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September 19, 2017

Brian Golden, Director
Boston Planning and Development Agency
One City Hall Square, 9th Floor
Boston, MA 02201

Attn: Tim Czerwienski

Subject: 252-264 Huntington Avenue

Dear Mr. Golden:

We are writing this letter to provide an update on changes made to the 252-264 Huntington Avenue Project (the Project) on behalf of QMG Huntington, LLC (the Proponent). The Project site comprises the three contiguous parcels at 252, 258, and 264 Huntington Avenue. Located in a portion of the Fenway neighborhood known as the Avenue of the Arts district of Boston, the site is generally bounded: on the northwest by Huntington Avenue, on the northeast by a three-story, mixed-use building commonly known as 250 Huntington Avenue; on the southeast by Public Alley 821; and to the southwest by Public Alley 822 and a six-story mixed-use building commonly known as 270 Huntington Avenue. The parcel known as 264 Huntington Avenue includes the existing 890-seat Boston University Theatre and its four-story masonry annex. The parcels at 252 and 258 Huntington Avenue are each currently improved by two-story, masonry buildings, with ancillary uses to the Theatre.

Expanded PNF Project

The Project, as described in the PNF, proposes to redevelop the former university property along Boston's Avenue of the Arts, while leaving intact the 890-seat theatre at 264 Huntington Avenue, known as the Boston University Theatre (B.U. Theatre or Theatre). To enable preservation of this cultural facility, the Proponent proposes to construct a new mixed-use building on the two adjacent parcels known as 252 and 258 Huntington Avenue.

The Proponent has signed a license agreement with Huntington Theatre Company (HTC) and upon issuance of a building permit, will gift the Theatre and annex to HTC for $1 benefiting the City by offering long-term stability to this cultural institution. In the PNF, development at the site focused solely upon the 252 and 258 Huntington Avenue parcels, which the Proponent proposes to redevelop with a new, 32-story building with up to 426 residential units, up to 7,500 square feet of retail/restaurant space, and 14,000 square feet of cultural space on the first two levels for use by the Theatre.

Project History

QMG Huntington, LLC submitted a Project Notification Form (PNF) on June 26, 2017. Since the filing of the PNF, the Proponent has met with City agencies, the Impact Advisory Group (IAG), neighborhood organizations, community members, and the Boston Civic Design Commission (BCDC). In addition, the Huntington Theatre Company (HTC) has developed a scope of work that will allow the company to safely and successfully effectuate its mission to provide world-class theatre performances and educational programming to Boston's Avenue of the Arts and the Greater Boston community. This includes renovations to the theatre as well as the redevelopment of the adjacent annex building. In response to comments received, the Proponent has conducted a pedestrian study, and has made refinements to the Project design.

Project Changes

Huntington Theatre Renovations

The Huntington Theatre Company has occupied the Theatre at 264 Huntington Avenue since the company was founded in 1982. After decades of deferred maintenance and capital neglect by its former owner, the theatre requires significant renovations. HTC has embraced the future operation and stewardship of the landmark building with a clear vision of what the restored theatre should be – an improved version of itself – with new handicapped-accessible seating, staging infrastructure, and backstage facilities. The changes will allow HTC to meet the needs of contemporary audiences and performers, and create space to expand its educational outreach programs to the Boston Public Schools and other young people.

The theatre building has received minimal maintenance since a modest renovation project in 1980, and has never been completely upgraded since its original construction 94 years ago. The building's structural system is sound, but will require reinforcement to support new seating configurations and stage rigging. HVAC, life

safety and electrical systems all need to be replaced. Code mandated upgrades are required for seating, access and circulation. The exterior masonry requires repair, as do windows. When the theatre reopens, the public will benefit from improved seating, enhanced lighting, and restored finishes in both the auditorium and lobbies, as well as expanded program space for gathering, education and performance, located within the new residential tower.

The exterior masonry of the theatre building requires repair, as do its windows. Therefore, the theatre renovation will also include the rehabilitation of the Huntington Avenue façade, streetscape improvements in front of the theatre, and raising the height of the "stage house," located towards the rear of the parcel by approximately 10 feet to allow for an improved rigging system.

The existing concrete entry platform along Huntington Avenue will be removed entirely, and an elegant stone terrace will be re-constructed from 1923 blueprints. Reinstating the original terrace will provide an outdoor extension of the historic theatre lobby. Certain deviations from the original design are required to meet contemporary program and design requirements, however, these exterior renovations will be consistent with the Secretary of Interior's Standards for the Treatment of Historic Properties.

Replacement Annex Building

Until recently, HTC housed its scenery production facilities, telemarketing office and rehearsal studio at 254 and 258 Huntington Avenue, which also provided loading access to the theatre space. Additionally, HTC currently leases administrative office space across Huntington Avenue. In order to consolidate these functions, HTC proposes to demolish the existing, four-story annex building at 264 Huntington Street, abutting Alley 821 (the West Wing), and replace it with a new structure of up to 100 feet in height. The replacement West Wing will house essential theatre operations including: rehearsal facilities, production shops (including costume, sound and electrical shops), dressing rooms and a green room, a loading area that can accommodate trucks and other delivery vehicles in order to bring sets built off-site and other deliveries into an adjacent staging area for these sets, as well as short-term storage, and administrative offices. The new loading area will conform with current City regulations.

The existing West Wing, built in 1923, is a four story, 18,850 gross square foot (gsf) brick building, 40 feet in height. The replacement West Wing will have approximately 42,000 gsf on eight levels of program space, above a loading dock and

a sub-grade basement for a new mechanical room. The West Wing will not be visible from Huntington Avenue, and as an addition to an historic structure is consciously differentiated from it in architectural style. The West Wing will have an exposed lightweight steel frame and concrete deck, a simplified cladding system, and durable interior finishes. Floor plans, sections, elevations, and renderings of the new West Wing are provided in Figures 1 through 15, at the end of this letter.

Both renovation of the historic theatre, and construction of the replacement West Wing for support functions, are made possible by the gifting of the entire parcel and its improvements – both the theatre and the existing annex - to the HTC by QMG Huntington, LLC. QMG Huntington, LLC is also paying to develop 14,000 sf of space within the adjacent tower for rent-free use by HTC over a 99-year lease, including a new, fully accessible lobby for the theatre.

Altogether, the renovations to the theatre, the replacement West Wing, and the new cultural space in the adjacent tower allow HTC to preserve the theatre building while providing up-to-date amenities for artists, audiences, and the community, and implementing state-of-the-art technology for its productions in the theatre itself.

Table 1 below provides a revised Project program.

Table 1 Revised Project Program

Project Element	Approximate Dimension - PNF	Approximate Dimension - Supplemental
New residential	Up to 426 units	Up to 426 units
New retail/restaurant	7,500 sf	7,500 sf
New theatre space	14,000 sf	56,000 sf
New Parking	114 spaces	114 spaces
New Gross Square Footage (GSF)	**405,500 sf**	**447,500 sf**
Demolished university space	30,008 sf	30,008 sf
Demolished theatre space		18,850 sf
Net change in GSF	**+375,492 sf**	**+398,642 sf**
Gifted theatre space to remain	35,654 sf	16, 804 sf

Table 1 Revised Project Program (Continued)

Project Element	Approximate Dimension - PNF	Approximate Dimension - Supplemental
Height of new building	32 stories/ 362 feet	Residential tower – 32 stories/362 feet West Wing – 8 stories/100 feet
Total lot area	34,173 sf	34,173 sf
Total GSF at Project completion	441,154 sf	464,304 sf
Resulting floor Area Ratio (FAR)	12.9	13.6

Changes in Tower Design

Through the ongoing design review process between the BCDC and the architects of the residential tower, small changes to the exterior of that building have been made. These include the reduction of the second-floor balcony to accommodate a larger glass expression at the theatre entrance. This enlarged entry includes higher floor to ceiling heights at both the first and second levels of the tower to accommodate programing requirements of the adjacent theatre. The design team is also looking at a more refined curtainwall language for the north and south facades of the building and will be presenting these changes for the BCDC to review later in the month of September.

Summary of Environmental Impacts

The anticipated impacts related to changes to the Project are described below. The minor design changes to the residential tower do not result in any significant changes to environmental impacts.

Transportation

Howard Stein Hudson, the transportation consultant, has reviewed the Theatre's program, in light of planned operations at the replacement West Wing and assessed potential transportation impacts.

The existing and future operations of major operational components of the Huntington Theatre Company are described below along with a general discussion of transportation issues.

- West Wing – Currently the four-story West Wing includes dressing rooms, the costume shop, supplemental rehearsal spaces, and some administrative space. The replacement West Wing will be eight stories and continue to serve as production support, but will house all rehearsal space and all theatre administrative offices. A new off-street loading facility will be located on Alley 821, near the corner of Alley 822. Trucks will be able to maneuver fully into the loading dock and not block other vehicles travelling in the adjacent alleys. This is an improvement over current operations, which can involve loading from the Huntington Avenue sidewalk in front of the theatre. A dockmaster will oversee operations at the new loading facility. Overall, the replacement West Wing will consolidate activities that are currently occurring in nearby buildings and will not a net create an increase in vehicle trips in the area.
- Production Studio - Until recently, the production studio, located in two contiguous buildings at 252-258 Huntington Avenue, housed the scene shop, paint shop, props shop, storage, rehearsal space, and some administrative space. Trucks serving the production studio functions would park along Huntington Avenue. These buildings have always been proposed to be demolished as part of the residential portion of the Project. Now, the rehearsal and administrative functions previously housed here will move to the replacement West Wing. In addition to theatre staff, students and faculty from Boston University had been occupying the production studio (and, at times, the existing West Wing), but have since been relocated to B.U.'s new theatre on Commonwealth Avenue. In July 2017, the scenery and production services moved permanently off-site to Everett, Massachusetts, and, therefore, much of the employee travel and delivery activities associated with these functions no longer occurs in the Huntington Avenue area. Deliveries between the off-site Everett facility and the replacement West Wing will occur at the new, off-street loading facility on Alley 821.
- Performance – While the historic theatre itself will undergo restoration and enhancements, including a new lobby within the adjacent residential tower, the seating capacity, and therefore, the level of travel activity generated by performances, will not change.
- Administration – In addition to the administrative space that had been housed in the production studio and is currently in the West Wing, the theatre leases office space within the two-story retail/office building across Huntington Avenue, near

Gainsborough Street. These administrative functions will also move to the replacement West Wing, allowing consolidation of all theatre office space in one building. The travel activity generated by these employees will not change – their origins/destinations will simply change from one face of the same block to another. For example, an administrative employee who currently walks from the MBTA's Green Line Symphony Station will instead walk to the replacement West Wing location rather than to rented offices on the other side of the same street. Note that the overall number of theatre employees – administrative and other - will remain the same as the current level.

The overall combination of relocating some theatre functions from the to-be-demolished production studio to the replacement West Wing and consolidating administration in the new West Wing is expected to have no negative impact to traffic volumes or travel patterns in the area. In fact, the relocation of the production functions to the site in Everett has already created an associated small reduction in trip activity along Huntington Avenue.

The traffic analysis contained in the June 2017 PNF continues to reflect the whole of transportation impacts expected from the Project, including the Huntington Theatre's replacement West Wing. The Project is still expected to have minimal impact on the surrounding transportation network, and will take advantage of the transit and pedestrian/bicycle opportunities to limit the number of vehicle trips generated.

In addition to studying the potential impacts of the Project changes, Howard Stein Hudson conducted a sidewalk pedestrian capacity and level of service (LOS) analysis to assure adequate pedestrian flow can be maintained at this location once the improvements are in place. This analysis is presented in Attachment A. Note that although the site plan has been modified since this study was conducted, and the effective sidewalk width has been slightly reduced, the Project will still significantly improve existing conditions.

Wind

RWDI, the wind consultant, reviewed updated massing diagrams that incorporate the replacement West Wing building, and is of the opinion that these changes will not result in any changes to the conclusions or recommendations previously presented by RWDI in the PNF. A letter stating this opinion is presented in Attachment B.

Shadow

Updated shadow graphics, presented in Figures 16 through 29, show that minimal new shadow will be cast by the replacement West Wing building, which will be approximately 60 feet higher than the current West Wing building.

Daylight

The replacement West Wing will not be visible from Huntington Avenue, and will not change the daylight obstruction values presented in the PNF.

Solar Glare

The replacement West Wing will not include highly reflective glass and will not create significant solar glare impacts.

Air Quality

The proposed Project changes will not result in a change to the number of vehicle trips, so air-quality impacts remain the same as described in the PNF.

Noise

Noise impacts are anticipated to be similar to those described in the PNF.

Construction

A Construction Management Plan in compliance with the City's Construction Management Program will be submitted to the Boston Transportation Department, and provide information on construction impacts and mitigation.

Sustainable Design

Energy conservation and other sustainable design measures are integral to the proposed Project. The design team will work with the BPDA to incorporate systems to improve the building performance of the replacement West Wing and Theatre, both of which will be supported by all new mechanical systems.

Urban Design

At street level, the replacement West Wing building will be hidden from view due to its location along the alley and the height of the abutting buildings. The design of the West Wing will be sensitive to the proximity of adjacent buildings, specifically respecting the privacy of residential units. Both the adjacent buildings have few if any windows facing the 264 Huntington Avenue parcel for the first 30 to 50 feet above grade. Openings in the replacement West Wing will emphasize these locations, and the uppermost floor where skylights are feasible, and limit windows directly opposite residential units.

The existing concrete entry terrace along Huntington Avenue will be removed and a re-interpretation of the original, elegant stone terrace will be constructed in alignment with historic design review requirements. The new terrace will allow a wider sidewalk in front of the building and direct pedestrian traffic to the new, accessible public entry at the base of the new tower.

Historic Resources on the Project Site

The Theatre, designed in 1923, is eligible for listing on the National Register of Historic Places and HTC, working through its third-party consultant, has submitted a preliminary review request to the National Park Service (NPS), relative to utilizing federal historic tax credits for the rehabilitation of the theater. Based on the initial budget, the theatre renovations could be eligible for up to $6 million in historic tax credits providing a significant amount of equity. The preliminary review, also known as a "blue sheet" review, focuses on the demolition of the rear wing, the retention of the arcade, and the rehabilitation of the main façade. If HTC moves forward with the full tax credit application, then all interior and exterior work will be reviewed by the Massachusetts Historical Commission and NPS. The rehabilitation will bring the historic finishes in the public area back to their original condition while allowing for changes required to meet current ADA and life safety codes. Additionally, the building will receive all new infrastructure and systems as well as the most up to date sound and lighting equipment, all while preserving its historic character.

The originally intended use of the existing annex building was as the "Club Building" makes it significant relative to the original history of the theatre. However, in practice, the existing West Wing instead served back-of-the-house functions for all but a very short period. Used as a workshop by B.U. since its purchase of the property in 1956, the assembly hall has lost most of its original distinguishing features. While the theatre

building facing Huntington Avenue retains sufficient integrity to be eligible for listing on the National Register, the removal of the rear annex, which is not visible from the public way and has generally not been publicly accessible, does not represent the loss of significant historic fabric.

Historic Resources in the Vicinity

The replacement West Wing building will be located immediately south of the rear façade of 270 Huntington Avenue, an early 20th Century residential building listed on the National Historic Register. While the two buildings, both built to their respective property lines, will only be 8-12 feet apart across a public right of way, the impact of the replacement annex on historic resources will be minimal. The rear of 270 Huntington Avenue in not a public façade and does not include formal architectural features. In addition, except for its front, north-facing façade, any public view of 270 Huntington Avenue is already concealed by the New England Conservatory's Student Life Building and its Music Library which border the block to the south and west respectively.

The shadow studies presented in Figures 16 through 29 show that that the rear façade of 270 Huntington Avenue is already substantially impacted by the New England Conservatory's 150 foot tall Student Life Building and its Music Library, which, as just noted, border the block to the south and west respectively. The replacement West Wing will cast only very minimal new shadows on 270 Huntington Avenue, and only for a few days during the year. It will not cast any new shadows on any other historic resources in the vicinity of the site.

Infrastructure

The changes to the Project described in this supplemental submission are not anticipated to result in an increase in wastewater generation. The Project's stormwater impacts are anticipated to be similar to those described in the Expanded PNF.

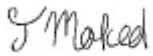
Conclusion

As described above, the changes to the Project will have few impacts in addition to those already described in the Expanded PNF, while continuing to provide a number of benefits, including significant improvements for the theatre, new tax revenue, new construction and permanent jobs, new residential units including affordable housing units, and significant public realm improvements.

We look forward to continuing to work with the BPDA and City as this Project moves forward.

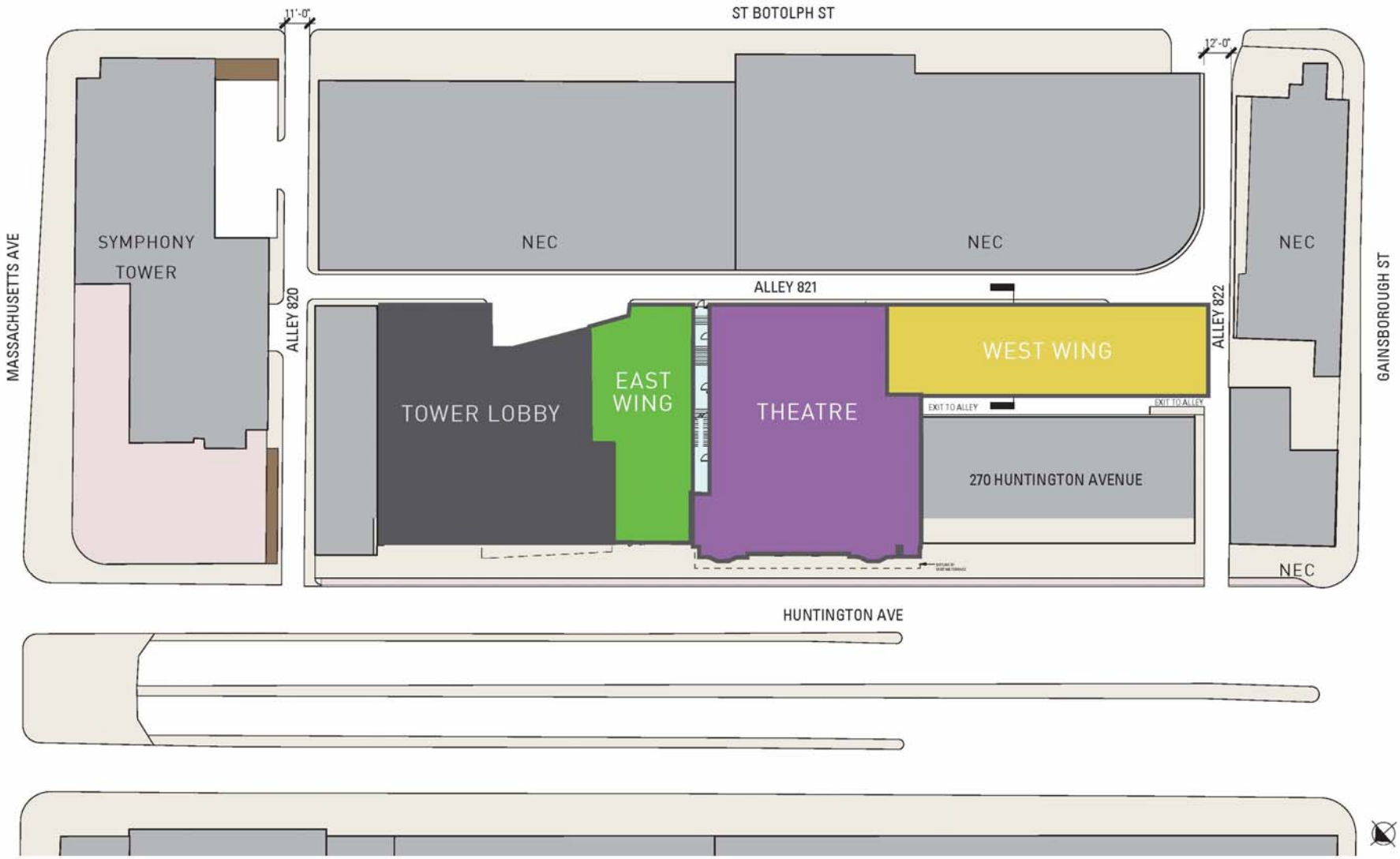
Sincerely,

EPSILON ASSOCIATES, INC.



