



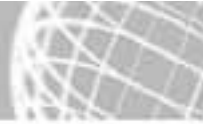
Managing an Outside Plant Fiber Optic Network with GIS

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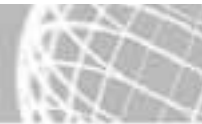
Frankfort Plant Board History

- Electric & Water Service since 1943
- Cable service since 1952
- High Capacity Fiber since 1997
- Largest municipally owned cable company in U.S.
- Services the State Capital of Kentucky



FPB Services

- High-Speed Internet Access
- Telephony Service
- Cable Television
- Water
- Electric
- Security Services



FPB Fiber Optic Network

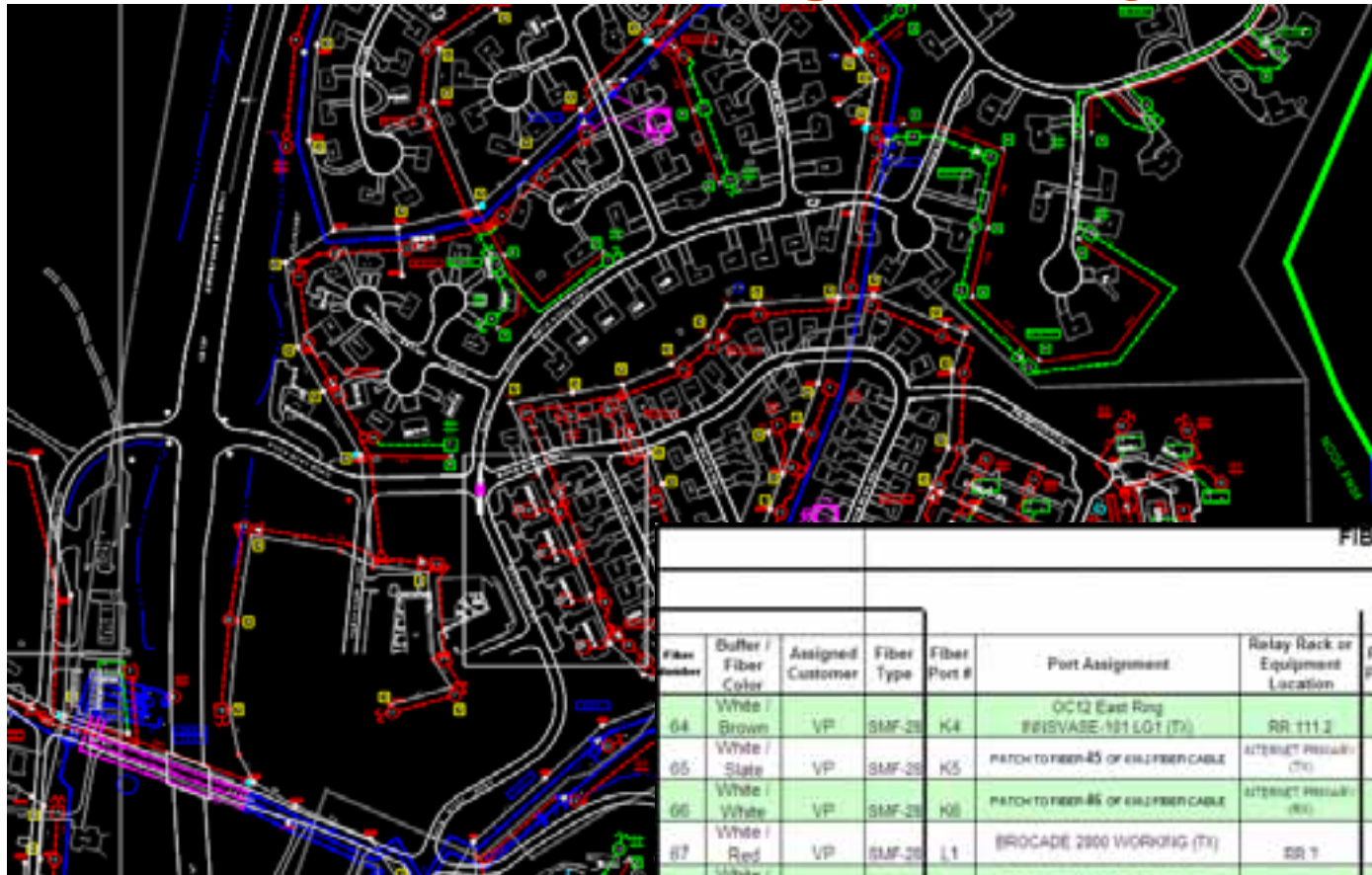
- Expanding the Full Service Network
- Provides service to 20,000 customers
- Fiber Optic Network supports:
 - Internet Access
 - Dark Fiber
 - High Capacity Internet
 - Cable Television Nodes
 - Telephony Applications



Need for GIS Based Management

- Massive Fiber System Expansion
- Network Expert was retiring
- Record Keeping was Inefficient and Complex
- Integration with Gas and Water GIS
- Company-wide Access to Data
- Fiber Network Analysis and Reporting

