Chapter 3 Production From Quarry and Pit Sites and Stockpiling

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Chapter 3 Production From Quarry and Pit Sites and Stockpiling

3-1 Production

3-1.1 General Instructions

In the production of crushed and screened materials, continuous and effective inspection throughout all phases of the work is essential in order for the Washington State Department of Transportation (WSDOT) to obtain the best possible product from the available material. The Project Engineer is responsible for the enforcement of all specifications governing pit operations, crushing and screening procedures, and handling and placing of the product, as well as the various specifications governing gradation and quality.

The Project Engineer and Region Materials Office provides the Inspectors with the proper tools to test and inspect the production of materials. They also ensure that facilities are available at the plant site to enable the Inspector to carry out the work in the proper manner and obtain test results which are accurate and complete. The Project Engineer makes certain that the Inspector understands the nature of the work to be performed and is acquainted thoroughly with the applicable specifications and that the Inspector is proficient in the various testing techniques.

The Inspector needs to be familiar with the methods and procedures involved in crushing and screening operations so that the Inspector can appraise the causes of troubles when they occur. The Engineer or Inspector must never attempt to tell the Contractor how to conduct their operations (except where required by the specifications), but a good working relationship with the Contractor, based on a mutual respect for each other's knowledge and ability, will do much to ensure an efficient operation and a good product.

3-1.2 Preparation of Pit or Quarry

The portion of the pit or quarry site to be used is prepared in accordance with the requirements of Section 3-01 of the *Standard Specifications*. The strippings from the pit are stockpiled or disposed of in accordance with the reclamation plan as covered in Chapter 3-3 of this manual. Care is taken in this operation so that usable material is not fouled or lost. In most cases, the manner in which the site is worked will determine how much work will be required to dress it up in accordance with the reclamation plan.

3-1.3 Sampling and Testing

Prior to sampling and testing the material produced by the contractor, the Inspector is required to satisfactorily complete the Construction Tester Qualification Program in Chapter 9 of this manual for the tests to be performed.

It is imperative that the Engineer keep the Contractor informed of test results at all times. If the material being produced does not meet the requirements of the specifications, the Contractor must be informed immediately that the material is unacceptable so that corrections may be made. The Inspector's Record of Field Tests is used to record the test results completed by the Inspector. The Contractor Foreman's copy of the test results should be delivered as soon as practical after completion of each test to the foreman in charge of producing the material. When the test results show the material fails to meet specification requirements, the Inspector shall explain in the remarks section on the test form what action was taken to correct the deficiency. This form has the twofold purpose of providing a record of the test results and of keeping the Contractor informed of the quality and gradation of the material being produced.

Several field control tests may be required by the specifications for the type of material involved. These tests include:

- screen analysis for gradation,
- sand equivalent test for detrimental fines,
- examination of the material to determine percentage of fractured pieces,
- moisture determination test, and
- organic matter content test.

The Inspector shall conduct these tests as often as necessary following the instructions for sampling and test methods described in Chapter 9 of this manual. When production is first started, and until the production has resulted in a uniform product well within specification requirements, tests need to be taken more frequently than the minimum specified. Special care must be exercised to ensure that the sample taken for testing is representative of the material being produced.

Samples are taken and forwarded to the Region Materials Laboratory or State Materials Laboratory in the amounts and at the intervals specified in Chapter 9 of this manual. Job site samples shall be obtained, tested, and recorded in accordance with the *Standard Specifications*, the contract special provisions, and Chapters 9-5 and 10-3 of this manual.

Samples of aggregate for bituminous mixtures are submitted to the State Materials Laboratory for determination of a mix design. These samples must be representative of the average grading of separate materials produced and information concerning the proportions of coarse and fine aggregates produced shall be included in the letter of transmittal. If blending sand may be required, a sample of this material shall be included in the shipment.

Ample time for testing of the materials must be allowed. A minimum time of one to two weeks is required by the laboratory to complete the tests and advise the Project Engineer of the recommended mix design. The *Standard Specifications* require allowance of 15 working days for mix design work after receipt of material and data in Tumwater.

3-1.4 Pit Operations

The Inspector must be alert to detect changes in test results, and look for evidence of changes in the character of the pit, or changes in crushing or screening procedures, as possible causes of variations. The use of production control charts provides an excellent visual means of detecting changes in the material being produced. Use of these charts is recommended for any significant production operation. Some quarries and pits contain pockets or areas of unsuitable material. The Inspector should keep familiar with the condition of the site so if areas of unsuitable material do appear, steps can be taken to bypass these materials. The inspector should also be aware of the tempo of the plant operations. A steady operation in all phases is desired. In particular, the plant should not run faster after a sample has been taken than it was prior to sampling.

