## Item 7.1

## 5445 Rainnie Drive Mixed Use Development Halifax, Nova Scotia

## **Location and Context:**

The subject site is located across from the historical Citadel Hill, with open views and good orientation from east to west, which provides a great opportunity for an interesting design. The redevelopment of this site with a new, modern and well-articulated mixed-use building will complement the historic Halifax landmark, the Halifax Metro Center and the Police Department. With proximity to major health and academic institutional complexes, and surrounded by tremendous public open space, this development will help define the image of downtown as a livable, enriching and sustainable place to live work and play.

## Site and Site Development Criteria

The Halifax LUB allows the development of a mixed use Commercial and Residential building at 5445 Rainnie Drive.

This development is guided and regulated by the Land Use Bylaw quantitative elements such as:

- a.) building height of 23 meters,
- b.) street wall setbacks of 0-1.5,
- c.) street wall heights of 11 meters minimum before a required step backs, and
- d.) street step backs of 10% or 5.5 meters where required.

The qualitative element of this development is shaped by Schedule S-1: Design Manual such as:

- a.) pedestrian-oriented commercial uses,
- b.) streetwall placement, and
- c.) height of streetwall up to the point where upper storey step backs are required.

In addition, the design of street walls with pedestrian accessibility, care for animation and engagement, which this development has been able to achieve.

## **Building Design Criteria**

The proposed building complies with the main design criteria set up by Schedule S-1: Design Manual regarding the articulation of a well-defined building base; middle and top, in addition to the appropriate use of texture, colour, materials, and a well-articulated roof line and landscaped rooftop area.

## Building Design Description (scale composition and materials)

The proposed mixed-use project includes 3 levels of underground parking, 13,000 sq.ft. of commercial space at grade, and 67 residential units within 6 floors and a penthouse level. The roof top provides landscape and amenity space for the residents, in addition to a prominent and a visually interesting skyline feature.

The vision and architectural articulation of the building has been shaped by the existing topography of the land and street, its location across from Citadel Hill, the unobstructed views and orientation north-south and east- west, and by following the regulations and guidelines of Halifax Downtown LUB and Schedule S-1: (Design Manual).

The continuous and hilly slope along Rainnie Drive along with the substantial drop towards the back of the property facing North (new hotels), provides a natural opportunity to place the three parking levels below street level.

The 10'-0" wide utility easement created on the east side of the building provides an opportunity for a landscaped corridor with wide stone steps, cobbled stone, lighting, and benches

The main pedestrian entrances on Level 100 serving both the Retail and Residential Lobby are at street level, and sheltered by the Residential Level 200. This is defined by the setback of the street wall facing Rainnie Drive, and therefore, in compliance with the Design Manual criteria of Pedestrian Oriented Commercial Use.

The entrance to the underground parking levels is located on the west side away from the heavy traffic intersection on Rainnie and Brunswick Streets. It is located next to a green area owned by the Police Department which allows for open views.

## **Building Form and Materials**

## South Elevation Features:

- A well-defined building base, middle and top.
- Street face is envisioned as Curtain Wall with Solarban 70 clear vision glass which provides high performance to major climate factors such as solar heat gain (.27 coefficient vs. 77 standard), visible light (64% visibility vs. 82% standard), ultraviolet transmission (6% allow vs. 59% standard) and less heat loss.
- Spandrel glazing is 6 mm heat strengthened single glass with a scrim back coating and insulated metal back pan. Spandrels are part of Curtain Wall used to block undesired views such as columns, party walls, and/or ventilation systems. The spandrel colour is always a challenge and will be studied to complement the architectural features. For now, we envision a light silver grey.
- Operating windows, balcony doors, handrails and 5 mm tempered glass inserts.
- Awnings will be sightless and balcony doors thermally broken aluminum sliders.
- All mullions will be a clear anodized finish on the inside, with a 2.5" horizontal line capped at every level, with an 8" cap framing part of the middle body. The caps will be silver in colour. All remaining joints will be silicon connection (frameless).
- Balcony handrails and glass inserts will consist of aluminum framing, light in colour, with 5mm clear tempered glass inserts.
- Tinted Glazing; through means of colour at glazing and balconies, we envision a visually pleasant and exciting building that is engaging and vibrant.
- Red composite metal banding to identify and accentuate the residential entrance.
- Shelter to pedestrians is provided by the articulation of the base and the middle block. Therefore, no canopy is required as part of the building design.

## West Elevation

A well defined building base, middle and top. Building is similar to the South Elevation, however, the transition created at the parking entrance, where the building changes to Ceramic Tile panels (12"x48"), helps to anchor the building. The windows are smaller due to its proximity to the property line, as regulated by the NBCC. This elevation shows a gradually sloped roof at the top of the penthouse which is balanced by a horizontal Zen Style Arbour.

## North Elevation

A well-defined and articulated top, with a base and middle restricted to smaller windows, to comply with the limiting distance as set up by the NBCC. The colour of the Ceramic Tiles will be aimed to reduce rigidity, and enhance the visual appeal at this elevation.

## East Elevation

A well-defined building base, middle and top. The transition from glass to Ceramic Tile panels (12"x48") helps to anchor the building. The windows are smaller and staggered to make the elevation more dynamic. This elevation is accentuated by a well-defined geometric element at the intersection of the South and East Elevations. The articulation of the building blocks is enhanced by colour and the enlarged penthouse glazing. The penthouse roof slab is balanced by a horizontal Zen Style Arbour.

## **Required Variances:**

We require one minor variance related to the placement of the hand rail at level 600. This is necessary for the residents to safely access and enjoy the outdoor terrace. It also adds to the visual articulation of the building and its relationship with the street.

Roberto Menendez, M.Arch., MIDS Director of Design Development W M Fares Group





|           | <u>F</u> | RAINNIE D | RIVE           |        |           |
|-----------|----------|-----------|----------------|--------|-----------|
| LEVEL     | BACH.    | 1 BDRM    | 1 BDRM<br>+DEN | 2 BDRM | TOTAL     |
| 200       | 1        | 3         | 1              | 7      | 12        |
| 300       | 1        | 3         | 1              | 7      | 12        |
| 400       | 1        | 3         | 1              | 7      | 12        |
| 500       | 1        | 3         | 1              | 7      | 12        |
| 600       | 0        | 3         | 0              | 6      | 9         |
| 700       | 0        | 3         | 0              | 6      | 9         |
| PENTHOUSE | 0        | 0         | 0              | 2      | 2         |
| TOTAL     | 4        | 17        | 5              | 42     | <u>68</u> |
|           | 6%       | 25%       | 7%             | 62%    | 100%      |

LEVEL 100:

| TOTAL       | -13816 sq.ft. |
|-------------|---------------|
| COMMERCIAL  | -13219 sq.ft. |
| RESIDENTIAL | - 597 sq.ft.  |

| Proposed                          | No. Description                    | Date     | Stamp | Title              | Scale          | Date          |
|-----------------------------------|------------------------------------|----------|-------|--------------------|----------------|---------------|
|                                   | A SCHEDULE S-1<br>DHLUB SUBMISSION | 30/08/13 |       |                    | 1/4" = 1'-0"   | October. 2013 |
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| References                        |                                    |          |       |                    | STAFF          |               |
| Owner                             |                                    |          |       |                    | Checked by     |               |
|                                   |                                    |          |       |                    | RM             | AC0           |
| WM FARES                          |                                    |          |       |                    | Project number |               |
| ARCHITECTS   ENGINEERS   PLANNERS |                                    |          |       |                    | 2013-06        |               |
|                                   |                                    |          |       |                    | l              | ·             |

## SUMMARY:

<u>P3</u>

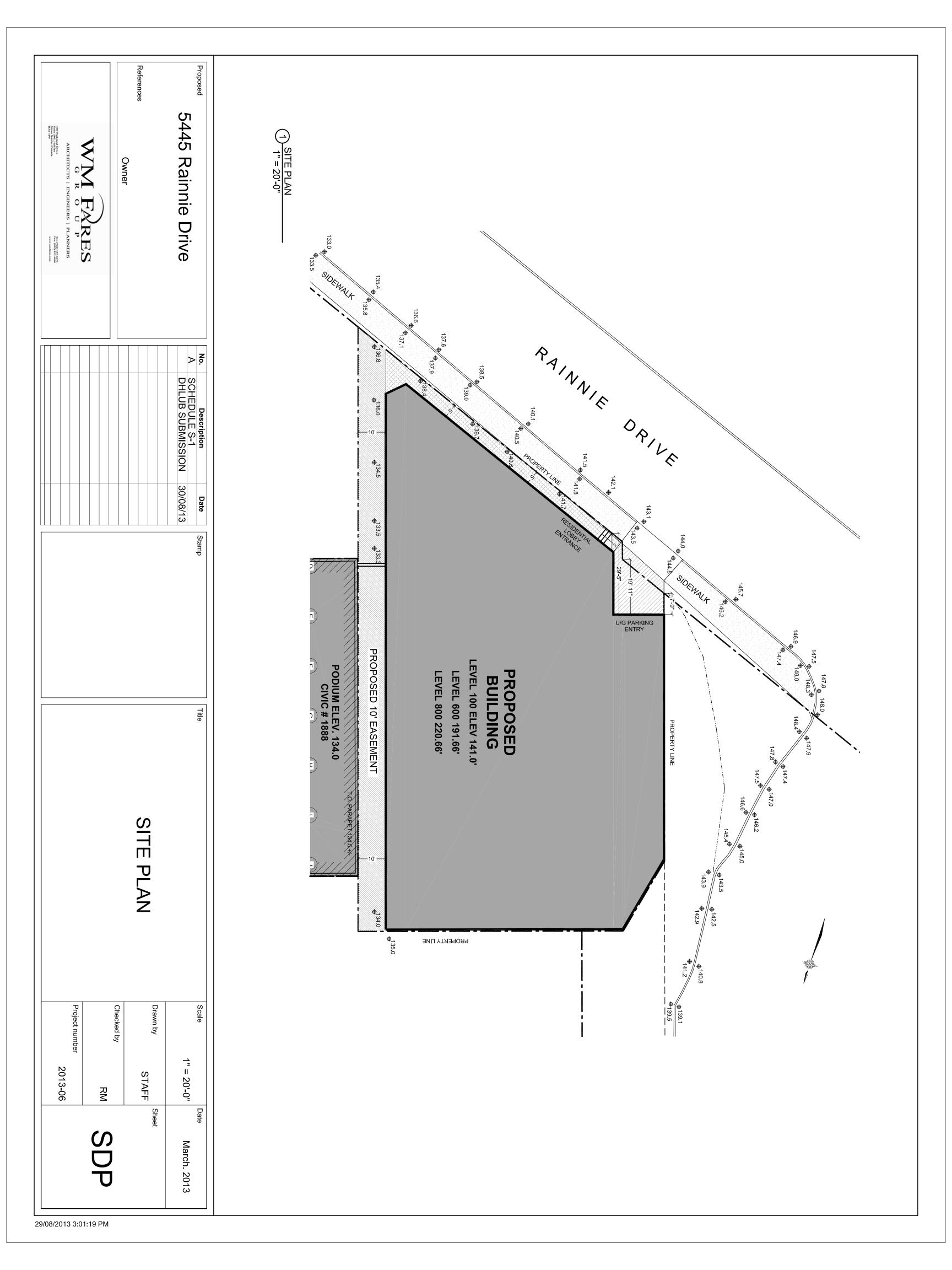
LOT AREA - 18969 sq.ft.COMMERCIAL AREA - 13905 sq.ft.ROOF AREA - 12100 sq.ftTOTAL 2 BEDROOM UNITS42TOTAL 1 BEDROOM UNITS22TOTAL BACHELOR UNITS

