WISCONSIN DIVISION OF STATE FACILITIES

STATE FAIR PARK
STORM SEWER CCTV

REPORT AND RECOMMENDATIONS

Project No.: R08-0202-101

November 24, 2010

CRISPELL-SNYDER, INC.
PROFESSIONAL CONSULTANTS

WISCONSIN DIVISION OF STATE FACILITIES
STATE FAIR PARK UTILITY MAPPING
STORM SEWER TELEVISING
REPORT AND RECOMMENDATIONS
PROJECT NO. R08-0202-101

Introduction
The Wisconsin Department of State Facilities contracted Crispell-Snyder, Inc. to assess the current condition of the storm sewer mains located at the Wisconsin State Fair Park grounds located in West Allis, Wisconsin (*see Exhibit A – Project Location Map in the appendix*). The storm sewers were televised in conjunction with the State Fair Park Utility Mapping project.

Sewer Main Televising
To perform the televising a contractor was hired to complete closed circuit televising (CCTV) inspection. The contractor recorded video into a digital format and recorded images (pictures) of substantial defects. These defects are coded by type and severity. Once the CCTV was completed, a report was generated for each line segment. A line segment is defined as the sewer main between two consecutive structures (i.e. manholes, catch basins, inlets). The report generated is a general report showing and locating deficiencies along the line segment by the CCTV operator.

Assessment

Once all the data was compiled it was reviewed in detail by Crispell-Snyder, Inc. The storm sewer mains were analyzed for individual pipe defects as well as an overall line segment condition.

The sewer mains televised are constructed of various materials, including plastic pipe (polyethylene, PVC, and truss), concrete, vitrified clay, steel, and cast iron. Of the 26,800 lineal feet of sewer mains televised, 49% are constructed of polyethylene and PVC, 37% are constructed of concrete, 12% are constructed of vitrified clay pipe, and the remaining 2% are constructed of steel, truss and cast iron pipe. Based on footages derived from the Storm Sewer Geographical Information System Map, it is estimated that approximately 2,000 lineal feet of the sewer lines that were televised were unable to be inspected due to poor conditions such as heavy buildup of debris or potentially collapsed pipes. Common defects discovered in the lines televised include cracked and broken pipe, severe offset joints, severe line sags, and heavy buildup of debris such as dirt, leaves and gravel.

Storm Sewer Mains

Recommendations

First Priority - Dig-up Sewer Relays

The first priority rehabilitation recommendation is to complete sewer main relays in eleven separate line segments (Table 1). It is recommended to complete a full relay of these line segments due to the overall condition of the entire line to ensure structural integrity.

Table 1

FULL RELAY							
May 2010 CCTV							
CCTV Section NR	**Up MH No**	**Line Length**	**Line Size**	**Down MH No.**	**Line ID**	**Location**	**Notes**
47	**1024**	45'	10"	**1024A**	**1024A**	North Street	Broken pipe and appears to be collapsing.
48	**1024B**	42'	10"	**1024**	**1024B**	North Street	Broken pipe and appears to be collapsing.
95	**3004**	120'	12"	**2026**	**30042026**	Race Track	Clay pipe subject to collapse - relay 62' from MH
96	**3070**	91'	12"	**2098**	**30702098**	Race Track	Full relay - clay pipe cracked and severe offset joints in concrete pipe
102	**2029**	58'	10"	**2029C**	**2029C**	Race Track	Clay pipe subject to collapse.
246	**3122**	127'	18"	**3118**	**31223118**	Easement	Collapsed pipe.
July 2010 CCTV							
CCTV Section NR	**Up MH No**	**Line Length**	**Line Size**	**Down MH No.**	**Line ID**	**Location**	**Notes**
16 & 17	**2158**	262'	8"	**2138**	**21582138**		Pipe subject to collapse 150'-165', severe offset joint, offset joints throughout
39	**1019**	Unknown	6"	**Main**	**1019C**	Central Mall	Cracked/broken pipe - possibly collapsed
November 2010 CCTV							
CCTV Section NR	**Up MH No**	**Line Length**	**Line Size**	**Down MH No.**	**Line ID**	**Location**	**Notes**
7	**MAIN**	114'	8"	**3067**	**3067A**	Central Mall	Cracks throughout - unable to line (connects to main)
8	**3169**	31'	6"	**MAIN**	**21693087**	Central Mall	Separated joints and severe offsets throughout.
16	**3063**	26'	6"	**3088**	**30633088**	Badger Ave	Severe sag in line 10' from MH 3088

For the first priority the estimated rehabilitation construction cost is as follows:

- Completion of dig-up sewer relays in 11 separate line segments is estimated at $125,000.00.

Total estimated cost for Priority #1 is estimated at $125,000.00.

(See Exhibit B in the Appendix for dig-up sewer relay locations.)

Note: Estimated costs are based on average pricing for storm sewer main construction. Actual cost may vary depending on location and site restoration required. It is recommended that sewer lines be evaluated for capacity prior to relay to ensure proper sizing of storm sewer pipes.

Second Priority - Dig-up Spot Repairs

The second priority rehabilitation recommendation is to complete sewer main dig-up spot repairs in ten separate line segments (Table 2). Two of the repairs being recommended should be made prior to completion of full lining in order to repair structural integrity in the line segments. The remaining repairs may be made as desired. Some of the sewer mains may be functioning in their current condition, but be advised that the following line segments contain major deficiencies which may inhibit proper flow of storm water in the future.