Talya Moked
Project Planner

Figures



252-264 Huntington Avenue Boston, Massachusetts

Bruner/Cott
architects and planners

Figure 1
Huntington Theatre Campus

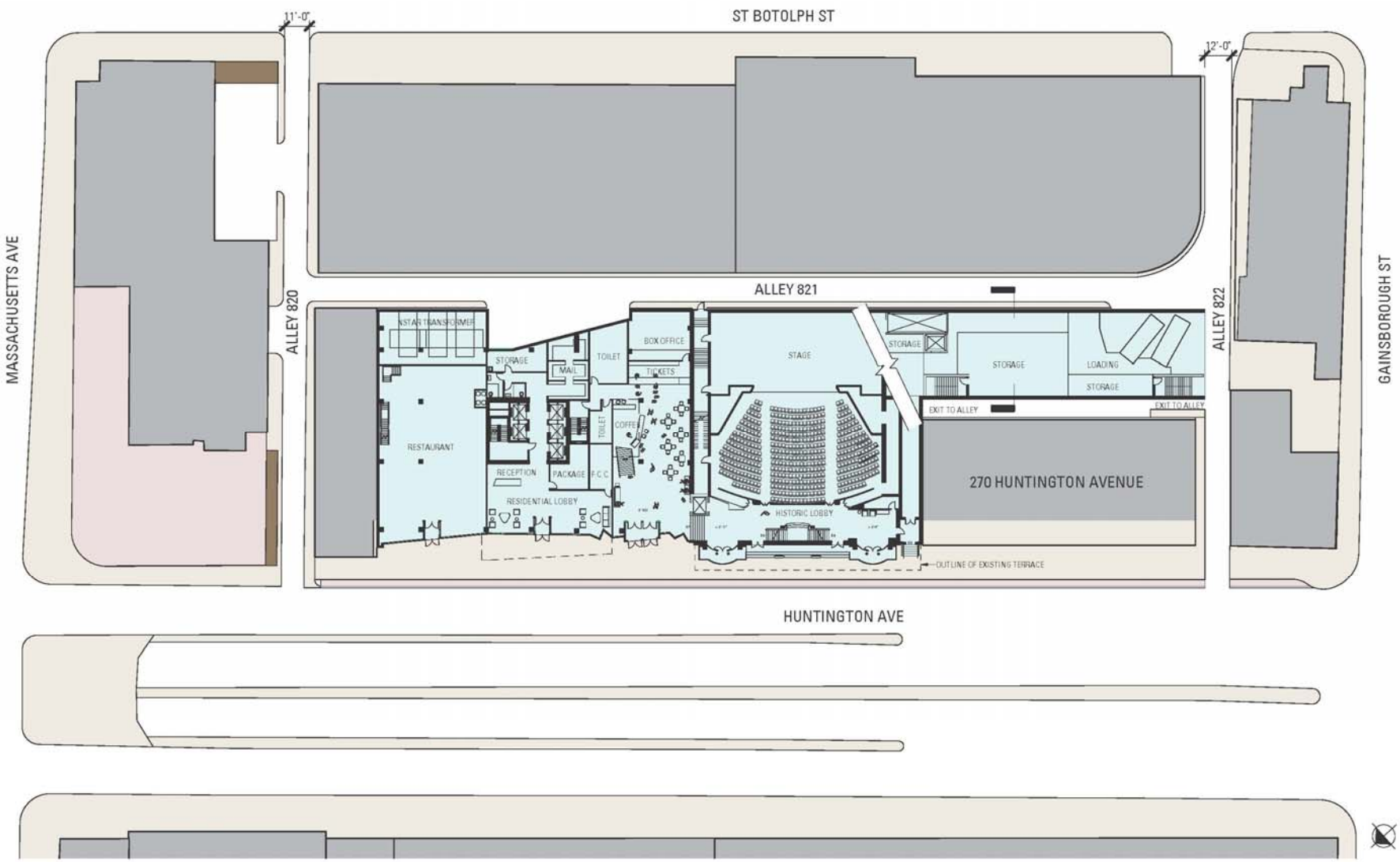


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Figure 2
Site Plan

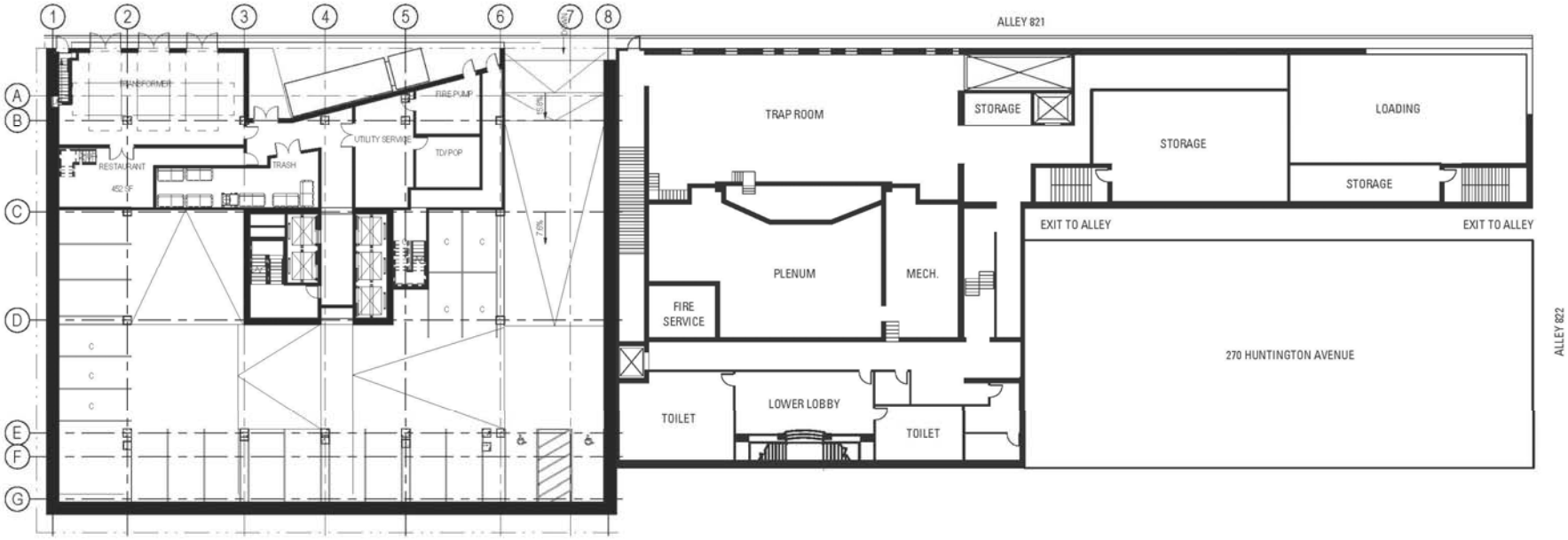

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Figure 3
Lower Level Plan

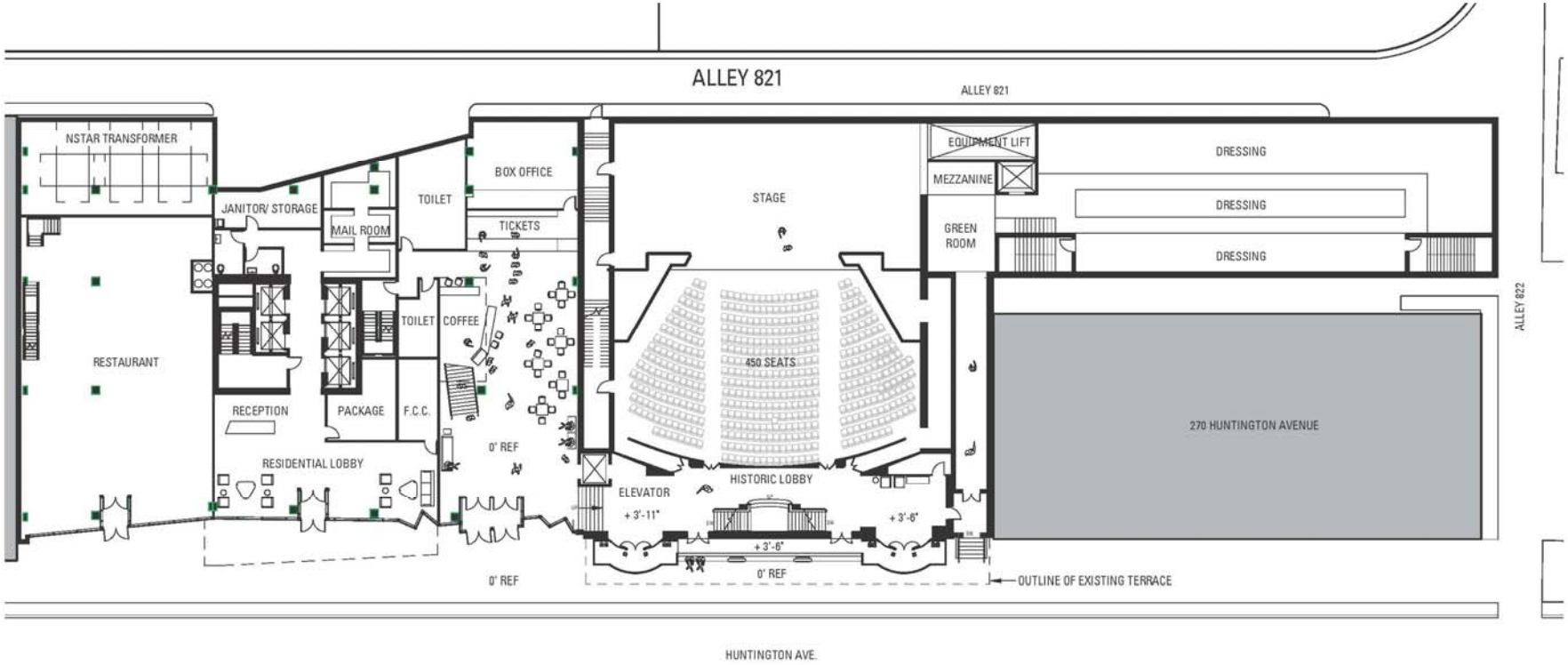

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Figure 4
First Floor Plan

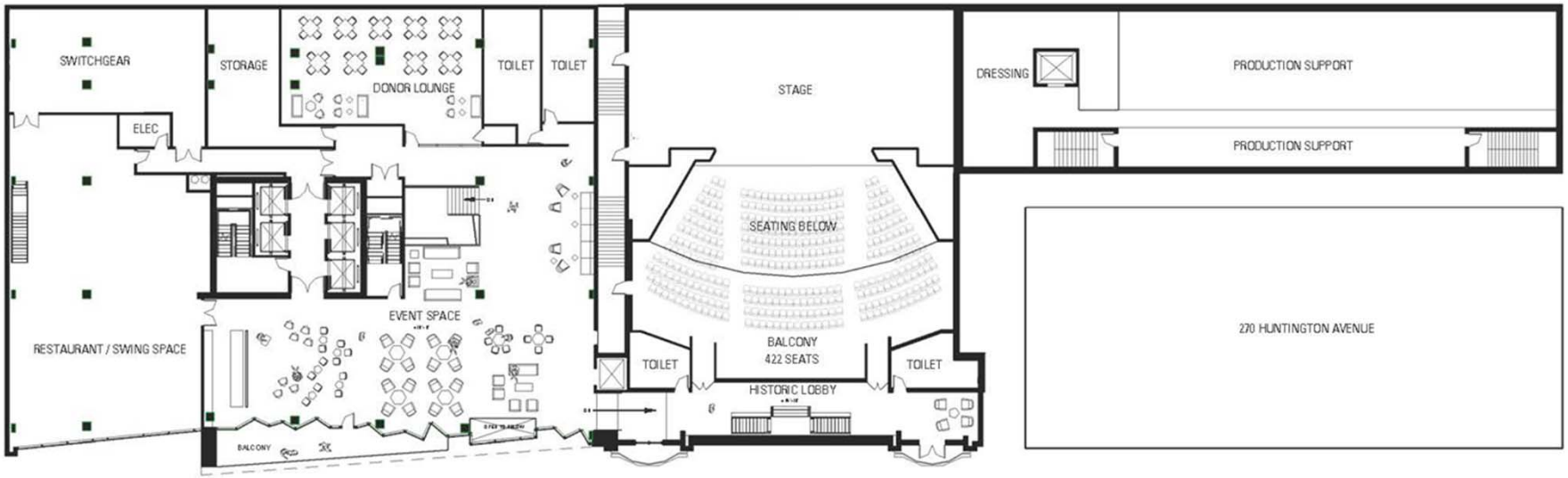

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Figure 5
Second Floor Plan

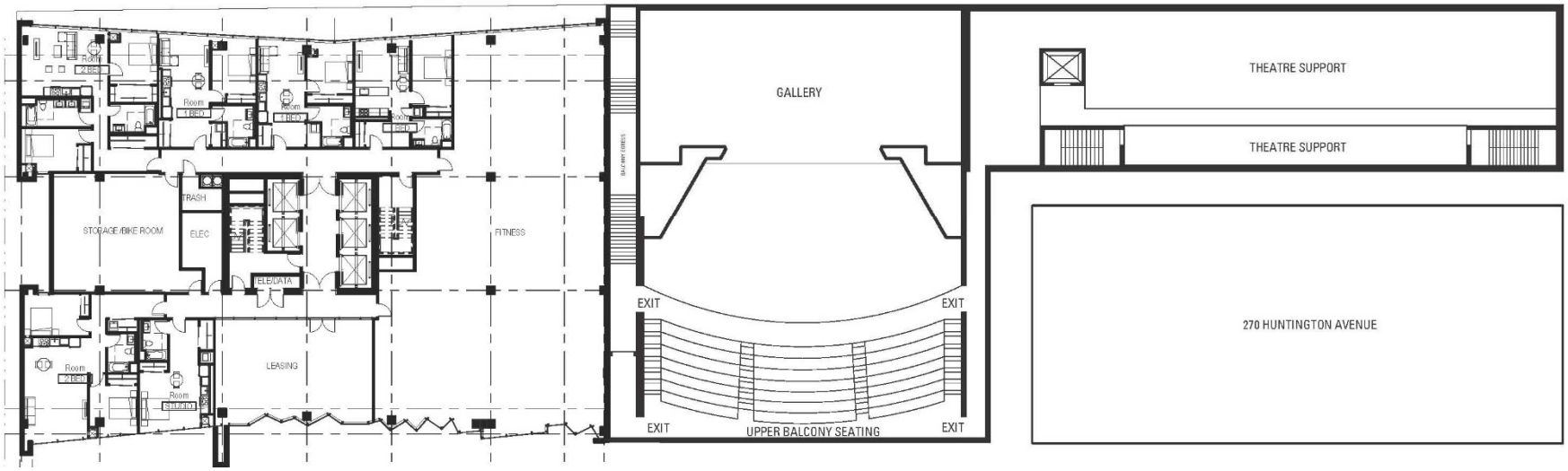

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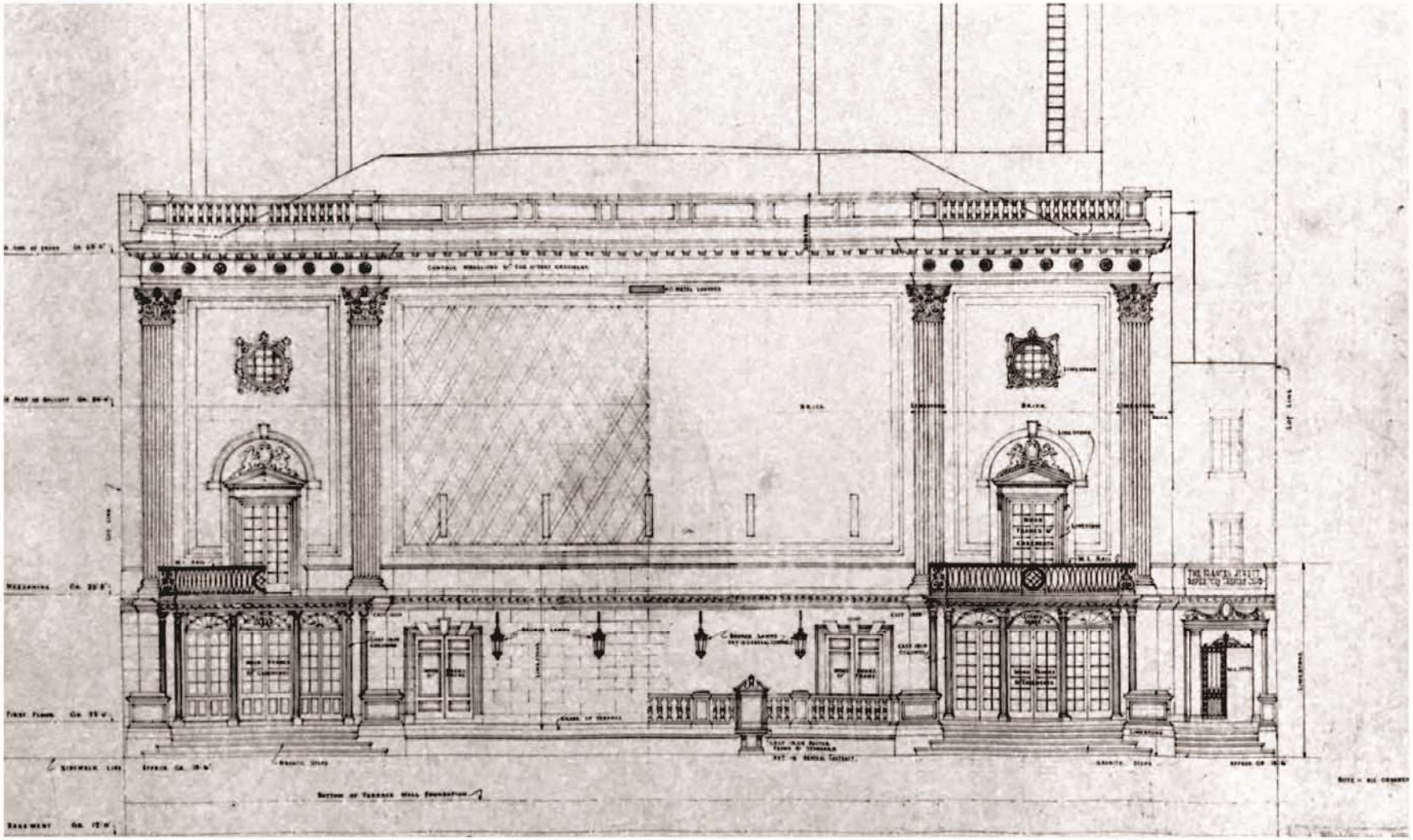
Figure 6
Upper Levels



252-264 Huntington Avenue Boston, Massachusetts

Figure 7
Huntington Theatre 1923 Blueprint

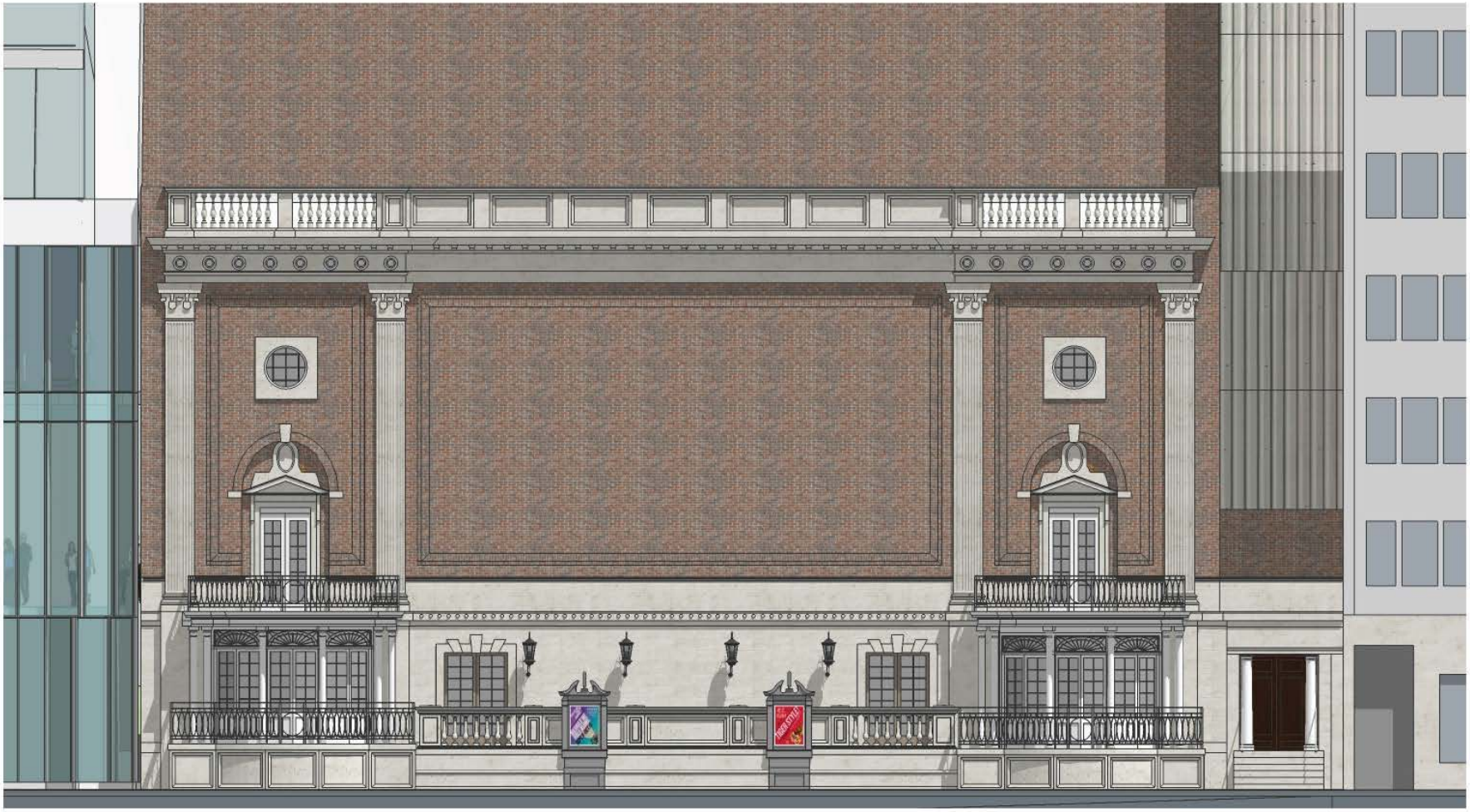


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Figure 8
Huntington Theatre Proposed Elevation

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Figure 9
View of Huntington Avenue

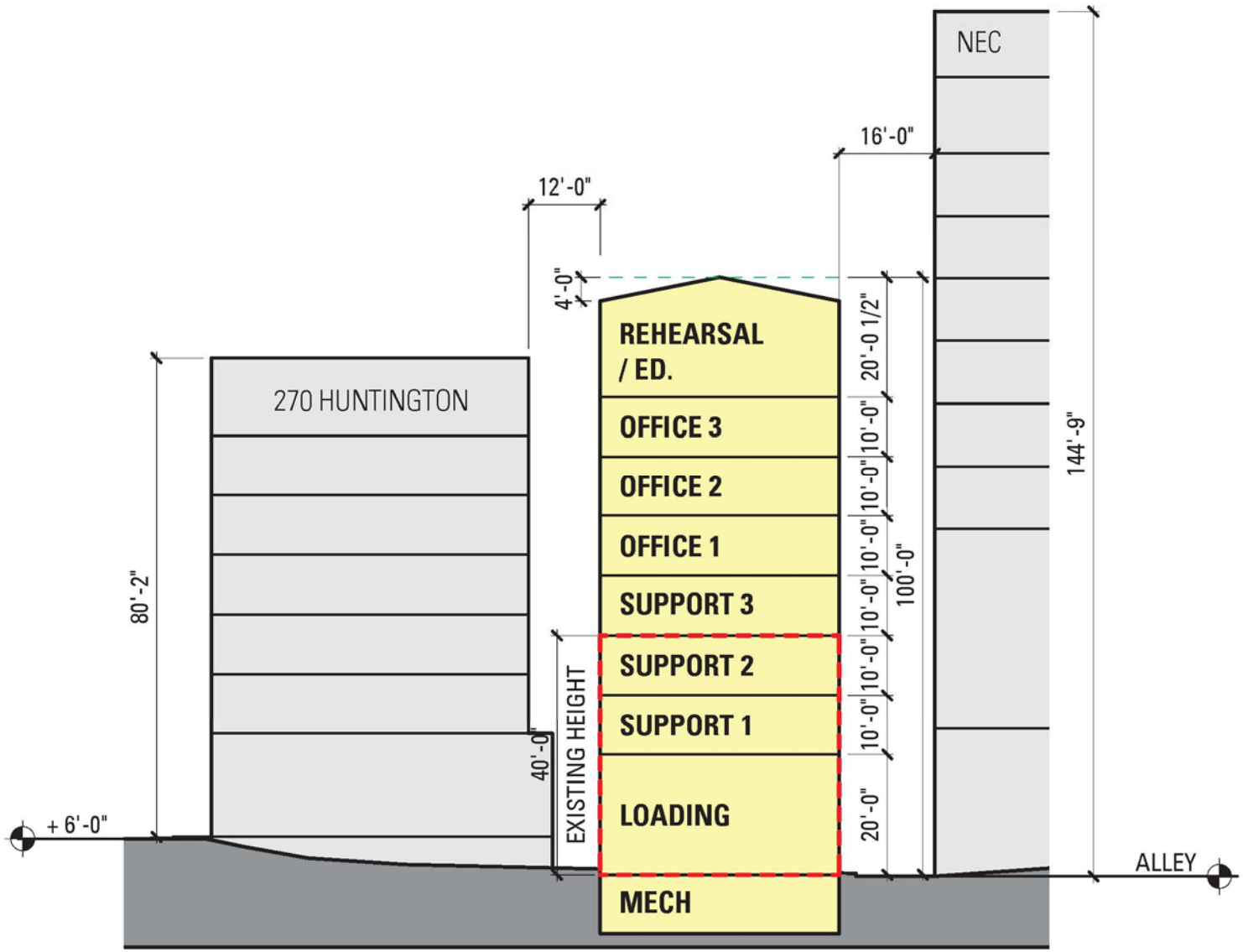

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Figure 10
Conceptual Section – Alley 822

