



City of Plainfield  
NJEDA - Innovation Planning Challenge Grant

Final Report  
March 2020



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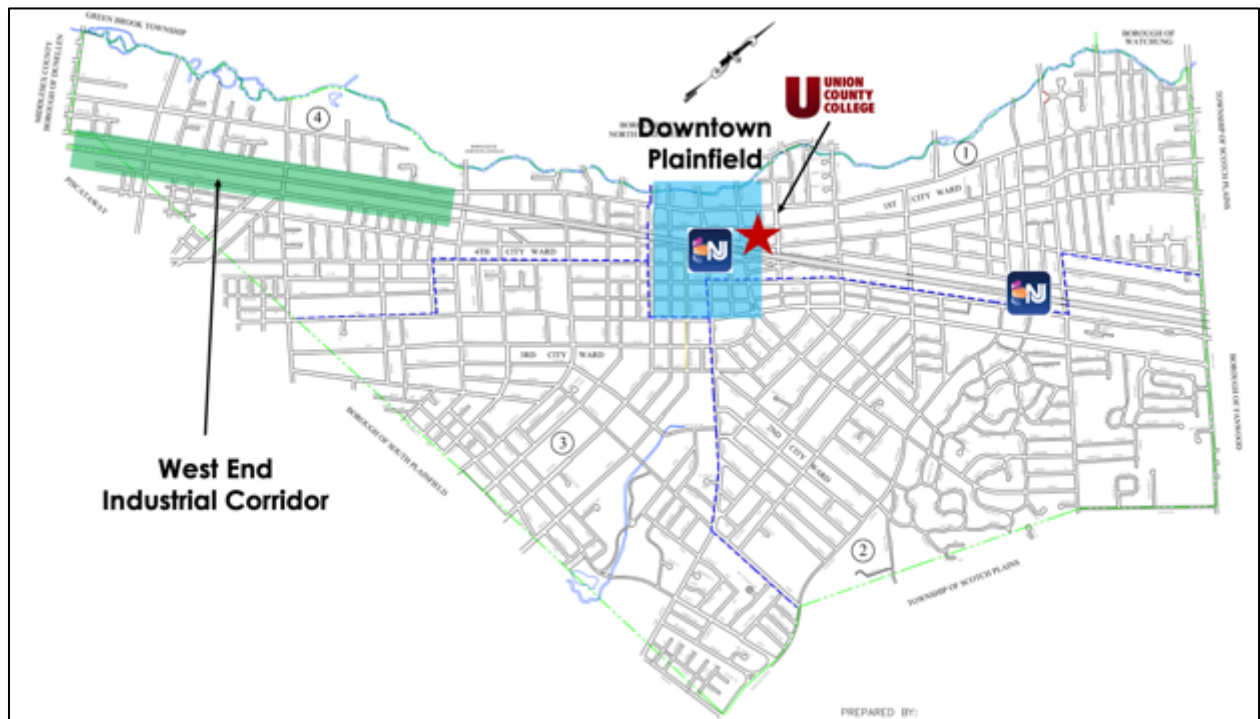
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*New Jersey Innovation Institute (NJII) is an NJIT corporation focused on helping private enterprise discover what's possible. Whether it's working to solve the grand challenges shared across an entire sector or helping a single company find an innovative way to pursue a new product or market opportunity, NJII brings world-class intellectual and technological resources to bear. We are unique in our formation and role as a not-for-profit corporation in pursuit of economic development and in our agility in transforming intellectual capital into commercial success.*

## I. EXECUTIVE SUMMARY

In October 2019, the City of Plainfield was awarded a New Jersey Economic Development Authority (NJEDA) Innovation Challenge grant. The overarching goal of this state program is to catalyze planning and key investments that would position New Jersey cities and regions to capture future innovation-driven growth. The focus of the Plainfield grant is to leverage high speed communication technologies (HSCTs) to revitalize the West End Industrial Corridor (**Figure 1**) – a tract of land southwest of Downtown Plainfield that is zoned as light industrial and bordered closely by residential neighborhoods. (See **APPENDIX A** for a full review of the project narrative and work plan.)

The New Jersey Innovation Institute (NJII) was selected as the lead partner to deliver the scope of work set forth by the City of Plainfield. iNeighborhoods LLC, a licensed engineering firm, supported the technical telecommunications evaluation.



**Figure 1: Project Scope in Context**

### METHODOLOGY

While this primary deliverable for this project is a set of technology recommendations, the NJII team recognizes that technology is a means to an end – not the end itself. In fact, lessons learned from early successes in deploying next generation communication technology indicate the need to first establish a “use case” – a specific situation or need to which a product or

service can be applied.<sup>1</sup> As such, the project team approached this engagement by asking the following questions:

*“What is a high potential direction of economic development for Plainfield? And, how can organizations and resources align with technology to accelerate progress in that direction?”*

Collectively answering these questions, quantitatively and qualitatively, provides a destination around which the community can mobilize and a target toward which technology can be deployed.

### **SUCCESS CHARACTERISTICS**

In service of bring into focus this *“high potential direction”*, the City of Plainfield leadership articulated the following success characteristics<sup>2</sup> within a hypothetical 5-year timeframe.

1. Diversify the Plainfield economy, adding well-paying commercial and industrial jobs that support long-term career paths. Metrics:
  - New business creation and/attraction
  - New middle/upper income jobs
  - Decrease portion of tax revenue from single family homes (currently 80%)
  - Increased commercial and industrial tax revenue
  - Increased property utilization (of existing commercial and industrial buildings)
  
2. Attract a new demographic to Plainfield: middle/upper-class residents including the millennials and empty nesters (i.e. “non-school impacting”) already interested in living in an urban environment. Metric:
  - New residents filling the new housing units (primarily rental)
  
3. Jobs created are inclusive of the diverse education levels of the workforce in Plainfield. Metric:
  - Availability of middle skill job opportunities, new skills training programs, internships, apprenticeships, and co-op opportunities

Through facilitating this goal setting exercise, it became clear that this project is about much more than the primary deliverable – a technology feasibility assessment. Ensuring that the technology recommendations meet the success characteristics meant that the solution needed to be informed by the needs of the community and businesses in the West End Industrial Corridor (the Corridor), which are primary small and medium-sized specialty manufacturers. As

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<sup>1</sup> US Ignite Forum Playbook: Community Initiatives to Drive 5G, Small Cell, and IoT Deployment

<sup>2</sup> The success delivery of the NJII scope of work will not be judged using these criteria. The commitment of NJII is limited to the stated scope of work and deliverables in the New Jersey Innovation Institute (NJII) Proposal Response.



such, the discovery phase of the project included direct interaction with the Corridor businesses, research into the drivers of growth and disruption in advanced manufacturing, and engaging community leaders from across the spectrum of city services (education, workforce, etc.).

### **OPPORTUNITY IDENTIFICATION**

The guiding methodology, scope of work, and success characteristics needed to be translated into a set of specific selection criteria that all potential growth opportunities could be measured against. This also provided transparently as to how decisions are made and prevents scope creep during the execution phase.

The foundational constraint is that the Corridor should maintain its industrial character. Within that boundary, the following selection criteria were defined based on the scope of work and success characteristics:

- Growth is enabled by HSCT (High Speed Communication Technology)
- High growth market (CAGR > 10%)
- Aligned with state priorities
- Ability to attract established companies
- Ability to attract startup companies
- Enabling ecosystem in place
- Generates high quality inclusive, employment opportunities

These criteria are further elaborated in **Section IV** and the growth opportunity described immediately below meets these selection criteria and has the potential to drive each of the success characteristics.

### **CORRIDOR GROWTH OPPORTUNITY – SUMMARY**

The West End Industrial Corridor is well-positioned for redevelopment given its historically significant industrial architecture, strategic location inside a high-performing MSA (New York-Jersey City-Newark metropolitan statistical area) with excess demand for industrial space, and robust transportation infrastructure. However, much of the dense northern New Jersey market shares these attributes. Thus, to drive the above stated success criteria, differentiation is needed. The physical properties should be combined with programming, services, and assets that serve the needs of both the community and industry, thus, acting as a magnet to attract economic activity.

## **Vision Statement**

*The West End Industrial Corridor can leverage high speed communication networks, novel technology, and innovative business models to become a **21<sup>st</sup> Century industrial corridor.***

*As US manufacturing transforms into the next industrial era – Industry 4.0 – what does the industrial park of the future look like? The typically suburban industrial park of the past (and present) actually pre-supposes the now well-understand concept of coworking office spaces. Manufacturers have long understood the synergies of physical colocation. However, industrial colocation stopped short of the shared services model used by modern coworking operations. These novel shared office spaces centralize services that all member businesses need, reducing cost and staffing burdens that allow companies to remain agile. This model should be applied to the industrial parks of the future. But what are the shared services for an industrial corridor?*

*Over 90% of manufacturing companies struggle to onboard new digital manufacturing technologies – referred to as the Industrial Internet of Things, or IIoT (See Call Out Box on pg. 22) – citing barriers such as lack of digital talent, integration challenges, and – simply – they don't understand the value of IIoT. Centralizing an IIoT platform using an “as-a-Service” model, and pairing that model with a host of services, has the potential to support:*

- **transformation** of Plainfield Area manufacturers into the digital future,
- **growth** of startups and entrepreneurs,
- **upskilling** of the workforce, and
- **learning** through unique educational opportunities.

Moreover, the IIoT application platform can be leveraged for Corridor-level applications such as smart-grid management, AR/VR shipping and material handling solutions, and public safety applications – just to name of few.

Changes in technology and global markets have created the opportunity in the U.S. for digitized, distributed, urban manufacturing. The City of Plainfield should link and leverage its assets to harness these trends and position the West End Industrial Corridor for the next generation of American manufacturing excellence.

***The 4 key elements of the vision include:***

- ***Re-development Site: The Plainfield Urban Manufacturing Center***
- ***Businesses & Community Support Programs***
- ***Telecommunications Infrastructure***
- ***Downtown Connectivity***

***See Section V for a full explanation of the vision.***

## TECHNICAL SOLUTION – HIGH LEVEL SUMMARY

The core elements of the proposed technology solution are a **1) Application Service Provider (ASP)** that owns and/or operates a **2) private on-development fiber-wireless network** together with a **3) Corridor Application Platform**. This solution will support Corridor tenants and visitors with their on-site wireless broadband connectivity needs including on-premise private 5G networks. The recommended solution requires the following hardware build elements:

- Meet Me Point
- Wireless Network
- Fiber Buildout
- ASP Data Center

See **Section VI** for a full review of these elements.

### Cost Summary

The technical recommendations reflect just one of many ways in which the technical vision for the Corridor could come together. And, thus, the cost and timeline reflect solely the vision detailed in this study and, as such, are subject to change if the execution of the vision deviates from what has been detailed. Moreover, these figures are inevitably presented in vacuum. The technical infrastructure is only one element of the larger vision and, more importantly, all costs must be balanced against business and revenue models for the West End Industrial Corridor.

Technology	Cost
<b>Fiber</b>	\$ <b>93,100.00</b>
Range Low	\$ 105,000.00
Range High	\$ 90,000.00
<b>Wireless</b>	\$ <b>82,500.00</b>
Range Low	\$ 77,500.00
Range High	\$ 107,500.00
<b>ASP</b>	\$ <b>155,000.00</b>
Range Low	\$ 55,000.00
Range High	\$ 250,000.00
<b>Meet Me Room</b>	\$ <b>20,000.00</b>
Range Low	\$ 10,000.00
Range High	\$ 30,000.00
<b>Budgetary Total</b>	\$ <b>350,600.00</b>
Range Low	\$ 247,500.00
Range High	\$ 477,500.00

**Estimated Construction Timeline: 4-6 months**

### Legal Review Summary

New Jersey, to date, has been hesitant to enact comprehensive broadband municipal deployment regulations. As such, there are no state regulations and/or laws that discourage or otherwise inhibit Plainfield's ability to either provide broadband services on its own or allow non-carriers (such as a real estate developer) to do so. This provides the City of Plainfield the opportunity to promote and deploy the kind of robust forward-thinking broadband infrastructure that gives its citizens, business community and educators a world-class network and "Smart City" environment that can dramatically improve its quality of life and the economy.

## II. CONTEXT

The City of Plainfield, with its population of approximately 50,000 residents, is experiencing an influx of real estate investment, primarily up-market rental units. While there are a small number of active affordable housing developments, this recent investment – approximately \$750M and 4,000 to 5,000 units – is intended to attract a new community to Plainfield. The target demographic is middle- and upper-class residents including millennials and empty-nesters that are already interested in living in an urban environment (i.e. “non-school impacting”). In fact, according to EMSI data, the population in the Plainfield Area is expected to increase (though relatively slow, approximately 1%) over the next 5 years.

Recent investments are part of a larger trend in northern New Jersey. The City of Plainfield is located within the number one U.S. “Superstar” metropolitan area. That is, Plainfield is geographically located within the New York-Newark-Jersey City metropolitan statistical area (MSA). The northern suburbs of New Jersey, including Plainfield, all benefit from the economic proximity to New York City. To the credit of the City of Plainfield, leadership has enacted investment-friendly reforms to ensure there is little or no friction for investors seeking to build in Plainfield, NJ. While the current development is focused on the downtown business district anchored by the Plainfield train station, future improvements will be pursued around the Netherwood train station. To complement this real estate investment, the City of Plainfield is also seeking pedestrian-friendly improvements to the downtown area. Moreover, a critical next step is a permanent direct train ride to New York City. (Currently, riders need to transfer at Newark Penn Station.)

The current population of Plainfield, according to City leadership, is not expected to fill the new and planned housing units or patronize the types of businesses the City is attempting to attract to the retail corridors. According to a 2012 report, Plainfield experiences significant “sales leakage”.<sup>3</sup> That is, citizens of Plainfield spend their money elsewhere. Relative to both the region and state, Plainfield residents have lower median-incomes, less valuable homes, and lower educational attainment rates.<sup>4</sup> Relative to the state, Plainfield has more than triple the number of residents without a high school diploma and only one third of the state average for residents with a collage diploma.<sup>5</sup> It should be noted, however, that home values are on the rise coinciding with the broader positive real estate market outlook. Moreover, Plainfield is not monolithic. There are more affluent residents residing in communities such as Sleepy Hollow. The largest population, according to a 2017 Census update, is “Black and African American” at 40.8 percent and the next largest category is “Other” at 33.2 percent, which according to City leadership is dominated by the Latinx community. Plainfield has almost double the state average of foreign-born residents (38.8%) with more than 80% of those residents arriving post-

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<sup>3</sup> Thomas Edison State College, Economic Analysis of North Central New Jersey – Camion Associates, 2012.

<sup>4</sup> *ibid.*

<sup>5</sup> US Census 2017 ACS 5-Year Survey

2010.<sup>6</sup> City leadership considers the City's diversity as an asset. In addition, 94% of Plainfield residents work outside of Plainfield.<sup>7</sup> Commuters are oriented to the north east with top destinations in the surrounding cities and New York City.<sup>8</sup> The vast majority of commuters are drivers, with only 9% utilizing public transit.<sup>9</sup>

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<sup>6</sup> Ibid.

<sup>7</sup> U.S Census: On the Map

<sup>8</sup> Ibid.

<sup>9</sup> US Census 2017 ACS 5-Year Survey

### **III. ASSET INVENTORY: NON-TECHNICAL ASSET DISCOVERY**

#### **THE WEST END INDUSTRIAL CORRIDOR**

##### Historically Significant Architecture

Large portions of the West End Industrial Corridor are sections of the former Mack Truck plant in Plainfield. They are historically significant, connecting back to the city's manufacturing heritage and are architecturally interesting. Such assets around the country have proven to be attractive for redevelopers.



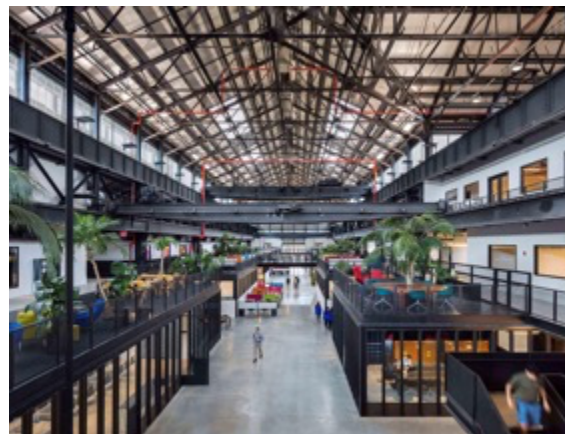
*Overhead View - Plainfield Development Corridor*



*Inside the Mack Truck Plant*



*Example Redevelopment (Before) - Brooklyn Navy Yard*



*Example Redevelopment (After) - Brooklyn Navy Yard*

**Figure 2** is a list of 10 businesses in the Corridor. It should be noted that there are other businesses located in the footprint of the Corridor. However, these businesses do not appear to be in good standing and have not been responsive to the City. Also, among the list of 10 active

and responsive businesses only three have expressed interest in this project and, largely, the nature of that engagement has been defensive.

Regarding the character of the businesses, they are largely niche and/or specialty manufacturing that serve a local market. Much of the work is highly custom and requires little hard tooling and automation. The largest business with public records is Injectron with approximately \$50M in annual revenue. They also in have the largest footprint in the Corridor. All businesses are small and medium-sized manufacturing companies (defined by the Small Business Administration as having less than 500 employees). With the exception of the skilled trades in the union construction shops, the manufacturing business depend on the low-cost laborforce in Plainfield. The front office “white collar” workforce typically does not live in Plainfield.

