بسم الله الرحمن الرحيم

التصميم الإنشائي لقصر الثقافة في مدينة الخليل

جامعة بوليتكنك فلسطين

كلية الهنــدسة والتكنولوجيا

دائرة الهندسة المدنية والمعمارية

هندسة مدنية فرع مباني

فريق العمل

بهاء هشام بدر **فواز خليل النتشة**

منتصر جبريل شويكي **محمد يونس الحلواني**

إشراف

د.نصر عبوشي

الخليل – فلسطين

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مقدمة مشروع التخرج

مقدم إلى دائرة الهندسة المدنية والمعمارية في كلية الهندسة والتكنولوجيا

جامعـــة بوليتكنك فلسطيـــن

للوفاء بجزء من متطلبات الحصول على

درجة البكالوريوس في الهندسة تخصص هندسة المباني

جامعة بوليتكنك فلسطين

الخليل – فلسطين

كانون ثاني – 2014

شهادة تقييم مقدمة مشروع التخرج

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بناء على توجيهات الأستاذ المشرف على المشروع وبموافقة جميع أعضاء اللجنة الممتحنة تم تقديم هذا المشروع إلى دائرة الهندسة المدنية والمعمارية في كلية الهندسة والتكنولوجيا للوفاء الجزئي بمتطلبات الدائرة لدرجة البكالوريوس تخصص هندسة المباني.

توقيع المشرف	**توقيع رئيس الدائرة**
د. نصر عبوشي	**د. غسان دويك**
.....	.....

الخليل - فلسطين

كانون ثاني - 2014

الإهـــــداء

إلى نبع الحنان الذي لا ينضب .....
إلى التي نحن لقهوتها و خبزها .....
إلى التي نعشق عمرنا لأننا نخجل من دمع عينيها .....
إلى القلب الكبير ، من تعب كثيرا حتى نصل ، ومن تحمل كثيرا ، وقدم كل الحب .....

إلى أمهاتنا العزيزات

إلى النور الذي أضاء حياتنا .....
إلى ذلك الشخص الذي كان لنا جسراً فوق مصاعب الحياة .....
إلى من أعطى بلا حدود ، إلى من نرى في ابتسامته الأمل ، وفي صبره الحياة.....

آبائنا الغاليين

في أجمل لحظاتٍ نعيشها ....
في أسوأ لحظاتٍ نعيشها ....
نجدكم أعظم من يشاركنا إحساسنا بتلك اللحظات .....

إخواننا الأعزاء

إلى أجمل هدية من الله ....

أصدقاءنا الأوفياء

إلى شموع الدرب التي تحترق لتضيء لنا طريقنا...

أساتذتنا الأعزاء

كيف تمضي السنين والأيام وينتهي كل شيء إلا الأحلام .....

إليكم يا من كنتم وما زلتم الشعلة المضيئة في موقد كياننا ووجداننا إلى كل من ساعدنا لنقدم هذا العمل المتواضع

فريق العمل

الشــكر و التقديـــر

إن الشكر دائما لله تعالى، الذي هدانا ووفقنا لانجاز هذا العمل .....

ثم نتقدم بجزيل الشكر والامتنان إلى جامعتنا العزيزة ..... "جامعة بوليتكنك فلسطين" ..... التي احتضنتنا طوال فترة دراستنا في كلية الهندسة والتكنولوجيا ..... ونخص بالذكر أساتذتنا الأجلاء الذين لم يألوا جهدا في إسداء نصائحهم وتوجيهاتهم لنا، ونثمن جهود أستاذنا ومشرفنا ...الدكتور القدير نصر عبوشي .. امتنانا له على مساعدتنا وتوجيهنا نحو الأفضل ..... كما نتوجه بالشكر الجزيل إلى الدكتور ماهر عمرو والدكتور هيثم عياد والأستاذ سفيان الترك والدكتور نبيل الجولاني ..... الذين قدما لنا يد العون وصطحبانا لمدة خمس سنوات ولم يبخلوا علينا بالكثير الكثير من العلم والمعرفة .....

وفـي النهايـة نتقـدم بجزيـل الشـكر والعرفـان إلـى كـل مـن سـاهم فـي انجـاز هـذا البحـث المتواضع.....

فريق العمل

ملخص المشروع

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جامعة بوليتكنك فلسطين 2013/ 2014

إشراف

د.نصر عبوشي

تتلخص فكرة المشروع في التصميم الإنشائي لقصر الثقافة في مدينة الخليل بحيث يشمل المشروع تصميم كافة التفاصيل الإنشائية اللازمة .

يتكون القصر من عدة مباني ويتميز التصميم المعماري للمشروع بأنه يحاكي الثقافة العربية والإسلامية بالإضافة إلى انه يقوم بتلخيص الواقع الفلسطيني تحت الاحتلال الإسرائيلي بوجود جدار يفصل المباني عن بعضها البعض كما الجدار العازل .

تكمن أهمية المشروع إلى الحاجة إلى وجود مبنى كهذا في مدينة الخليل فهناك العديد من الفعاليات التي تحتاج إلى مكان للعناية بالحركة الثقافية كالندوات والمحاضرات والمسرحيات والاحتفالات وغيرها، أما بالنسبة لأهميته الإنشائية تكمن في تنوع العناصر الإنشائية في المباني المختلفة بالإضافة إلى تغير المناسيب في المبنى الواحد.

سيتضمن المشروع دراسة إنشائية تفصيلية من تحديد وتحليل للعناصر الإنشائية والأحمال المختلفة المتوقعة ومن ثم التصميم الإنشائي للعناصر، وإعداد المخططات التنفيذية للعناصر الإنشائية وسيتم التصميم - إن شاء الله - بناءا على متطلبات الكود الأمريكي (ACI_318) واستخدام بعض برامج التصميم الإنشائي .

والله ولي التوفيق.

Abstract

The Structural Design for Hebron Culture Palace

Project Team

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Dr. Nasir Abboushi

The main idea of this project is to prepare all structural design and executive details for The Hebron Culture Palace.

The palace consists of several buildings and architectural design features of the project that shows the Arab and Islamic culture in addition to that is summarizing the Palestinian reality under Israeli occupation, by presence of a wall separating the buildings from each other as the "separation wall".

The importance of the project to the need to have a building like that in the city of Hebron, there are many events that need a place to take care of the movement of cultural, lectures, plays, ceremonies, etc. The importance of construction lies in the diversity of structural elements in different buildings in addition to changing levels in the building.

The project will include the study of structural detail to identify and analyze the elements of construction and different loads expected and then the structural design of the elements and the preparation of drawings of the elements construction and will be designed - God willing - based on the requirements of the (ACI_318 code) and use some structural design programs.

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List of Abbreviations

- **Ac** = area of concrete section resisting shear transfer.
- **As** = area of nonprestressed tension reinforcement.
- **Ag** = gross area of section.
- **Av** = area of shear reinforcement within a distance (S).
- **At** = area of one leg of a closed stirrup resisting tension within a (S).
- **b** = width of compression face of member.
- **bw** = web width, or diameter of circular section.
- **C_c =** compression resultant of concrete section.
- **C_s** = compression resultant of compression steel.
- **DL** = dead loads.
- **LL** = live loads.
- **d** = distance from extreme compression fiber to centroid of tension reinforcement.
- **Ec** = modulus of elasticity of concrete.
- **f_c'** = compression strength of concrete .
- **fy** = specified yield strength of non-prestressed reinforcement.
- **h** = overall thickness of member.
- **Lw** = length of wall.
- **M** = bending moment.
- **Mu** = factored moment at section.
- **Mn** = nominal moment.
- **Pn** = nominal axial load.
- **Pu** = factored axial load
- **S** = Spacing of shear in direction parallel to longitudinal reinforcement.
- **Vc** = nominal shear strength provided by concrete.
- **Vn** = nominal shear stress.
- **Vs** = nominal shear strength provided by shear reinforcement.
- **Vu** = factored shear force at section.
- **Wc** = weight of concrete.
- **Wu** = factored load per unit area.
- **a** = depth of rectangular compressive stress block.
- **C** = depth of the neutral axis measured from the extreme compression fibers.

الفصل الأول

المقدمة

1

1.1 نظرة عامة .

2.1 أهداف المشروع .

3.1 مشكلة المشروع .

4.1 حدود مشكلة المشروع .

5.1 الأدوات المستخدمة .

6.1 فصول المشروع .

7.1 إجراءات المشروع .

الفصل الأول

المقدمة

1.1 نظرة عامة :

منذ أن قام الاحتلال الصهيوني بالاستيلاء على فلسطين وهو يحاول أن ينسف كل ما يدل على وجودنا وأن يدمر كل ما يربطنا بأرضنا الفلسطينية، ولقد وجد الاحتلال من تهديم البيوت وقصفها سبيلا لطمس ونفي وجودنا، ولم تكن حربه لتشمل المجازر والتشريد والنفي والإبعاد فقط، بل امتدت لتصل إلى أخطر من ذلك لتحاول سلبنا ثقافتنا وهويتنا الفلسطينية وهي أخطر ما يمكن أن تصل إليه يد عدونا .

ولقد فهم الفلسطينيون عدوهم حين استولى على فلسطين و قام بتدمير المعالم الثقافية والحضارية لها وحين قام بحرق آلاف الكتب وحين حاول أن يمنع الأطفال من التوجه لمدارسهم ، وحاول الفلسطينيون صدّ كل تلك المحاولات بشتى الطرق للدفاع والحفاظ على أرضنا وموروثنا الحضاري.

وقد أثبتت الثقافة للجميع أنها من يستطيع أن يثبت وجود الإنسان وهي من يستطيع أن يربط الماضي بالحاضر وهي من يضمن مستقبلاً زاهراً للأجيال اللاحقة فكان لا بد لنا أن نقف في مشروعنا لنعبر عما نحلم به للأرض وللوطن .

تتطلب عملية التصميم عامة الأخذ بجميع النواحي للمبنى المراد إنشاؤه سواء من الناحية المعمارية التي تعنى بالمظهر العام للمبنى وكيفية توزيع الفراغات والمساحات داخله وربط الأقسام المختلفة ببعضها البعض، أو من الناحية الإنشائية التي تعنى بتوفير النظام الإنشائي القادر على التحمل الآمن للأحمال المؤثرة على المبنى مع مراعاة الناحية الاقتصادية الأدنى الممكنة لهذا النظام الإنشائي بما لا يتعارض مع التصميم المعماري المختار. كذلك لا بد من الأخذ بالاعتبار النواحي المتعلقة بالتمديدات الكهربائية بما يتلاءم مع طبيعة المشروع المنشأ وعناصره الميكانيكية كأنظمة التدفئة والتبريد والصرف الصحي.

يتضمن المشروع تصميم النظام الإنشائي للقصر الثقافي في مدينة الخليل المكون من سبعة أبنية متنوعة ومختلفة في المناسيب حسب طبيعة الأرض حيث يتم توزيع العناصر الإنشائية كالأعمدة والجسور بما يتلاءم مع المخططات المعمارية ومن ثم تصميم هذه العناصر ابتداء من العقدات وانتهاء بالقواعد والأساسات ومن ثم تجهيز المخططات الإنشائية التنفيذية وذلك من أجل الخروج بمشروع متكامل وقابل للتنفيذ.

2.1 أهداف المشروع :

نأمل من هذا البحث بعد إكماله أن نكون قد وصلنا إلى الأهداف التالية :

1. اكتساب المهارة في القدرة على اختيار النظام الإنشائي المناسب للمشاريع المختلفة وتوزيع عناصره الإنشائية على المخططات، بما يتناسب مع التخطيط المعماري له .
2. القدرة على تصميم العناصر الإنشائية المختلفة .
3. تطبيق وربط المعلومات التي تم دراستها في المساقات المختلفة .
4. إتقان استخدام برامج التصميم الإنشائي .

3.1 مشكلة المشروع :

تتمثل مشكلة هذا المشروع في التحليل والتصميم الإنشائي لجميع العناصر الإنشائية المكونة لمبنى الأنشطة الذي تم اعتماده ليكون ميداناً لهذا البحث وهو " قصر الثقافة في مدينة الخليل " وفي هذا المجال تم تحليل كل عنصر من العناصر الإنشائية مثل البلاطات و الأعصاب والجسور والأعمدة و الأساسات..الخ , بتحديد الأحمال الواقعة عليه , ومن ثم تحديد أبعادها وتصميم التسليح اللازم لها . مع الأخذ بعين الاعتبار عامل الأمان للمنشأ وتكاليف تنفيذه، وتم عمل المخططات التنفيذية للعناصر الإنشائية التي تم تصميمها؛ لإخراج هذا المشروع من حيز الاقتراح إلى حيز التنفيذ.

4.1 حدود مشكلة المشروع:

سيتم العمل في هذا المشروع على الناحية الإنشائية؛ ولدراسة التعارضات الإنشائية مع المعمارية والكهربائية والميكانيكية، وحساب كميات المواد المستخدمة لحساب تكاليف إنشاء المبنى، سيتم رفع المبنى باستخدام تقنية الـ " BUILDING INFORMATION MODELING " حيث تتمثل في رفع المبنى معمارياً ومن ثم إنشائياً بتحديد كافة العناصر الإنشائية وتحليلها وتصميمها ثم دمجها مع النموذج المعماري لبيان أي تعارضات قد تظهر بين توزيع النظام الإنشائي مع التصميم المعماري المطلوب، وسيتم " إن شاء الله " العمل خلال الفصلين الأول والثاني من السنة الدراسية 2013-2014 من خلال مقدمة مشروع التخرج في الفصل الأول ومشروع التخرج في الفصل الثاني .

5.1 الأدوات المستخدمة :

1. اعتماد الكود الأمريكي في التصاميم الإنشائية المختلفة (ACI-318-11) والأحمال من الكود الأردني .
2. استخدام برامج التحليل والتصميم الإنشائي مثل (ETABS , STAAD pro , SAP 2000 , Atir , Safe)
3. استخدام برامج الرسم وإخراج المخططات (REVIT , Auto CAD)

6.1 فصول المشروع :

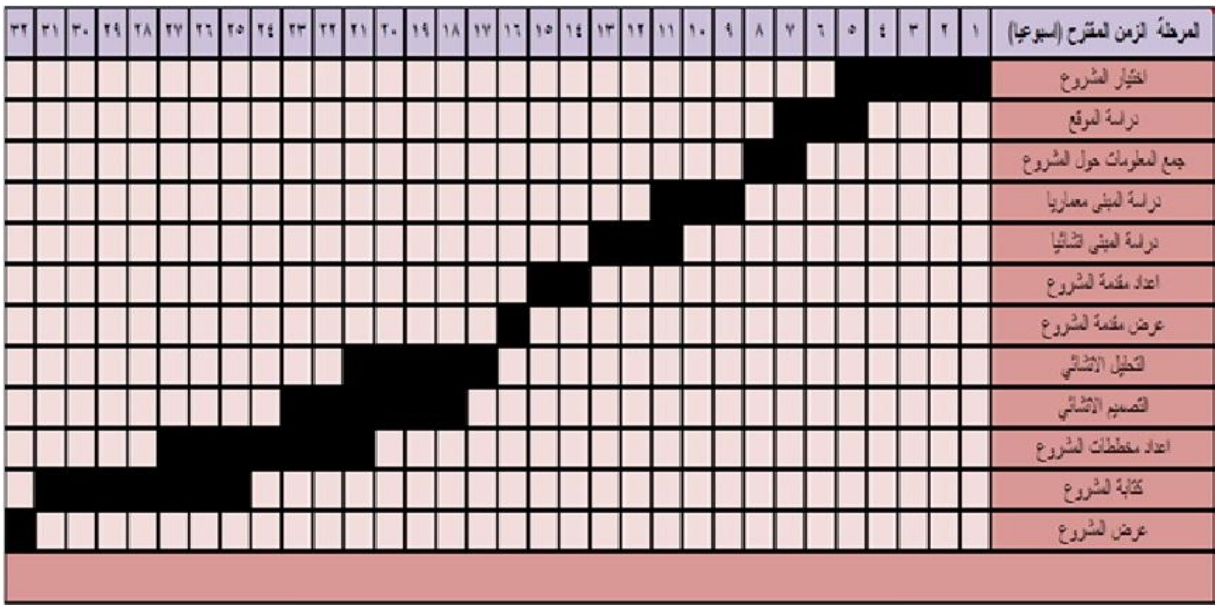
يحتوي هذا المشروع على اربعة فصول وهي :

1. الفصل الأول : يشمل المقدمة العامة ومشكلة البحث و أهدافه .
2. الفصل الثاني : يشمل الوصف المعماري للمشروع .
3. الفصل الثالث : يشمل وصف العناصر الإنشائية للمبنى .
4. الفصل الرابع : التحليل والتصميم الإنشائي للعناصر الإنشائية .

7.1 إجراءات المشروع :

1. دراسة المخططات المعمارية وذلك لفهمها من النواحي المعمارية وتوافقها مع أهداف المشروع واختيار النظام الإنشائي الملائم .
2. دراسة العناصر الإنشائية المكونة للمبنى والآلية الأنسب لتوزيع هذه العناصر كالأعمدة والجسور والأعصاب بشكل لا يتعارض مع التصميم المعماري الموضوع ويحقق الجانب الاقتصادي وعامل الأمان .
3. تحديد الأحمال المؤثرة على المبنى وتحليل العناصر الإنشائية على هذه الأحمال .
4. تصميم العناصر الإنشائية بناء على نتائج التحليل .
5. إنجاز المخططات التنفيذية للعناصر الإنشائية التي تم تصميمها ليخرج المشروع بشكله النهائي المتكامل والقابل للتنفيذ .

والجدول التالي يوضح تسلسل أعمال المشروع والزمن اللازم لكل نشاط.



الجدول (1-1): الجدول الزمني للمشروع خلال السنة الدراسية (2013- 2014)

الفصل الثاني

الوصف المعماري للمشروع

2

1.2 لمحة عن المشروع .

2.2 دراسة عناصر المشروع .

3.2 موقع المشروع .

4.2 وصف المساقط الأفقية للمبنى .

5.2 وصف الواجهات .

الفصل الثاني

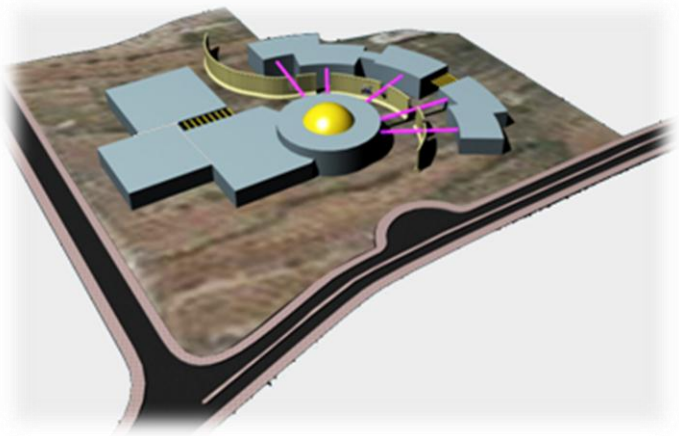
الوصف المعماري للمشروع

1.2 لمحة عامة عن المشروع :

كانت فكرة التصميم هي عمل تصميم معماري لقصر الثقافة في مدينة الخليل يقوم بتجميع النشاطات الثقافية التي تختص بأفراد المجتمع بشكل عام وأفراد الجيل الجديد بشكل خاص، من خلال العمل على إثراء فكر الجيل الجديد بحقيقة قضيته وهويته والتركيز على البعد الثقافي والفكري والذي يوضح أهمية الفكر والثقافة في العمل على نهضة المجتمع بالإضافة إلى العمل على استضافة الكثير من الفعاليات والنشاطات والمؤتمرات التي تحدث في المدينة.

لأداء أي عمل لابد أن يتم إنجازه على أكمل وجه، ولإقامة أي بناء لابد أن يتم تصميمه من جميع النواحي التي توفر الراحة والأمان لمستخدميه، حيث يبدأ أولا التصميم المعماري للمبنى بما يتلاءم مع وظيفته والغاية من تنفيذه بأن يتم تحديد شكل المنشأ مع الأخذ بعين الاعتبار تحقيق الوظائف والمتطلبات المختلفة ، إذ يجري التوزيع الأولي لمرافقه بهدف تحقيق الفراغات والأبعاد المطلوبة، ويتم بهذه العملية دراسة الإنارة والعزل والتهوية والتنقل والحركة وغيرها من المتطلبات الوظيفية.

وتبرز أهمية هذا المشروع في افتقار مدينة الخليل للمرافق الثقافية وقد راعى التصميم المعماري المواصفات والمتطلبات لاستخدام مرافق بشكل مريح وميسر وراعى معايير التصميم من حيث الفراغات ذات الارتباط الوثيق بهيكلية المباني السبعة بما يتلاءم مع وظيفة كل منهما ، ويظهر في المشروع طابعا معماريا فلسفيا يتمثل في وضع جدار خرساني شبيه بجدار الفصل العنصري بين المباني التي تمثل كل منها مدينة فلسطينية ولكن الجدار قام بربط هذه المباني (المدن) على عكس ما يفعله جدار الفصل العنصري الحالي على ارض الواقع.



الشكل (2-1): ربط كتل المشروع .

2.2 دراسة عناصر المشروع :

يتكون قصر الثقافة في مدينة الخليل من مسرح متعدد الأغراض، معارض داخلية وخارجية، مكتبة وقاعة لعرض الأفلام الوثائقية وقاعات للمحاضرات، وقاعة للفنون وقاعة للموسيقى وقاعة للحاسوب، ومركز إعلام ومصلى ومكاتب للموظفين والإداريين، بالإضافة إلى حدائق ومناطق خضراء وخدمات عامة وغرف حراس وكافتيريا ودورات مياه ومخازن ومواقف سيارات, وتبلغ المساحة الكلية للمبنى 12660م^2 وهم عبارة عن سبعة مباني وهم مبنى الرياضي، مبنى الأنشطة، الكتلة المركزية (الاستقبال)، المسرح، مبنى الحرف والمشغولات اليدوية، الكافتيريا، ومعرض الصور.

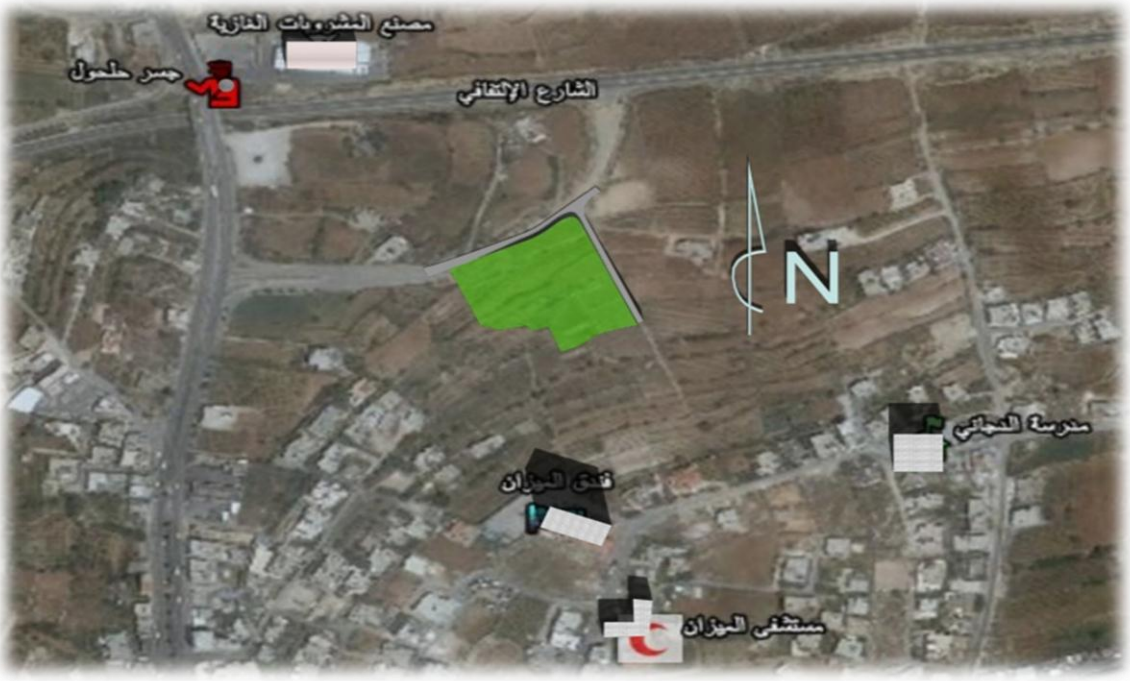
3.2 موقع المشروع :

تم اختيار قطعة أرض مساحتها (18 دونما) تقريباً، في منطقة " حرم الرامه " الواقعة في شمال المدينة وتبعد 3 كم عن مركز مدينة الخليل، المنطقة تتصف بموقعها الخلاب، والمتميز بقلة المباني المجاورة لقطعة الأرض المقترحة وإن المنطقة متصلة بشارع فرعي على علاقة بالشارع الرئيسي الواصل بين شارع رأس الجورة والطريق الالتفافي ويسهل الوصول إليه من خلال الطرق المفتوحة على مدخل المدينة تمتاز الأرض بوقوعها على أراضي مدينة الخليل التي تقع في جنوب الضفة الغربية وهي من أكبر مدن فلسطين مساحة إذ تبلغ مساحتها 22.8 كم^2.

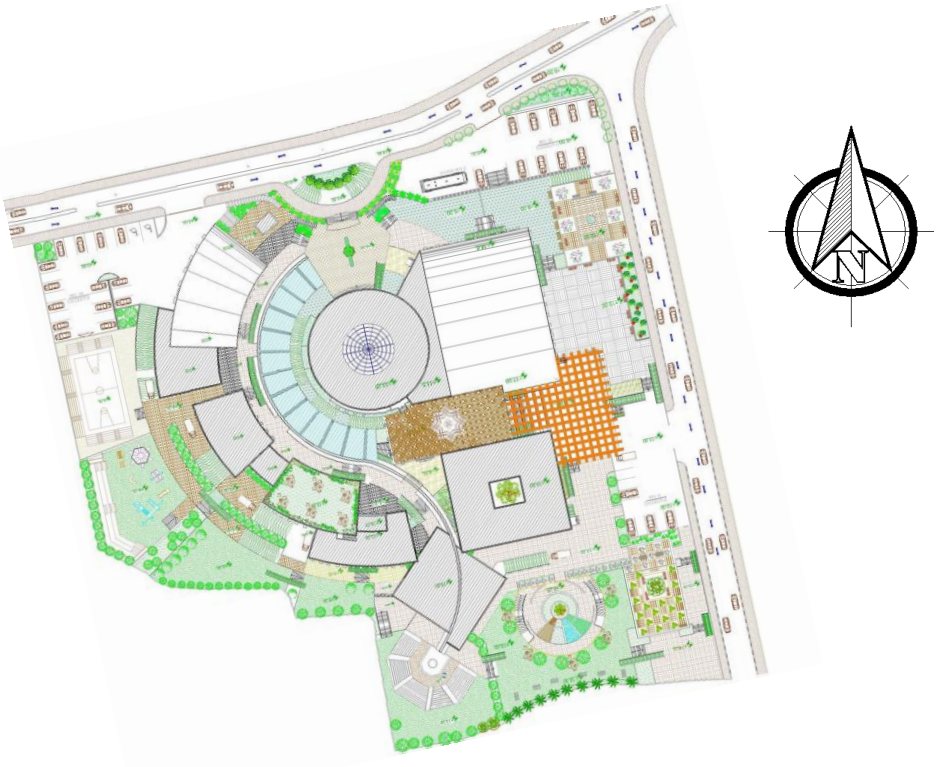
وتتدرج خطوط الكنتور من 975 م إلى 987 م فوق سطح البحر بحسب خرائط بلدية مدينة الخليل للمنطقة وهذا يدل على أن المناسيب مختلفة وتتناسب مع تضاريس المدن الفلسطينية.



الشكل (2-2): الموقع العام للأرض المقترحة



الشكل (2- 3): صورة جوية للأرض المقترحة " منطقة بئر حرم الرامة ـ مدينة الخليل "

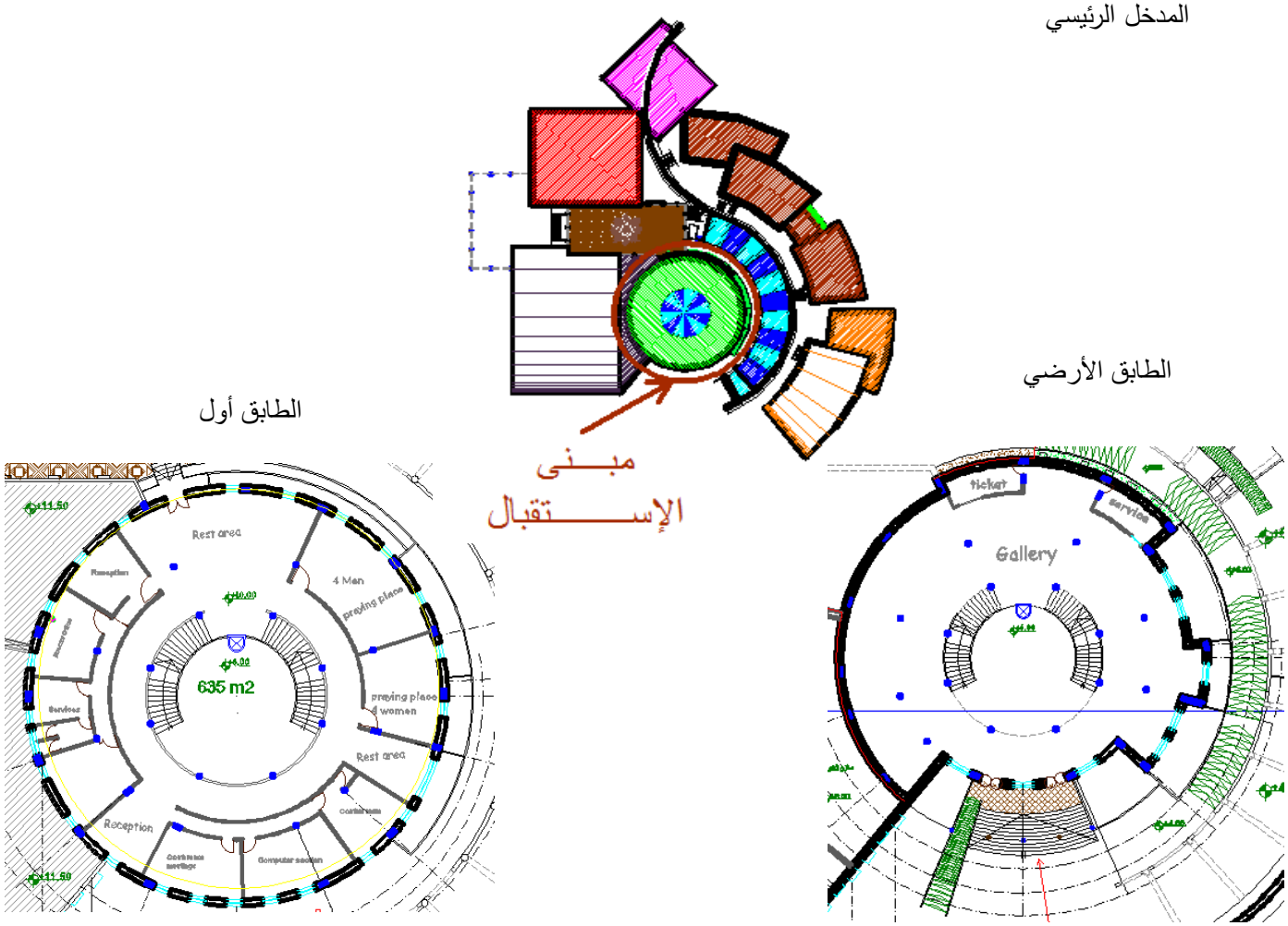


الشكل (2- 4): تصميم الموقع العام للقصر الثقافي على قطعة الأرض

4.2 وصف الأبنية المكونة للمشروع :

1.4.2 مبنى الاستقبال :

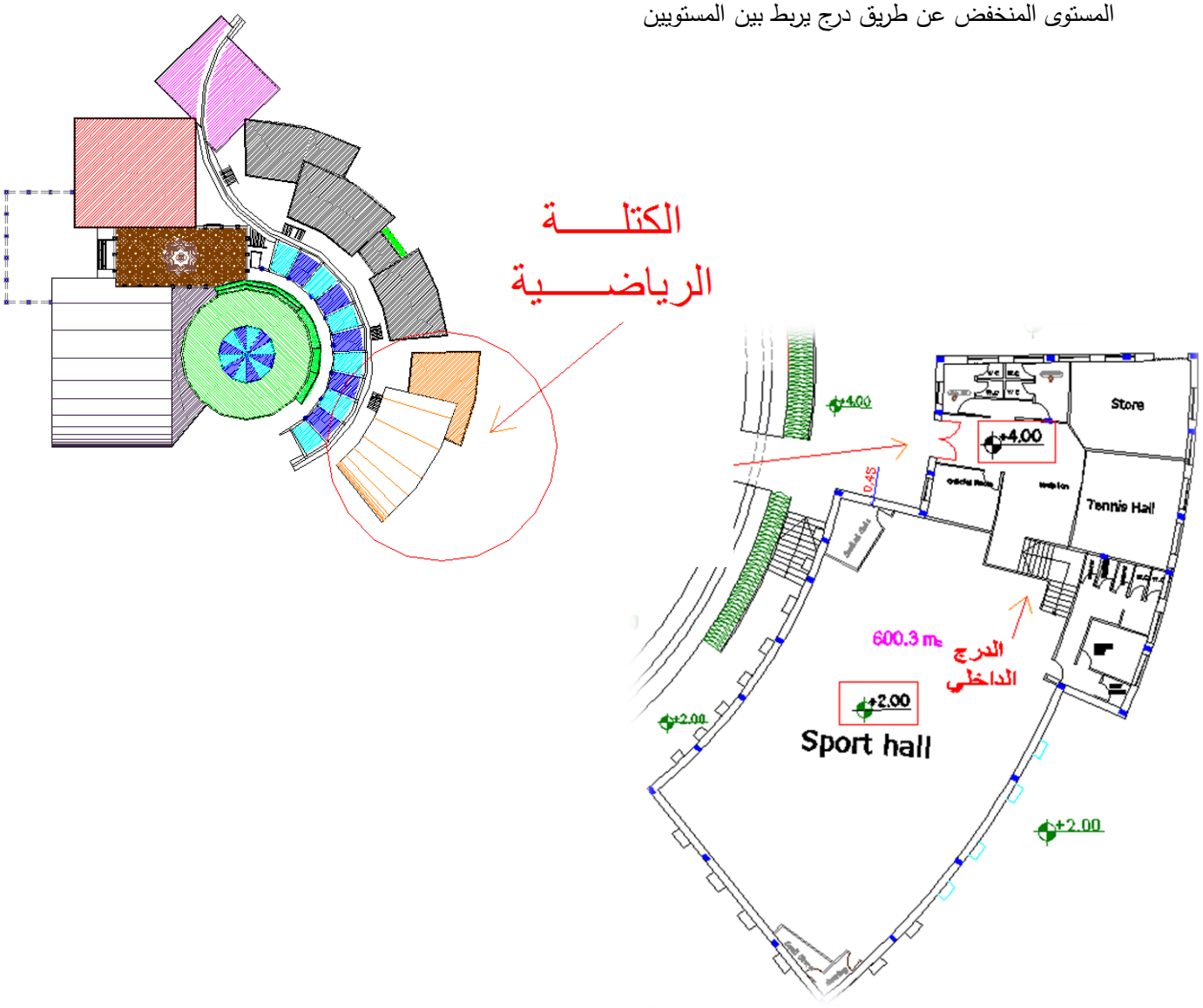
تبلغ مساحة مبنى الاستقبال 1270م^2 مقسمة على طابقين طابق أرضي ويحتوي على قاعة كبيرة للانتظار واللقاءات بمساحة 635 م^2 ، أما الطابق الاول فيتكون من مصلى لرجال ومصلى لنساء وفراغات مفتوحة للراحة، بالإضافة إلى غرفة المدير وما يتبعها من غرفة استقبال وغرفة خدمات وغرفة تحكم ويتكون أيضا من غرفة فيديو كونفرنس ومنطقة الحاسوب وغرف التحكم والمراقبة ويقع الطابق الاول على منسوب 10.00 + ويتم الصعود إليه عن طريق درجين دائريين توجد فوقهما قبة زجاجية تعطي للمبنى طابعا جميلا، ويمكن الوصول إلى المبنى عن طريق المدخل الرئيسي



الشكل (2- 5): مخطط مبنى الاستقبال

2.4.2 الكتلة الرياضية

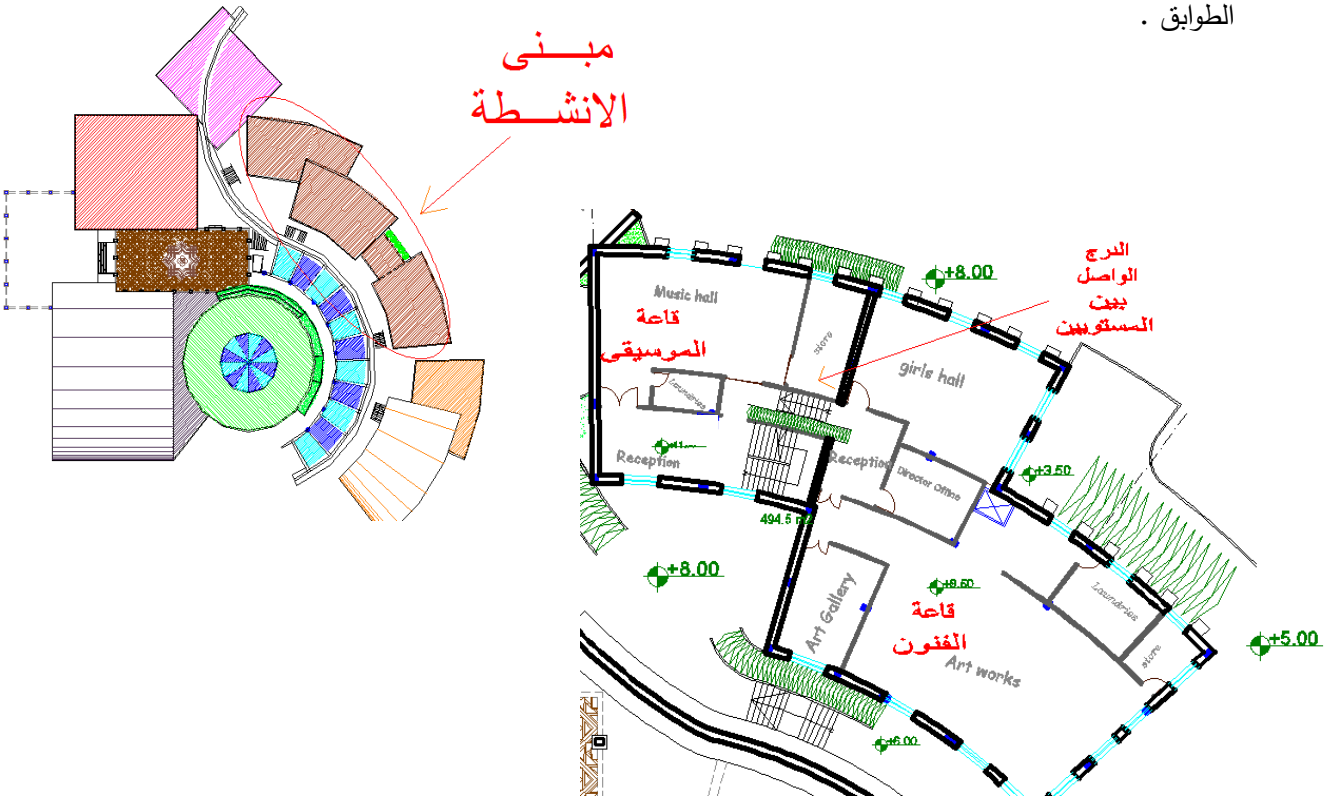
تبلغ مساحة المبنى 600 م^2 وهي مقسمة على مستوين الأول هو مستوى 2.00 + والثاني مستوى 4.00 + ويتكون من قاعة رياضية داخلية بالإضافة إلى مرافقها من غرف للغيار وحمامات وشورات وغرفة للخدمات الطبية ومخزن للمعدات الرياضية على المستوى المنخفض بالإضافة إلى ملعب تنس ومكاتب واستقبال ومرافقهم الصحية ويتم الوصول المبنى عن طريق المدخل الرئيسي على منسوب الأرض 4.00 + ومن ثم يتم النزول إلى الملعب على المستوى المنخفض عن طريق درج يربط بين المستويين



الشكل (2-6): مخطط الكتلة الرياضية

3.4.2 مبنى الأنشطة :

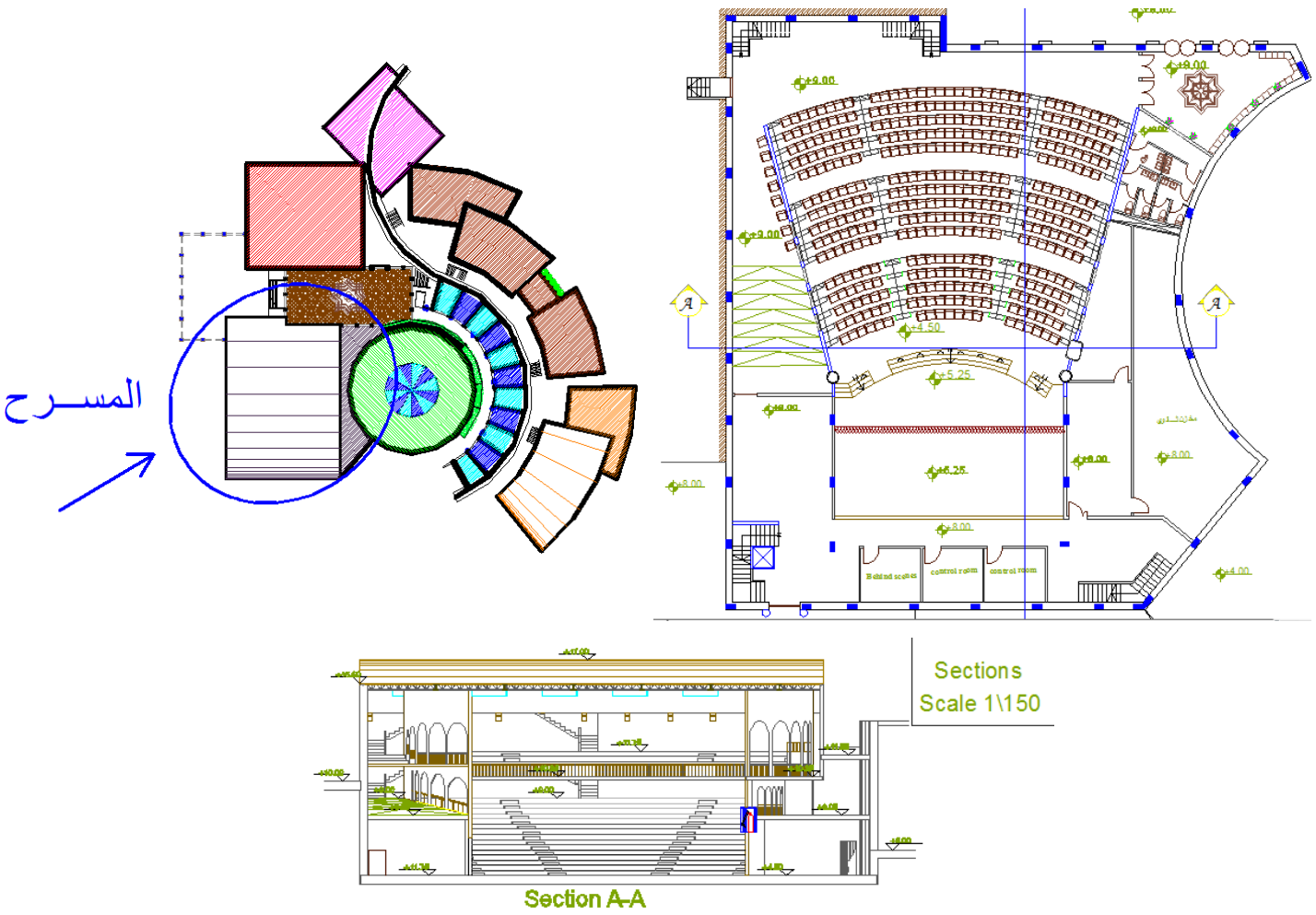
يتكون هذا المبنى من ثلاث طوابق، الطابق الأرضي بمساحة 160 م^2 على مستوى 3.50 + ويستخدم كمخزن لمبنى الأنشطة من اجل تخزين المواد والمعدات، الطابق الأول بمساحة 757.6 م^2 ويتكون من مستويين، المستوى الأول على منسوب 6.00 + ويحتوي على قاعة اجتماعات وقاعتين تدريسيتين وغرفة حاسوب ومكتبة تحتوي على غرف للأبحاث بالإضافة إلى الحمامات، أما المستوى الثاني على منسوب 8.00 + ويحتوي على قاعة سينما وقاعة استقبال، أما الطابق الثاني بمساحة 494.5 م^2 يتكون أيضا من مستويين، المستوى الأول على منسوب 9.50 + ويشكل قاعة الفنون من اجل الرسم والفن التشكيلي والفنون الأخرى، أما المنسوب الثاني 11.00 + فيحتوي على قاعة الموسيقى والبيانو بالإضافة إلى مخزن وغرفة طعام وقاعة استقبال، ويوجد للمبنى أكثر من مدخل فيوجد مدخل منفصل لقاعات التدريس ومدخل للحمامات، يوجد مدخل منفصل ومرتبط بدرج يوصل إلى قاعة السينما والى قاعة الموسيقى في الطابق الثاني ويوجد درج داخلي مع رامب يصل بين المستويين في الطابق الثاني كما ويوجد درج داخلي يربط بين الطابق الأرضي والطابق الأول ويوجد في داخل المبنى مصعد لنقل الأشخاص والمعدات بين الطوابق .



الشكل (2-7): مخطط مبنى الأنشطة

4.4.2 مبنى المسرح :

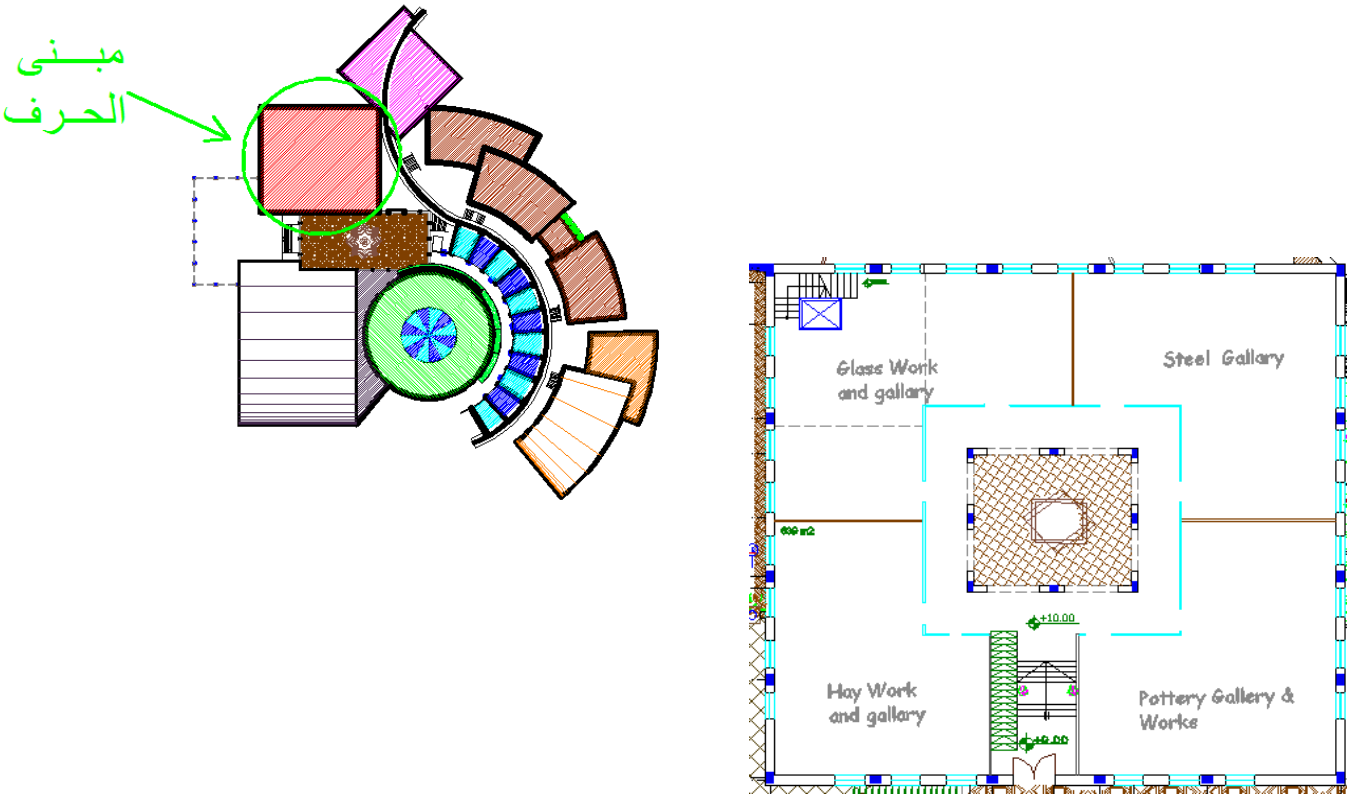
يتكون مبنى المسرح من ثلاث عقدات تربط بين مدرجين لديهم القدرة على استيعاب 600 شخص وتم تصميمها حسب المقاييس العالمية بمساحة تبلغ حوالي 965.7 م^2 ، ويحتوي مبنى المسرح على غرف للممثلين للذكور والإناث بالإضافة إلى غرف تحكم وفراغات خلف الكواليس، ويحتوي الطابق الثاني على غرف تخزين بالإضافة إلى غرف تحكم ثانوية وفضاءات خلف الكواليس ويربط بين الطوابق درجين إحداهم في الجهة الشرقية والأخر في الجهة الغربية كما ويوجد مصعد لنقل الأشخاص من الطابق الأرضي إلى الطابق العلوي ويتوفر أكثر من مدخل للمسرح حيث يوجد مدخل خاص في الممثلين يقع في الجهة الغربية من الناحية الخلفية للمسرح والمدخل الرئيسي الذي يقع على مستوى +9.00 الذي يدخل ويخرج منه الزوار .



الشكل (2-8): مخطط مبنى المسرح

5.4.2 مبنى الحرف والمشغولات اليدوية :

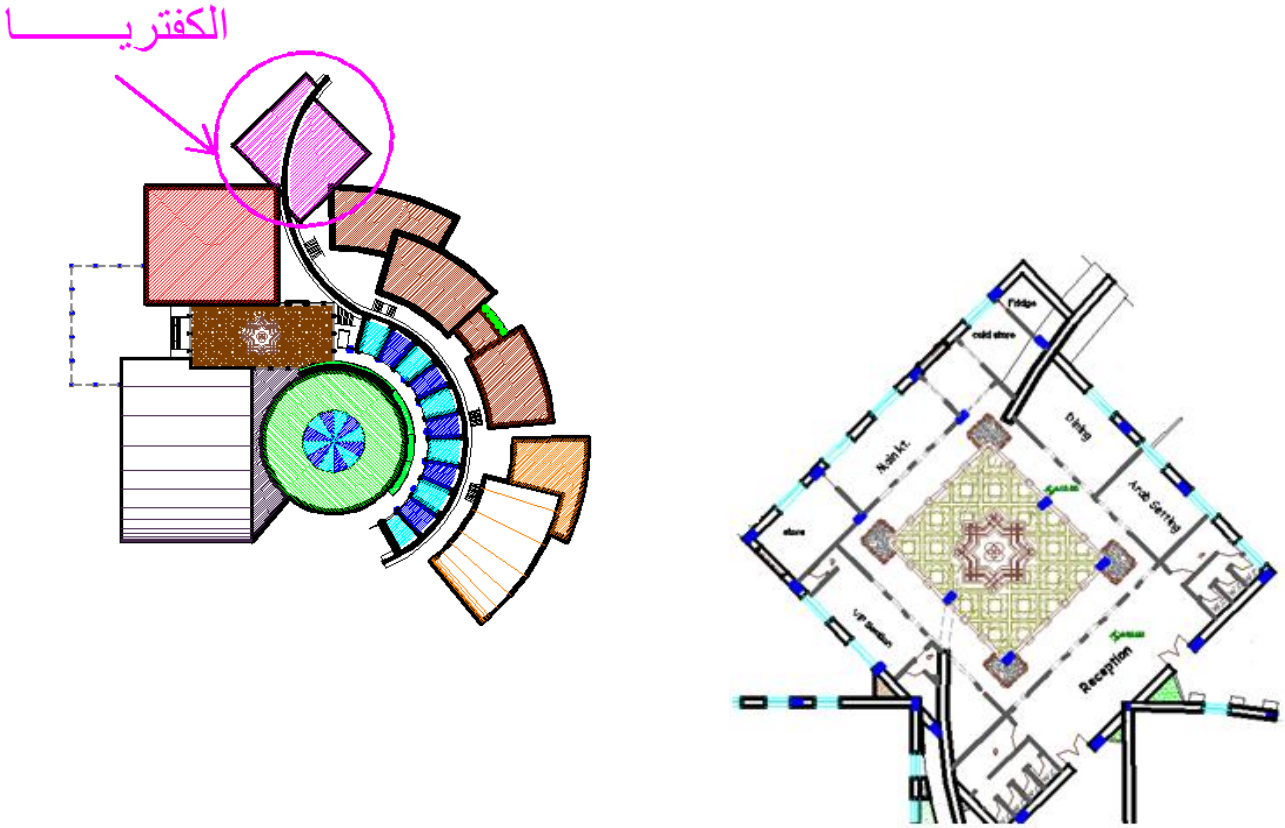
تبلغ مساحه مبنى الحرف والمشغولات اليدوية 639 م^2 ، وهو عبارة عن طابق فردي يحتوي على معرض للأدوات المعدنية ومعرض للأدوات الزجاجية ومعرض للخزف والتراث ومعرض مفتوح متعدد الاستخدامات ويقع المبنى على منسوب 10.00+ ومن الممكن استخدامه في معارض الصناعات ومعارض الحرف والتراث ومشاريع الطلاب ومعرض للفنانين التشكيلين .



الشكل (2-9): مخطط مبنى الحرف والمشغولات اليدوية

6.4.2 مبنى الكافتيريا :

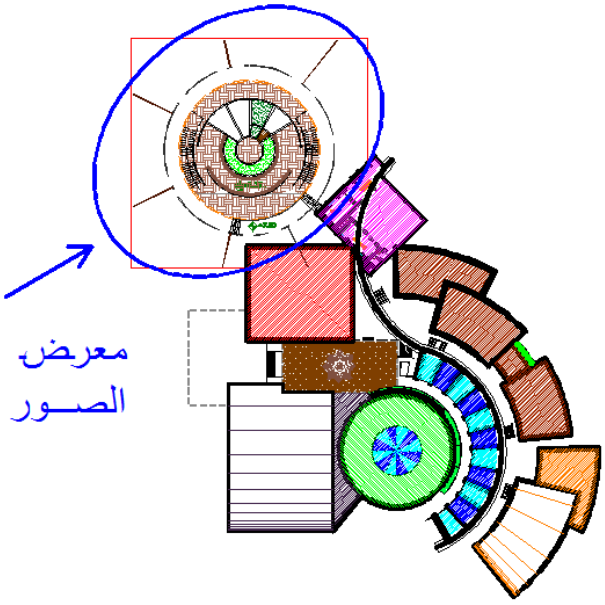
تبلغ مساحة الكافتيريا 391.7 م^2 وهي عبارة عن طابق فردي يحتوي على مطبخ ومطعم وقسم للأشخاص المميزين " VIP " وجلسة عربية بالإضافة إلى مخزن وثلاجة وحمامات للذكور وللإناث ويقع المبنى على منسوب 10.00+ ويوجد مدخلين للمبنى مدخل للبضائع يطل على المخزن ومدخل للزبائن ومخرج قريب من مصف السيارات.

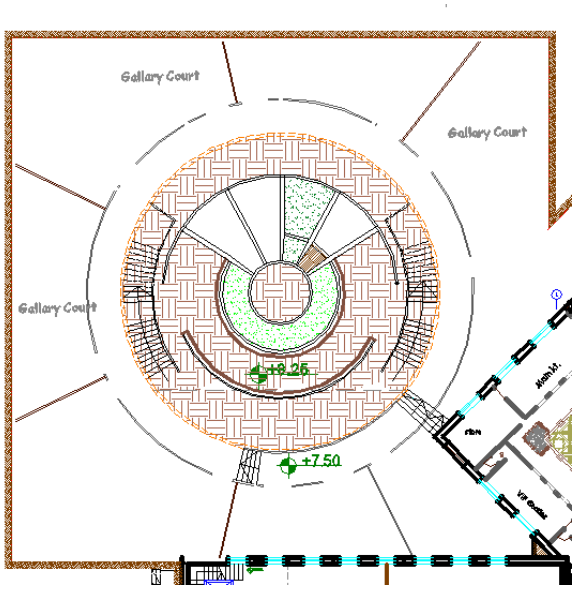


الشكل (2-10): مخطط مبنى الكافتيريا

7.4.2 مبنى معرض الصور:

تبلغ مساحة معرض الصور 1325 م^2 وهو عبارة عن طابق فردي يحتوي على معرض للصور مقسم إلى أربع فراغات معمارية لعرض الصور بالإضافة إلى حمامات وغرفة خدمات كما ويوجد مشغل للرسم، ويقع المبنى على منسوب 8.25 + ويقع المعرض على منسوب الأرض الطبيعي، ويوجد في داخل المبنى فتحة دائرية في الوسط.



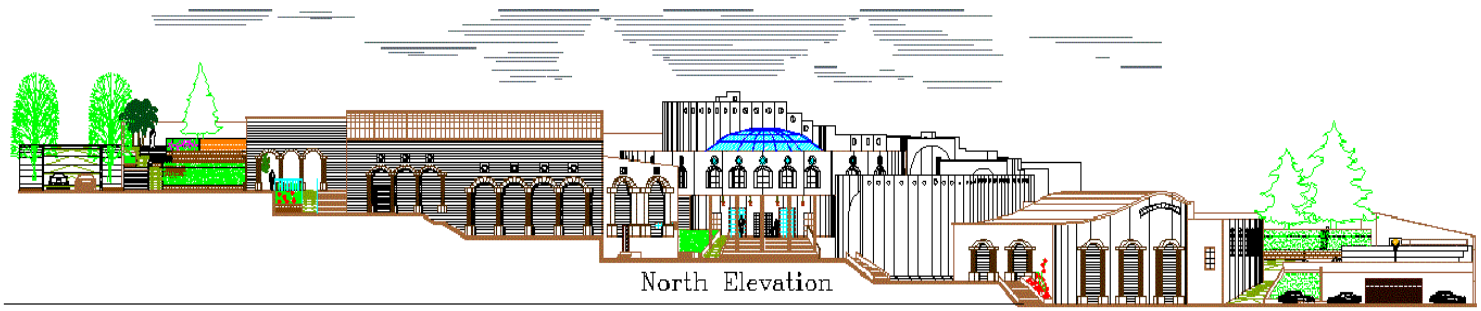


الشكل (2-11): مخطط مبنى معرض الصور

5.2 وصف الواجهات :

1.5.2 الواجهة الشمالية :

وهي الواجهة التي تحتوي على المدخل الرئيسي للقصر الثقافي. ويظهر فيها ثلاث مباني رئيسية وهي القاعة الرياضية ومبنى الاستقبال وكذلك المسرح، وهنا أيضا تم وضع الأقواس لتعطي للواجهات جمالا معماريا يعكس رونق المباني، وتم أيضا توضيح الفرق في المناسيب كما هو في الشكل (2–12) .



الشكل (2-12): الواجهة الشمالية

2.5.2 الواجهة الغربية:

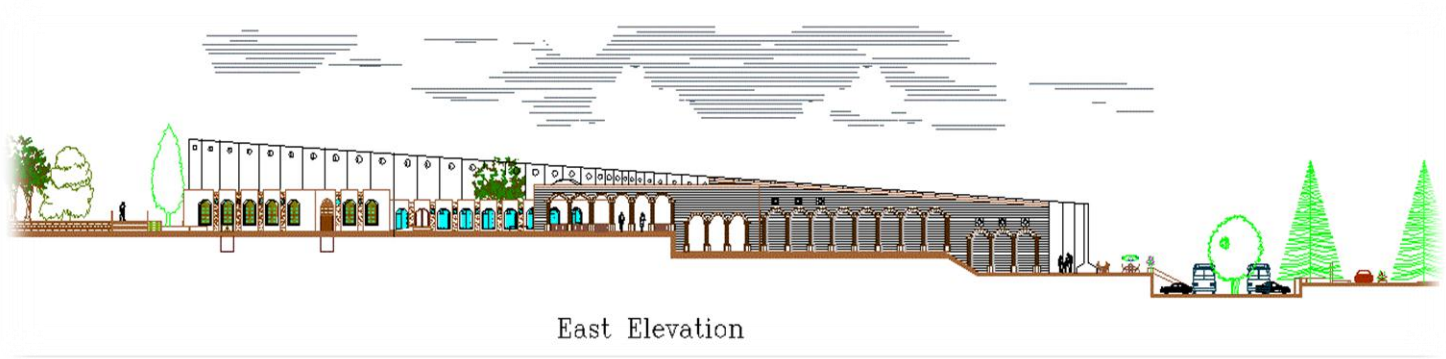
وهي الواجهة التي يظهر فيها جدار الفصل العنصري بشكل واضح، فقد احتوى الجدار على العديد من الفتحات التي تهدف إلى توحيد عناصر المشروع وترمز إلى الأمل بزوال الجدار عن أرضنا وتوحد كافة أجزاء الوطن، وتظهر الواجهة أيضا مبنى المطعم ومبنى الأنشطة وقاعة الرياضة ، حيث أن الجدار يمر من وسط مبنى المطعم دون أن يقسمه إلى قسمين. وتم توضيح الفرق في المناسيب كما هو في الشكل (2–13).



الشكل (2-13): الواجهة الغربية

3.5.2 الواجهة الشرقية:

تمتاز بإظهار كثرة الأقواس والبروزات المعمارية الجميلة، وتظهر هذه الواجهة أيضا مبنى المشغولات الحرفية والمسرح، وتوضح الفرق في المناسيب كما هو في الشكل (2–14) .



الشكل (2-14): الواجهة الشرقية

4.5.2 الواجهة الجنوبية:

وهي تمثل الواجهة الخلفية للقصر الثقافي، وتوضح كيفية مرور جدار الفصل العنصري بمبنى المطعم وتوضح أيضا الفرق في المناسيب كما هو في الشكل (2–15) .



الشكل (2-15): الواجهة الجنوبية

الفصل الثالث

الوصف الإنشائي للمشروع

3

1.3 المقدمة .

2.3 هدف التصميم الإنشائي .

3.3 الأحمال.

4.3 العناصر الإنشائية .

1.3 مقدمة :

بعد أن تمت دراسة المشروع من الناحية المعمارية لابد من تطبيق جميع الأفكار والمقترحات المعمارية للمبنى من خلال تصميم إنشائي يلبى هذه الأفكار، والهدف الرئيسي لعملية التصميم الإنشائي هو ضمان المتانة مع التشغيل فيه والأخذ بعين الاعتبار الأبعاد الاقتصادية له.

يعتمد التصميم الإنشائي بشكل أساسي على تصميم كافه العناصر الإنشائية بحيث تقاوم كافه الأحمال التي تؤثر عليها وبالتالي يجب وصف كافه هذه العناصر وصفا دقيقا يلبي متطلبات الحسابات الهندسية لهذا المشروع بالإضافة للحفاظ على التصميم المعماري وعدم تغييره .

2.3 هدف التصميم الإنشائي :

يهدف التصميم الإنشائي بشكل أساسي إلى إنتاج منشأ متين ومتزن من جميع النواحي الهندسية الإنشائية ومقاوم لجميع المؤثرات الخارجية من أحمال ميتة وحية وأيضا أحمال بيئية من تأثير والرياح والثلوج.

وبالتالي يتم تحديد العناصر الإنشائية بناء على :

- عامل الأمان (Factor of Safety) : يتم تحقيقه عبر اختيار مقاطع للعناصر الإنشائية قادرة على تحمل القوى المؤثرة والإجهادات الناتجة عنها.
- التكلفة (Cost) : يتم تحقيقها عن طريق اختيار مواد البناء ومقاطع مناسبة التكلفة وكافية للغرض الذي ستستخدم من أجله.
- حدود صلاحية المبنى للتشغيل (Serviceability) : من حيث تجنب أي هبوط زائد (Deflection) و تجنب التشققات (Cracks) التي تؤثر سلباً على المنظر المعماري المطلوب.
- الانسجام بين التصميم الإنشائي والمعماري للمبنى.

3.3 الأحمال :

تتعرض المباني إلى أنواع عدة من الأحمال وهي مجموعة القوى التي تؤثر على المبنى ويتم تصميمه بناءاً على تأثيرها وتكون على شكل أحمال ميتة وحيه وبيئية وغيرها، وتنقسم هذه الأحمال إلى قسمين :

1. الأحمال الرئيسية (المباشرة) : وهذه الأحمال تتضمن الأحمال الميتة والأحمال الحية والأحمال البيئية .
2. الأحمال الثانوية (غير المباشرة) : وتشمل انكماش الجفاف للخرسانة ، والتأثير الحراري وهبوط الأساس.

لذلك تجب الدقة المتناهية في حسابات الأحمال، حيث أن الخطأ في مثل هذه الحسابات يؤثر سلبا على التصميم الإنشائي وقد يكون هذا الخطأ فادحا وقد يؤدي إلى خسائر بشريه وماديه.

1.3.3 الأحمال الميتة :

هي أحمال تنجم عن وزن المبنى الذاتي الذي يتكون من أوزان مواد البناء المستخدمة حيث تتضمن جميع العناصر الإنشائية و التجهيزات الثابتة فهي أحمال تلازم المبنى بشكل دائم، ثابتة المقدار والاتجاه.

وفيما يتعلق بالكثافة النوعية للمواد المستخدمة فهي كالتالي:

الرقم المتسلسل	المادة المستخدمة	الكثافة المستخدمة (KN/m^3)
1	البلاط	23
2	المونة	22
3	الخرسانة	25
4	الطوب	9
5	القصارة	22
6	الرمل	16

الجدول (3-1): الكثافة النوعية للمواد المستخدمة

2.3.3 الأحمال الحية :

وهي الأحمال التي تتعرض لها الأبنية والإنشاءات بحكم الاستعمالات المختلفة، بما في ذلك الأحمال الموزعة والمركزة، وهي تشمل :

1. أوزان الأشخاص مستعملي المنشأة.
2. الأحمال الساكنة، والتي يمكن تغيير أماكنها من وقت لآخر، كالأثاث، والأجهزة والآلات غير المثبتة، والمواد المخزنة والأثاث والأجهزة والمعدات، والجدول (3-2) يبين قيمة الأحمال الحية اعتمادا على نوعية استخدام المبنى حسب الكود الأردني للأحمال 2006.
3. الأحمال الديناميكية.

الرقم المتسلسل	طبيعة الاستخدام	الحمل الحي (KN/m^2)
1	المسارح والقاعات	5.0
2	غرف التدريس	3.0
3	غرفة المطالعة والكتب	4.0
4	الأدراج والممرات	3.0
5	المخازن	5.0
6	المطاعم والصالات	5.0
7	مواقف السيارات	5.0
8	منصات المسرح	7.5
9	قاعات المعدات	2
10	مكاتب الاستعلام	2.5
11	الممرات والمداخل	3.0
12	المساجد	3.0

الجدول (3-2) : الأحمال الحية

3.3.3 الأحمال البيئية :

هي النوع الثالث من الأحمال التي يجب نأخذها بعين الاعتبار عند التصميم، وهذه الأحمال تتمثل في :

1.3.3.3 أحمال الرياح :

عبارة عن قوى أفقية تؤثر على المبنى ويظهر تأثيرها في المباني المرتفعة وهي القوى التي تؤثر بها الرياح على الأبنية أو المنشآت أو أجزاءها وتكون موجبة إذا كانت ناتجة عن ضغط وسالبة إذا كانت ناتجة عن شد، وتقاس بالكيلو نيوتن لكل متر مربع (KN/m^2). وتحدد أحمال الرياح اعتماداً على ارتفاع المبنى عن سطح الأرض، والموقع من حيث الإحاطة من مباني سواء كانت مرتفعة أو منخفضة.

2.3.3.3 أحمال الثلوج :

هي الأحمال التي يمكن أن يتعرض لها المنشأ بفعل تراكم الثلوج، ويمكن تقييم أحمال الثلوج اعتماداً على الأسس التالية:

- ارتفاع المنشأة عن سطح البحر.
- ميلان السطح المعرض لتساقط الثلوج.

و الجدول التالي يبين قيمة أحمال الثلوج حسب الارتفاع عن سطح البحر حسب الكود الأردني.

علو المنشأ عن سطح الأرض (H) (بالمتر)	أحمال الثلوج (KN/M^2)
h < 250	0
500 > h > 250	(h-250) /1000
1500 > h > 500	(h-400) / 400
2500 > h > 1500	(h – 812.5) / 250

الجدول (3-3): قيمة أحمال الثلوج حسب الارتفاع عن سطح البحر

3.3.3.3 أحمال الزلازل :

من أهم الأحمال البيئية التي تؤثر على المبنى و هي عبارة عن قوى أفقية و رأسية يتولد عنها عزوم منها عزم الالتواء وعزم الانقلاب، ويمكن مقاومتها باستخدام جدران القص المصممة بسماكات وتسليح كافي يضمن سلامة المبنى عند تعرضه لمثل هذه الأحمال التي يجب مراعاتها في عملية التصميم لتقليل الخطورة والمحافظة على أداء المبنى لوظيفته أثناء الزلازل، ويتم تحديد أحمال الزلازل وقوى القص اعتماداً ورجوعا إلى الكود المستخدم (UBC97).

4.3 العناصر الإنشائية :

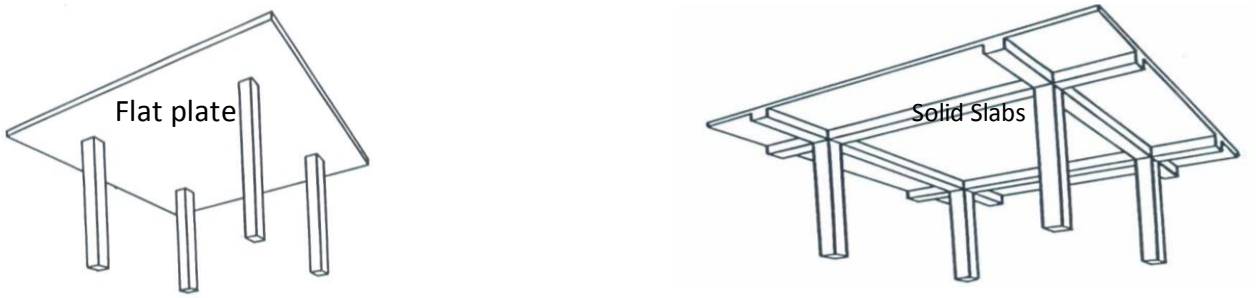
تتكون جميع المباني عادة من مجموعة من العناصر الإنشائية التي تتكاتف لكي تحافظ على استمرارية وجود المبنى وصلاحيته للاستخدام البشري، ومن أهم هذه العناصر، العقدات والجسور والأعمدة والجدران الحاملة والأساسات وغيرها.

1.4.3 العقدات :

هي عبارة عن العناصر الإنشائية القادرة على نقل القوى الرأسية بسبب الأحمال المؤثرة عليها إلى العناصر الإنشائية الحاملة في المبنى مثل الجسور والجدران والأعمدة.

توجد أنواع مختلفة وعديدة شائعة الاستعمال من العقدات الخرسانية المسلحة والتي يتم استخدامها في النظام الإنشائي للمبنى، منها ما يلي :

- البلاطات المصمتة (Solid Slabs) : هي عبارة عن بلاطات خرسانيه مسلحة محمولة على جسور أو حوائط ومنها ما هو باتجاه واحد أو باتجاهين.
- Flat plate : هي عبارة عن بلاطات مسطحة (أي لا يوجد بها جسور) وترتكز على الأعمدة مباشرة.
-

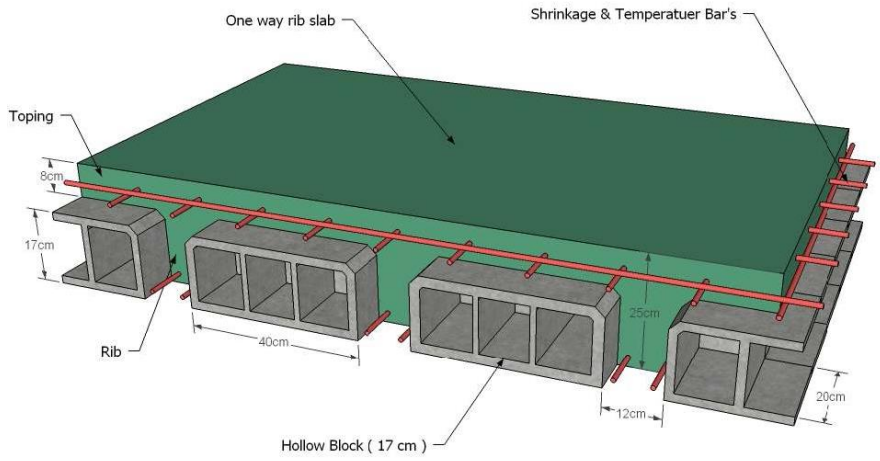


الشكل (3-1): عقدة البلاطة المصمتة

- البلاطات المفرغة (Ribbed Slabs) وتقسم إلى :

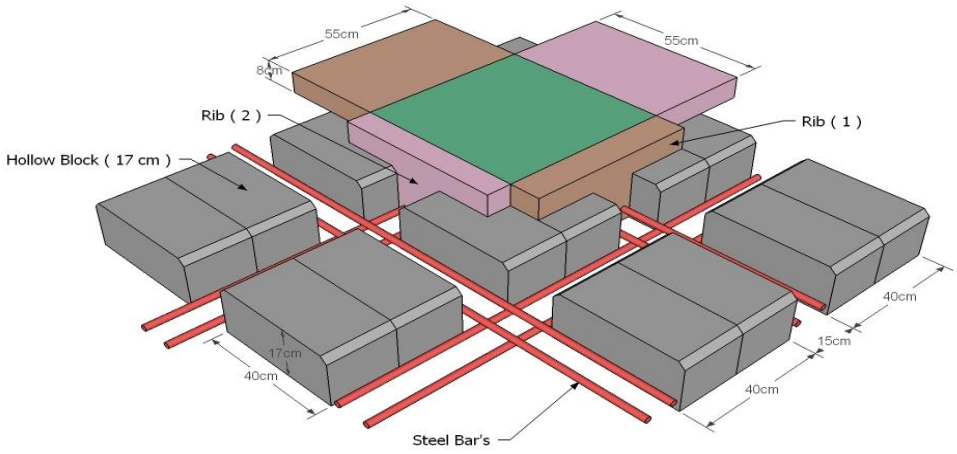
1. عقدات العصب ذات الاتجاه الواحد (One-way ribbed slab) .
2. عقدات العصب ذات الاتجاهين (Two-way ribbed slab).

1.1.4.3 عقدات العصب ذات الاتجاه الواحد (One way ribbed slab):



الشكل (3-2): عقدات العصب ذات الاتجاه الواحد

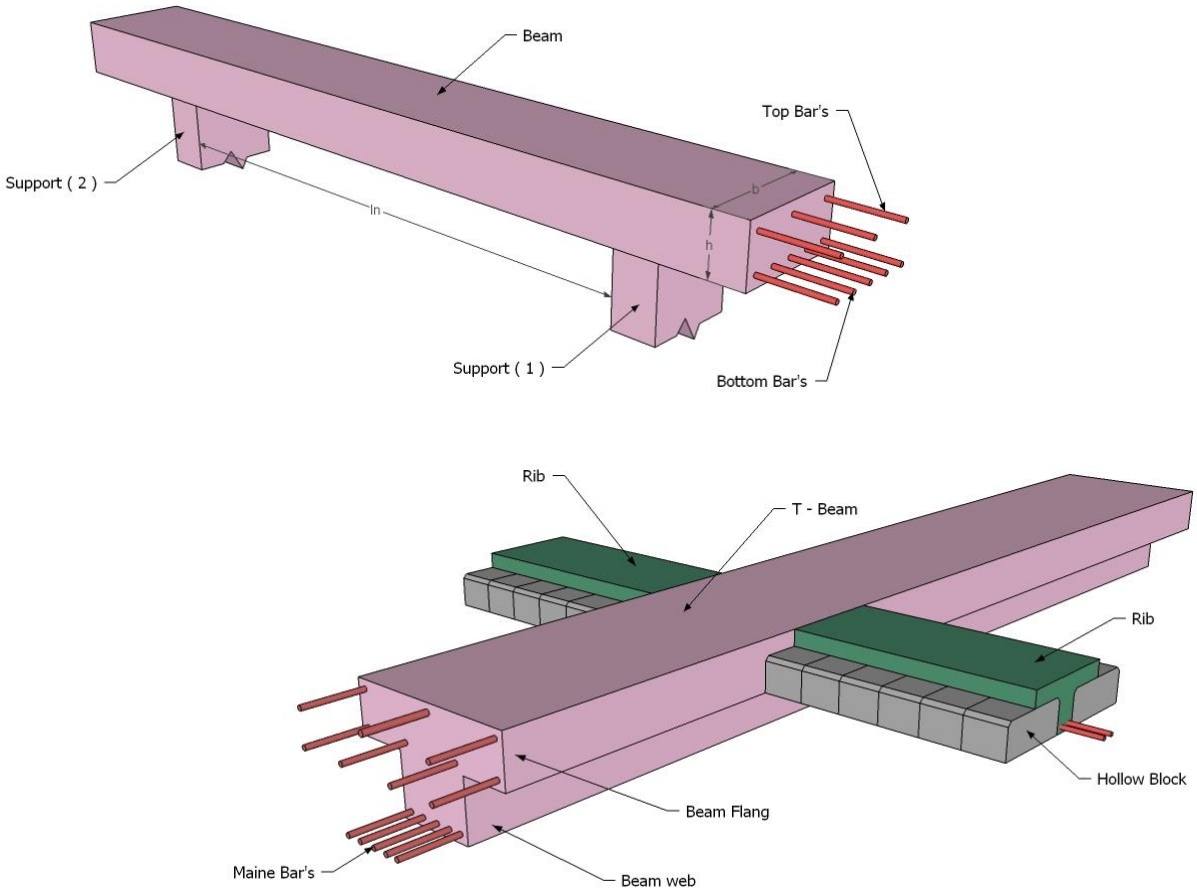
2.1.4.3 عقدات العصب ذات الاتجاهين (Two way ribbed slab):



الشكل (3-3): عقدات العصب ذات الاتجاهين

1.4.3 الجسور:

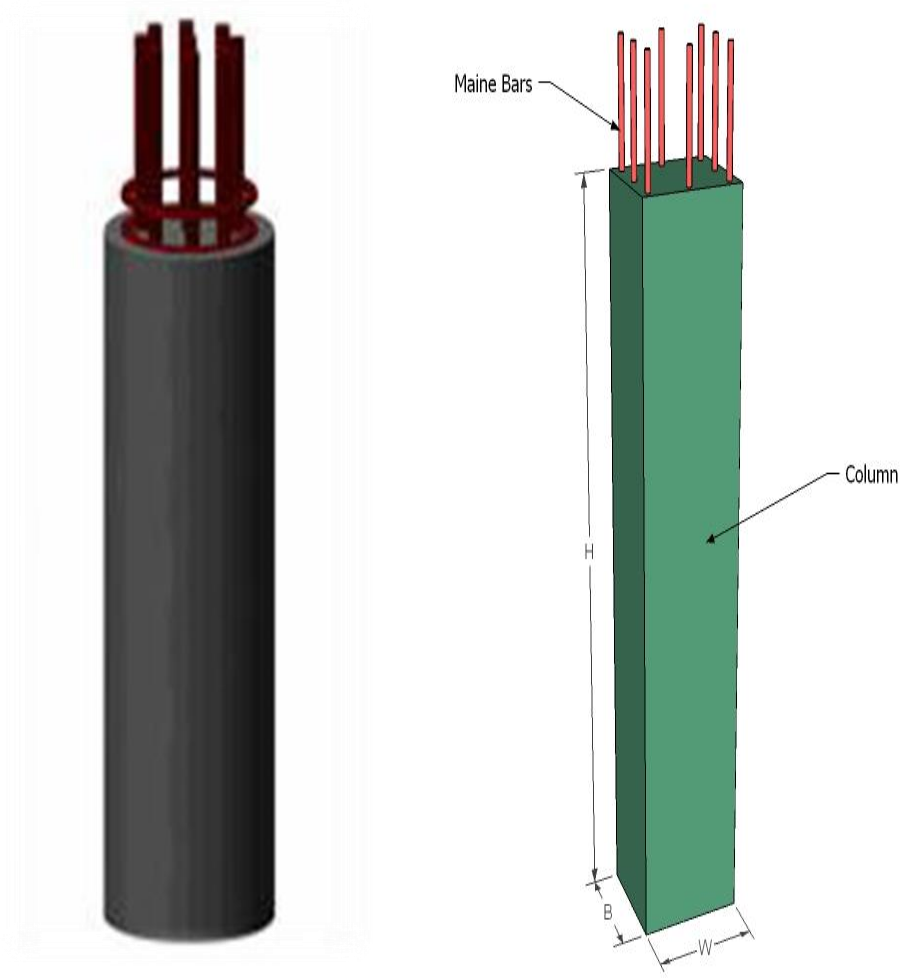
وهي عناصر إنشائية أساسية في نقل الأحمال من البلاطات إلى الأعمدة، وهي نوعين جسور مسحورة (مخفية داخل العقدات) والجسور المدلاه " Dropped Beams " وهي التي تبرز عن العقدة من الأسفل، وفي المشروع سنقوم باستخدام الجسور المسحورة والجسور المدلاه حسب الأحمال الواقعة على الجسر وكذلك حسب الفضاءات وبعد كل جسر.



الشكل (3-4): أشكال الجسور المدلاه و المسحورة

3.4.3 الأعمدة :

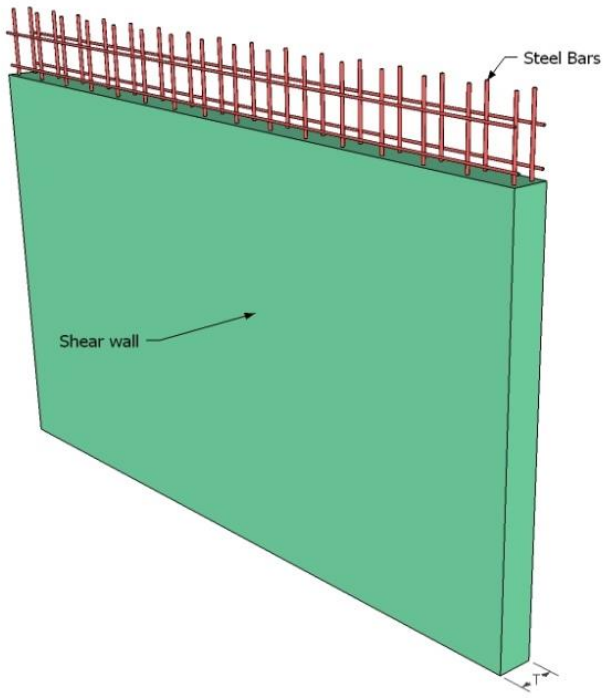
تعتبر الأعمدة العضو الرئيسي في نقل الأحمال من العقدات والجسور إلى الأساسات، وبذلك فهي عنصر إنشائي ضروري لنقل الأحمال وثبات المبنى، لذلك يجب تصميمها بحيث تكون قادرة على حمل ونقل الأحمال الواقعة عليها، وهي متنوعة من حيث المقطع وطريقة العمل.



الشكل (3-5): إحدى أشكال الأعمدة

4.4.3 الجدران الحاملة (جدران القص) :

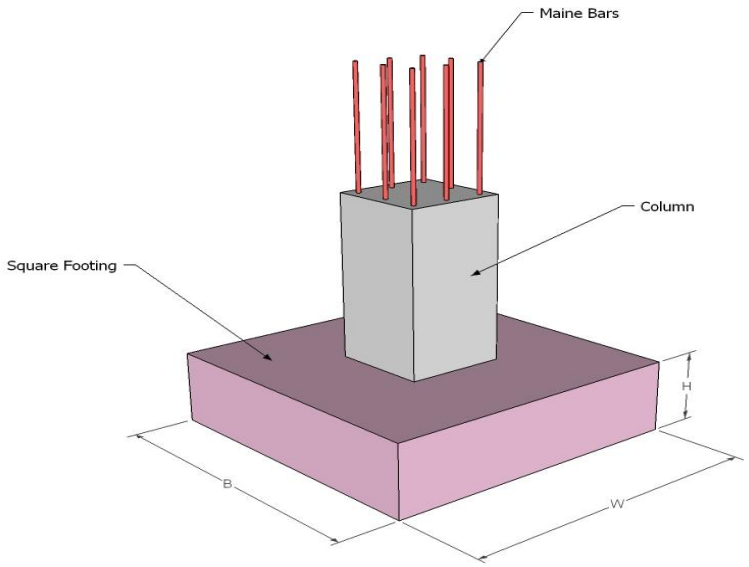
وهي عناصر إنشائية حاملة تقاوم القوى العمودية والأفقية الواقعة عليها وتستخدم بشكل أساسي لمقاومة الأحمال الأفقية مثل قوى الرياح والزلازل وتسمى جدران القص (shear wall) وهذه الجدران تسلح بطبقة واحدة أو طبقتين من الحديد حتى تزيد من كفاءتها على مقاومة القوى الأفقية. وقد تم تحديد الجدران الحاملة في المبنى وتوزيعها وتتمثل الجدران الحاملة بجدران بيت الدرج، وجدران المصاعد، والجدران الأخرى التي تبدأ من أساسات المبنى، وتعمل على تحمل الأوزان الرأسية المنقولة إليها كما تعمل كجدران قص تقاوم القوى الأفقية التي يتعرض لها المنشأ، ويجب توفرها في الاتجاهين مع مراعاة أن تكون المسافة بين مركز المقاومة الذي تشكله جدران القص في كل اتجاه ومركز الثقل للمبنى أقل ما يمكن، وان تكون هذه الجدران كافية لمنع أو تقليل تولد عزوم اللي وآثاره على جدران المبنى المقاومة للقوى الأفقية .



الشكل (3-6): جدار القص

5.4.3 الأساسات:

بالرغم من أن الأساسات هي أول ما يبدأ بتنفيذها عند بناء المنشأ، إلا أن تصميمها يتم بعد الانتهاء من تصميم كافة العناصر الإنشائية في المبنى.

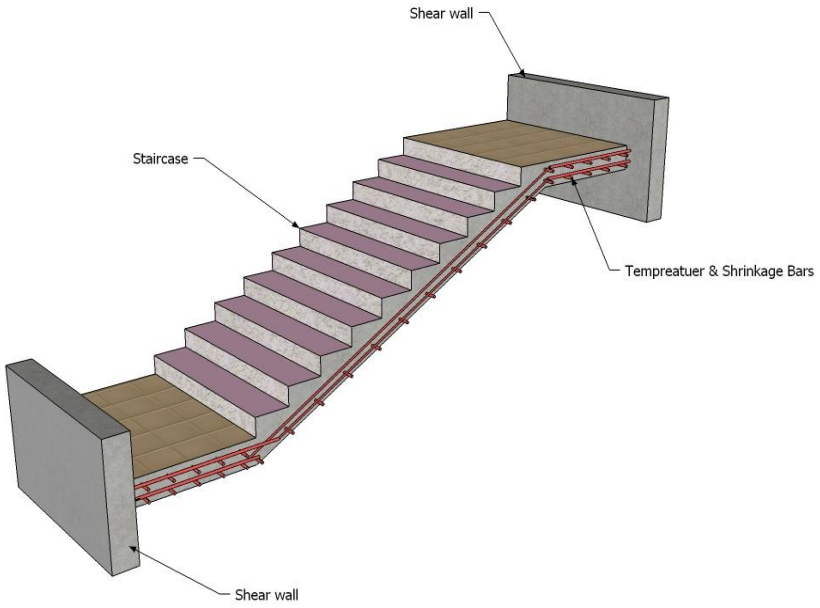


الشكل (3-7) : الأساس المنفرد

ولمعرفة الأوزان والأحمال الواقعة عليها، فإن الأحمال الواقعة على العقدة تنتقل إلى الجسور ثم إلى الأعمدة وأخيرا إلى الأساسات، وتكون هذه الأحمال هي الأحمال التصميمية للأساسات، و بناءا على الأحمال الواقعة عليها وطبيعة الموقع يتم تحديد نوع الأساسات المستخدمة، ومن المتوقع استخدام أساسات من أنواع مختلفة وذلك تبعا لقوة تحمل التربة والأحمال الواقعة على كل أساس و نظرا لما يتخذه هيكل المنشأ من شكل متدرج ليتلاءم مع طبوغرافية الأرض.

6.4.3 الأدراج :

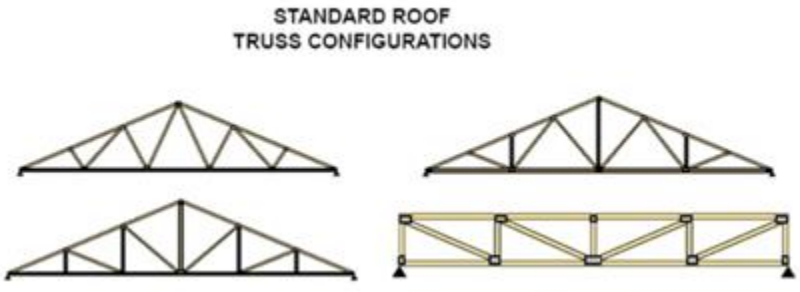
عبارة عن عناصر معمارية تستخدم للانتقال الرأسي بين المستويات المختلفة، وتم استخدامها في مشروعنا بشكل واضح والشكل (3–8) يبين مقطع عام للدرج.



الشكل (3-8): الدرج

7.4.3 Truss:

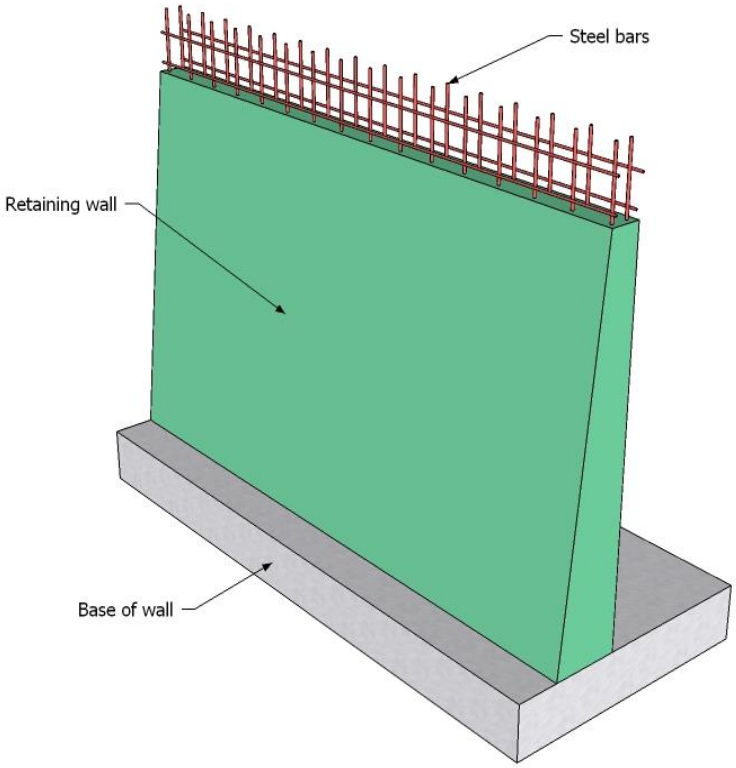
وهو عنصر إنشائي يتألف من مجموعه من الوحدات المثلثية المترابطة فيما بينها، بحيث يتم تركيب أجزاء الـــ Trussباستخدام البراغي واللحام، ويتميز بخفة وزنة و فضاءاتة الكبيرة؛ حيث تم استخدامها في مبنى المسرح، ومبنى الاستقبال على شكل قبة فولاذية .



الشكل (3-9): Truss

8.4.3 الجدران الإستنادية :

بسبب الاختلاف الواضح في مناسيب قطعة أرض المشروع، كان لا بد من استخدام جدران الإستنادية لتحمي التربة من الانهيار أو الانزلاق، و تنفذ الجدران الإستنادية من الخرسانة المسلحة .



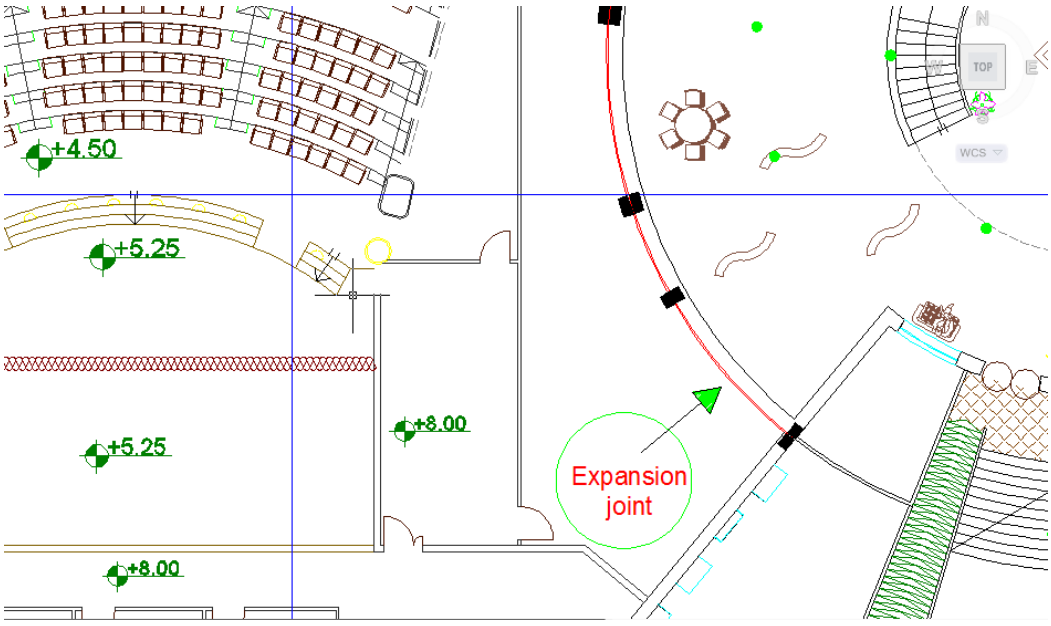
الشكل (3-10): جدار استنادي

9.4.3 فواصل التمدد (Expansions Joints) :

يمكن تحديد المسافة القصوى بين فواصل التمدد للمنشات العادية كما يلي :

3. من 40 إل 45 م في المناطق المعتدلة كما هو الحال في فلسطين .
4. من 30 إل 35 م في المناطق الحارة .
5. ويمكن زيادة هذه المسافات بشرط الأخذ بعين الاعتبار تأثير عوامل الانكماش والتمدد.
6. وفي حالة أعمال الخرسانة كالحوائط الإستنادية والأسوار يجب تقليل المسافات بين الفواصل و اخذ الاحتياطات اللازمة لمنع تسرب المياه من خلال فواصل التمدد .

وتم استخدام أربع فواصل تمدد في هذا المشروع في عدة أماكن مختلفة .



الشكل (3-11): فاصل التمدد في مبنى المسرح.

Chapter Four

Structural Analysis and Design

4

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4 – 1 Introduction.

4 – 2 Factored Loads.

4 – 3 Determination of thickness of one way rib slab.

4 – 4 Topping Design.

4 – 5 Load Calculation for Rib (Rc5).

4 – 6 Design of rib (Rc5) in the second floor.

4 – 7 Design of Beam (Bc10) in the second floor.

4 _ 8 Design of one way Solid slab.

4 _ 9 Design of Tow way ribbed slab.

4_ 10 Design of Tow way Solid slab.

4_ 11 Design of Column.

4_ 12 Design of Isolated Footing.

4_ 13 Design of Basement Wall.

4_ 14 Design of Stairs.

4_ 15 Design of Shear wall.

4_ 16 Design of Truss.

Chapter Four

Structural Analysis and Design

4.1 Introduction :

In This Project, there are many types of slabs: one-way solid slabs, two-way solid slabs, flat plate, one-way ribbed and two-way ribbed slabs. They would be analyzed and designed by using finite element programs such as " safe , ATIR- Software " to find the internal forces, deflections and moments, and then hand calculation would be made to find the required steel for some members (such as ribs , beam , two-way slabs).

The design strength provided by a member, its connections to other members, and its cross-sections in terms of flexure, shear, and torsion is taken as the nominal strength calculated in accordance with the requirements and assumptions of ACI-code.

NOTE:

* Concrete B300 { fc'= 24 N/mm2 (MPa) } .

* The specified yield strength of the reinforcement { fy = 420 N/mm² (MPa)}.

*The specified yield strength of the STEEL { Fy=36ksi }.

*The specified ultimate strength, of the STEEL { FU=58ksi }.

4.2 Factored Loads :

The factored loads on which the structural analysis and design is based for flexural members in the project (slabs and beams) , is determined as follows :

$$q_u = 1.2\ DL + 1.6\ LL \qquad ACI - 318 - 08$$

4.3 Determination of Thickness for One Way Ribbed Slab :

The structure may be exposed to different loads such as dead and live loads. The value of the load depends on the structure type and the intended use.

The following limitations are specified by the ACI code:

- Atypical imaginary strip 1m wide is assumed.
- The minimum thickness of one-way slabs using grade 420 steel can be defined according to the ACI Code, 9.5.2.1, Table 9.5a, for solid slabs and for beams or ribbed one-way slabs .

ACI 9.5.2.1 – Minimum thickness stipulated in Table 9.5(a) shall apply for one-way construction not supporting or attached to partitions or other construction likely to be damaged by large deflections, unless computation of deflection indicates a lesser thickness can be used without adverse effects.

TABLE 9.5(a) — MINIMUM THICKNESS OF NONPRESTRESSED BEAMS OR ONE-WAY SLABS UNLESS DEFLECTIONS ARE CALCULATED

	Minimum thickness, h			
	Simply supported	One end continuous	Both ends continuous	Cantilever
Member	Members not supporting or attached to partitions or other construction likely to be damaged by large deflections			
Solid one-way slabs	$\ell/20$	$\ell/24$	$\ell/28$	$\ell/10$
Beams or ribbed one-way slabs	$\ell/16$	$\ell/18.5$	$\ell/21$	$\ell/8$

Notes:
Values given shall be used directly for members with normalweight concrete and Grade 420 reinforcement. For other conditions, the values shall be modified as follows:
a) For lightweight concrete having equilibrium density, w_c, in the range of 1440 to 1840 kg/m^3, the values shall be multiplied by $(1.65 - 0.0003w_c)$ but not less than 1.09.
b) For f_y other than 420 MPa, the values shall be multiplied by $(0.4 + f_y/700)$.

-The maximum span length for one – end continuous (for ribs):

$$h_{min} = \frac{L}{18.5} = \frac{3900}{18.5} = 210.81 \text{ mm}$$ ACI-318-08

-The maximum span length for both - end continuous (for ribs):

$$h_{min} = \frac{L}{21} = \frac{5260}{21} = 250.0 \text{ mm}$$

max $\mathbf{h_{min}} = 250.0$ mm

Take slab thickness $\mathbf{h = 250\ mm}$.

h = 25 cm (17 cm Hollow block + 8cm Topping).

4.4 Topping Design :

Topping in one way ribbed slab can be considered as a strip of **One meter width** and span of hollow block length with both end fixed in the ribs.

Table 4.1: Dead load calculation for topping

Dead load from:	σ * y*1	KN/m
Tiles	0.03*23*1	0.69
mortar	0.02*22*1	0.44
Coarse sand	0.07*16*1	1.12
topping	0.08*25*1	2
partitions	2.3*1	2.3
	∑	6.55

Live load calculation = 3 * 1 = 3 KN/m

Total factor load:

Wu = (1.2 * 6.55) + (1.6 * 3) = 12.66 KN/m

→ For a one meter strip Wu = 12.66 KN/m

Assume slab fixed at supported points (ribs):

Mu = $\frac{w_u * l^2}{12} = \frac{12.66 * 0.4^2}{12}$ = 0.168 KN.m / m of strip width.

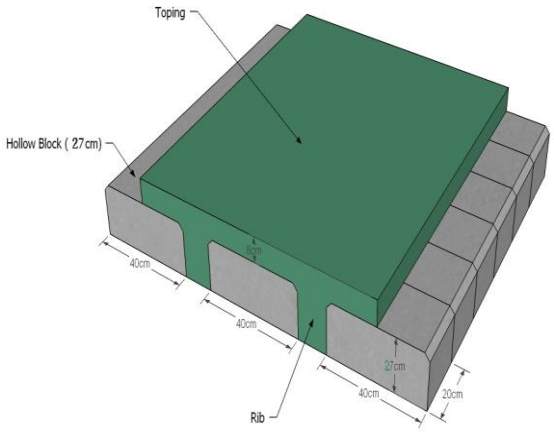


Fig. 4-1 : Toping of slab

Φ Mn ≥ Mu − strength condition,

where Φ=0.55−for plain concrete.

$Mn = 0.42 * \sqrt{f_c'} * S_m$ *ACI-318-05*

Where S_m for rectangular section of the slab:

$S_m = \frac{bh^2}{6} = \frac{1000 * 80^2}{6}$ = 1066666.67 mm^3.

Mn = 0.42 * $\sqrt{24}$ * 1066666.67 * 10^{-6} = 2.195KN.m

Φ Mn = 0.55 * 2.195 = 1.207KN.m

Φ Mn = 1.207 KN.m >> Mu = 0.168 KN.m

* No reinforcement is required by analysis. Provide As, min for slabs as shrinkage and temperature reinforcement.

$\rho_{shrinkage}$ = 0.0018 ACI-318-08

As = ρ * b * t = 0.0018 * 1000 * 80 = 144 mm2/m strip

Try Φ 8 with As = 50.27mm^2.

Bar numbers n = $\frac{A_S}{A_{S\Phi 8}} = \frac{144}{50.27} = 2.87$

Use 3 Φ8 /m with A_s = 150.8 mm^2/m strip or Φ8 @ 300 mm in both direction .

Step (s) is the smallest of :

1. 3h = 3 * 80 = 240mm – control.
2. 450mm.
3. S = 380 ($\frac{280}{fs}$) - 2.5 C_c = 380 ($\frac{280}{\frac{2}{3}\ 420}$) $- 2.5 * 20 = 330\ mm.$

S ≤ 380 ($\frac{280}{fs}$) = 300 ($\frac{280}{\frac{2}{3}\ 420}$) = 300mm.

Take Φ8 @ 200 mm in both directions. S = 200 mm.

4.5 Load Calculation for Rib Rc5 :

For the one-way ribbed slabs, the total dead load to be used in the analysis and design is calculated as follows :

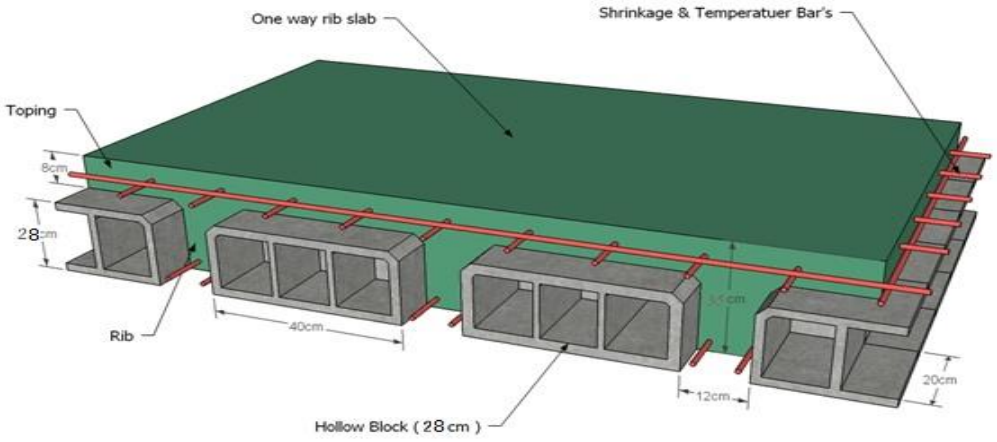


Fig. 4-2 : One way rib slab

The effective Flange width (be) is the smallest of :

(a) be $\leq \frac{\ln}{4} = \frac{(3920-800)}{4} = 780$ mm.

where ln is taken here as the smallest clear span of the rib.

(b) be ≤ bw + 16 * hf = 120 + 16 * 80 = 1400 .

(c) be ≤ center to center spacing between adjacent beams

= 400 + 120 = 520 – control .

Take be = 520 mm.

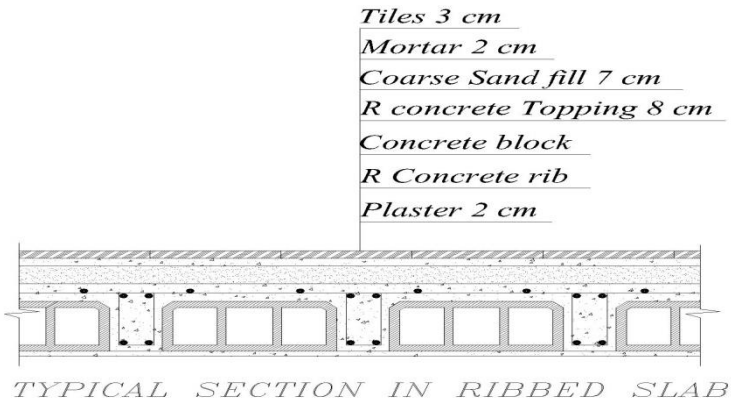


Fig. 4-3 : Typical section in rib slab

Table 4.2 : Dead load calculation for Rib (2B)

No.	material	H*σ	KN/m
1	Tile	0.03*23*0.52	0.359
2	Mortar	0.02*22*0.52	0.229
3	Sand	0.07*16*0.52	0.583
4	Topping	0.08*25*0.52	1.04
5	Rib	0.12*0.17*25	0.51
6	Block	0.17*0.4*9	0.612
7	Plaster	0.02*22*0.52	0.229
8	partition	2.3*0.52	1.196
		∑ = 4.758 KN/m	

Live load calculations:

LL = 3* 0.52 = 1.56 KN/m .

Dead load / rib : DL = 4.758 KN/m.

Live Load / rib : LL = 1.56 KN/m.

4.6 Design of Rib (Rc5):

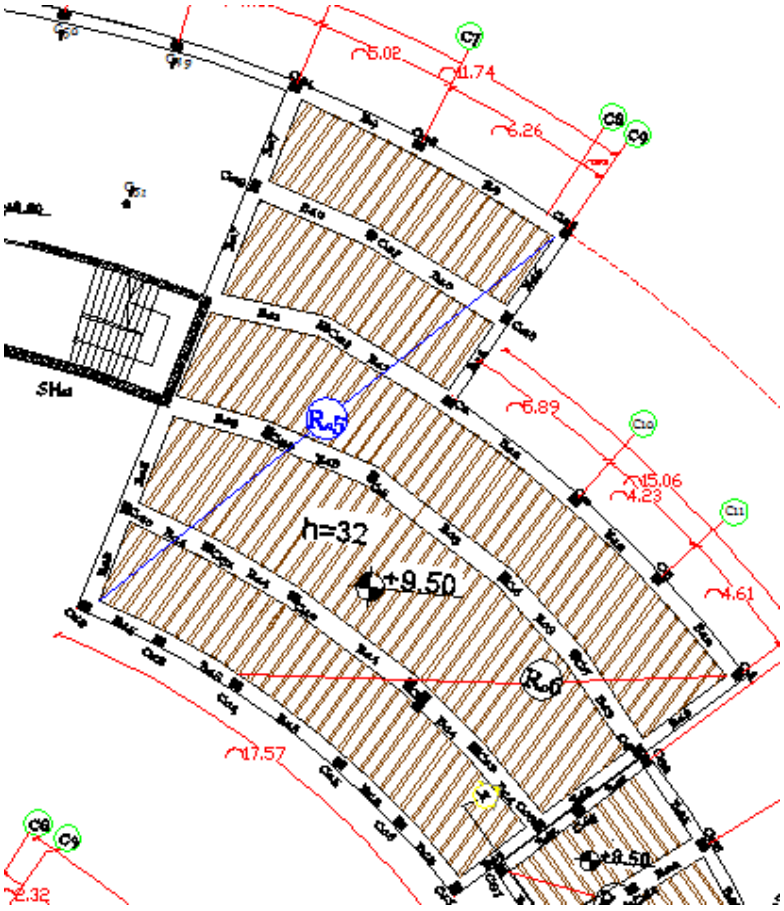


Fig. 4-4 : Rib location

By using **ATIR** program we get the envelope moment and shear diagram as the follows:-

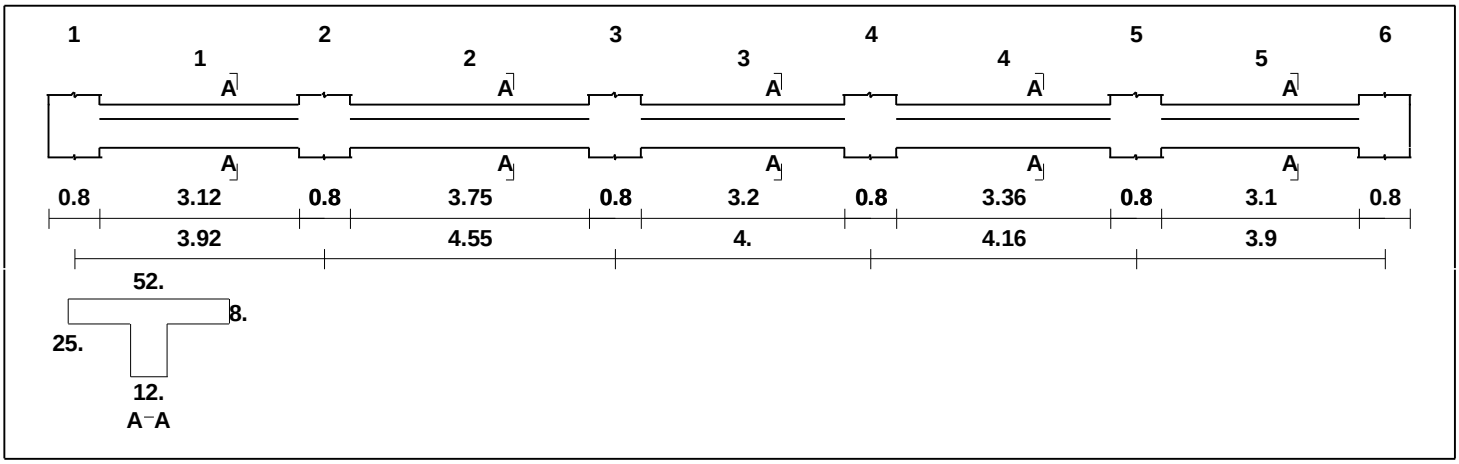


Fig. 4-5 : Spans length and section of rib (Rc5).

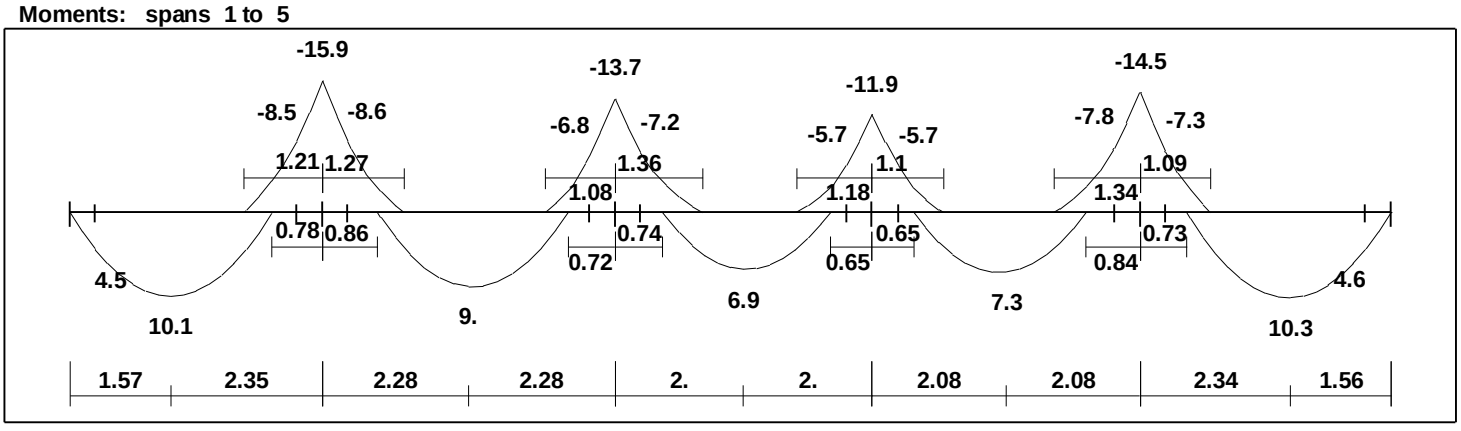


Fig. 4-6 : Moment diagram for rib (Rc5) - (KN.m).

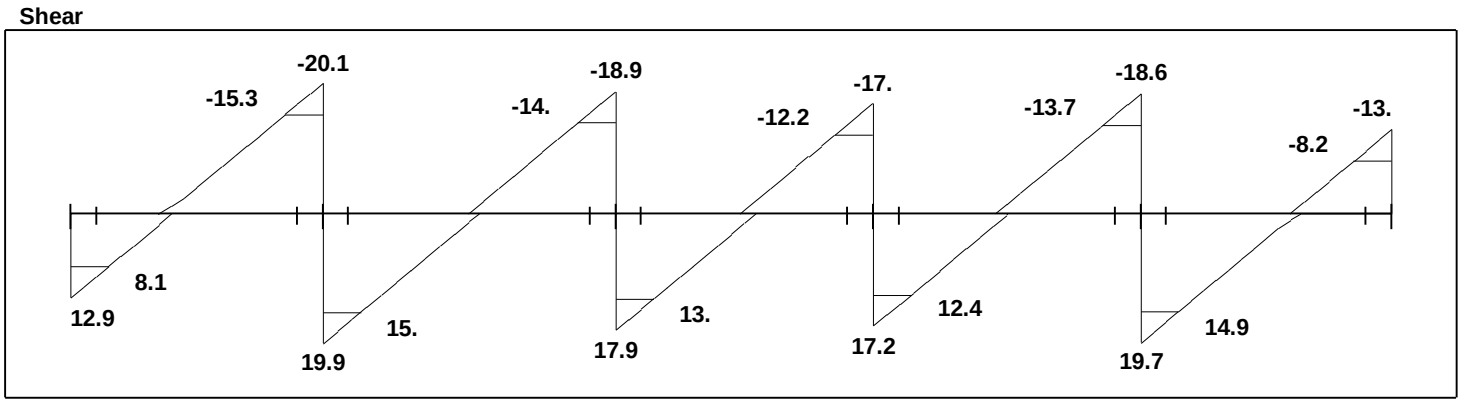


Fig. 4-7 : Shear diagram for rib (Rc5) - (KN).

4.6.1 Design of Rib (Rc5) Positive Moment :

Assume bar diameter Φ12 for main positive moment reinforcement .

d = h- cover – $d_{stirrups}$ – $\frac{d_b}{2}$ = 250 – 20 – 10 – 6 = 214 mm.

» M_u max positive for span = +10.3 kN.m

$R_n = \frac{Mu}{\Phi b d^2} = \frac{10.3*10^6}{0.9*520*214^2}$ = 0.48 MPa.

$m = \frac{f_y}{0.85*f_c'} = \frac{420}{0.85*24}$ = 20.588

$\rho = \frac{1}{m}(1 - \sqrt{1 - \frac{2R_n*m}{f_y}}) = \frac{1}{20.588}(1 - \sqrt{1 - \frac{2*0.48*20.588}{420}})$

=0.00115

A_s =ρ*b*d = 0.00115*(520) *(214) = 128.7 mm2

*Check for $A_{s,\ min}$:

$$A_{s\ min} = 0.25 * \frac{\sqrt{f'_c}}{(f_y)} * (b_w) * (d)$$ *ACI-318* -05

$$A_{s\ min}=0.25\frac{\sqrt{24}}{420} * (120) * (214) = 74.88\ mm^2.$$

$$A_{s\ min} = \frac{1.4}{(f_y)} (b_w) (d)$$

$$A_s = \frac{1.4}{420} (120) (214) = 85.6\ mm^2.$$ - control

A_s= 128.7 mm^2 > $A_{s\ min}$ = 85.6 mm^2

$A_{s\ req}$= 128.7 mm^2

Use 2 Φ10 with A_s =157.07 mm^2 > $A_{s\ req}$ = 128.7 mm^2. -OK

* Check for Strain:

$$a = \frac{A_s * f_y}{0.85 * f'_c * b} = \frac{157.07 * 420}{0.85 * 24 * 520} = 6.22\ mm$$

$$c = \frac{a}{0.85} = \frac{6.22}{0.85} = 7.32\ mm$$

$$\varepsilon_s = 0.003 * \left(\frac{d-c}{c}\right) = 0.003 * \left(\frac{214 - 7.32}{7.32}\right) = 0.085 > 0.005$$

Ok…

4.6.2 Design of Negative Moment for Rib (Rc5):

The maximum negative moment at the face of support **Mu = - 8.6 kN.m**

Assume bar diameter Φ12 for main negative moment reinforcement.

d = h – cover – $d_{stirrups}$- $\frac{d_b}{2}$ = 250 – 20 – 10 – 6 = 214mm.

m = 20.588

$$Rn = \frac{Mu}{\Phi b d^2} = \frac{8.6*10^6}{0.9*120*214^2} = 1.738 \text{ MPa.}$$

$$\rho = \frac{1}{m}\left(1 - \sqrt{1 - \frac{2R_n*m}{f_y}}\right) = \frac{1}{20.588}\left(1 - \sqrt{1 - \frac{2*1.738*20.588}{420}}\right)$$

$$= 0.00433$$

$A_s = \rho * b * d = 0.00433*(120)*(214) = 111.22 \text{ mm}^2$

*Check for $A_{s,\,min}$:

$$A_{smin} = 0.25 * \frac{\sqrt{f'_c}}{(f_y)} * (b_w) * (d) \qquad \textit{ACI-318} \text{ -05}$$

$$A_{s\,min} = 0.25\frac{\sqrt{24}}{420} * (120) * (214) = 74.88 \text{ mm}^2.$$

$$A_{smin} = \frac{1.4}{(f_y)}(b_w)\,(d)$$

$$A_s = \frac{1.4}{420}(120)\,(214) = 85.6 \text{ mm}^2. \qquad \text{- control}$$

$A_s = 111.22 \text{ mm}^2 > A_{s\,min} = 85.6 \text{ mm}^2$

$A_{s\,req} = 111.22 \text{ mm}^2$

Use 2 Φ10 with $A_s = 157.07 \text{ mm}^2 > A_{s\,req} = 111.22 \text{ mm}^2$. -OK

* Check for Strain:

$$a = \frac{A_s * f_y}{0.85 * f'_c * b} = \frac{157.07 * 420}{0.85 * 24 * 120} = 26.9 \text{ mm}$$

$$c = \frac{a}{0.85} = \frac{26.9}{0.85} = 31.7\ mm$$

$\varepsilon_s = 0.003 * (\frac{d-c}{c}) = 0.003 * (\frac{214-31.7}{31.7}) = 0.0173 > 0.005$

Ok…

** Usually, no Reinforcement less than 2Φ10 can be used .so , for all spans with positive moment equal or less than M_u = 10.3 KN/m and for all supports with negative moment equal or less than M_u = - 8.6 KN/m
** Use 2Φ10 for each rib span .

4.6.3 Design of shear for rib (Rc5):

The maximum shear force at the distance " d " from the face of support

$V_{u\,max}$ = -15.3 kN

Use Φ8 with two legs

$V_c = (1.1) * \frac{1}{6} * \sqrt{f'_c} * b_w * d = (1.1) * \frac{1}{6} * \sqrt{24} * 120 * 214 * 10^{-3} = 23.06$ KN.

$\Phi V_c = 0.75 * 23.06 = 17.29$ KN .

$\frac{1}{2}\Phi V_c = 8.65$ KN < $V_{u\,max} = 15.3$ kN < $\Phi V_c = 17.92$ KN … control

no shear reinforcement is required (joist construction is an exception).

4.7 Design Of beam (Bc10):

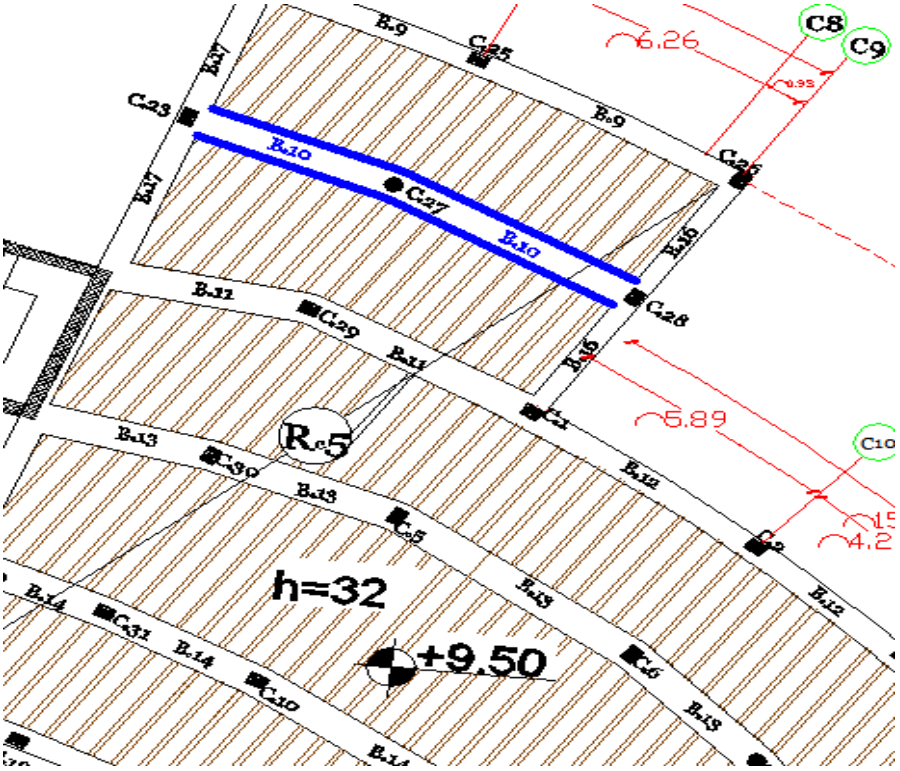


Fig. 4-8 : location of beam (Bc10)

4.7.1 Load calculation of beam (Bc10) :

The distribution Dead load and live loads acting upon the Beam2 can be difined from the support reactions of the rib Rc5 only .

Dead load calculation :

From Rc5 :

$W_{DL\ from\ rib\ c5} = \frac{22.79}{0.52} = 43.82$ KN/m. on span 1+2

B = 0.8 m -- then the own weight of the beam and plaster :

RC beam = 0.35 * 25 * 0.8 = 7KN/m palster =0.02*22*0.8 = 3.52 KN/m

Live load calculation :

From Rc5:

$W_{LL\ from\ rib\ c5} = \frac{7.9}{0.52} = 15.2$ KN/m. on span 1+2

From use atir program we find the envolop moment and shear diagram .

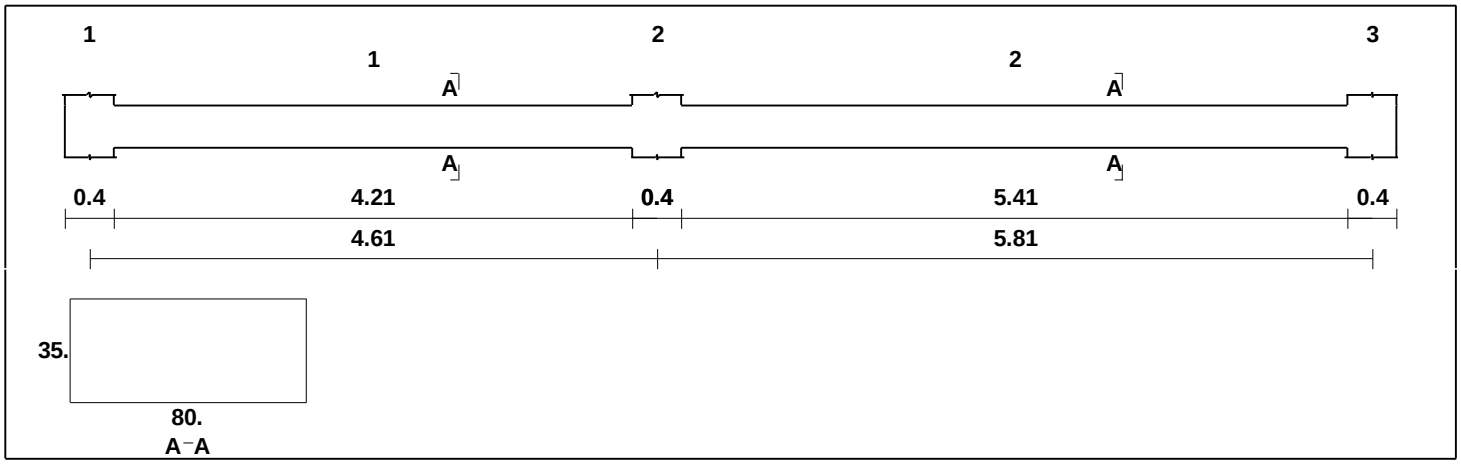


Fig. 4-9 : spans and section of beam (Bc10)

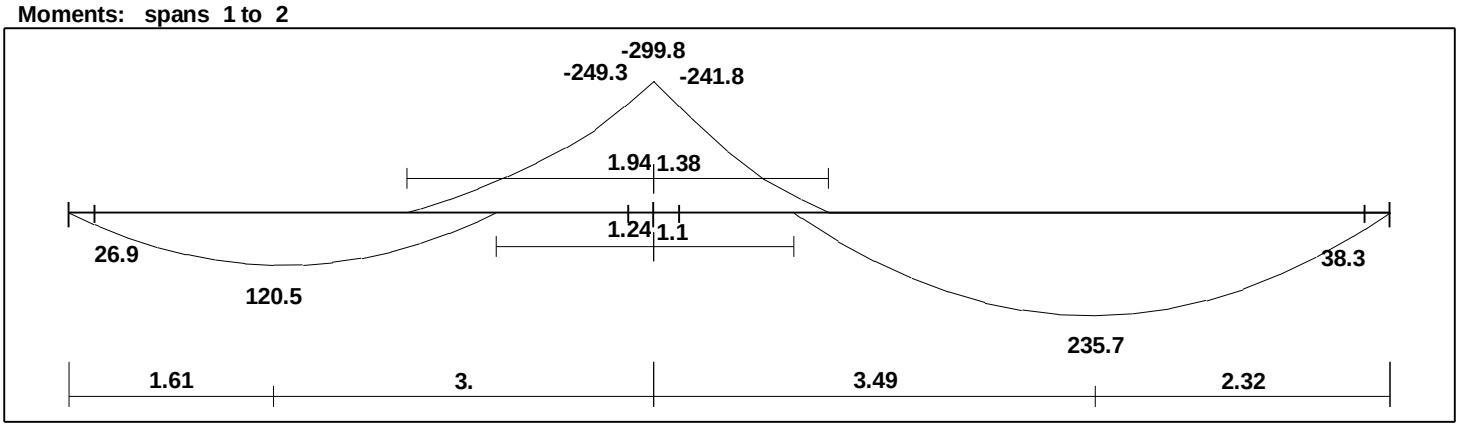


Fig. 4-10 : Moment diagram for Beam (Bc10)-(KN.m).

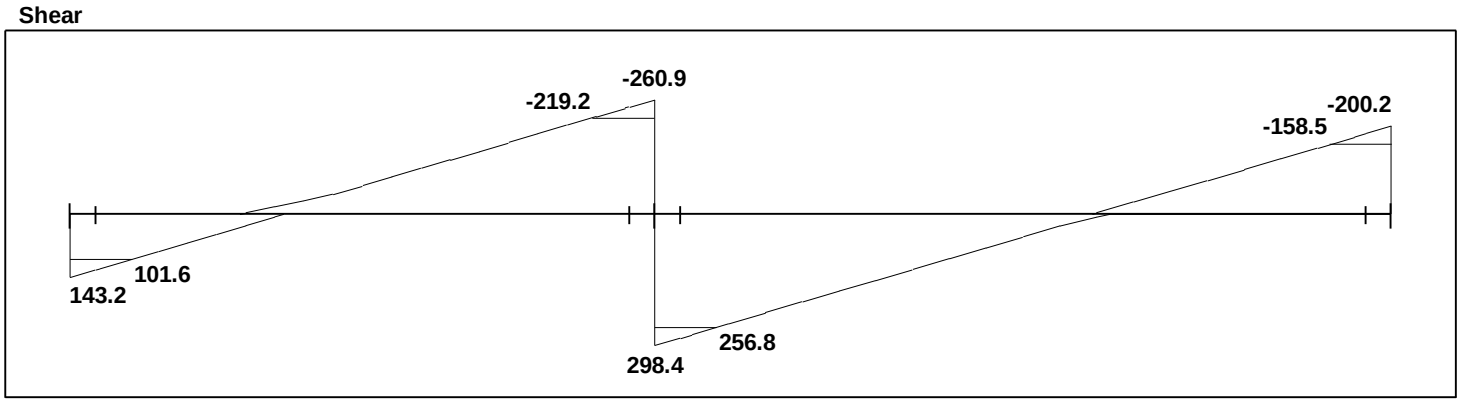


Fig. 4-11 : Shear diagram for Beam (Bc10)-(KN.m).

4.7.2 Design of positive moment for beam (Bc10) :

Mu = +235.7 KN.m for span 2

d= h- cover – d $_{stirrups}$ – $\frac{d_b}{2}$ = 350 – 40 – 8 – $\frac{18}{2}$ = 293mm.

C = $\frac{3}{7}d = \frac{3}{7} * 293 = 125.57$ mm

a= β * c = 0.85 * 125.57 = 106.73 mm

$M_{n\,max}$ = 0.85 * f'_c * a * b * (d – $\frac{a}{2}$) = 0.85 * 24*106.73 * 800 * (293 – $\frac{106.73}{2}$) 10^{-6} = 417.4 KN.m

Φ =0.82

Φ $M_{n\,max}$ =417.4 > M_u = 235.7

** Design the section as singly reinforced concrete section .

.....

m = 20.588

$R_n = \frac{Mu}{\Phi b d^2} = \frac{235.7*10^6}{0.9*800*293^2} = 3.81$ MPa.

$\rho = \frac{1}{m}\left(1 - \sqrt{1 - \frac{2R_n*m}{f_y}}\right) = \frac{1}{20.588}\left(1 - \sqrt{1 - \frac{2*3.81*20.588}{420}}\right)$

=0.0101

$A_s = \rho * b * d = 0.0101 * (800) * (293) = 2373.8\ mm^2$

*Check for $A_{s,\ min}$:

$$A_{smin} = 0.25 * \frac{\sqrt{f'_c}}{(f_y)} * (b_w) * (d)$$ *ACI-318* -05

$A_{s\ min} = 0.25 \frac{\sqrt{24}}{420} * (800) * (293) = 683.52\ mm^2.$

$$A_{smin} = \frac{1.4}{(f_y)} (b_w)\ (d)$$

$A_s = \frac{1.4}{420} (800)\ (293) = 781.33\ mm^2.$ - control

$A_s = 2373.8\ mm^2 > A_{s\ min} = 781.33\ mm^2$ OK

No. of bar $= \frac{A_{s\,req}}{A_{bar}\,\Phi 18} = \frac{2373.8}{254.5} = 9.3$

Use 10 Φ 18 in one layer with A =2545 mm^2 > $A_{s\ req}$= 2373.8 mm^2. -OK

* Check for Strain:

$$a = \frac{A_s * f_y}{0.85 * f'_c * b} = \frac{2545 * 420}{0.85 * 24 * 800} = 65.5\ mm$$

$$c = \frac{a}{\beta} = \frac{65.5}{0.85} = 77\ mm$$

$\varepsilon_s = 0.003 * (\frac{d-c}{c}) = 0.003 * (\frac{293-77}{77}) = 0.084 > 0.005$ Ok…

Positive moment Mu = + 120.5 KN.m for span 1

$$R_n = \frac{Mu}{\Phi b d^2} = \frac{120.5 * 10^6}{0.9 * 800 * 293^2} = 1.949\ MPa.$$

$$\rho = \frac{1}{m}\left(1 - \sqrt{1 - \frac{2R_n * m}{f_y}}\right) = \frac{1}{20.588}\left(1 - \sqrt{1 - \frac{2*1.949*20.588}{420}}\right)$$

$$= 0.00488$$

$A_s = \rho * b * d = 0.00488*(800)*(293) = 1145.6\ mm^2$

*Check for $A_{s,\ min}$:

$$A_{smin} = 0.25 * \frac{\sqrt{f'_c}}{(f_y)} * (b_w) * (d)$$ *ACI-318* -05

$$A_{s\ min} = 0.25\frac{\sqrt{24}}{420} * (800) * (293) = 683.52\ mm^2.$$

$$A_{smin} = \frac{1.4}{(f_y)}(b_w)\ (d)$$

$$A_s = \frac{1.4}{420}(800)\ (293) = 781.33\ mm^2.$$ - control

$A_s = 1145.6\ mm^2 > A_{s\ min} = 781.33\ mm^2$ OK..

$$\text{No. of bar} = \frac{A_{s\,req}}{A_{bar}\,\Phi 18} = \frac{1145.6}{254.5} = 4.5$$

Use 5 Φ18 in one layer with A =1272.5 $mm^2 > A_{s\ req} = 1145.6\ mm^2$. -OK

* Check for Strain:

$$a = \frac{A_s * f_y}{0.85 * f'_c * b} = \frac{1272.5 * 420}{0.85 * 24 * 800} = 32.75\ mm$$

$$c = \frac{a}{\beta} = \frac{32.75}{0.85} = 38.5\ mm$$

$$\varepsilon_s = 0.003*\left(\frac{d-c}{c}\right) = 0.003*\left(\frac{293-38.5}{38.5}\right) = 0.0198 > 0.005\ \text{Ok…}$$

4.7.3 Design of negative moments for beam (Bc10) :

Mu= -249.3 KN.m

$R_n = \frac{Mu}{\Phi b d^2} = \frac{249.3*10^6}{0.9*800*293^2} = 4.03$ MPa

$\rho = \frac{1}{m}\left(1 - \sqrt{1 - \frac{2R_n*m}{f_y}}\right) = \frac{1}{20.588}\left(1 - \sqrt{1 - \frac{2*4.03*20.588}{420}}\right)$

=0.01079

$A_s = \rho*b*d = 0.01079*(800)*(293) = 2530.3$ mm^2

*Check for $A_{s,\,min}$:

$$A_{smin} = 0.25 * \frac{\sqrt{f'_c}}{(f_y)} * (bw) * (d)$$ *ACI-318* -05

$A_{s\,min} = 0.25\frac{\sqrt{24}}{420} * (800) * (293) = 683.52$ mm2.

$$A_{smin} = \frac{1.4}{(f_y)}(b_w)\,(d)$$

$A_s = \frac{1.4}{420}(800)\,(293) = 781.33$ mm^2. - control

$A_s = 2530.3$ mm^2 > $A_{s,\,min} = 781.33$ mm^2 OK..

No. of bar = $\frac{A_{s\,req}}{A_{bar}\Phi 18} = \frac{2530.3}{254.5} = 9.9$

Use 10Φ18 in one layer with A =2545 mm^2> $A_{s\,req}$= 2530.3 mm^2. -OK

* Check for Strain:

$$a = \frac{A_s * f_y}{0.85 * f'_c * b} = \frac{2545 * 420}{0.85 * 24 * 800} = 65.5 \text{ mm}$$

$$c = \frac{a}{\beta} = \frac{65.5}{0.85} = 77 \ mm$$

$$\varepsilon_s = 0.003 * \left(\frac{d-c}{c}\right) = 0.003 * \left(\frac{293-77}{77}\right) = 0.0084 > 0.005 \quad \text{Ok…}$$

4.7.4 Design of shear for Beam (Bc10) :

critical section of distance d= 293mm from the face of support .

$Vu_{critical}$ = 256.8 kN at midspan .

Use Φ8 with 4 legs

$Vc = \frac{1}{6} * \sqrt{f'_c} * b_w * d = \frac{1}{6} * \sqrt{24} * 800 * 293 * 10^{-3} = 191.38$ KN

ΦVc = .75* 191.38= 143.5 KN.

Check for section dimension :

$Vs = \frac{V_u}{\Phi} - Vc = \frac{256.8}{0.75} - 191.38 = 151.02$ KN

$V_{s\,max} = \frac{2}{3} * \sqrt{f'_c} * b_w * d = \frac{2}{3} * \sqrt{24} * 800 * 293 * 10^{-3} = 765.5$ KN

$\Phi V_{s\,max} = 574.12$KN.

$Vu = 256.8 < \Phi(Vc + V_{s\,max}) = 717$

Section dimension are enough ……. ok

Find the maximum stirrups spacing :

Case III

$V_{s\,min} = \frac{1}{3} * b_w * d = \frac{1}{3} * 800 * 293 * 10^{-3} = 78.13$ KN .....control

$V_{s\,min} = \frac{1}{16} * \sqrt{f'_c} * b_w * d = \frac{1}{16} * \sqrt{24} * 800 * 293 * 10^{-3} = 71.77$ KN

Φ (Vc +$V_{s\,min}$) = 202.13 KN < Vu= 256.8 KN

Case IV :

$V'_s = \frac{1}{3} * \sqrt{f'_c} * b_w * d = \frac{1}{3} * \sqrt{24} * 800 * 293 * 10^{-3} = 382.77$ KN

Φ (Vc +$V_{s\,min}$) = 202.13 < Vu =256.8 < Φ (Vc + V'_s) = 430.6 KN

Use stirrups 2U – shape (4 legs stirrups) Φ8

With Av = 4* 50.27 = 201.1 mm^2 .

$$S_{req} = \frac{A_v f_{yt} * d}{V_s} = \frac{201.1 * 420 * 293 * 10^{-3}}{151.02} = 163.8 \text{ mm}$$

$S_{max} \leq \frac{d}{2} = \frac{293}{2} = 146.5$ mm or $S_{max} \leq 600$mm

S =163.8 > S_{max} = 146.5 mm

Take 2 U-shape (4 legs stirrups) Φ8 @120 mm < S_{max}

$Vu_{\,critical}$ = 158.5 kN at end span

Use Φ8 with 4 legs

Vc = $\frac{1}{6} * \sqrt{f'_c} * b_w * d = \frac{1}{6} * \sqrt{24} * 800 * 293 * 10^{-3} = 191.38$ KN

Φ Vc = 0.75 * 191.38 = 143.5 KN.

Check for section dimension :

$Vs = \frac{V_u}{\Phi} - Vc = \frac{158.5}{0.75} - 191.38 = 19.95$ KN

$V_{s\,max} = \frac{2}{3} * \sqrt{f_c'} * b_w * d = \frac{2}{3} * \sqrt{24} * 800 * 293 * 10^{-3} = 765.5$ KN

$\Phi V_{s\,max} = 574.12$KN.

$Vu = 158.5 < \Phi (Vc + V_{s\,max}) = 717$

Section is enough diminution ……. ok

Find the maximum stirrups spacing :

Case III

$V_{s\,min} = \frac{1}{3} * b_w * d = \frac{1}{3} * 800 * 293 * 10^{-3} = 78.13$ KN ……control

$V_{s\,min} = \frac{1}{16} * \sqrt{f_c'} * b_w * d = \frac{1}{16} * \sqrt{24} * 800 * 293 * 10^{-3} = 71.77$ KN

$\Phi Vc = 143.5$ KN < Vu = 158.5 KN < $\Phi (Vc + V_{s\,min}) = 202.13$ KN

Minimum shear reinforcement is provided ($A_{v\,min}$) with

$S_{max} \leq 600$mm or $S_{max} \leq \frac{d}{2} = \frac{293}{2} = 146.5$ mm

$Av_{\,min} = \frac{1}{16}\sqrt{fc'}\,\frac{bw*s}{fyt} > Av_{\,min} = \frac{1}{3}\frac{bw*s}{fyt}$

$Av_{\,min} = 76.2$ mm^2

Use stirrups U – shape (2 legs stirrups) $\Phi 8$

With Av = 2* 50.27 = 100.5 mm^2 .

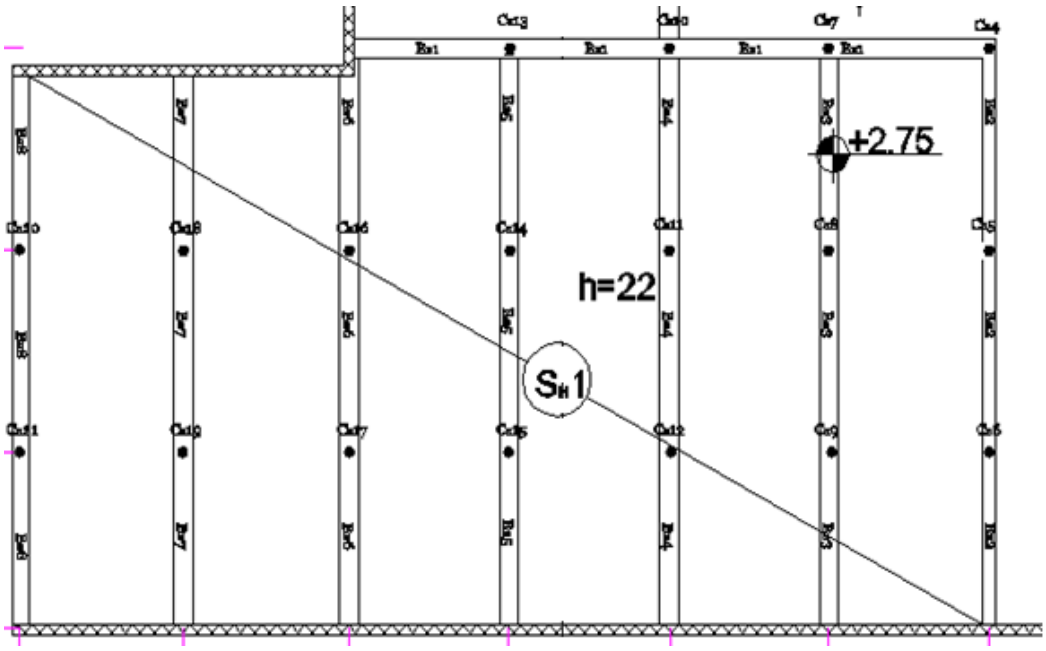
$S_{req} = \frac{A_v f_{yt} * d}{V_s} = \frac{100.5*420*293*10^{-3}}{78.13} = 158.3$ mm

S = 158.3 > S_{max} = 146.5 mm

$S_{max} \leq 600$mm or $S_{max} \leq \frac{d}{2} = \frac{293}{2} = 146.5$ mm

Take U shape (2 legs stirrups) $\Phi 8$ @120 mm < S_{max}

4.8.1 Determination Thickness for one Way solid Slab:



Minimum thickness of slab :

For first and last spans (one end continuous):

$$\text{hmin} = \frac{l}{24} = \frac{5.12}{24} = 213mm$$

For interior spans (both end continuous):

$$\text{hmin} = \frac{l}{28} = \frac{5.23}{28} = 186mm$$

Take thickness h = 22 cm

Assume bar diameter 12 mm for main reinforcement .

d = h – 20 - d_b/2

= 220 – 20 – 6 = 194 mm

Load calculation :

Chapter Four

Structural Analysis and Design

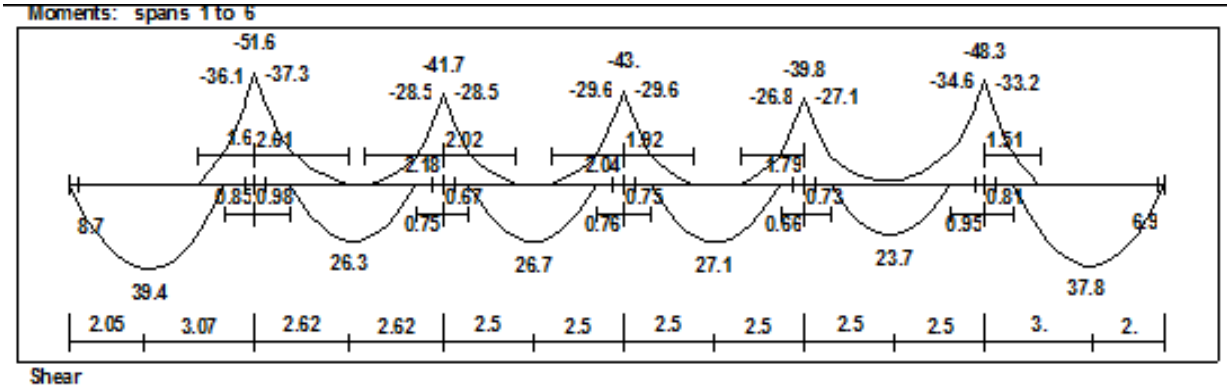
	Thicknees	Dencity	Kn/m
Backfill	**10**	**18**	**1.8**
R.C	**0.22**	**25**	**5.5**
Plaster	**0.02**	**22**	**.45**

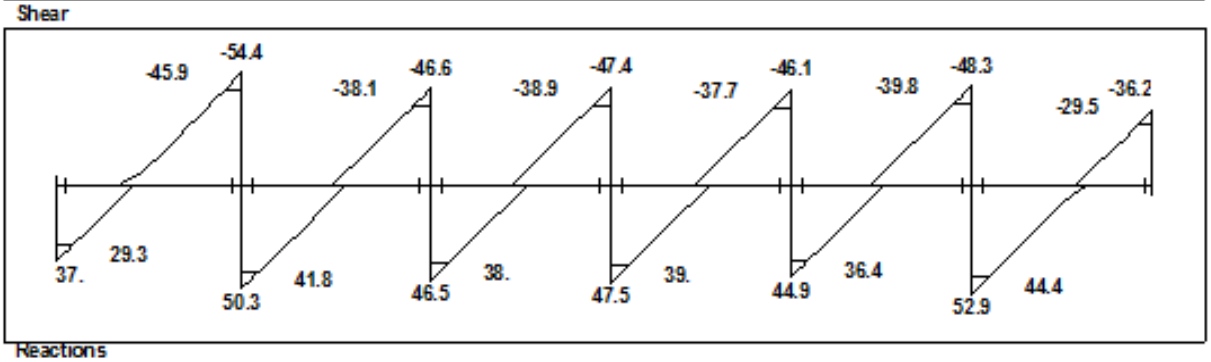
DL =

7.75 Kn/m

LL =5 Kn/m $\text{wDL} = 1.2 * 7.75 = 9.3\ \text{KN}/m^2$ $\text{wLL} = 1.6 * 5 = 8.0\ \text{KN}/m^2$

$\text{w} = 1.2 * 7.75 + 1.6 * 5 = 17.3\ \ \text{KN}/m^2$





Reactions

Factored

DeadR	18.66	54.72	45.94	47.08	44.8	52.74	18.34
LiveR	18.3	49.96	47.2	47.82	46.25	48.44	17.89
MaxR	36.96	104.68	93.13	94.89	91.04	101.18	36.22
MinR	16.4	74.39	60.34	63.66	59.38	71.18	16.22
Service							
DeadR	15.55	45.6	38.28	39.23	37.33	43.95	15.28
LiveR	11.44	31.23	29.5	29.88	28.9	30.28	11.18
MaxR	26.99	76.82	67.78	69.12	66.23	74.22	26.46
MinR	14.14	57.89	47.28	49.59	46.44	55.47	13.96

Design For Shear:

Check whether thickness is adequate for shear :

The shear critical section is at distance d from the beam face:

$V_{ud} = 45.9\ kN$

The shear strength of the slab is:

$$V_c = 1 * \frac{1}{6} * \sqrt{f_c} * b_w * d = 1 * \frac{1}{6} * \sqrt{24} * 1000 * 194 * 10^{-3} = 158.4kN$$

$$\emptyset V_c = 0.75 * 158.4 = 118.8\ kN$$

$$\frac{\emptyset V_c}{2} = 59.4\ kN > V_{ud} = 45.9\ kN$$

The thickness of the slab is adequate enough.

4.8.2 : Design of slab (negative moment)

Mu= -37.3 KN.m/m

Assume bar diameter $\Phi 12$ for main negative moment reinforcement.

d = h- cover $- \frac{d_b}{2} =$

$$250 - 20 - \frac{12}{2} = 194mm$$

$$m = \frac{f_y}{0.85 * f_c} = \frac{420}{0.85 * 24} = 20.59$$

$$R_n = \frac{Mu}{\Phi b d^2} = \frac{37.3 * 10^6}{0.9 * 1000 * 194^2} = 1.101\ Mpa$$

$$\rho = \frac{1}{m}(1 - \sqrt{1 - \frac{2R_n * m}{f_y}} = \frac{1}{20.59}(1 - \sqrt{1 - \frac{2 * 1.101 * 20.59}{420}} = 0.002696$$

A_s = **ρ***b*d = 0.002696*1000 * 194 = 524 mm^2

*Check for $A_{s,\,min}$:

$A_{smin} = \rho bh = .0018 * 1000 * 220 = 396\ mm^2$

A_s=524 > A_{smin}=396 mm^2

$$n = \frac{As}{As\Phi 12} = \frac{524}{113} = 4.6\ bar$$

Use 5Φ12 With As = 565 mm^2 or $\Phi 12$ @ 200 mm

Step (s) is smallest of :

1. 3h = 3*220 = 660mm
2. 450
3. S = 380 * $\frac{280}{fs}$ - 2.5 c_c = 380 * $\frac{280}{280}$ - 2.5* 20 = 330mm

   S < = 300 ($\frac{280}{fs}$) = 300 mm

   S = 150 < s_{max} = 300

Check for Strain:

$$a = \frac{A_s * f_y}{0.85 * f'_c * b} = \frac{565 * 420}{0.85 * 24 * 1000} = 15.52\text{mm}$$

β = 0.85

$$c = \frac{a}{0.85} = \frac{15052}{0.85} = 18.26\ \text{mm}$$

ε_s= 0.003* $\frac{d-c}{c}$ = 0.003* $\frac{194-18.26}{16.42}$ = .030 > .005 ok

$\therefore$ ***use*** $\Phi 12$ @ 200 mm

4.8.3 : Design of slab (positive moment)

Mu= +39.40 KN.m/m

Assume bar diameter $\Phi 12$ for main negative moment reinforcement.

d = h- cover $- \frac{d_b}{2} =$

$$250 - 20 - \frac{12}{2} = 194mm$$

$$m = \frac{f_y}{0.85 * f_c} = \frac{420}{0.85 * 24} = 20.59$$

$$R_n = \frac{Mu}{\Phi b d^2} = \frac{39.4 * 10^6}{0.9 * 1000 * 194^2} = 1.163\ Mpa$$

$$\rho = \frac{1}{m}(1 - \sqrt{1 - \frac{2R_n * m}{f_y}} = \frac{1}{20.59}(1 - \sqrt{1 - \frac{2 * 1.163 * 20.59}{420}} = 0.0028533$$

A_s = **ρ***b*d = 0.0028533*1000 * 194 = 554mm^2

*Check for $A_{s,\ min}$:

$A_{smin} = \rho bh = 0.0018 * 1000 * 220 = 396\ mm^2$

A_s = 554 mm^2 > A_{smin}= 396 mm^2

$$n = \frac{As}{As\Phi 12} = \frac{554}{113} = 4.90\ \ bar$$

Use 5Φ12 With As =565 mm2 or $\Phi 12$ @ 200 mm

Step (s) is smallest of :

1. 3h = 3*220 = 660mm
2. 450
3. S = 380 * $\frac{280}{fs}$ - 2.5 c_c = 380 * $\frac{280}{280}$ - 2.5* 20 = 330mm

   S < = 300 ($\frac{280}{fs}$) = 300 mm

   S = 150 < s_{max} = 300

Check for Strain:

$$a = \frac{A_s * f_y}{0.85 * f'_c * b} = \frac{565 * 420}{0.85 * 24 * 1000} = 15.52\text{mm}$$

β = 0.85

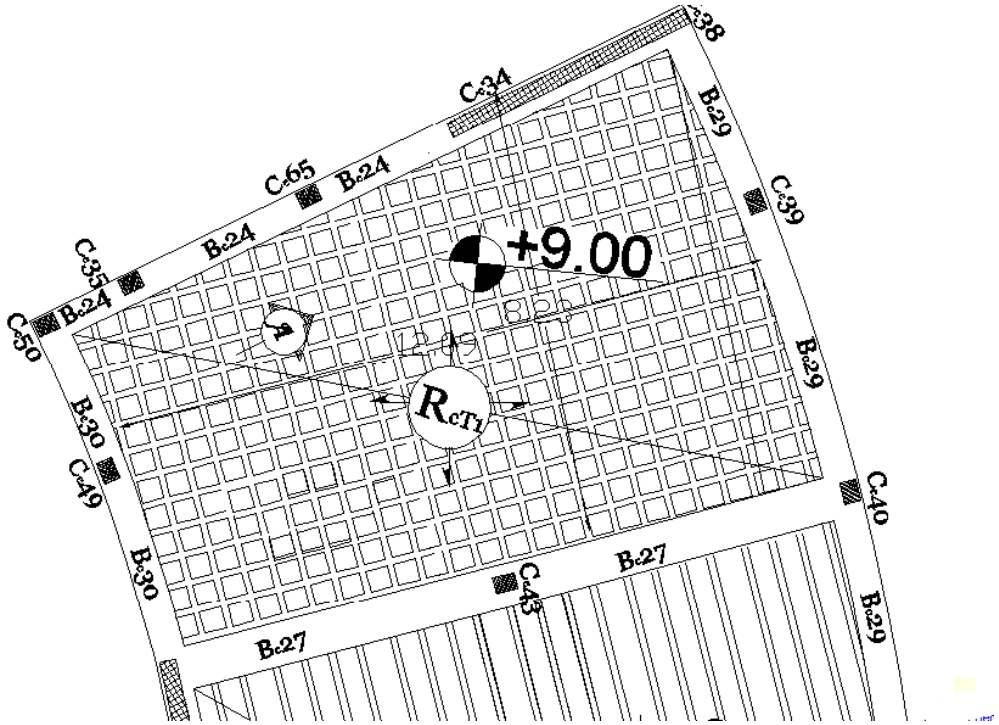
$$c = \frac{a}{0.85} = \frac{15052}{0.85} = 18.26 \text{ mm}$$

$$\varepsilon_s = 0.003 * \frac{d-c}{c} = 0.003 * \frac{194-18.26}{16.42} = .030 > .005 \quad \text{ok}$$

$\therefore$ ***use*** $\Phi 12 \text{ @ } 200\ mm$

4.9: Design of Two Way Rib Slab

4.9.1 Determination Thickness for two Way Ribbed Slab:



Minimum thickness of slab

take H is 32 as one way ribbed slabs

The section of external beams (b=60cm, h=32cm), and the section of internal beam is (b=80cm, h=32cm).

The moment of inertia for the ribbed slab is the sum of moment of inertia of T-section ribs.

$$y_c = \frac{40 * 8 * 4 + 32 * 12 * 16}{40 * 8 + 32 * 12} = 10.55 \text{ cm}$$

$$I_{rib} = \frac{52 * 10.55^3 + 12 * (32 - 10.55)^3 - 10.55 * 8.)^3}{3}$$

$$I_{rib} = 59609 \text{ cm}^4$$

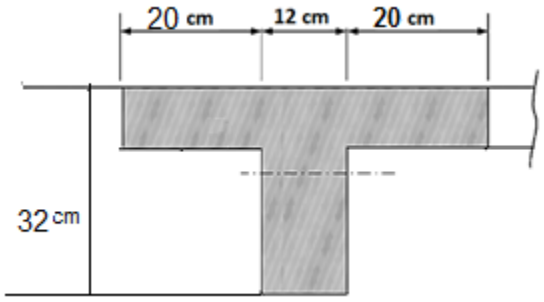


Fig. (4-1)T-Section of Rib Slab

$$I_{ext-beam1;2;3} = \frac{bh^3}{12} = \frac{60 * 32^3}{12} = 163840 cm^4$$

$$I_{int-beam\ 4} = \frac{bh^3}{12} = \frac{80 * 32^3}{12} = 218453.33\ cm^4$$

For short direction L = 8.23 m and long direction L = 12.09m

$$I_s = \frac{I_{rib}\left(\frac{l_r}{2} + \frac{l_l}{2} + b_w\right)}{b_f}$$

$$I_s1 = \frac{59609(1209/2 + 60)}{52} = 761737\ cm^4$$

$$I_s2 = \frac{59609\left(\frac{823}{2} + 60\right)}{52} = 540495\ cm^4$$

$$I_s3 = \frac{59609(1209/2 + 60)}{52} = 761737\ cm^4$$

$$I_s4 = \frac{59609\left(\frac{823}{2} + \frac{475}{2} + 80\right)}{52} = 835675\ cm^4$$

$$\alpha_1 = \frac{I_b}{Is} = \frac{163840.}{761737} = 0.215$$

$$\alpha_2 = \frac{I_b}{Is} = \frac{163840}{540495} = 0.303$$

$$\alpha_1 = \frac{I_b}{Is} = \frac{163840}{761737} = 0.215$$

$$\alpha_1 = \frac{I_b}{Is} = \frac{218453.33}{835675} = 0.261$$

$$\alpha_{fm} = \frac{\alpha_1 + \alpha_2 + \alpha_{243} + \alpha_4}{4} = \frac{1}{4} = .25$$

$$\alpha_{fm} = 0.25 < 2$$

The minmum slab thickness will be

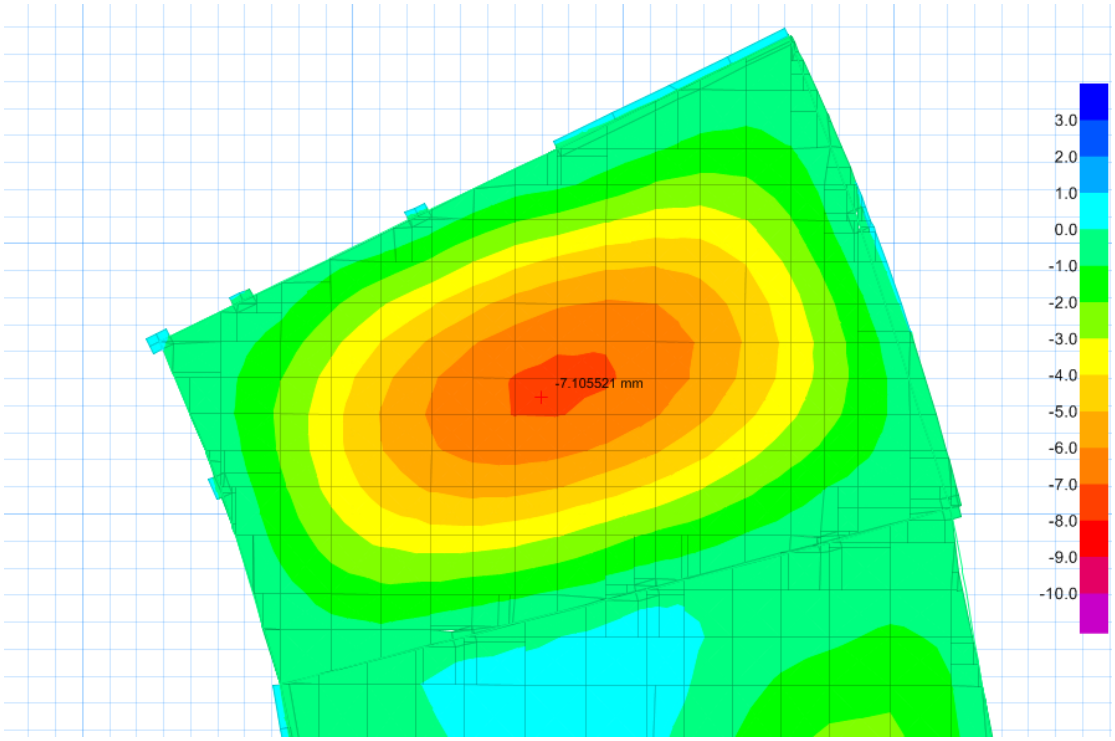
$$h_{slab} = \frac{L_n(0.8 + \frac{f_y}{1400})}{36 + 5\,\beta(\alpha_{fm} - .2)}$$

$$\mathrm{L_n} = 12.09\ m$$

$$\beta = \frac{l_{n\ long}}{l_{n\ short}} = \frac{1209}{823} = 1.47$$

$$h_{slab} = \frac{12090\left(0.8 + \frac{420}{1400}\right)}{36 + 5 * 1.47(.25 - .2)} = 365.8mm$$

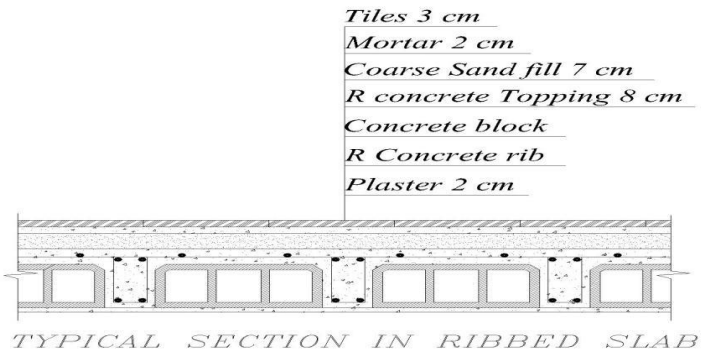
after making caulculation for deflection the deflection has 8mm by using safe program < l/360 = 12090/360 =33.5 mm



Take h_{slab} for ony way & two way rib slab 32 cm (8 cm topping and 24 cm block) .