Old Management System

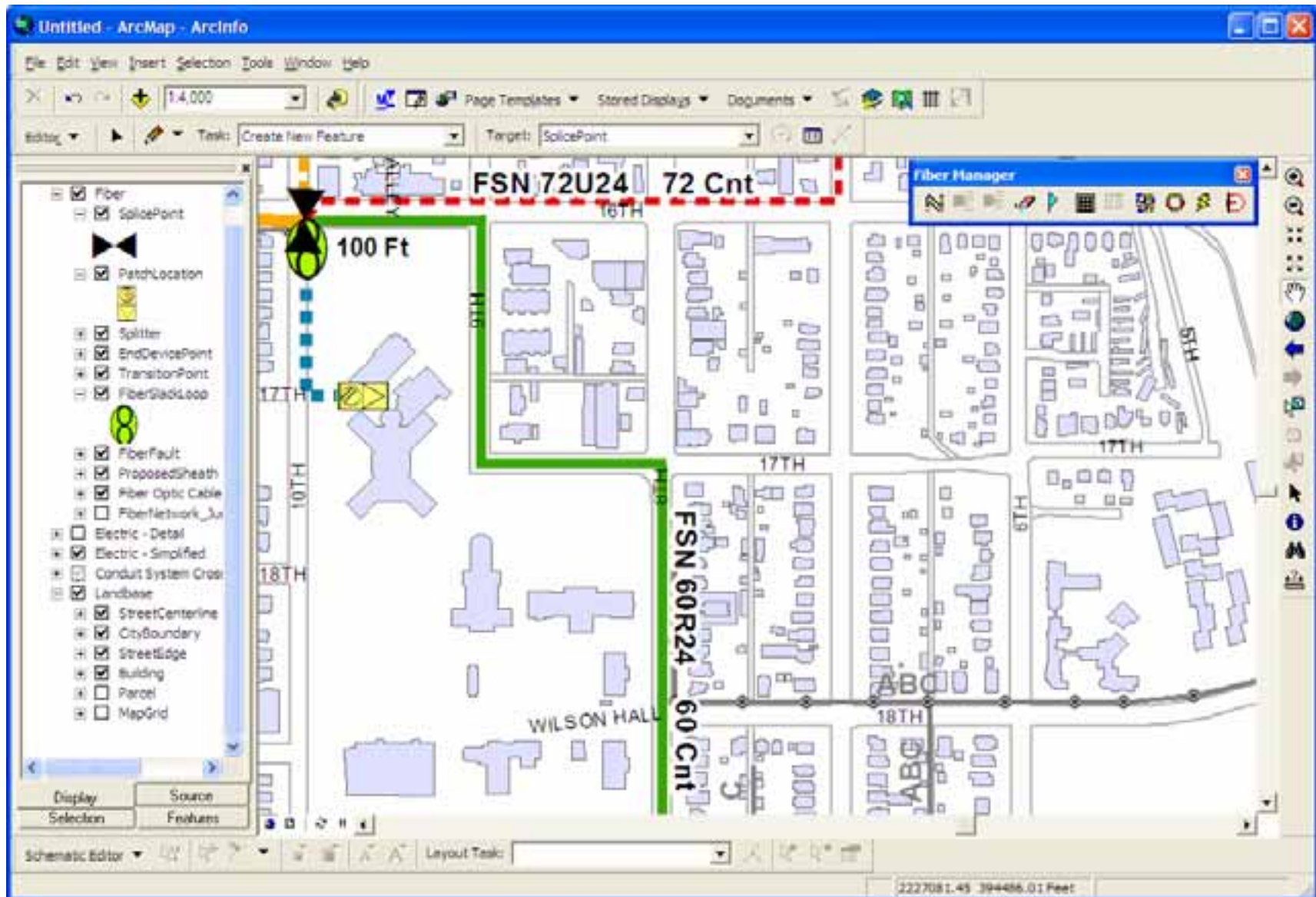


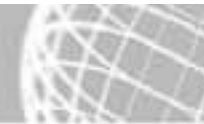
CAD File

Connection Spreadsheet

FIBER ASSIGNMENTS Central Fiber									
Fiber Number	Buffer / Fiber Color	Assigned Customer	Fiber Type	Fiber Port #	Port Assignment	Relay Rack or Equipment Location	Fiber Port #	Port Assignment	Relay Rack or Equipment Location
64	White / Brown	VP	SMF-28	K4	OC12 East Ring #2(SVASE-101 LG1 (Tx))	RR 111.2	K4	OC12 East Ring WBROVASE-101 LG2 (Rx)	RR 112.2
65	White / Slate	VP	SMF-28	K5	PATCH TO FIBER #5 OF EXISTING FIBER CABLE	INTERNET PROVIDER (Tx)	K5	PATCH TO FIBER #5 OF V-BROAD TO DUFF SPAN	INTERNET PROVIDER (Tx)
66	White	VP	SMF-28	K6	PATCH TO FIBER #6 OF EXISTING FIBER CABLE	INTERNET PROVIDER (Rx)	K6	PATCH TO FIBER #6 OF V-BROAD TO DUFF SPAN	INTERNET PROVIDER (Rx)
67	White / Red	VP	SMF-28	L1	BROCADE 2800 WORKING (Tx)	RR 1	L1	PATCH TO FIBER #7 OF V-BROAD TO DUFF SPAN	DJRP (Tx)
68	White / Black	VP	SMF-28	L2	BROCADE 2800 PROTECT (Tx)	RR 1	L2	PATCH TO FIBER #8 OF V-BROAD TO DUFF SPAN	DJRP (Rx)
69	White / Yellow	VP	SMF-28	L3	OC48 Central Ring #2(SVASC-102 LG1 (Rx))	RR 207.5	L3	OC48 Central Ring WBROVASC-101 LG2 (Tx)	RR 10.5
70	White / Violet	VP	SMF-28	L4	OC48 Central Ring #2(SVASC-102 LG1 (Tx))	RR 207.5	L4	OC48 Central Ring WBROVASC-101 LG2 (Rx)	RR 10.5
71	White / Rose	VP	SMF-28	L5	OC12 North Ring #2(SVASH-102 LG2 (Rx))	RR 110.6	L5	PATCH TO FIBER #71 OF V-BROAD TO DUFF SPAN	DCS/NORTHWARD SUPPLY (Tx)
72	White / Aqua	VP	SMF-28	L6	OC12 North Ring #2(SVASH-102 LG2 (Tx))	RR 110.6	L6	PATCH TO FIBER #72 OF V-BROAD TO DUFF SPAN	DCS/NORTHWARD SUPPLY (Rx)
73	Red / Blue		SMF-28	M1			M1		
74	Red / Orange		SMF-28	M2			M2		