Table 2

DIG-UP SPOT REPAIR							
May 2010 CCTV							
CCTV Section NR	**Up MH No**	**Line Length**	**Line Size**	**Down MH No.**	**Line ID**	**Location**	**Notes**
92	**3082**	141'	12"	**3027**	**30823027**	State Fair Park	Severe offset at previous repair - 46' from MH 3027
113	**3022**	154'	10"	**3014**	**30223014**	Race Track	Severe offset joint 2' from MH 3014
July 2010 CCTV							
CCTV Section NR	**Up MH No**	**Line Length**	**Line Size**	**Down MH No.**	**Line ID**	**Location**	**Notes**
15	**2083A**	Unknown	8"	**2083**	**2083A**	Central Mall	Severe offset joint 5' from CB 2083
21	**3116**	100'	8"	**3080A**	**31303080**		Collapsed pipe 5' from MH 3130
31	**3077**	26'	8"	**2099**	**30772099**	Second St	Severe Offset Joint -13' from 2099
44	**1019A**	Unknown	6"	**1019**	**1019A**	Central Mall	Collapsed pipe @ 44' from MH 1019
November 2010 CCTV							
CCTV Section NR	**Up MH No**	**Line Length**	**Line Size**	**Down MH No.**	**Line ID**	**Location**	**Notes**
2	**3084**	106'	8"	**3052**	**30843052**	Second St	Severe offsets 25' - unable to televise. May need to relay entire line.
4	**3067**	112'	8"	**3087**	**30673087**	Central Mall	Repair severe offset 100.5' from MH 3067 and 10' from MH 3087 - Unable to televise entire line
5	**2031**	202'	8"	**3087**	**20313087**	Central Mall	Possibly collapsed pipe 3'- Line was unable to be televised
12	**4050**	82'	6"	**3051**	**40503051**	Badger Ave	Severe offset 7' from MH 3051 - unable to televise line

For the second priority the estimated rehabilitation construction cost is as follows:

- Completion of dig-up sewer relays in 10 separate line segments is estimated at $35,000.00.

Total estimated cost for Priority #2 is estimated at $35,000.00.

(See Exhibit C in the Appendix for dig-up sewer relay locations.)

Note: Estimated costs are based on average pricing for storm sewer main spot repairs. Actual cost may vary depending on location and site restoration required. Lines that were not televised entirely may require additional repair.

Third Priority – Full Lining

The third priority rehabilitation recommendation is to complete installation of full liners in twenty separate line segments containing structural defects including cracked and broken pipes (Table 3).

Table 3

**** Complete recommended dig-up repairs prior to lining.***

FULL LINING							
May 2010 CCTV							
CCTV Section NR	**Up MH No**	**Line Length**	**Line Size**	**Down MH No.**	**Line ID**	**Location**	**Notes**
49	**4061A**	61'	12"	**4061**	4061A	Parking Lot	Cracked and broken pipe - exposed reinforcement.
53	**2134**	171'	10"	**3047**	21343047	Race Track	Cracked pipe throughout
54	**3047**	208'	10"	**3002**	30023047	Race Track	Cracked pipe throughout
91	**3027**	151'	12"	**3020**	30273020	State Fair Park	Cracks throughout and hole in pipe.
* 92	**3082**	140'	12"	**3027**	30823027	State Fair Park	Cracked and broken pipe - needs spot repair and heavy cleaning prior to installation of full liner.
115	**3043**	214'	10"	**2035**	30353043	Southern Ave	Cracks throughout.
155	**3011**	74'	15"	**3111**	30113111	Grandstand Ave	Multiple cracks throughout.
193	**2163**	35'	12"	**3090**	21633090	Grandstand Ave	Cracked pipe throughout
276	**2039**	54'	12"	**3074**	20393074	Grandstand Ave	Cracked/broken pipe
July 2010 CCTV							
CCTV Section NR	**Up MH No**	**Line Length**	**Line Size**	**Down MH No.**	**Line ID**	**Location**	**Notes**
1	**2084**	129'	15"	**2017A**	2084A	Central Ave	Cracks and broken pipe throughout
2	**3003**	155'	15"	**2084**	30032084	Central Ave	Multiple cracks throughout
3 & 7	**2097**	36'	15"	**3003**	20973003	Central Ave	Cracks / heavy debris buildup.
8 & 10	**3131**	280'	15"	**2097**	31312097	Central Ave	Cracks in pipe - protruding tap 127' from MH 2097 needs to be cut.
11	**2106**	102'	15"	**3131**	21093131	Central Mall	Multiple cracks throughout
12	**3059**	120'	15"	**2106**	30592106	Central Mall	Multiple cracks throughout - Deck of MH 3059 is collapsing
14	**3034**	35'	12"	**2083**	30342083	Central Mall	2 Holes in pipe
November 2010 CCTV							
CCTV Section NR	**Up MH No**	**Line Length**	**Line Size**	**Down MH No.**	**Line ID**	**Location**	**Notes**
1	**3052**	36'	8"	**3029**	30523029	Second Street	Multiple cracks throughout
* 4	**3067**	112'	8"	**3087**	30673087	Central Mall	Cracks throughout and hole in pipe.
15	**3088**	30'	6"	**3009**	30883009	Badger Ave	Cracks throughout.
19	**3046**	24'	6"	**3052**	30463052	Second Street	Cracks throughout.

For the third priority the estimated rehabilitation construction cost is as follows:

- Installation of full liners in twenty separate line segments is estimated at $80,000.00.

Total estimated cost for Priority #3 is $80,000.00.

(See Exhibit D in the Appendix for full liner installation locations.)

Fourth Priority – Short Lining

The fourth priority rehabilitation recommendation is to complete installation of short liners in line segments containing isolated structural defects (Table 4).

