

# NOISE MANAGEMENT PLAN

March 2021 - October 2021

## BROWARD COUNTY CONVENTION CENTER

1850 - 1950 Eisenhower Boulevard Fort Lauderdale, FL 33316

#### Broward County Convention Center - Noise Management Plan

## **Balfour Beatty**

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#### 1 Description of Work

- Steel Erection, Steel Detailing, Concrete Pours, Civil work, Interior Masonry, MEPF Systems and Finishes at the Convention Center. The work would commence at 7 AM and be completed by 10 PM (15 hours) Monday through Saturday. On Sunday, the work would commence at 10 AM and be completed by 7 PM. The off hours will commence on March 11<sup>th</sup> and continue through October of 2021. No person shall operate or cause to be operated any equipment used in construction, repair, alteration or demolition work on buildings, structures, streets, alleys, or appurtenances thereto with sound-control devices less effective than those provided on the original equipment prior to 7 AM and after 10 PM.
- The equipment with the most amount of noise will be utilized during daylight hours only (Reference the Noise and Vibration Predictions below and Appendix 8.10 which shows the noise generated from the construction will reduce to below the ambient noise level adjacent to the local residences due to distance from the construction to the residence). The average duration of steel erection will be approximately 10 12 hours Monday through Saturday and approximately 9 hours on Sunday. The Steel erection will take place only during daylight hours and welding/detailing will take place on off hours (no sound control equipment will be utilized prior to 7 AM and after 10 PM).
- See attached estimated schedule for the description of work (Reference Appendix 8.7)

Table 1: Description of Work Schedule			
Subcontractor Work	Daylight to Dusk (Monday – Saturday, Sunday)	Monday – Saturday: 7 AM – 10 PM (15 Hours) Sunday: 10 AM – 7 PM (9 Hours)	
Steel Erection	Yes	Only during Daylight	
Civil Work	Yes	Yes	
Steel Detailing	Yes	Yes	
Interior Masonry	Yes	Yes	
MEPF Systems	Yes	Yes	
Concrete Pours	Yes	Yes	
Finishes	Yes	Yes	

- Site Plan & Location Map (Reference Appendix 8.1)
- Legal Description:
  - 1850 Eisenhower Boulevard:
     PORT EVERGLADES PLAT NO 2 108-31 B POR OF PAR A DESC
     AS:COMM SW COROF NE1/4 OF SE1/4 OF SEC 14-50 42,NLY 289,ELY
     95 TO POB,ELY 220 NLY 792,WLY 220,SLY 411,WLY 15, SLY 110,ELY
     15,SLY 271 TO POB
  - 1950 Eisenhower Boulevard: PORT EVERGLADES PLAT NO 2 108-31 B PARCEL A LESS POR DESC:COMM SW COR OF NE1/4 OF SE1/4 OF SEC 14-50-42,NLY 289,ELY 95 TO POB, ELY 220,NLY 792,WLY 220,SLY 411, WLY 15,SLY 110,ELY 15,SLY 271 TO POB,& LESS POR PAR A DESC AS COM NW COR PAR A,E 80 TO POB,CONT E 832,S 288.81,W 114.03,N 88.96,W 475.01,N 29.73,W 235,N 168.61 TO POB
- Justification for Work:
  - Safely putting more people to work during COVID-19
  - There has been a significant increase in rainfall during 2020 which has impacted the construction schedule by 30+ workdays. The project is estimating that in order to make up the 30+ days, the project will have to work two (2) shifts through the completion of the project. The project completion date is October 15<sup>th</sup>, 2021 and it is estimated that the 2021 Boat Show will start loading around the 10<sup>th</sup> of October.
  - o The project estimates that the building will be dried in (Building envelope will be completed) no later than June of 2021. This will significantly reduce any noise outside of the project as the majority of the work will be inside the building. The Dry in will start as early as April of 2021 with an anticipated dry in date of June of 2021. The noise level will continue at the same level through the beginning of March and slowly start to decrease through the completion of the dry in of the building. The shortest distance from the work to the nearest residential condo is 580 feet (Reference Appendix 8.5). The distance from the work to the nearest residence should not be any more significate than 17<sup>th</sup> street itself (reference Noise Monitoring Report appendix 8.6).

- The second shift will help accelerate the project.
- Early morning concrete pours will help alleviate the amount of Construction traffic on SE 17<sup>th</sup> Street during peak traffic hours.
- The above will reduce the impact of construction on the surrounding residential neighborhoods and businesses by keeping the project within the original completion date.
- Commencement Date and Duration of Work:
  - The second shift will commence on March 11<sup>th</sup>, 2021 and continue through October of 2021.
  - Steel Erection, Concrete Pours, Interior Masonry, Civil, MEPF, and Finishes
    activities will be in accordance with the attached estimated schedule.

#### 2 Contractor Contacts

Balfour Beatty Construction - Broward County Convention Center Project Team - Table 2

Table 2: BBC Contact List			
Name	Position	Contact Number	
Ron Ferguson	General Superintendent	(407) 713-1877	
Chris Baran	Senior Project Manager	(407) 461-4107	
Tom Stedem	Senior Project Manager	(863) 640-0298	
Jose Rodriguez	Superintendent	(407) 304-9401	
Justin Valdes	Assistant Superintendent	(407) 572-5654	

#### 3 Equipment

- The equipment used for construction work is the quietest reasonably available.
- Equipment that may generate noise during the second shift are as follows:
  - o Cranes
  - o Concrete Trucks
  - o Concrete Pumps
  - Concrete Vibrators
  - o Back-up Alarm on Construction Equipment
  - Material Delivery Trucks
- The duration of use of equipment and/or period of work will vary depending on each activity. Noise generated will be intermittent based on specific activity taking place (i.e. back-up warning alarm from trucks, concrete vibrators, pump trucks, etc...)

#### 4 Noise and Vibration Predictions

- Reference Appendix 8.10 NV5 Signed and Sealed Engineered Calculation showing that the noise generated from the construction project is equal to or less than the surrounding ambient noise. Reference the last paragraph of page 3 and all of the information on page 4 for specifics. The following is the information from the bottom of page 3 and 4:

In order to determine compliance with the City regulations a calculation of noise at the adjacent properties is necessary. Noise reduces with distance and using a standard calculation noise may be predicted based upon an initial level and distance. The use of the inverse square law allows predication in that a sound level (intensity) will drop off as distance increases. This law which has been demonstrated by evidence and actual measurement calculates a six (6) decibel drop with a doubling of the distance in feet. Considering the 85-decibel level for the forklift at 570 feet noise would reduce to 64 dBA.

The predicted level is presuming no uninterrupted path for the sound and that no existing levels are considered. However, the largest reduction of noise would be the shadowing of any noise at the Convention Center by existing noise from the community and traffic on SE 17th Street.

Measured levels from October 31, 2020 through December 16, 2020 show that noise from the adjacent street area and associated community produce levels that do not regularly go below 60-65 decibels up to 70 decibels. This data shows a solid noise level that exists over this period consistently. This may be considered as the "ambient" level of noise. Graphs are attached following the conclusion of this letter that show data from the noise meter for a series of dates which also identify City time frames and working shifts. Also shown are two graphs showing overall noise levels as the one minute maximum levels from October 28 through December 16, 2020. As the noise levels are 60 – 65 decibels at the minimum the 64 dBA generated by the forklift would be obscured by community ambient levels. Also, considering the noise levels occur 24-hours over this range of noise, the 60 dBA daytime and 50 dBA nighttime noise limits of the City cannot be met due to ambient conditions. In our opinion the noise levels projected to the north properties would not be in excess of the noise regulations of the City.

- Equipment Noise Emission Levels (Lmax Noise (dba) 50 ft):
  - o Concrete Trucks 85
  - o Concrete Pumps 82
  - o Concrete Vibrators 80
  - Back-up Alarm 97 112
  - o Crane 85
- The aforementioned equipment predicated noise emissions can be reviewed in the Appendices below or on the U.S. Department of Transportation Highway Administration website (Link <u>HERE</u>).

#### 5 Noise and Vibration Control Measures

- We have installed a noise monitoring device located adjacent to the nearest residential condo to demonstrate that the noise generated during the off hours outside of 8 AM to 7 PM are equivalent to the noise generated from 17<sup>th</sup> Street and the surrounding areas. Reference attached GeoSonics report for noise monitoring (Appendix 8.6).
- Only the equipment necessary for Concrete pours, Interior Masonry, MEPF Systems, and Finishes will be utilized prior to and after the normal Construction operation hours of 8 AM to 7 PM.
  - Concrete Truck back-up alarms will be switched to ambient white noise to lessen noise emissions by 18 dBA when safety protocols allow.
  - On-site traffic patterns will be coordinated to minimize backing up movement.
  - Deliveries will be sequenced appropriately to reduce the amount of idling Trucks.
- We do not anticipate any heavy vibration during the concrete pours and no pile work will be conducted during this time frame.

#### 6 Complaint Response

#### 6.1 Procedure and recording of complaints

- The Balfour Beatty Construction Broward County Convention Center Team will be responsible for logging and responding to all complaints
- Any complaints can be made via phone or in writing to:

Balfour Beatty Construction ATTN: Ron Ferguson 7901 S.W. 6<sup>th</sup> Court, Ste. 200 Plantation, FL 33324 (407) 713-1877 Balfour Beatty Construction ATTN: Chris Baran 7901 S.W. 6<sup>th</sup> Court, Ste. 200 Plantation, FL 33324 (407) 461-4107

#### 6.2 Community Notification

- Balfour Beatty Construction will post a Community Notification around the project site on the perimeter fence and with the Condo Association announcement boards in the adjacent condo building. In addition, notifications will be left in mailboxes of adjacent businesses. (Reference Appendix 8.3).
- The project will also utilize the Fort Lauderdale Office of Neighbor Support to ensure maximum outreach.
- Notifications will identify all second shift work and will be posted prior to the commencement of work.
- Reference Appendices for Community Notification Letter and Distribution Area.

#### 7 COVID 19

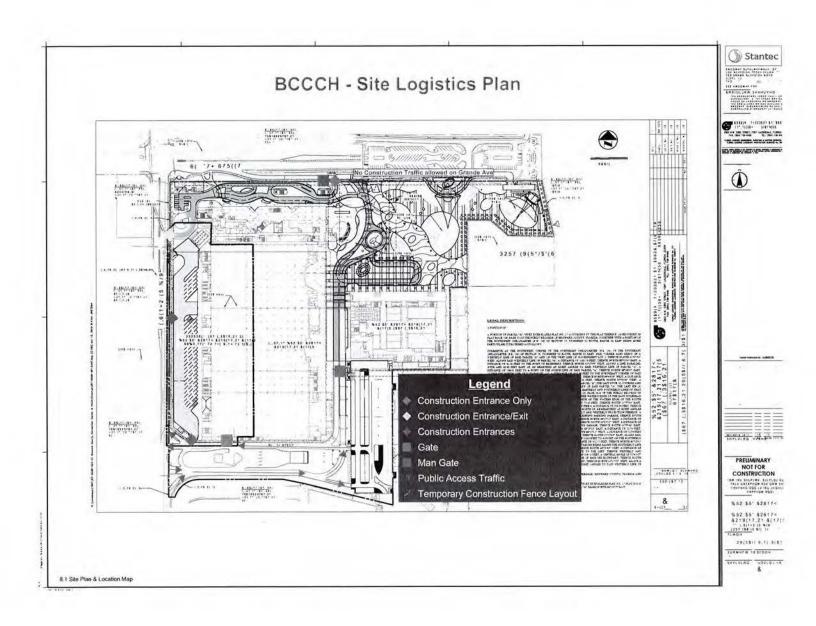
Balfour Beatty Construction is closely monitoring the COVID 19 pandemic and ensuring every measure is being followed in the office and the field to the safety of the workers and the surrounding community. (Reference our COVID 19 Project Protocols in Appendix 8.8).

#### Broward County Convention Center - Noise Management Plan

## **Balfour Beatty**

#### 8 Appendices

- 8.1 Site Plan & Location Map
- 8.2 Community Notification
- 8.3 Community Notification Distribution Area
- 8.4 Equipment Predicated Noise Emissions
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## \*PUBLIC NOTICE\*

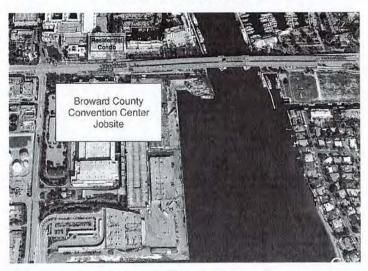
# EARLY MORNING CONCRETE POUR, STEEL DETAILING, STEEL ERECTION INTERIOR MASONRY, MEPF SYSTEMS, AND FINISHES ADVISORY

#### **BROWARD COUNTY**

#### **CONVENTION CENTER**

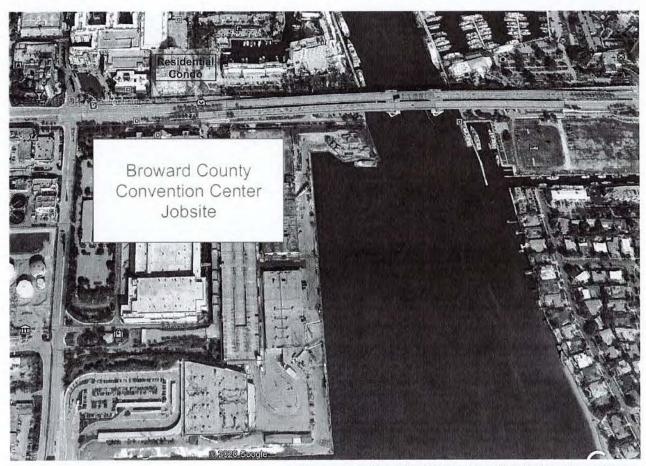
1850 - 1950 Eisenhower Boulevard Fort Lauderdale, FL 33316

Please be advised that the Broward County Convention Center at 1850-1950 Eisenhower Boulevard, Fort Lauderdale, FL 33316 will be conducting second shift work Monday – Saturday 7 AM to 10 PM and Sunday 10 AM to 7 PM beginning March 11<sup>th</sup>, 2021 and will continue through October of 2021.



