Prototype Development Proposal for Syringa Networks

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Executive Summary

As a growing company, Syringa Networks has identified gaps in workflow efficiencies. As a response to this, they asked for a consultation that would identify where efforts and resources could be invested in order to overcome those limitations. The resulting analysis identified Information Products and Services that would allow for Syringa to reclaim losses due to inefficiencies. The benefits from these products would allow Syringa to reclaim lost work hours as well as lost capital. Additionally, due to the companies prior investment in an ESRI solution, the costs were found to be minimal and limited, for the most part, to the first year of the product implementation.

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Organization

Syringa Networks is a business-to-business fiber-optic network organization established in 2002 (LinkedIn, 2020) and based in Boise, Idaho. It was formed out of a need by twelve smaller, rural, and local telecommunication companies to fend off competitive threats brought on by larger organizations. Today, their service areas are concentrated in the states of Idaho and Utah, but efforts to grow have created a moderate increase in presence across the US. There have been additional successful expansion efforts into Northern Europe, Asia, the Middle East, and Australia (Syringa, 2020b). As a privately held company, it generates approximately $56 million worth of revenue as it competes against other telecommunication companies like Bluebird Network, Fibernet Direct, and The Adtell Integration (Zoominfo, 2020).

> "Syringa Networks was founded on a single guiding principle—to provide a world-class, high-performance communications infrastructure that will create growth and opportunity for our customers and their communities."
>
> ~ *Syringa Mission Statement*

The organization's mission statement summarizes its primary strategic plan, to provide outstanding service to its customers. While one of their slogans, "Performance. Rapid response. Commitment to your success. These are the reasons why so many businesses choose Syringa Networks", states in no uncertain terms how they go about accomplishing that goal (Syringa, 2020a). In addition to their primary strategic plan, Syringa stands by an unwritten objective: to serve its member companies. For them to accomplish this, it is essential for Syringa to use its available resources in any way that will allow for the organization and its member companies to maintain a competitive advantage not only over their local competitors but also over their larger and brand-recognized ones as well. Accomplishments which are reflected as they are recognized

for the tenth straight year as one of Idaho's top 100 companies (Syringa, 2020c).

At an executive level the CEO, Sales Team, and General Manager work together to identify opportunities for growth that further the company's strategic purpose. This takes form in new strategic Outside Plant (OSP) infrastructure construction. These projects are then reviewed by the Board of Directors, which is comprised of the member companies. If approved, new projects will be assigned an appropriate budget and time constraints.

As a telecommunication company, Syringa has already established a GIS department in order to meet its geospatial information needs. The GIS department is responsible for designing, construction, project management, budgeting, and closeouts of new fiber optics-build projects. Other responsibilities can include municipality-requested relocation projects of communication lines as public rights-of-way are reconstructed. Also, it falls on the GIS department to handle the maintenance and routine auditing of the existing fiber-optic infrastructure. These tasks must be done in a timely manner and as efficiently as possible.

As Syringa's project plans pass from hand to hand, top to bottom, several different factors are taken into consideration. Historical information is used to estimate construction costs, timelines, budgets, as well as to project future OSP costs. Software tools such as Excel spreadsheets, ticketing systems, and document repositories are used in this process. More recently, a newly implemented Customer Relationship Management (CRM) and Enterprise Resource Planning (ERP) systems from Microsoft's Dynamics 365 are being used to automate processes and remove data silos from the organization. While the GIS department makes use of tools like ESRI's ArcGIS Enterprise and OSPInsight. The resulting information is readily available, augments company workflows, and is better for decision-making.

Of equal importance in this process are the employee's experience, knowledge, and skill. Project management skills become a crucial component to ensuring project plans are moving

along from service-order receipt to project-closeout. A thorough understanding of OSP design and topology is equally important to capitalize on current opportunities and future growth. All employees must know how to interact with any kind of stakeholder, such as customers, partners, local and federal agencies in order to meet the departmental objectives.

Various types of information products (IP) will be developed during a new project or in regular operating processes. Network infrastructure records, for example, will be comprised of maps, as-built documents, staking sheets, and splicing worksheets. Reports on cable miles with costs per foot are also created.

Needs Assessment

In order to create a Needs Assessment, a series of interviews were conducted with Syringa's GIS Manager, Austin Little, and additional information related to the company's operational processes was provided by team member and GIS Technician, Jordan Gomez. These conversations were utilized at first to discuss current workflows and processes. After which, the relationships between current IPs, software, and manual procedures were noted for further analysis and solution development. This interviewing process was concluded with guided conversation in which insight was searched for as it related to desired outputs and/or changes in the company's workflow.

Syringa's GIS department tools currently consist of ESRI's software ArcGIS Desktop, ArcGIS Online, and Server Portals. OSPInsight fiber management software and Ptarmigan's engineering design tool are also used in conjunction with ESRI's solutions. Some of the other tools used by department personnel include FME for data analysis, statistics, and conversion, Google Earth, and Microsoft's Task Scheduler. While these tools should provide an arsenal of resources from which to maximize efficiencies, there are a number of shortcomings that have created a gap between current and potential performance.

Overall, these tools are described as being effective, though, they could be made more efficient. One of the more common problems is the need to perform several steps manually in any given process. The lack of Python scripting when using FME or Model Builder was mentioned as an example. Similarly, the effectiveness of Task Scheduler is reduced when steps require a manual log-in for services. This is an issue that is also present in the department's workflow. Work orders, for instance, will often require field technicians to do asset auditing by hand. Staking, or Design sheets, also require several manual steps in which the field tech receives a pre-staking sheet for review, and which frequently goes through several iterations of edits with the GIS Manager.

Table 1

Preliminary Needs List

Title	Description	User
Conduit Mapping	Accounts for number and direction of cables within a conduit.	Austin Little
Mobile Mapping	Ability to view, edit, create, and remove features (assets) on the field.	GIS Department
Staking Design	Staking sheet automation for construction plans; process for route engineering.	GIS Department
CDMAE Solution	Replacement for OSPInsight.	Jordan Gomez
811 Survey	Improvement on 811 survey request portal.	Jordan Gomez

Note: Descriptive list of IPs based on information gathered during Needs Assessment.

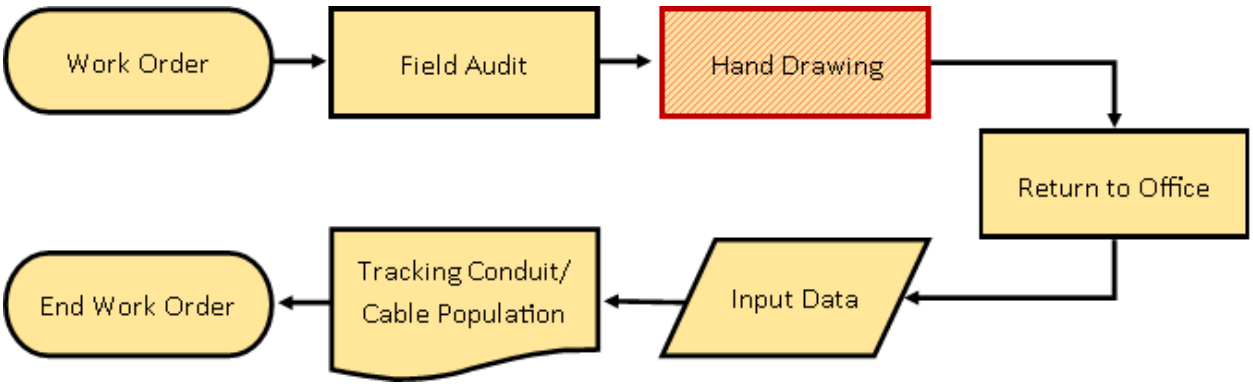
When asked what type of improvement Syringa would like to see implemented, the following options were quickly identified. First, staking sheet automation and integration for its fiber optics construction plan. Second, general staking processes for route engineering. Third, mobile mapping for database auditing. Fourth, an improvement in location access points processes. And fifth, an improvement on 811 survey request portal. Ultimately, it would be

desirable if these services led to better inter and intra-departmental collaboration. An additional comment was provided stating there have been several limitations when it comes to OSPInsight. for which they would like to explore the possibility of identifying a possible substitute or alternatives (Table 1).

As this phase reached a conclusion, a commonality took form: there were several inefficiencies in the processes used to gather field data. As such, details pertaining to two specific field processes were requested. The first of these was Conduit Mapping. The purpose of this task is to track conduit or cable population so as to have a record of conduit availability. Currently, this work order starts with having a field technician do an in-person field audit of the requested conduit. The technician then creates a hand drawing of the conduit on paper. Once completed, the technician returns and delivers the drawing to the GIS department. Finally, the GIS department digitizes the collected data (Figure 1).

Figure 1

Conduit Mapping Workflow



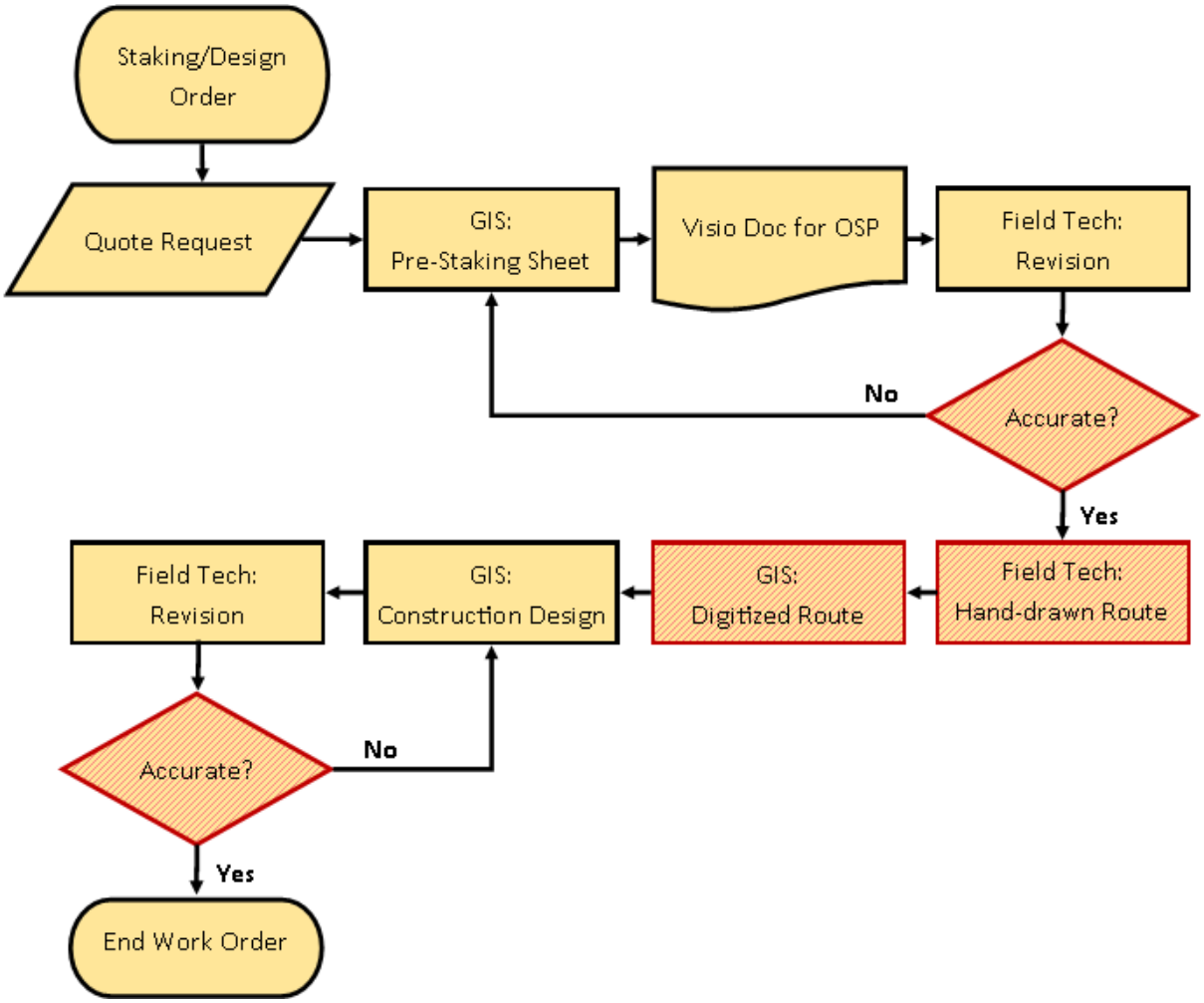
Note: Workflow diagram representing Conduit Mapping tasks with highlighted inefficiency.

The second field process detailed was for Staking Design. This task is used when a request is made to create a new access point from the existing infrastructure for a customer. The Staking Design work order starts with the GIS Department creating a Pre-Staking sheet using

Visio Doc for OSPInsight. This document itself is created using ESRI's ArcGIS as well as a Google Earth KMZ. Once completed, the Visio Doc is sent to a Field Technician for revision. Current methods require, more often than not, for the document to be edited and returned to the GIS Department. Once the document meets the Field Technician's approval, he/she will stake the route. This step involves hand drawing on the document the true route needed for construction. The document is once more returned to the GIS Department where the route is digitized into OSPInsight. It was

Figure 2

Staking Design Workflow



Note: Workflow diagram representing Staking Design tasks with highlighted inefficiencies.

noted that this is a rough digitization with a high relative error. Once the Visio Doc is updated into OSPInsight, a staking sheet is created and is sent to the Field Technician again for review. Here too, it is usually necessary to send back the Staking sheet to the GIS Department with final edits. Once the GIS Department and the Field Technician accept all edits, the Design Phase is Complete (Figure 2), (A. Little and J. Gomez, personal communication, November 2020).