4.9.2: Load Calculation forTwo way Rib Slab:

For the two-way ribbed slabs, the total dead load be used in the analysis and design is calculated as follows:



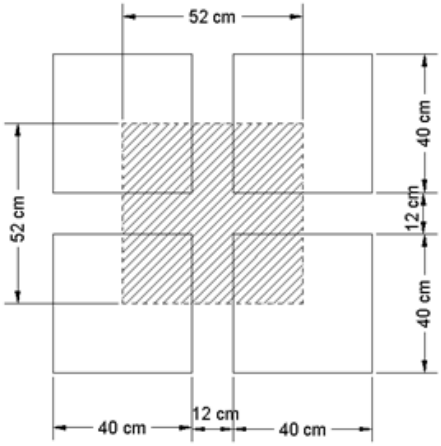


Fig. (4-5)typical section in rib slab **Fig. (4-4)**two way rib slabs trip

Load Calculations:

	Dead Load for two way rib slab				
DEAD LOAD from:	Thicknis (m)	dencity(kn/m3)	Width (m)		**Kn/m**
Tiles	0	23	0.52 * 0.52 =	0.2704	**0.000**
mortar	0	22	0.52 * 0.52 =	0.2704	**0.000**
Coarse Sand	0	16	0.52 * 0.52 =	0.2704	**0.000**
Topping	0.08	25	0.52 * 0.52 =	0.2704	**0.541**
RC Rib	0.24	25	0.12 * (.052 + 0.4) =	0.1104	**0.662**
Hollow Block	0.24	9	0.4 * 0.4 =	0.16	**0.346**
Plaster	0.02	22	0.52 * 0.52 =	0.2704	**0.119**
Interior Partition (kn/m2)	0	_____	0.52 * 0.52 =	0.2704	**0.000**
			DL kn/m =		**1.668**

Table 4.2: Dead load calculation for Rib

$$\mathrm{DL} = \frac{1.5}{0.52 * 0.52} = 6.2 \ \frac{\mathrm{KN}}{\mathrm{m}^2}$$

$Live\ Load\ /rib: LL\ = 1.5 KN/\mathrm{m}^2$

$snow\ Load: sL\ =\ 1.5\ KN/\mathrm{m}^2$

$LL\ or\ SL\ = 1.5\ KN/\mathrm{m}^2$

$\mathrm{w} = 1.2 * 6.2 = 7.44\ \mathrm{KN}/m^2$

$\mathrm{w} = 1.6 * 1.5 = 2.4\ \mathrm{KN}/m^2$

$\mathrm{w} = 1.2 * 6.2 + 1.6 * 1.5 = 9.84\ \ \mathrm{KN}/m^2$

4.9.3: Moment calculation using (coefficient method)

$\mathrm{M_a} = Ca\ \ w\ l_a^2$

$\mathrm{M_b} = Cb\ \ w\ l_b^2$

$\mathrm{m} = \frac{l_a}{l_b} = \frac{8.23}{12.09} =\ .68$

case 6:

Negative Moments (Table):

$\mathrm{C_{a,neg}} = .0922\ \rightarrow\ \mathrm{M_{a,neg}} = Ca\ \ w\ l_a^2\ \times 0.52 =\ 31.9\ KN.m/rib \qquad Panel\ 4$

Positive Moments (Table):

$\mathrm{C_{a,D}} = .0522\ \rightarrow\ \mathrm{M_{a,D}} = 13.6\ KN.m/rib$

$\mathrm{C_{a,L}} = .0616\ \rightarrow\ \mathrm{M_{a,L}} = 5.2\ KN.\frac{m}{rib}$

$\mathrm{M_{a,Pos}} = 13.6 + 5.2 = 18.8\ KN.m/rib$

$C_{b,D} = .0082 \rightarrow M_{b,D} = 4.6\ KN.m/rib$

$C_{b,L} = .0118 \rightarrow M_{b,L} = 2.15 KN.\frac{m}{rib}$

$M_{b,Pos} = 4.6 + 2.15 = 6.75 KN.m/rib$

Note : Negative Moments at discontinuous edges = $\frac{1}{3}$ x positive moment

4.9.4: Shear Coefficients:

Case 6 : $m_1 = 0.68$

$W_a = .918$

$W_b = 0.082$

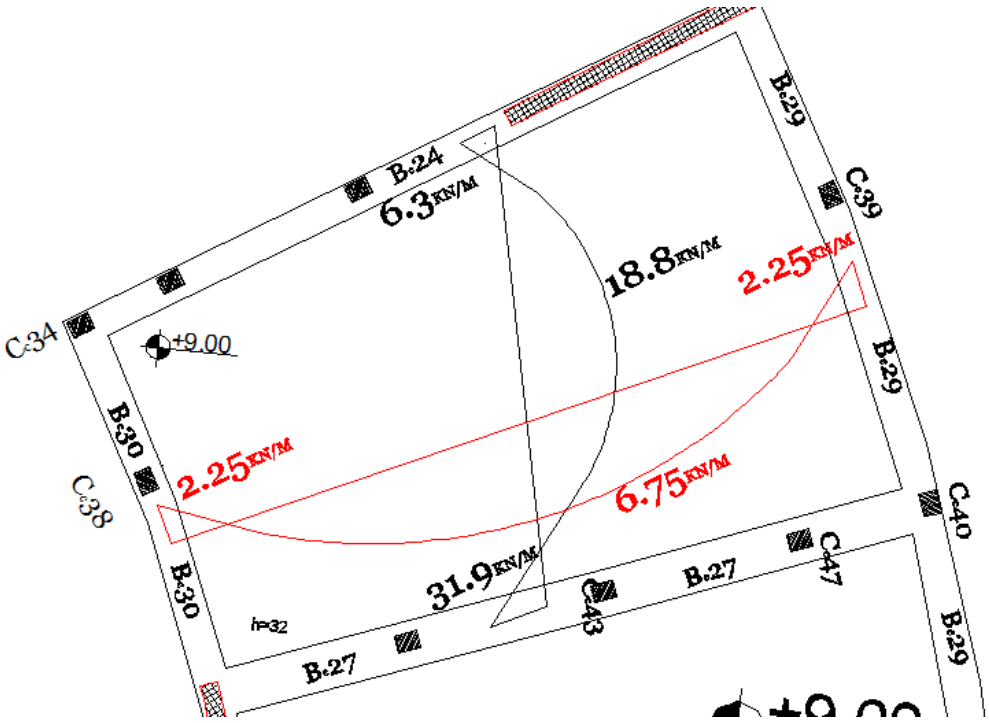


Fig.(4-7) Moment Diagram

4.9.5: Design Rib For Flexure:

4.9.5.1 Design of Rib (negative moment in short direction continues edge)

Mu= -31.9 KN.m/rib

Assume bar diameter $\Phi 18$ for main negative moment reinforcement.

d = h- cover $-d_{stirrups} - \frac{d_b}{2} =$

$$320 - 20 - 10 - \frac{18}{2} = 281\ mm$$

$$m = \frac{f_y}{0.85 * f_c} = \frac{420}{0.85 * 24} = 20.59$$

$$R_n = \frac{Mu}{\Phi b d^2} = \frac{31.9 * 10^6}{0.9 * 120 * 281^2} = 3.741 Mpa$$

$$\rho = \frac{1}{m}(1 - \sqrt{1 - \frac{2R_n * m}{f_y}} = \frac{1}{20.59}(1 - \sqrt{1 - \frac{2 * 3.741 * 20.59}{420}} = .0099193$$

A_s = **ρ***b*d = . 0099193* 120 * 281 = 334.5 mm^2

*Check for $A_{s,\ min}$:

$$A_{smin} = 0.25 * \frac{\sqrt{f'_c}}{f_y} * b_w * d$$

$$A_{smin} = 0.25 \frac{\sqrt{24}}{420} * 120 * 281 = 98.33\ mm^2.$$

$$A_{smin} = \frac{1.4}{f_y} * b_w * d = \frac{1.4}{420} * 120 * 281 = 112.4 mm^2 \quad \ldots. contral$$

A_s=334.5 > A_{smin}=112.4 mm^2

Use $2\Phi 18$ with $A_s = 402.12 mm^2$

$A_{s\ prov}$=402.12>$A_{s\ req}$=334.5 mm^2

Check for Strain:

$$a = \frac{A_s * f_y}{0.85 * f'_c * b} = \frac{402.12 * 420}{0.85 * 24 * 120} = 68.99\text{mm}$$

$\beta = 0.85$

$$c = \frac{a}{0.85} = \frac{68.992}{0.85} = 81.17\ \text{mm}$$

$$\varepsilon_s = 0.003 * \frac{d-c}{c} = 0.003 * \frac{281-81.17}{81.17} = 0.007423 > 0.005\ \text{OK}$$

$M \therefore \boldsymbol{use\ 2\ \emptyset 16}$

Design of Rib (negative moment in short direction discontinues edge)

Mu = -6.3 kn .m/rib

Assume bar diameter Φ10 for main negative moment reinforcement.

$$d = h - \text{cover} - d_{stirrups} - \frac{d_b}{2} = 320 - 20 - 10 - \frac{18}{2} = 281\ mm$$

$$m = \frac{f_y}{0.85 * f_c} = \frac{420}{0.85 * 24} = 20.59$$

$$R_n = \frac{Mu}{\Phi b d^2} = \frac{6.3 * 10^6}{0.9 * 120 * 281^2} = 0.738 Mpa$$

$$\rho = \frac{1}{m}\left(1 - \sqrt{1 - \frac{2R_n * m}{f_y}}\right) = \frac{1}{20.59}\left(1 - \sqrt{1 - \frac{2 * 0.738 * 20.59}{420}}\right) = 0.001792$$

$A_s = \rho * b * d = 0.001792 * 120 * 281 = 60.42\ mm^2$

*Check for $A_{s,\ min}$:

$$A_{smin} = 0.25 * \frac{\sqrt{f'_c}}{f_y} * b_w * d$$

$$A_{smin} = 0.25\frac{\sqrt{24}}{420} * 120 * 281 = 98.33\ mm^2.$$

$$A_{smin} = \frac{1.4}{f_y} * b_w * d = \frac{1.4}{420} * 120 * 281 = 112.4 mm^2 \quad \ldots. \ contral$$

A_s 60.42<A_{smin}=112.48 mm^2

Use 2Φ10 with $A_s = 157.07 mm^2$

Check for Strain:

$$a = \frac{A_s * f_y}{0.85 * f'_c * b} = \frac{157.07 * 420}{0.85 * 24 * 120} = 26.95 mm$$

$\beta = 0.85$

$$c = \frac{a}{0.85} = \frac{26.95}{0.85} = 31.71\ mm$$

$$\varepsilon_s = 0.003 * \frac{d-c}{c} = 0.003 * \frac{247 - 31.71}{31.71} = 0.02037 > 0.005 \ \text{ok} \qquad \therefore \boldsymbol{use\ 2\ \emptyset 10}$$

4.9.5.2 Design of Rib (positive moment in short direction)

Mu= 18.8 KN.m

Assume bar diameter $\Phi 14$ for main positive moment reinforcement.

d = h- cover $-d_{stirrups} - \frac{d_b}{2} = 320 - 20 - 10 - \frac{18}{2} = 281\ mm$

$$m = \frac{f_y}{0.85 * f_c} = \frac{420}{0.85 * 24} = 20.59$$

$$R_n = \frac{Mu}{\Phi b d^2} = \frac{18.8 * 10^6}{0.9 * 520 * 281^2} = .508\ Mpa$$

$$\rho = \frac{1}{m}(1 - \sqrt{1 - \frac{2R_n * m}{f_y}} = \frac{1}{20.59}(1 - \sqrt{1 - \frac{2 * .508 * 20.59}{420}} = .001227$$

$A_s = \rho * b * d = .001227 * 520 * 281 = 179.28\ mm^2$

*Check for $A_{s,\ min}$:

$$A_{smin} = 0.25 * \frac{\sqrt{f'_c}}{f_y} * b_w * d$$

$$A_{smin} = 0.25 \frac{\sqrt{24}}{420} * 120 * 281 = 98.33\ mm^2.$$

$$A_{smin} = \frac{1.4}{f_y} * b_w * d = \frac{1.4}{420} * 120 * 281 = 112.4 mm^2 \quad \ldots . contral$$

$A_s = 179.28 > A_{s\ min} = 122.4\ mm^2$

Use $2\Phi 12$ with $A_s = 226\ mm^2$

$A_{s\ prov} = 226 > A_{s\ req} = 179.28\ mm^2$

Check for Strain:

$$a = \frac{A_s * f_y}{0.85 * f'_c * b} = \frac{226 * 420}{0.85 * 24 * 520} = 8.947\text{mm}$$

$\beta = 0.85$

$$c = \frac{a}{0.85} = \frac{8.947}{0.85} = 10.527 \text{ mm}$$

$$\varepsilon_s = 0.003 * \frac{d-c}{c} = 0.003 * \frac{281-8.947}{8.947} = 0.09 > 0.005 \text{ ok}$$

$\therefore$ ***use* 2 ∅12**

4.9.5.3: Design of Rib in long direction (positive moment discontinuous edge)

Mu= 6.75 KN.m/rib

Assume bar diameter Φ10 for main negative moment reinforcement.

$$d = h - \text{cover} - d_{stirrups} - \frac{d_b}{2} = 280 - 20 - 8 - \frac{10}{2} = 247\ mm$$

$$m = \frac{f_y}{0.85 * f_c} = \frac{420}{0.85 * 24} = 20.59$$

$$R_n = \frac{Mu}{\Phi b d^2} = \frac{6.75 * 10^6}{0.9 * 120 * 243^2} = .425 Mpa$$

$$\rho = \frac{1}{m}\left(1 - \sqrt{1 - \frac{2R_n * m}{f_y}}\right) = \frac{1}{20.59}\left(1 - \sqrt{1 - \frac{2 * .425 * 20.59}{420}}\right) = 0.0010226$$

$A_s = \rho * b * d = .00010226 * 120 * 247 = 30.1 \text{ mm}^2$

*Check for $A_{s,\ min}$:

$$A_{smin} = 0.25 * \frac{\sqrt{f'_c}}{f_y} * b_w * d$$

$$A_{smin} = 0.25 \frac{\sqrt{24}}{420} * 120 * 247 = 86.43\ mm^2.$$

$$A_{smin} = \frac{1.4}{f_y} * b_w * d = \frac{1.4}{420} * 120 * 247 = 98.8\ mm^2 \quad \ldots . \ contral$$

A_s 30.1<A_{smin}=98.8 mm^2

Use 2Φ10 with $A_s = 157.07 mm^2$

Check for Strain:

$$a = \frac{A_s * f_y}{0.85 * f'_c * b} = \frac{157.07 * 420}{0.85 * 24 * 120} = 26.95 mm$$

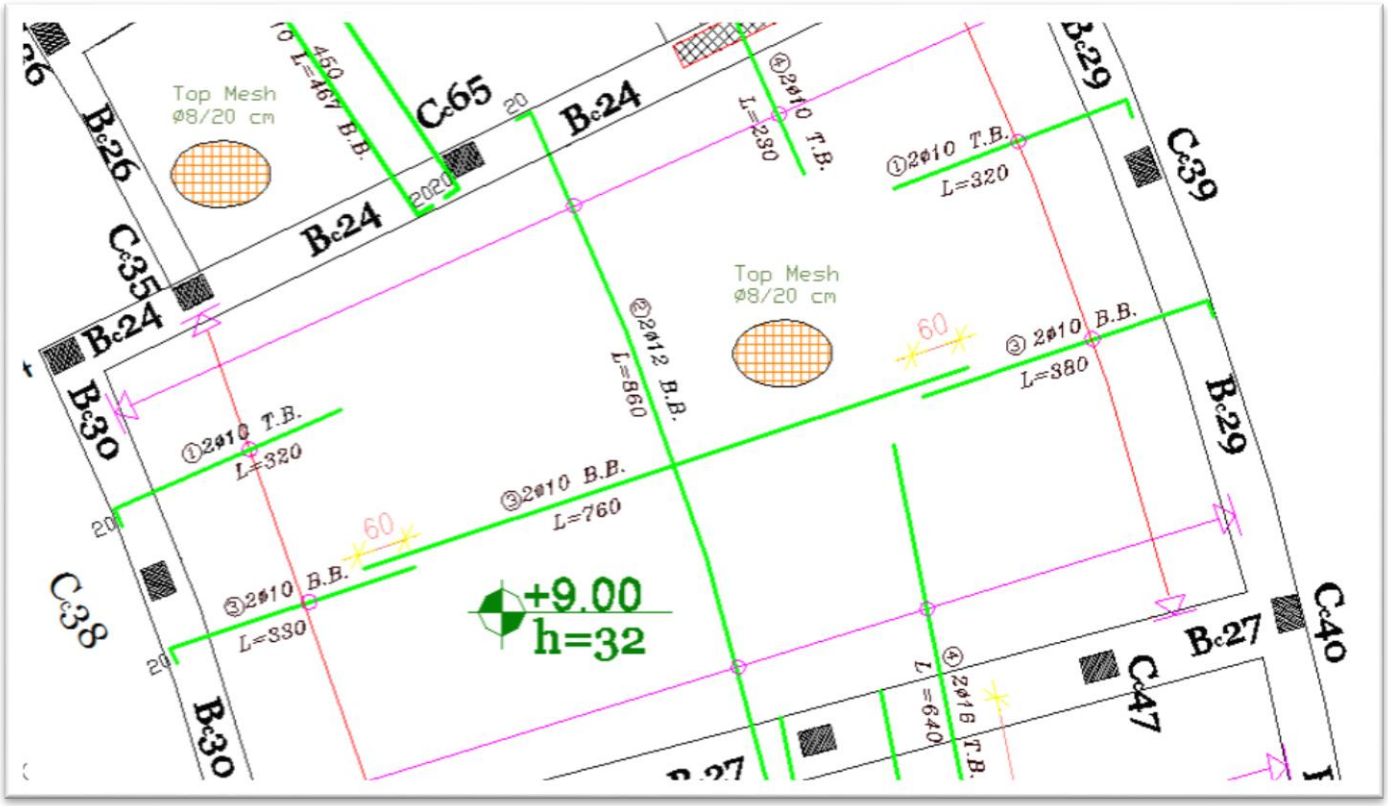
$$\beta = 0.85$$

$$c = \frac{a}{0.85} = \frac{26.95}{0.85} = 31.71\ mm$$

$$\varepsilon_s = 0.003 * \frac{d-c}{c} = 0.003 * \frac{247-31.71}{31.71} = 0.02037 > 0.005 \ \text{ok}$$

$\therefore$ ***use* 2 ∅10**

$\therefore$ ***use* 2 ∅10** for negative moment long direction .



9.6: Design For Shear:

The maximum shear coefficient will be in the short direction for the slab with boundary condition as in case4:

Wa= 0.918

●The total load on the panel being (8.23*12.09*11.52=1146.3 kn)

●The load per rib at face of the long beam is (.918*1146.3 *0.52 / (2 * 12.09)= 22.63 KN

The shear critical section is at distance d from the beam face:

$$V_{ud} = V_{u,face} - w_u * b_f * d = 22.63 - (11.52 * .52 * .247) = 21.2\ kN$$

The shear strength of rib in the slab is:

$$V_c = 1.1 * \frac{1}{6} * \sqrt{f_c} * b_w * d = 1.1 * \frac{1}{6} * \sqrt{24} * 120 * 247 * 10^{-3} = 26.62kN$$

$$\emptyset V_c = 0.75 * 26.62 = 19.96kN$$

$$\emptyset V_c = 19.96\ kN < V_{ud} = 21.2\ kN$$

$V_{s.\ min} = \frac{1}{16} * \sqrt{f_c'} * b_w * d = \frac{1}{16} * \sqrt{24} * 120 * 247 * 10^{-3} = 9.08$ KN

$V_{s.\ min} = \frac{1}{3} * b_w * d = \frac{1}{3} * 120 * 247 * 10^{-3} = 9.8$ KN... control

$$\emptyset V_c = 21.2kN < V_{ud} = 26.62kN < \emptyset(V_C + V_{s\,min}) = 27.6\ kN$$

Provide minimum shear reinforcement

Use 2Ø8 $for\ the\ stripe\ A_{V\ 2\emptyset 8} = 2 * 50.25 = 100.5\ mm^2$

$$\frac{A_{V\ 2\emptyset 8}}{s} = \frac{1}{3}\frac{b_w}{f_y} = \frac{120}{3 * 420} = 0.0952 \quad \rightarrow \quad s = 1055.25\ mm$$

$$S_{max} \leq \frac{d}{2} \leq 600\ mm$$

$$S_{max} \leq \frac{247}{2} = 123.5 \leq 600\ mm$$

Use 2Ø8 @ 10 cm c/c for the distance of 1m from the face of suppurt ,

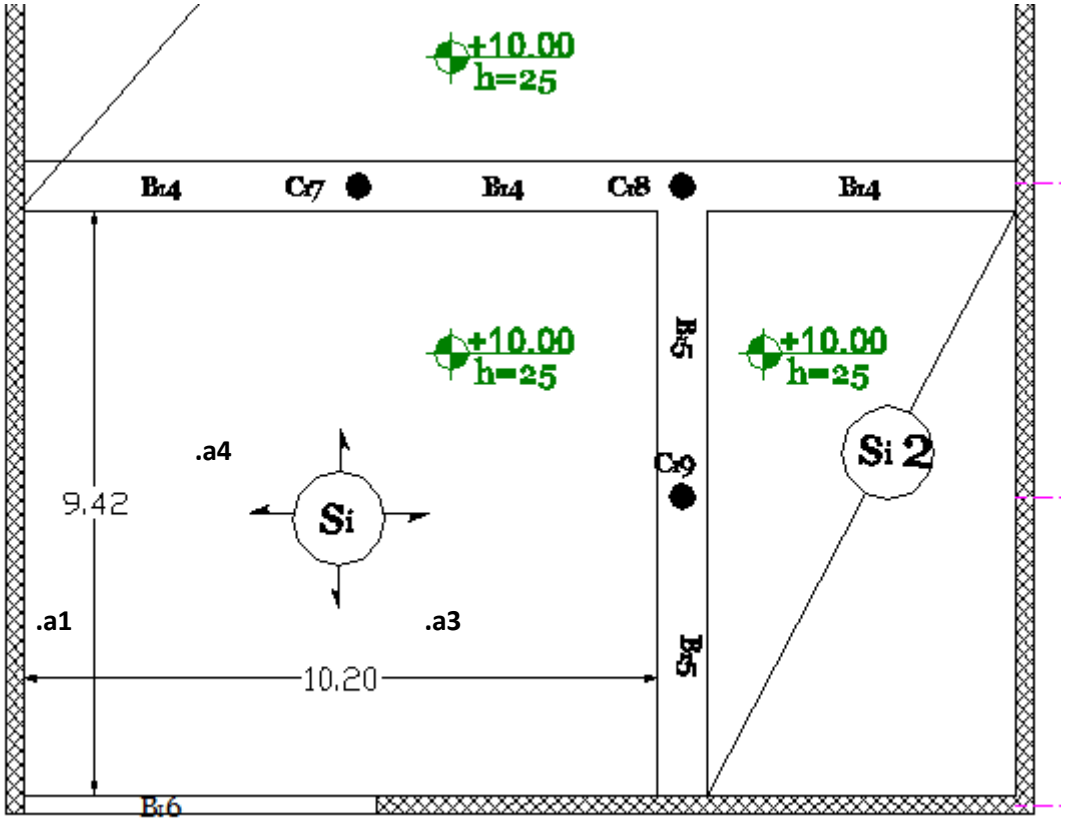
and 2Ø8 @ 30 cm c/c in the middle space . Note that the shearforce at

1 m from the face of support is $V_{u\ at\ 1\ m} = 11.52 * 0.52 * (4.115 - 1) = 18.66$ kN $< \emptyset V_c$ $= 21.2\ kN$

so no shear reinforcmant is required for middleSpace.

4.10: Design of Two Way solid Slab

4.10.1 Determination Thickness for two Way solid Slab:

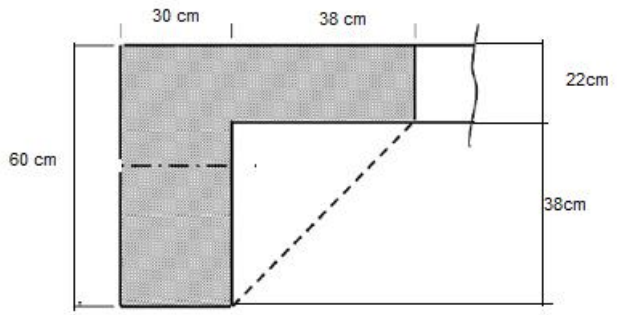


Minimum thickness of slab:

According to one way solid slab take

$$\text{hmin} = 220mm$$

The section of external beams (b=30cm, h=60cm), and the section of internal beam is (b=45cm, h=60cm).



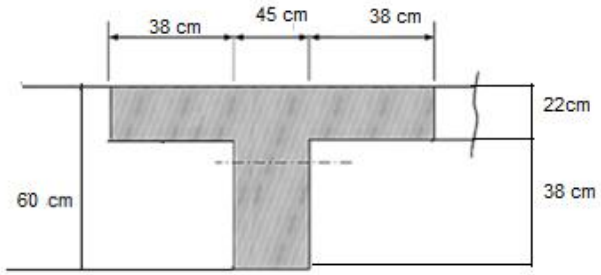
for external beam 1 & 2

$$y_c = \frac{22 * 68 * 49 + 38 * 30 * 19}{22 * 68 + 38 * 30} = 36.1 \text{ cm}$$

$$I_{exbeam\ 1\ \&\ 2} = \frac{68 * 23.9^3 - 38 * 1.9^3 + 30 * 36.1^3}{3}$$

$$I_{exbeam\ 1\&2} = 779815\ cm^4$$

For internal beam 3 & 4.



$$y_c = \frac{22 * 121 * 49 + 45 * 38 * 19}{22 * 121 + 45 * 38} = 37.3\ cm$$

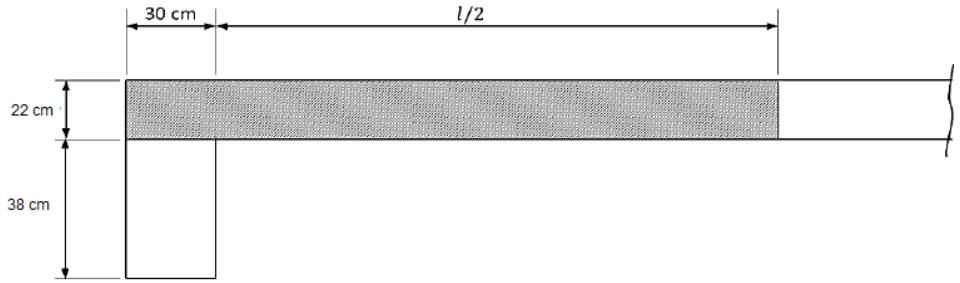
$$I_{in.beam\ 3;4} = \frac{121 * (22 + .7)^3 - 2 * 38 *. 7^3 + 45 * 37.3^3}{3}$$

$$I_{in.beam\ 3;4} = 1250200.41\ cm^4$$

For short direction L =9.62 m and long direction L = 10.40m

$$I_s = \frac{\left(\frac{l_r}{2} + \frac{l_l}{2} + t^3\right)}{12}$$

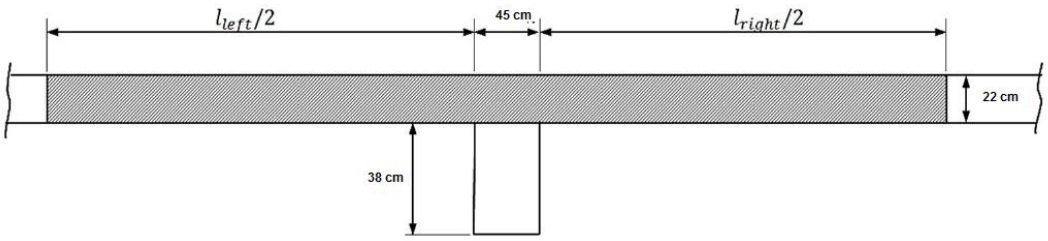
- Slab section for Exterior beam:



$$I_s1 = \frac{(1020/2 + 30) * 22^3}{12} = 474723\ cm^4$$

$$I_s2 = \frac{\left(\frac{932}{2} + 30\right) * 22^3}{12} = 40117\ cm^4$$

- Slab section for Interior beam:



$$I_s3 = \frac{\left(\frac{1020}{2} + \frac{498}{2} + 45\right) * 22^3}{12} = 708979cm^4$$

$$I_s4 = \frac{\left(\frac{932}{2} + \frac{420}{2} + 45\right) * 22^3}{12} = 639767\ cm^4$$

$$\alpha_1 = \frac{I_b}{Is} = \frac{779815.}{474723} = 1.64$$

$$\alpha_2 = \frac{I_b}{Is} = \frac{779815}{40117} = 1.8$$

$$\alpha_1 = \frac{I_b}{Is} = \frac{1250200.41}{708979} = 1.8$$

$$\alpha_1 = \frac{I_b}{Is} = \frac{1250200.41}{639767} = 1.95$$

$$\alpha_{fm} = \frac{\alpha_1 + \alpha_2 + \alpha_{243} + \alpha_4}{4} = \frac{7.13}{4} = 1.8$$

$$\alpha_{fm} = 1.8 < 2$$

The minmum slab thickness will be

$$h_{slab} = \frac{L_n(\ 0.8 + \frac{f_y}{1400})}{36 + 5\ \beta\ (\alpha_{fm} - .2)}$$

$$\beta = \frac{l_{n\,long}}{l_{n\,short}} = \frac{1040}{932} = 1.08$$

$$h_{slab} = \frac{10400\left(0.8 + \frac{420}{1400}\right)}{36 + 5 * 1.08(1.8 - .2)} = 249.2mm$$

.

Take h_{slab} for ony way & two way rib slab 25 cm

4.10: Design of Two Way solid Slab

4.10.2: Load Calculation for Two way solid Slab:

For the two-way ribbed slabs, the total dead load be used in the analysis and design is calculated as follows:

Load Calculations:

	Thicknees	Dencity	Kn/m
Backfill	**30**	**18**	**5.4**
R.C	**.25**	**25**	**6.25**
Plaster	**.02**	**22**	**.44**

DL = 12.1 Kn/m

LL= 5

$\text{wDL} = 1.2 * 12.1 = 14.52\ \text{KN}/m^2$

$\text{wLL} = 1.6 * 5 = 8\ \text{KN}/m^2$

$\text{w} = 1.2 * 12.1 + 1.6 * 5 = 22.52\ \ \text{KN}/m^2$

4.10.3: Moment calculation using (coefficient method)

$M_a = Ca\ w\ l_a^2$

$M_b = Cb\ w\ l_b^2$

$m = \frac{l_a}{l_b} = \frac{932}{1040} = .90$

case 4 :

Negative Moments (Table):

$C_{a,neg} = .060 \rightarrow M_{a,neg} = Ca\ w\ l_a^2 = 129.87\ KN.m$

$C_{b,neg} = .040 \rightarrow M_{b,neg} = Ca\ w\ l_a^2 = 107.8\ KN.m$

Positive Momts (Table):

$C_{a,D} = .033 \rightarrow M_{a,D} = 41.6\ KN.m$

$C_{a,L} = .093 \rightarrow M_{a,L} = 84.1\ KN.$

$M_{a,Pos} = 41.6 + 84.1 = 125.7\ KN.m$

$C_{b,D} = .0082 \rightarrow M_{b,D} = 34.55\ KN.m/rib$

$C_{b,L} = .026 \rightarrow M_{b,L} = 29.3\ KN.$

$M_{b,Pos} = 34.55 + 29.3 = 63.8\ KN.m$

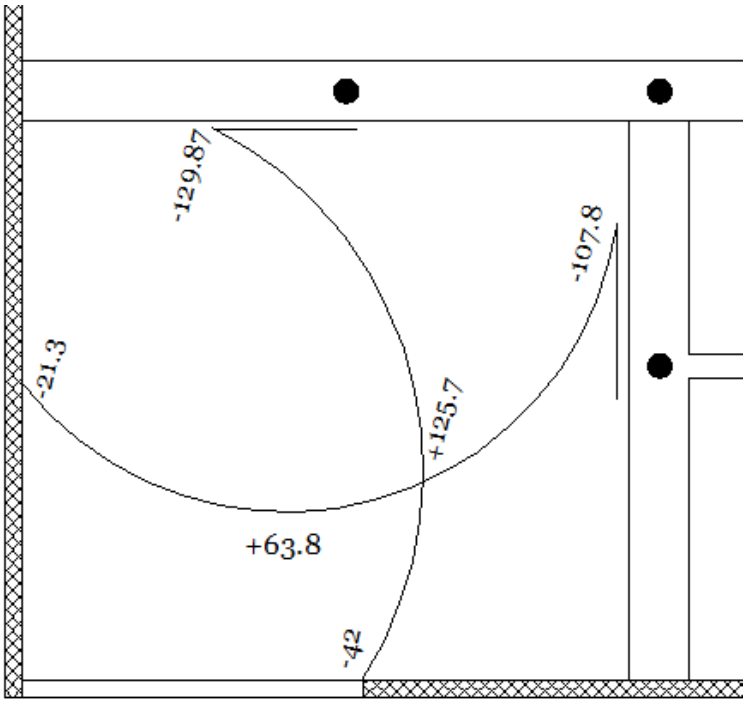
Note : Negative Moments at discontinuous edges = $\frac{1}{3}$ x positive moment

4.10.4: Shear Coefficients:

Case 4 : $m_1 = 0.9$

$W_a = 0.6$

$W_b = 0.4$



4.10.5: Design slab For Flexure:

4.10.5.1 Design of slab (negative moment in short direction continues edge)

Mu= -129.87 KN.m/m

Assume bar diameter $\Phi 18$ for main negative moment reinforcement.

d = h- cover $- \frac{d_b}{2} =$

$$250 - 20 - \frac{18}{2} = 221\ mm$$

$$m = \frac{f_y}{0.85 * f_c} = \frac{420}{0.85 * 24} = 20.59$$

$$R_n = \frac{Mu}{\Phi b d^2} = \frac{129.87 * 10^6}{0.9 * 1000 * 221^2} = 2.954\ Mpa$$

$$\rho = \frac{1}{m}(1 - \sqrt{1 - \frac{2R_n * m}{f_y}} = \frac{1}{20.59}(1 - \sqrt{1 - \frac{2 * 2.954 * 20.59}{420}} = .0076345$$

$A_s = \rho * b * d = .0076345 * 1000 * 221 = 1687.22\ mm^2$

*Check for $A_{s,\ min}$:

$$A_{smin} = \rho b h = .0018 * 1000 * 250 = 450\ mm^2$$

$A_s = 1687.22 > A_{smin} = 450\ mm^2$

$$n = \frac{As}{As\Phi 18} = \frac{1687.22}{254.5} = 7\ bar$$

Use $7\Phi 18$ with or $\Phi 18$ @ 150

With As = 1696.6

Check for Strain:

$$a = \frac{A_s * f_y}{0.85 * f'_c * b} = \frac{1696.6 * 420}{0.85 * 24 * 1000} = 34.93 mm$$

$\beta = 0.85$

$$c = \frac{a}{0.85} = \frac{34.93}{0.85} = 41.09\ mm$$

$$\varepsilon_s = 0.003 * \frac{d - c}{c} = 0.003 * \frac{221 - 41.09}{41.09} = .010 > .005 \quad ok$$

$\therefore$ ***use*** $\Phi 18$ @ 150

Design of slab (negative moment in short direction discontinues edge)

Mu= -42 KN.m/m

Assume bar diameter $\Phi 10$ for main negative moment reinforcement.

d = h- cover $- \frac{d_b}{2} =$

$$250 - 20 - \frac{10}{2} = 225\ mm$$

$$m = \frac{f_y}{0.85 * f_c} = \frac{420}{0.85 * 24} = 20.59$$

$$R_n = \frac{Mu}{\Phi b d^2} = \frac{42 * 10^6}{0.9 * 1000 * 225^2} = 0.922\ Mpa$$

$$\rho = \frac{1}{m}(1 - \sqrt{1 - \frac{2R_n * m}{f_y}} = \frac{1}{20.59}(1 - \sqrt{1 - \frac{2 * 0.922 * 20.59}{420}} = .0022486$$

A_s = **ρ***b*h = 0.022486 *1000 * 2 = 505.52 mm^2

*Check for $A_{s,\ min}$:

$A_{smin} = \rho bh = .0018 * 1000 * 250 = 450\ mm^2$

A_s=505.52 > A_{smin}=450 mm^2

$$n = \frac{As}{As\Phi 10} = \frac{505.52}{78.5} = 7\ bar$$

Use $7\Phi 10$ with or $\Phi 10$ @ 150

With As = 523.6 mm2

Check for Strain:

$$a = \frac{A_s * f_y}{0.85 * f'_c * b} = \frac{523.6 * 420}{0.85 * 24 * 1000} = 10.78\text{mm}$$

$\beta = 0.85$

$$c = \frac{a}{0.85} = \frac{10.78}{0.85} = 12.68 \text{ mm}$$

$$\varepsilon_s = 0.003 * \frac{d-c}{c} = 0.003 * \frac{225-12.68}{12.68} = .050 > .005 \quad \text{ok}$$

$\therefore$ ***use*** $\Phi 10$ @ 150

4.10.5.2 Design of slab (positive moment in short direction)

Mu= +125.7 KN.m/m

Assume bar diameter $\Phi 18$ for main negative moment reinforcement.

$$d = \text{h- cover} - \frac{d_b}{2} = 250 - 20 - \frac{18}{2} = 221\ mm$$

$$m = \frac{f_y}{0.85 * f_c} = \frac{420}{0.85 * 24} = 20.59$$

$$R_n = \frac{Mu}{\Phi b d^2} = \frac{125.7 * 10^6}{0.9 * 1000 * 221^2} = 2.86\ Mpa$$

$$\rho = \frac{1}{m}\left(1 - \sqrt{1 - \frac{2R_n * m}{f_y}}\right) = \frac{1}{20.59}\left(1 - \sqrt{1 - \frac{2 * 2.86 * 20.59}{420}}\right) = .00736743$$

$A_s = \boldsymbol{\rho} * b * d = .00736743 * 1000 * 221 = 1628.22\ mm^2$

*Check for $A_{s,\,min}$:

$A_{smin} = \rho b h = .0018 * 1000 * 250 = 450\ mm^2$

A_s=1628.22 > A_{smin}=450 mm^2

$$n = \frac{As}{As\Phi 18} = \frac{1628.22}{254.5} = 7\ bar$$

Use $7\Phi 18$ with or $\Phi 18$ @ 150

With As = 1696.6

Check for Strain:

$$a = \frac{A_s * f_y}{0.85 * f_c' * b} = \frac{1696.6 * 420}{0.85 * 24 * 1000} = 34.93\text{mm}$$

$\beta = 0.85$

$$c = \frac{a}{0.85} = \frac{34.93}{0.85} = 41.09\ \text{mm}$$

$$\varepsilon_s = 0.003 * \frac{d-c}{c} = 0.003 * \frac{221-41.09}{41.09} = .010 > .005 \quad \text{ok}$$

$\therefore$ ***use*** $\Phi 18$ @ 150

4.10.5.3: Design of slab in long direction (negative moment discontinuous edge)

Mu= -107.8 KN.m/m

Assume bar diameter $\Phi 18$ for main negative moment reinforcement.

d = h- cover $- \frac{d_b}{2} - db =$

$$250 - 20 - \frac{18}{2} - 18 = 203\ mm$$

$$m = \frac{f_y}{0.85 * f_c} = \frac{420}{0.85 * 24} = 20.59$$

$$R_n = \frac{Mu}{\Phi b d^2} = \frac{107.8 * 10^6}{0.9 * 1000 * 203^2} = 2.907\ Mpa$$

$$\rho = \frac{1}{m}(1 - \sqrt{1 - \frac{2R_n * m}{f_y}} = \frac{1}{20.59}(1 - \sqrt{1 - \frac{2 * 2.907 * 20.59}{420}} = .0074994$$

$A_s = \rho * b * d = .0074994 * 1000 * 203 = 1522.38\ mm^2$

*Check for $A_{s,\ min}$:

$$A_{smin} = \rho b h = .0018 * 1000 * 250 = 450\ mm^2$$

$A_s = 1522.38 > A_{smin} = 450\ mm^2$

$$n = \frac{As}{As\Phi 18} = \frac{1522.38}{254.5} = 6\ bar$$

Use $6\Phi 18$ with or $\Phi 18$ @ 150

With As = 1696.6

Check for Strain:

$$a = \frac{A_s * f_y}{0.85 * f'_c * b} = \frac{1696.6 * 420}{0.85 * 24 * 1000} = 34.93 mm$$

$\beta = 0.85$

$$c = \frac{a}{0.85} = \frac{34.93}{0.85} = 41.09\ mm$$

$$\varepsilon_s = 0.003 * \frac{d-c}{c} = 0.003 * \frac{203-41.09}{41.09} = .010 > .005 \quad ok$$

$\therefore use\ \Phi 18$ @ 150

Design of slab (negative moment in long direction discontinues edge)

Mu= -21.3 KN.m/m $\therefore use\ \Phi 10$ @ 150

Design of slab (positive moment in short direction)

Mu= +63.8 KN.m/m

Assume bar diameter $\Phi 14$ for main positive moment reinforcement.

d = h- cover $- \frac{d_b}{2} - db = 205 - 20 - \frac{14}{2} - 18 = 205\ mm$

$$m = \frac{f_y}{0.85 * f_c} = \frac{420}{0.85 * 24} = 20.59$$

$$R_n = \frac{Mu}{\Phi b d^2} = \frac{63.8 * 10^6}{0.9 * 1000 * 205^2} = 1.608\ Mpa$$

$$\rho = \frac{1}{m}(1 - \sqrt{1 - \frac{2R_n * m}{f_y}} = \frac{1}{20.59}(1 - \sqrt{1 - \frac{2 * 1.608 * 20.59}{420}} = .0041976$$

$A_s = \boldsymbol{\rho} * b * d = .0041976 * 1000 * 205 = 860.52\ mm^2$

*Check for $A_{s,\ min}$:

$A_{smin} = \rho b h = .0018 * 1000 * 250 = 450\ mm^2$ $A_s = 860.52 > A_{smin} = 450\ mm^2$

$$n = \frac{As}{As\Phi 14} = \frac{860.52}{153.9} = 6\ bar$$

Use $6\Phi 14$ with or $\Phi 14$ @ 150 With As = 1026 mm2

Check for Strain:

$$a = \frac{A_s * f_y}{0.85 * f'_c * b} = \frac{1026 * 420}{0.85 * 24 * 1000} = 21.13 mm$$

$\beta = 0.85$ $c = \frac{a}{0.85} = \frac{21.13}{0.85} = 24.86\ mm$

$\varepsilon_s = 0.003 * \frac{d-c}{c} = 0.003 * \frac{205 - 24.86}{24.86} = .020 > .005$ ok

$\therefore \boldsymbol{use}\ \Phi 14$ @ 150

4.10.5: Design For Shear:

The maximum shear coefficient will be in the short direction for the slab with boundary condition as in case4:

Wa= 0.6

Wb= 0.4

- The total load on the panel being (9.32*10.4*24.92=2415 kn)
- The load per rib at face of the long beam is (.6*2415/ (2 * 10.4)= 69.66 KN
- The load per rib at face of the long beam is .4*2415/ (2 * 9.32)= 51.82 KN

The shear critical section is at distance d from the beam face:

$$\mathrm{V_{ud}} = V_{u,face} - w_u * d = 69.66 - (24.92 * .203) = 21.2\ kN$$

The shear strength of the slab is:

$$\mathrm{V_c} = 1.1 * \frac{1}{6} * \sqrt{\mathrm{f_c}} * \mathrm{b_w} * \mathrm{d} = 1.1 * \frac{1}{6} * \sqrt{24} * 1000 * 203 * 10^{-3} = 182.3kN$$

$$\emptyset \mathrm{V_c} = 0.75 * 182.3 = 136.7kN$$

$$\emptyset \mathrm{V_c} = 136.7\ kN > V_{ud} = 69.66\ kN$$

The thickness of the slab is adequate enough.

4.11 Design of Long Column (C6) :

4.11.1 Design of Longitudinal Reinforcement :

Select column (Cf14)

DL = 273 KN

LL = 170 KN

Pu = 600 KN

Pn = 443 KN

$\rho g = 1.5\%$

$Pn = 0.8 * Ag\{0.85 * fc' + \rho g(fy - 0.85 fc')\}$

$443 * 10^{-3} = 0.8 * Ag[0.85 * 24 + 0.015 * (420 - 0.85 * 24)]$

$Ag = 0.021 m^2$

X = $\sqrt{0.021} = 0.145$ m

Use 30*25cm with Ag = 750 cm² > Ag_{req} = 210 cm²

4.11.2 Check Slenderness Effect :

$$\frac{klu}{r} < 34 - 12\frac{M1}{M2} \quad .....ACI - (10.12.2)$$

Lu: Actual unsupported (un braced) length.

K: effective length factor (K= 1 for braced frame).

r : radius of gyration = 0.3 h = $\sqrt{\frac{I}{A}}$

Lu = 4.7 m

M1&M2 =1

K=1 , According to ACI 318-2002 (**10.10.6.3)** The effective length factor, ***k***, shall be permitted to be taken as 1.0.

$$\left(\frac{Klu}{r}\right) \le (34 - 12\left(\frac{M1}{M2}\right) \le 40 \quad ..... \quad \text{ACI 10-12-2}$$

$$\frac{1*4.7}{0.3*0.3}=52.22>22 \qquad \frac{1*4.7}{0.3*0.25}=62.67>22$$

* Long column in both direction

$$EI=0.4\frac{E_cI_g}{1+\beta_d} \quad .....[ACI\,318-2002\ (Eq.10-15)]$$

$$E_c=4750\sqrt{fc'}=4750*\sqrt{24}=23270.15Mpa$$

$$\beta_d=\frac{1.2DL}{Pu}=\frac{327.6}{600}=0.546$$

$$I_g=\frac{b*h^3}{12}=\frac{0.3*0.25^3}{12}=3.906*10^{-4}m^4$$

$$EI=\frac{0.4*23270.15*3.906*10^{-4}}{1+0.546}=2.35MN.m^2$$

$$P_{cr}=\frac{\pi^2EI}{(KLu)^2} \quad .....ACI\,318-2002(Eq.10-13)$$

$$P_c=\frac{3.14^2*2.35}{(1.0*4.7)^2}=1.05MN.$$

$$Cm=0.6+0.4\left(\frac{M1}{M2}\right) \quad .....ACI\,318-2002(Eq.10-16)$$

$$Cm=1 \quad .....According\ \ to\ \ ACI\,318-2002(10.10.6.4)$$

$$\delta_{ns}=\frac{Cm}{1-(Pu/0.75P_c)}\geq 1.0 \quad .....ACI\,318-2002(Eq.10-12)$$

$$\delta_{ns}=\frac{1}{1-(600/0.75*1.05*10^3)}=4.2>1$$

$$e_{\min}=15+0.03*h=15+0.03*250=22.5mm=0.0225m$$

$$e=e_{\min}\times\delta_{ns}=0.0225*4.2=0.0945m$$

$$\frac{e}{h}=\frac{0.0945}{0.25}=0.378$$

$From \quad Interaction \quad Diagram$

$$\frac{\phi P_n}{A_g} = \frac{600}{0.3*0.25} * \frac{145}{1000} = 1160 \ Psi$$

$$= 1.16 ksi$$

$$\rho_g = 0.01$$

$A_s = \rho * Ag = 0.01*30*25 = 7.5\ cm^2$

$$\text{Use } \Phi 16 \ >> \ \#\, of bar \ = \frac{7.5}{2.01} = 3.73$$

Use 6 Φ 16 with $As = 12.06\ cm^2 > As_{req} = 7.5\ cm^2$

- **Check for spacing between the bar**

$$S = \frac{300 - 2*40 - 2*10 - 6*16}{2}$$

$$S = 52 \ mm$$

$$\geq 40\ mm$$

$$\geq 1.5 db = 37.5\ mm$$

4.11.3 Design of the Tie Reinforcement:

$S \leq 16$ db (longitudonal bar diameter).....ACI - 7.10.5.2

$S \leq 48$ dt (tie bar diameter).

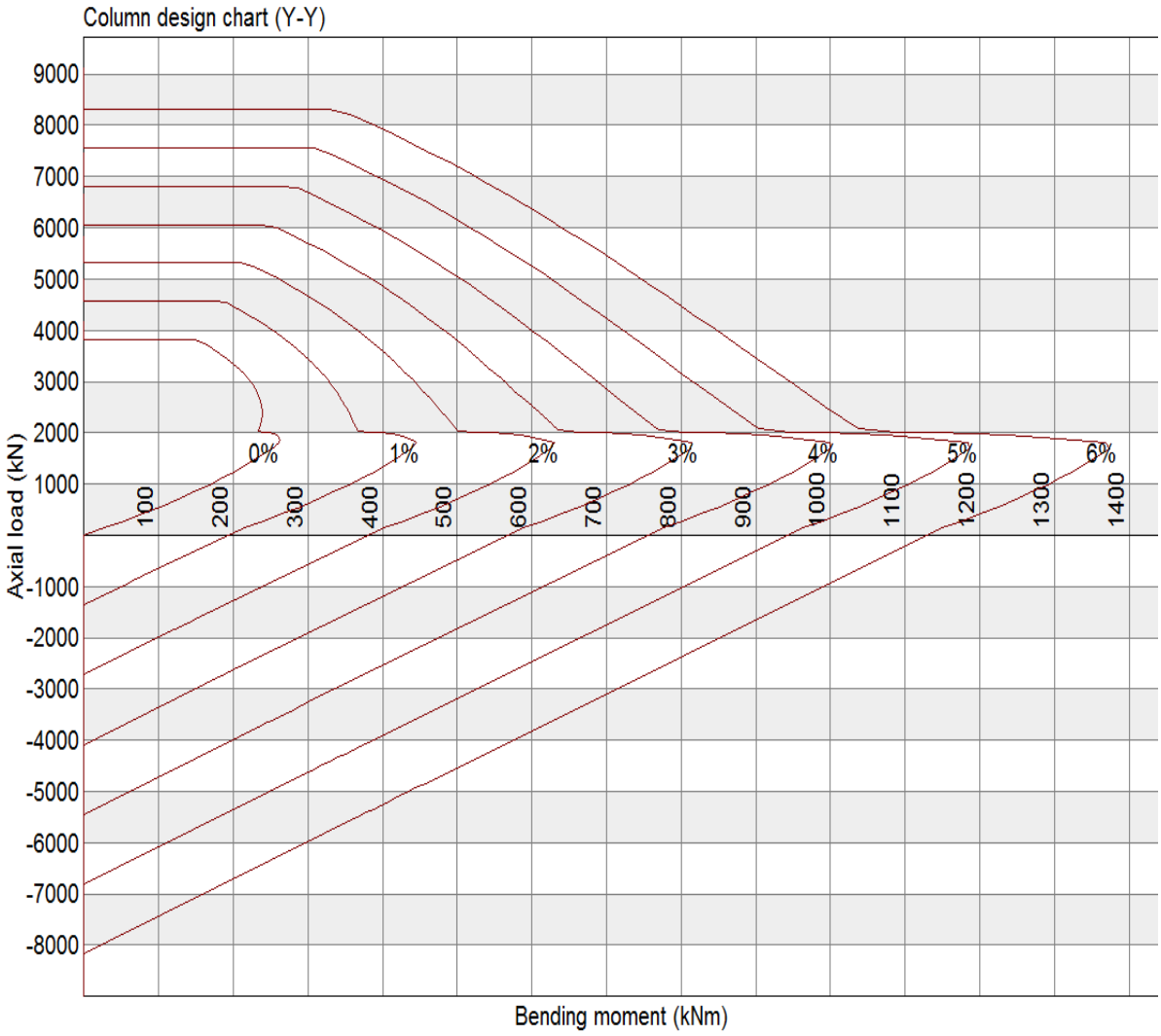
$S \leq$ Least dimension.

$$Spacing \leq 16 \times d_b (Longitudinal.bar.diameter) = 16 \times 1.6 = 25.6 cm.$$

$$Spacing \leq 48 \times d_t (tie.bar.diameter) = 48 \times 1.0 = 48 cm.$$

$$Spacing \leq Least.\dim ension = 25 cm$$

$$\therefore \ Use \ 1\phi 10 @ 25 cm$$


Column design chart (Y-Y)
Axial load (kN)
9000
8000
7000
6000
5000
4000
3000
2000
1000
-1000
-2000
-3000
-4000
-5000
-6000
-7000
-8000
0%
1%
2%
3%
4%
5%
6%
100
200
300
400
500
600
700
800
900
1000
1100
1200
1300
1400
Bending moment (kNm)

4.12 Design of Isolated Footing (F2):

Determine the base area and overall thickness for a spread footing with the following

Condition, and design the footing:

Total Service Load Pn = 650.0 KN

Total Factored Load Pu = 487.5 KN

Service Surcharge = 5 KN/m^2

Allowable soil pressure qa = 400 KN/m^2

Concrete Density = 25 KN/m^3

Fc = 24 MPa , Fy = 420 Mpa

Concrete Cover = 75 mm

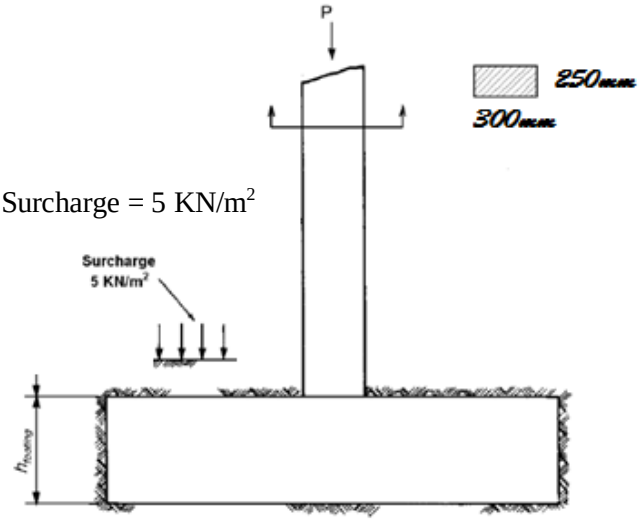


Fig. (0.0) Isolated Footing Condition

4.12.1 Calculate the weight of footing, soil, and the surcharge floor load:

Assume Thickness of Footing = 40 cm

$W_{footing} = .4 \times 25 = 10\ KN/m^2$

$Total\ Surcharge\ \ load = 5\ KN/m^2$

$Net\ soil\ pressure\ , q_{a,net} = 400 - 15 = 385\ KN/m^2$

4.12.2 Required Size Of Footing:

$$A = \frac{P_n}{q_{a,net}} = \frac{487.5}{385} = 1.266 m^2 \ , \qquad A = L^2$$

$$\gg\gg \quad L = \sqrt{A} = \sqrt{1.266} = 1.125\ m$$

Select L = 1.15 m

$P_u = 650$ KN

$$q_u = \frac{P_u}{A} = \frac{650}{1.3225} = 491.5\ KN/m^2$$

4.12.3 One Way Shear (Beam Shear):

Vu at distance d from the face of support:

$$V_u = q_u b\left(\frac{L}{2} - \frac{a}{2} - d\right) = 491.5 \times 1.15 \times \left(\frac{1.15}{2} - \frac{.25}{2} - d\right)$$

$$Let\ V_u = \emptyset V_C\ ,\quad (\emptyset = 0.75)$$

$$V_C = \frac{1}{6}\sqrt{fc}\, b_w d = \frac{1}{6}\sqrt{24} \times 1150 \times d$$

$$\frac{491.5 \times 1.15}{0.75} \times \left(\frac{1.15}{2} - \frac{0.25}{2} - d\right) = \frac{1}{6}\sqrt{24} \times 1150 \times d$$

$$\gg\gg\ d = 0.2001\ m$$

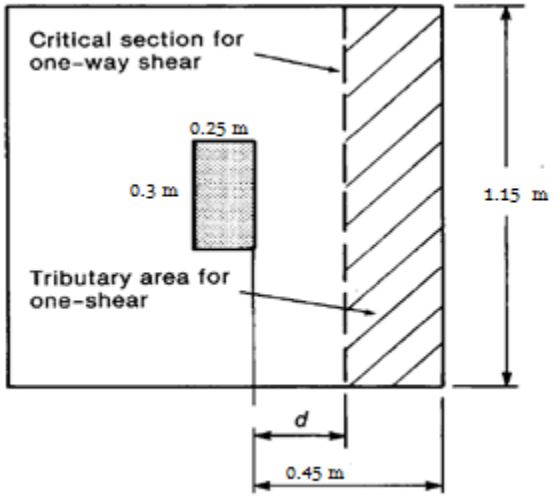


Fig. (4-17) Critical Section for One Way Shear

$$h = 200 + 75 + 16 = 291\ mm$$

Take h =400 mm

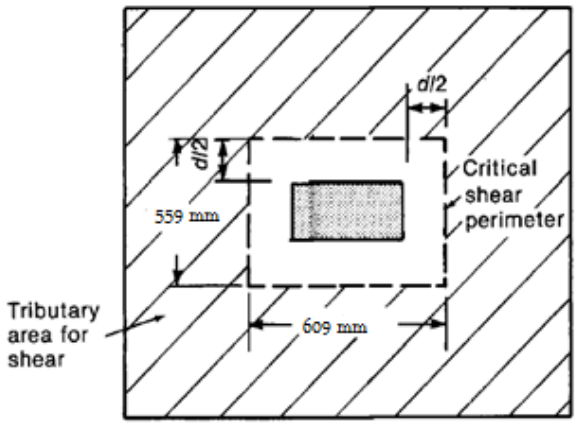
$$Then\ ,\quad d = 800 - 75 - 16 = 309\ mm$$

4.12.4 Two Way Shear (Punching Shear):

Vu at distance d/2 from the face of support:

$$Let\ V_u = \emptyset V_C\ ,\quad (\emptyset = 0.75)$$

$$V_u = 491.5 \times \left(1.15 * 1.15 - (.3 + 0.309)(0.25 + 0.309)\right)$$



$$V_u = 482.7\ \text{KN}$$

$$\beta = \frac{300}{250} = 1.2$$

$$b_o = 2(0.3 + 0.309) + 2(0.25 + 0.309) = 2.336\ m$$

Fig. (4-18) Critical Section for Two Way Shear

$\alpha s = 40 - interior\ column$

$$V_C = \frac{1}{6}\left(1+\frac{2}{\beta}\right)\sqrt{Fc}\,b_o d = \frac{1}{6}\left(1+\frac{2}{1.2}\right)\sqrt{24}\times 2336\times 309\times 10^{-3} = 1571.64KN$$

$$\emptyset V_C = 0.75\times 1571.64 = 1178.7\ KN$$

$$V_C = \frac{1}{6}\left(\frac{\alpha s d}{b_o}+2\right)\sqrt{Fc}\,b_o d = \frac{1}{6}\left(2+\frac{40*309}{2336}\right)\sqrt{24}\times 2336\times 309\times 10^{-3} = 2148.56KN$$

$$\emptyset V_C = 0.75\times 2148.56 = 1611.4KN$$

$$V_C = \frac{1}{3}\sqrt{Fc}\,b_o d = \frac{1}{3}\sqrt{24}\times 2336\times 309\times 10^{-3} = 1178.7KN$$

$\emptyset V_C = 0.75\times 1178.7 = 884.05KN$ …… control

$\emptyset V_C$ = 884.05 > Vu =482.7 ……ok.

4.12.5 Design For Flexure In Long Direction:

Take Steel Bars of Diameter 16

B = 1.15m, h =0 .4 m, d = 400 -75 – 16/2 = 317 mm

$$Mu = 491.5\times 1.15\times\frac{0.45^2}{2} = 57.3\ KN.M$$

$$Rn = \frac{Mu}{\emptyset bd^2} = \frac{57.3\times 10^6}{0.9\times 1150\times 317^2} = 0.55\ MPa$$

$$m = \frac{Fy}{0.85\,fc} = \frac{420}{0.85\times 24} = 20.6$$

$$\rho = \frac{1}{m}\left(1-\sqrt{1-\frac{2mRn}{fy}}\right) = \frac{1}{20.6}\left(1-\sqrt{1-\frac{2\times 20.6\times 0.55}{420}}\right) = 0.00134$$

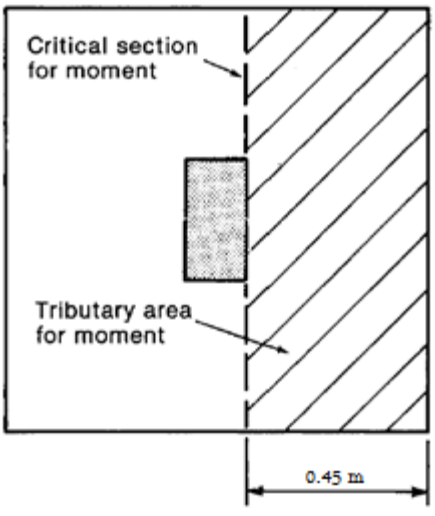


Fig. (4-19) Critical Section for Moment

$As = \rho bd = 0.00134 \times 1150 \times 317 = 479.56\ mm^2$

$As_{min} = 0.0018bh = 0.0018 \times 1150 \times 400 = 828\ mm^2$

$As < As_{min}\ So\ ,\qquad Take\ As = 828\ mm^2$

$\boldsymbol{Use\ 11\emptyset 10}$

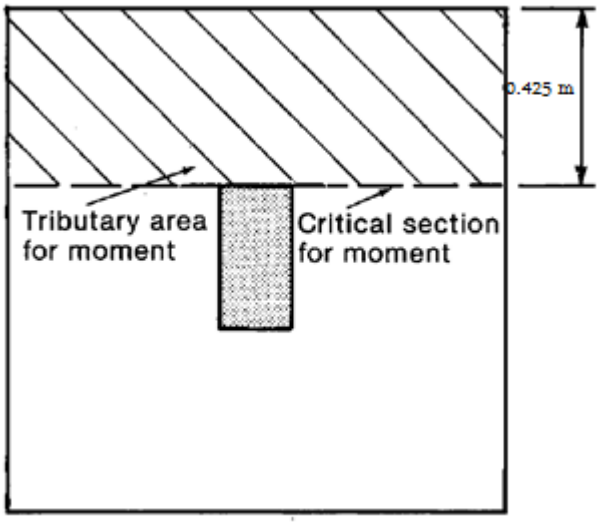


Fig. (4-20) Critical Section for Moment

4.12.6 Design For Flexure In Short Direction:

Take Steel Bars of Diameter 20

d = 400 -75 – 10 - 10/2 = 310 mm

$Mu = 491.5 \times 1.15 \times \frac{0.425^2}{2} = 51.05\ KN$

$Rn = \frac{Mu}{\emptyset bd^2} = \frac{51.05 \times 10^6}{0.9 \times 1150 \times 310^2} = 0.48\ MPa$

$m = \frac{Fy}{0.85\ fc} = \frac{420}{0.85 \times 24} = 20.6$

$\rho = \frac{1}{m}\left(1 - \sqrt{1 - \frac{2mRn}{fy}}\right) = \frac{1}{20.6}\left(1 - \sqrt{1 - \frac{2 \times 20.6 \times 0.48}{420}}\right) = 0.001160$

$As = \rho bd = 0.001160 \times 310 * 1150 = 413.5\ mm^2$

$As_{min} = 0.0018bh = 0.0018 \times 1150 \times 400 = 828.0\ mm^2$

$As < As_{min}\quad So\ ,\qquad Take\ As_{min} = As = 828.0\ mm^2$

$\boldsymbol{Use\ 11\emptyset 10}$

4.12.7 Footing Details:

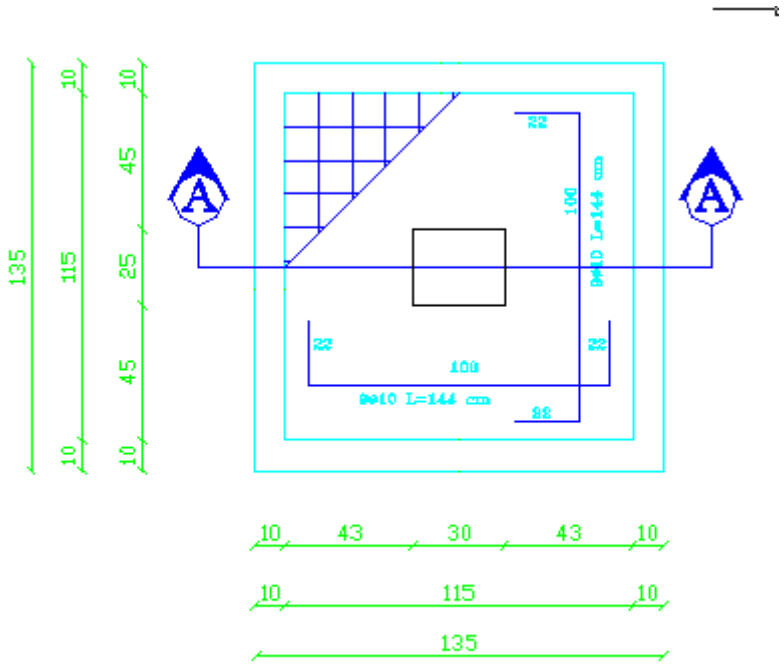
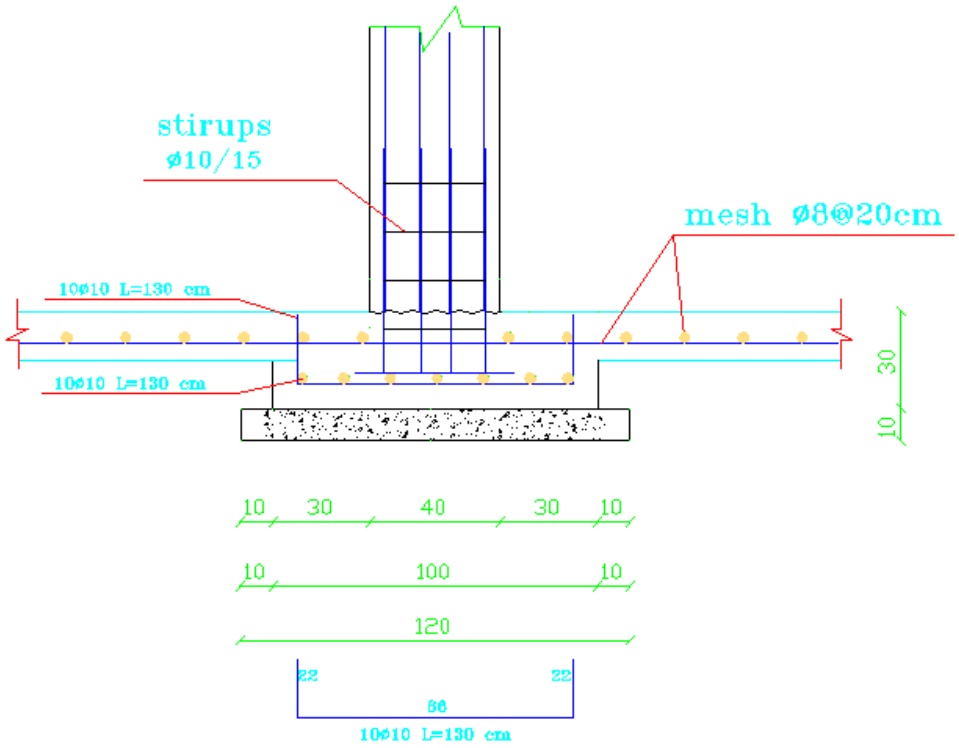


Fig. (4-21) Footing 2 Plan



4.13 Design Basement Wall:

Design the basement Wall Which have the following condition :

Fc = 24 MPa

Fy = 420 MPa

Backfill Density = 18KN/m^3

Surcharge Load = 5 KN/m^2

Wall Thickness = 20 cm

Co= 1-sin $\varphi = 1 - \sin 30.$

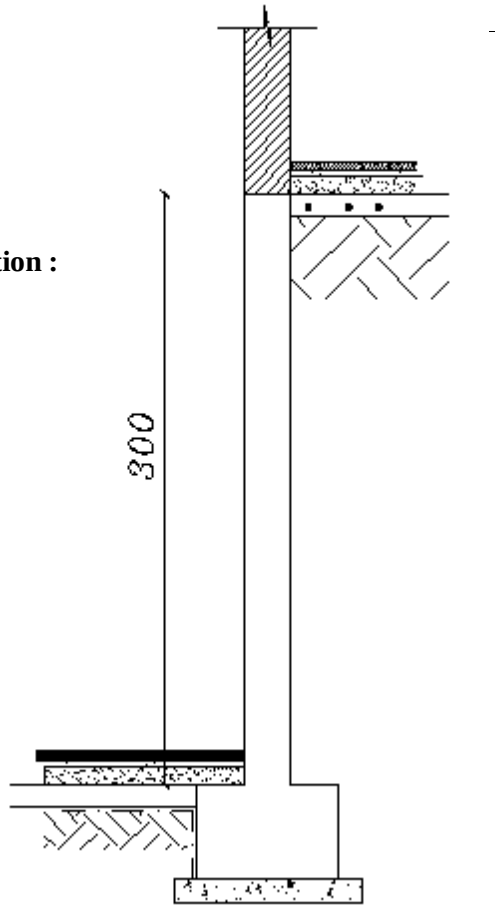


Fig. (4-23) Basement Wall Condition

4.13.1 Load Calculations:

$P_1 =$ due to soil Pressure

$P_1 = C_o \times h \times \gamma_s$

$= 0.5 * 3 * 18 = 27 KN/m^2$

$P_2 =$ due to Surcharge Load

$P_2 = C_o \times Surcharge\ Load$

$= .5 \times 5 = 2.5 KN/m^2$

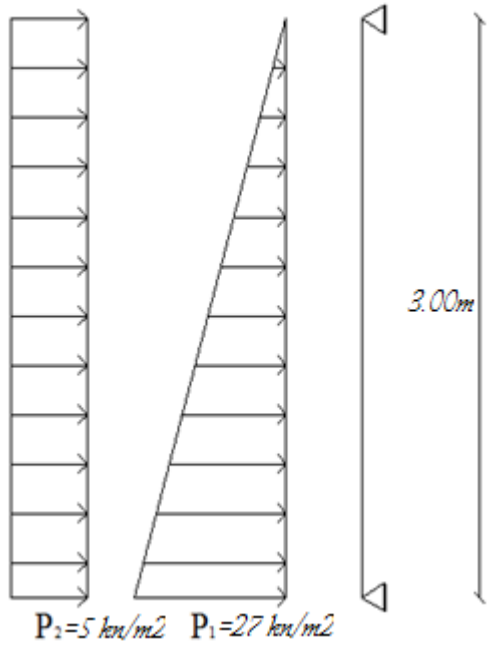
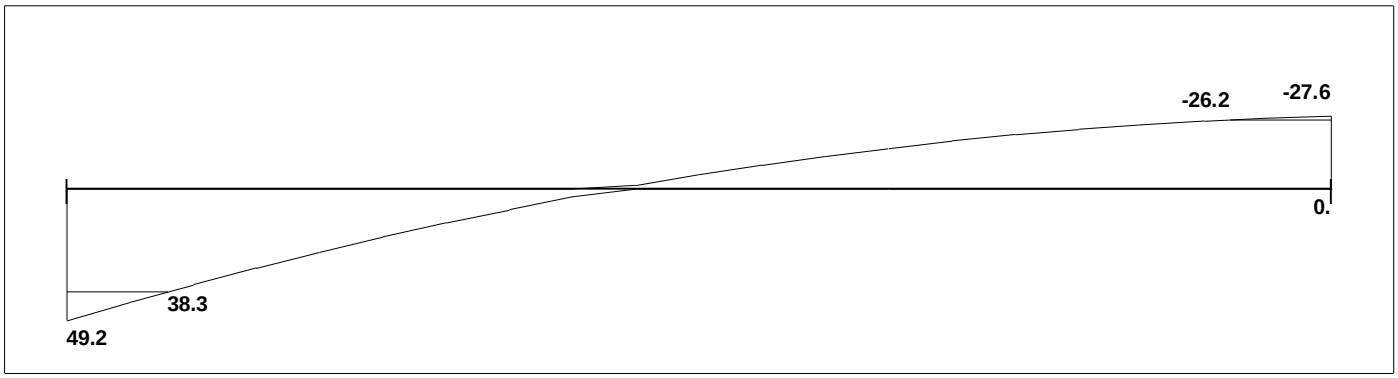


Fig. (4-24) Static System

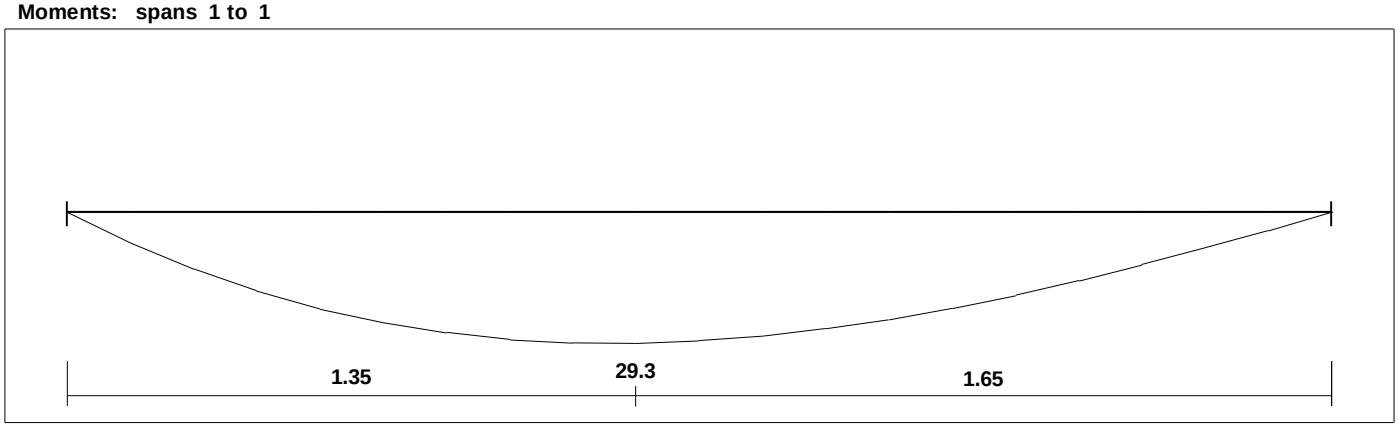
From Atir We have the moment and shear diagram:

Moment/Shear Envelope (Factored) Units:kN,meter

Shear



Moments: spans 1 to 1



Reactions

Factored

DeadR	0.	0.
LiveR	49.2	27.6
MaxR	49.2	27.6
MinR	0.	0.
Service		
DeadR	0.	0.
LiveR	30.75	17.25
MaxR	30.75	17.25
MinR	0.	0.

4.13.2Design of Bending Moment:

M_u=29.3 KN.m

Assume bar ϕ14 will be used

d=200-75-14/2 =118 mm

$$R_n = \frac{29.3*10^6}{0.9*1000*118^2} = 2.314MPa \ .$$

$$m = \frac{fy}{0.85\times fc'}$$

$$m = \frac{420}{0.85\times 24} = 20.59$$

$$\rho = \frac{1}{m}\left(1-\sqrt{1-\frac{2mR_n}{f_y}}\right) = \frac{1}{20.59}\left(1-\sqrt{1-\frac{2*20.59*2.314}{420}}\right) = 0.0058638$$

As req = 0.0058638*1000*118 =691.93 mm^2

As min=0.0012bh …… (φ>16)

=0.0012*200*1000=240 mm^2

A_{smin}= $0.25\frac{\sqrt{24}}{420} * 1000* 118$=344.09 mm^2.

$A_{smin} = \frac{1.4}{f_y} * b_w * d = \frac{1.4}{420} * 1000 * 118 = 393.3mm^2$ …. *contral*

As req >As min

Use ϕ 14 @ 20 cm

As prov $=\frac{1}{20} * 153.9 = 769.7\ mm^2$>As req =691.93 mm^2

Check for spacing

3h=3*200=600 mm

S=450

S=200 mm< 450

$$a = \frac{A_s * f_y}{0.85 * f'_c * b} = \frac{769.7 * 420}{0.85 * 24 * 1000} = 15.8 \text{ mm}$$

$$\beta = 0.85$$

$$c = \frac{a}{0.85} = \frac{15.8}{0.85} = 18.64\text{mm}$$

$\varepsilon_s = 0.003 * \frac{d-c}{c}$ = 0.003* 118-18.64/18.64= 0.015988> 0.005

for horizontal bar(ρ =0.002)

for horizontal bars use the half of the As min. in each side

As =0.5* 0.002*1000*200=200 mm^2

Use ϕ10@30cm for horizontal bar and

Use ϕ10@30 cm for vertical in outer side to hold the horizontal bares

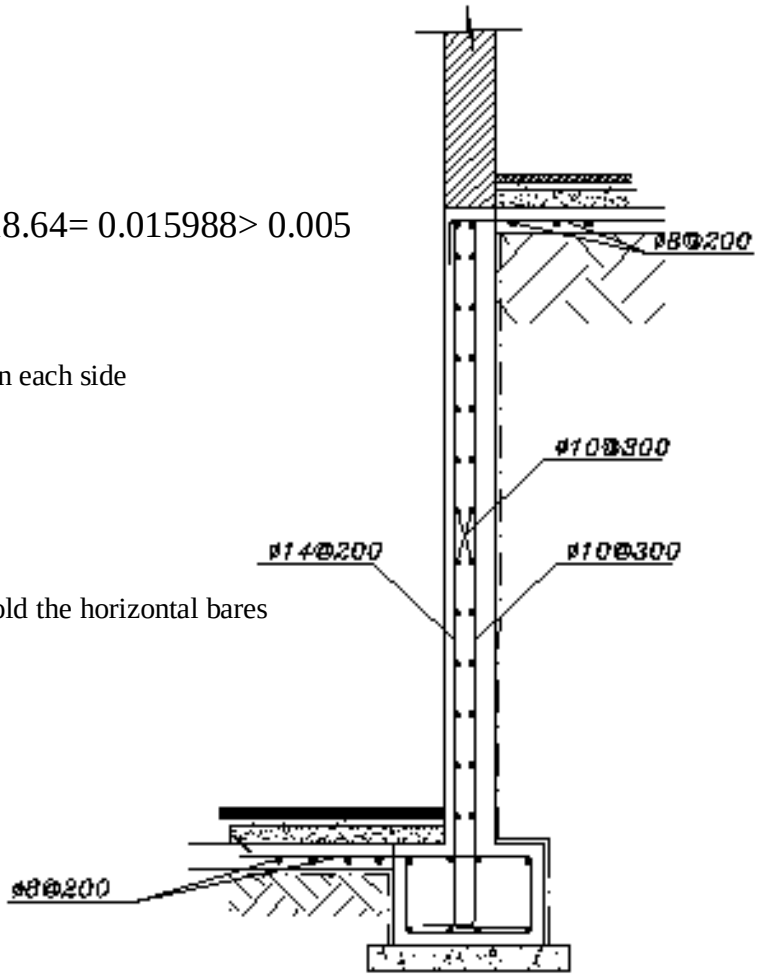


Fig. (4-26) Basement Wall Detailing

4.14 Design of Stairs:

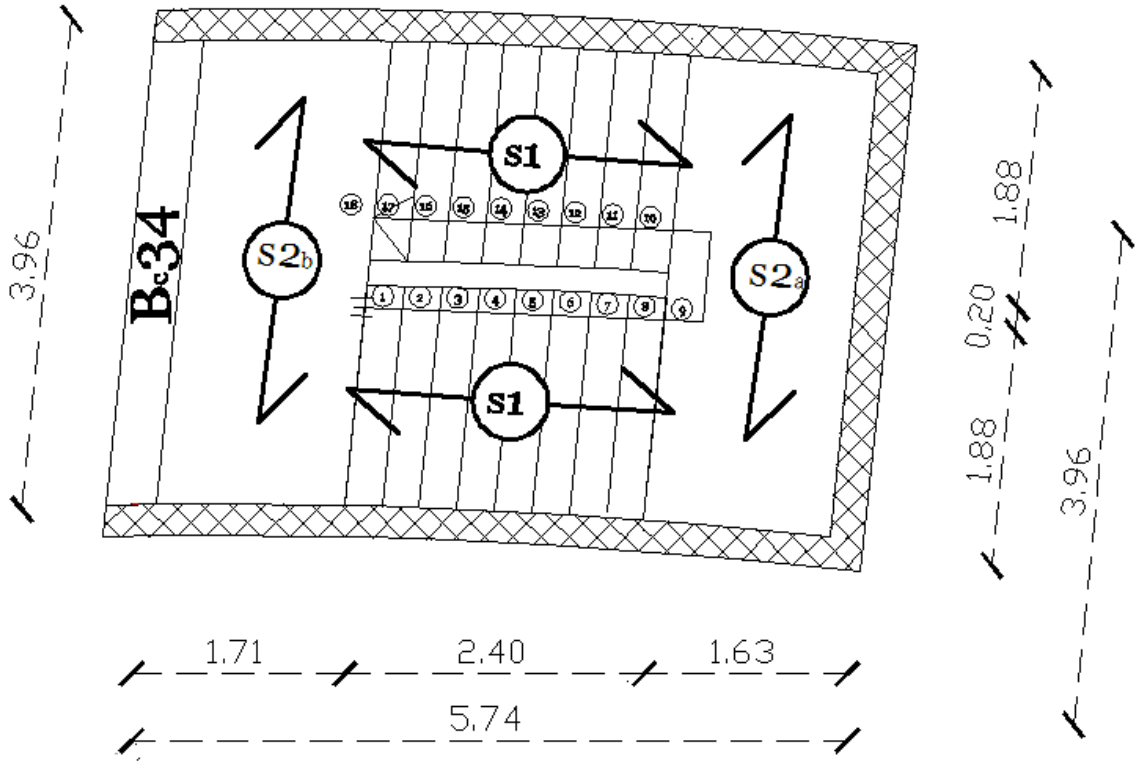


Fig. (4-29) Plan of Stair

4.14.1 Determination of Slab Thickness:

H_{req} = L/ 20

h_{req} = 4.07/ 20 = 0.2035m

Use h = 200mm

for stair and landing

rise = 165 mm

run = 300 mm

$\theta = \tan^{-1}(167/300) = 29.1°$

4.14.2 Load Calculations at section (A-A):

4.14.2.1 Flight Load Calculation

Dead Load:

Dead Load stair case (flight)			
DEAD LOAD from:	dencity(kn/m3)	**w kn/m**	
Tiles	27	27 * ((0.35+ 0.165) / 0.3) * .03 * 1 =	**1.391**
mortar	22	22 * ((0.3+ 0.165) / 0.3) * .02 * 1 =	**0.682**
stair steps	25	25/ 0.3*((0.3+0.165)/2)*1 =	**2.063**
RC solid slab	25	25 * 0.2 * 1 / cos 28.81 =	**5.706**
Plaster	22	22 *.02 * 1 / cos 28.81 =	**0.502**
		DL kn/m =	**10.344**

Table (4-6) Load on flight

4.14.2.2 Load on landing:

Dead Load:

Dead Load stair case (landing)			
DEAD LOAD from:	dencity(kn/m3)	**w kn/m**	
Tiles	22	22 * .03 * 1 =	**0.660**
mortar	22	22 * .02 * 1 =	**0.440**
RC solid slab	25	25 *0.2 * 1 =	**5.000**
Plaster	22	22 * .02 * 1 =	**0.440**

Table (4-6) Load on Landing

Live load:

Live load for stairs = 4 KN/ m^2.

Factored load flight (S1)

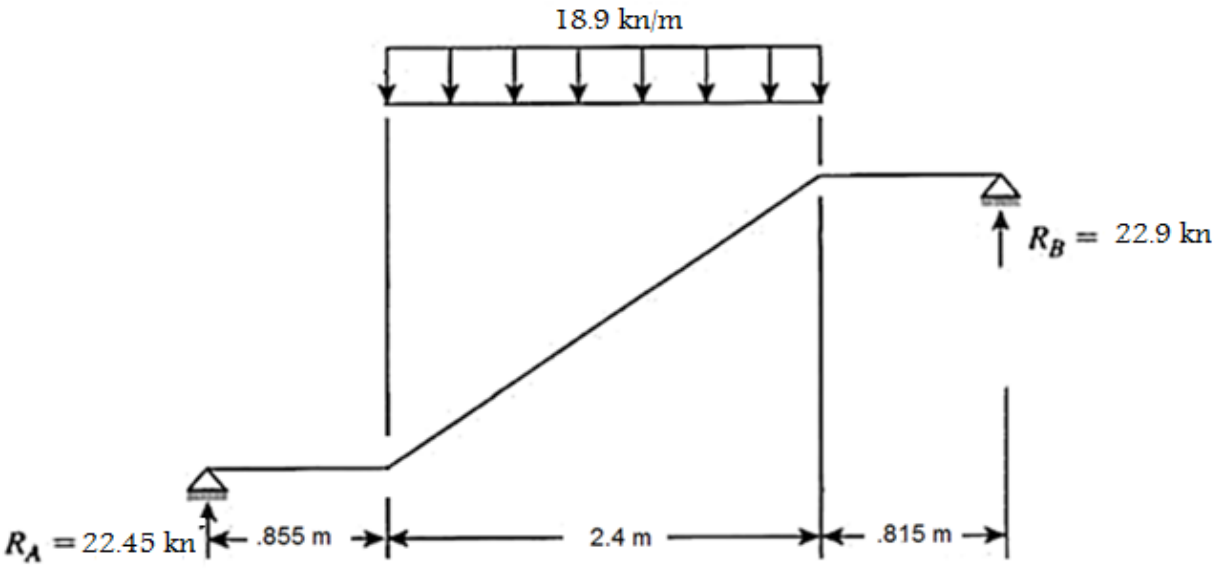
qu =1.2*10.4 + 1.6*4 =18.88 KN/ m^2.

Factored load landing (S2)

qu =1.2*6.54+ 1.6 *4 = 14.25 KN/ m^2.

Design of flight (s1)

Slab S2 is supported at the centerline of slabs S1.



4.14.3 Check for Shear strength:

Assume Ø 14 for main reinforcement:-

So, d = 200-20 -14/2 = 173 mm

Take the maximum shear as the support reaction Vu = 24.8 KN.

$$\phi Vc = \frac{\phi\sqrt{f_c'} * b_w * d}{6}$$

$$\phi Vc = \frac{0.75 * \sqrt{24} * 1000 * 173 * E-3}{6} = 44.7KN$$

$V_u = 26.9 < 44.7\ ok$

No shear Reinforcement is required. So the depth of the stair is OK.

4.14.4 Design of Bending Moment:

$$M_u = 22.45 * (1.19 + .855) - 18.9 * \frac{1.19^2}{2} = 32.5\ Kn.m$$

Mu =32.5 KN.m

Assume Ø 14 for main reinforcement.

d =173 mm.

Mn = Mu / 0.9 = 32.5/ 0.9= 36.11 KN.m/m.

$$R_n = \frac{Mn}{b \cdot d^2}$$

$$R_n = \frac{36.11 * 10^6}{1000 * 223^2} = 1.207MPa\ .$$

$$m = \frac{fy}{0.85 \times fc'}$$

$$m = \frac{420}{0.85 \times 24} = 20.59$$

$$\rho = \frac{1}{m}\left(1 - \sqrt{1 - \frac{2mR_n}{f_y}}\right) = \frac{1}{20.588}\left(1 - \sqrt{1 - \frac{2 * 20.59 * 1.207}{420}}\right) = 0.0029631$$

$$As_{req} = \rho bd = 0.0029631 * 1000 * 173 = 512.62\ mm^2$$

$$As_{\min} = 0.0018 * b * h = 0.0018 * 1000 * 200 = 360 mm^2$$

$As_{\min}$ = 360 mm² ≤ As_{req} =512.62 mm²

Use Φ 14

$$S = \frac{A_{S\,\emptyset 14}}{A_s} = \frac{153.9}{512.62} = 0.303m$$

use ∅14@ 300 mm

Step (s) is the smallest of :

1. 3h= 3*250= 750 mm
2. 450 mm
3. $s = 380\left(\frac{280}{f_s}\right) - 2.5\ C_c$

$$= 380\left(\frac{280}{\frac{2}{3} * 420}\right) - 2.5 * 20 = 330\ mm$$

$$s \leq 300\left(\frac{280}{f_s}\right) = 300 * \left(\frac{280}{\frac{2}{3} * 420}\right) = 300\ mm \ldots contral$$

S=300 mm = Smax = 300 mm …ok

Check for strain:

Tension = Compression

$$A_s * fy = 0.85 * fc' * b * a$$
$$513.3 * 420 = 0.85 * 24 * 1000 * a$$
$$a = 10.56mm$$
$$c = \frac{a}{\beta_1} = \frac{10.56}{0.85} = 12.43mm$$
$$\varepsilon_s = \frac{223 - 12.43}{12.43} * 0.003$$
$$\varepsilon_s = 0.0387 > 0.005 \longrightarrow ok$$

4.14.5 Secondary reinforcement:

$$As_{Shrinkage} = 0.0018 \times b \times h = 0.0018 \times 1000 \times 200 = 360mm^2$$

$$S = \frac{A_{S\,\emptyset 14}}{A_s} = \frac{153.9}{360} = 0.427m$$

Use Φ14 @ 400 mm

Step (s-for shrinkage and temperature reinforcement) is the smallest of:

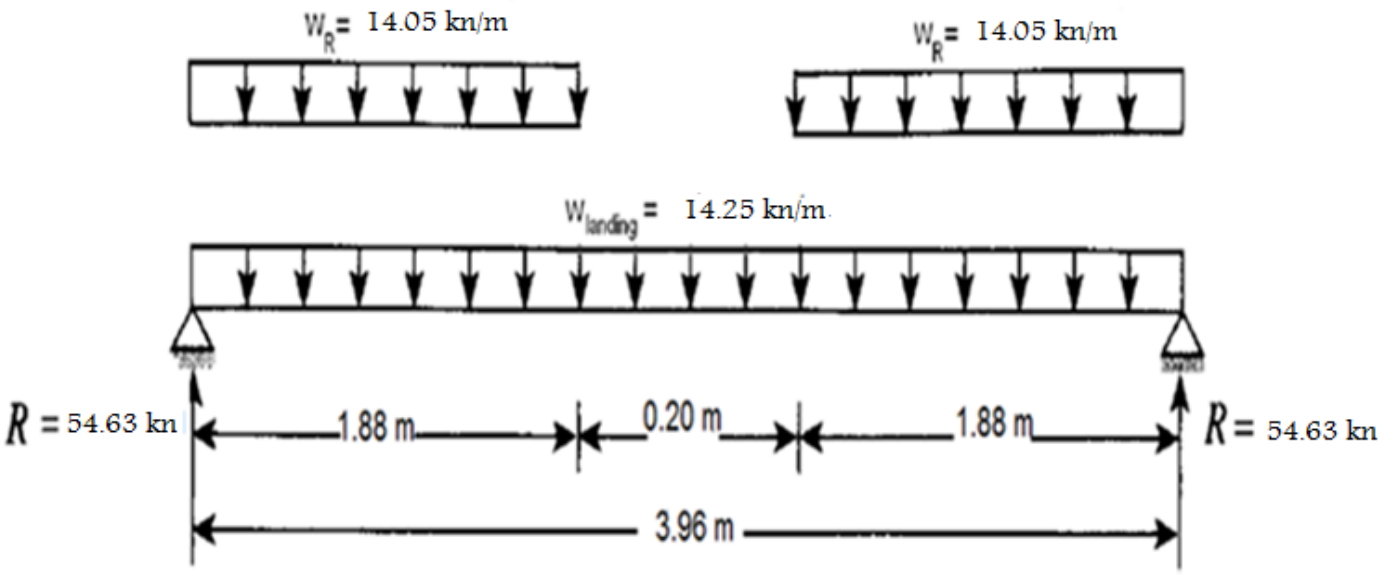
5h = 5 *200= 1000 mm

450 mm …… control

400 < Smax = 450 ……ok

Design of landing (S2a)

WR =22.9\1.63 = 14.05 KN/m



$$R = 14.25 * \frac{3.96}{2} + 14.05 * 1.88 = 54.63 \text{ Kn}$$

$$M_u = 54.63 * 1.98 - 14.05 * 1.88 * 1.04 - 14.25 * \frac{1.98^2}{2} = 52.8\ KNm$$

Mu =52.8 kN.m

Assume Ø 14 for main reinforcement.

d= 173 mm.

Mn = Mu / 0.9 = 52.8/ 0.9= 58.67KN.m/m.

$$R_n = \frac{Mn}{b \cdot d^2} \qquad R_n = \frac{58.67 * 10^6}{1000 * 173^2} = 1.96 MPa \ .$$

$$m = \frac{fy}{0.85 \times fc'} \qquad m = \frac{420}{0.85 \times 24} = 20.59$$

$$\rho = \frac{1}{m}\left(1 - \sqrt{1 - \frac{2mR_n}{f_y}}\right) = \frac{1}{20.588}\left(1 - \sqrt{1 - \frac{2 * 20.59 * 1.96}{420}}\right) = 0.0049159$$

$$As_{req} = \rho bd = 0.0049159 * 1000 * 173 = 850.45 mm^2$$

$$As_{\min} = 0.0018 * b * h = 0.0018 * 1000 * 200 = 360 mm^2$$

$As_{\min}$ = 360mm^2 ≤ As_{req} =850.45 mm^2

Use Φ 14

$$S = \frac{A_{S\,\emptyset 14}}{A_s} = \frac{153.9}{850.45} = .181 m$$

use Ø14@150 mm

Step (s) is the smallest of :

1. 3h= 3*250= 750 mm
2. 450 mm
3. $s = 380\left(\frac{280}{f_s}\right) - 2.5\, C_c$

$$= 380\left(\frac{280}{\frac{2}{3} * 420}\right) - 2.5 * 20 = 330\ mm$$

$$s \leq 300\left(\frac{280}{f_s}\right) = 300 * \left(\frac{280}{\frac{2}{3} * 420}\right) = 300\ mm \ldots contral$$

S=150 mm < Smax = 300 mm …ok

Check for strain:

Tension = Compression

$$A_s * fy = 0.85 * fc' * b * a$$
$$1026.7 * 420 = 0.85 * 24 * 1000 * a$$
$$a = 21.13mm$$
$$c = \frac{a}{\beta_1} = \frac{21.13}{0.85} = 24.86mm$$
$$\varepsilon_s = \frac{173 - 24.86}{24.86} * 0.003$$
$$\varepsilon_s = 0.017 > 0.005 \longrightarrow ok$$

4.14.5 Secondary reinforcement:

$$As_{Shrinkage} = 0.0018 \times b \times h = 0.0018 \times 1000 \times 200 = 360mm^2$$

$$S = \frac{A_{S\,\emptyset 14}}{A_s} = \frac{153.9}{360} = 0.427m$$

Use Φ14 @ 400 mm

Step (s-for shrinkage and temperature reinforcement) is the smallest of:

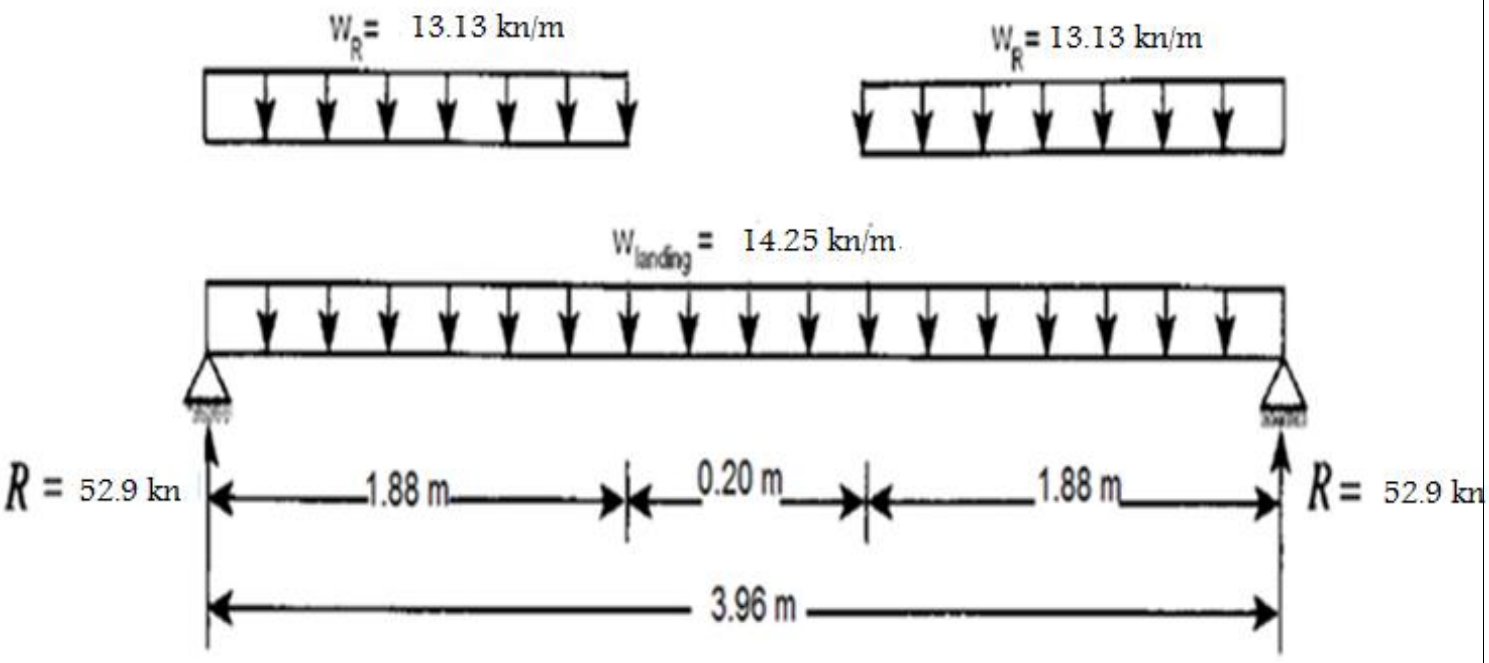
5h = 5 *200= 1000 mm

450 mm …… control

400 < Smax = 450 ……ok

Design of landing (S2b)

WR =22.45\1.71= 13.13 KN/m



$$R = 14.25 * \frac{3.96}{2} + 13.13 * 1.88 = 52.9 \text{ Kn}$$

$$M_u = 52.9 * 1.98 - 13.13 * 1.88 * 1.04 - 14.25 * \frac{1.98^2}{2} = 51.1\ KNm$$

Mu =51.1 kN.m

Assume Ø 14 for main reinforcement.

d=173 mm.

Mn = Mu / 0.9 = 51.1/ 0.9= 56.8 KN.m/m.

$$R_n = \frac{Mn}{b \cdot d^2} \qquad R_n = \frac{56.8 * 10^6}{1000 * 223^2} = 1.897 MPa \ .$$

$$m = \frac{fy}{0.85 \times fc'} \qquad m = \frac{420}{0.85 \times 24} = 20.59$$

$$\rho = \frac{1}{m}\left(1 - \sqrt{1 - \frac{2mR_n}{f_y}}\right)$$

$$= \frac{1}{20.588}\left(1 - \sqrt{1 - \frac{2 * 20.59 * 1.897}{420}}\right) = 0.004749$$

$As_{req} = \rho bd = 0.004749 * 1000 * 173 = 821.58\ mm^2$

$As_{\min} = 0.0018 * b * h = 0.0018 * 1000 * 200 = 360 mm^2$ $As_{\min}$ = 360mm^2 ≤ As_{req} =821.58 mm^2

Use Φ 14

$$S = \frac{A_{S\,\emptyset 14}}{A_s} = \frac{153.9}{821.58} = .187m$$

use Ø14@150mm

Step (s) is the smallest of :

1. 3h= 3*250= 750 mm
2. 450 mm
3. $s = 380\left(\frac{280}{f_s}\right) - 2.5\ C_c$

   $$= 380\left(\frac{280}{\frac{2}{3} * 420}\right) - 2.5 * 20 = 330\ mm$$

   $$s \le 300\left(\frac{280}{f_s}\right) = 300 * \left(\frac{280}{\frac{2}{3} * 420}\right) = 300\ mm \ldots contral$$

   S=150 mm < Smax = 300 mm …ok

Check for strain:

Tension = Compression

$$A_s * fy = 0.85 * fc' * b * a$$
$$1026.7 * 420 = 0.85 * 24 * 1000 * a$$
$$a = 21.13mm$$
$$c = \frac{a}{\beta_1} = \frac{21.13}{0.85} = 24.86mm$$
$$\varepsilon_s = \frac{173 - 24.86}{24.86} * 0.003$$
$$\varepsilon_s = 0.017 > 0.005 \longrightarrow ok$$

4.14.5 Secondary reinforcement:

$$As_{Shrinkage} = 0.0018 \times b \times h = 0.0018 \times 1000 \times 200 = 360mm^2$$

$$S = \frac{A_{S\,\emptyset 14}}{A_s} = \frac{153.9}{360} = 0.427m$$

Use Φ14 @ 400 mm

Step (s-for shrinkage and temperature reinforcement) is the smallest of:

5h = 5 *200= 1000 mm

450 mm …… control

400 < Smax = 450 ……ok

4.15 Design of shear wall :-

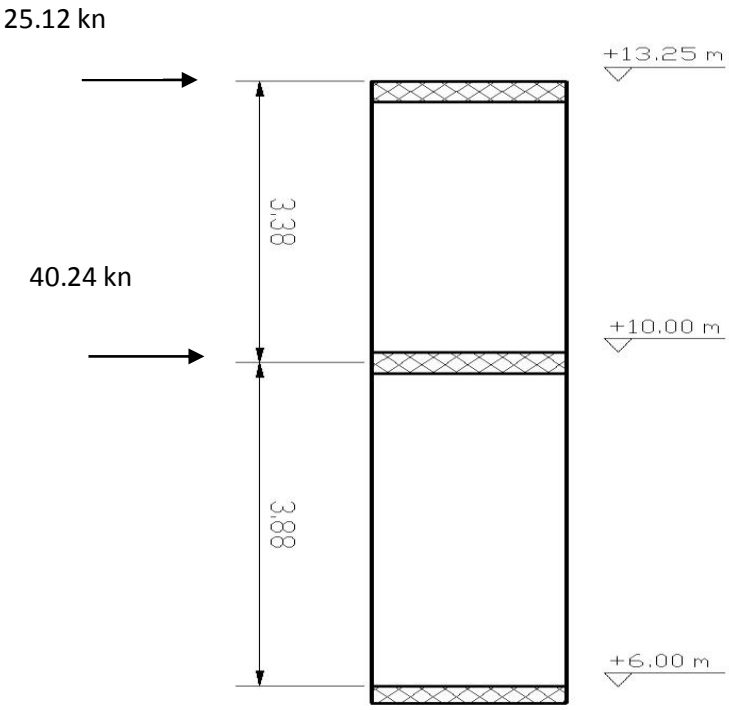
f_c' = 24MPa

fy = 420 MPa

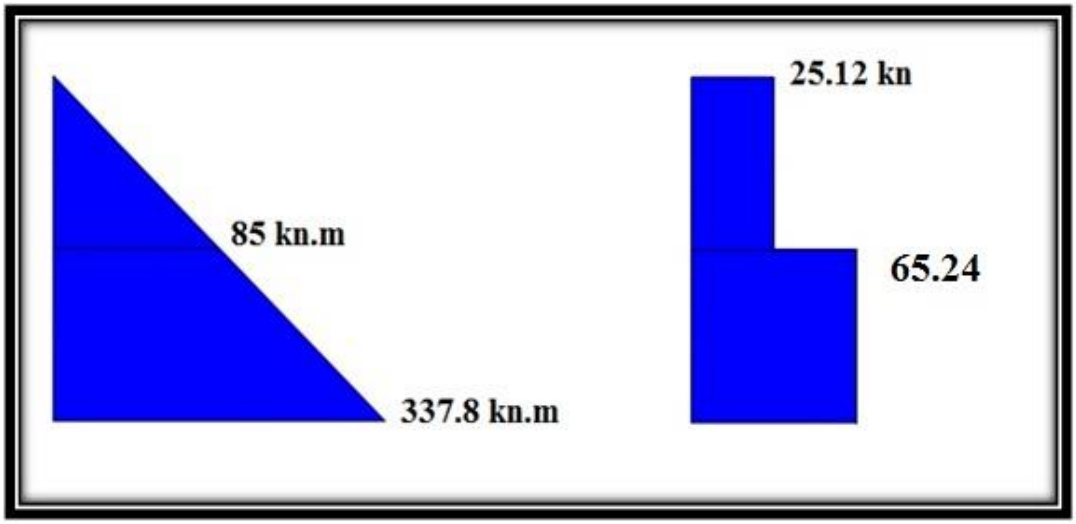
t=25cm ,shear wall thickness

Lw = 2.0 ,shear wall width

hw = 7.25 m



Section Of Shear Wall



Moment and shear diagram

fc' (MPa)	fy (MPa)	t (cm)	Lw(m)	hw(m)
24	420	25	2.0	7.25

- **4.15.1 Design of shear:**

- Design of the Horizontal reinforcement:

- The critical Section is the smaller of:

$$\frac{lw}{2}=\frac{2.0}{2}=1.0m\ldots\ldots \quad control$$

$$\frac{hw}{2}=\frac{7.25}{2}=3.625m$$

$$storyheight=3.38m$$

$$d=0.8\times lw=0.8\times 2.0=1.6m$$

Vu_{max} (KN)	d (m)
65.24	1.6

$$\emptyset V_{nmax}=\emptyset\frac{5}{6}\sqrt{f_c'}hd$$

$$=0.75\times 0.83\times\sqrt{24}\times 250\times 1.6=764.0\ KN$$

$$Vc1=\frac{\sqrt{24}*250*1.6}{6}=326.6KN$$

$$Vc2=0.27\times\sqrt{24}\times h*d+\frac{Nu*d}{4Lw}$$

$$Vc2=0.27\times\sqrt{24}\times 250*1.6+0=529.1\ KN$$

4.15.2 Moment at critical section:

Mu = 85+65.24 x (3.88 - 1) = 273 KN.m

$\frac{Mu}{Vu} - \frac{Lw}{2} = \frac{273}{65.24} - \frac{2}{2}$ = 3.18 (+ve value)

$Vc3 = (0.05*\sqrt{24} + \frac{2*(0.1*\sqrt{24}+0)}{3.18})*250*1.6$

= 221.2 KN ….. Control

ΦVn,max(KN)	Vc (KN)	Mu (KN.m)
764	221.2	273

- Determine required horizontal shear reinforcement:

Vu = 65.24 KN > $\frac{1}{2}$ *0.75*221.2 = 83.0 KN **need reinforcement**

- Minimum shear reinforcementis required:

Take ρ = 0.0025

- Maximum spacing is the least of :

$\frac{Lw}{5} = \frac{2000}{5}$ = 400 mm ……. Control

3*h = 3*250 = 750 mm

OR 450 mm

Try φ10 (As = 78.5 mm2) for two layers

$$\rho = \frac{Avh}{h*S2} = \frac{2*78.5}{250*S2} = 0.0025$$

S2 = 251.2 mm , φ10@250 mm

- Determine vertical shear reinforcement:

$$\frac{hw}{lw} = \frac{7.25}{2} = 3.625$$

$$\rho_{v\,min} > 0.0025 + 0.5\left(2.5 - \frac{h_w}{l_w}\right)(\rho_t - 0.0025) > 0.0025$$

For this wall with $\frac{hw}{lw}$ = 3.6 > 2.5 , $\rho_{\min}$ = 0.0025

Select Φ 10 @250mm. In two layer

- Maximum spacing is the least of :

$$\frac{Lw}{3} = \frac{2000}{3} = 666.67 \text{ mm}$$

3*h = 3*250 = 750 mm

OR 450 mm ……. Control

- **4.15.3 Design of bending moment:**
- **Try φ10@ 250mm (As =78.5 mm2) for two layers**

Mu = 337.8 KN.m

Ast = $\frac{2000}{250}$ *2*78.5 = 1256 mm2

w = $\frac{Ast}{Lw*h} * \frac{fy}{fc'} = \frac{1256}{2000*250} * \frac{420}{24}$ = 0.04396

α = $\frac{Pu}{Lw*h*fc'}$ = 0

$\frac{c}{Lw} = \frac{(w+\alpha)}{2w+0.85*\beta} = (\frac{(0.04396+0)}{2*0.04396+0.85*0.85})$ = 0.0542

$\emptyset M_n = \emptyset\left[0.5A_{st}f_y l_w(1+\frac{P_u}{A_{st}f_y})(1-\frac{c}{l_w})\right]$

= 0.9*(0.5*1256*420*2000*(1+ 0)*(1 – 0.0542)*10^{-6}

= 449.0 KN.m

Φ Mn = 449.0 KN.m > Mu = 337.8 KN.m

→use φ10@250 mm for vertical reinforcement

4.16:- Truss design

4.16.1:- Load calculation

A. Dead Load:-

Surface layer of steel sheet with thickness of 0.6mm=0.05KN/m2

Heat insulation layer of rock wool with thickness of 100mm=0.1 KN/m2

Sheet metal with thickness of 0.75mm =0.078 KN/m2

D.L=0.05+0.1+0.08=0.3KN/m^2

B. Snow load

S=h-400/400

=997-400/400=1.5KN/m^2

Qt=1.5+0.228=1.8 KN/m^2

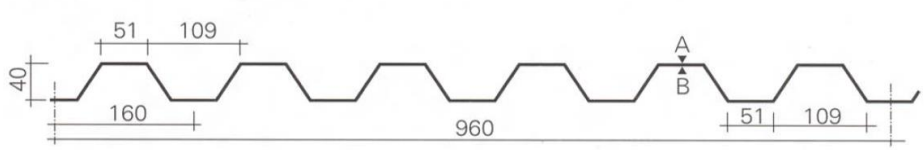
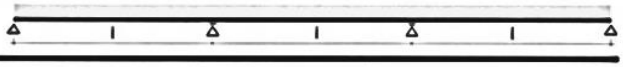


Fig.(4-17) Cross section of sheet metal

Zwischenauflagerbreite ≥ 60 mm

Dicke mm	Gewicht kN/m²	I_{eff} cm⁴/m		Zulässige, gleichmäßig verteilte Belastung in kN/m² bei einer Stützweite l in m (inkl. Eigengewicht)															
				1,00	1,25	1,50	1,75	2,00	2,25	2,50	2,75	3,00	3,25	3,50	3,75	4,00	4,25	4,50	4,75
0,63	0,066	16,5	1	7,98	5,64	3,98	2,92	2,24	1,77	1,43	1,18	0,99	0,85	0,73	0,64	0,56	0,50	0,44	0,40
			2	7,98	5,64	3,98	2,92	2,24	1,77	1,43	1,18	0,99	0,85	0,73	0,61	0,50	0,42	0,35	0,30
			3	7,98	5,64	3,98	2,92	2,24	1,77	1,37	1,03	0,79	0,62	0,50	0,41	0,33	0,28	0,23	0,20
0,75	0,078	20,8	1	10,70	7,44	5,16	3,79	2,90	2,30	1,86	1,54	1,29	1,10	0,95	0,83	0,73	0,64	0,57	0,51
			2	10,70	7,44	5,16	3,79	2,90	2,30	1,86	1,54	1,29	1,10	0,94	0,77	0,63	0,53	0,44	0,38
			3	10,70	7,44	5,16	3,79	2,90	2,30	1,73	1,30	1,00	0,79	0,63	0,51	0,42	0,35	0,30	0,25
0,88	0,092	25,8	1	13,94	9,44	6,56	4,82	3,69	2,91	2,36	1,95	1,64	1,40	1,20	1,05	0,92	0,82	0,73	0,65
			2	13,94	9,44	6,56	4,82	3,69	2,91	2,36	1,95	1,64	1,40	1,17	0,95	0,78	0,65	0,55	0,47
			3	13,94	9,44	6,56	4,82	3,69	2,91	2,13	1,60	1,23	0,97	0,78	0,63	0,52	0,43	0,37	0,31
1,00	0,104	30,4	1	17,17	11,41	7,92	5,82	4,46	3,52	2,85	2,36	1,98	1,69	1,46	1,27	1,11	0,99	0,88	0,79
			2	17,17	11,41	7,92	5,82	4,46	3,52	2,85	2,36	1,98	1,69	1,38	1,12	0,92	0,77	0,65	0,55
			3	17,17	11,41	7,92	5,82	4,46	3,46	2,52	1,89	1,46	1,15	0,92	0,75	0,62	0,51	0,43	0,37
1,25	0,130	39,4	1	24,56	15,78	10,96	8,05	6,16	4,87	3,94	3,26	2,74	2,33	2,01	1,75	1,54	1,36	1,22	1,09
			2	24,56	15,78	10,96	8,05	6,16	4,87	3,94	3,26	2,74	2,23	1,78	1,45	1,19	1,00	0,84	0,71
			3	24,56	15,78	10,96	8,05	6,16	4,48	3,26	2,45	1,89	1,48	1,19	0,97	0,80	0,66	0,56	0,48
1,50	0,156	47,5	1	31,80	20,35	14,13	10,38	7,95	6,28	5,09	4,20	3,53	3,01	2,60	2,26	1,99	1,76	1,57	1,41
			2	31,80	20,35	14,13	10,38	7,95	6,28	5,09	4,20	3,42	2,69	2,15	1,75	1,44	1,20	1,01	0,86
			3	31,80	20,35	14,13	10,38	7,69	5,40	3,94	2,96	2,28	1,79	1,43	1,17	0,96	0,80	0,67	0,57

Zwischenauflagerbreite ≥ 60 mm



Dicke mm	Gewicht kN/m²	I_{eff} cm⁴/m		Zulässige, gleichmäßig verteilte Belastung in kN/m² bei einer Stützweite l in m (inkl. Eigengewicht)														
				1,00	1,25	1,50	1,75	2,00	2,25	2,50	2,75	3,00	3,25	3,50	3,75	4,00	4,25	4,50	4,75
0,63	0,066	16,5	1	8,95	5,73	3,98	2,99	2,38	1,93	1,60	1,35	1,15	0,99	0,86	0,75	0,67	0,59	0,53	0,48
			2	8,95	5,73	3,98	2,99	2,38	1,93	1,60	1,21	0,93	0,73	0,59	0,48	0,39	0,33	0,28	0,23
			3	8,95	5,73	3,98	2,99	2,09	1,47	1,07	0,81	0,62	0,49	0,39	0,32	0,26	0,22	0,18	0,16
0,75	0,078	20,8	1	11,62	7,44	5,16	3,96	3,14	2,55	2,10	1,77	1,50	1,29	1,12	0,98	0,87	0,77	0,69	0,62
			2	11,62	7,44	5,16	3,96	3,14	2,55	2,03	1,53	1,18	0,92	0,74	0,60	0,50	0,41	0,35	0,30
			3	11,62	7,44	5,16	3,95	2,64	1,86	1,35	1,02	0,78	0,62	0,49	0,40	0,33	0,28	0,23	0,20
0,88	0,092	25,8	1	14,75	9,44	6,65	5,11	4,04	3,27	2,70	2,26	1,92	1,65	1,43	1,26	1,11	0,99	0,88	0,80
			2	14,75	9,44	6,65	5,11	4,04	3,27	2,51	1,88	1,45	1,14	0,91	0,74	0,61	0,51	0,43	0,37
			3	14,75	9,44	6,65	4,88	3,27	2,29	1,67	1,26	0,97	0,76	0,61	0,50	0,41	0,34	0,29	0,24
1,00	0,104	30,4	1	17,82	11,41	8,15	6,25	4,93	3,98	3,28	2,75	2,33	2,00	1,74	1,52	1,34	1,20	1,07	0,96
			2	17,82	11,41	8,15	6,25	4,93	3,98	2,96	2,23	1,72	1,35	1,08	0,88	0,72	0,60	0,51	0,43
			3	17,82	11,41	8,15	5,76	3,86	2,71	1,98	1,48	1,14	0,90	0,72	0,59	0,48	0,40	0,34	0,29
1,25	0,130	39,4	1	24,65	15,78	11,55	8,81	6,93	5,58	4,59	3,84	3,25	2,79	2,42	2,12	1,87	1,66	1,49	1,34
			2	24,65	15,78	11,55	8,81	6,93	5,26	3,84	2,88	2,22	1,75	1,40	1,14	0,94	0,78	0,66	0,56
			3	24,65	15,78	11,55	7,45	4,99	3,51	2,56	1,92	1,48	1,16	0,93	0,76	0,62	0,52	0,44	0,37
1,50	0,156	47,5	1	31,80	20,80	15,19	11,55	9,06	7,28	5,98	4,99	4,23	3,62	3,14	2,75	2,42	2,15	1,92	1,73
			2	31,80	20,80	15,19	11,55	9,04	6,35	4,63	3,48	2,68	2,11	1,69	1,37	1,13	0,94	0,79	0,67
			3	31,80	20,80	14,28	9,00	6,03	4,23	3,09	2,32	1,79	1,40	1,12	0,91	0,75	0,63	0,53	0,45

Table(4-3) sheet metal for 2&3spanes

From the table above the bearing load of sheet metal is 5.16 KN/m^2

Qu=3.79KN/m2>Qt=1. 8KN/m2……Ok

Note: - the members are A36 (Fy=36ksi and Fu=58ksi)

4.16.2:- Purlins design

Qu=1.7(1.4*0.3)=0.714

Qu=1.7(1.2*0.3+1.6*1.5)=4.692KN/m2…….control .

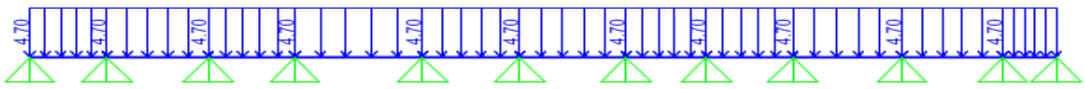
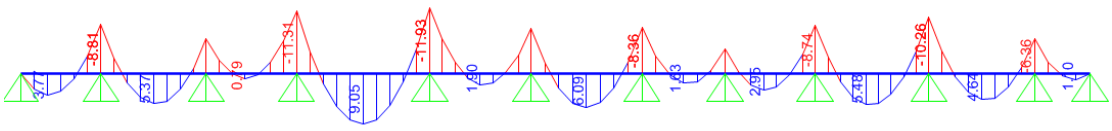


Fig.(4-18) static system for purlins

- Moment

Max moment=-11.31 KN.m



⇨Design of moment :-

Mu (max) = 11.31 KN.m = 11.31/4.448×1000×1/39.37 = 100.10kip.in

Mp≥ Mu

0.9*36*Zx=100.1 → Zx=3.09

Select HSS 4*3*1/4 → Zx= 3.81

b/t=9.88 , h/t=14.2

⇨Check Compact :

ʎ p=1.12√(E/Fy) =1.12√(28000/36) = 31.8

ʎ r=1.4√(E/Fy) =1.4√(28000/36) = 39.73

b/t and b/t < ʎ p so Compact section

- shear stress

Max shear =17.38KN

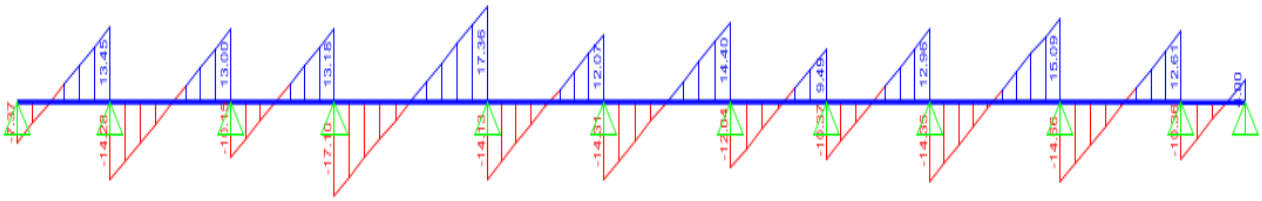


Fig.(4-20)Shear envelop for purlins

⇨Design of Shear :-

Vu (max)= 17.38 kn.m = $\frac{17.38}{4.448}$ = 3.9 kip

Vp≥ Vu

0.9*0.6*Fy*d*tw ≥ 3.9

0.9*0.6*36*4*$\frac{1}{4}$ = 19.44 kip > 3.9 …….ok

4.16.3:-Truss design

4-16.3.1:- internal forces calculation

Max support from purlins =27.72KN

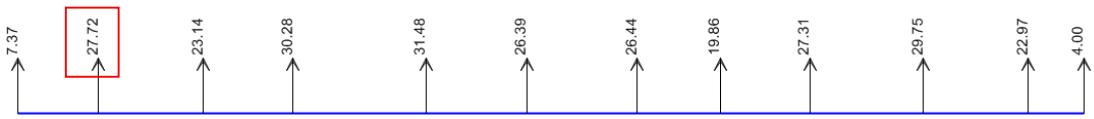


Fig.(4-21) Support reaction for purlins

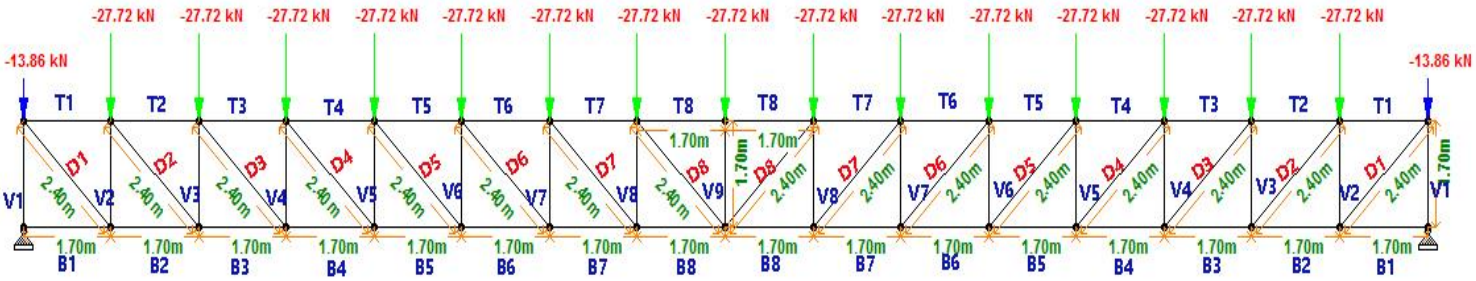


Fig.(4-22) Truss system

⇨The truss consists of four types of member

1- The vertical member(V)

NO. of member	Value of compression force	
	KN	Kip
V1	-222	-49.91
V2	-208	-46.76
V3	-180	-40.47
V4	-153	-34.4
V5	-125	-28.1
V6	-97	-21.81
V7	-70	-15.74
V8	-42	-9.44
V9	-28	-6.29

Table (4-4) vertical member forces

2- The top member (T)

NO. of member	Value of compression force	
	KN	Kip
T1	-208	-46.76
T2	-388	-87.23
T3	-540.5	-121.52
T4	-666	-149.73
T5	-763	-171.54
T6	-832	-187.05
T7	-874	-196.49
T8	-887	-199.42

3- The diagonal member(D)

NO. of member	Value of tension force	
	KN	Kip
D1	294	67.5
D2	255	57.33
D3	216	48.56
D4	177	39.79
D5	138	31.03
D6	98	22.03
D7	59	13.26
D8	20	4.5

Table (4-6) diagonal member forces

4- The bottom member(B)

NO. of member	Value of tension force	
	KN	Kip
B1	0	0
B2	208	46.76
B3	388	87.23
B4	540.5	121.52
B5	666	149.73
B6	763	171.54
B7	832	187.05
B8	874	196.49

Table (4-7) bottom member forces

4-16.3.2:-Design of tension member

⇨ bottom member

Max.valu of tension =874KN=196.49Kip

Tensile yielding

Pu=Φ*Fy*Ag

Ag=196.5/0.9*36=6.06in2

Try HSS*5*5*3/8 =6.18 in^2

- **Tensile rupture**

ΦPn=Φ*F_u*(U*Ag) =0.75*58*(1*6.18)= 268.83 Kip > 196.5 Kip……**Ok**

Diagonal member Max. tension = 294 KN= 67.5.1 Kips

- **Tensile yielding**

Pu=Φ*F_Y*Ag

Ag=67.5/0.9*36= 2.04in^2

Try HSS 4*4*3/16 with Ag=2.58 in^2

- **Tensile rupture**

ΦPn=Φ*Fu*(U*Ag) =0.75*58*1*2.58 = 123.98 Kip> 67.5 Kip……**Ok**

Design of compression member

✓ **Vertical member Max. compression = 222 KN= 49.9 Kips**

- **Take section member HSS 4*4*3/16**

Section property: A=2.58 in^2, r_x =1.55 in, r_y =1.55 in

L=1.7m= 5.576 ft

- **Determine of the reduction factor for slender "stiffened element":**

$$\lambda = \frac{b}{t} = 20$$

$$\Rightarrow \frac{KL}{r} = \frac{1*5.576*12}{1.55} = 43.18 < 200$$

$$4.71\sqrt{\frac{E}{Fy}} = 4.71\sqrt{\frac{29000}{36}} = 133.7 > 29.67 \text{ inelastic buckling}$$

$$F_e = \frac{\pi^2 E}{(KL\backslash r)^2} = \frac{\pi^2 29000}{(29.67)^2} = 153.5 \text{ ksi}$$

$$\Longrightarrow Fcr = \left[0.658^{Fy/Fe}\right] * Fy = \left[0.658^{36/325.13}\right] * 36 = 32.63\ ksi$$

Nominal Strength

➔Pn= F_{cr}*Ag=34.37*2.58= 84.196 Kips

$$1.49\sqrt{\frac{E}{Fy}} = 1.49\sqrt{\frac{29000}{36}} = 42.29 > \frac{b}{t} = 20 \rightarrow \text{no slender element}$$

Lateral Flexural Buckling Strength

➔Pn= F_{cr}*Ag=34.37*2.58= 84.196 Kips

LRFD $\emptyset_c P_n = 0.90(84.196) = 75.776 \text{ ksi} > P_u = 49.9 \text{ Kips} \ldots \text{OK}$

✓ **TOP member Max. compression = 887 KN= 199.42 Kips**

- **Take section member HSS 5*5*1/2**

Section property: A= 7.88 in2, r_x =1.82 in, r_y =1.82 in

L=1.7m= 5.576 ft

- **Determine of the reduction factor for slender "stiffened element":**

$$\lambda = \frac{b}{t} = 7.75$$

$$\Rightarrow \frac{\mathrm{KL}}{\mathrm{r}} = \frac{1*5.576*12}{1.82} = 36.76 < 200$$

$$4.71\sqrt{\frac{\mathrm{E}}{\mathrm{Fy}}} = 4.71\sqrt{\frac{29000}{36}} = 133.7 > 36.76$$ inelastic buckling

$$\mathrm{F_e} = \frac{\pi^2 \mathrm{E}}{(\mathrm{KL}\backslash \mathrm{r})^2} = \frac{\pi^2 29000}{(36.76)^2} = 211.75 \text{ ksi}$$

$$\Rightarrow \mathrm{Fcr} = \left[0.658^{\mathrm{Fy}/\mathrm{Fe}}\right] * \mathrm{Fy} = \left[0.658^{36/211.75}\right] * 36 = 33.53\ ksi$$

Nominal Strength

➔Pn= F_{cr}*Ag=33.53*7.88= 264.19 Kips

- **Check Compact :**

ʎp=1.12√ (E/Fy) =1.12√ (28000/36) = 31.8

ʎr=1.4√ (E/Fy) =1.4√ (28000/36) = 39.73

b/t and b/t < ʎp so Compact section

Lateral Flexural Buckling Strength

Nominal Strength

➔ Pn= F_{cr}*Ag=33.53*7.88= 264.19 Kips LRFD

$$\emptyset_c \mathrm{P_n} = 0.90(264.19) = 237.78 \text{ ksi} > \mathrm{P_u} = 199.42 \text{ Kips} \ldots \mathrm{OK}$$

Design of weld:-

The calculations of weld based on the following:

1). Fillet Weld is used.

4). The electrodes having FExx = 70 ksi.

5). The shielded metal arc welding (SMAW) is used.

- **Design of fillet weld between purlins and Trusses:**

Max. weld size (amax) = $\frac{3}{16}in$

Min. weld size (amin) = $\frac{3}{16}in$

∴ Use weld size (a) = $\frac{3}{16}in.$

⇨Design strength of weld:-

$\emptyset Rnw = \emptyset \times te \times 0.6 \times FExx$

$\emptyset Rnw = 0.75 \times \left(0.707 \times {}^{3}/_{16}\right) \times 0.6 \times 70 = 4.175\ kips/\text{in}$

⇨Design strength of Truss:-

$\emptyset Rn = \emptyset \times (0.6 \times Fy) \times t = 1.0\ \times 0.6 \times 36 \times 3/16$

$= 4.05\ kips/\text{in} <\ 4.175\ kips/\text{in} \therefore ok$

$\emptyset Rn = \emptyset \times (0.6 \times Fu) \times t = 0.75\ \times 0.6 \times 58 \times 3/16$

$= 4.89\ kips/in > 4.175\ kips/in\ \ \therefore ok$

Design of weld between the vertical member and the horizontal member in the corners of the truss:-

The section of the vertical member is HSS 4*4*3/16

Member property…… Ag = 2.58 in2

The value of Max. Compression in the vertical member is Vu= 49.91 kips.

➔ Because we have four faces side Vu= 12.5 kips

Max. weld size (amax) = $t = \frac{3}{16} in.$

Min. weld size (amin) = $\frac{13}{16} in.$

∴ Use weld size (a) = $\frac{3}{16} in.$



Fig.() weld forces vertical member

⇨Design strength of weld:-

$\emptyset Rnw = \emptyset \times te \times 0.6 \times FExx$

$\emptyset Rnw = 0.75 \times \left(0.707 \times {}^{3}/_{16}\right) \times 0.6 \times 70 = 4.176\ kips/\text{in}$

⇨Design strength of base material:-

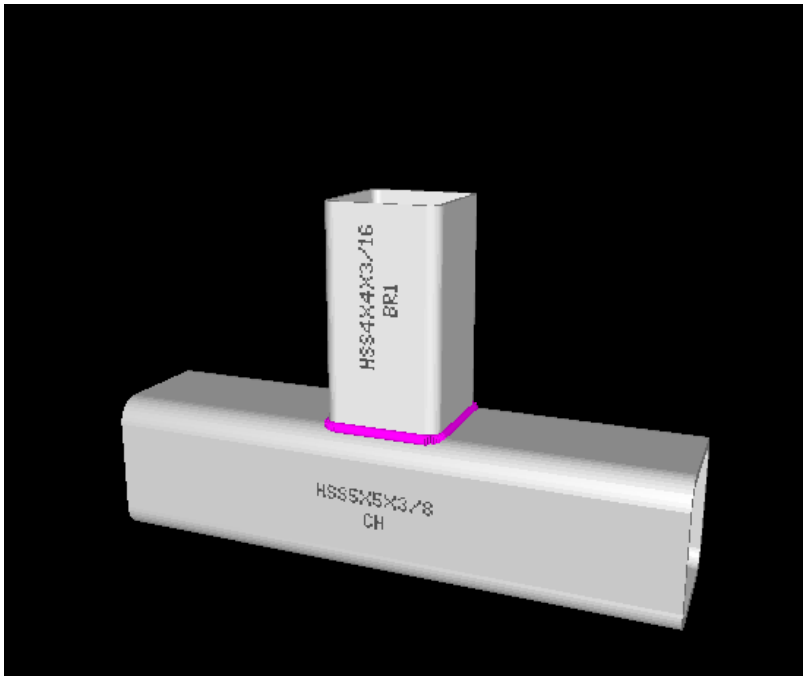
$\emptyset Rn = \emptyset \times (0.6 \times Fy) \times t = 1.0 \times 0.6 \times 36 \times 3/16$

$= 4.05 kips/\text{in} < 4.176\ kips/\text{in} \quad \therefore ok$

$\emptyset Rn = \emptyset \times (0.6 \times Fu) \times t = 0.75 \times 0.6 \times 58 \times 3/16$

$= 4.89\ kips/in > 4.175\ kips/in \quad \therefore ok$

$F_1 = 4.05 * 4 = 16.2\ Kips$



- Design of weld between the diagonal member and the gusset plate:-

The section of the diagonal member is $\left(HSS\ 4 * 4 * \frac{3}{16}\right)$.

Member property…… Ag = 2.58 in2

The value if Max.Tension in the diagonal member is Tu = 67.5 kips.

➔ Because we have two main faces Vu= 33.75 kips

Max. weld size (a_{max}) = $t = \frac{3}{16} in.$

Min. weld size (a_{min}) = $\frac{3}{16} in.$

∴ Use weld size (a) = $\frac{3}{16} in.$

⇨Design strength of weld:-

$\emptyset Rnw = 0.75 * t_e * 0.6 * F_{EXX} = 0.75 \times \left(0.707 \times {}^{3}/_{16}\right) \times 0.6 \times 70 = 4.175$ kips./in

⇨Design strength of base material:-

$\emptyset Rn = \emptyset \times (0.6 \times Fy) \times t = 1.0 \times 0.6 \times 36 \times 3/16$

$= 4.05 kips/in < 4.175 kips/in \quad \therefore ok$

$\emptyset Rn = \emptyset \times (0.6 \times Fu) \times t = 0.75 \times 0.6 \times 58 \times 3/16$

$= 4.89\ kips/in > 4.175\ kips/in \quad \therefore ok$

$F_3 = 4 * 4.05 = 16.2\ Kips$

$\Sigma Mat F_1 = 0$

$= F_3 * 2 + F_2 * 4 - 33.75 * 2 = 16.2 * 2 + F_2 * 4 - 33.75 * 2 = 0$

$\Rightarrow F_2 = 8.775\ kips$

$F_1 = 33.75 - 16.2 - 8.78 = 8.775\ kips$

$Lw1 = \frac{F1}{\emptyset Rnw} = \frac{8.775}{4.05} = 2.1\ in \quad \therefore use\ 2.5\ in.$

$Lw2 = \frac{F2}{\emptyset Rnw} = \frac{8.775}{4.05} = 2.1\ in \quad \therefore use\ 2.5\ in.$

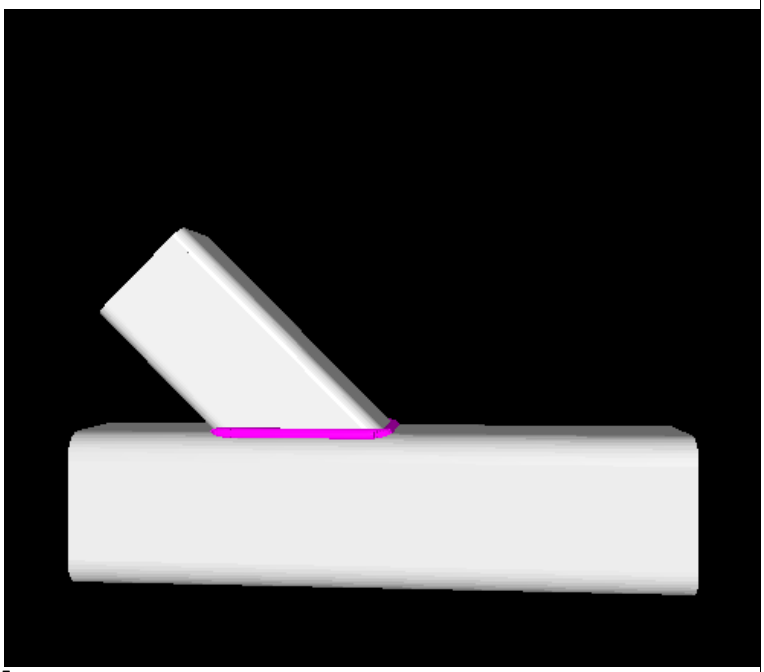
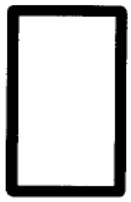


Table 1–11 (continued)
Rectangular HSS
Dimensions and Properties



HSS5–HSS3½

Shape	Axis Y-Y				Workable Flat		Torsion		Surface Area
	I	*S*	*r*	*Z*	Depth	Width	*J*	*C*	
	in.⁴	in.³	in.	in.³	in.	in.	in.⁴	in.³	ft²/ft
HSS5×2½×¼	3.13	2.50	0.999	2.95	3⅞	—	7.93	4.99	1.18
×3/16	2.53	2.03	1.02	2.33	4 3/16	—	6.26	3.89	1.20
×⅛	1.82	1.46	1.05	1.64	4 7/16	—	4.40	2.70	1.22
HSS5×2×⅜	2.28	2.28	0.748	2.88	3 5/16	—	6.61	5.20	1.07
×5/16	2.10	2.10	0.772	2.57	3⅝	—	5.99	4.59	1.08
×¼	1.84	1.84	0.797	2.20	3⅞	—	5.17	3.88	1.10
×3/16	1.51	1.51	0.823	1.75	4 3/16	—	4.15	3.05	1.12
×⅛	1.10	1.10	0.848	1.24	4 7/16	—	2.95	2.13	1.13
HSS4×3×⅜	5.01	3.34	1.11	4.18	2 5/16	—	10.6	6.59	1.07
×5/16	4.52	3.02	1.13	3.69	2⅝	—	9.41	5.75	1.08
×¼	3.91	2.61	1.16	3.12	2⅞	—	7.96	4.81	1.10
×3/16	3.16	2.10	1.19	2.46	3 3/16	—	6.26	3.74	1.12
×⅛	2.27	1.51	1.21	1.73	3 7/16	—	4.38	2.59	1.13
HSS4×2½×⅜	3.17	2.54	0.922	3.20	2 5/16	—	7.57	5.32	0.983
×5/16	2.89	2.32	0.947	2.85	2⅝	—	6.77	4.67	1.00
×¼	2.53	2.02	0.973	2.43	2⅞	—	5.78	3.93	1.02
×3/16	2.06	1.65	0.999	1.93	3⅛	—	4.59	3.08	1.03
×⅛	1.49	1.19	1.03	1.36	3 7/16	—	3.23	2.14	1.05
HSS4×2×⅜	1.80	1.80	0.729	2.31	2 5/16	—	4.83	4.04	0.900
×5/16	1.67	1.67	0.754	2.08	2⅝	—	4.40	3.59	0.917
×¼	1.48	1.48	0.779	1.79	2⅞	—	3.82	3.05	0.933
×3/16	1.22	1.22	0.804	1.43	3 3/16	—	3.08	2.41	0.950
×⅛	0.898	0.898	0.830	1.02	3 7/16	—	2.20	1.69	0.967
HSS3½×2½×⅜	2.77	2.21	0.904	2.82	—	—	6.16	4.57	0.900
×5/16	2.54	2.03	0.930	2.52	2⅛	—	5.53	4.03	0.917
×¼	2.23	1.78	0.956	2.16	2⅜	—	4.75	3.40	0.933
×3/16	1.82	1.46	0.983	1.72	2 11/16	—	3.78	2.67	0.950
×⅛	1.33	1.06	1.01	1.22	2 15/16	—	2.67	1.87	0.967
HSS3½×2×¼	1.30	1.30	0.766	1.58	2⅜	—	3.16	2.64	0.850
×3/16	1.08	1.08	0.792	1.27	2 11/16	—	2.55	2.09	0.867
×⅛	0.795	0.795	0.818	0.912	2 15/16	—	1.83	1.47	0.883

Table (4-8.b) HSS

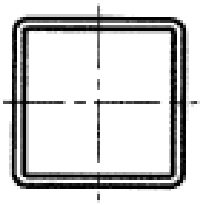
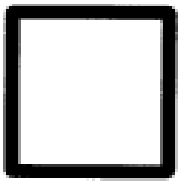


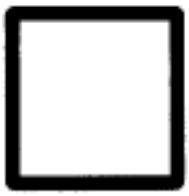
Table 1–12 (continued)
Square HSS
Dimensions and Properties



HSS7–HSS4½

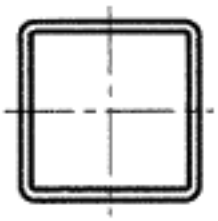
Shape	Design Wall Thickness, t	Nominal Wt.	Area, A	b/t	h/t	I	S	r	Z	Workable Flat	Torsion J	Torsion C	Surface Area
	in.	lb/ft	in.²			in.⁴	in.³	in.	in.³	in.	in.⁴	in.³	ft²/ft
HSS7×7×5/8	0.581	50.60	14.0	9.05	9.05	93.4	26.7	2.58	33.1	4 3/16	158	47.1	2.17
×1/2	0.465	41.91	11.6	12.1	12.1	80.5	23.0	2.63	27.9	4 3/4	133	39.3	2.20
×3/8	0.349	32.51	8.97	17.1	17.1	65.0	18.6	2.69	22.1	5 5/16	105	30.7	2.23
×5/16	0.291	27.54	7.59	21.1	21.1	56.1	16.0	2.72	18.9	5 5/8	89.7	26.1	2.25
×1/4	0.233	22.39	6.17	27.0	27.0	46.5	13.3	2.75	15.5	5 7/8	73.5	21.3	2.27
×3/16	0.174	17.06	4.67	37.2	37.2	36.0	10.3	2.77	11.9	6 1/16	56.1	16.2	2.28
×1/8	0.116	11.55	3.16	57.3	57.3	24.8	7.09	2.80	8.13	6 7/16	38.2	11.0	2.30
HSS6×6×5/8	0.581	42.10	11.7	7.33	7.33	55.2	18.4	2.17	23.2	3 3/16	94.9	33.4	1.83
×1/2	0.465	35.11	9.74	9.90	9.90	48.3	16.1	2.23	19.8	3 3/4	81.1	28.1	1.87
×3/8	0.349	27.41	7.58	14.2	14.2	39.5	13.2	2.28	15.8	4 5/16	64.6	22.1	1.90
×5/16	0.291	23.29	6.43	17.6	17.6	34.3	11.4	2.31	13.6	4 5/8	55.4	18.9	1.92
×1/4	0.233	18.99	5.24	22.8	22.8	28.6	9.54	2.34	11.2	4 7/8	45.6	15.4	1.93
×3/16	0.174	14.51	3.98	31.5	31.5	22.3	7.42	2.37	8.63	5 5/16	35.0	11.8	1.95
×1/8	0.116	9.85	2.70	48.7	48.7	15.5	5.15	2.39	5.92	5 7/16	23.9	8.03	1.97
S5½×5½×3/8	0.349	24.85	6.68	12.8	12.8	29.7	10.8	2.08	13.1	3 13/16	49.0	18.4	1.73
×5/16	0.291	21.16	5.85	15.9	15.9	25.9	9.43	2.11	11.3	4 1/8	42.2	15.7	1.75
×1/4	0.233	17.28	4.77	20.6	20.6	21.7	7.90	2.13	9.32	4 3/8	34.8	12.9	1.77
×3/16	0.174	13.23	3.63	28.6	28.6	17.0	6.17	2.16	7.19	4 11/16	26.7	9.85	1.78
×1/8	0.116	9.00	2.46	44.4	44.4	11.8	4.30	2.19	4.95	4 15/16	18.3	6.72	1.80
HSS5×5×1/2	0.465	28.30	7.88	7.75	7.75	26.0	10.4	1.82	13.1	2 3/4	44.6	18.7	1.53
×3/8	0.349	22.30	6.18	11.3	11.3	21.7	8.68	1.87	10.6	3 5/16	36.1	14.9	1.57
×5/16	0.291	19.03	5.26	14.2	14.2	19.0	7.62	1.90	9.16	3 5/8	31.2	12.8	1.58
×1/4	0.233	15.58	4.30	18.5	18.5	16.0	6.41	1.93	7.61	3 7/8	25.8	10.5	1.60
×3/16	0.174	11.96	3.28	25.7	25.7	12.6	5.03	1.96	5.89	4 3/16	19.9	8.08	1.62
×1/8	0.116	8.15	2.23	40.1	40.1	8.80	3.52	1.99	4.07	4 7/16	13.7	5.53	1.63
S4½×4½×1/2	0.465	24.90	6.95	6.68	6.68	18.1	8.03	1.61	10.2	2 1/4	31.3	14.8	1.37
×3/8	0.349	19.75	5.48	9.89	9.89	15.3	6.79	1.67	8.36	2 13/16	25.7	11.9	1.40
×5/16	0.291	16.91	4.68	12.5	12.5	13.5	6.00	1.70	7.27	3 1/8	22.3	10.2	1.42
×1/4	0.233	13.88	3.84	16.3	16.3	11.4	5.08	1.73	6.06	3 3/8	18.5	8.44	1.43
×3/16	0.174	10.68	2.93	22.9	22.9	9.02	4.01	1.75	4.71	3 11/16	14.4	6.49	1.45
×1/8	0.116	7.30	2.00	35.8	35.8	6.35	2.82	1.78	3.27	3 15/16	9.92	4.45	1.47

Table (4-8.b) HSS



HSS4–HSS2

Table 1–12 (continued)
Square HSS
Dimensions and Properties

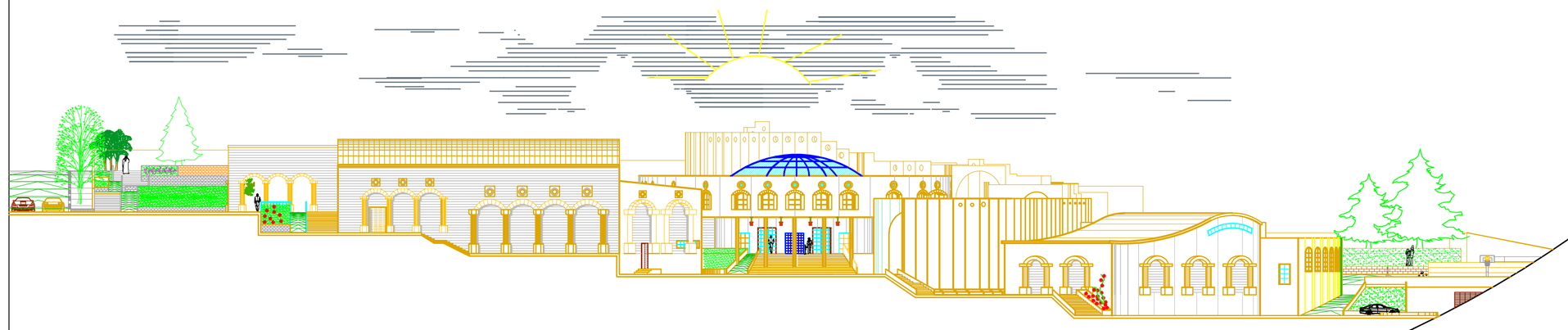


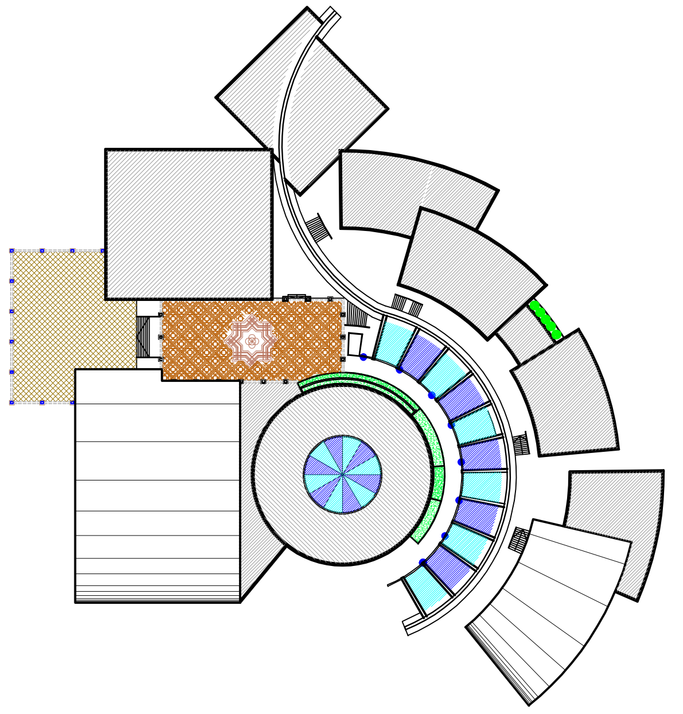
Shape	Design Wall Thickness, t	Nominal Wt.	Area, A	b/t	h/t	I	S	r	Z	Workable Flat	Torsion		Surface Area
											J	C	
	in.	lb/ft	in.^{2}			in.^{4}	in.^{3}	in.	in.^{3}	in.	in.^{4}	in.^{3}	ft^2/ft
HSS4×4×1/2	0.465	21.50	6.02	5.60	5.60	11.9	5.97	1.41	7.70	—	21.0	11.2	1.20
×3/8	0.349	17.20	4.78	8.46	8.46	10.3	5.13	1.47	6.39	2 5/16	17.5	9.14	1.23
×5/16	0.291	14.78	4.10	10.7	10.7	9.14	4.57	1.49	5.59	2 5/8	15.3	7.91	1.25
×1/4	0.233	12.18	3.37	14.2	14.2	7.80	3.90	1.52	4.69	2 7/8	12.8	6.56	1.27
×3/16	0.174	9.40	2.58	20.0	20.0	6.21	3.10	1.55	3.67	3 3/16	10.0	5.07	1.28
×1/8	0.116	6.45	1.77	31.5	31.5	4.40	2.20	1.58	2.56	3 7/16	6.91	3.49	1.30
HSS3 1/2×3 1/2×3/8	0.349	14.65	4.09	7.03	7.03	6.49	3.71	1.26	4.69	—	11.2	6.77	1.07
×5/16	0.291	12.65	3.52	9.03	9.03	5.84	3.34	1.29	4.14	2 1/8	9.89	5.90	1.08
×1/4	0.233	10.48	2.91	12.0	12.0	5.04	2.88	1.32	3.50	2 3/8	8.35	4.92	1.10
×3/16	0.174	8.13	2.24	17.1	17.1	4.05	2.31	1.35	2.76	2 11/16	6.56	3.83	1.12
×1/8	0.116	5.60	1.54	27.2	27.2	2.90	1.66	1.37	1.93	2 15/16	4.58	2.65	1.13
HSS3×3×3/8	0.349	12.09	3.39	5.60	5.60	3.78	2.52	1.06	3.25	—	6.64	4.74	0.900
×5/16	0.291	10.53	2.94	7.31	7.31	3.45	2.30	1.08	2.90	—	5.94	4.18	0.917
×1/4	0.233	8.78	2.44	9.88	9.88	3.02	2.01	1.11	2.48	—	5.08	3.52	0.933
×3/16	0.174	6.85	1.89	14.2	14.2	2.46	1.64	1.14	1.97	2 3/16	4.03	2.76	0.950
×1/8	0.116	4.75	1.30	22.9	22.9	1.78	1.19	1.17	1.40	2 7/16	2.84	1.92	0.967
HSS2 1/2×2 1/2×5/16	0.291	8.40	2.35	5.59	5.59	1.82	1.46	0.880	1.88	—	3.20	2.74	0.750
×1/4	0.233	7.08	1.97	7.73	7.73	1.63	1.30	0.908	1.63	—	2.79	2.35	0.767
×3/16	0.174	5.57	1.54	11.4	11.4	1.35	1.08	0.937	1.32	—	2.25	1.86	0.784
×1/8	0.116	3.90	1.07	18.6	18.6	0.998	0.799	0.965	0.947	—	1.61	1.31	0.800
HSS2 1/4×2 1/4×1/4	0.233	6.23	1.74	6.66	6.66	1.13	1.01	0.806	1.28	—	1.96	1.85	0.683
×3/16	0.174	4.94	1.37	9.93	9.93	0.953	0.847	0.835	1.04	—	1.60	1.48	0.700
×1/8	0.116	3.47	0.956	16.4	16.4	0.712	0.633	0.863	0.755	—	1.15	1.05	0.717
HSS2×2×1/4	0.233	5.38	1.51	5.58	5.58	0.747	0.747	0.704	0.964	—	1.31	1.41	0.600
×3/16	0.174	4.30	1.19	8.49	8.49	0.641	0.641	0.733	0.797	—	1.09	1.14	0.617
×1/8	0.116	3.04	0.840	14.2	14.2	0.486	0.486	0.761	0.584	—	0.796	0.817	0.633

References and appendices

1. building code Requirements for Structural oncrete (ACI 318M-08) and Commentary USA 2008.
2. Uniform Building Code (UBC – 1997) for seismic loads determination.

3. كودات البناء الوطني الاردني ، كودة الاحمال والقوى ، مجلس البناء الوطني الاردني ،عمان ، الاردن ، 2007 م
4. تلخيص وملاحظات الدكتور المشرف.
5. مشاريع تخرج سابقة تم الحصول عليها من مكتبة الجامعة.





PALESTINE POLYTECHNIC UNIVERSITY

Civil.&Arch.Eng.Department

Civil Engineering

Graduation Project
The Structural Design of Hebron Cultur Palace

DESIGNED BY:

Baha Bader

Fawaz Natsheh

montaser shweiki

mohamed younis Halwani

Supervisor:

Dr . Nasr Abboushi

2013-2014

ARCHTECTURAL

LIST OF DRAWINGS	
A0	Real Contour plan
A01	SITE Plan
A02	BASEMENT 2 (DIMENSIONS)
A03	BASEMENT 1 (DIMENSIONS)
A04	GROUND FLOOR (AXES & DIMENSIONS)
A05	FIRST FLOOR (AXES & DIMENSIONS)
A06	THEATER UNDERGROUND LEVEL DIMENSIONS
A07	THEATER GROUND LEVEL (AXES & DIMENSIONS)
A08	THEATER FIRST LEVEL (AXES & DIMENSIONS)
A09	THEATER SECOND LEVEL (AXES & DIMENSIONS)
A10	BASEMENT 2 WITH FURNTURE
A11	BASEMENT 1 WITH FURNTURE
A12	GROUND FLOOR WITH FURNTURE
A13	FIRST FLOOR WITH FURNTURE
A14	THEATER UNDERGROUND LEVEL FURNTURE
A15	THEATER GROUND LEVEL FURNTURE
A16	THEATER FIRST LEVEL FURNTURE
A17	THEATER SECOND LEVEL FURNTURE
A18	SECTIONS
A19	THEATER SECTIONS
A20	ELEVATION (NORTH + SOUTH)
A21	ELEVATION (WEST + EAST)

STRUCTURAL

LIST OF DRAWINGS		LIST OF DRAWINGS	
S00	Ground Buliding levels	S61	THAETRR (G.F SLAB ON +8.00&+9.00)
S01	Foundation plan Zoon 1	S62	THAETRR (G.F SLAB ON +8.00&+9.00)- reinforcement
S02	Foundation plan Zoon 2	S63	THAETRR (ROOF SLAB ON +11.50)
S03	Foundation plan Zoon 3	S64	THAETRR (ROOF SLAB ON +11.50)- reinforcement
S04-S09	Isolated Foundation	S65	THAETRR (F.F SLAB ON +11.25 & 12.25)
S10-S12	Strip Foundation	S66	THAETRR (F.F SLAB ON +11.25 & 12.25)- reinforcement
S13-S14	Compound Foundation	S67	THAETRR (S.F SLAB ON +14.75)
S15-S21	Mat Foundation	S68	THAETRR (S.F SLAB ON +14.75)- reinforcement
S22-S25	Continuous Foundation	S69	THAETRR (ROOF SLAB ON +17.00) Truss
S26	Column Details	S70	HANDCRAFTT (ROOF SLAB ON +14.00)
S27-S28	Column Section	S71	HANDCRAFTT (ROOF SLAB ON +14.00)- reinforcement
S29	Ground Beams	S72	RESTURNCE (ROOF SLAB ON +15.00)
S30-S31	Basment Wall	S73	RESTURNCE (ROOF SLAB ON +15.00)- reinforcement
S32-S38	Shear Wall	S74	PHOTO GALARY (ROOF SLAB ON +12.00)
S39-S46	Stair's Details	S75	PHOTO GALARY (ROOF ON +12.00)- reinforcement
S47	RECEPTION (FIRST SLAB)	S76	PARCKING 1 (ROOF SLAB ON +2.75)
S48	RECEPTION (FIRST SLAB)- reinforcement	S77	PARCKING 1 (ROOF SLAB ON +2.75)- reinforcement
S49	RECEPTION (ROOF SLAB)	S78	PARCKING 1 (ROOF SLAB ON +3.75)
S50	RECEPTION (ROOF SLAB)- reinforcement	S79	PARCKING 1 (ROOF SLAB ON +3.75)- reinforcement
S51	SPORT HALL (ROOF SLAB)	S80	PARCKING 2 (ROOF SLAB ON +10.00)
S52	SPORT HALL (ROOF SLAB)- reinforcement	S81	PARCKING 2 (ROOF SLAB ON +10.00)- reinforcement
S53	BULIDING ACTIVITY(F.F. SLAP ON +9.50)	S82-S124	Beam Detail's
S54	BULIDING ACTIVITY(F.F. SLAP ON +9.50)- reinfoc.	S125-s127	Truss Details
S55	BULIDING ACTIVITY(F.F. SLAP ON +11.00)	S128	Dom Details
S56	BULIDING ACTIVITY(F.F. SLAP ON +11.00)- reinforc.	S129	Ritaning Wall(external work)
S57	BULIDING ACTIVITY(S.F. SLAP ON +12.25)		
S58	BULIDING ACTIVITY(S.F. SLAP ON +12.25)- reinforc.		
S59	BULIDING ACTIVITY(S.F. SLAP ON +13.75)		
S60	BULIDING ACTIVITY(S.F. SLAP ON +13.75)- reinforc.		