Table 4

SHORT LINING							
May 2010 CCTV							
CCTV Section NR	**Up MH No**	**Line Length**	**Line Size**	**Down MH No.**	**Line ID**	**Location**	**Notes**
150	**2162**	187'	24"	**2140**	21622140	Grandstand Ave	Gap at joint - 129.5' from MH 2162
260	**2167**	129'	15"	**1057**	21671057	Grandstand Ave	Install 11' +/- from MH 2167
July 2010 CCTV							
CCTV Section NR	**Up MH No**	**Line Length**	**Line Size**	**Down MH No.**	**Line ID**	**Location**	**Notes**
38	**2132**	65'	8"	**Main**	2132A	First St	Pipe broken @ 48' - Line 45'-51'

For the fourth priority the estimated rehabilitation construction cost is as follows:

- Completion of short liner installation in three separate line segments is estimated at $7,500.00.

Total estimated cost for Priority #4 is $7,500.00.

(See Exhibit E in the Appendix for third priority recommendation locations.)

Fifth Priority – Heavy Cleaning

The fifth priority recommendation is to complete heavy cleaning in the line segments discovered during televising with excessive gravel and silt buildup in the line segments (Table 5).

Table 5

HEAVY CLEAN/RE-TELEVISE							
May 2010 CCTV							
CCTV Section NR	**Up MH No**	**Line Length**	**Line Size**	**Down MH No.**	**Line ID**	**Location**	**Notes**
1	**4006**	16'	12"	**4001**	40464024	North Street	Line full of gravel
7	**2127**	44'	12"	**2092**	21272092	North Street	0' - 18': Pipe 1/4 full of silt/gravel
9	**2042**	147'	12"	**3005**	30052042	RV Park	Pipe 1/4 full of silt/gravel
32	**1014A**	17'	18"	**1014**	1014A	North Street	Pipe full of gravel 38' from MH 1014
51	**2164A**	Unknown	15"	**2164**	2164A	Easement	Line too dirty to televise.

HEAVY CLEAN/RE-TELEVISE (cont.)							
67	**2098**	55'	24"	**2120**	20982120	Race Track	Line is dirty
68	**2165**	85'	24"	**2098**	21652098	Race Track	Line is 1/4 full of gravel/debris
69	**2026**	86'	24"	**2165**	20262165	Race Track	Line is 1/4 full of gravel/debris
70	**1010**	104'	24"	**2026**	10102026	Race Track	Line too dirty to televise.
89	**1075**	255'	36"	**1023**	10751023	State Fair Park	Heavy silt/gravel buildup in line
93	**3082**	141'	12"	**3027**	30823027	State Fair Park	Heavy gravel buildup
94	**?**	60'	12"	**1010**	1010A	Race Track	Blockage in line w/heavy gravel buildup
101	**2093**	122'	15"	**2002**	20932002	Race Track	Chunks of concrete in pipe
106	**3019**	32'	15"	**1016**	30191016	Race Track	Unable to televise - heavy silt buildup
107	**2045**	73'	15"	**1016**	20451016	Race Track	Unable to televise - heavy silt buildup
111	**3012**	137'	12"	**Main**	3012B	Race Track	Unable to televise - heavy silt buildup
117	**2095**	17'	10"	**North**	2095A	Southern Ave	Unable to televise - heavy silt buildup
123	**4054**	152'	12"	**3031**	40543031	Grandstand Avenue	Unable to televise - heavy silt buildup
140	**4025**	34'	12"	**4058**	40254058	Grandstand Avenue	Unable to televise - heavy silt buildup
146	**2072**	61'	24"	**3013**	20723013	Grandstand Avenue	Needs cleaning
150	**2162**	187'	24"	**2140**	21622140	Grandstand Avenue	Needs cleaning
156	**2007**	43'	15"	**3011**	20073011	Grandstand Avenue	Line 1/2 full of gravel
170	**1062**	115'	15"	**2089**	10622089	Central Avenue	Line needs cleaning.
192	**3097**	200'	12"	**2163**	30972163	Grandstand Avenue	Brick in line.
194	**2110**	Unknown	12"	**2163**	21102163	Second Street	Debris in line - protruding service connection
227	**2102**	51'	12"	**2116**	21022116	Race Track	Line too dirty to televise.
228	**1015**	56'	15"	**1021**	10151021	Fifth Street	Needs Cleaning
229	**1021A**	Unknown	12"	**1021**	1021A	Fifth Street	Line full of gravel @ 18'
231	**4020**	12'	12"	**1015**	40201015	Fifth Street	Needs Cleaning
232	**1018**	171'	12"	**2024**	10182024	Wetley Way	Camera blocked due to debris
233	**4057**	36'	12"	**4023**	40574023	Wetley Way	Camera blocked due to debris
249	**4014**	46'	15"	**2020**	40142020	Third Street	Needs cleaning
250	**2020**	114'	15"	**2017**	20202017	Third Street	Needs cleaning
255	**1053**	119'	12"	**1050**	10531050	Easement	Needs cleaning
264	**2126**	40'	12"	**2102**	21262102	Race Track	Needs heavy cleaning at MH 2102
275	**3074**	162'	12"	**2007**	30742007	Grandstand Avenue	Unable to televise
277 / 278	**1048**	79'	12"	**3011**	10483011	Grandstand Avenue	Heavy gravel buildup
279	**1029**	18'	12"	**1048**	10291048	Grandstand Avenue	Heavy gravel buildup
280	**1002**	200'	10"	**1029**	10021029	Third Street	Bricks in line.
281	**1002**	64'	10"	**4056**	10024056	Third Street	Line 3/4 full with silt/gravel.