<u>Company</u>	<u>Category</u>	<u>Address</u>	<u>Website</u>
Architectural Iron Designs	Iron works	950 S 2nd St	<a href="https://www.archirondesign.com/">https://www.archirondesign.com/</a>
F & C Professional Aluminum	Fence supply	1149 W Front St	<a href="https://fcprofessional.com/">https://fcprofessional.com/</a>
Fayette Trading	Textile exporter	1355 W Front St	<a href="http://www.fayettetrading.com/">http://www.fayettetrading.com/</a>
Injectron Corporation	Plastic injection molding	1000 S 2nd St	<a href="http://www.injectron.com/">http://www.injectron.com/</a>
Maaco Collision Repair & Auto Painting	Auto repair	1652 S 2nd St	<a href="https://www.maaco.com/location/nj/plainfield-12637/">https://www.maaco.com/location/nj/plainfield-12637/</a>
New Industrial Foam Corporation	Plastic fabrication	1355 W Front St	<a href="https://newindustrialfoam.com/">https://newindustrialfoam.com/</a>
Norpak Corporation	Food wrapping paper manufacturer	1355 W Front St	<a href="https://norpak.net/">https://norpak.net/</a>
Papp Iron Works	Iron works	950 S 2nd St	<a href="http://www.pappironworks.com/">http://www.pappironworks.com/</a>
S&B Pallet	Pallet manufacturer	1348 S 2nd St	<a href="http://sbpallet.com/">http://sbpallet.com/</a>
Solanos Auto Body Shop	Auto repair	1205 W Front St	N/A

**Figure 2: Existing Business - West End Industrial Corridor**

#### Transportation & Utility Infrastructure

Below is a list of potential marketing assets relating to transportation and utilities:

- “Potential” for low cost electricity. Brunswick Trading Co. was able to negotiate a \$0.06-8/kwh energy rate with PSE&G. This was possible due to underutilized electrical



infrastructure that was sized for the heavy manufacturing of the past. It should be noted that the businesses in the Corridor have not negotiated for more favorable rates.

- Ability to move things; location relative to road and rail infrastructure designed to move heavy manufactured goods.
- Proximity to the NYC market
- Low cost, large spaces with high floor loading

### ***TALENT – CURRENT WORKFORCE***

The following section is an analysis of an EMSI dataset that sources its content from online job postings and online resumes and profiles in a designated area. The reference area (referred to as the Plainfield Area) is a 5-mile radius centered around the City of Plainfield. **Figure 3** reveals the top ten available skills in the Plainfield Area. That is, these are the top skills being advertised by the residents in the Plainfield Area.

<b>A</b>	<b>B</b>	<b>C</b>	<b>D</b>	<b>E</b>	<b>F</b>
<b>Skills</b>	<b>Number Job Postings w/Skill (Demand)</b>	<b>Frequency in Postings</b>	<b>Number of Candidate Profiles w/Skill (Supply)</b>	<b>Frequency in Candidate Profile Postings</b>	<b>Skill Gap</b>
Accounting	30,539	5%	48,097	7%	-17,558
Project Management	20,632	3%	41,721	6%	-21,089
Strategic Planning	17,791	3%	35,586	5%	-17,795
SQL (Programming Language)	21,766	3%	34,099	5%	-12,333
Customer Relationship Management	17,087	3%	32,584	5%	-15,497
Business Development	17,002	3%	30,704	5%	-13,702
Sales Management	8,844	1%	30,215	5%	-21,371
Auditing	32,209	5%	28,335	4%	3,874
Customer Satisfaction	16,288	3%	28,223	4%	-11,935
Budgeting	13,140	2%	28,120	4%	-14,980

**Figure 3: Top 10 Skills Plainfield Area Residents Offer Prospective Businesses**

Note that Column F reveals that a large majority (90%) of these skills are not in demand in the reference area. That is, there is a surplus of workers with these skills. This finding supports the fact that more than 90% of Plainfield resident work outside the area.

**Figure 4** arranges the data by top skills demanded in the Plainfield Area and reveals that 80% of skills on demand are not being fully met by the local community.

A	B	C	D	E	F
Skills	Number Job Postings w/Skill (Demand)	Frequency in Postings	Number of Candidate Profiles w/Skill (Supply)	Frequency in Candidate Profile Postings	Skill Gap
Pharmaceuticals	34,264	5%	25,906	4%	8,358
Merchandising	32,801	5%	26,154	4%	6,647
Auditing	32,209	5%	28,335	4%	3,874
Accounting	30,539	5%	48,097	7%	-17,558
Selling Techniques	30,330	5%	20,106	3%	10,224
Warehousing	24,015	4%	3,876	1%	20,139
Customer Experience	23,420	4%	5,745	1%	17,675
Agile Software Development	22,098	3%	13,187	2%	8,911
SQL (Programming Language)	21,766	3%	34,099	5%	-12,333
Nursing	20,739	3%	13,026	2%	7,713

**Figure 4: Top 10 Skills in Demand by Existing Plainfield Area Businesses**

**Figure 5** highlights the skills set in the Plainfield Area experiencing the largest shortages.

A	B	C	D	E	F
Skills	Number Job Postings w/Skill (Demand)	Frequency in Postings	Number of Candidate Profiles w/Skill (Supply)	Frequency in Candidate Profile Postings	Skill Gap
Warehousing	24,015	4%	3,876	1%	20,139
Customer Experience	23,420	4%	5,745	1%	17,675
Selling Techniques	30,330	5%	20,106	3%	10,224
Key Performance Indicators	12,216	2%	2,269	0%	9,947
Agile Software Development	22,098	3%	13,187	2%	8,911
Pharmaceuticals	34,264	5%	25,906	4%	8,358

Application Programming Interface (API)	10,825	2%	2,765	0%	8,060
Python (Programming Language)	12,759	2%	4,732	1%	8,027
Nursing	20,739	3%	13,026	2%	7,713
Standard Operating Procedure	8,965	1%	1,280	0%	7,685

**Figure 5: Top 10 Skill Gaps in the Plainfield Area**

## **TALENT – ACADEMIC PIPELINE**

### Plainfield Area

The anchor academic institution in the Plainfield Area (and partner in the grant) is **Union County College**, which – according to EMSI – graduated 182 with either a certificate or associate degrees in 2018. A close second is Lincoln Technical Institute in South Plainfield with 175 graduates. South Plainfield is also home to the Central Career School, which graduated 101 students in 2018. The area also has two beauty schools and a small art school, deCret School of Arts.

### **Union County College**

Union County College is a public comprehensive community college. It's the first of New Jersey's associate degree colleges, founded in 1933. The College operates major campuses in Cranford, Elizabeth, Plainfield, Scotch Plains and a satellite location in Rahway. Union enrolls almost 20,000 credit, non-credit, and continuing education students and is accredited by the Middle States Commission on Higher Education.

### Academic Programming

- UCC offers a full complement of general education courses to earn an associate degree, transferable to a 4-year institution
- UCC also hosts the JFK Muhlenberg Harold B. and Dorothy A. Snyder School of Nursing Program, which is affiliated with Hackensack Meridian Health. This is also an associate degree.
- The 2020-21 strategic plan references consideration for an Aviation Technology Program.

### Other Programming

- UCC offers many industry-specific workforce training programs for corporate partners (Ex. Cisco Networking Associate).
- UCC hosts the Union County workforce development center.

### Northern New Jersey

**Figure 6** below is a summary of 4-year college degree types from all academic institutes in a 15-mile radius around Plainfield. Program titles are normalized across institutions. Included in the analysis are 54 unique physical campuses, and a fewer number of educational institutions as, for example, Rutgers University has multiple campuses. The R1 research universities include Rutgers to the South and NJIT to the north.

In summary, the top degrees coming out of the 4-year academic pipeline are related to health and life sciences. However, there is a very diverse and high-quality pool of graduates in northern New Jersey spanning business, engineering, and the humanities.

Program Description	Bachelor's Degree > All Program Types > 2017 Completions	Bachelor's Degree > All Program Types > % Completions Change (2010-2017)	Bachelor's Degree > All Program Types > Completions Change (2010-2017)
Psychology, General	1,934	29%	435
Biology/Biological Sciences, General	1,137	44%	349
Registered Nursing/Registered Nurse	1,118	110%	585
Accounting	850	37%	230
Business Administration and Management, General	798	-24%	-253
Speech Communication and Rhetoric	653	14%	78
Finance, General	629	39%	177
English Language and Literature, General	581	-13%	-88
Computer and Information Sciences, General	552	207%	372
Economics, General	497	-28%	-189
Criminal Justice/Safety Studies	478	0%	-2
Mechanical Engineering	407	74%	173
Marketing/Marketing Management, General	402	41%	116
Kinesiology and Exercise Science	385	97%	190
Political Science and Government, General	380	-31%	-13
Sociology	358	11%	42
Human Resources Management/Personnel Administration, General	347	Insf. Data	347

History, General	345	-40%	-234
Information Science/Studies	340	198%	226
Logistics, Materials, and Supply Chain Management	320	Insf. Data	320
Public Health, General	287	254%	206
Electrical and Electronics Engineering	284	101%	143
Labor and Industrial Relations	268	146%	159
Mathematics, General	245	9%	21
Social Work	235	36%	62
Civil Engineering, General	219	47%	70

**Figure 6: 4-year College Degree Types in the Plainfield Area**

### **BUSINESS ECOSYSTEM – PLAINFIELD AREA**

**Figure 7** enumerates the top economic clusters in the Plainfield Area. An economic cluster is a regional concentration of related industries in a particular location which make regions uniquely competitive for jobs and private investment. Clusters consist of companies, suppliers, and service providers, as well as government agencies and other institutions that provide specialized training and education, information, research, and technical support.<sup>10</sup> Top clusters are determined by a calculation that includes the following weighted industry factors: earnings, growth (controlled for overall economic growth), and regional specialization (i.e. location quotient). To be clear, this is not simply a calculation of largest industries in the area.

**Five of the top 10 clusters are specialized manufacturing.** Moreover, ranked number 11 is plastics manufacturing which is, in fact, the largest (by square footage) operation in the West End Industrial Corridor. While manufacturing employs a relatively small share of the overall working population, it accounts for the largest economic output in the region as – generally – manufacturing is a highly productive (i.e. innovative) sector of the economy (**Figure 8**). However, manufacturing in northern New Jersey, on the whole, is either shrinking or holding steady.

To the point of innovation-driven productively, the list of top clusters also includes **education, government, and healthcare provision**. These industries are not necessarily regional advantages. “Meds and Eds” have played a large role in the bifurcation of the workforce in the United States. In recent years/decades these sectors have taken on the workforce shifting away from the industrial economy, which in many respects is a positive development. However, these sectors – relative to the manufacturing and related sectors – tend to pay less, require few specialized skills and do not drive economic output (i.e. productivity) (**Figure 9**). High productively jobs are the source of high paying jobs. Moreover, NJII has completed similar

<sup>10</sup> The U.S. Cluster Mapping Project, [www.clustermapping.us](http://www.clustermapping.us).

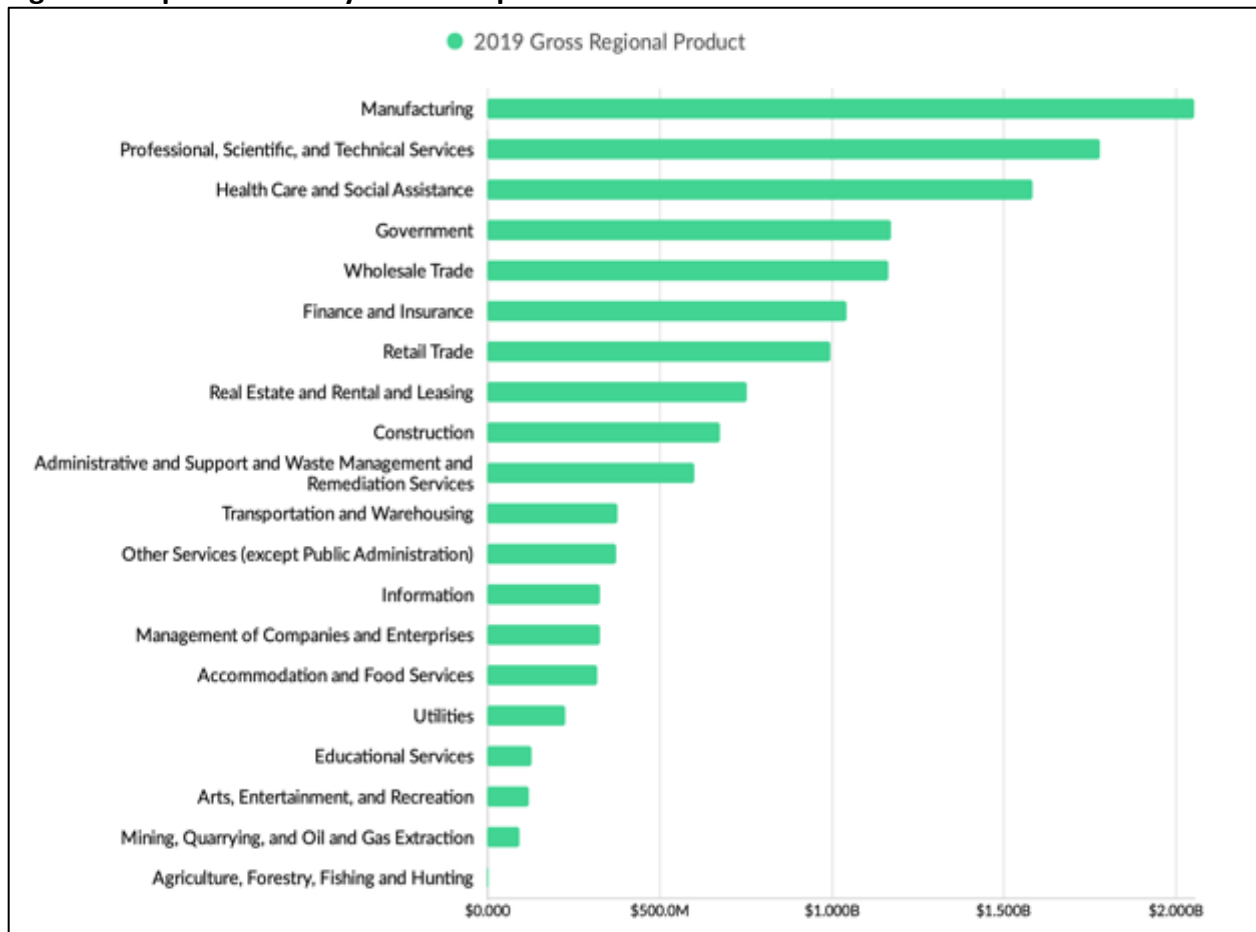
analyses is other parts of New Jersey and these same clusters (education, government and healthcare) are typically in the top 10 list. This is primarily because NJ is the most densely populated state in the US and all communities require these provisions. As such, these sectors are not necessarily a competitive advantage for the Plainfield region. That may also be the conclusion for **Distribution and Online Commerce**. The Port of New York and New Jersey is the largest port on the East Coast. As such, there are significant warehousing, distribution, and logistics assets throughout northern New Jersey.

**Figure 7: Plainfield Area Economic Clusters (Source: EMSI, 2014-2019 Analysis, 2019-2029 Projections)**

Rank	Cluster Description	Growing or Shrinking?	10-Year Projection: Growing or Shrinking?
1	<b>Manufacturing - Medical Device</b> 339112 - Surgical and Medical Instrument Manufacturing 339114 - Dental Equipment and Supplies Manufacturing	Shrinking	Shrinking
2	<b>Manufacturing - Biopharmaceuticals</b> 325411 - Medicinal and Botanical Manufacturing 325412 - Pharmaceutical Preparation Manufacturing	Growing	Shrinking
3	<b>Manufacturing - Upstream Chemical Products</b> 325199 - All Other Basic Organic Chemical Manufacturing	Shrinking	Shrinking
4	<b>Business Services</b> This category includes 27 different and diverse NAICS codes, which reflect a varied set of "white collar support services".	-	-
5	<b>Local Education &amp; Training</b> This category has 5 unique NAICS codes. All communities require education, health and government services. New Jersey is the most densely populated state in the US. As such, it is reasonable to expect national distinctiveness (i.e. industry cluster) in this area.	-	-

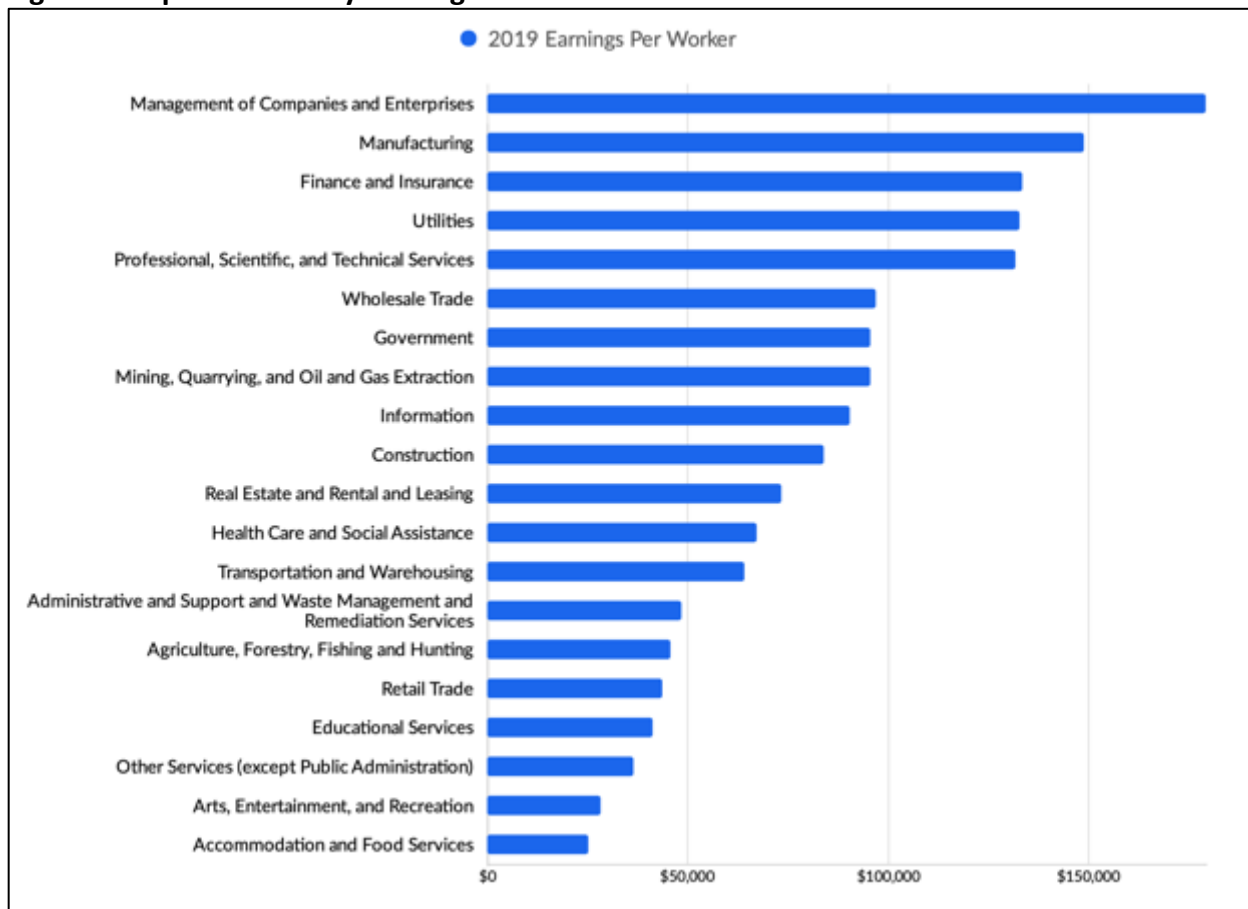
6	<b>Manufacturing - Food Processing &amp; Manufacturing</b> 311942 - Spice and Extract Manufacturing 311999 - All Other Miscellaneous Food Manufacturing 327213 - Glass Container Manufacturing	Growing	Steady
7	<b>Local Government Services</b> This category has 1 unique NAICS code. See "Local Education & Training"	-	-
8	<b>Distribution and Online Commerce</b> The Port of New York and New Jersey is the largest port on the East Coast. As such, there are significant warehousing, distribution, and logistics assets throughout north New Jersey.	-	-
9	<b>Manufacturing - Paper &amp; Packaging</b> 322212 - Folding Paperboard Box Manufacturing 322220 - Paper Bag and Coated and Treated Paper Manufacturing 322291 - Sanitary Paper Product Manufacturing	Shrinking	Steady
10	<b>Local Health Services</b> This category has 31 unique NAICS codes. See "Local Education & Training"	-	-
11	<b>Manufacturing - Plastics</b> 326111 - Plastics Bag and Pouch Manufacturing 326113 - Unlaminated Plastics Film and Sheet (except Packaging) Manufacturing 326121 - Unlaminated Plastics Profile Shape Manufacturing 326150 - Urethane and Other Foam Product (except Polystyrene) Manufacturing 326199 - All Other Plastics Product Manufacturing 339994 - Broom, Brush, and Mop Manufacturing	Growing	Steady/Growing

**Figure 8: Top Industries by Gross Output**





**Figure 9: Top Industries by Earning Per Worker**



### **STARTUP ECOSYSTEM – PLAINFIELD AREA**

The Plainfield Area does not have an established startup ecosystem. To quantify such an ecosystem, the CrunchBase database was used to define a young firm as an active company established in the last 10 years and has received investment funding in the last 5 years. Plainfield has 0 firms matching this description. Expanding the search to the Plainfield Area, 11 firms are revealed. Within this cluster of startups, 5 are related to Health Care. Thus, the location quotient of this cluster is 3.37. As such, the defined area (technically) has a relative competitive advantage (RCA) in Health Care. That is, health care startups represent a larger share of the Plainfield Area startups than the national share. However, the data set is quite small and should not be given much consideration.