Many quarries and pits require scalping to remove a portion of the fine material. When scalping is required, it is necessary for the Inspector to check to be sure the scalping screen does not become coated or plugged and allow the fine material to be incorporated into the finished product. When a scalping screen of a certain size is required in the special provisions, the Inspector shall check to see that it is of sufficient size and capacity that most of the material finer than the specified size is removed.

The Inspector must watch for evidence of segregation of the material on conveyor belts, in bunkers, or in discharging material into trucks. If any evidence of segregation is found at any stage of manufacture or handling, corrective devices, such as baffles, mixing chutes, rock ladders, etc., must be required.

3-1.5 Outline of Inspector's Duties

Some of the most important duties of inspection are listed below:

- Check special provisions for special requirements in pit operation (area to be excavated, depth of excavation, etc.).
- See that overburden is stripped from pit in proper manner.
- Watch for radical changes in the character of material in pit.
- When required, see that washing and/or scalping are conducted in a proper manner.
- See that the plant, belts and loaders operate at a constant rhythm.
- Watch for evidence of segregation of the material. Advise the Contractor to take steps to correct any segregation.
- Sampling and testing of the product by a Qualified Tester: gradation analysis, sand equivalent test, fracture, moisture, etc.
- Keep complete records of field tests.
- See that both the crushing and prime Contractors are informed of test results.
- When required, submit samples for mix design. Be sure to allow ample time for testing.
- Submit samples for determination of standard density.

3-1.6 WSDOT Furnished Material Sources

WSDOT furnished material sources normally are to be used on future projects as well as the present one so it is necessary that the material be removed in such a manner that the future usefulness of the pit is not impaired. Section 3-01.3(1) of the *Standard Specifications* requires the Contractor to submit a work plan for approval of the proposed operations in the pit before starting work in the pit so that it can be ascertained that the Contractor will not impair the future usefulness of the site.

In addition to the source containing sufficient material for the project, there should also be adequate area for the plant setup. If the project includes treated materials, consideration should also be given to provide sufficient area for the temporary stockpiling of the aggregates for the treated material and the mixing plant.

Disposal of strippings and scalpings in the site is of utmost importance if satisfactory reclamation of the site is to be accomplished with the minimum amount of work. This material should be placed where it will not interfere with future development of the site.

Surplus material accumulated during the production of specified materials will remain the property of WSDOT and must be stockpiled in the pit area where directed by the Engineer in accordance with the specifications for stockpiling material. The Contractor may be eligible for reimbursement of the production costs of the surplus material up to 110% of plan quantity or as specified by the Engineer.

If more than one source is provided in the special provisions, the Contractor may obtain the material from any of the sources. If the Contractor sets up in a site, and it is found that the quantity of raw materials from that site, when the site is exhausted, is less than that specified by WSDOT, then WSDOT may pay for moving the crushing plant in accordance with the provisions of Section 3-01.3(5) of the *Standard Specifications*. If the new source of material necessitates a longer haul of the materials, WSDOT may also pay for the additional haul as specified.

3-1.7 Pit Evaluation Report

When the Contractor has completed work in a WSDOT furnished material source, the Project Engineer shall prepare a pit evaluation report on Form 350-023. The information contained in these reports is needed to determine the future use of the pit. Also the information is very helpful in preparing plans for future projects in estimating stripping or special requirements that may be necessary to produce satisfactory products.

3-1.8 Contractor Furnished Material Sources

If the Contractor is required to furnish a source of materials or elects to use materials from a source different from those provided by WSDOT, the Contractor shall make arrangements for obtaining the materials and testing the source at no expense to WSDOT. The contractor shall submit Request for Approval of Material, Form 350-071, identifying the source. If sampling is required, the contractor is responsible for providing the preliminary samples which are taken at locations designated and witnessed by the Region Materials Engineer or a designated representative. Use of the materials from the Contractor's source will not be permitted until after the materials have been tested, the source approved, and authority granted for the use of it. Acceptance of the materials will be based on their meeting the requirements of the specifications at the point of acceptance in Chapter 9-5.3.

If the Contractor has elected to use a source listed in the Aggregate Source Approval (ASA) Data Base, and the material has been approved for the intended use, the Project Engineer can approve the Contractor's request. If the Contractor has selected a source not in the ASAe Data Base, a preliminary sample will be required. The Project Engineer can approve the request based on test results showing the material meets the specifications for which its use is intended.

Before preliminary samples of the materials are taken, the Contractor is required to have done enough testing of the source to ensure the quantity of material available so samples can be obtained which are representative of the material available from the source. The material in the Contractor's source must be of a quality equal to or better than that of the WSDOT provided source if test values are listed in the special provisions, otherwise they must meet the minimum specification requirements. Any surplus screening accumulated during the manufacture of specified material will remain the property of the Contractor.