## $\underline{\text{TOTAL } \# \text{ OF UNITS } = 68}$

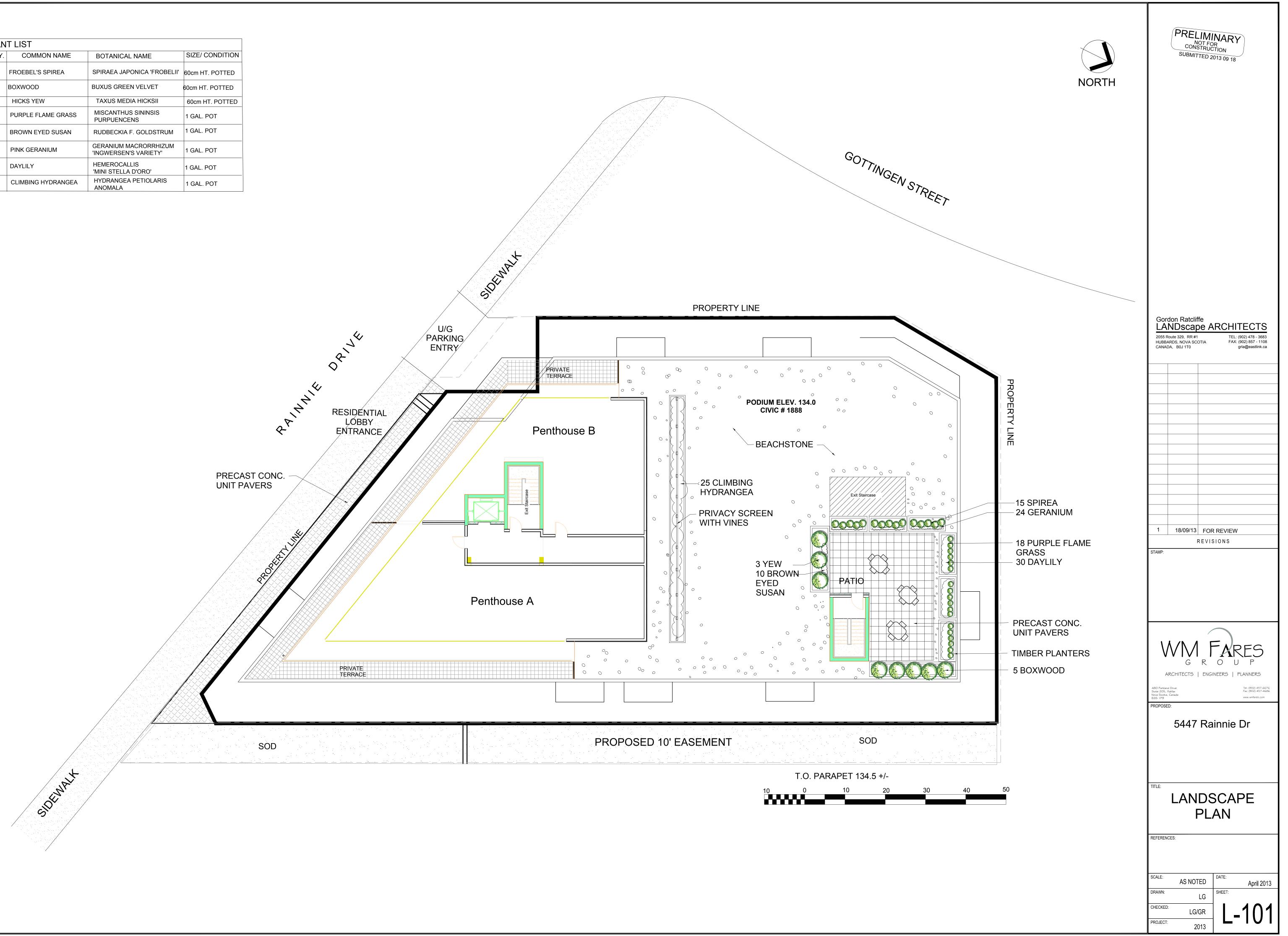
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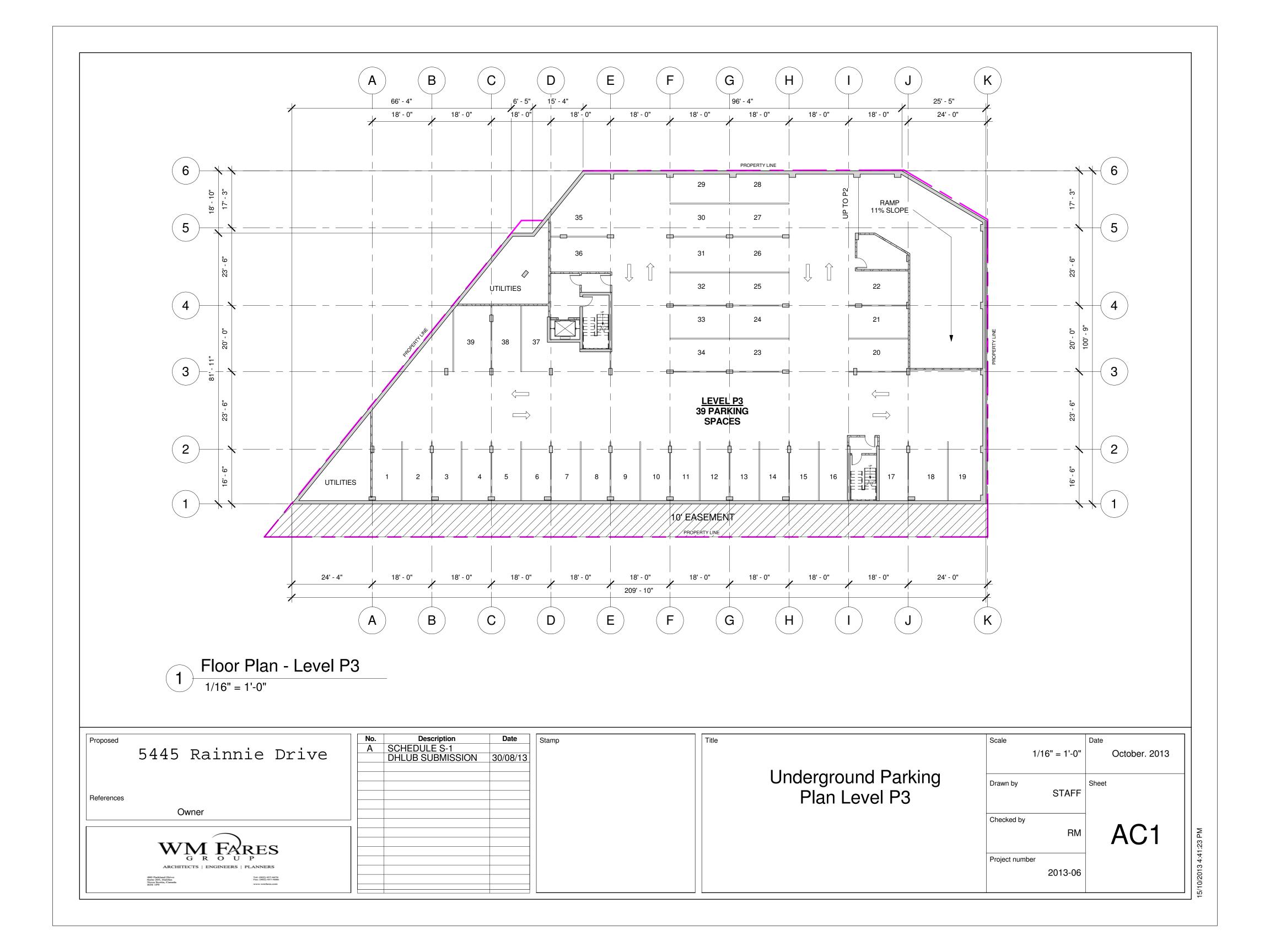
| PARKING:  | TOTAL = 105 spaces |
|-----------|--------------------|
| <u>P1</u> | 30 spaces          |
| <u>P2</u> | 36 spaces          |