More importantly, however, Plainfield resides in the New York-Newark-Jersey City MSA which has the second largest number of RCAs in the country at 269, which includes an RCA in manufacturing startups.

## IV. OPPORTUNITY GENERATION & JUSTIFICATION

Given the desire of City leadership to prioritize and amplify the industrial economy in Plainfield proper, finding specialty and advanced manufacturing as the primary economic engine of the Plainfield Area was a positive outcome of the regional economic analysis. The next step was to deepen the analysis beyond simply “advanced manufacturing” and map the potential opportunity to the stated project selection criteria.

### **Growth Enabled by High Speed Communication Technologies (HSCT)**

At the intersection of manufacturing and HSCT is the Industrial Internet of Things (IIoT), also referred to as Industry 4.0. This is the future of manufacturing – the merging of cyber and physical systems on the production floor, buildings, supporting infrastructure and supply chains. A high-wage nation like the United States can no longer compete on price and volume. Innovation-driven competition is the imperative for the future of US-based manufacturing.

Alarming, according to a recent survey, only 9% of manufacturing companies in the US are leveraging IoT – and they tend to be very large, well-capitalized companies.<sup>11</sup> (Figure 10). Small and medium-sized manufacturing companies are struggling with digital transformation, citing the following barriers to adoption of new IoT technologies<sup>12</sup>:

- Cyber Security
- Unclear ROI
- Integration
- Interoperability
- Talent

These challenges, in fact, were confirmed by the companies in the Corridor. Small and medium-sized manufacturers need help with digital

### **What is the Industrial Internet of Things?**

*The Industrial Internet of Things (IIoT or Industry 4.0) is a concept encompassing the net impact of four new technologies in manufacturing: cyber-physical systems, the Internet of Things (IoT), cloud computing and cognitive computing. Taken together these technologies are revolutionizing manufacturing by enabling a degree of flexibility and efficiency that will dramatically lower costs while increasing scale and profitability. The global market already exceeds \$100 billion as firms in most developed and developing countries invest in Industry 4.0 technologies and embrace the benefits of the transformation.*

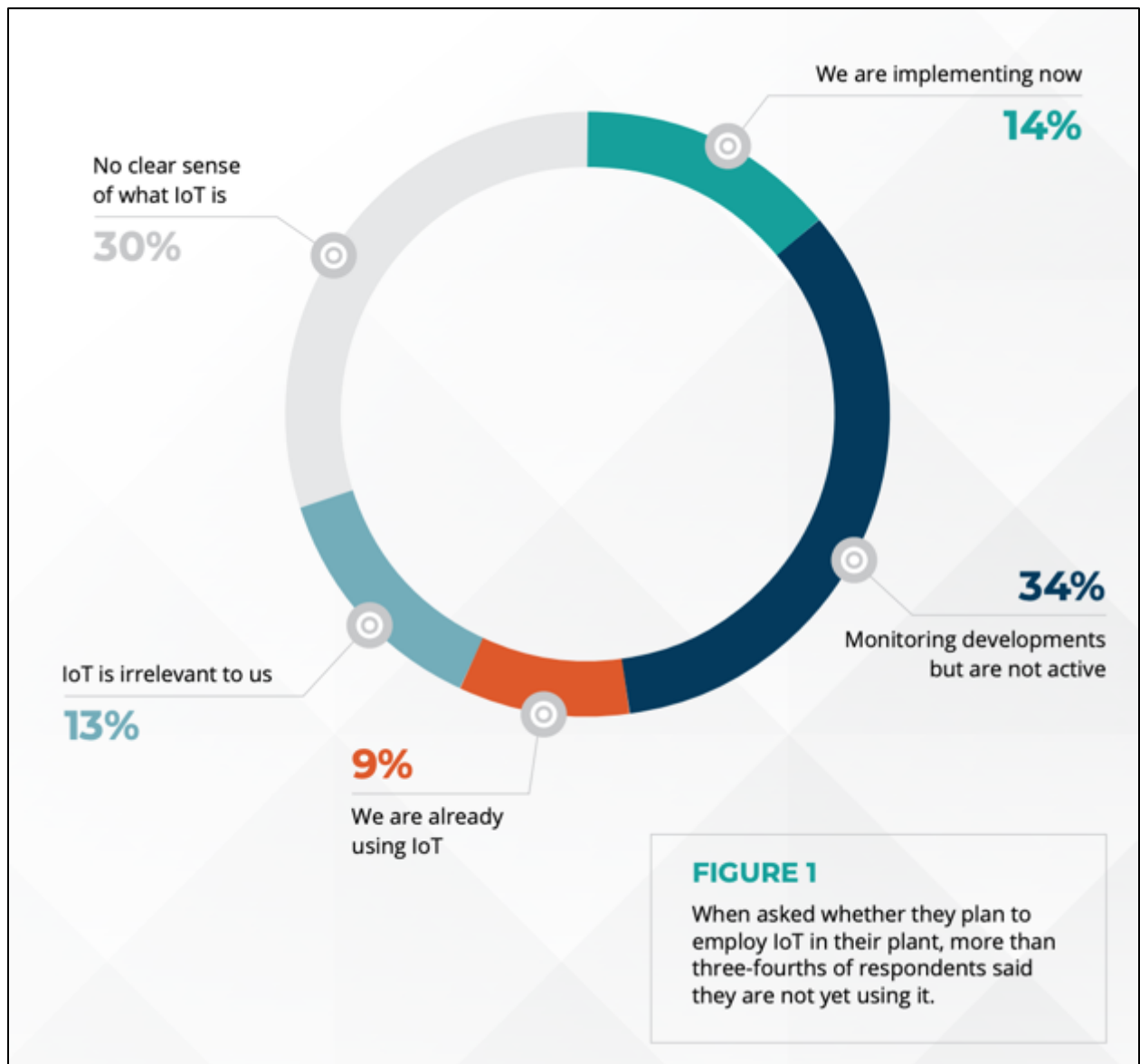


Source: BCC Research

<sup>11</sup> 2018 M&D Report, The Industry 4.0 Factor, Sikich

<sup>12</sup> Bain & Company: Beyond Proofs of Concept, Scaling the Industrial IoT

transformation. Before that can occur, however, new communication networks must be deployed to support these new digital technologies.



**Figure 10: Manufacturing Companies in the US Leveraging IoT. Source: 2018 M&D Report, The Industry 4.0 Factor, Sikich**

### **High Growth Market (CAGR > 10%)**

Targeting a sector of the economy that is growing creates the conditions for 1) new companies to enter the market 2) existing companies to grow and 3) new jobs to be created – all necessary to drive the project success criteria. The combined manufacturing, energy, and utility market in

North America for the IIoT is expected to expand to \$90B+ by 2023 with a compound annual growth rate of 29.2%.<sup>13</sup> It is important to note that while the overall theme of the Corridor is manufacturing, manufacturing is generally not a growth market in the United States. It is these technology-forward IIoT companies that are positioned for high growth and should be central to this vision.

### ***Aligned w/State Priorities***

Advanced Manufacturing is one of seven “high wage, high growth” sectors of the economy targeted by the Murphy Administration for support by the NJEDA<sup>14</sup>. As such, this initiative has an established avenue for support and engagement with the State.

### ***Enabling Ecosystem in Place***

Sound economic development strategy dictates that communities amplify assets already present in the community. An analysis of industry clusters (using 2020 EMSI data) in the Plainfield Areas reveals that 5 out of top 10 industry clusters are specialty and advanced manufacturing, including the top 3 positions. Moreover, while manufacturing ranks seventh in top industries by employment, it ranks number one in economic output – producing more than \$2B in economic activity annually. (See Section III above).

### ***Ability to Attract Established Companies***

Excess demand is present in the NJ industrial real estate market and anecdotal evidence reveals that manufacturing companies in the region are attracted to Plainfield’s relative low-cost property, access to transit and logistics infrastructure, and position between two major markets.<sup>15</sup> Using U.S. Census data, NJII found more than 14,400 small and medium-sized manufacturers in the New York metropolitan area alone. Thus, there is certainly a stock of companies in the region that may be looking for less expensive space relative to areas such as Brooklyn and Queens. Nonetheless, additional differentiation for Plainfield is needed, and should be derived by addressing market and community needs that go beyond inexpensive real estate.

### ***Ability to Attract Start-up Companies***

Start-up companies, scale-up companies, and entrepreneurs need (among other things) access to customers to validate their business plans (i.e. product-market fit) and develop business. Thus, early stage IIoT, IoT, and Smart Building/City companies would benefit from being collocated in a business corridor with potential customers and, more broadly, be part of a relatively dense manufacturing community in northern Jersey. An analysis of the CrunchBase

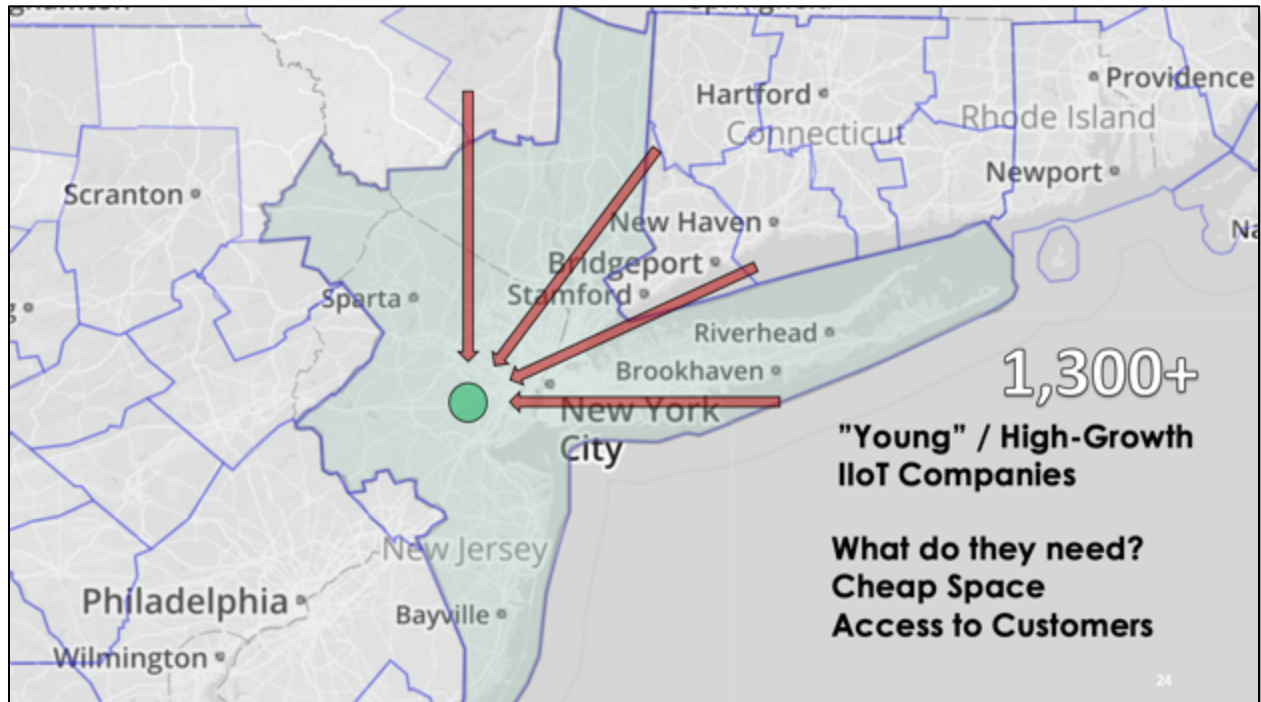
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<sup>13</sup> BCC Research

<sup>14</sup> New Jersey Economic Development Authority, “The State of Innovation: Building a Stronger and Fairer Economy in New Jersey”

<sup>15</sup> Demand Outpaces Development in New Jersey’s Industrial Market, Rebusiness Online, October 16, 2019. <https://rebusinessonline.com/demand-outpaces-development-in-new-jerseys-industrial-market/>

database reveals that within the NYC MSA there more than 1,300 IoT young start-up or scale-up companies and, in fact, the NYC MSA has a regional competitive advantage in manufacturing-related startups (**Figure 11**). Thus, there is a stock of high-growth companies that could be attracted and supported in Plainfield.



**Figure 11: Manufacturing-related Startups in the NYC MSA**

***Generates High Quality Inclusive, Employment Opportunities***

Both the IIoT and manufacturing sector are both well suited for skill development outside of the traditional education pipeline, providing opportunities to create new workforce development programming.

## V. USE CASE: CORRIDOR GROWTH OPPORTUNITY

The West End Industrial Corridor can leverage high speed communication networks, novel technology, and innovative business models to become a **21<sup>st</sup> Century industrial corridor**.

As US manufacturing transforms into the next industrial era – Industry 4.0 – what does the industrial park of the future look like? The typically suburban industrial park of the past (and present) actually pre-supposes the now well-understand concept of coworking office spaces. Manufacturers have long understood the synergies of physical colocation. However, industrial colocation stopped short of the shared services model used by modern coworking operations. These novel shared office spaces centralize services that all member businesses need, reducing cost and staffing burdens that allow companies to remain agile. This model should be applied to the industrial parks of the future. But what are the shared services for an industrial corridor?

Over 90% of manufacturing companies struggle to onboard new digital manufacturing technologies – citing barriers such as lack of digital talent, integration challenges, and – simply – they don’t understand the value. Centralizing an IIoT platform using an “as-a-Service” model, and pairing that model with a host of services, has the potential to support:

- **transformation** of Plainfield Area manufacturers into the digital future,
- **growth** of startups and entrepreneurs,
- **upskilling** of the workforce, and
- **learning** through unique educational opportunities.

Moreover, the IIoT application platform can be leveraged for Corridor-level applications such as smart-grid management, AR/VR shipping and material handling solutions, and public safety applications – just to name of few.

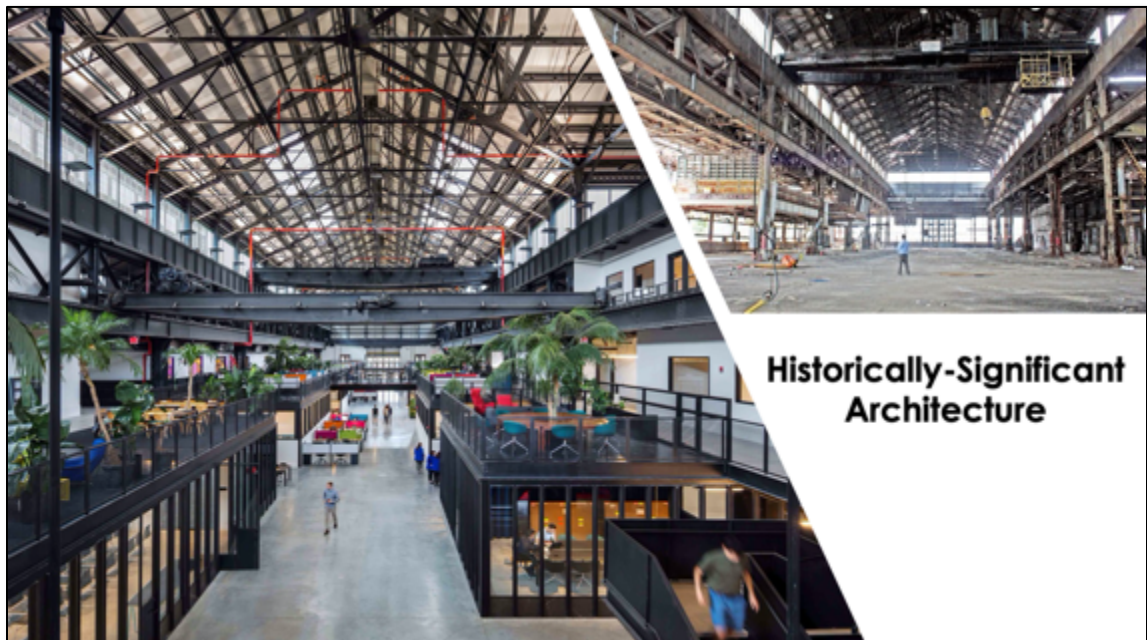
### The 4 key elements of the vision include:

- **Re-development Site: The Plainfield Urban Manufacturing Center**
- **Businesses & Community Support Programs**
- **Telecommunications Infrastructure**
- **Downtown Connectivity**

Below is an elaboration of how these elements interact with each other and the desired project outcomes.