**Balfour Beatty Construction** 

ATTN: Ron Ferguson 7901 S.W. 6<sup>th</sup> Court, Ste. 200 Plantation, FL 33324 (407) 713-1877 ATTN: Chris Baran 7901 S.W. 6<sup>th</sup> Court, Ste. 200 Plantation, FL 33324 (407) 461-4107



**Community Notification Distribution Area** 

8.3 Community Notification Distribution Area

## Effective Noise Control During Nighttime Construction

Workshops > Reduced Demand

#### Introduction

In recent years there have been fundamental changes in the types of projects that Departments of Transportation (DOT) are constructing. Today a significant number of projects are urban widening/rehabilitation work where daylight construction closures of the routes cause unacceptable congestion problems. Therefore, because of the high traffic volumes during the normal workday on these major urban transportation corridors, it is usually only possible to perform construction operations during the nighttime.

Departments of Transportation are writing into the specifications for these projects severe restrictions on when a contractor can execute the work. Typically the work must be performed at night. In turn, these nighttime work requirements precipitated disturbances to adjacent property owners'. When residents complain the path of their complaints is often through their local government. Additionally, the resulting complaints are coming during a climate of national concern about the adverse effects of environmental noise.

In the conduct of their construction and rehabilitation programs agencies struggle with three interested and impacted parties that must be satisfied.

- · The driving public both commercial and private
- · The community through which the transportation corridor traverses
- · The construction contractors

This is a compilation of methods and techniques for mitigating nighttime construction nuisances. Mitigation is a critical requirement for serving the traveling public, for conducting DOT business in a responsible manner, and for preparing valid contract documents.

#### **Problems**

The major nuisances associated with the nighttime construction are noise, vibration, and illumination. Noise problems are normally caused by the operation of heavy equipment and specifically by vehicle and machine backup-alarms, Table 1. Vibration problems are primarily a result of pile driving, blasting operations, or the use of vibratory rollers. While good illumination is necessary for the work to proceed at night and for the safety of the traveling public, proper work zone illumination can be very intrusive to project neighbors. There is also concern by Departments about exposure to possible contractor claims if noise objectives are not properly presented in the contract documents.

A telephone survey of state DOTs found that many require adherence to certain noise (decibel) limits during nighttime construction. In many cases these limits are the consequence of specific local ordinances. Some Departments indicated that they could receive local ordinance waivers rather easily. Other Departments stated that they had jurisdiction over the local municipalities in these matters, but they tried to abide by the local ordinances.

#### **TABLE 1. Critical Nighttime Construction Noise Generators**

Noise Generator	Percent of DOTs identifying as Cause of Problems*
Back-up Alarms	41%
Slamming Tailgates	27%
Hoe Rams	24%

Milling/Grinding Machines 16%
Earthmoving Equipment 14%
Crushers 6%

#### Sound

The human ear does not judge sound in absolute terms, but instead senses the intensity of how many times greater one sound is to another. A decibel is the basic unit of sound level; it denotes a ratio of intensity to a reference sound. Most sounds that humans are capable of hearing have a decibel (dB) range of 0 to 140. A whisper is about 30 dB, conversational speech 60 dB, and 130 dB is the threshold of physical pain, Fig. 1.

Figure 1. Representative Noise Levels

Noise levels tested (in increasing decibel level) include: sound studio (20 dB), quiet office (40 dB), conversation (60 dB), noisy restaurant (75 dB), chain saw (120 dB), jet plane (148 dB), and saturn rocket (200 dB).

Sound and noise are not the same thing, but sound becomes noise when:

- · It is too loud
- · It is unexpected
- · It is uncontrollable
- · It occurs unexpectedly
- · It has pure tone components

Noise is any sound that has the potential to annoy or disturb humans, or cause an adverse psychological or physiological effect on humans. In the case of the general population a 5 dBA change is required before most people realize there is a perceptible sound difference.

The noise levels generated during the construction process vary depending on the type of equipment and the nature of the work being performed. It should be recognized that noise impacts can be severe, especially during nighttime activities, and that in many cases simple noise mitigation strategies will not suffice.

Noise generation on most construction projects is the result of equipment operation with diesel engines being the primary generators. Equipment components that generate noise include: the engine, cooling fan, air intake, exhaust, transmission, and tires. In assessing noise generation, construction equipment can be grouped into two categories, stationary and mobile. Equipment noise can also be categorized as being either continuous or impulse in nature. Stationary equipment is considered to operate in one location for one or more days at a time; pumps, generators, compressors, screens, are typical examples of stationary equipment. In addition, pile drivers and pavement breakers are sometimes categorized as stationary equipment. Mobile equipment includes machinery that performs cyclic processes such as: bulldozers, scrapers, loaders, and haul trucks.

#### **Equipment Noise**

Construction equipment is a major noise generator on nearly all nighttime construction projects. The equipment type, specific model, equipment condition and the operation performed influence equipment noise. Equipment manufacturers began attacking machine noise problems in the late '60s and today because of design improvements and technological advances new machines have been quieted to an acceptable level for almost every situation. Newer equipment is noticeably quieter than older models due primarily to better engine mufflers, refinements in fan design and improved hydraulic systems. Noise levels as generated by typical equipment are shown in Table 2.

<sup>\*</sup>As rated by the 50 State DOTs

How equipment noise will be perceived is also a function of use duration. On a monitored project in New Jersey the highest noise levels resulted from pile driving; but, because the driving was completed in a short period of time, the activity did not draw any complaints.

One of the conclusions from the U.S. Department of Transportation's 1979 construction equipment noise study was that 88 dBA is a reasonable noise level to expect for *used* equipment with an engine horsepower of 400 or less. It should be noted that the USDOT tests were made in the field under actual operating conditions at road construction sites, mines and quarries.

In 1994 and 1995 Harris Miller Miller & Hanson Inc. performed noise studies for the Central Artery/Tunnel project in Boston. The first study sought to quantify an *average*noise level while the second defined a *typical* noise level. It would seem that a typical value is better to use in developing specifications or project restrictions. That data delineates the most commonly occurring level.

Table 2. Construction Equipment Noise Emission Levels

Air Compressor       85       81       80         Backhoe       84       83       80       80         Chain Saw       85       85       85         Compactor       82       80       80         Compressor       90       85       80         Concrete Truck       81       85       85         Concrete Mixer       85       85       85         Concrete Pump       82       82       82         Concrete Vibrator       76       80         Crane, Derrick       86       87       88       85         Crane, Mobile       87       83       85	
Chain Saw       85         Compactor       82       82       80         Compressor       90       85       80         Concrete Truck       81       85         Concrete Mixer       85       85         Concrete Pump       82       82         Concrete Vibrator       76       80         Crane, Derrick       86       87       88       85	
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Concrete Pump         82         82           Concrete Vibrator         76         80           Crane, Derrick         86         87         88         85	
Concrete Vibrator         76         80           Crane, Derrick         86         87         88         85	
Crane, Derrick 86 87 88 85	
Crane, Mobile 87 83 85	
Dozer 88 84 85 85	
Drill Rig 88 85	
Dump Truck 84 84	
Excavator 85	
Generator 84 78 81 82	
Gradall 86 85	
Grader 83 85 85	
Hoe Ram 85 90	
Impact Wrench 85 85	
Jackhammer* 89 88 85	
Loader 87 86 85 80	
Paver 80 89 85	
Pile Driver, Impact 101 101 95	
Pile Driver, Sonic 96 95	
Pump 80 85 77	

Rock Drill			98	85
Roller			74	80
Scraper	89		89	85
Slurry Machine		91		82
Slurry Plant				78
Truck	89	85	88	84
Vacuum Excavator				85

<sup>\*</sup> There are 82 dBA @ 7 meter rated jackhammers (90 lb. class) available. This would be equivalent to 74 dBA @ 50 ft. These are silenced with molded intricate muffler tools.

#### **Equipment Noise Control Options**

Listed in Table 3 are the major sources of equipment noise that cause complaints. The Table also lists specific methods for controlling the identified noise problem.

Table 3. Construction Equipment Noise Control Options

Noise Source	Control
Backup alarms	Use manually-adjustable alarms
	Use self adjusting alarms
	Use an observer
	Configure traffic pattern to minimize backing movement
Slamming tailgates	Establish truck cleanout staging areas
	Use rubber gaskets
	Decrease speed of closure
	Use bottom dump trucks
Pavement breakers (jackhammers)	Fit with manufacturer approved exhaust muffler
gesmanne.c,	Prohibit within 200 ft. of a noise sensitive location during nighttime hours
	Enclose with a noise tent
Prolonged idling of equipment	Reduce idling
	Locate equipment away from noise sensitive areas

Ambient-sensitive self-adjusting backup alarms increase or decrease their volume based on background noise levels. These alarms work best on smaller equipment such as backhoes and trucks. The alarm self-adjusts to produce a tone that is readily noticeable over ambient noise levels (a minimum increment of 5 decibels is typically considered readily noticeable), but not so loud as to be a constant annoyance to neighbors. The typical alarm adjustment is 82 or 107 dBA. Close attention must be give to the alarm's mounting location on the machine in order to minimize engine noise interference, which can be sensed by the alarm as the ambient noise level. These alarms should be mounted as far to the rear of the machine as possible. An alarm mounted directly behind a machine's radiator will sense the cooling fan's noise and adjust accordingly, Figure 2. Such a mounting will negate the purpose of the device.

**Manually**-adjustable alarms are effective in reducing backup alarm noise nuisance but their use requires that each alarm be set at the beginning of each day and night shift. The manual setting feature eliminates the machine mounting location problem of the ambient-sensitive self-adjusting backup alarms. The manually adjustable alarms typically have an 87 and 107 dBA setting range, with the 87 dBA setting used for nighttime operations.

#### **Noise Mitigation**

Of interest in terms of community noise impact is the overall noise resulting from a construction site. The noise of each individual piece of equipment and sometimes the highest noise source is not always the number one priority. Noise control is directed toward modification of a perceived sound field. It strives to change the impact at the receiver so that the sounds conform to a desired level. Mitigation of undesired sounds should consider source control, path control, and receptor control Figure 3.

Figure 2. A Self-Adjusting Backup Alarm Mounted in the Wrong Position

Figure 3. Noise Transfer Situation

The Noise Transfer Situation shows the relation between sources, such as a pile driver, loader and truck, and their paths, groundborne vibration and direct sound (which includes a reverberant field) to the receiver. The relation is detailed below.

The Pile Driver creates a groundborne vibration path to the receiver. The loader and truck create a direct sound (reverberant field) path to the receiver.

Source Controls

Source control is the most effective method of eliminating noise problems. It is a cardinal rule that, where possible, noises control should occur at the source. Source controls, which limit noise emissions, are the easiest to oversee on a construction project. Source mitigation reduces the noise problem everywhere not just along a single path or for one receiver. Consequently, a project's noise mitigation strategy should emphasize noise control at the source.

Require Construction Operations Planning

Restrict the movement of equipment into and through the construction site. Long-term impacts are generated along haul routes when there are large quantities of materials to be moved. Reroute truck traffic away from residential streets. Impose seasonal limitations on construction noise, the spring or fall are critical times in residential areas because windows are usually open at night.

**Example Specifications** 

Where practical and feasible, construction sites shall be configured to minimize back-up alarm noise. For example, construction site access should be designed such that delivery trucks move through the site in a circular manner without the need to back up.

Require Modern Equipment

Unions recognize construction noise as a hazard to workers and the first of five things suggested to workers to address the problem is that they "Ask contractors to buy quieter equipment when they buy new equipment." DOT specification of equipment noise emission limits forces the use of modern equipment having better engine insulation and mufflers. The emission levels specified should reflect levels that can reasonably be achieved with well-maintained equipment, see Table 3.

**Equipment Restrictions** 

Restrict the type of equipment used.

**Example Specifications** 

The use of impact pile drivers shall be prohibited during evening and nighttime hours.

All jackhammers and pavement breakers used on the construction site shall be fitted with manufacturer's approved exhaust mufflers.

The use of pneumatic impact equipment (i.e. pavement breakers, jackhammers) shall be prohibited within 200 feet of a noise-sensitive location during nighttime hours.

The local power grid shall be used wherever feasible to limit generator noise. No generators larger than 25 KVA shall be used and, where a generator is necessary, it shall have a maximum noise muffling capacity.

Call the contractor's attention to the back-up alarm noise problem and require measures to address the issue.

By specification direct the use of only power grid connected or solar powered traffic control devices, Figure 4.

**Example Specifications** 

All variable message/sign boards shall be solar powered or connected to the local power grid.

Figure 4. Solar Powered Traffic Control Devices

Operate at Minimum Power

Noise emission levels tend to increase with equipment operating power. This is a critical issue with older street sweepers, demolition work using a hoe-ram, and equipment such as vac-trucks, Figure 5. Require that such equipment operate at the lowest possible power levels.

Figure 5. vac-truck working at night

Use Quieter Alternate Equipment

Electric or hydraulic powered equipment is usually quieter than a diesel-powered machine. Encourage contractors to use alternate equipment. Use electric tower cranes, Fig. 6, instead of diesel power mobile cranes

Figure 6. Electric Tower Cranes for Bridge Construction

#### **Path Controls**

Alone, source noise controls are frequently inadequate at adequately minimizing noise impacts on abutting sensitive receptors because of the close proximity to residences and businesses in urban areas and because of the very nature of the construction work. Thus, having exhausted all possible mitigation methods of controlling noise at the source, the second line of attack is controlling noise radiation along its transmission path. Noise path barriers should provide a substantial reduction in noise levels, should be cost effective, and should be implementable in a practical manner without limiting accessibility. Barriers can increase a project's visual impact. This visual change can have either a positive or negative impact. Therefore, aesthetic effects must be considered when designing barrier systems.