Prototype

The prototyping process began by interpreting the information gathered through the Needs Assessment dialogues. It was at this point that two Information Products (IP) were targeted for design. First, a Conduit Map IP would be created to expand Syringa's current network map by providing the information needed to determine how many cables are present in a given conduit, as well as the directional properties associated with its lay information. This process will require ArcGIS and the ability of ESRI's Collector app to access Syringa's network infrastructure. Fields should be added to the appropriate asset layer which will account for 1) Conduit Type, 2) Conduit Population, 3) the Direction taken by the existing cables within the conduit, and 4) Photograph of conduit (see Figure A4 for feature diagram).

Second, a Staking Audit IP would be designed to allow users to View, Edit, Create, or Remove features on Syringa's network map. This process will also require ArcGIS and the ability of Collector to access Syringa's infrastructure. Specifically, Collector's functions will need to be expanded to include Edit, Create, and Remove. Additionally, while updates should be marked for approval by the GIS Manager before being committed to the database as a Data Integrity and Security measure. The only added field needed would be for possible attached documents or photographs.

Third, the ability to add attachments to notes will be sought so as to allow the inclusion of documents or photographs on non-asset features. This could extend the use of the Notes feature

to allow for work orders to be added as a scanned document or to supplement any on-the-field notes made. However, it would be of some benefit to extend this same attachment ability to asset-specific features. For this to take place, asset features should also be added in an attachment field.

Fourth, as the foundation upon which Syringa's GIS data rests is already one of the strongest platforms in the market, ESRI's ArcGIS, the possibility of having a communication network solution completely based solely on it and thereby removing the need for OSPInsight was also investigated. After said research, the Communication Data Management for ArcGIS Enterprise (CDMAE) was identified. Although this solution was not sought for the purpose of this project plan, it was incorporated into future development recommendations. Instead, and with that same future outlook insight, the schema for the lighter Communication Data Management for ArcGIS Online (CDMAO) version of this solution was incorporated into the prototype as an additional proof-of-concept (see Figure A10 for schema mapping diagram).

In summary, the functionality of these IPs will exceed current methods and efficiencies. As previously mentioned, one of the main goals for Syringa is to provide excellent service to its partners. The presence of this main organizational goal gives rise to an unwritten second: to find and leverage competitive advantages in order to stay competitive with larger telecommunication companies. Designing and implementing these IPs will allow Syringa to accomplish this task by having a more efficient and effective method of collecting data, reducing workflow steps, increases in data accuracy, and decreasing the likelihood of errors in data collection.

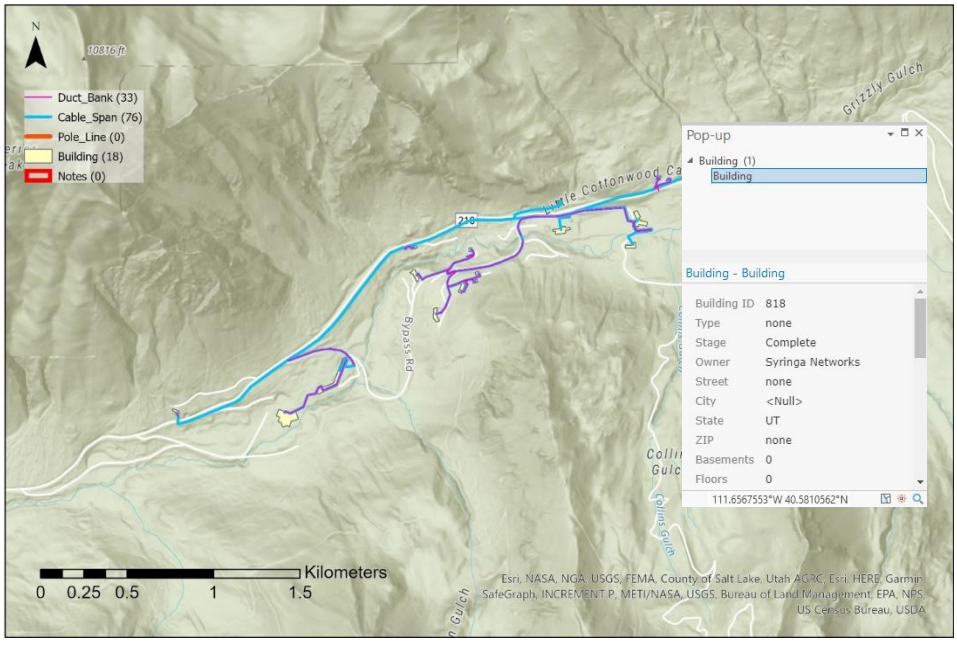
In order to create these IPs, Syringa's existing datasets housed within ArcGIS Enterprise server environment would be needed. Once obtained, the datasets required data cleaning processes as well as preparation for migration. Obsolete fields left from previous upgrades as well as fields used for internal OSPInsight processes were identified and removed while the new

fields previously identified were added. Some data-type restructuring was also necessary due to ArcGIS's internal handling of fields and domains. The decision to maintain Domain relationships was for the purpose of restricting the options a Field Technician could enter; thereby reducing the probability of errors in data. The next step was to match Syringa's dataset structure to the schema template provided by CDMAO (see Appendix A for field and domain diagrams and relationships).

Part of this process also noted that the Prototype design requirements would not be taken into consideration at this point as it is based on ArcGIS Online. It should also be noted, however, that should future Enterprise deployment of CDMAE be sought, the current Relational Database Management System (RDBMS) should be maintained. As Syringa already relies on ArcGIS Enterprise, it can be taken as a given that all system requirements are, and will continue to be met.

Figure 3

Cable & Building View by Layer

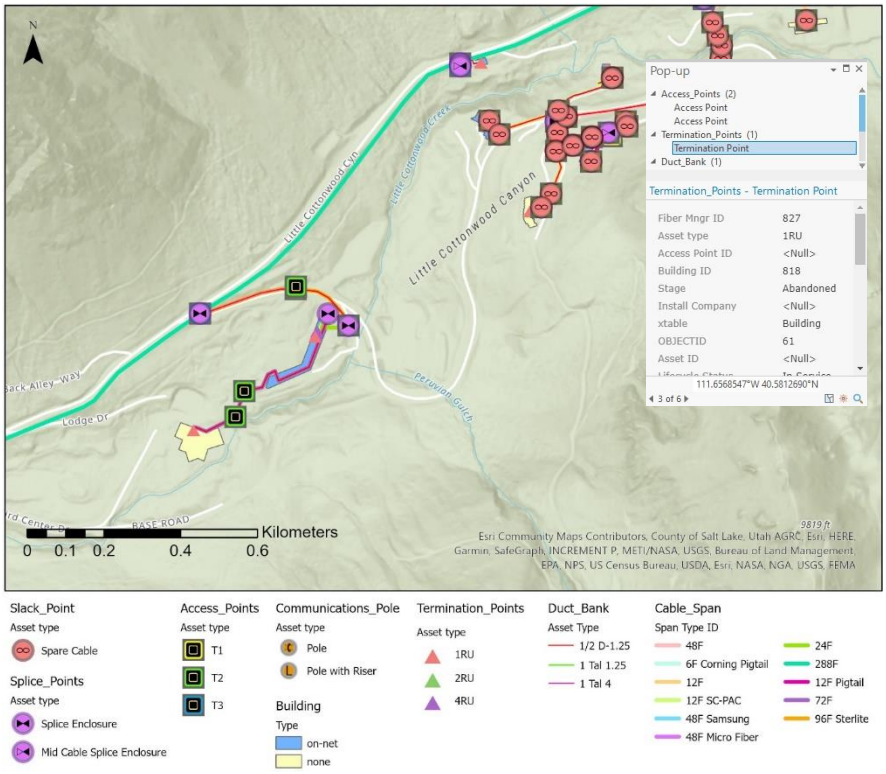


Note: Cable and Building by feature layer visibility at 1:24,000 scale.

Once all of these aspects were in place, the fine-tuning aspect of the IP development took over. Map projection was left on default WGS 1984 Web Mercator (Auxiliary Sphere) as both schemas matched. Next, error tolerances were identified, as per Syringa's standards, to be 10% on Referential errors, 0% on Topographical errors, 2 to 3 meters of Absolute and Relative errors for polygon features, and 3 to 4 centimeters of Absolute and Relative errors for line and point features. This was followed by defining the Default Extent scale at 1:18,000. Additional Scale Dependencies were set for World visibility at 1:100,000; Cable & Building feature visibility at 1:24,000 (Figure 3); and Point feature visibility at 1:10,000 (Figure 4), (see Figures B1 and B2 for additional views).

Figure 4

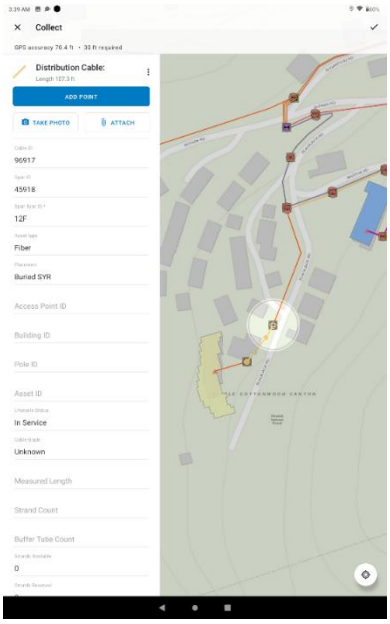
All Assets View by Type



Note: All assets by type visibility at 1:10,000 scale. Pop-up shows as active with multiple selections.

Figure 5

Collector Full Asset Audit

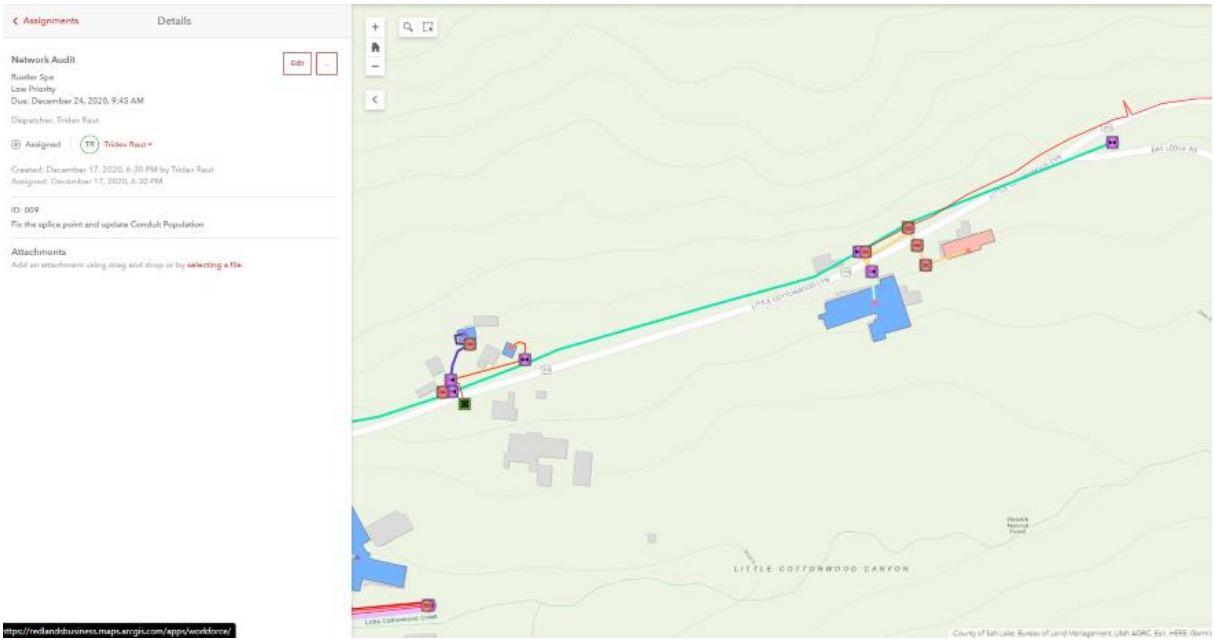


Note: View from Collector displaying full edit control.

After the migration process was complete, the data was published as a service to ArcGIS Online, and editing was enabled to allow for field collection functions using a Webmap, Collector, or FieldMaps (Figure 5), (see Figures B3 and B4 for additional views). It was during the testing phase of this step that an additional service, Workforce for ArcGIS, was added to further improve the workflow. With Workforce for ArcGIS's, work orders could now be generated within the system. System administrators or work dispatchers would also be able to generate work orders and assign tasks to specific technicians (see Appendix Figure B5), further removing a manual step from the process and allowing access to data via mobile devices. This functionality has the potential to remove additional manual steps in, and during, a work order by generating them electronically and by being able to check for status updates (Figure 6 and 7).

Figure 6

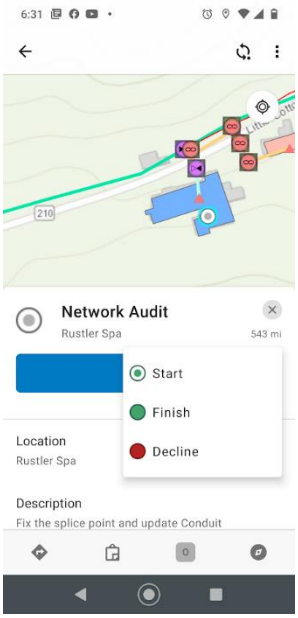
Workforce Details View



Note: Service area view displaying Workforce assignment details.

Figure 7

Workforce Update Status View



Note: Workforce demonstrating job status update options.

