Mr. Paul Leedham, CIO – IT Director
City of Hudson
1040 Terex Road
Hudson, Ohio 44236

RE: City of Hudson – Velocity Broadband FTTP Expansion Engineering Consulting Services

Dear Mr. Leedham,

OHM Advisors (OHM) is pleased to submit this statement of qualifications to support the City of Hudson's next phase to plan, prioritize, subsequently extend, and memorialize last mile symmetrical high-speed fiber-optic broadband to homes in the community. Building from its sustained commercial success, Velocity Broadband has propelled Hudson to become one of Ohio's first Gigabit cities keeping the city on the leading edge of technological and data-driven cultural shifts. As the Community Advancement firm, we know the benefits of reliable and affordable communication and how it touches everything from safety forces, traffic smart technology, economic development, and community activation and engagement. It is simply essential. We applaud the architects who devised the system, its thought leaders, and daily managers.

To complete the vision initiated in 2015, the city must meet several challenges inherent with this undertaking to design and implement a phased, citywide Fiber-to-the-Premises (FTTP) network that provides 6,500 serviceable passes over four years. These challenges include High Level Design (HLD) to define a long-term buildout plan building from architecture already in place; Outside Plant Design defining the split between backbone and distribution areas; Low Level Design (LLD) to ground truth routes and identify solutions to overcome physical constraints; efficient, yet accurate, plan development to define construction risks, safeguard assets, and account for holistic restoration especially in front of residences; and accurate as-built records for long-term operations and maintenance. Our team is poised to guide the City through this critical undertaking offering gigabit-class internet access to residents and additional businesses. We are confident that our team will exceed expectations by:

PROVIDING LOCAL LEADERSHIP – Through one point of contact in our project principal, R. Tony Burgoyne, PE, the city will have access to a host of OHM's Akron-based engineers, surveyors, designers, CAD technicians, GIS and field service managers. Tony is known to Hudson and is a collaborative, take-charge leader bringing direct and recent fiber design, deployment, and construction oversight experience in support of Summit County's ongoing public safety and fiber initiatives. Recently completing the City of Hudson's latest comprehensive plan, Arthur Schmidt will support the team through anticipated public engagement.

RESOURCING NATIONAL EXPERTISE THROUGH LOCAL PARTNERSHIP – Our OHM-led team includes Uptown Services, LLC, Velocity Broadband's trusted advisors for the past several years. Neil Shaw will oversee High-Level and Low-Level Design initiatives enabling the city and team to quickly build from, not reinvent, past efforts offering a true succession of system development and deployment. Uptown boasts dozens of similar undertakings for similar community and county agencies across the country.

RIGHT-SIZING CONSTRUCTION PLAN DEVELOPMENT EFFORTS – The largest risks associated with fiber extension, especially underground deployment, are utility impacts, permitting coordination, and property restoration particularly in front of homes. Recognizing funding is limited, our team will right size efforts to only provide survey and CAD design efforts where underground fiber conduits are anticipated and in areas of critical roadway, waterway, or state route crossings. Construction Plan development will include a combination of GIS and CAD plans depending on location and alignment sensitivity to safeguard likely budget constraints.

ENGAGING OUR GIS TOOLS TO ACCURATELY RECORD AS-BUILTS IN NEAR REAL TIME – Through use of OHM's web-based programs and GIS capabilities coupled with our advancement and use of Eos Positioning Systems Arrow Gold or Gold + GNSS receivers OHM will develop a dashboard tracking tool to aid with public notices to report installation status, forecast upcoming construction zones, etc. The benefit is it markets the platform, provides transparent public awareness and, at the same time, compiles as-built records during construction in near real time. It allows us to define horizontal and vertical disposition within centimeter accuracy for linear assets, handholes, splice points, etc. Shapefiles obtained from field efforts can seamlessly be exported to CAD. City personnel can be outfitted with necessary equipment during line work to save costs.

We appreciate the opportunity to provide our qualifications. Should you have any questions feel free to contact me at 330.913.1048.

Sincerely,

OHM Advisors

R Tony Burgoyne

Tony Burgoyne, PE – Principal in Charge

COVER PAGE & FIRM BACKGROUNDS

OHM Advisors is a team of over 720 people from different backgrounds working in 23 cities across Michigan, Ohio, Indiana, Pennsylvania, Kentucky, Florida and Tennessee. We strive to use our combined expertise and talents to continually advance the communities we serve. Our work spans client communities across the public and private sectors—including municipalities, state and federal agencies, Fortune 100 companies, developers, schools, universities, and more.

As a growing firm with full-service capabilities under one roof, we are listed on ENR's list of Top 500 Design Firms and recognized for our contributions to our industry. But it's not awards or personal gain that drives us. It is a passion for making a difference through innovative, people focused problem solving, design and ideas that drive whole communities forward—today, and well into the future.

Firm Growth

OHM Advisors was established in 1962 and has been growing steadily ever since. As a multi-disciplinary organization, we provide a variety of services to our clients with a passion to be Advancing Communities for many years to come.

Firm Ownership

OHM Advisors is a privately held corporation, governed by a seven-member Board of Directors and has 54 employee shareholders.

Full Legal Name	Orchard, Hiltz & McCliment, Inc.
Contact Person	Tony Burgoyne, PE (Principal)
Telephone	330.913.1048
Email	tony.burgoyne@ohm-advisors.com
Contract Address	388 South Main Street, Suite 301 Akron, OH 44311
Federal Employer Id No.	38-1691323
Type of Entity	Corporation - Michigan
Age of Firm	62 years (Incorporated 05/22/1962)
Subconsultant	Uptown Services
Contact	Neil Shaw
Telephone	303.554.5854

Uptown Services has provided leading edge consulting services to municipalities and utilities considering entering the broadband services sector since 1999. Our services and expertise cover the full potential of this industry including all broadband applications, various technologies, and business structure models. We have served over 100 municipal broadband clients.

Uptown has established a strong track record as a consulting advisor to numerous municipal broadband systems across a full range of functional expertise cover planning, business case development, financial analysis, market research and analysis, business operations, system design, technical planning, construction management and system implementation.