Fiber Optic Network in GIS

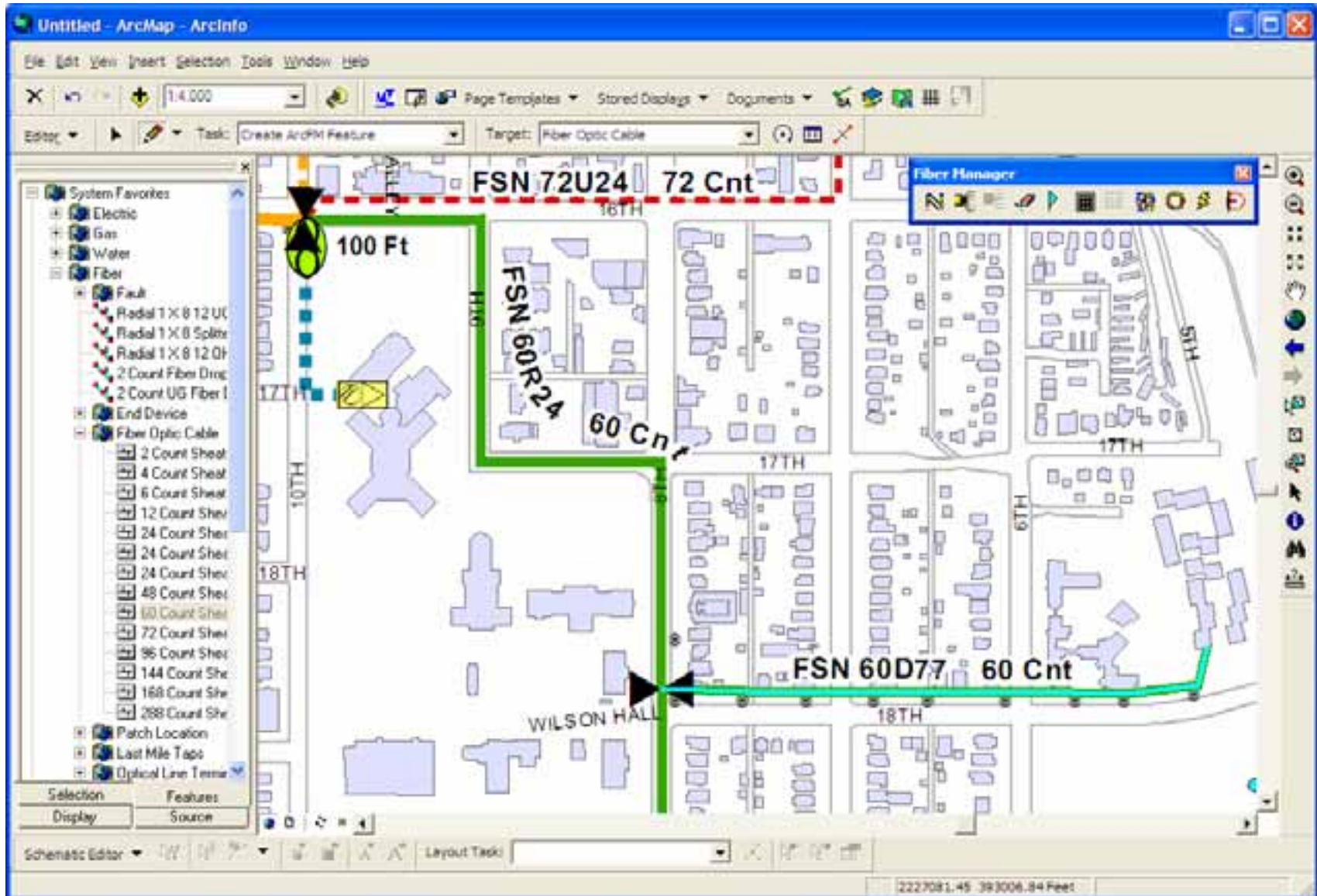




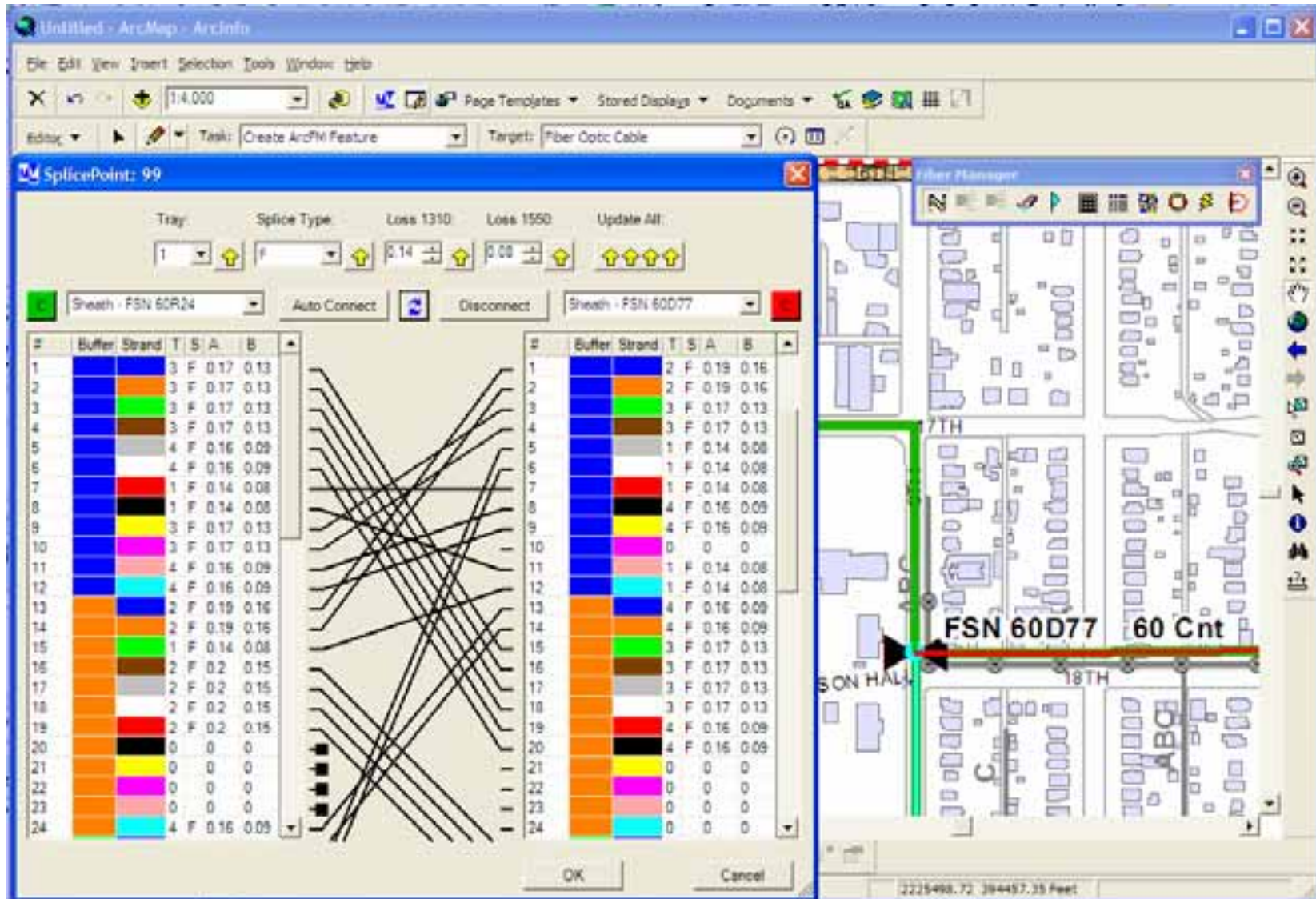
Uses of the GIS Data

- Call Before You Dig Program
- Operations Maps
- Annual and Ad Hoc Reporting
- System Planning and Expansion
- System Visualization with Electric and Water
- System Analysis

Connecting the Network



Splicing Fibers

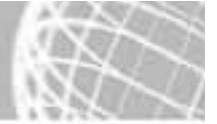


The screenshot shows the ArcMap interface with the 'SplicePoint: 99' dialog box open. The dialog box contains two tables of fiber strands and their connections. The left table represents the 'FSN 60R24' sheath, and the right table represents the 'FSN 60D77' sheath. The tables are connected by a complex web of lines, indicating the splicing configuration.

#	Buffer	Strand	T	S	A	B
1	Blue	3	F	0.17	0.13	
2	Orange	3	F	0.17	0.13	
3	Green	3	F	0.17	0.13	
4	Brown	3	F	0.17	0.13	
5	Blue	4	F	0.16	0.09	
6	Blue	4	F	0.16	0.09	
7	Red	1	F	0.14	0.08	
8	Black	1	F	0.14	0.08	
9	Blue	3	F	0.17	0.13	
10	Blue	3	F	0.17	0.13	
11	Blue	4	F	0.16	0.09	
12	Blue	4	F	0.16	0.09	
13	Orange	2	F	0.19	0.16	
14	Orange	2	F	0.19	0.16	
15	Green	1	F	0.14	0.08	
16	Brown	2	F	0.2	0.15	
17	Brown	2	F	0.2	0.15	
18	Brown	2	F	0.2	0.15	
19	Red	2	F	0.2	0.15	
20	Black	0	0	0		
21	Yellow	0	0	0		
22	Pink	0	0	0		
23	Pink	0	0	0		
24	Cyan	4	F	0.16	0.09	

The right table (FSN 60D77) has a similar structure but with different values for 'T', 'S', 'A', and 'B' columns, reflecting the specific configuration of the second sheath.

The background map shows a street layout with a fiber line labeled 'FSN 60D77 60 Cnt' running along 'SON HALL' and '18TH'. The map also shows various buildings and street names like 'C' and 'ABC'.