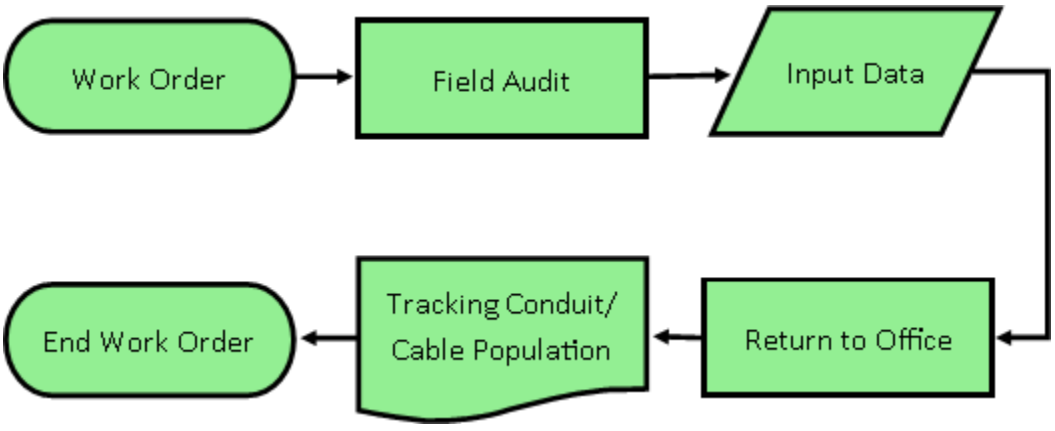
Benefits

Once the Prototype was completed and tested, the predicted benefits from a streamlined workflow were confirmed. For the Conduit Map IP, the impact on the new workflow was the removal of one step (Figure 8), while the Staking Design IP saw a reduction of at least eight steps, depending on how many revisions an order might go through (Figure 9). This reduction in workflow steps has several cost-saving effects. First, there is a reduction in needed hand-drawn paperwork, which should have an impact on office supply costs. Second, there are savings in the number of hours spent creating and revising manual documents. This has implications in terms of raw potential time-value, as well as, labor costs. Lastly, there is also a potential savings in terms of transportation costs, should there be errors that would have required in-person field editing.

Another benefit gained by these IPs is an increase in accuracy from field audits. Errors due to inaccuracies can be quite costly, that is why a more accurate data gathering IP is highly sought. Such benefits would also extend to public works agencies, as more accurate data could

Figure 8

Revised Conduit Mapping Workflow

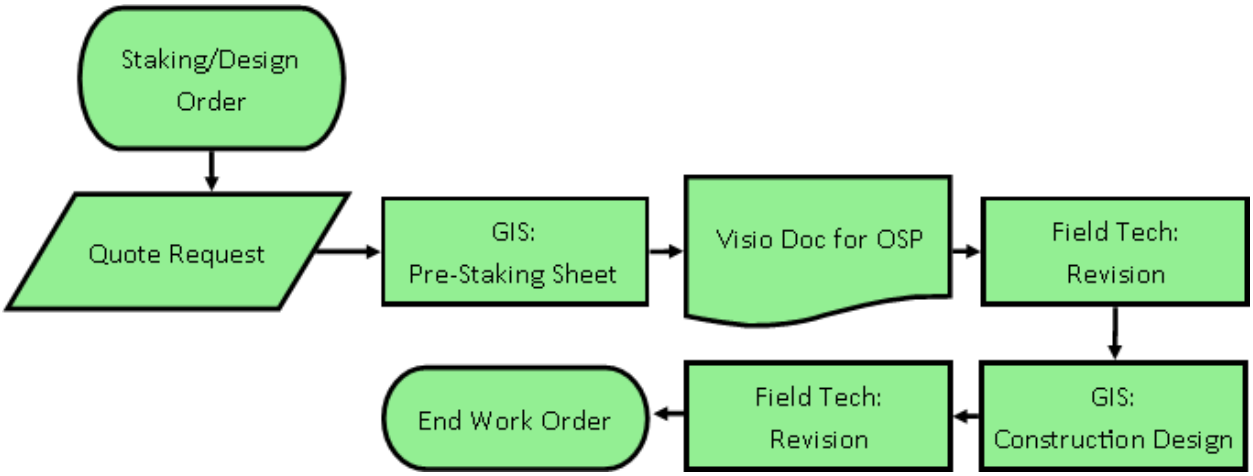


Note: Workflow diagram representing revised and condensed Conduit Mapping tasks.

be provided to them for accountability of asset locations. This, in turn, creates another benefit for Syringa as buffer safety lines can be defined in narrower terms. Once buffer safety zones are narrower, there are fewer people or agencies requesting information prior to any construction project. This liberates more of Syringa's resources as they would no longer be required to attend to those dropped calls. This type of benefit would also have the potential to improve response times should there be a disruption in services.

Figure 9

Revised Staking Design Workflow



Note: Workflow diagram representing a revised and condensed Staking Design tasks.

One of the long-term benefits that the Prototype demonstrates with its ease of deployment, is the ability to capture a competitive advantage in which its functions are packaged as a service that could be offered to Syringa's partner companies. Another very significant benefit, however, lies in this Prototype not only showing how to improve current workflows but also in demonstrating the feasibility of implementing the CDMAE solution. A task that should allow for Syringa to completely move away from OSPInsight and have a one-stop solution based off of ESRI's platforms. When taking into consideration licensing costs for OSPInsight, this

creates a savings of approximately $14,000 per year (J. Gomez, personal communication, November 2020).

Costs

The fact that costs will be low across the board is one that is hard to ignore. The reason behind this is Syringa's existing ArcGIS Enterprise solution. The developed IPs will not require any new hardware or software. In terms of servers, the existing in-house ones will meet any new need. Additionally, ESRI's current licensing terms and application products for Syringa will cover these new IPs as well. The current mobile devices used to gather outside data are all under 2 years, meaning that there is no immediate need to purchase new ones. The only new input device that would be needed at a cost ranging from $4-6,000 is a Trimble R2. A device that is needed to allow for GPS data to be gathered to a high degree of accuracy and then to be transmitted to the working platform via Bluetooth. Another cost that was acknowledged, but identified as being negligible, related to the knowledge gap within Syringa's GIS Department. Because it was concluded that these are professionals already well versed in ArcGIS, any needed training on the IPs would be to identify new processes only, as opposed to full functionality. To do this, a GIS Departmental meeting should suffice.

Full accountability of financial costs due to this project is not possible at this time. One reason for this was not having sufficient information pertaining to Syringa's current budgeting processes and accounting. Another reason why these figures were not accounted for was due to the method by which Syringa accounts for employee costs. The costs due to employee's work are measured as a unit of time only, a model similar to that of a Flat Organizational structure. The closest approximation possible accounts for approximately 1,200 workhours to develop these IPs and $4-6,000 to purchase the Trimble R2 device. Both of these costs would only take place during the first year of implementation. After this initial cost, subsequent years could see savings

in workhours from workflow needed to produce the necessary IPs of 25 to 33%.

Risks

An immediate and compounding risk will exist as these IPs are continuously relied upon, expanded on, and serve to inspire new development. This risk is the deprecation of OSPInsight, even though its removal is ultimately a long-term goal. This is categorized as a risk because as Syringa moves away from relying on OSPInsight, it is possible that it will be abandoned prematurely and cause critical errors in information. An additional risk introduced by the Prototype is its reliance on ArcGIS Online. This is because any modification made to the dataset must be pushed manually onto Syringa's servers. These manual steps can also give rise to the possibility of data corruption or errors.

Risk in deployment should also be acknowledged. For example, there are constraints that will need to be observed as deployment passes from pilot to full deployment to expansion, and that is due to the constraints brought on by various vendors, such as ESRI and OSPInsight. The complexity due to migrating a utility network is also a major factor in calculating risks. It is a tedious and time-consuming process. Last, even though most of the functionalities currently used by Syringa's solutions can be accounted for in the Prototype as well as the Enterprise solution, it is entirely possible that once the Prototype process moves into the Pilot phase, some differences may be discovered. Ultimately, however, risk analysis determined that the possibility of failure was 9.75% (Table 2).

To account for possible risks, several factors were taken into account utilizing a template analyzer provided by Dr. Christopher Franklin, from the University of Redlands. Under 'Technology', few threatening factors were found to be present. Only a 1.00% risk factor was allowed due to some of the modifications which will be needed to migrate systems. Next, for 'Organizational Functions' and 'Interactions', an overall 5.10% risk is seen as being present, the

Table 2

Risk Assessment Table.

Risk Category	Determinants	Factor Present?	Contribution to Failure
Technology			
	Being implemented with new equip?	N	0.00%
	Is this the first (bug/flaws version) release of SW?	N	0.00%
	Are there gaps in TECH for clients needs?	N	0.00%
	Special programming needed to fill needs?	Y	1.00%
Organizational Functions			
	Are changes forseeble in functions & workflow?	Y	5.00%
Organizational Interactions			
	Are multiple internal agencies involved?	N	0.00%
	Geographically dispersed (e.g., global)	Y	0.10%
	Are mgmt changes required?	N	0.00%
Constraints (Delimits)			
	Are there BUDGET constraints (or unforseen)?	N	0.00%
	Is the timing DOABLE under expected sked?	Y	0.00%
Stakeholders			
	Are there multi-level stakeholders?	Y	0.10%
	Is there involvement of public/media/lobby groups?	N	0.00%
Overall Complexity			
	What is the probability of failure due to over complexity?	Y	0.50%
Project Planning			
	Is the planning well defined?	Y	0.25%
	Is there alignment with G.O.S.T. ?	Y	0.50%
Project Management			
	Are you using Best business practice methods?	Y	0.00%
	Is there built-in accountability?	N	0.10%
	Is there built-in qualty control	N	1.00%
Project Schedulng			
	Are scheduling deadlines reasonable?	Y	0.00%
	Do you have Project-mgmt tools to identify Milestones?	Y	1.00%
Project Resources			
	Do you have adequately trained staff?	Y	0.10%
	Is there a knowledge gap	Y	0.10%
	Probability of Project Success		**90.25%**

Note: Itemized table of factors contributing to potential project failure (Franklin, 2020)

highest of this project. The principal cause of this threat is from the possible changes or disruptions which could take place in the future as Syringa incorporates new business functions and goals as it explores new opportunities for growth. Related to ‘Technology’, the overall ‘Complexity’ of this project was also seen as being a risk factor and was weighed at 0.50%. ‘Project Planning’ accounted for 0.75% of the risk due to some lacking information at this time,

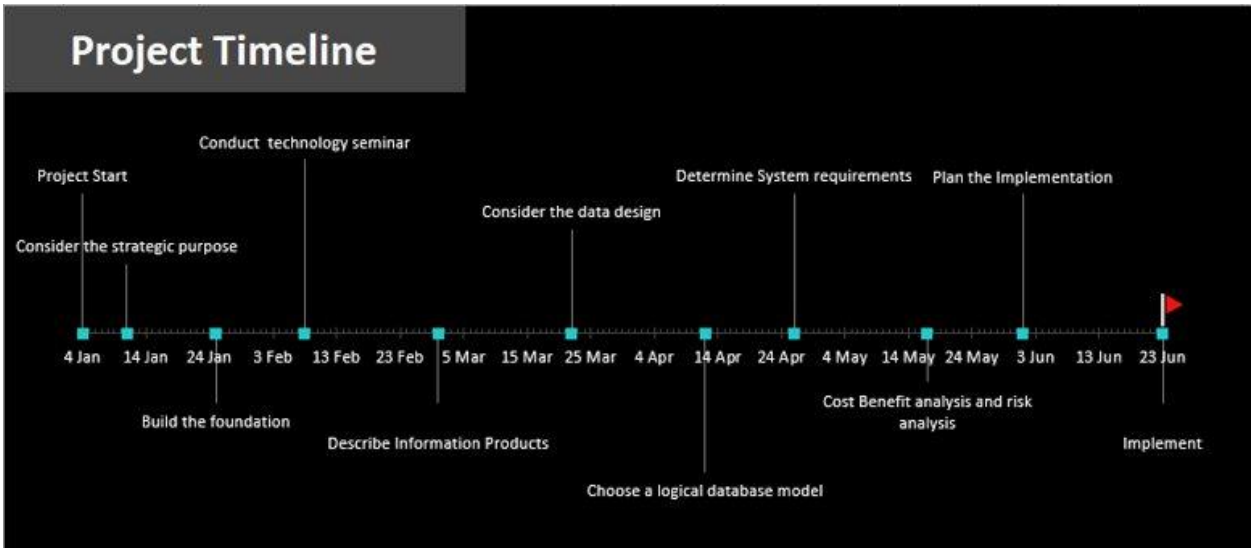
though it could be mitigated in the future. In terms of 'Project Management', the lack of built-in quality control at this time was considered to add a 1.00% risk to the project's failure. A risk of 1.00% was introduced, even though milestones have been placed, due to the possibility of not accounting for crucial ones as a complete understanding of the GIS Department is not fully known yet. Finally, a 0.20% risk margin was allowed in order to account for possible knowledge gaps or the need for future training of staff.

Implementation

Following the Prototyping phase as well as the benefit-cost analysis, and while taking risks into consideration, it was determined that this plan implementation should be undertaken by Syringa's own GIS Department. They will be tasked with setting up the necessary roles and granting permissions and access where necessary. All data preparation will need to be performed by them. Publishing services as well as ArcGIS Online Webmap, Workforce, and field audits will be necessary. It should be possible to perform all of these tasks with minimal training.

Figure 10

Project Timeline



Note: Estimated project timeline.

Finally, it was determined that the piloting of the Prototype should take place in a small to medium-size service area, such as Midvale, Idaho. Such a test area would allow for enough dispersion of asset points to allow for near real-world simulation tests without straining the resources needed to accomplish these tasks. In terms of time, it was concluded that the implementation plan would be ready within seven months of the starting point. This information, along with historical weather data from the pilot area, which indicated cold and snowy conditions during the winter months, identified the starting date as being January 4th, 2020, and an implementation date of June 23rd, 2021 (Figure 10). Allowing for one month in which to pilot the Prototype, the overall project duration should be approximately seven months. The recommendation to update the utility network model to CDMAE should continue to be considered during development, implementation, and full deployment and should be revisited within the next two years as it would offer more functionality over the current system and invite continuous IP development, serving as a one-stop solution.

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Tables

Table 1

Preliminary Needs List

Title	Description	User
Conduit Mapping	Accounts for number and direction of cables within a conduit.	Austin Little
Mobile Mapping	Ability to view, edit, create, and remove features (assets) on the field.	GIS Department
Staking Design	Staking sheet automation for construction plans; process for route engineering.	GIS Department
CDMAE Solution	Replacement for OSPInsight.	Jordan G.
811 Survey	Improvement on 811 survey request portal.	Jordan G.