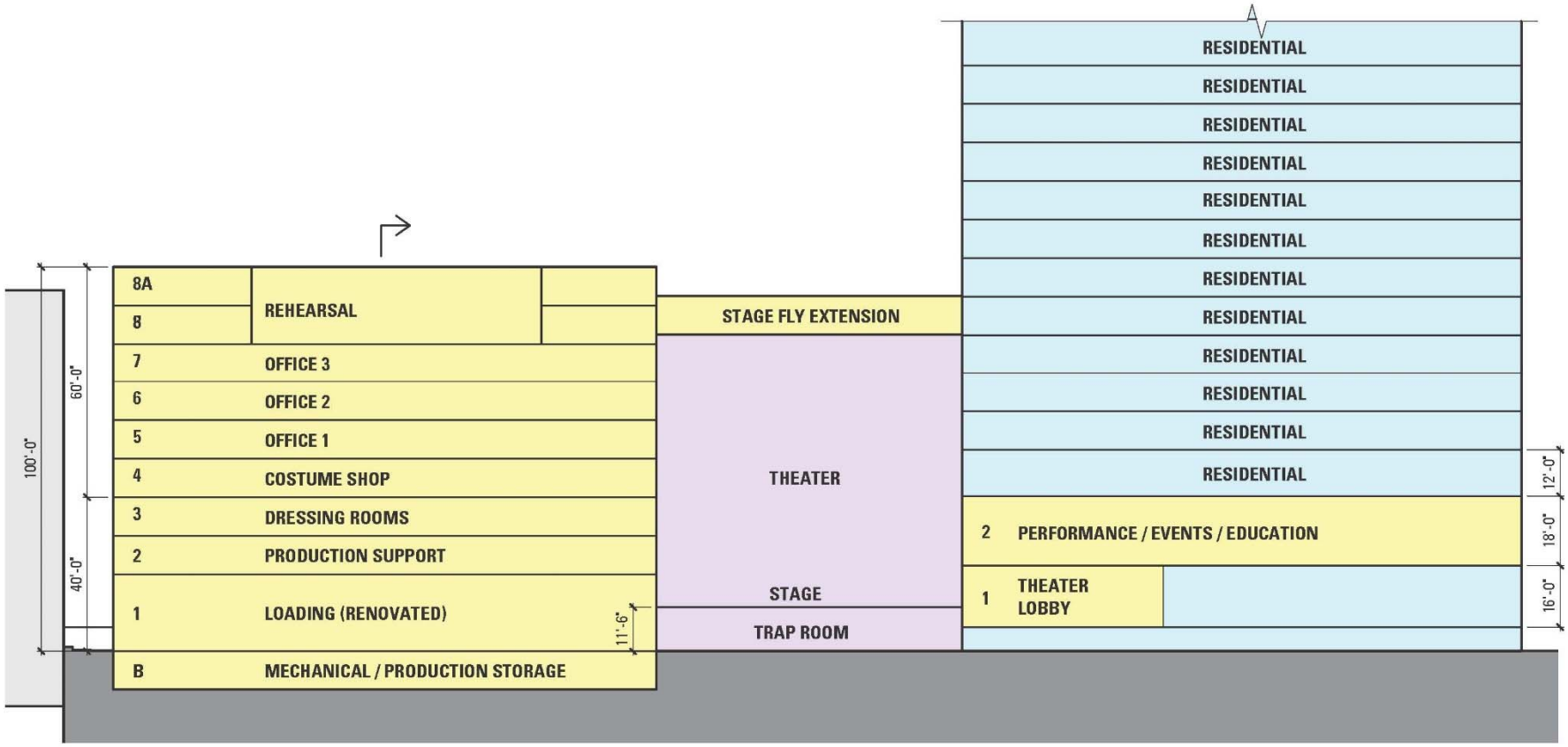

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Figure 11

Conceptual Section – Alley 821

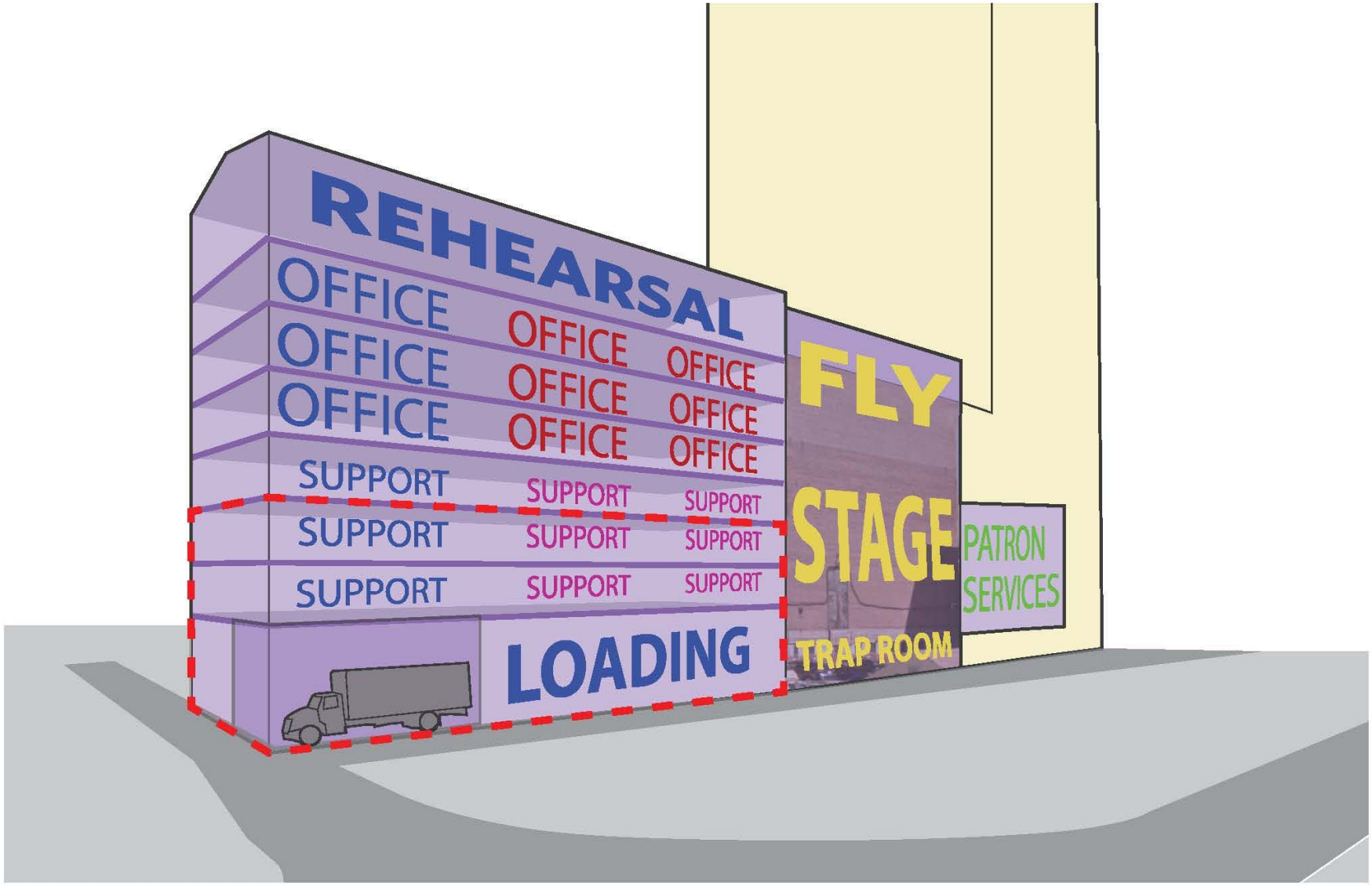

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Figure 12

West Wing – Conceptual Program Diagram

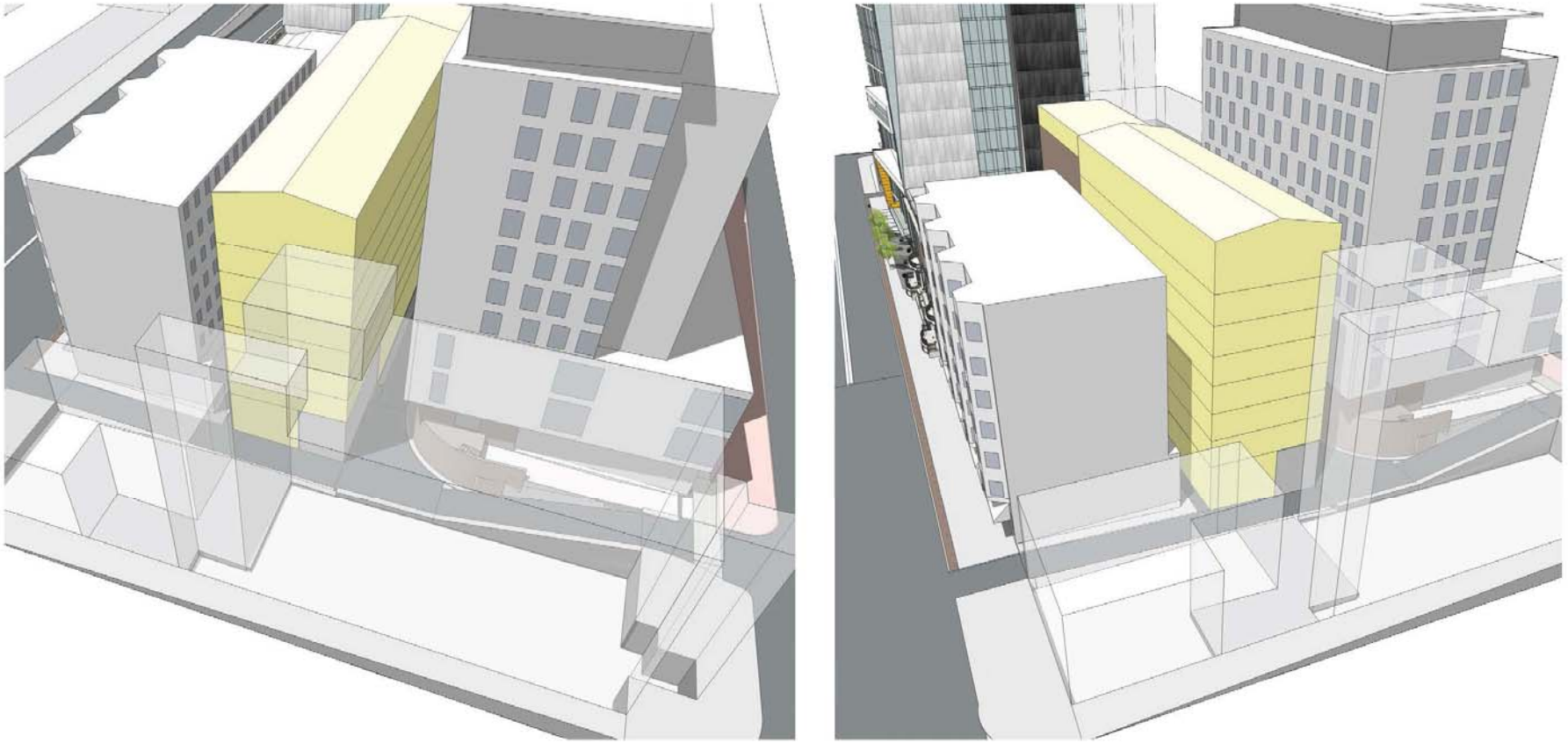
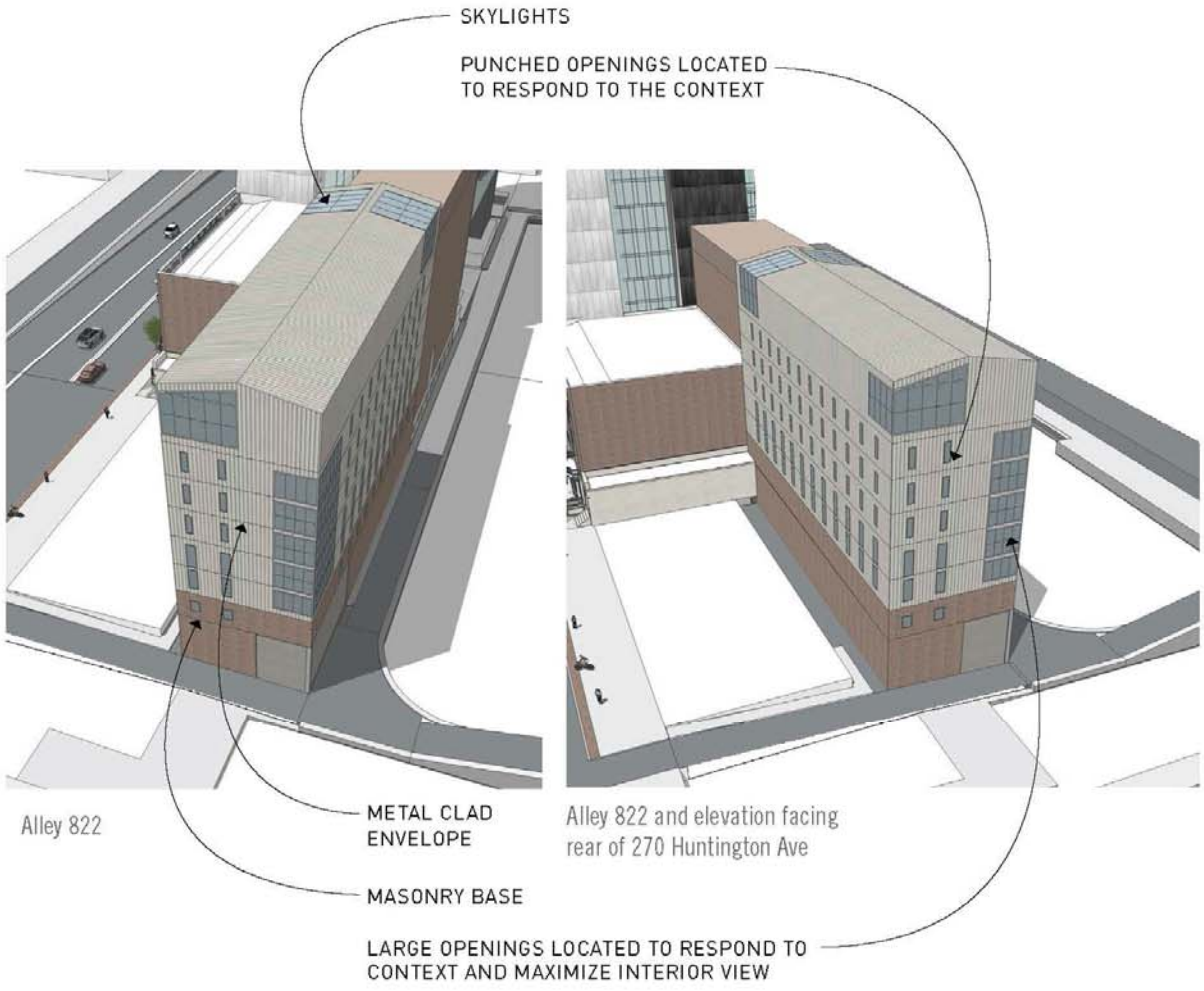
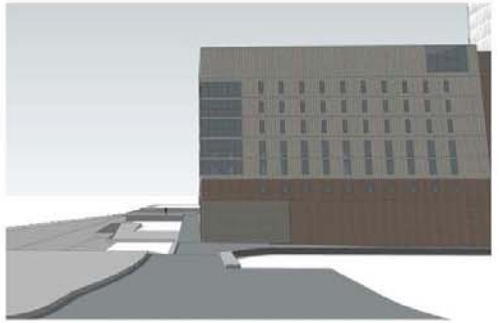


Figure 13

West Wing – Massing with Context



Corner at Alley 821 and 822



View From St Botolph

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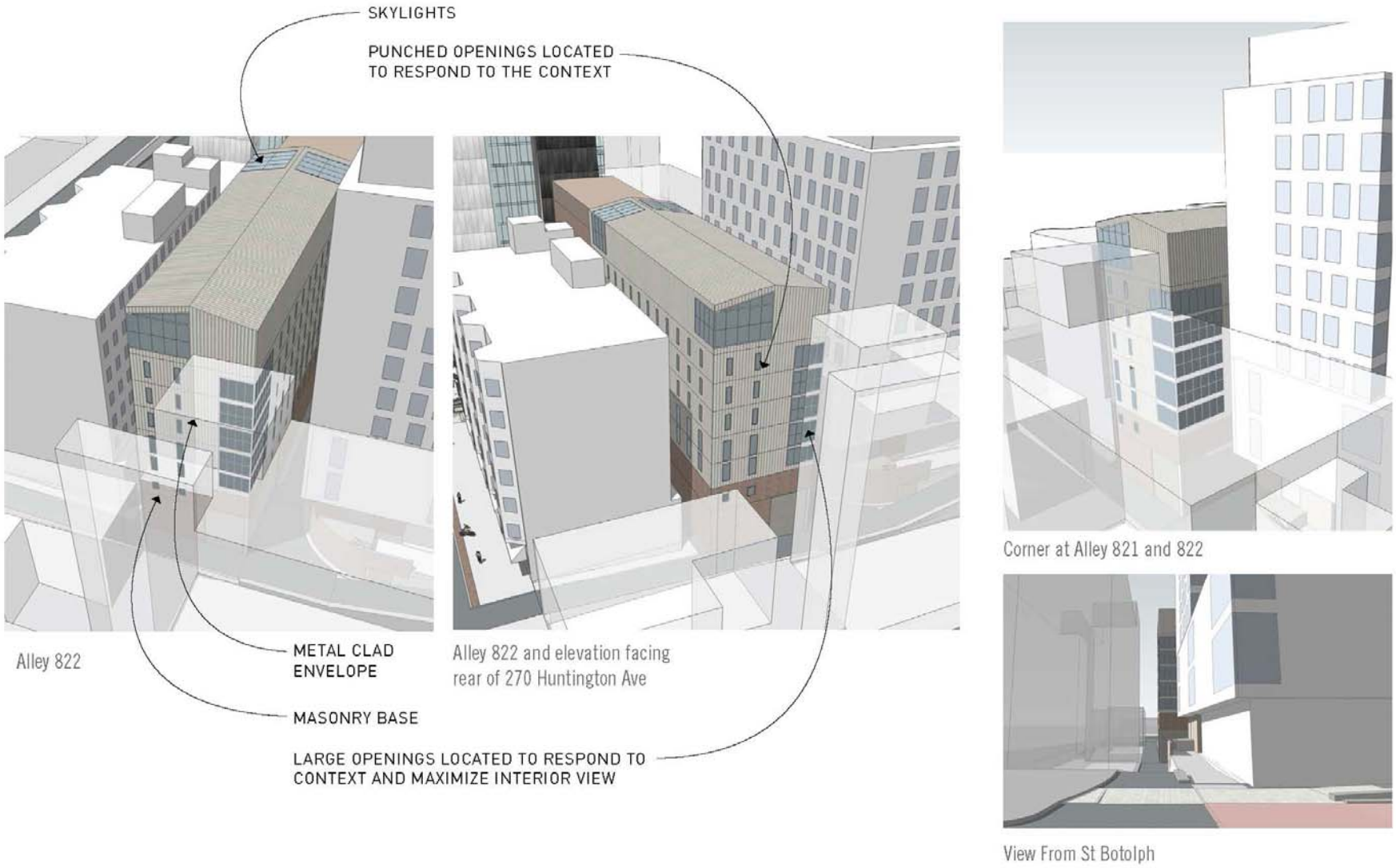
Figure 14

West Wing – Conceptual Elevations without Context



252-264 Huntington Avenue Boston, Massachusetts

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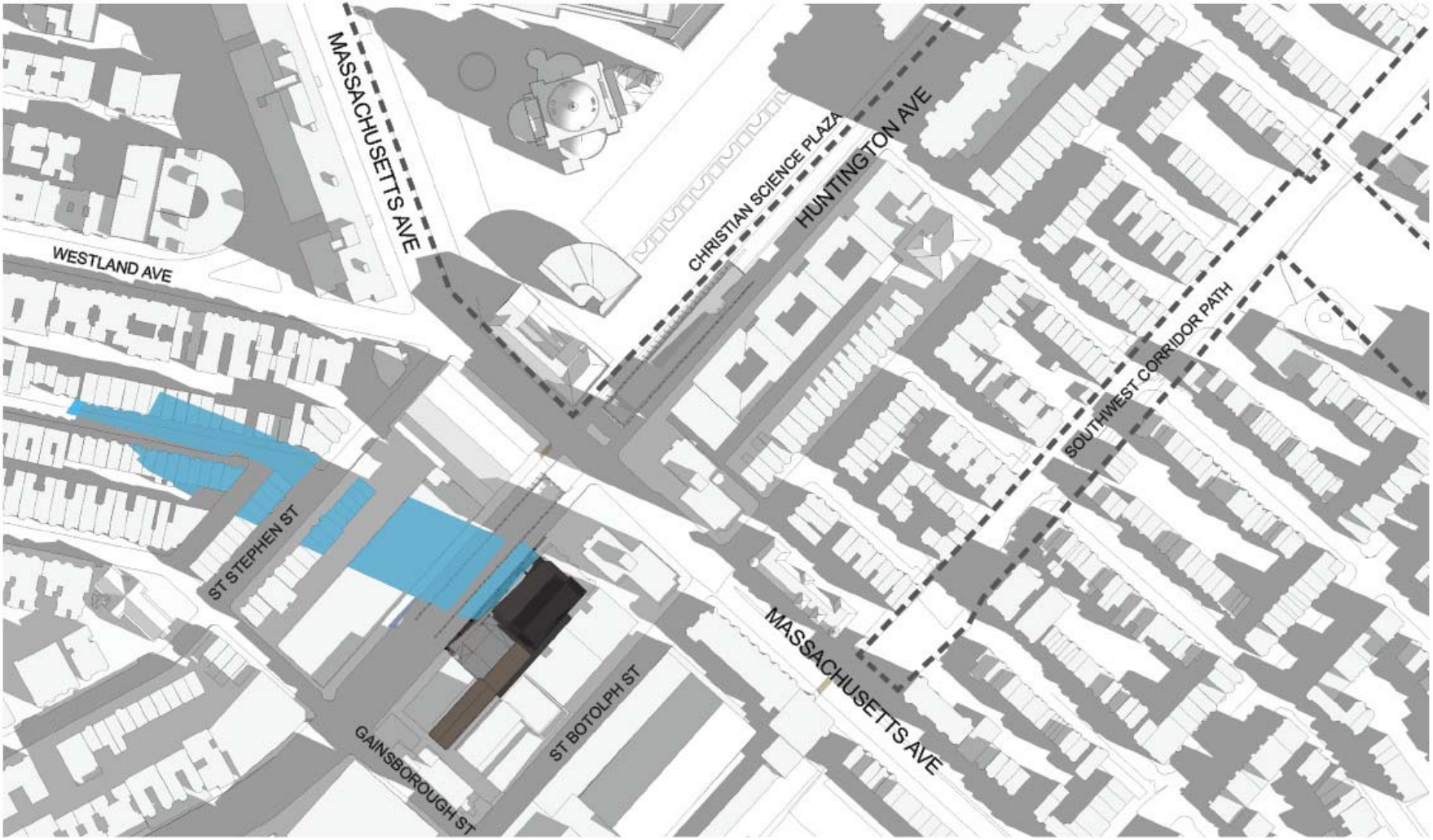
Figure 15

West Wing – Conceptual Elevations with Context

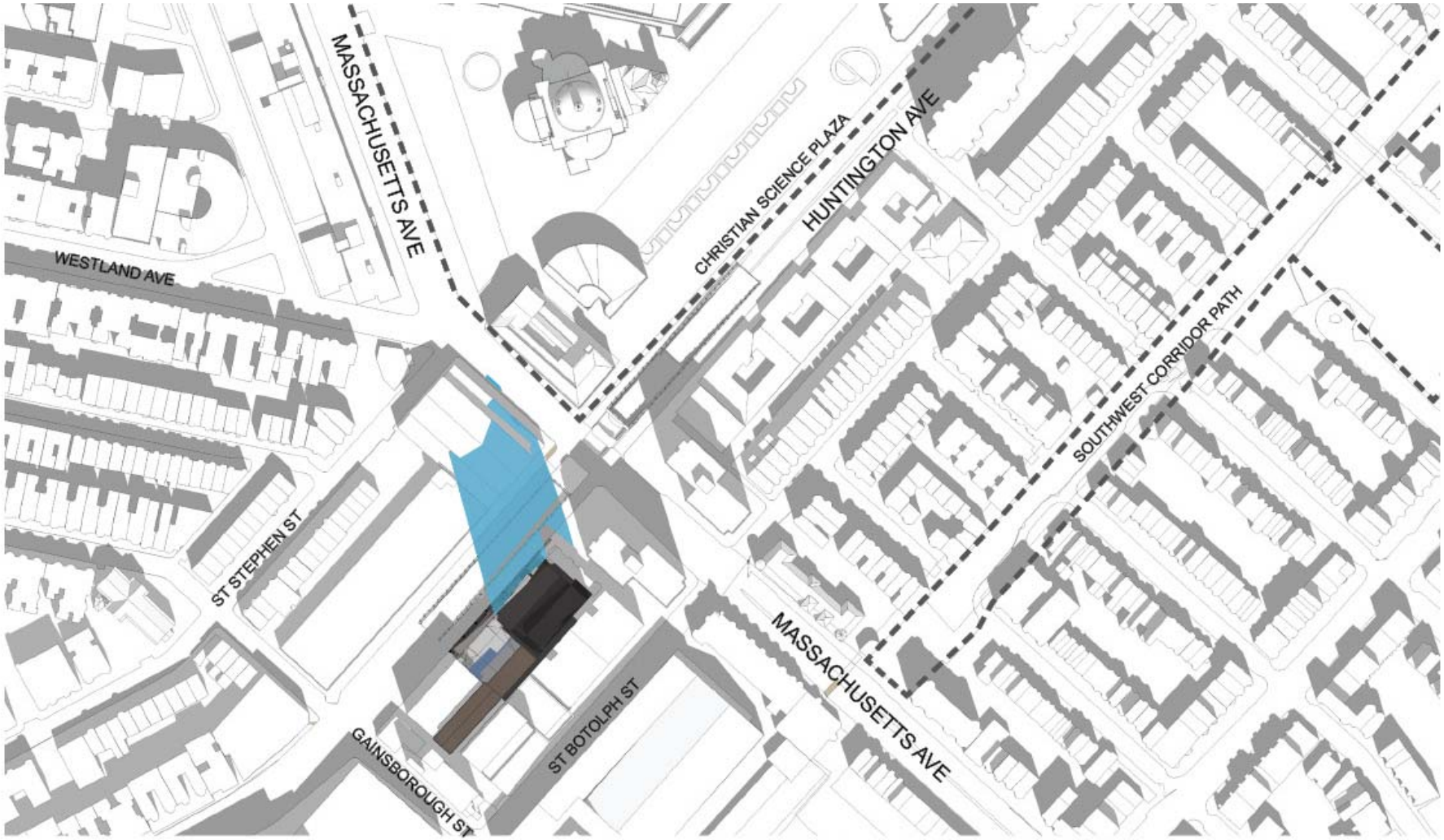


252-264 Huntington Avenue Boston, Massachusetts

Stantec

Figure 16

Shadow Study: March 21, 9:00 a.m.



252-264 Huntington Avenue Boston, Massachusetts

Stantec

Figure 17

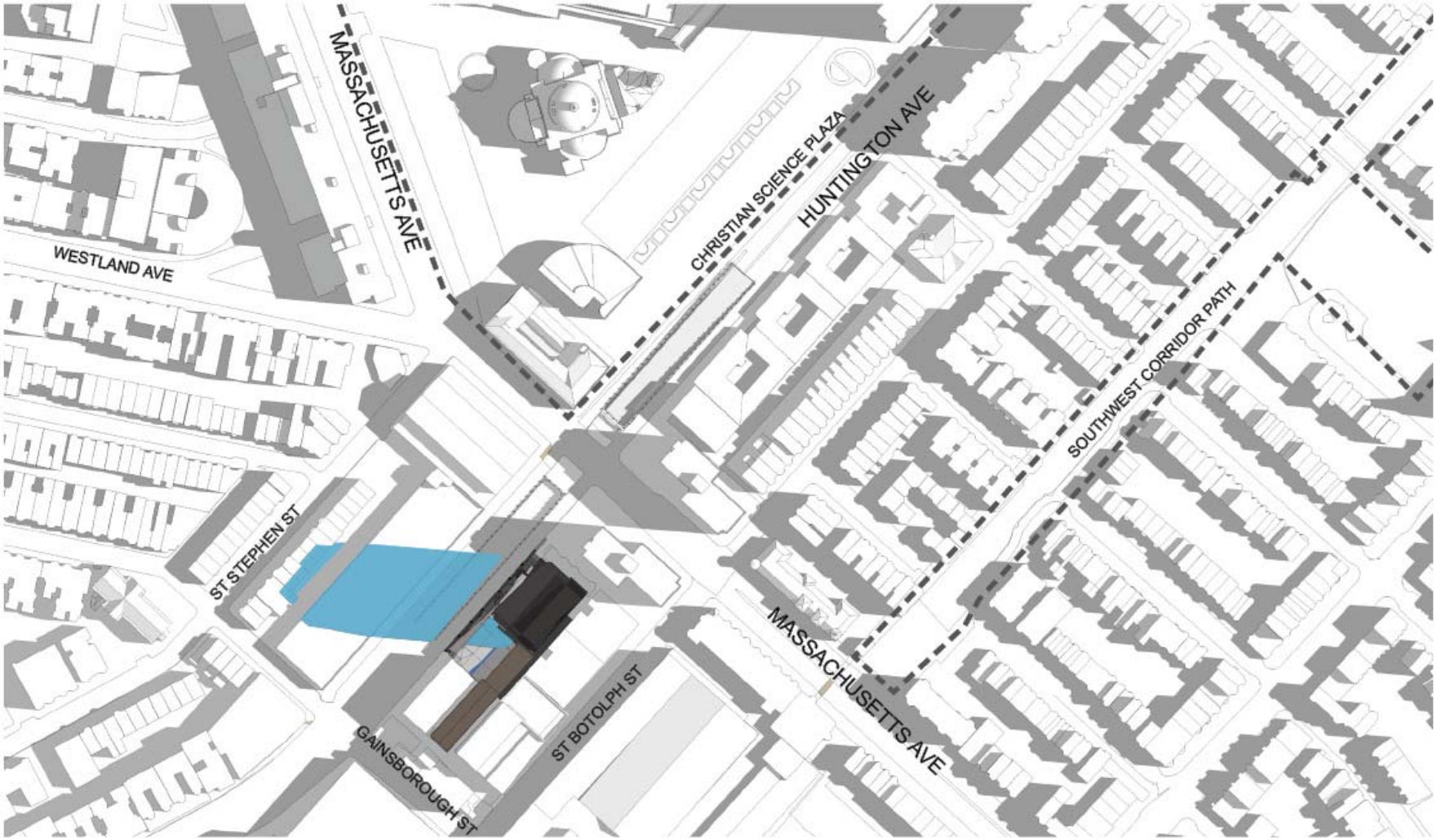
Shadow Study: March 21, 12:00 p.m.

252-264 Huntington Avenue Boston, Massachusetts

Stantec

Figure 18

Shadow Study: March 21, 3:00 p.m.

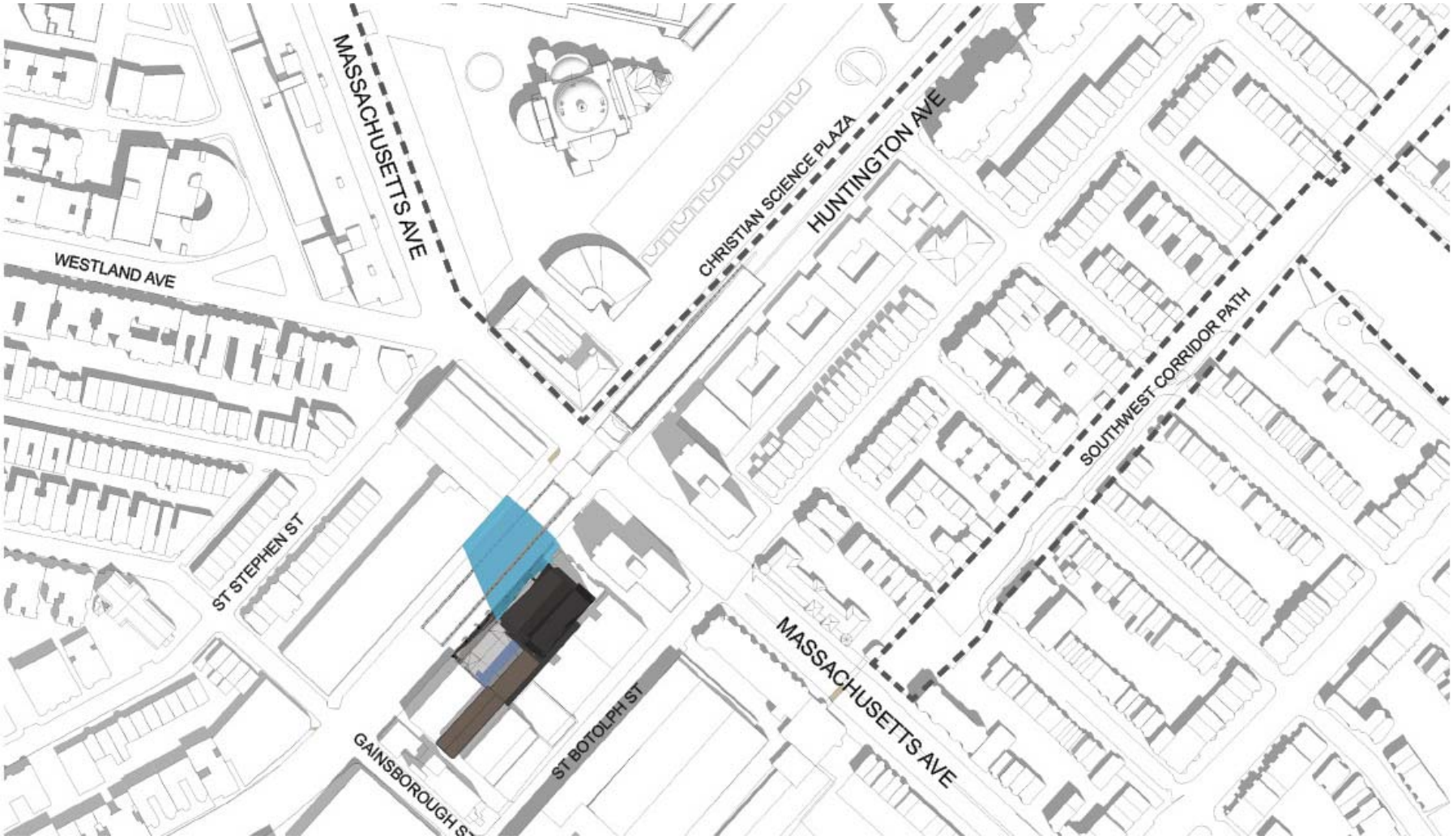


252-264 Huntington Avenue Boston, Massachusetts

Stantec

Figure 19

Shadow Study: June 21, 9:00 a.m.