By the name of Allah

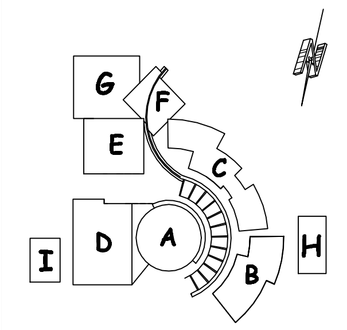
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

Number	Name
A	Reception
B	Sport hall
C	Building activities
D	Theater
E	Handicrafts
F	Restaurant
G	Photo Gallery
H	Parking 1
I	Parking 2

Drawing Title

APPENDIX

Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	*No.of Draw*	*Date*
1/100	I	2013-2014

appendix A

Architectural Drawing

By the name of Allah

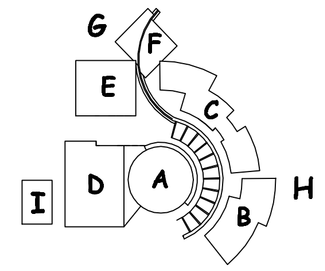
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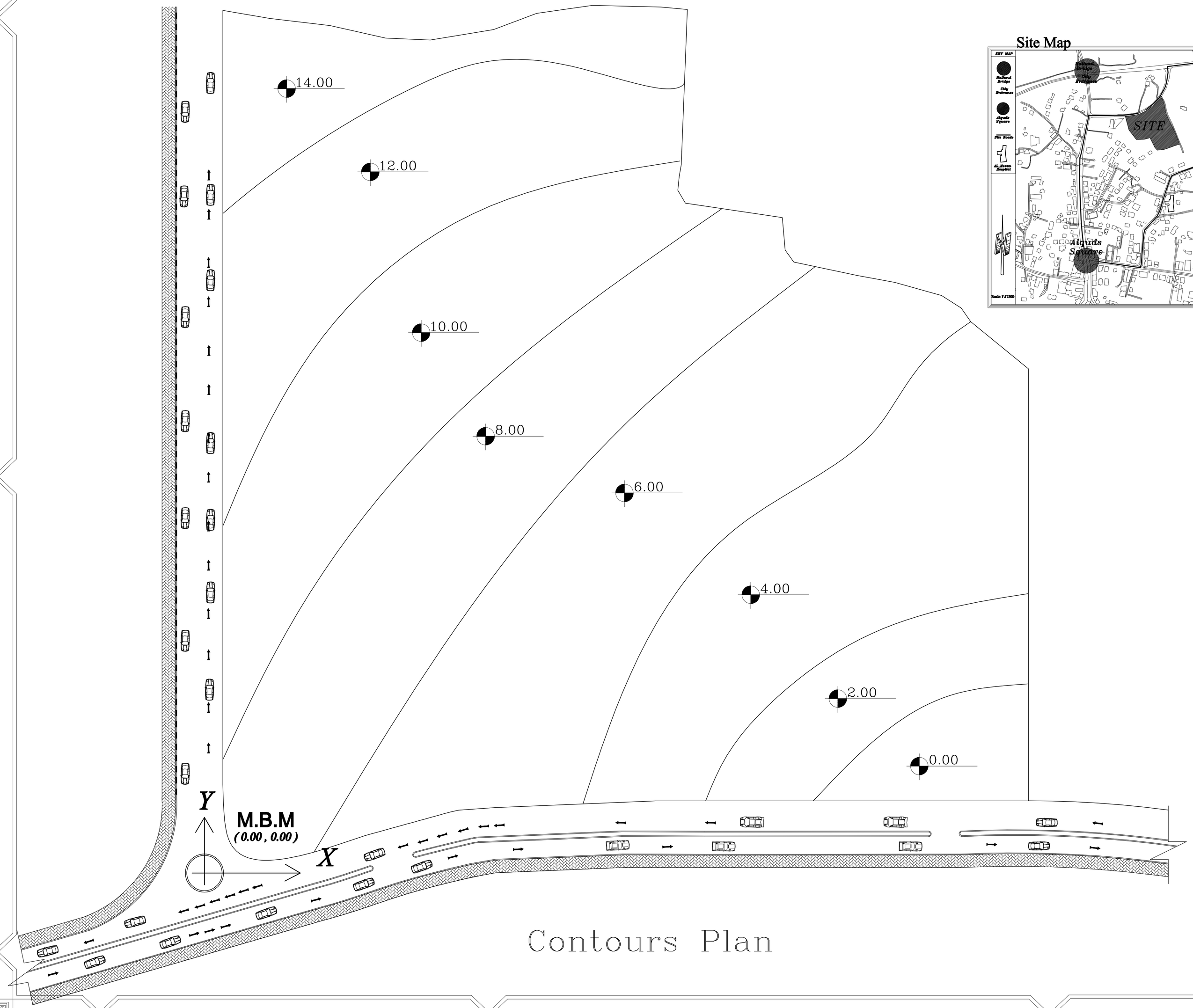
Tabel of Building	
Number	Name
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Drawing Title

Designed By

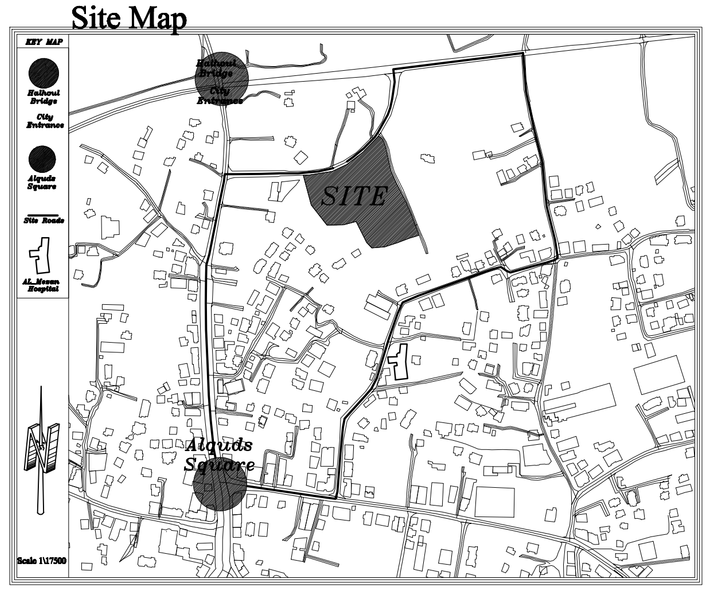
Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	*No.of Draw*	*Date*
		2013/2014



Contours Plan

Site Map



By the name of Allah

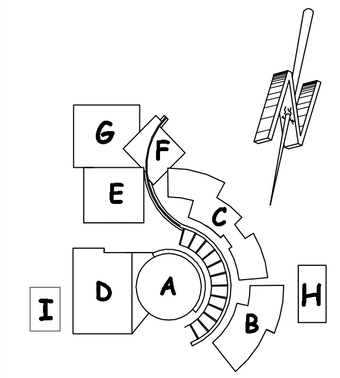
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Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

Number	Name
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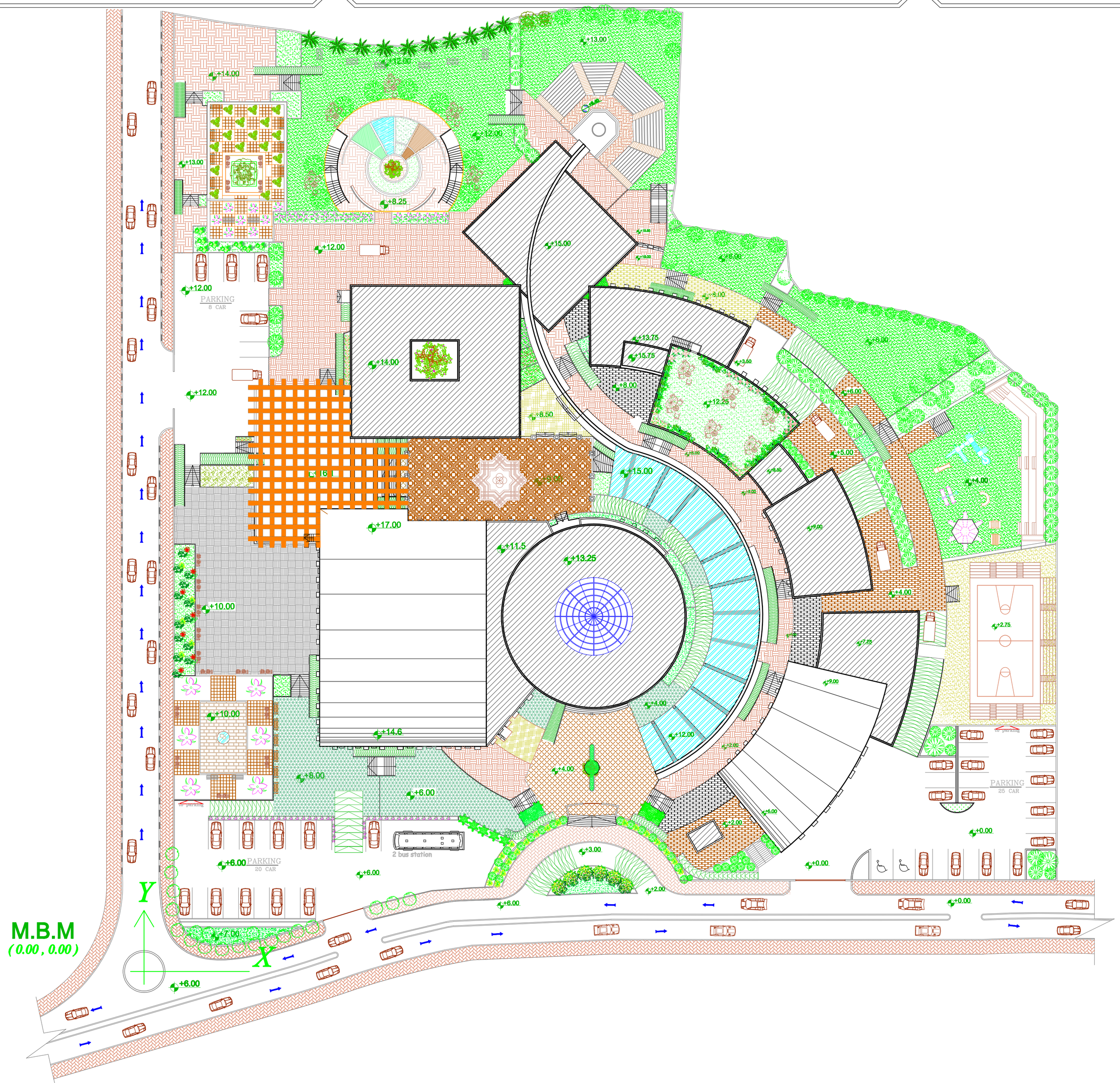
Drawing Title

Real Countor Plan

Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	No.of Draw	Date
1\350	A 00	2013-2014



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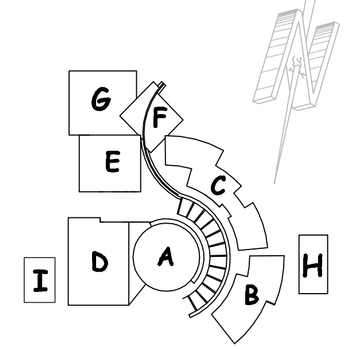
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Tabel of Building

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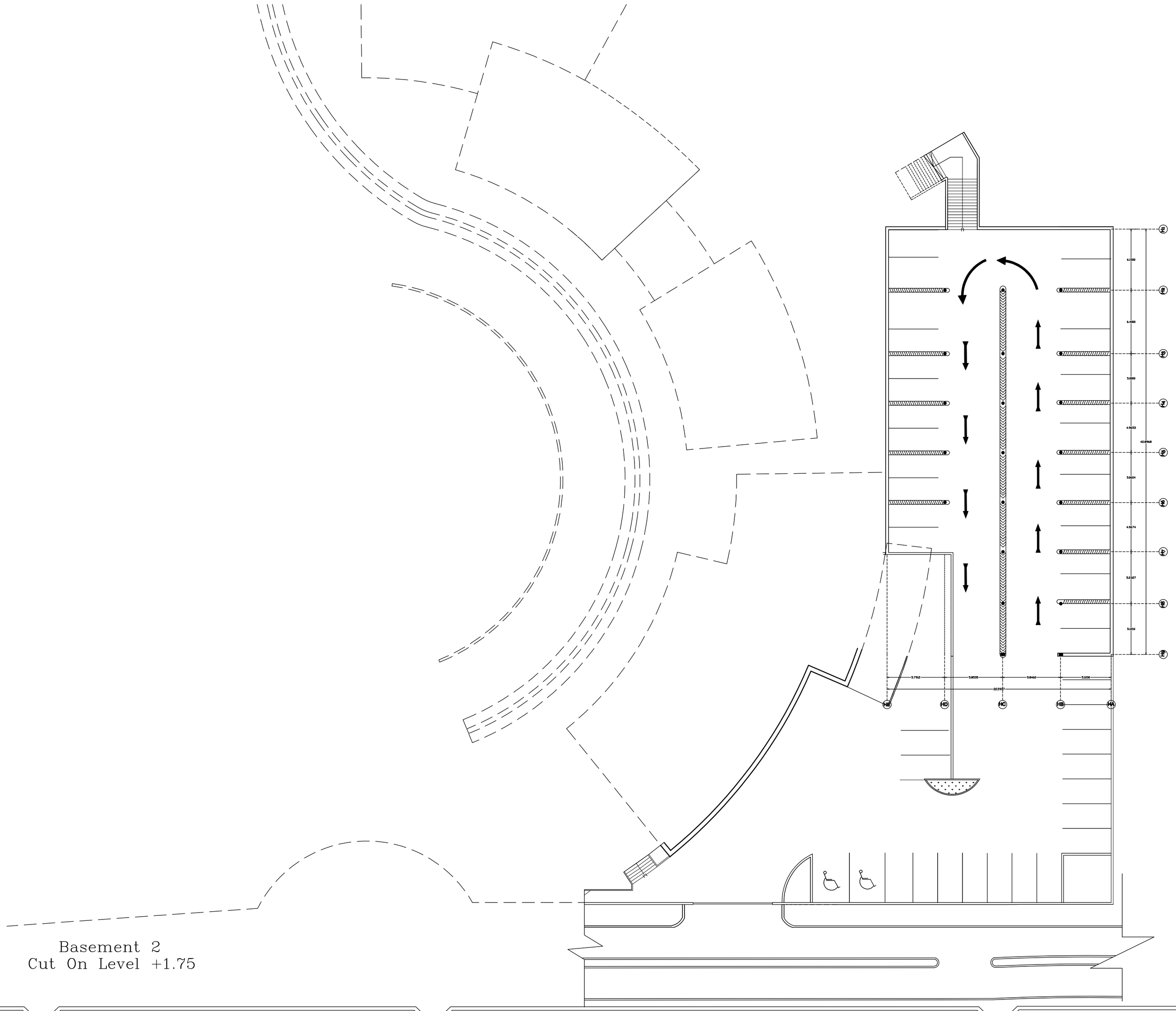
Drawing Title

site plan

Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	No.of Draw	Date
1\250	A01	2013-2014



Basement 2
Cut On Level +1.75

By the name of Allah

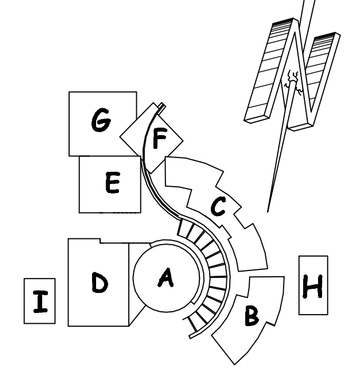
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Dr.Nasr Abboushi



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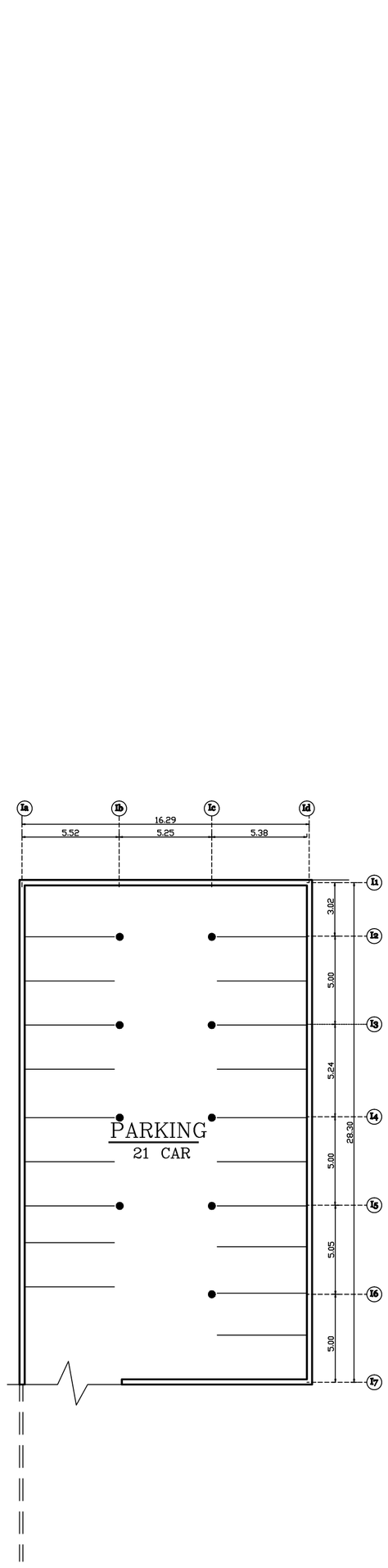
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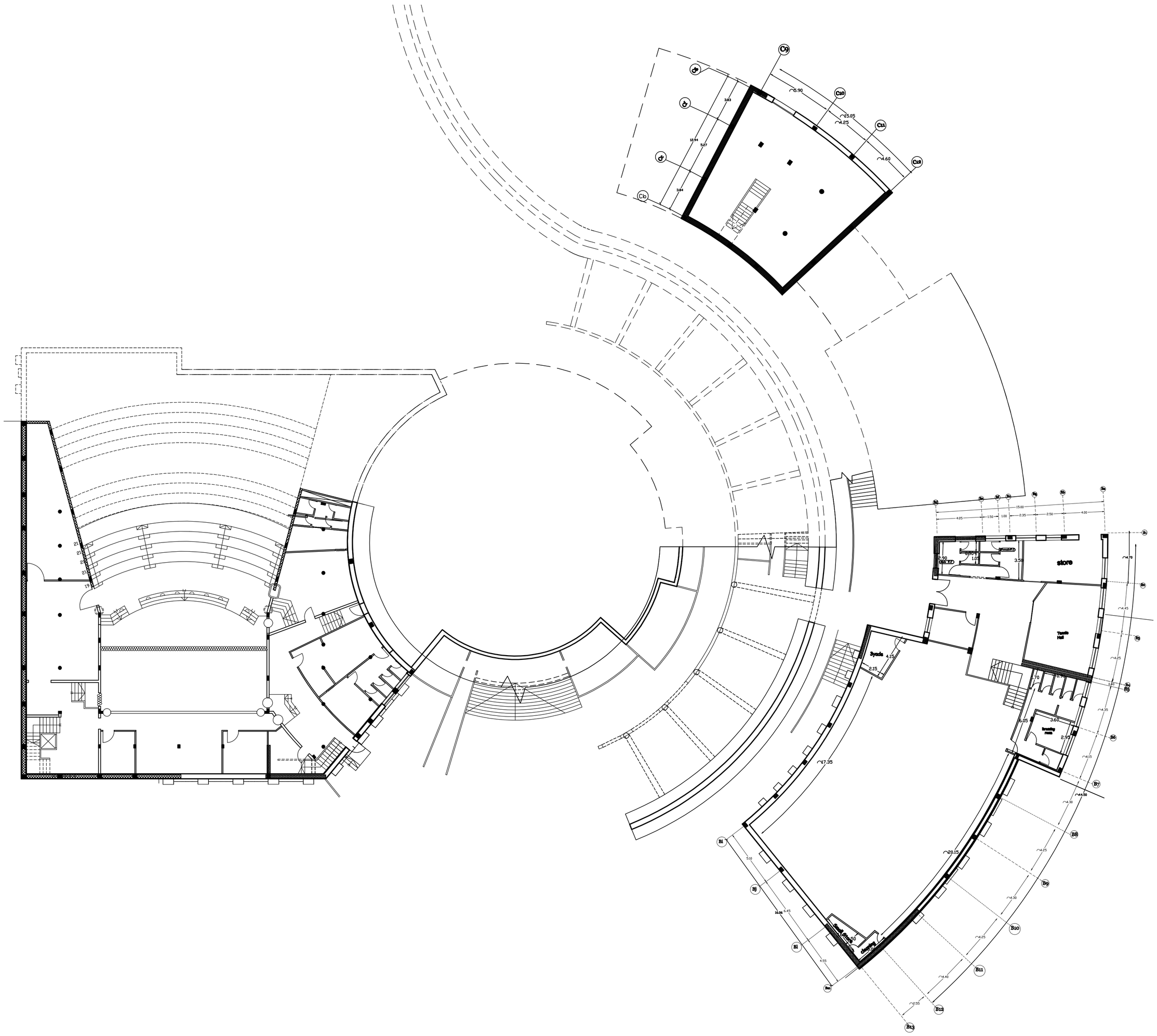
Basement 2
WITH Dimension

Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	*No.of Draw*	*Date*
1\200	A02	2013-2014





Cut On Level +6.00
Basement 1

By the name of Allah

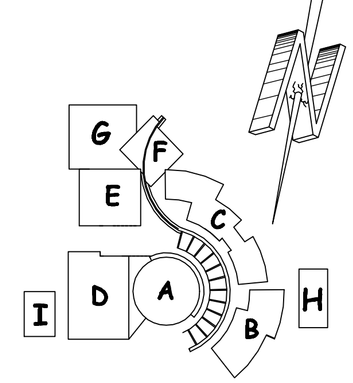
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Civil Engineering

Hebron Culture Palace

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Tabel of Building	
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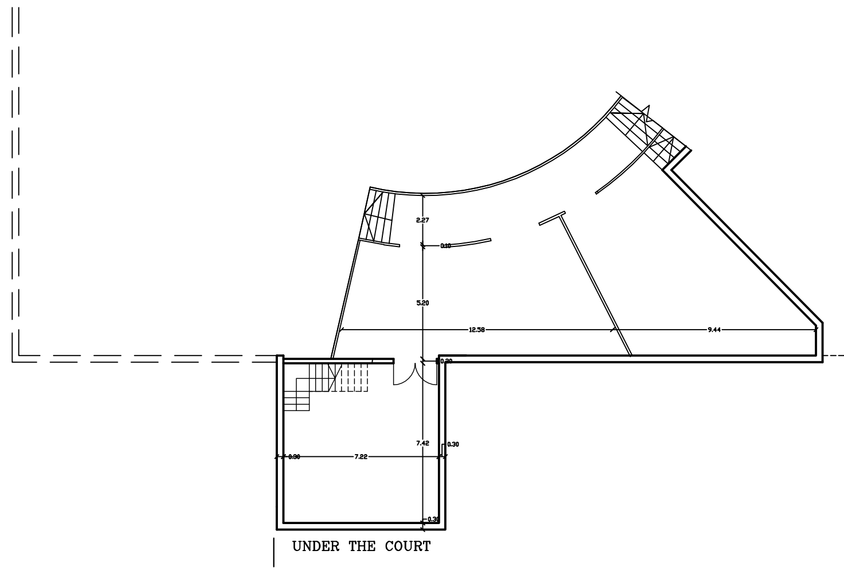
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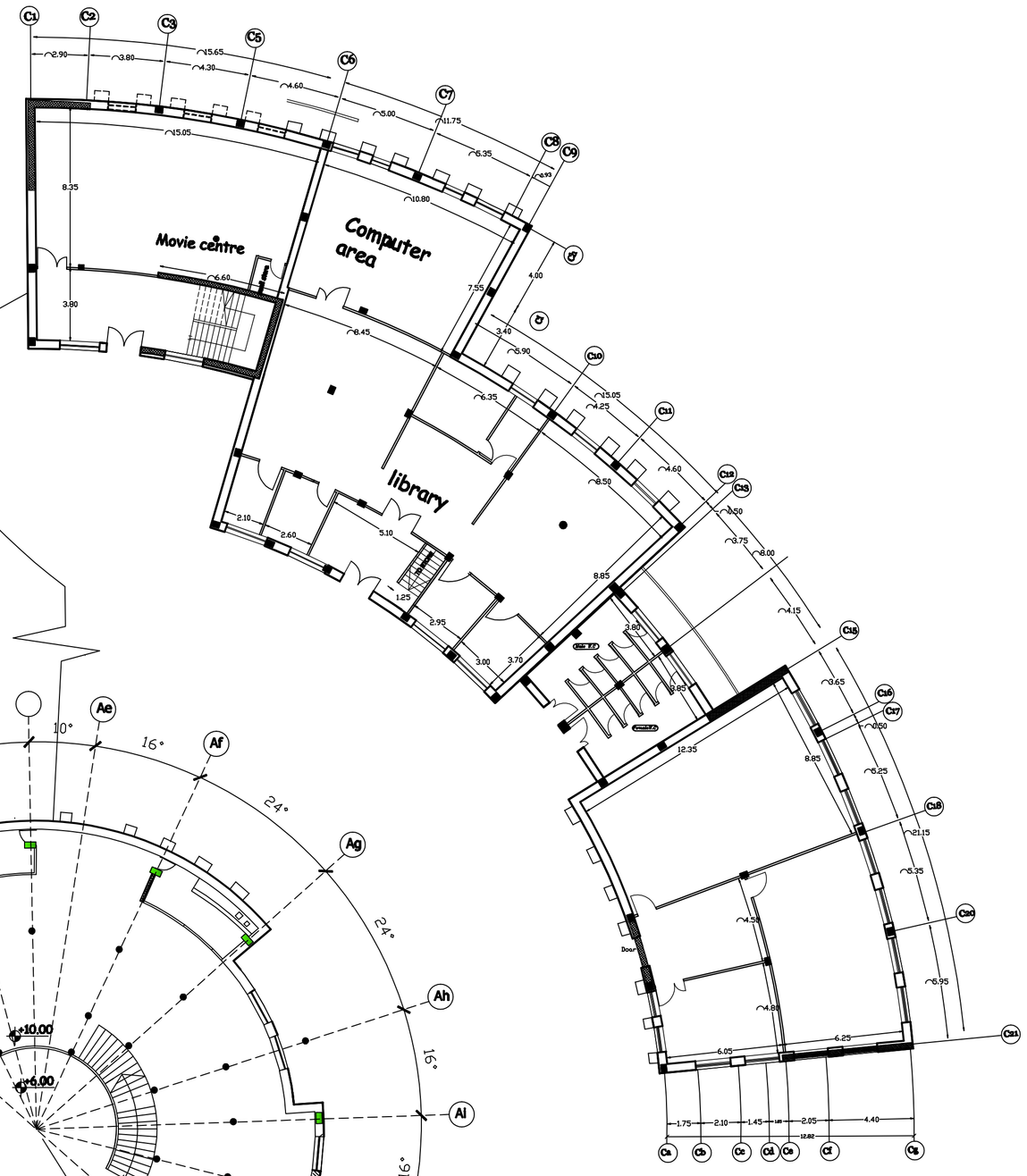
Basement 1
1660 m2
Dimension

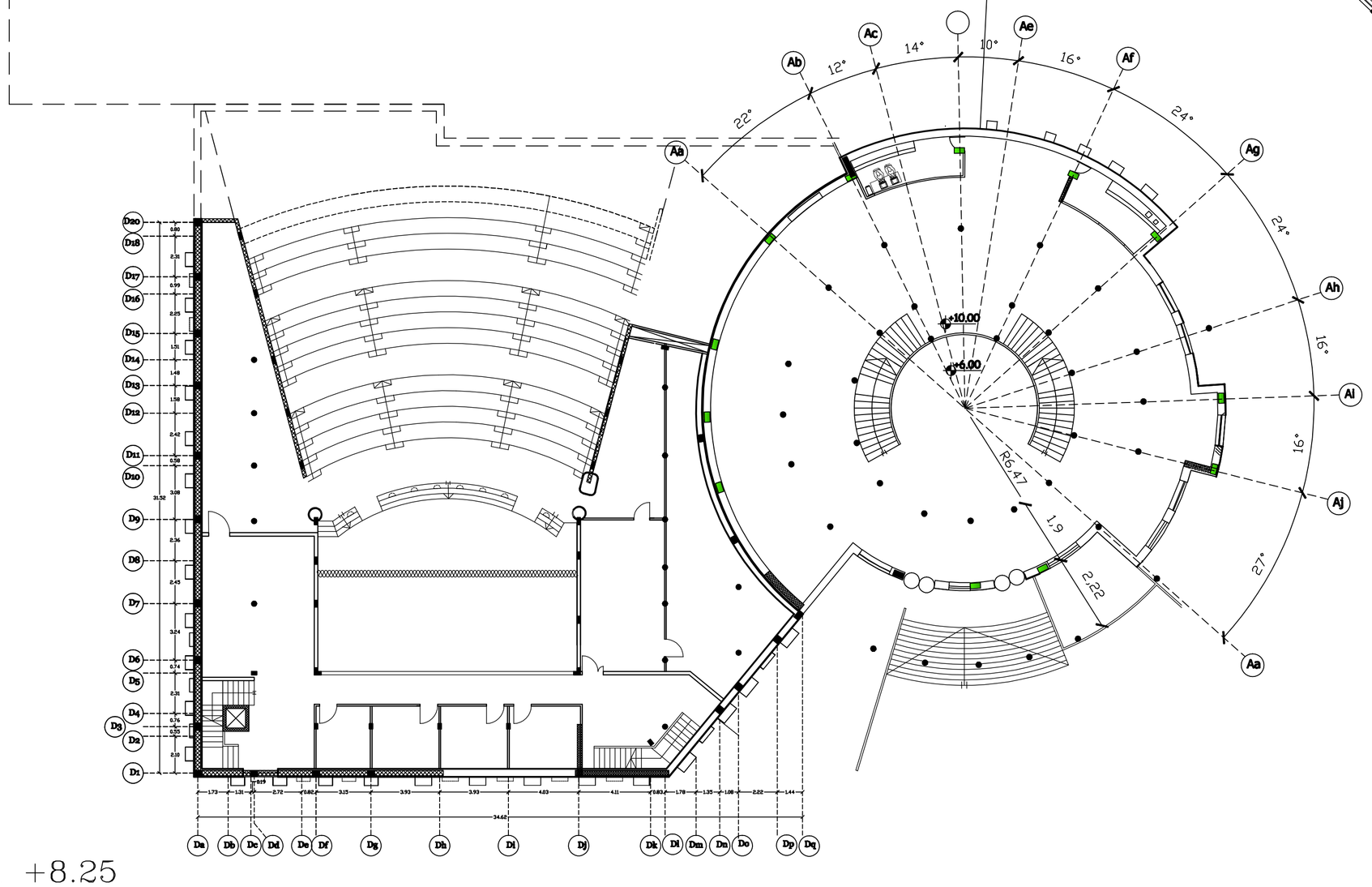
Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	*No.of Draw*	*Date*
1\200	A03	2013-2014







Cut On Level +8.25

By the name of Allah

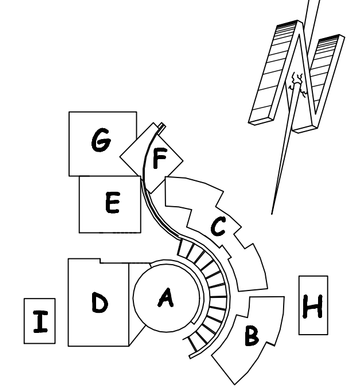
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Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

Number	Name
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H	Parking 1
I	Parking 2

Drawing Title

Ground Floor

Dimension

Designed By

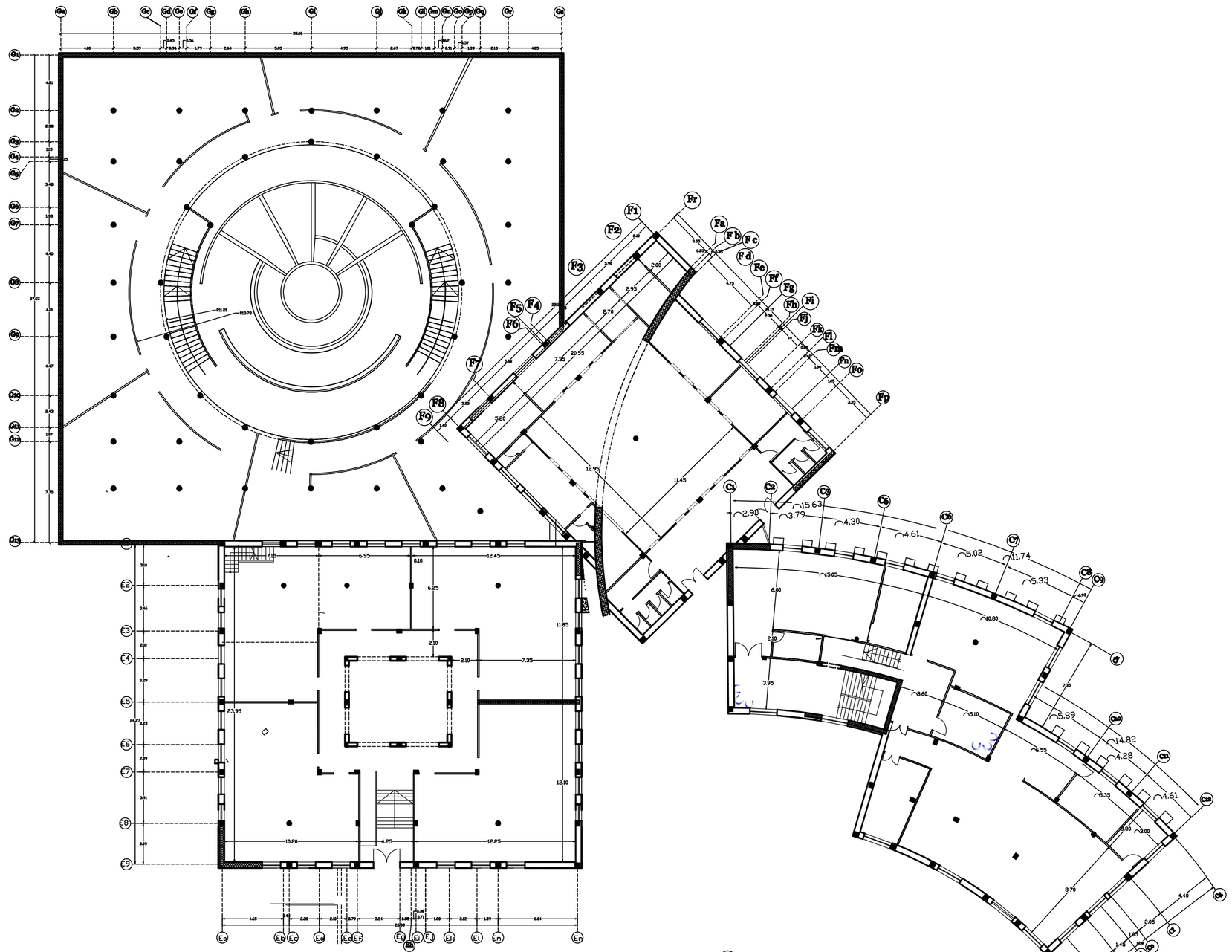
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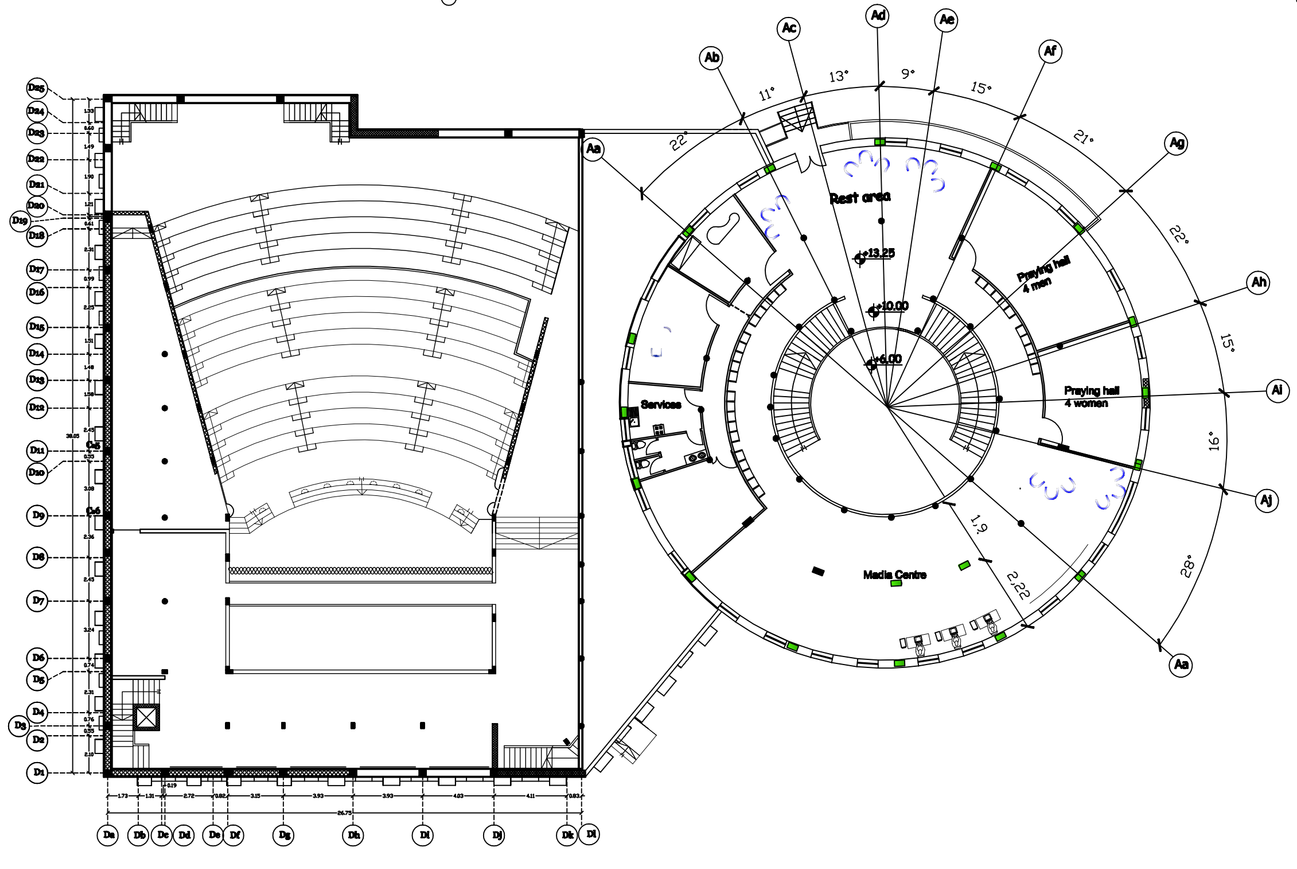
Fawaz Natsheh

Montaser shweiki

Mohamed Halwani

Scale	No.of Draw	Date
1\200	A04	2013-2014





Cut On Level +11.25
First Floor

By the name of Allah

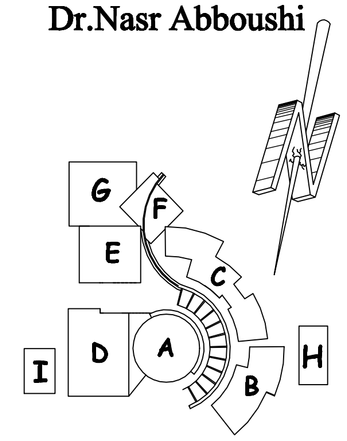
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Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

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H	Parking 1
I	Parking 2

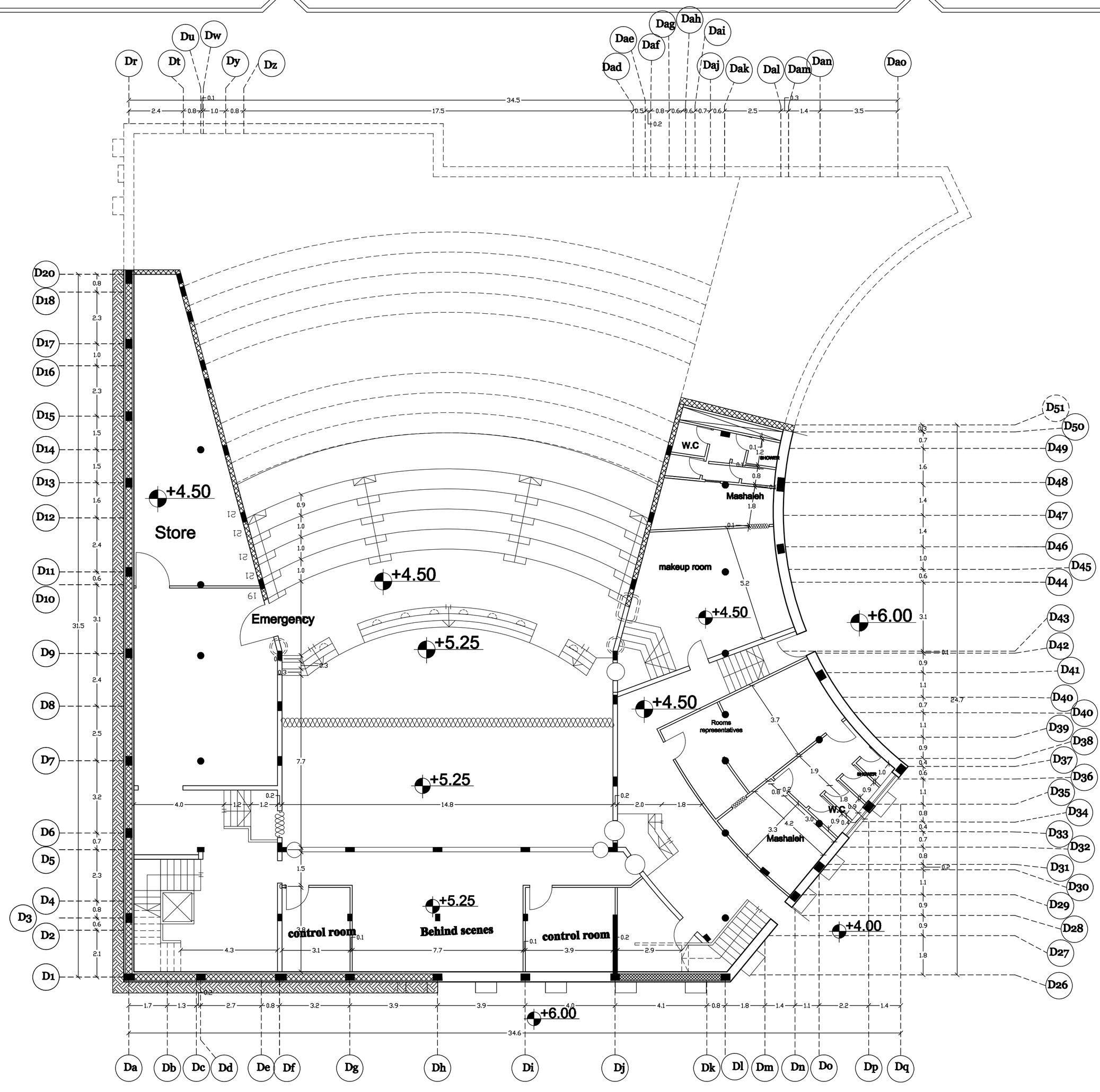
Drawing Title

First Floor
Dimension

Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	*No.of Draw*	*Date*
1\250	A05	2013-2014



cut on +6 m
underground level

By the name of Allah

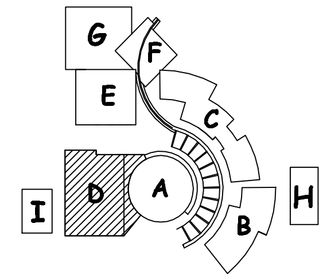
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

Number	Name
A	Reception
B	Sport hall
C	Building activities
D	Theater
E	Handicrafts
F	Restaurant
G	Photo Gallery
H	Parking 1
I	Parking 2

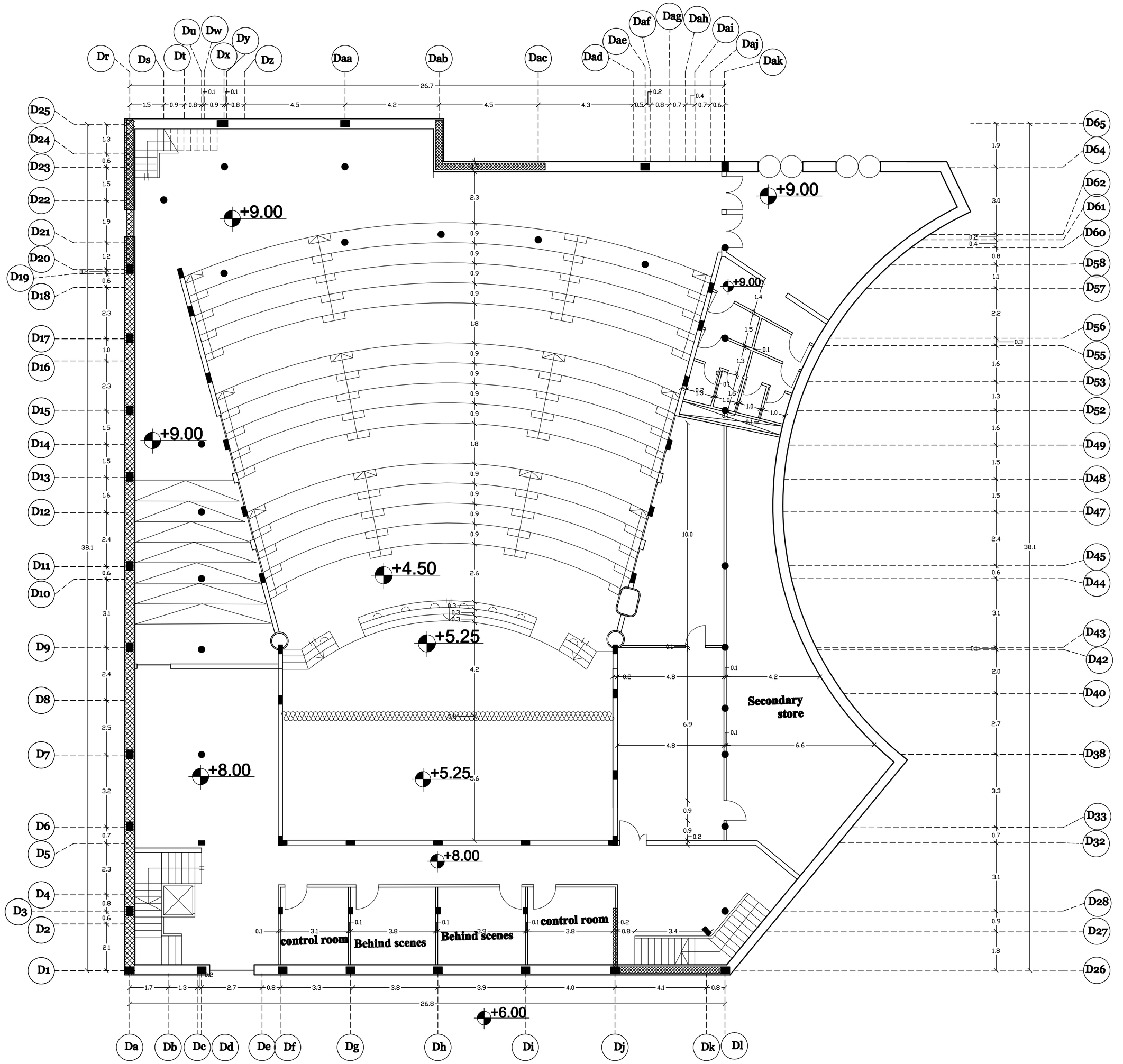
Drawing Title

underground level dimention

Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwane

Scale	*No.of Draw*	*Date*
1/100	A06	2013-2014



cut on 9.50 m

Ground level

By the name of Allah

جامعة فلسطين التقنية
رابطة الجامعين/الخليل

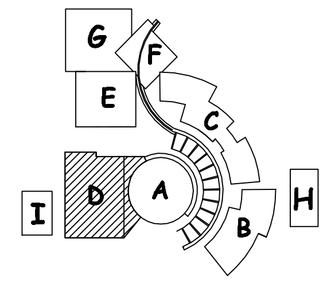
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

Number	Name
A	Reception
B	Sport hall
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F	Restaurant
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H	Parking 1
I	Parking 2

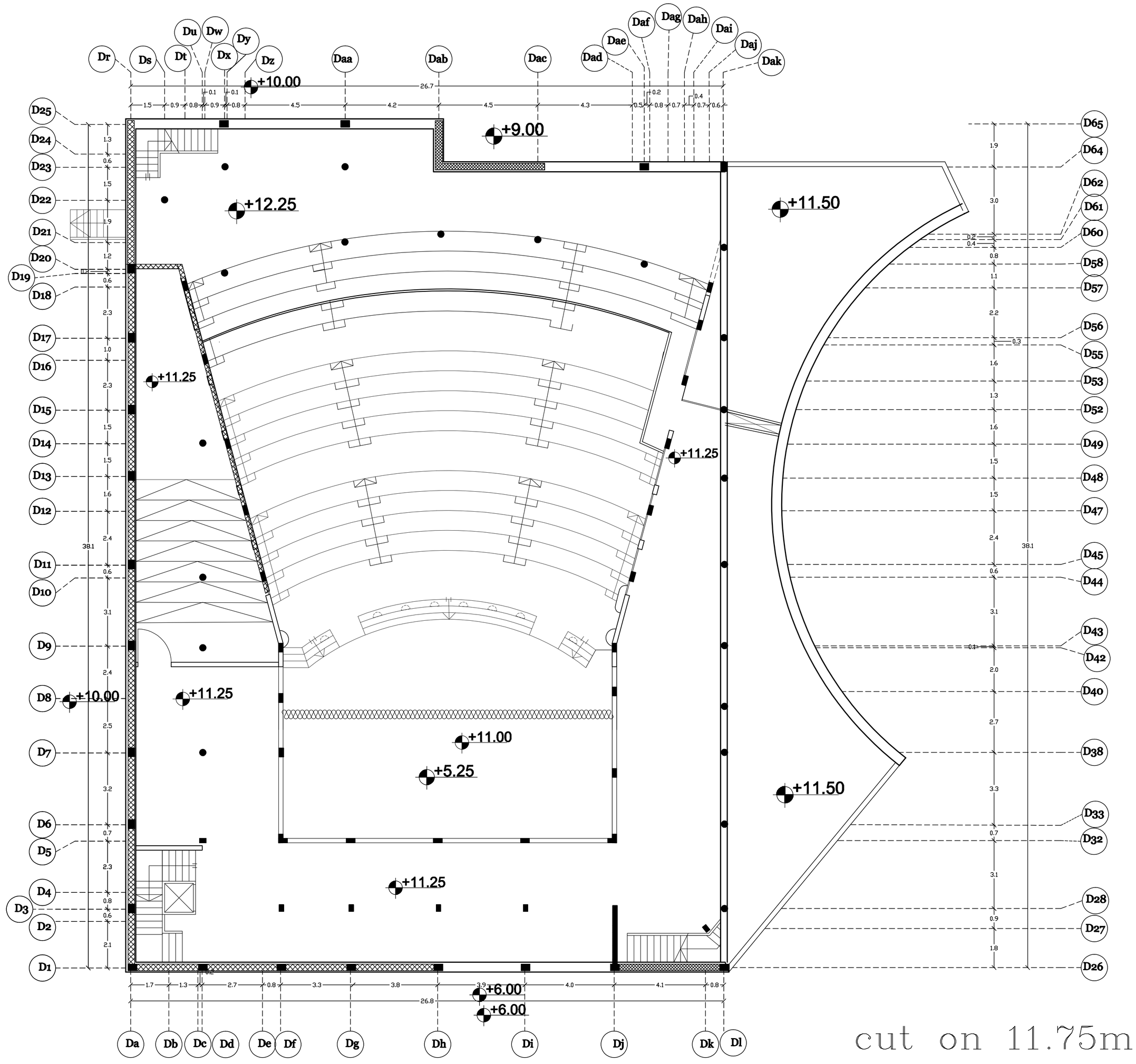
Drawing Title

Ground level dimention

Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwane

Scale	No.of Draw	Date
1/100	A07	2013-2014



cut on 11.75m
First Level

By the name of Allah



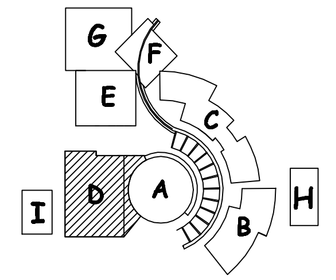
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

Number	Name
A	Reception
B	Sport hall
C	Building activities
D	Theater
E	Handicrafts
F	Restaurant
G	Photo Gallery
H	Parking 1
I	Parking 2

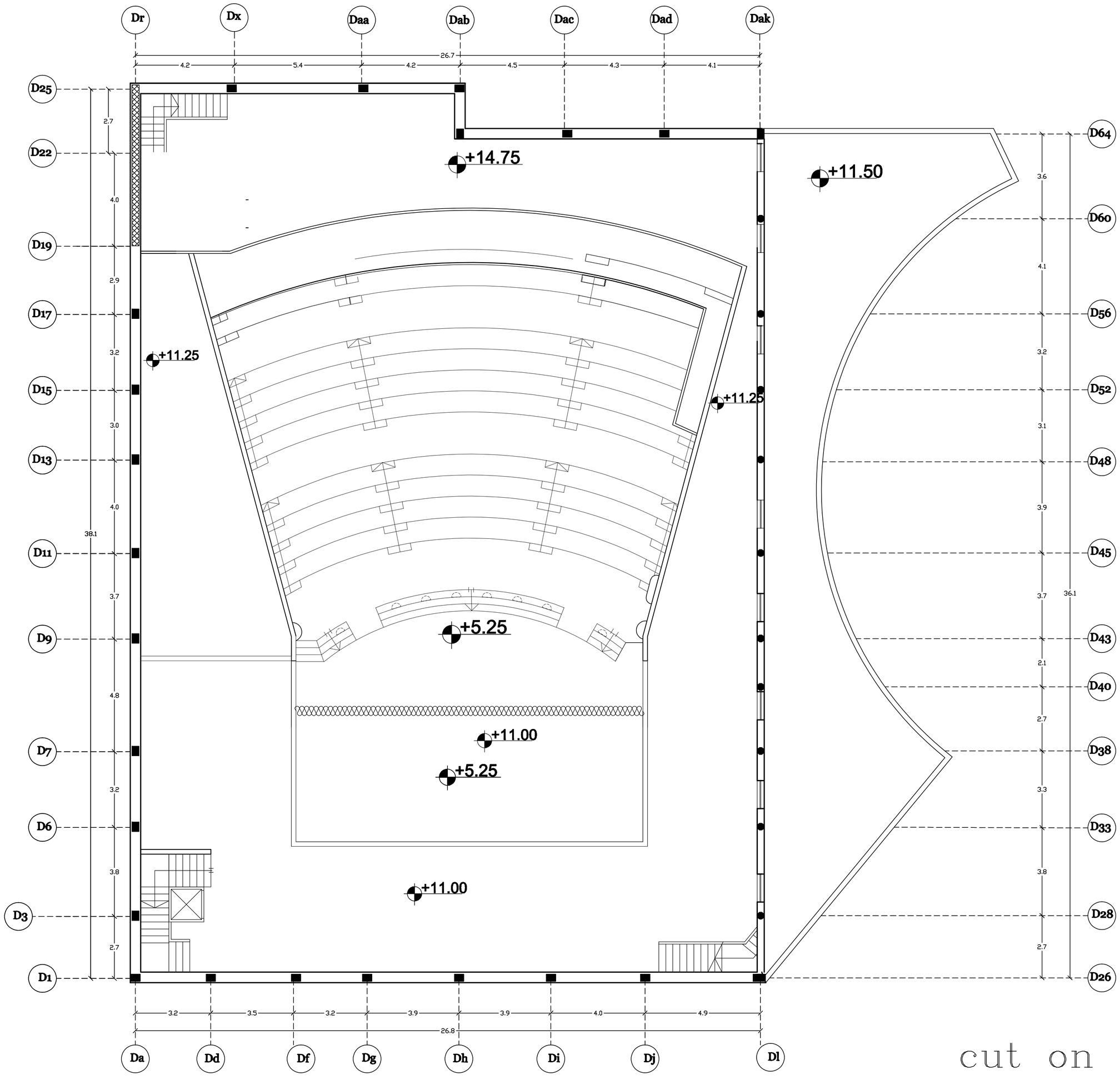
Drawing Title

First Level dimention

Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwane

Scale	No.of Draw	Date
1/100	A08	2013-2014



cut on 13.75m

Second Level

By the name of Allah

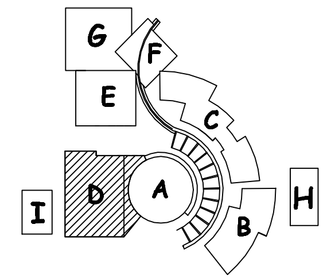
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

Number	Name
A	Reception
B	Sport hall
C	Building activities
D	Theater
E	Handicrafts
F	Restaurant
G	Photo Gallery
H	Parking 1
I	Parking 2

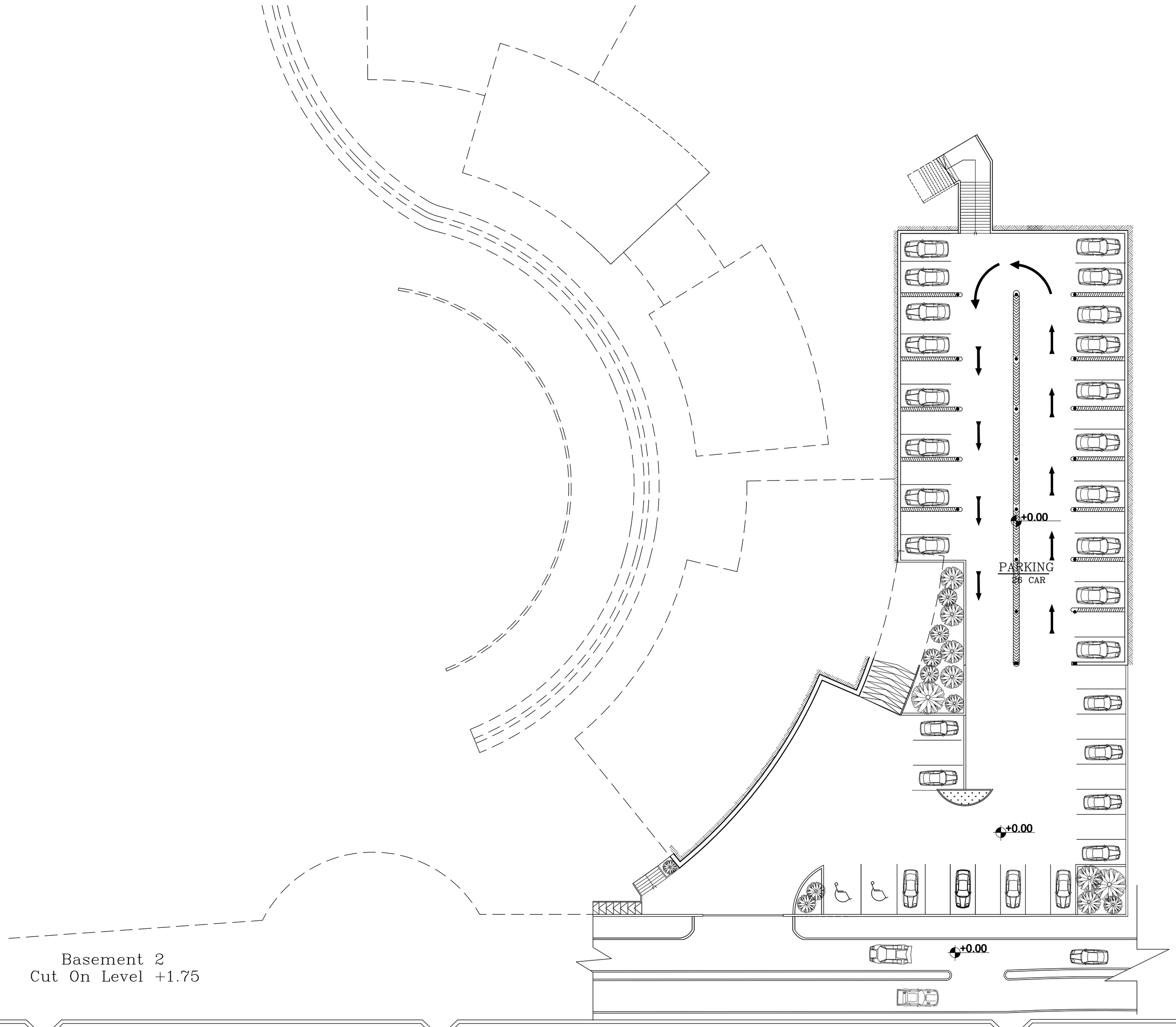
Drawing Title

Second Level dimention

Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwane

Scale	*No.of Draw*	*Date*
1/100	A09	2013-2014



Basement 2
Cut On Level +1.75

By the name of Allah

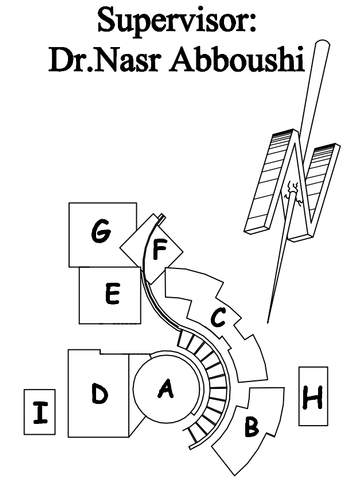
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building	
Number	**Name**
A	**Reception**
B	**Sport hall**
C	**Building activities**
D	**Theater**
E	**Handicrafts**
F	**Restaurant**
G	**Photo Gallery**
H	**Parking 1**
I	**Parking 2**

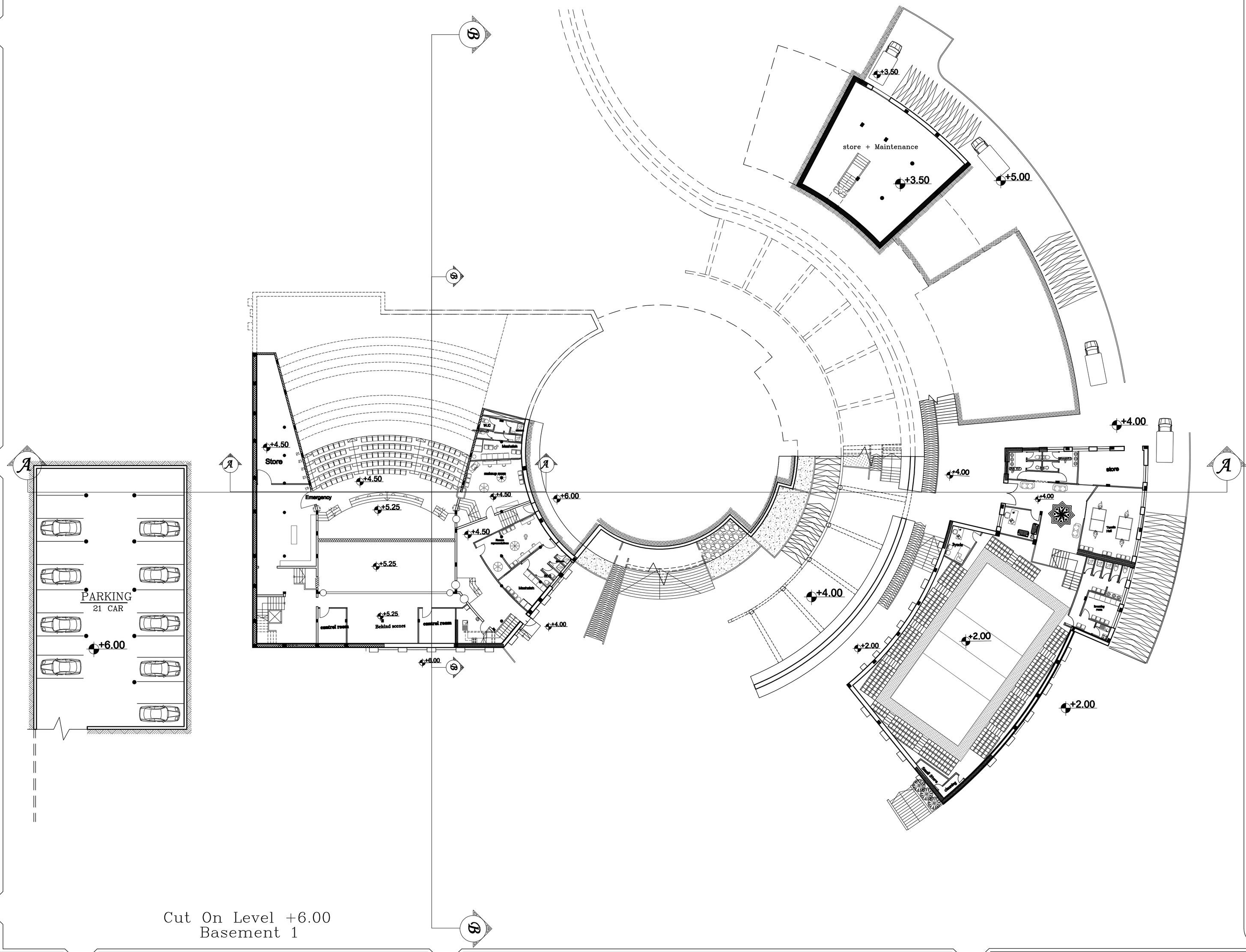
Drawing Title

Basement 2
WITH FURNITURE

Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	*No.of Draw*	*Date*
1\200	A10	**2013-2014**



Cut On Level +6.00
Basement 1

By the name of Allah

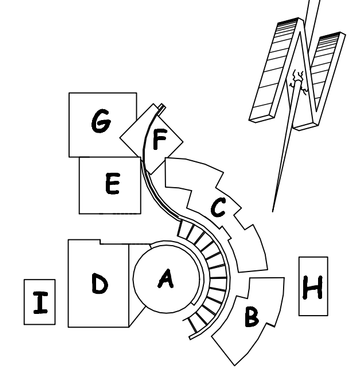
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building	
Number	Name
A	Reception
B	Sport hall
C	Building activities
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E	Handicrafts
F	Restaurant
G	Photo Gallery
H	Parking 1
I	Parking 2

Drawing Title

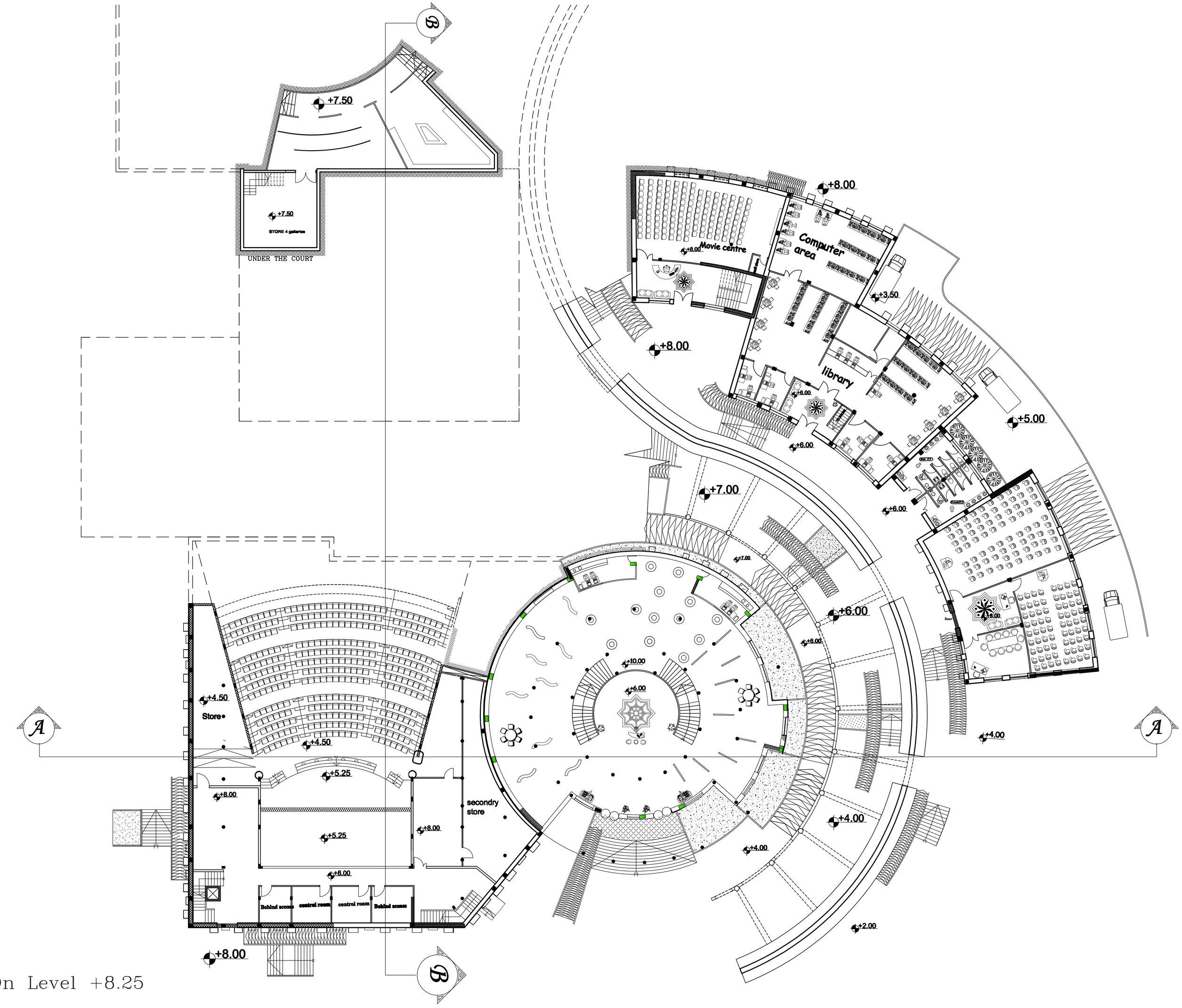
Basement 1
WITH FURNITURE

1660 m2

Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	*No.of Draw*	*Date*
1\200	A11	2013-2014



Cut On Level +8.25

By the name of Allah

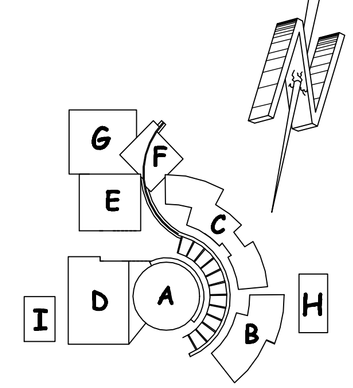
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building	
Number	Name
A	Reception
B	Sport hall
C	Building activities
D	Theater
E	Handicrafts
F	Restaurant
G	Photo Gallery
H	Parking 1
I	Parking 2

Drawing Title

Ground Floor

Firniture

Designed By

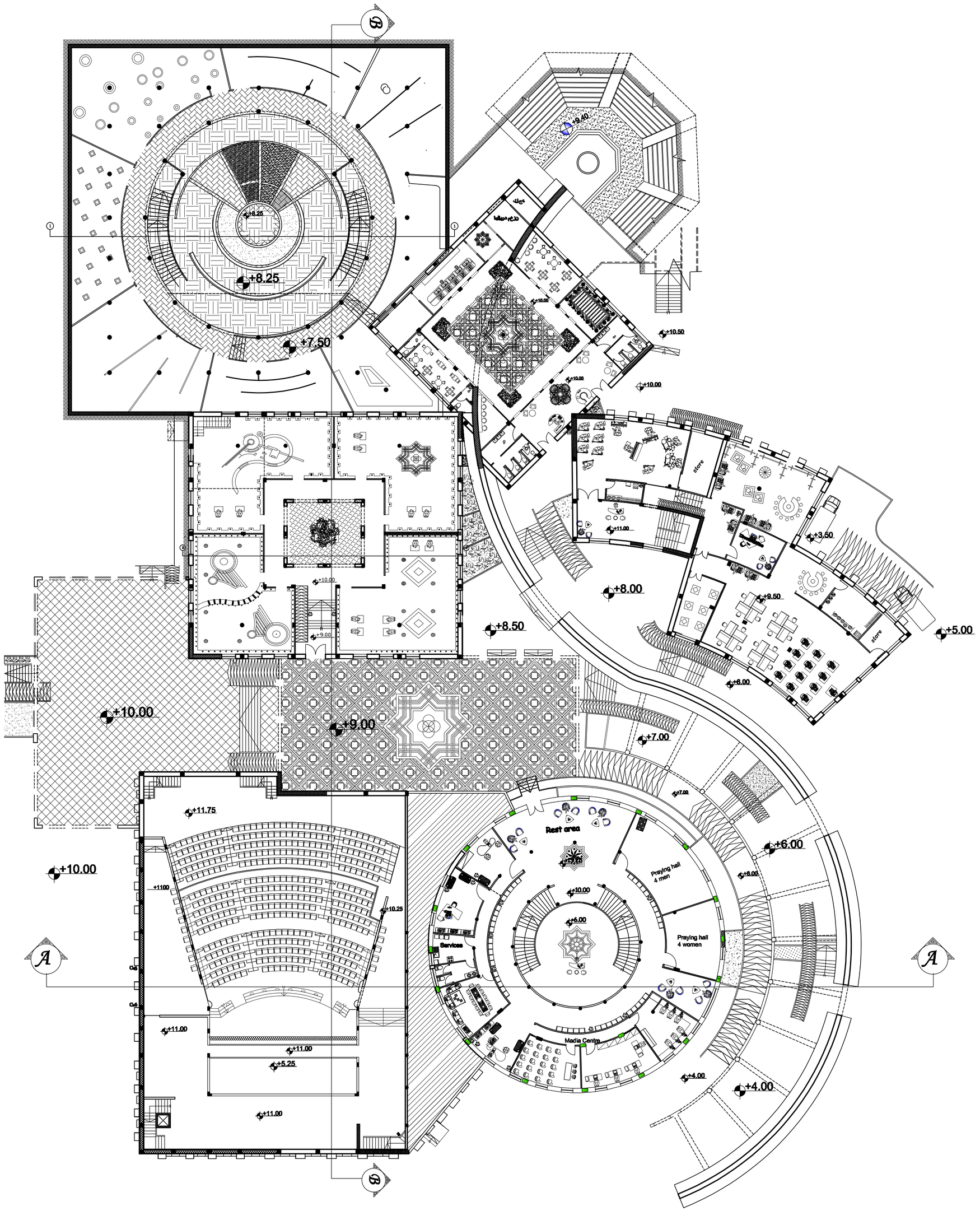
Baha Bader

Fawaz Natsheh

Montaser shweiki

Mohamed Halwani

Scale	*No.of Draw*	*Date*
1\200	A12	2013-2014



Cut On Level +11.25
First Floor

By the name of Allah

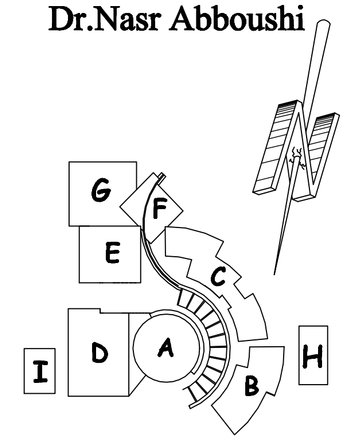
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

Number	Name
A	Reception
B	Sport hall
C	Building activities
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F	Restaurant
G	Photo Gallery
H	Parking 1
I	Parking 2

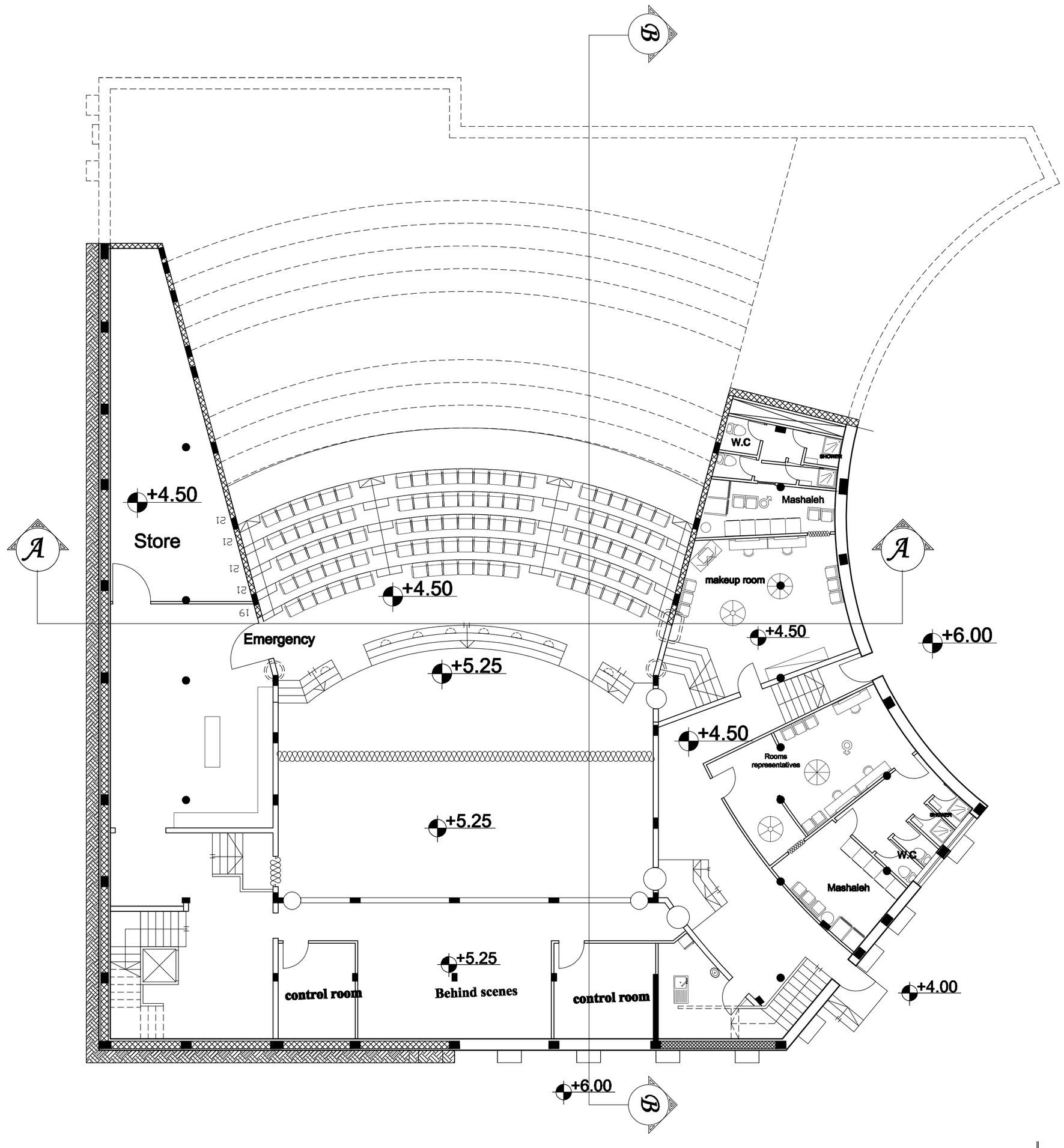
Drawing Title

First Floor
Firniture

Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	*No.of Draw*	*Date*
1\250	A013	2013-2014



cut on +6 m
underground level

By the name of Allah

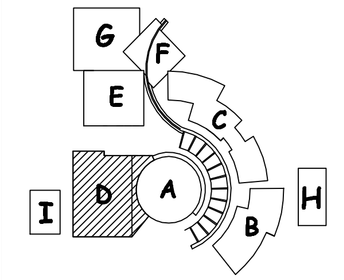
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

Number	Name
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B	Sport hall
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I	Parking 2

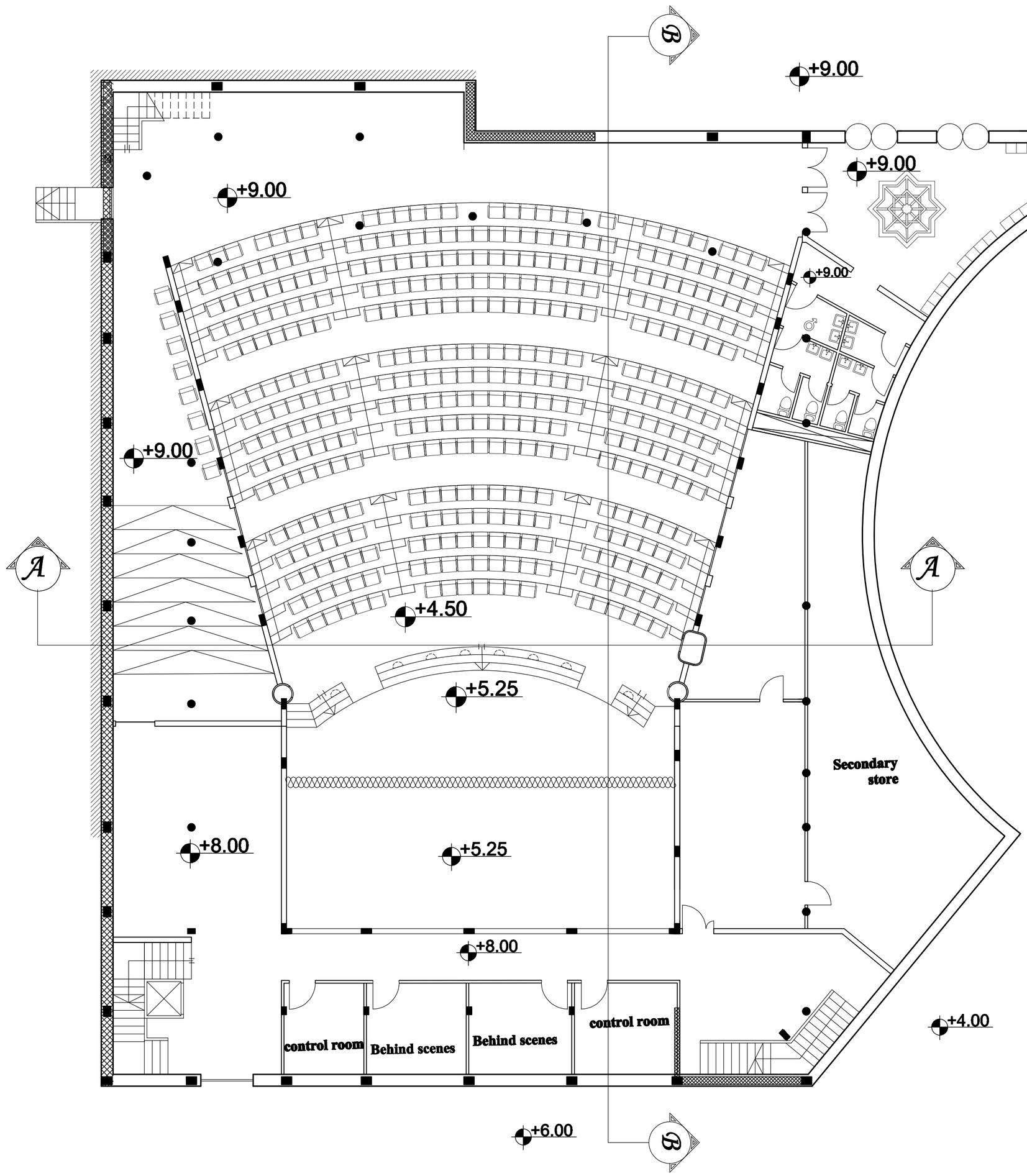
Drawing Title

underground level furnitures

Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwane

Scale	*No.of Draw*	*Date*
1/100	A14	2013-2014



cut on 9.50 m

Ground level

By the name of Allah

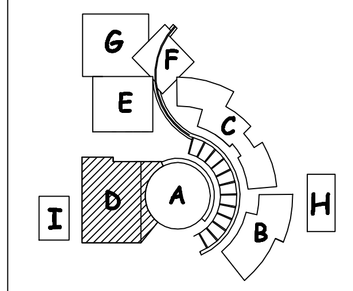
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

Number	Name
A	Reception
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C	Building activities
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E	Handicrafts
F	Restaurant
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H	Parking 1
I	Parking 2

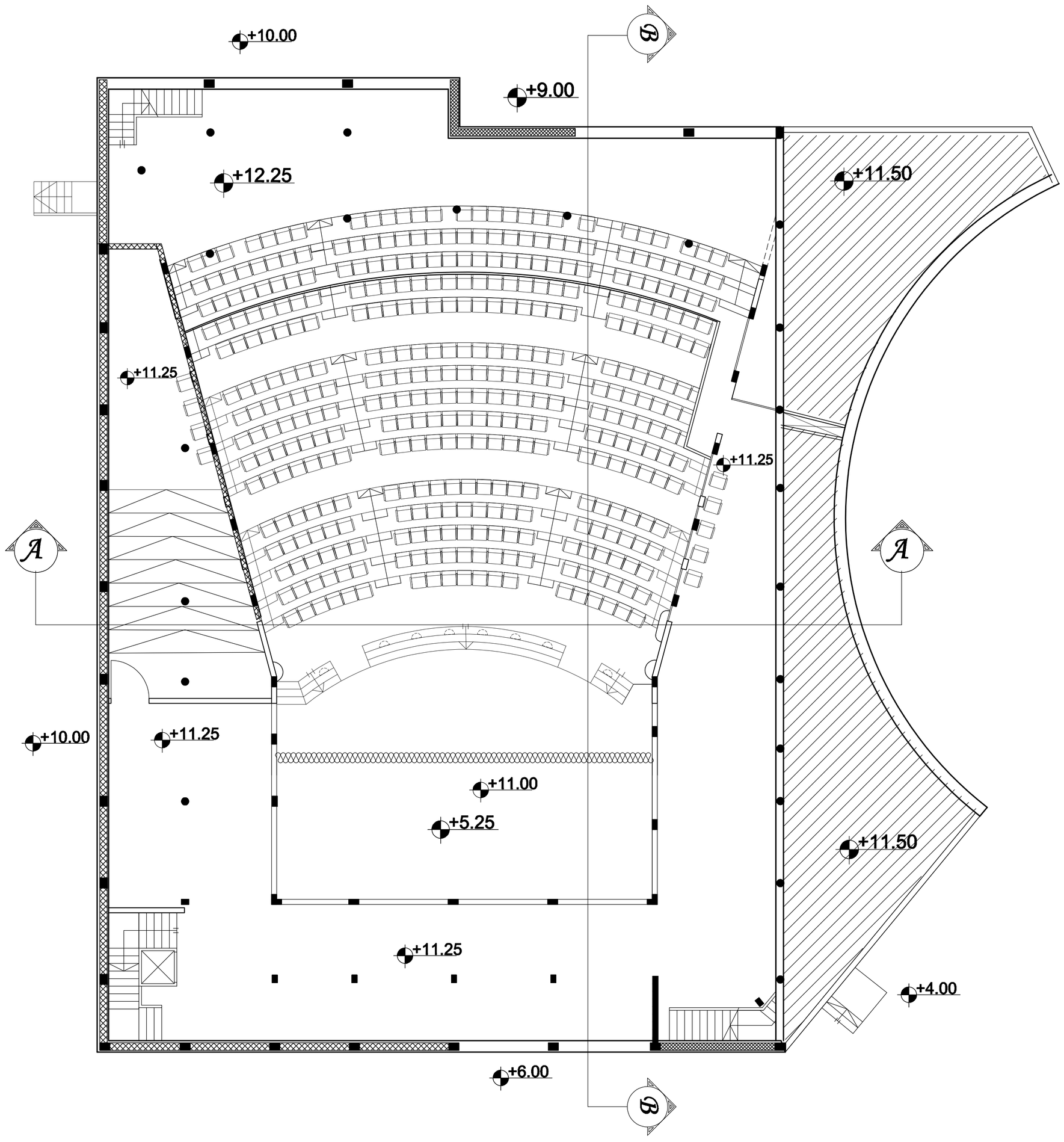
Drawing Title

Ground level furnitures

Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwane

Scale	No.of Draw	Date
1/100	A15	2013-2014



cut on 11.75m
First Level

By the name of Allah

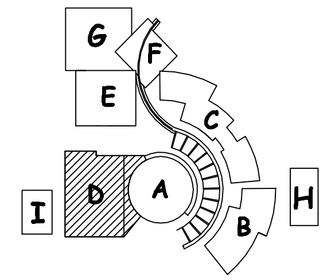
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

Number	Name
A	Reception
B	Sport hall
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E	Handicrafts
F	Restaurant
G	Photo Gallery
H	Parking 1
I	Parking 2

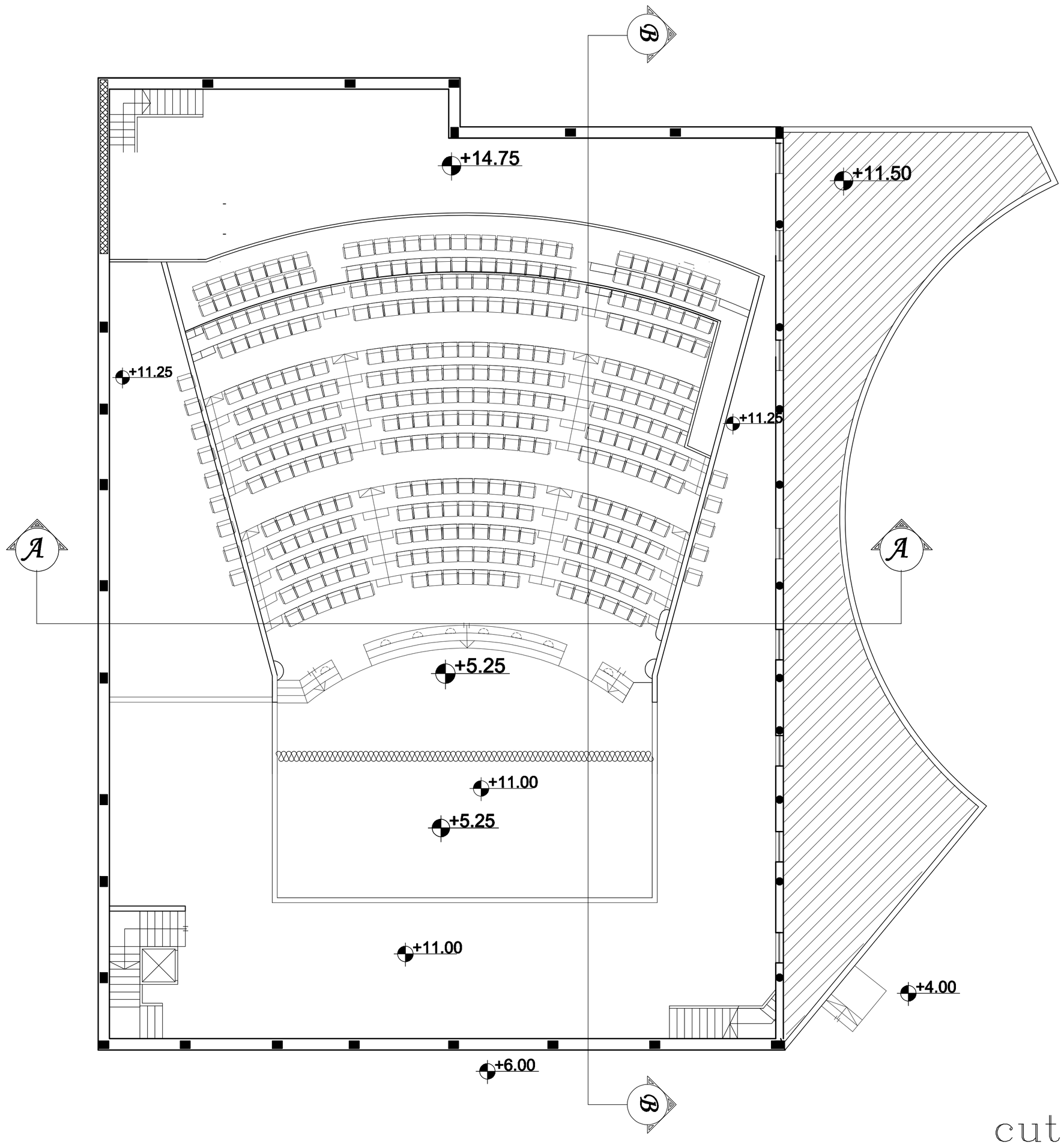
Drawing Title

First Level furnitures

Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwane

Scale	*No.of Draw*	*Date*
1/100	A16	2013-2014



cut on 13.75m

Second Level

By the name of Allah

جامعة فلسطين التقنية
رابطة الخضوري/الخليل

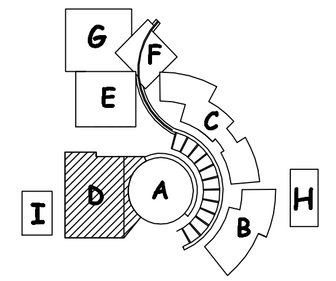
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building	
Number	Name
A	Reception
B	Sport hall
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F	Restaurant
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I	Parking 2

Drawing Title

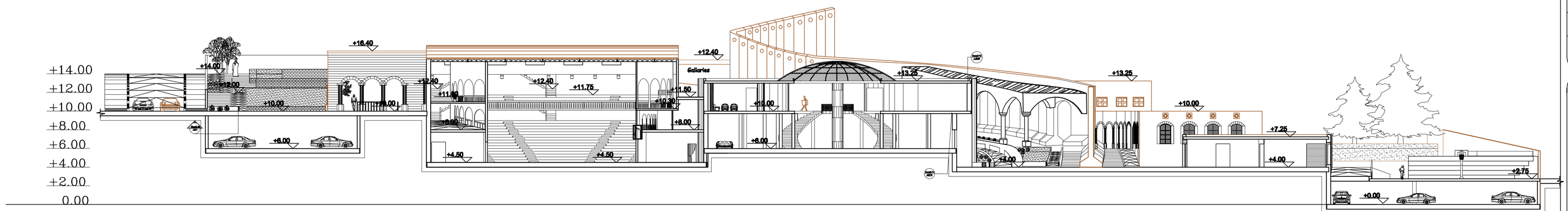
Second Level furnitures

Designed By

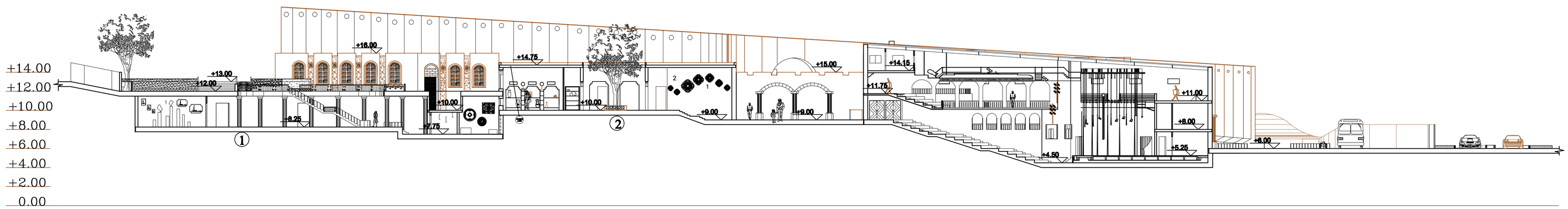
Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwane

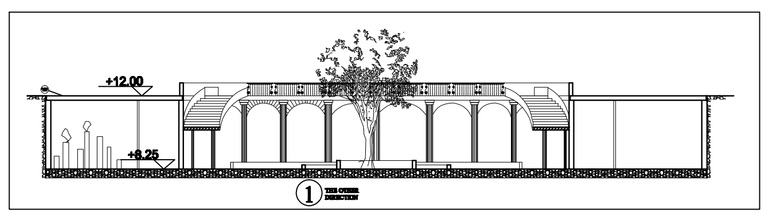
Scale	*No.of Draw*	*Date*
1/100	A17	2013-2014

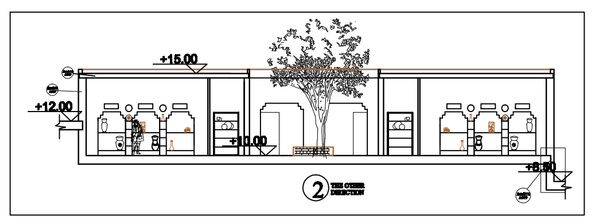
Sections A-A



Sections B-B







By the name of Allah

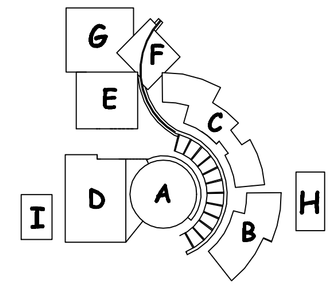
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building	
Number	Name
A	Reception
B	Sport hall
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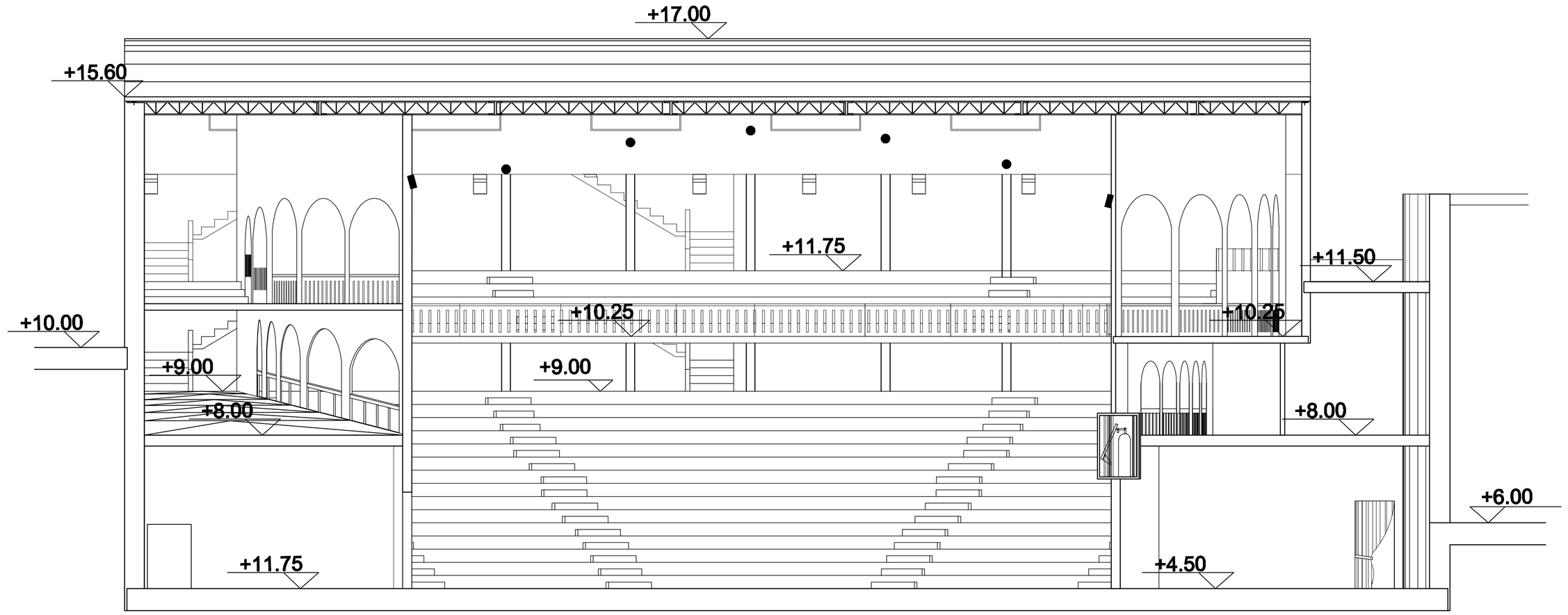
Drawing Title

Sections

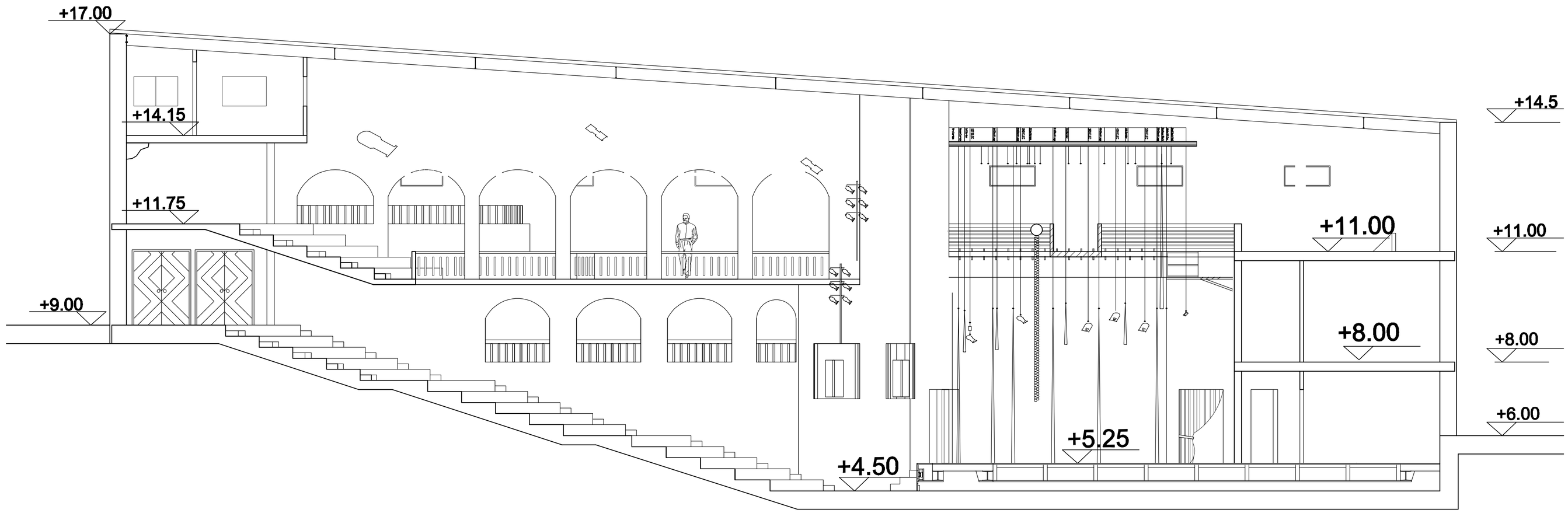
Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	*No.of Draw*	*Date*
1\250	A18	2013-2014



Section A–A



Section B–B

By the name of Allah

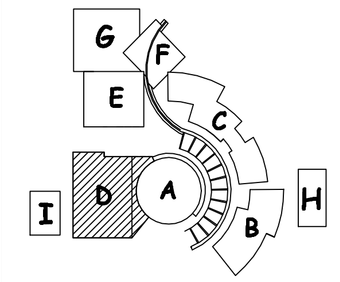
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building	
Number	Name
A	Reception
B	Sport hall
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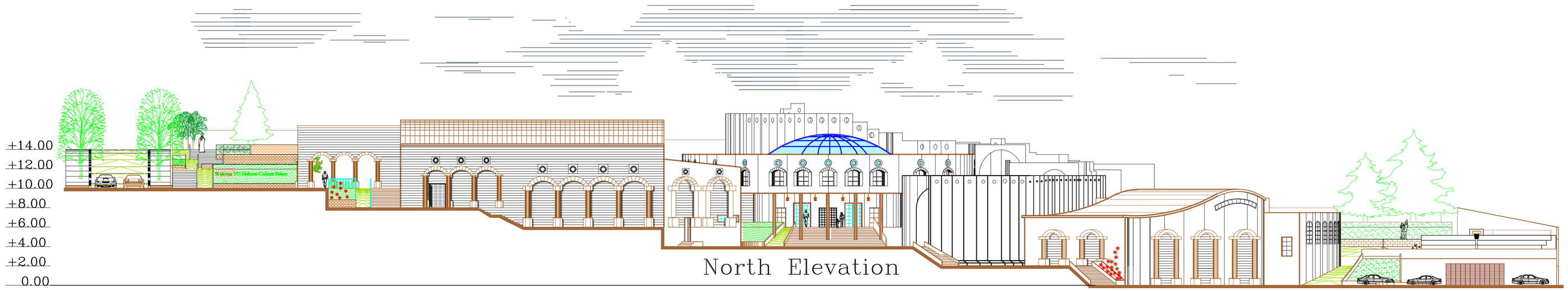
Drawing Title

Theater Sections

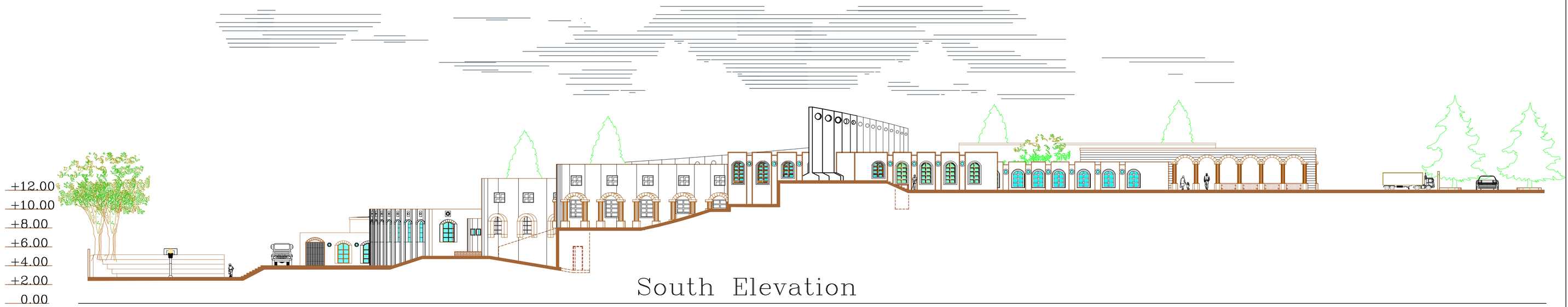
Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwane

Scale	No.of Draw	Date
1/100	A19	2013-2014



North Elevation



South Elevation

By the name of Allah

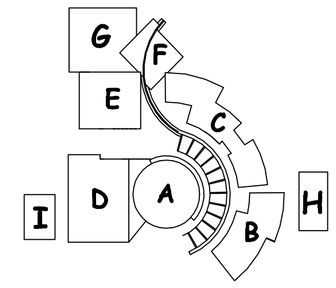
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

Number	Name
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B	Sport hall
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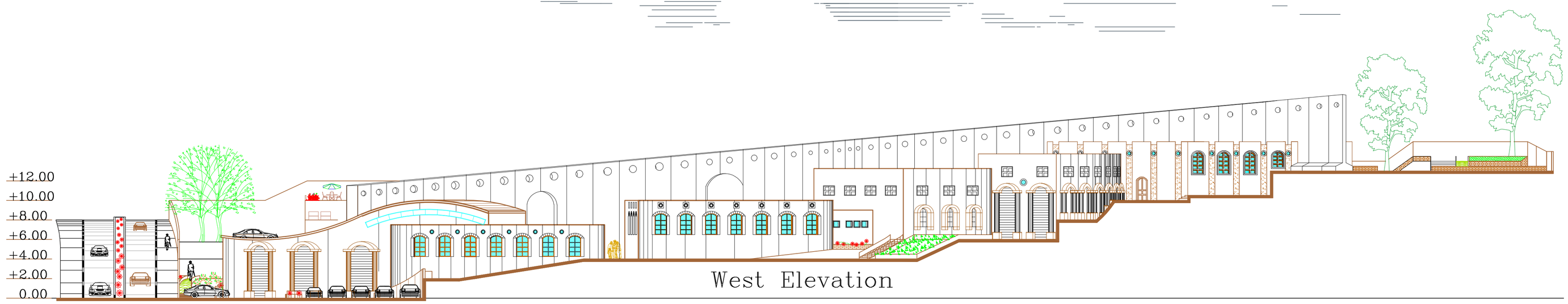
Drawing Title

Elevations

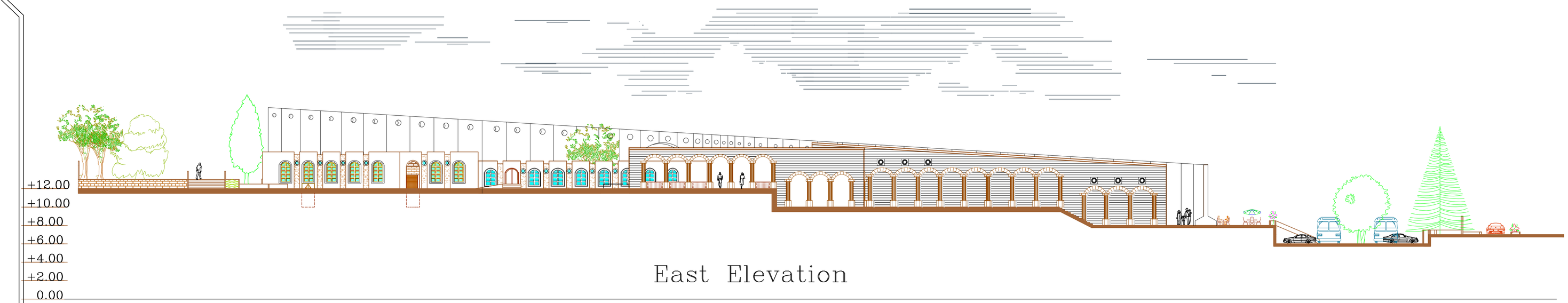
Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	*No.of Draw*	*Date*
1\250	A20	2013-2014



West Elevation



East Elevation

By the name of Allah

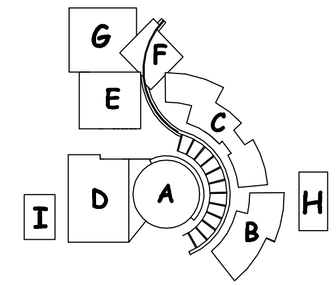
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building	
Number	Name
A	Reception
B	Sport hall
C	Building activities
D	Theater
E	Handicrafts
F	Restaurant
G	Photo Gallery
H	Parking 1
I	Parking 2

Drawing Title

Elevations

Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	*No.of Draw*	*Date*
1\250	A21	2013-2014

appendix B

Structural Drawing

By the name of Allah

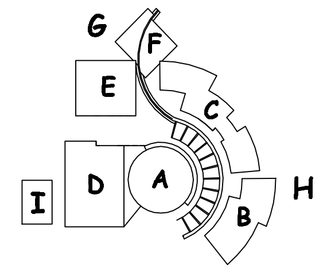
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

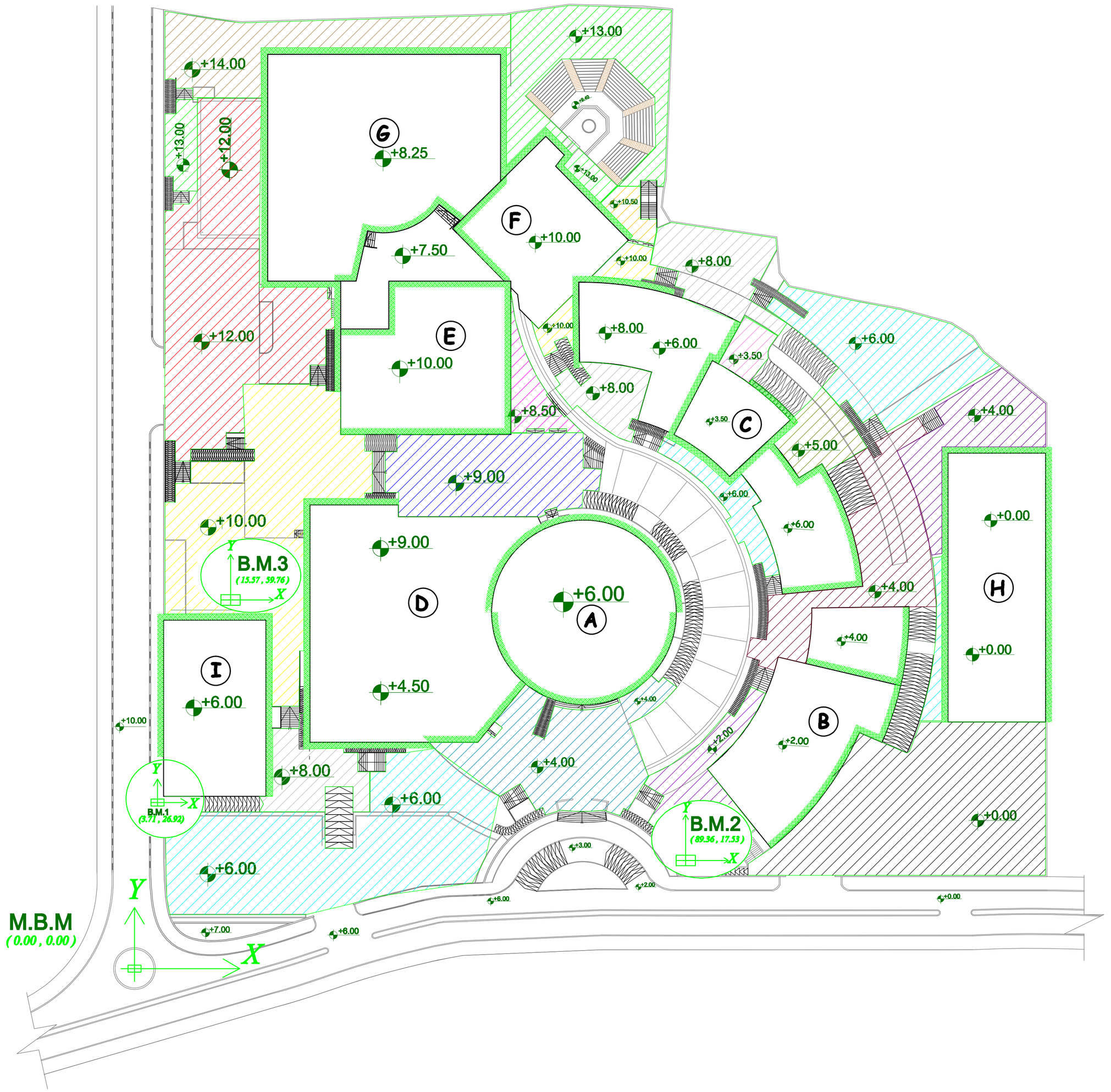
Number	Name
A	Reception
B	Sport hall
C	Building activities
D	Theater
E	Handicrafts
F	Restaurant
G	Photo Gallery
H	Parking 1
I	Parking 2

Drawing Title

Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	*No.of Draw*	*Date*
		2013/2014



By the name of Allah

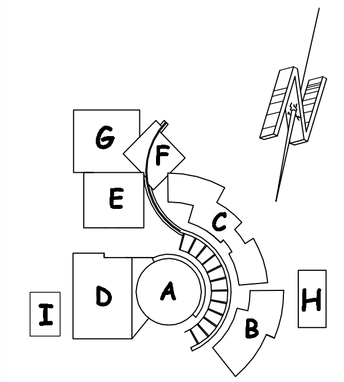
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

Number	Name
A	Reception
B	Sport hall
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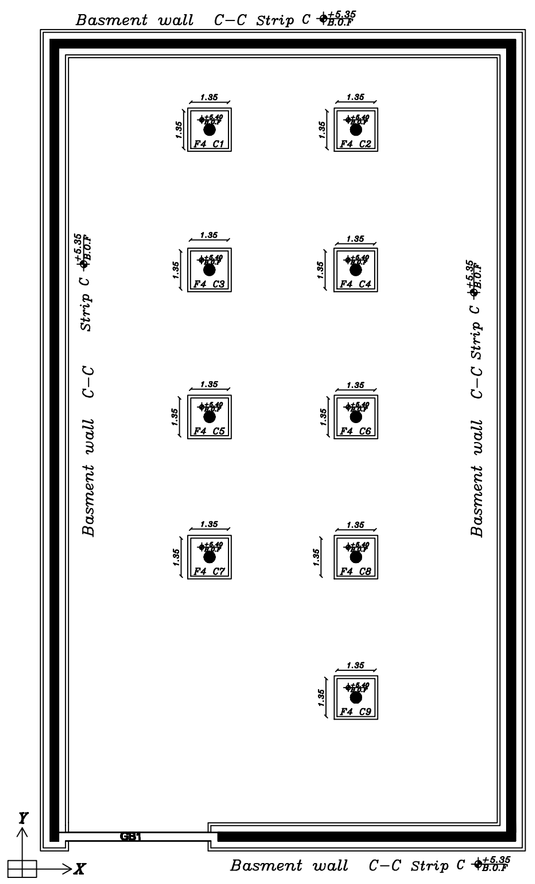
Drawing Title

Buildings Ground Levels

Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

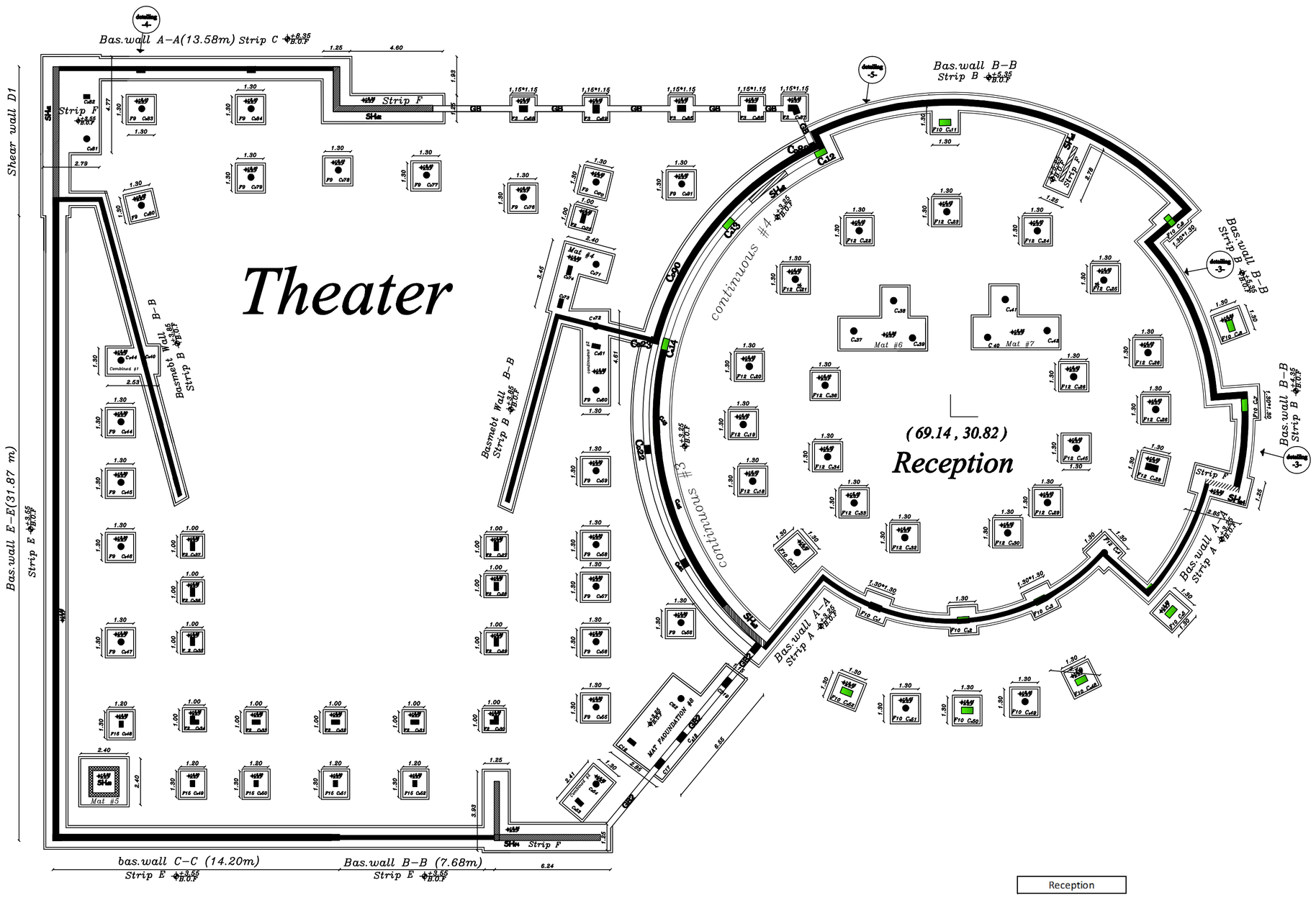
Scale	No.of Draw	Date
1/350	S00	2013-2014



parking 2

B.M.1

(3.71 , 26.92)



Theater

Reception

parcking 1

NAME OF COLUMN	X-axis	Y-axis
Ch1	42.22	59.63
Ch2	48.07	59.63
Ch3	53.91	59.63
Ch4	42.22	53.23
Ch5	48.07	53.23
Ch6	53.91	53.23
Ch7	42.22	48.23
Ch8	48.07	48.23
Ch9	53.91	48.23
Ch10	42.22	43.23
Ch11	48.07	43.23
Ch12	53.91	43.23
Ch13	42.22	38.23
Ch14	48.07	38.23
Ch15	53.91	38.23
Ch16	48.07	33.23
Ch17	53.91	33.24
Ch18	48.07	28.23
Ch19	53.91	28.21
Ch20	48.06	22.89
Ch21	53.91	22.89

Theater

NAME OF COLUMN	X-axis	Y-axis
Cd2	24.93	38.38
Cd3	24.95	35.14
Cd4	24.95	32.15
Cd5	24.95	28.13
Cd6	24.95	24.5
Cd7	24.95	19.65
Cd8	24.95	16.45
Cd9	24.95	12.63
Cd10	25	9.98
Cd11	28.17	9.98
Cd12	31.71	9.98
Cd13	34.86	9.98
Cd14	38.79	9.98
Cd15	42.73	9.98
Cd16	53.49	14.72
Cd17	54.86	13.65
Cd18	55.91	14.92
Cd19	58.14	17.65
Cd20	59.56	19.33
Cd21	56.08	23.57
Cd22	54.27	29.2
Cd23	54.55	34.64
Cd24	49.15	33.6
Cd25	48.35	30.6
Cd26	47.54	27.6
Cd27	46.75	24.41
Cd28	46.75	22.44
Cd29	46.75	19.66
Cd30	46.65	15.8
Cd31	42.72	15.7
Cd32	38.8	15.7
Cd33	34.86	15.7
Cd34	31.82	15.8
Cd35	31.71	19.69
Cd36	31.71	22.13
Cd37	31.71	24.39

Reception

NAME OF COLUMN	X-axis	Y-axis
Ca1	65.55	21.39
Ca2	69.9	20.76
Ca3	73.7	21.75
Ca4	76.87	24.08
Ca5	80.16	21.15
Ca7	83.81	31.36
Ca8	83.11	35.35
Ca9	80.15	40.51
Ca11	69	45.41
Ca12	62.84	43.93
Ca13	58.25	40.38
Ca14	55.14	34.41
Ca15	54.68	30.3
Ca16	55.4	26.31
Ca17	61.66	24.1
Ca18	59.46	27.63
Ca19	58.98	30.44
Ca20	59.28	33.33
Ca21	61.57	37.64
Ca22	64.72	40.06
Ca23	69.06	41
Ca24	73.55	40.05
Ca25	76.84	37.6
Ca26	79.04	34.03
Ca27	79.42	31.2
Ca28	79.16	28.35
Ca29	74.06	26.57
Ca30	72.08	25.07
Ca32	67	24.84
Ca33	64.49	26.57
Ca34	63.17	28.83
Ca36	63.05	32.39
Ca37	64.47	35.07
Ca38	66.44	36.57
Ca39	67.37	34.75
Ca40	71.09	34.76
Ca41	71.96	36.64

By the name of Allah

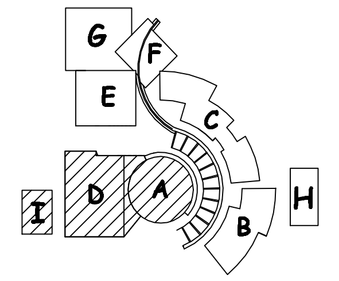
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

Number	Name
A	Reception
B	Sport hall
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D	Theater
E	Handicrafts
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H	Parking 1
I	Parking 2

Drawing Title

Foundation Plan Zoon 1

Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	No.of Draw	Date
1/150	S01	2013–2014

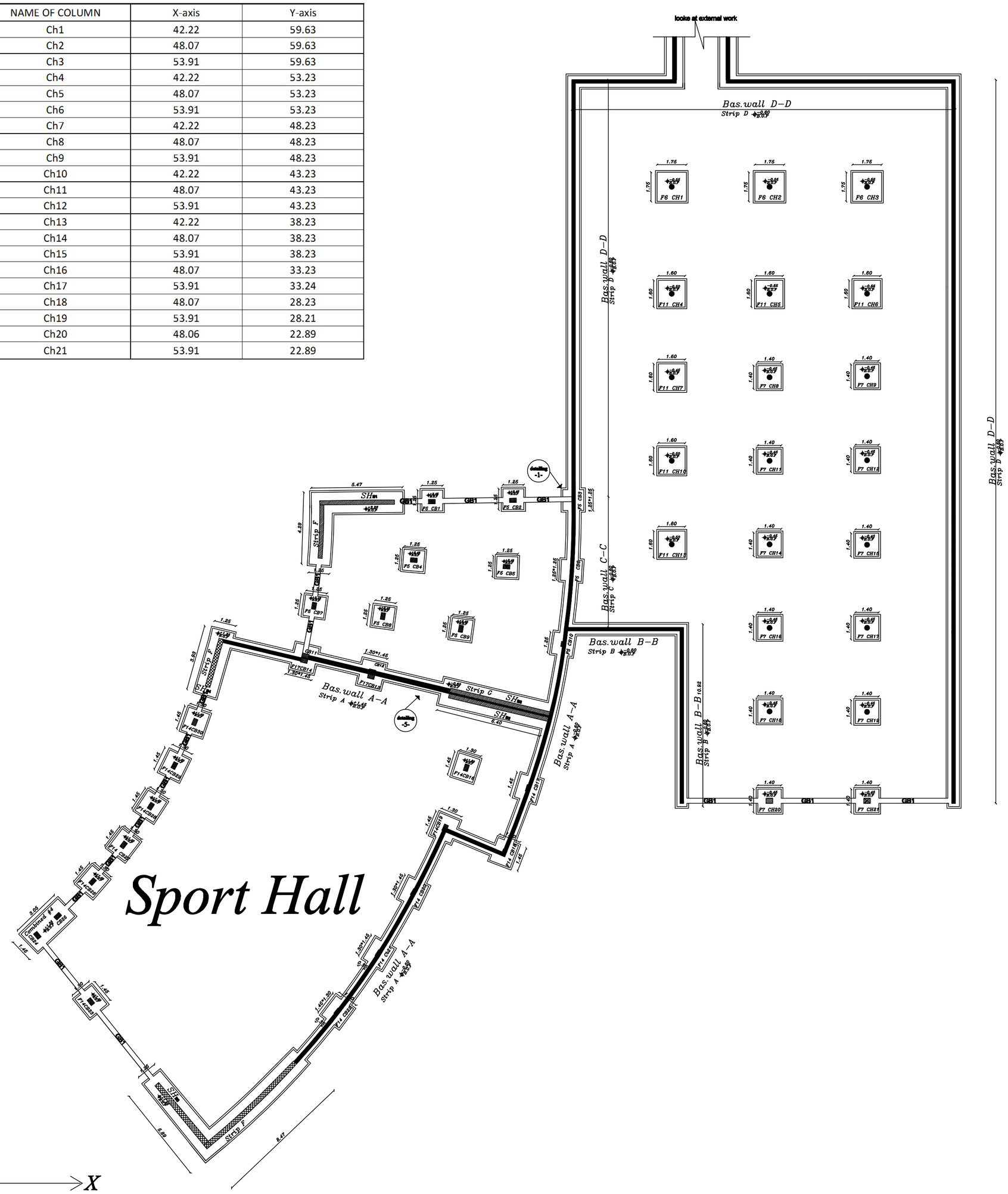
Parking 1

Sport Hall

NAME OF COLUMN	X-axis	Y-axis
Cb1	27.86	40.79
Cb2	32.71	40.87
Cb3	36.35	40.97
Cb4	26.78	37.29
Cb5	32.32	36.9
Cb6	36.25	36.71
Cb7	20.8	34.55
Cb8	24.93	33.93
Cb9	29.59	33.17
Cb10	35.72	32.27
Cb11	20.27	31.58
Cb12	24.29	30.61
Cb13	24.22	30.32
Cb14	20.22	31.27
Cb16	29.93	24.87
Cb17	33.6	23.61
Cb18	32.16	19.08
Cb19	28.66	21.26
Cb20	26.77	17.39
Cb21	24.68	13.75
Cb22	22.19	10.26
Cb23	7.45	10.86
Cb24	4.24	14.83
Cb25	5.47	15.98
Cb26	7.56	18.05
Cb27	9.41	20.24
Cb28	11.06	22.57
Cb29	12.45	25
Cb30	13.67	27.6

parking 1

NAME OF COLUMN	X-axis	Y-axis
Ch1	42.22	59.63
Ch2	48.07	59.63
Ch3	53.91	59.63
Ch4	42.22	53.23
Ch5	48.07	53.23
Ch6	53.91	53.23
Ch7	42.22	48.23
Ch8	48.07	48.23
Ch9	53.91	48.23
Ch10	42.22	43.23
Ch11	48.07	43.23
Ch12	53.91	43.23
Ch13	42.22	38.23
Ch14	48.07	38.23
Ch15	53.91	38.23
Ch16	48.07	33.23
Ch17	53.91	33.24
Ch18	48.07	28.23
Ch19	53.91	28.21
Ch20	48.06	22.89
Ch21	53.91	22.89



By the name of Allah

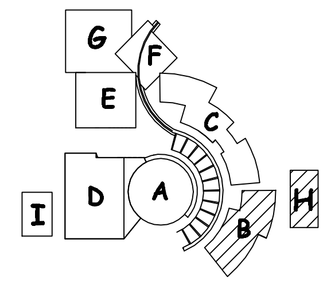
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building	
Number	Name
A	Reception
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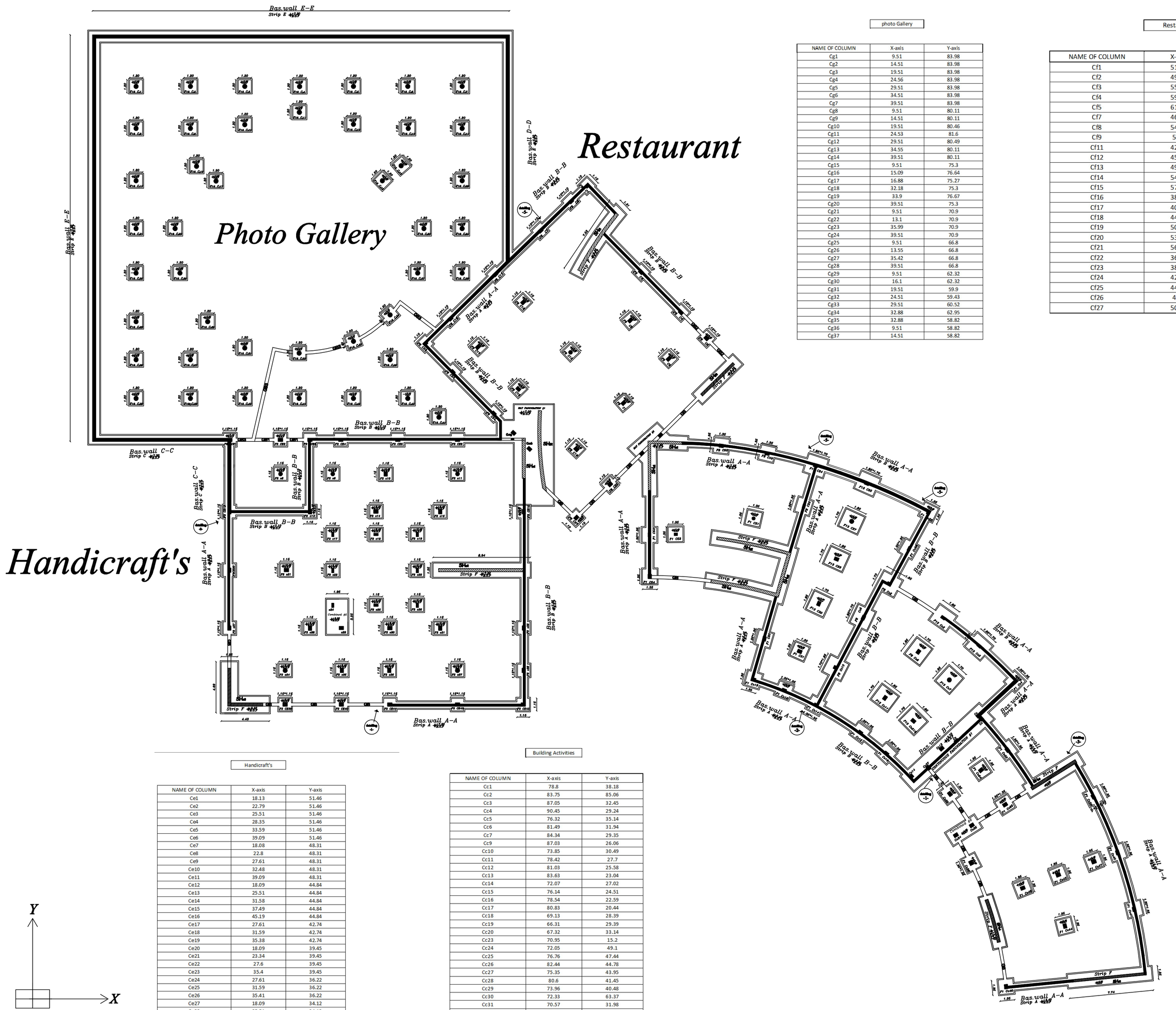
Drawing Title

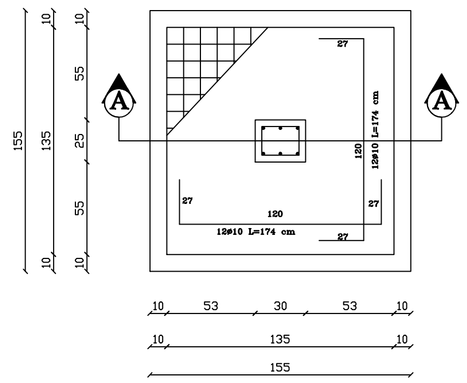
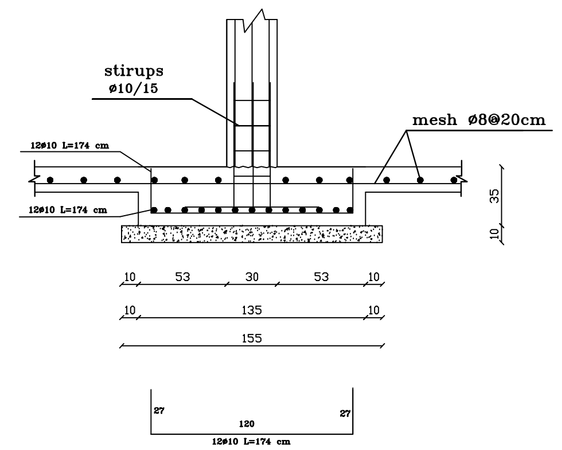
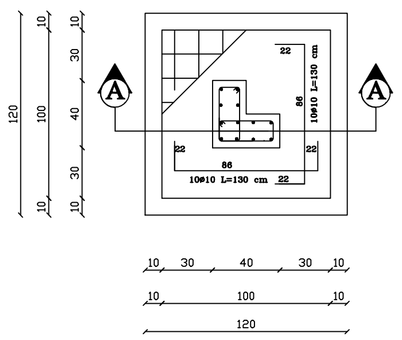
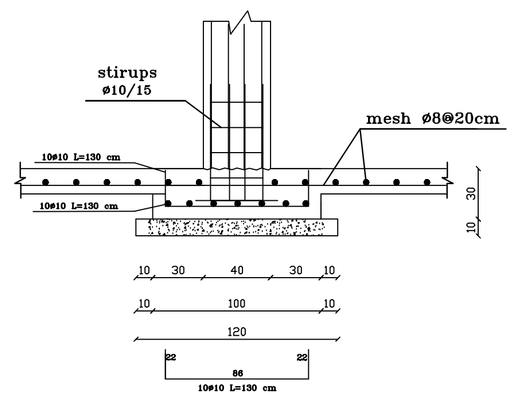
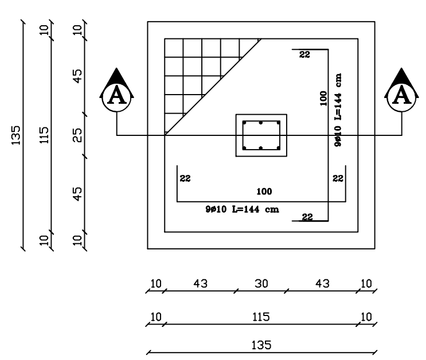
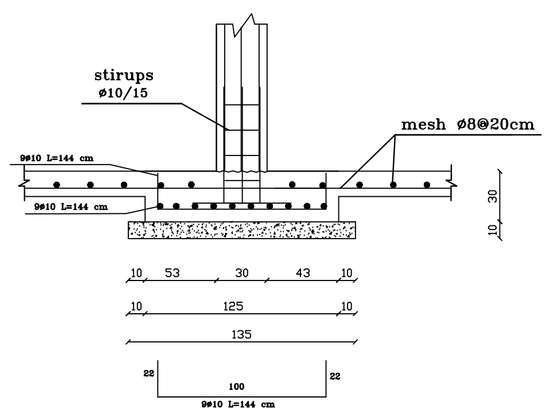
Foundation Plan Zoon 2

Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	No.of Draw	Date
1/150	S02	2013–2014


Bas.wall E–E
Strip E 4659
Bas.wall F–F
Strip F 4659
Photo Gallery
Restaurant
Handicraft's
Building Activities
Bas.wall A–A
Strip A 4659
Bas.wall B–B
Strip B 4659
Bas.wall C–C
Strip C 4659
Bas.wall D–D
Strip D 4659
Strip G 4659
Strip H 4659
Strip I 4659
Strip J 4659
Strip K 4659
Strip L 4659
Strip M 4659
Strip N 4659
Strip O 4659
Strip P 4659
Strip Q 4659
Strip R 4659
Strip S 4659
Strip T 4659
Strip U 4659
Strip V 4659
Strip W 4659
Strip X 4659
Strip Y 4659
Strip Z 4659
Strip 1 4659
Strip 2 4659
Strip 3 4659
Strip 4 4659
Strip 5 4659
Strip 6 4659
Strip 7 4659
Strip 8 4659
Strip 9 4659
Strip 10 4659
Strip 11 4659
Strip 12 4659
Strip 13 4659
Strip

Foundation Dim	SECTION INFORMATION		Foundation Plan	Section A-A
135 x 135 x 35	**F1**			
	Long direction Bars	12Ø10		
	short direction bars	12Ø10		
	Concret Cover	7.5 cm		
	Coulmn dimenstion	30 x 25		
	Scale	1 : 25		
100 x 100 x 30	**F2**			
	Long direction Bars	10Ø10		
	short direction bars	10Ø10		
	Concret Cover	7.5 cm		
	Coulmn dimenstion	40 x 40		
	Scale	1 : 25		
115 x 115 x 30	**F3**			
	Long direction Bars	9Ø10		
	short direction bars	9Ø10		
	Concret Cover	7.5 cm		
	Coulmn dimenstion	30 x 25		
	Scale	1 : 25		

By the name of Allah

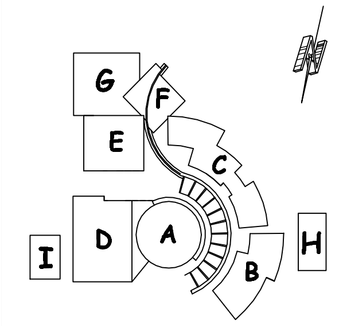
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

Number	Name
A	Reception
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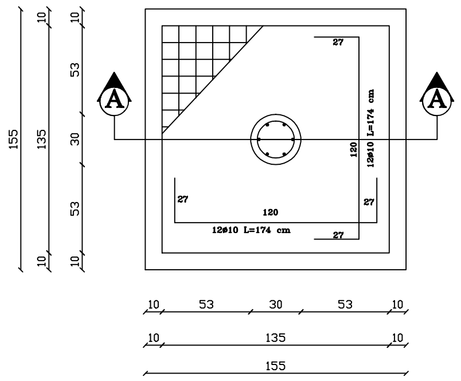
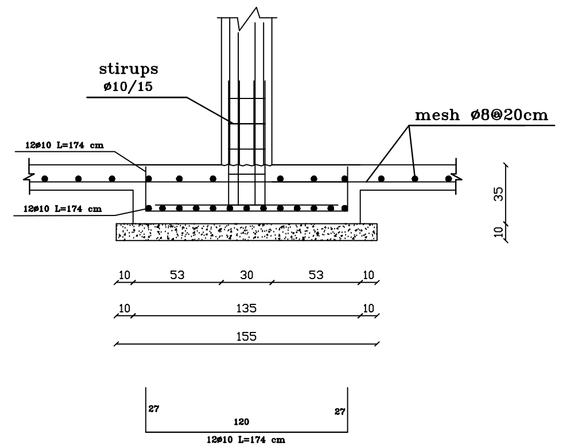
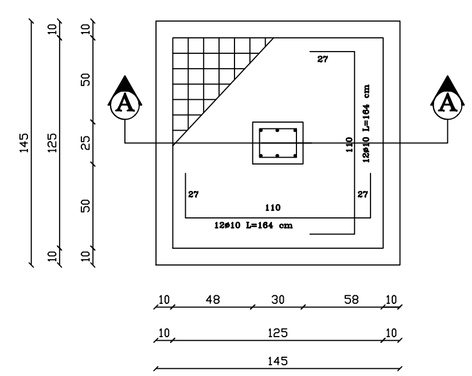
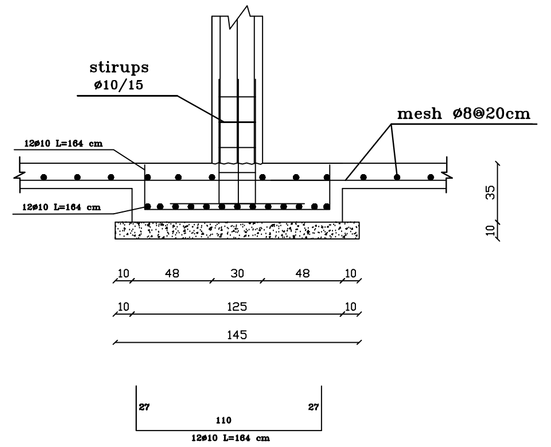
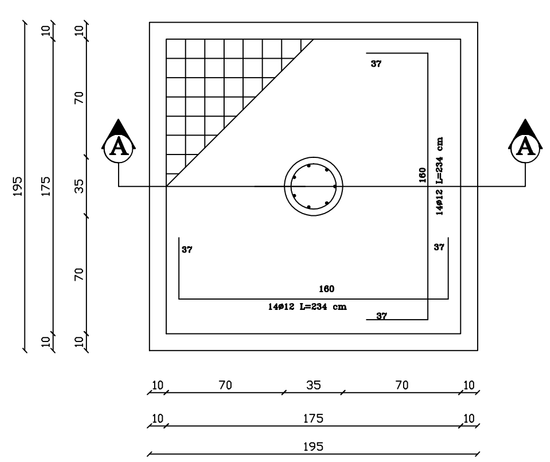
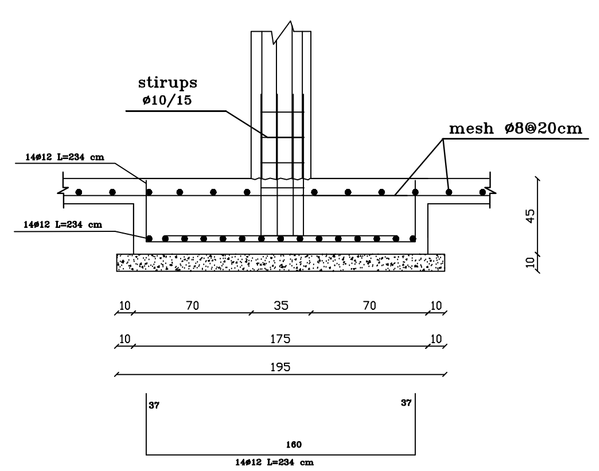
Drawing Title

isolated foundation

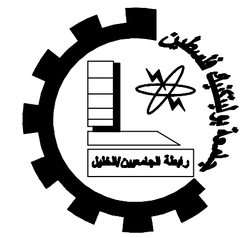
Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	No.of Draw	Date
1/25	S04	2013-2014

Foundation Dim	SECTION INFORMATION		CONCRETE SECTION	Section A-A
135 x 135 x 35	**F4**			
	Long direction Bars	12Ø10		
	short direction bars	12Ø10		
	Concret Cover	7.5 cm		
	Coulmn dimenstion	D = 30		
	Scale	1 : 25		
125 x 125 x 35	**F5**			
	Long direction Bars	12Ø10		
	short direction bars	12Ø10		
	Concret Cover	7.5 cm		
	Coulmn dimenstion	30 x 25		
	Scale	1 : 25		
175 x 175 x 45	**F6**			
	Long direction Bars	14Ø12		
	short direction bars	14Ø12		
	Concret Cover	7.5 cm		
	Coulmn dimenstion	D = 35		
	Scale	1 : 25		

By the name of Allah



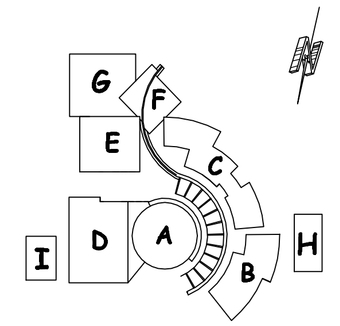
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

Number	Name
A	Reception
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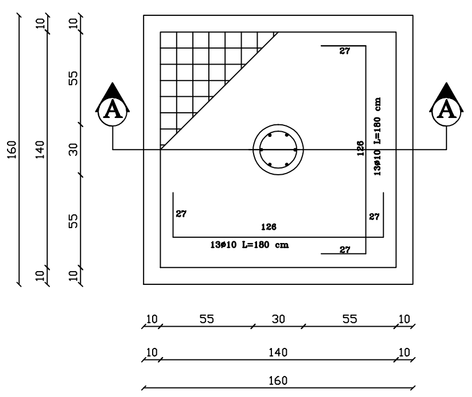
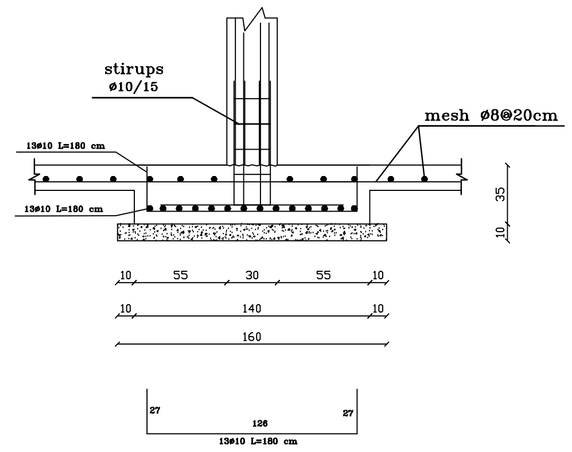
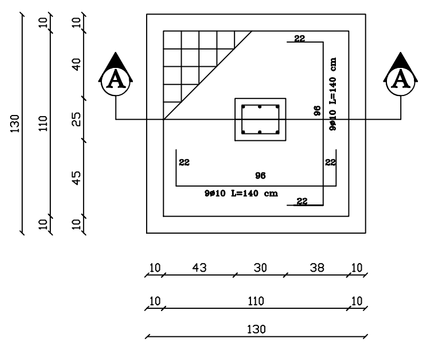
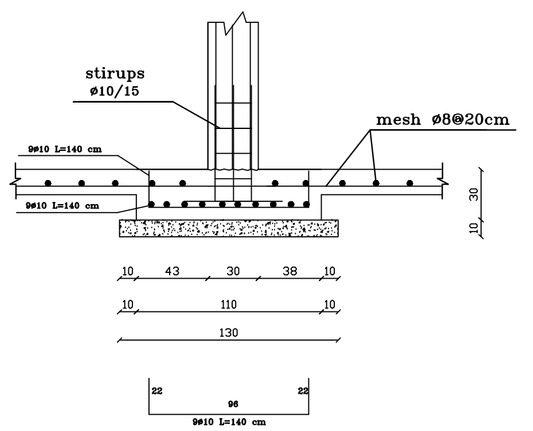
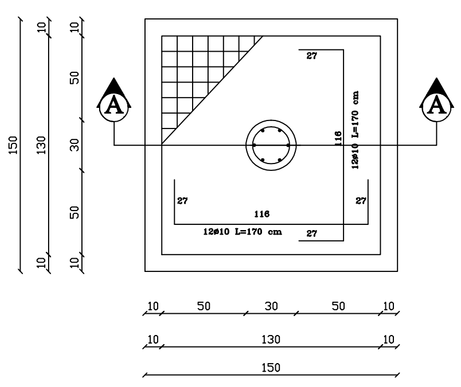
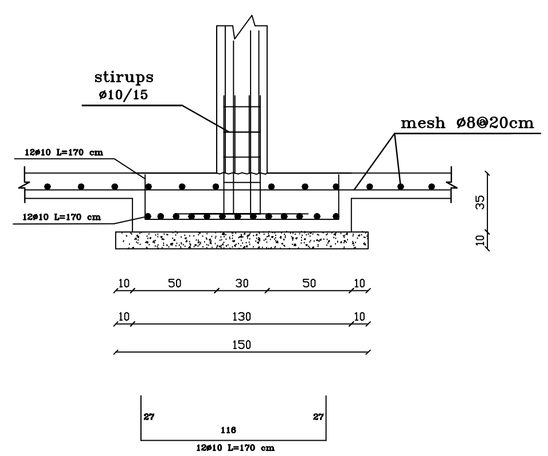
Drawing Title

isolated foundation

Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	No.of Draw	Date
1/25	S05	2013-2014

Foundation Dim	SECTION INFORMATION		CONCRETE SECTION	Section A-A
140 x 140 x 35	**F7**			
	Long direction Bars	13Ø10		
	short direction bars	13Ø10		
	Concret Cover	7.5 cm		
	Coulmn dimenstion	D = 30		
	Scale	1 : 25		
110 x 110 x 30	**F8**			
	Long direction Bars	9Ø10		
	short direction bars	9Ø10		
	Concret Cover	7.5 cm		
	Coulmn dimenstion	30 x 25		
	Scale	1 : 25		
130 x 130 x 35	**F9**			
	Long direction Bars	12Ø10		
	short direction bars	12Ø10		
	Concret Cover	7.5 cm		
	Coulmn dimenstion	D = 30		
	Scale	1 : 25		

By the name of Allah

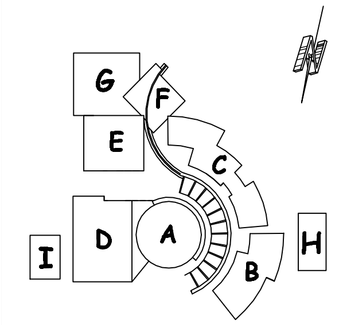
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

Number	Name
A	Reception
B	Sport hall
C	Building activities
D	Theater
E	Handicrafts
F	Restaurant
G	Photo Gallery
H	Parking 1
I	Parking 2

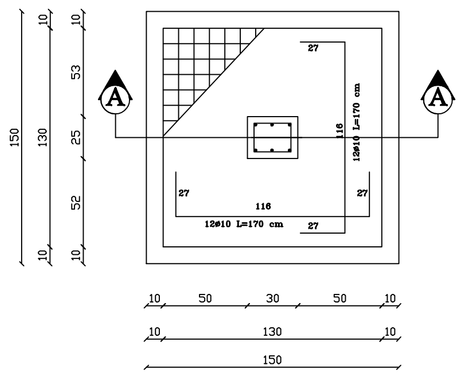
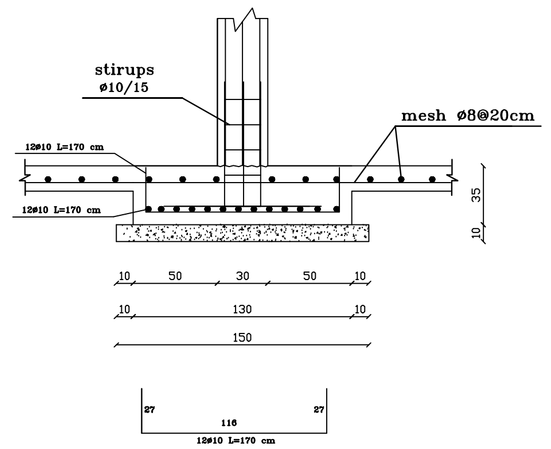
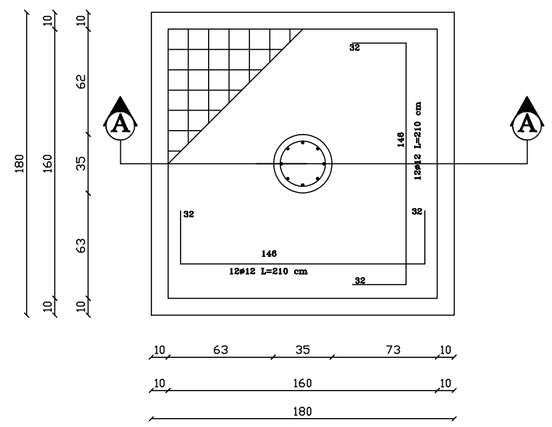
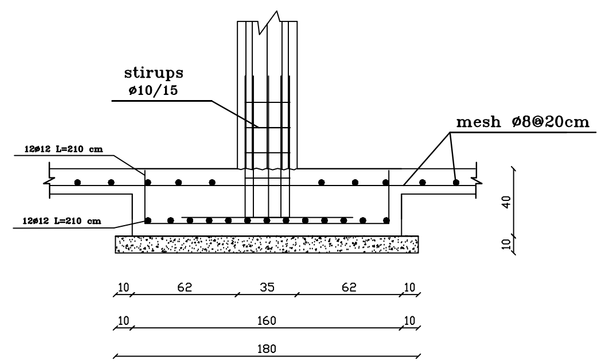
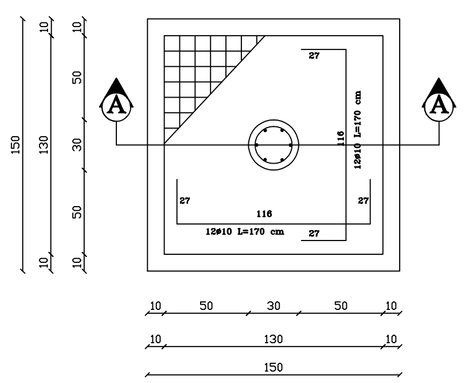
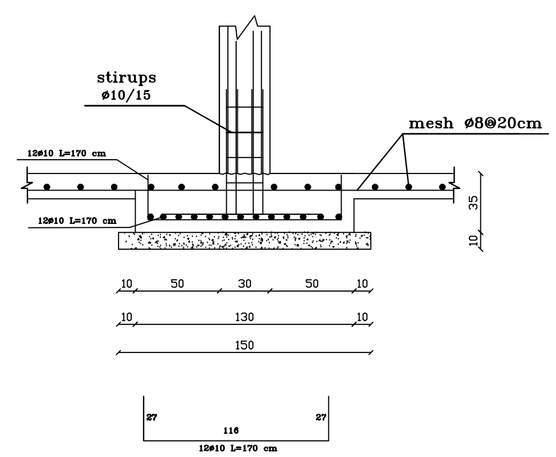
Drawing Title

isolated foundation

Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	No.of Draw	Date
1/25	S06	2013-2014

Foundation Dim	SECTION INFORMATION		CONCRETE SECTION	Section A-A
130 x 130 x 35	**F10**			
	Long direction Bars	12Ø10		
	short direction bars	12Ø10		
	Concret Cover	7.5 cm		
	Coulmn dimenstion	30 x 25		
	Scale	1 : 25		
160 x 160 x 40	**F11**			
	Long direction Bars	12Ø12		
	short direction bars	12Ø12		
	Concret Cover	7.5 cm		
	Coulmn dimenstion	D = 35		
	Scale	1 : 25		
130 x 130 x 35	**F12**			
	Long direction Bars	12Ø10		
	short direction bars	12Ø10		
	Concret Cover	7.5 cm		
	Coulmn dimenstion	D = 30		
	Scale	1 : 25		

By the name of Allah

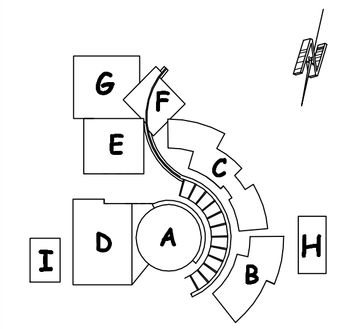
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

Number	Name
A	Reception
B	Sport hall
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H	Parking 1
I	Parking 2

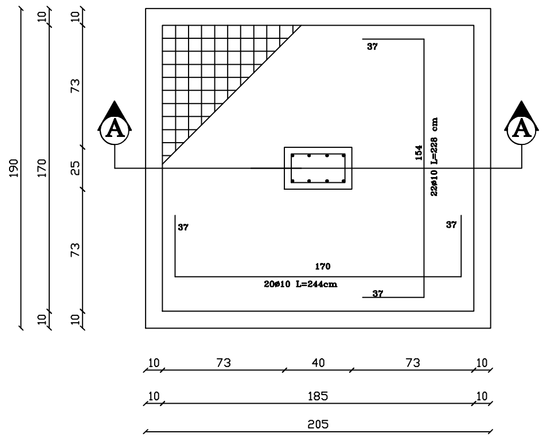
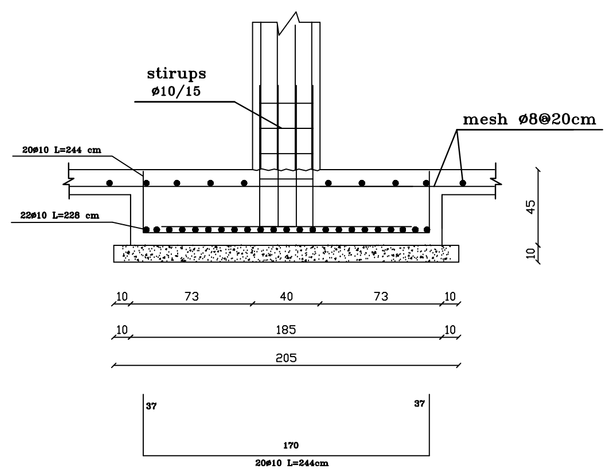
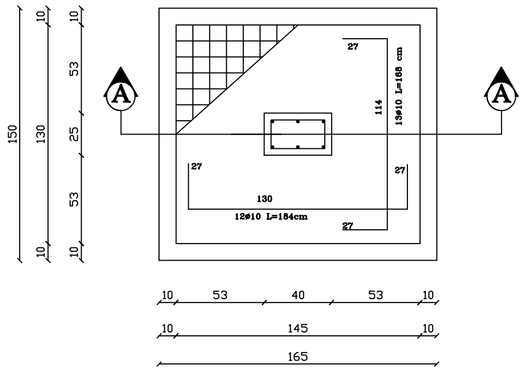
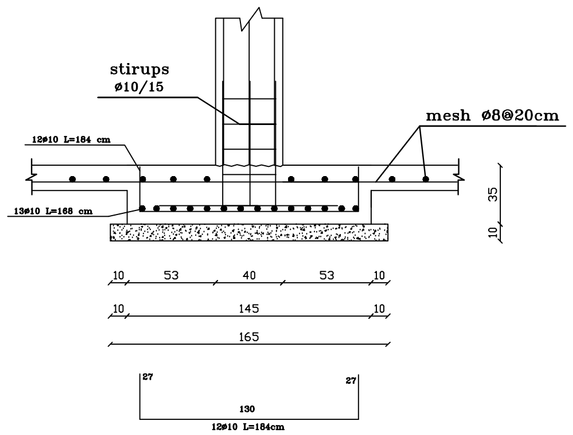
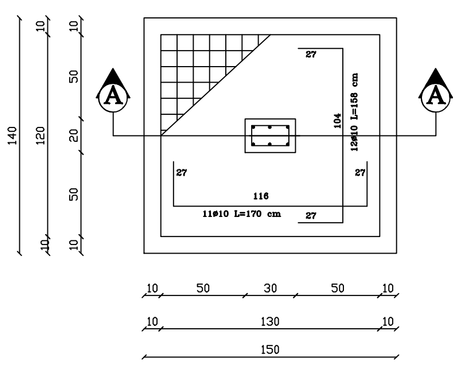
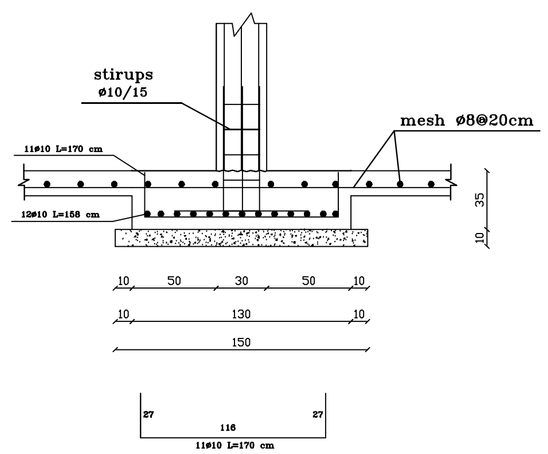
Drawing Title

isolated foundation

Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	No.of Draw	Date
1/25	S07	2013-2014

