROPOSED AFTER PROJECT 10-YEAR FLOODING BOUNDARY

SHERMER RD.

24"

24"

2116 2110 2106 2100

2040 2036 2032 2028 2026 2020 2016 2010 2002

WALTERS AVE.

24"

2117 2115 2103 2101

2051 2043 2037 2029

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FIRST STREET AND CENTER AVENUE

PROJECT 29

Project 30

Wendy Drive

1224 Wendy Drive
looking Northeast

1224 Wendy Drive
looking Northeast

1224 Wendy Drive
looking North

PROJECT 30
WENDY DRIVE

Statement of Conditions:

The drainage of the low area on Wendy Drive that floods is dependent upon an older, existing drainage system. That drainage system utilizes the Ridge Road storm sewer for low flows and the depth of flooding for moderate to high rain intensities is controlled by the flood overflow conditions at Ridge Road. Conditions are further aggravated by increased runoff due to more recent development that drains to that system. Another contributing cause of these conditions is overflow from Caryn Terrace. The Wendy Drive drainage system cannot adequately convey storms of moderate to high rainfall intensities. As a result, the flooding of Wendy Drive occurs. When the pavement is flooded, access to the southerly section of Wendy Drive is limited.

The MSMP Project 13, RIDGE ROAD/LEE ROAD was recently completed (2012) and included the construction of a new storm sewer along Ridge Road from Lee Road to Daryl Lane. Otherwise, the majority of the Ridge Road drainage system is 45-55 years old and cannot adequately convey storms of moderate to high intensities. Project 13 provides the opportunity to improve the local drainage system upstream of Daryl Lane as it can serve as an improved outlet.

Problem Identification:

Street and front yard flooding

Recommended Plan:

- Improve inlet capacity along Wendy Drive by constructing additional inlet structures at the Wendy Drive low area and at the Ridge Road intersection.
- Improve low flow conveyance along Wendy Drive from its low area to Ridge Road by constructing a larger storm sewer
- Improve low flow conveyance along Ridge Road from Wendy Drive to Daryl Lane by constructing a larger storm sewer.
- Provide a flood overflow route along Wendy Drive around the southeast corner of the Ridge Road intersection. An easement will likely be needed

  Or,

- Provide stormwater detention within a suitable, acquired lot adjacent to the flooded area to mitigate potential project drainage impacts if necessary.

Estimated Total Cost	Construction Cost	Property Cost	Engineering Cost	B/C Ratio	Optimum Protection
$ 229,000	$ 186,000	$15,000	$ 28,000	0.28	10-yr

WENDY DRIVE

PROJECT 30

Project 31

WILLOW CREEK SUBDIVISION

Yard Flooding at
2574 Canterbury Drive
looking Northeast

Intersection of Wood Drive
and Canterbury Drive
looking Southeast

Intersection of Elm Ridge Drive
and Canterbury Drive
looking North

2574 Canterbury Drive
looking Southeast

PROJECT 31
WILLOW CREEK SUBDIVISION

Statement of Conditions:

The local drainage system is dependent upon small storm sewer conveyance and inlet collection system that is over 50 years old (Willow Creek Development CO, recorded 1956; School Trustee Sub, recorded earlier), and stormwater runoff conditions have increased due to property redevelopment. The roadway drainage system cannot adequately convey runoff from the subdivision tributary area for low intensity storm events. This condition results in street and adjacent property flooding that has been identified at the Canterbury Drive and Elm Ridge Drive, Wood Drive and Canterbury Drive, and Elm Ridge Drive and Woodland Drive intersections. The South Fork of Techny Drain flows through the subdivision and serves as the outlet for the local drainage system

Phase IV of the Village adopted February 2001 Techny Drain Stormwater Management Improvement Plan was completed in 2011. The projects in that phase included flood reduction benefits to properties located along the South Fork of Techny Drain stream channel. The reduction of flood levels provides the opportunity for improvement of the local drainage system.

Problem Identification:

Street, front yard and back yard flooding associated with the local storm sewer and inlet drainage system.

Recommended Plan:

- Reduce flooding by constructing a new 36 inch diameter storm sewer along Canterbury Dr. and Elm Ridge Dr. from Wood Drive to the South Fork channel.
- Construct ditch overflow relief from the Canterbury/ Elm Ridge Road intersection to the South Fork Techny Drain channel
- Mitigate potential downstream drainage impacts by constructing a stormwater detention facility on an acquired property lot located adjacent to the identified intersection flooding locations

Estimated Total Cost	Construction Cost	Property Cost	Engineering Cost	B/C Ratio	Optimum Protection
$1,215,000	$622,000	$500,000	$93,000	0.14	10-yr

NOTE: TYPICAL STORMWATER DETENTION SITE.