252-264 Huntington Avenue Boston, Massachusetts

Stantec

Figure 20

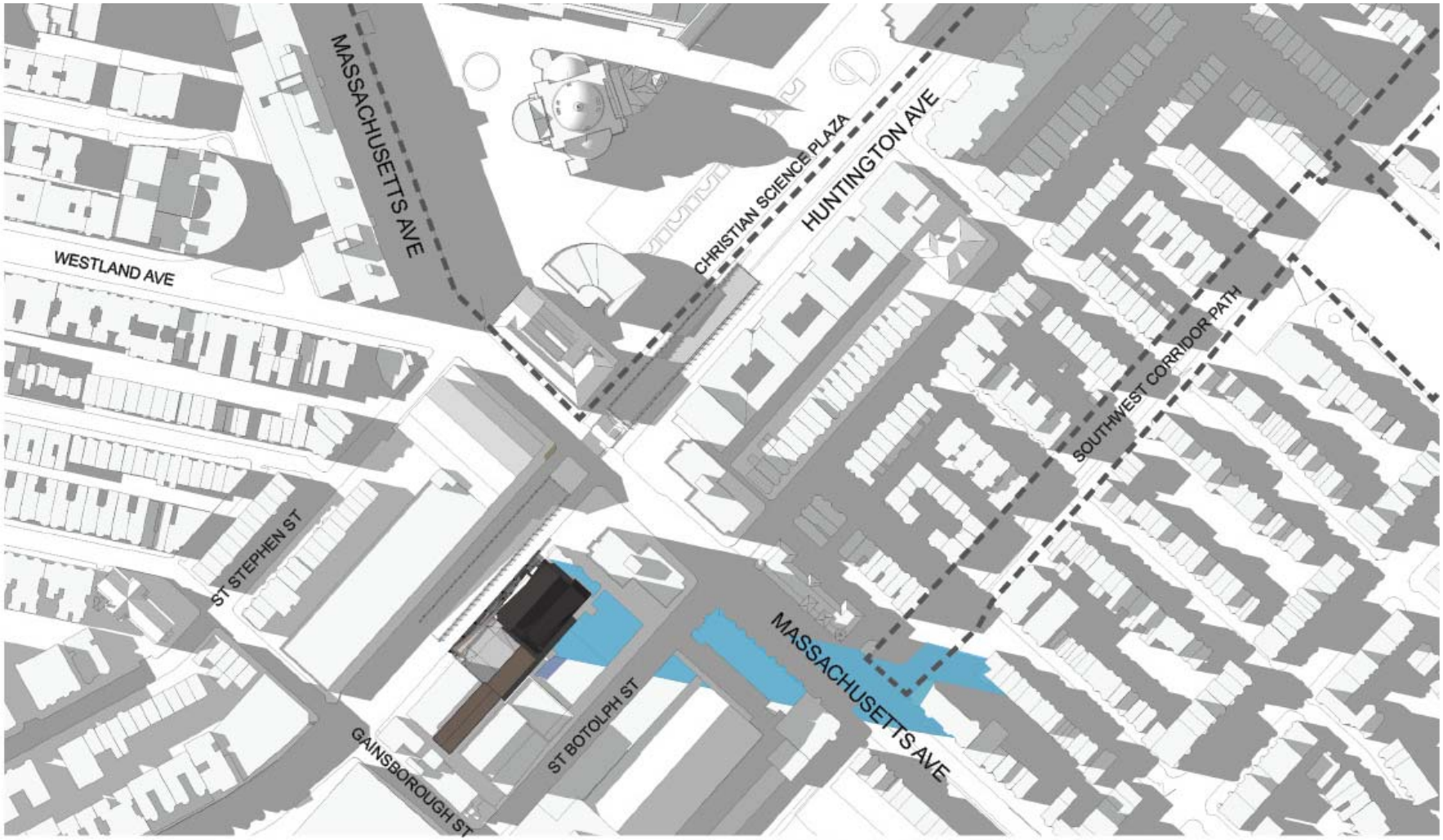
Shadow Study: June 21, 12:00 p.m.

252-264 Huntington Avenue Boston, Massachusetts

Stantec

Figure 21

Shadow Study: June 21, 3:00 p.m.

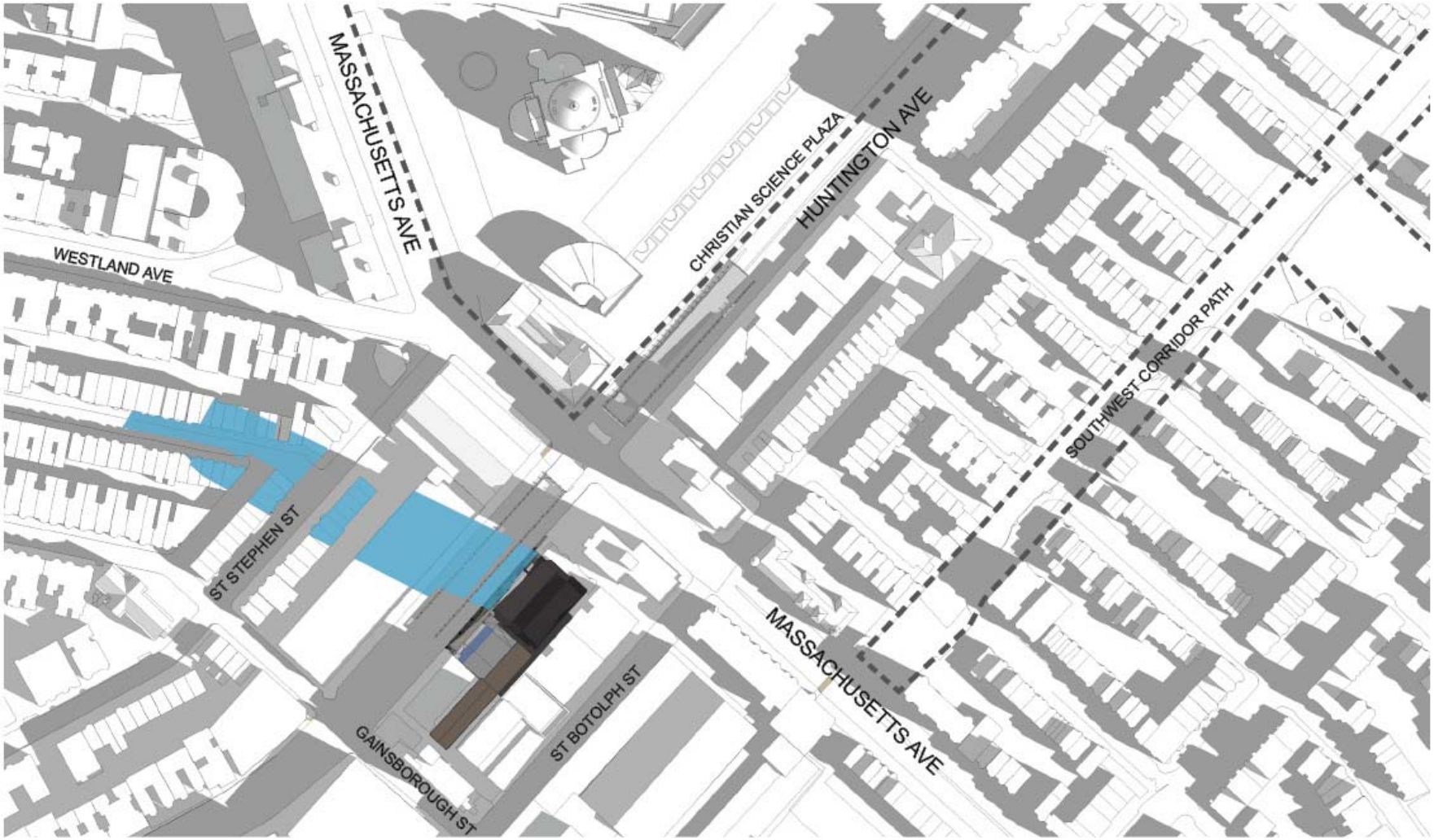


252-264 Huntington Avenue Boston, Massachusetts

Stantec

Figure 22

Shadow Study: June 21, 6:00 p.m.

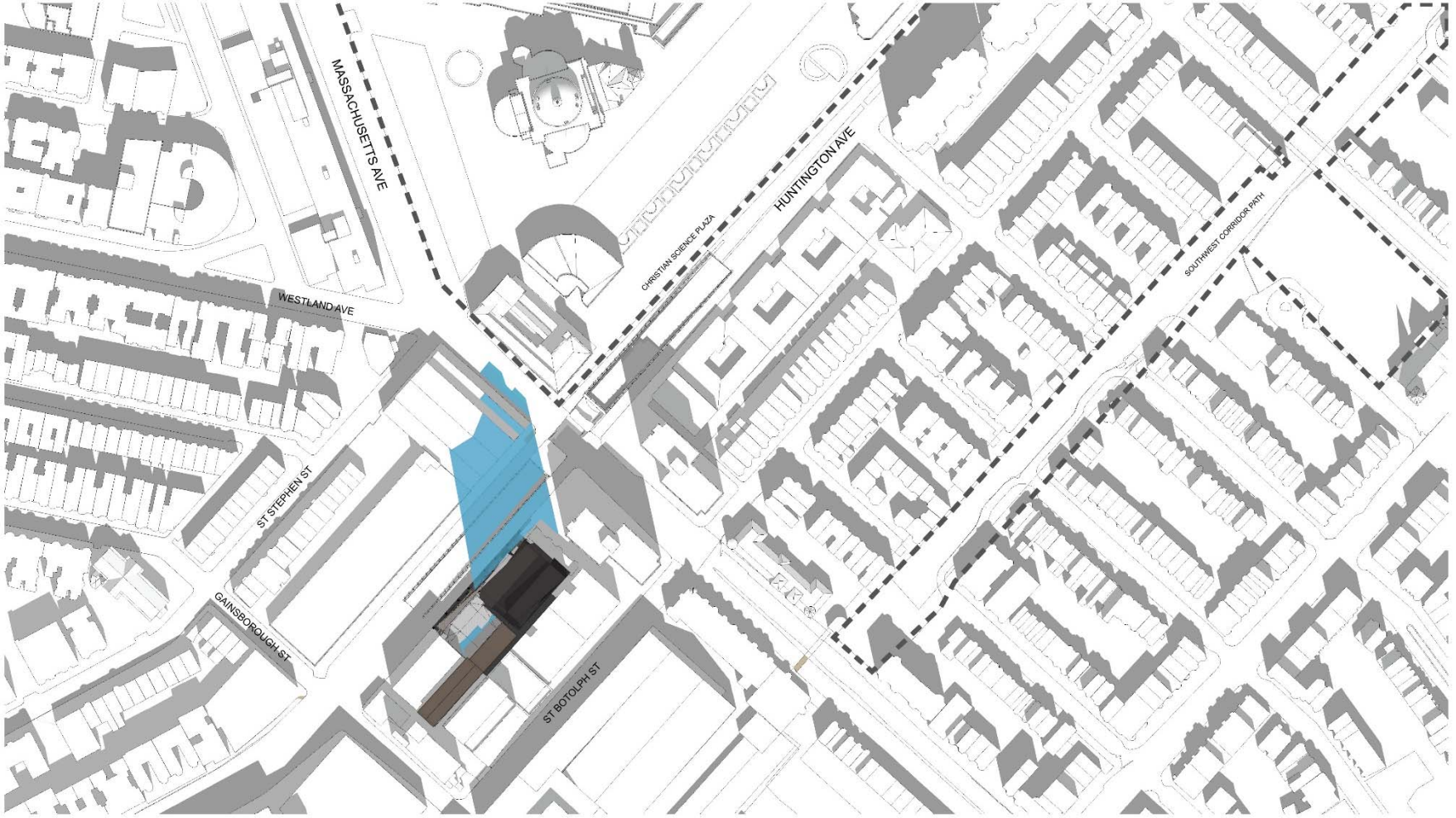


252-264 Huntington Avenue Boston, Massachusetts

Stantec

Figure 23

Shadow Study: September 21, 9:00 a.m.



252-264 Huntington Avenue Boston, Massachusetts

Stantec

Figure 24

Shadow Study: September 21, 12:00 p.m.

252-264 Huntington Avenue Boston, Massachusetts

Stantec

Figure 25

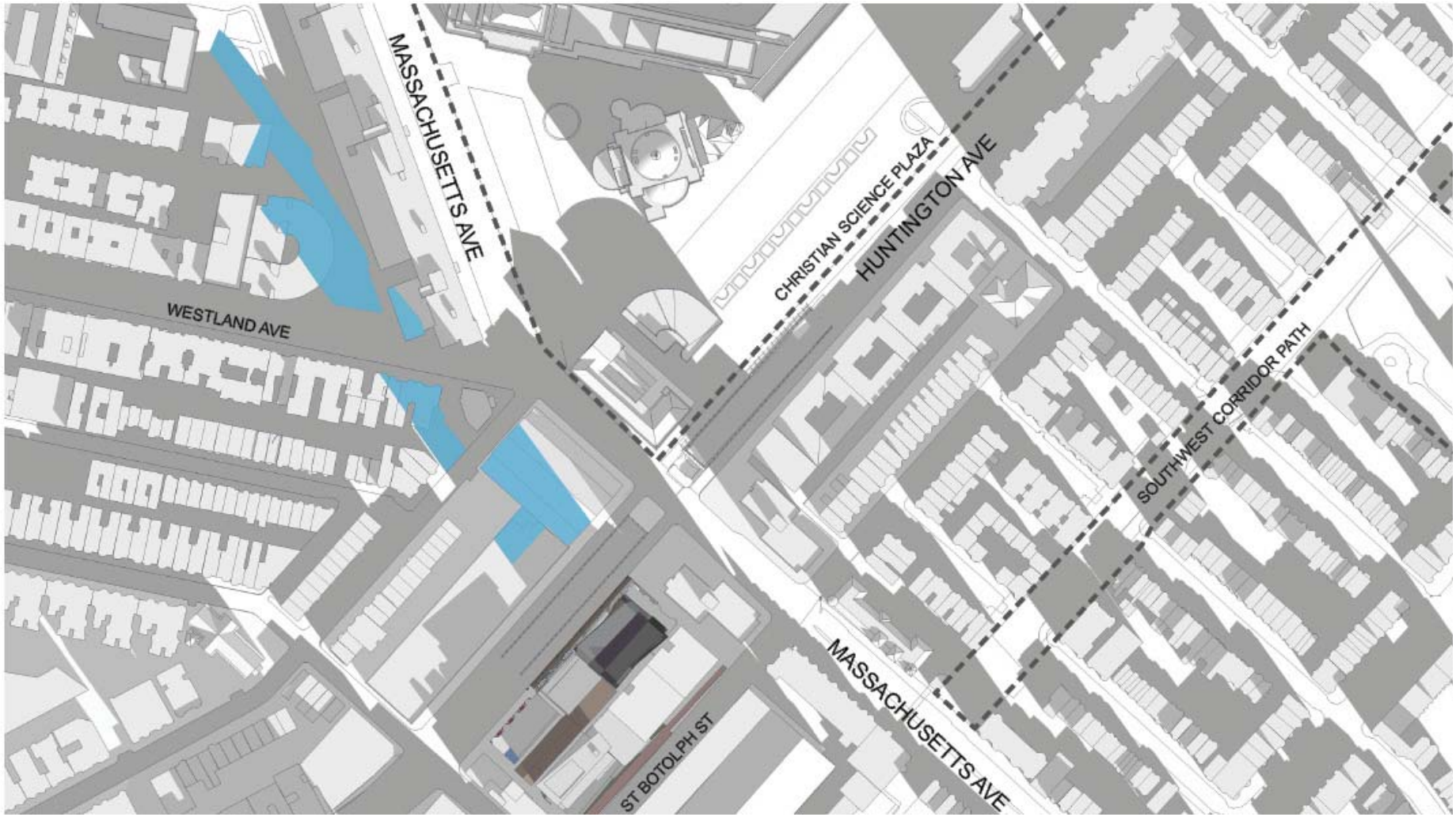
Shadow Study: September 21, 3:00 p.m.

252-264 Huntington Avenue Boston, Massachusetts

Stantec

Figure 26

Shadow Study: September 21, 6:00 p.m.

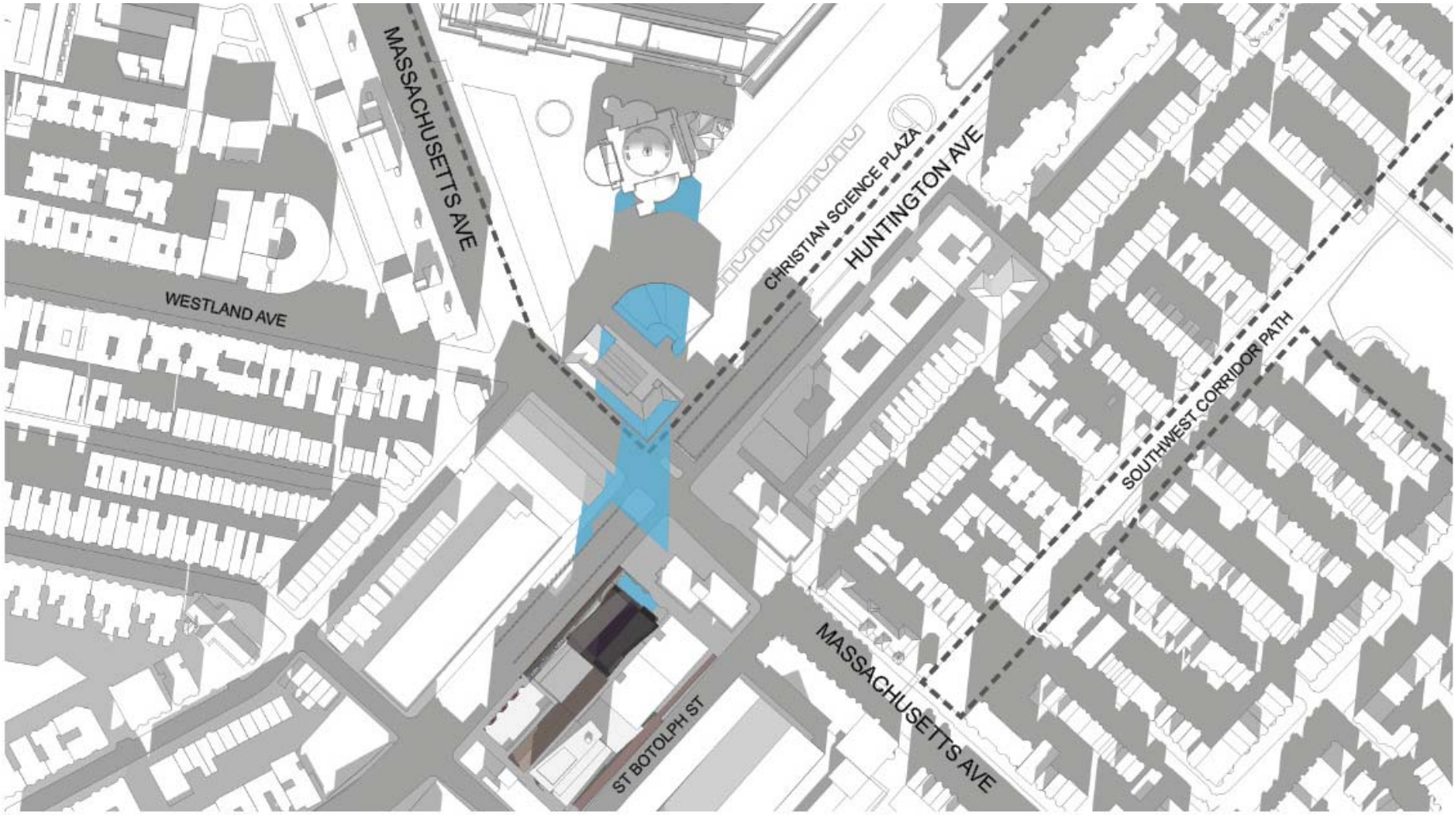


252-264 Huntington Avenue Boston, Massachusetts

Stantec

Figure 27

Shadow Study: December 21, 9:00 a.m.



252-264 Huntington Avenue Boston, Massachusetts

Stantec

Figure 28

Shadow Study: December 21, 12:00 p.m.

252-264 Huntington Avenue Boston, Massachusetts

Stantec

Figure 29

Shadow Study: December 21, 3:00 p.m.

Attachment A

Pedestrian Level of Service Evaluation

TO:	John Matteson, QMG Huntington James Gray, Stantec Architecture	DATE:	August 25, 2017
FROM:	Guy Busa Melissa Restrepo	HSH PROJECT NO.:	2016066.00
SUBJECT:	252 – 264 Huntington Avenue Redevelopment Sidewalk/Pedestrian Level of Service Evaluation		

Introduction

The redevelopment of 252 – 264 Huntington Avenue (the Project) is located in Boston's Fenway-Kenmore neighborhood along the one-way eastbound Huntington Avenue approach to Massachusetts Avenue. The mixed-use Project will include the following components:

- **Residential Tower** – Located at two contiguous parcels at 252 and 258 Huntington Avenue, a new residential tower consisting of 426 residential units and approximately 7,500 square feet (sf) of ground floor restaurant/retail space will be constructed.
- **East Wing Theatre Expansion** – Located on the first and second floor of the new building will be approximately 14,000 sf of auxiliary space for the Huntington Theatre (formerly known as the Boston University Theatre), including the theater's main entrance and lobby, patron services such as the box office, the bar, and restrooms. There will also be a function room for special events.
- **Theatre Building** – The existing Huntington Theatre, located at 264 Huntington Avenue, will remain in place.

A key part of the Project involves the renovation and update of the existing Huntington Theatre Building that will include improvements and widening of the sidewalk along Huntington Avenue.

As part of the City's review process, the Boston Civic Design Commission (BCDC) has requested that a sidewalk pedestrian capacity and level of service (LOS) analysis be conducted to assure adequate pedestrian flow can be maintained at this location once the improvements are in place, the proposed Project is fully occupied, and the Huntington Theatre is active. This memo presents an analysis of the Huntington Avenue sidewalk at the site to understand the pedestrian environment under existing conditions, future conditions without the Project, and future conditions with the Project.

Pedestrian Conditions

Sidewalk Environment

The existing public sidewalk width along this segment of Huntington Avenue varies from 8 feet wide to 19 feet wide from the curb edge to back of sidewalk, as presented in Figure 1. The property line is 4'-4" from the curb edge making most of the sidewalk along this portion of Huntington Avenue private property with public rights of passage by easement. The narrowest section of sidewalk at 8 feet is directly in front of the Huntington Theatre and provides a 4 foot clear walking path and a 4 foot bricked buffer zone for street trees, street lights, and parking meters. Exterior stairs, a ramping system, and a platform into the Huntington Theatre are located between the sidewalk and the building façade. The Project will provide for an interior lobby, stairs, and an accessible entrance into the theater space, eliminating the need for these exterior features. The Huntington Theatre project will remove these elements and improve the sidewalk in front of its space.

As shown on the attached proposed site plan in Figure 2, improvements to the sidewalk at the proposed Project's tower include setting back the new tower by 2 feet from the existing building face, thereby widening the sidewalk at the new residential tower and retail/restaurant space from 18'-8" to 20'-8". Sidewalk improvements at and by the Huntington Theatre include removal of the exterior stairs, ramp, and platforms at the Huntington Theatre thereby significantly increasing the sidewalk width from 8 feet wide to 12'-11" at the Huntington Theatre building, with more than 19' at the new theater lobby space included in the new tower.

Pedestrian Counts

Pedestrian counts were collected on Huntington Avenue adjacent to the Project site on Friday, August 4, 2017, between 4:00 – 11:00 p.m. The counts were collected at a point immediately north of where the existing accessible pedestrian ramp from the theater meets the sidewalk. During the observations, the weather was clear and warm.

The counts reflect a typical summer Friday evening without a performance at the Huntington Theatre or Symphony Hall, but with a Red Sox game (vs. White Sox, 7:10 p.m. start and 10:55 p.m. end). Note that these are summer pedestrian volumes and, as such, do not include activity associated with full attendance at Northeastern University or New England Conservatory.

For this assessment, the three analysis periods include the standard evening peak hour, which occurs between 5:00 to 6:00 p.m., and both the arrival and dismissal peak hours of a typical performance (7:00

to 8:00 p.m. and 10:00 to 11:00 p.m.). Table 1 summarizes the three peak hours of existing pedestrian activity during the summer season.

Table 1. Huntington Ave. Sidewalk - Existing Pedestrian Volumes – Summer

Period	Peak Hour	Pedestrians per Hour		
		Eastbound toward Massachusetts Ave.	Westbound toward Gainsborough St.	Total
Standard Commuter Peak Hour	5:00 – 6:00 p.m.	108	133	**241**
Performance Arrival Period[1]	7:00 – 8:00 p.m.	101	147	**248**
Performance Dismissal Period[1]	10:00 – 11:00 p.m.	48	32	**80**

[1] *Note that a performance is not reflected in these summer data.*

As indicated, there were approximately 241 pedestrians (108 eastbound towards Massachusetts Avenue and 133 westbound towards Gainsborough Street) during the weekday evening peak hour of 5:00 to 6:00 p.m. These volumes continue at about the same level through the period when a typical 8:00 p.m. performance would start at the Huntington Theatre. Pedestrian volumes drop off precipitously by the time a typical 2-hour performance would end at 10:00 p.m. Detailed pedestrian volumes are provided as an attachment.

The summer volumes in Table 1 do not reflect pedestrian activity associated with the Huntington Theatre or full attendance at nearby schools and universities. To estimate the theater volumes, the study team contacted the theater and discussed the arrival and dismissal characteristics of patrons at a performance. Friday evening performances typically begin at 8:00 p.m. and run for approximately two hours. Based on this information, the additional pedestrian volumes associated with the start and end of a performance were estimated. Background pedestrian activity associated with the nearby schools was estimated by comparing the summer count data to the pedestrian counts conducted for the Huntington Theatre Development EPNF. These pedestrian counts were collected in April 2016 and showed the pedestrians volumes to be twice as high as the counts collected in the summer of 2017. Therefore, to better understand the existing conditions during regular school session, the summer counts were doubled to include all activity such as schools and universities in the surrounding area.

The volumes in Table 2 represent a non-summer Friday evening condition when schools are in session and a performance is scheduled at the Huntington Theatre.