Experience with Broadband Techology & Network Solutions

Uptown's experience spans the evolution of FTTP technology from the early days of active Ethernet to the current gigabit passive optical network (GPON and NG-PON2) standards. Design approaches are tailored to the needs of the given client and application. From backbone middle mile to end user last mile, we have the experience required to address each client's unique requirements.

Uptown staff has completed/are completing designs for 14 fiber networks since 2006, below are some examples:

- 100 mile / 7,400 passing FTTP system for Concord Municipal Light Plant
- 200 mile / 15,000 passing FTTP system for Cedar Falls Utilities
- 100 mile / 6,500 passing FTTP system for the City of Dover, Ohio
- 300 mile / 24,000 passing FTTP system for the City of Wilson, NC
- 100 mile SCADA / middle mile backbone for Delta Montrose Electric Association
- 450 mile / 39,000 passing FTTP system for the City of Longmont
- 1,000 mile / 7,500 passing FTTP system for San Luis Valley REC (work in process)
- 100 mile / 15,000 passing FTTP system for City of Beverly Hills, CA
- 400 mile / 10,000 passing FTTP system for Town of Estes Park, CO
- 150 mile / 15,000 passing FTTP system for City of Glenwood Springs, CO
- 300 miles SCADA / middle mile backbone for Poudre Valley REA

CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY): 05/19/2025

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.

IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must have ADDITIONAL INSURED provisions or be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).

PRODUCER
Professional Concepts Insurance Agency, Inc.
1127 South Old US Highway 23
Brighton MI 48114-9861

CONTACT NAME: certs@pciaonline.com
PHONE (A/C, No, Ext): (800) 969-4041 **FAX (A/C, No):** (800) 969-4081
E-MAIL ADDRESS: certs@pciaonline.com

INSURER(S) AFFORDING COVERAGE	NAIC #
INSURER A : American International Co.	
INSURER B : National Union Fire Insurance Co	19445
INSURER C : McGowan Program Administrators	
INSURER D : XL Specialty Ins. Co.	37885
INSURER E :	
INSURER F :	

INSURED
Orchard Hiltz & McCliment, Inc., DBA: OHM Advisors
34000 Plymouth Rd
Livonia MI 48150

COVERAGES **CERTIFICATE NUMBER:** 25-26 ALL **REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR LTR	TYPE OF INSURANCE	ADDL INSD	SUBR WVD	POLICY NUMBER	POLICY EFF (MM/DD/YYYY)	POLICY EXP (MM/DD/YYYY)	LIMITS	
A	[X] COMMERCIAL GENERAL LIABILITY [ ] CLAIMS-MADE [X] OCCUR [X] Contractual Liability [X] X,C,U GEN'L AGGREGATE LIMIT APPLIES PER: [X] POLICY [ ] PRO-JECT [ ] LOC [ ] OTHER:			GL 3961062	06/01/2025	06/01/2026	EACH OCCURRENCE DAMAGE TO RENTED PREMISES (Ea occurrence) MED EXP (Any one person) PERSONAL & ADV INJURY GENERAL AGGREGATE PRODUCTS - COMP/OP AGG 	$ 2,000,000 $ 500,000 $ 25,000 $ 2,000,000 $ 4,000,000 $ 4,000,000 $
B	AUTOMOBILE LIABILITY [X] ANY AUTO [ ] OWNED AUTOS ONLY [ ] SCHEDULED AUTOS [X] HIRED AUTOS ONLY [X] NON-OWNED AUTOS ONLY [X] Com. $1,000 [X] Coll. $1,000			AL 7107738	06/01/2025	06/01/2026	COMBINED SINGLE LIMIT (Ea accident) BODILY INJURY (Per person) BODILY INJURY (Per accident) PROPERTY DAMAGE (Per accident) 	$ 2,000,000 $ $ $ $
C	[X] UMBRELLA LIAB [X] OCCUR EXCESS LIAB [ ] CLAIMS-MADE [ ] DED [X] RETENTION $ 10,000			CUP-4X416635-25-NF	06/01/2025	06/01/2026	EACH OCCURRENCE AGGREGATE 	$ 10,000,000 $ 10,000,000 $
A	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? (Mandatory in NH) Y / N: N If yes, describe under DESCRIPTION OF OPERATIONS below	N / A		13188328	06/01/2025	06/01/2026	[X] PER STATUTE [ ] OTH-ER E.L. EACH ACCIDENT E.L. DISEASE - EA EMPLOYEE E.L. DISEASE - POLICY LIMIT	 $ 1,000,000 $ 1,000,000 $ 1,000,000
D	Professional Liability			DPR5036974	12/01/2024	12/01/2025	Per Claim Aggregate	5,000,000 7,000,000

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

CERTIFICATE HOLDER

For Informational Purposes only

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.

AUTHORIZED REPRESENTATIVE

Michael Cosgrove

Summit Co. PSAP Inspections Services
Tallmadge, OH

OHM Advisors provided inspection and construction administrative services for Summit County, facilitating the extension of underground conduit and 288-pair fiber from the Consolidated Dispatch Center in Akron to the Public Safety Answering Point (PSAP), Summit County's 911 Center located in Tallmadge. This project covered approximately 24,300 feet of new conduit and fiber and included the additional installation of approximately 2,900 feet of new fiber into existing conduit within the center of Tallmadge. The network construction utilized horizontal directional drilling, with the extension being pulled through new conduit. All installations occurred within the public right-of-way, adhering to tolerances with existing underground utilities. The County selected Lakeland Electric Inc. and their subcontractor, DRS Enterprises, for the installation. Two construction crews were deployed, starting from opposite ends.

Responsibilities and Deliverables: OHM's inspection team was responsible for typical inspection and daily administrative services. Additional responsibilities included: • Daily as-built documentation. • Locating constructed infrastructure using hand-held RTK/GPS units. • Recording existing underground utility locations within 18 inches of the new network. • Delivering recorded data in ESRI format, including x, y, and z positioning for precise conduit location, ensuring ease of future servicing. • Providing complete detailed as-built documents in both GIS and AutoCAD formats at project completion.