ESTIMATED PROPOSED AFTER PROJECT 10-YEAR FLOODING BOUNDARY AVG DEPTH = 0.2'±

ESTIMATED EXISTING 10-YEAR FLOODING BOUNDARY

HIGH CAPACITY INLET (TYP.)

ALT. A

ALT. B

CANTERBURY DR.

WOOD DR.

ELM RIDGE DR.

WOODLAND DR.

36"±

30"±

27"

12"±

18"±

10"

48"

77"X52"

CONTROL STRUCTURE/ OVERFLOW STRUCTURE

PLUG EXISTING SEWER

GRADE OVERFLOW DITCH

OVERFLOW COLLECTION GRATE

SOUTH FORK OF TECHNY DRAIN

ESTIMATED PROPOSED AFTER PROJECT 10-YEAR FLOODING BOUNDARY AVG DEPTH = 0.4'±

ESTIMATED PROPOSED AFTER PROJECT 10-YEAR FLOODING BOUNDARY AVG DEPTH = 0.2'±

ESTIMATED EXISTING 10-YEAR FLOODING BOUNDARY

0 100' 200'

LEGEND

- EXISTING SEWER
- PROPOSED SEWER
- CATCH BASIN
- MANHOLE
- DITCH FLOWLINE

VILLAGE OF NORTHBROOK COOK COUNTY ILLINOIS 1901 CIVITAS 1923

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WILLOW CREEK

PROJECT 31

Village of Northbrook

Addendum #2

Appendix
Master Stormwater Management Plan

April 2015

Hampton, Lenzini and Renwick, Inc.
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PROJECT BENEFIT COST RATIO				
Project No.	**Project**	**Estimate of Cost**	**Estimated Number of Damaged Structures Benefited**	**Benefit Cost Ratio**
29	First Street / Center Avenue	$374,000	1	2.41
30	Wendy Drive	$229,000	0	0.28
31	Willow Creek Subdivision	$1,215,000	0	0.14

PROJECT COST PER PROPERTY BENEFITED				
Project No.	**Project**	**Estimate of Cost**	**Estimated Number of Properties Benefited**	**Cost per Property Benefited**
29	First Street / Center Avenue	$374,000	10	$37,400
30	Wendy Drive	$229,000	10	$22,900
31	Willow Creek Subdivision	$1,215,000	24	$50,625

PROJECT COST RANGE			
Project No.	**Project**	**Estimate of Cost**	**Project Cost Range**
29	First Street / Center Avenue	$374,000	**< $500,000**
30	Wendy Drive	$229,000	**< $250,000**
31	Willow Creek Subdivision	$1,215,000	**> $1,000,000**

Estimated Total Cost Table
(Recommended Plan)

Project 29 - First Street / Center Avenue

	SUMMARY OF QUANTITIES			ESTIMATE OF COST	
	ITEM	UNIT	QUANTITY	UNIT PRICE	COST
CONSTRUCTION	EARTH EXCAVATION	CU YD	20	$45.00	$900.00
	SODDING	SQ YD	216	$6.00	$1,296.00
	TRENCH BACKFILL	CU YD	316	$45.00	$14,220.00
	AGGREGATE BASE COURSE, TYPE A 6"	SQ YD	200	$25.00	$5,000.00
	HOT-MIX ASPHALT BINDER COURSE, IL-19.0, N70	TON	24	$100.00	$2,400.00
	HOT-MIX ASPHALT SURFACE COURSE, MIX "D", N70	TON	24	$125.00	$3,000.00
	STORM SEWER, CLASS A, TYPE 2, 12"	FOOT	175	$85.00	$14,875.00
	STORM SEWER, CLASS A, TYPE 2, 30"	FOOT	120	$150.00	$18,000.00
	DUCTILE IRON WATER MAIN, 48"	FOOT	390	$450.00	$175,500.00
	5' SIDEWALK REMOVAL AND REPLACEMENT	SQ FT	540	$7.50	$4,050.00
	MANHOLES, TYPE A, 5' DIAMETER, TYPE 1 FRAME AND LID	EACH	2	$3,500.00	$7,000.00
	MANHOLES, TYPE A, 7' DIAMETER, TYPE 1 FRAME AND LID	EACH	1	$7,500.00	$7,500.00
	CATCH BASIN	EACH	1	$2,500.00	$2,500.00
	CONTROL STRUCTURE	EACH	1	$15,000.00	$15,000.00
	COMBINATION CONCRETE CURB AND GUTTER REMOVAL	FOOT	20	$5.00	$100.00
	COMBINATION CONCRETE CURB AND GUTTER, TYPE B-6.12	FOOT	20	$30.00	$600.00
	DRIVEWAY REMOVAL	SQ YD	8	$11.00	$88.00
	HOT-MIX ASPHALT DRIVEWAY SURFACE, 3"	SQ YD	8	$30.00	$240.00
	TREE REMOVAL (6 TO 15 UNITS DIAMETER)	UNIT	36	$40.00	$1,440.00
	TRAFFIC CONTROL AND PROTECTION	L SUM	1	$10,000.00	$10,000.00
				SUBTOTAL	$284,000.00
				CONTINGENCY 10%	$28,000.00
				TOTAL	**$312,000.00**
	ENGINEERING (15% CONSTRUCTION COST)	LSUM	1	$47,000.00	$47,000.00
	EASEMENT ACQUISITION	LSUM	1	$15,000.00	$15,000.00
				TOTAL	**$62,000.00**