Table 2. Huntington Ave. Sidewalk - Existing Pedestrian Volumes – Non-Summer

Time Period	Peak Hour	Pedestrians per Hour		
		Eastbound toward Massachusetts Ave.	Westbound toward Gainsborough St.	Total
Standard Commuter Peak Hour	5:00 – 6:00 p.m.	216	266	**482**
Performance Arrival Period	7:00 – 8:00 p.m.	425	517	**941**
Performance Dismissal Period	10:00 – 11:00 p.m.	541	509	**1050**

It is typical to assess a seven-year time horizon for future conditions, identified here as 2024. The No-Build pedestrian volumes were estimated by applying a half-percent annual growth rate to the existing volumes shown in Table 2. The No-Build volumes, shown in Table 3, do not include the new Project but do include theater pedestrian traffic.

Table 3. Huntington Ave. Sidewalk -No-Build (2024) Pedestrian Volumes

Time Period	Peak Hour	Pedestrians per Hour		
		Eastbound toward Massachusetts Ave.	Westbound toward Gainsborough St.	Total
Standard Commuter Peak Hour	5:00 – 6:00 p.m.	224	275	**499**
Performance Arrival Period	7:00 – 8:00 p.m.	440	535	**975**
Performance Dismissal Period	10:00 – 11:00 p.m.	560	527	**1087**

To estimate the Build Condition sidewalk volumes, shown in Table 4, the new Project generated pedestrian trips (as estimated in the EPNF) were distributed to the sidewalk based on doorway locations of the new building and the theater and added to the No-Build volumes. Both the No-Build and Build volumes reflect non-summer conditions.

Table 4. Huntington Ave. Sidewalk -Build (2024) Pedestrian Volumes

Time Period	Peak Hour	Pedestrians per Hour		
		Eastbound toward Massachusetts Ave.	Westbound toward Gainsborough St.	Total
Standard Commuter Peak Hour	5:00 – 6:00 p.m.	367	418	**784**
Performance Arrival Period	7:00 – 8:00 p.m.	546	641	**1188**
Performance Dismissal Period	10:00 – 11:00 p.m.	596	563	**1158**

For purposes of the pedestrian analysis, the sidewalk's most critical point was chosen – directly across from the existing Huntington Theatre entrance/exit. Currently the sidewalk width at this critical point is at its most narrow at 8 feet and, while widened significantly by the theater project to just under 13 feet, it will remain the critical point since it will be narrower than other sidewalk segments along this block. The relocation of the theater lobby to the new tower will affect the amount of pedestrians traversing the narrower sidewalk in front of the Huntington Theatre building since those accessing the new theater lobby from the east will not need to travel by the study critical point. Table 5 below shows the number of pedestrians that will travel by the study critical point with the relocated theater lobby in the new tower.

Table 5. Huntington Ave. Sidewalk-Build (2024) Pedestrian Volumes at Critical Point with New Tower Theater Lobby

Time Period	Peak Hour	Pedestrians per Hour		
		Eastbound toward Massachusetts Ave.	Westbound toward Gainsborough St.	Total
Standard Commuter Peak Hour	5:00 – 6:00 p.m.	367	418	**784**
Performance Arrival Period	7:00 – 8:00 p.m.	546	312	**858**
Performance Dismissal Period	10:00 – 11:00 p.m.	151	527	**678**

Sidewalk Capacity Analysis

The sidewalk was analyzed using the pedestrian methodology for urban street segments, detailed in the *Highway Capacity Manual 2010* (HCM) (attached). The HCM methodology uses average pedestrian space (in square feet/pedestrian) to determine the level of service of the sidewalk segment. Table 5 summarizes the qualitative description of pedestrian space that can be used to evaluate sidewalk

performance. For the purpose of this analysis, the random pedestrian flow, which is typical of most segments, was used to analyze both the existing and future conditions.

Table 6. Qualitative Description of Pedestrian Space (HCM Excerpt)

Pedestrian Space (sf/p)		Description
Random Flow	Platoon Flow	
>60	>530	Ability to move in desired path, no need to alter movements
>40-60	>90-530	Occasional need to adjust path to avoid conflicts
>24-40	>40-90	Frequent need to adjust path to avoid conflicts
>15-24	>23-40	Speed and ability to pass slower pedestrians restricted
>8-15	>11-23	Speed restricted, very limited ability to pass slower pedestrians
≤8	≤11	Speed severely restricted, frequent contact with other uses

Pedestrian LOS was determined for two conditions with three different time periods: an existing condition without the proposed improvements and a future condition that incorporates the Project's new pedestrian activity and improvements to the pedestrian environment. The calculations are provided as an attachment. The Build Condition analysis incorporates the additional proposed 4-feet in width, for a total of an approximate 13-feet sidewalk width, and reflects the doorway locations of the new building and the theater. Table 6 and Table 7 summarize the pedestrian level of service for the Existing and Build conditions, respectively.

Table 7. Huntington Ave. Sidewalk - Existing Condition Pedestrian Level of Service

Time Period	Peak Hour	Pedestrians per Hour (p/h)	Pedestrians Space (sf/p)	Level of Service (sf/p)
Standard Commuter Peak Hour	5:00 – 6:00 p.m.	482	98	**>60**
Performance Arrival Period	7:00 – 8:00 p.m.	941	49	**>40-60**
Performance Dismissal Period	10:00 – 11:00 p.m.	1050	44	**>40-60**

Under the Existing Condition, the lowest spaces per pedestrian are 49 square feet during the 7:00-8:00 p.m. time period and 44 square feet during the 10:00-11:00 p.m. time period, resulting in the second most optimal level of service (>40-60 sf/p) for a sidewalk segment. The HCM describes this level of service as "occasional need to adjust path to avoid conflict". The remaining time period, standard

commuter peak hour, provide the most optimal level of service (>60 sf/p) for a sidewalk segment. The HCM describes this level of service as the "ability to move in desired path, no need to alter movements".

Huntington Ave. Sidewalk - Build (2024) Condition Pedestrian Level of Service

Time Period	Peak Hour	Pedestrians per Hour (p/h)	Pedestrians Space (sf/p)	Level of Service (sf/p)
Standard Commuter Peak Hour	5:00 – 6:00 p.m.	784	161	**>60**
Performance Arrival Period	7:00 – 8:00 p.m.	858	147	**>60**
Performance Dismissal Period	10:00 – 11:00 p.m.	678	187	**>60**

Under the Build Condition, with increased pedestrian activity associated with the Project and the proposed improvements to the sidewalks both at the proposed residential tower and in front of the Huntington Theatre, pedestrian would experience the most optimal level of service (>60.0 sf/p). This is an improvement over the Existing Condition.

Based on the above results, a satisfactory condition is met with the proposed improvements.

Summary and Recommendations

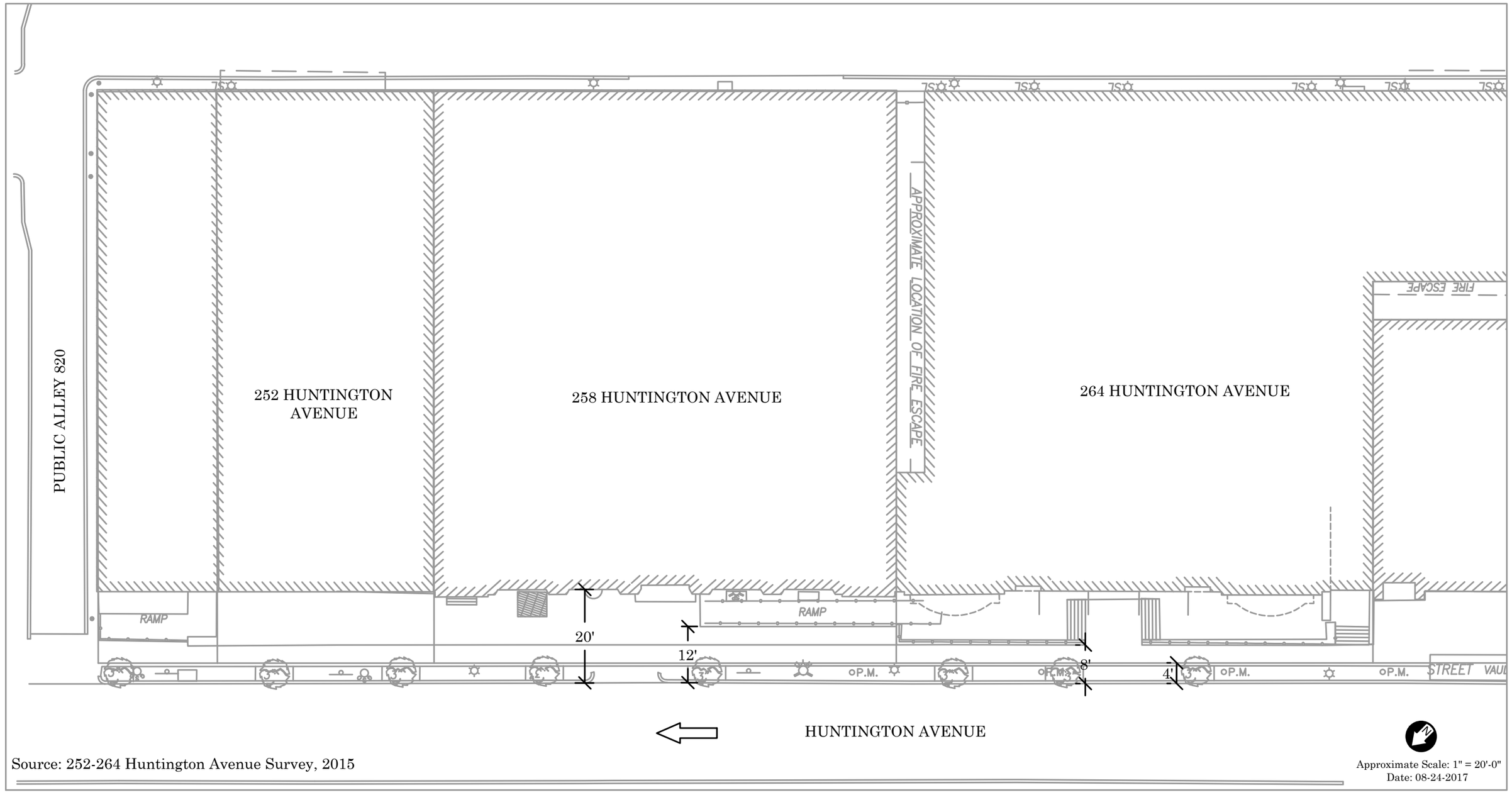
The proposed sidewalk in front of the Project's new residential tower, its retail/restaurant space, and the new Huntington Theatre entrance are more than adequate to handle the proposed uses and an active Huntington Theatre. The sidewalk space will allow not only for free pedestrian flow and excellent level of service, it will also provide enough room for theater goers to queue and/or linger without feeling they are in the way of general sidewalk pedestrian activity. The removal of the existing stairs and ramping system in front of the existing Huntington Theatre entrance is a significant improvement to the existing pedestrian experience. Similar to the sidewalk in front of the Project's tower, the proposed sidewalk at the Huntington Theatre will also provide a generous pedestrian environment well able to support general pedestrian traffic, the Project's expected foot traffic, and theater goers.

Attachments

- Existing & Proposed Site Plan
- Pedestrian Counts
- Pedestrian LOS Methodology
- Pedestrian LOS Calculations

Existing Site Plan

Figure 1. ***Existing Site Plan***

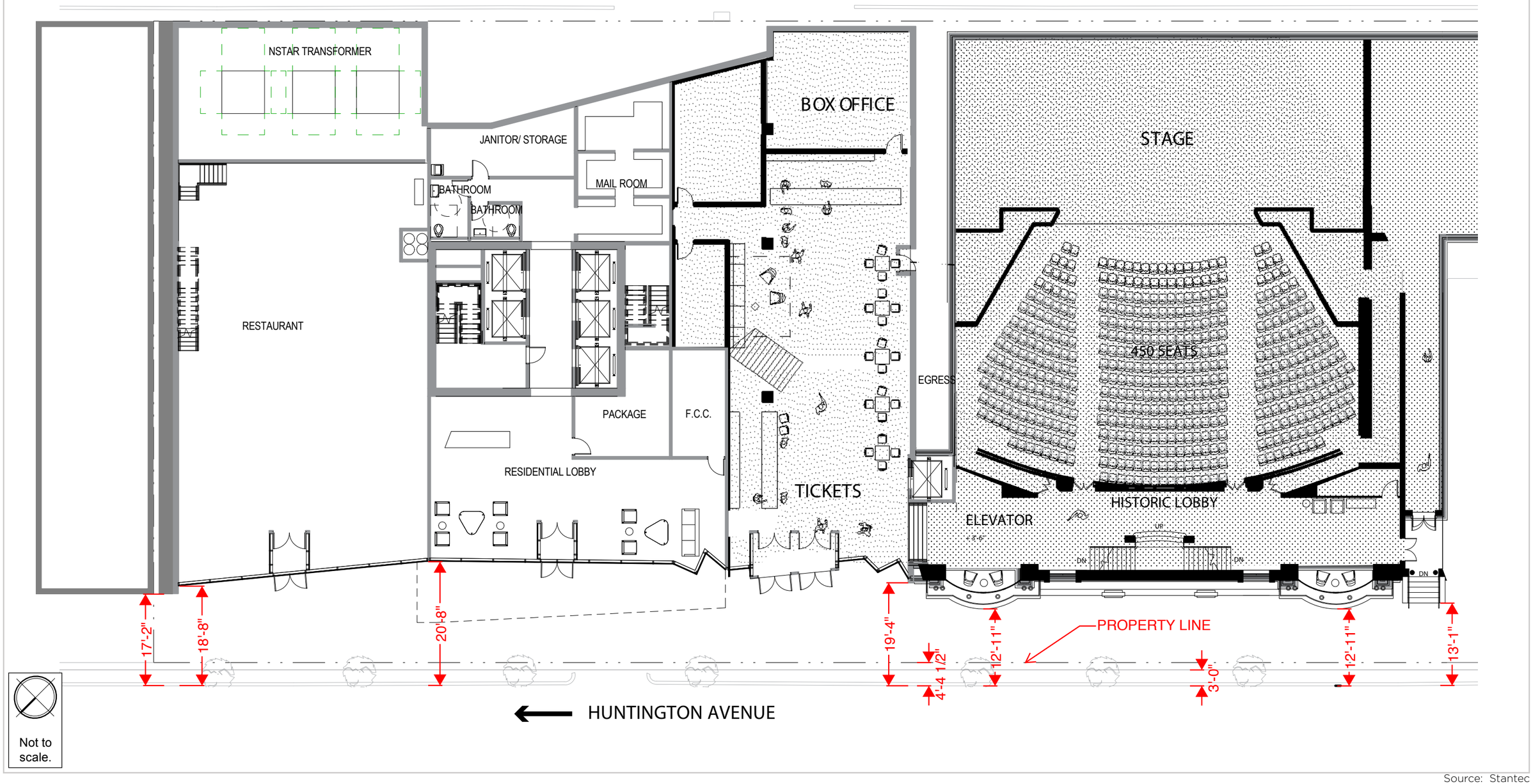


Source: 252-264 Huntington Avenue Survey, 2015

Approximate Scale: 1" = 20'-0"
Date: 08-24-2017

Proposed Site Plan

Figure 2. ***Proposed Site Plan***



Source: Stantec

Pedestrian Volumes

Accurate Counts

978-664-2565

N/S Street : Huntington Avenue
E/W Street : Peds / Bikes on Sidewalk
City/State : Boston, MA
Weather : Clear

File Name : 16066001
Site Code : 16066001
Start Date : 8/4/2017

Groups Printed- Bikes

	From North	From South	
Start Time	Thru	Thru	Int. Total
04:00 PM	0	0	0
04:15 PM	1	0	1
04:30 PM	0	0	0
04:45 PM	0	0	0
Total	1	0	1
05:00 PM	0	0	0
05:15 PM	0	0	0
05:30 PM	2	0	2
05:45 PM	1	0	1
Total	3	0	3
06:00 PM	0	1	1
06:15 PM	0	0	0
06:30 PM	1	0	1
06:45 PM	1	0	1
Total	2	1	3
07:00 PM	0	0	0
07:15 PM	0	0	0
07:30 PM	0	0	0
07:45 PM	0	0	0
Total	0	0	0
08:00 PM	1	0	1
08:15 PM	0	0	0
08:30 PM	0	0	0
08:45 PM	0	0	0
Total	1	0	1

Accurate Counts

978-664-2565

N/S Street : Huntington Avenue
E/W Street : Peds / Bikes on Sidewalk
City/State : Boston, MA
Weather : Clear

File Name : 16066001
Site Code : 16066001
Start Date : 8/4/2017

Groups Printed- Bikes

	From North	From South	
Start Time	Thru	Thru	Int. Total
09:00 PM	0	0	0
09:15 PM	0	0	0
09:30 PM	0	0	0
09:45 PM	0	0	0
Total	0	0	0
10:00 PM	0	0	0
10:15 PM	0	0	0
10:30 PM	0	0	0
10:45 PM	0	0	0
Total	0	0	0
Grand Total	7	1	8
Apprch %	100	100	
Total %	87.5	12.5	

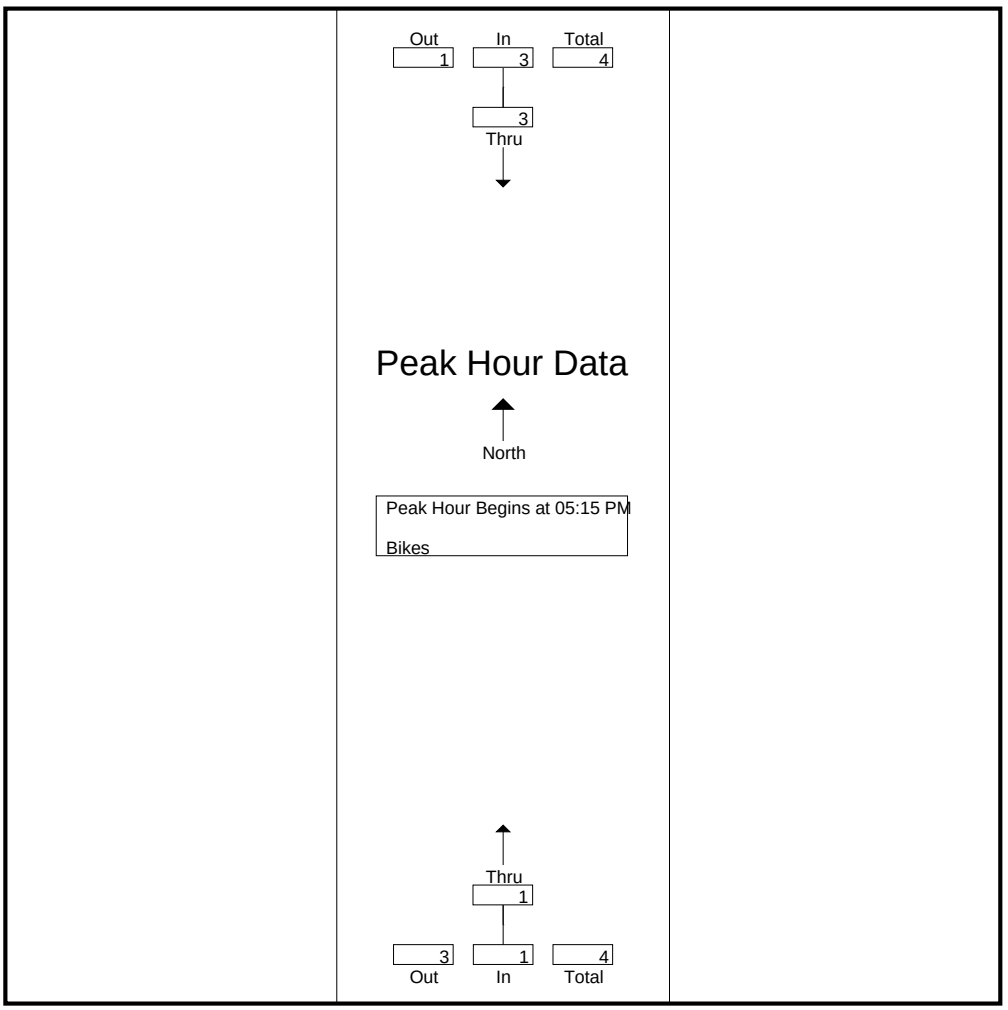
Accurate Counts

978-664-2565

N/S Street : Huntington Avenue
E/W Street : Peds / Bikes on Sidewalk
City/State : Boston, MA
Weather : Clear

File Name : 16066001
Site Code : 16066001
Start Date : 8/4/2017
Page No : 3

	From North		From South		
Start Time	Thru	App. Total	Thru	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 06:45 PM - Peak 1 of 1					
Peak Hour for Entire Intersection Begins at 05:15 PM					
05:15 PM	0	0	0	0	0
05:30 PM	**2**	**2**	0	0	**2**
05:45 PM	1	1	0	0	1
06:00 PM	0	0	**1**	**1**	1
Total Volume	3	3	1	1	4
% App. Total	100		100		
PHF	.375	.375	.250	.250	.500



Accurate Counts

978-664-2565

N/S Street : Huntington Avenue
E/W Street : Peds / Bikes on Sidewalk
City/State : Boston, MA
Weather : Clear

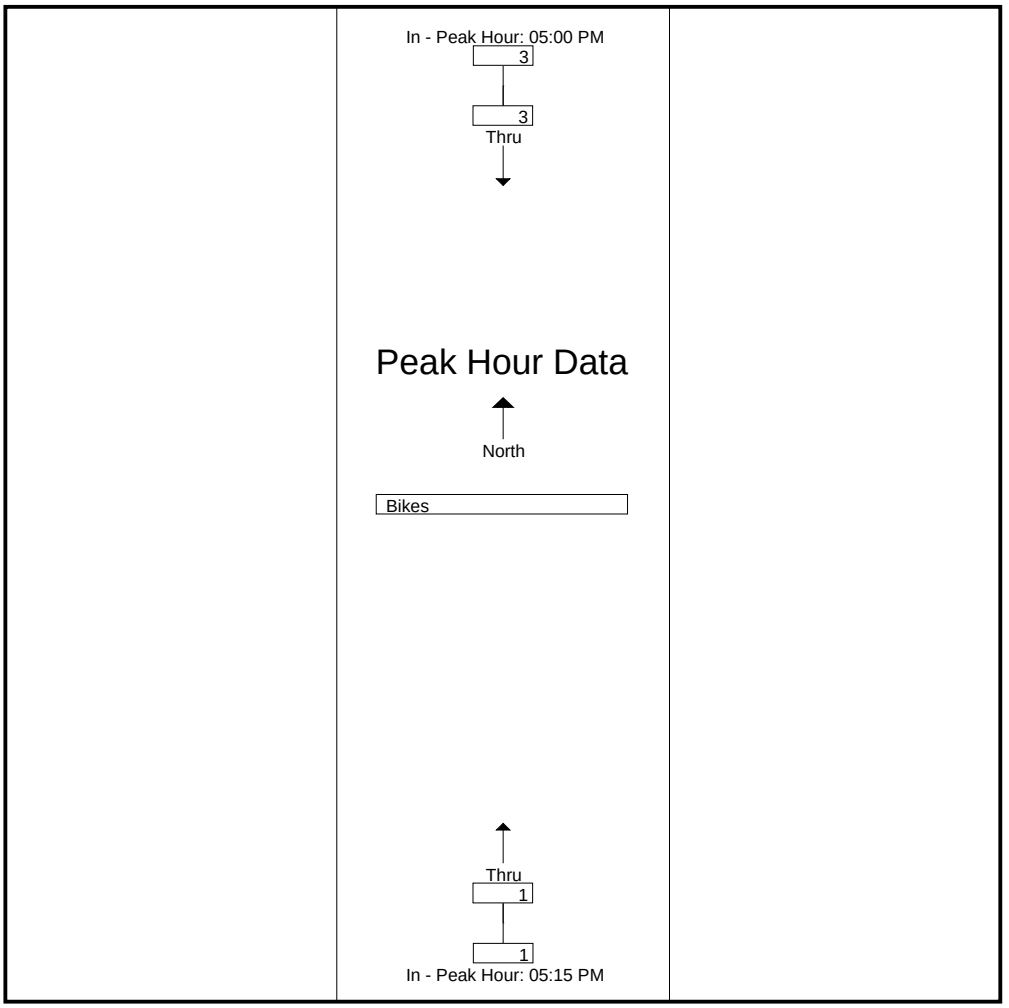
File Name : 16066001
Site Code : 16066001
Start Date : 8/4/2017
Page No : 4

	From North		From South		
Start Time	Thru	App. Total	Thru	App. Total	Int. Total

Peak Hour Analysis From 04:00 PM to 06:45 PM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

	05:00 PM		05:15 PM	
+0 mins.	0	0	0	0
+15 mins.	0	0	0	0
+30 mins.	**2**	**2**	0	0
+45 mins.	1	1	**1**	**1**
Total Volume	3	3	1	1
% App. Total	100		100	
PHF	.375	.375	.250	.250



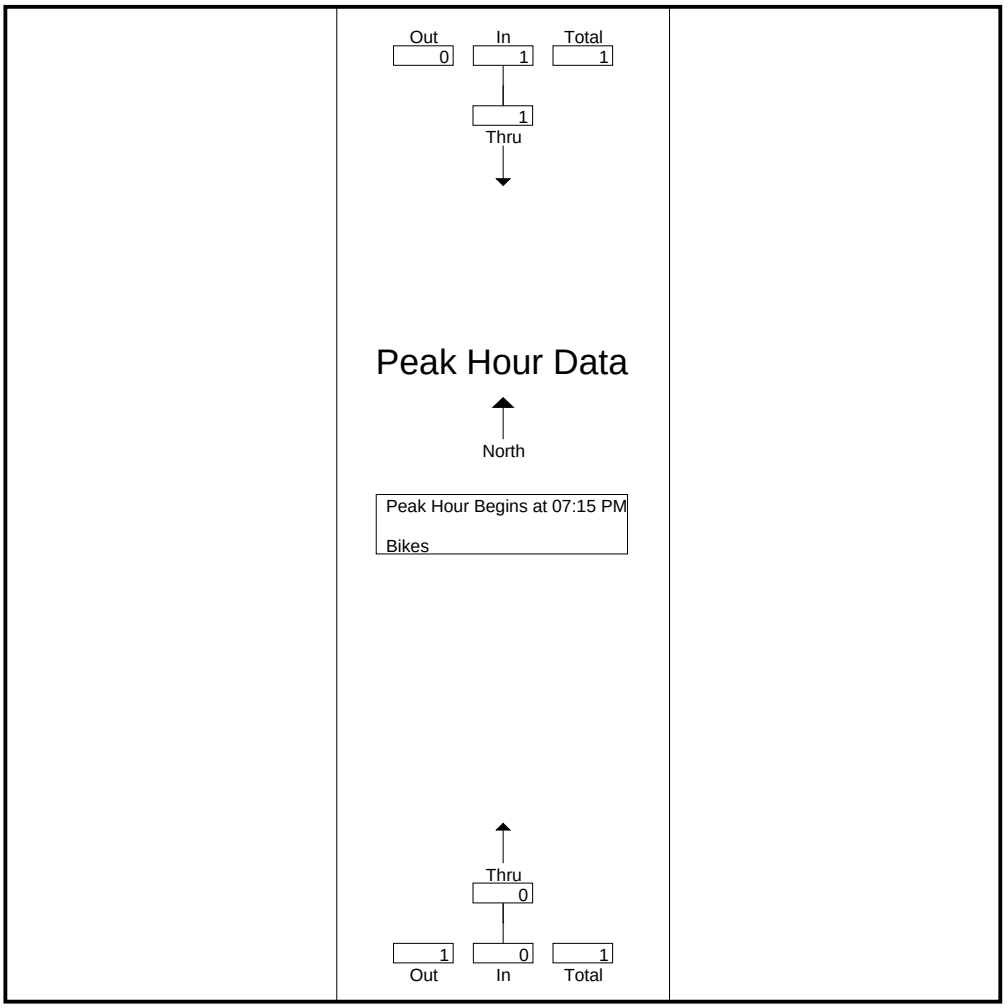
Accurate Counts

978-664-2565

N/S Street : Huntington Avenue
E/W Street : Peds / Bikes on Sidewalk
City/State : Boston, MA
Weather : Clear

