


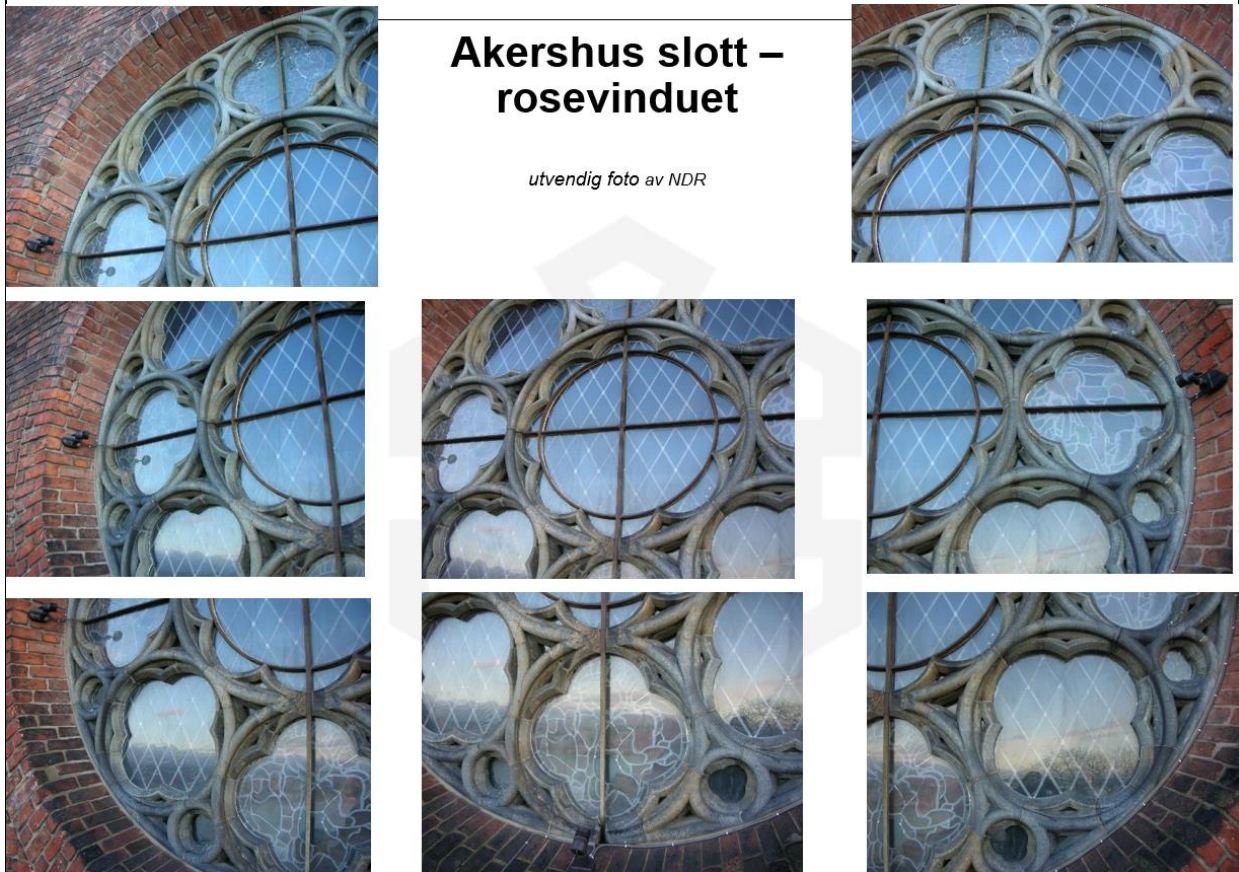
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Chapter	Code/Specification
00	INTRODUCTION
00.01	<p>Content Overview</p> <ul style="list-style-type: none"> 00 Introduction 01 Rigging and operation 02 Masonry and soapstone works 03 Stained glass - with options <p>Appendices:</p> <ul style="list-style-type: none"> - Dimensions of gates at Akershus Fortress. - Restoration Workshop of Nidaros Cathedral (NDR): Condition report, Rose Window, Nov./Dec. 2009 - NDR: Report on Akershus Castle – Rose Window Restoration 9/2001 - NDR: Report from Emanuel Vigeland Museum, Trondheim, 11 September 2013 
00.02	<p>BRIEF DESCRIPTION OF THE MEASURES REQUIRED</p> <p>The Norwegian Defence Estates Agency is planning the following measures:</p> <ol style="list-style-type: none"> 1. Restoration of the soapstone window tracery. 2. Replacement of the clear glass, either with a recreation of Emanuel Vigeland’s original stained glass windows or with coloured leaded glass. <p>This contract includes repair and maintenance of the tracery, as well as removal and installation of glass panels. Four quatrefoil panels and five trefoil panels are to be lightly restored. Two alternatives for replacing the glass panels have been described.</p> <p>The description follows recommendations given by the Restoration Workshop of Nidaros Cathedral (NDR). The recommendations are made on the basis of an inspection made from a crane outside and</p>

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a single scaffold inside. NDR states that its recommendation is contingent on their having interpreted the construction and the damage correctly. The description is based on NDR's recommendation. However, the Norwegian Defence Estates Agency does not disregard the fact that the task of renovation can be carried out in a different manner in consultation with the Client.

NDR has recommended that the tracery must be dismantled, part by part. The outermost part of the tracery can probably be left as is, if possible. The stones in the worst condition must be replaced with new cut stones, and the iron bars must be replaced with a stainless metal (e.g. acid-resistant steel). Soapstone with minor damage must be restored. NDR further recommends using dowels in acid-resistant steel between the stones and that the joints are filled with suitable hydraulic lime mortar.



All glass panels without stained glass shall be replaced with recreated stained glass or coloured glass. Alternative designs are described in more detail in chap. 03 Stained glass with options.

00.03

HISTORY

The construction of Akershus Castle started in 1299 as a castle and residence for King Håkon V Magnussen. The north wing was originally built with a royal hall upstairs. After a major fire caused by lightning in 1527, the castle fell into disrepair, and large parts of the upper floor were demolished. The north wing with the upper floor was completely restored around 1915–1917 by the architect Holger Sinding-Larsen and the interior was finally completed by the architect Arnstein Arneberg. This includes the tracery for the rose window. Shortly afterwards, Emanuel Vigeland was commissioned for the stained glass windows.

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The Filipstad explosion in 1943 ruined the rose window, and more than half of its stained glass was destroyed. The tracery was later repaired, and simple leaded glass windows with clear glass were installed in all glass panels. In 2001, the best-preserved stained glass was restored and remounted under the auspices of the Akershus Castle Friends Association. Four of the nine large window panels thus have original stained glass windows.

Emanuel Vigeland's full scale working drawings were found in 2009. Later the remains of the other stained glass windows were found; these will form the basis for a possible reconstruction of the stained glass windows.

The rose window belongs to a significant work of art, Emanuel Vigeland's most important non-ecclesiastical work. The rose window's tracery consists of 56 profiled stones with 17 stained glass panels, of which nine are large. In addition, there are 64 small triangular openings with stained glass spread evenly over the window.

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PRESERVATION STATUS

Akershus Castle was originally built in the Middle Ages and is automatically protected under Section 4 of the Cultural Heritage Act.

This means that all measures that go beyond normal maintenance (narrow definition) must be approved by the cultural heritage authorities.


It also means that the contractor can be liable for damage to the cultural monument. This also applies to any damage caused, through transport or in the workshop, to parts (stone or glass) of the rose window.