Contact:
Summit County
Holly Miller, Assistant Director
175 South Main Street, Room 207, Akron, OH 44308
330.643.8013
hmiller@summitoh.net

Summit Co. DJFS/BOE Fiber Extension Design
Summit County, OH

OHM Advisors lead the fast-tracked design of an approx. 1-mile fiber service extension to support the relocation of the Board of Elections (BOE) to the new Department of Jobs & Family Services (DJFS) facility, formerly Fortis College, adjacent to the License Bureau off Tallmadge Avenue in Akron, Ohio. Design and subsequently construction schedule was accelerated such that facilities were in full operation prior to November 2024 elections. The fiber design included horizontal and vertical design to coordinate public and private utility impacts, contend with traffic maintenance, and define site restoration measures. Project limits started at fiber handholes located along Evans Avenue and extended nearly one mile along Brittain Road north to Longstone Avenue, then west to the DJFS facility.

Brittain Road is a major arterial route, requiring careful consideration during both design and construction phases to minimize community disruptions and utility conflicts. Design included meticulous planning for horizontal directional drilling trenchless methods within the public right-of-way and public utility easements.

Responsibilities and Deliverables: OHM's municipal design team handled detailed design services, along with:

- Survey and Right-of-Way Resolution and basemapping.
- Public and Private Utility Coordination and Conflict Management
- Local permitting.
- Site restoration detailing and coordination with landowners.

Contact:
Summit County
Holly Miller, Assistant Director
175 South Main Street, Room 207, Akron, OH 44308
330.643.8013, hmiller@summitoh.net

San Luis Valley REC

Uptown was hired by San Luis Valley REC (SLVREC) to complete a broadband feasibility study in 2013. The primary recommendations coming out of the study were to first build a robust fiber backbone to support internal SCADA and communication needs between the various electric substations. Then, begin a phased construction of a system-wide FTTP network to serve the members across the massive service area.

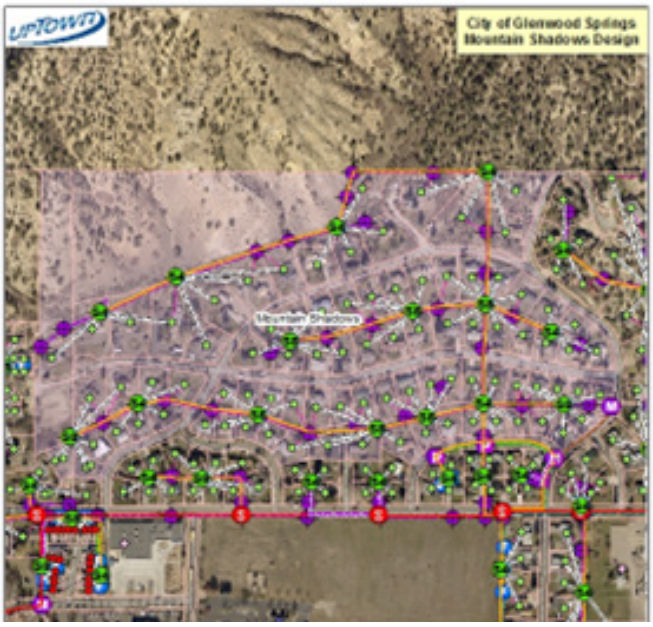
Uptown was asked to design the 300 mile fiber backbone in 2014. The backbone called for the use of high count all dielectric self support (ADSS) cable to be placed in the power zone approximately 12 inches below neutral on SLVREC poles. Backbone construction took approximately 18 months.

Uptown was then asked to architect, design and engineer the new FTTP infrastructure throughout the service area. The process involved a deep dive into the optimal approach for delivering all fiber capabilities in a low density environment. The SLVREC territory included six rural counties in southwest Colorado. Large farms and ranches dot the landscape and provided a design challenge from both economic and technological perspectives. Uptown recommended a distributed split architecture and specified all of the network building blocks including head end equipment, customer premises equipment and all outside plant components.

Once most members had been served, SLVREC chose to expand the fiber network outside of their electric service area into higher density communities. In these cases, Uptown has used a centralized split architecture with standard splitter cabinets and drop terminals. Uptown continues to be the engineer of record for the SLVREC fiber network.

Contact:
San Luis Valley REC
Monroe Johnson, Chief Technology Officer
P: 719.852.6641 E: mjohnson@slvrec.com

City of Glenwood Springs, CO



Uptown was hired by the City of Glenwood Springs (COGS) to study the feasibility of expanding the City's fiber backbone network to provide retail broadband services to all households and businesses. Uptown's study determined that such a venture could be feasible and the City Council voted to approve bonds and build the network.

Uptown was asked to architect, design and engineer the citywide FTTP system. One of the unique aspects of the COGS fiber design was their desire to use occupied electric duct for new fiber infrastructure. This lowered the cost of construction substantially in underground service areas and called for the use of creative methods and materials to be used in the construction process. For example, the limited space in the occupied duct drove the need for a smaller, more rugged fiber cable design. The smaller cable counts led a distributed split approach with 1x4 drop terminals throughout the network.

The City completed the construction of their new FTTP system in 2023. Uptown completed the as-built mapping at the end of 2023 and the firm continues to provide ongoing implementation support. Our experience with this deployment shows that one size definitely does not fit all in the world of FTTP design.