Note: Descriptive list of IPs based on information gathered during Needs Assessment.

Table 2

Risk Assessment Table

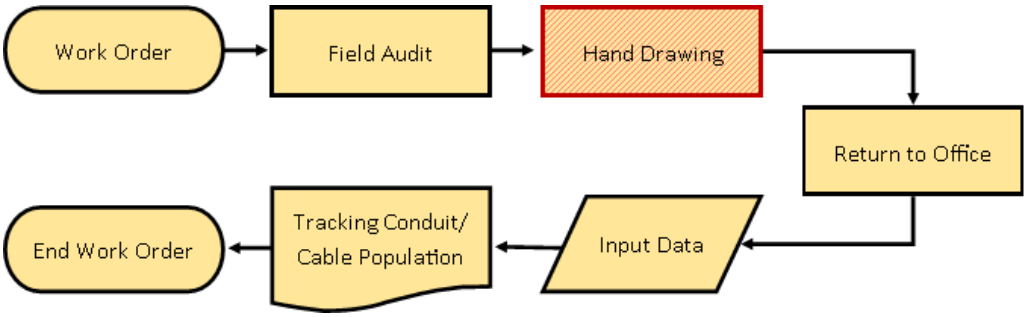
Risk Category	Determinants	Factor Present?	Contribution to Failure
Technology			
	Being implemented with new equip?	N	0.00%
	Is this the first (bug/flaws version) release of SW?	N	0.00%
	Are there gaps in TECH for clients needs?	N	0.00%
	Special programming needed to fill needs?	Y	1.00%
Organizational Functions			
	Are changes forseeble in functions & workflow?	Y	5.00%
Organizational Interactions			
	Are multiple internal agencies involved?	N	0.00%
	Geographically dispersed (e.g., global)	Y	0.10%
	Are mgmt changes required?	N	0.00%
Constraints (Delimits)			
	Are there BUDGET constraints (or unforseen)?	N	0.00%
	Is the timing DOABLE under expected sked?	Y	0.00%
Stakeholders			
	Are there multi-level stakeholders?	Y	0.10%
	Is there involvement of public/media/lobby groups?	N	0.00%
Overall Complexity			
	What is the probability of failure due to over complexity?	Y	0.50%
Project Planning			
	Is the planning well defined?	Y	0.25%
	Is there alignment with G.O.S.T. ?	Y	0.50%
Project Management			
	Are you using Best business practice methods?	Y	0.00%
	Is there built-in accountability?	N	0.10%
	Is there built-in qualty control	N	1.00%
Project Schedulng			
	Are scheduling deadlines reasonable?	Y	0.00%
	Do you have Project-mgmt tools to identify Milestones?	Y	1.00%
Project Resources			
	Do you have adequately trained staff?	Y	0.10%
	Is there a knowledge gap	Y	0.10%
	Probability of Project Success		**90.25%**

Note: Itemized table of factors contributing to potential project failure (Franklin, 2020).

Figures

Figure 1

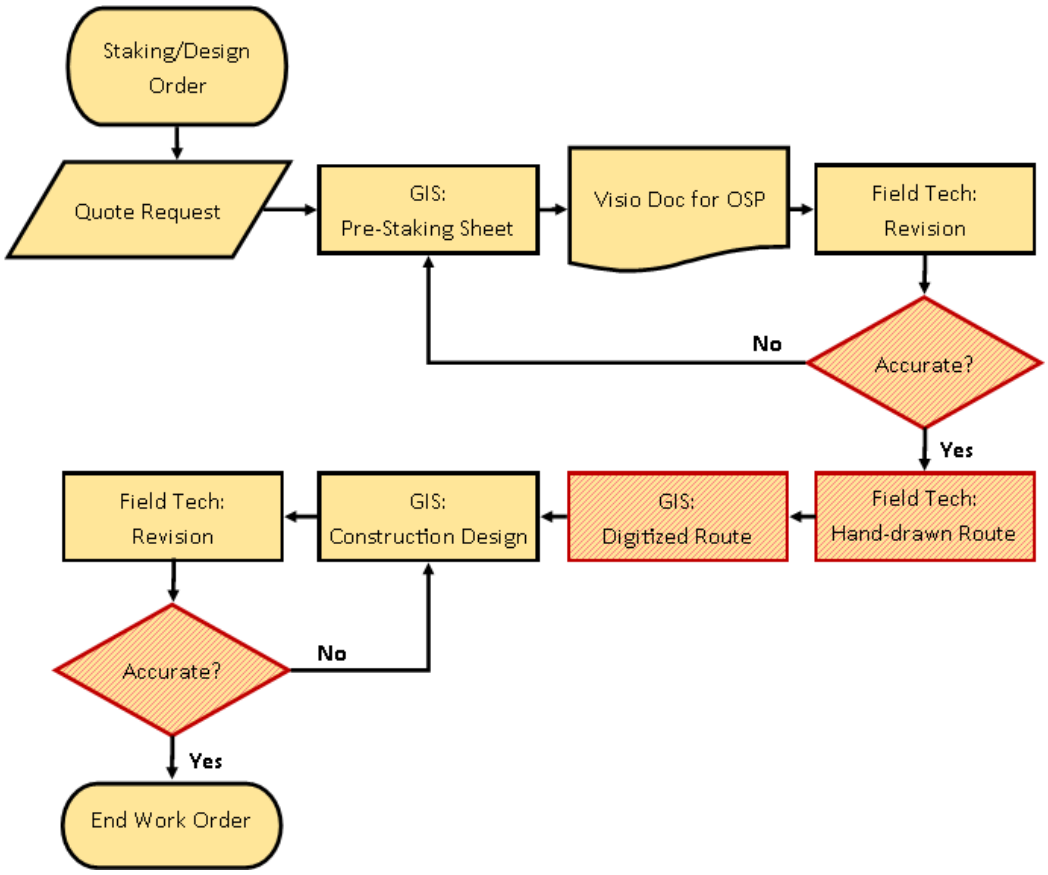
Conduit Mapping Workflow



Note: Workflow diagram representing Conduit Mapping tasks with highlighted inefficiency.

Figure 2

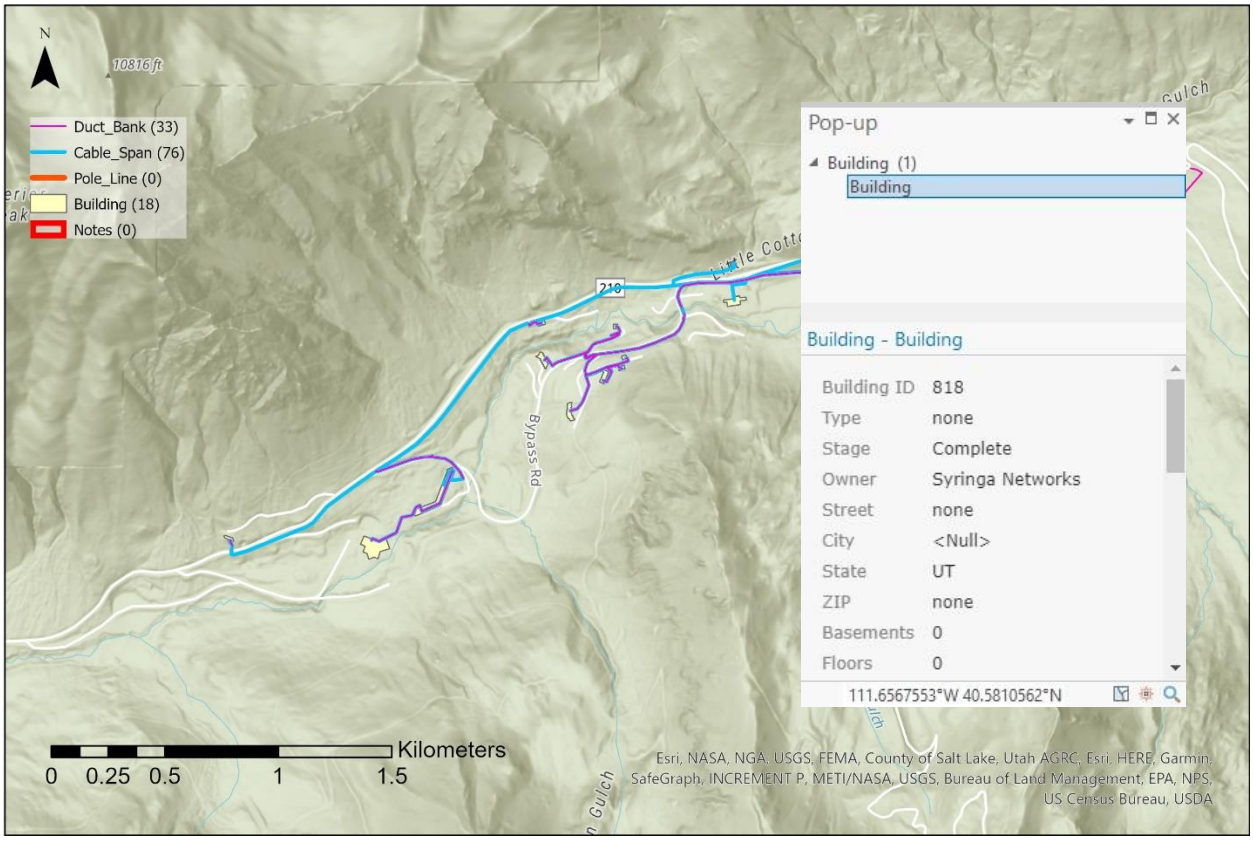
Staking Design Workflow



Note: Workflow diagram representing Staking Design tasks with highlighted inefficiencies.

Figure 3

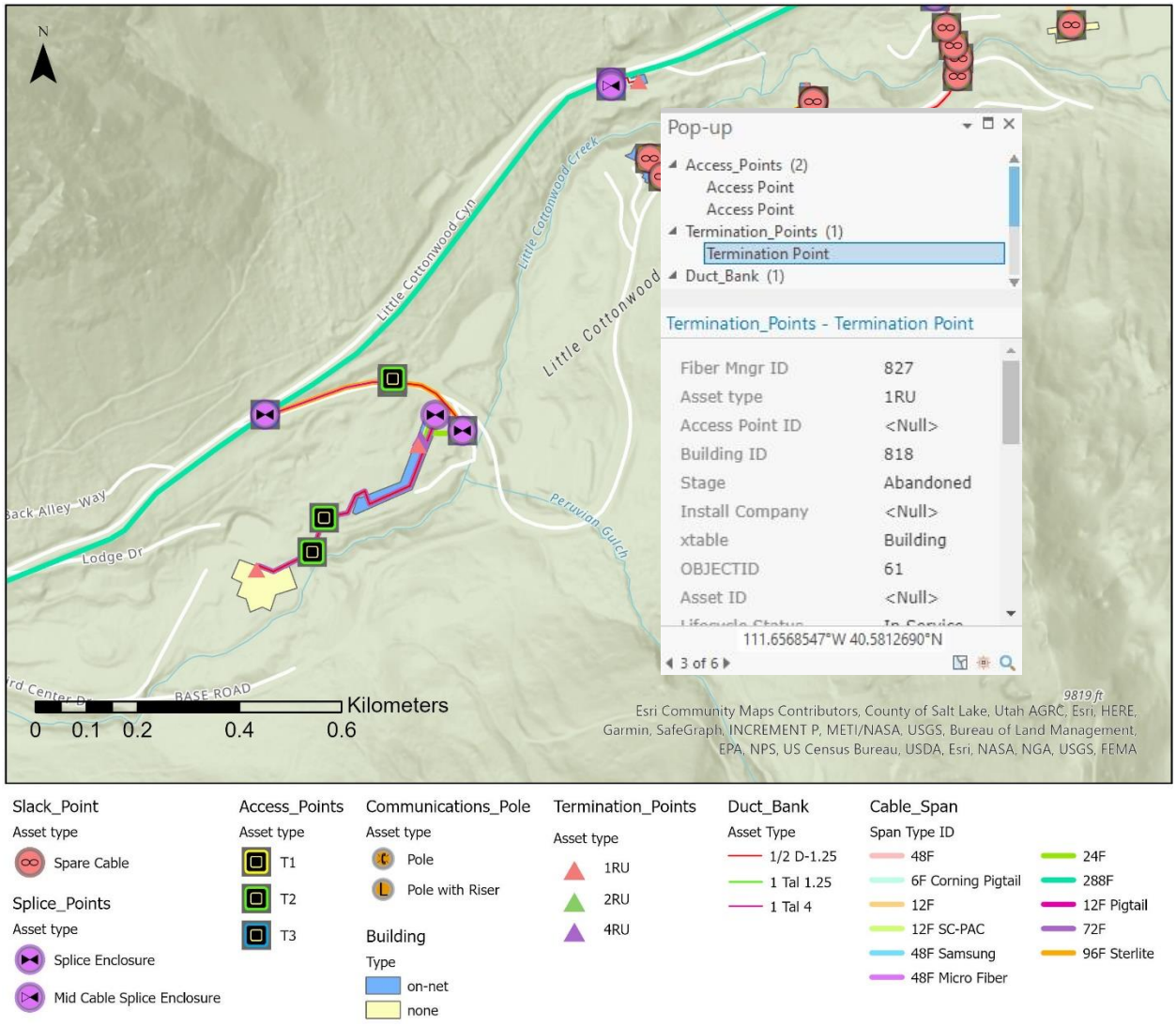
Cable & Building View by Layer



Note: Cable and Building by feature layer visibility at 1:24,000 scale.