Foundation Dim	SECTION INFORMATION		CONCRETE SECTION	Section A-A
185 x 170 x 45	**F13**			
	Long direction Bars	20Ø10		
	short direction bars	22Ø10		
	Concret Cover	7.5 cm		
	Coulmn dimenstion	40 x 25		
	Scale	1 : 25		
145 x 130 x 35	**F14**			
	Long direction Bars	12Ø10		
	short direction bars	13Ø10		
	Concret Cover	7.5 cm		
	Coulmn dimenstion	40 x 25		
	Scale	1 : 25		
130 x 120 x 35	**F15**			
	Long direction Bars	11Ø10		
	short direction bars	12Ø10		
	Concret Cover	7.5 cm		
	Coulmn dimenstion	30 x 20		
	Scale	1 : 25		

By the name of Allah

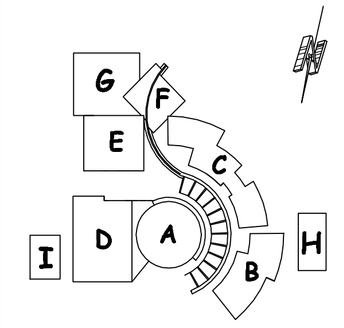
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

Number	Name
A	Reception
B	Sport hall
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I	Parking 2

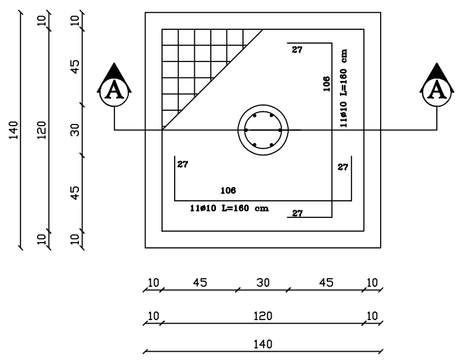
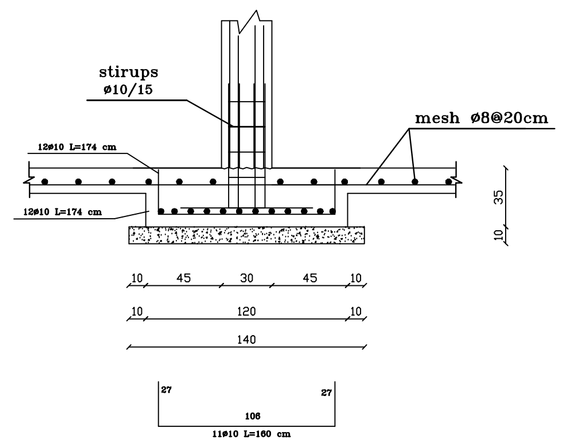
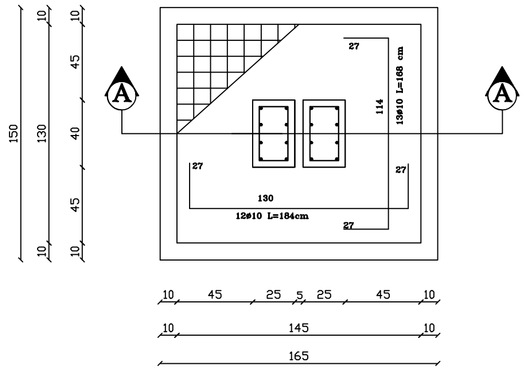
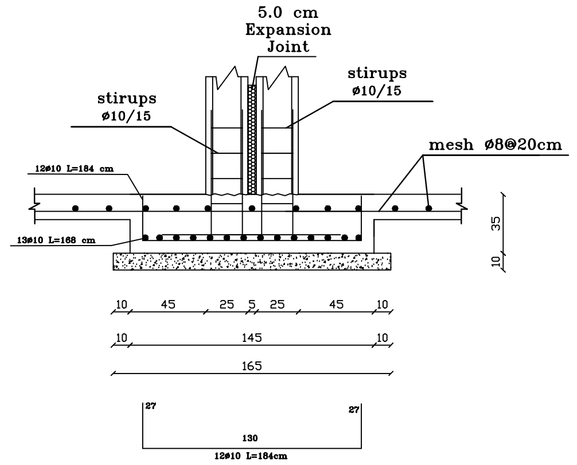
Drawing Title

isolated foundation

Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	No.of Draw	Date
1/25	S08	2013-2014

Foundation Dim	SECTION INFORMATION		CONCRETE SECTION	Section A-A
120 x 120 x 35	F16			
	Long direction Bars	11Ø10		
	short direction bars	11Ø10		
	Concret Cover	7.5 cm		
	Coulmn dimenstion	D = 30		
	Scale	1 : 25		
145 x 130 x 35	F17			
	Long direction Bars	12Ø10		
	short direction bars	13Ø10		
	Concret Cover	7.5 cm		
	Coulmn dimenstion	40 x 25		
	Scale	1 : 25		

By the name of Allah

جامعة فلسطين التقنية/الخضوري

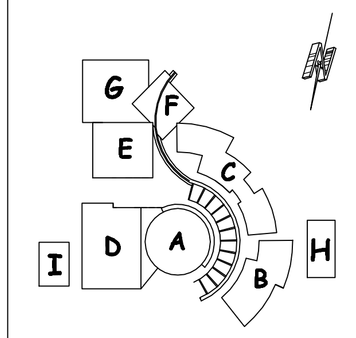
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

Number	Name
A	Reception
B	Sport hall
C	Building activities
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H	Parking 1
I	Parking 2

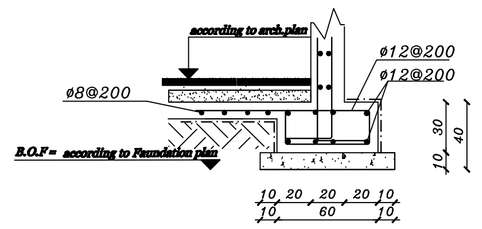
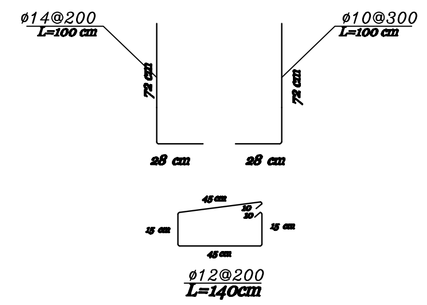
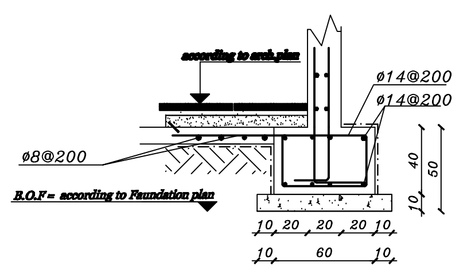
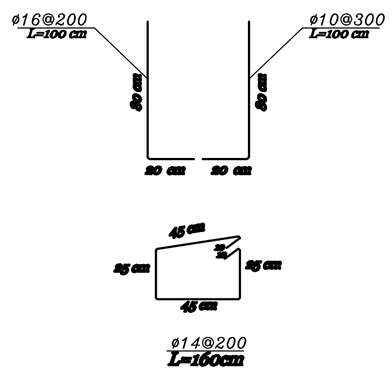
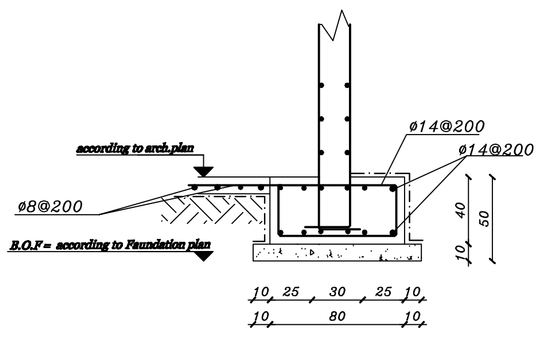
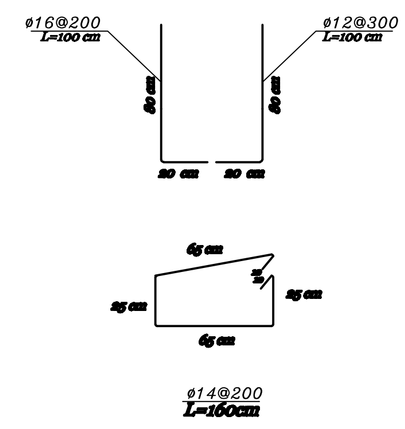
Drawing Title

isolated foundation

Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	No.of Draw	Date
1/25	S09	2013-2014

Foundation Dim	SECTION INFORMATION		CONCRETE SECTION	Section A-A
60 x 30	**Strip A**			
	Long direction Bars	Ø12 / 200		
	short direction bars	Ø12 / 200		
	Concret Cover	7.5 cm		
	Scale	1 : 25		
60 x 40	**Strip B**			
	Long direction Bars	Ø14 / 200		
	short direction bars	Ø14 / 200		
	Concret Cover	7.5 cm		
	Scale	1 : 25		
80 x 40	**Strip C**			
	Long direction Bars	Ø14 / 200		
	short direction bars	Ø14 / 200		
	Concret Cover	7.5 cm		
	Scale	1 : 25		

By the name of Allah



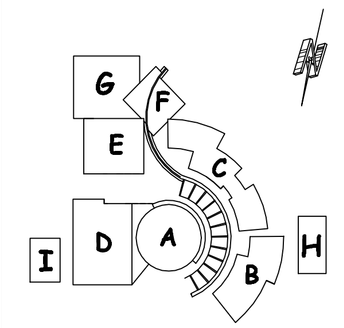
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

Number	Name
A	Reception
B	Sport hall
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I	Parking 2

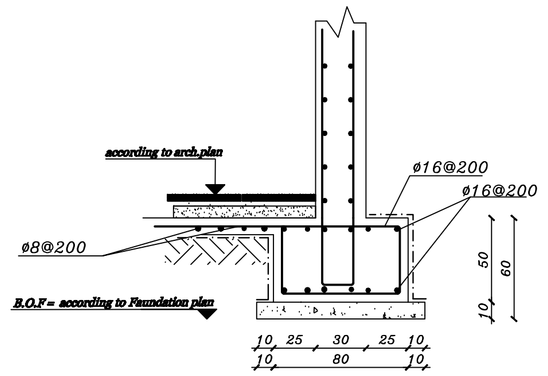
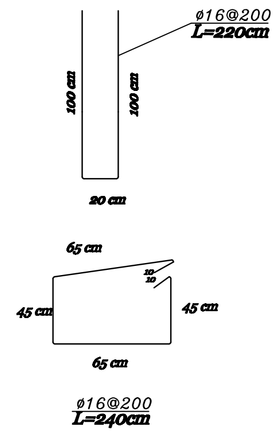
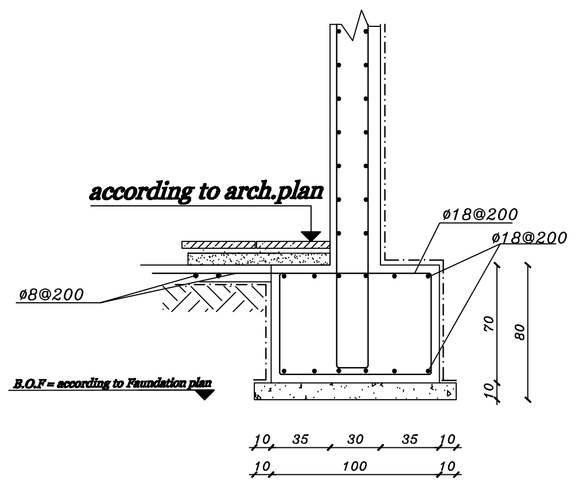
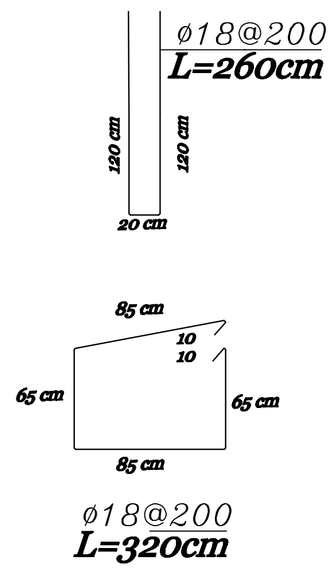
Drawing Title

STRIP foundation

Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	No.of Draw	Date
1/25	S10	2013-2014

Foundation Dim	SECTION INFORMATION		CONCRETE SECTION	Section A-A
80 x 50	Strip D			
	Long direction Bars	Ø16 / 200		
	short direction bars	Ø16 / 200		
	Concret Cover	7.5 cm		
	Scale	1 : 25		
100 x 70	Strip E			
	Long direction Bars	Ø18 / 200		
	short direction bars	Ø18 / 200		
	Concret Cover	7.5 cm		
	Scale	1 : 25		

By the name of Allah

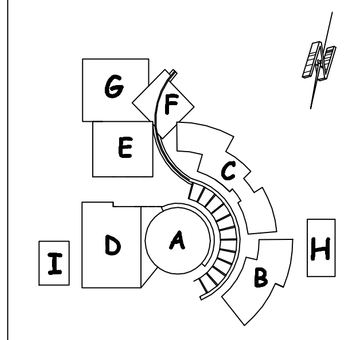
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building	
Number	Name
A	Reception
B	Sport hall
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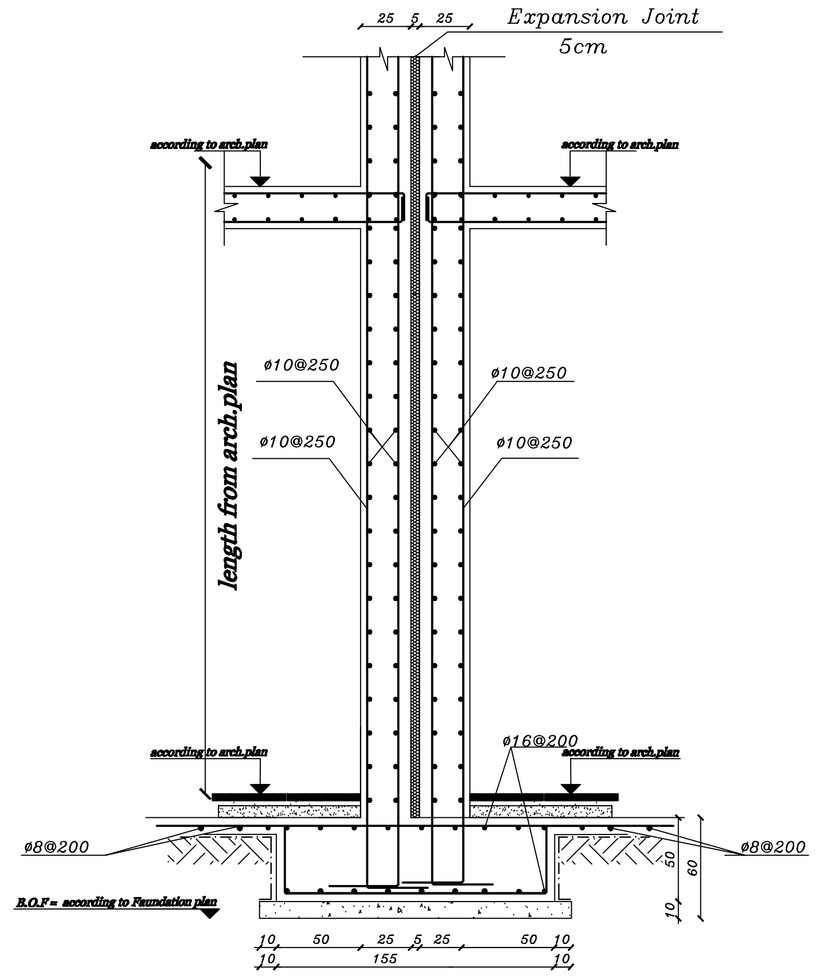
Drawing Title

STRIP foundation

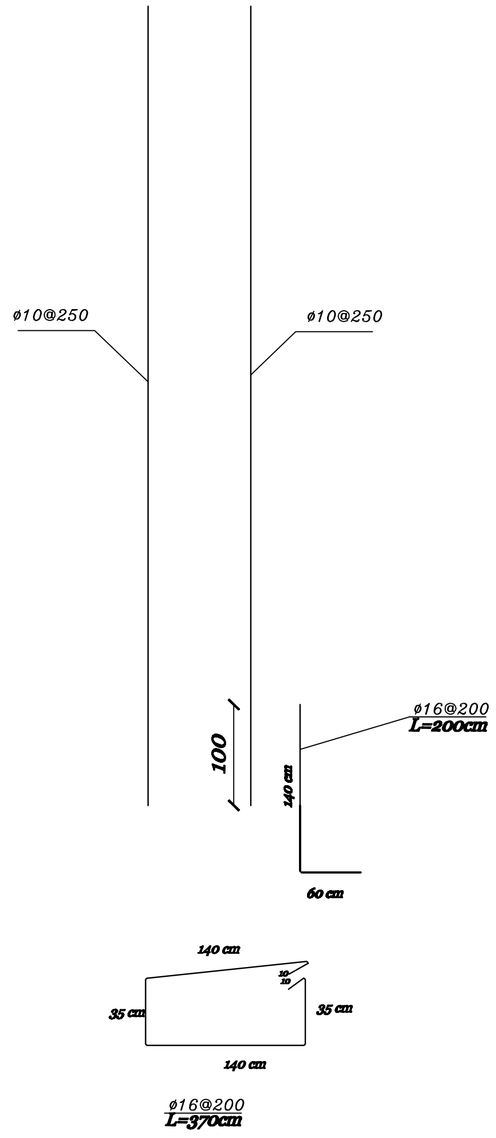
Designed By

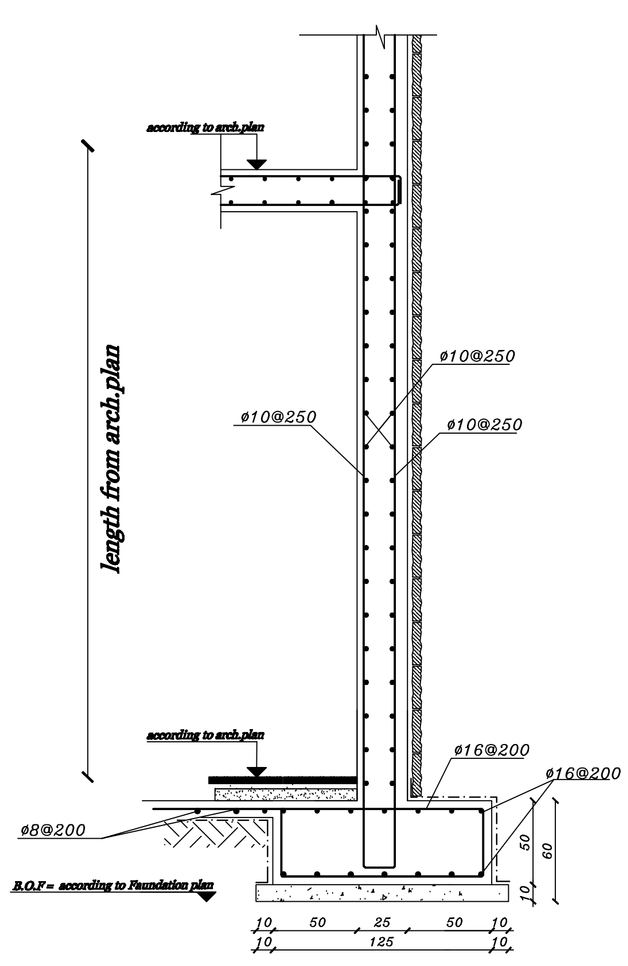
Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	No.of Draw	Date
1/25	S11	2013-2014

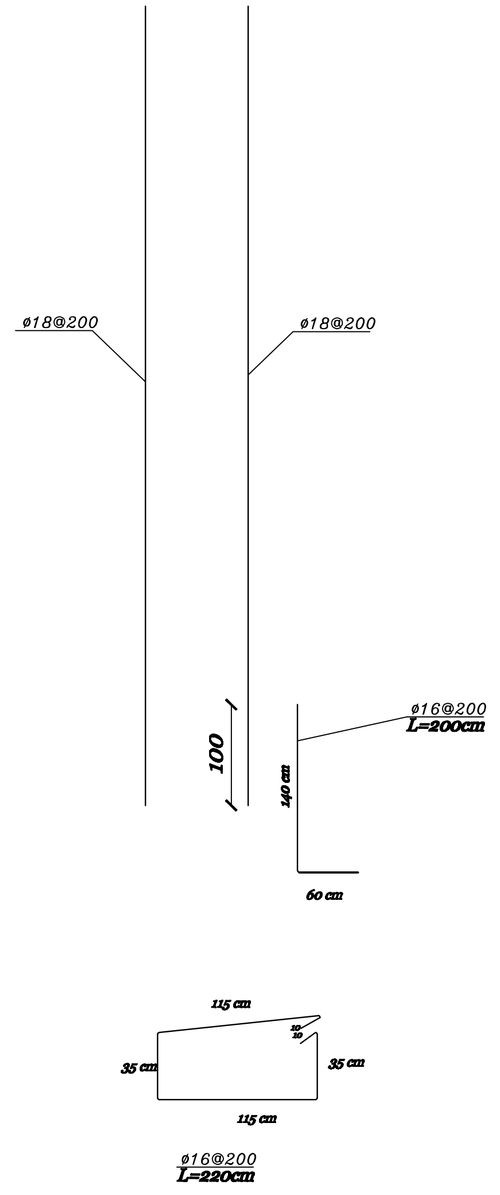


Sec(G-G)





Sec(F-F)



By the name of Allah

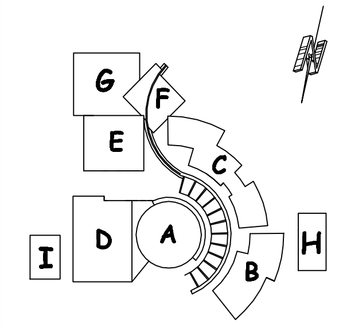
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

Number	Name
A	Reception
B	Sport hall
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Drawing Title

STRIP foundation

Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

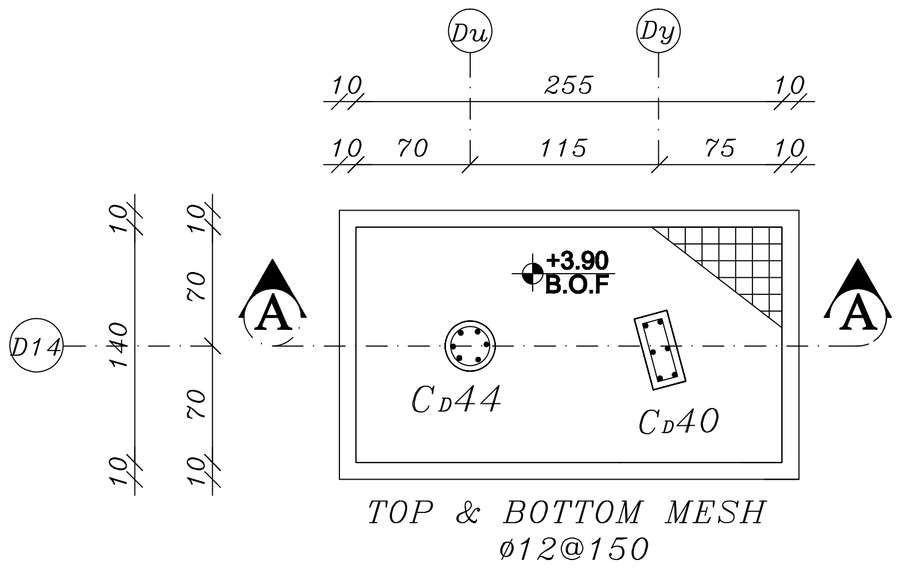
Scale	No.of Draw	Date
1/25	S12	2013-2014

Foundation Dim	SECTION INFORMATION	Foundation Plan	Section A-A	Detailing

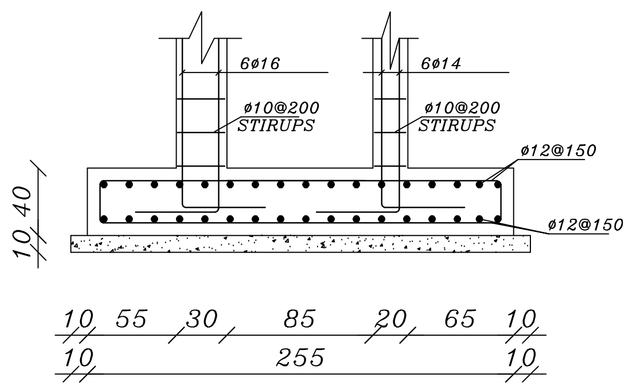
255 x 140 x 40

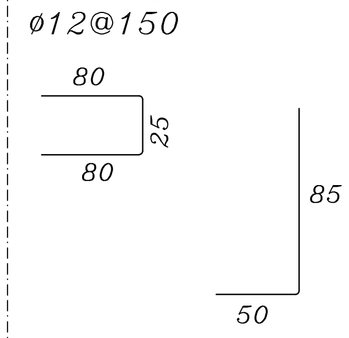
Combined #1

FOOTING Location	Theater
TOP STEEL in both dir.	Ø12 / 150
BOT. STEEL in both dir.	Ø12 / 150
Concret Cover	7.5 cm
Scale	1 : 25



TOP & BOTTOM MESH
ø12@150

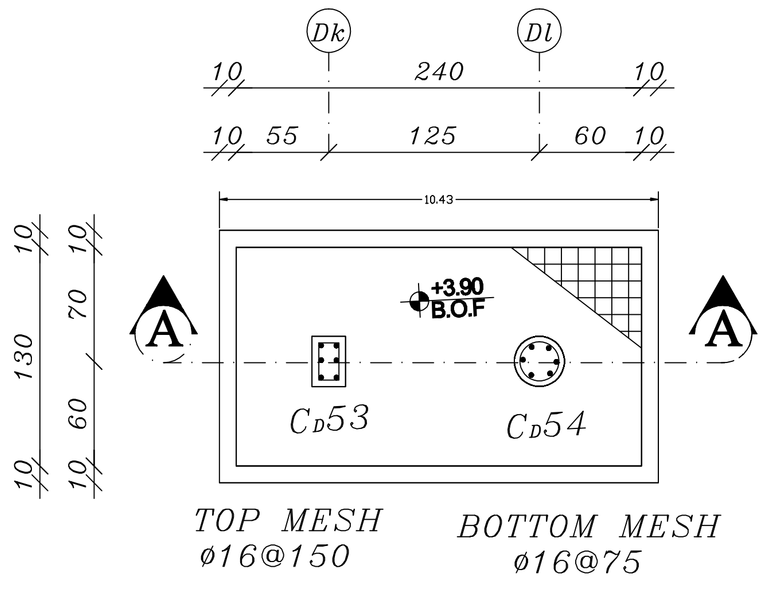




240 x 130 x 50

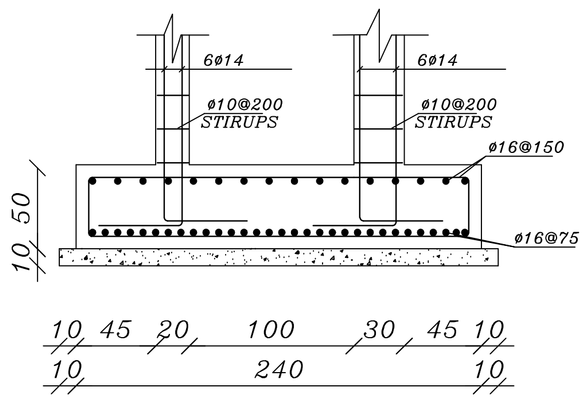
Combined #2

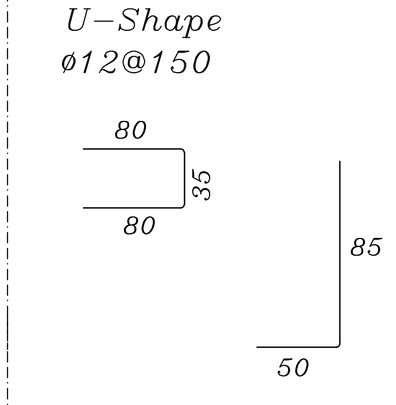
FOOTING Location	Theater
TOP STEEL in both dir.	Ø16 / 150
BOT. STEEL in both dir.	Ø16 / 75
Concret Cover	7.5 cm
Scale	1 : 25



TOP MESH
ø16@150

BOTTOM MESH
ø16@75





By the name of Allah

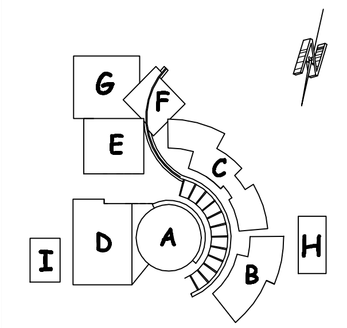
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

Number	Name
A	Reception
B	Sport hall
C	Building activities
D	Theater
E	Handicrafts
F	Restaurant
G	Photo Gallery
H	Parking 1
I	Parking 2

Drawing Title

Combined foundation

Designed By

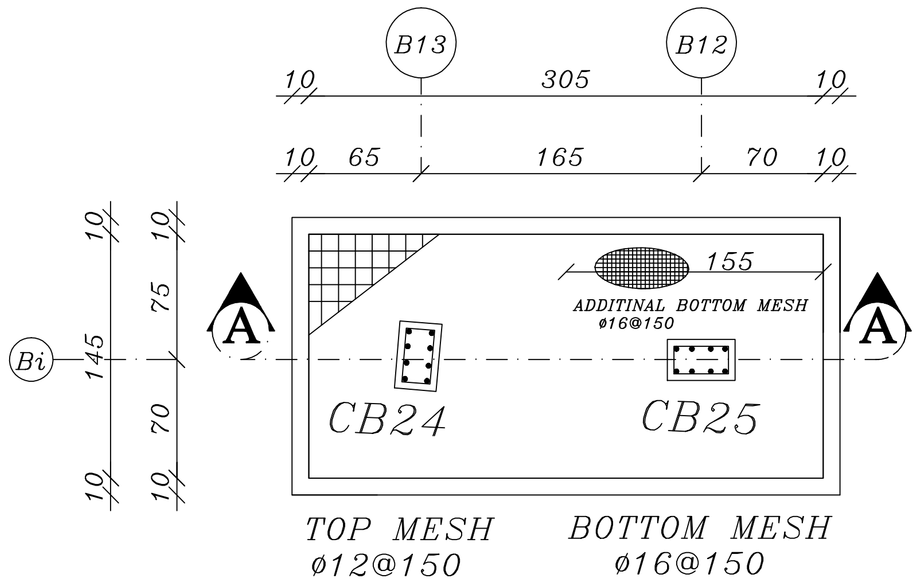
Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

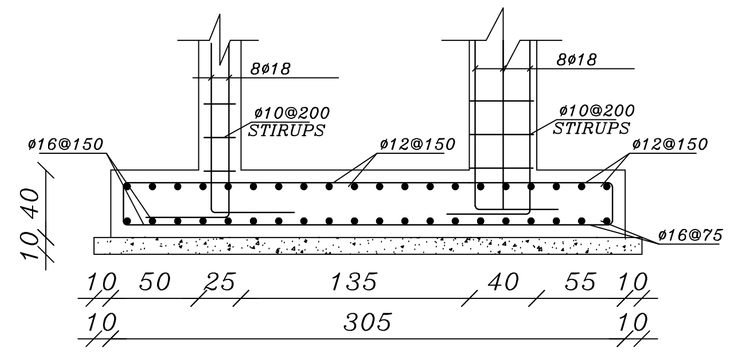
Scale	No.of Draw	Date
1/25	S13	2013-2014

Foundation Dim	SECTION INFORMATION	Foundation Plan	Section A-A	Detailing

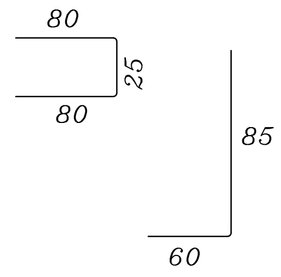
305 x 145 x 40 — Combined #4

FOOTING Location	Sport hall
TOP STEEL in both dir.	Ø12 / 150
BOT. STEEL in both dir.	Ø16 / 150
Concret Cover	7.5 cm
Scale	1 : 25



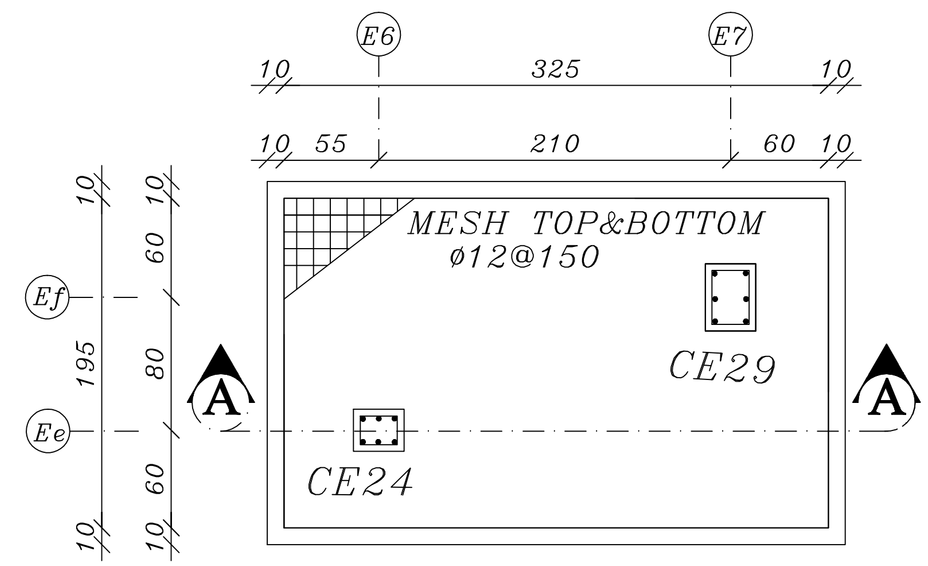


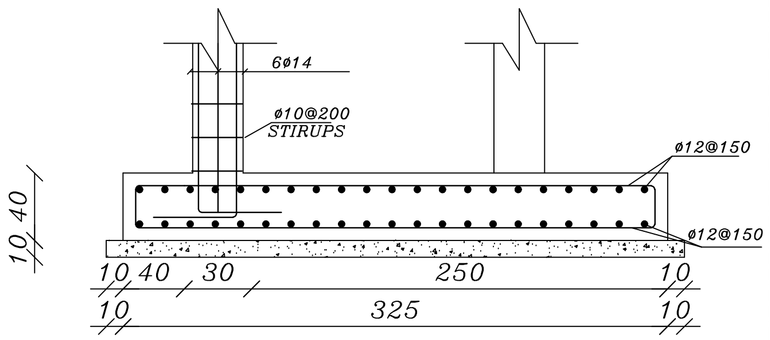
U–Shape
ø12@150



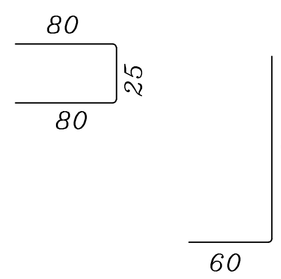
325 x 195 x 40 — Combined #5

FOOTING Location	Handicrafts
TOP STEEL in both dir.	Ø12 / 150
BOT. STEEL in both dir.	Ø12 / 150
Concret Cover	7.5 cm
Scale	1 : 25



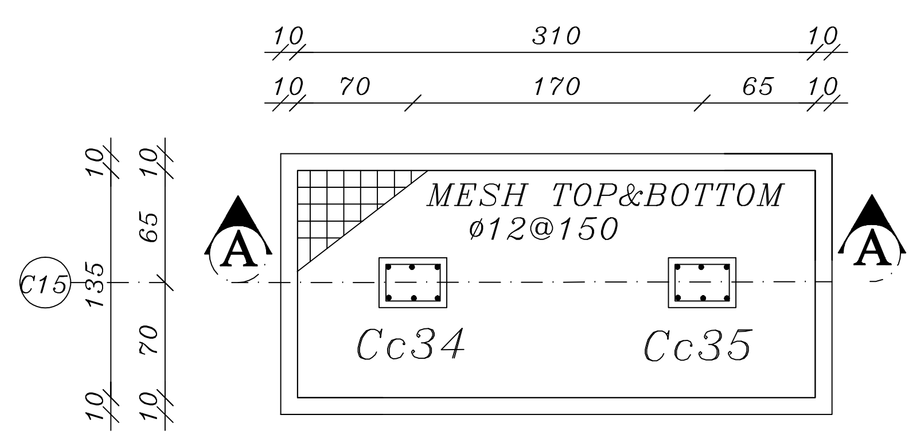


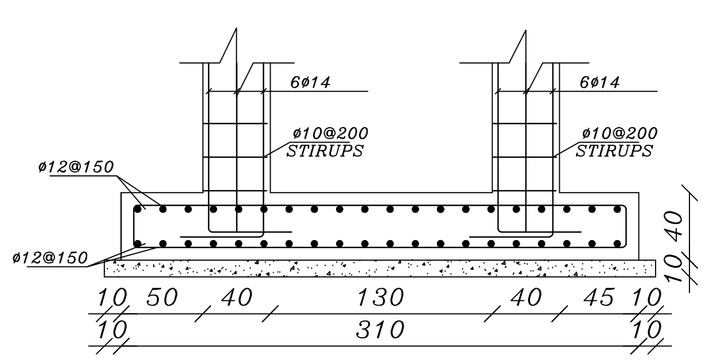
U–Shape
ø12@150



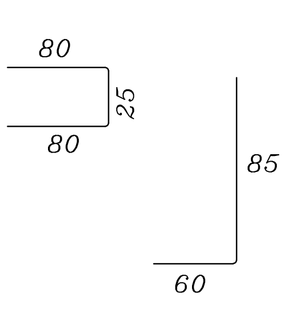
310 x 135 x 40 — Combined #6

FOOTING Location	Theater
TOP STEEL in both dir.	Ø12 / 150
BOT. STEEL in both dir.	Ø12 / 150
Concret Cover	7.5 cm
Scale	1 : 25





U–Shape
ø12@150



By the name of Allah

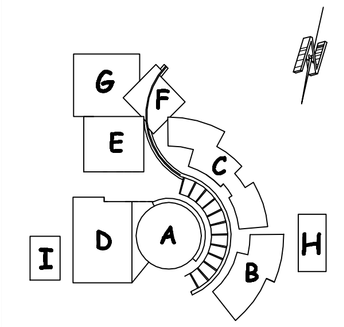
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

Number	Name
A	Reception
B	Sport hall
C	Building activities
D	Theater
E	Handicrafts
F	Restaurant
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H	Parking 1
I	Parking 2

Drawing Title

Combined foundation

Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

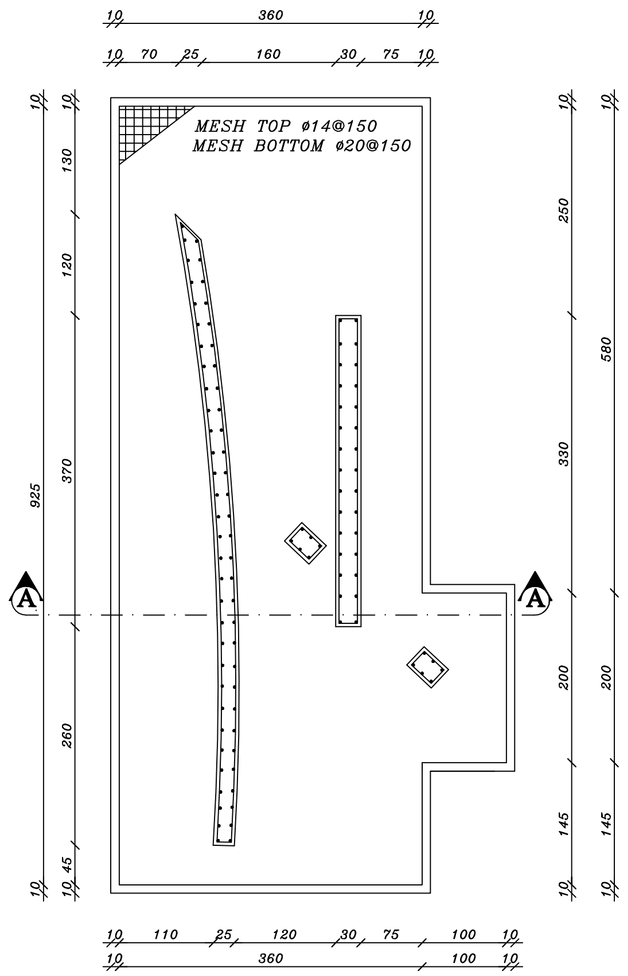
Scale	No.of Draw	Date
1/25	S14	2013-2014

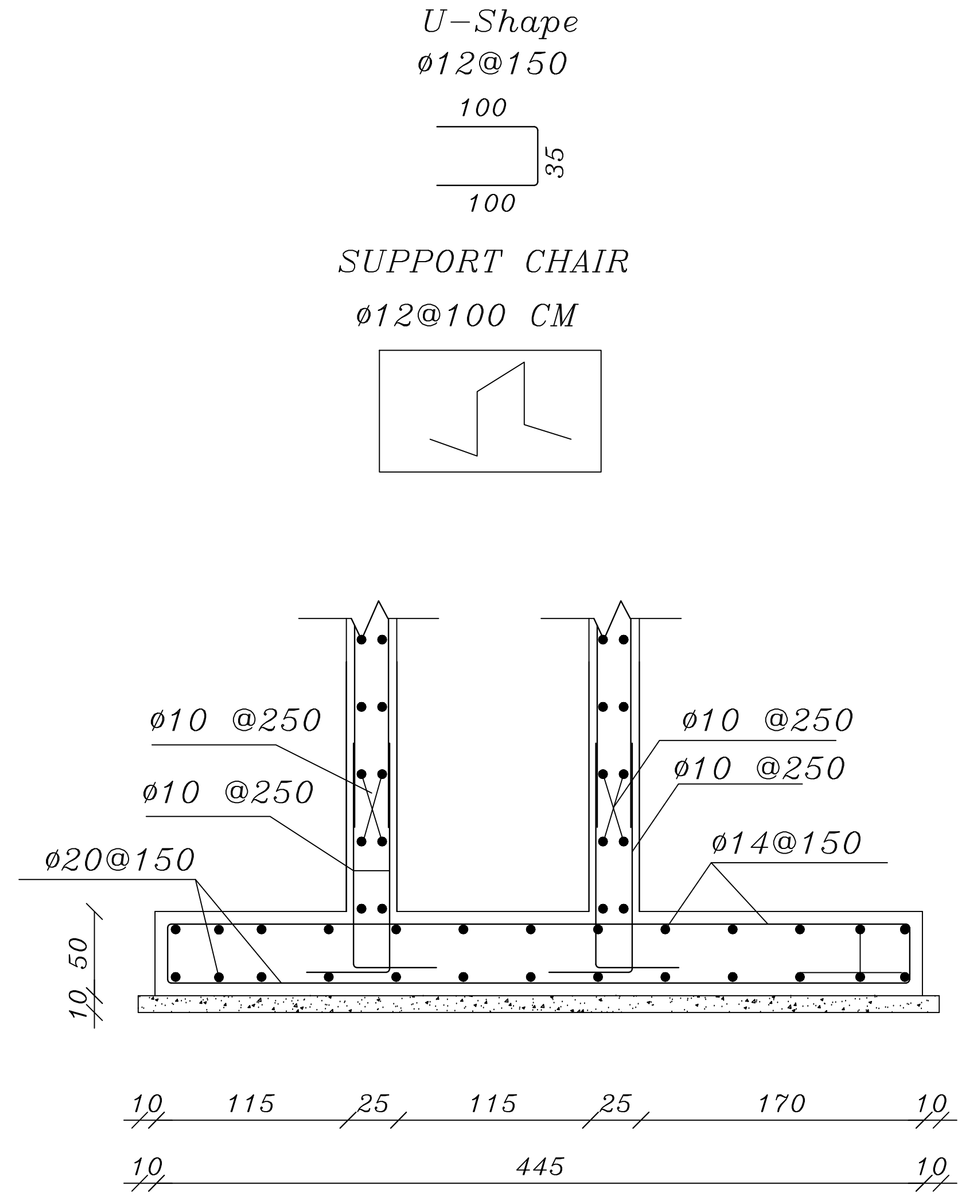
Foundation Dim	SECTION INFORMATION	Foundation Plan	Section A-A and Detailing

925 x 380 x 50

Mat #1

FOOTING Location	Restaurant
TOP STEEL in both dir.	Ø14 / 150
BOT. STEEL in both dir.	Ø20 / 150
Concret Cover	7.5 cm
Scale	1 : 25





By the name of Allah

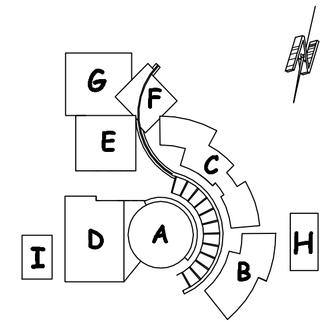
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

Number	Name
A	Reception
B	Sport hall
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F	Restaurant
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H	Parking 1
I	Parking 2

Drawing Title

Mat foundation

Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

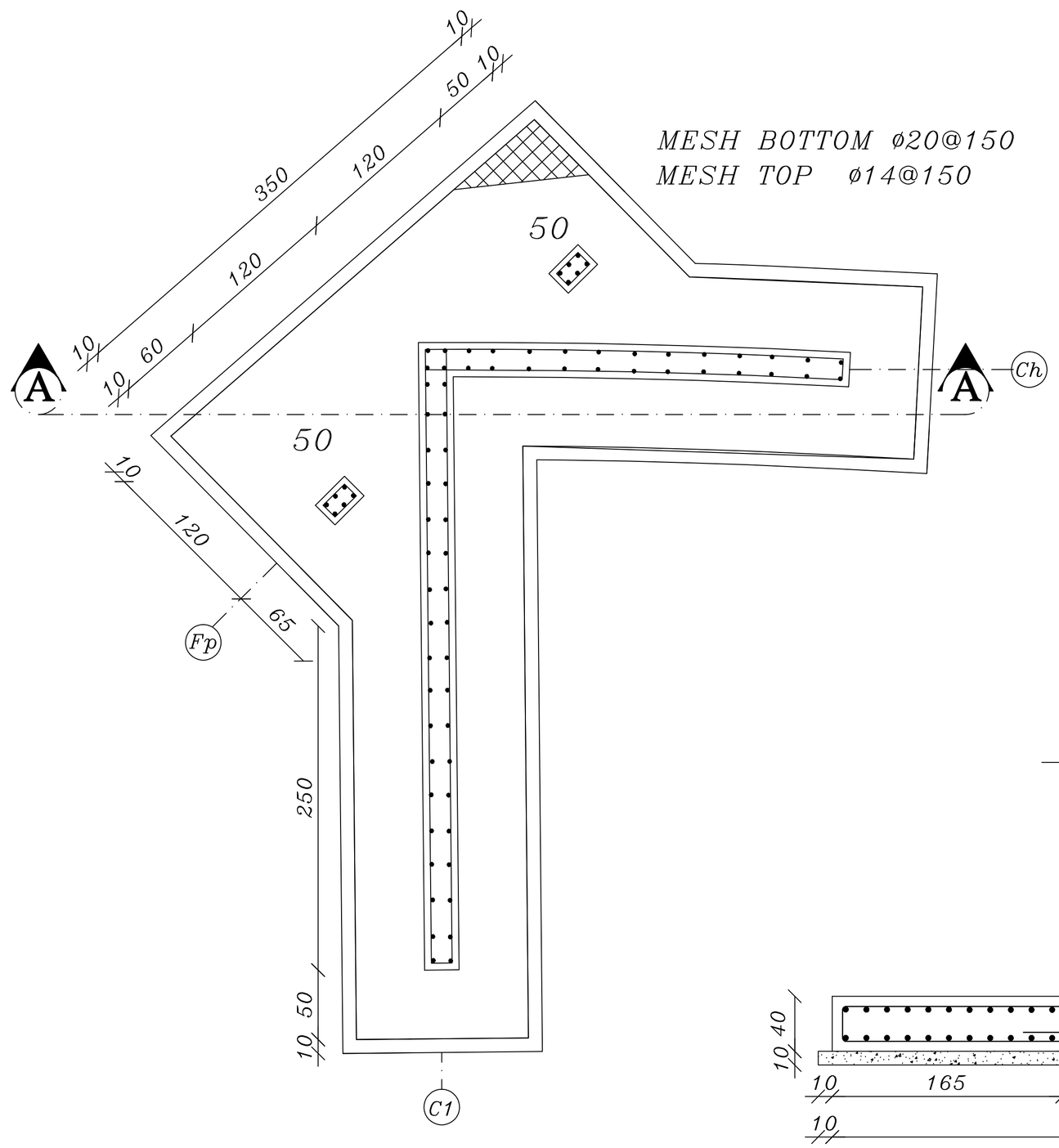
Scale	No.of Draw	Date
1/25	S15	2013-2014

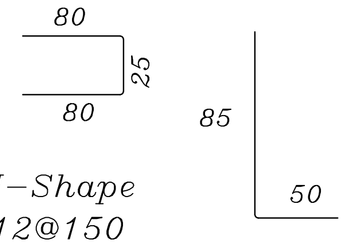
Foundation Dim	SECTION INFORMATION	Foundation Plan	Section A-A and Detailing

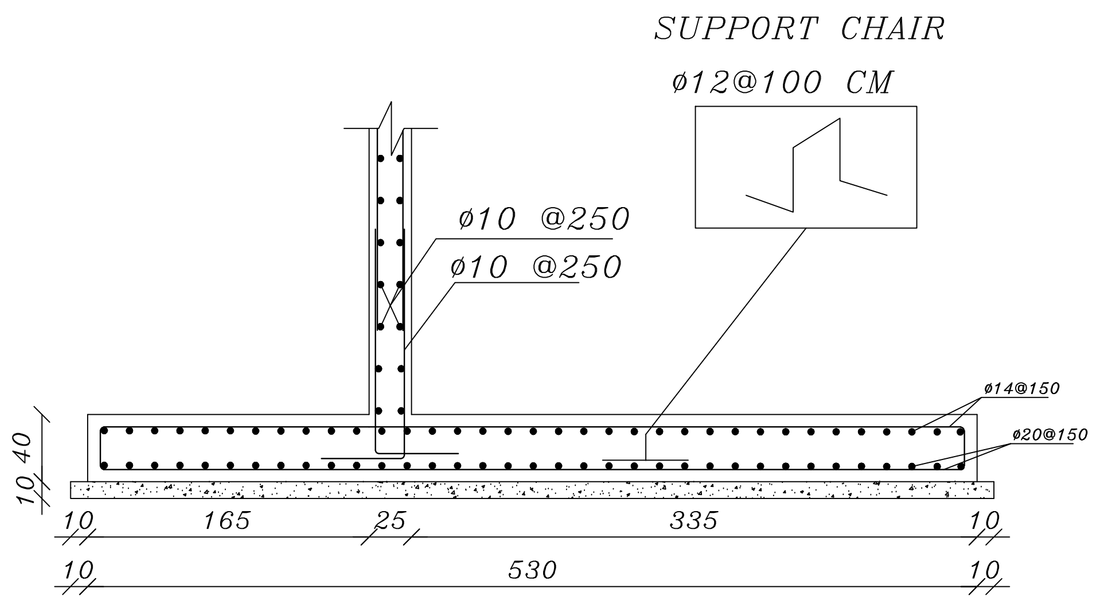
350 x 185 x 40

Mat #2

FOOTING Location	Building activities
TOP STEEL in both dir.	Ø14 / 150
BOT. STEEL in both dir.	Ø20 / 150
Concret Cover	7.5 cm
Scale	1 : 25







By the name of Allah

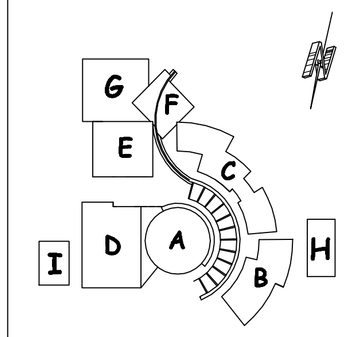
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building	
Number	Name
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I	Parking 2

Drawing Title

Mat foundation

Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

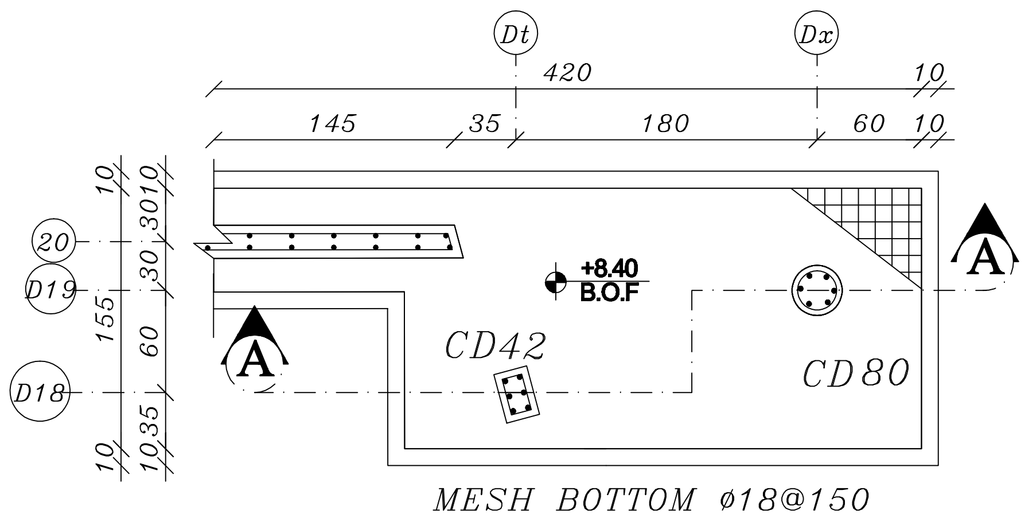
Scale	No.of Draw	Date
1/25	s16	2013-2014

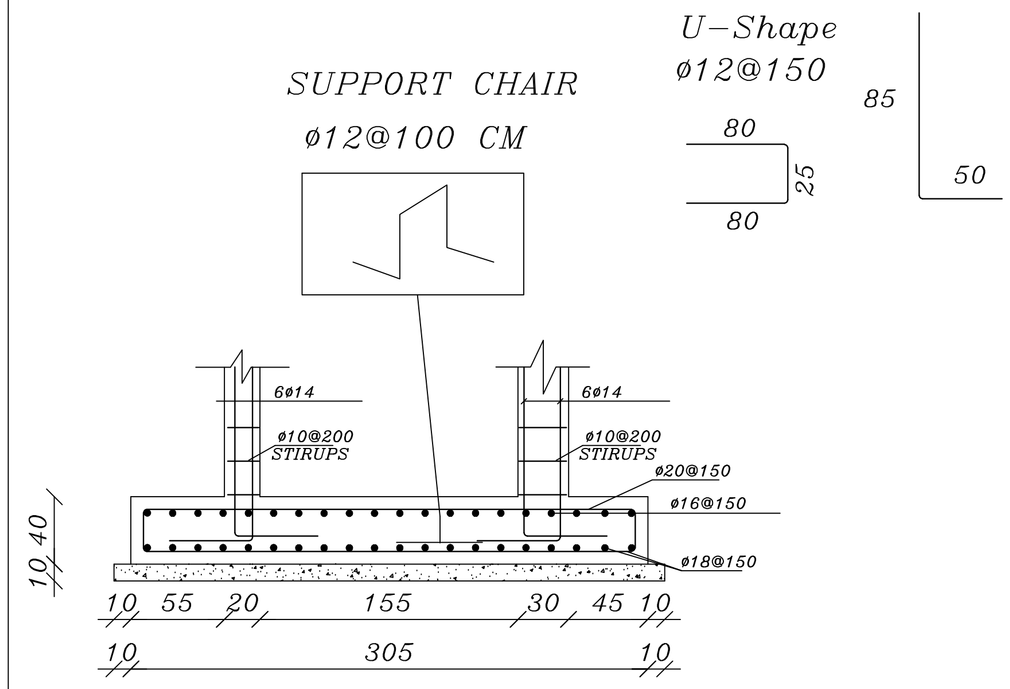
Foundation Dim	SECTION INFORMATION	Foundation Plan	Section A-A and Detailing

420 x 155 x 40

Mat #3

FOOTING Location	Theater
TOP STEEL in both dir.	Ø16/150 Ø20/150
BOT. STEEL in both dir.	Ø28 / 150
Concret Cover	7.5 cm
Scale	1 : 25

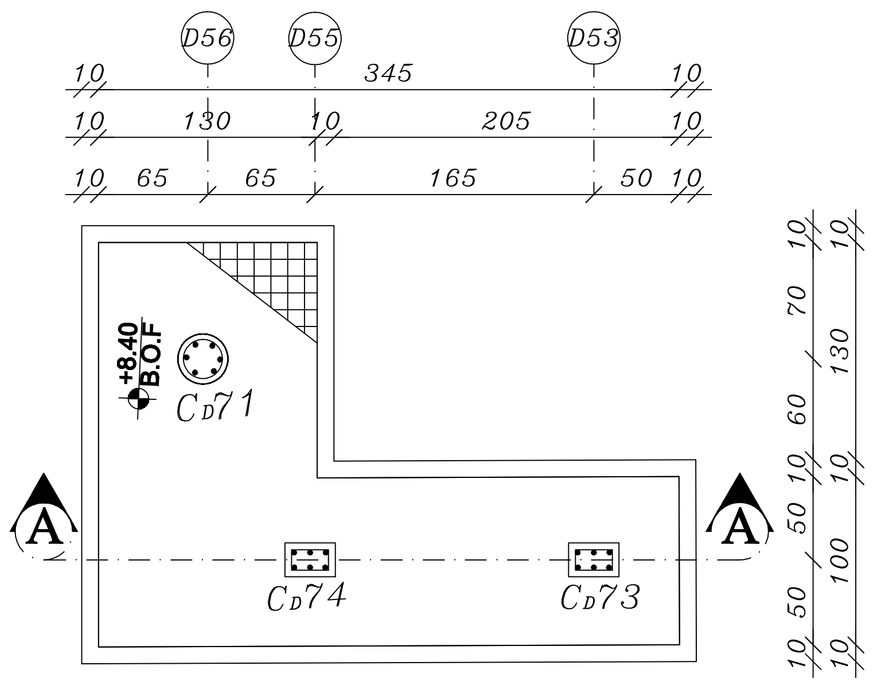


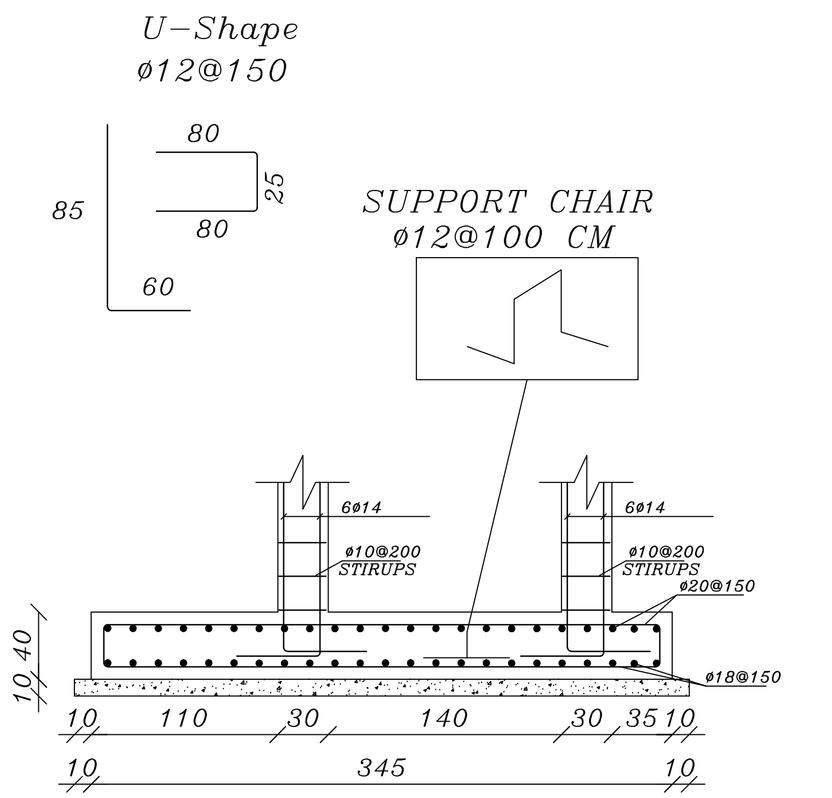


345 x 340 x 40

Mat #4

FOOTING Location	Theater
TOP STEEL in both dir.	Ø12 / 150
BOT. STEEL in both dir.	Ø18 / 150
Concret Cover	7.5 cm
Scale	1 : 25





By the name of Allah

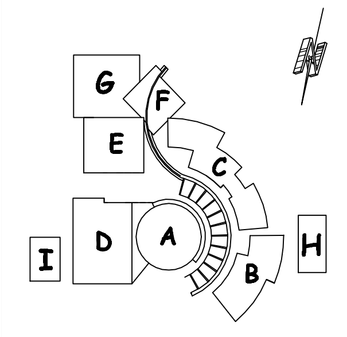
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building	
Number	Name
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I	Parking 2

Drawing Title

Mat foundation

Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

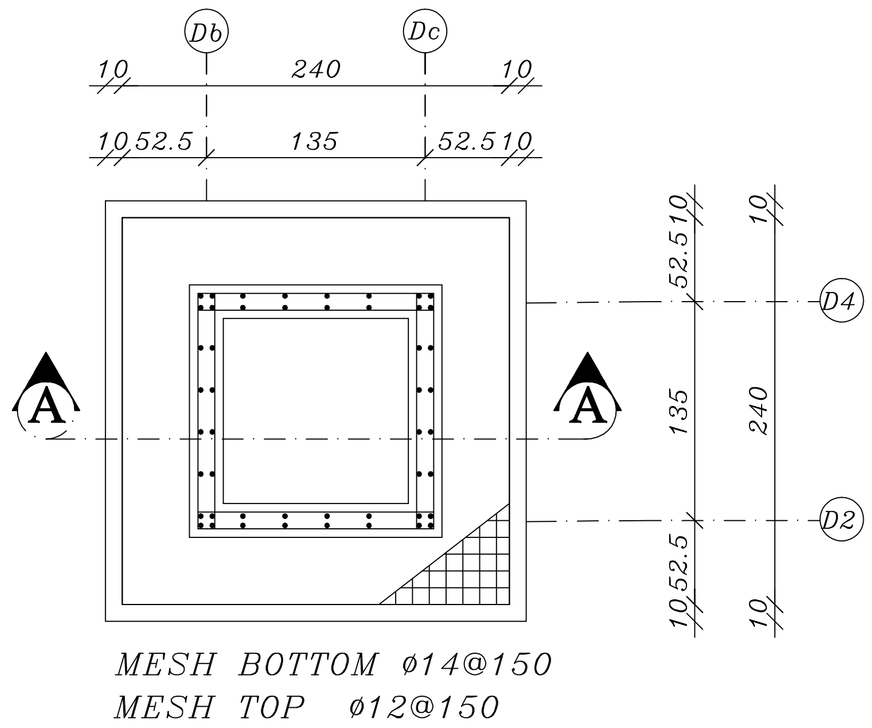
Scale	No.of Draw	Date
1/25	S17	2013-2014

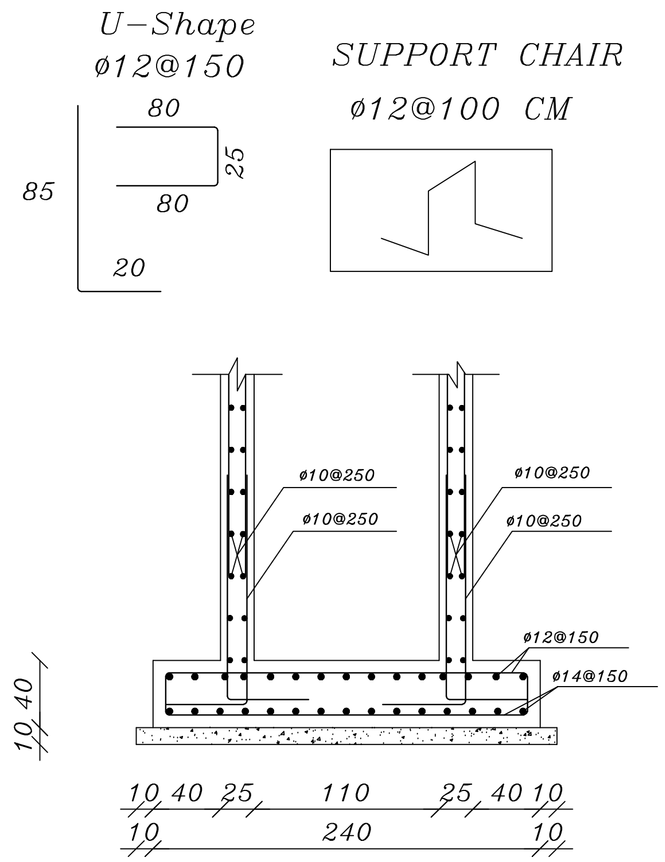
Foundation Dim	SECTION INFORMATION	Foundation Plan	Section A-A and Detailing

240 x 240 x 40

Mat #5

FOOTING Location	Theater
TOP STEEL in both dir.	Ø12 / 150
BOT. STEEL in both dir.	Ø14 / 150
Concret Cover	7.5 cm
Scale	1 : 25

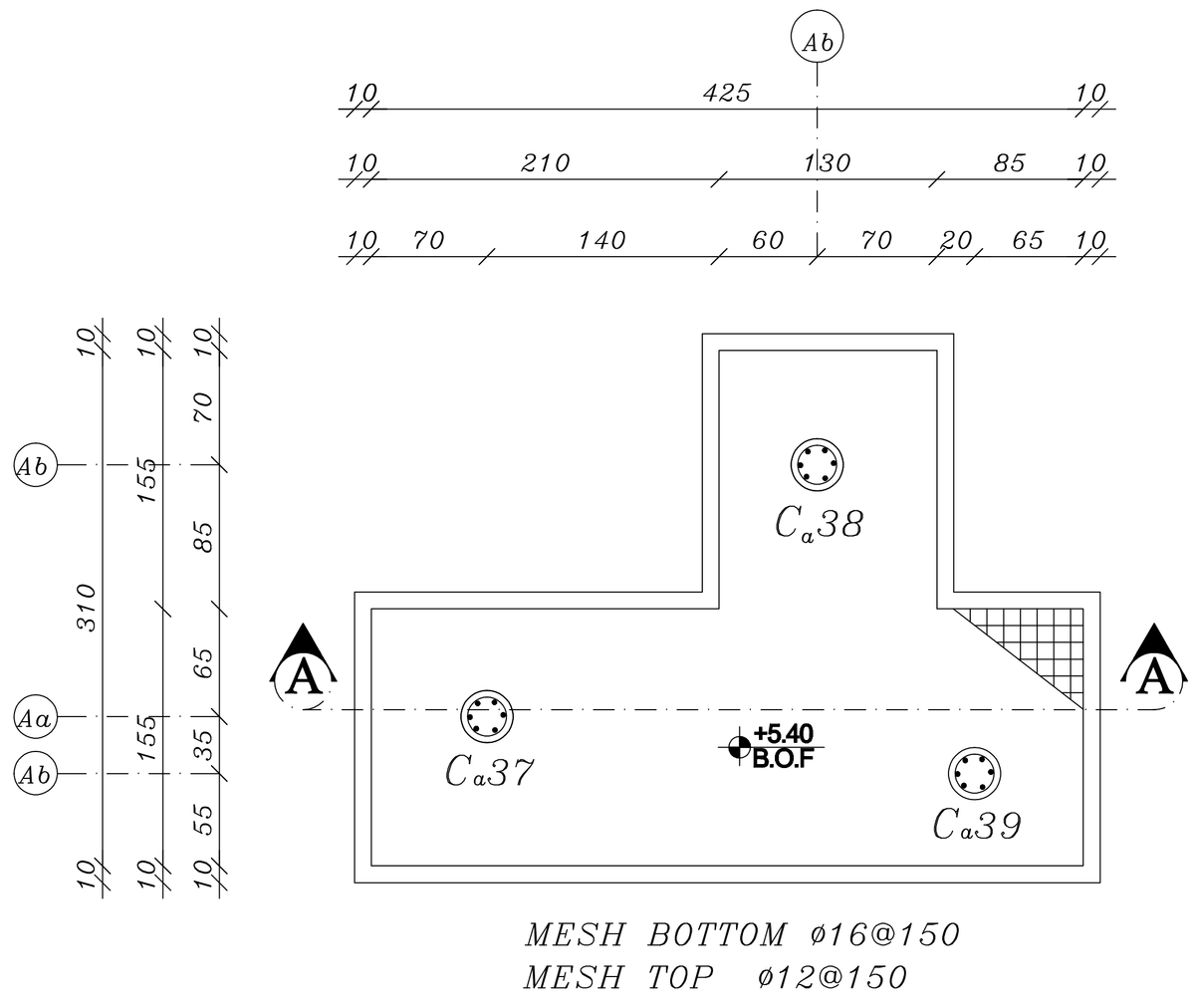


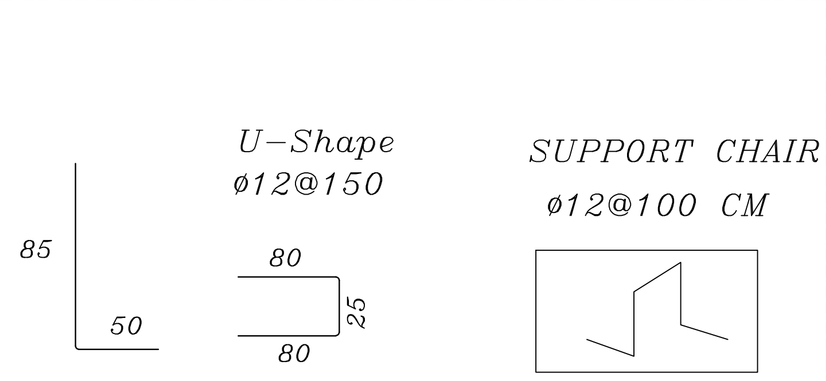


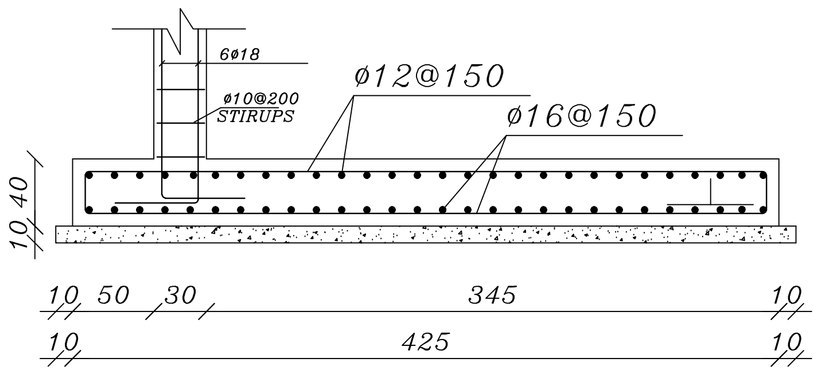
425 x 310 x 40

Mat #6

FOOTING Location	Reception
TOP STEEL in both dir.	Ø12 / 150
BOT. STEEL in both dir.	Ø16 / 150
Concret Cover	7.5 cm
Scale	1 : 25







By the name of Allah

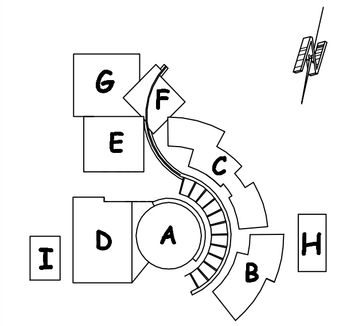
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

Number	Name
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I	Parking 2

Drawing Title

Mat foundation

Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

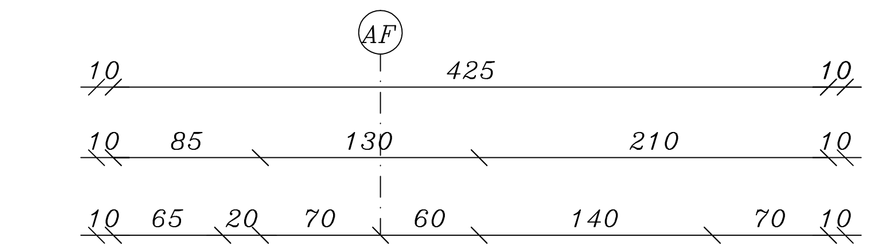
Scale	No.of Draw	Date
1/25	S18	2013-2014

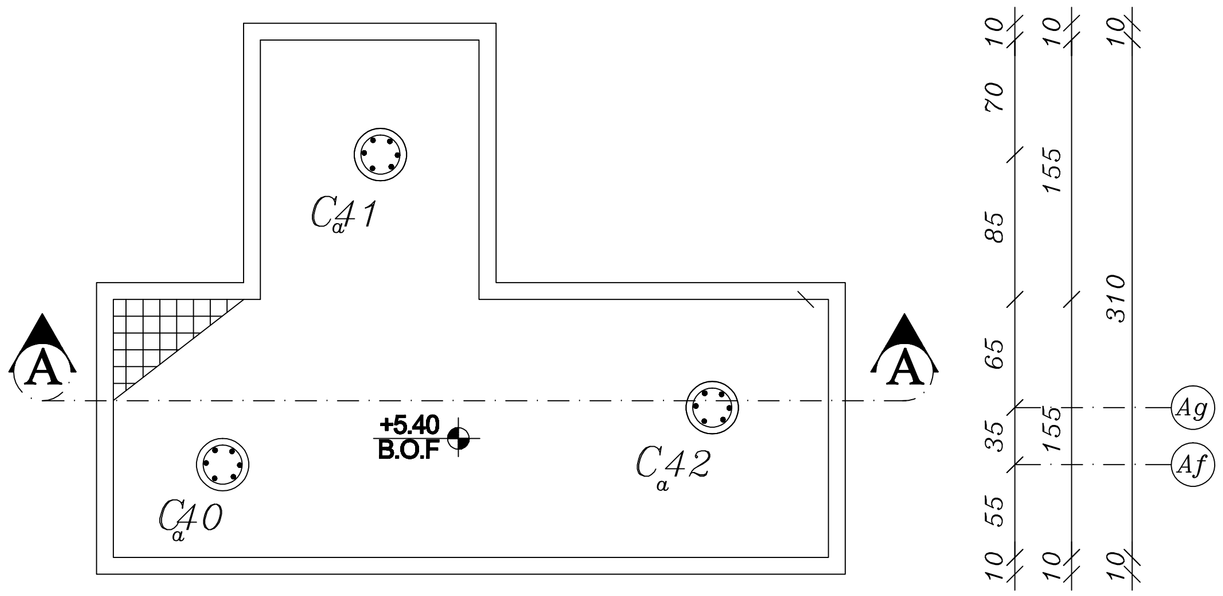
Foundation Dim	SECTION INFORMATION	Foundation Plan	Section A-A and Detailing

425 x 310 x 40

Mat #7

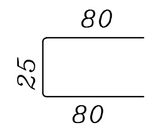
FOOTING Location	Restaurant
TOP STEEL in both dir.	Ø12 / 150
BOT. STEEL in both dir.	Ø16 / 150
Concret Cover	7.5 cm
Scale	1 : 25



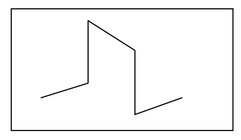


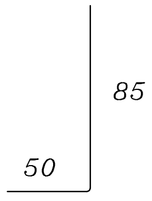
MESH BOTTOM ø16@150
MESH TOP ø12@150

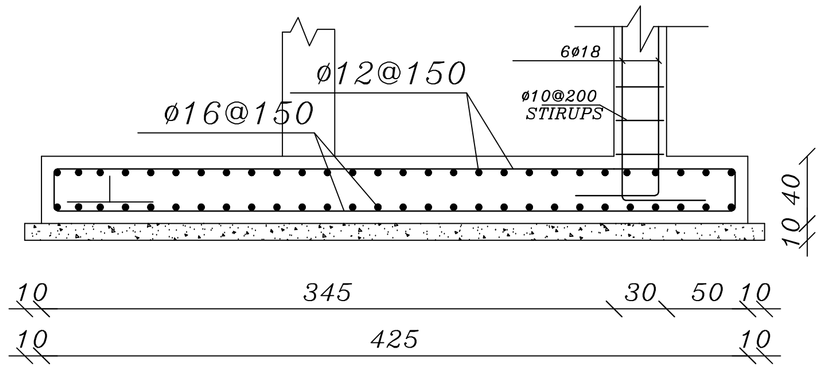
U–Shape ø12@150



SUPPORT CHAIR ø12@100 CM







By the name of Allah

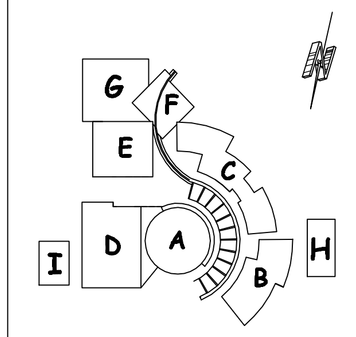
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Drawing Title

Mat foundation

Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	No.of Draw	Date
1/25	S19	2013-2014

Foundation Dim

SECTION INFORMATION

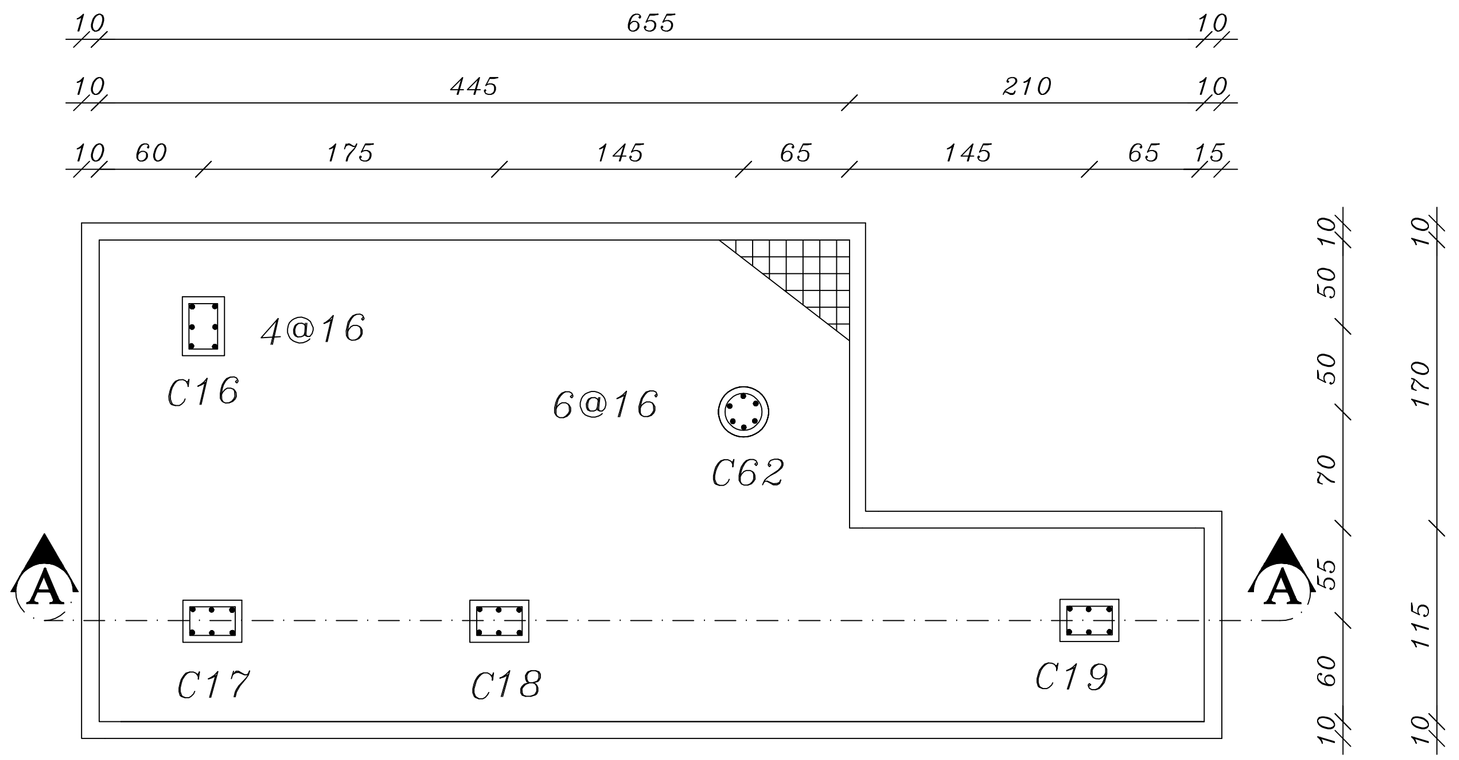
Foundation Plan

Section A-A and Detailing

Mat #8

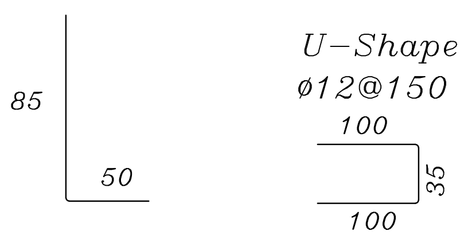
655 x 285 x 50

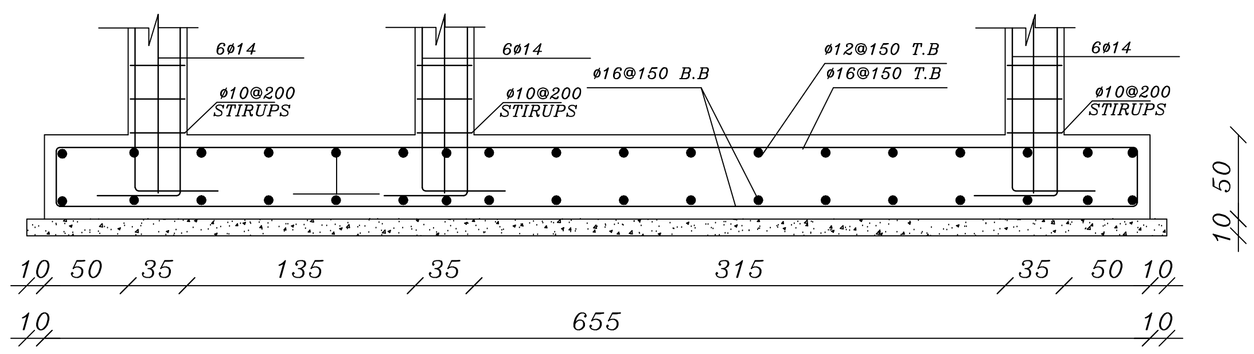
FOOTING Location	Theater
TOP STEEL in both dir.	Ø16/150 Ø12/150
BOT. STEEL in both dir.	Ø16 / 150
Concret Cover	7.5 cm
Scale	1 : 25



TOP LONG DIRECTION ø16@150
SHORT DIRECTION ø12@150

BOTTOM MESH ø16@150





By the name of Allah

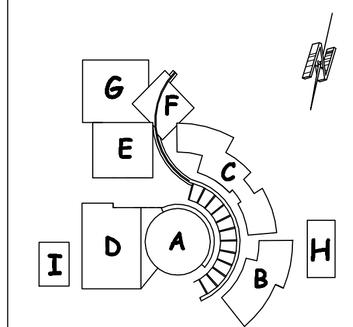
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building	
Number	Name
A	Reception
B	Sport hall
C	Building activities
D	Theater
E	Handicrafts
F	Restaurant
G	Photo Gallery
H	Parking 1
I	Parking 2

Drawing Title

Mat foundation

Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

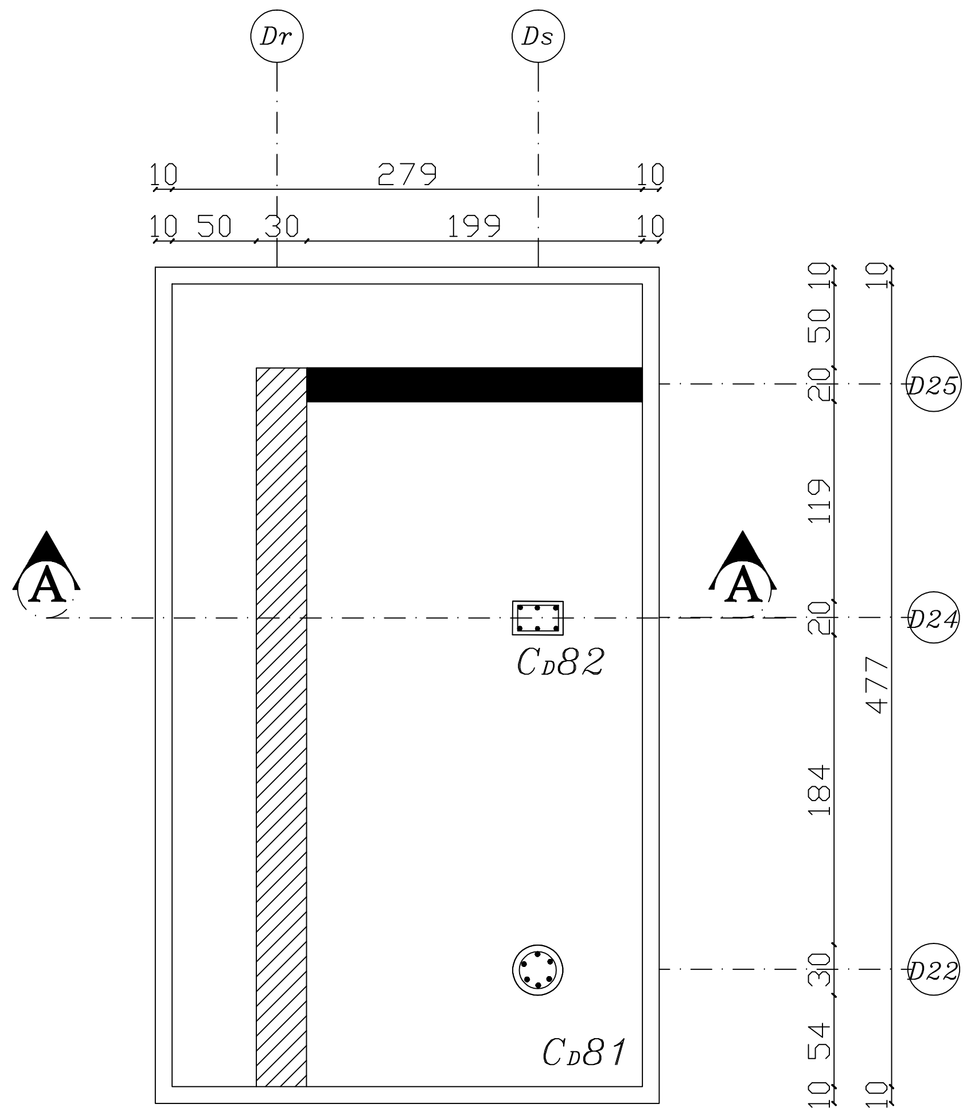
Scale	No.of Draw	Date
1/25	S20	2013-2014

Foundation Dim	SECTION INFORMATION	Foundation Plan	Section A-A and Detailing

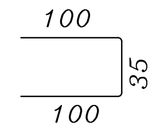
477 x 280 x 50

Mat #9

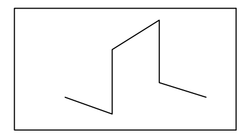
FOOTING Location	Theater
TOP STEEL in both dir.	Ø14 / 150
BOT. STEEL in both dir.	Ø20 / 150
Concret Cover	7.5 cm
Scale	1 : 25

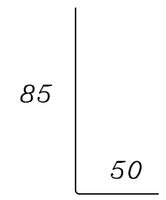


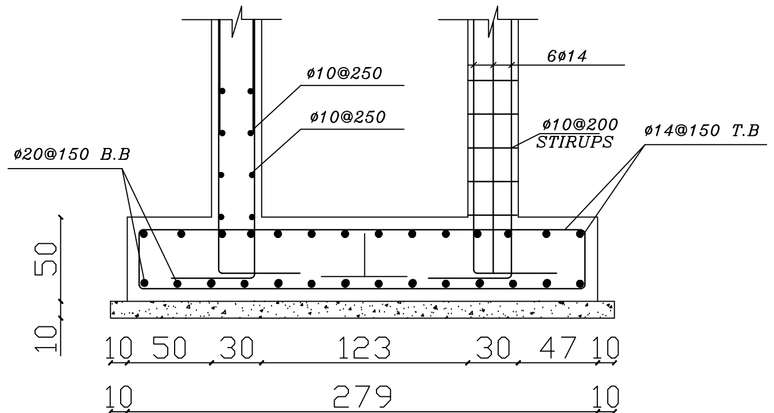
U-Shape
ø12@150



SUPPORT CHAIR
ø12@100 CM







By the name of Allah

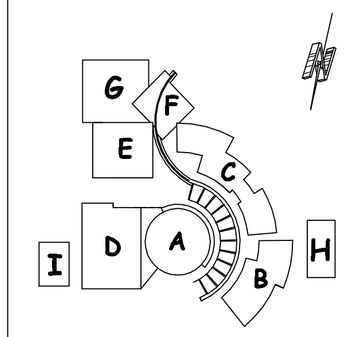
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

Number	Name
A	Reception
B	Sport hall
C	Building activities
D	Theater
E	Handicrafts
F	Restaurant
G	Photo Gallery
H	Parking 1
I	Parking 2

Drawing Title

Mat foundation

Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

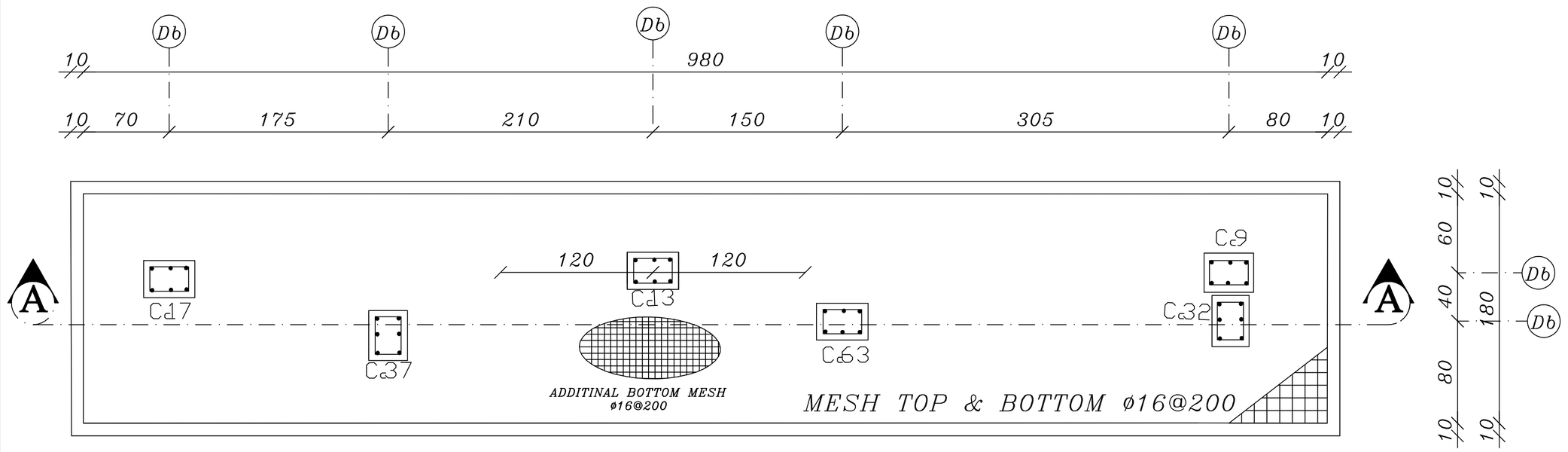
Scale	No.of Draw	Date
1/25	S21	2013-2014

Foundation Dim	SECTION INFORMATION	Foundation Plan

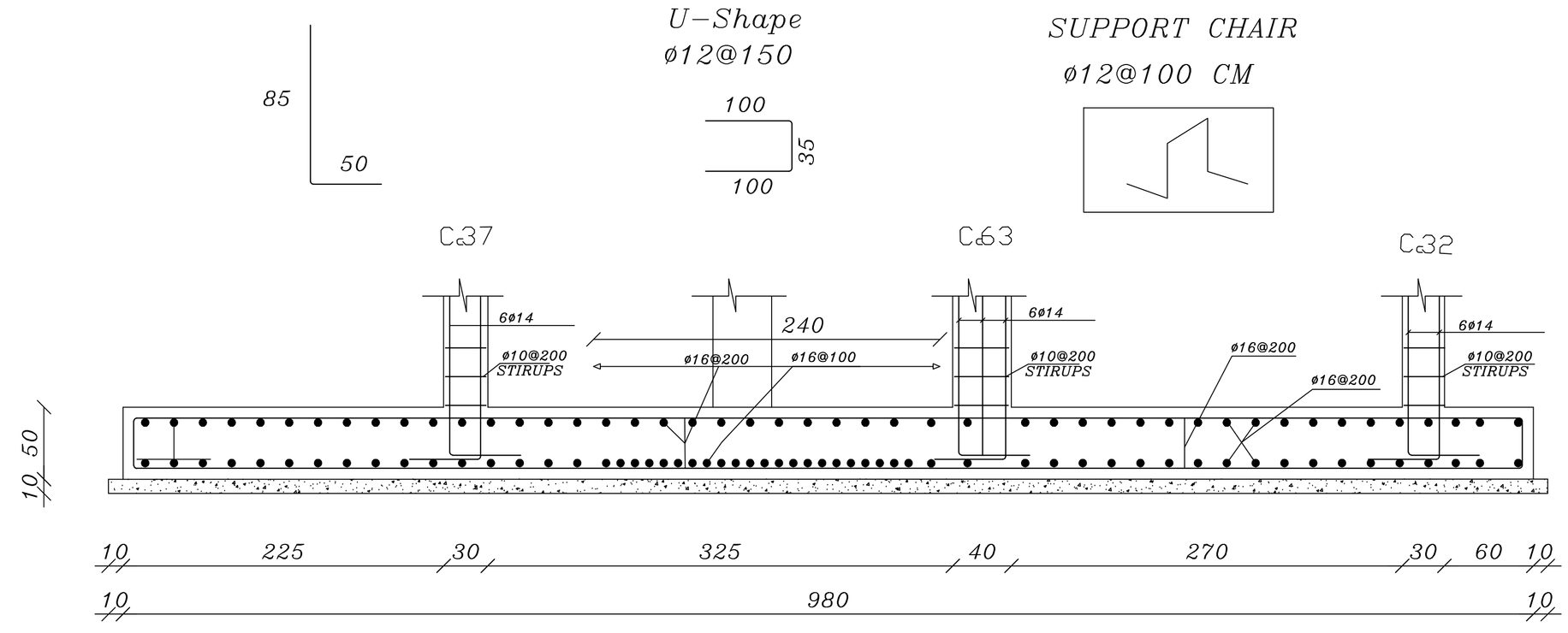
980 x 180 x 50

CONTINUOUS #1

FOOTING Location	Building activities
TOP STEEL in both dir.	Ø16 / 200
BOT. STEEL in both dir.	Ø16 / 200
Concret Cover	7.5 cm
Scale	1 : 25



Section A-A and Detailing



By the name of Allah

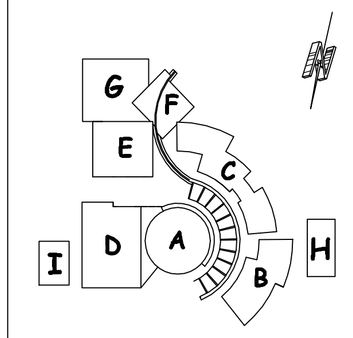
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
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Tabel of Building

Number	Name
A	Reception
B	Sport hall
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I	Parking 2

Drawing Title

Continuous foundation

Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

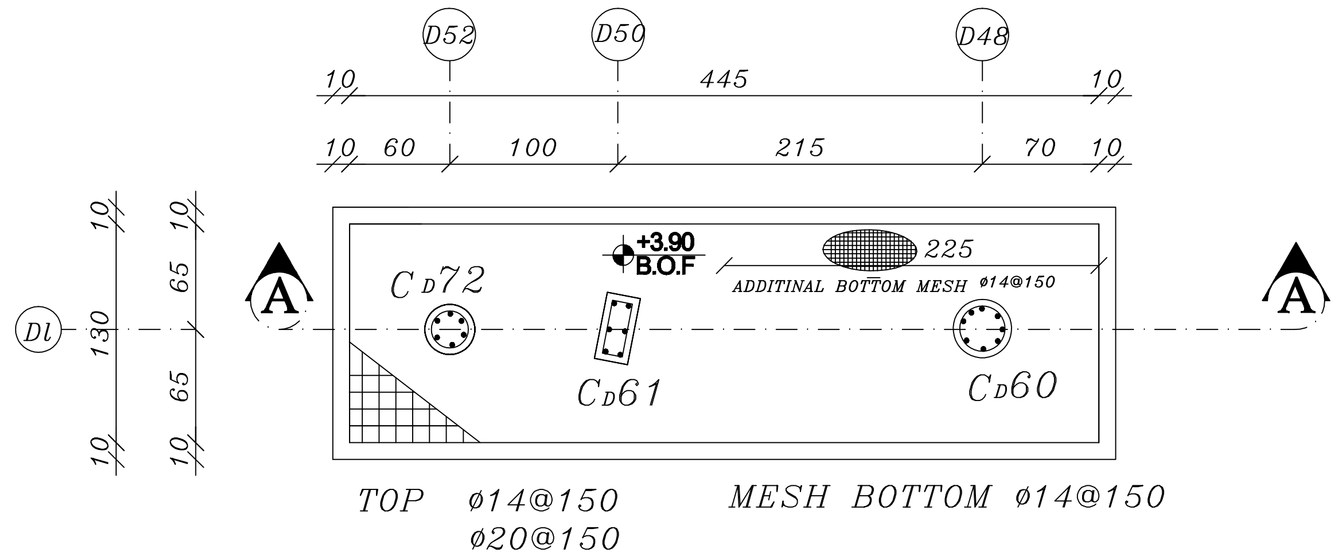
Scale	No.of Draw	Date
1/25	S22	2013-2014

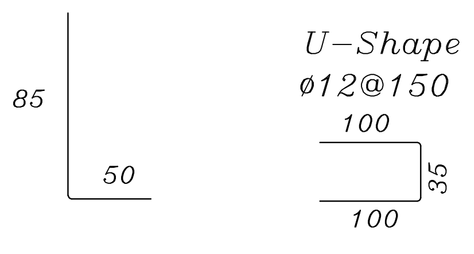
Foundation Dim	SECTION INFORMATION	Foundation Plan	Section A-A and Detailing

445 x 130 x 40

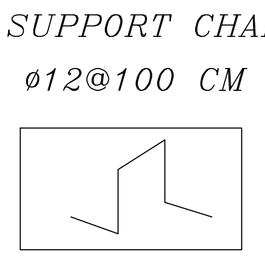
CONTINUOUS # 2

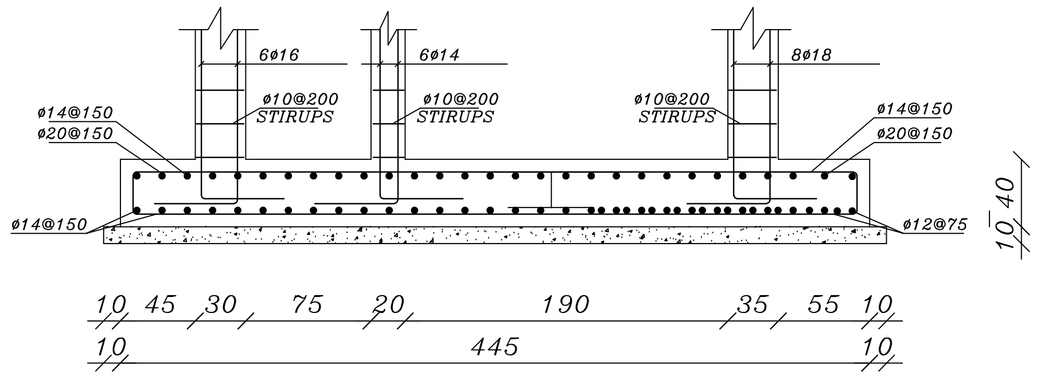
FOOTING Location	Theater
TOP STEEL in both dir.	Ø14 / 150 Ø20 / 150
BOT. STEEL in both dir.	Ø14 / 150
Concret Cover	7.5 cm
Scale	1 : 25





SUPPORT CHAIR
ø12@100 CM





By the name of Allah

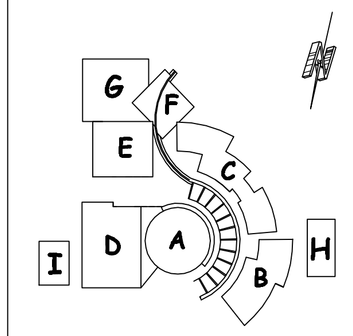
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

Number	Name
A	Reception
B	Sport hall
C	Building activities
D	Theater
E	Handicrafts
F	Restaurant
G	Photo Gallery
H	Parking 1
I	Parking 2

Drawing Title

Continuous foundation

Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

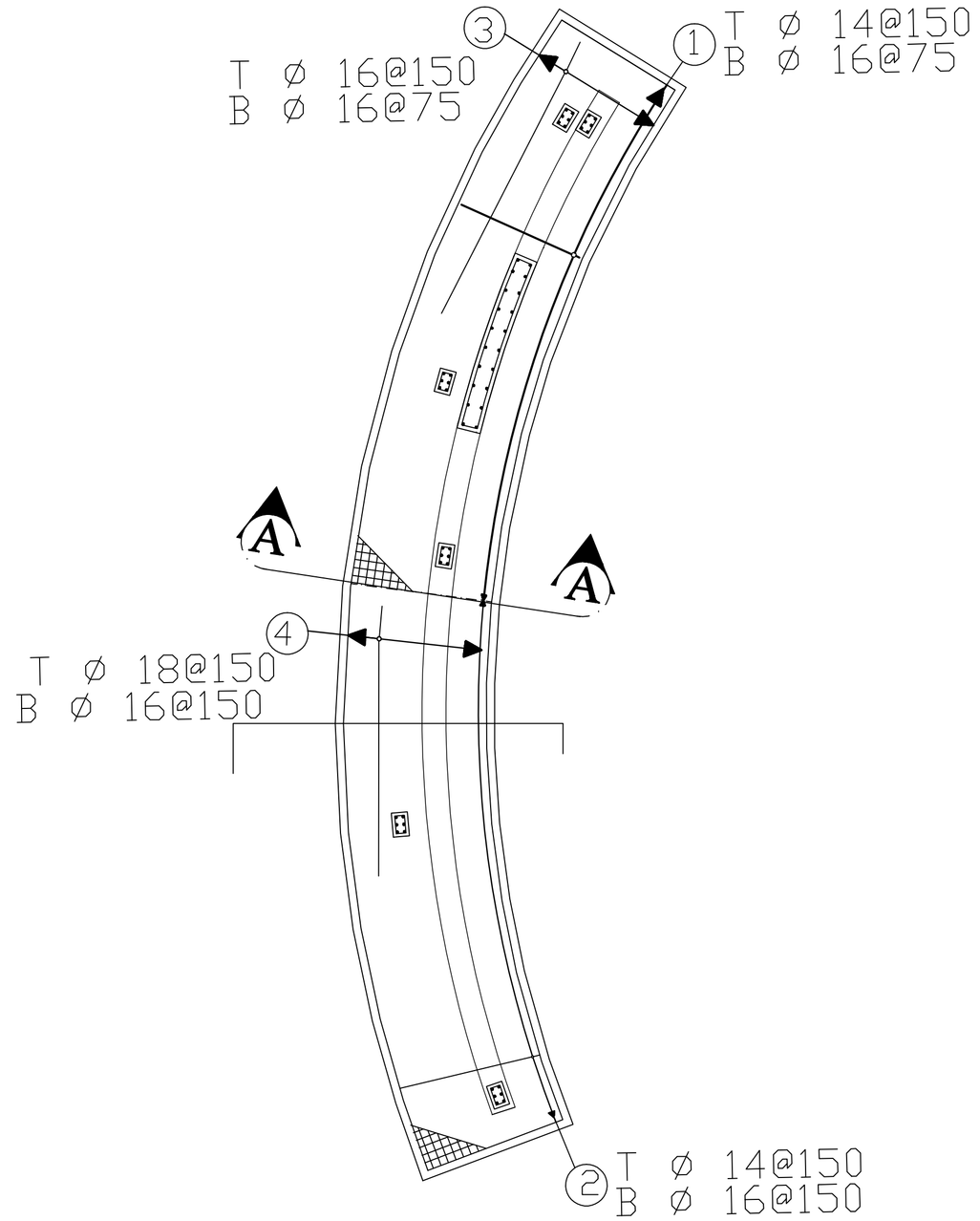
Scale	No.of Draw	Date
1/25	S23	2013-2014

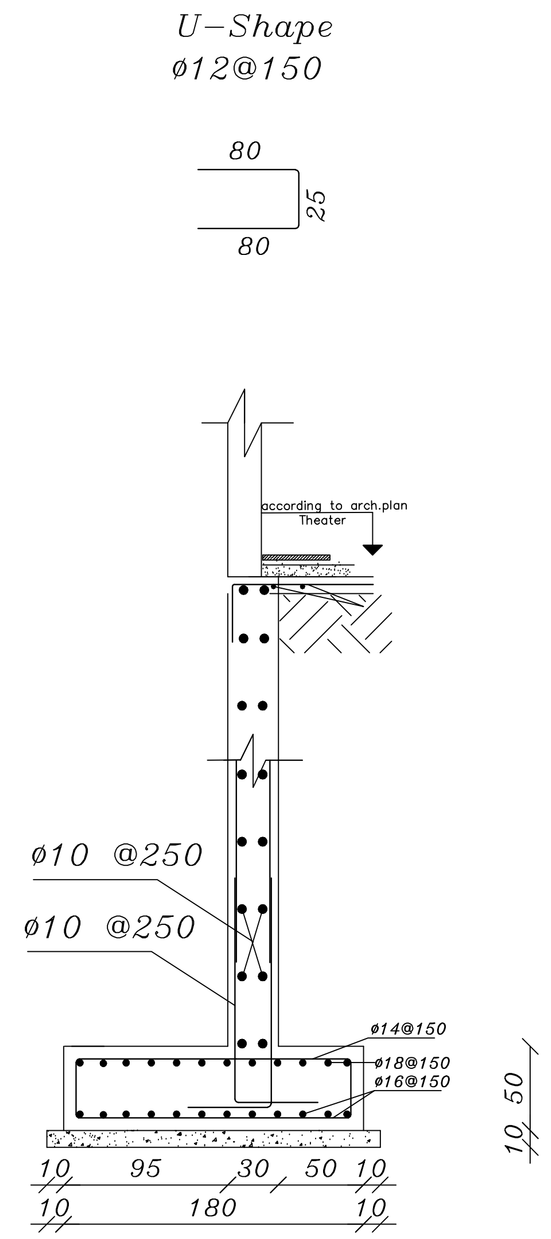
Foundation Dim	SECTION INFORMATION	Foundation Plan	Section A-A and Detailing

750 x 180 x 50

CONTINUOUS #3

FOOTING Location	Reception
TOP STEEL in both dir.	Ø16 / 150 Ø18 / 150 Ø14 / 150
BOT. STEEL in both dir.	Ø16 / 150 Ø16 / 75
Concret Cover	7.5 cm
Scale	1 : 25





By the name of Allah

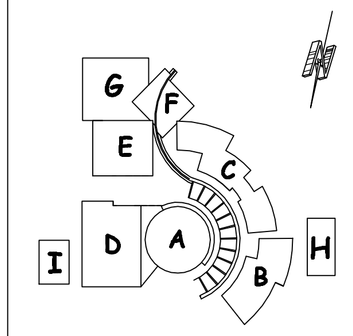
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building	
Number	Name
A	Reception
B	Sport hall
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D	Theater
E	Handicrafts
F	Restaurant
G	Photo Gallery
H	Parking 1
I	Parking 2

Drawing Title

Continuous foundation

Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

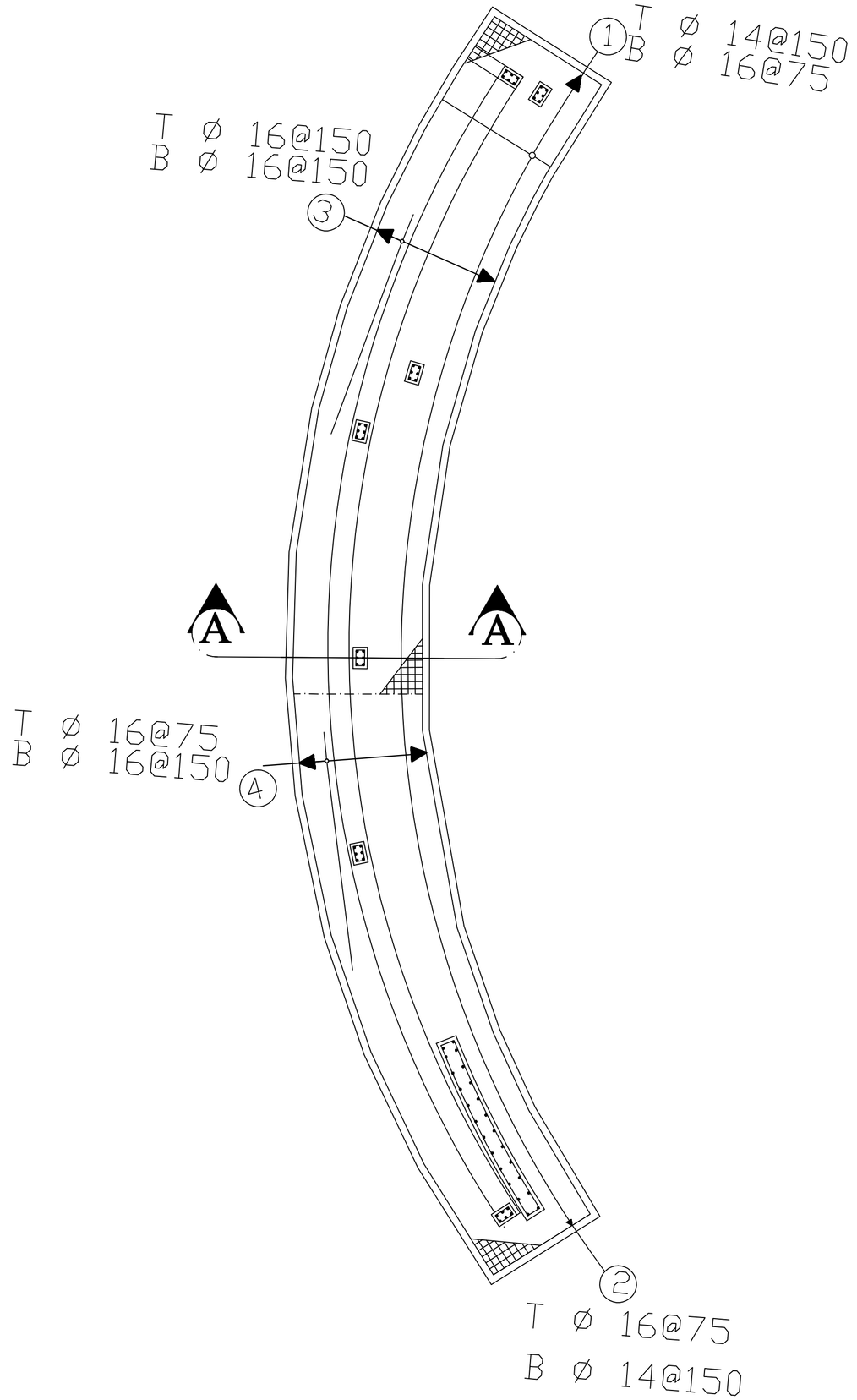
Scale	No.of Draw	Date
1/25	S24	2013-2014

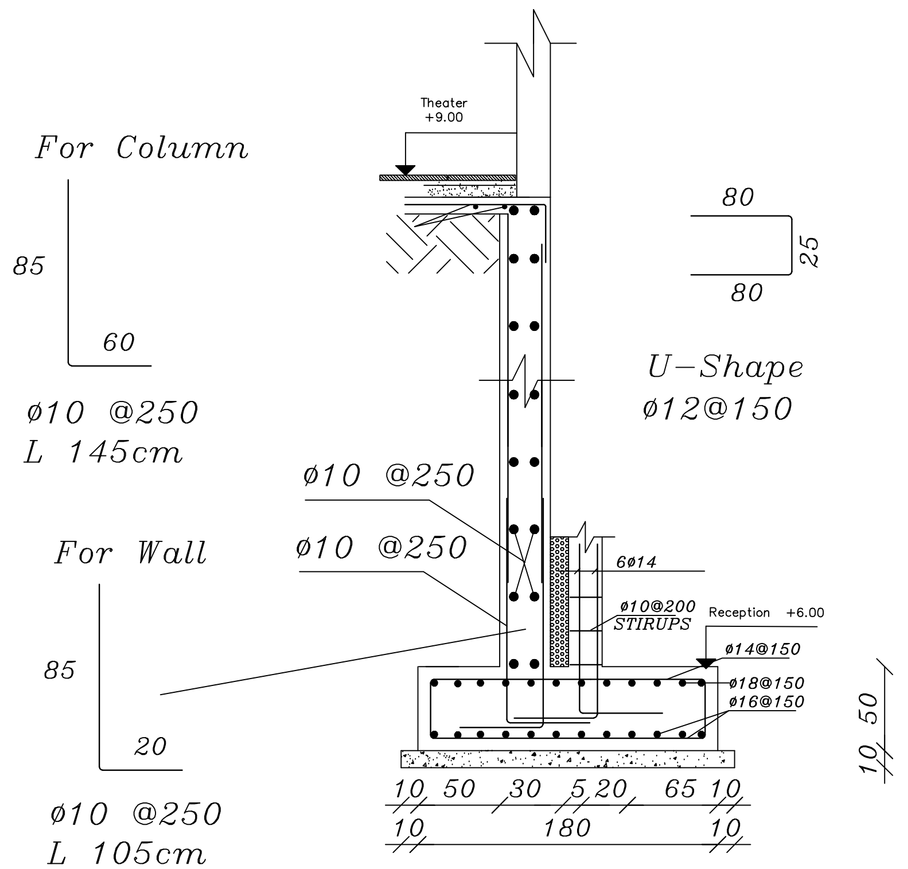
Foundation Dim	SECTION INFORMATION	Foundation Plan	Section A-A and Detailing

CONTINUOUS #4

900 x 180 x 50

FOOTING Location	Reception
TOP STEEL in both dir.	Ø16 / 150 Ø16 / 75
BOT. STEEL in both dir.	Ø16 / 150 Ø14 / 150
Concret Cover	7.5 cm
Scale	1 : 25





By the name of Allah

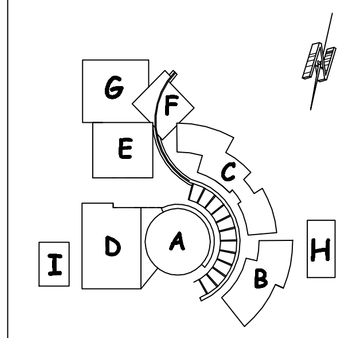
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

Number	Name
A	Reception
B	Sport hall
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E	Handicrafts
F	Restaurant
G	Photo Gallery
H	Parking 1
I	Parking 2

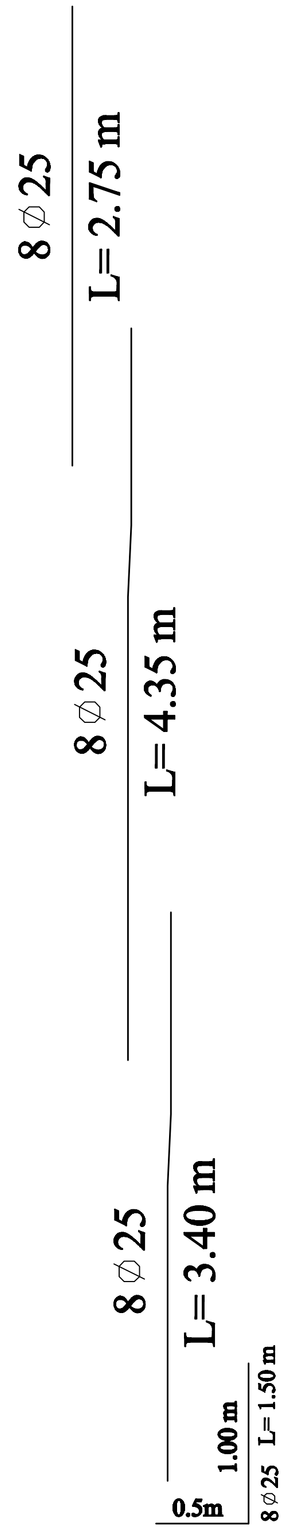
Drawing Title

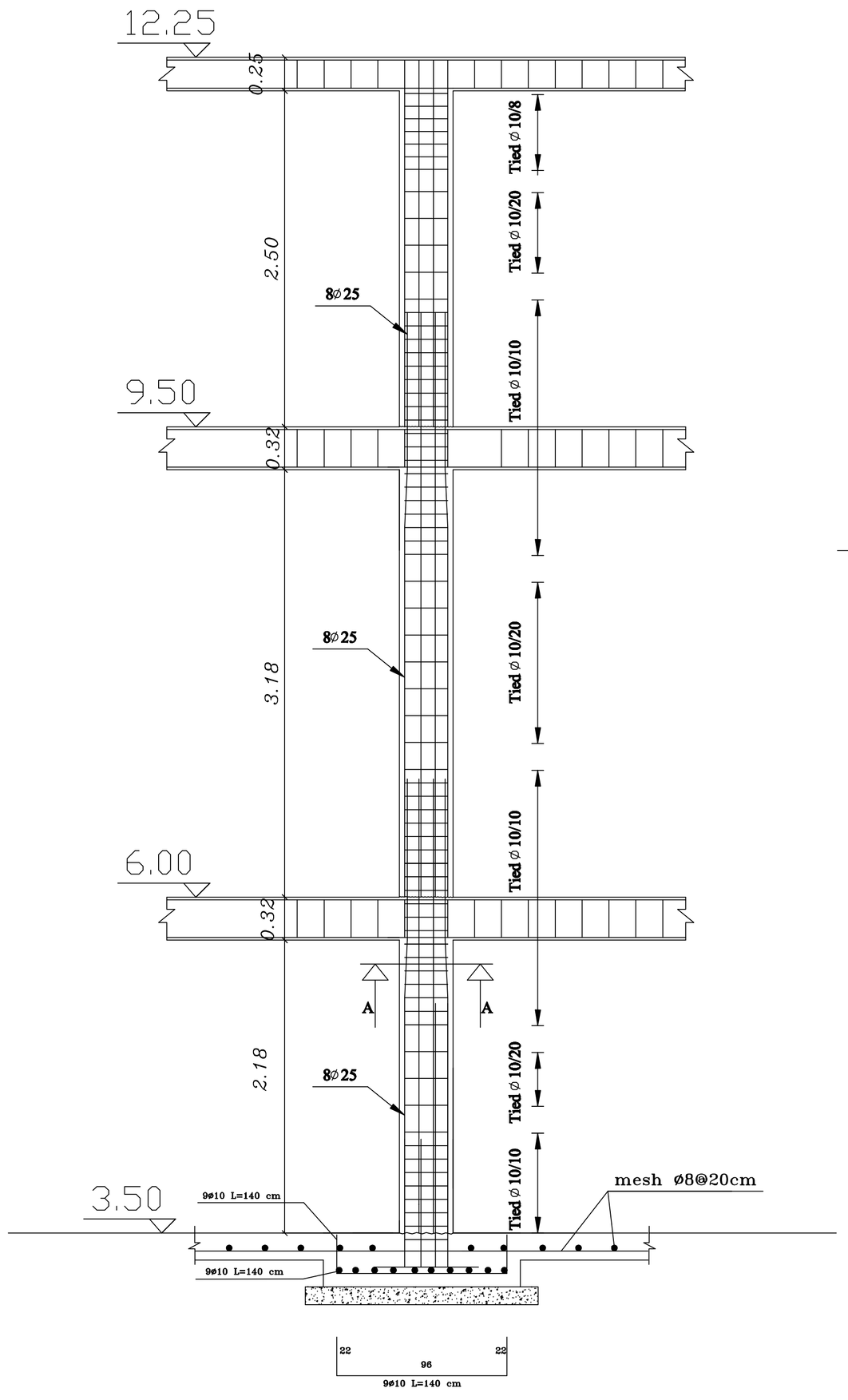
Continuous foundation

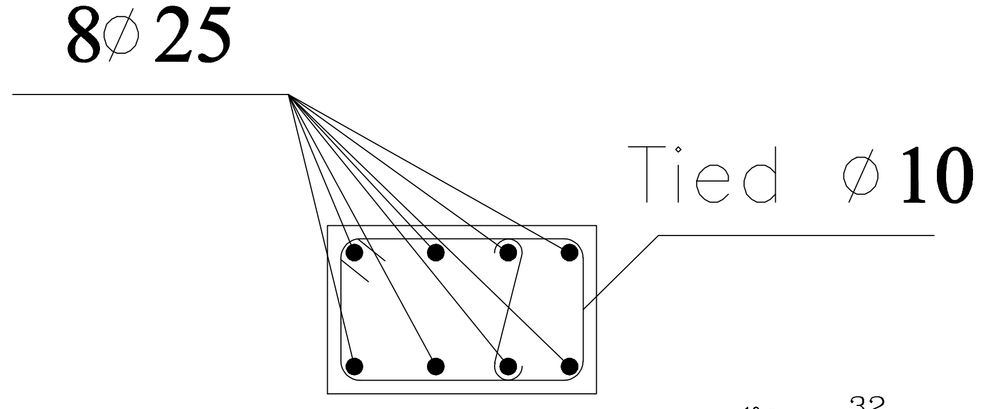
Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

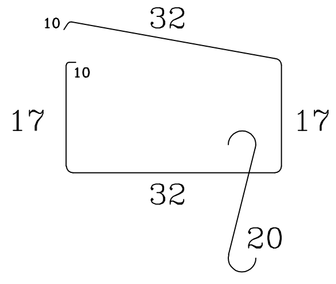
Scale	No.of Draw	Date
1/25	S25	2013-2014







Section A-A



By the name of Allah

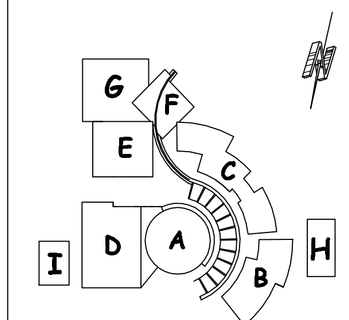
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

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Tabel of Building	
Number	Name
A	Reception
B	Sport hall
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D	Theater
E	Handicrafts
F	Restaurant
G	Photo Gallery
H	Parking 1
I	Parking 2

Drawing Title

Column details

Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	No.of Draw	Date
1/25	**S26**	2013-2014

BUILDING NAME	COLUMNS Dim	SECTION INFORMATION		CONCRETE SECTION	STEEL BARS ARRANGEMENT	STIRRUPS DETAILS
Recpation	D = 30 cm	C 4 , 17 20-23 , 25		Ø30		Ø22
		Vertical Bars	6Ø20			
		Stirrups	Ø10/20 cm			
		Concret Cover	4 cm			
		Scale	1 : 20			
	D = 30 cm	C 5 8 , 18 , 19 , 24 26-52		Ø30		Ø22
		Vertical Bars	6Ø18			
		Stirrups	Ø10/20 cm			
		Concret Cover	4 cm			
		Scale	1 : 20			
	30 x 25 cm	C 1 , 11		30 / 25		22 / 17 / 17 / 22
		Vertical Bars	6Ø18			
		Stirrups	Ø10/20 cm			
		Concret Cover	4 cm			
		Scale	1 : 20			
	30 x 25 cm	C 2 3 , 7 , 9 , 10 12-16		30 / 25		22 / 17 / 17 / 22
		Vertical Bars	6Ø16			
		Stirrups	Ø10/20 cm			
		Concret Cover	4 cm			
		Scale	1 : 20			

BUILDING NAME	COLUMNS Dim	SECTION INFORMATION		CONCRETE SECTION	STEEL BARS ARRANGEMENT	STIRRUPS DETAILS
Building Activity	40 x 25 cm	C 1-3 5-7 , 10-12		40 / 25		32 / 17 / 17 / 32 / 20
		Vertical Bars	8Ø25			
		Stirrups	Ø10/20 cm			
		Concret Cover	4 cm			
		Scale	1 : 20			
	30 x 25 cm	C 4 , 8 , 9 13-20 , 23 , 26 , 28 , 31-54 , 63-65		30 / 25		22 / 17 / 17 / 22
		Vertical Bars	6Ø14			
		Stirrups	Ø10/20 cm			
		Concret Cover	4 cm			
		Scale	1 : 20			
	40 x 25 cm	C 24 , 25 27 , 29 , 30		40 / 25		32 / 17 / 17 / 32 / 20
		Vertical Bars	8Ø20			
		Stirrups	Ø10/20 cm			
		Concret Cover	4 cm			
		Scale	1 : 20			
	D = 35 cm	C 27		Ø35		Ø27
		Vertical Bars	6Ø25			
		Stirrups	Ø10/20 cm			
		Concret Cover	4 cm			

BUILDING NAME	COLUMNS Dim	SECTION INFORMATION		CONCRETE SECTION	STEEL BARS ARRANGEMENT	STIRRUPS DETAILS
Sprot Hall	30 x 25 cm	C 1-12 15 , 17 , 18		30 / 25		22 / 17 / 17 / 22
		Vertical Bars	6Ø14			
		Stirrups	Ø10/20 cm			
		Concret Cover	4 cm			
		Scale	1 : 20			
	40 x 25 cm	C 16		40 / 25		32 / 17 / 17 / 32 / 20
		Vertical Bars	8Ø28			
		Stirrups	Ø10/20 cm			
		Concret Cover	4 cm			
		Scale	1 : 20			
	40 x 25 cm	C 13 , 14 20-29		40 / 25		32 / 17 / 17 / 32 / 20
		Vertical Bars	8Ø18			
		Stirrups	Ø10/20 cm			
		Concret Cover	4 cm			
		Scale	1 : 20			
	40 x 25 cm	C 19 , 30		40 / 25		32 / 17 / 17 / 32 / 20
		Vertical Bars	6Ø25			
		Stirrups	Ø10/20 cm			
		Concret Cover	4 cm			
		Scale	1 : 20			

BUILDING NAME	COLUMNS Dim	SECTION INFORMATION		CONCRETE SECTION	STEEL BARS ARRANGEMENT	STIRRUPS DETAILS
Parcking I	D = 35 cm	C 4-7 10 , 13		Ø35		Ø27
		Vertical Bars	8Ø18			
		Stirrups	Ø10/20 cm			
		Concret Cover	4 cm			
		Scale	1 : 20			
	D = 35 cm	C 1-3		Ø35		Ø27
		Vertical Bars	7Ø25			
		Stirrups	Ø10/20 cm			
		Concret Cover	4 cm			
		Scale	1 : 20			
	D = 30 cm	C 11 , 12 14-19		Ø30		Ø22
		Vertical Bars	6Ø20			
		Stirrups	Ø10/20 cm			
		Concret Cover	4 cm			
		Scale	1 : 20			
	40 x 25 cm	C 20 , 21		40 / 25		32 / 17 / 17 / 32 / 20
		Vertical Bars	8Ø18			
		Stirrups	Ø10/20 cm			
		Concret Cover	4 cm			
		Scale	1 : 20			

By the name of Allah

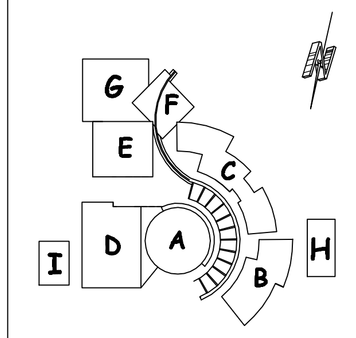
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
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Tabel of Building

Number	Name
A	Reception
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H	Parking 1
I	Parking 2

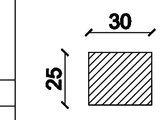
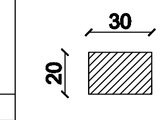
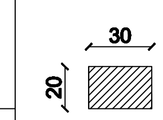
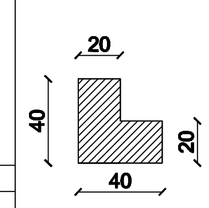
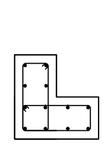
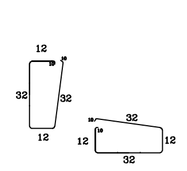
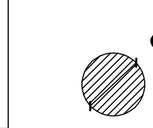
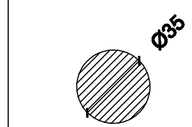
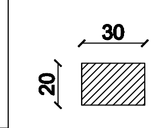
Drawing Title

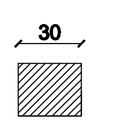
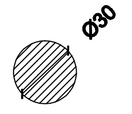
Column's Section

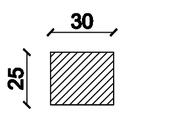
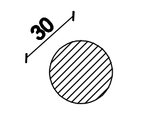
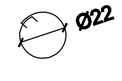
Designed By

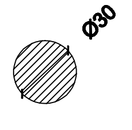
Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

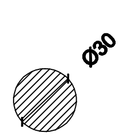
Scale	No.of Draw	Date
1/20	S27	2013-2014

BULIDING NAME	COULUMN Dim	SECTION INFORMATION	CONCRETE SECTION	STEEL BARS ARRANGEMENT	STIRRUPS DETAILS
Theater	30 x 25 cm	C 1-23 64-69 , 85-90 Vertical Bars: 6Ø14 Stirrups: Ø10/20 cm Concrete Cover: 4 cm Scale: 1 : 20			
	30 x 20 cm	C 24-29 , 31-33 35-42 , 53 73-75 Vertical Bars: 6Ø12 Stirrups: Ø10/20 cm Concrete Cover: 4 cm Scale: 1 : 20			
	30 x 20 cm	C 48-52 Vertical Bars: 6Ø20 Stirrups: Ø10/20 cm Concrete Cover: 4 cm Scale: 1 : 20			
	40 x 20 cm	C 30 , 34 Vertical Bars: 12Ø12 Stirrups: Ø10/20 cm Concrete Cover: 4 cm			
	D = 30 cm	C 43-47 , 62 , 63 , 71 , 72 , 78-84 Vertical Bars: 6Ø16 Stirrups: Ø10/20 cm Concrete Cover: 4 cm			
	D = 35 cm	C 54-60 , 70 Vertical Bars: 8Ø18 Stirrups: Ø10/20 cm Concrete Cover: 4 cm			
	30 x 20 cm	C 16 , 53 Vertical Bars: 6Ø14 Stirrups: Ø10/20 cm Concrete Cover: 4 cm			

BULIDING NAME	COULUMN Dim	SECTION INFORMATION	CONCRETE SECTION	STEEL BARS ARRANGEMENT	STIRRUPS DETAILS
HAND CRAFT	30 x 25 cm	C 1-7 , 12-33 35 , 36 , 38-43 Vertical Bars: 6Ø14 Stirrups: Ø10/20 cm Concrete Cover: 4 cm Scale: 1 : 20			
	D = 30 CM	C 8 , 9 , 11 , 34 37 Vertical Bars: 6Ø18 Stirrups: Ø10/20 cm Concrete Cover: 4 cm Scale: 1 : 20			

BULIDING NAME	COULUMN Dim	SECTION INFORMATION	CONCRETE SECTION	STEEL BARS ARRANGEMENT	STIRRUPS DETAILS
Resturance	30 x 25 cm	C 1-12 14-27 Vertical Bars: 6Ø16 Stirrups: Ø10/20 cm Concrete Cover: 4 cm Scale: 1 : 20			
	D = 30 cm	C 13 Vertical Bars: 6Ø18 Stirrups: Ø10/20 cm Concrete Cover: 4 cm Scale: 1 : 20			

BULIDING NAME	COULUMN Dim	SECTION INFORMATION	CONCRETE SECTION	STEEL BARS ARRANGEMENT	STIRRUPS DETAILS
Photo Galaray	D = 30 CM	C 4-7 10 , 13 Vertical Bars: 6Ø16 Stirrups: Ø10/20 cm Concrete Cover: 4 cm Scale: 1 : 20			

BULIDING NAME	COULUMN Dim	SECTION INFORMATION	CONCRETE SECTION	STEEL BARS ARRANGEMENT	STIRRUPS DETAILS
Parcking II	D = 30 cm	C 1-9 Vertical Bars: 6Ø20 Stirrups: Ø10/20 cm Concrete Cover: 4 cm Scale: 1 : 20			

By the name of Allah

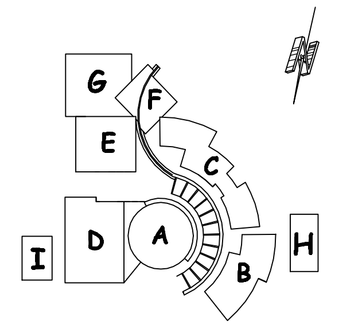
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

Number	Name
A	Reception
B	Sport hall
C	Building activities
D	Theater
E	Handicrafts
F	Restaurant
G	Photo Gallery
H	Parking 1
I	Parking 2

Drawing Title

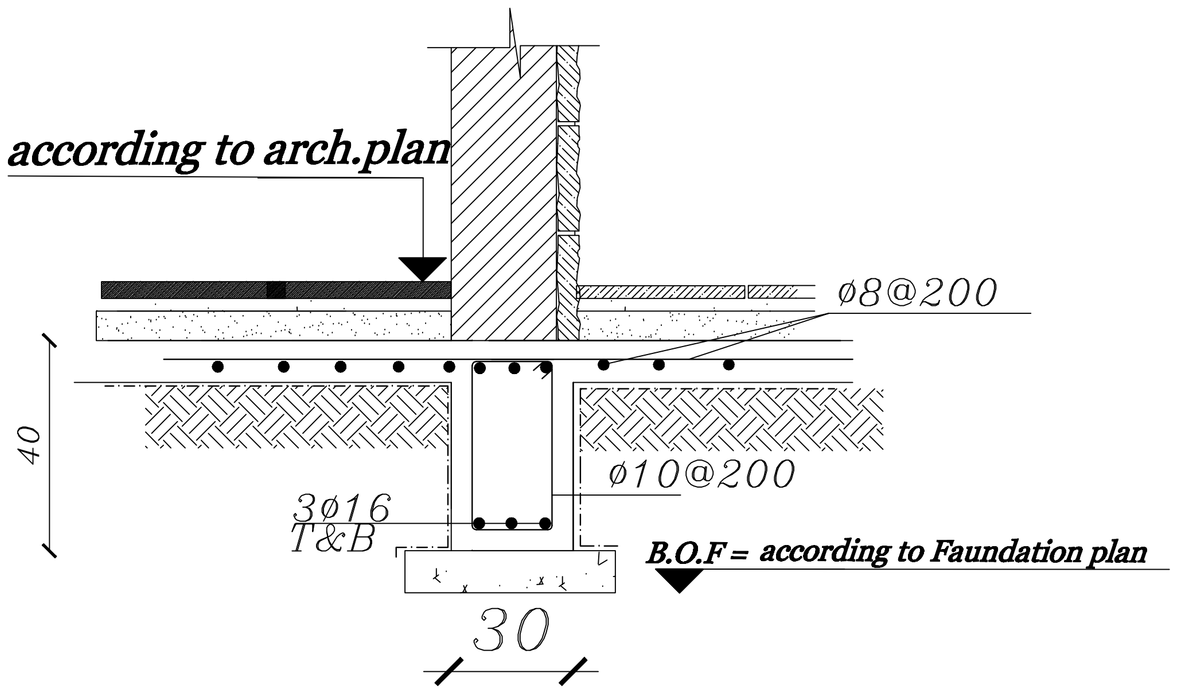
Column's Section

Designed By

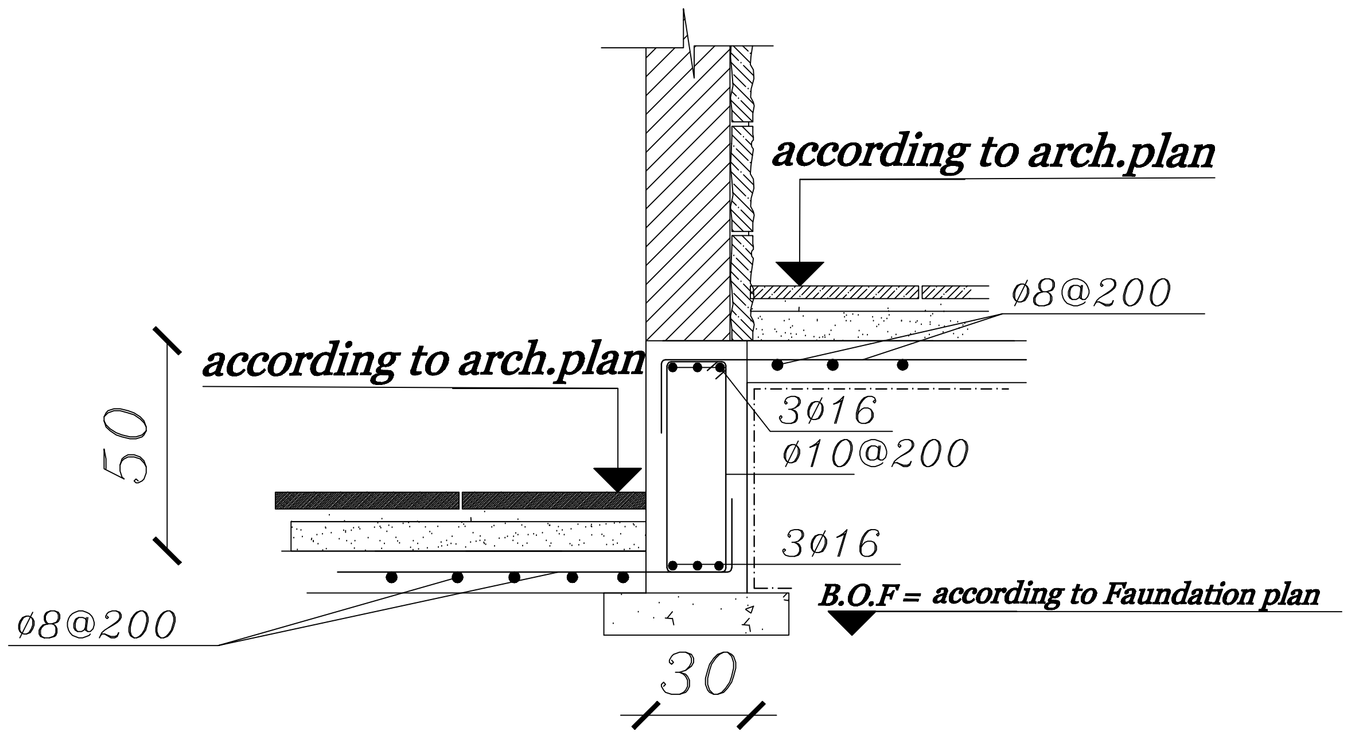
Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	No.of Draw	Date
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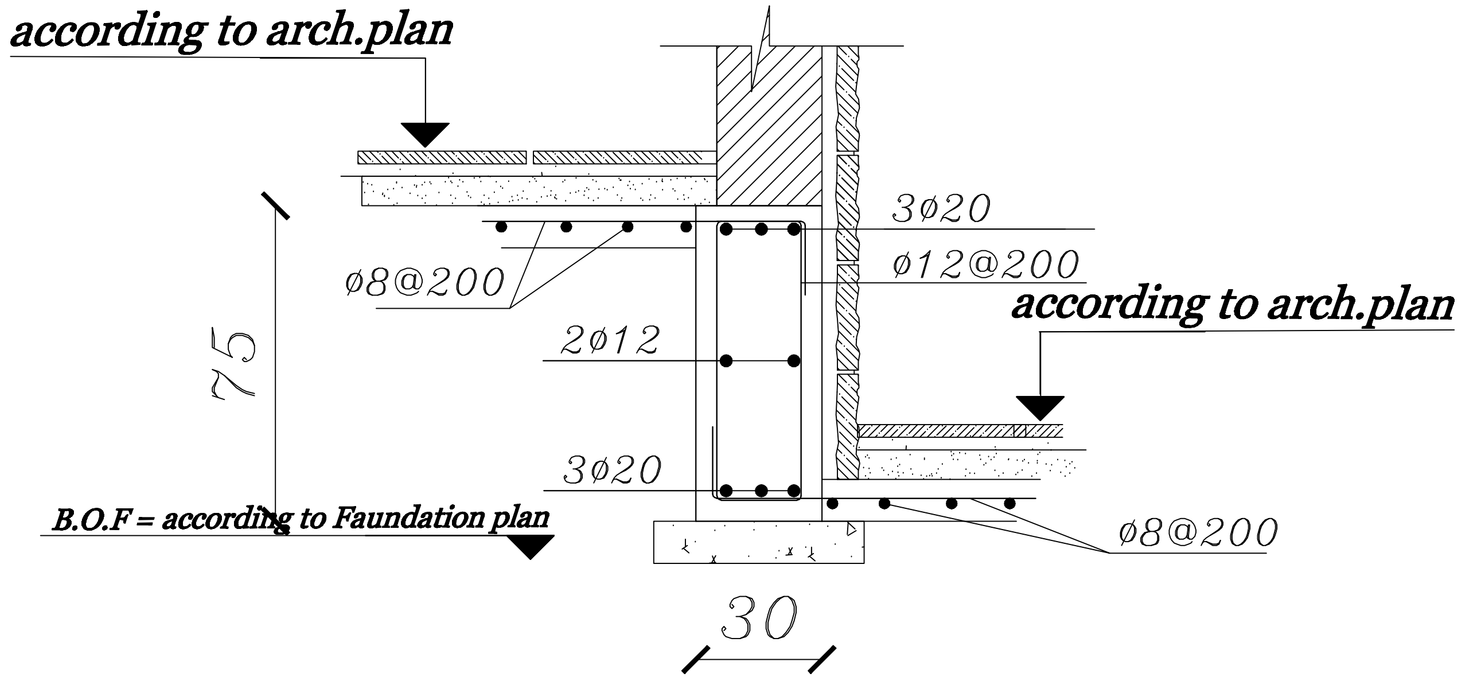
GB -1-



GB -2-



GB -3-



By the name of Allah

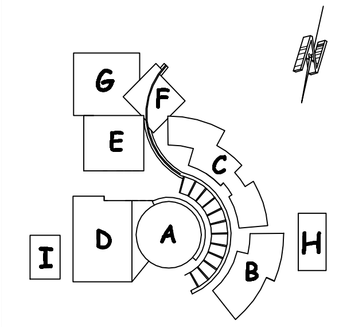
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



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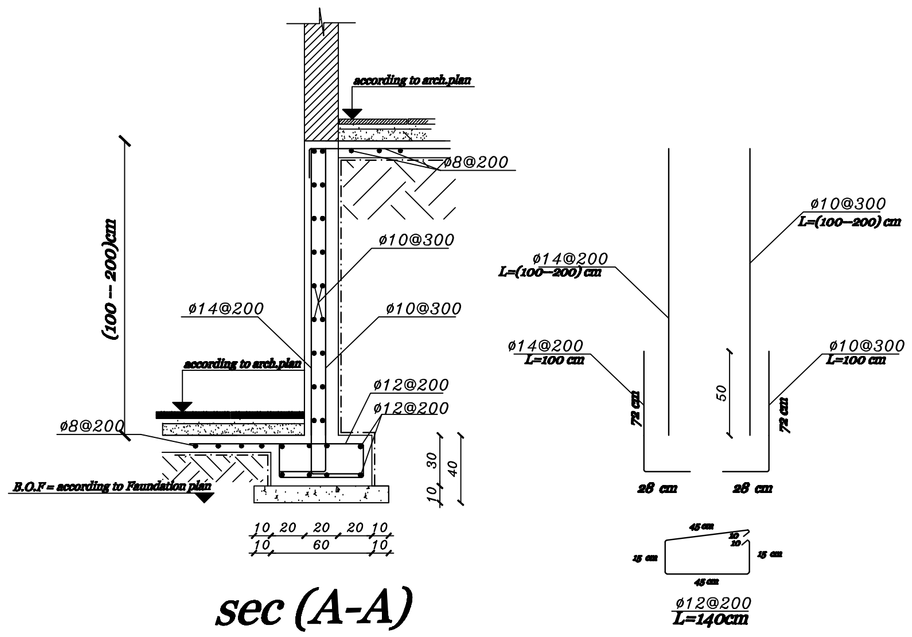
Drawing Title

Ground Beam

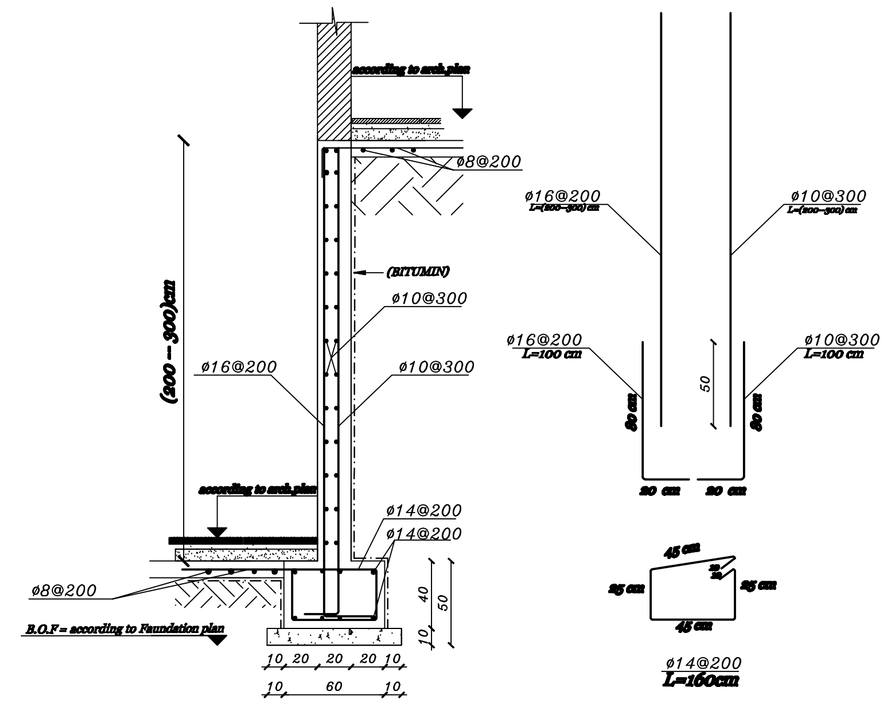
Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

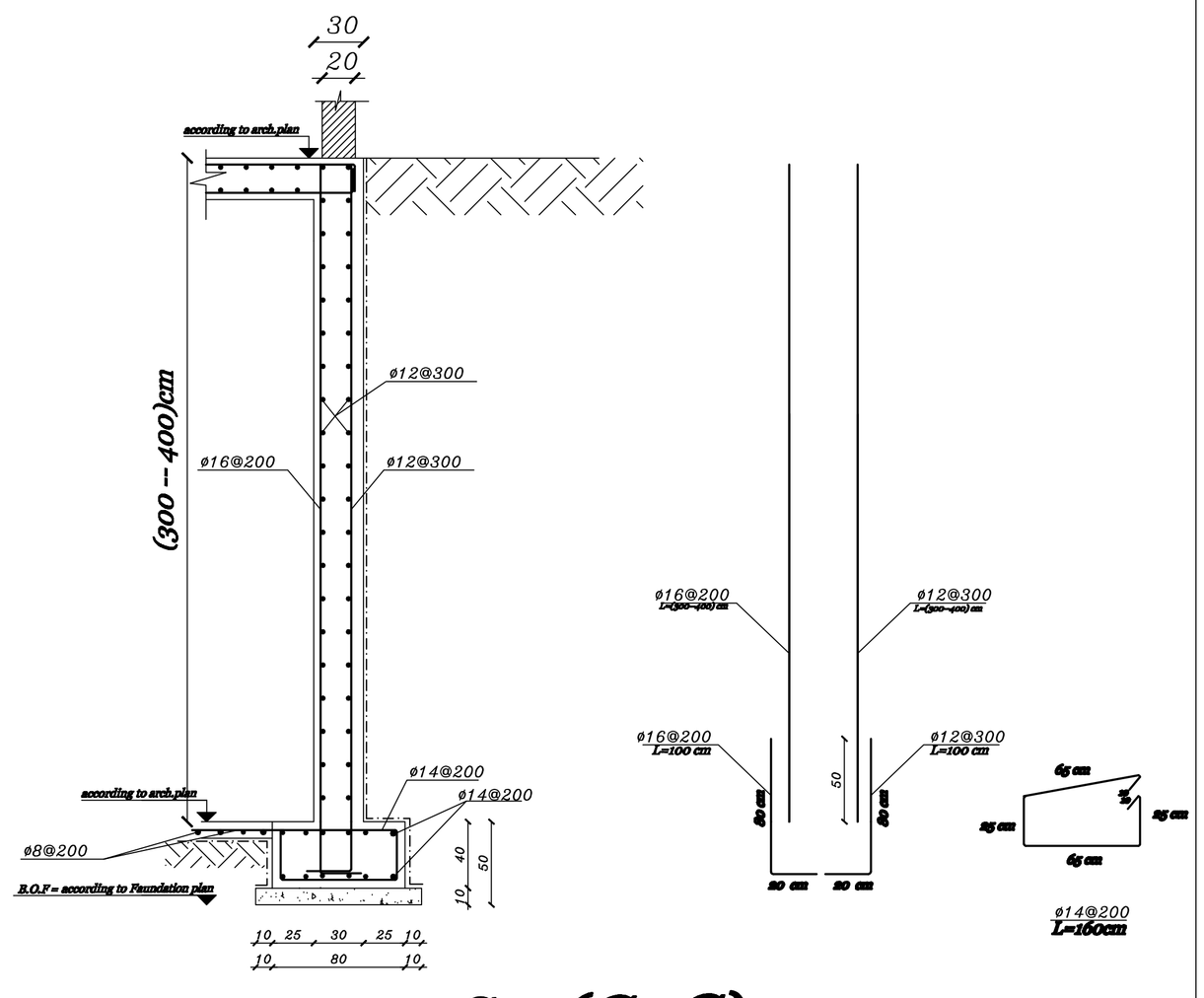
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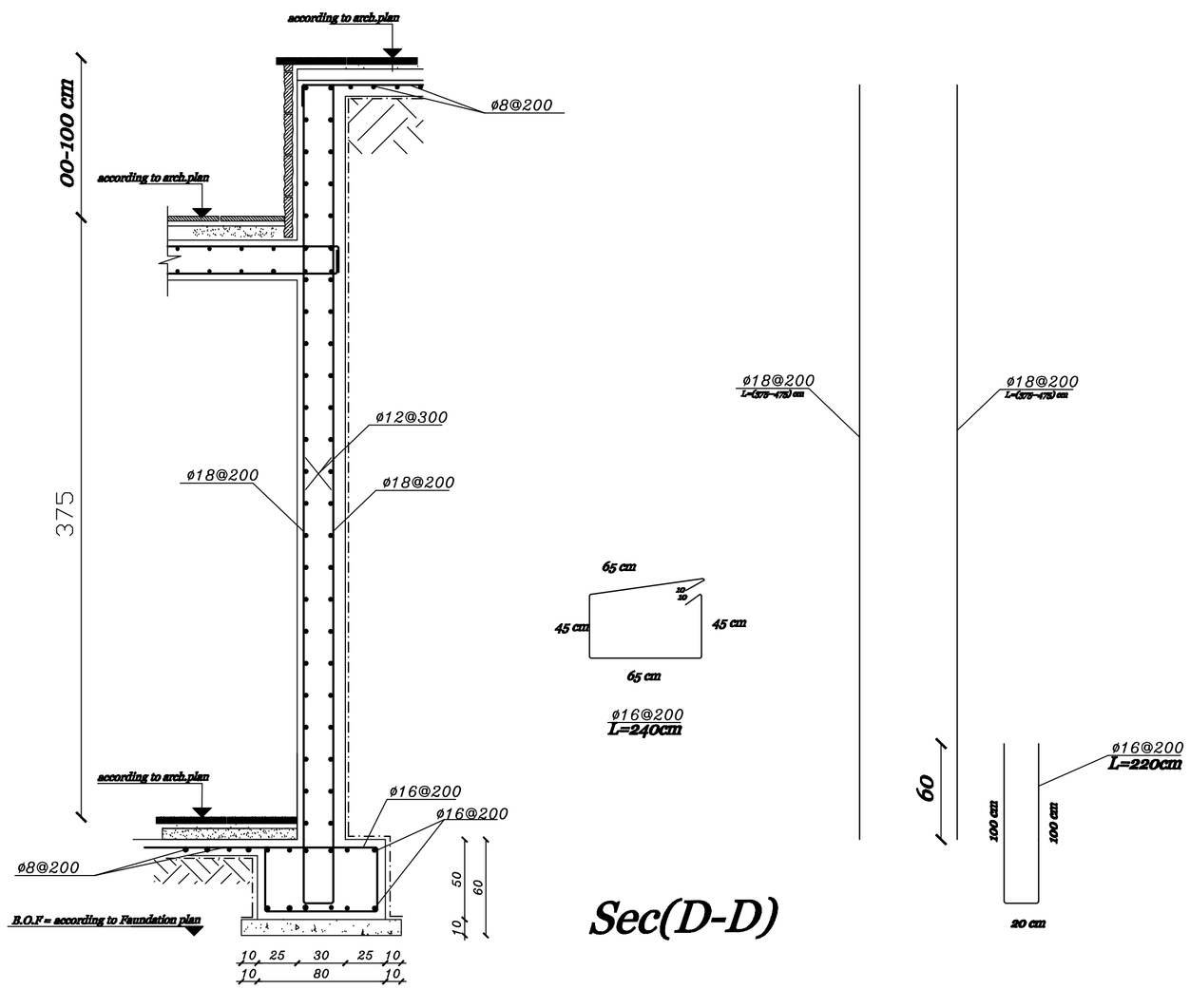
sec (A-A)



Sec(B -B)



Sec(C -C)



Sec(D-D)

By the name of Allah

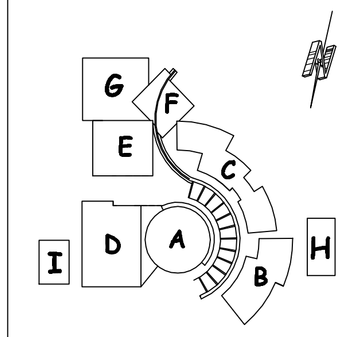
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

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Tabel of Building	
Number	Name
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I	Parking 2

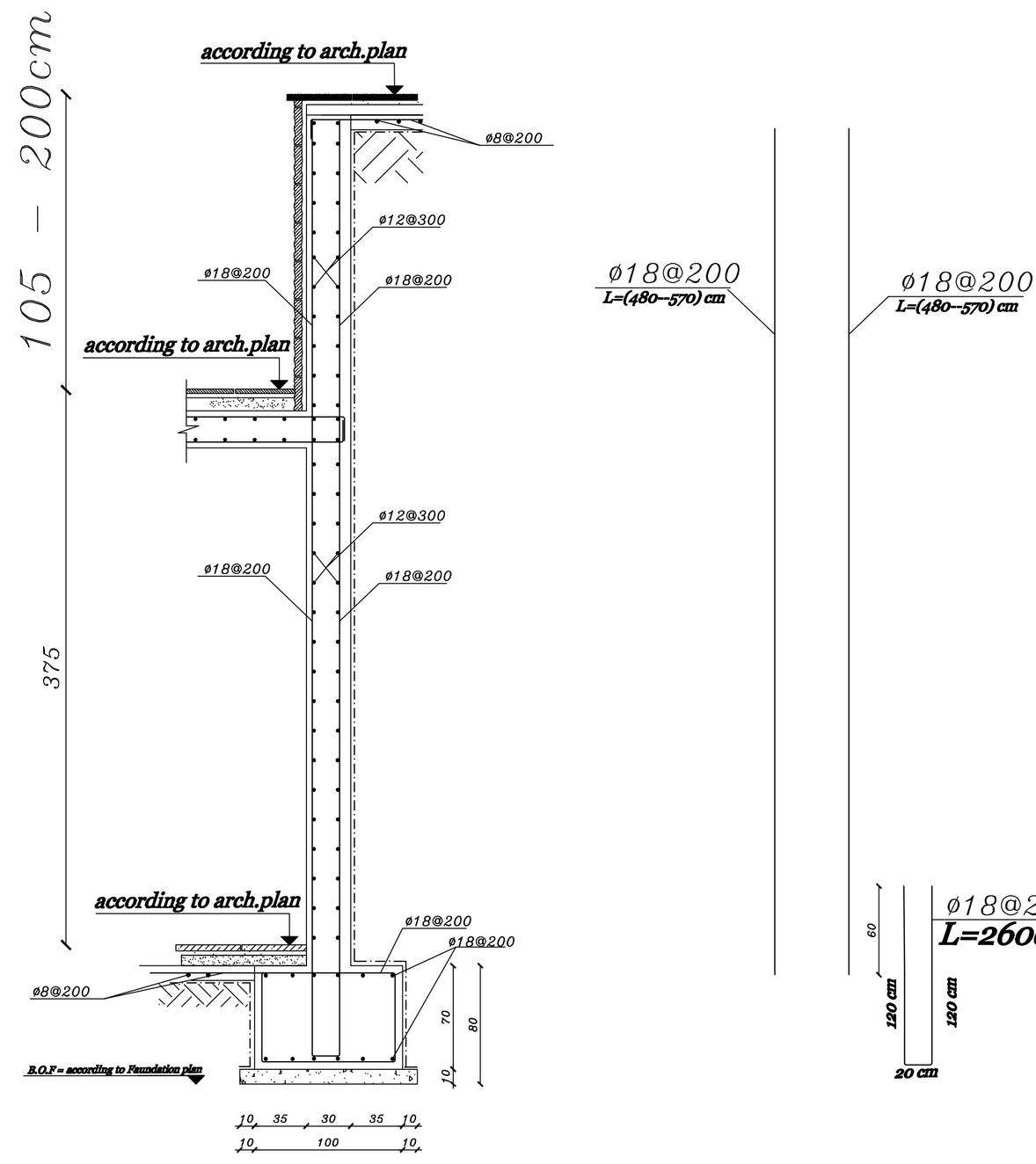
Drawing Title

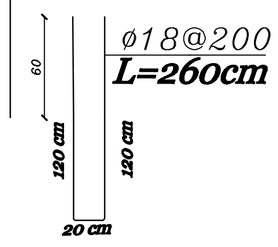
Basment wall

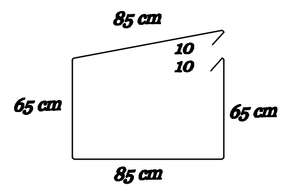
Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	No.of Draw	Date
1/25	S30	2013-2014