39 spaces

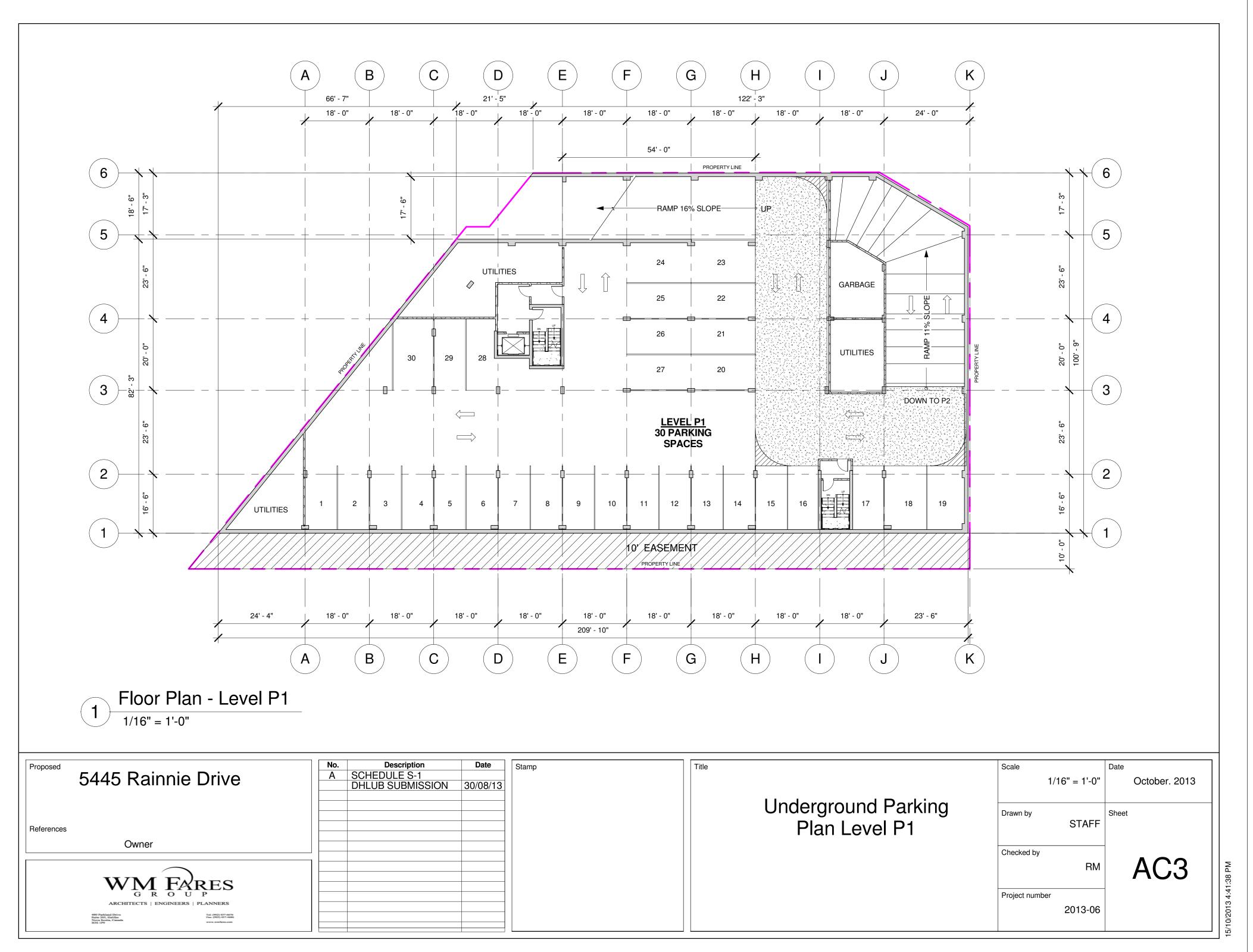


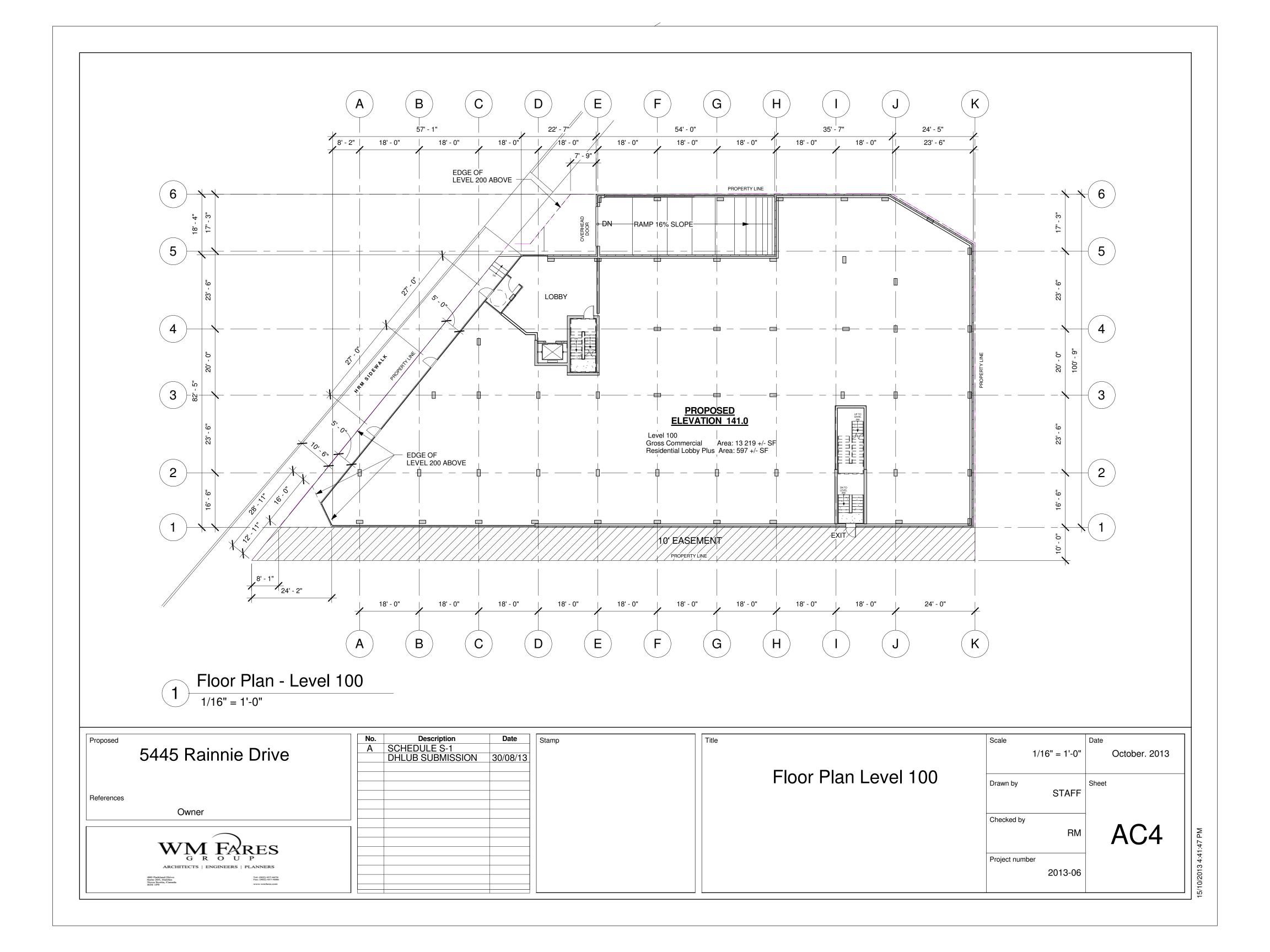
|      | тнот               |  |                 |  |  |  |  |  |
|------|--------------------|--|-----------------|--|--|--|--|--|
| PLAN | PLANT LIST         |  |                 |  |  |  |  |  |
| QTY. | COMMON NAME        | BOTANICAL NAME                                 | SIZE/ CONDITION |  |  |  |  |  |
| 15   | FROEBEL'S SPIREA   | SPIRAEA JAPONICA 'FROBELII'                    | 60cm HT. POTTED |  |  |  |  |  |
| 5    | BOXWOOD            | BUXUS GREEN VELVET                             | 60cm HT. POTTED |  |  |  |  |  |
| 3    | HICKS YEW          | TAXUS MEDIA HICKSII                            | 60cm HT. POTTED |  |  |  |  |  |
| 20   | PURPLE FLAME GRASS | MISCANTHUS SININSIS<br>PURPUENCENS             | 1 GAL. POT      |  |  |  |  |  |
| 10   | BROWN EYED SUSAN   | RUDBECKIA F. GOLDSTRUM                         | 1 GAL. POT      |  |  |  |  |  |
| 20   | PINK GERANIUM      | GERANIUM MACRORRHIZUM<br>'INGWERSEN'S VARIETY' | 1 GAL. POT      |  |  |  |  |  |
| 20   | DAYLILY            | HEMEROCALLIS<br>'MINI STELLA D'ORO'            | 1 GAL. POT      |  |  |  |  |  |
| 25   | CLIMBING HYDRANGEA | HYDRANGEA PETIOLARIS<br>ANOMALA                | 1 GAL. POT      |  |  |  |  |  |

