

# **ICC-ES Evaluation Report**

#### ESR-4915

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DIVISION: 03 00 00 Section: 03 41 10 – Precast Concrete Design	REPORT HOLDER: SUMITOMO MITSUI CONSTRUCTION CO., LTD.	EVALUATION SUBJECT: SUMITOMO-MITSUI QUICK RC INTEGRATION METHOD (SQRIM) PRECAST CONCRETE BEAM- COLUMN JOINT SYSTEM	
		SYSIEM	

## **1.0 EVALUATION SCOPE**

Compliance with the following codes:

■ 2024 and 2021 International Building Code® (IBC)

#### **Property evaluated:**

Structural

## **2.0 USES**

The SQRIM Precast Concrete Beam-Column Joint System (SQRIM System) is used as the main lateral force resisting system (LFRS) in building structures, to resist seismic or wind loads. The SQRIM System can also be used to support gravity loads.

## **3.0 DESCRIPTION**

**3.1 General:** Sumitomo Mitsui Construction Co., Ltd.'s (SMCC) SQRIM System consists of steel-reinforced precast concrete beams and columns that are connected in the field to assemble special concrete moment frames. The SQRIM System uses grouted filled mechanical splices and headed deformed bars at the joints, as applicable. The SQRIM System may be constructed following one of two methods: SQRIM-H and SQRIM. For additional information, see <u>Figure 1</u>.

**3.1.1 SQRIM-H:** For the SQRIM-H construction method, the column-beam joints are configured such that the precast concrete beams connect to the face of a precast concrete column.

**3.1.2 SQRIM:** For the SQRIM construction method, the column-beam joints are configured such that the precast concrete columns connect to the top and bottom of the precast concrete beam.

**3.2 Concrete:** Concrete must be normal weight concrete as required in ACI 318-19 for the design of special reinforced concrete moment frames.

**3.3 Reinforcement:** Mild steel reinforcement must be uncoated deformed bars complying with ASTM A615 Grade 60 or ASTM A706 Grade 60.

3.4 Mechanical Splice: Splices must be NMB Splice Sleeve® UX (SA) Type 2, per ICC-ES ESR-3141.

**3.5 Grout:** Grout must be SS Mortar or similar grout from NMB Splice Sleeve<sup>®</sup>, per ICC-ES ESR-3141.

**3.6 Headed Deformed Bars**: Headed deformed bars in tension must comply with the requirements of ACI 318-19 or must be evaluated under ICC-ES Acceptance Criteria for Headed Deformed Bars (AC347).



## **4.0 DESIGN AND INSTALLATION**

**4.1 Design:** The SQRIM System complies with Section ACI 318-19 Section 18.9.2.3 and is to be designed and detailed as special reinforced concrete moment frames in accordance with ACI 318-19 Sections 18.2, 18.6, 18.7 and 18.8, and the additional requirements of IBC Chapters 16 and 19. For determining seismic loads, the system seismic performance coefficients and factors for the IBC are permitted to be as follows:

SEISMIC SYSTEM <sup>*</sup>	RESPONSE MODIFICATION COEFFICIENT	OVERSTRENGTH FACTOR	DEFLECTION AMPLIFICATION FACTOR
	R	$\Omega_0$	Cd
SMF	8	3	5.5

\*Seismic force-resisting system as defined in <u>ASCE/SEI 7</u>, Table 12.2-1, must conform to limitations in IBC and ASCE/SEI 7, including provisions for structural system limitations including structural height noted in Table 12.2-1 of ASCE/SEI 7.

The design must consider the following conditions:

- a) Concrete compressive strength must comply with ACI 318-19 Section 19.2. Additionally, concrete used in special moment frames must meet the requirements of ACI 318-19 Chapters 18 and 19.
- b) Contribution of the slab reinforcement for the determination of beam nominal flexural strength must be omitted.
- c) Strength and serviceability, including deformation and drift of the assembly, must comply with the requirements of ASCE/SEI 7.
- d) Rebar sizes for design must consider mechanical splice size availability from the manufacturer, NMB Splice Sleeve.

**4.2 Special Inspections:** Special inspections, testing, and structural observations are required in accordance with Chapter 17 of the IBC and Chapter 26 of ACI 318-19. When special inspections are required, the inspections must be included in the statement of special inspections prepared by the registered design professional for submittal to the code official.

**4.3 Fabrication:** The SQRIM System precast components must be manufactured by an SMCC authorized fabricator in accordance with Section 1704.2.5.1 of the 2024 and 2021 IBC, fabrication manuals by the authorized fabricator, and fabrication drawings from a registered design professional authorized by SMCC.

**4.4 Installation:** Precast concrete beams and columns must be installed by an SMCC authorized contractor in accordance with the precast manufacturer's installation instructions.

## **5.0 CONDITIONS OF USE:**

- **5.1** Construction documents, including engineering calculations and drawings must be submitted to the code official when application is made for a permit, verifying compliance with this report and the applicable code. The design calculations and details must be prepared by a registered design professional where required by the statutes of the jurisdiction in which the project is to be constructed.
- **5.2** The foundation supporting the SQRIM Precast Concrete Beam-Column Joint System (SQRIM System) is outside the scope of this report and must be designed by a registered design professional.
- **5.3** Manufacturing of SQRIM Precast Concrete Beam-Column Joint System (SQRIM System) is not recognized under this ICC-ES Evaluation report until the manufacturing locations are qualified and under an inspection program with inspections by ICC-ES.
- **5.4** Special inspections, fabrication and installation must be in accordance with Section 4.2, 4.3 and 4.4 of this report and the approved construction documents, as prepared by a registered design professional and approved by the authority having jurisdiction (AHJ).
- **5.5** The use of the SQRIM System must be authorized by SMCC.

## **6.0 EVIDENCE SUBMITTED**

- **6.1** Manufacturer's descriptive literature and installation instructions.
- **6.2** Data in accordance with ACI 374.1-05 (2019) (Acceptance Criteria for Moment Frames Based on Structural Testing and Commentary)

# 7.0 IDENTIFICATION

- **7.1** The ICC-ES mark of conformity, electronic labeling, or the evaluation report number (ICC-ES ESR-4915) along with the name, registered trademark, or registered logo of the report holder [and/or listee] must be included in the product label.
- 7.2 The report holder's contact information is the following:

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SQRIM-H General Installation Sequence



SQRIM General Installation Sequence FIGURE 1—SQRIM AND SQRIM-H CONSTRUCTION METHODS