ø18@200
L=320cm

Sec(E-E)

By the name of Allah

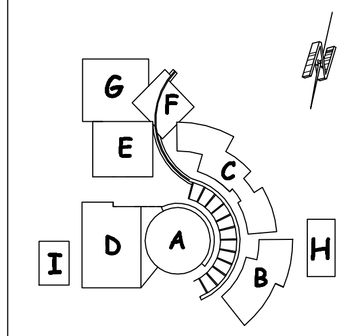
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

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Dr.Nasr Abboushi



Tabel of Building

Number	Name
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I	Parking 2

Drawing Title

Basment wall Footing

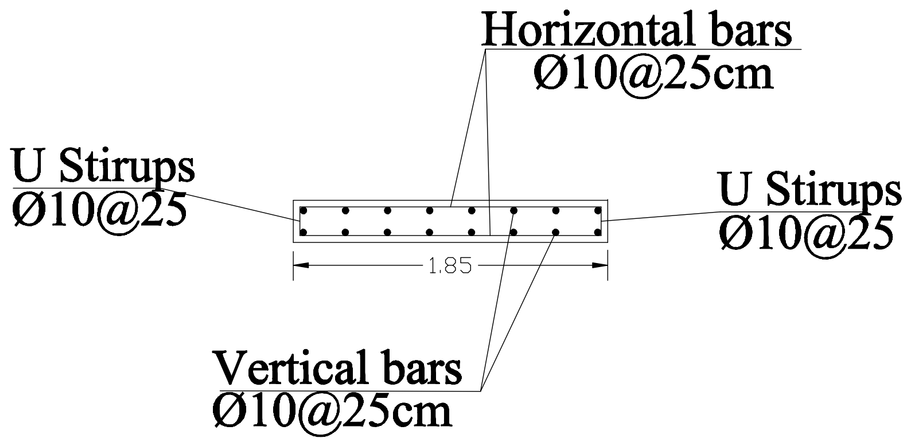
Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

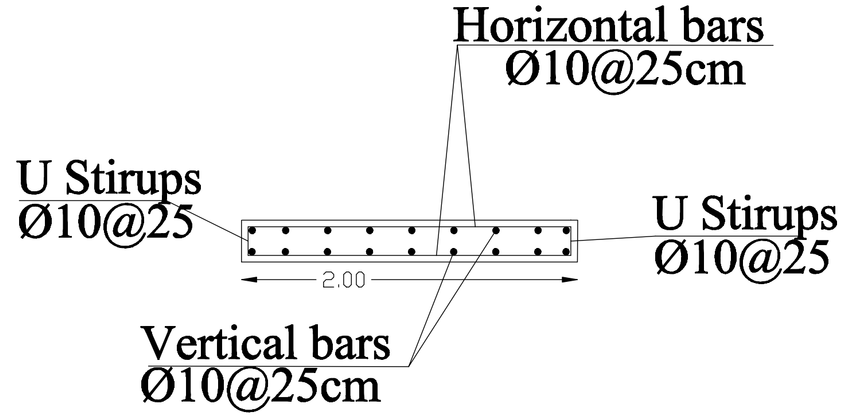
Scale	No.of Draw	Date
1/25	S31	2013-2014

Reception

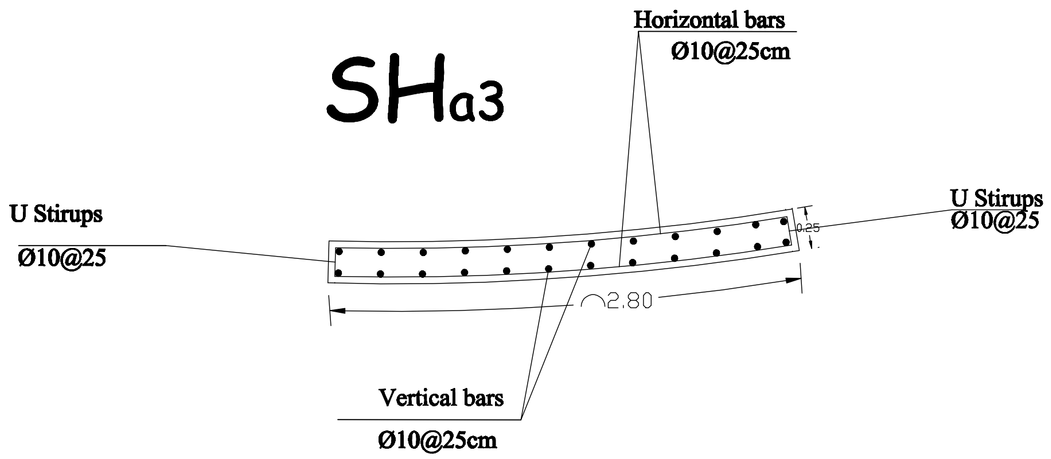
SHa4



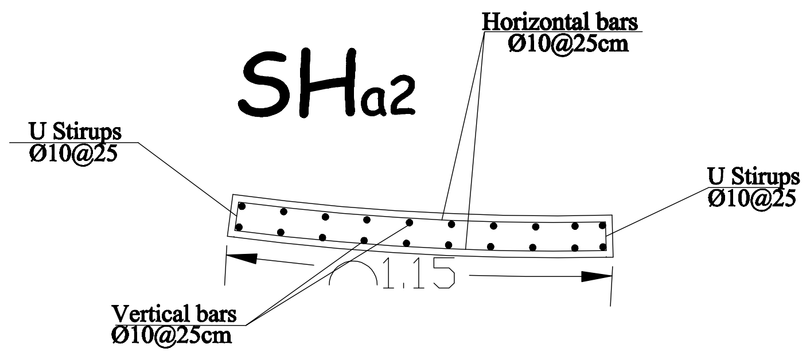
SHa1



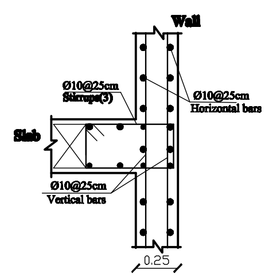
SHa3



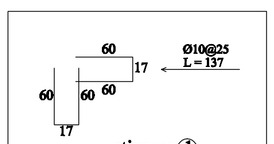
SHa2



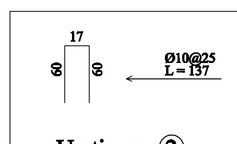
Connection between the Slab and the Wall



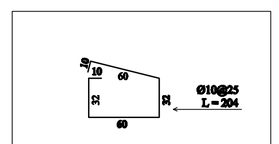
Section B - B
1:25



stirrups ①



U-stirups ②



Stirrups(3)

By the name of Allah

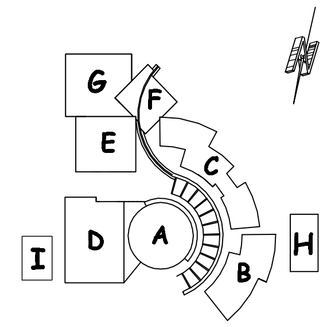
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

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Dr.Nasr Abboushi



Tabel of Building	
Number	Name
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I	Parking 2

Drawing Title

Shear Wall

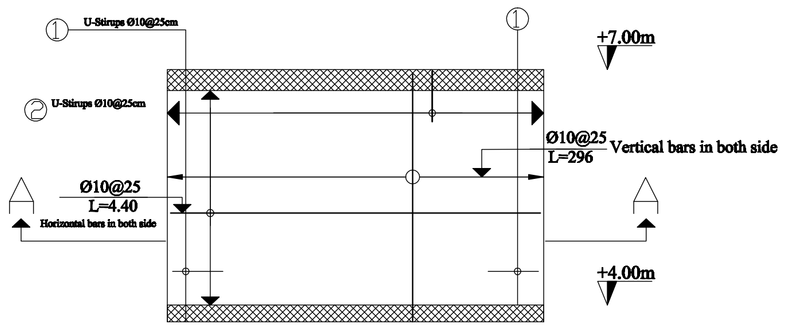
Designed By

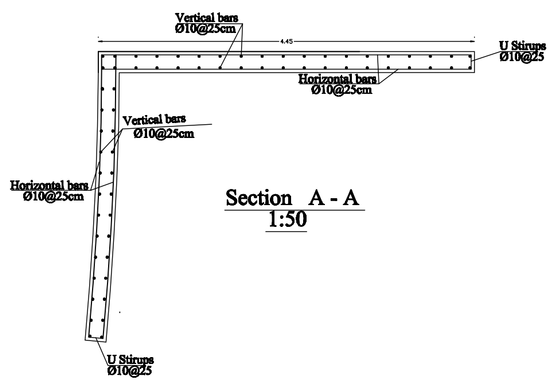
Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	No.of Draw	Date
1/25	S32	2013-2014

Sport hall

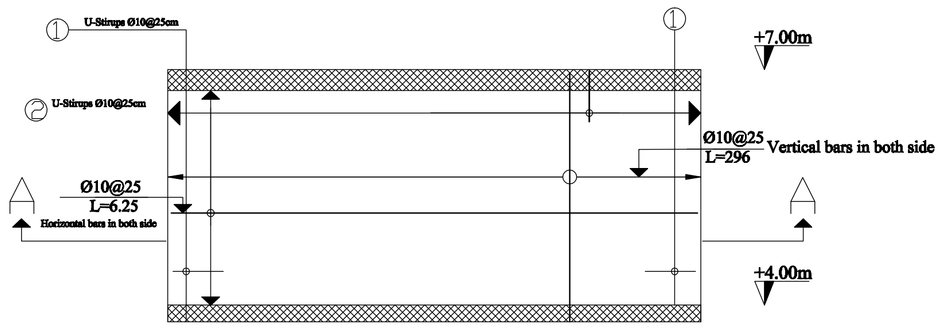
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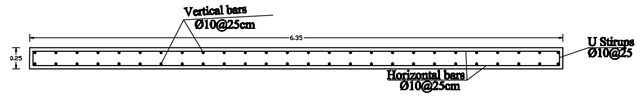




Section A - A
1:50

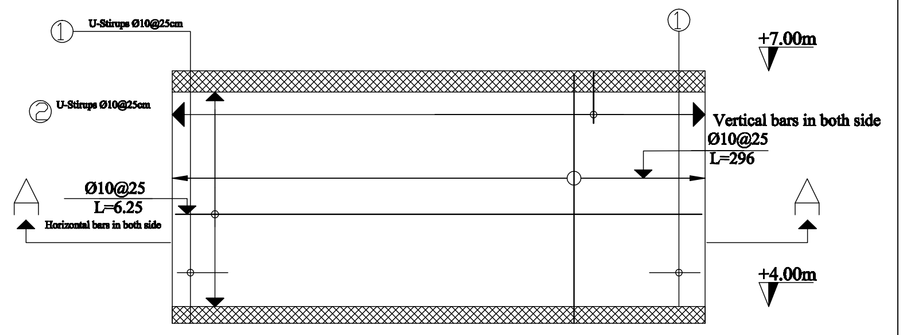
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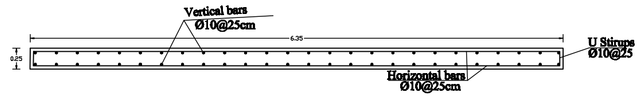




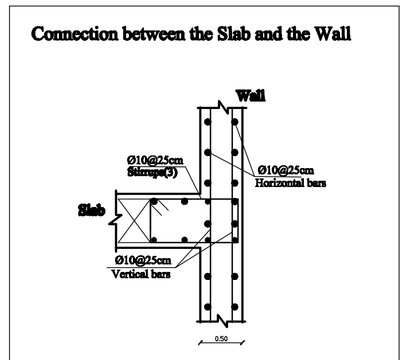
Section A - A
1:50

SH_{b3}

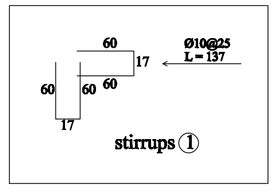




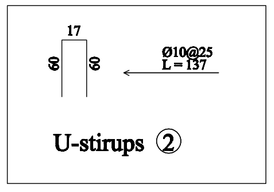
Section A - A
1:50



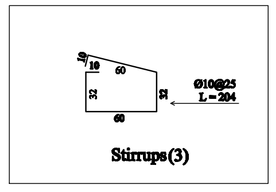
Section B - B
1:25



stirrups ①



U-stirups ②



Stirrups(3)

By the name of Allah

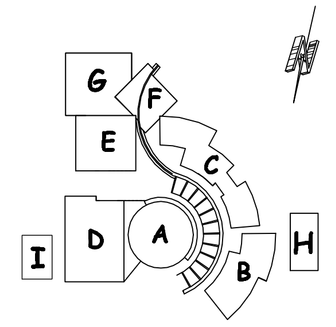
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

Number	Name
A	Reception
B	Sport hall
C	Building activities
D	Theater
E	Handicrafts
F	Restaurant
G	Photo Gallery
H	Parking 1
I	Parking 2

Drawing Title

Shear Wall

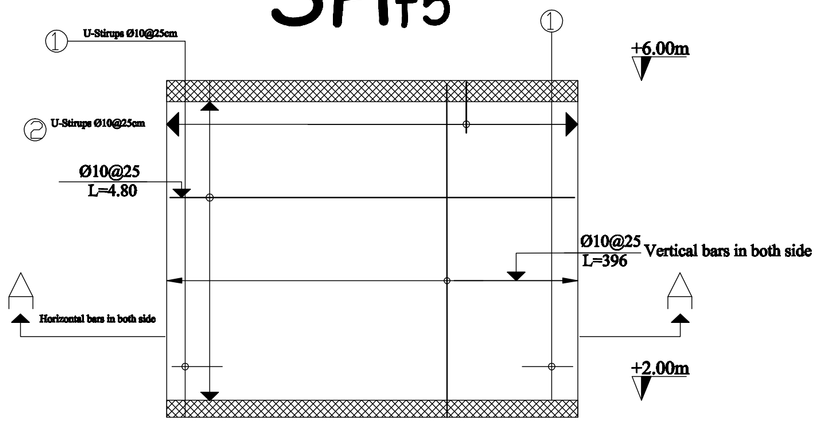
Designed By

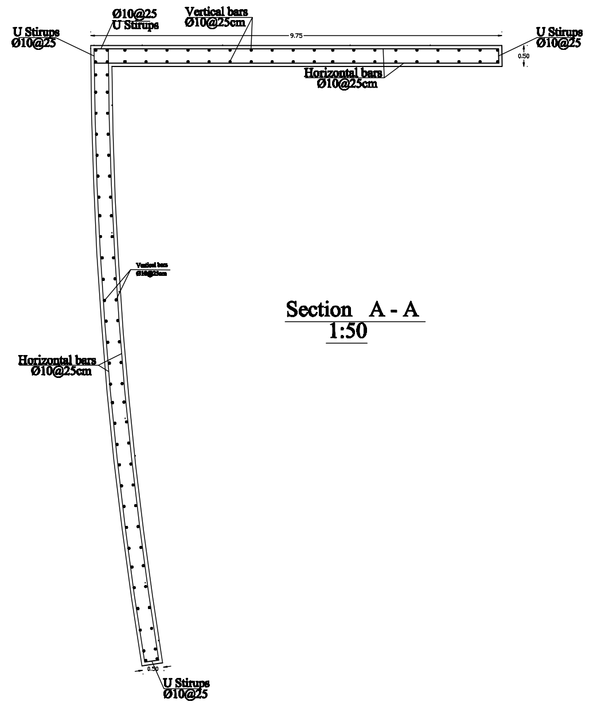
Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	No.of Draw	Date
1/50	S33	2013-2014

Sport hall

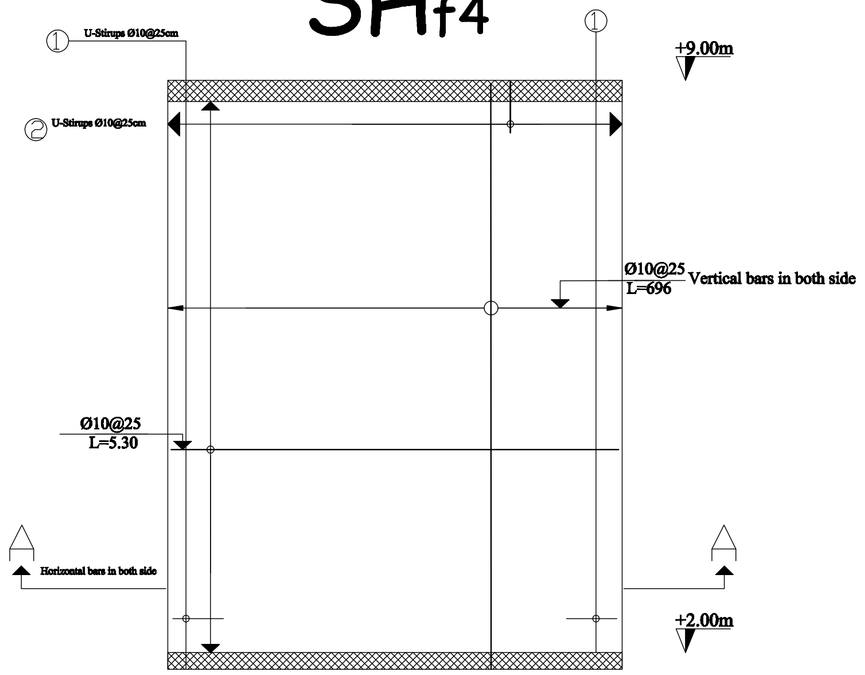
SHf5

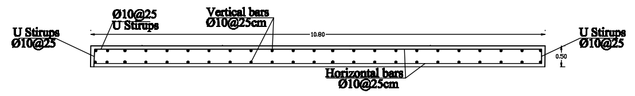




Section A - A
1:50

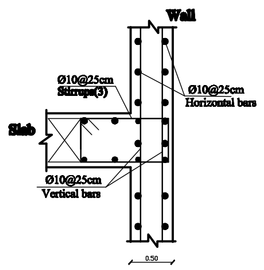
SHf4



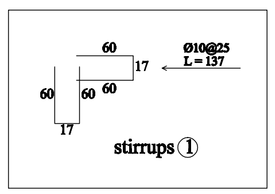


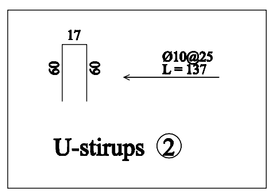
Section A - A
1:50

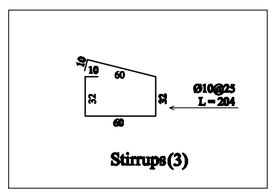
Connection between the Slab and the Wall



Section B - B
1:25







By the name of Allah

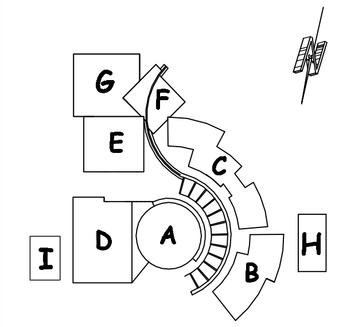
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

Number	Name
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Drawing Title

Shear Wall

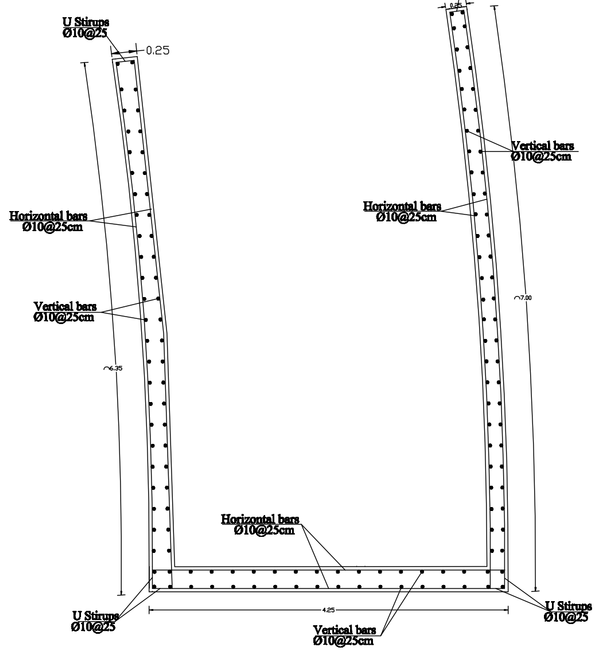
Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

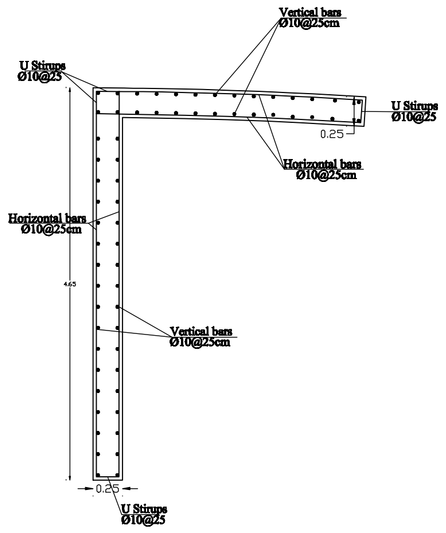
Scale	No.of Draw	Date
1/50	S34	2013-2014

Building activities

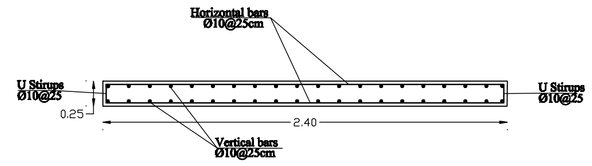
SHc2



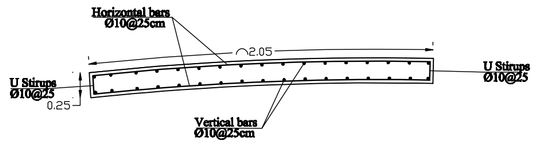
SHc1



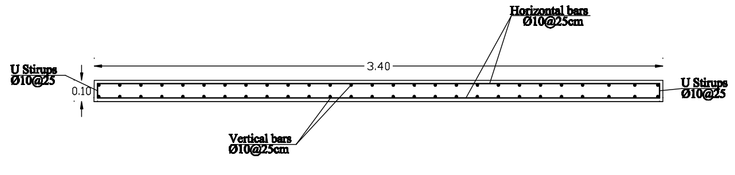
SHc3



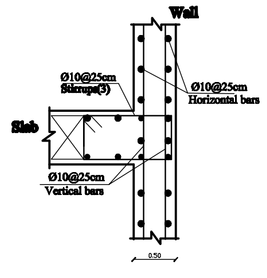
SHc4



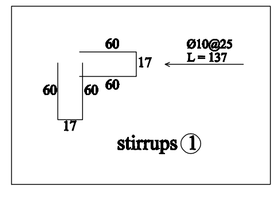
SHc5



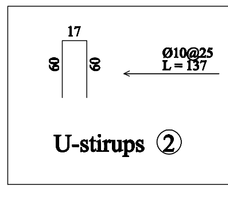
Connection between the Slab and the Wall



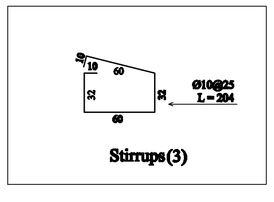
Section B - B
1:25



stirrups ①



U-stirups ②



Stirrups(3)

By the name of Allah

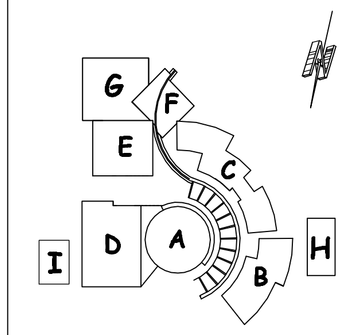
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

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I	Parking 2

Drawing Title

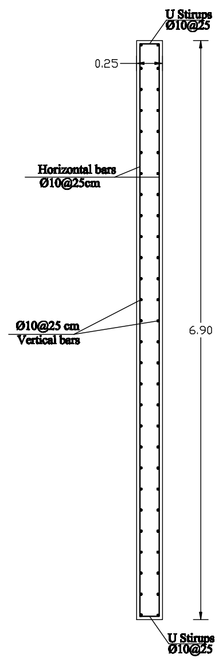
Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

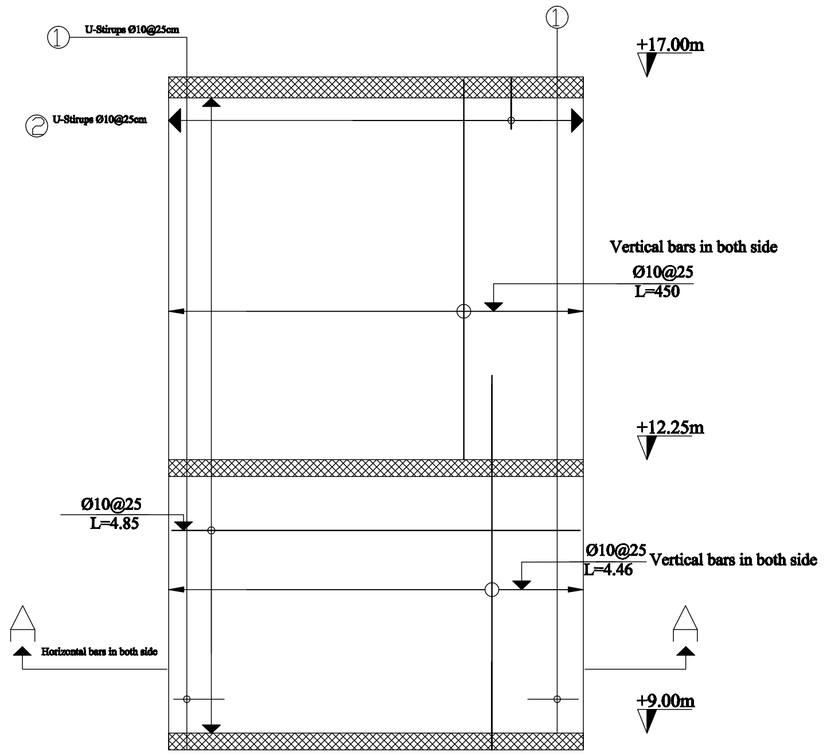
Scale	No.of Draw	Date
1/50	S35	2013-2014

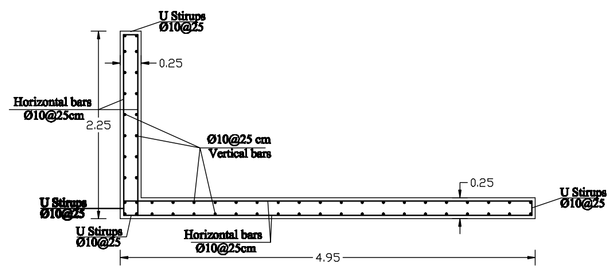
Theater

SHd1

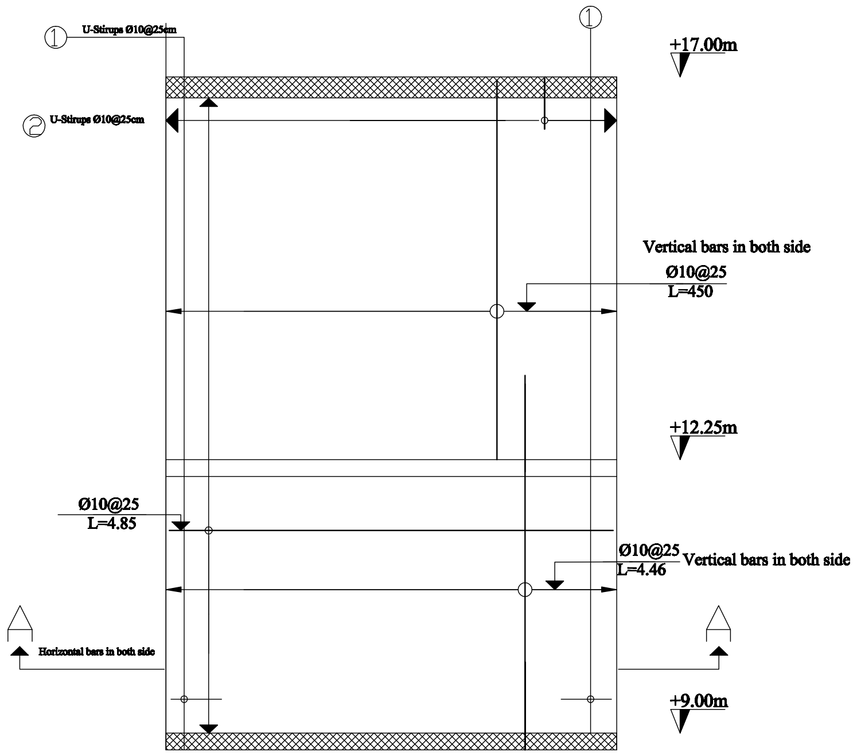


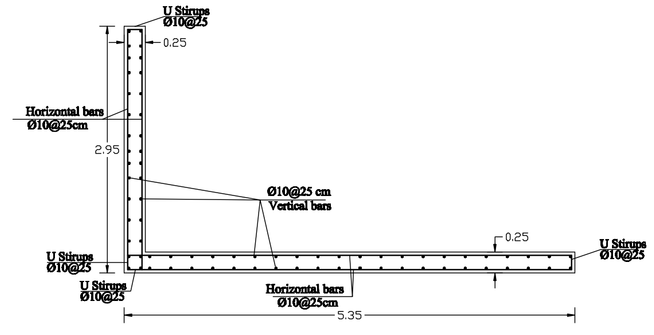
SHd2



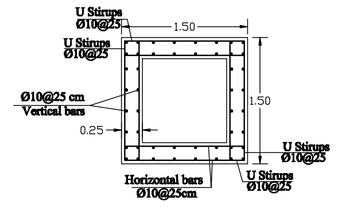


SHd4

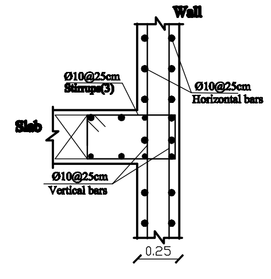




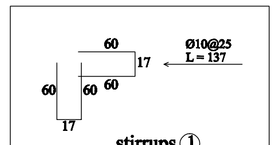
SHd3



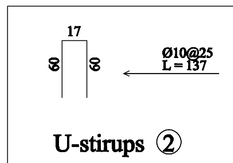
Connection between the Slab and the Wall



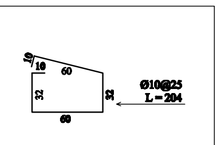
Section B - B
1:25



stirrups ①



U-stirups ②



Stirrups(3)

By the name of Allah

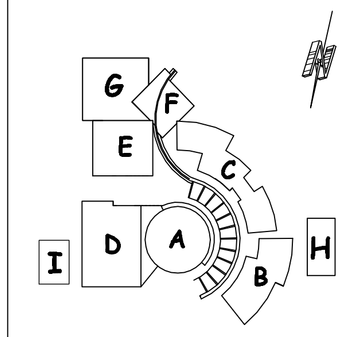
Graduation Project

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Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



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Drawing Title

Shear Wall

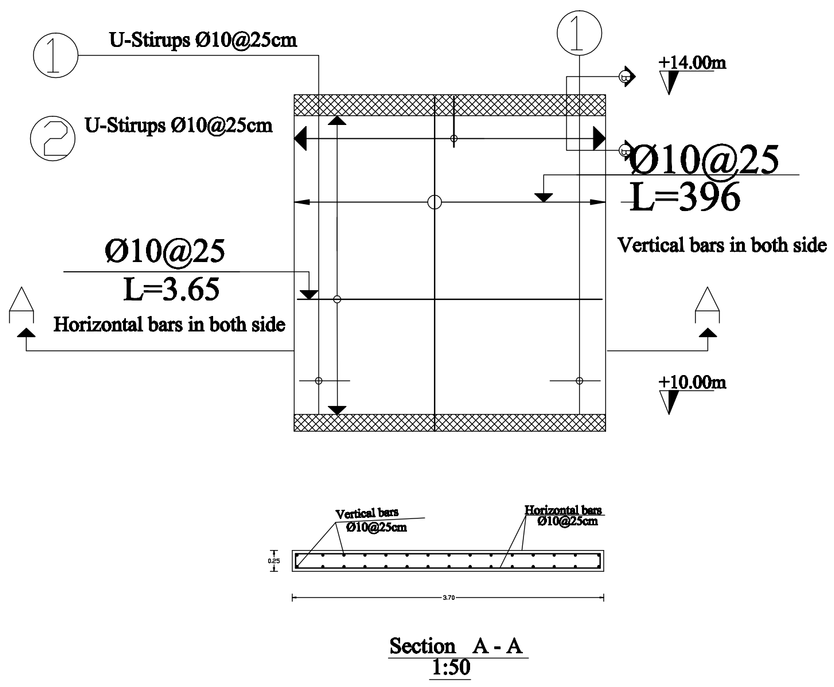
Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	No.of Draw	Date
1/50	S36	2013-2014

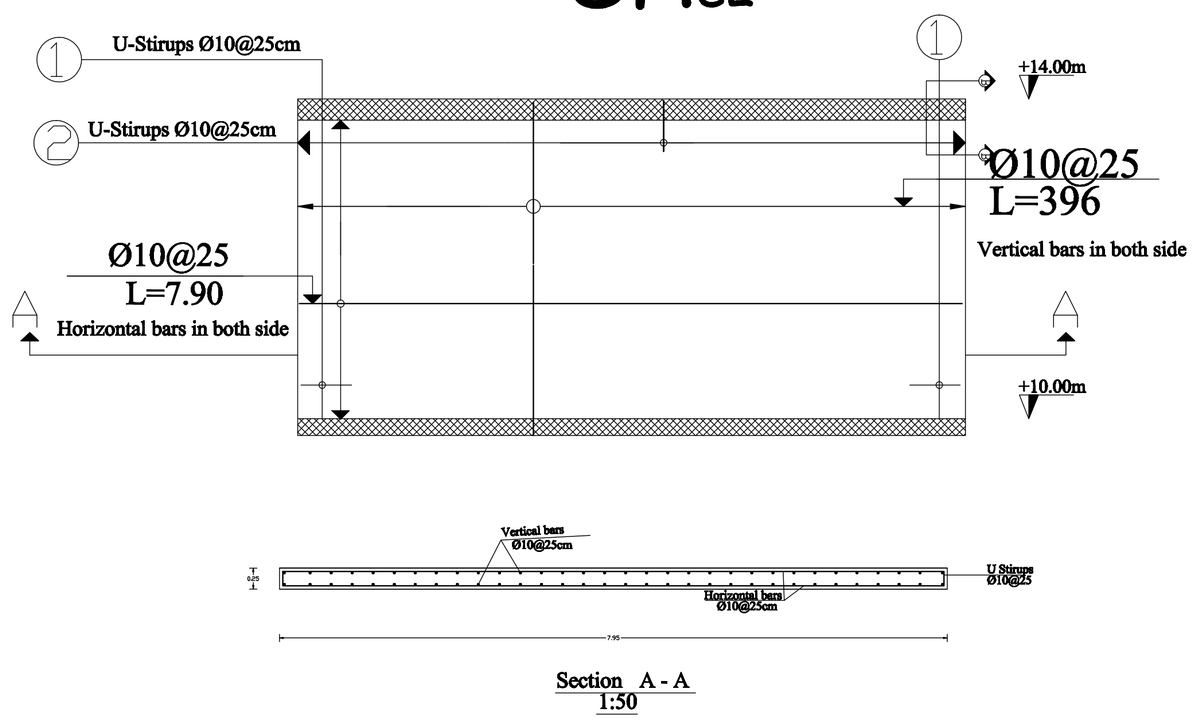
Handicrafts

SHe1



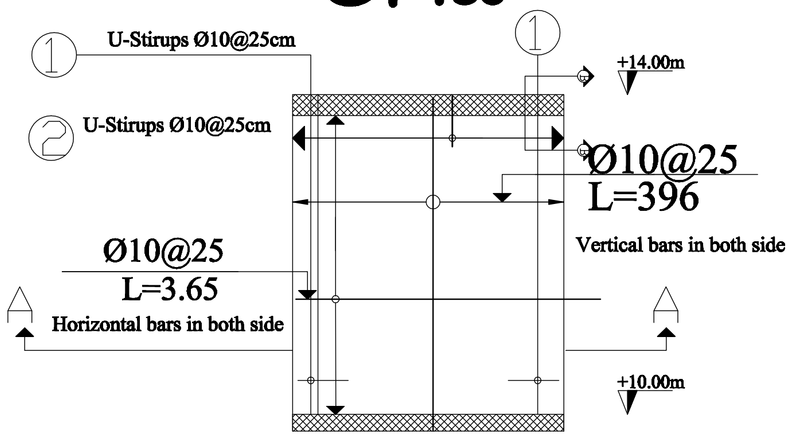
Section A - A
1:50

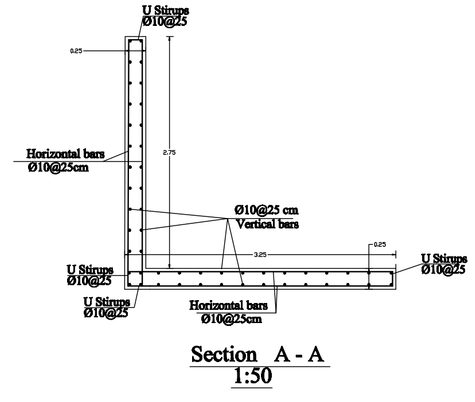
SHe2



Section A - A
1:50

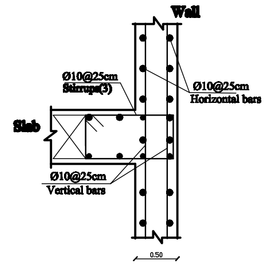
SHe3



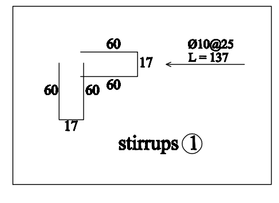


Section A - A
1:50

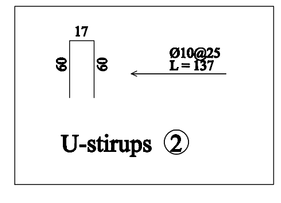
Connection between the Slab and the Wall



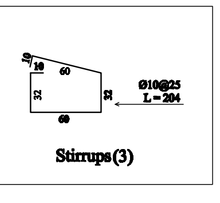
Section B - B
1:25



stirrups ①



U-stirups ②



Stirrups(3)

By the name of Allah

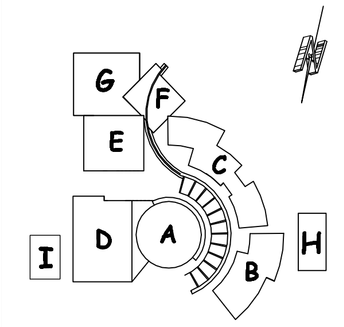
Graduation Project

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Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



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Drawing Title

Shear Wall

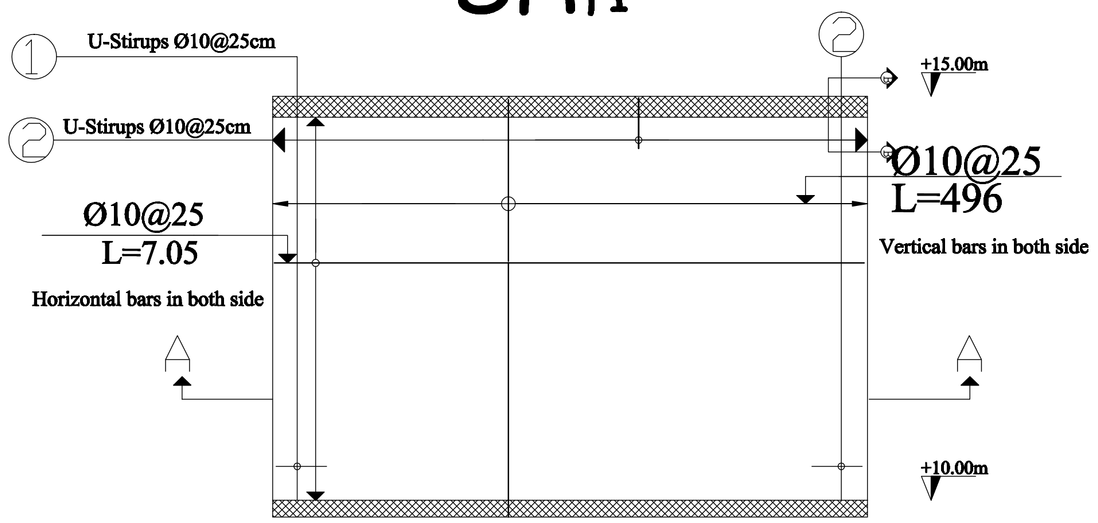
Designed By

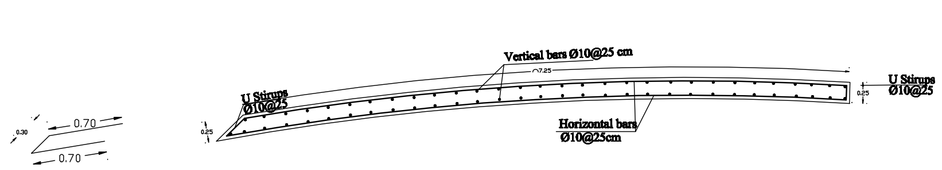
Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	No.of Draw	Date
1/50	S37	2013-2014

Restaurant

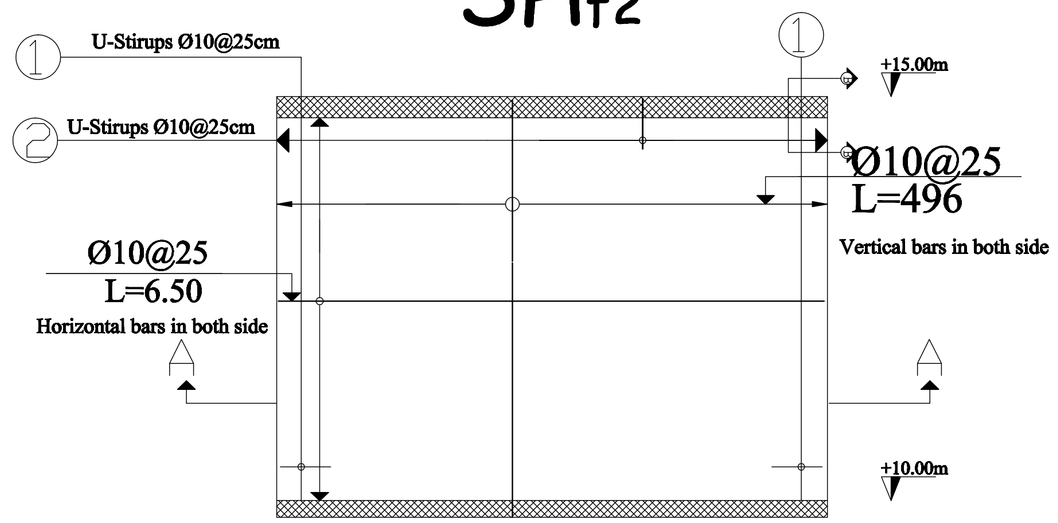
SHf1

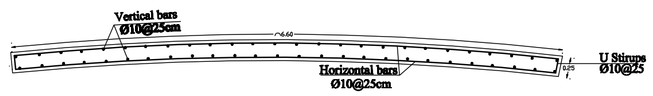




Section A - A
1:50

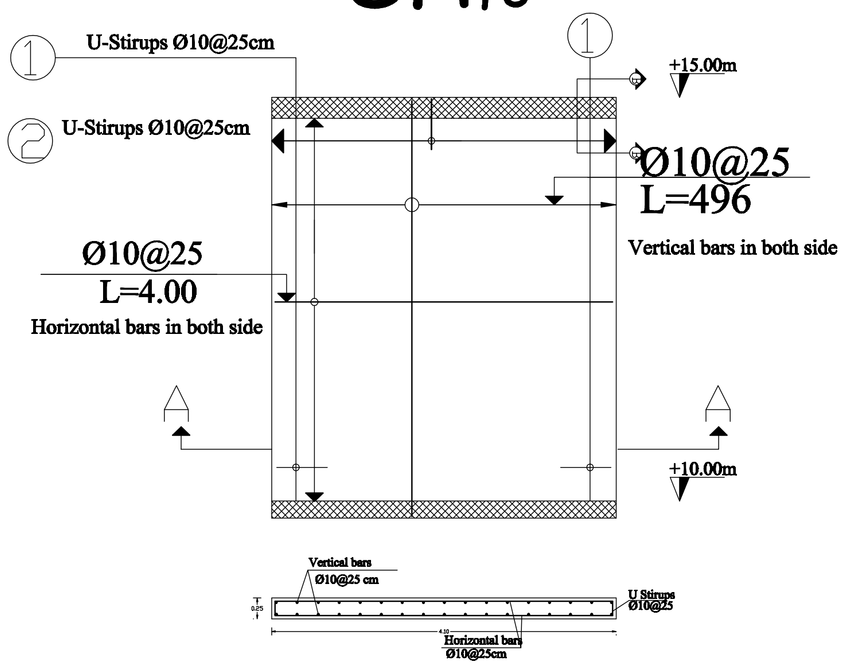
SHf2





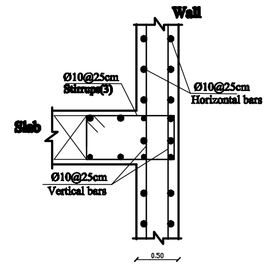
Section A - A
1:50

SHf3

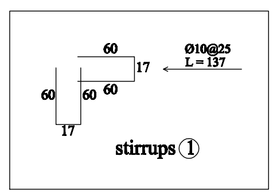


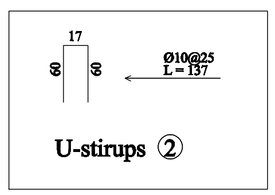
Section A - A
1:50

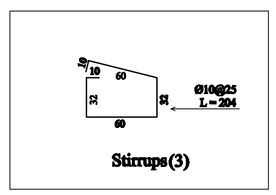
Connection between the Slab and the Wall



Section B - B
1:25







By the name of Allah



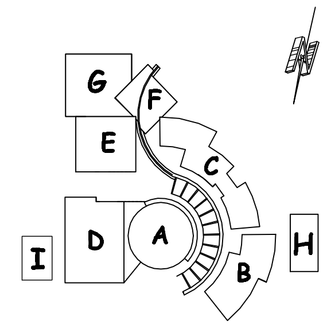
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

Number	Name
A	Reception
B	Sport hall
C	Building activities
D	Theater
E	Handicrafts
F	Restaurant
G	Photo Gallery
H	Parking 1
I	Parking 2

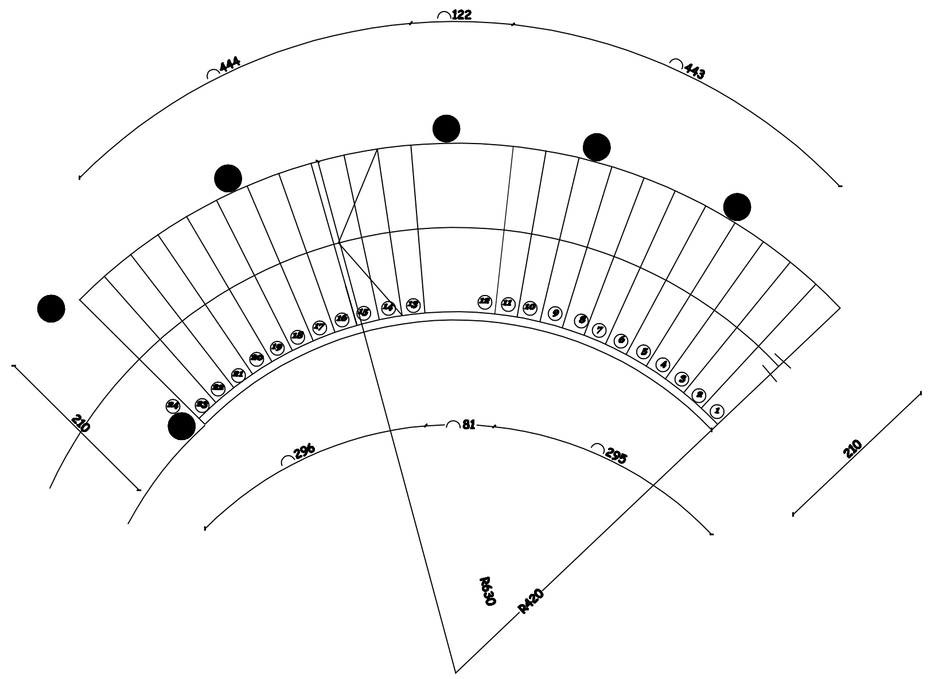
Drawing Title

Shear Wall

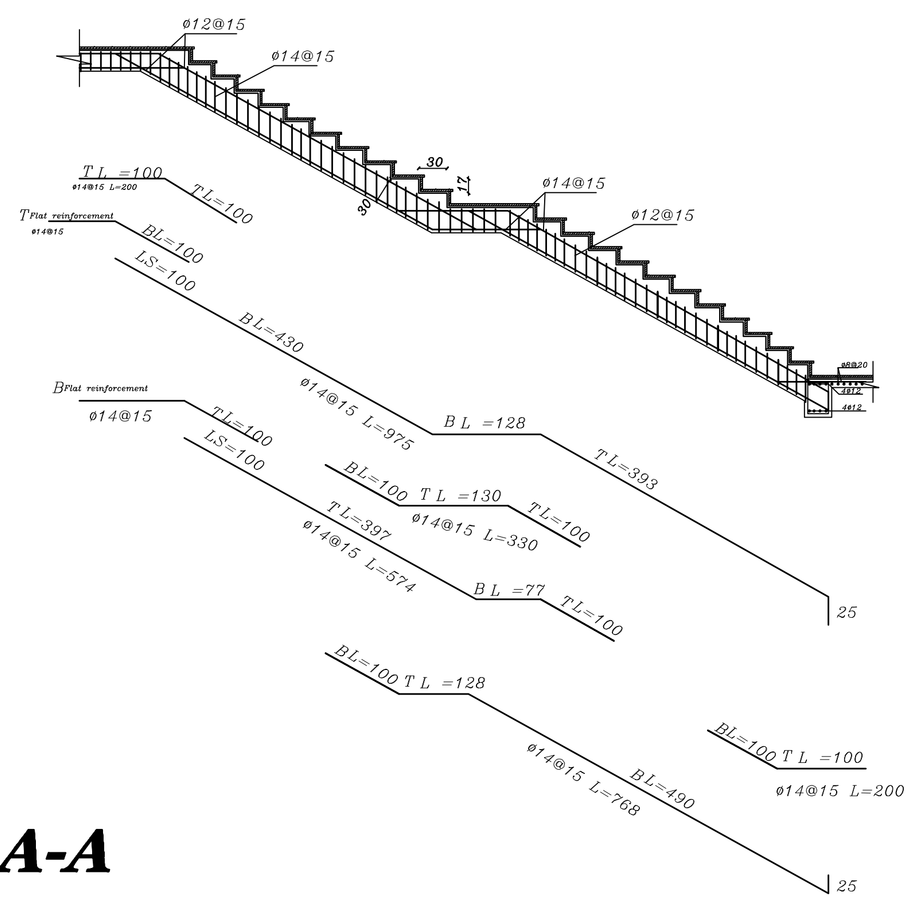
Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

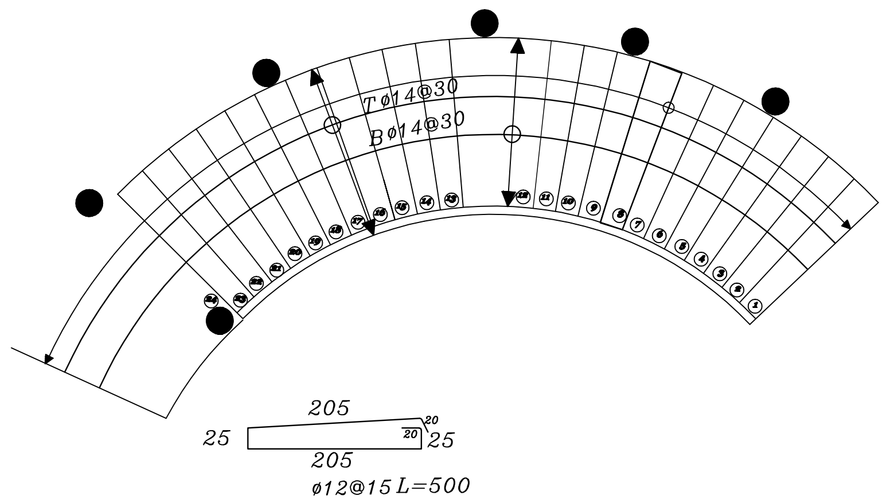
Scale	No.of Draw	Date
1/50	S38	2013-2014



stair plan (SA1)



SECTION A-A



stair plan (SA1)

By the name of Allah

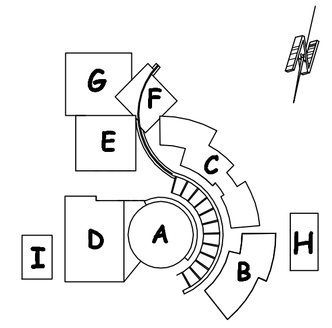
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

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Tabel of Building	
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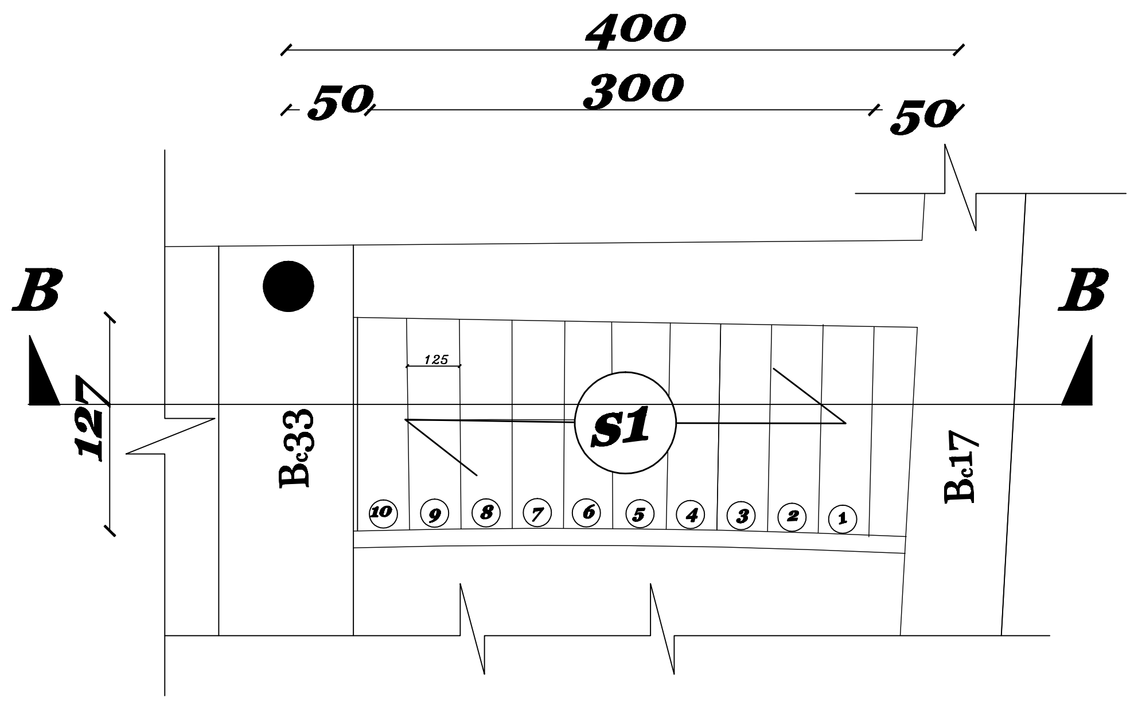
Drawing Title

staircase SA1

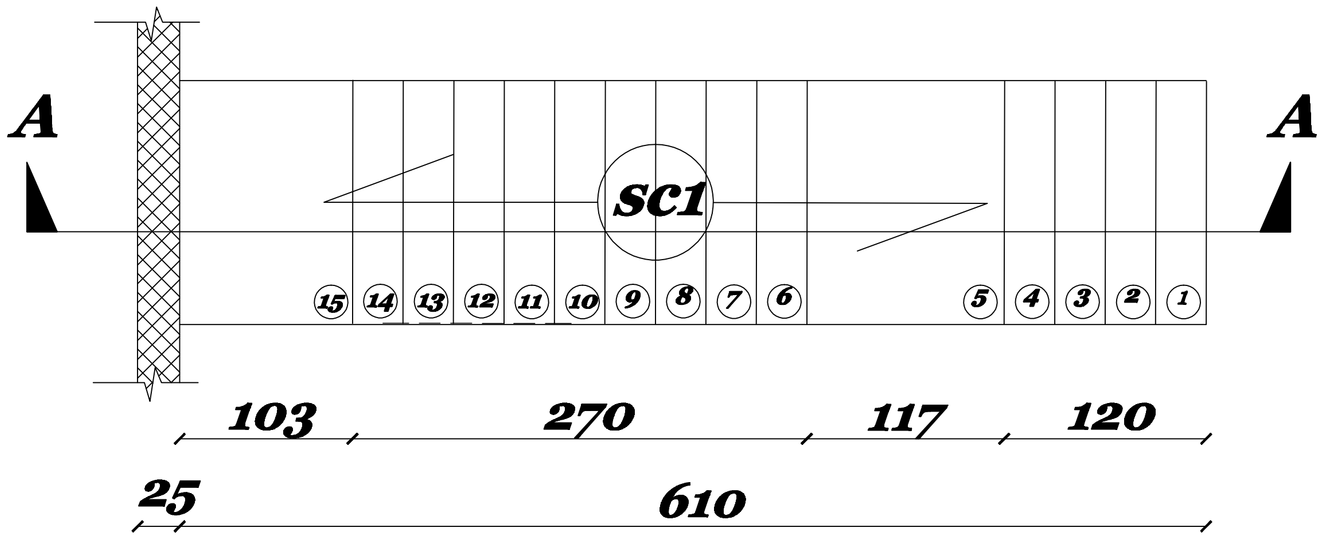
Designed By

Baha Bader
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Montaser shweiki
Mohamed Halwani

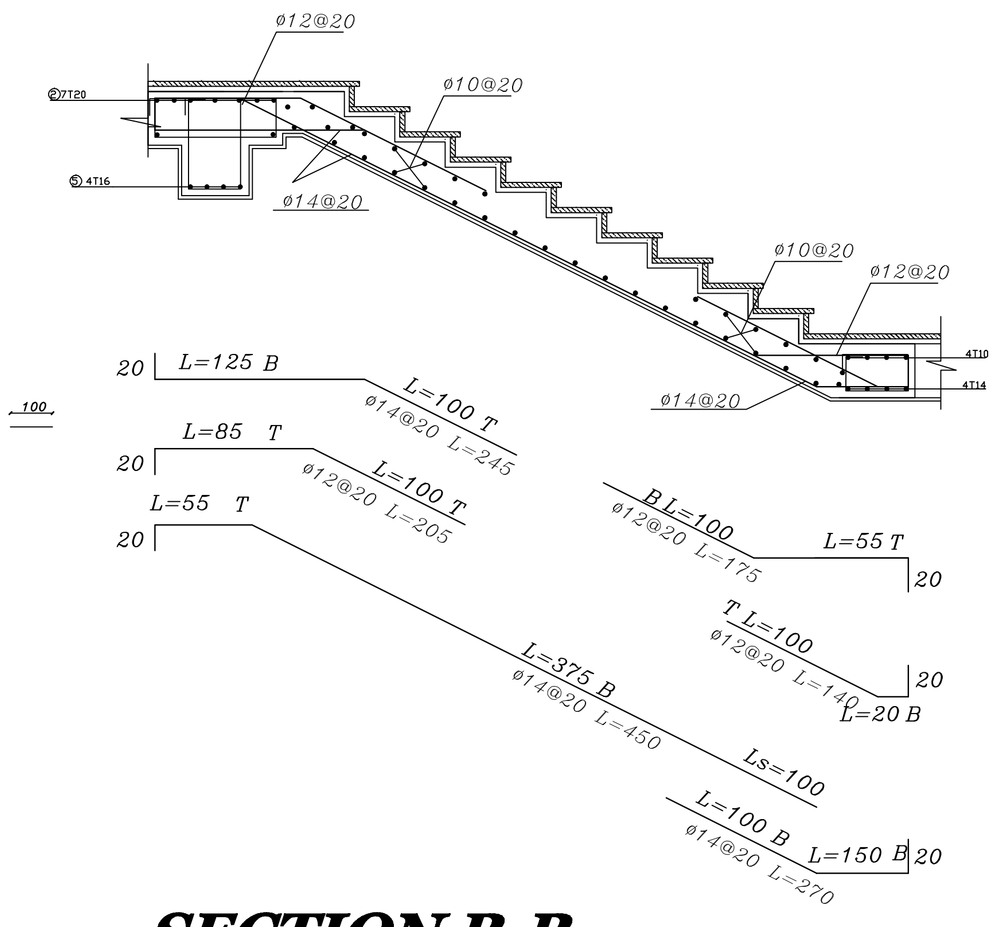
Scale	No.of Draw	Date
1/50	s39	2013-2014



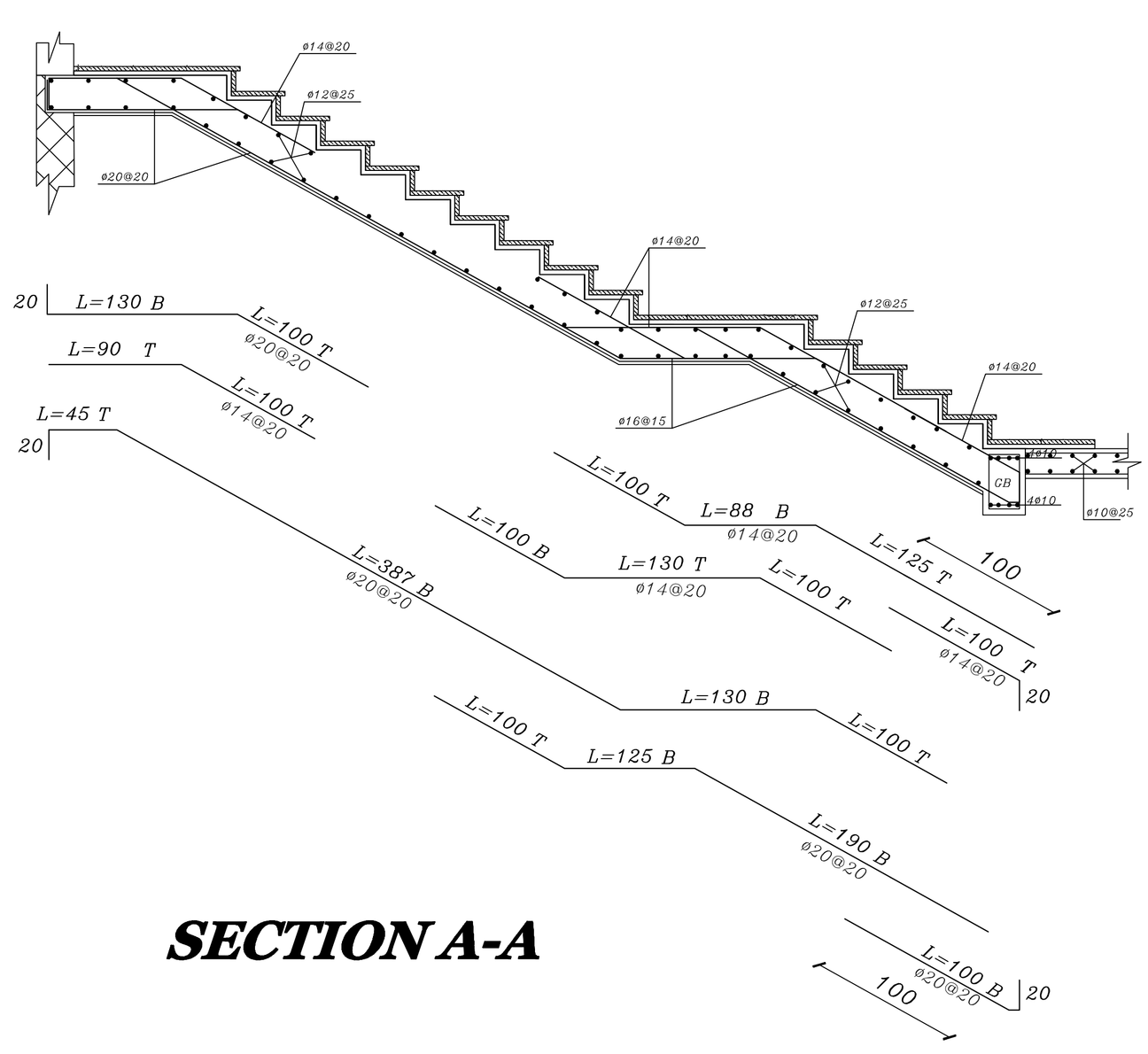
stair plan (sc3)



stair plan (sc1)



SECTION B-B



SECTION A-A

By the name of Allah

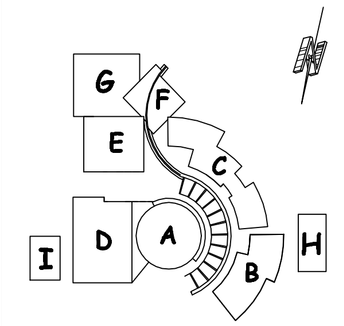
Graduation Project

Palestine Polytechnic University

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Hebron Culture Palace

Supervisor:
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Tabel of Building	
Number	Name
A	Reception
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F	Restaurant
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H	Parking 1
I	Parking 2

Drawing Title

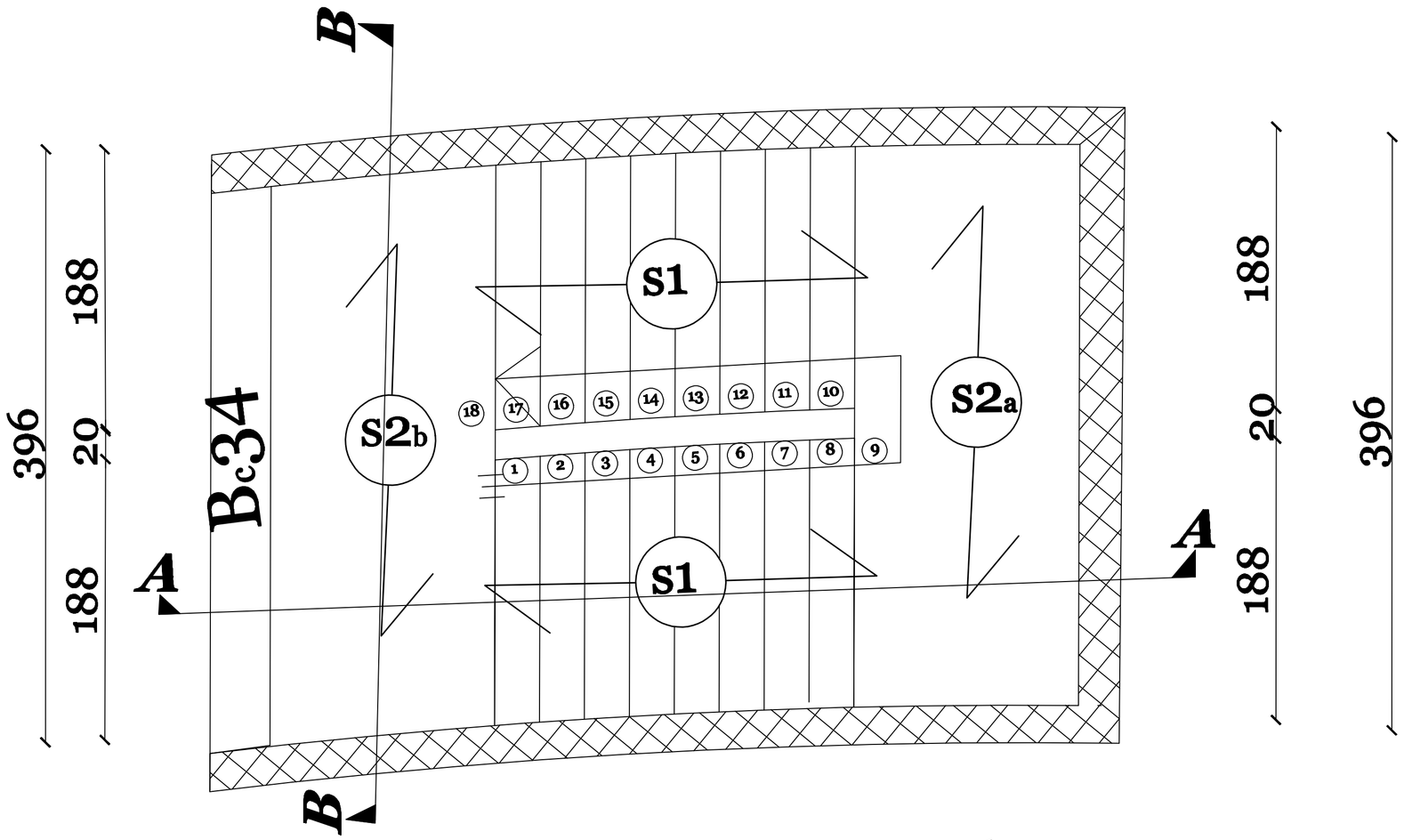
staircase
sc1 & sc3

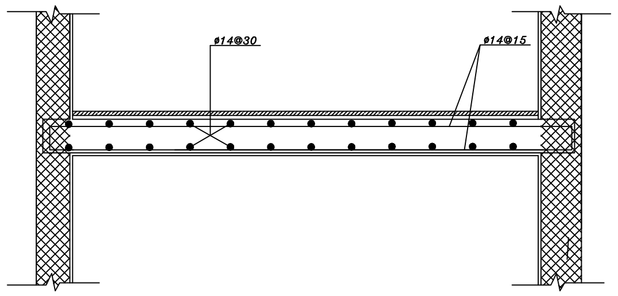
Designed By

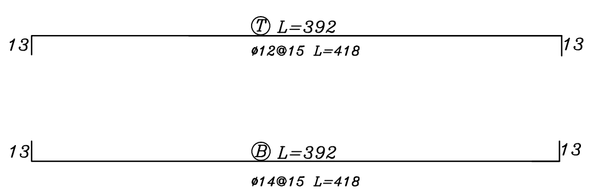
Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	No.of Draw	Date
1/25	S40	2013-2014

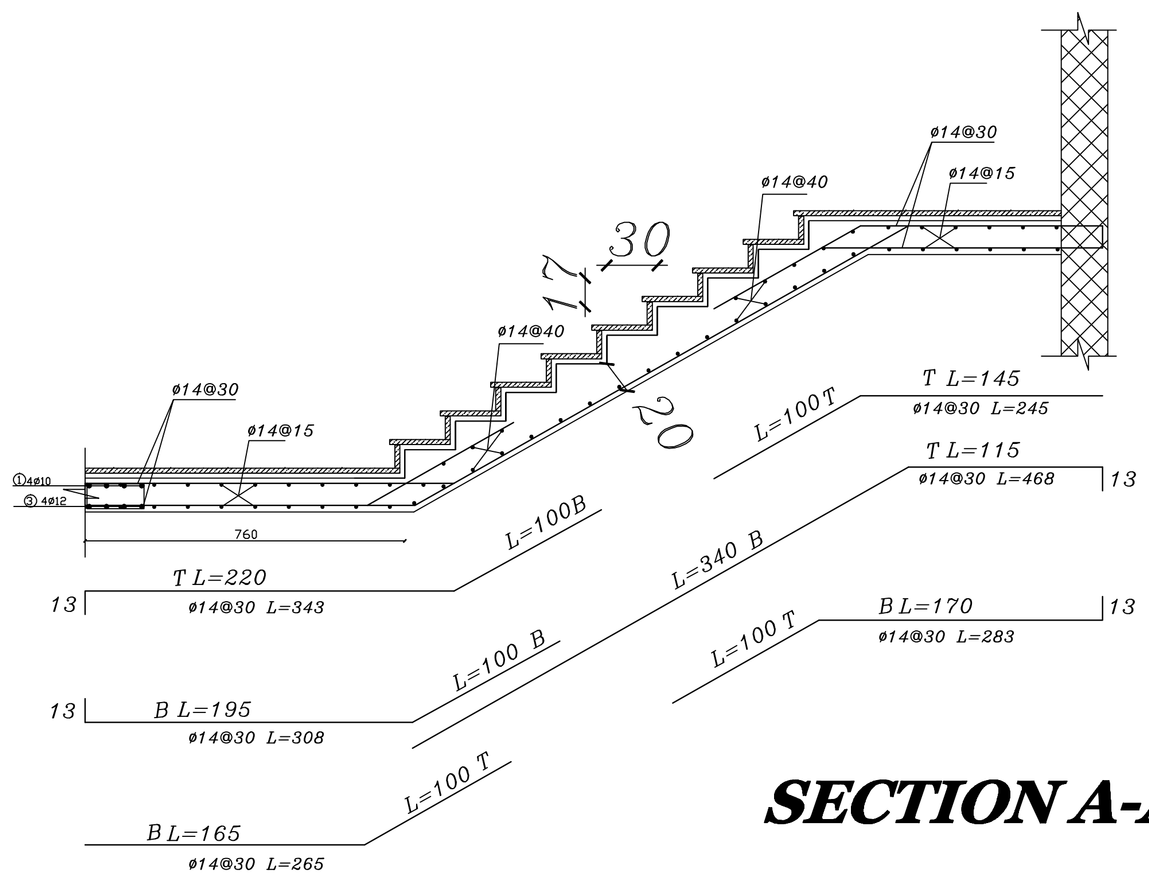
stair plan (sc2)







SECTION B-B



SECTION A-A

By the name of Allah

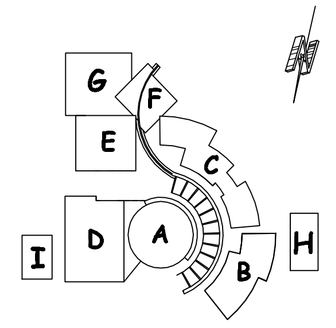
Graduation Project

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Civil Engineering

Hebron Culture Palace

Supervisor:
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Tabel of Building	
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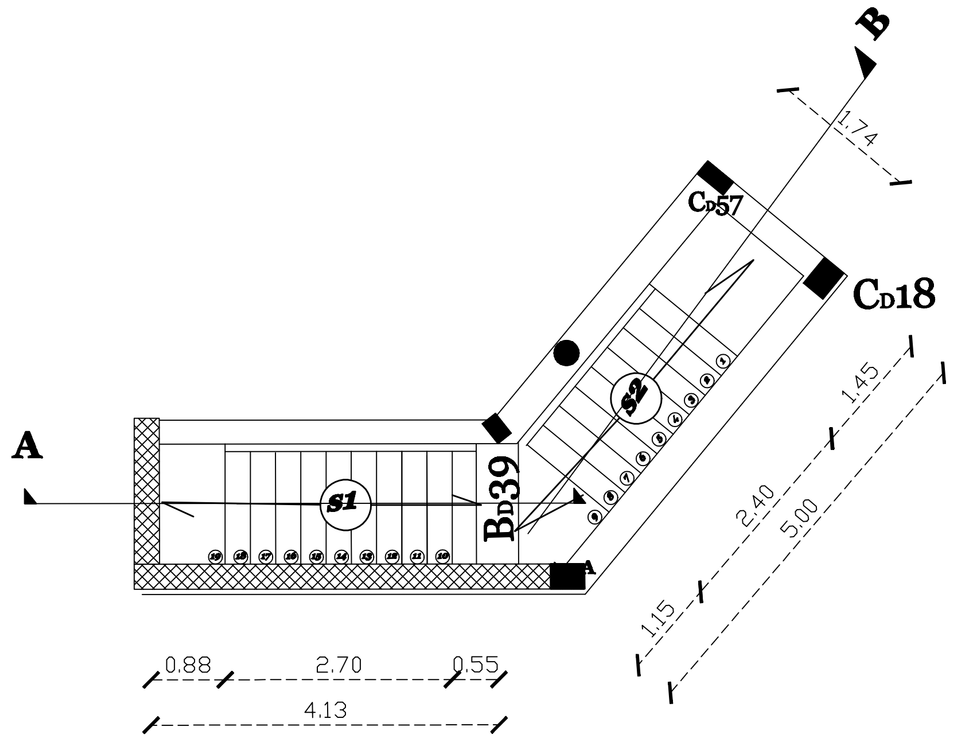
Drawing Title

staircase sc2

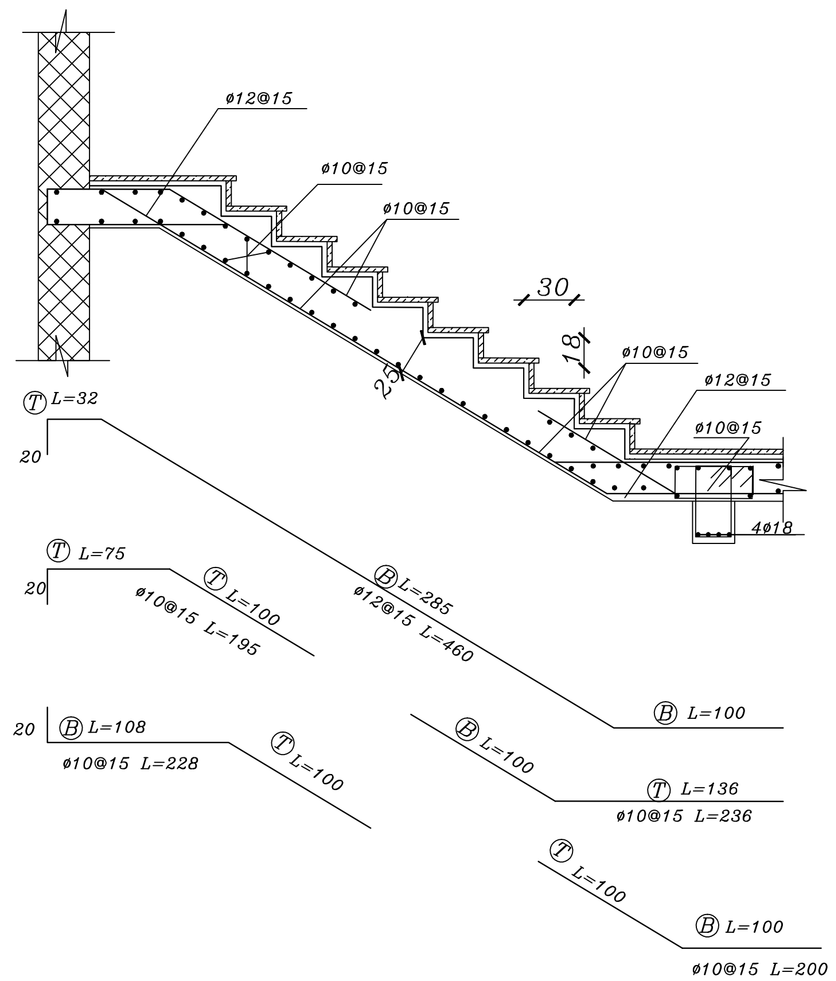
Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

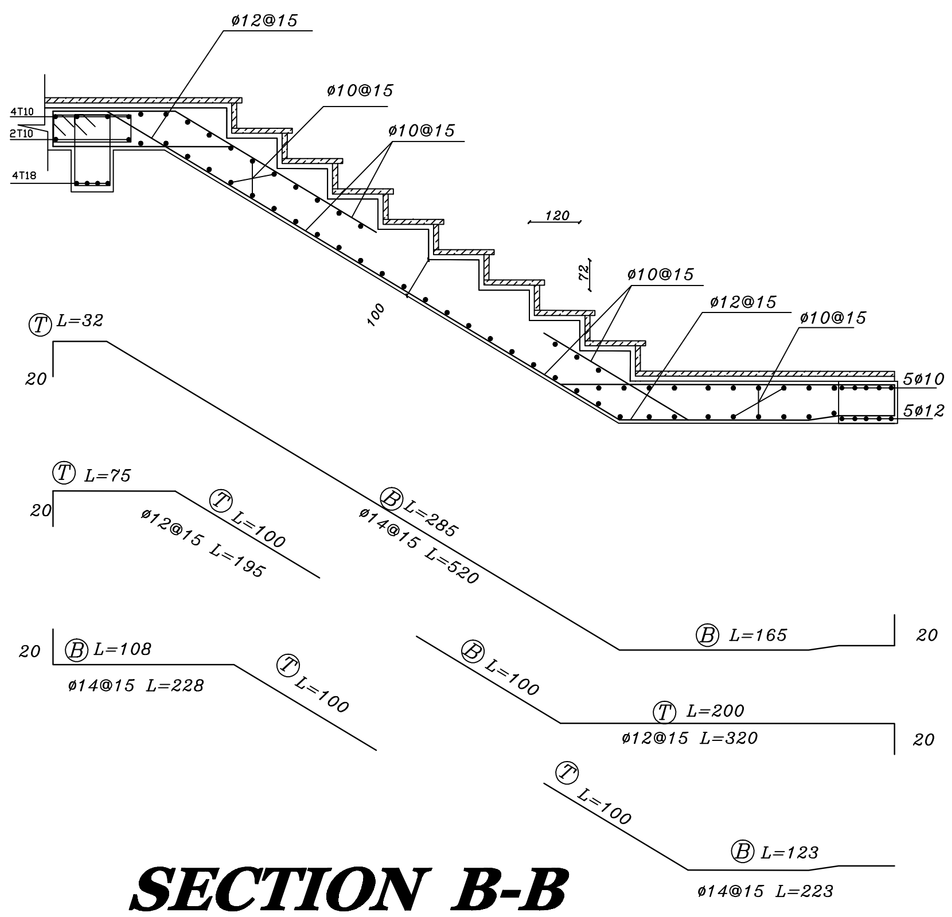
Scale	No.of Draw	Date
1/25	S41	2013-2014



stair plan (SD1)
1:50



SECTION A-A



SECTION B-B

By the name of Allah

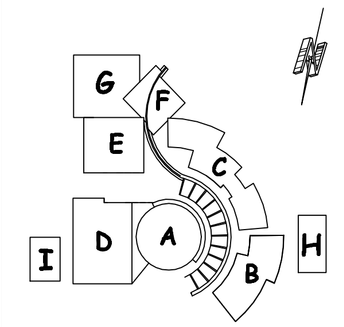
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
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Tabel of Building	
Number	Name
A	Reception
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Drawing Title

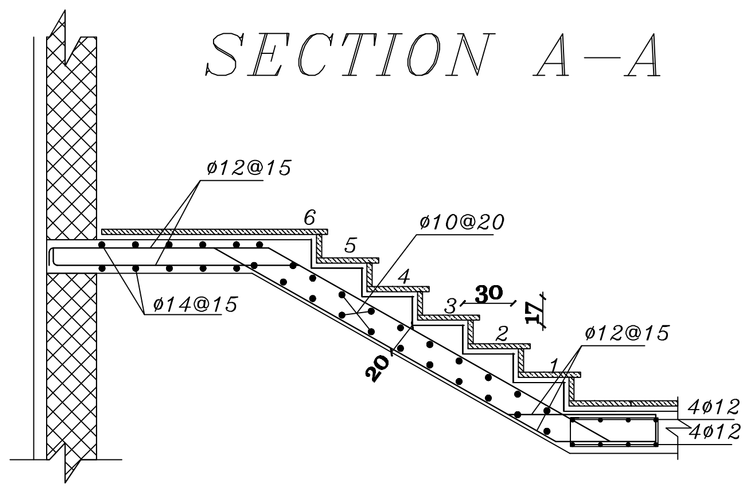
staircase SD1

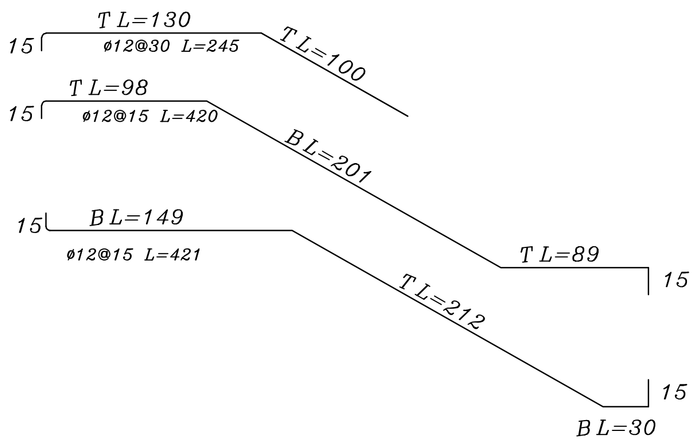
Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

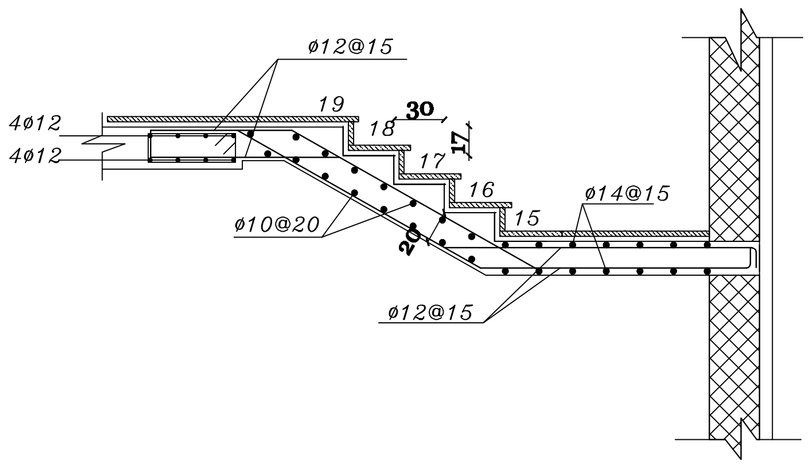
Scale	No.of Draw	Date
1/25	S42	2013-2014

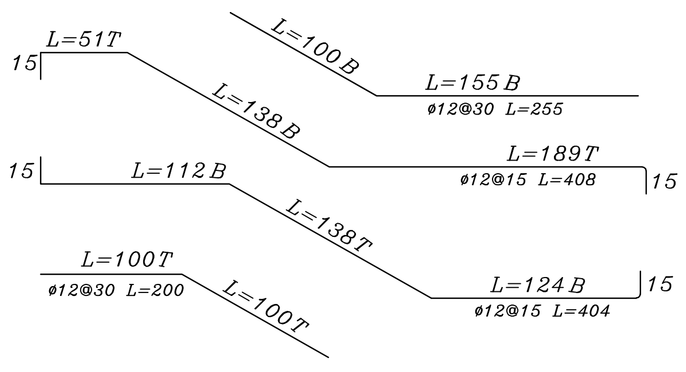
SECTION A–A

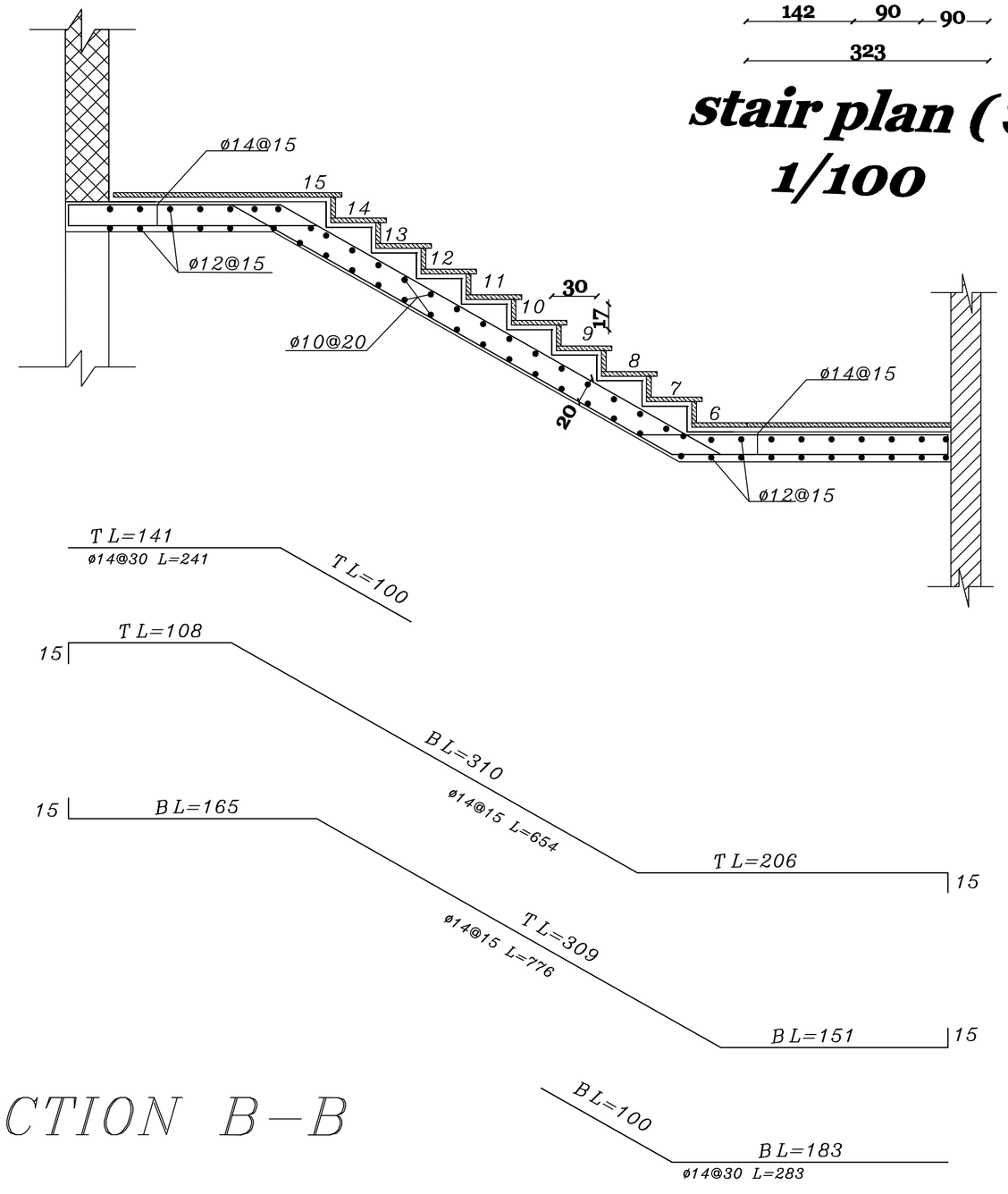




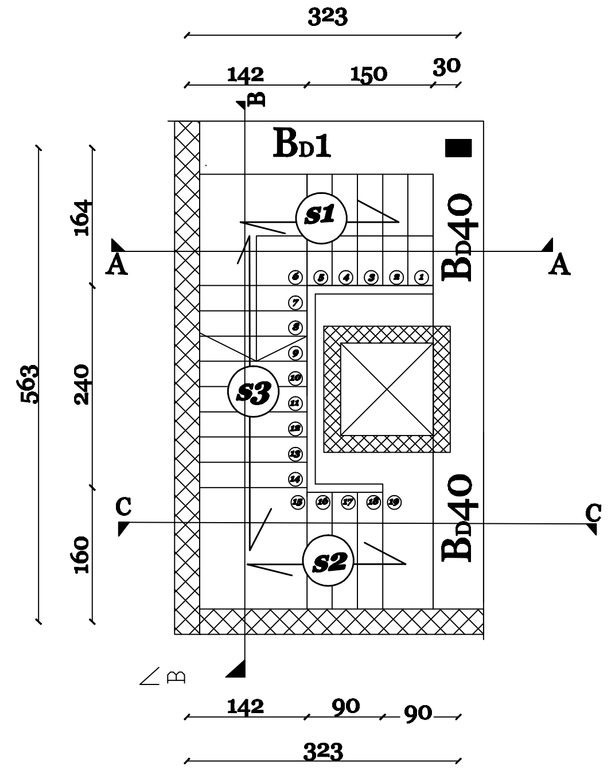
SECTION C–C







SECTION B–B



stair plan (SD2)
1/100

By the name of Allah

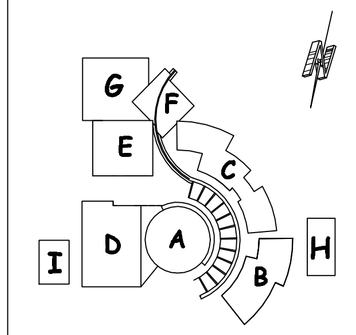
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

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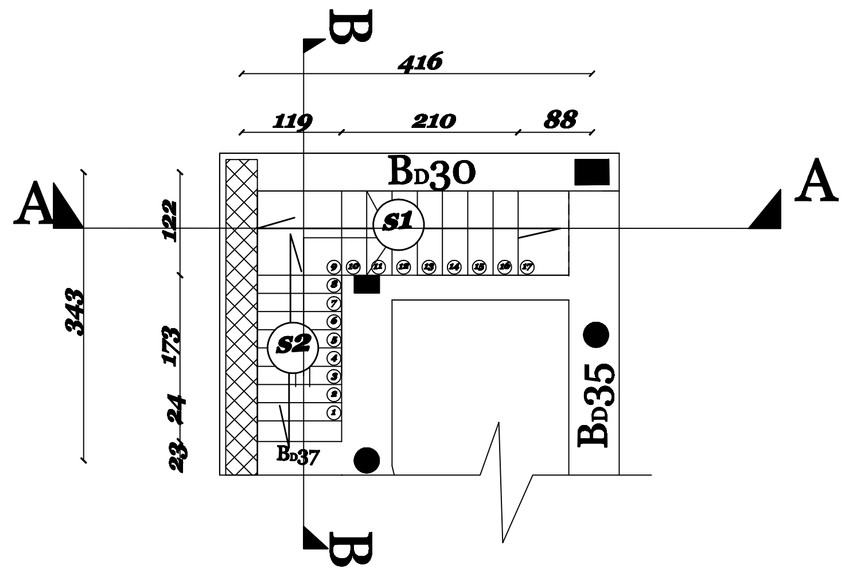
Drawing Title

staircase
SD2

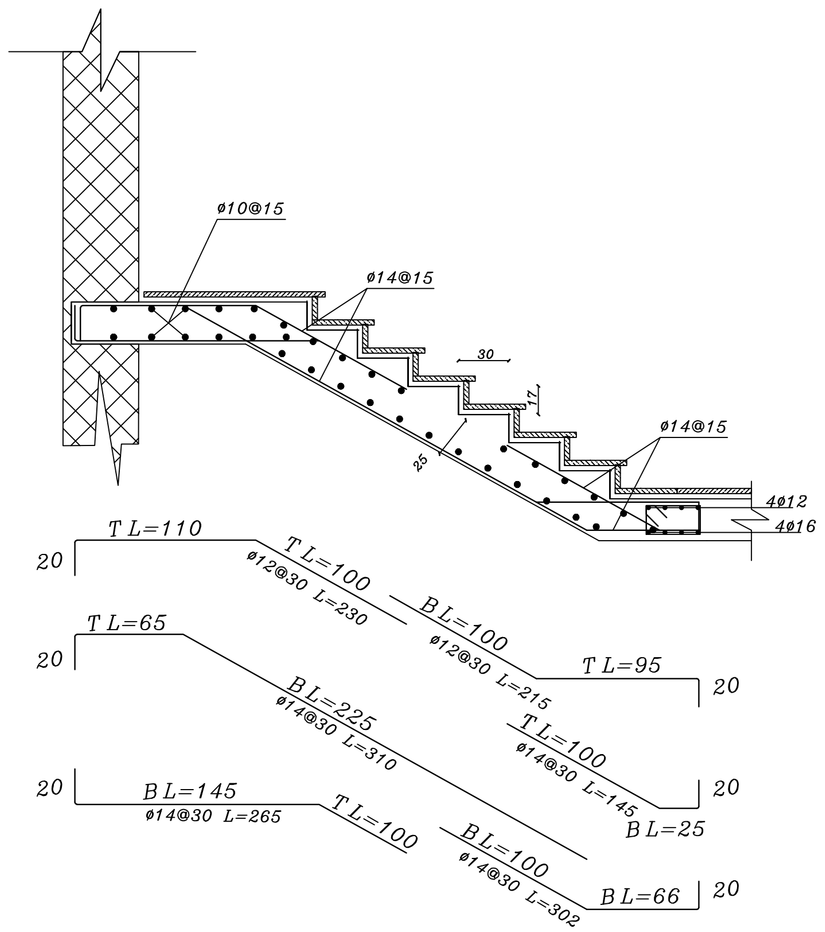
Designed By

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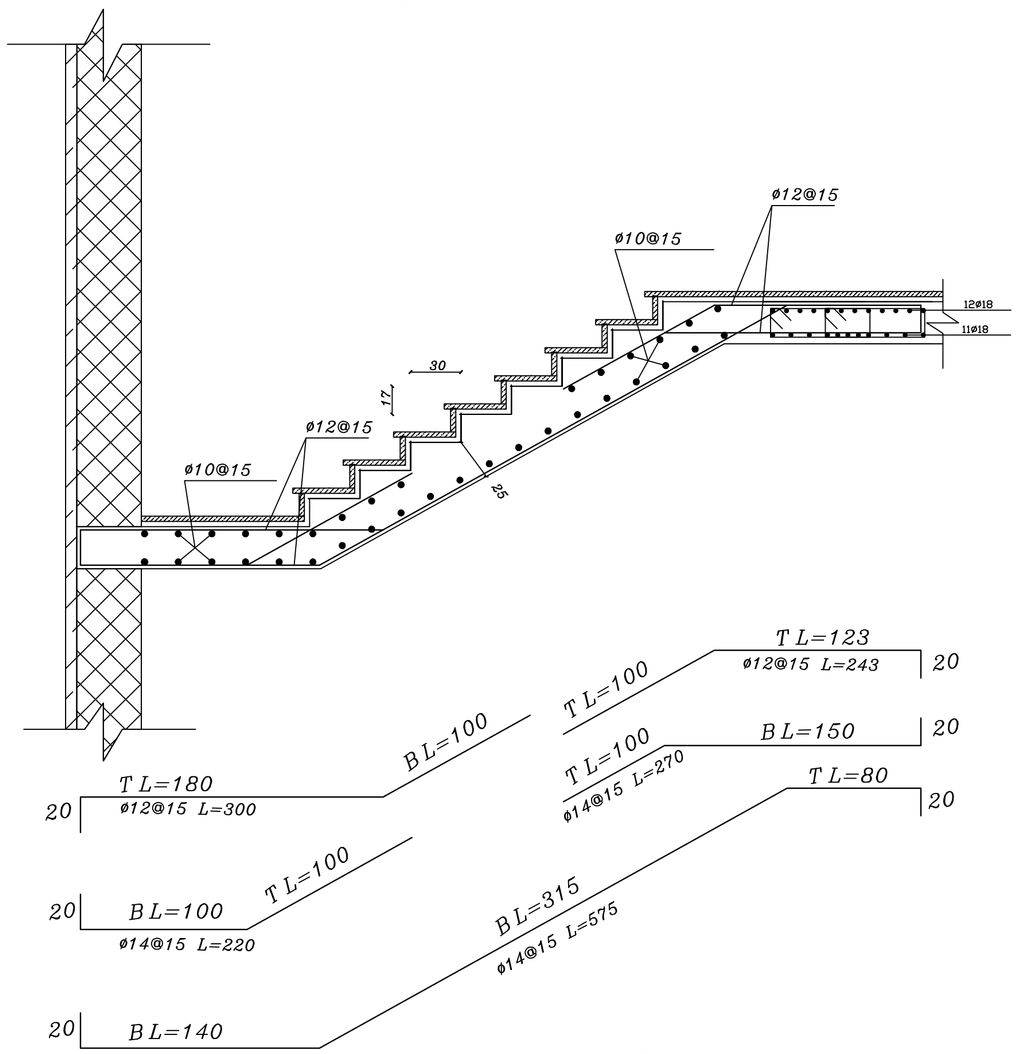
Scale	No.of Draw	Date
1/50	S43	2013-2014



stair plan (SD3)
1:50



section B-B
1/25



section A-A
1/25

By the name of Allah

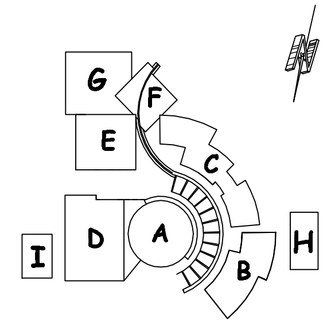
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

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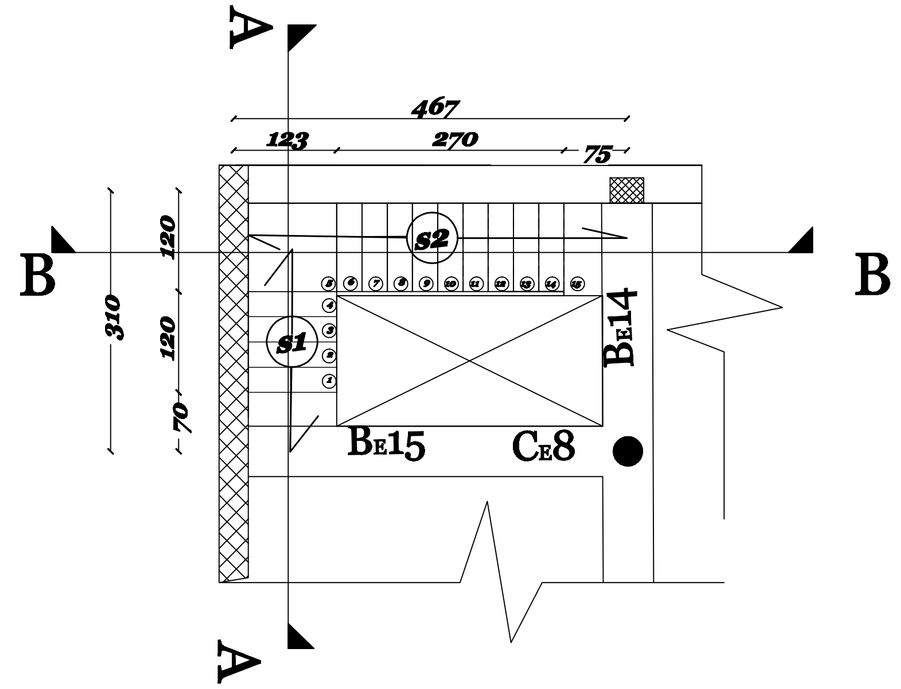
Drawing Title

staircase
SD3

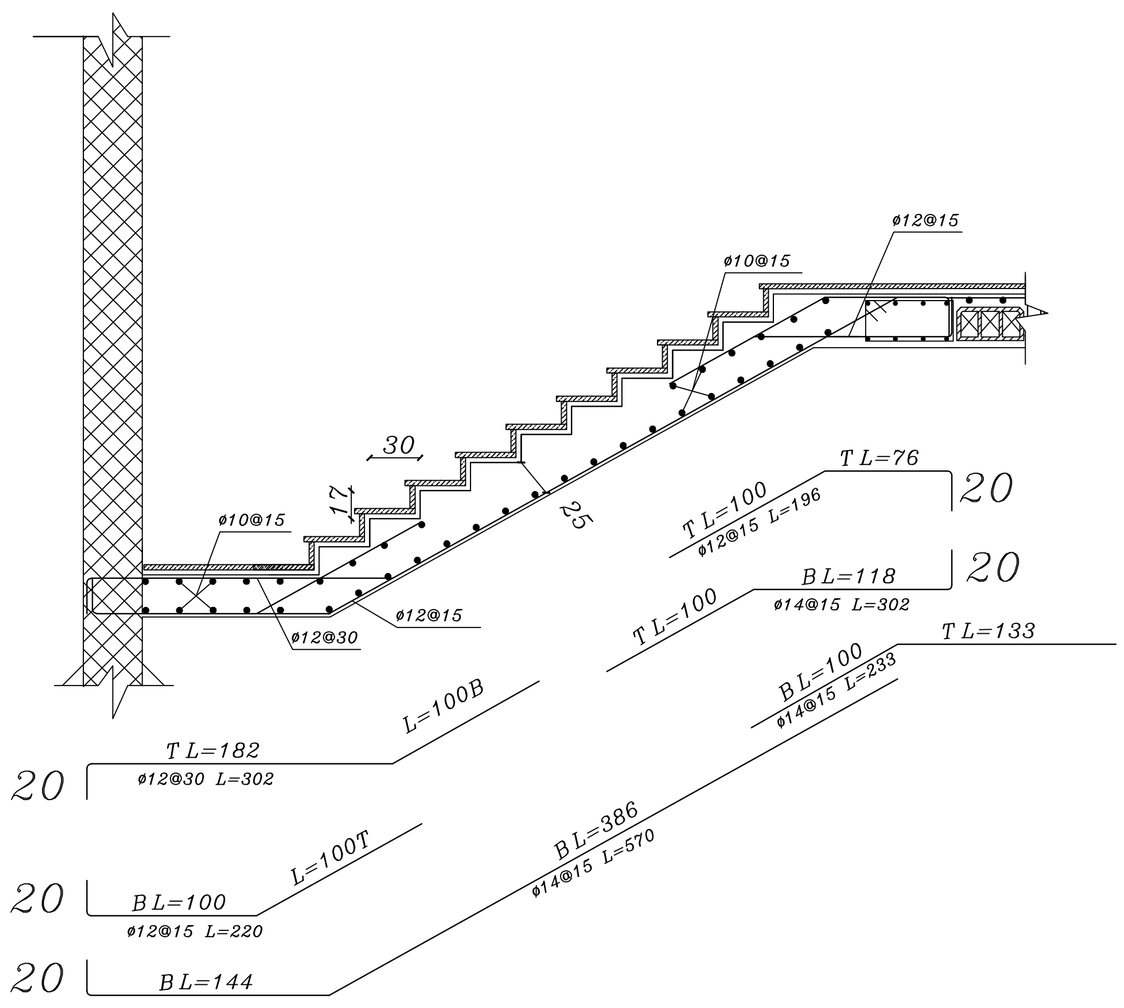
Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

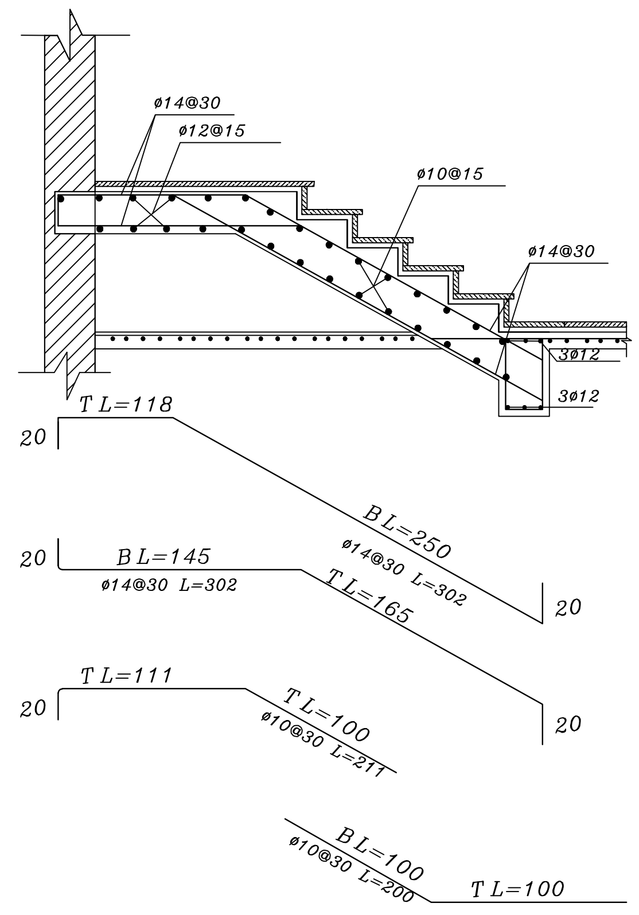
Scale	No.of Draw	Date
1/25	S44	2013-2014



stair plan (SE1)
1:50

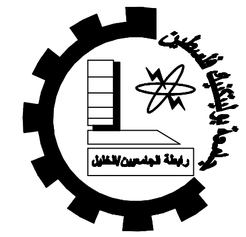


SECTION B-B
1/25



SECTION A-A
1/25

By the name of Allah



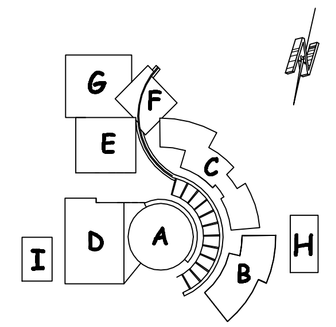
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building	
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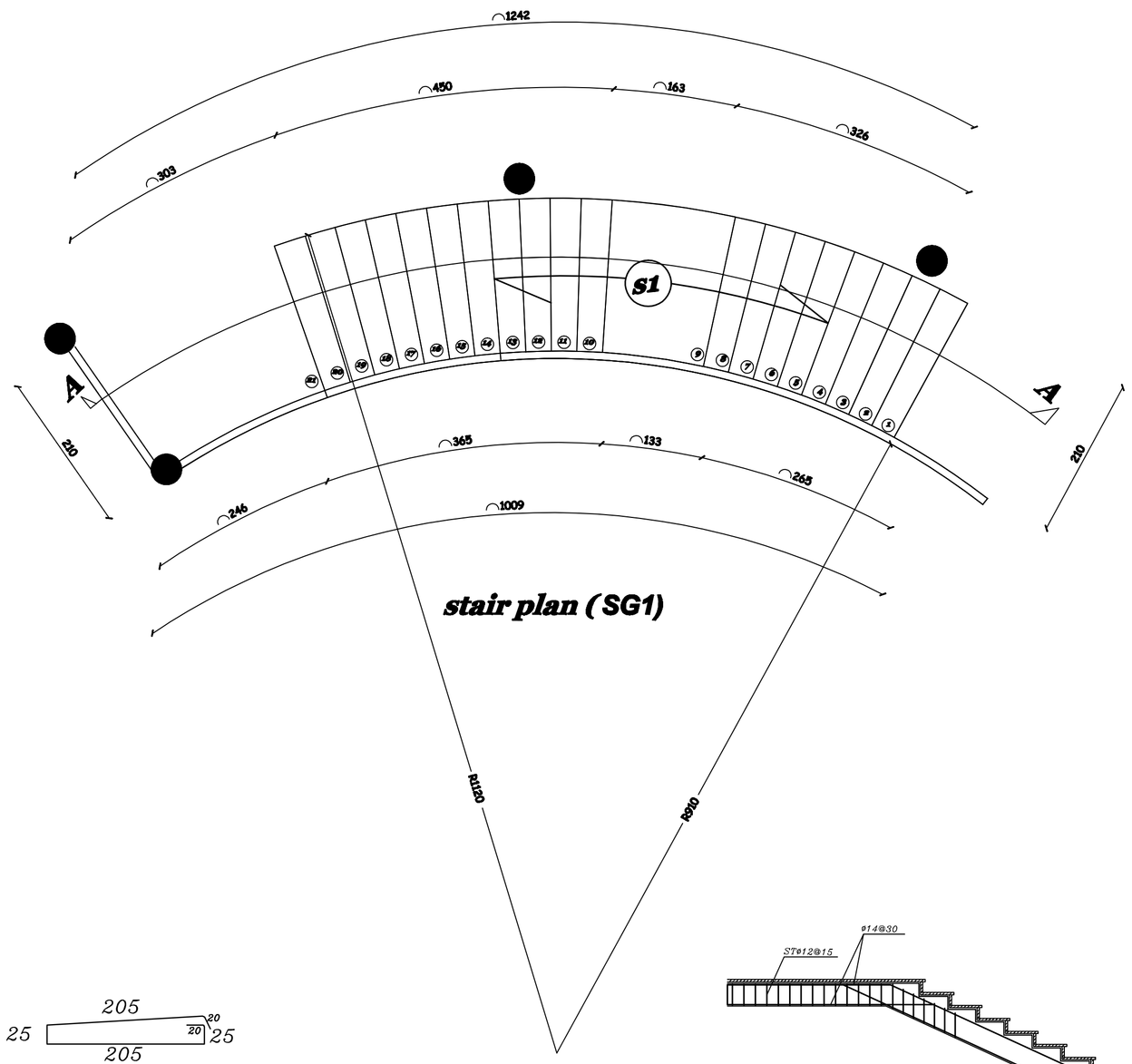
Drawing Title

staircase
SE1

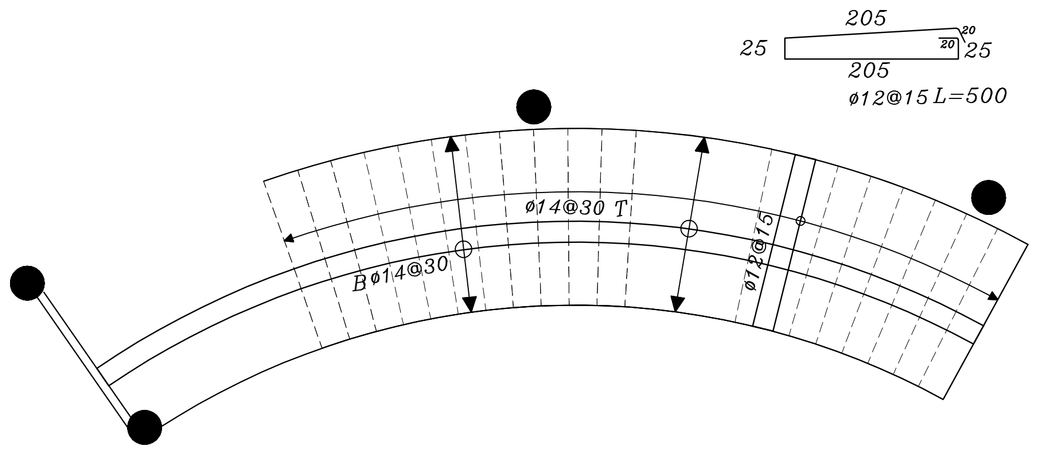
Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

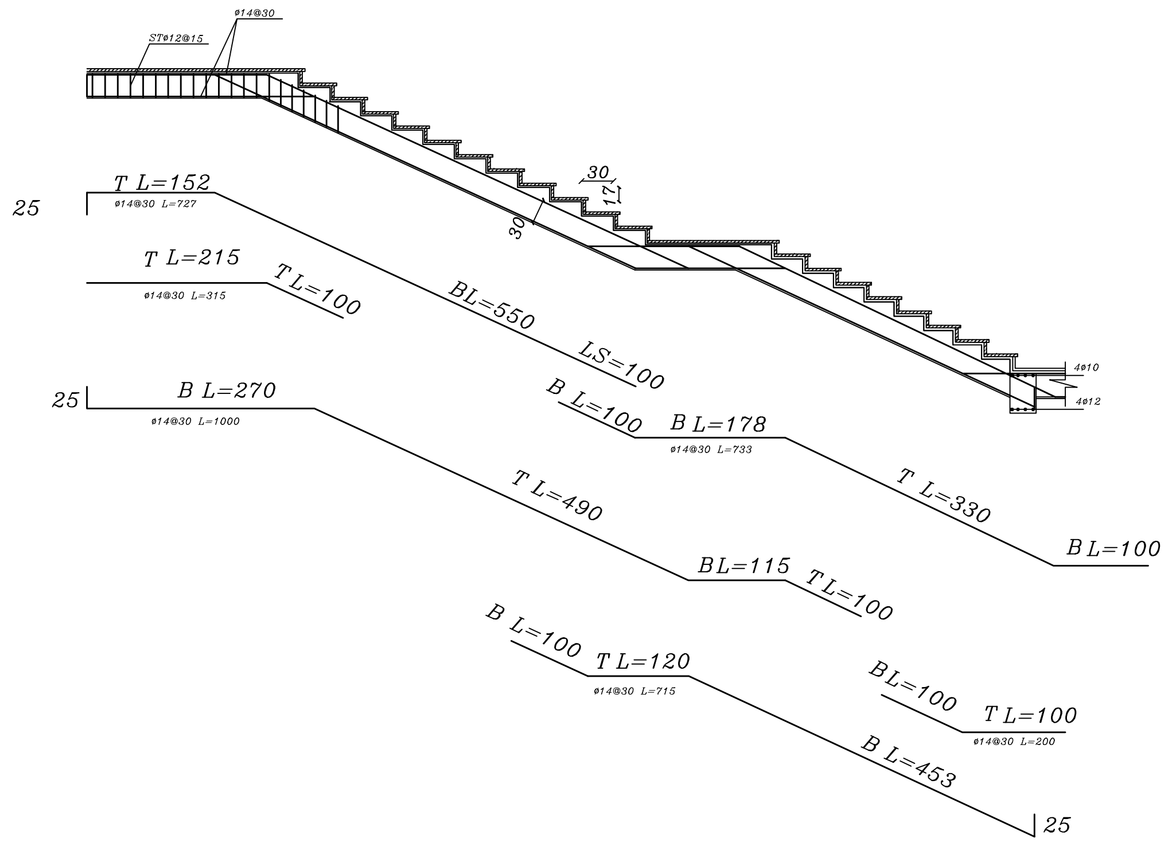
Scale	No.of Draw	Date
1/25	S45	2013-2014



stair plan (SG1)



stair plan (SG1)



SECTION A-A

By the name of Allah

رابطة جامعيين/الخليل

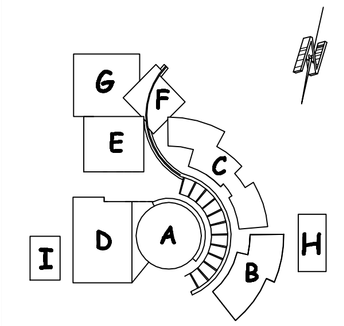
Graduation Project

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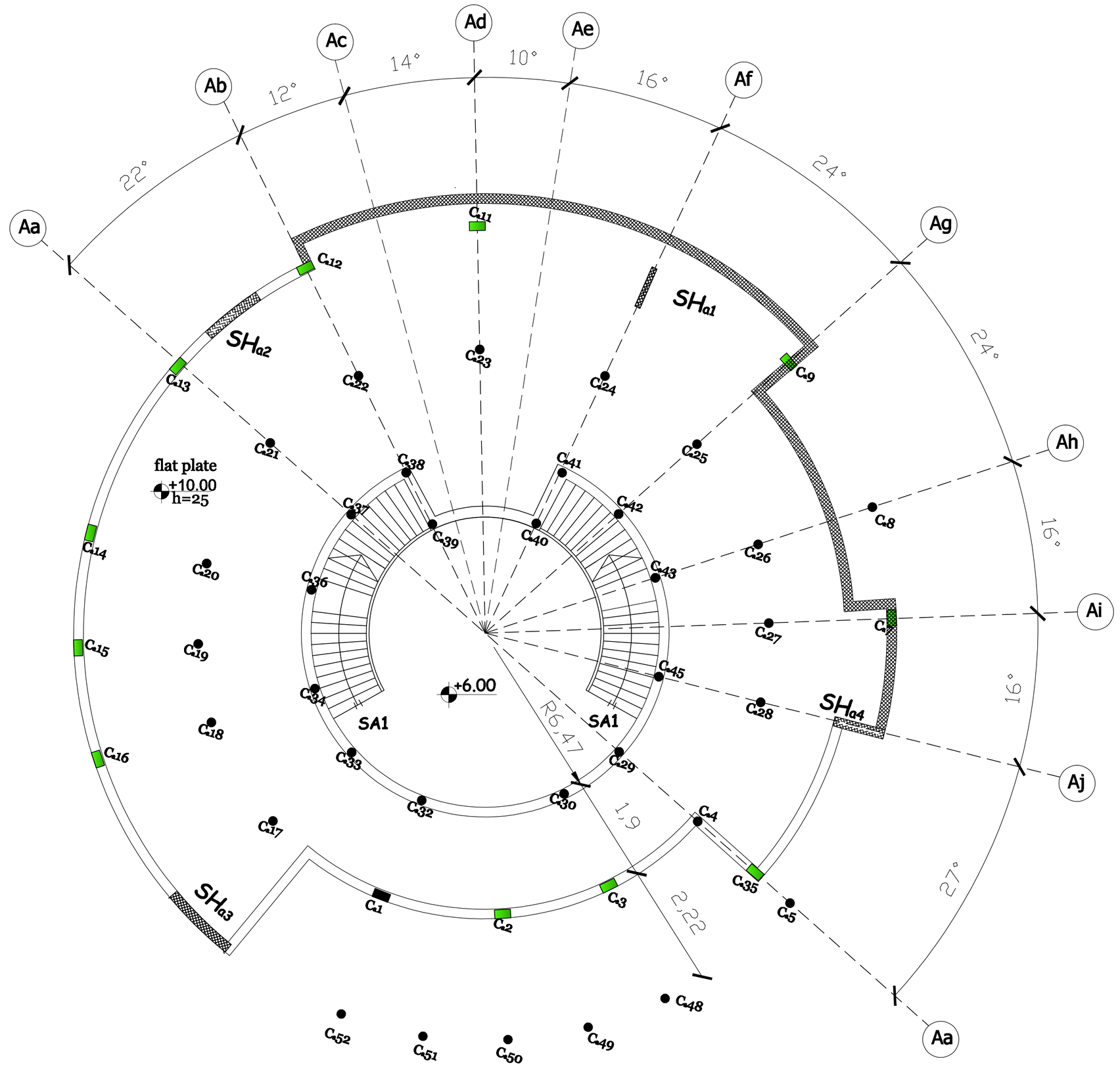
Drawing Title

staircase SG1

Designed By

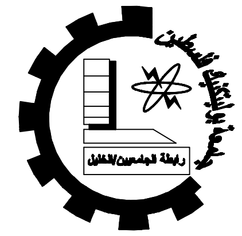
Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	No.of Draw	Date
1/50	S46	2013-2014



roof slab on
+10.00

By the name of Allah



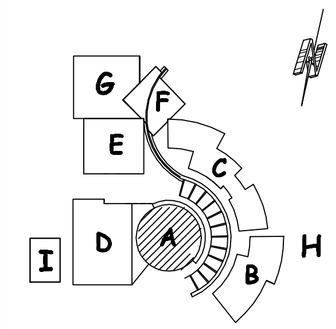
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

Number	Name
A	Reception
B	Sport hall
C	Building activities
D	Theater
E	Handicrafts
F	Restaurant
G	Photo Gallery
H	Parking 1
I	Parking 2

Drawing Title

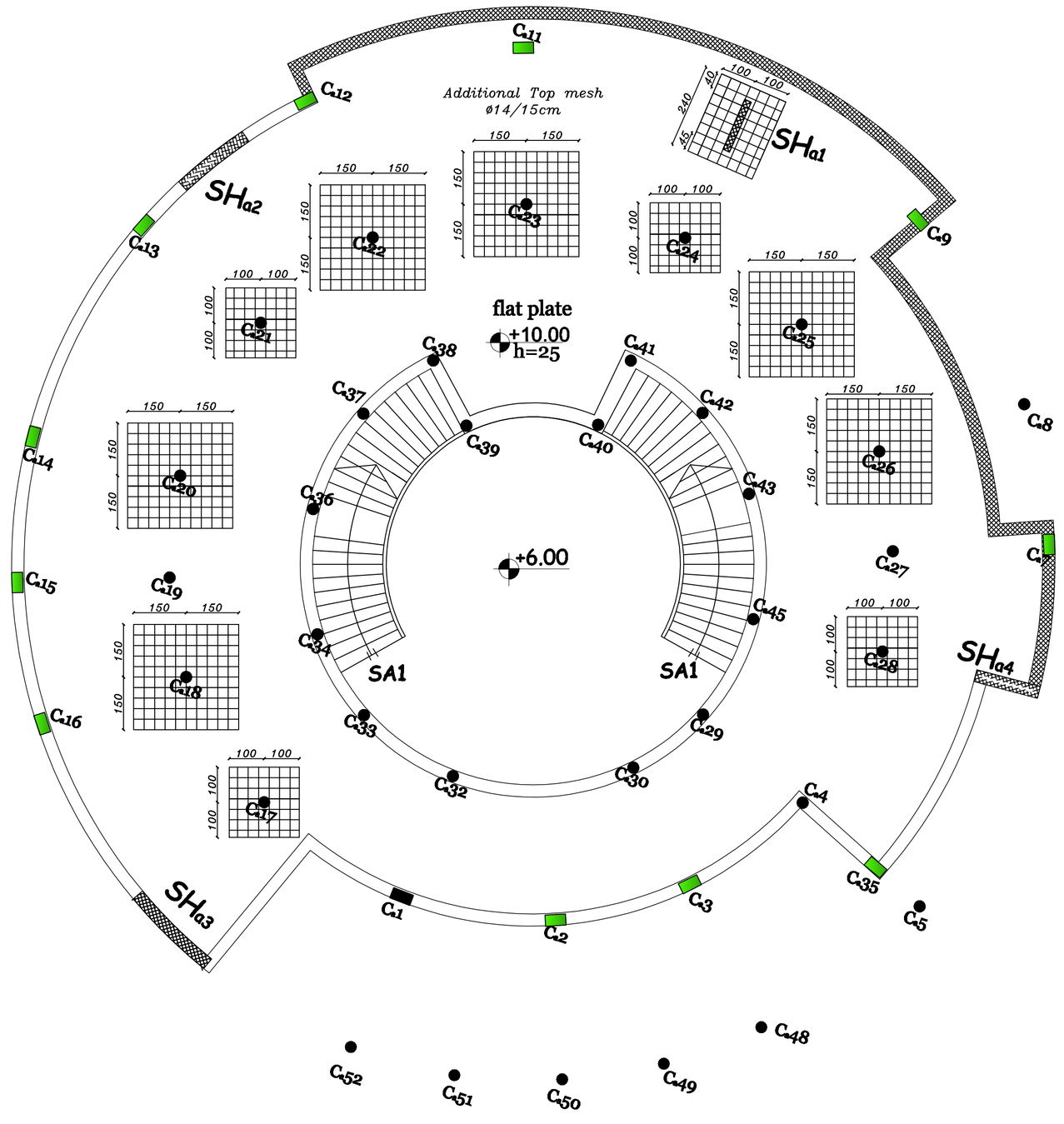
Reception

Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	*No.of Draw*	*Date*
1/100	S47	2013-2014

main reinforcement mesh
ø14/15cm Top and bottom



roof slab on
+10.00

By the name of Allah

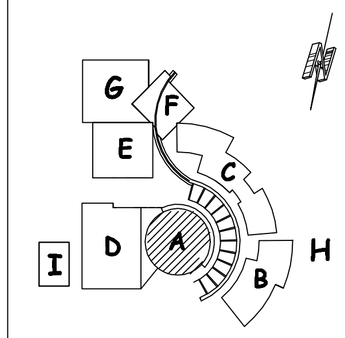
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

Number	Name
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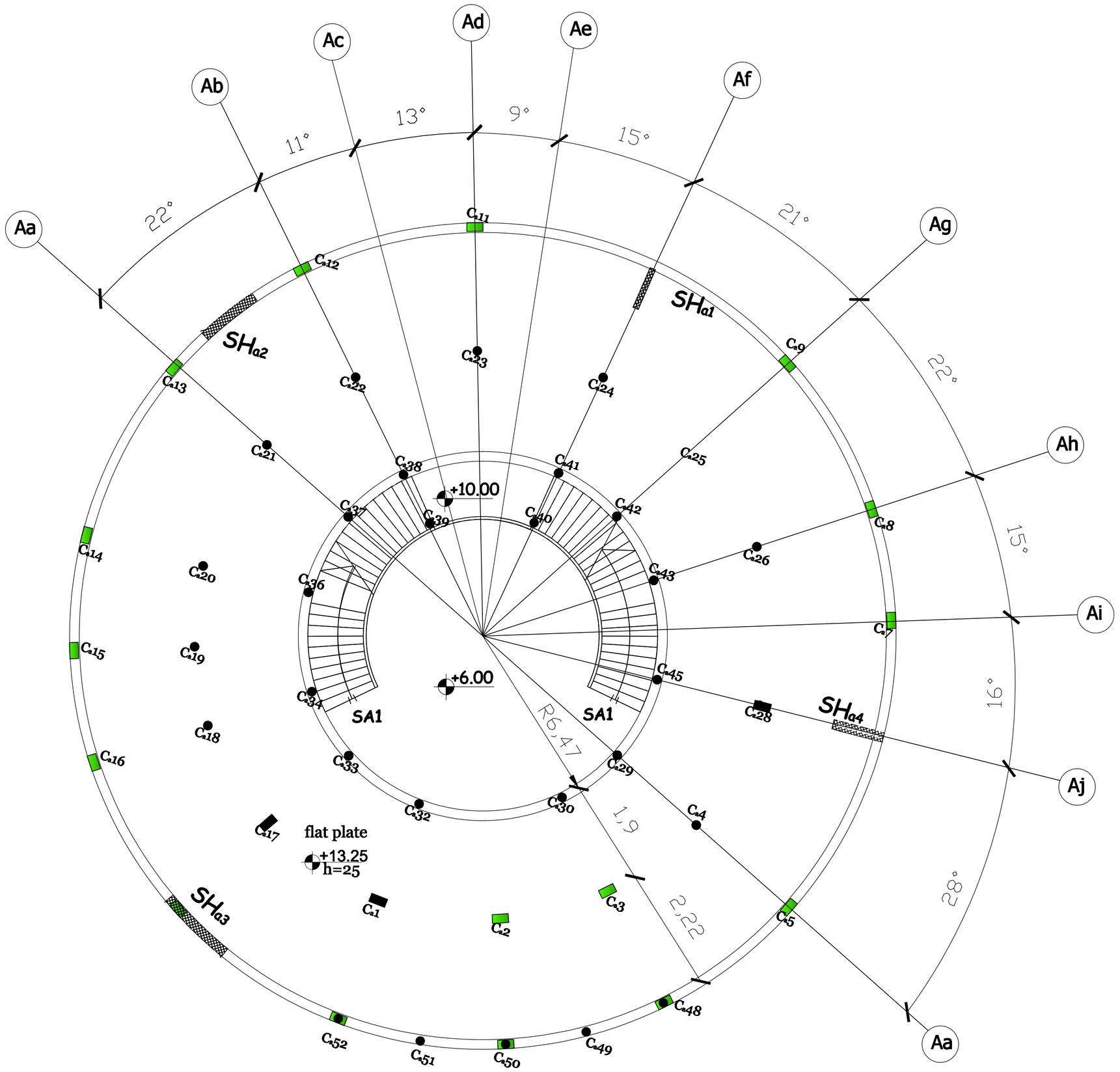
Drawing Title

Reception

Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	*No.of Draw*	*Date*
1/100	S48	2013-2014



roof slab on
+13.25

By the name of Allah

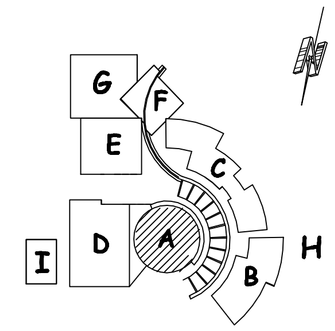
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building	
Number	Name
A	Reception
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I	Parking 2

Drawing Title

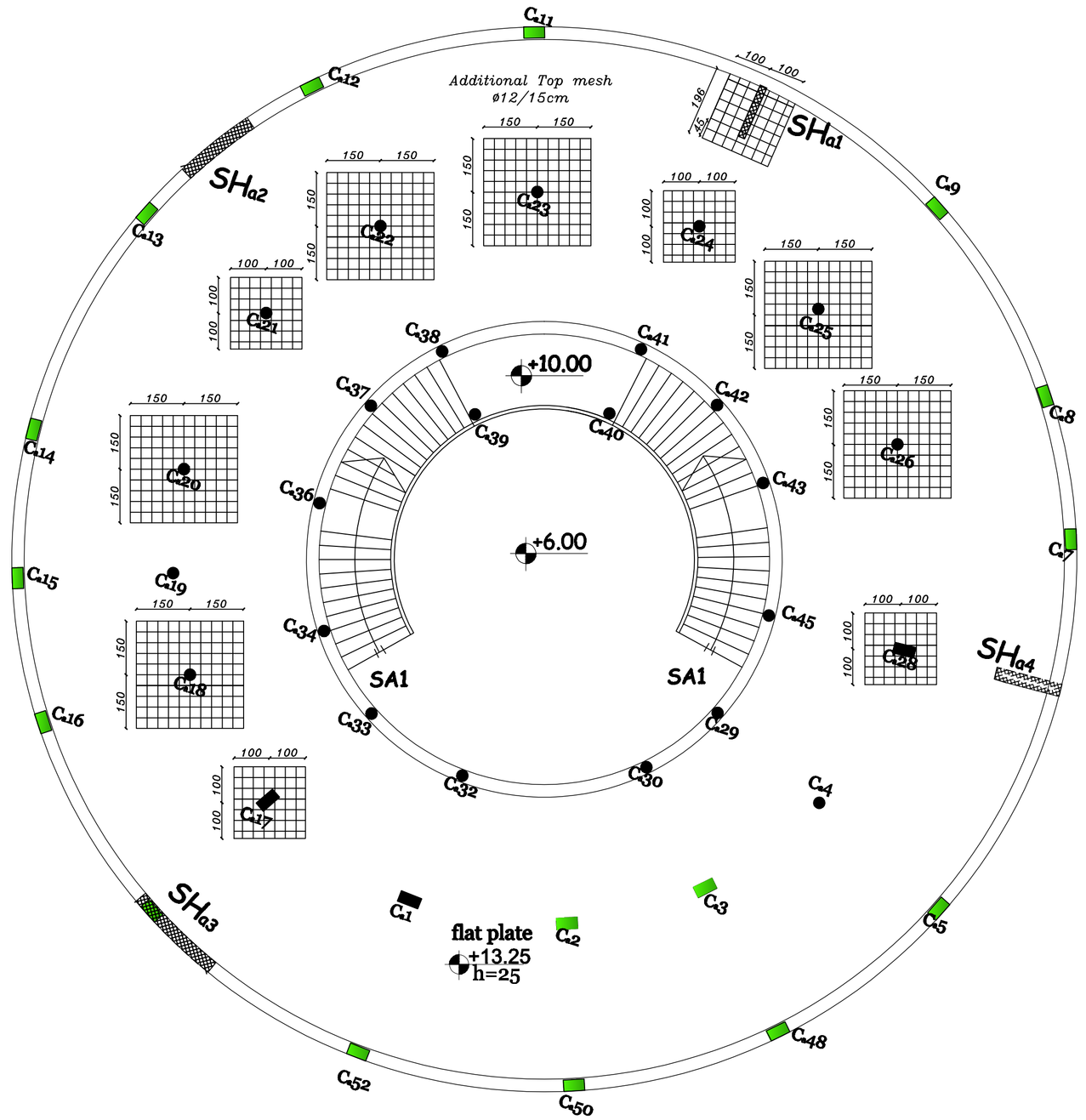
Reception

Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	*No.of Draw*	*Date*
1/100	S49	2013-2014

main reinforcement mesh
ø14/15cm Top and bottom



roof slab on
+13.25

By the name of Allah

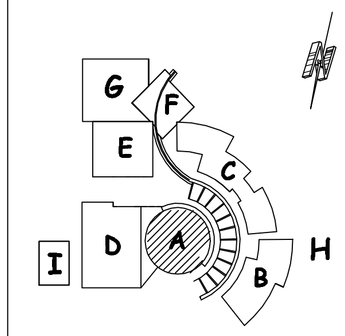
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

Number	Name
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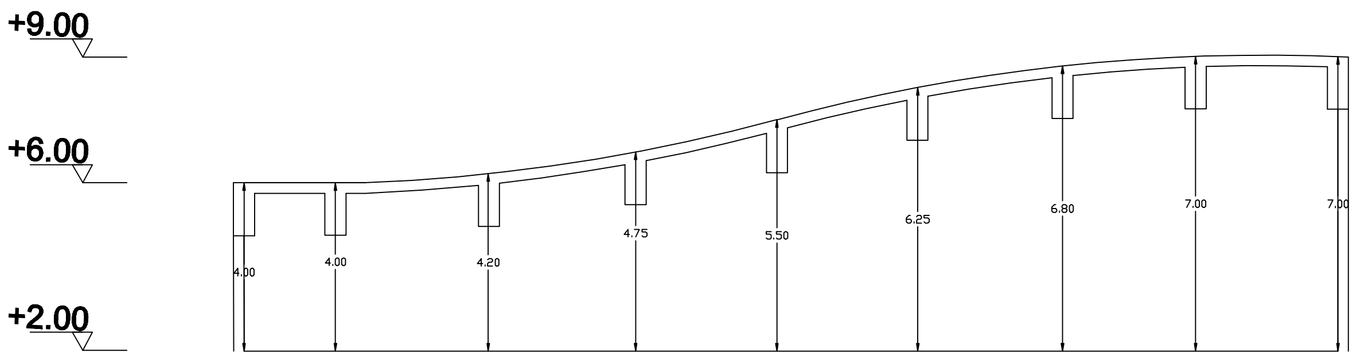
Drawing Title

Reception

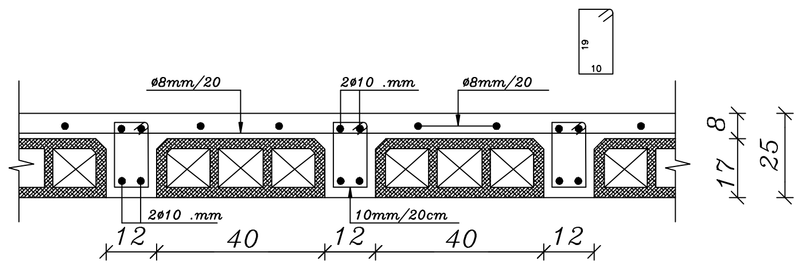
Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

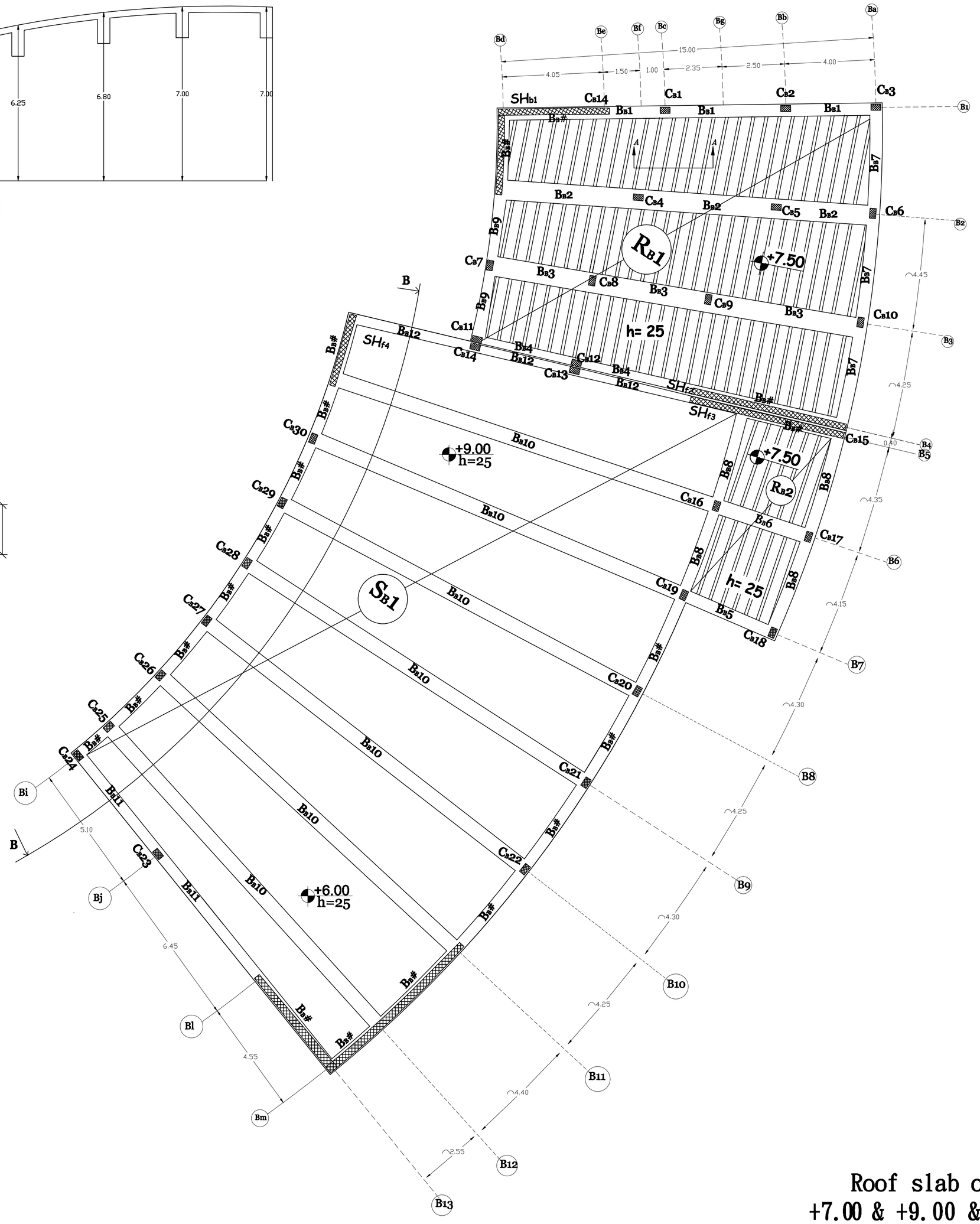
Scale	*No.of Draw*	*Date*
1/100	S50	2013-2014



Section B-B



Section A – A



Roof slab on
+7.00 & +9.00 & +6.00

By the name of Allah

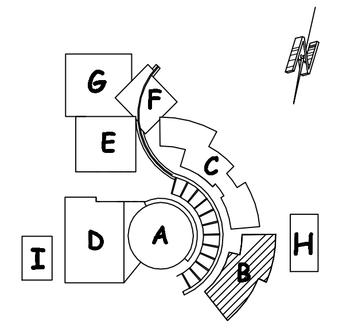
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

Number	Name
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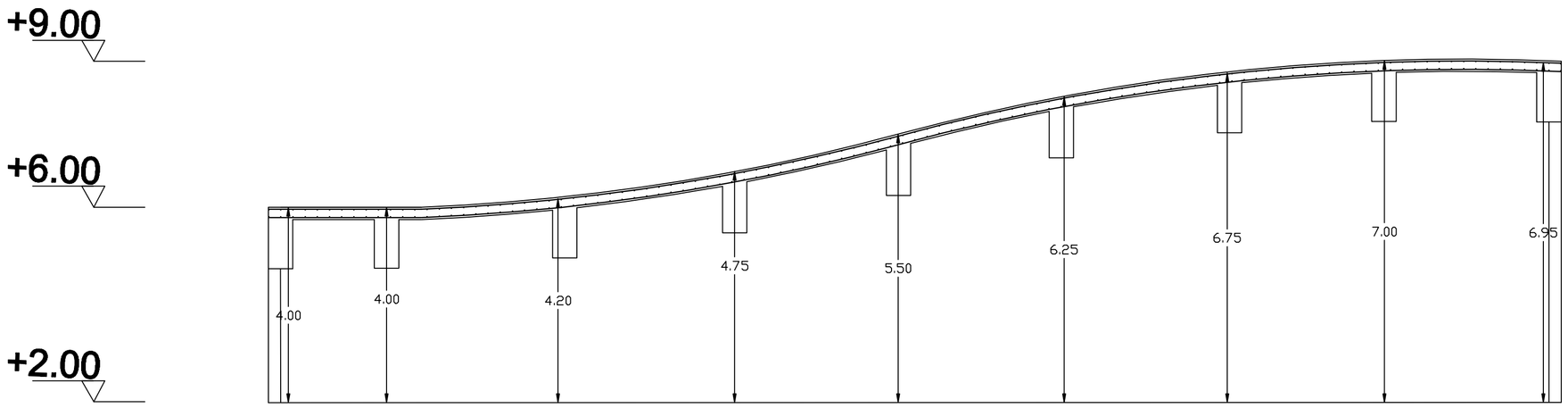
Drawing Title

Sport hall

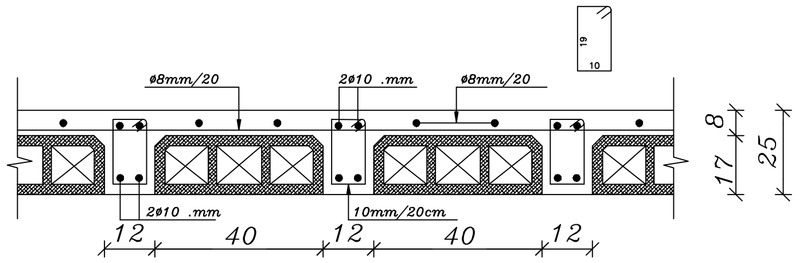
Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

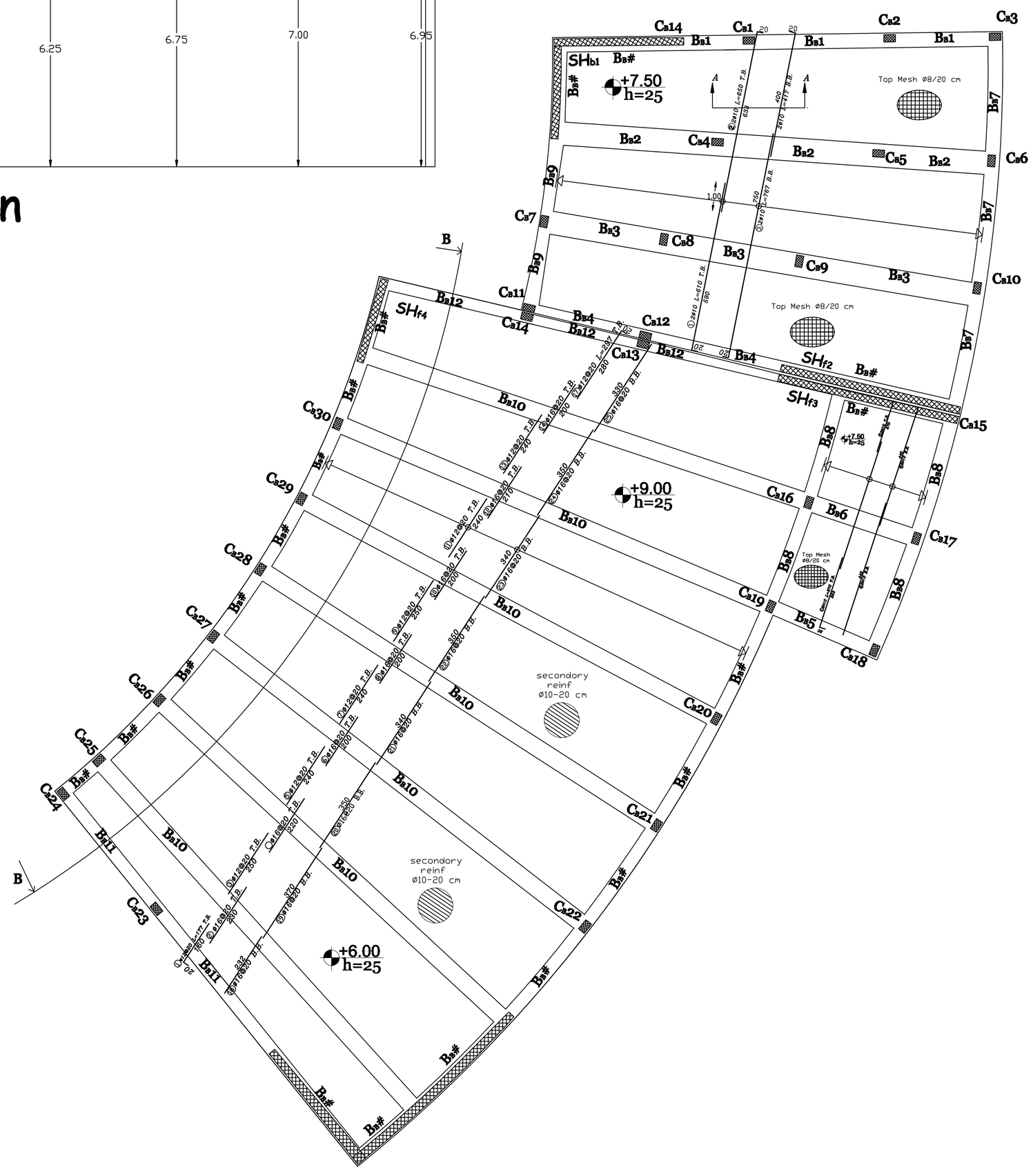
Scale	No.of Draw	Date
1/100	S51	2013-2014



Section B-B



Section A – A



Roof slab on +7.00 & +9.00 & +6.00

By the name of Allah

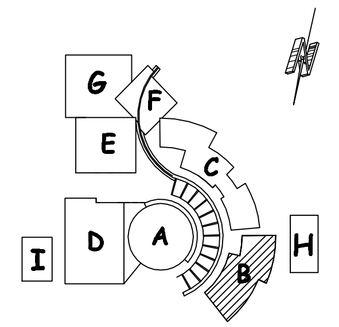
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

Number	Name
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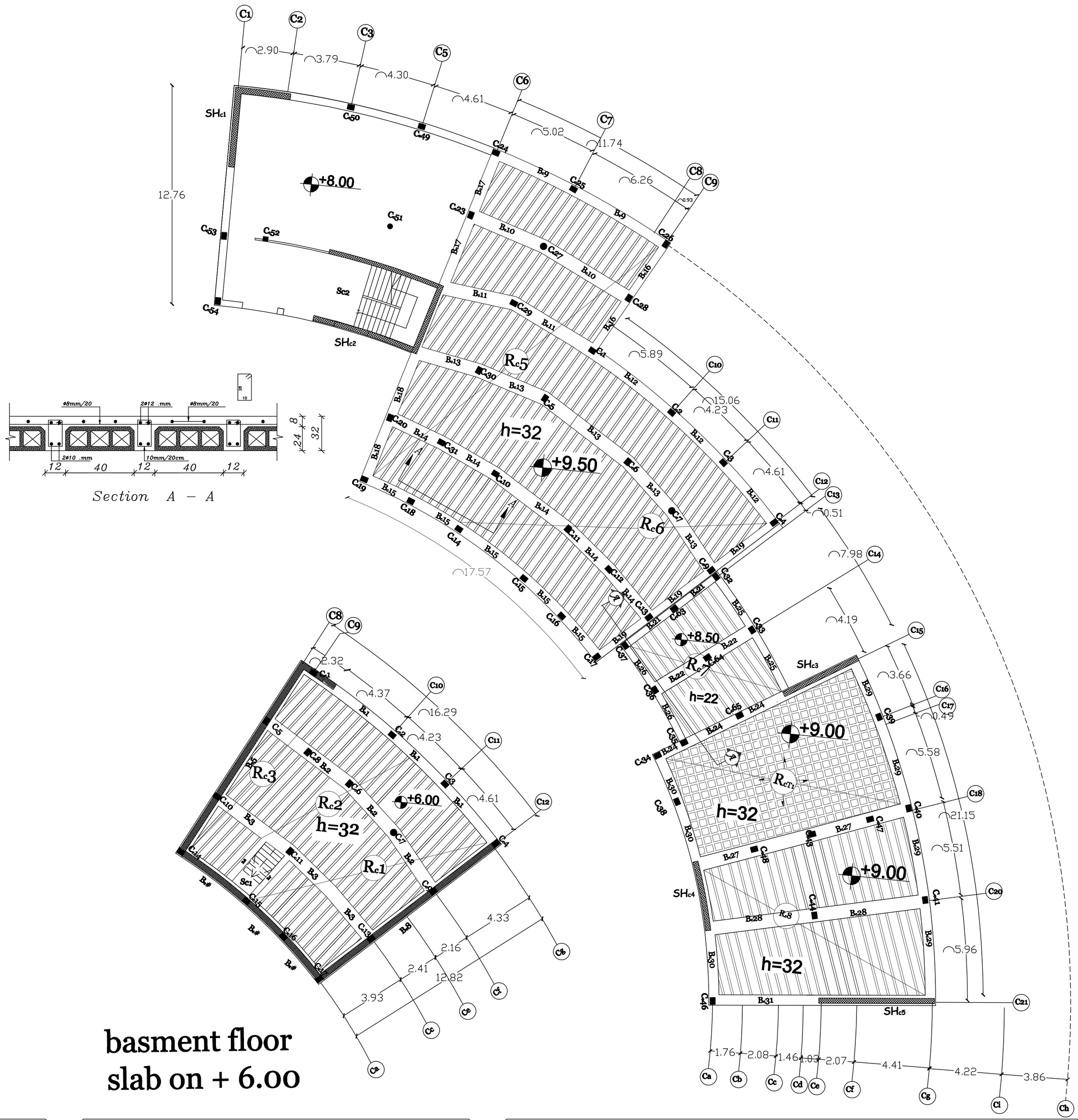
Drawing Title

Sport hall

Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	No.of Draw	Date
1/100	S52	2013-2014



Section A – A

By the name of Allah

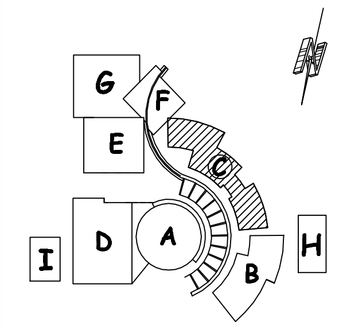
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

Number	Name
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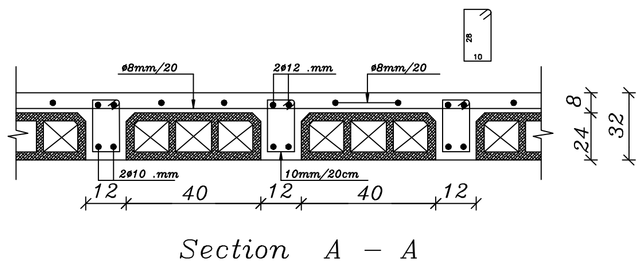
Drawing Title

Buliding activity

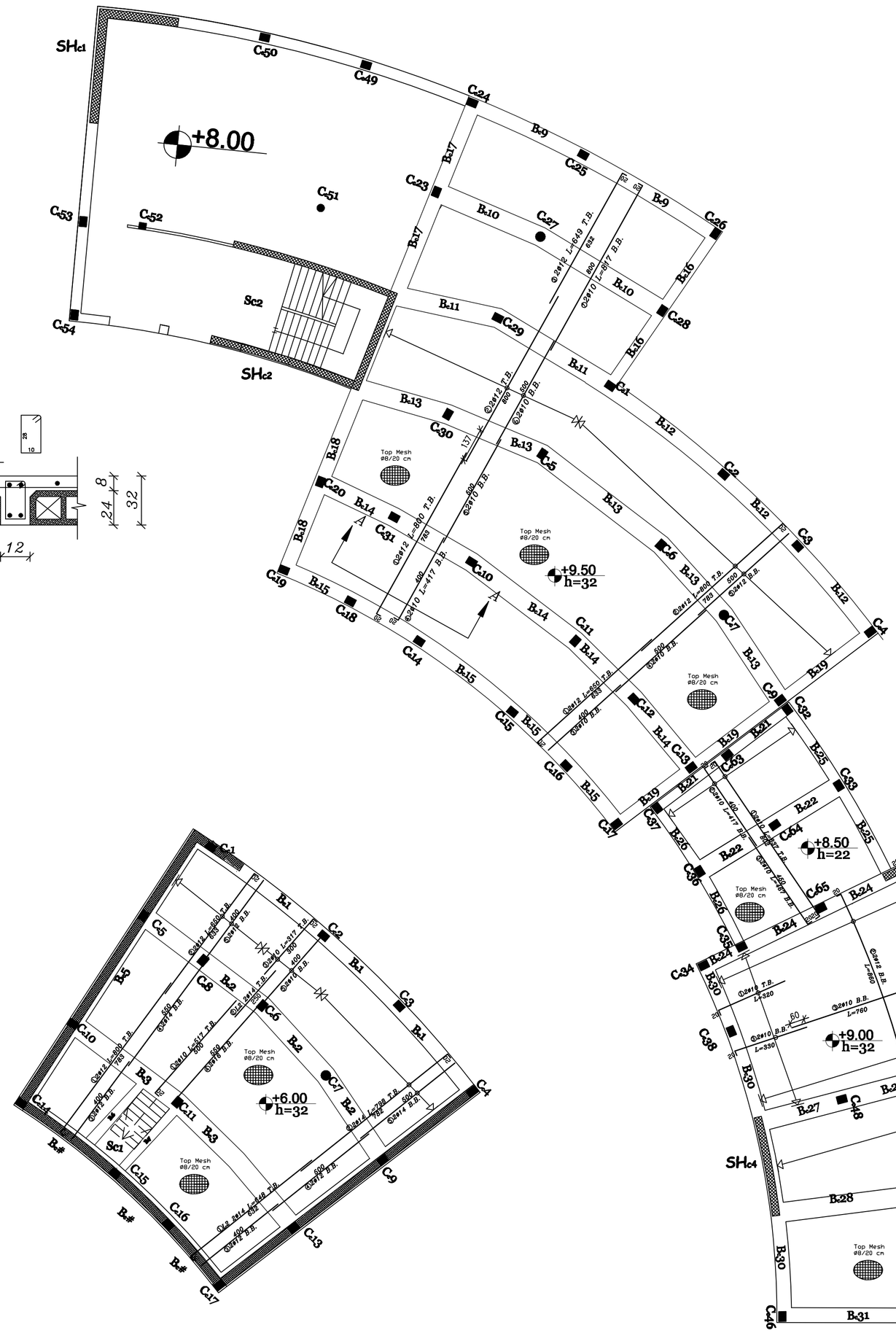
Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	No.of Draw	Date
1/125	S53	2013-2014



Section A – A



first floor slab on + 9.50

By the name of Allah

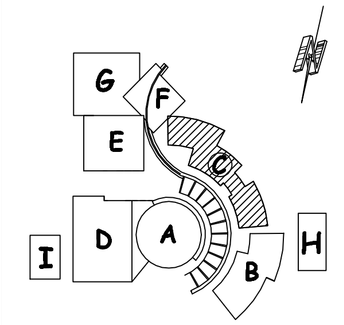
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

