

Village of Northbrook

Addendum #1 Master Stormwater Management Plan

April 2012



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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 #1
New Master Stormwater Plan (April 2012)
for Additional Areas with Flooding Issues

During the discussions and Open House meetings with the public for the New Master Stormwater Management Plan 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 New Plan. It was recommended by staff to study six additional areas consistent with the level of detail for the current 22 projects ranked in the New Master Plan, 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 six 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 23) 1100 Block of Blackthorn Lane.

The existing street flooding condition has worsened over the years to the point that two homes are now experiencing damages. The flooding occurs in a roadway sag that has an upstream drainage area of approximately 9 acres. The receiving storm sewer is small compared to today's standards and outfalls to the Cherry Lane storm sewer system, which is also undersized.

2. (Project 24) Brittany Road (Bordeaux Drive to Dauphine Avenue).

This is another roadway sag location that experiences inundation during heavy to severe rainfall events, causing structure flooding at one location. The upstream drainage area is approximately 115 acres. The Public Works Department has added one open grate drainage structure at this location to provide additional inlet capacity, giving additional runoff access to the existing 42-inch diameter trunk storm sewer.

3. (Project 25) Dehne Road - Glendale Avenue Intersection.

The home located at the southeast corner has begun to experience structure flooding during heavy rainfall events. The property topography does not have sufficient positive grade to convey the flood overflows around the structure. Approximately 18 acres drain to this location. The roadside ditch and culvert system are not adequate to safely convey runoff and cannot be increased in size due to the downstream capacity constraints.

4. (Project 26) Landwehr Road - Sunset Trail Intersection.

Sunset Trail floods at Landwehr Road floods every heavy rainfall event and is very slow to drain. Approximately 29 acres drain to this area. A pronounced drainage system is absent. The downstream pipe culvert and roadside ditch along the east side of Landwehr Road is clogged and needs to be regraded by the Cook County Highway Department, which is responsible for maintenance.

5. (Project 27) Longvalley Drive - Longvalley Court Intersection

The street flooding on Longvalley Drive at Longvalley Court has worsened over time to the point that now one home is experiencing flood damages. The upstream drainage area is approximately 9 acres with the potential of 4 additional acres that would overflow from unincorporated Northfield Township. The grate capacity at the intersection has been checked and all receiving storm sewer lines are functioning as intended.

6. **(Project 28) Surrey Lane Cul-De-Sac.**

The majority of the homeowners who live along this street have requested storm sewer improvements to reduce the street flooding condition in the cul-de-sac. Currently no homes suffer flooding damages. It appears that approximately 9 acres are tributary to this location with the possibility that an additional 4 acres would overflow from other upstream areas. The existing 8-inch sewer is too small under today's standards to effectively drain this area. The opportunity exists to enlarge this sewer due to the improved storm sewer outlet on the downstream Lee Road drainage system.

Village of Northbrook
Overall Location Map for Additional Flooding Areas



Location Index

- 23 - Blackthorn Lane (1100 Block)
- 24 - Brittany Road (Bordeaux Drive to Dauphine Avenue)
- 25 - Dehne Road - Glendale Avenue Intersection
- 26 - Landwehr Road - Sunset Trail Intersection
- 27 - Longvalley Drive - Longvalley Court Intersection
- 28 - Surrey Lane Cul-de-sac



PROJECT RANKING TABLE	PROJECT	RANK ^{1,2}	SCORE	PROJECT NUMBER	OPTIMUM LEVEL OF PROTECTION (YEARS) ³									
					BENEFIT-COST RATIO (B/C)	RANK BY BENEFIT-COST RATIO (B/C)	ESTIMATED NUMBER OF DAMAGED 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 (2011 DOLLARS) ^{5,6}	AVERAGE COST PER DAMAGED STRUCTURE BENEFITED ⁶	AVERAGE COST PER PROPERTY BENEFITED ⁶	
1	1.67	23	Blackthorn Lane (1100 Block)		10	2.88	3	2	1	12	\$130,000	\$65,000	\$10,800	
2	2.00	26	Landwehr Road - Sunset Trail Intersection		5	3.48	2	1	2	11	\$97,000	\$97,000	\$8,800	
3	3.00	25	Dehne Road - Glendale Avenue Intersection		10	9.25	1	1	2	1	\$130,000	\$130,000	\$130,000	
4	3.33	27	Longvalley Drive - Longvalley Court Intersection		10	1.74	5	1	2	8	\$95,000	\$95,000	\$11,900	
5	3.67	24	Brittany Road (Bordeaux Drive to Dauphine Avenue)		10	1.75	4	1	2	6	\$139,000	\$139,000	\$23,200	
6	5.33	28	Surrey Lane (Cul-De-Sac)		10	0.34	6	0	6	7	\$61,000	N/A	\$8,700	
										TOTAL COST OF ALL PROJECTS	\$652,000			

NOTES:

1. This table is a list of projects evaluated in Addendum #1 of the New 2011 Master Stormwater Management Plan (August 2011) 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 benefited.
3. The optimum level of protection refers to the storm event for which a project can reliably provide benefits to properties affected.
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.**
6. Cost are based on 2011 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

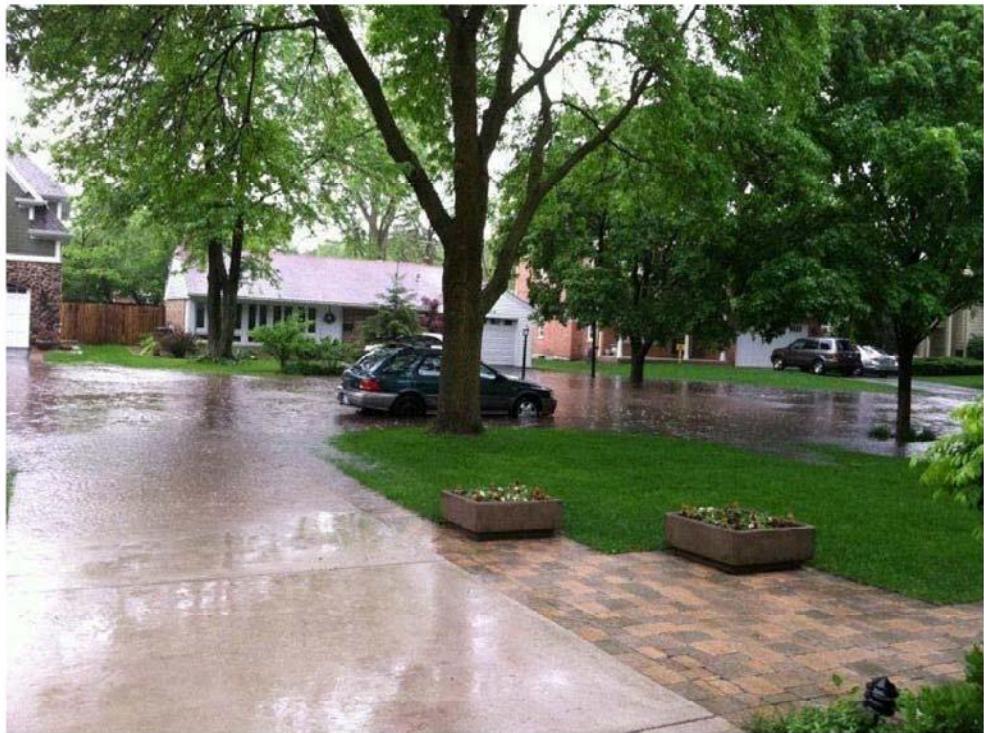
	Existing Storm Sewer, Sewer Size and Drainage Structures
	Edge of Pavement
	Property Boundaries
	FEMA Flood Insurance Rate Map 100-year Floodway
	FEMA Flood Insurance Rate Map 100-year Floodplain
	FEMA Flood Insurance Rate Map 500-year Boundary
	Estimated Existing Flooding Boundary *
	Estimated Proposed After Project Flooding Boundary *
	Proposed Storm Sewer
	Proposed Manhole
	Proposed Catch Basin / Inlet
	Direction of Flow
	Flood Overflow

Note: 1. The existing and proposed flooding boundaries are not regulatory and are for informational purposes only. (*)
2. Aerial Photographs are from 2005.

Neighborhood Projects



**Project 23
BLACKTHORN LANE**



1114 Blackthorn Lane looking West (May 25, 2011)



1108 and 1114 Blackthorn Lane looking Southwest (May 25, 2011)

PROJECT 23
BLACKTHORN LANE
(1100 Block)

Statement of Conditions:

The existing storm sewer drainage system is 50 to 60 years old. The system cannot adequately convey runoff from storms of moderate to high rainfall intensities and the receiving storm sewer system is undersized compared to today's standards. Blackthorn Lane and adjacent properties form a bowl-shaped area that functions like a stormwater detention basin. The drainage service area is $9 \pm$ acres with the possibility of receiving flood overflows from adjacent drainage systems. Increased flooding depths and related flooding of two structures have been reported.