The outdoor area is also automatically protected. This means that applications must be made for approval for all digging and foundations in the ground. If the contractor plans to dig or otherwise


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	<p>impact the environment, this requires dispensation from the regulations. The Norwegian Defence Estates Agency will be responsible for any applications to the Norwegian Directorate for Cultural Heritage with documentation from the contractor. The contractor must anticipate case processing time before measures beyond those described can be initiated.</p> <p>Placement of temporary rigging with the necessary pressure distribution on the ground is not considered to require an application for approval.</p> <p>Necessary permission The Norwegian Defence Estates Agency has received the necessary permission from the Norwegian Directorate for Cultural Heritage for the described works, including full reconstruction of the lost stained glass windows. If there are significant deviations from the description, the cultural heritage department at the Norwegian Defence Estates Agency will have to obtain permission from the Norwegian Directorate for Cultural Heritage.</p>
<p>00.04</p>	<p>BRIEF DESCRIPTION OF THE CONDITION OF THE WINDOW</p> <p>The rose window has for a long time been assessed as condition grade 3 (severe symptoms) and consequence grade 3 due to the danger that loose glass and stone pieces will loosen and fall down.</p> <p>In 2009, the Restoration Workshop of Nidaros Cathedral (NDR) carried out a condition analysis which concluded that the bracing iron crosses has rusted and created tension in the soapstone tracery. Several soapstone sections also have other weaknesses. In addition, some of the lead glass fields have shifted. See further details about the condition in NDR's condition report.</p>
<p>00.05</p>	<p>GENERAL PROVISIONS</p> <p>The performance requirements that are not described in the tender documentation are part of the contractor's obligation, even if they are not repeated in price-bearing items. Transport, materials and workmanship shall be included in all price-bearing items, as long as nothing else is specified.</p> <p>Work shall generally be carried out in accordance with NS 3420 ed. 4 with the requirements and prerequisites given here and the standards referred to, where nothing else is specifically mentioned. Even if no reference is made to the codes in NS 3420, requirements and provisions in corresponding items will apply. In cases where there are conflicting provisions between NS 3420 and this description, provisions given in this description take precedence over NS 3420.</p> <p>Specification of technical regulations and requirements for materials and workmanship are stated in the individual subject chapters.</p> <p>All executing parties have a duty to control adjacent disciplines and facilitate collaboration as much as possible to ensure a good and lasting result. The main contractor is responsible for coordinating this.</p>

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Chapter	Code/Specification	Unit	Quantity	Price	Total
01	<p>RIGGING AND OPERATION</p> <p>The rigging and operation chapter follows NS 3420 for specified codes with associated provisions. The price shall include rigging and operation for implementing the subject chapters, including chapter 03, regardless of which solution is chosen. Additional rigging and operation costs for the completion of additional work, if applicable, are calculated on the basis of the rigging and operating prices stated in this chapter.</p> <p>Akershus Castle is located on a hill. There is no access to the workplace for large vehicles. Smaller vehicles can enter the inner fortress, but transport must pass through several brick gates, which have height and width restrictions. Damage to the protected gates cannot be accepted. Possible access routes will be indicated during the tender inspection. The dimensions of the gate openings on the access road to the rose window are shown in the appendix.</p>  <p><i>Worksite indicated with a red ring</i></p>				

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Chapter	Code/Specification	Unit	Quantity	Price	Total
01.01	<p>AV1.1A (NS 3420 Code) ESTABLISHMENT OF CONSTRUCTION SITE FOR OWN CONTRACT WORK Round total <i>Location:</i> The rigging site will be designated. Scaffolding on the west wall of the north wing and scaffolding inside the Olav V's hall. Note restrictions on transport routes. Height above the ground to the upper edge of the Rose window is approx 15 m. Rose window has a diameter of 1.8 m. The width of the bottom between the wall and the emergency exit is 7.7 m. The toilet in the building can be used. Parts of the Olav V's hall can be used by the contractor.</p>  <p><i>Other requirements:</i> a) Scope and price basis It is the contractor's responsibility to choose the rigging required for the delivery to be as expected and approved by the Client. Masonry scaffolding must be used on the outside, with optional scaffolding on the inside. Scaffolding must be adapted for the efficient transport of materials up and down. Exterior scaffolding must be covered and secured with climbing protection for unauthorised persons. There should be a top cover that protects the work/rose window. An escape route from the building must be established. See the door in the escape route in the picture below). Coverage and protection of cobblestones and terrain must be included.</p>	RS			

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	<p>All floors indoors in the work area are covered with OSB/plywood to avoid damage to the floor. Ventilation extraction must be covered for dusty work, possibly by creating a "plastic box" with a lock and a separate extraction system where dusty work is carried out.</p> <p>A closed box that closes inside the entire window and the area being worked on is probably the best solution. For example, a light scaffolding that is covered with plastic. Separate extraction is carried out through a temporary window.</p> <p>The contractor is generally responsible for avoiding damage to roads, terrain, adjacent buildings, other parts of the building and to gates during transport.</p> <p>The code-specific requirements in NS3420 apply to the code stated.</p>				
01.02	<p>AJ8.22 (NS 3420 code) PREPARATION OF WASTE PLAN</p> <p><i>Other requirements: No</i></p> <p>The code-specific requirements in NS3420 apply to the code stated.</p>	RS			
01.03	<p>AV2.1A (NS 3420 Code) OPERATION OF CONSTRUCTION SITE FOR OWN CONTRACT WORK</p> <p><i>Location: specified rigging site</i></p> <p><i>Other requirements:</i></p> <p>a) Scope and price basis</p> <p>Waste must be removed on an ongoing basis to the agreed intermediate storage location outside the inner fortress.</p> <p>The coverings required along the route must be included in the price.</p> <p>The code-specific requirements in NS3420 apply to the code stated.</p>	RS			
01.04	<p>AV3.1 (NS 3420 Code) DECOMMISSIONING OF CONSTRUCTION SITE FOR OWN CONTRACT WORK</p> <p><i>Location: specified rigging site</i></p> <p><i>Other requirements:</i></p> <p>a) Scope and price basis</p> <p>There shall be no damage to roads, squares or adjacent buildings or indoors after dismantling.</p> <p>The code-specific requirements in NS3420 apply to the code stated.</p>	RS			

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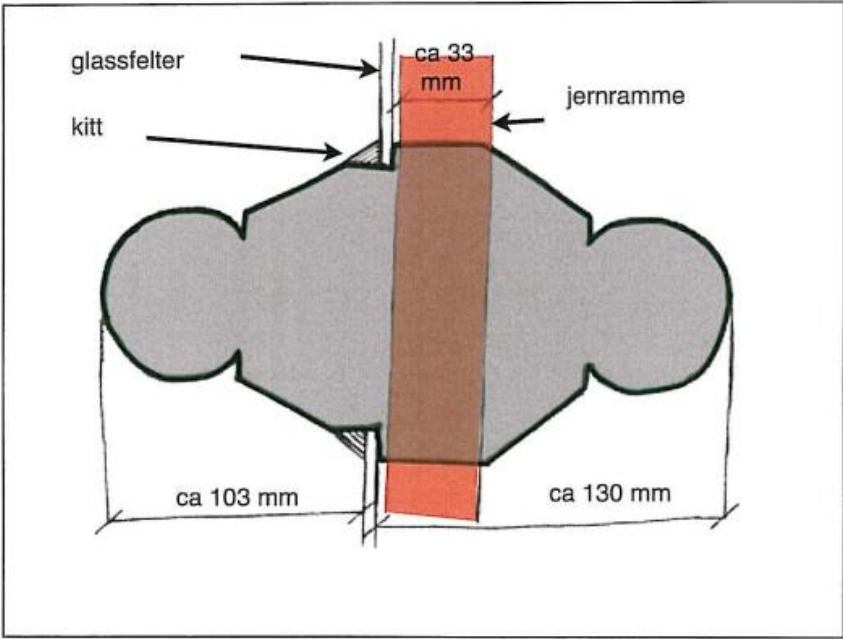
Chapter	Code/Specification	Unit	Quantity	Price	Total
01.05	AQ1.220A (NS 3420 code) FINAL BUILDING CLEANING FOR OWN CONTRACT WORK - ROUND TOTAL TIME: During and after dismantling the rigging. <i>Area specification:</i> Applies especially to the area in the Olav V's hall and supply roads. <i>Other requirements:</i> a) There should be no damage to the interior and fixtures. The code-specific requirements in NS3420 apply to the code stated.	RS			
01.06	Mandatory stoppages to the work per day due to notified events Applies to entire individual days work cannot be carried out due to an imposed stoppage. The Client must provide notice at least three working days in advance. Adjustable amount according to the actual number of days	days	10		
01.07	Mandatory stoppages to work per day due to notified events Hours during a working day in the event of an imposed stoppage to work The Client must provide notice no later than the day before. The item is used when the daily rate is more expensive. Adjustable amount according to the actual number of hours	hours	20		
02.10	Preparation of MOM documentation MOM (Management, Operation and Maintenance) documentation shall be submitted on two memory sticks. A sample of MOM documentation must be approved by the Client. MOM documentation must contain information about all new products, with product data sheets where available. The work that has been carried out must be documented through photos and descriptions. The choice of methods and materials must be justified.				
02.10.01	Preparation of MOM documentation	RS			
	Total accumulated chapter 01 Rigging and operation				