When measurement is by mass and the specific gravity of the material in the Contractor's source is greater than in the specified source, Section 3-01.4(1) of the *Standard Specifications* require that any additional material required to construct the minimum specified surfacing depth shall be furnished by the Contractor at no cost to WSDOT. The following procedures shall be used to administer the specification:

When the Contractor's source of material has a specific gravity greater than the WSDOT provided source, a variation up to and including 0.05 above the specified source will be considered within the limit of working variation and will not affect course depths by a measurable amount. A variation in specific gravity greater than 0.05 will require a correction item for a credit deduction in treated and untreated items to compensate for the heavier materials. The credit deduction will be based on the following formula.

$$T \times \frac{C - (S + 0.05)}{(S + 0.05)} = D$$

Where
- T = Gross Mass of Product Furnished in Tons (tonnes)
- C = Specific Gravity of Contractor's Source
- S = Specific Gravity of WSDOT Furnished Source
- D = Credit Mass to be Deducted in Tons (tonnes)

Payment under the item will be made for:

$$T - D = \text{Net Tons (tonnes)}$$

The preparation, production, and cleanup of the Contractor's material sources shall conform to the requirements of Section 3-01.4 of the *Standard Specifications*. Clearing, grubbing, and stripping are not to be paid for on contractor's sources.

3-1.9 Measurement and Payment

Clearing, grubbing, and stripping WSDOT furnished quarries, pits, plant sites, and stockpile sites are pay items only when they are included as bid items in the contract. The area to be used to obtain material, for plant setup and any necessary stockpiles, shall be staked and measured for clearing and grubbing as specified in Chapter 2-1 of this manual. The area to be stripped must be staked and final ground measurements taken to determine the volume of material excavated. It is important that an area be stripped which is slightly larger than the area required for the material. This will permit stripping additional area without leaving some material to contaminate the pit and it will also prevent working the pit to the edge of the strippings.

Measurement and payment for particular aggregates produced shall be as specified in the appropriate sections of the *Standard Specifications*.

3-2 Stockpiling

3-2.1 General Instructions

Stockpiles shall be constructed in conformity with the provisions of the *Standard Specifications*. The area upon which the material is to be stockpiled is prepared carefully by removing all vegetation and constructing a uniform, flat ground surface. Preparation of a good base for the stockpile will minimize wastage of material, and will prevent contamination of the material when removing it from the stockpile.

The Engineer indicates to the Contractor the location of each proposed stockpile by placing marked stakes at each corner of the area to be used. If the material is to be stockpiled for later use by the Contractor, as in the case of aggregates for bituminous mixtures, the Engineer must consult with the Contractor and locate these stockpiles to conform with Contractor's plans for erecting the mixing plant, etc.

Stockpiles shall be located to ensure easy access by trucks and loading equipment and care must be exercised to see that a sufficient distance is maintained between the various stockpiles so there will be no possibility of mixing the various classes of materials. For all stockpiles, the maximum height is 24 feet (7.5 meters). For stockpiles in excess of 200 cubic yards (200 cubic meters), the material shall be placed in the stockpile in layers not to exceed 4 feet (1.2 meters) in height, and in such a manner that segregation of the fine and coarse portions of the material does not occur. The Inspector must be watchful to see that segregation is held to a minimum. End dumping, dozing material over the side of the stockpile, or allowing material to roll down the slope is not permitted as severe segregation will occur as a result of such procedures.

After completion of each lift of material during the construction of a stockpile, it is common practice to use a pneumatic dozer to level the top of the lift before placing the next layer. This practice may be permitted but the Inspector must see that the operation of the dozer is limited to the minimum amount of work required to level the top of the layer, as excessive operation of the dozer on the pile can result in serious degradation of the material. If it is known that the stone is rather soft and subject to severe degradation under abrasion, the use of dozers on the pile must be prohibited and the pile leveled by hand or other methods which will eliminate the possibility of excessive degradation of product.

It is important to protect stockpiles from becoming contaminated with mud or other material tracked onto the stockpile. If the surrounding ground is wet and soft, or for any reason contaminates are carried onto the stockpile, the Contractor shall provide a means of preventing the contaminates from contaminating the stockpile. This may be by the placement of granular material on the haul routes to keep the equipment tires clean.

When the Contractor is stockpiling two or more classes of materials at the same time, the Inspector must be alert to see that the materials are placed in the proper stockpiles. A few loads of fine screenings inadvertently placed in a stockpile of coarse screenings can destroy or greatly reduce the quality of a large amount of material.