July 2010 CCTV							
CCTV Section NR	**Up MH No**	**Line Length**	**Line Size**	**Down MH No.**	**Line ID**	**Location**	**Notes**
3 & 7	**2097**	36'	15"	**3003**	20973003	Central Ave	Heavy debris buildup
12	**3059**	120'	15"	**2106**	30592106	Central Mall	Needs cleaning
13	**2083**	187'	15"	**3059**	20833059	Central Mall	Pipe 1/2 full of debris.
15	**?**	Unknown	8"	**2083**	2083A	Central Mall	Pipe 1/2 full of debris.
18	**1**	Unknown		**2**		Wetley Way	Heavy gravel buildup - pipe appears full 20' from MH 1
19 & 20	**3130**	100'	12"	**3080**	31303080	Central Ave	Gravel buildup - Unable to televise

HEAVY CLEAN/RE-TELEVISE (cont.)							
35	**3116**	147'	12"	**3130**	31163130	Grandstand Ave	Gravel buildup from MH 3116 to pipe bend (39')
36	**4076**	112'	12"	**3059**	40763059	Dairy Lane	Brick in line.
37	**2138A**	Unknown	15"	**2138**	2138A	Dairy Lane	Heavy gravel buildup
November 2010 CCTV							
CCTV Section NR	**Up MH No**	**Line Length**	**Line Size**	**Down MH No.**	**Line ID**	**Location**	**Notes**
3	**3087**	36'	8"	**MAIN**	3087A	Central Mall	Pipe 1/2 full of debris.
17	**2001**	91'	6"	**3009**	20013009	Second Street	Pipe full of debris/silt.
18	**Building**	12'	6"	**3084**	3084A	Second Street	Pipe full of debris/silt.

Heavy cleaning is completed on an hourly basis utilizing a Vactor truck and a CCTV truck. The Vactor truck is used to clean the lines and remove the debris at the access manholes, and the CCTV truck is utilized to verify all of the debris (gravel, silt, ect.) is removed from the line segment. Several manholes will also require heavy cleaning due to buildup of gravel and debris. Please refer to Table 6 showing examples of line segments requiring heavy cleaning due to buildup of gravel and debris.

Table 6

PHOTO 1

PHOTO 2

PHOTO 3

PHOTO 4

PHOTO 5	**PHOTO 6**

For the fifth priority the estimated rehabilitation construction cost is as follows:

- Completion of heavy cleaning in fifty-two separate line segments and twelve manholes is estimated at $60,000.00.

Total estimated cost for Priority #5 is $60,000.00.

(See Exhibit F in the Appendix for fourth priority recommendation locations.)

Sixth Priority – Cleaning and Televising Maintenance Program

The sixth priority recommendation is to establish an annual cleaning and televising program for the sewer mains associated with Wisconsin State Fair Park after all heavy cleaning and rehabilitation has been completed. Standard cleaning of the storm sewers should include the use of a Vactor truck to remove debris from the sewer mains, and should require no more than three passes with a water jet nozzle to adequately clean the system. There are approximately 28,500 lineal feet of storm sewer mains and leads associated with this project. It is recommended that a ten -year cleaning cycle be established to maintain sewer function after all of the recommended rehabilitation work has been completed. Each year, approximately 2,850 lineal feet of sewer mains should be cleaned and televised. The cost to complete cleaning and televising annually of 2,850 lineal feet of sewer mains is estimated at $3,750.00 using current pricing arrangements. Certain areas may require more frequent cleaning dependent upon the amount of debris entering the system through normal park use.

APPENDIX

TABLE OF CONTENTS

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EXHIBIT C……	DIG-UP SPOT REPAIR LOCATION MAP
EXHIBIT D……	FULL LINING LOCATION MAP
EXHIBIT E ……...……	SHORT LINING LOCATION MAP
EXHIBIT F ……...……	HEAVY CLEANING LOCATION MAP
EXHIBIT G……...……	RECOMMENDED REHABILITATION SEWER CCTV REPORTS