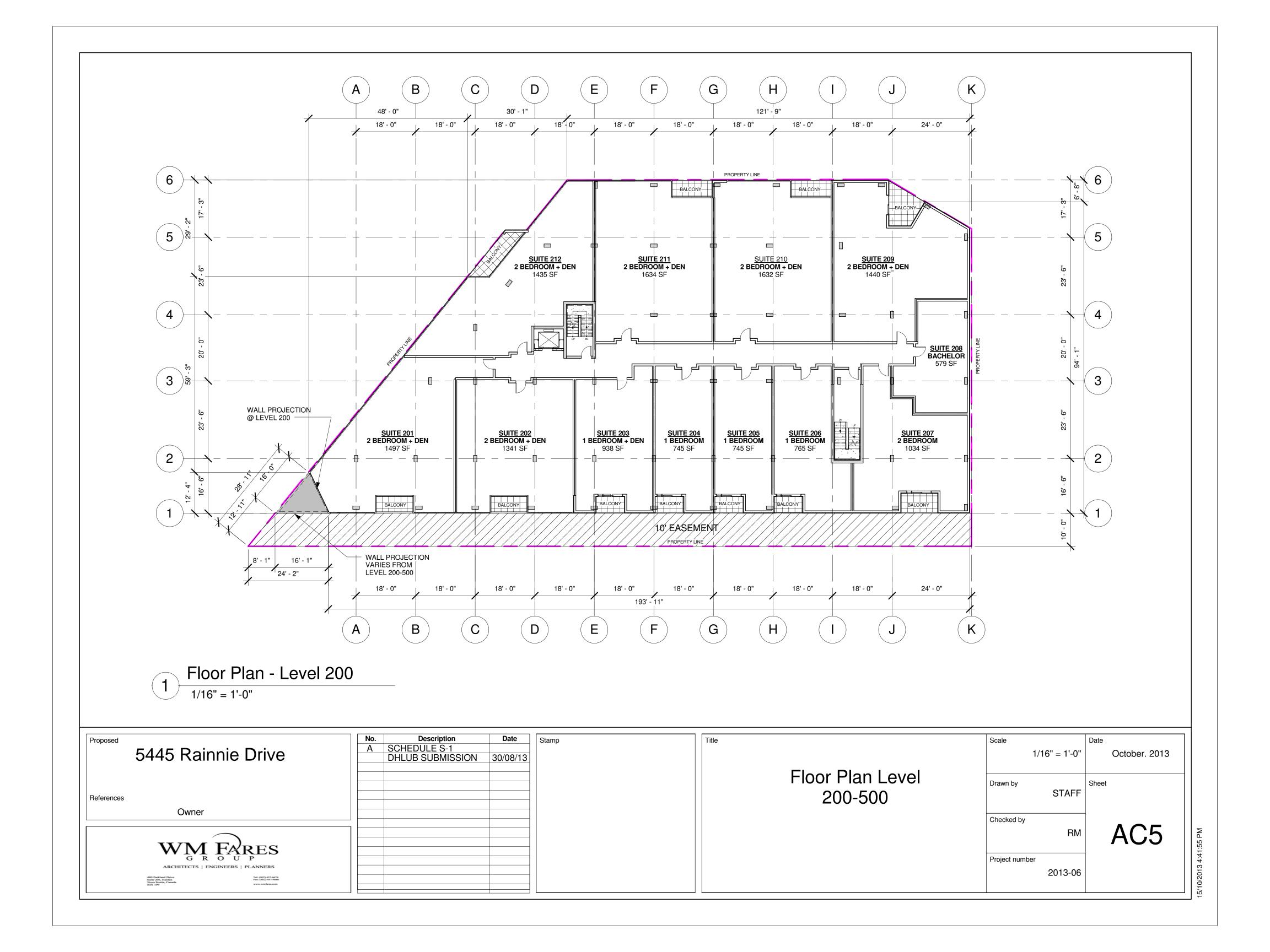


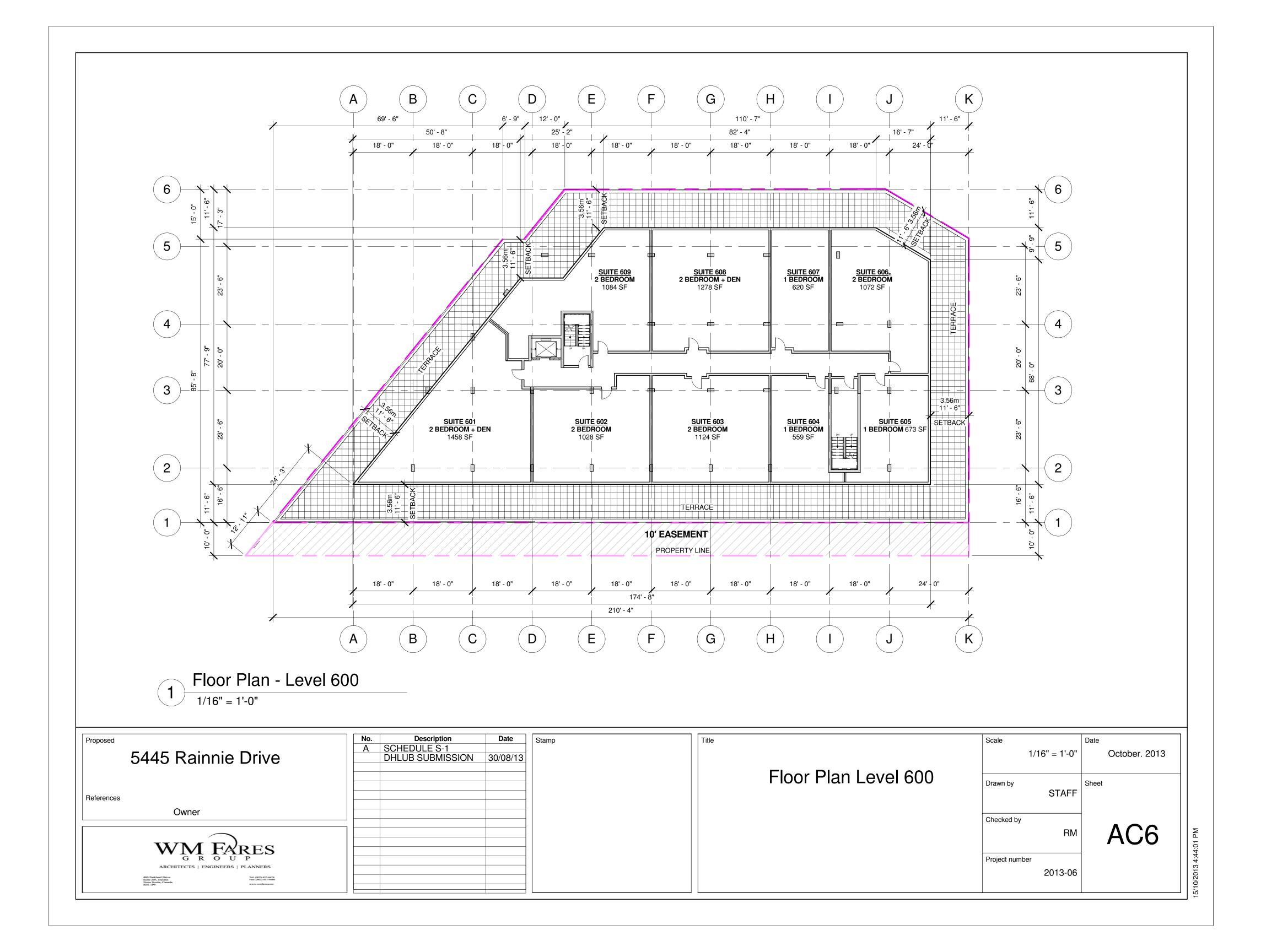


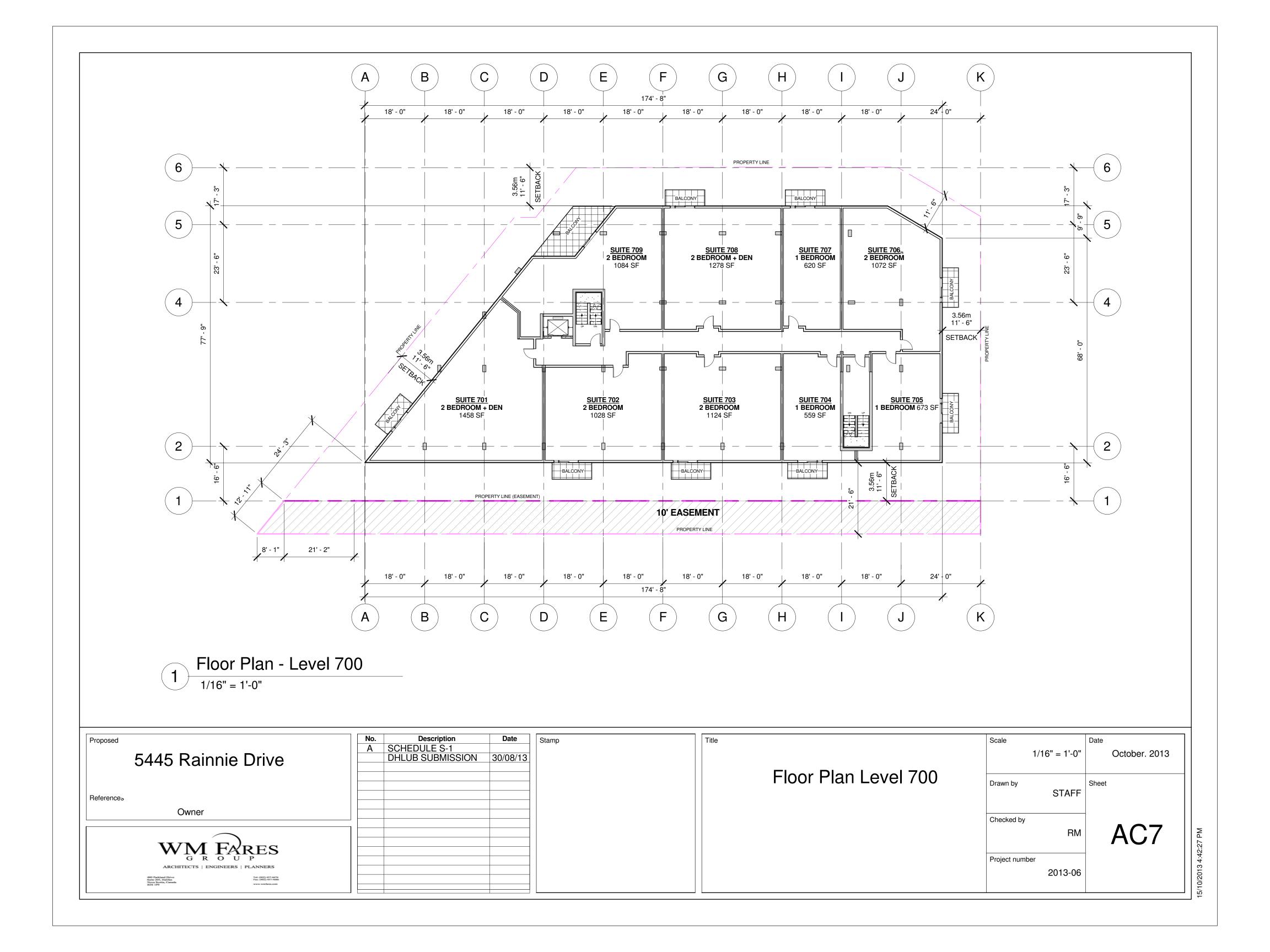


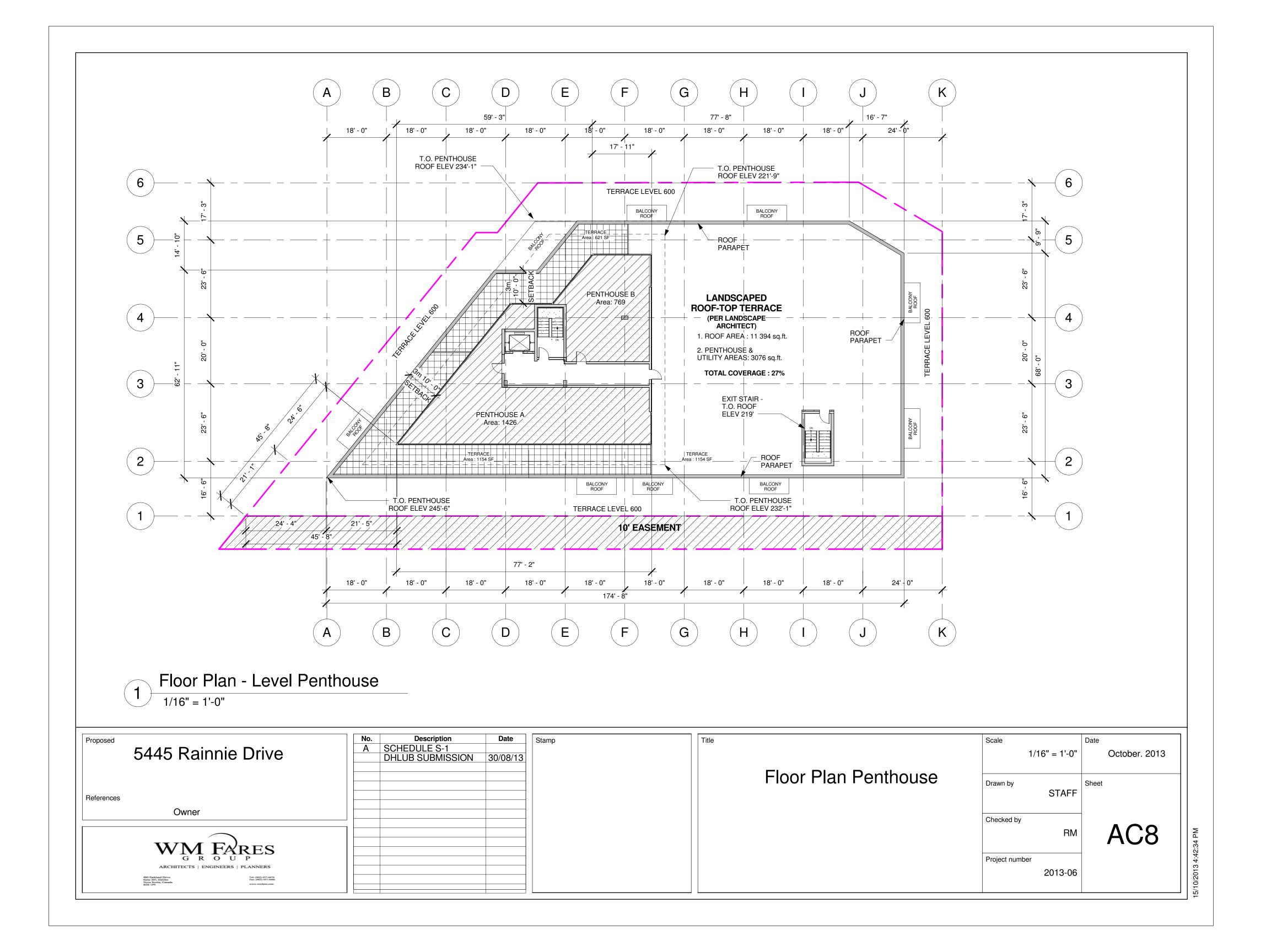


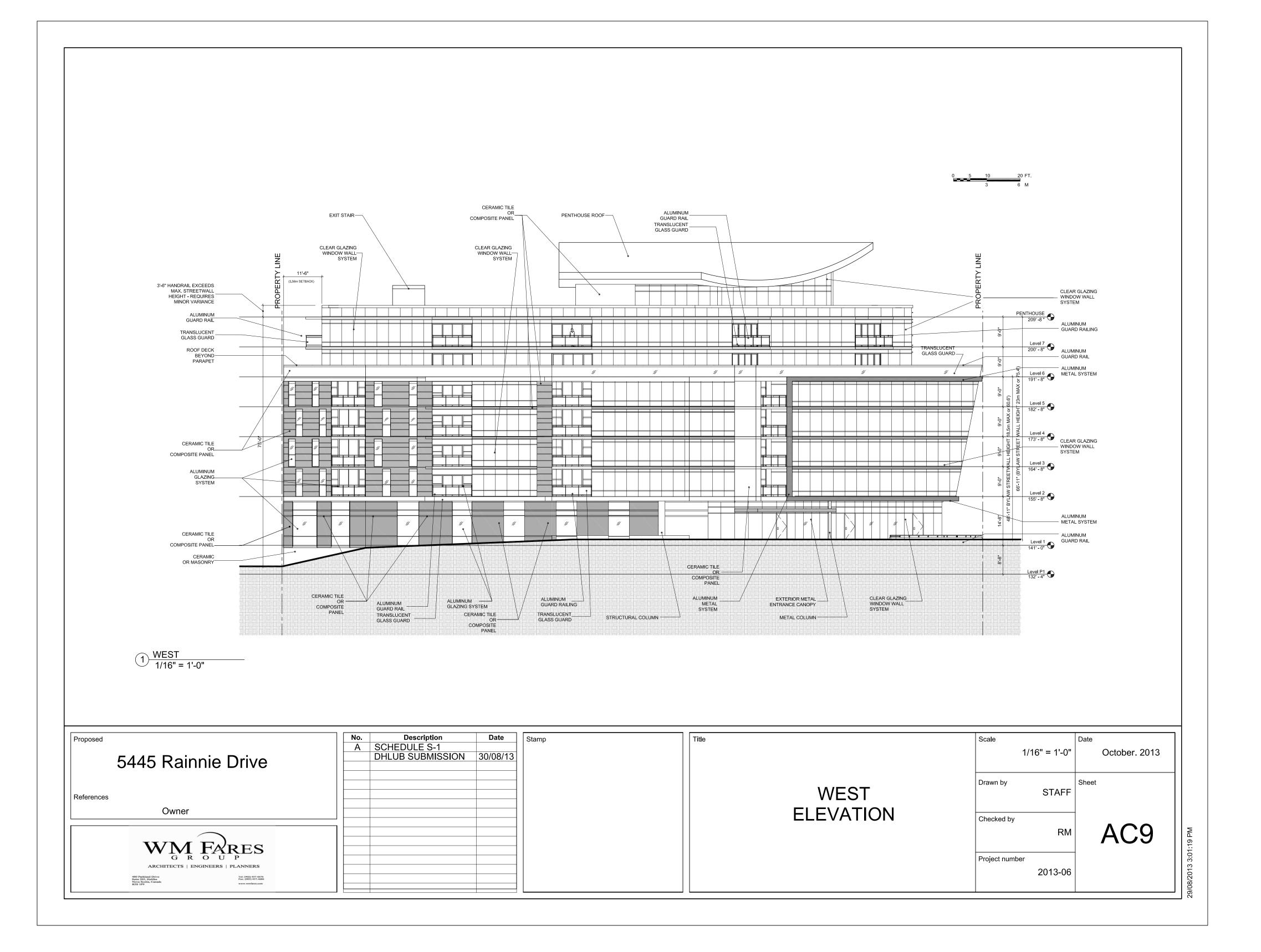


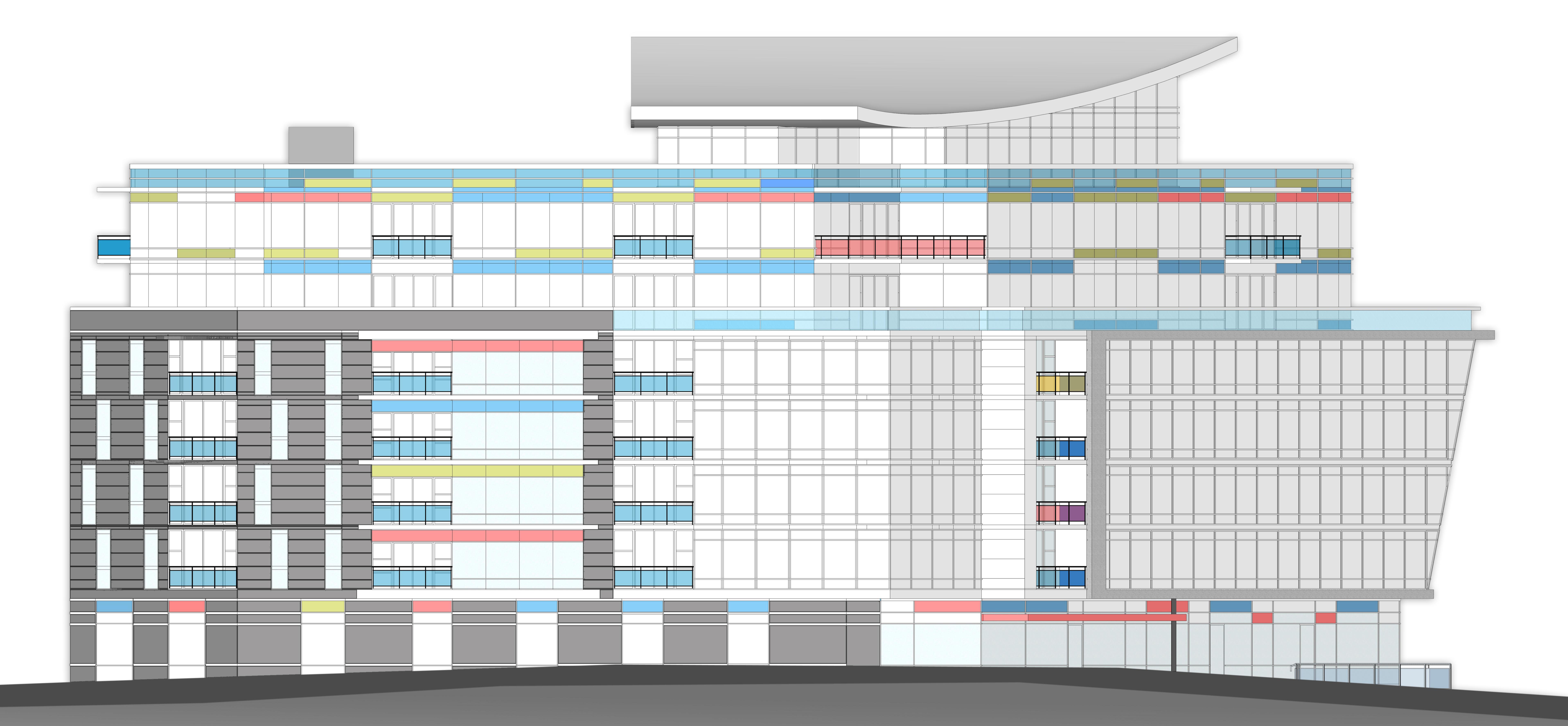




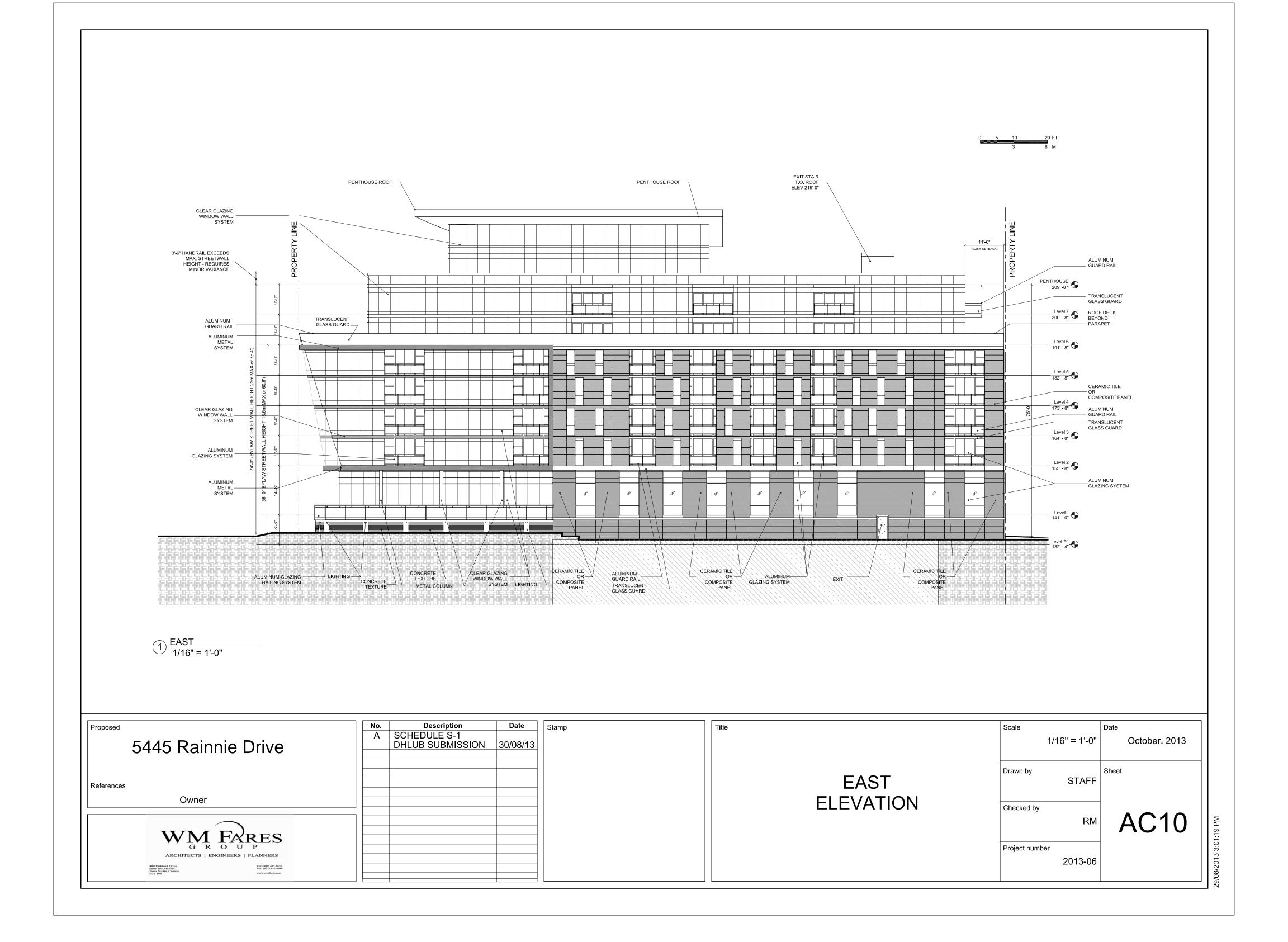






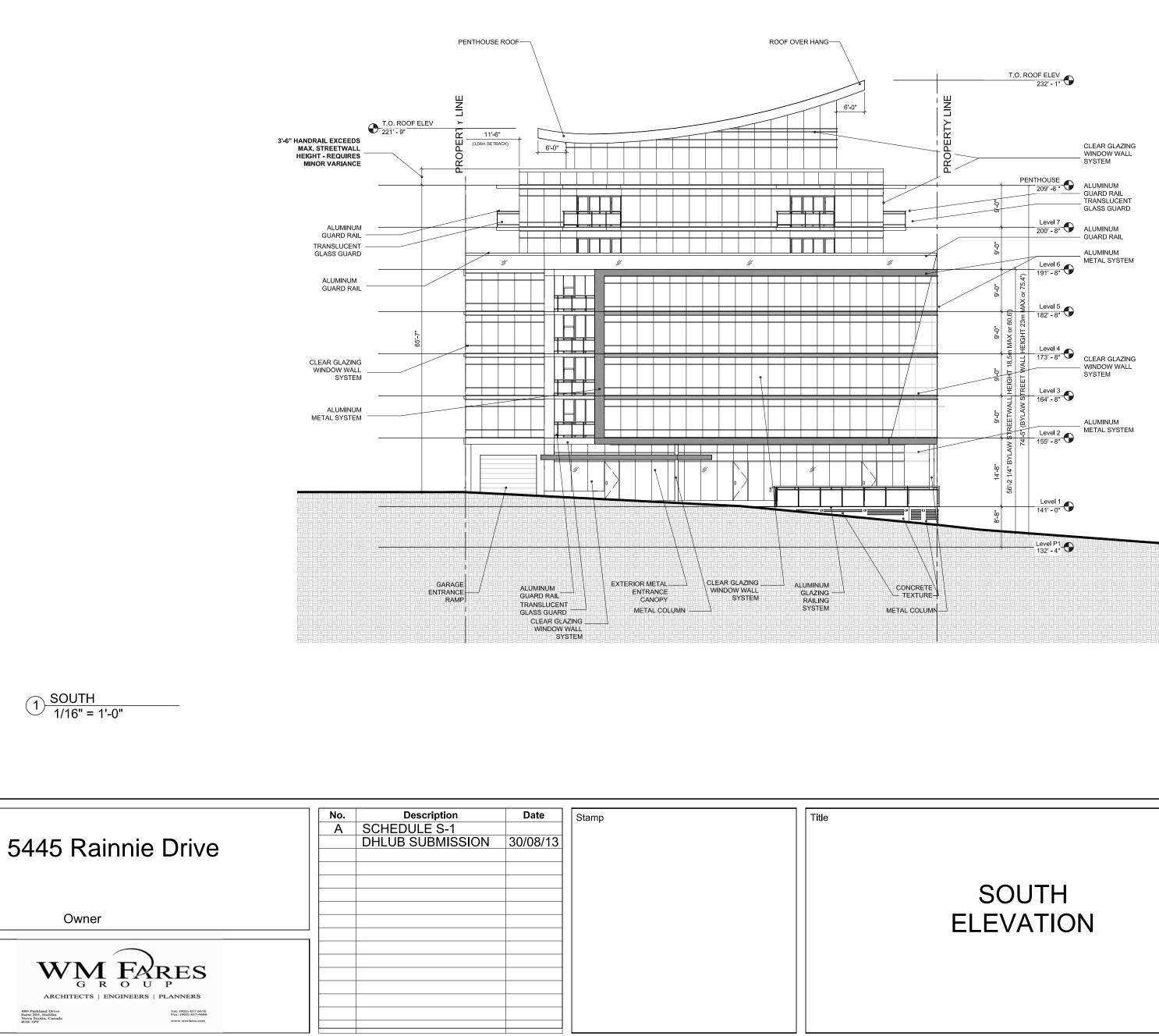


## West Elevation



## East Elevation





Proposed

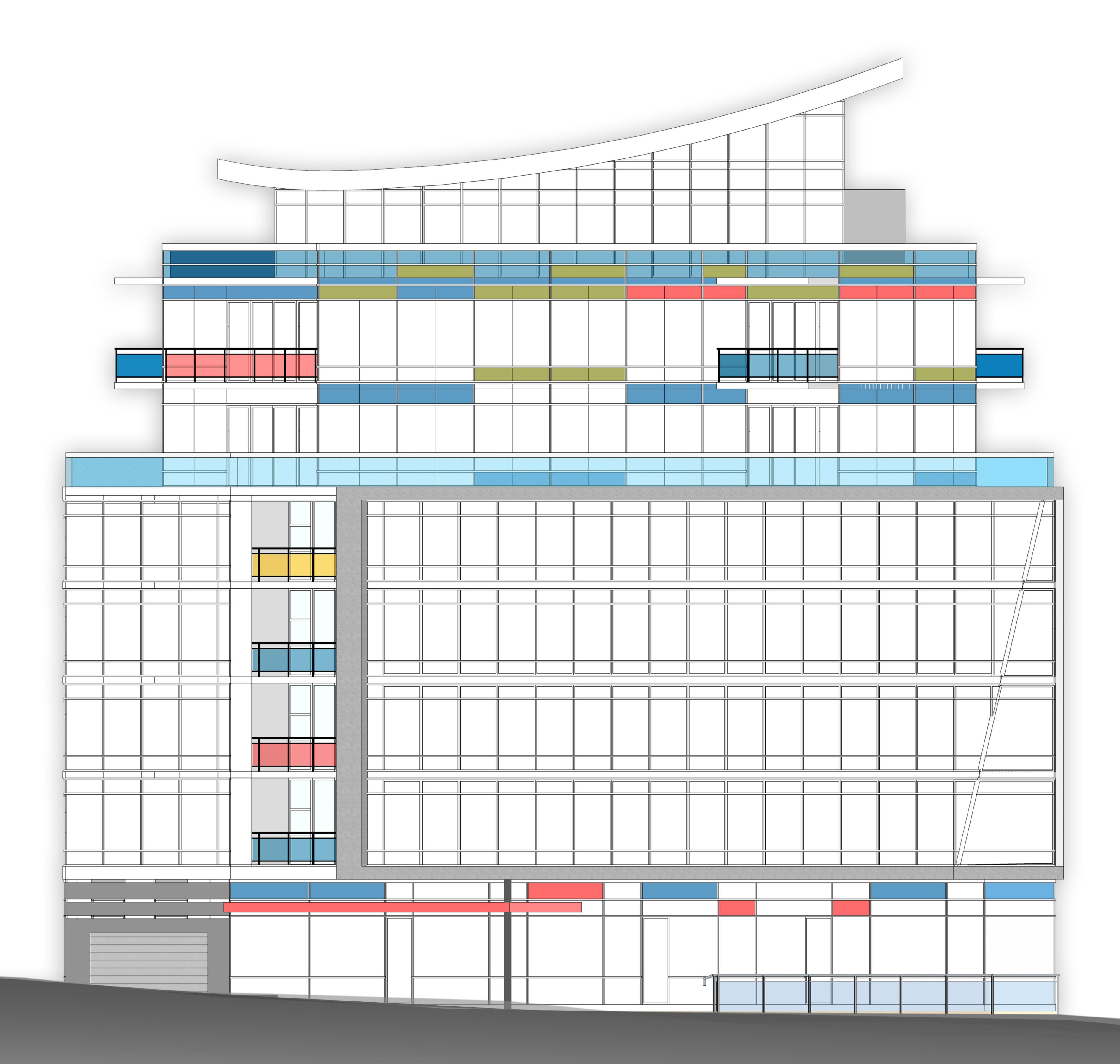
References

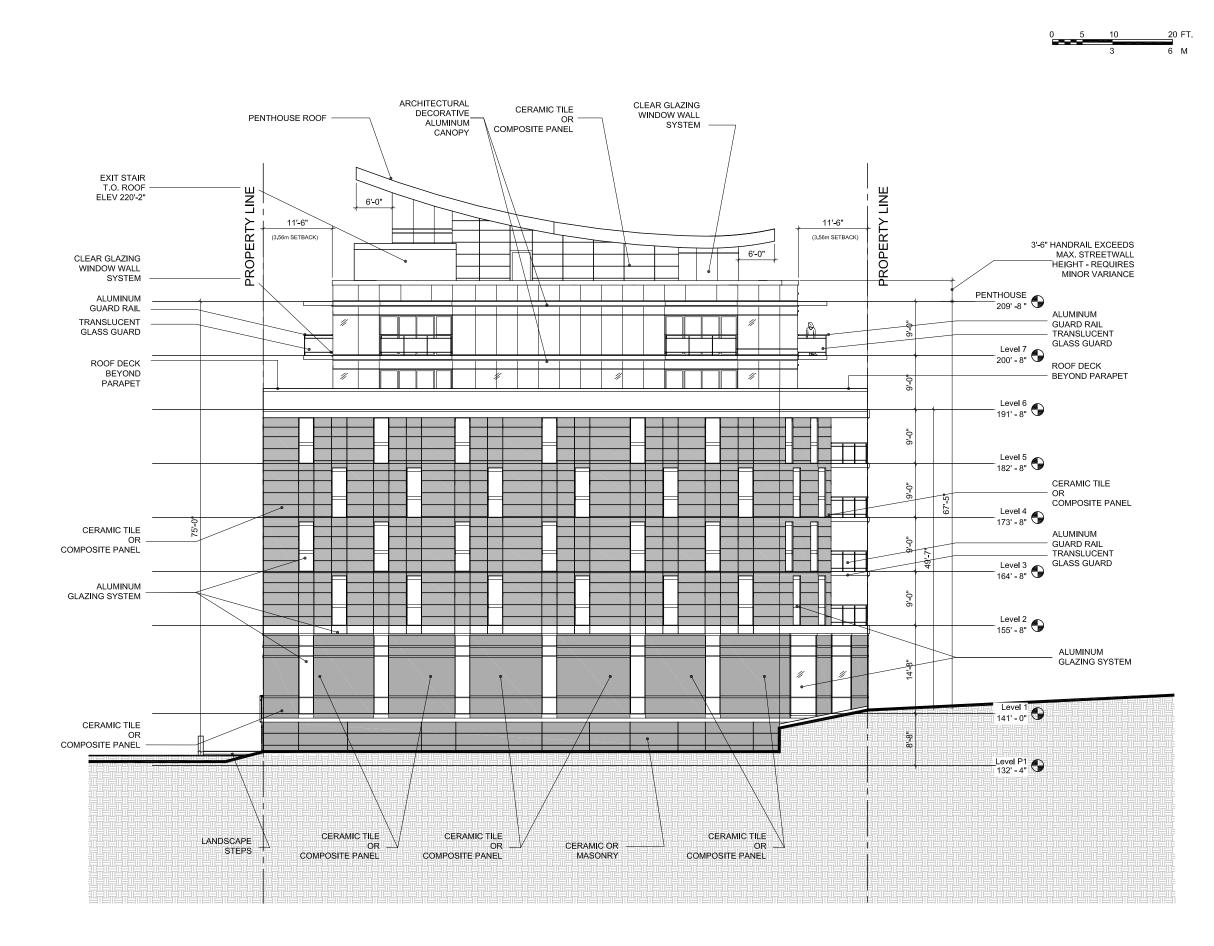
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|-------|--------|----------------|---------------|
|       |        | 1/16" = 1'-0"  | October. 2013 |
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|       |        | 2013-06        |               |

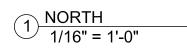
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# South Elevation







| roposed   | No. | Description      | Date     | Stam |
|---|-----|------------------|----------|------|
|   | A   | SCHEDULE S-1     |          |      |
| 5445 Rainnie Drive  |     | DHLUB SUBMISSION | 30/08/13 |      |