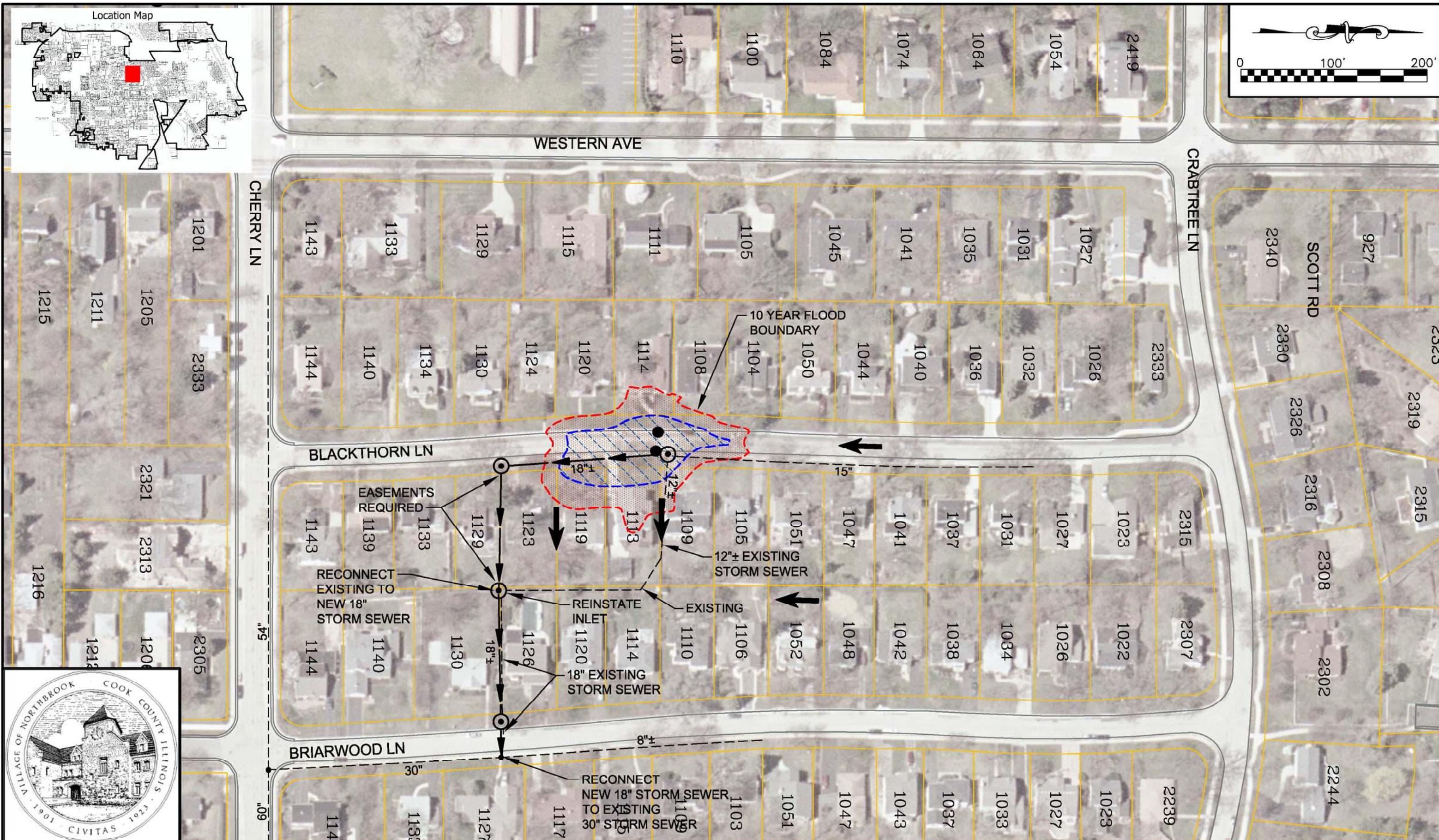
Problem Identification:

Street, front yard, back yard and structure flooding.

Recommended Plan:

- Improve street drainage collection system by increasing inlet capacity both along the street and within the low street area.
- Replace the old Blackthorn Lane corrugated metal pipe system with a new 18" diameter storm sewer.
- Construct storm water control structure with $12'' \pm$ orifice plate on Blackthorn Lane.
- Acquire drainage easements between two properties fronting on Blackthorn Lane to facilitate the construction of the new storm sewer to Briarwood Lane.
- Reconnect the rear yard drainage inlets to the new storm sewer.

Estimated Total Cost (w/o mitigation)	Construction Cost	Property Cost	Engineering Cost	B/C Ratio (with mitigation)	Optimum Protection
\$130,000	\$96,000	\$20,000	\$14,000	2.88	10-yr



BLACKTHORN LANE (1100 BLOCK)

PROJECT 23

Project 24
BRITTANY ROAD
(Bordeaux Drive to Dauphine Avenue)



3923 Brittany Road (May 25, 2011)



3923 Brittany Road (May 25, 2011)

PROJECT 24
BRITTANY ROAD
(Bordeaux Drive to Dauphine Avenue)

Statement of Conditions:

The existing drainage system is over 40 years old. The storm sewer system cannot adequately convey storms of moderate to high rainfall intensities. The project area is at the lower end of a $115\pm$ acre drainage service area. Flood flows that exceed the capacity of the storm sewer system utilize the street network as conveyance paths that lead to the project area. Street flooding occurred on Brittany Road and adjacent properties easterly of Bordeaux Drive during the July 23, 2011 storm event. Repetitive property and street flooding has been identified. Brittany Road is located within a depressional area that could flood as deep as $1.7'\pm$ before overflow relief occurs in a westerly direction along Bordeaux Drive.

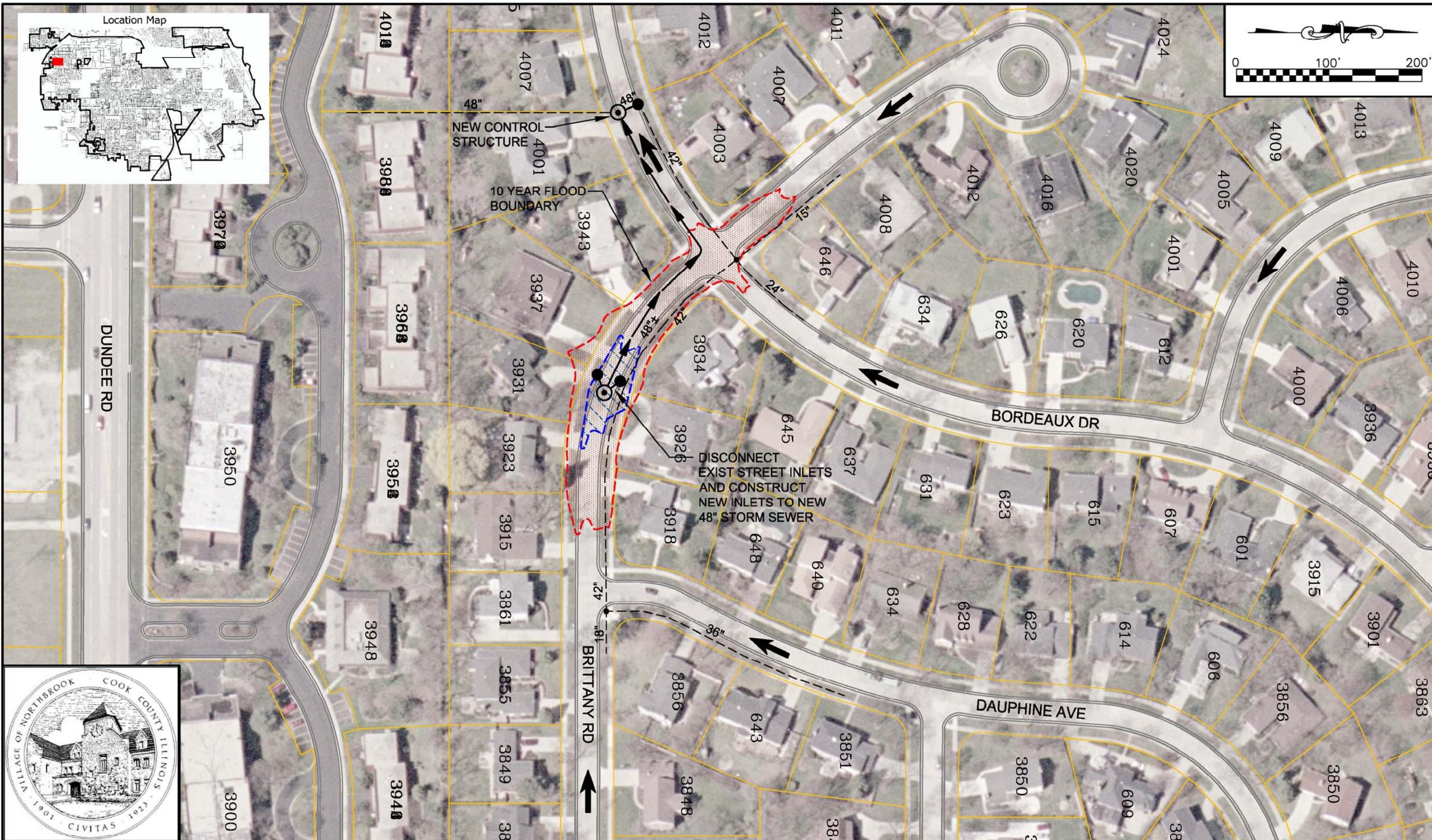
Problem Identification:

Street, front yard and reported structure flooding.