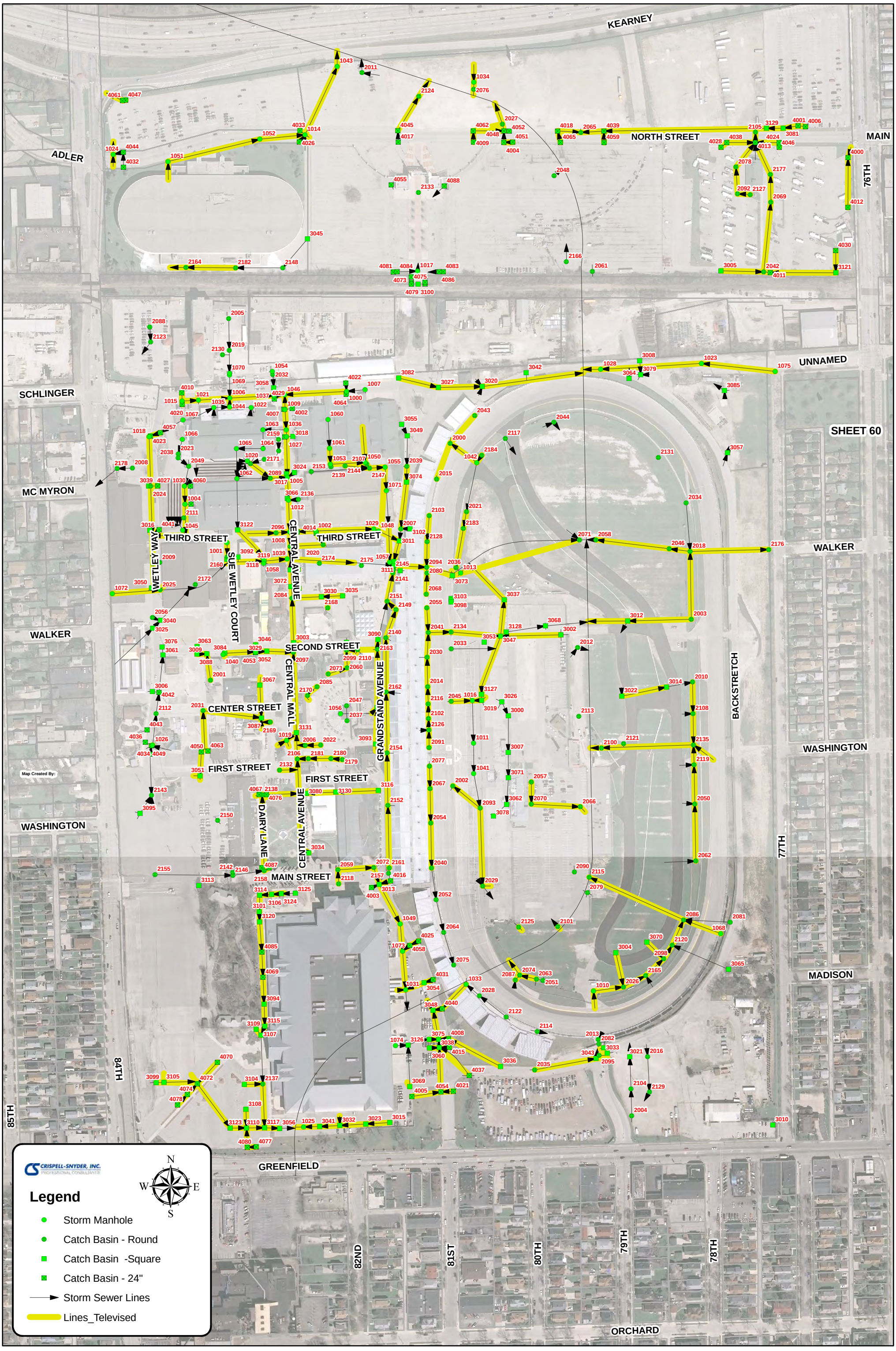

EXHIBIT A - PROJECT LOCATION MAP

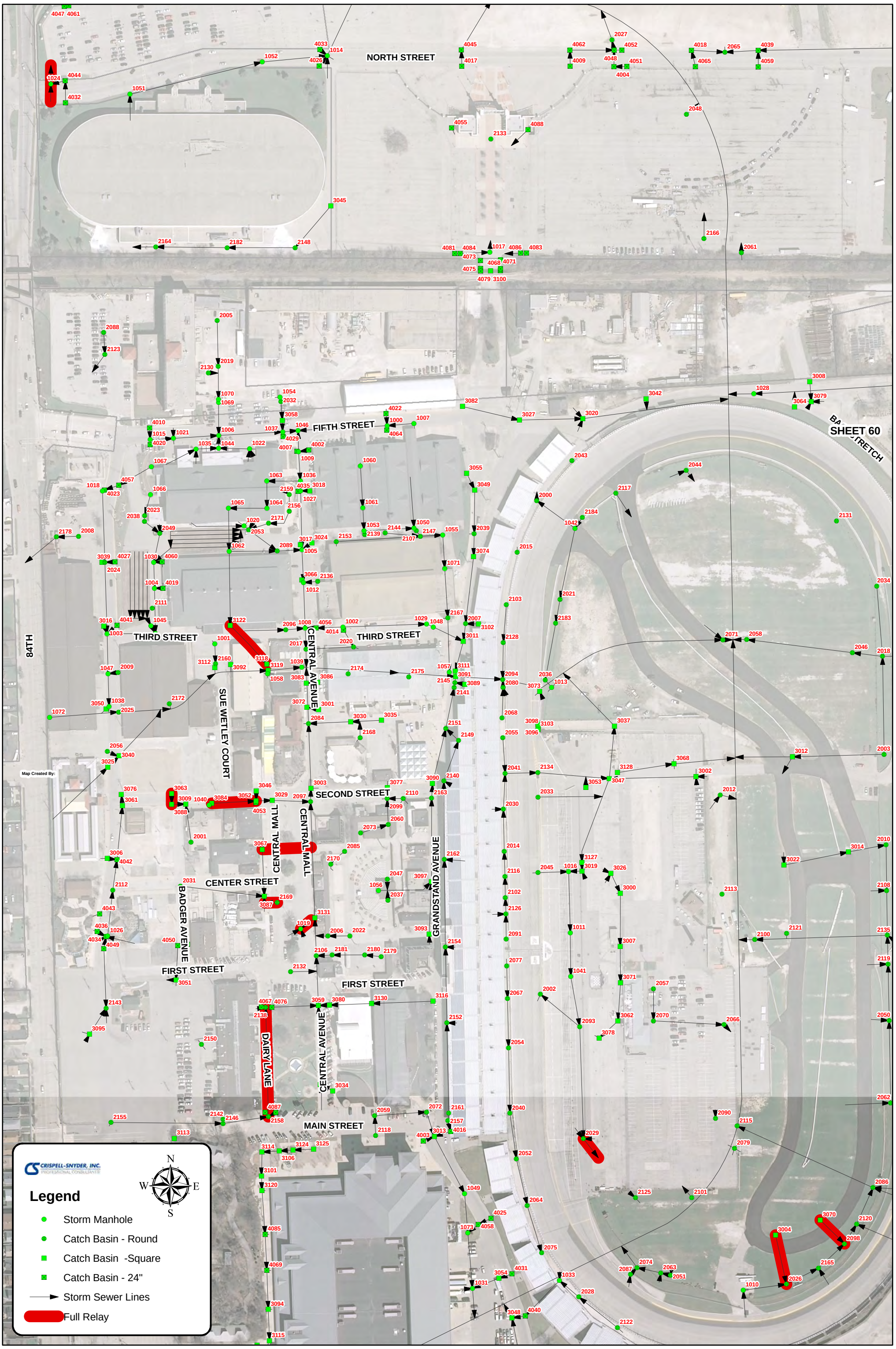