|   |     |                  |          |      |
|   |     |                  |          |      |
|   |     |                  |          |      |
| eferences   |     |                  |          |      |
| Owner   |     |                  |          |      |
|   |     |                  |          |      |
|   |     |                  |          |      |
|   |     |                  |          |      |
| WM FARES  |     |                  |          |      |
| GROUP   |     |                  |          |      |
| ARCHITECTS   ENGINEERS   PLANNERS   |     |                  |          |      |
| 480 Parkland Drive Tel: (902) 457-6676<br>Stutie 205, Halfax Fas: (902) 457-6666<br>Nova Scotia, Canada www.wmfarea.com |     |                  |          |      |

| Title     | Scale<br>1/16" = 1'-0"    | Date<br>October. 2013 |
|-----------|---------------------------|-----------------------|
| NORTH     | Drawn by<br>STAFF         | Sheet                 |
| ELEVATION | Checked by                | AC12                  |
|           | Project number<br>2013-06 | -                     |

## North Elevation





Ref. No. 121-12667-18

April 30, 2013

Ms. Ashley Blissett, P. Eng., Development Engineer HRM Community Development PO Box 1749 HALIFAX NS B3J 3A5

## RE: Traffic Impact Statement, Proposed Residential / Commercial Development, 5447 Rainnie Drive, Halifax, Nova Scotia

Dear Ms. Blissett:

*W. M. Fares Group.* is preparing plans to redevelop the existing commercial property at 5447 Rainnie Drive, Halifax. The proposed development (Figure 1) will include removal of the existing office building and construction of a new building to include approximately 13,900 square feet of ground floor commercial space, a 68 unit apartment building, and 104 underground parking spaces. This is the Traffic Impact Statement (TIS) required to accompany the development application.

**Description of Site Access** - The driveway for the parking garage on the redeveloped site will be at the west property line on the north side of Rainnie Drive (Figure 1). Visibility is good on both Rainnie Drive approaches to the driveway as illustrated in Photos 1 and 2.