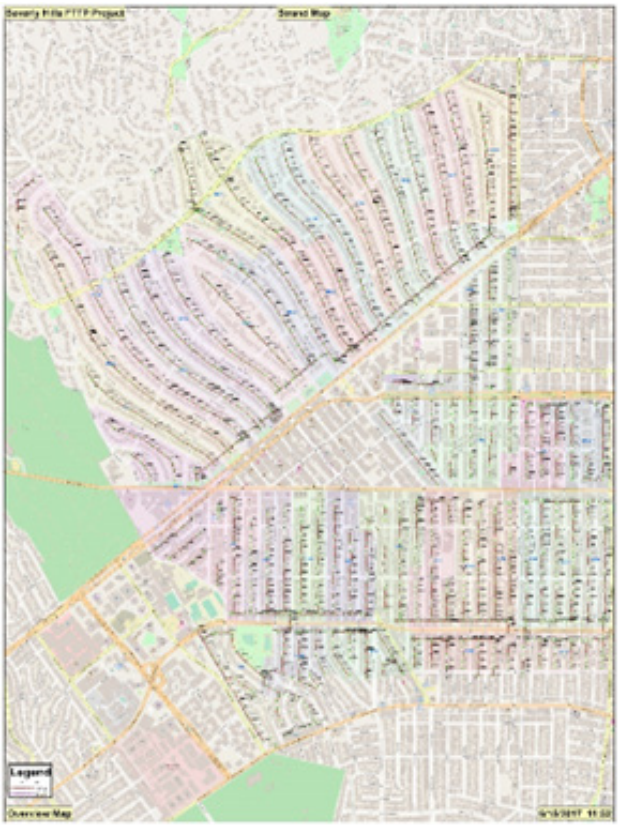
Contact:
City of Glenwood Springs, Colorado
Michael Gardner, Superintendent of Broadband Operations
P: 970.384.4800 E: michael.gardner@cogs.us

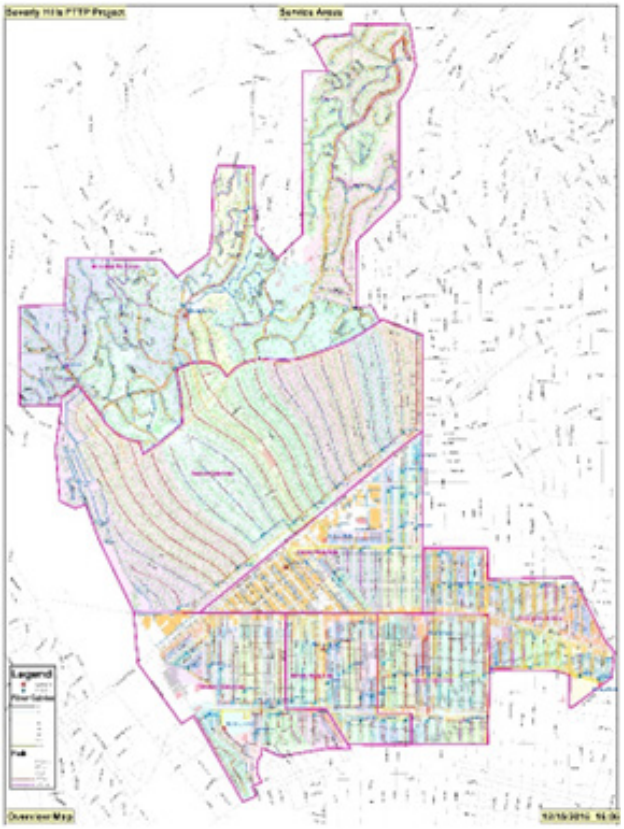
City of Beverly Hills, CA

Uptown was hired to complete a broadband feasibility study for the City of Beverly Hills. Our study showed that the network could meet the required financial metrics if the City provided all the required funding in the form of an equity investment. The City Council voted to proceed with the project and the City asked Uptown to design the network.

Projects in southern California are typically complex given the population density and the high cost of doing business. The City had recently completed the installation of a new streetlight system that included broad deployment of 2IN conduits and small hand holes. The system was designed to accommodate copper wiring to feed streetlights, so the sweeps and hand holes were too tight or small to support the installation of standard fiber cable and closures. This led Uptown to the development of a "micro based" strategy that included the use of microduct and microfiber cable. Uptown worked with City engineers to create the proper specifications for each outside plant situation. Uptown also sourced the required duct, cable and splice closures to be installed.

Network construction completed in 2018 and the network is currently being used to backhaul streetlight video camera feeds back to the City data center. The Citywide FTTP deployment is on hold given the high cost of customer drop installs and pole make ready on SCE poles. Uptown continues to serve as the engineer of record and provides a full time field engineer in support of the streetlight camera expansion.





Contact:
City of Beverly Hills, CA
David Schirmer, Chief Information Officer
310.285.2581
dschirmer@beverlyhills.org

The City of Hudson will design and implement a phased, citywide Fiber-to-the-Premises (FTTP) network through Hudson's Velocity Broadband initiative that provides 6,500 serviceable passes over four years, enabling gigabit-class internet access to residents and businesses. The scale of the project is large, totaling approximately 140-fiber miles comprised of a combination of aerial and underground infrastructure. The program will follow a macro- to micro process or top-down approach to step through High Level Design (HDD), Low Level Design (LLD), and Construction Prints production. The goal is to strategically masterplan the overall fiber network architecture; detail routing, splicing, and mitigation measures; and secure permits from agencies having jurisdiction to subsequently advance construction. Construction prints will be prepared following the City of Hudson and Ohio Department of Transportation (ODOT) plan development guidelines and specifications for critical underground crossings at state routes, congested arterial streets, railroads, turnpike, and waterways.

Technical Approach

The OHM/Uptown Services Team was comprised through exclusive partnership and specifically tailored to drive key program components aimed at efficiency with limited overlap. The makeup of this team benefits the city by combining national expertise with local proficiency available through one, trusted point of contact. Starting with the end in mind and near the end of the first year, the team will create an overarching playbook defining a FTTP network long-term buildout plan and documenting preferred systemwide criterion, specifications, and design package requirements based on current reference architecture of the active system. This masterplan enables targeted marketing ahead of anticipated installation and allows for better procurement and budget forecasting. The playbook will remain a living document and will be regularly updated based on high- and low-level design efforts and subsequent construction plan development and installation to scale up or down program needs in later years. Specifically, the team will guide the city through a paced program that thoroughly addresses the following project keys.

High Level Design

Uptown will prepare a comprehensive high-level design for the designated area(s) in a GIS format, including but not limited to, address data, area boundaries, efficient aerial/underground fiber design routes showing major network routes and project scope. Uptown will use the City's dataset, when available, to advance the following steps:

1. Engineering Notebook

Uptown recommends that the engineering team document the key design and construction assumptions and specifications in an engineering notebook. This document would include the following information:

- GIS / CAD Standards
- Description of Reference Architecture for FTTP Network
- Aerial Construction Specifications
- Underground Construction Specifications
- Technical Services Specifications (storage, splicing, closure prep, etc.)
- List of preferred materials for aerial and underground construction
- Design Package Requirements (GIS)
- It is expected that most of this information is readily available, so the main effort will be to compile the details into a summary document that will be used to guide the design process.

