SPECIFICATIONS

for

AERIAL PHOTOGRAPHY AND TOPOGRAPHIC MAPPING

of

ABANDONED MINE LANDS

Prepared By:

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Mining & Reclamation Division

Abandoned Mine Land Section

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SPECIFICATIONS

1. SCOPE OF WORK

1.1 Aerial photography shall be performed on nine (9) abandoned coal mine reclamation projects located in Bibb, Blount, Cullman, Jackson, Jefferson, Tuscaloosa and Walker Counties. The projects to be photographed and mapped are listed in the appendix and delineated on the accompanying U.S.G.S. topographic maps. LiDAR (Light Detection and Ranging) shall be used to produce the "bare earth" points for generating the topographic maps on all nine (9) of those projects totaling approximately one thousand, seventy-five (1,075) acres of abandoned mine lands. LiDAR shall be used to determine the bare ground elevation of the AML sites identified in these specifications. LiDAR will be used in conjunction with topographic mapping to produce an existing contour map of each site. The CONTRACTOR shall be responsible for editing the LiDAR points and incorporating that information into his stereo model of the topographic and planimetric features of the sites. LiDAR data shall be edited by the CONTRACTOR so that contours are not generated under buildings, structures, etc., on the finished topographic map. It will be the responsibility of the CONTRACTOR to compare the LiDAR data to the photogrammetric data for accuracy and completeness of the topographic map. The CONTRACTOR shall furnish all labor, equipment and materials to produce the desired maps and associated items for the projects. A priority list shown in the appendix provides a schedule by which the projects are to be completed. This is a tentative schedule which may be modified by the DEPARTMENT, after giving adequate notice to the CONTRACTOR.

1.2 The DEPARTMENT will hold a mandatory pre-bid conference for the Aerial Contract. All contractors interested in bidding on this Aerial Photography and Topographic Mapping Contract will need to attend the pre-bid conference. The location of the pre-bid conference will be identified in the invitation to bid package sent out by the Division of Purchasing.

1.3 The work shall be accomplished as follows: after receiving a Purchase Order for aerial photography, the CONTRACTOR shall contact the Birmingham office to arrange a pre-flight conference, then arrange to have nine (9)) of the projects flown; afterwards, he shall submit two (2) sets of stereo contact prints for each listed project to the AML Field Office in Birmingham. The exact areas needing aerial topographic mapping will be delineated on one (1) set of prints by the DEPARTMENT. Prints for these nine (9) projects will be returned to the CONTRACTOR (in groups of two or more) with instructions for furnishing the digital orthophotographs, topographic maps, AutoCAD drawing files and contour coordinate (DTM) point file.

Any Prints submitted to the CONTRACTOR for mapping shall be returned to the DEPARTMENT with the desired map products within sixty (60) days from the date of the submittal letter to the CONTRACTOR. All topographic mapping and other related services shall be completed by December 31, 2010.

1.4 The CONTRACTOR shall be reimbursed on a lump sum basis for performing aerial photography of nine (9) projects and submitting two (2) sets of stereo contact prints per project. The Lump Sum bid price for aerial photography shall not exceed twenty percent (20%) of the total contract bid price. The

CONTRACTOR shall also be reimbursed on a lump sum basis for performing LiDAR (Light Detection and Ranging) on all nine (9) projects. All remaining work and services provided by the CONTRACTOR under this contract shall be compensated on a unit cost basis for those items in accordance with the CONTRACTOR's bid proposal.

1.5 The CONTRACTOR shall be responsible for providing and establishing ground control on each project. The CONTRACTOR shall contact and obtain verbal permission from the property owner(s) before entering private property to perform ground control work as outlined in these specifications.

1.6 All items of work furnished by the CONTRACTOR shall be delivered directly to the address shown below via UPS or first class U.S. Mail. All CD-Roms placed in cases and packaging shall be protected with padding or bubble wrapping to prevent damage in transit. The CONTRACTOR shall send all products and correspondence to the address as follows:

Michael H. Vinson
Alabama Department of Industrial Relations
Abandoned Mine Land Reclamation Office
11 W. Oxmoor Road, Suite 100
Birmingham, AL 35209

2. BEGINNING WORK

2.1 Within ten (10) calendar days after the CONTRACTOR receives the Purchase Order, a pre-flight conference shall be held at the AML Field Office in Birmingham. The CONTRACTOR, his surveyor, his project manager, and the AML Design Engineer will review the specifications and project locations at this time.

3. GROUND CONTROL

3.1 Ground Control of Project

The CONTRACTOR shall be responsible for providing and establishing ground control on each project listed in the Appendix. A minimum of five (5) permanent monuments with identifiable panels shall be established at each project site as per Article 3.5 of these Specifications.

3.2 Accuracy

The CONTRACTOR shall secure the services of a licensed land surveyor to engage in the ground control work. The Surveyor shall employ acceptable methods using total station electronic distance measuring devices to achieve a National Map Standard for horizontal accuracy of not less than third order work. The surveyor shall utilize automatic levels and standard leveling practices to obtain a National Map Standard for vertical accuracy of not less than third order work.

3.3 Datums

The CONTRACTOR shall use the NAV 83 and NAVD 88 to establish the Alabama State Plane Coordinate System on all monumented control panels.

The CONTRACTOR shall identify the source and the monument(s) location used to establish the ground control on each project site.

3.4 Panels

The CONTRACTOR shall deploy a minimum of five (5) panels at locations on or close to each designated project site. The panels may be in a "V" or "+" configuration and shall be a minimum of seven (7) feet long each. The panel material may be either six (6) mil white vinyl or eleven (11) pound builders paper. Six (6) mil white vinyl panels shall be twelve (12) inches wide. Builders paper shall be eleven (11) inches wide with a ten (10) inch wide white stripe painted along the center of each panel member. Other methods of placing panels to identify monuments will be considered when presented by the CONTRACTOR. Panel members shall be secured in place with nails and bottle caps or nails and flat washers. Twigs, broken boards, rocks and bent wire will not be considered as appropriate items to secure the panels in place. Pastures that contain grazing cattle shall be avoided. Painted panels on paved roads will be acceptable but all the panels on a project cannot be located in paved roads. Painted panels in the roads shall be a minimum of seven (7) feet long and ten (10) inches wide. All panels with appropriate monuments shall be deployed prior to flying the site.

3.5 Monuments

The CONTRACTOR shall establish permanent monuments on all control panels visible in the aerial photographs. Horizontal and vertical control shall be established on each monument. The monuments shall consist of cast caps on 3/4" or 5/8" diameter steel bars or cast caps which are threaded to fit one (1) inch galvanized steel pipe. All monuments i.e., for panels and references

irons shall be installed flush with the existing ground or surface where they are installed. If there are any existing rock layers six (6) to twelve (12) inches below the surface, monuments may be cut shorter to accommodate the depth to the existing rock layer. Each monument cap shall bear an identification number as well as the CONTRACTOR's name. The monuments shall be distinguishable on the stereo contact prints by use of panels or by other approved methods. The monuments and panels will be deployed before the actual ground control is completed; however, the identifying panels and monuments shall be in place before any aerial photographs are made. Stereo prints that do not show targeted points shall be re-flown at the CONTRACTOR's expense. The monumented triangulation points shall appear on the topographic maps with identifying numbers, coordinates and elevations. Every effort shall be made to insure that monumented points are visible from one to the other without any obstructions between them. In the event the monumented points cannot be seen from one to the other, a reference iron shall be set within two hundred (200) feet of each monument, but no closer than one hundred (100) feet. One-half inch (½") reinforcing rods that are eighteen (18) inches long shall be used to reference the location of each monument. Traverse information (i.e. bearings, distances, coordinates and elevations) along with topographic mapping features such as, but not limited to, tree lines, roads, fences, buildings, impoundments, etc. (excluding contours) shall be included on the survey map as part of the ground control data. The CONTRACTOR shall furnish a scaled map of all ground control for each project site. The map shall show all traverse points from all targets along with a point list (N,E,Z) of all targets in the field as part of the ground control. The bearings and distances shall be annotated on all traverse and sideshot lines. All points shall be labeled to match numbers used in the field survey.

A separate list of all points including targets and sideshot reference points with x, y, and z coordinates shall also be included. All ground control work shall be completed in the field, as specified above, before payment of ground control work is approved.

3.6 Global Positioning System (GPS) shall be used to establish horizontal and vertical control on all monumented control panels. A complete GPS report shall be furnished on all ground control points set on each project site. Each control panel shall be flagged in the field and clearly identified on an accompanying survey map in the report. All field surveying performed in conjunction with the GPS shall be included in each report. The NAV 83 and NAVD 88 shall be used to establish the Alabama State Plane Coordinate System on all monumented control panels. The control monuments used to establish ground control on each project site shall be shown on the survey map for each project site.

3.7 **Completion and Approval**

The CONTRACTOR shall notify the DEPARTMENT upon completion of the ground control work. The CONTRACTOR shall furnish field notes of the ground control work and a scaled drawing of the ground control traverse when the checkprint of the contour map is sent to the DEPARTMENT. Ground control must be verified and approved by the DEPARTMENT before payment is made for that item of work. Unit prices are required for ground control on each project. In the event that a project site is deleted from the contract, the amount paid for ground control work will be decreased accordingly.