Path Mitigation Techniques

Once established, only reflection, diffraction insulation or dissipation can modify an airborne sound field. In other words, it is necessary to increase the distance from the source or to use some form of solid object to either destroy part of the sound energy by absorption, or to redirect part of the energy by wave deflection. The three techniques for path mitigation are therefore:

Distance

Reflection

Absorption

Enclose especially Noisy Activities or Stationary Equipment

Enclosures can provide a 10 to 20 dBA sound reduction. Additionally the visual impact of roadwork activities has an affect on how construction sounds are perceived. An important noise mitigation issue, therefore, is the audio-visual sensing factor. Enclosures address both the absolute audio and the visual perception issue, Figure 7.

**Example Specifications** 

All jackhammers and pavement breakers used at the construction site shall be enclosed with shields, acoustical barrier enclosures, or noise barriers.

Figure 7. Slurry Plant Enclosure for Audio-Visual and Dust Control

#### Conclusions

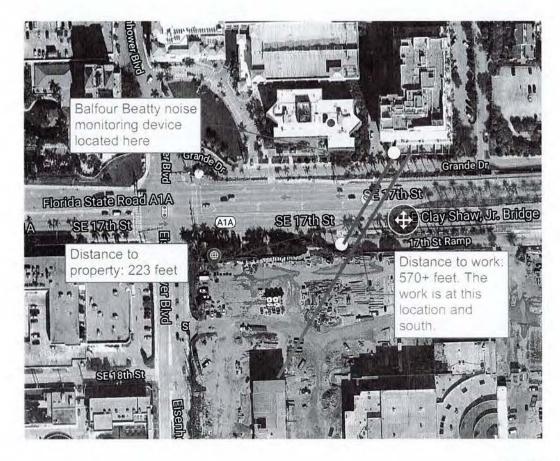
A significant number of future construction projects will involve urban work. Therefore, it is important that before contracts are advertised and bid that there be an objective assessment as to the magnitude of noise nuisances. Noise problems are normally caused by the operation of heavy equipment. The identification of methods and techniques for mitigating such nuisances is a critical planning requirement for both owners and contractors.

**Source control** is the most effective method of controlling construction noise. Source controls, which limit noise, are the easiest to oversee on a construction project. Mitigation at the source reduces the problem everywhere not just along one single path or for one receiver. The specification of equipment noise emission limitsforces the use of modern equipment having better engine insulation and mufflers.

**Path Controls** are the second line of attack in controlling noise. Barriers can provide a substantial reduction in the nuisance effect in some cases. The use of barriers should be examined against other possible measures to prove that they are cost effective. Further, aesthetic effects must be considered when designing barrier systems. Path control measures include:

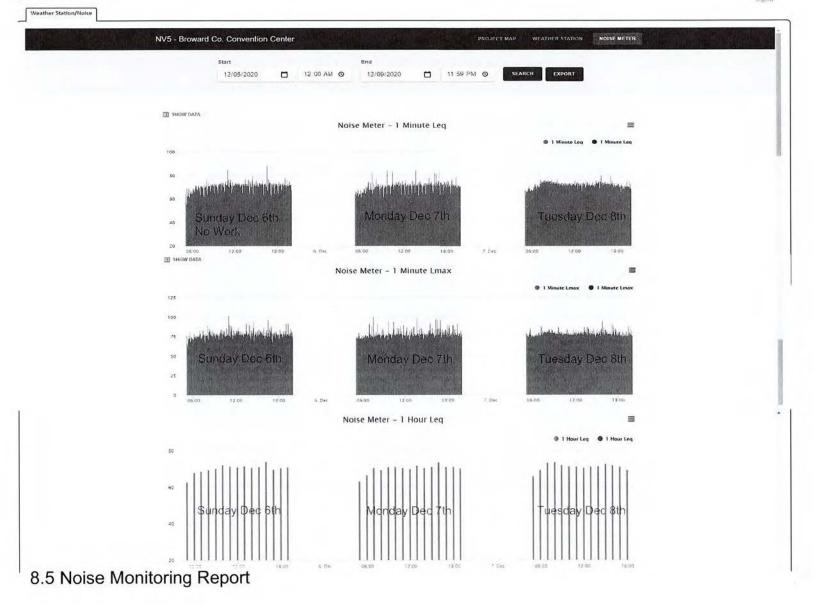
- · Move equipment farther away from the receiver
- Enclose especially noisy activities or stationary equipment
- · Erect noise barriers or curtains
- · Use landscaping as a shield and dissipater

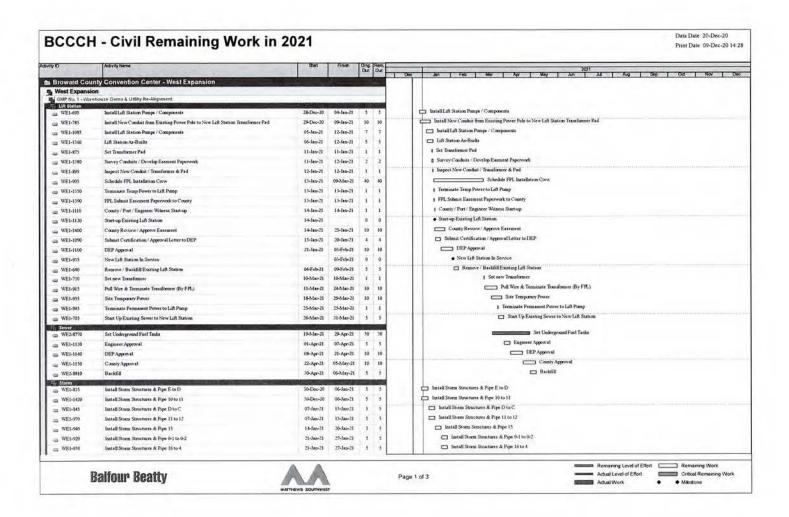
## **BCCCH - Distance to Condo**

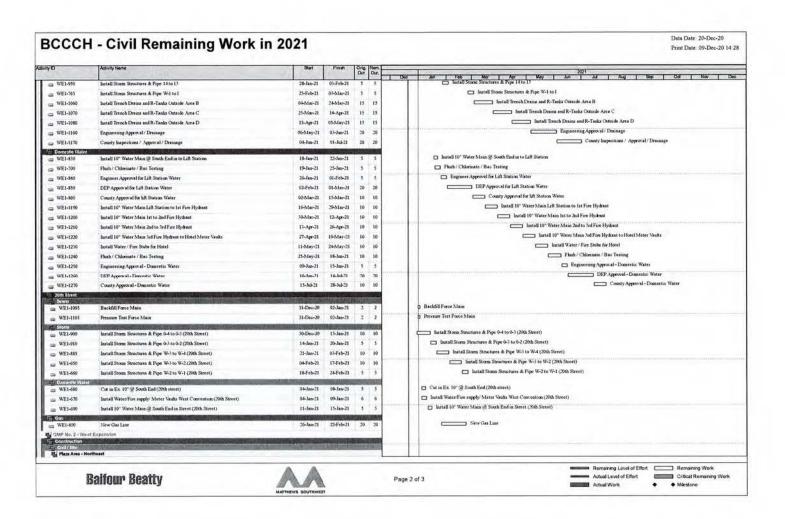


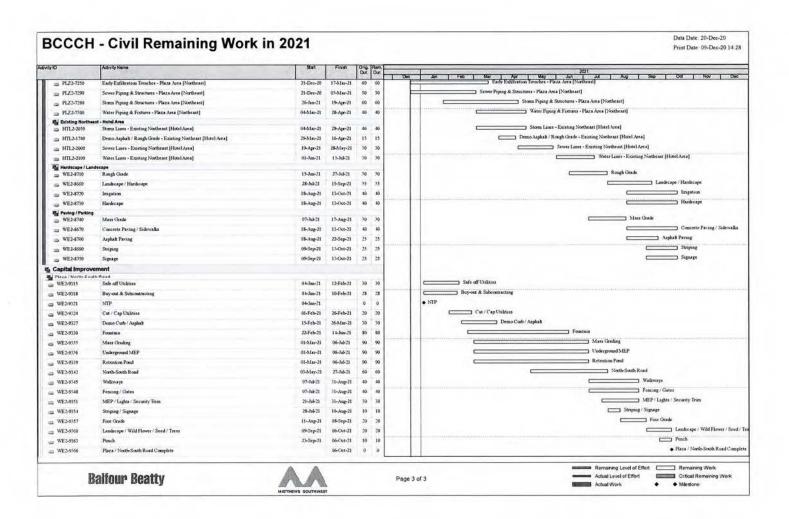
**Balfour Beatty** 

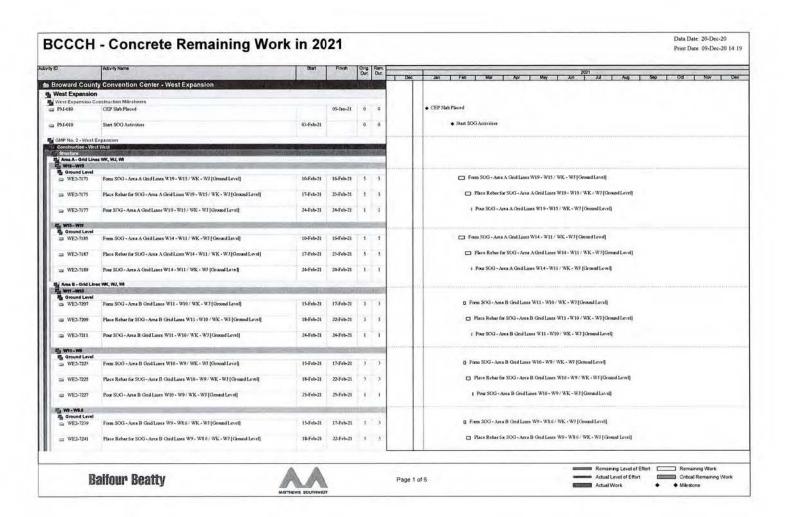
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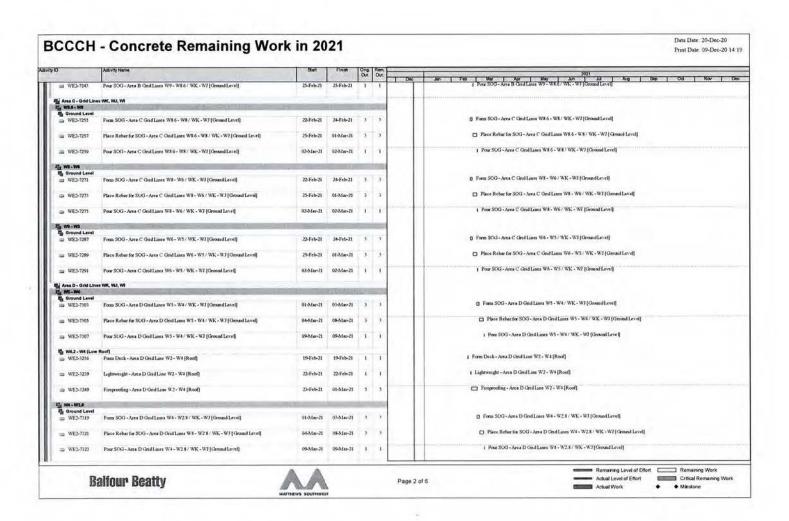