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Chapter	Code/Specification	Unit	Quantity	Price	Total
02.01	GENERAL INFORMATION ABOUT MASONRY AND SOAPSTONE WORK				
02.01.01	<p>SCOPE</p> <p>The entire rose window shall be restored, including the iron cross and fastenings in the brick masonry. The rose window has a circular shape with a radius of approx. 1760 mm. The tracery is symmetrically built around a central field. The tracery consists of 56 profiled stones carved in soapstone. An iron cross, anchored into the brickwork, braces the entire window.</p> <p>The central window panel is an eight-section window, which is surrounded by eight quatrefoil windows, which in turn are surrounded by eight small trefoil windows. In addition, there are 64 small triangular light openings.</p> <p>In brief, the work includes:</p> <ul style="list-style-type: none"> - Documentation - Removal of glass panels (covered by Chapter 03 Stained glass) - Packing and safe transport of soapstone and stained glass to and from the workshop - Preservation of glass panels (covered by Chapter 03 Stained glass) - Cleaning out joints - Dismantling of soapstone - Replacement of iron cross - Restoring the stone around the anchoring of the iron cross - Masonry work on soapstone - Final pointing of joints - Insertion of glass (covered by chapter 03 Stained glass) <p>There is an option for repointing the brick wreath, 1½ stones in the outer reveal.</p> <p>All quantities in the description for the masonry work are adjustable.</p>				
02.01.02	<p>EXECUTION</p> <p>Lamps and cabling must be dismantled (for later reassembly) before the masonry work starts.</p> <p>The masonry work shall be carried out in accordance with antiquarian principles of work on listed buildings. Damage is not acceptable beyond what is described by repair work.</p> <p>Documentation, cleaning out joints and disassembly</p> <p>The tracery must be well documented before dismantling. It must be registered which stones are to be restored and which are to be replaced. The contractor chooses the documentation method which must be approved by the Client.</p>				

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	<p>It is a requirement that the same bricklayers (or conservators with bricklaying experience) work on the repointing and masonry of soapstone that are also responsible for cleaning out joints and disassembly work.</p> <p>All cleaning out joints and disassembly must be carried out with care and gently without inflicting new damage.</p> <p>Soapstone must be disassembled for possible reuse. The condition of each stone must be documented and assessed as to whether or not the stone is suitable for reuse or can be restored. It must be transported and stored in an appropriate manner so that it is not damaged.</p> <p>Masonry around iron anchoring After inserting a new metal cross, the masonry around the anchorage must be fixed in place. Stone shall be inserted, and new joints will be laid, without spilling onto other parts of the masonry. Repointing is performed with filled joints to be compacted. The necessary covering must be included in the items.</p> <p>Cutting of new soapstone New stones shall be carved as exact copies of the original ones. Sectional drawing from NDR below.</p>  <p><i>25: Prinsippskisse av grindverkets snitt ved gjennomføringen av jernrammen.</i></p> <p>Masonry work on soapstone Soapstone shall be joined together with the use of lead wedges and dowels. On such a complicated construction, it is essential to have control of the lines in the tracery before locking and pointing of the joints. Lead wedges can be reused but can also be supplemented as needed.</p>				

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	<p>Repointing of the joints, soapstone The narrow joints between the soapstone must be jointed internally and externally with suitable mortar, lime-based, hydraulic or KC mortar. The bidder proposes the use of mortar, which must be approved by the Client.</p> <p>Repointing of the joints in the exterior of the brick wreath (option) Requirements are stipulated for bricklayers who are to work on repointing and replacing the stone, who are also responsible for cleaning out joints and disassembly.</p> <p>All cleaning out joints and disassembly work must be carried out with care without inflicting new damage.</p> <p>The joints must not be smoothed but must have the structure formed by compaction with the pointing pin. If applicable, bumps and edges of excess mortar shall be brushed away with a dry brush. Finishing work with shrinkage cracks shall be carried out using compaction. Wet rubbing with a broom or sponge shall not be used.</p> <p>Joint masonry work All masonry work shall be pre-watered, post-watered and covered in accordance with the current conditions on site and the relevant mortar in use. The contractor shall demonstrate understanding of the relationship between the time it takes for the mortar to harden, reduce suction and thus withstand frost, and how long their own work must be covered. It is the contractor's responsibility to ensure that this is done correctly, and that rigging and operation of scaffolding and covering make this possible.</p> <p>The work is planned so that all mortar work is carried out in the period April - September. Exterior lime work must be covered as necessary to ensure adequate hardening and carbonation. It is the contractor's responsibility to calculate how long will be needed, and this shall be stated in the contractor's progress plan. The costs for this shall be included in the item for the operation of scaffolding, including rental costs.</p> <p>All records shall include the local rigging of tools and materials required for the execution of the individual item at all times. All temporary covering that is necessary to protect adjacent building parts and the environment must at all times be assessed by the contractor, and the costs shall be included in the relevant item.</p> <p>All waste shall be transported daily to the waste site the contractor has rigged on the construction site. The costs for this shall be included in the items here. The costs for the rigging and operation of such a waste station shall be included in the chapter for rigging and operation.</p>				

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02.01.03	<p>MATERIALS Price-bearing items with adjustable quantities, with the exception of hourly items, shall generally include all necessary materials already delivered and prepared for use and distribution on the construction site, as well as those installed in the finished product. This applies to all materials that must be included in a complete delivery of the individual item.</p> <p>Grout mortar NDR believes the tracery to be grouted with cement mortar or a lime-cement mortar. Mortar samples shall be submitted for analysis to clarify the original mortar. Grout mortar in the brick wreath shall be adapted to existing mortar and adjacent mortar. The contractor's choice of mortar must be approved by the Client.</p> <p>Wedges Lead wedges/lead plates used to adjust the distance between the stones have been found. From this, it is deduced that the tracery is of drystone, wedged and finally grouted. It appears that two different thicknesses of lead wedges have been used. Lead wedges must be reused and supplemented as needed. The contractor shall propose the type of wedges for use during masonry.</p> <p>Dowels NDR has not found any evidence that dowels have been used. For masonry, the use of dowels between the stones is proposed. The contractor shall propose the type and material.</p> <p>Metal frame The tracery is bricked around iron rods designed as a cross with a ring in the center field. The iron has a trapezoidal cross section measuring widths of 10 to 24 mm, and a depth of about 33 mm. The iron frame is anchored into the brick masonry.</p> <p>Soapstone For new cutting of new soapstone, a type of soapstone must be used that harmonises well with the existing one and at the same time has the necessary durability properties. The type of soapstone must be approved by the Client.</p> <p>Materials for preserving soapstone The type of glue must be stated and approved by the Client.</p> <p>The contractor's recommended materials for the work to be performed: (to be filled in by the bidder)</p> <p><i>Mortar for joints between soapstone (Binder, the fraction of sand, if applicable other constituents):</i></p> <p>.....</p>				