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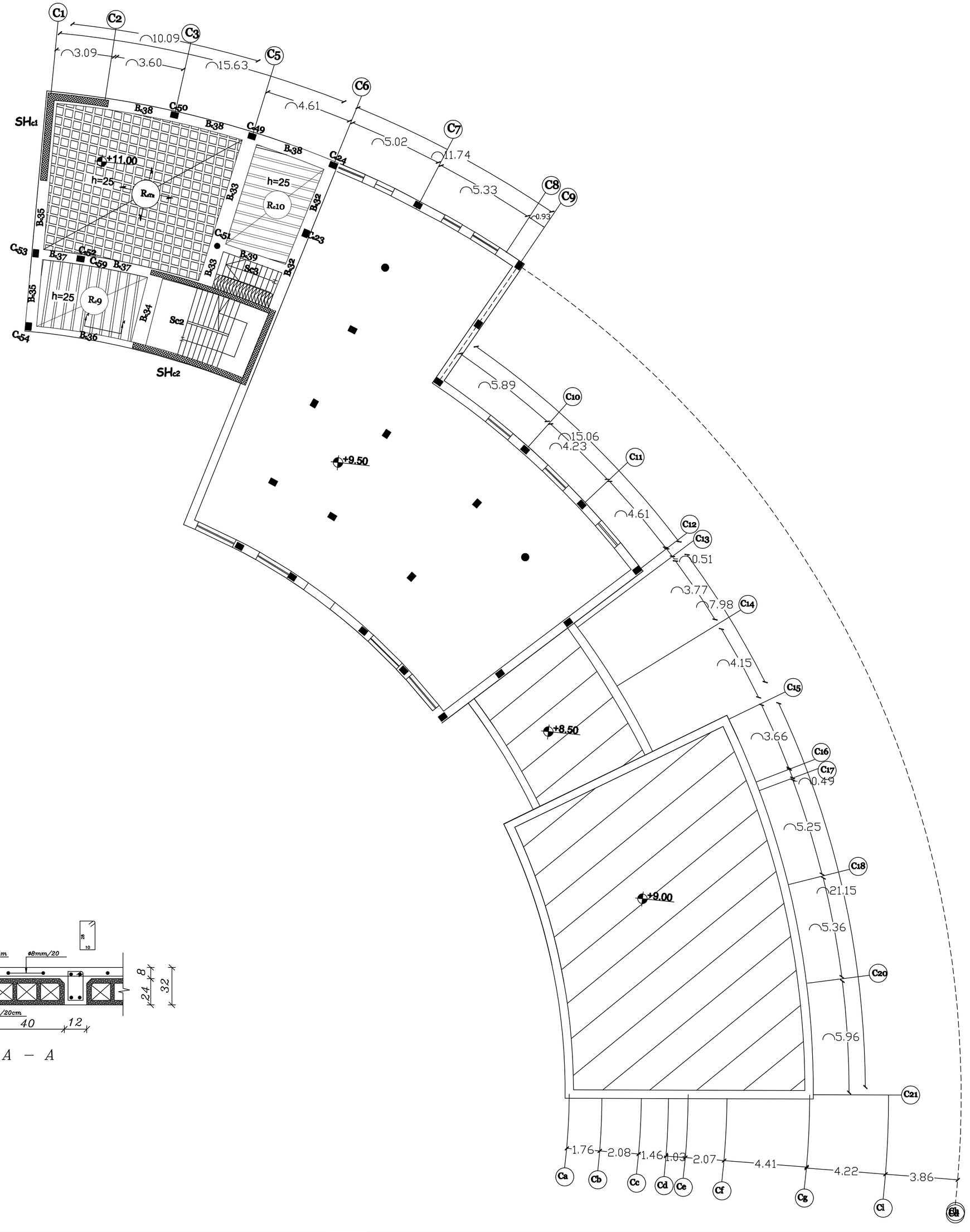
Drawing Title

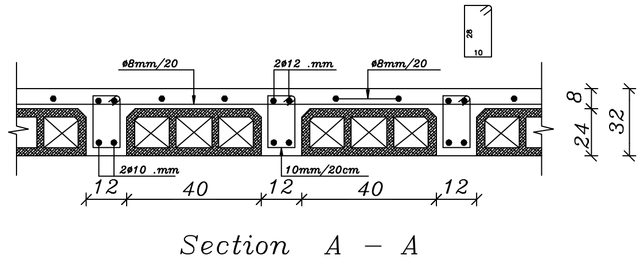
Buliding activity

Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	No.of Draw	Date
1/125	S54	2013-2014





Section A – A

By the name of Allah

جامعة فلسطين التقنية
رابطة دوامين/الخليل

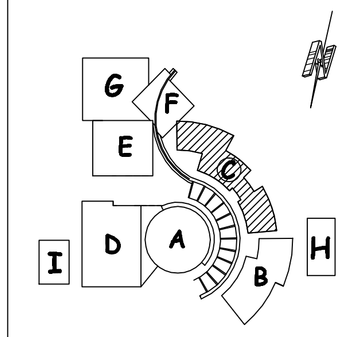
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

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F	Restaurant
G	Photo Gallery
H	Parking 1
I	Parking 2

Drawing Title

Buliding activity

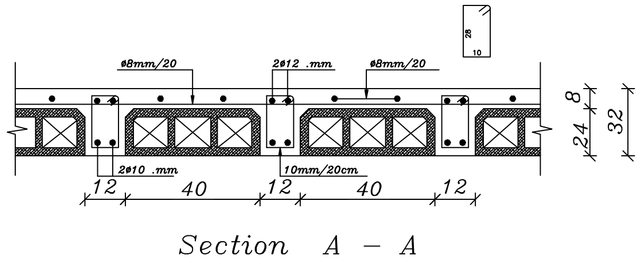
Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	*No.of Draw*	*Date*
1/125	S55	2013-2014

first floor slab on +11.00





Section A – A

first floor slab on +11.00

By the name of Allah

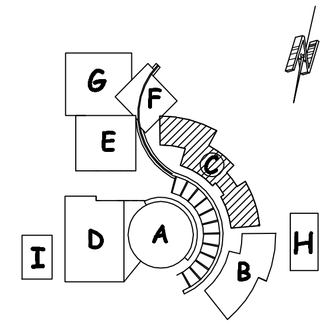
Graduation Project

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Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



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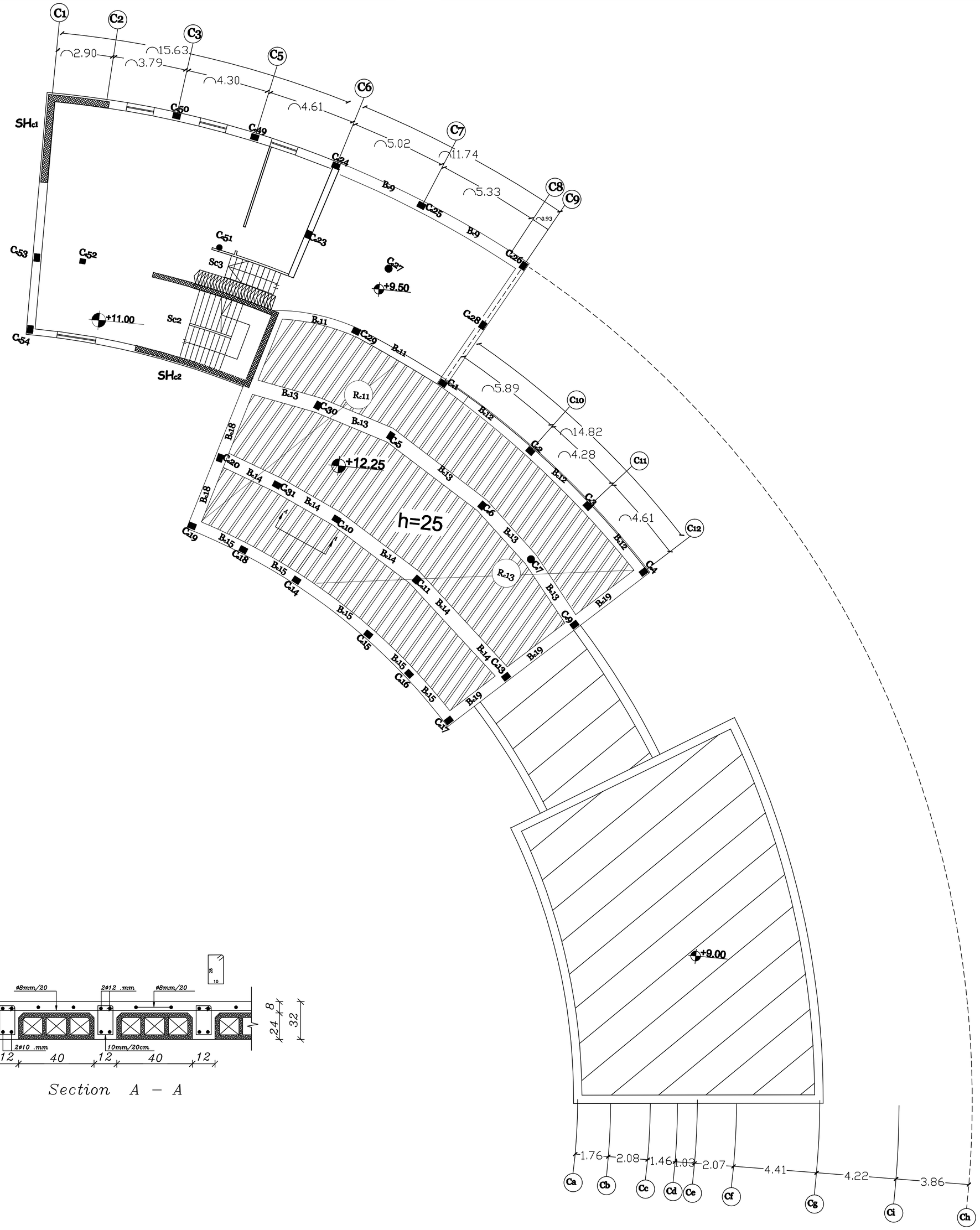
Drawing Title

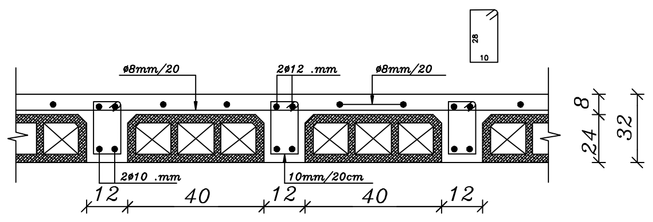
Buliding activity

Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	No.of Draw	Date
1/125	S56	2013-2014





Section A – A

secand floor slab on +12.25

By the name of Allah

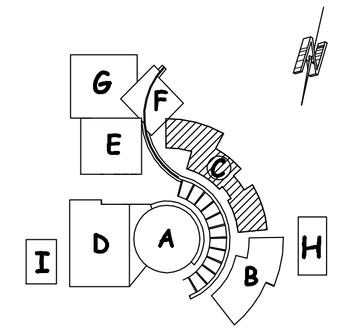
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
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Tabel of Building

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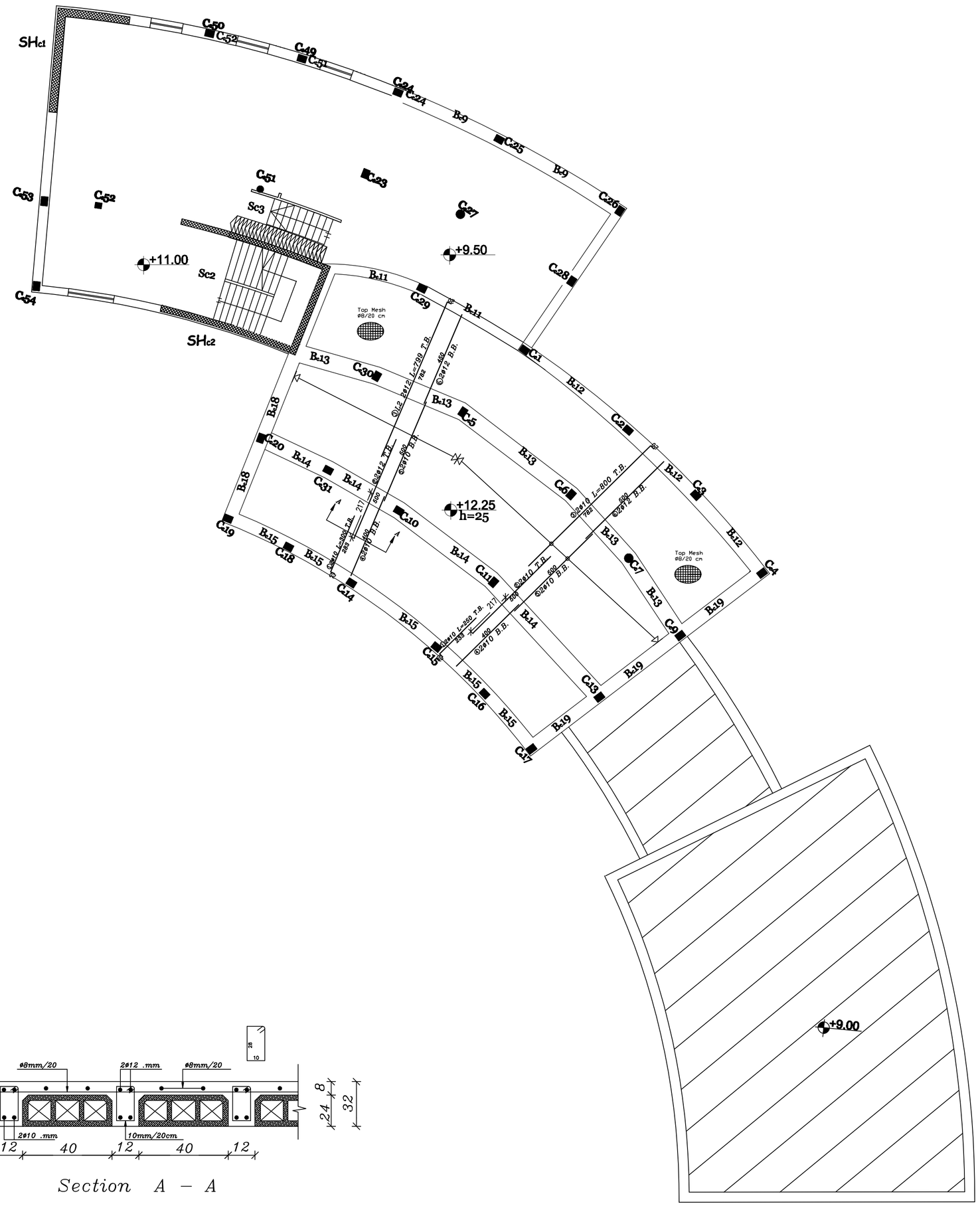
Drawing Title

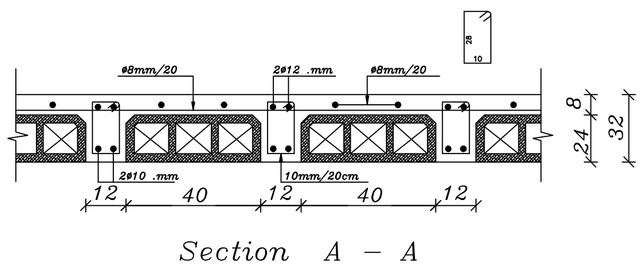
Buliding activity

Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	No.of Draw	Date
1/125	S57	2013-2014





Section A – A

secand floor slab on +12.25

By the name of Allah

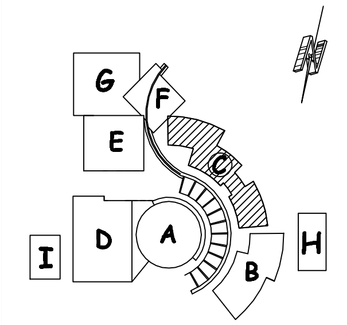
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

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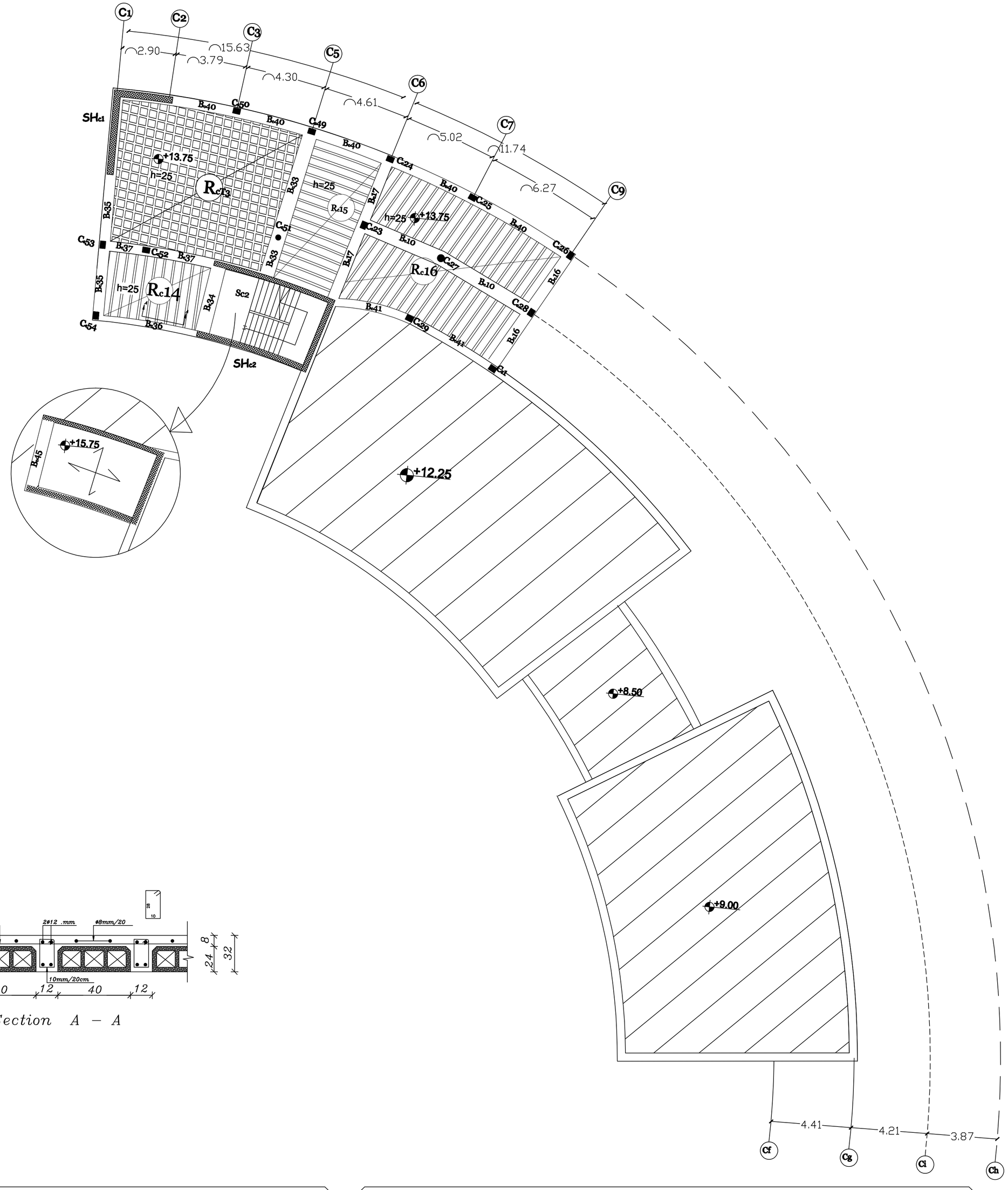
Drawing Title

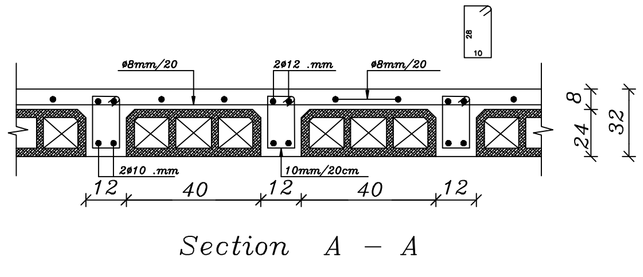
Buliding activity

Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	No.of Draw	Date
1/125	S58	2013-2014





Section A – A

secand floor slab on +13.75

By the name of Allah

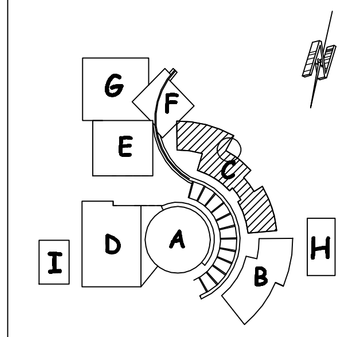
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

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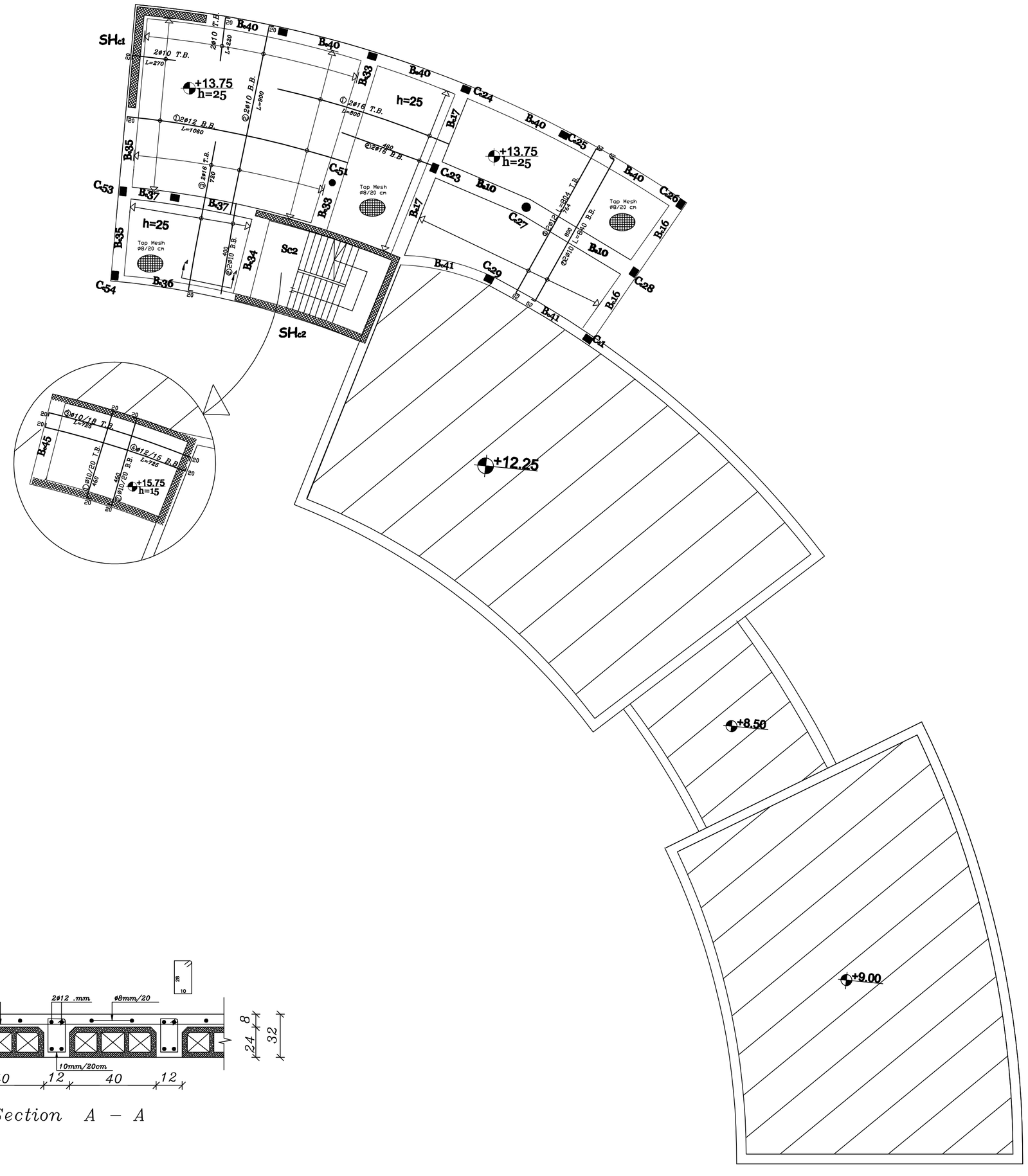
Drawing Title

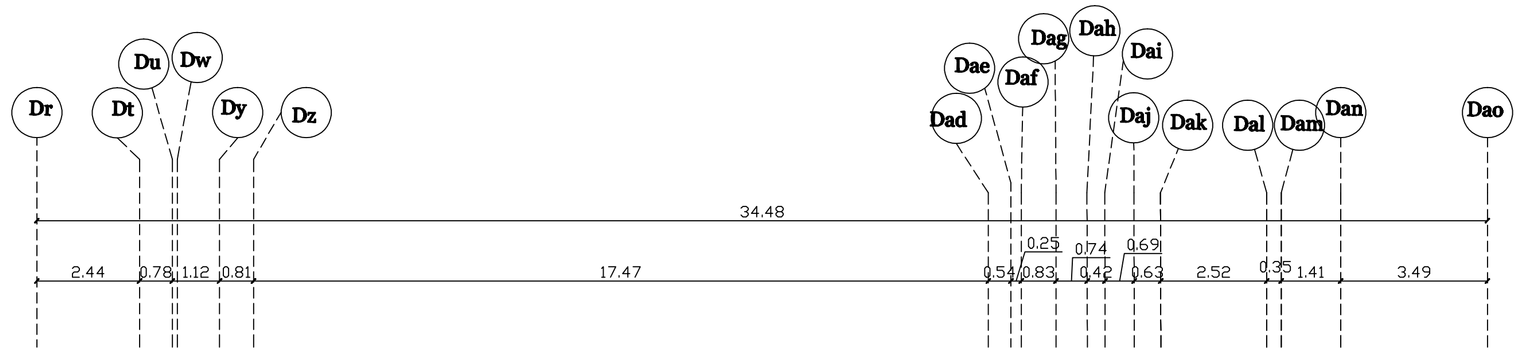
Buliding activity

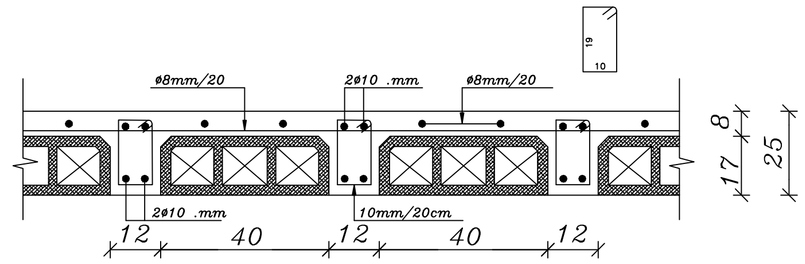
Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

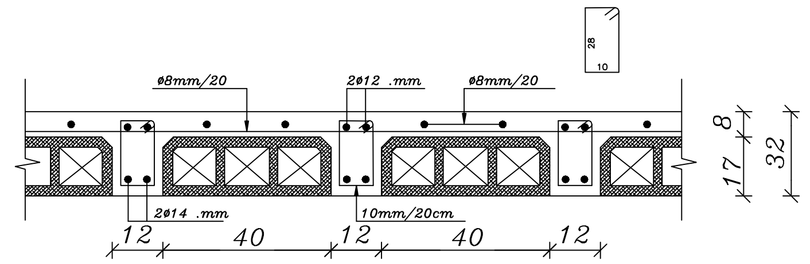
Scale	No.of Draw	Date
1/125	S59	2013-2014


SHc1
SHc2
B40
B33
B37
B35
B34
B36
B45
B17
B10
B16
C24
C25
C26
C23
C27
C28
C29
C51
C53
C54
C1
Sc2
h=25
+13.75
h=25
+12.25
+8.50
+9.00
+15.75
h=15
Top Mesh
Ø8/20 cm
2Ø10 T.B.
L=470
2Ø12 B.B.
L=1060
2Ø16 T.B.
L=450
2Ø14 T.B.
L=1060
2Ø10 B.B.
L=1060
2Ø12 T.B.
L=1060
2Ø12 B.B.
L=1060
2Ø10 T.B.
L=1060
2Ø10 B.B.
L=1060
2Ø12 T.B.
L=1060
2Ø12 B.B.
L=1060
2Ø10 T.B.
L=1060
2Ø10

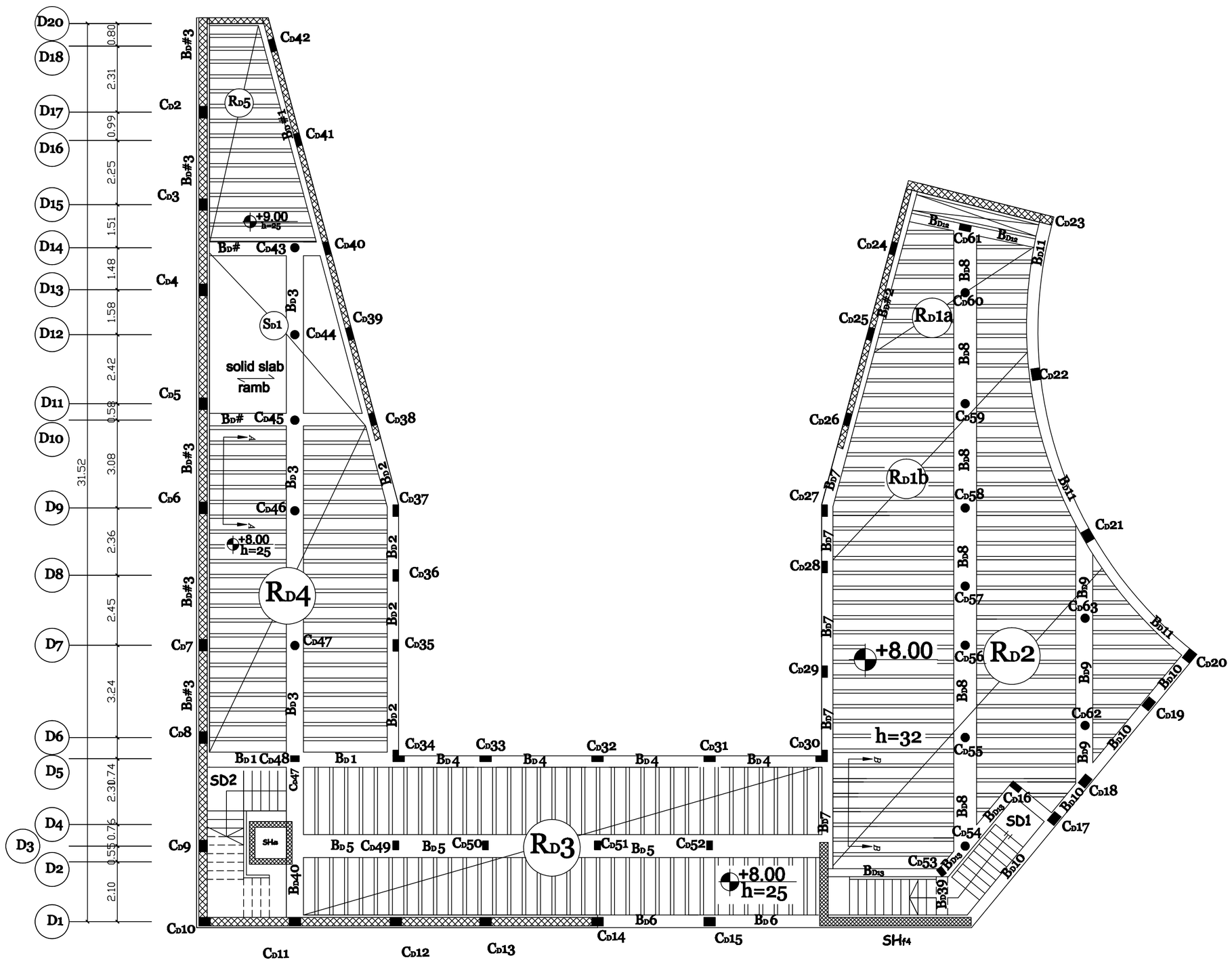


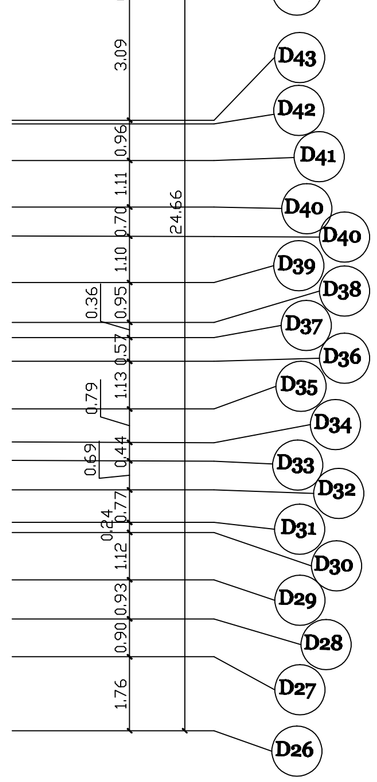


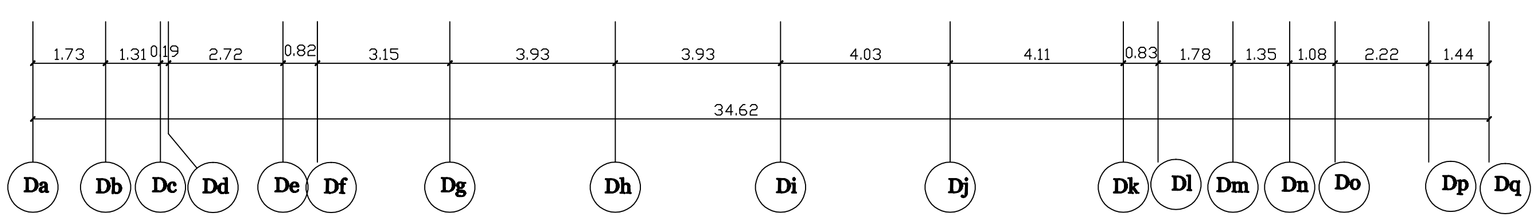
Section A – A



Section B – B







graound floor slab on
+8.00 & +9.00

By the name of Allah

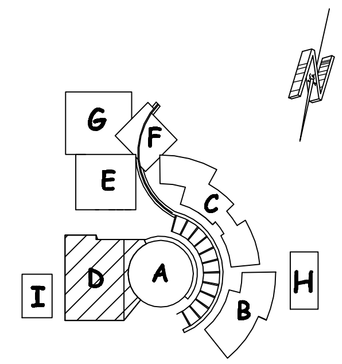
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

Number	Name
A	Reception
B	Sport hall
C	Building activities
D	Theater
E	Handicrafts
F	Restaurant
G	Photo Gallery
H	Parking 1
I	Parking 2

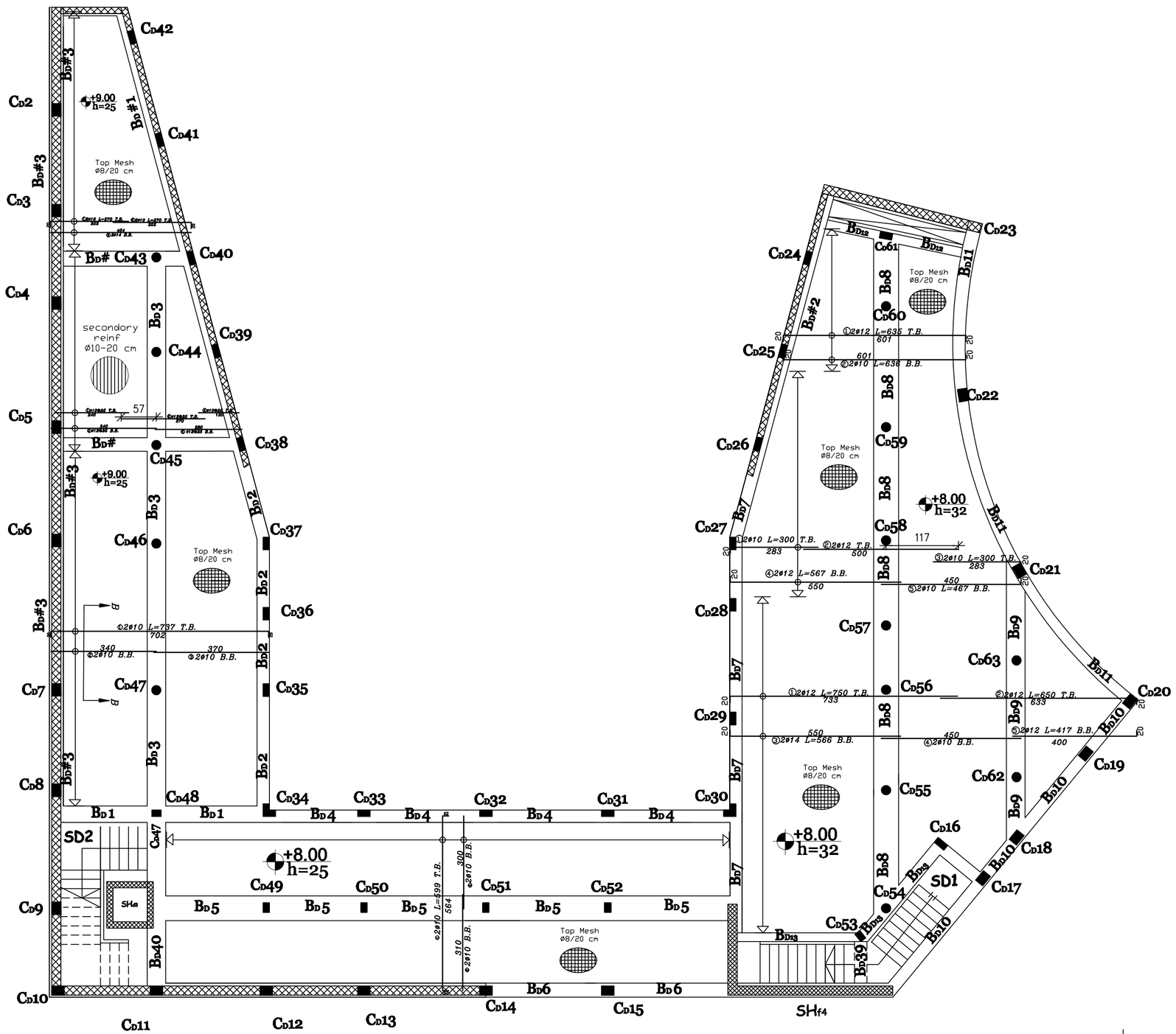
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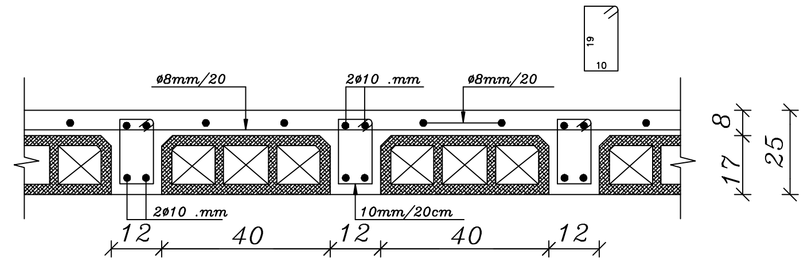
Theater

Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	No.of Draw	Date
1/100	S61	2013-2014





Section B – B

graound floor slab on
+8.00 & +9.00

By the name of Allah

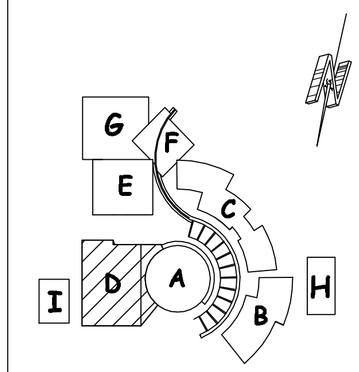
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

Number	Name
A	Reception
B	Sport hall
C	Building activities
D	Theater
E	Handicrafts
F	Restaurant
G	Photo Gallery
H	Parking 1
I	Parking 2

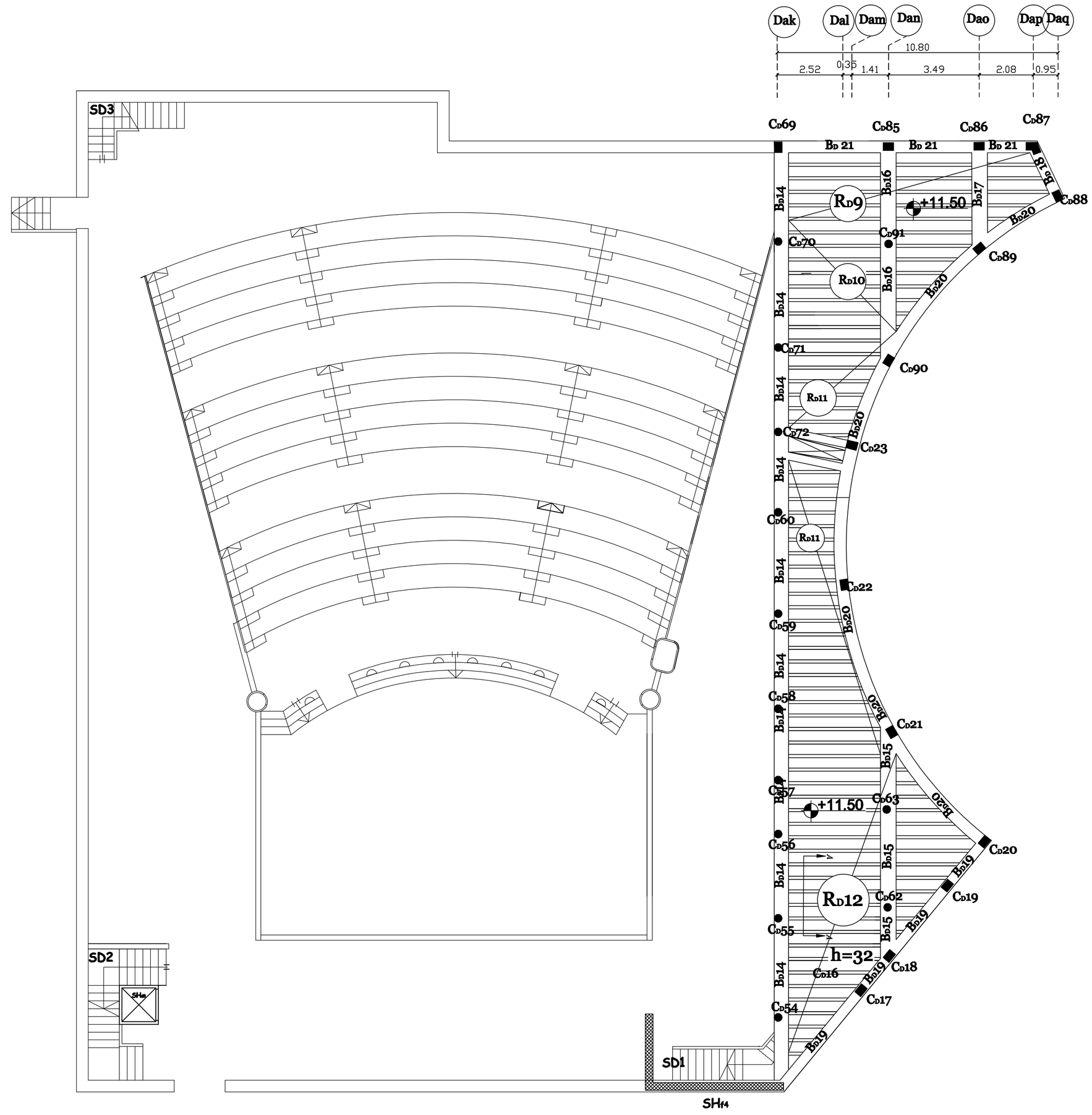
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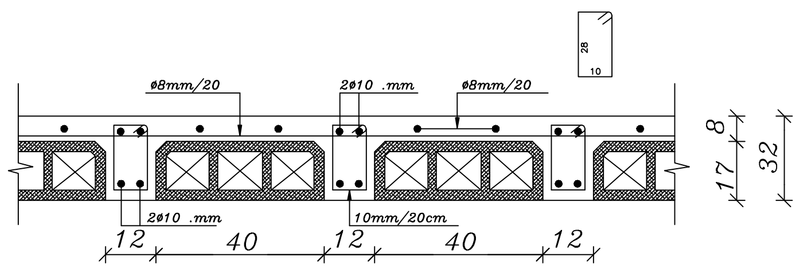
Theater

Designed By

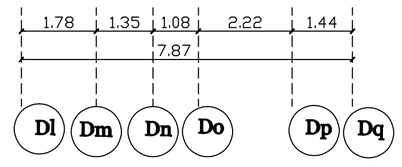
Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	No.of Draw	Date
1/100	S62	2013-2014





Section A – A



Roof slab on +11.50

By the name of Allah

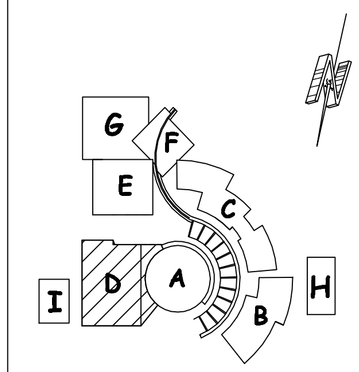
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

Number	Name
A	Reception
B	Sport hall
C	Building activities
D	Theater
E	Handicrafts
F	Restaurant
G	Photo Gallery
H	Parking 1
I	Parking 2

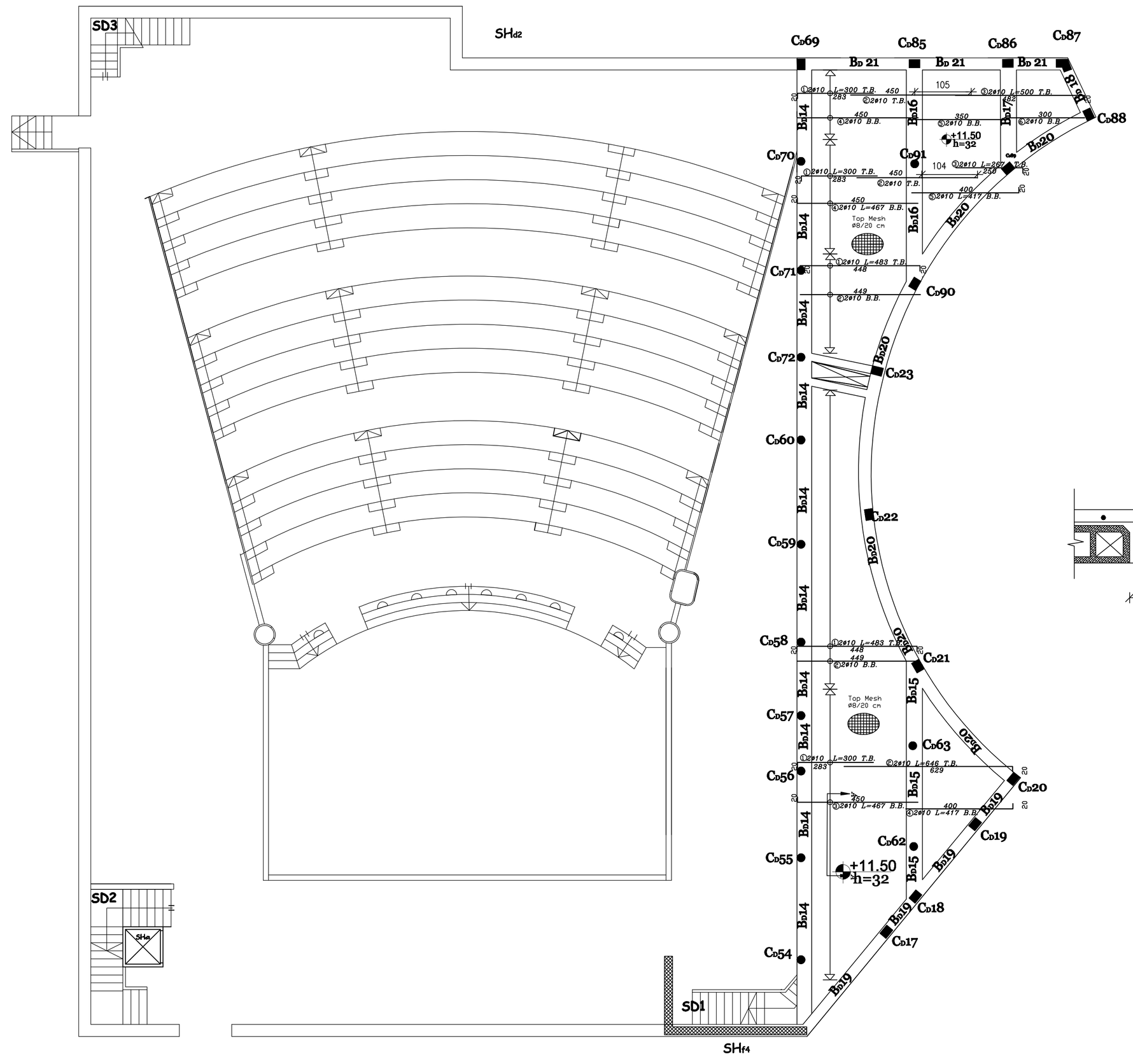
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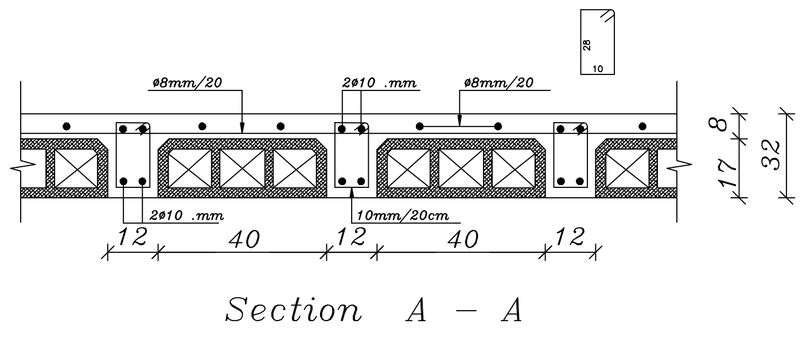
Theater

Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	No.of Draw	Date
1/100	S63	2013-2014





Section A – A

By the name of Allah

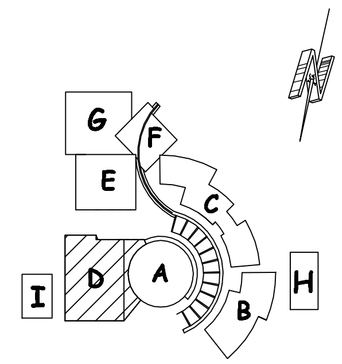
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

Number	Name
A	Reception
B	Sport hall
C	Building activities
D	Theater
E	Handicrafts
F	Restaurant
G	Photo Gallery
H	Parking 1
I	Parking 2

Drawing Title

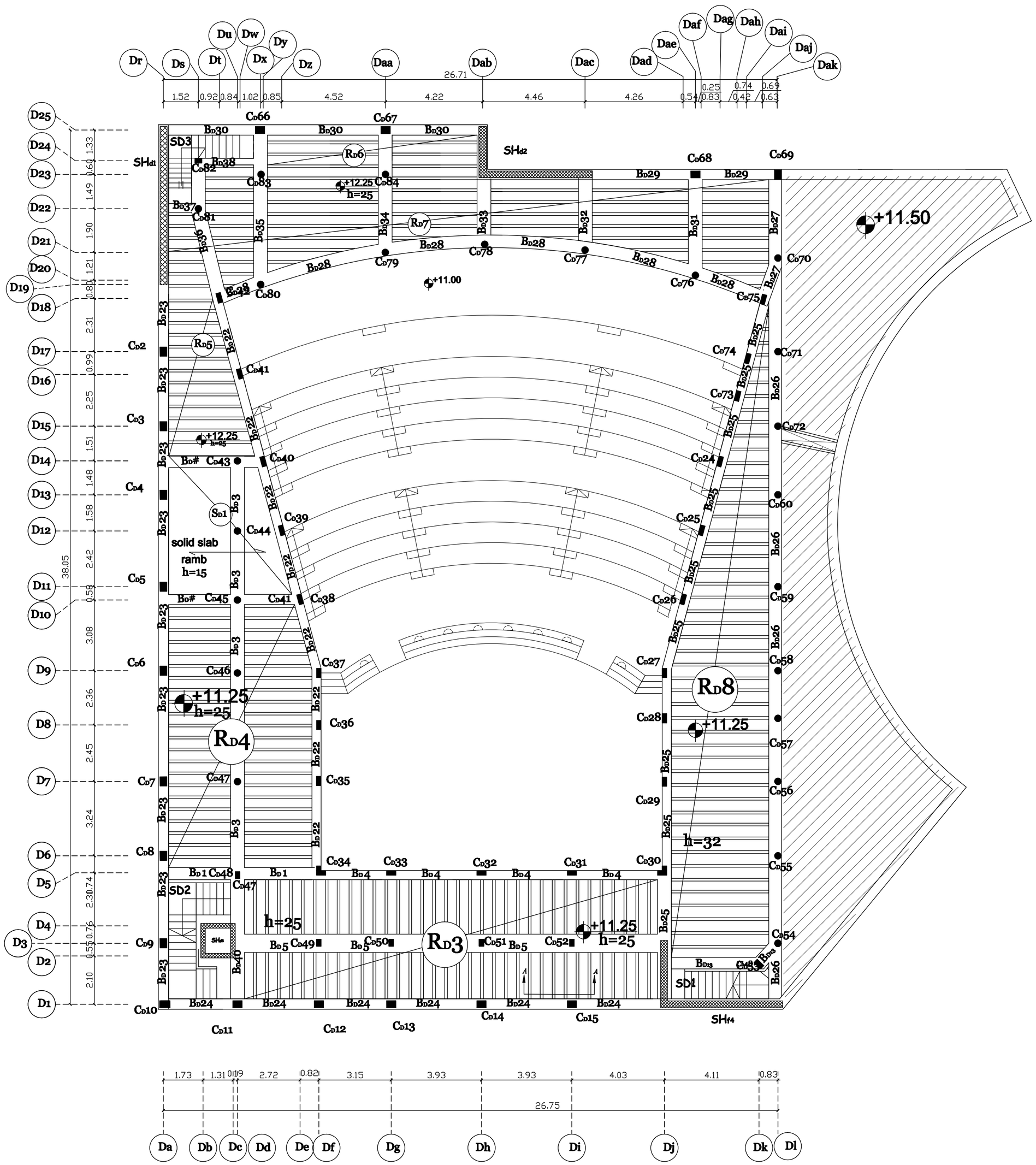
Theater

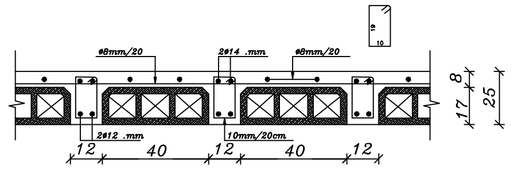
Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	No.of Draw	Date
1/100	S64	2013-2014

Roof slab on +11.50





Section A – A

First Floor slab on
10.25 & +11.00 & +11.75

By the name of Allah

جامعة فلسطين التقنية
رابطة دوما-حبرون/الأهلية

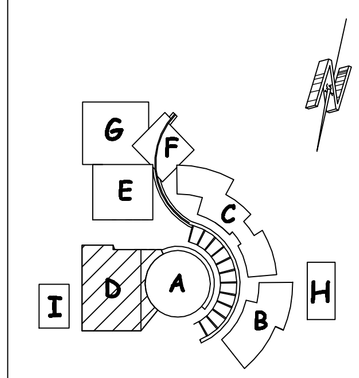
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

Number	Name
A	Reception
B	Sport hall
C	Building activities
D	Theater
E	Handicrafts
F	Restaurant
G	Photo Gallery
H	Parking 1
I	Parking 2

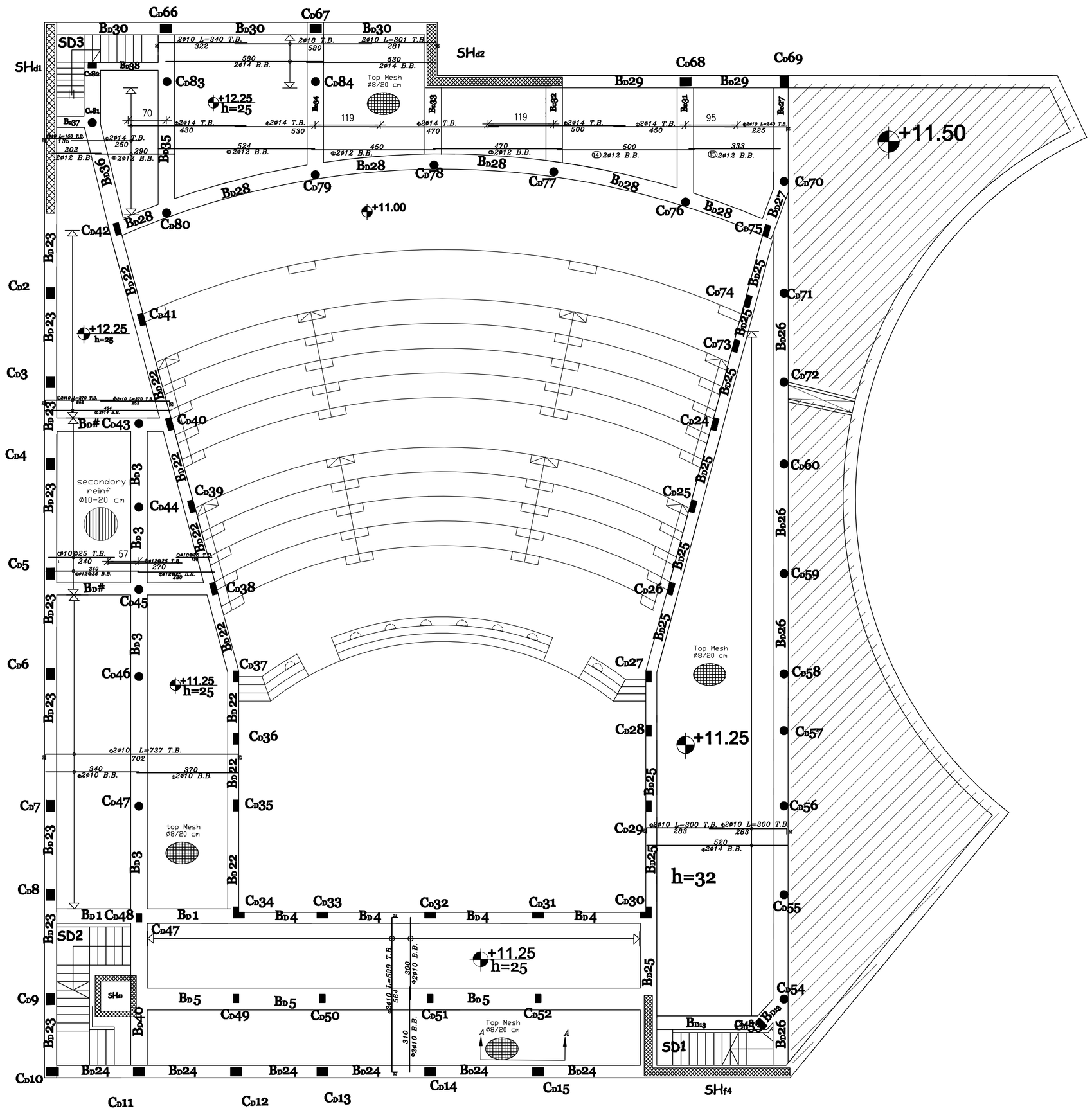
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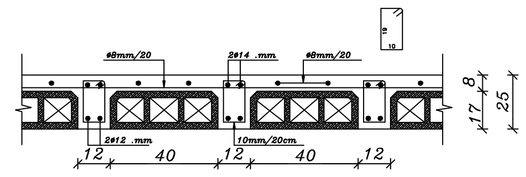
Theater

Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	No.of Draw	Date
1/100	S65	2013-2014





Section A – A

First Floor slab on
10.25 & +11.00 & +11.75

By the name of Allah

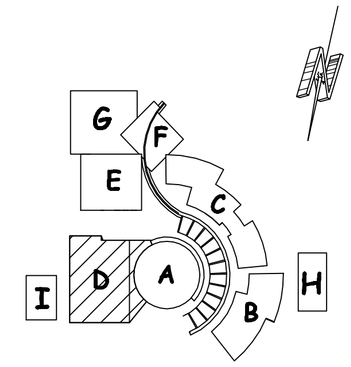
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

Number	Name
A	Reception
B	Sport hall
C	Building activities
D	Theater
E	Handicrafts
F	Restaurant
G	Photo Gallery
H	Parking 1
I	Parking 2

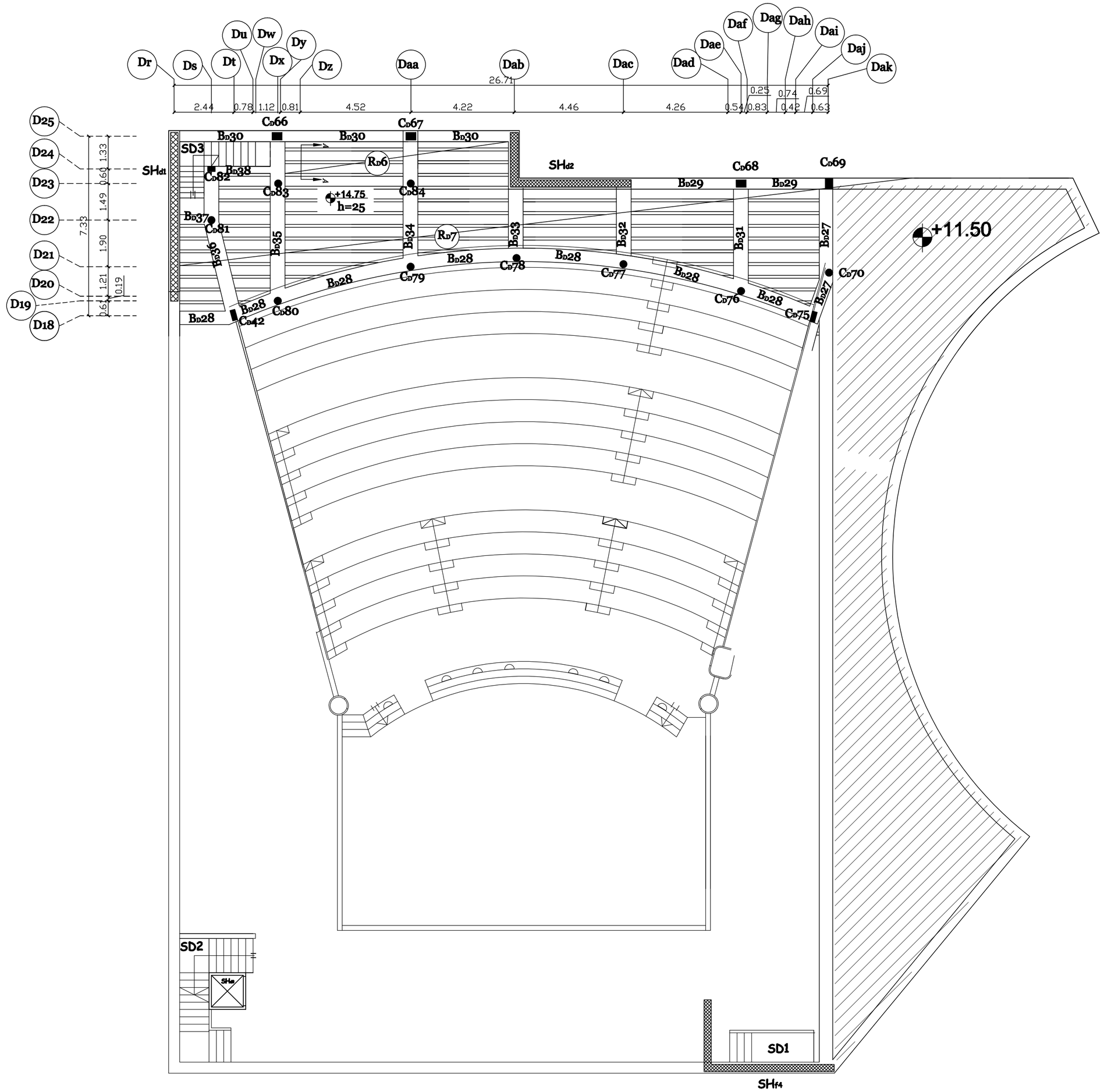
Drawing Title

Theater

Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

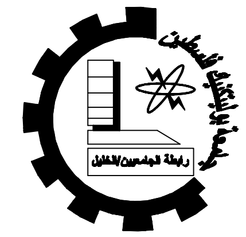
Scale	No.of Draw	Date
1/100	S66	2013-2014



Section A – A

FORTH Floor slab on +14.75

By the name of Allah



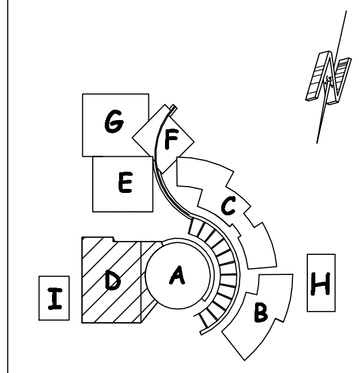
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor: Dr.Nasr Abboushi



Tabel of Building	
Number	Name
A	Reception
B	Sport hall
C	Building activities
D	Theater
E	Handicrafts
F	Restaurant
G	Photo Gallery
H	Parking 1
I	Parking 2

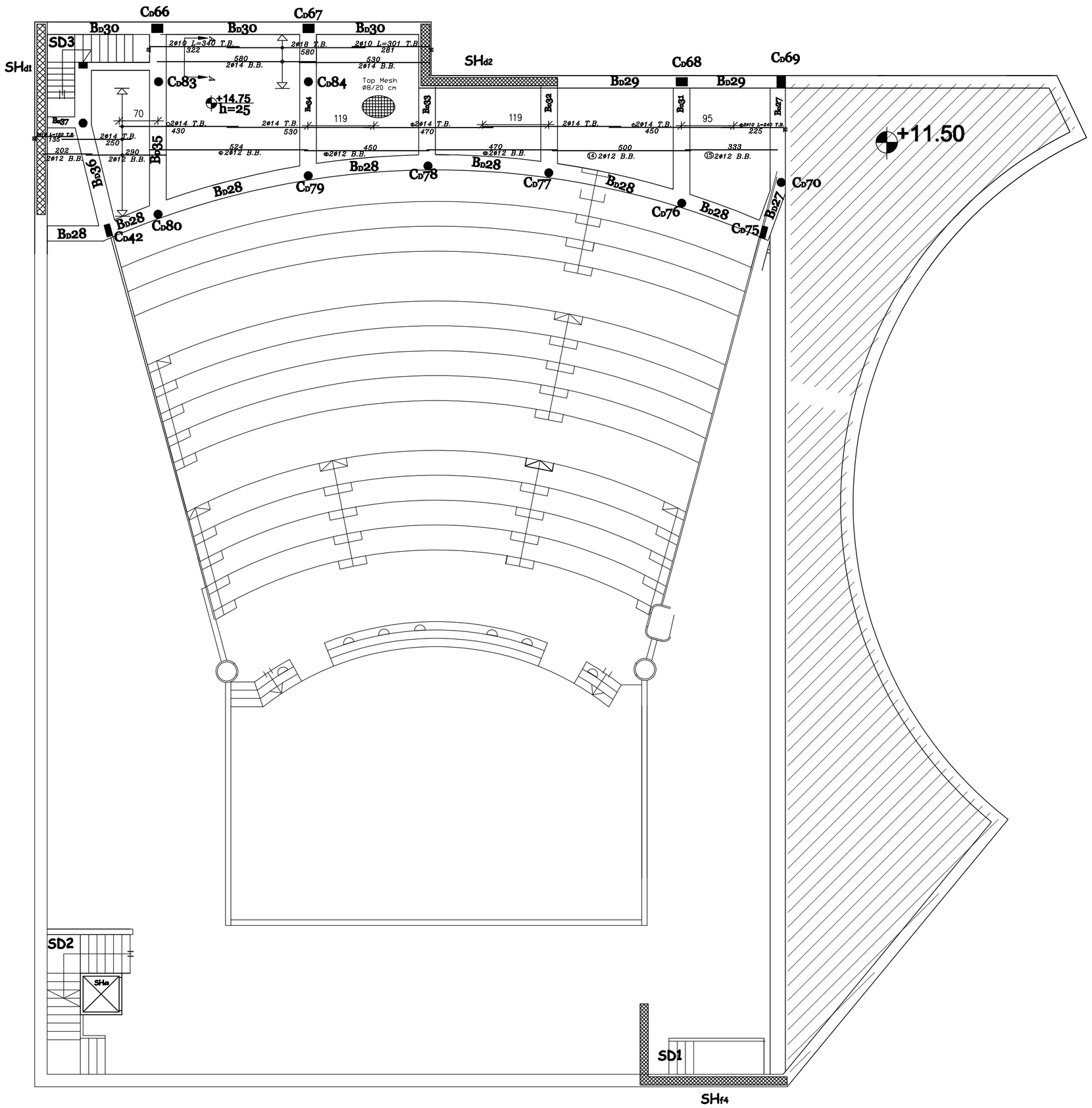
Drawing Title

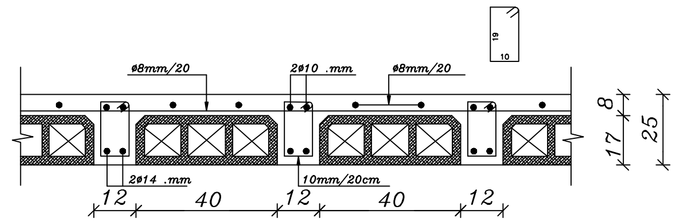
Theater

Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	No.of Draw	Date
1/100	S67	2013-2014





Section A – A

Floor slab on +14.75

By the name of Allah

جامعة فلسطين التقنية
رابطة الجامعين/الخليل

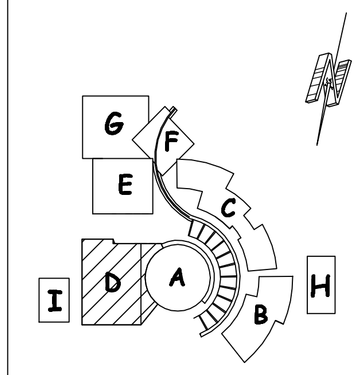
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor: Dr.Nasr Abboushi



Tabel of Building	
Number	Name
A	Reception
B	Sport hall
C	Building activities
D	Theater
E	Handicrafts
F	Restaurant
G	Photo Gallery
H	Parking 1
I	Parking 2

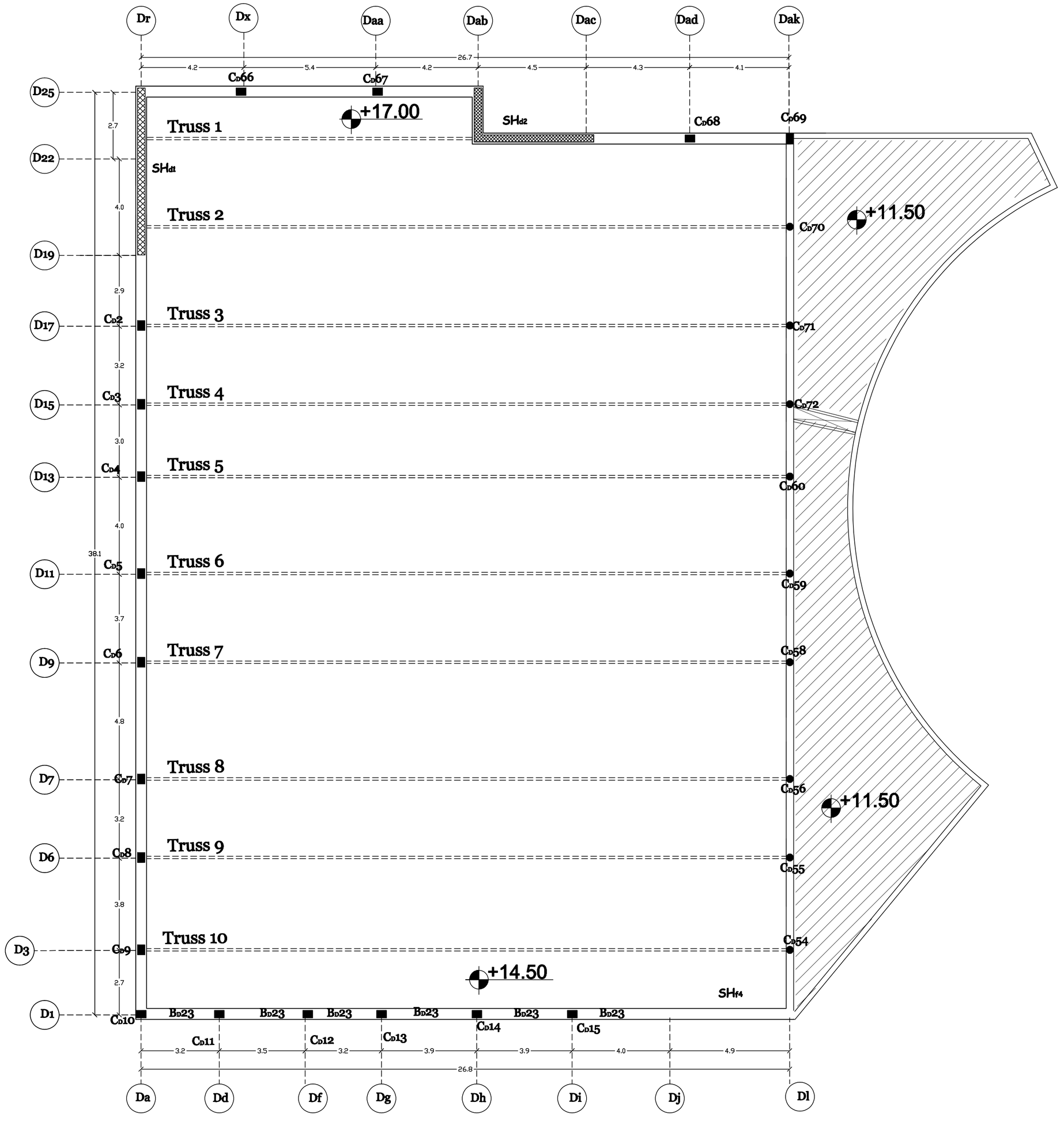
Drawing Title

Theater

Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	No.of Draw	Date
1/100	S68	2013-2014



Roof slab
+14.50 to +17.00

By the name of Allah

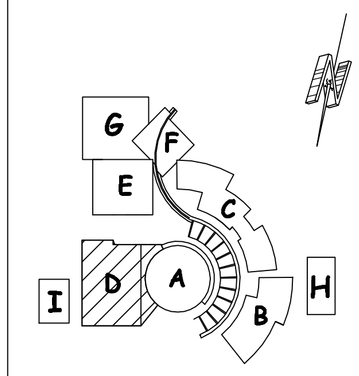
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

Number	Name
A	Reception
B	Sport hall
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E	Handicrafts
F	Restaurant
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H	Parking 1
I	Parking 2

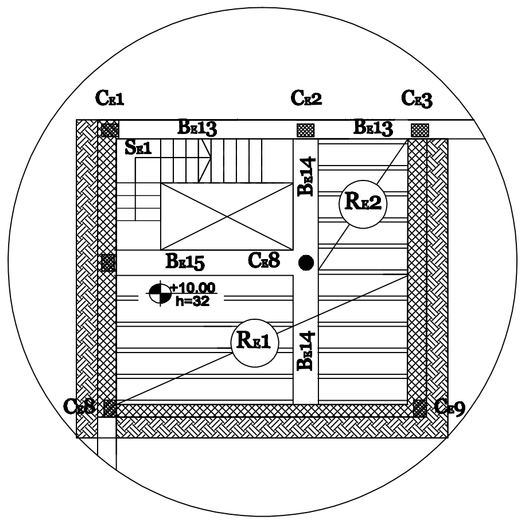
Drawing Title

Theater

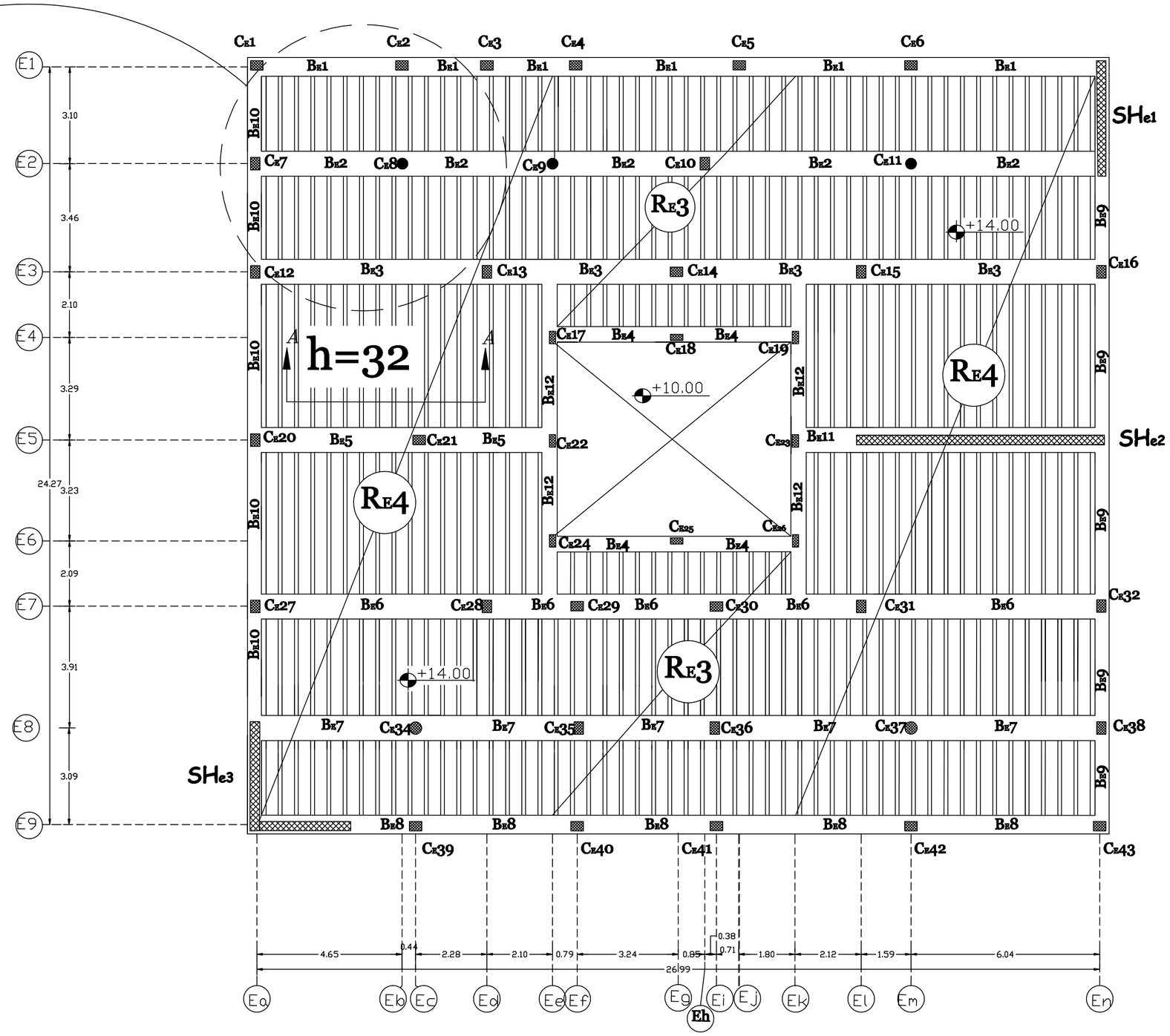
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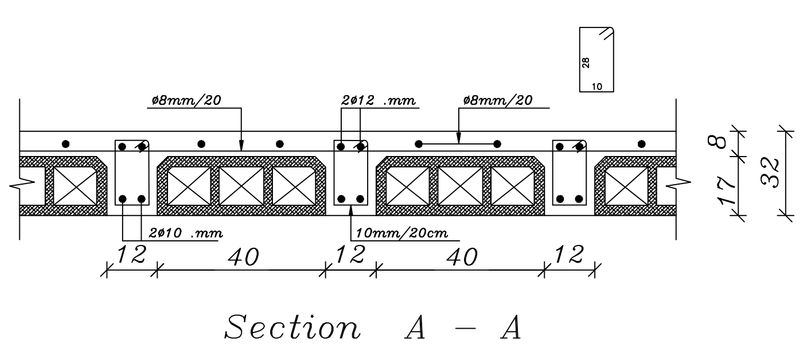
Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	*No.of Draw*	*Date*
1/100	S79	2013-2014



plan on +10.00





Section A – A

Roof slab
+14.00

By the name of Allah

جامعة فلسطين التقنية
رابطة دوحة حبرون/الخليل

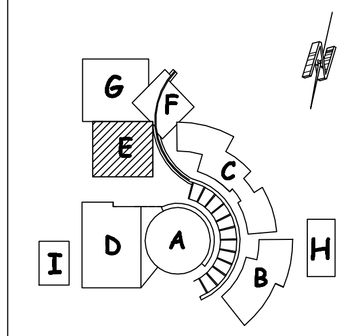
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building	
Number	Name
A	Reception
B	Sport hall
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F	Restaurant
G	Photo Gallery
H	Parking 1
I	Parking 2

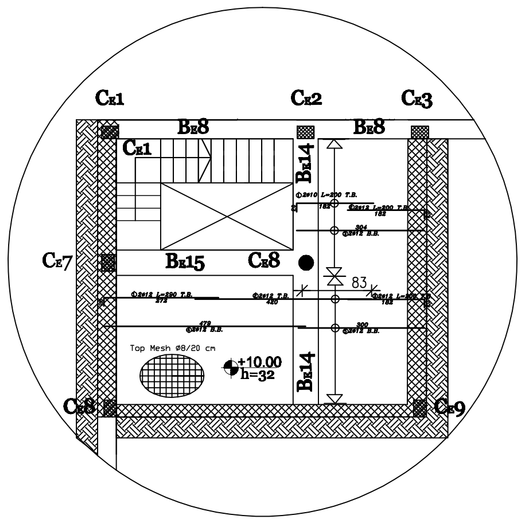
Drawing Title

Handicraft's

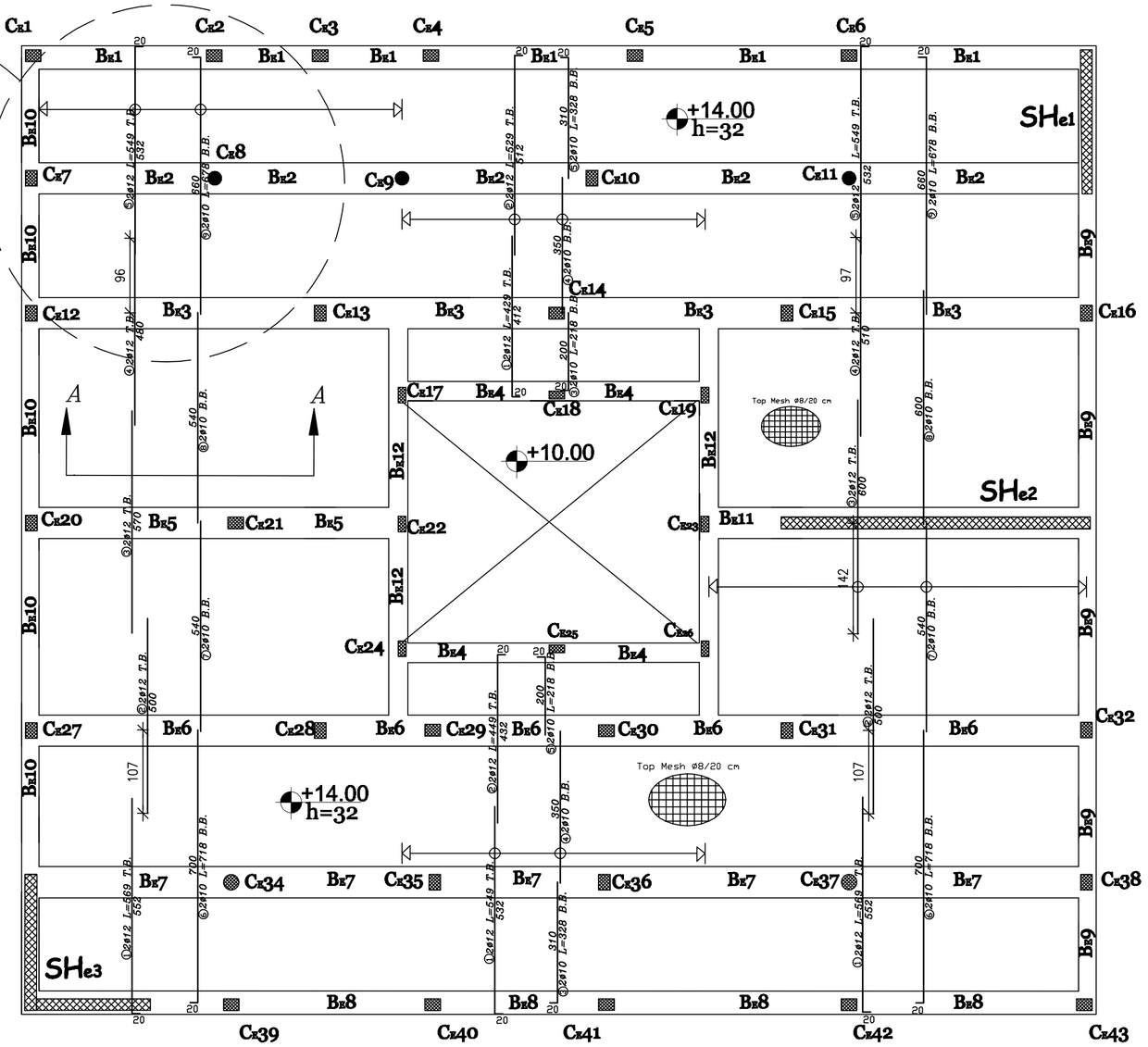
Designed By

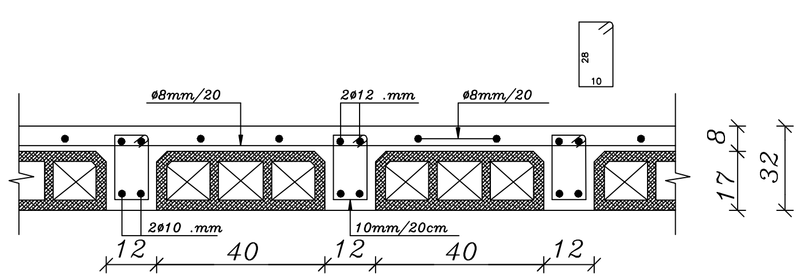
Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	No.of Draw	Date
1/100	S70	2013-2014



plan on +10.00





Section A – A

Roof slab +14.00

By the name of Allah

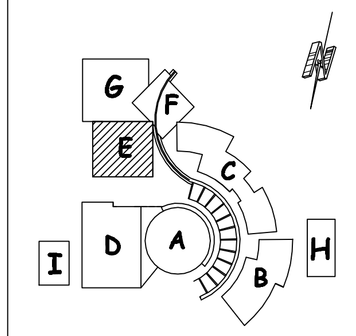
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building	
Number	Name
A	Reception
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I	Parking 2

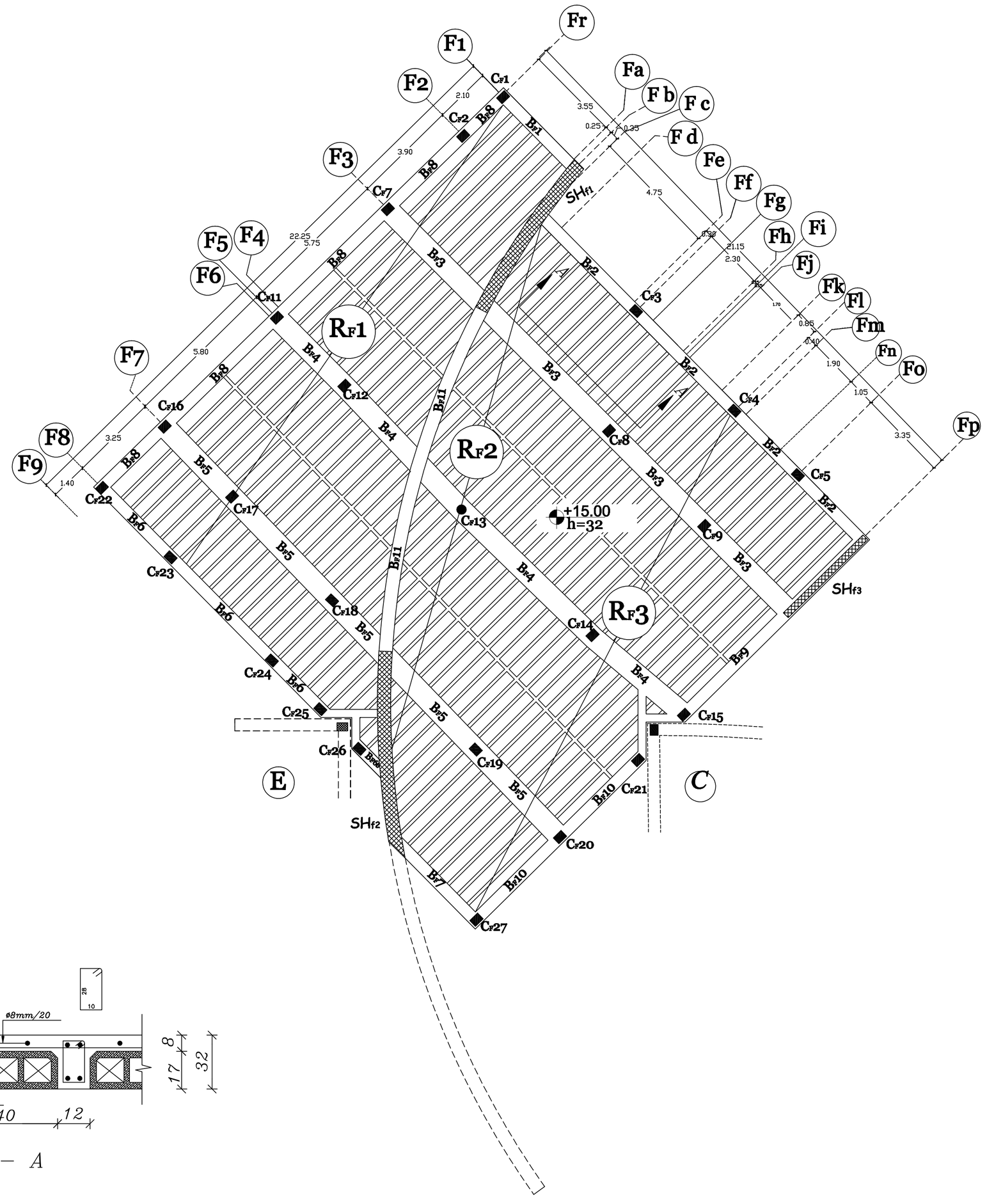
Drawing Title

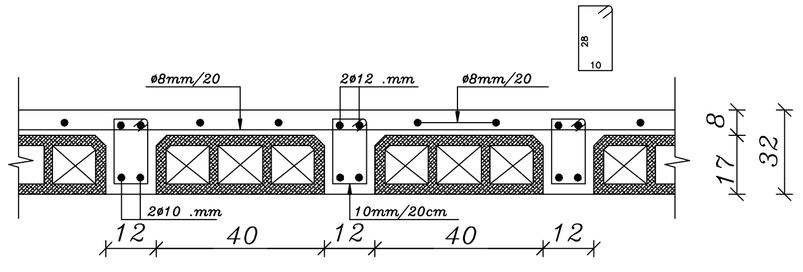
Handicraft's

Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	No.of Draw	Date
1/100	S71	2013-2014





Section A – A

Roof slab
on +15.00

By the name of Allah

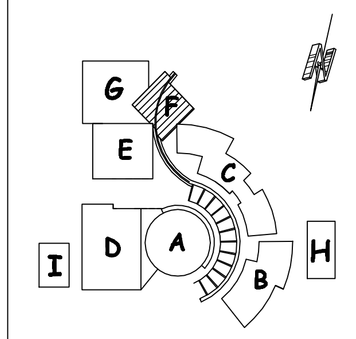
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

Number	Name
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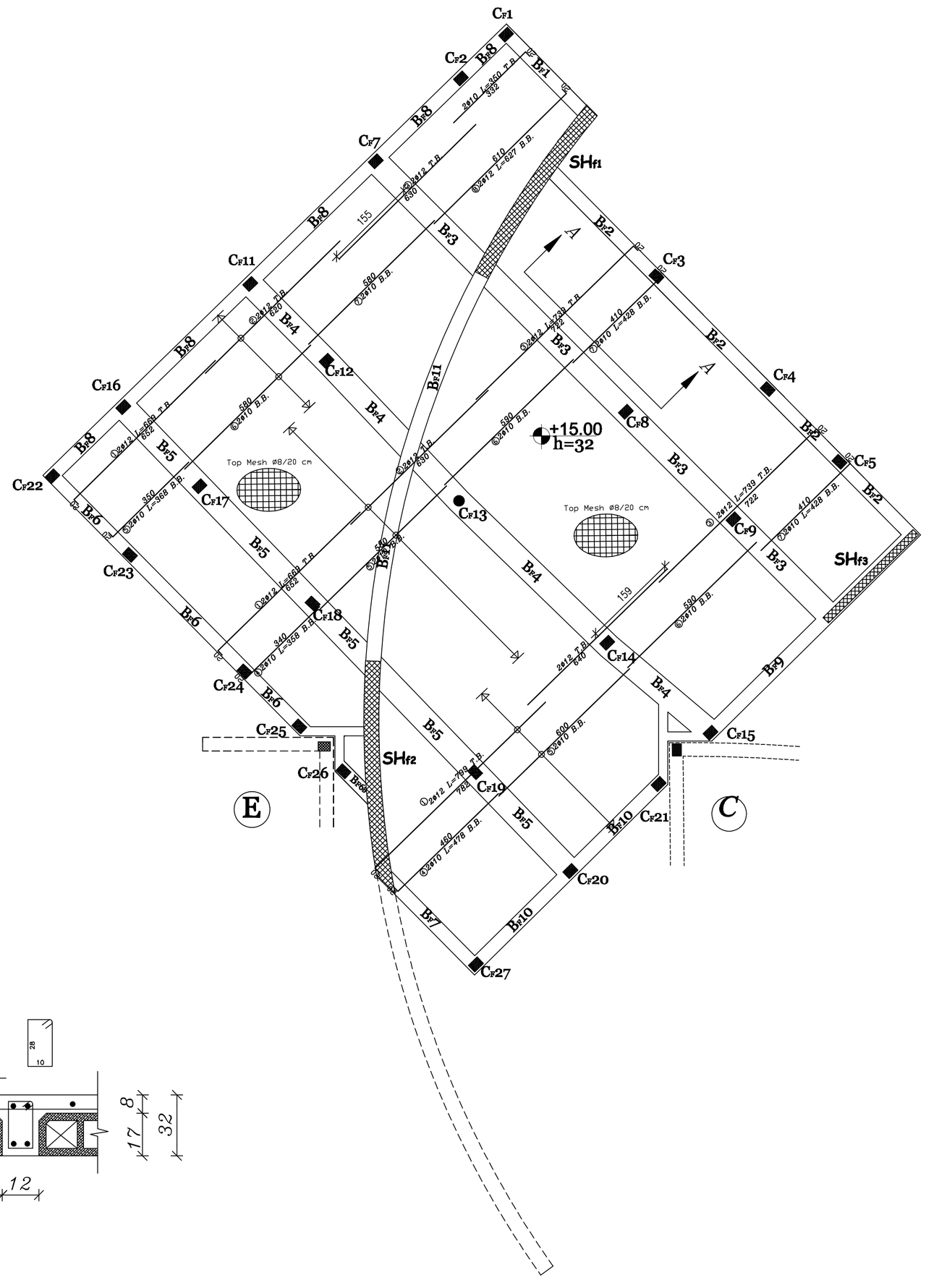
Drawing Title

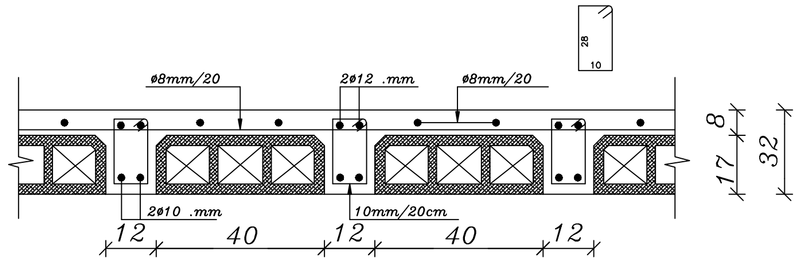
Restaurant

Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	No.of Draw	Date
1/100	S72	2013-3014





Section A – A

Roof slab on +15.00

By the name of Allah

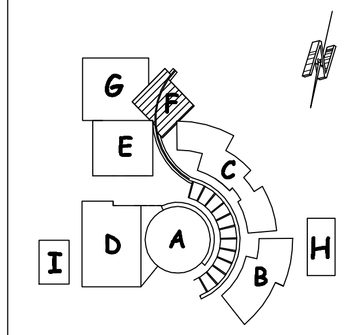
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

Number	Name
A	Reception
B	Sport hall
C	Building activities
D	Theater
E	Handicrafts
F	Restaurant
G	Photo Gallery
H	Parking 1
I	Parking 2

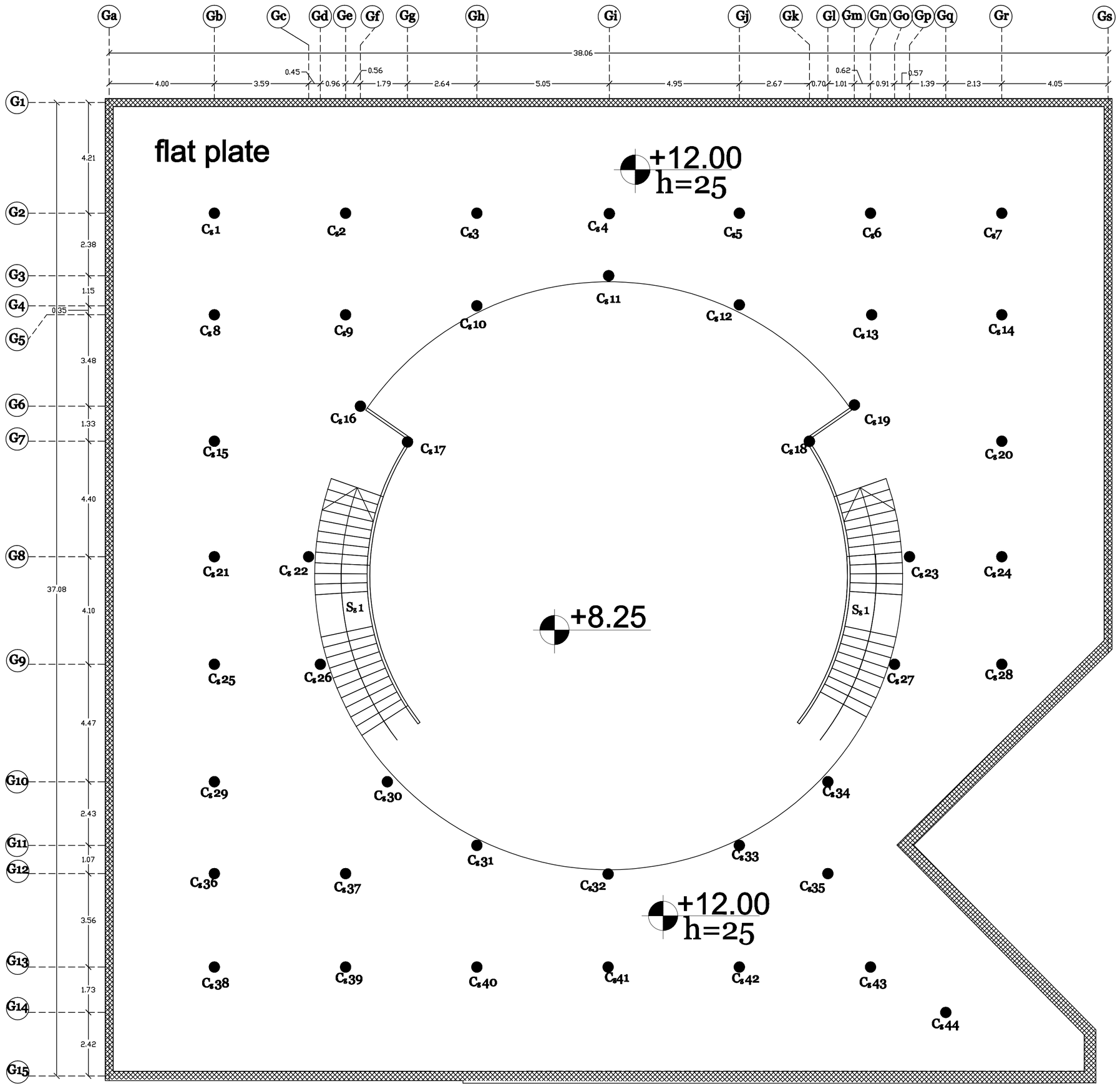
Drawing Title

Restaurant

Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	No.of Draw	Date
1/100	S73	2013-3014



roof slab on
+12.00

By the name of Allah

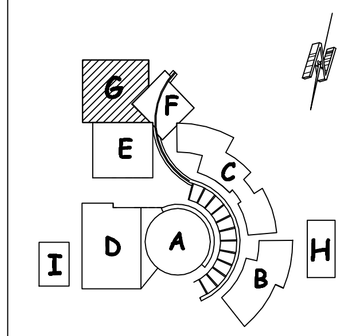
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

Number	Name
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I	Parking 2

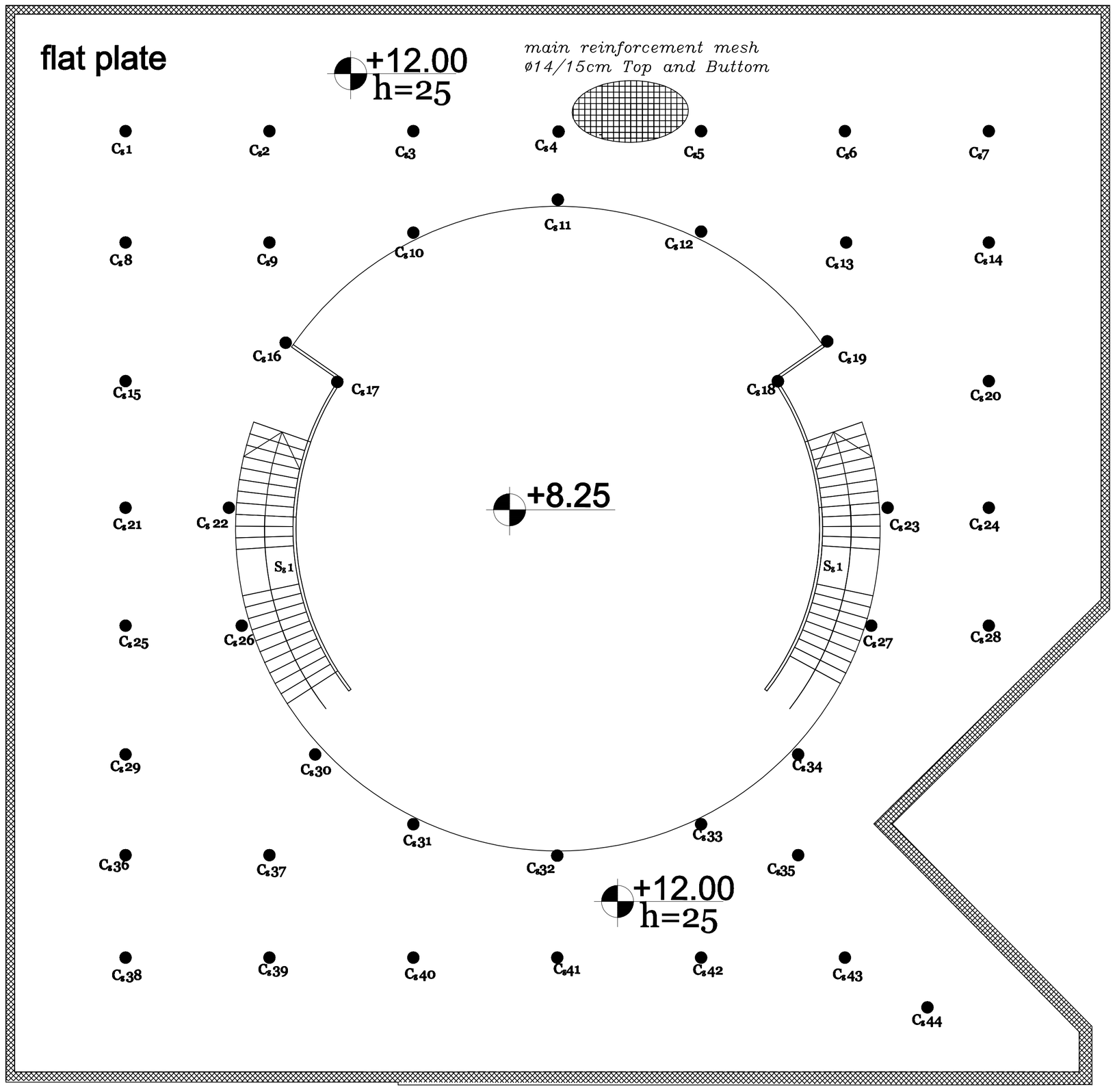
Drawing Title

Photo Gallery

Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	No.of Draw	Date
1/100	S74	2013-2014



roof slab on
+12.00

By the name of Allah

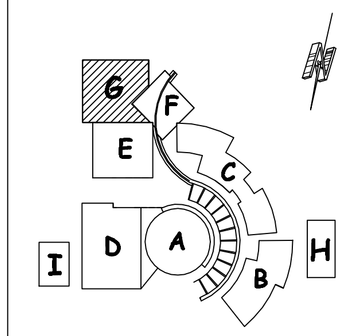
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building	
Number	Name
A	Reception
B	Sport hall
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E	Handicrafts
F	Restaurant
G	Photo Gallery
H	Parking 1
I	Parking 2

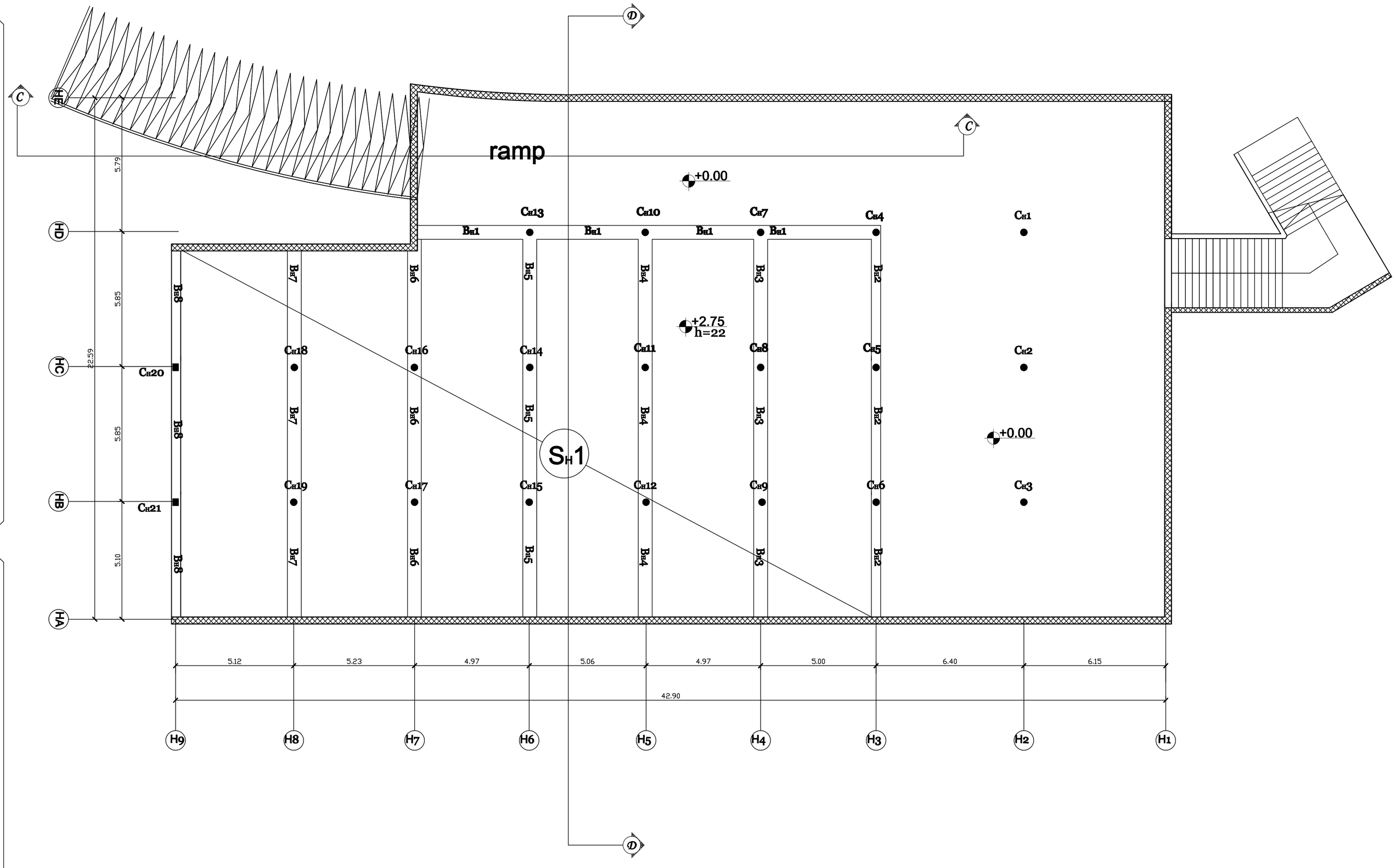
Drawing Title

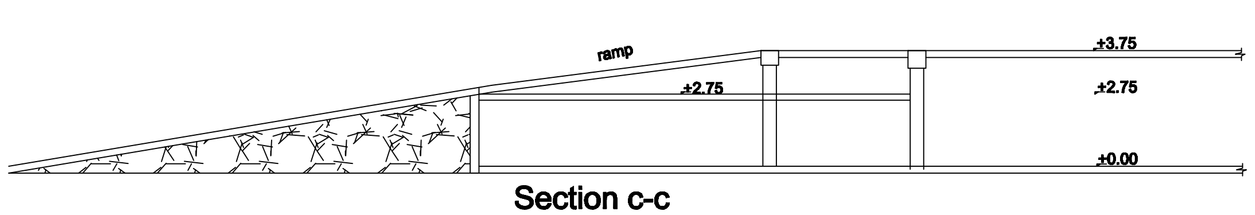
Photo Gallery

Designed By

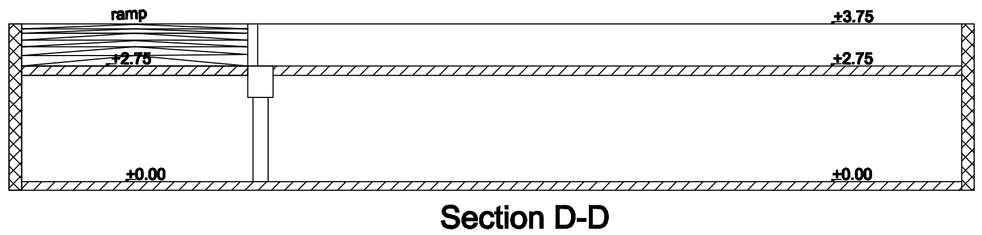
Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	No.of Draw	Date
1/100	S75	2013-2014





Section c-c



Section D-D

roof slab
on +2.75

By the name of Allah

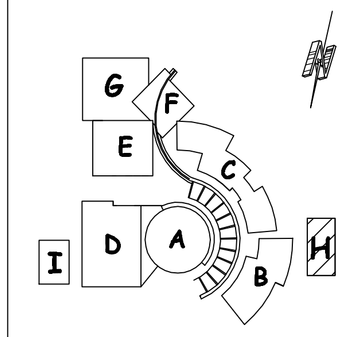
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

Number	Name
A	Reception
B	Sport hall
C	Building activities
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F	Restaurant
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H	Parking 1
I	Parking 2

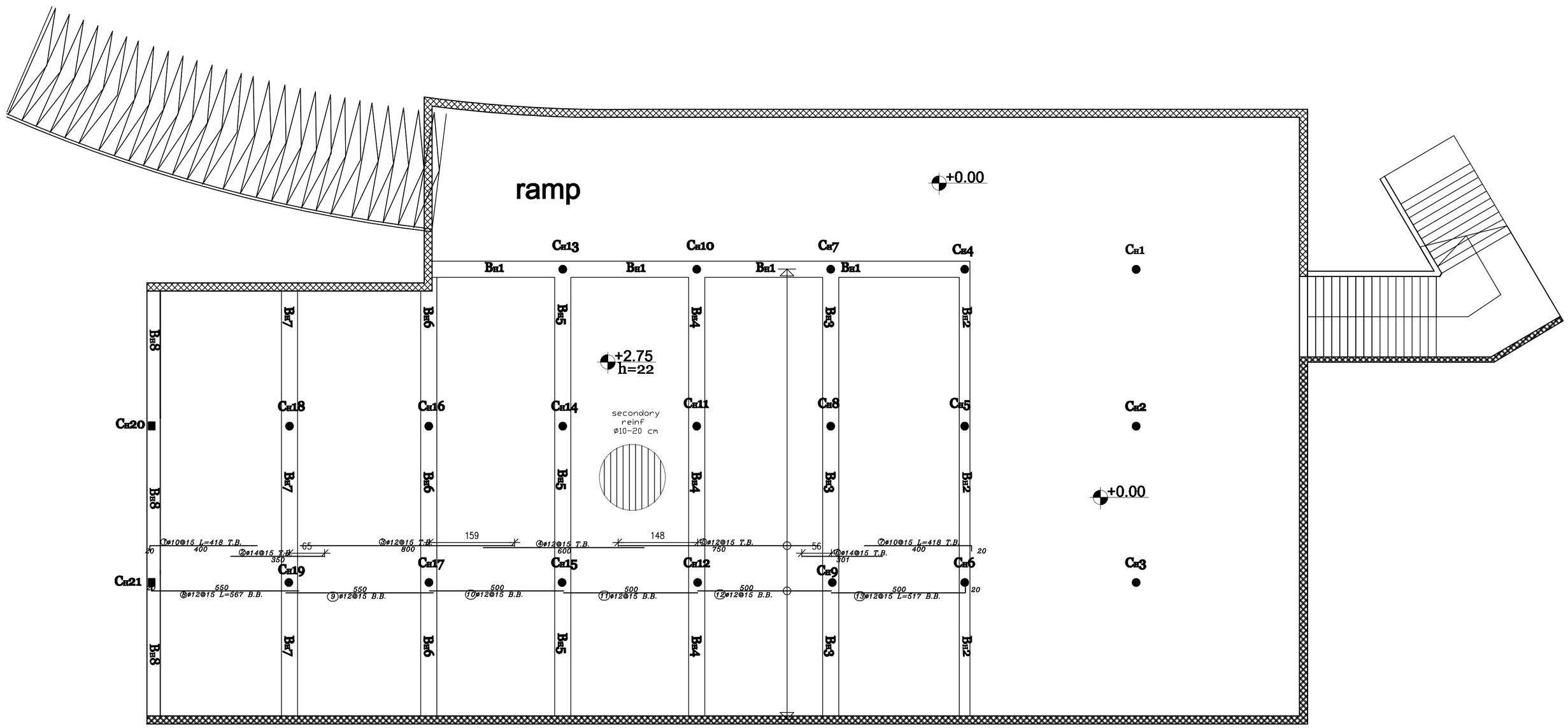
Drawing Title

Parking 1

Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	*No.of Draw*	*Date*
1/100	S76	2013-2014



roof slab
on +2.75

By the name of Allah

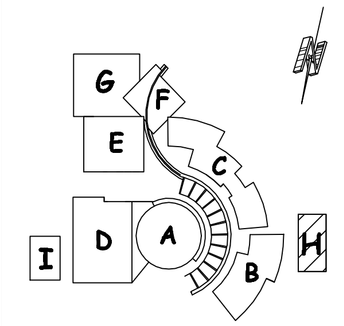
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building	
Number	Name
A	Reception
B	Sport hall
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I	Parking 2

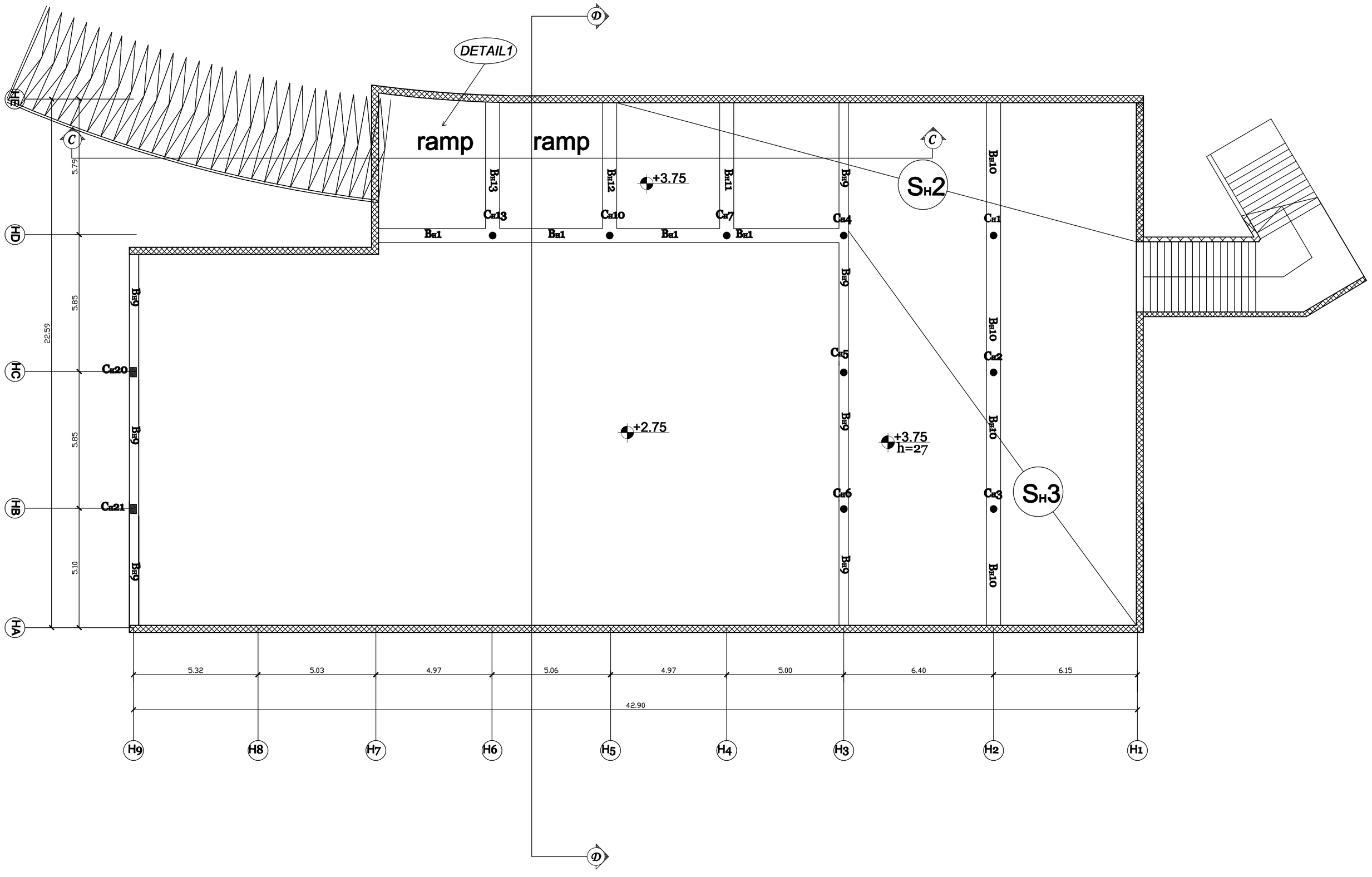
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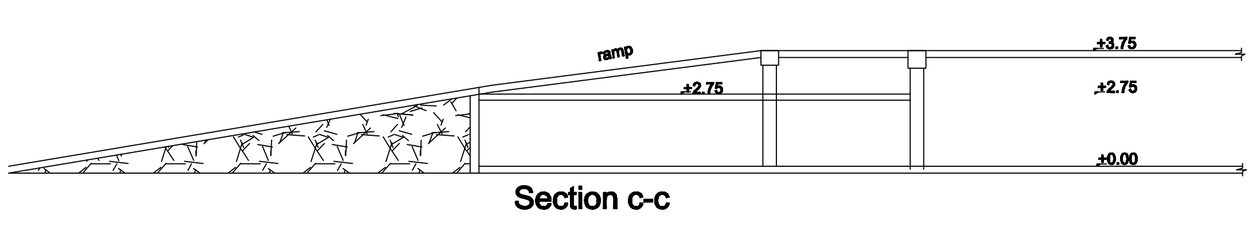
Parking 1

Designed By

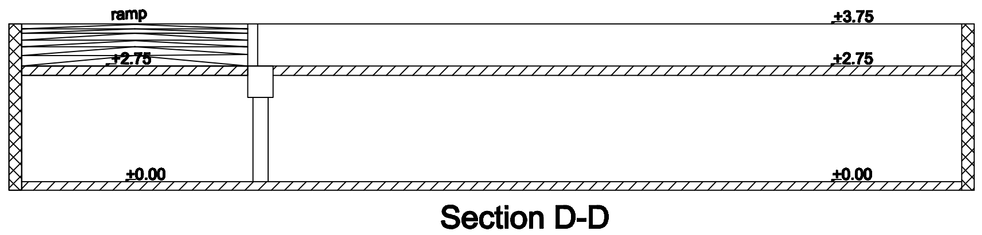
Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	No.of Draw	Date
1/100	S77	2013-2014





Section c-c



Section D-D

roof slab
on +3.75

By the name of Allah

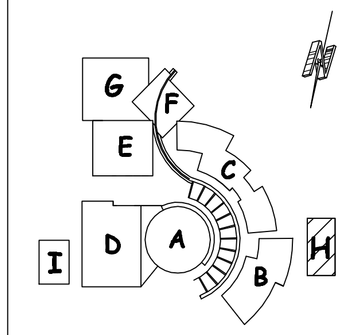
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

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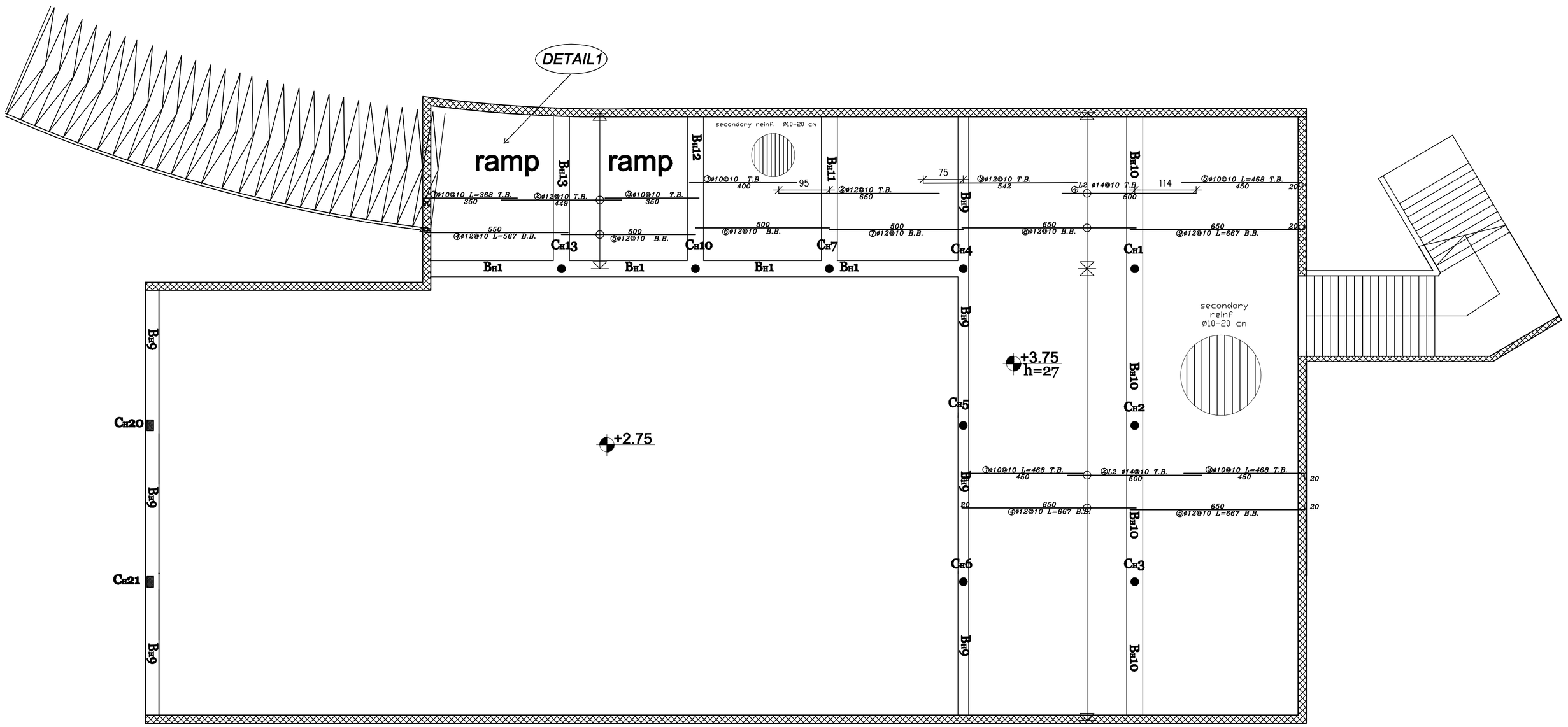
Drawing Title

Parking 1

Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	No.of Draw	Date
1/100	S78	2013-2014



roof slab
on +3.75

By the name of Allah

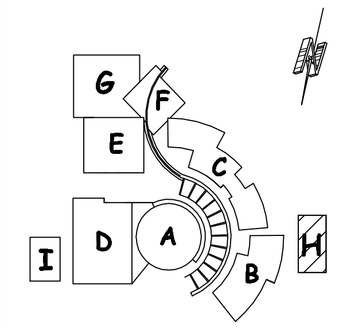
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

Number	Name
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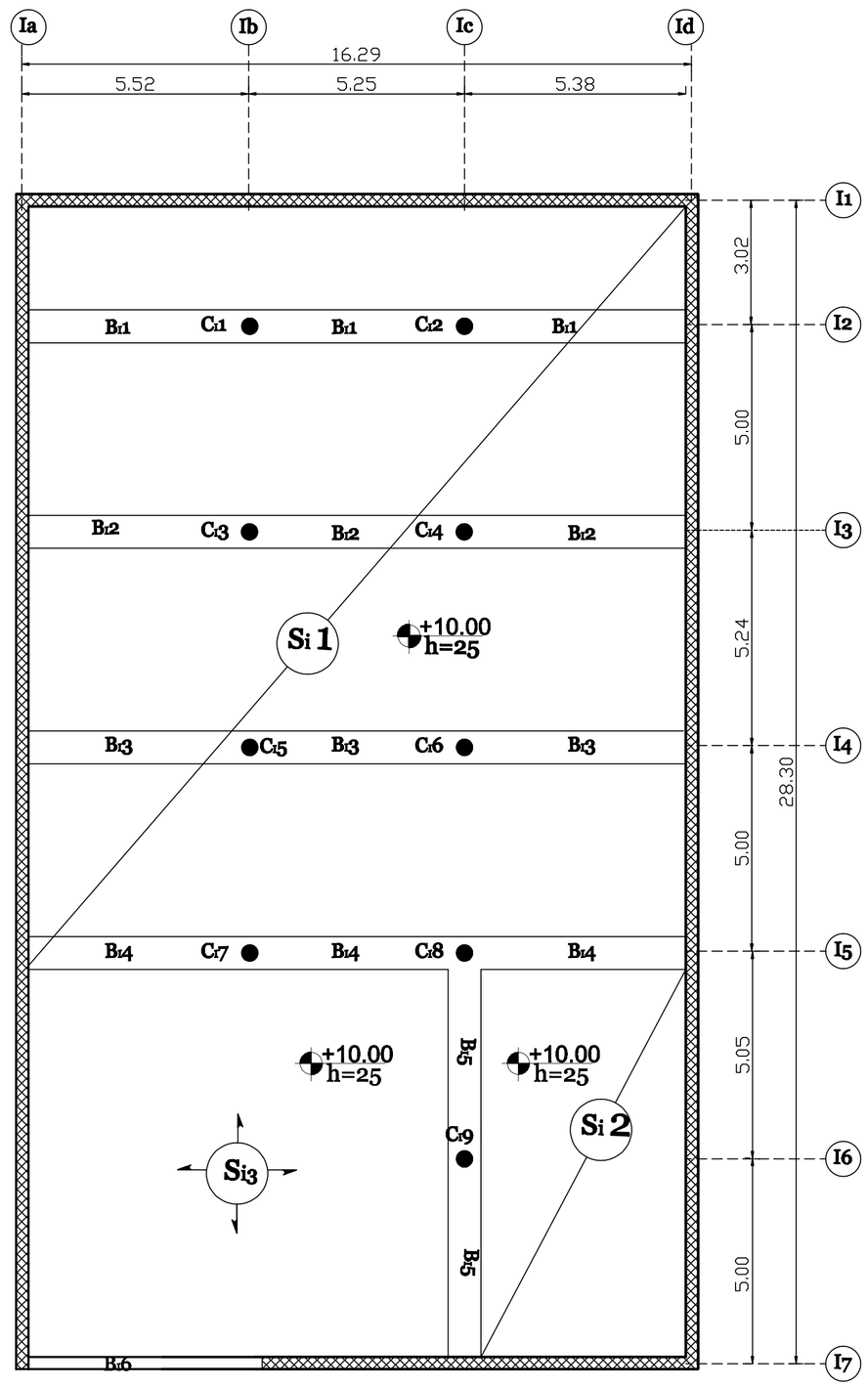
Drawing Title

Parking 1

Designed By

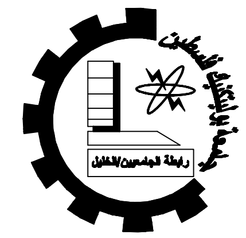
Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	No.of Draw	Date
1/100	S79	2013-2014



roof slab
on +10.00

By the name of Allah



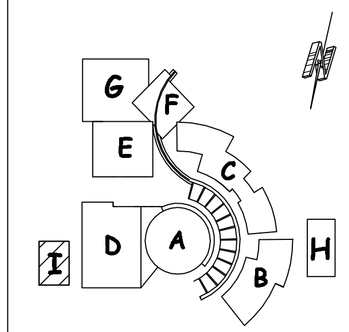
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building	
Number	Name
A	Reception
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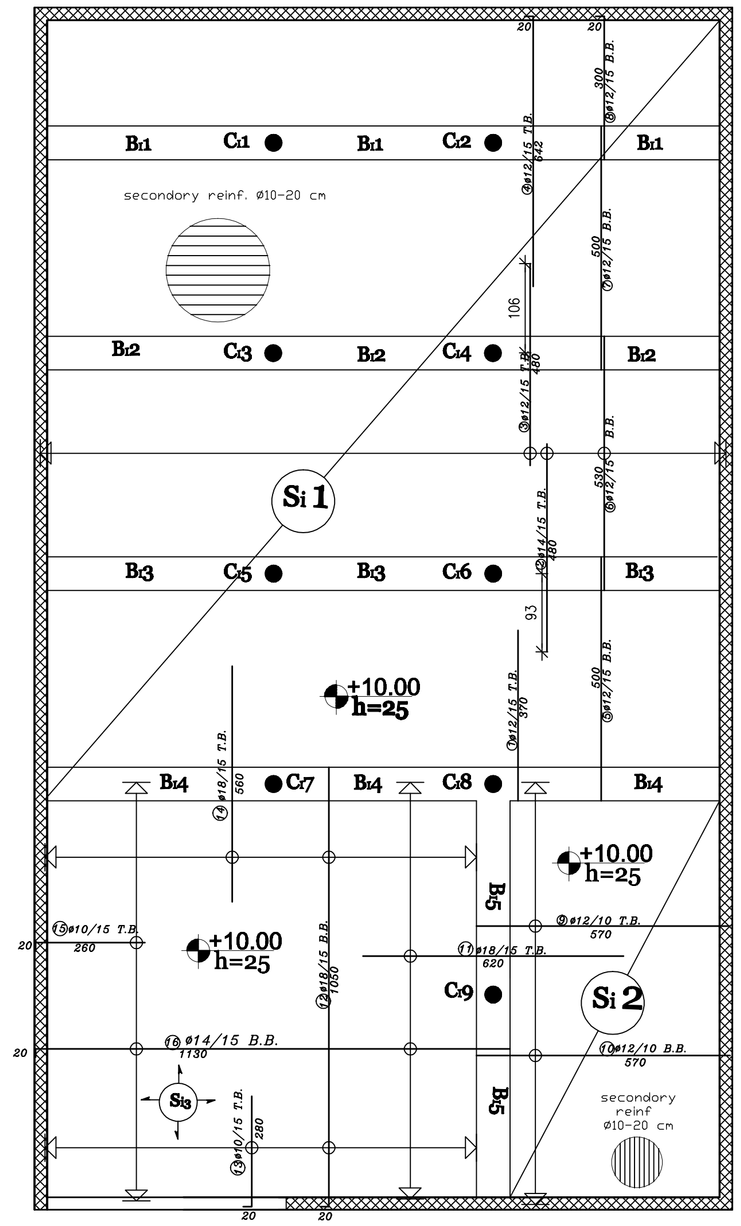
Drawing Title

parking 2

Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	No.of Draw	Date
1/100	S80	2013-2014



roof slab
on +10.00

By the name of Allah

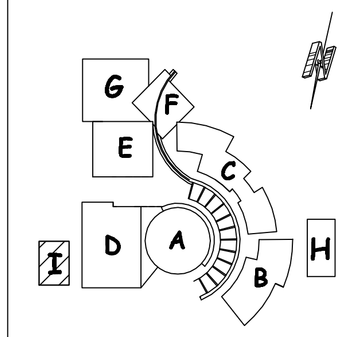
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building	
Number	Name
A	Reception
B	Sport hall
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D	Theater
E	Handicrafts
F	Restaurant
G	Photo Gallery
H	Parking 1
I	Parking 2

Drawing Title

parking 2

Designed By

Baha Bader

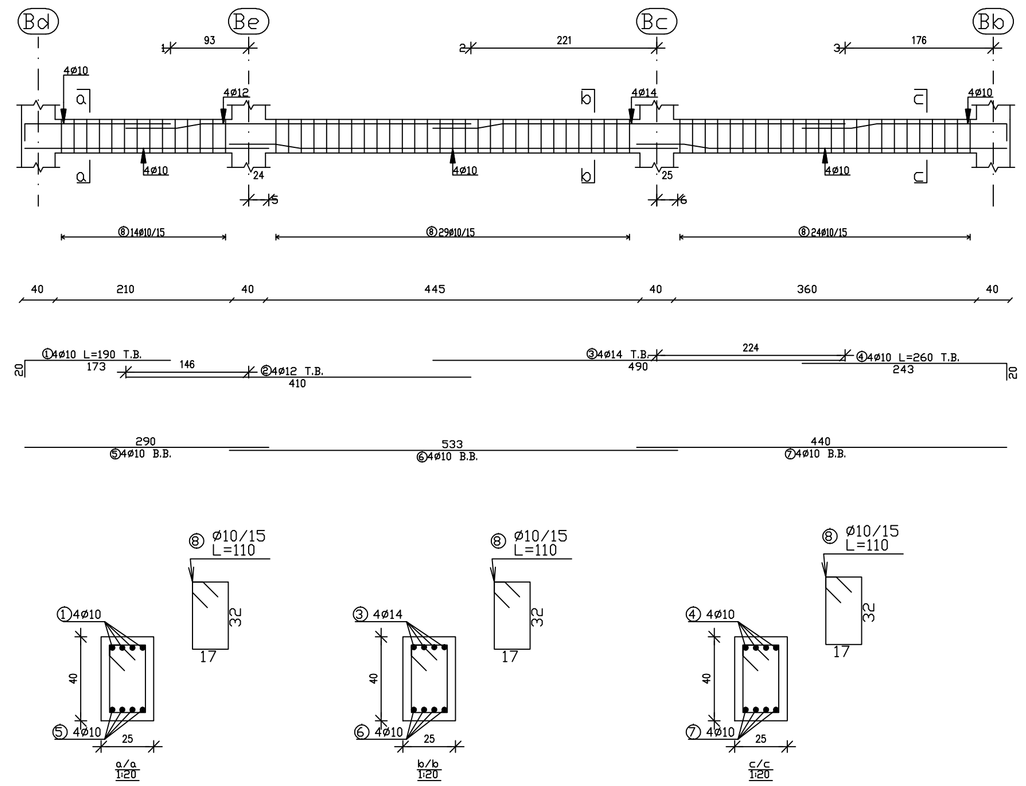
Fawaz Natsheh

Montaser shweiki

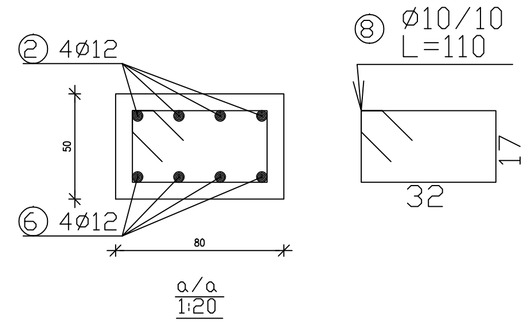
Mohamed Halwani

Scale	No.of Draw	Date
1/100	S81	2013-2014

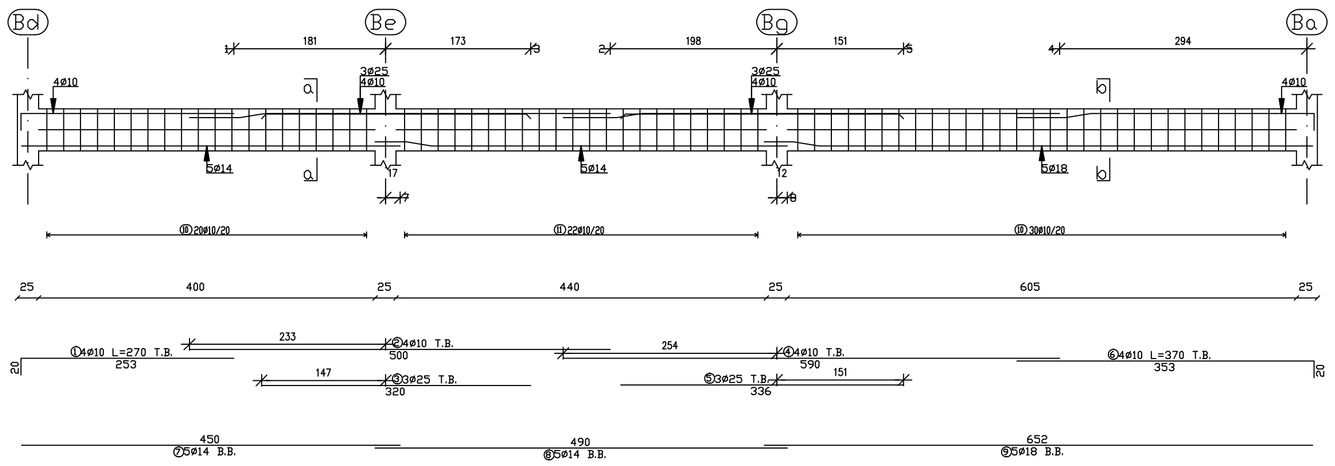
Beam:BB1

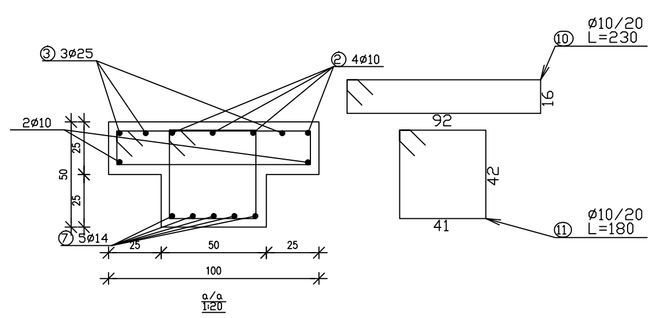


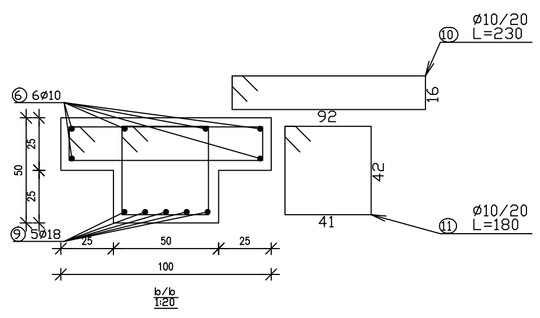
Beam:BB#



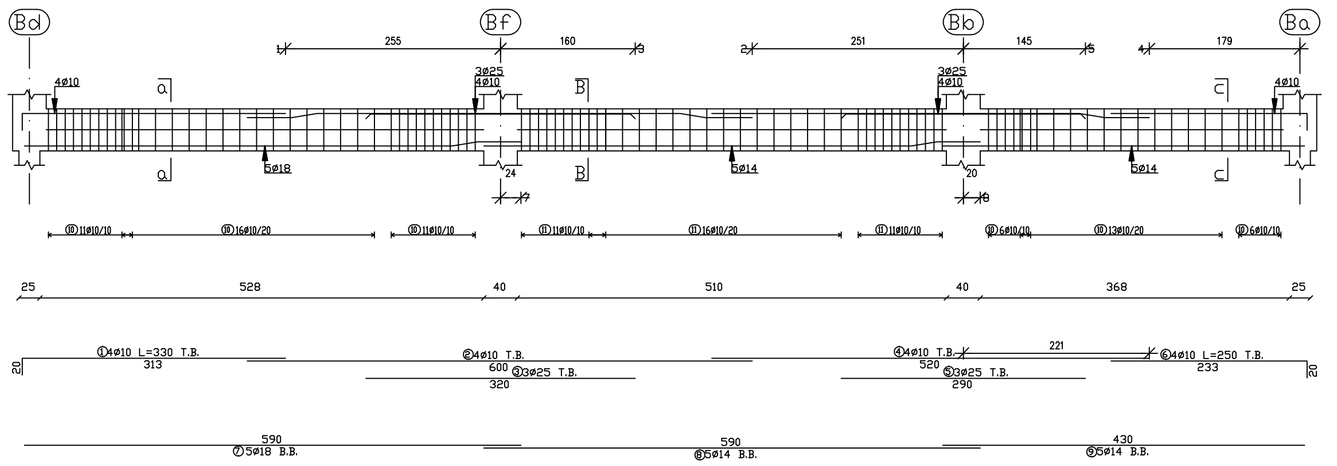
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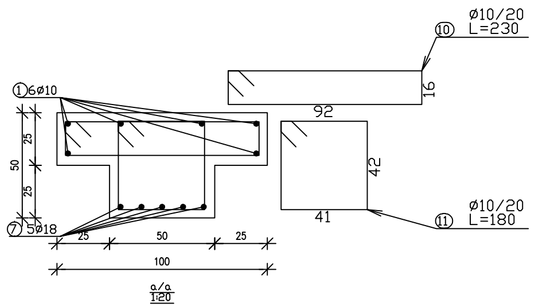


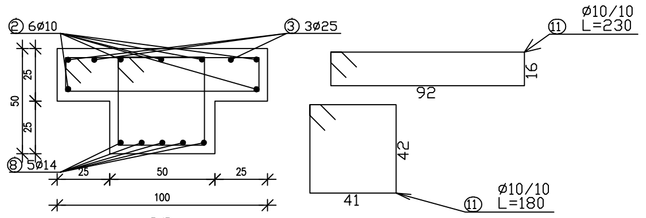


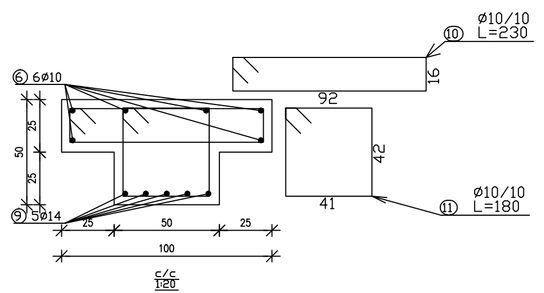


Beam: BB2









By the name of Allah

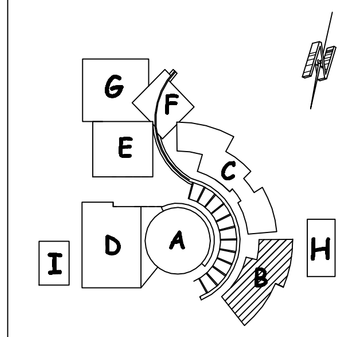
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building	
Number	Name
A	Reception
B	Sport hall
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F	Restaurant
G	Photo Gallery
H	Parking 1
I	Parking 2

Drawing Title

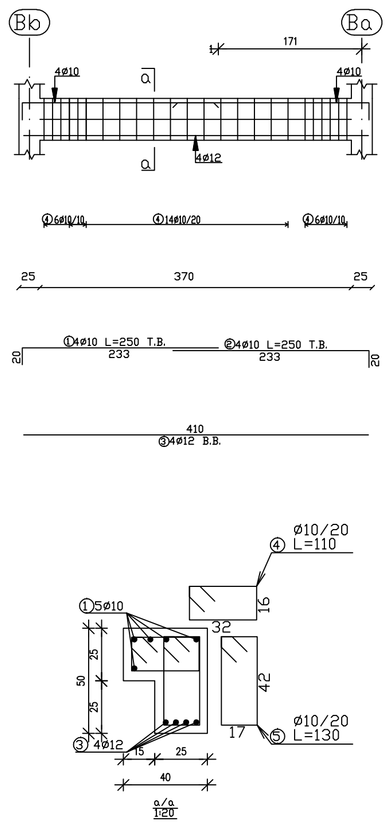
Sport hall Beame's

Designed By

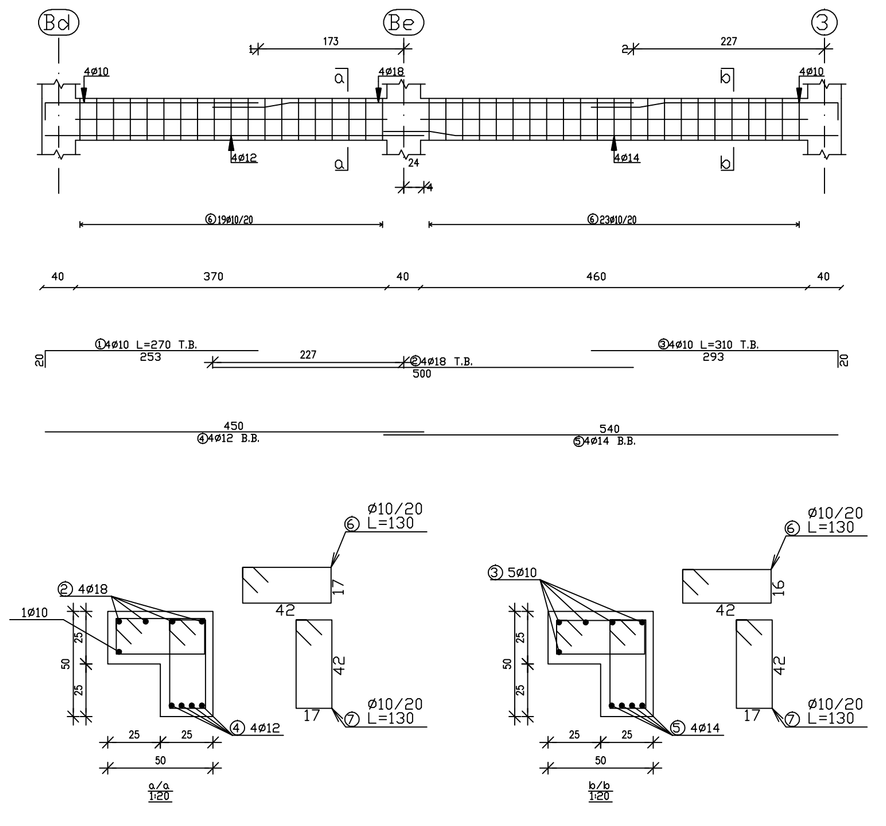
Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	No.of Draw	Date
1/50	S82	2013-2014

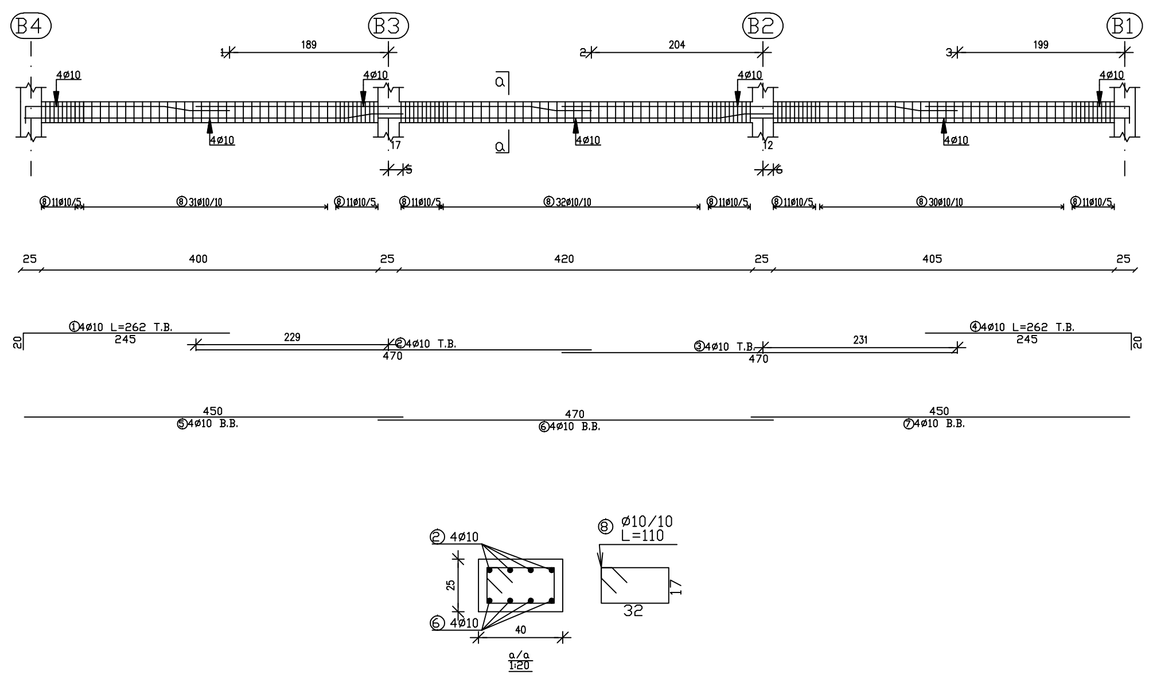
Beam:BB5



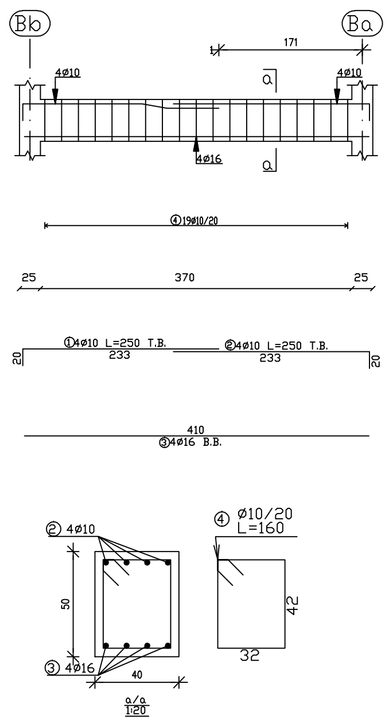
BB4



Beam:BB7



Beam:BB6



By the name of Allah

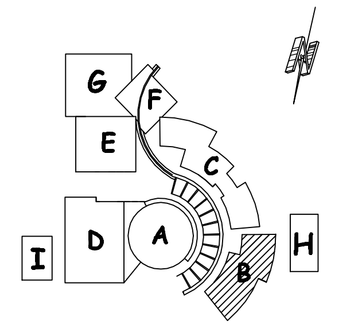
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

Number	Name
A	Reception
B	Sport hall
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H	Parking 1
I	Parking 2

Drawing Title

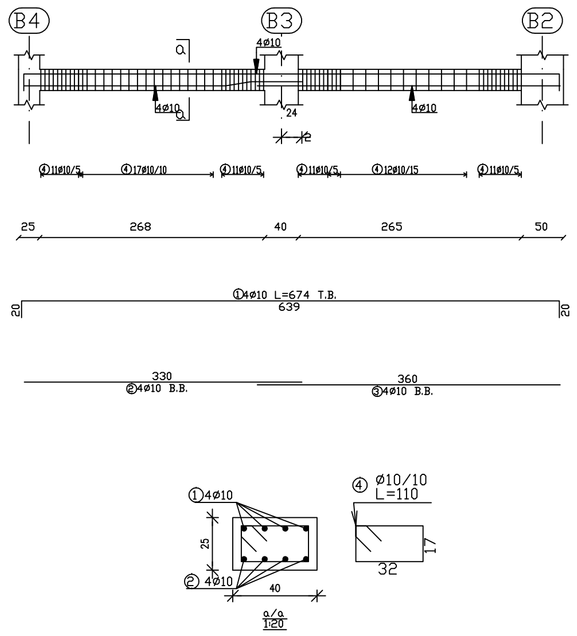
Sport hall Beame's

Designed By

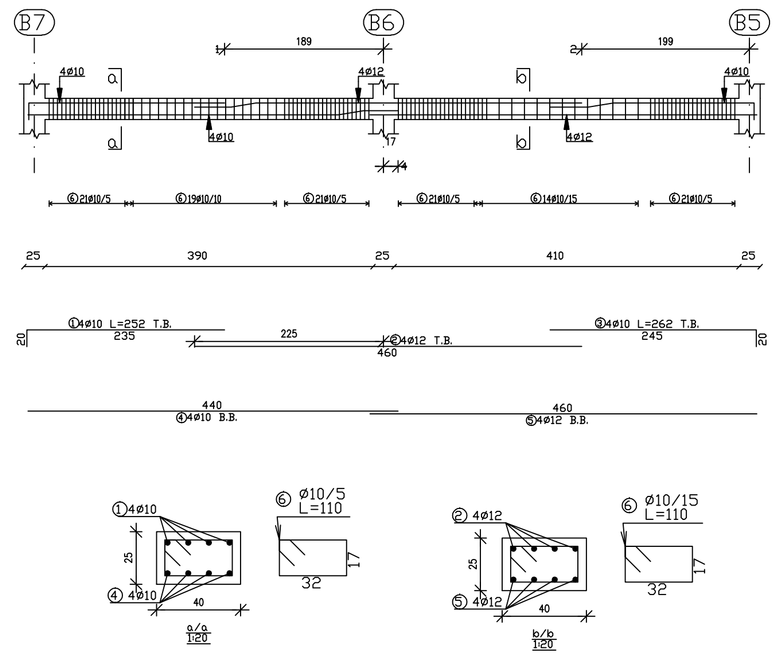
Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	No.of Draw	Date
1/50	S83	2013-2014

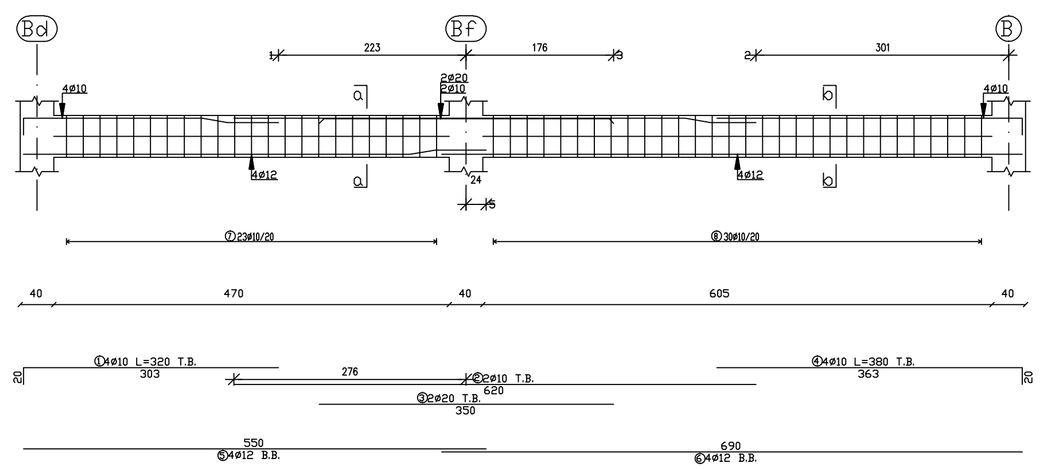
Beam:BB9



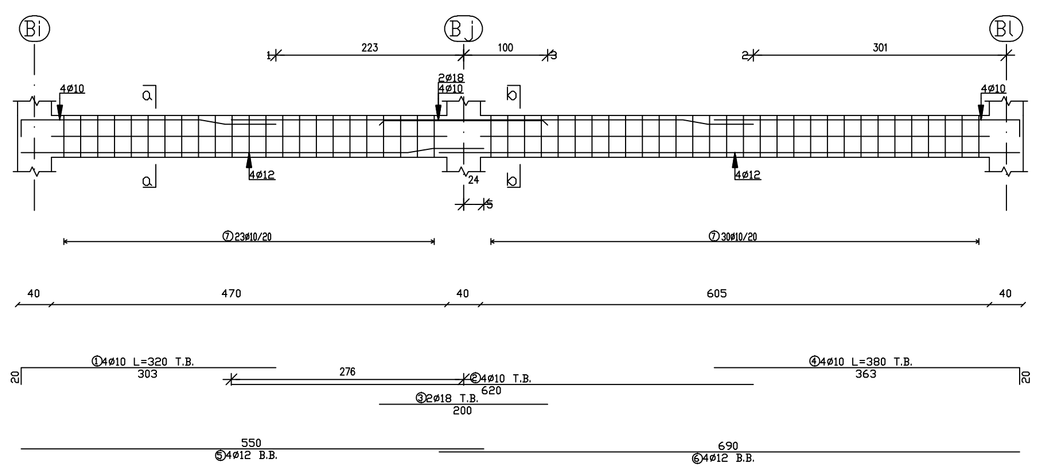
Beam:BB8



Bdeam:BB12



Bieam:BB11



By the name of Allah

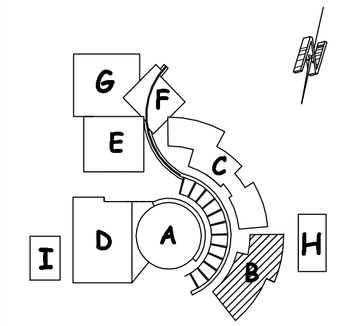
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

Number	Name
A	Reception
B	Sport hall
C	Building activities
D	Theater
E	Handicrafts
F	Restaurant
G	Photo Gallery
H	Parking 1
I	Parking 2