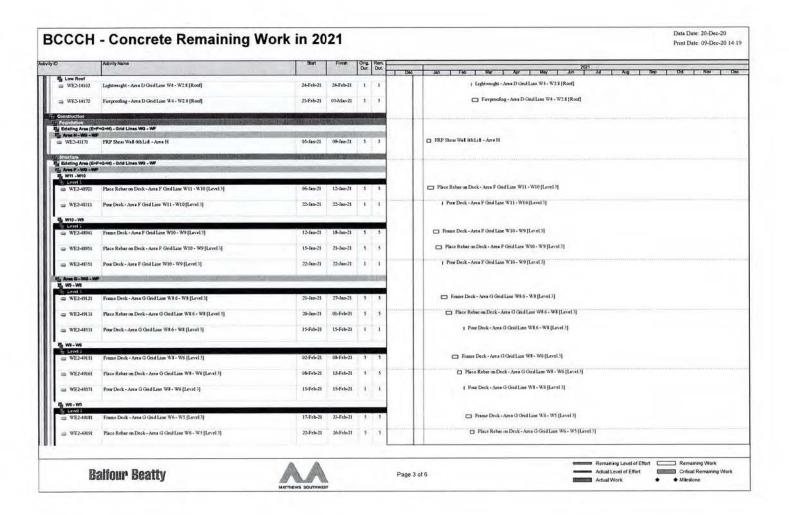


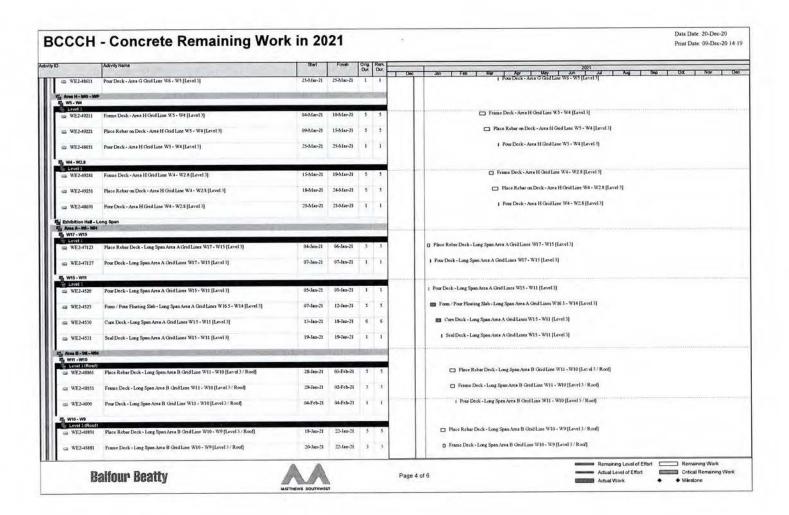


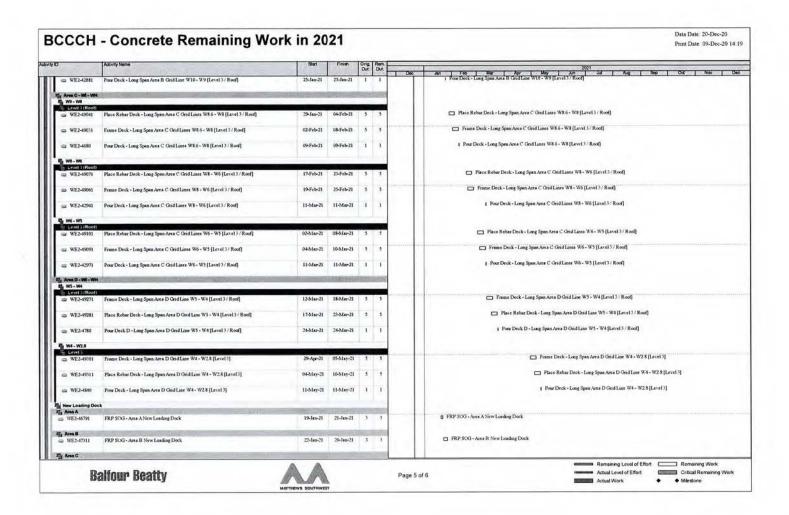


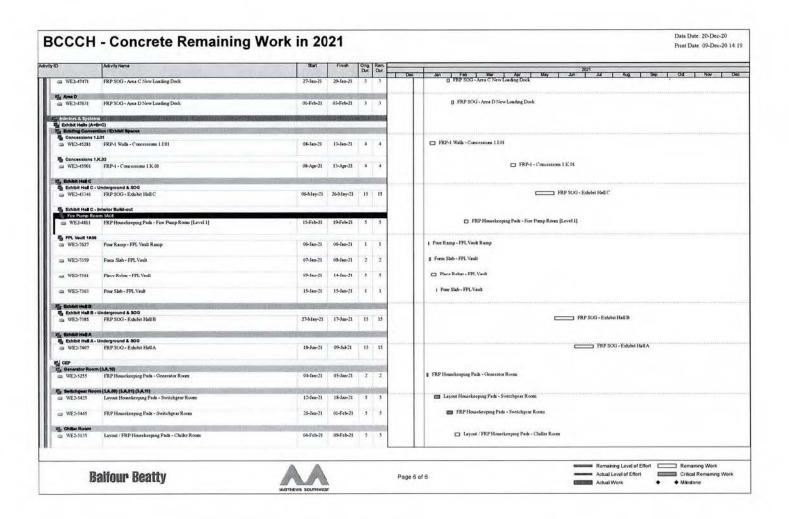


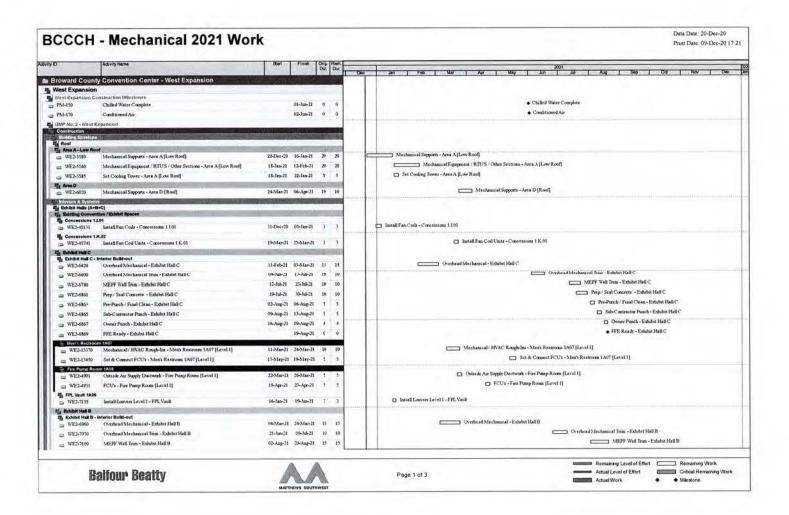


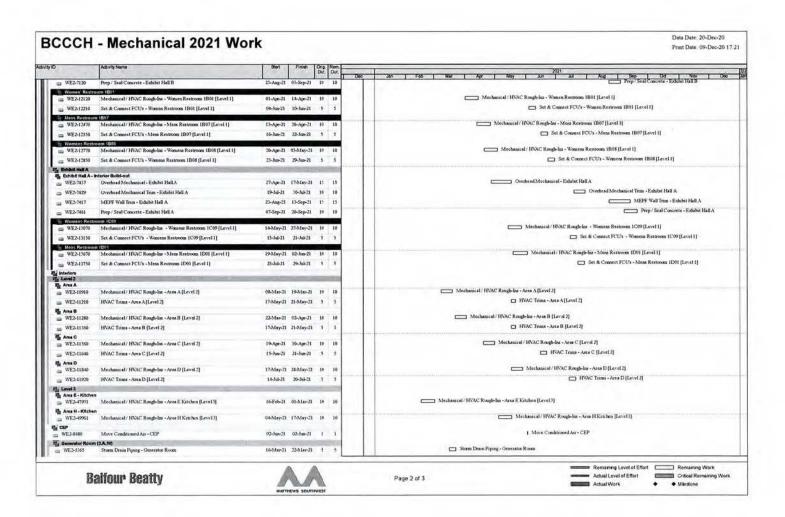


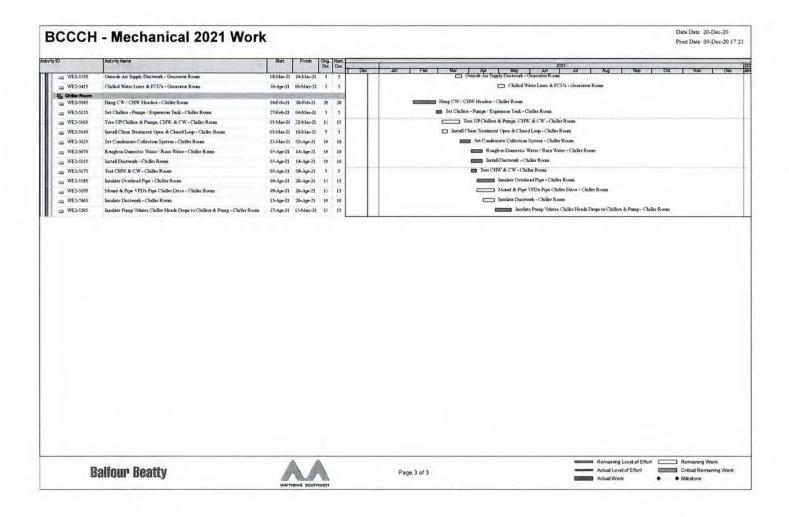


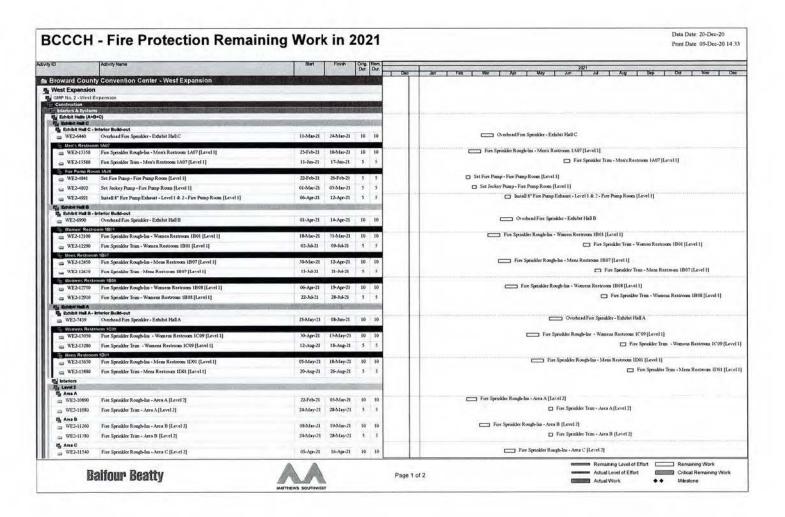


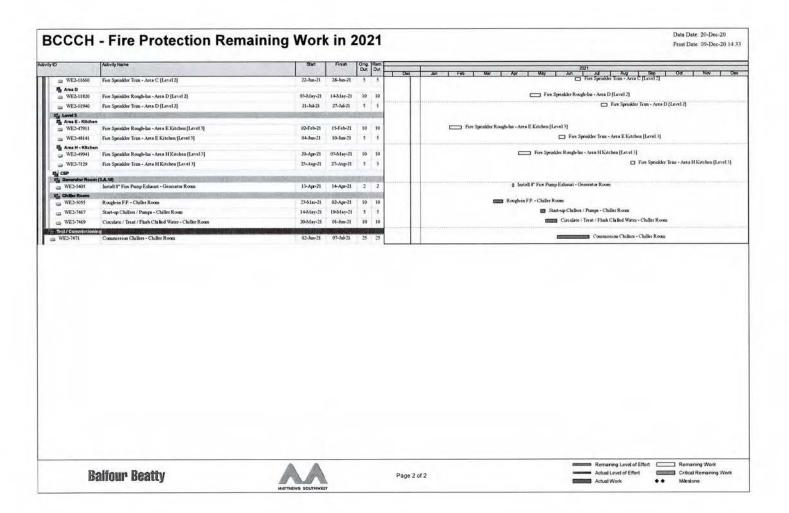


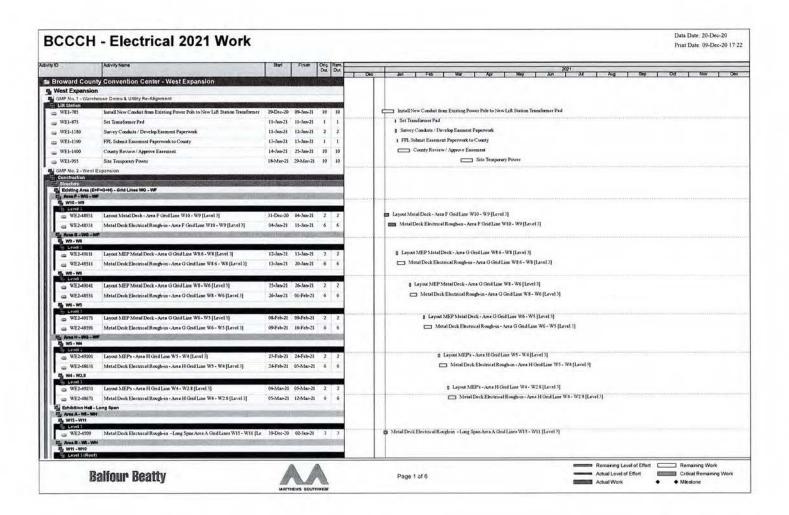


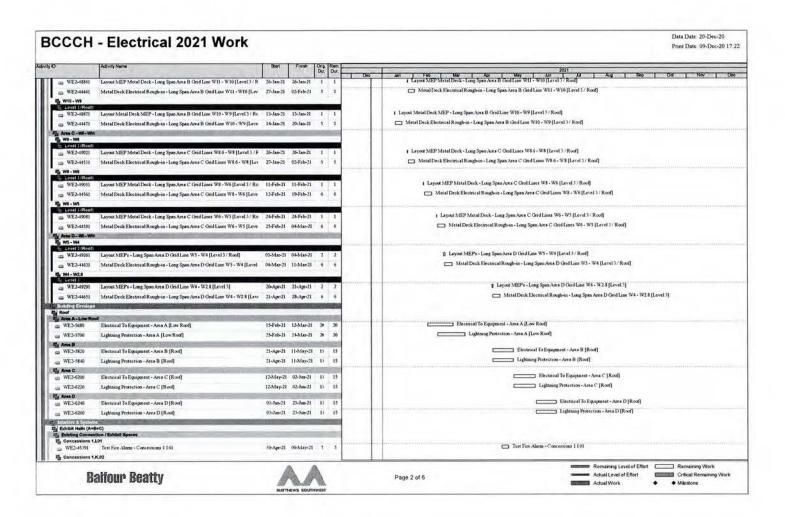


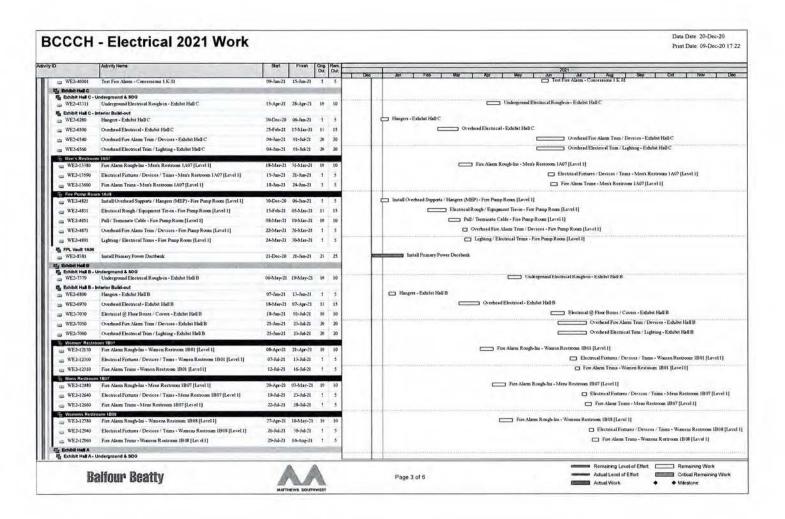


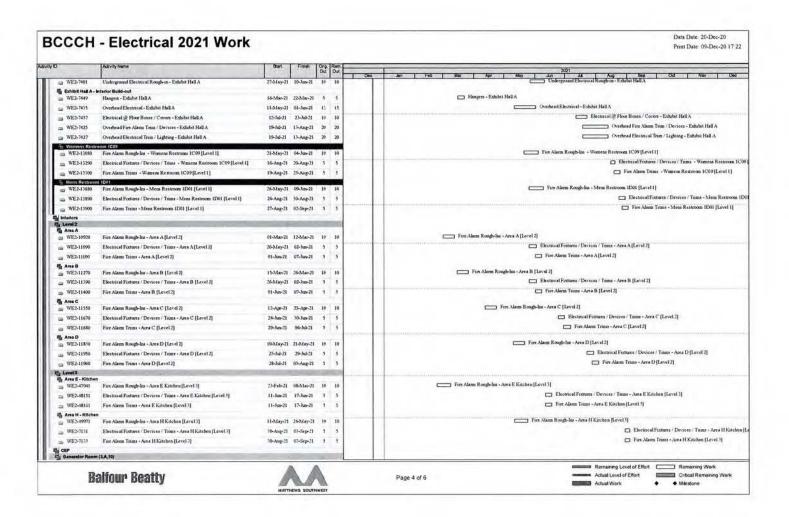


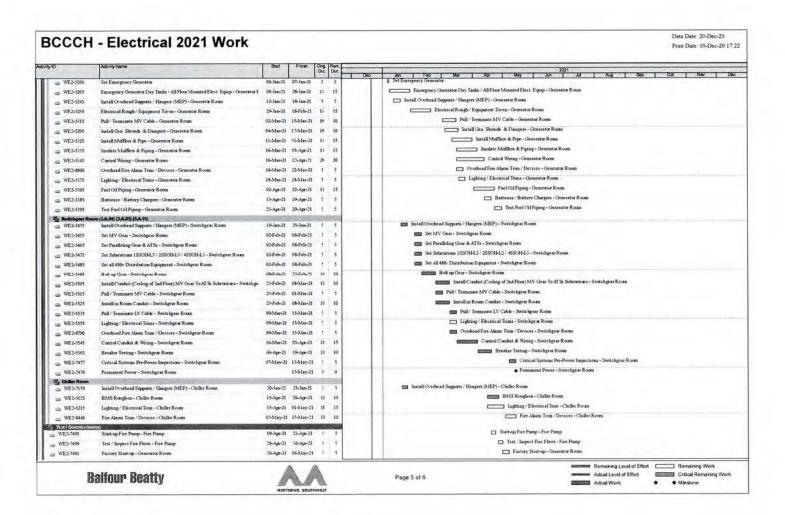


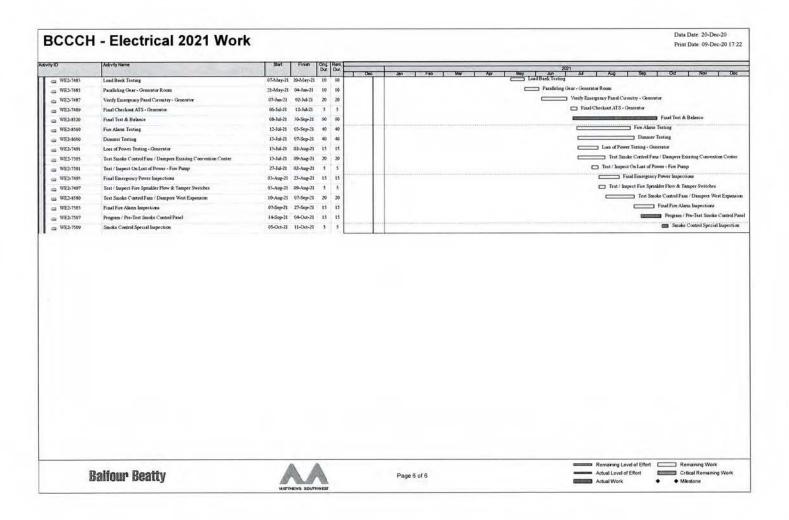


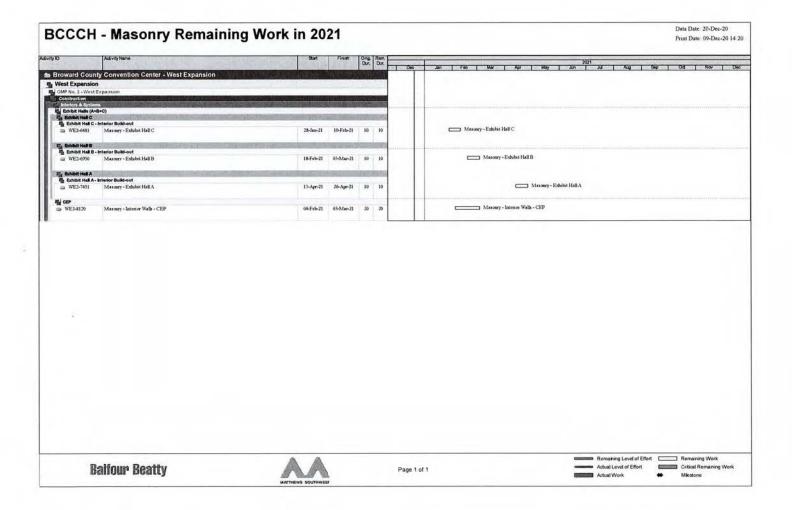


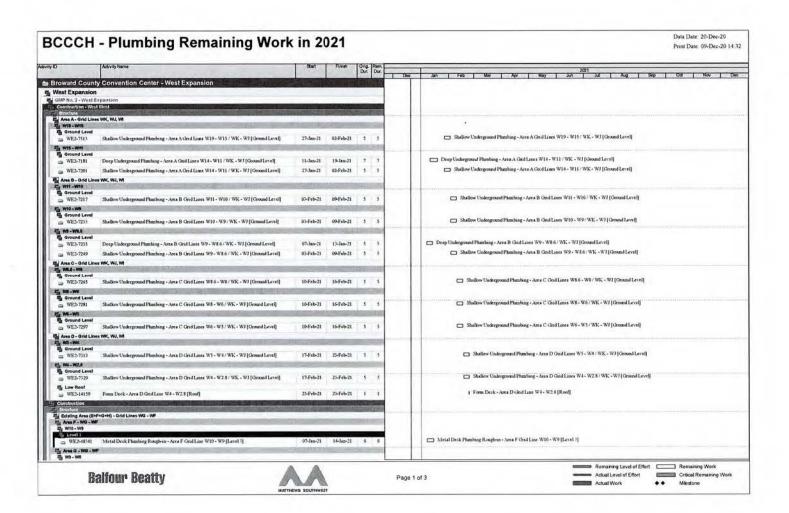




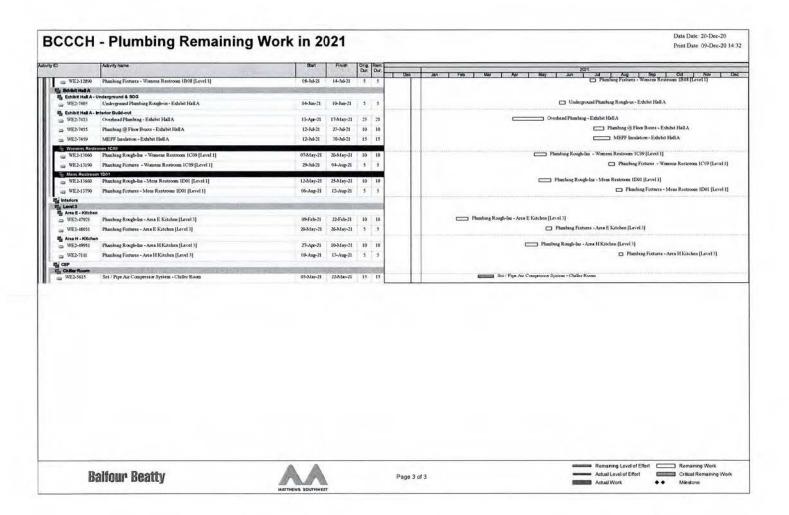


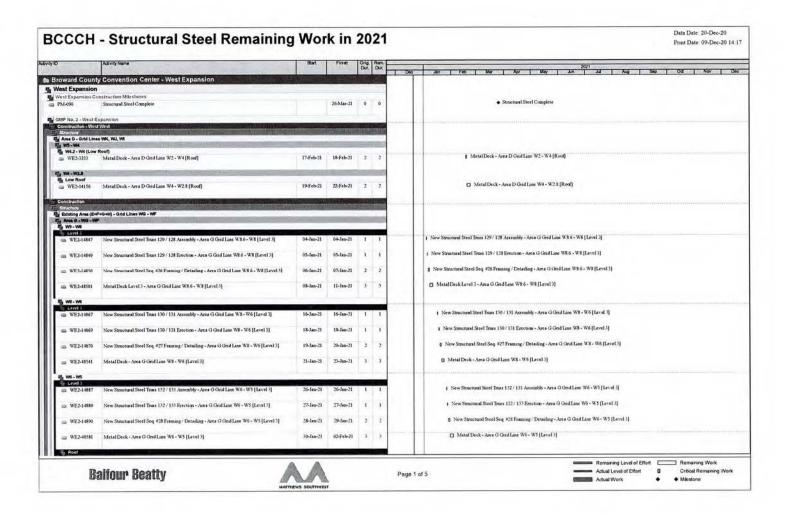


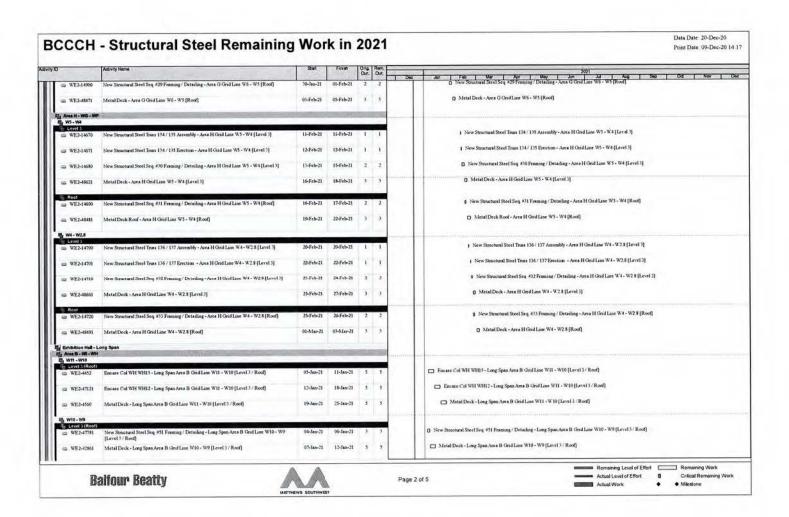


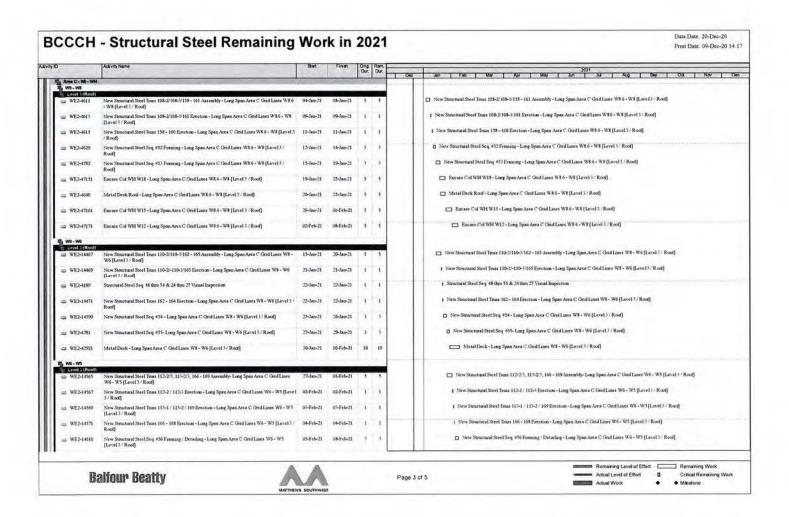


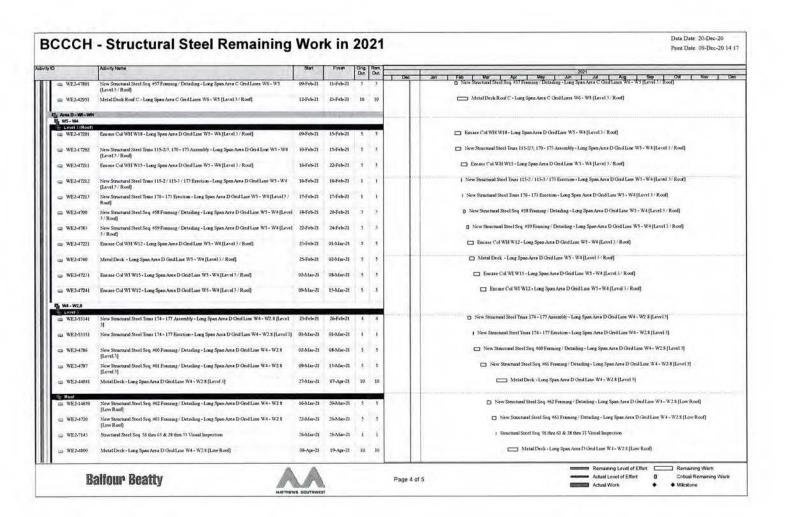
	Advity Name	Start	Finsh	Orig	Ren.		
			4970	Orig. Dur.	Dur.	Doc Jun Feb Mar Apr May Jun Jul Aug Sep Oct	] Nov ]
WE2-48521	Metal Deck Phanbing Rough-in - Area G Grid Line W8 6 - W8 [Level 3]	18-Jan-21	25-Jan-21	6	6	Metal Deck Phurbing Rough-in - Area G Grid Line W8 6 - W8 [Level 3]	
WE2-18561	Metal Deck Plumbing Rough-in - Area G Grid Line W8 - W6 [Level 3]	29-Jan-21	03-Feb-21	6	6	☐ Metal Deck Phanbang Rough-in - Area G Grid Line W8 - W6 [Level 3]	
WE2-48601	Metal Deck Plumbing Rough-in - Area G Grid Line W6 - W5 [Level 3]	12-Feb-21	19-Feb-21	6	6	Metal Deck Plumbing Rough-in - Area G Grid Line W6 - W5 [Lavel 3]	
WS - W4  E COWE 5  WEZ-48641  W W4 - W2.8	Metal Desk Plumbing Rough-in - Area H Grid Line W5 - W4 [Level 3]	01-Mar-21	08-Mar-21	6	6	Metal Deck Plaming Rough-in - Area H Guid Lane W5 - W4 [Level 3]	
Erhibition Hell - L		10-Mar-21	17-Mar-21	6	6	☐ Metal Deck Plambag Roughen - Area H Grid Line W4 - W2.8 [Level 3]	
WE2-44631	Metal Deck Plambing Rough-in - Long Span Area D Grid Line WS - W4 (Level 3 / Roof)	09-Mar-21	16-Mar-21	6	6	☐ Metal Deck Plumbing Rough-in - Long Span Area D Grid Line W5 - W4 [Level 3 / Roof]	
WE2-44661	Metal Deck Phinbing Rough-in - Long Span Area D Grid Line W4 - W2.8 [Level 3]	26-Apr-21	03-May-21	6	6	Metal Deck Plambung Rough-in - Long Span Area D Grid Line W4 - W2 8 [8]	Level 31
The Property of the Party of th		22-Apr-21	28 Apr 21		THE REAL PROPERTY.	— Undergrossed Phanelong Rough-in - Edulahi Hali C	
Exhibit Hall C - I WE2-6480		28-Jan-21	03-Mar-21		25	Coenhead Plamburg - Exhibit Hall C	
WE2-6385	MEPF Insulation - Exhibit Hall C	27-May-21	17-Jun-21	15	15	MEPF Insulation - Exhibit Hall C	
₩E2-13360	Planbing Rough-ha - Men's Restroom 1A67 [Level 1]	04-Mar-21	17-Mar-21	10	10	Phimbing Rough-las - Men's Restroom 1A07 [Level 1]	
WE2-13490	Phunbing Focures - Men's Restroom 1A67 [Level 1]	27-May-21	03-Jun-21	5	3	Phanbing Fixtures - Men's Restroom 1A07 [Level 1]	
WE2-7381	Underground & SOG Underground Plumbing Rough-in - Exhibit Hall B	13-May-21	19-May-21	50	3	Underground Planteing Rough-in - Exhibit Half B	
Exhibit Hall B - WE2-6910	Overhead Plumbing - Exhibit Hall B	18-Feb-21	24-Mar-21	25	25	Overhead Plambing - Exhibit Hall B	
WE2-7020	Plumbing @ Floor Boxes - Exhibit Hall B	18-Jun-21	01-361-21	10	10	Plumbing (it Floor Boxes - Exhibit Hall B	
WE2-7040	MEPF Insulation - Exhibit Hall B	18-Jun-21	09-Jul-21	15	15	MEPF Insulation - Exhibit Hall B	
Wemen' Restre	Planbing Rough-his - Women Restroom 1B01 [Level 1]	25-Mar-21	07-Apr-21	10	10	Plumbung Rough-las - Women Restroom 1B01 [Level 1]	
₩E2-12210	Phanbing Fixtures - Women Restroom 1B01 [Level 1]	18-Jun-21	24-Jun-21	5	5	☐ Plumbing Fixtures - Women Restroom 1B01 (Level	1)
Mens Restroor	n 1937	-		_			
₩E2-12460 ₩E2-12590	Phambing Rough-Ins - Mens Restroom 1B07 [Level 1] Phambing Factures - Mens Restroom 1B07 [Level 1]	06-Apr-21 30-Jun-21	19-Apr-21 07-Jul-21	10	10	Phimbing Rough-line - Mens Restroom 1B97 [Level 1]  — Phimbing Fritures - Mens Restroom 1B97 [Level 1]	evel 1]
WEZ-12760	Plumbing Rough-lus - Womens Restroom 1B08 [Level 1]	13-Apr-21	26-Apr-21	10	10	Phanbing Rough-lins - Wassens Restroom IBO8 [Level 1]	

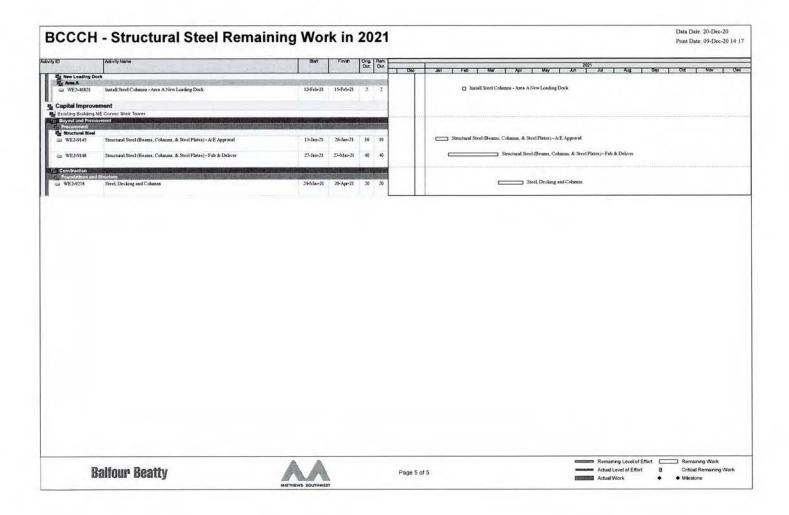












### UPDATED COVID-19 PLAN FOR BCCCH OFFICE AND FIELD

Date Modified: 12/10/2020