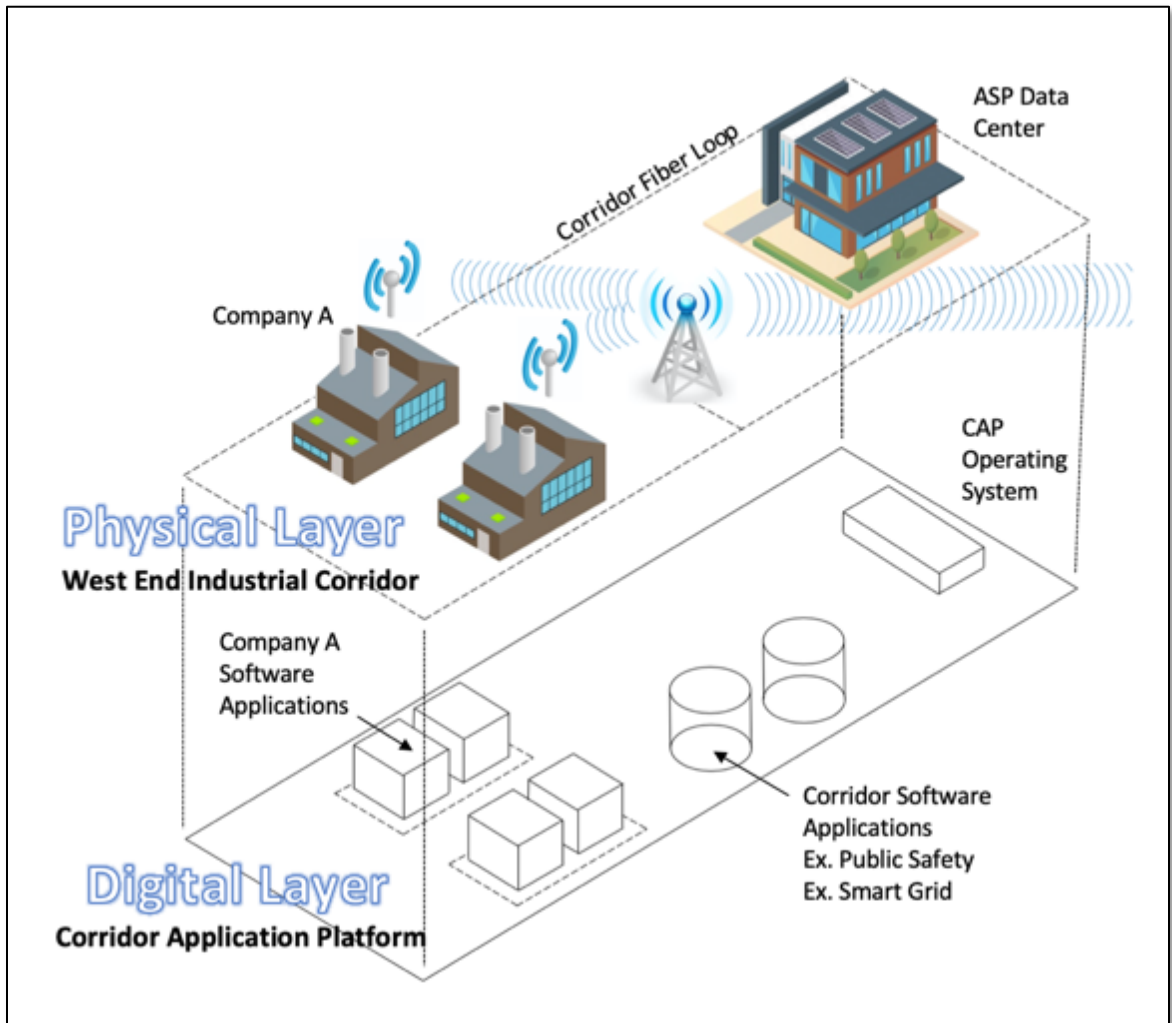
- The redeveloped **Plainfield Urban Manufacturing Center** will be the visual indicator that the Corridor is evolving into a next-generation urban industrial corridor, harnessing the trend of authentic spaces that link the past and the future (**Figure 12**).





**Figure 12: Brooklyn Navy Yard – Example of Historically-Significant Industrial Space**

- The Plainfield Urban Manufacturing Center will provide the physical to space to administer and deliver the **Business & Community Support Programs**:
  - Digital Transformation Support Center
  - Digital Manufacturing Training Center
  - Educational Programming
- Generally, a Digital Transformation Support Center 1) addresses a market need for existing small and medium-sized manufacturing companies in the Plainfield Area and 2) is an asset to attract new manufacturers to the West End Industrial Corridor.
- Specifically, the Digital Transformation Support Center offers 1) a la carte technical assistance 2) technology demonstration capabilities and 3) and “IoT-as-a-Service” to help tenants in the Corridor and the broader Plainfield Area to overcome the barrier to IoT technology adoption.
- The “IoT-as-a-Service” is a novel concept. It is an extension of the shared-services model that keeps costs low for companies in coworking or other collaborative work environments. The Corridor itself will have dedicated software application platform (the **Corridor Application Platform**), linking the physical to the digital. This centrally operated IIoT platform will offer development, integration, and support for IoT applications to the companies in the Corridor, property owners (i.e. smart building applications) and the Corridor itself.



- The Corridor Application Platform, operated by an application service provider (ASP), would provide dedicated higher speed (quality of service) connectivity through the buildout of the necessary **Telecommunications Infrastructure (See Section IV):** Meet Me Point, Wireless, Fiber, and ASP Data Center.
- The Plainfield Urban Manufacturing Center would also provide physical office space and shared administrative services (i.e. co-working) for IIoT, IoT, Smart City technology providers. The value proposition for these high-growth companies is 1) access to customers 2) a platform to demonstrate their technologies and 3) low-cost, flexible offices space (i.e. coworking element).
- A stated barrier to IoT technology adoption for small and medium sized manufacturing companies is the availability of staff with the expertise operate these technologies.



These are not traditional manufacturing skill sets; they are software, coding, and data analytic skill sets. The Digital Manufacturing Training Center would provide a skills course to train incumbent workers and create a new pipeline of talent of Plainfield Area manufacturers.

- The Plainfield Urban Manufacturing Center together with the corridor application platform would offer unique entrepreneurial education opportunities. Student challenges could be hosted to build applications for the corridor application platform. Startups need cheap labor. A program could be developed to pair startups with student interns, exposing students to the culture of entrepreneurship. Expansion of entrepreneurship education programs could also occur, co-located with actual entrepreneurs.
- The overall vision for the West End Industrial Corridor should include a **car-free transportable solution** linking the West End Industrial Corridor to the Downtown area. This could include relatively inexpensive solutions such as bike-share or scooters (i.e. micro-mobility) or, on the other end of the spectrum re-development of the idled NJ Transit station on the West End.
- Consider the West End Industrial Corridor a smart city pilot project. The basic architecture of this solution is scalable to other areas of Plainfield. Sees **APPENDICES G and H.**

## **VI. FULL TECHNICAL REVIEW**

### **DISCOVERY: SURVEY OF CURRENT TELECOMMUNICATION ASSETS RELEVANT TO WEST END INDUSTRIAL CORRIDOR**

The City of Plainfield has three dark fiber providers currently deployed within a portion of the City's footprint: Zayo, Altice USA, and Crown Castle. There is likely some limited fiber present from AT&T and Verizon, but these legacy service providers generally have small fiber counts, limit access to their fiber and likely only transit to areas that meet a sizable revenue opportunity for the service requirements of a large commercial user. (See the Section "Plainfield Addressable Market")

Zayo is a nationwide fiber provider and follows the tracks of the NJ Transit railroad on the Raritan Valley Line through Plainfield. The color of Zayo's fiber route along these tracks is dark red in **Figure 13** and very likely has no splice boxes for access along this transit path. This may be of interest since it is parallel and in close proximity to both the Plainfield and Netherwood train stations. There may be a willingness for Zayo to provide an access splice box to accommodate a new service given there is a potential revenue opportunity for them. Unlike Zayo, the other two providers are local and they likely have within-City splice boxes for access based on their fiber footprint that includes a number of lateral fiber runs (**Figure 13**).

Altice USA, Inc., commonly known as Altice, is an American cable television provider with headquarters in New York City and their fiber is represented in blue in Figure 13. Given their CATV (community access television) commercial focus, they are likely not an ideal fit for a business development opportunity.

The third provider is Crown Castle and their fiber assets are represented in green. Crown Castle also operates a cell tower within the Development corridor at 900 South 2<sup>nd</sup> Street (**Figure 13**). The tower provides full point of service delivery for AT&T, T-Mobile, Sprint PCS and Verizon and has additional space for other future services. The tower itself is owned by a local company called the Plainfield Realty Association. Crown Castle is a good potential candidate for network and business expansion since they appear to have the most sizable fiber footprint in Plainfield, and their fiber is approximately 1300 ft. from their cellular tower but is currently not connected to the tower.

A PSEG utility substation is located at Clinton Ave. on one end of the development corridor. This is not a telecommunication asset. However, energy efficiency and energy management of central concerns to IIoT, IoT, and Smart City/Building Management. There is both easy fiber access to this location (and PSEG poles) plus room to drop a small wireless tower which could serve the corridor or the surrounding area. PSEG also has a Smart City and demand management program that could benefit companies located in the corridor to help lower their energy costs during peak and off-peak hours. Furthermore, an IoT sensor could possibly be located at the PSEG substation to provide real time energy consumption data to the

community, or an IoT sensor could be located at Injectron (and other renewable locations) to report real-time energy consumption/generation of renewable energy resources within the Corridor Community



**Figure 13: Fiber Routes in the West End Industrial Corridor**

#### **PLAINFIELD ADDRESSABLE MARKET**

Market research, leveraging data analysis by Blue Ridge Advisory Services, showed that the City of Plainfield mobile services market (3G, 4G, 4G LTE, etc.) today is relatively small at \$22M and expected to grow to \$28M in by 2028. For perspective, Carriers have expressed interested in expanding 5G into the Newark, NJ market which is estimated of \$124M. As, it unlikely that 5G connectivity would be organically deployed in the Plainfield Area in the new future.

#### **HIGH LEVEL DESIGN CONSIDERATIONS**

- *Future Proof:* The West End Industrial Corridor network will have different stages of development. There will be an early stage where stakeholders partner, develop a mutual benefit business plan, and make the first investment to ignite organic market traction, followed by an interim stage and later stages. At this early stage the technical approach should be to provide the most efficient and inexpensive design to create viability for the stated vision. However, the full solution should allow for scalability as early success lead to addition demand on the system. Simply put, the solution should be future proof.

- *Citizen’s Broadband Radio Service*: The design is based on the ability to leverage CBRS. Citizens Broadband Radio Service (CBRS) is a 150MHz wide broadcast band of the 3.5 GHz band (3550 MHz to 3700 MHz) in the U.S. In 2017 the FCC completed a process, which began in 2012, to establish new rules for the commercial public use of this band, while reserving parts of the band to protect the radar and aircraft communications of the US Navy. On January 27, 2020 the FCC authorized full use of the CBRS band for public-private commercial wireless service use, with certain restrictions to prevent interference with military use of the spectrum. For example, under the new rules, commercial building owners and real estate developers might use CBRS to deploy their own private in-building and on-developments wireless networks for use by its tenants and visitors to support their on-site wireless cell phone and broadband connectivity needs including 5G, all this without the need to acquire expensive dedicated spectrum licenses through the FCC.
- *Community-Driven*: Top-level designs for the Corridor must follow a citizen-centric (business, residential and instructional) philosophy, including guidelines for integrating City policy with a transformative model for public, private, public-private sector (the Stakeholders) investment and operations when appropriate. In other words, the best outcomes come about when citizens and businesses are engaged collaboratively in the design, provisioning, funding and delivery of the West End Industrial Corridor.
- *Private-Sector Funded*: Recommended a solution that can deployed, if necessary, without taxpayer investment. Nonetheless, public sources of funding should be leverage, if possible, to unlock private funding.

## TECHNICAL SOLUTION

The core elements of the technical solution are a **1) Application Service Provider (ASP)** that owns and/or operates a **2) private on-development fiber-wireless network** together with a **3) Corridor Application Platform**. This solution will support Corridor tenants and visitors with their on-site wireless broadband connectivity needs including on premise private 5G networks.

The recommended solution requires the following hardware build elements:

- Meet Me Point
- Wireless Network
- Fiber Buildout
- ASP Data Center

To reiterate the “early stage/late stage” design approach, all equipment should be installed as part of the Corridor redevelopment, however, some equipment – namely the hardline fiber – will remain inactive until needed.

### Wireless Connectivity Overview – Early Stage Solution

This early stage, fully wireless solution will source 1-10 Gbps of internet bandwidth from the fiber networks in a new Meet Me Room at 200 West 2nd Street. That internet signal goes via building fiber to a millimeter wave licensed radio and small dish antenna on top of the Meet Me Point building. That antenna points directly toward the Crown Castle tower within the Corridor at 900 2nd Street, which also has a millimeter wave licensed radio and small dish antenna. From the Crown Castle tower, individual 1 Gbps wireless connections (5Ghz non-licensed spectrum) beam to individual wireless subscriber units (i.e. Corridors tenants/users).

### Meet Me Point Detail

A municipal building located at 200 West 2nd Street in downtown Plainfield has been selected for the Meet Me Point based on ease of access (it is a publicly owned building), height, and proximity to existing telecommunication providers (Figure 14).

A Meet Me Point is a convenient location for different fiber networks to cross connect. This is location that, ultimately, connects the Corridor network to the Internet. Like a train station that exchanges passengers at a station, a Meet Me Point exchanges data packets between different fiber networks for local distribution. A Meet Me Room (MMR) is the location within the Meet Me Point building where a fiber patch panel and supporting equipment are located. The selected location in the building for the MMR should be centrally located and have easy access to the building risers from the ground floor to the roof.

Moreover, consideration should be given to future expansion at this stage. Namely, the space for the actual MMR should provide space to install future hardware and each of the build floors should have panels for horizontal extension to potential future tenants. As the need for services grow within the community, the Meet Me Building can be used expand network capability. Tenants and users of an MMR can include internet service providers, local exchange companies, cable companies and e-commerce companies. Since the MMR can distribute traffic at a low cost, large, high-bandwidth users such as hospitals and universities can also benefit. This Meet Me Point building with fiber and wireless nodes will become a network aggregation point that will allow for Smart City expansion across Plainfield.

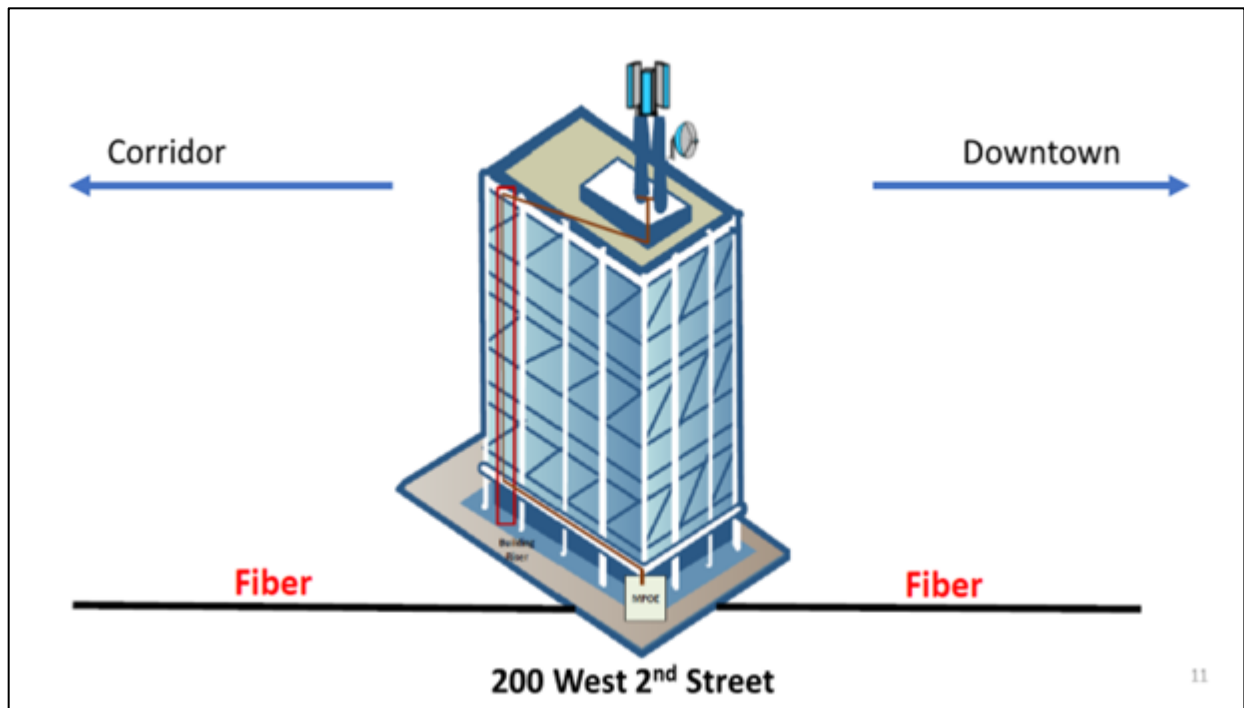
A millimeter wave licensed radio and small dish antenna on top of the Meet Me Point building will transmit to the Crown Castle tower in the Corridor at 900 2nd Street, which also has a millimeter wave licensed radio and small dish antenna. Note, the cost of roof-top and tower equipment is capture in the wireless equipment cost summary.

**Business Model Considerations:** The stand-alone, carrier-neutral data center can be privately owned or leased for 15-30 years by the operator. Another option is to be a tenant in a larger carrier hotel on a 5-year lease. Operated by building management, Meet-Me Rooms are never stand-alone facilities. Found in carrier hotels, they are normally directly under a management contract with another firm.

Legal Considerations: There are permitting considerations for the wireless connectivity elements of the Meet Me Point. Crown Castle, the owner of the existing cell tower, is a private actor and, as such, would not require permitting assuming the tower is structure sufficient to support the addition hardware. This assumption is supported by the NJII survey. However, a permit from the City of Plainfield would be necessary to erect a tower on top of the Meet Me Point.