Drawing Title

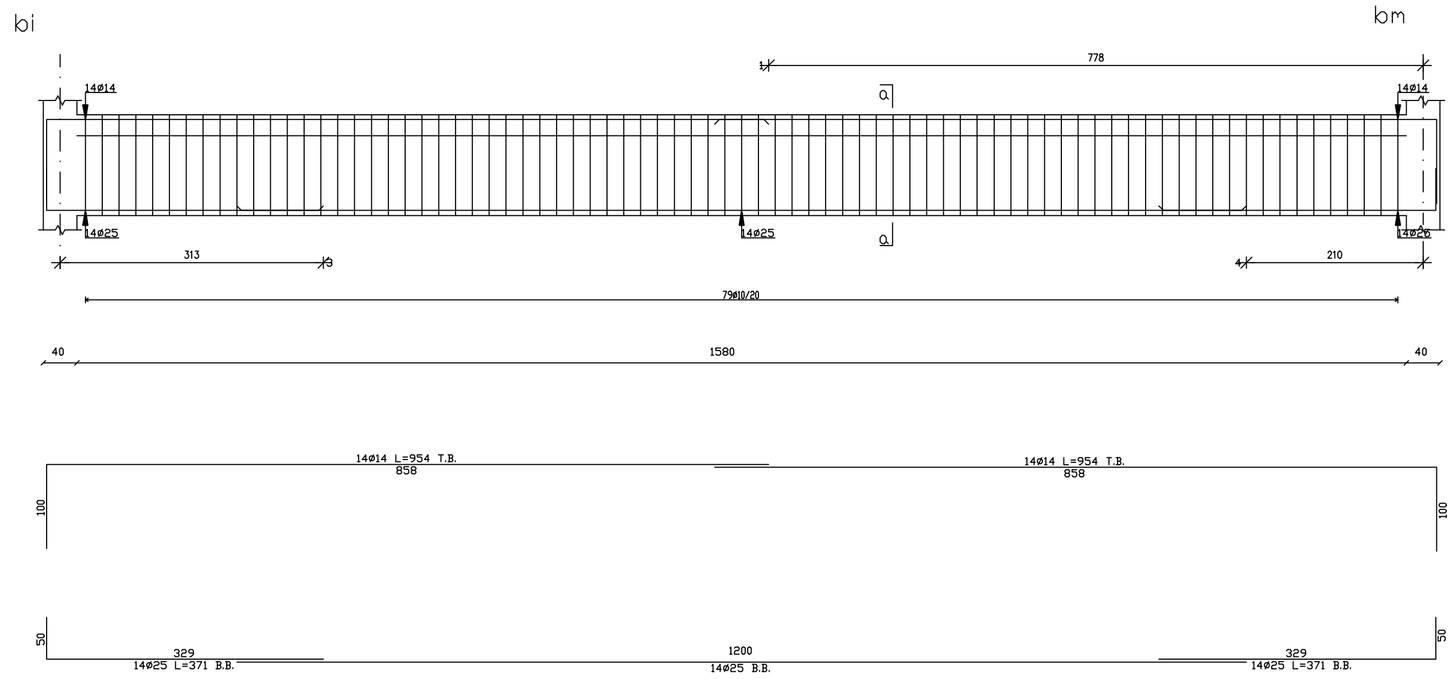
Sport hall Beame's

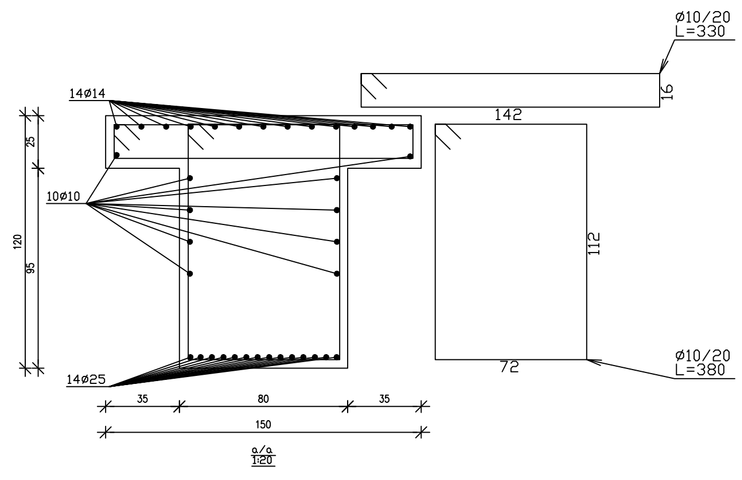
Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	No.of Draw	Date
1/50	S84	2013-2014

BB10





By the name of Allah

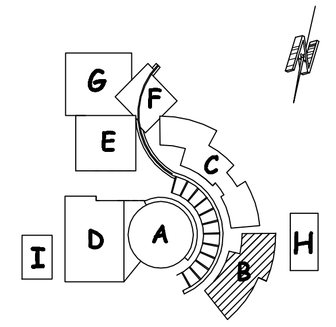
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

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Dr.Nasr Abboushi



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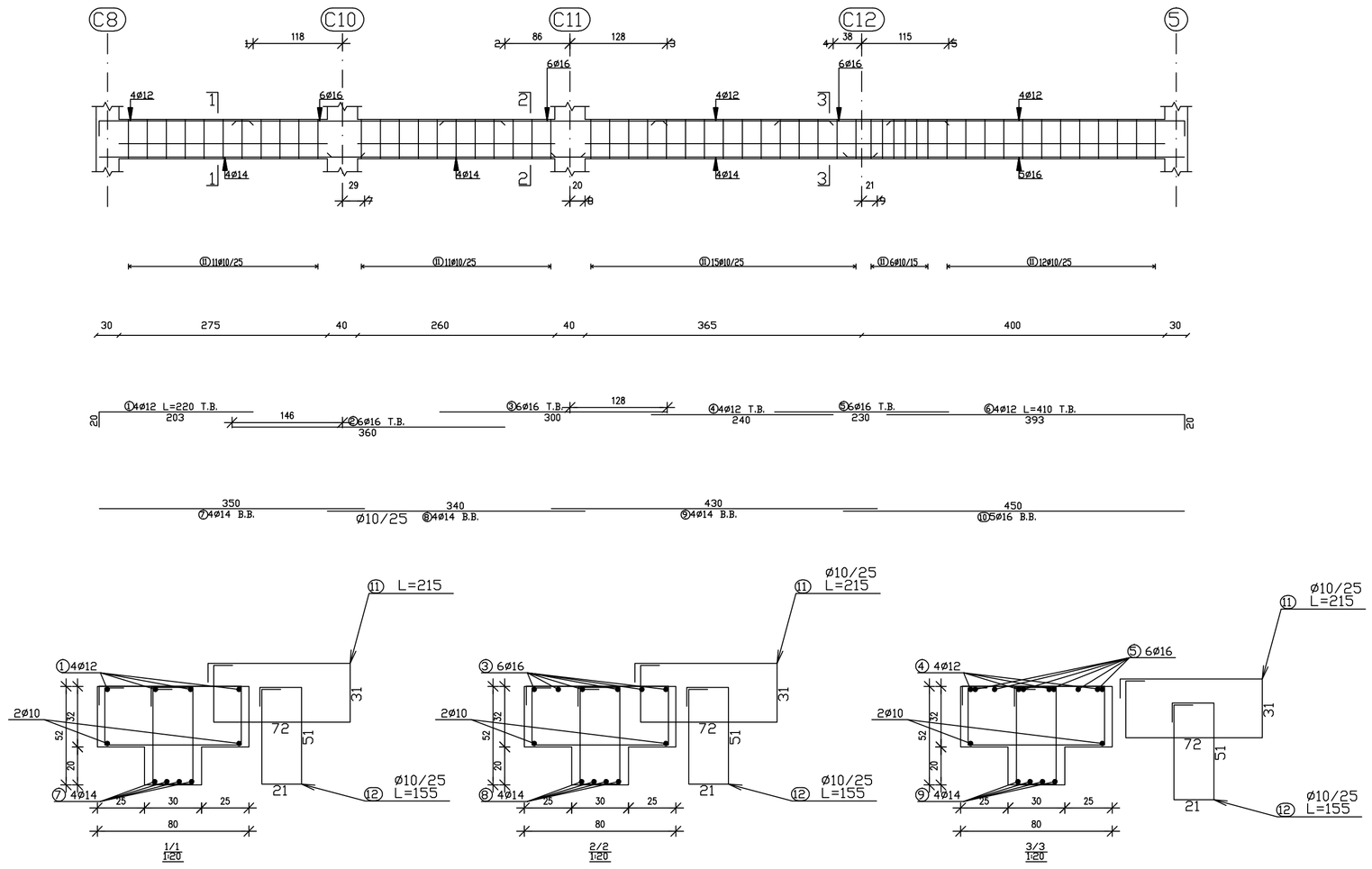
Drawing Title

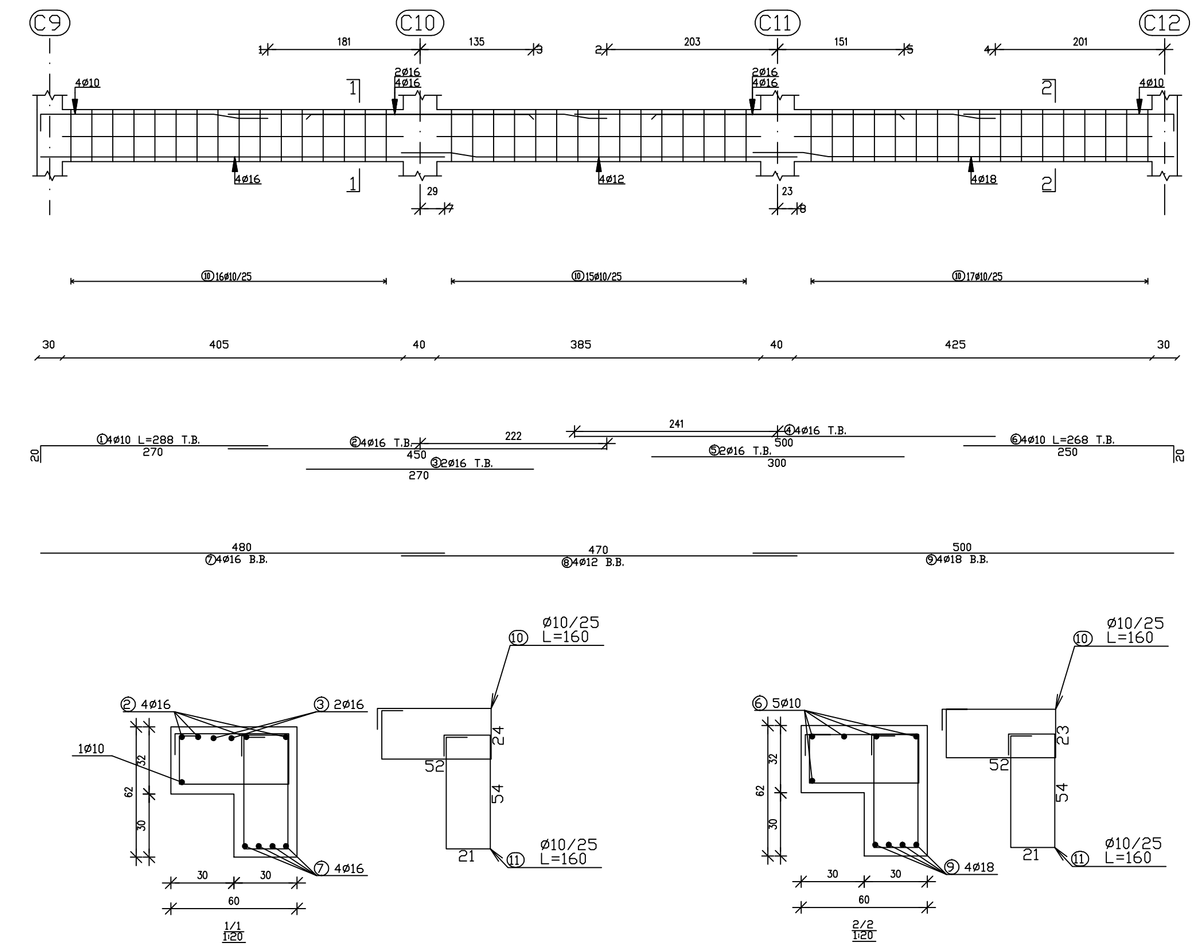
Sport hall Beame's

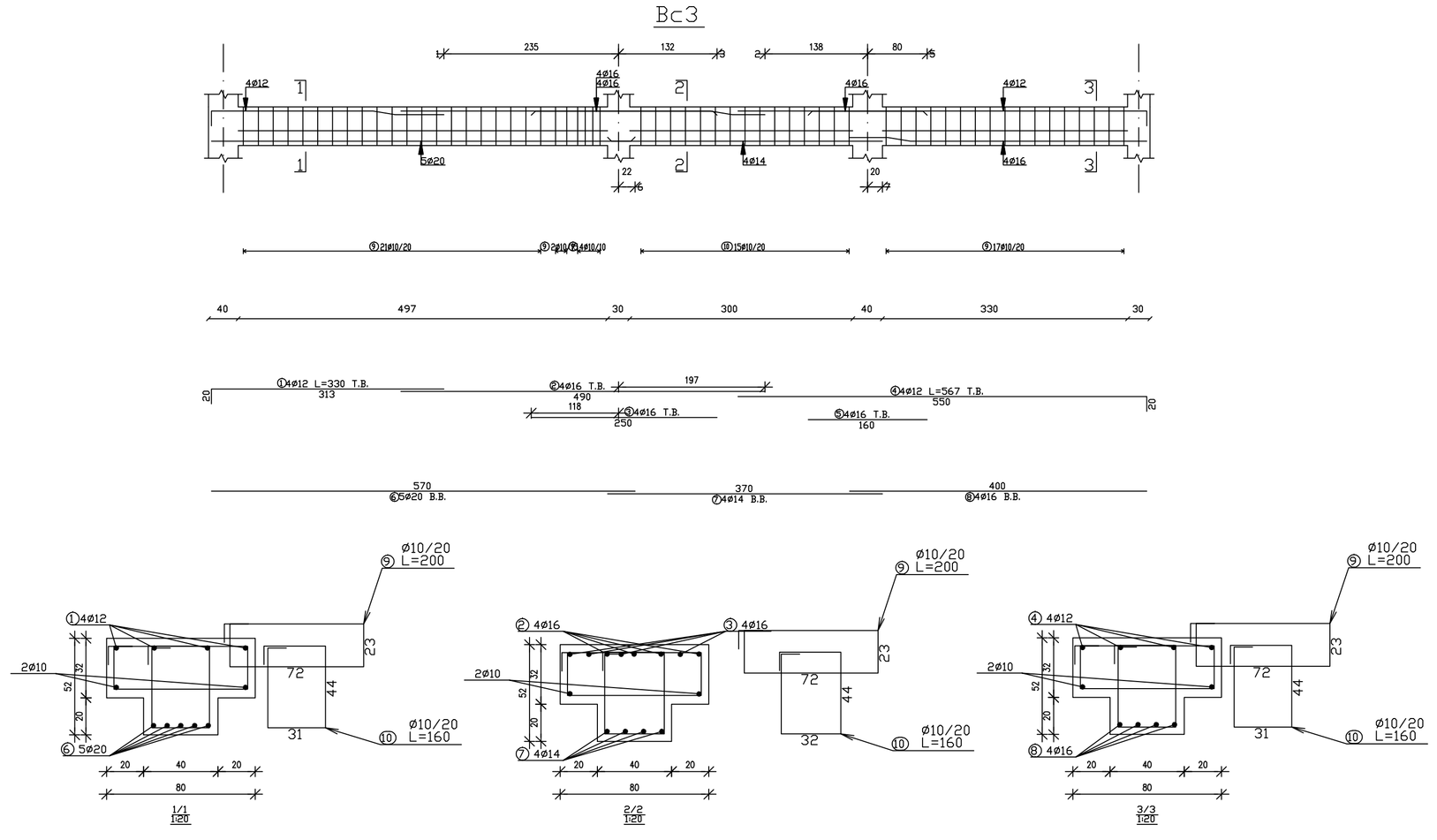
Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	No.of Draw	Date
1/50	S85	2013-2014







By the name of Allah

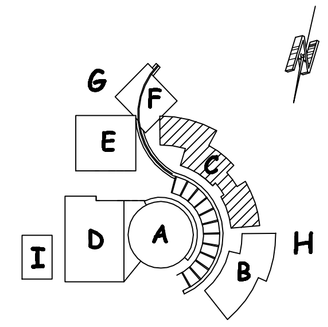
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

Number	Name
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Drawing Title

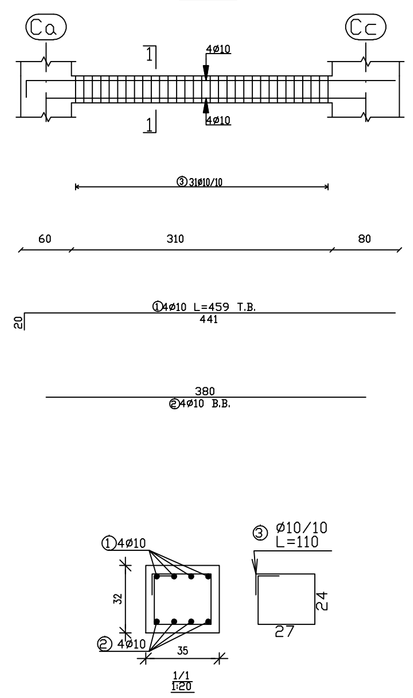
Building activities Beame's

Designed By

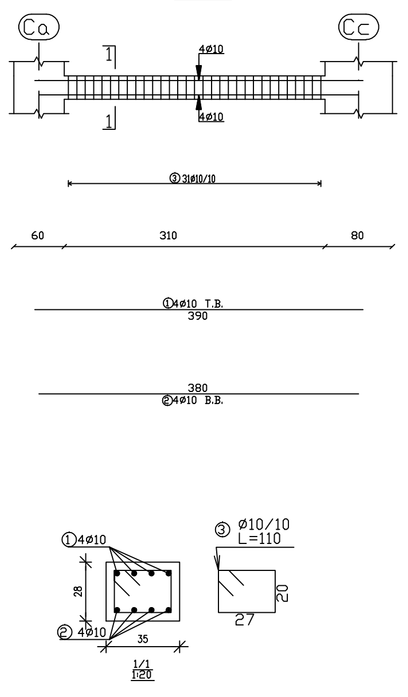
Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	No.of Draw	Date
1/50	S86	2013/2014

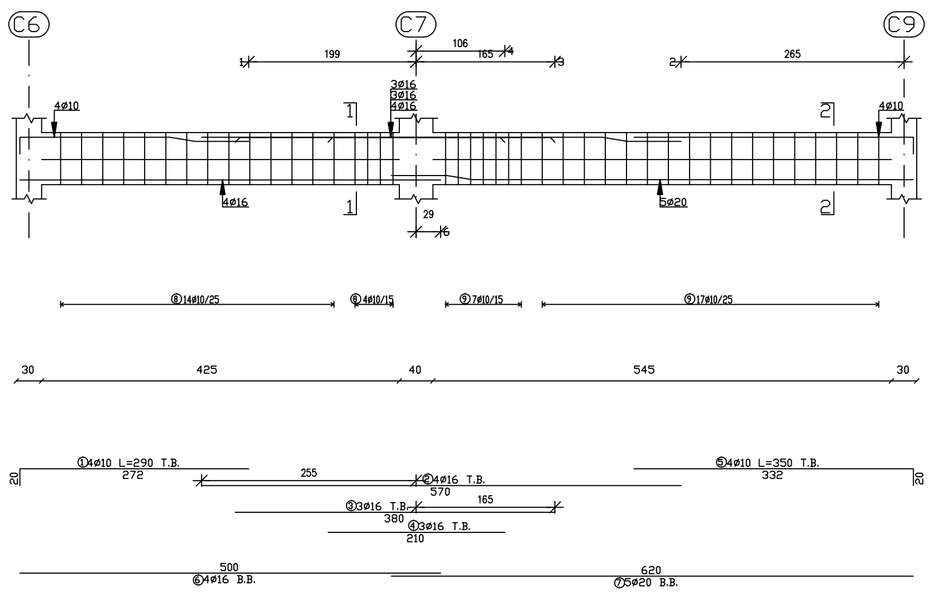
Bc7

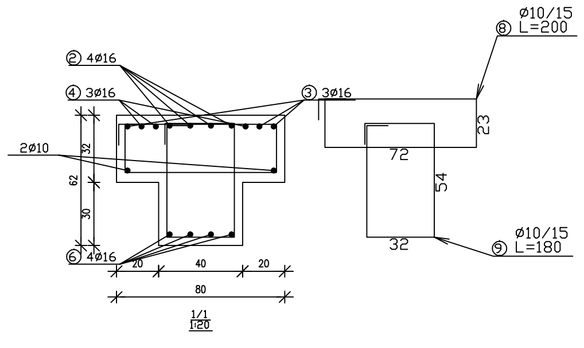


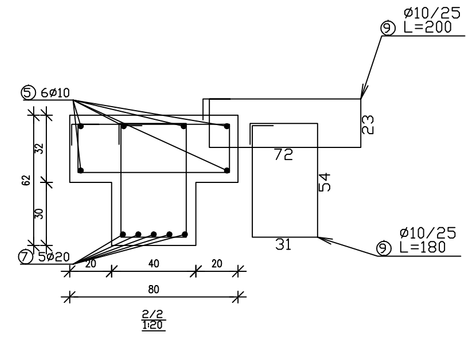
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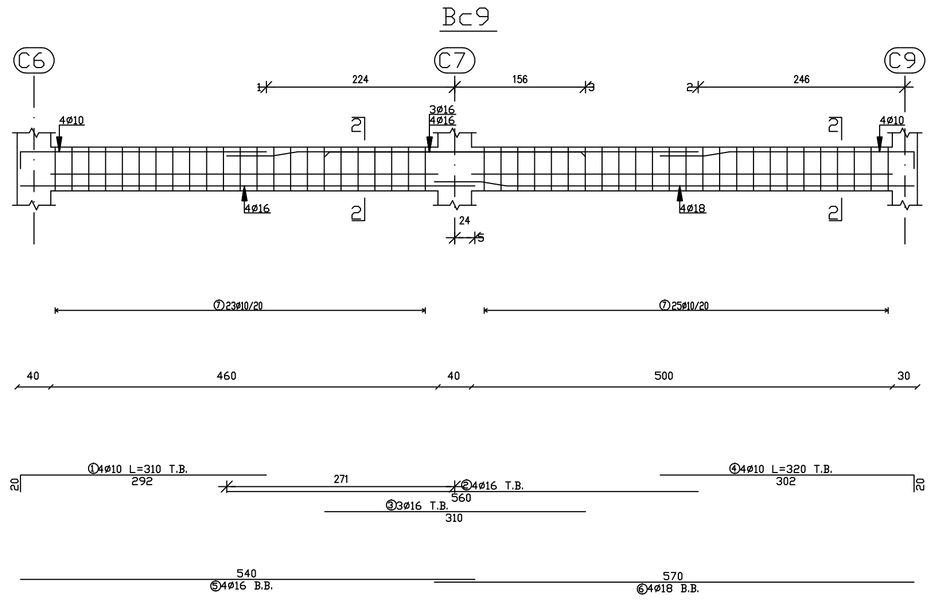
Bc10

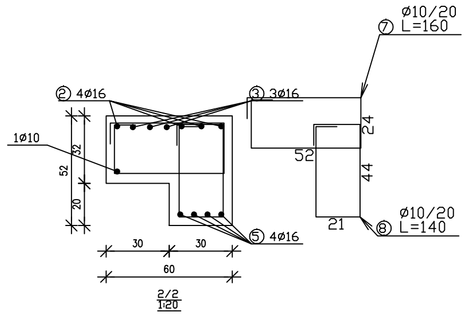


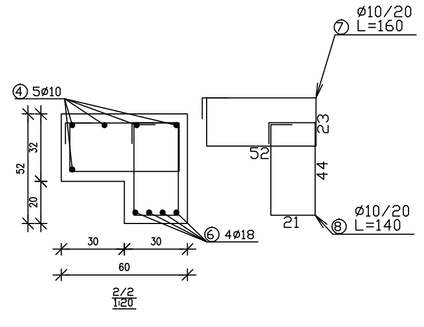




Bc9







By the name of Allah

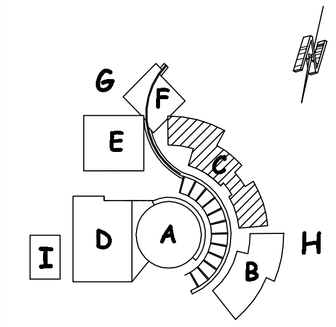
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

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I	Parking 2

Drawing Title

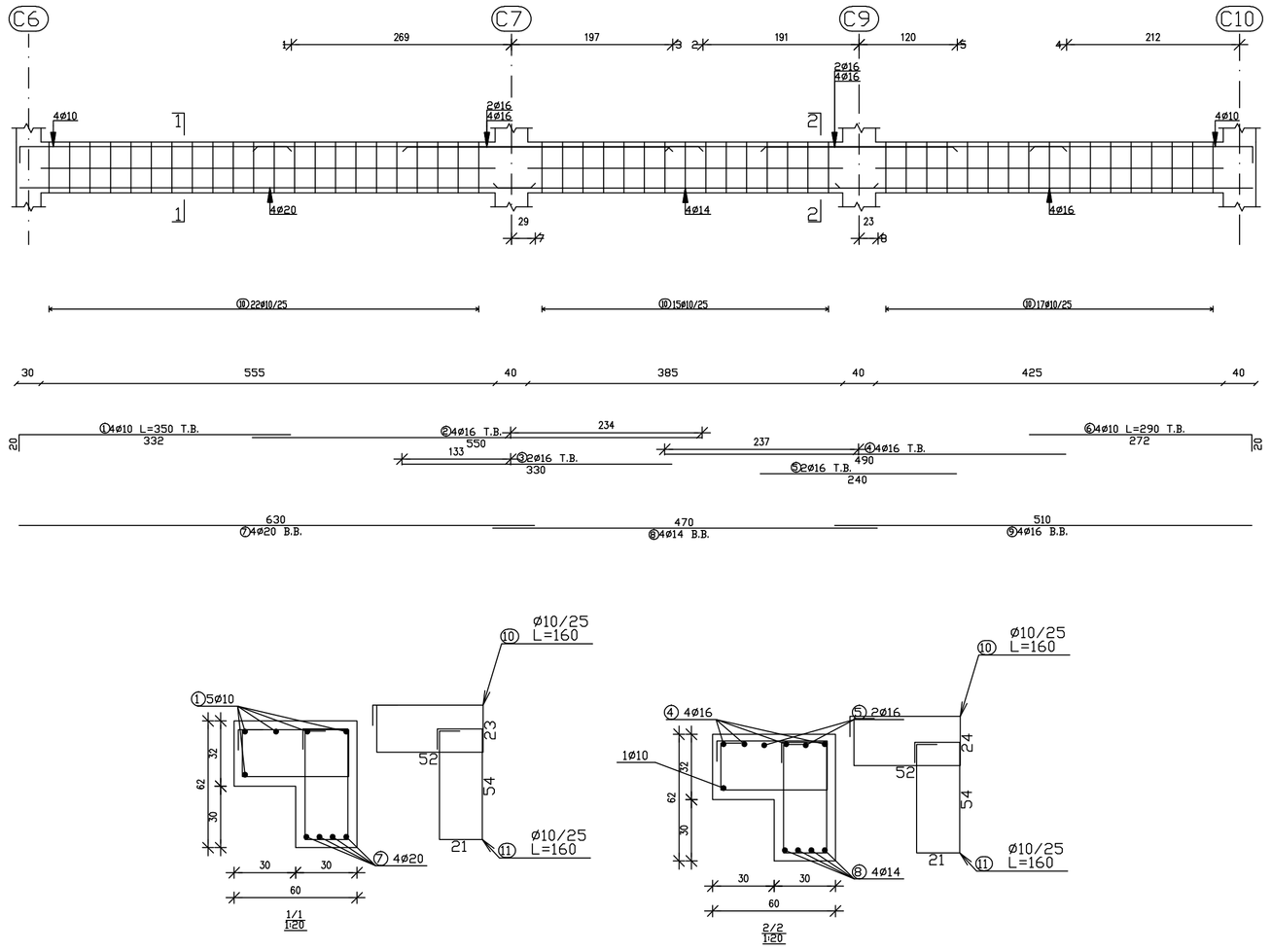
Building activities
Beame's

Designed By

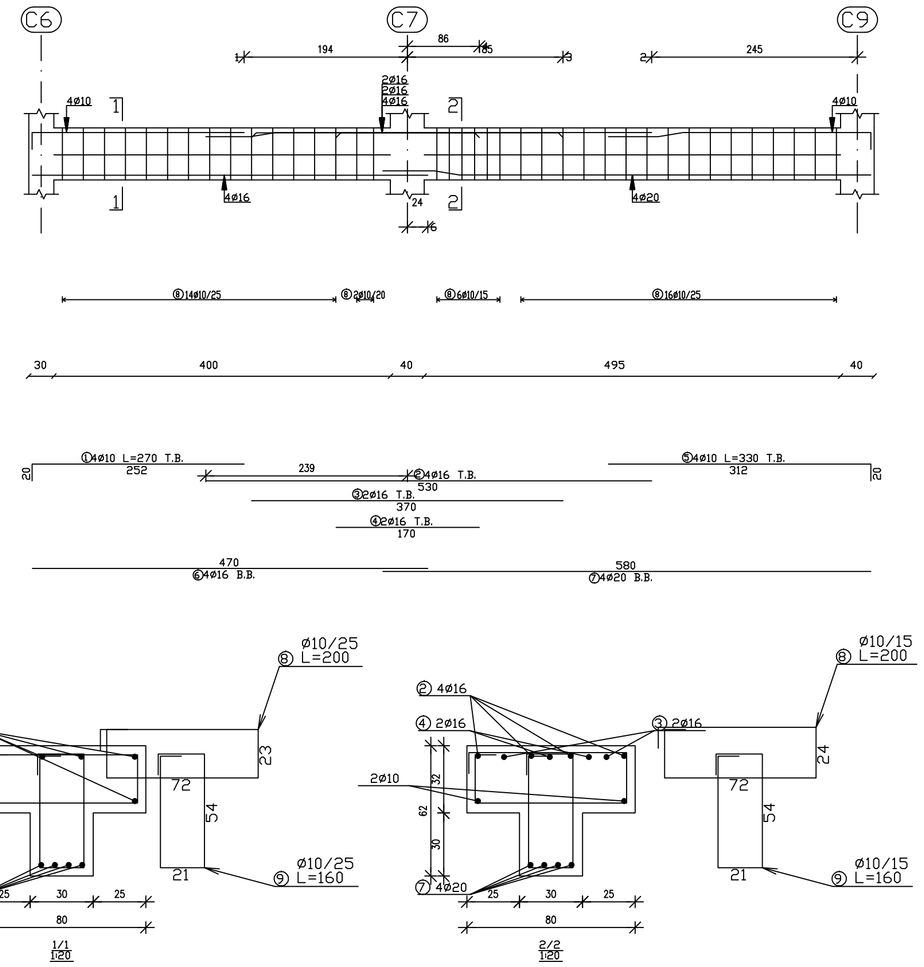
Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	No.of Draw	Date
1/50	S87	2013/2014

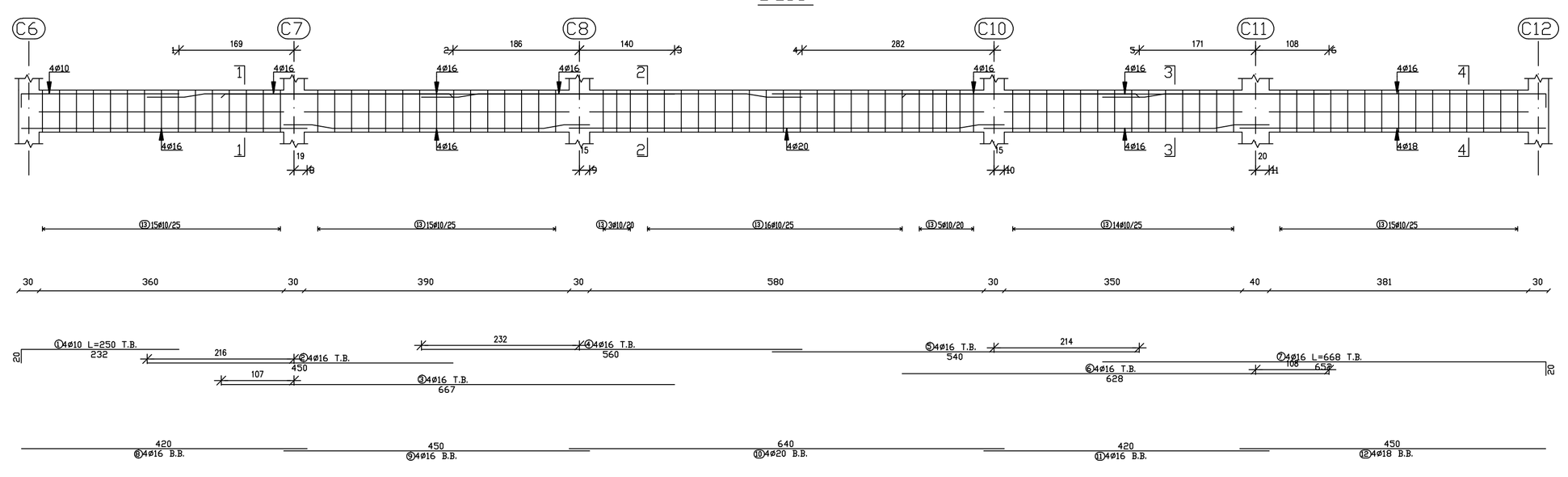
Bc12



Bc11



Bc13



By the name of Allah

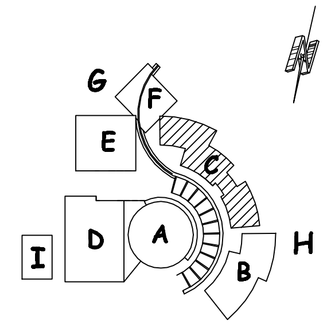
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

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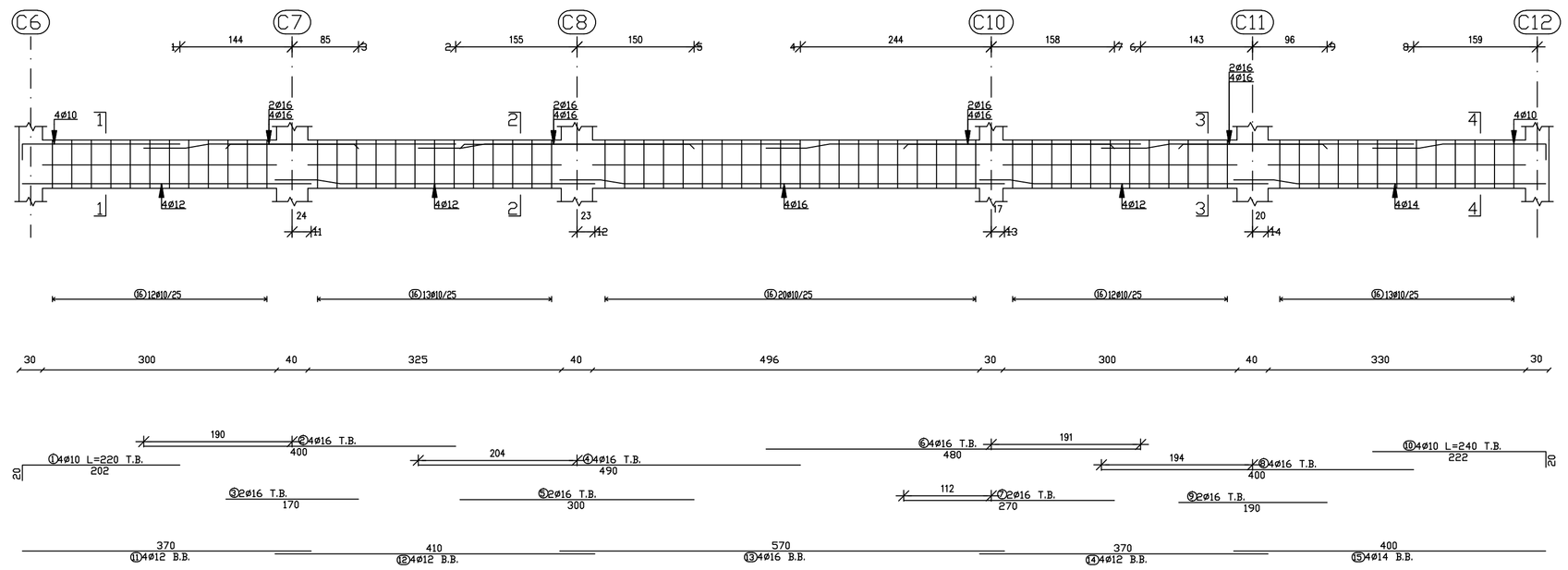
Building activities Beame's

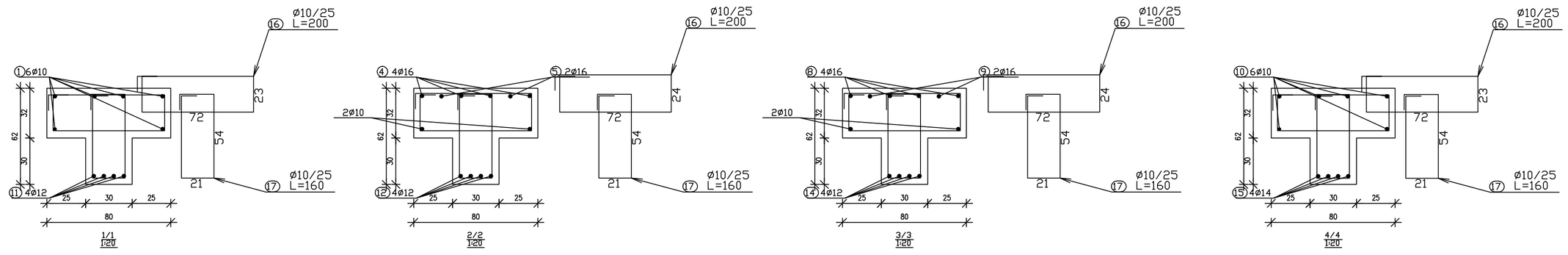
Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

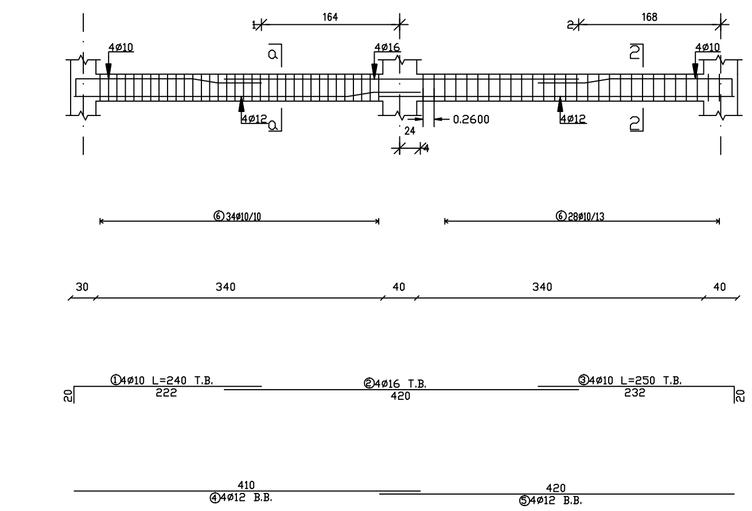
Scale	*No.of Draw*	*Date*
1/50	S88	2013/2014

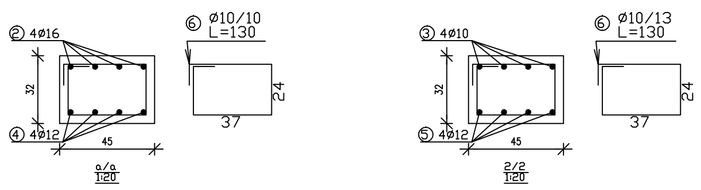
Bc14



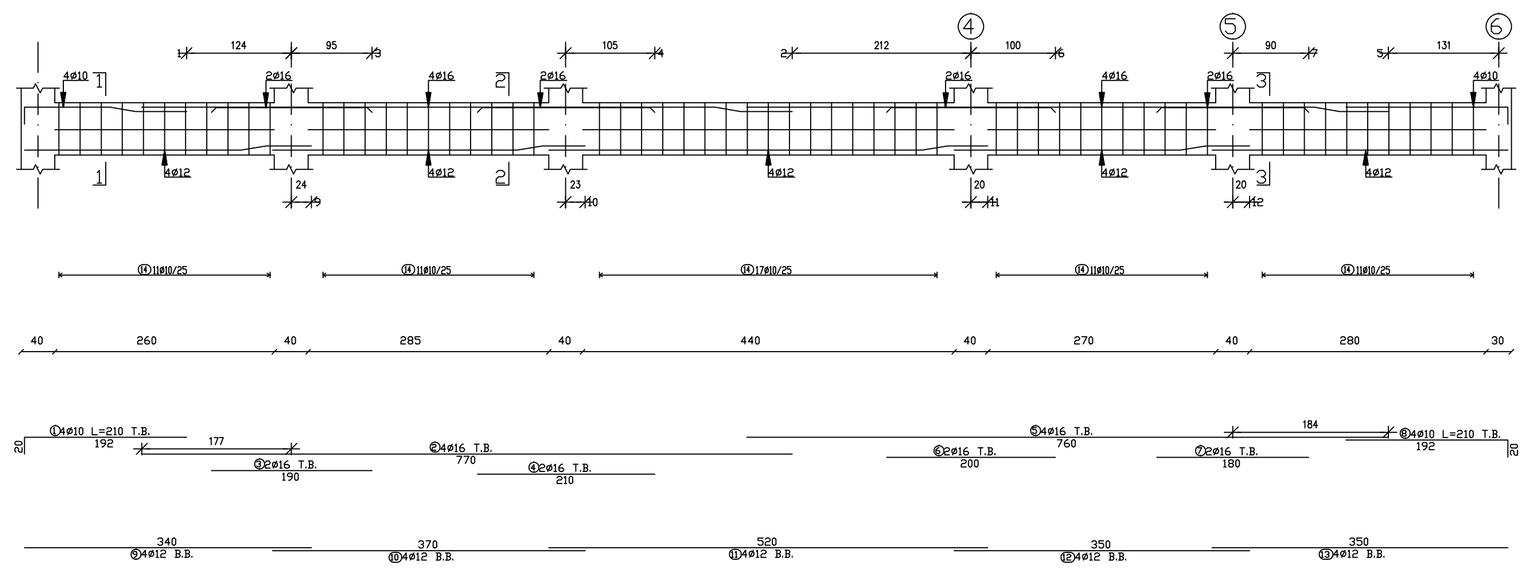


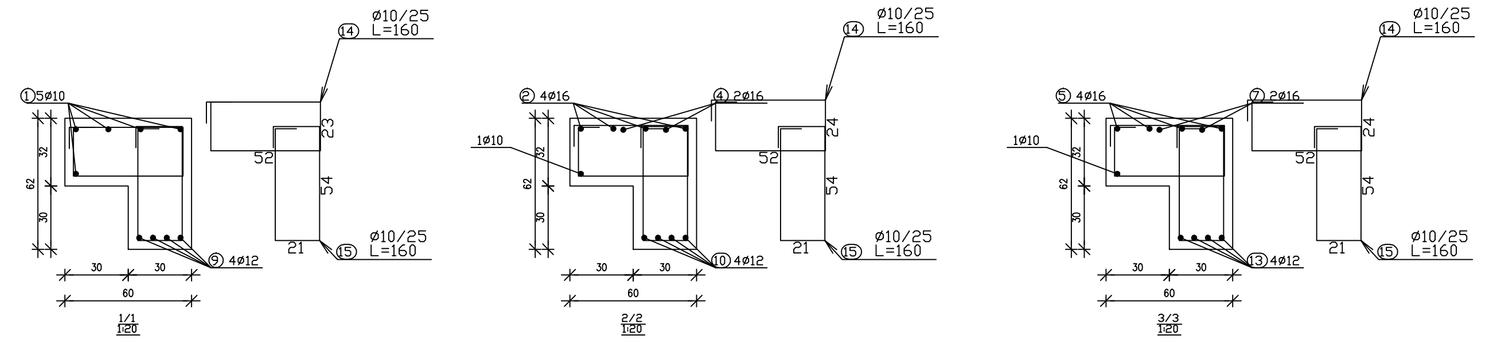
Bc16





Bc15





By the name of Allah

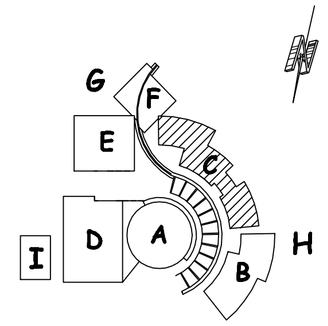
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



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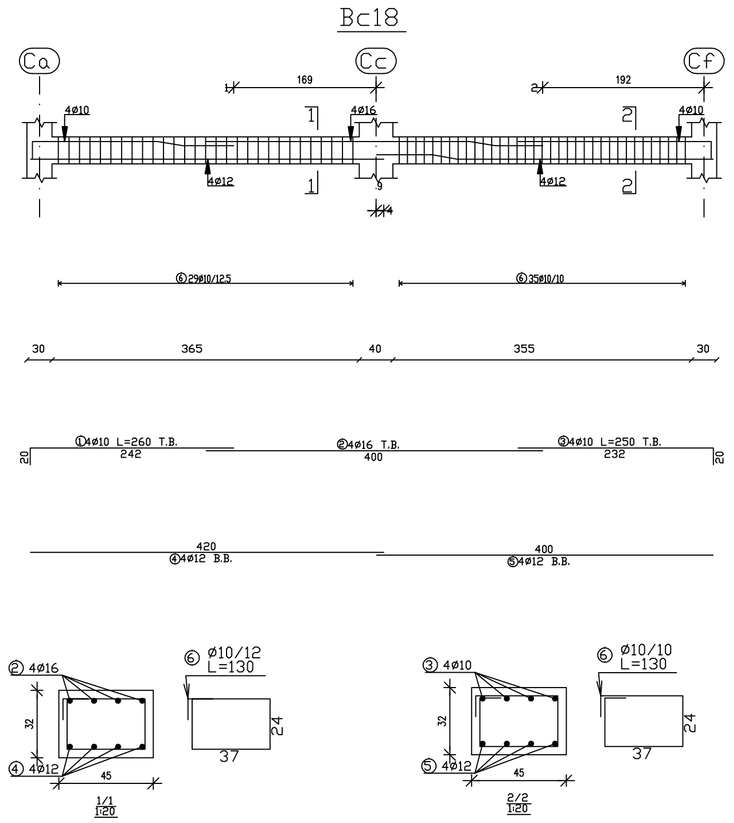
Drawing Title

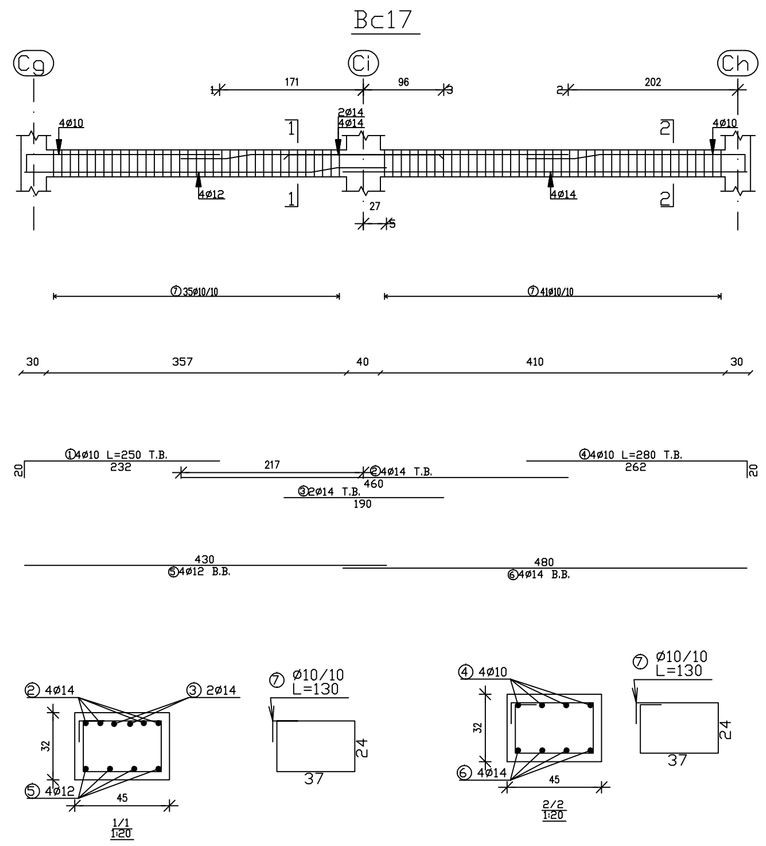
Building activities
Beame's

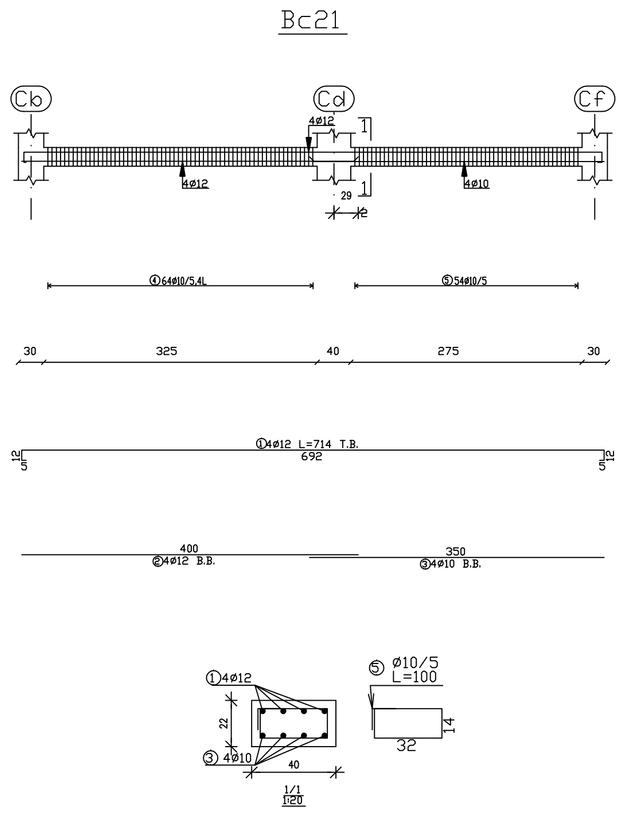
Designed By

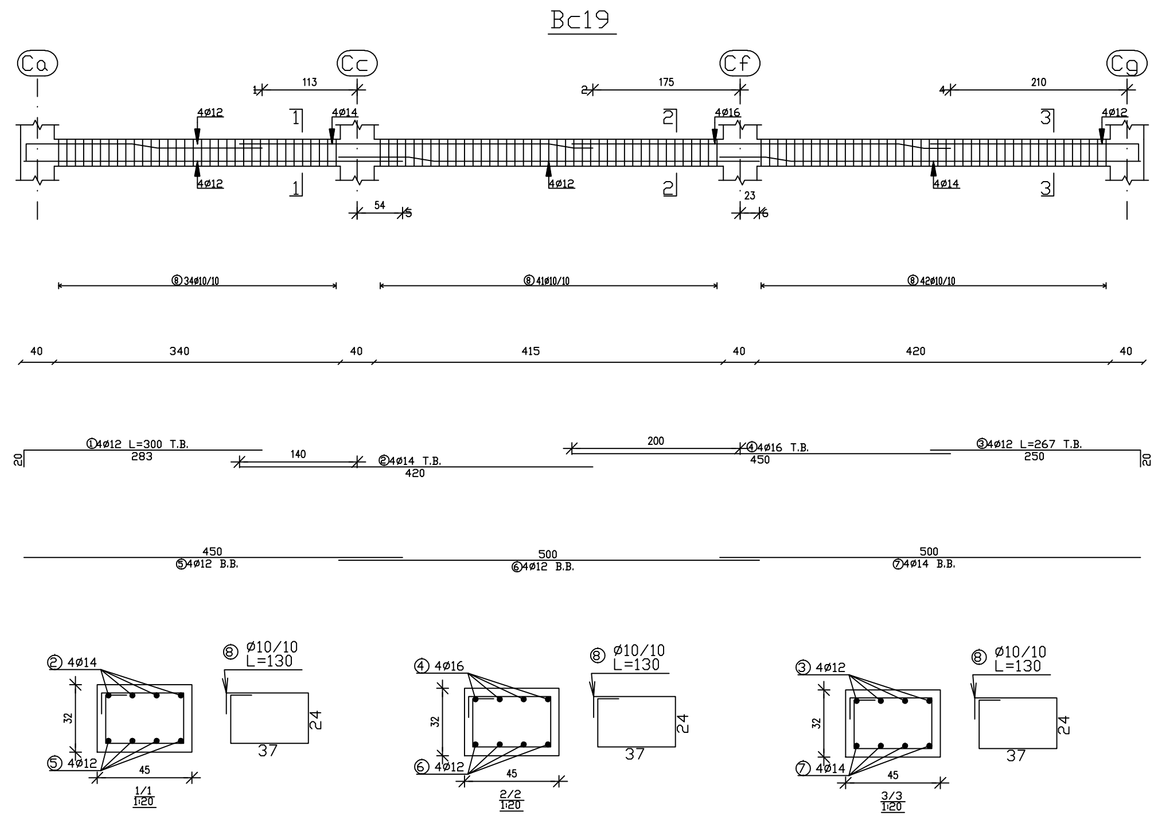
Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	No.of Draw	Date
1/50	S89	2013/2014









By the name of Allah

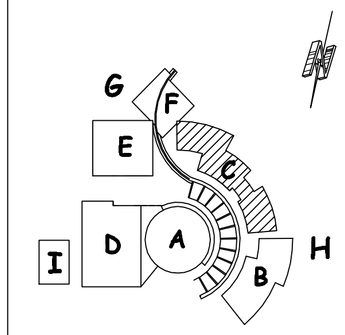
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

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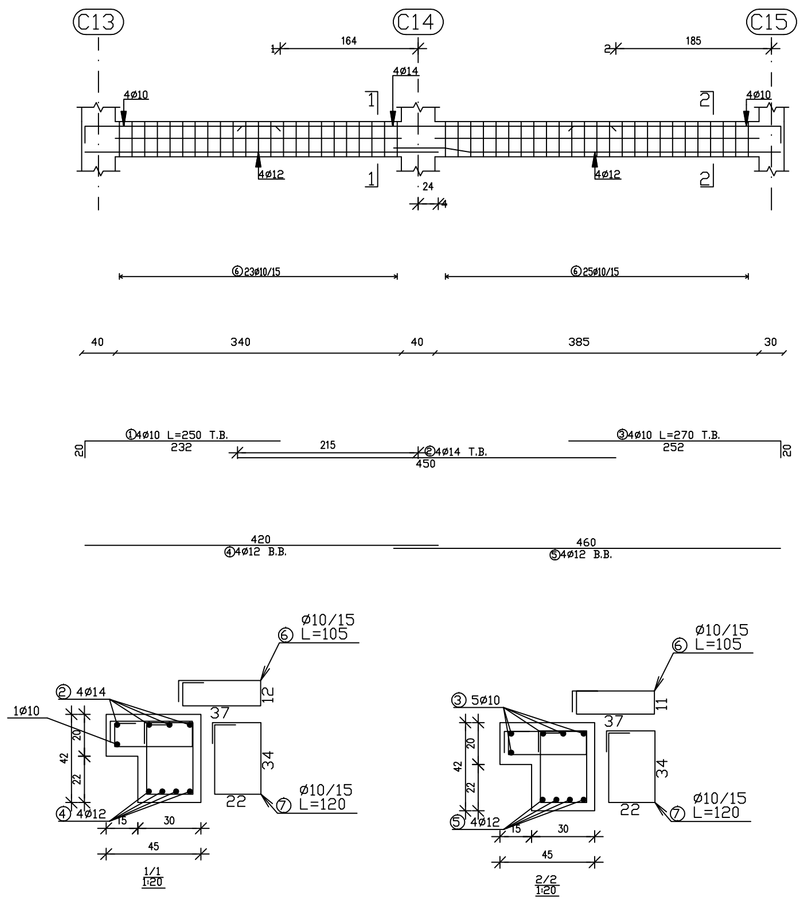
Building activities
Beame's

Designed By

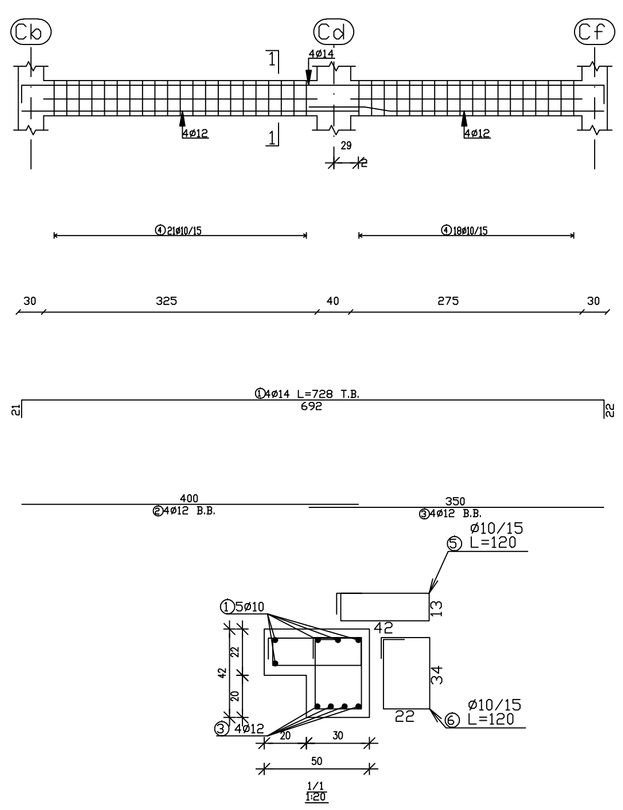
Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	No.of Draw	Date
1/50	S90	2013/2014

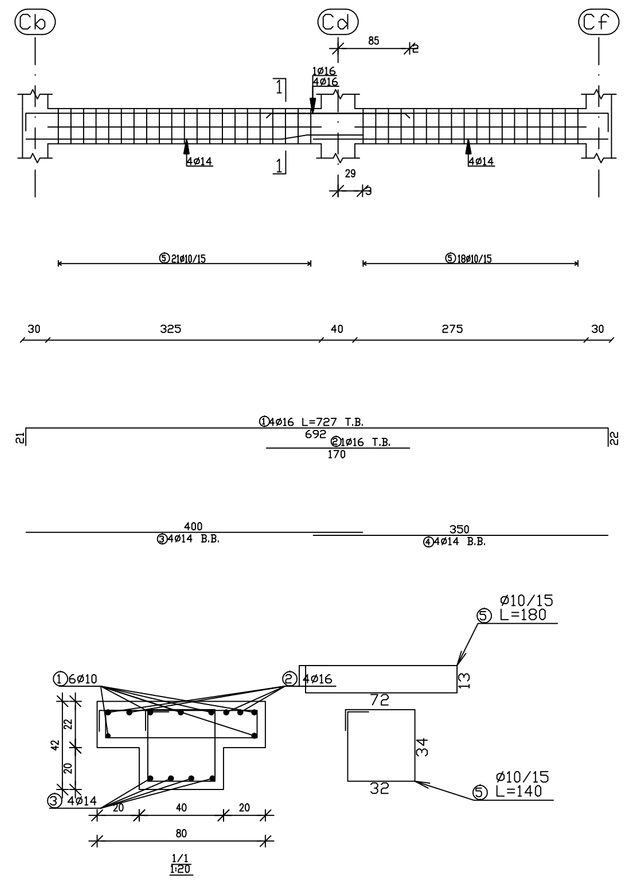
Bc25



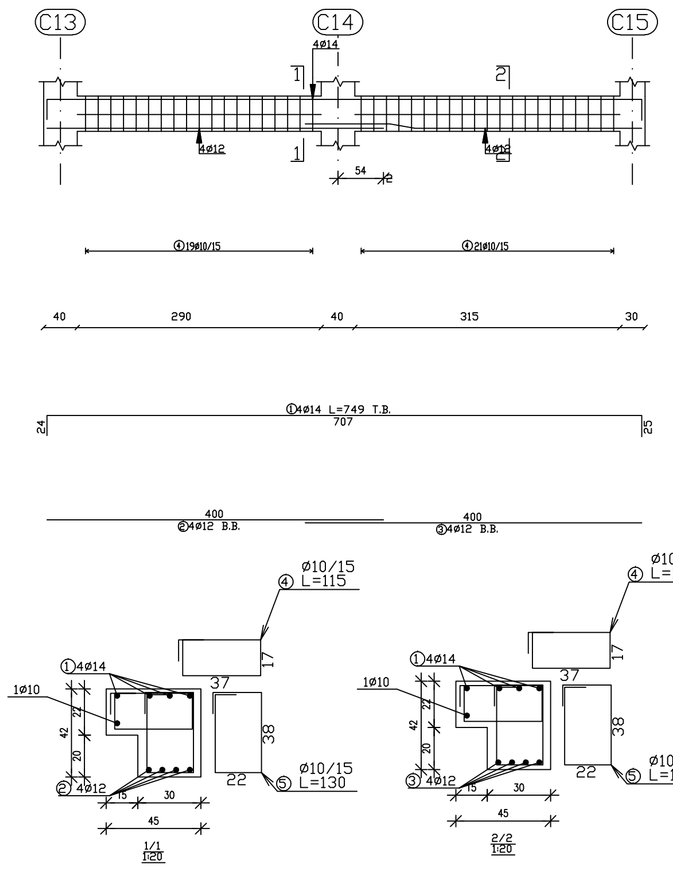
Bc23



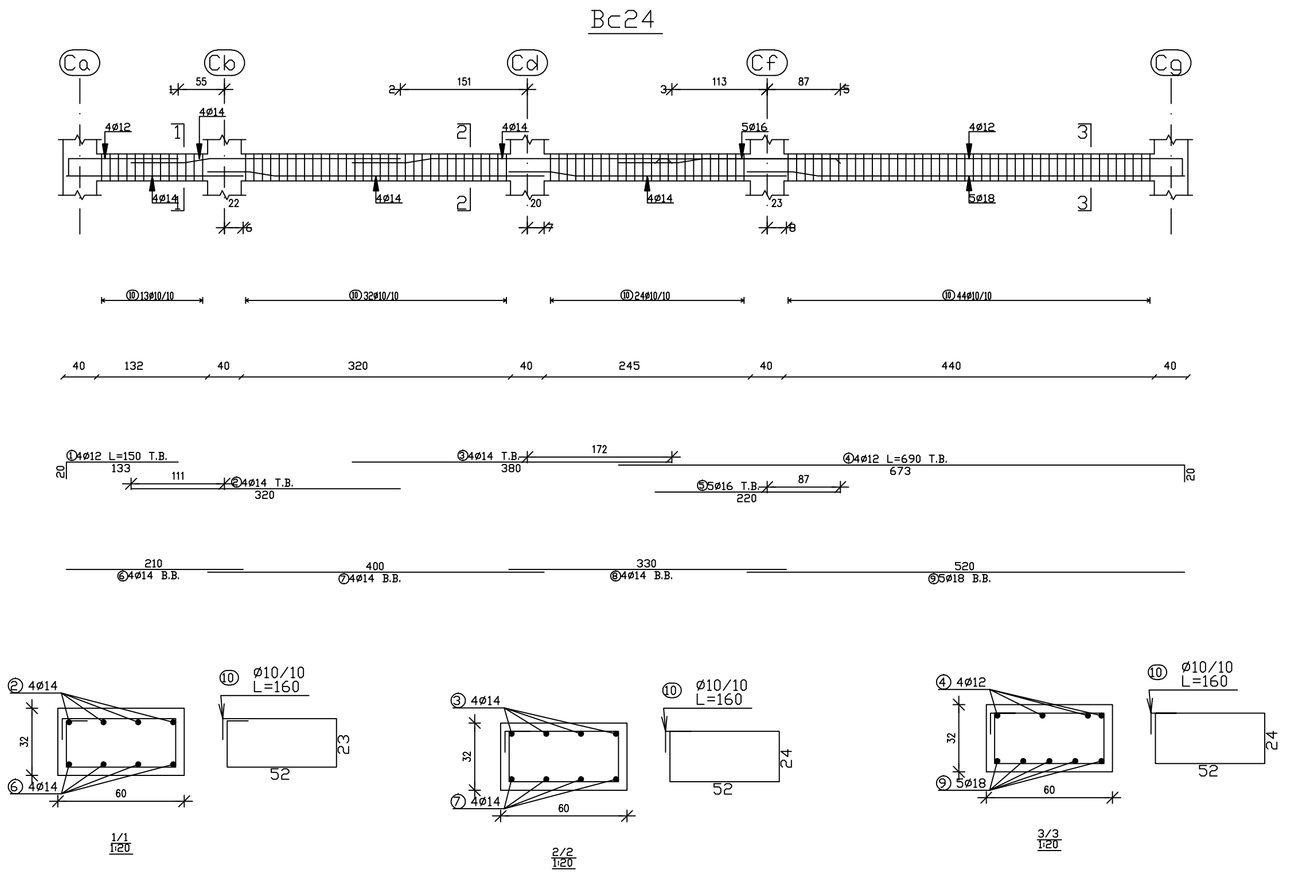
Bc22



Bc26



Bc24



By the name of Allah

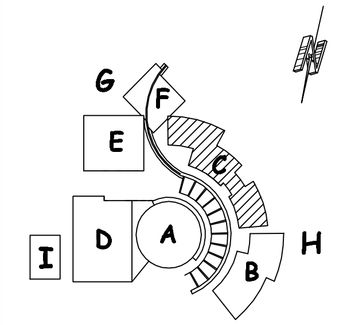
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

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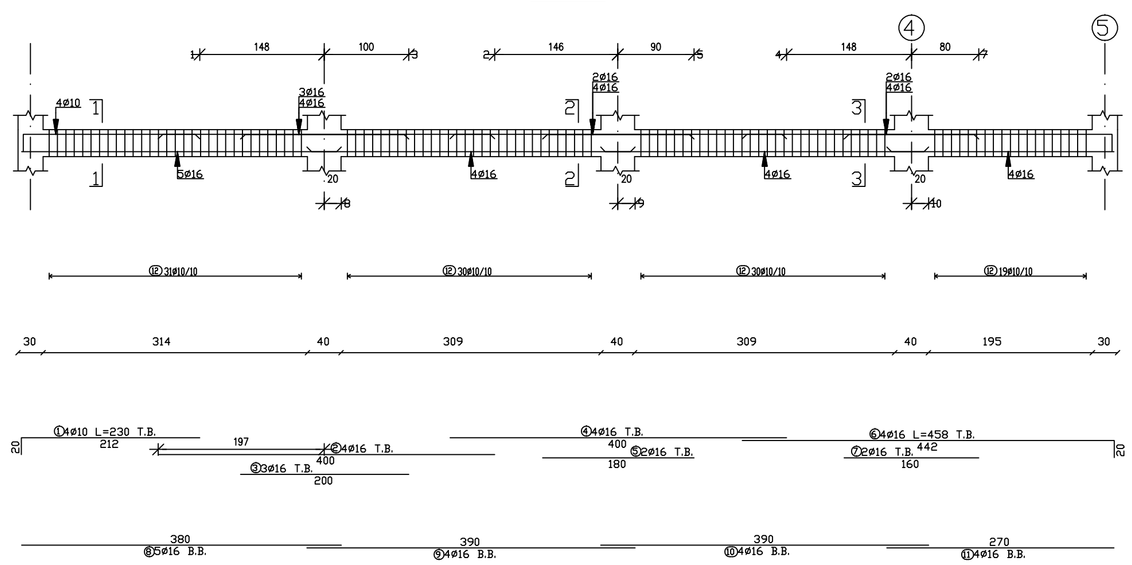
Building activities
Beame's

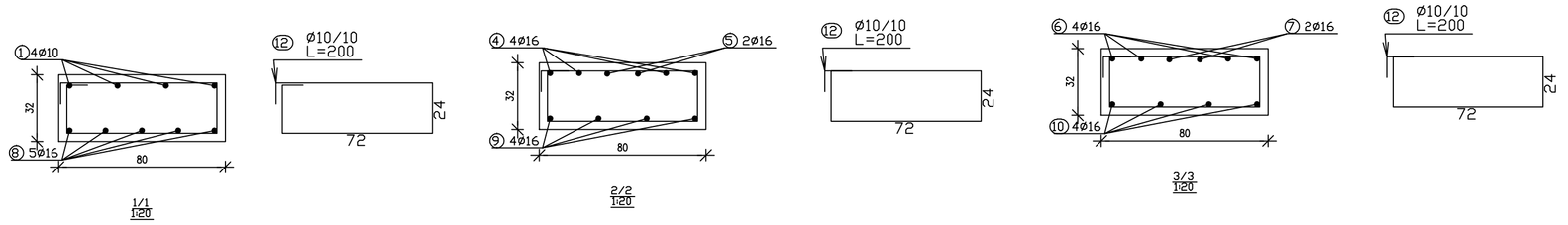
Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

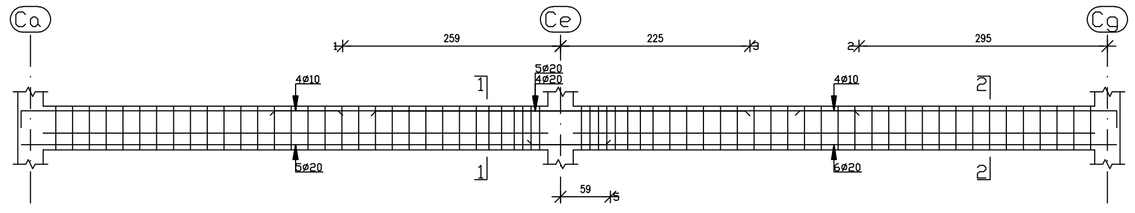
Scale	No.of Draw	Date
1/50	S91	2013/2014

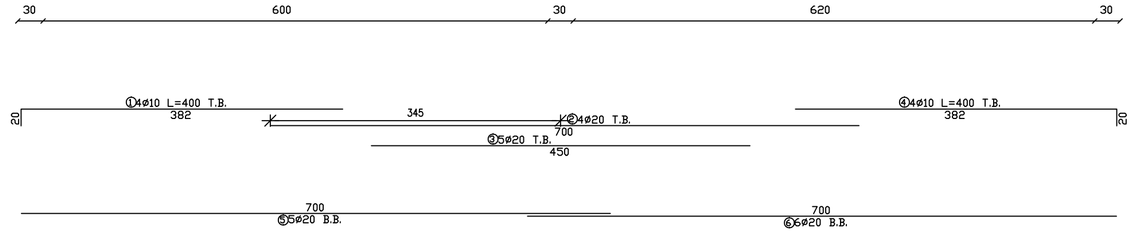
Bc27

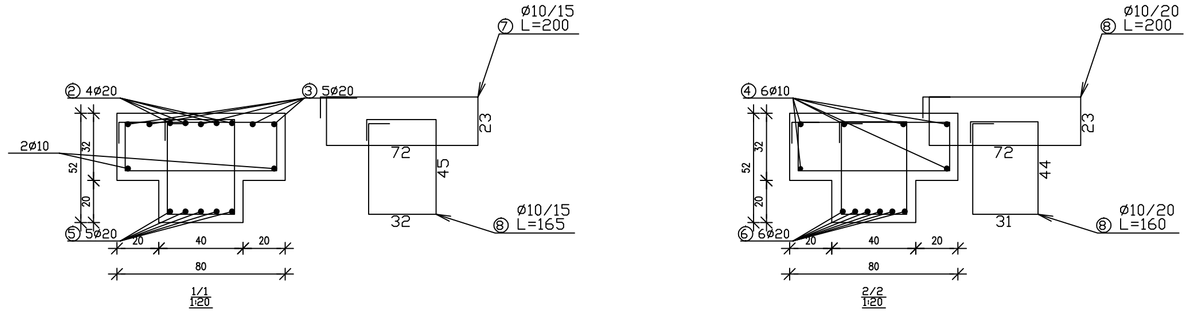




Bc28







By the name of Allah

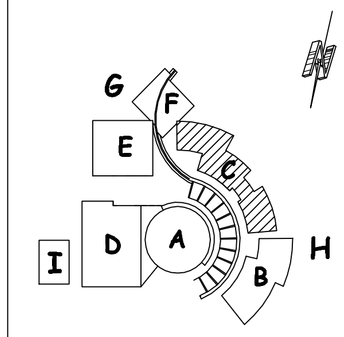
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

Number	Name
A	Reception
B	Sport hall
C	Building activities
D	Theater
E	Handicrafts
F	Restaurant
G	Photo Gallery
H	Parking 1
I	Parking 2

Drawing Title

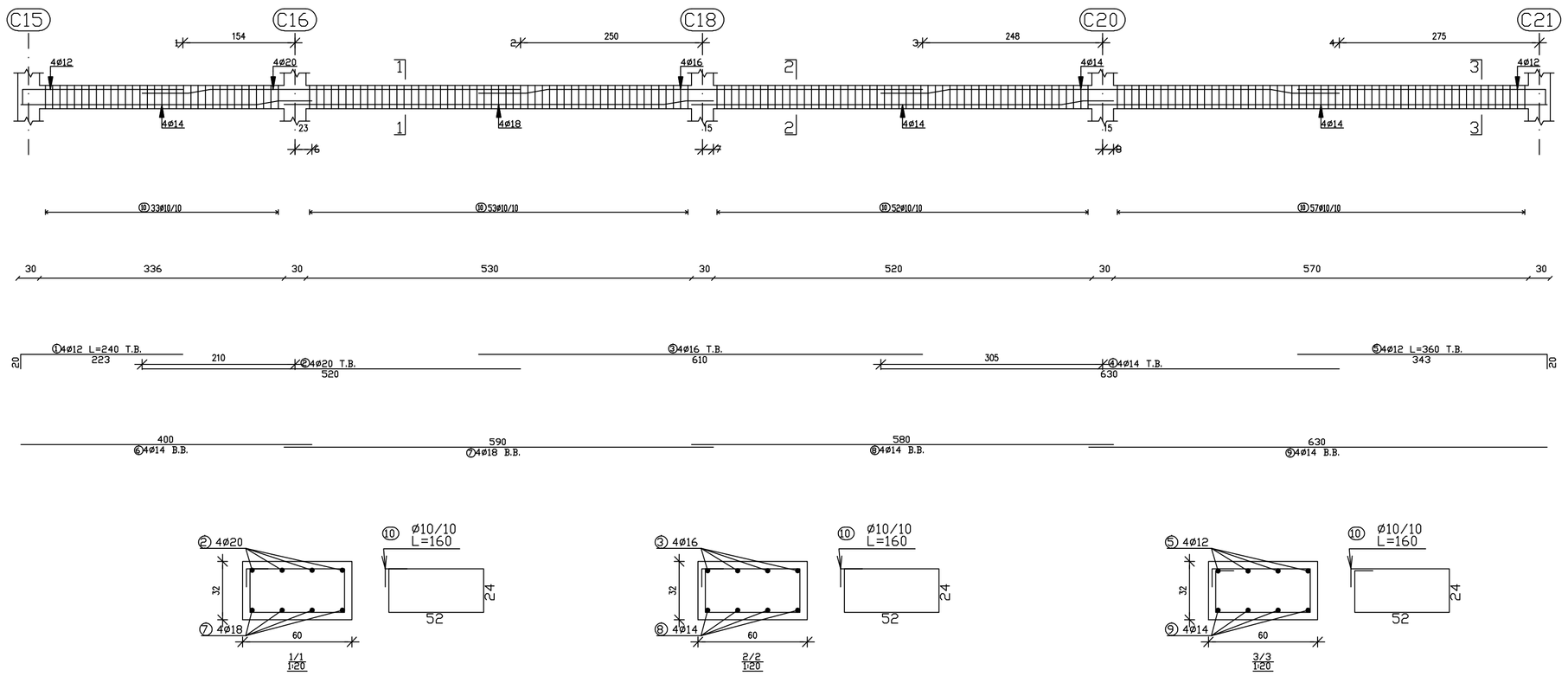
Building activities Beame's

Designed By

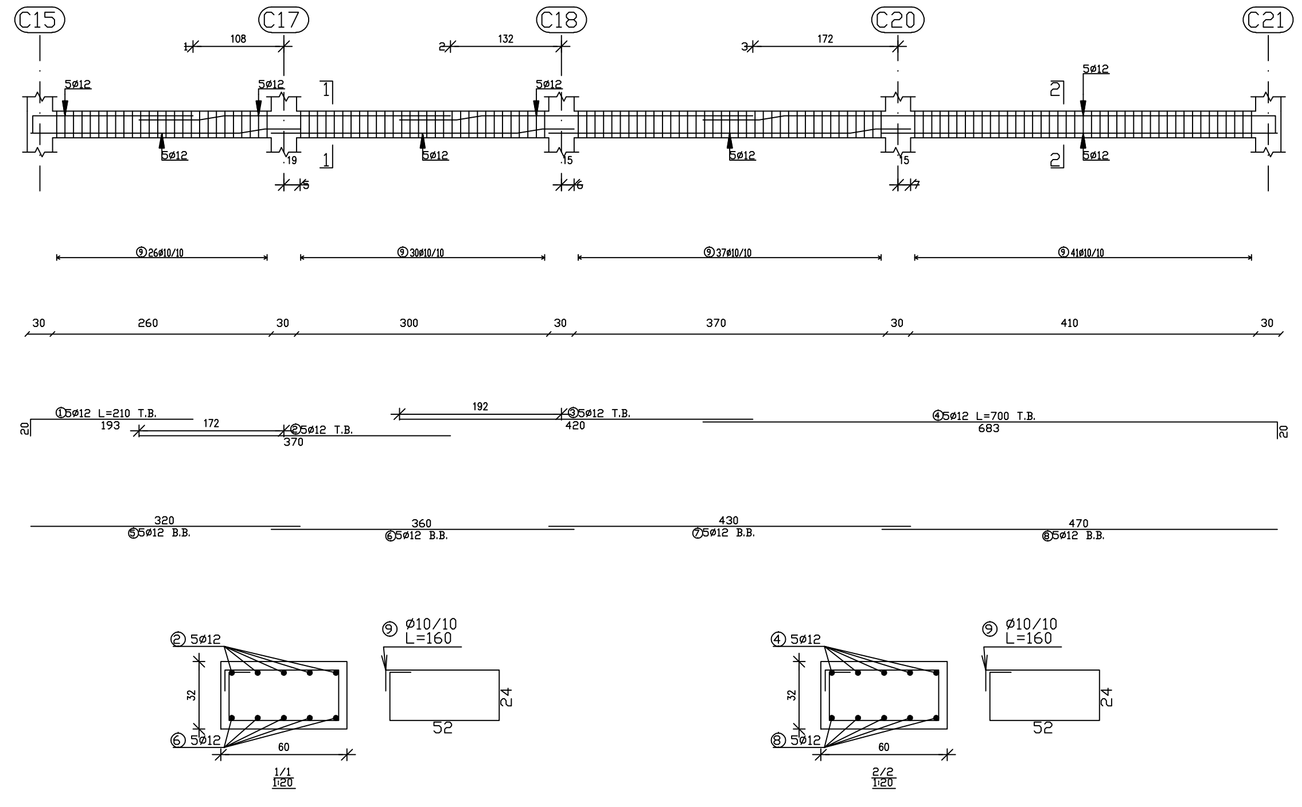
Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	No.of Draw	Date
1/50	S92	2013/2014

Bc29



Bc30



By the name of Allah

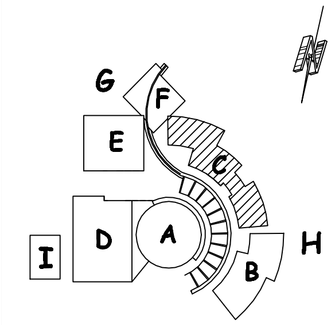
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

Number	Name
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Drawing Title

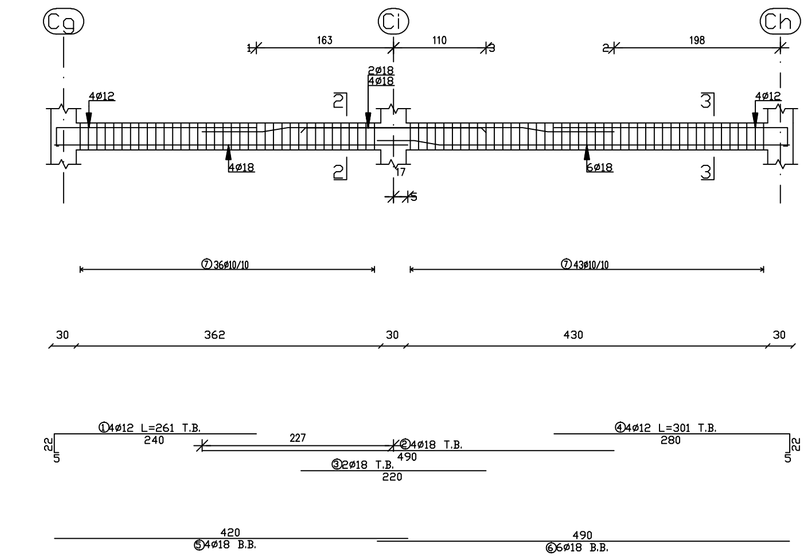
Building activities
Beame's

Designed By

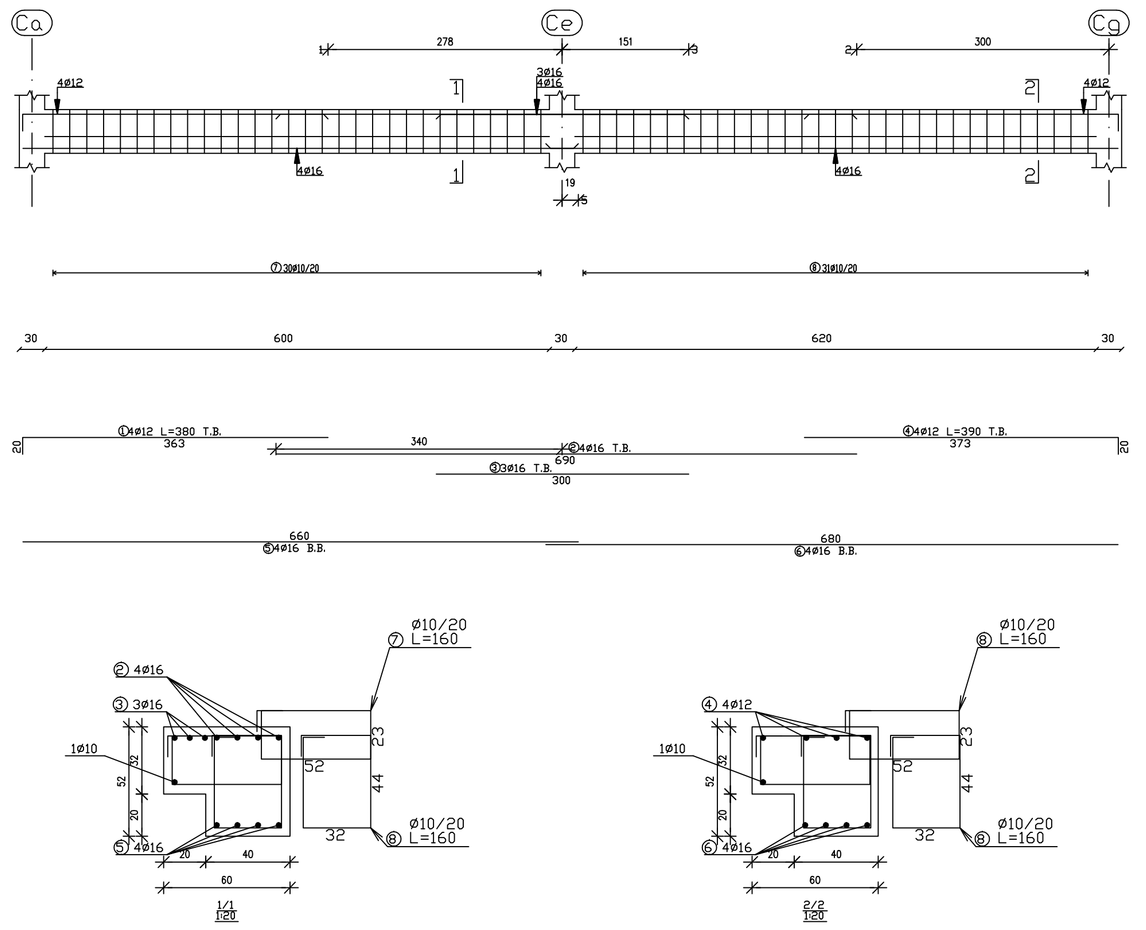
Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	No.of Draw	Date
1/50	S93	2013/2014

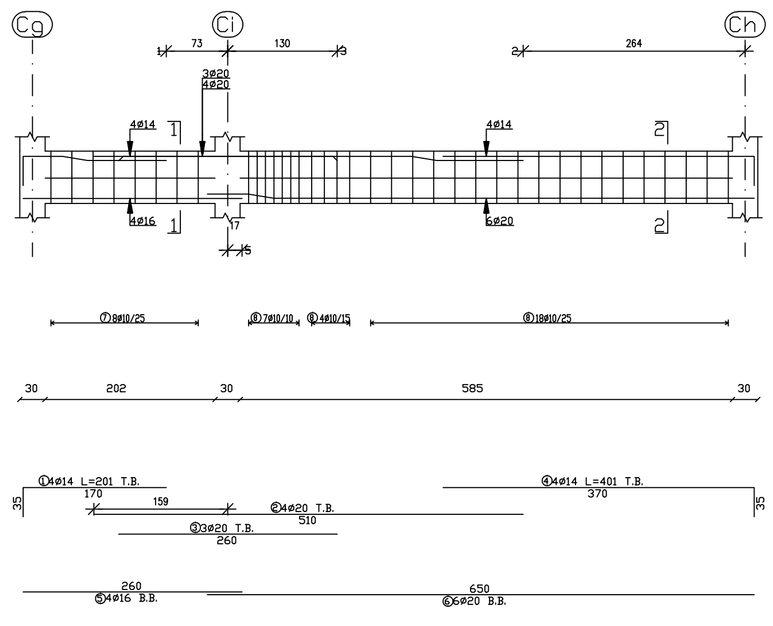
Bc32



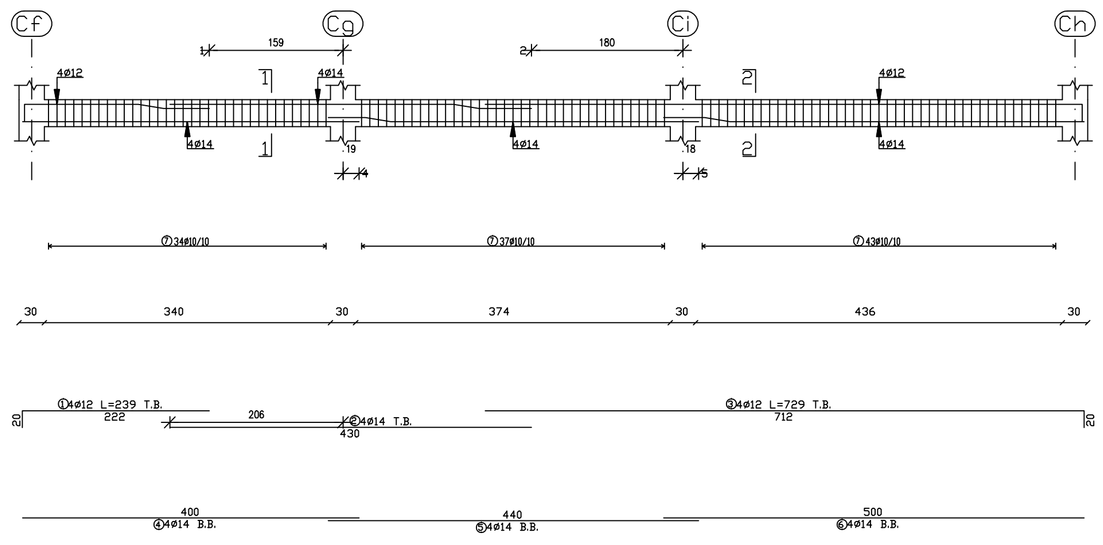
Bc31



Bc33



Bc35



By the name of Allah

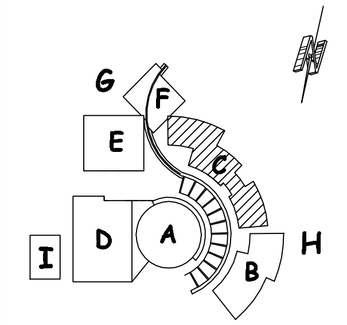
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

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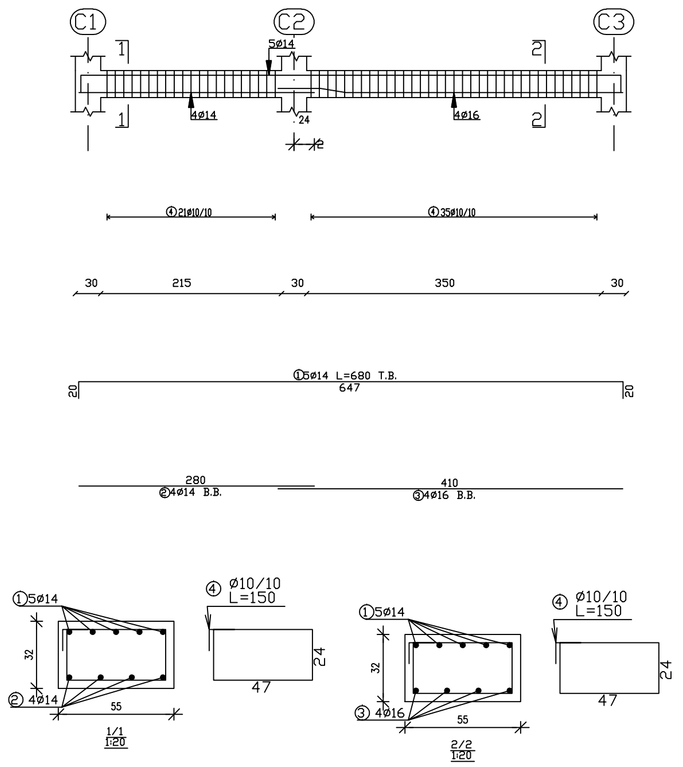
Building activities
Beame's

Designed By

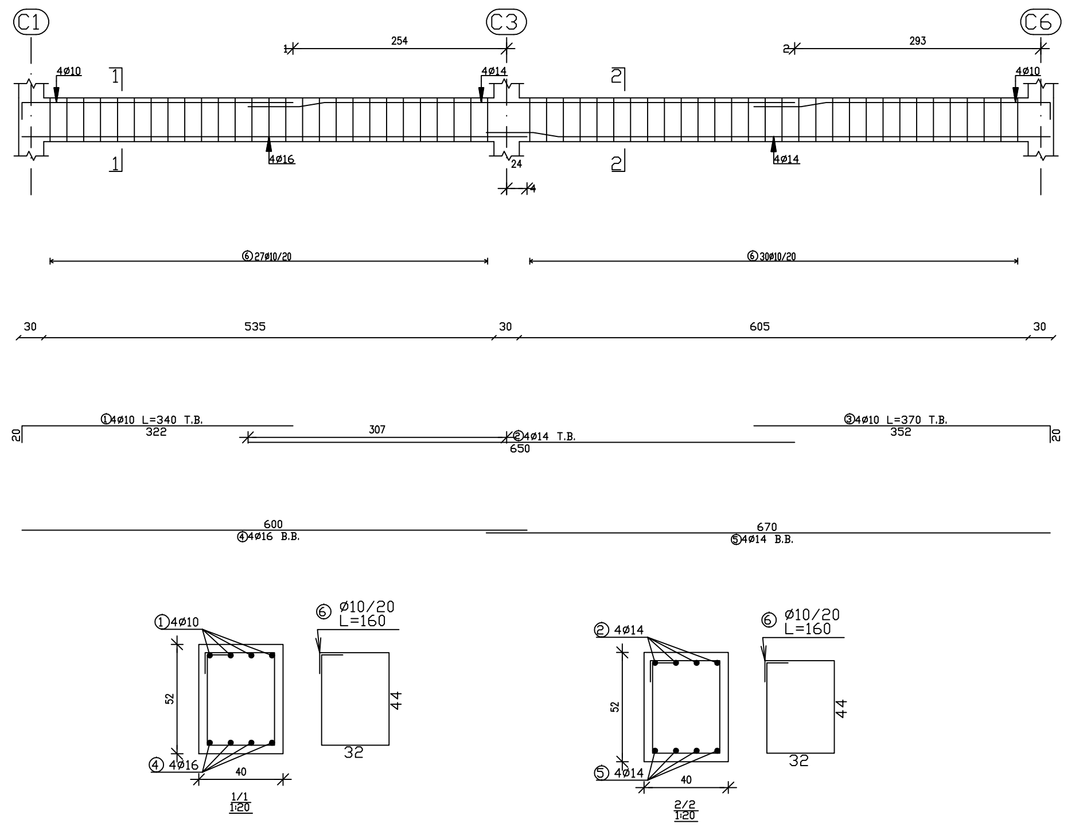
Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	No.of Draw	Date
1/50	S94	2013/2014

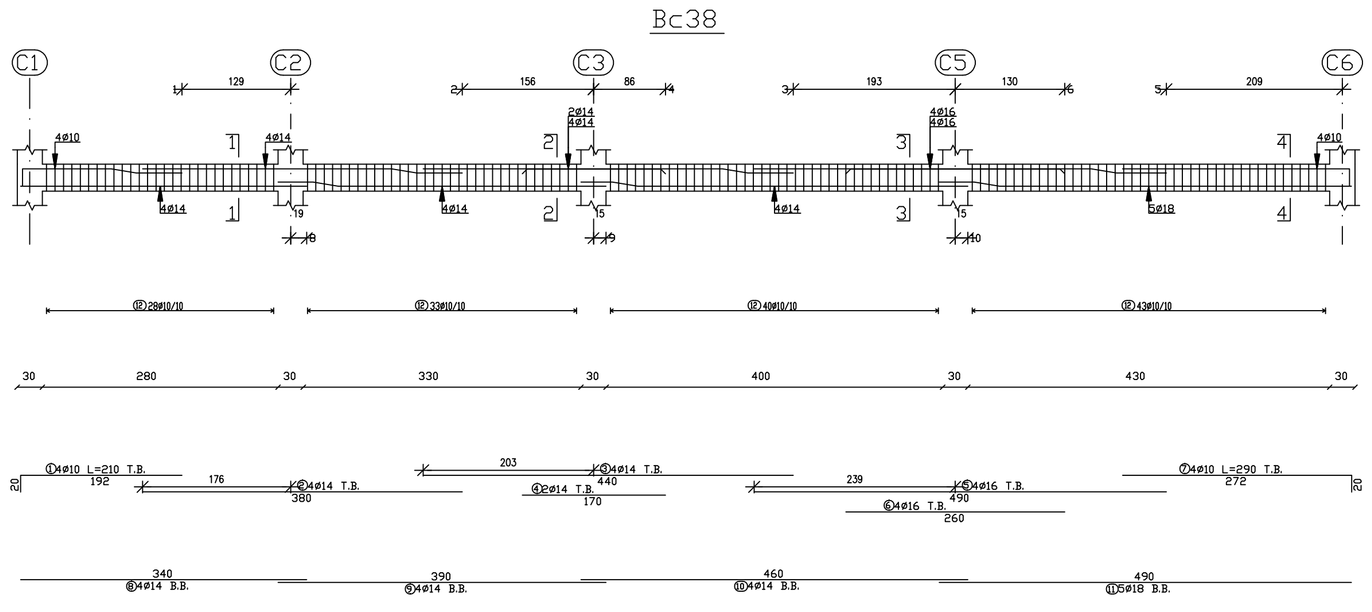
Bc37



Bc36



Bc38



By the name of Allah

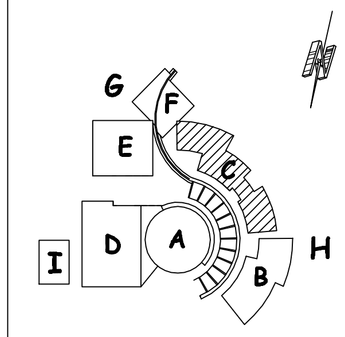
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



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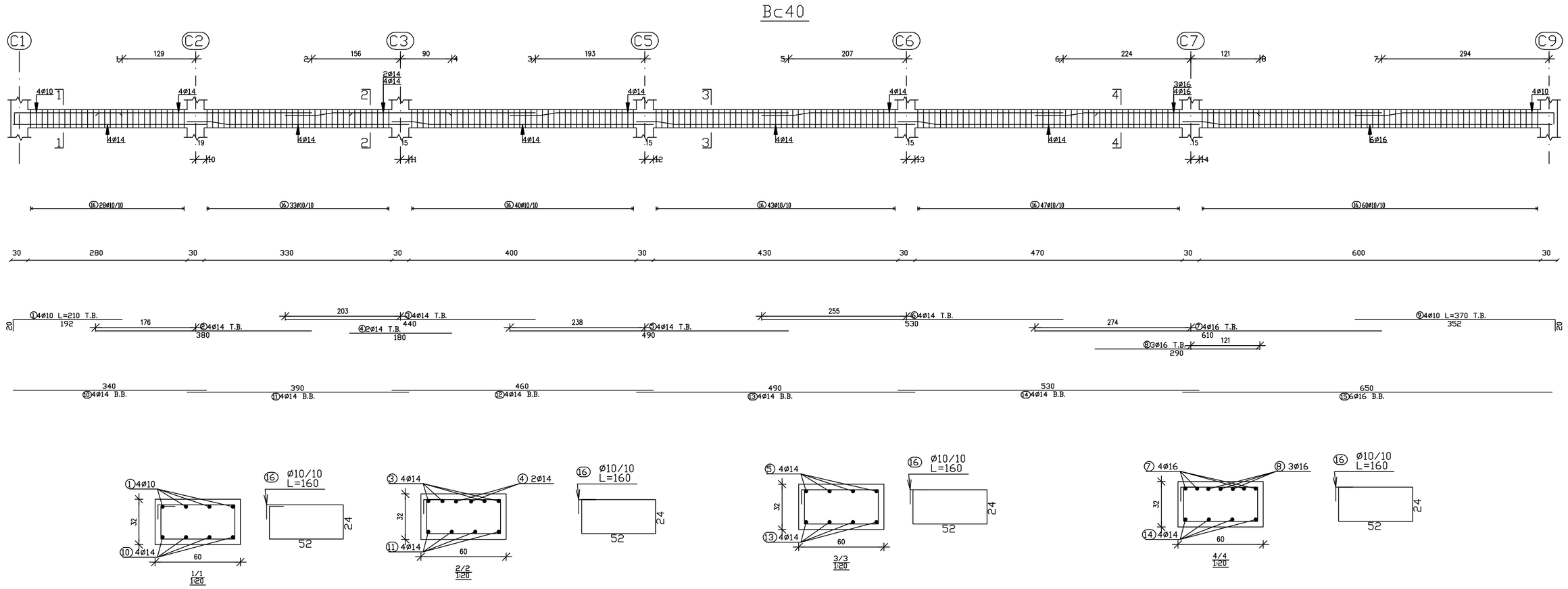
Drawing Title

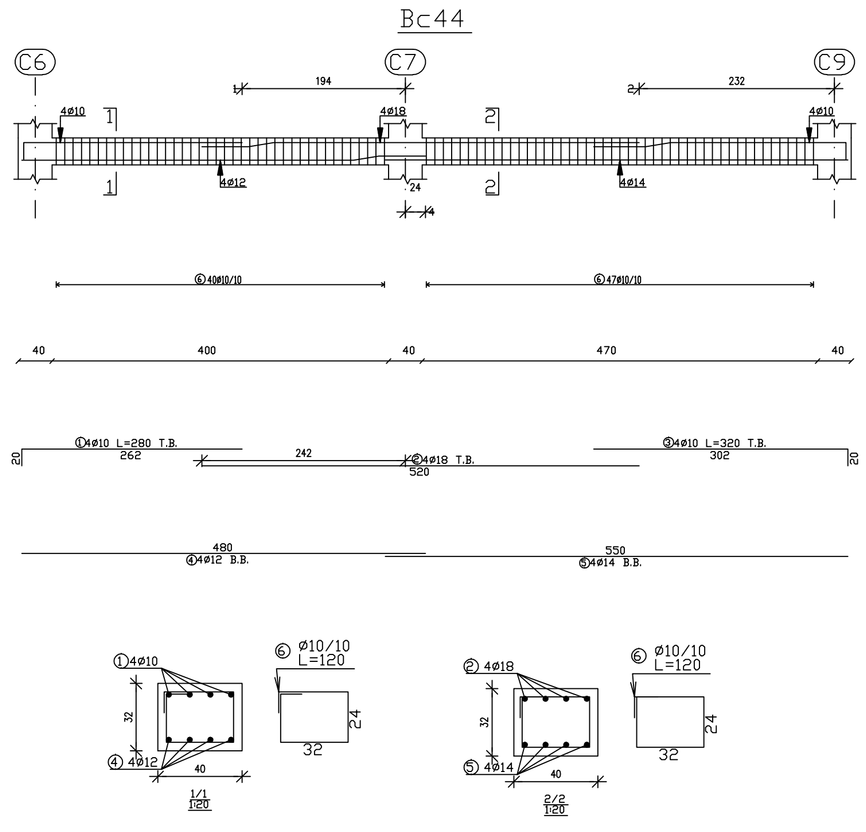
Building activities
Beame's

Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	*No.of Draw*	*Date*
1/50	S95	2013/2014





By the name of Allah

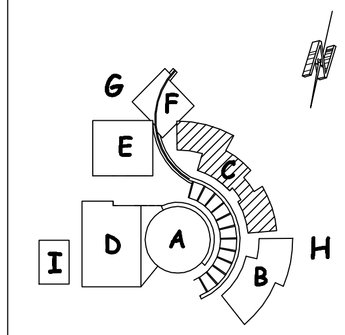
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

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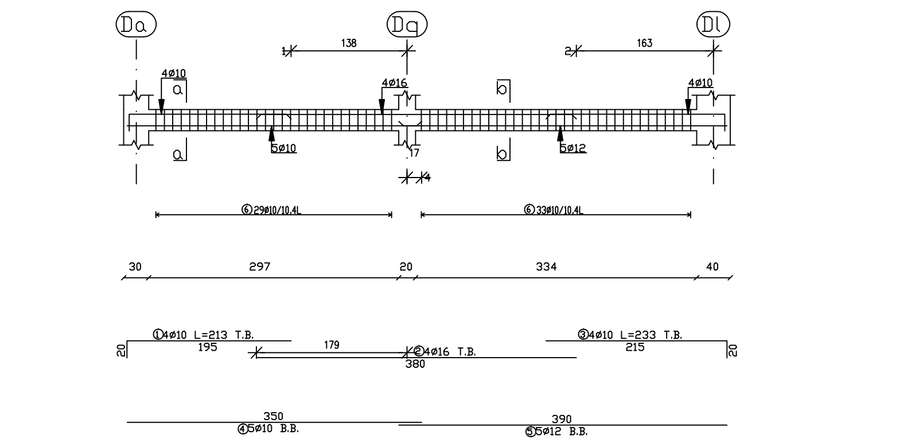
Building activities
Beame's

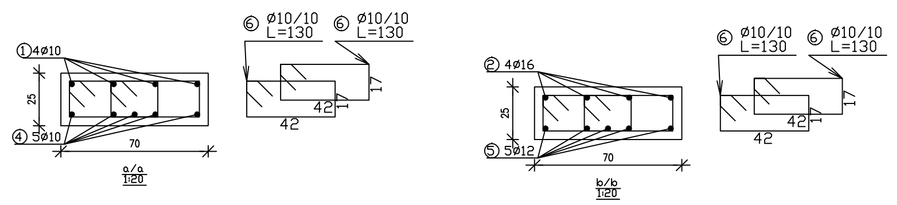
Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

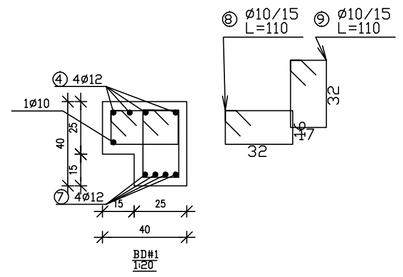
Scale	*No.of Draw*	*Date*
1/50	S96	2013/2014

Beam:BD1

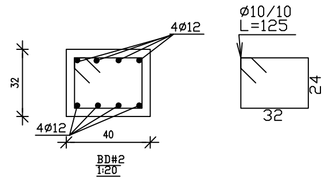




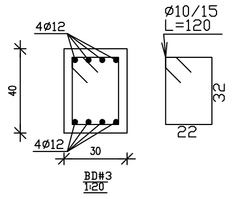
BB#1



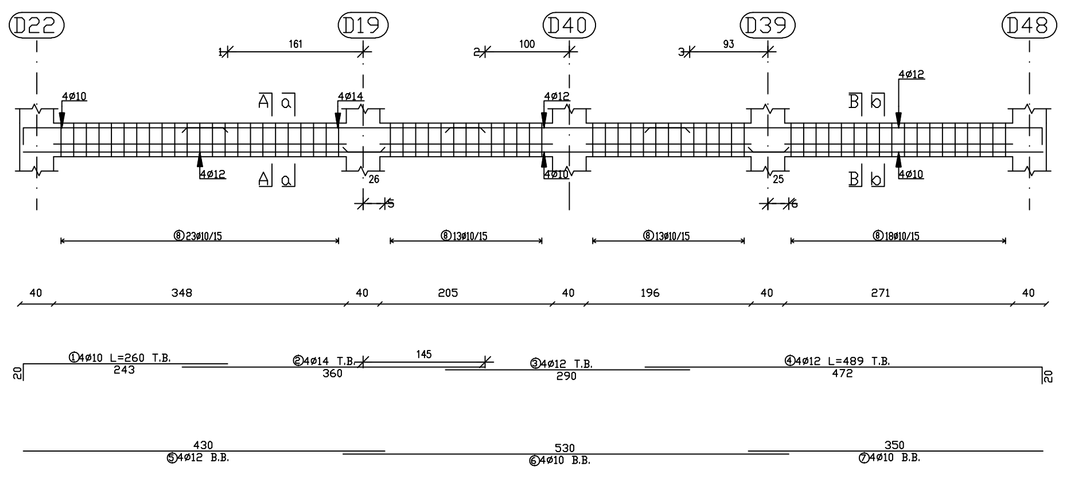
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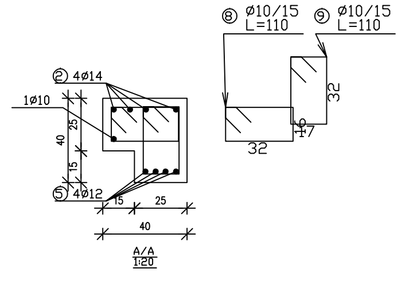


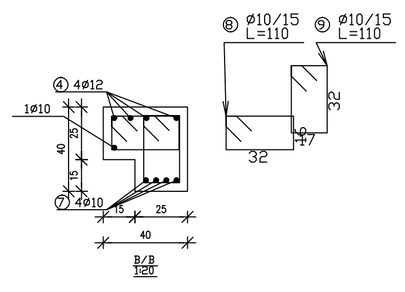
BD#3



ABD2







By the name of Allah

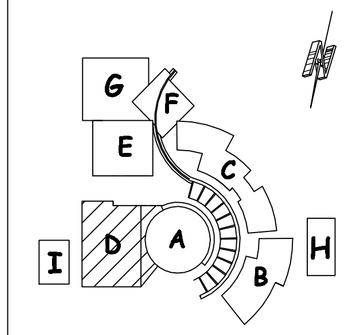
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building	
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H	Parking 1
I	Parking 2

Drawing Title

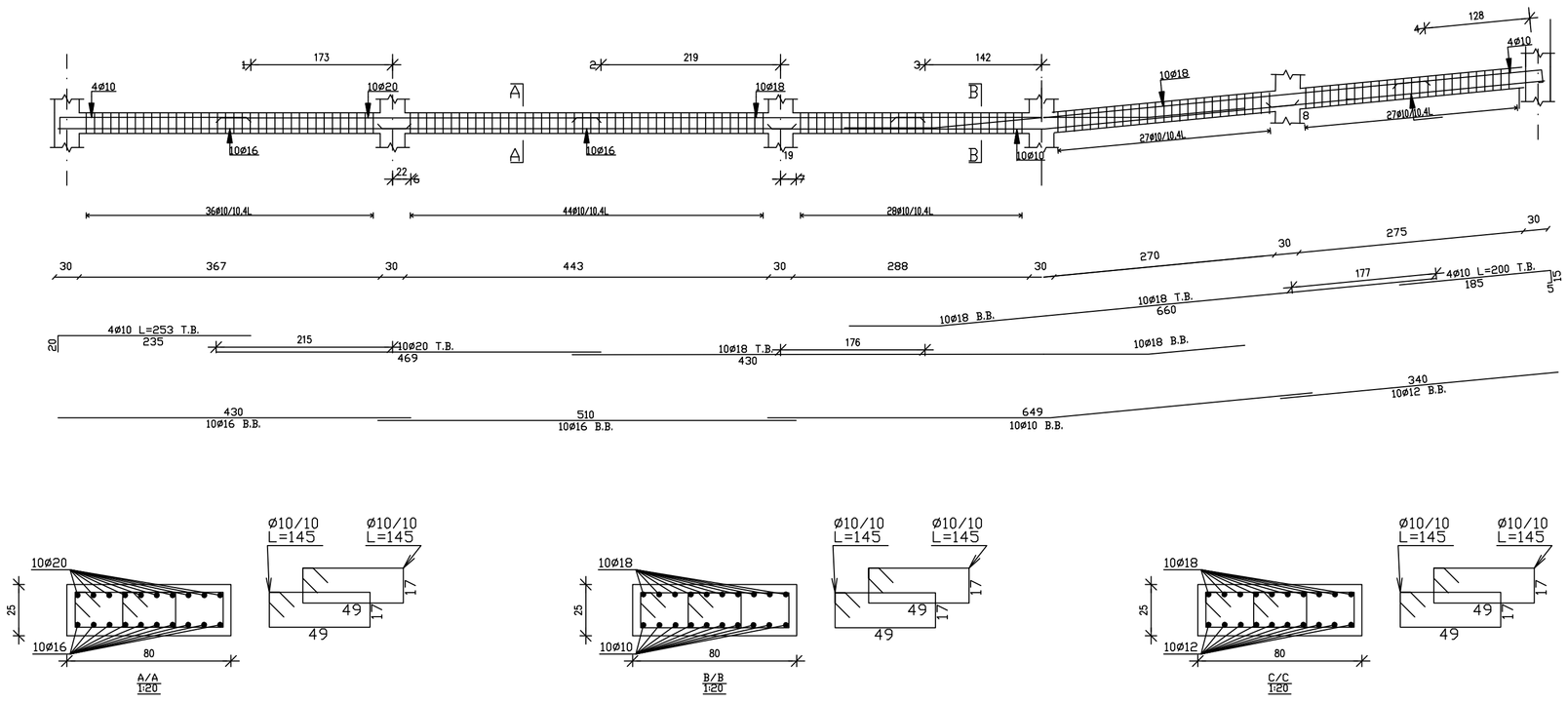
Theater Beame's

Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	No.of Draw	Date
1/50	S97	2013/2014

BD3



BD4

By the name of Allah

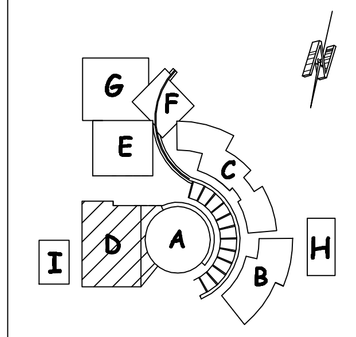
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

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I	Parking 2

Drawing Title

Theater Beame's

Designed By

Baha Bader

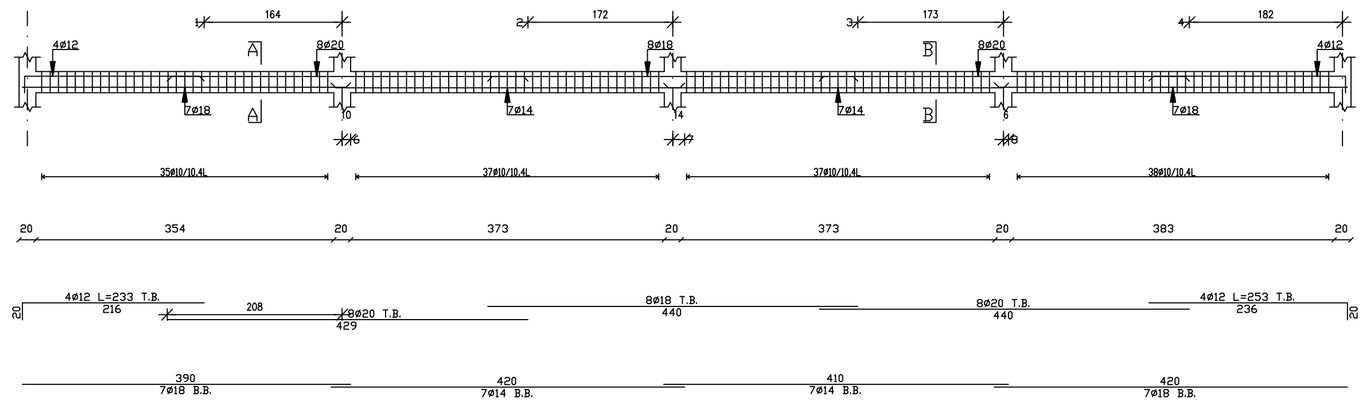
Fawaz Natsheh

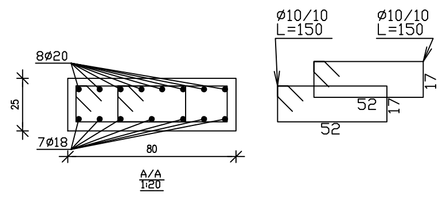
Montaser shweiki

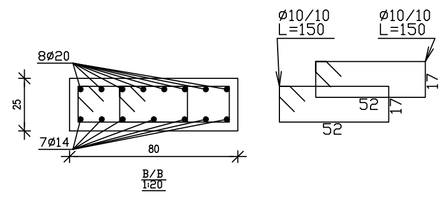
Mohamed Halwani

Scale	No.of Draw	Date
1/50	S98	2013/2014

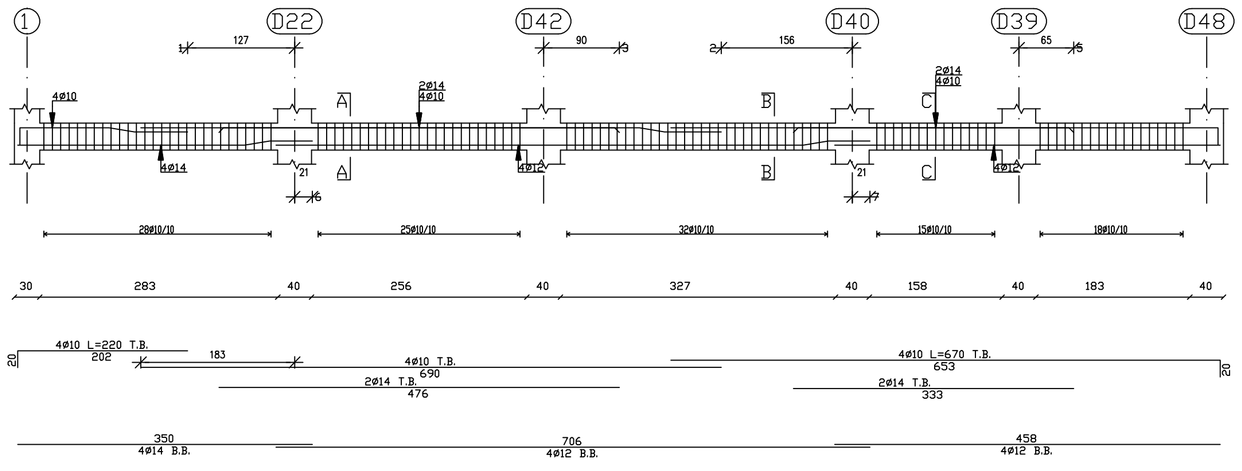
BD5

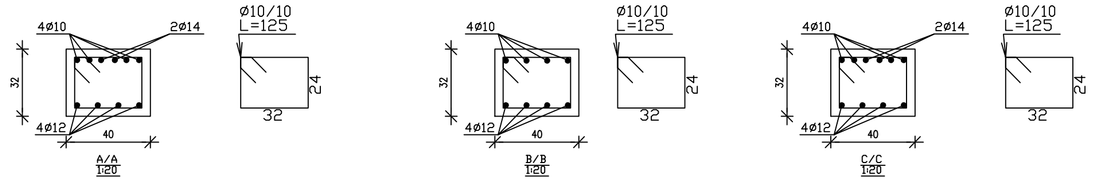




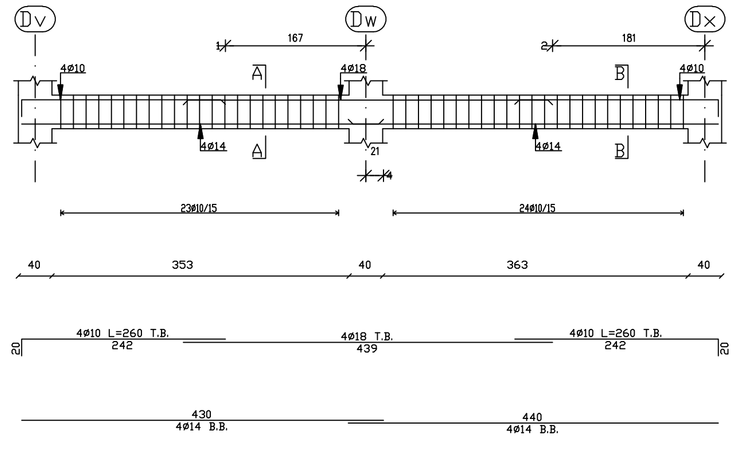


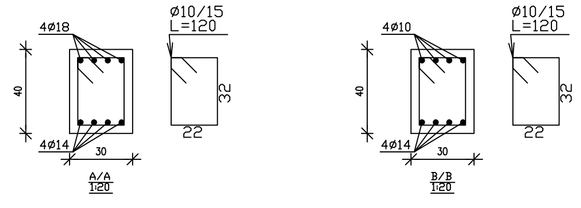
BD7



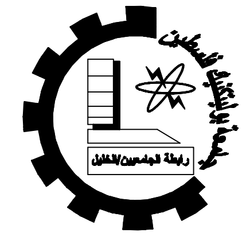


BD6





By the name of Allah



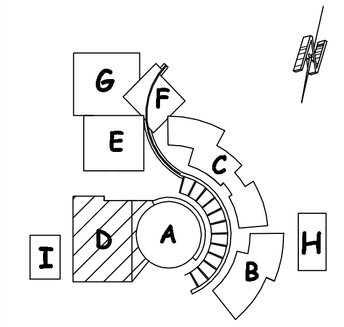
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

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Drawing Title

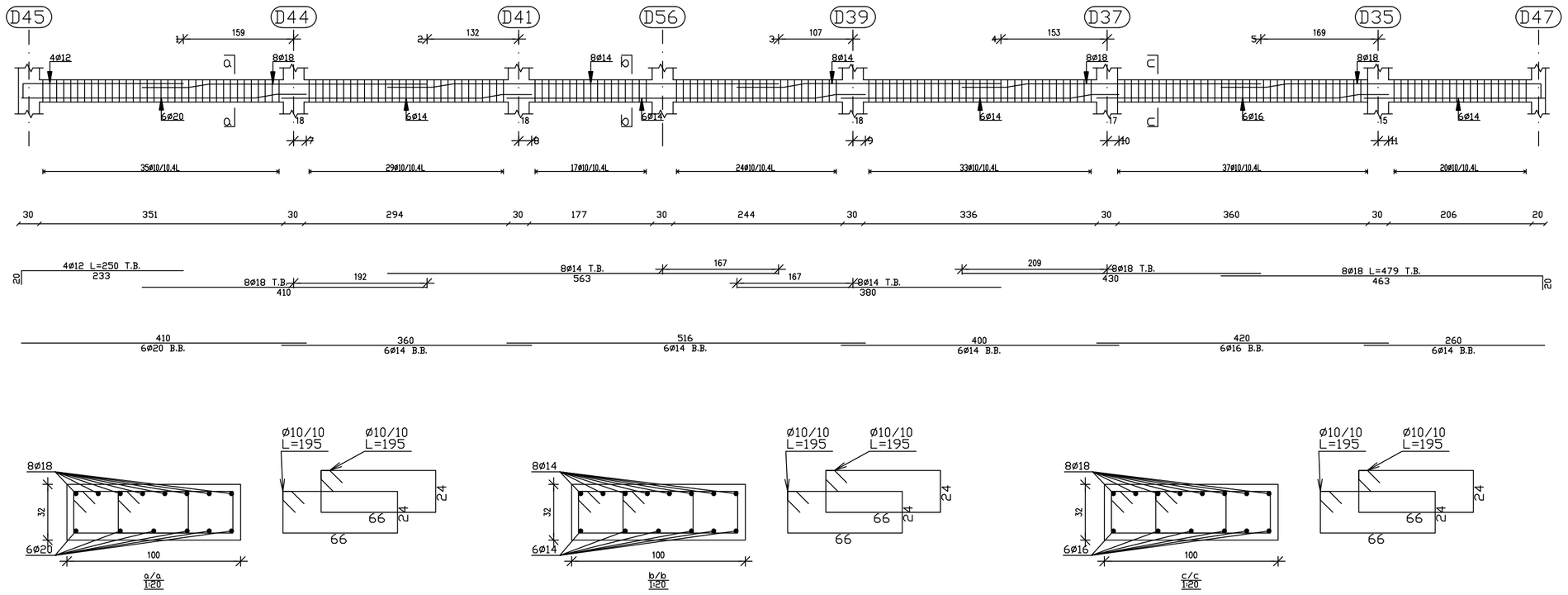
Theater Beame's

Designed By

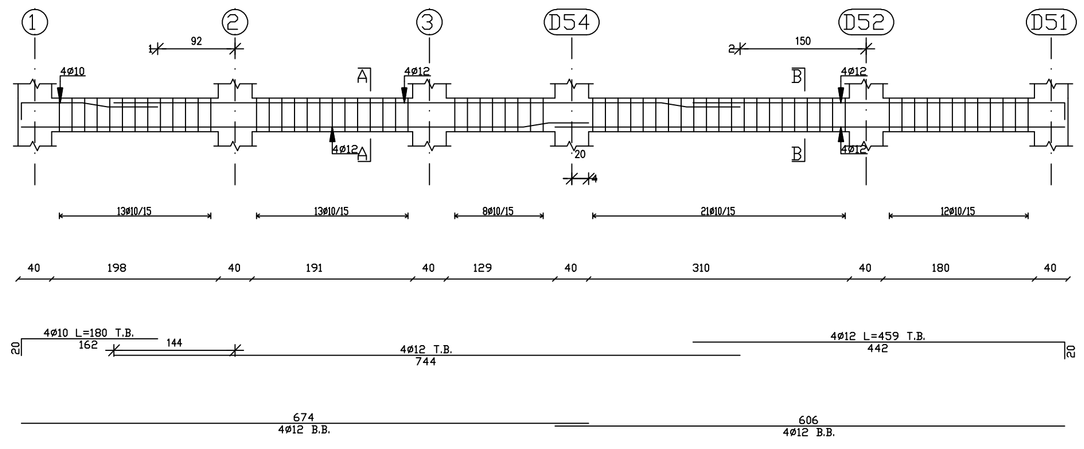
Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	No.of Draw	Date
1/50	S99	2013/2014

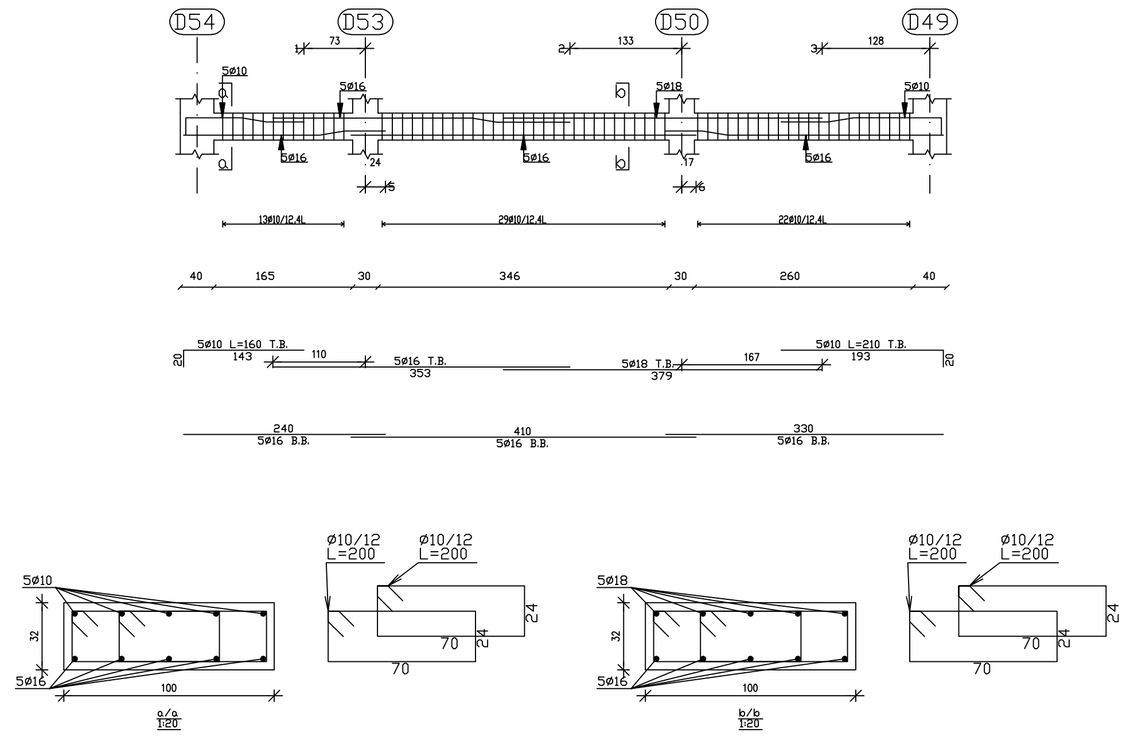
BD8



BD10



BD9



By the name of Allah

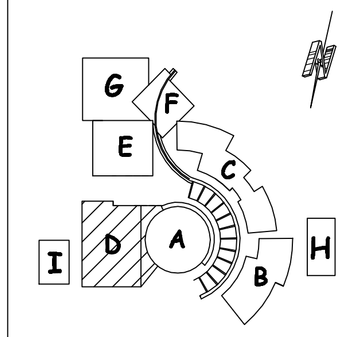
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

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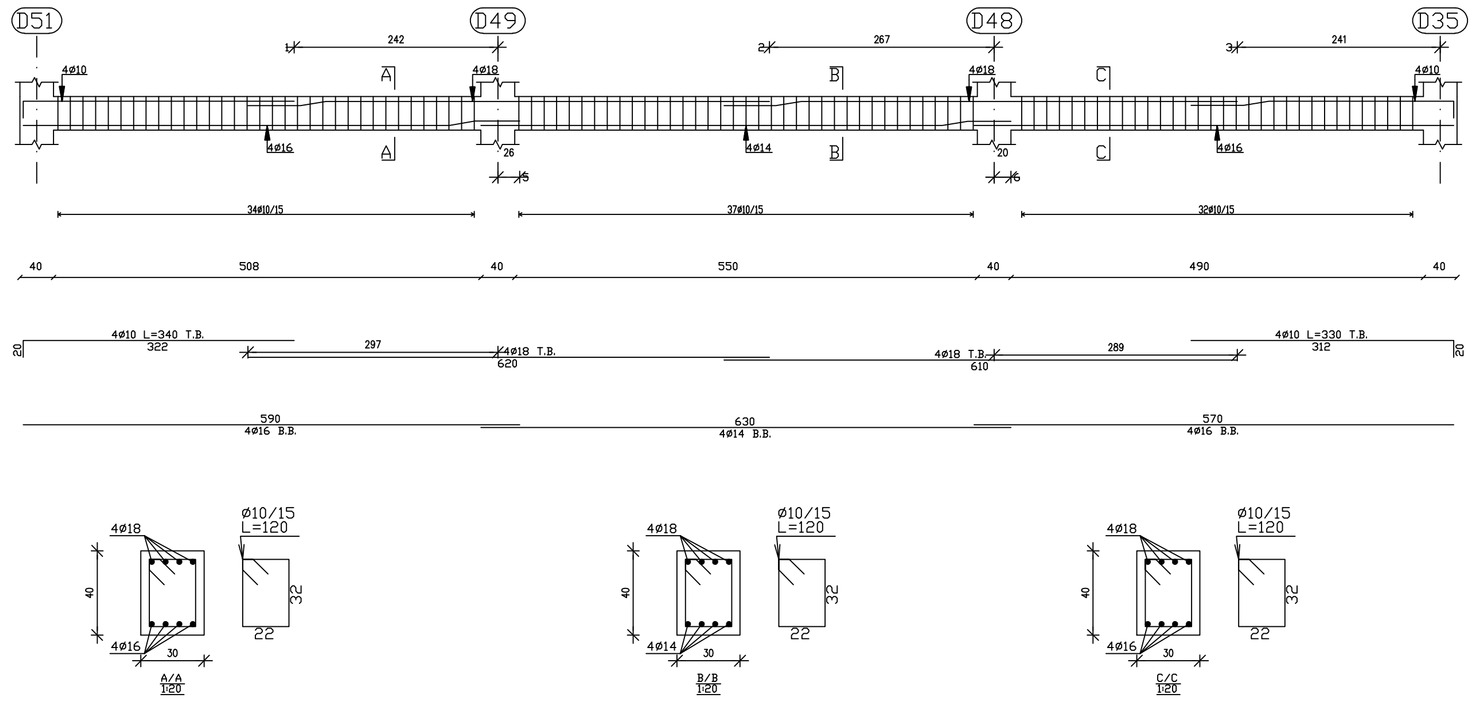
Theater Beame's

Designed By

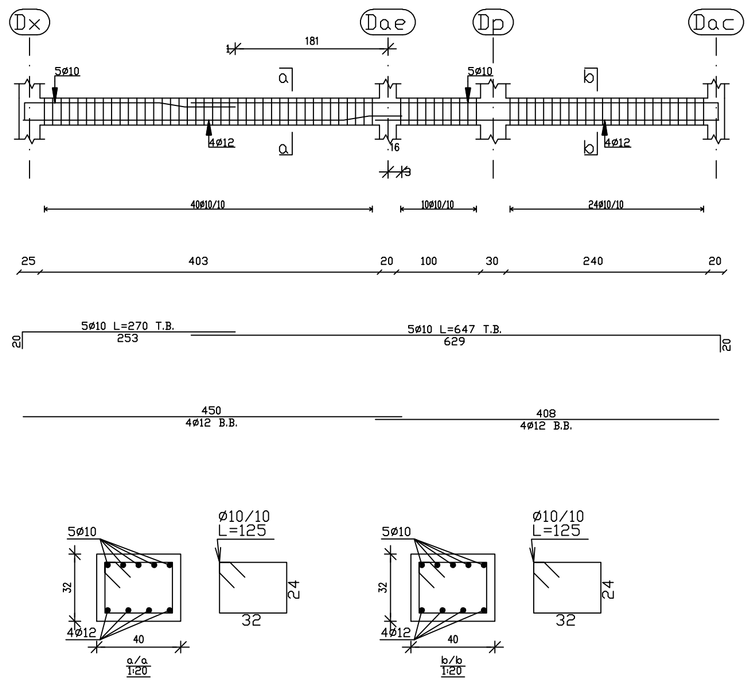
Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	*No.of Draw*	*Date*
1/50	S100	2013/2014

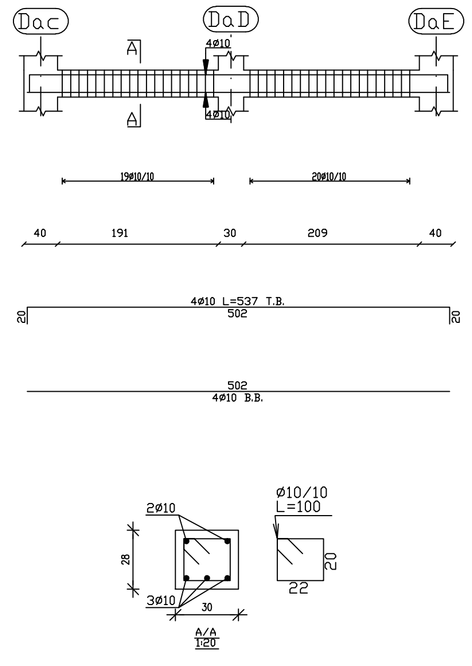
BD11



BD13



BD12



By the name of Allah

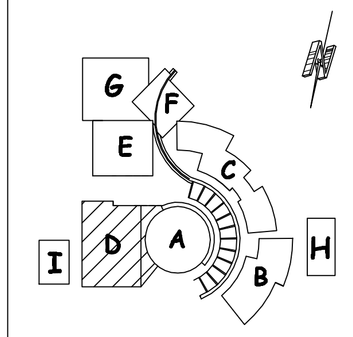
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

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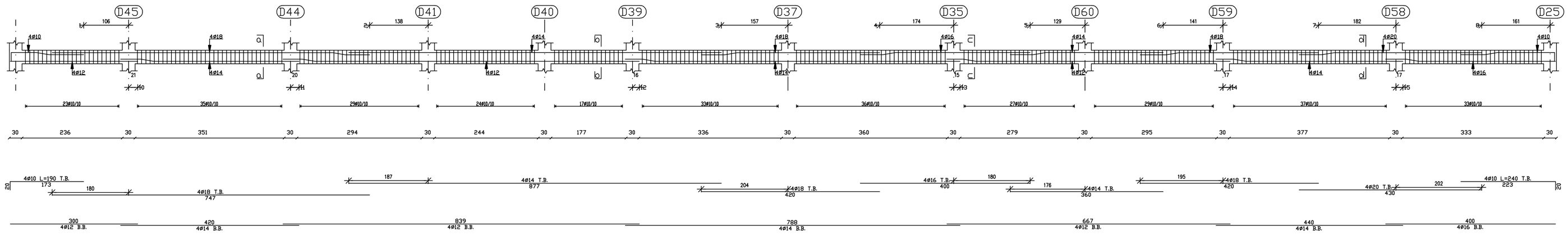
Theater Beame's

Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

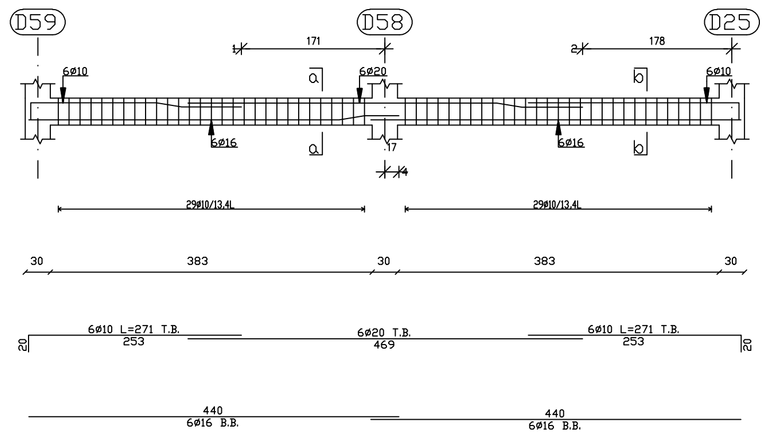
Scale	No.of Draw	Date
1/50	S101	2013/2014

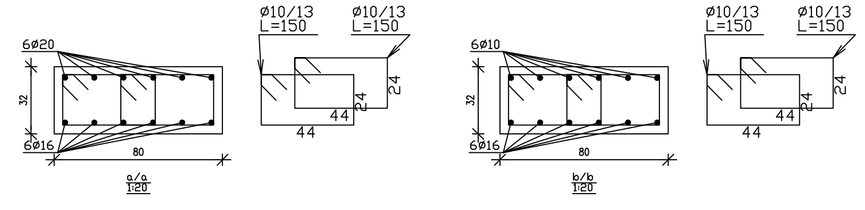
BD14



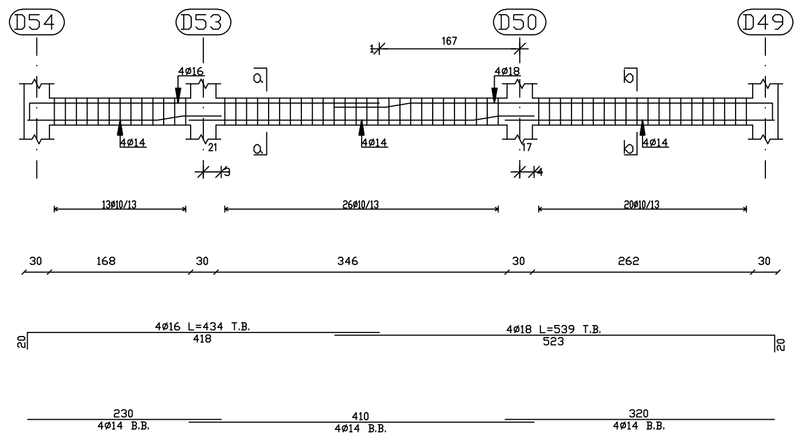


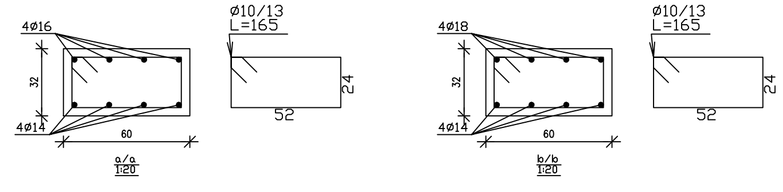
BD16





BD15





By the name of Allah

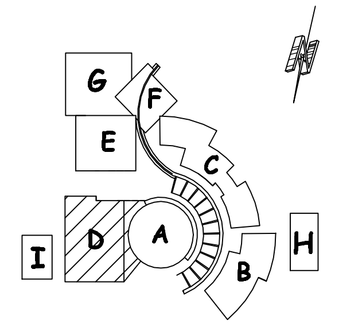
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

Number	Name
A	Reception
B	Sport hall
C	Building activities
D	Theater
E	Handicrafts
F	Restaurant
G	Photo Gallery
H	Parking 1
I	Parking 2

Drawing Title

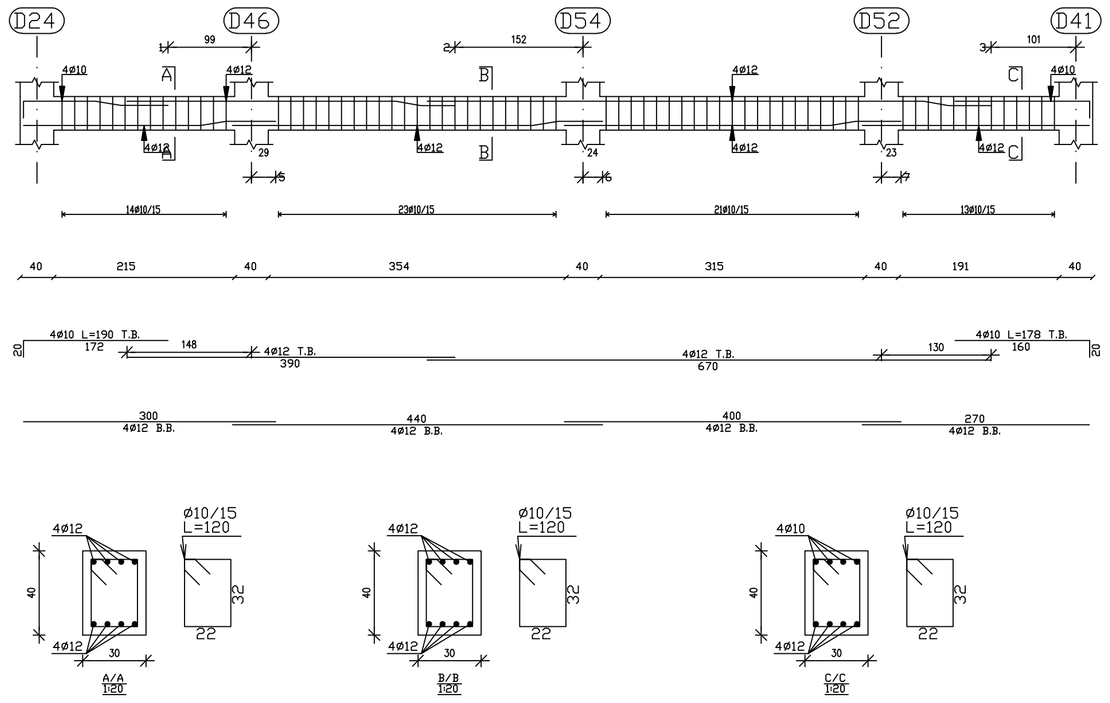
Theater Beame's

Designed By

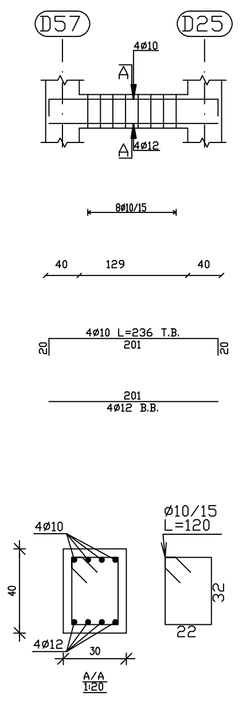
Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	No.of Draw	Date
1/50	S102	2013/2014

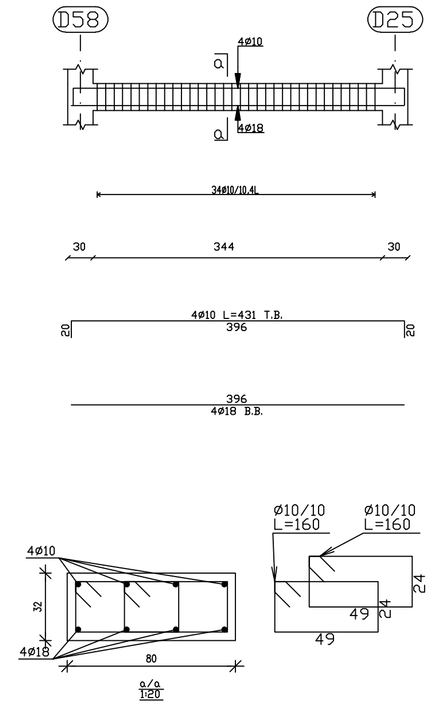
BD19



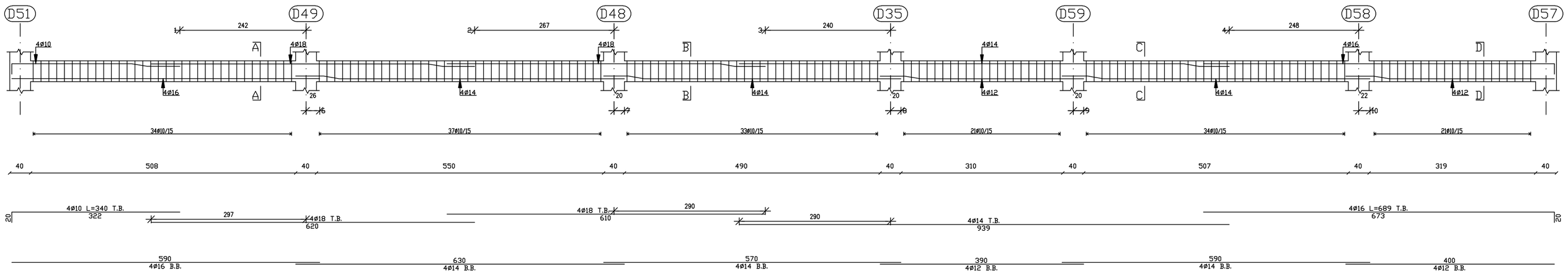
BD18



BD17

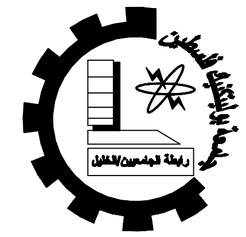


BD20





By the name of Allah



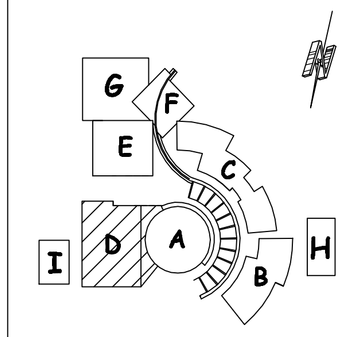
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

Number	Name
A	Reception
B	Sport hall
C	Building activities
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H	Parking 1
I	Parking 2

Drawing Title

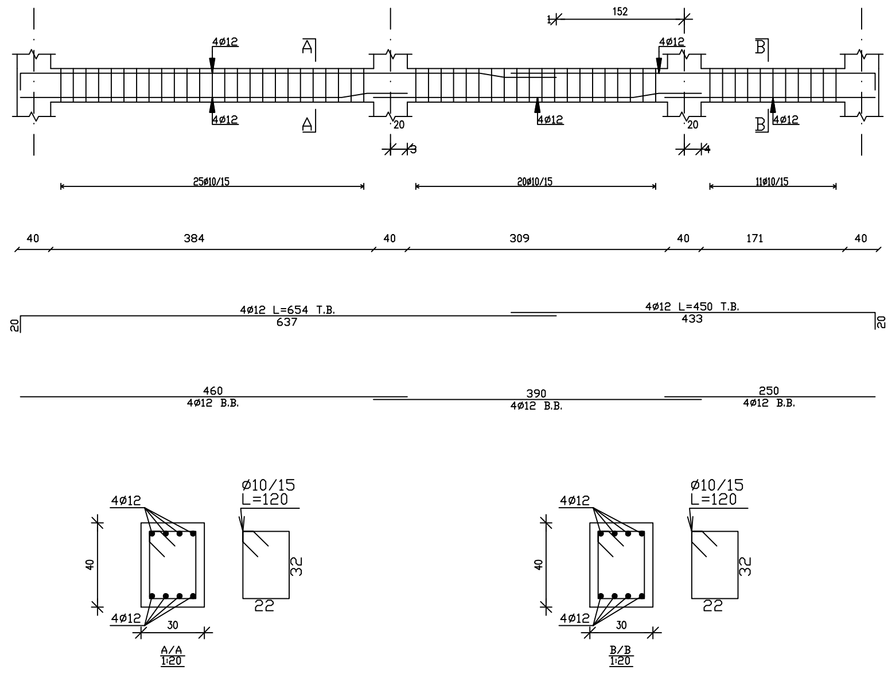
Theater Beame's

Designed By

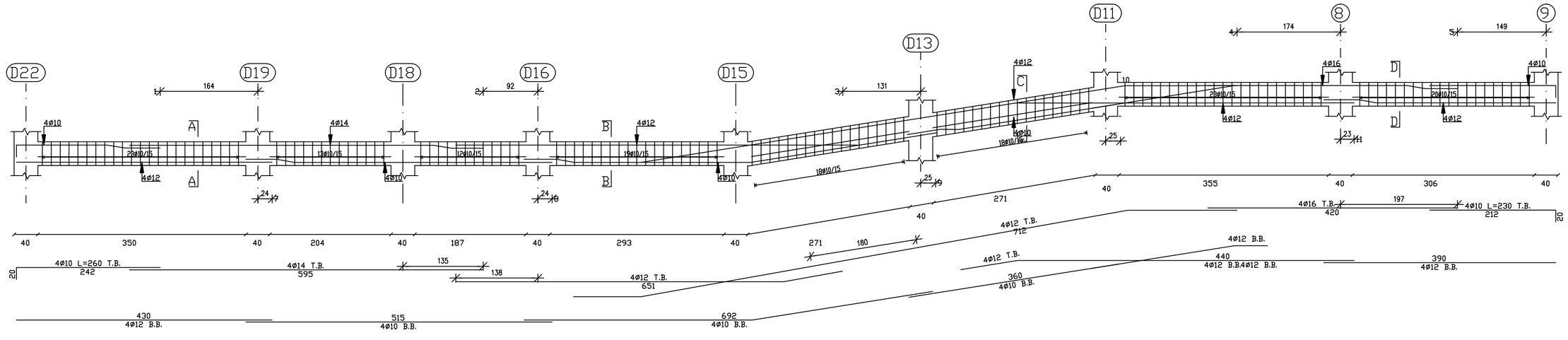
Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

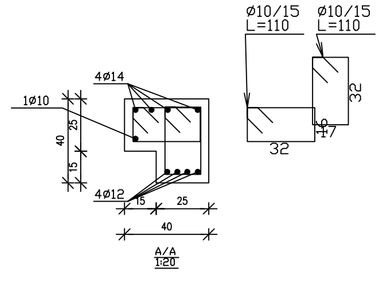
Scale	No.of Draw	Date
1/50	S103	2013/2014

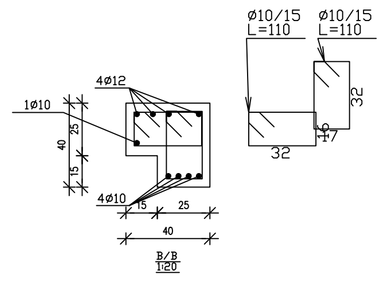
BD21

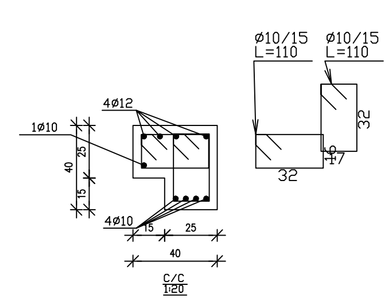


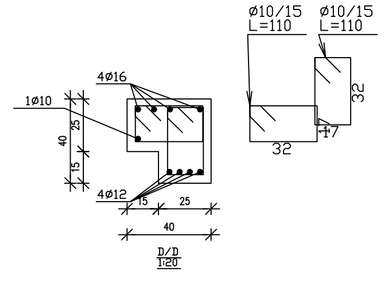
BD22











By the name of Allah



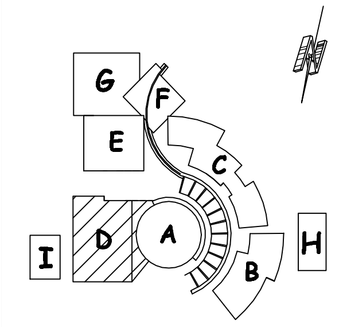
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

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Drawing Title

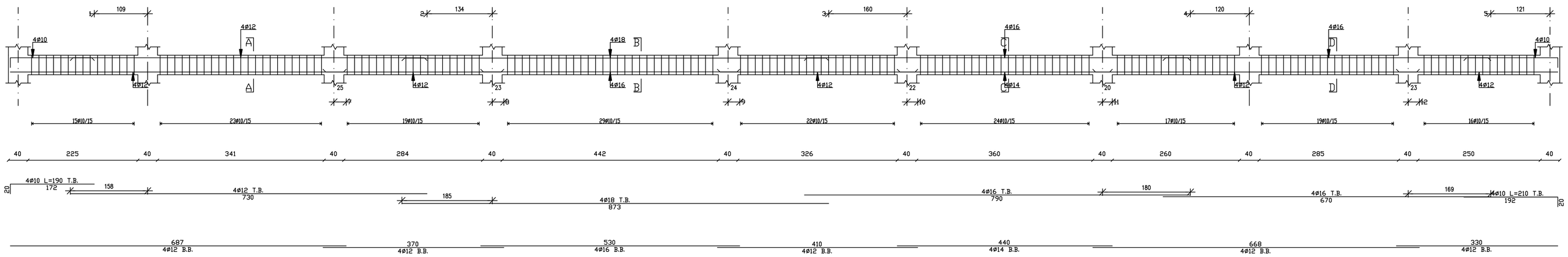
Theater Beame's

Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

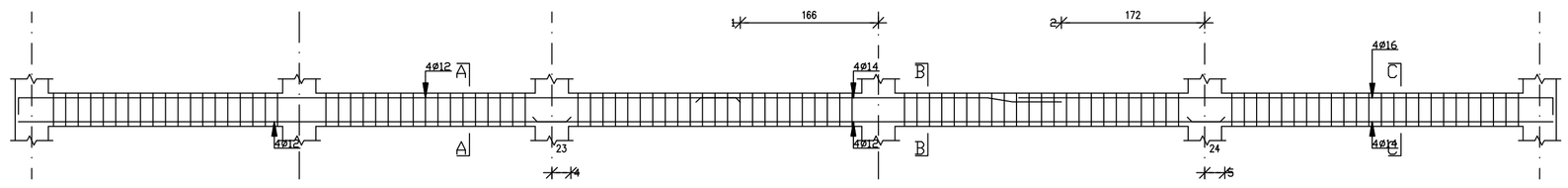
Scale	No.of Draw	Date
1/50	S104	2013/2014

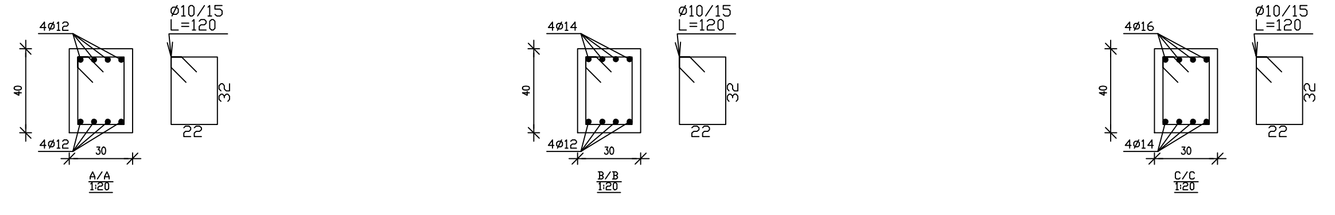
BD23





BD24





By the name of Allah

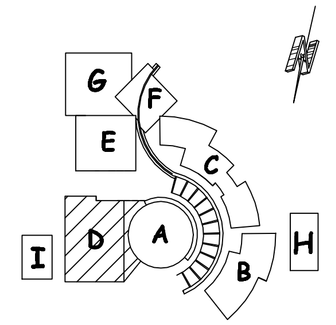
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

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I	Parking 2

Drawing Title

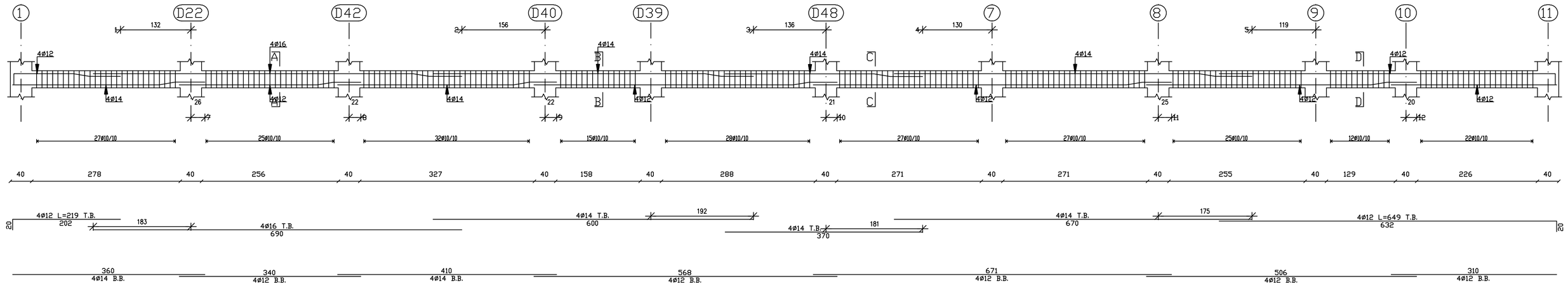
Theater Beame's

Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

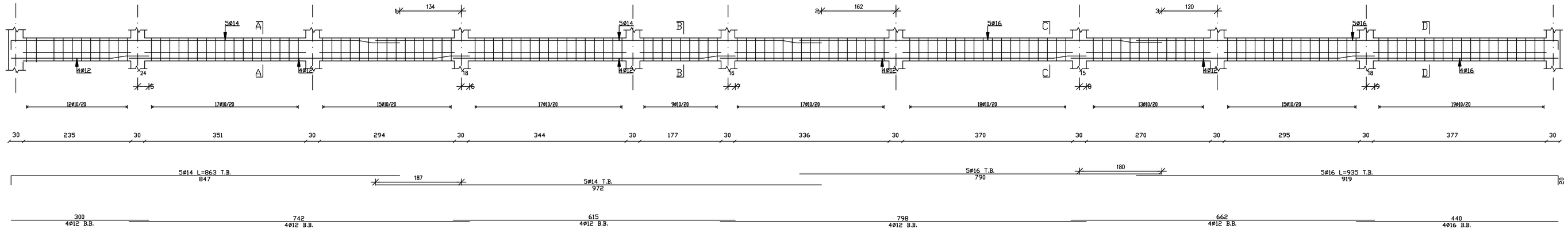
Scale	No.of Draw	Date
1/50	S105	2013/2014

BD25





BD26





By the name of Allah

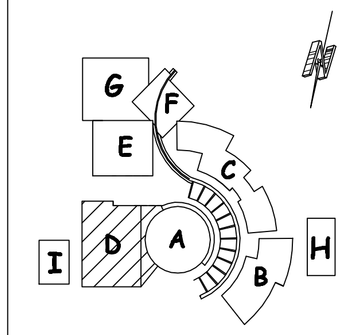
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

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Tabel of Building

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Drawing Title

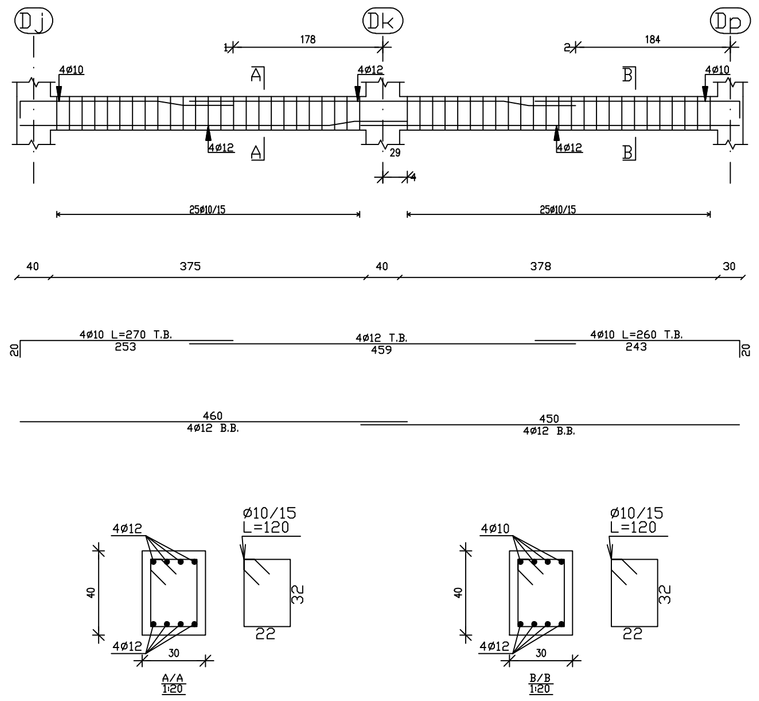
Theater Beame's

Designed By

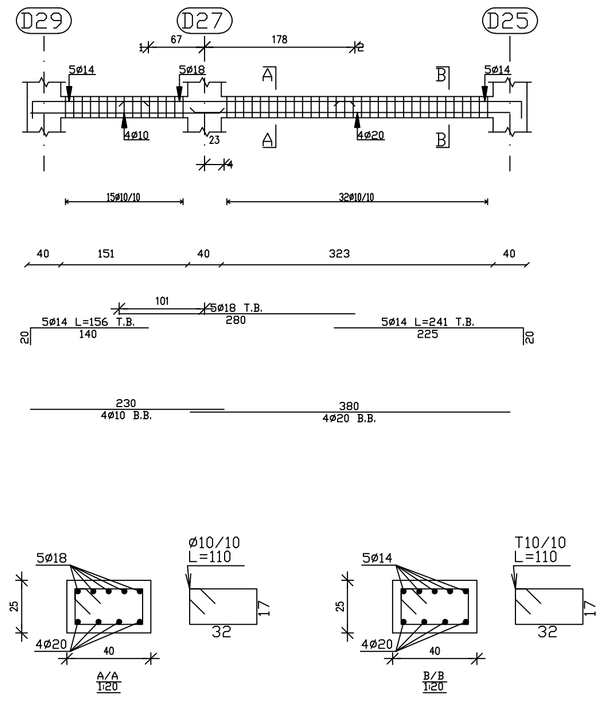
Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	No.of Draw	Date
1/50	S106	2013/2014

