

PIPE INSTALLATION (CONTINUED):

7. A CORRECTIVE ACTION PLAN SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL A MINIMUM OF 21-DAYS PRIOR TO BEGINNING ANY CONSTRUCTION ACTIVITIES WITHIN 30-FEET OF THE TOWER #1 FOUNDATION AND THE BUILDING. THE CORRECTIVE ACTION PLAN SHALL INCLUDE, AT A MINIMUM, MEASURES TO STOP ANY MOVEMENT AND RESTORE ANY AREA DAMAGED BY MOVEMENT OR VIBRATION WHICH EXCEEDED THE ALLOWABLE THRESHOLDS PROVIDED BELOW. THE COST FOR THE PREPARATION AND EXECUTION OF THE CORRECTIVE ACTION PLAN SHALL BE CONSIDERED INCIDENTAL TO ITEM 204.25 STRUCTURE EXCAVATION UNLESS OTHERWISE NOTED IN NOTE 8.

8. THE MAXIMUM ALLOWABLE HORIZONTAL OR VERTICAL MOVEMENT OF THE TOWER #1 FOUNDATION OR THE BUILDING IS 0.25-INCHES. THE MAXIMUM LATERAL MOVEMENT OF THE EXCAVATION SUPPORT AT THE TOWER #1 AND BUILDING LOCATION SHALL BE LIMITED TO 0.50 INCHES. THE CONTRACTOR SHALL MONITOR AND MEASURE THE MOVEMENTS OF THE EXCAVATION SUPPORT, TOWER #1 FOUNDATION AND THE BUILDING DURING EXCAVATION ACTIVITIES EVERY 2-FEET OF EXCAVATED DEPTH UNTIL THE BOTTOM OF EXCAVATION IS REACHED; DAILY THEREAFTER FOR A PERIOD OF 1 MONTH AFTER THE EXCAVATION HAS BEEN BACKFILLED. THE CONTRACTOR SHALL ESTABLISH AT LEAST FIVE MONITORING LOCATIONS ALONG THE FACE OF THE EXCAVATION SUPPORT ALONG THE TOP AND THEN IN THE VERTICAL DIRECTION AS THE EXCAVATION PROGRESSES DEEPER TO CREATE A 5X5 ARRAY OF MEASUREMENT POINTS WHEN FULLY EXCAVATED. THE MONITORING LOCATIONS FOR TOWER #1 AND THE BUILDING SHALL BE AS DESCRIBED IN NOTE 6 ABOVE.

THE CONTRACTOR SHALL IMMEDIATELY STOP WORK AND NOTIFY THE ENGINEER OF ANY MOVEMENTS. IF THE ENGINEER DETERMINES THAT THE MOVEMENTS EXCEED THOSE SPECIFIED AND REQUIRE CORRECTIVE ACTION, THE CONTRACTOR SHALL TAKE CORRECTIVE ACTIONS NECESSARY TO STOP THE MOVEMENT AND PERFORM REPAIRS. WHEN DUE TO THE CONTRACTOR'S METHODS OR OPERATIONS OR FAILURE TO FOLLOW THE SPECIFIED/APPROVED CONSTRUCTION SEQUENCE, AS DETERMINED BY THE ENGINEER, THE COSTS OF PROVIDING CORRECTIVE ACTIONS SHALL BE BORNE BY THE CONTRACTOR. WHEN DUE TO DIFFERING SITE CONDITIONS, AS DETERMINED BY THE ENGINEER, THE COSTS OF PROVIDING CORRECTIVE ACTIONS SHALL BE PAID AS EXTRA WORK.

9. THE CONTRACTOR SHALL MONITOR VIBRATIONS WITH AN APPROVED SEISMOGRAPH(S) LOCATED, AS APPROVED, BETWEEN THE WORK AREA AND THE CLOSEST STRUCTURE SUBJECT TO VIBRATION DAMAGE. THE SEISMOGRAPH USED SHALL BE CAPABLE OF RECORDING PARTICLE VELOCITY FOR THREE MUTUALLY PERPENDICULAR COMPONENTS OF VIBRATION IN THE FREQUENCY RANGE GENERALLY FOUND WITH CONSTRUCTION ACTIVITIES GENERATING VIBRATIONS SUCH AS COMPACTING, SHEET PILING, ETC. THE VIBRATION MONITORING EQUIPMENT SHALL HAVE A SAMPLING RATE SUFFICIENT TO ACCURATELY RECORD HIGH FREQUENCY VIBRATIONS CLOSE TO THE WORK AREA. THE COST FOR ALL VIBRATION MONITORING SHALL BE CONSIDERED INCIDENTAL TO ITEM 204.25 STRUCTURE EXCAVATION.