#### Cost Summary

Meet Me Room Build Out	Cost
<b>Budgetary Total</b>	<b>\$20,000</b>
Low Range	\$10,000
High Range	\$30,000



**Figure 14: Meet me Point at 200 West 2nd Street**

#### Corridor Tenant/User Connectivity

In this early stage, the end to end customer connection is purely over a wireless network via small cell Gigabit wireless access points (**Figure 15**) together with a Smart Node mounted on the customer's private property (**Figure 16**). The traffic is managed on a symmetrical 1 Gbps connection.





**Figure 15: Small Cell Gigabit Wireless Access Points**



**Figure 16: Smart Nodes**

The purpose of the Smart Node is to extend connectivity and IoT capabilities outside of the customer premise. This can serve the area around the building such as walkways, loading, inventory or parking areas. System integrators and solution providers can easily extend Smart Node capabilities via simple integration with third party devices, to provide on premise smart-lighting, waste management metering etc. Third party devices include IoT gateways (e.g. LoRa,

ZigBee, Wi-Fi, Bluetooth, etc.) computing systems for analytics, storage, cyber security gateways and more.

Today there are only a small set of vendors whose equipment has passed both FCC and SAS requirements and that can be legally acquired and deployed for a CBRS network. As such, costs are still at a premium but will be falling drastically over the next 12 months. As example, a recent turnkey CBRS trial project consisting of a single \$15,000 radio, \$6000 in labor, \$2500 on consumable parts and a demo account for SAS access was delivered for \$23,500. Note, however, this example is a tower deployment.

#### Business Model Considerations:

The Corridor building owner or tenant would likely lease this equipment from the ASP. In this scenario, the cost of installation would be incurred by the ASP and recovered by leasing and services management fees.

#### Legal Considerations

Because the small cells would be located on private or utility towers, and on each individual Corridor buildings, a traditional city-based small cell attachment process would not be needed. Nonetheless, the usual permitting process for any possible structural changes (required for mounting) to a Corridor building would be required.

#### Cost Summary

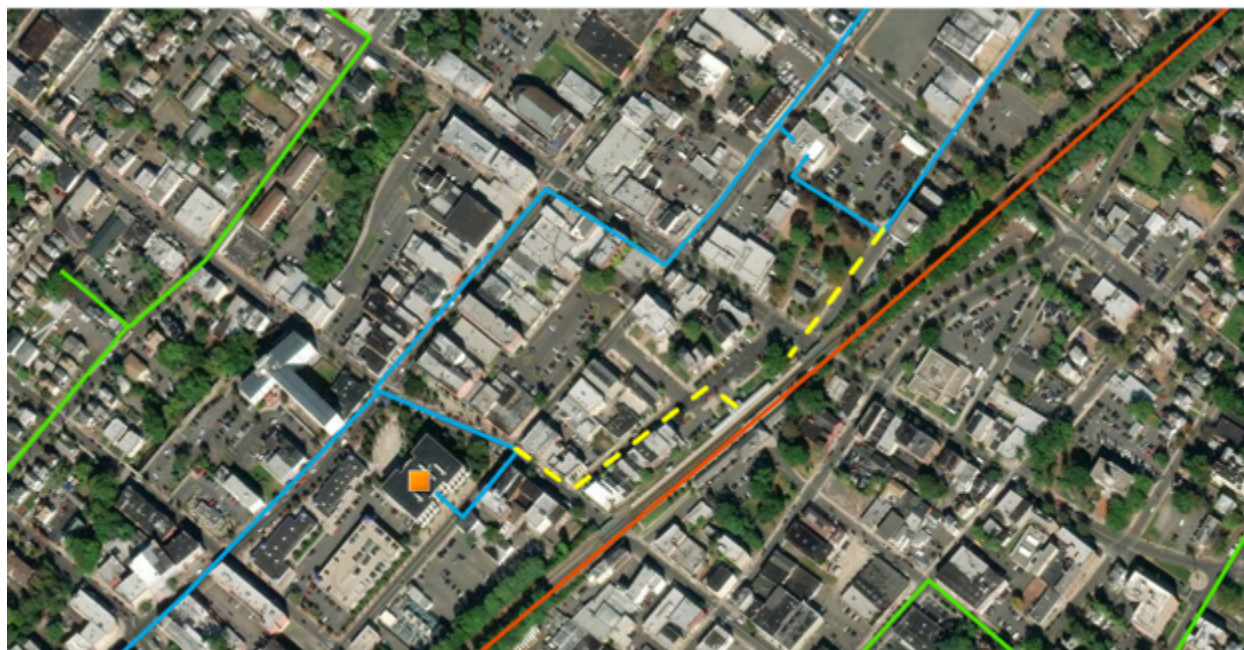
Technology	Cost
Meet Me Point (Wireless Element)	\$ 15,000.00
Backhaul Radios	\$ 40,000.00
5 Smart Nodes	\$ 7,500.00
5 Subscriber Units	\$ 20,000.00
<b>Budgetary Total</b>	<b>\$ 82,500.00</b>
Range Low	\$ 77,500.00
Range High	\$ 107,500.00

#### Later Stage – Hybrid Fiber-Wireless Connectivity Overview

Eventually the early stage solution will be overtaxed as demand for services increases, and hardline fiber will be needed to boost bandwidth. This fiber, however, should be installed during the redevelopment and remain inactive until needed. This effectively is “future-proofing” the Corridor development. The later stage solution is 10 Gbps, or more, of internet bandwidth sourced from the fiber networks inside the Meet Me Room at 200 West 2nd Street. That internet signal cross connects to the existing Altice fiber in the Meet Me Building (blue – **Figure 17**) which then makes its way to Clinton and 2nd Street along existing Altice fiber on West Front Street where it would be spliced to the proposed fiber, (yellow) and then make its way down Clinton Ave to 2nd Street where a fiber lateral connect to the Crown Castle Tower.



The end to end customer connection remains a wireless network and has a symmetrical 1 Gbps (or higher – 10Gbps) connection.



**Figure 17: Aerial View of Fiber Routes**

#### Proposed Fiber Build Out Details

The new proposed aerial fiber (yellow dashed lines) would run the length of South 2nd Street, Clinton Ave (within the Corridor), and along West Front Street perimeter of the Corridor. This new fiber will provide connectivity along the new route and connect to a new fiber splice point at either intersection.

In reference to **Figure 18** below, the location depicted by a yellow circle on the map is for placing a splice box which will enable splicing into existing Crown Castle aerial fiber at the intersection of Clinton Ave and South 2nd Street and allow fiber pairs to be attached from a new fiber build. There is also the option to create a second splice location in the Front Street and Clinton Ave intersection depicted by a white circle on the map that could operate as a ring connecting 2nd Street proposed fiber and introduces another potential splice location for Altice fiber to connect.

#### Business Model Considerations:

The private Corridor fiber network, including the connection to Meet Me Point, could be financed as part of the Plainfield Urban Manufacturing Center building redevelopment, led by a real estate developer. Future ownership and management of the private network would be negotiated between the ultimate building owner and the ASP. As a revenue opportunity, the owner of this new fiber could offer as a lease to other service providers or to local businesses to extend connectivity between their own businesses along the new fiber route. This new fiber

build could also be used to augment the wireless coverage for the area and allow the introduction of new access points while creating redundancy and a more robust service level offering.

#### Legal Considerations:

Installing this fiber will require permitting from the City of Plainfield.

#### Fiber Cost Summary

Fiber Runs	Start Point	End Point	Distance	Cost
2nd Street	Hazelwood	Grant	1.4	\$ 54,600.00
Front Street	Jefferson	Clinton	0.99	\$ 38,500.00
<b>Total Cost</b>				<b>\$ 93,100.00</b>



**Figure 18: Proposed Fiber Routes with Splice Boxes**





**Figure 19: Application Service Provider & the Corridor Application Platform**

The private on-development network would be operated by an application service provider (ASP), providing connectivity, higher speeds, and higher quality of service (QoS) for the time dependent industrial applications in the Corridor. More important, however, is the ASP’s provision of “IoT-as-a-Service”. The discovery phase of this project revealed several barriers for onboarding IIoT technologies (**Figure 19**). The ASP services as a platform to from small and medium-sized manufacturers to outsource the onboarding and management of an IIoT platform, leveraging this shared-services model to reduce the cost of these new technologies. Moreover, the ASP brings the IIoT expertise to help manufactures identify IIoT use cases, design and build solutions, and support those solutions. Taken together, the ASPs reduces cost, knowledge, and talent barriers to the adoption of IIoT technologies.

The IoT application would not be limited to the businesses themselves but would extend to entire the development – enabling a Smart Industrial Corridor. The ASP would manage this array of IoT applications on the Corridor Application Platform, which is effectively an operating system for the Corridor (Figure 19).

#### Business Model

The costs associated with the ASP would likely be incurred by the ASP itself, though the redevelopment financing vehicle could be used to the make the investment in necessary equipment. Ultimately, the ASP would be responsible for creating a sustainable revenue model out of the “IoT-as-as-Service” vision.

### Legal Considerations

This equipment would be a privately held business asset.

### Cost Summary

*Note: This solution assumes that the ASP (and the necessary data center equipment) is located on the Corridor and, moreover, would be located with the new Plainfield Urban Manufacturing Center.*

Technology	Cost
Networking	30,000
Servers	20,000
Software	80,000
IoT-IIoT Devices	20,000
Misc. Hardware	5,000
<b>Budgetary Total</b>	<b>155,000</b>
High Range	250,000
Low Range	55,000

### LIST OF POTENTIAL VENDORS

<b>Outside Plant, Poles, Duct and Fiber</b> <a href="#">JDH Contractors</a> <a href="#">Wolfline Construction</a> <a href="#">CTS</a> <a href="#">Ervin Cable Construction</a> <a href="#">Ariel Construction</a> <a href="#">Nebcon Inc.</a> <a href="#">BHC Rhodes</a>	<b>Wireless Technology</b> <a href="#">Siklu</a> <a href="#">Ubiquity</a> <a href="#">AirSpan</a> <a href="#">Radwin</a>
<b>Wireless Integrators</b> <a href="#">Word Wide Technology</a> <a href="#">Let's Think Wireless</a> <a href="#">Five Nines Wireless</a>	<b>ISP/WISP</b> <a href="#">GigXero</a> <a href="#">Elite Fiber System</a>

## VII. NEXT STEPS

At this early stage of strategy development, it is important to understand the solution developed during Phase 1 as a **community-informed, data-driven hypothesis**. As such, critical next steps should include a clear statement of assumptions and stakeholder engagement efforts to validate those assumptions. These activities will not only lead to a sound business and revenue model, they will cultivate along the way the necessary partners and stakeholders.

**Objective:** Deepen understanding of stakeholder needs, assets, and motivations

**Potential Activities:**

- Press Release/Press Conference and release of a RFI (request for information)
- Direct, 1:1 customer discover targeting the following:
  - Established Manufacturing Companies
  - High-Growth IIoT and IoT Entrepreneurs, Start-Ups, and Technologies
  - Real Estate Developers
  - Existing Technology Demonstration Centers
  - Existing Digital Transformation Program Providers (local, state & national)
  - New Jersey Economic Development Authority
  - Neighboring Municipalities

**Objective:** Validate the demand (i.e. market opportunity) for 1) the services offered by the ASP 2) for coworking and 3) community support services, while also building energy and momentum toward the realization of the vision.

**Potential Activities:**

- A pilot project to test the assumptions made during phase 1. This is not research. This project would be time constrained (90-120 days) and designed to engage the key stakeholders included in the Phase 1 vision. This could include, for example, a Pitch Day that brings together IIoT technology providers and Plainfield Area manufacturing companies.

**Objective:** Hardening the Investment Prospectus

**Potential Activities**

- Site Selection: Plainfield Urban Manufacturing Center
- Development of Business and Revenue Plan

**Duration: 4-6 Months**

## **APPENDIX A: PROJECT NARRATIVE & WORK PLAN**

**Project Narrative & Work Plan  
Innovation Planning Challenge Grant  
Smart City Technology Needs Assessment for Underutilized and Vacant Properties in the City  
of Plainfield**

### **PROJECT OBJECTIVE**

Recommend technology HSCT (high-speed communication technology) improvements for a select number of Plainfield properties in the designated Development Corridor that would attract new companies to underutilized properties and meaningfully enhance their competitiveness in a to-be-identified target growth opportunity – enabling these new companies to offer high quality, inclusive employment and educational opportunities to Plainfield residents. Workforce needs within the identified target market will be identified.

**Timeline: October 28<sup>th</sup>, 2019 – March 28<sup>th</sup>, 2020**

### **OUTCOMES**

<b>Success Characteristic</b>	<b>Metric</b>
Diversify the Plainfield economy, adding well-paying commercial and industrial jobs that support long-term career paths	New Businesses Middle/Upper Income Jobs Decrease portion of tax revenue from single-family homes (currently 80%) Increased commercial and industrial tax revenue Increased property utilization (of existing commercial and industrial buildings)
Attract a new demographic to Plainfield: middle/upper-class residents including the millennials and empty-nesters already interested in living in an urban environment (i.e. “non-school impacting”)	New residents filling the new housing units (primarily rental)
Jobs created are inclusive of the diverse education levels of the workforces in Plainfield	Availability of middle skill job opportunities Internship, apprenticeship, and co-op opportunities

*Note: These characteristics were articulated together with the City of Plainfield leadership on a 5-year timeframe. As such, they are intended to serve as project principles to inform the trajectory of this project. However, success of this NJII project will not be judged using these*

*criteria. The commitment of NJII is limited to the stated in the New Jersey Innovation Institute (NJII) Proposal Response.*

## **TARGET DEVELOPMENT CORRIDOR**

See APPENDIX 1 for maps and aerial photographs.

### **Project-Level Risks**

- *Scope: Target Properties* - The properties housing the businesses engaged (to-date) in early planning stages of this grant are not contiguous, creating an irregular definition of the development corridor.
- *Commitment of the Business Community* - Early conversions with select individuals at the private companies targeted to be engaged in the project reveal that these business may not have full knowledge of vision of the planning grant and, the level commitment to the project by these businesses is not clear at the onset. Additional unplanned activities have been added to the project scope for the purposes of coalition building, which is necessary for success.

## **WORK PLAN OVERVIEW**

### **PHASE 1:**

The first phase is primarily stage setting. A shared vision of the future, by the NJII team and project sponsors, is critical to orient the activities of the planning effort. The input from this phase will be used to refine the activities and deliverables of Phases 2 and 3 of the project. Moreover, there is some foundational context setting that is necessary such as understanding community demographics and current economic planning activities that should inform the NJII work.

#### *Phase 1 Core Activities*

- Strategy Session 1
- Initial Site Visit
- Plainfield Demographic Research

#### *Phase 1 Deliverables:*

- Annotated Bibliography: Plainfield Economic Development Strategy Documents
- Plainfield Demographic Summary



- Strategy Session Summary: Articulated Objectives & Outcomes, Phase 2 and 3 Work Plan
- Refined Project Scope (as it relates to the geographic boundaries of the report)
- Property Location Map

## PHASE 2

### *Description*

This planning activity, generally, has five key elements combining desktop research; analysis and design; onsite technical surveys; and community engagement:

1. Local Business Engagement
2. Research & Analysis: Opportunity Generation
3. Research & Analysis: Smart Corridor Research
4. Technological Survey & Design
5. Stakeholder Workshop
6. Workforce Research

After the planning phase (Phase 1), the work logically breaks down into two phases, split by the Stakeholder Workshop (**Figure 20**).

This second phase will launch the Elements 1-4 (above) in parallel. The early work of Phase 2 will have an outsized focus on engaging the businesses located in the Development Corridor to understand the level of engagement and expectations of this important group of stakeholders. While this constituency is certainly not the only set of important stakeholders, they will be directly impacted by outcomes recommended by this effort. Thus, the conclusion of this early work will have significant impact of the trajectory of the project. For example, with a core group of businesses energetically engaged, the focus of the work can be on collective action that could have a direct impact on these businesses. Alternatively, if the companies have limited capacity to engage, or finding a common set of interests becomes a challenge, this project can focus on repositioning an individual or set of vacant and underutilized structures that would not require the direct cooperation of businesses in the Development Corridor.

Elements 1 and 2 will have a direct impact on the agenda of the Stakeholder Workshop. The outcomes will this session will interact with the smart corridor application research (Element 3) and the technical design (Element 4) to generate final recommendations. Moreover, the target opportunities will trigger the workforce development research (Workshop 5).

### *Phase 2 Core Activities:*

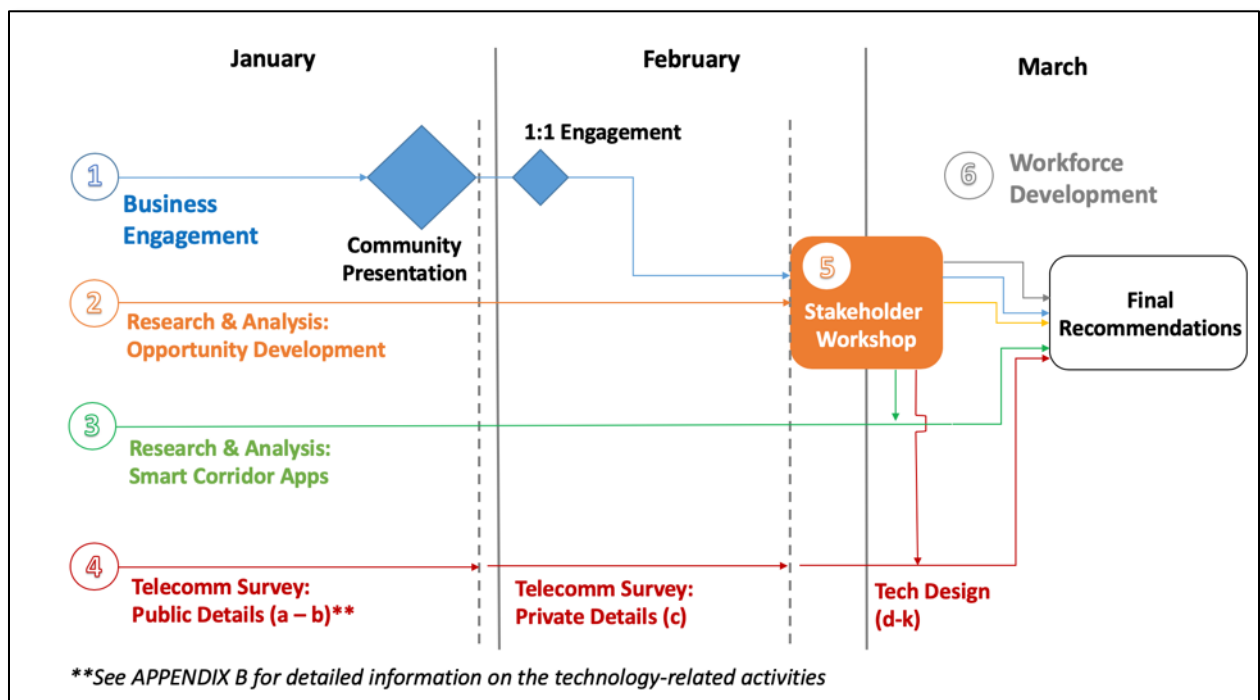
- Engage businesses in the development corridor

- Set date and start preparations for the Stakeholder Workshop
- Create and approve (by CoP leadership) the opportunity selection matrix
- Research: opportunity generation
- Research: smart corridor applications
- Technical survey of existing telecommunications infrastructure
- Complete Midpoint Report: Due January 17, 2020

*Phase 2 Deliverables:*

- Business engagement summaries
- Approved Selection Matrix
- Workshop Research: List of potential opportunities
- Mid-Point Written Report

**Figure 70: Phase 2 and 3 Work Plan Overview**



## PHASE 3

### *Description*

The core activity anchoring this phase is a stakeholder workshop. This collaborative, structured workshop will be used to prioritize a set of growth propositions that could create the organizing theme for the Smart Corridor. The participants in this workshop are ideally the full representation of stakeholders impacted by this project.