EXHIBIT B - SEWER MAIN RELAY MAP

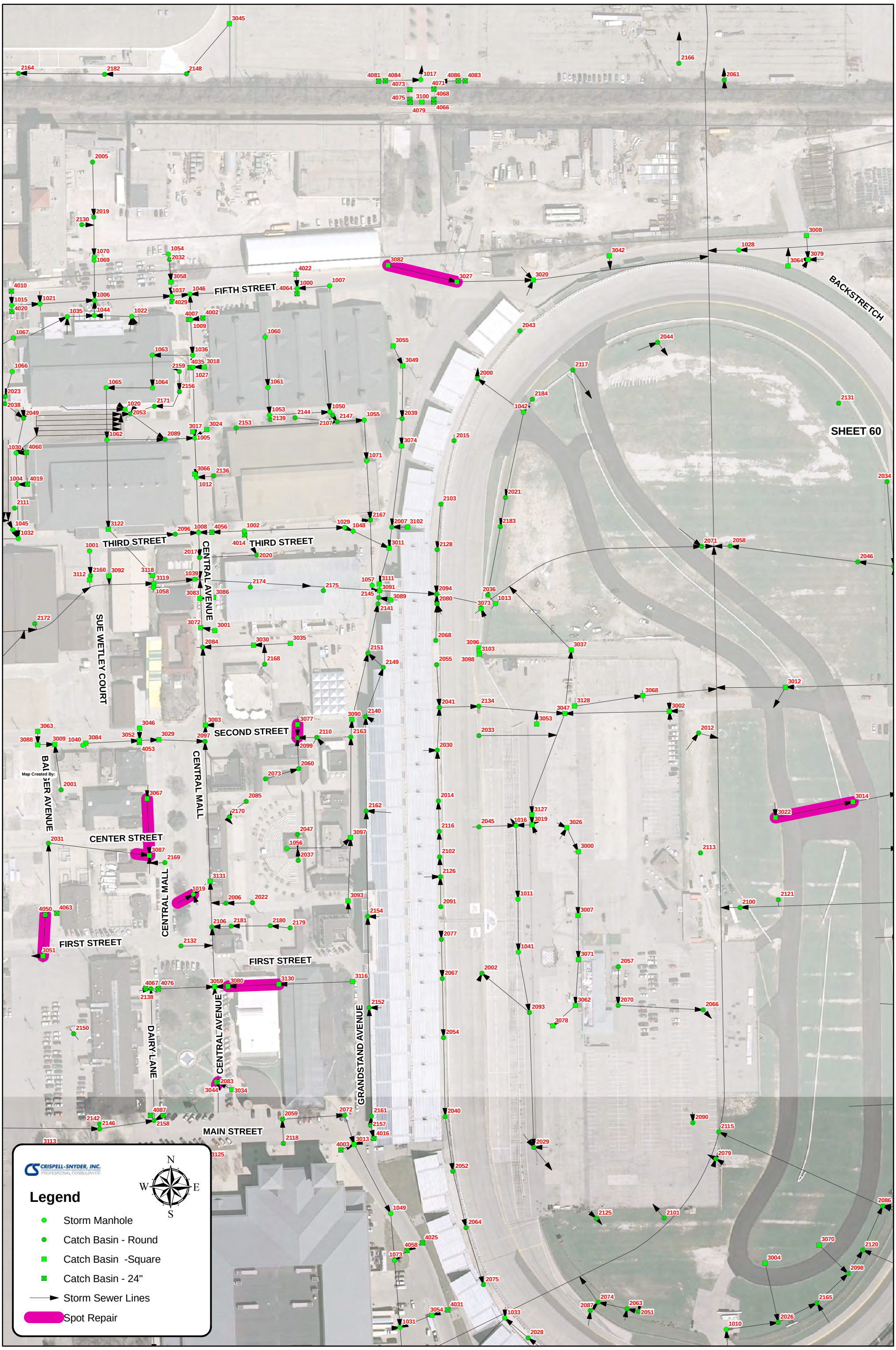

EXHIBIT C - DIG-UP SPOT REPAIR LOCATIONS MAP