4. AERIAL PHOTOGRAPHY

4.1 Time, Season and Conditions

All flights will be made in accordance with these specifications from December 1, 2009 to March 19, 2010 between 11:00 a.m. CST and 2:00 p.m. CST. Any photographs obscured by more than five (5) percent clouds, haze, smoke or dust shall be re-flown. The CONTRACTOR shall notify the DEPARTMENT within 48 hours before the flights are to be made. Projects shall be flown at the optimum time to eliminate or at least minimize shadows under highwalls. Any photographs of sites having excessive highwall shadows shall be re-flown if, in the opinion of the DEPARTMENT, the quality of the corresponding topographic map would be adversely affected.

4.2 Aircraft

The aircraft to be used shall be specially modified for aerial photography work with all necessary navigation and photogrammetric instruments for the performance of the work in accordance with these specifications. The aircraft pilot must possess a valid pilot's license, as well as previous experience with aerial photography work.

4.3 Aerial Camera

An aerial camera, equipped with a six (6) inch focal length lens that has been tested and certified for accuracy by the U.S. Geological Surveys will be used. A digital camera may be used provided that it is a large format metric quality mapping camera. A copy of that certification must be produced at the time of the pre-flight conference for the camera that will be used for the photography work.

4.4 Flight Lines

Where parallel flights are necessary on larger project sites, they shall be within five (5) degrees of parallel. Photographic strips shall be broken only when necessary. Whenever flight lines are broken, sufficient overlap for stereo coverage will be required. Stereo coverage must extend well beyond the desired mapping area. In no case shall the lack of parallelism between adjacent strips be such as to prevent the side lap between strips from conforming to these specifications.

4.5 Scales and Altitudes

The flight altitude shall be adjusted to match the equipment used and comply with the National Map Standards for stereo prints (scale of 1" = 500') and the base mapping compilation scale of 1" = 100' with two (2) foot contours. The flight altitude may also be adjusted for making the digital orthophotographs.

4.6 Negatives

The negatives shall be clear and sharp in detail, fine-grained, or uniform density and average contrast, and be free from clouds, cloud shadows, snow, flood waters, light streaks, static marks, stains, shadows along the highwalls or blemishes which would render them unsuitable for their intended purpose. Each negative shall be consecutively indexed just inside the exposed area, beginning with No. 1 and continuing through all exposures for this contract. The date of exposure, approximate photo scale and the project name shall be indexed adjacent to the consecutive exposure number.

4.7 Film Processing

The films shall be processed on continuous roll automated processing equipment. Special care shall be exercised to ensure proper development, thorough fixation and washing of the film, and to avoid rolling the film too tightly on the drum or distorting it during the developing or drying process.

4.8 Stereo Contact Prints

Two sets of stereo contact prints for each project shall be submitted to the DEPARTMENT within ten (10) calendar days from the date the projects are flown, but under no circumstances, later than March 31, 2010. In the event that any projects or portions of projects must be re-flown as required by the DEPARTMENT, those stereo contact prints must be received by the DEPARTMENT within ten (10) calendar days from the DEPARTMENT's notification date. Stereo contact prints shall be clear, sharp in detail, of average contrast and free from static marks, shadows along the highwalls or other blemishes which would interfere with their intended purpose. The photographs shall be black and white with a semi-double mat weight finish. The prints shall have a mat size of nine (9) inches by nine (9) inches and an approximate scale of five hundred (500) feet per inch. The stereo contact prints shall be identified with the project name, photo scale, photo number, and flight date. The stereo contact prints shall be numbered consecutively without regard to flight numbers.

4.9 Overlap, Side Lap

Overlap on all photography in the direction of the line of flight shall be sixty (60) percent unless otherwise specified. Overlap in the direction of the line of flight of more than sixty-five (65) percent or less than fifty-five(55) percent

may be cause for rejection. Where parallel flights are necessary, the side lap shall be thirty (30) percent or more. Any side lap of less then twenty (20) percent may be cause for rejection.

4.10 Tip, Tilt, Crab

Tip, tilt and crab shall be kept to a minimum. Tip and tilt shall not exceed four (4) degrees per exposure. Crab in excess of five (5) degrees is undesirable and may be cause for rejection. Crab in excess of ten (10) degrees, as measured from the center line of flight along the principal points of consecutive prints, shall be cause for rejection.

4.11 Completion and Approval

After approval by the DEPARTMENT, compensation for work performed under this section will be made on a lump sum basis upon completion of the aerial photography and submission of two (2) sets of stereo contact prints for each project. No compensation will be made until the aerial photography requirements on all projects have been completed, regardless of whether some of the projects require re-flying. The ground control panels shall be identified with a quarter (¼) inch triangle symbol and point number on all contact prints on which they appear. The triangle symbols shall appear on one set only and shall be hand drawn directly on that set of stereo prints in black ink.

4.12 Late Assessment

A late fee of $150.00 per calendar day will be assessed against the CONTRACTOR in the event that he fails to submit the required two (2) sets of stereo contact prints for each project by the close of business on March 31, 2010 as specified in Article 4.8.

5. DIGITAL ORTHOPHOTOGRAPHS

5.1 Photographic Method

Digital orthophoto production shall be obtained from a high altitude spot shot covering each mine during the aerial mission. This image must meet all aerial photography standards stipulated for the mapping imagery; e.g., no clouds or cloud shadows, optimal image quality and defect-free materials.

The original negative (or a high-quality diapositive) shall be scanned using a radiometrically accurate and geometrically precise scanner designed to support photogrammetric applications in order to obtain the raw digital raster image. Each image must be scanned at a finer resolution than the output resolution, to provide for resampling during the orthorectification process. The scan resolution must be a minimum of 1,200 dpi., preferably 2,000 dpi. Maximum care shall be taken during scanning to ensure that no lint, dust, fingerprints, or other anomalies appear on the images.

Proper software shall be used to perform the digital orthorectification on a pixel-by-pixel basis. The camera calibration report is used to perform interior orientation on the raw raster image, which is then correlated to the world using the ground control (exterior orientation). The entire image is then rectified to fit the 3-D DTM surface, eliminating all horizontal displacement from terrain as well as tip and tilt of the aircraft at the moment of exposure.

Each abandoned mine site shall be delivered in a single seamless digital raster file, digitally dodged and balanced for optimum tone, density and quality. The area of interest must have sufficient surrounding image for visual orientation,

but will be extracted from the overall frame to minimize the file size and assure maximum utility. If compression is to be used, a small compression factor must be employed to minimize image degradation.

Delivery of the digital orthophoto will be in standard titled Tagged Image File (TIF) format, with an ASCII world file for geo-referencing. The world file (TFW) will be formatted to work within the AutoCad software, assuring each image will be accurately placed. The TIF and TFW file must be placed together (in the same directory) on the CD-ROM to assure the software will recognize the world file.

5.2 Sheet Size and Border

Screened half-tone mylar positives of each project site shall be printed on bond or vellum as a checkprint for AML review. Each sheet shall measure thirty-six (36) inches by twenty-four (24) inches. A border and title block will not be required for these sheets. For the DEPARTMENT's drafting purposes, no writing shall be placed on any part of the photograph within an area one and one-half (1-½) inches inside the left edge of the sheet or three-quarters (¾) of an inch inside the top, bottom and right edges of the sheet. However, a north arrow and photograph scale bar shall be included on the sheet. The CONTRACTOR's logo may appear on the sheet within the matted area outside the project site(s), preferably in the lower left corner of the sheet.

5.3 North Arrow and Scale

The North direction of the drawing positive shall be oriented in the same direction as the north direction of the topographic map. The positive image shall be enclosed in the matted area at varying scales to show the topography

of the site. However, not more than four thousand (4,000) feet shall be shown on an individual sheet. The approximate scale shown on each site shall be either 1" = 100' or 1" = 200'; but it shall remain constant for all the sites in a given project.

5.4 Digital Orthophotograph File

The digital orthophotograph file for each Abandoned Mine Site shall be submitted on a CD-ROM diskette as follows: Each submittal may include multiple sites on a single diskette, but every project submittal, whether it includes a single project or multiple projects, shall include all required data for those projects on the diskettes. The scale will be in accordance with the specifications set forth for each site. The file size of the digital orthophotograph for each project shall be kept to a size of 30 to 40 Megs, if possible.

5.5 Completion and Approval

Compensation for work under this section will be made on a unit cost basis upon approval by the DEPARTMENT.

6. TOPOGRAPHIC MAPS

6.1 Plotting Equipment

Topographic maps shall be compiled from digital data obtained from an analytical stereo plotter and LiDAR (Light Detection and Ranging) data. Two (2) foot contours shall be generated electronically from the digital data imported into a software program capable of producing the existing contours of the site.