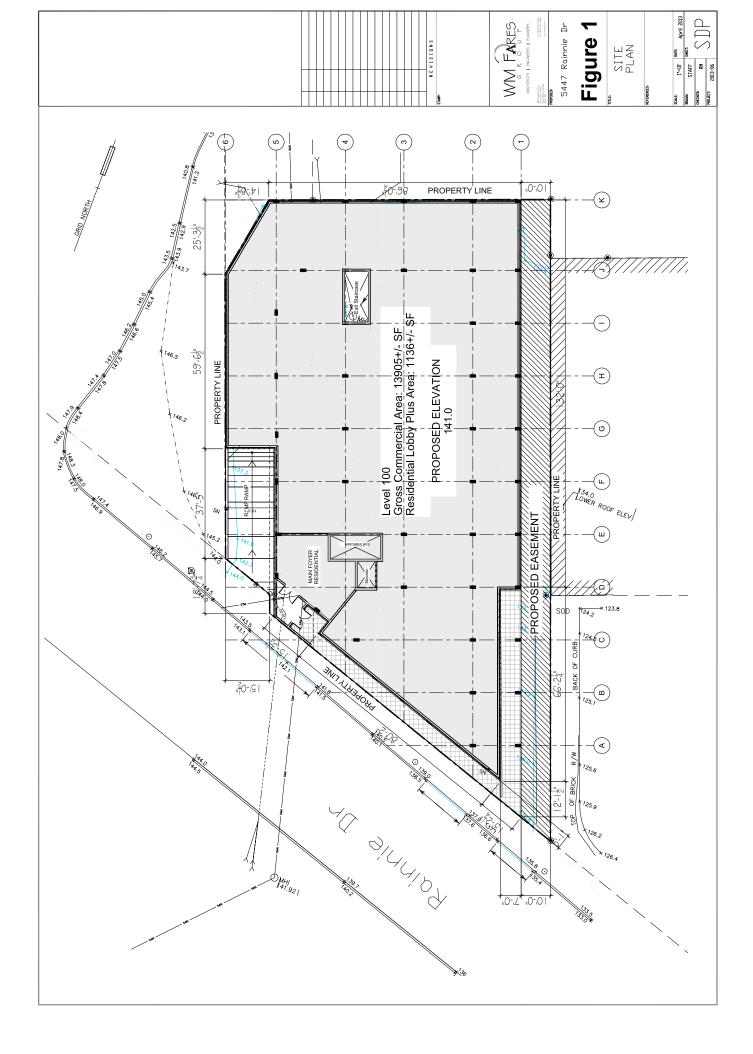
Rainnie Drive is a three lane collector street with two lanes westbound and one lane eastbound. The street has curb. gutter, and sidewalks on both sides (Photos 1 and 2). The street has a traffic signal controlled intersection with Brunswick Street and Duke Street approximately 90 m east of the proposed driveway location. A driveway to the HRM Police Department is approximately 40 m west of the site driveway, and Gottingen Street meets the north side of Rainnie Drive approximately 90 m west of the driveway location.



Photo 1 - Looking east on Rainnie Drive towards the Brunswick Street / Duke Street intersection from the proposed site driveway location.



Photo 2 - Looking west on Rainnie Drive towards the Police Department driveway and Gottingren Street intersection from the proposed site driveway location.



**Traffic Volumes** - A traffic count obtained by HRM Traffic & Right of Way Services at the Brunswick Street / Rainnie Drive / Duke Street intersection during November, 2012, indicated Rainnie Drive two-way volumes of approximately 1,200 vehicles per hour (vph) during the AM peak hour and about 1,300 vph during the PM peak hour.

**Trip Generation** -Trip generation estimates for the development were prepared using published trip generation rates from *Trip Generation*, 9<sup>th</sup> Edition. Since the existing commercial building will be removed, trips now generated by that building have been considered as a 'credit' when determining additional vehicle trips that will be generated by the redeveloped site. Also, since there is high pedestrian / cycling / transit usage in the Downtown Areas of Halifax, a 25% reduction has been applied to site generated trip estimates for both the existing and proposed land uses.

It is estimated (Table 1) that the redeveloped site will generate a total of 30 two-way vehicle trips (16 entering and 14 exiting) during the AM peak hour and 42 two-way trips (19 entering and 23 exiting) during the PM peak hour. However, when trips generated by the existing commercial building are considered, it is estimated that the redeveloped site will generate 17 additional two-way vehicle trips (4 entering and 13 exiting) during the AM peak hour and 29 two-way trips (17 entering and 12 exiting) during the PM peak hour.

|  | Table 1  | - Trip Ge   | neration E   | stimates f  | or Propos   | ed Develo   | pment   |  |   |
|--|--|---|--|---|---|---|---|--|---|
| 1  | 2  |   | Trip Genera  | tion Rates  | 3   |   | Trips Ge  | enerated <sup>3</sup>  |   |
| Land Use <sup>1</sup>  | Units <sup>2</sup>   | AM  | Peak   | PM  | Peak  | AM  | Peak  | PM   | Peak  |
|  |  | In  | Out  | In  | Out   | In  | Out   | In   | Out   |
| Trip Generation Estimates for the Proposed Development   |  |   |  |   |   |   |   |  |   |
| Mid-Rise Apartment<br>(Land Use 223)   | 68<br>units  | 0.09  | 0.21   | 0.23  | 0.16  | 6   | 14  | 15   | 11  |
| Specialty Retail<br>(Use Code 826) <sup>4</sup>  | 6.95<br>KGLA   | 0.76  | 0.60   | 1.19  | 1.52  | 5   | 4   | 8  | 11  |
| General Office<br>(Land Use 710)   | 6.95<br>KGFA   | 1.37  | 0.19   | 0.25  | 1.24  | 10  | 1   | 2  | 9   |
|  | Trip Ge  | neration Es   | timates for F  | Proposed De   | velopment   | 21  | 19  | 25   | 31  |
| 25% Reduction in Tri   | Generation   | Estimates ·   | High Pedes   | strian / Trans  | sit Usage <sup>5</sup>  | 5   | 5   | 6  | 8   |
| Adju   | sted Trip Ge   | neration Est  | timates for F  | Proposed De   | velopment   | 16  | 14  | 19   | 23  |
| Trip Generation Estir  | nate for the   | Existing Of   | ffice Buildir  | ıg  |   |   |   |  |   |
| General Office<br>(Land Use 710)   | 12.0<br>KGFA   | 1.37  | 0.19   | 0.25  | 1.24  | 16  | 2   | 3  | 15  |
| 25% Reduction in Trip  | Generation   | Estimates -   | High Pedes   | trian / Trans   | it Usage <sup>5</sup>   | 4   | 1   | 1  | 4   |
|  | Adjusted Tr  | p Generatio   | on Estimates   | s for Existing  | Building <sup>6</sup>   | 12  | 1   | 2  | 11  |
| Estimated Additional   | Trips Genei  | ated by the   | e Redevelop  | oed Site  |   |   |   |  |   |
| Addit  | ional Vehicl   | e Trip Estii  | mates for th   | e Redevelo  | ped Site <sup>7</sup>   | 4   | 13  | 17   | 12  |
| 2012.<br>2. KGFA<br>3. Rates<br>4. Since t<br>hour tr<br>PM rat<br>5. Since t<br>applied<br>6. These<br>estima<br>7. These | are for the in<br>is 'Gross Flo<br>are 'vehicles<br>here are no p<br>ips to Specia<br>e with revers<br>here is high p<br>I to site gene<br>are the trip<br>tes for the re<br>are the estin<br>for trips gene | or Area x 10<br>per hour peo-<br>bublished ra<br>al of the dir<br>pedestrian /<br>rated trip e-<br>estimates f<br>developed a<br>nated additi | 000 square f<br>er unit'; Trips<br>ates for the A<br>re generally<br>ectional split<br>cycling / trai<br>stimates.<br>or the existi<br>site.<br>ional trips th | eet'; KGLA i<br>generated a<br>M peak hou<br>lower than P<br>t.<br>nsit usage in<br>ng site whic<br>at will be ge | s 'Gross Lea<br>are 'vehicles<br>Ir for Specia<br>M rates, AM<br>the Downto<br>h can be con<br>nerated by | asable Area<br>per hour fo<br>lity Retail (L<br>trip rates ha<br>wn Areas of<br>onsidered a | x 1000 squa<br>r peak hours<br>and Use 82(<br>ave been ass<br>Halifax, a 2<br>as a 'credit' | are feet'.<br>s'.<br>6) , and sinc<br>sumed to be<br>5% reduction<br>for site trip | e AM peak<br>50% of the<br>n has been<br>generation |

*Transit Service* - Metro Transit Route 6 serves Rainnie Drive and several other routes also provide service at nearby locations on Cogswell Street and Duke Street which will allow transfer and connections to many other Metro Transit and Ferry services.

## Summary and Conclusion -

- The proposed development at 5447 Rainne Drive will include removal of the existing office building and construction of a new building to include approximately 13,900 square feet of ground floor commercial space, a 68 unit apartment building, and 104 underground parking spaces.
- 2. The driveway for the parking garage on the redeveloped site will be at the west property line on the north side of Rainnie Drive. Visibility is good on both Rainnie Drive approaches to the driveway location.
- 3. Rainnie Drive is a three lane collector street with two lanes westbound and one lane eastbound. The street has curb, gutter, and sidewalks on both sides. Two-way volumes on Rainnie Drive adjacent to site are approximately 1,200 vehicles per hour (vph) during the AM peak hour and about 1,300 vph during the PM peak hour.
- Metro Transit Route 6 serves Rainnie Drive and several other routes also provide service at nearby locations on Cogswell Street and Duke Street which will allow transfer and connections to many other Metro Transit and Ferry services.
- 5. It is estimated that the redeveloped site will generate a total of 30 two-way vehicle trips (16 entering and 14 exiting) during the AM peak hour and 42 two-way trips (19 entering and 23 exiting) during the PM peak hour. However, when trips generated by the existing commercial building are considered, it is estimated that the redeveloped site will generate 17 additional two-way vehicle trips (4 entering and 13 exiting) during the AM peak hour and 29 two-way trips (17 entering and 12 exiting) during the PM peak hour.
- Conclusion While Rainnie Drive peak hour volumes are reasonably high, the low numbers
  of additional vehicle trips generated by the redeveloped site are not expected to have any
  significant impact to the performance of Rainnie Drive, nearby intersections, or the regional
  street network.
- Recommendation While visibility is good for Rainnie Drive approaches to the proposed underground parking driveway, care must be exercised in the final site design to ensure that drivers exiting the parkade have adequate visibility to pedestrians on the sidewalk.

If you have any questions or comments, please contact me by Email to <u>ken.obrien@genivar.com</u> or telephone 443-7747.

Sincerely: Signed by

Ken O'Brien, P. Eng. Senior Traffic Engineer GENIVAR Inc.



**GENIVAR Inc.** 

1 Starr Lane, Dartmouth, NS Canada, B2Y-4V7 | 902.461.2525 www.ekistics.net

**KISTICS PLANNING & DESIGN** 

Planning Applications Planning & Development Services PO Box 1749 Halifax, NS, B3J 3A5

Friday, 17 May, 2013

Landscape Architecture
Environmental Planning
Urban Design
Engineering

Attn: Mr Richard Harvey, LPP

#### Re: Proposed Rainnie Dr. Site Wind Impact Qualitative Assessment

Dear Richard,

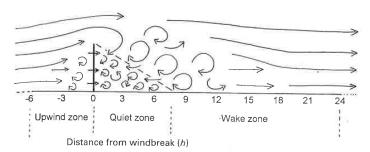
The proposed 7-storey mixed-use development project near the corner of Rainnie Dr. and Brunswick Street sits just northeast of the historic Citadel Hill. To the north of the site is the Cogswell precinct and Cogswell Interchange. Development here ranges from single-family residential to sporadic high rise apartment towers up to 49 metres in height. To the east and south lie the Historic Properties district and upper central downtown. This area contains a range of mid and high rise building types ranging from 22 to 49 metres in height and marks the entry into the Halifax downtown corridor. At the intersection to the immediate southeast of the site, is another landmark, the Halifax Metro Centre, which, along with the World Trade & Convention Centre, consist of a contiguous 3-storey building footprint the occupies an entire city block.