COVID Plan Captain: Lisa Falso

#### **GUIDELINES FOR OFFICE**

This plan is effective immediately for all Balfour Beatty employees working at the BCCCH project office located at 1799 SE 17<sup>th</sup> Street. Any employees with constraints such as childcare, family members with underlying conditions, etc. that are being affected by COVID-19 must contact John Parker to discuss any potential concerns.

The following is the guide moving forward for the foreseeable future:

#### Office Hygiene

Due to Covid-19 there will be a continued effort to improve the overall hygiene of the BCCCH office and the project site.

Balfour Beatty will perform office cleanings consistent, to the greatest degree possible, with the CDC guidelines: <a href="https://www.cdc.gov/coronavirus/2019-ncov/community/organizations/cleaning-disinfection.html">https://www.cdc.gov/coronavirus/2019-ncov/community/organizations/cleaning-disinfection.html</a>

- In addition to the CDC guidelines Balfour Beatty has employed a full-time cleaning person (Sharonda Neil) to sanitize all door handles, surfaces, desk, etc. Please accommodate Sharonda and thank her daily!
- 2. Wash your hands with soap and water or use hand sanitizer, especially after touching used items or surfaces. This must be done when you enter the building.
- 3. Avoid touching your face
- 4. Sneeze or cough into a tissue, or the inside of your elbow
- 5. Disinfect frequently used items and surfaces as much as possible
- 6. Continue using face coverings while in public, and particularly when using mass transit
- 7. Restrooms
  - a. Personnel are required to wear face covering when entering restrooms
  - b. All Employees and Guests must wash their hands when leaving the restroom
  - c. Waste cans will be no touch and will be located in and out of restrooms
  - d. Waste to be removed throughout the day
- Restrict COMMON AREAS (Breakroom 2-person limit) to be used for heating up food, putting food in the fridge, and/or getting coffee/water/soda. There will be no consumption of food in the kitchen.

#### People Who Feel Sick Must Stay at Home

- 1. DO NOT GO TO WORK contact your manager
- If you go to the doctor please self-quarantine in accordance with the doctor's and/or CDC recommendations

12/10/20

### Office Personnel - Social Distancing Requirements

- You must follow Social Distancing guidelines as outlined in the CDC.
- In order to Social Distance in the office please:
  - o Do not enter another employee's office.
  - Stand outside door.
  - o No more than 1 person in the hallway outside an office at a time.
- All employees will wear **PROTECTIVE** cloth face coverings/face mask when work requires less than 6 feet of separation and when walking through the office. This includes all public spaces.
- · Personal accountability for cleaning and disinfecting high touch surfaces
  - o Each employee will be provided a bottle of hand sanitizer at desk
  - o Hand sanitizer will be located on each side of all doors
  - o We will have trash cans on either side of all doors
  - o Disinfectants will be available in each area of the office for your use
- We will be spacing all workstations in open areas to ensure 6' or more of separation
- For the foreseeable future we will be utilizing TELEWORK, Microsoft Team site, GoToMeetings for all project team meetings and for any meetings with 10 or more individuals (when meeting outside of the TELEWORK mask must be worn)
- Minimize NON-ESSENTIAL Travel. If you do have to travel, please advise your supervisor prior to travel.
- When transporting between the office and field make sure that you sanitize the vehicle and face coverings must be worn in accordance with CDC.
- VISITORS should be discouraged from entering office, if required, individuals must sign in and follow the same guidelines as written in this plan. All Visitors must schedule an appointment. No walk-ins allowed.
- Everyone is encouraged to bring their food and eat at their desk.

### Logistics:

Reference attached plan. There is a dedicated access point exclusively for ingress/egress to/from the office to support social distancing as recommended by the CDC.

