

**KANSAS DEPARTMENT OF HEALTH AND ENVIRONMENT
SURFACE MINING SECTION**

AML PROJECT DESIGN GUIDELINES

1. Approach to Design

It is the intent of the Kansas Department of Health and Environment (KDHE), Surface Mining Section (SMS) to construct reclamation projects with long term stability and very low maintenance. To accomplish this, project design shall be comprehensive and practical. The Consultant should try to achieve a balance between the most ideal permanent solution to a given problem and what is practical and cost effective. Cost is a consideration, but it should not be the driving force behind design decisions. If there is bias one way or the other, the preferred design approach is toward the more conservative solution which may be more costly, but which will pay off in the long term by providing a more serviceable and reduced maintenance solution.

2. On Site Inspections

In addition to any required surveying and other trips during the project design period to properly complete the designs, specifications, and plans, the Consultant shall make at least two (2) on-site inspections accompanied by SMS personnel. One inspection shall be made during the preliminary design phase, and the second during the final design phase. All site inspections shall be coordinated with the SMS. The Consultant shall perform any investigations, engineering, and/or make any revisions required to address any problems, or potential problems, identified during the field inspections.

During the first inspection(s), the Consultant shall review the overall hydrology of the site, the drainage area potentially affected by the reclamation project, and the current land use(s). The overall feasibility of the reclamation plan, and its effect on the current land use, shall be reviewed with the SMS prior to starting preliminary and/or final design details.

Prior to completing the final designs, the Consultant shall review proposed plans on-site to identify any potential problems with construction, and make appropriate construction and design modifications, prior the final submittal and bidding.

3. Project Coordination

The Consultant shall work closely with the SMS Project Manager during the early stages of design. Close coordination in the early phase of the project will help prevent undue revisions of preliminary plans.

4. Design Standards

A. State and Federal Highways, and State Property

All designs within the right-of-way of a State or Federal Highway shall be coordinated with the Kansas Department of Transportation (KDOT). All designs will comply with KDOT requirements and/or AASHTO Standards, as is appropriate.

All designs for work to be performed on property owned or managed by a State agency (such as the Kansas Department of Wildlife, Parks and Tourism) shall be coordinated with that agency. Any design changes requested by the affected agency shall be incorporated into the plans as much as is practical (such as boat ramps) and with the approval of the SMS.

B. City Streets, Municipal Projects, Public Projects

All designs for areas inside city limits, or on city or state owned property, shall be coordinated with the city or state agency engineer, and designs shall conform to city codes and/or other requirements.

The Consultant shall determine whether or not designs for projects which will be used by the public (i.e., city sidewalks and golf course modifications) must be in accordance with the requirements of the American Disability Act (ADA), and prepare the plans accordingly.

C. County Roads/County Projects

Design work on county roads or county property shall be coordinated with the County Engineer for that county. If no engineer is available, coordinate with the appropriate county official(s). If no guidance is given, refer to the latest KDOT and/or AASHTO Roadside Design and other appropriate AASHTO Design Guides for standards.

D. Hydraulic and Hydrologic Design - Drainage, Stream Channels, Culverts, Impoundments, etc.

The Consultant shall review the surface drainage pattern within the reclamation site(s) as well as the overall drainage from around and through the site. This may include the potential for drainage to be diverted to (or from) abandoned underground mines via shafts, sinkholes, and/or direct access to the underground mines at abandoned strip mine highwalls.

The Consultant shall consider the impacts of the reclamation on the surface drainage. The designs shall insure there are no adverse effects on, or off, site which result from the reclamation. Also, the reclamation designs shall eliminate any connections between surface drainage and abandoned underground mines as much as possible.

All designs for site drainage should accommodate the 50 year, 6 hour event. However, the Consultant shall also investigate the effects of a 100 year, 6 hour event on the designs to insure there will be no damage upstream or downstream of the site. Exceptions to this will be considered as recommended by the design engineer. All designs within a National Flood Insurance Program (NFIP) designated floodplain shall consider the effect of the project on the 100 year Base Flood Elevation. Consideration shall be given for all water entering and leaving the site. Downstream improvements shall be made to accommodate any additional flows created by the project. All designs shall comply with the Kansas Levee Law and the Obstructions in Streams Act.