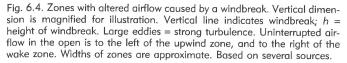
The following assessment looks to interpret the probable impacts to existing wind speed and turbulence on surrounding properties and sidewalks as a result of the proposed Rainnie Drive development. To that end wind data recorded at the local Shearwater Airport between 1953 and 2000 was assembled and analyzed using Windrose PRo 2.3 to understand the intensity, frequency, and direction of winds at the Rainnie Drive site. The resulting diagram (Fig 1.) shows that the highest and most frequent wind speeds come **from** the west and south. The relative distribution of higher wind speeds are somewhat constant from the north, north-west, and south-west. High winds from the north-east, east, and south-east are substantially infrequent when

compared to other directions. This has visible implications for development on the site as is shown in Fig 2.

### **Urban Windbreak Impacts**

The surrounding buildings shown on Fig 2 (red numbers represent *#* of stories) already create significant wind implications on this site. Because the study site is already surrounded by taller buildings on the north and massive land





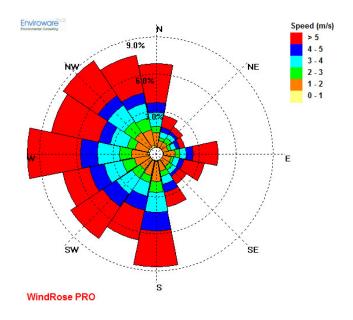
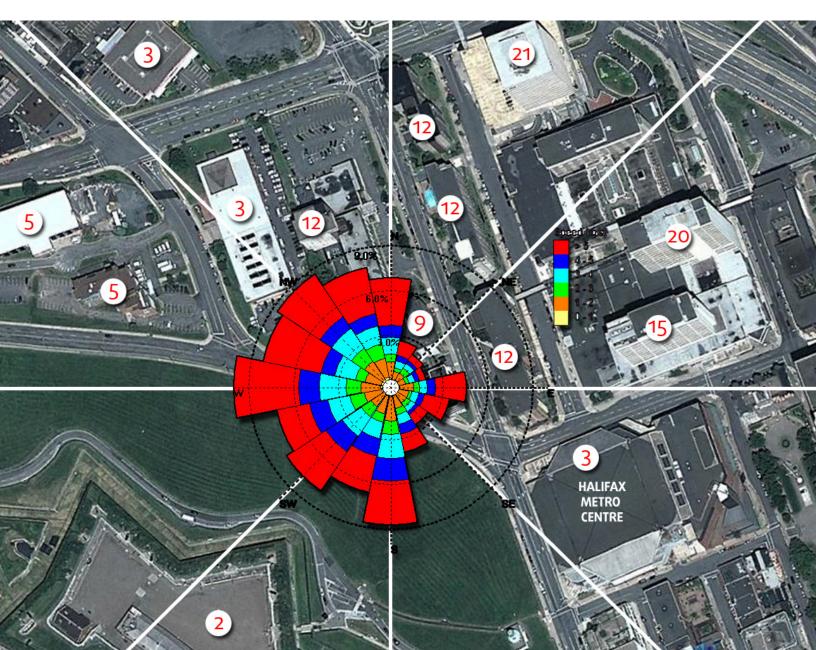


Figure 1. Wind Rose for Shearwater Airport. Diagram shows winds in the FROM direction.

Figure 2. Wind Rose overlain on top of the proposed development site. Red #'s denote # storeys



berming on the southwest side (the direction of prevailing winds in winter and summer), the area is well within the wake zone of these existing entities. Wake zones for zero porosity structures can extend 8-30 times the height of a structure. So, a 10-storey building can generate reduced wind speeds between 800 and 3,000 feet on the lee side. Beyond the wake zone, there are typically more gusts and eddies as a result of more turbulent air. On the trailing edges of the building, wind strikes the building and concentrates the flow, accelerating the wind speed near the trailing fringes and on the windward side. As the ground levels of the proposed Rainnie Dr. building are already within the wake zone of neighbouring tall structures, it is doubtful

that any wind changes will occur at the sidewalk on the windward side. Wind speed will likely be reduced on the leeward side of the building toward the Halifax Citadel Hotel most of the year, and along Rainnie Dr. during the winter months.

While wind turbulence is often increased by structures, wind speed is reduced on the leeward side (down-wind) and increased around the trailing

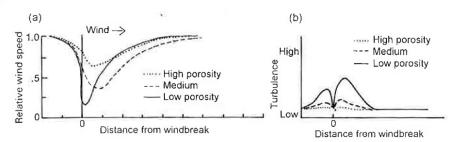


Fig. 6.5. Effect of windbreak porosity on streamline and turbulent airflows. (a) Streamline airflow based on treebelts of different foliage densities; wind measurements at 1.4 m height. From Heisler & DeWalle (1988) with permission of Elsevier Science Publishers. (b) Generalized expected turbulence pattern based on Robinette (1972), Rosenberg et al. (1983), Heisler & DeWalle (1988), McNaughton (1988).

fringes of the building down-wind. Low porous or no porous structures such as buildings will reduce wind speeds immediately adjacent to the structure on the windward side (as shown in the above graph). Wind speed is also reduced on the leeward side but generally reaches original approach speeds at an average distance of 4 times the structure height.

### COMFA Model (Brown and Gillespie, 1995)

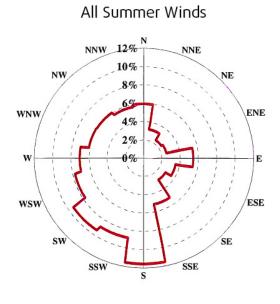
Dr. Robert Brown of the University of Guelph developed the COMFA model to model human thermal comfort as a result of a number of variables including wind speed. Human thermal comfort is more pronounced during low-activity situations like sitting than during high-activity situations like running. The model is explained in the attached paper by Brown and LeBlanc (2003). Mr. LeBlanc was also the co-author with Dr. Brown in the 2008 ed. "Landscape Architectural Graphic Standards", Microclimate Chapter. This model is the basis for the theoretical assessment of human thermal comfort changes as a result of the building explained below.

#### **Seasonal Wind Impacts**

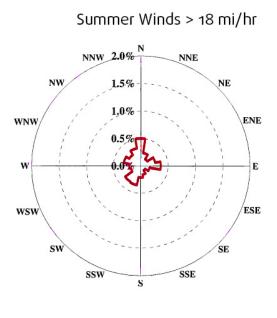
Looking at the seasonal wind impacts (Fig 3.), during the summer the majority of winds come from the southwest quadrant, approximately 46%, with the remaining spread amongst the other 3 ordinal directions: roughly 20% from the southeast, 24% from the northwest, and a mere 10% originating out of the northeast quadrant. Overall, the winds are mild, with just over two percent of all winds reaching speeds over 18 miles

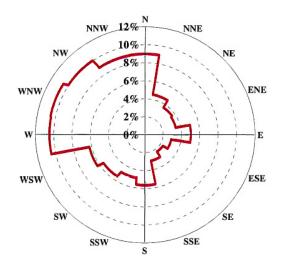
per hour (+/- 29 kph). **Summer** winds are likely to be reduced at the sidewalk on Rainnie Dr. just south of the development where large wake zone flows from Citadel Hill flow into the front facade of the building. With the Citadel Hotel (12-storey) buildings being constructed on the north side of the Rainnie building, it is doubtful that there will be an increase in wind speed to the north on Cogswell in the summer as a result of the proposed building because of the predominant impact of the Citadel Hotel. The proposed building may also slightly elevate summer wind wake zones on either side of the building as wind is accelerated up and around the structure. The indentations on the front facade have been purposely designed to reduce these impacts. There will be very little wind impacts on properties to the west of the site in the summer and a slight elevation of wind speed between the new development and the property to the east of the site.

Figure 3. Seasonal Wind Direction for Shearwater Airport

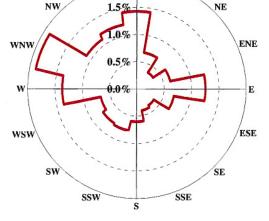


Shearwater, NS. 1953-2000









NNE

NNW 2.0%

Winter Winds > 18 mi/hr

In the **winter** the prevailing winds shift to a northwest dominated occurrence. Approximately 48% of all winds come from the northwest. Winter winds are also stronger, with around fifteen percent of all winds reaching speeds above 18 miles per hour. The new structure could elevate the wind speeds along the toe of Citadel Hill and at the fringes of Brunswick Street, however the impact would be minimal. During high wind conditions (>18mph), only the winds from the west-northwest (that occur 1.5% of the time) will impact pedestrians on the Rainnie St. sidewalk. During these times, wind speeds could increase up to 20% from existing conditions as wind is forced and accelerated around the building.

It should be noted that the building's upper stepback should reduce wind speed in the direct vicinity of the sidewalks. Down-gusts from the upper storeys will hit the upper raised terraces, reducing the wind speed at the sidewalk but causing slightly more turbulence.

### Wind Comfort Assessment

Changes in wind speed as a result of buildings vary depending on wind direction and building design. On the upwind side of the building (north and west) there can be more turbulent wind but little change in wind speed if the building is vertically stepped. On the downwind side of the building (south and east), wind speed is often reduced up to eight times the height of the building in what is often referred to as the "quiet zone". On the east side of the new building, 'streamlines' can occur where the wind is accelerated through the openings between buildings. The taller the buildings, the greater the potential for increased wind speed. The area where this will impact as a result of the new building will be a small undeveloped zone to the south of the Citadel Hotel when winds prevail from the south (about 10% of the time during the summer) and from the north during the winter (about 9%) of the time. Even during these infrequent times, wind speeds will likely not increase more than 10% at the street or sidewalk level due to staggered building footprints, vertical stepping, and existing vegetation. This eastern corridor is also reserved for maintenance access only and will remain as such with the proposed building. There are no proposed access points along this corridor.

The areas most likely to be impacted by the new building due to increased turbulence and small eddies will be the sidewalk along Rainnie Dr. during the summer. This will only occur during prevailing south wind directions (12% of the time). Even with these minor increases we do not anticipate any more 'uncomfortable' conditions than those that already exist. The building should not create any additional 'uncomfortable' conditions more than 1% of the time. Around other areas of the building, there will be no measurable change in wind speed as a result of the development. There will be no measurable change in comfort for people walking on any of the sidewalks surrounding the development, and no measurable change in comfort for people sitting around the development with the exception of the eastern corridor. Here, as discussed, streamlines may occur on occasion in the summer months, but the impact will be minimal. The front entrance may experience occasional small eddies when prevailing winds come from south which may make standing at this location uncomfortable (the increase in discomfort as a result of the building will be less than 1% of the time).

### Summary

As a result of this development, the noticeable impacts of wind speed will be along Rainnie Dr. where speeds will be mostly reduced during the winter months except near the trailing edge of the building where there will be a slight increase in wind speed. However, the building will likewise create a small zone of lower wind speeds along the front facade during the summer months. The 7-storey building is not anticipated to have any measurable change in human thermal comfort for a person sitting, standing, walking or running within the anticipated wake zones of the building. The existence of several multi-story buildings in the adjacent areas along with Citadel Hill, currently disrupt street level wind patterns so much that the addition of the 7-storey Rainnie Dr. building will have little effect on the overall human thermal comfort of the neighbourhood. Changes to neighbourhood wind patterns may see slight increases in mild localized seasonal breeze turbulence but little, changes in wind speed.

If you have any questions please contact me at your convenience.

Sincerely,

Signed by

Robert LeBlanc, president Ekistics Planning & Design