6.2 LiDAR

LiDAR topographic data shall be furnished on nine (9) project sites for the DEPARTMENT covering approximately one thousand, seventy-five (1,075) acres. The area required on each project site will be delineated on a stereo photograph and submitted to the CONTRACTOR for mapping. The LiDAR CONTRACTOR or SUB-CONTRACTOR shall furnish the GPS control required for each project site. Existing panels established in Article 3 of these specifications may be used; however, additional panels may be established if required.

The flying heights shall be selected by the CONTRACTOR or SUB-CONTRACTOR that will achieve the best data based on vegetative cover, terrain relief and cultural features. All flight lines shall be flown with a minimum of 30% side lap. The CONTRACTOR or SUB-CONTRACTOR shall be responsible for flying the project sites when there are an optimal number of satellites available for the most accurate GPS differential corrections. Dual frequency, GPS receivers shall be used during the flying operation to collect LiDAR data. The flying will be accomplished with a helicopter, single engine or twin engine aircraft flying at an air speed no greater than 140 knots. The accuracy of the data shall produce at least two to three points per square meter which will be verified to the DEPARTMENT by the CONTRACTOR or SUB-CONTRACTOR. The horizontal and vertical accuracy shall be according to National Map Standards.

The LiDAR data shall be used in conjunction with the planimetric and photogrammetric data to produce an accurate existing topographic map of each site. Payment for LiDAR shall be made as a lump sum for all nine (9) project sites. The CONTRACTOR or SUB-CONTRACTOR shall furnish the DEPARTMENT a DTM point file with unedited two (2) foot contours on each site, before the lump sum payment will be made.

6.3 Sheet Size and Border

The topographic maps shall be formatted to a thirty-six (36) inch by twenty-four (24) inch sheet. Border and title blocks will not be required; however, a space for the AML title box shall be left available in the lower right corner of the sheet. No writing or contour mapping shall be performed within three-quarters (¾) of an inch from the top, bottom and right edges of the sheet and one and one-half (1-½) inches from the left edge of the sheet. When possible, an area measuring six (6) inches wide, located along the right edge of each sheet and extending the height of the matted area, shall be reserved for notes and legends used in future design work.

6.4 Map Scale and Contour Interval

A map scale of one inch equals one hundred feet (1" = 100') shall be used. A contour interval of two (2) feet shall be used for slopes of zero (0) percent to fifty (50) percent. A contour interval of ten (10) feet shall be used for slopes of greater than fifty (50) percent. Spot elevations shall be given for hilltops, saddles, depressions, sinkholes, water surfaces and where contour lines are spaced more than two hundred (200) map feet apart. Spot elevations shall also be given at the intersection of paved and unpaved roads as well as every two

hundred (200) feet in each direction along the centerlines of the roads. Depressions shall be noted with tick marks along the first completely enclosed contour line, and an elevation shall be given at the bottom of the depression.

6.5 North Arrow

A north arrow will be required on each sheet. All map work shall be oriented with the north direction to the top of the sheet or as shown on the sheet layouts. The northen direction may be rotated up to ninety (90) degrees right or left to best fit the topographic map on the sheet.

6.6 Match Lines and Overlap

Match lines shall be used to connect portions of a site which cannot be positioned on a single sheet. A one (1) inch band of overlapping contours on each sheet shall be used to join adjacent contour sheets. A match line identifying its corresponding sheet number shall extend through the center of the overlapped area. A sheet index shall appear on each sheet for sites requiring multiple sheets. The specific sheet on which the index appears shall be accented with heavier lines than the adjoining sheet(s). Match lines may appear on one or more sides of the contour map, depending upon the size of the site.

6.7 Grid Lines

Grid lines shall be spaced at five hundred (500) foot intervals across each sheet in the North-South and East-West directions using the Alabama State Plane Coordinate System.

6.8 Planimetric Features to be Shown

Cultural features to be shown on the maps shall include buildings, foundations, public roads, haul roads, access roads, railroads, runways, paved areas, fence lines, tree lines, heavy vegetation areas, bench marks, triangulation monuments, impoundments, drainage lines, streams, creek and dams. Below ground utilities will not be represented. However, above ground power poles, transmission, telegraph and telephone lines which are local or cross-country in nature shall be shown. All cultural features shall be represented as they appear on the photograph in accordance with standard topographic mapping practices. Access roads from major roads to the site shall be shown, without contours, regardless of whether they are delineated on the stereo photo(s) for contouring.

6.9 Horizontal Accuracy

Ninety (90) percent of all well-defined planimetric features shall be plotted within 1/30th of an inch of their true positions. No feature of such description shall be misplaced by more than 1/30th of an inch at the map scale when scaled from the nearest coordinate lines.

6.10 Vertical Accuracy

Ninety (90) percent of all contours shall be plotted within one-half contour interval of correct elevations as determined by check lines or check provisions. The remaining ten (10) percent of the contours shall not be more than one contour interval from correct elevation; however, such a contour shall be considered acceptable if it can be brought within vertical tolerance by shifting its position by 1/30th of an inch. An exception to these accuracy requirements

will be in those areas where, due to dense evergreen or coniferous growth, the earth is completely obscured from view; in such cases, contours shall be shown by dashed lines and shall be guaranteed to one-fourth (1/4) of the height of the trees.

6.11 Completion and Approval

The CONTRACTOR shall submit a checkprint of each project site for review by the AML engineering personnel. Any corrections which may be required on the topographic maps for final approval shall be completed and returned to the DEPARTMENT within ten (10) calendar days from the date of the DEPARTMENT's written request. Compensation for topographic maps and the items discussed in Article 7 shall be made on a unit cost basis (per acre) for each project that has been completed and approved by the DEPARTMENT. The acreage figure used for payment will be based on the actual area contoured on each sheet. For those sheets which incorporate match lines, the acreage used for payment will be calculated only to the match line and shall not include any area outside of that line.

6.12 Late Assessment

A late fee of $25.00 per calendar day shall be assessed against the CONTRACTOR for all checkprints that are not submitted within the sixty (60) day time limit as specified in Article 1.2 of these specifications. This is to reimburse the DEPARTMENT for delays in engineering design schedules, construction scheduling, and increased time required for project design. For any project which is submitted later, compensation will not be considered until all topographic maps for that project have been received and approved by the DEPARTMENT.

7. AUTOCAD DRAWING FILE AND DTM FILE

7.1 The CONTRACTOR will be required to furnish a copy of the drawing in AutoCAD format (2004 or current AML version) and a digital terrain model (DTM) of three-dimensional lines, points, etc. capable of reproducing the existing contours and spot elevations. The AutoCAD drawing and DTM file shall be stored under suitable file names on a CD-ROM diskette. Other planimetric features such as tree lines, roads, fences, power lines, etc., shall not be included in the DTM file.

7.2 All drawing files shall be 100% AutoCAD compatible without additional hardware or software being required to generate the drawing. Any shapes, fonts, blocks, etc., created in the drawing files that are either not included in or not compatible with the AutoCAD version being utilized by the DEPARTMENT shall be furnished to the AML office with the submittal of the first drawing files.

7.3 The AML AutoCAD drawing format for contouring mapping utilizes line colors to determine pen number and width of line to plot. The lettering or numbering used to identify grid lines, northing and easting coordinates, point elevations, two foot contour lines and elevations, W/E (water elevation), and ground control point numbers and symbols shall be drawn using a text height of 0.075 inch and a pen width of 0.010 inch. The 10 foot contour lines and elevations shall be plotted with a pen width of 0.012 inch. The planimetric features shall be plotted with a pen width of 0.010 inch. Paved roads shall be identified with a continuous line, while dirt roads and single width unimproved roads shall be identified with a double-dashed line and small woods trails with a single-dashed line.

7.4 Layer names chosen by the CONTRACTOR shall clearly and accurately describe the feature stored on the layer. The CONTRACTOR shall limit the number of layers needed to store the features. Closely related physical features such as paved roads, gravel roads or haul roads shall appear on the same layer. Dissimilar items such as tree lines, drainage ditches or utilities that are plotted with the same pen size shall be stored on separate layers. Features that require a large number of entities such as two (2) foot contours shall be stored on a single layer. Polylines shall be used to depict control lines, roadways and other continuous lines to facilitate editing. All polylines used as part of the digital terrain model shall be three-dimensional, i.e. with corresponding elevations at all vertices.

7.5 The CONTRACTOR shall incorporate a program that will reduce (edit) the coordinates of a polyline without sacrificing its accuracy. By editing all polylines such as the existing contours, curves, roadways, etc., the overall drawing size will be reduced.

7.6 Each project shall be stored on CD-ROM diskettes. On projects that require multiple sheets, each sheet shall be stored in a separate drawing file. Survey maps and digital orthophotographs shall be included on the CD-ROM diskettes. The file name for each project and/or site shall relate to the project name with a combination of eight (8) alphanumeric characters.

7.7 A checkprint of the contour drawing shall be furnished on translucent bond or vellum paper within the sixty (60) calendar-day time limit on each project delineated for mapping. The check plot will be reviewed for accuracy and

format. Corrections and/or revisions will be marked on the copy before returning it to the CONTRACTOR. Once the corrections and/or revisions have been made by the CONTRACTOR, the topographic map will be prepared and sent to the AML Office in the AutoCAD drawing format along with the digital orthophotograph file, the DTM data file and the checkprint copy.