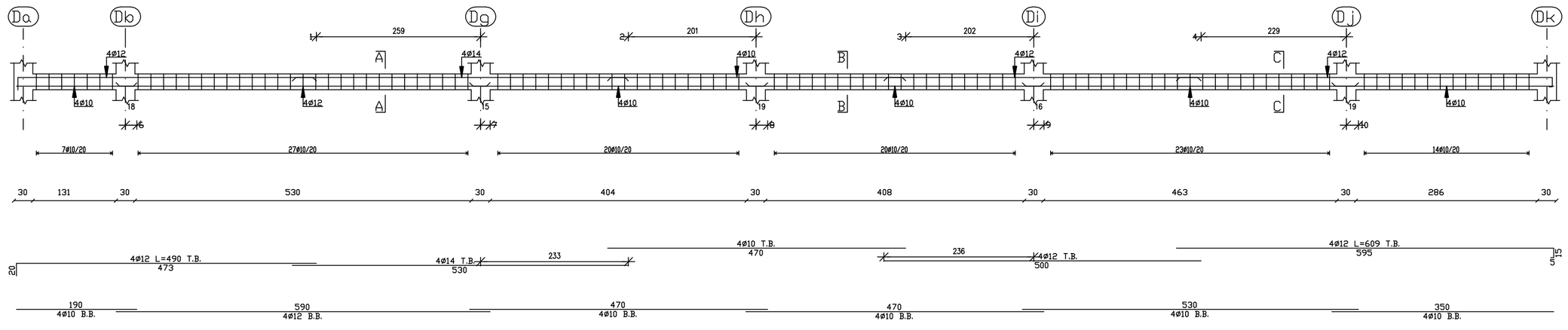
BD29

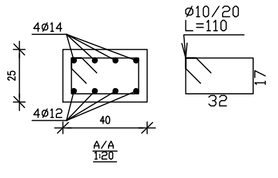


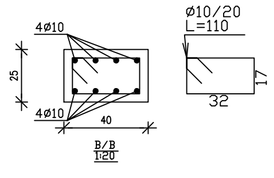
BD27

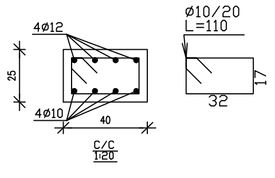


BD28









By the name of Allah

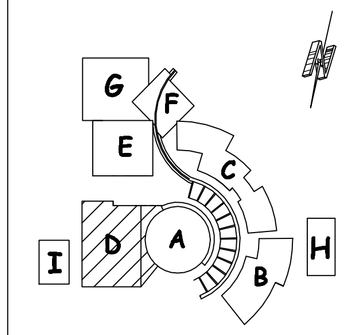
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

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Drawing Title

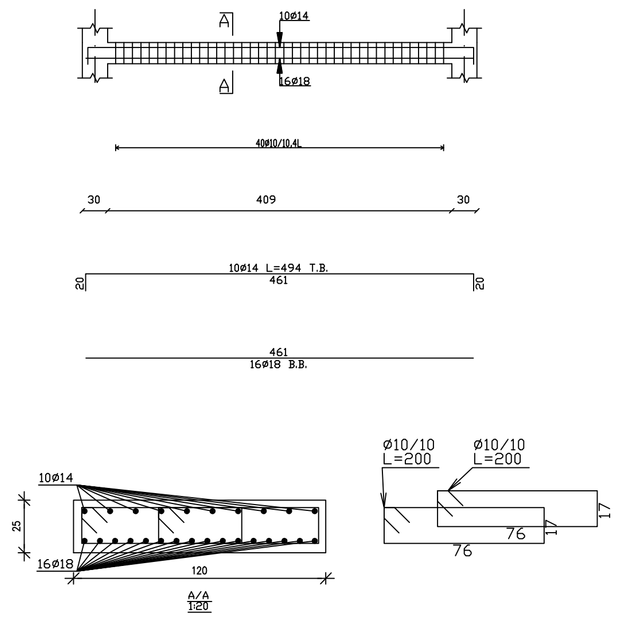
Theater Beame's

Designed By

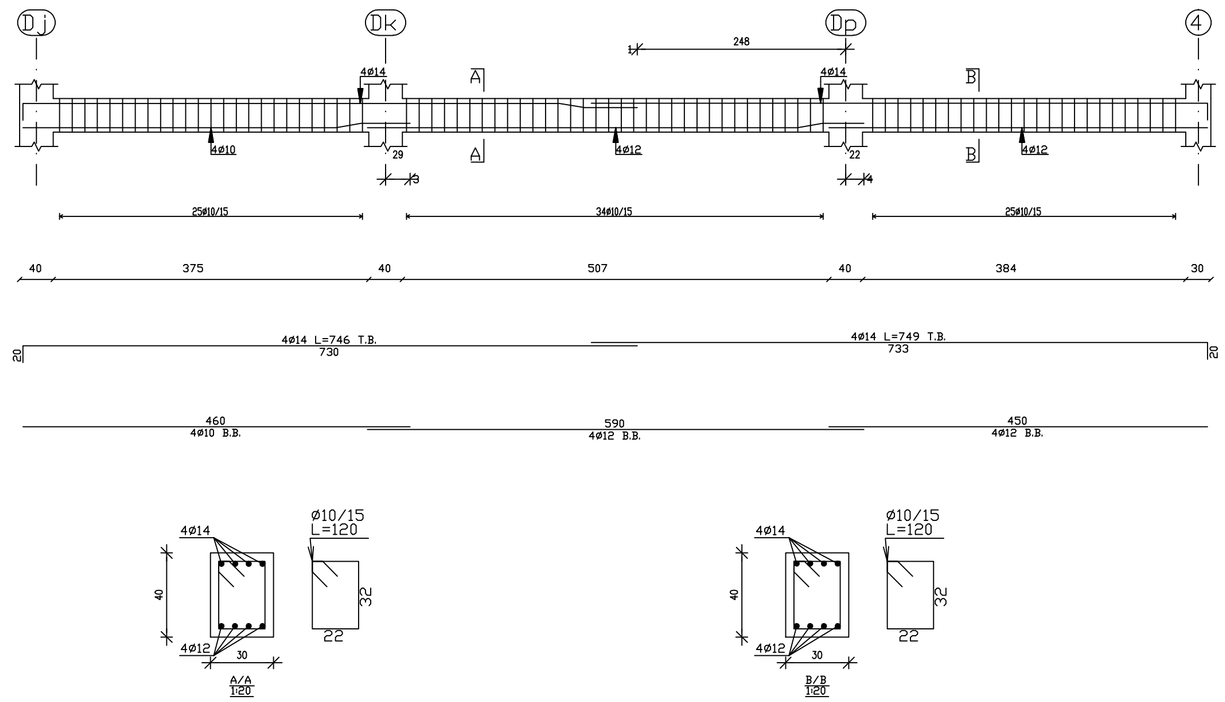
Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	No.of Draw	Date
1/50	S107	2013/2014

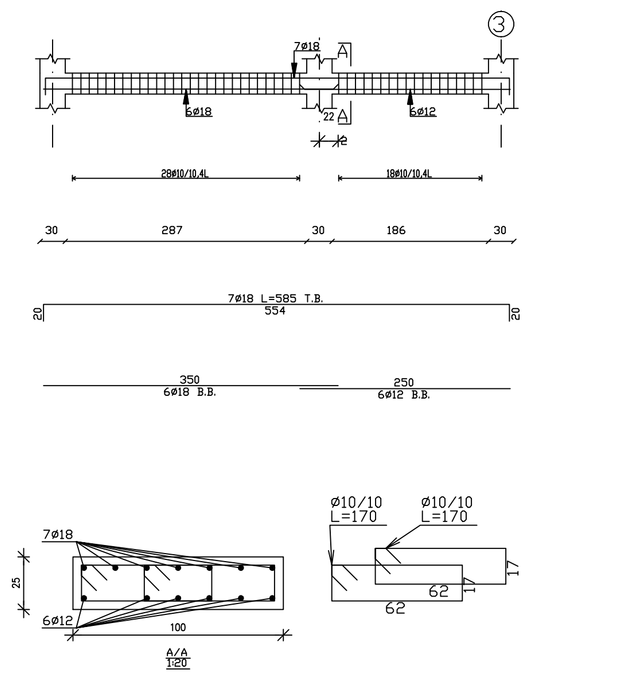
BD31



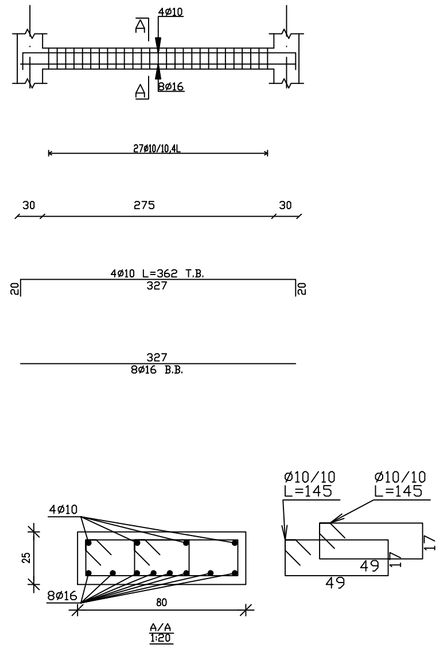
BD30



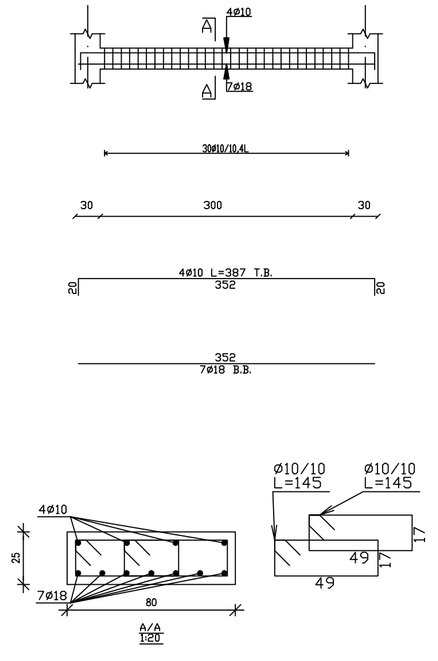
BD34



BD33



BD32



By the name of Allah

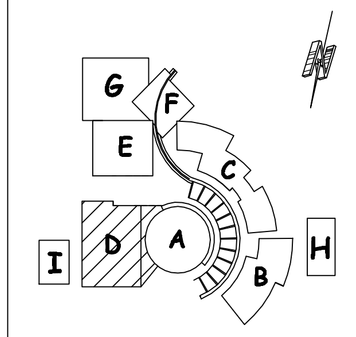
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

Number	Name
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H	Parking 1
I	Parking 2

Drawing Title

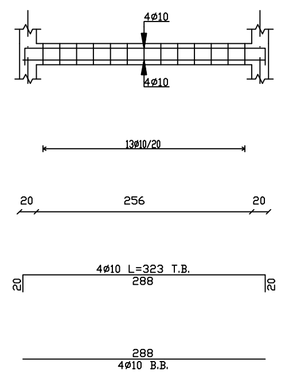
Theater Beame's

Designed By

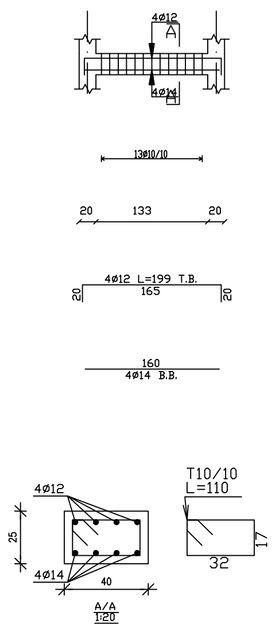
Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	No.of Draw	Date
1/50	S108	2013/2014

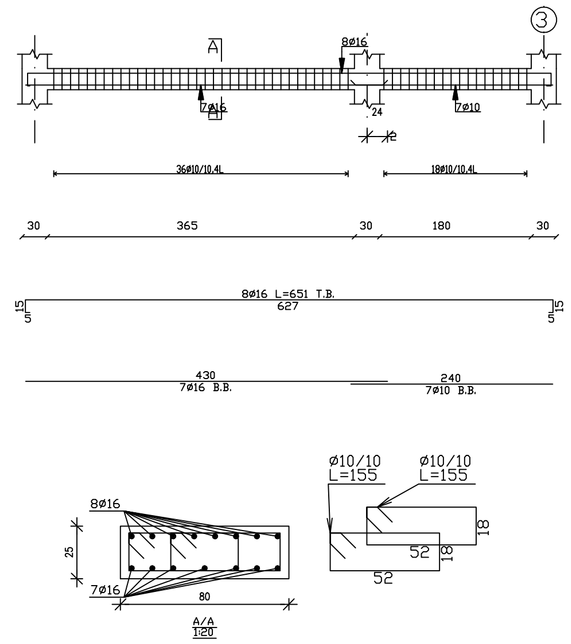
BD38



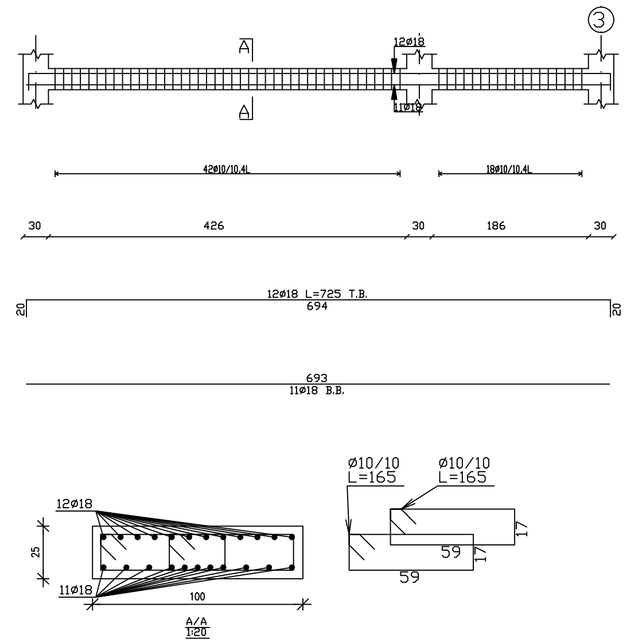
BD37



BD36



BD35



By the name of Allah



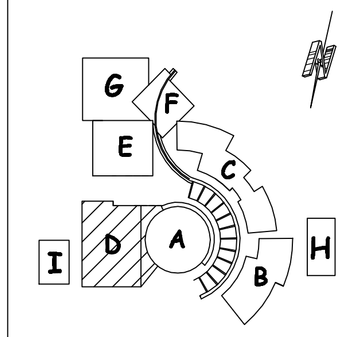
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

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I	Parking 2

Drawing Title

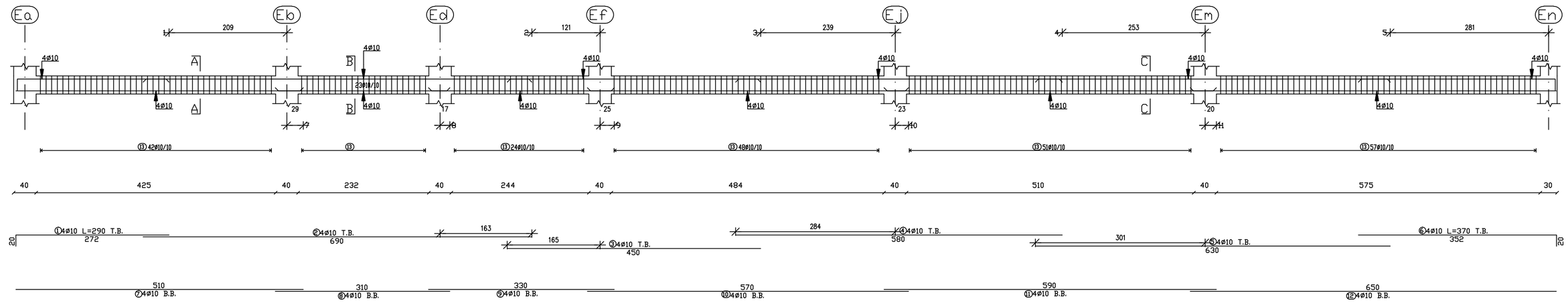
Theater Beame's

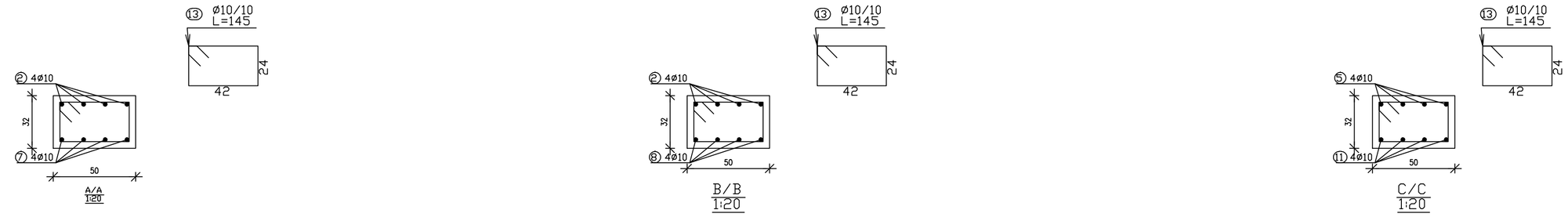
Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

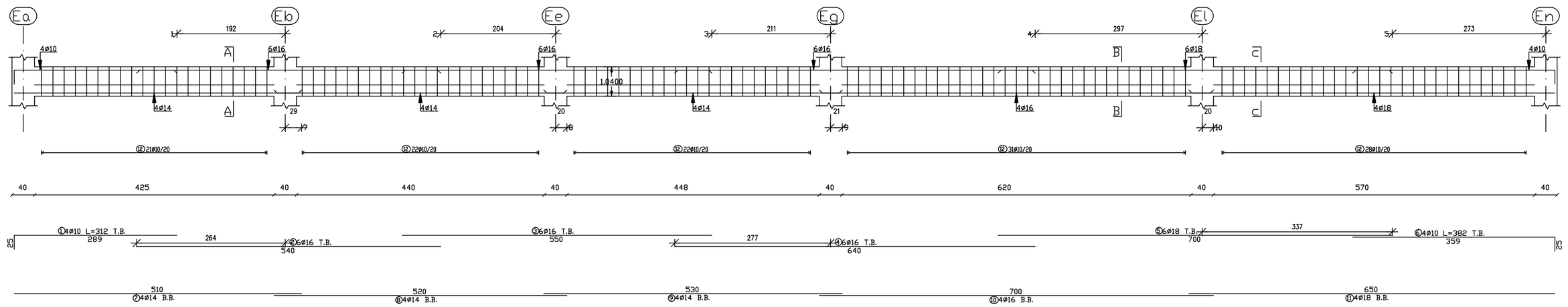
Scale	*No.of Draw*	*Date*
1/50	S109	2013/2014

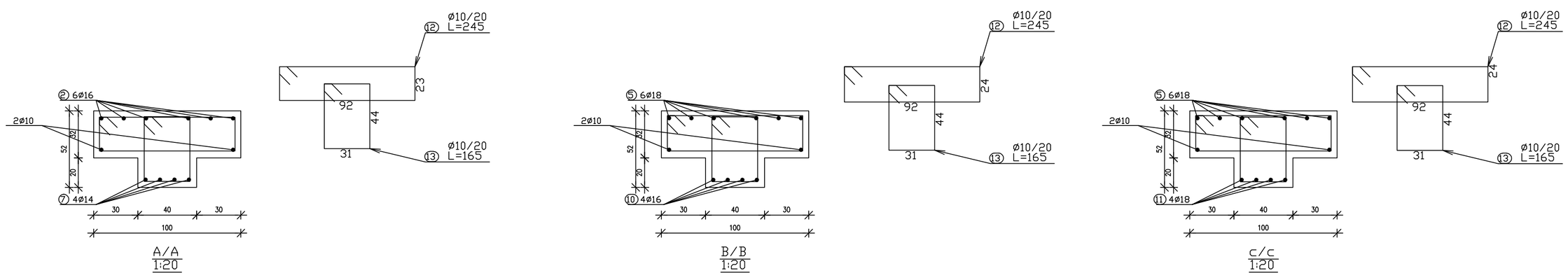
Beam: BE1 hand





Beam: BE2 hand





By the name of Allah

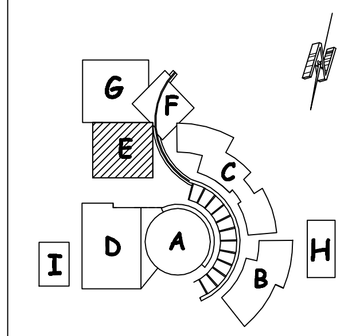
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

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Tabel of Building

Number	Name
A	Reception
B	Sport hall
C	Building activities
D	Theater
E	Handicrafts
F	Restaurant
G	Photo Gallery
H	Parking 1
I	Parking 2

Drawing Title

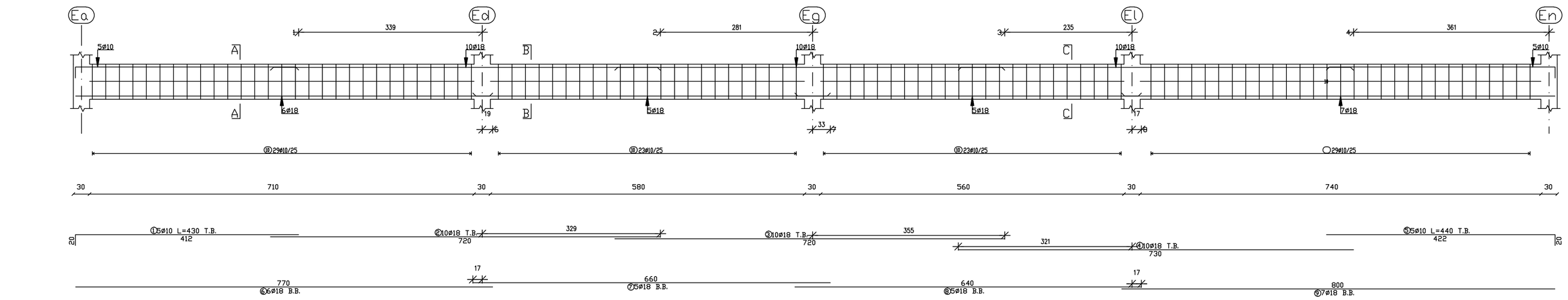
Handicraft's Beame's

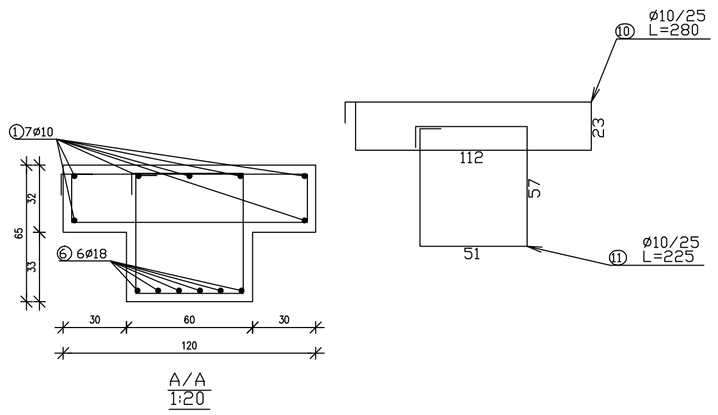
Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

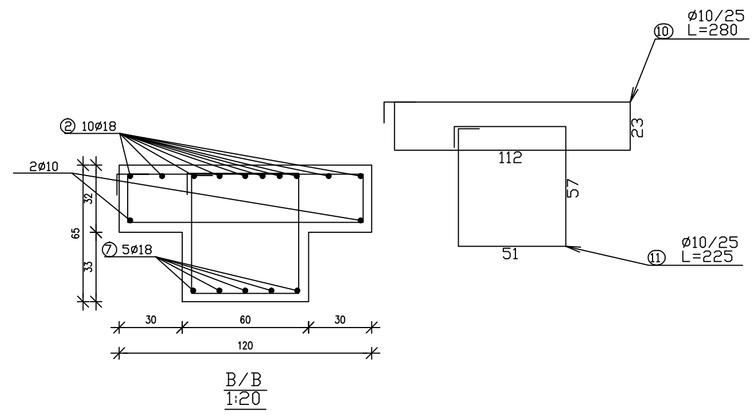
Scale	*No.of Draw*	*Date*
1/50	S110	2013/2014

Beam: BE3 hand

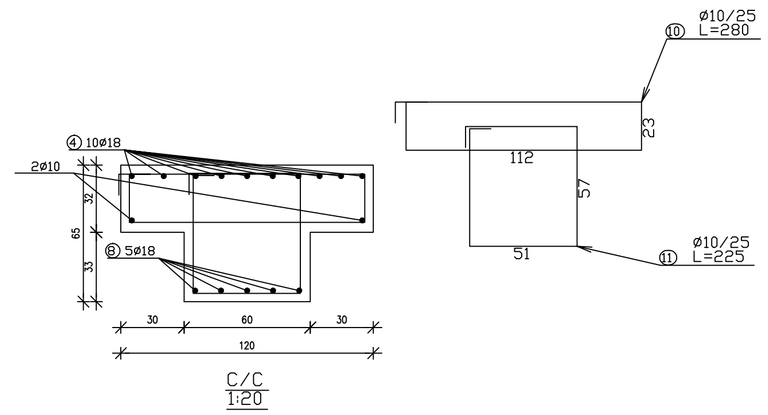




A/A
1:20

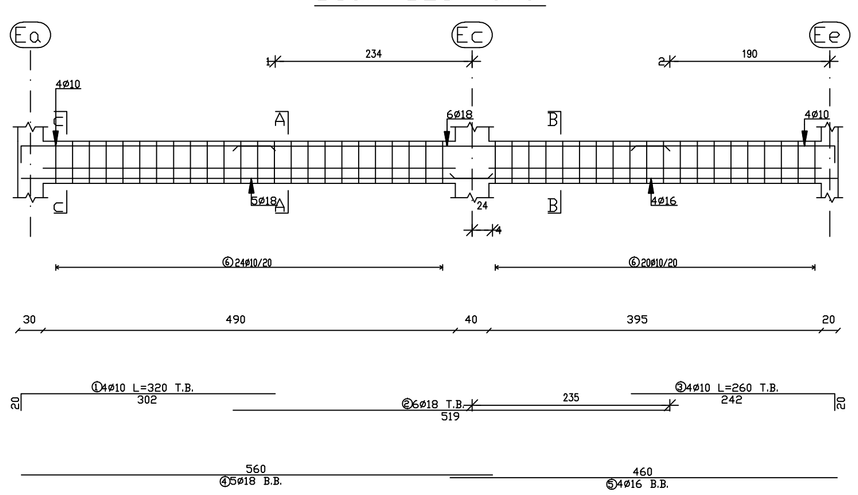


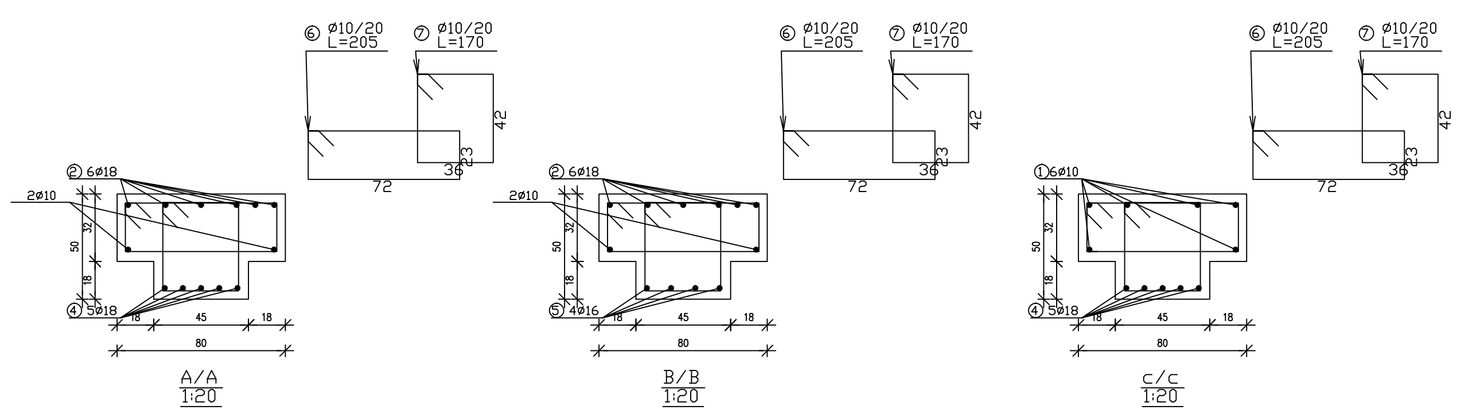
B/B
1:20



C/C
1:20

Beam: BE5 hand



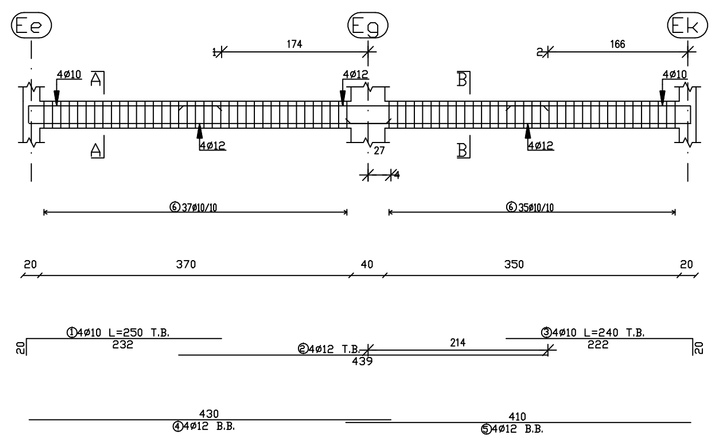


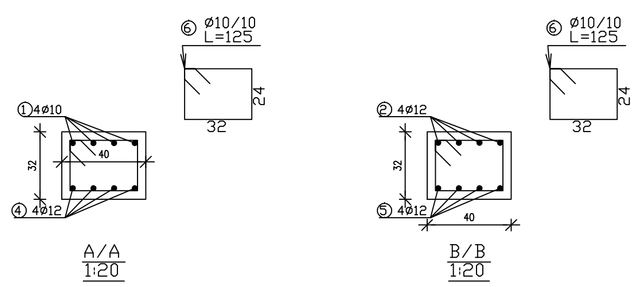
A/A
1:20

B/B
1:20

C/c
1:20

Beam: BE4 hand





A/A
1:20

B/B
1:20

By the name of Allah

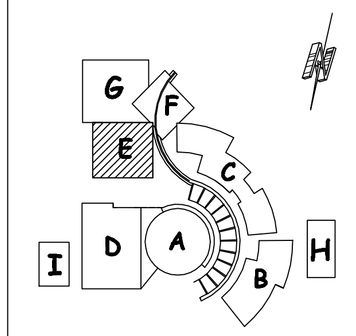
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

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I	Parking 2

Drawing Title

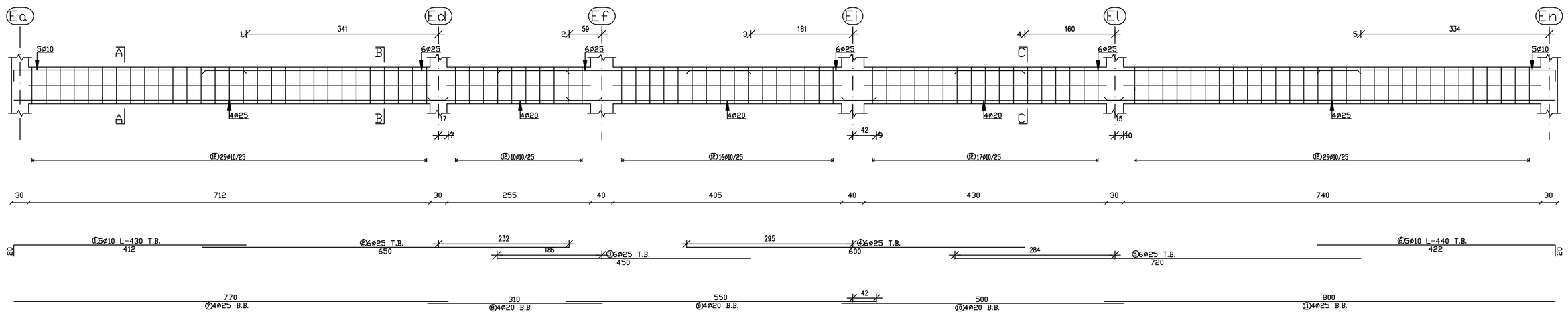
Handicraft's Beame's

Designed By

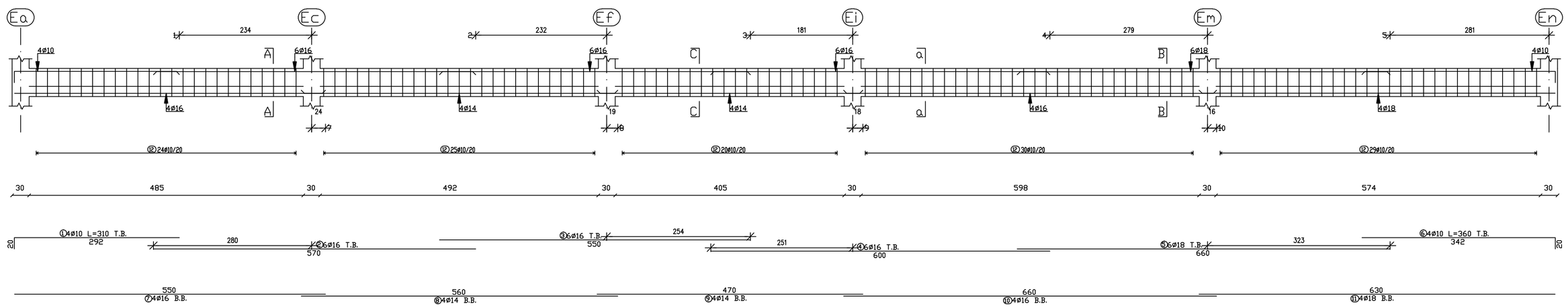
Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	No.of Draw	Date
1/50	S111	2013/2014

Beam: BE6 hand



Beam: BE7 hand



By the name of Allah

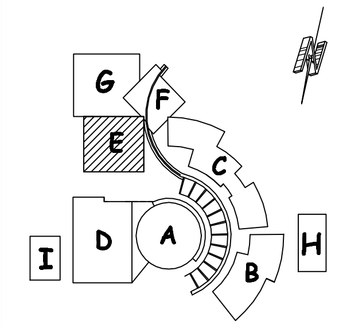
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

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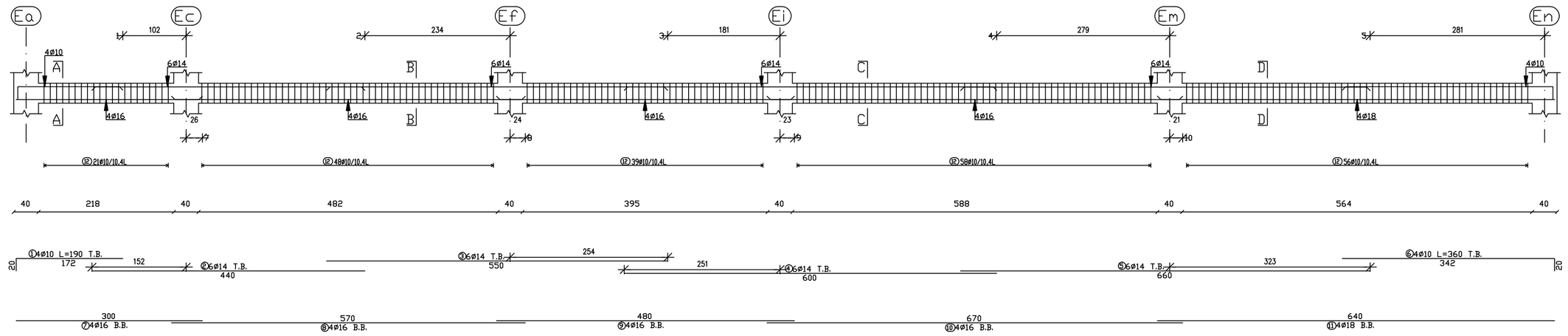
Handicraft's Beame's

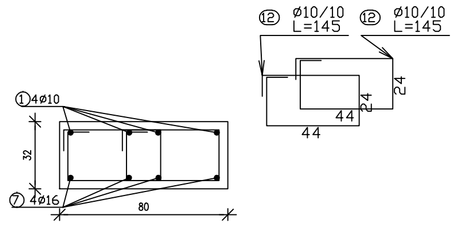
Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

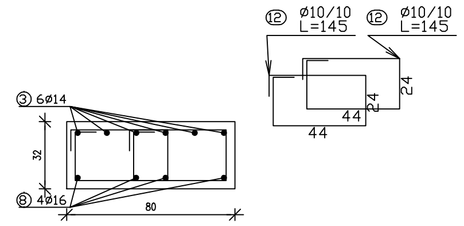
Scale	No.of Draw	Date
1/50	S112	2013/2014

Beam: BE8 hand

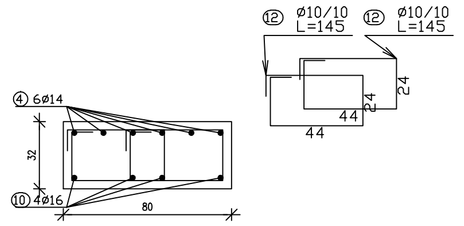




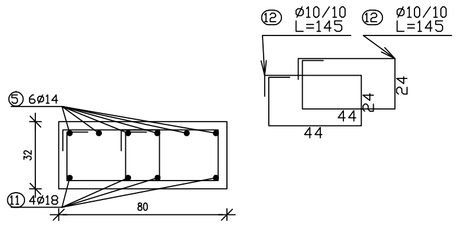
A/A
1:20



B/B
1:20

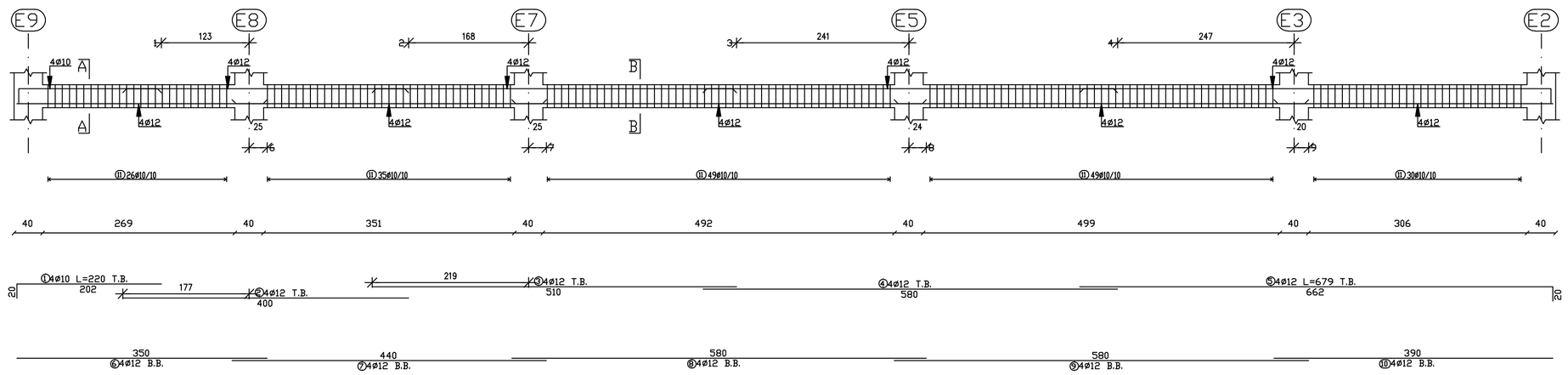


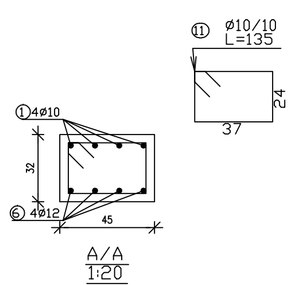
C/C
1:20



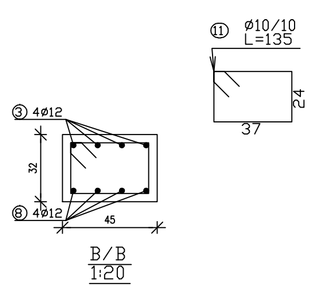
D/D
1:20

Beam: BE9 hand





A/A
1:20



B/B
1:20

By the name of Allah

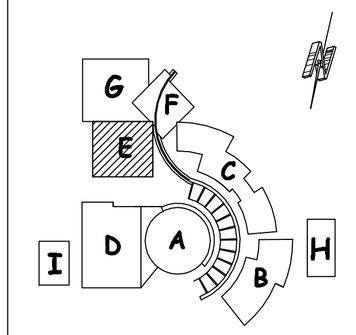
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

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I	Parking 2

Drawing Title

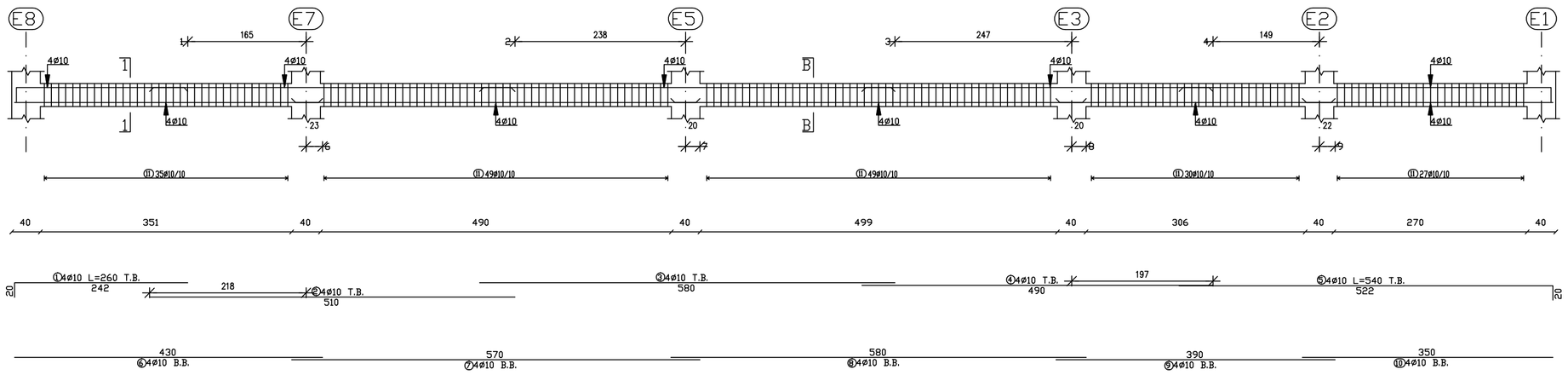
Handicraft's Beame's

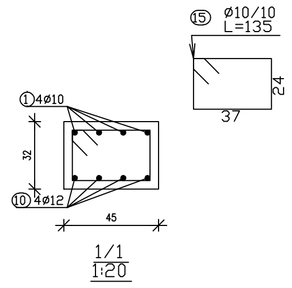
Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

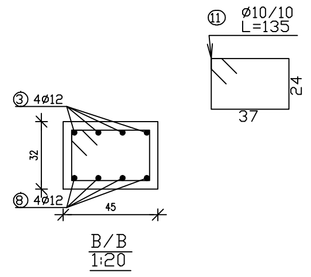
Scale	No.of Draw	Date
1/50	S113	2013/2014

Beam: BE10 hand



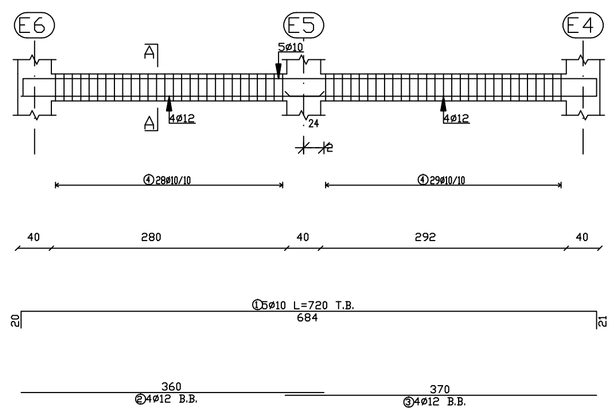


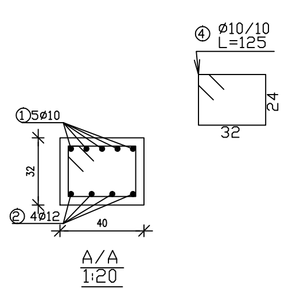
1/1
1:20



B/B
1:20

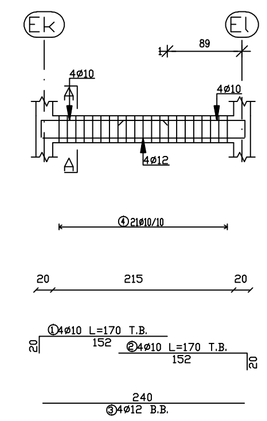
Beam: BE12 hand

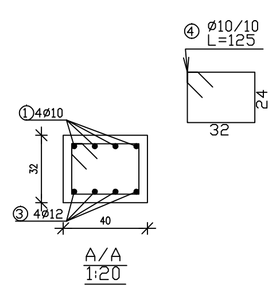




A/A
1:20

Beam: BE11 hand





A/A
1:20

By the name of Allah

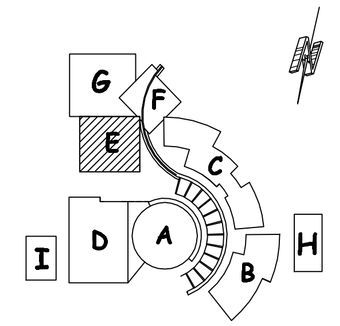
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

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Drawing Title

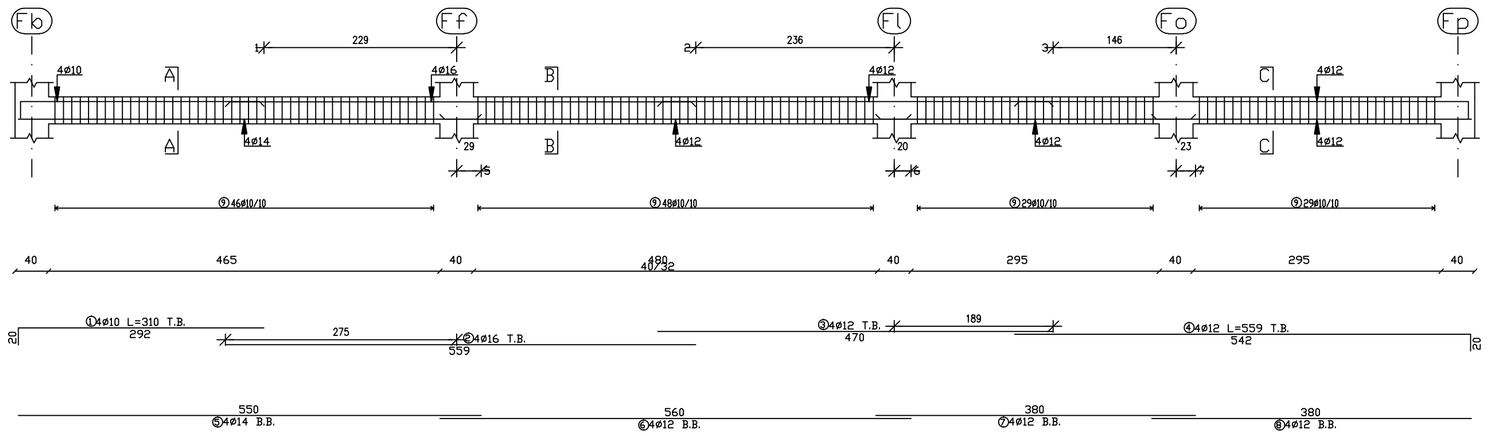
Handicraft's Beame's

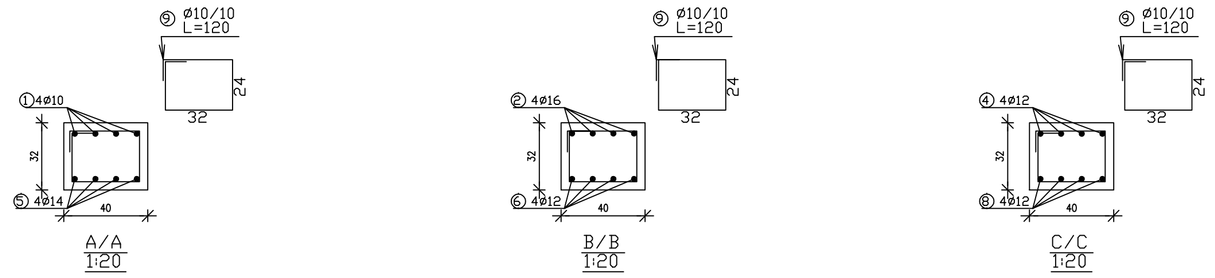
Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

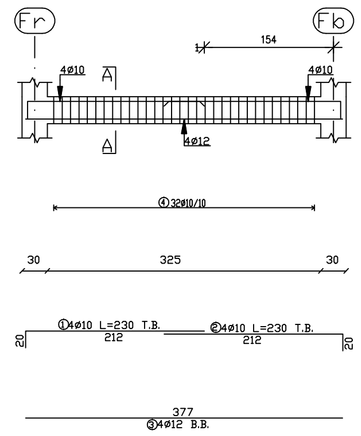
Scale	No.of Draw	Date
1/50	S114	2013/2014

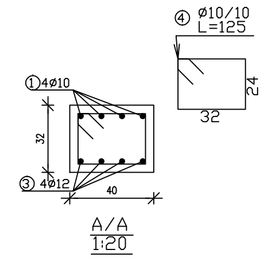
Beam: BF2 RES



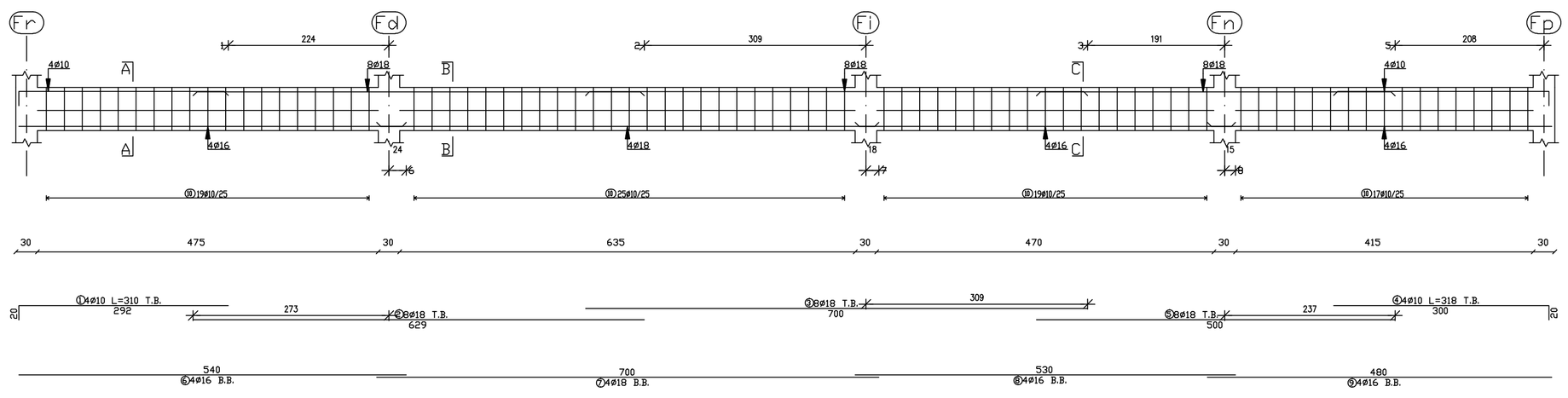


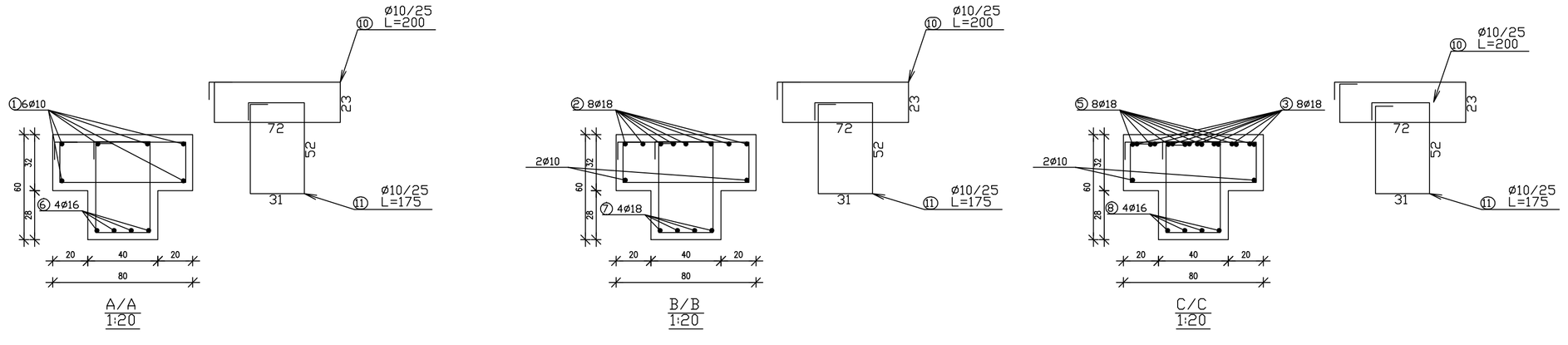
Beam: BF1 RES Fb





Beam: BF3 RES





By the name of Allah

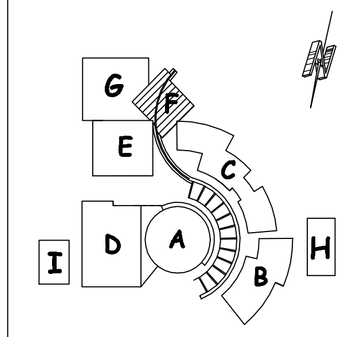
Graduation Project

Palestine Polytechnic University

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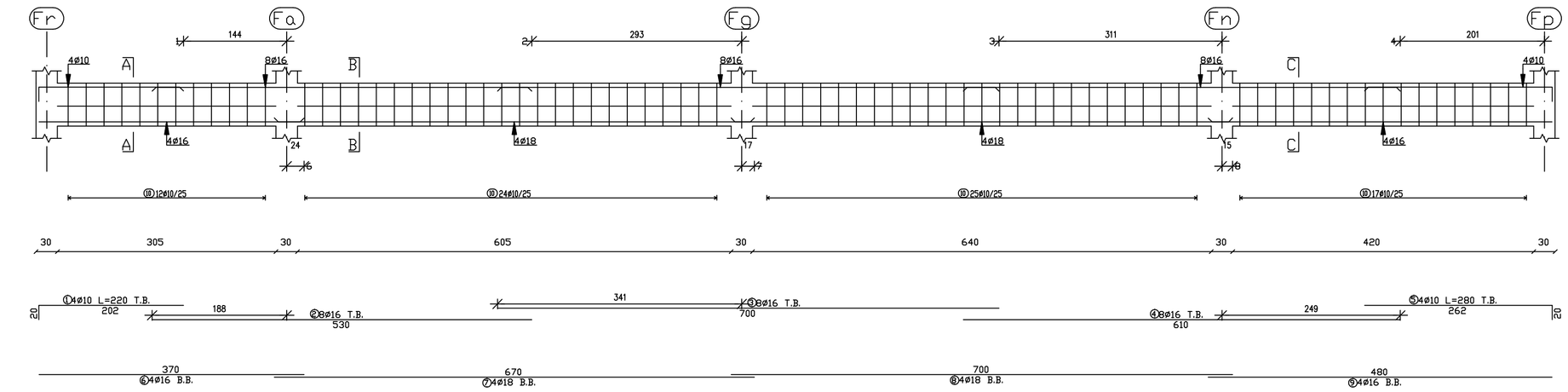
Restaurant Beame's

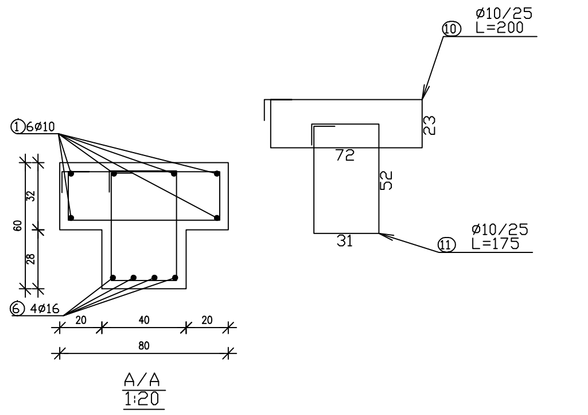
Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

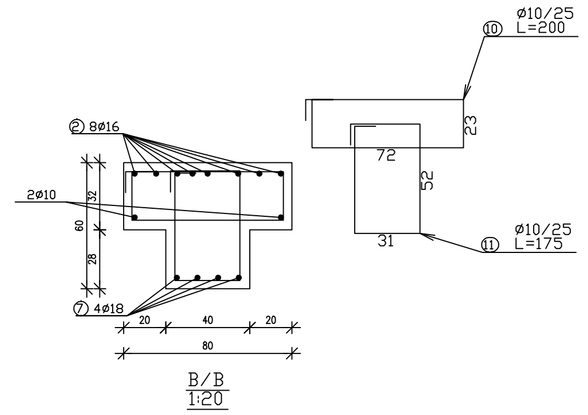
Scale	No.of Draw	Date
1/50	S115	2013-3014

Beam: BF4 RES

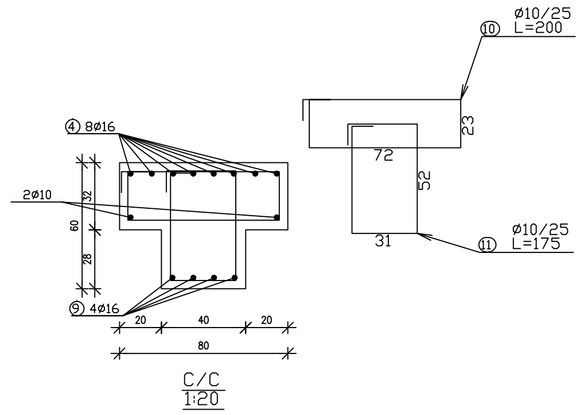




A/A
1:20

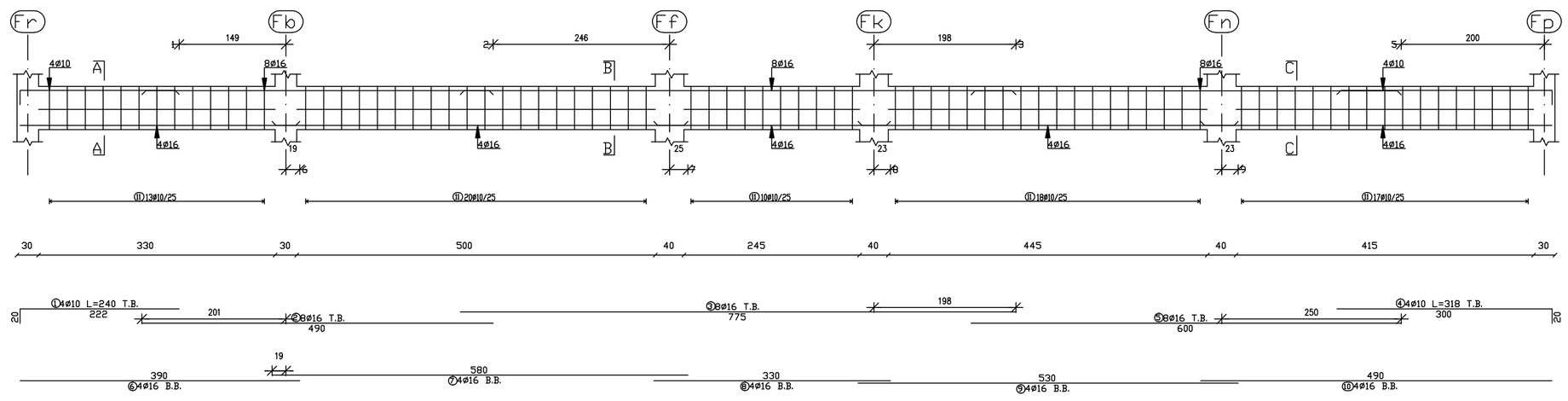


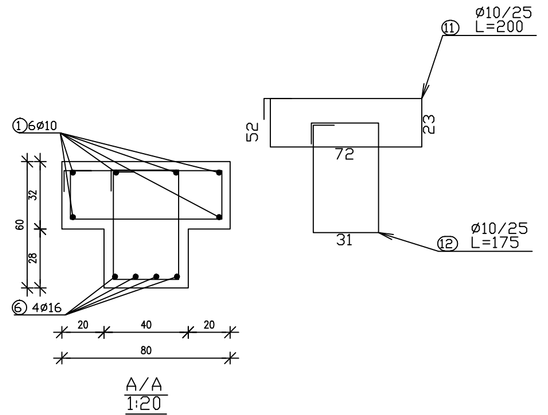
B/B
1:20



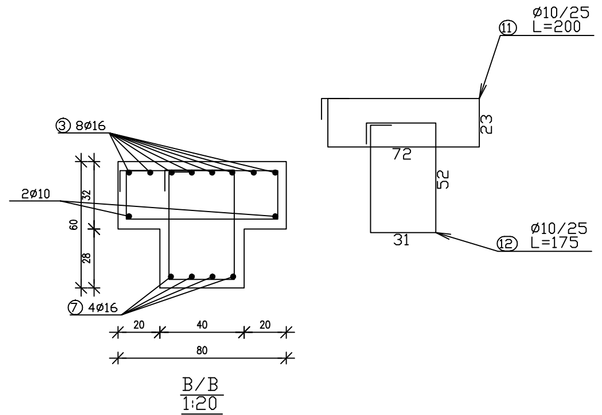
C/C
1:20

Beam: BF5 RES

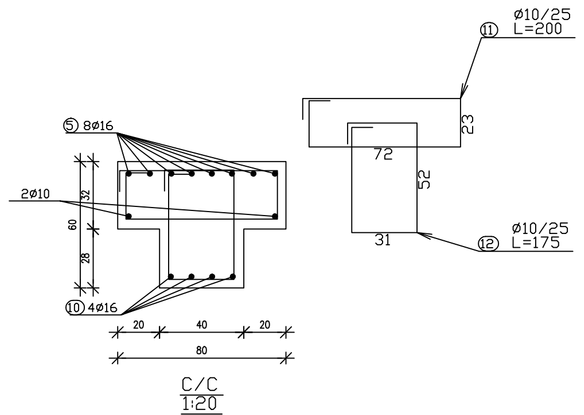




A/A
1:20



B/B
1:20



C/C
1:20

By the name of Allah

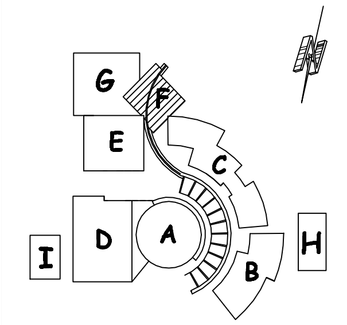
Graduation Project

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Civil Engineering

Hebron Culture Palace

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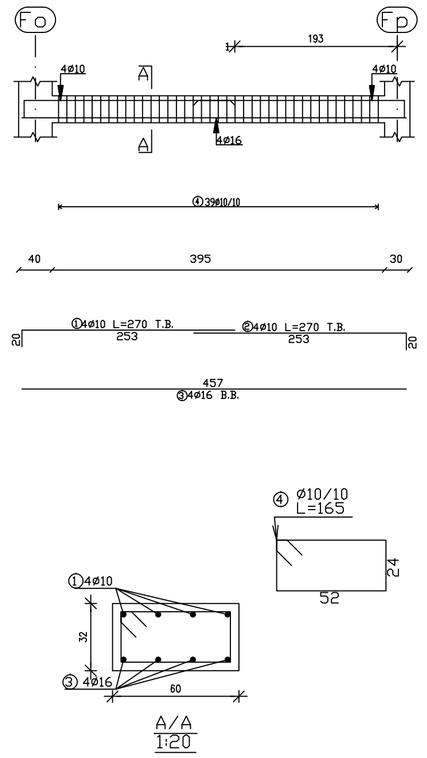
Restaurant Beame's

Designed By

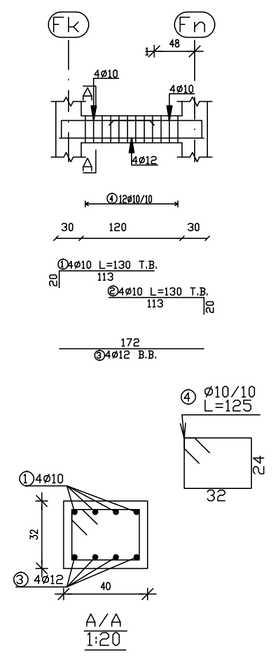
Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	*No.of Draw*	*Date*
1/50	S116	2013-3014

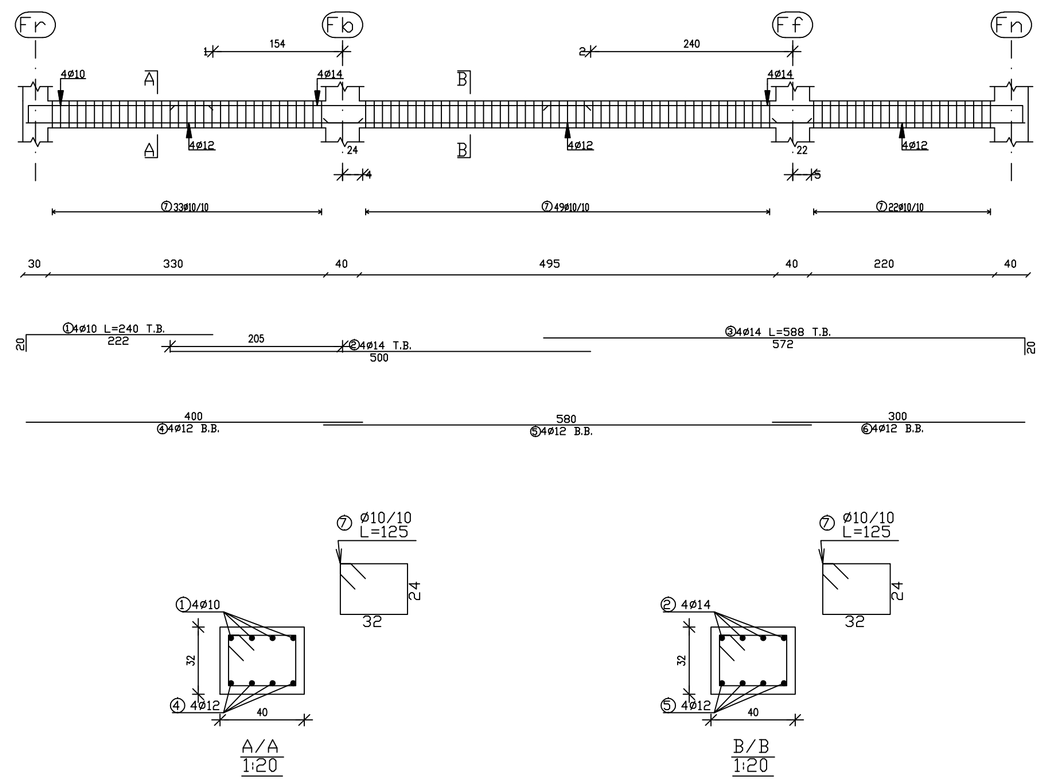
Beam: BF7 RES



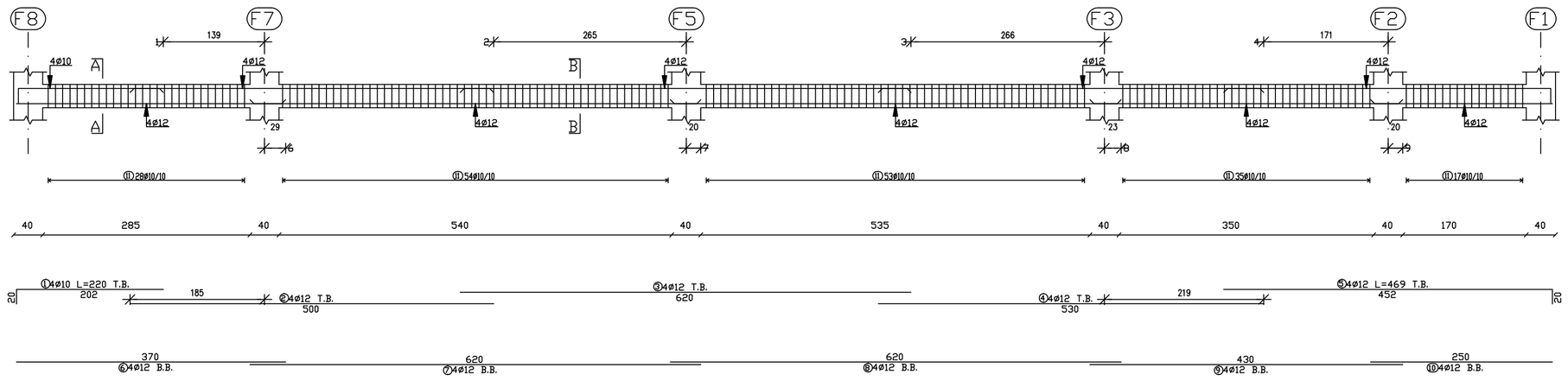
Beam: BF6b RES

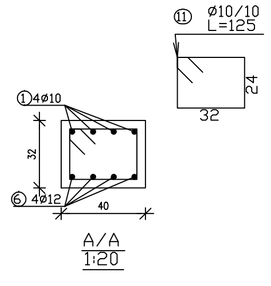


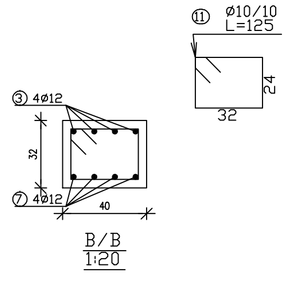
Beam: BF6 RES



Beam: BF8 RES







By the name of Allah

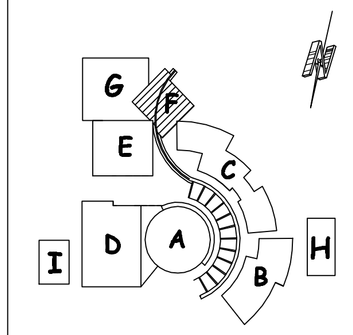
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building	
Number	Name
A	Reception
B	Sport hall
C	Building activities
D	Theater
E	Handicrafts
F	Restaurant
G	Photo Gallery
H	Parking 1
I	Parking 2

Drawing Title

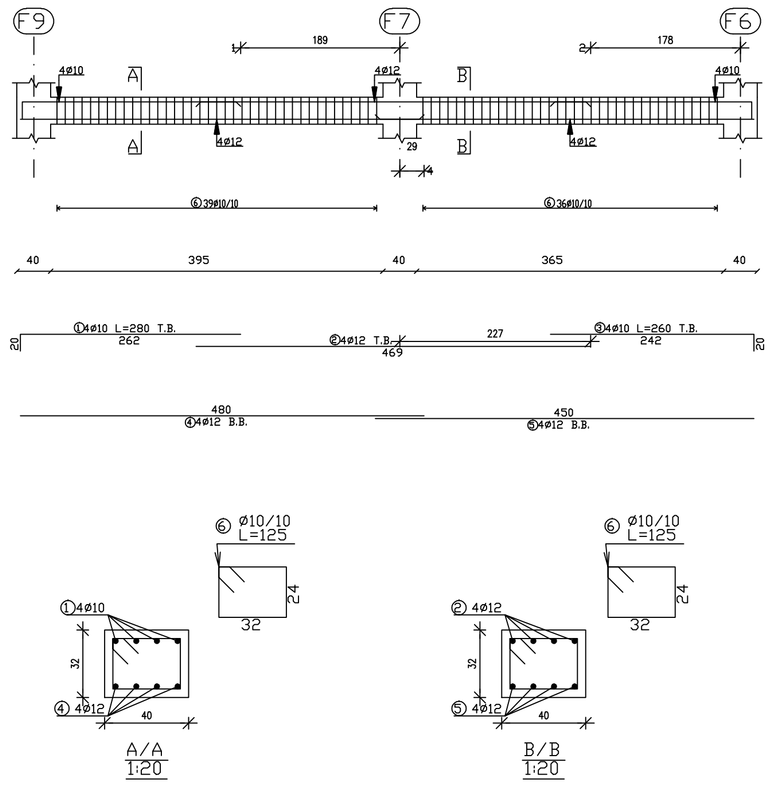
Restaurant Beame's

Designed By

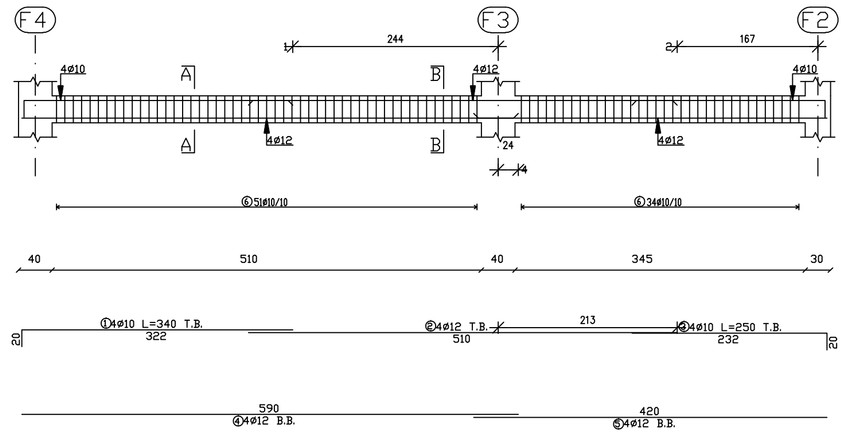
Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

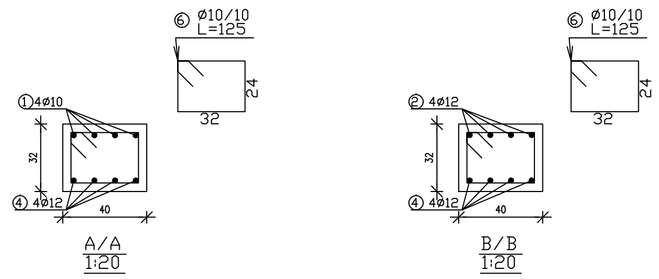
Scale	No.of Draw	Date
1/50	S117	2013-3014

Beam: BF10 RES

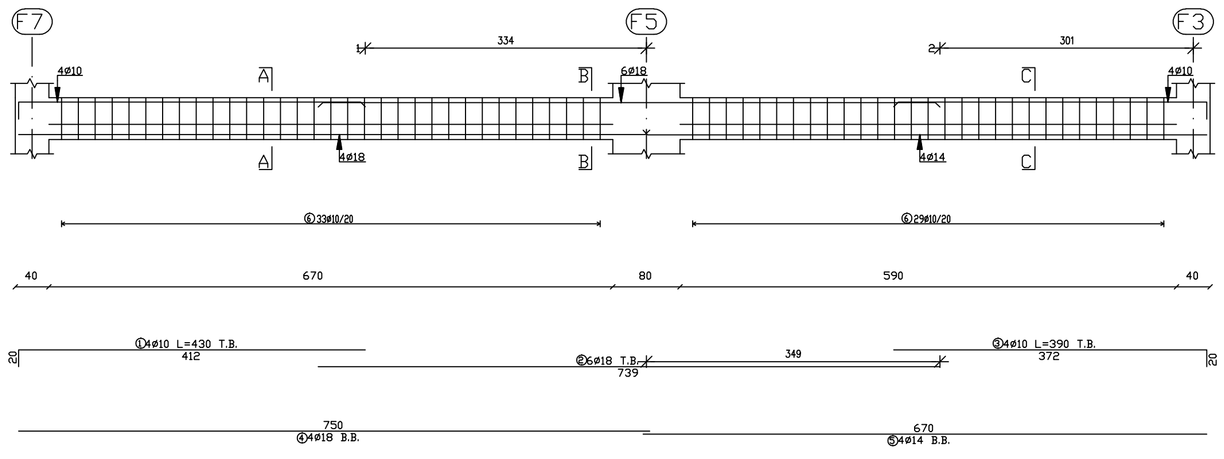


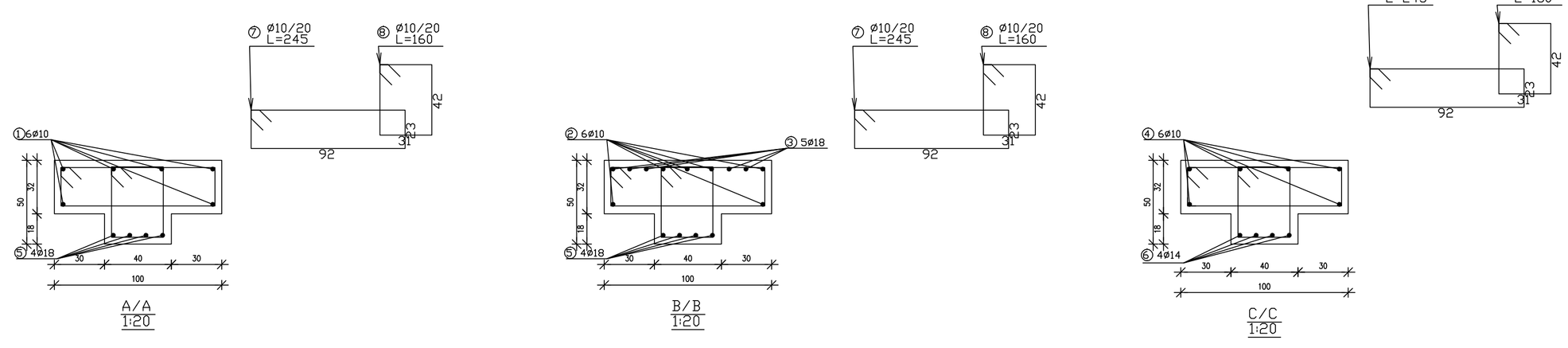
Beam: BF9 RES





Beam: BF11 RES





By the name of Allah

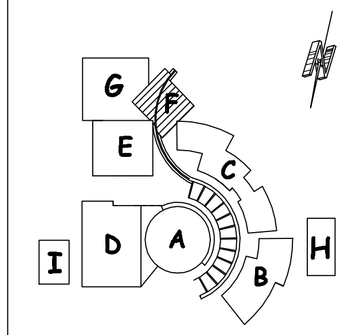
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

Number	Name
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H	Parking 1
I	Parking 2

Drawing Title

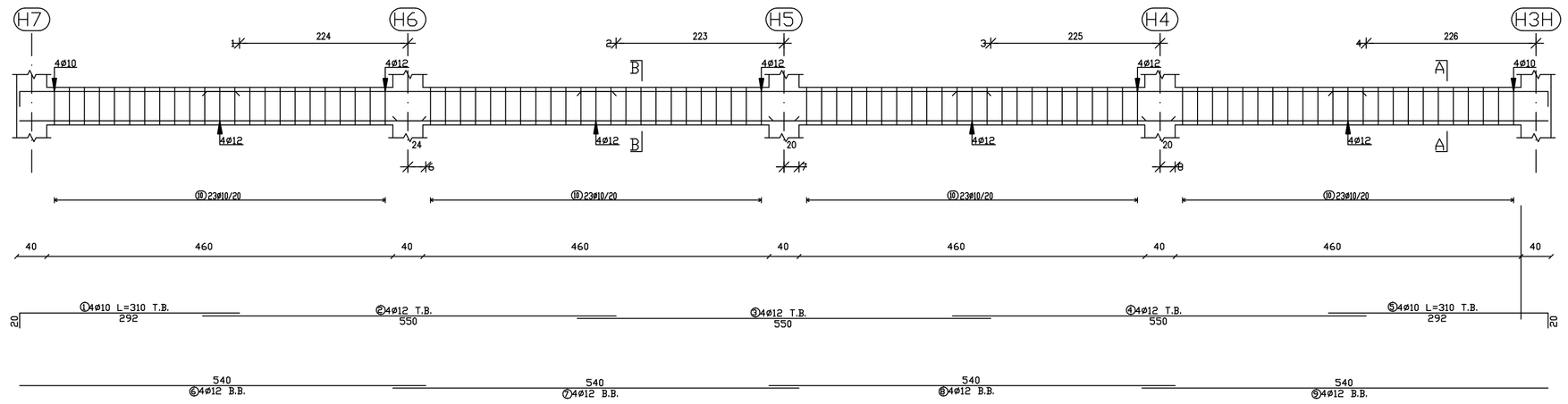
Restaurant Beame's

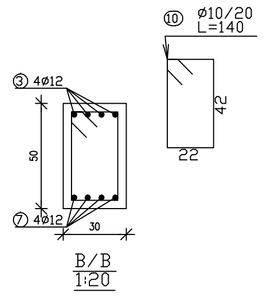
Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

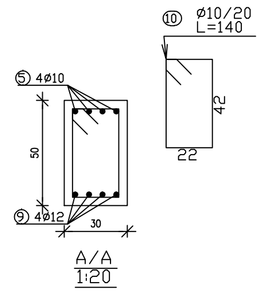
Scale	No.of Draw	Date
1/50	S118	2013-3014

Beam: BH1 par 1



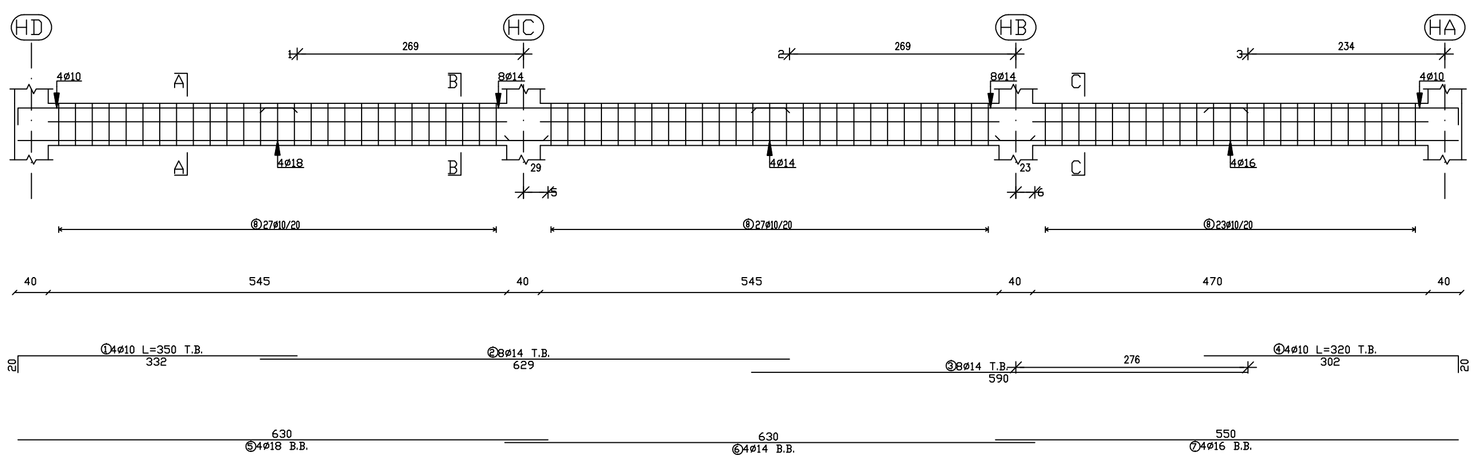


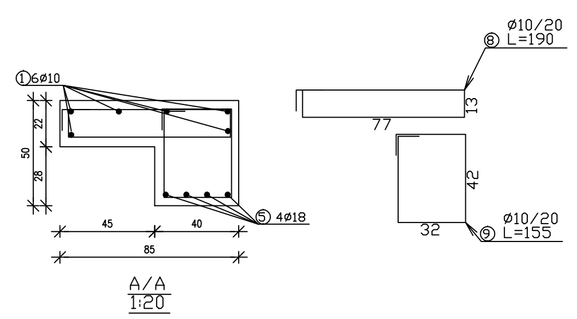
B/B
1:20



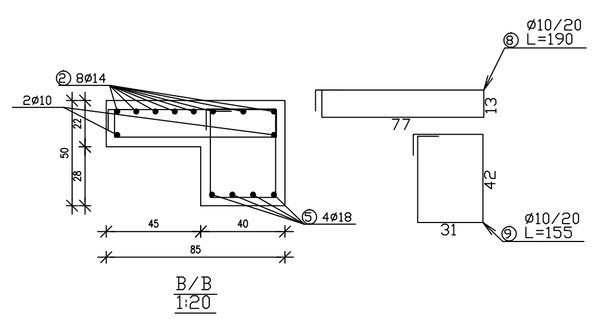
A/A
1:20

Beam: BH2 par 1

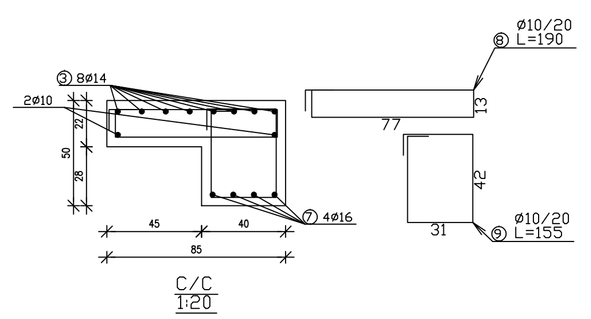




A/A
1:20



B/B
1:20



C/C
1:20

By the name of Allah

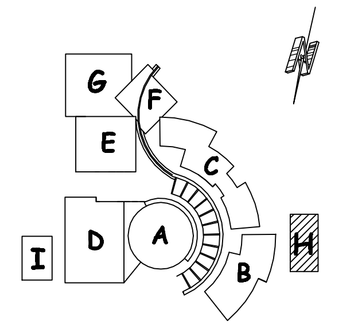
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

Number	Name
A	Reception
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G	Photo Gallery
H	Parking 1
I	Parking 2

Drawing Title

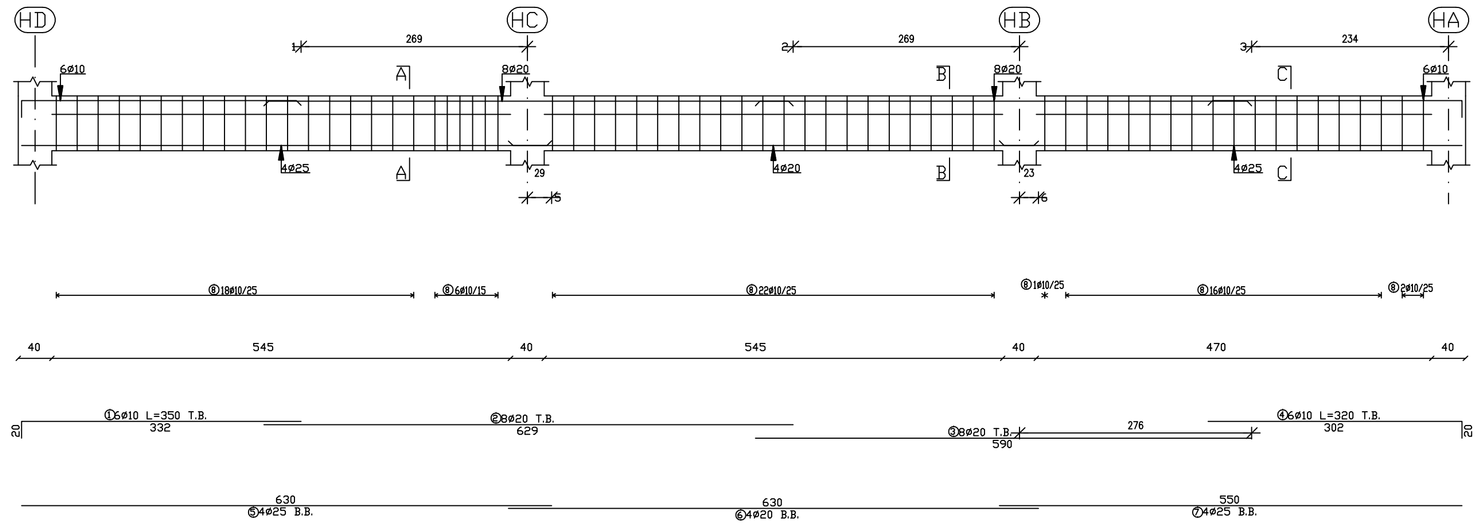
Parking 1 Beame's

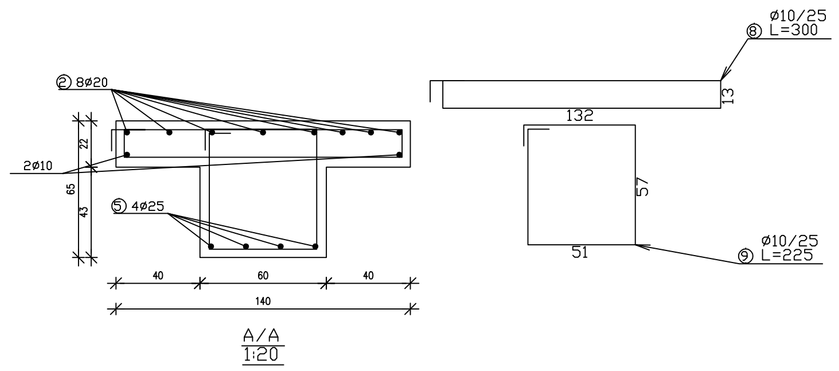
Designed By

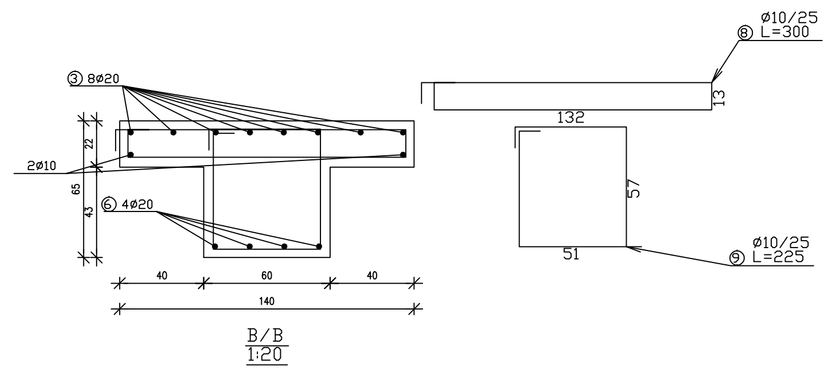
Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

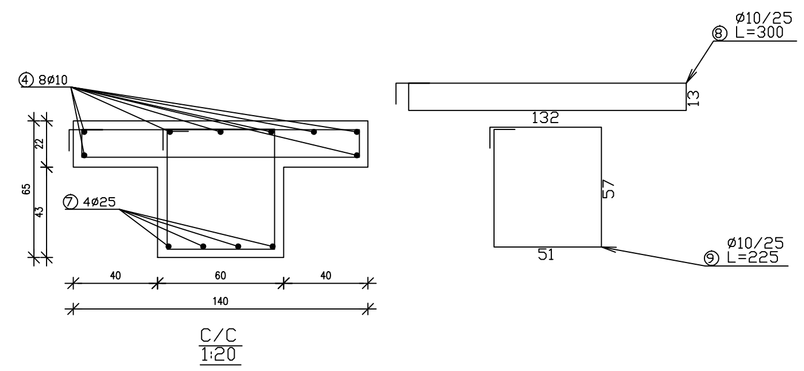
Scale	*No.of Draw*	*Date*
1/50	S119	2013-2014

Beam: BH(3+4+5+6) par 1

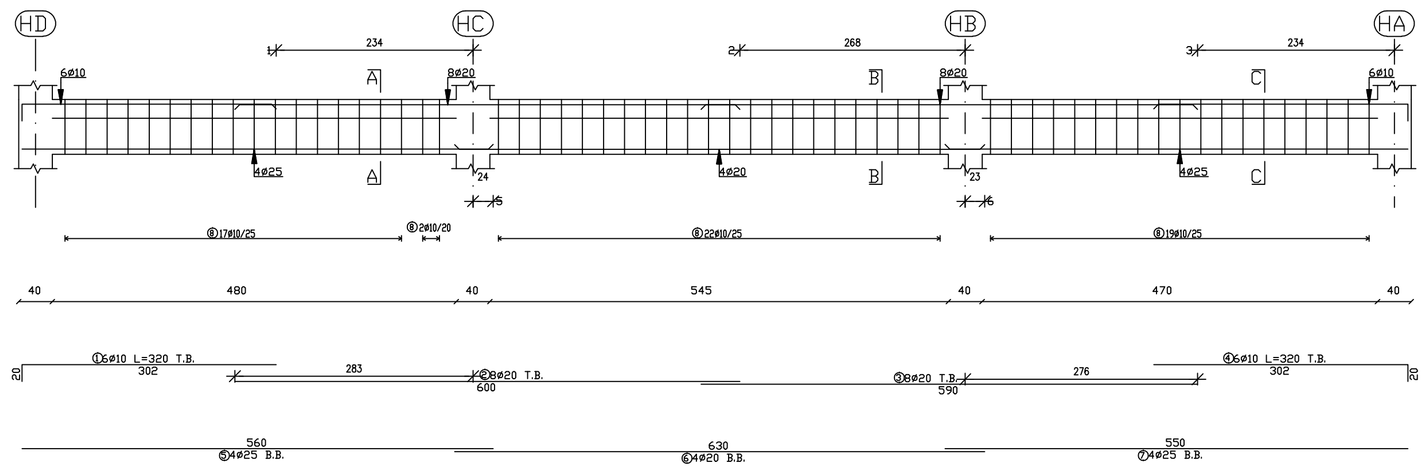


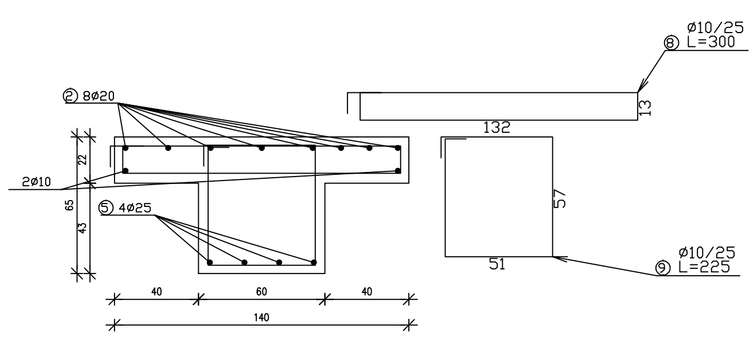


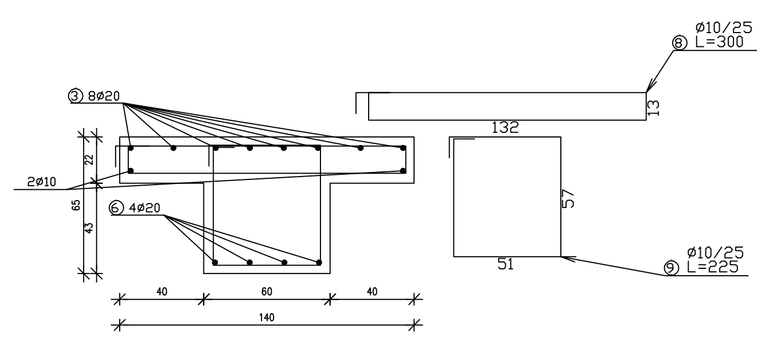


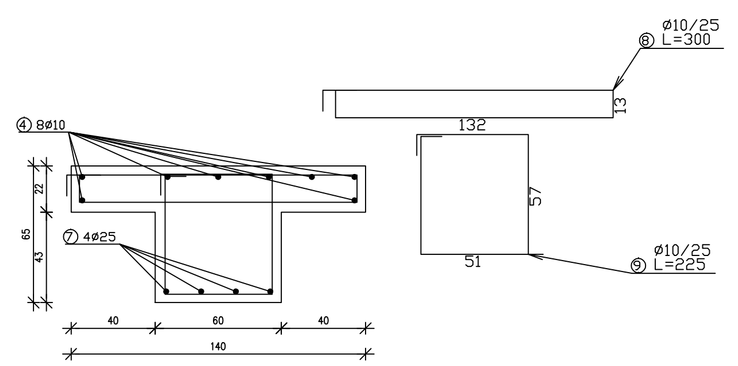


Beam: BH7 par 1









By the name of Allah

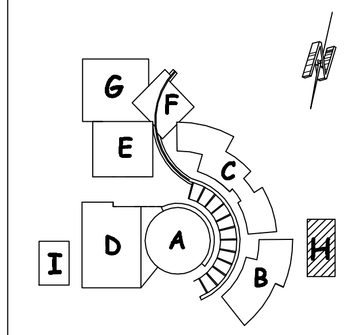
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

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I	Parking 2

Drawing Title

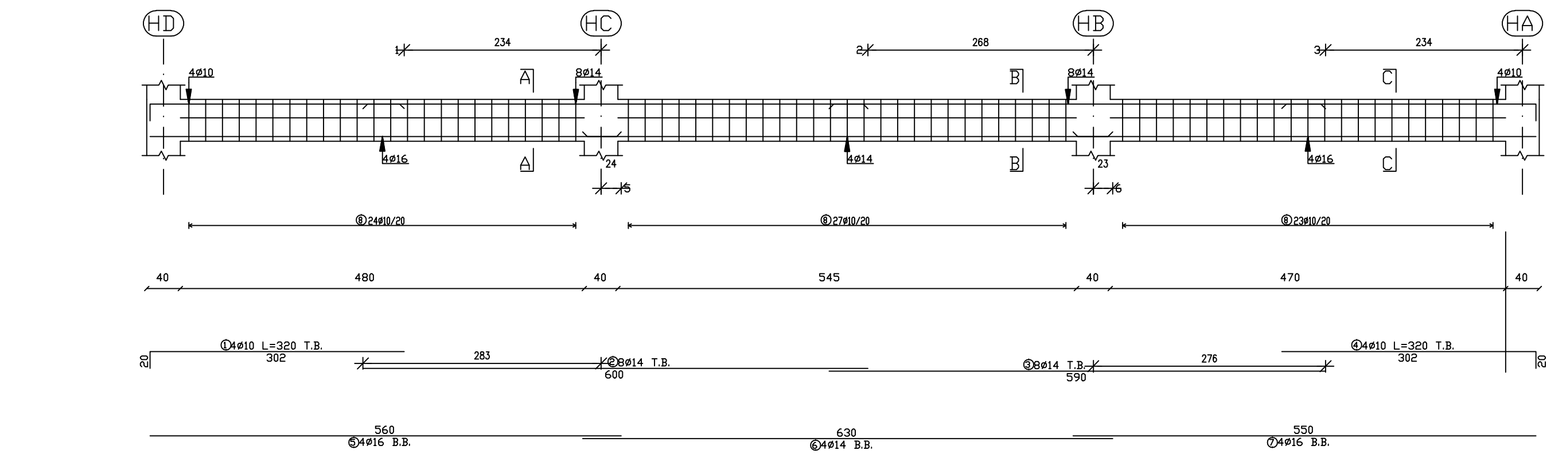
Parking 1 Beame's

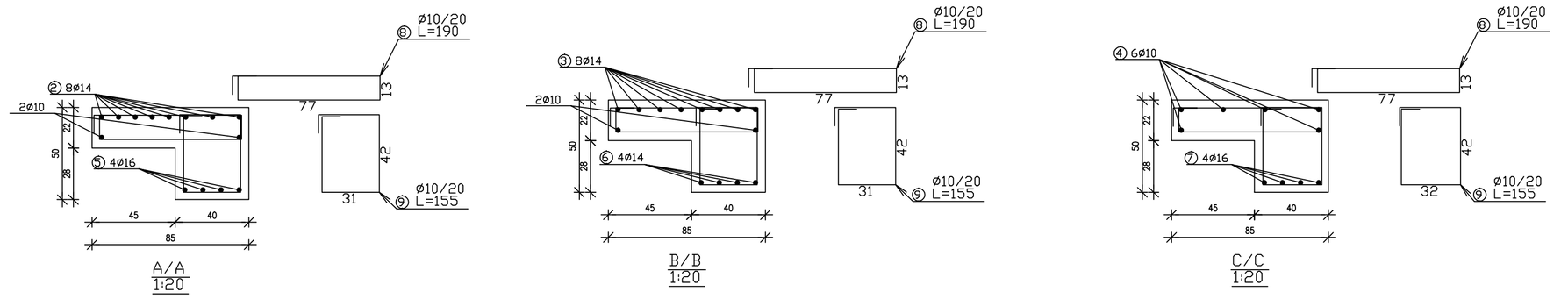
Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

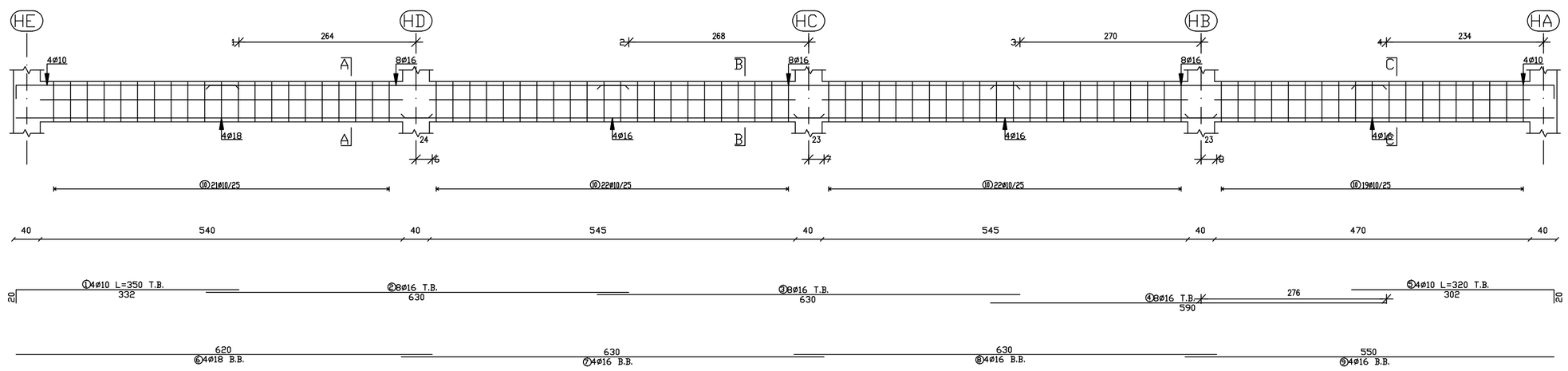
Scale	*No.of Draw*	*Date*
1/50	S120	2013-2014

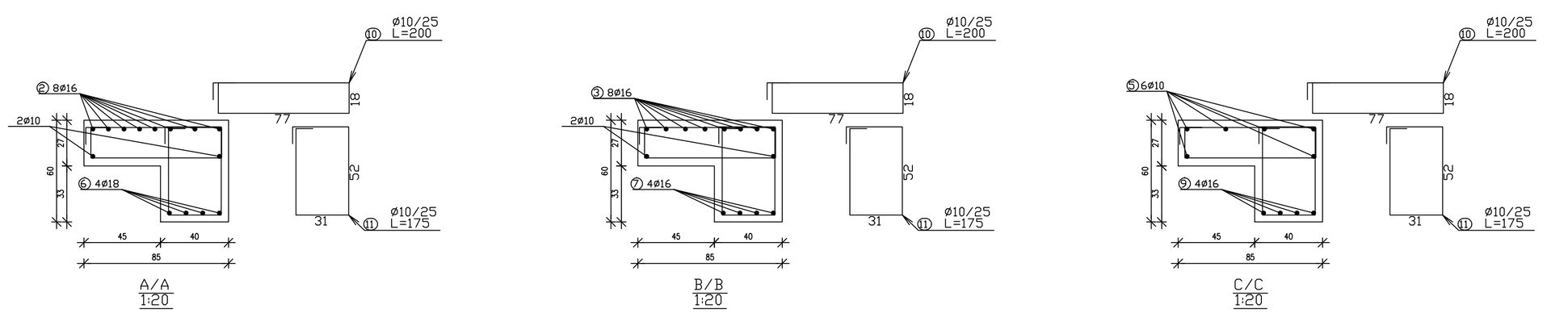
Beam: BH8 par 1





Beam: BH9 par 1





By the name of Allah

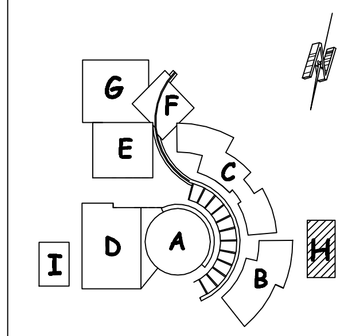
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

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Dr.Nasr Abboushi



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Drawing Title

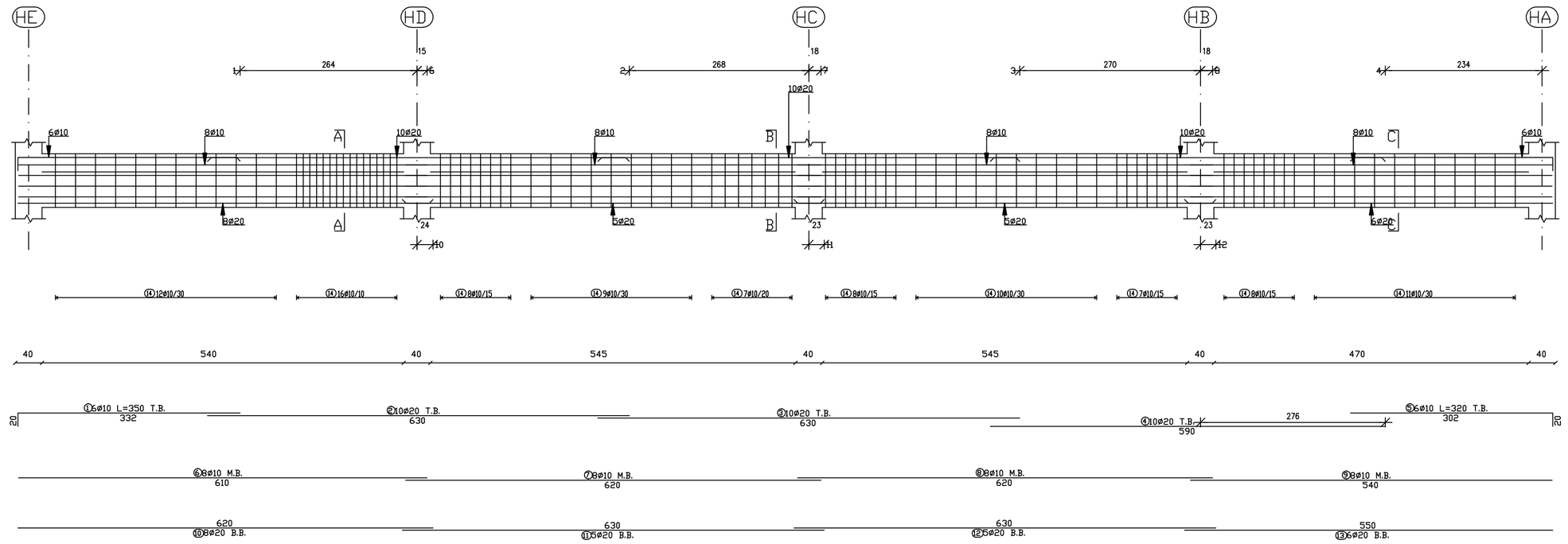
Parking 1 Beame's

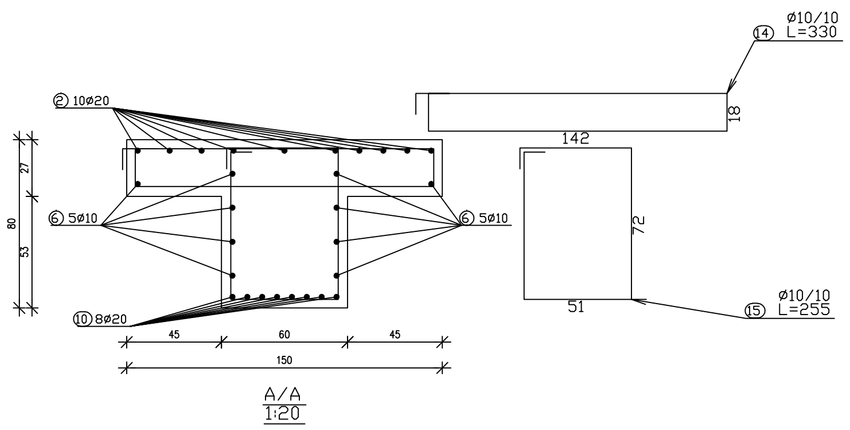
Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

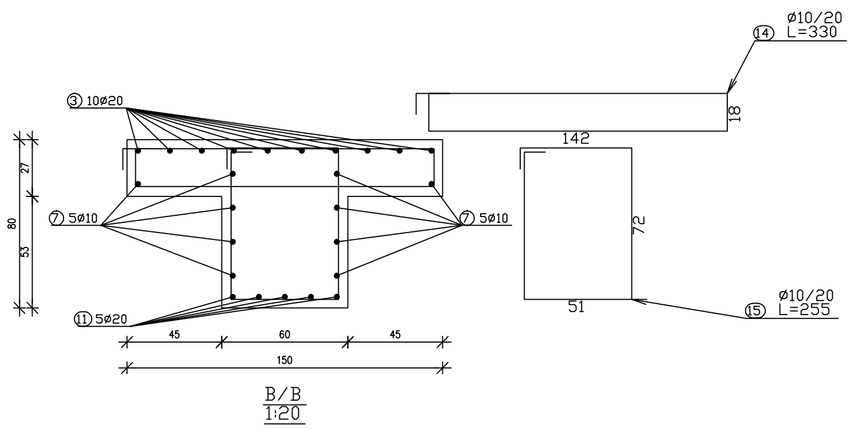
Scale	No.of Draw	Date
1/50	S121	2013-2014

Beam: BH10 par 1

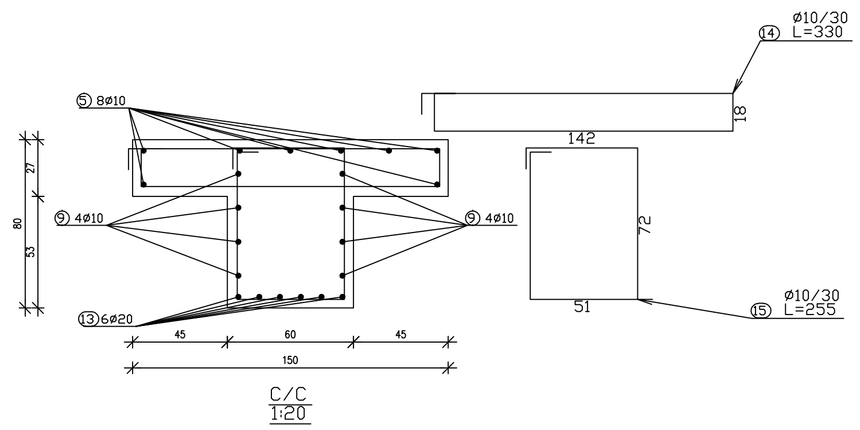




A/A
1:20

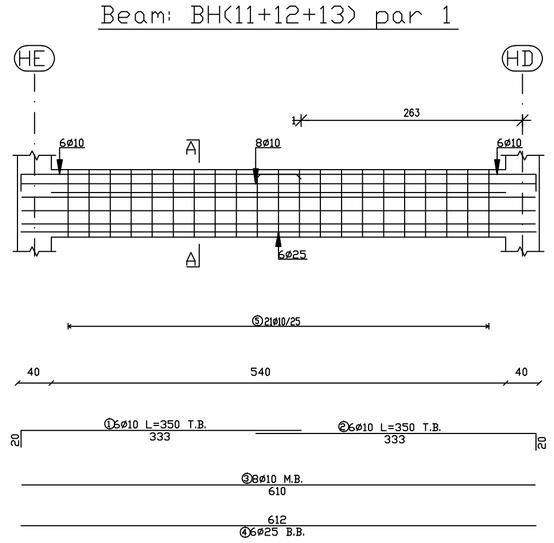


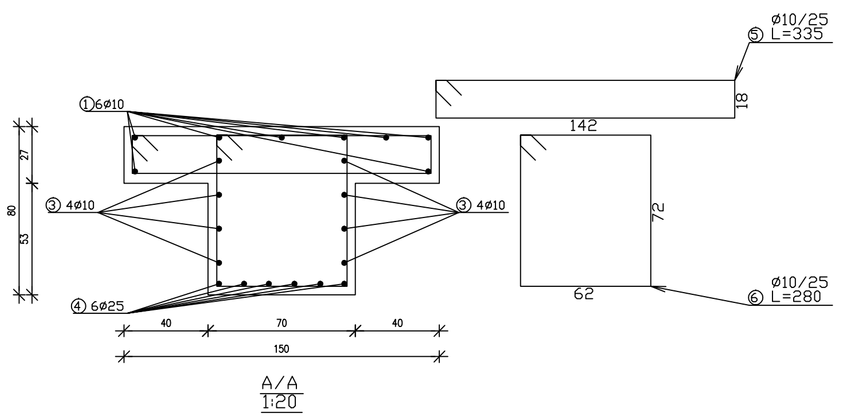
B/B
1:20



C/C
1:20

Beam: BH(11+12+13) par 1





A/A
1:20

By the name of Allah

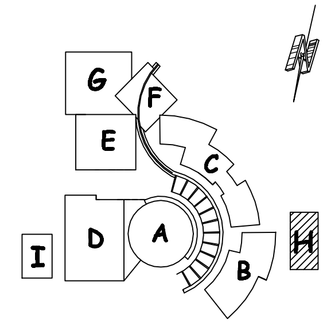
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

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Tabel of Building	
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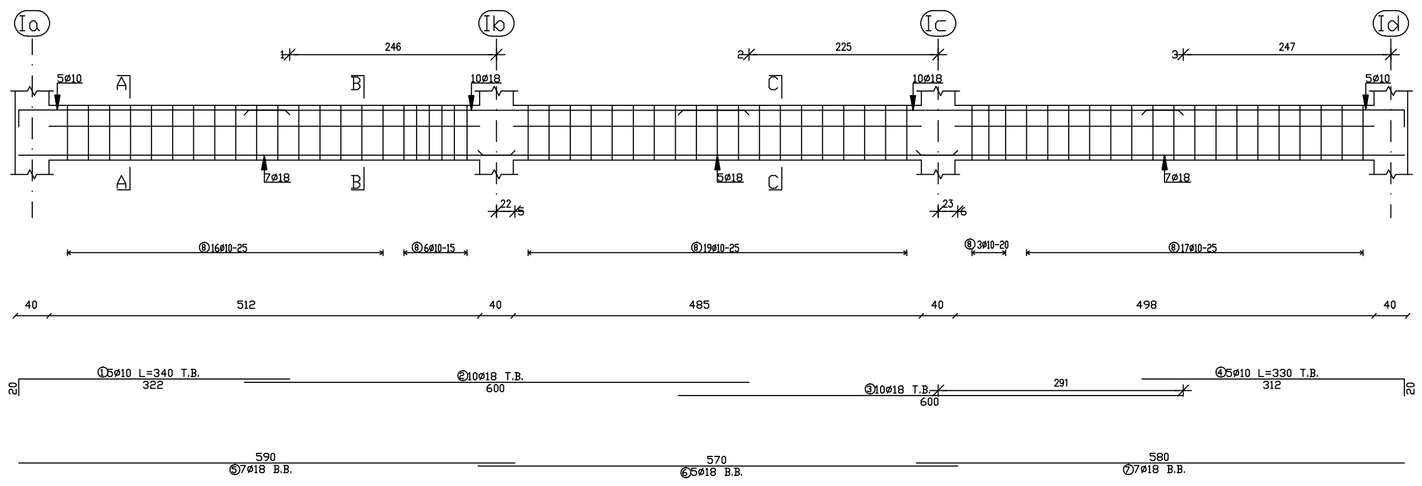
Parking 1 Beame's

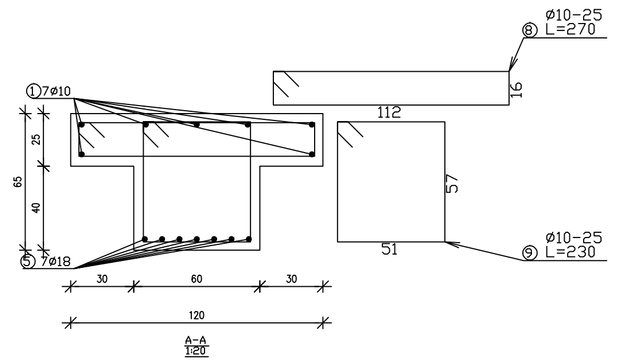
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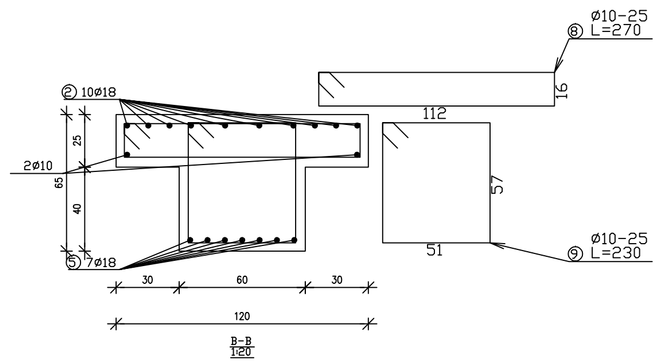
Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

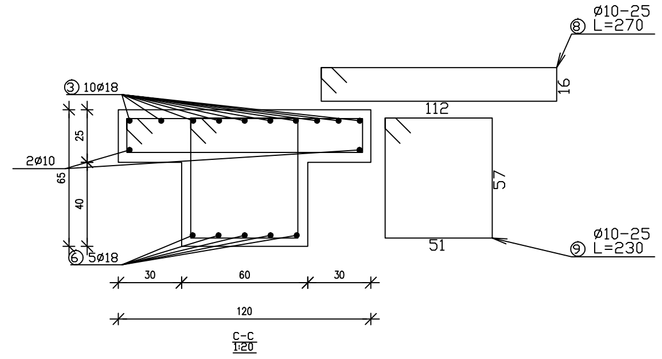
Scale	No.of Draw	Date
1/50	S122	2013-2014

Beam BI1+2+3 PARK2 Ib Ic Id

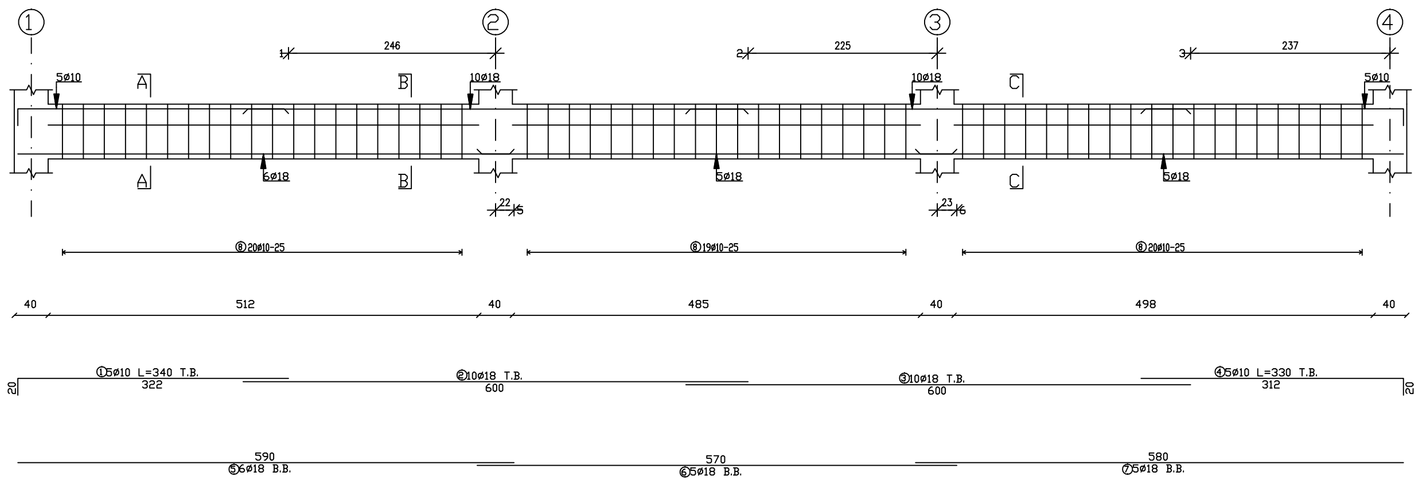


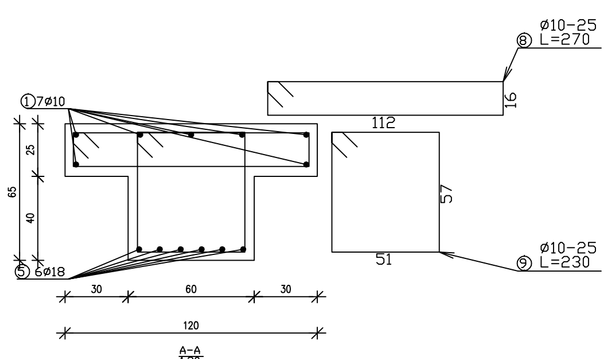


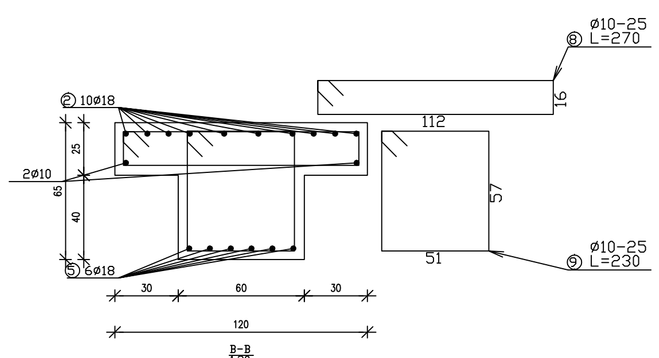


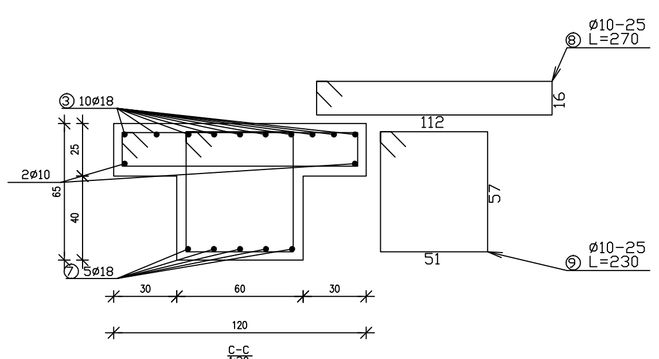


Beam BI4 PARK2









By the name of Allah



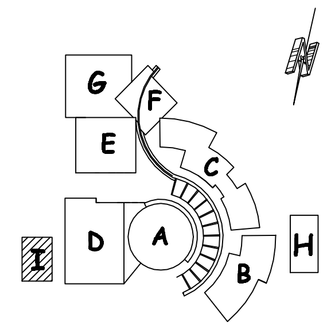
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

Number	Name
A	Reception
B	Sport hall
C	Building activities
D	Theater
E	Handicrafts
F	Restaurant
G	Photo Gallery
H	Parking 1
I	Parking 2

Drawing Title

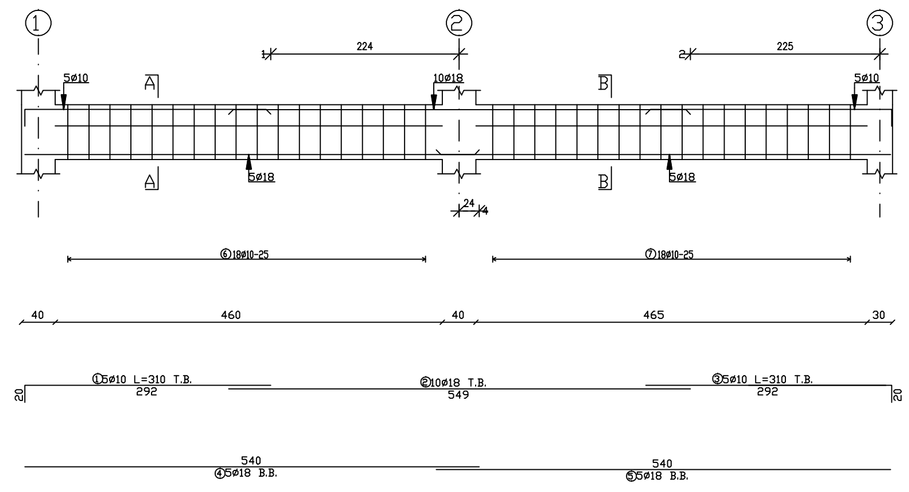
parking 2 Beam's

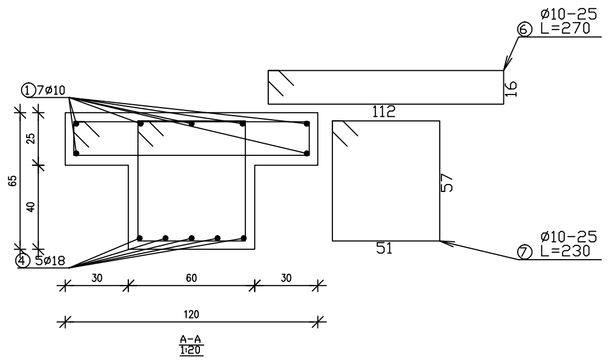
Designed By

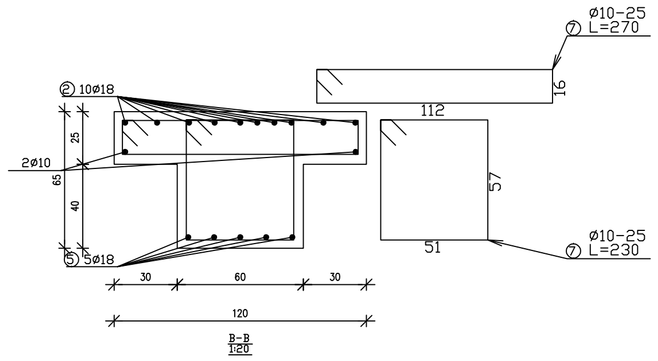
Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

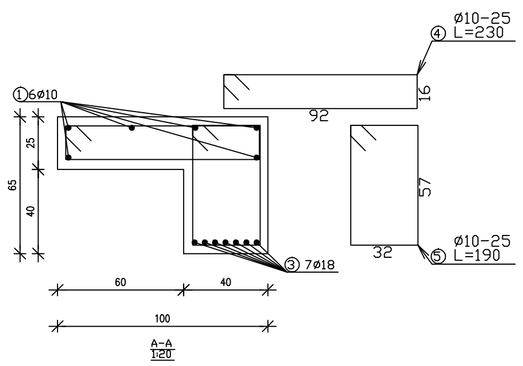
Scale	No.of Draw	Date
1/50	S123	2013-2014

Beam B15 PARK2

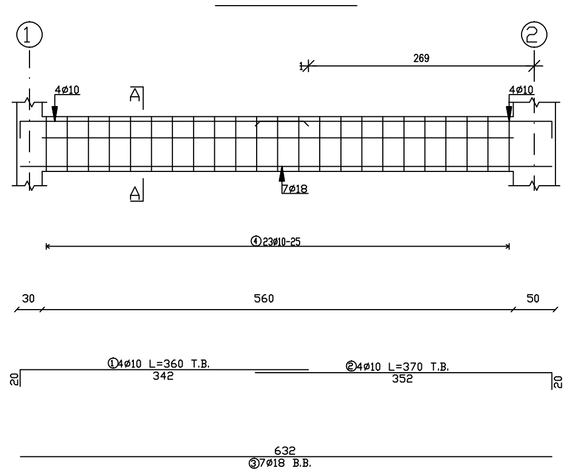








Beam: 1 2



By the name of Allah

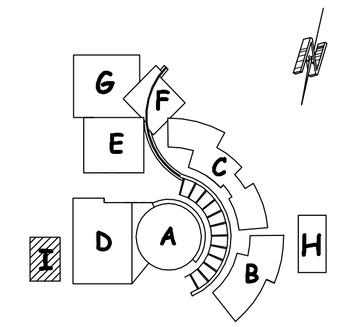
Graduation Project

Palestine Polytechnic University

Civil Engineering

Hebron Culture Palace

Supervisor:
Dr.Nasr Abboushi



Tabel of Building

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I	Parking 2

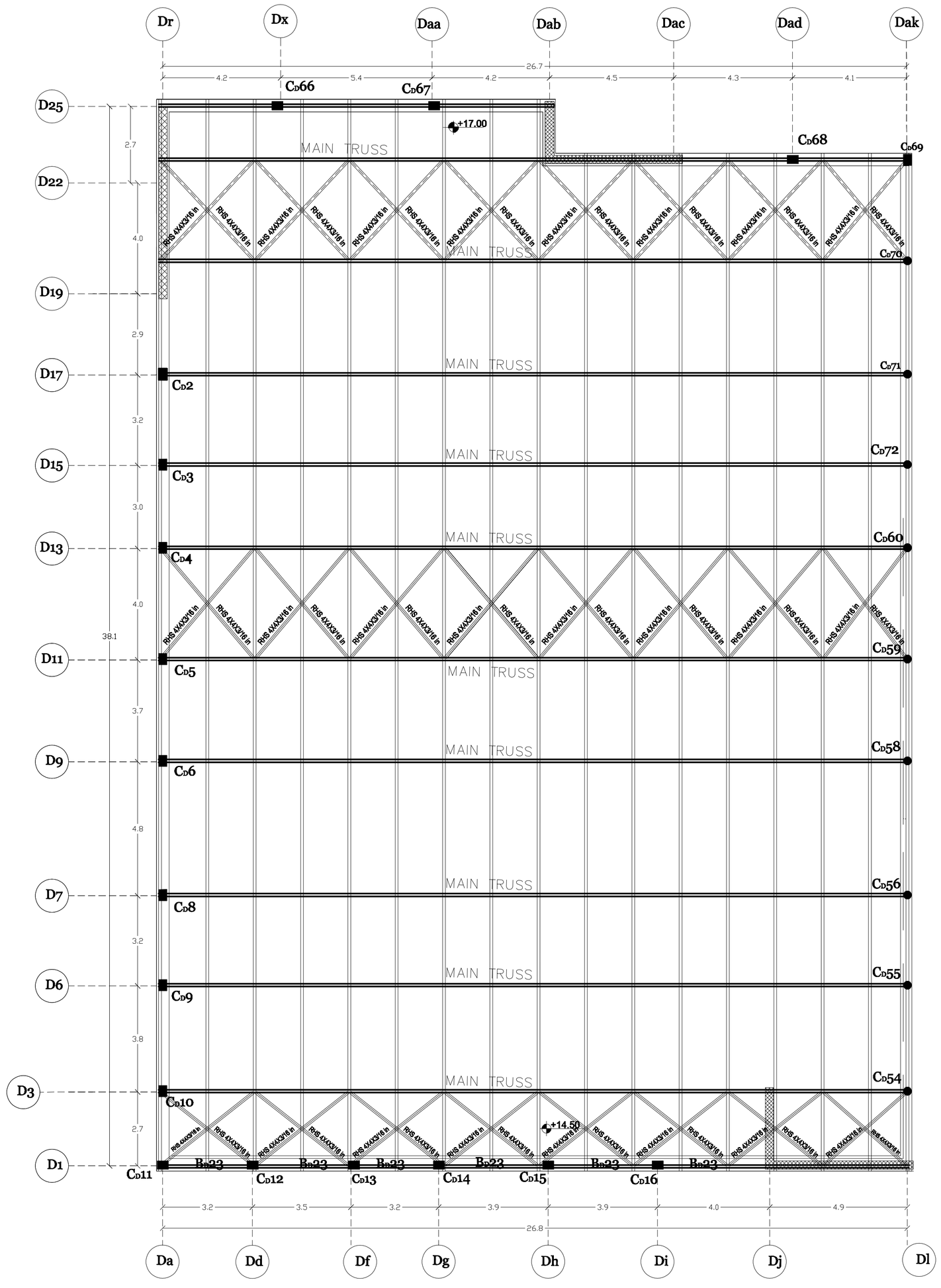
Drawing Title

parking 2
Beam's

Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	No.of Draw	Date
1/50	S124	2013-2014



Roof slab
+14.50 to +17.00

By the name of Allah

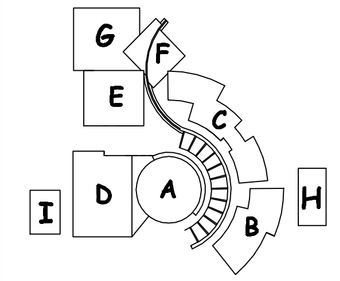
Graduation Project

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Civil Engineering

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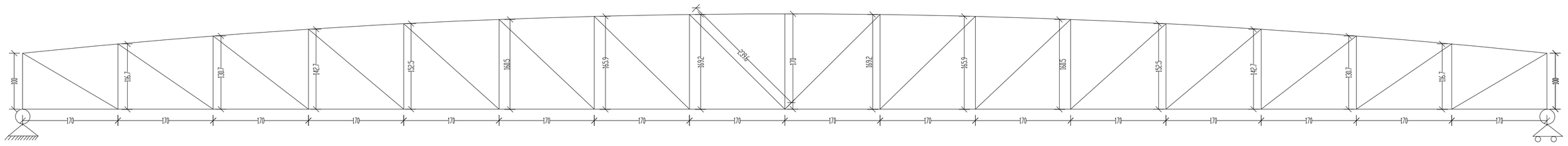
Drawing Title

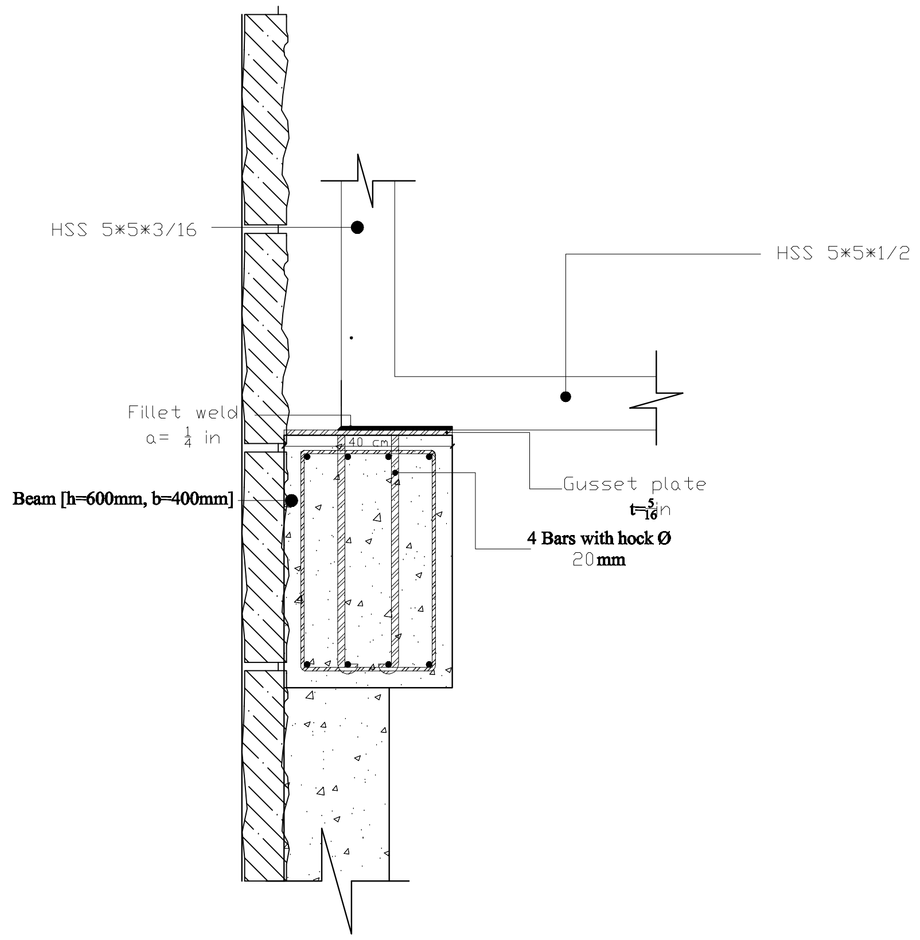
Truss Details

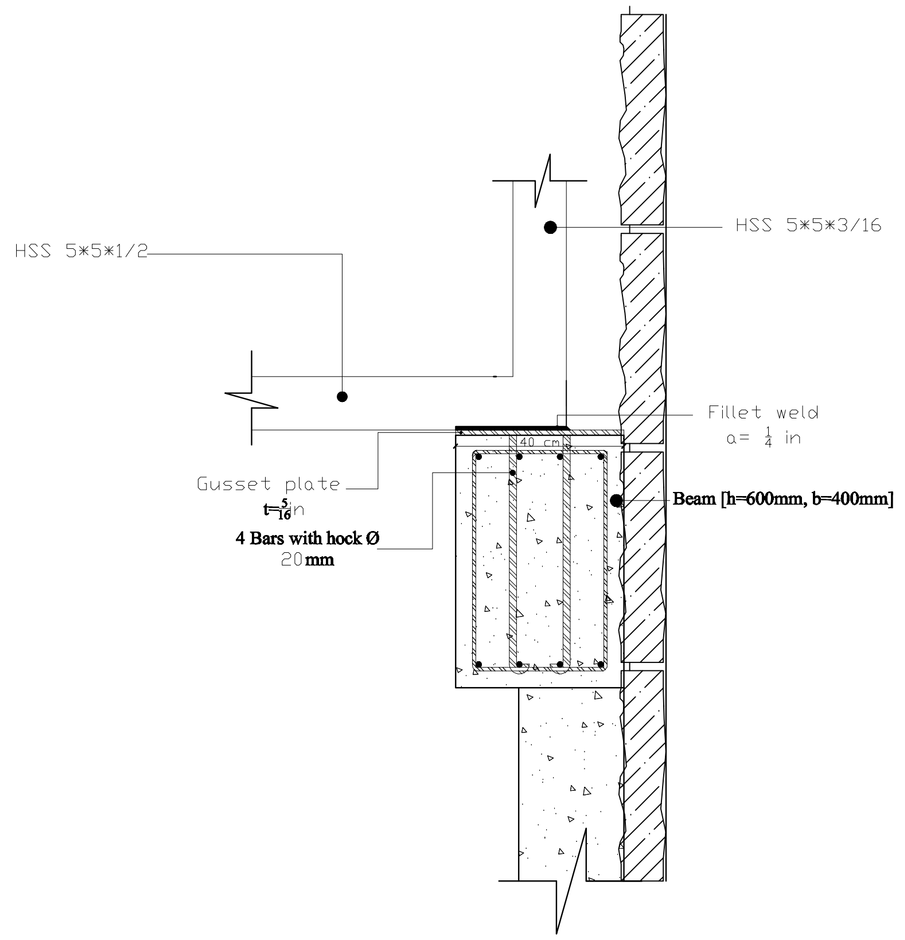
Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

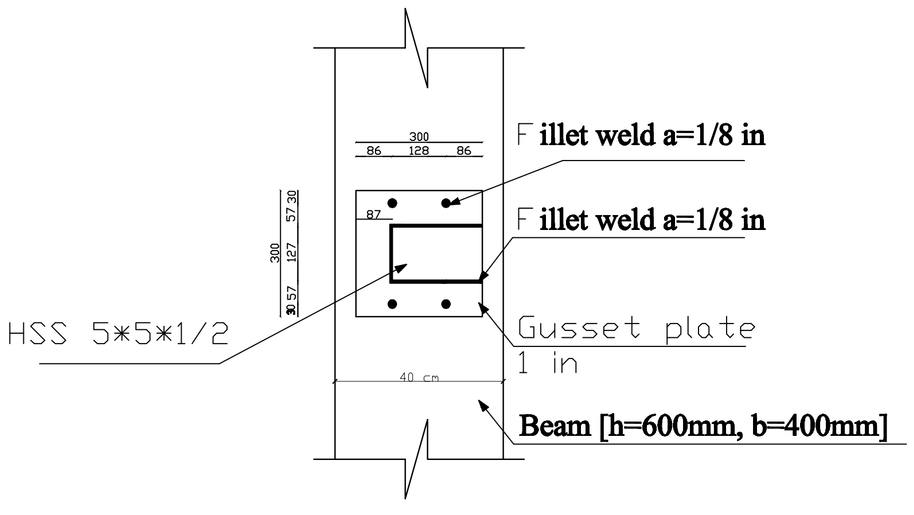
Scale	No.of Draw	Date
1/100	S125	2013-2014


100
167
167
142
142
125
125
168
168
165
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162
162
204
170
170
170



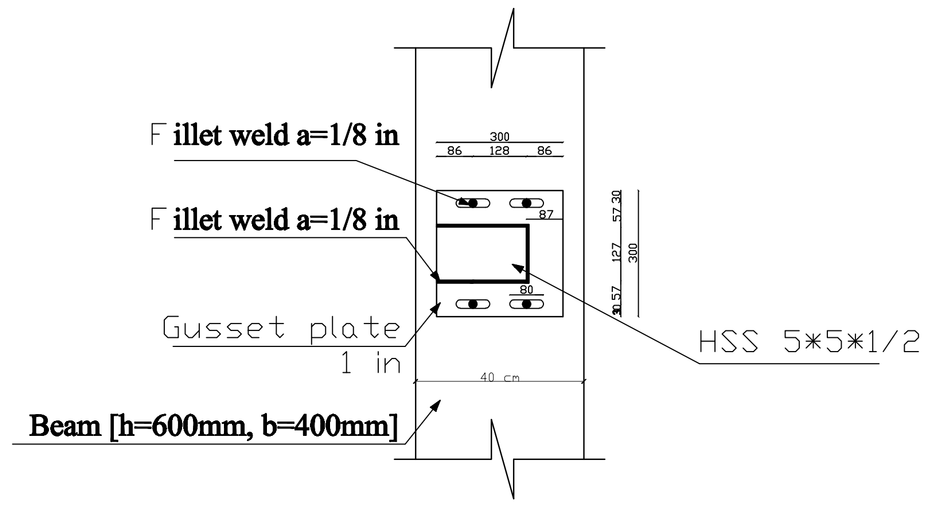


Pin support



Detail E
1:10

Roller support



Detail A
1:10

By the name of Allah

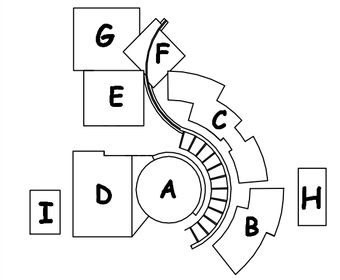
Graduation Project

Palestine Polytechnic University

Civil Engineering

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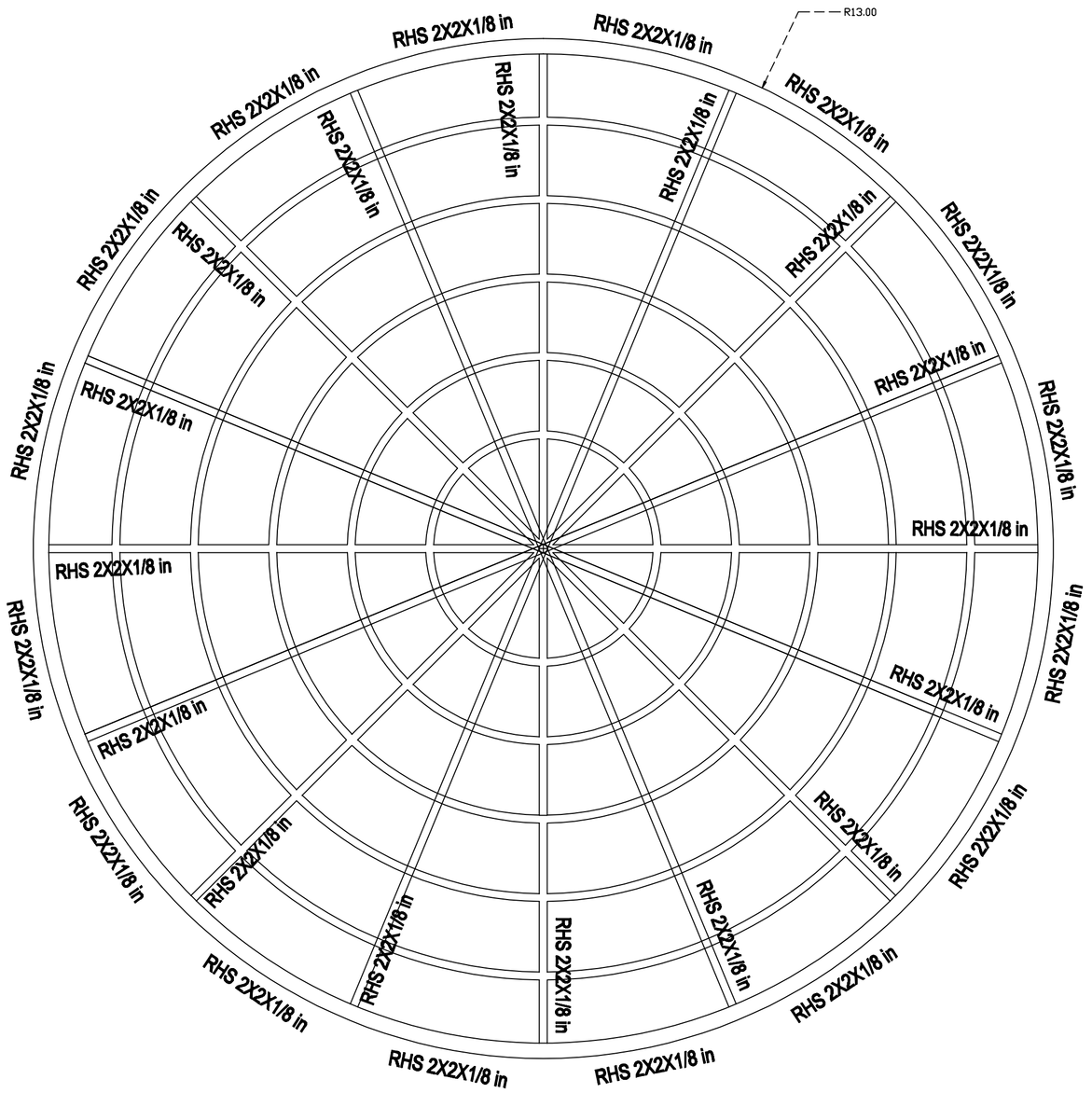
Drawing Title

Truss Details

Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

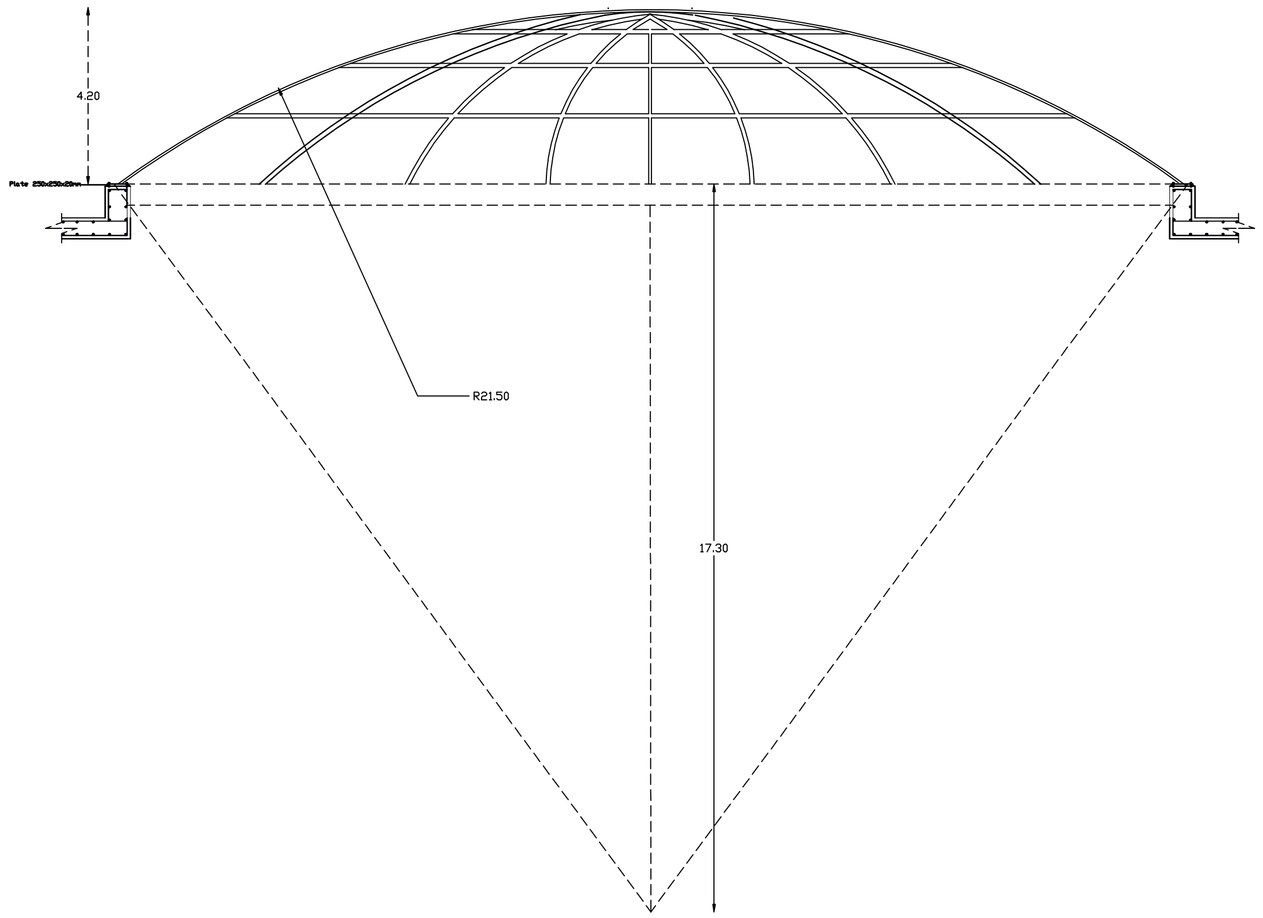
Scale	No.of Draw	Date
1/10	S127	2013-2014

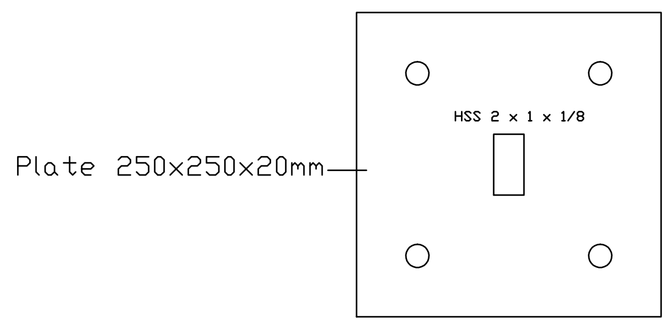


Top view for Dom

All member RHS 2X2X1/8 in

scale 1:100





By the name of Allah

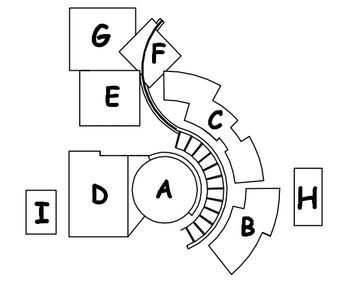
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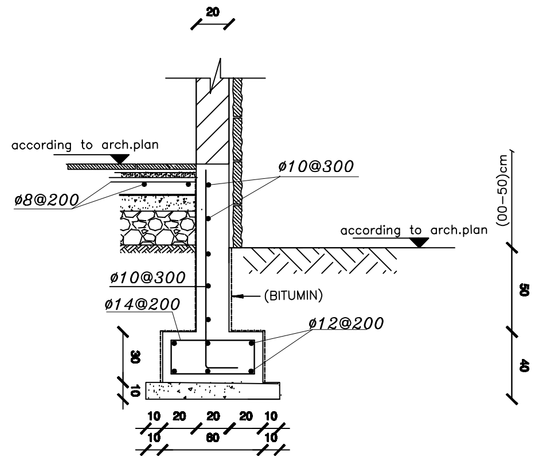
Drawing Title

Dom Details

Designed By

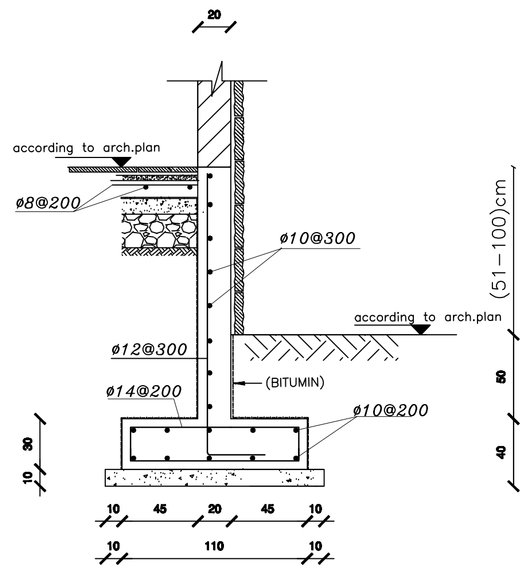
Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	No.of Draw	Date
1/50	S128	2013-2014



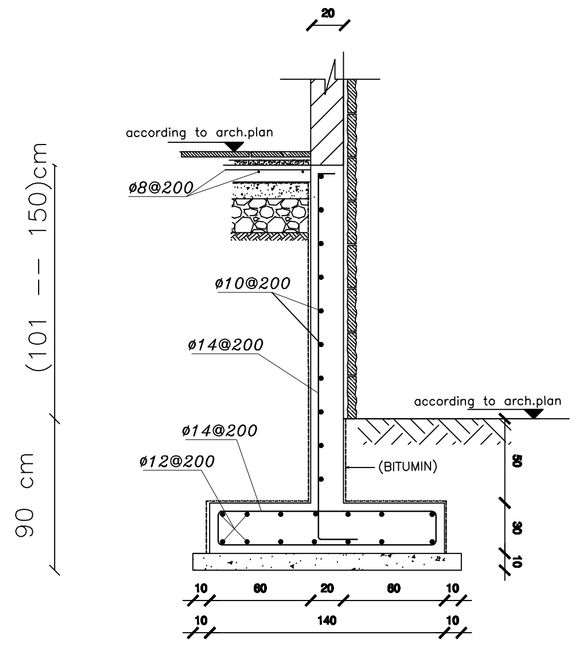
R.W Section (1-1)

(SCALE 1:25)



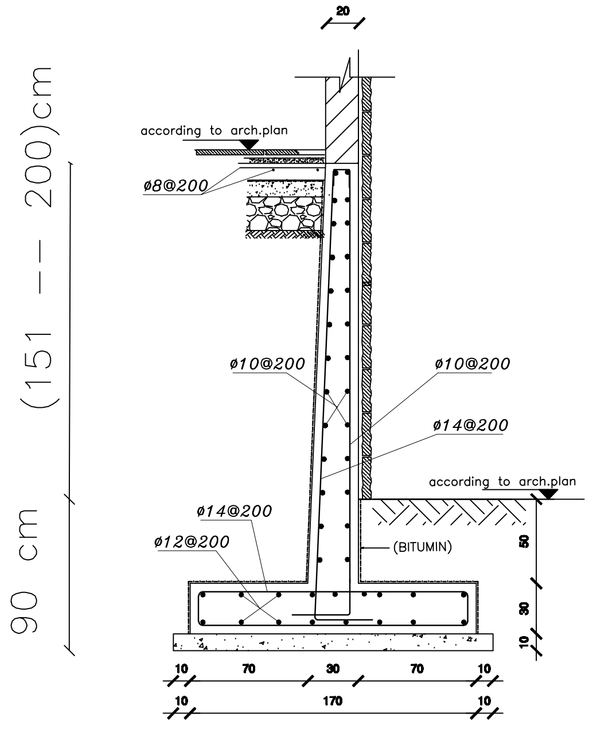
R.W Section (2-2)

(SCALE 1:25)



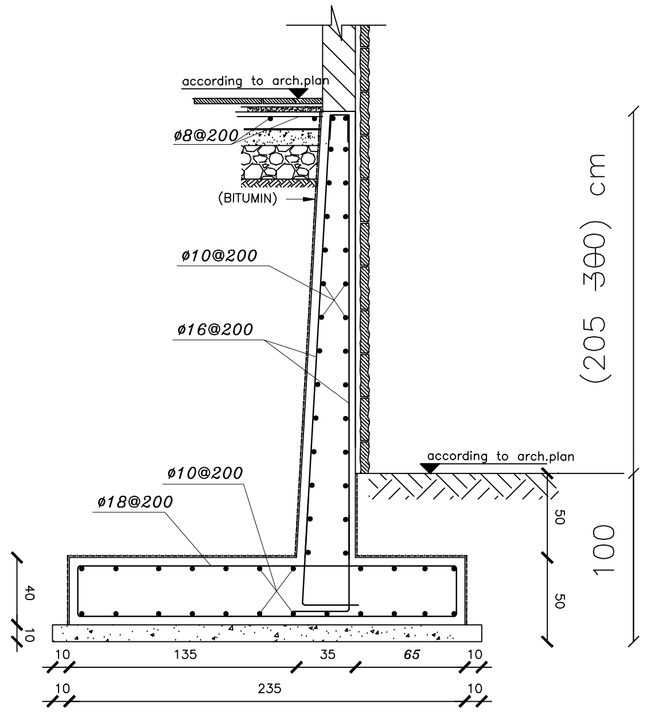
R.W Section (3-3)

(SCALE 1:25)



R.W Section (4-4)

(SCALE 1:25)



R.W Section (5-5)

(SCALE 1:25)

By the name of Allah

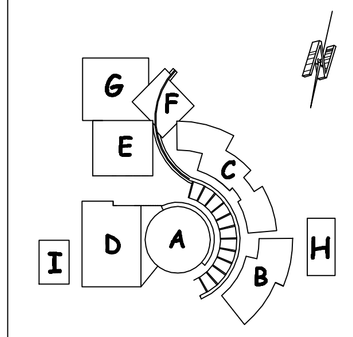
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Drawing Title

Retaining wall details

Designed By

Baha Bader
Fawaz Natsheh
Montaser shweiki
Mohamed Halwani

Scale	*No.of Draw*	*Date*
1/25	S129	2013-2014