HLD DELIVERABLES

1. Engineering Notebook defining systemwide criterion
2. Long Term Buildout Plan
3. Route analysis Report
4. Shapefiles for all new fiber network components
5. Bill of materials for each service area
6. Bill of materials for each backbone and feeder segment
7. Preliminary construction map set for each service area
8. Preliminary Opinion of Probable Construction Costs (OPCC)

Figure 1: HLD Deliverables

2. Long Term Buildout Plan

Uptown recommends that the engineering team create service area boundaries, backbone and feeder routes for the ultimate buildout area envisioned by the City. It is understood that a multi-year buildout is planned and that the scope of the design effort will be determined on a rolling basis. However, a master plan of the total build area would be very beneficial in terms of understanding the required backbone and feeder sizing to support all future service areas. Drawing all the service area boundaries would also enhance the budgeting process at the neighborhood level. A GIS mosaic showing the preliminary service areas could also be used in marketing efforts.

Uptown's approach to creating the long-term buildout plan would be driven by the reference FTTP architecture and design of the primary electric system. If the architecture going forward is PON with a centralized split, then Uptown would recommend a target service area of 240 to 250 passings. Assuming that we would have access to the electric system layers, we would follow the primary electric pathways to join up 240 to 250 passings and draw the resulting boundary. This process would continue until all proposed passing are within a new service area boundary. Uptown will then identify the best location for a cabinet in each service area. Finally, we would layout a high-level backbone and feeder network to connect all the new cabinets to the primary equipment location(s). All future network planning efforts would be able to use this high-level plan as a reference.

3. Preliminary Outside Plant Design

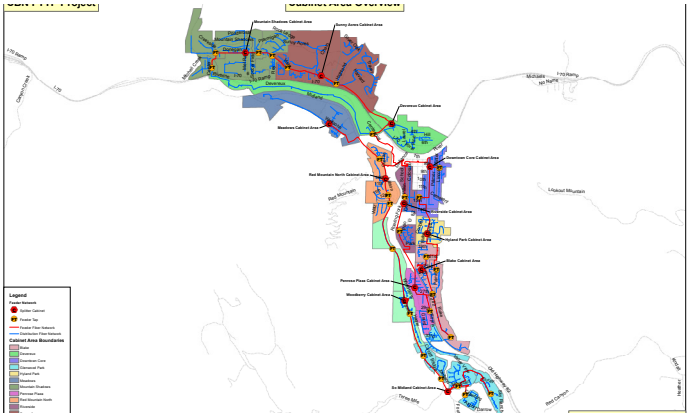


Figure 2: Service Areas Example

Uptown will complete the preliminary outside plant design based on the outcomes of the network planning process. The preliminary design will be completed using ESRI ArcGIS. Aerial and underground system designs will be completed including all required conduit, underground structures, fiber cable and splice points.

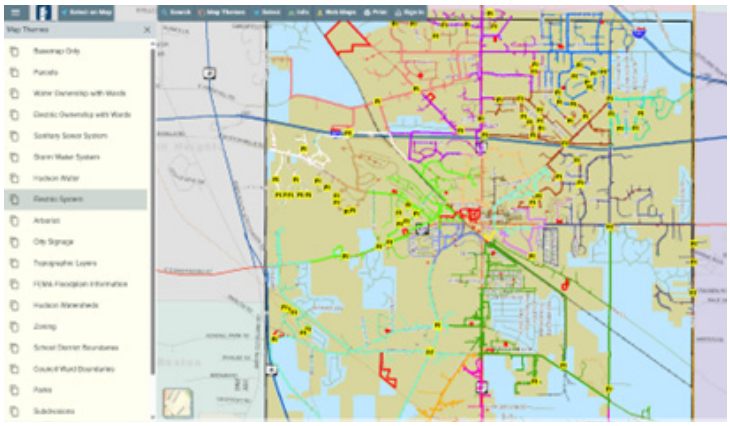


Figure 3: Hudson GIS Electric System Map

The outside plant design will split into two portions – backbone and distribution areas. The backbone design will be one or more rings of high-count fiber that will be used to connect each service area to the primary network equipment location. Distribution areas will cover neighborhoods of approximately 225 to 250 homes. Uptown will complete standalone designs for the backbone and each service area. Preliminary designs will be completed based on the latest pole and span data provided by the Owner.

Low Level Design

Uptown will build from preliminary planning efforts to create a detailed design in GIS format. Adhering to the following steps, this detailed design will highlight key features including proposed strand and poles, fiber cable, proposed vaults and conduit, pole locations, drops, work area boundaries, parcels, and service locations overlayed on current aerial imagery. With approval of the design by the City of Hudson, Uptown will then provide a final detailed design including proposed strands, poles, cables, conduits, and other infrastructure. Uptown will use the Cities dataset, when available, and only deploy OHM's field services team to field verify when requested.

1. High Level Design Review & Approval - Uptown will review high level designs with city staff and document any issues raised. Once city staff approves the high-level designs, Uptown will proceed to outside the plant design.
2. Final Outside Plant Design - Uptown will add all required strand, poles, fiber cable, vaults, conduit, drops, boundaries and service locations to the preliminary design. Uptown will draw all network sizing assumptions and materials specifications from the engineering notebook prepared in the HLD phase.
3. Final Splice Matrix - Uptown will develop a splicing matrix for each service area. It will detail assignments for all connections in the new service area. Fiber assignments upstream from the new service area will need to be coordinated with city staff, with the goal of showing all fiber assignments from each new service area back to primary equipment location(s). It is assumed that Uptown will not be working directly in the Vetro platform, but we have extensive experience with different fiber management systems and are willing to learn how to use Vetro if that is desired by the City.