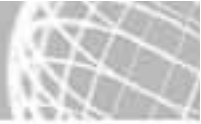
Splicing Challenges

- Poor Source Documents for Connectivity
 - Difficult to interpret
 - Information was out-of-date
- Fiber Optic Expert had Retired
- Tracing tools helped discover the connectivity
- Some field checking was required

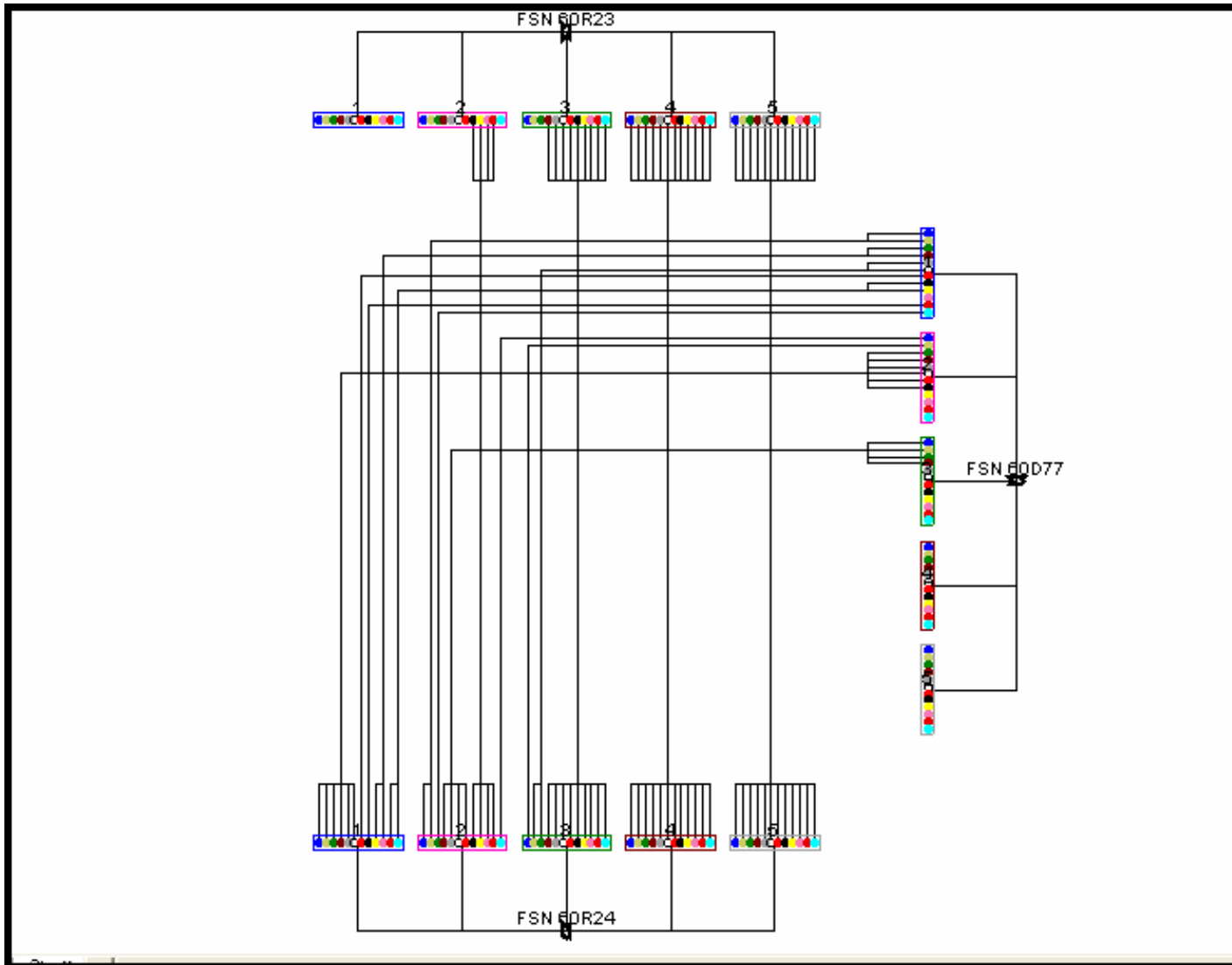


Splice Report

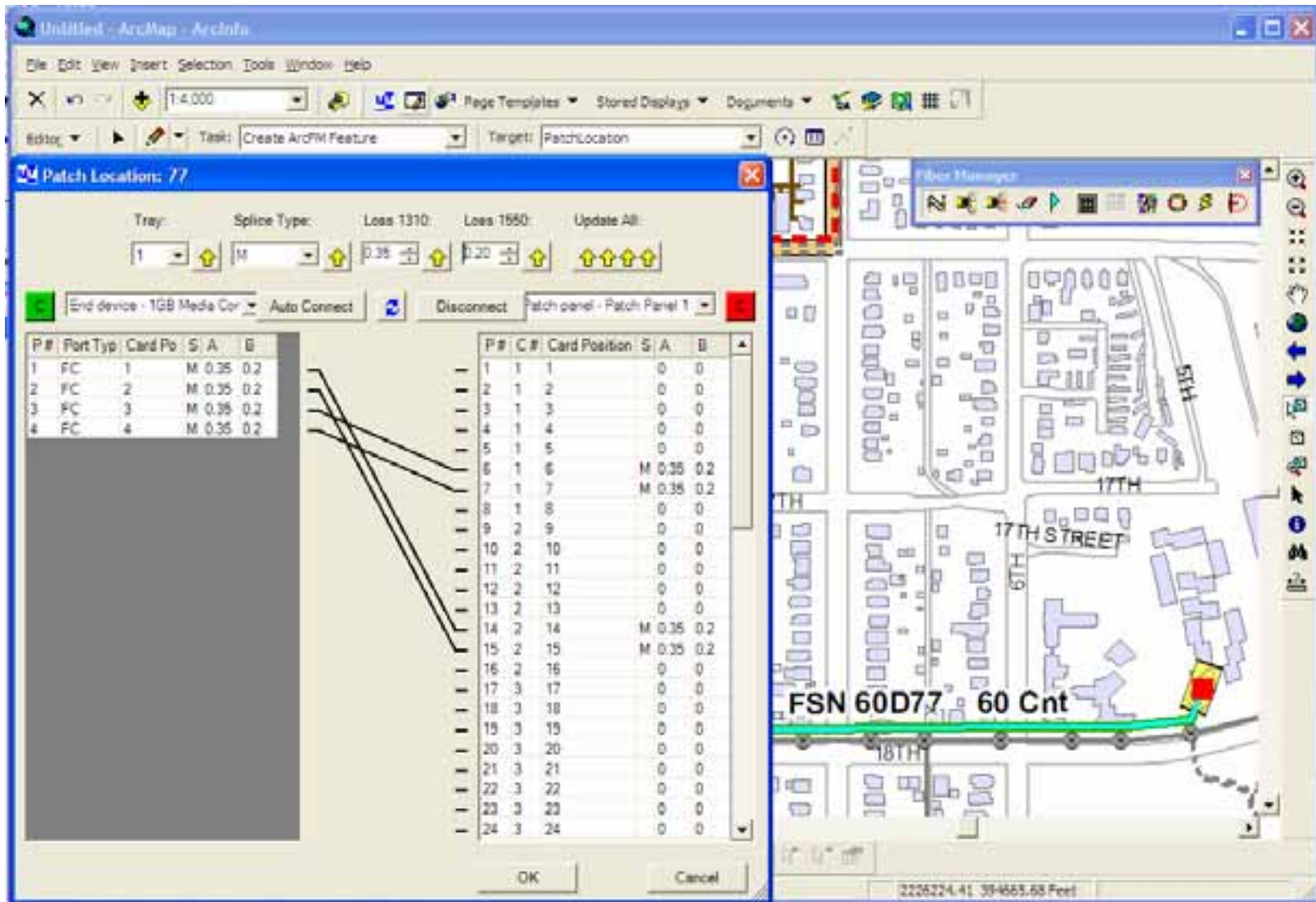
Sheath - FSN 60D77		1	13		Sheath - FSN 60R24	2	*	F	0.19	0.16
Sheath - FSN 60D77		2	14		Sheath - FSN 60R24	2	*	F	0.19	0.16
Sheath - FSN 60D77		3	9		Sheath - FSN 60R24	3	*	F	0.17	0.13
Sheath - FSN 60D77		4	10		Sheath - FSN 60R24	3	*	F	0.17	0.13
Sheath - FSN 60D77		5	26		Sheath - FSN 60R24	1	*	F	0.14	0.08
Sheath - FSN 60D77		6	27		Sheath - FSN 60R24	1	*	F	0.14	0.08
Sheath - FSN 60D77		7	7		Sheath - FSN 60R24	1	*	F	0.14	0.08
Sheath - FSN 60D77		8	11		Sheath - FSN 60R24	4	*	F	0.16	0.09
Sheath - FSN 60D77		9	12		Sheath - FSN 60R24	4	*	F	0.16	0.09
Sheath - FSN 60D77		10	*		*	*	*	*	*	*
Sheath - FSN 60D77		11	8		Sheath - FSN 60R24	1	*	F	0.14	0.08
Sheath - FSN 60D77		12	15		Sheath - FSN 60R24	1	*	F	0.14	0.08
Sheath - FSN 60D77		13	24		Sheath - FSN 60R24	4	*	F	0.16	0.09