7.8 The cost associated with furnishing the CD-ROM diskette(s) for each project designated for contouring shall be included in the unit price for topographic mapping for the project and shall be submitted to the AML Office upon approval of the checkprint. The CONTRACTOR shall submit the CD-ROM diskette(s) of the topographic mapping, the digital orthophotograph and the DTM data file on each approved project. Each drawing file shall be edited to produce a plotted copy of the topographic map. If the drawing file fails to produce an exact copy, the CD-ROM shall be returned to the CONTRACTOR for corrections before payment is approved. Payment will not be considered until both items have been checked and approved by the DEPARTMENT.

8. REVIEW OF WORK

The CONTRACTOR shall submit each of the requested work items to the DEPARTMENT for review prior to payment. Ground control work, aerial photographs and map products will be checked for compliance with the contract specifications. If required by the DEPARTMENT, the CONTRACTOR shall promptly, without cost to the DEPARTMENT, correct any defective work items or replace them with non-defective work items before payment is made.

9. COLOR AERIAL PHOTOGRAPHY

9.1 The CONTRACTOR shall furnish a pilot and a FAA approved, aircraft (single engine, high-wing plane or helicopter) equipped with four (4) seats to provide flight coverage, as requested, of various AML project sites located in the central and northern counties of Alabama. The plane shall have adequate side windows for shooting photographs from the aircraft. The high-wing aircraft shall provide unrestricted clearance to allow shooting digital pictures of the land below.

9.2 Upon written notification from the AML FIELD SUPERVISOR, the CONTRACTOR shall schedule the services of a plane and a licensed pilot to fly up to three (3) AML employees to selected project sites. The CONTRACTOR will be notified as to project location and will have ten (10) calendar days from the written notification in which to secure a pilot. A minimum of three (3) days in advance of the flight date, the CONTRACTOR will notify the AML FIELD SUPERVISOR or designated personnel of the date and the time that the plane has been scheduled from a local Birmingham area airport.

9.3 The pilot shall be experienced and competent in performing safe maneuvers to accomplish various positions for aerial photography and will be required to make as many passes over each project site as necessary until AML employees have shot the desired number of photographs. The DEPARTMENT will furnish all required photographic equipment and supplies.

9.4 Flying time will be determined by the location of the projects that will be flown and fuel tank capacity. Forecasted inclement weather conditions shall be avoided. In such cases, the flight shall be rescheduled for a later date. When flying is already underway and inclement weather is prevalent near a project site, that project may be rescheduled at a later date.

9.5 Once all photographs have been taken of the sites scheduled for that day's flying, the pilot shall make as direct a route as possible back to the airport where the flight originated.

9.6 This portion of the contract will remain in effect until December 31, 2010. Photographs of AML projects may be taken at any time of the year, depending upon the project status. The number of hours listed in the Principal Items of Work is only an estimate, as the actual total hours of flying time may be more or less. The CONTRACTOR shall be paid for the total number of hours actually flown, rounded to the nearest 1/4 hour.

9.7 The CONTRACTOR shall be compensated for the actual time the plane is used; that is, from the time of takeoff until the plane lands and the passengers unload. Air time will be verified by the pilot and AML employees immediately after the service is provided. The CONTRACTOR shall be compensated for total hours of each trip rounded to the nearest 1/4 hour based on the hourly rate submitted on the Bid Proposal Form. The CONTRACTOR may submit only one invoice per month when flying services have been provided. The flying time described above is not to be used in conjunction with the flying time required for aerial photography described in Article 4 of these specifications.

10. PAYMENT

10.1 Payment for work done under this contract shall be made on a combination lump sum/unit cost basis. The CONTRACTOR may request partial payments from the DEPARTMENT at the following intervals:

- Completion of aerial photography on nine (9) of the project sites and submission of two (2)sets of stereo contact prints for each project (lump sum).

- Completion of LiDAR (Light Detection and Ranging) on nine (9) project sites (lump sum) to be paid as follows:

    1. 50% of the lump sum bid when LiDAR points and an unedited plot of two foot contours are delivered on each project site.
    2. 25% of the lump sum bid when five projects have been completed and approved by the DEPARTMENT.
    3. The remaining balance of the lump sum bid when the last four projects have been completed and approved by the DEPARTMENT.

- Submission of all digital orthophotographs and topographic maps in AutoCAD drawing format on a CD-ROM diskette on two (2) or more projects (unit cost).

- Completion of ground control for two or more projects (unit cost).

- Submission of hourly airplane service during any month in which the service is provided.

10.2 Unit prices are required on all Principal Items of Work. Failure to submit unit prices for all items of work will result in the bid being automatically rejected without further consideration.

10.3 Each line item on the Bid Proposal Form shall be bid according to the DEPARTMENT's estimated quantity. Extended prices will be calculated by multiplying the CONTRACTOR's unit price by the DEPARTMENT's estimated quantity. The extended prices will be totaled to obtain a Total Contract Bid Price, from which the contract will be awarded.

10.4 If an error has been made in calculating the extended price of a bid item, the unit price submitted by the CONTRACTOR will prevail and the extended price will be re-calculated. Likewise, if an error has been made in adding the extended prices to arrive at a Total Contract Bid Price, the Total Contract Bid Price will be re-calculated and the resulting price will prevail.

10.5 In the event that one or more of the listed projects or sites within a project must be deleted, or any of the listed quantities are reduced, the contract will be decreased accordingly for work not required.

APPENDIX

APPENDIX

TABLE OF CONTENTS

AML MAPPING
PRIORITY LIST

* (Ranked in Order of Priority)

1. Piper II
2. Hamilton Mountain
3. Nyota II
4. Wildcat Hollow
5. Indian Creek
6. Crocker Hill II
7. Crosston, East
8. Lower Davis Creek II
9. Grace Chapel, East

* **Subject to Change**

LIST OF PROJECT LOCATIONS BY COUNTY

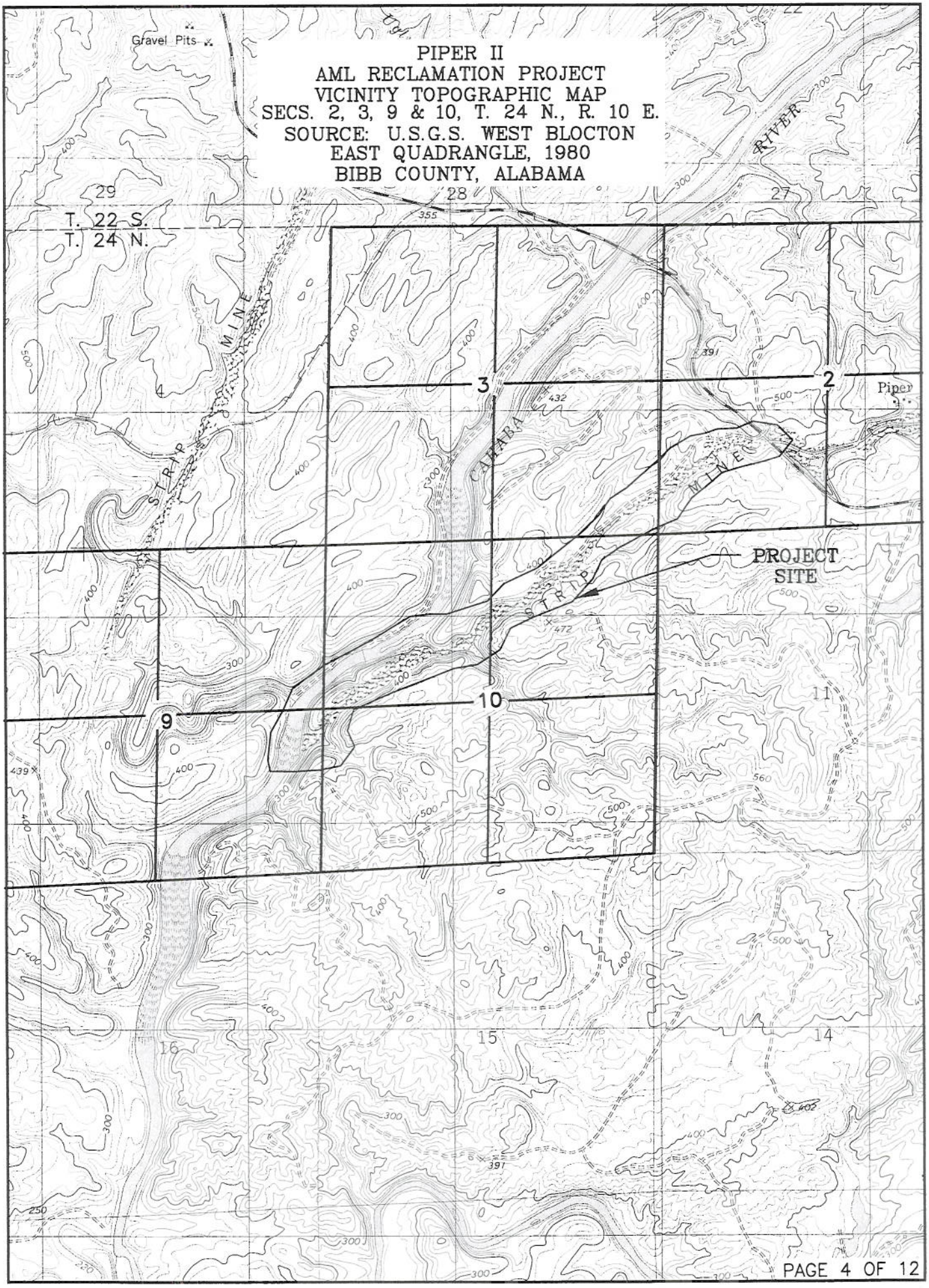
(Also see attached maps)