LLD DELIVERABLES

1. Shapefiles for all new fiber network components
2. Bill of materials for each service area
3. Bill of materials for each backbone and feeder segment
4. Final construction map set for each service area
5. Final splicing matrix for each service area (Excel)
6. Updated OPCC

Figure 4: LLD Deliverables

Construction Prints

OHM will lead Construction Print production using a combination of GIS and CAD to define the horizontal and vertical disposition of proposed fiber routes in critical underground crossing areas. Only areas where underground conduits will be installed via trenchless means will be designed to safeguard budget constraints. These areas include state route crossings SR 91 and SR 303, I-480, and the Ohio Turnpike where expecting permitting is needed. Additional design prints for railroad, waterway, and other congested arterial street crossings where overhead extension is not feasible will also be included. The extent and limits of plan development will be dependent on HLD and LLD outcomes. OHM's field services team will topographically survey these predefined footprints only after confirmation again in the interest of reducing field and design efforts as well as associated costs. All other FTTP network plans will be generated using GIS and readily available utility datasets based on the LLD phase.

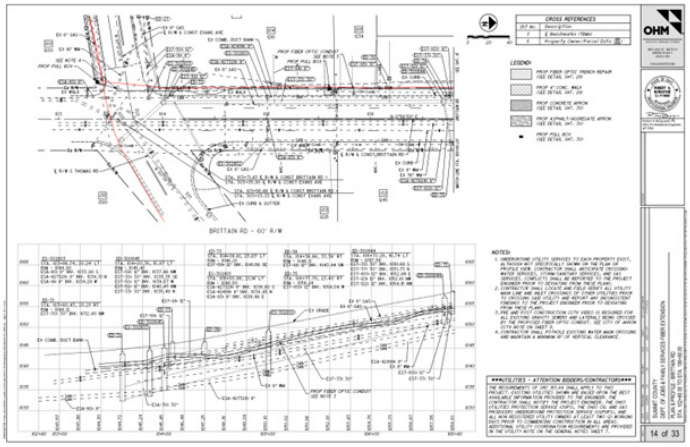


Figure 5: CAD Construction Print Showing Plan & Profile of Underground Summit Co. Fiber

Where CAD Construction Prints are developed, each will include plan and profile views in accordance with the City of Hudson and ODOT specifications clearly showing limits of public right-of-way, property ownership, existing topographic attributes, and underground utilities including water, sewer, stormwater, private gas, Hudson public power, telecommunications, and other found utilities at a quality Level C mapping. OUPS ticket requests will be submitted ahead of field survey. Proposed improvements including underground conduit routing, horizontal and vertical offsets from other utilities, handholes, etc. will be clearly defined for permitting and construction purposes.

Public Engagement

Ideally, the City will host public involvement meetings to advertise planned construction, discuss likely impacts in front of homes, set expectations, and promote the advancement of the fiber system.Similar to our efforts in leading the City's recent comprehensive plan, OHM will organize up to two public engagement meetings to share information and gather community feedback. OHM offers a range of low-cost services, including online surveys, tours, neighborhood walks, community newsletters, and interactive public workshops, to raise awareness and ensure public participation.

Permitting

OHM anticipates the need to acquire right-of-way access permits, pole attachment agreements, and private utility coordination with the following entities. OHM routinely works with each of these agencies which aids in expedited permitting.

- Ohio Department of Transportation (ODOT)
- Ohio Turnpike Commission (OTC)
- City of Hudson Engineering
- City of Hudson Public Power
- City of Hudson Water
- Summit County Department of Sanitary Sewer Services (DSSS)
- FirstEnergy
- Enbridge (formerly Dominion East Ohio Gas)
- AT&T Communications
- CSXT Railroad

As-built Collection & Documentation

OHM uses advanced Global Navigation Satellite System (GNSS) receivers to collect field measurements while infrastructure is being installed. Utilizing Eos Positioning Systems Arrow Gold or Gold + GNSS receivers connected to the Ohio Department of Transportation (ODOT) Continuously Operating Reference Station (CORS) and Ohio Real Time Network (RTN), field measurements are taken with survey grade accuracy. Measurements are recorded using the Esri Inc. Field Maps Mobile Application on a mobile device paired via Bluetooth to the high-accuracy GNSS receiver.

The Eos Arrow Gold and Gold + supports all four GNSS constellations (GPS, GLONASS, Galileo, and BeiDou) available from the ODOT CORS & RTN. With any survey equipment utilizing GNSS, accuracy depends on multipath errors, number of satellites in view, satellite geometry, baseline length (for local services) and ionospheric activities. All features collected will have metadata written into the feature's schema containing accuracy information for each point. Horizontal and vertical accuracy down to 1 cm can be achieved with this technology. Our technicians are trained and practiced in collecting near real-time as-built data on utility projects. Each year training sessions are required for staff that will be using this technology on their projects.

Data is collected directly into our Enterprise Geographic Information Systems (GIS) data server. Field data is available instantaneously on our server for quality assurance checks and to begin the as-built drawing process or geodatabase creation. Deliverables vary with our wide variety of clients. Field data can easily be incorporated into presentation maps for progress meetings and/or analysis. Additionally, utilizing preconfigured data collection templates we can document material quantities on a project-by-project basis. Data files will be processed and delivered in any desired coordinate system. Field GIS has many benefits; most importantly, it provides near real-time insight to our Project Managers and Owners. This data is available on project specific web mapping applications and Dashboards.