The criteria for freeboard for impoundments shall be as follows:

- a. The minimum freeboard for all non-regulated structures, with a fetch length less than 660 feet, and with a height of 10 feet or less, shall be 2 feet.
- b. For non-regulated structures above 10 feet, and with a fetch longer than 660 feet, the freeboard shall be 2 feet plus 10% of the dam height over 10 feet, or plus sufficient height to prevent overtopping by wave action, whichever is greater.
- c. The minimum freeboard for all regulated structures shall conform to the requirements of the regulating agencies.

Open channel flow is preferred to conduit flow whenever possible. KDOT standard designs for culverts and RC box culverts shall be utilized when appropriate.

The Consultant is to determine the most suitable materials for culvert pipe and/or pipe extensions by including consideration of soil acidity, condition of the existing culvert and its suitability for use, utility clearance problems, fire resistance, and compatibility of the extension with the existing culvert, in addition to normal culvert design considerations. Product availability must also be considered.

KDOT specifications for CMP, RCP, RCB culverts, and other precast products, shall generally be used as a basis for the designs and specifications. HDPE pipe is not acceptable unless specifically approved by the SMS on a case-by-case basis. Corrugated Metal Pipe (CMP) is not acceptable for use in mine spoil. If CMP is proposed for other areas, a minimum of 14 ga., asphalt coated pipe, shall be specified.

E. Grading Plans

Generally, slopes should be no steeper than 4 horizontal to 1 vertical, unless prior approval is obtained from the SMS. New grades shall make a smooth transition into existing grades. Aesthetics is a consideration, along with current and future land use concerns and accessibility for maintenance such as mowing.

In general, the final normal waterline for relocated or filled pits or ponds shall be a minimum of 80 feet from the edge of the travelway of any public roads. The SMS may

approve the water line of impoundments to be located closer than 80 feet from roads for restricted or unusual site conditions, and/or if protective barriers are present. Generally, graded earth slopes into water shall not be steeper than 4:1 for a distance of at least 5 feet below the normal water level for ease of egress.

The safety factor for slopes created by fills or excavations (in submerged, partially saturated, or dry) shall not be less than 1.6:1 (minimum). Appropriate slope stability analysis shall be used to determine stability of proposed slopes.

Rock toe buttresses shall be considered for pit end fills when the water depth of the pits exceeds 10 feet, or where site conditions and/or slope stability concerns, require positive control of the earth fills.

On fill slopes, the Consultant shall take precautions not to direct runoff and other drainage down the center of the fills. Where possible, all drainage (including off-site and road ditch drainage) shall be directed down the groins of the fills, and the channels shall be appropriately protected. Benches or terraces may be considered to protect very long slopes.

For calculating the amount of earthwork required, the Consultant shall use whatever percent shrinkage and/or swell from bank yardage it feels is appropriate for the project and site conditions. The specifications should also note the contractors are expected to achieve the grades shown and that the actual amount of material handled will vary with the equipment and method of construction used.

F. Utilities

The Consultant shall locate all utility lines within the project site and show their locations on the plans. The Consultant shall utilize "Dig-Safe", local rural water districts, as well as other means, to locate utility lines. The Consultant should exhaust all alternative and economical design considerations, such as multiple, pipe arch, or elliptical culverts, and/or raising road elevations, before considering relocation of utilities. This is especially important with utilities with very high relocation costs such as fiber optic cables; mainline telephone, power, and waterlines; and high pressure gas pipelines.

Any required relocation of utilities shall be clearly and completely shown on the plans, and it shall be clearly stated who is to perform, as well as pay the cost of, any relocation work. Provisions shall be made in the bid documents to cover the cost of relocation by the reclamation contractor.