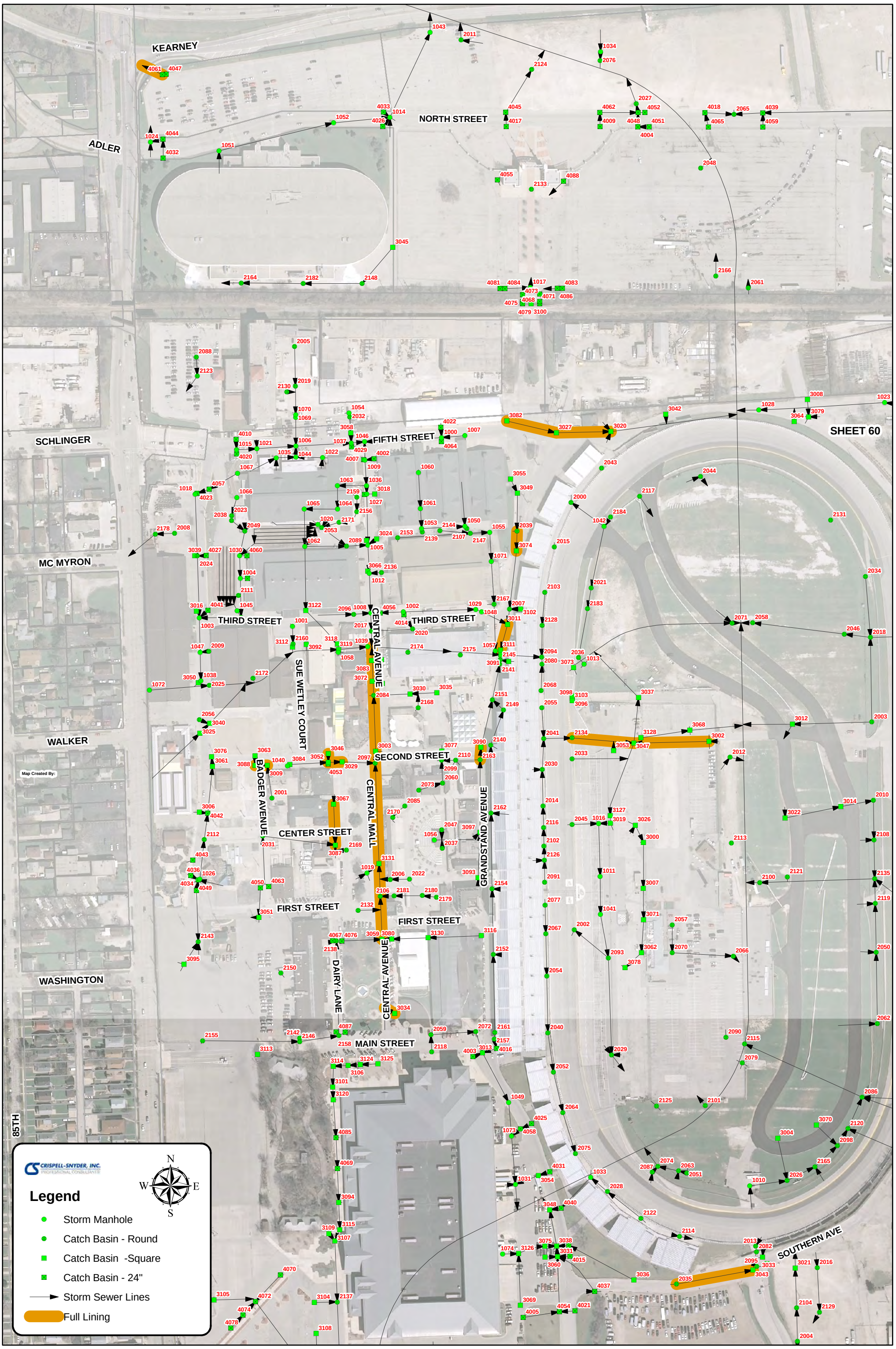

EXHIBIT D - FULL LINING LOCATIONS MAP

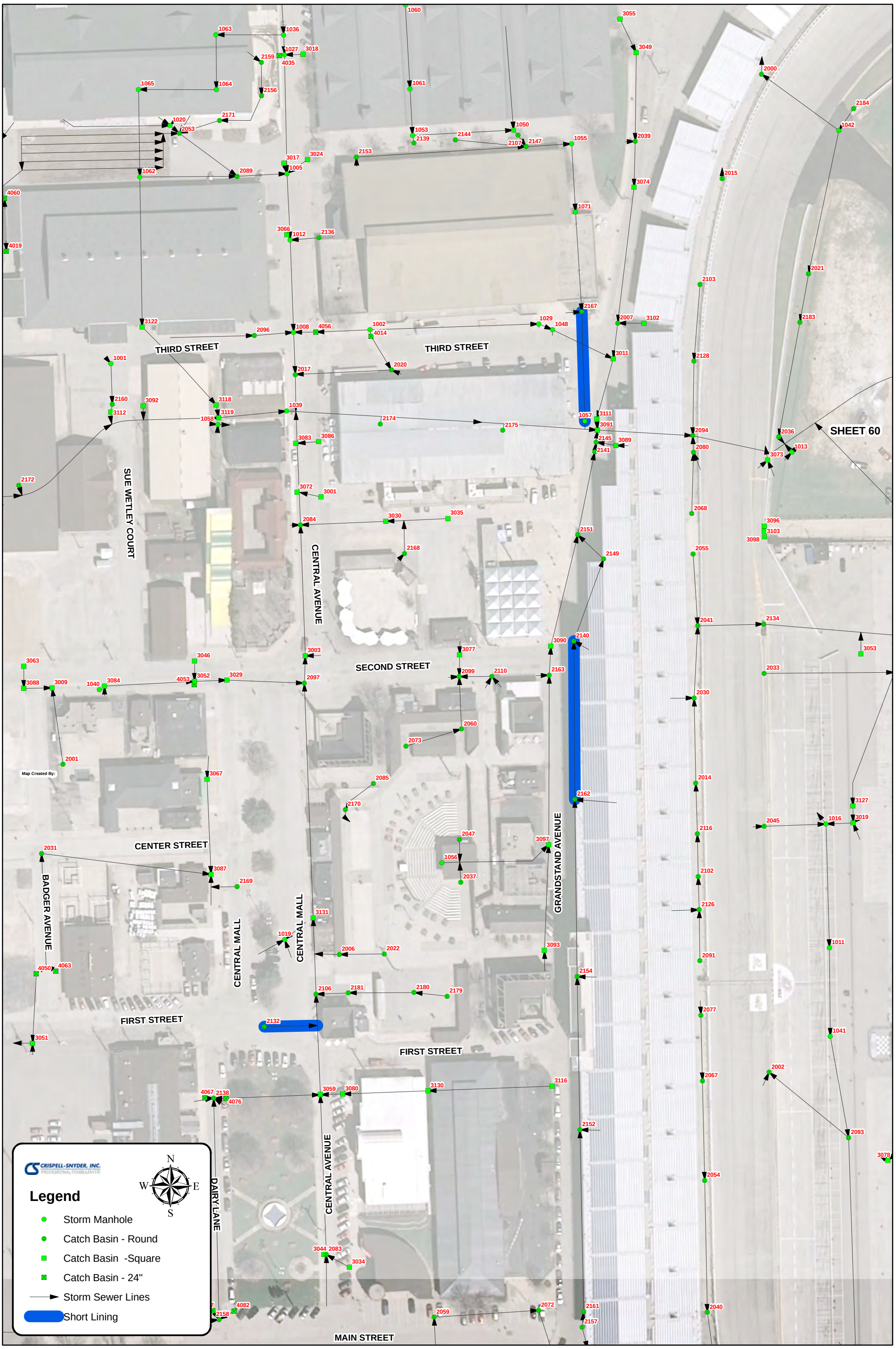