Sheath - FSN 60D77		14	25		Sheath - FSN 60R24	4	*	F	0.16	0.09
Sheath - FSN 60D77		15	1		Sheath - FSN 60R24	3	*	F	0.17	0.13
Sheath - FSN 60D77		16	2		Sheath - FSN 60R24	3	*	F	0.17	0.13
Sheath - FSN 60D77		17	3		Sheath - FSN 60R24	3	*	F	0.17	0.13
Sheath - FSN 60D77		18	4		Sheath - FSN 60R24	3	*	F	0.17	0.13
Sheath - FSN 60D77		19	5		Sheath - FSN 60R24	4	*	F	0.16	0.09
Sheath - FSN 60D77		20	6		Sheath - FSN 60R24	4	*	F	0.16	0.09
Sheath - FSN 60D77		21	*		*	*	*	*	*	*
Sheath - FSN 60D77		22	*		*	*	*	*	*	*
Sheath - FSN 60D77		23	*		*	*	*	*	*	*
Sheath - FSN 60D77		24	*		*	*	*	*	*	*
Sheath - FSN 60D77		25	16		Sheath - FSN 60R24	2	*	F	0.2	0.15
Sheath - FSN 60D77		26	17		Sheath - FSN 60R24	2	*	F	0.2	0.15
Sheath - FSN 60D77		27	18		Sheath - FSN 60R24	2	*	F	0.2	0.15



Splice Schematic



Connecting a Patch Panel



The screenshot shows the ArcMap interface with the Patch Locations dialog box open. The dialog box contains a table of port configurations and a diagram showing connections between ports. The map in the background shows a street grid with a fiber line highlighted in green, labeled "FSN 60D77 60 Cnt".