G. Backfilling

When planning backfilling into pits or impounded water, the project design shall take into consideration slope stability concerns, the potential for movement of sediment and mud during construction, and requirements for proper handling and/or disposal. For example,

if an area is required to bury excess mud pushed from a pit (or other unsuitable materials), the area designated for such disposal should be included in the plans and specifications. If the movement of mud and sediment is not desired, the plans and specifications should include construction of cofferdams, or other methods, to restrict or direct movement as necessary. When designing partial fills of water filled pits, provisions for stable fill toes shall be made by utilizing rock fills, or other means, when necessary.

H. Erosion Control and Water Quality

All projects, or combination of projects, require a Storm Water Pollution Prevention Plan (SWPPP) Permit be prepared which complies with KDHE and NPDES Storm Water Permit requirements.

Necessary sediment and erosion controls shall be shown on plans. The Consultant shall be responsible for drafting the SWPPP for the project.

Should the project plans dictate discharging of water into a stream, and it is evident an NPDES Permit may be needed, the Consultant shall obtain and submit the necessary information for the permit application to the Kansas Department of Health and Environment, Bureau of Water - Industrial Program Section.

The Consultant shall coordinate with the Bureau of Water as to specific permit review requirements.

I. Contour Mapping and Survey Information

1. Surveying

Site plans shall indicate property lines, rights of way, easements, existing fences, and all other improvements which could interfere with construction.

If the Consultant uses global positioning system (GPS) equipment for surveying and site location work, only "survey grade" GPS equipment shall be used.

Control points, for aerial surveys and otherwise, shall be clearly marked in the field by driving a minimum 5/8" (#5) diameter x 24" long rebar to, or below, ground level. All control points shall be referenced to the nearest permanent landmark(s). The landmark shall be identified by the use of flagging, paint, and/or other highly visible means, and the location shall be accurately described on site plans. Control point locations shall be chosen so that they can be readily located by visual inspection or can be relocated by triangulation without long traverses. Control points shall be outside the construction disturbance limits of the site, but in close proximity to the construction area. Control points and references shall be included in the plans.

All survey and control points shall be referenced and noted on the plans. The coordinates for the survey and control points on the plans and drawings shall be in NAD 83 State Plane Coordinates.

The Consultant shall be responsible for surveying or otherwise obtaining the depth of water in the open pits and shall show the same on the cross-sections. Also, an estimate of the amount of sediment or mud in the pit(s) shall be made.

2. Contour Mapping

The Consultant shall retain all mapping and survey data in a form usable by the SMS in the event design work on the site is halted. Negatives, contact prints, photo diapositives, and camera calibration data from the aerial mapping shall be considered the property of the SMS, and all the information shall be provided to the SMS upon completion of the work, or if the work is otherwise halted. Having contact prints made as part of the aerial mapping work is mandatory.

The mapping shall conform to the following specifications:

- a. All mapping by aerial photography shall be in accordance with National Map Accuracy Standards.
- b. All text and contour annotation shall have the "Z" axis elevation set to zero, or it shall be on a different layer(s). All power poles, buildings, roads, streams, and other reference lines shall have the "Z" axis elevations set to zero unless they are at actual ground elevations. Elevations are not to be assigned to anything other than the contour polylines.
- c. Mapping shall include the .TIN (Triangular Irregular Network) file data. The .TIN file data shall be compiled using a grid of spot elevation "mass" points along with breaklines, and skeletal line strings of points, representing breaks in grade.
- d. A minimum 1" = 200' scale "hard-copy" of the contour mapping on mylar(s) shall be furnished. Mapping to other scales may be approved depending on the size of the mylar sheet required, the mapped area, and/or the number of sheets required. The mapping shall be plotted on "D" size (22" x 34") sheets.
- e. The contour and .TIN file data shall be provided in a format for use with AutoCad 2000, or later version. The contour data shall be batch and manually edited, converted to a *.DWG file, and furnished on a CD.
- f. After the order is placed, KDHE and the successful bidder will coordinate the details for establishment of the elevations and coordinates to be used for mapping prior to performing the mapping work.