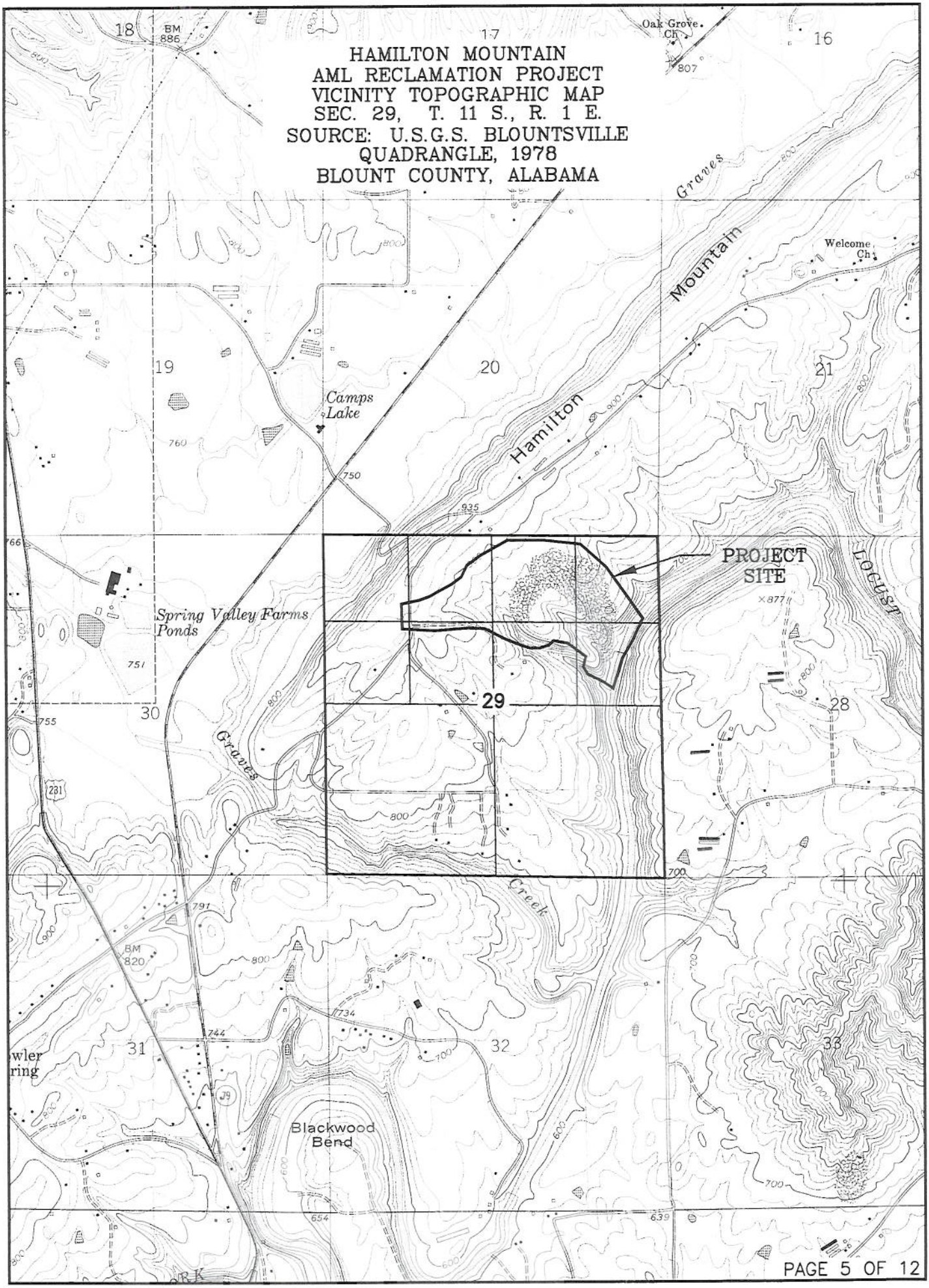
	PROJECT	ACREAGE
1.	PIPER II (BIBB COUNTY) West Blocton East Quad., 1980 SW ¼ of Section 2; the SE ¼ of the SE ¼ of Section 3; the N ½ and the NW ¼ of the SW ¼ of Section 10; the SE ¼ of the NE ¼ and the NE ¼ of the SE ¼ of Section 9, T. 24 N., R. 10 E.	250
2.	HAMILTON MOUNTAIN (BLOUNT COUNTY) Blountsville Quad., 1978 N ½ of Section 29, T. 11 S., Range 1 E.	110
3.	NYOTA II (BLOUNT COUNTY) Trafford Quad., 1978 and Warrior Quad., 1986 NE ¼ of the NE ¼ of Section 4; and the N ½ of the NW ¼ and the NW ¼ of the NE ¼ of Section 3, T. 14 S., R. 2 W.	50
4.	WILDCAT HOLLOW (CULLMAN COUNTY) Arkadelphia Quad., 1978 S ½ of the NE ¼ and the N ½ of the SE ¼ of Section 17; and the SW ¼ of the NW ¼ and the NW ¼ of the SW ¼ of Section 16, T. 13 S., R. 4 W.	65
5.	INDIAN CREEK (JACKSON COUNTY) Flat Rock Quad., 1983 E ½ of the SW ¼ and the W ½ of the SE ¼ of Section 27, T. 2 S., R. 9 E.	40
6.	CROCKER HILL II (JEFFERSON COUNTY) Brookside Quad., 1986 and Gardendale Quad., 1979 SE ¼ of the NW ¼, the S ½ of the NE ¼, the W ½ of the SE ¼ and the E ½ of the SW ¼ of Section 6; and the NE ¼ of the NW ¼ and the NW ¼ of the NE ¼ of Section 7, T. 16 S., R. 3 W.	150

LIST OF PROJECT LOCATIONS BY COUNTY (Con't)

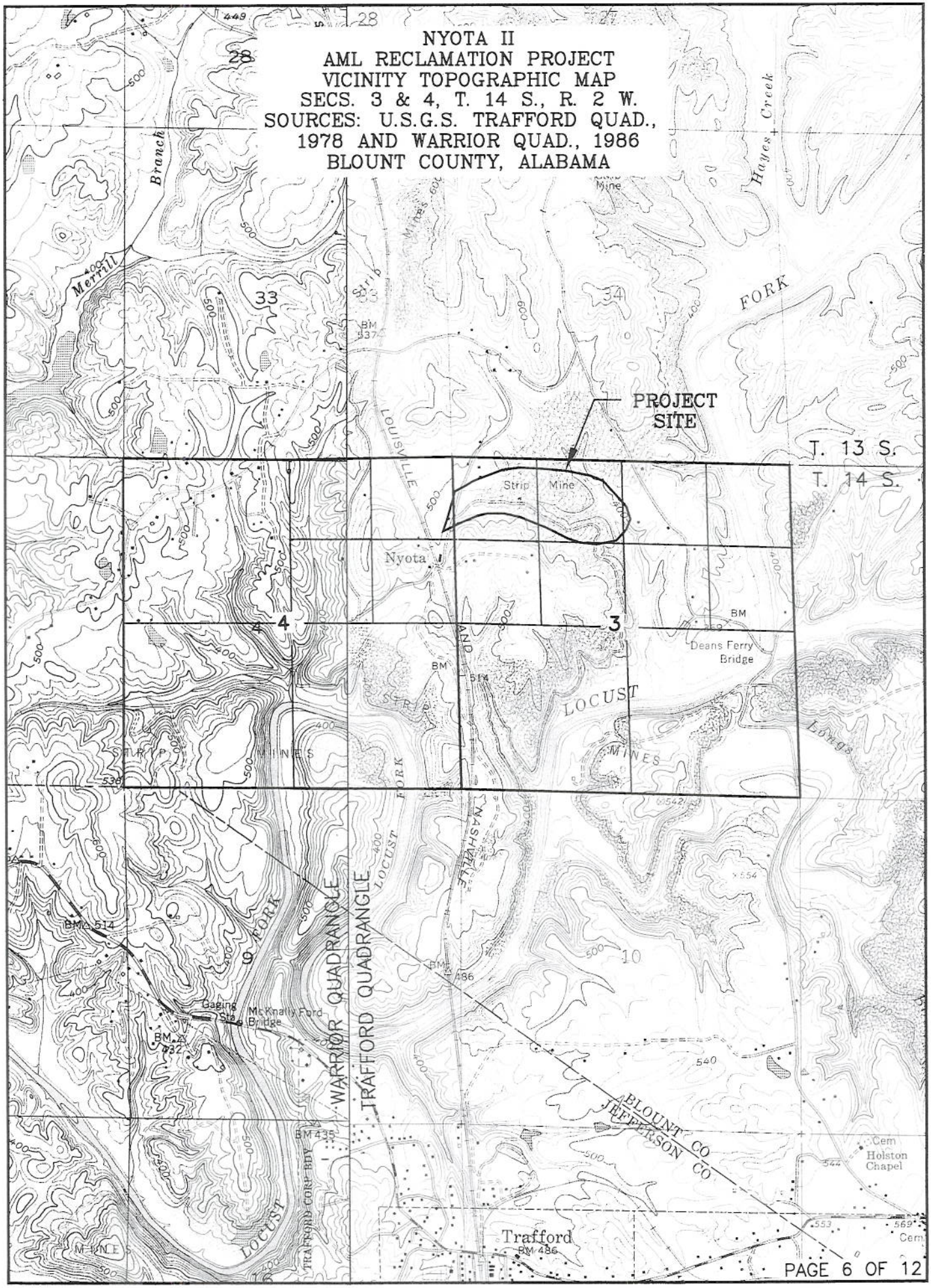
(Also see attached maps)