File Name : 16066001
Site Code : 16066001
Start Date : 8/4/2017
Page No : 5

	From North		From South		
Start Time	Thru	App. Total	Thru	App. Total	Int. Total
Peak Hour Analysis From 07:00 PM to 10:45 PM - Peak 1 of 1					
Peak Hour for Entire Intersection Begins at 07:15 PM					
07:15 PM	0	0	0	0	0
07:30 PM	0	0	0	0	0
07:45 PM	0	0	0	0	0
08:00 PM	**1**	**1**	0	0	**1**
Total Volume	1	1	0	0	1
% App. Total	100		0		
PHF	.250	.250	.000	.000	.250



Accurate Counts

978-664-2565

N/S Street : Huntington Avenue
E/W Street : Peds / Bikes on Sidewalk
City/State : Boston, MA
Weather : Clear

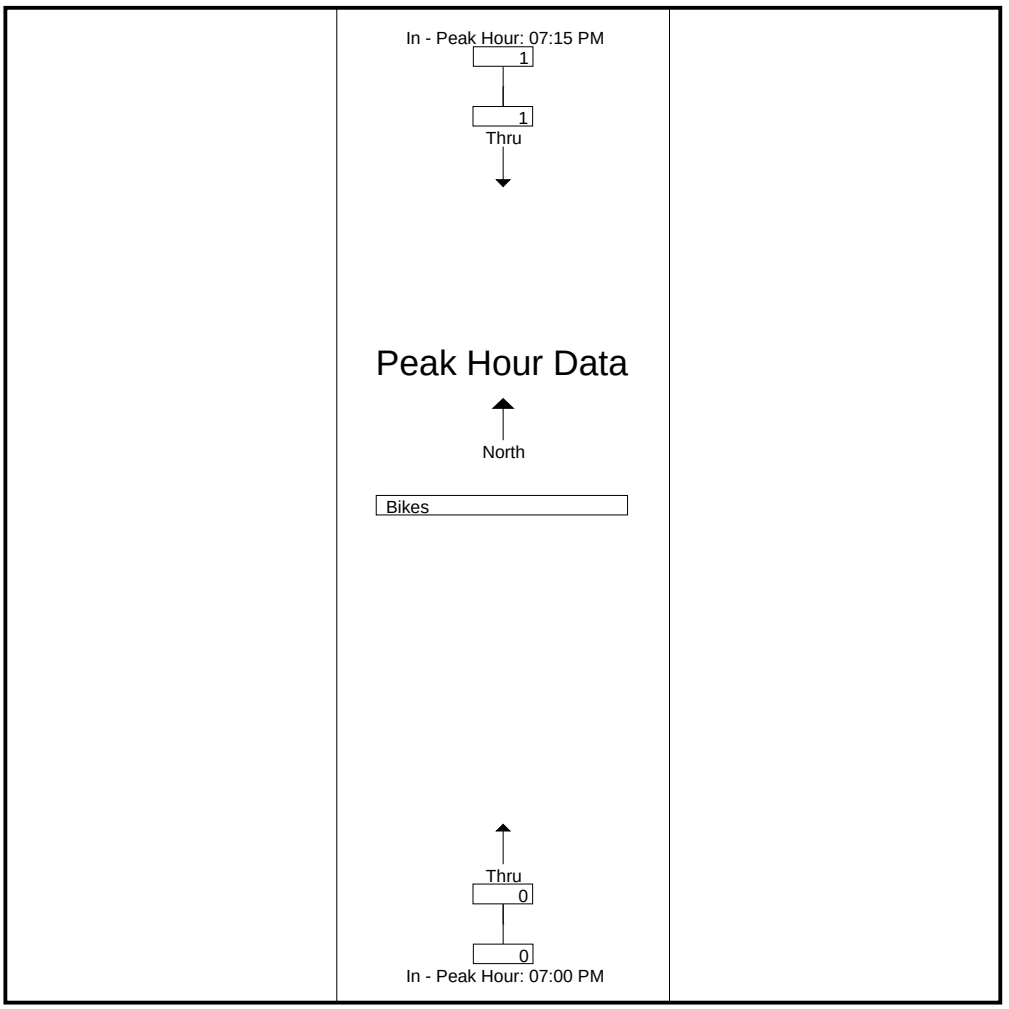
File Name : 16066001
Site Code : 16066001
Start Date : 8/4/2017
Page No : 6

	From North		From South		
Start Time	Thru	App. Total	Thru	App. Total	Int. Total

Peak Hour Analysis From 07:00 PM to 10:45 PM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

	07:15 PM		07:00 PM	
+0 mins.	0	0	0	0
+15 mins.	0	0	0	0
+30 mins.	0	0	0	0
+45 mins.	**1**	**1**	0	0
Total Volume	1	1	0	0
% App. Total	100		0	
PHF	.250	.250	.000	.000



Accurate Counts

978-664-2565

N/S Street : Huntington Avenue
E/W Street : Peds / Bikes on Sidewalk
City/State : Boston, MA
Weather : Clear

File Name : 16066001
Site Code : 16066001
Start Date : 8/4/2017

Groups Printed- Peds

	From North	From South	
Start Time	Thru	Thru	Int. Total
04:00 PM	20	28	48
04:15 PM	18	26	44
04:30 PM	14	38	52
04:45 PM	16	50	66
Total	68	142	210
05:00 PM	21	39	60
05:15 PM	16	21	37
05:30 PM	29	21	50
05:45 PM	42	52	94
Total	108	133	241
06:00 PM	41	28	69
06:15 PM	46	26	72
06:30 PM	29	35	64
06:45 PM	32	33	65
Total	148	122	270
07:00 PM	23	23	46
07:15 PM	26	29	55
07:30 PM	32	53	85
07:45 PM	20	42	62
Total	101	147	248
08:00 PM	24	35	59
08:15 PM	14	23	37
08:30 PM	20	25	45
08:45 PM	17	39	56
Total	75	122	197

Accurate Counts

978-664-2565

N/S Street : Huntington Avenue
E/W Street : Peds / Bikes on Sidewalk
City/State : Boston, MA
Weather : Clear

File Name : 16066001
Site Code : 16066001
Start Date : 8/4/2017

Groups Printed- Peds

	From North	From South	
Start Time	Thru	Thru	Int. Total
09:00 PM	16	14	30
09:15 PM	17	5	22
09:30 PM	10	6	16
09:45 PM	39	16	55
Total	82	41	123
10:00 PM	13	11	24
10:15 PM	8	5	13
10:30 PM	8	11	19
10:45 PM	19	5	24
Total	48	32	80
Grand Total	630	739	1369
Apprch %	100	100	
Total %	46	54	

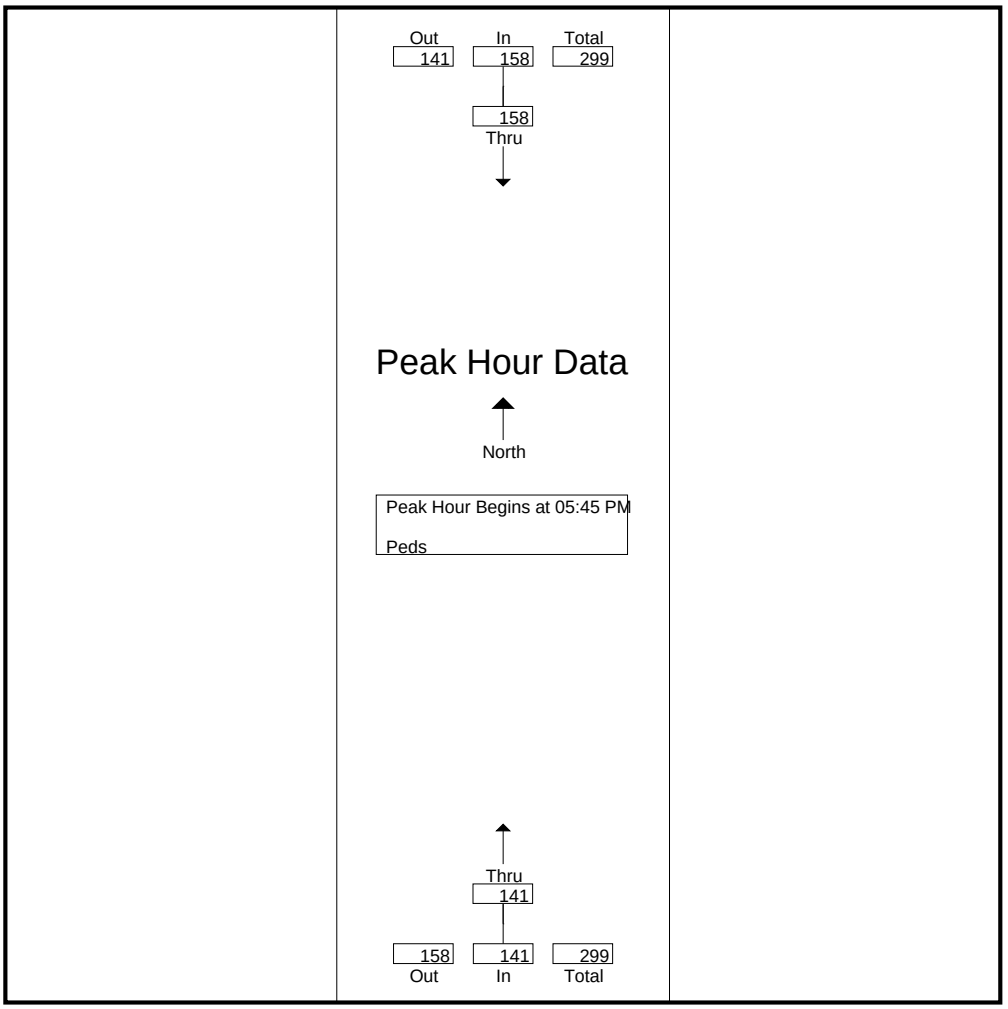
Accurate Counts

978-664-2565

N/S Street : Huntington Avenue
E/W Street : Peds / Bikes on Sidewalk
City/State : Boston, MA
Weather : Clear

File Name : 16066001
Site Code : 16066001
Start Date : 8/4/2017
Page No : 3

	From North		From South		
Start Time	Thru	App. Total	Thru	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 06:45 PM - Peak 1 of 1					
Peak Hour for Entire Intersection Begins at 05:45 PM					
05:45 PM	42	42	**52**	**52**	**94**
06:00 PM	41	41	28	28	69
06:15 PM	**46**	**46**	26	26	72
06:30 PM	29	29	35	35	64
Total Volume	158	158	141	141	299
% App. Total	100		100		
PHF	.859	.859	.678	.678	.795



Accurate Counts

978-664-2565

N/S Street : Huntington Avenue
E/W Street : Peds / Bikes on Sidewalk
City/State : Boston, MA
Weather : Clear

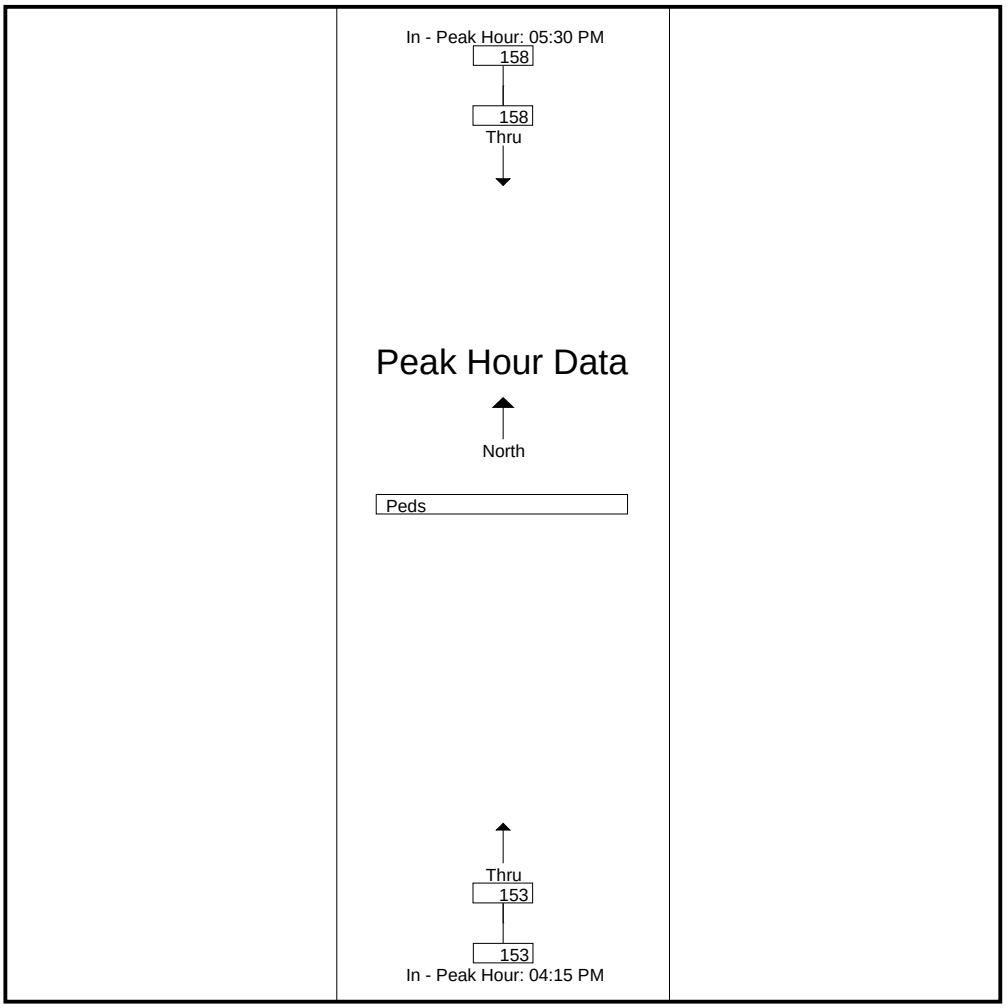
File Name : 16066001
Site Code : 16066001
Start Date : 8/4/2017
Page No : 4

	From North		From South		
Start Time	Thru	App. Total	Thru	App. Total	Int. Total

Peak Hour Analysis From 04:00 PM to 06:45 PM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

	05:30 PM		04:15 PM	
+0 mins.	29	29	26	26
+15 mins.	42	42	38	38
+30 mins.	41	41	**50**	**50**
+45 mins.	**46**	**46**	39	39
Total Volume	158	158	153	153
% App. Total	100		100	
PHF	.859	.859	.765	.765



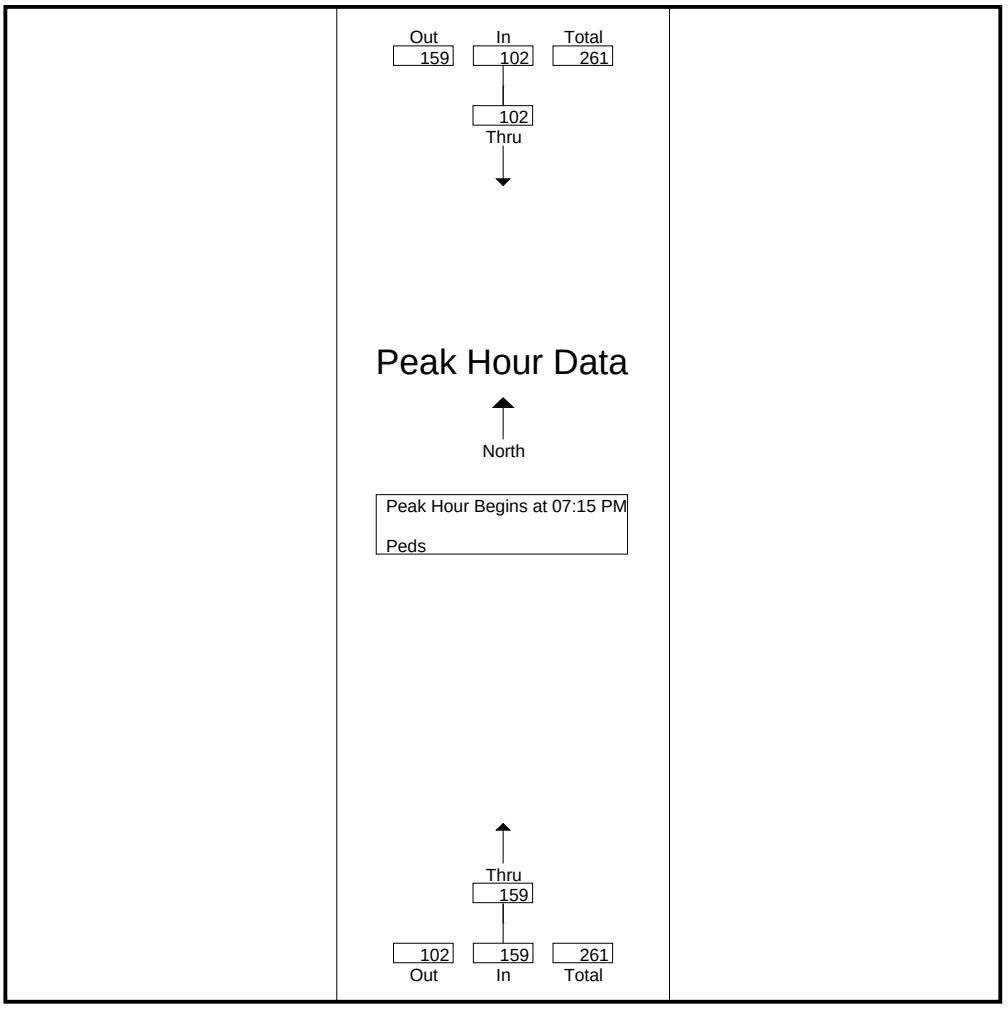
Accurate Counts

978-664-2565

N/S Street : Huntington Avenue
E/W Street : Peds / Bikes on Sidewalk
City/State : Boston, MA
Weather : Clear

File Name : 16066001
Site Code : 16066001
Start Date : 8/4/2017
Page No : 5

	From North		From South		
Start Time	Thru	App. Total	Thru	App. Total	Int. Total
Peak Hour Analysis From 07:00 PM to 10:45 PM - Peak 1 of 1					
Peak Hour for Entire Intersection Begins at 07:15 PM					
07:15 PM	26	26	29	29	55
07:30 PM	**32**	**32**	**53**	**53**	**85**
07:45 PM	20	20	42	42	62
08:00 PM	24	24	35	35	59
Total Volume	102	102	159	159	261
% App. Total	100		100		
PHF	.797	.797	.750	.750	.768



Accurate Counts

978-664-2565

N/S Street : Huntington Avenue
E/W Street : Peds / Bikes on Sidewalk
City/State : Boston, MA
Weather : Clear

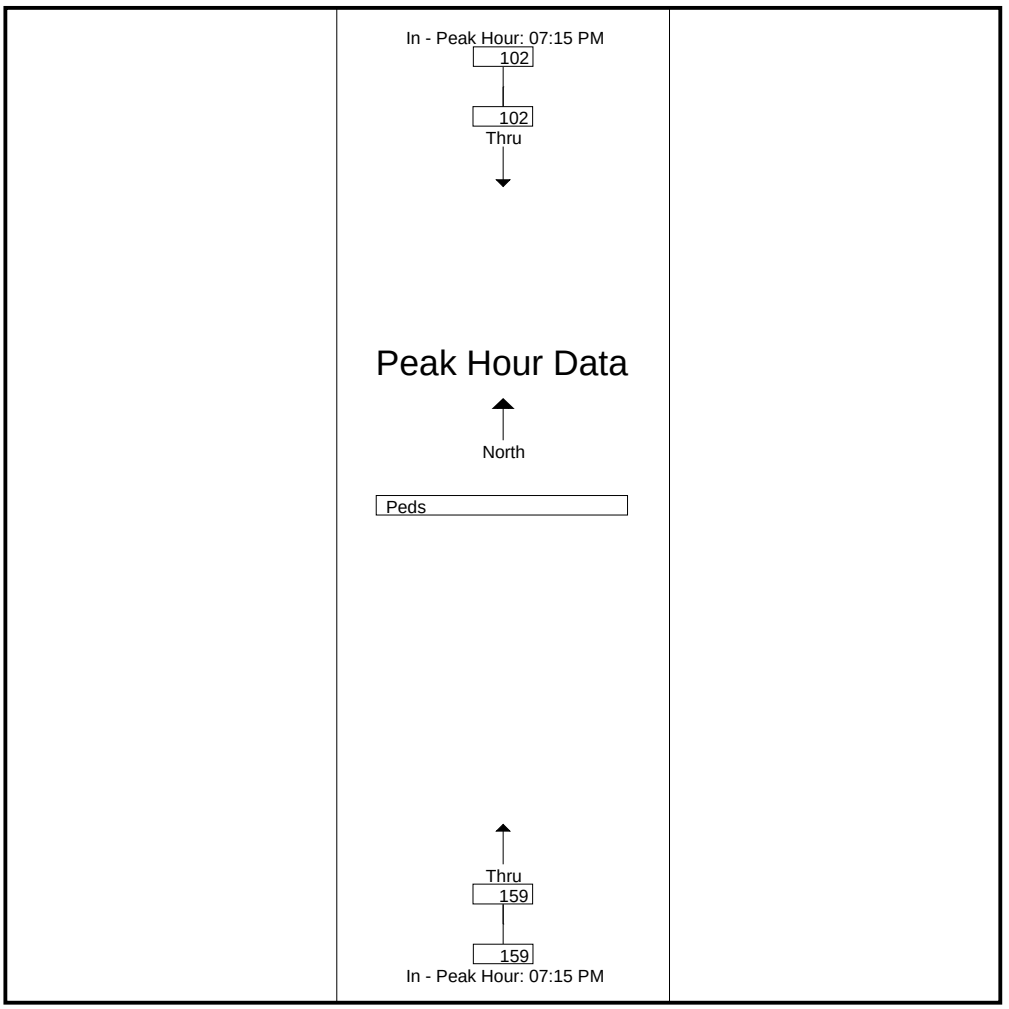
File Name : 16066001
Site Code : 16066001
Start Date : 8/4/2017
Page No : 6

	From North		From South		
Start Time	Thru	App. Total	Thru	App. Total	Int. Total

Peak Hour Analysis From 07:00 PM to 10:45 PM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

	07:15 PM		07:15 PM	
+0 mins.	26	26	29	29
+15 mins.	**32**	**32**	**53**	**53**
+30 mins.	20	20	42	42
+45 mins.	24	24	35	35
Total Volume	102	102	159	159
% App. Total	100		100	
PHF	.797	.797	.750	.750



Accurate Counts

978-664-2565

N/S Street : Huntington Avenue
E/W Street : Peds / Bikes on Sidewalk
City/State : Boston, MA
Weather : Clear

File Name : 16066001
Site Code : 16066001
Start Date : 8/4/2017

Groups Printed- Peds - Bikes

	From North	From South	
Start Time	Thru	Thru	Int. Total
04:00 PM	20	28	48
04:15 PM	19	26	45
04:30 PM	14	38	52
04:45 PM	16	50	66
Total	69	142	211
05:00 PM	21	39	60
05:15 PM	16	21	37
05:30 PM	31	21	52
05:45 PM	43	52	95
Total	111	133	244
06:00 PM	41	29	70
06:15 PM	46	26	72
06:30 PM	30	35	65
06:45 PM	33	33	66
Total	150	123	273
07:00 PM	23	23	46
07:15 PM	26	29	55
07:30 PM	32	53	85
07:45 PM	20	42	62
Total	101	147	248
08:00 PM	25	35	60
08:15 PM	14	23	37
08:30 PM	20	25	45
08:45 PM	17	39	56
Total	76	122	198

Accurate Counts

978-664-2565

N/S Street : Huntington Avenue
E/W Street : Peds / Bikes on Sidewalk
City/State : Boston, MA
Weather : Clear

File Name : 16066001
Site Code : 16066001
Start Date : 8/4/2017

Groups Printed- Peds - Bikes

	From North	From South	
Start Time	Thru	Thru	Int. Total
09:00 PM	16	14	30
09:15 PM	17	5	22
09:30 PM	10	6	16
09:45 PM	39	16	55
Total	82	41	123
10:00 PM	13	11	24
10:15 PM	8	5	13
10:30 PM	8	11	19
10:45 PM	19	5	24
Total	48	32	80
Grand Total	637	740	1377
Apprch %	100	100	
Total %	46.3	53.7	
Peds	630	739	1369
% Peds	98.9	99.9	99.4
Bikes	7	1	8
% Bikes	1.1	0.1	0.6

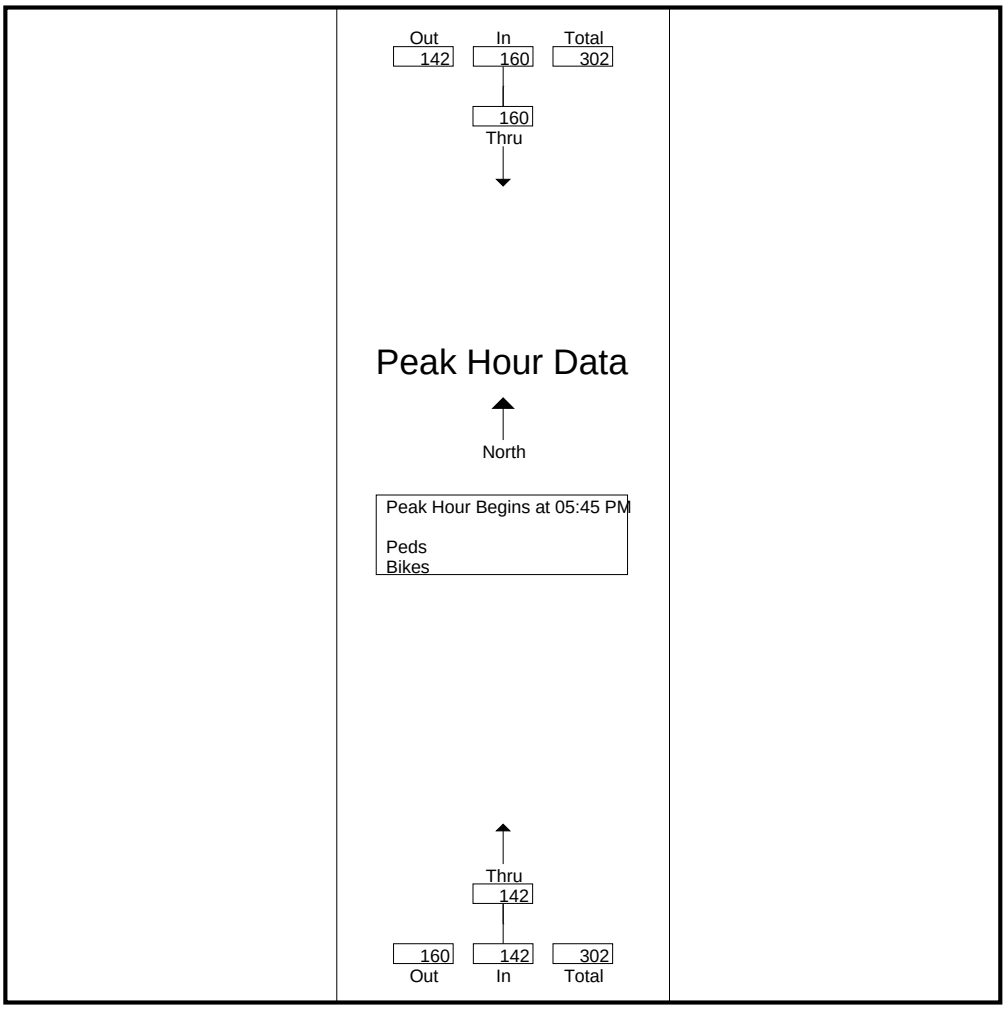
Accurate Counts

978-664-2565

N/S Street : Huntington Avenue
E/W Street : Peds / Bikes on Sidewalk
City/State : Boston, MA
Weather : Clear