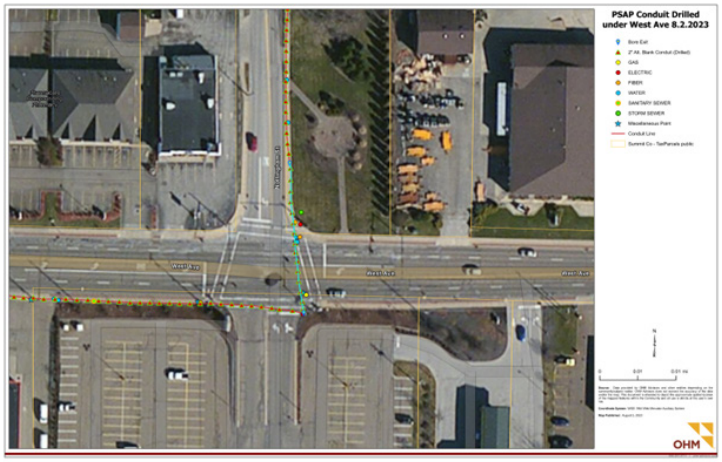


Figure 6: Summit Co. PSAP Fiber Near Real Time As-built Map

PROJECT FEE

Task Item	Duration	Estimated NTE Fees		
		Unit Fee	Uptown	OHM
1. High Level Design (6,500 Passes)				
Engineering Notebook	25 Hours	Std. Rates	$5,000	$3,000
Long Term Buildout Plan	50 Hours	Std. Rates	$10,000	
Preliminary Outside Plant Design (Bill of Materials, Walkout Maps)	Variable	$0.20 per foot	$24,000	
Opininon of Probable Construciton Costs (OPCC)	10 Hours	Std. Rates	$2,000	
2. Low Level Design (120,000 LF) Yr. 1				
High Level Design Review and Approval	24 Hours	Std. Rates	$4,800	
Final Outside Plant Design	Variable	$0.20 per foot	$24,000	
Final Splicing Matrix	Variable	$0.10 per foot	$12,000	
Engagement	40 Hours	Std. Rates	$3,200	$6,400
OPCC Update	10 Hours	Std. Rates	$2,000	
3. Permitting				
Hudson Engineering, Hudson Public Power, ODOT, OTC, Railroad^	75 Days	Std. Rates		$19,000
4. Construciton Prints (120,000 LF) Yr. 1				
Survey (Assume 15,000 LF)+	Variable	$8.00 per foot		$120,000
GIS - Aerial Plan Development (Assume 105,000 LF)*	Variable	$1.00 per foot		$105,000
CAD Plan Development (Assume 15,000 LF - Approx. 30 Plan/Profile Sheets)**	Variable	$14.00 per foot		$210,000
OPCC Update	20 Hours	Std. Rates		$4,000
5/6. Asbuilt Collection & Documentation (120,000 LF) YR 1				
Dashboard & GIS Management	Near Real Time	$0.75 per foot		$90,000
7. Project Consulting Services Yr. 1				
Project Admin. Management, and QA/QC	Full Time	Std. Rates	$14,400	$19,200
Direct Expenses	As Needed	Direct Costs	$5,000	$2,500
		Consultant Subtotals	$106,400	$579,100
		Total Estimated NTE Fee	**$685,500**	

Assumptions & Exclusions:

Estimated fees shown. Final fees to be negitiated based on actual, agreed upon scope of services.

+Topographic survey will be limited to determined underground and critical roadway or waterway crossings only.

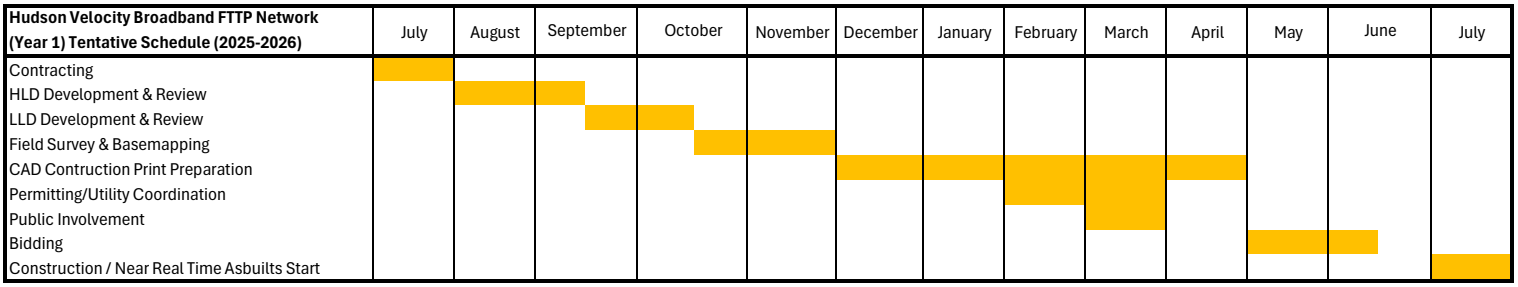
***GIS Aerial plan development to include GIS utilities, aerial imagery, City/County R/W, parcel data, and overhead fiber routing only. No profiles.

****CAD plan development will be limited underground and critical crossings only. Full Level C utility identification is included.

^Permitting costs not included for Railroad or other agencies having jurisdicition. Those costs shall be borne by owner.

Construction management and inspection services are excluded.

PROJECT SCHEDULE



Our project management system begins with ensuring that we have a solid understanding of the project's scope and goals. The process for our Project Management is focused on delivering a product to our client on time and on budget that meets our client's expectations for completeness and quality.

The project manager (PM) is responsible for preparing the scope, schedule and budget and then staying with the project until it is completed. We feel project success is best achieved when a single person is both responsible and accountable. Overall our PMs are responsible for:

- Communicating project status with the client
- Scheduling and documenting project meetings
- Ensuring project deliverables are completed on-time and within budget
- Securing all needed permits and ensuring a project meets all applicable standards
- Managing staff assigned to the project
- Submitting any modifications to the standard QA/QC procedure to the Principal in Charge (PIC) and implementing agreed upon procedures
- Invoicing and billing for project
- If required, preparing scope, schedule and budget modifications
- Anticipating potential project issues and discussing with the PIC and client when needed

Once the project scope, schedule and budget are drafted, the PM will meet with the client to make sure all of the project elements are addressed and potential issues identified. This upfront communication helps to ensure that the most complete, realistic scope is prepared and that the agreed upon project expectations are met.

This step minimizes out of scope work efforts and averts potential schedule conflicts. The PIC's role is to assure our client the highest degree of professional service and to ensure the project exceeds expectations.

Establishing and implementing sound project management strategies from the onset of the project and continuously using them during the course of the work will help ensure project success. We define project success as follows:

- Effective project communication occurs throughout the course of the project
- Project objectives and goals are met
- Schedule is maintained and milestone dates are met
- Project costs are controlled

Three specific tools are created and used as part of our Project Management strategy to ensure the four key items are achieved. These include the development of a Project Management Plan, tracking costs with a Cost and Schedule Control Tool and utilizing a Communication and Coordination Plan.