PROJECT		ACREAGE
7.	CROSSTON, EAST (JEFFERSON COUNTY) Pinson Quad., 1979 SW ¼ of Section 13; the SE ¼ of the SE ¼ of Section 14; the E ½ of the NE ¼ of Section 23; and the NW ¼ of Section 24, T. 15 S., R. 2 W.	200
8.	LOWER DAVIS CREEK II (TUSCALOOSA COUNTY) Burchfield Store Quad., 1983 and Brookwood Quad., 1983 SE ¼ of Section 13, T. 19 S., R. 8 W.	50
9.	GRACE CHAPEL, EAST (WALKER COUNTY) Jasper Quad., 1981 and Townley Quad., 1981 SE ¼ of Section 22; the SW ¼ of the NW ¼, the SW ¼ of the SW ¼, the N ½ of the SW ¼ of Section 23; and the NW ¼ of the NE ¼ of Section 27, T. 14 S., R. 8 W.	160

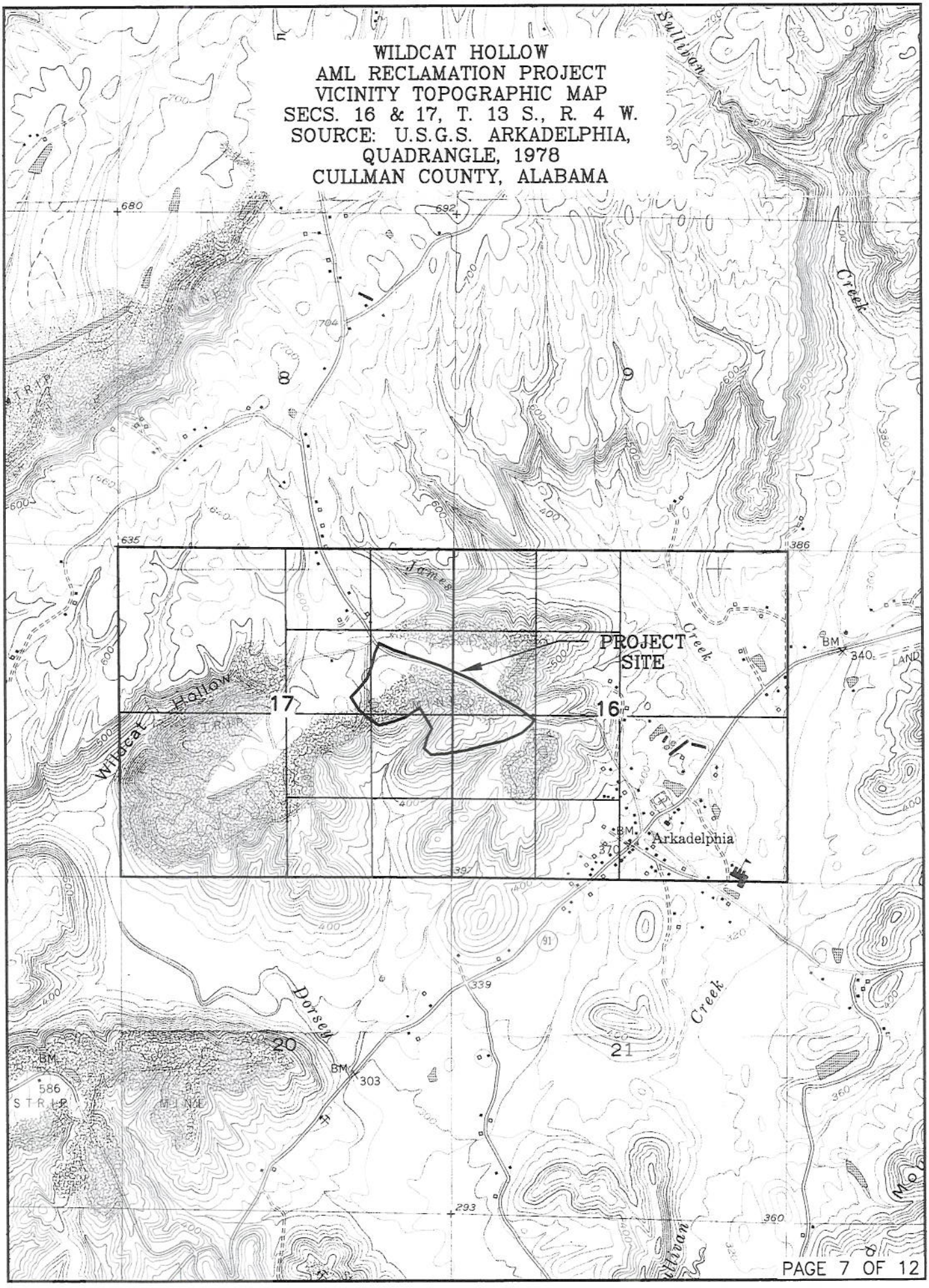

PIPER II
AML RECLAMATION PROJECT
VICINITY TOPOGRAPHIC MAP
SECS. 2, 3, 9 & 10, T. 24 N., R. 10 E.
SOURCE: U.S.G.S. WEST BLOCTON
EAST QUADRANGLE, 1980
BIBB COUNTY, ALABAMA
Gravel Pits
T. 22 S.
T. 24 N.
29
28
27
22
355
RIVER
MINE
STRIP
CAHABA
391
3
2
Piper
432
500
PROJECT
SITE
472
10
11
9
439
560
16
15
14
402
391
250
220
PAGE 4 OF 12