- g. All contours shall be at 2 foot intervals. Closer intervals may be used if the aerial photography permits, and if the Consultant deems it necessary for their design work, or if specifically requested by the SMS for a specific site. When aerial mapping is to be utilized, the Consultant must ensure that all contour polylines are generated with vertices rather than arcs. The contours shall not be “smoothed”, if the software smoothing process creates arcs in the contour lines.
- h. All contours shall be generated on their respective layers (i.e, 10' contours on one layer and 2' contours on another, etc.). Do not label index contours.
- i. The Consultant is responsible for determining that size of the area mapped is adequate to define the site drainage and any potential impacts of the reclamation, and to properly prepare the designs and ascertain the construction limits for the project.
- j. All mapping shall be aligned to NAD 83 State Plane Coordinates.

J. Specifications

The SMS shall provide the Consultant with the SMS's current standard construction specifications as a guideline. These specifications are for general use and may be modified by the Consultant to meet project specific requirements.

The Consultant is expected to use the standard SMS specifications for items such as riprap structures, erosion control devices and materials, and fencing unless the Consultant feels site conditions indicate modifications, or alternate designs, are necessary to properly design a project (subject to SMS review and approval). Any proposed modifications shall be submitted to the SMS.

K. General Design and Drawing Standards

All designs shall be formatted for 22" x 34" sheets (“D” Size) unless specifically approved otherwise by the SMS in writing. All text, lettering, dimensioning, etc. shall be large enough to be legible when the drawings are reduced ½ scale for printing on 11" x 17" sheets. Any drawings to scale shall be laid out so that when the drawings are reduced to ½ scale, 11" x 17" sheets, the scale will be proportional (i.e., original drawing scale 1" = 200' to ½ scale drawing scale 1" = 400').

All base lines and benchmarks shown on the designs shall be located in close proximity to the construction site, located so they can easily be surveyed in the field, and referenced to the control points. Base lines (where practical) should be positioned so the cross-sections are perpendicular to any slopes to be constructed. The designs shall include a sufficient number of cross-sections from the base lines for the purposes of laying out the work and verifying the construction is in accordance with the plans.

All hatching, line types, and other annotation on the drawings shall be formatted so that the drawings are clear and unambiguous when printed blue or black line. No copyrighted fonts and/or hatching which cannot be used by the SMS shall be used on the drawings. All general notes should be kept to a single sheet, especially where there are multiple sites for one project. This will assist the SMS in breaking up the plans if construction is phased.

The Consultant shall use the most current standards and design guides available at the time the design work is being performed.

All plans and specifications shall be clearly marked with the date and type of issue. Preliminary sets shall be marked "PRELIMINARY - NOT FOR CONSTRUCTION". All final sets shall be marked "FINAL".

L. Final Plans and Specification Submittal Format

Upon SMS approval and completion of the Final Plans and the Final Draft of the specifications, the Consultant shall furnish the SMS with the following:

1. One (1) set of "D" sized (22" x 34") mylars of the drawings "mirrored" (meaning plotted on the back side of the mylar sheet).
2. Two (2) full-sized (22" x 34"), grayscale, prints, and one (1) 1/2 sized, grayscale, reduced set of prints on 11" x 17" (ledger size) paper.
3. Two (2) three ring binders, each containing a copy of the specifications and a 1/2 scale reduced set of drawings (11" x 17" ledger size).
4. One (1) set of computer disks, or readable CD-ROM, with the specifications in a word processor format compatible with Corel WordPerfect 8.0, or MicroSoft Word 97.
5. One (1) set of computer disk(s), Zip disks, or readable CD-ROM with copies of the drawings which are compatible with AutoCAD 2000, or later, version. Files shall contain sufficient information (fonts, etc.) to allow the SMS reproduce the drawing directly from the computer files. If line weights and pen widths are used for plotting, the appropriate information identifying the weights and widths shall be included.

For use by the SMS when plotting the drawings, the Consultant shall also include all .ctb, .PCP, .PC2, and/or other pen width files needed to plot the drawings.