Recommended Plan:

- Supplement the existing 42" storm sewer by constructing approximately 375' of 48" storm sewer to drain the low area on Brittany Road to the 48" storm sewer outlet on Bordeaux Road.
- Disconnect the lower inlets within the flood prone area from the existing storm sewer and reconnect them to the 48" storm sewer.
- Increase the inflow capacity by adding inlets.
- Construct downstream control structure with control orifice plate and street inlets that also serve as "bubblers" to maintain flood overflows along Bordeaux Drive.

Estimated Total Cost (w/o mitigation)	Construction Cost	Property Cost	Engineering Cost	B/C Ratio (with mitigation)	Optimum Protection
\$139,000	\$121,000	N/A	\$18,000	1.75	10-yr



Project 25
DEHNE ROAD - GLENDALE AVENUE
INTERSECTION



2251 Glendale Avenue looking Southeast



2251 Glendale Avenue looking
Northeast



Dehne Road and Glendale Avenue
Intersection looking Northwest

PROJECT 25
DEHNE ROAD - GLENDALE AVENUE
INTERSECTION

Statement of Conditions:

The original drainage system consisting of ditches and culverts is generally 60 to 70 years old. The system has undergone modification that consists of intermittent sections of storm sewer. The drainage service area is $17.7\pm$ acres. The system cannot adequately convey runoff from storms of moderate to high rainfall intensities and the drainage system is undersized compared to today's standards. The downstream drainage system has similar characteristics and is considered to be sensitive to upstream projects. The flood overflow path is across Glendale Avenue and along the east side of the road and on private property located in the southeast corner of the intersection.

Problem Identification:

Street, front yard and structure flooding.

Recommended Plan:

- Reduce the risk of flood overflow across the southeast corner private property by increasing the swale capacity between the road and the property. This would be accomplished by either deepening the swale and/or re-grading the street parkway and the private property front/side yard area to increase the berm height (including private entrance modifications).
- Remove and replace 350' of old 8" corrugated metal pipe storm sewer and inlets located on the east side of the Glendale Avenue.
- Re-grade 200' \pm of the westerly road ditch to provide a positive flow path to the existing culvert under Glendale Avenue.
- Construct 330' \pm of 18" \pm storm sewer along Glendale Avenue between Bellevue Place and Techny Road to reinstate positive flow in a southerly direction (contingent upon the Techny Road project being in place).
- Add 2271 Dehne Road to Prioritized Parcel Acquisition list.

Estimated Total Cost	Construction Cost	Property Cost	Engineering Cost	B/C Ratio	Optimum Protection
\$130,000	\$113,000	N/A	\$17,000	9.25	10-yr



DENHE ROAD - GLENDALE AVE (INTERSECTION)

PROJECT 25

Project 26
LANDWEHR ROAD - SUNSET TRAIL INTERSECTION



2300 Landwehr Road (July 23, 2011)



Sunset Trail (July 23, 2011)

PROJECT 26
LANDWEHR ROAD - SUNSET TRAIL
INTERSECTION

Statement of Conditions:

The existing drainage system is over 50 years old and has been modified as part of recent private property redevelopment. The Landwehr Road and Floral Drive drainage system outlet cannot adequately convey storms of moderate to high rainfall intensities from the $29\pm$ acre drainage service area. The project is located at the upper end of the South Fork of Techny Drain. Flood flows that exceed the low flow drainage system capacity result in ponding westerly on Sunset Trail, southerly of Floral Drive along the east side of Landwehr Road, and on adjacent properties. Recent photographs suggest that Sunset Trail and adjacent properties are subject to as much as a $2'\pm$ flooding depth.

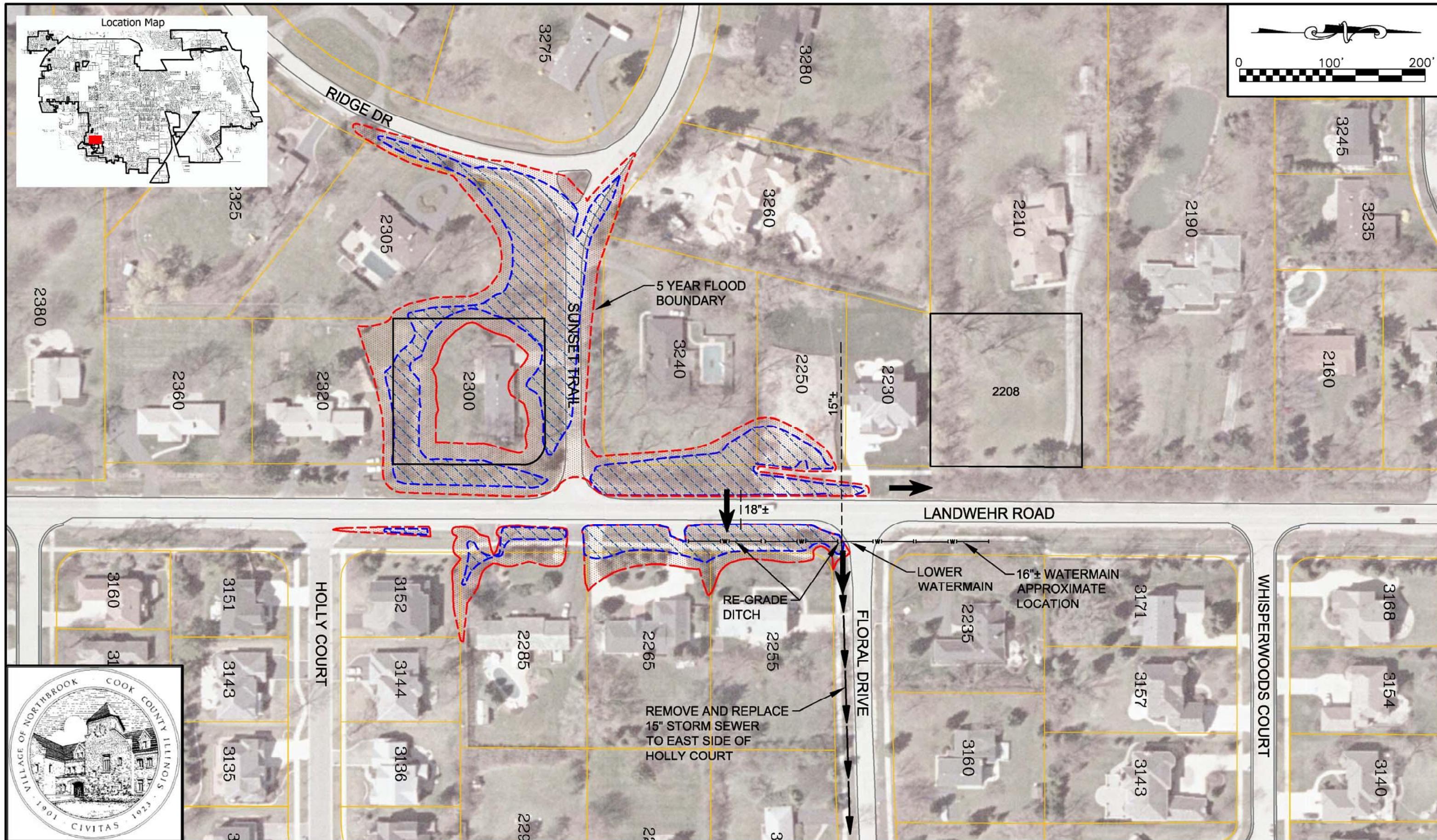
Problem identification:

Street, front yard, back yard and structure flooding.

Recommended Plan:

- Remove and replace $505'\pm$ of existing 15" storm sewer along Floral Drive between Landwehr Road and the east side of Holly Court.
- Adjust (lower) Landwehr Road east side water main as required to accommodate the lower storm sewer profile.
- Re-grade Landwehr Road east ditch to achieve positive flow to the lowered storm sewer.
- Coordinate and process permit with Cook County Highway Department for construction activities that would occur within the Landwehr Road ROW.
- Add the properties located at 2300 and 2208 Landwehr Road to the Prioritized Parcel Acquisition list.

Estimated Total Cost (w/o mitigation)	Construction Cost	Property Cost	Engineering Cost	B/C Ratio (with mitigation)	Optimum Protection
\$97,000	\$84,000	N/A	\$13,000	3.48	5-yr



LANDWEHR ROAD - SUNSET TRAIL (INTERSECTION)

PROJECT 26

Project 27
LONGVALLEY DRIVE – LONGVALLEY COURT
INTERSECTION



Drift line at 1673 Longvalley Drive (July 23, 2011)



Drift line at 1673 Longvalley Drive (July 23, 2011)

PROJECT 27
LONGVALLEY DRIVE – LONGVALLEY COURT
(Intersection)

Statement of Conditions:

The existing drainage system is over 40 years old. The Longvalley Drive storm sewer system cannot adequately convey storms of moderate to high rainfall intensities. Street flooding on Longvalley Drive at the intersection with Longvalley Court has been reported to have worsened over time such that one home may have recently experienced flooding. The intersection is located in a low area that could pond as deep as 2' before overflowing southerly and/or easterly along Longvalley Drive. The drainage service area is 9.1± acres. Flood overflows from a 3.9± acre unincorporated Northfield Township area located to the west and from the Prestwick Lane storm sewer system could contribute to intersection flooding for the larger storm events.