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	<p><i>Mortar for joints in brick masonry (Binder, fractional sand, if applicable other constituents):</i></p> <p>.....</p> <p><i>Type of dowels between stones:</i></p> <p>.....</p> <p><i>Product for injecting into soapstone with cracks:</i></p> <p>.....</p> <p><i>Product for glueing soapstone:</i></p> <p>.....</p> <p><i>New soapstone:</i></p> <p>.....</p>				
02.02	Documentation				
02.02.01	<p>Surveys and methodology Contractors are given the opportunity for further inspections after the scaffolding has been set up. The method for improvement work shall be presented in writing. The method must be approved before start-up. Up to 30 hours will be covered according to approved timesheets. On the basis of the inspections, the contractor shall present a method for documentation and restoration. Timesheets shall be submitted.</p> <p>In addition, mortar samples shall be taken and sent to Seir Materialanalyser. The costs for mortar analysis are covered by the agreed surcharge.</p>	hours	30		

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02.02.02	Documentation before disassembly Construction and composition shall be documented for use in masonry at a later stage. The documentation method must be approved by the Client.	RS			
02.02.03	Documentation during disassembly Pictures shall be taken during the disassembly process that shows the composition of the Rose window.	RS			
02.03	Cleaning out joints Performed after all glass has been disassembled. All items have adjustable quantities.				
02.03.01	Cleaning out joints between the soapstone This applies to the necessary cleaning out joints between the soapstone before disassembly. This is partly carried out to gain enough insight so that the individual stone can be dismantled in a controlled manner. Further scrubbing after disassembly. After the disassembly, it must be scrubbed to a sufficient depth in joints between the soapstone in the wreath that is not to be disassembled. All cleaning out joints must be done with care without damaging the soapstone. Damage to soapstone cannot be accepted. Varying lengths of the joints.	pieces	66		
02.03.02	Cleaning out the outer joint between soapstone and brick wreath All cleaning out joints must be done with extreme care without damaging the soapstone. Damage to soapstone cannot be accepted.	lm	5,6		
02.03.03	Cleaning glass flanges Careful and necessary cleaning of glass flanges, so that the conservator can approve this as a basis for the necessary priming and application of linseed oil putty. Performed partly on site, partly in a workshop. The item has adjustable quantities. Carried out as hourly work, timesheets must be submitted.	hours	40		
02.03.04	Option: Cleaning out of brick joints in the wreath around the rose window Applies to rejoining of the brick wreath, measured by exposed area.	m ²	4		

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Chapter	Code/Specification	Unit	Quantity	Price	Total
02.04	Disassembly of tracery and individual bricks Careful disassembly. All disassembly includes transport and storage. All items have adjustable quantities. Carried out as hourly work, timesheets must be submitted.				
02.04.01	Disassembly of individual stones in the tracery Applies to dismantling of 40 individual stones. The outer wreath of soapstone shall be kept at the site if possible, otherwise, the external wreaths of soapstone shall also be disassembled.	hours	100		
02.04.02	Disassembly of masonry sections/stones Applies to the disassembly of bricks in the brick wreath that are too damaged to remain in place.	hours	20		
02.04.03	Further cleaning of scrubbed masonry and soapstone Finally, the delimited area must be cleaned with compressed air. It may be required to combine this with the use of a vacuum cleaner. Water should not be used.	hours	10		
02.05	Replacement of metal cross The existing cross, including the inner ring, shall be removed with care and disposed of as sorted waste. A new rust-proofed cross shall be designed with the same profile and thickness. Before removing the iron, rust treatment should be considered as an alternative to replacement. To be clarified with the Client.				
02.05.01	Replacement of metal cross Includes removal of old cross, production of new cross, shipping and assembly. Will not be executed if rust treatment is considered a better alternative. The masonry work on the brick wreath as a result of disassembly and installation of new metal is included in this item. Four anchor points.	pieces	1		
02.06	Masonry work on the brick wreath Applies to masonry work on new/reused bricks. All items have adjustable quantities.				
02.06.01	Masonry work on individual stones in brick wreath Applies to masonry work on individual stones, always following the applicable bond. Does not apply to masonry work on new/reused brick, in masonry areas larger than 0.25 m ² .	pieces	30		

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02.06.02	Delivery of bricks for supplementation Applies to delivery of supplementary stone to the construction site. Applies to solid bricks of the same format and expression for use in the refitting of disassembled individual bricks/areas. Strict requirements are set for the choice of stone. Must be approved by the Client's representative before ordering and delivery to the construction site.	pieces	20		
02.07	Cutting of new soapstone Same size, shape and profiles as the original. All items have adjustable quantities. The type of soapstone must be approved by the Client.				
02.07.01	Cutting wide stones for the outer wreath Approx. dimensions: 425 x 425 mm at the highest point. Thickness approx. 233 mm	pieces	2		
02.07.02	Cutting new narrow stones for the outer wreath, narrow approximate dimensions Approx. dimensions: 250 x 150 mm at the highest point. Thickness approx. 233 mm	pieces	1		
02.07.03	Cutting new stones for the inner garland Approx. dimensions: 275 x 370 mm at the highest. Thickness approx. 233 mm	pieces	3		
02.08	Preserving/repairing soapstone The most relevant method will be an injection into an existing crack using suitable glue. The contractor must also be able to perform glueing of complete parts that are so loose that they must be taken down in connection with the work. It can also include replacement. All items have adjustable quantities. Carried out as hourly work, timesheets must be submitted.				
02.08.01	Preservation of stones in the outer wreath The NDR report suggests the need for seven stones, but more stones may be needed.	hours	50		
02.08.02	Preservation of stone between quatrefoil windows The NDR report suggests the need for one stone, but more stones may be needed.	hours	10		
02.09	Rejoining Applies to rejoining the brick facade and soapstone. The mortar used must be approved by the Client. All items have adjustable quantities.				