6. A set of final cost estimates consisting of a cost breakdown (by unit price and quantity) of material and/or service for each site within a given project, and a total cost for construction of the entire project. Estimated quantities shall not be shown or summarized on the drawings.

7. One set of negatives, contact prints, photo diapositives, and camera calibration data from aerial photography and contour mapping services which were provided as part of the Contract.

The technical professional(s) licensed by the Kansas State Board of Technical Professions (KSBTP) who are responsible for preparation of the engineering designs, plans, and specifications shall certify the mylars and prints of the plans and specifications in accordance the KSBTP Article: Professional Practice, Regulation No. 66-6-1, Title: Seal, Section (b), which requires that "... After the licensee's seal has been applied to the original or record copy, the licensee shall place the licensee's handwritten signature and date across the seal." An electronically reproduced seal on the drawings, which is in compliance with KSBTP requirements, is acceptable to the SMS.

Any documents submitted to the SMS which are required to be certified by technical professionals shall be sealed, signed, and dated in accordance with the above regulations to be considered valid and acceptable.

5. Permits

A. General

The Consultant shall coordinate with appropriate local, state, and federal agencies to ensure compliance with all environmental laws governing work on the Project. These laws include, but are not limited to:

- The Endangered Species Act
- National Historic Preservation Act
- Clean Water Act
- Migratory Bird Treaty Act
- Obstructions in Streams Act
- Kansas Levee Law
- Farmland Protection Policy Act

Modifications to the preliminary plan submittals may be required after consultation with appropriate agencies and the SMS. The Consultant may be required to attend meetings and subsequently prepare documents as required for compliance with environmental laws.

However, the Consultant will not be required to prepare an environmental assessment for the project(s).

B. Department of the Army, Corps of Engineers

The Consultant shall be responsible for determining and delineating the extent of any wetlands and/or waters of the United States which may be disturbed or otherwise impacted by the project(s).

Unless specifically designated otherwise by the SMS, the Consultant shall be responsible for completing the wetland delineation investigations, and submitting the application for a required permit(s) associated with regulated impacts and disturbances, including preparation and submittal of any engineering drawings and documents required.

C. Kansas Department of Agriculture, Division of Water Resources

The Consultant shall be responsible for preparation and submittal of the permit application and any engineering documents required to obtain permits for stream obstructions, floodplain fills, levees, channel changes, and/or other activities regulated by the Kansas Department of Agriculture, Division of Water Resources. This shall also include preparation of any Applications for Water Appropriation for Beneficial Use (Water Rights) which may be required as a result of design and construction of the project.

The Consultant shall also advise if the contractor constructing the project must obtain any Water Appropriation for Beneficial Use (Water Right) permits (i.e., for dewatering, compaction, drilling or boring, and/or dust control water) in order to complete the project(s).

D. Threatened and Endangered Species Permits

Through the required coordination activities with the various agencies, the Consultant is to determine the impact of the project(s) on any State or federally listed Threatened and Endangered (T & E) species, propose mitigation if required, and prepare any engineering designs and documents needed for the permit application.

With the coordination and cooperation of the Consultant as noted above, the SMS will apply for, and obtain, any required permits associated with T & E species from the Kansas Department of Wildlife, Parks and Tourism and/or the Department of Interior, U.S. Fish and Wildlife Service.

E. Kansas Department of Transportation

The Consultant shall be responsible for preparation and submittal of permit application and any engineering documents required to obtain permits from the Kansas Department of Transportation (KDOT) for any work within the right-of-way of any State highway or other property controlled by KDOT.

F. Storm Water Pollution Prevention Plan (SWPPP) Permit

The SMS will prepare and submit the permit application for the SWPPP. The SMS's submittal is to be based on the draft SWPPP prepared by the Consultant as noted above under Section 4.H.

G. NPDES Permit

The SMS will prepare and submit the application for the NPDES permit. The SMS's submittal is to be based on water sampling data, proposed discharges, and other required information prepared by the Consultant, if required by the Contract.

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