QUALITY ASSURANCE & QUALITY CONTROL

Quality is a fundamental project goal of OHM Advisors. Project quality begins with a team commitment to produce the best possible work product consistent with our clients' goals and expectations. Sound project management and effective communication are critical components. OHM Advisors commitment to excellence is what we strive for and is demonstrated as part of our comprehensive QA/QC program. These methods include:

Project Reviews and Accountability | QA/QC reviews will be performed at critical points in the project. Time for project reviews is included in the project schedule at the beginning of a project. Reviews are tracked and documented. Each team member is required to certify completion of their review.

Results | The results of a strong QA/QC program benefit our team and our clients. Our clients benefit from on-time, within-budget projects. During the bidding phase, contractors recognize the thoroughness of our documents, and as a result, their bids are tight. During the construction phase, change orders are generally few and small relative to overall project cost. Our firms benefit by completing work according to planned compensation and by avoiding error and omissions claims and unhappy clients as well as public stakeholders.

Procedures | Our QA/QC program provides rigorous reviews at critical points in the project to ensure the work is done correctly. Experienced staff participate in peer review of all critical decisions. In addition to our technical departments, our graphics and office services support staff maintain standards specific to their respective areas, and also participate in reviews.

ADDITIONAL INFORMATION

R. TONY BURGOYNE, PE | Principal, Fiber Design Review Manager | *25 years experience.*

OHM Advisors. For more than 25 years, Tony has advised communities in support of place making and critical infrastructure initiatives aimed at economic development, land management, operations, maintenance, and regionalization. He has extensive experience leading planning, design, and construction management efforts that require large and diverse discipline teams. Tony is a technically proficient engineer in most municipal infrastructure initiatives. He is a connecting collaborator, take charge leader, and effective public communicator responsible for client cultivation, partnering, and consensus building. Tony's experience includes: Summit County BOE Fiber Design, OH; Summit County DJFS Fiber Inspection Services, OH; Summit County PSAP Inspection Services, OH; Medina County LIT Communities Expansion, Fiber & Small Cell Communications Zoning Amendments, Seville, OH. For each of the above projects, Tony served in key leadership roles to either zone, permit, design, or inspect fiber expansions. Project goals targeted underserved census tracks and focused on consolidation and interconnection of community safety forces, fortification of election polling stations, and establishing criterion for municipal zoning ordinances. Generally, the projects included demographic evaluations, land and utility coordination, funding solicitation and compliance, safety forces and political communication, detailed design, and construction inspection. His engineering and municipal expertise, in many cases, aided with the fast-tracked deployment of mostly trenchless installation of fiber networks across opportunity zones and congested corridors. Education: BS, Civil & Environmental Engineering, The University of Akron, 2003.

ARTHUR SCHMIDT, IV | Planning & Public Engagement | *13 years experience.*

OHM Advisors. As a Planner at OHM Advisors, Arthur brings a collaborative and place-based approach to each project. Arthur's 13 years of experience include community and transportation planning, public policy, zoning codes, economic development and public engagement. Prior to joining OHM Advisors, Arthur worked in the public sector where he coordinated local design review boards, collaborated with local communities on neighborhood-based plans with developers, and managed grant programs to assist in funding planning and implementation projects and efforts. Arthur believes that design is a participatory process that engages citizens in the development of plans that embrace the desires of the community, the character qualities of the community, and set a sustainable model for continued long-term success. His commitment to understanding the needs and desires of the community, and pairing that with a collaborative, trust-building approach translates to enriched visions and plans. Arthur's experience includes: Wadsworth Parks & Active Transportation Master Plan, Wadsworth, OH; Hudson Comprehensive Plan, Hudson, OH; Huron Main Street Corridor Plan, Huron, OH; Peninsula Downtown Master Plan, Peninsula, OH. Education: MS, Urban Design, Kent State University, 2013; BA, Architecture Studies, Kent State University, 2011.

NEIL SHAW | Network Architect | *38 years experience.*

Uptown Services. Neil has an extensive understanding of various broadband network infrastructure alternatives and the financial dynamics that are critical to making decisions in this industry. Examples of relevant broadband experience are: As vice president of marketing at TCI Internet Services, he guided the launch of the @Home Network in the first three markets deployed worldwide. These market launches jump-started the cable industry in entering the broadband Internet sector. As vice president and general manager for Jones Lightwave, he launched a full suite of SONET-based transport services in one of the earliest competitive access providers. As a principal for Uptown Services, Neil has built the firm's municipal broadband practice from scratch over the past 26 years. His business case financials have been the basis for over $480M in publicly financed municipal broadband projects. He has also personally completed detailed FTTH designs for several clients, including the 300-mile passive optical network for the City of Wilson, NC. Neil understands the inner workings of the local government process based on his experience with more than 100 municipal and utility clients. Education: BS, Electrical Engineering, Iowa State University; MBA, University of Colorado.

DAVE STOCKTON | QA/QC | *37 years experience.*

Uptown Services. Dave has 37 years of experience in the telecommunications, cable, and high-speed Internet sectors. He spent 17 years in management positions at Northwestern Bell, US WEST, MediaOne, and AT&T Broadband and was Vice President of Marketing & Sales for a 600k subscriber system in Atlanta. For the last 18 years he has been a Principal with Uptown Services. In that capacity he has completed 36 feasibility studies. In completing these studies he has overseen market research for each study with total quantitative research sample of over 10,000 residential respondents, evaluated competitive offerings and created product strategies and plans, and completed detailed financial analysis and pro forma development. A number of these feasibility studies have subsequently deployed FTTP systems. In addition to his leadership roles in private sector operating units, during his consulting career he has assisted in multi-year projects with the start-up of 8 municipal FTTP systems, playing a key role in the functional areas of developed marketing and sales plans, defining product strategy and pricing, creating brand identities, securing video programming contracts, securing backbone connectivity, evaluating operating support and billing systems, assisting with staffing, developing budgets and operating forecasts/reporting, establishing methods and procedures, and negotiating wholesale partner agreements with CLEC partners.