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02 20 00 EXISTING CONDITIONS

02 22 00 Existing Conditions Assessment

Part 1 – General

This section applies to all new buildings, building expansions, utility expansions, parking structures, surface parking lots, campus mall amenities, or any other design/construction activity that materially change or affect the current features found on campus. Areas incorporated into this section are civil surveys, geotechnical engineering investigation, archaeological studies and utility mapping.

Part 2 – Products

N/A

Part 3 – Execution

All existing built site features shall be noted as to their disposition during and after construction, i.e., removed, relocated, demolished, stored, etc. Contractor is to provide record photographs, prior to the start of construction, documenting the condition of site features to remain.

All landscape material (trees, shrubs, etc.) and irrigation supply devices shall be noted as to remain, stored, relocated or demolished. If existing plant material is to remain or be stored for future project use, it shall be noted as the Contractor's responsibility to maintain such plant material for the duration of construction.

Any existing site feature (built or plant material) shall be clearly identified as to whom will remove, relocate, demolish or store it (Contractor or NAU).

****END OF SECTION****

SectionTitle
Number

02 30 00 SUBSURFACE INVESTIGATION

02 31 13 Seismic Investigations

Part 1 – General

Design Professional shall determined, based on ICC Codes, using information such as existing soil conditions provided by a soil investigation, type of foundation system, building structural loads, type of building occupancy, etc… what seismic requirements are to be followed on this project. Typically, projects on NAU Campus have been designed under Seismic zone. Design Professional shall determine the Occupancy Category (A category used to determine earthquake design loads based on the nature of the occupancy) and Seismic Category (A classification assigned to a structure based on its occupancy category and the severity of the design earthquake ground motion at the site as defined in IBC and ASCE 7.) Furthermore, using information such as but not limited to existing site-specific soil conditions provided by a soil or geotechnical engineering investigation, type of foundation system, building structural loads, type of building occupancy, etc. The registered design professional in responsible charge shall state the applicable seismic qualification requirements for designated seismic systems on the construction documents that are to be followed on the project.

This topic includes information related to seismic inquiries and investigations required prior to design and performed prior to construction. Seismic investigations survey soil stability to understand soil composition, solidity and quality in addition to determining the depth of soil layers, bedrock and water table. The results define the suitability of land for development, volume of excavation, and structural requirements. Design Professional shall determine, based on ICC Codes, using information such as existing soil conditions provided by a soil investigations, type of foundation system, building structural loads, type of building occupancy, etc… what seismic requirements are to be followed on this project.

Typically, older projects on NAU Campus had been designed under “Seismic Zones”; and newer projects on NAU Campus are designed under “Seismic Design Categories”. As-built construction documents may be available for review upon request from Facility Services. The International Building Code (IBC) classifies structures into *Seismic Design Categories* (SDC): this is different from the older Uniform Building Code (UBC) which classified them into *Seismic Zones*. Seismic Design Categories go much further than merely outlining various regions of the country. Seismic Design Categories are site specific and include classifications of A, B, C, D, E and F and are based on the following three (3) basic criteria. 1. Probable Site Ground-motion: 2. Soil (Site Class): 3. Building Occupancy Use. The process to determine the Seismic Design Categories must be done by an engineer.

Registered Design Professional shall determine the Occupancy Category: One of the first considerations in the design of any structure starts with determining the occupancy category of the structure. The purpose of determining occupancy category is to set a

particular amount by which something is multiplied (or safety factor) in calculating the structural requirements based on occupancy. This requires classification of the occupancy category of any building in accordance with the nature of occupancy as described in the International Building Code or ASCE 7. The occupancy category serves as a threshold for a variety of code provisions related to earthquake, flood, snow and wind loads. Particularly noteworthy are the importance factors that are used in the calculation of design earthquake, snow and wind loads. The value of the importance factor generally increases with the importance of the facility. Structures assigned greater importance factors must be designed for larger forces. The result is a more robust structure that would be less likely to sustain damage under the same conditions than a structure with a lower importance factor. The intent is to enhance a structure's performance based upon its use or the need to remain in operation during and after a design event. The impact of a higher occupancy category classification is not limited to increasing the design loads. Compared to Occupancy Category I, II or III, for instance, an Occupancy Category IV classification can lead to a higher seismic design category classification that can, in turn, require more stringent seismic detailing and limitations on the seismic-force-resisting system. This can also affect the seismic design requirements for architectural, mechanical and electrical components and systems.