The Inspector is cautioned to be especially alert when stockpiling is being done during hours of darkness to see that all phases of the work are carried out in accordance with the specifications. In many instances, when difficulties are encountered in the use of stockpile material, it is found that the trouble occurred during the night shift when inspection and testing work are very difficult to accomplish in the proper manner. If the Contractor elects to stockpile aggregates prior to use in the immediate work, the requirements of Section 3-02.2(4) of the *Standard Specifications* must be complied with. The Project Engineer's attention is directed to Section 3-02.3 of the *Standard Specifications* for additional requirements for stockpiling certain aggregates.

Some of the important duties of the inspector are listed below:

- See that stockpile area is prepared properly.
- Stake each corner of proposed area for piles.
- Watch to see that material is placed in the stockpile in an approved manner.
- Watch for evidence of degradation or segregation of the material in the pile.
- See that piles are kept separate and are neatly finished.

3-2.2 Measurement and Payment

Clearing and grubbing of the stockpile site are pay items only when they are included as bid items in the contract. The area to be used for stockpiles shall be staked and measured for clearing and grubbing as specified in Chapter 2-1 of this manual.

Measurement and payment of stockpiled aggregates will be in accordance with Sections 3-02.4 and 3-02.5 of the *Standard Specifications*.

3-3 Site Reclamation

3-3.1 General

All surface mines are to be reclaimed in accordance with RCW 78.44 Surface Mining Act and the Contract Reclamation Plan. Section 3-03 of the *Standard Specifications* covers the requirements for site reclamation.

The intent of site reclamation is to develop an area that remains useful and aesthetically pleasing in appearance after the materials are removed from the site.

Costs involved in complying with the requirements and restrictions imposed by WSDOT, the Department of Natural Resources (DNR), or other agencies in order to comply with the Surface Mining Act do not constitute a basis for additional compensation. Any request for an extension of time resulting from plan approval delays will be considered only if complete and adequate plans were submitted in a timely manner.

To permit positive identification of the pit sites when the various surface mining forms are filled out, the pit site number should be included in the description box in the upper right hand corner of the forms.

3-3.2 Contractor Furnished Sources

Upon completion of seeding and/or planting, Form SM-3 shall be completed by the Operator and forwarded to the appropriate DNR Area Management office.

Sites operating under a valid reclamation permit issued by DNR will not require a plan to be submitted to the Engineer, nor the DNR form, since the Contractor will be corresponding directly with DNR. Evidence of the permit and the conditions contained therein shall be furnished by the Contractor to the Project Engineer. DNR shall perform the inspection and administration of these sites.

Sites with less than 3 acres (1.2 hectares) of newly disturbed land or with walls less than 30 feet (9.15 meters) in height and one to one or flatter slopes, waste sites, and stockpile sites are not surface mines and do not come under the provisions of the Surface Mining Act but must be reclaimed in accordance with the contract plans.

3-3.3 WSDOT Furnished Sources

Contract reclamation plans for sources furnished by WSDOT will normally be included in the contract plans. When this is not done, or when a change to another state source is required, a new plan shall be prepared by the Project Engineer and submitted to the Region Materials Office for review. The Region Materials Office will review the contract reclamation plan to verify that it is in compliance with the DNR Reclamation Permit. The Project Engineer prepares the plan and related papers in accordance with the instructions issued by the Environmental and Engineering Programs Division. These instructions are located in Section 460.05 of the *Plans Preparation Manual*.

Upon completion of seeding and/or planting the source, the Project Engineer shall complete the SM-3 form and forward to the appropriate DNR Area Management office for all sites that come under the provisions of the Surface Mining Act.

3-3.4 Reclamation of Stockpile and Waste Sites

Reclamation plans are not required for stockpile or waste sites. However, all stockpile and waste sites are to be graded to the extent necessary to control erosion and provide satisfactory appearance consistent with anticipated future use.

Compliance with the State Environmental Policy Act (SEPA) is required for sites on WSDOT right of way involving more than 100 cubic yards (76 cubic meters) of excavation or landfill throughout the lifetime of the site. For waste sites not on WSDOT right of way, the contractor must comply with the SEPA regulation adopted by the local jurisdiction. Sites involving more than 500 cubic yards (382 cubic meters) of excavation or landfill throughout the lifetime of the site always require compliance with SEPA.

As an assurance of compliance, it is recommended that a site plan for reclaiming stockpile and waste sites be agreed upon by the Region and the Contractor.

In areas where local City or County ordinances exercise control of stockpile or waste sites, the Contractor shall submit copies of the governing agency's permit and evidence of approval by the property owner to the Project Engineer.

In all cases, the Region will be expected to inspect the sites, devoting special attention to aesthetics and ensuring that any diversion of drainage waters due to the wasting or stockpiling operations will not produce any adverse conditions.