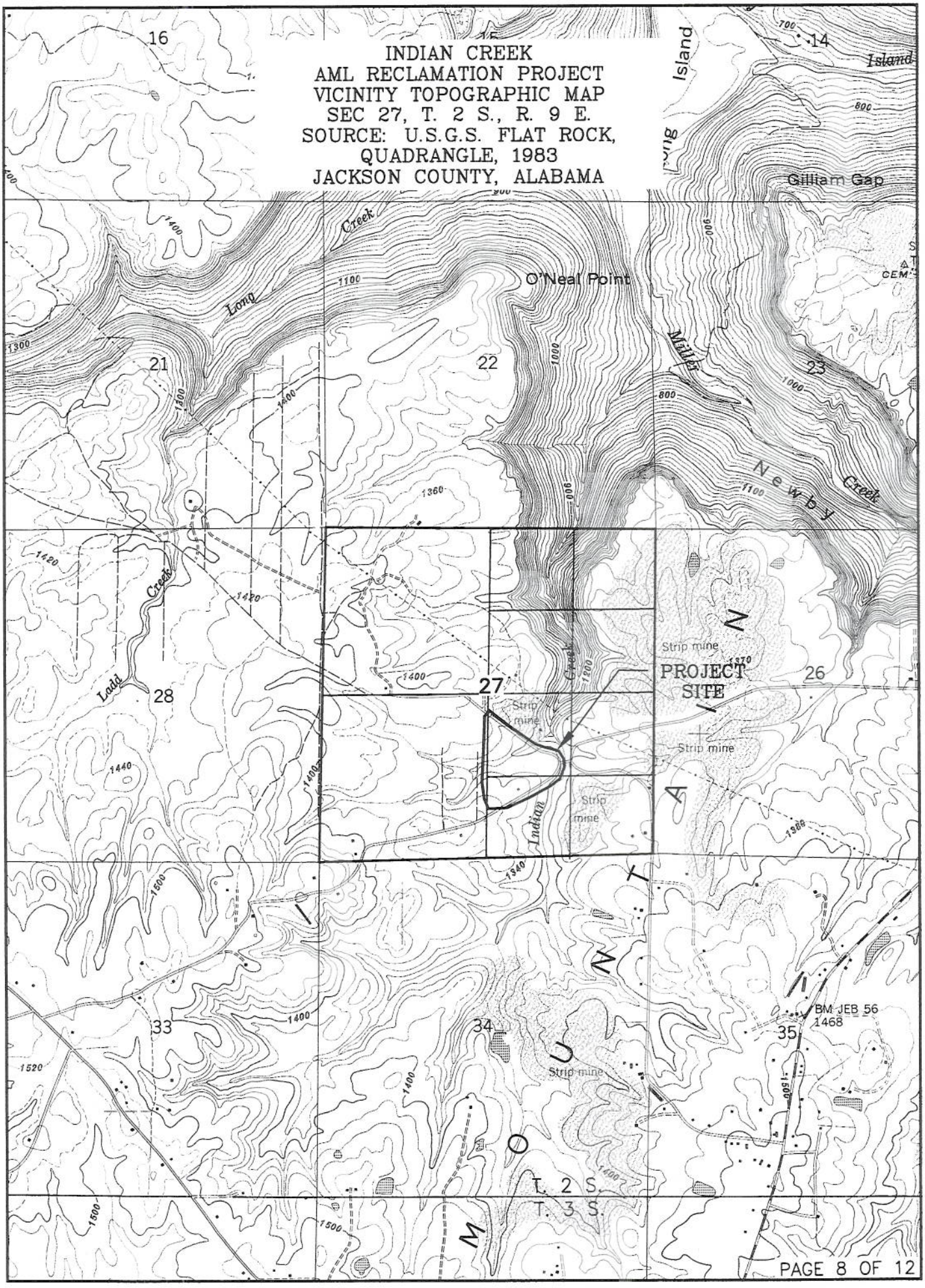

HAMILTON MOUNTAIN
AML RECLAMATION PROJECT
VICINITY TOPOGRAPHIC MAP
SEC. 29, T. 11 S., R. 1 E.
SOURCE: U.S.G.S. BLOUNTSVILLE
QUADRANGLE, 1978
BLOUNT COUNTY, ALABAMA
PROJECT SITE
Graves Mountain
Hamilton
Camps Lake
Spring Valley Farms Ponds
Oak Grove Ch.
Welcome Ch.
Locust
Graves
Creek
Blackwood Bend
BM 886
BM 820
17
18
19
20
21
16
29
30
31
32
33
28
231

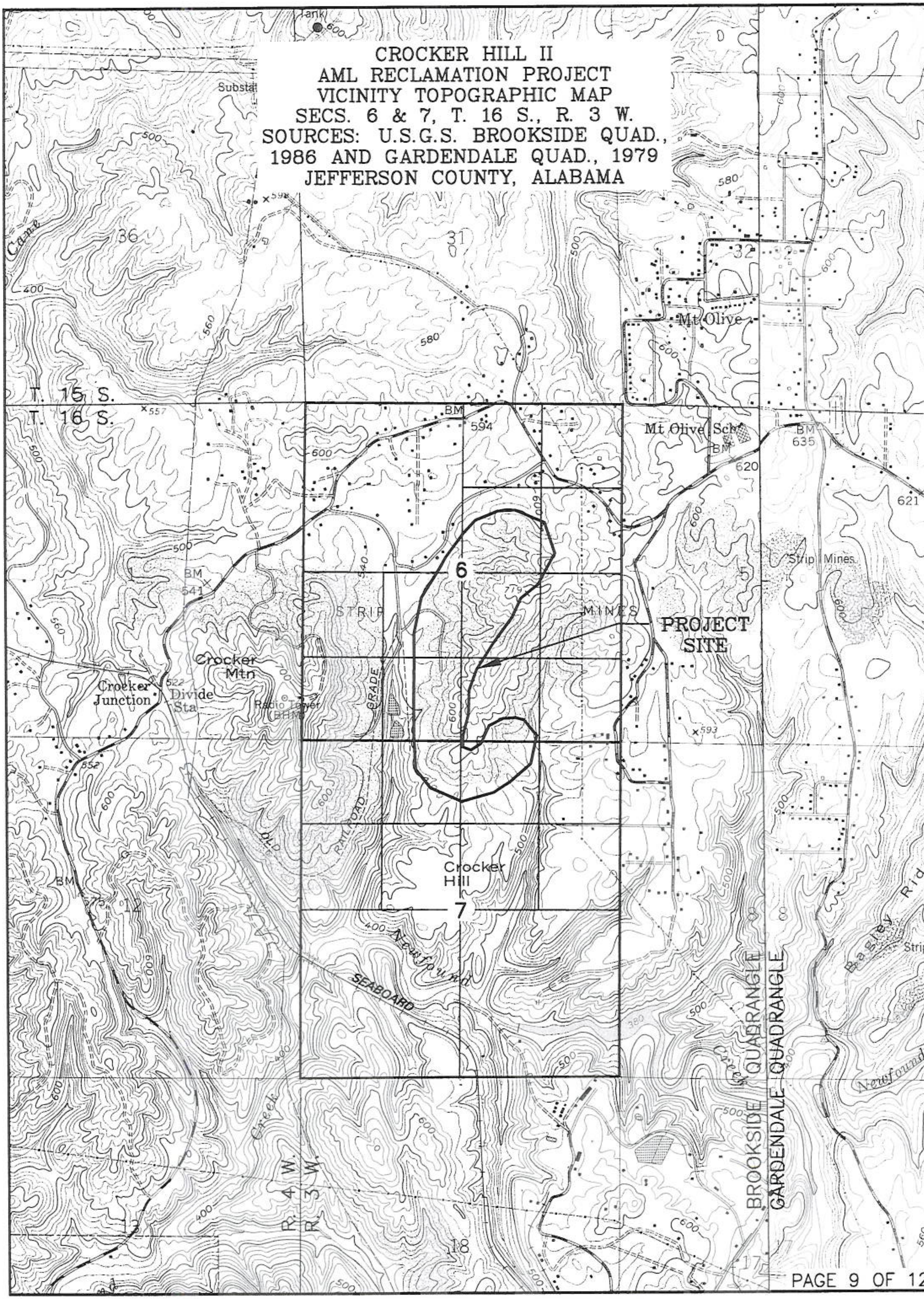
NYOTA II
AML RECLAMATION PROJECT
VICINITY TOPOGRAPHIC MAP
SECS. 3 & 4, T. 14 S., R. 2 W.
SOURCES: U.S.G.S. TRAFFORD QUAD., 1978 AND WARRIOR QUAD., 1986
BLOUNT COUNTY, ALABAMA