Considerations:

The Occupancy Category and Importance Factor are outlined by IBC and ASCE 7 as minimum required guidelines, with the primary intent of protecting the life and safety of the public. This does not necessarily include protecting the aesthetics or functionality of the structure after a severe event. In other words, the structure is designed not to fail, but may endure significant damage (structural or otherwise). This damage may prevent full functionality of the facility after a severe event. This is the reason the code increases the Importance Factor for Occupancy Categories III and IV. A higher Importance Factor improves the reliability (safety factor) of the structure, which helps protect its occupants (School, Buildings with Public Assembly Areas containing greater than 300 occupants), as well as its function (Police, Designated Emergency Shelters), during and after a major environmental event. There may be instances where increasing these parameters above "code minimums" should be considered such as:

- Facilities' ability to function after a major environmental event
- Increased Safety Factor
- Future use of Facility
- Importance factor of closely situated structures, for the purpose of emergency egress and rescue efforts.
- Building design Life Span
- Insurance Carrier Requirements

The desire to increase the Importance Factor should be made aware to the Structural Engineer as early in the project as possible.

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Registered Design Professional shall determine the Seismic Design Category:
A classification assigned to a structure based on its *occupancy category* and the severity of the design earthquake ground motion at the site. The seismic design category serves as a trigger mechanism for many seismic requirements, including such as the following:
1. Permissible seismic-force-resisting systems.
2. Limitations on height.
3. Consideration of structural irregularities.
4. The type(s) of lateral force analysis that may be used.
5. The need for additional special inspections.

Registered Design Professional In Responsible Charge of the project shall state the applicable seismic qualification requirements for designated seismic systems on the construction documents that are to be followed on the project. The earthquake load design basis, indicated on the construction documents by the design professional, provides information that allows facilitating the plan review process. All buildings, except those indicated in the IBC exceptions (e.g. Section 1613.1), are to be designed for earthquake effects. The earthquake design data for a specific building are required to meet or exceed the minimum requirements established by NAU adopted codes (e.g. IBC Section 1613.)

Part 2 – Products
N/A

Part 3 – Execution
N/A

02 32 13 Subsurface Investigation

Part 1 – General
- Any project requiring subsurface investigation work shall be coordinated through NAU Facility Services.
- Soils investigations to determine subsurface conditions shall be made prior to the design and construction of new buildings and other structures. Such investigations shall also be conducted when additions to existing facilities are considered and are of such a scope that would significantly increase or change the distribution of foundation loads.
- Geotechnical investigations prepared for adjacent construction projects are another potential source of available site information.
- In accordance with the exception as prescribed in the International Building Code (IBC), where geotechnical data from adjacent areas are well known, the NAU building official (and along with a written request from the Design Professional in

responsible charge of the project) can accept the use of local engineering practices for the design of foundations.

- The investigation is to be performed by a "*registered design professional*", which in most cases would be an "*approved agency"* geotechnical engineer (see Part 2 & 3 Definitions).
- The "*registered design professional*" shall have a fully qualified representative on site during all boring or sampling operations.
- After an "*approved agency*" has been "*approved*", then the NAU Project Manager will typically contract these services directly with geotechnical engineering/soil investigation firm.
- The registered design professional in responsible charge of the project (e.g. Architect) along with all other "*registered design professional*" (e.g. Geotechnical Engineer, Structural Engineer, Etc.) shall participate, such as identifying the type of tests, # of tests, frequency of tests, requirements of tests, etc….
- Where geotechnical investigations are required, a written report of the investigations shall be submitted at the time of *permit* application.
- In any event, geotechnical investigations shall be conducted and reported in accordance with (and fully comply with) the applicable requirements as specified in the most recent edition of the NAU adopted International Building Code (IBC).

Part 2 – Approved Agency

Definitions

- **Approved Agency** – An established and recognized agency regularly engaged in conducting tests or furnishing inspection services, when such agency has been "*approved*".
- **Approved** – Acceptable to the NAU Building Official, whereas deemed qualified as per the applicable necessary preconditions as outlined in the International Building Code (IBC).

Such work shall be performed by an independent testing agency. An approved agency shall provide all information as necessary for the NAU Project Manager, Registered Design Professional in Responsible Charge and NAU Building Official to determine that the agency meets the applicable requirements as specified in the International Building Code. An approved agency shall be objective, competent and independent from the contractor responsible for the work being inspected. The agency shall also disclose possible conflicts of interest so that objectivity can be confirmed. An approved agency shall have adequate equipment to perform required tests. The equipment shall be periodically calibrated. An approved agency shall employ experienced personnel educated in conducting, supervising and evaluating tests and/or inspections.