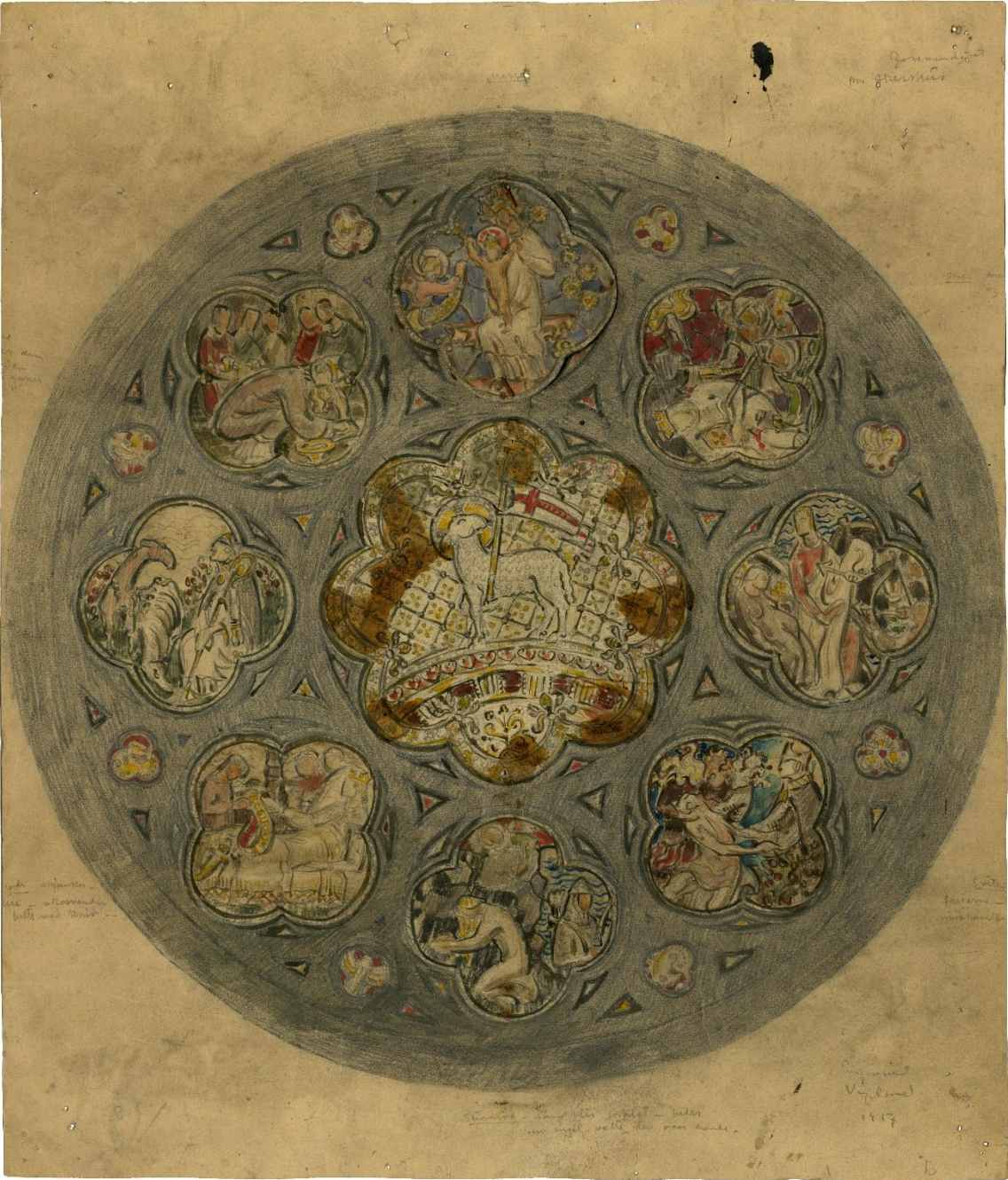


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Chapter	Code/Specification	Unit	Quantity	Price	Total
02.09.01	Option rejoining of brick Applies to rejoining of the brick wreath, measured by exposed area.	m ²	4		
02.09.02	Rejoining soapstone Applies to rejoining around granite elements in cornices. Varying length of joints. Price per joint length	pieces	66		
02.09.03	Rejoining outer joint between soapstone and brick wreath Applies to rejoining around the window frame.	lm	6		
	Total chapter 02 Masonry/soapstone work				


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Contract: **General contract**
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Chapter	Code/Specification	Unit	Quantity	Price	Total
03.01	<p>STAINED GLASS WINDOW</p> 				
<p><i>Emanuel Vigeland's sketch of the Rose Window</i></p>					

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Chapter	Code/Specification	Unit	Quantity	Price	Total
03.01.01	<p>Scope</p> <p>The central window panel is an eight-section window, which is surrounded by eight quatrefoil windows, which in turn are surrounded by eight small trefoil windows. In addition, there are 64 small triangular light openings, in total 81 light openings. The original four quatrefoil windows and five trefoil windows with stained glass are intact in the rose window framework. Emanuel Vigeland's Museum has preserved 19 of the small original triangular sections, in addition to pieces and fragments from the missing stained glass.</p>  <p><i>The rose window in its current condition seen from the inside.</i></p>				

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Chapter	Code/Specification	Unit	Quantity	Price	Total
	<p>In brief, the stained-glass window work includes:</p> <ul style="list-style-type: none"> - Documentation - Removal of all glass panels - Proper packaging and transport of glass panels to the conservator or restoration studio - Conservation of the original glass panels (4 quatrefoil windows + 5 trefoil windows + 19 small triangular panels) - New production of stained and leaded glass panels (Middle panel + 4 quatrefoil + 3 trefoil windows + 62 small triangular panels) - Remounting of all glass panels using linseed oil putty <p>The work includes removing leaded glass panels, partly conservation and restoring of glass panels, partly creating new glass panels, either based on the recreation of Emanuel Vigeland's stained glass or based on new coloured glass, and finally remounting all glass panels. The glass panels must be put in place using linseed oil putty.</p> <p>Two alternatives for the new stained glass panels have been described. The final choice of alternative has not yet been decided, as it will be calculated based on what is left of the original glass and how much of the restoration work it is possible to include in the current budget. This will be clarified in parallel with the restoration process.</p> <p>In any case, four large and five smaller glass panels with stained glass, which are mainly original, will be restored and remounted. 19 original small triangular glass panels can be found at the Emanuel Vigeland Museum. These must be cleaned, restored, and inserted in the right place.</p> <p>The following two options are described for the new glass panels; the middle section, the four new large (quatrefoil) and three small (trefoil) glass panels:</p> <p>Alternative 1: Full reconstruction of the stained glass based on Emanuel Vigeland's original sketches, preserved glass and photos of the complete window. The original parts of the preserved stained glass will form a model for the artist's form of expression.</p> <p>Alternative 2: The clear glass panels are replaced by coloured glass so that the original fields stand out in a better way in terms of light.</p> <p>All quantities stated for the items are adjustable.</p>				
03.01.02	Execution				
	All window glass must be documented before removal. Damage such as cracks and broken glass etc., shall be marked and documented.				

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Chapter	Code/Specification	Unit	Quantity	Price	Total
	<p><i>Removal of glass</i></p> <p>A total of nine large glass panels, of which four consisting of stained glass must be removed with care. In addition, there are 72 small glass panels to be removed. The window panels are mounted from the inside and sealed with linseed oil putty into a flange in the framework. Small iron brackets hold and secure the window in place.</p> <p>The four large window panels (quatrefoil) and five smaller panels (trefoil) with stained glass must be carefully removed, appropriately packed, and transported safely to the conservator or restoration studio. Damage to the original glass cannot be accepted.</p> <p>When removing the clear glass windows, it must be considered whether the window panels can be used as a template (or if they are too imprecise/too small).</p> <p>All glass will be removed and cleaned, and a suitable primer applied before remounting the glass using new linseed oil putty.</p> <p>Tolerance requirements: Directions, lines and deviations shall normally remain and follow existing directions and lines in a natural manner without attempting to rectify them.</p>				
02.01.03	<p>Materials</p> <p>Different glass qualities are used depending on the alternative design. Glass quality must be clarified with the Client.</p> <p>Replacement of the putty shall be executed using linseed oil putty, which is then painted over with linseed oil paint after it is sufficiently dry.</p> <p>If applicable, colours must be approved by the Client.</p>				
03.02	<p>Disassembly of glass panels</p> <p>Glass panels must be disassembled with care. The putty must be heated in such a way that nor the lead or the stained glass windows are damaged. Be aware that it may be modern hard putty that has been overpainted.</p>				
03.02.01	<p>Documentation of stained glass before disassembly</p> <p>Documentation shall be conducted by the stained glass conservator</p>	RS			
03.02.02	<p>Documentation of stained glass and fastening during disassembly</p> <p>Documented in a note with photos</p>	RS			