Figure 4

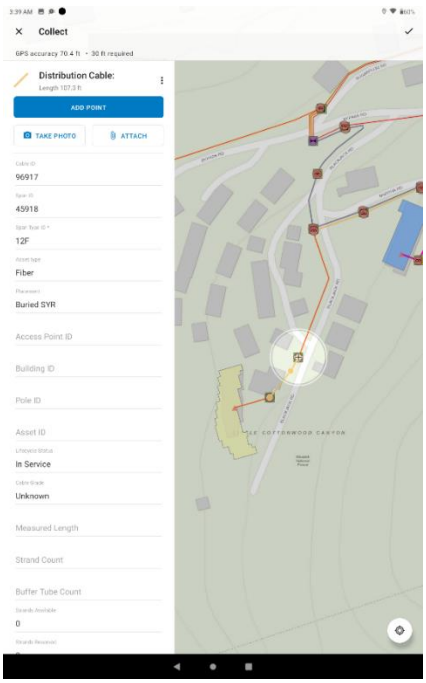
All Assets View by Type



Note: All assets by type visibility at 1:10,000 scale. Pop-up shows as active with multiple selections.

Figure 5

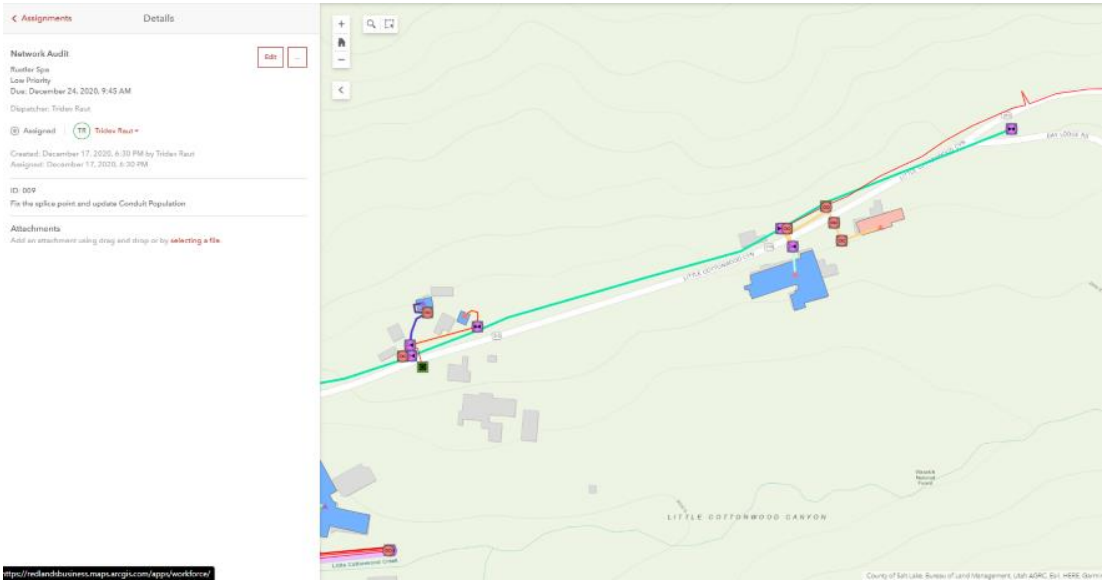
Collector Full Asset Audit



Note: View from Collector displaying full edit control.

Figure 6

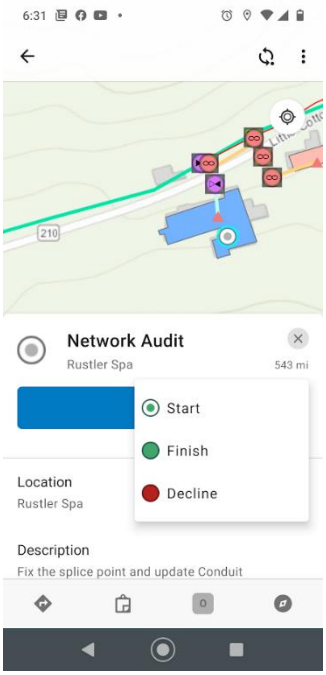
Workforce Details View



Note: Service area view displaying Workforce assignment details.

Figure 7

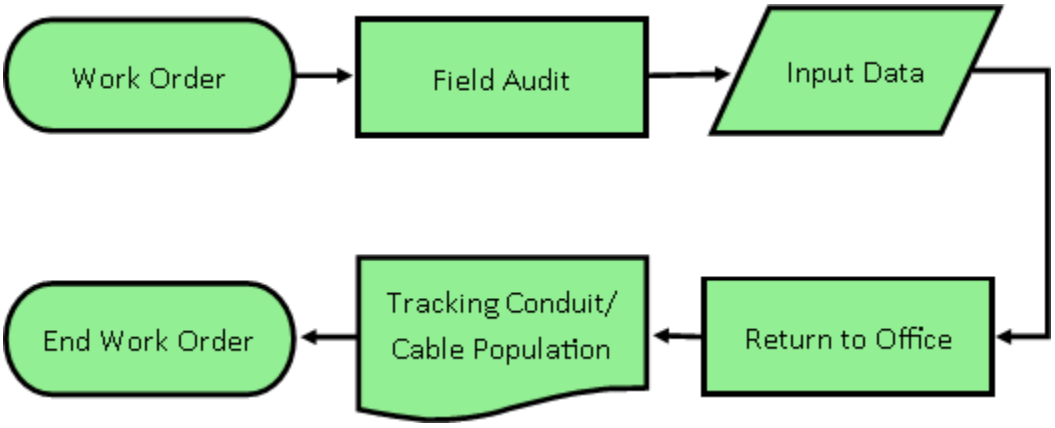
Workforce Update Status View



Note: Workforce demonstrating job status update options.

Figure 8

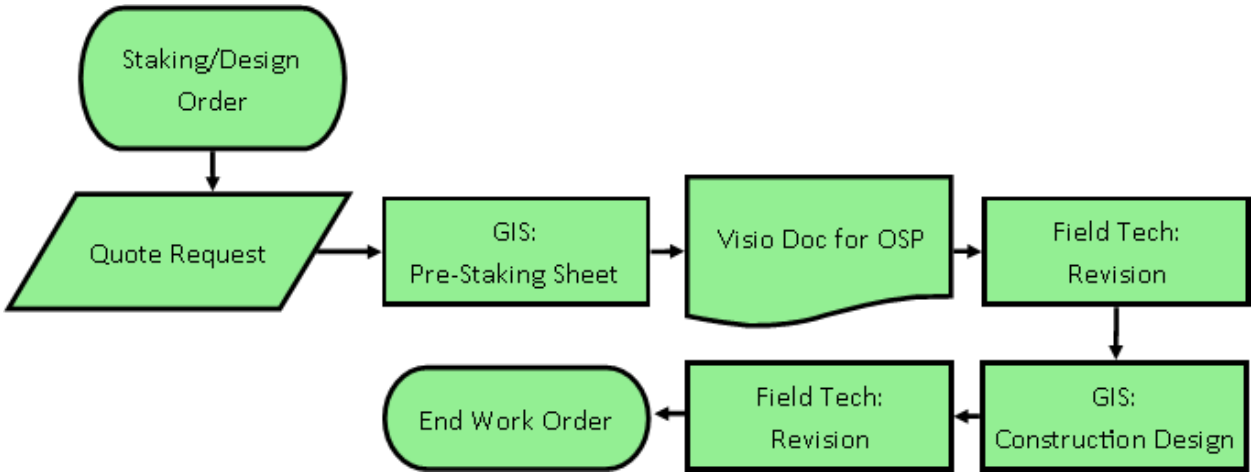
Revised Conduit Mapping Workflow



Note: Workflow diagram representing revised and condensed Conduit Mapping tasks.

Figure 9

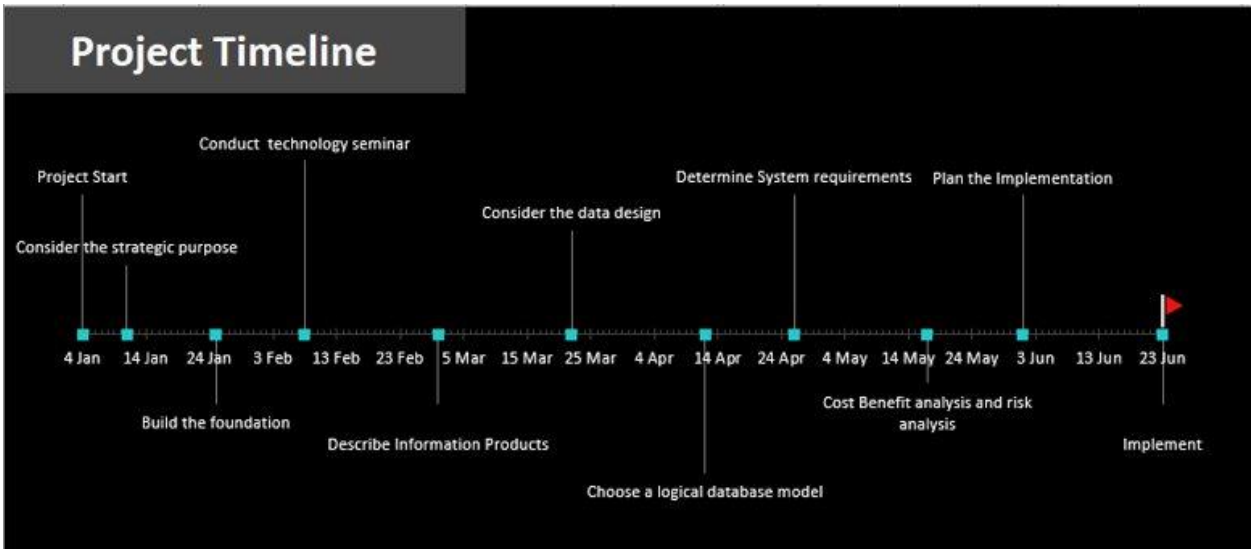
Revised Staking Design Workflow



Note: Workflow diagram representing revised and condensed Staking Design tasks.

Figure 10

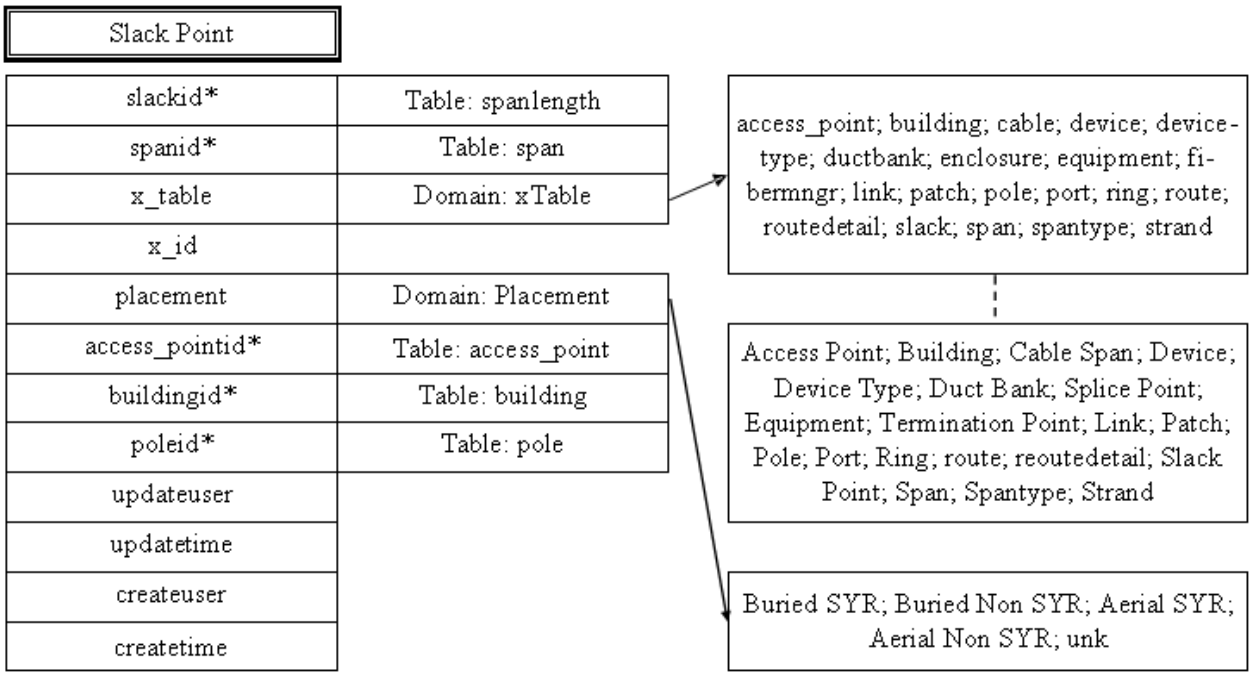
Project Timeline



Note: Estimated project timeline.