EXHIBIT E - SHORT LINING LOCATIONS MAP

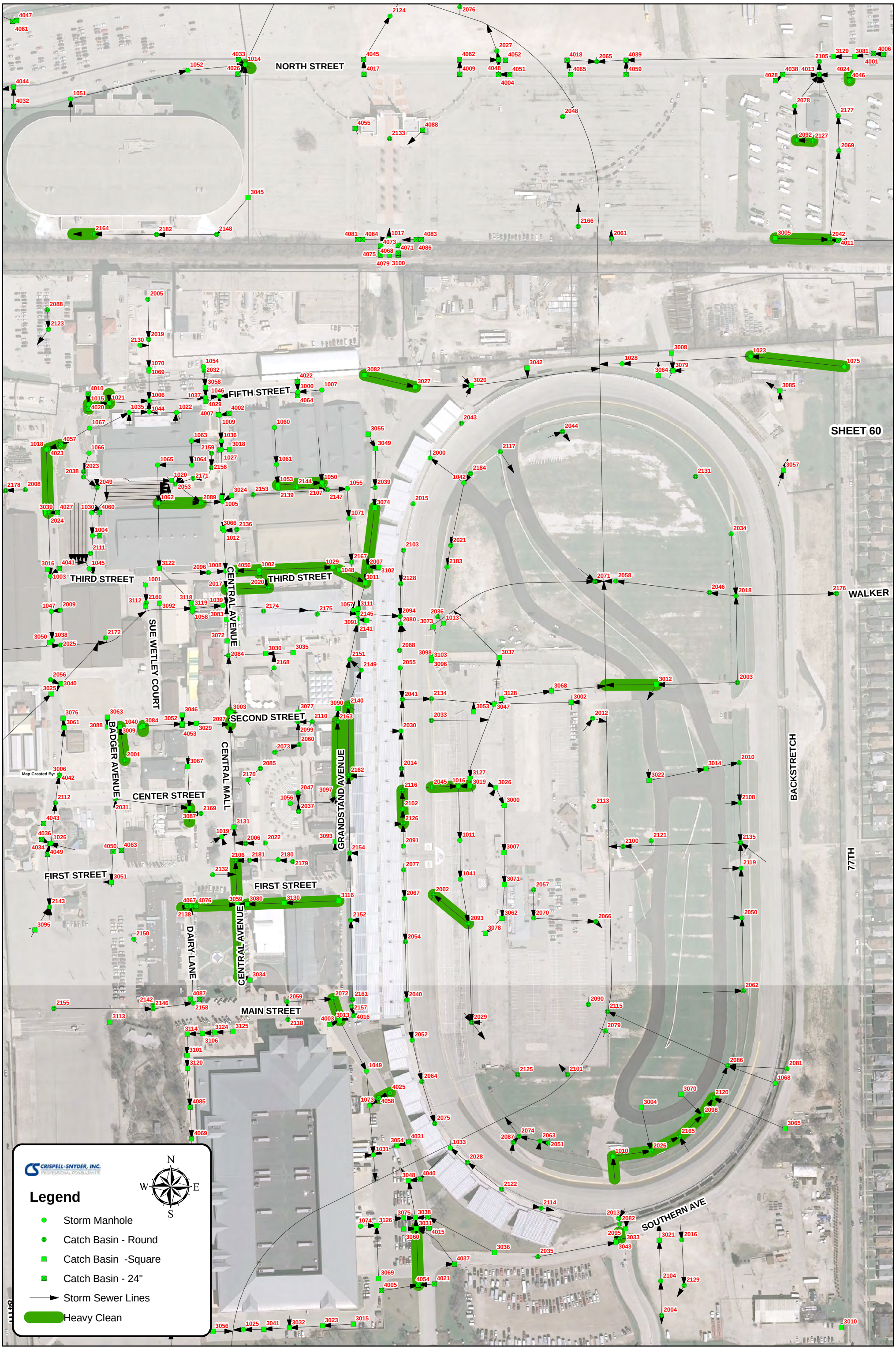

EXHIBIT F - HEAVY CLEANING LOCATIONS MAP