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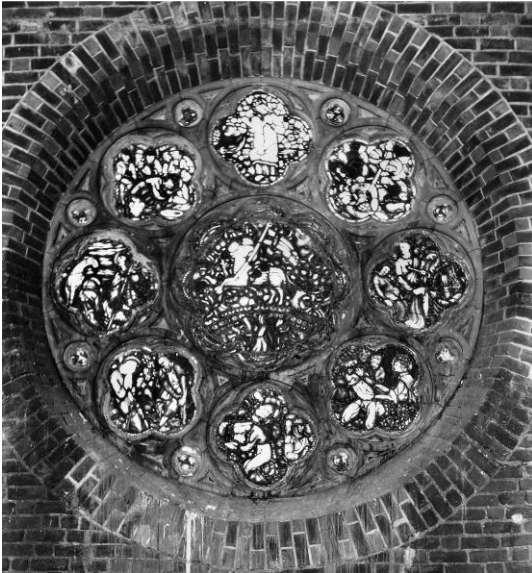

Chapter	Code/Specification	Unit	Quantity	Price	Total
03.02.03	Dismantling four large quatrefoil windows with stained glass Disassemble with care without damaging the original stained glass. The putty must be heated in such a way that the stained glass windows and lead are not damaged. Be aware that it may be modern putty that has been overpainted.	pieces	4		
03.02.04	Disassembly of five trefoil glass panel with stained glass Disassemble with care without damaging original stained glass. The putty must be heated in such a way that the stained glass windows and lead are not damaged. Be aware that it may be modern putty that has been overpainted.	pieces	5		
03.02.05	Disassembly of clear glass, large quatrefoil and one eight-section panels Dismantled for assessment to find whether the assumption in the report by the Restoration Workshop of Nidaros Cathedral (NDR 9/2002) can be considered as one of the reasons for damage; that new glass has been made inaccurately or is too small. Clarify if the glass panels can be considered as a template for the new stained glass panels? After the assessment, the glasses can be disposed of into sorted waste. Possible hazardous waste. Variable quality of putty.	pieces	5		
03.02.06	Disassembly of clear glass, trefoil panels Disassemble to assess whether the glass can be used as a template for new glass. After the assessment, the glasses can be disposed of into sorted waste. Possible hazardous waste. Variable quality of putty.	pieces	3		
03.02.07	Disassembly of other clear triangular glass, small Disassemble to assess whether the glass can be used as a template for new glass. After the assessment, the glasses can be disposed of into sorted waste. Possible hazardous waste. Variable quality of putty.	pieces	64		
03.03	Cleaning/restoration of stained glass Carried out by the stained glass conservator or restoration studio.				
03.03.01	Cleaning/conservation of 4 quatrefoil glass panels with stained glass Carried out by the stained glass conservator or restoration studio.	hours	80		

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Chapter	Code/Specification	Unit	Quantity	Price	Total
03.03.02	Cleaning/conservation of 5 trefoil glass panels with stained glass Carried out by the stained glass conservator or restoration studio.	hours	25		
03.03.03	Cleaning/Preservation of 19 small original panels Clean the glass and carry out the necessary restoration work. These are to be stored in boxes at the Emanuel Vigeland Museum. Carried out by the stained glass conservator or restoration studio. Volume-regulated, depending on how many can be reused.	hours	38		
03.03.04	Material costs in the case of hourly work Estimate NOK 20,000. Paid according to purchase price + mark-up. The mark-up percentage is stated in the price column, and the total sum is stated in the total, including the mark-up percentage.	%	NOK 20, 000		
03.04	Insertion of glass panels Attached in the same way as original with small iron brackets, sealed with putty and overpainted.				
03.04.01	Insertion of 4 large quatrefoil windows with original stained glass Applies to the preserved stained glass. Including fastening, application of the putty and painting.	pieces	4		
03.04.02	Insertion of 4 large quatrefoil windows, newly produced Including fastening, application of the putty and painting.	pieces	4		
03.04.03	Insertion of a central eight-section window, newly produced Including fastening, application of the putty and painting.	pieces	1		
03.04.04	Insertion of 8 trefoil window panels, either preserved or newly produced Including fastening, application of the putty and painting.	pieces	8		
03.04.05	Insertion of small triangular glass Applies to the 19 original preserved sections and the 45 new sections. Including fastening, application of the putty and painting.	pieces	64		
	Total accumulated chapter 03 Stained glass window				

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Chapter	Code/Specification	Unit	Quantity	Price	Total
03.05	<p>Option 1 OPTION – Full reconstruction/recreation of stained glass</p> <p>Alternative 1: Full reconstruction/recreation of missing stained glass to be based on Emanuel Vigeland’s sketches and on photographs (Væring and Wilse) of the complete window before the Filipstad explosion in 1943. In addition to the full-format sketch (see the photo in 03.01), there are sketches of each of the large stained glass panels in 1:1 scale at the museum. A higher resolution photo will be made available when the contract is awarded. The original preserved parts of the stained glass found at the museum will form a model for the artist’s form of expression. The stained glass shall be made using approximately the same technique and expression as the original.</p> <div style="display: flex; justify-content: space-around;">   </div> <p><i>Photo: Wilse</i> <i>Photo: Wæring</i></p> <p>Execution, see advice in the report from the Restoration Workshop of Nidaros Cathedral (NDR 9/2002). It cannot be assumed that ordinary glass can be used. The glass panels must have a distinctive surface. It must be expected that glass samples be taken, which must be burned to obtain the correct surface. The contractor must find the right colour and tone. Some trial and error must be expected. The Client has joined forces with a conservator/art historian who can provide guidance and approve glass samples.</p> <p>Adjustable quantities. Timesheets must be submitted.</p>				
03.05.01	<p>Testing with guidance from the Client’s representative</p> <p>Testing to find the right glass with the right expression. The Client’s conservator/art historian can provide guidance and shall approve final glass samples. The Client’s hours shall not be included here.</p>	hours	100		

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Chapter	Code/Specification	Unit	Quantity	Price	Total
03.05.02	Reconstruction/recreation of the central eight-section window, 1 piece Production according to approved samples	hours	300		
03.05.03	Reconstruction/recreation of quatrefoil windows, 4 pcs Production according to approved samples	hours	800		
03.05.04	Reconstruction/re-creation of trefoil windows, 3 pcs Production according to approved samples	hours	150		
03.05.05	Reconstruction/recreation of triangular small glass section, 45 pcs These are probably single-colour. Production according to approved tests.	hours	90		
03.05.06	Material costs in connection with hourly work, Estimated NOK. 120,000, - Paid according to purchase price + mark-up. The mark-up percentage is stated in the column for the price, and the total sum is stated in sum including mark-up percentage.	%	NOK 120, 000		
	Total option alternative 1				
03.06	Alternative 2 OPTION – stained glass The clear glass panels are replaced by coloured glass, so that the original fields stand out in a better way. Designed as simple lead glass panels as shown in photo in post 00.02 (midfield) Samples of glass must be submitted and approved by the Client. Adjustable quantities				
03.06.01	Production of the central eight-section window with leaded and coloured glass, 1 piece Production according to approved samples	pieces	1		
03.06.02	Production of quatrefoil windows with leaded and coloured glass, 4 pcs Production according to approved samples	pieces	4		
03.06.03	Production of trefoil windows with leaded and coloured glass, 3 pcs Production according to approved samples	pieces	3		