As part of the basis for approval of a particular inspection agency, the agency must demonstrate its objectivity and competence. The judgement of objectivity is linked to the financial and fiduciary independence of the agency. The competence of the agency is judged by its experience and organization, and the experience of its personnel. For example, suppose that ACME Agency is the inspection agency employed by Builder's, Inc. for factory-built fireplaces. During an investigation of the agency, it is discovered that ACME and Builder's are subsidiaries of the same parent company, Conglomerate, Inc. The inspection agency and manufacturer clearly have a relationship that is undesirable from the standpoint of independence.

Part 3 – Geotechnical Investigations Required

Definitions

- **Registered Design Professional** – An individual who is registered or licensed to practice their respective design profession as defined by the statutory requirements of the professional registration laws of the state or *jurisdiction* in which the project is to be constructed.

The purpose of a **Geotechnical Investigation** is to determine the engineering qualities of the subsurface such as soils or rocks at a site, and how their location and depth affects an envisioned construction project. The presence of any buried organic materials with poor engineering qualities, obstructions to earthwork, and the depth of the water table are also important to identify during a geotechnical investigation. Geotechnical investigations shall be conducted in accordance with applicable requirements as specified in the most recent edition of the NAU adopted International Building Code (IBC). IBC sections 1803 address the conditions that mandate a geotechnical investigation, as well as the information that must be included in the report. The investigation of soils is to be done by a *registered design professional* in recognition that the testing and calculations necessitate individuals with significant experience in soil and foundation analysis. The field of soil mechanics and foundation engineering is diverse and complicated, and since it is not an exact science, its application requires specialized knowledge and judgment based on experience. Where subsurface conditions are found or suspected to be of a critical nature, the Design Professional in responsible charge of the project shall seek the professional advice of highly experienced foundation engineers."

Soils investigations to determine subsurface conditions shall be made prior to the design and construction of new buildings and other structures. Such investigations shall also be conducted when additions to existing facilities are considered and are of such a scope that would significantly increase or change the distribution of foundation loads.

Part 4 – Geotechnical Investigations Exception

The NAU Building Official (and along with a written request from the Design Professional in responsible charge of the project) shall be permitted to waive the requirement for a geotechnical investigation where satisfactory data from adjacent areas is available that

demonstrates an investigation is not necessary for any of the conditions as noted in the applicable code sections of the IBC (e.g. Sections 1803.5.1 through 1803.5.6 and Sections 1803.5.10 and 1803.5.11.) FYI: There are two main objectives for conducting a soils investigation. The first is of a confirmatory nature. Its purpose is to obtain information already known from adjacent structures, such as soil-boring records, field test results, laboratory test data and analyses and any other knowledge useful in the design of the foundation system. The second objective is of an exploratory nature. It is warranted where soils information does not exist or is insufficient or unsatisfactory for use in the design of the foundation system.

Regardless of the objective of the soils investigation, the information generally required includes one or more (or all) of the following items for determining subsurface conditions:

1. The depth, thickness and composition of each soil stratum;
2. For rock, the characteristics of the rock stratum (or strata), including the thickness of the rock to a reasonable depth;
3. The depth of ground water below the site surface; and
4. The engineering properties of the soil and rock strata that are pertinent for the proper design and performance of the foundation system.

For shallow foundations, the soils investigation should yield sufficient information to establish the character and load-bearing capacity of the soil (or rock) at depths that will receive the foundations.

Foundation problems are not uncommon and may vary greatly, ranging from very simple and manageable problems to very complex situations that may be either manageable or without practical remedy.

As indicated in the IBC exception, where geotechnical data from adjacent areas are well known, the building official (and along with a written request from the Design Professional in responsible charge of the project) can accept the use of local engineering practices for the design of foundations.

PART 5 – Information to be included in Construction Documents

When a written report is required by the International Building Code, it is required to include at a minimum the items listed in the applicable code sections. These items will establish a retrievable and verifiable record of the soil conditions if problems are encountered in the future. These items also provide the minimum necessary information for compliance with the code and an adequate foundation system. Load-bearing values for soils must be documented so that the foundation design can be verified.

Also show all: existing conduits, drains, utility lines, sewers, tunnels, cables, trees, paving, walks, foundations and other objects or obstructions, whether in use or abandoned. State

that information is for contractor's use and that in no way shall the University be held responsible for accuracy of the information.

PART 6 – Preparation of Plans for Borings

In the preparation of plans for boring locations, the Architect/Engineer shall study plans of existing underground utilities and shall locate borings to avoid these utilities. Where excavation will remove lateral support from any foundation, an investigation shall be conducted to assess the potential consequences and address mitigation measures. Maps showing underground installations may be available for review upon request from Facility Services.