Please note that all doors are to remain locked and you must always carry your key card access with you at all times. We are installing an AI Phone at the reception desk glass door. This will allow Lisa to communicate with and control access at the glass door.

No guests are allowed in the building without prior communication with Lisa Falso.

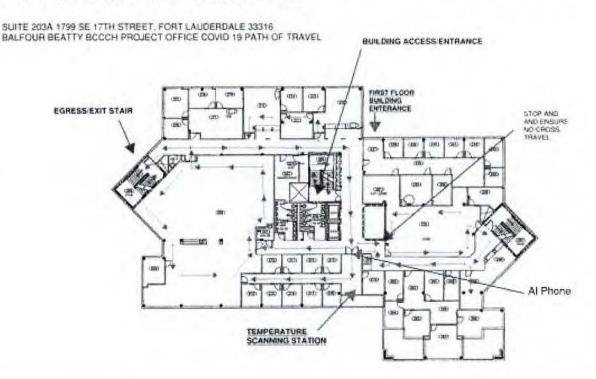
NOTE ALL EMPLOYEES AND GUEST MUST BE SCANNED BY THE THERMAL IMAGAING CAMERA LOCATED AT THE OFFICE LOBBY EVERY TIME THEY ENTER THE OFFICE. IF ANYONE IS SCANNED AND IDENIFIED AS HAVING AN ABNORMAL TEMPERATURE (AS NOTED BY THE THERMAL IMAGING CAMERA) WILL BE ASKED TO LEAVE THE OFFICE AND NOT RETURN UNTIL THEY HAVE RECEIVED A RELEASE FROM A DOCTOR.

- We have taken into consideration corridors for one-way travel to minimize interaction with others. Foot traffic in the office shall be one way. See map below for routes and direction of travel. We will post signs to indicate direction of travel through the office.
- Stairwells are one-way, signage will be posted

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We are encouraging everyone to utilize the stairs if possible. If not, only one person per elevator

AS A BACKUP PLAN ALL EMPLOYEES NEED TO HAVE A WORKSTATION AT THE OFFICE AND THEIR HOME, BBC WILL PROVIDE MONITORS FOR YOUR OFFICE AT HOME IF NEEDED. ALL MONITORS MUST BE RETURNED TO BBC AFTER THE COVID 19 IS OVER.



### **GUIDELINES FOR FIELD**

- 1. All team members must communicate the plan daily
- 2. Checks are completed at the gate, entrance to the work, during morning safety huddles and periodic checks through the work day.
- 3. Plan must be updated based on the progress of the work/change conditions.
- 4. Constant recommunication of the plan / plan updates

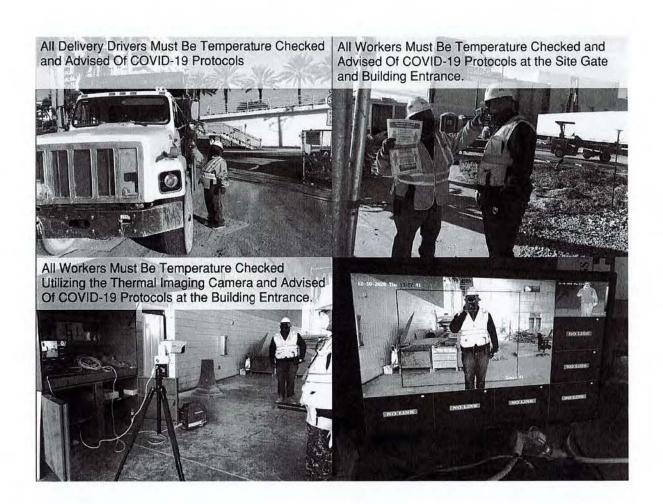
#### Items to check daily in the field:

- Signage at the gates, fence and within the project limits showing social distancing
- 2. We have a person at each entrance that stops every person to visually inspect to ensure they are not showing any of the main signs of the COVID-19 (fatigue, cough, breathlessness, etc..) and to educate them in English and Spanish what social distancing is. If someone shows any signs of COVID-19 per the CDC they are not allowed to enter the site.
- 3. Ensure team members walk around all day making sure that everyone is staying 6' away. There are some instances where the individuals do to safety reason do have to be within 6' but limited to actual need. Subs are to identify who on the teams are working near each other to track should one of them become symptoms

12/10/20

- 4. Cleaning team members must clean all surfaces non-stop all day (toilets, tables, handles, gates, etc)
- 5. All morning meeting are to be handled separately to ensure there are no large groups of people in one area. The individual groups stay at least 6 feet away from each other.
- 6. Document daily with pictures to show the separation
- 7. The helicopter flies over once a day to take pictures of the site to verify social distancing is happening. Ensure we are reviewing the pictures for social distancing
- 8. All AHJ's have assigned parking to ensure there is separation around them and they have clear access to the site without interacting with the workers
- 9. If someone is identified to be sick/potentially sick we will immediately stop work in the area and disinfect the tools, equipment and area the worker was working. Anyone working near the worker will be asked to leave and self-quarantine and must provide a note from a doctor before they return.
- 10. Every subcontractor must have a COVID-19 plan and monitor their plan
- 11. Leadership must walk once a week with the prime subs to ensure we are working together to address any concerns
- 12. We have added a safety person to the site for another set of eyes and to ensure we are working safely
- 13. We have increased the servicing schedule of the port-o-lets and hand wash stations to daily
- 14. Lunch and break areas are set-up to adhere to the 6ft separation
- 15. Self-serve from lunch truck has been eliminated. Designated person distributes contents.