Patch Locations: 77

Tray: [1] Splice Type: [M] Loss 1310: [0.35] Loss 1550: [1.20] Update All: [↑↑↑↑]

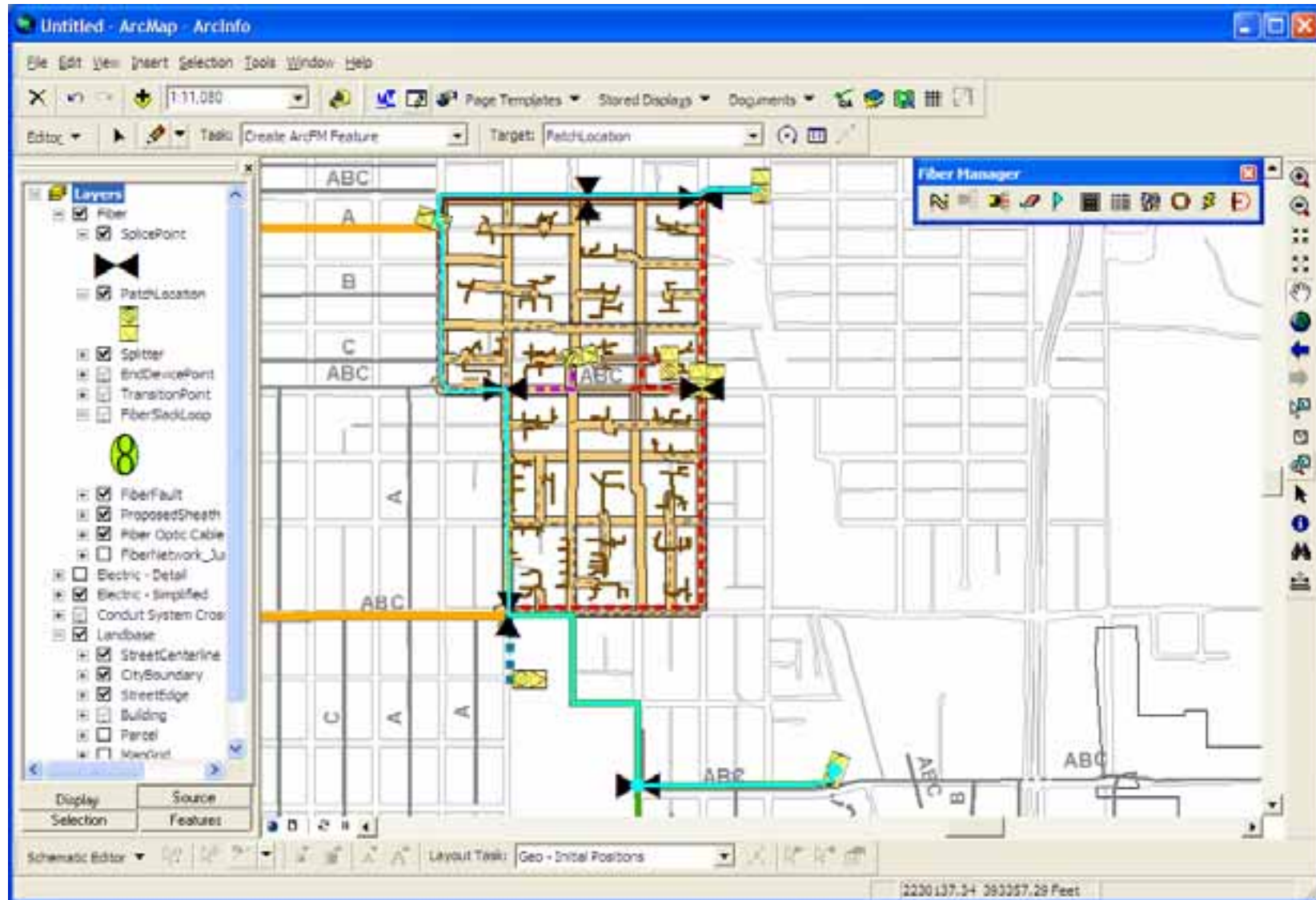
End device: 1GB Media Cor Auto Connect Disconnect Patch panel: Patch Panel 1

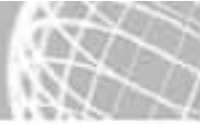
P#	Port Typ	Card Po	S	A	B
1	FC	1	M	0.35	0.2
2	FC	2	M	0.35	0.2
3	FC	3	M	0.35	0.2
4	FC	4	M	0.35	0.2
5					
6			M	0.35	0.2
7			M	0.35	0.2
8					
9					
10	2	10			
11	2	11			
12	2	12			
13	2	13			
14	2	14	M	0.35	0.2
15	2	15	M	0.35	0.2
16	2	16			
17	3	17			
18	3	18			
19	3	19			
20	3	20			
21	3	21			
22	3	22			
23	3	23			
24	3	24			

Diagram: A diagram showing connections between ports. Lines connect ports 1, 2, 3, and 4 on the left to ports 6, 7, 14, and 15 on the right.