PEAK PARTICLE VELOCITY OF EACH COMPONENT SHALL NOT BE ALLOWED TO EXCEED THE SAFE LIMITS OF THE NEAREST STRUCTURE SUBJECT TO VIBRATION DAMAGE. SAFE VIBRATION LIMITS WILL BE CONSIDERED THOSE SHOWN IN TABLE 1, UNLESS THE CONTRACTOR PROVIDES EVIDENCE, TO THE ENGINEER'S SATISFACTION, THAT DIFFERENT LIMITS SHOULD BE USED. DATA RECORDED FOR ALL SHOTS SHALL BE FURNISHED TO THE ENGINEER, AND SHALL INCLUDE THE FOLLOWING:

- IDENTIFICATION OF INSTRUMENT USED.
- NAME OF QUALIFIED OBSERVER AND INTERPRETER.
- DISTANCE AND DIRECTION OF RECORDING STATION FROM WORK AREA.
- TYPE OF GROUND AT RECORDING STATION AND MATERIAL ON WHICH THE INSTRUMENT IS SITTING.
- MAXIMUM PARTICLE VELOCITY IN EACH COMPONENT.
- MAXIMUM DYNAMIC GROUND DISPLACEMENT.
- A DATED AND SIGNED COPY OF PHOTOGRAPHIC RECORDS OF SEISMOGRAPH READINGS.

TABLE 1

STRUCTURE TYPE	MAXIMUM ALLOWABLE PEAK PARTICLE VELOCITY (PPV) (1)	MAXIMUM DYNAMIC GROUND DISPLACEMENT (2)
STANDARD CONSTRUCTION TIMBER FRAME, BRICK AND CONCRETE BUILDINGS	50 MM/SEC (2.0 IN/SEC)	2 MM
REINFORCED CONCRETE STRUCTURES	100 MM/SEC (4.0 IN/SEC)	2 MM
STEEL STRUCTURES	100 MM/SEC (4.0 IN/SEC)	2 MM
BURIED UTILITIES/WELLS	50 MM/SEC (2.0 IN/SEC)	2 MM
GREEN CONCRETE	DEPENDS ON STRENGTH OF CONCRETE AND AS APPROVED BY ENGINEER	DEPENDS ON STRENGTH OF CONCRETE AND AS APPROVED BY ENGINEER

NOTES:

1. MAXIMUM PPV SHALL BE THE MAXIMUM OF THREE COMPONENTS MEASURED IN THREE MUTUALLY PERPENDICULAR DIRECTIONS (TRANSVERSE, VERTICAL AND LONGITUDINAL). THE CONTRACTOR SHALL MONITOR VIBRATIONS AT THE NEAREST STRUCTURE FOR ALL CONSTRUCTION ACTIVITIES GENERATING VIBRATIONS AND OTHER SENSITIVE STRUCTURES AS DESIGNATED BY ENGINEER.
2. DYNAMIC GROUND DISPLACEMENT EVALUATED ASSUMING SINUSOIDAL WAVE PATTERN AND USING THE FOLLOWING FORMULA:

$$D = PPV / 2\pi F$$

WHERE: D = DISPLACEMENT (MM);
PPV = PEAK PARTICLE VELOCITY (MM/SECOND) AND;
F = FREQUENCY (HZ)

10. THE CONTRACTOR SHALL REPORT ALL RESULTS OF THE VIBRATION AND EXCAVATION SUPPORT, TOWER #1 FOUNDATION AND BUILDING MOVEMENT MONITORING TO THE ENGINEER IN WRITING DAILY.

11. AT THE COMPLETION OF THE CONSTRUCTION ACTIVITIES WITHIN 30-FEET OF THE TOWER #1 FOUNDATION AND THE BUILDING A POST-CONSTRUCTION SURVEY SHALL BE CONDUCTED THAT MEETS ALL OF THE CRITERIA FROM THE PRE-CONSTRUCTION SURVEY FOR THE TOWER AND BUILDING. THE CONTRACTOR SHALL CONTINUE TO MONITOR THE ESTABLISHED BENCHES FOR MOVEMENT 1-MONTH AFTER THE COMPLETION OF THE CONSTRUCTION ACTIVITIES WITHIN 30-FEET OF THE TOWER #1 FOUNDATION AND THE BUILDING. AFTER 1-MONTH OF ADDITIONAL MOVEMENT MONITORING THE CONTRACTOR SHALL SUBMIT WRITTEN DOCUMENTATION OF THE MOVEMENT, IF ANY, TO THE ENGINEER. THE COST OF POST-CONSTRUCTION SURVEY AND REPORTING SHALL BE CONSIDERED INCIDENTAL TO ITEM 204.25 STRUCTURE EXCAVATION.

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PROJECT NOTES SHEET 2

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