CAM # 21-0415 Exhibit 1 Page 55 of 69

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May-2015 May-2016	0	0	0	1.86	0.73	0.13	0.03	0.35	0	0	0	0 03	0.32	0.13	0	0	0.12	0.62	0.06	0	0 0.11	0	0.03	0.51	0.15	0.01	0.04	1.18	0.03	0	0 002	1.97	
May-2017	0	0.2	0	0.16	0.18	0	0	0	0	0	0	0		0.36	0	0	0.08	0.25	0.23	0	0	0	0	0.51	9.5	0	0	0	0	0	0	2.87	
May-2018	0	0	0.18	0.18	0.1	0.72	0	0	0	0	0	0		0.54	1.2	0	0.44	0.01	0.87	5.27			0.14	0.17	0.67	0.71	1.29	0.03	0.49	0	0.22	15.15	
May-2019	0.1	2.12	0.23	0	0.15	0.35	0	0	. 0	0	0.04		0.37	.0	0.18		0	0	0	0.28	0	0	0	0	0	0	0	0	0	0	0	3.97	
aily Average	0.02	0.46	0.08			0.24	0.01	0.07	0.00	0.00				0.21	0.28		0.15	0.18	0.23	1.11	0.07	0.00	0.03	0.31	0.26	0.15		0.24	0.10	0.00	0.05	3.00	
May-2020	0	0	0	0	0	0	- 5	0	0	11.23	0.01	0	0	0.01	1.04	1.31	0.1	2.31	0.21	0.06	0.15	502	3.05	1.05	2.03	1.2	0.02	0	0	0	0	16.07	
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Jul-2015	0	0	0	0	0	0.18	0.03	0	0	0	0	0	0.19	0.01	0.04	0.21	0.01	0.65	0	0.02	0	0.3	0	0	1.05	0	0.01	0	0	0	0.33	3.03	
Jul-2016	0.3	.0	0	0	0	0	0	0	0	0	0	8	0.27	0.22	0.06	0	0.48	0	0	0	0.13	0	0	9.04	0	0.54	0	0	0.33	0	0.04	2.41	
Jul-2017	0.11	0.53	0.59	0.01	0.08	0	0	0.15	0	0.48	0.16	0.37	0.5	0.01	0.01	0.24	0.11	0.9	0.15	0.23	0.97	0 0.69	0.02	0.01	0.19	0	0.23	0 13	0.15	0.78	0.16	5.8	
Jul-2018	0.11	0	0.59	0.01	0.22	0.07	0.23	0.72	0	0.59	0.13	0.03	0	0	0.01	0	0.04	0.9	0	0.28	0.02	0.69	0.02	0.19	0.19	0.15	0.23	0 13	0.04	0.45	0.08	3.54	
aily Average	0.08	0.11	0.12		0.06	0.05	0.05		0.00					0.05	0.02		0.13	0.32	0.03	0.15	0.22		0.02	0.05	0.35	0.14	0.06	0.03	0.10		0.18	2,54	
Jul-2020	0.01	0.09	0	0.14	1.32	77.16	0	0.18	0	0.01	0.32	0	0.37	11.22	0	0	0.96	0.05	0	0.18	0.56	1.61	ii 68-	0.47	0.01	0.01	0	0	0	Ü	0	5-21	
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Aug-2015	0	0.69	0	0	0	0	0	0.06	0.16	0.01	0.05	0	0.2	0.07	0.93		0	0	0	0	0	0	0	0	0.12	1.71	0.03	0	0.12	0.72	0	5.75	
Aug-2016	0.55	1.17	0.08	0	0	0.78			0.01	0	0		3.04	0.11	0.05		0.12	0.04	0	0	0	0	0	0.39	0.12	0.06	0.19	0.09	0.19	1.37	0.44	7.17	
Aug-2017	0.15	0	0	0	0	0.37	0	0.02	0			0	0	0	0	0	0	0	0	0.18	0.04	0.14	0.01	2.81	2.56	1.65	0.82	233	0	0	0	14.54	
Aug-2018	0.02	0.01	0	0.48	0.13	0.01	0	. 0	0	0.31	0.02	0	0.76	0	0.01	0	0	0.2	0.19	0	0	0.02	0.73	0	1.14	0.03	0	0.27	0.29	0.51	0.14	5.27	
Aug-2019	1.02	0.86	0.18			0.08	0.1	0.34	0.05	0	0.43	0.03	0.51	0.29	0.49		0.27	0	0	0.1	0	0.11	0.69	0.47	0.05	0	1.95	0.01	0.12	0.77	0.5	11.98	
ally Average	0.35	0.55	0.05	0.57	0.07	0.24	0.05	0.15	0.04	0.75	0.24	0.12	0.30	0.09		0.24	0.08	0.05	0.04	0.06	0.01	0.05	0.29	0.73	0.80	0.57	0.60	0.54	0.14	0.67	0.22	13.72	
Aug-2020	7.23	0.31	1.18	3.91	(9.7)	0.34	0.	0 1	0	0	0 1	0 1	0 1	0 1	2,97	1 0	9.98	0	3.47	0	0	0.13	0.04	0.41	1 0	0.01	u.	0	0.05	0.38	E.39	- 10.76	
	Tue	Wed.	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	fet	Set	Sun	Mon	Tue	Wed	Thu	Fri		Sun	Mon			Thu		Sat		Mon		Wed	S .		- Communication
	1	2	3		115.11	6	7		9		11	12	11	14	15			18	19	20	21	22	23	24	25	25	27		29	30		Total Rainfall	5 VR Average
Sep-2015	0.1	0.1	Ò	1,24	0.39	0.01	0.17	80.0	- 0	0	0.01		0.75	0	0.31		1,27	0.83	0.22	0.01	0.1	1.44	0	0.07	0	0.01	0-	0	0.33	0	-	10.1	
Sep-2016	0	0	0	0	0.18	0	0.12	0.96	0				0.29	0	-0	0	0	0	0.75	0.45	8	10.0	0	231	0	0.49	0.01	0.05	0.04	0.15		11.95	
Sep-2017 Sep-2018	0.09	2.08	1.71	0.08	0.15	0.52	0.28	0.01	0.22	4.3	0	0	0	0.05	0.03		0.09	0	0.05	0	0.22	0.61	0	0.01	0	0	0	0	0.53	0.53		5.54	
Sep-2019	0.05	0.75	0.1	0	0	0	0	0	0.22	0		0.07	0.22	0.02	0.02		0	0	0	0.02			0	0	0	0	0	0	0.03	0		1.33	
aily Average	0.05	0.59	0.36			0.11								0.01		0.31			0.21	0.10		0.41	0.00	0.48	0.00	0.10	0.29	0.05	0.19	0.14	1		Marie Control
Sep-2020	0	0	0	0	n	0.4	0	0.01	0.1	0.21	CCE	0.21	D	Cor	- 0	0	0	- 0	0	0	4.8	0	0	10.0	9.12	5,61	0	0	0.1	5.85		21.65	110
	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	5at	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat		
	1	2	3	4	5	6	7	8	9	10	11	12	33	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30		Total Rainfall	5 YR Average
Oct-2015	0	0	. 0	0	0.13	0.03	0.03	0	0	0.01	0	0	0.09	0	0	0	0	0.18	0	0	0	0	0.09	0.38	0.74	0	0.02	0.14	0.87	0	0	2,71	
Oct-2016	0.26	0.06	0.63	0	0	1.19	0	0	0	0	0	0.03	0.17	0	0.54	0.24	0	0	0	0.14	0	0	0	0	0	0.01	0.01	0	0.03	0.06	0	3.32	0.500
Oct-2017	0	0.2	0.72		0.46	0	0.01	0	0.09	0.08	0.05	0.5	0.1	0	- 0	0.04	0	0.32	0.21	0	0.28		0	0.49	0.2	0	0	2.18	0.79	0	0	7	3,654
Oct-2018	0.43	0.13	0	0.01		0.14		0.09	0.03	0.05		0	0	0	0.03	0	0	0	0.02	0	0	0.06	0	0	0	0.39	0	0	0	0.04	0	2.23	
Oct-2019	0.04	0.03	0.02	0.06	0.03	0.13		0.04	0.04	0.03	0.87	0.11	0.06	0.00		0.06	0	0.10	0.16	0.03	0.06	0.01	0.02	0.17	0.06	0.39	0.01	0.46	0.34	0.02	0.00	3,01	
Oct-2020	9.21	0.08	1.09	0.06	0.12	0.30	0.24	0.04	0.03		0.13	0.31	0	0.00		0.06	0.00	0.10	0.16	0.03			0.02	0.05	4.61	0.08	0.01		0.04	0.02	9.34	20.42	
		-																				-											
	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon		Wed	Thu	Fri	Sat	Sun		Tue	Wed		Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	-	Total Baint "	5 YR Average
Nov-2015	0	0	0	9.07	3.01	0.52	7	0.03	9	10	0	12	0.56	0.38	0.19		0.06	18	19	0.04	0.87	0.55	23	24	0.09	26	0	28	29	0.73		Total Rainfall 4.88	
Nov-2015	0	0	0	0.07	0.34	0.01	0	0.03	0	0	0	0	0 0	0.36	0.42	0.76	0.06	0	0	0	0.87	0.55	0.02	0.02	0.01	0	0	0.07	0	0.06		1.04	
Nav-2017	0	0	0.12		0.34	0.01	0	0.02	0	0.4	0.15	0.07	0.01	0.04	0.54		0	0	0	0	1.85		0.46	0	0	0	0.05	0.53	1.25	0		5,76	
Nov-2018	0	0.01	0.01	0.26	0	0	0.02	0	0.01	0.05	1.42	0.48	0.12	0.04	0.07		0	0	0	0.07	0	0.04	0	0	0	0	0	0	0	0		2.6	
Nov-2019	0	0	0.67	0.07		0	0	0.02	0.28	0.07	0	0	1.36	2.25	0.57		0	0	0	0	0	0	0	0.2	0	0	0	0	0	0		5.93	
taily Average	0.00	0.00	0.16		80.0	0.11	0.00	0.01	0.06	0.10	0.31	0.11		0.54	0.36		0.01	0.00		0.02	0.54	0.12		0.04	0.02	0.00	0.01		0.25	0.16			-
Nov-2020	13/85	0	0	1 0	13.66	1.00.16	D. 10 Sec. 4	5.41	0.00	-0	Bar.	10.46	.0	15.19	111.11	0	1 0	0	0	0.05	0	0.41	0	0	0	0	0	0	0	0	1	11.11	

The five year average for the months listed above is 33 inches. The actual rainfall during the months listed above was 92.21 inches. There were sixty more inches of rain in 2020 than the five year average.

8.9 Rain Fall Information for 2020

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December 17, 2020

Mr. Thomas Stedem Senior Project Manager Balfour Beatty 1799 SE 17th Street Fort Lauderdale, Florida 33316

Re: Report of Noise Level Estimation – Additional Hours Broward County Convention Center 1950 Eisenhower Boulevard Fort Lauderdale, Florida Project 16698 Proposal 20-0911

Dear Mr. Stedem:

NV5 Inc. submits this letter in fulfillment of the requested scope of service. NV5 has been providing Noise Monitoring Summary reports. This report provides a summary of the information collected since the previous report.

The project site is located at 1950 Eisenhower Boulevard. In October 2020, a monitoring unit was placed at the southeast corner of the building at 1799 SE 17<sup>th</sup> Street, Fort Lauderdale, FL.

Noise Monitoring starting in October, 2020 and is currently ongoing. This report addresses the information recorded from October 31, 2020 to December 15, 2020.

#### **PURPOSE**

The purpose of our services on this project were to: provide a review of noise levels that could be expected at adjacent condominium property line north of the convention center for construction at hours outside of those outlined within the City of Fort Lauderdale noise regulations.

#### NOISE MONITORING EQUIPMENT

NV5, in conjunction with Geosonics, provided noise monitoring equipment to the project. For this project a Re:mote Noise Level Meter operated at the southeast corner of the building at 1799 SE 17<sup>th</sup> Street, Fort Lauderdale, FL. Normally a noise limit is provided. We understand that a specific limit for noise was not provided for this project.

#### Remote Equipment

NV5 provided Re:mote Noise Level Meter monitoring equipment to the project. The monitoring units run daily providing the summary records that are transmitted and reported daily to an online site. The unit

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transmits the data to us daily and we review the day's noise levels and cite the maximum value recorded each day.

The reports online summarize the noise levels a day at a time from the instrument location. They are histogram format or vertical bars of the vibration levels recorded during the day.

### **REVIEW OF NOISE MONITORING DATA**

Based on the attached report, noise limits of the City of Ft. Lauderdale that are represented by 60 dBA during day time hours and 50 dBA during night time hours, can't be met due to the fact that the noise from the adjacent street and associated community produce levels in the range of 60-70 dBA. These levels were recorded during the above mentioned period consistently and we highly recommends these levels to be considered as acceptable ambient levels of noise for this project only.

Attached to this letter is the summary of the Re:mote noise data collected for the time period of October 31, 2020 through December 15, 2020 and estimates that the noise levels during extended hours projected to the north properties would not be in excess of the noise regulations of the City.

Complete copies of the data for each day have been available online.