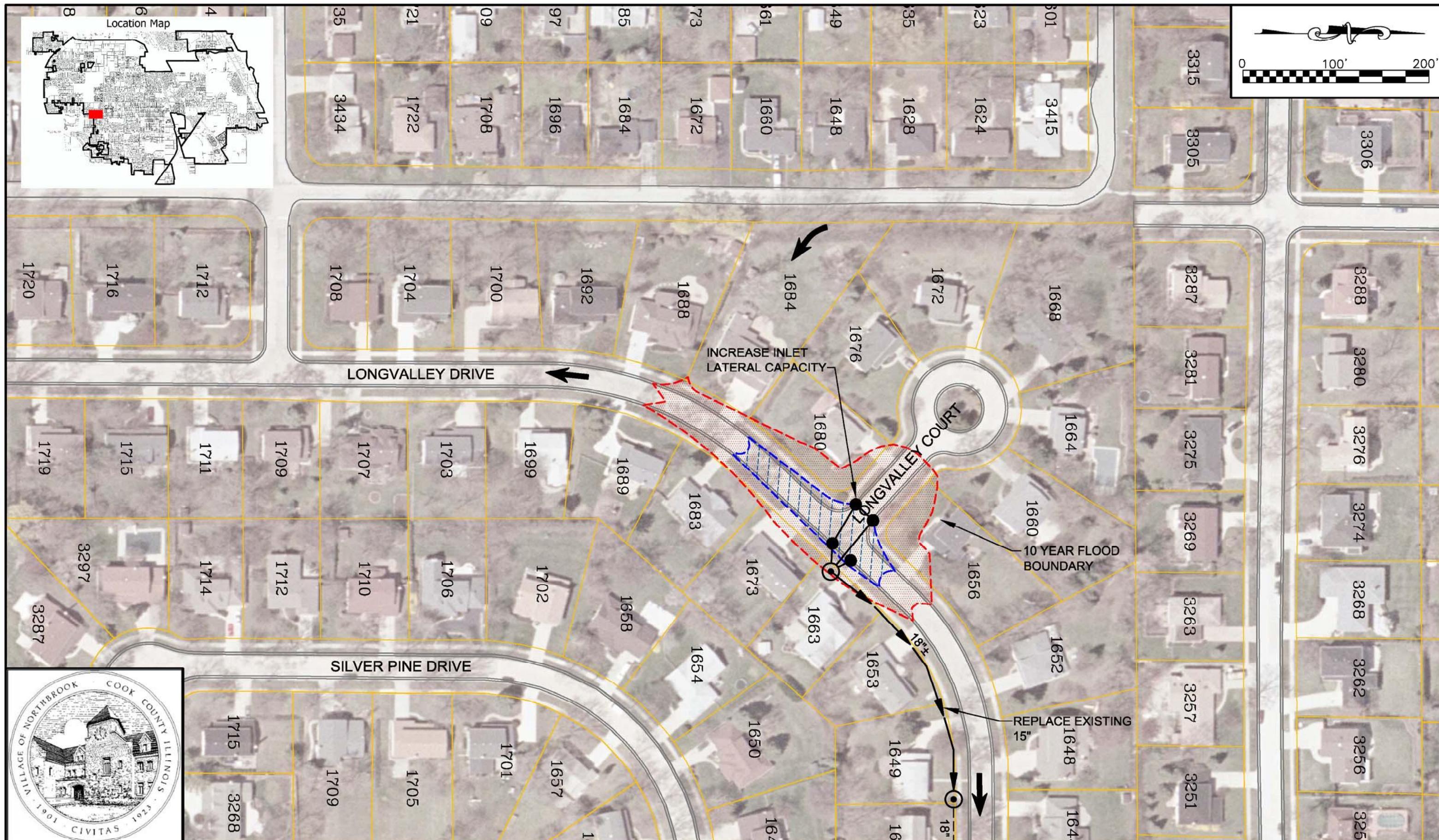
Problem Identification:

Street, front yard and structure flooding.

Recommended Plan:

- Improve intersection drainage collection system by increasing inlet capacity and related lateral storm sewer capacities.
- Replace 300" of existing 15" storm sewer with 18" storm sewer northeasterly from the intersection.
- Construct control structure with 15"± restrictor plate at beginning of the 18" storm sewer (5-year level of protection).

Estimated Total Cost (w/o mitigation)	Construction Cost	Property Cost	Engineering Cost	B/C Ratio (with mitigation)	Optimum Protection
\$95,000	\$83,000	N/A	\$12,000	1.74	10-yr



Y DRIVE - LONGVALLEY COURT (INTERSECTION)

PROJECT 27

**Project 28
SURREY LANE
(Cul-De-Sac)**



956 Surrey Lane (June 23, 2011)



956 Surrey Lane (June 23, 2011)

Surrey Lane flooding



PROJECT 28
SURREY LANE
(Cul-De-Sac)

Statement of Conditions:

The existing storm sewer drainage system is 60 to 70 years old. The system cannot adequately convey runoff from storms of moderate to high intensities and the receiving storm sewer system is small compared to today's standards. The drainage service area is $9.1 \pm$ acres with another $3.9 \pm$ acres contributing via flood overflow paths. The Surrey Lane cul-de-sac and adjacent properties lie within a depressional area that can flood as deep as $1 \frac{1}{2}'$ to 2' before flood overflow relief occurs. The flood overflow relief path and outlet storm sewer drain to the Lee Road drainage system.

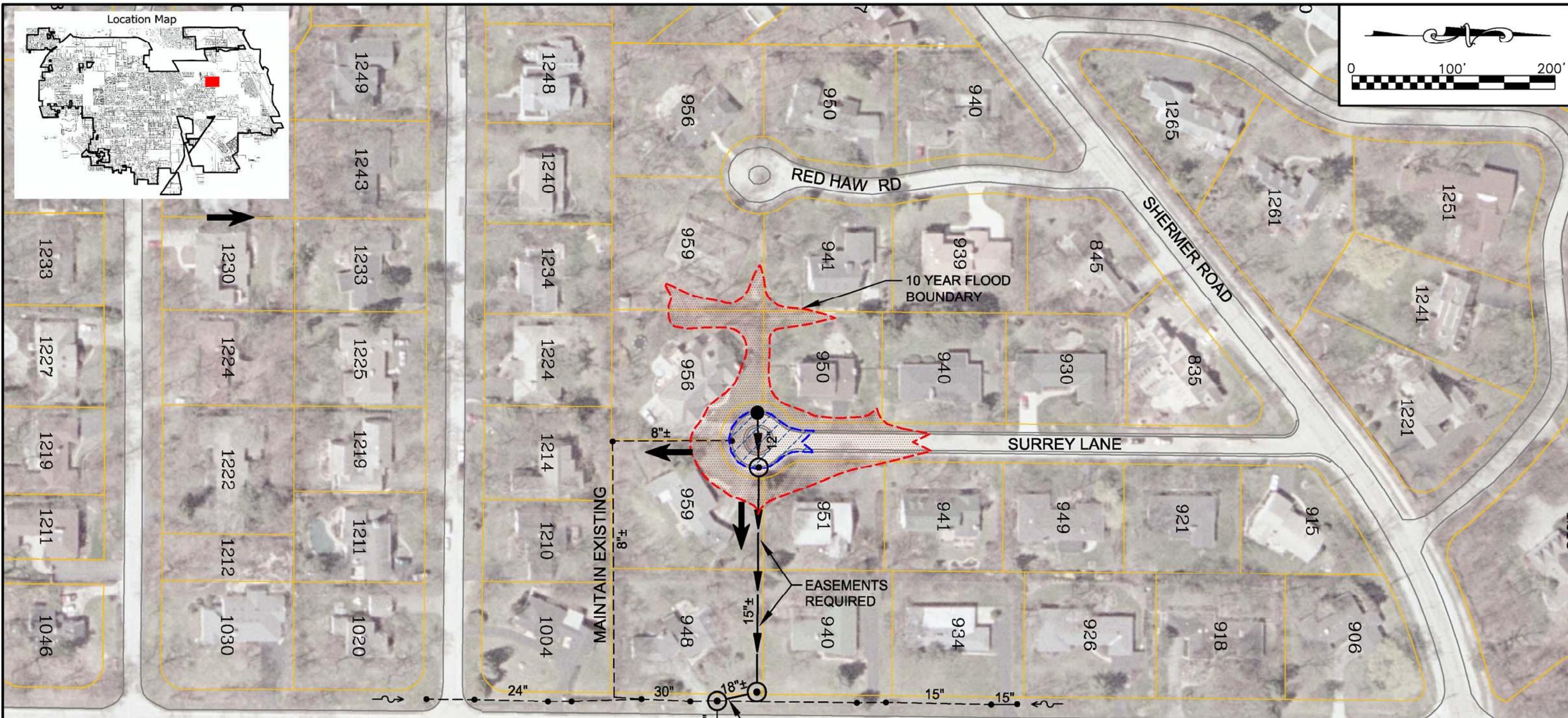
Problem Identification:

Cul-de-sac, front yard and rear yard flooding (no known flooded structures).

Recommended Plan:

- Obtain 15' wide drainage easement between the Surrey Lane cul-de-sac and Lee Road.
- Improve low flow from the cul-de-sac area by constructing a conveyance storm sewer ($15" \pm$) from the cul-de-sac to Lee Road.
- Construct a low/flood overflow structure at the east side of the cul-de-sac with a restrictor plate (10" to 12"+ opening).
- Define flood overflow relief location by constructing a relief swale within the drainage easement.
- Improve Surrey Lane drainage collection system by adding 2 inlets within the cul-de-sac area.
- Modify a short segment of the Lee Road storm sewer system to accommodate the new storm sewer and flood overflow path
- Retain the existing $8" \pm$ storm sewer.