ESTIMATED TOTAL COST	**$374,000.00**

Estimated Total Cost Table
(Recommended Plan)

Project 30 - Wendy Drive

	SUMMARY OF QUANTITIES			ESTIMATE OF COST	
	ITEM	UNIT	QUANTITY	UNIT PRICE	COST
CONSTRUCTION	EARTH EXCAVATION	CU YD	20	$45.00	$900.00
	SODDING	SQ YD	10	$6.00	$60.00
	TRENCH BACKFILL	CU YD	157	$45.00	$7,065.00
	AGGREGATE BASE COURSE, TYPE A 6"	SQ YD	170	$25.00	$4,250.00
	HOT-MIX ASPHALT BINDER COURSE, IL-19.0, N70	TON	21	$100.00	$2,100.00
	HOT-MIX ASPHALT SURFACE COURSE, MIX "D", N70	TON	21	$125.00	$2,625.00
	STORM SEWER, CLASS A, TYPE 2, 15"	FOOT	424	$90.00	$38,160.00
	STORM SEWER, CLASS A, TYPE 2, 18"	FOOT	330	$95.00	$31,350.00
	MANHOLES, TYPE A, 5' DIAMETER, TYPE 1 FRAME AND LID	EACH	4	$3,500.00	$14,000.00
	HIGH CAPACITY INLET	EACH	4	$15,000.00	$60,000.00
	CONNECT TO EXISTING MANHOLE	EACH	1	$1,000.00	$1,000.00
	TRAFFIC CONTROL AND PROTECTION	L SUM	1	$7,500.00	$7,500.00
				SUBTOTAL	$169,000.00
				CONTINGENCY 10%	$17,000.00
				TOTAL	**$186,000.00**
	ENGINEERING (15% CONSTRUCTION COST)	LSUM	1	$28,000.00	$28,000.00
	EASEMENT ACQUISITION	LSUM	1	$15,000.00	$15,000.00
				TOTAL	**$43,000.00**
				ESTIMATED TOTAL COST	**$229,000.00**

Estimated Total Cost Table
(Recommended Plan)

Project 31 - Willow Creek

	SUMMARY OF QUANTITIES			ESTIMATE OF COST	
	ITEM	UNIT	QUANTITY	UNIT PRICE	COST
CONSTRUCTION	EARTH EXCAVATION	CU YD	1036	$45.00	$46,620.00
	SEEDING, CLASS 2A	ACRE	0.4	$20,000.00	$8,000.00
	SODDING	SQ YD	376	$6.00	$2,256.00
	TRENCH BACKFILL	CU YD	941	$45.00	$42,345.00
	AGGREGATE BASE COURSE, TYPE A 6"	SQ YD	710	$25.00	$17,750.00
	HOT-MIX ASPHALT BINDER COURSE, IL-19.0, N70	TON	85	$100.00	$8,500.00
	HOT-MIX ASPHALT SURFACE COURSE, MIX "D", N70	TON	85	$125.00	$10,625.00
	STORM SEWER, CLASS A, TYPE 2, 12"	FOOT	168	$85.00	$14,280.00
	STORM SEWER, CLASS A, TYPE 2, 18"	FOOT	197	$95.00	$18,715.00
	STORM SEWER, CLASS A, TYPE 2, 30"	FOOT	300	$150.00	$45,000.00
	STORM SEWER, CLASS A, TYPE 2, 36"	FOOT	925	$175.00	$161,875.00
	MANHOLES, TYPE A, 5' DIAMETER, TYPE 1 FRAME AND LID	EACH	5	$3,500.00	$17,500.00
	OVERFLOW COLLECTION GRATE	EACH	1	$15,000.00	$15,000.00
	HIGH CAPACITY INLET	EACH	7	$15,000.00	$105,000.00
	COMBINATION CONCRETE CURB AND GUTTER REMOVAL	FOOT	116	$5.00	$580.00
	COMBINATION CONCRETE CURB AND GUTTER, TYPE M-4.12	FOOT	116	$30.00	$3,480.00
	CONTROL STRUCTURE / OVERFLOW STRUCTURE	EACH	1	$15,000.00	$15,000.00
	FLARED END SECTION 12"	EACH	1	$750.00	$750.00
	FLARED END SECTION 18"	EACH	1	$950.00	$950.00
	FLARED END SECTION 36"	EACH	2	$1,800.00	$3,600.00
	GRATING FOR CONCRETE FLARED END SECTION, 48"	EACH	1	$1,000.00	$1,000.00
	DRIVEWAY REMOVAL	SQ YD	32	$11.00	$352.00
	HOT-MIX ASPHALT DRIVEWAY SURFACE, 3"	SQ YD	32	$30.00	$960.00
	TRAFFIC CONTROL AND PROTECTION	L SUM	1	$25,000.00	$25,000.00
				SUBTOTAL	$565,000.00
				CONTINGENCY 10%	$57,000.00
				TOTAL	**$622,000.00**
	ENGINEERING (15% CONSTRUCTION COST)	LSUM	1	$93,000.00	$93,000.00
	PROPERTY COST	LSUM	1	$500,000.00	$500,000.00
				TOTAL	**$593,000.00**
				ESTIMATED TOTAL COST	**$1,215,000.00**