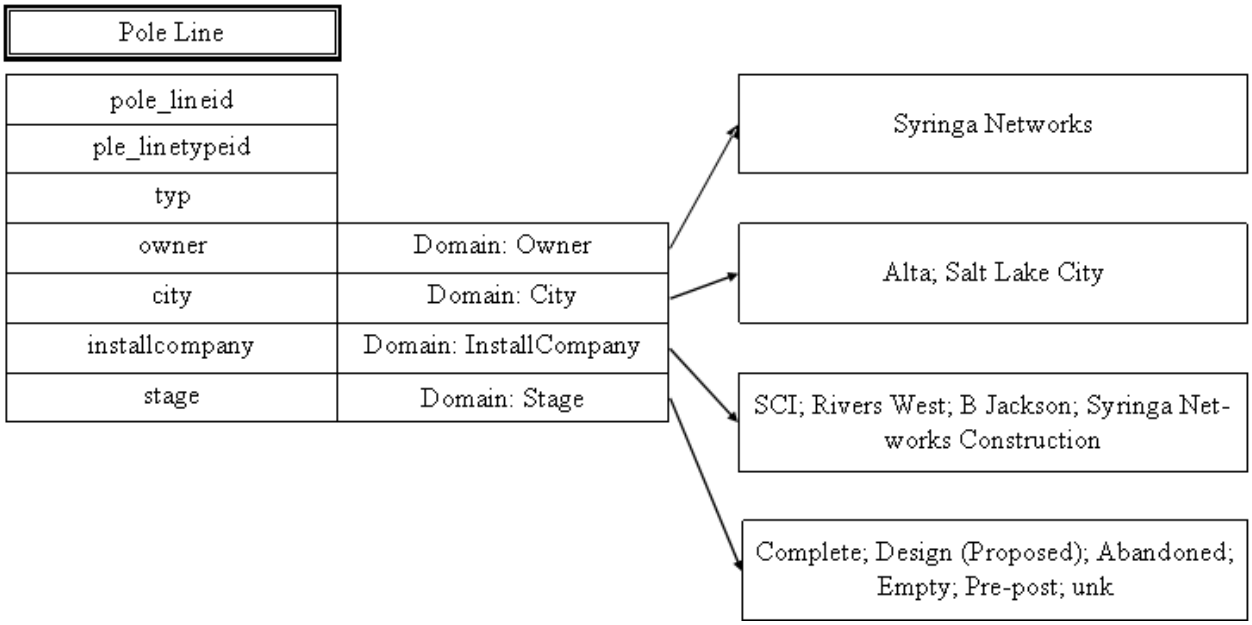
Appendix A

Figure A1



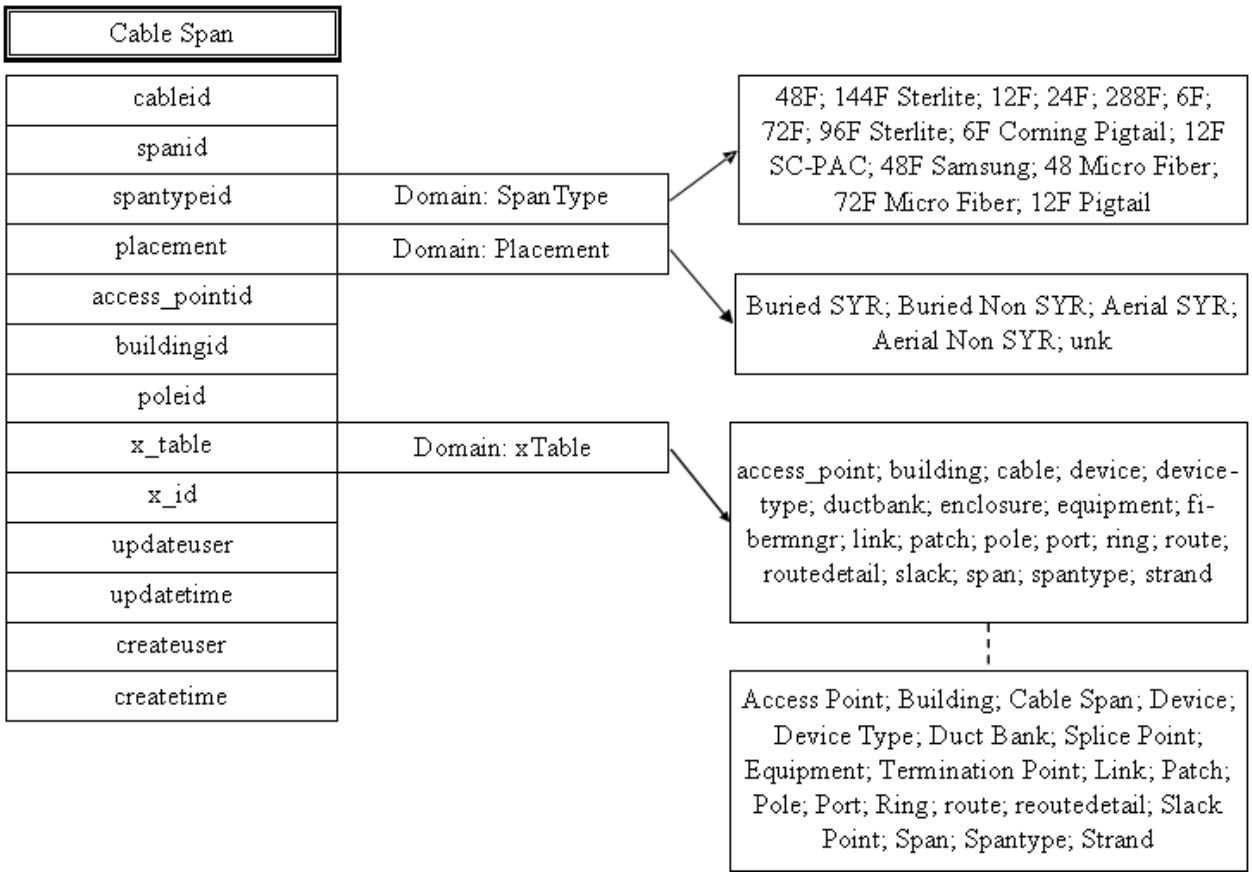
Note: Diagram of Slack Point feature, including the requested Domain attributes.

Figure A2



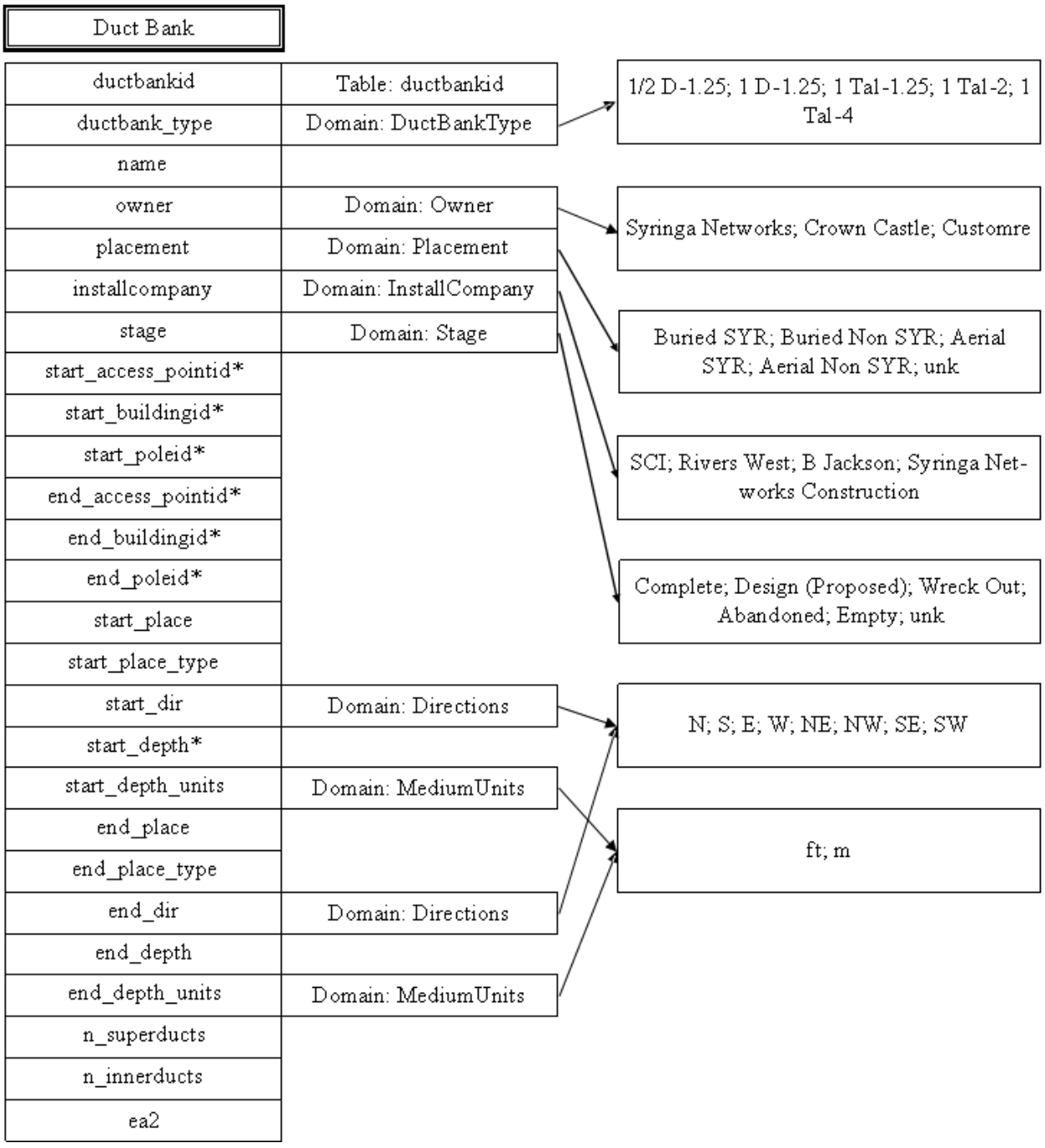
Note: Diagram of Pole Line feature, including the requested Domain attributes.

Figure A3



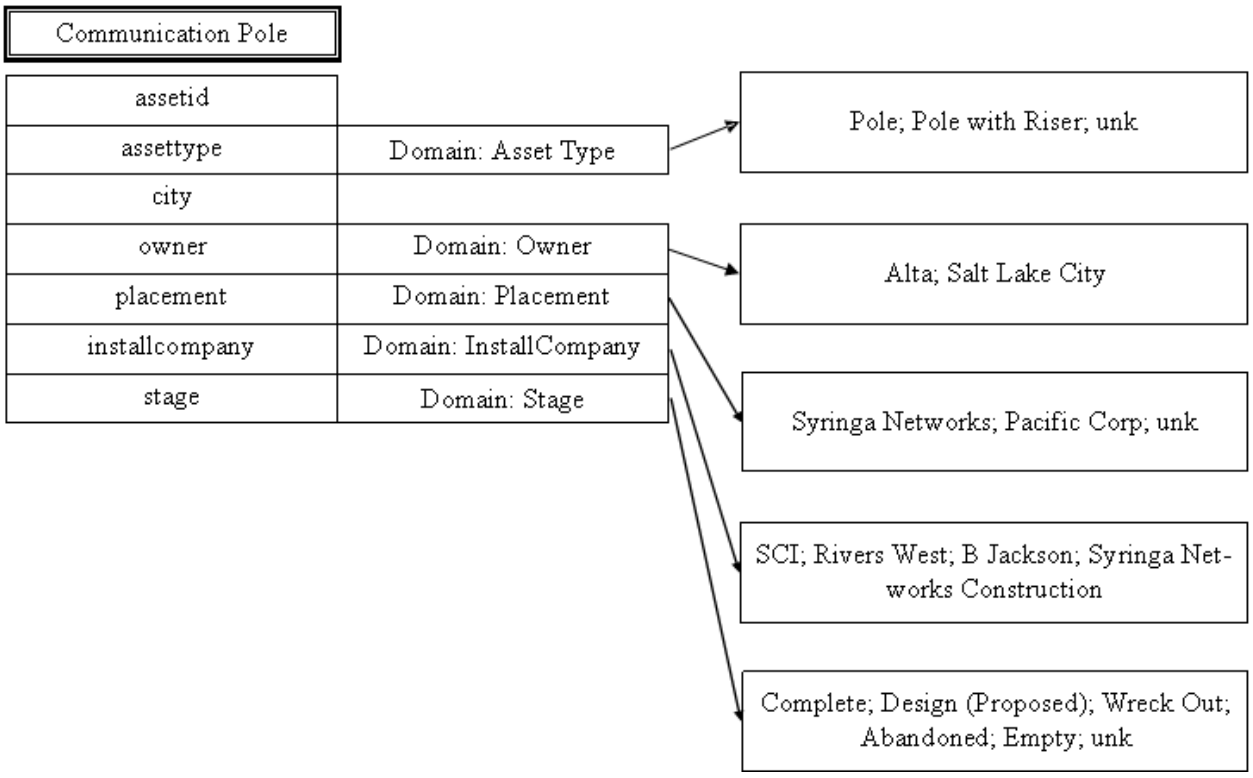
Note: Diagram of Cable Span feature, including the requested Domain attributes.

Figure A4



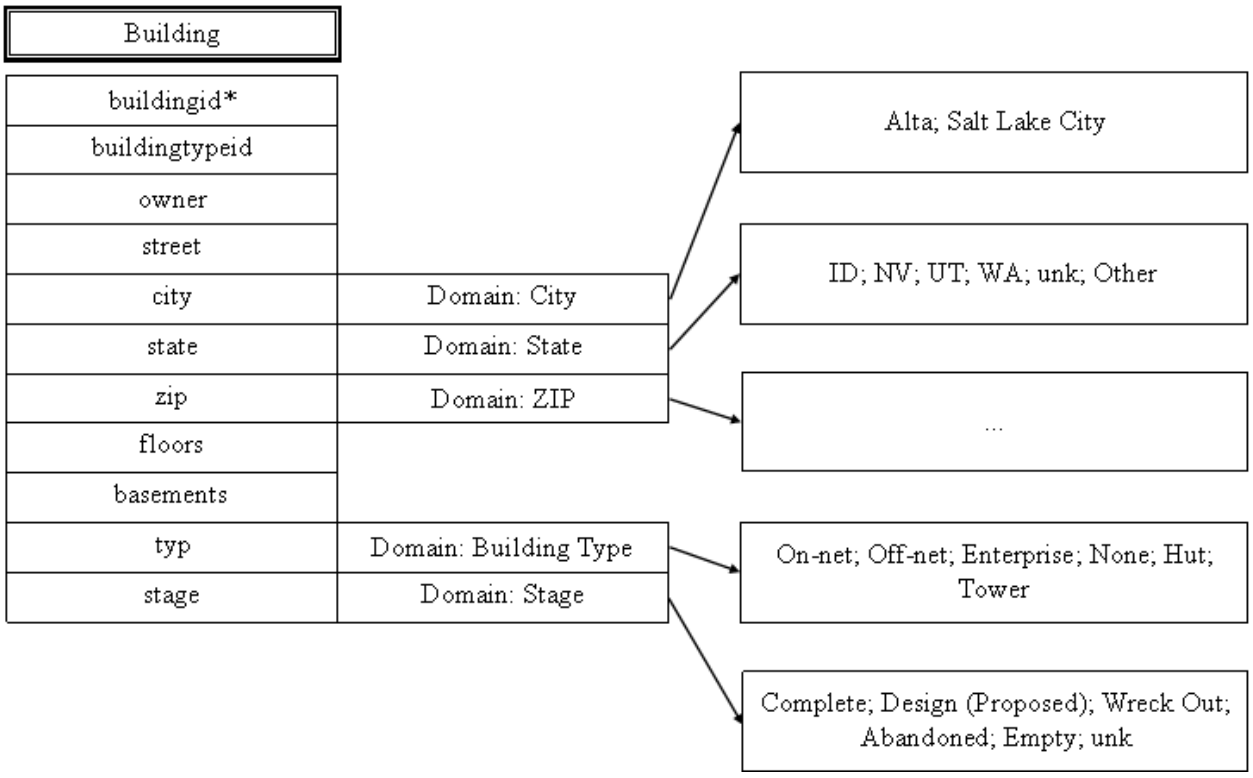
Note: Diagram of Duct Bank feature, including the requested Domain attributes.