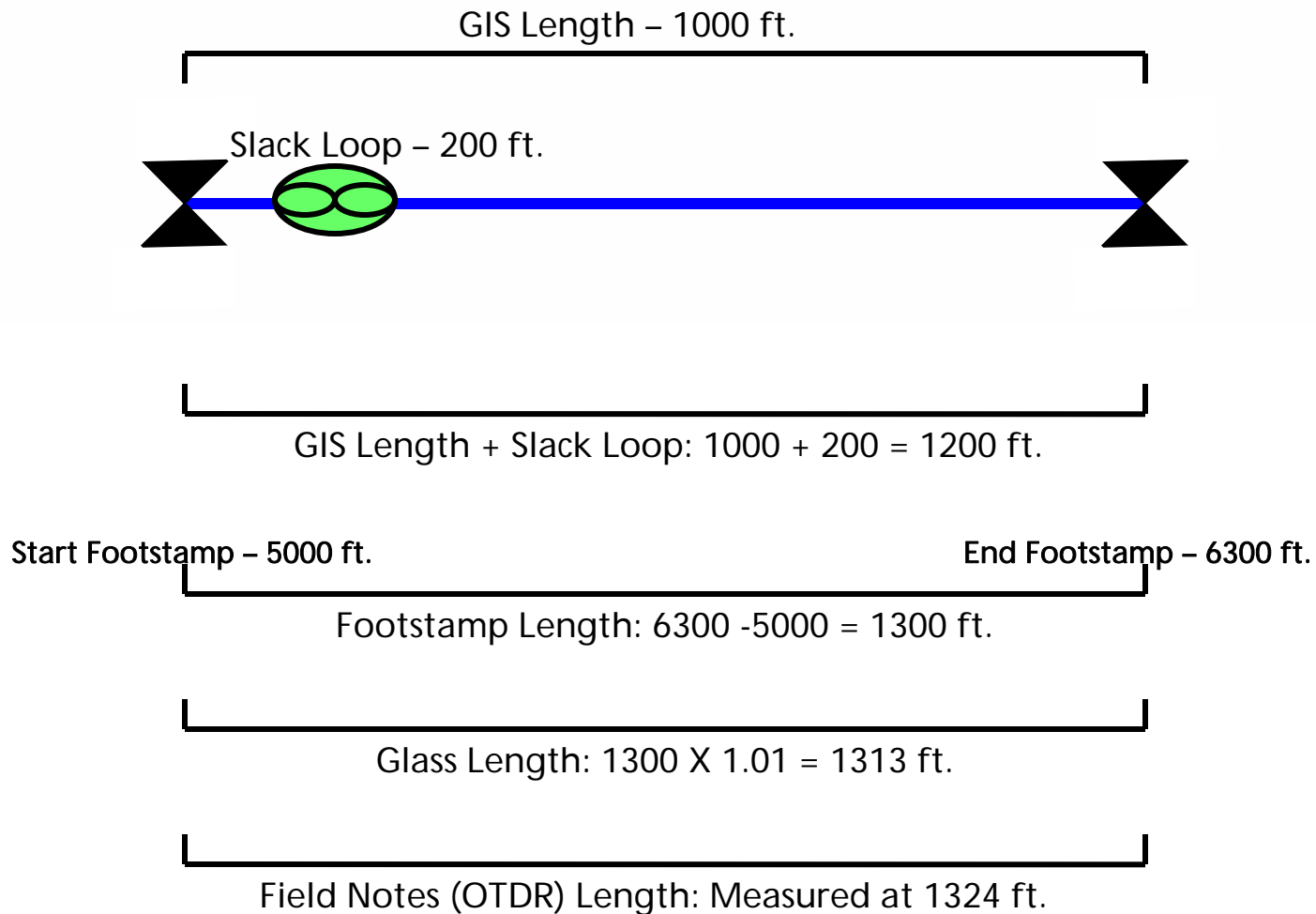
Map: A map showing a street grid with a fiber line highlighted in green. The line is labeled "FSN 60D77 60 Cnt". The map includes labels for "17TH STREET", "6TH", and "18TH".

Tracing the Network





Lengths Illustrated



OTDR Outage

The screenshot displays the ArcMap interface with a fiber network diagram. The main map area shows a grid of streets with fiber lines and components. A red line indicates the OTDR trace path, starting from a patch location and moving through several buildings. The 'Layers' panel on the left lists various fiber-related features such as PatchLocation, SplicePoint, and FiberFault. Two dialog boxes are open on the right side of the screen: 'OTDR Footage' and 'Port Picker'. The 'OTDR Footage' dialog shows a distance of 8555 and a red trace color. The 'Port Picker' dialog shows a tree view of network components, with 'Device Port: 3' selected under 'Rack: Rack 1'.

Layers:

- Fiber
- PatchLocation
- SplicePoint
- Splitter
- EndDevicePoint
- TransitionPoint
- FiberStackLoop
- FiberNetwork_Junct
- FiberFault
- ProposedHealth
- Fiber-Optic-Cable
- Electric
- Conduit System Cross Se
- Lanbase
- StreetCenterline
- CityBoundary
- StreetEdge
- Building
- Parcel
- MapGrid

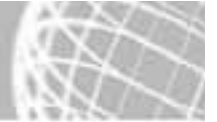
OTDR Footage:

- 8555
- Trace Color: [Red]
- Zoom to trace extent
- OK Cancel

Port Picker:

- End Device: TGB Media Converter
 - Device Port: 1
 - Device Port: 2
 - Device Port: 3**
 - Device Port: 4
- Rack: Rack 1
 - Patch Panel 1
 - Card: 1
 - Card: 2
 - Port: 10
 - Port: 11
 - Port: 12

Select Cancel



Conclusions

- Enterprise GIS improved system management
- Data available company-wide for many uses
- GIS provides a rich way to capture, analyze and report on the network data
- Many benefits despite partial data capture
- The data will improve as the system is used



Managing an Outside Plant Fiber Optic Network with GIS

Questions?

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