#### CLOSURE

We appreciate the opportunity to be of service. In the event you have questions about information in this report, please contact the undersigned.

Vice President

Florida Registrati8

Sincerely,

NV5 Inc

Glenn Massinger Project Manager

Attachments: Re:mote Unit Noise Summary Report (11 pages)

2 Copies to Addressee via U.S. Mail

Copy to NV5 File

NIVI5

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December 18, 2020

Glenn Massinger, Project Manager NV5 14486 Commerce Way Miami Lakes FL 33016 Suite 4 6900 S. W. 21st Court Davie, FL 33317

Phone 954.424.2101 Fax 954.424.2104

Re: Broward Convention Center - Noise Level Estimation - Additional Hours

Dear Mr. Massinger:

Per your request I am providing a review of noise levels that could be expected at the adjacent condominium property line to the north of the convention center for construction at hours outside of those outlined within the City of Fort Lauderdale noise regulations. Construction is currently operating at hours of 8:00 am to 7:00 pm. Due to time requirements on the project the proposed working hours will be 7:00 am to 10:00 pm the following day. As noise level monitoring has been completed with a Re:mote™ Noise Level Meter operated at the southeast corner of the building at 1799 SE 17<sup>th</sup> Street, Fort Lauderdale, FL this letter covers our opinion on the noise levels expected.

Noise is measured at ground level at the "receiving land use" property line according to the Fort Lauderdale Noise Code. With the unit in its existing location it is on the ground level with a microphone approximately  $4-5^{\circ}$  off the ground consistent with how noise is to be measured. The noise is measured in a line consistent with the property line / building area of the structures north of SW  $17^{th}$  Street. The levels measured at this point would be consistent with those for comparison to the City code. The noise levels measured from the installation on October 31 through December 15 have been considered.

The extended hours that would be used in the upcoming work would be primarily for steel erection located at the northwest corner of the site extending south and parallel with the existing convention center. The closest area to the condominium to the north is approximately 570 feet. Associated with this work would be the use of a forklift that generates 85 dBA at a distance of 50 feet. This level is the estimated maximum and calculated at the closest point of the operation. As this is mobile equipment the peak level only occurs when the forklift would be in that closest area. At other times since the project would work south to north the levels would be consistently lower.

In order to determine compliance with the City regulations a calculation of noise at the adjacent properties is necessary. Noise reduces with distance and using a standard calculation noise may be predicted based upon an initial level and

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distance. The use of the inverse square law allows predication in that a sound level (intensity) will drop off as distance increases. This law which has been demonstrated by evidence and actual measurement calculates a six (6) decibel drop with a doubling of the distance in feet. Considering the 85 decibel level for the forklift at 570 feet noise would reduce to 64 dBA.

The predicted level is presuming no uninterrupted path for the sound and that no existing levels are considered. In this case the elevated section of the SE 17<sup>th</sup> Street Bridge over the Intracoastal Waterway would provide shielding and reduced noise at the property line. However, the largest reduction of noise would be the shadowing of any noise at the Convention Center by existing noise from the community and traffic on SE 17<sup>th</sup> Street.

Measured levels from October 31, 2020 through December 16, 2020 show that noise from the adjacent street area and associated community produce levels that do not regularly go below 60-65 decibels up to 70 decibels. This data shows a solid noise level that exists over this period consistently. This may be considered as the "ambient" level of noise. Graphs are attached following the conclusion of this letter that show data from the noise meter for a series of dates which also identify City time frames and working shifts. Also shown are two graphs showing overall noise levels as the one minute maximum levels from October 28 through December 16, 2020. As the noise levels are 60 – 65 decibels at the minimum the 64 dBA generated by the forklift would be obscured by community ambient levels. Also, considering the noise levels occur 24-hours over this range of noise, the 60 dBA daytime and 50 dBA nighttime noise limits of the City cannot be met due to ambient conditions. In our opinion the noise levels projected to the north properties would not be in excess of the noise regulations of the City.

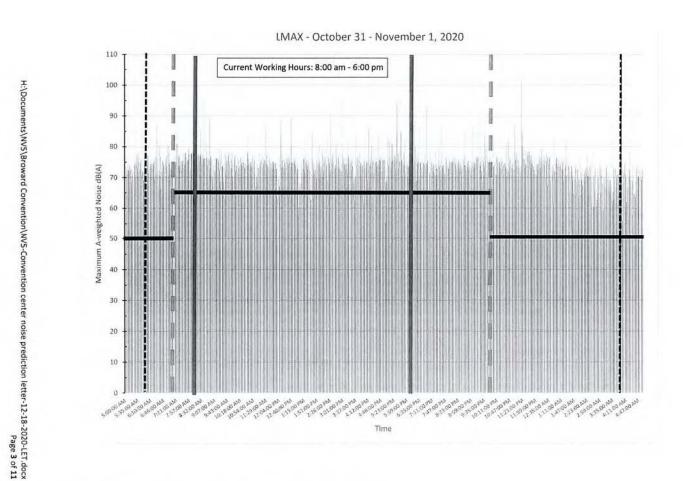
If you have any questions please feel free to contact me.

Sincerely,

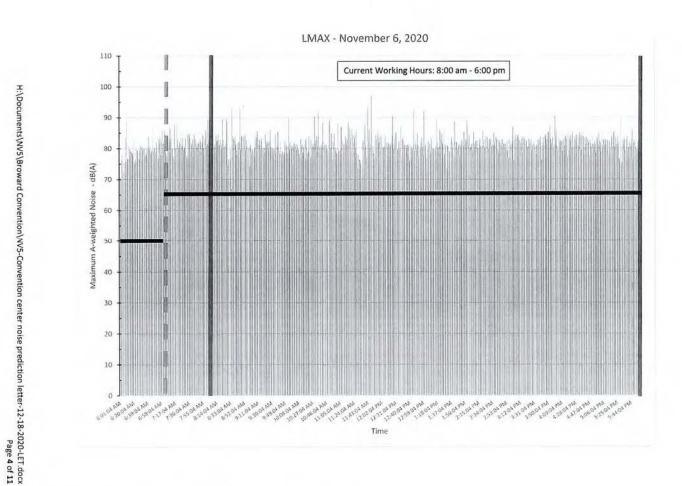
Jeffrey A. Straw

Vice President and Area Manager

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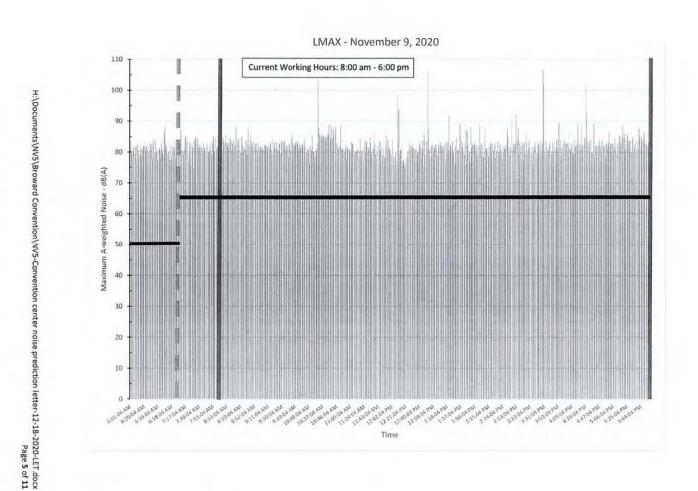


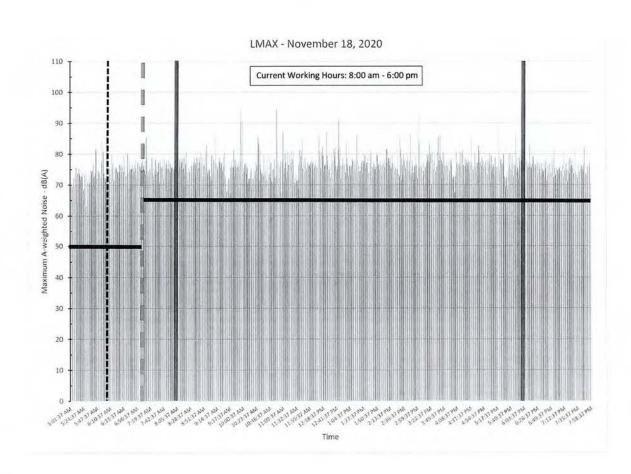
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8.10 NV5 Signed and Sealed Engineered Calculation

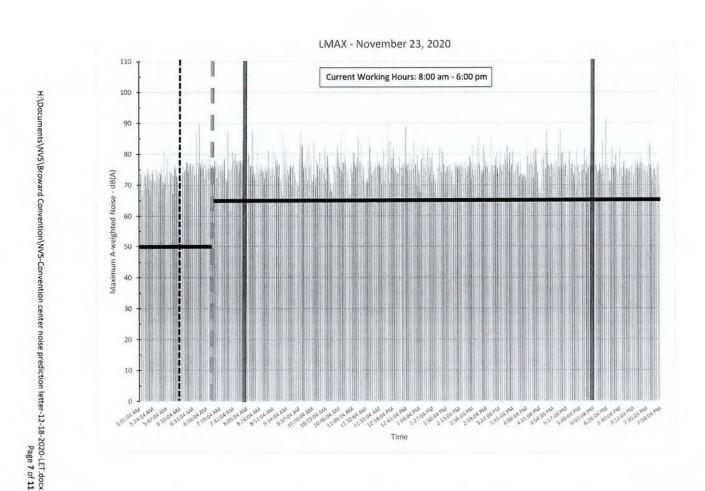
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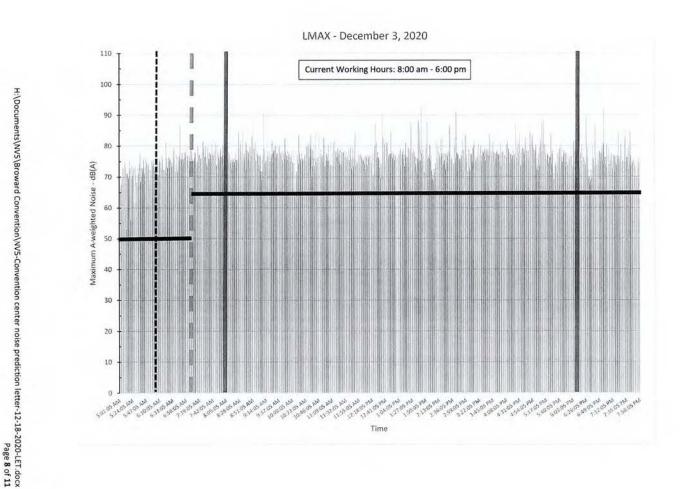


8.10 NV5 Signed and Sealed Engineered Calculation

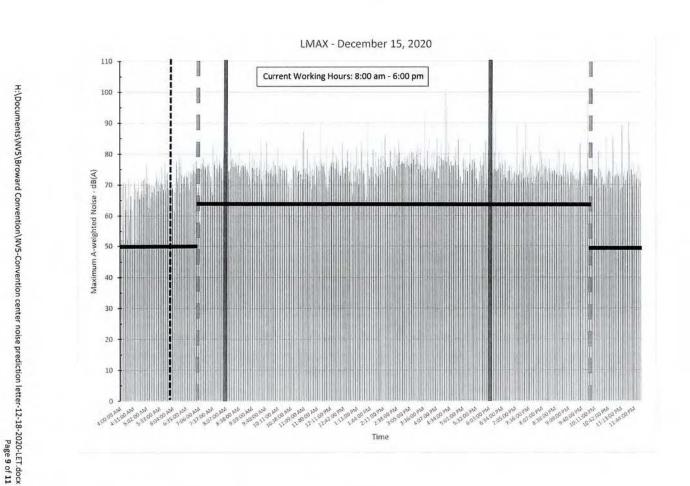
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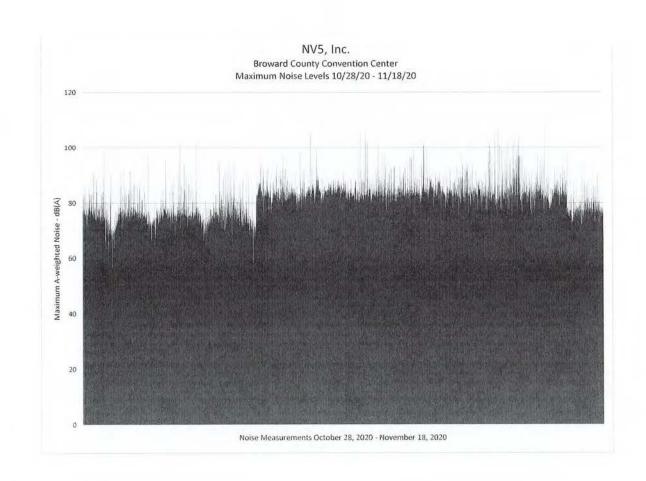


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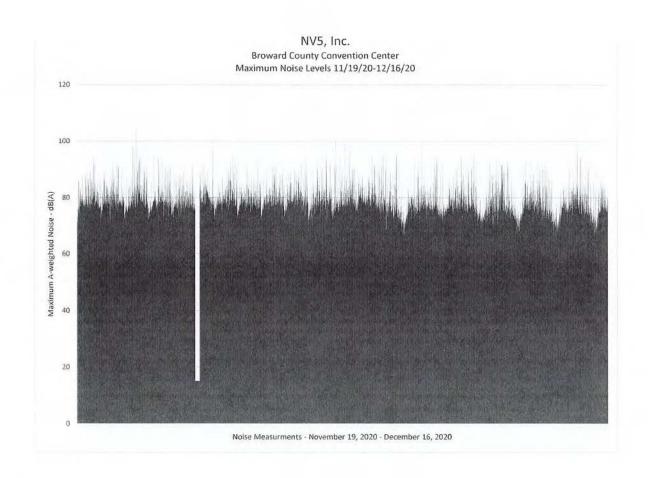
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8.10 NV5 Signed and Sealed Engineered Calculation

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