File Name : 16066001
Site Code : 16066001
Start Date : 8/4/2017
Page No : 3

	From North		From South		
Start Time	Thru	App. Total	Thru	App. Total	Int. Total
Peak Hour Analysis From 04:00 PM to 06:45 PM - Peak 1 of 1					
Peak Hour for Entire Intersection Begins at 05:45 PM					
05:45 PM	43	43	**52**	**52**	**95**
06:00 PM	41	41	29	29	70
06:15 PM	**46**	**46**	26	26	72
06:30 PM	30	30	35	35	65
Total Volume	160	160	142	142	302
% App. Total	100		100		
PHF	.870	.870	.683	.683	.795



Accurate Counts

978-664-2565

N/S Street : Huntington Avenue
E/W Street : Peds / Bikes on Sidewalk
City/State : Boston, MA
Weather : Clear

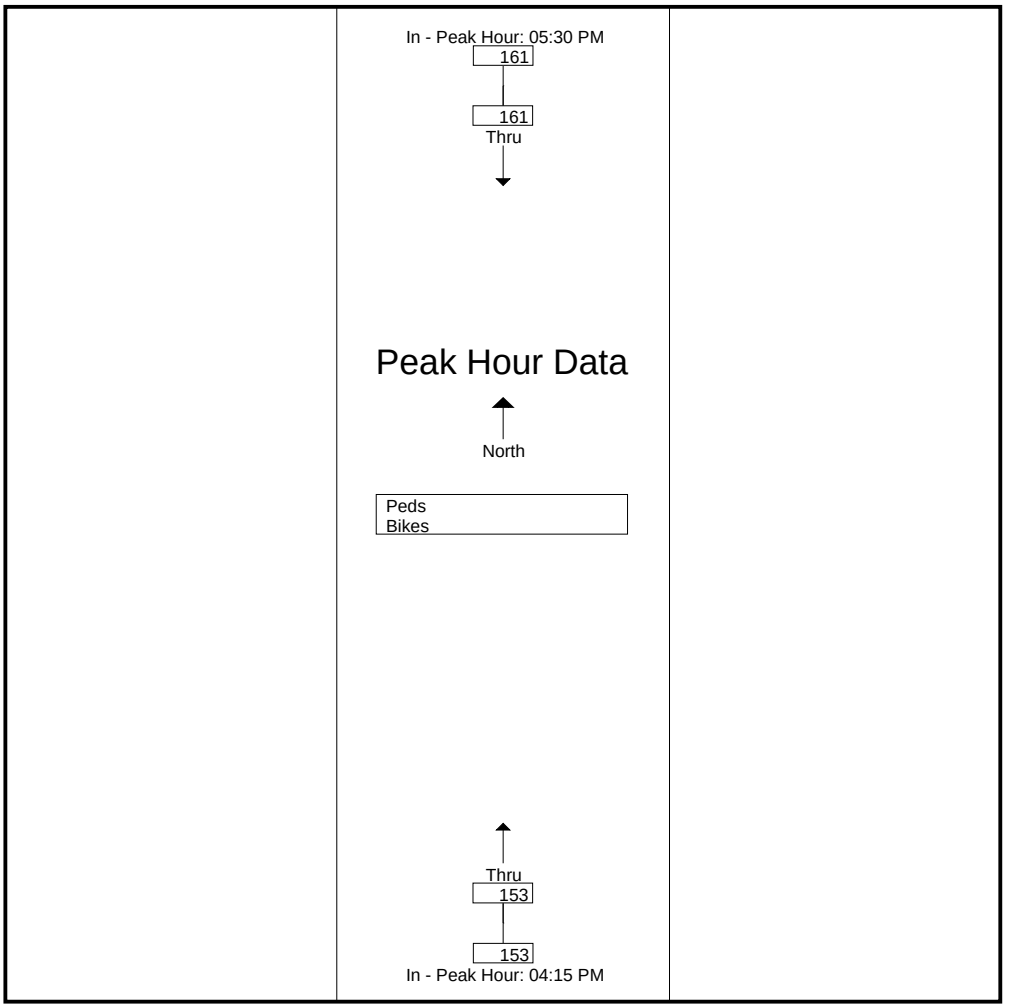
File Name : 16066001
Site Code : 16066001
Start Date : 8/4/2017
Page No : 4

	From North		From South		
Start Time	Thru	App. Total	Thru	App. Total	Int. Total

Peak Hour Analysis From 04:00 PM to 06:45 PM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

	05:30 PM		04:15 PM	
+0 mins.	31	31	26	26
+15 mins.	43	43	38	38
+30 mins.	41	41	**50**	**50**
+45 mins.	**46**	**46**	39	39
Total Volume	161	161	153	153
% App. Total	100		100	
PHF	.875	.875	.765	.765



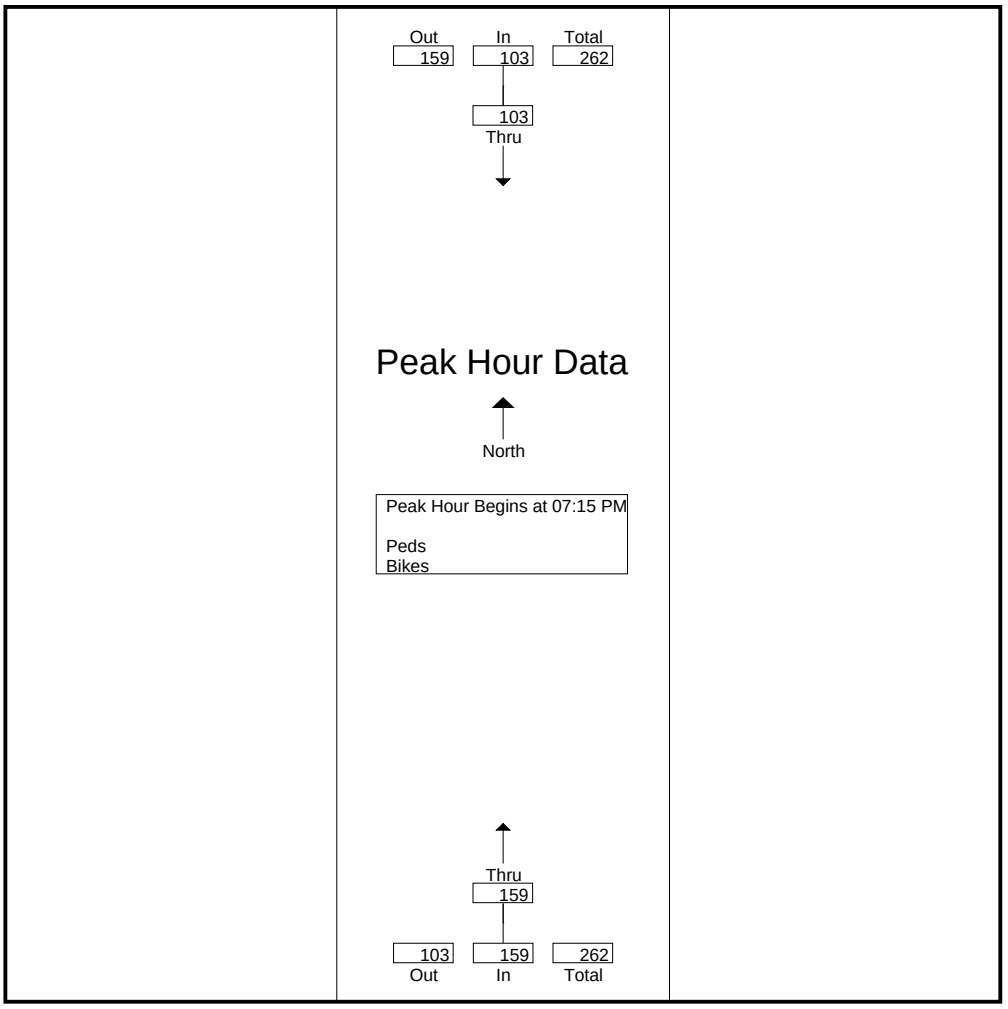
Accurate Counts

978-664-2565

N/S Street : Huntington Avenue
E/W Street : Peds / Bikes on Sidewalk
City/State : Boston, MA
Weather : Clear

File Name : 16066001
Site Code : 16066001
Start Date : 8/4/2017
Page No : 5

	From North		From South		
Start Time	Thru	App. Total	Thru	App. Total	Int. Total
Peak Hour Analysis From 07:00 PM to 10:45 PM - Peak 1 of 1					
Peak Hour for Entire Intersection Begins at 07:15 PM					
07:15 PM	26	26	29	29	55
07:30 PM	**32**	**32**	**53**	**53**	**85**
07:45 PM	20	20	42	42	62
08:00 PM	25	25	35	35	60
Total Volume	103	103	159	159	262
% App. Total	100		100		
PHF	.805	.805	.750	.750	.771



Accurate Counts

978-664-2565

N/S Street : Huntington Avenue
E/W Street : Peds / Bikes on Sidewalk
City/State : Boston, MA
Weather : Clear

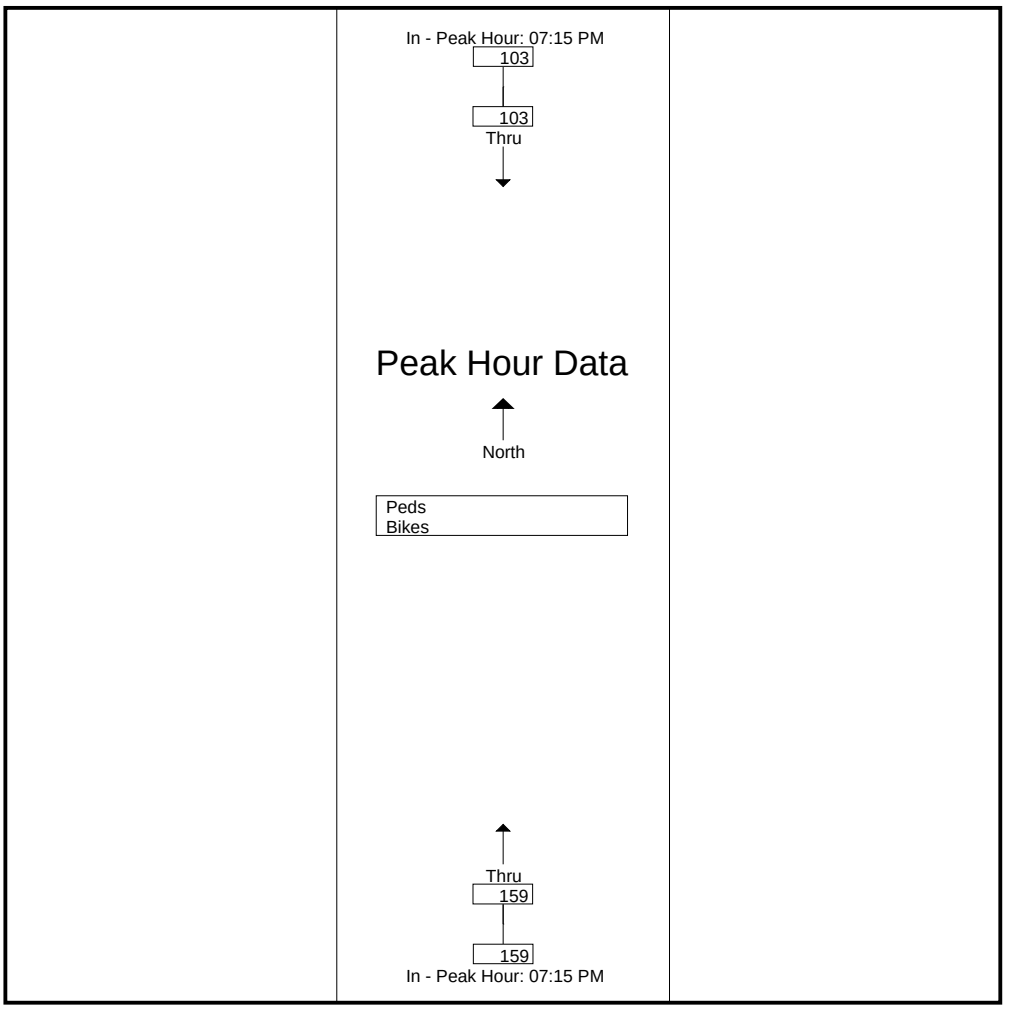
File Name : 16066001
Site Code : 16066001
Start Date : 8/4/2017
Page No : 6

	From North		From South		
Start Time	Thru	App. Total	Thru	App. Total	Int. Total

Peak Hour Analysis From 07:00 PM to 10:45 PM - Peak 1 of 1

Peak Hour for Each Approach Begins at:

	07:15 PM		07:15 PM	
+0 mins.	26	26	29	29
+15 mins.	**32**	**32**	**53**	**53**
+30 mins.	20	20	42	42
+45 mins.	25	25	35	35
Total Volume	103	103	159	159
% App. Total	100		100	
PHF	.805	.805	.750	.750



Pedestrian LOS Methodology

a pedestrian perspective. No methodology exists for evaluating two-way STOP-controlled intersection performance (with the cross street STOP controlled). However, it is reasoned that this type of control has negligible influence on pedestrian service along the segment. This edition of the HCM does not include a procedure for evaluating a segment's performance when the boundary intersection is an all-way STOP-controlled intersection, a roundabout, or a signalized interchange ramp terminal.

The pedestrian methodology is applied through a series of nine steps that culminate in the determination of the segment LOS. These steps are illustrated in Exhibit 17-15. Performance measures that are estimated include

- Pedestrian travel speed,
- Average pedestrian space, and
- Pedestrian LOS scores for the link and segment.

A methodology for evaluating off-street pedestrian facilities is provided in Chapter 23, Off-Street Pedestrian and Bicycle Facilities.

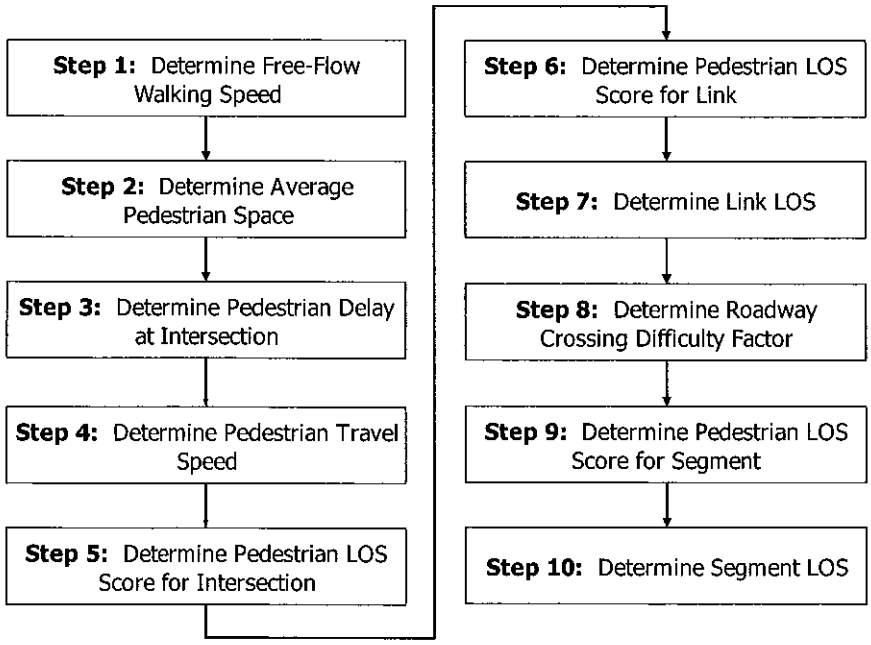


Exhibit 17-15
Pedestrian Methodology for Urban Street Segments

Link-Based Evaluation

Steps 6 and 7 of the pedestrian methodology can be used as a stand-alone procedure for link-based evaluation of pedestrian service. This approach is regularly used by local, regional, and state transportation agencies. It offers the advantage of being less data-intensive than the full, 10-step methodology and produces results that are generally reflective of pedestrian perceptions of service along the roadway. It can be especially attractive when agencies are performing a networkwide evaluation for a large number of roadway links.

The analyst should recognize that the resulting link LOS does not consider some aspects of pedestrian travel along a segment (e.g., crossing difficulty or intersection service). For this reason, the LOS score for the link should not be

aggregated for the purpose of characterizing facility performance. The analyst should also be aware that this approach precludes an integrated multimodal evaluation because it does not fully reflect segment performance.

Concepts

The methodology provides a variety of measures for evaluating segment performance in terms of its service to pedestrians. Each measure describes a different aspect of the pedestrian trip along the segment. One measure is the LOS score. This score is an indication of the typical pedestrian's perception of the overall segment travel experience. A second measure is the average speed of pedestrians traveling along the segment.

A third measure is based on the concept of "circulation area." It represents the average amount of sidewalk area available to each pedestrian walking along the segment. A larger area is more desirable from the pedestrian perspective. Exhibit 17-16 provides a qualitative description of pedestrian space that can be used to evaluate sidewalk performance from a circulation-area perspective.

Exhibit 17-16
Qualitative Description of Pedestrian Space

Pedestrian Space (ft^2/p)		
Random Flow	Platoon Flow	Description
>60	>530	Ability to move in desired path, no need to alter movements
>40–60	>90–530	Occasional need to adjust path to avoid conflicts
>24–40	>40–90	Frequent need to adjust path to avoid conflicts
>15–24	>23–40	Speed and ability to pass slower pedestrians restricted
>8–15	>11–23	Speed restricted, very limited ability to pass slower pedestrians
≤8	≤11	Speed severely restricted, frequent contact with other users

The first two columns in Exhibit 17-16 indicate a sensitivity to flow condition. Random pedestrian flow is typical of most segments. Platoon flow is appropriate for shorter segments (e.g., in downtown areas) with signalized boundary intersections.

Step 1: Determine Free-Flow Walking Speed

The *average* free-flow pedestrian walking speed S_{pf} is needed for the evaluation of urban street segment performance from a pedestrian perspective. This speed should reflect conditions in which there are negligible pedestrian-to-pedestrian conflicts and negligible adjustments in a pedestrian's desired walking path to avoid other pedestrians.

Research indicates that walking speed is influenced by pedestrian age and sidewalk grade (6). If 0% to 20% of pedestrians traveling along the subject segment are elderly (i.e., 65 years of age or older), an average free-flow walking speed of 4.4 ft/s is recommended for segment evaluation. If more than 20% of pedestrians are elderly, an average free-flow walking speed of 3.3 ft/s is recommended. In addition, an upgrade of 10% or greater reduces walking speed by 0.3 ft/s.

Step 2: Determine Average Pedestrian Space

Pedestrians are sensitive to the amount of space separating them from other pedestrians and obstacles as they walk along a sidewalk. Average pedestrian

space is an indicator of segment performance for travel in a sidewalk. It depends on the effective sidewalk width, pedestrian flow rate, and walking speed. This step is not applicable when the sidewalk does not exist.

A. Compute Effective Sidewalk Width

The effective sidewalk width equals the total walkway width less the effective width of fixed objects located on the sidewalk and less any shy distance associated with the adjacent street or a vertical obstruction. Fixed objects can be continuous (e.g., a fence or a building face) or discontinuous (e.g., trees, poles, or benches).

The effective sidewalk width is an average value for the length of the link. It is computed by using Equation 17-22 to Equation 17-26.

$$W_E = W_T - W_{O,i} - W_{O,o} - W_{s,i} - W_{s,o} \quad \geq 0.0 \qquad \textbf{Equation 17-22}$$

with

$$W_{s,i} = \max(W_{buf}, 1.5) \qquad \textbf{Equation 17-23}$$

$$W_{s,o} = 3.0 p_{\text{window}} + 2.0\, p_{\text{building}} + 1.5\, p_{\text{fence}} \qquad \textbf{Equation 17-24}$$

$$W_{O,i} = w_{O,i} - W_{s,i} \quad \geq 0.0 \qquad \textbf{Equation 17-25}$$

$$W_{O,o} = w_{O,o} - W_{s,o} \quad \geq 0.0 \qquad \textbf{Equation 17-26}$$

where

W_E = effective sidewalk width (ft),

W_T = total walkway width (ft),

$W_{O,i}$ = adjusted fixed-object effective width on inside of sidewalk (ft),

$W_{O,o}$ = adjusted fixed-object effective width on outside of sidewalk (ft),

$W_{s,i}$ = shy distance on inside (curb side) of sidewalk (ft),

$W_{s,o}$ = shy distance on outside of sidewalk (ft),

W_{buf} = buffer width between roadway and sidewalk (ft),

p_{window} = proportion of sidewalk length adjacent to a window display (decimal),

p_{building} = proportion of sidewalk length adjacent to a building face (decimal),

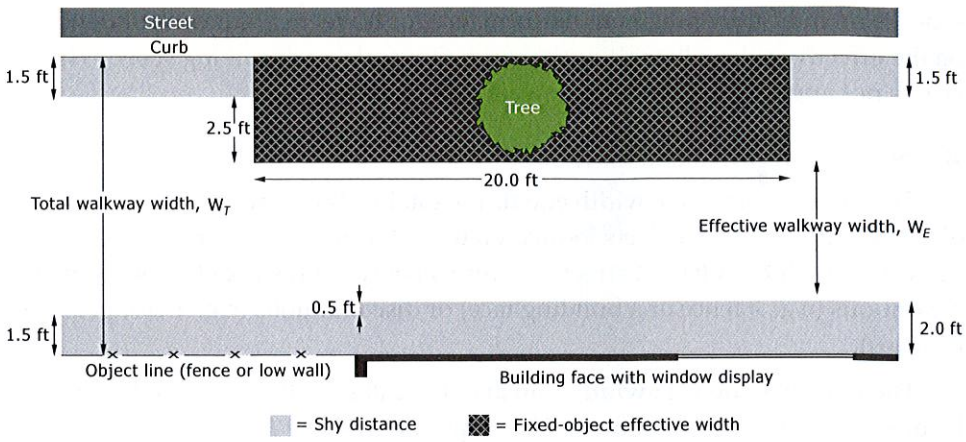
p_{fence} = proportion of sidewalk length adjacent to a fence or low wall (decimal),

$w_{O,i}$ = effective width of fixed objects on inside of sidewalk (ft), and

$w_{O,o}$ = effective width of fixed objects on outside of sidewalk (ft).

The relationship between the variables in these equations is illustrated in Exhibit 17-17.

Exhibit 17-17
Width Adjustments for Fixed Objects



The variables W_T, W_{buf}, p_{window}, $p_{building}$, p_{fence}, $w_{O,i}$, and $w_{O,o}$ are input variables. They represent average, or typical, values for the length of the sidewalk. Chapter 23, Off-Street Pedestrian and Bicycle Facilities, provides guidance for estimating the effective width of many common fixed objects.

Typical shy distances are shown in Exhibit 17-17. Shy distance on the inside (curb side) of the sidewalk is measured from the outside edge of the paved roadway (or face of curb, if present). It is generally considered to equal 1.5 ft. Shy distance on the outside of the sidewalk is 1.5 ft if a fence or a low wall is present, 2.0 ft if a building is present, 3.0 ft if window display is present, and 0.0 ft otherwise.

B. Compute Pedestrian Flow Rate per Unit Width

The pedestrian flow per unit width of sidewalk is computed by using Equation 17-27 for the subject sidewalk. The variable v_{ped} is an input variable.

Equation 17-27

$$v_p = \frac{v_{ped}}{60\ W_E}$$

where

v_p = pedestrian flow per unit width (p/ft/min),

v_{ped} = pedestrian flow rate in the subject sidewalk (walking in both directions) (p/h), and

W_E = effective sidewalk width (ft).

C. Compute Average Walking Speed

The average walking speed S_p is computed by using Equation 17-28. This equation is derived from the relationship between flow rate and average walking speed described in Exhibit 23-1 of Chapter 23.

Equation 17-28

$$S_p = (1 - 0.00078\ v_p^2)\ S_{pf} \quad \geq 0.5\ S_{pf}$$

where S_p = pedestrian walking speed (ft/s), S_{pf} = free-flow pedestrian walking speed (ft/s), and v_p = pedestrian flow per unit width (p/ft/min).

D. Compute Pedestrian Space

Finally, Equation 17-29 is used to compute average pedestrian space.

$$A_p = 60\frac{S_p}{v_p} \quad \textbf{Equation 17-29}$$

where A_p is the pedestrian space (ft²/p) and other variables are as previously defined.

The pedestrian space obtained from Equation 17-29 can be compared with the ranges provided in Exhibit 17-16 to make some judgments about the performance of the subject intersection corner.

Step 3: Determine Pedestrian Delay at Intersection

Pedestrian delay at three locations along the segment is determined in this step. Each of these delays represents an input variable for the methodology and is described in Section 1, Required Input Data.

The first delay variable represents the delay incurred by pedestrians who travel through the boundary intersection along a path that is parallel to the segment centerline d_{pp}. The second delay variable represents the delay incurred by pedestrians who cross the segment at the nearest signal-controlled crossing d_{pc}. The third delay variable represents the delay incurred by pedestrians waiting for a gap to cross the segment at an uncontrolled location d_{pw}.

Step 4: Determine Pedestrian Travel Speed

Pedestrian travel speed represents an aggregate measure of speed along the segment. It combines the delay incurred at the downstream boundary intersection plus the time required to walk the length of the segment. As such, it is typically slower than the average walking speed. The pedestrian travel speed is computed by using Equation 17-30.

$$S_{Tp,seg} = \frac{L}{\frac{L}{S_p} + d_{pp}} \quad \textbf{Equation 17-30}$$

where

$S_{Tp,seg}$ = travel speed of through pedestrians for the segment (ft/s),

L = segment length (ft),

S_p = pedestrian walking speed (ft/s), and

d_{pp} = pedestrian delay when walking parallel to the segment (s/p).