Estimated Total Cost	Construction Cost	Property Cost	Engineering Cost	B/C Ratio	Optimum Protection
\$61,000	\$36,000	\$20,000	\$5,000	0.34	10-yr



HLR

SURREY LANE CUL-DE-SAC

PROJECT 28

Village of Northbrook
Addendum #1
Appendix
Master Stormwater Management Plan
April 2012



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PROJECT BENEFIT COST RATIO				
Project No.	Project	Estimate of Cost	Estimated Number of Damaged Structures Benefited	Benefit Cost Ratio
25	Dehne Road - Glendale Avenue Intersection	\$130,000	1	9.25
26	Landwehr Road - Sunset Trail Intersection	\$97,000	1	3.48
23	Blackthorn Lane (1100 Block)	\$130,000	2	2.88
24	Brittany Road (Bordeaux Drive to Dauphine Avenue)	\$139,000	1	1.75
27	Longvalley Drive - Longvalley Court Intersection	\$95,000	1	1.74
28	Surrey Lane (Cul-De-Sac)	\$61,000	0	0.34

PROJECT COST PER PROPERTY BENEFITED				
Project No.	Project	Estimate of Cost	Estimated Number of Properties Benefited	Cost per Property Benefited
28	Surrey Lane (Cul-De-Sac)	\$61,000	7	\$8,700
26	Landwehr Road - Sunset Trail Intersection	\$97,000	11	\$8,800
23	Blackthorn Lane (1100 Block)	\$130,000	12	\$10,800
27	Longvalley Drive - Longvalley Court Intersection	\$95,000	8	\$11,900
24	Brittany Road (Bordeaux Drive to Dauphine Avenue)	\$139,000	6	\$23,200
25	Dehne Road - Glendale Avenue Intersection	\$130,000	1	\$130,000

PROJECT COST RANGE			
Project No.	Project	Estimate of Cost	Project Cost Range
28	Surrey Lane (Cul-De-Sac)	\$61,000	< \$250,000
27	Longvalley Drive - Longvalley Court Intersection	\$95,000	
26	Landwehr Road - Sunset Trail Intersection	\$97,000	
23	Blackthorn Lane (1100 Block)	\$130,000	
25	Dehne Road - Glendale Avenue Intersection	\$130,000	
24	Brittany Road (Bordeaux Drive to Dauphine Avenue)	\$139,000	

Master Stormwater Management Plan
Village of Northbrook

Blackthorn Lane (1100 Block)

SUMMARY OF QUANTITIES			ESTIMATE OF COST		
CONSTRUCTION	ITEM	UNIT	QUANTITY	UNIT PRICE	COST
	EARTH EXCAVATION	CU YD	20	\$45.00	\$900.00
	TRENCH BACKFILL	CU YD	218	\$45.00	\$9,810.00
	SEEDING, CLASS 4	ACRE	0.1	\$30,000.00	\$3,000.00
	AGGREGATE BASE COURSE, TYPE A 6"	SQ YD	167	\$10.00	\$1,670.00
	HOT-MIX ASPHALT BINDER COURSE, IL-19.0, N70	TON	60	\$80.00	\$4,800.00
	HOT-MIX ASPHALT SURFACE COURSE, MIX "D", N70	TON	40	\$100.00	\$4,000.00
	STORM SEWER, CLASS A, TYPE 2, 15"	FOOT	30	\$75.00	\$2,250.00
	STORM SEWER, CLASS A, TYPE 2, 18"	FOOT	530	\$85.00	\$45,050.00
	MANHOLES, TYPE A, 5' DIAMETER, TYPE 1 FRAME AND LID	EACH	3	\$2,500.00	\$7,500.00
	MANHOLES, TYPE A, 5' DIAMETER, TYPE 1 FRAME AND LID (SPEC)	EACH	1	\$3,500.00	\$3,500.00
	INLET	EACH	2	\$1,000.00	\$2,000.00
TRAFFIC CONTROL AND PROTECTION			L SUM	\$3,000.00	\$3,000.00
				SUBTOTAL	\$87,000.00
				CONTINGENCY10%	\$9,000.00
				TOTAL	\$96,000.00
ENGINEERING (15% CONSTRUCTION COST)			LSUM	1	\$14,000.00
EASEMENT ACQUISITION			LSUM	2	\$10,000.00
				TOTAL	\$34,000.00
				ESTIMATED TOTAL COST	\$130,000.00

Master Stormwater Management Plan
Village of Northbrook

Brittany Road - Bordeaux Drive to Dauphine Avenue

CONSTRUCTION	SUMMARY OF QUANTITIES			ESTIMATE OF COST	
	ITEM	UNIT	QUANTITY	UNIT PRICE	COST
TRENCH BACKFILL	CU YD	570	\$35.00	\$19,950.00	
AGGREGATE BASE COURSE, TYPE A 6"	SQ YD	355	\$10.00	\$3,550.00	
HOT-MIX ASPHALT BINDER COURSE, IL-19.0, N70	TON	130	\$80.00	\$10,400.00	
HOT-MIX ASPHALT SURFACE COURSE, MIX "D", N70	TON	40	\$100.00	\$4,000.00	
STORM SEWER, CLASS A, TYPE 2, 15"	FOOT	60	\$75.00	\$4,500.00	
STORM SEWER, CLASS A, TYPE 2, 48"	FOOT	375	\$135.00	\$50,625.00	
MANHOLES, TYPE A, 6' DIAMETER, TYPE 1 FRAME AND LID	EACH	1	\$3,500.00	\$3,500.00	
MANHOLES, TYPE A, 6' DIAMETER, TYPE 1 FRAME AND LID (SPEC)	EACH	1	\$4,500.00	\$4,500.00	
CATCH BASIN	EACH	4	\$1,500.00	\$6,000.00	
TRAFFIC CONTROL AND PROTECTION	L SUM	1	\$3,000.00	\$3,000.00	
			SUBTOTAL	\$110,000.00	
			CONTINGENCY 10%	\$11,000.00	
			TOTAL	<b">\$121,000.00</b">	
ENGINEERING (15% CONSTRUCTION COST)	LSUM	1	\$18,000.00	\$18,000.00	
			TOTAL	<b">\$18,000.00</b">	
			ESTIMATED TOTAL COST	<b">\$139,000.00</b">	

Master Stormwater Management Plan
Village of Northbrook

Dehne Road - Glendale Avenue Intersection

SUMMARY OF QUANTITIES			ESTIMATE OF COST	
ITEM	UNIT	QUANTITY	UNIT PRICE	COST
EARTH EXCAVATION	CU YD	25	\$45.00	\$1,125.00
SEEDING, CLASS 2A	ACRE	0.1	\$10,000.00	\$1,000.00
SODDING	SQ YD	233	\$6.00	\$1,398.00
TRENCH BACKFILL	CU YD	20	\$45.00	\$900.00
AGGREGATE BASE COURSE, TYPE A 6"	SQ YD	31	\$10.00	\$310.00
HOT-MIX ASPHALT BINDER COURSE, IL-19.0, N70	TON	10	\$80.00	\$800.00
HOT-MIX ASPHALT SURFACE COURSE, MIX "D", N70	TON	10	\$100.00	\$1,000.00
STORM SEWER, CLASS A, TYPE 2, 15"	FOOT	20	\$85.00	\$1,700.00
STORM SEWER, CLASS A, TYPE 2, 18"	FOOT	330	\$85.00	\$28,050.00
STORM SEWER, PVC, SDR-26, 8"	FOOT	350	\$50.00	\$17,500.00
MANHOLES, TYPE A, 5' DIAMETER, TYPE 1 FRAME AND LID	EACH	1	\$2,500.00	\$2,500.00
UTILITY CONFLICT STRUCTURE WITH INFLOW GRATE	EACH	1	\$40,000.00	\$40,000.00
METAL END SECTION, 8"	EACH	1	\$500.00	\$500.00
PVC RESTRICTED DEPTH INLET	EACH	6	\$500.00	\$3,000.00
TRAFFIC CONTROL AND PROTECTION	L SUM	1	\$3,000.00	\$3,000.00
			SUBTOTAL	\$103,000.00
			CONTINGENCY 10%	\$10,000.00
			TOTAL	\$113,000.00
ENGINEERING (15% CONSTRUCTION COST)	LSUM	1	\$17,000.00	\$17,000.00
			TOTAL	\$17,000.00
				ESTIMATED TOTAL COST \$130,000.00