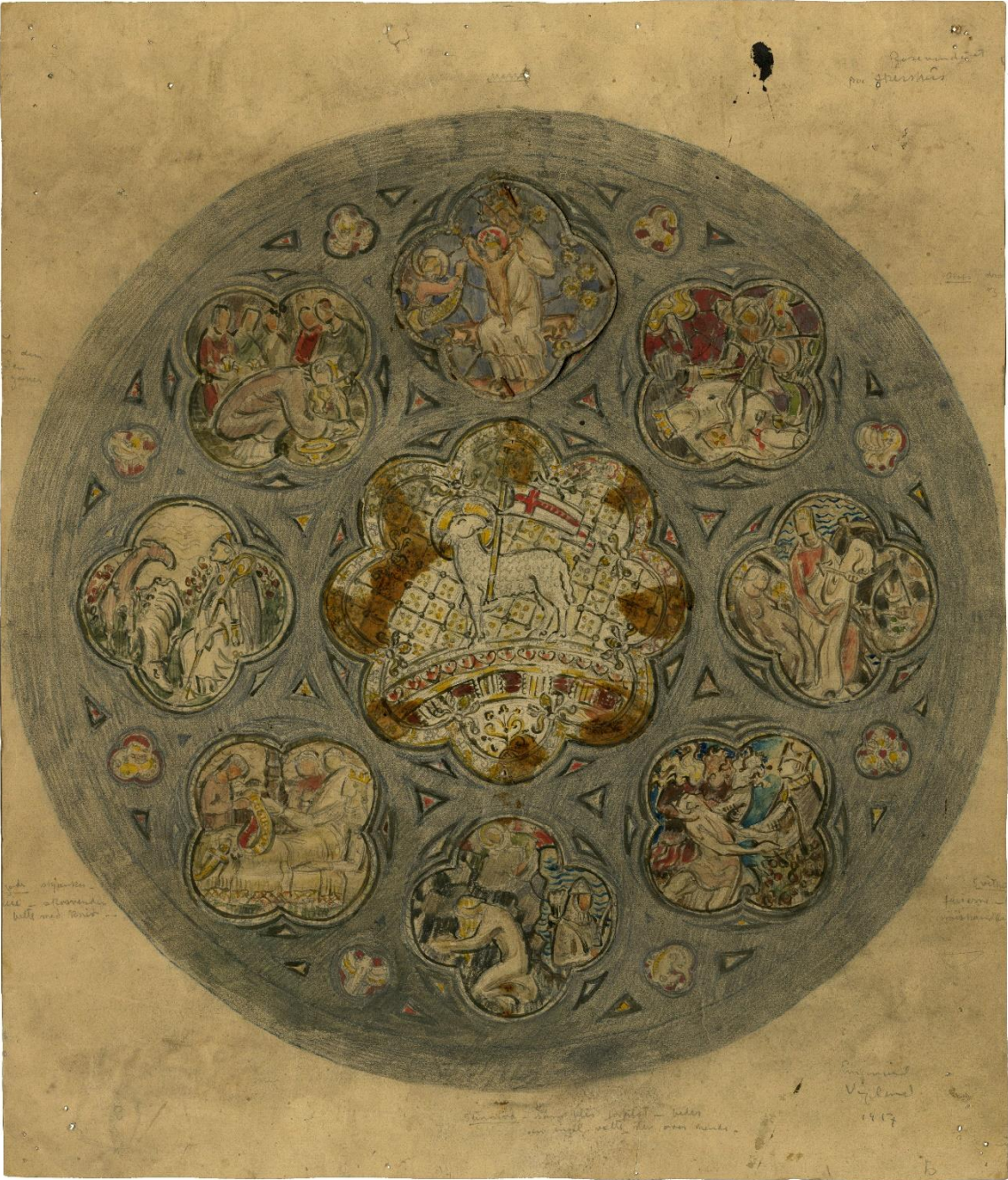


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Chapter	Code/Specification	Unit	Quantity	Price	Total
03.06.04	Production of small triangular panels with leaded and coloured glass Production according to approved samples	pieces	45		
	Total option 2				


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Chapter	Code/Specification	Unit	Quantity	Price	Total
03.01	<p>STAINED GLASS WINDOW</p> 				
<p><i>Emanuel Vigeland's sketch of the Rose Window</i></p>					

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Chapter	Code/Specification	Unit	Quantity	Price	Total
03.01.01	<p>Scope</p> <p>The central window panel is an eight-section window, which is surrounded by eight quatrefoil windows, which in turn are surrounded by eight small trefoil windows. In addition, there are 64 small triangular light openings, in total 81 light openings. The original four quatrefoil windows and five trefoil windows with stained glass are intact in the rose window framework. Emanuel Vigeland's Museum has preserved 19 of the small original triangular sections, in addition to pieces and fragments from the missing stained glass.</p>  <p><i>The rose window in its current condition seen from the inside.</i></p>				

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Chapter	Code/Specification	Unit	Quantity	Price	Total
	<p>In brief, the stained-glass window work includes:</p> <ul style="list-style-type: none"> - Documentation - Removal of all glass panels - Proper packaging and transport of glass panels to the conservator or restoration studio - Conservation of the original glass panels (4 quatrefoil windows + 5 trefoil windows + 19 small triangular panels) - New production of stained and leaded glass panels (Middle panel + 4 quatrefoil + 3 trefoil windows + 62 small triangular panels) - Remounting of all glass panels using linseed oil putty <p>The work includes removing leaded glass panels, partly conservation and restoring of glass panels, partly creating new glass panels, either based on the recreation of Emanuel Vigeland's stained glass or based on new coloured glass, and finally remounting all glass panels. The glass panels must be put in place using linseed oil putty.</p> <p>Two alternatives for the new stained glass panels have been described. The final choice of alternative has not yet been decided, as it will be calculated based on what is left of the original glass and how much of the restoration work it is possible to include in the current budget. This will be clarified in parallel with the restoration process.</p> <p>In any case, four large and five smaller glass panels with stained glass, which are mainly original, will be restored and remounted. 19 original small triangular glass panels can be found at the Emanuel Vigeland Museum. These must be cleaned, restored, and inserted in the right place.</p> <p>The following two options are described for the new glass panels; the middle section, the four new large (quatrefoil) and three small (trefoil) glass panels:</p> <p>Alternative 1: Full reconstruction of the stained glass based on Emanuel Vigeland's original sketches, preserved glass and photos of the complete window. The original parts of the preserved stained glass will form a model for the artist's form of expression.</p> <p>Alternative 2: The clear glass panels are replaced by coloured glass so that the original fields stand out in a better way in terms of light.</p> <p>All quantities stated for the items are adjustable.</p>				
03.01.02	Execution				
	All window glass must be documented before removal. Damage such as cracks and broken glass etc., shall be marked and documented.				

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Chapter	Code/Specification	Unit	Quantity	Price	Total
	<p><i>Removal of glass</i></p> <p>A total of nine large glass panels, of which four consisting of stained glass must be removed with care. In addition, there are 72 small glass panels to be removed. The window panels are mounted from the inside and sealed with linseed oil putty into a flange in the framework. Small iron brackets hold and secure the window in place.</p> <p>The four large window panels (quatrefoil) and five smaller panels (trefoil) with stained glass must be carefully removed, appropriately packed, and transported safely to the conservator or restoration studio. Damage to the original glass cannot be accepted.</p> <p>When removing the clear glass windows, it must be considered whether the window panels can be used as a template (or if they are too imprecise/too small).</p> <p>All glass will be removed and cleaned, and a suitable primer applied before remounting the glass using new linseed oil putty.</p> <p>Tolerance requirements: Directions, lines and deviations shall normally remain and follow existing directions and lines in a natural manner without attempting to rectify them.</p>				
02.01.03	<p>Materials</p> <p>Different glass qualities are used depending on the alternative design. Glass quality must be clarified with the Client.</p> <p>Replacement of the putty shall be executed using linseed oil putty, which is then painted over with linseed oil paint after it is sufficiently dry.</p> <p>If applicable, colours must be approved by the Client.</p>				
03.02	<p>Disassembly of glass panels</p> <p>Glass panels must be disassembled with care. The putty must be heated in such a way that nor the lead or the stained glass windows are damaged. Be aware that it may be modern hard putty that has been overpainted.</p>				
03.02.01	<p>Documentation of stained glass before disassembly</p> <p>Documentation shall be conducted by the stained glass conservator</p>	RS			
03.02.02	<p>Documentation of stained glass and fastening during disassembly</p> <p>Documented in a note with photos</p>	RS			