Figure A5



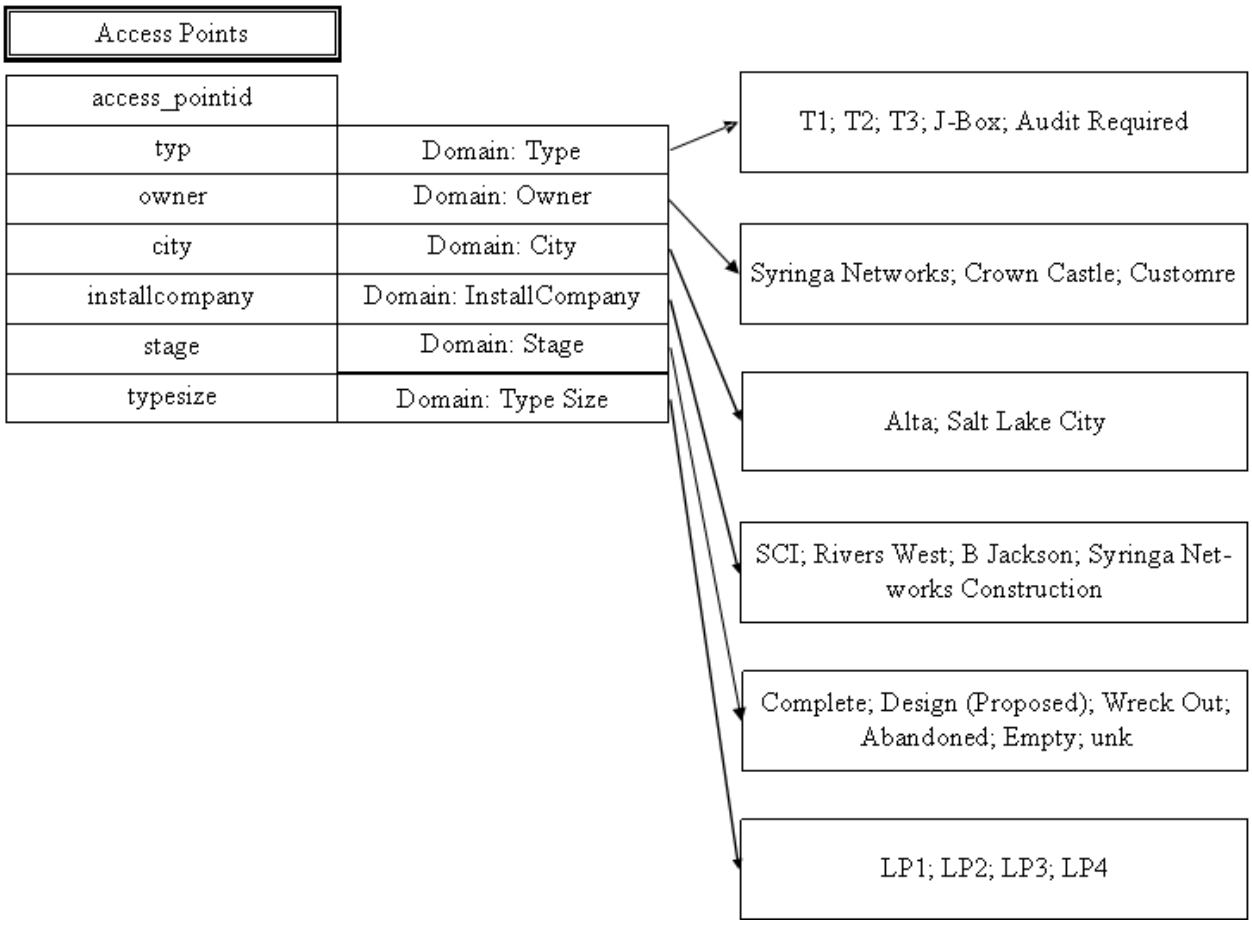
Note: Diagram of Communication Pole feature, including the requested Domain attributes.

Figure A6



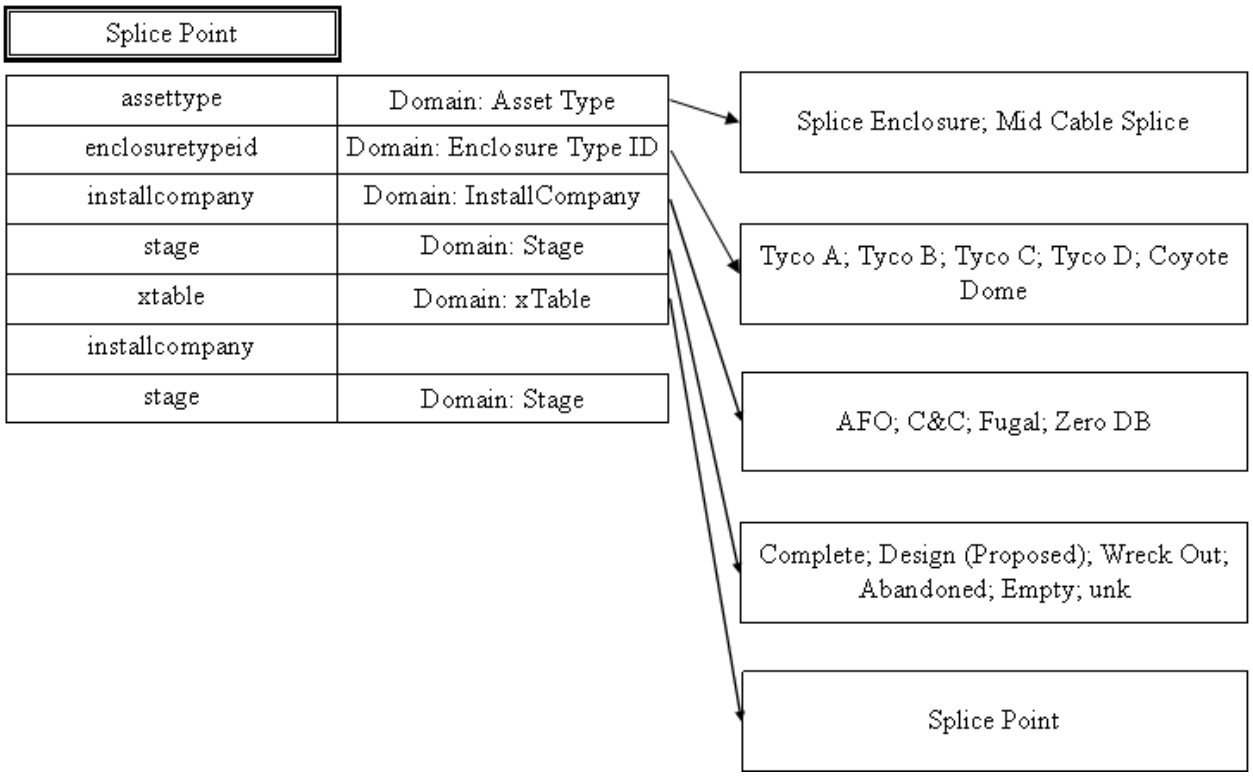
Note: Diagram of Building feature, including the requested Domain attributes.

Figure A7



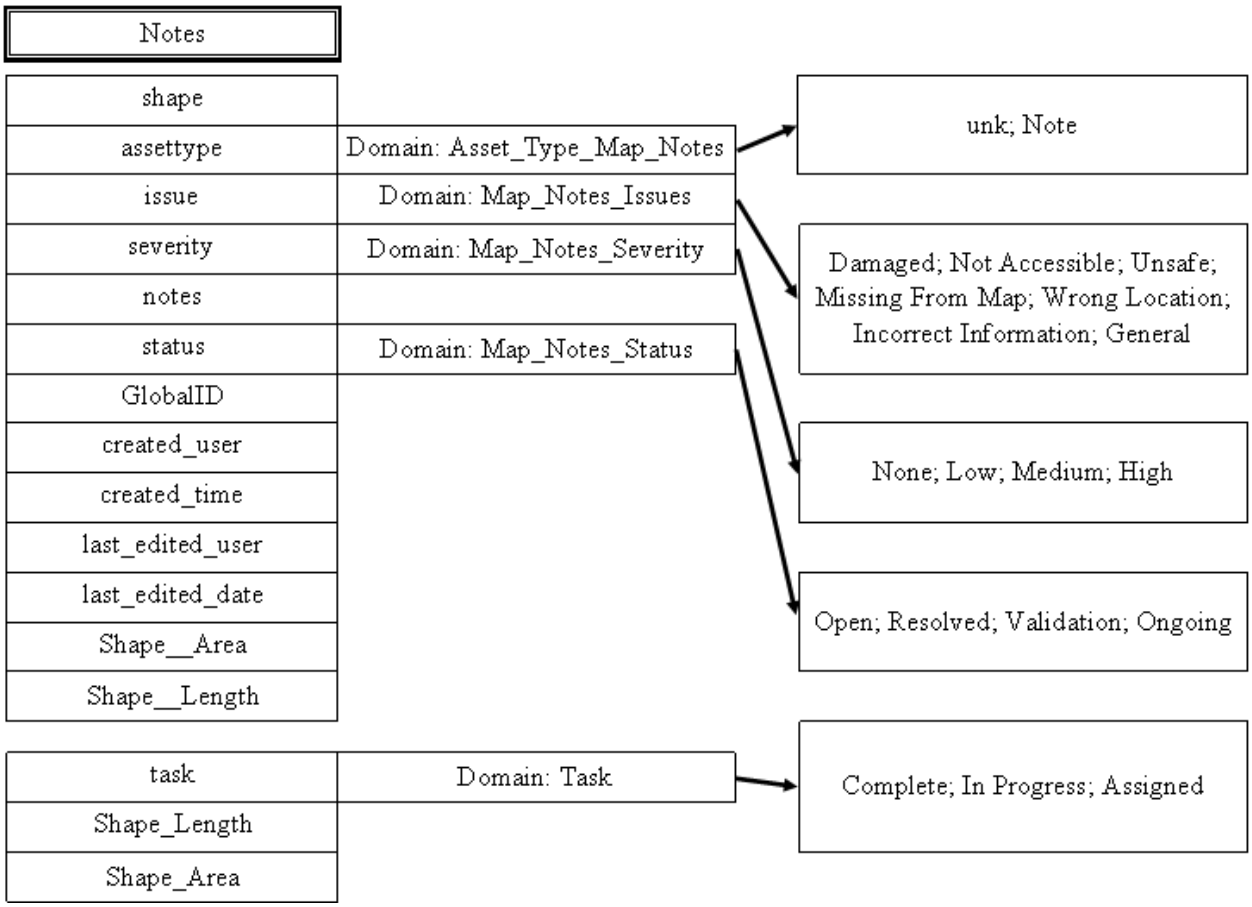
Note: Diagram of Access Point feature, including the requested Domain attributes.

Figure A8



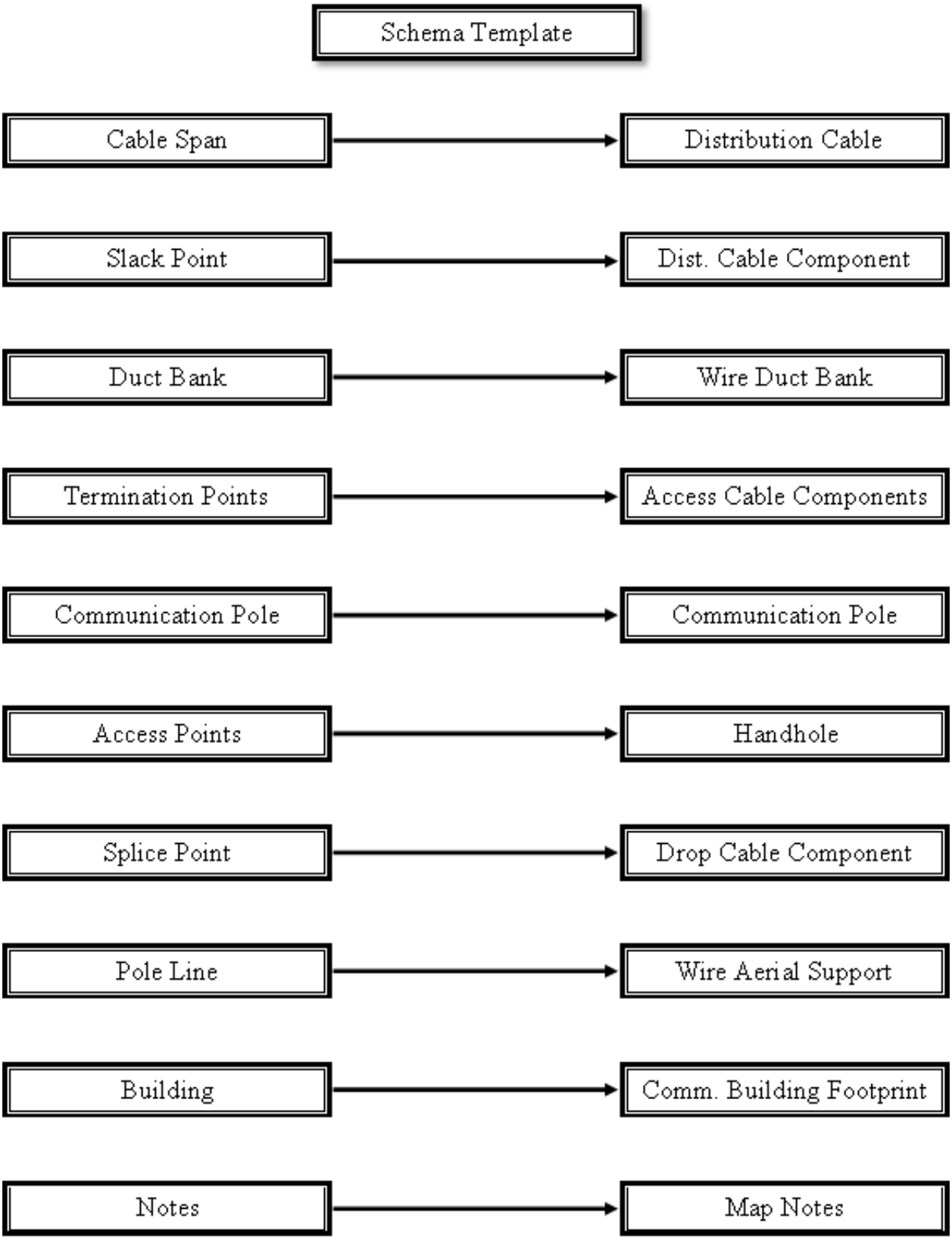
Note: Diagram of Splice Point feature, including the requested Domain attributes.