Master Stormwater Management Plan
Village of Northbrook

Landwehr Road - Sunset Trail Intersection

	SUMMARY OF QUANTITIES			ESTIMATE OF COST	
	ITEM	UNIT	QUANTITY	UNIT PRICE	COST
CONSTRUCTION	EARTH EXCAVATION	CU YD	20	\$45.00	\$900.00
	TRENCH BACKFILL	CU YD	147	\$45.00	\$6,615.00
	SEEDING, CLASS 4	ACRE	0.1	\$30,000.00	\$3,000.00
	AGGREGATE BASE COURSE, TYPE A 6"	SQ YD	20	\$10.00	\$200.00
	HOT-MIX ASPHALT BINDER COURSE, IL-19.0, N70	TON	10	\$80.00	\$800.00
	HOT-MIX ASPHALT SURFACE COURSE, MIX "D", N70	TON	0	\$100.00	\$0.00
	STORM SEWER, CLASS A, TYPE 2, 15"	FOOT	505	\$75.00	\$37,875.00
	WATER MAIN, ADJUST 16"	L SUM	1	\$15,000.00	\$15,000.00
	REGRADE DITCH	L SUM	1	\$5,000.00	\$5,000.00
	MANHOLES, TYPE A, 4' DIAMETER, TYPE 1 FRAME AND LID	EACH	1	\$1,850.00	\$1,850.00
	CATCH BASIN	EACH	2	\$1,500.00	\$3,000.00
	TRAFFIC CONTROL AND PROTECTION	L SUM	1	\$2,000.00	\$2,000.00
				SUBTOTAL	\$76,000.00
				CONTINGENCY10%	\$8,000.00
				TOTAL	\$84,000.00
ENGINEERING (15% CONSTRUCTION COST)				LSUM	1
				\$13,000.00	\$13,000.00
				TOTAL	\$13,000.00
				ESTIMATED TOTAL COST	\$97,000.00

Master Stormwater Management Plan
Village of Northbrook

Longvalley Drive - Longvalley Court (Intersection)

	SUMMARY OF QUANTITIES			ESTIMATE OF COST	
	ITEM	UNIT	QUANTITY	UNIT PRICE	COST
CONSTRUCTION	EARTH EXCAVATION	CU YD	10	\$45.00	\$450.00
	TRENCH BACKFILL	CU YD	343	\$45.00	\$15,435.00
	SEEDING, CLASS 4	ACRE	0.1	\$30,000.00	\$3,000.00
	AGGREGATE BASE COURSE, TYPE A 6"	SQ YD	50	\$10.00	\$500.00
	HOT-MIX ASPHALT BINDER COURSE, IL-19.0, N70	TON	20	\$80.00	\$1,600.00
	HOT-MIX ASPHALT SURFACE COURSE, MIX "D", N70	TON	10	\$100.00	\$1,000.00
	STORM SEWER, CLASS A, TYPE 2, 12"	FOOT	60	\$65.00	\$3,900.00
	STORM SEWER, CLASS A, TYPE 2, 18"	FOOT	300	\$85.00	\$25,500.00
	5' SIDEWALK REMOVAL AND REPLACEMENT	SQ FT	1200	\$7.50	\$9,000.00
	MANHOLES, TYPE A, 5' DIAMETER, TYPE 1 FRAME AND LID	EACH	1	\$2,500.00	\$2,500.00
	MANHOLES, TYPE A, 5' DIAMETER, TYPE 1 FRAME AND LID (SPEC.)	EACH	1	\$3,500.00	\$3,500.00
	CATCH BASIN	EACH	4	\$1,500.00	\$6,000.00
	COMBINATION CONCRETE CURB AND GUTTER, TYPE B-6.24	FOOT	25	\$30.00	\$750.00
	TRAFFIC CONTROL AND PROTECTION	L SUM	1	\$2,000.00	\$2,000.00
				SUBTOTAL	\$75,000.00
				CONTINGENCY10%	\$8,000.00
				TOTAL	\$83,000.00
ENGINEERING (15% CONSTRUCTION COST)		LSUM	1	\$12,000.00	\$12,000.00
		LSUM	0	\$10,000.00	\$0.00
				TOTAL	\$12,000.00
				ESTIMATED TOTAL COST	\$95,000.00

Master Stormwater Management Plan
Village of Northbrook

Surrey Lane - Cul-De-Sac

	SUMMARY OF QUANTITIES			ESTIMATE OF COST	
	ITEM	UNIT	QUANTITY	UNIT PRICE	COST
CONSTRUCTION	EARTH EXCAVATION	CU YD	20	\$45.00	\$900.00
	TRENCH BACKFILL	CU YD	20	\$45.00	\$900.00
	SEEDING, CLASS 2A	ACRE	0.1	\$10,000.00	\$1,000.00
	CATCH BASIN	EACH	2	\$1,500.00	\$3,000.00
	AGGREGATE BASE COURSE, TYPE A 6"	SQ YD	20	\$10.00	\$200.00
	HOT-MIX ASPHALT BINDER COURSE, IL-19.0, N70	TON	10	\$80.00	\$800.00
	HOT-MIX ASPHALT SURFACE COURSE, MIX "D", N70	TON	0	\$100.00	\$0.00
	STORM SEWER, CLASS A, TYPE 2, 12"	FOOT	60	\$65.00	\$3,900.00
	STORM SEWER, CLASS A, TYPE 2, 15"	FOOT	240	\$60.00	\$14,400.00
	STORM SEWER, CLASS A, TYPE 2, 18"	FOOT	40	\$75.00	\$3,000.00
	MANHOLES, TYPE A, 4' DIAMETER, TYPE 1 FRAME AND LID	EACH	1	\$1,850.00	\$1,850.00
	MANHOLES, TYPE A, 5' DIAMETER, TYPE 1 FRAME AND LID	EACH	1	\$2,500.00	\$2,500.00
	TRAFFIC CONTROL AND PROTECTION	L SUM	1	\$1,000.00	\$1,000.00
			SUBTOTAL	\$33,000.00	
			CONTINGENCY 10%	\$3,000.00	
			TOTAL	<b">\$36,000.00</b">	
			ENGINEERING (15% CONSTRUCTION COST)	LSUM	1
				\$5,000.00	\$5,000.00
			EASEMENT ACQUISITION	EACH	2
				\$10,000.00	\$20,000.00
			TOTAL	<b">\$25,000.00</b">	
			ESTIMATED TOTAL COST	\$61,000.00	

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

Blackthorn Lane - 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	2	\$497,000	\$250,000	\$10,000	\$4,500	\$2,000	\$2,800	\$4,000	\$25,000	\$795,300	\$80,000	-
Proposed Conditions	0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$10,000	\$10,000	\$1,000	\$79,000

Blackthorn Lane - 10-Year Storm Event				
Total Flood Damage per Year	Present Worth Damages	Net Benefit	Project Costs	Benefit / Cost Ratio
Existing Conditions	\$80,000	\$1,718,560		
Proposed Conditions	\$1,000	\$21,482	\$1,697,000	\$590,000 2.88

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

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

Brittany Road - 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	\$250,000	\$125,000	\$12,500	\$2,250	\$1,000	\$1,400	\$2,000	\$35,000	\$429,150	\$43,000	-
Proposed Conditions	0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$10,000	\$10,000	\$1,000	\$42,000

Brittany Road - 10-Year Storm Event					
	Total Flood Damage per Year	Present Worth Damages	Net Benefit	Project Costs	Benefit / Cost Ratio
Existing Conditions	\$43,000	\$923,726			
Proposed Conditions	\$1,000	\$21,482	\$902,000	\$514,000	1.75

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

Note: Stormwater attenuation and mitigation required for the loss of storage is estimated at \$375,000

Note: Assume structural damage cost \$250,000, content damage \$125,000, and \$10,000 per structure.

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

Dehne Road - Glendale 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	\$84,000	\$437,000	\$3,800	\$2,250	\$1,000	\$1,400	\$2,000	\$35,000	\$566,450	\$57,000	-
Proposed Conditions	0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$10,000	\$10,000	\$1,000	\$56,000

Dehne Road - Glendale Avenue - 10-Year Storm Event					
	Total Flood Damage per Year	Present Worth Damages	Net Benefit	Project Costs	Benefit / Cost Ratio
Existing Conditions	\$57,000	\$1,224,474			
Proposed Conditions	\$1,000	\$21,482	\$1,203,000	\$130,000	9.25

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

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

Landwehr Road - Sunset Trail - 5-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	\$70,593	\$371,171	\$2,522	\$2,250	\$1,000	\$1,400	\$2,000	\$35,000	\$485,936	\$97,000	-
Proposed Conditions	0	\$0	\$0	\$1,552	\$0	\$0	\$0	\$0	\$10,000	\$11,552	\$2,000	\$95,000

Landwehr Road - Sunset Trail - 5-Year Storm Event				
Total Flood Damage per Year	Present Worth Damages	Net Benefit	Project Costs	Benefit / Cost Ratio
Existing Conditions	\$97,000	\$2,083,754		
Proposed Conditions	\$2,000	\$42,964	\$2,041,000	3.48

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

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

Longvalley Drive & Longvalley Court - 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	\$250,000	\$125,000	\$10,000	\$2,250	\$1,000	\$1,400	\$2,000	\$25,000	\$416,650	\$42,000	-
Proposed Conditions	0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$10,000	\$10,000	\$1,000	\$41,000

Longvalley Drive & Longvalley Court - 10-Year Storm Event					
	Total Flood Damage per Year	Present Worth Damages	Net Benefit	Project Costs	Benefit / Cost Ratio
Existing Conditions	\$42,000	\$902,244			
Proposed Conditions	\$1,000	\$21,482	\$881,000	\$507,500	1.74

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

Note: Stormwater attenuation and mitigation required for the loss of storage is estimated at \$412,500

Note: Assume structural damage cost \$250,000, content damage \$125,000, and \$10,000 per structure.