****END OF SECTION****

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Number

02 40 00 DEMOLITION

This section shall be used by the Design Professional to accurately define the scope of the demolition effort required for the project. Whenever possible a demolition plan shall be created to graphically show the extent of the demolition work and its impact to adjacent areas. Adequate provisions must be made to maintain traffic (vehicles, bikes and pedestrians) through/past the construction zone via the use of temporary walkways, signage, barricades, etc. Emergency egress paths are particularly critical, so closure of existing building exits and egress paths must be coordinated with the NAU Fire Marshal. Develop Traffic Control Plans for vehicles, bikes and pedestrians in advance for NAU review/approval. NAU may from time to time choose to assist with minor signage, but the bulk of the traffic control measures during construction lies with the contractor.

Provisions shall be made in the documents to require that all demolition work be performed without disruption to adjacent occupied areas, i.e., off hours work. Only when the anticipated demolition work will not present disruption to the user or occupant can the assumption be made that it can be conducted at any time.

Demolition work is usually associated with trash and dust. Appropriate provisions shall therefore be made to address mitigation procedures in the demolition work.

The demolition plan shall identify all materials/equipment, etc., which are to be reused and/or salvaged by either the University or the Contractor. Please keep in mind that all equipment and building material is ultimately the property of NAU and only when its salvage cost exceeds its usable value is it to be considered unwanted. This determination can only be made by NAU.

A complete investigation of the area(s) shall be performed so that all existing aspects and elements affected by the project are either removed under the demolition plan or incorporated into the new work with the installation drawings, i.e., existing/abandoned outlets, t-stats, etc. Where callouts such as 'Match Existing' are used, these locations shall be field checked during design to verify that the proposed improvement will indeed fit well to the existing.

Part 1 – General

Other than items with are to be reused there are basically two groups of salvageable material presented with nearly all projects. Care must be exercised when handling all salvageable material so as to maintain its value.

The following items are always salvaged by the University:

- LED exit lights
- Door Hardware
- Fire Alarm Exits

- Chalk/White boards
- Drinking Fountains
- EMCS Equipment
- Window Blinds
- Lab Fixtures
- Meters (all kinds)
- Backflow Preventers

The following is a representative, but not conclusive, list of items in which salvage may be considered:

- Wood/HM Doors
- Plumbing Fixtures
- Electrical Light Fixtures
- Electrical panels
- Casework
- Electrical Equipment
- Mechanical Equipment
- Disconnect switches
- Starters
- Ceiling diffusers
- Elevator equipment
- Windows
- Projection screens
- Soap dispensers
- Transformers
- Mirrors
- Clocks
- Thermostats
- Irrigation equipment
- Access doors
- Shelving
- Refrigeration equipment
- Landscape planting
- HVAC mixing boxes
- Lab equipment (hoods)

Prior to finalizing the construction documents the DP shall conduct a site meeting with the appropriate Facility Services personnel and determine precisely what items are to be salvaged. The documents should then clearly identify what is to be salvaged, by whom and where it is to be delivered to or stored. Options include but are not limited to:

- Removal and transport by contractor.

- Removal by contractor and transport by NAU.
- Removal and transport by NAU.

Whenever NAU is to participate in either the removal or transportation of salvage materials a time frame and contact person shall be identified and referenced in the documents.

All items encountered which contain an affixed Northern Arizona University Control Tag require special procedures for dispersal. Consequently, these items should be brought to the attention of the NAU Project Manager. Items which contain this tag are part of the registered inventory of a particular NAU department or unit and dispersal must be coordinated through their respective business manager.

Fluorescent light fixture tubes and certain light fixture ballasts must be separately disposed of in accordance with applicable environmental regulations. Consequently, the removal and disposal of existing fluorescent light fixtures shall include the following:

- All fluorescent tubes shall be removed and packaged by the Contractor in cartons supplied by the Facility Services Electrical Shop. The number of tubes in each carton shall be clearly marked on the outside of the carton. Contractor to deliver packaged tubes to Facility Services Electrical Shop for disposal.
- Fixture ballasts not clearly marked as containing "NO PCB's" shall be removed by the Contractor and after short clipping all wires place them in a metal drum supplied to the jobsite by Northern Arizona University Safety and Environmental Services department. After completion of the demolition effort, Northern Arizona University Safety and Environmental Services will remove the drum for disposal offsite. Apportioned disposal costs are then to be charged to the project.

Part 2 – Products
N/A

Part 3 – Execution
All electrical services discontinued with the demolition effort shall be properly "tagged out".

Prior to starting any demolition work, Contractor shall verify with NAU Project Manager (and with NAU Trades) that all utilities have been disconnected.