Village of Northbrook
Master Stormwater Management Plan
Benefit-Cost Ratio Determination

First Street / Center Avenue - 10-Year Storm Event

	Number of Structures Damaged	Structural Damage	Contents Damage	Associated Damages	Automobile Damage	Exterior Damage	Displacement Cost	Lost Wages and Income	Public Works Costs	Total Costs	Total Flood Damage Per Year	Benefits per Year
Existing Conditions	1	$263,453	$136,083	$2,479	$2,250	$10,000	$1,400	$2,000	$25,000	$442,665	$44,000	-
Proposed Conditions	0	$0	$0	$1,475	$0	$9,000	$0	$0	$10,000	$20,475	$2,000	$42,000

First Street / Center Avenue - 10-Year Storm Event

	Total Flood Damage per Year	Present Worth Damages	Net Benefit	Project Costs	Benefit / Cost Ratio
Existing Conditions	$44,000	$945,208			
Proposed Conditions	$2,000	$42,964	$902,000	$374,000	2.41

Note: Assume the interest rate is 4% and a project life of 50 years

Village of Northbrook
Master Stormwater Management Plan
Benefit-Cost Ratio Determination

Wendy Drive - 10-Year Storm Event

	Number of Structures Damaged	Structural Damage	Contents Damage	Associated Damages	Automobile Damage	Exterior Damage	Displacement Cost	Lost Wages and Income	Public Works Costs	Total Costs	Total Flood Damage Per Year	Benefits per Year
Existing Conditions	0	$0	$0	$0	$0	$1,000	$0	$0	$35,000	$36,000	$4,000	-
Proposed Conditions	0	$0	$0	$0	$0	$0	$0	$0	$10,000	$10,000	$1,000	$3,000

Wendy Drive - 10-Year Storm Event

	Total Flood Damage per Year	Present Worth Damages	Net Benefit	Project Costs	Benefit / Cost Ratio
Existing Conditions	$4,000	$85,928			
Proposed Conditions	$1,000	$21,482	$64,000	$229,000	0.28

Note: Assume the interest rate is 4% and a project life of 50 years

Village of Northbrook
Master Stormwater Management Plan
Benefit-Cost Ratio Determination

Willow Creek Subdivision - 10-Year Storm Event

	Number of Structures Damaged	Structural Damage	Contents Damage	Associated Damages	Automobile Damage	Exterior Damage	Displacement Cost	Lost Wages and Income	Public Works Costs	Total Costs	Total Flood Damage Per Year	Benefits per Year
Existing Conditions	0	$0	$0	$0	$0	$27,000	$0	$0	$75,000	$102,000	$10,000	-
Proposed Conditions	0	$0	$0	$0	$0	$14,000	$0	$0	$10,000	$24,000	$2,000	$8,000

Willow Creek Subdivision - 10-Year Storm Event

	Total Flood Damage per Year	Present Worth Damages	Net Benefit	Project Costs	Benefit / Cost Ratio
Existing Conditions	$10,000	$214,820			
Proposed Conditions	$2,000	$42,964	$172,000	$1,215,000	0.14

Note: Assume the interest rate is 4% and a project life of 50 years