After the Stakeholder Workshop, the multiple work streams begin to converge. The output of the workshop – a target theme – will inform and enable specificity to the both the Smart Corridor application research and the technology design. Moreover, the identification of the theme will then trigger the research into the workforce needs of the market (or markets) within that theme.

### *Phase 3 Core Activities*

- Workshop 1
- Finalize Research: Smart Corridor Applications
- Technical Analysis & Design
- Research: Workforce Development

### *Phase 3 Deliverables:*

- Workshop Summary: Prioritized opportunities
- Final Report generation
  - Recommendations: Target theme and applications within that theme
  - Recommendations: Workforce needs within the target theme
  - Recommendations: High speed communication technologies to enable the target theme (See Appendix 2)

MAPS

Figure 21: Project in the Context of the City of Plainfield

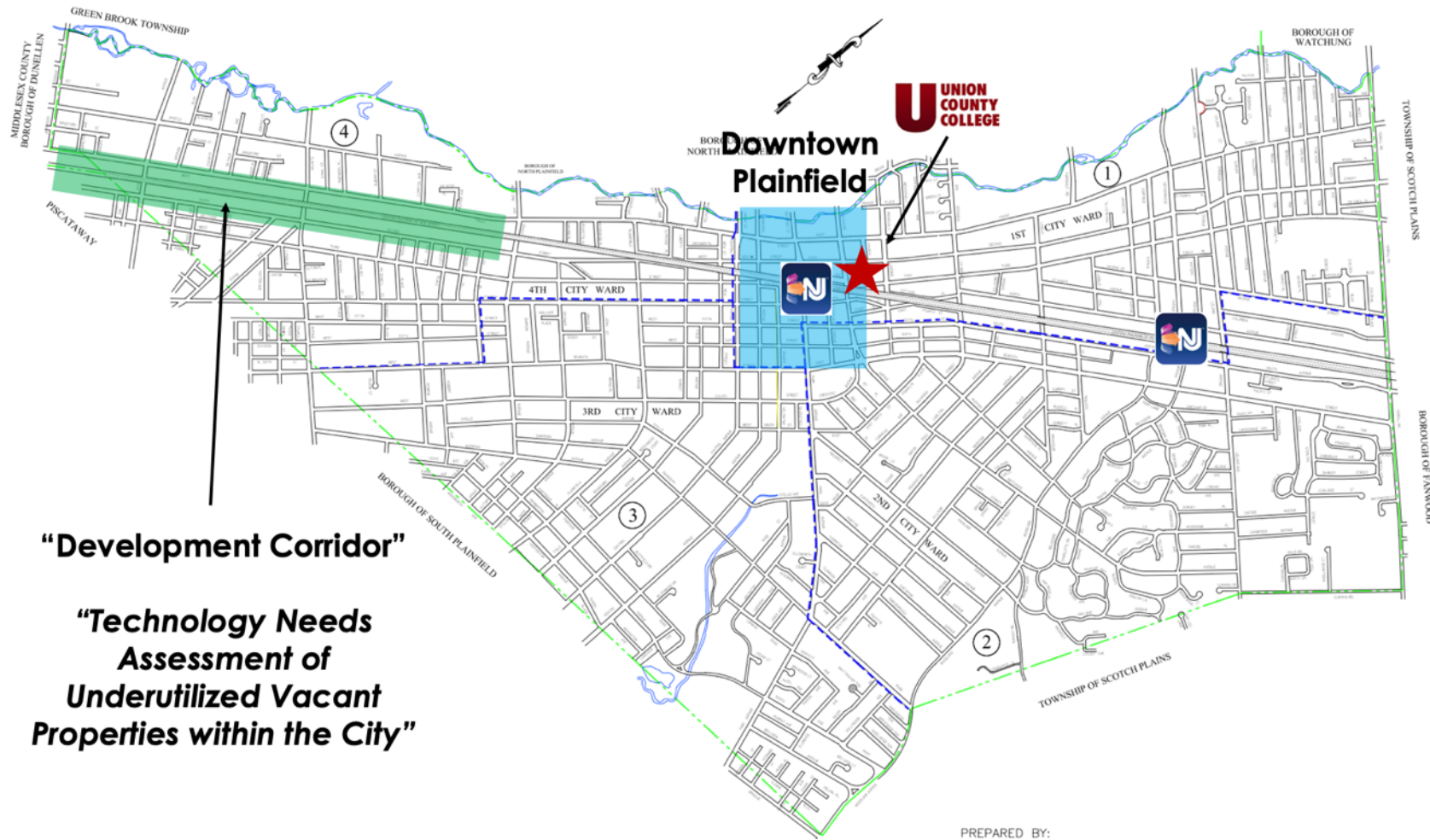


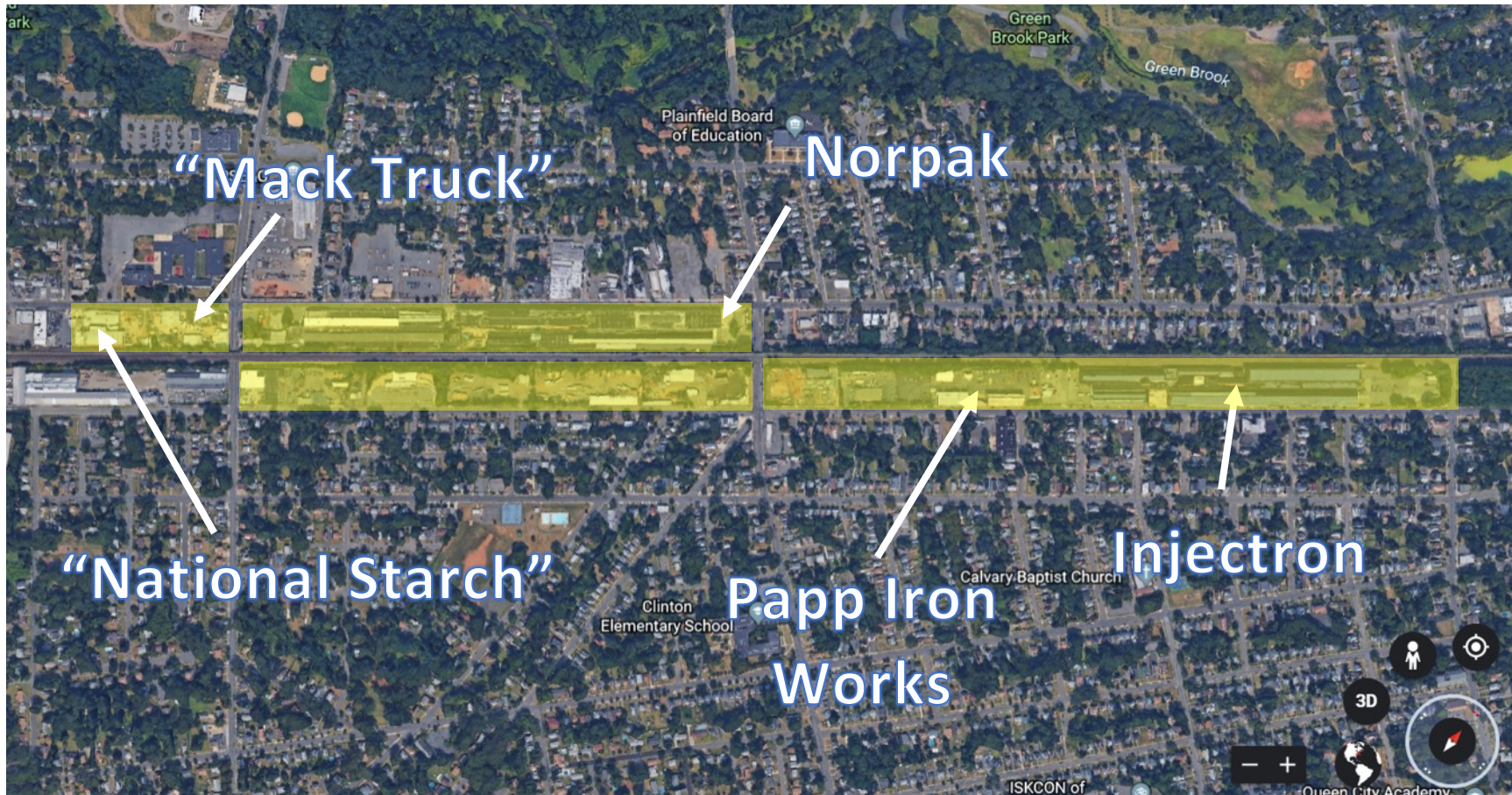


Figure 22: Development Corridor Footprint // Property Location Map





**Figure 23: Business Locations within Development Corridor // Property Location Map**



## TECHNOLOGY TIMELINE AND SUMMARY SOW – INEIGHBORHOODS

- a) Plainfield confirms development area boundaries
- b) General walkout of Plainfield to begin
  - a. Start with City Planning and go from there.
  - b. December 17<sup>th</sup> and 18<sup>th</sup> are currently available.
- c) Plainfield sends Interview/Walkout Request letter
  - a. Individual building interviews and walkout Dates to be confirmed by Mike Van Ter Sluis
  - b. Plainfield notifies “building managers”, provides NJII- iNeighborhoods with walkout info.
  - c. Walkout letter requests interview, access to grounds and telephone closets.
- d) Evaluation of wireless technologies
- e) High level fiber design
- f) High level wireless design
- g) Cost range for e) and f)
- h) Legal review
- i) List of companies capable of responding to a new RFP
- j) Implementation schedule
- k) Draft report to NJII team

NOTE: High level SOW from the NJII RFP response below. I have added comments in italics and bold to stress the high-level assessment nature of the project and to provide additional clarification for the actual iNeighborhoods SOW.

NJII is proposing a planning project leading to a full technology assessment that will identify appropriate underutilized and vacant commercial and vacant structures that should be a part of the study in the **development corridor identified by the City of Plainfield**. The assessment will include recommendations **on what if any** high-speed connectivity technology that can be installed in the City.

It will evaluate the potential of mobile wireless, fixed wireless; “small cell” nodes, lower frequencies that offer wider coverage, or all **as appropriate** within the location and/or corridors of the city (***the development corridor***) for the appropriate high-speed connectivity technology within the commercial and industrial areas – *the development corridor*.

The assessment will also **suggest high-level design guidelines (*high-level reference design, fiber and wireless*)** that should be utilized and then provide a **cost estimate range** and implementation schedule for the installation of high-speed connectivity technology.



Identify any legal requirements for installation of high-speed connectivity technology, i.e. federal, state, and local permitting, rights-of-way, application timelines and fees, etc. Finally, a list of potential companies, capable of responding to a request for proposals to install the high-speed connectivity technology in the city, will be included.

**Attendance from agile strategy session on December 6, 2019**

<b>Name</b>	<b>Company</b>
Antoinette Brevard	Plainfield
Shep Brown	Plainfield
John Costello	NJEDA
Tom Durkin	NJII
Eric Jackson	Plainfield
Valerie Jackson	Plainfield
Tom Motyka	NJII
Dave Sandel	NJII
Cheryl Shiber	UCC
Ian Trammell	NJII
Victoria Ukachukwu	UCC
Mike Van Ter Sluis	NJII
Miguel Vargas	Business owner
Dave Watts	NJII
Ronald West	Plainfield
Jamie Wisniewski	NJII

## **APPENDIX B: JANUARY 29, 2020 – BUSINESS ENGAGEMENT MEETING**

### **Meeting Summary Development Corridor Business Engagement Meeting January 29, 2020**

#### **PARTICIPANT LIST**

##### **Development Corridor Businesses in Attendance**

###### **Steph Naude, Injectron**

- Plastic Injection Molding facility that serves the local market
- Depends on local, low-cost labor force
- For the near future, expects to remain in Plainfield. However, there is fear that a changing Plainfield will require them to move.
- However, they are open to at least hearing how technology can improve their business. But, HSCT is a priority
- Injectron is one of the largest injection molders on the East Coast, with a 300,000 square foot, 24/7 operational facility. This is the largest building in the development corridor, sized at about 3365ft x 225 ft (~825,000 ft<sup>2</sup>). In addition to manufacturing, Injectron also warehouses its products.

###### **Glenn Papp, Papp Iron Works**

- Papp Iron Works provides shop drawings, fabrication and erection of all types of miscellaneous metals including stairs, railings, grating platforms, mechanical unit dunnages and any custom metal fabrications. The 3.5-acre fabrication facility and 20,000 Sq. ft. plant is equipped with the following:
  - 8,000 s/f Painting Area
  - 80 Employees
  - 15 Field Trucks
  - 7 Overhead Cranes
  - Automated Beam Drill Line
  - Automated Angle Master
  - Automated Plasma Burning Table Welding Positioner
  - Bonding capacity up to \$12,500,000.
  - The Papp Ironworks building is about 2745ft x 230 ft (~630,000 ft<sup>2</sup>).

###### **Russell Kussner, New Industrial Foam**

- Manufactures custom foam packaging solutions for a local market
- Low- to high-volume
- Most the electronics resale market
- Depends on local, low-cost labor force
- They do not produce the foam - they cut, size, fuse, etc.

Maher Janajri, Brunswick Trading

- Owns a data center in the corridor
- Owns a coffee shop near downtown Plainfield

#### Other Attendees

Name	Company
Jeannette Aparicio	Plainfield
Tom Durkin	NJII
Valerie Jackson	Plainfield
Bill Nierstedt	Plainfield
Dave Sandel	NJII
Mike Van Ter Sluis	NJII
Dave Watts	NJII
Jamie Wisniewski	NJII

#### ***NJII PRESENTATION DECK***

This presentation deck is provided as a separate document in the final delivery package.

#### ***MEETING SUMMARY***

##### **Key Takeaways**

- The focus on the corridor should remain light industrial -- but with data enabled infrastructure. There are other arts, retail, and co-working/entrepreneur-support efforts being promoted at other locations in the city. “We should not be thinking about conversion of industrial to non-industrial.”
- However, there is a clear interest in mixing high-growth young companies together with legacy companies inside the corridor. In this sense, “mixed-used” is desirable - yet, residential and retail should not be the primary focus.
- When asked about concerns, beyond the explicit project scope, public safety (personal and private) was a primary concern for all attendees.
- Tapping into the network of start-ups, entrepreneurs, and the young-adult community – generally – should be prioritized.
- For the industrial tenants in the corridor there is not a clear value proposition for the HSTC. (This is not true for the data center.)

##### **Marketable Assets of the Corridor**

- “Potential” for low cost electricity. Brunswick Trading was able to negotiate a \$0.06-8/kwh energy rate with PSE&G. Maher believed this was possible due underutilized electrical infrastructure that was sized for the heavy manufacturing of the past. It should be noted that not all the businesses in the Corridor have negotiated for more favorable rate.

- Ability to move things; location relative to road and rail infrastructure designed to move heavy manufactured goods.
- Proximity to the NYC market – very good. Need a circulator shuttle bus too when ready.
- Relative-low cost workforce located in Plainfield, NJ. This was important for plant floor workers. (It should be noted that “higher-skill” office/management workers do not live in Plainfield, NJ.
- Low cost, large spaces with high floor loading.

### **Challenges**

- The existing production facilities depend on a low-cost labor force. Concerns were expressed about pushing that community outside of Plainfield due to the rising cost of living.
- The capacity and ability of K-12, and community colleges to execute has not yet been evaluated.
- The entrepreneurial ecosystem has not yet been evaluated. This is very important, as this is the ecosystem that will produce new jobs and companies. If the ecosystem is weak, the potential of our SOW initiative may not be successful.

### **Miscellaneous:**

- All businesses in attendance were property owners, with the exception of New Industrial Foam who is a tenant in the Norpak building.
- The Corridor is located in an Urban Enterprise Zone.
- The manufacturing companies here are “niche”. The companies present produce locally and serve the local market.
- The NJII report will be used to market Plainfield to developers, service providers, qualified tech firms in the NY-NJ region, investors and government funders

## **APPENDIX C: MARCH 4, 2020 – COMMUNITY ENGAGEMENT MEETING**

### **PARTICIPANT LIST**

#### **Participant Group 1**

<b>Name</b>	<b>Company</b>	<b>Category</b>
Mike van Ter Sluis	NJII	NJII
Don Sebastian	NJII	NJII
Stephen Naude	Injectron Corporation	Industry
Miguel Vargas	SID Board/Business Owner	Industry
Victoria Ukachukwu	Union County College	Education
Tom Durkin	iNeighborhoods	Technology
Valerie Jackson	City of Plainfield	Government
Elton Armady	City of Plainfield	Government

#### **Participant Group 2**

<b>Name</b>	<b>Company</b>	<b>Category</b>
Jamie Wisniewski	NJII	NJII
Dave Watts	NJII	NJII
Jeannette Aparicio	City of Plainfield	Government
Rashara Fuller	Plainfield Action Center	Workforce
Glenn Domenick	CHA Partners	Developer
Keyla Pavia	Pillar College	Education
Leah Dade	Second Street Youth Center	Education

#### **Participant Group 3**

<b>Name</b>	<b>Company</b>	<b>Category</b>
Dave Sandel	NJII	NJII
Bill Nierstedt	City of Plainfield	Government

Maher Janajri	Brunswick Trading/Queen City Coffee Roasters	Industry
Antoinette Brevard	SID Board	Industry
Patrick Terborg	TD & Partners	Developer
Esther Diaz	Pillar College	Education
Cheryl Shiber	Union County College	Education
Victoria Guzman	Plainfield Public School Family Success Center	Education

### ***NJII PRESENTATION DECK***

This presentation deck is provided as a separate document in the final delivery package.