In the case of a building renovation, some of the utilities might need to stay on during the renovation work, to keep the building under a conditioned environment (i.e. heating system stays on during a winter interior renovation project). Close coordination with the NAU Project Manager and NAU Trades will then be required to ensure safe work environment during renovation. Contractor shall also coordinate with NAU Fire Marshal

and, as applicable depending on the nature of the renovation work, shall present a plan identifying how the building FLS systems will remain active and protect the building against fire during the renovation process.

In the case of the demolition of street lighting and pedestrian lighting, there should never be a time when travelways for vehicles, bikes and pedestrians experience a substandard level of lighting. This may be special sequencing of the demolition work to keep the existing lights in place until the new lighting is operational, or the provision for temporary lighting, or some other means to maintain safe lighting levels.

All permits and fees for demolition are the responsibility of the contractor but these requirements should be specifically identified in the contract documents.

****END OF SECTION****

Section Number Title

02 50 00 SITE REMEDIATION

Part 1 – General

Through the Office of Environmental Health and Safety, NAU will provide some information on potential existing site conditions that might require Site Remediation. This could also be discovered during subsurface investigations. Depending on the nature of the required remediation, NAU will elect to either hire an independent Contractor to conduct the remediation effort, or have the DP and Contractor identify the nature of the remediation and hire some experts appropriately.

If during the course of construction, some unknown conditions are discovered by the Contractor, they should be reported immediately to NAU Project Manager who will take the appropriate measure, including contacting the Office of Environmental Health and Safety.

Part 2 – Products

N/A

Part 3 – Execution

N/A

****END OF SECTION****

Section Number Title

02 60 00 CONTAMINATED SITE MATERIAL REMOVAL

Part 1 – General

During earthwork activities, should the Contractor encounter contaminated site materials; Contractor shall stop all work and report immediately to NAU Project Manager. Depending on the nature of the contamination, NAU Project Manager, in collaboration with the Office of Environmental Health and Safety, will make the determination to either contract the Contractor to remove all contaminated materials, or hire an independent Contractor to perform such task.

Part 2 – Products

N/A

Part 3 – Execution

N/A

****END OF SECTION****

Section Number | Title

02 70 00 WATER REMEDIATION

Part 1 – General

The Design Professional and Contractor shall review the Geotechnical or Soil Investigation Report and determine if water might be an issue during excavation activities. If such, Design Professional shall provide recommendations on how to perform water remediation and include in the design ways to divert the water, collect it, or deal with it with appropriate choice of foundation system.

However, Design Professionals and Contractors should be aware of the fact that NAU Campus has numerous sporadic groundwater springs that may not always been found during subsurface investigations, especially depending on the time of the year the investigation is being performed. We've seen numerous springs developing unpredictably within caissons or footings during excavation, requiring water pumping, or switching to a different type of concrete mix design or foundation system to adjust to soil conditions. Contractor shall be aware of this risk and be prepared to take appropriate measures should water remediation be necessary on the project.

Part 2 – Products

N/A

Part 3 – Execution

N/A

****END OF SECTION****

SectionTitle
Number

02 80 00 FACILITY REMEDIATION

Part 1 – General

As part of the existing conditions investigation to be performed during the Programming phase of the project (especially in the case of a renovation project), NAU Project Manager will contact the Office of Environmental Health and Safety and have them provide survey report on potential existing Hazardous Materials (such as Asbestos, Lead, Radioactive materials, hazardous chemicals, etc…).

Such report shall be provided to the Design Professional and Contractor at the end of the Programming Phase.

As the project design evolves and scope is being defined more precisely, the DP shall identify existing building components that will need to be demolished or disturbed during the renovation process and provide a detailed demolition scope that will help the Office of Environmental Health and Safety define further the level of facility remediation required for the project. The Office of Environmental Health and Safety shall be informed of all changes of scope throughout the project with adequate lead time to ensure that any additional necessary remediation is accounted for and completed prior to the commencement or continuance of work in the target area.

On almost all renovation projects, NAU Office of Environmental Health and Safety will handle the facility remediation scope, hiring an independent Contractor to perform the work. All required remediation work shall be scheduled and performed prior to the commencement of other demolition or construction activities. Remediation of all hazards may require removal of materials which are not otherwise impacted by the project if contact or disturbance hazards to workers exist or may arise during the project. Office of Environmental Health and Safety will make recommendations for abatement scope based on their evaluation of the demolition scope, building area, applicable regulations, and NAU standards and policies.

Refer to Section Division 1 for additional procedural information.

Part 2 – Products

N/A

Part 3 – Execution

N/A

****END OF SECTION****