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

Surrey Lane - 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	\$2,722	\$0	\$0	\$0	\$0	\$15,000	\$17,722	\$2,000	-
Proposed Conditions	0	\$0	\$0	\$0	\$0	\$0	\$0	\$0	\$5,000	\$5,000	\$1,000	\$1,000

Surrey Lane - 10-Year Storm Event					
	Total Flood Damage per Year	Present Worth Damages	Net Benefit	Project Costs	Benefit / Cost Ratio
Existing Conditions	\$2,000	\$42,964			
Proposed Conditions	\$1,000	\$21,482	\$21,000	\$61,000	0.34

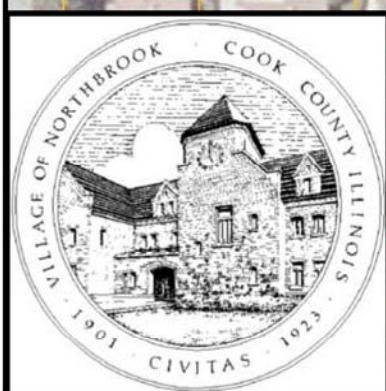
Note: Assume the interest rate is 4%and a project life of 50 years

Prioritized Parcel Acquisition

No.	Project No.	Description	Property Address	Priority
1	16	Sunny Acres	4180 Phyllis Road	High
2	19	Wellers Subdivision (Weller, Hillcrest, Christina Lanes)	Pfingsten / Keystone	High
3	20	Western Avenue/Oak Avenue (Wescott Road to Shermer	1503-1517 Cedar Lane	Medium
4	20	Western Avenue/Oak Avenue (Wescott Road to Shermer	2030 Maple	Low
5	X	Hillcrest - Stonehedge	2435 Pfingsten	Low
6	X	West Fork North Branch Chicago River	Illinois Road	Low
7	X	Illinois Road Watershed	1680 Shermer	Low
8	10	Keystone Road / Chartres Drive	3025 Keystone Road	Low
A-1	25	Dehne Road/Glendale Avenue Intersection	2271 Dehne Road	High
A-2	26	Landwehr Road/Sunset Trail Intersection	2300 Landwehr Road	Medium
A-3	26	Landwehr Road/Sunset Trail Intersection	2208 Landwehr Road	High
A-4	3	Techny Drain Phase IV	2255 Greenview Road	High
A-5	10	Keystone Road / Chartres Drive	2960 Keystone Road	Medium
A-5	19	Wellers Subdivision (Weller, Hillcrest, Christina Lanes)	2960 Keystone Road	Medium
A-6	2	Shermer Road Overflow Sewer	1600-1616 Shermer Road	High
A-6	8	Dehne's Subdivision (Dehne Road, Brentwood Road)	1600-1616 Shermer Road	High
A-6	22	Woodlawn Road (Penfold Place to Shermer Road)	1600-1616 Shermer Road	High
A-6	25	Dehne Road/Glendale Avenue Intersection	1600-1616 Shermer Road	High

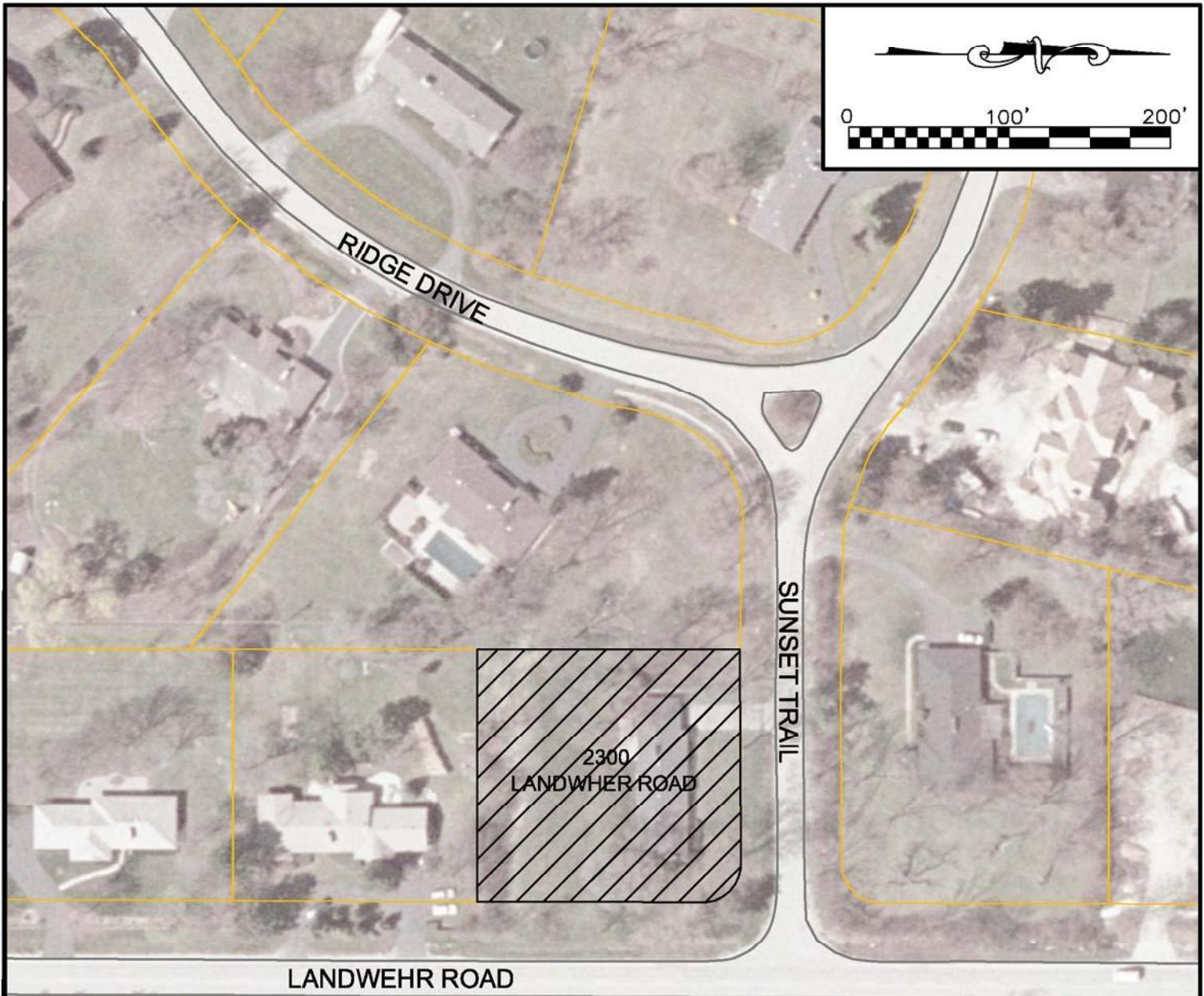


GLENDALE AVENUE



**PRIORITIZED PARCEL NO. A-1
2271 DENHE ROAD**





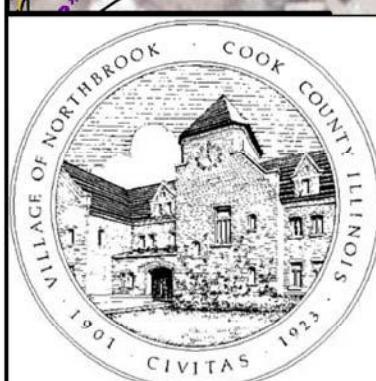
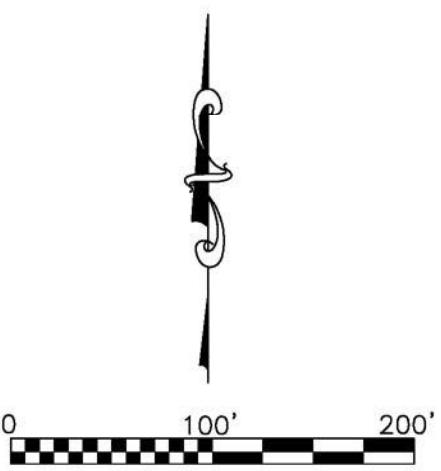
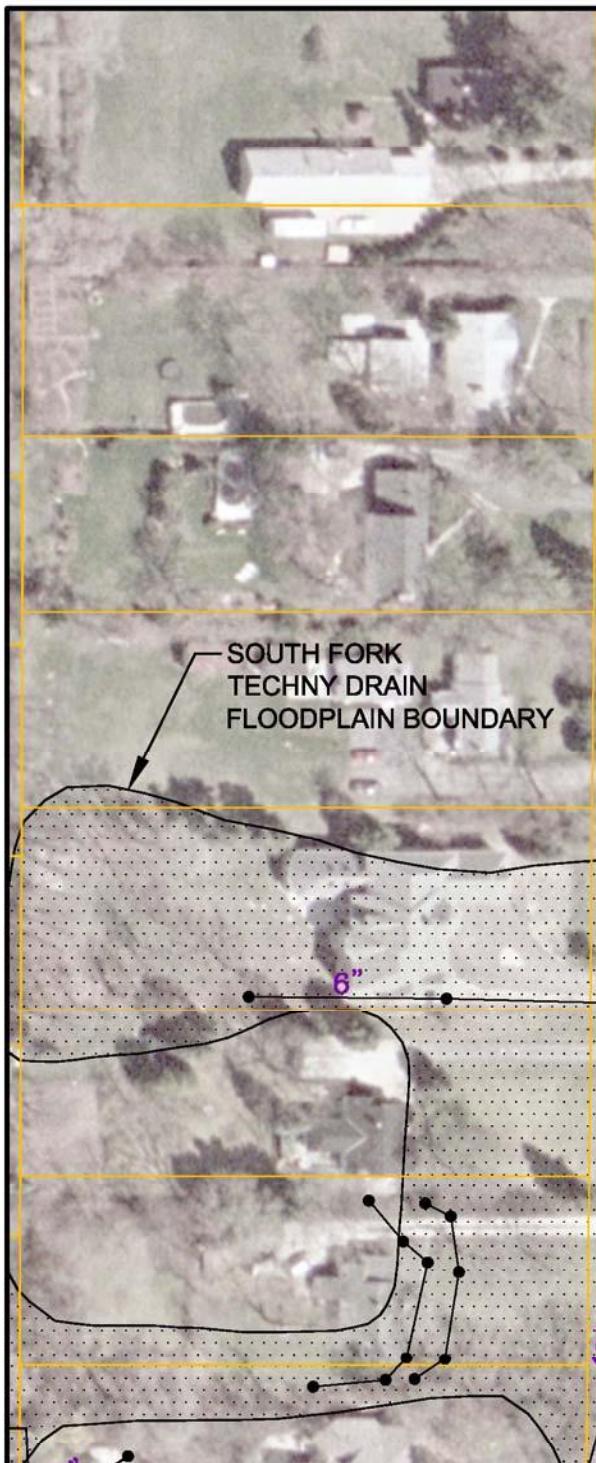
LANDWEHR ROAD