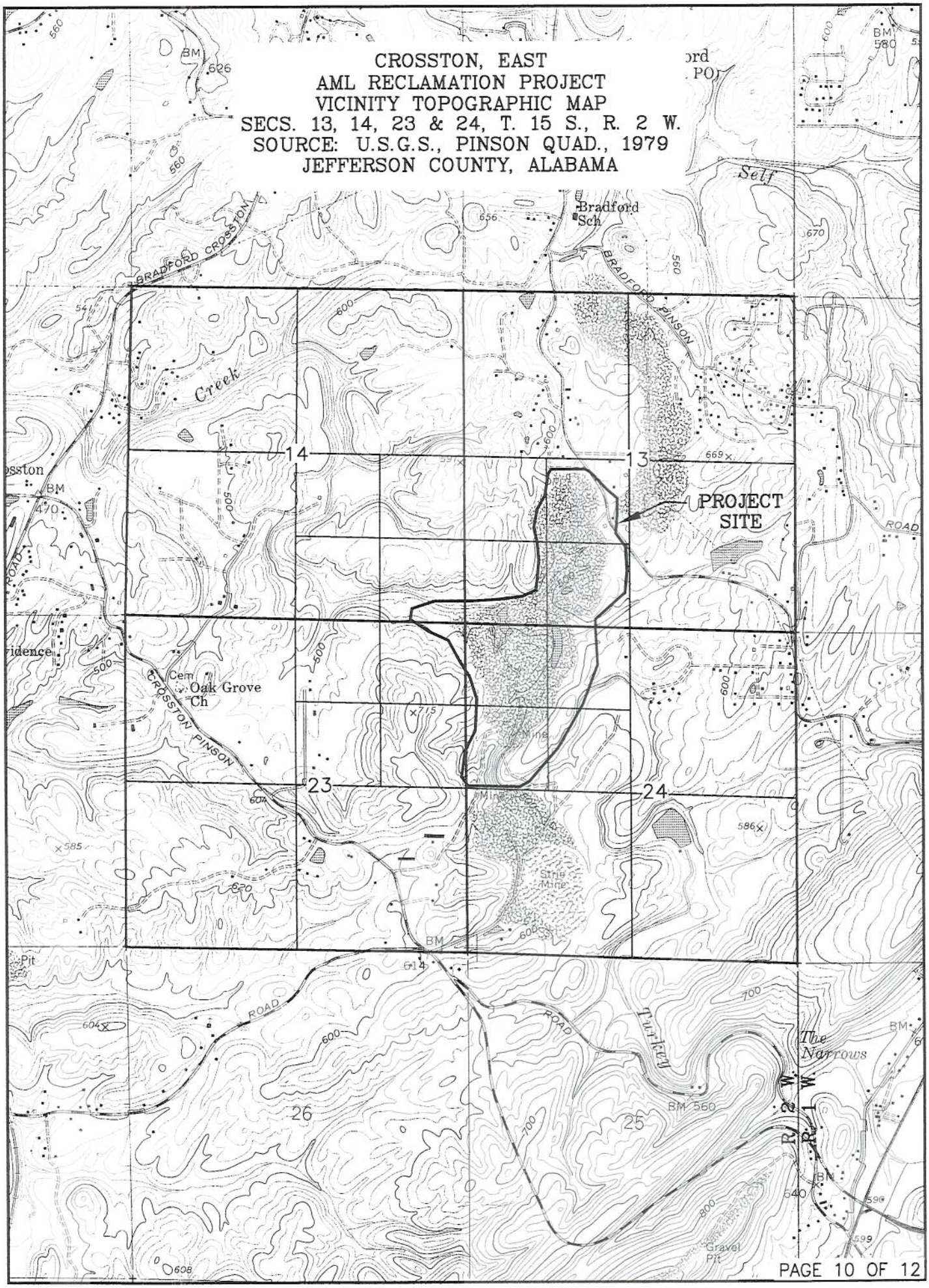


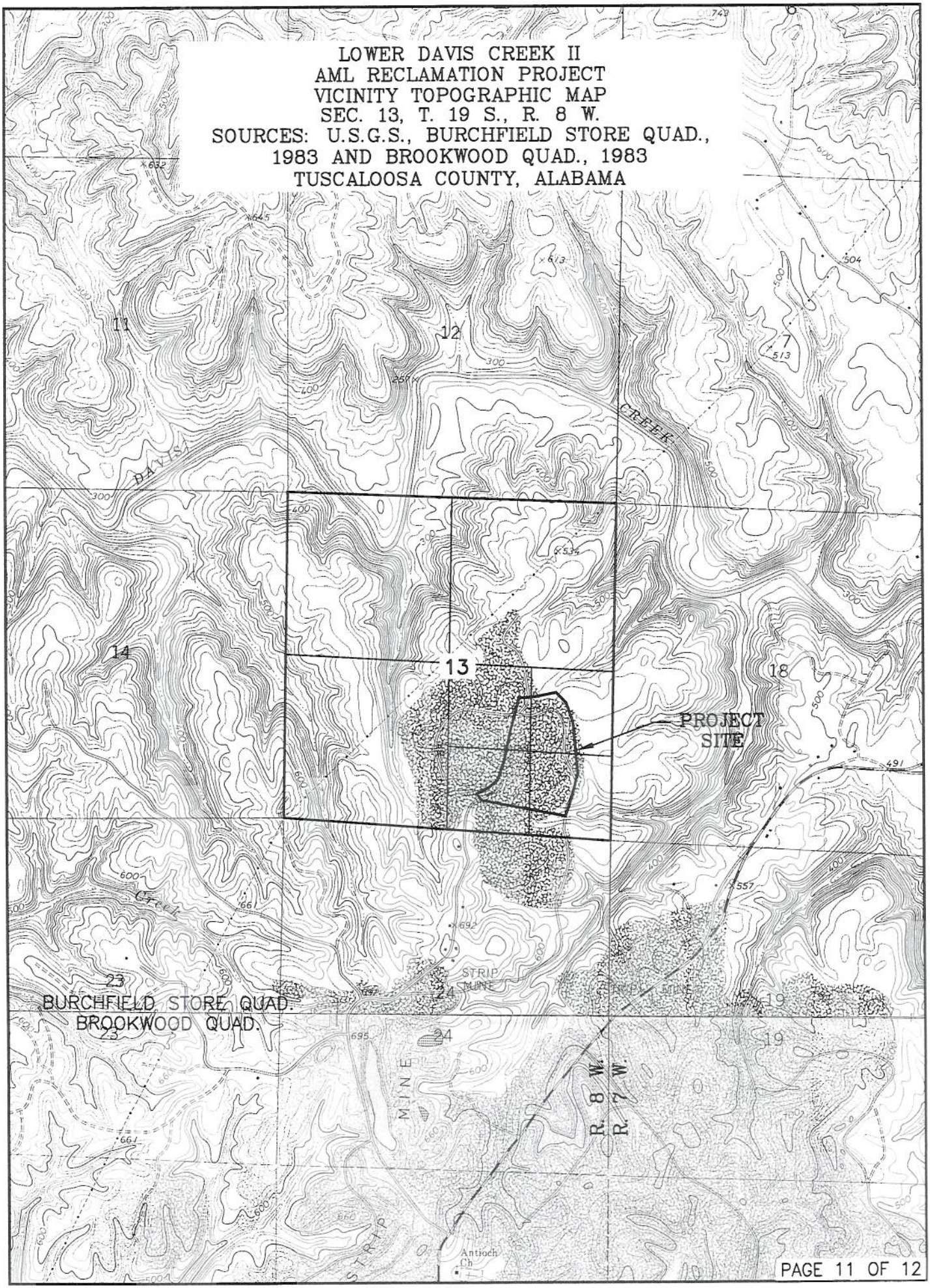
WILDCAT HOLLOW
AML RECLAMATION PROJECT
VICINITY TOPOGRAPHIC MAP
SECS. 16 & 17, T. 13 S., R. 4 W.
SOURCE: U.S.G.S. ARKADELPHIA, QUADRANGLE, 1978
CULLMAN COUNTY, ALABAMA




INDIAN CREEK
AML RECLAMATION PROJECT
VICINITY TOPOGRAPHIC MAP
SEC 27, T. 2 S., R. 9 E.
SOURCE: U.S.G.S. FLAT ROCK,
QUADRANGLE, 1983
JACKSON COUNTY, ALABAMA
Gilliam Gap
O'Neal Point
Long Creek
Miller
Newby Creek
Ladd Creek
Indian Creek
PROJECT SITE
Strip mine
BM JEB 56
1468
T. 2 S.
T. 3 S.
16
14
21
22
23
28
27
26
33
34
35


CROCKER HILL II
AML RECLAMATION PROJECT
VICINITY TOPOGRAPHIC MAP
SECS. 6 & 7, T. 16 S., R. 3 W.
SOURCES: U.S.G.S. BROOKSIDE QUAD., 1986 AND GARDENDALE QUAD., 1979
JEFFERSON COUNTY, ALABAMA
PROJECT SITE
T. 15 S.
T. 16 S.
R. 4 W.
R. 3 W.
Crocker Mtn
Crocker Junction
Divide Sta
Radio Tower
STRIP
MINES
Strip Mines
Crocker Hill
Mt Olive
Mt Olive Sch
SEABOARD
RAILROAD
GRADE
Newfound
Creek
Bagley Ridge
BROOKSIDE QUADRANGLE
GARDENDALE QUADRANGLE


CROSSTON, EAST
AML RECLAMATION PROJECT
VICINITY TOPOGRAPHIC MAP
SECS. 13, 14, 23 & 24, T. 15 S., R. 2 W.
SOURCE: U.S.G.S., PINSON QUAD., 1979
JEFFERSON COUNTY, ALABAMA
PROJECT SITE
BRADFORD CROSSTON
BRADFORD PINSON
CROSSTON PINSON
Bradford Sch
Oak Grove Ch
Cem
Creek
Self
Turkey
The Narrows
Strip Mine
Gravel Pit
Pit
ROAD
BM
14
13
23
24
26
25
T. 15 S.
R. 2 W.
R. 1 W.


LOWER DAVIS CREEK II
AML RECLAMATION PROJECT
VICINITY TOPOGRAPHIC MAP
SEC. 13, T. 19 S., R. 8 W.
SOURCES: U.S.G.S., BURCHFIELD STORE QUAD., 1983 AND BROOKWOOD QUAD., 1983
TUSCALOOSA COUNTY, ALABAMA
PROJECT SITE
BURCHFIELD STORE QUAD.
BROOKWOOD QUAD.
DAVIS CREEK
STRIP MINE
R. 8 W.
R. 7 W.
Antioch Ch
11
12
13
14
18
19
23
24


GRACE CHAPEL, EAST
AML RECLAMATION PROJECT
VICINITY TOPOGRAPHIC MAP
SECS. 22, 23 & 27, T. 14 S., R. 8 W.
SOURCES: U.S.G.S. JASPER QUAD., 1981
AND TOWNLEY QUADRANGLE, 1981
WALKER COUNTY, ALABAMA
PROJECT SITE
Grace Chapel
Hilliard
McLain Bridge
Pleasant Grove Ch
Slate Creek Sch
Dutton Hill Ch
Tubbs Hill
Bear Pen Mtn
Stub Mine
BANKHEAD
NORTHERN
Rocky
Slate
Creek
Branch
22
23
27
26
34
35
T. 14 S.
T. 15 S.
TOWNLEY QUADRANGLE
JASPER QUADRANGLE