### ***MEETING SUMMARY***

#### **Key takeaways**

1. Overall, the vision was well received by the stakeholders, and all agree this is a positive initiative that would benefit the City of Plainfield.
2. More than half of the room was familiar with concepts of IoT and IIoT.
3. Diverse community buy-in will be key to this project's success. Plainfield is a diverse community with many different stakeholder groups. Participants at our meeting expressed the need for diverse community buy-in, which historically has been difficult to achieve in the City of Plainfield. The City of Plainfield is 'siloe'd' with groups of individuals operating in their own independent ethnic, religious and income groups. Communicating this vision will need tailored to each stakeholder group to build trust and consensus.
4. Workforce and education programs will need to be redeveloped to prepare the existing population for Industry 4.0 jobs. There was concern about workforce development needs, and skepticism of whether or not the K-12 system would be enough to prepare young adults for Industry 4.0 jobs. It was also mentioned that similar apprenticeship programs have not been successful with Plainfield High School and UCC students, and, instead, adult-learners and immigrants have been more engaged and successful in these programs. Because the graduation rate for apprenticeship programs is low, workforce and education stakeholders believe there needs to be a greater incentive for students to join these programs. In addition to students, educators will need to be re-trained with these skills.

5. There is an opportunity to build a Hispanic Entrepreneurial community. The City of Plainfield's population is predominantly Hispanic. Plainfield public schools range from 60-90% Hispanic so training in the Spanish language is essential. There is a huge opportunity to build a Hispanic Entrepreneurial community and this narrative can be built into the greater vision for this project.
6. Connecting the Industrial Corridor to the downtown is crucial. Currently there is public transportation connecting downtown to the west end of town. All stakeholders agree connecting the two districts would increase visibility of the industrial corridor and generate interest in the area. Bill Nierstedt mentioned that improved transportation should be included in the 2020 Master Plan. Special attention could be given to connecting Union County College and Rutgers University. Additionally, Plainfield used to have four train stations, which could potentially be restored some day.
7. An industrial developer should vet our vision. Glenn Domenick, a commercial real estate developer in Plainfield, provided valuable insight about real estate development. Glenn suggested we run our vision by an industrial developer and/or broker, especially since this is what Valerie plans to do with our report once completed. Glenn validated that the industrial real estate market is in high-demand in New Jersey. Several industrial developers approached Glenn to buy part of his Muhlenberg property, and he was offered prices higher than what he paid for his entire property. Glenn was involved with JP Morgan's data center in Totowa, New Jersey and suggested that 69kv power would be more attractive than 5G HSCT.



## **APPENDIX D: TECHNICAL SOLUTION - LEGAL BACKGROUND**

### **New Jersey Municipal Right of Way (ROW) How Local Governments and Telecommunications Carriers Can Work Together**

*Emerging Regulatory and Legal Frameworks for Broadband Infrastructure  
Deployments that promote and enhance economic development while improving  
peoples' lives*

#### **Introduction**

Today, most major telecom/broadband service providers (hereinafter called “carriers”) are proactively approaching their selection of state and local governments as they work diligently to improve the valuations of their service offerings in an ever-changing, evolving and competitive telecommunication marketplace. For those cities not approached, they are finding themselves, their citizens, their educators and their business community asking “why not us?” Is Plainfield, N.J. one of these cities? And, if “yes” what can Plainfield do from a regulatory and legal perspective with its assets of rights of way (ROW) and telecom/broadband-enabling infrastructure?

Let’s start with the basics. At this point in time carriers<sup>16</sup> are primarily looking at their service and franchise “footprints” to see if city governments can and will create a “win-win” environment whereby the city’s often underutilized assets of public ROW, street lights, traffic signals, signage and government or muni owned utility poles (hereinafter collectively referred to as “street furniture”) can be made available to carriers for its for-profit use while, at the same time, addressing the city’s internal operational and fire/life/safety telecom needs via the city’s leveraging its ROW assets in order to reach all its telecom/broadband goals.

As a result, both parties are becoming increasingly aware that these assets have the potential to service the two primary goals of meeting customer ever-increasing demand for improved

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<sup>16</sup> For the purposes of this report, “carriers” also include ASPs or Application Service Providers, ISPs or Internet Service Providers, as well as closely related WISPs or Wireless Internet Service Providers. All three share the common need for both wireline and wireless telecom networks to be located in public ROW and on “street furniture.” Less commonly recognized ASPs are businesses providing computer-based services to customers over a network; such as access to a particular software application using standard protocols (such as HTTP). The need for ASPs has evolved from the increasing costs of specialized software that have far exceeded the price range of small to medium-sized businesses. As well, the growing complexities of software have led to huge costs in distributing software to end-users. Through ASPs, the complexities and costs of such software can be cut down. In addition, the issues of upgrading have been eliminated from the end-firm by placing the onus on ASPs to maintain up-to-date services, 24 x 7 technical support, physical and electronic security & in-built support for business continuity and flexible working. Clients for ASP services include businesses, government organizations and non-profits.

advanced telecom/broadband services and capacities while, at the same time, meeting the social, economic and educational challenges of a city, particularly a city like Plainfield, N.J. who, in the shadow of the New York City Area’s phenomenal growth expansion, must respond to internal and outside pressures to do something that can help meet the region’s need for reasonable, manageable and workable growth solutions.

For example, because New York City has declared that its coronavirus exposure represents a city-wide emergency, it has encouraged its employers to allow workers to telecommute to work. And, given the fact that many medical professionals expect this pandemic to get worse<sup>17</sup> and not better any time soon, Plainfield, with its relatively easy New Jersey Transit commute into New York City (and beyond) has the unique opportunity to provide its citizens, business community and real estate developers an ideal platform of telecom infrastructure that could enable a worker to work either from home<sup>18</sup> or from a Plainfield-based remote office and then, only when and as needed, travel the relatively short 1-hour commuting distance to Manhattan to attend meetings and the like. Further, improved telecom/broadband infrastructure (with its associated applications) in Plainfield will allow it to better care for its coronavirus-infected population via remote telemedicine capabilities that improves and speeds-up diagnostics and treatment and that reduces or even prevents potential coronavirus exposures to its medical practitioners<sup>19</sup> and others.

Historically telecom/broadband carriers have obtained franchises from cities allowing them to construct and operate telecommunications outside plant (OSP) facilities in public ROW consisting of copper, coax and fiber optic cabling via conduits, manholes and handholes (when OSP must be placed underground) and wireless equipment using both existing and new spectrum regulated and allocated by the Federal Communications Commission (FCC) via pole attachments, cell towers and small cells (5G). And, spectrum allocation can become a city-specific opportunity if it were to keep abreast of, promote and use both new 5G technologies<sup>20</sup>

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<sup>17</sup> On 3/9/2020, CNN made the decision to officially adopt the term “pandemic” in its reporting and on 3/13/20 President Trump officially declare the pandemic a national emergency.

<sup>18</sup>In North America, the average household has 13 connected devices, with smartphones outnumbering tablets 6 to 1. IHS Market Connected Device Market Monitor: Q1 2016, June 7, 2016.

<sup>19</sup> For example, 5G will enable doctors to treat homebound patients through telemedicine, perform robotically assisted surgeries from across the country and detect illnesses early with remote monitoring devices. Telemedicine and other healthcare advancements are projected to save \$305 billion annually.

<sup>20</sup> The term “5G” refers to the fifth generation of wireless technology. The first generation of wireless technology (1G) provided basic voice services; 2G introduced text messaging; 3G brought smart phones and Internet access; and 4G enabled broadband services such as video streaming. Enabled by 5G wireless networks autonomous vehicles will be transformational, allowing self-driving cars to reduce transportation obstacles and give people with disabilities new levels of personal and professional freedom. 5G represents a major breakthrough in wireless technology that will enable far greater download speeds, greatly reduce network latency (or lag), allow for more connections with greater capacity, and provide other advances such as significantly increased battery life for cell phones. 5G will improve cell phone service, but also will enable fixed wireless broadband service to homes and businesses and provide the bandwidth and capacity for the rapid increase in devices being driven by the Internet

and the newly created FCC encouraged 5G-related spectrum opportunities<sup>21</sup>, such as private spectrum use otherwise now known as CBRS (Citizens Broadband Radio Service)<sup>22</sup>.

In addition to the use of private property, in many (if not in most instances) carriers will use public ROW whenever possible, as is most often authorized by local franchises with city governments<sup>23</sup>. And, many states and the federal government have developed rules<sup>24</sup> that apply to local governments considering requests from carriers to use public ROW. Excepting the small cell bill<sup>25</sup> currently under consideration by the State of New Jersey Assembly, iNeighborhoods has found few currently enacted telecom-related State of New Jersey regulations that could seriously impeded Plainfield when considering the below three telecom/broadband opportunities that they should consider. Please see this report's Page 6, 2<sup>nd</sup> paragraph for more commentary on the pending New Jersey small cell bill.

1. Plainfield issuing an industry-wide RFP asking that carriers help the city address its telecom/broadband goals.

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of Things, or IoT. Smart, connected IoT solutions are expected to become increasingly pervasive in fields like healthcare and transportation, as well as manufacturing and agriculture. According to one estimate, wireless providers will invest \$275 billion in 5G infrastructure deployments by 2028, which is expected to create 3 million new jobs and increase U.S. GDP by \$500 billion.

<sup>21</sup> The FCC has recognized the urgency of moving ahead with 5G deployments, citing an estimate that advancing 5G deployment by one year would produce a \$100 billion benefit for the U.S. economy.

<sup>22</sup> Citizens Broadband Radio Service (CBRS) is a 150MHz wide broadcast band of the 3.5 GHz band (3550 MHz to 3700 MHz) in the U.S. In 2017, the FCC completed a process, which began in 2012, to establish new rules for the commercial public use of this band, while reserving parts of the band to protect the radar and aircraft communications of the US Navy. On January 27, 2020, the FCC authorized full use of the CBRS band for public-private commercial wireless service use, with certain restrictions to prevent interference with military use of the spectrum. For example, under the new rules, commercial building owners and real estate developers might use CBRS to deploy their own private in-building and on-developments wireless networks for use by its tenants and visitors to support their on-site wireless cell phone and broadband connectivity needs including 5G, all this without the need to acquire expensive dedicated spectrum licenses through the FCC.

<sup>23</sup> At this point it should be noted that currently most New Jersey municipalities have been and are granting access to its public ROWs to carriers pursuant to and governed by the many provisions of N.J.S.A and N.J.A.C., such as 48:2-14, 48:3-19, 48:17-8, 48:17-10 and 54:30A-124 and N.J.A.C 14:10-1.2 and 14:10-11(a)(2).

<sup>24</sup> These rules include such things as time limits on deciding whether or not to grant the request and issue the necessary permits (so-called "shot clocks") and other factors that may be considered when making ROW-related decisions, as well as caps on ROW use application fees.

<sup>25</sup> The New Jersey Legislature is considering the "Small Wireless Facilities Deployment Act," which provides for uniform regulation of small wireless facility deployment in New Jersey's local government's right of way and prohibits cities from regulating small wireless facilities in a manner inconsistent with the bill. The bill (A5560) was introduced on June 13, 2019.

2. The creation of public-private partnerships that leverage the complementary telecom/broadband needs of carriers and Plainfield. This could be a scenario whereby Plainfield becomes its own ISP in a public-private partnership with carriers, real estate developers, investors, local business or combinations of, or
3. Plainfield's own provision of telecom/broadband services (in whole or in part) when carriers (or other possible partners) fail to or are unwilling to meet the telecom/broadband needs and goals of the City.<sup>26</sup>

Key to the implementation of any one of these opportunities is Plainfield's proactive use of the franchising, permitting and ROW usage powers it has. So, before the City of Plainfield, N. J. are many opportunities presented in this report and this paper addresses these opportunities in two strategic ways.<sup>27</sup>

1. By assessing the current FCC and New Jersey regulatory environment that may impact Plainfield's ability to respond to these opportunities, with suggestions as to how best to either remove or mitigate any regulatory/legal restraints that might otherwise prevent or discourage Plainfield from pursuing telecom/broadband solutions that benefits its citizens and guest.

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<sup>26</sup> Note, this approach may cause a carrier to try to use the Federal Telecom Act of 1996's 47 U.S.C. Sec 332 (c) (7)'s "no unreasonable discrimination" requirement if they think Plainfield has unreasonably discriminated against them respecting a carriers' (i.e. a provider "of functionally equivalent services") actual or desired placement, construction, operation or modification of telecom/broadband facilities in Plainfield ROW. There are other provisions of the Act (as well as the Middle Class Tax Relief and Job Creation Act of 2012, because of its wireless spectrum provisions of Sec 6409(a)) that a carrier may try to use and this paper does not attempt to address all these possible Act-related challenges.

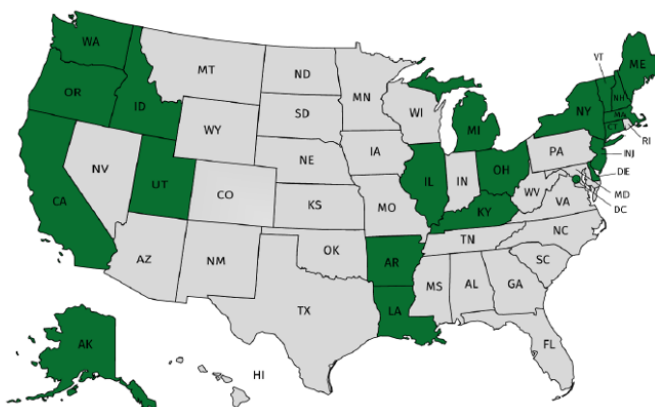
<sup>27</sup> Previously NJII presented to Plainfield, N.J. telecom/broadband regulatory considerations developed by iNeighborhoods, a synopsis of which follows: As Plainfield, N.J. takes advantage of advancements in telecom infrastructures and services it needs to be aware that, though currently challenged in the courts, it's possible Plainfield-ISP (Internet Service Providers) partners are today considered "Information Service Providers", rather than "Telecommunications Carriers", due to their removal from the 1996 Telecom Act Title II status. With this new status comes the realization that the FCC (and the telecom industry) may lack the regulatory authority to preempt state and local telecom regulations as courts are denying this right because today's carriers don't have Title II status. Further, New Jersey, upon seeing the FCC bow to telecom industry pressure that eliminated previously enacted internet Net Neutrality (NN) rules, did decide to join 21 other states (and DC) in a lawsuit against the FCC in an attempt to reverse the FCC's NN repeal. In addition, its Governor issued an Executive Order enforcing certain state-mandated NN rules. This action prevents ISPs from blocking or throttling lawful Internet traffic for any consumer in N.J and paid prioritization is also off-limit and each ISP is required to provide N.J. citizens "accurate information regarding the network [they are using and its] performance" Such actions are prompting others to hold ISP's "feet to the fire" by ensuring that they are all held to the finer points of any City/ISP agreement, such as wiring all municipal buildings with TV and Internet service including first responders' buildings and free Wi-Fi for all guests around these facilities. Plainfield, N.J. is encouraged to examine further their rights as controllers of ROW assets/franchises/permits. This is made possible, in part, due to Plainfield's ability to, in the face of any possible telecom industry opposition, allow the courts to determine, as needed, if any telecom carrier has the right to stop Plainfield from any telecom decision it may make and/or can exempt themselves from Plainfield oversight when, at the same time, claiming to be an ISP because, it is being held that, such rights are only available to ISP when they are deemed to be and treated as Title II Telecommunications Carriers.

2. By providing Plainfield a brief overview “To Do” list of important things a municipality should consider for permitting ROW use leading to the establishment of a successful and workable telecom/broadband ROW access and permitting process suitable for presentation to carriers and for enforcement of rules related to carriers accessing Plainfield ROW and supporting infrastructures.

### **FCC and New Jersey State Regulatory Matters Impacting Plainfield, N.J.**

As depicted on the below map, one of New Jersey’s biggest telecom/broadband decisions has been to join 20 states and D.C. in becoming a Reverse Preemption State under the 1978 Federal Pole Attachment Act, governing investor-owned utilities, by electing to have “reverse preemptive” status under the Act.

The federal Pole Attachment Act does not control in twenty States and the District of Columbia because they have “reverse preempted” the federal statute:



**Figure 24: Federal Pole Attachment Act Geographic Map**

So, unlike the 30 other states electing to be governed under the Act, by being a Reverse Preempted State, New Jersey had to and did 1) develop its own State rules and regulations governing pole attachment rates, terms and conditions, 2) establish a complaint process that resolves pole attachment disputes in less than a year and 3) certify to the FCC that it regulates pole attachments and that, in doing so, it considers the interests of the pole owners and attaching entities.

Now, with it being over four years since the FCC last stepped in<sup>28</sup> to provide further ROW guidance to state and local governments, it has again stepped in with a new comprehensive

<sup>28</sup> Please keep in-mind that each day is a different day at the FCC, so it is recommended that readers of this report check its web site of [www.fcc.gov](http://www.fcc.gov) for any new information and/or updates.

framework for governing carrier requests when deploying small cells.<sup>29</sup> And, between 2016 and 2019 twenty-eight states have enacted small cell legislation, with New Jersey's legislation pending. These statutes are needed because, unlike previous OSP deployments of conduits and traditional utility pole use (used for well over a 100 years) the newest telecom/broadband technologies need new infrastructures in ROW that provides for the placement of relatively small antennas that are both more prevalent (approx. one in every 500 foot radius across a city's commercial business environments<sup>30</sup>) and lower to the ground (approx. 30-50 feet high) than traditional cell towers. And, while these are wireless sites, each site taxes ROW use, congestion and traffic control because each site requires that it be connected for power and fiber optic cabling that, most often, must be located in public ROW.