**PRIORITIZED PARCEL NO. A-2
2300 LANDWEHR ROAD**

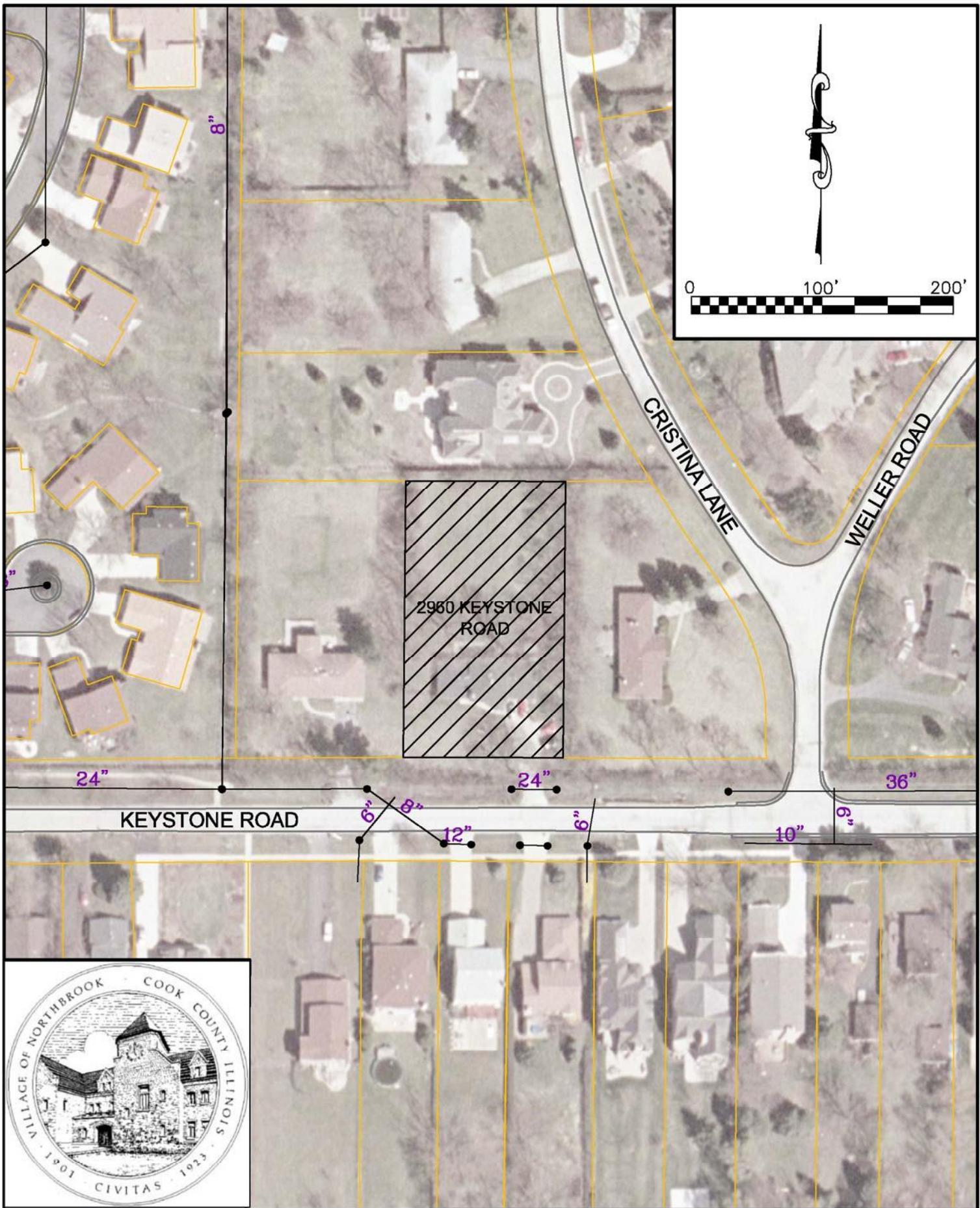


**PRIORITIZED PARCEL NO. A-3
2208 LANDWEHR ROAD**

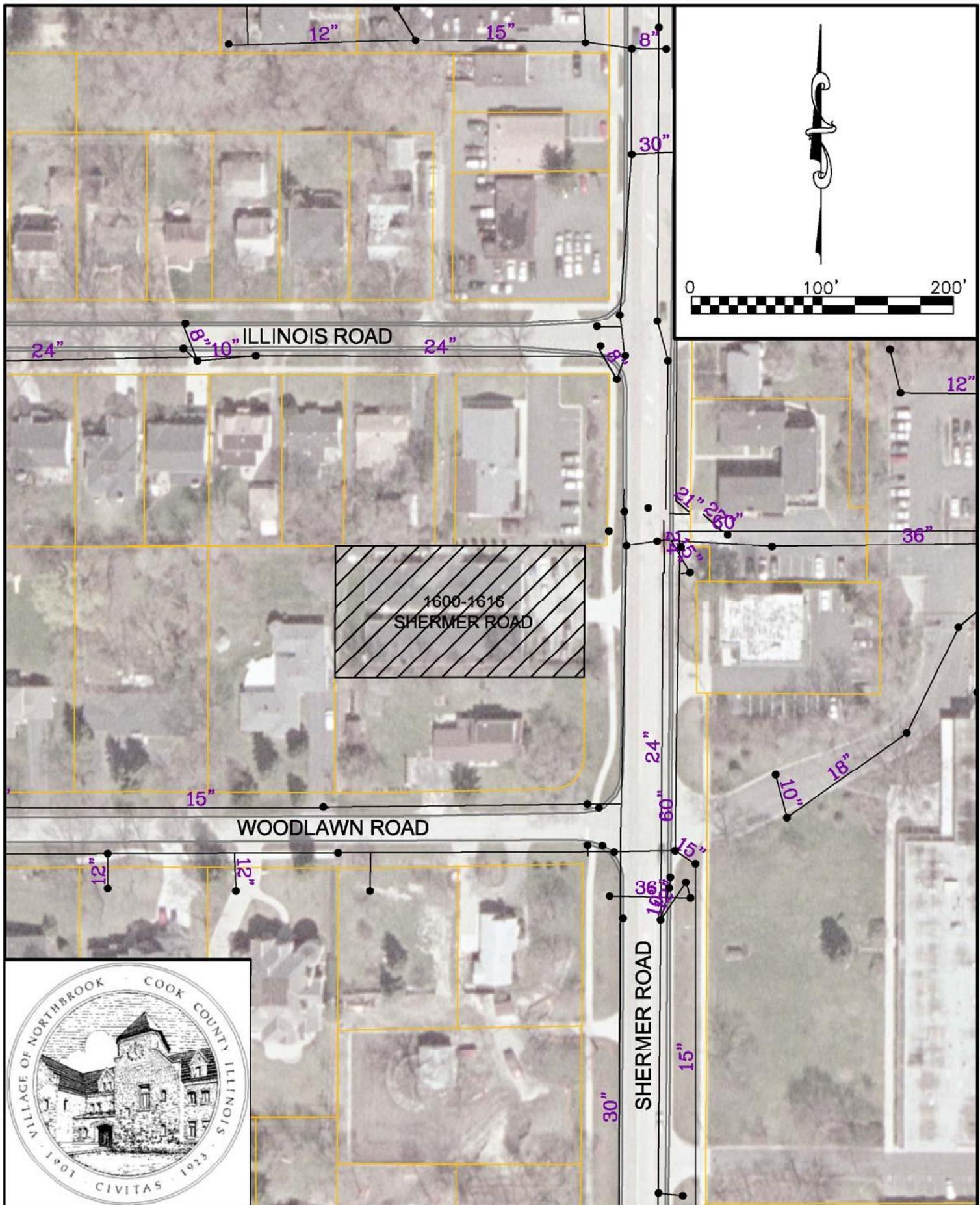


**PRIORITIZED PARCEL NO. A-4
2255 GREENVIEW ROAD**





PRIORITIZED PARCEL NO. A-5
2960 KEYSTONE ROAD



PRIORITIZED PARCEL NO. A-6
1600-1616 SHERMER ROAD