In general, a travel speed of 4.0 ft/s or more is considered desirable and a speed of 2.0 ft/s or less is considered undesirable.

Step 5: Determine Pedestrian LOS Score for Intersection

The pedestrian LOS score for the boundary intersection $I_{p,int}$ is determined in this step. If the boundary intersection is signalized, then the pedestrian

methodology described in Chapter 18 is used for this determination. If the boundary intersection is two-way STOP controlled, then the score is equal to 0.0.

Step 6: Determine Pedestrian LOS Score for Link

The pedestrian LOS score for the link $I_{p,link}$ is calculated by using Equation 17-31.

Equation 17-31

$$I_{p,link} = 6.0468 + F_w + F_v + F_S$$

with

Equation 17-32

$$F_w = -1.2276 \ln(W_v + 0.5\,W_1 + 50\,p_{pk} + W_{buf}\,f_b + W_{aA}\,f_{sw})$$

Equation 17-33

$$F_v = 0.0091 \frac{v_m}{4\,N_{th}}$$

Equation 17-34

$$F_s = 4\left(\frac{S_R}{100}\right)^2$$

where

$I_{p,link}$ = pedestrian LOS score for link;

F_w = cross-section adjustment factor;

F_v = motorized vehicle volume adjustment factor;

F_S = motorized vehicle speed adjustment factor;

$\ln(x)$ = natural log of x;

W_v = effective total width of outside through lane, bicycle lane, and shoulder as a function of traffic volume (see Exhibit 17-18) (ft);

W_1 = effective width of combined bicycle lane and shoulder (see Exhibit 17-18) (ft);

p_{pk} = proportion of on-street parking occupied (decimal);

W_{buf} = buffer width between roadway and available sidewalk (= 0.0 if sidewalk does not exist) (ft);

f_b = buffer area coefficient = 5.37 for any continuous barrier at least 3 ft high that is located between the sidewalk and the outside edge of roadway; otherwise use 1.0;

W_A = available sidewalk width = 0.0 if sidewalk does not exist or $W_T - W_{buf}$ if sidewalk exists (ft);

W_{aA} = adjusted available sidewalk width = min(W_A, 10) (ft);

f_{sw} = sidewalk width coefficient = 6.0 – 0.3 W_{aA};

v_m = midsegment demand flow rate (direction nearest to the subject sidewalk) (veh/h);

N_{th} = number of through lanes on the segment in the subject direction of travel (ln); and

time to get around a fixed object. The effective length of a fixed object is assumed to be five times the object's effective width.

Typically, a walkway operational analysis evaluates the portion of the walkway with the narrowest effective width, since this section forms the constraint on pedestrian flow. A design analysis identifies the minimum effective width that must be maintained along the length of the walkway to avoid pedestrian queuing or spillover.

Exhibit 23-11 gives the effective widths of a variety of typical fixed objects found along on- and off-street pedestrian facilities. The values in Exhibit 23-11 can be used when specific walkway configurations are not available.

Exhibit 23-11
Typical Fixed-Object Effective Widths

Fixed Object	Effective Width (ft)
Street Furniture	
Light pole	2.5–3.5
Traffic signal poles and boxes	3.0–4.0
Fire alarm boxes	2.5–3.5
Fire hydrants	2.5–3.0
Traffic signs	2.0–2.5
Parking meters	2.0
Mail boxes (1.7 ft x 1.7 ft)	3.2–3.7
Telephone booths (2.7 ft x 2.7 ft)	4.0
Trash cans (1.8 ft diameter)	3.0
Benches	5.0
Bus shelters (on sidewalk)	6.0–7.0
Public Underground Access	
Subway stairs	5.5–7.0
Subway ventilation gratings (raised)	6.0+
Transformer vault ventilation gratings (raised)	6.0+
Landscaping	
Trees	3.0–4.0
Planter boxes	5.0
Commercial Uses	
Newsstands	4.0–13.0
Vending stands	Variable
Advertising and store displays	Variable
Sidewalk cafés (two rows of tables)	7.0
Building Protrusions	
Columns	2.5–3.0
Stoops	2.0–6.0
Cellar doors	5.0–7.0
Standpipe connections	1.0
Awning poles	2.5
Truck docks (trucks protruding)	Variable
Garage entrance/exit	Variable
Driveways	Variable

Source: Pushkarev and Zupan (*9*).

See Exhibit 23-10 for shy distances associated with curbs and building faces.

Stairways

Pedestrians tend to walk in lines or lanes on stairways; thus, meaningful increases in capacity are related to the number of pedestrian lanes available.

A stairway's capacity is largely affected by its width. Unlike walking on a level surface, traversing stairs tends to make people walk in lines or lanes. The width of a stairway determines both the number of distinct lines that can traverse the stair and the side-to-side spacing between them, affecting both the ability of faster pedestrians to pass slower-moving pedestrians and the level of interference between adjacent lines of people. The consequence is that meaningful increases in capacity are not linearly proportional to the width but occur in increments of about 30 in. (*1*).

Pedestrian LOS Calculations - Existing

Pedestrian Space for Existing Segment at 5-6 PM

Step 1. Determine Free-Flow Walking Speed

S_{pf} = free-flow walking speed = 4.4 ft/s

Step 2. Determine Average Pedestrian Space

A. Compute Effective Width

W_E = effective sidewalk width = 3.00 ft

$W_E = W_T - W_{O,I} - W_{O,o} - W_{s,I} - W_{s,o} \geq 0$ =

8 ft - 1.5 ft - 0 ft - 2 ft - 1.5 ft = 3 ft

W_T = total walkway width = 8.00 ft

$W_{O,I}$ = adjusted fixed object effective width on inside of sidewalk = 1.50 ft

$W_{O,I} = \omega_{O,i} - W_{s,I} \geq 0$ =

3 ft -1.5 ft = 1.5 ft

Fixed objects include: Bike racks (effective width 2.5') & Tree boxes (effective width 5' x 2)

$\omega_{O,i}$ = effective width of fixed objects on inside of sidewalk = 3.0 ft

$W_{s,I}$ = shy distance on inside (curb side) of sidewalk = 1.5 ft

$W_{O,o}$ = adjusted fixed object effective width on outside of sidewalk = 0.00 ft

$W_{O,o} = \omega_{O,o} - W_{s,o} \geq 0$ =

0 ft -2 ft = 0 ft

$\omega_{O,o}$ = effective width of fixed objects on outside of sidewalk = 0.00 ft

$W_{s,o}$ = shy distance on outside of sidewalk = 2 ft

$W_{s,o} = 3.0\rho_{window} + 2.0\rho_{building} + 1.5\rho_{fence}$ =

3.0 * 0 + 2.0 * 1 + 1.5 * 0 = 2 ft

ρ_{window} = proportion of sidewalk length adjacent to a window display = 0

$\rho_{building}$ = proportion of sidewalk length adjacent to a building face = 1

ρ_{fence}= proportion of sidewalk length adjacent to a fence = 0

B. Compute Pedestrian Flow Rate per Unit Width

v_p = pedestrian flow per unit width 2.6778 p/ft/min

$v_p = v_{ped}/60W_E$ =

482 p/h / (60 * 3 ft) = 2.68 p/ft/min

v_{ped} = pedestrian flow rate in the subject sidewalk = 482 p/h

C. Compute Average Walking Speed

S_p = pedestrian walking speed = 4.3754 ft/s

$S_p = (1 - 0.00078\ v_p^2)\ S_{pf} \geq 0.5\ S_{pf}$ =

(1 - 0.00078 * (2.68 p/ft/min)2) * 4.4 ft/s ≥ 0.5 4.4 ft/s = 4.38 ft/s

D. Compute Pedestrian Space

A_p = pedestrian space = 98.038 sf/p

$A_p = 60 * S_p / v_p$ =

60 * 4.38 ft/s / 2.68 p/ft/min = 98.04 sf/p

Pedestrian Space for Existing Segment at 7-8 PM

Step 1. Determine Free-Flow Walking Speed

S_{pf} = free-flow walking speed = 4.4 ft/s

Step 2. Determine Average Pedestrian Space

A. Compute Effective Width

W_E = effective sidewalk width = 3.00 ft

$W_E = W_T - W_{O,I} - W_{O,o} - W_{s,I} - W_{s,o} \geq 0$ =

8 ft - 1.5 ft - 0 ft - 2 ft - 1.5 ft = 3 ft

W_T = total walkway width = 8.00 ft

$W_{O,I}$ = adjusted fixed object effective width on inside of sidewalk = 1.50 ft

$W_{O,I} = \omega_{O,i} - W_{s,I} \geq 0$ =

3 ft -1.5 ft = 1.5 ft

Fixed objects include: Bike racks (effective width 2.5') & Tree boxes (effective width 5' x 2)

$\omega_{O,i}$ = effective width of fixed objects on inside of sidewalk = 3.0 ft

$W_{s,I}$ = shy distance on inside (curb side) of sidewalk = 1.5 ft

$W_{O,o}$ = adjusted fixed object effective width on outside of sidewalk = 0.00 ft

$W_{O,o} = \omega_{O,o} - W_{s,o} \geq 0$ =

0 ft -2 ft = 0 ft

$\omega_{O,o}$ = effective width of fixed objects on outside of sidewalk = 0.00 ft

$W_{s,o}$ = shy distance on outside of sidewalk = 2 ft

$W_{s,o} = 3.0\rho_{window} + 2.0\rho_{building} + 1.5\rho_{fence}$ =

3.0 * 0 + 2.0 * 1 + 1.5 * 0 = 2 ft

ρ_{window} = proportion of sidewalk length adjacent to a window display = 0

$\rho_{building}$ = proportion of sidewalk length adjacent to a building face = 1

ρ_{fence}= proportion of sidewalk length adjacent to a fence = 0

B. Compute Pedestrian Flow Rate per Unit Width

v_p = pedestrian flow per unit width 5.2278 p/ft/min

$v_p = v_{ped}/60W_E$ =

941 p/h / (60 * 3 ft) = 5.23 p/ft/min

v_{ped} = pedestrian flow rate in the subject sidewalk = 941 p/h

C. Compute Average Walking Speed

S_p = pedestrian walking speed = 4.3062 ft/s

$S_p = (1 - 0.00078\ v_p^2)\ S_{pf} \geq 0.5\ S_{pf}$ =

(1 - 0.00078 * (5.23 p/ft/min)2) * 4.4 ft/s ≥ 0.5 4.4 ft/s = 4.31 ft/s

D. Compute Pedestrian Space

A_p = pedestrian space = 49.423 sf/p

$A_p = 60 * S_p / v_p$ =

60 * 4.31 ft/s / 5.23 p/ft/min = 49.42 sf/p

Pedestrian Space for Existing Segment at 10-11 PM

Step 1. Determine Free-Flow Walking Speed

S_{pf} = free-flow walking speed = 4.4 ft/s

Step 2. Determine Average Pedestrian Space

A. Compute Effective Width

W_E = effective sidewalk width = 3.00 ft

$W_E = W_T - W_{O,I} - W_{O,o} - W_{s,I} - W_{s,o} \geq 0$ =

8 ft - 1.5 ft - 0 ft - 2 ft - 1.5 ft = 3 ft

W_T = total walkway width = 8.00 ft

$W_{O,I}$ = adjusted fixed object effective width on inside of sidewalk = 1.50 ft

$W_{O,I} = \omega_{O,i} - W_{s,I} \geq 0$ =

3 ft -1.5 ft = 1.5 ft

Fixed objects include: Bike racks (effective width 2.5') & Tree boxes (effective width 5' x 2)

$\omega_{O,i}$ = effective width of fixed objects on inside of sidewalk = 3.0 ft

$W_{s,I}$ = shy distance on inside (curb side) of sidewalk = 1.5 ft

$W_{O,o}$ = adjusted fixed object effective width on outside of sidewalk = 0.00 ft

$W_{O,o} = \omega_{O,o} - W_{s,o} \geq 0$ =

0 ft -2 ft = 0 ft

$\omega_{O,o}$ = effective width of fixed objects on outside of sidewalk = 0.00 ft

$W_{s,o}$ = shy distance on outside of sidewalk = 2 ft

$W_{s,o} = 3.0\rho_{window} + 2.0\rho_{building} + 1.5\rho_{fence}$ =

3.0 * 0 + 2.0 * 1 + 1.5 * 0 = 2 ft

ρ_{window} = proportion of sidewalk length adjacent to a window display = 0

$\rho_{building}$ = proportion of sidewalk length adjacent to a building face = 1

ρ_{fence}= proportion of sidewalk length adjacent to a fence = 0

B. Compute Pedestrian Flow Rate per Unit Width

ν_p = pedestrian flow per unit width 5.8333 p/ft/min

$\nu_p = \nu_{ped}/60W_E$ =

1050 p/h / (60 * 3 ft) = 5.83 p/ft/min

ν_{ped} = pedestrian flow rate in the subject sidewalk = 1050 p/h

C. Compute Average Walking Speed

S_p = pedestrian walking speed = 4.2832 ft/s

$S_p = (1 - 0.00078\ \nu_p^2)\ S_{pf} \geq 0.5\ S_{pf}$ =

(1 - 0.00078 * (5.83 p/ft/min)2) * 4.4 ft/s ≥ 0.5 4.4 ft/s = 4.28 ft/s

D. Compute Pedestrian Space

A_p = pedestrian space = 44.056 sf/p

$A_p = 60 * S_p / \nu_p$ =

60 * 4.28 ft/s / 5.83 p/ft/min = 44.06 sf/p

Pedestrian LOS Calculations - Proposed

Pedestrian Space with Proposed Segment at 5-6 PM

Step 1. Determine Free-Flow Walking Speed

S_{pf} = free-flow walking speed = 4.4 ft/s

Step 2. Determine Average Pedestrian Space

A. Compute Effective Width

W_E = effective sidewalk width = 8.00 ft

$W_E = W_T - W_{O,I} - W_{O,o} - W_{s,I} - W_{s,o} \geq 0$ =

13 ft - 1.5 ft - 0 ft - 2 ft - 1.5 ft = 8 ft

W_T = total walkway width = 13.00 ft

$W_{O,I}$ = adjusted fixed object effective width on inside of sidewalk = 1.50 ft

$W_{O,I} = \omega_{O,i} - W_{s,I} \geq 0$ =

3 ft -1.5 ft = 1.5 ft

Fixed objects include: Bike racks (effective width 2.5'),
Tree boxes (effective width 5' x 2),
Sculpture columns (effective width 2.5' x 3)

$\omega_{O,i}$ = effective width of fixed objects on inside of sidewalk = 3.0 ft

$W_{s,I}$ = shy distance on inside (curb side) of sidewalk = 1.5 ft

$W_{O,o}$ = adjusted fixed object effective width on outside of sidewalk = 0.00 ft

$W_{O,o} = \omega_{O,o} - W_{s,o} \geq 0$ =

0 ft -2 ft = 0 ft

$\omega_{O,o}$ = effective width of fixed objects on outside of sidewalk = 0.00 ft

$W_{s,o}$ = shy distance on outside of sidewalk = 2 ft

$W_{s,o} = 3.0\rho_{window} + 2.0\rho_{building} + 1.5\rho_{fence}$ =

3.0 * 0 + 2.0 * 1 + 1.5 * 0 = 2 ft

ρ_{window} = proportion of sidewalk length adjacent to a window display = 0

$\rho_{building}$ = proportion of sidewalk length adjacent to a building face = 1

ρ_{fence}= proportion of sidewalk length adjacent to a fence = 0

B. Compute Pedestrian Flow Rate per Unit Width

ν_p = pedestrian flow per unit width 1.6333 p/ft/min

$\nu_p = \nu_{ped}/60W_E$ =

784 p/h / (60 * 8 ft) = 1.63 p/ft/min

ν_{ped} = pedestrian flow rate in the subject sidewalk = 784 p/h

C. Compute Average Walking Speed

S_p = pedestrian walking speed = 4.3908 ft/s

$S_p = (1 - 0.00078\ \nu_p^2)\ S_{pf} \geq 0.5\ S_{pf}$ =

(1 - 0.00078 * (1.63 p/ft/min)2) * 4.4 ft/s ≥ 0.5 4.4 ft/s = 4.39 ft/s

D. Compute Pedestrian Space

A_p = pedestrian space = 161.3 sf/p

$A_p = 60 * S_p / \nu_p$ =

60 * 4.39 ft/s / 1.63 p/ft/min = 161.3 sf/p

Pedestrian Space with Proposed Segment at 7-8 PM

Step 1. Determine Free-Flow Walking Speed

S_{pf} = free-flow walking speed = 4.4 ft/s

Step 2. Determine Average Pedestrian Space

A. Compute Effective Width

W_E = effective sidewalk width = 8.00 ft

$W_E = W_T - W_{O,I} - W_{O,o} - W_{s,I} - W_{s,o} \geq 0$ =

13 ft - 1.5 ft - 0 ft - 2 ft - 1.5 ft = 8 ft

W_T = total walkway width = 13.00 ft

$W_{O,I}$ = adjusted fixed object effective width on inside of sidewalk = 1.50 ft

$W_{O,I} = \omega_{O,i} - W_{s,I} \geq 0$ =

3 ft -1.5 ft = 1.5 ft

Fixed objects include: Bike racks (effective width 2.5'),
Tree boxes (effective width 5' x 2),
Sculpture columns (effective width 2.5' x 3)

$\omega_{O,i}$ = effective width of fixed objects on inside of sidewalk = 3.0 ft

$W_{s,I}$ = shy distance on inside (curb side) of sidewalk = 1.5 ft

$W_{O,o}$ = adjusted fixed object effective width on outside of sidewalk = 0.00 ft

$W_{O,o} = \omega_{O,o} - W_{s,o} \geq 0$ =

0 ft -2 ft = 0 ft

$\omega_{O,o}$ = effective width of fixed objects on outside of sidewalk = 0.00 ft

$W_{s,o}$ = shy distance on outside of sidewalk = 2 ft

$W_{s,o} = 3.0\rho_{window} + 2.0\rho_{building} + 1.5\rho_{fence}$ =

3.0 * 0 + 2.0 * 1 + 1.5 * 0 = 2 ft

ρ_{window} = proportion of sidewalk length adjacent to a window display = 0

$\rho_{building}$ = proportion of sidewalk length adjacent to a building face = 1

ρ_{fence}= proportion of sidewalk length adjacent to a fence = 0

B. Compute Pedestrian Flow Rate per Unit Width

ν_p = pedestrian flow per unit width 1.7875 p/ft/min

$\nu_p = \nu_{ped}/60W_E$ =

858 p/h / (60 * 8 ft) = 1.79 p/ft/min

ν_{ped} = pedestrian flow rate in the subject sidewalk = 858 p/h

C. Compute Average Walking Speed

S_p = pedestrian walking speed = 4.389 ft/s

$S_p = (1 - 0.00078\ \nu_p^2)\ S_{pf} \geq 0.5\ S_{pf}$ =

(1 - 0.00078 * (1.79 p/ft/min)2) * 4.4 ft/s ≥ 0.5 4.4 ft/s = 4.39 ft/s

D. Compute Pedestrian Space

A_p = pedestrian space = 147.32 sf/p

$A_p = 60 * S_p / \nu_p$ =

60 * 4.39 ft/s / 1.79 p/ft/min = 147.32 sf/p

Pedestrian Space with Proposed Segment at 10-11 PM

Step 1. Determine Free-Flow Walking Speed

S_{pf} = free-flow walking speed = 4.4 ft/s

Step 2. Determine Average Pedestrian Space

A. Compute Effective Width

W_E = effective sidewalk width = 8.00 ft

$W_E = W_T - W_{O,I} - W_{O,o} - W_{s,I} - W_{s,o} \geq 0$ =

13 ft - 1.5 ft - 0 ft - 2 ft - 1.5 ft = 8 ft

W_T = total walkway width = 13.00 ft

$W_{O,I}$ = adjusted fixed object effective width on inside of sidewalk = 1.50 ft

$W_{O,I} = \omega_{O,i} - W_{s,I} \geq 0$ =

3 ft -1.5 ft = 1.5 ft

Fixed objects include: Bike racks (effective width 2.5'),
Tree boxes (effective width 5' x 2),
Sculpture columns (effective width 2.5' x 3)

$\omega_{O,i}$ = effective width of fixed objects on inside of sidewalk = 3.0 ft

$W_{s,I}$ = shy distance on inside (curb side) of sidewalk = 1.5 ft

$W_{O,o}$ = adjusted fixed object effective width on outside of sidewalk = 0.00 ft

$W_{O,o} = \omega_{O,o} - W_{s,o} \geq 0$ =

0 ft -2 ft = 0 ft

$\omega_{O,o}$ = effective width of fixed objects on outside of sidewalk = 0.00 ft

$W_{s,o}$ = shy distance on outside of sidewalk = 2 ft

$W_{s,o} = 3.0\rho_{window} + 2.0\rho_{building} + 1.5\rho_{fence}$ =

3.0 * 0 + 2.0 * 1 + 1.5 * 0 = 2 ft

ρ_{window} = proportion of sidewalk length adjacent to a window display = 0

$\rho_{building}$ = proportion of sidewalk length adjacent to a building face = 1

ρ_{fence}= proportion of sidewalk length adjacent to a fence = 0

B. Compute Pedestrian Flow Rate per Unit Width

ν_p = pedestrian flow per unit width 1.4125 p/ft/min

$\nu_p = \nu_{ped}/60W_E$ =

678 p/h / (60 * 8 ft) = 1.41 p/ft/min

ν_{ped} = pedestrian flow rate in the subject sidewalk = 678 p/h

C. Compute Average Walking Speed

S_p = pedestrian walking speed = 4.3932 ft/s

$S_p = (1 - 0.00078\ \nu_p^2)\ S_{pf} \geq 0.5\ S_{pf}$ =

(1 - 0.00078 * (1.41 p/ft/min)2) * 4.4 ft/s ≥ 0.5 4.4 ft/s = 4.39 ft/s

D. Compute Pedestrian Space

A_p = pedestrian space = 186.61 sf/p

$A_p = 60 * S_p / \nu_p$ =

60 * 4.39 ft/s / 1.41 p/ft/min = 186.61 sf/p

Attachment B

RWDI Letter

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September 13, 2017

James J. Gray, AIA
Stantec Architecture
James.Gray@stantec.com

Cc: Scott Aquilina
Bruner/Cott
saquilina@brunercott.com

Re: 252-264 Huntington Avenue,

Dear James,

With regards to the above project, we understand that massing changes are being contemplated for the project. RWDI received notice of these changes on August 30, 2017 via pdf attachment to an email from Scott Aquilina of Bruner Cott.

The changes consist of adding several stories to the annex building to the west of the theatre. Specifically, this change is shown on the last page of the .pdf file we were sent, and that the theater has expanded from the red box to the volume shown in yellow. We also understand that the new massing is substantially surrounded by other elements of the development.

It is RWDI's opinion that these changes will not result in any significant changes to the pedestrian wind environment, and will not change any conclusions or recommendations previously presented by RWDI.

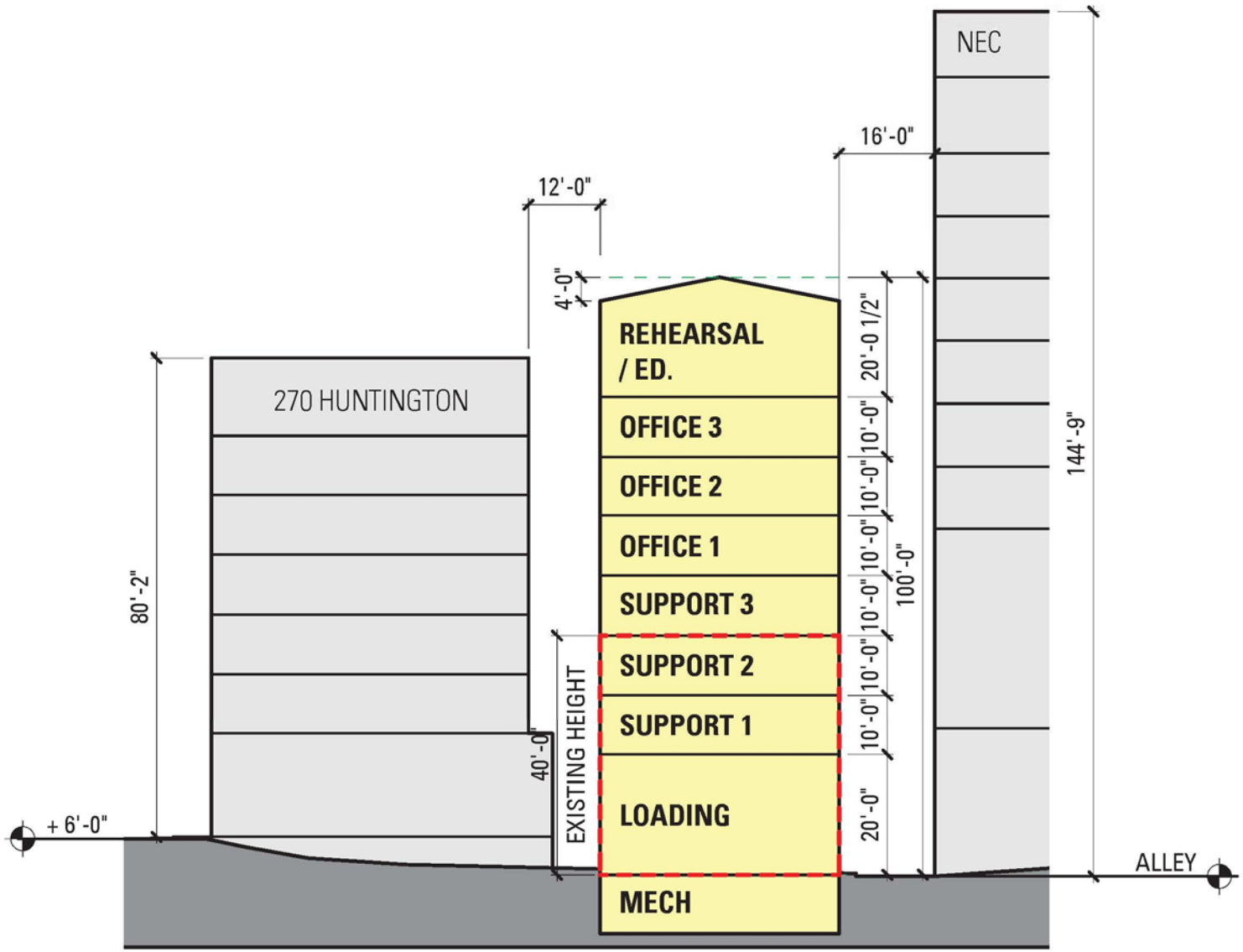
Please feel free to let us know if you have any questions or comments on the above.

Yours truly,

RWDI

Bill Smeaton, P.Eng.
Principal/Senior Project Manager

WHS/jls



252-264 Huntington Avenue Boston, Massachusetts

Bruner/Cott
architects and planners

Figure 10
Conceptual Section – Alley 822