**Figure 25: Small Cell Legislation Map by State**

These entire telecom/broadband infrastructure needs will be challenging for Plainfield, but should be doable in a win-win environment between the city and the carriers because, uniquely and at the exact same time, both cities and carriers are finding themselves under enormous pressure to deploy new telecom/broadband services and applications. For cities this includes new life/fire/safety enhancements that take advantage of the new carrier telecom/broadband infrastructures being deployed. Many cities are rightly calling these enhancements the creation of their own “Smart City.” And, any failure to create a Smart City can expose a city to criticism (and liability?) because people and entities may rightly feel that, when it comes to life/fire/safety measures that must be deployed, it is the city's fiduciary responsibility to its citizens and businesses, especially when the city has the power to do so.

<sup>29</sup> See FCC's *In the Matter of Accelerating Wireless Broadband Deployment by Removing Barriers to Infrastructure Advancement and Accelerating Wireline Broadband Deployment by Removing Barriers to Infrastructure Advancement*, Declaratory Ruling and Third Report and Order, WT Docket No. 17-79 and WC Docket No. 1784 (September 7, 2018) at ¶12 (“Small Cell Order”).

<sup>30</sup> To serve an area such as a business district, small cells must be placed at intervals to form a grid, sometimes called a polygon, providing contiguous coverage sectors. Such coverage will require extensive small cell deployment.

Thus, most forward-thinking cities like Plainfield, N.J., through its partnership with New Jersey Innovation Institute (NJII), are now addressing its Smart City opportunities<sup>31</sup> while, at the same time getting ready to respond or already are responding to many new carrier-use-of-ROW requirements and issues, such as a carrier's need to access ROW and attach to government "street furniture." Included in this would also be required timelines and processes for permit applications to deploy fiber optics and small cells, with caps on application fees and ROW and pole attachment recurring charges for ROW. As a result, in 2018 the FCC created comprehensive and workable national carrier-use and city-government-providing-ROW standards that are largely consistent with the state statutes that preceded them.

Before 2016 few, if any, states and local authorities had regulations that allowed carriers to challenge cities when cities deny them the right to attach to government poles and "street furniture." That meant that, in most states, carriers had to figure out ways to negotiate a non-standard franchise agreement, master license agreement or similar arrangement with each city, county, or state agency before it could access the ROW for their fiber and cell site deployments. In such instances local governments might try to use and apply zoning rules developed for cell towers, even though such rules made little sense for these new deployments. These agreements, and other such-like arrangements, typically address recurring charges for ROW access or any telecom-related property taxes<sup>32</sup> and, if allowed, attachments to "street furniture." These ROW access rates varied widely from city to city.

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<sup>31</sup> Plainfield, N.J. will need to factor in recent 3/11/20 telecom trade press entitled..."*Verizon, AT&T Withdraw from Smart City Efforts*" -- "Verizon and AT&T no longer have high-profile executives dedicated to smart city operations. In addition, both have largely folded their smart city efforts into other business units. So, why are AT&T and Verizon retreating from smart cities? It is because they are both already getting access to city infrastructure for [ROW and] small cells thanks to new FCC rules that went into effect last year. ... [A]s a result of the rules, Verizon and AT&T no longer need to ink smart city partnerships in order to get access to city-owned streetlights and other infrastructure to house their small cells for 4G and 5G. Instead, they can simply leverage the FCC's new rules to quickly install the small cells they need, and they don't need to engage in any smart city agreements to do so."

<sup>32</sup> Respecting certain city property taxes paid by carriers to N.J. municipal governments (like Plainfield) in July 2019 N.J. Local Exchange Carrier Verizon (VZ) was under investigation by the state alleging that VZ had, for a decade, avoided paying cities local taxes (ranging from \$15,000 to more than \$1 million a year) on poles, lines, related telecom equipment and real property. This resulted in Assemblyman John Burzichelli (D–Paulsboro) filing the N.J.A.B 5450 a bill (on 5/23/19) that, if passed, would force VZ (and other carriers) to back taxes for all the payments not made. Even though this bill on progressed only 25% through the N.J. Assembly and died in chamber, it is worth noting as an example of conflicts that can materialize between cities and carriers. Here is a synopsis of the conflict....As of 2015 VZ reportedly stopped paying the tax in more than 150 municipalities in N.J. The tax dispute centered on a 1997 amendment to 2013 N.J.R.S. Title 54 Section 54:4-1 "Property Subject to Taxation", which requires the payment of "business personal property" taxes to N.J. by phone companies (like VZ) that provide "dial tone and access to 51% of a local telephone exchange." However, in 2008, VZ started notifying 150+ N.J. cities that it would stop paying this tax because it felt that its market share had dropped below the 51% threshold. This 2008 notification prompted the City of Hopewell Borough to begin a 10-year legal battle against VZ, alleging that VZ had violated the state tax law, and in January 2019 N.J. Tax Court's Judge Mary Siobhan Brennan concluded that VZ had substantially (and perhaps unknowingly) underestimated its market share and that instead of the 44%-48% of the city that VZ claimed to only serve, its share was closer to 90%. This ruling resulted in a past-due taxes bill of \$38,655 for 2009 alone. However, the Court also ruled that, in order for Hopewell to



Respecting city taxes, a telecom supported small cell bill before the State of New Jersey Assembly suggests that its Section 16 prohibit N.J. cities from receiving any additional fees or taxes being charged on the placement or operations of “communication facilities in the right of way by a communications service provider.” And, with regard to this the New Jersey League of Municipalities (NJLM)<sup>33</sup> has protested the fact that Section 16 changes the term “wireless providers” to “communications service provider” and stated that their concern is that this change becomes so broad that it may encompass other entities besides wireless providers and thus may have an impact on property taxes and the business personal property tax (BPPT.) They have asked that this Section 16 be clarified, asking “would it be possible to avoid utility fees and taxes if all utility poles were replaced by wireless provider poles?”

Additionally, New Jersey is one of 19 states that, as of 2016, has enacted laws governing applications to install or modify or collocate wireless facilities on a cell tower. From 2016 to August 2019, 28 states have enacted small cell statutes. The majority of these statutes add standalone chapters or sections that comprehensively addressed ROW and carrier access to government owned poles, along with application processing, recurring and one-time charges and other issues. Other states (Indiana, Maine, Minnesota and North Carolina) have address telecom/broadband ROW use issues by engrafting provisions into existing ROW laws. In 2018 the FCC prohibited express and *de facto* moratoria by states and localities on the deployment of telecommunications services and facilities, except in limited circumstances. That decision, along with the below one, has been appealed to the U.S. Ninth Circuit Court of Appeals.

What is important to Plainfield, N.J. is the FCC 2018 determination that federal law prohibits state and local governments to materially inhibit the ability of a wireless carrier to compete in a fair and balanced regulatory environment. Applying that principle, the FCC requires that recurring and nonrecurring charges assessed carriers must be cost-based and the FCC established presumptively reasonable ROW charging limits that only can be exceeded if the governing authority shows that higher charges are cost-based. The FCC also established criteria for wireless equipment aesthetics, undergrounding, and minimum spacing and adopted new

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collect past-due taxes for years 2010+, it would have to prove similar 2009-like false VZ market share results. Assemblyman Burzichelli’s bill establishes that there has been an incorrect interpretation of the state tax law making sure that Hopewell Borough (and other N.J. cities) can collect for all subsequent years without further legal battles and is retroactive to 2007. At the time, Assemblyman Burzichelli was the chair of the Assembly's Appropriations Committee.

<sup>33</sup> NJLM is also concerned about this bill’s Section 17 dealing with non-conforming and previously adopted ordinances. In this section, it states that... a city may not require a “wireless provider” to enter into an agreement with them but can enter into a voluntary agreement. In addition, ordinances or agreements between a city “wireless provider” already in-place that do not comply with this bill will be enforceable only for those facilities installed and operational prior to the bill. However, these ordinances/agreements not in compliance with the bill will become void 181 days after the effective date of the legislation. NJLM feels that this...“section in effect removes the applicability of a “savings clause” in any ordinance adopted after the effective date of the bill. In other words, if one part of the ordinance is invalid, by law, the entire ordinance would be invalid and there would be no local regulation until a fully compliant ordinance is adopted. This section of the bill would also work to invalidate already approved agreements and ordinances.”

rules imposing application processing times (i.e., “shot clocks”). Since the FCC’s September 2018 order was issued<sup>34</sup>, eight small cell statutes have been enacted, with bills remaining as pending in the four states of New Jersey, Pennsylvania, Alabama and South Carolina.

These laws and statutes, however helpful they might be, provide Plainfield, N.J. with limited assurances that it has definitive telecom/broadband regulations and/or laws “on-the-books” that specifically favors the city for the time when a carrier might challenge the city. This challenge could be in the form of a carrier objecting to any city sponsored plan to provide its own viewed-as-competitive-telecom/broadband services and/or any carrier-perceived favoritism displayed by a city towards another carrier over the challenging carrier’s own interests. And, when iNeighborhoods compared other state telecom/broadband laws and regulations (respecting carrier access to and use of city ROWs for both wireline and wireless purposes) it did not find them to be any more specific, comprehensive or and far-reaching<sup>35</sup> than what they have found in New Jersey. Even so, the mere fact that these new laws have been created elsewhere nationwide<sup>36</sup> should be a source of encouragement to Plainfield and should encourage it to justifiably go forward when considering NJII’s telecom/broadband recommendations and initiatives.

### **Closing Remarks**

A practical consequence of New Jersey’s seemingly relaxed approach or thus far hesitancy to enact comprehensive telecom/broadband municipal deployment regulations<sup>37</sup> is the positive result of there be little in the way of New Jersey state regulations and laws that discourage or otherwise inhibit Plainfield’s ability to either 1) provide telecom/broadband services on its own or 2) allow non-carriers (such as a real estate developer) to do so or 3) do so through a public-private partnership with carriers or a carrier. This provides the City of Plainfield the opportunity to start immediately to promote and deploy the kind of robust forward-thinking advanced telecom/broadband infrastructure that gives its citizens, business community and educators a world-class network and “Smart City” environment that can dramatically improve its quality of

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<sup>34</sup> This Order took effect on January 14, 2019.

<sup>35</sup> For example other states, with respect to a city’s aerial-to-undergrounding initiatives, protect a city’s ROW with statutes that 1) require carriers obtain a waiver before installing a new pole, with many states saying that the waiver process can be required only if certain utilities have been placed underground a certain time before the wireless provider submits its application, 2) specify that pole installations may not be denied in an undergrounding area where doing so would have the effect of the prohibiting the provision of wireless services and 3) deal with situations where a designated undergrounding area has small cells installed prior to such designation allowing the city to either allow the wireless carrier to keep its small cell in-place or move to a nearby location.

<sup>36</sup> In the majority of cases to encourage small cell deployments.

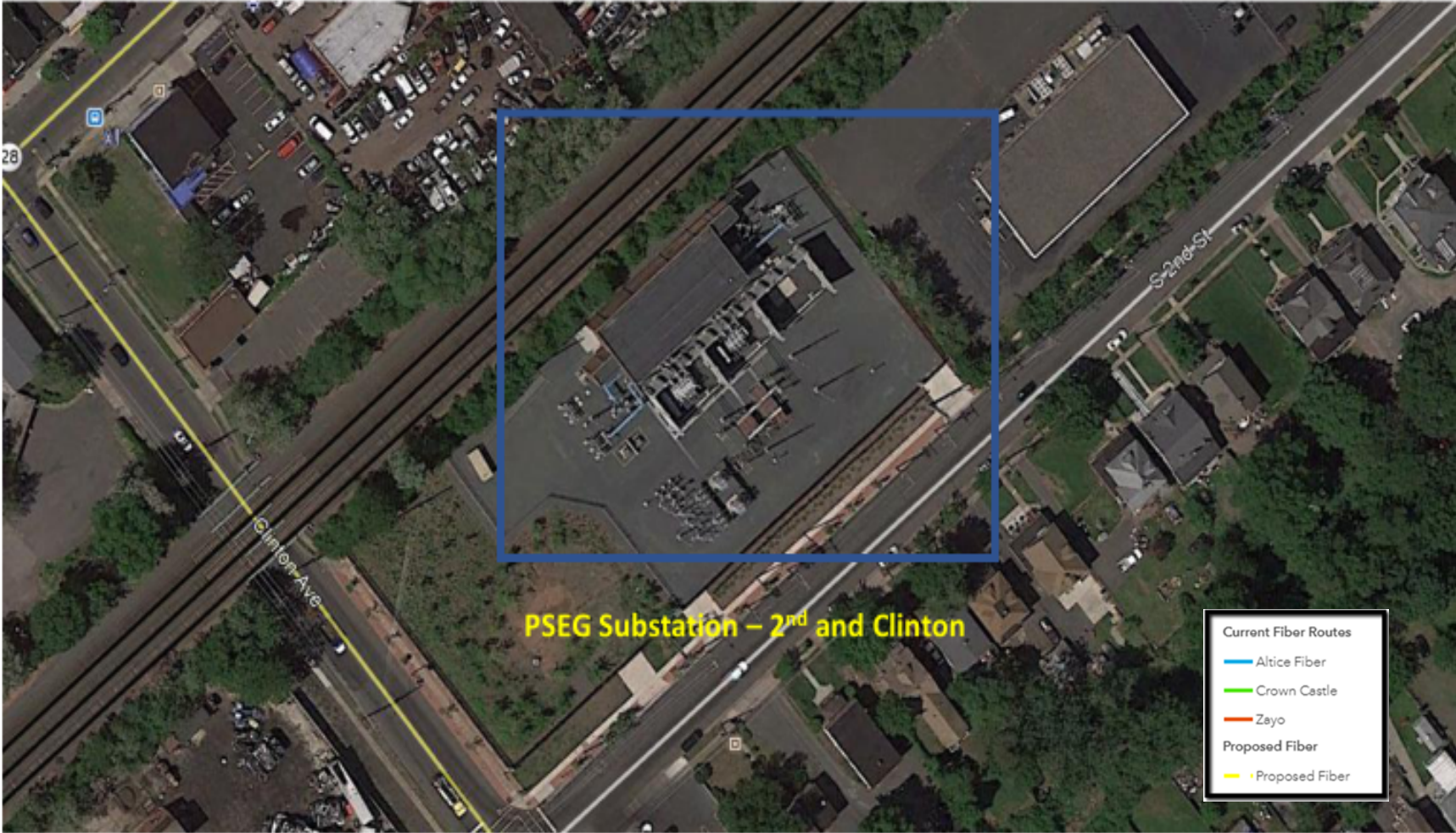
<sup>37</sup> At this point it is worth noting that a March 3, 2020 BroadbandNow Research report of nationwide Internet coverages, speeds and prices (among over 2,000 ISPs) concluded that New Jersey ranks the highest state in the nation (@ 98%) in terms of population having wired broadband coverage of at least 25 Mbps download and 3 Mbps upload (New York state ranked second) and 78% in terms of low-price plan availability @ less than \$60 per month.

life and the economy. Perhaps even more importantly telecom industry investment is expected to expand and accelerate in 2020, bringing in much-needed interest to the New York City region (which Plainfield, N.J. is an integral part of) in communications infrastructure that can enable a vast array of new services to citizens and businesses.

## **APPENDIX E: FUTURE POSSIBILITY – PSEG**

During our West End Industrial Corridor Discovery, we uncovered a PSEG utility substation. This substation. We consider the utility substation an asset because if we added a new tower near the substation where Crown Castle fiber currently exists, or near the PSEG utility substation, we could offer wireless access and potential point to point services. Though we have not yet engaged PSEG, we believe this could be a valuable asset to explore.

A PSEG utility substation is located at Clinton Ave. on one end of the development corridor – see Figure 22 below. There is both easy fiber access to this location (and PSEG poles) plus room to drop a small wireless tower which could serve the corridor or the surrounding area. PSEG also has a Smart City and demand management program that could benefit companies located in the corridor to help lower their energy costs during peak and off-peak hours. Furthermore, an IoT sensor could possibly be located at the PSEG substation to provide real time energy consumption data to the community, or an IoT sensor could be located at Injatron (and other renewable locations) to report real-time energy consumption/generation of renewable energy resources within the Corridor or the community.



**Figure 26: PSEG Sub Station Location - 2nd and Clinton**





Figure 27 Corridor Fiber Assessment and Potential



**Option 1:** The proximity of the Utility substation to two of the existing fiber providers, Crown Castle and Altice provides an opportunity to extend their aerial fiber from the intersection onto PSEG property and create a wireless access node.

The color-coded dashed lines in the above drawing indicated the length of a new aerial build from each of the providers' overhead pole attachments on Clinton Ave necessary to enable wireless backhaul for access to the internet and to other network services.

It will be necessary to speak to either Crown Castle or Altice to gain agreement to splice onto their fiber or alternatively have them extend their own fiber to a new community based wireless service on the PSEG property. In addition, a tower would need to be placed on the PSGE or potentially evaluate another available structure suitable for to support the placement of an antenna with a suitable powered transponder.

**Option 2:** The other viable option available on the PSGE property is to use their existing building on the property and build out the wireless service node from the vantage position on the roof with a smaller less expensive support mount. Given the proximity to the Crown Castle fiber, the drawing illustrates extending their existing fiber that terminates on PSGE's adjacent property which will be easier to negotiate splicing and at a lower price than Option 1 fiber extended from Clinton Ave.

Either of these two viable options require PSEG to partner on this service offering (or to lease space) and PSGE can also take advantage of this new service for their SCADA functions at their substation.



Figure 28 Utility Substation with Points and Tower Option

## **APPENDIX F: FUTURE POSSIBILITY – EXPANSION DOWNTOWN**

An additional opportunity to explore is the expansion of connectivity to the downtown. There are a number of benefits to expanding connectivity to the downtown. Below are several potential applications.

### **Phase II Area**

The map below (**Figure 29**) captures the existing fiber available downtown from Altice (in blue) and demonstrates the potential for extending this network downtown, which is represented with dash blue lines, into the downtown area surrounding the Plainfield train station.

The Meet Me Room MMR is proposed to be placed in a government building at 200 West 2nd Street because of its ideal height and the existing fiber; close by. A site survey would need to be conducted, but the fiber appears to be buried which will place the new proposed build (yellow fiber) at an additional cost, but minimally this MMR building could be a wireless aggregation node and use the existing in-house building fiber as backhaul further allowing connectivity to the West End Industrial Corridor or the Phase II Area.

*Moreover, the same MMR with fiber (yellow) and rooftop wireless capability could serve the Train Station area, the Plaza area and the Arts District. This is referred to as the Phase II Area and was not part of the original NJ EDA grant SOW.*



**Figure 29: Phase II Area**