Figure A9



Note: Diagram of Notes feature, including the requested Domain attributes.

Figure A10

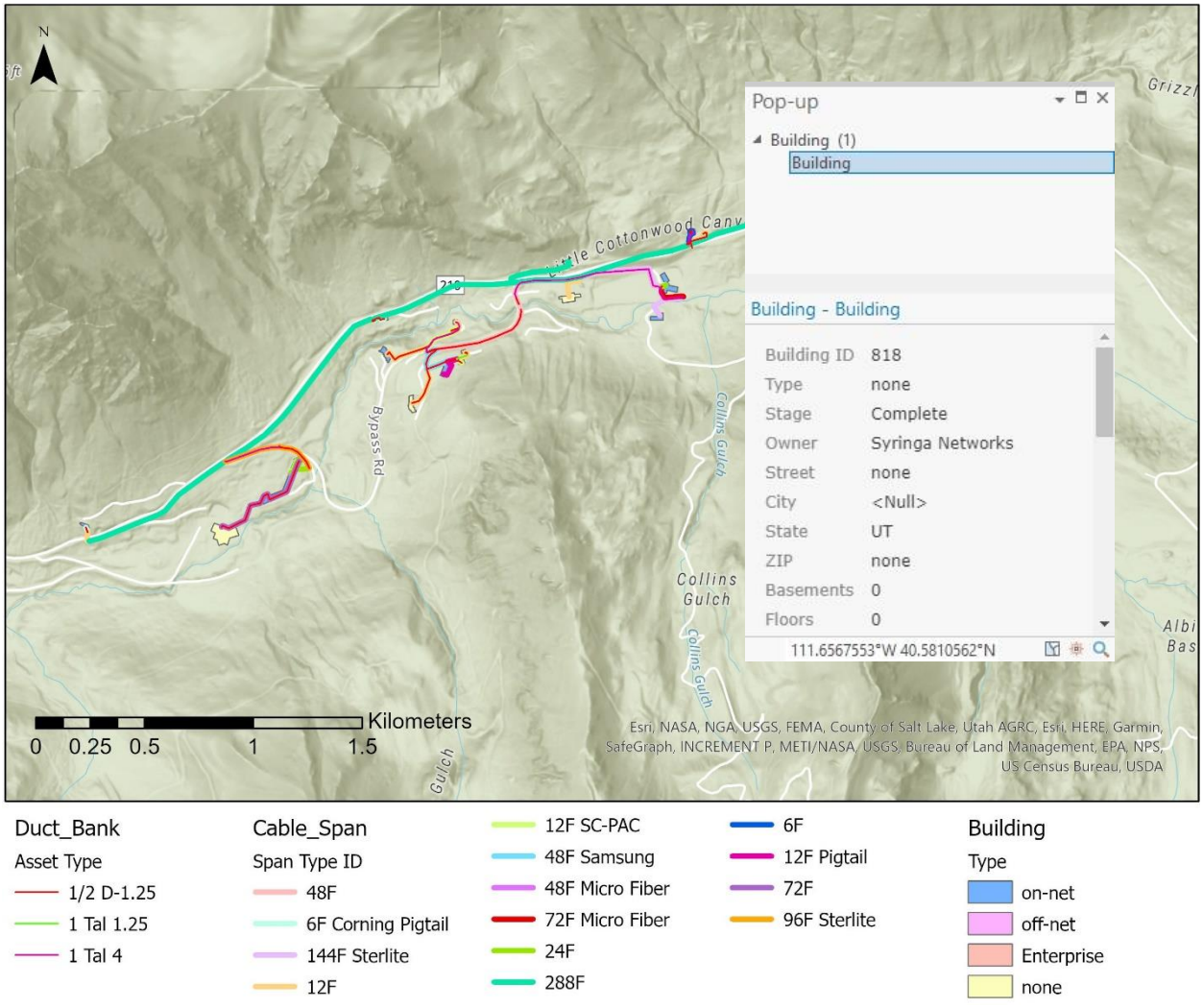


Note: Diagram for application of schema template.

Appendix B

Figure B1

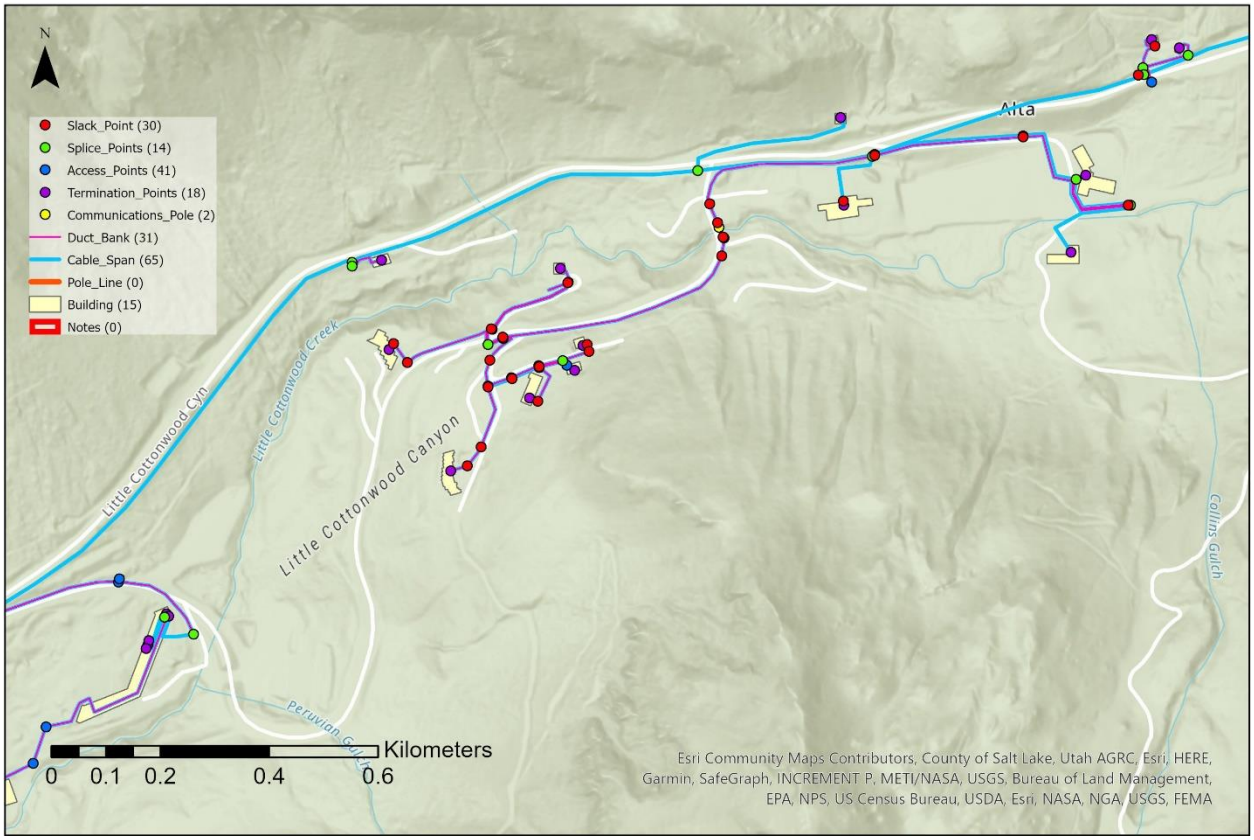
Cable & Building View by Type



Note: Cable and Building by type visibility at 1:24,000 scale. Pop-up shows as active with single selections

Figure B2

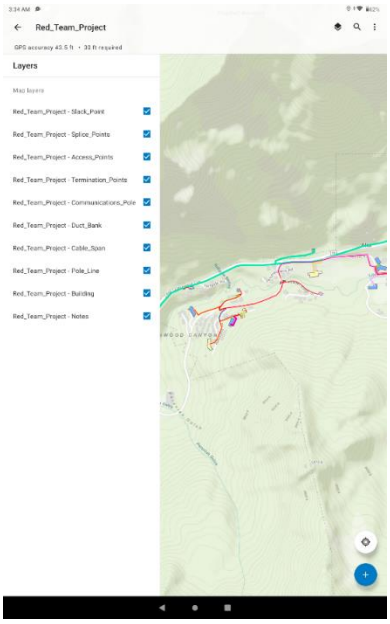
All Assets View by Layer



Note: All assets by feature layer visibility at 1:10,000 scale.

Figure B3

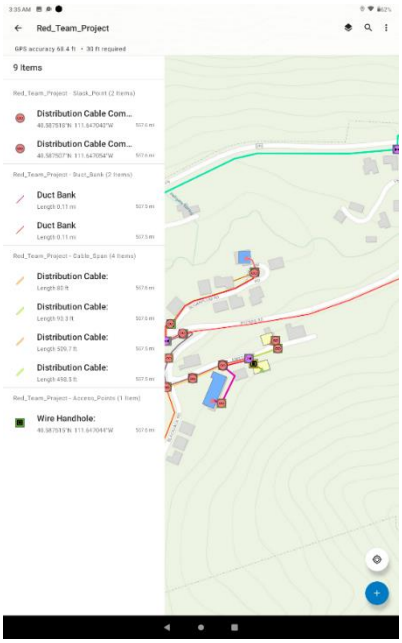
Collector Layer Selection



Note: View from Collector demonstrating Show/Hide function.

Figure B4

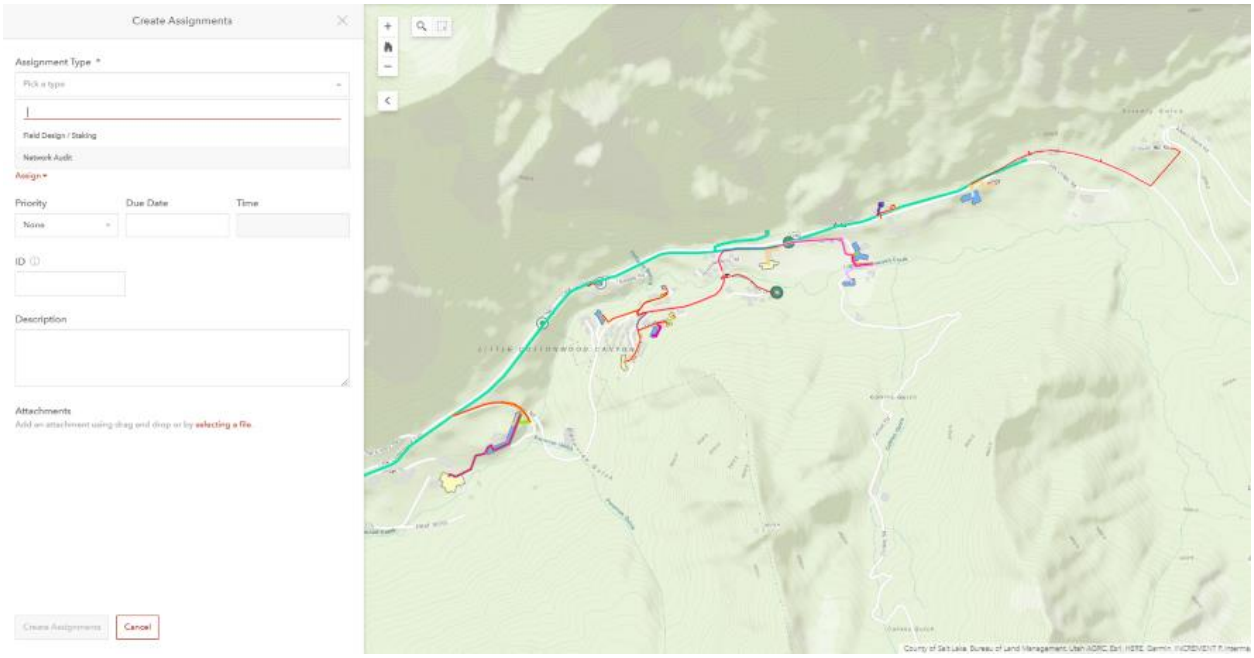
Collector Multiple Selections



Note: View from collector displaying multiple asset selection.

Figure B5

Workforce Assignment Creation



Note: Assignment creation view of a service area through Workforce