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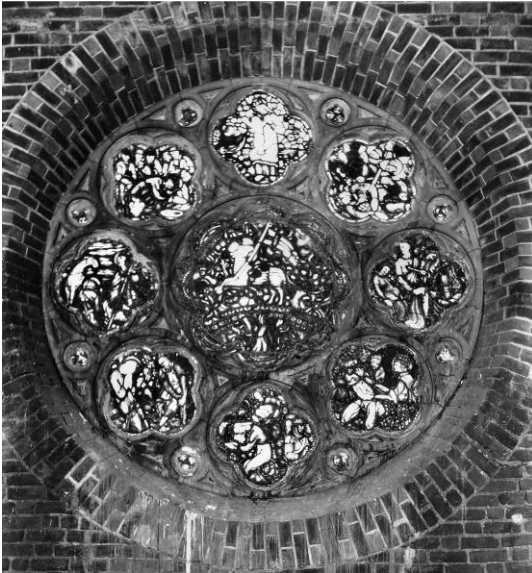

Chapter	Code/Specification	Unit	Quantity	Price	Total
03.02.03	Dismantling four large quatrefoil windows with stained glass Disassemble with care without damaging the original stained glass. The putty must be heated in such a way that the stained glass windows and lead are not damaged. Be aware that it may be modern putty that has been overpainted.	pieces	4		
03.02.04	Disassembly of five trefoil glass panel with stained glass Disassemble with care without damaging original stained glass. The putty must be heated in such a way that the stained glass windows and lead are not damaged. Be aware that it may be modern putty that has been overpainted.	pieces	5		
03.02.05	Disassembly of clear glass, large quatrefoil and one eight-section panels Dismantled for assessment to find whether the assumption in the report by the Restoration Workshop of Nidaros Cathedral (NDR 9/2002) can be considered as one of the reasons for damage; that new glass has been made inaccurately or is too small. Clarify if the glass panels can be considered as a template for the new stained glass panels? After the assessment, the glasses can be disposed of into sorted waste. Possible hazardous waste. Variable quality of putty.	pieces	5		
03.02.06	Disassembly of clear glass, trefoil panels Disassemble to assess whether the glass can be used as a template for new glass. After the assessment, the glasses can be disposed of into sorted waste. Possible hazardous waste. Variable quality of putty.	pieces	3		
03.02.07	Disassembly of other clear triangular glass, small Disassemble to assess whether the glass can be used as a template for new glass. After the assessment, the glasses can be disposed of into sorted waste. Possible hazardous waste. Variable quality of putty.	pieces	64		
03.03	Cleaning/restoration of stained glass Carried out by the stained glass conservator or restoration studio.				
03.03.01	Cleaning/conservation of 4 quatrefoil glass panels with stained glass Carried out by the stained glass conservator or restoration studio.	hours	80		

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Chapter	Code/Specification	Unit	Quantity	Price	Total
03.03.02	Cleaning/conservation of 5 trefoil glass panels with stained glass Carried out by the stained glass conservator or restoration studio.	hours	25		
03.03.03	Cleaning/Preservation of 19 small original panels Clean the glass and carry out the necessary restoration work. These are to be stored in boxes at the Emanuel Vigeland Museum. Carried out by the stained glass conservator or restoration studio. Volume-regulated, depending on how many can be reused.	hours	38		
03.03.04	Material costs in the case of hourly work Estimate NOK 20,000. Paid according to purchase price + mark-up. The mark-up percentage is stated in the price column, and the total sum is stated in the total, including the mark-up percentage.	%	NOK 20, 000		
03.04	Insertion of glass panels Attached in the same way as original with small iron brackets, sealed with putty and overpainted.				
03.04.01	Insertion of 4 large quatrefoil windows with original stained glass Applies to the preserved stained glass. Including fastening, application of the putty and painting.	pieces	4		
03.04.02	Insertion of 4 large quatrefoil windows, newly produced Including fastening, application of the putty and painting.	pieces	4		
03.04.03	Insertion of a central eight-section window, newly produced Including fastening, application of the putty and painting.	pieces	1		
03.04.04	Insertion of 8 trefoil window panels, either preserved or newly produced Including fastening, application of the putty and painting.	pieces	8		
03.04.05	Insertion of small triangular glass Applies to the 19 original preserved sections and the 45 new sections. Including fastening, application of the putty and painting.	pieces	64		
	Total accumulated chapter 03 Stained glass window				

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Chapter	Code/Specification	Unit	Quantity	Price	Total
03.05	<p>Option 1 OPTION – Full reconstruction/recreation of stained glass</p> <p>Alternative 1: Full reconstruction/recreation of missing stained glass to be based on Emanuel Vigeland’s sketches and on photographs (Væring and Wilse) of the complete window before the Filipstad explosion in 1943. In addition to the full-format sketch (see the photo in 03.01), there are sketches of each of the large stained glass panels in 1:1 scale at the museum. A higher resolution photo will be made available when the contract is awarded. The original preserved parts of the stained glass found at the museum will form a model for the artist’s form of expression. The stained glass shall be made using approximately the same technique and expression as the original.</p> <div style="display: flex; justify-content: space-around;">   </div> <p><i>Photo: Wilse</i> <i>Photo: Wæring</i></p> <p>Execution, see advice in the report from the Restoration Workshop of Nidaros Cathedral (NDR 9/2002). It cannot be assumed that ordinary glass can be used. The glass panels must have a distinctive surface. It must be expected that glass samples be taken, which must be burned to obtain the correct surface. The contractor must find the right colour and tone. Some trial and error must be expected. The Client has joined forces with a conservator/art historian who can provide guidance and approve glass samples.</p> <p>Adjustable quantities. Timesheets must be submitted.</p>				
03.05.01	<p>Testing with guidance from the Client’s representative</p> <p>Testing to find the right glass with the right expression. The Client’s conservator/art historian can provide guidance and shall approve final glass samples. The Client’s hours shall not be included here.</p>	hours	100		



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Chapter	Code/Specification	Unit	Quantity	Price	Total
03.05.02	Reconstruction/recreation of the central eight-section window, 1 piece Production according to approved samples	hours	300		
03.05.03	Reconstruction/recreation of quatrefoil windows, 4 pcs Production according to approved samples	hours	800		
03.05.04	Reconstruction/re-creation of trefoil windows, 3 pcs Production according to approved samples	hours	150		
03.05.05	Reconstruction/recreation of triangular small glass section, 45 pcs These are probably single-colour. Production according to approved tests.	hours	90		
03.05.06	Material costs in connection with hourly work, Estimated NOK. 120,000, - Paid according to purchase price + mark-up. The mark-up percentage is stated in the column for the price, and the total sum is stated in sum including mark-up percentage.	%	NOK 120, 000		
	Total option alternative 1				
03.06	Alternative 2 OPTION – stained glass The clear glass panels are replaced by coloured glass, so that the original fields stand out in a better way. Designed as simple lead glass panels as shown in photo in post 03.01.01 (midfield) Samples of glass must be submitted and approved by the Client. Adjustable quantities				
03.06.01	Production of the central eight-section window with leaded and coloured glass, 1 piece Production according to approved samples	pieces	1		
03.06.02	Production of quatrefoil windows with leaded and coloured glass, 4 pcs Production according to approved samples	pieces	4		
03.06.03	Production of trefoil windows with leaded and coloured glass, 3 pcs Production according to approved samples	pieces	3		



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Chapter	Code/Specification	Unit	Quantity	Price	Total
03.06.04	Production of small triangular panels with leaded and coloured glass Production according to approved samples	pieces	45		
	Total option 2				